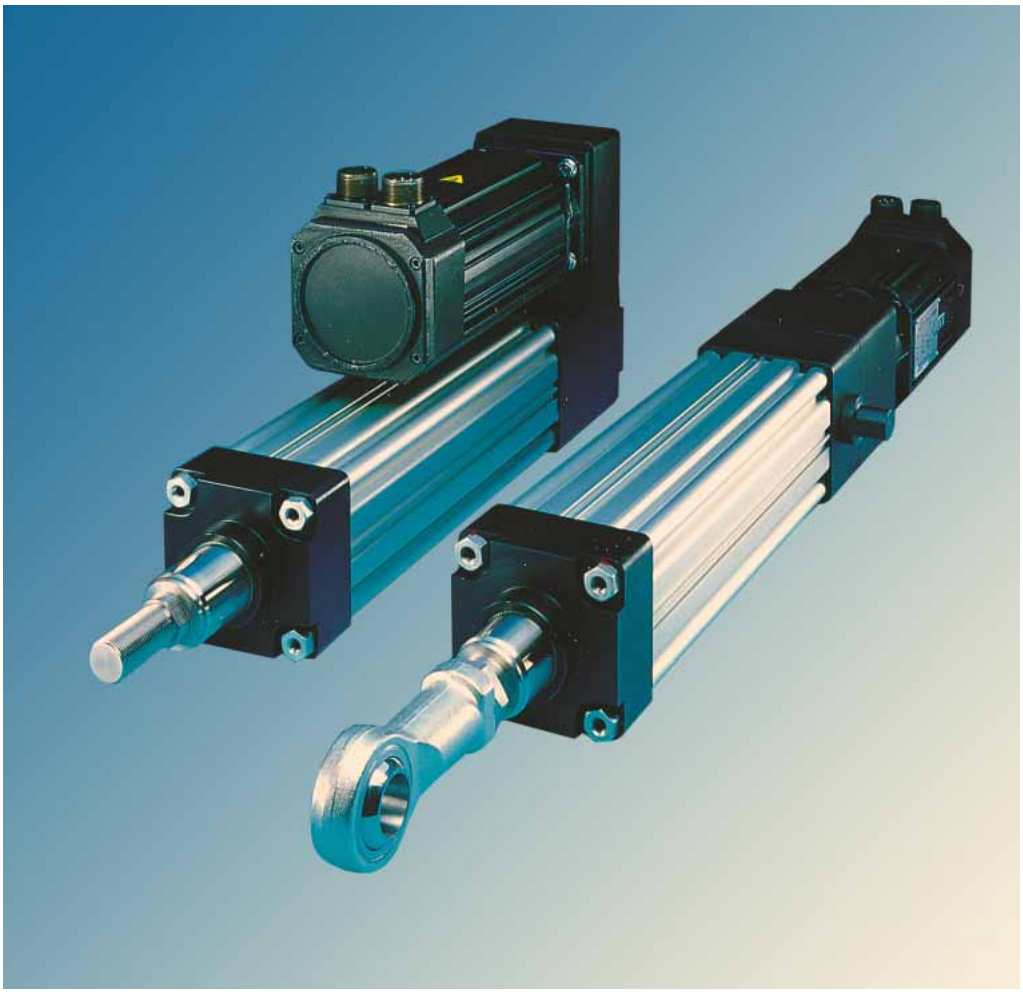
ET manual - Mounting, Setup, Maintenance, Repair

ET Electro-thrust cylinders - metrical



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Parker Hannifin GmbH & Co. KG
Electromechanical Automation Europe [EME]
Robert-Bosch-Strasse 22
77656 Offenburg (Germany)
Tel.: + 49 (0781) 509-0
Fax: + 49 (0781) 509-98176
Internet: **www.parker-automation.com** http://www.parker-automation.com
E-mail: **sales.automation@parker.com** mailto:sales.automation@parker.com

Parker Hannifin GmbH & Co. KG - registered office: Bielefeld - Amtsgericht: Bielefeld HRA 14808
Personally liable shareholder: Parker Hannifin Management GmbH - Amtsgericht: Bielefeld HRB 35489
executive board: Dr. Gerd Scheffel, Günter Schrank, Christian Stein, Kees Veraart, Hans Wolfs - Chairman of the board: Hansgeorg Greuner

Headquarters:

Italy:
Parker Hannifin S. p. A • Electromechanical Automation • Via Gounod 1 •
I-20092 Cinisello Balsamo (MI), Italy •
Tel.: +39 (0)2 361081 • Fax: +39 (0)2 36108400 •
E-mail: **www.parker-automation.com** http://www.parker-automation.com •
Internet: **www.parker-automation.com** http://www.parker-automation.com

Great Britain:
Parker Hannifin plc • Electromechanical Automation • Arena Business Centre •
Holy Rood Close • Poole, Dorset BH17 7FJ UK •
Tel.: +44 (0)1202 606300 • Fax: +44 (0)1202 606301 •
E-mail: **sales.automation@parker.com** mailto:sales.automation@parker.com •
Internet: **www.parker-automation.com** http://www.parker-automation.com

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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.

Internet:

Additional information:

Our product on the Internet: http://www.parker-eme.com/et

Contents

1. Introduction

In this chapter you can read about:

1.1 Device assignment

This manual is valid for the following devices:

Electro-thrust cylinders for standard NEMA motors:

- ETS32
- ETS50
- ETS80

Electro-thrust cylinder for metric motors and gearboxes as well as special NEMA motors:

- ETB32
- ETB50
- ETB80
- ETB100
- ETB125

Electro-thrust cylinder for metrical motors and gearboxes, but with enhanced lifetime:

- ETV32
- ETV100

1.2 Type specification plate

The exact designation of the linear module is marked on the type specification plate

Example: ETB50M05PA57FMA450A

Explanation:

Product designation	ET
Design	B
Frame Size	50
Screw Lead	M05
Motor mounting position	P
Ratio	A
prepared for (Code no. drive)	57
Mounting type	F
Thrust rod type	M
Housing orientation	A
Stroke in mm	450
Designation/Protection class	A

Details can be found in the **Order code** (see page 44).

1.3 Safety Instructions

1.3.1. General hazards

General Hazards on Non-Compliance with the Safety Instructions

This machine component 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

- danger for life and limb of the operator or third persons
- 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.

1.3.2. Intended use

The linear actuator has a number of uses including:
Positioning, transporting, feeding, removing, pallet handling, loading, unloading, processing and manipulating workpieces 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.
Please make sure that the mounting of parts or tools will not pose a threat to persons or cause damages to any parts or devices. This also applies, for example, to the case of a broken timing belt.
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.

1.3.3. 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 damage.-
💡	**Hint**	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.

1.3.4. 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.

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

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

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 can be safeguarded with safety transmitter switches.

1.3.5. 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.

1.3.6. Safety Instructions for Operating Personnel

Any work step that has a negative effect on the operating safety of the linear actuator 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 behaviour) 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. 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.

1.4 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

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

The packaging material must be kept and reused in the case of a return shipment. Improper or faulty packaging may lead to transport damages.

Transport

Make sure to transport the linear module always in a safe manner and with the aid of suitable lifting equipment (**Means of transport** (see page 8)).

Storage

The linear module must be stored evenly and without any mechanical load.

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

1.4.1. 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.

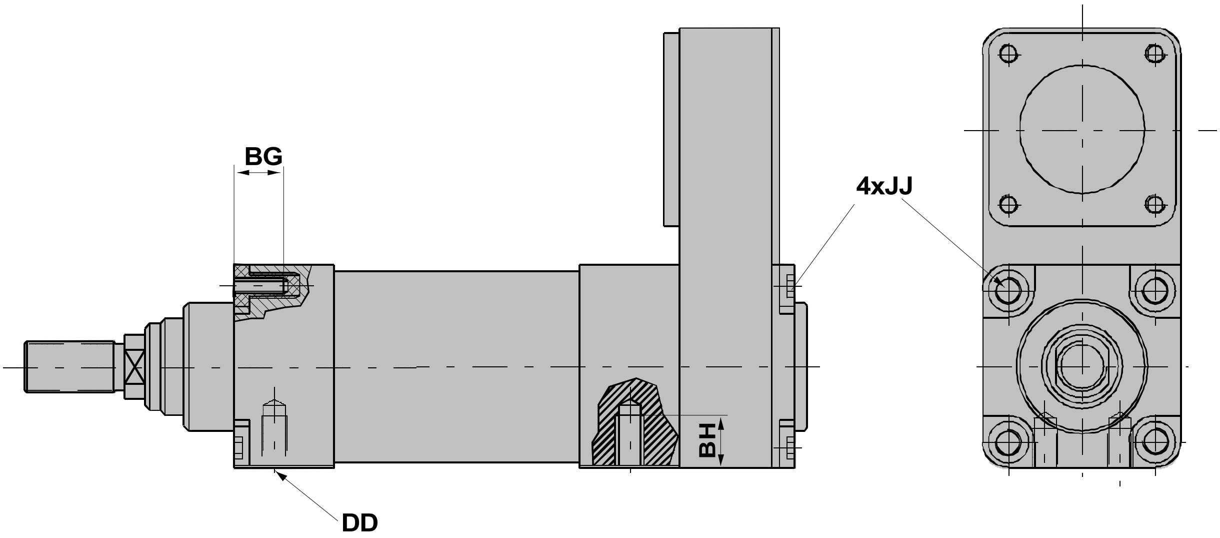
Never step under overhead loads – danger of being injured!
Moving parts must always be secured against slipping or moving.

Required minimum load bearing capacity of the means of transport:

ET_32	ET_50	ET_80	ET_100	ET_125
80kg	200kg	400kg	750kg	1500kg

In these table values, a safety factor of S=8 is taken into consideration (motor and gearbox weight included). This means that it does **not** represent the cylinder weight.

The following threads on the cylinder can be used to mount transport or mounting equipment (for example eye bolts):



	ET_32	ET_50	ET_80	ET_100	ET_125
DD	M6x1.0	M8x1.25	M10x1.5	M12x1.75	M16x2.0
JJ	M6x1.0	M8x1.25	M10x1.5	M10x1.5	M12x1.75
BH	9	12.7	17.5	24	24
BG	14.5	16	16	16	16

1.5 Warranty conditions

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.

1.6 Conditions of utilization

General introductory notes

With the ET electro-thrust 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-thrust 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

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)
- Velocity
- 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-thrust cylinder
- Screw Lead
- Direct or parallel drive via toothed belt transmission
- Transmission ratio in the drive
- Mounting method
- Mounting orientation vertical or horizontal resp. inclined
- Travel Stroke

If the motor used with the ET cylinder should be able to exceed indivudual 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.

⚠ The internal end stops of the ET 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 ET cylinder depends strongly on the degree of power exploitation and on impermissible operating states occurring – even if only for a short time -.

2. Set-up

In this chapter you can read about:

The linear module 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 indications in the **Technical Data** (see page 24) chapter must be adhered to under all circumstances.

2.1 Mounting

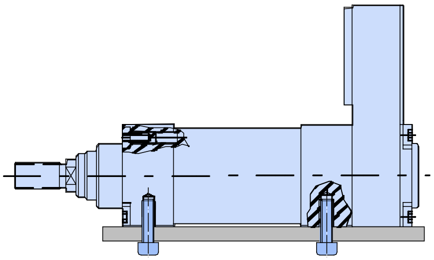
Please Note:

- The cylinder housing must be mounted without tension or contorsion.
- The cylinder housing must be precisely aligned to the load direction of motion.
- Occurring **lateral forces** (see page 27) on the cylinder must be taken into consideration.

2.1.1. Mounting with mouting 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 contorsion. This method of mounting is only possible, if the lower side of the mounting surface is accessible.

Mounting with mouting threads on the cylinder



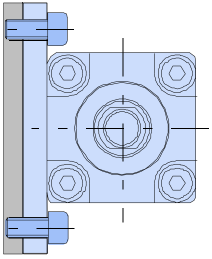
Dimensions (see page 33)

2.1.2. Mounting with mounting accessories

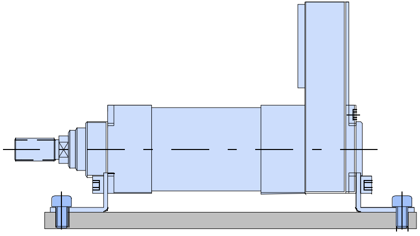
Cylinder mounting with mounting plates or foot mounting brackets

If the underside of the mounting surface is not accessible, mounting plates or foot mounting brackets are available as accessories.
Manifold cylinder mounting options are displayed. One of the listed should be suitable for your application.
ET-cylinder accessories (see page 35)

Mounting via mounting plates



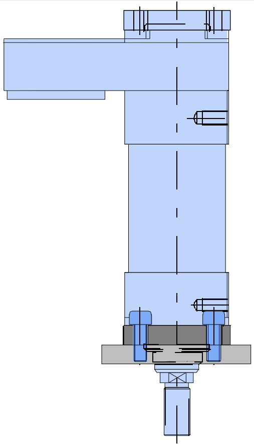
Mounting via mounting brackets (foot mounting)



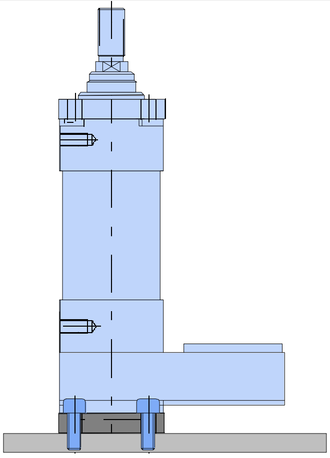
Cylinder mounting via mounting flanges (front plate and rear plate)

For the front and rear cylinder end, individual mounting plates are available. The rear mounting plate can only be attached, with parallel or reverse motor position. If you fix the cylinder only at the rear end (e.g. also with a rear clevis/eye) please respect the effective direction of occurring forces. Critical are above all lateral forces in horizontal or vertical direction.

Mounting via front plate



Mounting via rear plate



2.1.3. Mounting notes

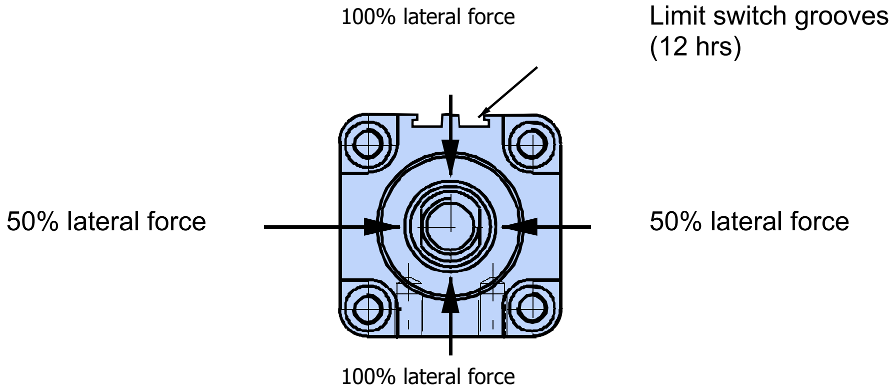
2.1.3.1 Horizontal Mounting

in horizontal mounting position, each mass mounted on the thrust rod generates a lateral force on the bearing. Note the indications:

- **Diagrams for maximum permissible lateral force** (see page 27)
- Use of a **Rod guiding** (see page 38)

The sizes ET_100 and ET_125 feature limit switch mounting grooves on all four housing surfaces. For the housing orientation please see the **Type specification plate** (see page 4).

Lateral force bearing capacity



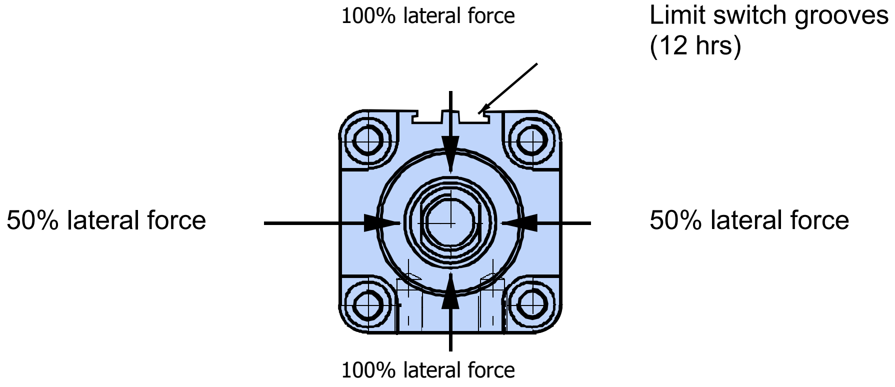
If high lateral forces occur, it may be helpful to select a cylinder with a longer stroke than necessary for the application.

Example: An ET_50 with 200mm stroke can bear a lateral force of 72N in fully extended state.
An ET_50 with 300mm stroke can however, if only 200mm are extended, accept a lateral force of 166N.
If your application requires an even higher load bearing capacity, you can fortify the cylinder with the **rod guiding system** (see page 38) available as an option (not for ETB125).

2.1.3.2 Vertical mounting

In vertical mounting position, each force applied horizontally on the thrust rod represents a lateral force load. Here applies logically the same as with the horizontal mounting position. Do mount the cylinder so taht all forces apply in the direction where the cylinder can bear the entire lateral force load.

Lateral force bearing capacity



2.1.3.3 Mounting of the payload

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-thrust cylinder considerably.

There are two possibilities to avoid this problem:

- Use a **flexible coupling** (see page 37).
  This coupling can compensate up to 3mm axial offset and up to 10° angular offset.
- Use other thrust rod connection elements (**accessories** (see page 35)), which are able to compensate certain deviations such as for example
  - rod clevis or spherical rod eye
- use a flexible cylinder fixing device (**accessories** (see page 35)) such as for example
  - Clevis or trunnion.

2.2 Electric installation

No initiator is to be mounted in the area of the lubrication hole. If you should need an initiator at this position due to your application, please contact us.

2.2.1. Mounting and connection of the travel limit switches

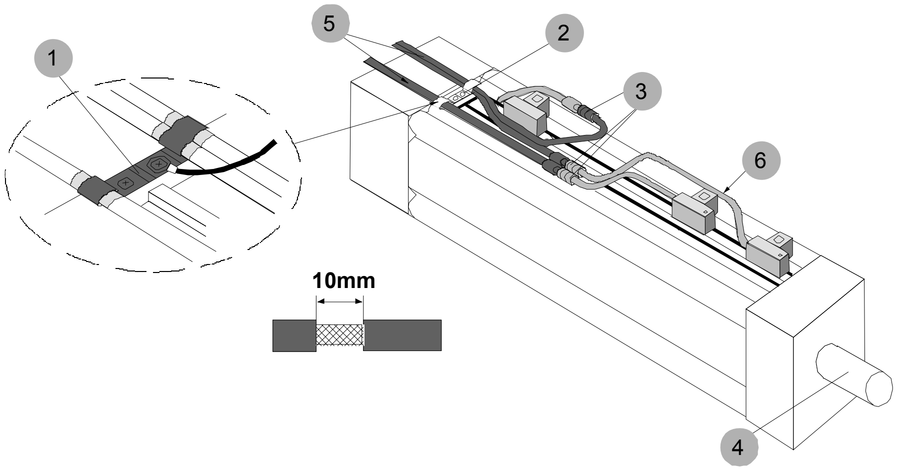
All ET cylinders feature a permanent magnet in the spindle nut. This shall activate the limit switches which are mounted in the special mounting grooves on one side of the cylinder. If ordered accordingly, the limit switches are mounted and wired in our factory.
Available limit switches (see page 43)

Procedure

- Mount the limit switches on their approximate positions in the grooves of the cylinder body. Tighten the fixing screws of the limit switches lightly and lead the cable along the cylinder body to the motor.
- If the connection lines between limit switches and controller are shielded, the shield must be grounded with the cylinder housing in order to comply with the EMC directives. For this purpose there are two drilled holes at the rear end of the cylinder body. There, the stripped cables can be fixed to the housing with the aid of a clip.

Mounting the limit switches

1: Clip
2: Grounding
3: Connector
4: Rod end
5: shielded cable
6: unshielded cable



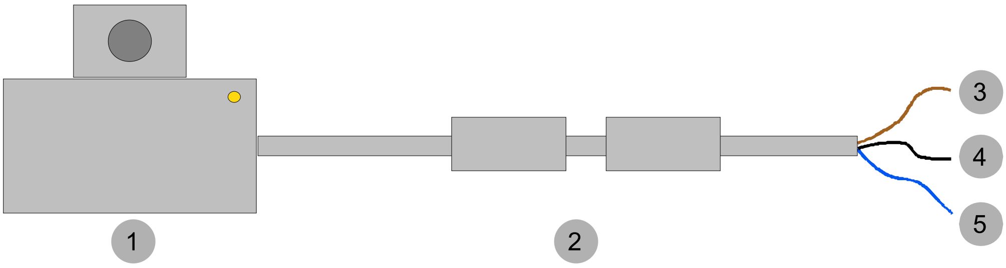
- Strip the cables for approx. 10mm at the position, where they shall be clipped to the cylinder in order to bare the shielding of the cable.
- Connect the cable shield with the aid of the clip with the cylinder housing. In the cylinder body, there are two drilled holes suitable for M3 screws. The holes are closed with sealing plugs.
- Connect the grounding line to one of the clip fixing screws and the other end to a suitable gounding point.
  Note: The cables at the limit switches are not shielded.

⚠ The large-area connection between cable shield and the cylinder housing is an essential prerequisite to comply with the EMC directive - do not use any other method than the one described here!

- Connect the limit switches with the controller.

connect limit switches

1: Initiator
2: Connector
3: brown, +24V
4: black, signal
5: blue, 0V



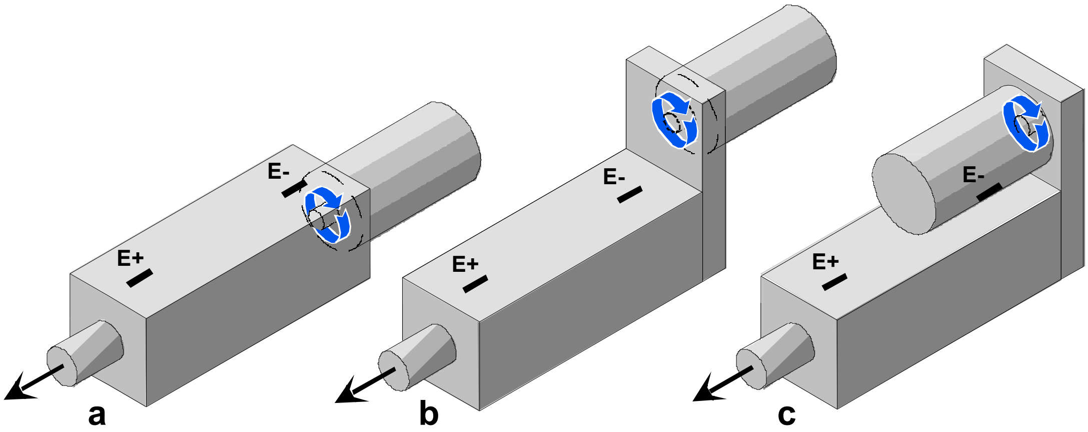
The shielding of the cable may not be connected to the controller.

The limit switches must be wired correctly depending on the motor turning direction.

- In the motor position drawing a and b (direct and reverse), the cylinder rod extends if the motor turns in clockwise direction (front view to motor shaft). With this motor direction, the positive limit (E+) must be mounted at the front of the cylinder.
- In the motor position c (parallel), the cylinder rod pulls back if the motor turns in clockwise direction (front view to motor shaft). If the positive limit (E+) is mounted at the front of the cylinder with this motor direction, the limit switches must be wired accordingly.

On our controllers the limit switch E+ is called "CW" or "+", the limit switch E- is called "CCW" or "-".
E+ and E- are mounted in our factory.

Direction of the motor during extension of the cylinder



With parallel drive (drawing c), the turning direction of the motor is reversed in comparison with the reverse and direct drive!

2.2.2. Setting the end limits

The steps described below can be best excuted with energized drive. Therefore, they may only be performed by trained dand authorized personnel.

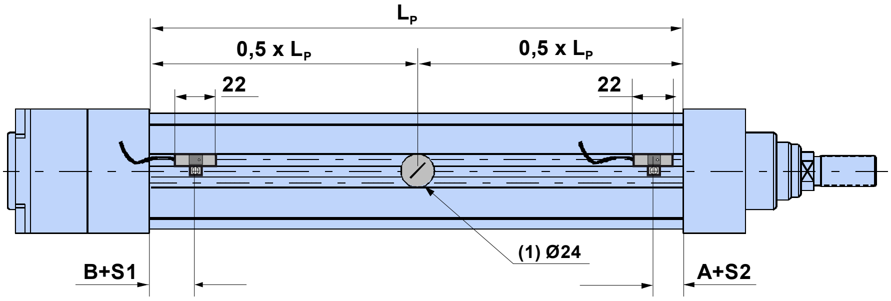
Do only travel at very low speed (<10mm/s) and reduce the drive torque to a minimum.

Ensure that there are no persons in the hazardous area.

The setting of the end limits depends on the application.

Initiator / limit switch - mounting **(see page 14)**

No initiator is to be mounted in the area of the lubrication hole. If you should need an initiator at this position due to your application, please contact us.



(1): Lubrication bore

S1, S2: **Safety travels** (see page 26)

A, B: Switching distances

Stated in mm

Minimum safety travels

Cylinders	ET_32		ET_50			ET_80			ET_100				ETB125			
Table Style	M05	M10	M05	M10	M16	M05	M10	M25	M05	M10	M20	M40	M05	M10	M20	M50
S1 = S2	10	20	10	20	30	10	20	30	10	20	25	30	10	20	25	40

Switching distance [mm]	A: on the thrust rod side	B: on the motor side
ET_32M05	15	66
ET_32M10	15	66
ET_50M05	19	83
ET_50M10	19	86
ET_50M16	19	90
ET_80M05	23	68
ET_80M10	23	87
ET_80M25	23	94
ETB100M05	15	101
ETB100M10	15	120
ETB100M20	15	138
ETB100M40	15	148
ETV100M05	15	121
ETV100M10	15	162
ETB125M05	69	72
ETB125M10	69	102
ETB125M20	69	102
ETB125M50	69	125

Adjusting the machine zero switch

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.

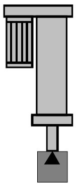
2.3 Motor mounting - exchange of motor

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.

The motor must be grounded with a separate PE protective lead (green/yellow, cross-section at least $2.5mm^2$).

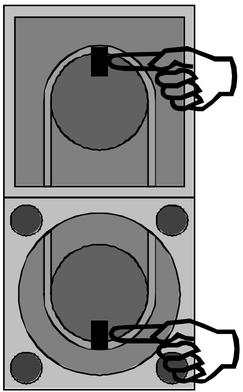
This cable must be connected to the available motor-ground connector or - if there is non available - with a mounting screw. In the latter case, the coloring under the head of the screw must be removed.



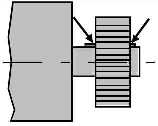
If the axis is mounted upright, it must be secured against moving out!

Motor Mounting

Procedure



- Remove closing lid (50).
- Loosen clamping screws (55) so far that you can move the motor a bit into the direction of the cylinder body. This relieves the toothed belt.
- Remove motor fixing screws (59) and draw motor from flange.
- Mark the position of the toothed pulley on the motor shaft



- Loosen threaded pin (56) and remove pulley from the old motor and put on the new motor shaft according to the mark. Retighten the threaded pin.

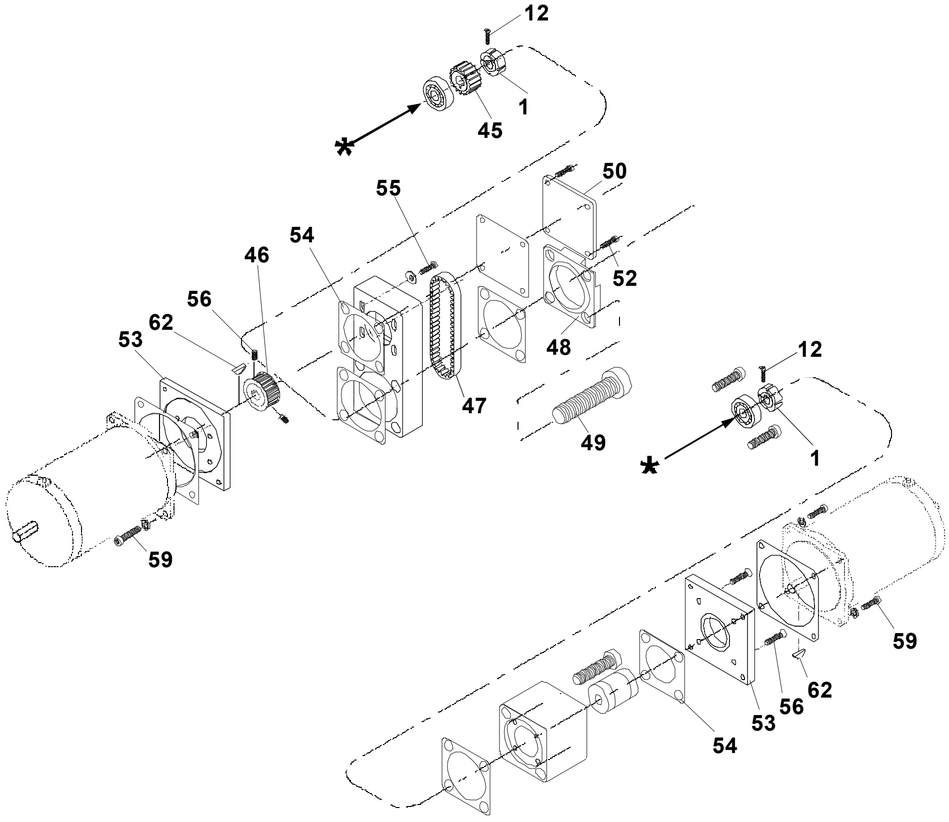
- Reinsert motor into flange and fix with screws (59) to the flange.
- Before mounting the toothed belt, extend axis to approx. half of the stroke (by manually turning the screw)
- Reinsert toothed belt into the pulleys.
- Refix lid (48) with all screws (49)!
- Tension toothed belt according to the following table (belt tensions).
  Wer recommend the belt tension measuring device RSM20005 (037-000201) (see at the left.
  Tip for practical use:
  In in many cases it is sufficient to check the toothed belt pretension provisorially. For this, you can bend the toothed belt with the finger and compare the bending and force with the previous correct status or with another specimen.
- Tension toothed belt slightly by lifting the motor by hand (press for about 2-3mm).
- Tighten clamping screws (55) again.
- Fix lid (50)
- **Set new machine zero point** (see page 17)

Belt tensions:

With new belts	ET32	ET50	ET80	ET100	ET125
Belt tension [N]	40±2	147±7	238±12	335±15	656±32
Trum Frequency [Hz]	310±8	304±8	260±6	150±3	125±3

With used belts	ET32	ET50	ET80	ET100	ET125
Belt tension [N]	29±2	105±7	170±12	304±21	469±32
Trum Frequency [Hz]	262±9	257±9	220±8	144±5	106±4

Belt mass	ET32	ET50	ET80	ET100	ET125
Belt mass [kg/m]	0.036	0.059	0.098	0.186	0.31



3. Maintenance

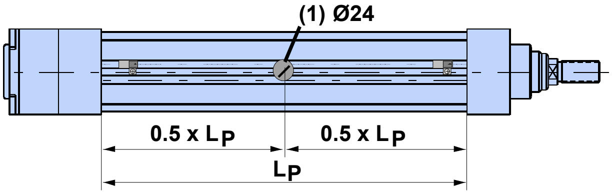
The ballscrew drive and the screw support bearing must be relubricated from time to time, the lubricating intervals depend on the application.

◆ **application factor** (see page 31)

3.1 Relubrication

Lubrication interval for the ballscrew drive

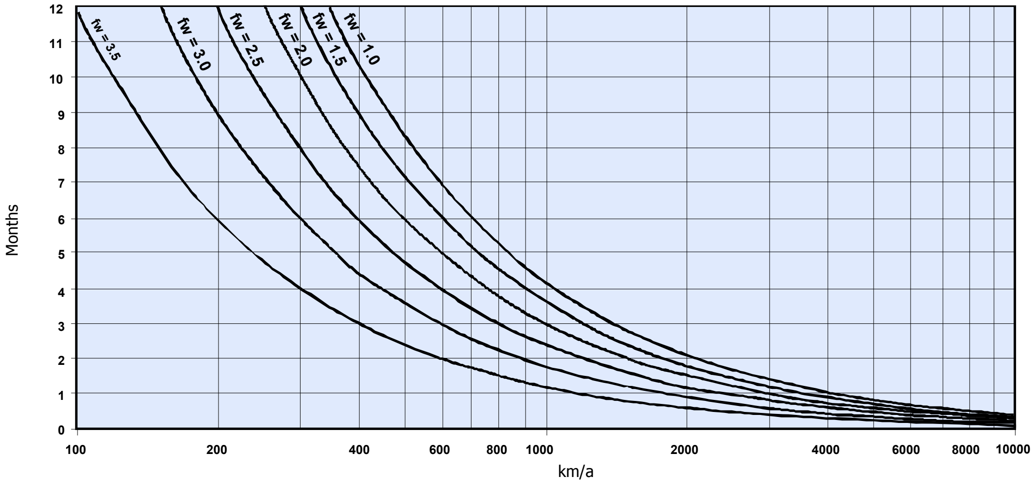
All sizes have a lubrication bore in the cylinder body (in the middle of the aluminium profile), which permits to lubricte the screw nut.
On the ET_32, 50 and 80 cylinders, this bore can be found at the same side as the sensor mounting grooves. Free access to this bore – even after integration of the cylinder into a system – can be ensured by choosing the corresponding **profile orientation** (see page 27).
The necessary lubrication intervals depend on the application.



(1): Lubrication bore
LP: Length of profile

Greatest interval with an application factor of fw = 1.0:

◆ 12 months or 350km, depending on which value is first reached.



Lubrication intervals for the screw bearing

The lubrication interval ist half the grease service life:

ETV100 - M05 (increased service life)	Lubrication after approx. 4000km
ETV100 – M10 (increased service life)	Lubrication after approx. 7000km
ETB125 - M05	Lubrication after approx. 2000km
ETB125 - M10	Lubrication after approx. 3000km
ETB125 - M20	Lubrication after approx. 6000km
ETB125 - M50	No lubrication necessary up to 20000km

ET_32 to ETB100 are not lubricated at the **screw support bearing**.

Lubricants

⚠

Do only use "Klüber NBU15" lubricating grease for standard cylinders.

Lubricating amounts

	ET_32	ET_50	ET_80	ET_100	ETV_100	ET_125
Amount of lubricant	5cm^3	6cm^3	8cm^3	12cm^3	14cm^3	16cm^3

Procedure

- Open the screw cap.
- Move the cylinder slowly to the lubricating position until the lubricating nipple or the lubricating hole becomes visible.
- The sizes ET32 and ET50 do have 3mm diameter lubricating holes. You need a nozzle for your grease gun.
- The sizes ET_80, ET_100, ETV100 and ET_125 habe a lubricating nipple (DIN3405).
  Use a stable pipe (no hose).

4. 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.

5. Specifications

The characteristics given in this chapter are not to be exceeded.
Please respect especially the maximum permissible speed, which might be exceeded in combination with many drives.

Cylinder size	**Unit**	**ET_32**		**ETV32**		**ET_50**			**ET_80**		
Table Style		**M05**	**M10**	**M05**	**M10**	**M05**	**M10**	**M16**	**M05**	**M10**	**M25**
Lead screw											
Screw Lead	mm	5	10	5	10	5	10	16	5	10	25
Screw diameter	mm	12		12		16			25		
Travels, speeds and accelerations [1]											
Available strokes	mm	continuous, from 50-750		continuous, from 50-750		continuous, from 50-1000			continuous, from 100-1500		
Max. permissible speeds at a stroke =											
50-300mm	mm/s	420	840	420	840	320	730	1170	270	540	1340
450mm	mm/s	420	840	420	840	320	730	1170	270	540	1340
600mm	mm/s	270	540	270	540	320	630	1000	270	540	1340
750mm	mm/s	190	380	190	380	230	450	720	270	540	1340
1,000mm	mm/s	-	-	-	-	150	300	470	210	420	1040
1,250mm	mm/s	-	-	-	-	-	-	-	150	290	720
1,500mm	mm/s	-	-	-	-	-	-	-	110	210	530
Max. Acceleration	m/s^2	3	6	3	6	3	6	10	3	6	10
Forces [2]											
Max. traction/thrust force	N	600		600		3300			8300		
Weight and mass moments of inertia											
Weight of base unit with zero stroke	kg	1.3		1.2		2.3			6.8		
Weight of additional length	kg/m	3		3		6			10		
Mass moment of inertia J_0 refers to the drive shaft without stroke for i=1, for $i \neq 1$ applies: $J_{total}=[J_0(i=1)+J_H(i=1)] / i^2$											
Parallel drive	$kgmm^2$	4.2	4.4	3.8	4.1	55.4	57.6	60.5	128.9	135.3	142.8
Direct drive	$kgmm^2$	2.5	2.7	2.4	2.5	12.9	15.8	18.7	74.8	81.1	88.7
Mass moment of inertia J_H refers to the drive shaft per meter of additional length for i=1;											
Drive parallel/direct	$kgmm^2/m$	16.6	18.5	16.6	18.5	51.6	54.0	56.8	302.0	306.0	332.0

Precision and backlash		
Repeatability	mm	± 0.07
Reversing play	mm	0.02 with inline drive/0.025 with parallel and reverse drive
Efficiency		
Direct drive	%	90
Parallel drive	%	81

ratios		
ratios		1:1 (inline or parallel drive); 1.5:1 (parallel drive-transmission to slow); 2:1 (parallel drive-transmission to slow); 1:1.5 (parallel drive – transmission to fast only with ET_032)

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[1] Please contact us if you wish to work at higher speeds or at operation times >80%!

[2] Values refer to the maximum permissible cylinder load. Please do also respect the "life time curve"! With parallel drive, the maximum thrust/traction force is limited by the timing belt, see "transmissible torques at parallel drive"

ET_32, ETV32, ET_50, ET_80 available for servo motor or stepper motor mounting

Cylinder size	Unit	ETB100				ETV100		ETB125			
Table Style		**M05**	**M10**	**M20**	**M40**	**M05**	**M10**	**M05**	**M10**	**M20**	**M50**
Lead screw											
Screw Lead	mm	5	10	20	40	5	10	5	10	20	40
Screw diameter	mm	40				40		50			
Travels, speeds and accelerations [1]											
Available strokes	mm	continuous,from 100-1500						continuous,from 100-2400			
Max. permissible speed at stroke =											
50-300mm	mm/s	170	340	670	1340	170	340	140	270	540	1340
450mm	mm/s	170	340	670	1340	170	340	140	270	540	1340
600mm	mm/s	170	340	670	1340	170	340	140	270	540	1340
750mm	mm/s	170	340	670	1340	170	340	140	270	540	1340
1,000mm	mm/s	170	340	670	1340	170	340	140	270	540	1340
1,250mm	mm/s	170	340	670	1340	170	340	140	270	540	1340
1,500mm	mm/s	160	310	610	1220	160	310	140	270	540	1340
1,600mm	mm/s	-	-	-	-	-	-	140	270	540	1340
1,800mm	mm/s	-	-	-	-	-	-	140	270	530	1330
2,000mm	mm/s	-	-	-	-	-	-	120	230	450	1100
2,200mm	mm/s	-	-	-	-	-	-	100	190	380	950
2400mm	mm/s	-	-	-	-	-	-	90	170	330	820
Max. Acceleration	m/s^2	3	6	6	10	-	-	3	6	6	10
Forces [2]											
Max. traction/thrust force	N	21200				21200		44500			
Weight and mass moments of inertia											
Weight of base unit with zero stroke	kg	14.8				16.6		30			
Weight of additional length	kg/m	20				20		37			
Mass moment of inertia J_0 refers to the drive shaft without stroke for i=1, for $i \neq 1$ applies: $J_{total}=[J_0(i=1)+J_H(i=1)] / i^2$											
Parallel drive	$kgmm^2$	708.3	749.2	818.3	918.9	866.9	947.9	3470.1	3484.7	3543.2	3952.7
Direct drive	$kgmm^2$	401.8	442.7	517.7	612.4	442.1	523.1	3364.4	3379.0	3437.5	3847.1
Mass moment of inertia J_H refers to the drive shaft per meter of additional length for i=1											
Drive parallel/direct	$kgmm^2/m$	1978.0	1986.0	2016.4	2138.0	1978.0	1986.0	4821.6	4836.4	4895.7	5312.0
Precision and backlash											
Repeatability	mm	± 0.07									
Reversing play	mm	0.02 with inline drive/0.025 with parallel and reverse drive									
Efficiency											
Direct drive	%	90									
Parallel drive	%	81									
ratios											
ratios		1:1 (inline or parallel drive); 1.5:1 (parallel drive-transmission to slow); 2:1 (parallel drive-transmission to slow)									

---

[1] Please contact us if you wish to work at higher speeds or at operation times >80%!

[2] Values refer to the maximum permissible cylinder load. Please do also respect the "life time curve"! With parallel drive, the maximum thrust/traction force is limited by the timing belt, see "transmissible torques at parallel drive"

ET_100, ETV100, ET_125 available for operation with servo motor drive

5.1 Determine maximum possible mechanical stroke

Many sizes of the electro-thrust cylinder such as the maximum permissible speed, permissible drive torque, weight and mass moment of inertia depend on the stroke. The stroke* of your cylinder can be seed on the **type specification plate** (see page 4).

*Refers to the maximum possible mechanical stroke - the cylinder moves from one internal stop to the other **(Definition of stroke)** (see page 26).

Definition of stroke, travel and safety travel

Stroke: The stroke to be indicated in the order code is the maximum possible stroke between the internal end stops.

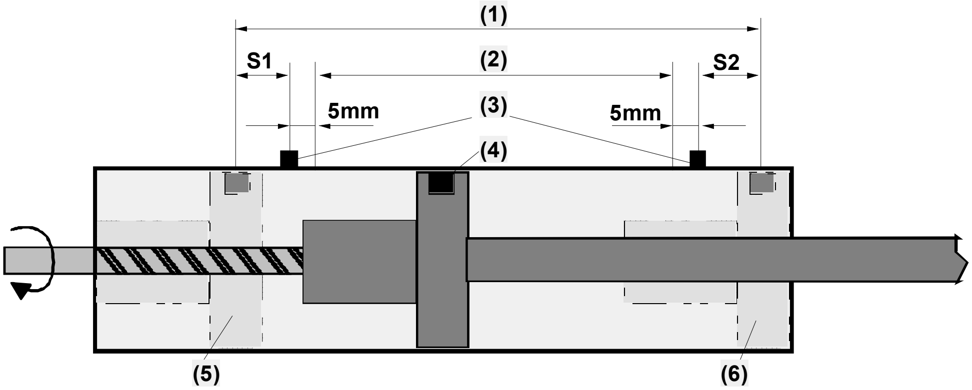
Working stroke: The travel is the distance which you need to move in your application. It is always shorter than the stroke.

Safety travels 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). For vertical mounting, S1 and S2 must in general be different. The minimum safety travels given in the table are, according to experience, sufficient for most applications. With demanding applications (great masses and high dynamic), the safety travel has to be calculated and enlarged accordingly (dimensioning on demand).

Minimum safety travels

Cylinders	**ET_32**		**ET_50**			**ET_80**			**ET_100**				**ETB125**			
Table Style	M05	M10	M05	M10	M16	M05	M10	M25	M05	M10	M20	M40	M05	M10	M20	M50
S1 = S2	10	20	10	20	30	10	20	30	10	20	25	30	10	20	25	40

Recommended minimum safety travels with horizontal mounting position: Calculated for a load of up to 50% of the maximum permissible thrust/traction force and for a speed of up to 50% of the maximum permissible speed and under the condition that the drive is able to generate a corresponding braking torque.
Recommended safety travel = S1+S2+10mm



(1): Stroke
(2): Working stroke
(3): Initiators
(4): Magnet
(5): Retracted cylinder position
(6): Extended cylinder position

Hint for the order statement: Stroke ≥ working stroke + 10mm + S1 + S2

This formula takes a distance between the software end limit and a limit switch of 5mm per side into consideration. The length of this distance depends on the closed loop controller used.

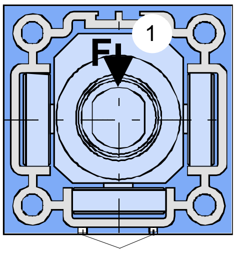
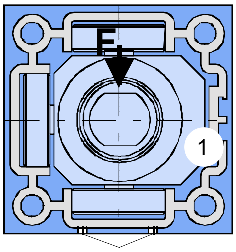
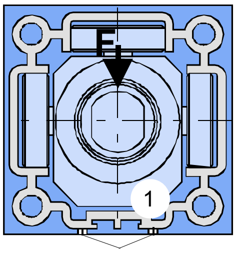
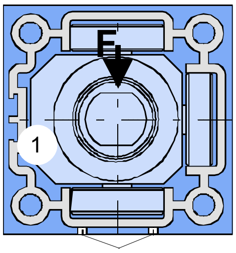
5.2 Permissible side loads

The electro thrust cylinder disposes of a generously dimensioned cylinder rod bearing together with 3 Nylatron NS wheels which prevent the rod rotation. Thanks to this system, the cylinder is able to accept a certain side load.
Please note that the load bearing capacity increases with a longer stroke, as the distance between the bearings becomes longer. In order to reach the required load values in a given application, it can be useful to select a cylinder with a longer stroke than necessary for the application.

Example: An ET_50 with 200mm stroke can bear a lateral force of 72N in fully extended state.
An ET_50 with 300mm stroke can however, if only 200mm are extended, accept a lateral force of 166N.
If your application requires an even higher load bearing capacity, you can fortify the cylinder with the **rod guiding system** (see page 38) available as an option (not for ETB125).

Lateral load – profile orientation

Profile orientations – view on the thrust rod

Standard	A	B	C
12 hrs	3 hrs	6 hrs	9 hrs
			
2	2	2	2

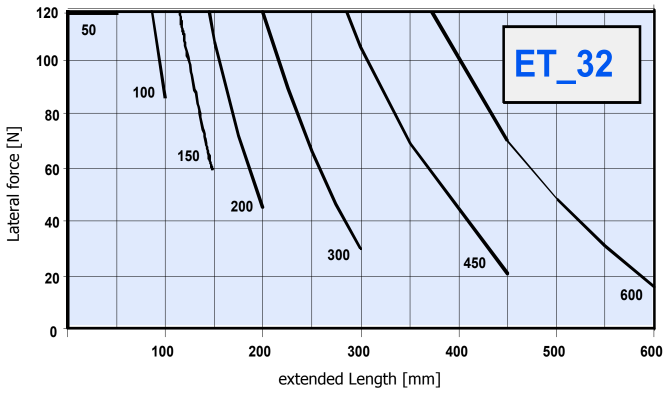
1: Sensor mounting grooves: on ET_32, 50 and 80 only on one side, on ET_100 and ETB125 on all sides.
2: Thread for foot mounting
F: Lateral force

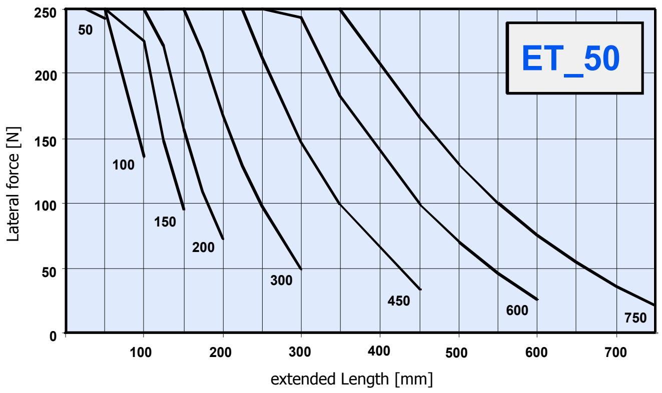
- with standard and B profile orientation the lateral force is accepted by two rollers,
  with A and C profile orientation, only by a single roller.
- If the lateral force F does not apply, as in the drawing, from above or below but from the right or the left, the opposite of the above description applies!

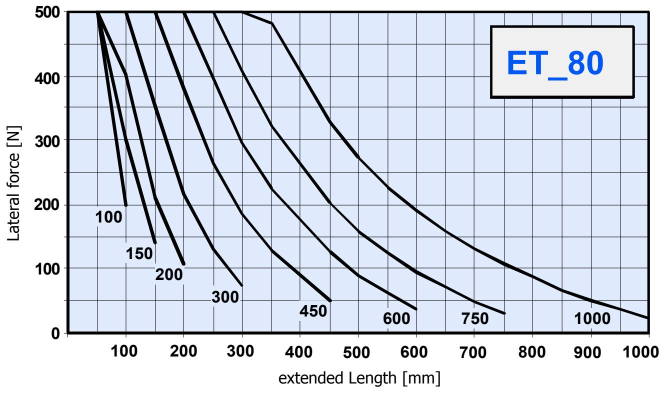
The profile orientation of ET_32, 50 and 80 does also determine the mounting position of the sensors and does therefore also influence the mounting position of the motor. At the same time, the profile orientation defines the position of the lubrication bore.

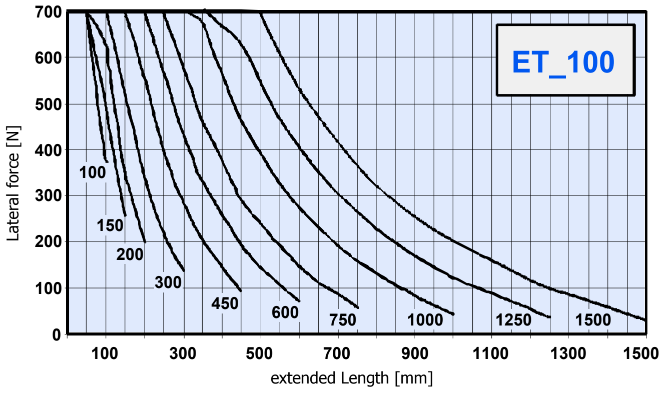
Lateral forces may reduce the lifetime of the cylinder. If you want to exploit the maximum possible lateral force at 100%, you will have to reduce the duty cycle to 40% or you can only exploit 40% of the max. possible lateral force if you want to operate at a 100% duty cycle.

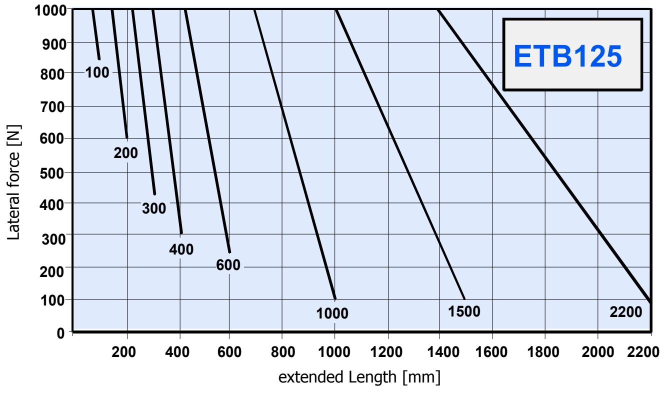
The curves given here are only valid for a profile orientation of 12 hrs (standard) and 6 hrs (B), if the lateral force applies from above or from below. With profile orientation 3 hrs and 9 hrs (A and C), the permissible lateral load is halved!











5.3 Thrust force factor and breakaway torque

The following table shows the resulting thrust or traction per 1Nm of torque at the screw, taking the efficiency, belt transmission ratio and screw pitch into consideration. The table can be used for a rough calculation of the drive dimensioning. For precise drive dimensioning, the mass moment of inertia of the screw must be taken into consideration!
Please do also account for *transmittable torques in parallel drives* ***(see page 30) and other limit values***

The "L" or "P" stands for the motor mounting L = direct (in-line), P = all parallel or reverse motor positions;"**A**" stands for a ratio of i = 1:1, "**B**" for i =1.5:1, "**D**" for i = 2:1, **Z**" for i = 1:1.5.

Example: ET_32 (size) M04 (screw pitch) L (motor mounting) A (ratio)

	Thrust force factor [N/Nm]	Breakaway torque for the drive [Nm]
ET_32		
ET_32-M05LA	1130	0.2
ET_32-M05PA	1015	0.2
ET_32-M05PZ	675	0.4
ET_32-M10LA	565	0.3
ET_32-M10PA	510	0.3
ET_32-M10PZ	335	0.4
ET_50		
ET_50-M05LA	1130	0.4
ET_50-M05PA	1015	0.4
ET_50-M05PB	1525	0.3
ET_50-M05PD	2035	0.2
ET_50-M10LA	565	0.5
ET_50-M10PA	510	0.6
ET_50-M10PB	765	0.4
ET_50-M10PD	1015	0.3
ET_50-M16LA	353	0.5
ET_50-M16PA	317	0.6
ET_50-M16PB	476	0.4
ET_50-M16PD	635	0.3
ET_80		
ET_80-M05LA	1130	0.5
ET_80-M05PA	1015	0.6
ET_80-M05PB	1525	0.4
ET_80-M05PD	2035	0.3
ET_80-M10LA	565	0.6
ET_80-M10PA	510	0.7
ET_80-M10PB	765	0.4
ET_80-M10PD	1015	0.3
ET_80-M25LA	225	0.9
ET_80-M25PA	205	1.0
ET_80-M25PB	305	0.7
ET_80-M25PD	405	0.5
ET_100		
ET_100-M05LA	1130	0.5
ET_100-M05PA	1015	0.6
ET_100-M10LA	565	0.6
ET_100-M10PA	510	0.7
ETB100-M20LA	283	0.7
ETB100-M20PA	255	0.8
ETB100-M40LA	140	0.9
ETB100-M40PA	125	1.0
ETB125		
ETB125-M05LA	1130	2.6
ETB125-M05PA	1107	2.9
ETB125-M10LA	565	3.0
ETB125-M10PA	508	3.3
ETB125-M20LA	283	3.4
ETB125-M20PA	255	3.8
ETB125-M50LA	113	3.8
ETB125-M50PA	102	4.2

5.4 Transmissible torques in parallel drive mounting

The table shows the torques that can be transmitted by the timing belt.
Please respect in addition the maximum permissible traction/thrust force:
ET_32, 50, 80 (see page 24), **ET_100, ETB125** (see page 25).
For the conversion, you can use the **thrust force factor table** (see page 29).

The "L" or "P" stands for the motor mounting L = direct (in-line), P = all parallel or reverse motor positions;"**A**" stands for a ratio of i = 1:1, "**B**" for i =1.5:1, "**D**" for i = 2:1, **Z**" for i = 1:1.5.

		Motor / gear type																			transmissible motor torque [Nm]							
		Stepper motor Motor code			Servo motor Motor code										Gear code						Speed at the drive shaft [rpm]							
		20	30	40	37	47	57	67	77	87	J4	J5	J6	J7	P3	P4	P5	P7	N6	N8	100	500	1000	1500	2000	2500	3000	3300
ET_32	PA	X				X															1.68	1.35	1.09	0.92	0.84	0.75	0.68	0.65
	PZ	X				X															1.22	0.99	0.82	0.72	0.63	0.57	0.53	0.50
ET_50	PA	X			X																2.80	2.19	1.73	1.42	1.27	1.12	1.01	0.99
	PB	X																			1.93	1.55	1.25	1.04	0.94	0.84	0.76	0.73
	PD	X																			1.43	1.16	0.94	0.80	0.73	0.66	0.60	0.57
	PA		X				X	X											x		3.64	2.93	2.39	2.10	1.85	1.67	1.53	1.38
	PB		X																		2.40	1.96	1.62	1.44	1.28	1.17	1.08	0.99
ET_80	PA		X																		7.07	5.55	4.39	3.77	3.22	2.84	2.52	2.20
	PB		X																		5.08	4.04	3.25	2.83	2.46	2.21	2.00	1.78
	PD		X																		3.64	2.93	2.39	2.10	1.85	1.67	1.53	1.38
	PA			X	X			X	X		X				x				x	x	13.4	10.6	8.43	7.16	6.11	5.40	4.79	4.18
	PB			X	X			X	X						x				x		9.66	7.69	6.18	5.38	4.68	4.19	3.79	3.38
	PD				X			X											x		6.91	5.57	4.54	4.01	3.51	3.18	2.91	2.65
ET_100	PA								X	X		X	X			x	x			x	61.2	37.1	32.6	30.4	28.5	27.6	25.9	24.8
ETB125	PA									X			X	X			x	x			91.0	81.0	77.0	72.0	71.0	--	--	--

Motor / gear codes: **Order code** (see page 44)

5.5 Nominal lifetime

Nominal lifetime of ballscrew and rear screw bearing

The lifetime depends strongly on the degree of power exploitation and on impermissible operating states occurring – even if only for a short time -. The lifetime of the stripper depends strongly on the frequency and speed of motion, especially in connection with lateral forces (danger of heating) as well as the amount of contamination.

Prerequisite:

- Bearing and screw temperature between 20°C and 40°C
- no affectation of the lubricant, for example by external particles
- lubrication conform to the specifications
- the given values for thrust force, speed and acceleration must be adhered to at any rate.
- no contact to mechanical end stops (external or internal) and no other abrupt loads
- no lateral forces are being applied to the cylinder rod
- no short stroke (stroke smaller than 2.5 x screw pitch)
- no vibration at standstill or at very low speed
- no high exploitation of several power features at a time (for example maximum speed or thrust force)

only under these circumstances, the service life corresponds to the nominal lifetime

Determination of the medium dynamic axial load:

If the load on the ballscrew is varying, the lifetime must be determined with the aid of the medium dynamic axial load. The medium dynamic axial load is determined as follows in the event of cascaded load changes:

$$F_m = \sqrt[3]{\frac{1}{L} * \left(Fa_1^{3} * s_1 + Fa_2^{3} * s_2 + \ldots + Fa_n^{3} * s_n\right)}$$

F_m = medium dynamic axial load [N]
F_{an} * = varying load [N]
s_n * = travel under a defined load F_n [mm]
L * = total travel [mm]

**** Forces and travels must be entered as absolute values.***

If you need the lifetime as the number of possible cycles, just divide the lifetime in kilometers by twice the stroke traveled.

The application factor fw

The application factor has a strong influence on the lifetime of a screw.
The application factor can be roughly determined with the aid of the following table:

Load from vibration, shock, temperature, dirt	Screw speed	fw
light	n < 500 rpm	1.0 - 1.5
Medium	500 < n < 2000 rpm	1.5 - 2.0
high	2000 < n < 3300 rpm	2.0 - 3.5

Lifetime calculation:

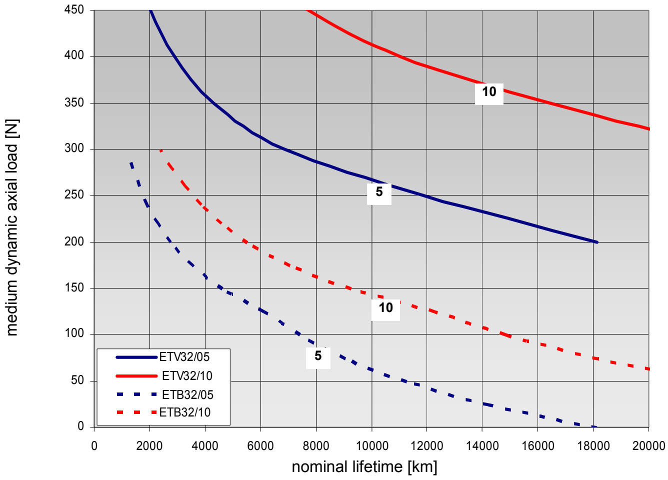
$$\text{Ln (fw)} = \frac{\text{Ln(fw=1.0)}}{\text{fw}^3}$$

Ln: Nominal lifetime
Ln(fw=1.0): see lifetime diagrams
fw: application factor

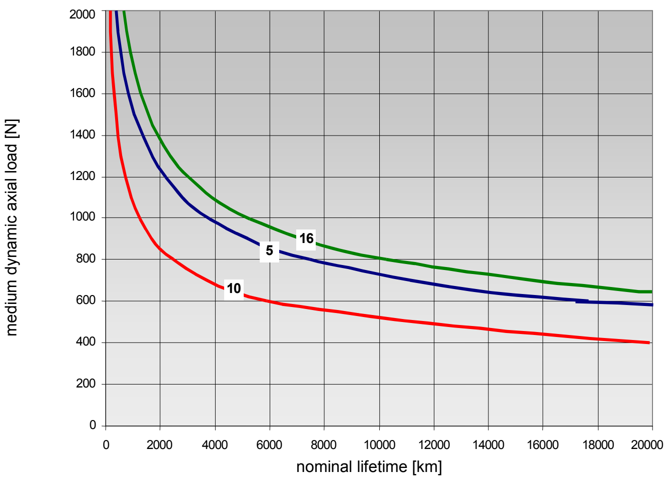
Lifetime diagrams

The screw lifetime is calculated with the factor fw=1.0.

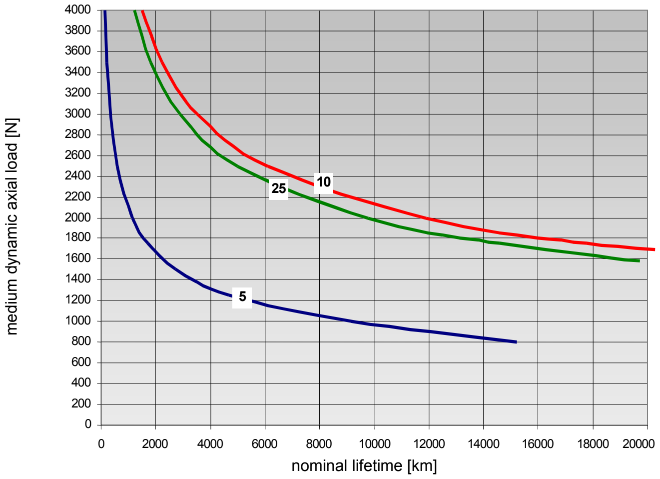
Lifetime of an ET_32 screw and fixed bearing



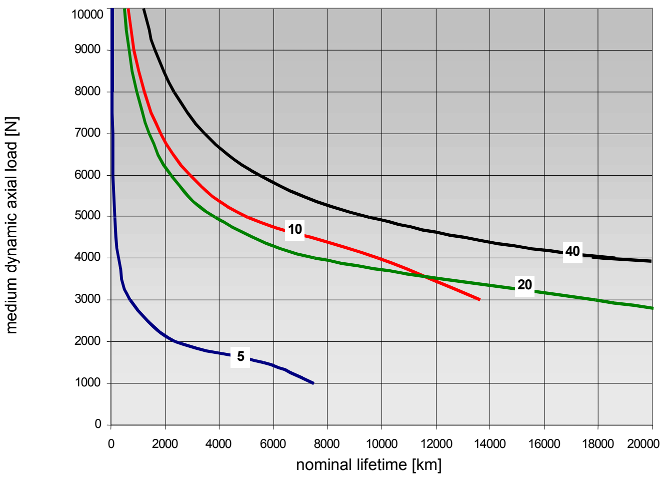
Lifetime of an ET_50 screw and fixed bearing



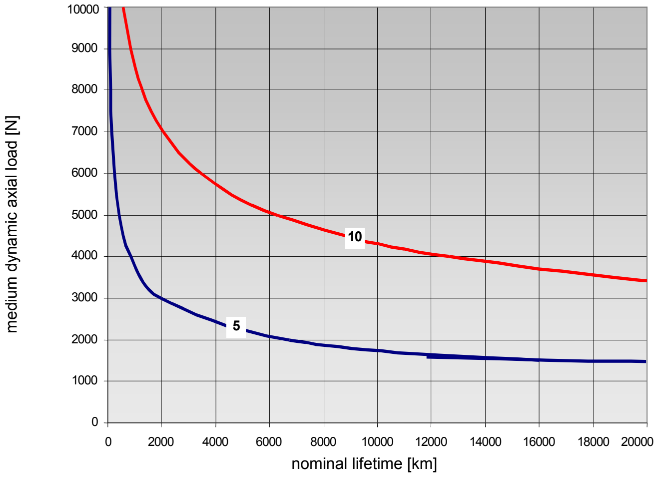
Lifetime of an ET_80 Screw and fixed bearing



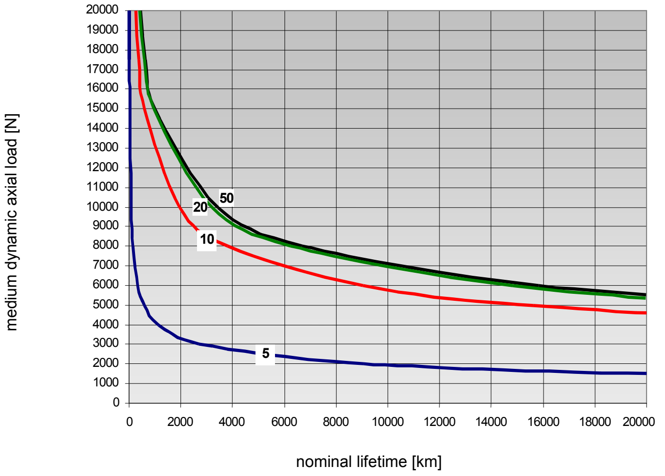
Lifetime of an ETB100 Screw and fixed bearing



Lifetime of an ETV100 Screw and fixed bearing



Lifetime of an ETB125 Screw and fixed bearing

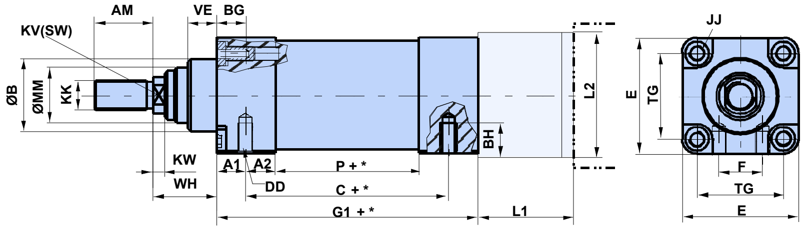


Designation: 5 = 5mm, 10 = 10mm screw pitch etc.

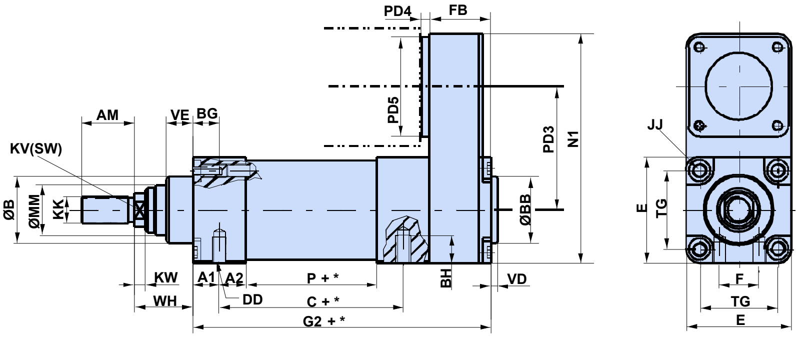
5.6 Dimensions

Stated in mm

Electro thrust cylinder – in-line motor mounting



Electro thrust cylinder – parallel motor mounting



ET (inline/parallel)

	A1	A2	AM	BG	BH	DD	E	F	JJ**	KK	KV	ØMM	TG	KW	N1	FB	VD	ØBB
ET_32	14	14	22	14.5	9	M6x1.0 (1)	46.5	16	M6x1.0	M10x1.25	10	18	32.5	5	106.4	37	4	30
ET_50	16	16	32	16	12.7	M8x1.25	63.5	24	M8x1.25	M16x1.5	17	25	46.5	6.5	139.4	39	4	40
ET_80	21	21	40	16	17.5	M10x1.5	95.3	30	M10x1.5	M20x1.5	22	35	72	10	191.3	57	5	45
ET_100	27.5	27.5	54	16	24	M12x1.75	114	50	M10x1.5	M27x2.0	27	50	89	13	254	79	4	55
ETB125	42.4	33	72	16	24	M16x2.0	139.7	64	M12x1.75	M36x2.0	41	70	110	13	334.5	127.1	7	60

** Thread "JJ" is not available in IP65 version for ET_32 and ET_50!
(1) If you wish to mount a component at the front screws (with thread II = M6x1), please provide for through holes with a diameter of at least 7mm at this component, even though this is not the common norm.

	Standard cylinder			IP65 rating		
	VE	WH	ØB	VE	WH	ØB
ET_32	13	26	30	40	50	46
ET_50	16	37	40	43	64	62
ET_80	20	46	50	55	81	68
ET_100	20	51	65	60	91	89
ETB125	20	68	90	On request		

Stroke dependent dimensions

		Standard cylinder				IP65 rating			
		C+*	G1+*	G2+*	P+*	C+*	G1+*	G2+*	P+*
ET_32	**M05**	112.5	140.5	176.7	84.5	115.7	143.7	179.9	84.5
	M10	112.5	140.5	176.7	84.5	115.7	143.7	179.9	84.5
ETV32	**M05**	100.0	138.0	163.2	66.5	103.2	141.2	166.4	66.5
	M10	102.8	140.8	166.0	69.3	106.0	144.0	169.2	69.3
ET_50	**M05**	128.4	160.4	199.5	96.4	131.6	163.6	202.7	96.4
	M10	131.4	163.4	202.5	99.4	134.6	166.6	205.7	99.4
	M16	135.4	167.4	206.5	103.4	138.6	170.6	209.7	103.4
ET_80	**M05**	129.5	173.0	228.3	86	132.7	176.2	231.5	86
	M10	148.1	191.6	246.9	104.6	151.3	194.8	250.1	104.6
	M25	154.9	198.4	253.7	111.4	158.1	201.6	256.9	111.4
ETB100	**M05**	201.5	259.7	335.5	132.1	204.7	262.9	338.7	132.1
	M10	221.3	279.5	355.3	151.9	224.5	282.7	358.5	151.9
	M20	239.3	297.5	373.3	169.9	242.5	300.7	376.5	169.9
	M40	249.4	307.6	383.4	179.9	252.6	310.8	386.6	179.9
ETV100	**M05**	222.3	290.2	366	143.1	225.5	293.4	369.2	143.1
	M10	263.1	331	406.8	183.9	266.3	334.2	410.0	183.9
ET125	**M05**	207.0	283.9	411.0	140.0	On request			
	M10	237.0	313.9	441.0	170.0				
	M20	237.0	313.9	441.0	170.0				
	M50	260.0	336.9	464.0	193.0				

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

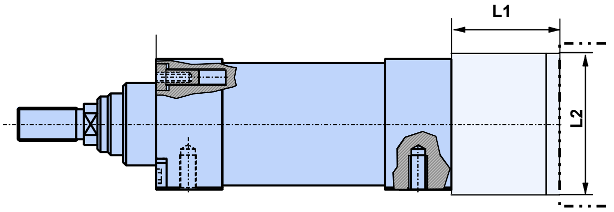
Motor / gear mounting, transmission ratios, dimensions

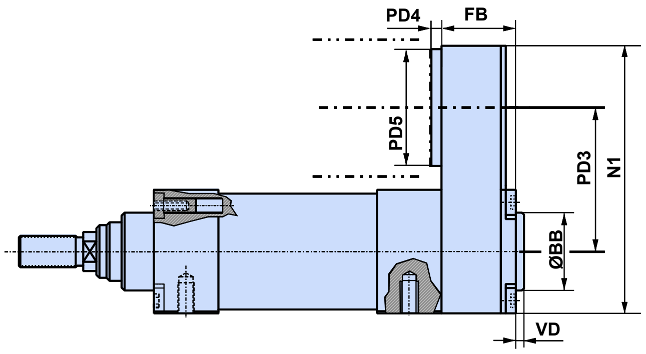
The "L" or "P" stands for the motor mounting L = direct (in-line), P = all parallel or reverse motor positions;"**A**" stands for a ratio of i = 1:1, "**B**" for i =1.5:1, "**D**" for i = 2:1, **Z**" for i = 1:1.5.

	prepared for motor / gear mounting	Mounting method/transmission ratio					Order code	Dimensions in [mm]				
		LA	PA	PB	PD	PZ		direct L1	direct L2	parallel PD3(1)	parallel PD4	parallel PD5
ET...	for stepper motor mounting											
S32	**NEMA 23 (SY56)**	x	x			x	20	44.25	57.15	54.00	5.75	57.15
S50	**NEMA 23 (SY56)**	x	x	x	x		20	53.50	63.50	75.00	5.75	57.15
	NEMA 34 (SY83)	x	x	x			30	68.25	82.55	82.50	7.75	82.55
S80	**NEMA 34 (SY83)**	x	x	x	x		30	79.50	95.25	95.00	7.75	86.36
	NEMA 42 (SY107)	x	x	x			40	89.26	107.95	105.00	7.75	107.95
ET...	for servo motor / gear mounting											
B32 **V32**	**NEMA 23 with 9.525mm shaft (i.e. SM23 with long shaft)**	x	x			x	20	61.10	57.15	54.00	5.75	57.15
	MH56-B5/9 or SMH60-B8/9	x	x			x	47*	49.80	57.15	54.00	5.75	57.15
B50	**NEMA 23 with 9.525mm shaft (i.e. SM23 with long shaft)**	x	x	x	x		20	66.50	63.50	75.00	5.75	57.15
	NEMA 34 with 1/2 inch shaft	x	x				30	68.25	82.55	82.50	7.75	82.55
	NEMA 34 with 14mm shaft		x				37	68.25	82.55	82.50	7.75	82.55
	MH70-B05/11 or SMH60-B05/11	x	x				57	59.00	69.80	82.50	8.74	76.20
	SMH82-B08/14	x	x				67	65.60	95.25	82.50	8.56	95.25
	P3 (planetary gear)	x					P3	83.00	72.00	--	--	--
	PE3 (planetary gear)	x	x				N6	69.50	90.00	82.5	2.00	72.15
B80	**NEMA 34 with 1/2 inch shaft (BE34)**	x	x	x	x		30	87.50	95.00	95.00	7.75	86.36
	NEMA 34 with 14mm shaft (MD3450/3475)	x	x	x	x		37	87.50	95.00	95.00	7.75	86.36
	SMH82-B8/14	x	x	x	x		67	85.75	95.25	95.00	10.75	95.25
	SMH82-B5/19 / SMH100-B5/19 / MH105-B5/19	x	x	x			77	99.00	107.95	107.50	10.00	107.95
	MH105-B9/19	x	x	x			J4	95.75	96.00	97.50	10.75	95.25
	P3 (planetary gear)	x	x				P3	105.25	95.00	95.00	19.00	82.00
	P4 (planetary gear)	x	x				P4	111.50	95.00	104.00	31.00	80.00
	PE3 (planetary gear)	x	x				N6	89.50	80.00	95.00	10.00	80.00
	PE4 (planetary gear)	x	x				N8	94.50	80.00	95.00	10.00	80.00
B100 **V100**	**SMH82-B5/19 / SMH100-B5/19 / MH105-B5/19**	x	x				77	107.50	107.95	140.00	11.50	107.95
	MH145-B5/24 or SMH142-B5/24	x	x				87	115.34	142.87	140.00	20.00	142.88
	MH105-B6/24 or SMH115-B7/24	x	x				J5	112.50	114.30	140.00	17.00	114.30
	HJ155	x	x				J6	128.25	152.40	140.00	20.00	142.88
	P4 (planetary gear)	x	x				P4	125.00	107.95	140.00	18.00	98.00
	P5 (planetary gear)	x	x				P5	158.00	120.65	140.00	40.00	114.00
B125	**MH145-B5/24 or SMH142-B5/24**	x	x				87	155.00	139.70	184.00	22.50	150.00
	HJ155	x	x				J6	155.00	140.00	184.00	28.50	155.00
	MH205-B5/38	x	x				J7	188.00	205.00	184.00	27.50	205.00
	P5 (planetary gear)	x	x				P5	195.00	139.70	184.00	32.50	150.00
	P7 (planetary gear)	x	x				P7	220.00	145.00	184.00	55.00	150.00

(1): PD3 = distance between spindle and motor shaft. Tolerance: ± 3mm, as the toothed belt is tensioned over this distance!

*: SMH60 with encoder option (A6/7) cannot be connected to the ETB32 with parallel mounting, use option C6/7 if necessary!





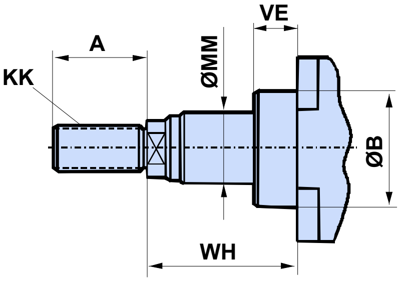
6. Accessories

In this chapter you can read about:

Stated in mm

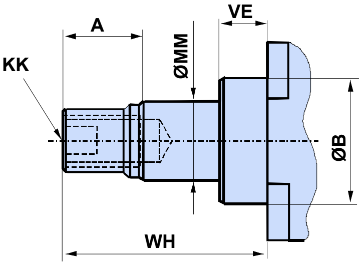
6.1 Configuration of the thrust rod

External thread



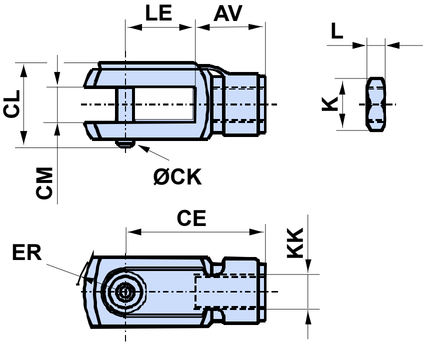
	External thread (delivery standard)								
				Standard cylinder			IP65 rating		
	A	KK	ØMM	VE	WH	ØB	VE	WH	ØB
ET_32	22	M10x1.25	18	13	26	30	40	50	46
ET_50	32	M16x1.5	25	16	37	40	43	64	62
ET_80	40	M20x1.5	35	20	46	50	55	81	68
ET_100	54	M27x2.0	50	20	51	65	60	91	89
ETB125	71.5	M36x2.0	70	20	68	90	-	-	-

Internal Thread



	Internal Thread								
				Standard cylinder			IP65 rating		
	A	KK	ØMM	VE	WH	ØB	VE	WH	ØB
ET_32	14	M10x1.25	18	13	32	30	40	56	46
ET_50	24	M16x1.5	25	16	50	40	43	77	62
ET_80	29	M20x1.5	35	20	59	50	55	94	68
ET_100	40	M27x2.0	50	20	73	65	60	113	89
ETB125	50	M36x2.0	70	20	99.5	90	-	-	-

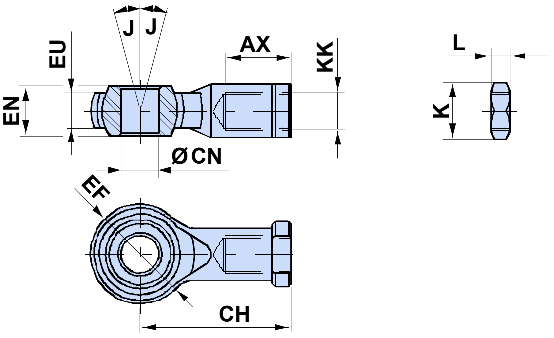
6.1.1. Rod Clevis



	Order no.	KK	CL	CM		LE	CE	AV	ER	ØCK (h11/E9)	K	L
ET_32	4309	M10x1.25	26.0	10.2	+0.13 -0.05	20	40	20	14	10	17	5
ET_50	4312	M16x1.5	39.0	16.2	+0.13 -0.05	32	64	32	22	16	24	8
ET_80	4314	M20x1.5	52.5	20.1	+0.02 -0.0	40	80	40	30	20	30	10
ET_100	4331	M27x2.0	72.0	30.0	+0.6 -0.2	54	110	56	35	30	41	10
ETB125	413-042-195	M36x2.0	83.0	35		72	144	72	50	35	55	14

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

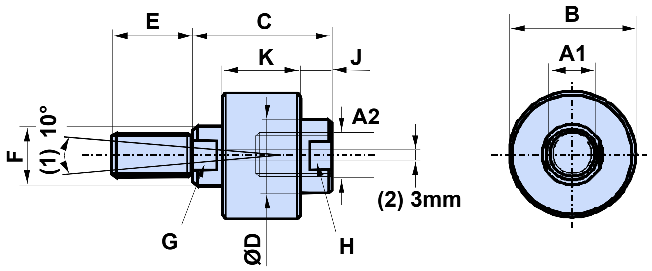
6.1.2. Sperical Rod Eye



	Order no.	ØCN (H9)	EN (h12)	EU	AX	CH	ØEF	KK	J°	K	L
ET_32	4078-10	10	14	10.5	20	43	28	M10x1.25	13	17	5
ET_50	4078-16	16	21	15.0	28	64	42	M16x1.5	15	24	8
ET_80	4078-20	20	25	18.0	33	77	50	M20x1.5	14	30	10
ET_100	4078-27	30	37	25.0	51	110	70	M27x2.0	15	41	10
ETB125	4078-36	35	43	28.0	56	125	80	M36x2.0	15	55	14

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

6.1.3. Flexible coupling



For mounting at the extremity of the thrust 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 is maintained

(1): Angle offset
(2): Axial offset
A2: Thread depth=E

	Order no.	A1	A2	B	C	ØD	E	F	G	H	J	K
ET_32	**LC32-1010**	M10x1.25	M10x1.25	40	51	19	19	16	13	16	13	26
ET_50	**LC50-1616**	M16x1.5	M16x1.5	54	59	32	29	25	22	29	14	33
ET_80	**LC80-2020**	M20x1.5	M20x1.5	54	59	32	29	25	22	29	14	33
ET_100	**LC100-2727**	M27x2.0	M27x2.0	89	102	51	51	38	32	43	19	64
ETB125	**LC125-3636**	M36x2.0	M36x2.0	102	112	57	57	44.5	38	49.3	22	70

Not listed in the cylinder order code, please order separately.

6.2 Mounting options

6.2.1. Rod guiding

The outrigger bearing unit performs the following tasks:

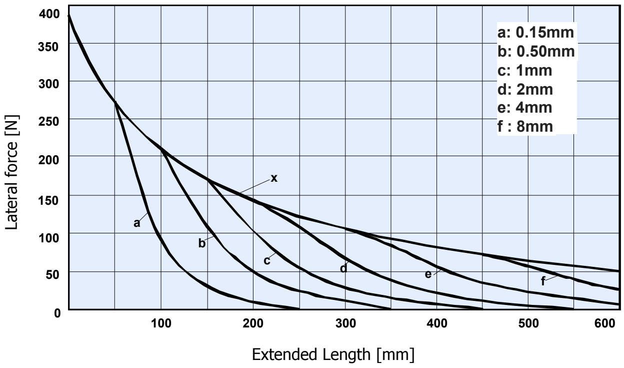
- Rotation protection for higher torques
- Absorption of lateral forces
- Relieves the cylinder of lateral forces

The additional stability and precision is ensured by 2 hardened steel guiding rods in connection with 4 linear ball bearings.

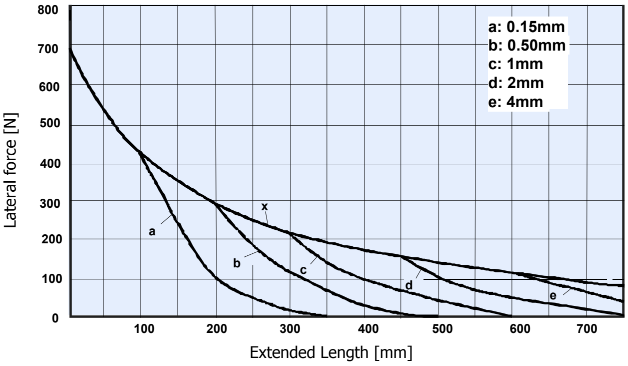
Not available for ETB125, not possible with IP65 rating

Rigidity of the cylinder with outrigger bearing

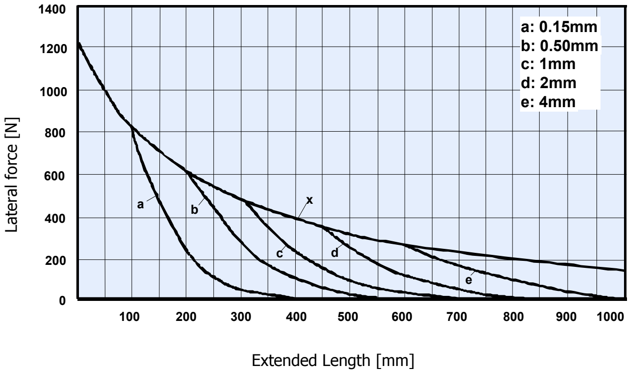
ET_32 with outrigger bearing



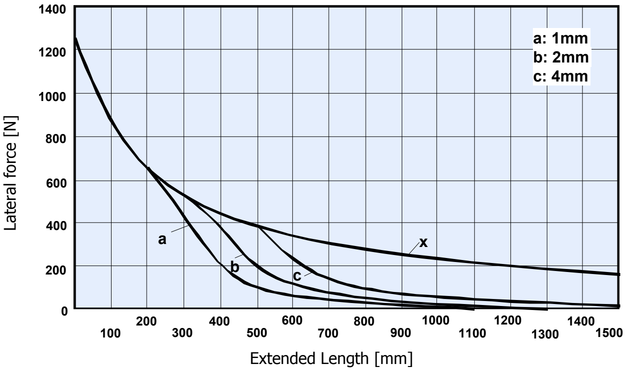
ET_50 with outrigger bearing



ET_580 with outrigger bearing



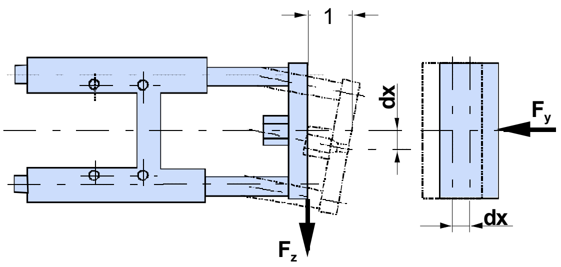
ET_100 with outrigger bearing



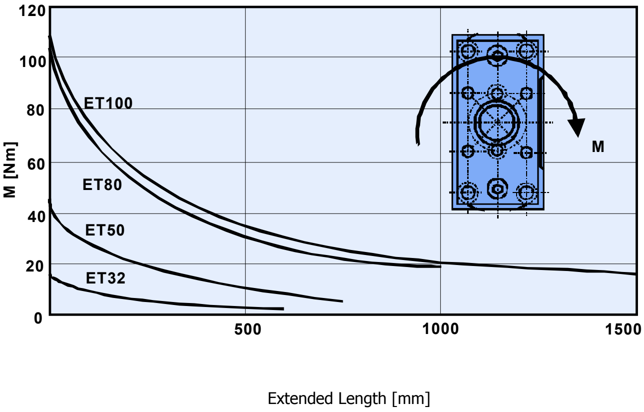
a, b, ...: deflection

x: Deflecion with maximum load

Deflection



1: Stroke
dx: deflection
valid for F_z or F_y
M: Torsional load



Dimensions of ET outrigger bearing

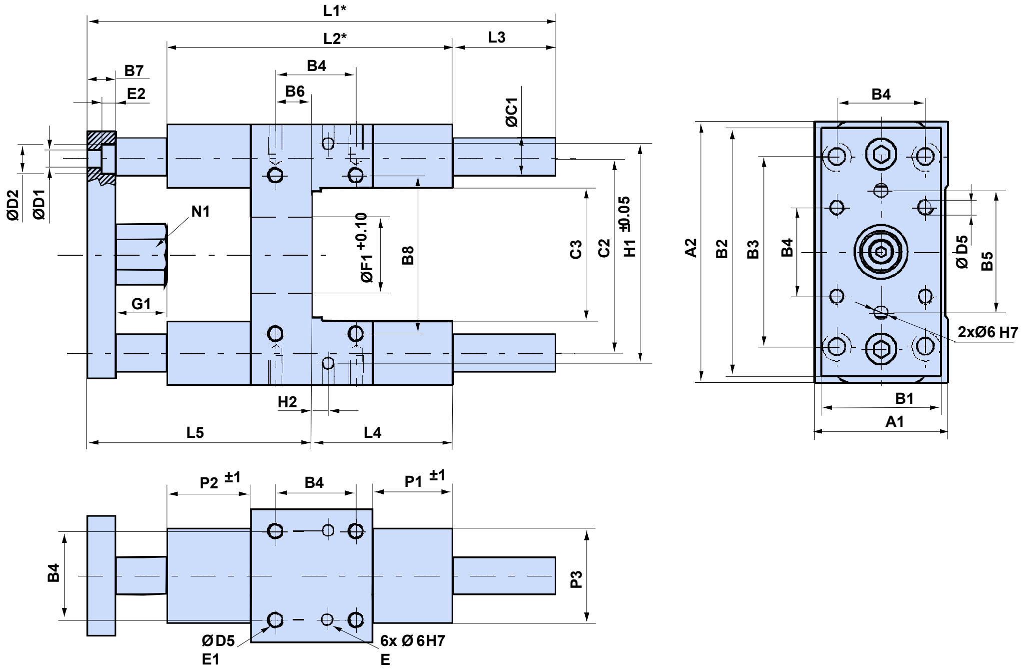
	ET_32	**ET_50**	**ET_80**	**ET_100**
Model Series	32-2800R	50-2800R	80-2800R	100-2800R
A1	50	70	105	130
A2	97	137	189	213
B1	45	63	100	120
B2	90	130	180	200
B3	78	100	130	150
B4	32.5	46.5	72	89
B5	50	72	106	131
B6	4	19	21	24.5
B7	12	15	20	20
B8	61	85	130	150
ØC1	12	20	25	25
C2	73.5	103.5	147	171.5
C3	50	70	105	130
ØD1	6.6	9	11	11
ØD2	11	14	17	17
ØD5	M6	M8	M10	M10
E (Depth)	10	10	10	10
E1 (Depth)	12	16	20	20
E2 (Depth)	7	9	11	11
ØF1	30	40	50	65
G1	17	27	32	55
H1	81	119	166	190
H2	11.7	4.2	15	20.5
L1+*	150	192	247	290
L2	120	150	200	220
L3+*	15	24	24	24
L4	71	79	113	128
L5	64	89	110	138
N1	17	24	30	38
P1	36	42	50	49
P2	31	44	52	51
P3	40	50	70	70
Mass	970g	2560g	6530g	8760g
Additional mass / 100mm stroke	175g	495g	770g	770g

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

N1: Hexagon head, outrigger bearing not possible with IP65 rating!

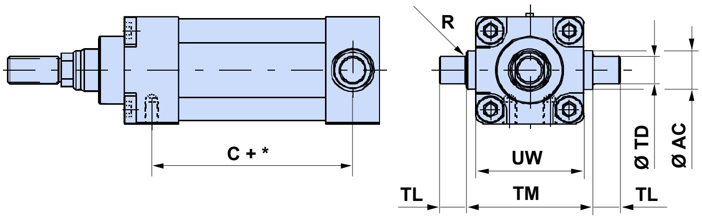
For the ET_100, a larger coupling piece is used (concerns G1 and N1)

For the ET_80 and the ET_100, the standard pneumatic outrigger bearing modules cannot be used, ØF1 must be bored up to 50 mm for ET_80 (from 45mm) and to 65mm for ET_100 (from 55mm).



The hole pattern is suitable for Parker pneumatic modules, e.g. grippers and pivoting units

6.2.2. Centre trunnion mounting



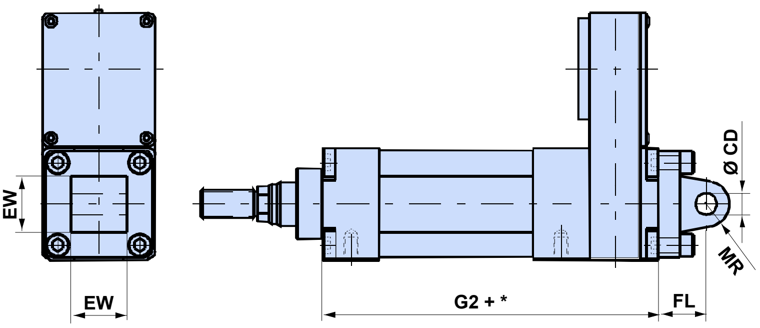
	C+*	UW	ØTD**	R	TL***	TM	ØAC
ET_32	**stroke_dependent** (see page 33)	46.5	12	0.8	12	50	18
ET_50	**stroke_dependent** (see page 33)	63.5	16	0.8	16	75	25
ET_80	**stroke_dependent** (see page 33)	95.3	20	0.8	20	110	30
ET_100	**stroke_dependent** (see page 33)	114.3	25	1.6	25	132.5	40
ETB125	**stroke_dependent** (see page 33)	139.7	32	2.0	32	149.7	45

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

**: ØTD according to ISO tolerance field h7

***: TL according to ISO tolerance field e9

6.2.3. Rear Eye Mounting



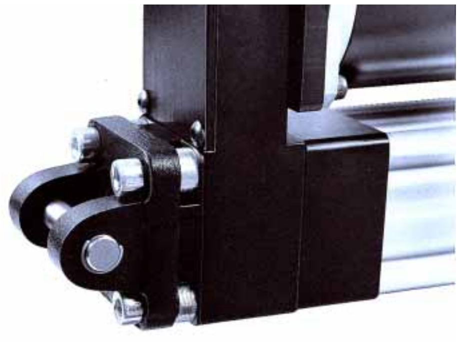
Only for parallel / reverse drive

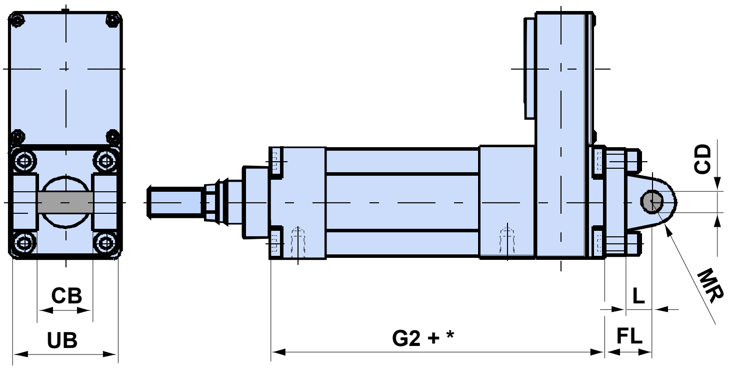
	Order no.	G2+*	EW	ØCD	MR (H9)	FL ±0.2
ET_32	32-2800C	**stroke_dependent** (see page 33)	26	10	10	22
ET_50	50-2800C	**stroke_dependent** (see page 33)	32	12	12	27
ET_80	80-2800C	**stroke_dependent** (see page 33)	50	16	16	36
ET_100	100-2800C	**stroke_dependent** (see page 33)	60	20	20	41
ETB125	413-042420	**stroke_dependent** (see page 33)	70	25	25	50

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

6.2.4. Rear Clevis





Only for parallel / reverse drive

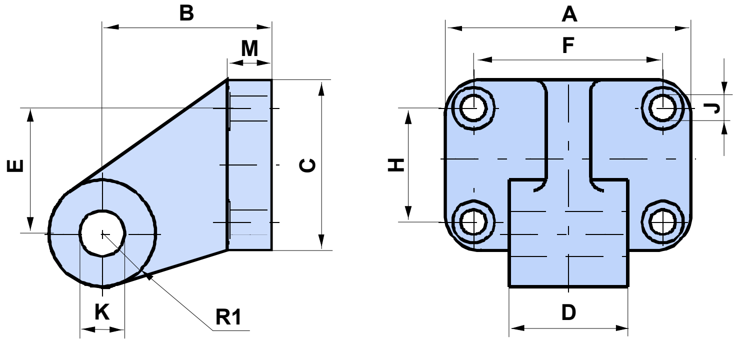
	Order no.	G2+*	UB (h14)	CB (H14)	ØCD (H9)	MR	L	FL ±0.2
ET_32	32-2800B	**stroke_dependent** (see page 33)	45	26	10	10	13	22
ET_50	50-2800B	**stroke_dependent** (see page 33)	60	32	12	12	16	27
ET_80	80-2800B	**stroke_dependent** (see page 33)	90	50	16	16	22	36
ET_100	100-2800B	**stroke_dependent** (see page 33)	110	60	20	20	27	41
ETB125	125-2800B	**stroke_dependent** (see page 33)	130	70	25	25	30	50

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

6.2.5. Bearing Block

Counterpiece of the rear clevis



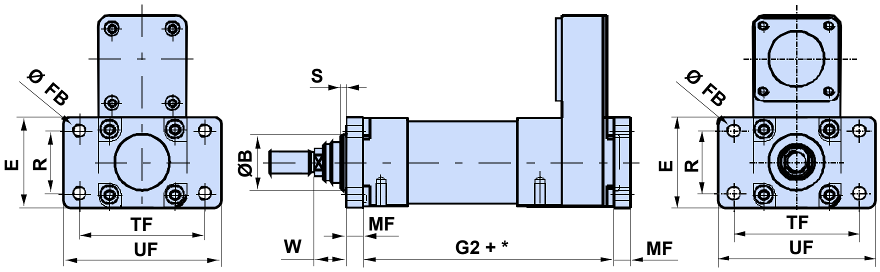
	Order no.	A	B (JS15)	C	D	E (JS14)	F (JS14)	H	ØJ (H13)	ØK (H9)	M	R1
ET_32	32-2800T	51	32	31	25.5	21	38	18	6.6	10	8	10
ET_50	50-2800T	65	45	45	31.0	33	50	30	9.0	12	12	13
ET_80	80-2800T	86	63	60	49.0	47	66	40	11.0	16	14	15
ET_100	100-2800T	96	71	70	59.0	55	76	50	11.0	20	15	21
ETB125	125-2800T	124	90	90	69.0	70	94	60	14.0	25	20	25

Not listed in the cylinder order code, please order separately.

6.2.6. Installation flanges

Front plate not possible with IP65 rating

Rear plate only for parallel / reverse drive



	Art. No. (1 piece)	G2+*	UF	E	TF	ØFB	R	W	MF	ØB	S
ET_32	32-2800A	**stroke_dependent** (see page 33)	80	48	64	7	32	16	10	30	3
ET_50	50-2800A	**stroke_dependent** (see page 33)	110	65	90	9	45	25	12	40	4
ET_80	80-2800A	**stroke_dependent** (see page 33)	150	95	126	12	63	30	16	50	4
ET_100	100-2800A	**stroke_dependent** (see page 33)	180	110	150	14	75	35	16	65	4
ETB125	ET125MTG-JBSC	**stroke_dependent** (see page 33)	205	140	180	17	90	53	20	90	0

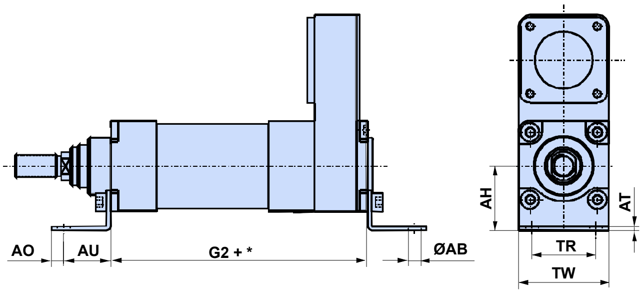
+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

6.2.7. Foot mounting

Only for parallel / reverse drive

Front foot mounting plate not possible with IP65 rating.

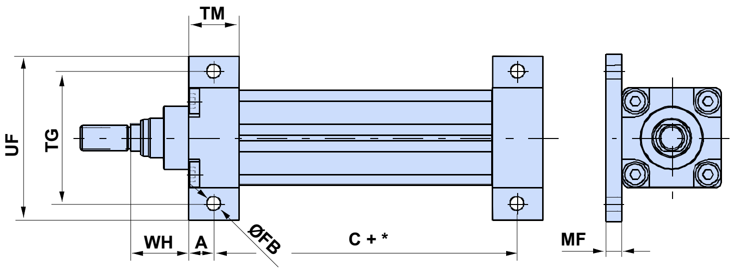


	Art. No. (2 pieces)	G2+*	AH	AT	TR	ØAB (H14)	AO	AU	TW
ET_32	32-2800D	**stroke_dependent** (see page 33)	32	3	32	7	8	24	48
ET_50	50-2800D	**stroke_dependent** (see page 33)	45	3	45	9	12	32	65
ET_80	80-2800D	**stroke_dependent** (see page 33)	63	4	63	12	15	41	95
ET_100	100-2800D	**stroke_dependent** (see page 33)	71	6.5	75	14	17	41	115
ETB125	ET125MTG-BBSC	**stroke_dependent** (see page 33)	90	8.3	90	17	25	45	140

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

6.2.8. Mounting flanges

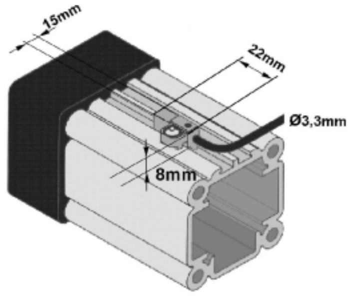


	Art. No. (2 pieces)	C+*	WH	TG	UF	ØFB	TM	MF	A
ET_32	1440.079	**stroke_dependent** (see page 33)	**Dimensions** (see page 33)	62	78	6,6	25	8	14
ET_50	1441.093	**stroke_dependent** (see page 33)	**Dimensions** (see page 33)	84	104	9	30	10	16
ET_80	ET80E24	**stroke_dependent** (see page 33)	**Dimensions** (see page 33)	120	144	11	40	12	21
ET_100	ET100E14	**stroke_dependent** (see page 33)	**Dimensions** (see page 33)	150	185	13	50	12	27,5
ETB125	ET125MTG-GBSC	**stroke_dependent** (see page 33)	**Dimensions** (see page 33)	175	210	17	70	20	35

+* =Measure + length of desired stroke **Definition of stroke** (see page 26)

Listed in the order code of the cylinder, the order number is only for ordering spare parts.

6.3 Initiators / limit switches

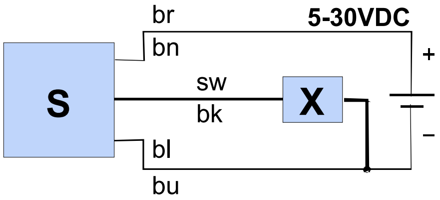


The cylinder profile has two t-grooves for the mounting of initiators. The initiators can be freely positioned along the profile (access to the lubricating hole must be granted).
ET_100 and ETB125 have these longitudinal grooves on all sides, ET_32, ET_50 and ET_80 only on one side of the profile.
The permanent magnet integrated into the spindle nut, actuates the initiators.

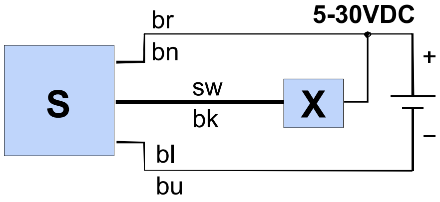
The following initiator types are available for the ET cylinder series:

- Hall effect sensor
  - Normally closed contact or normally open contact
  - electronic
  - LED display
  - medium costs
  - long life

PNP sensor



NPN sensor



S: Switch / X: Load

Hall effect sensors								
Type	**Function**	**LED**	**Logic**	**Cables**	**Switching current**	**Electric current drain**	**Utilities**	**Switching frequency**
SMH-1P*	Normally open contact	Green	PNP	1.5m	max.150mA	7mA at 12VDC 14mA at 24VDC	5 - 30VDC	max.500Hz
SMH-1N*	Normally open contact	Red	NPN					
SMC-1P*	Normally closed contact	Yellow	PNP					
SMC-1N*	Normally closed contact	White/Red	NPN					

*If you require only 150mm of cable length instead of 1.5m, please add a "C" to you order code. Example: SMH-1PC.
Use only SMC-1P with COMPAX.

7. Order code

ET series	Order example: ETB50M05PA67FMA600A	ET	B	50	M05	P	A

Design

Standard NEMA motors (ET32 to 80)	S
metric motors and gears as well as special NEMA motors (ET32 to 125)	B
like version B, but with increased lifetime (only ET32&ET100)	V

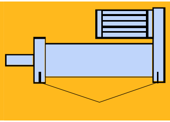
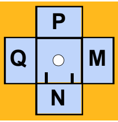
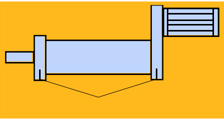
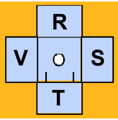
Model /size

ISO 32	32
ISO 50	50
ISO 80	80
ISO 100	100
ISO 125	125

Screw pitch Mxx in mm

ET_32	ET_50	ET_80	ETB100	ETV100	ET_125	
X	X	X	X	X	X	M05
X	X	X	X	X	X	M10
	X					M16
			X		X	M20
		X				M25
			X			M40
					X	M50

Motor mounting position

direct (inline)			L
Parallel			P M N Q
antiparallel			R S T V

with parallel motor mounting, the motor could, depending on the profile orientation, interfere with the initiators (ET_32, 50, 80) and block the lubrication hole (see page 27)

Transmission ratio (combinations (see page 34))

1:1	in-line, parallel, antiparallel	A
1.5:1	parallel, antiparallel (only drives with shaft ∅>9mm, not ET_50)	B
2:1	parallel, antiparallel	D
1:1.5	parallel, antiparallel (only ET_32)	Z

67	F	M	A	600	A

Protection class

For IP65, contact the supplier in order to discuss conditions of use and environment.

A	company internal designation
IP	IP65 rating (not for ETB125)

Stroke in mm

Definition of stroke (see page 26)

ET_32: 50 - 0750
ET_50: 50 – 1000
ET_80: 100 - 1500
ET_100: 100 - 1500
ETB125: 100 - 2400

Housing orientation

The profile orientation (see page 27) does also define the position of the lubrication hole.

A	3 hrs (not with motor position M)
B	6 hrs (not with motor position N)
C	9 hrs (not with motor position Q)
	12 hrs/standard (not with motor position P)

Thrust rod

*not for ETB125 and not with IP65

M	External thread (Standard metrical)
F	Internal thread
C	Rod clevis
S	Spherical rod eye
R	Outrigger bearing*

Mounting type

Stainless versions of the mounting options on request
*not for motor position L
** not with IP65

B	Foot mounting*
C	Rear clevis mounting*
D	Centre trunnion mounting
E	Rear eye mounting*
F	Standard (Thread at cylinder profile)
G	Mounting flanges
H	Rear plate*
J	Front plate**
N	Front- and rear plate*
X	Customer specific

Motor mounting options
(combinations (see page 34))

	Fitting edge	pitch diameter	∅Shaft	Shaft length	Note		
20	38.1	66.6	6.35	20.8		NEMA 23	prepared for NEMA standard motors
30	73	98.42	9.52	31.5		NEMA 34	
40	55.54	125.5	15.87	50		NEMA 42	
20	38.1	66.6	9.525	20.8	M5 bore	NEMA 23 with 9.525mm shaft	prepared for metric motors and special NEMA motors (47: SMH60 with encoder A6 / A7cannot be mounted parallelly on ET_32.
30	73	98.42	12.7	30.23		NEMA 34 with ½inch shaft	
37	73	98.42	14	30		NEMA 34 with 14mm shaft	
47	40	63	9	20		MH56-B5/9, SMH60-B8/9	
57	60	75	11	23		MH70-B5/11, SMH60-B5/11	
67	80	100	14	30		SMH82-B08/14	
77	95	115	19	40		SMH82-, SMH100- or, MH105-B5/19	
87	130	165	24	50		MH145-B5/24, SMH142-B5/24	
J4	80	100	19	40		MH105-B9/19	
J5	110	130	24	50		MH105-B6/24 ,SMH115-B7/24	
J6	130	165	32	58		HJ155	
J7	180	215	38	80		MH205-B5/38	
P3	60	75	16	48		P3	prepared for planetary gearbox
P4	70	85	22	56		P4	
P5	90	120	32	88		P5	
P7	130	165	40	112		P7	
N6	40	52	14	35	Internal thread M5	PE3	
N8	80	100	20	40		PE4	
90							prepared for non-standard motors / gears (only motors/gears with keyway can be fitted)

8. Index

9. Internet

Internet:

Additional information:

Our product on the Internet: http://www.parker-eme.com/et