Linear actuator with track roller guidance system and toothed belt drive

MLFI25-ZR

Fitting and maintenance manual

SCHAEFFLER GROUP
INDUSTRIAL

Safety guidelines and symbols

High product safety

Our products correspond to the current level of research and technology. If the bearing arrangement is correctly designed, if the products are handled and fitted correctly and as agreed and if they are maintained as instructed, they do not give rise to any immediate hazards.

Statements to be observed

This publication gives descriptions of standard products. Since these are used in numerous applications, we cannot make a judgement as to whether any malfunctions will cause harm to persons or property.

It is always and fundamentally the responsibility of the designer and user to ensure that all specifications are observed and that all necessary safety information is communicated to the end user. This applies in particular to applications in which product failure and malfunction may endanger persons.

Definition of guidelines and symbols

The warning and hazard symbols are defined along the lines of ANSI Z535.6-2006.

The meaning of the guidelines and symbols is as follows.

Warning  If they are not observed, death or serious injury may occur.

Caution  If they are not observed, minor or slight injury will occur.

 If they are not observed, damage or malfunctions in the product or the adjacent construction will occur.

Note! There follows additional or more detailed information that must be observed.

① Numbers within a circle are item numbers.

❑ Squares with a shaded border are placed in front of instructions.

✓ Tick marks indicate preconditions.

Contents

Contents

About this manual

The purpose of this manual

This fitting and maintenance manual is valid exclusively for the linear actuator MLFI25-ZR.

It describes the secure fitting and maintenance of the linear actuator.

How to use the manual

- ❑ This manual should be read carefully in full before starting any fitting or maintenance work.
- ❑ The manual must be stored throughout the life of the linear actuator.
- ❑ Please ensure that the manual is accessible at all times to the target group.
- ❑ The manual must be forwarded to each subsequent owner or operator of the linear actuator or the machine or equipment in which the linear actuator is fitted.

Target group

The target group of this manual comprises the operator and trained skilled personnel charged with the fitting and maintenance of the linear actuators described.

Safety guidelines for linear actuators

Use for the intended purpose

The linear actuator is intended exclusively for moving machine components connected to the carriage.

Any other use is not for the intended purpose and is therefore impermissible. The Schaeffler Group accepts no liability for any damage or loss arising therefrom.

General safety guidelines

- ❑ Any actions and methods that endanger the safety of human beings must not be carried out.
- ❑ In all fitting and maintenance work, the following must be observed:
  - all nationally valid and relevant specifications for the prevention of accidents
  - all generally recognised rules of safety practice and occupational medicine.

The linear actuator is constructed in accordance with the current level of technology and the recognised rules of safety practice. Nevertheless, while it is being used the user or third parties may be put at risk or the linear actuator and other material assets may be impaired.

Risk reduction

Risks can be reduced by observing the following points:

- ❑ The linear actuator should only be operated if it is free from technical defects.
- ❑ The linear actuator should only be used for the intended purpose and with an awareness of safety and hazards.
- ❑ If any malfunctions occur that have safety implications, the linear actuator must be stopped immediately and the malfunction rectified by a person with appropriate responsibility.

Fundamental instructions

The assembly and fitting of the linear actuator as well as the fitting and dismantling of the individual components must only be carried out as described in this manual:

- ❑ Carry out the operations in the specified sequence.
- ❑ Use the listed tools and fitting accessories correctly. Tools and fitting accessories that are unsuitable, damaged or contaminated will impair the function of the linear actuator.
- ❑ Screws must only be tightened using a torque wrench and the specified torques must be observed.
- ❑ Use rubber hammers only, not metal hammers.
- ❑ Do not use pointed or sharp-edged tools.

Personnel selection and qualification

Persons charged with the fitting and maintenance of the linear actuator must have adequate qualification. They must receive appropriate training and instruction before carrying out fitting or maintenance work.

Providing information to personnel

The fitting and maintenance manual must be available in a suitable form to the nominated persons (for example as a printout). This includes drawing explicit attention to the hazard and safety guidelines in this manual.

Disclaimer of liability

The Schaeffler Group does not accept any liability for harm to human beings, the linear actuator and the adjacent construction that can be attributed to:

- incorrect fitting
- incorrect or inadequate maintenance
- incorrect communication of the content to third parties or a failure to communicate the content.

Use of replacement parts

Special INA replacement parts have been developed for the linear actuator MLFI25-ZR. These ensure the reliable and long term function of the linear actuator.

❑ Do not use replacement parts other than original replacement parts from INA, see page 41.

Use of products from other sources

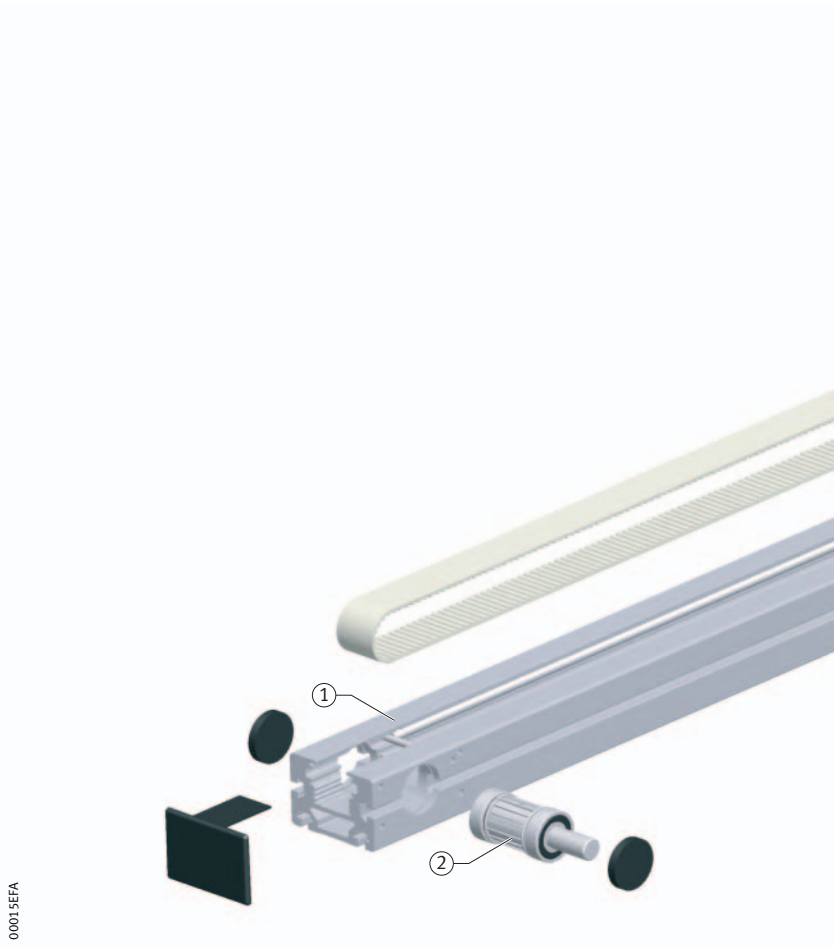
The use of products from other sources instead of INA replacement parts can:

- change the characteristics of the linear actuator in a negative manner
- endanger users or third parties
- cause impairment to the linear actuator and other material assets.

Disclaimer of liability

The Schaeffler Group accepts no liability for any damage or loss arising from the use of products from other sources.

Overview of the linear actuator

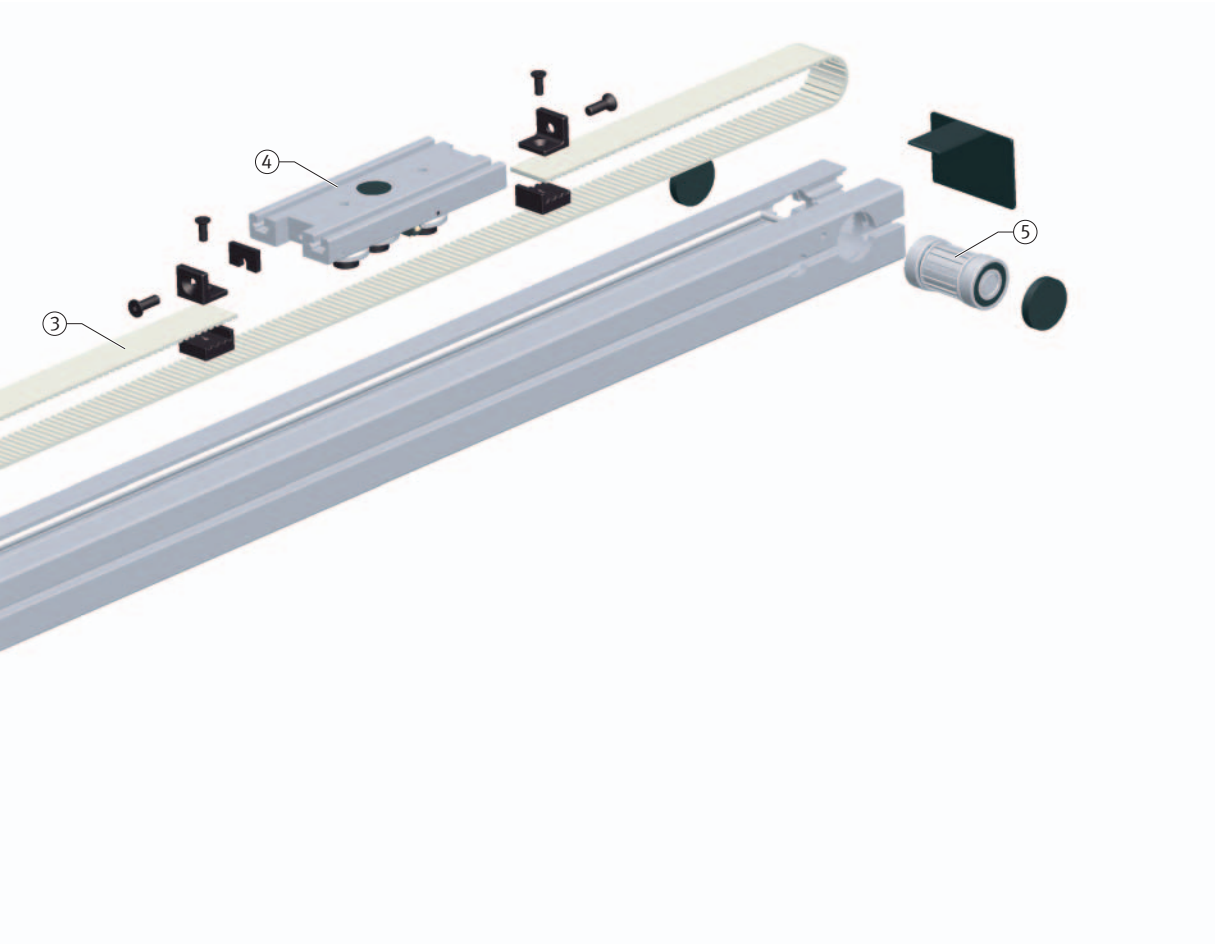


① Support rail with raceway shafts
② Drive unit
(return mechanism on drive side)
③ Toothed belt unit
④ Carriage with profiled track rollers
⑤ Return unit
(return mechanism on non-driven side)

Figure 1
Subassemblies
of linear actuator MLFI25-ZR

Scope of delivery

- Support rail with raceway shafts ①.
- Drive unit ②.



Scope of delivery
– continued

- Toothed belt unit ③.
  Toothed belt and toothed belt clamping devices:
  The toothed belt is fixed to the carriage by means of the two clamping devices.
- Carriage with profiled track rollers ④.
- Return unit ⑤.

Available designs

The linear actuator is available in different designs.

Carriage

Carriage	Suffix in ordering designation
Number of driven carriages	
1	–
2	Variant, see page 39
Length	
130 mm	–
250 mm	250
500 mm	500

Drive system

Drive system	Suffix in ordering designation
Without drive	OA
Drive shaft on right side	AR
Drive shaft on left side	AL
Drive shaft on both sides (right and left)	RL
Without drive shaft	OZ

Support rail

Support rail	Suffix in ordering designation
Single-piece maximum length: 4 000 mm	–

Note!

The text and illustrations in this manual cover,
by way of an example, the following design of linear actuator:

- one driven carriage 130 mm long
- drive shaft on the left side (AL).

The information in this manual can be applied analogously to all variants of the linear actuator MLFI25-ZR.

The precise design of your linear actuator is dependent on your order.

Ordering designation

The ordering number can be found engraved on one side of the support rail.

Ordering example

Design

Linear actuator with enclosed track roller guidance system	MLFI
Size	25
Drive type: single toothed belt	ZR
Drive shaft on left side	AL
Number of carriages	1
Total length of actuator	4 000 mm
Stroke length of actuator	3 735 mm

Ordering number **MLFI25-ZR-AL/4 000-3 735**

Variants

Variants of the standard designs are shown in the chapter Variants, see page 39.

Fitting in the adjacent construction

The linear actuator is fitted in two steps:

- the support rail is fixed to the adjacent construction
- the carriage is fixed to the adjacent construction.

Location of the support rail on the adjacent construction

The support rail can be located on the adjacent construction using the following accessories:

- clamping lugs, see page 13
- fixing brackets, see page 13
- T-nuts to DIN 508, see page 14
- T-bolts to DIN 787, see page 14
- hexagonal nuts to DIN 934, see page 14.

Note!

Under normal loads, location by means of clamping lugs, fixing brackets **or** T-nuts, T-bolts etc. is normally sufficient.

INA connecting brackets

Multi-axis handling systems comprising INA linear actuators can be constructed using INA connecting brackets.

Detailed information on the connecting brackets can be found in INA publication Fasteners and connecting brackets for linear actuators (TPI 153).

If linear actuators are located incorrectly, this can damage the linear actuator itself and the adjacent construction.

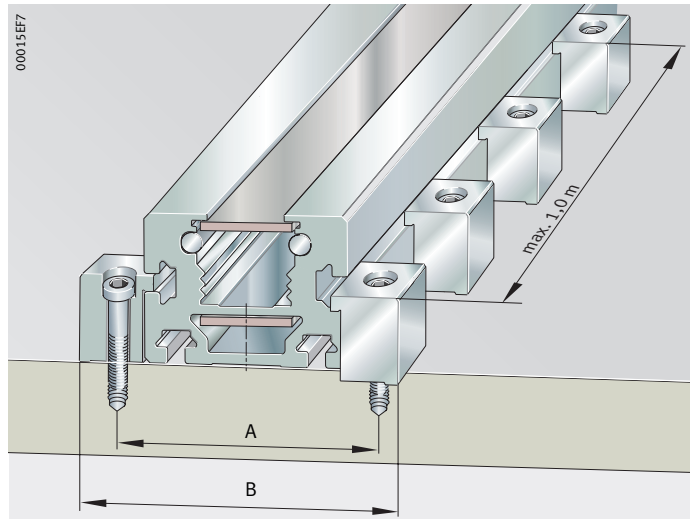
❑ Note the maximum tightening torques for the fixing screws, see page 45.

❑ Note the maximum spacings for the fasteners.

❑ Ensure that the adjacent construction has adequate strength.

Location of the support rail using clamping lugs or fixing brackets

❑ If the support rail is fully in contact with the adjacent construction, clamping lugs or fixing brackets should be fitted on the left and right sides of the support rail at intervals of max. 333 mm.



A = 73 mm
B = 88 mm

Figure 2
Location using clamping lugs

❑ Under high loads, the support rail should be fixed at shorter intervals or additionally by means of T-nuts or other accessories named on page 12.

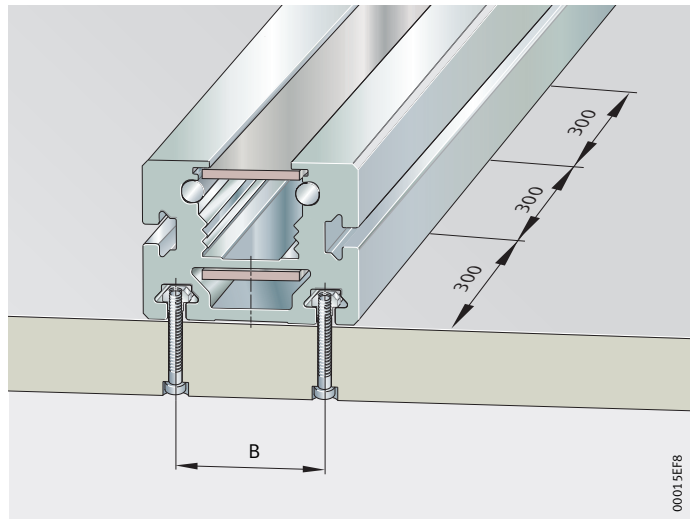
Fixing the support rail by means of T-nuts

❑ If the support rail is fully in contact with the adjacent construction, T-nuts should be fitted in both profiled slots at intervals of max. 300 mm.

Note!

The following accessories can be used instead of T-nuts:

- T-bolts
- hexagonal nuts.



B = 40 mm

Figure 3
Fixing by means of T-nuts

❑ Under high loads, the support rail should be fixed at shorter intervals or additionally by means of clamping lugs or fixing brackets.

Fixing the carriage to the adjacent construction

The carriage is fixed by means of:

- T-nuts to DIN 508
- T-bolts to DIN 787
- T-strips
- hexagonal nuts to DIN 934.

If linear actuators are located incorrectly, this can damage the linear actuator itself and the adjacent construction.

❑ Note the maximum tightening torques for the fixing screws, see page 45.

❑ Ensure that the adjacent construction has adequate strength.

❑ Protect the raceway of the carriage against contamination.

Fixing the carriage

❑ Carriages must be fixed to the adjacent construction in accordance with the loads and the forces acting on them.

Fitting and mounting of accessories

For the linear actuator MLFI25-ZR, INA offers specially developed accessories, see chapter Appendix, page 44.

This chapter shows the fitting of the following accessories:

- coupling housing
- coupling.

Coupling housing

The following tools are required:

- torque wrench
- Allen key or hex key inserts.

Warning

Sudden start of the machine.

Crushing of fingers between the linear actuator and machine parts.

❑ Before starting work, disconnect the machine from the power supply.

❑ Secure the main switch of the machine against switching on.

Fitting the coupling housing

❑ Remove the black protective cap from the drive shaft, see *Figure 11*, page 25.

❑ Slide the coupling housing over the drive shaft.
The larger opening must face towards the adjacent construction.

❑ Screw mount the coupling housing to the support rail using fixing screws.
– MLFI25-ZR: M5/5,5 Nm.

Figure 4
Screw mounting of the coupling

Removing the coupling housing

✓ Coupling removed.

❑ Loosen the fixing screws.

❑ Remove the coupling housing in the direction of the drive shaft.

Coupling

The following tools are required:

- torque wrench
- Allen key or hex key inserts.

Warning

Sudden start of the machine.

Crushing of fingers between the linear actuator and machine parts.

❑ Before starting work, disconnect the machine from the power supply.

❑ Secure the main switch of the machine against switching on.

Fitting the coupling

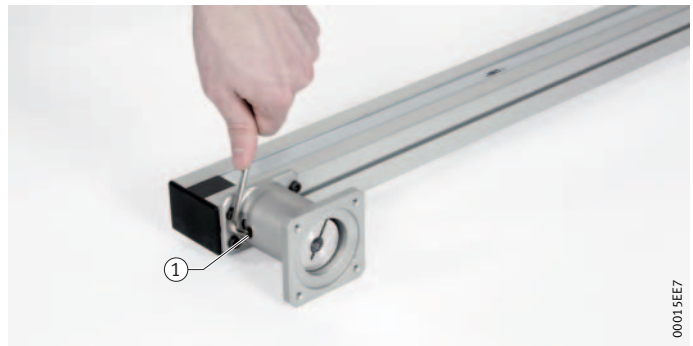
✓ Coupling housing fitted.

✓ Coupling firmly screw mounted on the motor side to the drive shaft.

❑ Slide the coupling onto the drive shaft of the drive unit. There must be a gap of approx. 2 mm left between the coupling and the end face of the housing on the actuator side.

❑ Rotate the coupling so that the fixing screw is accessible via the hole in the coupling housing.

❑ Fully tighten the fixing screw. The fixing screw and tightening torque will differ according to the coupling used, for information see INA publication ALE, Driven Linear Units.



① Hole in the coupling housing

Figure 5
Screw mounting of the coupling

Removing the coupling

❑ Rotate the coupling so that the fixing screw is accessible via the hole in the coupling housing.

❑ Loosen the fixing screw.

❑ Remove the coupling in the direction of the drive shaft.

Maintenance

Maintenance requirements

Maintenance work is restricted to:

- relubrication
- cleaning.

Maintenance work may require the removal and refitting of components, see page 22 onwards.

Visual inspection

In order to ensure exact function and a long operating life of the linear actuator, it must be visually inspected for damage and contamination at regular intervals.

Maintenance intervals

Maintenance intervals, especially the intervals between relubrication, are influenced by:

- travel speed and drive torque
- loading
- temperature
- stroke length
- environmental conditions (cleanliness etc.).

Maintenance according to operating conditions

It is not possible to calculate all the influences on maintenance intervals. The intervals can therefore only be determined precisely under operating conditions.

Note!

The interval lengths stated in the following sections are **maximum** maintenance intervals. They must be shortened for each individual case depending on the types of influences present.

Relubrication

Relubrication is necessary for:

- carriages.

When should relubrication be carried out?

The relubrication interval is dependent on the environmental conditions. Relubrication times and quantities can only be determined precisely under operating conditions.

Relubrication must be carried out:

- as a function of the application
  This must be determined in accordance with the operating conditions.
- as soon as fretting corrosion[1)] occurs.

Note! If fretting corrosion occurs, the lubrication intervals should definitely be reduced.

What should be used for relubrication?

For relubrication of the carriage, oils CL and CLP to DIN 51 517 with a viscosity of ISO-VG 220 are recommended.

Note! Detailed information on recommended lubricants can be found in the INA publication ALE, Driven Linear Units. The INA publication can be requested through info.linear@schaeffler.com.

What is the relubrication quantity?

Guide values for the required quantity of oil are dependent on the length of the carriage.

Relubrication quantity Carriage

Carriage length	Relubrication quantity for carriage (guide values)
130 mm	approx. 1 ml to 2 ml
250 mm	approx. 2 ml to 3 ml
500 mm	approx. 2 ml to 3 ml

Note! It is more advisable to carry out relubrication at several points during the maintenance interval, using partial quantities in each case, than relubrication at the end of the interval using the entire quantity.

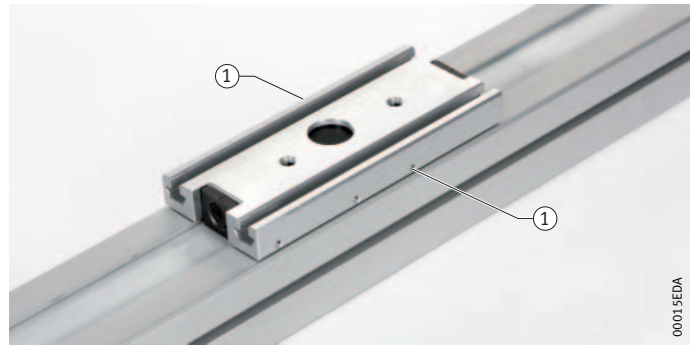
1) Fretting corrosion can be identified by a reddish discolouration of the raceway shafts or the outside surface of the track rollers.

Relubrication of carriages

The carriage is lubricated via felt inserts integrated in the carriage. Relubrication is carried out via holes in the carriage.

Holes for relubrication

The holes are located on the longitudinal sides of the carriage.



① Holes for relubrication

Figure 6
Holes for relubrication

Relubrication can be carried out from either the left or right side.

Warning

Sudden start of the machine.
Crushing of fingers between the carriage and machine parts.
- ❑ Before starting work, disconnect the machine from the power supply.
- ❑ Secure the main switch of the machine against switching on.

Relubrication of carriages

- ✓ Linear actuator warm from operation.
- ✓ Hole for relubrication clean and accessible.
- ❑ Remove the grub screw from the hole.
- ❑ Feed the required lubricant quantity into the hole.
- ❑ If possible, move the carriage by hand during lubrication in order to distribute the oil evenly.
- ❑ Close the hole again using the grub screw.

Cleaning

When should cleaning be carried out?

Cleaning must be carried out if heavy contamination is present.

The cleaning requirements are dependent on the environmental and application conditions and can only be determined in the operational state.

Cleaning of components after removal

If components must be removed or the linear actuator must be dismantled, the components should be cleaned before refitting.

Damage due to unsuitable cleaning tools or cleaning agents.

- ❑ Do not use pointed, hard or abrasive objects.
- ❑ Do not dampen lubricated components during cleaning.
- ❑ Do not use abrasives, petroleum spirit, oil etc.

What should be used for cleaning?

Suitable cleaning tools are:

- paint brush
- soft brush
- soft cloths.

Linear actuator

The linear actuator is dismantled in the following sequence:

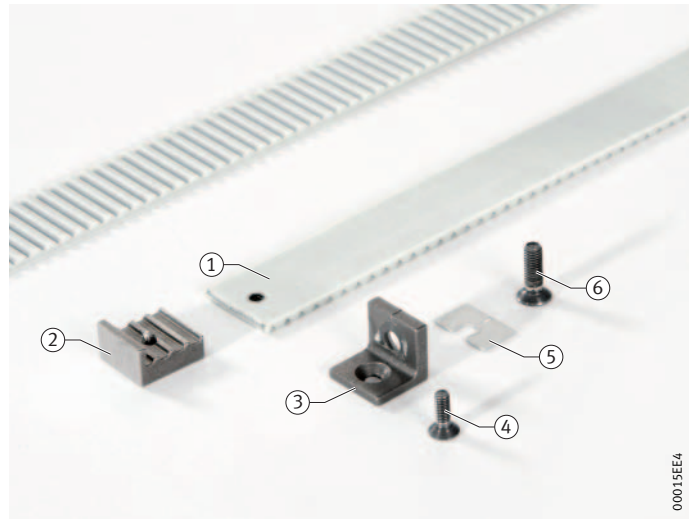
- remove the toothed belt, see page 23 to page 24
- remove the drive unit or return unit, see page 25 to page 26
- remove the carriage, see page 27.

Note!

It is only necessary in exceptional cases to completely disassemble the linear actuator.

Toothed belt unit

The toothed belt unit comprises the toothed belt and two clamping devices. The clamping devices connect the toothed belt to the carriage.



① Toothed belt

Clamping device:
② Lower clamping piece
③ Upper clamping piece
④ Fixing screw
⑤ Spacer
⑥ Adjusting screw

Figure 7
Overview of toothed belt unit

Warning

Sudden start of the machine.

Crushing of fingers between the carriage and machine parts.

❑ Before starting work, disconnect the machine from the power supply.

❑ Secure the main switch of the machine against switching on.

Removing the toothed belt

The following tools are required:

- torque wrench
- Allen key or hex key inserts.

Note!

The toothed belt is supplied with a factory-specified preload. If the toothed belt is refitted after removal, it must be set to the same preload as before removal, see page 37.

Detaching the clamping devices from the carriage

❑ Loosen and remove the adjusting screw.

Figure 8
Loosening the adjusting screw

❑ Remove the clamping devices and the spacers from the carriage.

❑ If the same toothed belt is refitted: store the spacers carefully and reuse them when fitting the clamping device in order to achieve the original preload.

Removing the clamping device from the toothed belt

❑ Loosen and remove the fixing screws of the clamping device.

Figure 9
Loosening the fixing screw

❑ Remove the upper and lower clamping pieces from the toothed belt.

Detaching the second clamping device from the carriage

❑ Detach the second clamping device from the carriage, but **do not** remove the clamping pieces from the toothed belt.

Note!

The second clamping device must only be removed from the toothed belt if the clamping device itself or the toothed belt must be replaced. Dismounting of the second clamping device is not necessary in order to remove the toothed belt unit.

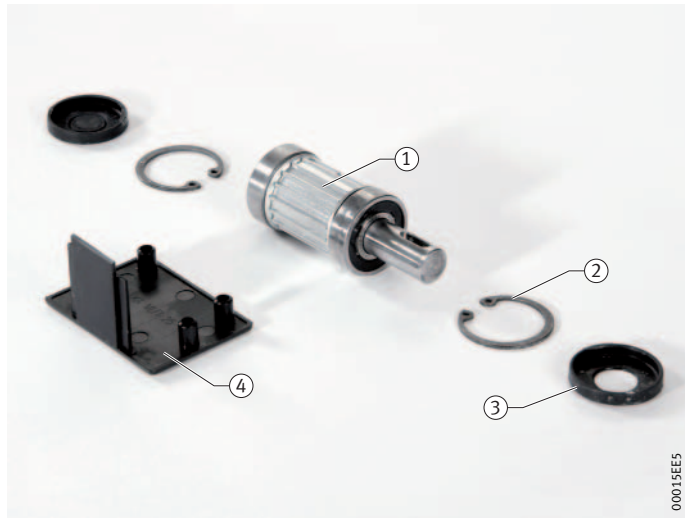
Removing the toothed belt

❑ Grip the toothed belt by the clamping device and pull it out of the support rail.

Figure 10
Removing the toothed belt

Drive and return unit

The drive unit and return unit differ according to the design. However, both components are dismounted in the same way.



① Toothed belt pulley with bearing
② Snap rings
③ Protective caps
④ End cover

Figure 11
Overview of drive unit

Removing the drive unit or return unit

The following tools are required:

- snap ring pliers
- removal tool.

✓ Toothed belt removed, see page 23.

✓ In the case of the drive unit: motor, coupling and coupling housing removed, see page 17 and page 16.

Preparing for removal

❑ Remove the black end cover from the support rail.

Figure 12
Removing the end cover

❑ Remove the round protective caps.

Removing the toothed belt pulley

❑ Remove the snap ring.

Figure 13
Removing the snap ring

Damage to the toothed belt pulley and support rail due to unsuitable tools.

❑ Do not use pointed or sharp-edged tools.

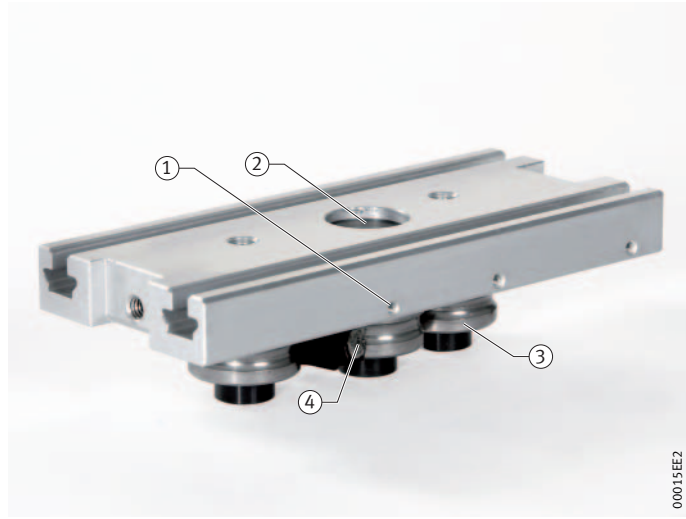
❑ Do not use a hammer.

❑ Remove the toothed belt pulley using a press-out tool.

Carriage

It is only necessary to remove the carriage if it is to be replaced by a new carriage.

Carriages differ according to the design. However, they are all dismounted in the same way.



① Hole for relubrication
② Protective cap for eccentric bolt
③ Profiled track rollers
④ Felt inserts for relubrication

Figure 14
Overview of carriage

Damage due to contaminated lubricant.

The characteristics of oil may change due to contamination.

❑ The work area must be cleaned before removing the carriage.

❑ Elements with oil must be laid only on a clean, lint-free underlay.

Removal of carriage

✓ Drive unit or return unit removed, see page 25.

Damage due to incorrect removal.

❑ While removing the carriage, hold it concentric and parallel to the support rail.

Removing the carriage

❑ Push out the dowel pin at the open end of the support rail.

❑ Remove the carriage carefully from the support rail.

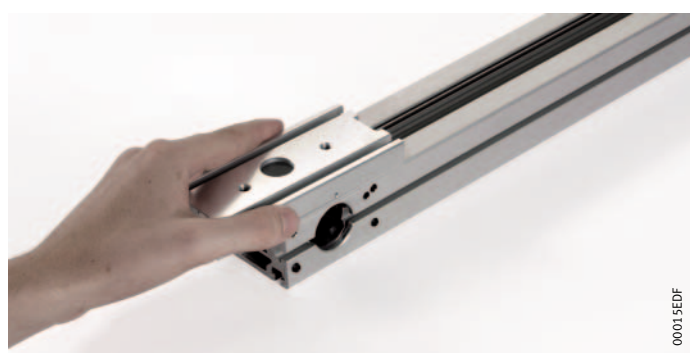


Figure 15
Removing the carriage

Linear actuator

A completely disassembled linear actuator is reassembled in the following sequence:

- fit the carriage, see page 29 to page 31
- fit the drive unit and return unit, see page 32
- insert the toothed belt, see page 34 to page 35
- fix the toothed belt to the carriage, see page 36
- preload the toothed belt, see page 37 to page 38.

Carriage

A component overview is shown in *Figure 14*, page 27.

The following tools are required:

- torque wrench
- Allen key or hex key inserts
- ring wrench.

Damage due to incorrect fitting.

❑ Hold the profiled track rollers with the correct fit at the level of the raceway shafts.

❑ Hold the carriage concentric and parallel to the support rail.

❑ Ensure that the carriage runs without clearance over the whole length of the support rail.

❑ After fitting, relubricate the raceway shafts.

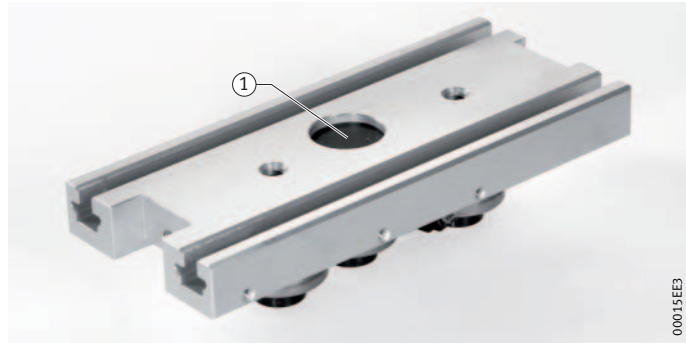
Fitting the carriage

✓ Drive unit or return unit removed, see page 25.

✓ Dowel pin pushed out.

Preparing the carriage

❑ Remove the black protective cap on the eccentric bolt.

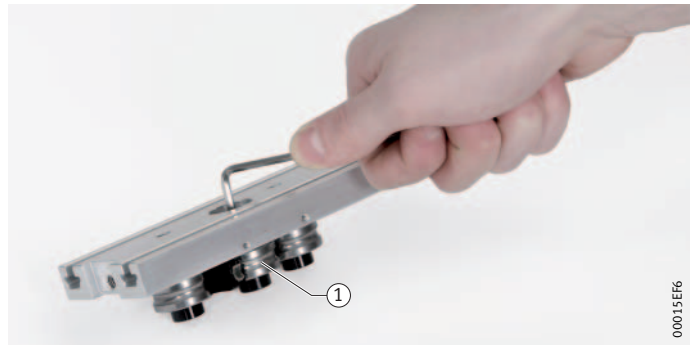


① Protective cap on eccentric bolt

Figure 16
Protective cap on eccentric bolt

❑ Loosen the nut of the eccentric bolt until the eccentric bolt can be turned.

❑ Turn the profiled track roller of the eccentric bolt towards the centre of the carriage.



① Profiled track roller with eccentric bolt

Figure 17
Turning the profiled track roller towards the centre of the carriage

Sliding the carriage onto the support rail

❑ Slide the carriage carefully onto the raceway shafts.

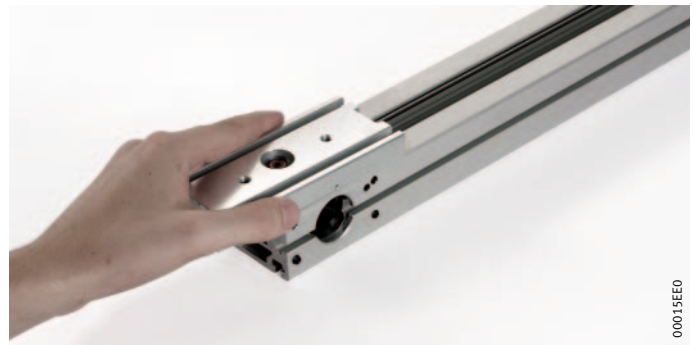


Figure 18
Sliding the carriage onto the raceway shafts

Setting the profiled track rollers clearance-free

❑ Turn the eccentric bolt until the carriage sits without clearance on the raceway shafts. While doing this, move the carriage by hand.

Figure 19
Turning the eccentric bolt

❑ Tighten the nut of the eccentric bolt to a tightening torque of 15 Nm. Ensure that the eccentric bolt does not rotate as well.

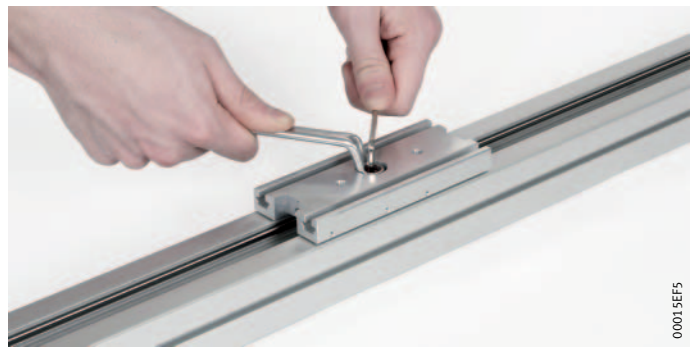


Figure 20
Tightening the nut on the eccentric bolt

❑ Move the carriage by hand and check whether it can move without clearance over the whole length of the support rail.

Note!

If the carriage **cannot** move without clearance over the whole length of the support rail, please contact Application Engineering at the Linear Technology Division.

Finishing the fitting procedure

❑ Press the protective cap into the recess for the eccentric bolt.

❑ Drive in the dowel pin on the support rail.

Drive unit and return unit

A component overview is shown in *Figure 11*, page 25.

The following tools are required:

- snap ring pliers.

✓ Carriage fitted, see page 29 to page 31.

Fitting the drive unit or return unit

The drive unit and return unit differ according to the design. However, both components are mounted in the same way.

Damage to the toothed belt pulley and support rail due to unsuitable tools.

❑ Do not use pointed or sharp-edged tools.

❑ Do not use a hammer.

Fitting the toothed belt pulley

❑ Press the toothed belt pulley into the support rail until it is in contact with the snap ring at the back.

❑ Fit the front snap ring.

Figure 21
Fitting the snap ring

Finishing the fitting procedure

❑ Fit the protective caps.

Toothed belt unit

A component overview is shown in *Figure 7*, page 22.

Overview of fitting

The toothed belt is fitted in 3 steps:

- insert the toothed belt
- fix the toothed belt to the carriage
- preload the toothed belt.

The following tools are required:

- torque wrench
- Allen key or hex key inserts
- screwdriver.

Note!

If the toothed belt is refitted after removal, it must be set to the same preload as before removal, see page 37.

Starting point

The following instructions are based on the assumption that the toothed belt is inserted into the support rail end of the drive unit.

Fitting the toothed belt

✓ Drive unit **and** return unit fitted, see page 32.

Inserting the toothed belt

❑ Insert the toothed belt into the lower hollow section of the support rail. The teeth of the toothed belt must face upwards.

Figure 22
Inserting the toothed belt into the support rail

❑ Insert the toothed belt until it reaches the toothed belt pulley of the return unit.

Damage to the toothed belt due to unsuitable tools.
❑ Do not use pointed or sharp-edged tools.

❑ In the **return unit,** push the toothed belt upwards with the aid of a screwdriver and feed it onto the teeth of the toothed belt pulley.

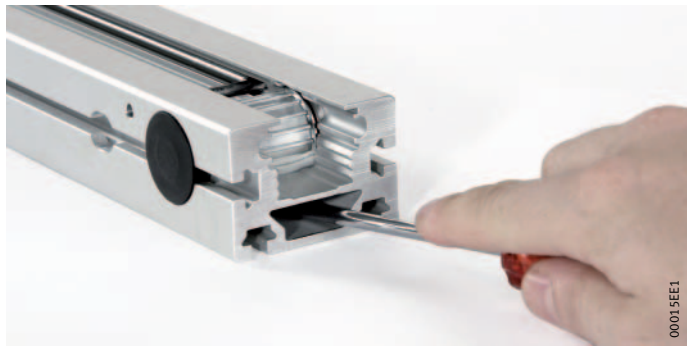


Figure 23
Feeding the toothed belt onto the toothed belt pulley

❑ Feed the toothed belt over the toothed belt pulley and pull it out far enough until its other end is below the drive unit.

❑ Feed the toothed belt in the drive unit onto the teeth of the toothed belt pulley.

❑ Feed the toothed belt pulley over the toothed belt pulley and pull it out.

Fitting the end covers

❑ Mount the black end covers on the ends of the support rail.

Figure 24
Fitting the end cover

Attaching the toothed belt to the carriage

❑ Screw mount the upper and lower clamping pieces of the first clamping device to the toothed belt:
– MLFI25-ZR: M4/2,7 Nm.

Figure 25
Screw mounting the clamping device to the toothed belt

❑ Screw mount the clamping device to the carriage using the adjusting screw:
– MLFI25-ZR: M5/5,5 Nm.

Figure 26
Screw mounting the clamping device to the carriage

❑ Screw mount the second clamping device to the toothed belt:
– MLFI25-ZR: M4/2,7 Nm.

❑ Screw mount the clamping device to the carriage loosely enough that the toothed belt is **not** yet tensioned.

Preloading the toothed belt during refitting

When refitting a toothed belt that has been removed:

❑ Reinsert the stored spacer between the clamping device and the carriage.

❑ Tighten the clamping device with a torque of M5/5,5 Nm to the hard stop.

Preloading a new toothed belt

When fitting a new toothed belt:

❑ Mark a measurement length of 1 000 mm on the untensioned toothed belt.
In order to increase the measurement accuracy,the measurement length can be extended in the case of longer linear actuators (2 000 mm, 3 000 mm etc.).

Figure 27
Measurement length marked (not to scale)

❑ Tighten the adjusting screw on the second clamping device until the measurement length is extended by 1 mm per 1 000 mm.

Figure 28
Measurement length preloaded (not to scale)

Inserting the spacer

- ❑ Measure the gap between the clamping device and carriage using a vernier.
- ❑ Select one spacer corresponding to the width of the gap. If a single spacer is not sufficient, select 2 or more spacers that together correspond to the width of the gap.
- ❑ Insert the spacer in the gap between the carriage and clamping devices.
- ❑ Tighten both clamping devices with a torque of M5/5,5 Nm to the hard stop.

Variants

Available variant

Carriage	Suffix in ordering designation
2 driven carriages	W2

Ordering example

Design	
Linear actuator with enclosed track roller guidance system	MLFI
Size	25
Carriage length	250 mm
Drive type: single toothed belt	ZR
Drive shaft on both sides	RL
Two carriages	W2
Total length of actuator	4 000 mm
Stroke length of actuator	3 735 mm

Ordering designation **MLFI25-250-ZR-RL-W2/4 000-3 735**

Multiple carriages

If the linear actuator has more than one carriage, these are linked by individual pieces of toothed belt.

Fitting of multiple carriages

The following tools are required:

- rubber hammer
- torque wrench
- Allen key or hex key inserts
- screwdriver.

✓ All carriages slid onto raceway shafts, see page 29 to page 31.

Fixing the toothed belt between carriages

❑ Fit short pieces of toothed belt with clamping devices and use these to link the carriages, see page 36.

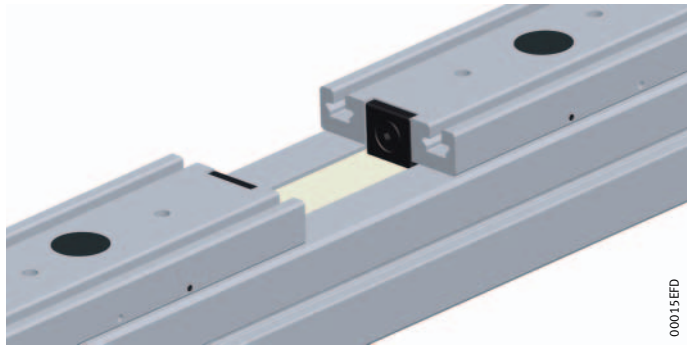


Figure 29
Linking carriages using separate piece of toothed belt

Fitting the toothed belt

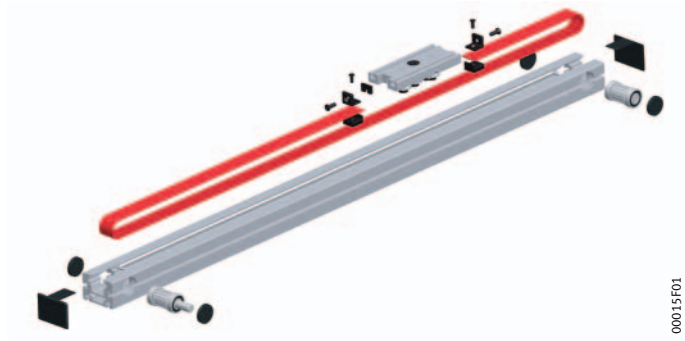
❑ Fit the long piece of toothed belt, see page 34 onwards.

Replacement parts

Note!

The precise design of your linear actuator is dependent on your order. When ordering replacement parts, please indicate the ordering number of your linear actuator. The ordering number can be found engraved on one side of the support rail.

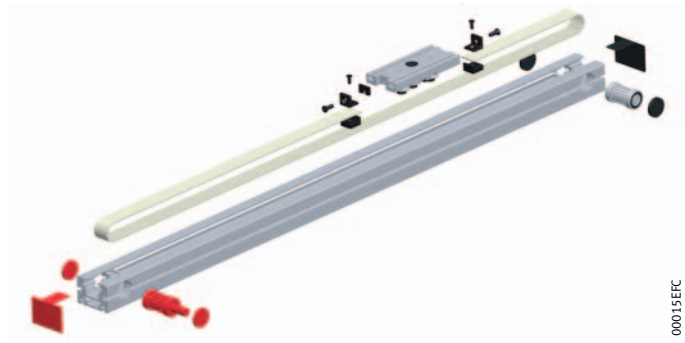
Toothed belt



Replacement parts list for toothed belt

Linear actuator	Designation	MATNR
MLFI25-ZR	ZHRI25-AT-5	001288261-0000

Drive unit

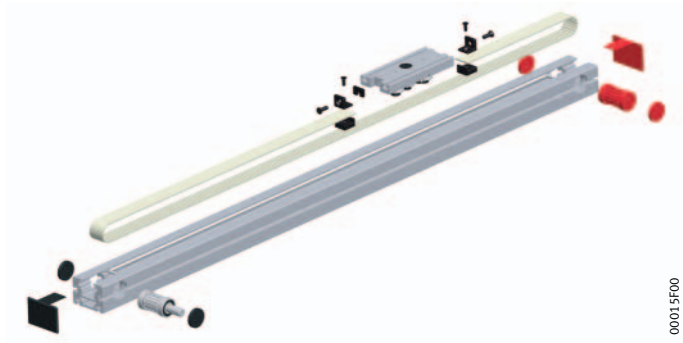


Replacement parts list for drive unit

Linear actuator	Designation	MATNR
Drive shaft on left or right side		
MLFI25-ZR	WE.MLFI25-ZR-AR-7800	001256319-0000
Drive shaft on both sides		
MLFI25-ZR	WE.MLFI25-ZR-RL-7800	002454599-0000

Replacement parts

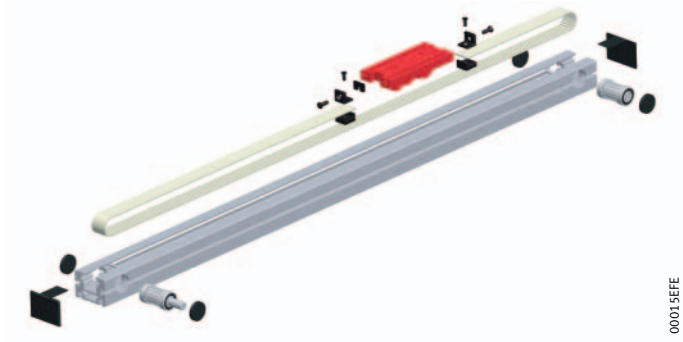
Return unit



Replacement parts list for return unit

Linear actuator	Designation	MATNR
MLFI25-ZR	WE.MLFI25-ZR-7800	001230689-0000

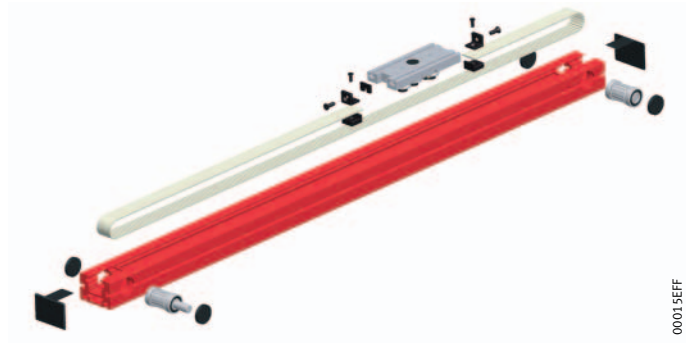
Carriage



Replacement parts list for carriage

Linear actuator	Designation	MATNR
Carriage length 130 mm		
MLFI25-ZR	LAW.MLFI25-ZR-4400	001212761-0000
Carriage length 250 mm		
MLFI25-ZR	LAW.MLFI25-250-ZR-4400	003331199-0000
Carriage length 500 mm		
MLFI25-ZR	LAW.MLFI25-500-ZR-4400	003266940-0000

Support rail



Replacement parts list for support rail

Linear actuator	Designation	MATNR
Drive unit on one side		
MLFI25-ZR	LFS.MLFI25-ZR-RL-4700	029053501-0000
Drive unit on both sides		
MLFI25-ZR	LFS.MLFI25-ZR-RL-RL-4700	029053510-0000

Appendix

Accessories

Special INA replacement parts have been developed for the linear actuator. These ensure the reliable and long term function of linear actuators.

Location

Accessory	Article number
Clamping lugs	SPPR24×20
T-nuts	MU-DIN508-M4×5
	MU-M5×5-POS
	MU-M6×8-POS
Slot closing strips	NAD5×5,7
Connecting brackets	See INA publication Fasteners and connecting brackets for linear actuators (TPI 153)

Coupling, gearbox, motor

As a system supplier, the Schaeffler Group also offers components including coupling housings, couplings, gearboxes and motors. These components are precisely matched to the linear actuator.

Coupling	Coupling housing	Gearbox[1)]	Motor
KUP50-40-2-12H7/16H7	KGEH25/36000-MLFI-ZR	PL 70..-i	MOT-SMH60
			MOT-SMH82
KUP50-40-2-11H7/12H7			MOT-SMH60
KUP50-40-2-12H7/14H7	KGEH25/36200-MLFI-ZR		MOT-SMH82

1) i = ratio.

Comprehensive information can be found in INA publication ALE, Driven Linear Units and on the Internet at www.schaeffler.com.

Tightening torques

The correct tightening torques are shown in the table.

Screw	Grade	Tightening torque Nm
M4	8.8	2,7
	10.9	4,3
	12.9	5,1
M5	8.8	5,5
	10.9	8,4
	12.9	10,2
M6	8.8	9,5
	10.9	14,7
	12.9	17,6
M8	8.8	23
	10.9	35,3
	12.9	42,2
M10	8.8	46
	10.9	67
	12.9	78
M12	8.8	80
	10.9	115
	12.9	135

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