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## Symbols, safety



Important information



Observe directions for disposal



Observe directions for disposal



Maintenance



Note! Failure to observe this safety instruction can result in material damage



Warning! Failure to observe this safety instruction is likely to result in material damage, serious injury or death



Caution! Failure to observe this safety instruction can result in material damage, serious injury or death



Caution! Failure to observe this safety instruction can result in material damage or injury

## General safety information

The details and information in this guide are provided for the purposes of describing the product and its installation only. This information does not discharge users from the obligation to conduct their own assessments and checks. It is also important to bear in mind that our products are subject to a natural process of wear and ageing.

This guide contains important information that will enable you to use the product safely and appropriately. When the product is sold, rented out or otherwise passed on to another party, this guide must be handed over with it. You must therefore read and follow the safety instructions set out below.

- All work on and with Linear Unit KLE 5 40x40 LR must be performed with “safety first” in mind.
- Switch off the power to Linear Unit KLE 5 40x40 LR before carrying out any work on the linear axis.
- Observe the regulations pertaining to accident prevention and environmental protection that apply in the country and place of work where the product is being used.
- Use only item products that are in perfect working order.
- Failure to use original spare parts will invalidate the product warranty!
- Check the product for obvious defects.
- Use the product only within the performance range described in the technical data.
- Ensure all the safety equipment associated with the product is present, properly installed and in full working order.
- Do not alter the position of safety equipment, circumvent it or render it ineffective.

Linear Unit KLE 5 40x40 LR, as described here, corresponds to the state of the art and takes into account the general principles of safety applicable at the time this guide was published. Nevertheless, failure to observe the safety instructions and warning notices in this guide may result in personal injury and damage to property. We will assume no liability for any resulting damage or injury. We reserve the right to make changes that represent technical advances. Keep this guide in a place where it can be accessed by all users at any time. This general safety information applies to the entire lifecycle of Linear Unit KLE 5 40x40 LR.

## Correct use

Linear Unit KLE 5 40x40 LR is a component and must only be used in accordance with the technical data and safety requirements set out in this document. Combining Linear Unit KLE 5 40x40 LR with a motor and controller creates a partly completed machine as defined in Machinery Directive 2006/42/EC. Internal company requirements and the regulations that apply in the country where the product is being used must be observed. You must not make any design modifications to Linear Unit KLE 5 40x40 LR yourself. We will assume no liability for any resulting damage or injury. You may only install, operate and maintain Linear Unit KLE 5 40x40 LR if:

- Linear Unit KLE 5 40x40 LR has been integrated into its surroundings in a proper and safe manner.
- You have carefully read and understood the guide.
- You are appropriately qualified.
- You are authorised to do so by your company.
- You are using only original equipment from the manufacturer.

Linear Unit KLE 5 40x40 LR is designed for indoor use.

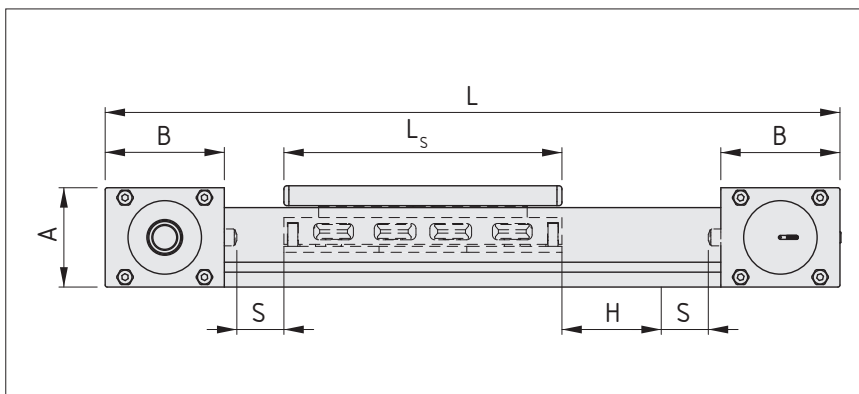
## Improper use

Improper use is defined as any use of the product for purposes other than those authorised in this guide and under the definition of correct use. We will assume no liability for any resulting damage or injury.

## Product description

Linear Unit KLE 5 40x40 LR with roller guide and dynamic timing-belt drive is designed for operating loads of up to 150 N. The roller elements run from the Timing Belt and are concealed within the profile.

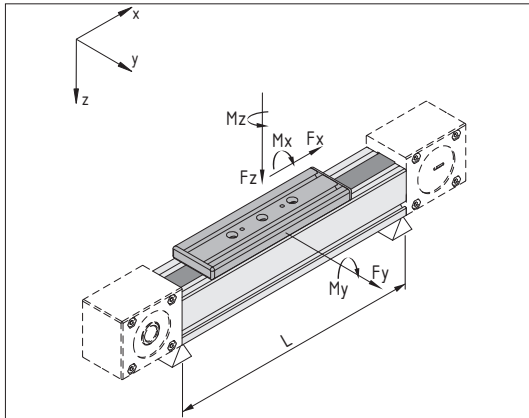
Linear Unit KLE 5 40x40 LR:



Article	A [mm]	B [mm]	s [mm]	L <sub>s</sub> [mm]	L [mm]	Mass
0.0.710.86 (base unit)	50	60	23.5	140	H+320	1.289 kg
0.0.719.96						1.999 kg/m

H: Stroke

## Technical data



Maximum stroke:	2800 mm
Mass per mm of stroke:	1.999 kg/m
Repeatability:	0.1 mm
Maximum acceleration:	10 m/s <sup>2</sup>
Maximum speed:	5 m/s
Feed:	90 mm/revolution
Mounting dimension:	50 mm x 40 mm
Maximum operating load:	150 N

	Support width $L_{max}$ at $F_{z max}$ [mm]	Support width $L_{max}$ at $F_{y max}$ [mm]	$F_{y max}$ [N]	$F_{z max}$ [N]	$M_{x max}$ [Nm]	$M_{y max}$ [Nm]	$M_{z max}$ [Nm]	Operating load $F_{x max}$ [N]
Linear Unit KLE 5 40x40 LR	1050	1200	250	200	4	8	15	150

Ambient conditions:

Storage temperature: -20°C to +70°C

Relative humidity: 5% to 85%

Linear Unit KLE 5 40x40 LR is intended as a permanent fixture to be used in an area that is protected from the weather.

Do not set up or use in close proximity to industrial plants that produce chemical emissions.

Do not install or use in an area that is regularly exposed to high-energy surges such as those caused by presses or heavy machinery, for example.

In case of doubt regarding resistance to certain chemicals such as test oil, alloyed oils, aggressive cleaning substances, solvents or brake fluid, we advise that you consult your specialist representative.

Consult the manufacturer if using in very salty air.

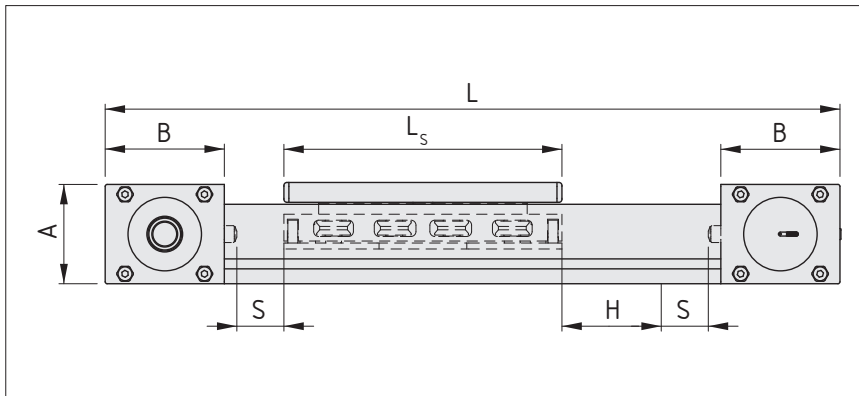
Deflection in Linear Unit KLE 5 40x40 LR should not exceed 1 mm over an axis of 1000 mm.

## Preparing for installation

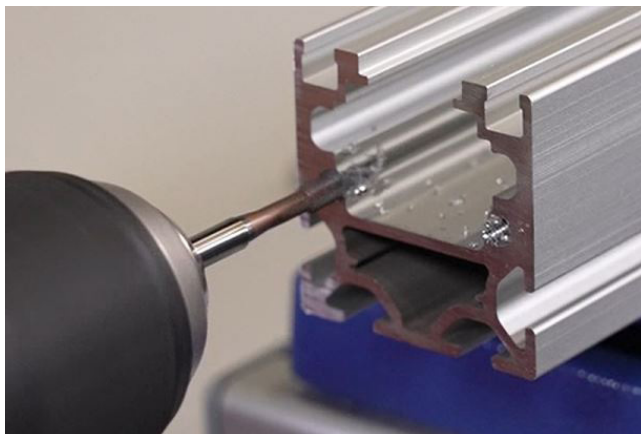
Switch off the power to the system before carrying out any installation, cleaning or maintenance work on Linear Unit KLE 5 40x40 LR.

Preparations for installation:

- |  |                                       |
|--|---------------------------------------|
| ▪ Total length of Linear Unit KLE 5 40x40 LR [mm]: | $L = H + 320 \text{ mm}$              |
| ▪ Length of profile [mm]:                          | $L_p = H + 200 \text{ mm}$            |
| ▪ Length of Cover Profile [mm]:                    | $L_A = L_p$                           |
| ▪ Shaft D6 [mm]:                                   | $L_W = L_p - 2 \text{ mm}$            |
| ▪ Timing Belt [mm]:                                | $L_Z = 2 \times L_p + 140 \text{ mm}$ |
| ▪ Stroke [mm]:                                     | H                                     |



NOTE! Anti-slip aids should be placed underneath the axis during installation.  
Safety gloves should be worn when installing the axis.

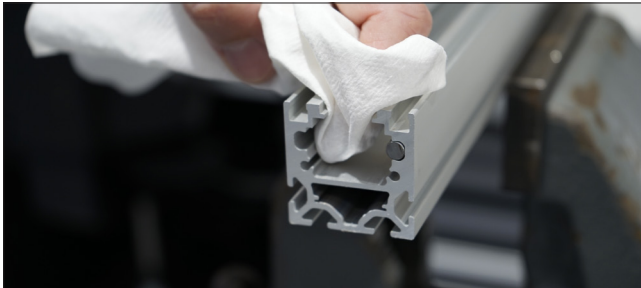


The first step is to countersink the core bores on the end face of Profile 5 40x40 KLE on both sides and give them an M4x12 thread. The tap should have a helix to prevent it from canting in the core hole.

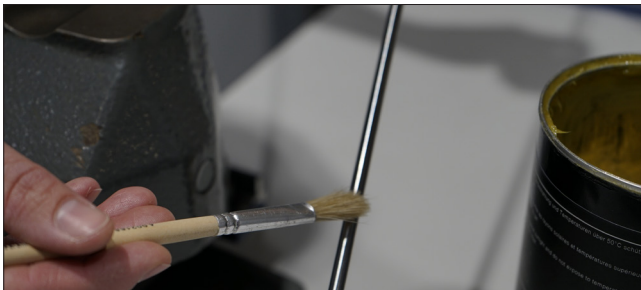
The holes and the profile must then be thoroughly cleaned of shavings.

## Press-fitting the Shafts

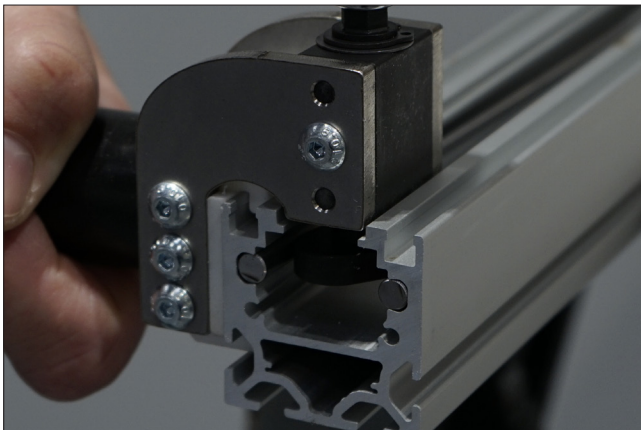
The Shafts D6 (0.0.356.01) are pressed into the Support Profile. We recommend using a tool set (0.0.720.58).



Firstly, clean the open clamping channels for holding the shafts and the shafts themselves. It is essential to ensure that the shaft ends are free of burrs.



The Shaft is greased with a commercially available roller bearing grease to facilitate pressing in.



The Shaft is positioned with an offset of approx. 1 mm inwards. The Press-in tool uses the profile contour of the KLE 5 profile. The Press-in tool is supported in the lower groove, the upper channel and the open contour of the KLE 5 profile. With the help of a torque spanner, an eccentric device is turned, which presses and clamps the shafts D6 into the channel, side by side.

A torque of  $M = 35 \text{ Nm}$  must be applied to press the Shaft D6 in correctly.



The Shaft is pressed into the channel in 40 mm steps along the entire length of the profile.



**CAUTION!** The clamping distances should not be larger, otherwise shaft sections will not be pressed in and the Slide will be jammed..

## Installing the carriage



The carriage is pre-assembled.

There is an extension spring on the bottom of the carriage, and this must be tensioned.

The safety label is designed to prevent the Hexagon Socket Head Cap Screws being loosened before installation, which would release the tension in the spring.



**CAUTION!** The safety label that covers three Hexagon Socket Head Cap Screws must only be removed after the carriage has been installed in the profile.



The felt inserts of the End Cap and Lubricating System are sufficiently wetted with oil before installation



The felt inserts of the End Cap and Lubricating System are pressed together carefully when the carriage is inserted into the support profile so they are not damaged by the sharp cut edges of the profile.



**CAUTION!** Damaging the felt inserts will have a significant impact on the service life of the Linear Unit.



Once the carriage has been pushed into the profile, remove the safety label. Significant play can still be felt on the carriage within the profile.



Loosen the Hexagon Socket Head Cap Screws, which are now accessible. The tension in the pre-tensioned spring will start to release, adjusting the two internal rollers in the profile to eliminate play. Gently moving the carriage will help this play-free setting up process.

Move the carriage along the entire length of the profile to check how free of play it is.

Finally, undo the Hexagon Socket Head Cap Screws fully and remove the carriage plate.



There are two other plates beneath the carriage plate. These must both also be removed. Only the Dowel Pins remain in the carriage body.

### Installing the Timing Belt



The Timing Belt, which has already been cut to the calculated length, is pushed into the lower section of the profile designed for this purpose.

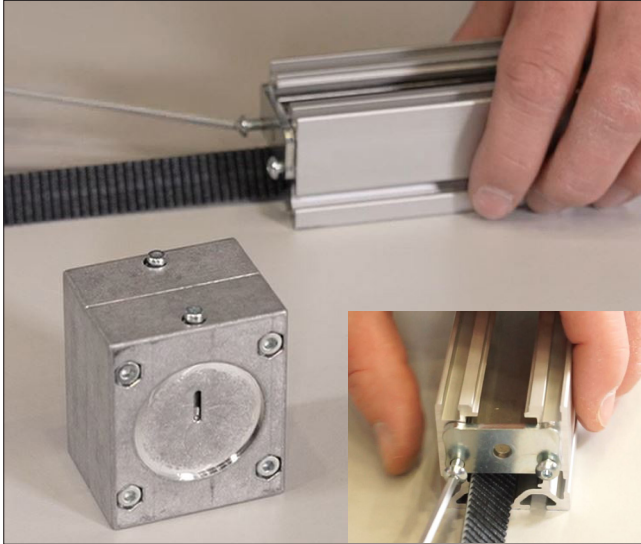
The back of the Timing Belt should face downwards, with the teeth of the belt facing inwards.



Position the Timing Belt so it protrudes evenly to the left and right.

## Installing the Timing-Belt Reverse Unit and drive assembly

The Timing-Belt Reverse Unit and drive assembly are installed in the same way.



First screw the profile connecting plate onto the profile using 2 Button-Head Screws M4x12.

$M_T=4 \text{ Nm}$

Attention must be paid to the alignment of the mounting plate, otherwise the further installation and function of the Linear Unit will be impacted.

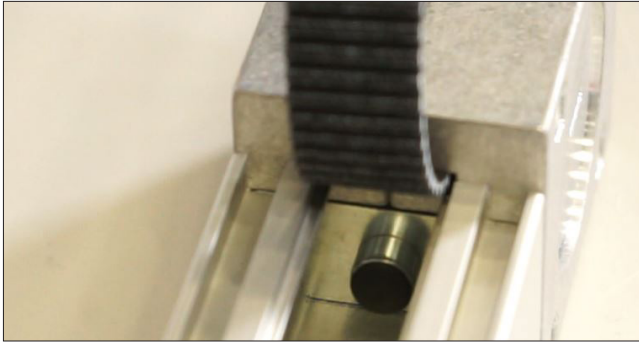


First push the Timing Belt into the bottom of the Reverse Unit with the teeth pointing inwards, until it comes out at the top of the Reverse Unit.



Then pull the Reverse Unit towards the profile and attach it to the profile from the inside using Hexagon Socket Head Cap Screw M5x12.

$M_T=6 \text{ Nm}$



Finally, press the enclosed black cap onto the head of the screw. This cap serves as an impact buffer and carriage bumper as required.



TIP! Push the carriage gently against the cap to push it into place.

### Installing the carriage plate

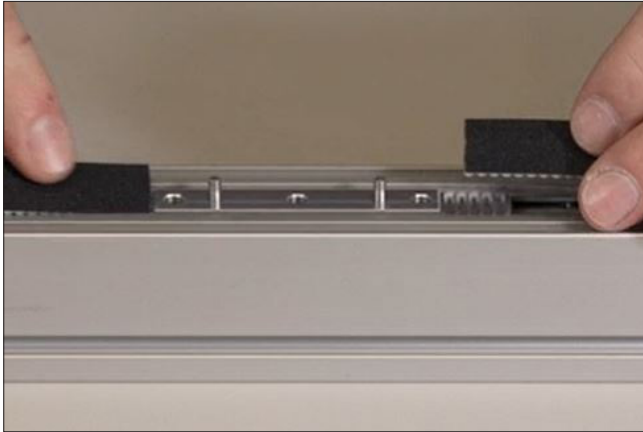


To connect the carriage with the Timing Belt, first set back the tension pulley of the Reverse Unit.

Do this by alternately screwing out the two tensioning screws (M3) until the axis of the Return Pulley is in the front section of the window.

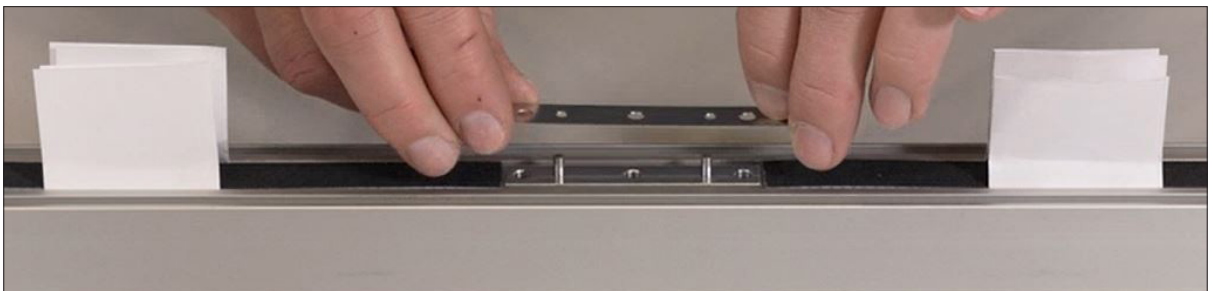


**NOTE!** Before you attach the Timing Belt, fold an ordinary piece of note paper over the belt to the right and left of the carriage. This will anchor the belt in place and stop the Timing Belt from tilting or sliding during installation, while also ensuring the Timing Belt is connected to the carriage centrally.

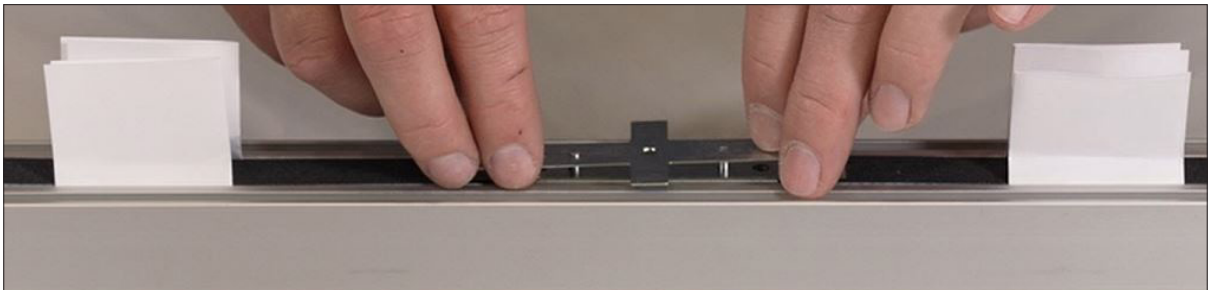


Now place the Timing Belt fully on the teeth of the carriage.

If the Timing Belt is too long, it can be shortened.



Once the Timing Belt is in place on top of the carriage, use the pins to position the spacer plate, and then place the sensor plate – the cruciform plate – on top of the spacer plate.



Screw in the three Hexagon Socket Head Cap Screws M4x25 with the carriage plate on the plates.  
Tightening torque:  $M_T=5 \text{ Nm}$



CAUTION! Before tensioning the Timing Belt, remove the paper that served as an installation aid.

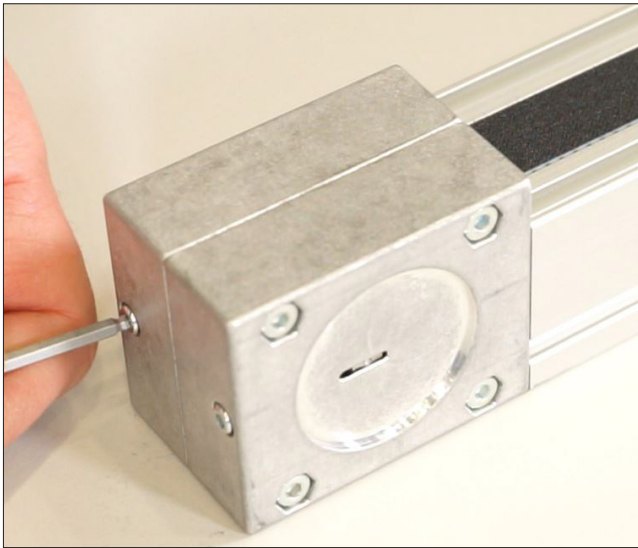
## Timing belt tension



**CAUTION!** The Timing Belt must be tensioned. Tensioning the Timing Belt has a significant impact on the function and service life of the Linear Unit.



**NOTE!** Thanks to a spring-mounted tensioning mechanism, the Timing Belt will be sufficiently tensioned at its operating load (150 N) when the clamping screws on the Timing-Belt Reverse Unit are flush with the outer surface of the reverse unit housing. If the Timing Belt is not sufficiently tensioned, this will lead to skipping in the belt. If the Timing Belt is tensioned too far, this will damage the Linear Unit.



Tension the Timing Belt by alternately tightening the tensioning screws M3x30 in the housing of the Timing-Belt Reverse Unit.



The Timing Belt is sufficiently tensioned when the head of the Hexagon Socket Head Cap Screws is flush with the outer surface of the reverse unit housing.

The straight running of the Timing Belt should then be checked. If necessary, the straight running can be corrected by fine adjustment of the tensioning screws M3x30.

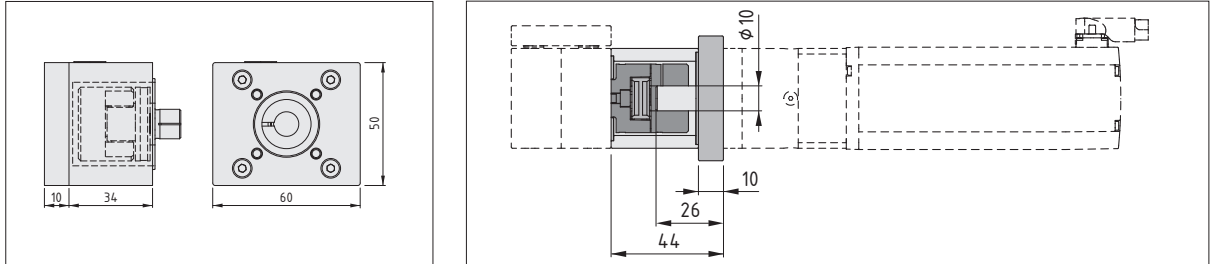


**CAUTION!** Once you have tensioned the belt, run the carriage along the entire linear axis and check the system for smooth operation, straight running and indications of collision.

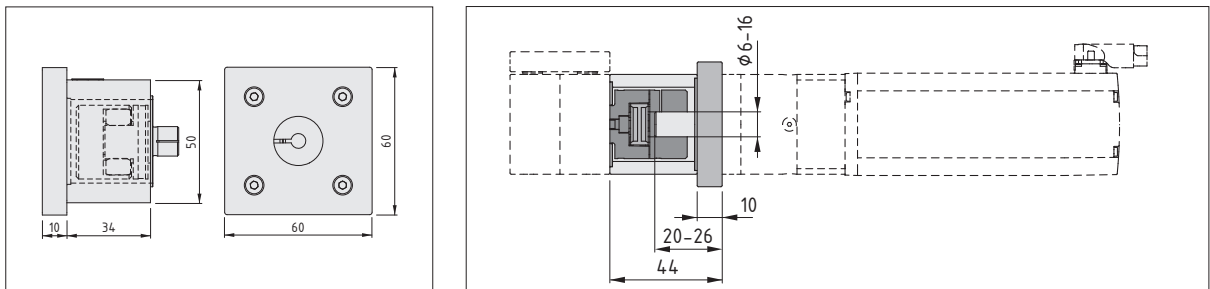
## Drive Set

There are several possible options for connecting a motor to Linear Unit KLE 5 40x40 LR. Universal Connection Sets make it possible to connect a third-party motor.

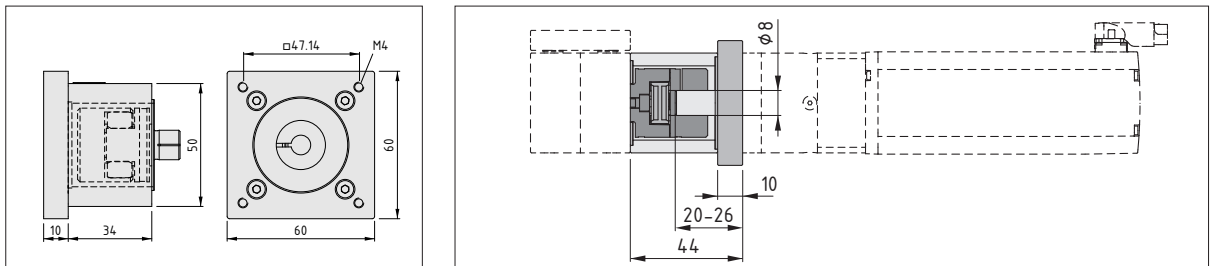
### Drive Set KLE 5 40x40 AP/WP 40 – 0.0.713.46



### Drive Set KLE 5 40x40 – 0.0.718.24 (universal)



### Drive Set ZU 5 40x40 NEMA 24 – 0.0.717.14



## Installing Drive Set KLE 5 40x40 AP/WP 40

Servomotors from item can be connected directly to the linear axis with the help of the relevant Drive Sets. Motors from other manufacturers can be adapted using the universal Drive Set. The flange plate must be adapted accordingly for this purpose. In this example, Motor SE 40 and a Gearbox WP 40 are installed using Drive Set KLE 5 40x40 AP/WP 40.



First remove the four screws and nuts from the drive assembly. These will later be replaced by longer Hexagon Socket Head Cap Screws that will secure the drive set housing. This does not affect the structure of the ready-for-use axis.

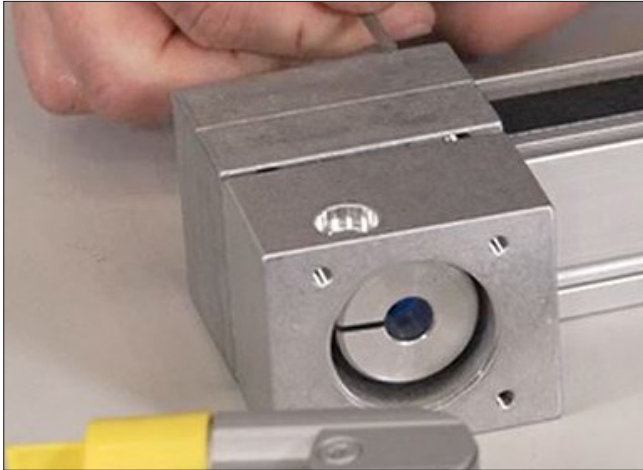


Insert the expanding hub coupling half into the D12 bore of the Linear Unit and tighten the expanding hub screw.

Tightening torque  $M_T = 2.8\text{Nm}$



Fit the Coupling Insert followed by Coupling Half D30/D12 so that they are mounted flush on the expanding hub coupling half. The clamping screw of Coupling Half D30/D12 should be aligned as shown and accessible from above.



Now put the Coupling Housing in position and screw it into place through the casing of the Drive Unit and into the coupling housing of the drive set using the Hexagon Socket Head Cap Screws M4x45 supplied with the Drive Set.

Tightening torque:  $M_T = 3 \text{ Nm}$



Next, use the four Hexagon Socket Head Cap Screws M4x12 to screw down the adapter plate for Motor SE 40 so that it, too, is flush with the Coupling Housing.

Tightening torque  $M_T = 3 \text{ Nm}$

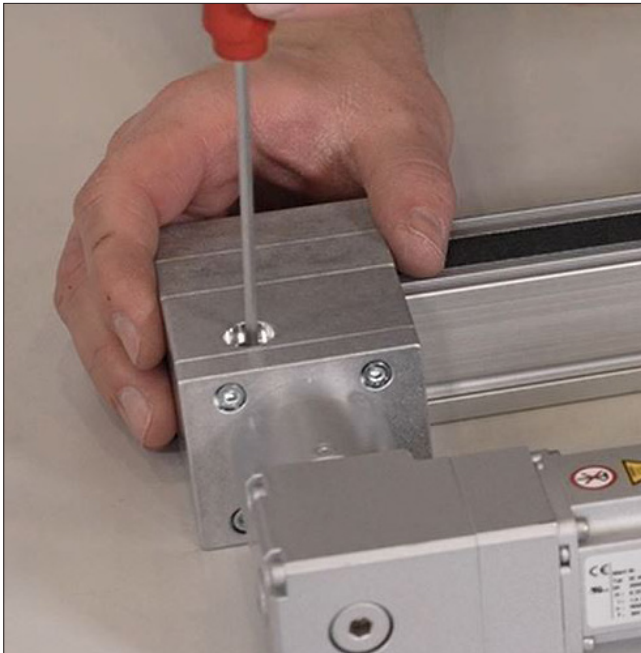
In addition, screw the Connecting Plate onto the motor, paying attention to the alignment of the centring elements on both sides.



Place Motor SE 40 (the motor shown here) with Gearbox WP 40 into the Drive Set and secure it in place using the four Screws M4x10.

Tightening torque  $M_T = 1.2 \text{ Nm}$

Before tightening the screws, ensure the Coupling Housing, Adapter Plate, Reverse Unit motor and linear axis are all aligned flush with each other.

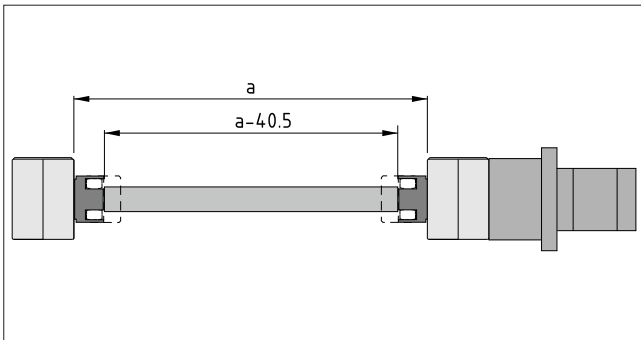


Finally, tighten the clamping hub screw M3 of Coupling Half D30/D12 through the maintenance hole. Use a cap to seal the hole.

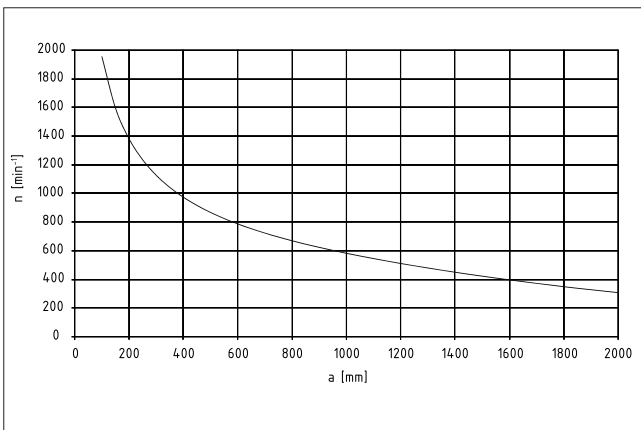
Tightening torque  $M_T = 1.5 \text{ Nm}$

## Synchronisation

Two Linear Units KL 5 40x40 LR can be connected to form a functional unit using Synchronising Set GSF 8 40 R10 (0.0.662.95). The synchroniser shaft (Tube D16x1.5 St, stainless – 0.0.664.14) transfers the motor's torque to the second drive unit.



The Tube St (sawn to length) turns the Synchronising Set into complete synchronisation.



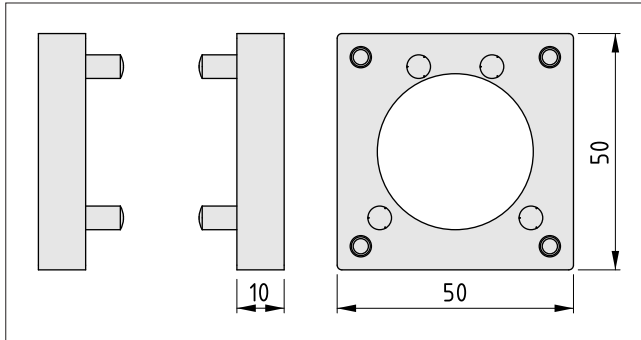
The permissible speed of a Synchroniser Shaft depends on its length.

$n$  = Rotary speed of the Synchroniser Shaft

$a$  = Distance between Linear Units



CAUTION! The rotating synchronisation elements must be safely covered if they pose any kind of potential risk.



Synchroniser Shaft Cover Set KLE 5 40x40 (0.0.717.72) is a fastening for a protective housing made from Conduit Profiles U to safely cover a synchroniser shaft between two Linear Units KLE 5 40x40 LR (0.0.710.86).

The Cover Set contains the Adapter Plates and the fastening materials required. Conduit Profile U 40x40 E (7.0.001.44) and Cover Profile D40 E (7.0.001.46) must be ordered separately

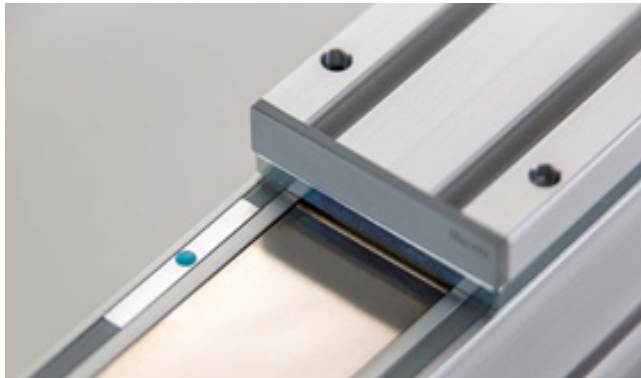
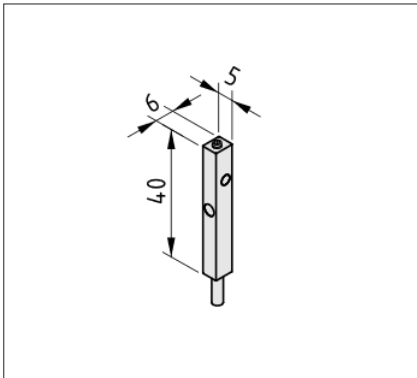
The required length of Conduit Profile U 40x40 E and Cover Profile D40E is calculated based on the distance  $a$  between the reverse units:

Profile length =  $a - 20$

### Accessories Linear Unit KLE 5 40x40 LR

Proximity Switch KLE 6 60x60 - 1NC (0.0.604.41)

Proximity Switch KLE 6 60x60 - 1NO (0.0.609.31)



Inductive proximity switch, positive switching

Housing Al, anodized, natural

Fixing mechanism, fixing screws

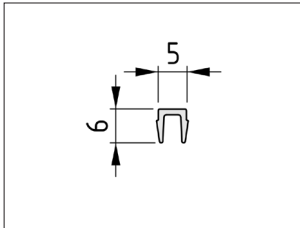
Voltage = 10...30 V DC

Maximum switching current = 150 mA

Sensing range = 2 mm

Cable, grey,  $l = 10$  m;  $d = 3$  mm

**Cover Profile 6 LE, grey similar to RAL 7042 (0.0.603.88)**

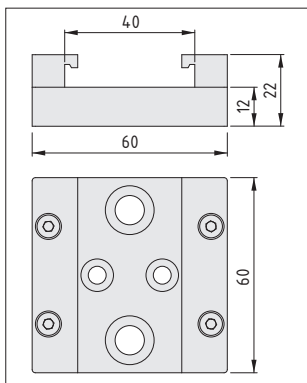


The support profile of Linear Unit KLE 5 40x40 LR features two indentations running along the top to accommodate Proximity Switch KLE and cables. These grooves are to be sealed with cover profiles to ensure a smooth, easy-to-clean surface.



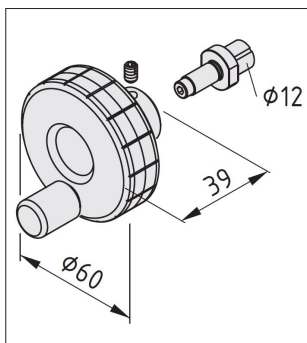
To install, pass the Cover Profile, which has already been cut to the correct length, under the carriage then press it into the groove. When doing so, the carriage should be close to a Reverse Unit so the Cover Profile does not have to be pushed too far.

**Profile Fastening Set 5 5/8 60x60 (0.0.718.36)**



Profile Fastening Set 5 5/8 60x60 enables a friction-based connection between a Linear Unit KLE 5 40x40 LR (0.0.710.86) and profiles with a Line 5 or Line 8 groove. Secure the Fastening Set in the groove. Then release the clamping jaws on the side, push in the Linear Unit and retighten the screws.

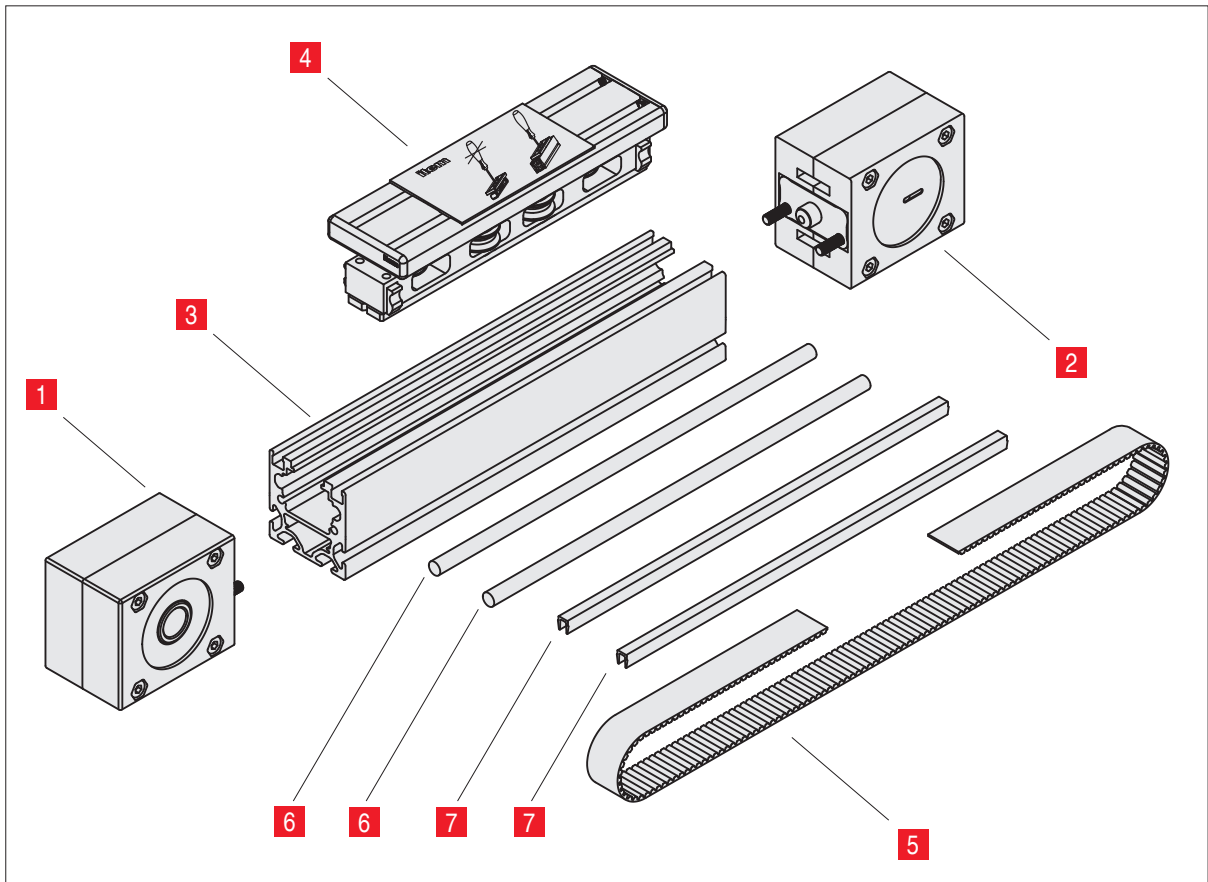
**Hand-Wheel D60 D12 (0.0.714.12)**



Hand-Wheel D60 D12 can be used to operate linear axes with a D12 hollow shaft by hand. This means adjustments can easily be made at a low torque.

Easy to install, the Hand-Wheel can be used both as an alternative to a motor in development applications and for making manual adjustments in production applications. Featuring a rotating cylindrical knob, the Hand-Wheel can transmit a torque of up to 3.7 Nm.

## Dealer configuration and spare parts list



The construction of a Linear Unit KLE 5 40x40 LR, the individual parts to be used and preconfigured sets of articles depend largely on the stroke lengths selected.

### Basic configuration and spare parts list for constructing Linear Unit KLE 5 40x40 LR

Ref.	No.	Article number	Product name		Comments
DA	<b>1</b>	0.0.711.36	Drive Unit KLE 5 40x40	1 set	-
DA	<b>2</b>	0.0.717.82	Timing-Belt Reverse Unit KLE 5 40x40	1 set	-
DA	<b>3</b>	0.0.710.87	Profile X 5 40x40 D6	1 pce., 6 m	cut-off: 0.0.710.95
DA	<b>4</b>	0.0.710.88	Carriage Set KLE 5 40x40	1 set	with safety closure
DA	<b>5</b>	0.0.711.41	Timing Belt R16 AT3	1 roll, 50 m	cut-off: 0.0.711.42
CA	<b>6</b>	0.0.453.75	Shaft D6, bare	1 pce., 3 m	cut-off: 0.0.356.01
CA	<b>7</b>	0.0.603.88	Cover Profile 6 LE, grey	1 pce., 2 m	cut-off: 0.0.605.10

Key:

- CA: Catalogue article
- DA: Dealer article

## Checklist

### Installing Linear Unit KLE 5 40x40 LR

Notes	Checked	Comments
Visual inspection		
Screws tightened		
Carriage aligned		
Timing Belt tensioned		
End Cap and Lubricating System (felt inserts) oiled		
Unusual running noises during manual test run		
Abrasion		

Date:

Signature:

## Repair and maintenance



Linear Unit KLE 5 40x40 LR requires no maintenance.

The felt inserts of the carriage unit are thoroughly oiled during initial installation.

The recommended service life for the initial lubrication applies to normal operating conditions.



**CAUTION!** If operating conditions are unusual, e.g. special type of installation, dust, short stroke, influence of solvents etc., the service life of Linear Unit KLE 5 40x40 LR must be adapted accordingly.

Normal operating conditions:

Ambient temperature: 10°C ... 40°C

50% of max. load



Recommended oil:

Track Oil for Linear Guides

(recommended: Klüber Oil 4 UH1-460), Art. No. 0.0.612.75

Fill quantity:

approx. 1 ml per maintenance interval on each felt insert

Maintenance interval:

Every 6 months or every 1000 km

Greases containing solid particles (e.g. graphite and MoS2 additives) must not be used!



To lubricate the felt inserts of the carriage unit, first slacken the Timing Belt. This is done by alternately turning the tensioning screws to move the tensioning axle of the Reverse Unit towards the carriage. Then remove the carriage plate and the other plates. Remove the Timing Belt so the felt inserts can be reached with an oil can (Pressol Oil Can KLE-LR, article number 0.0.612.74)



NOTE! See the "Tensioning the Timing Belt" and "Installing the carriage plate" sections for dismantling and reinstallation instructions.

NOTE! This information does not discharge users from the obligation to carry out their own assessments and checks. It is also important to bear in mind that our products are subject to a natural process of wear and ageing.

### Care and cleaning

Incorrect care and/or cleaning risks causing damage.

A cloth and a standard domestic cleaning agent are adequate for cleaning Linear Unit KLE 5 40x40 LR. Check that the substances you are using are suitable for use on paints and plastics. Aggressive cleaning agents and pressure washers may damage the product.

### Disposal



The product can be recycled or re-used (after any necessary refurbishment and replacement of parts). The use of appropriate materials and easy dismantling ensure the product can be recycled. Improper disposal of Linear Unit KLE 5 40x40 LR can pollute the environment.



You should therefore dispose of Linear Unit KLE 5 40x40 LR in full accordance with the laws of your country. Inappropriate disposal poses a hazard to the environment.



Transport packaging:  
Dispose of the packaging using the return and collection systems that are available to you.

## Product development and documentation

A process of continuous product development ensures that products from item Industrietechnik GmbH always exhibit a high standard of innovation.

Consequently, there could be inconsistencies between this guide and the product you have acquired. item Industrietechnik GmbH can also not exclude the possibility of errors. We therefore ask for your understanding that the information, illustrations and descriptions provided here cannot constitute an entitlement to any claims.

You can find the latest version of this user guide at [www.item24.com](http://www.item24.com).

**item**

item Industrietechnik GmbH  
Friedenstrasse 107-109  
42699 Solingen  
Germany  
Phone +49 212 6580 0  
info@item24.com  
item24.com

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Made in Germany

item Industrietechnik GmbH

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