item

Linear Unit KLE
Assembly instructions

Contents

Symbols, safety

Important, safety information, recommendation

Maintenance

1. General safety information

The data and the information contained in the Notes on Use and Installation are intended exclusively for product description and assembly. The information does not release the user from conducting their own assessments and checks. It should be noted that our products are subject to natural wear and tear as well as an aging process.

These Notes on Installation and Useinclude important information for the safe and appropriate use of the product. In the case of a sale, rent or other transmission of the product, the latter must be accompanied by the Notes on Use and Installation.

During the assembly, operation and maintenance of the Linear Units KLE, it must be ensured that all moving parts are secured against accidental switch-on or moving. Rotating and moving parts can lead to serious injury! Please make sure to read and observe the following safety precautions.

- Any work with or close to the Linear Units KLE must be performed under the motto „safety first".
- Switch the drive unit off before you begin a task close to the Linear Units KLE.
- Secure the drive unit against accidental switch-on, e.g. by installing signs near the switch or remove the fuse from the power supply.
- Do not reach into the working area of the moving parts of the Linear Units KLE while it is operating.
- Secure the moving parts of the Linear Units KLE against accidental contact by installing protective devices and enclosures.
- Please take note of the applicable regulations for accident prevention and environmental protection in the country of use and the workplace.
- Use item products only in technically perfect condition.
- Non-use of original spare parts leads to the expiry of the warranty!
- Check if the product has obvious defects.
- Use the product exclusively within the range of performance described in the technical data.
- Make sure all the safety devices belonging to the product are available, suitably installed and fully functional.
- You are not allowed to change the position of, avoid or disable safety devices.

The KLE 6 60x60 LR and KLE 8 80x80 LR described here corresponds to the state-of-the-art and respects the general principles of safety at the date of printing of the present Notes on Use and Installation. Nonetheless, the hazard for personal injury and damage to property remains when the fundamental safety instructions and warning notices mentioned in the present Notes on Use and Installation are not observed.We accept no liability for any damage that may arise from them. In the interest of further development, we reserve ourselves the right to technical changes. Keep the present Notes on Use and Installation readily accessible to all users. Please take notice of the superordinate instructions for use of the complete machinery or equipment.The general hazard warning refers to the whole life cycle of the partly completed machinery.

1. Transport
Please note the transport instructions on the packaging. Make sure to leave the product in the original packaging and protect it from humidity and damage until assembly. Please note that moving parts are fixed and can cause no damage during transport.

2. Assembly
Always switch the relevant system component off-circuit before you assemble the product or plug/unplug it. Secure the system against re-starting. Lay the cables and conducts so that they cannot be damaged and nobody can trip over them. Avoid places with risk of slipping, tripping or falling.

3.Putting into service
Let the product acclimatise for some hours before putting it into service.Make sure the partly completed machinery is tightly and safely integrated to the complete machinery. Only put fully installed products into service.

4. During operation
Allow the access to the direct operational area of the system only to people authorised by the operator. This also applies for downtimes of the system. Moving parts must not be accidentally actuated. In case of emergency, error or other irregularities, switch off the system and secure it against restarting. Make sure people cannot be shut in the system's danger zone.

5. Cleaning
Close all openings with appropriate protective devices so that no detergent can enter the system. Use no aggressive detergents. Do not use a high-pressure cleaner for the cleaning.

6. Putting into service and maintenance
Perform the required maintenance work in the time intervals described in the operating instructions. Make sure no connection line, connection or component is released until the system is under pressure and tension. Secure the system against restarting.

7. Disposal
Dispose of the product according to the national and international provisions of your country.

2. Appropriate use

The Linear Units KLE is a product in accordance with the Machinery Directive 2006/42/EC (partly completed machinery). The Linear Units KLE can only be used in accordance with the technical data and safety regulations of the present documentation. The internal rules and guidelines of the country of use must be respected. Unauthorised structural changes to the Linear Units KLE are not permitted. We accept no liability for any damage that may arise from them.

You are authorised to assemble, operate and maintain theLinear Units KLE only if:

- The Linear Units KLE has been integrated to the complete machinery according to the intended applications and safety requirements.
- You have read the Notes on Use and Installation carefully and understood them.
- You are qualified.
- You have the authorisation of your company.
- You exclusively use the original accessories of the manufacturer.

In case of unsafe and inappropriate operation of the Linear Units KLE, there is a danger of serious injury from crush and shear points.

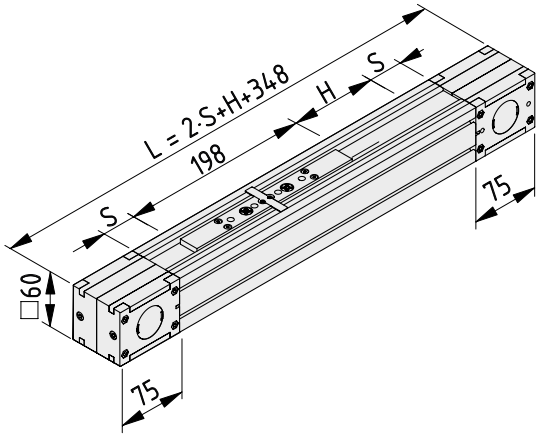
Inappropriate use
The inappropriate use refers to applications differing from the use authorised by the Notes on Use and Installation and the appropriate use. We accept no liability for any damage that may arise.

3. Selecting the right Linear Unit KLE

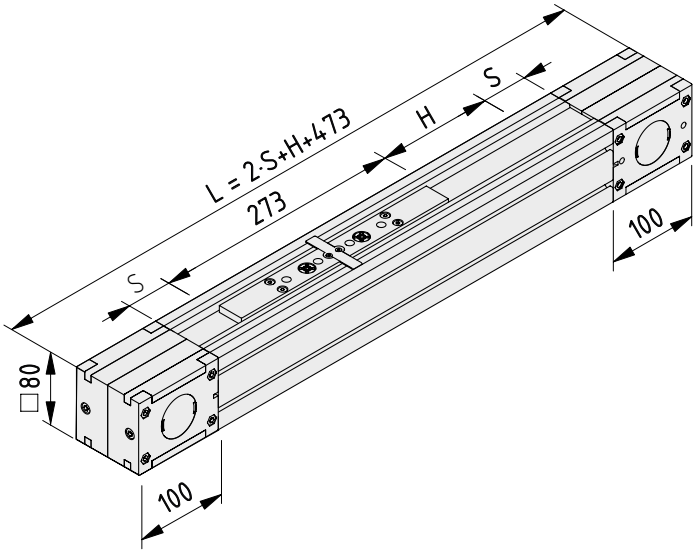
3.1 Design

Linear Unit KLE 6 60x60 LR 0.0.605.07
Linear Unit KLE 8 80x80 LR 0.0.605.02

KLE 6 60x60: 0.0.605.07



KLE 8 80x80: 0.0.605.02

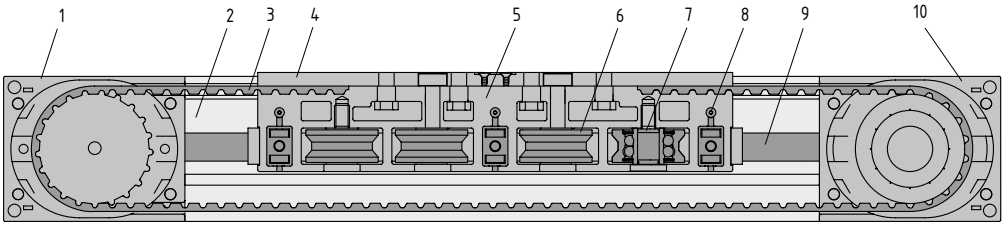


		KLE 6 60x60	KLE 8 80x80
L [mm]	Max. overall length	6.150	6.200
L [mm]	Min. overall length	400	600
S_{min} [mm]	min. safety distance	26	63,5
H [mm] H_{max}	stroke length max. stroke length by min. safety distance	5.750	5.600

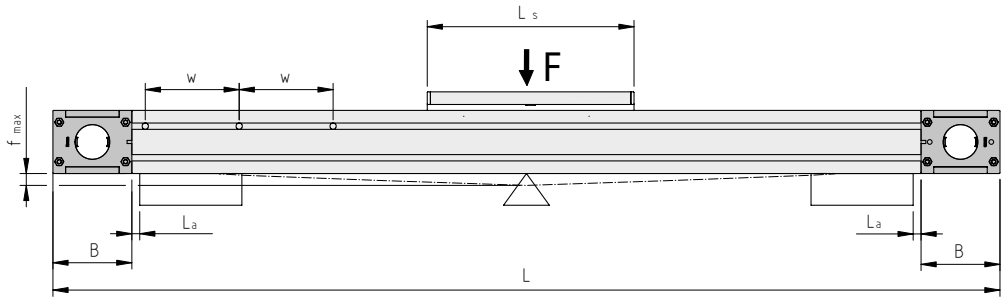
Table 1 Geometry

The safety distance S is a reserve distance to accommodate tolerances and Slide overtravel under high loads and accelerations at the reversal point. It must be calculated into the equation depending on the capabilities of the drive and control system, but in **any event should not be smaller than the lengths set out in Table 1** !

3.2 Terms, geometry



Article designation	Order number
1 Drive Unit KLE 6 60x60 LR	0.0.605.18
Drive Unit KLE 8 80x80 LR	0.0.604.95
2 Profile 6 60x60 KLE	0.0.603.83
Profile 8 80x80 KLE	0.0.600.42
3 Timing Belt R 25 AT5 PAR	0.0.604.06
Timing Belt R 34 AT10 PAR	0.0.600.28
4 Cover Plate KLE 60x60	
Cover Plate KLE 80x80	
5 Slide KLE 6 60x60	0.0.604.23
Slide KLE 8 80x80	0.0.600.26
6 Roller D10/D14, eccentric bearing	
7 Roller D10/D14, centric bearing	
8 Lubricating System with three grease nipples	
9 Shaft D10/D14	
10 Reverse Unit KLE 6 60x60 LR	0.0.604.21
Reverse Unit KLE 8 80x80 LR	0.0.600.49
11 Strip KLE 6 60x60	0.0.608.29
Strip KLE 8 80x80	0.0.608.30
12 Cover Profile KLE 6 60x60	0.0.603.88
Cover Profile KLE 8 80x80	0.0.600.54

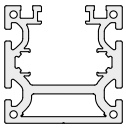


		KLE 6 60x60	KLE 8 80x80
L_s [mm]	Slide length	198	273
B [mm]	Width of Reverse Units	75	100
W [mm]	Distance between maintenance holes	85,5	119
L_a [mm]	Minimum distance from support to Reverse Unit	10	10
L [mm]	Max. overall length	6.150	6.200
L [mm]	Min. overall length	400	600
f_{max} [mm/m]	Deflection	≤ 1	≤ 1

Table 2 Geometry

The maximum deflection f_{max} of the system is governed by the dimension of the profile cross-section, the free profile length and the force applied.

The KLE housing must be given appropriate support if the linearity of movement has to be very precise.



	KLE 6 60x60	KLE 8 80x80
I_y	44.32 cm^4	135.59 cm^4
I_z	57.46 cm^4	179.77 cm^4
I_t	7.23 cm^4	20.31 cm^4
W_y	13.08 cm^3	29.88 cm^3
W_z	19.15 cm^3	44.94 cm^3

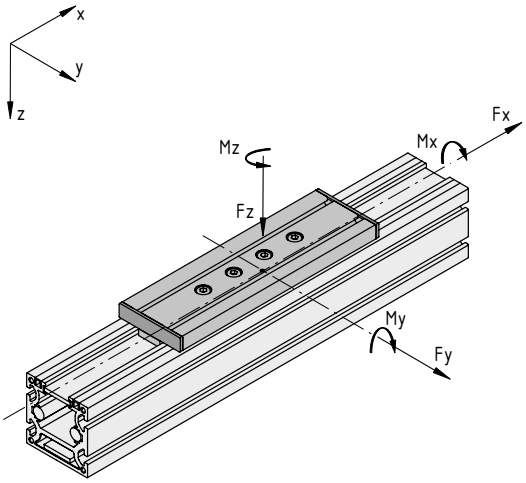
Table 3 Profile data

Deflection f_{max} is calculated using the mass moments of interia of the profile:

3.3 General technical data

	KLE 6 60x60	KLE 8 80x80
Static load factor per Roller C_0 [N]	2.470	4.400
Dynamic load factor per Roller C [N]	4.400	7.800
Repeat accuracy [mm]	± 0,1	± 0,1
v_{max} [m/s]	10	10

Table 4 Technical data



KLE	$M_{x\,max}$ [Nm]	$M_{y\,max}$ [Nm]	$M_{z\,max}$ [Nm]	$F_{x\,max}$ [N]	$F_{y\,max}$ [N]	$F_{z\,max}$ [N]
6 60x60	25	50	100	500	750	500
8 80x80	50	100	150	1.500	1.500	1.000

Table 3 Simplified maximum load data for 10,000 km distance travelled

If loads are combined, the general rule governing the total load also applies:

$$\frac{|M_x|}{M_{x\,max}} + \frac{|M_y|}{M_{y\,max}} + \frac{|M_z|}{M_{z\,max}} + \frac{|F_y|}{F_{y\,max}} + \frac{|F_z|}{F_{z\,max}} \leq 1$$

4. Assembly

The KLE is constructed from assemblies and cut-to-size elements and must be checked for completeness prior to actual assembly.

4.1 Tools

Assembly Set KLE LR (0.0.612.72) is used to support assembly and maintenance of both sizes of system. It consists of the following parts:

- Drilling Jig KLE 8 80x80 LR 0.0.611.21
- Drilling Jig KLE 6 60x60 LR 0.0.611.53
- Pin Spanner KLE 0.0.611.82
- Torque spanner 0.0.612.73
- Mounting Aid KLE 0.0.610.91
- Shaft Assembly Lever KLE 0.0.610.92

Also available:

- Track Oil 0.0.612.75
- Oil Can with Tip for KLE 0.0.612.74

The various tools and how they are used are described on the following pages.

4.2 Processing shafts and profiles

Cutting the Profile 6 60x60 KLE to size 0.0.603.83
Profile 8 80x80 KLE 0.0.600.42

Calculation of the profile length in consideration of the various system geometries and variable stroke length H, where:

KLE 6 60x60: $L_{Profile}$ = 2 x S + H + 198 mm

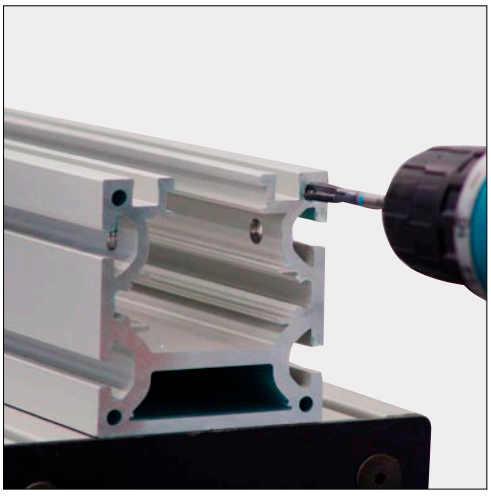
KLE 8 80x80: $L_{Profile}$ = 2 x S + H + 273 mm

Safety distance S of the KLE 6 60x60: S_{min} = 26.0 mm
KLE 8 80x80: S_{min} = 63.5 mm

Cutting Shaft D10 (KLE 6 60x60) / D14 (KLE 8 80x80) approx. 5 mm shorter than profile length:

KLE 6 60x60: L_{Shaft} = $L_{Profile}$ – 5 mm

KLE 8 80x80: L_{Shaft} = $L_{Profile}$ – 5 mm



Then cut threads into the core bores of the profile end faces.

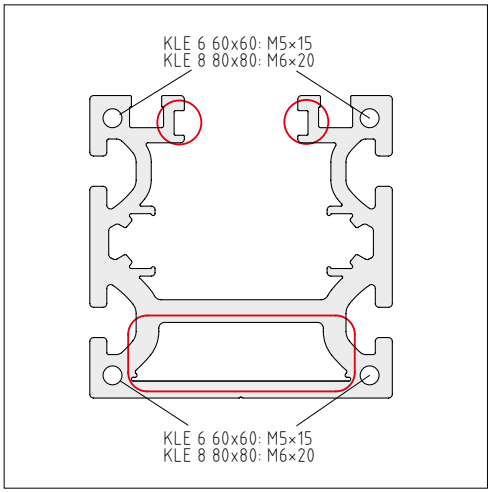
Threaded bore: KLE 6 60x60: M5x15
KLE 8 80x80: M6x20

The ends of the profiles in the areas marked red must be free of burrs in order to prevent damage to the Timing Belt. The cut edges must be machined accordingly!

Maintenance holes are then drilled into the profile.

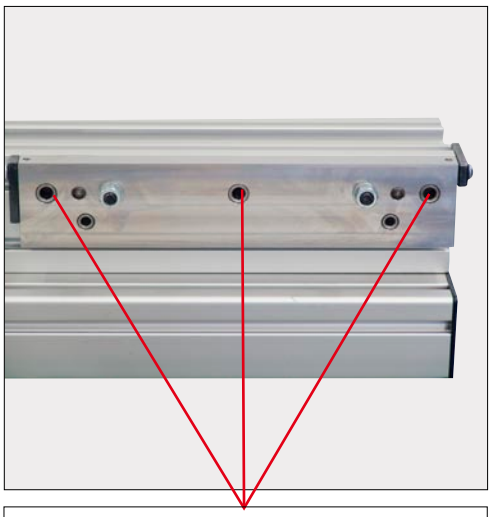
Assembly Set KLE-LR (0.0.612.72) contains a Drilling Jig for this purpose. This maps out the precise gauge for holes.

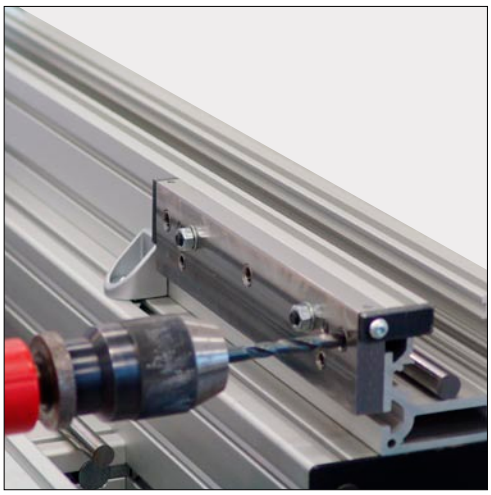
The Drilling Jig is fitted with a stop that ensures the minimum dimension required between the maintenance holes and the end of the profile.



The maintenance holes can be cut at any accessible point as long as the gauge for the holes is adhered to.

A pillar drill is recommended.

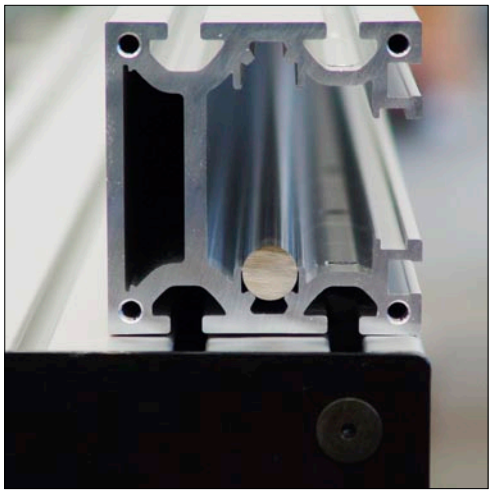




Distance between maintenance holes: w [mm]	
KLE 6 60x60: w = 85.5 mm	ø 6 mm
KLE 8 80x80: w = 119 mm	ø 8 mm

The maintenance holes need only be cut into the profile from one side so as to be able to access the Slide grease nipples.

4.3 Press-fitting the shafts



Press Shafts D10 (KLE 6 60x60) / D14 (KLE 8 80x80) into the profile geometry using the Mounting Aid, Shaft Assembly Lever (part of Assembly Set KLE-LR, 0.0.612.72) and a suitable second Line 8 profile.

Insert the Shafts into the profile geometry in the profile (rotated onto its side) and align them so that both ends of the Shaft are approx. 2.5 mm shorter than the profile.

Then use the Shaft Assembly Lever to press the Shafts, every 100 mm or so (the width of a hand), into the profile geometry until you can clearly feel or hear them engage.

The Shaft should be greased lightly to make it easier to press in.

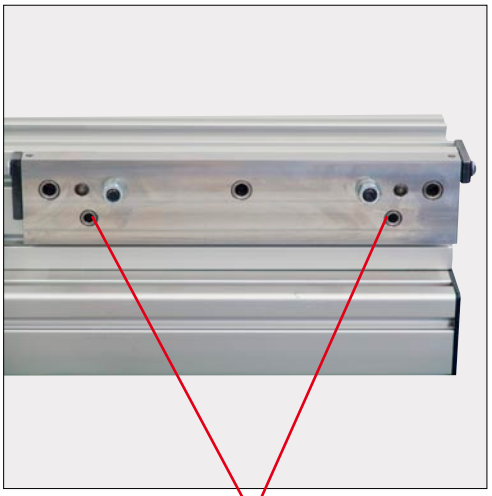
Then pin one end of the Shafts with the profile using the Drilling Jig included in Assembly Set KLE-LR (0.0.612.72).

To do this, suitable holes are provided in the Drilling Jig at a distance of 30 mm (KLE 60) / 40 mm (KLE 80) from the profile edge.

As the Shaft is hardened, the profile is laid on its side and a hole cut from above on a pillar drill.

- KLE 6 60x60: HM spiral drill ∅ 4 mm
  Recommended speed 3000 min^{-1}
- KLE 8 80x80: HM spiral drill ∅ 6 mm
  Recommended speed 2000 min^{-1}

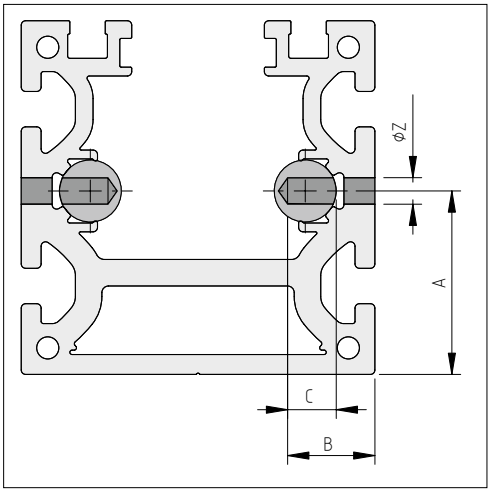
Then remove all the shavings and clean the profile and Shafts of all residual material.



Drilling aid for pinning the Shaft

	KLE 6 60x60	KLE 8 80x80
A [mm]	31.0	41.5
B [mm]	15.8	19.8
C [mm]	8.0	11.0
∅ Z [mm]	4.0	6.0

Table 6 Geometry for pinning



We recommend the following dowel for pinning purposes:

KLE 6 60x60 Dowel DIN 6325-4x14

KLE 8 80x80 Dowel DIN 6325-6x18

For KLE units with shaft lengths in excess of 3 m, Shafts D10 (KLE 6 60x60) / Shaft D14 (KLE 8 80x80) must be butt-joined. There must be no more than one butt joint.

The recommended minimum shaft length is $L_{shaft\ min}$ = 300 mm

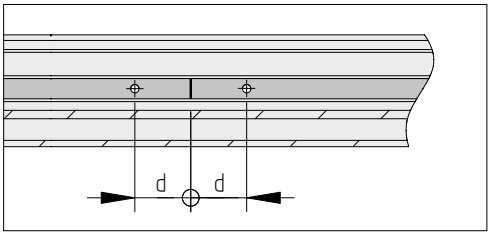
The Shaft butt joints located opposite each other should be positioned in parallel, i.e. they do not have to be offset to each other, since the Rollers of the Slide are offset.

The ends of the Shafts must be clean and free of burrs and chamfered edges.

The butt-jointed Shafts are pinned at the joints using the Drilling Jig (part of Assembly Set KLE-LR 0.0.612.72) but **not at the ends of the profiles** too. The recommended distance d from the fixing bore to the butt joint is:

KLE 6 60x60: d = 30 mm

KLE 8 80x80: d = 40 mm



4.4 Timing Belt and Strip

The length of the Timing Belt and Strip is calculated as follows:

1. Timing Belt: KLE 6 60x60: $L_{belt} = 2 \times L_{profile} + 162$ mm

   KLE 8 80x80 : $L_{belt} = 2 \times L_{profile} + 246$ mm

The formula already factors in an additional tooth as a safety factor

=> plus a tooth of Timing Belt R25 AT5 PAR: + 5 mm

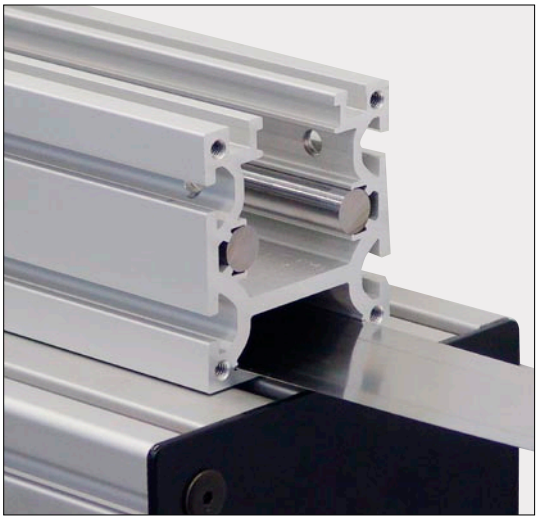
=> plus a tooth of Timing Belt R34 AT10 PAR: + 10 mm

2. Strip: $L_{strip} = L_{profile} - 2$ mm

The Strip at the bottom of the profile reduces the frictional losses of the moving Timing Belt.

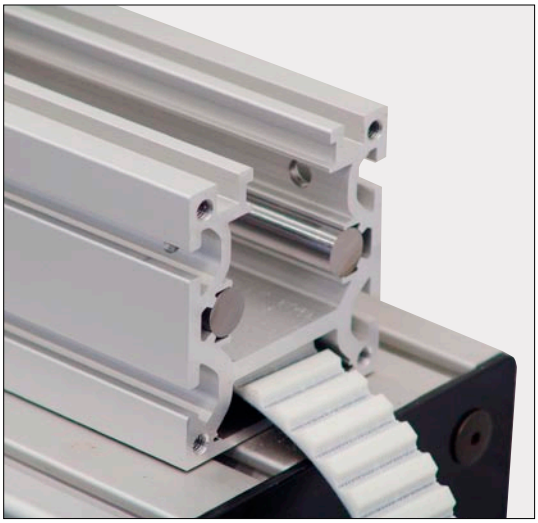
The ends of the Strip must be free of burrs.

The Strip in inserted all the way into the profile (with the curved side downwards) from below.



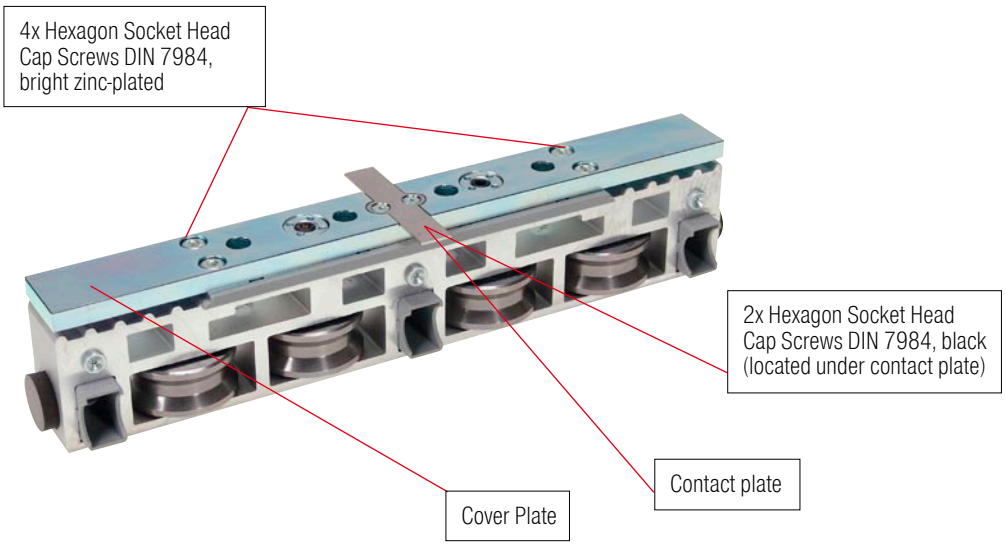
The Timing Belt can be cut with conventional metal shears.

After it has been cut, slide the Timing Belt over the Strip in the bottom of the profile so that it projects at both sides.



4.5 Slide

Slide KLE 6 60x60 / Slide KLE 8 80x80 is supplied pre-assembled.



Disassemble the contact plate. Do this by removing the two Countersunk Screws DIN 7997.

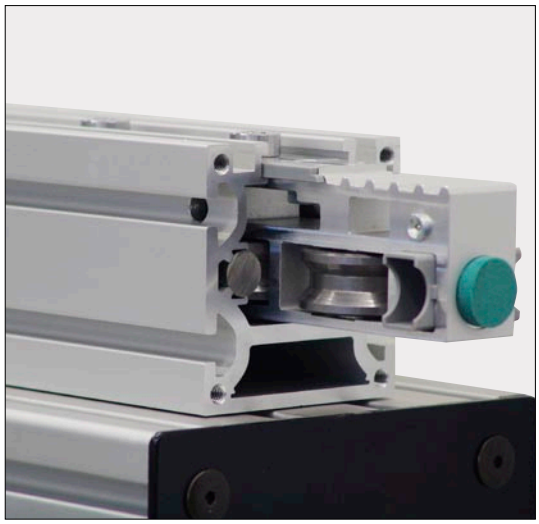
Remove the Cover Plate from the Slide. To do this, remove the four Hexagon Socket Head Cap Screws DIN 7984 (bright zinc-plated) on the outside and the two Hexagon Socket Head Cap Screws DIN 7984 (black) under the contact plate.

Then push the Slide without the lubricating felt inserts into the track between the Shafts.

Use the two (central) eccentrically adjusted bolts to set the Rollers free of play and slightly pre-tensioned over the entire length of travel.

To do this, push the Slide along the track in order to check it is running smoothly and to adjust the play.

It is important to check that the Slide runs easily and quietly.



When pushing in the Slide, the two central Rollers are adjusted with an Allan key A/F 4 so that the Slide can be slid into the Profile with ease.

When adjusting the Slide in the profile, the hexagonal sockets in the eccentric bolts of the Rollers may only be moved in **anti-clockwise** direction.

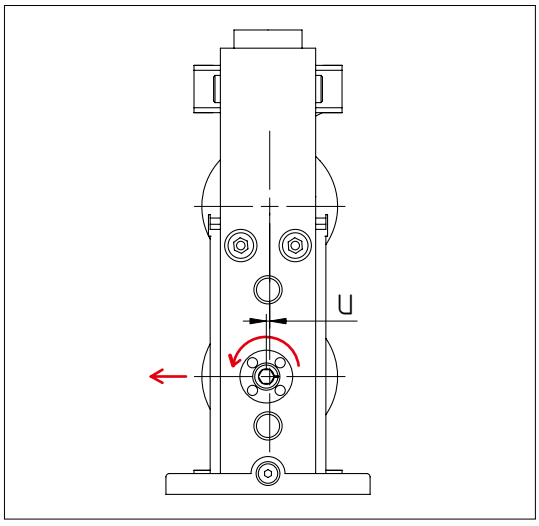
A small marking in the hexagonal socket indicates the position of the eccentric bolt.

Turning the marking **anti-clockwise** (to the left) also moves the Roller axis to the left. This allows the eccentric Roller to be adjusted a maximum of <360° on an arc.

The result is the maximum possible axial offset (u) of the outer Roller relative to the inner Roller of:

KLE 6 60x60: u_{max} = 1 mm

KLE 8 80x80: u_{max} = 2 mm



Caution! If you exert too much pressure on the Rollers, the Roller bearings may be damaged.

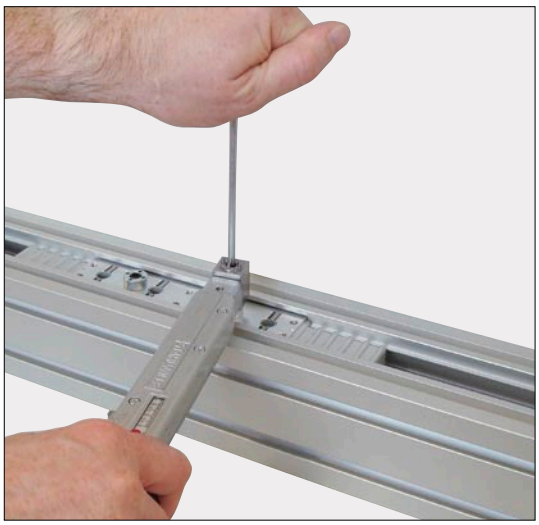
When running without play, the Rollers are secured in position using a special pin torque spanner (part of Assembly Set KLE-LR 0.0.612.72).

To secure the lock nut, turn the pin torque spanner clockwise and, at the same time, keep the bolt in it's position by means of the Allan key in anti-clockwise direction.

Tightening torque applied by torque spanner:

KLE 6 60x60: M = 10 Nm

KLE 8 80x80: M = 20 Nm



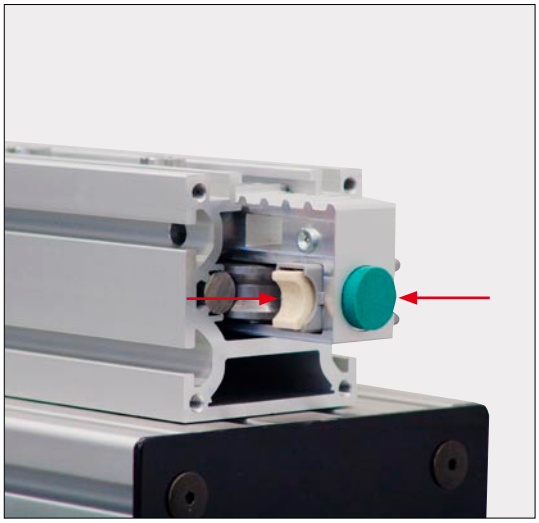
Remove the Slide from the guide track and fit the springs and felt inserts of the End Cap and Lubricating System into the positions provided for this purpose on the Slide.

Before the slide is inserted, the ducts of the lubrication system have to be filled completly.

The filling of the lubrication system is applied by the operator.

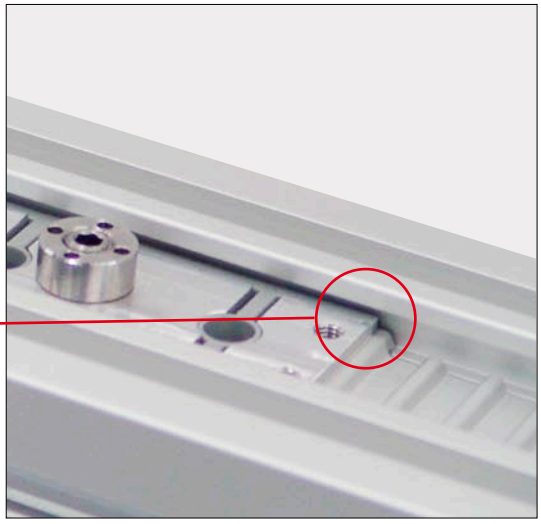
Insert the lubricating felt inserts in pairs into the plastic housings provided. A compression spring must be fitted between the felt inserts.

When the Slide is then inserted, the felt inserts must be pressed together to prevent them from being damaged.



Before inserting the slide, you have to place the plastic element in the correct position.

The plastic element is used to cover the gap and must be assembled with the tooth-shaped ends pointing downwards.



Ends of the plastic element pointing downwards in line with tooth shape

4.6 Reverse Unit, Drive Unit

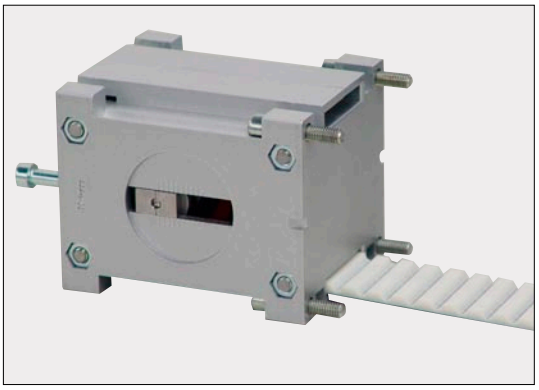
The Reverse Units of the Timing Belt on the KLE-LR units differ in design. There is a difference between the Drive Units and Reverse Units.

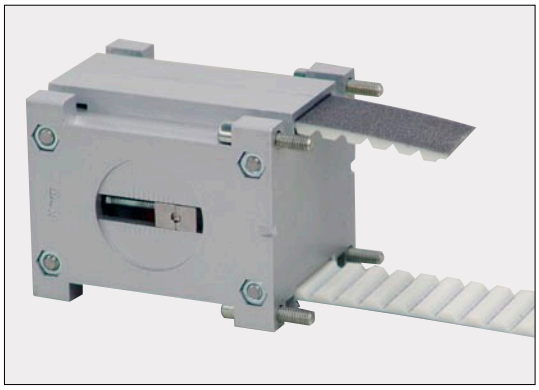
It is only possible to connect the motor to a Drive Unit.

A Drive Unit KLE is fitted to one end of Profile KLE and a Reverse Unit KLE to the other.

The ends of the Timing Belt emerging from the lower profile are routed through the two Reverse Units which are unsecured and have not to be dismantled, to run into the profile's upper guide groove.

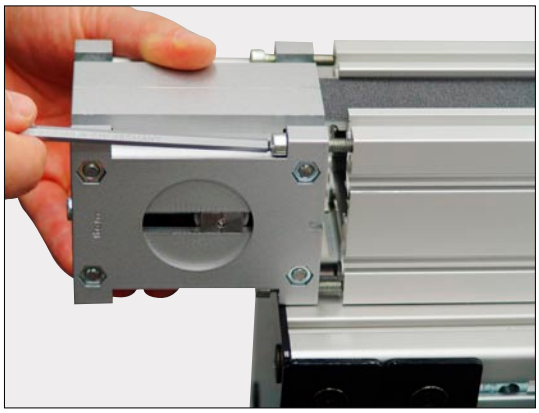
The tensioning axle at the end position of the Reverse Unit facilitates entry of the Timing Belt.





The Reverse Units are aligned to the end faces of Profile KLE and secured:

Tightening torque KLE 6 60x60 (M5): 6 Nm
Tightening torque KLE 8 80x80 (M6): 10 Nm



The Timing Belt is lifted out of the guide groove at the height of the Slide and is pressed onto the toothing in the ends of the Slide.

It is important to ensure that the Timing Belt is located centrally on the Slide: The Slide has a marking to indicate this. The fitter must mark the centre of the Timing Belt.

All teeth of the Timing Belt mesh into the gaps in the Slide profile.

Screw six Hexagon Socket Head Cap Screws DIN 7984 back into the Cover Plate:
KLE 60: 4 x M4x12 (bright zinc-plated) and 2 x M4x8 (black)

KLE 80: 4 x M5x14 (bright zinc-plated) and 2 x M5x12 (black)

Torque M4: 3 Nm

Torque M5: 6 Nm

The Cover Plate of the Slide can only be secured in one position! It is important to ensure that the holes in the Cover Plate coincide with the threads in the Slide and that the gap is symmetrical.

4x Hexagon Socket Head Cap Screws DIN 7984, bright zinc-plated

2x Hexagon Socket Head Cap Screws DIN 7984, black (under contact plate)

To check the Timing Belt for it's appropriate length, move the Slide backwards and forwards several times so that the belt teeth can align correctly in the pulleys of the Reverse Units.

If the Slide is difficult to move, the teeth are not yet positioned correctly in the pulley.

You can shorten the Timing Belt if necessary by unscrewing the Cover Plate, shortening the Timing Belt and refitting it. Then screw the Cover Plate back in place.

4.6.1 Calculating the Timing Belt tension

The measurable tensioning axle travel required on the Reverse Unit is determined as a function of the KLE load.

The following simplified rule of thumb applies for both sizes KLE 8 80x80 and KLE 6 60x60:

The tensioning axle travel in [mm] corresponds to the profile length in [m]

Conventional calculation by way of check:

Timing Belt tensioning distance $$\Delta L = \frac{F_{Rpre} \cdot L_R}{2 \cdot c_{spez}}$$

The following applies:

$F_{Rpre} + F_x < F_{Rperm}$

and: $F_{Rpre} > F_x$

where: $F_x = m \times a + m \times g + F_R$

where: Timing Belt tensioning distance
ΔL = 2 x tensioning axle travel [mm]

L_R = total Timing Belt length [mm]
(≈ 2 x profile length)

F_{Rpre} = pre-tensioning force for Timing Belt [N]

F_{Rperm} = permissible force for Timing Belt [N]

F_x = operating load [N]

F_R = frictional Force [N]
KLE 6 60x60: $F_R \approx 30$ N
KLE 8 80x80: $F_R \approx 75$ N

c_{spec} = specific spring rate [N]

	KLE 6 60x60	KLE 8 80x80
F_{Rzul} [N]	1.400	4.500
c_{spez} [N]	$0{,}35 \cdot 10^6$	$1{,}13 \cdot 10^6$
$F_{x\,max}$ [N] (permissible operating load by v_{mittel} = 1,5 m/s)	500	1500

Table 7 Timing Belt data

Example KLE 8 80x80:

KLE 8 80x80 profile length 5m

=> Tensioning axle travel = 5 mm

KLE 8 80x80 profile length 5m

F_x = 200 N

L_R = 10 m

ΔL = 10 mm (from simplified rule of thumb)

where: F_{Rpre} = 2,260 N > F_x = 275 N

and: F_{Rpre} = 2,260 N + 275 N < F_{Rperm} = 4,500 N

4.6.2 Tightening the Timing Belt

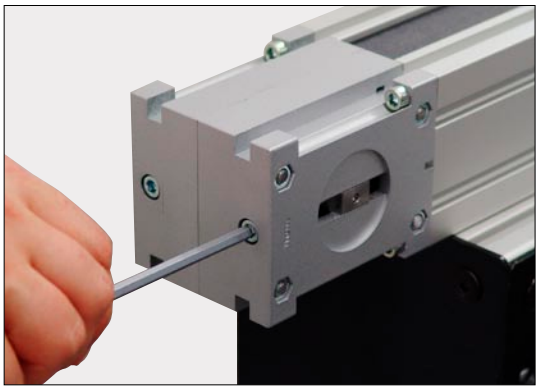
Tightening the Timing Belt using Reverse Unit KLE 6 60x60/Reverse Unit KLE 8 80x80:

Two Hexagon Socket Head Cap Screws DIN 912 are provided for this purpose on the end of the Reverse Unit.

The first operation when tightening the Timing Belt is to find the zero point at which the untightened belt has no sag at all and pre-tensioning begins.

To do this, pull back the movable tensioning axle in the Reverse Unit and then fix it in position using the screws.

A scale fitted on the Reverse Unit can be used to verify that the two screws are tightened evenly.

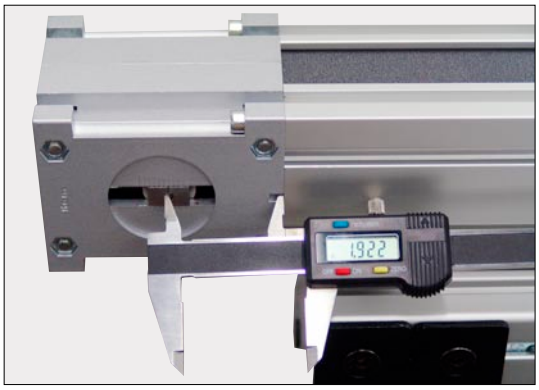


A calliper between the end of the profile and the marking on the tensioning axle enables precise pre-tensioning on both sides of the Reverse Unit.

Tighten the Timing Belt by tightening the two screws alternately and evenly.

It is vital that the tightening is not uneven, i.e. that the tensioning axle is not skew by > 0.05 mm!

The tensioning screws are secured (micro-encapsulated) to prevent them from being adjusted or working themselves loose unintentionally.

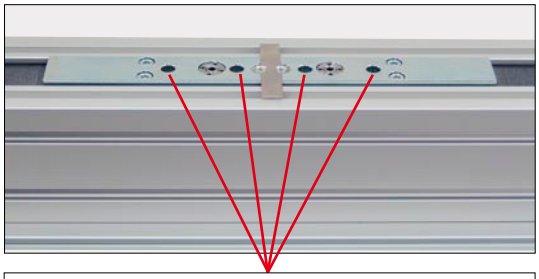


4.7 Support system, Carriage Plate

The assembled KLE enabled the use of the Carriage Plate KLE 6 60x60/Carriage Plate KLE 8 80x80 or of self-designed slide systems.

To do this, there are 4 mounting bores in the Cover Plate of the Slide for securing a support plate.

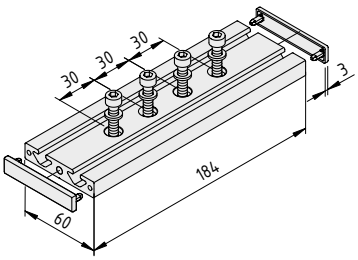
Depending on the system sizes, both Carriage Plate KLE 6 60x60 (0.0.609.25) and Carriage Plate KLE 8 80x80 (0.0.609.24) are available complete as sets of support plates.



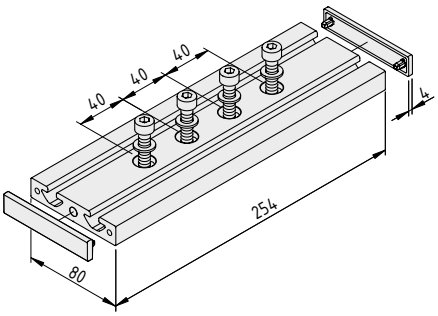
Mounting bores prepared:

KLE 6 60x60 for M6
KLE 8 80x80 for M8

KLE 6 60x60



KLE 8 80x80



4.8 Drive synchonisation

The basic unit of a KLE unit is now fully assembled; the next step consists of attaching a

- drive unit and any required
- synchronisation with a second drive unit.

4.8.1 The drive

The Drive Set contains all the components needed for connecting a motor or gearbox.

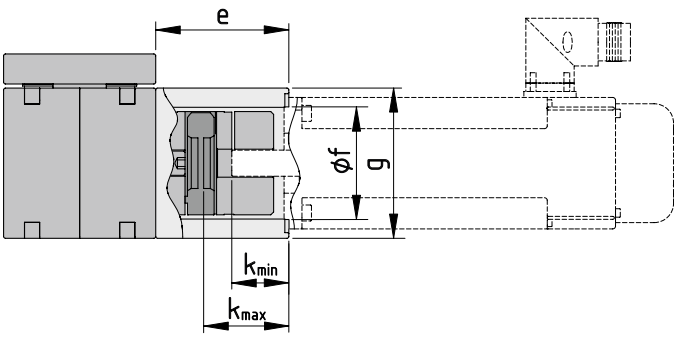
The Drive Set consists of:

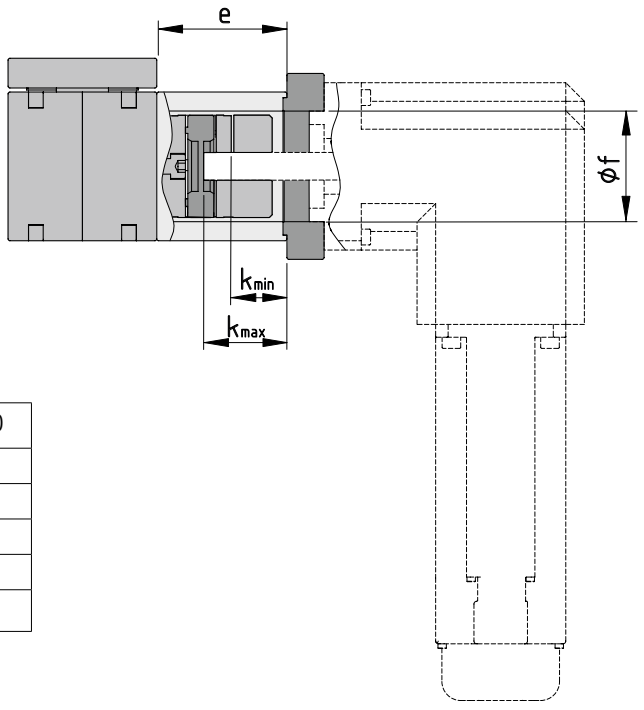
- Coupling Housing, Drive KLE
- Coupling Half KLE
- Coupling Half (unmachined)
- Coupling Insert
- Centring Piece KLE
- Adapter Plate KLE
- Hexagon Socket Head Cap Screws DIN 912, St, bright zinc-plated

Both the Drive Set and Synchronising Set can be assembled only from the drive side of the KLE!

Depending on the requirements of the motor or gearbox used, the drive casing or Adapter Plate KLE is machined and screwed to the motor or gearbox.

The connection processing parameters are the depth of insertion of drive shaft k, the gauge of the holes for fastening the motor/gearbox and the centring. (Table 8)





	[mm]	KLE 6 60x60	KLE 8 80x80
depth Coupling Housing	e	62	70
Centering	∅ f_{min}	47	59,5
height Coupling Housing	g	60	80
depth of insert of the drive shaft	k_{min}	34	30
	k_{max}	38	44

Table 8 Preparing the drive

If force is transferred from the coupling to the drive shaft using frictional resistance, the Coupling Half to be connected to the drive shaft must be provided with a hole the size of the shaft and then connected with the latter.

The Shaft and the hole in the coupling hub must be degreased and cleaned to ensure the frictional resistance is effective.

The torques transferred by the clamp connection of the drive shaft and the coupling half base on the maximum mating play for shaft fits: **Shaft k6 / hole H7**. (Table 9)

Clamping connection of motor shaft to coupling	KLE 6 60x60	KLE 8 80x80
Clamping screw	M6	M6
Tightening torque [Nm]	10,5	10,5
Hole diameter D[mm] of motor shaft	D6-D20	D8-D28
Transferrable drivetorque M_A [Nm]	12	30

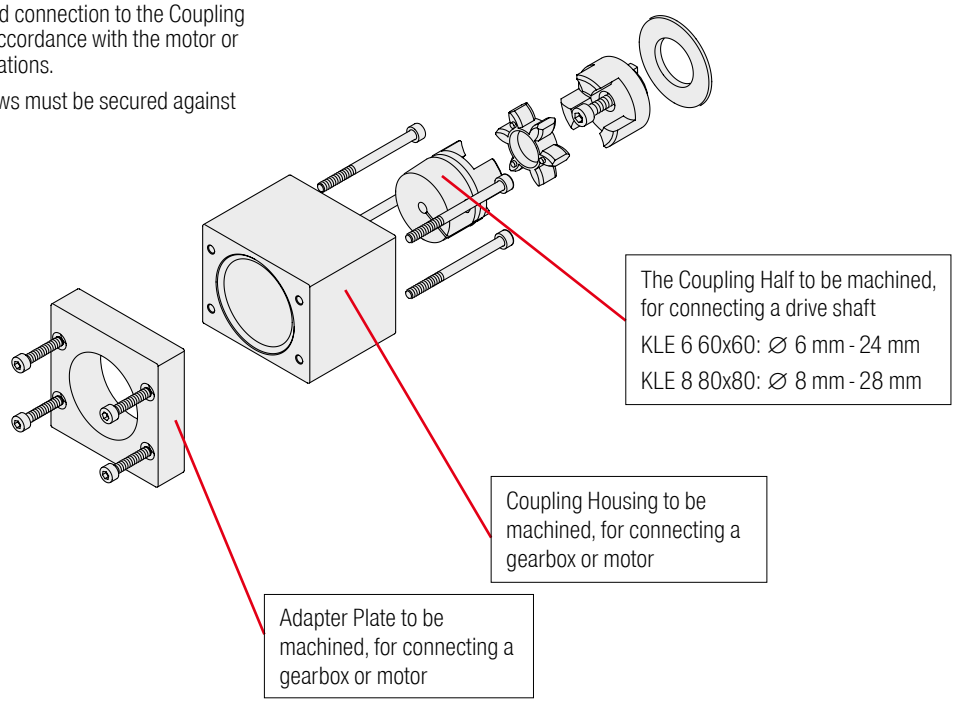
Permissible operating load of Drive Unit by v_{mittel} = 1,5 m/s	KLE 6 60x60	KLE 8 80x80
$F_{x\,max}$ [N]	500	1.500

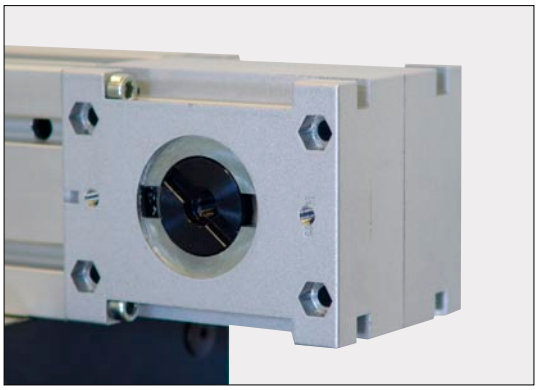
Table 9 Drive torques

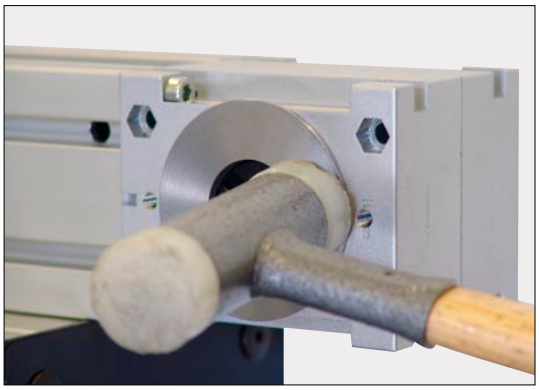
Rigid connection of motor shaft to coupling (e.g. with key)	KLE 6 60x60	KLE 8 80x80
Transferrable drivetorque M_A [Nm]	12	50

If a the drive shaft requires a rigid connection to the Coupling Half, this must be machined in accordance with the motor or gearbox manufacturer's specifications.

Hexagon Socket Head Cap Screws must be secured against working loose.

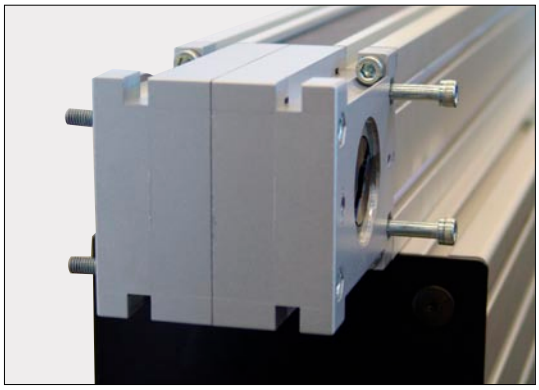




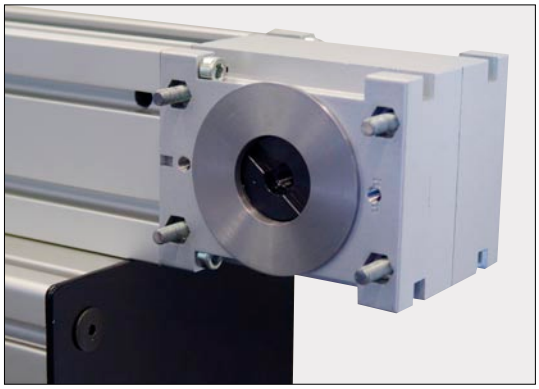


To assemble the Drive Set, carefully position Centring Piece KLE on the motor side of Drive Unit KLE using a rubber hammer.

The longer Hexagon Socket Head Cap Screws DIN 912 from Drive Set KLE are then used to replace the fastening screws and inserted nuts for the two halves of the Drive Unit.



The longer screws enable connection of Coupling Housing KLE.



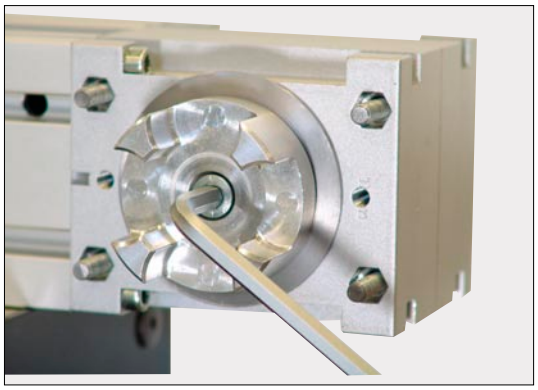
Coupling Half KLE is now inserted centrally into Drive Unit KLE and screw-connected.

To do this, the Coupling Half must be secured to prevent it twisting.

Tightening torque of Coupling Half fastening screw:

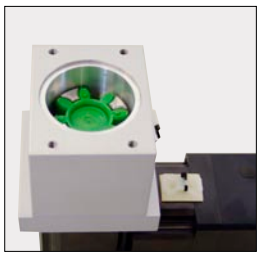
KLE 6 60x60: M6 = 10 Nm

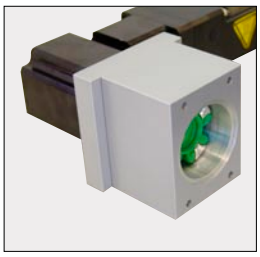
KLE 8 80x80: M8 = 20 Nm



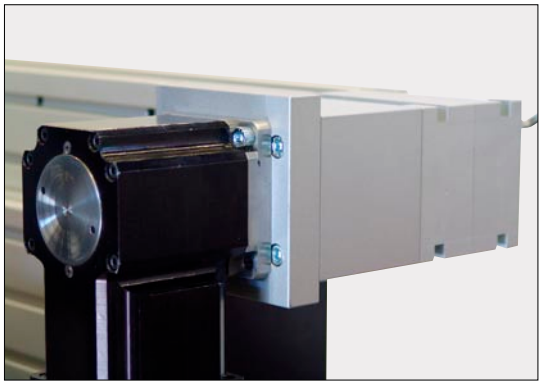
The Coupling Insert is pressed in.

The Coupling Housing is then screwed to Drive Unit KLE.





The question of whether a machined Coupling Housing or a machined Adapter Plate is used for connecting the motor depends on the geometry of the gearbox or motor. (Table 8)



4.8.2 Synchronising two Linear Units KLE

Two KLEs are synchronised by connecting Drive Units KLE using a Synchronising Set and the corresponding tube.

The Synchronising Sets include all components required for connecting two Linear Units KLE.

The Synchronising Set contains:

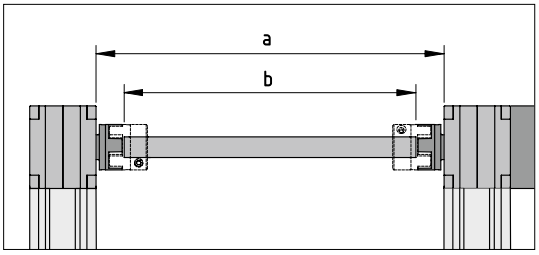
- 2 Coupling Halves KLE Al
- 2 Coupling Halves for tube clamping
- 2 Coupling Inserts
- Hexagon Socket Head Cap Screws St, bright zinc-plated

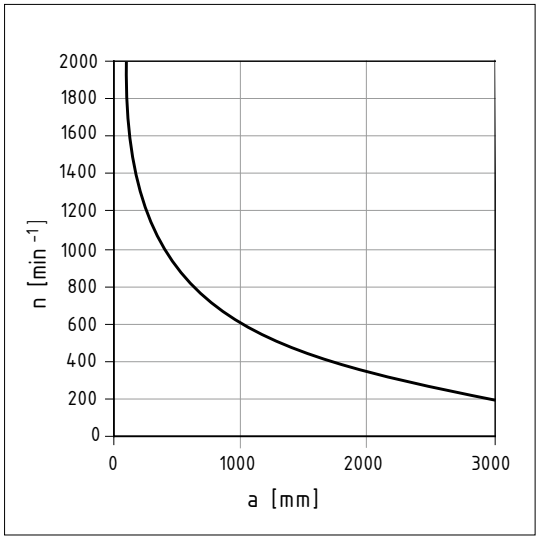
When designing the synchronised Linear Units, the drive speed and the distance between the Linear Units are key criteria.

The length of Synchroniser Shaft (b) is defined as follows:

	KLE 6 60x60	KLE 8 80x80
Tube	D20x3 St	D25x3St
b	a - 65 mm	a - 70 mm
a	distance between Linear Units	

Table 10 Synchonising



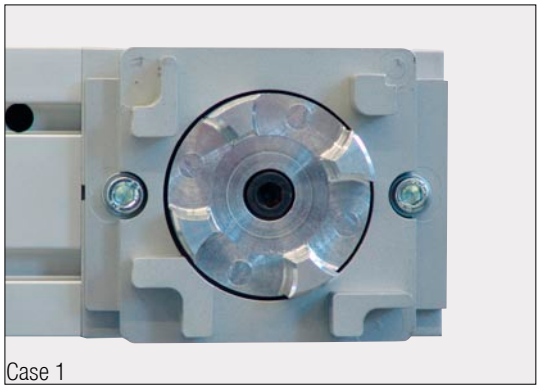


n = rotational speed of the synchonizer shaft
a = distance between Linear Units

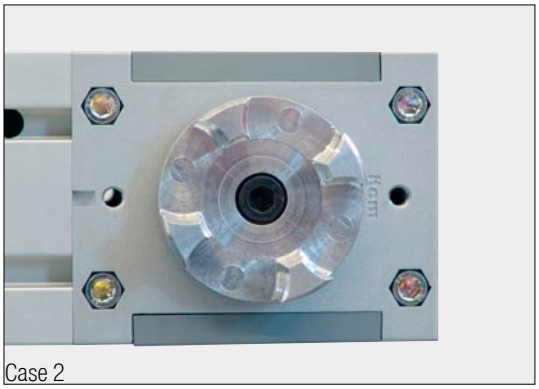
Coupling Half KLE is first connected to Drive Unit KLE and has a rigid connection with the timing pulley of the Drive Unit. (see page 20)

There are two options for the next step of the assembly operation:

1. If a cover (using a Synchroniser Shaft Cover Set and cable conduit) is required to provide protection against the rotating Synchroniser Shaft, the synchroniser adapter plates are first secured to the two Drive Units of the Linear Units KLE.
2. If no cover is required to protect against the rotating Synchroniser Shaft, the Synchroniser Shaft Cover Sets are not required.



Case 1



Case 2

Case 1:

The Synchroniser Shaft (tube) is cut to size b and the clamping Coupling Halves from the Synchronising Set are pushed onto the Synchroniser Shaft to a point beyond their operating position. (Table 10)

The Coupling Insert is carefully driven in Coupling Half KLE using a rubber hammer.

The prepared Synchroniser Shaft with the two Coupling Halves right and left is then held in the installation position and the Coupling Halves are carefully driven onto the assembled Coupling Half of the KLE 6 60x60 or KLE 8 80x80 using a rubber hammer.

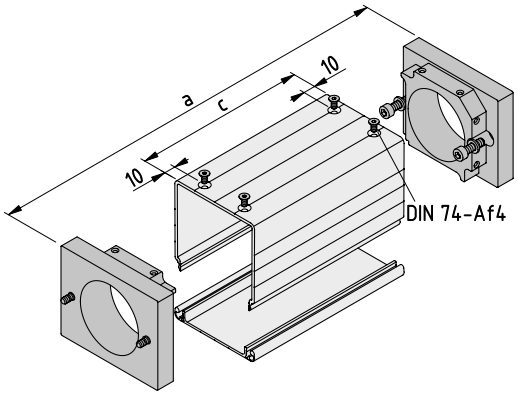
The Slide position and the appropriate angle must be set before clamping the Synchroniser Shaft (tube).

Clamping screw M6
Tightening torque 10.5 Nm

Case 2:

If a guard is fitted to provide protection against the rotating shaft, the cable conduit required is first sawn to the correct length and then machined.

The rotating parts of the Synchroniser Shaft are covered by a Conduit Profile U 60x60 E with Lid Profile D 60 E or a Conduit Profile U 80x80 E with Lid Profile D 80 E.



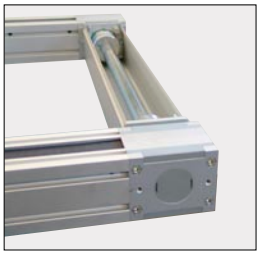
a: distance between Linear Units

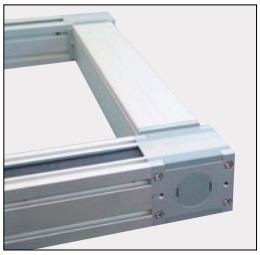
c: Length of conduit elements for covering the Synchroniser Shaft

KLE 6 60x60: c = a – 24 mm
KLE 8 80x80: c = a – 32 mm

The cable conduit section is then swung at a slight angle between the synchroniser adapter plates.

Depending on the position selected for the screwed-on Adapter Plate, it is possible to screw the cable conduit on any side and thus to establish the optimal position for opening the lid.





4.9 Proximity Switches

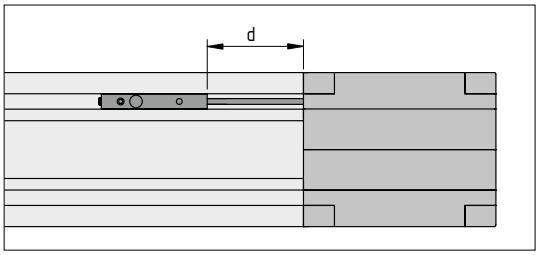
Proximity Switches KLE in the system are fitted into the profile grooves where they are secured using a grub screw. The switches become locked in the groove.

The Proximity Switch cables run inside the groove and through the Reverse Units. The cable is run out to the outside at a suitable point (by removing the Caps of the Reverse Units).

The minimum distance is determined by the Slide geometry and the contact plate located on this:

KLE 6 60x60: d_{min} = 80 mm +S

KLE 8 80x80: d_{min} = 100 mm + S



The Slide braking distance is disregarded.

The Proximity Switch cables cannot be routed past a further Proximity Switch in the groove! Consequently, a maximum of 4 Proximity Switches can be used for each Linear Unit KLE.

Two different Proximity Switches are available for each system size: switches - 1 NO or 1 NC

The groove is closed using Cover Profile 6 60x60 or 8 80x80. The Cover Profile is pressed over the cable to protect it from damage.
The Cover Profile has to be interrupted at the locations of Proximity Switches.

5. Initial operation

It is important prior to start-up to ensure that the Rollers are lubricated (see Section 6 - Maintenance).

The reference run serves as a final quality check.The following factors must be checked:

- Are the conditions okay?
  - Ambient temperature (10C°- 40C°)
  - Load
  - Travel speed
  - Stroke length
- Have all relevant elements been lubricated? (see Section 6 - Maintenance)
- Is there sufficient protection on all rotating parts, live electrical parts and points where parts of the body may become trapped?
- Are all screws tightened to rule?
- All caps have to be assembled, especially to cover the rotating parts

A trial run must be carried out at low speed that takes in the entire travel path and checks that the Linear Unit KLE is functioning correctly.

Possible faults may show up in the form of smoke or noise!

6. Maintenance

Basic lubrication for the guide is applied by the operator under normal operating conditions.

The initial lubrication is sufficient for normal operating conditions.

Normal operating conditions:

Ambient temperature: 10°C ... 40°C

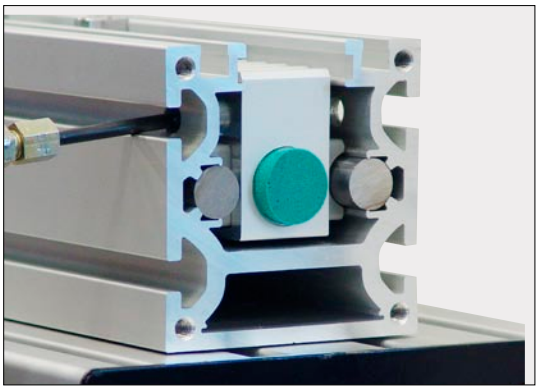
50 % of max. load

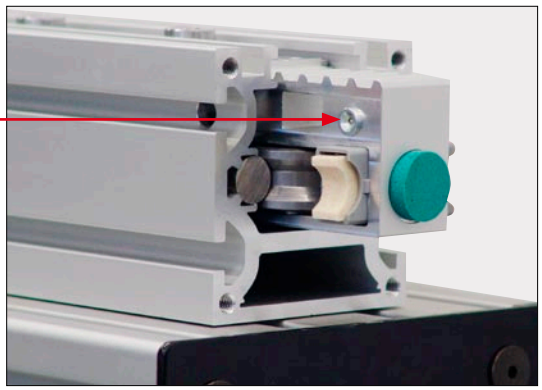
A special oil press can be used to provide additional lubrication to the guide system.

To do this, the Slide is moved to the "maintenance position" defined by the position of the lubrication holes and is lubricated through the three holes with the same spacing as the grease nipples (see Section 4.2).

The long tip of the oil press is pressed through the maintenance holes onto the Slide grease nipples and lubrication applied.

The End Cap and Lubricating Systems need to be re-lubricated with the required amount from one side only.





If operating conditions are unusual - e.g. special type of installation required, dust, short stroke, influence of solvents etc. - the lubrication intervals must be adapted accordingly.

Recommended oil:
Track Oil for Linear Guides
(recommended: Klüber Oil 4 UH 1-460), Art.-Nr. 0.0.612.75

Auxiliary tool:
Pressol oil can, Art.-Nr. 0.0.612.74

Fill quantity:
Approx. 1 ml per maintenance hole per maintenance interval
(1 ml is equivalent to one actuation of the Pressol oil can)

Maintenance interval:
Every 6 months or every 2,500 km

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

item

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