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1 General information

1.1 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 Use include 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 KGT (Ball Screw Unit), 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 Ball Screw Units KGT must be performed under the motto „safety first“.
- Switch the drive unit off before you begin a task close to the Ball Screw Units KGT.
- 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 Ball Screw Units KGT while it is operating.
- Secure the moving parts of the Ball Screw Units KGT 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 Ball Screw Units KGT 20x5 VK14, KGT 20x5 Machining, KGT 20x20 VK14 and KGT 20x20 Machining 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.

1.2 Appropriate use

The Ball Screw Unit KGT is a product in accordance with the Machinery Directive 2006/42/EC (partly completed machinery). The Ball Screw Unit KGT 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 Ball Screw Unit KGT are not permitted. We accept no liability for any damage that may arise from them.

You are authorised to assemble, operate and maintain the Ball Screw Unit KGT only if:

- The Ball Screw Unit KGT 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 Ball Screw Unit KGT, there is a danger of serious injury from crush and shear points.

Inappropriate use

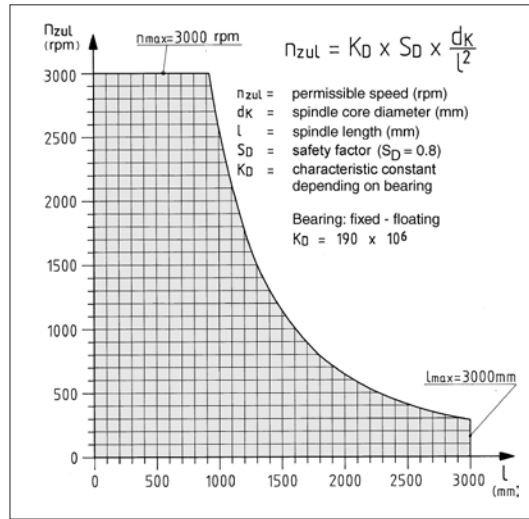
The inappropriate use refers to applications differing from the use authorised by the Notes on Use and Installation and the appropriate use. We accept no liability for any damage that may arise.

1.3 Selecting the Right Ball Screw Units in Combination with the Right Drives

Ball screw units are used wherever high accuracy and rigidity are required. Due to the high masses being moved (spindle rotation) and the related problems of dynamics, ball screw units are not suitable for applications involving high speeds and long travel paths.

The maximum rotational speeds shown in the diagram as a function of the spindle length can only be achieved if the spindle is optimally aligned and the yoke adapter is guided with sufficient rigidity by the slide. Generally speaking, the design should be such that the rotational speeds lie well below the specified maximum.

In certain applications, selecting a geared motor and a spindle with a higher lead allows the spindle's rotational speed to be reduced while retaining the same movement.



1.4 Combination of Ball Screw Units KGT and Servomotors

When used in combination with servo-drives, ball screw units require highly accurate settings for the controllers in the power electronics of servo-amplifiers of similar motor control units.

To meet the high dynamic requirements, high masses (spindles) of ball screw units often have to be accelerated and decelerated without a gearbox. These masses are governed by the length of the spindle.

Measures to eliminate problems (vibrations, noise), arising from control operations can include careful adaptation of the control parameters, couplings with damping effect and the reduction of rotational speed levels or the use of gearboxes.

1.5 Combination of Ball Screw Units KGT and Stepping Motors

Stepping motors work in a way that is not always suitable for applications where the rotor of the stepping motor has to accelerate and decelerate masses larger than those of its own rotor. Refer to the stepping motor specifications for further details.

In certain cases, the operating mode of the stepping motor (half-stepping mode, micro stepping), the use of an elastic coupling to separate the masses of the rotor and spindle, and the use of gears can open up further applications for ball screw unit/stepping motor combinations.

1.6 Suitable Linear Guides for Ball Screw Units KGT

Ball screw units KGT are equipped with a special yoke adapter which allows them to be combined with various linear guides without any risk of strains resulting from slight alignment inaccuracies between ball screw and slide. The installed linear guide therefore has the role of guiding the yoke adapter.

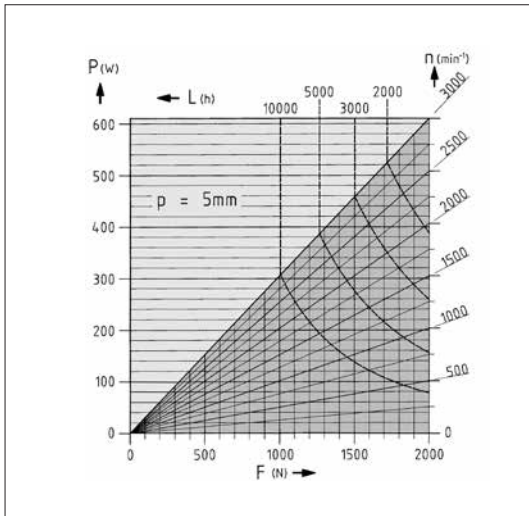
An integrated gimbal adapter extensively compensates for inaccuracies in movement and/or angle errors of the linear guide resulting from changes in loads etc.

The linear guide is, however, sufficiently rigid to fully exploit the dynamic parameters cited for ball screw units KGT.

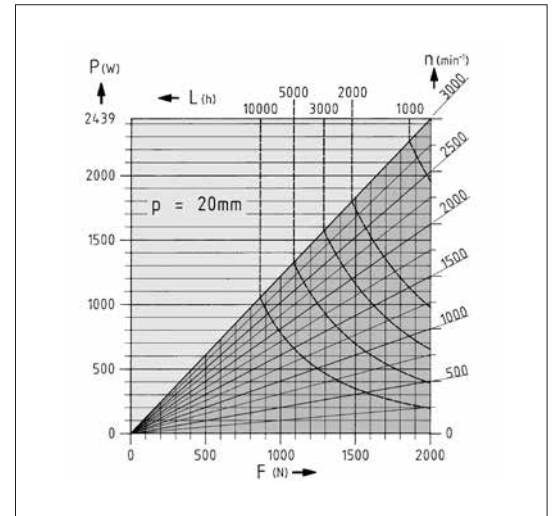
When assessing the rigidity of a linear guide fitted directly to profile 80x80 KGT, the geometry of the profile (profile open on one side) must be taken into account. The roller guides 8 D14 or linear guides PS 4-15 are particularly suitable for this particular application, while roller guides for higher loads should be used on external profiles.

Where guides are used on external profiles, measures must be adopted to ensure that transport of the yoke adapter is both rigid and correctly aligned. The yoke adapter must not be subjected to any forces or moments other than pure axial forces.

1.7 Calculation of Service Life



The service life of the Spindle Drive Nut combinations can be estimated depending on the axial loads and drive speeds.



1.8 Support with Technical Queries

This technical information bulletin makes no claim to completeness.

For further information and/or assistance, please contact the Dept. Technical Support at item international.

1.9 Liability

item Industrietechnik und Maschinenbau GmbH cannot accept any liability where components belonging to the Ball Screw Unit KGT are modified.

Only original spare parts may be used for maintenance and repair work.

item cannot be held liable for any malfunctioning, damage or injury if spare or replacement parts not given prior approval by item have been used.

item cannot accept liability for any damage or injury resulting from incorrect fitting or improper maintenance or use of the Ball Screw Unit!

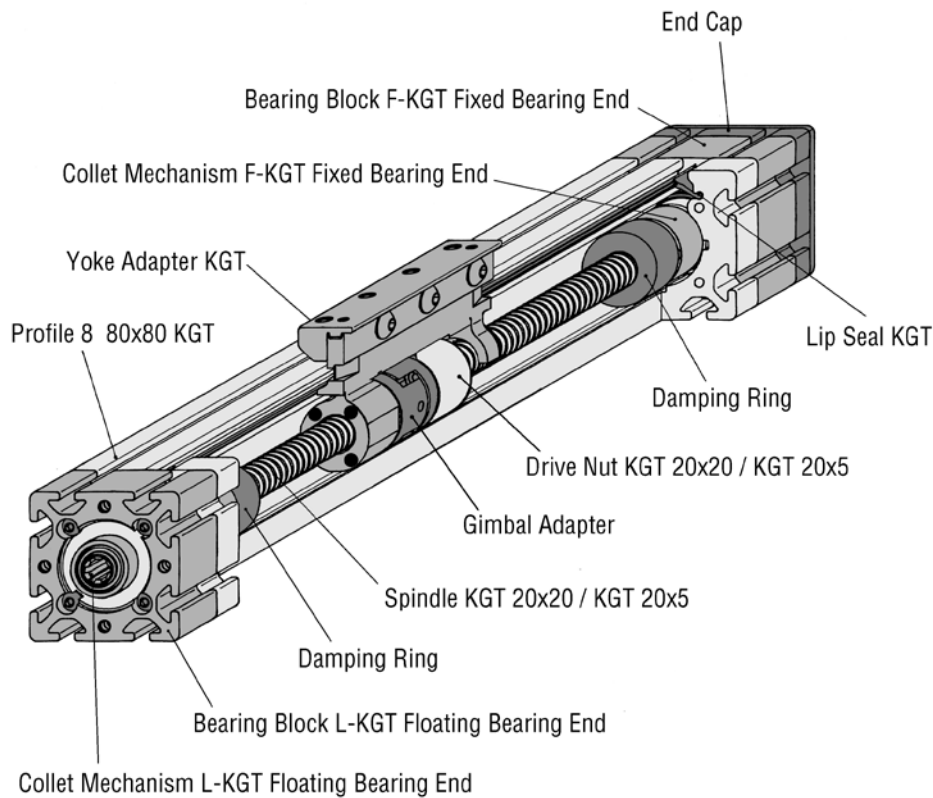
item reserves the right to make improvements and technical modifications without notice.

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In case you have further questions or need information, please always quote the identification number and the designation as shown in the catalogue.

2 Basic construction
2.1 Section view



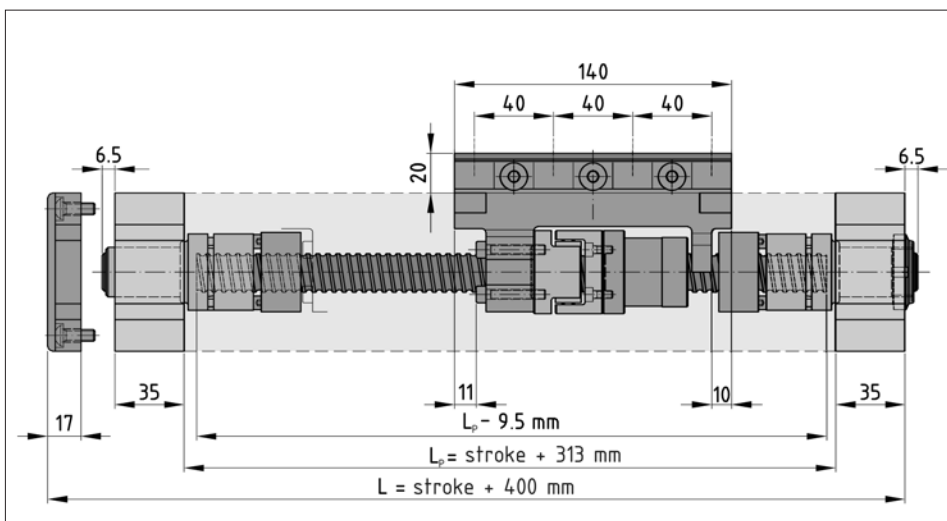
2.2 Component set

The Ball Screw Unit KGT consists of the following components:

Product	Order no.
> Lip Seal KGT	0.0.414.75
> End Cap	0.0.414.36
> Drive Nut KGT 20x20 or Drive Nut KGT 20x5	0.0.414.25 0.0.414.27
> Gimbal Adapter	0.0.414.31
> Bearing Block F-KGT / preassembled (incl. Collet Mechanism and Damping Ring) or Bearing Block F-KGT Universal (incl. Collet Mechanism and Damping Ring)	0.0.414.11 0.0.414.34
> Bearing Block L-KGT (incl. Collet Mechanism and Damping Ring) or Bearing Block L-KGT Universal (incl. Collet Mechanism and Damping Ring)	0.0.414.15 0.0.414.35
> Yoke Adapter KGT	0.0.414.40
> Profile 8 80x80 KGT	0.0.414.01
> Spindle KGT 20x20 or Spindle KGT 20x5	0.0.414.24 0.0.414.26

2.3 Determining the length of the components

- > Work out the lifting stroke (H)
- > Profile 8 80x80 KGT and Lip Seal KGT:
Lifting stroke + 313 mm
- > Spindle KGT 20x20 or 20x5:
Length of the Profile 8 80x80 KGT - 9,5 mm
- > Ball Screw Unit KGT complete unit (incl. Multi-Spline Hub):
Lifting stroke + 400 mm
- 400 mm = 313 mm + 70 mm + 17 mm
- 313 mm = min. profile length for Yoke Adapter and Collet Mechanism
- 70 mm = 2xBearing Block à 35 mm
- 17 mm = End Cap
- 6,5 mm = outside overhang of Collet Mechanism)



3 Assembly guides

3.1 Profile 8 80x80 KGT, Machining

Ball screw units feature a rotating spindle which is relatively thin compared with the length and exhibits a tendency to vibrate due to the effects of rotation. All factors improving the concentric running and angular bedding of the spindle will lessen these vibration problems.

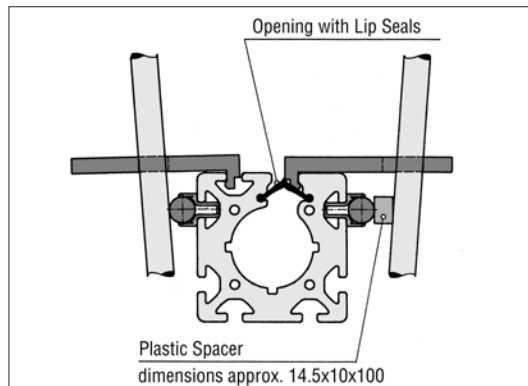
The supporting profile should therefore be cut with great care. The angle error should be kept to 0.1 mm if possible and should be checked for every ball screw unit.

Afterwards, M6x17 tapped holes will be drilled from both sides into the core bore of the Profile.

3.2 Profile 8 80x80 KGT, Installing the Guiding Shafts

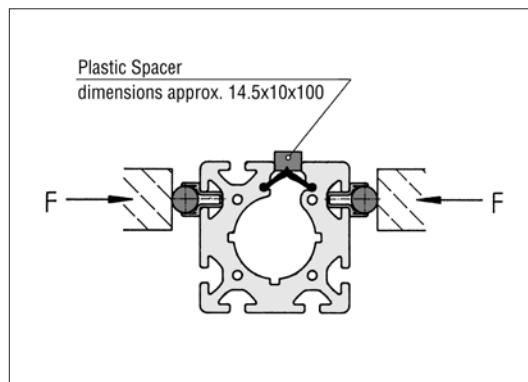
The guiding shafts to be installed into the complete ball screw unit can be pressed in using the item shaft insertion tool (Order-No. 0.0.265.38).

On the side which is without a Line 8 groove, the opening for the yoke adapter can be used to press in the shaft.



Alternative installation suggestion for shorter sections of Profiles:

When installing the second shaft by clamping the entire unit (vice etc.), the groove of the yoke adapter needs to be stabilized with a suitable spacer.

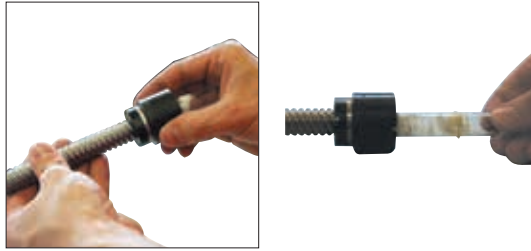


3.3 Fitting onto the Spindle - Drive Nut, Gimbal Adapter, Yoke Adapter, Damping Rings

After cutting the spindle sharp edges should be removed.

When screwing on the Drive Nut, take particular care not to lose any of the ball bearings. Under no circumstances may the mounting aid tube be removed from the Nut!

The nut is placed against the end face of the spindle end and is carefully screwed onto the spindle (clockwise thread) using the mounting aid. As the spindle gets in the mounting aid is pushed slowly out of the nut. It should be kept in a safe place for removing the nut as and when required.

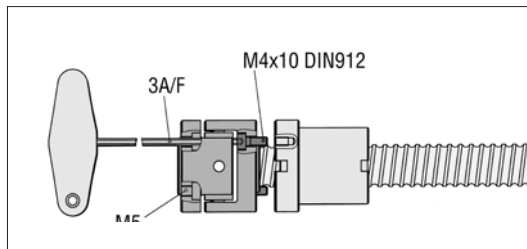


When fitting the nut is the possibility of individual ball bearings being lost. Individual ball bearing can be replaced providing that all bearings are actually present. You can check this by carefully turning the free end of the spindle until the individual ball bearings are visible. You can now fit the loose bearings back in the load-bearing inner channel (not in the return channel).

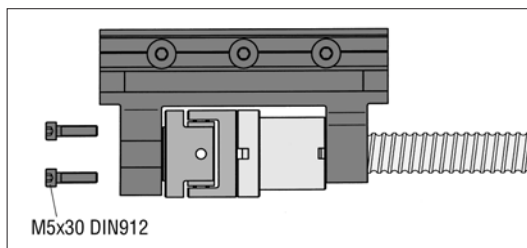
Nuts should not be fitted in ball screw units if ball bearings are missing (noise, service life).

After the nut has been fitted, the gimbal adapter and yoke can be screwed on (to the flange side of the nut). To do this, the nut should be positioned carefully until its flange side is approximately 20 mm from the end of the spindle.

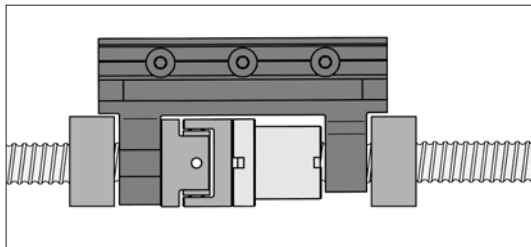
Note: The Gimbal Adapter is a deliberately tight fit to prevent play in the drive train.



Next, slide the Nut Connector in place and screw it in position on the Gimbal Adapter.



Fitting a damping ring both in front of and behind the yoke adapter secures the unit axially and prevents it from working loose during assembly.



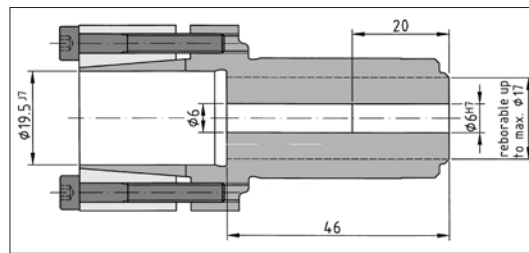
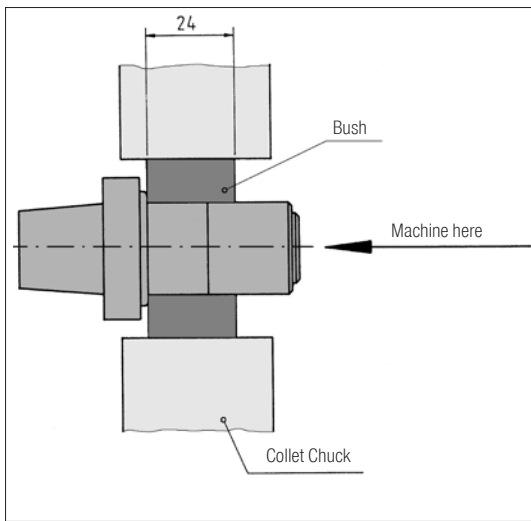
3.4 Bearing Block KGT Universal

Depending on the type of drive chosen, the Collet Mechanism on the Bearing Blocks Universal might require machining. In order to allow collet mechanisms to be machined to customers' requirements, they have been provided with bores.

KGT Bearing Blocks Universal are always supplied in a disassembled state.

However, the ball bearings are press-fitted in the Housing Profile.

3.4.1 Customized Machining of the Collet Mechanism



The hub is reborable up to max. \varnothing 17 mm or \varnothing 14 mm and insertion of a parallel keyway as per DIN 6885 T1.

Machining, which generally involves a reboring operation and the provision of a parallel keyway, must be performed from the bearing seat side, since the bore here offers the required accuracy. The collet mechanism must be clamped in the chuck of the lathe using a sleeve inserted over the seat of the roller bearings.

Manufacturing inaccuracies result in strains when installing gears and/or drive units/motors. This in turn leads to increased friction, vibration and noise and, if the worst come to the worst, can result in the entire unit falling.

It is therefore advisable to work with commercially available shaft couplings which can compensate both alignment and angle errors. The item couplings which permit a certain damping in the direction of rotation would be highly suitable due to additional considerations which will be discussed below.

3.4.2 Fitting the Bearing Block KGT Universal

The machined Collet Mechanism of the fixed bearing version is pushed into the bearing and held in place with a Locating Nut. The Self-locking Locating Nut is tightened using a tubular socket wrench. Apply tightening torque until the bearing becomes stiff. Finally release the Splined Nut by one quarter-turn and then retighten it until there is no more play in the bearing.

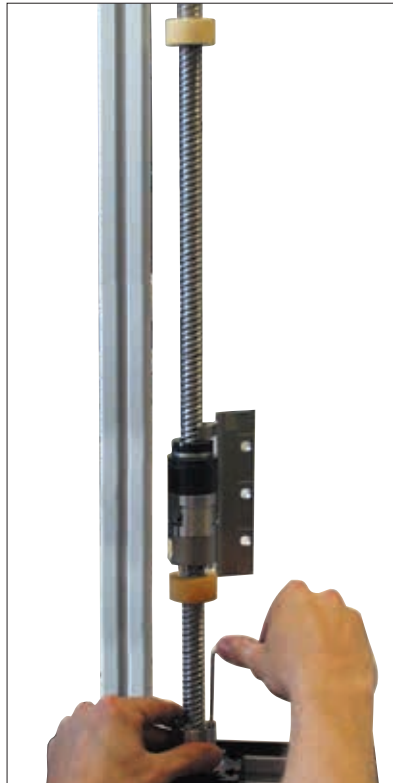
3.5 Clamping the Spindle Collet Mechanism, Floating Bearing End

Since angular errors between the collet mechanism and the spindle can impair the smooth running of the ballscrew units, it is essential to ensure correct alignment on assembly.

The forked end of the yoke should face the fixed bearing (the one with the large nut), whilst the end which fastens to the Gimbal Adapter should face the floating bearing. This it possible to exchange the otherwise asymmetrical ball screw units or to operate several such units in a parallel arrangement.



You will find it easier to fit the collet mechanisms if you first assemble the one at the floating bearing end. It is recommended that the fit of the collet in the bearing is checked prior to this and adjusted by relieving the bearing diameter if necessary with fine emery paper and a rotating mount. The fit of the collet in the bearing should be such that it can easily be removed axially using only gentle taps with a hammer.



The spindle must be inserted vertically (eliminating any sag) into the collet mechanism, which in turn will be fitted into the floating bearing housing.

We recommend using an assembly aid made of item Profiles. This is then used for fixing the bearing block in place and checking that the spindle is correctly clamped in the Collet Mechanism.

The yoke assembly should now be moved towards the floating bearing and held by the damping rings so that the collet screws can still be adjusted.

The spindle can now be aligned axially with the collet mechanism. To do this, tighten the four collet clamping screws little by little and keep rotating the collet mechanism and spindle as a check. A stop positioned close to the screw above the collet mechanism can be used as a visual check of runout. Each time a screw is tightened the runout of the collet will be seen to be affected. By differentially tightening the screws this runout can be minimised. Proceed until all screws are secure. If the collet runout is unacceptable, loosen all screws and use two of them in the holes provided to break in locking action of the collet, rotate the shaft slightly in the collet and try again.

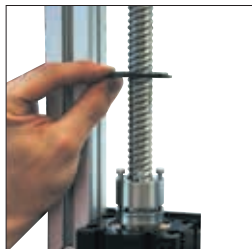
The runout of clamping should not exceed 0,5 mm over a spindle length of approximately 1,000 m.

The collet mechanism at the floating bearing end now must be separated from the floating bearing block. It remains on the spindle so that the pre-assembled unit can be inserted into profile 8 80x80 KGT later on.

3.6 Clamping the Spindle Collet Mechanism, Fixed Bearing End

The collet mechanism at the fixed bearing end is fitted in the same sequence as described for the floating bearing end. To this end, the preassembled fixed bearing block is attached to the assembly aid and the spindle inserted vertically.

It is important to note that the centring ring at this end is fitted before the collet mechanism is clamped in position. It is not possible to fit the centring ring afterwards.



3.7 Lubricating the spindle

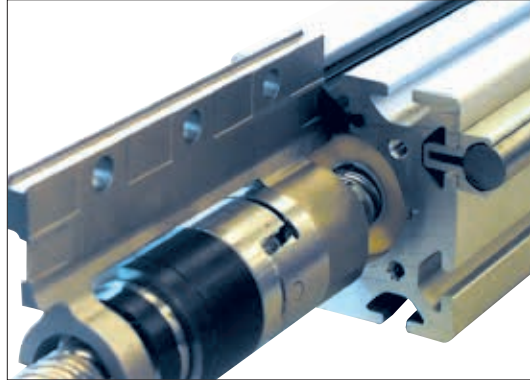
The preassembled Ball Screw Unit has to be greased with a suitable grease.

We recommend applying GLEITMO 810 (Fuchs Lubritech) using a brush.

3.8 Insertion into Profile 8 80x80 KGT

After the lip seals have been inserted into profile 8 80x80 KGT, the adjusted, pre-assembled unit consisting of:

- > collet mechanism at floating bearing end
- > damping ring
- > drive nut
- > gimbal adaptor
- > yoke adaptor
- > spindle
- > second damping ring
- > and collet mechanism in fixed bearing block with centring ring is inserted into profile 80x80 KGT and secured in position.

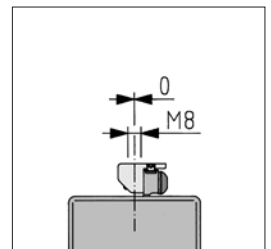
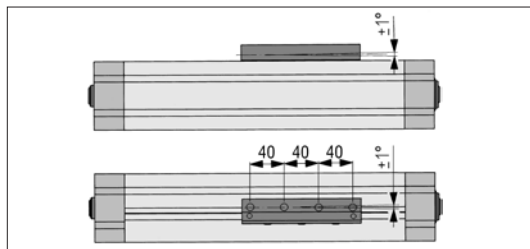
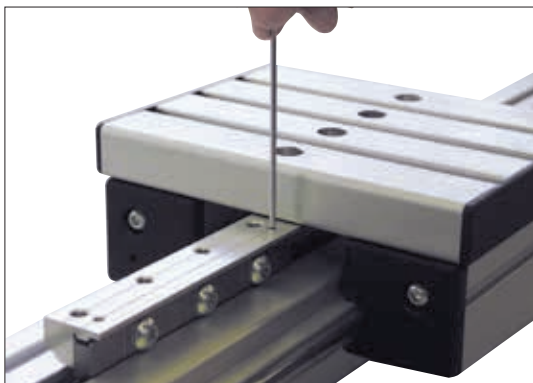
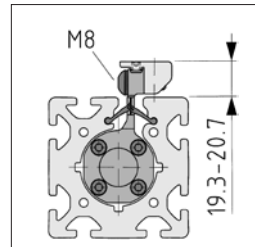
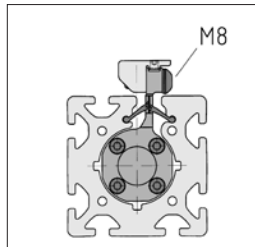
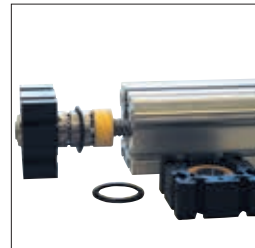


3.9 Adjusting Yoke Adapter

The yoke adapter is adjusted at the fixed bearing end which is already fitted. For this purpose, the yoke adapter is moved as far as possible towards the fixed bearing end (using a crank handle or similar).

The floating bearing block with centring ring is positioned over the free end of the spindle and the collet mechanism at the floating end and is temporarily fixed in position in order to reduce the possibility of the spindle sagging.

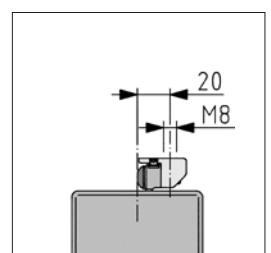
The yoke adapter consists of two parts connected by M8 screws. Two grub screws are also provided for adjusting the height and angle.



The relevant slide (made up from Roller Guides 8 D14, for example) is then moved into position over the yoke adapter and the latter adjusted relative to the slide using the grub screws (DIN 913-M5x5).

Ensure the yoke adapter is correctly aligned with the spindle and Profile. The maximum permissible angle error must not be exceeded.

The fact that the gimbal adaptor allows the yoke adapter a certain freedom of movement means that various settings are possible. The yoke adapter should be adjusted such that the gimbal mounting operates as close as possible to the centre of its range of movement. The setting made by means of the grub screws is then fixed by means of the M8 screws.

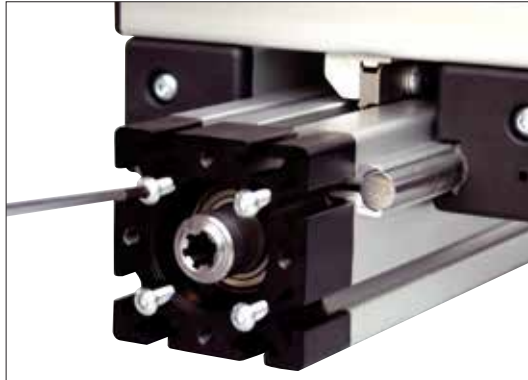


The slide is connected to the adjusted yoke adapter. The connecting threads can be arranged either centrally to the carriage or displaced by 20 mm, depending on the way the carrier is fitted.

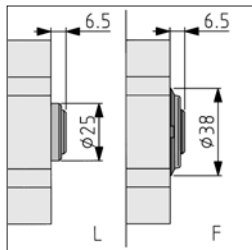
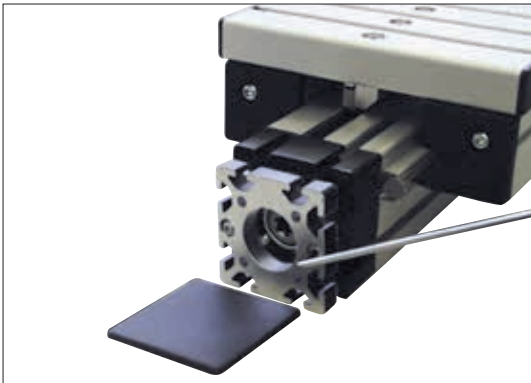
3.10 Installation Floating Bearing Block

The floating bearing block has so far been secured only on a temporary basis. The relevant screws are now loosened until the bearing block can move freely within the dimensions defined by the centring piece.

The slide is then moved to the floating bearing end. The spindle is fixed in position by the nut and the floating bearing block is aligned accordingly. It can then be secured with minimum strain resulting by using the M6x45 Button-Head Screws to attach it to the Profile 8 80x80 KGT.



3.11 Fitting End Cap



The Collet Mechanism and Splined Nut (on the fixed bearing) will stand proud of the bearing block Profile housing.

The End Cap is screwed to the bearing block that is not involved in the drive to cover the rotating parts.

3.12 Maintenance

Ball Screw Unit KGT are virtually maintenance free. As a rule, the spindle threads require lubricating every 400-500 operating hours. GLEITMO 815 (Fuchs Lubritech) or a similar mineral oil based sprayable grease is recommended.

The lubrication intervals will depend on the working conditions. Since re-lubrication produces a thinner layer of grease than the original, the service intervals will be correspondingly shorter (approx. every 200 - 300 operating hours).

item

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