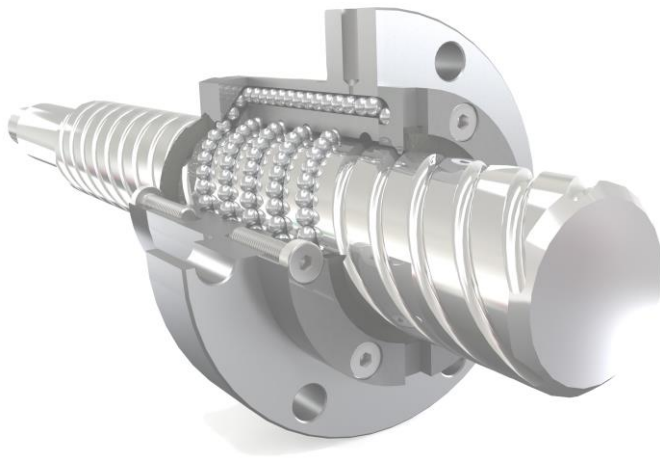


OPERATING MANUAL



KGT Ball Screws **TGT Trapezoidal Screws**

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KGT Ball Screw

1. Installation

The installation of ball screws requires expertise and may only be carried out by trained staff.

Ball screws can only absorb axial forces. All lateral forces (radial or axial) have to be absorbed by respective separate guides.

Due to low friction, misalignment can only be detected by suitable measurements. To avoid damage to the ball screw, limit switches and protection strips have to be installed in the machine.

2. Versions

NEFF-Gewindetriebe GmbH provides ball screws in the following versions:

- Ball screws and nuts in standard dimensions and with standard ends.
- Ball screws according to customer drawings.
- Screws cut to lengths as required by the customer; annealed shaft ends, if required; nuts on sleeves. The nuts are ready to be installed; the sleeve keeps the balls in the nut track.
- Screws in production length, nuts on sleeves.

3. Assembly

- Cut the screws to length (cutting wheel or carbide tool), screw hardness of 60^{+2} HRC.
- Anneal and machine the screw ends. Anneal at $650-700^{\circ}\text{C}$ (dark red) and leave to cool down by air.

Caution: Cool adjacent threads.

- Remove any burrs from the beginning of the ball thread. Clean the entire screw.
- Remove one of the two axial locks of the nut sleeve and place the sleeve and the nut on the end of the shaft. Centre the sleeve and press it against the beginning of the thread (Fig. 2).

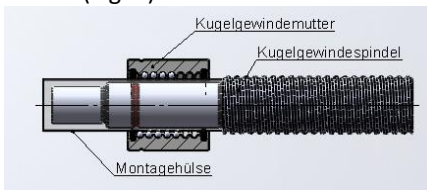


Fig. 2

- Screw the entire nut onto the screw (Fig. 3).

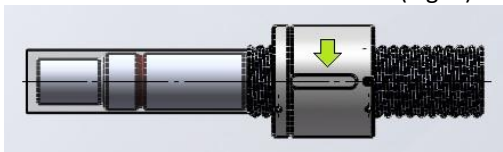


Fig. 3

- Remove the sleeve. Secure the nut against coming off of the screw (use a rubber ring or the axial lock of the sleeve) (Fig. 4).

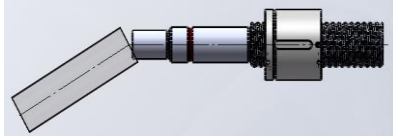


Fig. 4

- Install the ball screws. Permissible misalignment: 0.05mm/m . Screw the nut assembly as close to the screw bearing as possible, align it and secure it using bolts and pins, if required. The ball screw must not absorb any radial load.
- Connect central lubrication, where applicable – directly to the flange nut, or via the required housing to the cylindrical nut.

4. Cover

Any dirt caused during installation should be removed using petroleum, oil or cleaner's solvent. Do not use cold cleaners or lacquer solvents. Protect ball screws from dust, chips etc., even if they are equipped with cleaners. The following protection measures can be taken:

- Bellows (for vertical installation only if there is no additional guide).
- Spiral spring cover.

5. Lubrication

5.1 Grease lubrication

Correct lubrication is important to ensure that the ball screw reaches the calculated service life, to avoid excessive heating and to ensure low-noise running. For KGTs, the same lubricants are used for as for roller bearings (grease according to NGLI1 to NGLI3, DIN ISO 2137).

Grease types: Roller bearing grease without solid lubricants (lubricant grease type according to DIN 51825).

Initial lubrication is carried out in the factory using high-performance grease for long-term lubrication NEFF GREASE 2/3 according to NGLI.

5.1.1 Guide values for grease lubrication

Use the values in the following tables as guide values for the fill quantities.

Type	Version*	Initial lubrication	Relubrication**
KGM 1205	Ch	0.75 ml/0.65 g	0.50 ml/0.45 g
KGM 1605	I	2.05 ml/1.85 g	1.65 ml/1.45 g
KGM 1610	Ch	2.55 ml/2.35 g	1.75 ml/1.65 g
KGM 2005	Ch	2.85 ml/2.65 g	1.95 ml/1.85 g
KGM 2020	Co	3.25 ml/2.95 g	2.25 ml/2.05 g
KGM 2050	Co	6.35 ml/5.85 g	4.45 ml/4.05 g
KGM 2505	I	3.15 ml/2.85 g	2.55 ml/2.25 g
KGM 2510	Ch	4.85 ml/4.45 g	3.35 ml/3.15 g
KGM 2520	Co	3.75 ml/3.45 g	2.65 ml/2.45 g
KGM 2525	Co	4.35 ml/4.05 g	3.05 ml/2.85 g
KGM 2550	Co	6.75 ml/6.25 g	4.75 ml/4.35 g
KGM 3205	I	5.25 ml/4.85 g	4.15 ml/3.85 g
KGM 3210	I	16.35 ml/15.05 g	13.05 ml/12.05 g
KGM 3220	Ch	11.95 ml/11.05 g	8.35 ml/7.75 g
KGM 3240	Co	4.15 ml/3.85 g	2.95 ml/2.65 g
KGM 4005	I	6.45 ml/6.05 g	5.25 ml/4.85 g
KGM 4010	I	19.25 ml/17.75 g	15.35 ml/14.15 g
KGM 4020	Ch	14.55 ml/13.35 g	10.15 ml/9.35 g
KGM 4040	Co	13.45 ml/12.35 g	9.45 ml/8.65 g
KGM 5010	I	32.35 ml/29.75 g	25.85 ml/23.75 g
KGM 5020	Ch	37.85 ml/34.85 g	26.45 ml/24.35 g
KGM 6310	I	41.15 ml/37.75 g	32.95 ml/30.25 g

*I=Individual, Ch=Channel, Co=Cover diversion

**in ideal conditions

Type	Version*	Initial lubrication	Relubrication**
KGF-D 1605	I	3.75 ml/3.45 g	2.65 ml/2.35 g
KGF-D 1610	Ch	3.55 ml/3.25 g	2.15 ml/1.95 g
KGF-D 2005	Ch	4.85 ml/4.45 g	2.95 ml/2.65 g
KGF-D 2505	I	5.55 ml/5.15 g	3.85 ml/3.55 g
KGF-D 2510	Ch	6.75 ml/6.25 g	4.05 ml/3.75 g
KGF-D 2520	Co	3.75 ml/3.45 g	2.25 ml/2.05 g
KGF-D 2525	Co	4.35 ml/4.05 g	2.55 ml/2.45 g
KGF-D 2550	Co	6.75 ml/6.25 g	4.05 ml/3.75 g
KGF-D 3205	I	8.95 ml/8.25 g	6.25 ml/5.75 g
KGF-D 3210	I	22.95 ml/21.15 g	16.05 ml/14.75 g
KGF-D 3220	Ch	16.25 ml/14.95 g	9.75 ml/8.95 g
KGF-D 4005	I	11.65 ml/10.75 g	8.15 ml/7.55 g
KGF-D 4010	I	28.75 ml/26.45 g	20.15 ml/18.55 g
KGF-D 4020	Ch	20.35 ml/18.75 g	12.15 ml/11.25 g
KGF-D 4040	Co	13.45 ml/12.35 g	8.05 ml/7.45 g
KGF-D 5010	I	45.95 ml/42.25 g	32.15 ml/29.55 g
KGF-D 5020	Ch	51.25 ml/47.15 g	30.75 ml/28.25 g
KGF-N 1605	I	4.05 ml/3.75 g	2.85 ml/2.65 g
KGF-N 2005	I	5.15 ml/4.75 g	3.55 ml/3.35 g
KGF-N 2020	Co	3.25 ml/2.95 g	1.95 ml/1.75 g
KGF-N 2050	Co	6.35 ml/5.85 g	3.75 ml/3.45 g
KGF-N 2505	I	6.45 ml/5.95 g	4.55 ml/4.15 g
KGF-N 3205	I	9.95 ml/9.15 g	6.95 ml/6.35 g
KGF-N 3210	I	25.55 ml/23.55 g	17.85 ml/16.45 g
KGF-N 3240	Co	4.15 ml/3.85 g	2.45 ml/2.25 g
KGF-N 4005	I	12.25 ml/11.25 g	8.55 ml/7.85 g
KGF-N 4010	I	30.45 ml/28.05 g	21.35 ml/19.65 g
KGF-N 5010	I	47.95 ml/44.15 g	33.55 ml/30.85 g
KGF-N 6310	I	62.95 ml/57.95 g	44.05 ml/40.55 g

*I=Individual, Ch=Channel, Co=Cover diversion

**in ideal conditions

5.1.2 Lubrication intervals

Regular and careful lubrication is important as ball screws exhibit more grease loss than ball bearings. There are no guidelines concerning the lubrication intervals, as they depend on many factors.

Such as:

- Size and screw diameter.
- Operating speeds and accelerations.
- Tightness of the cleaners.
- Environmental conditions, such as temperature, dirt, liquids, etc.

Due to this high number of factors it is not feasible to create a universal guideline for lubrication intervals in all operating conditions. It is also difficult to define a factor used to determine the lubrication intervals.

With roller bearings, the number of turns is often used. From the number of turns, other guide values can be deduced, e.g. operating hours or operating time.

Numerous tests showed that relubrication should take place after approximately **1.5 to 2.5×10^7 turns.**

In case of large diameters and individual diversion, the smaller number has to be used. In case of small diameters and channel or cover diversion, the higher number has to be used. The theoretical lubrication interval is then calculated from the average speed, travel distance and the thread pitch. Below, lubrication interval examples at 2×10^7 turns are provided in hours and kilometres.

Average speed [min^{-1}]	Lubrication interval [h]
500	667
1000	333
1500	222
2000	167
2500	133
3000	111

Pitch [mm]	Lubrication interval [mm]
5	100
10	200
20	400
25	500
40	800
50	1000

5.1.3 Grease application and assembly information

If the ball screw is not greased on delivery, lubricate the nut via the lubrication hole prior to commissioning. During initial lubrication and relubrication of the ball nuts via the lubrication hole keep in mind that the grease is distributed slowly and unevenly in the nut. This makes it difficult to completely fill the nut to the values indicated in the table. We therefore recommend filling the nut in several steps and moving it along the screw occasionally to help distributing the grease in the threads. It is usually enough to execute a few turns with the nut (at least one length of the nut). Pay attention to the grease collar forming at both nut ends during filling.

If a pre-greased ball nut is mounted on the respective ball screw, also note that a certain amount of grease is lost at the end of the travel path (at the end of the screw). In case of excessive loss, it is therefore necessary to add a certain amount of grease using the lubrication hole of the assembled ball nut to ensure sufficient lubrication.

5.1.4 Note on the lubrication intervals

All stated values are given only for guidance and are in part based on experience. Regular checks of the ball screw are therefore essential. Pay attention to signs of insufficient lubrication, such as a dry screw or excessive grease loss.

5.2 Oil mist lubrication

Keep in mind that only ball nuts without cleaners may be used for central lubrication with oil mist.

5.3 Oil lubrication

The amount of oil added must not exceed the loss at the cleaners (otherwise use recirculating-oil lubrication).

Oil types: viscosity of 25 to 100mm²/s at 100°C.

6. Operating temperature

The permissible operating temperature of ball screws is -30°C to +80°C. Temporarily, a temperature of +110°C is also permissible. Proper lubrication is a prerequisite.

With temperatures below -20°C the torque may increase to 10 times the usual value.

7. Information on short stroke operation

Short stroke operation is only permissible in the following cases:

- The stroke is larger than the pitch of the ball screw.
- At least one load cycle is larger than the pitch of the ball screw if at least one short stroke is smaller than the pitch of the ball screw.
- The stated lubrication intervals apply.
- If the above conditions are not met, obtain a special permission by NEFF following consultation.

TGT Trapezoidal Screw

1. Installation

Carefully align the trapezoidal screws during installation. If you do not have the required measurement devices, manually turn the screw on its entire length before the drive is installed. If the required amount of force varies and/or there are run marks on the outside of the screw, this indicates misalignment of the screw axis and the guide. In this case, loosen the respective fastening screws and manually turn the screw once more. When the required amount of force is steady, align the respective components. Otherwise, find the misalignment by loosening additional fastening screws. By design, trapezoidal screws are more resistant against dirt than ball screws, especially at low speeds (e.g. manual operation).

However, motion drives require similar protection as ball screws, in particular if they use plastic nuts.

2. Lubrication

Grease lubrication is usually used for trapezoidal screws. The lubrication intervals are determined by the operating conditions. We recommend cleaning the screw before it is lubricated, in particular if high-performance lubrication systems are used. Grease types: Roller bearing grease without solids.

3. Operating temperature

Depends on the nut type used, the lubrication conditions and the requirements. Please consult us concerning temperatures above 100°C (above 70°C in case of plastic nuts).

4. Wear and tear

Can be checked manually. If the axial clearance of a single-thread screw exceeds $\frac{1}{4}$ of the pitch, replace the nut.

Manufacturer's Declaration

We hereby declare that the following product:

KGT ball screw or TGT trapezoidal screw

for lifting and lowering loads

was manufactured in accordance with the EC machinery directive 2006/42/EC annex II B on incomplete machinery.

This incomplete machinery must not be commissioned until the machine it is to be incorporated in has been declared to comply with the provisions of the EC machinery directive, the harmonized standards, European standards or the applicable national standards.

The manufacturer undertakes to forward the documentation on the incomplete machinery to national authorities on request. The technical documentation was created according to annex VII B.

Person responsible for documentation:

Andreas Ries, QA manager

Address of the person responsible for documentation:

Neff Gewindetriebe GmbH

Karl-Benz-Str. 24

71093 Weil im Schönbuch

Germany

The following harmonized standards have been applied:

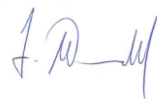
DIN EN ISO 12100-1 Safety of machinery – Basic concepts, general principles for design, part 1: Basic terminology, methodology

DIN EN ISO 12100-2 Safety of machinery – Basic concepts, general principles for design, part 2: Technical principles and specifications

The following national standards, guidelines and specifications have been applied:

BGV D8 Accident prevention regulations for hoist gears, lifting and towing equipment

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Weil im Schönbuch, 15 April 2015

Hartmut Wandel, Director

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