DANAHER
MOTION
*Helping you build a better machine, **faster.***

Screw Drives
GT, MICRONLine®, KOKON®

THOMSON NEFF™

DANAHER MOTION

Helping you build a better machine, ***faster.***

Danaher Motion -
Helping you build a better machine, faster

Danaher Corporation combined over 30 industry-leading brands such as Kollmorgen, Thomson, Dover, Pacific Scientific, Portescap, Neff, Seidel and Bautz to establish a customer-focused motion control manufacturing company called Danaher Motion. We offer this powerful set of integrated motion control technologies under the Danaher Motion and Thomson brand names. We are a $1B+ global motion control leader, unique in our ability to marshal decades of application experience and technical innovation to help you build better machines, faster.

Danaher Motion defines high standards of quality, innovation and technology. We enable improved machine performance and reliability while controlling costs. Our global manufacturing footprint, rapid customization and prototyping capabilities drive quick lead times. Unmatched application experience and design expertise empowers you to commission machines faster.

Consider your options in today's market for a motion control partner. Select Danaher Motion and join a team with over 6000 employees, over 60 years of application experience and 2000+ distributor locations around the globe. Danaher Motion serves industries as diverse as semiconductor, aerospace and defense, electric vehicle systems, packaging, printing, medical and robotics. We offer an unparalleled depth and breadth of motion control product solutions through a worldwide service and support infrastructure, field service engineers and support teams available when and where you need them.

The Danaher Business System -
Building sustainable competitive advantage into your business

The Danaher Business System (DBS) was established to increase the value we bring to customers. It is a mature and successful set of tools we use daily to continually improve manufacturing operations and product development processes. DBS is based on the principles of Kaizen which continuously and aggressively eliminate waste in every aspect of our business. DBS focuses the entire organization on achieving breakthrough results that create competitive advantages in quality, delivery and performance – advantages that are passed on to you. Through these advantages Danaher Motion is able to provide you faster times to market as well as unsurpassed product selection, service, reliability and productivity.

Local Support Around the Globe

Contents

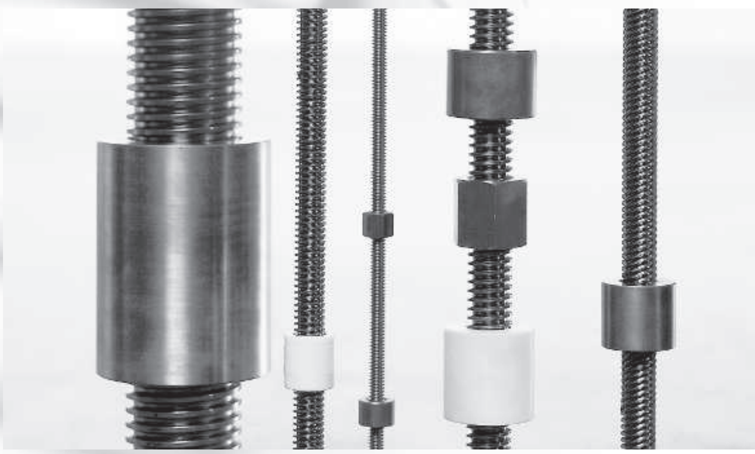
What are your requirements on a screw drive today?

The principle of the screw drive is very simple. And yet, in practice, there are a multitude of requirements and versions. Alongside the technical requirements, economic aspects are becoming more and more important.
This faces the supplier with the following challenges:

How do you reduce costs in procurement, manufacturing and assembly?
Growing pressure of costs and a high degree of flexibility demand short delivery times and attractive prices in the procurement of the components used. And individual customer wishes should already be taken into account at this time.

How can I increase the reliability of my systems?
High precision and low maintenance costs are what is expected of the components.

How can I make my system more efficient?
High speeds and more power through the correct choice of screw drive allow efficient operation of the system.



THOMSON NEFF Screw Drives – A good turn for your drive application

THOMSON NEFF manufactures screws in rolled quality since more than 30 years. Our range includes suitable drives for practically every moving application: ball-screw drives for high requirements on precision and speed, trapezoidal screw drives as a lower-priced alternative for rugged use. And all of them harmonised with our comprehensive programme of accessories. With their years of experience and end-to-end quality management, THOMSON NEFF guarantees a maximum of quality and reliability.

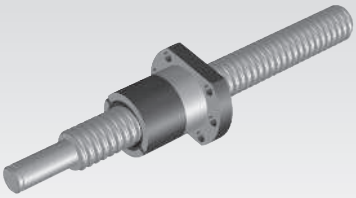
We offer you the solution

The versatile programme of THOMSON NEFF screw drives offers the screws and the matching nuts at an attractive price-performance ratio. The customer-specific machining of the ends reduces your manufacturing costs.

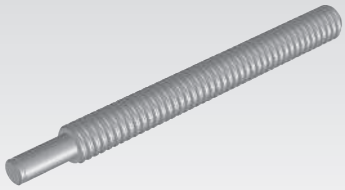
Screws in many different diameters and different leads, various ball return systems and low-backlash nuts or pre-loaded nut units guarantee efficient operation practically wherever they are installed.

Summary of THOMSON NEFF screw drives

Ball screw drive KGT

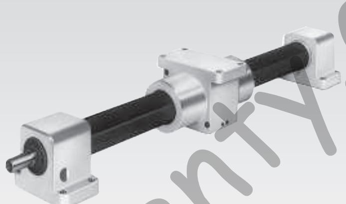


Ball screw KGS

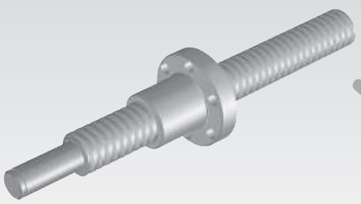


Ball nut KGF/KGM

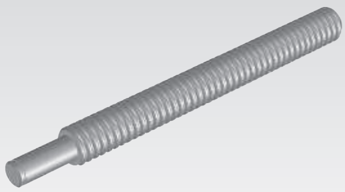
Fully protected ball screw drive KOKON®



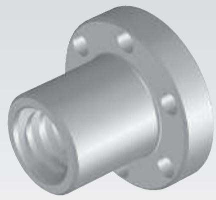
Trapezoidal screw drive TGT



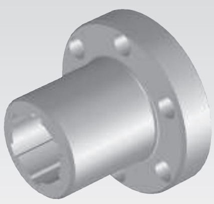
Trapezoidal screw RPTS



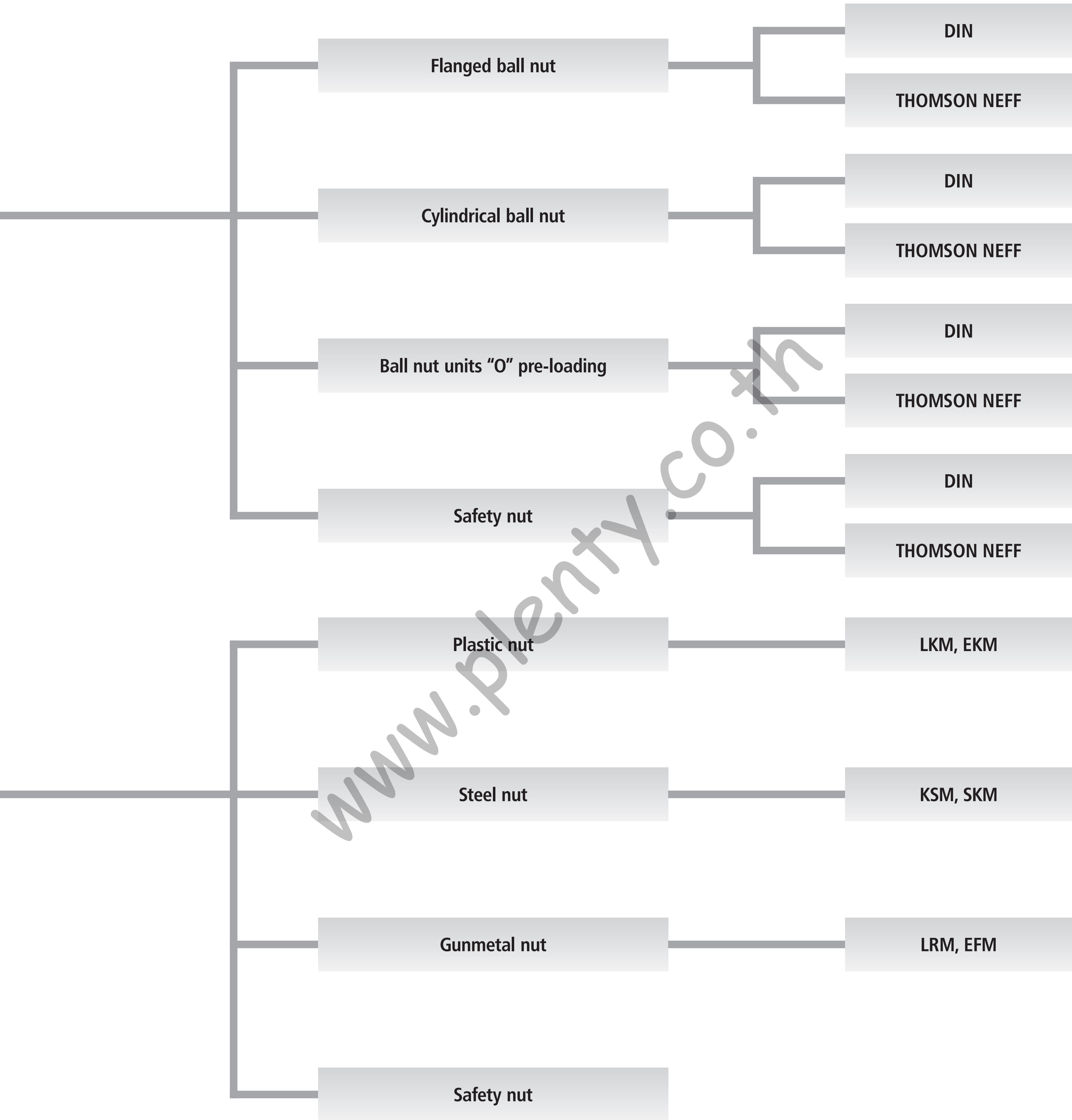
Trapezoidal nut



Accessories



- **Covering**
  - **Spiral spring cover**
- **Adapter**
  - **Adapter bracket**
  - **Universal joint adapter**


Flanged ball nut
DIN
THOMSON NEFF
Cylindrical ball nut
DIN
THOMSON NEFF
Ball nut units “O” pre-loading
DIN
THOMSON NEFF
Safety nut
DIN
THOMSON NEFF
Plastic nut
LKM, EKM
Steel nut
KSM, SKM
Gunmetal nut
LRM, EFM
Safety nut

Precision is our drive

The programme conforms to DIN 69051 and to the THOMSON NEFF-standard. All nuts, both flanged nuts and cylindrical nuts, are available with the corresponding DIN connectors.

All screws are available with screw end machining in accordance with individual customer requirements. Screws with soft annealed ends for individual end machining are available on request.

The high degree of mechanical efficiency of up to 98 % requires less drive power than trapezoidal screw drives.

The low friction permits a long life-time. This helps saving costs, thus increasing the economic efficiency.

- High travel speeds allow short cycle times.
- The reduced maintenance expenses help saving costs.
- High positioning accuracy is achieved with pre-loaded nut units.

General technical data

Manufacturing process
The thread profile is produced by cold rolling in the thread rolling method. Both screw and nut have a gothic thread profile. The load angle is 45°.

Linear speeds
At present, the permissible rotation limit is in the region of 3000 rpm, at individual dimensions up to 4500 rpm. This limit defines the maximum rotation, which must be run only under ideal operating conditions.

Installed position
The position in which the screw drive is installed can always be freely chosen. Please consider that all radial forces that occur need to be absorbed by external guides.

Accuracy
The standard programme has a precision of 50 µm per 300 mm, screws from the ***MICRON****Line*® series, which are available on request, achieve an accuracy of 23 µm per 300 mm.

Safety advice
Ball screw drives are generally not self-locking due to the low friction. It is therefore advisable to install suitable motors with holding brake, particularly when the ball screw drive is installed vertically.

Efficiency
Trapezoidal screw drives have a max. mechanical efficiency of 50 %, ball screw drives achieve a mechanical efficiency of up to 98 %.

Duty cycle
The ball screw drive permits a duty cycle of up to 100%. Extremely high loads in combination with high duty cycles can reduce the life time.

Temperatures
All screw drives are designed for continuous operation at ambient temperatures of -30 °C up to 80 °C. Temperatures of up to 110 °C are also permitted for brief periods. Ball screw drives are only in exeptional cases suitable for operation at subzero temperatures.

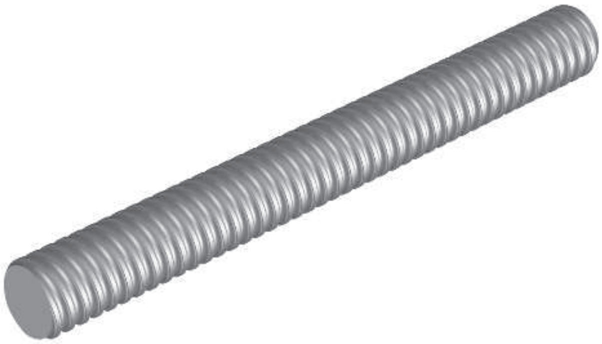
Repeatability
The repeatability is defined as the capability of a screw drive to reach an actual position that has once been reached again under the same conditions. It refers to the average position variation according to VDI/DGQ 3441.
The repeatability is influenced amongst others by:
- Load
- Speed
- Deceleration
- Direction of travel
- Temperature

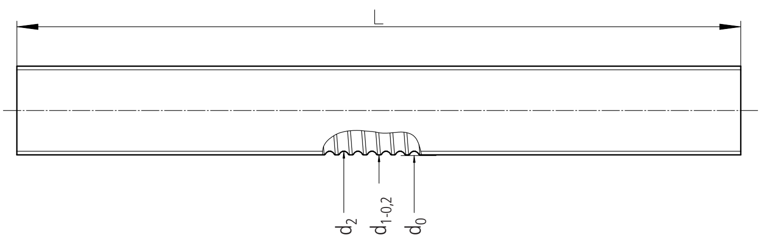
Aggressive ambient working conditions
In cases of heavy dirt and dust particles, an additional bellow or a spiral spring cover is recommended.

Installation and maintenance
See page 60

Technical Data	Ball screw drive KGS
■ Thread:	Gothic profile (pointed profile)
■ Diameter:	Standard: 12 – 80 mm ***MICRON****Line*®: 12 – 40 mm
■ Lead:	Standard: 5 – 50 mm ***MICRON****Line*®: 5 – 40 mm
■ Number of starts:	1 – 5
■ Thread direction:	Right hand thread, KGS 2005 also left hand thread
■ Length:	Standard: 5600 mm KGS 1205: 1300 mm
■ Material:	1.1213 (Cf 53) Ball track inductively hardened and polished, screw end and core in soft condition
■ Lead accuracy:	Standard: 50 µm/300 mm ***MICRON****Line*®: 23 µm/300 mm
■ Straightness:	L < 500 mm: 0.05 mm/m L = 500 – 1000 mm: 0.08 mm/m L > 1000 mm: 0.1 mm/m
■ Left and right hand screw:	KGS 2005 only
■ End machining:	To customer specs

Ball screws KGS





Type Diameter [mm] Lead [mm] Right hand thread	Accuracy class [µm/300 mm]	Dimensions [mm] d_0	d_1	d_2	L[1] max.	Weight W_{KGS} [kg/m]	Planar moment of inertia Iy [10^4 mm^4]	Section modulus[3] [10^3 mm^3]	Mass moment of inertia [kg m^2/m]
KGS-1204	50	12	11.5	10.1	1300[2]	0.75	0.053	0.104	$1.13 \cdot 10^{-5}$
KGS-1205	50	12	11.5	10.1	1300[2]	0.75	0.051	0.101	$1.13 \cdot 10^{-5}$
KGS-1605	50	16	15.5	12.9	5600	1.26	0.136	0.211	$3.21 \cdot 10^{-5}$
KGS-1610	50	16	15.4	13.0	5600	1.26	0.140	0.216	$3.21 \cdot 10^{-5}$
KGS-2005	50	20	19.5	16.9	5600	2.04	0.400	0.474	$8.46 \cdot 10^{-5}$
KGS-2020	50	20	19.5	16.9	5600	2.04	0.400	0.474	$8.46 \cdot 10^{-5}$
KGS-2050	50	20	19.1	16.5	5600	2.04	0.364	0.441	$8.46 \cdot 10^{-5}$
KGS-2505	50	25	24.5	21.9	5600	3.33	1.129	1.031	$2.25 \cdot 10^{-4}$
KGS-2510	50	25	24.5	21.9	5600	3.33	1.129	1.031	$2.25 \cdot 10^{-4}$
KGS-2520	50	25	24.6	22.0	5600	3.33	1.150	1.045	$2.25 \cdot 10^{-4}$
KGS-2525	50	25	24.5	22.0	5600	3.33	1.150	1.045	$2.25 \cdot 10^{-4}$
KGS-2550	50	25	24.1	21.5	5600	3.33	1.049	0.976	$2.25 \cdot 10^{-4}$
KGS-3205	50	32	31.5	28.9	5600	5.63	3.424	2.370	$6.43 \cdot 10^{-4}$
KGS-3210	50	32	32.7	27.3	5600	5.63	2.727	1.998	$6.43 \cdot 10^{-4}$
KGS-3220	50	32	31.7	27.9	5600	5.63	2.974	2.132	$6.43 \cdot 10^{-4}$
KGS-3232	50	32	31.6	28.5	6000	5.61	3.149	2.225	$6.39 \cdot 10^{-4}$
KGS-3240	50	32	30.9	28.3	5600	5.63	3.149	2.225	$6.43 \cdot 10^{-4}$
KGS-4005	50	40	39.5	36.9	5600	9.01	9.101	4.933	$1.65 \cdot 10^{-3}$
KGS-4010	50	40	39.5	34.1	5600	8.35	6.737	3.893	$1.41 \cdot 10^{-3}$
KGS-4020	50	40	39.7	35.9	5600	9.01	8.154	4.542	$1.65 \cdot 10^{-3}$
KGS-4040	50	40	38.9	36.3	5600	9.01	8.523	4.696	$1.65 \cdot 10^{-3}$
KGS-5010	50	50	49.5	44.1	5600	13.50	18.566	8.420	$3.70 \cdot 10^{-3}$
KGS-5020	50	50	49.5	44.1	5600	13.50	18.566	8.420	$3.70 \cdot 10^{-3}$
KGS-6310	50	63	62.5	57.1	5600	22.03	52.181	18.280	$9.84 \cdot 10^{-3}$
KGS-6320	50	63	62.5	57.1	6000	22.03	52.180	18.280	$9.79 \cdot 10^{-3}$
KGS-8010	50	80	79.5	74.1	7000	36.41	148	39.940	$2.68 \cdot 10^{-2}$
Left hand thread									
KGS-2005 LH	50	20	19.5	16.9	5600	2.04	0.400	0.474	$8.46 \cdot 10^{-5}$

[1] Delivery length 6000 mm, hardened length min. 5600 mm, both ends soft annealed.
[2] KGS-1205: Delivery length 1500 mm, hardened length min. 1300 mm, both ends soft annealed.
[3] The polar moment of inertia is twice the section modulus.

Ball nuts

THOMSON NEFF ball screw nuts are made as flanged nuts (KGF) and cylindrical nuts (KGM). They can be combined with all screws with any kind of end machining. Single nuts are also available on assembly sleeves.

Flanged ball screw nuts are made with attachment holes; cylindrical ball screw nuts have a spline.

THOMSON NEFF manufactures ball screw nuts with three different ball return systems, depending on the diameter and the lead of the screw used. Profiled wipers reduce the seepage of lubricant, and help to repel dirt.

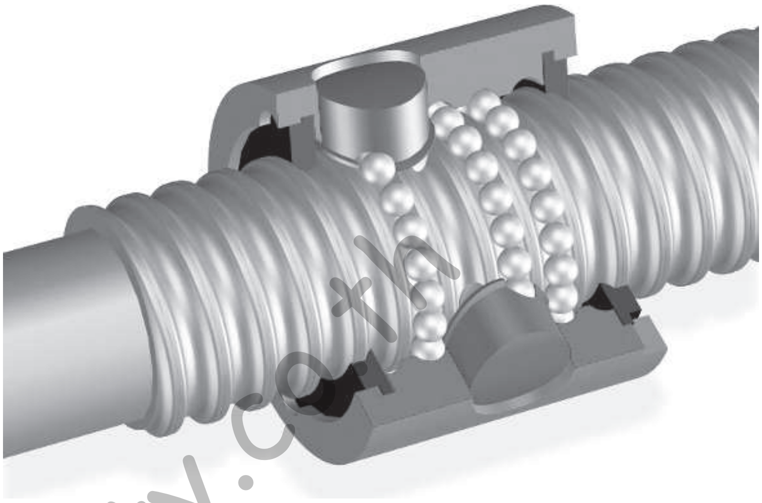
Material: Steel 1.7131 (ESP65)/1.3505 (100 Cr 6).

THOMSON NEFF ball return systems

Single return duct

For single-start screw drives.

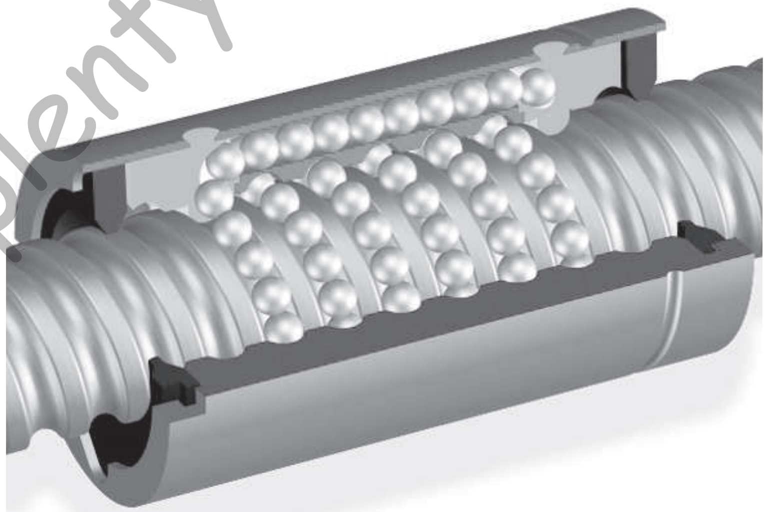
The balls are lifted out of the track after every turn of the screw and are moved back one thread lead. The THOMSON NEFF guide piece, made of fibre glass reinforced plastic, ensures perfect guidance and low ball wear. Available for our thread leads 5 and 10 mm.



Return duct

For single- and multi-start screw drives.

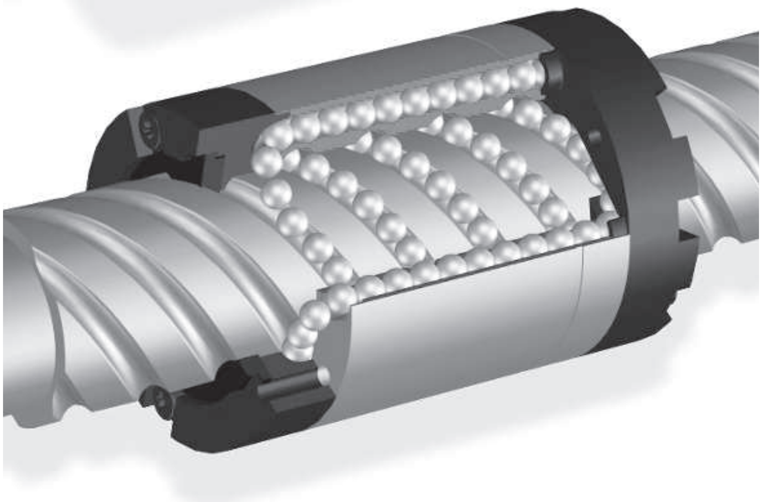
After several revolutions, the balls are returned through a patented reverse and return system that is integrated in the nut.
Available for our thread leads 5, 10 and 20 mm.



Multi-turn return duct

For multi-start screw drives.

The balls are returned via two special recirculading lids and the return duct is integrated in the nut.
Available for our thread leads 20, 25, 40 and 50 mm.



Ball nuts

Ball nut units – pre-loaded

As a rule all nuts can be combined to form backlash-free, pre-loaded nut units except when the lead is equal to or greater than the diameter of the screw. THOMSON NEFF supplies ready-to-install units with "O" pre-loading.

O pre-loading:
With this type of pre-loading the lines of forces run in a rhomboidal pattern (O-shaped), i.e. the nuts are pressed apart by the pre-loading force. This configuration offers particularly high rigidity against tilting. The standard pre-loading is equal to 10 % of the dynamic load rating C.

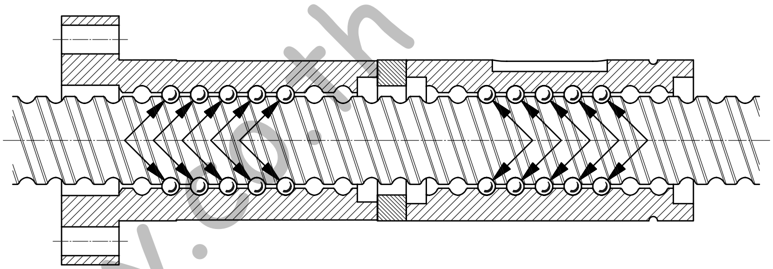
Note:
Backlash-free preloading is only possible with a lead accuracy $\leq$ 50 µm/300 mm and leads P < diameter d_0.
Lead accuracies of > 50 µm/300 mm and leads $\geq$ diameter d_0 only allow a low backlash preloading. The total length of the nut can increase up to 10 mm due to the installed preloading disc.

Single nuts mounted backlash-free on request. Please contact our technical support. (s. p. 63)

Pre-loading variants

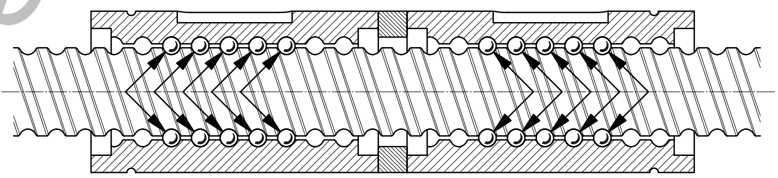
KGT-FM

Ball screw drive with one KGF flanged nut and one KGM cylindrical nut with O-pre-loading.



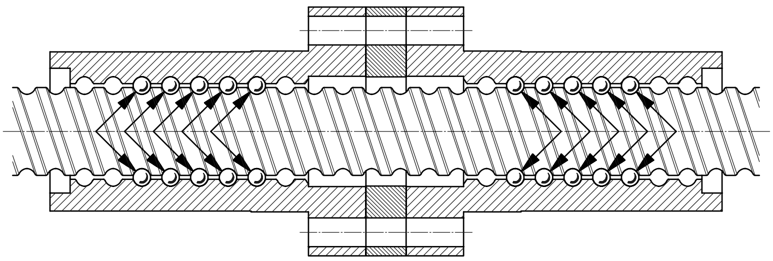
KGM-MM

Ball screw drive with two KGM cylindrical nuts and O-pre-loading. Only one of the two feather keys transmits the drive torque.



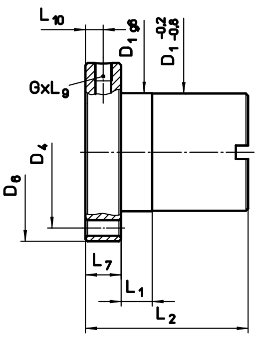
KGT-FF

Ball screw drive with two KGF flanged nuts with O-pre-loading.

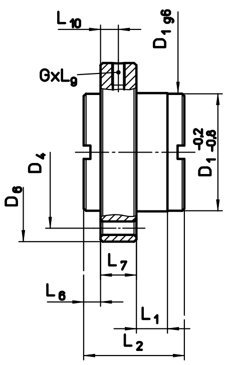


Flanged ball nuts KGF-D according to DIN 69051

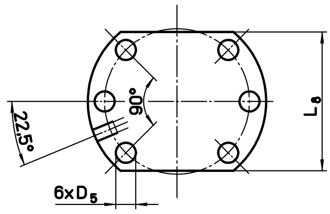
Form E



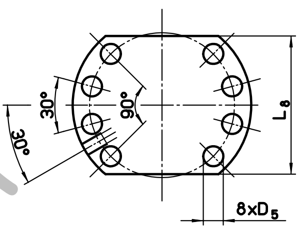
Form S



Hole pattern 1 Flanged form B to DIN 69051



Hole pattern 2 Flanged form B to DIN 69051



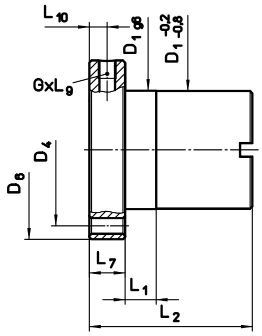
Material: 1.7131 (ESP65) / 1.3505 (100 Cr 6).

Type Diameter [mm] Lead [mm] Right hand thread	Form	Hole pattern	Dimensions [mm]											Lubrication hole	Axial backlash max [mm]	No. of circuits	Load rating [kN]		
			D_1	D_4	D_5	D_6	L_1	L_2	L_6	L_7	L_8	L_9	L_{10}	G			C[2]	C[3]	$C_o = C_{oa}$
KGF-D 1605 RH-EE	E	1	28	38	5.5	48	10	42	–	10	40	10	5	M 6	0.08	3	12.0	9.3	13.1
KGF-D 1610 RH-EE	E	1	28	38	5.5	48	10	55	–	10	40	10	5	M 6	0.08	6	23.0	15.4	26.5
KGF-D 2005 RH-EE	E	1	36	47	6.6	58	10	42	–	10	44	10	5	M 6	0.08	3	14.0	10.5	16.6
KGF-D 2505 RH-EE	E	1	40	51	6.6	62	10	42	–	10	48	10	5	M 6	0.08	3	15.0	12.3	22.5
KGF-D 2510 RH-EE	E	1	40	51	6.6	62	16	55	–	10	48	10	5	M 6	0.08	3	17.5	13.2	25.3
KGF-D 2520 RH-EE	S	1	40	51	6.6	62	4	35	10.5	10	48	8	5	M 6	0.15	4	19.0	13.0	23.3
KGF-D 2525 RH-EE	S	1	40	51	6.6	62	9	35	8	10	–[4]	8	5	M 6	0.08	5	21.0	16.7	32.2
KGF-D 2550 RH-EE	S	1	40	51	6.6	62	10	58	10.0	10	48	8	5	M 6	0.15	5	22.5	15.4	31.7
KGF-D 3205 RH-EE	E	1	50	65	9	80	10	55	–	12	62	10	6	M 6	0.08	5	24.0	21.5	49.3
KGF-D 3210 RH-EE	E	1	53[1]	65	9	80	16	69	–	12	62	10	6	M 8x1	0.08	3	44.0	33.4	54.5
KGF-D 3220 RH-EE	E	1	53[1]	65	9	80	16	80	–	12	62	10	6	M 6	0.08	4	42.5	29.7	59.8
KGF-D 3232 RH-EE	S	1	50	65	9	80	12	42	9	12	62	8	6	M 6	0.08	4	–	19,7	37,4
KGF-D 4005 RH-EE	E	2	63	78	9	93	10	57	–	14	70	10	7	M 6	0.08	5	26.0	23.8	63.1
KGF-D 4010 RH-EE	E	2	63	78	9	93	16	71	–	14	70	10	7	M 8x1	0.08	3	50.0	38.0	69.1
KGF-D 4020 RH-EE	E	2	63	78	9	93	16	80	–	14	70	10	7	M 8x1	0.08	4	44.5	33.3	76.1
KGF-D 4040 RH-EE	S	2	63	78	9	93	16	85	7.5	14	–[4]	10	7	M 8x1	0.08	8	42.0	35.0	101.9
KGF-D 5010 RH-EE	E	2	75	93	11	110	16	95	–	16	85	10	8	M 8x1	0.08	5	78.0	68.7	155.8
KGF-D 5020 RH-EE	E	2	85[1]	103[1]	11	125	22	95	–	18	95	10	9	M 8x1	0.08	4	82.0	60.0	136.3
KGF-D 6320 RH-EE	E	2	95	115	14	135	25	99	–	20	100	10	10	M 8	0.08	4	–	78,4	171,3
Left hand thread																			
KGF-D 2005 LH-EE	E	1	36	47	6.6	58	10	42	–	10	44	10	5	M 6	0.08	3	16.5	10.5	16.6

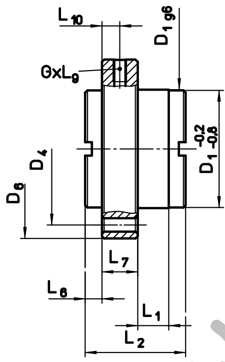
[1] D_1 not conforming to DIN 69051.
[2] Dynamic load rating according to DIN 69051 part 4, draft 1978.
[3] Dynamic load rating according to DIN 69051 part 4, draft 1989.
[4] Round flange.

Flanged ball nuts KGF-N according to THOMSON NEFF standard

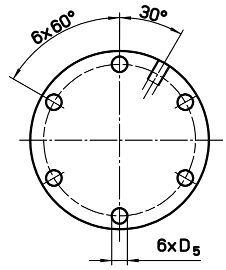
Form E



Form S



Hole pattern 3 THOMSON NEFF standard



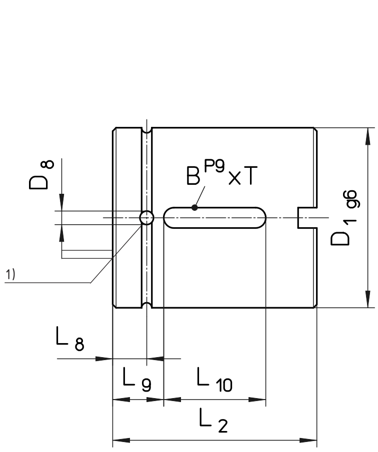
Material: 1.7131 (ESP65) / 1.3505 (100 Cr 6).

Type Diameter [mm] Lead [mm] Right hand thread	Form	Dimensions [mm]										Lubrication hole	Axial backlash max [mm]	No. of circuits	Load rating [kN]		
		D_1	D_4	D_5	D_6	L_1	L_2	L_6	L_7	L_9	L_{10}	G			C[1]	C[2]	$C_o = C_{oa}$
KGF-N 1605 RH-EE	E	28	38	5.5	48	8	44	–	12	8	6	M 6	0.08	3	12.0	9.3	13.1
KGF-N 2005 RH-EE	E	32	45	7	55	8	44	–	12	8	6	M 6	0.08	3	14.0	10.5	16.6
KGF-N 2020 RH-EE	S	35	50	7	62	4	30	8	10	8	5	M 6	0.08	4	12.0	11.6	18.4
KGF-N 2050 RH-EE	S	35	50	7	62	10	56	9	10	8	5	M 6	0.15	5	18.0	13.0	24.6
KGF-N 2505 RH-EE	E	38	50	7	62	8	46	–	14	8	7	M 6	0.08	3	15.0	12.3	22.5
KGF-N 3205 RH-EE	E	45	58	7	70	10	59	–	16	8	8	M 6	0.08	5	24.0	21.5	49.3
KGF-N 3210 RH-EE	E	53	68	7	80	10	73	–	16	8	8	M 8x1	0.08	3	44.0	33.4	54.5
KGF-N 3240 RH-EE	S	53	68	7	80	14	45	7.5	16	10	8	M 6	0.08	4	17.0	14.9	32.4
KGF-N 4005 RH-EE	E	53	68	7	80	10	59	–	16	8	8	M 6	0.08	5	26.0	23.8	63.1
KGF-N 4010 RH-EE	E	63	78	9	95	10	73	–	16	8	8	M 8x1	0.08	3	50.0	38.0	69.1
KGF-N 5010 RH-EE	E	72	90	11	110	10	97	–	18	8	9	M 8x1	0.08	5	78.0	68.7	155.8
KGF-N 6310 RH-EE	E	85	105	11	125	10	99	–	20	8	10	M 8x1	0.08	5	86.0	76.0	197.0
KGF-D 8010 RH-EE	E	105	125	14	145	10	101	–	22	8	11	M 8x1	0.08	5	–	86.25	262.41

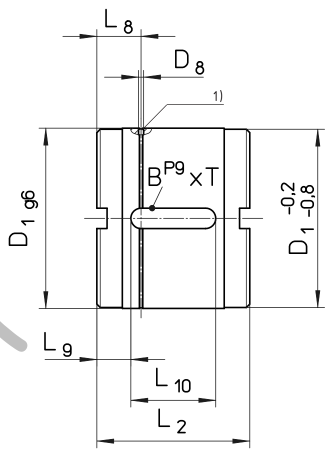
[1] Dynamic load rating according to DIN 69051, part 4, draft 1978.
[2] Dynamic load rating according to DIN 69051, part 4, draft 1989.

Cylindrical ball nuts KGM-D according to DIN 69051

Form E



Form S



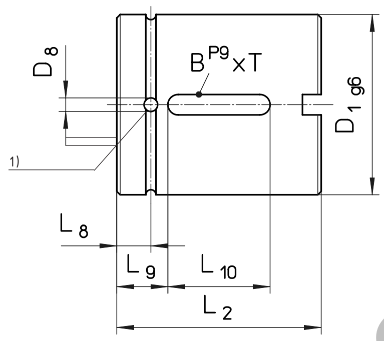
Material: 1.7131 (ESP65) / 1.3505 (100 Cr 6).

Type Diameter [mm] Lead [mm] Right hand thread	Form	Dimensions [mm]							Axial backlash max [mm]	No. of circuits	Load rating [kN]		
		D_1	D_8	L_2	L_8	L_9	L_{10}	BxT			C[2)]	C[3)]	$C_o = C_{oa}$
KGM-D 1605 RH-EE	E	28	3	34	7	7	20	5x2	0.08	3	12.5	9.3	13.1
KGM-D 1610 RH-EE	E	28	3	50	7	15	20	5x2	0.08	6	23.0	15.4	26.5
KGM-D 2005 RH-EE	E	36	3	34	7	7	20	5x2	0.08	3	14.0	10.5	16.6
KGM-D 2505 RH-EE	E	40	3	34	7	7	20	5x2	0.08	3	15.0	12.3	22.5
KGM-D 2510 RH-EE	E	40	3	45	7.5	12.5	20	5x2	0.08	3	17.5	13.2	25.3
KGM-D 2520 RH-EE	S	40	1.5	35	14	11.5	12	5x3	0.15	4	19.0	13.0	23.3
KGM-D 2525 RH-EE	S	40	1.5	35	11.5	11	13	5x3	0.08	5	21.0	16.7	32.2
KGM-D 2550 RH-EE	S	40	1.5	58	17	19	20	5x3	0.15	5	22.5	15.4	31.7
KGM-D 3205 RH-EE	E	50	3	45	7.5	8	30	6x2.5	0.08	5	24.0	21.5	49.3
KGM-D 4005 RH-EE	E	63	3	45	7.5	8	30	6x2.5	0.08	5	26.0	23.8	63.1
KGM-D 4010 RH-EE	E	63	4	60	10	15	30	6x2.5	0.08	3	50.0	38.0	69.1
KGM-D 4020 RH-EE	E	63	3	70	7.5	20	30	6x2.5	0.08	4	44.5	33.3	76.1
KGM-D 4040 RH-EE	S	63	1.5	85	15	27.5	30	6x3.5	0.08	8	42.0	35.0	101.9
Left hand thread													
KGM-D 2005 LH-EE	E	36	3	34	7	7	20	5x2	0.08	3	16.5	10.5	16.6

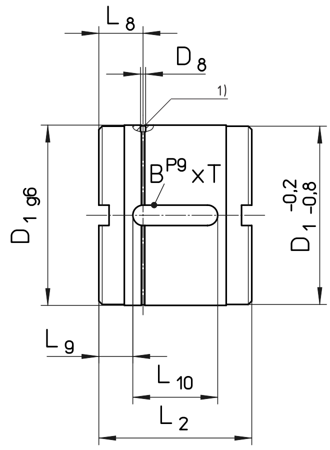
1) Position of grease holes not defined on circumference.
2) Dynamic load rating according to DIN 69051, part 4, draft 1978.
3) Dynamic load rating according to DIN 69051, part 4, draft 1989.

Cylindrical ball nuts KGM-N according to THOMSON NEFF standard

Form E



Form S



Material: 1.7131 (ESP65) / 1.3505 (100 Cr 6).

Type Diameter [mm] Lead [mm] Right hand thread	Form	Dimensions [mm]							Axial backlash max [mm]	No. of circuits	Load rating [kN]		
		D_1	D_8	L_2	L_8	L_9	L_{10}	BxT			C[2]	C[3]	C_0=C_{oa}
KGM-N 1204 RH-OO	E	20[4]	-	24	-	5	14	3x1.8	0.08	3	-	4.9	6.6
KGM-N 1205 RH-OO	E	20[4]	–	24	–	5	14	3x1.8	0.08	3	6.0	4.4	6.8
KGM-N 2005 RH-EE	E	32	3	34	7	7	20	5x2	0.08	3	14.0	10.5	16.6
KGM-N 2020 RH-EE	S	35	1.5	30	11.5	9	12	5x3	0.08	4	12.0	11.6	18.4
KGM-N 2050 RH-EE	S	35	1.5	56	16	18	20	5x3	0.15	5	18.0	13.0	24.6
KGM-N 2505 RH-EE	E	38	3	34	7	7	20	5x2	0.08	3	15.0	12.3	22.5
KGM-N 3205 RH-EE	E	45	3	45	7.5	8	30	6x2.5	0.08	5	24.0	21.5	49.3
KGM-N 3210 RH-EE	E	53	4	60	10	15	30	6x2.5	0.08	3	44.0	33.4	54.5
KGM-N 3220 RH-EE	E	53	3	70	7.5	20	30	6x2.5	0.08	4	42.5	29.7	59.8
KGM-N 3240 RH-EE	S	53[5]	1.5	45	13	10	25	6x4	0.08	4	17.0	14.9	32.4
KGM-N 4005 RH-EE	E	53	3	45	7.5	8	30	6x2.5	0.08	5	26.0	23.8	63.1
KGM-N 5010 RH-EE	E	72	4	82	11	23	36	6x2.5	0.08	5	78.0	68.7	155.8
KGM-N 5020 RH-EE	E	85	4	82	10	23	36	6x2.5	0.08	4	82.0	60.0	136.3
KGM-N 6310 RH-EE	E	85	4	82	11	23	36	6x2.5	0.08	5	86.0	76.0	197.0
KGM-N 6320 RH-EE	E	95	4	82	10	23	36	6x2.5	0.08	4	-	78.4	171.3
KGM-N 8010 RH-EE	E	105	4	82	11	23	36	8x3	0.08	5	-	86.3	262.4

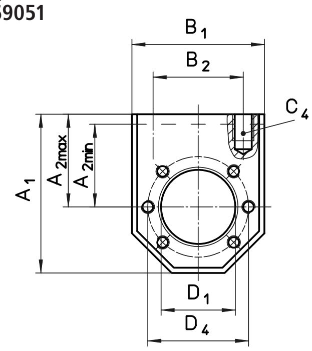
[1] Position of grease holes not defined on circumference.
[2] Dynamic load rating according to DIN 69051, part 4, draft 1978.
[3] Dynamic load rating according to DIN 69051, part 4, draft 1989.
[4] Nut without wiper.
[5] D_1 -0.2/-0.8 does not apply, therefore D_1 -1.0/-1.5.

Adapter bracket KON

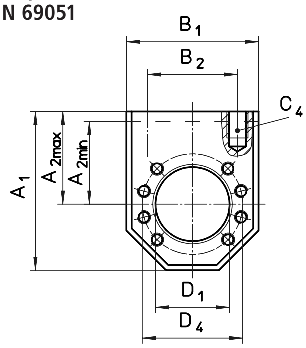
Adapter bracket for the radial fixing of flanged ball nut KGF.

Material: 1.0065 (St37) / 1.0507 (St52).

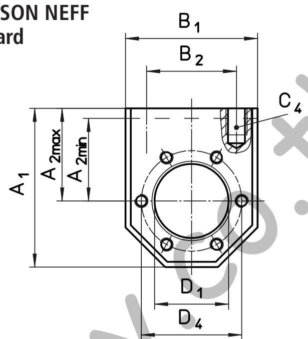
Hole pattern 1
DIN 69051

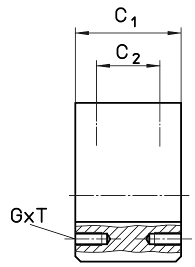


Hole pattern 2
DIN 69051



Hole pattern 3
THOMSON NEFF
standard





For KGF	Hole pattern	Dimensions [mm] A_1	$A_{2\ max}$ 1)	$A_{2\ min}$	B_1	B_2	C_1	C_2	C_4 1)	D_1	D_4	G x T
KON 1605 KON 1605/1610	3 1	60 60	35 35	25 25	50 50	34 34	40 40	24 24	M 8x15 M 8x15	28 28	38 38	M 5x10 M 5x10
KON 2005 KON 2005	3 1	68 68	37.5 37.5	29 30	58 58	39 39	40 40	24 24	M 8x15 M 8x15	32 36	45 47	M 6x12 M 6x12
KON 2020/2050	3	75	42.5	32.5	65	49	40	24	M 10x15	35	50	M 6x12
KON 2505	3	75	42.5	32.5	65	49	40	24	M 10x15	38	50	M 6x12
KON 2505/2510/2520/ 2525/2550	1	75	42.5	32.5	65	49	40	24	M 10x12	40	51	M 6x12
KON 3205 KON 3205/3232	3 1	82 92	45 50	37 40	75 85	54 60	50 50	30 30	M 10x12 M 12x15	45 50	58 65	M 6x12 M 8x12
KON 3210/3240/4005 KON 3210/3220	3 1	92 92	50 50	42 40	85 85	60 60	50 50	30 30	M 12x15 M 12x15	53 53	68 65	M 6x12 M 8x12
KON 4010	3	120	70	50	100	76	65	41	M 14x25	63	78	M 8x14
KON 4005/4010/4020/4040	2	120	70	50	100	76	65	41	M 14x25	63	78	M 8x14
KON 5010 KON 5010 KON 5020	3 2 2	135 135 152	77.5 77.5 87.5	57.5 57.5 65	115 115 130	91 91 101	88 88 88	64 64 64	M 16x25 M 16x25 M 16x30	72 75 85	90 93 103	M 10x16 M 10x16 M 10x16
KON 6310 KON 6320	3 2	152 172	87.5 97.5	65 75	130 150	101 121	88 88	64 64	M 16x30 M 16x30	85 95	105 115	M 10x16 M 12x18
KON 8010	3	172	97.5	75	150	121	88	64	M 16x30	105	125	M 12x18

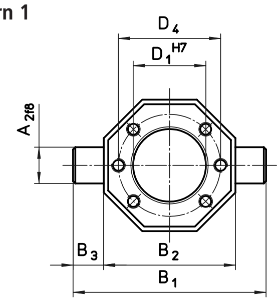
1) Standard = $A_{2\ max}$ (delivery status)

Universal joint adapter KAR

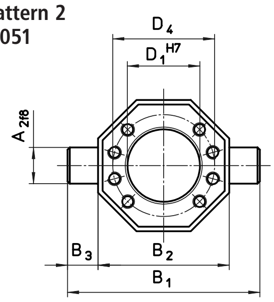
Universal joint adapter for trunnion mounting of flanged ball nuts KGF.

Material: 1.0065 (St37) / 1.0507 (St52).

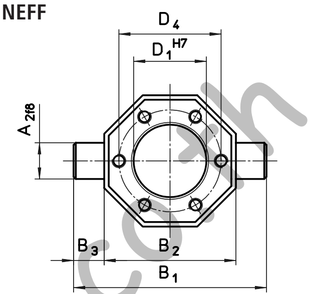
Hole pattern 1
DIN 69051

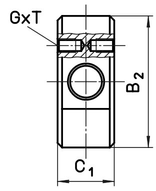


Hole pattern 2
DIN 69051



Hole pattern 3
THOMSON NEFF
standard





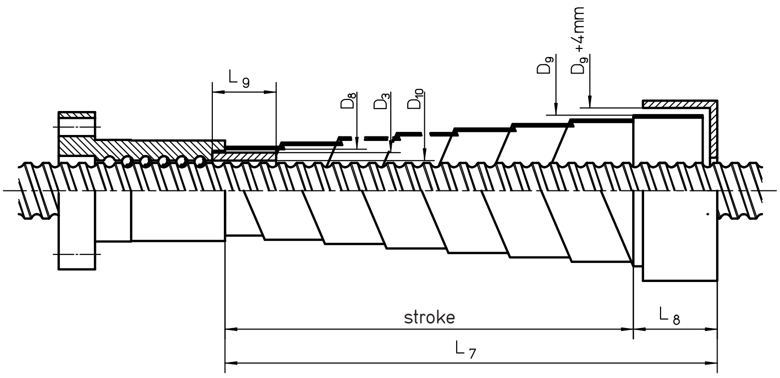
For KGF	Hole pattern	Dimensions [mm] A_2	B_1	B_2	B_3	C_1	D_1	D_4	G x T
KAR 1605	3	12	70	50	10	20	28	38	M 5x10
KAR 1605/1610	1	12	70	50	10	20	28	38	M 5x10
KAR 2005	3	16	85	58	13.5	25	32	45	M 6x12
KAR 2005	1	16	85	58	13.5	25	36	47	M 6x12
KAR 2020/2050	3	18	95	65	15	25	35	50	M 6x12
KAR 2505	3	18	95	65	15	25	38	50	M 6x12
KAR 2505/2510/2520/2525/2550	1	18	95	65	15	25	40	51	M 6x12
KAR 3205	3	20	110	75	17.5	30	45	58	M 6x12
KAR 3205/3232	1	25	125	85	20	30	50	65	M 8x12
KAR 3210/3240/4005	3	25	125	85	20	30	53	68	M 6x12
KAR 3210/3220	1	25	125	85	20	30	53	65	M 8x12
KAR 4010	3	30	140	100	20	40	63	78	M 8x14
KAR 4005/4010/4020/4040	2	30	140	100	20	40	63	78	M 8x14
KAR 5010	3	40	165	115	25	50	72	90	M 10x16
KAR 5010	2	40	165	115	25	50	72	93	M 10x16
KAR 5020	2	40	180	130	25	50	85	103	M 10x16
KAR 6310	3	40	180	130	25	50	85	105	M 10x16
KAR 6320	2	50	200	150	25	60	95	115	M 12x18
KAR 8010	3	50	200	150	25	60	105	125	M 10x16

Spiral spring cover SF

Spiral spring cover for protection against ambient influences. Suitable for horizontal and vertical installation position.

Material: Tempered spring band steel.

When a spiral spring cover is used, seal form Z (centering sleeve) is used on the attachment side of the ball-screw nut.
(see order code page 62)



For KGT 1605

D_3 = 22 mm D_{10} = 16.8 mm L_9 = 20 mm			
Type D_8/stroke/L_8	L_{7v} [1]	L_{7h} [2]	D_9
SF 25/100/20	100	60	35
SF 25/150/20	150	110	38
SF 25/200/20	200	160	40
SF 25/250/20	250	210	44
SF 25/300/30	300	240	43
SF 25/350/30	350	290	46
SF 25/400/30	400	340	49
SF 25/450/40	450	370	48
SF 25/500/40	500	420	51

For KGT 2005
KGT 2020
(KGT 2505)[3]

D_3 = 26 (31)[3] mm D_{10} = 20.8 (25.8)[3] mm L_9 = 28 (28)[3] mm			
Type D_8/stroke/L_8	L_{7v} [1]	L_{7h} [2]	D_9
SF 30/150/30	150	90	39
SF 30/250/30	250	190	44
SF 30/350/30	350	290	49
SF 30/450/40	450	370	53
SF 30/550/40	550	470	58
SF 30/650/50	650	550	55
SF 30/750/50	750	650	59

For KGT 3205
KGT 3240

D_3 = 38 mm D_{10} = 33 mm L_9 = 35 mm			
Type D_8/stroke/L_8	L_{7v} [1]	L_{7h} [2]	D_9
SF 40/150/30	150	90	51
SF 40/250/30	250	190	56
SF 40/350/30	350	290	60
SF 40/450/40	450	370	63
SF 40/550/40	550	470	68
SF 40/350/50	350	250	55
SF 40/450/50	450	350	58
SF 40/550/50	550	450	61
SF 40/650/50	650	550	65
SF 40/750/50	750	650	69
SF 40/450/60	450	330	55
SF 40/550/60	550	430	58
SF 40/650/60	650	530	62
SF 40/750/60	750	630	66

For KGT 3205
KGT 3240
(continued)

D_3 = 38 mm D_{10} = 33 mm L_9 = 35 mm			
Type D_8/stroke/L_8	L_{7v} [1]	L_{7h} [2]	D_9
SF 40/900/60	900	780	70
SF 40/650/75	650	500	62
SF 40/750/75	750	600	66
SF 40/900/75	900	750	72
SF 40/1100/78	1100	950	78
SF 40/1300/75	1300	1150	84
SF 40/1500/75	1500	–	90
SF 40/1000/100	1000	800	66
SF 40/1200/100	1200	1000	70
SF 40/1500/100	1500	1300	78
SF 40/1800/100	1800	–	82
SF 40/1800/120	1800	1560	82
SF 40/2000/120	2000	1760	86
SF 40/2200/120	2200	–	91

1) $L_{7v} = L_7$ vertical installation
2) $L_{7h} = L_7$ horizontal installation

3) Figures in brackets apply to 2505.

Spiral spring cover SF

For KGT 4005 (KGT 3210)

D_3 = 46 (44) mm
D_{10} = 41 (34) mm
L_9 = 45 (45) mm

Type D_8/stroke/L_8	L_{7v} 1)	L_{7h} 2)	D_9
SF 50/150/30	150	90	63
SF 50/250/30	250	190	68
SF 50/250/50	250	150	62
SF 50/350/50	350	250	66
SF 50/450/50	450	350	70
SF 50/550/50	550	450	73
SF 50/550/60	550	430	68
SF 50/650/60	650	530	72
SF 50/750/60	750	630	76
SF 50/750/75	750	600	78
SF 50/900/75	900	750	84
SF 50/1100/75	1100	950	90
SF 50/1100/50	1100	900	75
SF 50/1300/100	1300	1100	79
SF 50/1500/100	1500	1300	83
SF 50/1700/120	1700	1460	91
SF 50/1800/120	1800	–	94
SF 50/1900/120	1900	1660	95
SF 50/2100/120	2100	1860	100
SF 50/2300/120	2300	–	105
SF 50/2500/120	2500	–	111
SF 50/2800/120	2800	–	118
SF 50/2800/150	2800	2500	118
SF 50/3000/150	3000	–	123
SF 50/3000/180	3000	2640	123
SF 50/3250/180	3250	–	128
SF 50/3250/200	3250	2850	128
SF 50/3250/200	3250	–	134

For KGT 4010

D_3 = 52 mm
D_{10} = 41 mm
L_9 = 50 mm

Type D_8/stroke/L_8	L_{7v} 1)	L_{7h} 2)	D_9
SF 55/150/30	150	90	68
SF 55/250/30	250	190	73
SF 55/250/50	250	150	66
SF 55/350/50	350	250	71
SF 55/450/50	450	350	74
SF 55/550/50	550	450	77
SF 55/550/60	550	430	75
SF 55/650/60	650	530	79
SF 55/750/60	750	630	83
SF 55/750/75	750	600	83
SF 55/900/75	900	750	89
SF 55/1100/75	1100	950	94
SF 55/1100/100	1100	900	83
SF 55/1300/100	1300	1100	87
SF 55/1500/100	1500	1300	94
SF 55/1800/120	1800	–	102
SF 55/1700/120	1700	1460	96
SF 55/1900/120	1900	1660	100
SF 55/2100/120	2100	1860	105
SF 55/2300/120	2300	2060	110
SF 55/2500/120	2500	–	116
SF 55/2800/150	2800	2500	121
SF 55/2800/120	2800	–	123
SF 55/3000/150	3000	2640	126
SF 55/3000/180	3000	–	126
SF 55/3250/180	3250	2850	130
SF 55/3250/200	3250	–	130
SF 55/3250/200	3250	–	137

For KGT 5010

D_3 = 62 mm
D_{10} = 51.2 mm
L_9 = 55 mm

Type D_8/stroke/L_8	L_{7v} 1)	L_{7h} 2)	D_9
SF 65/250/30	250	90	85
SF 65/250/50	250	150	76
SF 65/350/50	350	250	83
SF 65/450/50	450	350	88
SF 65/550/60	550	430	88
SF 65/650/60	650	530	92
SF 65/750/60	750	630	95
SF 65/750/75	750	600	93
SF 65/900/75	900	750	99
SF 65/1100/75	1100	950	107
SF 65/1100/100	1100	900	95
SF 65/1300/100	1300	1100	99
SF 65/1500/100	1500	1300	108
SF 65/1700/120	1700	1460	106
SF 65/1800/100	1800	–	117
SF 65/1900/120	1900	1660	109
SF 65/2100/120	2100	1860	113
SF 65/2300/120	2300	2060	118
SF 65/2500/150	2500	–	132
SF 65/2800/120	2800	–	128
SF 65/2800/150	2800	–	132
SF 65/3000/150	3000	–	142
SF 65/3000/180	3000	–	136
SF 65/3250/180	3250	–	145
SF 65/3250/200	3250	2850	138

For KGT 6310

D_3 = 74 mm
D_{10} = 63.2 mm
L_9 = 65 mm

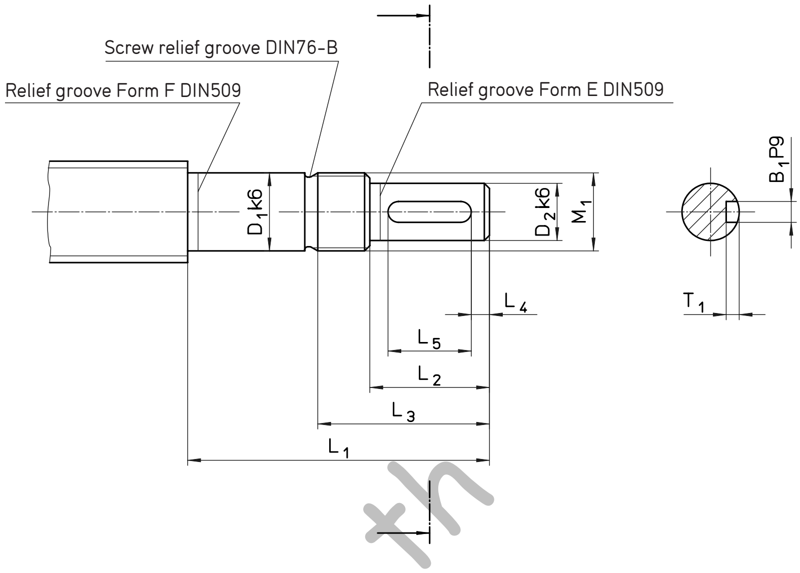
Type D_8/stroke/L_8	L_{7v} 1)	L_{7h} 2)	D_9
SF 75/250/30	250	190	99
SF 75/250/50	250	150	89
SF 75/350/50	350	250	94
SF 75/450/50	450	350	101
SF 75/550/60	550	430	99
SF 75/650/60	650	530	103
SF 75/750/60	750	630	108
SF 75/650/75	650	500	99
SF 75/750/75	750	600	104
SF 75/900/75	900	750	111
SF 75/1100/100	1100	900	108
SF 75/1300/100	1300	1100	112
SF 75/1500/100	1500	1300	120
SF 75/1500/120	1500	1260	115
SF 75/1700/100	1700	–	126
SF 75/1800/120	1800	1560	122
SF 75/2000/120	2000	1760	127
SF 75/2200/120	2200	–	132
SF 75/2000/150	2000	1700	135
SF 75/2400/150	2400	2100	141
SF 75/2800/150	2800	–	145
SF 75/2800/180	2800	2440	142
SF 75/3000/180	3000	–	148
SF 75/3250/180	3250	–	156
SF 75/3250/200	3250	2850	148
SF 75/3500/200	3500	–	158

1) $L_{7v} = L_7$ vertical installation
2) $L_{7h} = L_7$ horizontal installation

Screw end machining for movable/fixed bearing Form D, F

The type of bearing influences the stiffness of the entire screw drive, and also the vibration and buckling behaviour of the screw. The end machining is carried out on the ball screws as necessary for the various types of bearing.

Note:
Bearings are not part of our delivery programme.



Form D	Dimensions [mm]								Bearing
KGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	ZKLF…2RS
1605, 1610	12	9	55	20	32	2.5	16	M 12x1	3x1.8	1255
2005, 2020, 2050	15	11	58	23	35	3.5	16	M 15x1	4x2.5	1560
2505, 2510, 2520, 2525, 2550	20	14	70	30	44	4	22	M 20x1	5x3	2068
3205, 3210, 3220, 3232, 3240	25	19	82	40	57	6	28	M 25x1.5	6x3.5	2575
4005, 4010, 4020, 4040	30	24	92	50	67	7	36	M 30x1.5	8x4	3080

Form F	Dimensions [mm]									Bearing
KGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	ZARN…LTN
2505, 2510, 2520, 2525, 2550	15	11	73	23	35	3.5	16	M 15x1	4x2.5	1545
3205, 3240	20	14	88	30	45	4	22	M 20x1	5x3	2052
3210, 3220, 3232	20	14	107	30	50	4	22	M 20x1	5x3	2062
4005	25	19	105	40	58	6	28	M 25x1.5	6x3.5	2557
4010, 4020, 4040	25	19	120	40	63	6	28	M 25x1.5	6x3.5	2572
5010, 5020	35	28	145	60	82	10	40	M 35x1.5	8x4	3585
6310, 6320	40	36	175	80	103	8.5	63	M 40x1.5	10x5	4090

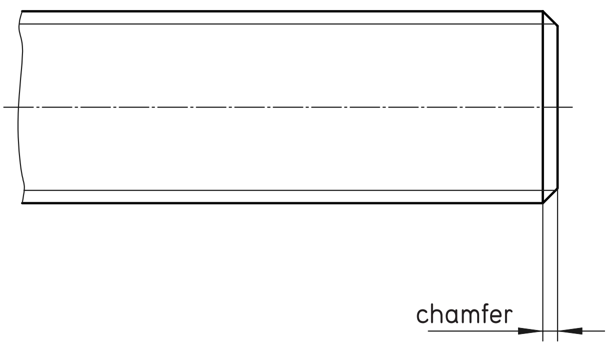
Screw end machining for movable/fixed bearing
Form H, J, L, Z

Form H	Dimensions [mm]									Bearing
KGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	ZARF…LTN
2505, 2510, 2520, 2525, 2550	15	11	85	23	35	3.5	16	M 15x1	4x2.5	1560
3205, 3232, 3240	20	14	102	30	44	4	22	M 20x1	5x3	2068
3210, 3220	20	14	122	30	49	4	22	M 20x1	5x3	2080
4005	25	19	120	40	57	6	28	M 25x1.5	6x3.5	2575
4010, 4020, 4040	25	19	135	40	63	6	28	M 25x1.5	6x3.5	2590
5010, 5020	35	28	160	60	81	10	40	M 35x1.5	8x4	35110
6310, 6320	40	36	195	80	105	8.5	63	M 40x1.5	10x5	40115

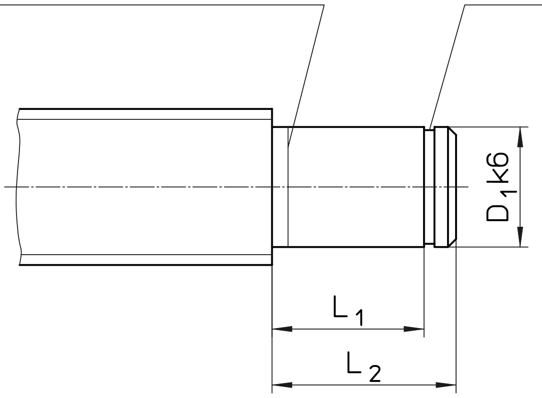
Form J	Dimensions [mm]									Bearing
KGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	FDX
1605, 1610	12	9	88	20	32	2.5	16	M 12x1	3x1.8	12
2005, 2020, 2050	15	11	92	23	35	3.5	16	M 15x1	4x2.5	15
2505, 2510, 2520, 2525, 2550	20	14	107	30	44	4	22	M 20x1	5x3	20
3205, 3210, 3220, 3232, 3240	25	19	122	40	57	6	28	M 25x1.5	6x3.5	25
4005, 4010, 4020, 4040	30	24	136	50	72	7	36	M 30x1.5	8x4	30
5010, 5020	40	36	182	80	102	8.5	63	M 40x1.5	10x5	40

Form L	Dimensions [mm]									
KGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	Bearing
1605, 1610, 2005, 2020, 2050	12	9	58	20	30	2.5	16	M 12x1	3x1.8	7201 BE RS
2505, 2510, 2520, 2525, 2550	15	11	73	23	33	3.5	16	M 15x1	4x2.5	7202 BE RS
3205, 3210, 3220, 3232, 3240	20	14	88	30	43	4	22	M 20x1	5x3	7204 BE RS
4005, 4010, 4020, 4040	25	19	120	40	55	6	28	M 25x1.5	6x3.5	7205 BE RS
5010, 5020	35	28	145	60	77	10	40	M 35x1.5	8x4	7207 BE RS
6310, 6320	40	36	175	80	103	8.5	63	M 40x1.5	10x5	7208 BE RS

Form Z
Chamfer 2 x 45°: KGS of ø 12 – 25 mm
Chamfer 3 x 45°: KGS of ø 26 – 40 mm
Chamfer 4 x 45°: KGS of ø 44 – 50 mm



Screw end machining for movable/fixed bearing
Form S, T, W, G, K



Form S	Dimensions [mm]				
KGT	D_1	L_1	L_2	Spacer sleeve	Bearing
1605, 1610	12	40	45	18x12.1x24	6001 RS
2005, 2020, 2050	15	46	51	21x15.1x28	6002 RS
2505, 2510, 2520, 2525, 2550	20	53	58	27x20.1x29	6004 RS
3205, 3210, 3220, 3232, 3240	25	53	58	32x25.1x23	6205 RS
4005, 4010, 4020, 4040	30	60	68	40x30.1x28	6206 RS
5010, 5020	40	80	88	50x40.1x44	6208 RS
6310, 6320	55	102	110	65x55.1x60	6211 RS

Form T	Dimensions [mm]				
KGT	D_1	L_1	L_2	Inner ring	Roller bearing
1605, 1610	12	40	45	2 IR 12x16x20	HK 1614 RS
2005, 2020, 2050	15	46	51	2 IR 15x20x23	HK 2018 RS
2505, 2510, 2520, 2525, 2550	20	53	58	2 LR 20x25x26.5	HK 2518 RS
3205, 3210, 3220, 3232, 3240	25	53	58	2 LR 25x30x26.5	HK 3018 RS
4005, 4010, 4020, 4040	30	60	68	2 LR 30x35x30	HK 3518 RS
5010, 5020	40	80	88	4 LR 40x45x20	HK 4518 RS

Form G: Screw end annealed to costumer's specification.

Form K: Produced specially to costumer's drawing.

Form W	Dimensions [mm]			
KGT	D_1	L_1	L_2	Bearing
1605, 1610	12	8	12	6001 RS
2005, 2020, 2050	15	9	13	6002 RS
2505, 2510, 2520, 2525, 2550	20	12	16	6004 RS
3205, 3210, 3220, 3240	25	15	20	6205 RS
4005, 4010, 4020, 4040	30	16	21	6206 RS
5010, 5020	40	18	25	6208 RS
6310	55	21	29	6211 RS

Sizing and selection

Life L

The (nominal) life of a ball screw drive can be calculated analogue to that of a ball bearing.

! Note that vibration and shocks reduce the life of the ball screw drive.

Average speed

(I) $$n_m = \frac{n_1 \cdot q_1 + n_2 \cdot q_2 + ... + n_i \cdot q_i}{100}$$

$n_1, n_2, \ldots$ Speeds [rpm] during $q_1, q_2, \ldots$

n_m Average speed [rpm]

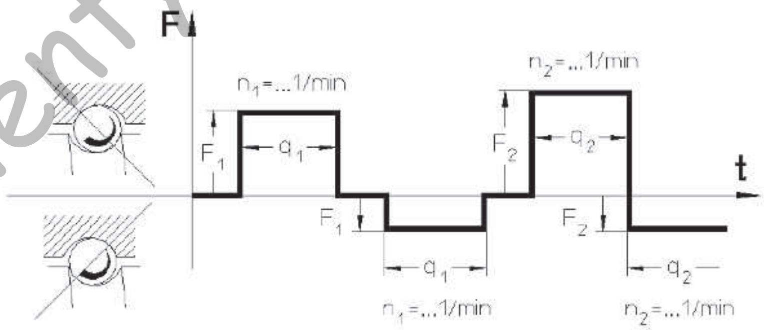
$q_1, q_2, \ldots$ Components of the duration of a load in one load direction in [%]

Dynamic equivalent bearing load

(II) $$F_m = \sqrt[3]{F_1^3 \cdot \frac{n_1 \cdot q_1}{n_m \cdot 100} + F_2^3 \cdot \frac{n_2 \cdot q_2}{n_m \cdot 100} + ... F_1^3 \cdot \frac{n_i \cdot q_i}{n_m \cdot 100}}$$

$F_1, F_2, \ldots$ Axial loads [N] in one load direction during $q_1, q_2, \ldots$

F_m Dynamic equivalent bearing load [N]
Since loads can act on a ball screw drive in two directions, F_m should first be determined for each of two load directions; the larger value should then be included in the calculation of L. It is in general useful to draw a schematic diagram like the one below:



It should be noted that any pre-loading represents a continuous load.

Life of a ball screw

(III) $$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^6$$

C Axial, dynamic load rating [N]
Centrally applied load [N] of constant force direction at which an appropriately large number of identical ball screw drives achieve a nominal life of 10^6 revolutions.

➔ Technical data KGF/KGM see page 14 – 17

L_{10} Lifetime of the ball screw drive. Expressed as the number of revolutions achieved or exceeded by 90 % (L10) of a sufficiently large sample of apparently identical ball screw drives before the first signs of material fatigue occur.

Sizing and selection

Calculation example for the life of a ball screw drive

Given values:

F_1 = 30000 N	at	n_1 = 150 1/min	for	q_1 = 21 %	of the duration of operation
F_2 = 18000 N	at	n_2 = 1000 1/min	for	q_2 = 13 %	of the duration of operation
F_3 = 42000 N	at	n_3 = 75 1/min	for	q_3 = 52 %	of the duration of operation
F_4 = 1800 N	at	n_4 = 2500 1/min	for	q_4 = 14 %	of the duration of operation
				Σ = 100 %	

!

Ball screw drive KGT 5010

Sought-after results: Maximum achievable life, under the given operating conditions.

?

Average speed n_m

from (I)

$$n_m = \frac{n_1 \cdot q_1 + n_2 \cdot q_2 + n_3 \cdot q_3 + n_4 \cdot q_4}{100}$$

$$n_m = \frac{150 \cdot 21 + 1000 \cdot 13 + 75 \cdot 52 + 2500 \cdot 14}{100} \text{ 1/min}$$

$$\rightarrow n_m = 550.5 \text{ 1/min}$$

Dynamic equivalent bearing load F_m

from (II)

$$F_m = \sqrt[3]{F_1^3 \cdot \frac{n_1 \cdot q_1}{n_m \cdot 100} + F_2^3 \cdot \frac{n_2 \cdot q_2}{n_m \cdot 100} + F_3^3 \cdot \frac{n_3 \cdot q_3}{n_m \cdot 100} + F_4^3 \cdot \frac{n_4 \cdot q_4}{n_m \cdot 100}}$$

$$F_m = \sqrt[3]{30000^3 \cdot \frac{150 \cdot 21}{550.5 \cdot 100} + 18000^3 \cdot \frac{1000 \cdot 13}{550.5 \cdot 100} + 42000^3 \cdot \frac{75 \cdot 52}{550.5 \cdot 100} + 1800^3 \cdot \frac{2500 \cdot 14}{550.5 \cdot 100}} \text{ N}$$

$$F_m = 20144 \text{ N}$$

Lifetime of a ball screw drive L_{10}

from (III)

$$L_{10} = \left(\frac{C}{F_m}\right)^3 \cdot 10^6$$

Axial, dynamic load rating C = 68700 N
➔ Technical data KGF/KGM see page 14 – 17

$$L_{10} = \left(\frac{68700}{20144}\right)^3 \cdot 10^6$$

Number of revolutions L_{10}

$$L_{10} = 39.67 \cdot 10^6$$

$$L_h = \frac{L_{10}}{n_m \cdot 60} = \frac{47.7 \cdot 10^6}{550.5 \cdot 60} = 1201 \text{ h}$$

Livetime in hours L_h

Result:

Under the given load conditions, the selected screw drive has a total life of $39.67 \cdot 10^6$ revolutions, which translates into a time of 1201 hours.

Sizing and selection

Lifetime of a ball screw drive with pre-loaded nut system
The pre-loading force of the nut unit has the effect of a permanent load on the ball screw drive.

Calculation of the dynamic equivalent bearing load F_m
Analog to the single nut (see page 25 equations (I) and (II)).

Lifetime L

(IV) $$L = \left(F_{m1}^{\frac{10}{3}} + F_{m2}^{\frac{10}{3}} \right)^{-0.9} \cdot C^3 \cdot 10^6$$

$F_{m1}, F_{m2}, \ldots$ Dynamic equivalent bearing load of the first or second nut [N].

C Axial, dynamic load rating [N]
Centrally applied load [N] of constant force direction at which an appropriately large number of identical ball screw drives achieve a nominal life of 10^6 revolutions.

➔ Technical data KGF/KGM see page 14 – 17

The calculation methods above are valid only under correct lubrication conditions. Dirt or lack of lubricant may significantly reduce the life. Reduced life must also be expected in the case of very short strokes – please contact us in these cases.

! **Ball screw drives cannot absorb radial forces or tilting moments !**

Sizing and selection

Critical speed of ball screws

With thin, fast-rotating screws, there is a danger of "whipping".
The method described below allows the resonant frequency to be estimated assuming a sufficiently rigid assembly. Furthermore, speeds in the vicinity of the critical speed considerably increase the risk of lateral buckling. The critical speed is therefore included in the calculation of the critical buckling force.

Maximum permissible speed

(V) $n_{zul} = 0.8 \cdot n_{kr} \cdot f_{kr}$

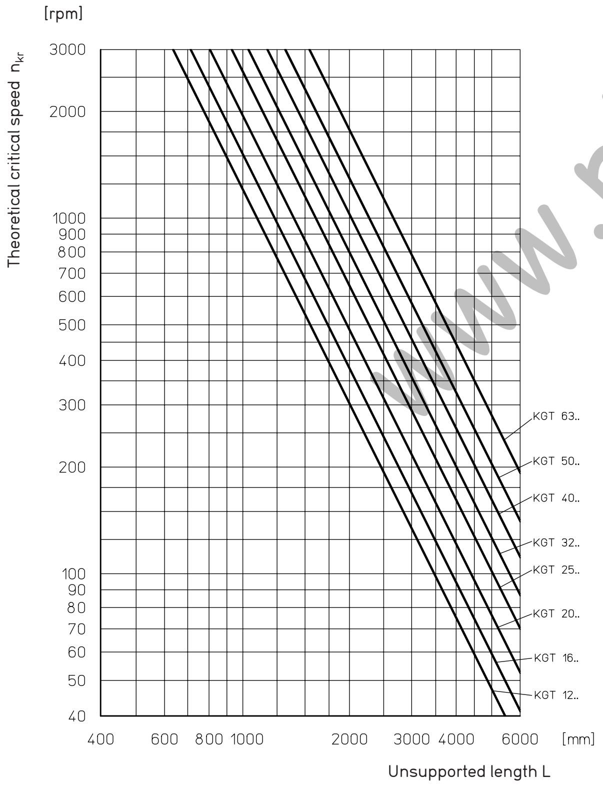
n_{zul} Maximum permissible speed [rpm]

n_{kr} Theoretical critical speed [rpm], that can lead to resonance effects ➔ see table

f_{kr} Correction factor, considering the bearing support of the screw. ➔ see table

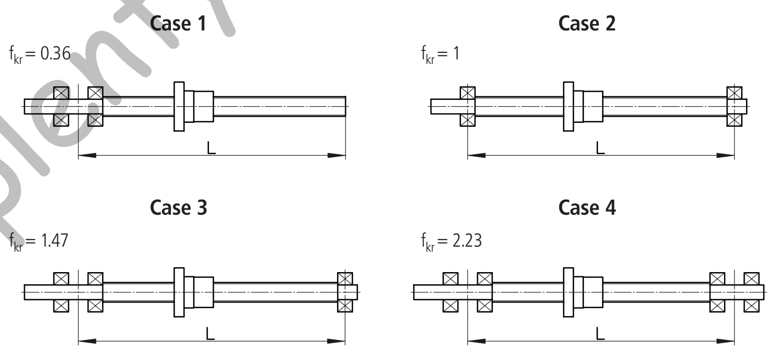
! The operating speed must not exceed 80 % of the maximum speed

Theoretical critical speed n_{kr}



Bearing support

Typical values of correction factor f_{kr} corresponding to the usual cases of installation for standard screw bearings.



Sizing and selection

Critical buckling force of ball screws

With thin, fast-rotating screws under compressive load, there is a danger of lateral buckling. The procedure described below can be used to calculate the permissible axial force according to Euler. Before the permissible compressive force is defined, allowance must be made for safety factors appropriate to the installation.

Maximum permissible axial force

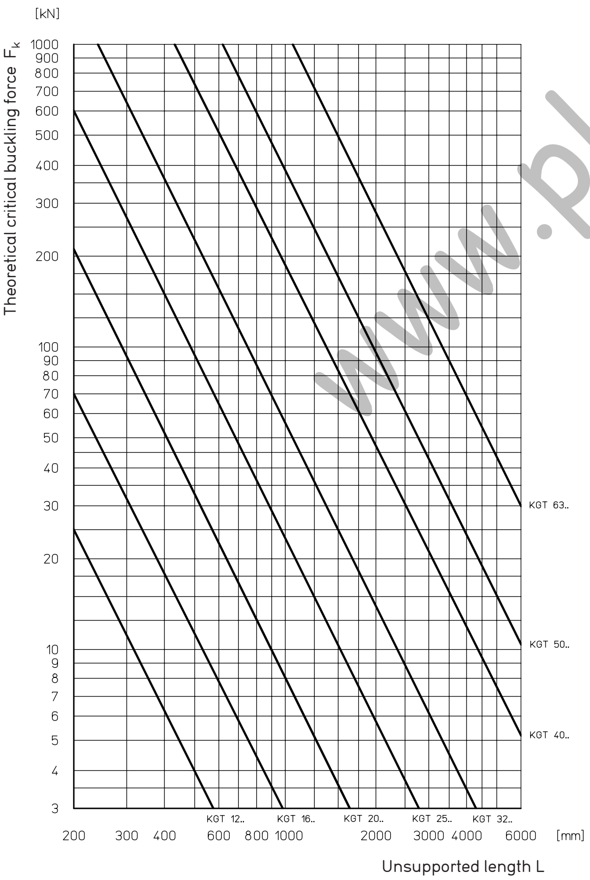
(VI) $F_{zul} = 0.8 \cdot F_k \cdot f_k$

F_{zul}	Maximum permissible axial force [kN]
F_k	Theoretical critical buckling force [kN], ➔ see diagram
f_k	Correction factor, considering the bearing support of the screw. ➔ see table

! The operating force must not exceed 80 % of the maximum permissible axial force

Theoretical critical buckling force F_k

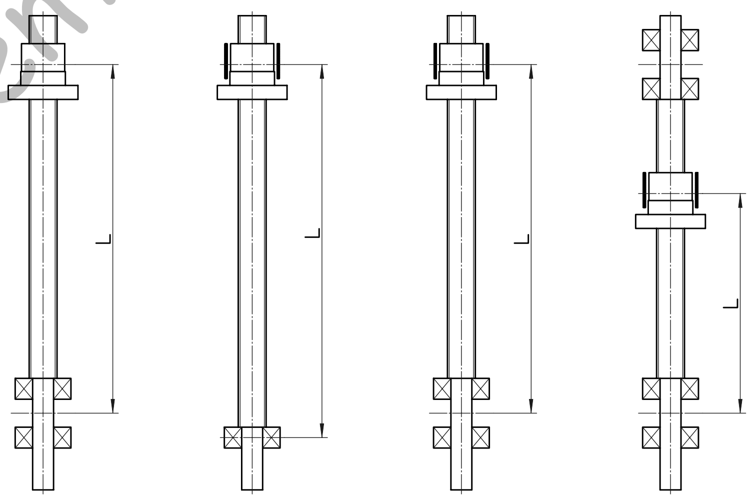
! The permissible maximum load is limited by the load rating.



Bearing support

Typical values of correction factor f_k corresponding to the usual cases of installation for standard screw bearings.

Case 1 **Case 2** **Case 3** **Case 4**



$f_k = 0.25$ $f_k = 1$ $f_k = 2.05$ $f_k = 4$

Sizing and selection

Deflection of the screw under its own weight

Even in the case of correctly installed screw drives where the resulting radial forces are absorbed by external guides, the weight of the unsupported screw itself may lead to deflection. The formula below allows you to calculate the maximum deflection of the screw.

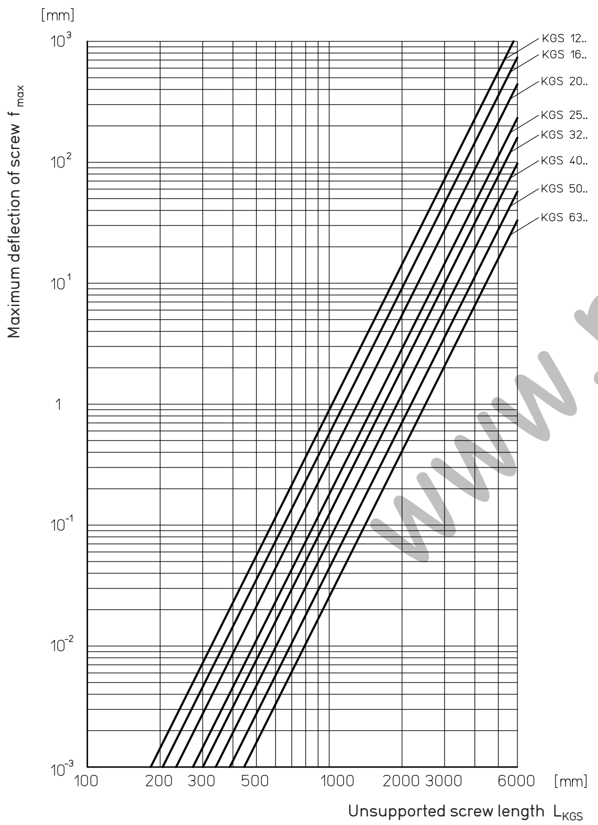
Maximum deflection of screw

(VII)

$$f_{max} = f_B \cdot 0.061 \cdot \frac{w_{KGS} \cdot L_{KGS}}{I_Y}$$

f_B	Correction factor considering the bearing support of the screw [mm] ➔ see table
I_Y	Planar moment of inertia [mm^4] ➔ see table page 11
L_{KGS}	Unsupported screw length [mm]
w_{KGS}	Weight [kg/m]

Theoretical maximum deflection of screw

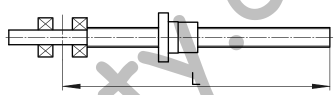


Bearing support

Typical values of correction factor f_B corresponding to the usual cases of installation for standard screw bearings.

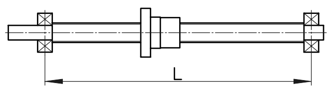
Case 1

$f_B = 9.57$



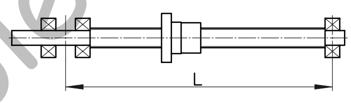
Case 2

$f_B = 1$



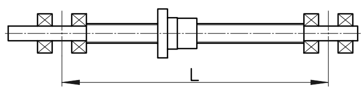
Case 3

$f_B = 0.41$



Case 4

$f_B = 0.20$



Sizing and selection

Example calculation for a ball screw drive

Given Values:

!

Ball screw drive KGT 5010
Length L = 2000 mm
Installation case 3
Maximum operating speed: n_{max} = 3000 [1/min]

Sought-after Results:

?

Is the operating speed uncritical?
What is the permissible axial force?
What is the maximum deflection?

Maximum persmissible speed n_{zul}

from (V) $n_{zul} = 0.8 \cdot n_{kr} \cdot f_{kr} = 0.8 \cdot 1290\ 1/min \cdot 1.47 = 1517\ 1/min$

➔ n_{zul} = 1517 1/min (< limit speed!)

Theoretical critical speed n_{kr} = 1290 rpm
➔ from diagram "Theoretical critical speed"

from (VI) $F_{zul} = 0.8 \cdot F_k \cdot f_k = 0.8 \cdot 95\ kN \cdot 2.05 = 156\ kN$

➔ F_{zul} = 155.8 kN (max. static load rating C_O!)

Theoretical critical buckling force F_k = 95 kN
➔ from diagram "Theoretical critical buckling force"

from (VII) $$f_{max} = f_B \cdot 0.061 \cdot \frac{w_{KGS} \cdot L_{KGS}}{I_Y} = 0.41 \cdot 0.061 \cdot \frac{13.50\ kg/m \cdot 2\ m}{18.566\ cm^4}$$

f_{max} = 0.036 mm

Weight w_{KGS} = 13.50 kg/m
Planar moment of inertia I_Y = 18.566 cm^4

➔ from table page 11

Result:

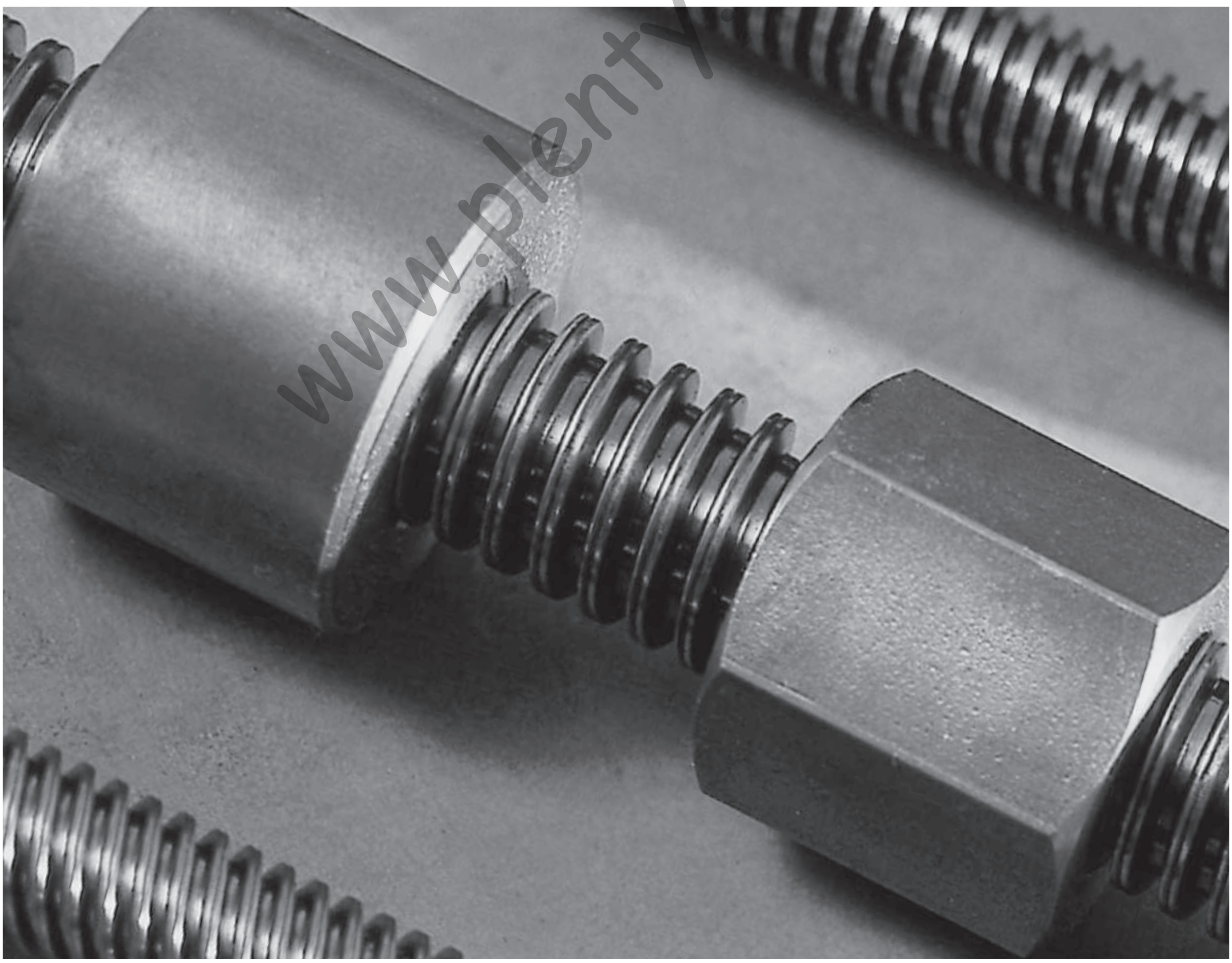
The selected screw drive may be operated only at n_{max} = 1517 rpm.
It can be statically loaded with a maximum axial force of 155.8 kN,
and when installed horizontally has a maximum deflection of 0.036 mm.
Please also consider the dynamic load rating!

Robust and cost efficient

Trapezoidal screw drives offer a budget-priced solution for demands like clamping, positioning and feed movements.

The programme conforms to DIN 103, and offers a wide selection of nuts in different materials.

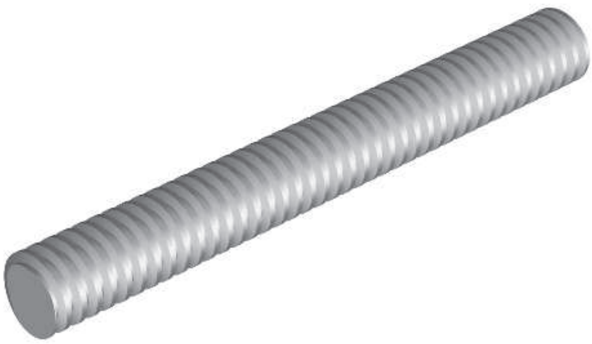
All screws are available with end machining to customer's specs.



General technical data of trapezoidal screws

THOMSON NEFF trapezoidal screws are manufactured in a cold rolling process. Further dimensions as well as lead screws (version stainless steel) see separate catalogue THOMSON NEFF.

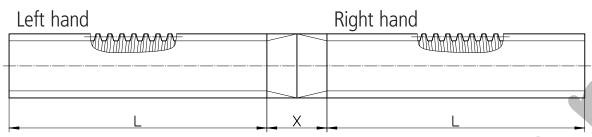
Precision trapezoidal screws RPTS



Technical data

- Thread: Metric ISO trapezoidal thread to DIN 103, 7c
- Diameter: 10 – 80 mm
- Lead: 2 – 24 mm
- No. of starts: Up to 6 starts
- Thread direction: Right hand thread; single start also available left hand thread, see table p. 35
- Length: Up to 3000 mm for screws up to Tr 18 x 4; Up to 6000 mm for screws up to Tr 20 x 4
- Material: 1.0401 (case hardened steel C15), stress relief annealed, weldable
- Lead accuracy: 50 to 300 µm/300 mm
- Straightness: 0,1 to 0,5 mm/300 mm
- Left and right hand screw: For thread leads of 2 – 10 mm
- End machining: In accordance with customer's specs

Trapezoidal screws with right and left hand thread



Technical data

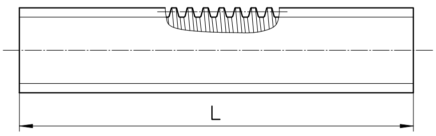
- Diameter: 10 – 80 mm
- Lead: 2 – 10 mm
- No. of starts: Single start
- Thread direction: Right hand thread and left hand thread
- Length: Max. 3000 mm, up to 6000 mm for screws from Tr 20 x 4, on request.
- Material: 1.0401 (C15)
- Lead accuracy: 50 to 300 µm/300 mm
- Straightness: 0,1 to 0,5 mm/300 mm
- Dimensions X: 100 mm; Diameter in the area of dimension X smaller than nominal diameter

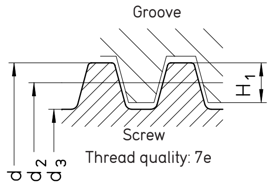
Trapezoidal screws RPTS

Rolled precision trapezoidal screws RPTS

Standard length 3000 mm, from ø 20 mm up to 6000 mm available.
Dimension L to customer's specs.

Material: 1.0401 (C15).





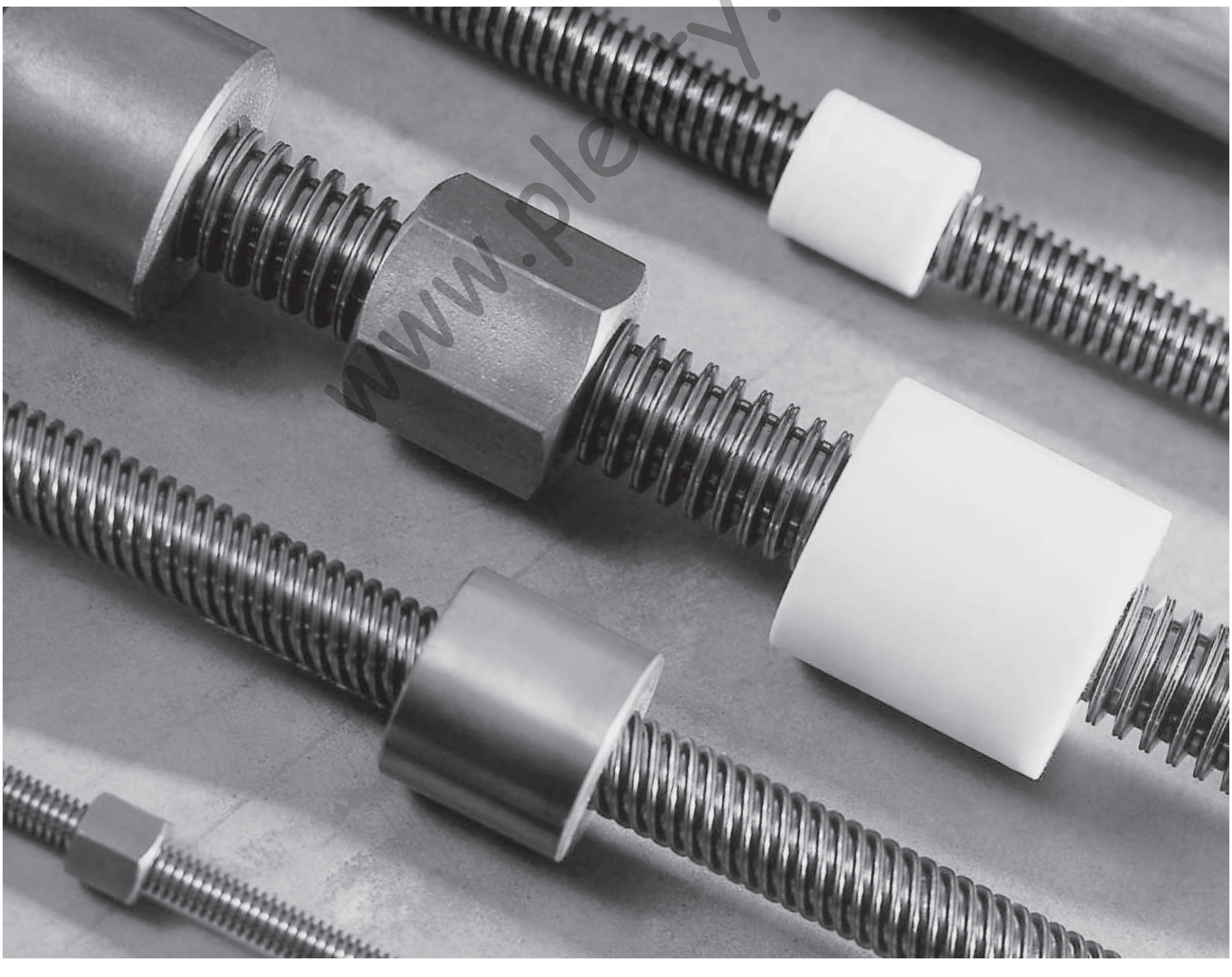
Type Outer diameter [mm] Lead [mm] Right/left hand thread	d	Dimensions [mm] $d_{2\,min}$	$d_{2\,max}$	d_3 1)	H_1	Accuracy [µm/ 300 mm]	Straight-ness [mm/ 300 mm]	α 2)	η 3)	Weight [kg/m]	Planar moment of inertia [cm⁴]	Moment of section modulus 4) [cm³]	Mass moment of inertia [kg m²/m]
RPTS Tr 10x2 RPTS Tr 10x3	10	8.739 8.191	8.929 8.415	6.89 5.84	1 1.5	300 300	0.5 0.5	4° 2′ 6° 24′	0.40 0.51	0.500 0.446	0.011 0.0057	0.032 0.020	$0.51 \cdot 10^{-5}$ $0.40 \cdot 10^{-5}$
RPTS Tr 12x3 RPTS Tr 12x6 P3 5)	12 12	10.191 10.165	10.415 10.415	7.84 7.84	1.5 1.5	300 300	0.5 0.5	5° 11′ 10° 18′	0.46 0.62	0.68 0.68	0.019 0.019	0.047 0.047	$0.94 \cdot 10^{-5}$ $0.94 \cdot 10^{-5}$
RPTS Tr 14x3 RPTS Tr 14x4	14	12.191 11.640	12.415 11.905	9.84 8.80	1.5 2	300 300	0.5 0.5	4° 22′ 6° 3′	0.42 0.50	0.96 0.888	0.046 0.029	0.094 0.067	$1.88 \cdot 15^{-5}$ $1.60 \cdot 10^{-5}$
RPTS Tr 16x2 RPTS Tr 16x4 RPTS Tr 16x8 P4 5)	16 16 16	14.729 13.640 13.608	14.929 13.905 13.905	12.89 10.80 10.80	1 2 2	50 50 300	0.1 0.1 0.3	2° 36′ 5° 11′ 10° 18′	0.28 0.46 0.62	1.39 1.21 1.21	0.136 0.067 0.067	0.210 0.124 0.124	$3.9 \cdot 10^{-5}$ $2.96 \cdot 10^{-5}$ $2.96 \cdot 10^{-5}$
RPTS Tr 18x4	18	15.640	15.905	12.80	2	50	0.1	4° 32′	0.43	1.58	0.132	0.206	$5.05 \cdot 10^{-5}$
RPTS Tr 20x4 RPTS Tr 20x8 P4 5) RPTS Tr 20x16 P4 5)	20	17.640 17.608 17.608	17.905 17.905 17.905	14.80 14.80 14.80	2 2 2	50 200 200	0.1 0.2 0.2	4° 2′ 8° 3′ 15° 47′	0.40 0.57 0.71	2.00 2.00 2.00	0.236 0.236 0.236	0.318 0.318 0.318	$8.10 \cdot 10^{-5}$ $8.10 \cdot 10^{-5}$ $8.10 \cdot 10^{-5}$
RPTS Tr 22x5 RPTS Tr 22x24 P4 S 5) 6)	22	19.114 19.140	19.394 19.505	15.50 16.50	2.5 2.5	50 200	0.1 0.2	4° 39′ 21° 34′	0.43 0.75	2.34 2.34	0.283 0.364	0.366 0.441	$1.11 \cdot 10^{-4}$ $1.11 \cdot 10^{-4}$
RPTS Tr 24x5 RPTS Tr 24x10 P5 5)	24	21.094 21.058	21.394 21.394	17.50 17.50	2.5 2.5	50 200	0.1 0.2	4° 14′ 8° 25′	0.41 0.58	2.85 2.85	0.460 0.460	0.526 0.526	$1.65 \cdot 10^{-4}$ $1.65 \cdot 10^{-4}$
RPTS Tr 26x5	26	23.094	23.394	19.50	2.5	50	0.1	3° 52′	0.39	3.40	0.710	0.728	$2.35 \cdot 10^{-4}$
RPTS Tr 28x5	28	25.094	25.394	21.50	2.5	50	0.1	3° 34′	0.37	4.01	1.050	0.976	$3.26 \cdot 10^{-4}$
RPTS Tr 30x6 RPTS Tr 30x12 P6 5)	30	26.547 26.507	26.882 26.882	21.90 21.90	3 3	50 200	0.1 0.2	4° 2′ 8° 3′	0.40 0.57	4.50 4.50	1.130 1.130	1.030 1.030	$4.10 \cdot 10^{-4}$ $4.10 \cdot 10^{-4}$
RPTS Tr 32x6	32	28.547	28.882	23.90	3	50	0.1	3° 46′	0.38	5.19	1.600	1.340	$5.45 \cdot 10^{-4}$
RPTS Tr 36x6	36	32.547	32.882	27.90	3	50	0.1	3° 18′	0.35	6.71	2.970	2.130	$9.10 \cdot 10^{-4}$
RPTS Tr 40x7 RPTS Tr 40x14 P7 5)	40	36.020 35.978	36.375 36.375	30.50 30.50	3.5 3.5	50 200	0.1 0.2	3° 29′ 6° 57′	0.37 0.53	8.21 8.21	4.250 4.250	2.790 2.790	$1.37 \cdot 10^{-3}$ $1.37 \cdot 10^{-3}$
RPTS Tr 44x7	44	40.020	40.275	34.50	3.5	50	0.1	3° 8′	0.34	10.10	6.950	4.030	$2.10 \cdot 10^{-3}$
RPTS Tr 48x8	48	43.468	43.868	37.80	4	100	0.1	3° 18′	0.35	12.00	10.000	5.300	$2.90 \cdot 10^{-3}$
RPTS Tr 50x8	50	45.468	45.868	39.30	4	100	0.1	3° 10′	0.34	13.10	11.700	5.960	$3.40 \cdot 10^{-3}$
RPTS Tr 60x9	60	54.935	55.360	48.15	4.5	200	0.3	2° 57′	0.33	19.00	26.400	11.000	$7.30 \cdot 10^{-3}$
RPTS Tr 70x10	70	64.425	64.850	57.00	5	200	0.3	2° 48′	0.32	26.00	51.800	18.200	$1.40 \cdot 10^{-2}$
RPTS Tr 80x10	80	74.425	74.850	67.00	5	200	0.3	2° 25′	0.29	34.70	98.900	29.500	$2.40 \cdot 10^{-2}$

1) For a wider filleting the core diameter is slightly smaller, deviating from DIN 103.
2) Lead angle at the flank diameter; ➔ see formula (XVI) p. 52.
3) Theoretical efficiency for converting a rotary motion into a linear motion with a coefficient of friction $\mu = 0.1$.
Efficency for other friction coefficients; ➔ see formula (XVI) p. 52.
4) The section modulus of inertia is double the moment of inertia.
5) Only right hand thread.
6) Special profile.

Trapezoidal nuts

Trapezoidal nuts according to DIN 103, tolerance class 7H.

Nuts of ø 18 mm and larger in a chased-thread version are available for all screws.



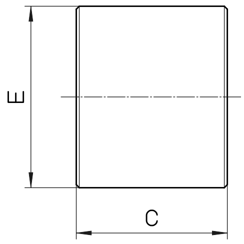
Trapezoidal nuts

Short steel nut blank, cylindrical KSM

Suitable for clamping operations, manual positioning and mounting. Not suitable for motion drives because the steel/steel friction tends to seizure.

Further processing: the thread serves as reference for precise machining and assembly.

Material: free-cutting steel 1.0718 (9 SMn 28K).



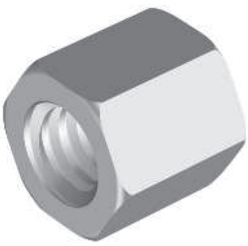
Type	E [mm]	C [mm]	Weight [kg]
KSM Tr 10x2	22	15	0.037
KSM Tr 10x3	22	15	0.036
KSM Tr 12x3	26	18	0.064
KSM Tr 14x3	30	21	0.96
KSM Tr 14x4	30	21	0.96
KSM Tr 16x4	36	24	0.16
KSM Tr 18x4	40	27	0.22
KSM Tr 20x4	45	30	0.31
KSM Tr 22x5	45	33	0.33
KSM Tr 24x5	50	36	0.45
KSM Tr 26x5	50	39	0.47
KSM Tr 28x5	60	42	0.76
KSM Tr 30x6	60	45	0.79
KSM Tr 32x6	60	48	0.81
KSM Tr 36x6	75	54	1.5
KSM Tr 40x7	80	60	1.9
KSM Tr 44x7	80	66	2.7
KSM Tr 48x8	90	72	2.9
KSM Tr 50x8	90	75	2.7
KSM Tr 60x9	100	90	3.7
KSM Tr 70x10	110	105	4.9
KSM Tr 80x10	120	120	6.4

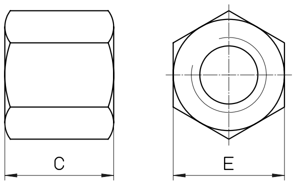
Hexagonal steel nut blank SKM

For clamping operations, manual positioning and mounting. Not suitable for motion drives because the steel/steel friction tends to seizure.

Further processing: the thread serves as reference for precise machining and assembly.

Material: free-cutting steel 1.0718 (9 SMn 28K).





Type	E [mm]	C [mm]	Weight [kg]
SKM Tr 10x2	17	15	0.022
SKM Tr 10x3	17	15	0.022
SKM Tr 12x3	19	18	0.028
SKM Tr 14x3	22	21	0.044
SKM Tr 14x4	22	21	0.044
SKM Tr 16x4	27	24	0.084
SKM Tr 18x4	27	27	0.086
SKM Tr 20x4	30	30	0.17
SKM Tr 22x5	30	33	0.17
SKM Tr 24x5	36	36	0.20
SKM Tr 26x5	36	39	0.20
SKM Tr 28x5	41	42	0.30
SKM Tr 30x6	46	45	0.43
SKM Tr 32x6	46	48	0.42
SKM Tr 36x6	55	54	0.73
SKM Tr 40x7	65	60	1.3
SKM Tr 44x7	65	66	1.2
SKM Tr 48x8	75	72	1.8
SKM Tr 50x8	75	75	1.8
SKM Tr 60x9	90	90	2.8
SKM Tr 70x10	90	105	3.1

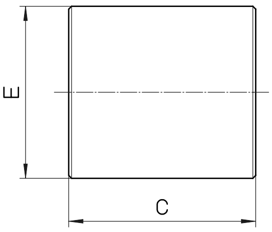
Trapezoidal nuts

Long gunmetal nut blank, cylindrical LRM

For motion drives in continuous operation, with particularly good wear characteristics.

Further processing: The thread serves as a reference for precise machining and assembly.

Material: 2.1090 (G-CuSn 7Zn Pb (Rg7)), Characteristics ➔ page 40.



Type	E [mm]	C [mm]	Weight [kg]	Bearing surface [mm²]
LRM Tr 10x2	22	20	0.056	200
LRM Tr 10x3	22	20	0.056	190
LRM Tr 12x3	26	24	0.092	280
LRM Tr 12x6 P3[1)]	26	24	0.092	280
LRM Tr 14x3	30	28	0.14	380
LRM Tr 14x4	30	28	0.14	370
LRM Tr 16x2	36	32	0.25	490
LRM Tr 16x4	36	32	0.25	490
LRM Tr 16x8 P4[1)]	36	32	0.25	490
LRM Tr 18x4	40	36	0.34	630
LRM Tr 20x4	45	40	0.48	790
LRM Tr 20x8 P4[1)]	45	40	0.45	790
LRM Tr 22x5	45	40	0.46	850
LRM Tr 22x24 P4S[1) 2)]	45	40	0.46	880
LRM Tr 24x5	50	48	0.69	1130
LRM Tr 24x10 P5[1)]	50	48	0.65	1130
LRM Tr 26x5	50	48	0.58	1240
LRM Tr 28x5	60	60	1.2	1680
LRM Tr 30x6	60	60	1.2	1780
LRM Tr 30x12 P6[1)]	60	60	1.2	1780
LRM Tr 32x6	60	60	1.2	1910
LRM Tr 36x6	75	72	2.2	2610
LRM Tr 40x7	80	80	2.8	3210
LRM Tr 40x14 P7[1)]	80	80	2.8	3210
LRM Tr 44x7	80	80	2.6	3560
LRM Tr 48x8	90	100	4.3	4840
LRM Tr 50x8	90	100	4.2	5060
LRM Tr 60x9	100	120	5.7	7320
LRM Tr 70x10	110	140	7.6	10000
LRM Tr 80x10	120	160	9.7	13200

[1)] Only right hand thread.
[2)] Special profile; nominal diameter 21.5.

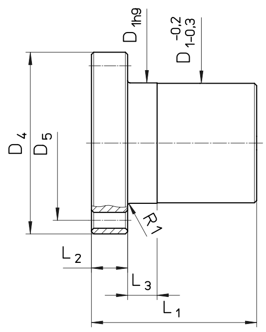
Trapezoidal nuts

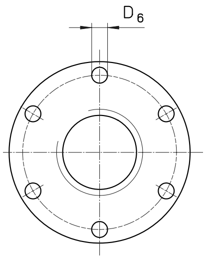
Complete bronze nut EFM

For motion drives in continuous operation, with particularly good wear characteristics. Suitable for use as a safety nut.

EFM nuts can be installed with the KON and KAR adapters (➔ page 41 – 42)

Material: 2.1090 (G-CuSn 7Zn Pb (Rg7)), Characteristics ➔ page 40





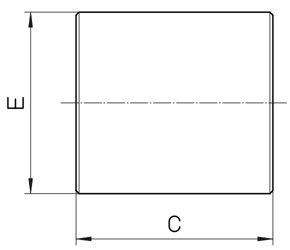
Type	Dimensions [mm]							Weight [kg]	Bearing surface [mm²]
	D_1	D_4	D_5	$6xD_6$	L_1	L_2	L_3		
EFM Tr 16x4	28	48	38	6	44	12	8	0.25	670
EFM Tr 18x4	28	48	38	6	44	12	8	0.25	770
EFM Tr 20x4	32	55	45	7	44	12	8	0.30	870
EFM Tr 24x5	32	55	45	7	44	12	8	0.30	1040
EFM Tr 30x6	38	62	50	7	46	14	8	0.40	1370
EFM Tr 36x6	45	70	58	7	59	16	10	0.60	2140
EFM Tr 40x7	63	95	78	9	73	16	10	1.70	2930
EFM Tr 50x8	72	110	90	11	97	18	10	2.60	4900
EFM Tr 60x9	85	125	105	11	99	20	10	3.70	6040
EFM Tr 70x10	95	140	180	17	100	30	16	7.80	8250
EFM Tr 80x10	105	150	190	17	110	30	16	8.90	10890

Long plastic nut blank, cylindrical LKM

For low-noise motion drives with higher speeds and longer operation time. Especially recommended in combination with rolled trapezoidal screws. Good emergency running characteristics.

Material: PETP, Characteristics ➔ page 40.

Lubrication: synthetic oil-based gear grease FUCHS LUBRITEC, URETHYN EM 1



Type	E [mm]	C [mm]	Weight [kg]	Bearing surface [mm²]
LKM Tr 12x3	26	24	0.012	280
LKM Tr 12x6 P3	26	24	0.012	280
LKM Tr 16x4	36	32	0.032	490
LKM Tr 16x8 P4	36	32	0.032	490
LKM Tr 20x4	45	40	0.06	790
LKM Tr 20x8 P4	45	40	0.06	790
LKM Tr 24x5	50	48	0.088	1130
LKM Tr 30x6	60	60	0.15	1780
LKM Tr 30x12 P6	60	60	0.15	1780
LKM Tr 36x6	75	72	0.30	2610
LKM Tr 40x7	80	80	0.37	3210
LKM Tr 50x8	90	100	0.55	5060

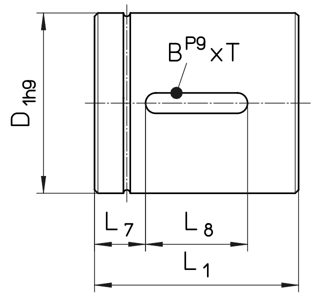
Right hand thread, left hand thread on request.

Trapezoidal nuts

Complete plastic nut EKM

For low-noise motion drives with higher speeds and longer operation time under moderate load. Good emergency running characteristics.
Especially recommended in combination with rolled trapezoidal screws.

Material: PETP, Characteristics see below.



Type	Dimensions [mm]					Weight [kg]	Bearing surface [mm²]
	ø D_1	L_1	L_7	L_8	BxT		
EKM Tr 16x4	28	34	7	20	5x2.9	0.02	520
EKM Tr 20x4	32	34	7	20	5x2.9	0.03	670
EKM Tr 20x8 P4	32	34	7	20	5x2.9	0.03	670
EKM Tr 20x16 P4	32	34	7	20	5x2.9	0.03	670

EKM with left hand thread on request.

Material Characteristics

Material 2.1090

- 0.2 % yield strength $R\rho_{0.2}$: 120 N/mm²
- Tensile strength R_m (δB): 240 N/mm²
- Min. strain at break A5 min.: 15 %
- Brinell hardness HB 10/1000: 65
- Density: 8.8 kg/dm³
- Modulus of elasticity: 90000 N/mm³
- pv factor: 300 N/mm² · m/min

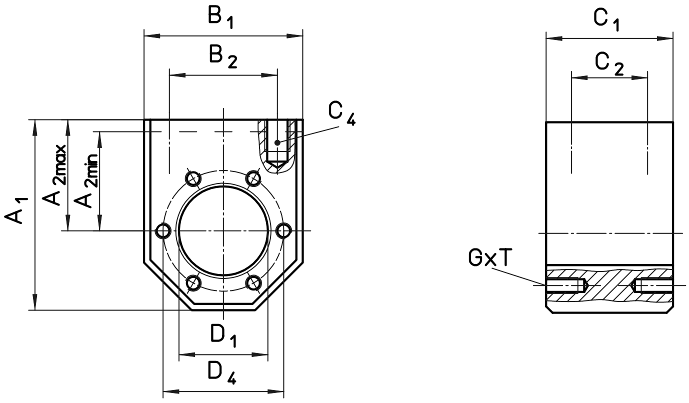
Material PETP

- Tensile strength: 80 N/mm²
- Modulus of elasticity: 2800 – 3000 N/mm²
- Impact strength: 40 kJm²
- Notch impact strength: 4 kJm²
- Thermal expansion: $8.5 \cdot 10^{-5}$/°C
- Water absorption: 0.25 %
- Water saturation: 0.6 %
- Density: 1.38 kg/dm³
- Friction against steel: 0.05 – 0.08
- Ball pressure H 358/30: 150 N/mm²
- Strain with a yield stress of 80 N/mm²: 4 – 5 %
- pv factor: 100 N/mm² · m/min
- Max. pressure per unit area: 10 N/mm²
- Max. rubbing speed: 120 m/min

Adapter bracket KON

Adapter bracket for radial attachment of trapezoidal nut EFM.

Material: 1.0065 (St37) / 1.0507 (St52).



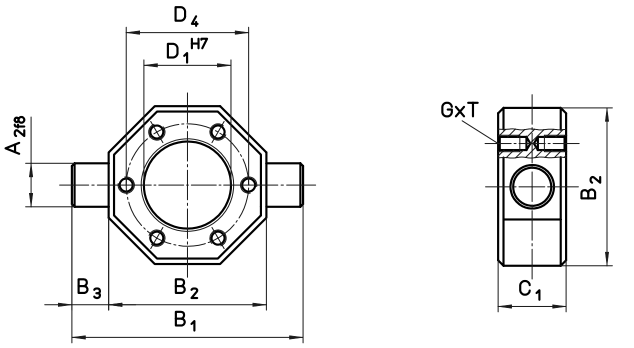
Type for EFM	A_1	$A_{2\,max}$ 1)	$A_{2\,min}$	B_1	B_2	C_1	C_2	C_4	D_1	D_4	G x T
	Dimensions [mm]										
KON Tr 16x4/Tr 18x4	60	35	25	50	34	40	24	M 8x15	28	38	M 5x10
KON Tr 20x4/Tr 24x5	68	37.5	29	58	39	40	24	M 8x15	32	45	M 6x12
KON Tr 30x6	75	42.5	32.5	65	49	40	24	M 10x15	38	50	M 6x12
KON Tr 36x6	82	45	37	75	54	50	30	M 10x12	45	58	M 6x12
KON Tr 40x7	120	70	50	100	76	65	41	M 14x25	63	78	M 8x14
KON Tr 50x8	135	77.5	57.5	115	91	88	64	M 16x25	72	90	M 10x16
KON Tr 60x9	152	87.5	65	130	101	88	64	M 16x30	85	105	M 10x16

1) Standard = $A_{2\,max}$ (delivery status)

Universal joint adapter KAR

Universal joint adapter for cardanic suspension of trapezoidal nut EFM.

Material: 1.0065 (St37) / 1.0507 (St52).

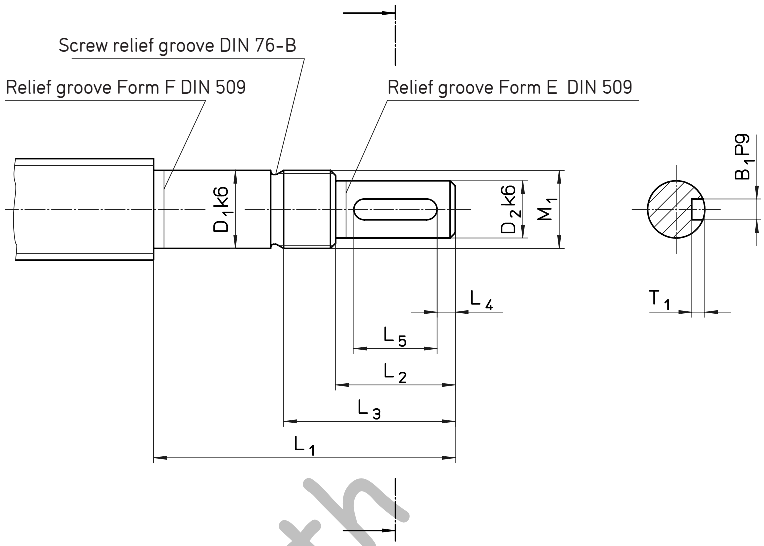


Type for EFM	Dimensions [mm] A_2	B_1	B_2	B_3	C_1	D_1	D_4	G x T
KAR Tr 16x4/Tr 18x4	12	70	50	10	20	28	38	M 5x10
KAR Tr 20x4/Tr 24x5	16	85	58	13.5	25	32	45	M 6x12
KAR Tr 30x6	18	95	65	15	25	38	50	M 6x12
KAR Tr 36x6	20	110	75	17.5	30	45	58	M 6x12
KAR Tr 40x7	30	140	100	20	40	63	78	M 8x14
KAR Tr 50x8	40	165	115	25	50	72	90	M 10x16
KAR Tr 60x9	40	180	130	25	50	85	105	M 10x16

Screw end machining for movable/fixed bearing Form D, F

The type of bearing influences the stiffness of the screw drive as a whole, as well as the vibration and buckling behaviour of the screw. End machining of the trapezoidal screw is carried out as appropriate for the various types of bearing.

Note: Bearings are not part of our delivery programme.



Form D	Dimensions [mm]									Bearing
TGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	ZKLF…2RS
Tr 18/20/22x…	12	9	55	20	32	2.5	16	M 12x1	3x1.8	1255
Tr 24/26x…	15	11	58	23	35	3.5	16	M 15x1	4x2.5	1560
Tr 28/30/32x…	20	14	70	30	44	4	22	M 20x1	5x3	2068
Tr 36x…	25	19	82	40	57	6	28	M 25x1.5	6x3.5	2575
Tr 40/44/48/50x…	30	24	92	50	67	7	36	M 30x1.5	8x4	3080

Form F	Dimensions [mm]									Bearing
TGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	ZARN...LTN
Tr 22/24/26x…	15	11	73	23	35	3,5	16	M 15x1	4x2.5	1545
Tr 28/30/32x…	20	14	88	30	45	4	22	M 20x1	5x3	2052
Tr 28/30/32x…	20	14	107	30	50	4	22	M 20x1	5x3	2062
Tr 36/40/44x…	25	19	105	40	58	6	28	M 25x1.5	6x3.5	2557
Tr 36/40/44x…	25	19	120	40	63	6	28	M 25x1.5	6x3.5	2572
Tr 48/50x…	35	28	145	60	82	10	40	M 35x1.5	8x4	3585
Tr 60/70x…	40	36	175	80	103	8.5	63	M 40x1.5	10x5	4090
Tr 80x…	55	48	215	110	136	10	90	M 55x2	14x5.5	55115

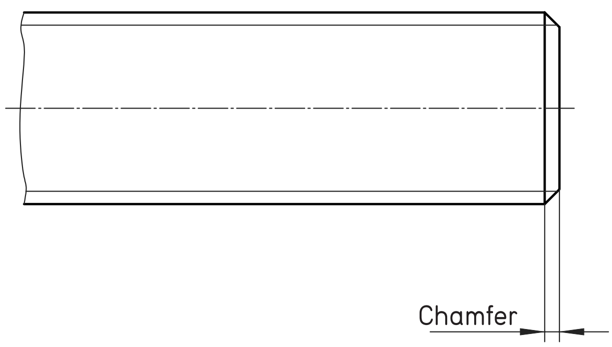
Screw end machining for movable/fixed bearing
Form H, J, L, Z

Form H	Dimensions [mm]									Bearing
TGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	ZARF...LTN
Tr 22/24/26x…	15	11	85	23	35	3.5	16	M 15x1	4x2.5	1560
Tr 28/30/32x…	20	14	102	30	44	4	22	M 20x1	5x3	2068
Tr 28/30/32x…	20	14	122	30	49	4	22	M 20x1	5x3	2080
Tr 36/40/44x…	25	19	120	40	57	6	28	M 25x1.5	6x3.5	2575
Tr 36/40/44x…	25	19	135	40	63	6	28	M 25x1.5	6x3.5	2590
Tr 48/50x…	35	28	160	60	81	10	40	M 35x1.5	8x4	35110
Tr 60/70x…	40	36	195	80	105	8.5	63	M 40x1.5	10x5	40115
Tr 80x…	55	48	235	110	135	10	90	M 55x2	14x5.5	55145

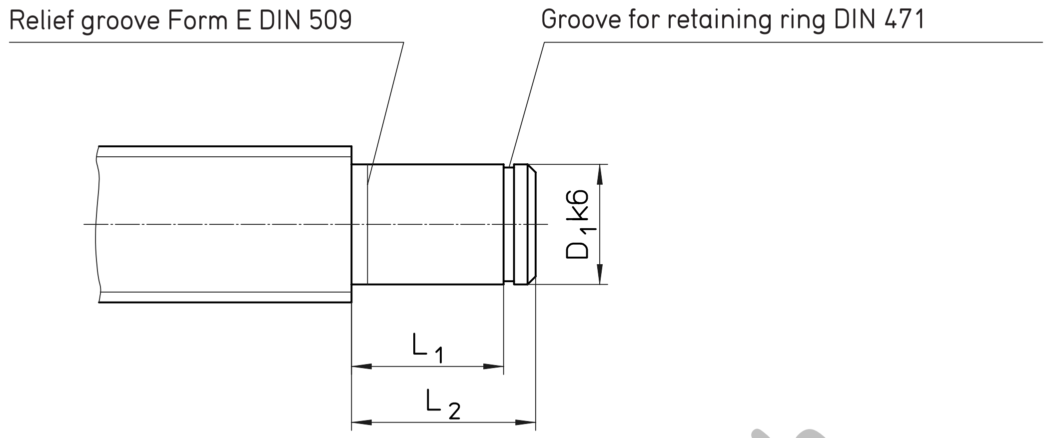
Form J	Dimensions [mm]									Bearing
TGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	FDX
Tr 20/22x…	12	9	88	20	32	2.5	16	M 12x1	3x1.8	12
Tr 24/26x…	15	11	92	23	35	3.5	16	M 15x1	4x2.5	15
Tr 28/30/32x…	20	14	107	30	44	4	22	M 20x1	5x3	20
Tr 36/40/44x…	25	19	122	40	57	6	28	M 25x1.5	6x3.5	25
Tr 48/50x…	30	24	136	50	72	7	36	M 30x1.5	8x4	30
Tr 60x…	40	36	182	80	102	8.5	63	M 40x1.5	10x5	40

Form L	Dimensions [mm]									
TGT	D_1	D_2	L_1	L_2	L_3	L_4	L_5	M_1	B_1xT_1	Bearing
Tr 16/18x…	10	8	55	20	30	–	–	M 10x0.75	–	7200 BE RS
Tr 20/22x…	12	9	58	20	30	2.5	16	M 12x1	3x1.8	7201 BE RS
Tr 24/26x…	15	11	73	23	33	3.5	16	M 15x1	4x2.5	7202 BE RS
Tr 28/30/32x…	20	14	88	30	43	4	22	M 20x1	5x3	7204 BE RS
Tr 36/40/44x…	25	19	120	40	55	6	28	M 25x1.5	6x3.5	7205 BE RS
Tr 48/50x…	35	28	145	60	77	10	40	M 35x1.5	8x4	7207 BE RS
Tr 60x…	40	36	175	80	103	8.5	63	M 40x1.5	10x5	7208 BE RS
Tr 70/80x…	55	48	215	110	133	10	90	M 55x2	14x5.5	7211 BE RS

Form Z
Chamfer 2 x 45°: TGS with ø 12 – 25 mm
Chamfer 3 x 45°: TGS with ø 26 – 40 mm
Chamfer 4 x 45°: TGS with ø 44 – 50 mm



Screw end machining for movable/fixed bearing
Form S, T, W, K



Form S	Dimensions [mm]				
TGT	D_1	L_1	L_2	Spacer sleeve	Bearing
Tr 18/20x…	12	40	45	18x12.1x24	6001 RS
Tr 22/24/26x…	15	46	51	21x15.1x28	6002 RS
Tr 28/30/32x…	20	53	58	27x20.1x29	6004 RS
Tr 36x…	25	53	58	32x25.1x23	6205 RS
Tr 40/44/48/50x…	30	60	68	40x30.1x28	6206 RS
Tr 60x…	40	80	88	50x40.1x44	6208 RS
Tr 70/80x…	55	102	110	65x55.1x60	6211 RS

Form T	Dimensions [mm]				
TGT	D_1	L_1	L_2	Inner ring	Roller bearing
Tr 18/20x…	12	40	45	2 IR 12x16x20	HK 1614 RS
Tr 22/24/26x…	15	46	51	2 IR 15x20x23	HK 2018 RS
Tr 28/30/32x…	20	53	58	2 LR 20x25x26.5	HK 2518 RS
Tr 36x…	25	53	58	2 LR 25x30x26.5	HK 3018 RS
Tr 40/44/48/50x…	30	60	68	2 LR 30x35x30	HK 3518 RS
Tr 60x…	40	80	88	4 LR 40x45x20	HK 4518 RS

Form K: Produced specially to customer's drawing.

Form W	Dimensions [mm]			
TGT	D_1	L_1	L_2	Bearing
Tr 14/16x…	10	8	12	6000 RS
Tr 18/20x…	12	8	12	6001 RS
Tr 22/24/26x…	15	9	13	6002 RS
Tr 28/30/32x…	20	12	16	6004 RS
Tr 36x…	25	15	20	6205 RS
Tr 40/44/48/50x…	30	16	21	6206 RS
Tr 60x…	40	18	25	6208 RS
Tr 70/80x…	55	21	29	6211 RS

Sizing and selection

Load rating of trapezoidal screw drives

As a general principle, the load rating of trapezoidal screw drives is dependent on their material, surface quality, state of wear, surface pressure, lubrication conditions, running speed and temperature, and thus on the duty cycle and the conditions for heat dissipation.

The permissible surface pressure is primarily dependent on the running speed of the screw drive.

With motion drives the surface pressure should not exceed 5 N per mm^2.

The permissible speed can be calculated from the supporting surface of the respective nut (see tables pp. 38 – 40) and the pv-factor of the respective nut materials (see p. 40).

pv-factors Material	pv-factors [N/mm^2 · m/min]
G-CuSn 7 ZnPb (Rg 7)	300
G-CuSn 12 (G Bz 12)	400
Plastic (PETP)	100
Cast iron GG 22/GG 25	200

Required bearing surface

$$A_{erf} = \frac{F_{ax}}{P_{zul}} \qquad \textbf{(VIII)}$$

A_{erf} Required bearing surface [mm^2]
F_{ax} Total axial load [N]
P_{zul} Maximum permissible surface pressure = 5 N/mm^2

Maximum linear running speed

$$v_{Gzul} = \frac{pv - Wert}{P_{zul}} \qquad \textbf{(IX)}$$

pv-factor see table
v_{Gzul} Maximum linear running speed [m/min]

Maximum permissible speed of rotation

$$n_{zul} = \frac{v_{Gzul} \cdot 1000}{D \cdot \pi} \qquad \textbf{(X)}$$

D Flank diameter [mm]
n_{zul} Maximum permissible speed of rotation [rpm]

Permissible feed speed

$$s_{zul} = \frac{n_{zul} \cdot P}{1000} \qquad \textbf{(XI)}$$

P Thread lead [mm]
s_{zul} Permissible feed speed [m/min]

Sizing and selection

Example load rating calculation

Given Valiues: !

Screw drive,
Trapezoidal screw drive with bronze nut $P_{zul} = 5\ N/mm^2$,
Total axial load $F_{ax} = 10000\ N$

Sought-after Results: ?

What travel speed is still permissible at this load?

A_{erf} Required bearing surface [mm²]

from (VIII)

$$A_{erf} = \frac{F_{ax}}{P_{zul}} = \frac{10000\ N}{5\ N/mm^2} = 2000\ mm^2$$

Selection of bronze nut EFM of technical data
➔ page 39

36 x 6 with bearing surface A = 2140 mm²

P Thread lead = 6 mm
D Flank diameter $= d - \frac{P}{2}$
$= 36 - \frac{6}{2}$ [mm]
= 33 mm

V_{Gzul} Maximum linear running speed [m/min]

from (IX)

$$v_{Gzul} = \frac{pv - factor}{P_{zul}} = \frac{300\ N/mm^2 \cdot m/min}{5\ N/mm^2} = 60\ m/min$$

With pv-factor for Rg 7 = 300 m/min (see table)

n_{zul} Maximum permissible speed [rpm]

from (X)

$$n_{zul} = \frac{v_{Gzul} \cdot 1000}{D \cdot \pi} = \frac{60\ m/min \cdot 1000\ mm/m}{33\ mm \cdot \pi} = 579\ rpm$$

S_{zul} Permissible feed speed

from (XI)

$$s_{zul} = \frac{n_{zul} \cdot P}{1000} = \frac{579\ 1/min \cdot 6\ mm}{1000\ mm/m} = 3.474\ m/min$$

Result:

At a load of 10.000 N, the trapezoidal screw drive can be operated at a speed of 3.474 metres per min.

Sizing and selection

Critical speed of trapezoidal screws

With thin, fast-rotating screws, there is the danger of "whipping". The method described below allows the resonant frequency to be estimated assuming a sufficiently rigid assembly. Furthermore, speeds in the vicinity of the critical speed considerably increase the risk of lateral buckling. The critical speed is therefore included in the calculation of the critical buckling force.

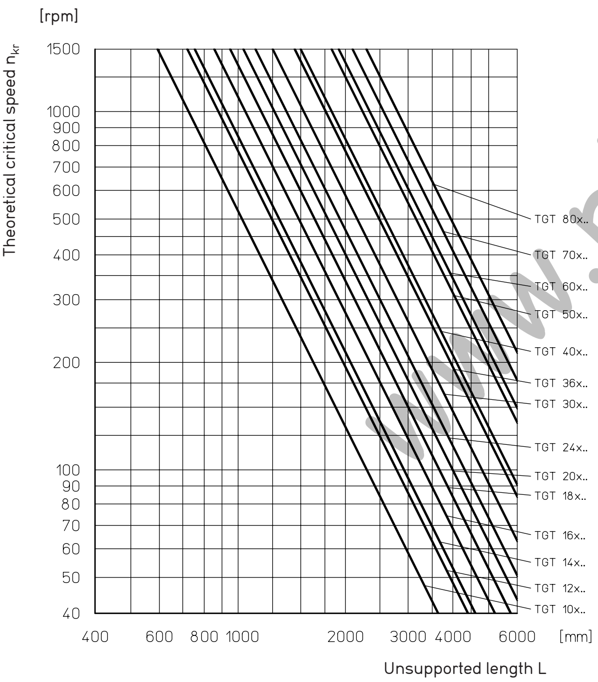
Maximum permissible speed

(XII) $n_{zul} = 0.8 \cdot n_{kr} \cdot f_{kr}$

n_{zul} Maximum permissible speed [rpm]
n_{kr} Theoretical critical speed [rpm], that can lead to resonance effects ➔ see diagram
f_{kr} Correction factor considering the bearing support of the screw ➔ see table

! The operating speed must not exceed 80 % of the maximum speed

Theoretical critical speed n_{kr}

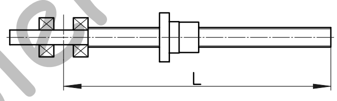


Bearing support

Typical values of correction factor f_{kr} corresponding to the usual cases of installation for standard screw bearings.

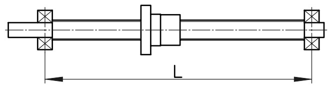
Case 1

$f_{kr} = 0.36$



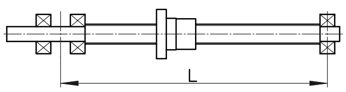
Case 2

$f_{kr} = 1$



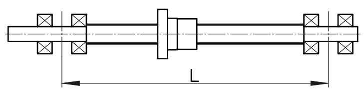
Case 3

$f_{kr} = 1.47$



Case 4

$f_{kr} = 2.23$



Sizing and selection

Critical buckling force of trapezoidal screws

With thin, fast-rotating screws under compressive load, there is the danger of lateral buckling.

The procedure described below can be used to calculate the permissible axial force according to Euler.
Before the permissible compressive force is defined, allowance must be made for safety factors appropriate to the installation.

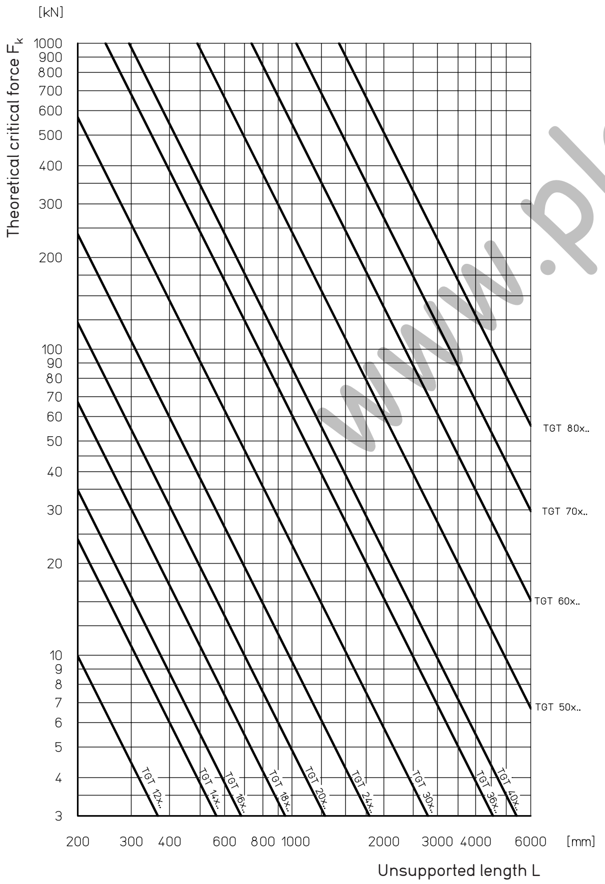
Maximum permissible axial force

(XIII) $F_{zul} = 0.8 \cdot F_k \cdot f_k$

F_{zul} Maximum permissible axial force [kN]
F_k Theoretical critical buckling force [kN], ➔ see diagram
f_k Correction factor considering the bearing support of the screw ➔ see table

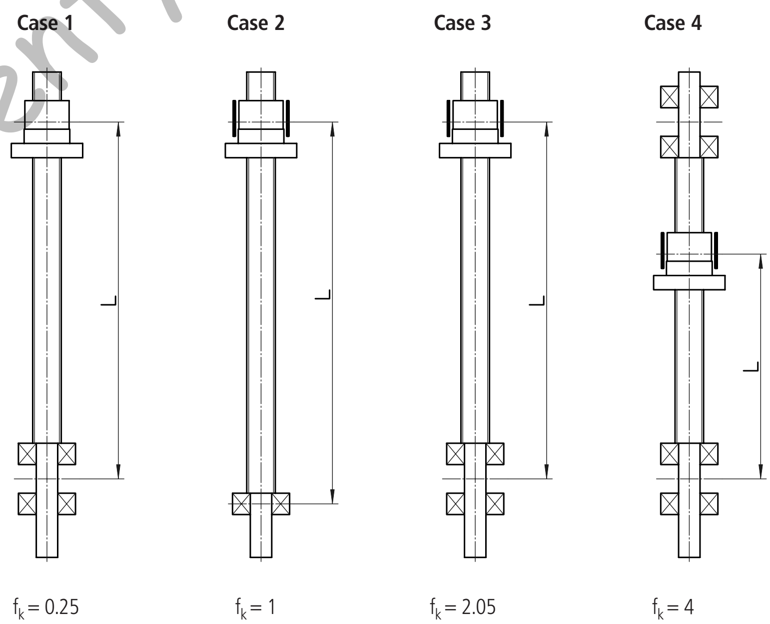
! The operating force must not exceed 80 % of the maximum permissible axial force

Theoretical critical buckling force F_k



Bearing support

Typical values of correction factor f_k corresponding to the usual cases of installation for standard screw bearings.



Sizing and selection

Deflection of the screw under its own weight

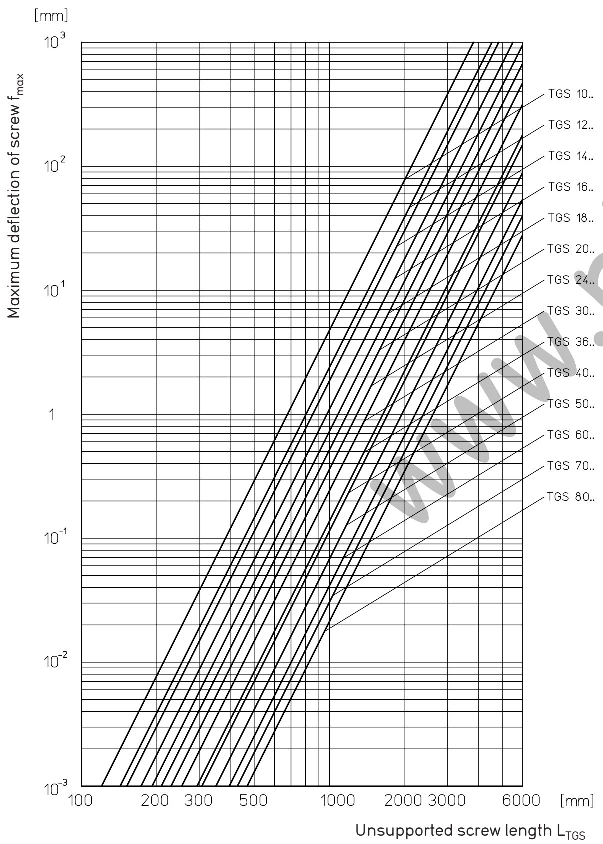
Even in the case of correctly installed screw drives where the resulting radial forces are absorbed by external guides, the weight of the unsupported screw itself may lead to deflection. The formula below allows you to calculate the maximum deflection of the screw.

Maximum deflection of screw

(XIV) $$f_{max} = f_B \cdot 0.061 \cdot \frac{w_{TGS} \cdot L_{TGS}}{I_Y}$$

f_B	Correction factor considering the bearing support of the screw ➔ see table
I_Y	Planar moment of inertia [mm^4] ➔ see table page 35
L_{TGS}	Unsupported screw length [mm]
w_{TGS}	Weight [kg/m]

Theoretical maximum deflection of screw

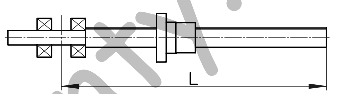


Bearing support

Typical values of correction factor f_B corresponding to the usual cases of installation for standard screw bearings.

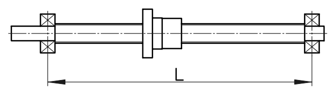
Case 1

$f_B = 9.57$



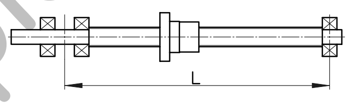
Case 2

$f_B = 1$



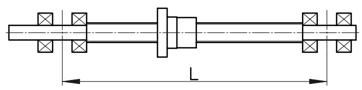
Case 3

$f_B = 0.41$



Case 4

$f_B = 0.20$



Sizing and selection

Example calculation for a trapezoidal screw drive

Given Values:

!

Trapezoidal screw drive
Screw RPTS Tr 24x5
Length L = 1500 mm
Installation case 2
Maximum operating speed: n_{max} = 500 [rpm]

Sought-after Results:

?

Is the operating speed uncritical?
What is the permissible axial force?
What is the maximum deflection?

Maximum permissible speed n_{zul}

from (XII) $n_{zul} = 0.8 \cdot n_{kr} \cdot f_{kr} = 0.8 \cdot 830\ \text{rpm} \cdot 1 = 664\ \text{rpm}$

Theoretical critical speed n_{kr} = 830 rpm
➔ from diagram "Theoretical critical speed"

from (XIII) $F_{zul} = 0.8 \cdot F_k \cdot f_k = 0.8 \cdot 4.2\ \text{kN} \cdot 1 = 3.36\ \text{kN}$

Theoretical critical buckling force F_k = 4.2 kN
➔ from diagram "Theoretical critical buckling force"

from (XIV)

$$f_{max} = f_B \cdot 0.061 \cdot \frac{W_{TGS} \cdot L_{TGS}}{I_Y} = 1 \cdot 0.061 \cdot \frac{2.85\ \text{kg/m} \cdot 1.5\ \text{m}}{0.460\ \text{cm}^4}$$

$$f_{max} = 0.57\ \text{mm}$$

Weight W_{TGS} = 2.85 kg/m
Planar moment of inertia I_y = 0.460 cm^4
➔ from table page 35

Result:

The selected screw drive is uncritical at n_{max} = 500 rpm.
It can be loaded with a maximum axial force of 3.36 kN,
and when installed horizontally has a maximum deflection
of 0.57 mm.
(Note surface pressure and pv-factor!)

Sizing and selection

Required drive torque and drive power
The required drive torque of a screw drive results from the axial load, the screw lead and the efficiency of the screw drive and bearings. With short run-up times and high speeds, the acceleration moment should be checked.

Note: In case of trapezoidal screw drives, in principle, there is always a breakaway moment to be overcome.

Required drive torque

(XV)

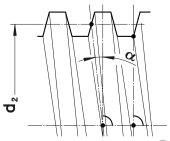
$$M_d = \frac{F_{ax} \cdot P}{2000 \cdot \pi \cdot \eta_A} + M_{rot}$$

F_{ax} Total axial load [N]
P Thread lead [mm]
η_A Efficiency of the overall drive
$= \eta_{TGT} \cdot \eta_{fixed\ bearing} \cdot \eta_{movable\ bearing}$
$\eta_{TGT\ (\mu = 0.1)}$ ➔ see table page 35
$\eta_{fixed\ bearing} = 0.9 \ldots 0.95$
$\eta_{movable\ bearing} = 0.95$
M_d Required drive torque [Nm]
M_{rot} Rotational acceleration torque [Nm]
$= J_{rot} \cdot \alpha_0$
$= 7.7 \cdot d^4 \cdot L \cdot 10^{-13}$
- J_{rot} Rotational mass moment of inertia [kgm²]
- d Nominal screw diameter [mm]
- L Screw length [mm]
- α_0 Angular acceleration [1/s²]

Efficiency η for coefficients of friction other than μ = 0.1

(XVI)

$$\eta = \frac{\tan \alpha}{\tan (\alpha + \rho')}$$



η Efficiency for converting a rotary motion into a linear motion
α Helical angle of the thread [°] ➔ see table page 35 or in general:

$$\tan \alpha = \frac{P}{d_2 \cdot \pi}$$

with P screw lead [mm]
d_2 flank diameter [mm]

ρ' Thread friction angle [°]
$\tan \rho' = \mu \cdot 1.07$ for ISO-trapezoidal thread
μ is the coefficient of friction

	μ during start-up (= μ_0)		μ in motion	
	dry	lubricated	dry	lubricated
Metal nuts	≈ 0.3	≈ 0.1	≈ 0.1	≈ 0.04
Plastic nuts	≈ 0.1	≈ 0.04	≈ 0.1	≈ 0.03

Required drive power

(XVII)

$$P_a = \frac{M_d \cdot n}{9550}$$

M_d Required drive torque [Nm] ➔ from (XV)
n Screw speed [rpm]
P_a Required drive power [kW]

Sizing and selection

Torque resulting from an axial load

Trapezoidal screw drives with a helical angle α greater than the friction angle ρ', are not self-locking, i.e. the application of an axial load produces a screw torque.

Efficiency η' for converting a linear motion into a rotary motion is lower than the conversion of a rotary motion into a linear motion.

Required holding moment

(XVIII) $$M_d' = \frac{F_{ax} \cdot P \cdot \eta'}{2000 \cdot \pi} + M_{rot}$$

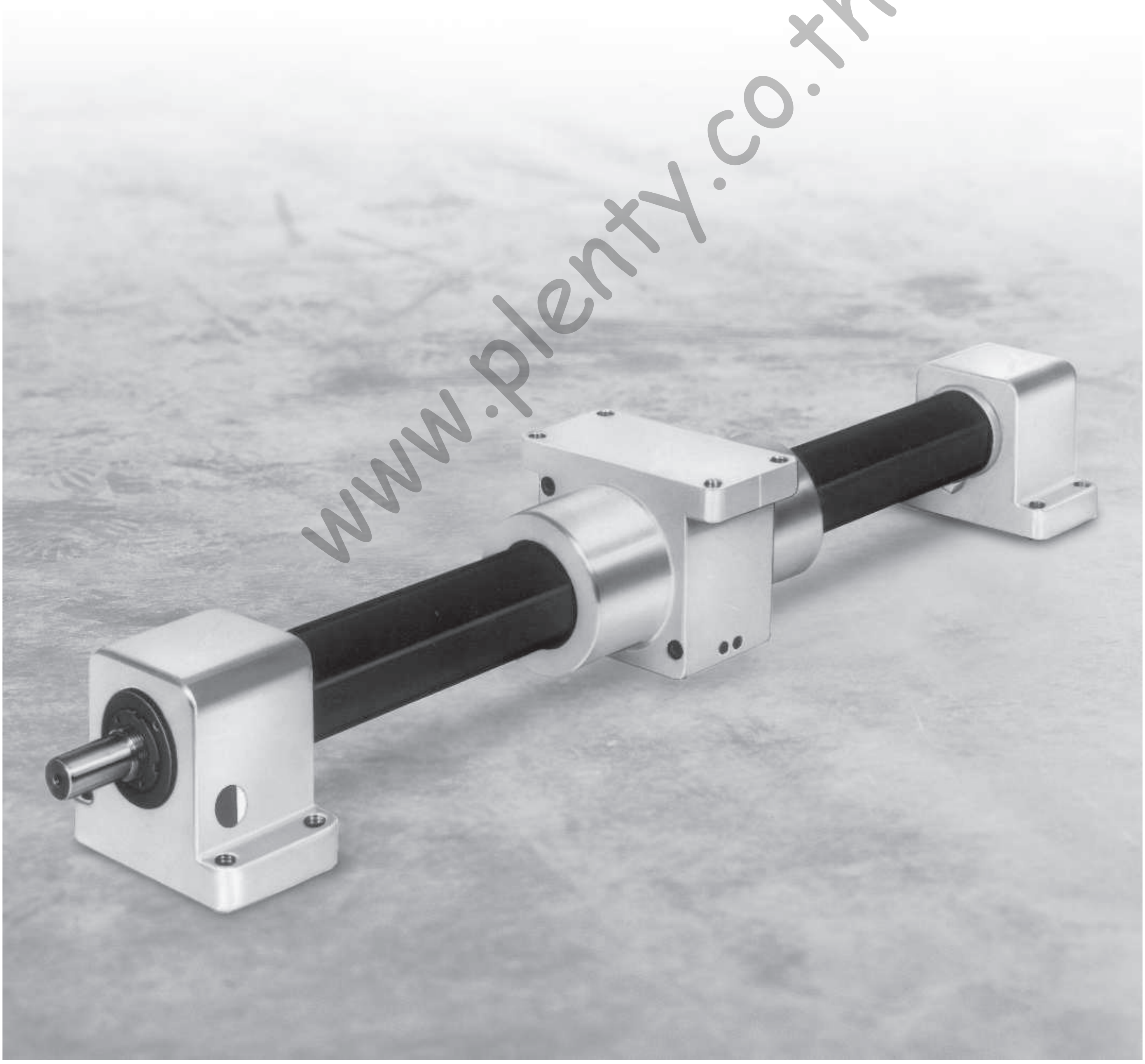
F_{ax} Total axial load [N]
P Thread lead [mm]
η' Efficiency for converting a linear motion into a rotary motion.

$$= \frac{\tan(\alpha - \rho')}{\tan \alpha}$$

$$= 0.7 \cdot \eta$$

The effect of the efficiency of the bearing is negligible.

M_d' Required holding moment [Nm]
M_{rot} Rotational acceleration torque [Nm]
$= J_{rot} \cdot \alpha_0$
$= 7.7 \cdot d^4 \cdot L \cdot 10^{-13}$
- J_{rot} Rotational mass moment of inertia [kgm^2]
- d Nominal screw diameter [mm]
- L Screw length [mm]
- α_0 Angular acceleration [$1/s^2$]



Ball Srew Drive KOKON
With all-round protection for rugged conditions

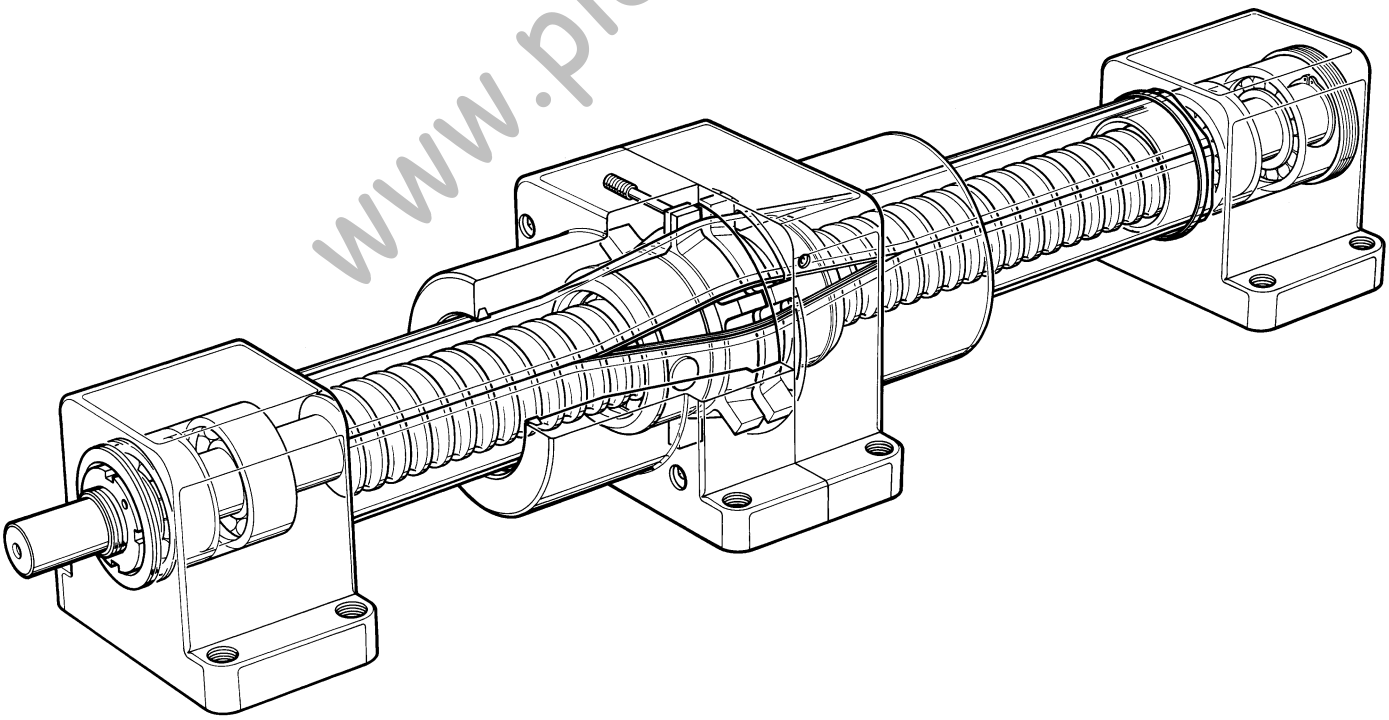
The KOKON® ball screw drive is optimised for rugged use in dirty surroundings and in applications with long travel.

Complete drive element with screw, cover and bearings ready for installation or attachment. The central housing with the pre-loaded nut unit and cover-strip return can be installed in various positions.

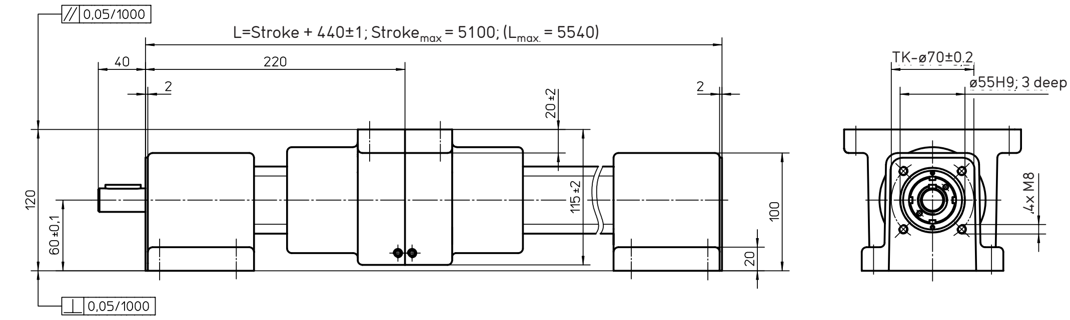
The covers for the ball screw drive are made of the shock-proof elastomer plastic PA12.

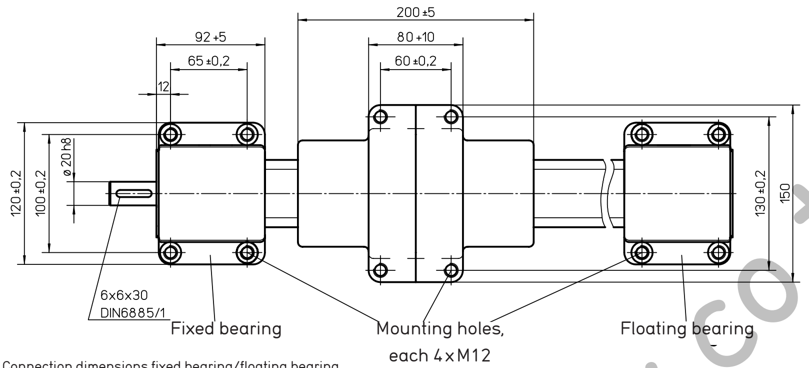
Simple maintenance through easily accessible lubrication system.

All dimensions of the cover depend on the length of the element.



KOKON
Fully protected ball screw drive

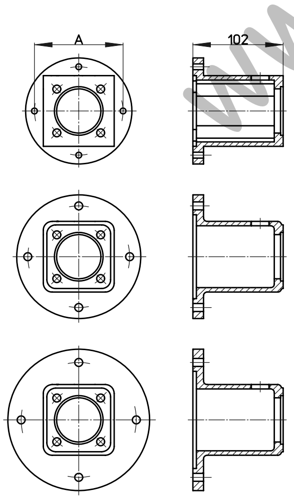




Connection dimensions fixed bearing/floating bearing

Accessories motor covers

	A
C120	100
C140	115
C160	130



Technical data

	KOKON 4005	KOKON 4010
■ Operation speed:	max. 250 mm/s	max. 500 mm/s
■ Repeatability:	± 0.05 mm	± 0.05 mm
■ Acceleration:	max. 20 m/s^2	max. 20 m/s^2
■ Rotation Speed:	max. 3000 rpm	max. 3000 rpm
■ Diameter:	40 mm	40 mm
■ Drive element:	Pre-loaded ball screw drive	
■ Lead:	5 mm	10 mm
■ Idling torque M_0:	0.6 ± 0.2 Nm	1.6 ± 0.4 Nm
■ Axial load rating C_0:	46000 N	46000 N
Axial load rating C[1]:	23000 N	42000 N
Axial load rating C[2]:	23000 N	38000 N
■ Efficiency η:	0.75	0.75
■ Weights		
Basic without stroke:	4.40 kg	4.40 kg
100 mm stroke:	0.95 kg	0.95 kg
Nut unit with housing:	3.60 kg	3.60 kg

Material characteristics cover strip

	KOKON 4005	KOKON 4010
■ Cover strip:	PA12	PA12
■ Modulus of elasticity:	300 N/mm^2	300 N/mm^2
■ Breaking strength:	40 N/mm^2	40 N/mm^2
■ Shore hardness:	54	54
■ Water absorption:	max. 1.4 %	max. 1.4 %
■ Oil and coolant resistant:	yes	yes

[1] DIN 69051 draft april 1978
[2] DIN 69051 draft may 1989

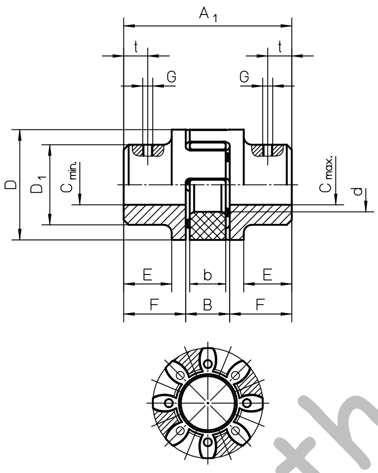
Principles of selection see pp. 25 ff.

Couplings

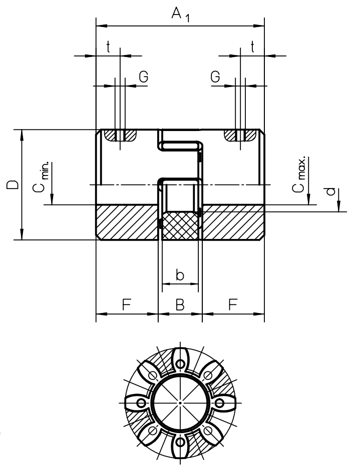
Flexible couplings RA, RG

Flexible couplings transmit the torque by positive locking, and compensate for slight non-alignment, stagger and offset of shafts.
Standard toothed ring 92 Shore A.

Version 1



Version 1a



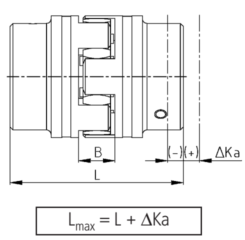
Size	Version	Max. M_d [Nm]	Dimensions [mm] A_1	E	F	B	b	D_1	D	d	C_{min} 1)	C_{max} 1)	Offset max. axial stagger Δ Ka [mm]	max. radial non-alignment n=1500 rpm Δ Kr [mm]	max. angle stagger at n=1500 rpm Δ Kw [°]	Δ Kw [mm]	Locking screw Dim. G	Dim. t	Weight [kg]
RA 14	1a	7.5	35	–	11	13	10	–	30	10	6	15	1.0	0.17	1.2	0.67	M4	5	0.05
RA 19	1	10	66	20	25	16	12	32	40	18	10	19	1.2	0.20	1.2	0.82	M5	10	0.15
RA 19	1a	10	66	–	25	16	12	–	41	18	19	24	1.2	0.20	1.2	0.82	M5	10	0.15
RA 24	1	35	78	24	30	18	14	40	55	27	14	24	1.4	0.22	0.9	0.85	M5	10	0.25
RA 24	1a	35	78	–	30	18	14	–	56	27	22	28	1.4	0.22	0.9	0.85	M5	10	0.35
RA 28	1	95	90	28	35	20	15	48	65	30	14	28	1.5	0.25	0.9	1.05	M6	15	0.40
RA 28	1a	95	90	–	35	20	15	–	67	30	28	38	1.5	0.25	0.9	1.05	M6	15	0.55
RG 38	1	190	114	37	45	24	18	66	80	38	16	38	1.8	0.28	1.0	1.35	M8	15	0.85
RG 42	1	265	126	40	50	26	20	75	95	46	28	42	2.0	0.32	1.0	1.70	M8	20	1.2
RG 48	1	310	140	45	56	28	21	85	105	51	28	48	2.1	0.36	1.1	2.00	M8	20	1.7

1) This catalogue does not list all intermediate sizes.
Further sizes on request.

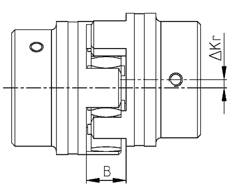
Offsets

In the case of the standard and large hubs RA 14–48, the tapped hole G for the locking screw is located opposite the groove.
Locking screws according to DIN 916 with toothed washer.

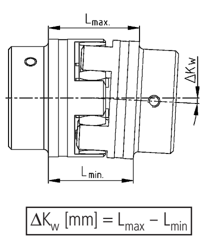
Axial offset Δ Ka [mm]



Radial offset Δ Kr [mm]

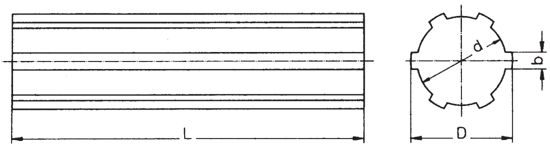


Angular offset Δ Kw [°]



Splined Shafts/Sliding Sleeve
KW Splined shafts

Material: CK 45.
Based on DIN 5463.

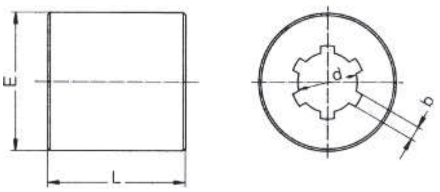


Type	Dimensions [mm]			Weight
	ø D -0.07 -0.27	ø d +0.0 -0.08	b +0.0 -0.08	[kg/m]
KW 13	16	13	3.5	1.20
KW 16	20	16	4	1.90
KW 21	25	21	5	2.10
KW 26	32	26	6	5.00
KW 42	48	42	8	12.30
KW 46	54	46	9	15.30

Straightness: 0.5 – 0.6 mm/300 mm
Straightness: 0.1 mm/300 mm on request

SR Sliding sleeve blank

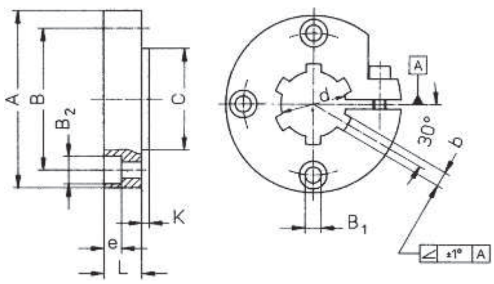
Material: 9 Smn 28 K.
Based on DIN 5463.



Type	Dimensions [mm]				Weight
	ø d G_6	b F_9	ø E	L	[kg/piece]
SR 13	13	3.5	32	26	0.15
SR 16	16	4	40	35	0.25
SR 21	21	5	45	43	0.40
SR 26	26	6	60	59	1.00
SR 42	42	8	90	71	2.60
SR 46	46	9	90	95	3.25

EK Clamping ring, ready to install

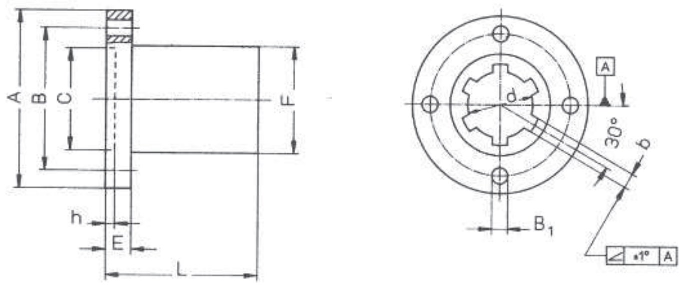
Material: C 45, surface burnished. Holes matched to ES.
Based on DIN 5463.



Type	Number of grooves	Dimensions [mm]										Weight
		ø d G_6	b F_9	ø A	ø B	ø B_1	ø B_2	e	ø C f_7	K	L	[kg/piece]
EK 16	6	16	4	52	38	5.3	10	6	26	2	14	0.20
EK 21	6	21	5	62	48	6.4	11	7	35	3	14	0.25
EK 26	6	26	6	70	56	6.4	11	7	40	3	15	0.25
EK 42	8	42	8	95	75	10.5	18	11	60	3	22	0.85
EK 46	8	46	9	99	80	10.5	18	11	65	3	24	0.95

ES Sliding sleeve, ready to install

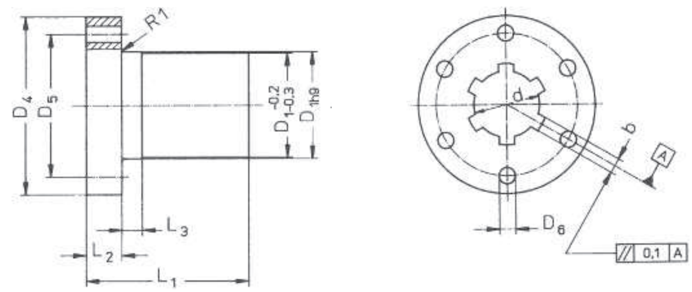
Material: C 45. Grooves not aligned to holes.
Based on DIN 5463.



Type	Number of grooves	Dimensions [mm]										Weight [kg/piece]
		ø d G_6	b F_9	ø A	ø B	ø B_1	ø C H_7	h	ø F h_7	L	E	
ES 13	6	13	3.5	43	32	4.3	20	3	24	30	8	0.10
ES 16	6	16	4	52	38	5.3	26	3	28	35	9	0.20
ES 21	6	21	5	62	48	6.4	35	3.5	34	50	10	0.30
ES 26	6	26	6	70	56	6.4	40	3.5	42	60	10	0.50
ES 42	8	42	8	95	75	10.5	60	4	60	90	16	1.30
ES 46	8	46	9	99	80	10.5	65	4	65	100	16	1.50

ESS Sliding sleeve, ready to install, in special bronze

Material: High quality bronze GBZ 12. Grooves not aligned to holes.
Based on DIN 5463.



Type	Number of grooves	Dimensions [mm]									Weight [kg/piece]
		ø d G_6	b F_9	D_1	D_4	D_5	D_6	L_1	L_2	L_3	
ESS 16	6	16	4	28	48	38	6	44	12	8	0.25
ESS 21	6	21	5	32	55	45	7	44	12	8	0.30
ESS 26	6	26	6	38	62	50	7	46	14	8	0.40
ESS 42	8	42	8	63	95	78	9	73	16	10	1.45
ESS 46	8	46	9	72	110	90	11	97	18	10	2.25

Installation and Maintenance

Ball screw drives KGT

Installation

Ball screw drives are precision machine components; their installation requires specialist knowledge and suitable measuring facilities. Alignment errors can generally not be felt when the screw drive is turned by hand, due to the low friction. Radial or eccentric forces must be taken up by external guides. Ball screw drives can absorb only axial forces. To avoid damage to the ball screw drive, limit switches and end stops must be installed in the machine.

Cover

Dirt that occurs during installation should be removed with paraffin, oil or petrol. Cold cleaners and paint solvents are not permitted. Ball screw drives must be protected against dust, chips, etc. even if equipped with wipers. Possible protective measures include:

– Bellows (suitable only for vertical installation without additional guide).
– Spiral spring cover.
– Telescopic tubes or sleeves (these take up a lot of axial space).

We also offer fully-protected complete systems:

– THOMSON NEFF KGT-KOKON® ball screw drives with self-closing cover strips.
– THOMSON NEFF WIESEL® mechanical linear drive units with integrated guide systems in encapsulated aluminium profile. Please contact us for further information.

Lubrication

Proper lubrication is important for the achievement of the calculated service life of a ball screw drive, to prevent excessive warming, and to ensure smooth, quiet running. The same lubricants are used for the ball screw drives as for roller bearings.

Oil-mist lubrication

In the case of central lubrication with oil mist, note that only ball screw nuts without wipers may be used.

Oil lubrication

The oil supply should not exceed the volume lost via the wipers; otherwise use recirculating-oil lubrication.
Oil types: Viscosity 25 to 100 mm^2/s at 100 °C.

Grease lubrication

Add grease as appropriate to the volume lost via the wipers (under normal operating conditions, it is sufficient to add grease every 200 to 300 hours). Experience shows that one-time lubrication for the service life is not sufficient because of the seepage of grease.

Grease type:

Roller bearing grease without solid lubricant content. Fuchs Lubritech URETHYN E/M1 roller bearing grease in accordance with NLGI1 DIN ISO 2137 is used for the initial grease filling in the factory. For higher loads, use a grease with NGLI2 in accordance with DIN ISO 2137. You will find detailed information on the required quantities of grease in the Internet at www.DanaherMotion.net.

Operating temperature

The permissible operating temperature range for ball screw drives is between –30 °C and +80 °C, up to +110 °C for brief periods. A precondition for this is correct lubrication. The torque may increase by a factor of up to 10 at temperatures below –20 °C.

Trapezoidal screw drives TGT

Installation

Trapezoidal screw drives must be aligned carefully during installation – if suitable measuring equipment is not available, the screw drive should be turned through its entire length by hand before the drive unit is attached. Variations in the amount of force required and/or marks on the external diameter of the screw indicate alignment errors between the spindle axis and guide. In this case, the relevant mounting bolts should first be loosened and the screw drive should be turned through by hand. If the amount of force required is now constant throughout, the appropriate components should be aligned, otherwise the alignment error should be localised by loosening further mounting bolts.

Cover

By virtue of their design, trapezoidal screw drives are less sensitive to dirt than ball screw drives, particularly at low speeds (manual operation).

Nevertheless motion drives, especially with plastic nuts, in particular require protection against dirt in the same way as ball screw drives.

Lubrication

Oil lubrication

Used only in special cases for trapezoidal screw drives.

Grease lubrication

The usual lubrication method for trapezoidal screw drives. Lubrication intervals are governed by operating conditions; it is advisable to clean the screw before greasing especially at use of heavy-duty lubricating machines.
Grease types: Roller bearing grease with no solid lubricant content.

Operating temperature

This depends on the type of nut used, the lubrication conditions and the user's requirements. Please consult us in the case of temperatures above 100 °C (plastic nuts 70 °C).

Wear

This can be checked manually: if the axial backlash with a single-start screw drive is more than $^1/_4$ of the lead, the nut should be replaced.

Ball screw drives/ball screws/KOKON®

Structure of Order Code:

Ball screw drive/ball screw

[_ _ _] – [_] – [_ _ | _ _] – [_ _ _] – [_ _] – [_ | _ _ _] – [_ _ _ _] – [_ | _ _ _] – [_ _ _] – [_ _] – [_]

1. – 2. – 3. 4. – 5. – 6. – 7. 8. – 9. – 10. 11. – 12. – 13. – 14.

1. Product
KGT = Ball screw drive complete
KGS = Ball screw
KGF = Flanged ball nut
KGM= Cylindrical ball nut

2. Nut version[1)]
D = Version in accordance with DIN 69051
N = THOMSON NEFF standard

3. Nominal thread diameter [mm]

4. Thread lead [mm]

5. Lead accuracy
50 µm/300 mm

6. Thread direction
RH = Right hand thread
LH = Left hand thread

7. Screw end 1
Standard ends D, F, H, J, L, S, T, W, Z see p. 22ff
G = Annealed end
K = Acc. to customer's drawing
X = Cut only

8. Code for end length 1
For G and K end length [mm]

9. Overall length KGS [mm]

10. Screw end 2
Standard ends form D, F, H, J, L, S, T, W, Z see p. 22ff
G = Annealed end
K = Acc. to customer's drawing
X = Cut only

11. Code for end length 2
For G and K end length [mm]

12. Nut form and configuraton[1)]
Flanged side KGF nut and contact surface KGM nut always at screw end 1
F = 1 Flanged nut
M = 1 Cylindrical nut
FM = 1 pre-loaded nut unit as per THOMSON NEFF standard (1 KGF, 1 KGM)
FMB= 1 Pre-loaded nut unit as per DIN 69051
FF = 1 Pre-loaded nut unit (2 KGF)
MM = 1 Pre-loaded nut unit (2 KGM)

13. Sealform[1)]
EE = Rubber wiper (standard)
OO = Without wiper
ZZ = 1 Wiper at each end, with location for spiral spring cover in each case

14. Special version or with accessories
0 = No
1 = Yes

[1)] Not necessary for ball screw

Example:

1 Ball screw drive complete with machined screw ends

KGT – D – 2005 – 050 – RH – K105 – 1003 – K025 – F – EE – 0

1. – 2. – 3. 4. – 5. – 6. – 7. 8. – 9. – 10. 11. – 12. – 13. – 14.

1. Product
KGT= Ball screw drive complete

2. Nut version
D = Version in accordance with DIN 69051

3. Nominal thread diameter [mm]

4. Thread lead [mm]

5. Lead accuracy
50 µm/300 mm

6. Thread direction
RH= Right hand thread

7. Screw end 1
K = Acc. to customer's drawing

8. Code for end length 1
For G and K end length [mm]

9. Overall length KGS [mm]

10. Screw end 2
K = Acc. to customer's drawing

11. Code for end length 2
For G and K end length [mm]

12. Nut form and configuration
F = 1 Flanged nut

13. Sealform
EE = Rubber wiper (standard)

14. Special version or with accessories
0 = No

Example:

1 Cylindrical ball nut

KGM – D – 2005 – RH – EE

1. – 2. – 3. 4. – 6. – 13.

1. Product
KGM = Cylindrical ball nut

2. Nut version
D = Version in accordance with DIN 69051

3. Nominal thread diameter [mm]

4. Thread lead [mm]

6. Thread direction
RH= Right hand thread

13. Sealform
EE = Rubber wiper (standard)

Structure of Order Code:

KOKON®

KOKON – 40 – [_ _] – [_] – [_ _ _] – [_ _ _ _] – [_ _ _ _] – [_] – [_] – [_] – [_]

1. – 2. – 3. – 4. – 5. – 6. – 7. – 8. – 9. – 10.

1. Product
KOKON®

2. Nominal thread diameter [mm]
40

3. Thread lead [5/10 mm]

4. Lead accuracy [µm/300 mm]

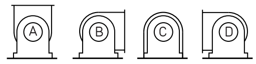
5. Stroke [mm]

6. Overall length [mm]

7. Pre-loading
0 = No backlash
1 = Pre-loaded

8. Drive shaft
0 = Without feather key groove
1 = With feather key groove

9. Installation position
K = Customer requirement
A-D= THOMSON NEFF standard versions



Installation position (view from fixed bearing)

10. Special version or with accessories
0 = No
1 = Yes

Trapezoidal screw drives/Spiral spring cover/Splined shafts

Structure of Order Code:

Trapezoidal screw drives

__ - ___ - Tr - __ - X - __ - P - __ - __ - _ - __ - ___ - _ - __ - _

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

1. Product
TGS = Trapezoidal screw
TGM = Trapezoidal nut

2. Type
Screw: RPTS
Nut: LKM, EKM, KSM, SKM, LRM, EFM

3. Nominal thread diameter [mm]

4. Thread lead [mm]

5. Thread pitch [mm]
Multi-start threads only; the distance between two successive thread turns in the axial direction = lead/number of turns

6. Thread direction
RH = Right hand thread
LH = Left hand thread

7. Screw end 1
Standard ends form D, F, H, J, L, S, T, W, Z, see p. 43ff
K = Acc. to customer's drawing
X = Cut only

8. Code for end length 1
For K end length [mm]

9. Overall length TGS [mm]

10. Screw end 2
Standard ends form D, F, H, J, L, S, T, W, Z, see p. 43ff
K = Acc. to customer's drawing
X = Cut only

11. Code for end length 2
For K end length [mm]

12. Special version or with accessories
0 = No
1 = Yes

Example:

1 Trapezoidal screw with machined screw ends

TGS - RPTS - Tr - 024 - X - 10 - P - 05 - RH - L - __ - 0900 - W - __ - 0

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

1. Product
TGS = Trapezoidal screw

2. Type
Screw: RPTS

3. Nominal thread diameter [mm]
24

4. Thread lead [mm]
10

5. Thread pitch [mm]
5

6. Thread direction
RH = Right hand thread

7. Screw end 1
Standard ends form L

9. Overall length TGS [mm]
900

10. Screw end 2
Standard ends form W

12. Special versions or with accessories
0 = No

Example:

1 Trapezoidal nut

TGM - LRM - Tr - 024 - X - 10 - P - 05 - RH

1. 2. 3. 4. 5. 6.

1. Product
TGM = Trapezoidal nut

2. Type
Nut: LRM

3. Nominal thread diameter [mm]
24

4. Thread lead [mm]
10

5. Thread pitch [mm]
5

6. Thread direction
RH = Right hand thread

Structure of Order Code:

Spiral spring cover

SF - __ - ___ - ___ - _

1. 2. 3. 4. 5.

1. Product
SF = Spiral spring cover

2. Smallest diameter D8 [mm]

3. Overall length [mm]

4. Smallest length L8 [mm]

5. Installation position
V = Vertical
H = Horizontal

Structure of Order Code:

Splined shafts

KW - 42 - ___

1. 2. 3.

1. Product
KW = Splined shafts

2. Size

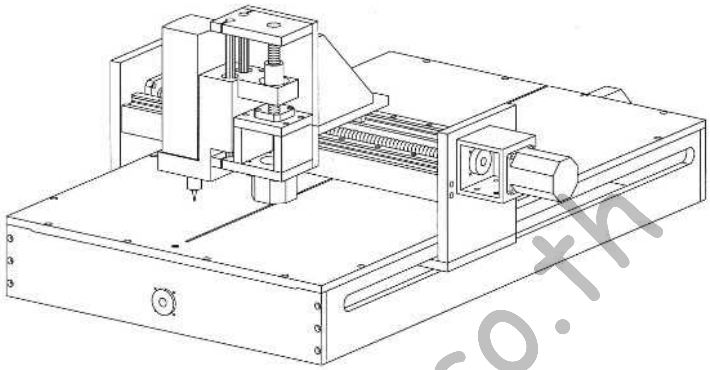
3. Length [mm]

Premium Lead Screws

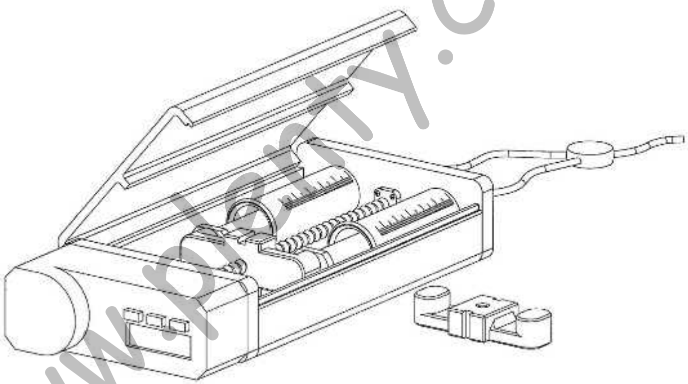
- ActiveCAM Technology
- Premium Plastic Nuts
- High Precision

Lead Screw Applications

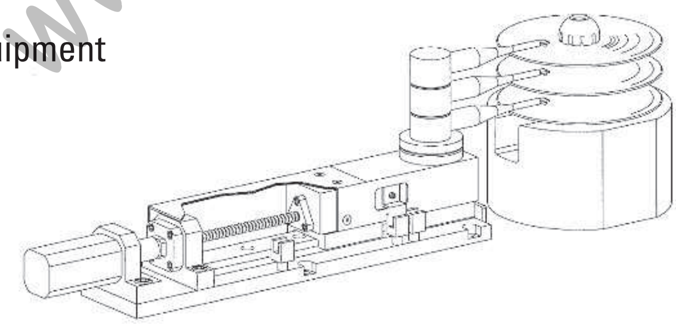
Engraving Equipment



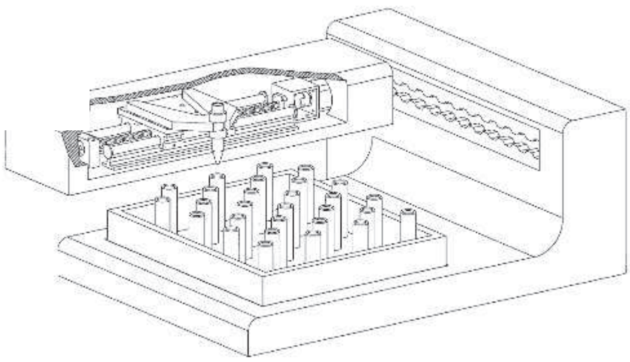
Medical Equipment



Semiconductor
Manufacturing Equipment



Laboratory Equipment



Offering smooth, precise, cost effective positioning, lead screws are the ideal solution for your application.

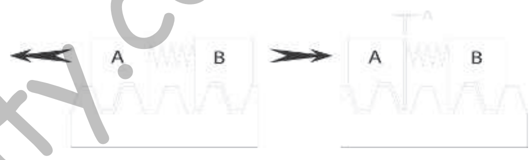
Thomson Neff precision lead screws from Danaher Motion are an excellent economical solution for your linear motion requirements. For more than 25 years, Danaher Motion has designed and manufactured the highest quality lead screw assemblies in the industry. Our precision rolling process ensures accurate positioning to ,075mm/300mm and our PTFE coating process produces assemblies that have less drag torque and last longer.

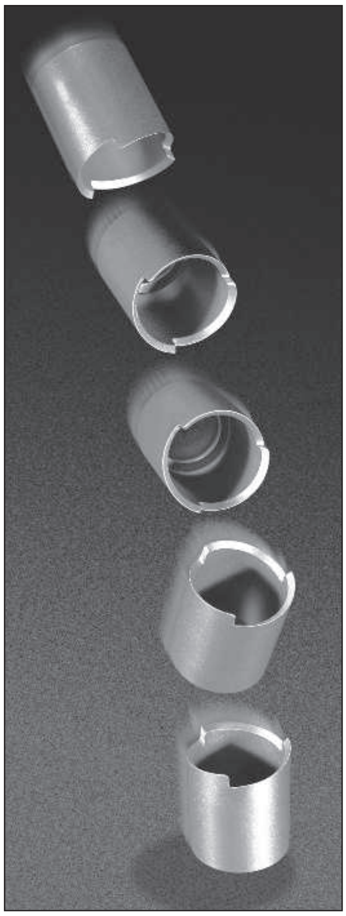
Danaher Motion provides a large array of standard plastic nut assemblies in anti-backlash or standard Supernut® designs. All of our standard plastic nut assemblies use an internally lubricated Acetal providing excellent lubricity and wear resistance with or without additional lubrication. With the introduction of our new unique patented zero backlash designs, Danaher Motion provides assemblies with high axial stiffness, zero backlash and the absolute minimum drag torque to reduce motor requirements. These designs produce products that cost less, perform better and last longer. Both designs automatically adjust for wear ensuring zero backlash for the life of the nut.

Danaher Motion also provides engineering design services to aid in your design requirements producing a lead screw assembly to your specifications. Call Danaher Motion today to discuss your application with one of our experienced application engineers.

Deliver Performance

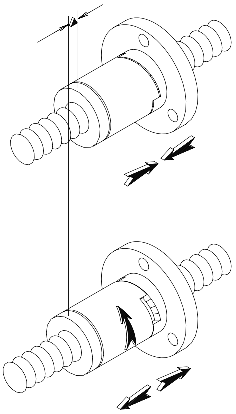
Clearance reduction plays a decisive role in guaranteeing precise positioning. Several types of preload versions are available on the market, all of which use an expandable preload. As these mechanisms are not particularly rigid, a high preload is required for the position to be maintained. This results in high drag torque, shorter life and poor performance. System costs increase as a larger motor is required.





The Solutions is THOMSON NEFF

With the introduction of the Patented XC series nut with **ActiveCAM**, the highest axial stiffness with the absolute minimum drag torque is achieved. Utilising an extremely rigid stainless steel cam for biasing, axial stiffness is unsurpassed.
Axial play is removed without the need for high preload, resulting in the lowest drag torque possible.



Self-Compensating

As wear occurs over time, the unique ActiveCAM mechanism automatically compensates without compromising stiffness, positional accuracy or affecting drag torque at any time.

US Patent #5839321 and one or more foreign counterparts.

Precision Lead Screws & Supernuts*

Features / Advantages

Low Cost
Considerable savings when compared to ball screw assemblies.

Variety
Large range of leads and diameters to match your requirements.

Lubrication

Internally lubricated plastic nuts will operate without additional lubrication. However, TriGEL grease or dry film lubricant is recommended and will extend product life. See pages 13 and 14.

Vibration and Noise
No ball recirculation vibration and often less audible noise compared to ball screws.

Custom Capability
Option of custom components to fit into your design envelope.

Non-Corrosive*
Stainless Steel and internally lubricated acetal.

Environment
Less susceptible to particulate contamination compared to ball screws.

Lightweight
Less mass to move.

Design Considerations

Supernuts
provide a cost effective solution for moderate to light loads. For vertical applications, anti-backlash supernuts should be mounted with thread/flange on the bottom.

Cantilevered Loads
Cantilevered loads that might cause a moment on the nut will cause premature failure.

Critical Speed
Refer to critical speed chart on page 66.

Column Loading
Refer to column loading chart on page 67.

Self-Locking
Lead screws can be self locking at low leads. Generally, the lead of the screw should be more than 1/3 of the diameter to satisfactorily backdrive.

Temperature
Ambient and friction generated heat are the primary causes of premature plastic nut failure. Observe the temperature limits below and discuss your design with our application engineers for continuous duty, high load and high speed applications. Danaher Motion recommends bronze nuts for very high temperature environments or can aid in your selection of high temperature plastic for a custom assembly.

Efficiency
Except at very high leads, efficiency increases as lead increases. Although the internally lubricated acetal provides excellent lubricity, Ball Screw Assemblies remain significantly more efficient than most Lead Screw designs. See page 72 for actual efficiencies.

Length Limitations

Screw Diameter	Max Length
10 mm	1200 mm
12 - 16 mm	1800 mm
>16 mm	3600 mm

Lead Accuracy

Standard Grade (SRA)	250 µm/300 mm
Precision Grade (SPR)	75 µm/300 mm

Assembly		Screws	Nuts**			
Maximum Temperature	Friction Coefficient	Material	Material	Tensil Strength	Water Absorption (24 HRS %)	Thermal Expansion Coefficient
82 °C	0,08 - 0,14	Stainless Steel*	Acetal with PTFE	55 MPa	0,15	$9{,}7 \times 10^{-5}$ m/m/C

* 1.4301 (AISI 304) & 1.4305 (AISI 303) ** Other materials available on a custom basis.

Useful Formulas for Lead Screw Assemblies

TORQUE, ROTARY TO LINEAR

Driving the screw to translate the nut, or driving the nut to translate the screw.

$$\text{Torque (N-mm)} = \frac{\text{Load (N)} \times \text{Lead (mm)}}{2\pi \times \text{efficiency}}$$

EFFICIENCY

$$\%\ \text{Efficiency} = \frac{\tan(\text{helix angle})}{\tan(\text{helix angle} + \arctan f)} \times 100$$

f = coefficient of friction

TORQUE, LINEAR TO ROTARY

Loading the nut to rotate the screw.

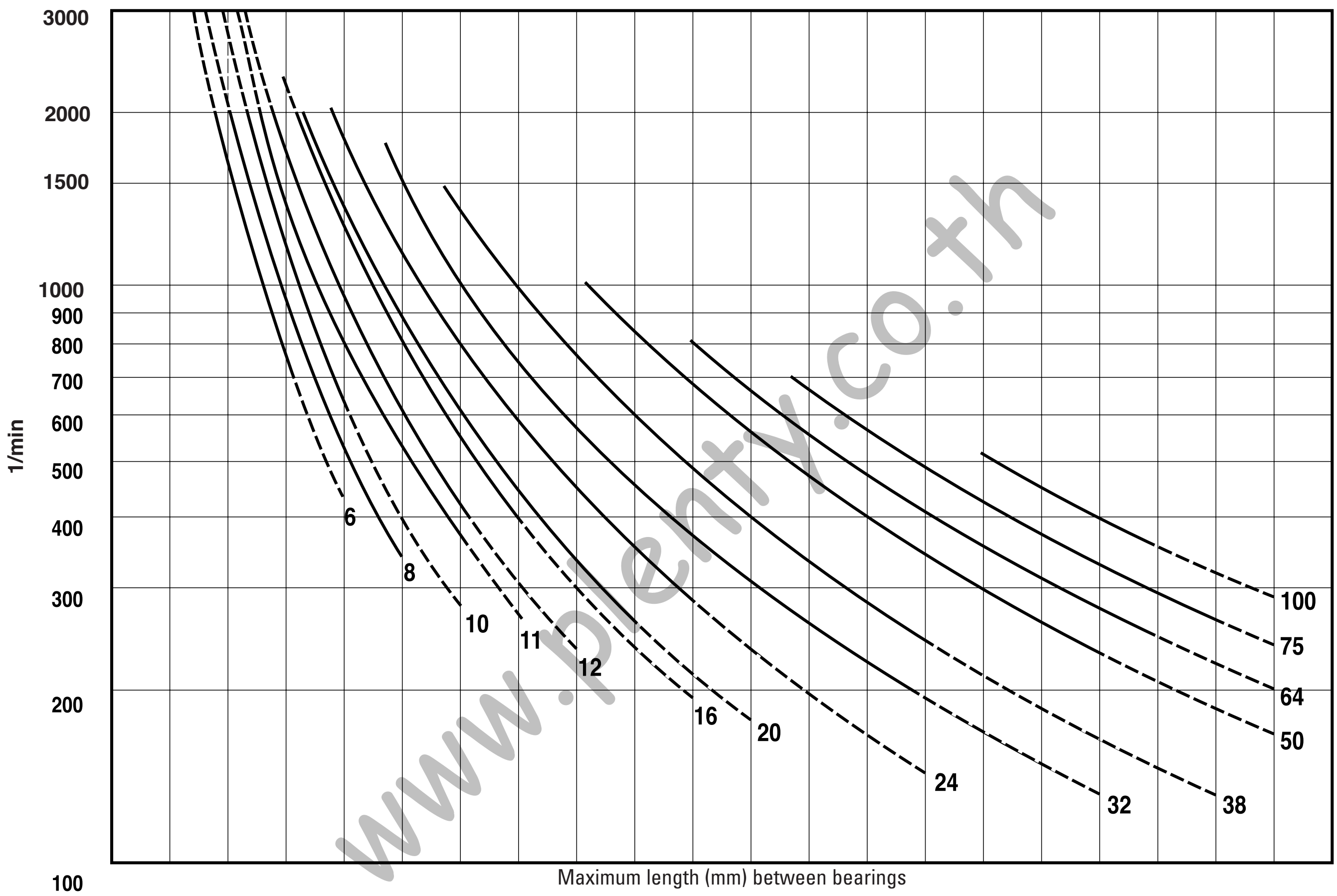
$$\text{Torque} = \frac{\text{Load} \times \text{Lead} \times \text{Efficiency}}{2\pi}$$

As a rule, assemblies that have an efficiency of 50% or more will backdrive. See page 12 for efficiencies. Efficiencies listed in catalogue computed at 0,1 friction coefficient.

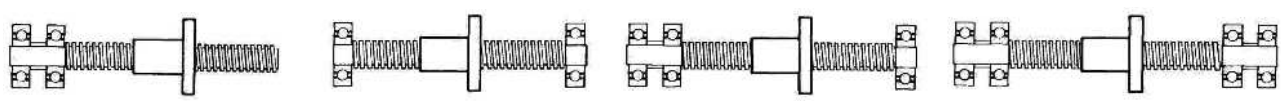
Critical Speed Limits Chart

Every screw shaft has a rotational speed limit. That is the point at which the rotational speed sets up excessive vibration. This critical point is modified by the type of end bearing support used.
To use this chart, determine the required RPM and the maximum length between bearing supports. Next, select one of the four types of end support shown below. The critical speed limit can be found by locating the point at which the RPM (horizontal lines) intersects with the unsupported screw length (vertical lines) as modified by the type of supports select below. We recommend operating at no more than 80% of the critical speed limit.

Warning: Curves for the screw diameters shown are based on the smallest root (minor) diameter of the standard screws within the nominal size range and truncated at the maximum ball nut rotational speed. DO NOT EXCEED this RPM regardless of screw length.



Fixed Free	150	300	460	610	760	910	1070	1220	1370	1520	1680	1830	1980	2130	2290	2440	2590	2740	3050	3200
Simple Simple	250	510	760	1020	1270	1520	1780	2030	2290	2540	2790	3050	3300	3560	3810	4060	4320	4570	4830	5080
Fixed Simple	300	610	910	1220	1550	1850	2160	2460	2770	3070	3380	3910	4010	4320	4620	4930	5230	5540	5840	6150
Fixed Fixed	380	760	1140	1520	1910	2290	2670	3020	3400	3780	4170	4550	4930	5310	5690	6070	6450	6830	7210	7570

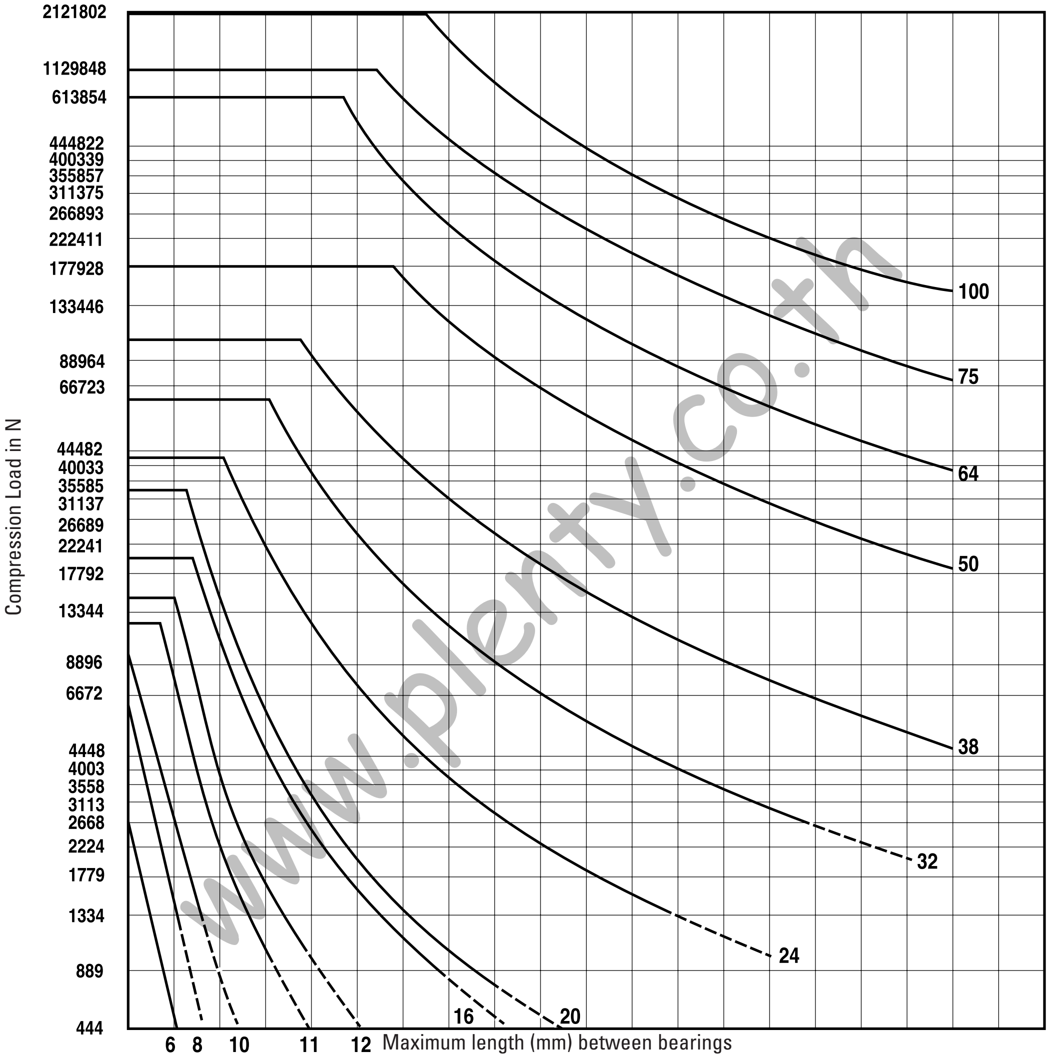


Fixed Free **Simple Simple** **Fixed Simple** **Fixed Fixed**

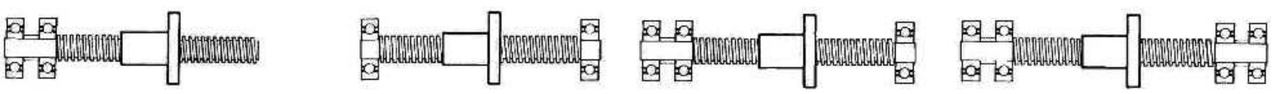
Column Loading Capacities Chart

Use the chart below to determine the Maximum Compression Load for Screw Shaft. Usually, screws operated in tension can handle loads up to the rated capacity of the nut, providing the screw length is within standard lengths. End supports have an effect on the load capacity of screws. The four standard variations are shown below with corresponding rating adjustments. Find the point of intersecting lines of load (horizontal) and length (vertical) to determine the minimum safe diameter of screw. If loads fall into dotted lines, consult factory.

Warning: DO NOT EXCEED nut capacity. Curves for the screw diameters shown are based on the smallest root (minor) diameter of the standard screws within the nominal size range.



Fixed Free	130	250	380	510	640	760	890	1020	1140	1270	1400	1520	1650	1780	1910	2030	2160	2290	2410
Simple Simple	250	510	760	1020	1270	1520	1780	2030	2290	2540	2790	3050	3300	3560	3810	4060	4320	4570	4830
Fixed Simple	360	710	1070	1450	1800	2160	2510	2870	3230	3580	3960	4320	4670	5030	5380	5740	6100	6480	6860
Fixed Fixed	510	1020	1520	2030	2540	3050	3560	4060	4570	5080	5590	6100	6600	7110	7620	8130	8640	9140	9650



Fixed Free **Simple Simple** **Fixed Simple** **Fixed Fixed**

Compression (Column) Load **Tension (Pulling) Load**

Lead Screw Product Summary

Series	Thomson Neff Precision Lead Screw
Lead accuracy	Standard - 250 µm / 300 mm Precision - 75 µm / 300 mm
Diameter	10 to 24 mm
Lead	2 to 45 mm
Backlash	,02 to ,25 mm (standard nut) Zero backlash available
Dynamic Load	Up to 1550 N
Max. Static Load	Up to 6675 N
Catalogue Pages	70 to 72

Lead Screw Product Availability

Metric

Lead (mm)

Dia. (mm)	2	3	4	5	6	8	10	12	15	16	20	25	35	45
10	● ○	●		●	●		●				●		●	
12		●	●	●	●		●		●			●		●
16			● ○	●		●				●		●	●	
20			● ○			●		●		●	●			●
24				● ○										

● = stocked size with right-hand thread ○ = stocked size with left-hand thread

Inch

Also available are our inch series lead screws.
Consult our website for further details at **www.danahermotion.com**

Lead (in)

Dia. (in)	0,050	0,063	0,083	0,100	0,125	0,167	0,200	0,250	0,375	0,500	0,800	1,000	1,200	2,000
3/8		● ○	● ○	● ○	● ○	●	●	● ○	● ○	● ○		●	●	
7/16					●			●		●				
1/2		●		● ○			●	●		●	●	●		
5/8				● ○	● ○		●	●		●				
3/4				● ○	● ○	● ○	● ○			●		●		● ○
1				● ○	● ○		● ○	● ○		●		●		

Note: Miniature sizes also offered. Consult our website for further details at **www.danahermotion.com**.
Custom diameters and leads per request.

Ordering Information

Danaher Motion engineers its lead screw thread to provide optimum performance. To ensure proper function, it is recommended that our nuts and screws be used only with mating Thomson Neff products manufactured by Danaher Motion. This is particularly important on our proprietary thread forms. If interchangeability is required, select a screw size from page 72 that conforms to the DIN standard.

It is recommended that you use a lubricant when operating a lead screw with a plastic nut. This will extend the life of the unit and increase the allowable operating load. (Note: load ratings in catalogue are calculated using a grease type lubricant.) See page 73 & 74 for lubrication options.

Nut Part Number (See pages 70 and 71)

Nut model number prefix (Letters only - 2 or 3 characters))			**Screw size from table on page 72.** (Do not include accuracy prefix)
Example			
X	C	B	10x2M

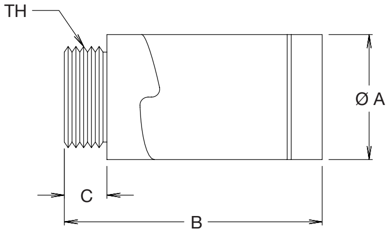
Note: Make sure the nut you have selected is offered for use with the screw diameter you select. See the "Screw Series" column on pages 70 and 71 to verify.

Screw Part Number (See page 72)

Accuracy Prefix (3 letter code for precision or standard accuracy)			**Screw Size** (specifies diameter and lead)	**Screw Length** (Please include units - mm preferred)
Example				
S	P	T	10x2M	150 mm

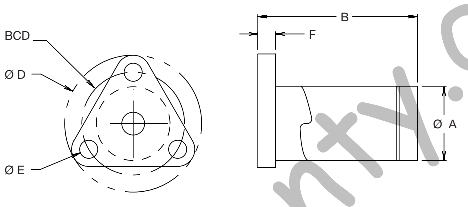
Note that if the screw and nut have the same screw size suffix as shown in the examples above, the two components are properly specified to operate together.

XC Series - The Performance Leader

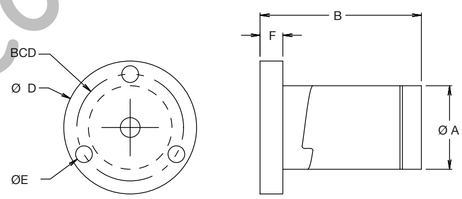


Threaded Nut Type

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions				Design Load (N)	Drag Torque	
			A (mm)	B (mm) max	C (mm)	TH (mm)		Minimum (N-mm)	Maximum (N-mm)
CB3700	10	5/16, 3/8	20,8	47,6	6,4	M16 x 1,5	100	7	21
CB5000	12	7/16, 1/2	28,4	57,2	9,5	M25 x 1,5	550	7	21
CB6200	16	5/8	35,6	66,0	12,7	M30 x 1,5	775	14	42
CB7500	20	3/4	41,4	73,7	12,7	M35 x 1,5	1100	21	71
CB10000	24	1	47,8	76,2	15,2	M40 x 1,5	1550	35	71



Nur XCF3700

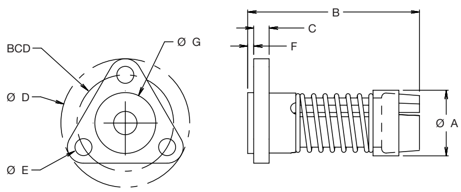


XCF5000, XCF6200

Flange Nut Type

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions						Design Load (N)	Drag Torque	
			A (mm)	B (mm) max	D (mm)	E (mm)	F (mm)	BCD (mm)		Min. (N-mm)	Max. (N-mm)
CF3700	10	5/16, 3/8	20,8	47,6	38,1	5,1	5,1	28,6	100	7	21
CF5000	12	7/16, 1/2	28,4	57,2	44,5	5,6	7,6	35,5	550	7	21
CF6200	16	5/8	35,6	66,0	54,1	5,6	12,7	42,9	775	14	42

AFT3700 - The OEM Solution

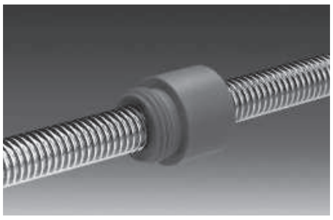


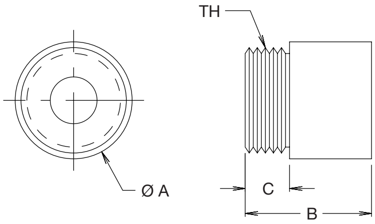
Flange Nut Type

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions								Design Load (N)	Drag Torque	
			A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	BCD (mm)		Min. (N-mm)	Max. (N-mm)
AFT3700	10	3/8, 7/16	19,6	50,8	5,1	38,1	5,1	1,5	18,0	28,6	45	14	35

See page 69 for ordering instructions

SB Series - Compact Thread Mount Style

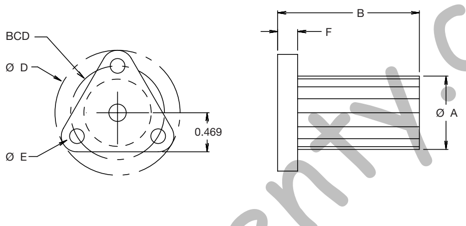




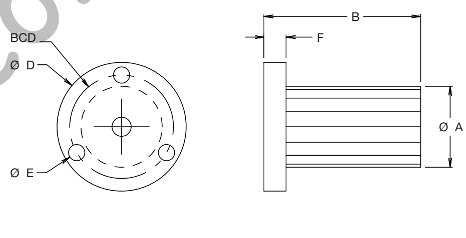
Threaded Nut Type

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions				Design Load (N)	Max.Static Load (N)	Drag Torque
			A (mm)	B (mm)	C (mm)	TH (mm)			
SB3700	10	5/16, 3/8	19,1	19,1	6,4	M16 x 1,5	310	1550	No Preload
SB5000	12, 16	7/16, 1/2	25,4	25,4	9,5	M22 x 1,5	445	2225	
SB1000	20, 24	3/4, 1	38,1	38,1	12,7	M35 x 1,5	1335	6675	

MTS Series - Easy Mount Flange Style



MTS3700 solo



MTS5000, MTS6200, MTS7500

Flange Nut Type

Model #	Screw Series (mm)	Also Use w/Series (inch)	Dimensions						Design Load (N)	Drag Torque
			A (mm)	B (mm)	D (mm)	E (mm)	F (mm)	BCD (mm)		
MTS3700	10	3/8, 7/16	18,0	38,1	38,1	5,1	5,1	28,6	325	No Preload
MTS5000	12	1/2	19,1	38,1	38,1	5,1	6,4	28,6	550	
MTS6200	16	5/8	22,4	41,4	38,1	5,1	7,6	30,2	775	
MTS7500	20	3/4	28,6	44,5	50,8	5,1	7,6	36,5	1200	

See page 69 for ordering instructions

Note: Design load is the recommended maximum operating load with lubrication at room temperature, 50% duty cycle, and 500 RPM. Increasing the RPM will decrease the maximum allowable operating load. At 1,000 RPM, the operating load is approximately 1/2 of the rated design load.

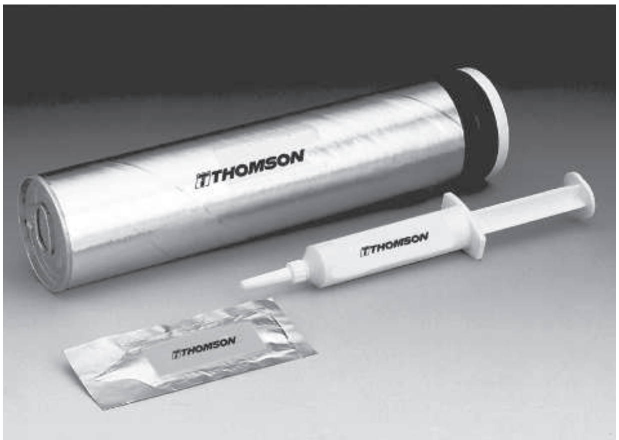
Precision Metric Screws

Precision rolled lead screws offer a burnished finish for maximum efficiency and lowest wear. All screws are stainless steel to provide corrosion resistance and a bright finish. SPT and SRT screws conform to DIN 103 while SPR and SRA screws have optimised thread forms for maximum performance.

Shaft Diameter (mm)	Lead (mm)	Part Number			Root Diameter (mm)	Efficiency @ .1 Friction Coefficient (%)
		Precision Accuracy Prefix	Standard Accuracy Prefix	Size		
10	2*	SPT	SRT	10 x 2M	7,4	42
	3^	SPT	SRT	10 x 3M	6,4	53
	5	SPR	SRA	2-10 x 2,5M	7,1	64
	6	SPR	SRA	4-10 x 1,5M	8,2	66
	10	SPR	SRA	5-10 x 2M	7,5	76
	20	-	SRA	6-10 x 3,3M	8,4	81
	35	-	SRA	10-10 x 3,5M	7,4	81
12	3*	SPT	SRT	12 x 3M	8,0	48
	4	SPR	SRA	2-12 x 2M	9,2	54
	5^	SPT	SRT	2-12 x 2,5M	8,9	59
	6	SPR	SRA	3-12 x 2M	9,1	63
	10^	SPT	SRT	4-12 x 2,5M	8,9	73
	15	SPR	SRA	6-12 x 2,5M	8,7	78
	25	-	SRA	10-12 x 2,5M	9,2	82
	45	-	SRA	15-12 x 3M	9,6	81
16	4*	SPT	SRT	16 x 4M	11,3	48
	5	SPR	SRA	2-16 x 2,5M	12,2	52
	8	SPR	SRA	4-16 x 2M	13,0	63
	16	SPR	SRA	7-16 x 2,3M	12,6	75
	25	-	SRA	5-16 x 5M	11,5	80
	35	-	SRA	7-16 x 5M	12,2	82
20	4*	SPT	SRT	20 x 4M	15,3	42
	8	SPR	SRA	2-20 x 4M	14,8	59
	12	SPR	SRA	3-20 x 4M	15,0	67
	16	SPR	SRA	4-20 x 4M	15,0	72
	20	-	SRA	5-20 x 4M	15,0	76
	45	-	SRA	9-20 x 5M	15,8	82
24	5*	SPT	SRT	24 x 5M	18,5	42

*Conforms to DIN 103 parts 1 & 2. Tolerance grade 7e.
^Conforms to DIN 103 part 1, not defined in parts 2 & 3
See page 65 for maximum available screw lengths
See page 69 for ordering instructions

Lubrication



Overview
We offer a full complement of lubricants including our low vapour pressure greases for clean room and vacuum application. The TriGel line is specifically formulated to offer a lubrication solution for a wide range of linear motion applications. Choose the appropriate gel for your requirements and get the utmost performance out of your Danaher Motion products.

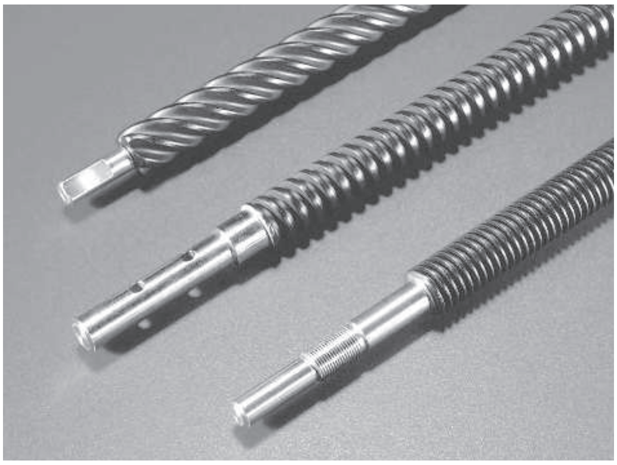
Lubrication Selection Chart for Ball & Lead Screw Assemblies

Thomson Neff	TriGel-300S	TriGel-450R	TriGel-600SM	TriGel-1200SC	TriGel-1800RC
Application	Lead Screws, Supernuts, Plastic Nuts	Ball Screws, Linear Bearings	Bronze Nuts	Lead Screws, Plastic Nuts, Clean Room, High Vacuum	Ball Screws, Linear Bearings, Bronze Nuts, Clean Room, Vacuum
Maximum Temperature	200 °C (392 °F)	125 °C (257 °F)	125 °C (257 °F)	250 °C (482 °F)	125 °C (257 °F)
Mechanism	Plastic on Plastic or Metal	Metal on Metal	Metal on Metal Bronze on Steel	Plastic on Metal Combination	Metal on Metal
Mechanical Load	Light	Moderate	Moderate to Heavy	Light to Moderate	Moderate
Very Low Torque Variation over Temperature	Yes	—	—	Yes	—
Very Low Starting Torque	Yes	Yes	—	Yes	Yes
Compatibility with Reactive Chemicals	Not recommended w/o OEM testing	Not recommended w/o OEM testing	Not recommended w/o OEM testing	Usually OK	Not recommended w/o OEM testing
Compatibility with Plastics and Elastomers	May cause silicon rubber seals to swell	May cause EPDM seals to swell	May cause EPDM seals to swell	Usually OK	May cause EPDM seals to swell
Clean Room Use	Not recommended	Not recommended	Not recommended	Usually OK	Usually OK
High Vacuum Use	Not recommended	Not recommended	Not recommended	Usually OK	Usually OK
Vapor Pressure (25°C)	Varies with lot	Varies with lot	Varies with lot	1 x 10^{-6} Pa	0,5 x 10^{-6} Pa
Packaging 10-cc-Syringe 0,45-kg-Tube	**TriGel-300S** **TriGel-300S-1**	7832867/**TriGel-450R** 7832868/**TriGel-450R-1**	0,1-kg-Tube/**TriGel-600SM**	**TriGel-1200SC** n.z.	7832869/**TriGel-1800RC**

* Maximum temperature for continuous exposure. Higher surge temperatures may be permissible but should be validated in the actual end use by the OEM. Low temperature limits are -15°C or lower. Consult Danaher Motion for specifics.

PTFE Dry Film Lubricant

Formulated for plastic on metal lead screw applications



PTFE coating is a dry film which creates a lubrication barrier between a metal substrate and a polymer bushing or lead nut. It can in some cases eliminate the need for an additional gel type lubricant which must be re-applied. It is well suited for use with our SuperNut line of plastic nuts and stainless steel lead screws. Lubrication maintenance intervals can be eliminated and the coating does not attract particulate like a gel lubricant.
Gel lubricants can provide lower friction coefficients than dry film lubricants but must be maintained to prevent performance degradation. PTFE coating provides an attractive and clean* alternative to gels and oils.

Typical Properties

Type:	Bonded Solid Film Lubricant
Purpose:	Increased Lubricity, Decreased Friction & Wear
Appearance:	Black Coating
Thickness:	Approx. 13 – 25 micron
Active Lubricant:	Polytetrafluroethylene
Friction Coefficient:	0,06 to 0,12
Temperature Operating Range:	-250° to 290° C
Resistance to Acids:	Excellent
Resistance to Bases:	Very Good
Resistance to Solvents:	Excellent

*Some particulate will be generated as a result of wear between nut and screw.
Screw may begin to show signs of “polishing” over time. This does not necessarily indicate failure.

Contact Details

Company:

Address:

Contact: Contact:

Tel: Tel:

Fax: Fax:

E-mail: E-mail:

Ball Screw Parameters

Diameter: mm Lead: mm Lead Direction: Right Hand Left Hand

Accuracy: /300mm Nut Condition: Backlash Preload

Travel Length: mm Track Length: mm Overall Length: mm

Application:

Environment

Lubrication: Oil Grease

Quantity: pcs per year Quantity: pcs per consignment

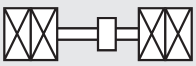
Ball Screw Mounting

Driven Element: Shaft Nut Mounting Plane: Horizontal Vertical Diagonal

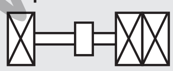
Maximum Speed: rpm Maximum Load: kN

Mounting Configuration:

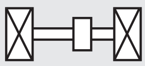
Fixed-Fixed



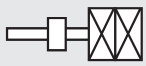
Simple-Fixed



Simple-Simple



Free-Fixed



Load/Life Data

Utilisation: %

Required Life: $x10^6$revs

Required Life: hrs

Minimum Dynamic Load: kN

	Load (N)	Speed (N)	Period (N)
F_1			
F_2			
F_3			

Assembly Options

- Cut to length shafts with nuts fitted
- Cut to length shafts with nuts supplied separately
- Shafts with annealed ends with nuts fitted
- Shafts with annealed ends with nuts supplied separately
- Fully machined shafts with nuts fitted
- Fully machined shafts with nuts and support bearings fitted

France
Danaher Motion
C.P 80018
12, Rue Antoine Becquerel – Z.I. Sud
72026 Le Mans Cedex 2
Phone : +33 (0) 243 50 03 30
Fax : +33 (0) 243 50 03 39
E-mail : sales.france@danahermotion.com

Germany
Neff Antriebstechnik Automation GmbH
Nürtinger Straße 70
72649 Wolfschlugen
Phone : +49 (0) 7022 504 0
Fax : +49 (0) 7022 504 400
E-mail : sales.wolfschlugen@danahermotion.com

Italy
Danaher Motion srl
Largo Brughetti
20030 Bovisio Masciago
Phone : +39 0362 594260
Fax : +39 0362 594263
E-mail : info@danahermotion.it

Spain
Danaher Motion
Rbla Badal, 29-31 7th, 1st
08014 Barcelona
Phone : +34 (0) 9329 80278
Fax : + 34 (0) 9329 80278
E-Mail : josep.estaran@danahermotion.com

Sweden
Danaher Motion
Estridsväg 10
29109 Kristianstad
Phone : +46 (0) 44-24 67 00
Fax : +46 (0) 44-24 40 85
E-mail : sales.scandinavia@danahermotion.com

United Kingdom
Danaher Motion
Chartmoor Road, Chartwell Business Park
Leighton Buzzard, Bedfordshire
LU7 4WG
Phone : +44 (0)1525 243 243
Fax : +44 (0)1525 243 244
E-mail : sales.uk@danahermotion.com

China
Danaher Motion
Rm 2205, Scitech Tower
22 Jianguomen Wai Street
Beijing 100004
Phone : +86 10 6515 0260
Fax : +86 10 6515 0263
E-mail : sales.china@danahermotion.com

India
Danaher Motion
Unit No 2, SDF 1 SeepzAnderi
Mumbai 400 096
Phone : +91 22 2829 4058
Fax : +91 22 2839 4036
E-mail : girish.mahajani@danahermotion.com

Japan
Danaher Motion Japan
2F, Tokyu Reit Hatchobori Bldg,
2-7-1 Hatchobori Chuo-ku,
Tokyo 104-0032
Phone : +81 3 6222 1051
Fax : +81 3 6222 1055
E-mail : info@danahermotion.co.jp

USA, Canada and Mexico
Danaher Motion
203A West Rock Road
Radford, VA 24141
Phone : +1 540 633 3400
Fax : +1 540 639 4162
E-mail : DMAC@danahermotion.com

EU200811-01 15Nov08 GB
Information & specifications subject to change at any time. Printed in Germany.