

Screw Drives

GT, *MICRON Line*[®], KOKON[®]



Linear to success.

Movement starts in the head and then has to be consistently turned into innovative product solutions of a high technical standard. As a first-class supplier of components for electrically powered linear technology, NEFF offers carefully designed standard products that can be flexibly modified to suit individual customer requirements. In-house development and research,

design and production combined with total quality management guarantee that our versatile product range and complete accessory programme meet the highest possible standards. Our international sales division with the NEFF Business Service is always ready to help – consulting advice, help with product selection and carrying out repairs – worldwide.



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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.



NEFF Screw Drives

A good turn for your drive application

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, NEFF guarantees a maximum of quality and reliability.

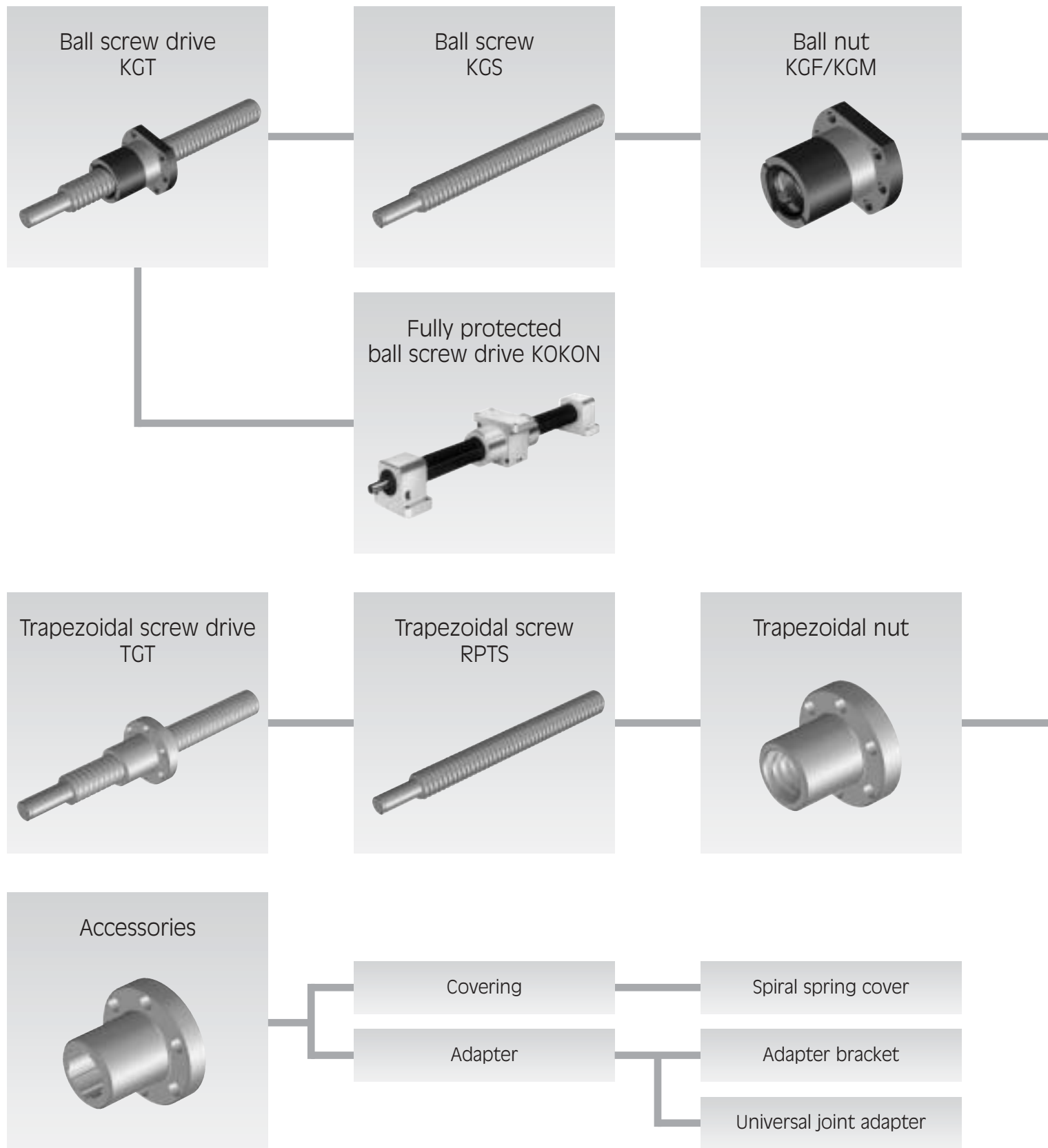
We offer you the solution

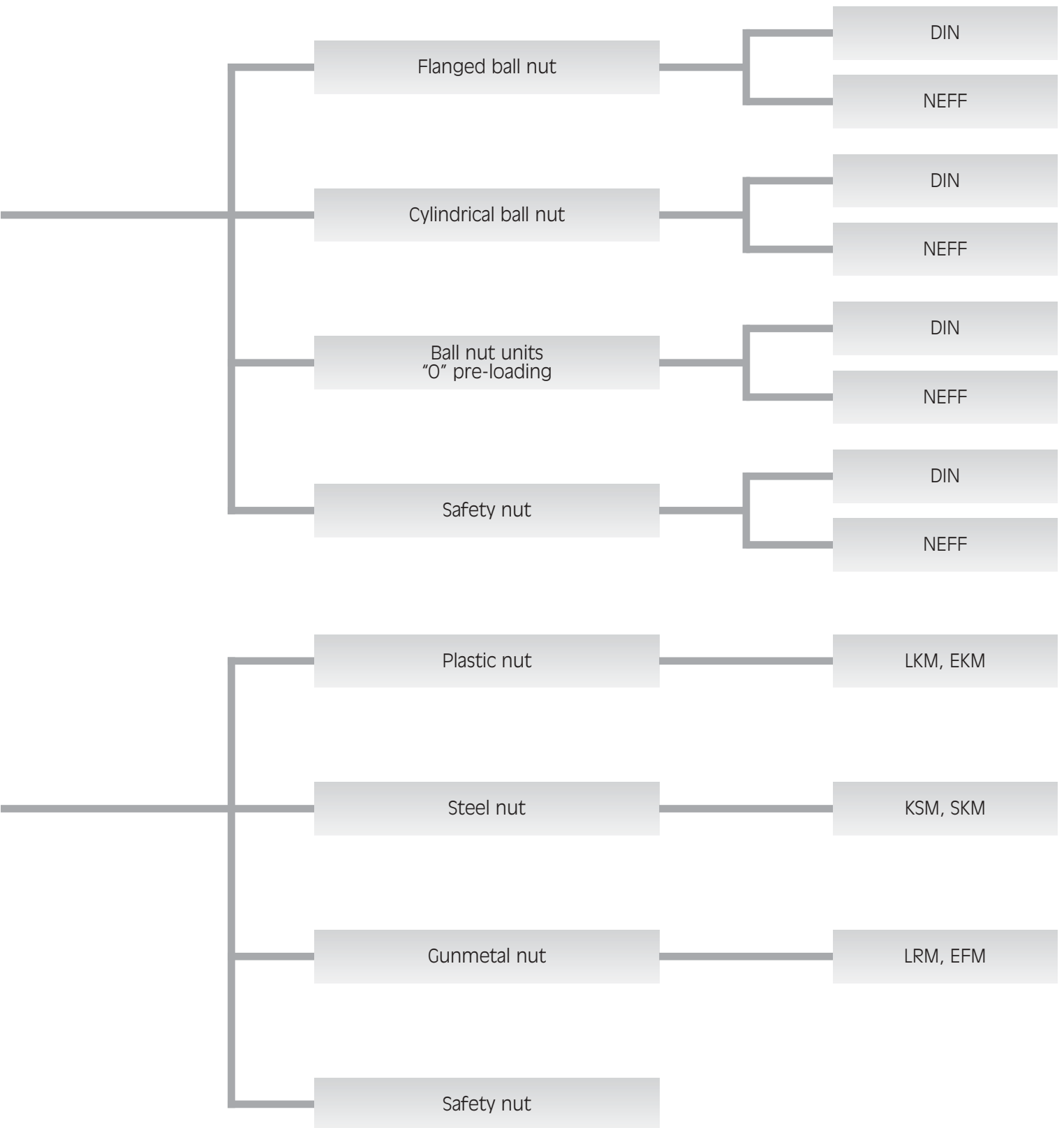
The versatile programme of NEFF screw drives offers the screws and the matching nuts at an attractive price-performance ratio. The customer-specific machining of the ends reduces your manufacturing costs.

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 NEFF screw drives







Ball screw drives KGT

Precision is our drive

The programme conforms to the NEFF-standard and to DIN 69051. 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.



Ball screw drives KGT

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. 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.

Duty cycle

The ball screw drive permits a duty cycle of up to 100%. Extremely high charges 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° up to 80° C. Temperatures of up to 110° C are also permitted for brief periods. Ball screw drives are only in exceptional 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

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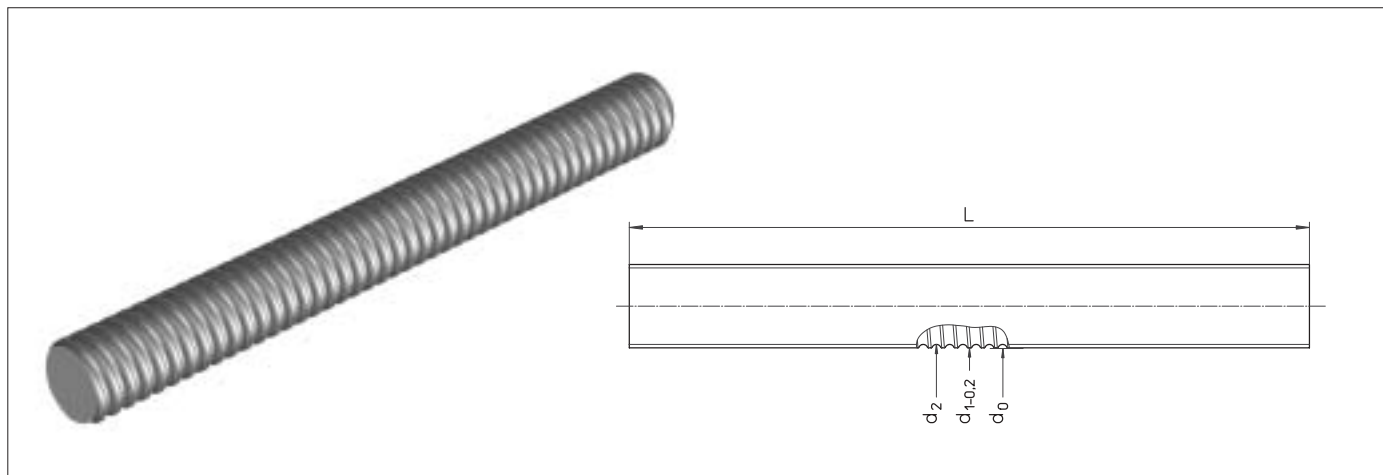
Technical Data

- Thread _____ Gothic profile (pointed profile)
- Diameter _____ Standard: 12 – 63 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, soft-annealed screw end and core
- 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 screw drive KGS

Ball screw drives

Summary of ball screws KGS



Type Diameter [mm] Lead [mm] Right hand thread	Accuracy class [μm/300mm]	Dimensions [mm]				Weight m' _{KGS} [kg/m]	Planar moment of inertia I _y [10 ⁴ mm ⁴]	Moment of resistance ²⁾ [10 ³ mm ³]	Mass moment of inertia [kg m ² /m]
		d ₀	d ₁	d ₂	L _{max.} ¹⁾				
KGS-1205	50	12	11,5	10,1	1300	0,75	0,051	0,101	1,13 · 10 ⁻⁵
KGS-1605	50	16	15,5	12,9	5600	1,26	0,136	0,211	3,21 · 10 ⁻⁵
KGS-1610	50	16	15,4	13,0	5600	1,26	0,140	0,216	3,21 · 10 ⁻⁵
KGS-2005	50	20	19,5	16,9	5600	2,04	0,400	0,474	8,46 · 10 ⁻⁵
KGS-2020	50	20	19,5	16,9	5600	2,04	0,400	0,474	8,46 · 10 ⁻⁵
KGS-2050	50	20	19,1	16,5	5600	2,04	0,364	0,441	8,46 · 10 ⁻⁵
KGS-2505	50	25	24,5	21,9	5600	3,33	1,129	1,031	2,25 · 10 ⁻⁴
KGS-2510	50	25	24,5	21,9	5600	3,33	1,129	1,031	2,25 · 10 ⁻⁴
KGS-2520	50	25	24,6	22,0	5600	3,33	1,150	1,045	2,25 · 10 ⁻⁴
KGS-2525	50	25	24,5	22,0	5600	3,33	1,150	1,045	2,25 · 10 ⁻⁴
KGS-2550	50	25	24,1	21,5	5600	3,33	1,049	0,976	2,25 · 10 ⁻⁴
KGS-3205	50	32	31,5	28,9	5600	5,63	3,424	2,370	6,43 · 10 ⁻⁴
KGS-3210	50	32	32,7	27,3	5600	5,63	2,727	1,998	6,43 · 10 ⁻⁴
KGS-3220	50	32	31,7	27,9	5600	5,63	2,974	2,132	6,43 · 10 ⁻⁴
KGS-3240	50	32	30,9	28,3	5600	5,63	3,149	2,225	6,43 · 10 ⁻⁴
KGS-4005	50	40	39,5	36,9	5600	9,01	9,101	4,933	1,65 · 10 ⁻³
KGS-4010	50	40	39,5	34,1	5600	8,35	6,737	3,893	1,41 · 10 ⁻³
KGS-4020	50	40	39,7	35,9	5600	9,01	8,154	4,542	1,65 · 10 ⁻³
KGS-4040	50	40	38,9	36,3	5600	9,01	8,523	4,696	1,65 · 10 ⁻³
KGS-5010	50	50	49,5	44,1	5600	13,50	18,566	8,420	3,70 · 10 ⁻³
KGS-5020	50	50	49,5	44,1	5600	13,50	18,566	8,420	3,70 · 10 ⁻³
KGS-6310	50	63	62,5	57,1	5600	22,03	52,181	18,280	9,84 · 10 ⁻³
Left hand thread									
KGS-2005 LH	50	20	19,5	16,9	5600	2,04	0,400	0,474	8,46 · 10 ⁻⁵

¹⁾ Delivery length 6000 mm, hardened length at least 5600 mm, both ends soft annealed.

²⁾ The polar moment of resistance is double the moment of resistance.

Ball screw drives

Ball nuts

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.

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:

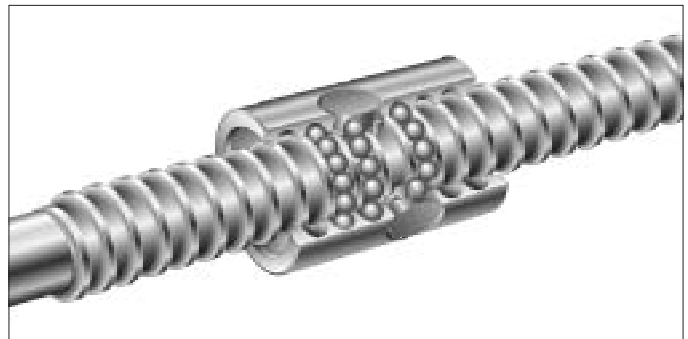
Steel 1.7131 (ESP65) / 1.3505 (100 Cr 6)

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 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 recirculating lids and the return duct is integrated in the nut.

Available for our thread leads 20, 25, 40 and 50 mm.



Ball screw drives

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. NEFF supplies ready-to-install units with "O" pre-loading.

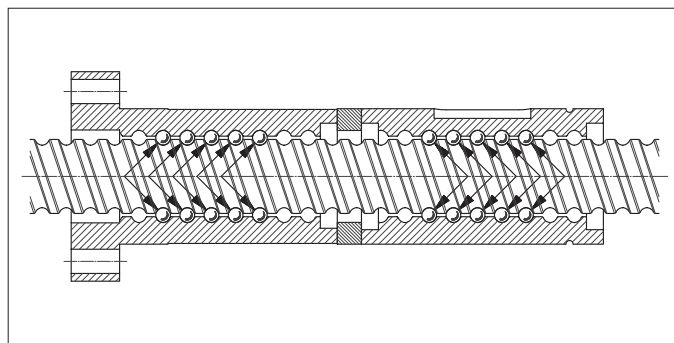
O pre-loading:
With this type of pre-loading the lines of forces run in a rhomboidal pattern (O-shaped), i.e. the nuts are pressed apart by the pre-loading force. This configuration offers particularly high

rigidity against tilting. The standard pre-loading is equal to 10% of the dynamic load rating C.

Pre-loading variants

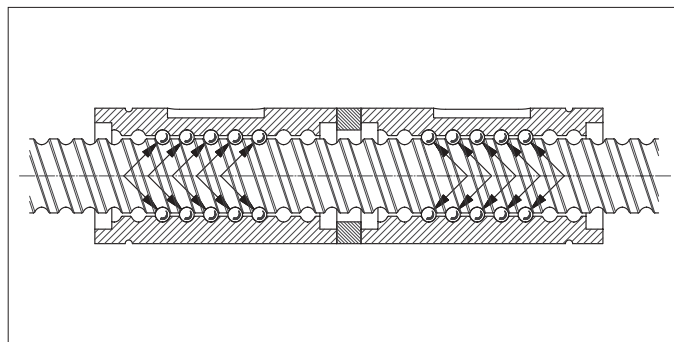
KGT-FM

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



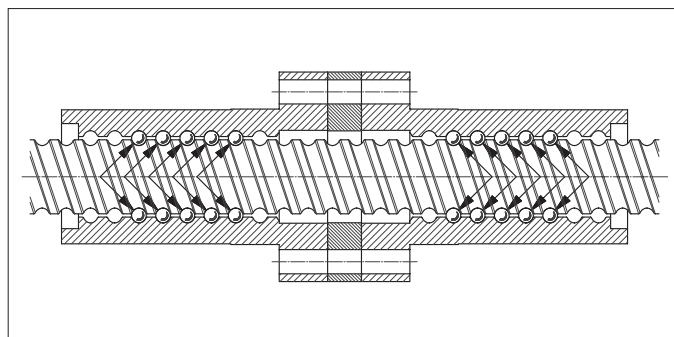
KGM-MM

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



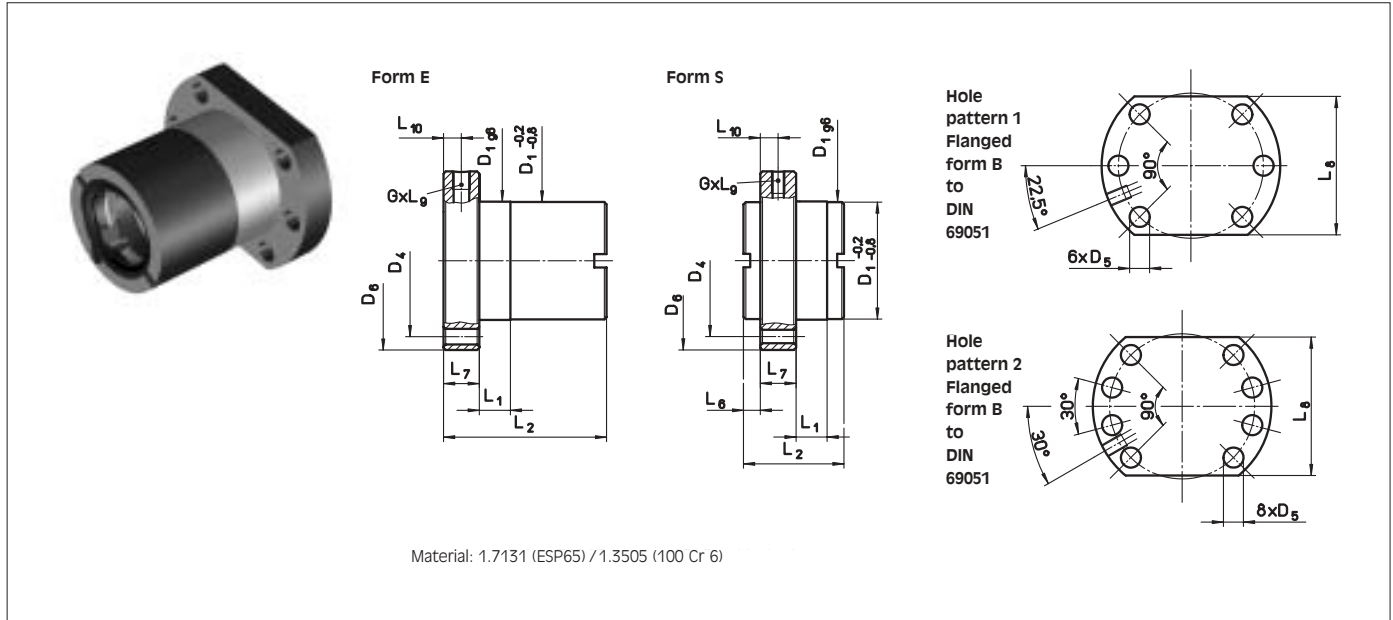
KGT-FF

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



Ball screw drives

Flanged ball nuts KGF-D according to DIN 69051



Type Diameter (mm) Lead (mm) Right hand thread	Form	Hole pattern	Dimensions [mm]										Lubrication hole G	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	C ²⁾	C ³⁾	C ₀ =C _{0a}
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 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
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⁾ D₁ not conforming to DIN 69051.

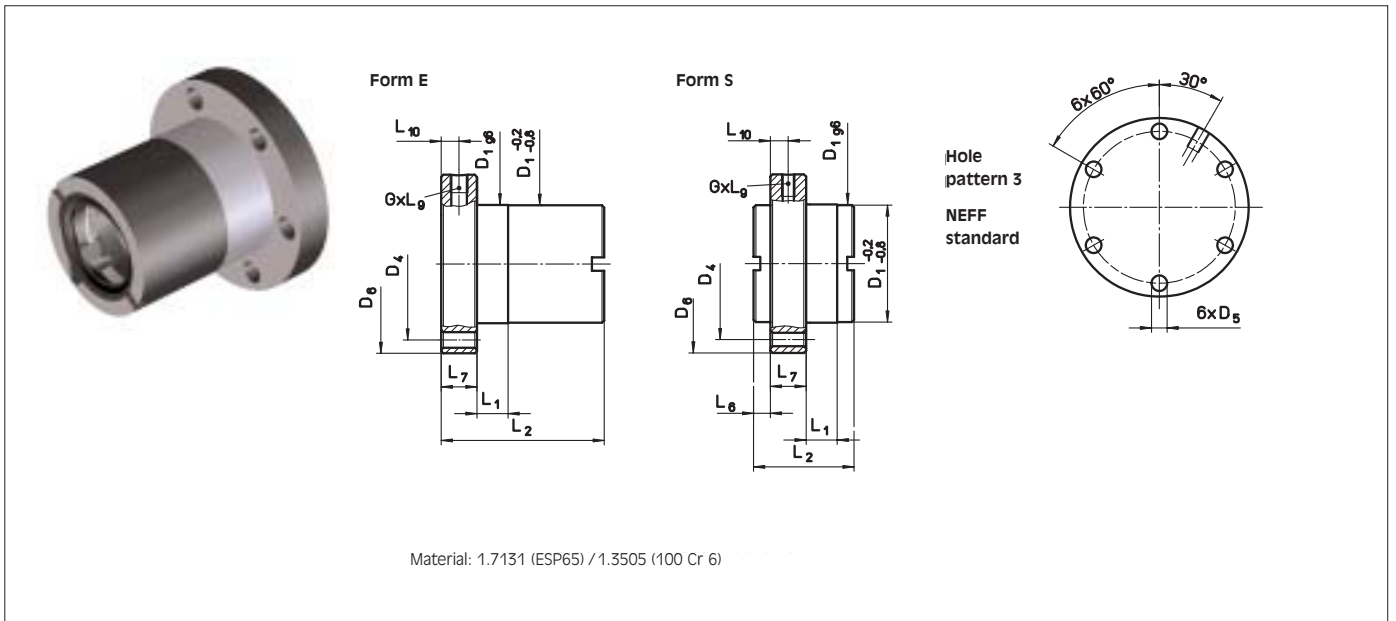
²⁾ Dynamic load rating according to DIN 69051 part 4, draft 1978.

³⁾ Dynamic load rating according to DIN 69051 part 4, draft 1989.

⁴⁾ Round flange

Ball screw drives

Flanged ball nuts KGF-N according to NEFF standard



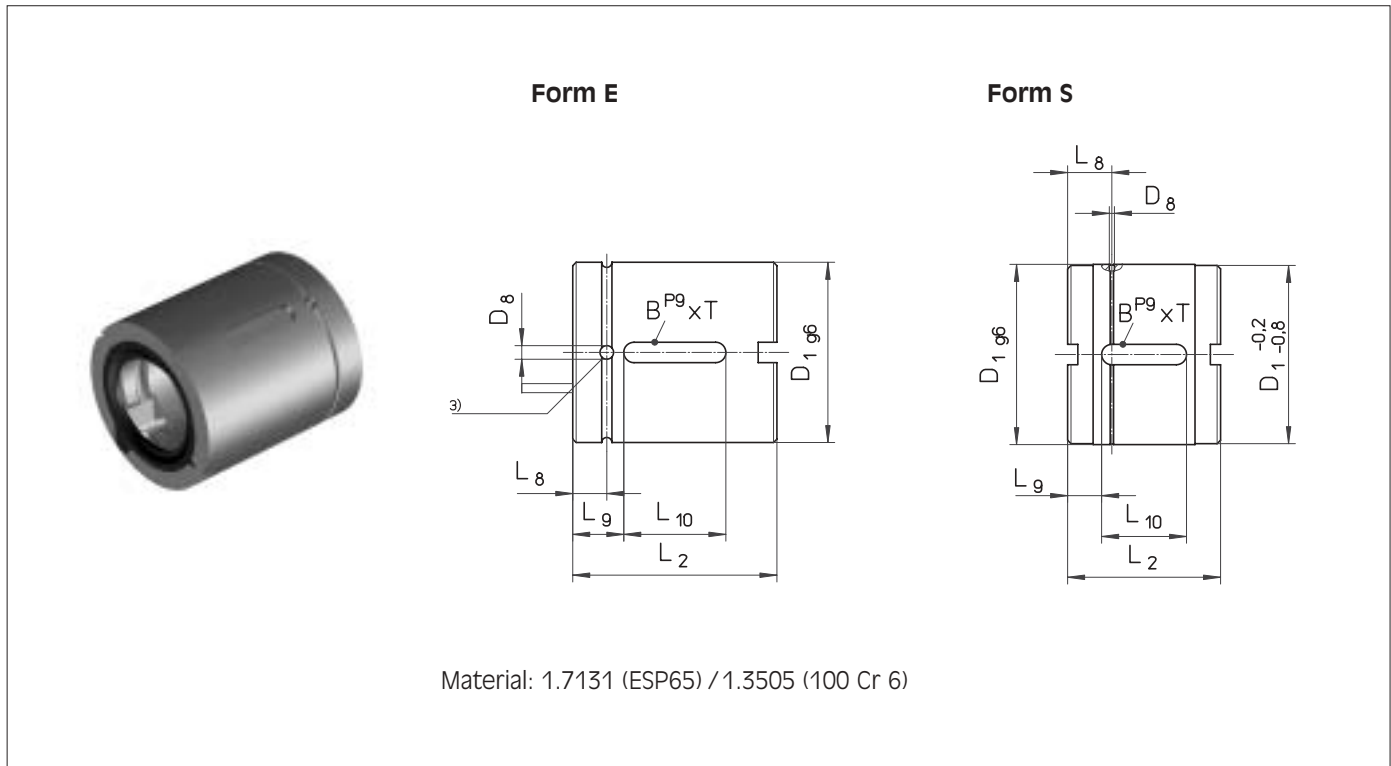
Type Diameter [mm] Lead [mm] Right hand thread	Form	Dimensions [mm]										Lubrication hole G	Axial backlash max [mm]	No. of circuits	Load rating [kN]		
		D ₁	D ₄	D ₅	D ₆	L ₁	L ₂	L ₆	L ₇	L ₉	L ₁₀				C ¹⁾	C ²⁾	C ₀ =C _{0a}
KGF-N 1605 RH-EE	E	28	38	5,5	48	8	44	–	12	8	6	M 6	0,08	3	12,0	9,3	13,1
KGF-N 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	4	86,0	76,0	197,0

¹⁾ Dynamic load rating according to DIN 69051, part 4, draft 1978.

²⁾ Dynamic load rating according to DIN 69051, part 4, draft 1989.

Ball screw drives

Cylindrical ball nuts KGM-D according to DIN 69051



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 ¹⁾	C ²⁾	C ₀ =C _{0a}
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

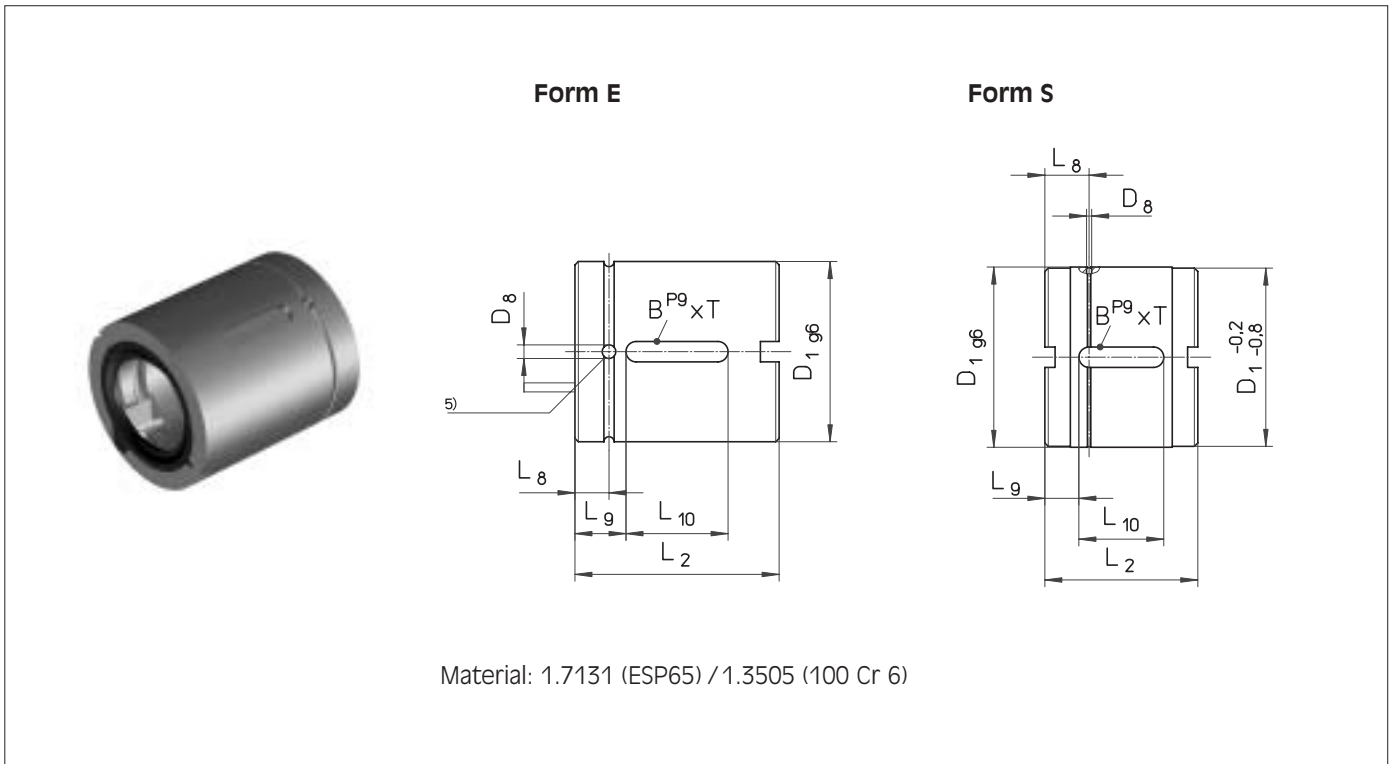
¹⁾ Dynamic load rating according to DIN 69051, part 4, draft 1978.

²⁾ Dynamic load rating according to DIN 69051, part 4, draft 1989.

³⁾ Position of grease holes not defined on circumference.

Ball screw drives

Cylindrical ball nuts KGM-N according to NEFF standard



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 _{0a}
KGM-N 1205 RH-00	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 ¹⁾	1,5	54	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

¹⁾ D₁ -0,2/-0,8 does not apply, therefore D₁ -1,0/-1,5
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⁾ Position of grease holes not defined on circumference.

Accessories ball screw drives

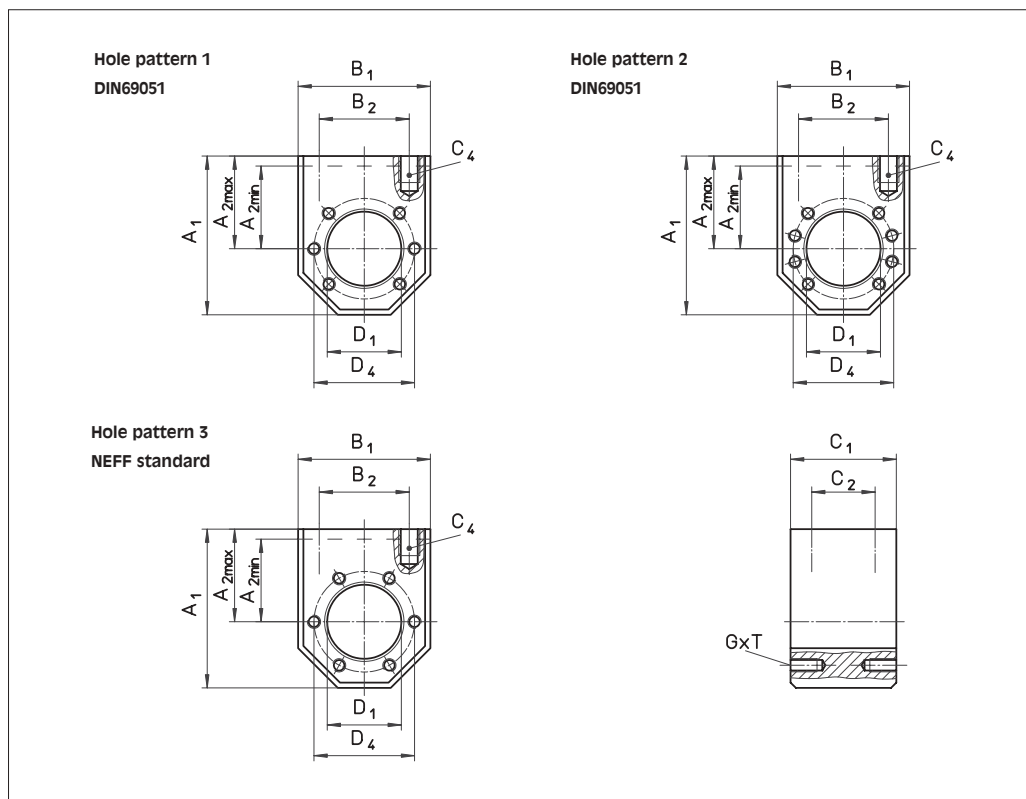
Adapter bracket

Adapter bracket KON

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

Material:

1.0065 (St37) / 1.0507 (St52)



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	3	60	35	25	50	34	40	24	M 8x15	28	38	M 5x10
KON 1605/1610	1	60	35	25	50	34	40	24	M 8x15	28	38	M 5x10
KON 2005	3	68	37,5	29	58	39	40	24	M 8x15	32	45	M 6x12
KON 2005	1	68	37,5	30	58	39	40	24	M 8x15	36	47	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	3	82	45	37	75	54	50	30	M 10x12	45	58	M 6x12
KON 3205	1	92	50	40	85	60	50	30	M 12x15	50	65	M 8x12
KON 3210/3240/4005	3	92	50	42	85	60	50	30	M 12x15	53	68	M 6x12
KON 3210/3220	1	92	50	40	85	60	50	30	M 12x15	53	65	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	3	135	77,5	57,5	115	91	88	64	M 16x25	72	90	M 10x16
KON 5010	2	135	77,5	57,5	115	91	88	64	M 16x25	75	93	M 10x16
KON 5020	2	152	87,5	65	130	101	88	64	M 16x30	85	103	M 10x16
KON 6310	3	152	87,5	65	130	101	88	64	M 16x30	85	105	M 10x16

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

Accessories ball screw drives

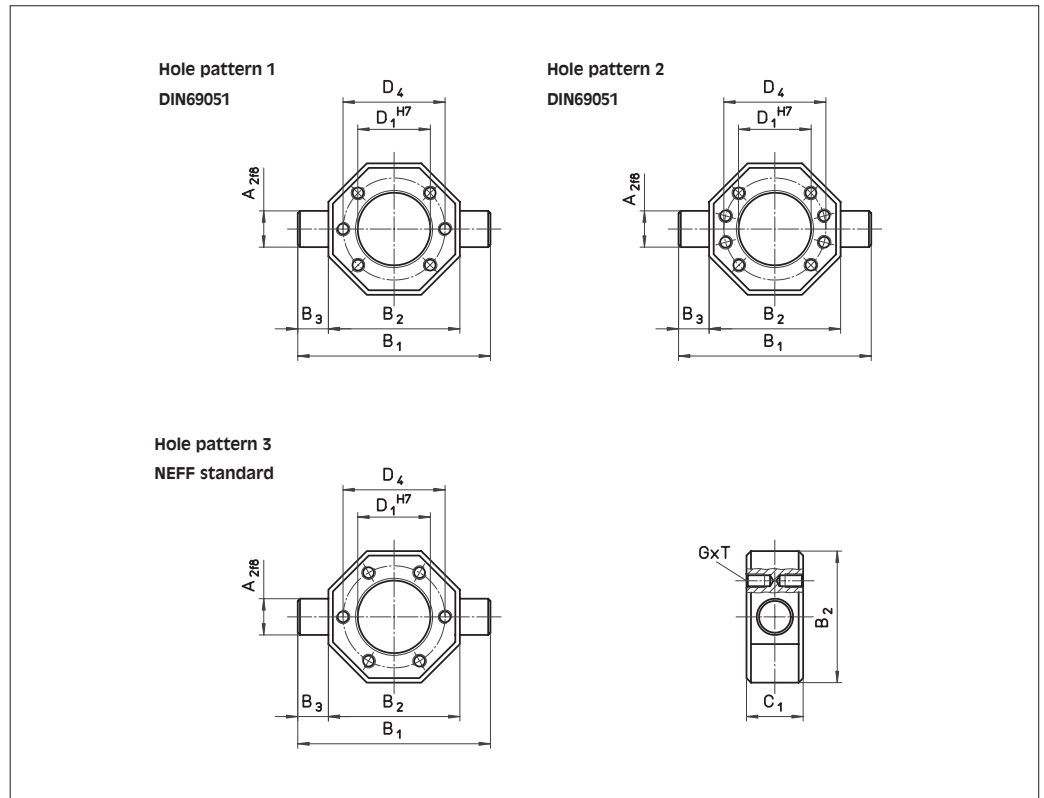
Universal joint adapter

Universal joint adapter KAR

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

Material:

1.0065 (St37) / 1.0507 (St52)



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	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

Accessories ball screw drives

Spiral spring cover

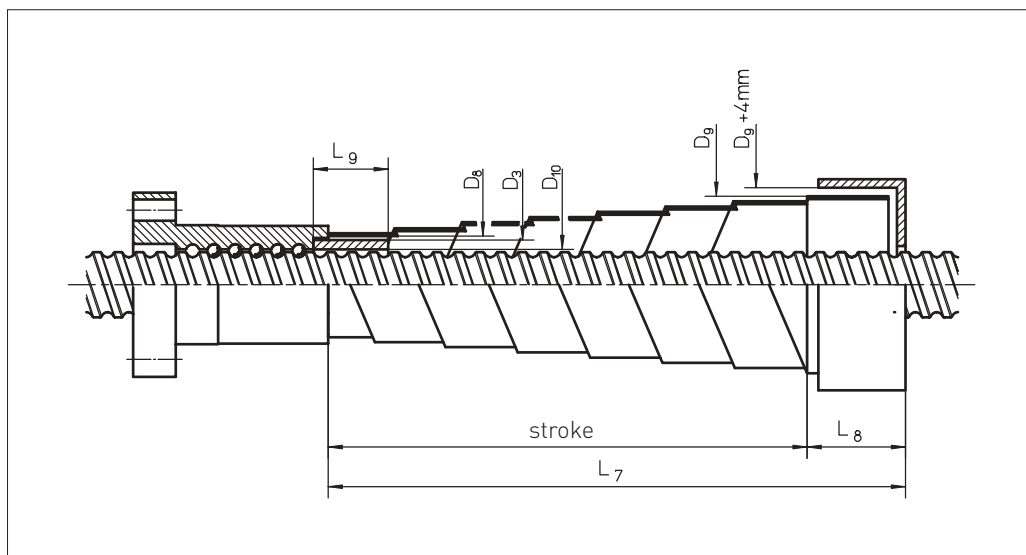
Spiral spring cover SF

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

$D_3 = 22 \text{ mm}$
 $D_{10} = 16,8 \text{ mm}$
 $L_9 = 20 \text{ mm}$

Type $D_8/\text{stroke}/L_8$	$L_{7V}^{1)}$	$L_{7H}^{2)}$	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 2002 KGT 2020 (KGT 2505)

$D_3 = 26 (31) \text{ mm}$
 $D_{10} = 20,8 (25,8) \text{ mm}$
 $L_9 = 28 (28) \text{ mm}$

Figures in brackets apply to 2505

Type $D_8/\text{stroke}/L_8$	$L_{7V}^{1)}$	$L_{7H}^{2)}$	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

$D_3 = 38 \text{ mm}$
 $D_{10} = 33 \text{ mm}$
 $L_9 = 35 \text{ mm}$

Type $D_8/\text{stroke}/L_8$	$L_{7V}^{1)}$	$L_{7H}^{2)}$	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
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

For KGT 3205 KGT 3240 (continued)

$D_3 = 38 \text{ mm}$
 $D_{10} = 33 \text{ mm}$
 $L_9 = 35 \text{ mm}$

Type $D_8/\text{stroke}/L_8$	$L_{7V}^{1)}$	$L_{7H}^{2)}$	D_9
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

Accessories ball screw drives

Spiral spring cover

For KGT 4005 (KGT 3210)

D ₃ = 46 (44) mm D ₁₀ = 41 (34) mm L ₉ = 45 (45) mm			
Type	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	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	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	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} = L₇ vertical installation
²⁾ L_{7H} = L₇ horizontal installation

Ball screw drives

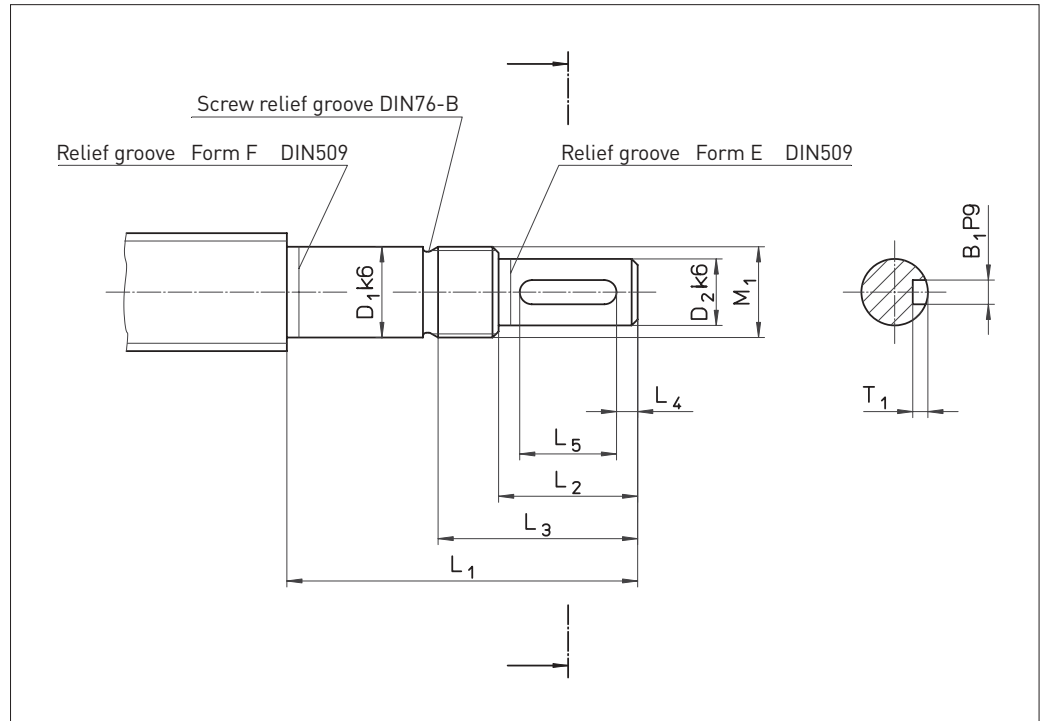
Screw end machining for movable/ fixed bearing

Screw end machining for movable/fixed bearing

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 – L



Form D KGT	Dimensions [mm]									Bearing ZKLF...2RS
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
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, 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 KGT	Dimensions [mm]									Bearing ZARN...LTN
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
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	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	40	36	175	80	103	8,5	63	M 40x1,5	10x5	4090

Order code see page 61

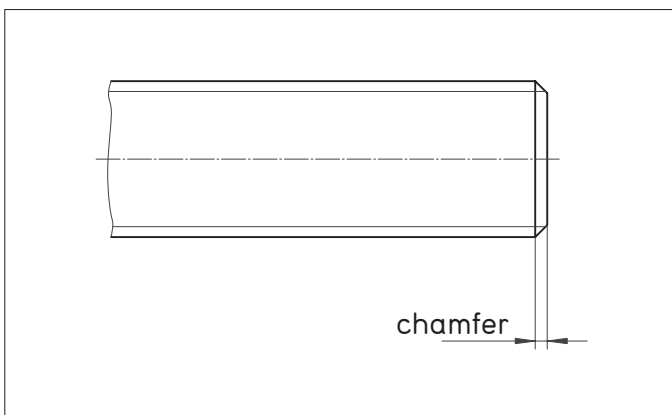
Ball screw drives

Screw end machining for movable/ fixed bearing

Form H KGT	Dimensions [mm]									Bearing ZARF...LTN
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
2505, 2510, 2520, 2525, 2550	15	11	85	23	35	3,5	16	M 15x1	4x2,5	1560
3205, 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	40	36	195	80	105	8,5	63	M 40x1,5	10x5	40115

Form J KGT	Dimensions [mm]									Bearing FDX
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
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, 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 KGT	Dimensions [mm]									Bearing
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
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, 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	40	36	175	80	103	8,5	63	M 40x1,5	10x5	7208 BE RS



Form Z

Chamfer 2 x 45°: KGS of \varnothing 12 – 25 mm

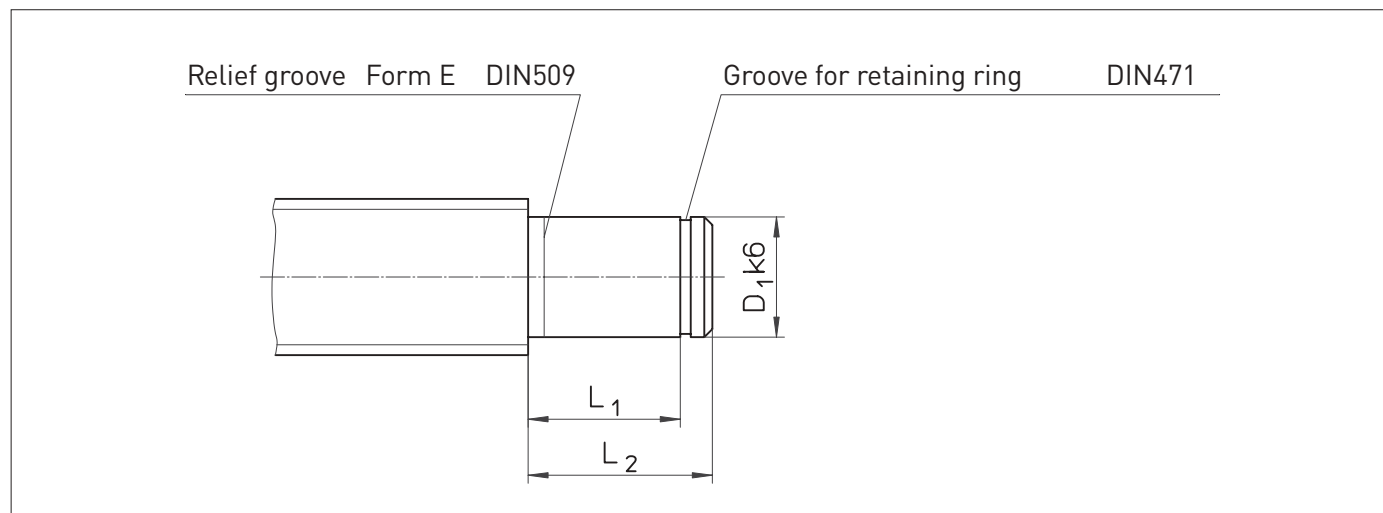
Chamfer 3 x 45°: KGS of \varnothing 26 – 40 mm

Chamfer 4 x 45°: KGS of \varnothing 44 – 50 mm

Ball screw drives

Screw end machining for movable/ fixed bearing

Form S – W



Form S KGT	Dimensions [mm]			Spacer sleeve	Bearing
	D_1	L_1	L_2		
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, 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	55	102	110	65x55,1x60	6211 RS

Form T KGT	Dimensions [mm]			Inner ring	Roller bearing
	D_1	L_1	L_2		
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, 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 W KGT	Dimensions [mm]			Bearing
	D_1	L_1	L_2	
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

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

Form K: Produced specially to customer's drawing.

Ball screw drives

Sizing and selection

Lifetime

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

Average speed

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

Dynamic equivalent bearing load

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

Lifetime of a ball screw

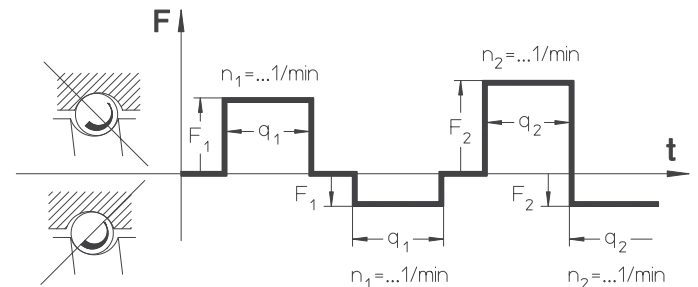
$$L_{10} = \left(\frac{C}{F_m} \right)^3 \cdot 10^6 \quad (III)$$

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

n_1, n_2, \dots Speeds [rpm] during q_1, q_2, \dots
 n_m Average speed [rpm]
 q_1, q_2, \dots Components of the duration of a load in one load direction in [%]

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

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.

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 lifetime of 10^6 revolutions.

➔ Technical data KGM/KGF see page 14 – 17

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

Ball screw drives

Sizing and selection

Example calculation lifetime of a ball screw drive

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

Required: Maximum achievable lifetime under the given operating conditions.

$$\Sigma = 100 \%$$

Ball screw drive KGT 5010

Average speed n_m

$$\text{from (I)} \quad n_m = \frac{n_1 \cdot q_1 + n_2 \cdot q_2 + n_3 \cdot q_3 + n_4 \cdot q_4}{100}$$

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

$$\Rightarrow n_m = 550,5 \text{ 1/min}$$

Dynamic equivalent bearing load F_m

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

$$F_m = \sqrt[3]{30000^3 \cdot \frac{150 \cdot 21}{550,5 \cdot 100} + 18000^3 \cdot \frac{1000 \cdot 13}{550,5 \cdot 100} + 42000^3 \cdot \frac{75 \cdot 52}{550,5 \cdot 100} + 1800^3 \cdot \frac{2500 \cdot 14}{550,5 \cdot 100}} \text{ N}$$

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

Lifetime of a ball screw drive L_{10}

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

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

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

$$L_{10} = 3,966 \cdot 10^7$$

Number of revolutions L_{10}

$$L_h = \frac{L_{10}}{n_m \cdot 60} = \frac{3,966 \cdot 10^7}{550,5 \cdot 60} = 1201 \text{ h}$$

Lifetime in hours L_h

Result:



Under the given load conditions, the selected screw drive has a total lifetime of $3,966 \cdot 10^7$ revolutions, which represents a time of 1201 hours.

Ball screw drives

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

$$L = \left(F_{m1}^{\frac{10}{3}} + F_{m2}^{\frac{10}{3}} \right)^{-0,9} \cdot C^3 \cdot 10^6 \quad \text{(IV)}$$

F_{m1}, F_{m2}, \dots	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 lifetime of 10^6 revolutions.

➔ Technical data KGM/KGF see page 14 – 17

The calculation methods above are valid only under correct lubrication conditions. Dirt or lack of lubricant may significantly reduce the lifetime. Reduced lifetime 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

Ball screw drives

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

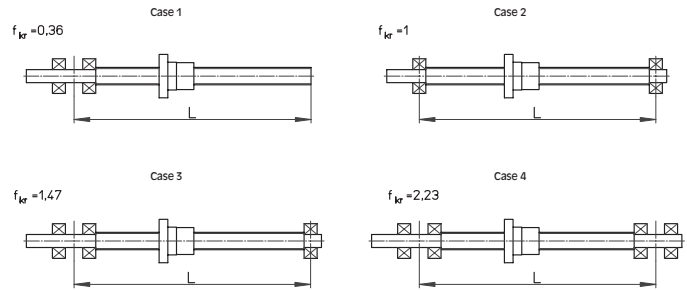
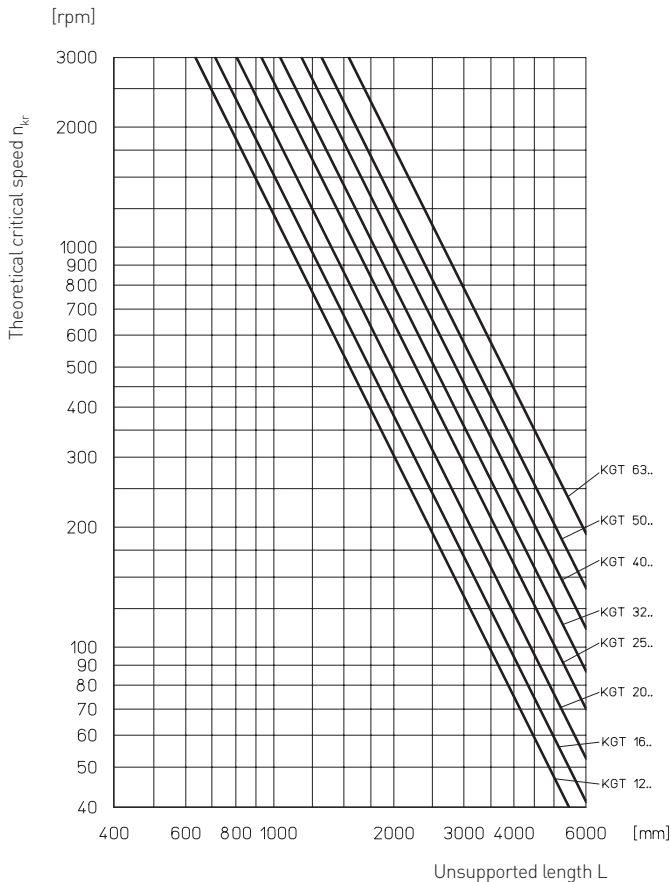
$$n_{zul} = 0,8 \cdot n_{kr} \cdot f_{kr} \quad (V)$$

- 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.



Ball screw drives

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

$$F_{zul} = 0,8 \cdot F_k \cdot f_k \quad (VI)$$

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

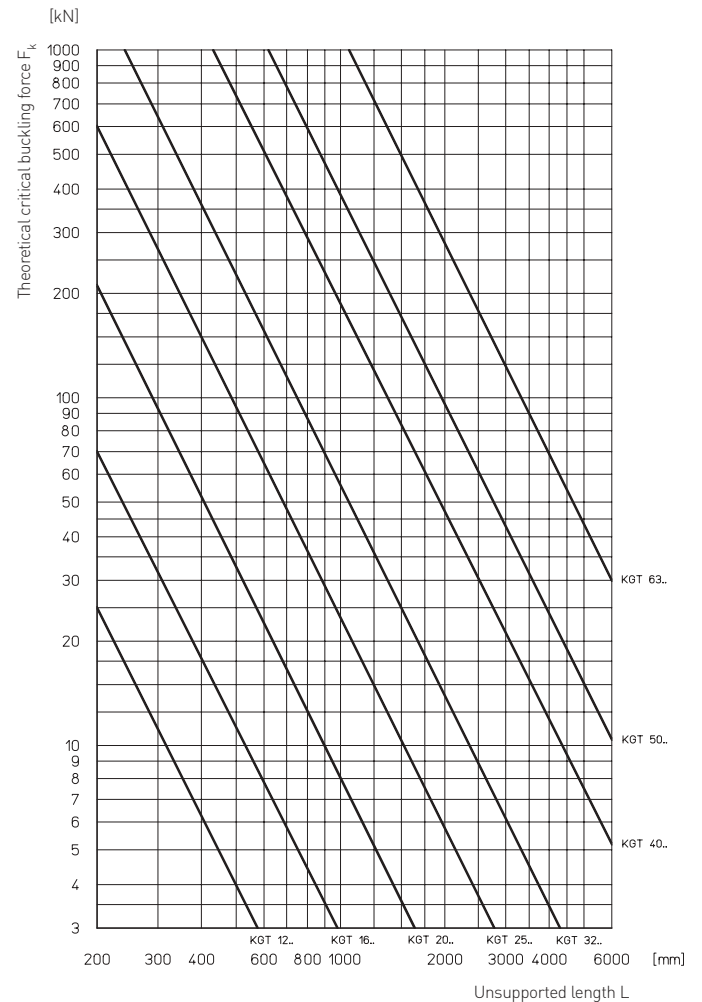
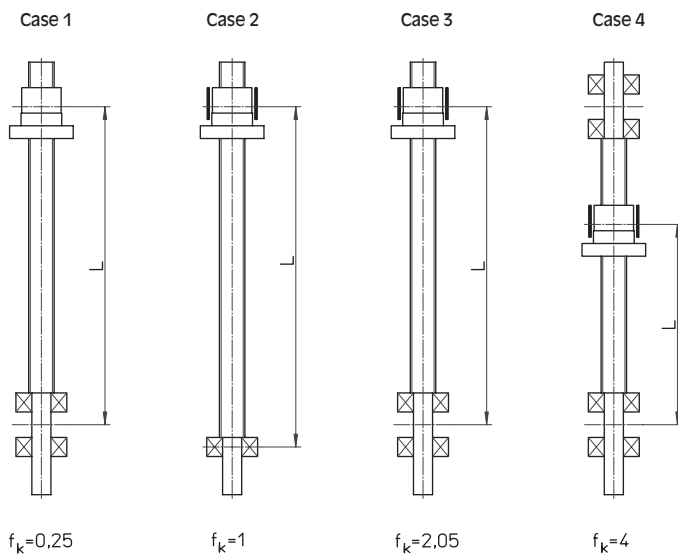
! The operating force must not exceed 80 % of the maximum permissible axial force

Bearing support

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

Theoretical critical buckling force F_k

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



Ball screw drives

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

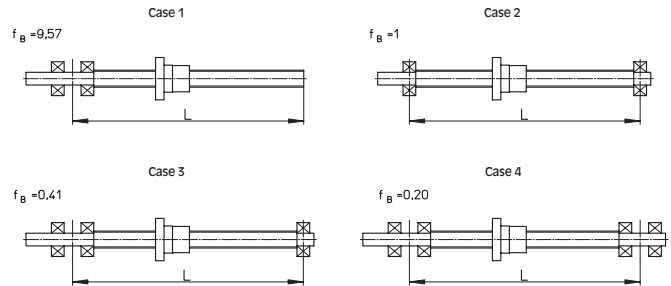
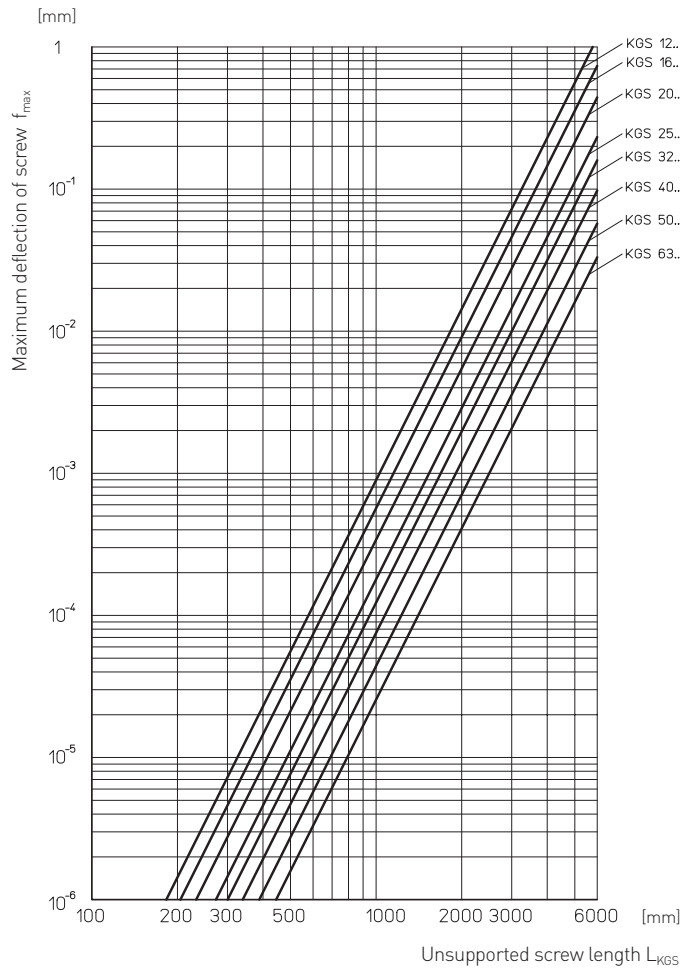
$$f_{\max} = f_B \cdot 0,061 \cdot \frac{m'_{KGS} \cdot L_{KGS}}{I_Y} \quad (VII)$$

f_{\max} Maximum deflection of screw [mm]
 f_B Correction factor considering the bearing support of the screw → see table
 I_Y Planar moment of inertia [mm⁴]
 → see table page 11
 L_{KGS} Unsupported screw length [mm]
 m'_{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.



Ball screw drives

Sizing and selection

Example calculation for a ball screw drive

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

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

Maximum permissible speed n_{zul}

from (V) $n_{zul} = 0,8 \cdot n_{kr} \cdot f_{kr} = 0,8 \cdot 1290 \text{ 1/min} \cdot 1,47 = 1517 \text{ 1/min}$
 $\Rightarrow n_{zul} \equiv 1517 \text{ 1/min}$ (< limit speed!)

Theoretical critical speed $n_{kr} = 1290$ rpm
 \Rightarrow from diagram "Theoretical critical speed"

from (VI) $F_{zul} = 0,8 \cdot F_k \cdot f_k = 0,8 \cdot 95 \text{ kN} \cdot 2,05 = 156 \text{ kN}$
 $\Rightarrow F_{zul} = 153 \text{ kN}$ (max. static load rating C_0 !)

Theoretical critical buckling force $F_k = 95$ kN
 \Rightarrow from diagram "Theoretical critical buckling force"

from (VII)

$$f_{max} = f_B \cdot 0,061 \cdot \frac{m'_{KGS} \cdot L_{KGS}}{I_Y} = 0,41 \cdot 0,061 \cdot \frac{13,50 \text{ kg/m} \cdot 2 \text{ m}}{18,566 \text{ cm}^4}$$

$$f_{max} = 0,036 \text{ mm}$$

Weight $m'_{KGS} = 13,50$ kg/m
Planar moment of inertia $I_Y = 18,566$ cm⁴
 \Rightarrow 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 150 kN,
and when installed horizontally has a maximum deflection of 0.036 mm

Note the dynamic load rating!

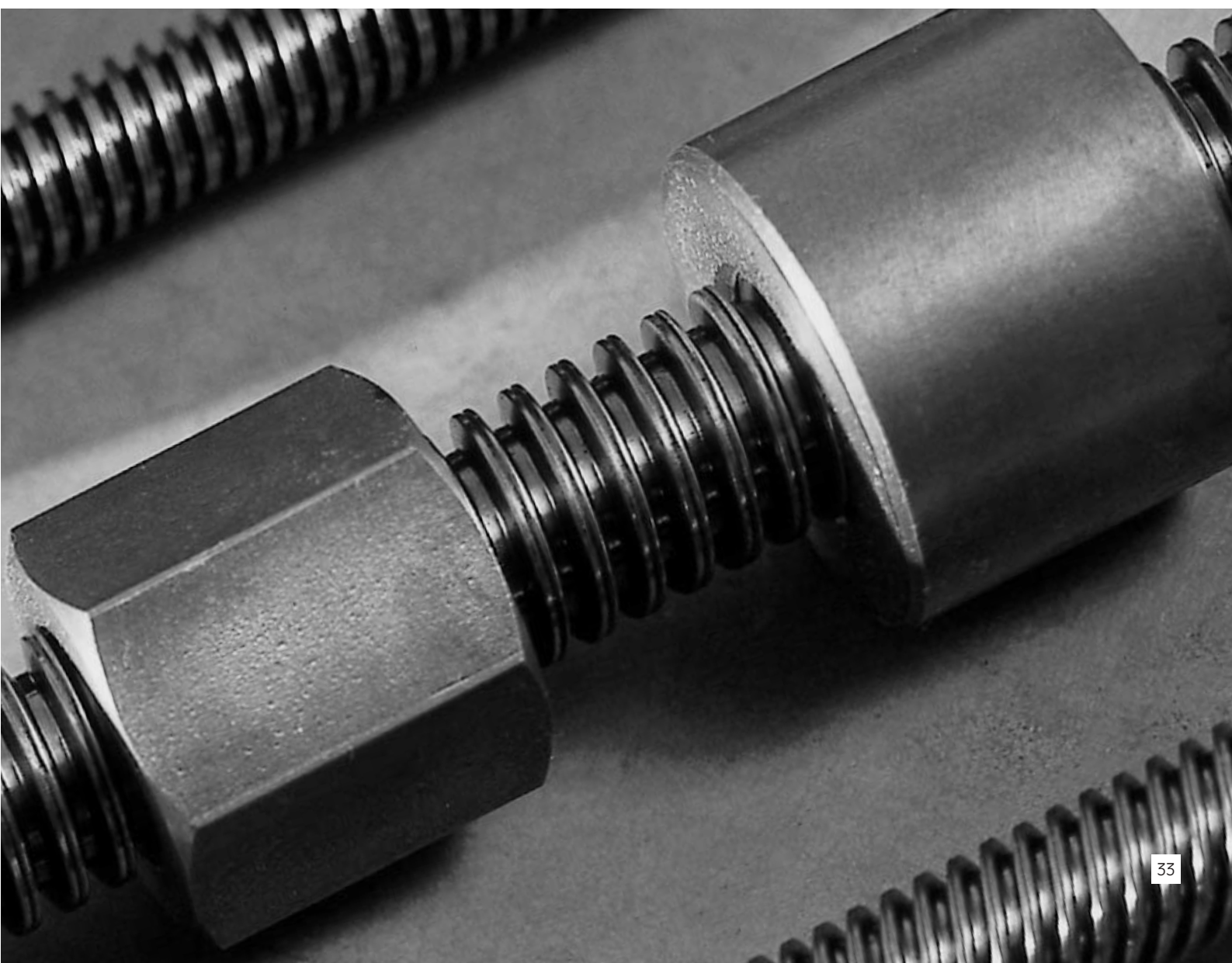


Azionamenti a vite trapezoidali TGT Robusti ed economici

Gli azionamenti a viti trapezoidali rappresentano la soluzione economica per costruzioni nei settori del serraggio, del posizionamento e dell'avanzamento.

Il programma è conforme alla norma DIN 103 e offre un'ampia scelta di chiocchie in diversi materiali.

Tutte le viti sono disponibili con lavorazione terminali specifica del cliente.



Azionamenti a vite trapezoidale TGT

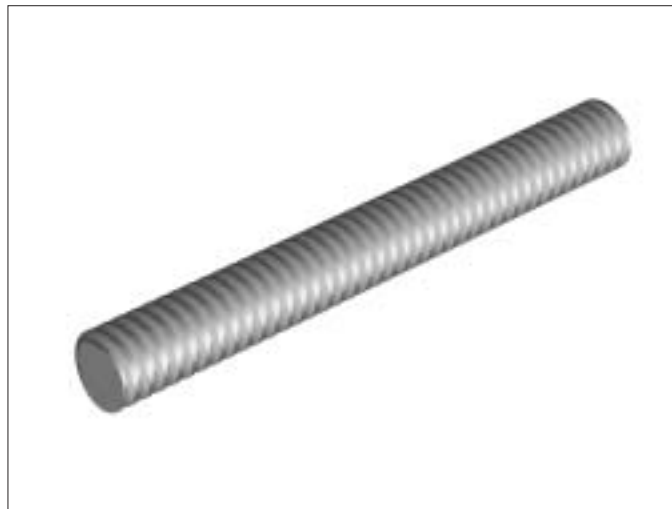
Dati tecnici generali

Le viti trapezoidali NEFF a ricircolo di sfere vengono prodotte in versione rullata.

Vite trapezoidale di precisione RPTS

Dati tecnici

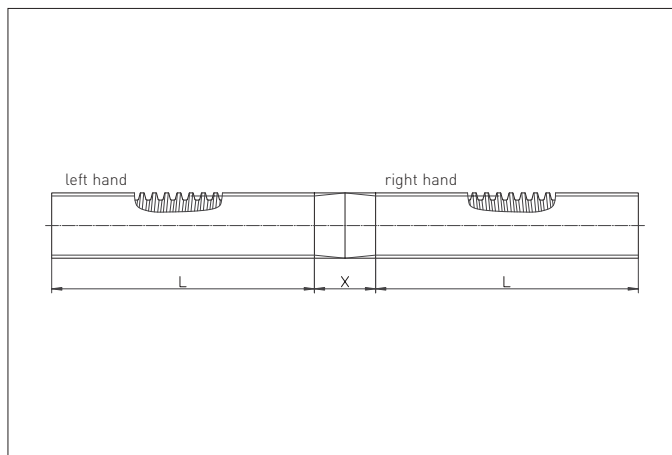
- Filettatura _____ Filettatura trapezoidale metrica ISO secondo norma DIN 103
- Diametro _____ 10 – 80 mm
- Passo _____ 2 – 24 mm
- Numero di principi _____ fino a 6 principi
- Senso di rotazione _____ a destra, 1 principio anche a sinistra, vedi tabella a pag. 35
- Lunghezza _____ Fino a 3000 mm fino a Tr 18 x 4
Fino a 6.000 mm da Tr 20 x 4
- Materiale _____ 1.0401 (acciaio da cementazione C15) sottoposta a distensione, saldabile
- Precisione _____ 50 to 300 $\mu\text{m}/300\text{ mm}$
- Linearità _____ 0,1 to 0,5 mm/300 mm
- Vite destra/sinistra _____ Con passi da 2 – 10 mm
- Lavorazione terminali _____ Su richiesta del cliente



Viti trapezoidali con filettatura destra e sinistra

Dati tecnici

- Diametro _____ 10 – 80 mm
- Passo _____ 2 – 10 mm
- Numero di principi _____ a un principio
- Senso di rotazione _____ a destra e a sinistra
- Lunghezza _____ Max. 3000 mm,
Da Tr 20x4 fino a 6000 mm, Su richiesta
- Materiale _____ 1.0401 (C15)
- Precisione _____ 50 to 300 $\mu\text{m}/300\text{ mm}$
- Linearità _____ 0,1 to 0,5 mm/300 mm
- Dimensione X _____ 100 mm
Diametro nell'area dimensione X inferiore al diametro nominale.



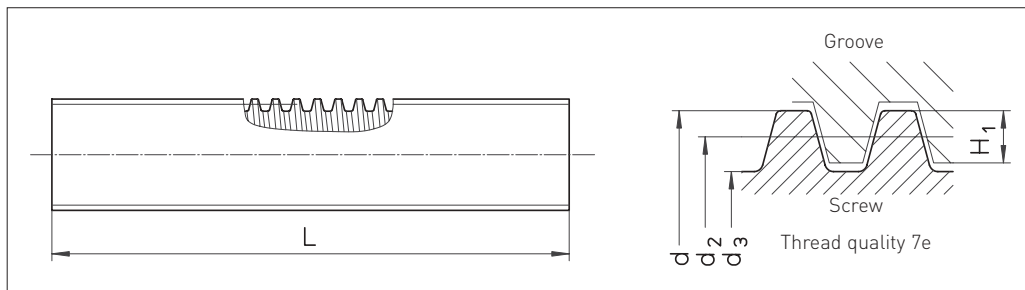
Azionamenti a vite trapezoidale

Viti trapezoidali

Vite trapezoidale di precisione rullata RPTS

Lunghezza di produzione 3000 mm, disponibile da \varnothing 20 mm a 6000 mm di lunghezza. Misura L su richiesta del cliente.

Materiale:
1.0401 (C15)



Tipo Diametro esterno Passo a destra/a sinistra	Dimensioni [mm]					Precisione [μ m/ 300mm]	Linearità [mm/ 300mm]	$\alpha^{2)}$	$\eta^{3)}$	Massa della vite [kg/m]	Momento d'inerzia superficiale [cm ⁴]	Momento di resistenza ⁴⁾ [cm ³]	Momento inerziale di massa [kg m ² /m]
	d	d _{2 min}	d _{2 max}	d ₃ ⁶⁾	H ₁								
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 · 10 ⁻⁵ 0,40 · 10 ⁻⁵
RPTS Tr 12x3 RPTS Tr 12x6 P3 ¹⁾	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 · 10 ⁻⁵ 0,94 · 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 · 15 ⁻⁵ 1,60 · 10 ⁻⁵
RPTS Tr 16x4 RPTS Tr 16x8 P4 ¹⁾	16 16	13,640 13,608	13,905 13,905	10,80 10,80	2 2	50 300	0,1 0,3	5° 11' 10° 18'	0,46 0,62	1,21 1,21	0,067 0,067	0,124 0,124	2,96 · 10 ⁻⁵ 2,96 · 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 · 10 ⁻⁵
RPTS Tr 20x4 RPTS Tr 20x8 P4 ¹⁾ RPTS Tr 20x16 P4 ¹⁾	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 · 10 ⁻⁵ 8,10 · 10 ⁻⁵ 8,10 · 10 ⁻⁵
RPTS Tr 22x5 RPTS Tr 22x24 P4 S ¹⁾⁵⁾	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 · 10 ⁻⁴ 1,11 · 10 ⁻⁴
RPTS Tr 24x5 RPTS Tr 24x10 P5	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 · 10 ⁻⁴ 1,65 · 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 · 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 · 10 ⁻⁴
RPTS Tr 30x6 RPTS Tr 30x12 P6 ¹⁾	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 · 10 ⁻⁴ 4,10 · 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 · 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 · 10 ⁻⁴
RPTS Tr 40x7 RPTS Tr 40x14 P7 ¹⁾	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 · 10 ⁻³ 1,37 · 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 · 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 · 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 · 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 · 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 · 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 · 10 ⁻²

¹⁾ solo destra

²⁾ Angolo di spira del diametro medio ➔ Formula (XVI) pag. 52

³⁾ Rendimento teorico per la conversione di una rotazione in un movimento longitudinale con coefficiente di attrito $\mu = 0,1$.
Rendimento per altri coefficienti di attrito ➔ Formula (XVI) pag. 52

⁴⁾ Il momento di resistenza polare è il doppio del momento di resistenza.

⁵⁾ Profilo speciale.

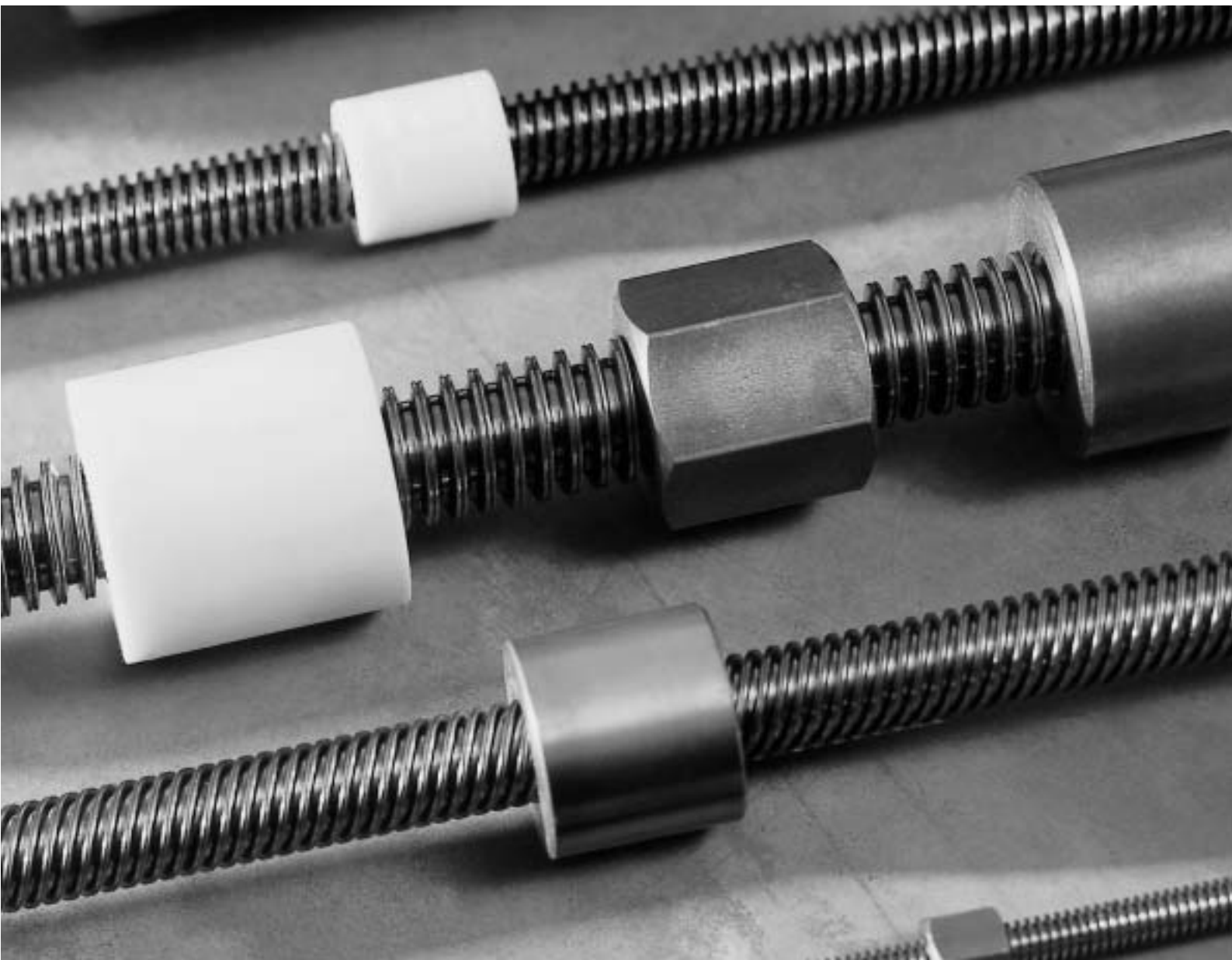
⁶⁾ Per un maggiore arrotondamento, indipendentemente dalla norma DIN 103, il diametro del nucleo è leggermente più piccolo.

Chioccioli per viti trapezoidali

Chioccioli per viti trapezoidali

Chioccioli per viti trapezoidali secondo la norma DIN 103, classe di tolleranza 7H.

È possibile fornire chioccioli da \varnothing 18 mm in versione filettate a pettine per quasi tutte le viti.



Azionamenti a vite trapezoidale

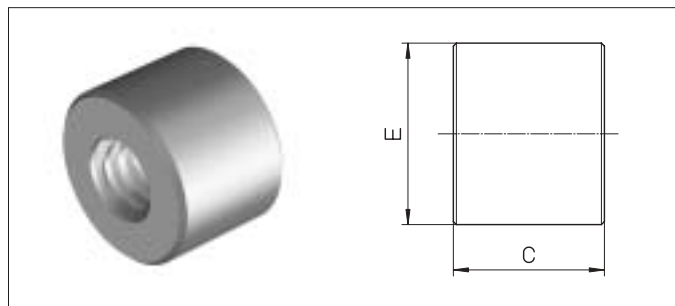
Chiocciola per viti trapezoidali

Chiocciola grezza corta in acciaio, versione cilindrica KSM

Indicate per tensionamenti, regolazioni in funzionamento manuale e come chiocciola di fissaggio. Non indicate per movimentazioni, poiché l'accoppiamento di scorrimento acciaio-acciaio tende alla grippatura.

Lavorazione ulteriore: per l'esatta lavorazione e montaggio, la filettatura funge da riferimento.

Materiale:
acciaio "automatico"
1.0718 (9 SMn 28K)



Tipo	E [mm]	C [mm]	Massa [kg]
KSM Tr 10x2	22	15	0,037
KSM Tr 10x3	22	15	0,036
KSM Tr 12-3	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

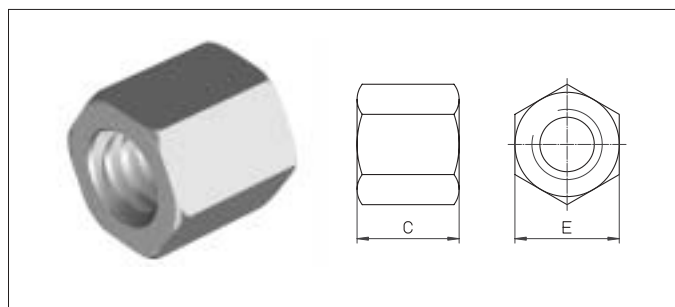
Tipo	E [mm]	C [mm]	Massa [kg]
KSM Tr 28x5	60	42	0,76
KSM Tr 30x6	60	45	0,79
KSM Tr 32x6	60	48	0,81
KSM Tr 36x6	75	54	1,5
KSM Tr 40x7	80	60	1,9
KSM Tr 44x7	80	66	2,7
KSM Tr 48x8	90	72	2,9
KSM Tr 50x8	90	75	2,7
KSM Tr 60x9	100	90	3,7
KSM Tr 70x10	110	105	4,9
KSM Tr 80x10	120	120	6,4

Chiocciola esagonale in acciaio SKM

Indicate per tensionamenti, regolazioni in funzionamento manuale e come chiocciola di fissaggio. Non indicate per movimentazioni, poiché l'accoppiamento di scorrimento acciaio-acciaio tende alla grippatura.

Lavorazione ulteriore: per l'esatta lavorazione e montaggio prendere la filettatura come riferimento.

Material:
acciaio "automatico"
1.0718 (9 SMn 28K)



Tipo	E [mm]	C [mm]	Massa [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

Tipo	E [mm]	C [mm]	Massa [kg]
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

Azionamenti a vite trapezoidale

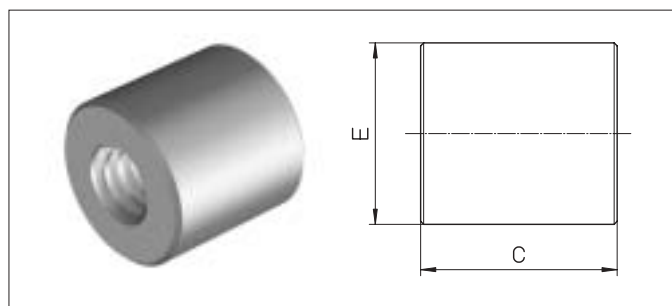
Chiocciolle per viti trapezoidali

Chiocciola lunga in rame rosso, versione cilindrica LRM

Per movimentazioni a basse e medie velocità con una durata di inserzione inferiore a 20%.

Lavorazione ulteriore: per l'esatta lavorazione e montaggio prendere la filettatura come riferimento.

Material:
2.1090 (G-CuSn 7Zn Pb (Rg7)),
Valori identificativi ➔ pagina 40



Tipo	E [mm]	C [mm]	Massa [kg]	Fattore di portanza [mm ²]
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 ¹⁾	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 P4 ¹⁾²⁾	45	40	0,46	880
LRM Tr 24x5	50	48	0,69	1130

¹⁾ Not available in left hand thread
²⁾ Profilo speciale; ø nominale 21,5

Tipo	E [mm]	C [mm]	Massa [kg]	Fattore di portanza [mm ²]
LRM Tr 24x10 PS 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

Azionamenti a vite trapezoidale

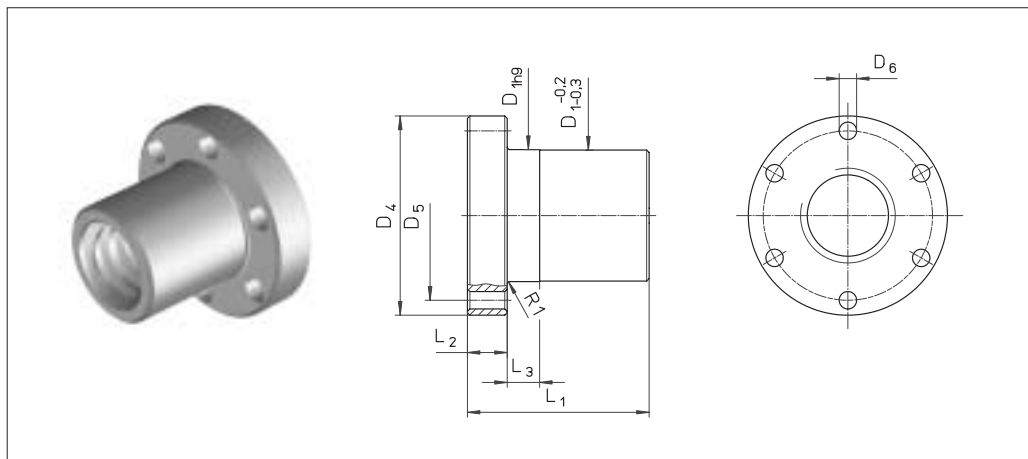
Chiocciole per viti trapezoidali

Chiocciole in bronzo EFM pronte all'uso

Per movimentazioni in esercizio continuo con caratteristiche di usura particolarmente accentuate. Indicate come chiocciole di sicurezza. Le EFM possono essere montate con gli adattatori KON e KAR (➔ pagina 41 – 42).

Materiale:

2.1090 (G-CuSn 7Zn Pb (Rg7))
Valori identificativi ➔ pagina 40



Tipo	Dimensioni [mm]							Massa [kg]	Fattore di portanza [mm ²]
	D ₁	D ₄	D ₅	6 x D 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	1,7	2930
EFM Tr 50x8	72	110	90	11	97	18	10	2,6	4900
EFM Tr 60x9	85	125	105	11	99	20	10	3,7	6040

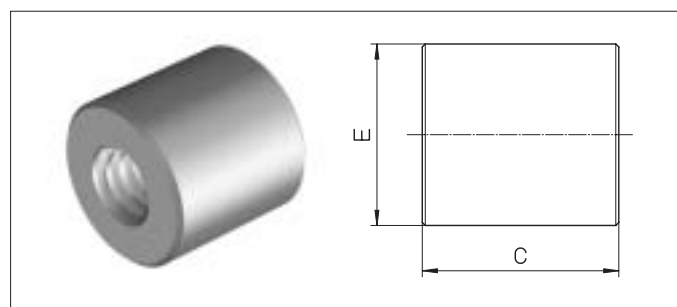
Chiocciola grezza lunga in plastica, versione cilindrica LKM

Per movimentazioni silenziose a elevate velocità e durata di inserzione. Particolarmente indicate per viti trapezoidali rullate. Buone caratteristiche di emergenza

Material:

PEPT, valori identificativi ➔ pagina 40

Lubrificazione: Grasso fluido a base di olio di sintesi
FUCHS LUBRITEC, URETHYN EM 1



Tipo	E [mm]	C [mm]	Massa [kg]	Fattore di portanza [mm ²]
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

Tipo	E [mm]	C [mm]	Massa [kg]	Fattore di portanza [mm ²]
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

LKM with left hand thread on request.

Codice ordine pagina 62

Azionamenti a vite trapezoidale

Chiocciole per viti trapezoidali



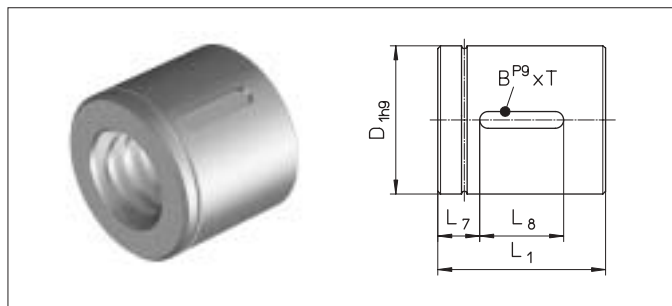
Chiocciola in plastica EKM pronta all'uso

Per movimentazioni silenziose a elevate velocità e durata di inserzione a carico medio.

Buone caratteristiche di emergenza.

Particolarmente indicate per viti trapezoidali rullate.

Material:
PETP, valori indicativi, vedi sotto



Tipo	Dimensioni [mm]					Massa [kg]	Fattore di portanza [mm ²]
	∅ 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.

Valori identificativi del materiale

Materiale 2.1090

Carico di snervamento 0,2% R_r 0,2: 120 N/mm²
 Resistenza a trazione R_m (δ_B): 240 N/mm²
 Allungamento alla rottura A5 min.: 15%
 Durezza Brinell HB 10/1000: 65
 Densità: 8,8 kg/dm³
 Modulo E: 90000 N/mm³
 Valore pv: 300 N/mm² · m/min

Materiale PETP

Resistenza a trazione: 80 N/mm²
 Modulo E: 2800 – 3000 N/mm²
 Resilienza: 40 kJm²
 Capacità di resilienza: 4 kJm²
 Dilatazione termica: 8,5 · 10⁻⁵/°C
 Assorbimento all'acqua: 0,25%
 Saturazione all'acqua: 0,6%
 Densità: 1,38 kg/dm³
 Attrito contro acciaio: 0,05 – 0,08
 Durezza di pressione delle sfere H 358/30: 150 N/mm²
 Dilatazione con tensionamento massa 80 N/mm²: 4 – 5%
 Valore pv: 100 N/mm² · m/min
 Pressione superficiale massima: 10 N/mm²
 Velocità di scorrimento massima: 120 m/min

Accessori azionamenti a vite trapezoidale

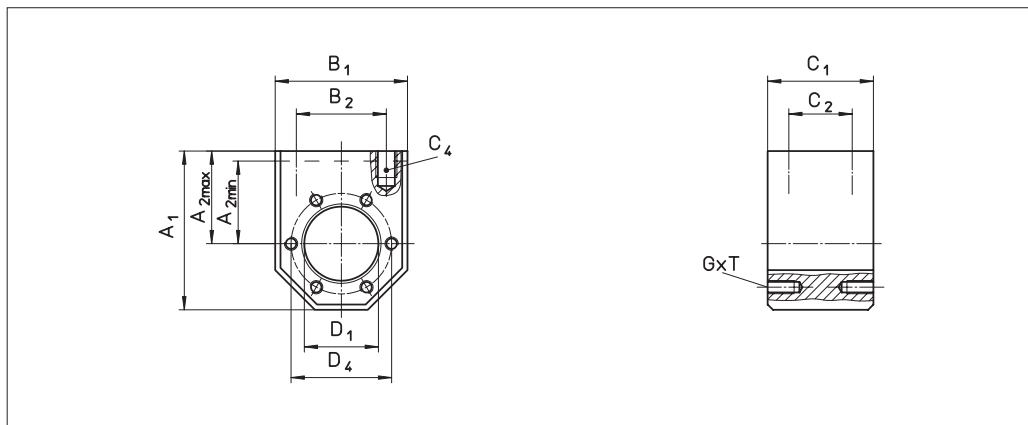
Supporto adattatore

Supporto adattatore KON

Supporto adattatore per fissaggio radiale delle chiocchie flangiate per viti trapezoidali EFM.

Materiale:

1.0065 (St37) /
1.0507 (St52)



Per EFM	Dimensioni (mm)										
	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
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} (fornitura)

Accessori azionamenti a vite trapezoidale

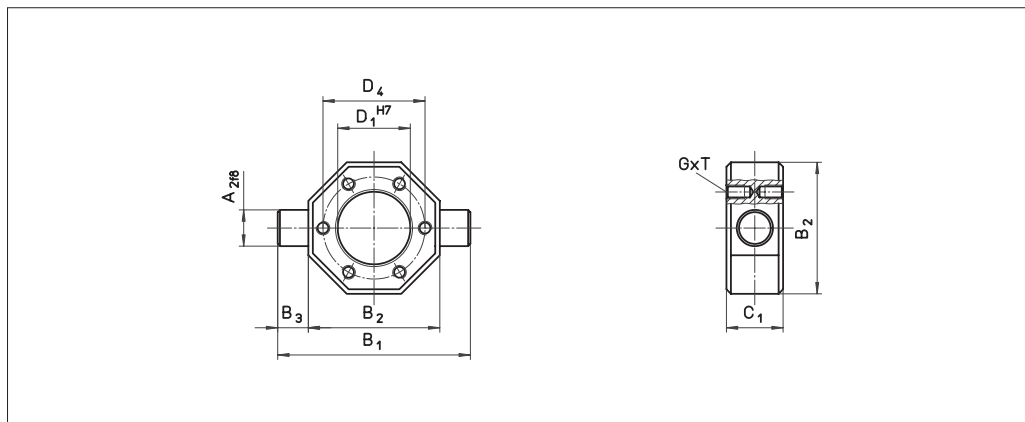
Adattatore cardanico

Adattatore cardanico KAR

Adattatore cardanico per sollevamento cardanico delle chiocciole flangiate per viti trapezoidali EFM.

Materiale:

1.0065 (St37) / 1.0507 (St52)



Per EFM	Dimensioni [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

Azionamenti a vite trapezoidale

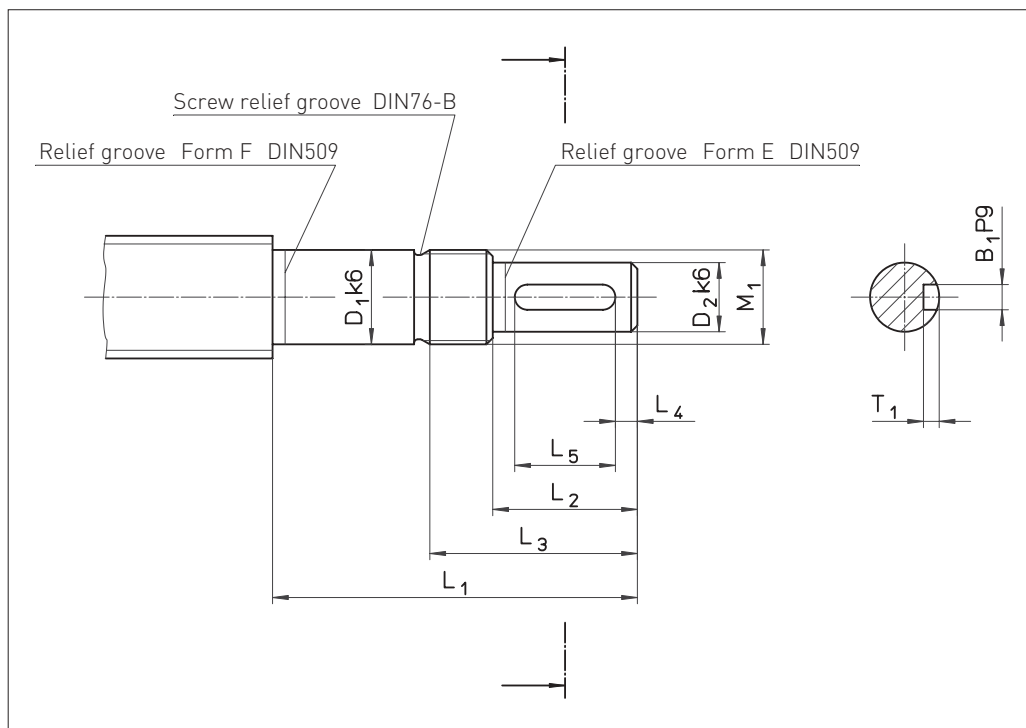
Lavorazione terminali per cuscinetto mobile e fisso

Form D – L

Lavorazione terminali per cuscinetto mobile e fisso

Il tipo di posizionamento influenza la rigidità dell'intero azionamento, nonché il comportamento alla piegatura e alle oscillazioni torsionali. In base ai diversi tipi di posizionamento vengono eseguite le necessarie lavorazioni terminali per viti trapezoidali.

Nota: i cuscinetti non fanno parte della fornitura.



Form aD TGS	Dimensioni [mm]									Bearing ZKLF...2RS
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
Tr18/20/22x...	12	9	55	20	32	2,5	16	M 12x1	3x1,8	1255
Tr24/26x...	15	11	58	23	35	3,5	16	M 15x1	4x2,5	1560
Tr28/30/32x...	20	14	70	30	44	4	22	M 20x1	5x3	2068
Tr36x...	25	19	82	40	57	6	28	M 25x1,5	6x3,5	2575
Tr40/44/48/50x...	30	24	92	50	67	7	36	M 30x1,5	8x4	3080

Forma F TGS	Dimensioni [mm]									Bearing ZARN...LTN
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
Tr22/24/26x...	15	11	73	23	35	3,5	16	M 15x1	4x2,5	1545
Tr28/30/32x...	20	14	88	30	45	4	22	M 20x1	5x3	2052
Tr28/30/32x...	20	14	107	30	50	4	22	M 20x1	5x3	2062
Tr36/40/44x...	25	19	105	40	58	6	28	M 25x1,5	6x3,5	2557
Tr36/40/44x...	25	19	120	40	63	6	28	M 25x1,5	6x3,5	2572
Tr48/50x...	35	28	145	60	82	10	40	M 35x1,5	8x4	3585
Tr60/70x...	40	36	175	80	103	8,5	63	M 40x1,5	10x5	4090
Tr80x...	55	48	215	110	136	10	90	M 55x2	14x5,5	55115

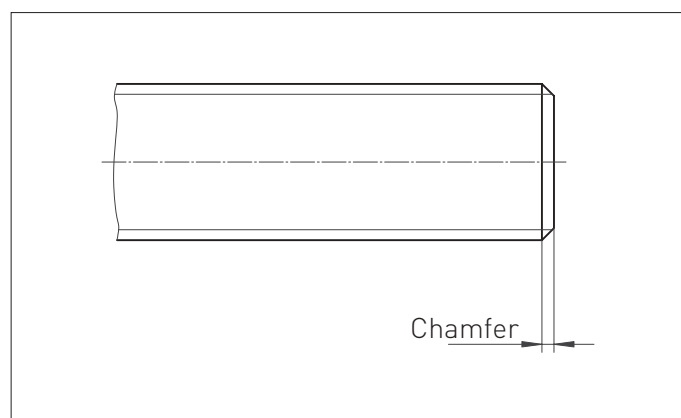
Azionamenti a vite trapezoidale

Lavorazione terminali per cuscinetto mobile e fisso

Forma H	Dimensioni (mm)									Cuscinetto ZARF...LTN
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
TGS										
Tr22/24/26x...	15	11	85	23	35	3,5	16	M 15x1	4x2,5	1560
Tr28/30/32x...	20	14	102	30	44	4	22	M 20x1	5x3	2068
Tr28/30/32x...	20	14	122	30	49	4	22	M 20x1	5x3	2080
Tr36/40/44x...	25	19	120	40	57	6	28	M 25x1,5	6x3,5	2575
Tr36/40/44x...	25	19	135	40	63	6	28	M 25x1,5	6x3,5	2590
Tr48/50x...	35	28	160	60	81	10	40	M 35x1,5	8x4	35110
Tr60/70x...	40	36	195	80	105	8,5	63	M 40x1,5	10x5	40115
Tr80x...	55	48	235	110	135	10	90	M 55x2	14x5,5	55145

Forma J	Dimensioni (mm)									Cuscinetto FDX
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
TGS										
Tr20/22x...	12	9	88	20	32	2,5	16	M 12x1	3x1,8	12
Tr24/26x...	15	11	92	23	35	3,5	16	M 15x1	4x2,5	15
Tr28/30/32x...	20	14	107	30	44	4	22	M 20x1	5x3	20
Tr36/40/44x...	25	19	122	40	57	6	28	M 25x1,5	6x3,5	25
Tr48/50x...	30	24	136	50	72	7	36	M 30x1,5	8x4	30
Tr60x...	40	36	182	80	102	8,5	63	M 40x1,5	10x5	40

Forma L	Dimensioni (mm)									Cuscinetto
	D ₁	D ₂	L ₁	L ₂	L ₃	L ₄	L ₅	M ₁	B ₁ xT ₁	
TGS										
Tr16/18x...	10	8	55	20	30	–	–	M 10x0,75	–	7200 BE RS
Tr20/22x...	12	9	58	20	30	2,5	16	M 12x1	3x1,8	7201 BE RS
Tr24/26x...	15	11	73	23	33	3,5	16	M 15x1	4x2,5	7202 BE RS
Tr28/30/32x...	20	14	88	30	43	4	22	M 20x1	5x3	7204 BE RS
Tr36/40/44x...	25	19	120	40	55	6	28	M 25x1,5	6x3,5	7205 BE RS
Tr48/50x...	35	28	145	60	77	10	40	M 35x1,5	8x4	7207 BE RS
Tr60x...	40	36	175	80	103	8,5	63	M 40x1,5	10x5	7208 BE RS
Tr70/80x...	55	48	215	110	133	10	90	M 55x2	14x5,5	7211 BE RS



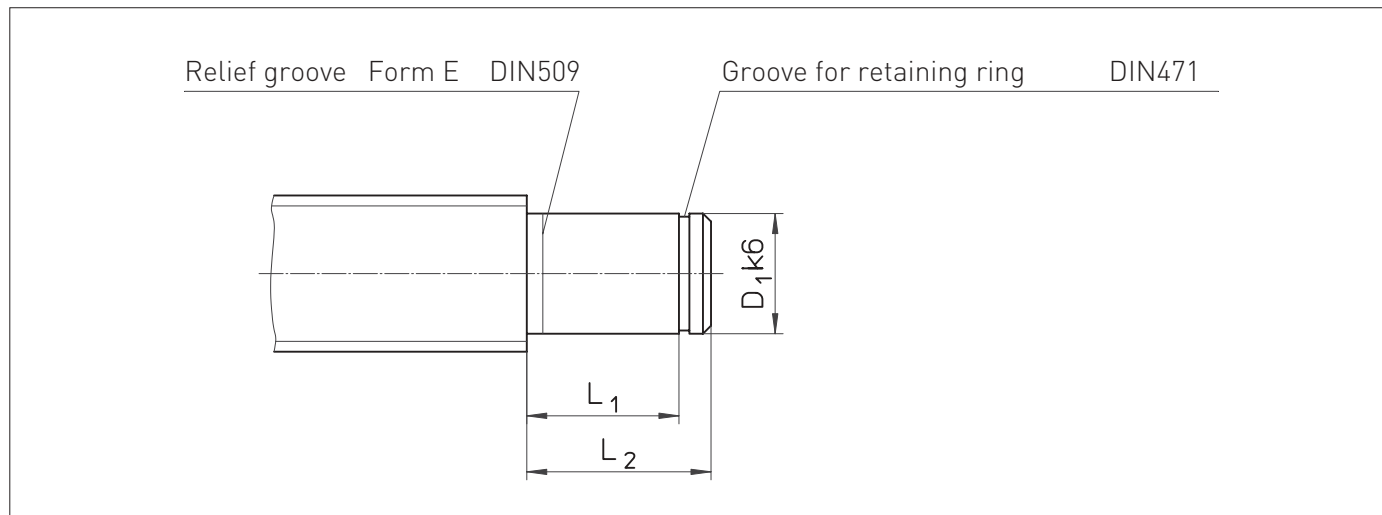
Forma Z

Smusso 2 x 45°: TGS with \varnothing 12 – 25 mm
 Smusso 3 x 45°: TGS with \varnothing 26 – 40 mm
 Smusso 4 x 45°: TGS with \varnothing 44 – 50 mm

Azionamenti a vite trapezoidale

Lavorazione terminali per cuscinetto mobile e fisso

Forma S – W



Forma S	Dimensioni [mm]			Boccola distanziale	Cuscinetto
	D_1	L_1	L_2		
TGS					
Tr18/20x...	12	40	45	18x12,1x24	6001 RS
Tr22/24/26x...	15	46	51	21x15,1x28	6002 RS
Tr28/30/32x...	20	53	58	27x20,1x29	6004 RS
Tr36x...	25	53	58	32x25,1x23	6205 RS
Tr40/44/48/50x...	30	60	68	40x30,1x28	6206 RS
Tr60x...	40	80	88	50x40,1x44	6208 RS
Tr70/80x...	55	102	110	65x55,1x60	6211 RS

Forma T	Dimensioni [mm]			Anello interno	Cuscinetto a rullini
	D_1	L_1	L_2		
TGS					
Tr18/20x...	12	40	45	2 IR 12x16x20	HK 1614 RS
Tr22/24/26x...	15	46	51	2 IR 15x20x23	HK 2018 RS
Tr28/30/32x...	20	53	58	2 LR 20x25x26,5	HK 2518 RS
Tr36x...	25	53	58	2 LR 25x30x26,5	HK 3018 RS
Tr40/44/48/50x...	30	60	68	2 LR 30x35x30	HK 3518 RS
Tr60x...	40	80	88	4 LR 40x45x20	HK 4518 RS

Forma W	Dimensioni [mm]			Cuscinetto
	D_1	L_1	L_2	
TGS				
Tr14/16x...	10	8	12	6000 RS
Tr18/20x...	12	8	12	6001 RS
Tr22/24/26x...	15	9	13	6002 RS
Tr28/30/32x...	20	12	16	6004 RS
Tr36x...	25	15	20	6205 RS
Tr40/44/48/50x...	30	16	21	6206 RS
Tr60x...	40	18	25	6208 RS
Tr70/80x...	55	21	29	6211 RS

Forma K: Versione speciale, secondo disegno del cliente

Trapezoidal screw drives

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 provision for the 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 mm².

The permissible speed can be calculated from the supporting surface of the respective nut (see tables pp. 37 – 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 / GG25	200

Required bearing surface

$$A_{\text{erf}} = \frac{F_{\text{ax}}}{P_{\text{zul}}} \quad (\text{VIII})$$

A_{erf} Required bearing surface [mm²]

F_{ax} Total axial load [N]

P_{zul} Maximum permissible surface pressure = 5 N/mm²

Maximum linear running speed

$$v_{\text{Gzul}} = \frac{\text{pv-factor}}{P_{\text{zul}}} \quad (\text{IX})$$

pv-factor see table

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

Maximum permissible speed of rotation

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

D Flank diameter [mm]

n_{zul} Maximum permissible speed of rotation [rpm]

Permissible feed speed

$$s_{\text{zul}} = \frac{n_{\text{zul}} \cdot P}{1000} \quad (\text{XI})$$

P Thread lead [mm]

s_{zul} Permissible feed speed [m/min]

Trapezoidal screw drives

Sizing and selection

Example load rating calculation

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

Required: What travel speed is still permissible at this load?
?

A_{erf} Required bearing surface [mm²]

$$\text{from (VIII)} \quad A_{erf} = \frac{F_{ax}}{P_{zul}} = \frac{10000 \text{ N}}{5 \text{ N/mm}^2} = 2000 \text{ mm}^2$$

Selection of bronze nut EFM of technical data → page 39

36x6 with bearing surface $A = 2140 \text{ mm}^2$

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]

$$\text{from (IX)} \quad V_{Gzul} = \frac{pv\text{-factor}}{P_{zul}} = \frac{300 \text{ N/mm}^2 \cdot \text{m/min}}{5 \text{ N/mm}^2} = 60 \text{ m/min}$$

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

n_{zul} Maximum permissible speed [rpm]

$$\text{from (X)} \quad n_{zul} = \frac{V_{Gzul} \cdot 1000}{D \cdot \pi} = \frac{60 \text{ m/min} \cdot 1000 \text{ mm/m}}{33 \text{ mm} \cdot \pi} = 579 \text{ rpm}$$

s_{zul} Permissible feed speed

$$\text{from (XI)} \quad s_{zul} = \frac{n_{zul} \cdot P}{1000} = \frac{579 \text{ 1/min} \cdot 6 \text{ mm}}{1000 \text{ mm/m}} = 3,474 \text{ m/min}$$

Result:



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

Trapezoidal screw drives

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

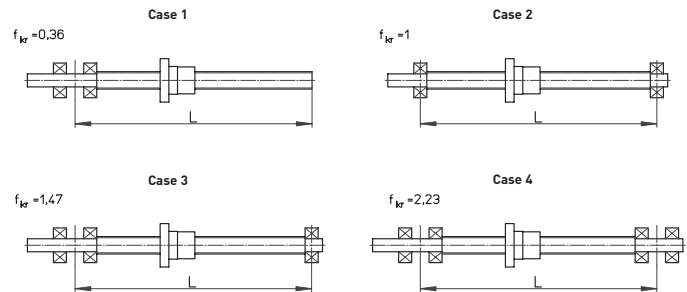
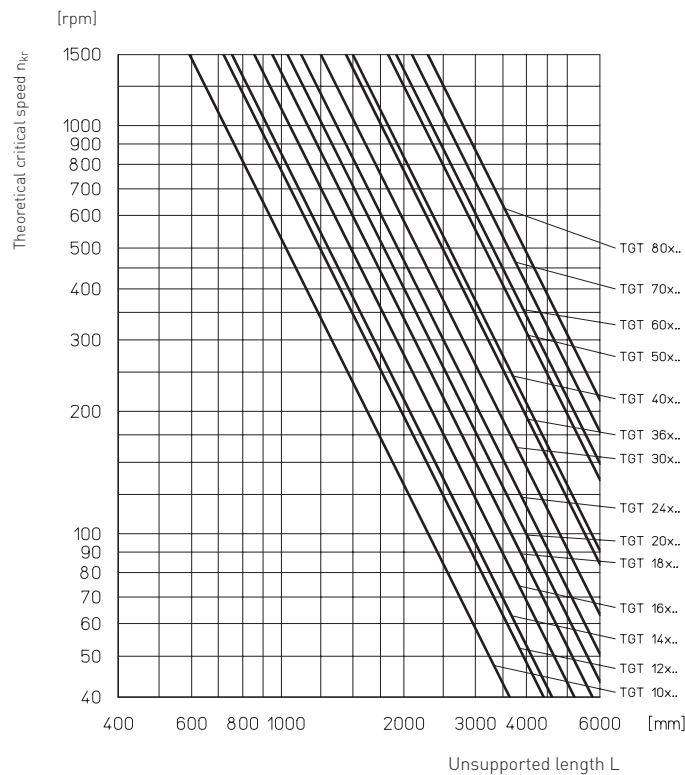
$$n_{zul} = 0,8 \cdot n_{kr} \cdot f_{kr} \quad (XII)$$

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.



Trapezoidal screw drives

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

$$F_{zul} = 0,8 \cdot F_k \cdot f_k \quad (\text{XIII})$$

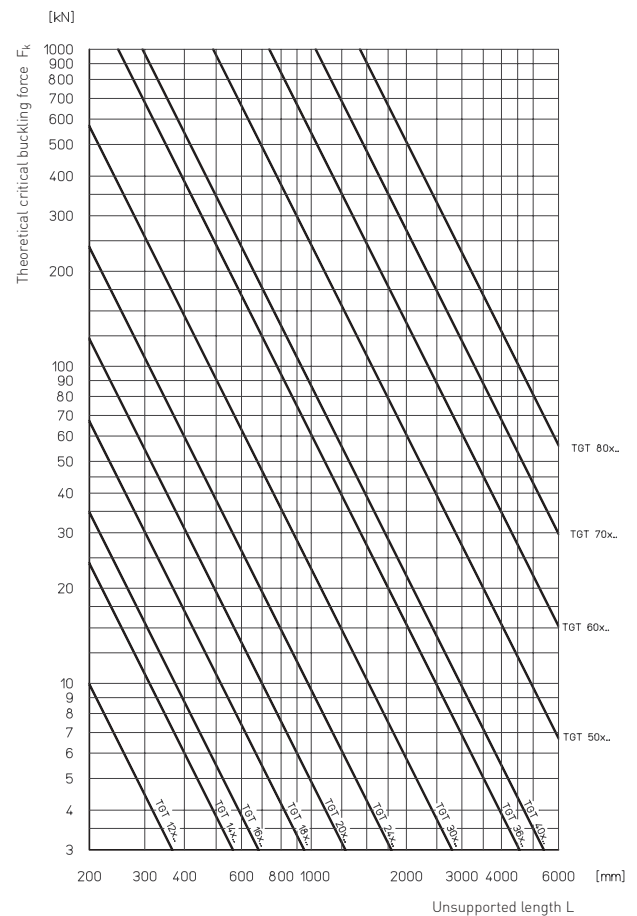
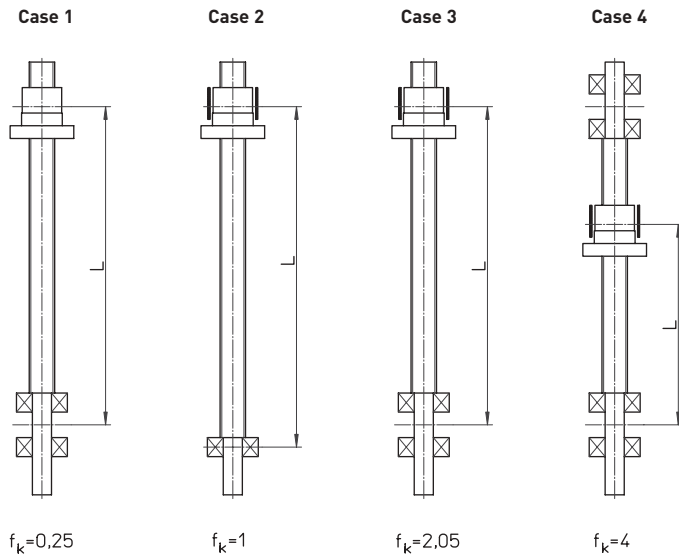
F_{zul} Maximum permissible axial force [kN]
 F_k Theoretical critical buckling force [kN] → see diagram
 f_k Correction factor considering the bearing support of the screw. → see table

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

Bearing support

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

Theoretical critical buckling force F_k



Trapezoidal screw drives

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

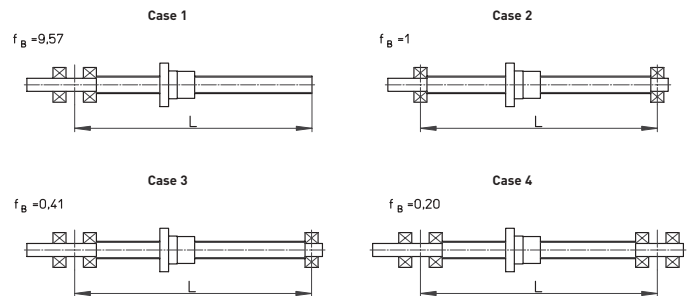
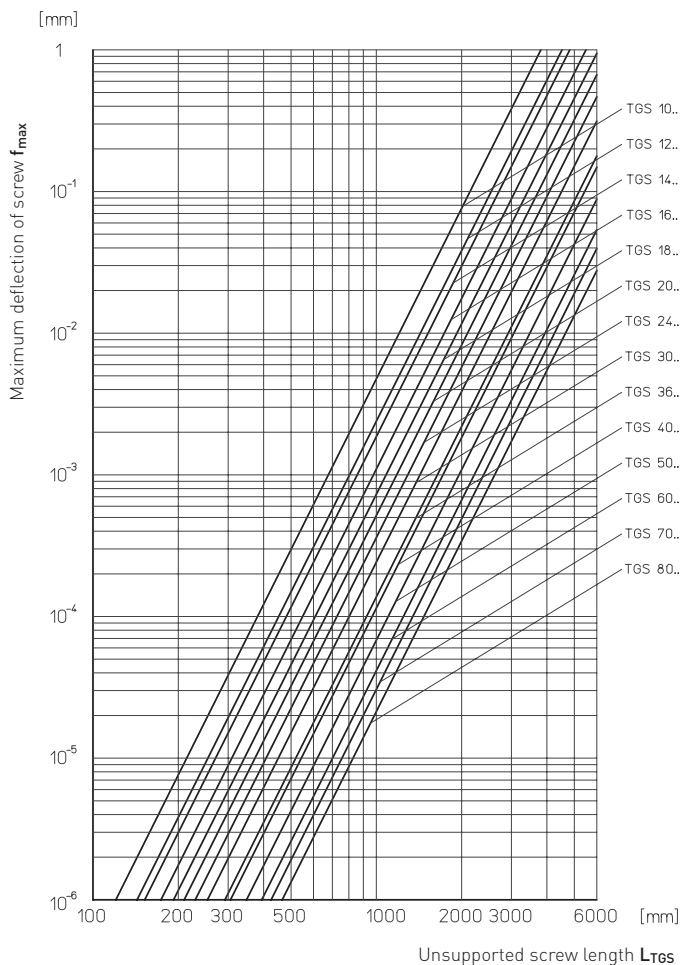
$$f_{\max} = f_B \cdot 0,061 \cdot \frac{m'_{TGS} \cdot L_{TGS}}{I_Y} \quad (XIV)$$

f_{\max} Maximum deflection of screw [mm]
 f_B Correction factor considering the bearing support of the screw. ➔ see table
 I_Y Planar moment of inertia [mm⁴]
 ➔ see table page 35
 L_{TGS} Unsupported screw length [mm]
 m'_{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.



Trapezoidal screw drives

Sizing and selection

Example calculation for a trapezoidal screw drive

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

Required: 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)

$$f_{\max} = f_B \cdot 0,061 \cdot \frac{m'_{TGS} \cdot L_{TGS}}{I_Y} = 1 \cdot 0,061 \cdot \frac{2,85 \text{ kg/m} \cdot 1,5 \text{ m}}{0,460 \text{ cm}^4}$$

$$f_{\max} = 0,57 \text{ mm}$$

Weight $m'_{TGS} = 2,85$ kg/m

Planar moment of inertia $I_Y = 0,460$ cm⁴

➔ 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)

Trapezoidal screw drives

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

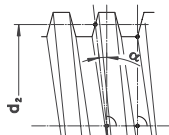
$$M_d = \frac{F_{ax} \cdot P}{2000 \cdot \pi \cdot \eta_A} + M_{rot} \quad (XV)$$

F_{ax}	Total axial load [N]
P	Thread lead [mm]
η_A	Efficiency of the overall drive $= \eta_{TGT} \cdot \eta_{fixed\ bearing} \cdot \eta_{movable\ bearing}$ $\eta_{TGT} (\mu = 0,1) \rightarrow$ see table page 35 $\eta_{fixed\ bearing} = 0,9 \dots 0,95$ $\eta_{movable\ bearing} = 0,95$
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 [kgm ²] d Nominal screw diameter [mm] L Screw length [mm] α_0 Angular acceleration [1/s ²]

Efficiency η for coefficients of friction other than $\mu = 0,1$

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

(XVI)



η	Efficiency for converting a rotary motion into a linear motion
α	Helical angle of the thread [°] \rightarrow 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	$\approx 0,3$	$\approx 0,1$	$\approx 0,1$	$\approx 0,04$
Plastic nuts	$\approx 0,1$	$\approx 0,04$	$\approx 0,1$	$\approx 0,03$

Required drive power

$$P_a = \frac{M_d \cdot n}{9550} \quad (XVII)$$

(XVII)

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

Trapezoidal screw drives

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

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

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 [kgm²]
 d Nominal screw diameter [mm]
 L Screw length [mm]
 α_0 Angular acceleration [1/s²]



Ball screw drive KOKON

With all-round protection for rugged conditions

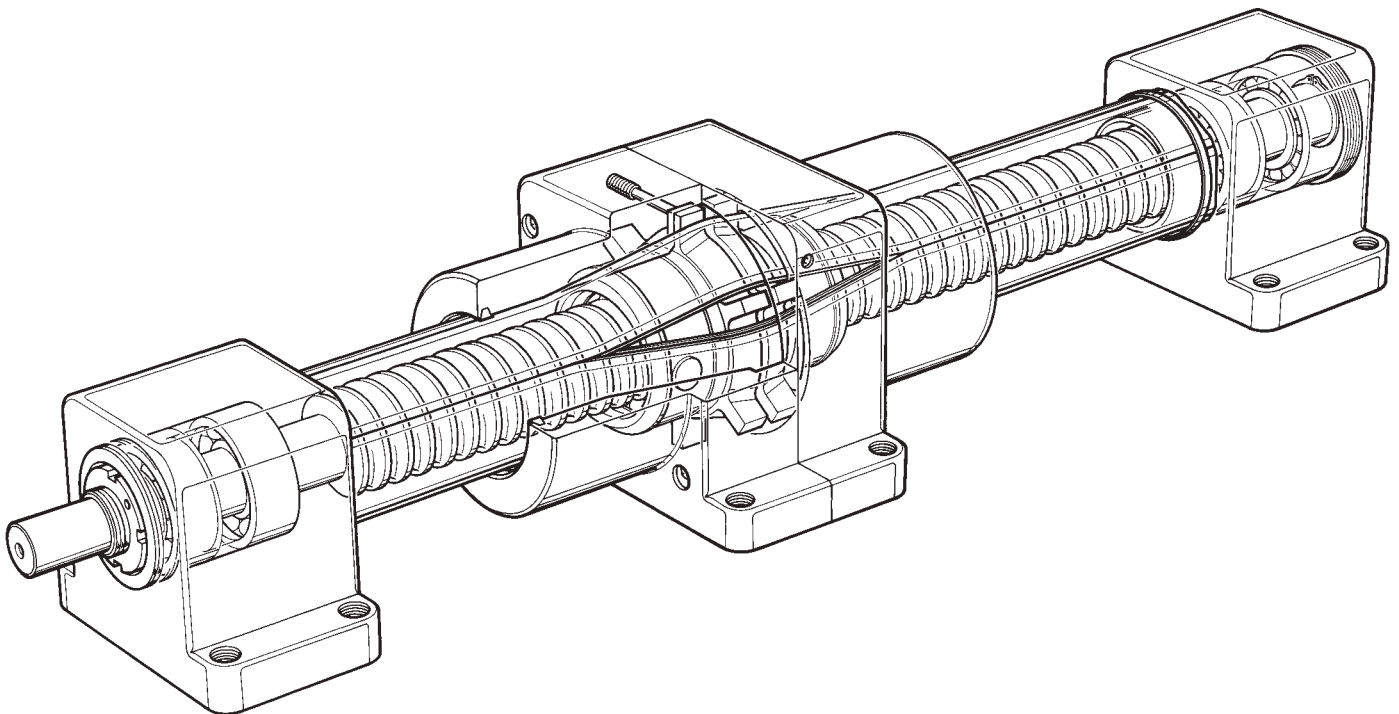
The KOKON ball screw drive is optimised for rugged use in dirty surroundings and in applications with long travel.

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.

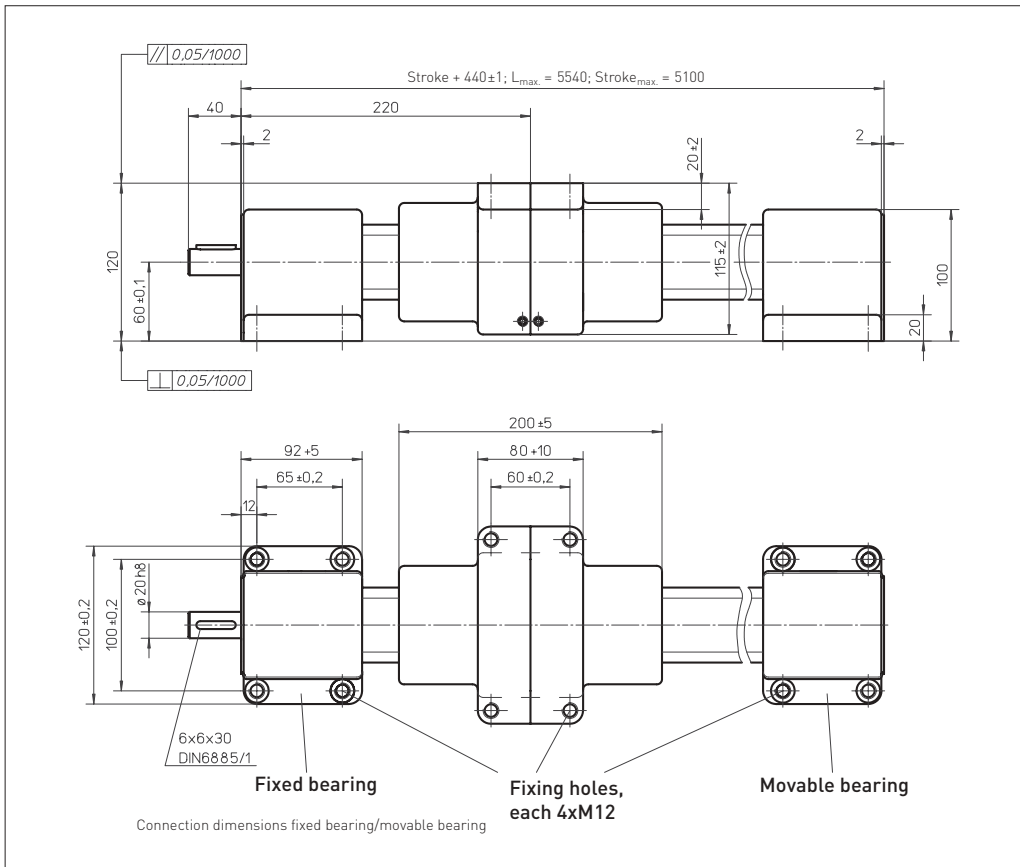
The covers for the ball screw drive are made of the shock-proof elastomer plastic PA12. Simple maintenance through easily accessible lubrication system.

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

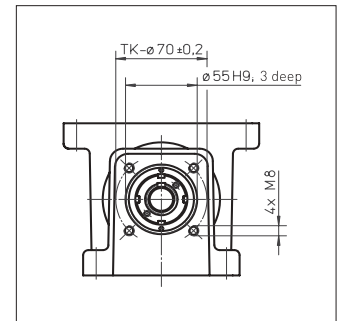


KOKON

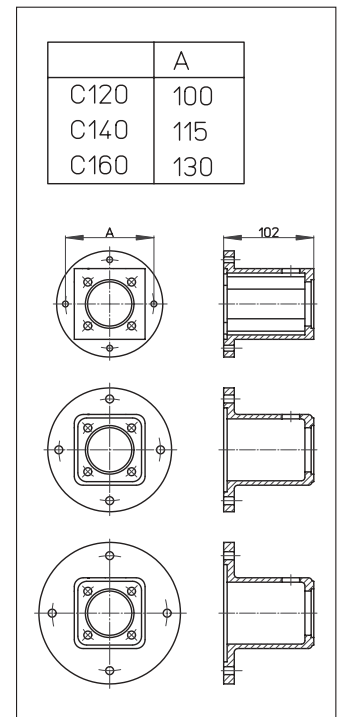
Fully protected ball screw drive



Position of installation
(viewed from fixed bearing)



Accessories motor covers



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:	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
	C ¹⁾ 23000 N	42000 N
	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

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

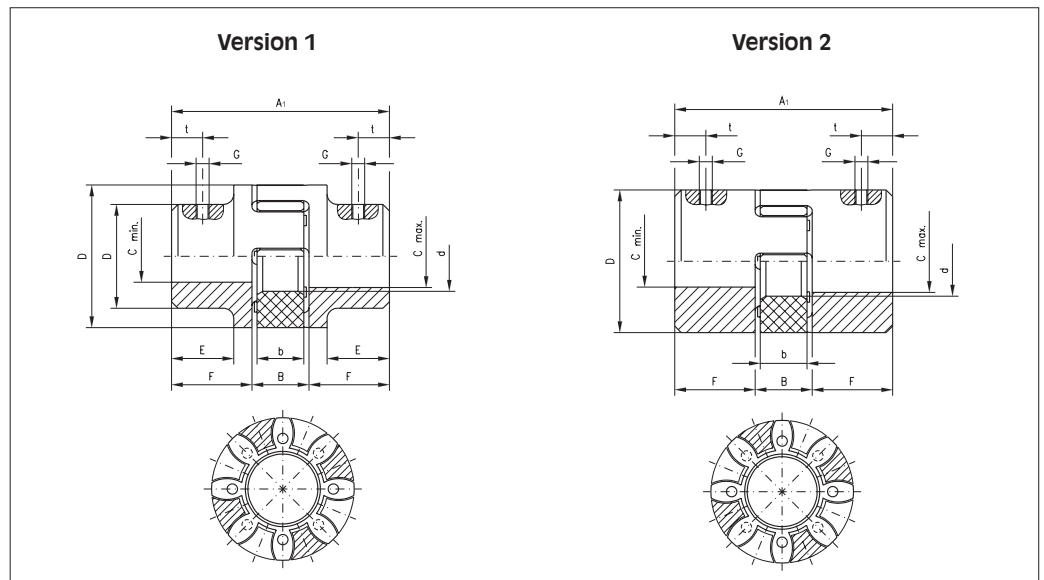
²⁾ DIN 69051 draft may 1989

Principles of selection see pp. 25 ff.

Order code see page 61

Flexible couplings RA, RC

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.

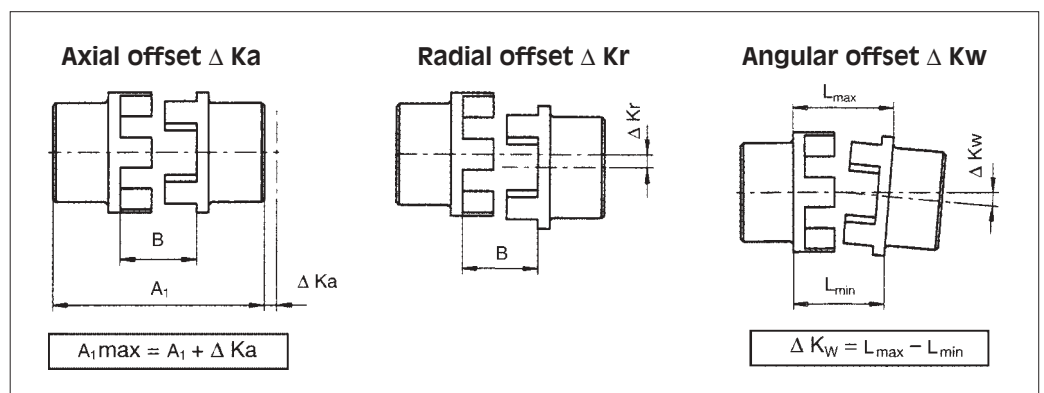


Size	Version	Max. M_d [Nm]	Dimensions [mm]										Offset				Locking screw		Weight [kg]
			A1	E	F	B	b	D1	D	d	$C_{min}^{1)}$	$C_{max}^{1)}$	max. axial-stagger ΔK_a [mm]	max. radial non-alignment $n=1500$ 1/min. ΔK_r [mm]	ΔK_w [°] max. angle stagger at $n=1500$ 1/min ΔK_w [mm]		Dim. G	Dim. t	
RA 14	2	7,5	35	-	11	13	10	-	30	10	6	15	1,0	0,17	1,2	0,67	M 4	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	M 5	10	0,15
RA 19/24	2	10	66	-	25	16	12	-	41	18	19	24	1,2	0,20	1,2	0,82	M 5	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	M 5	10	0,25
RA 24/28	2	35	78	-	30	18	14	-	56	27	22	28	1,4	0,22	0,9	0,85	M 5	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	M 6	15	0,40
RA 28/38	2	95	90	-	35	20	15	-	67	30	28	38	1,5	0,25	0,9	1,05	M 6	15	0,55
RA 38	1	190	114	37	45	24	18	66	80	38	16	38	1,8	0,28	1,0	1,35	M 8	15	0,85
RA 42	1	265	126	40	50	26	20	75	95	46	28	42	2,0	0,32	1,0	1,70	M 8	20	1,2
RA 48	1	310	140	45	56	28	21	85	105	51	28	48	2,1	0,36	1,1	2,00	M 8	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.

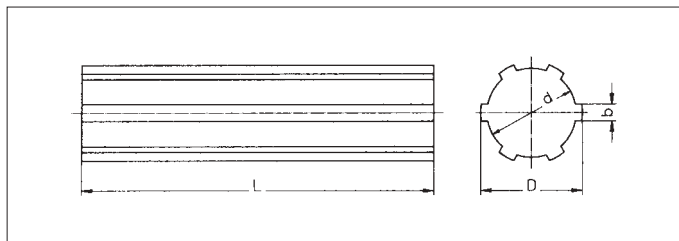


General Accessories

Splined shafts/Sliding sleeve blanks

KW Splined shafts

Material: CK 45
Following DIN 5463

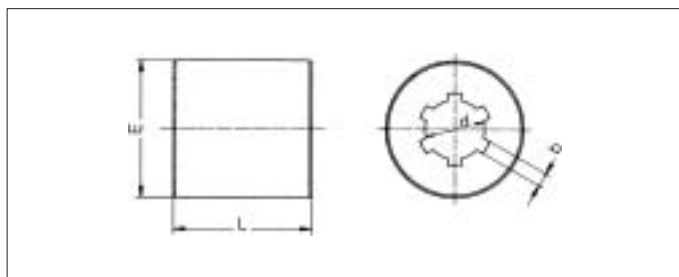


Type	Dimensions [mm]			Weight [kg/m]
	$\varnothing D$ -0,07 -0,27	$\varnothing d$ +0,0 -0,08	b +0,0 -0,08	
KW 13	16	13	3,5	1,20
KW 16	20	16	4	1,90
KW 21	25	21	5	2,10
KW 26	32	26	6	5,00
KW 42	48	42	8	12,30
KW 46	54	46	9	15,30

Straightness: 0,5 – 0,6 mm/300 mm
Straightness: 0,1 mm/300 mm on request

SR Sliding sleeve blank

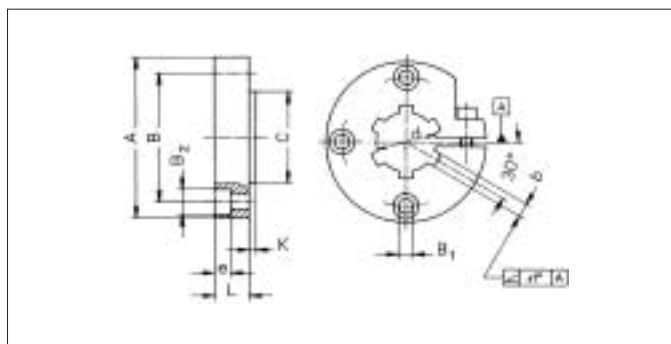
Material: 9 Smn 28 K
Following DIN 5463



Type	Dimensions [mm]			L	Weight [kg/piece]
	$\varnothing d$ G 6	b F 9	$\varnothing E$		
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 harmonised
with ES
Following DIN 5463



Type	Number of grooves	Dimensions [mm]										Weight [kg/piece]
		$\varnothing d$ G 6	b F 9	$\varnothing A$	$\varnothing B$	$\varnothing B_1$	$\varnothing B_2$	e	$\varnothing C$ f 7	K	L	
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

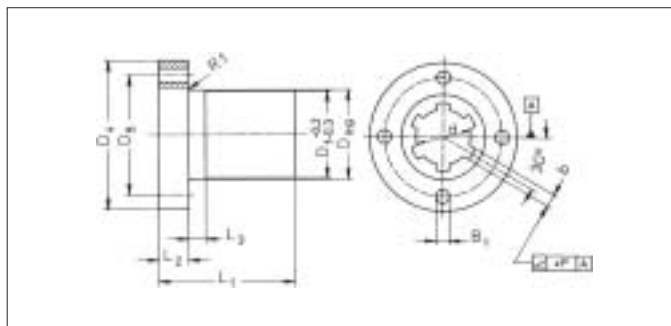
Order code see page 62

General Accessories

Splined shafts/Sliding sleeve blanks

ES Sliding sleeve, ready to install

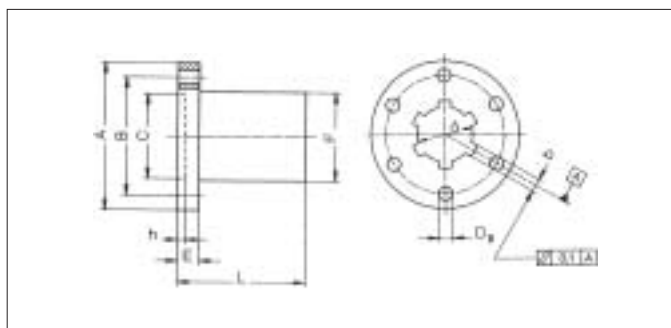
Material: C 45
Grooves not
harmonised with
holes
Following DIN 5463



Type	Number of grooves	Dimensions (mm)										Weight (kg/piece)
		ø d G 6	b F 9	ø A	ø B	ø B1	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
harmonised with
holes
Following DIN 5463



Type	Number of grooves	Dimensions (mm)									Weight (kg/piece)
		ø d G 6	b F 9	D1	D4	D5	D6	L1	L2	L3	
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

Order code see page 62

Installation and maintenance of ball screw drives

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:

- NEFF KGT-KOKON ball screw drives with self-closing cover strips (see p. 55)
- 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 lifetime 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 mm²/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 lifetime is not sufficient because of the seepage of grease.

Grease type: Roller bearing grease without solid lubricant shares. 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 NLGI2 in accordance with DIN ISO 2137. You will find detailed information on the required quantities of grease in the Internet at www.neffaa.de

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.

Installation and maintenance of trapezoidal screw drives

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).

Never the less 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.

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.

Order Code

Ball screw drives / ball screws / KOKON

Structure of Order Code:

Ball screw drive/ball screw

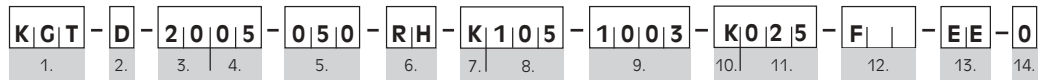


- 1. Product**
KGT = Ball screw drive complete
KGS = Ball screw
KGF = Flanged ball nut
KGM = Cylindrical ball nut
- 2. Nut version¹⁾**
D = Version in accordance with DIN 69051
N = NEFF standard
- 3. Nominal thread diameter (mm)**
- 4. Thread lead (mm)**
- 5. Lead accuracy**
50 µm/300 mm
- 6. Thread direction**
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. 22 ff
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 from D, F, H, J, L, S, T, W, Z see p. 22 ff
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 configuration¹⁾**
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 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. Sealform¹⁾**
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:

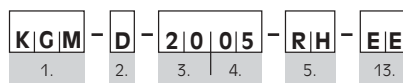
1 Ball screw drive complete with machined screw ends



- 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:

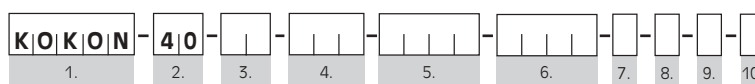
1 Cylindrical ball nut

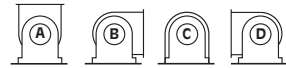


- 1. Product**
KGM = Cylindrical ball nut
- 2. Nut version**
D = Version in accordance with DIN 69051
- 3. Nominal thread diameter (mm)**
- 4. Thread lead (mm)**
- 5. Lead accuracy (µm/300 mm)**
- 6. Thread direction**
RH = right hand thread
- 13. Sealform**
EE = Rubber wiper (standard)

Structure of Order Code:

KOKON



- 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 = NEFF standard versions

Installation position (view from fixed bearing)
- 10. Special version or with accessories**
0 = no
1 = yes

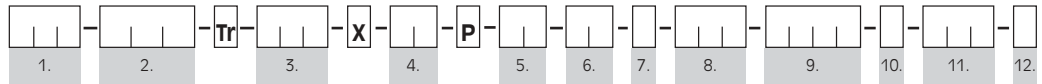
Order code

Trapezoidal screw drives / Spiral spring cover / Splined shafts



Structure of Order Code:

Trapezoidal screw drives



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

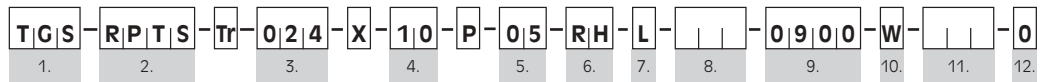
For »K« end length [mm]

12. Special version or with accessories

0 = No
1 = Yes

Example:

1 Trapezoidal screw with machined screw ends



1. Product

TGS = Trapezoidal screw

2. Type

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

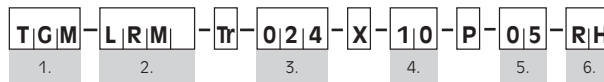
Standard ends form W

12. Special versions or with accessories

0 = No

Example:

1 Trapezoidal nut



1. Produkt

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



1. Product

SF = Spiral spring cover

2. Smallest diameter D8 [mm]

3. Overall length L8 [mm]

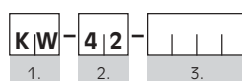
4. Smallest length L8 [mm]

5. Installation position

V = vertical
H = horizontal

Structure of Order Code:

Splined shafts



1. Product

KW = Splined shafts

2. Size

3. Length [mm]

Worldwide distribution network

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The following abbreviations show you which international service partner offers each product group:
ML = Mechanical linear drive units
SHG = Worm gear screw jacks
GT = Screw drives

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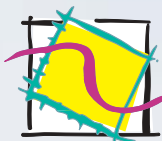
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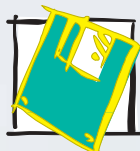
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