Eichenberger Gewinde

NEW: **Speedy** and **Rondo**
partly available in aluminum

100% Swiss made

Main Catalogue

Carry ball screws
Carry ***Speedline*** high-helix ball screws
Speedy high-helix lead screws
Rondo round thread lead screws

A company of the Festo Group

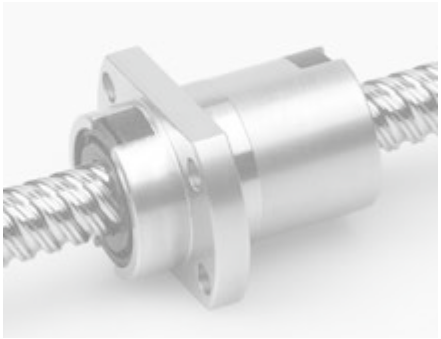
Summary description

Carry ball screws

Due to their premium quality and precision, the rolled Carry ball screws are suitable for all linear applications where heavy loads need to be transferred with optimum efficiency.

- ø 4–40 mm
- p 1–40 mm
- for high loads at medium moving speeds

pages 4/5 and 6–41

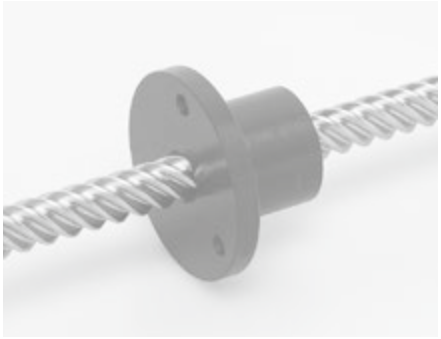


Carry Speed line high-helix ball screws

The cold-rolled, wear-resistant Carry *Speed-line* are marked by an extremely high helix. They provide for high moving speeds and deliver an efficiency which is nothing short of impressive.

- ø 8–25 mm
- p 10–50 mm
- for medium loads at high moving speeds

pages 4/5 and 42–51

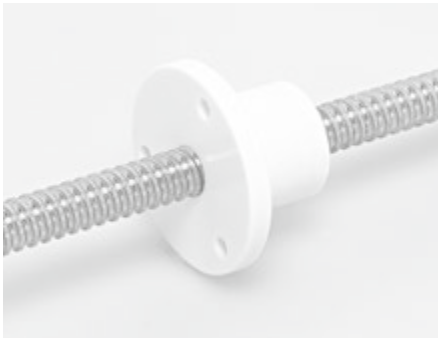


Speedy high-helix lead screws

The Speedy high-helix lead screws with helix up to 6 × diameter provide for maximum moving speeds at low rotational speeds or efficient conversion of linear to rotary movements.

- ø 4–36 mm
- p 4–200 mm
- for low loads at high moving speeds
- slide screw unit (steel, aluminium on request)

pages 52/53 and 54–77



Rondo round thread lead screws

The alternative to trapezoidal screws with remarkable efficiency.

- ø 6–16 mm
- p 2–5 mm
- for medium loads at medium moving speeds
- slide screw unit (steel, aluminium on request)

pages 52/53 and 78–84

Ball screw product range

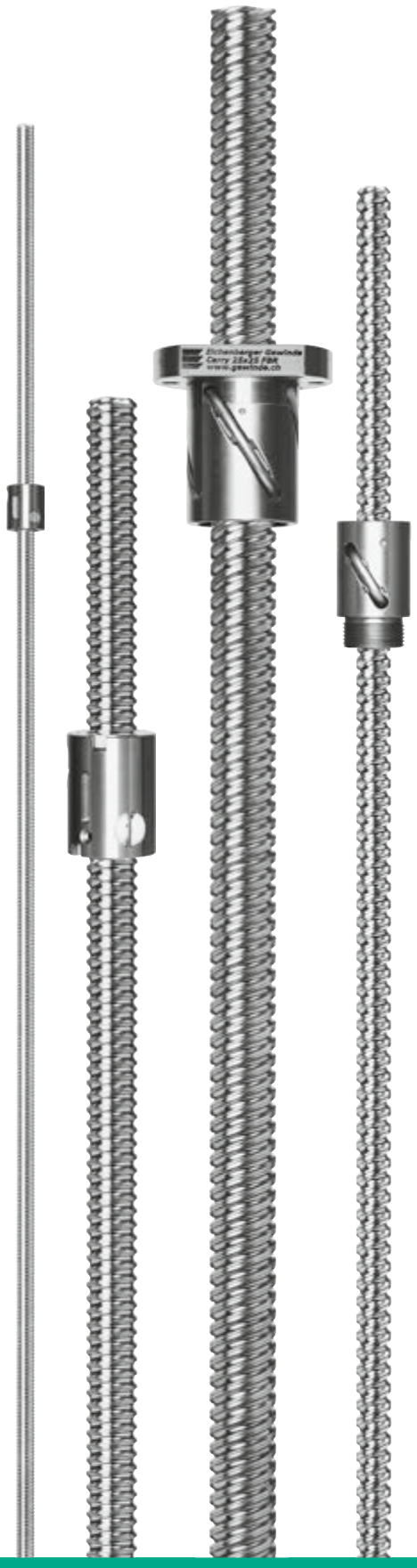
■ = standard range ● = ECONOMY range 2) = also available with left-hand thread

	type	$d_0 \times p$	4 × 1	5 × 2	5 × 3	6 × 1	6 × 2	8 × 1	8 × 1.5	8 × 2	8 × 2.5	8 × 3	8 × 5	8 × 8	8 × 12	10 × 2	10 × 3	10 × 4	10 × 10	12 × 2	12 × 3	12 × 4	12 × 5	12 × 10	12.7 × 12.7
Carry	ZYI		■	■		■		■	■	■	■	■				■ 2)		■		■ 2)					
Carry	ZYR									■	■		■				■ 2)		■			■			
Carry	FGI			●	●			●	●	●	●	●				● 2)	●	●		● 2)		●	●		
Carry	FGR						● 2)			●	●		●	●		● 2)	● 2)		●			●	● 2)	●	●
Carry	FBI		■			■		■		■								■					■		
Carry	FBR									■				■					■	■	■	■	■		
Carry Speedline	ZYE														■										
Carry Speedline	FBE														■										

Carry and Carry *Speedline* ball screws

12.7 × 25.4	■	■							12.7 × 25.4
14 × 2			■		●				14 × 2
14 × 4			■ 2)		● 2)	●	■ 2)	■	14 × 4
16 × 2			■		●	● 2)			16 × 2
16 × 5				■ 2)	● 2)	● 2)		■ 2)	16 × 5
16 × 10	■	■	■		●		■		16 × 10
16 × 16	■	■			●				16 × 16
16 × 50	■	■							16 × 50
20 × 2					● 2)				20 × 2
20 × 5				■ 2)	●	● 2)		■ 2)	20 × 5
20 × 10			■		●				20 × 10
20 × 20	■	■	■		●				20 × 20
25 × 5				■	●	●		■	25 × 5
25 × 10			■		●				25 × 10
25 × 25	■	■	■		●				25 × 25
25 × 30	■								25 × 30
32 × 5				■		●		■	32 × 5
32 × 10			■		●				32 × 10
32 × 15			■						32 × 15
32 × 32			■						32 × 32
40 × 5			■						40 × 5
40 × 20			■						40 × 20
40 × 40			■						40 × 40
pages	46–49	44/45	30–35	26–29	18–25	14–17	12/13	8–11	pages

Content Carry



Carry ball screws

Visit **www.gewinde.ch** for the latest on existing and/or new products.

Order system Carry

Example for complete ball screw — **KGT 16×5 FGR RH 1 S 350 G7 A E M**

Type of lead screw
KGT = Carry ball screw

Nominal size (d_0 × p) [mm]

Type of nut — for nut only
ZYI = cylindrical single nut with single-thread ball return
ZYR = cylindrical single nut with tube type ball return
FGI = nut with mounting thread and single-thread ball return
FGR = nut with mounting thread and tube type ball return
FBI = flange nut with single-thread ball return
FBR = flange nut with tube type ball return
MSX = special design according to drawing

Right-hand / left-hand thread
RH = right-hand thread (standard)
LH = left-hand thread (→ see dimensional charts)

Number of ball circulations — for nut only
1 = 1 ball circulation
2 = 2 ball circulations
3 = 3 ball circulations
4 = 4 ball circulations

Wiper (Seal) — for nut only
S = with wipers (plastic or brushes)
N = without wipers

Ball screw overall length [mm] — for screw only

Lead accuracy (class) — for screw only
G9 = ≤ 0.1 mm/300 mm (standard)
G7 = ≤ 0.052 mm/300 mm (on special request)
G5 = ≤ 0.023 mm/300 mm (on special request)

Backlash — for nut only
A = standard backlash (see dimensional charts)
R = reduced backlash upon specification

Screw end machining — for screw only
O = no end machining (cut by grinding, hardened ends; nut on mounting tube)
E = end machining according to drawing

Assembly
G = screw and nut separate
M = screw and nut assembled according to drawing/specified orientation

Example for screw only — **KGT 16×5 RH 350 G7 O G**

Example for nut only — **KGT 16×5 FGR RH 1 S A G**

Carry type «ZYI»

Cylindrical single nut with single-thread ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

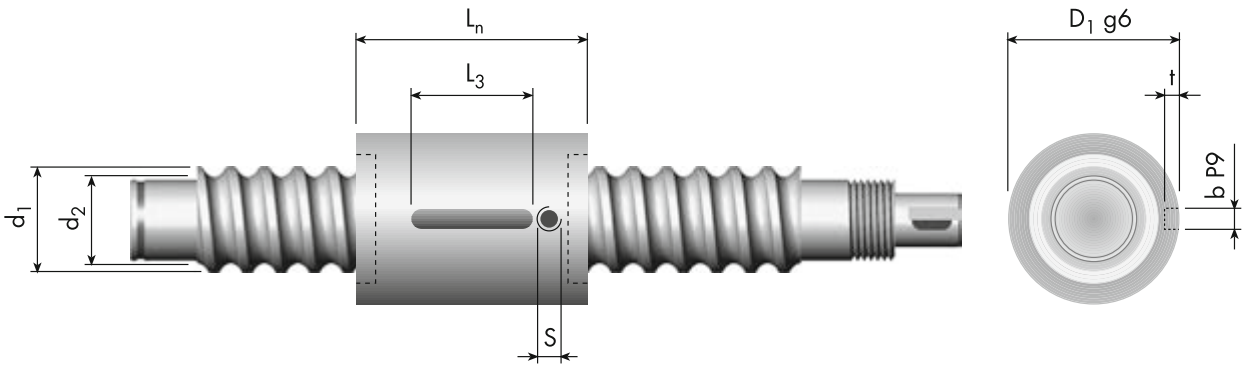
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «ZYI» (1/2)



Carry type «ZYI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	L_n	L_3	i	D_w	b P9	t	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
4 × 1	4.0	3.2	8	10	—	3×1	0.80	ø 2 $^{+0.1}_{0}$	1.0	—	—	0.03	430	580
5 × 2	5.0	4.0	10	14	8	3×1	0.80	2	1.0	—	—	0.03	500	800
6 × 1	6.0	5.0	12	14	8	3×1	0.80	2	1.2	—	—	0.03	600	1 000
8 × 1	8.0	7.0	14	14	8	3×1	0.80	2	1.2	—	—	0.03	700	1 200
8 × 1.5	8.0	6.7	14	14	8	3×1	1.20	2	1.2	—	—	0.04	800	1 300
8 × 2	8.0	6.5	16	20	8	3×1	1.59	2	1.2	—	—	0.05	1 400	2 000
8 × 2.5	8.0	6.6	16	22	10	3×1	1.59	3	2.0	—	—	0.05	1 400	2 100
8 × 2.5	8.0	6.6	16	22	10	3×1	1.59	3	2.0	ø 2	K	0.05	1 400	2 100
8 × 3	8.0	6.7	14	12	8	2×1	1.50	2	1.2	—	—	0.05	950	1 500
8 × 3 [3]	8.0	6.7	14	17	8	3×1	1.50	2	1.2	—	—	0.05	1 400	2 100
10 × 2	9.7	8.2	18	14	10	2×1	1.59	3	1.2	—	—	0.06	1 250	2 100
10 × 2 [3]	9.7	8.2	18	20	10	3×1	1.59	3	1.2	—	—	0.06	1 750	3 200
10 × 4	10.0	7.5	18	35	10	4×1	2.50	3	1.2	—	—	0.07	4 100	6 700
10 × 4	10.0	7.5	18	35	10	4×1	2.50	3	1.2	ø 2	K	0.07	4 100	6 700
12 × 2	12.0	10.6	20	15	10	2×1	1.59	3	1.2	—	—	0.06	1 380	2 500
12 × 2 [3]	12.0	10.6	20	20	10	3×1	1.59	3	1.2	—	—	0.06	2 000	4 000
left-hand threads														
10 × 2	9.7	8.2	18	14	10	2×1	1.59	3	1.2	—	—	0.06	1 250	2 100
10 × 2 [3]	9.7	8.2	18	20	10	3×1	1.59	3	1.2	—	—	0.06	1 750	3 200
12 × 2 [3]	12.0	10.6	20	20	10	3×1	1.59	3	1.2	—	—	0.06	2 000	4 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «ZYI»

Cylindrical single nut with single-thread ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

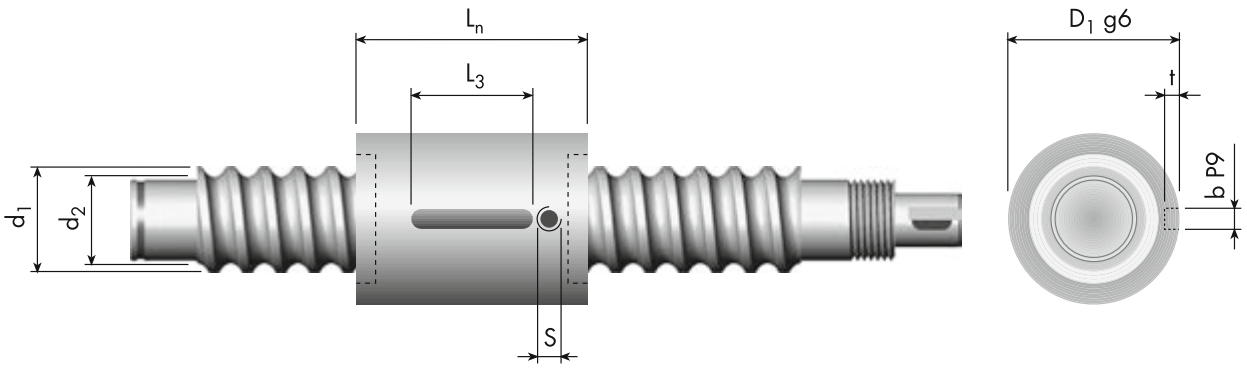
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «ZYI» (2/2)



Carry type «ZYI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	L_n	L_3	i	D_W	b P9	t	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
14 × 4	14.0	11.5	25	24	10	3×1	2.78	4	2.5	—	—	0.07	5000	8800
14 × 4	14.0	11.5	25	32	10	3×1	2.78	4	2.5	ø 4	K	0.07	5000	8800
16 × 5	15.7	13.0	30	43	16	3×1	3.50	4	2.5	M5	K	0.07	9700	22000
20 × 5	19.2	16.5	33	45	20	3×1	3.50	4	2.5	M5	K	0.07	10800	25000
25 × 5	24.6	21.5	38	50	20	3×1	3.50	4	2.5	M5	K	0.07	11700	30000
32 × 5	31.6	28.5	48	48	20	4×1	3.50	5	3.0	M5	K	0.07	19000	54000
left-hand threads														
16 × 5	15.7	13.0	30	43	16	3×1	3.50	4	2.5	M5	K	0.07	9700	22000
20 × 5	19.2	16.5	33	45	20	3×1	3.50	4	2.5	M5	K	0.07	10800	25000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «ZYR»

Cylindrical single nut with tube type ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
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Special designs available on request.
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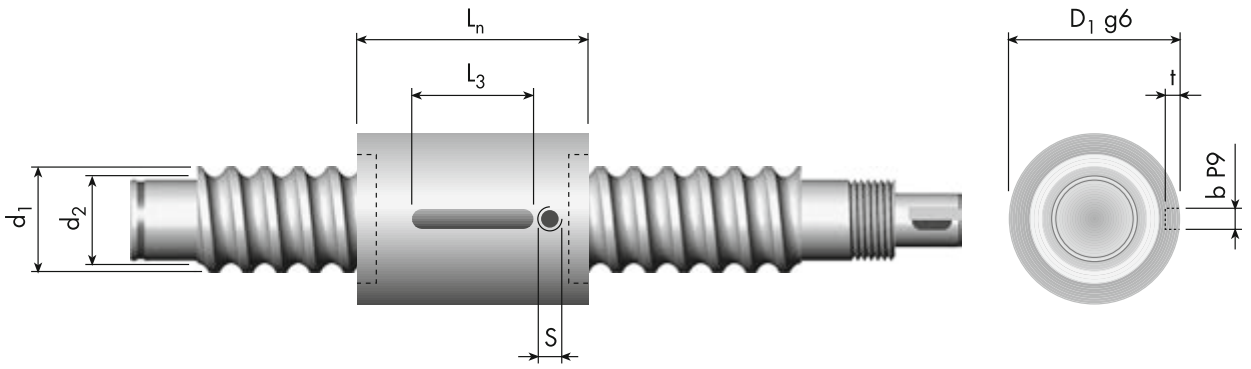
Quality management ISO 9001
Environmental management ISO 14001

Carry type «ZYR»



Carry type «ZYR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	L_n	L_3	i	D_W	b P9	t	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
8 × 2	8.0	6.5	18	14	8	1×3.5	1.59	2	1.2	—	—	0.06	2 000	3 200
8 × 2.5	8.0	6.6	18	16	10	1×3.5	1.59	3	2.0	—	—	0.06	2 000	3 200
8 × 5	8.0	6.7	18	19	10	2×2.5	1.50	3	2.0	—	—	0.06	1 960	3 470
10 × 3	9.9	7.8	22	24	10	1×3.5	2.00	3	2.0	—	—	0.06	2 800	5 000
10 × 3	9.9	7.8	22	24	10	1×3.5	2.00	3	2.0	ø 3.5	K	0.06	2 800	5 000
10 × 10	9.8	7.9	23	26	10	2×1.5	2.00	3	2.0	—	—	0.06	2 500	4 500
12 × 4	12.0	9.8	26	24	10	1×3.5	2.50	3	1.8	—	—	0.07	5 500	11 000
12 × 4	12.0	9.8	26	32	10	1×3.5	2.50	3	1.8	ø 4	K	0.07	5 500	11 000
14 × 4	14.0	11.5	29	24	16	1×3.5	2.78	4	2.5	—	—	0.07	8 100	16 000
14 × 4	14.0	11.5	29	32	16	1×3.5	2.78	4	2.5	ø 4	K	0.07	8 100	16 000
16 × 10	15.7	13.0	32	45	16	2×2.5	3.50	4	2.5	—	—	0.07	17 000	25 000
16 × 10	15.7	13.0	32	45	16	2×2.5	3.50	4	2.5	ø 4	K	0.07	17 000	25 000
left-hand threads														
10 × 3	9.9	7.8	22	24	10	1×3.5	2.00	3	2.0	—	—	0.06	2 800	5 000
10 × 3	9.9	7.8	22	24	10	1×3.5	2.00	3	2.0	ø 3.5	K	0.06	2 800	5 000
14 × 4	14.0	11.5	29	24	16	1×3.5	2.78	4	2.5	—	—	0.07	8 100	16 000
14 × 4	14.0	11.5	29	32	16	1×3.5	2.78	4	2.5	ø 4	K	0.07	8 100	16 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FGI»

Nut with mounting thread and single-thread ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
B = pin wrench hole (position not defined) [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

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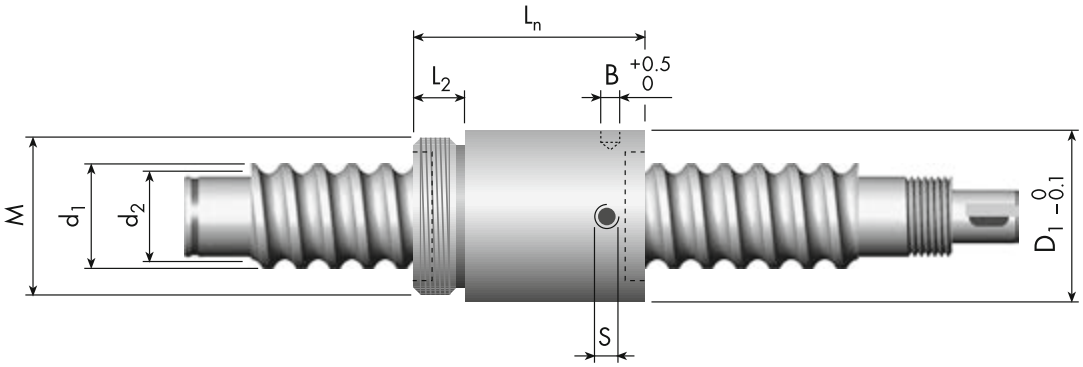
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FGI» (1/2)



Carry type «FGI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 0/–0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
5 × 2	5.0	4.0	10	M8×0.75	18	6	3×1	0.80	2.5	—	—	0.03	500	800
5 × 3	5.0	4.2	10	M8×0.75	19	6	2×1	0.80	2.5	—	—	0.03	340	490
5 × 3 [3]	5.0	4.2	10	M8×0.75	23	6	3×1	0.80	2.5	—	—	0.03	480	770
8 × 1	8.0	7.0	16	M14×1	22	8	3×1	0.80	2.5	—	—	0.03	700	1 200
8 × 1.5	8.0	6.7	16	M14×1	22	8	3×1	1.20	2.5	—	—	0.04	800	1 300
8 × 2	8.0	6.5	16	M14×1	28	8	3×1	1.59	2.5	—	—	0.05	1 400	2 000
8 × 2.5	8.0	6.6	16	M14×1	24	8	3×1	1.59	2.5	—	—	0.05	1 400	2 100
8 × 3	8.0	6.7	16	M14×1	25	8	3×1	1.50	2.5	—	—	0.05	1 400	2 100
10 × 2	9.7	8.2	18	M16×1	22	8	2×1	1.59	2.5	—	—	0.06	1 250	2 100
10 × 2 [3]	9.7	8.2	18	M16×1	28	8	3×1	1.59	2.5	—	—	0.06	1 750	3 200
10 × 3	9.9	7.8	20	M18×1	29	8	3×1	2.00	2.5	—	—	0.06	2 400	4 200
10 × 3	9.9	7.8	20	M18×1	29	8	3×1	2.00	2.5	ø 2	K	0.06	2 400	4 200
10 × 4	10.0	7.5	20	M18×1	40	8	4×1	2.50	2.5	—	—	0.07	4 100	6 700
10 × 4	10.0	7.5	20	M18×1	40	8	4×1	2.50	2.5	ø 2	K	0.07	4 100	6 700
12 × 2	12.0	10.6	20	M18×1	23	8	2×1	1.59	2.5	—	—	0.06	1 380	2 500
12 × 2 [3]	12.0	10.6	20	M18×1	28	8	3×1	1.59	2.5	—	—	0.06	2 000	4 000
12 × 4	12.0	9.8	24	M20×1	39	10	3×1	2.50	2.5	—	—	0.07	4 000	6 800
12 × 4	12.0	9.8	24	M20×1	39	10	3×1	2.50	2.5	ø 4	K	0.07	4 000	6 800
12 × 5	12.0	9.5	23	M20×1	42	10	3×1	2.78	3.0	—	—	0.07	5 000	8 600
12 × 5	12.0	9.5	23	M20×1	42	10	3×1	2.78	3.0	ø 4	K	0.07	5 000	8 600
left-hand threads														
10 × 2	9.7	8.2	18	M16×1	22	8	2×1	1.59	2.5	—	—	0.06	1 250	2 100
10 × 2 [3]	9.7	8.2	18	M16×1	28	8	3×1	1.59	2.5	—	—	0.06	1 750	3 200
12 × 2 [3]	12.0	10.6	20	M18×1	28	8	3×1	1.59	2.5	—	—	0.06	2 000	4 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FGI»

Nut with mounting thread and single-thread ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
B = pin wrench hole (position not defined) [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

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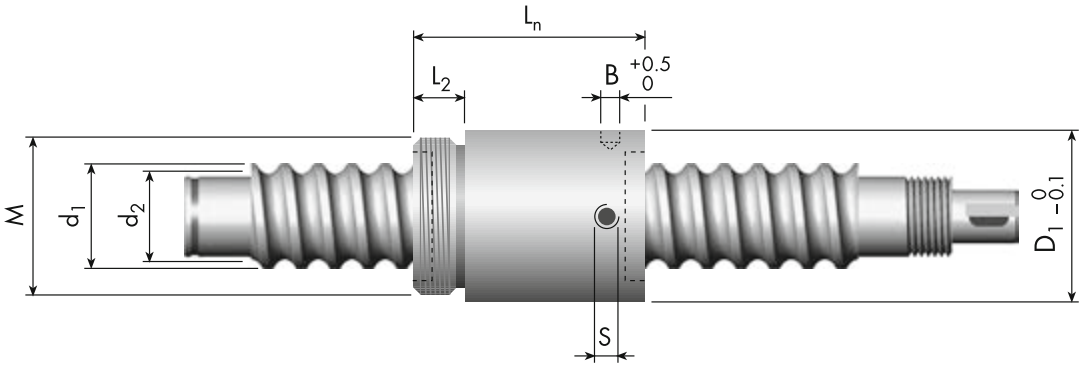
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FGI» (2/2)



Carry type «FGI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 0/−0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
14 × 4	14.0	11.5	25	M22×1.5	34	10	3×1	2.78	2.5	—	—	0.07	5 000	8 800
14 × 4	14.0	11.5	25	M22×1.5	38	10	3×1	2.78	2.5	ø 4	K	0.07	5 000	8 800
16 × 5	15.7	13.0	30.2	M26×1.5	45	12	3×1	3.50	3.5	—	—	0.07	9 700	22 000
16 × 5	15.7	13.0	30.2	M26×1.5	50	12	3×1	3.50	3.5	M5	K	0.07	9 700	22 000
20 × 5	19.2	16.5	33	M30×1.5	47	12	3×1	3.50	4.0	M5	K	0.07	10 800	25 000
25 × 5	24.6	21.5	40	M38×1.5	57	12	3×1	3.50	4.0	M5	K	0.07	11 700	30 000
32 × 5	31.6	28.5	52	M48×1.5	55	15	4×1	3.50	4.0	M5	K	0.07	19 000	54 000
left-hand threads														
16 × 2	16.0	14.5	25	M22×1.5	34	10	3×1	1.59	2.5	—	—	0.05	2 400	5 200
16 × 5 [3)]	15.7	13.0	30.2	M26×1.5	50	12	3×1	3.50	3.5	M5	K	0.07	9 700	22 000
20 × 5	19.2	16.5	33	M30×1.5	47	12	3×1	3.50	4.0	M5	K	0.07	10 800	25 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FGR»

Nut with mounting thread and tube type ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
B = pin wrench hole (position not defined) [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

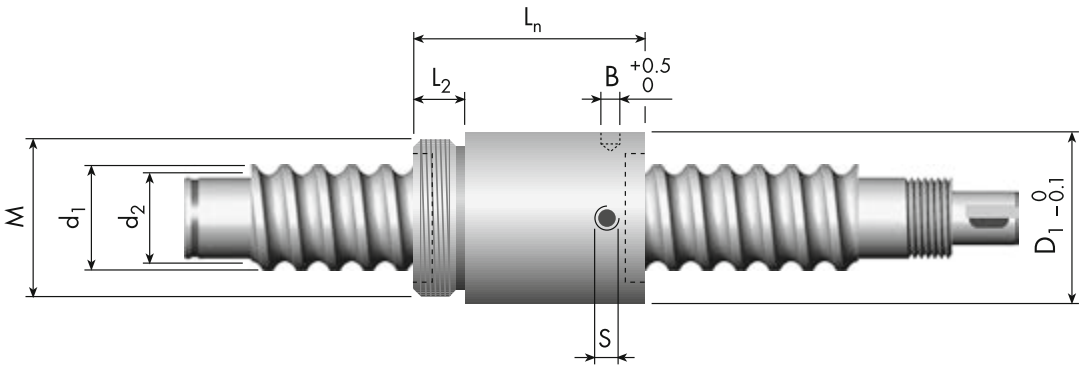
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FGR» (1/4)



Carry type «FGR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 0/−0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
6 × 2	5.7	4.6	16	M12×1	22	8	1×3.5	1.59	2.5	—	—	0.06	1 700	2 300
8 × 2	8.0	6.5	18	M14×1	24	8	1×3.5	1.59	2.5	—	—	0.06	2 000	3 200
8 × 2	8.0	6.5	18	M14×1	24	8	1×3.5	1.59	2.5	ø 2	K	0.06	2 000	3 200
8 × 2.5	8.0	6.6	17.5	M15×1	24	8	1×3.5	1.59	2.5	—	—	0.06	2 000	3 200
8 × 2.5	8.0	6.6	17.5	M15×1	26	8	1×3.5	1.59	2.5	ø 2	K	0.06	2 000	3 200
8 × 5	8.0	6.7	18	M14×1	25	8	2×1.5	1.50	2.5	—	—	0.06	1 960	3 470
8 × 8	8.0	6.6	18	M14×1	25	8	2×1.5	1.50	2.5	—	—	0.06	1 500	2 500
10 × 2	9.7	8.2	19.5	M17×1	22	7	1×3.5	1.59	2.5	—	—	0.06	2 300	4 000
10 × 2	9.7	8.2	19.5	M17×1	22	7	1×3.5	1.59	2.5	ø 2	K	0.06	2 300	4 000
10 × 3	9.9	7.8	21	M18×1	29	9	1×3.5	2.00	3.0	—	—	0.06	2 800	5 000
10 × 3	9.9	7.8	21	M18×1	29	9	1×3.5	2.00	3.0	ø 2	K	0.06	2 800	5 000
10 × 10	9.8	7.9	23	M18×1	35	9	2×1.5	2.00	3.0	—	—	0.06	2 500	4 500
10 × 10	9.8	7.9	23	M18×1	35	9	2×1.5	2.00	3.0	ø 4	K	0.06	2 500	4 500
left-hand threads														
6 × 2	5.7	4.6	16	M12×1	22	8	1×3.5	1.59	2.5	—	—	0.06	1 700	2 300
10 × 2	9.7	8.2	19.5	M17×1	22	7	1×3.5	1.59	2.5	—	—	0.06	2 300	4 000
10 × 3	9.9	7.8	21	M18×1	29	9	1×3.5	2.00	3.0	—	—	0.06	2 800	5 000
10 × 3	9.9	7.8	21	M18×1	29	9	1×3.5	2.00	3.0	ø 2	K	0.06	2 800	5 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FGR»

Nut with mounting thread and tube type ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
B = pin wrench hole (position not defined) [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

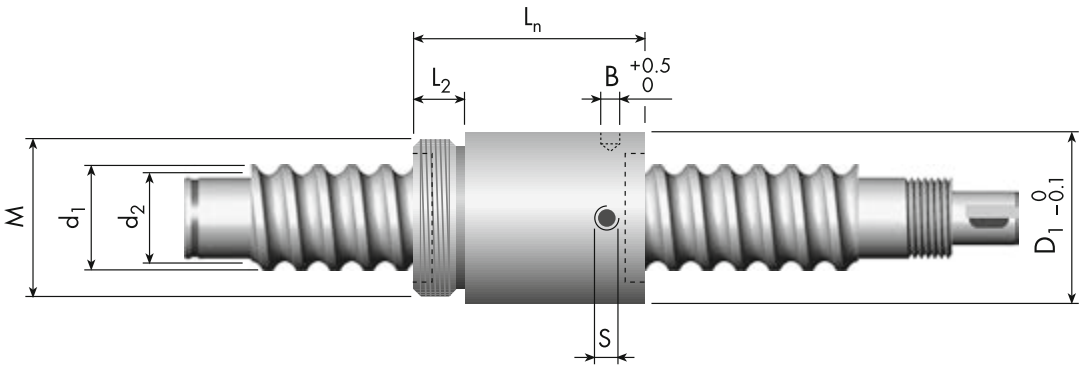
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FGR» (2/4)



Carry type «FGR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 0/−0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
12 × 4	12.0	9.8	26	M20×1	32	8	1×3.5	2.50	2.5	—	—	0.07	5 500	11 000
12 × 4	12.0	9.8	26	M20×1	34	10	1×3.5	2.50	2.5	ø 4	K	0.07	5 500	11 000
12 × 5	12.0	9.5	26	M20×1	37	8	1×3.5	2.78	3.0	—	—	0.07	6 600	12 000
12 × 5	12.0	9.5	26	M20×1	37	8	1×3.5	2.78	3.0	ø 4	K	0.07	6 600	12 000
12 × 10	11.9	9.7	26	M20×1	37	8	2×1.5	2.50	3.0	—	—	0.07	4 400	7 700
12.7 × 12.7	13.1	10.3	29.5	M25×1.5	50	12	2×1.5	3.50	3.0	—	—	0.07	8 000	15 500
12.7 × 12.7	13.1	10.3	29.5	M25×1.5	50	12	2×1.5	3.50	3.0	M5	B	0.07	8 000	15 500
14 × 2	14.0	12.5	26	M22×1.5	32	10	2×2.5	1.59	3.0	—	—	0.06	4 500	10 000
14 × 2	14.0	12.5	26	M22×1.5	32	10	2×2.5	1.59	3.0	ø 2	K	0.06	4 500	10 000
14 × 4	14.0	11.5	29	M22×1.5	32	8	1×3.5	2.78	3.0	—	—	0.07	8 100	16 000
14 × 4	14.0	11.5	29	M22×1.5	38	10	1×3.5	2.78	3.0	ø 4	K	0.07	8 100	16 000
left-hand threads														
12 × 5	12.0	9.5	26	M20×1	37	8	1×3.5	2.78	3.0	—	—	0.07	6 600	12 000
14 × 4	14.0	11.5	29	M22×1.5	32	8	1×3.5	2.78	3.0	—	—	0.07	8 100	16 000
14 × 4	14.0	11.5	29	M22×1.5	38	10	1×3.5	2.78	3.0	ø 4	K	0.07	8 100	16 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FGR»

Nut with mounting thread and tube type ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
B = pin wrench hole (position not defined) [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

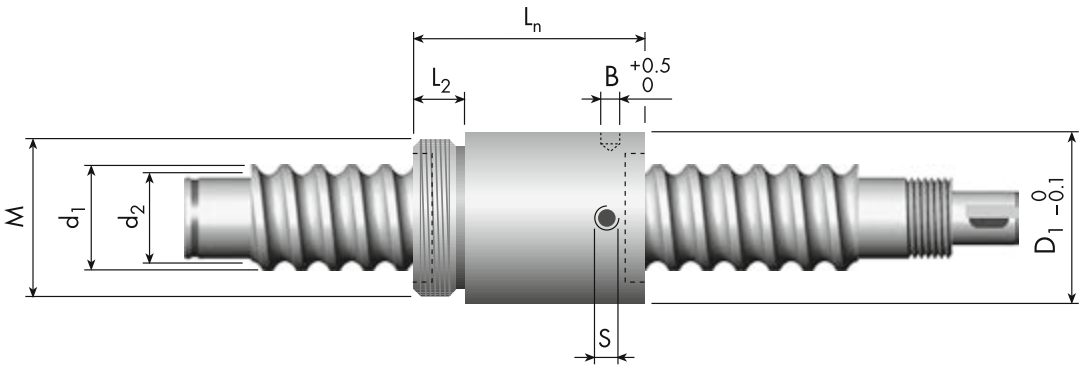
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FGR» (3/4)



Carry type «FGR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 0/−0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
16 × 2	16.0	14.5	30	M26×1.5	28	12	1×2.5	1.59	3.5	—	—	0.06	2 500	5 500
16 × 2	16.0	14.5	30	M26×1.5	28	12	1×2.5	1.59	3.5	ø 2	K	0.06	2 500	5 500
16 × 5	15.7	13.0	32	M26×1.5	42	12	1×3.5	3.50	4.0	—	—	0.07	12 000	25 000
16 × 5	15.7	13.0	32	M26×1.5	47	12	1×3.5	3.50	4.0	M5	K	0.07	12 000	25 000
16 × 10	15.7	13.0	32	M26×1.5	47	12	1×2.5	3.50	4.0	—	—	0.07	8 500	12 500
16 × 10	15.7	13.0	32	M26×1.5	52	12	1×2.5	3.50	4.0	ø 4	K	0.07	8 500	12 500
16 × 10	15.7	13.0	32	M26×1.5	47	12	2×2.5	3.50	4.0	—	—	0.07	17 000	25 000
16 × 10	15.7	13.0	32	M26×1.5	52	12	2×2.5	3.50	4.0	ø 4	K	0.07	17 000	25 000
16 × 16	15.9	13.2	32	M26×1.5	47	12	3×1.5	3.00	4.0	—	—	0.07	9 150	18 750
20 × 2	20.0	18.5	36	M30×1.5	30	12	2×2.5	1.59	4.0	—	—	0.06	4 600	15 000
20 × 5	19.2	16.5	36	M30×1.5	42	12	1×3.5	3.50	4.0	—	—	0.07	13 700	29 900
20 × 5	19.2	16.5	36	M30×1.5	47	12	1×3.5	3.50	4.0	ø 4	K	0.07	13 700	29 900
20 × 10	19.5	16.5	38	M35×1.5	58	19	2×2.5	3.50	4.0	—	—	0.07	21 000	51 000
20 × 10	19.5	16.5	38	M35×1.5	58	19	2×2.5	3.50	4.0	ø 4	B	0.07	21 000	51 000
20 × 20	20.0	16.5	38	M35×1.5	58	19	2×1.5	3.50	4.0	—	—	0.07	10 000	22 000
20 × 20	20.0	16.5	38	M35×1.5	64	19	2×1.5	3.50	4.0	ø 4	B	0.07	10 000	22 000
20 × 20	20.0	17.3	38	M35×1.5	58	19	4×1.5	3.00	4.0	—	—	0.07	14 600	35 000
left-hand threads														
16 × 5	15.7	13.0	32	M26×1.5	42	12	1×3.5	3.50	4.0	—	—	0.07	12 000	25 000
16 × 5	15.7	13.0	32	M26×1.5	47	12	1×3.5	3.50	4.0	M5	K	0.07	12 000	25 000
20 × 2	20.0	18.5	36	M30×1.5	30	12	2×2.5	1.59	4.0	—	—	0.06	4 600	15 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FGR»

Nut with mounting thread and tube type ball return

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
B = pin wrench hole (position not defined) [mm]
S = lubrication hole (position not defined) [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

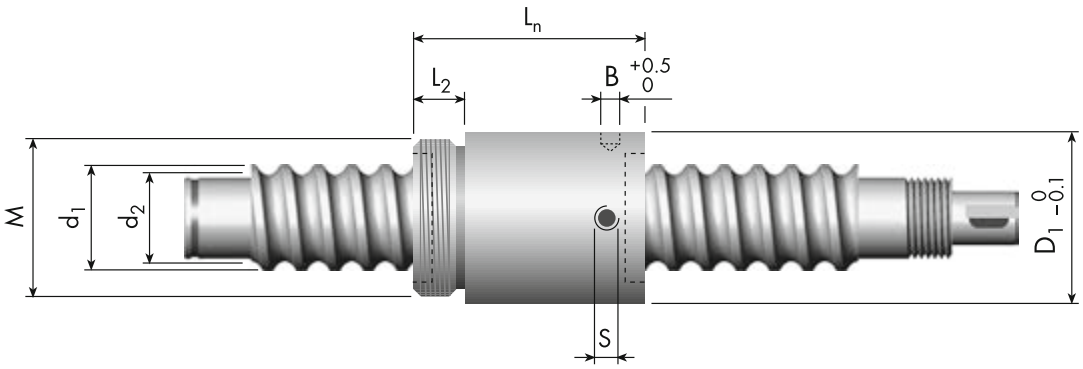
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FGR» (4/4)

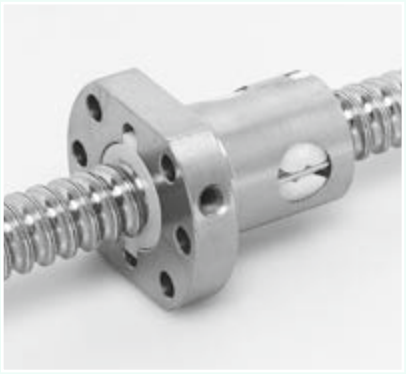


Carry type «FGR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 0/−0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
25 × 5	24.6	21.5	44	M40×1.5	58	19	2×2.5	3.50	4.0	—	—	0.07	17 500	42 400
25 × 10	24.8	21.8	43	M40×1.5	58	19	2×2.5	3.50	4.0	—	—	0.07	21 000	54 000
25 × 10	24.8	21.8	43	M40×1.5	58	19	2×2.5	3.50	4.0	ø 4	B	0.07	21 000	54 000
25 × 25	24.5	21.2	44	M40×1.5	72	20	2×1.5	3.50	4.0	ø 4	B	0.08	10 000	24 000
25 × 25	24.5	21.2	44	M40×1.5	72	20	4×1.5	3.50	4.0	ø 4	B	0.08	20 000	48 000
32 × 10	31.6	28.4	52	M48×1.5	62	19	2×2.5	3.50	4.0	ø 4	B	0.07	20 000	55 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FBI»

Flange nut with single-thread ball return (following DIN 69051: flange type B nut, master gauge 3)



Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

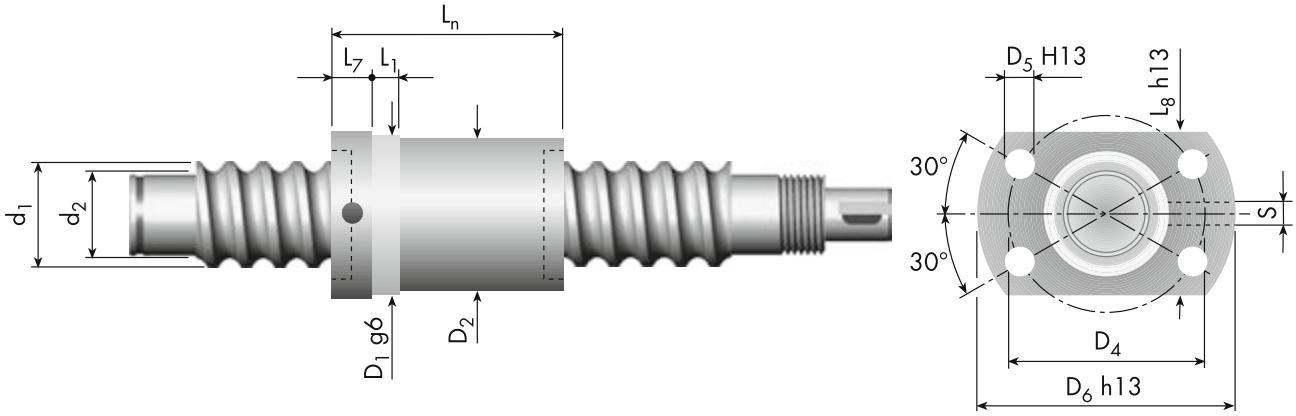
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FBI» (1/2)

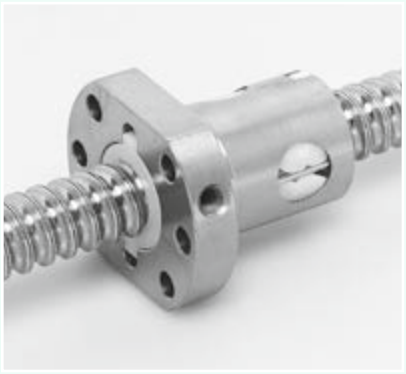


Carry type «FBI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	D_2	D_4 hole circle	D_5 H13	D_6 h13	L_n	L_1	L_7	L_8 h13	i	D_W	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
4 × 1	4.0	3.2	8	7.9	12	2.7	17	14	2	3	11	3×1	0.80	—	—	0.03	430	580
6 × 1	6.0	5.0	12	11.8	18	3.4	24	18	4	4	16	3×1	0.80	ø 2	K	0.03	600	1 000
8 × 1	8.0	7.0	14	13.5	21	3.4	27	18	4	4	18	3×1	0.80	ø 2	K	0.03	700	1 200
8 × 2	8.0	6.5	16	15.5	22	3.4	28	30	4	6	19	3×1	1.59	ø 4	K	0.05	1 400	2 000
10 × 4	10.0	7.5	18	17.8	28	4.5	36	38	6	6	23	4×1	2.50	—	—	0.07	4 100	6 700
10 × 4	10.0	7.5	18	17.8	28	4.5	36	38	6	6	23	4×1	2.50	ø 2	K	0.07	4 100	6 700
12 × 5	12.0	9.5	24	23.5	32	4.5	40	40	6	8	26	3×1	2.78	ø 4	K	0.07	5 000	8 600

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FBI»

Flange nut with single-thread ball return (following DIN 69051: flange type B nut, master gauge 1)



Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

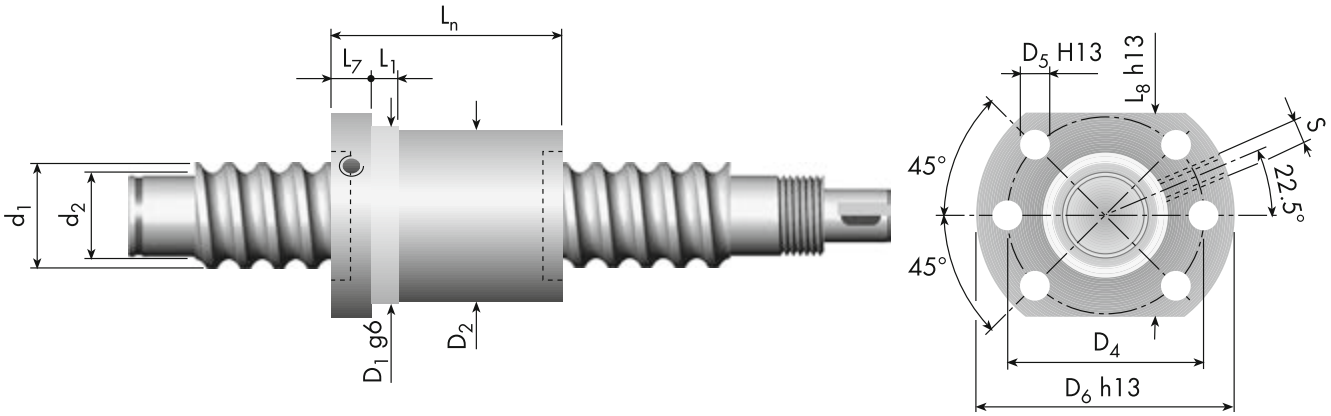
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FBI» (2/2)



Carry type «FBI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	D_2	D_4 hole circle	D_5 H13	D_6 h13	L_n	L_1	L_7	L_8 h13	i	D_W	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
16 × 5	15.7	13.0	28	27.8	38	5.5	48	45	6	10	40	3×1	3.50	M6	K	0.07	9 700	22 000
20 × 5	19.2	16.5	36	35.5	47	6.6	58	50	10	10	44	3×1	3.50	M6	K	0.07	10 800	25 000
25 × 5	24.6	21.5	40	39.5	51	6.6	62	50	10	10	48	3×1	3.50	M6	K	0.07	11 700	30 000
25 × 5	24.6	21.5	40	39.5	51	6.6	62	55	10	10	48	4×1	3.50	M6	K	0.07	14 000	35 000
32 × 5	31.6	28.5	50	49.5	65	9.0	80	57	10	12	62	4×1	3.50	M6	K	0.07	19 000	54 000
left-hand threads																		
16 × 5	15.7	13.0	28	27.8	38	5.5	48	45	6	10	40	3×1	3.50	M6	K	0.07	9 700	22 000
20 × 5	19.2	16.5	36	35.5	47	6.6	58	50	10	10	44	3×1	3.50	M6	K	0.07	10 800	25 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FBR»

Flange nut with tube type ball return (following DIN 69051: flange type B nut, master gauge 3)

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

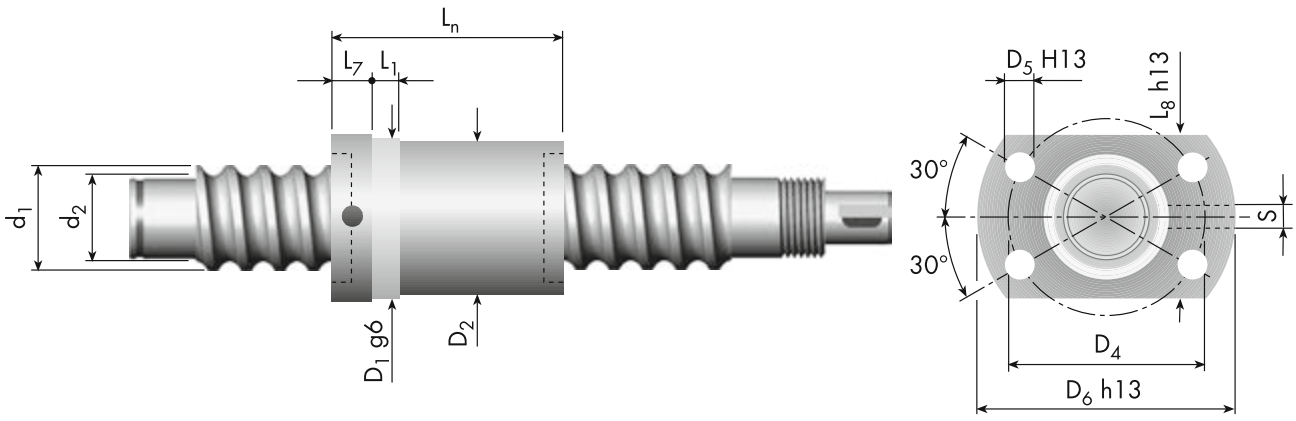
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FBR» (1/3)



Carry type «FBR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	D_2	D_4 hole circle	D_5 H13	D_6 h13	L_n	L_1	L_7	L_8 h13	i	D_W	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
8 × 2	8.0	6.5	18	17.5	22	3.4	28	25	4	6	19	1×3.5	1.59	ø 4	K	0.06	2 000	3 200
8 × 8 [3]	8.0	6.6	18	17.5	22	3.4	28	30	4	6	19	2×1.5	1.50	—	—	0.06	1 500	2 500
10 × 10	9.8	7.9	23	22.5	29	4.5	37	40	6	8	24	2×1.5	2.00	M5	K	0.06	2 500	4 500
12 × 2	12.0	10.6	22	21.5	29	4.5	37	30	5	8	24	1×3.5	1.59	ø 4	K	0.06	2 500	5 100
12 × 3	12.3	10.2	24	23.5	32	4.5	40	36	5	8	26	2×2.5	2.00	—	—	0.06	5 000	11 000
12 × 4	12.0	9.8	26	25.5	32	4.5	39.5	36	5	8	28	1×3.5	2.50	M5	K	0.07	5 500	11 000
12 × 5	12.0	9.5	26	25.5	32	4.5	39.5	40	5	7	28	1×3.5	2.78	M5	K	0.07	6 600	12 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FBR»

Flange nut with tube type ball return (following DIN 69051: flange type B nut, master gauge 1)

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

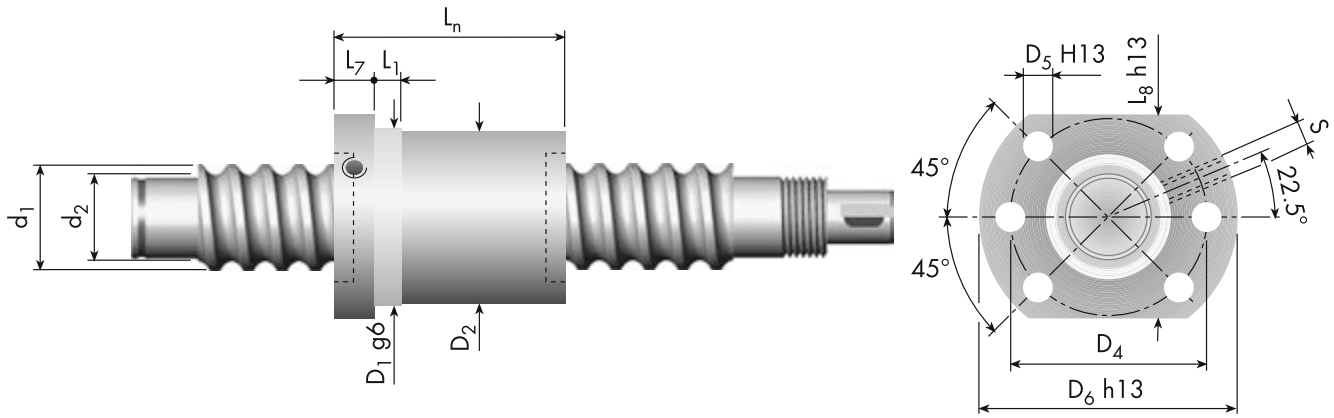
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FBR» (2/3)



Carry type «FBR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	D_2	D_4 hole circle	D_5 H13	D_6 h13	L_n	L_1	L_7	L_8 h13	i	D_W	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
14 × 2	14.0	12.5	26	25.5	32	4.5	39.5	32	5	7	28	2×2.5	1.59	ø 4	K	0.06	4 500	10 000
14 × 4	14.0	11.5	29	28.6	38	5.5	48	40	6	8	36	1×3.5	2.78	M5	K	0.07	8 100	16 000
16 × 2	16.0	14.5	30	29.5	38	5.5	48	45	6	10	40	2×2.5	1.59	M6	K	0.06	4 500	11 000
16 × 2	16.0	14.5	30	29.5	38	5.5	48	45	6	10	40	3×2.5	1.59	M6	K	0.06	6 000	15 000
16 × 10	15.7	13.0	32	31.5	43	6.6	54	52	6	12	44	2×2.5	3.50	M6	K	0.07	17 000	25 000
20 × 10	19.5	16.5	38	37.5	50	6.6	62	55	7	10	48	2×2.5	3.50	M6	B	0.07	21 000	51 000
20 × 10 [3]	19.5	16.5	38	37.5	50	6.6	62	65	7	10	48	2×3.5	3.50	M6	B	0.07	26 000	65 000
20 × 20	20.0	16.5	36	35.5	47	6.6	58	58	7	10	44	2×1.5	3.50	M6	B	0.07	10 000	22 000
25 × 10	24.8	21.8	43	42.5	55	6.6	65	55	7	10	50	2×2.5	3.50	M6	B	0.07	21 000	54 000
25 × 25	24.5	21.2	44	43.5	56	6.6	70	67	10	12	52	2×1.5	3.50	M6	B	0.08	10 000	24 000
25 × 25	24.5	21.2	44	43.5	56	6.6	70	67	10	12	52	4×1.5	3.50	M6	B	0.08	20 000	48 000
32 × 10	31.6	28.4	52	51.5	67	9.0	82	62	10	12	64	2×2.5	3.50	M6	B	0.07	20 000	55 000
32 × 15	31.4	28.5	56	55.5	71	9.0	86	74	12	14	65	2×2.5	3.50	M6	B	0.07	19 900	55 100
32 × 32	31.5	28.5	56	55.5	71	9.0	86	86	12	14	65	4×1.5	3.50	M6	B	0.07	25 700	76 200
left-hand threads																		
14 × 4	14.0	11.5	29	28.6	38	5.5	48	40	6	8	36	1×3.5	2.78	M5	K	0.07	8 100	16 000

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Carry type «FBR»

Flange nut with tube type ball return (following DIN 69051: flange type B nut, master gauge 2)

Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole [mm]
SA = wipers

K = plastic

B = brushes

F = felt rings (on request; in case of lifetime lubrication)

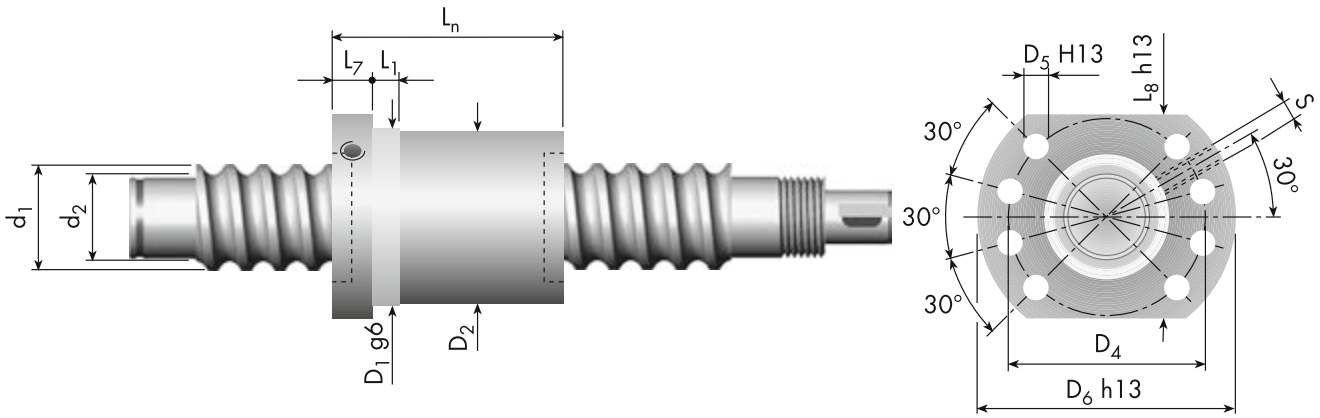
T = standard backlash [mm]

[3)] = only on request

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 39 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001
Environmental management ISO 14001

Carry type «FBR» (3/3)



Carry type «FBR» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	D_2	D_4 hole circle	D_5 H13	D_6 h13	L_n	L_1	L_7	L_8 h13	i	D_W	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
40 × 5	39.8	36.9	65	64.5	78	9.0	93	75	12	14	70	2×3.5	3.50	M8×1	B	0.07	29 400	97 000
40 × 20	40.3	36.9	65	64.7	78	9.0	93	88	12	14	70	2×2.5	4.00	M8×1	B	0.07	25 500	77 400
40 × 40	39.8	36.4	66	65.5	80	9.0	95	98	12	14	75	4×1.5	4.00	M8×1	B	0.07	29 900	94 500

The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Basic design / Materials

Basic design

Carry screws are manufactured by the highly economical cold-rolling process which offers both significant cost savings but also maintains a precision previously often only available with machine-ground screws. Carry screws are complemented by a range of single steel nuts produced in a special cost-cutting process.

Carry offers all the advantages of the inherent ball screw design:
– high efficiency, i.e.
  - low power input
  - low self-heating
– low frictional, stick-slip-free running
– maximum wear resistance, i.e. very good repetition accuracy with a constant positioning precision.
– high reliability and durability.

Materials
– standard: steel
  100Cr6 (1.3505)
  and
  Cf53 (1.1213)
– on request:
  X46Cr13 (1.4034)
– other materials on request

Attention: The use of stainless steel results in lower load rates; details on request.

Nut designs
Standard are the following three types:

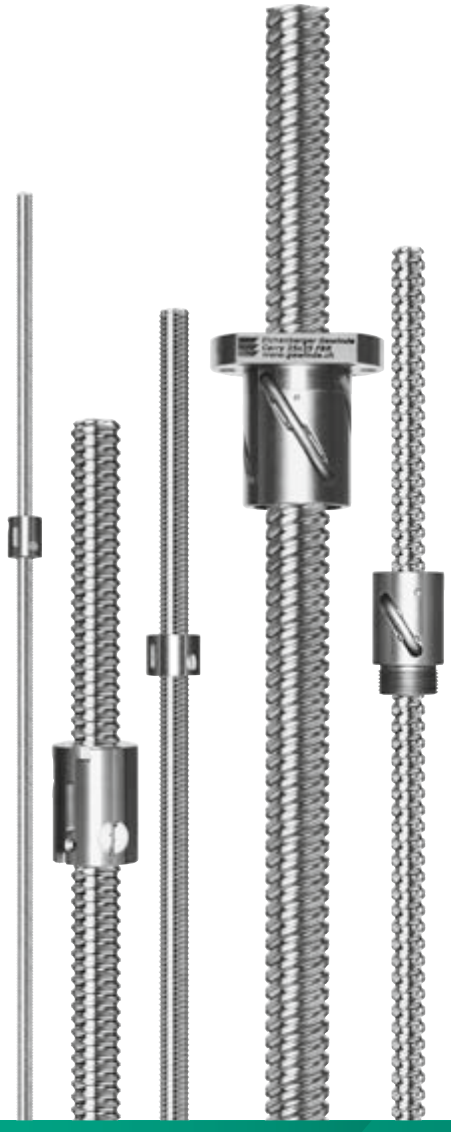
Cylindrical single nut type «ZY…»

Nut with mounting thread type «FG…»

Flange nut type «FB…»

Of course, any other nut designs (such as those with integrated cardanic axis) are available upon request.

Thread profile
Used most commonly are gothic arc (ogival) profiles.



Ball return / Precision / Lubrication

Ball return
Nuts feature single-thread ball returns or tube type ball returns, both fully integrated into the nut shape.

Single-thread ball return, type «…I»

Tube type ball return, type «…R»

Operating temperatures
Regular applications: –20 to +80 °C.
Please ask about other operating temperatures.

Lead accuracy
Eichenberger ball screws feature the following lead accuracies according to DIN 69051:

Standard:
– G9 ≙ ≤0.1 mm/300 mm

On request:
– G7 ≙ ≤0.052 mm/300 mm
– G5 ≙ ≤0.023 mm/300 mm

Reduced backlash
If necessary, reduced backlash up to ≤0.01 mm is available (only with paired or assembled screws).

Efficiency
The efficiency η for Carry ball screws is better than 0.9.

Wipers
Plastic (K) or brush (B) wipers are used, depending on nut type/dimension. Felt rings (F) available on request (in case of lifetime lubrication).

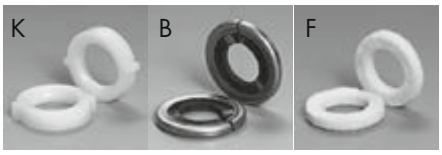
Lubrication
The usual specifications for lubricating ball bearings also apply to ball screws. However, lubrication applied only once but intended to last a lifetime is not sufficient in most cases. Regular lubrication is required to extend the service life of the ball screw.

Please note:
When shipped, screws simply have a protective film. Before mounting or operating the ball screw, units must be lubricated with the proper lubricant (through the lube hole for nuts with wipers; directly onto the screw for nuts without wipers).

Recommended all-purpose lubricant:
– Klüber Microlube GBU Y 131

When using another lubricant, please verify compatibility with anticorrosion agent; otherwise rinse ball screw unit prior to lubrication.

Caution: Do not use grease containing graphite or MoS.



Factory length / Ball screw ends / Handling

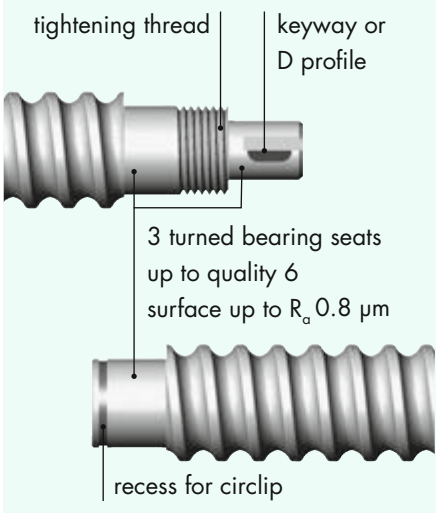
Factory length

In general, Eichenberger screws are available as threaded rods, approx. 2.8 to 3 m long. Upon request, lengths up to 6 m are available, depending on diameter and supply market situation.

Ball screw ends

Ball screw ends are without any machining cut by grinding (standard).
Upon request, a so-called standard screw end journal with three turned bearing seats (see figure below) is available. Dimensions are as per customer specifications.
Screws may also be ordered with softened ends for subsequent finishing by the customer or with an application-specific end journal.
In each instance, a detailed drawing would be necessary.

Note also the links to the CAD data at www.gewinde.ch



Handling

Ball screws are precision parts and must be protected from shock, dirt or moisture when transported or stored. Please do not unpack until ready for use.

Please check for cleanness when mounting the ball screw. Dirt or foreign matter on the ball race – especially inside the nut – may cause increased wear and premature failure.

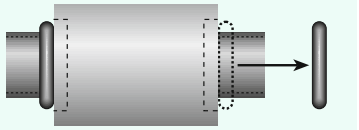
Please consult lubrication recommendation on page 37 before mounting or operating ball screws.

Radial loads and torque

Radial loads or torque brought to bear upon the nut result in overload of individual contact surfaces, thus seriously affecting the service life of the ball screw assembly. Therefore it is important to properly mount the screw and to comply with all relevant form and positional tolerances.

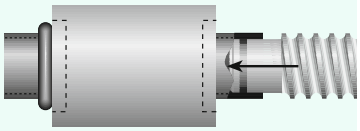
Assembling

1.



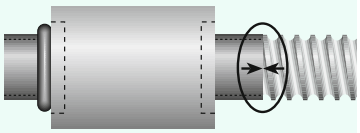
Remove transport lock (O-ring) on one side. Please keep sleeve and nut in horizontal position. Otherwise, the nut may slide from the sleeve and balls may fall out of the ball race.
In the event such incident does occur, balls must be properly re-inserted to prevent damage to or blockage of the ball screw. If in doubt, please contact Eichenberger Gewinde AG.

2.



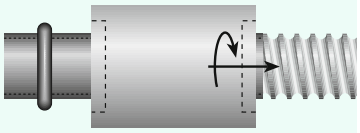
Insert screw end into mounting sleeve.

!



Caution: Operator must be able to advance sleeve up to the thread intake. Otherwise, balls may fall out of the ball race and damage or block the unit.

3.



Gently turn nut onto the screw.

The following are the relevant calculations which underly screw design and safe operation.

For detailed information on ball screw design, please refer to DIN 69051.

«Suitability test»
rotational speed characteristics

When selecting a ball screw it is important to first ensure that the correct nut design for the ball return system required to support the maximum rotational speed demanded by the application is used (independet of the screw length).

The maximum rotational speed is based on the system's rotational speed characteristics and the outside screw diameter:

$$n_{max} = \frac{\text{rotational speed characteristic}}{d_1} \; [min^{-1}]$$

n_{max} = maximum rotational speed [min^{-1}]

Rotational speed characteristics [–] for
- single-thread ball return: 60 000 (Carry «…I» types)
- tube type ball return: 80 000 (Carry «…R» types)
- end cap ball return: 80 000 (Carry *Speedline* «…E» types)

d_1 = outside screw diameter [mm]

Calculations at dynamic load:

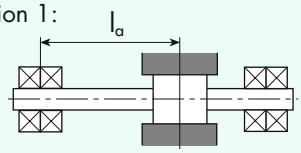
Critical rotational speed n_{per}

Permissible rotational speeds must differ substantially from the screw's own frequency.

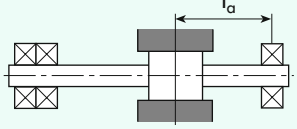
$$n_{per} = K_D \cdot 10^6 \cdot \frac{d_2}{l_a^2} \cdot S_n \; [min^{-1}]$$

n_{per} = permissible rotational speed [min^{-1}]
K_D = characteristic constant as a function of bearing configuration [–] → see below
d_2 = core diameter [mm]
l_a = bearing distances [mm] → see below (always include maximum allowable l_a in calculation)
S_n = safety factor usually S_n = 0.5…0.8 [–]

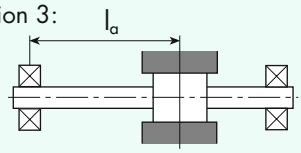
Configuration 1: fixed – fixed
K_D = 276



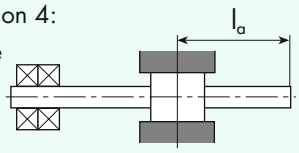
Configuration 2: fixed – simple
K_D = 190



Configuration 3: simple – simple
K_D = 122



Configuration 4: fixed – free
K_D = 43



Nominal service life L_{10} or L_h

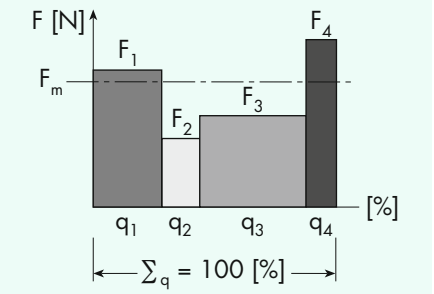
$$L_{10} = \left(\frac{C_{dyn}}{F_m}\right)^3 \cdot 10^6 \; [R]$$

$$L_h = \frac{L_{10}}{n_m \cdot 60} \; [h]$$

L_{10} = service life in revolutions [R]
L_h = service life in hours [h]
C_{dyn} = dynamic load [N]
F_m = average axial load [N]
$F_{1...n}$ = load per cycle unit [N]
n_m = average rotational speed [min^{-1}]
$n_{1...n}$ = rotational speed per cycle unit [min^{-1}]
$q_{1...n}$ = cycles [%]
100 = $\sum_q$ (sum of cycles $q_{1...n}$) [%]

Average axial load F_m
at constant rotational speed n_{const}
and dynamic load C_{dyn}

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



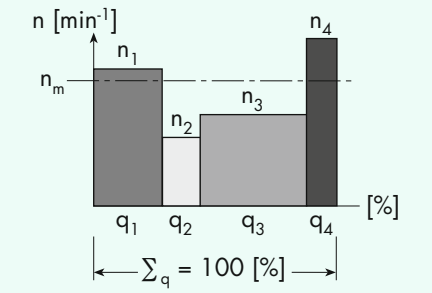
$$\rightarrow L_{10} = \left(\frac{C_{dyn}}{F_m}\right)^3 \cdot 10^6 \; [R]$$

$$\rightarrow L_h = \frac{L_{10}}{n_{const} \cdot 60} \; [h]$$

Calculations at dynamic load (continuation):

Average rotational speed n_m
at constant load F_{const}
and variable rotational speeds $n_{1...n}$

$$n_m = n_1 \frac{q_1}{100} + n_2 \frac{q_2}{100} + n_3 \frac{q_3}{100} + \ldots \; [\text{min}^{-1}]$$



$$\rightarrow L_{10} = \left(\frac{C_{dyn}}{F_{const}} \right)^3 \cdot 10^6 \; [R]$$

$$\rightarrow L_h = \frac{L_{10}}{n_m \cdot 60} \; [h]$$

Average axial load F_m
at constant rotational speeds n_{const}
and dynamic load C_{dyn}

$$F_m = \sqrt[3]{F_1^3 \frac{q_1}{100} + F_2^3 \frac{q_2}{100} + F_3^3 \frac{q_3}{100} + \ldots} \; [N]$$

$$n_m = n_1 \frac{q_1}{100} + n_2 \frac{q_2}{100} + n_3 \frac{q_3}{100} + \ldots \; [\text{min}^{-1}]$$

$$\rightarrow L_{10} = \left(\frac{C_{dyn}}{F_m} \right)^3 \cdot 10^6 \; [R]$$

$$\rightarrow L_h = \frac{L_{10}}{n_m \cdot 60} \; [h]$$

Efficiency η (theoretical)
Depends upon the type of power transmission.

Case 1: torque → linear movement

$$\eta \approx \frac{\tan \alpha}{\tan (\alpha + \rho)} \; [-]$$

Case 2: axial force → torque

$$\eta' \approx \frac{\tan (\alpha - \rho)}{\tan \alpha} \; [-]$$

whereby

$$\tan \alpha \approx \frac{p}{d_0 \cdot \pi} \; [-]$$

η = efficiency [%]
η' = corrected efficiency [%]
p = pitch [mm]
d_0 = nominal screw diameter [mm]
ρ = angle of friction [°]
→ ρ = 0.30...0.60°

Efficiency η_p (practical)
The efficiency η for Carry ball screws is better than 0.9.

Driving torque M
Depends upon the type of power transmission.

Case 1: torque → linear movement

$$M_a = \frac{F_a \cdot p}{2000 \cdot \pi \cdot \eta} \; [\text{Nm}]$$

Case 2: axial force → torque

$$M_e = \frac{F_a \cdot p \cdot \eta'}{2000 \cdot \pi} \; [\text{Nm}]$$

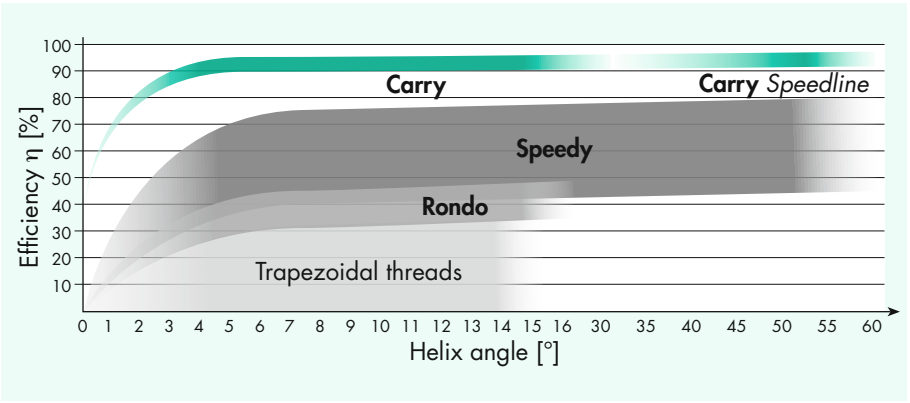
M_a = input torque [Nm], case 1
M_e = output torque [Nm], case 2
F_a = axial force [N]

Input performance P

$$P = \frac{M_a \cdot n}{9550} \; [\text{kW}]$$

P = input performance [kW]
n = rotational speed [min-1]

A safety margin of 20% is recommended when selecting drives.



Calculations at static load:

Permissible maximum load $F_{per.}$

$$F_{per.} = \frac{C_{stat}}{f_s} \text{ [N]}$$

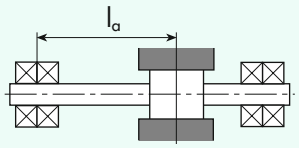
C_{stat} = static load [N]
f_s = operating coefficient
→ normal operation: 1…**2** [–]
→ shock load: 2…3 [–]

Permissible buckling force F_B

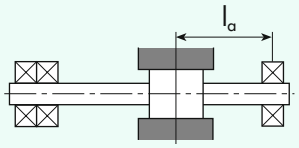
$$F_B = \frac{K_B}{S_B} \cdot \frac{d_2^4}{l_F^2} \cdot 10^3 \text{ [N]}$$

K_B = characteristic constant of load (depends on design) [–]
→ see below
d_2 = nominal screw diameter [mm]
l_F = force-transferring length [mm]
S_B = buckling safety factor
→ gen. S_B = 2…4 [–]

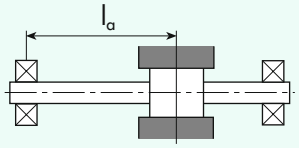
Case 1:
K_B = 400



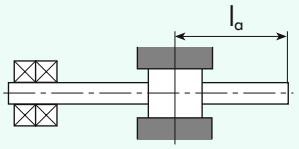
Case 2:
K_B = 200



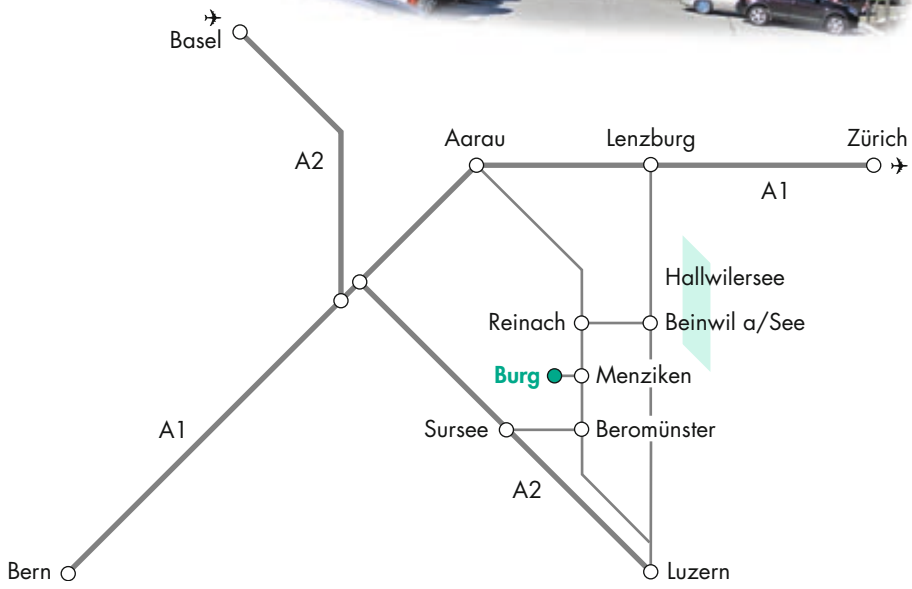
Case 3:
K_B = 100



Case 4:
K_B = 25



Eichenberger Gewinde



When in Burg, follow the signs to Eichenberger Gewinde.

Map and directions can be found on our website
www.gewinde.ch → Where to find us

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