Eichenberger Gewinde

100% Swiss made

Main Catalogue

Carry ball screws
Carry Speed-line high-helix ball screws
Speedy high-helix lead screws
Rondo round thread lead screws

The choice is yours

Thread rolling is the core expertise of Eichenberger Gewinde AG. Not surprisingly, the Company utilizes this process to form the thread profiles of all the screws it makes. Thread rolling (often also referred to as thread milling) is the cold forming of the surface of round workpieces. The thread form is produced by causing a radial dynamic force to be exerted between the two rotating rolling dies that form the workpiece. As the roll die profile penetrates the workpiece surface, the material in cold state is pressed all the way down into the root diameter of the thread roll die and is therefore rolled according to nominal value.

Advantages of thread rolling:
– significant increase in hardness through cold forming
– excellent surface smoothness on thread flanks and in ground radius
– reduced notch sensitivity
– no interrupted swalfe as in machine-ground threads
– excellent dimensional accuracy
– rational manufacturing process
– extremely cost-effective especially in large production batches

Even though all Eichenberger lead screws are made using the rational thread rolling process, individual model series feature distinct differences in design and performance. Product characteristics therefore need to be considered when selecting the right product.

Basic differences are shown in the summary description (opposite).

Summary description

Carry ball screws

Due to their premium quality and precision, the rolled Carry ball screws are often an ideal substitute for expensive, machine-ground screws. In general, they are suitable for all linear applications where heavy loads need to be transferred with optimum efficiency.

- ø 4–32 mm
- p 1–25 mm
- for high loads at medium moving speeds

pages 4/5 and 6–31

Carry Speedline high-helix ball screws

The cold-rolled, wear-resistant Carry Speedline 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

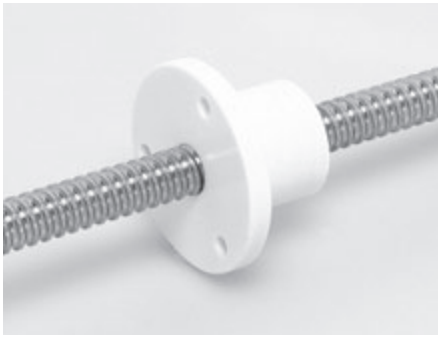
pages 4/5 and 32–39

Speedy high-helix lead screws

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

- ø 5–36 mm
- p 5–200 mm
- for low loads at high moving speeds
- slide screw unit

pages 40/41 and 42–63



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

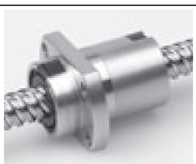
pages 40/41 and 64–68

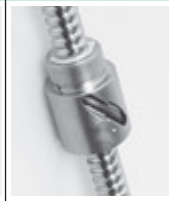
Contract work: **Thread rolling** pages 69/70

About the Company: Eichenberger Gewinde AG page 71

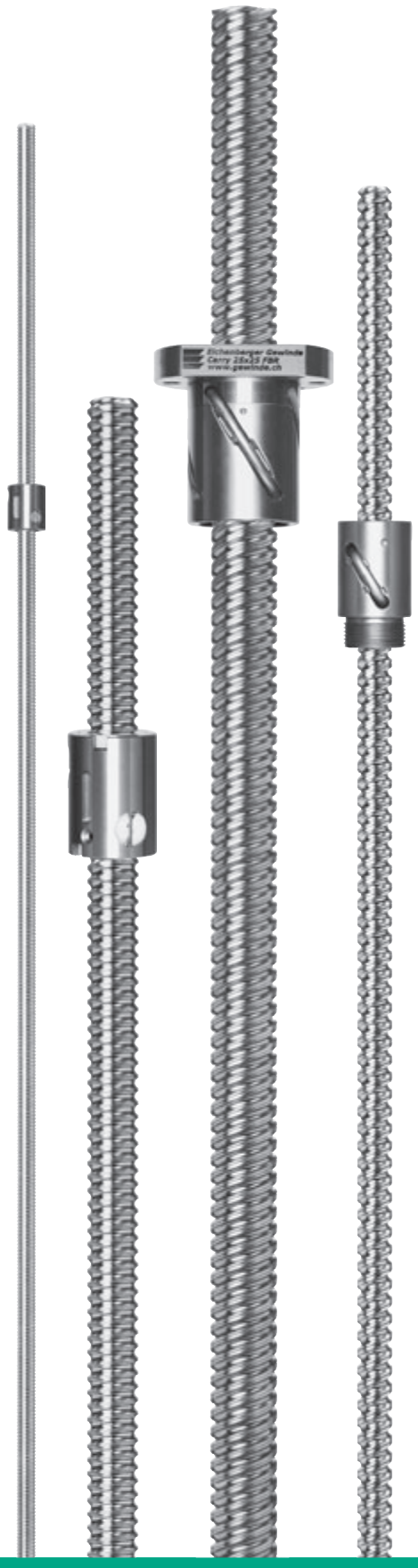
Ball screw product range

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

	type	pages		$d_0 \times p$: 4 x 1	5 x 2	5 x 3	6 x 1	6 x 2	8 x 1	8 x 1.5	8 x 2	8 x 2.5	8 x 3	8 x 8	8 x 12	10 x 2	10 x 3	10 x 4	10 x 10	12 x 2	12 x 3
Carry	ZYI	8/9		■	■		■		■	■	■		■			■ 2)		■		■ 2)	
Carry	ZYR	10/11									■	■					■ 2)		■		
Carry	FGI	12–15			●	●				●	●	●	●			● 2)		●		● 2)	
Carry	FGR	16–21						● 2)			●	●		●		● 2)	● 2)		●		
Carry	FBI	22/23		■			■		■		■							■			
Carry	FBR	24/25									■								■	■	■
Carry Speed-line	ZYE	34/35													■						
Carry Speed-line	FBE	36/37													■						
	type	pages		$d_0 \times p$: 4 x 1	5 x 2	5 x 3	6 x 1	6 x 2	8 x 1	8 x 1.5	8 x 2	8 x 2.5	8 x 3	8 x 8	8 x 12	10 x 2	10 x 3	10 x 4	10 x 10	12 x 2	12 x 3

12 x 4			■		●	●	■		12 x 4
12 x 5			■	■	● 2)	●			12 x 5
12.7 x 12.7					●				12.7 x 12.7
12.7 x 25.4	■	■							12.7 x 25.4
14 x 2			■		●				14 x 2
14 x 4			■ 2)		● 2)	●	■ 2)	■	14 x 4
16 x 2			■		●	● 2)			16 x 2
16 x 5				■ 2)	● 2)	● 2)		■ 2)	16 x 5
16 x 10	■	■	■		●		■		16 x 10
16 x 16	■	■							16 x 16
16 x 50	■	■							16 x 50
20 x 2					● 2)				20 x 2
20 x 5				■ 2)	●	● 2)		■ 2)	20 x 5
20 x 10			■		●				20 x 10
20 x 20	■	■	■		●				20 x 20
25 x 5				■		●		■	25 x 5
25 x 10			■		●				25 x 10
25 x 25	■	■	■		●				25 x 25
32 x 5				■		●		■	32 x 5
32 x 10			■		●				32 x 10
									
type	**FBE**	**ZYE**	**FBR**	**FBI**	**FGR**	**FGI**	**ZYR**	**ZYI**	**type**
pages	36/37	34/35	24/25	22/23	16–21	12–15	10/11	8/9	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 16x5 FGR RH 1 S 350 G7 A O M**

Type of lead screw
KGT = Carry ball screw

Nominal size (d_0x 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 type B single nut with single-thread ball return
FBR = flange type B single 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

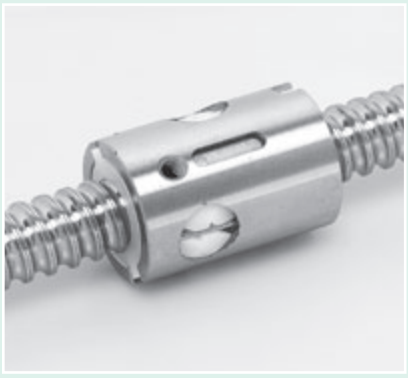
Assembly
G = screw and nut separate
M = screw and nut assembled according to drawing/specified orientation

Example for screw only — **KGT 16x5 RH 350 G7 O G**

Example for nut only — **KGT 16x5 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

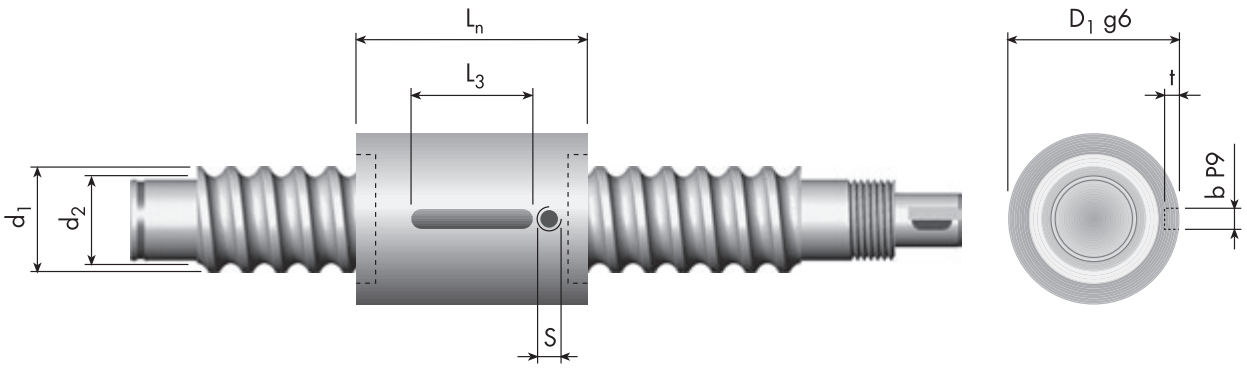
T = standard backlash [mm]

[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 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry type «ZYI»



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 x 1	4.0	3.2	8	10	—	3x1	0.80	ø 2	1.0	—	—	0.03	430	580
5 x 2	5.0	4.0	10	14	8	3x1	0.80	2	1.0	—	—	0.03	500	800
6 x 1	6.0	5.0	12	14	8	3x1	0.80	2	1.0	—	—	0.03	600	1 000
8 x 1	8.0	7.0	14	14	8	3x1	0.80	2	1.2	—	—	0.03	700	1 200
8 x 1.5	8.0	6.7	14	14	8	3x1	1.20	2	1.2	—	—	0.04	800	1 300
8 x 2	8.0	6.5	16	20	8	3x1	1.59	2	1.2	—	—	0.05	1 400	2 000
8 x 3	8.0	6.7	14	12	8	2x1	1.50	2	1.2	—	—	0.05	950	1 500
10 x 2	9.7	8.2	18	14	10	2x1	1.59	3	1.2	—	—	0.06	1 250	2 100
10 x 4	10.0	7.5	18	35	10	4x1	2.50	3	1.2	—	—	0.07	4 100	6 700
10 x 4	10.0	7.5	18	35	10	4x1	2.50	3	1.2	ø 2	K	0.07	4 100	6 700
12 x 2	12.0	10.6	20	15	10	2x1	1.59	3	1.2	—	—	0.06	1 380	2 500
14 x 4	14.0	11.5	25	24	10	3x1	2.78	4	2.5	—	—	0.07	5 000	8 800
14 x 4	14.0	11.5	25	32	10	3x1	2.78	4	2.5	ø 4	K	0.07	5 000	8 800
16 x 5	15.7	13.0	30	43	16	3x1	3.50	4	2.5	M5	K	0.07	9 700	22 000
20 x 5	19.2	16.5	33	45	20	3x1	3.50	4	2.5	M5	K	0.07	10 800	25 000
25 x 5	24.6	21.5	38	50	20	3x1	3.50	4	2.5	M5	K	0.07	11 700	30 000
32 x 5	31.6	28.5	48	48	20	4x1	3.50	5	3.0	M5	K	0.07	19 000	54 000
left-hand threads														
10 x 2	9.7	8.2	18	14	10	2x1	1.59	3	1.2	—	—	0.06	1 250	2 100
12 x 2 [3)]	12.0	10.6	20	15	10	2x1	1.59	3	1.2	—	—	0.06	1 380	2 500
16 x 5	15.7	13.0	30	43	16	3x1	3.50	4	2.5	M5	K	0.07	9 700	22 000
20 x 5	19.2	16.5	33	45	20	3x1	3.50	4	2.5	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 «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

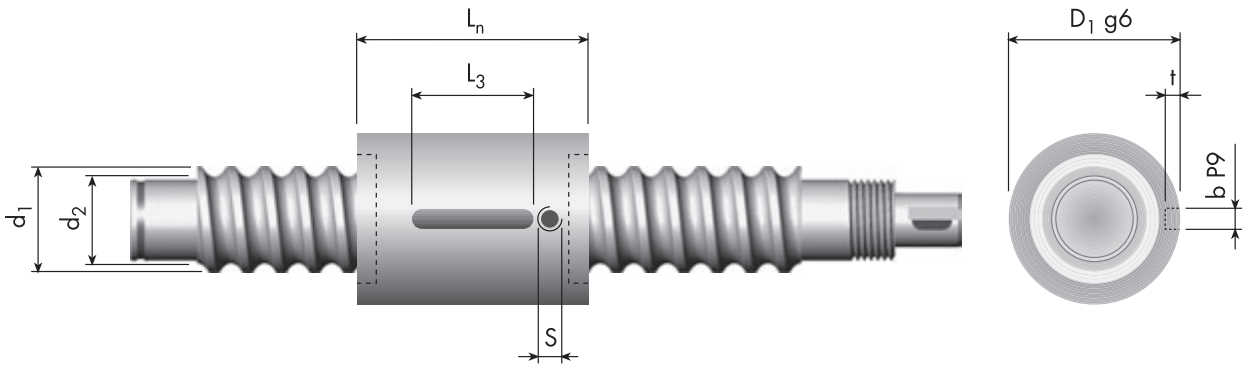
T = standard backlash [mm]

[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 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

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 x 2	8.0	6.5	18	14	8	1x3.5	1.59	2	1.2	—	—	0.06	2 000	3 200
8 x 2.5	8.0	6.6	18	16	10	1x3.5	1.59	3	2.0	—	—	0.06	2 000	3 200
10 x 3	9.9	7.8	22	24	10	1x3.5	2.00	3	2.0	—	—	0.06	2 800	5 000
10 x 3	9.9	7.8	22	24	10	1x3.5	2.00	3	2.0	ø 3.5	K	0.06	2 800	5 000
10 x 10	9.8	7.9	23	26	10	2x1.5	2.00	3	2.0	—	—	0.06	2 500	4 500
12 x 4	12.0	9.8	26	24	10	1x3.5	2.50	3	1.8	—	—	0.07	5 500	11 000
12 x 4	12.0	9.8	26	32	10	1x3.5	2.50	3	1.8	ø 4	K	0.07	5 500	11 000
14 x 4	14.0	11.5	29	24	16	1x3.5	2.78	4	2.5	—	—	0.07	8 100	16 000
14 x 4	14.0	11.5	29	32	16	1x3.5	2.78	4	2.5	ø 4	K	0.07	8 100	16 000
16 x 10	15.7	13.0	32	45	16	2x2.5	3.50	4	2.5	—	—	0.07	17 000	25 000
16 x 10	15.7	13.0	32	45	16	2x2.5	3.50	4	2.5	ø 4	K	0.07	17 000	25 000
left-hand threads														
10 x 3	9.9	7.8	22	24	10	1x3.5	2.00	3	2.0	—	—	0.06	2 800	5 000
10 x 3	9.9	7.8	22	24	10	1x3.5	2.00	3	2.0	ø 3.5	K	0.06	2 800	5 000
14 x 4	14.0	11.5	29	24	16	1x3.5	2.78	4	2.5	—	—	0.07	8 100	16 000
14 x 4	14.0	11.5	29	32	16	1x3.5	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

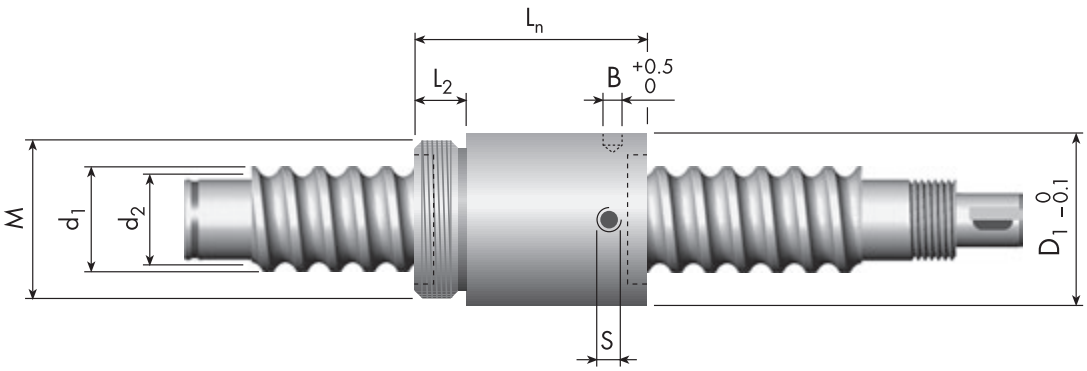
T = standard backlash [mm]

[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 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

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 x 2	5.0	4.0	10	M8x0.75	18	6	3x1	0.80	2.5	—	—	0.03	500	800
5 x 3 [3]	5.0	4.2	10	M8x0.75	19	6	2x1	0.80	2.5	—	—	0.03	340	490
8 x 1.5	8.0	6.7	16	M14x1	22	8	3x1	1.20	2.5	—	—	0.04	800	1 300
8 x 2	8.0	6.5	16	M14x1	28	8	3x1	1.59	2.5	—	—	0.05	1 400	2 000
8 x 2.5	8.0	6.6	16	M14x1	24	8	3x1	1.59	2.5	—	—	0.05	1 400	2 100
8 x 3	8.0	6.7	16	M14x1	25	8	3x1	1.50	2.5	—	—	0.05	1 400	2 100
10 x 2	9.7	8.2	18	M16x1	22	8	2x1	1.59	2.5	—	—	0.06	1 250	2 100
10 x 4	10.0	7.5	20	M18x1	40	8	4x1	2.50	2.5	—	—	0.07	4 100	6 700
10 x 4	10.0	7.5	20	M18x1	40	8	4x1	2.50	2.5	ø 2	K	0.07	4 100	6 700
12 x 2	12.0	10.6	20	M18x1	23	8	2x1	1.59	2.5	—	—	0.06	1 380	2 500
12 x 4	12.0	9.8	24	M20x1	39	10	3x1	2.50	2.5	—	—	0.07	4 000	6 800
12 x 4	12.0	9.8	24	M20x1	39	10	3x1	2.50	2.5	ø 4	K	0.07	4 000	6 800
12 x 5	12.0	9.5	23	M20x1	42	10	3x1	2.78	3.0	—	—	0.07	5 000	8 600
12 x 5	12.0	9.5	23	M20x1	42	10	3x1	2.78	3.0	ø 4	K	0.07	5 000	8 600
14 x 4	14.0	11.5	25	M22x1.5	34	10	3x1	2.78	2.5	—	—	0.07	5 000	8 800
14 x 4	14.0	11.5	25	M22x1.5	38	10	3x1	2.78	2.5	ø 4	K	0.07	5 000	8 800
left-hand threads														
10 x 2 [3]	9.7	8.2	18	M16x1	22	8	2x1	1.59	2.5	—	—	0.06	1 250	2 100
12 x 2 [3]	12.0	10.6	20	M18x1	23	8	2x1	1.59	2.5	—	—	0.06	1 380	2 500

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

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 29 for the appropriate calculations.

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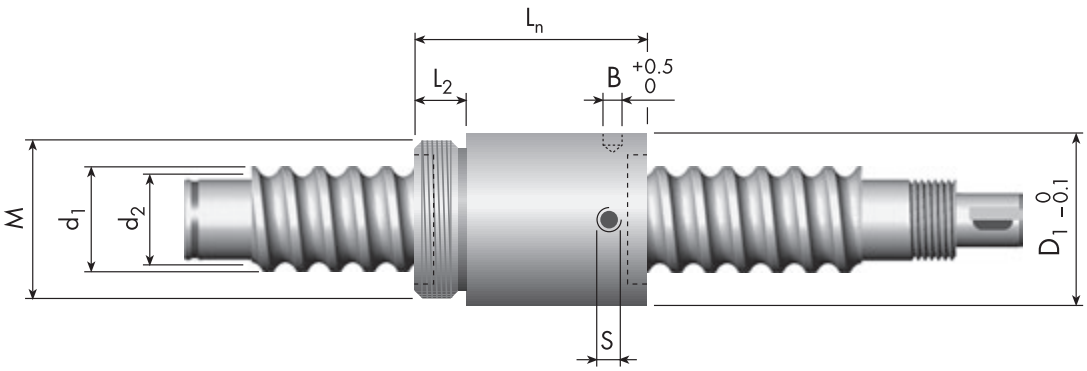
Quality management ISO 9001:2008

Carry type «FGI» (2/2)

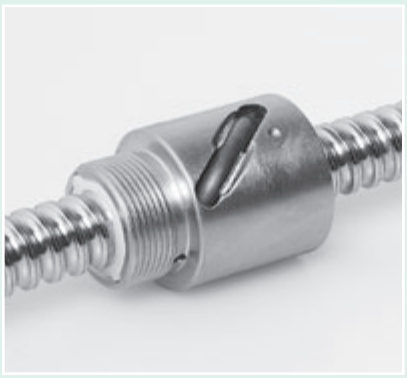


Carry type «FGI» d_0 x p	Dimensions Screw d_1	d_2	Nut D_1 0/–0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
16 x 5	15.7	13.0	30.2	M26x1.5	45	12	3x1	3.50	3.5	—	—	0.07	9700	22000
16 x 5	15.7	13.0	30.2	M26x1.5	50	12	3x1	3.50	3.5	M5	K	0.07	9700	22000
20 x 5	19.2	16.5	33	M30x1.5	47	12	3x1	3.50	4	M5	K	0.07	10800	25000
25 x 5	24.6	21.5	40	M38x1.5	57	12	3x1	3.50	4	M5	K	0.07	11700	30000
32 x 5	31.6	28.5	52	M48x1.5	55	15	4x1	3.50	4	M5	K	0.07	19000	54000
left-hand threads														
16 x 2	16.0	14.5	25	M22x1.5	34	10	3x1	1.59	2.5	—	—	0.05	2400	5200
16 x 5 [3)]	15.7	13.0	30.2	M26x1.5	50	12	3x1	3.50	3.5	M5	K	0.07	9700	22000
20 x 5	19.2	16.5	33	M30x1.5	47	12	3x1	3.50	4	M5	K	0.07	10800	25000

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

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 29 for the appropriate calculations.

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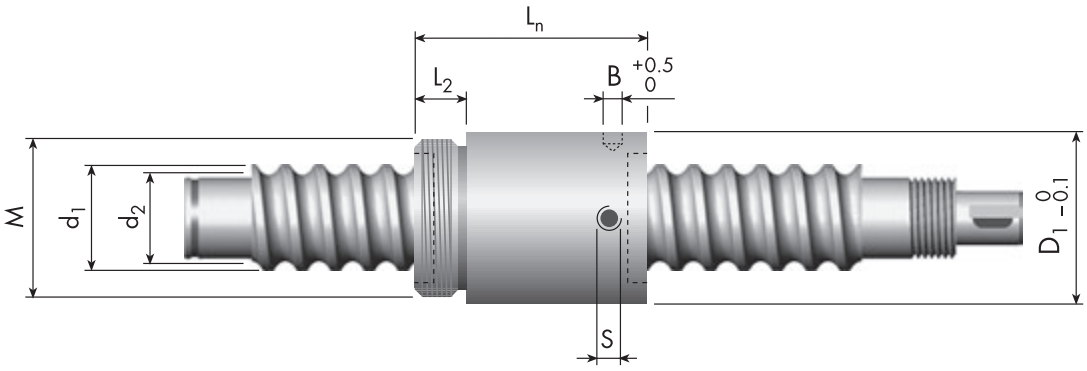
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry type «FGR» (1/3)



Carry type «FGR» d_0 x 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 x 2	5.7	4.6	16	M12x1	22	8	1x3.5	1.59	2.5	—	—	0.06	1 700	2 300
8 x 2	8.0	6.5	18	M14x1	24	8	1x3.5	1.59	2.5	—	—	0.06	2 000	3 200
8 x 2	8.0	6.5	18	M14x1	24	8	1x3.5	1.59	2.5	ø 2	K	0.06	2 000	3 200
8 x 2.5	8.0	6.6	17.5	M15x1	24	8	1x3.5	1.59	2.5	—	—	0.06	2 000	3 200
8 x 2.5	8.0	6.6	17.5	M15x1	26	8	1x3.5	1.59	2.5	ø 2	K	0.06	2 000	3 200
8 x 8	8.0	6.6	18	M14x1	25	8	2x1.5	1.50	2.5	—	—	0.06	1 500	2 500
10 x 2	9.7	8.2	19.5	M17x1	22	7	1x3.5	1.59	2.5	—	—	0.06	2 300	4 000
10 x 2	9.7	8.2	19.5	M17x1	22	7	1x3.5	1.59	2.5	ø 2	K	0.06	2 300	4 000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	2.00	3	—	—	0.06	2 800	5 000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	2.00	3	ø 2	K	0.06	2 800	5 000
10 x 10	9.8	7.9	23	M18x1	35	9	2x1.5	2.00	3	—	—	0.06	2 500	4 500
10 x 10	9.8	7.9	23	M18x1	35	9	2x1.5	2.00	3	ø 4	K	0.06	2 500	4 500
left-hand threads														
6 x 2	5.7	4.6	16	M12x1	22	8	1x3.5	1.59	2.5	—	—	0.06	1 700	2 300
10 x 2	9.7	8.2	19.5	M17x1	22	7	1x3.5	1.59	2.5	—	—	0.06	2 300	4 000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	2.00	3	—	—	0.06	2 800	5 000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	2.00	3	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

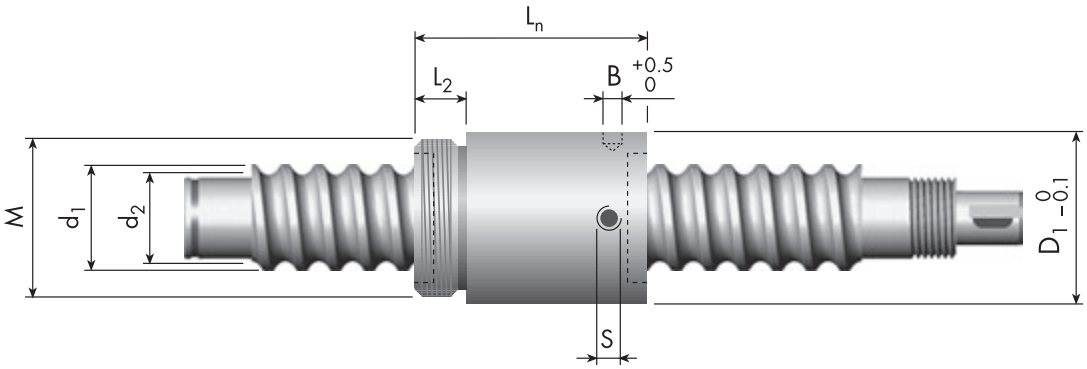
T = standard backlash [mm]

[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 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry type «FGR» (2/3)



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 x 4	12.0	9.8	26	M20x1	32	8	1x3.5	2.50	2.5	—	—	0.07	5 500	11 000
12 x 4	12.0	9.8	26	M20x1	34	10	1x3.5	2.50	2.5	ø 4	K	0.07	5 500	11 000
12 x 5	12.0	9.5	26	M20x1	37	8	1x3.5	2.78	3	—	—	0.07	6 600	12 000
12 x 5	12.0	9.5	26	M20x1	37	8	1x3.5	2.78	3	ø 4	K	0.07	6 600	12 000
12.7 x 12.7	13.1	10.3	29.5	M25x1.5	50	12	2x1.5	3.50	3	—	—	0.07	8 000	15 500
12.7 x 12.7	13.1	10.3	29.5	M25x1.5	50	12	2x1.5	3.50	3	M5	B	0.07	8 000	15 500
14 x 2	14.0	12.5	26	M22x1.5	32	10	2x2.5	1.59	3	—	—	0.06	4 500	10 000
14 x 2	14.0	12.5	26	M22x1.5	32	10	2x2.5	1.59	3	ø 2	K	0.06	4 500	10 000
14 x 4	14.0	11.5	29	M22x1.5	32	8	1x3.5	2.78	3	—	—	0.07	8 100	16 000
14 x 4	14.0	11.5	29	M22x1.5	38	10	1x3.5	2.78	3	ø 4	K	0.07	8 100	16 000
16 x 2	16.0	14.5	30	M26x1.5	28	12	1x2.5	1.59	3.5	—	—	0.06	2 500	5 500
16 x 2	16.0	14.5	30	M26x1.5	28	12	1x2.5	1.59	3.5	ø 2	K	0.06	2 500	5 500
16 x 5	15.7	13.0	32	M26x1.5	42	12	1x3.5	3.50	4	—	—	0.07	12 000	25 000
16 x 5	15.7	13.0	32	M26x1.5	47	12	1x3.5	3.50	4	M5	K	0.07	12 000	25 000
16 x 10	15.7	13.0	32	M26x1.5	47	12	1x2.5	3.50	4	—	—	0.07	8 500	12 500
16 x 10	15.7	13.0	32	M26x1.5	52	12	1x2.5	3.50	4	ø 4	K	0.07	8 500	12 500
16 x 10	15.7	13.0	32	M26x1.5	47	12	2x2.5	3.50	4	—	—	0.07	17 000	25 000
16 x 10	15.7	13.0	32	M26x1.5	52	12	2x2.5	3.50	4	ø 4	K	0.07	17 000	25 000
left-hand threads														
12 x 5	12.0	9.5	26	M20x1	37	8	1x3.5	2.78	3	—	—	0.07	6 600	12 000
14 x 4	14.0	11.5	29	M22x1.5	32	8	1x3.5	2.78	3	—	—	0.07	8 100	16 000
14 x 4	14.0	11.5	29	M22x1.5	38	10	1x3.5	2.78	3	ø 4	K	0.07	8 100	16 000
16 x 5	15.7	13.0	32	M26x1.5	42	12	1x3.5	3.50	4	—	—	0.07	12 000	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

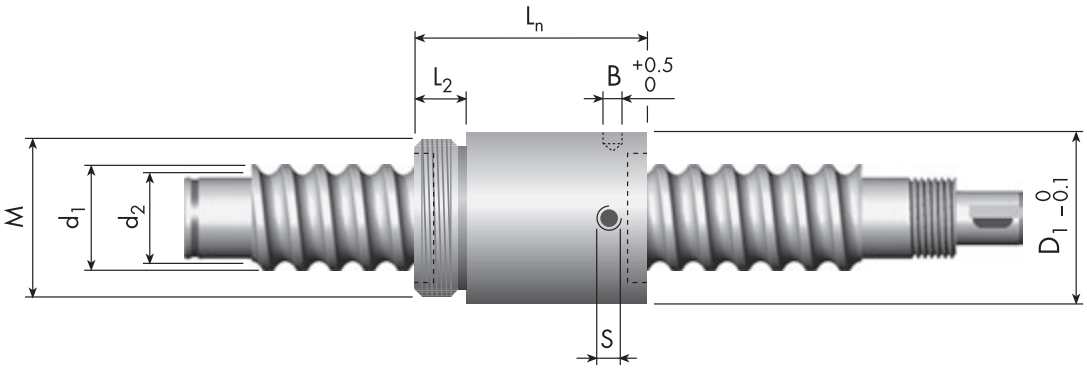
T = standard backlash [mm]

[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 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry type «FGR» (3/3)

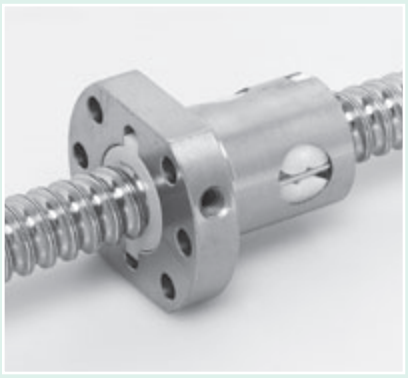


Carry type «FGR» d_0 x p	Dimensions Screw d_1	d_2	Nut D_1 0/−0.1	M	L_n	L_2	i	D_W	B +0.5/0	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
20 x 2	20.0	18.5	36	M30x1.5	30	12	2x2.5	1.59	4	—	—	0.06	4 600	15 000
20 x 5	19.2	16.5	36	M30x1.5	42	12	1x3.5	3.50	4	—	—	0.07	13 700	29 900
20 x 5	19.2	16.5	36	M30x1.5	42	12	1x3.5	3.50	4	ø 4	K	0.07	13 700	29 900
20 x 10	19.5	16.5	38	M35x1.5	58	19	2x2.5	3.50	4	—	—	0.07	21 000	51 000
20 x 10	19.5	16.5	38	M35x1.5	58	19	2x2.5	3.50	4	ø 4	B	0.07	21 000	51 000
20 x 20	20.0	16.5	38	M35x1.5	58	19	2x1.5	3.50	4	—	—	0.07	10 000	22 000
20 x 20	20.0	17.3	38	M35x1.5	58	19	4x1.5	3.00	4	—	—	0.07	14 600	35 000
25 x 10	24.8	21.8	43	M40x1.5	58	19	2x2.5	3.50	4	—	—	0.07	21 000	54 000
25 x 10	24.8	21.8	43	M40x1.5	58	19	2x2.5	3.50	4	ø 4	B	0.07	21 000	54 000
25 x 25	24.5	21.2	44	M40x1.5	72	20	2x1.5	3.50	4	ø 4	B	0.08	10 000	24 000
25 x 25	24.5	21.2	44	M40x1.5	72	20	4x1.5	3.50	4	ø 4	B	0.08	20 000	48 000
32 x 10	31.6	28.4	52	M48x1.5	62	19	2x2.5	3.50	4	ø 4	B	0.07	20 000	55 000
left-hand threads														
20 x 2	20.0	18.5	36	M30x1.5	30	12	2x2.5	1.59	4	—	—	0.06	4 600	15 000

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

Carry type «FBI»

Flange type B nut following DIN 69051 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 [mm]
SA = wipers

K = plastic

B = brushes

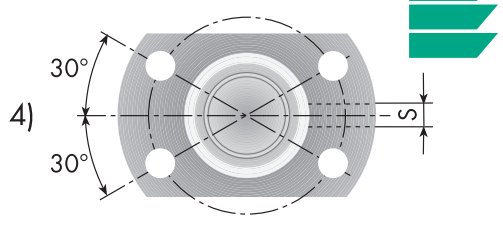
T = standard backlash [mm]

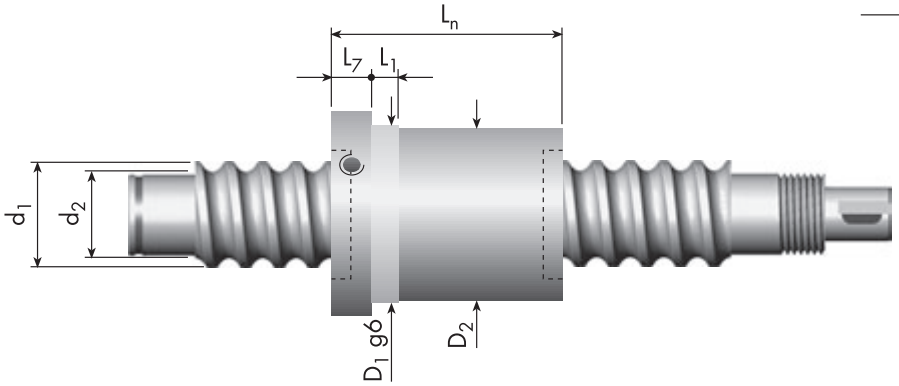
[3] = only on request
[4] = special master gauge for holes; only 4 instead of 6 holes
(for d_0 x p = 4 x 1, 6 x 1, 8 x 1, 8 x 2, 10 x 4 and 12 x 5)

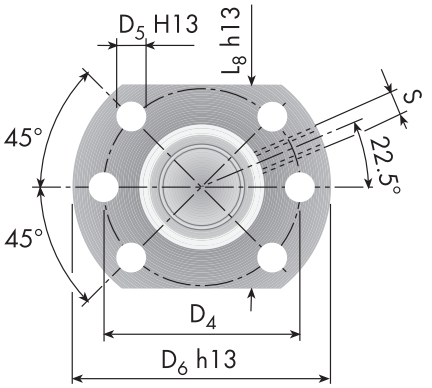
Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry type «FBI»





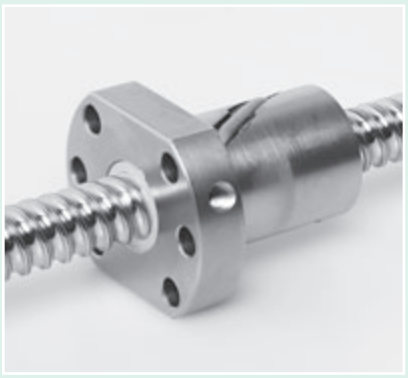


Carry type «FBI» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	D_2	D_4 hole circle	D_5 H13	D_6 h13	L_n	L_1	L_7	L_8 h13	i	D_W	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
4 x 1 [4]	4.0	3.2	8	7.9	12	2.7	17	14	2	3	11	3x1	0.80	—	—	0.03	430	580
6 x 1 [4]	6.0	5.0	12	11.8	18	3.4	24	18	4	4	16	3x1	0.80	ø 2	K	0.03	600	1 000
8 x 1 [4]	8.0	7.0	14	13.5	21	3.4	27	18	4	4	18	3x1	0.80	ø 2	K	0.03	700	1 200
8 x 2 [4]	8.0	6.5	16	15.5	22	3.4	28	30	4	6	19	3x1	1.59	ø 4	K	0.05	1 400	2 000
10 x 4 [4]	10.0	7.5	18	17.8	28	4.5	36	38	6	6	23	4x1	2.50	—	—	0.07	4 100	6 700
10 x 4 [4]	10.0	7.5	18	17.8	28	4.5	36	38	6	6	23	4x1	2.50	ø 2	K	0.07	4 100	6 700
12 x 5 [4]	12.0	9.5	24	23.5	32	4.5	40	40	6	8	26	3x1	2.78	ø 4	K	0.07	5 000	8 600
16 x 5	15.7	13.0	28	27.8	38	5.5	48	45	6	10	40	3x1	3.50	M6	K	0.07	9 700	22 000
20 x 5	19.2	16.5	36	35.5	47	6.6	58	50	10	10	44	3x1	3.50	M6	K	0.07	10 800	25 000
25 x 5	24.6	21.5	40	39.5	51	6.6	62	50	10	10	48	3x1	3.50	M6	K	0.07	11 700	30 000
25 x 5	24.6	21.5	40	39.5	51	6.6	62	55	10	10	48	4x1	3.50	M6	K	0.07	14 000	35 000
32 x 5	31.6	28.5	50	49.5	65	9.0	80	57	10	12	62	4x1	3.50	M6	K	0.07	19 000	54 000
left-hand threads																		
16 x 5	15.7	13.0	28	27.8	38	5.5	48	45	6	10	40	3x1	3.50	M6	K	0.07	9 700	22 000
20 x 5	19.2	16.5	36	35.5	47	6.6	58	50	10	10	44	3x1	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 type B nut following DIN 69051 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 [mm]
SA = wipers

K = plastic

B = brushes

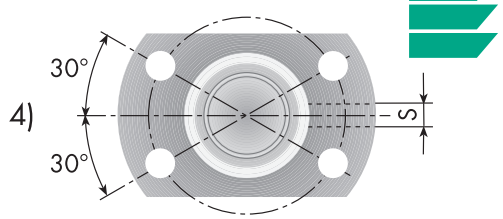
T = standard backlash [mm]

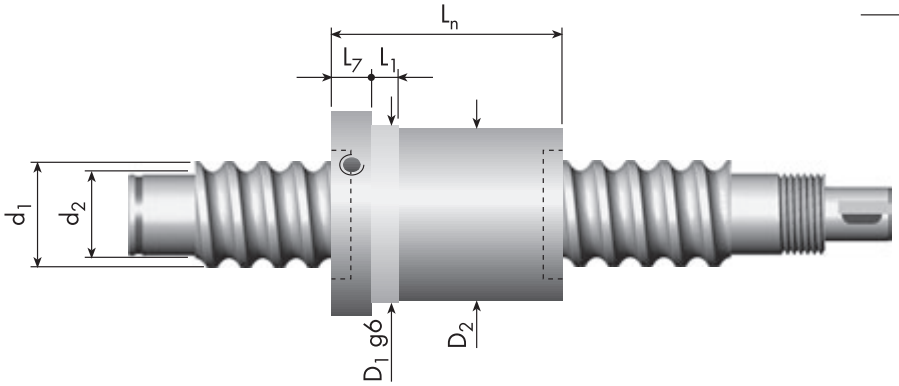
3) = only on request
4) = special master gauge for holes; only 4 instead of 6 holes
(for d_0 x p = 8 x 2, 10 x 10, 12 x 2, 12 x 3, 12 x 4 and 12 x 5)

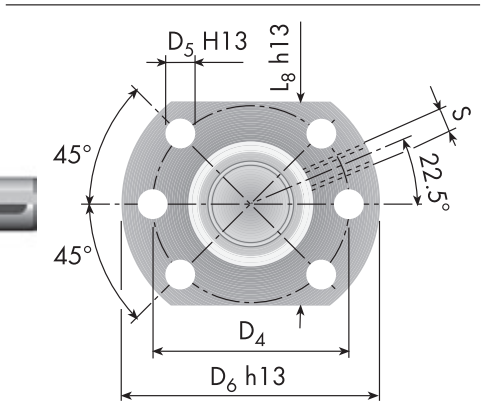
Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry type «FBR»







Carry type «FBR» $d_0 \times p$	Dimensions																Load rates	
	Screw		Nut															
	d_1	d_2	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	C_{dyn}	C_{stat}
mm	mm		mm														N	
right-hand threads																		
8 x 2 [4]	8.0	6.5	18	17.5	22	3.4	28	25	4	6	19	1x3.5	1.59	ø4	K	0.06	2 000	3 200
10 x 10 [4]	9.8	7.9	23	22.5	29	4.5	37	40	6	8	24	2x1.5	2.00	M5	K	0.06	2 500	4 500
12 x 2 [4]	12.0	10.6	22	21.5	29	4.5	37	30	5	8	24	1x3.5	1.59	ø4	K	0.06	2 500	5 100
12 x 3 [4]	12.3	10.2	24	23.5	32	4.5	40	36	5	8	26	2x2.5	2.00	—	—	0.06	5 000	11 000
12 x 4 [4]	12.0	9.8	26	25.5	32	4.5	39.5	36	5	8	28	1x3.5	2.50	M5	K	0.07	5 500	11 000
12 x 5 [4]	12.0	9.5	26	25.5	32	4.5	39.5	40	5	7	28	1x3.5	2.78	M5	K	0.07	6 600	12 000
14 x 2	14.0	12.5	26	25.5	32	4.5	39.5	32	5	7	28	2x2.5	1.59	ø4	K	0.06	4 500	10 000
14 x 4	14.0	11.5	29	28.6	38	5.5	48	40	6	8	36	1x3.5	2.78	M5	K	0.07	8 100	16 000
16 x 2	16.0	14.5	30	29.5	38	5.5	48	45	6	10	40	2x2.5	1.59	M6	K	0.06	4 500	11 000
16 x 2	16.0	14.5	30	29.5	38	5.5	48	45	6	10	40	3x2.5	1.59	M6	K	0.06	6 000	15 000
16 x 10	15.7	13.0	32	31.5	43	6.6	54	52	6	12	44	2x2.5	3.50	M6	K	0.07	17 000	25 000
20 x 10	19.5	16.5	38	37.5	50	6.6	62	55	7	10	48	2x2.5	3.50	M6	B	0.07	21 000	51 000
20 x 20	20.0	16.5	36	35.5	47	6.6	58	58	7	10	44	2x1.5	3.50	M6	B	0.07	10 000	22 000
25 x 10	24.8	21.8	43	42.5	55	6.6	65	55	7	10	50	2x2.5	3.50	M6	B	0.07	21 000	54 000
25 x 25	24.5	21.2	44	43.5	56	6.6	70	67	10	12	52	2x1.5	3.50	M6	B	0.08	10 000	24 000
25 x 25	24.5	21.2	44	43.5	56	6.6	70	67	10	12	52	4x1.5	3.50	M6	B	0.08	20 000	48 000
32 x 10	31.6	28.4	52	51.5	67	9	82	62	10	12	64	2x2.5	3.50	M6	B	0.07	20 000	55 000
left-hand threads																		
14 x 4	14.0	11.5	29	28.6	38	5.5	48	40	6	8	36	1x3.5	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**

Basic design / Materials

Basic design / Materials

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.

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

Nut designs
Standard are the following three types:

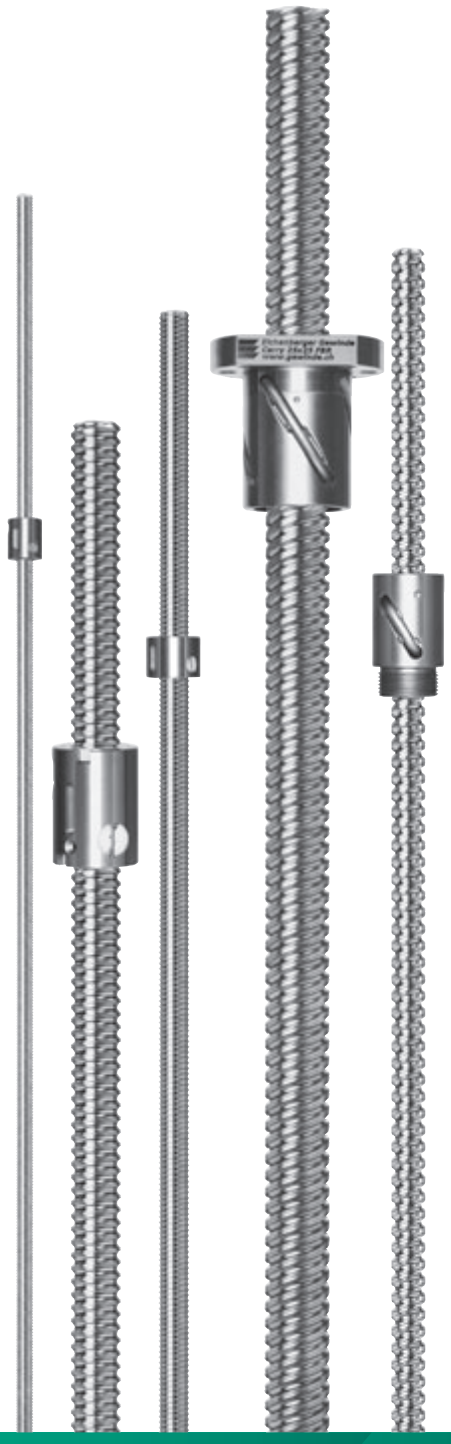
Cylindrical single nut type «ZY…»

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.

Materials
Screws as well as nuts are made of hardened steel. Stainless steel upon request (please ask for load rates).



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
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 or brush wipers, depending on nut type/dimension.

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

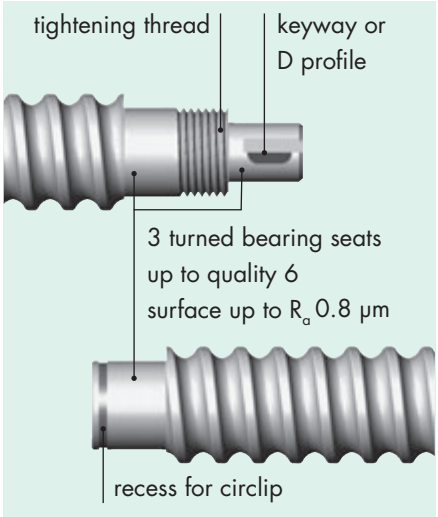
Factory length

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.

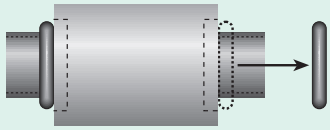
Please consult lubrication recommendation on page 27 before mounting or operating ball screws.

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.

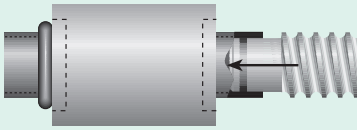
Assembling

1.



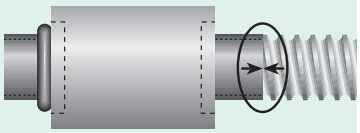
Remove transport lock (O-ring) on one side. Please keep sleeve and nut in horizontal position. Otherwise, the nut may slide from the sleeve and balls may fall out of the ball race.
In the event such incident does occur, balls must be properly re-inserted to prevent damage to or blockage of the ball screw.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

2.



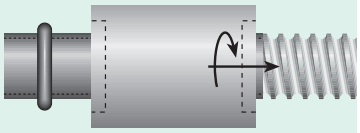
Insert screw end into mounting sleeve.

!



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.

Design fundamentals

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:

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

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 Speed-line «…E» types)

d_1 = outside screw diameter [mm]

Calculations at dynamic load:

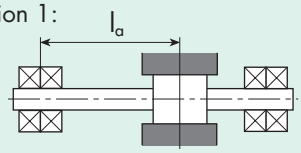
Critical rotational speed n_{per}

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

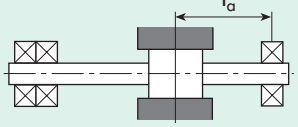
$$n_{per} = K_D \cdot 10^6 \cdot \frac{d_2}{l_a^2} \cdot S_n \; [\text{min}^{-1}]$$

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 [–]

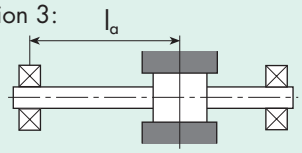
Configuration 1: fixed – fixed
K_D = 276



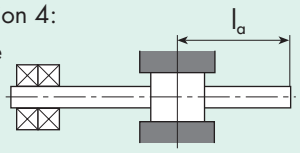
Configuration 2: fixed – simple
K_D = 190



Configuration 3: simple – simple
K_D = 122



Configuration 4: fixed – free
K_D = 43



Nominal service life L_{10} or L_h

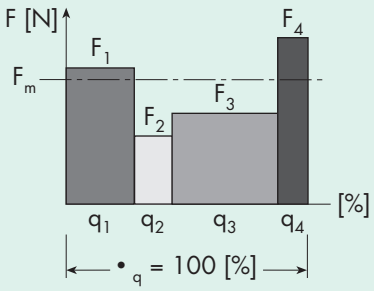
$$L_{10} = \left(\frac{C_{dyn}}{F_m}\right)^3 \cdot 10^6 \; [R]$$

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

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}

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



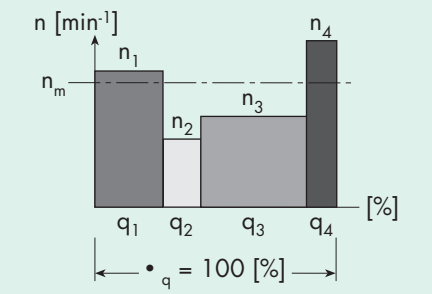
$$\rightarrow L_{10} = \left(\frac{C_{dyn}}{F_m}\right)^3 \cdot 10^6 \; [R]$$

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

Calculations at dynamic load (continuation):

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

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



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

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

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

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

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

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

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

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

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

Case 2: axial force → torque

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

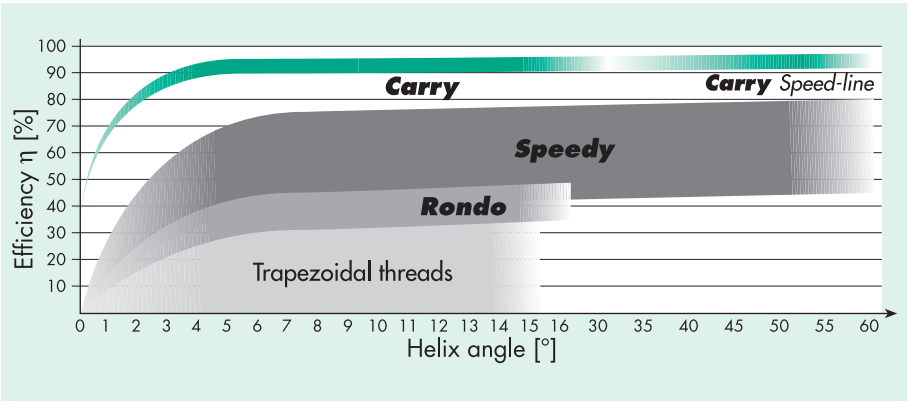
M_a = input torque [Nm], case 1
M_e = output torque [Nm], case 2
F_a = axial force [N]

Input performance P

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

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 $F_{per.}$

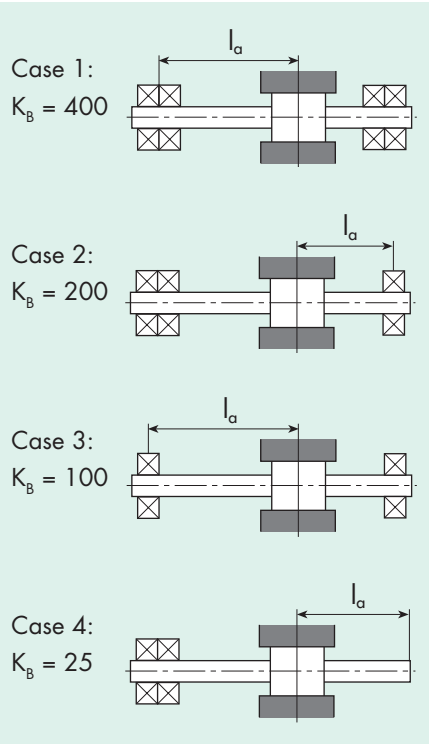
$$F_{per.} = \frac{C_{stat}}{f_s} \text{ [N]}$$

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 [–]



Content Carry Speed-line

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

Order system Carry Speed-line

Example for complete ball screw — **KGE 16x50 FBE RH 3 S 450 G9 A O M**

Type of lead screw
KGE = high-helix ball screw Carry Speed-line

Nominal size (d_0x p) [mm]

Type of nut — for nut only
ZYE = cylindrical nut with end cap ball return
FBE = flange nut with end cap ball return
MSX = special design according to drawing
(FSS, ZYK and FBK no more in the product range)

Right-hand / left-hand thread
RH = right-hand thread (standard)

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

Wipers — for nut only
S = with wipers (plastic; integrated into end cap ball return)

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 request; up to max. 1200 mm screw length)
G5 = ≤ 0.023 mm/300 mm (on request; up to max. 1200 mm screw length)

Backlash — for nut only
A = standard backlash (see technical data)
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 — **KGE 16x50 RH 450 G9 O G**

Example for nut only — **KGE 16x50 FBE RH 3 S A G**

Carry Speed-line type «ZYE»

Cylindrical nut with end cap ball return

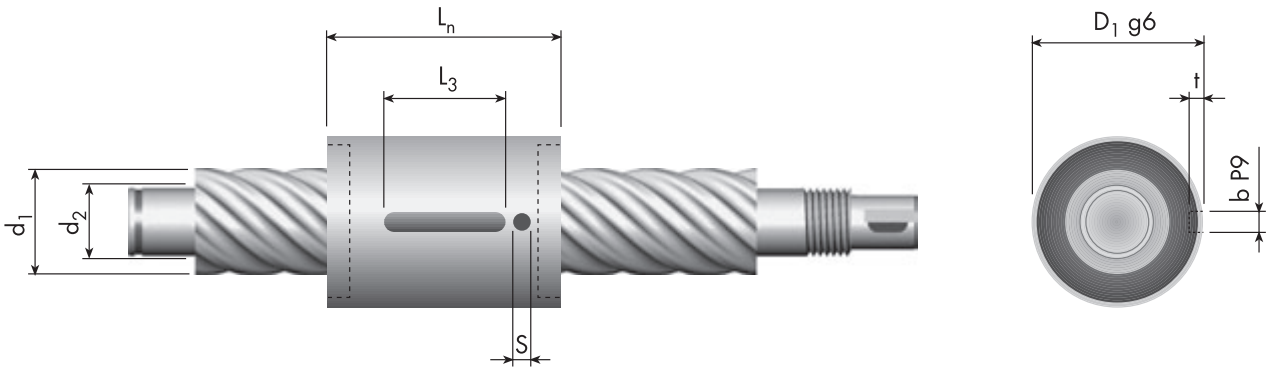
Legend

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 [mm]
SA = wipers
K = plastic
T = standard backlash

Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry Speed-line type «ZYE»

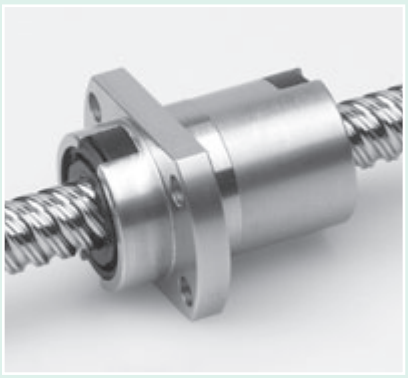


Carry S-line type «ZYE» $d_0 \times p$	Dimensions Screw d_1	d_2	Nut D_1 g6	L_n	L_3	i	D_W	b P9	t	S	SA	T	Load rates C_{dyn}	C_{stat}
mm	mm		mm										N	
right-hand threads														
8 x 12	8.0	6.7	18	28	8	2x1.5	1.50	2	1.2	ø 2	K	0.05	1 400	2 300
12.7 x 25.4	12.5	10.6	26	32	10	3x0.9	2.00	3	1.8	ø 4	K	0.05	2 300	4 500
16 x 10	16.0	13.4	28	42	16	2x2.9	3.00	4	2.5	ø 4	K	0.07	12 500	26 000
16 x 16	15.5	13.2	28	42	16	2x1.9	3.00	4	2.5	ø 3	K	0.07	7 800	15 500
16 x 50	16.0	13.2	28	55	16	3x0.9	3.00	4	2.5	ø 4	K	0.06	4 800	11 000
20 x 20	20.0	17.3	36	50	20	4x1.9	3.00	4	2.5	ø 4	K	0.06	17 900	44 600
25 x 25	24.5	21.2	40	60	20	4x1.9	3.50	4	2.5	ø 4	K	0.06	23 300	68 000

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

Carry Speed-line type «FBE»

Flange nut with end cap ball return



Legend

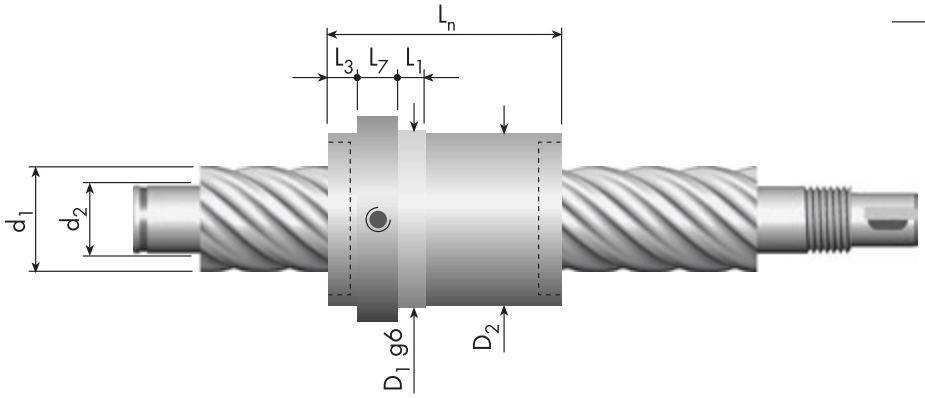
d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]
i = number of ball circulations [–]
D_W = ball diameter [mm]
S = lubrication hole [mm]
SA = wipers
K = plastic
T = standard backlash

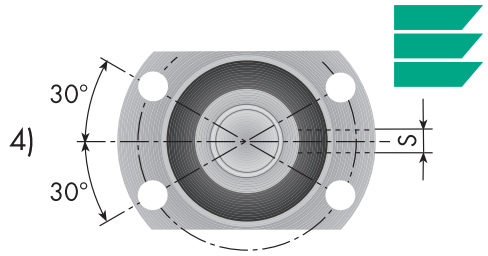
[4] = special master gauge for holes; only 4 instead of 6 holes (for d_0 x p = 8 x 12 and 12.7 x 25.4)

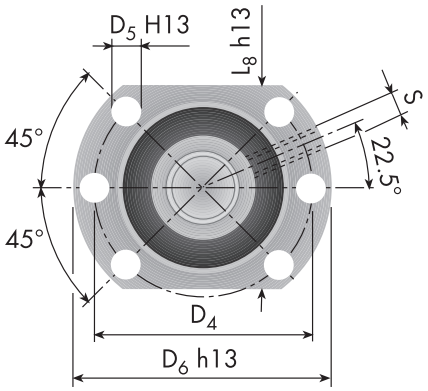
Warning! Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.
See page 29 for the appropriate calculations.

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Carry Speed-line type «FBE»







Carry S-line type «FBE» $d_0 \times p$	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_3	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 x 12 [4]	8.0	6.7	18	17.8	25	3.4	30	28	4	6	4	20	2x1.5	1.50	ø 2	K	0.05	1 400	2 300
12.7 x 25.4 [4]	12.5	10.6	26	25.5	33	4.5	42	32	5	7	8	28	3x0.9	2.00	ø 4	K	0.05	2 300	4 500
16 x 10	16.0	13.4	28	27.8	38	5.5	48	42	10	10	10	40	2x2.9	3.00	ø 4	K	0.07	12 500	26 000
16 x 16	15.5	13.2	28	27.8	38	5.5	48	42	10	10	10	40	2x1.9	3.00	ø 4	K	0.07	7 800	15 500
16 x 50	16.0	13.2	28	27.8	38	5.5	48	55	10	10	10	40	3x0.9	3.00	ø 4	K	0.06	4 800	11 000
20 x 20	20.0	17.3	36	35.5	47	6.6	58	50	10	10	12	44	4x1.9	3.00	M6	K	0.06	17 900	44 600
25 x 25	24.5	21.2	40	39.8	51	6.6	62	60	10	10	10	48	4x1.9	3.50	ø 4	K	0.06	23 300	68 000

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

Basic design / Materials

Basic design / Materials
The cold-rolled Carry Speed-line ball screw features an extremely high pitch. Designed to meet customer demand for a wear-free high-helix ball screw, it delivers a high transmission speed and an impressive efficiency.
Ball screws of the Carry Speed-line are the product of the very economical cold-rolling process. They combine with single steel nuts produced in a unique specially developed process.

The design and production of this high-helix ball screw derive from our experience in making the Carry and Speedy screws. In other words, the Carry Speed-line integrates the know-how of both technologies.

Carry Speed-line 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.

Thread profile
A gothic arc (ogival) profile is used.

Nut design
Standard are the following two types:

Cylindrical nut type «ZYE»

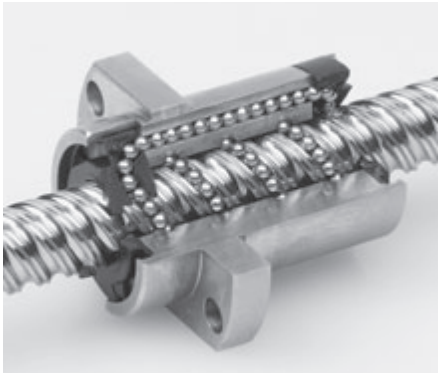
Flange nut type «FBE»

Other nut designs are available upon request.

Materials
Screws as well as nuts are made of hardened steel. Stainless steel upon request (please ask for load rates).
Nut end caps with integrated ball returns and wipers are made of plastic.

Ball return / Precision

Ball return
Nuts feature end cap ball returns, fully integrated into the nut shape and serving as wipers.



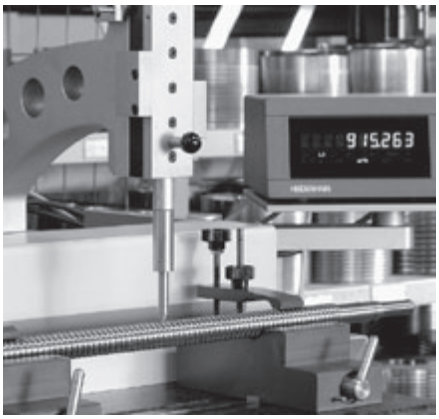
End cap ball return type «…E»

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

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

Standard
- G9 = ≤ 0.1 mm/300 mm

On request
up to max. 1200 mm screw length
- G7 = ≤ 0.052 mm/300 mm
- G5 = ≤ 0.023 mm/300 mm



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

Efficiency
The efficiency η for this Carry Speed-line is an impressive 0.95.

Wipers
Depending on construction Carry Speed-line features integrated wipers as part of the plastic end caps.

Lubrication
See Carry page 27.

Factory length
Ball screw ends
Handling
Radial loads and torque
Assembling
See Carry page 28.

Design fundamentals
See Carry pages 29–31.

Speedy high-helix lead screws and Rondo round thread lead screws

Slide lead screw product range

▲ = standard range

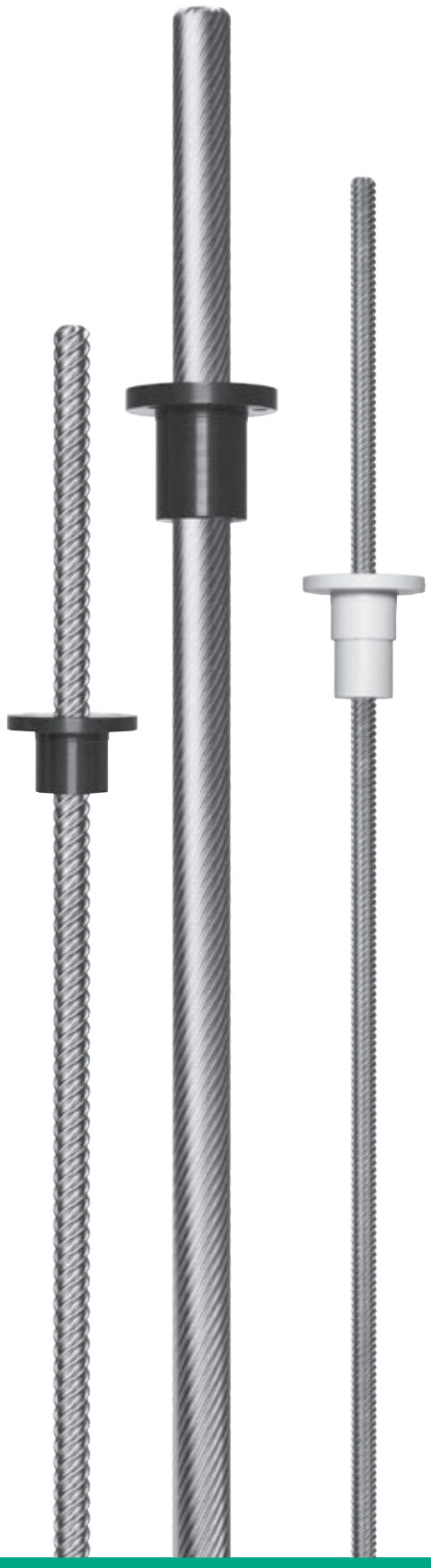
✷ = on request

2) = also available with left-hand thread

type pages d_0 / p_0	Rondo round thread 66/67	Speedy inch thread 58/59	Speedy fine-pitch thread 56/57	Speedy standard thread 44–55	type pages d_0 / p_0
					
4 / 10			▲		4 / 10
5 / 5			▲		5 / 5
5 / 20			▲ 2)		5 / 20
6 x 2	▲				6 x 2
6 / 25			▲		6 / 25
6.35 / 6.35		▲			6.35 / 6.35
6.35 / 12.7		▲			6.35 / 12.7
6.35 / 25.4		▲			6.35 / 25.4
7.5 / 7.5			▲		7.5 / 7.5
7.94 / 12.7		▲			7.94 / 12.7
8 x 2	▲				8 x 2
8 / 10				▲ 2)	8 / 10
8 / 12				▲	8 / 12
8 / 15				▲	8 / 15
8 / 30			▲ 2)		8 / 30
9 / 20				▲	9 / 20
9.7 / 25.4		▲ 2)			9.7 / 25.4
10 x 3	▲				10 x 3
10 / 10			▲		10 / 10
10 / 12				▲ 2)	10 / 12
10 / 15				▲	10 / 15
10 / 35			▲ 2)		10 / 35
10 / 50				▲ 2)	10 / 50
11 / 40			▲		11 / 40
11 / 60				▲	11 / 60
11.2 / 30.5		▲			11.2 / 30.5
12 x 3	▲				12 x 3
12 x 4	▲				12 x 4
12 / 15				▲ 2)	12 / 15
12 / 25				▲ 2)	12 / 25
12 / 45			▲ 2)		12 / 45
12.5 / 12.5			✷		12.5 / 12.5
12.8 / 35.6		▲			12.8 / 35.6
13 / 20				▲	13 / 20
13 / 70				▲ 2)	13 / 70
14 x 3	▲				14 x 3

14 x 4	▲				14 x 4
14 / 8				▲	14 / 8
14 / 18				▲ 2)	14 / 18
14 / 30				▲ 2)	14 / 30
14.3 / 40.6		▲ 2)			14.3 / 40.6
15 / 20				▲ 2)	15 / 20
15 / 80				▲ 2)	15 / 80
16 x 5	▲				16 x 5
16 / 21				▲ 2)	16 / 21
16 / 25				▲	16 / 25
16 / 35				▲	16 / 35
16.0 / 45.7		✷			16.0 / 45.7
16 / 90				▲ 2)	16 / 90
17.6 / 50.8		▲			17.6 / 50.8
18 / 16				▲	18 / 16
18 / 24				▲ 2)	18 / 24
18 / 40				▲ 2)	18 / 40
18 / 100				▲ 2)	18 / 100
19 / 30				▲	19 / 30
20 / 12				▲	20 / 12
20 / 45				▲	20 / 45
21 / 27				▲	21 / 27
21 / 35				✷	21 / 35
22 / 20				▲	22 / 20
22 / 50				▲	22 / 50
23 / 30				▲ 2)	23 / 30
24 / 40				✷	24 / 40
24 / 55				▲	24 / 55
25.7 / 76.2		▲ 2)			25.7 / 76.2
26 / 16				✷	26 / 16
26 / 24				▲	26 / 24
26 / 60				▲	26 / 60
27 / 45				✷	27 / 45
28 / 65				✷	28 / 65
30 / 28				▲	30 / 28
30 / 50				▲	30 / 50
30 / 70				▲	30 / 70
32 / 20				✷	32 / 20
32 / 75				✷	32 / 75
32.0 / 96.5		▲ 2)			32.0 / 96.5
34 / 32				✷	34 / 32
34 / 80				▲	34 / 80
36 / 200				▲	36 / 200
type pages	**round thread** 66/67	**inch thread** 58/59	**fine-pitch thread** 56/57	**standard thread** 44–55	**type** pages

Content Speedy



Speedy high-helix lead screws

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

Order system Speedy

Example for complete high-helix lead screw — **SGS 18/100 SFM RH 350 G9 O M**

Type of lead screw
SGS = High-helix lead screw Speedy

Nomina size (d_0/p_0) [mm]

Type of nut — for nut only
SFM = standard flange nut, non-preloaded, made of POM-C black [1)]
SFV = standard flange nut, axial-preloaded, made of POM-C black [1)]
SFT = standard flange nut, torsion-preloaded, made of EX100 white [6)]
SBM = standard flange nut, non-preloaded, made of bronze
SBV = standard flange nut, axial-preloaded, made of bronze [3)]
SBT = standard flange nut, torsion-preloaded, made of bronze [3)]
MSX = special design according to drawing

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

Lead screw overall length [mm] — for screw only
(stainless steel quality X20Cr13, Material N° 1.4021) [1)]

Lead accuracy (class) — for screw only
G9 = ≤ 0.1 mm/300 mm (standard)
GX = lead accuracy upon specification

End machining — for screw only
O = no end machining (cut by grinding; screw and nut separate)
E = end machining according to drawing

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

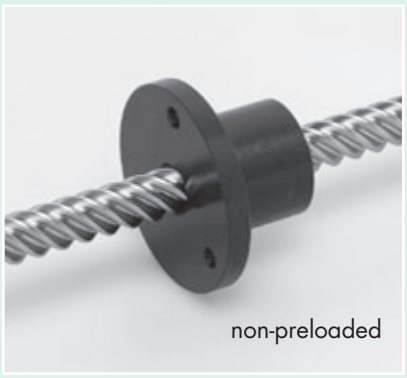
1) other materials on request
3) only on request
6) available for square pitches and larger (with electro polished screws)

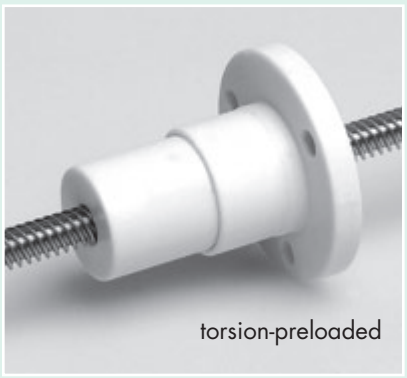
Example for screw only — **SGS 18/100 RH 350 G9 O G**

Example for nut only — **SGS 18/100 SFM RH G**

Speedy with standard thread

Standard flange nut, non-preloaded/preloaded


non-preloaded


torsion-preloaded

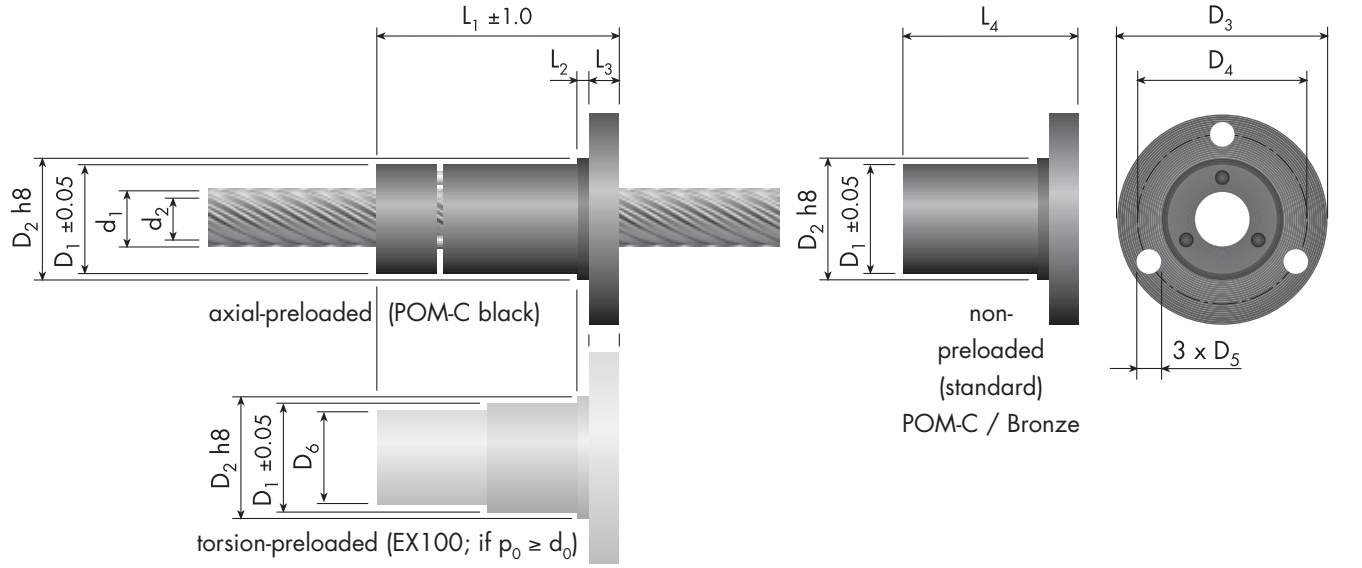
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with standard thread (1/6)

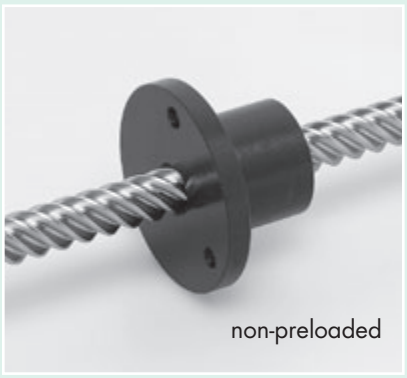


Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
8 / 10	8.2	5.5	10	4	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	800
8 / 12	8.0	5.9	12	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	800
8 / 15	8.0	5.9	15	6	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	850
9 / 20	8.9	5.8	20	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	850
10 / 12	10.0	7.1	12	4	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 200
10 / 15	10.0	7.4	15	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 200
12 / 15	12.2	9.2	15	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 400
12 / 25	11.9	8.0	25	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 500
left-hand threads															
8 / 10	8.2	5.5	10	4	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	800
10 / 12	10.0	7.1	12	4	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 200
12 / 15	12.2	9.2	15	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 400
12 / 25	11.9	8.0	25	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 500

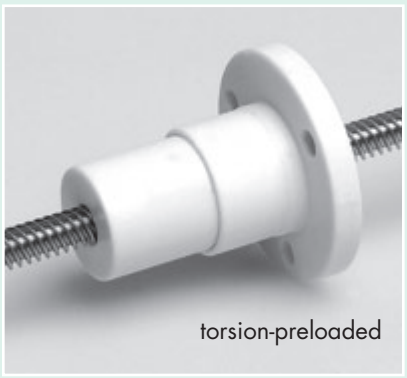
The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Speedy with standard thread

Standard flange nut, non-preloaded/preloaded



non-preloaded



torsion-preloaded

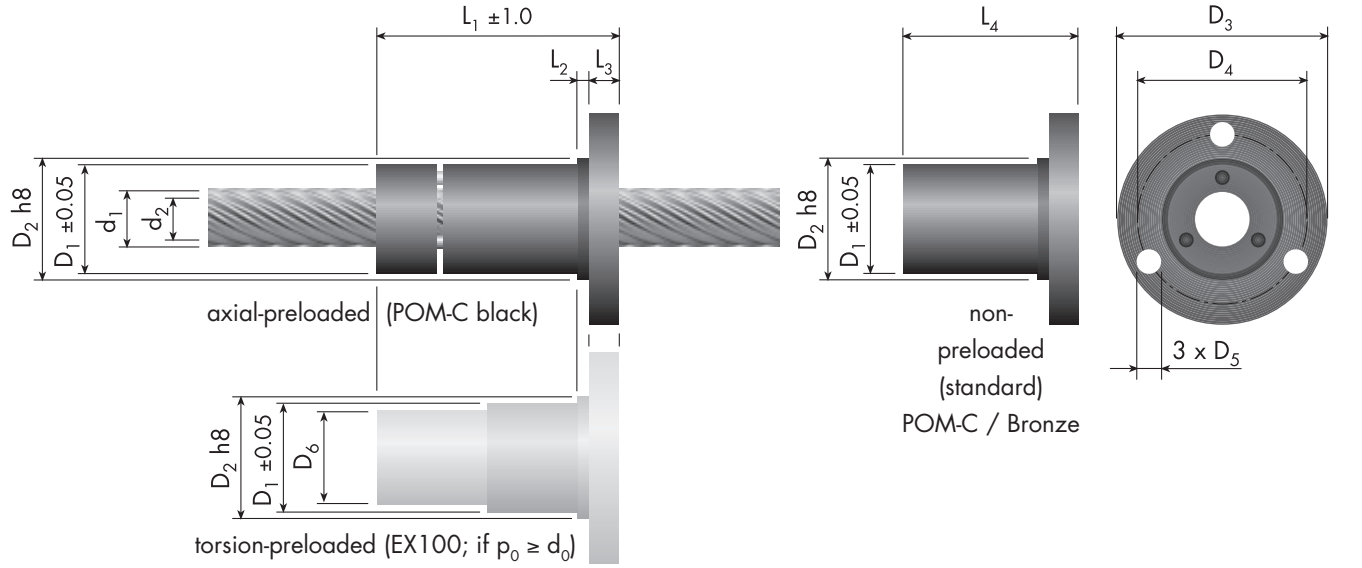
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with standard thread (2/6)

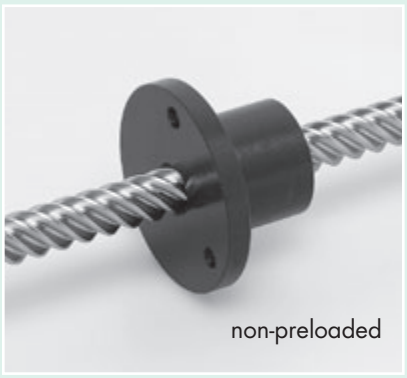


Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
10 / 50	10.0	7.4	50	10	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 250
11 / 60	11.7	9.1	60	12	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 500
13 / 20	13.3	8.8	20	4	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 300
13 / 70	13.5	10.9	70	14	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 750
14 / 8 [6]	14.0	9.8	8	2	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	900
14 / 18	14.3	11.4	18	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 600
14 / 30	13.9	10.1	30	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 750
left-hand threads															
10 / 50	10.0	7.4	50	10	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 250
13 / 70	13.5	10.9	70	14	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 750
14 / 18	14.3	11.4	18	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 600
14 / 30	13.9	10.1	30	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 750

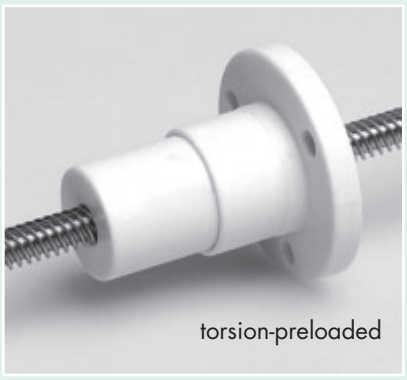
The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Speedy with standard thread

Standard flange nut, non-preloaded/preloaded



non-preloaded



torsion-preloaded

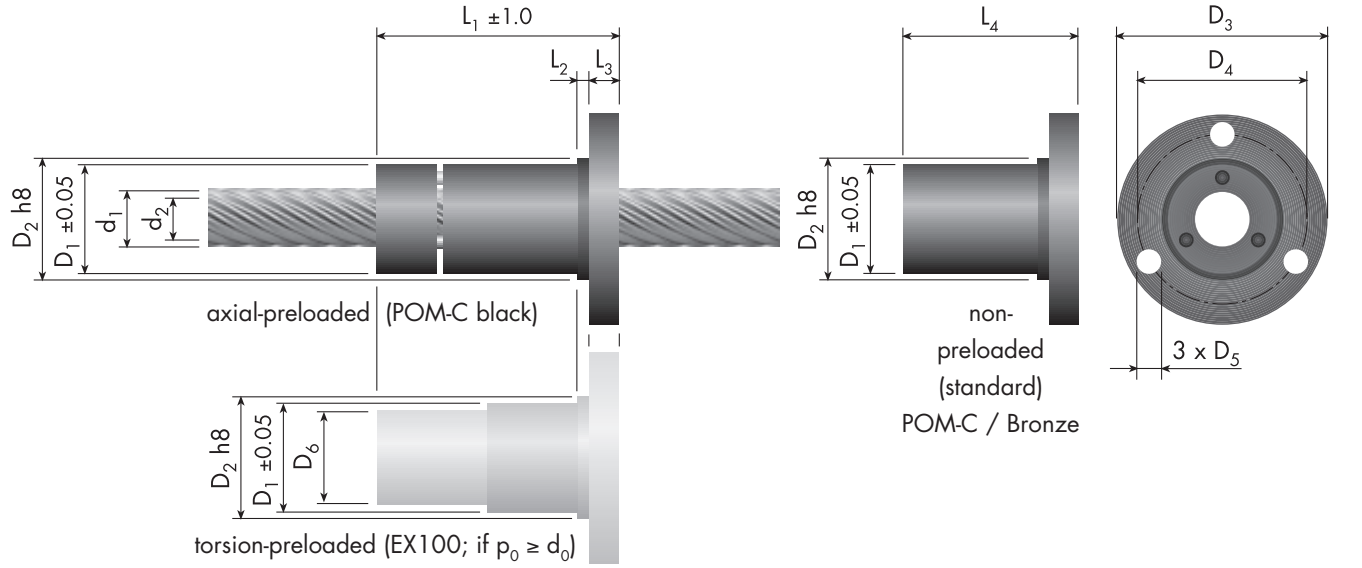
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with standard thread (3/6)

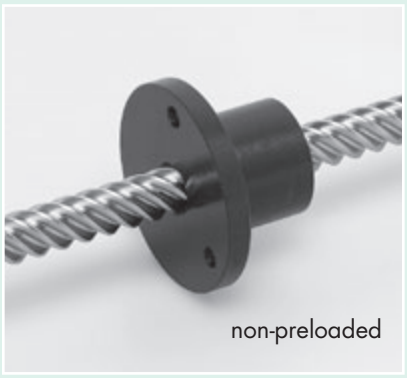


Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
15 / 20	15.2	12.5	20	8	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 600
15 / 80	15.2	12.6	80	16	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 000
16 / 21	16.5	13.6	21	7	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 800
16 / 25	16.0	11.5	25	5	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 550
16 / 35	15.9	12.1	35	7	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 000
16 / 90	17.0	14.3	90	18	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 250
18 / 16	18.0	14.3	16	4	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 100
18 / 24	18.7	15.7	24	8	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 000
18 / 40	17.9	14.1	40	8	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 250
18 / 100	18.8	16.2	100	20	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 500
19 / 30	18.8	14.2	30	6	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 800
left-hand threads															
15 / 20	15.2	12.5	20	8	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 600
15 / 80	15.2	12.6	80	16	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 000
16 / 21	16.5	13.6	21	7	29.5	30	49	39	5.1	27	58	3	7	42 / 30	1 800
16 / 90	17.0	14.3	90	18	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 250
18 / 24	18.7	15.7	24	8	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 000
18 / 40	17.9	14.1	40	8	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 250
18 / 100	18.8	16.2	100	20	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 500

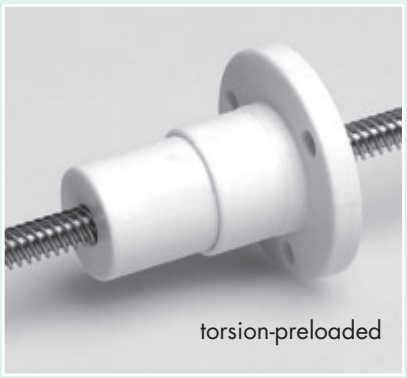
The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Speedy with standard thread

Standard flange nut, non-preloaded/preloaded



non-preloaded



torsion-preloaded

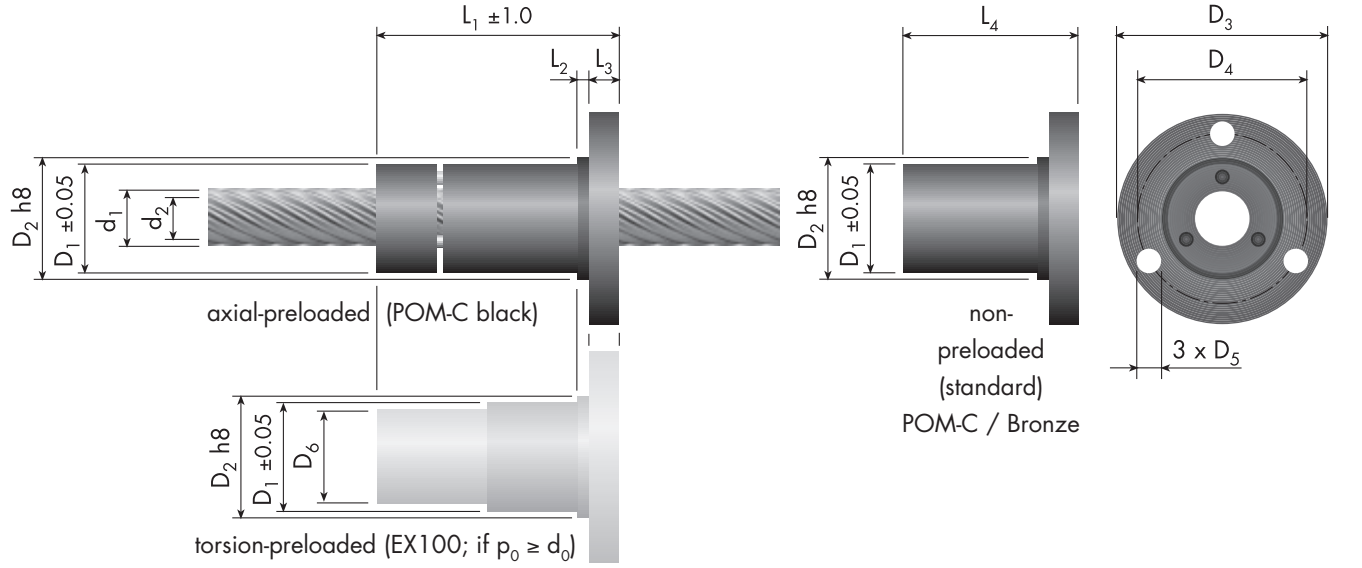
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with standard thread (4/6)

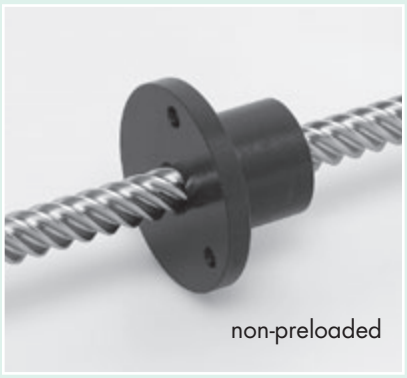


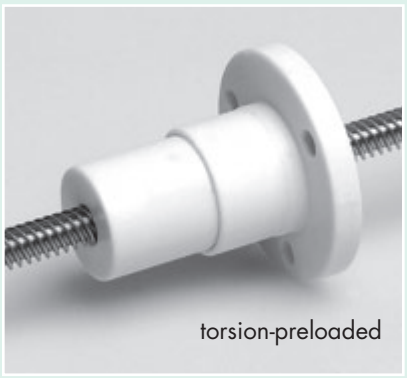
Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
20 / 12 [6]	20.0	15.8	12	3	35.5	36	59	47	6.2	33	64	5	8	46 / 32	1 200
20 / 45	20.0	16.1	45	9	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 500
21 / 27	20.8	17.9	27	9	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 200
21 / 35 [3]	21.5	17.0	35	7	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 050
22 / 20	22.0	18.3	20	5	35.5	36	59	47	6.2	33	64	5	8	46 / 32	1 400
22 / 50	22.0	18.1	50	10	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 750
23 / 30	23.0	20.0	30	10	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 400
24 / 40 [3]	24.3	19.8	40	8	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 300
24 / 55	24.0	20.1	55	11	35.5	36	59	47	6.2	33	64	5	8	46 / 32	3 000
left-hand threads															
23 / 30	23.0	20.0	30	10	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 400

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

Speedy with standard thread

Standard flange nut, non-preloaded/preloaded


non-preloaded


torsion-preloaded

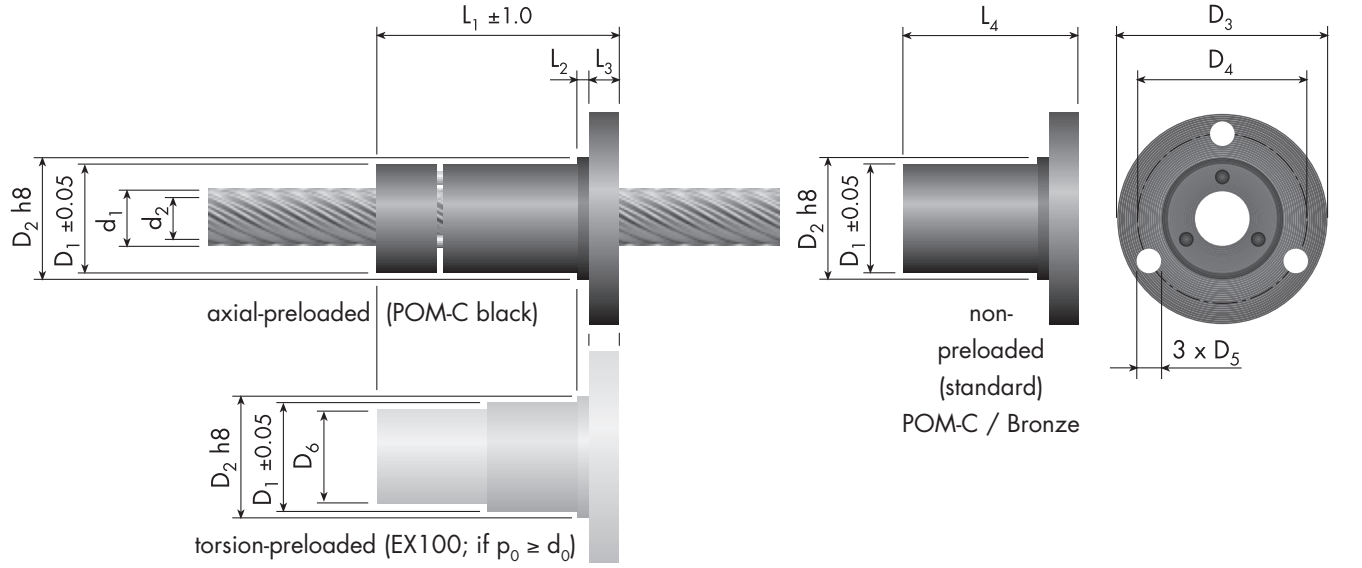
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with standard thread (5/6)

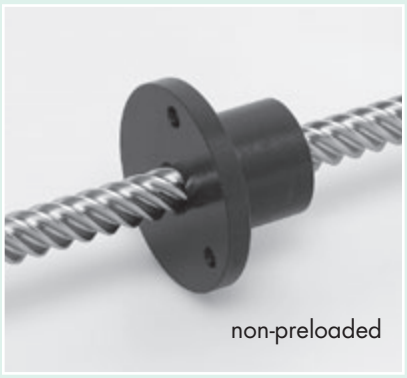


Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
26 / 16 [3) 6)]	26.0	21.8	16	4	41.5	42	64	53	6.2	39	71	5	8	50 / 35	1 400
26 / 24	26.0	22.3	24	6	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 000
26 / 60	26.0	22.2	60	12	41.5	42	64	53	6.2	39	71	5	8	50 / 35	3 250
27 / 45 [3)]	27.0	22.5	45	9	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 550
28 / 65 [3)]	28.0	24.2	65	13	41.5	42	64	53	6.2	39	71	5	8	50 / 35	3 500
30 / 28	30.0	26.5	28	7	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 000
30 / 50	29.8	25.3	50	10	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 800
30 / 70	30.0	26.2	70	14	41.5	42	64	53	6.2	39	71	5	8	50 / 35	3 750

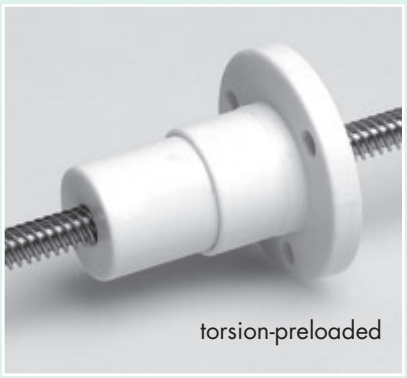
The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Speedy with standard thread

Standard flange nut, non-preloaded/preloaded



non-preloaded



torsion-preloaded

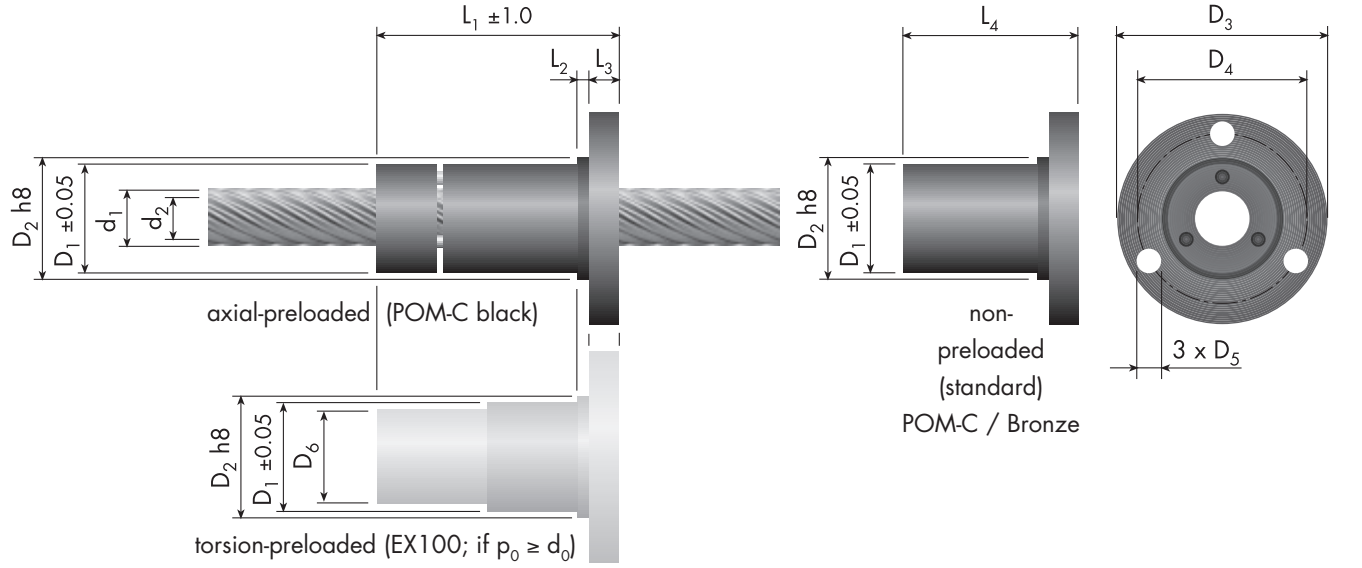
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with standard thread (6/6)

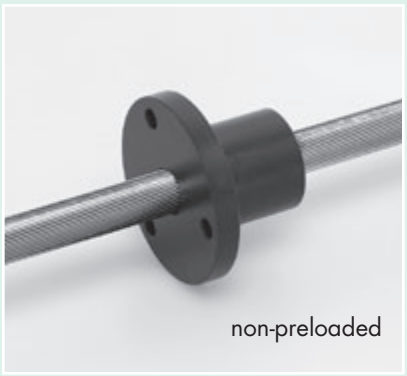


Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
32 / 20 [3]	32.0	27.8	20	5	49.5	50	80	65	9.0	—	—	10	12	70 / 50	2000
32 / 75 [3]	32.0	28.2	75	15	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4000
34 / 32 [3]	34.0	30.5	32	8	49.5	50	80	65	9.0	—	—	10	12	70 / 50	2300
34 / 80	34.0	30.2	80	16	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4250
36 / 200	36.0	33.4	200	40	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4500

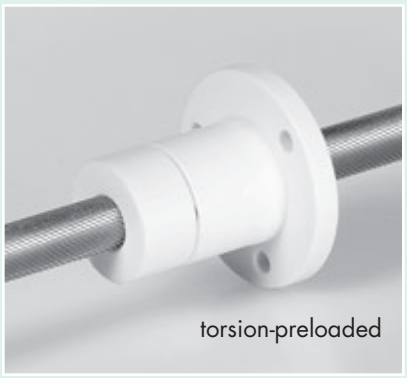
The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Speedy with fine-pitch thread

Standard flange nut, non-preloaded/preloaded



non-preloaded



torsion-preloaded

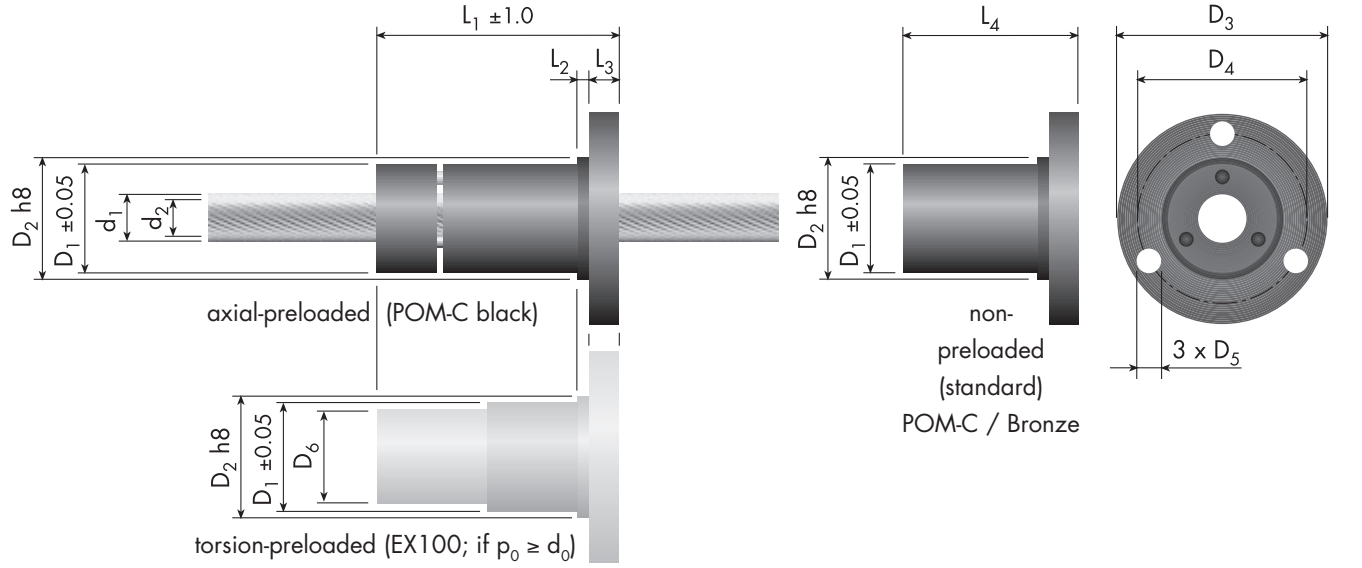
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N];
for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with fine-pitch thread

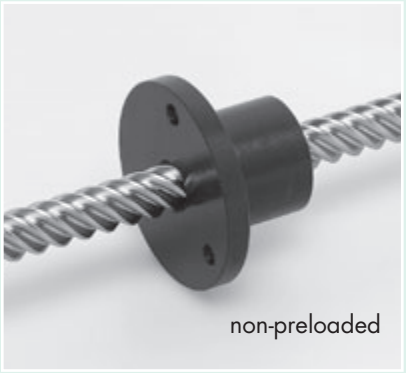


Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
4 / 10	4.0	3.0	10	8	11.5	12	28	18	3.2	—	—	3	4	20 / —	150
5 / 5	5.4	3.6	5	4	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	300
5 / 20	6.0	5.0	20	16	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	300
6 / 25	7.4	6.3	25	20	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	400
7.5 / 7.5	7.7	5.9	7.5	6	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	450
8 / 30	8.6	7.5	30	24	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	500
10 / 10	10.0	8.2	10	8	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	600
10 / 35	10.1	8.9	35	28	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	600
11 / 40	11.5	10.2	40	32	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	700
12 / 45	12.8	11.4	45	36	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	800
12.5 / 12.5 [3]	12.3	10.4	12.5	10	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	750
left-hand threads															
5 / 20	6.0	5.0	20	16	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	300
8 / 30	8.6	7.5	30	24	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	500
10 / 35	10.1	8.9	35	28	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	600
12 / 45	12.8	11.4	45	36	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	800

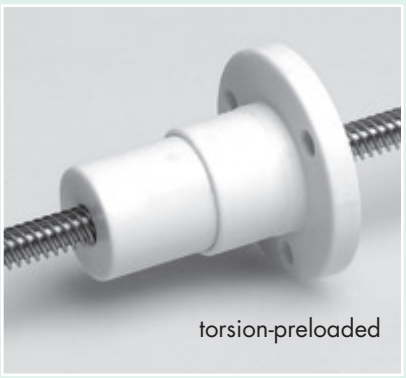
The CAD data corresponding to the types shown above are available at **www.gewinde.ch**

Speedy with inch thread

Standard flange nut, non-preloaded/preloaded



non-preloaded



torsion-preloaded

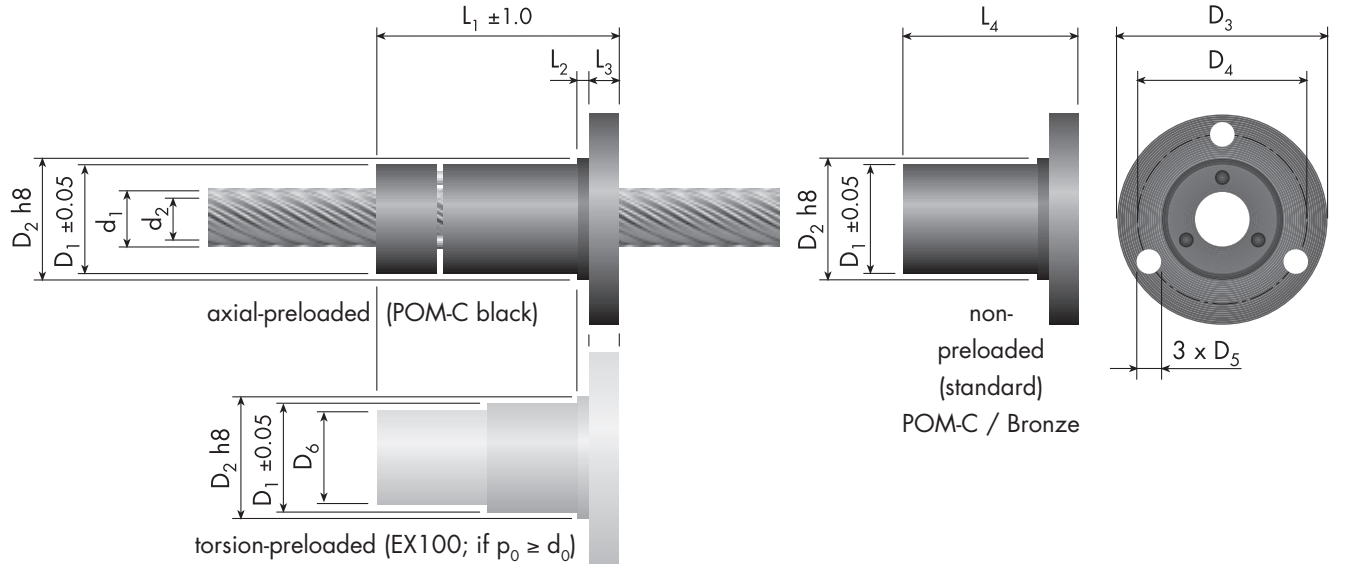
Legend

d_0 = nominal screw diameter [mm]
d_2 = core diameter [mm]
p_0 = nominal pitch [mm]
p = effective pitch [mm]
i = number of threads [–]
C_{stat} = static load rates for non-preloaded POM-C or preloaded EX100 nuts [N]; for higher load rates, bronze nuts must be used ($C_{stat\ bronze}$ = **1.3** x $C_{stat\ POM/EX100}$)
B = bronze CuSn12, material N° 2.1052

3) = only on request
6) = not available with torsion-preload

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Speedy with inch thread



Speedy	Dimensions														Load rates
	Screw				Nut										
d_0 / p_0	d_1	d_2	p	i	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	D_6	L_1	L_2	L_3	L_4 POM / B	C_{stat} for POM/EX100
mm	mm				mm										N
right-hand threads															
6.35 / 6.35	6.4	4.4	6.35	4	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	850
6.35 / 12.7	6.3	4.6	12.70	6	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	800
6.35 / 25.4	6.35	4.2	25.40	10	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	700
7.94 / 12.7	7.9	5.8	12.70	6	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	1 100
9.7 / 25.4	9.7	6.4	25.40	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / —	1 200
11.2 / 30.5	11.2	8.0	30.48	6	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 400
12.8 / 35.6	12.8	9.6	35.56	7	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1 600
14.3 / 40.6	14.4	11.2	40.64	8	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 800
16.0 / 45.7 [3]	16.0	12.8	45.72	9	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 000
17.6 / 50.8	17.6	14.4	50.80	10	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2 200
25.7 / 76.2	25.7	24.0	76.20	15	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 800
32.0 / 96.5	32.2	29.0	96.52	19	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4 600
left-hand threads															
9.7 / 25.4	9.7	6.4	25.40	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / —	1 200
14.3 / 40.6	14.4	11.2	40.64	8	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1 800
25.7 / 76.2	25.7	24.0	76.20	15	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 800
32.0 / 96.5	32.2	29.0	96.52	19	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4 600

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

Basic design / Materials / Precision

Basic design

The Eichenberger high-helix lead screws are not called Speedy for nothing: never before have such high moving speeds been obtained at such low rotational speeds. The Eichenberger Speedy has made this possible by using a helix pitch unheard of before. High-helix lead screws are made of stainless steel and are formed by the cold-rolling process. They are coupled with high wear-resistant thermoplastic nuts in simple (standard, POM-C) or preloaded (POM-C or EX 100) designs. For higher loads or special applications, alternative plastic materials or bronze may be used for the nuts.

Materials

Screw

- stainless steel X20Cr13, (material N° 1.4021 / AISI 420)
- other steel qualities, i.e.
  · X2CrNiMo17-12-2 (material N° 1.4404 / AISI 316 L)
  or
  · X10CrNiS18-09 (material N° 1.4305 / AISI 303)
  on request
- other materials, i.e. hard-anodized aluminium for fine-pitch threads on request

Nut

- non-preloaded: POM-C black
- preloaded:
  · axial-preloaded: POM-C black
  · torsion-preloaded: EX100 white (if $p_0 \geq d_0$)
- bronze CuSn12, material N° 2.1052
- other plastics on request

Nut design

For all thread types a standard flange nut design has been defined, which is deliverable in the following types:

Flange nut, non-preloaded
– type «SFM»: POM-C black
– type «SBM»: bronze

Flange nut axial-preloaded
– type «SFV»: POM-C black
– type «SBV»: bronze (on request)

Flange nut torsion-preloaded (for square pitches and larger)
– type «SFT»: EX100 white
– type «SBT»: bronze (on request)

Of course, any other application-specific nut designs can be supplied on request including injection-molded solutions.

Temperature range

POM-C nuts: –40 to +60 °C
EX100 nuts: –40 to +60 °C
bronze nuts: –40 to +200 °C

Lead accuracy

Standard
G9 = ≤ 0.1 mm/300 mm
(according to DIN 69051)
On request
other lead accuracies

Duty cycle

Load rates, lubrication notice and basic calculation with load factor f_L are based on a duty cycle of 10 % for a Speedy with non-preloaded POM-C nut.

Efficiency

The efficiency η depends on the helix angle and reaches values from ~0.5 to 0.75 (see chart on page 62).

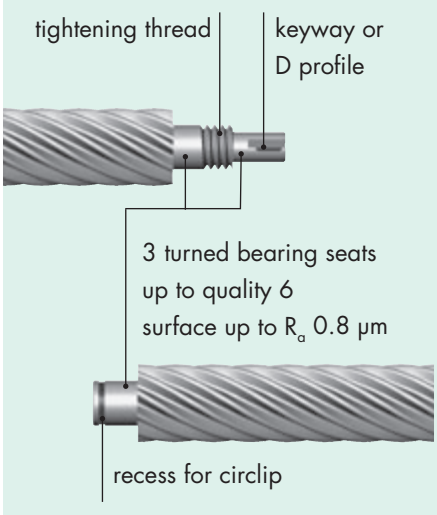
Factory length / Handling / Lubrication

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

Lead screw ends
Speedy lead screws are cut to the desired length without special machining (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.

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



Handling
High-helix lead screws are precision parts (non-hardened) 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 lead screw unit. Dirt or foreign matter on the thread may cause excessive wear.

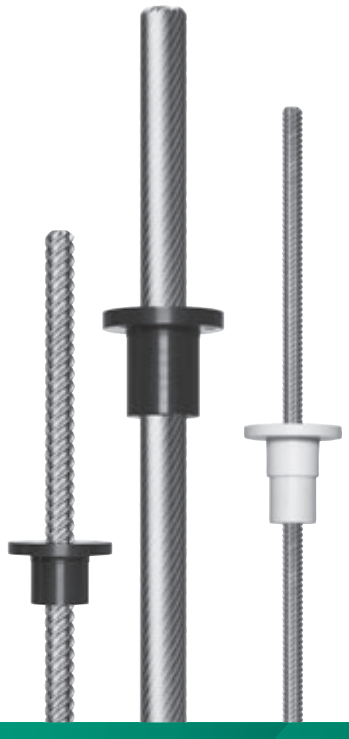
Please consult lubrication recommendation before mounting or operating Speedy lead screws.

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 lead screw assembly. Therefore it is important to properly mount the screw and to comply with all relevant form and positional tolerances.

Lubrication
In some cases, a single lubrication with grease or oil is sufficient. However, any lubrication cycle depends on the application environment.
Bronze nuts have to be lubricated regularly.
Lubricant used by manufacturer:
– Klüber Microlube GBU Y 131.

Applications
The Eichenberger high-helix lead screws are suitable for a variety of applications. For short strokes, they are a substitute for drive belts due to their low production cost. In addition, they are perfectly suitable as substitutes for hydraulic and pneumatic cylinders. Indeed, they allow low-friction acceleration as well as free positioning and operate without secondary energy sources. When appropriate, they are also ideal alternatives to trapezoidal or ball screws due to high efficiency and a convincing cost-performance ratio.

Typical applications are:
– Drives for doors, gates and windows
– Handling systems
– Graphics machinery
– Drives for valves and dampers
– Climate control systems
– Medical devices
– Textile machines
– Food and packaging industries
– Steering actuators
– Electronics industry
etc.



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

Calculations at dynamic load:

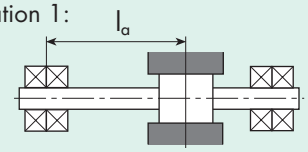
Critical rotational speed n_{per}

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

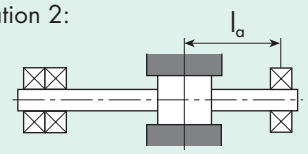
$$n_{per} = K_D \cdot 10^6 \cdot \frac{d_2}{l_a^2} \cdot S_n \ [min^{-1}]$$

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 opposite
(always include maximum allowable l_a in calculation)
S_n = safety factor
usually S_n = 0.5…0.8 [–]

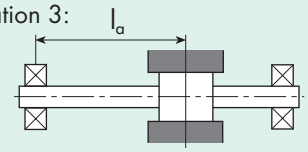
Configuration 1: fixed – fixed
K_D = 276



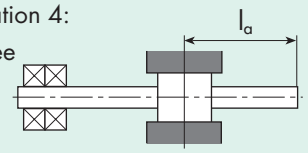
Configuration 2: fixed – simple
K_D = 190



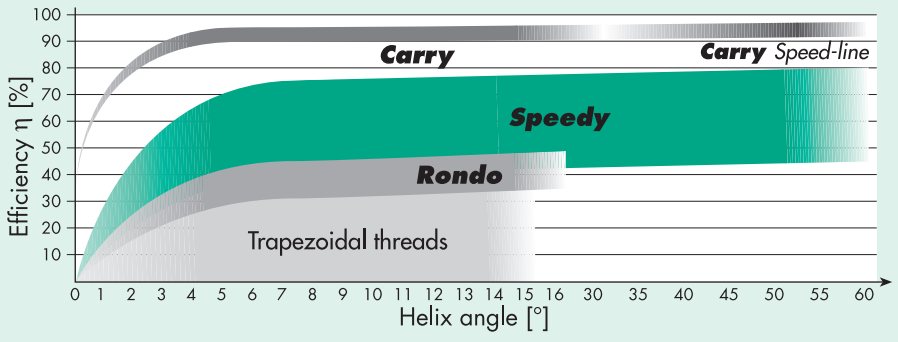
Configuration 3: simple – simple
K_D = 122



Configuration 4: fixed – free
K_D = 43



Efficiency η_p (practical)
The efficiency η depends on the helix angle and reaches values from ~0.5 to 0.75.



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]
M_e = output torque [Nm]
F_a = axial force [N]
η = efficiency [%]
η' = corrected efficiency [%]
p = pitch [mm]

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.

Basic calculations

Maximum authorized load depending on speed

$$F_{per.} = C_0 \cdot f_L \text{ [N]}$$

C_0 = static load rate [N]
f_L = load factor [–] for POM-C nuts

circumferential speed v_C [m/min]	load factor f_L [–]
5	0.95
10	0.75
20	0.45
30	0.37
40	0.12
50	0.08

Example

Parameters:
Speedy 10/50 with non-preloaded POM-C nut, d_0 = 10 mm, p = 50 mm and C_0 = 1250 N;
required moving speed v_S = 200 mm/sec.

We need to find: $F_{per.}$

We calculate n [min^{-1}],

$$n = \frac{v_S \text{ [mm/sec]} \cdot 60}{p \text{ [mm]}}$$

$$= \frac{200 \cdot 60}{50} = 240 \text{ min}^{-1}$$

circumferential speed v_C [m/min]

$$v_C = \frac{d_0 \text{ [mm]} \cdot \pi \cdot n \text{ [min}^{-1}\text{]}}{1000}$$

$$= \frac{10 \cdot \pi \cdot 240}{1000} = 7.53 \text{ m/min}$$

and find load factor f_L in above table:

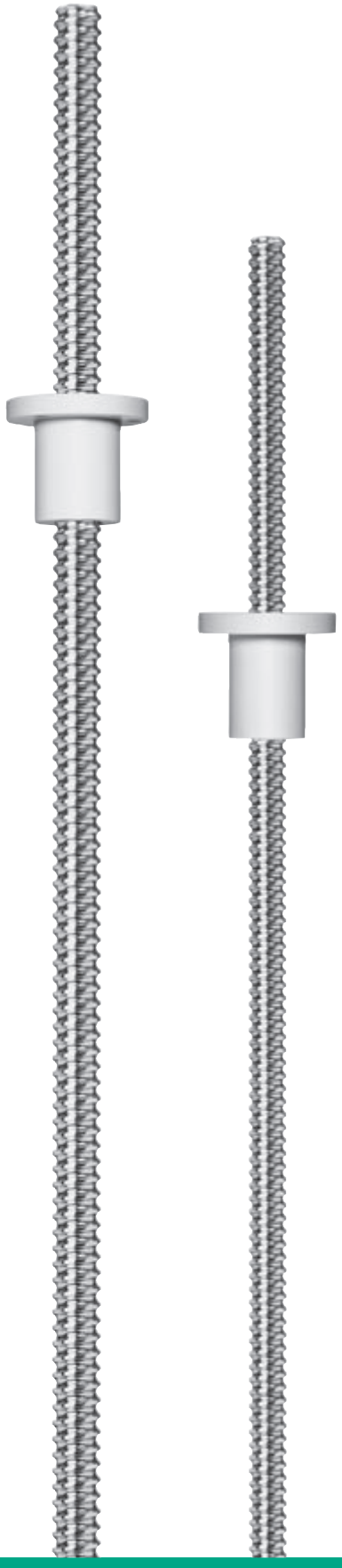
f_L at v_C of 7.53 m/min ≈ 0.85 [–]

It follows:

$F_{per.} = C_0 \cdot f_L = 1250 \cdot 0.85 = 1062.5$ N

In other words, the maximum load for a Speedy 10/50 at v_S = 200 mm/sec. (→ n = 240 min^{-1}) is 1060 N.

Content Rondo



Rondo round thread lead screws

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

Order system Rondo

Example for complete round thread lead screw — **RGS 10x3 RFM RH 350 G9 O M**

Type of lead screw
RGS = Round thread lead screw Rondo

Nominal size (d_0x p) [mm]

Type of nut — nut only
RFM = standard flange nut, made of EX100 white [1)]
MSX = special design according to drawing

Right-hand / left-hand thread
RH = right-hand thread (standard)
LH = left-hand thread (on request)

Lead screw overall length [mm] — screw only
standard steel quality: X20Cr13 (material N° 1.4021) [1)]

Lead accuracy (class) — screw only
G9 = ≤ 0.1 mm/300 mm (standard)
GX = lead accuracy upon specification

End machining — screw only
O = no end machining (cut by grinding; screw and nut separate)
E = end machining according to drawing

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

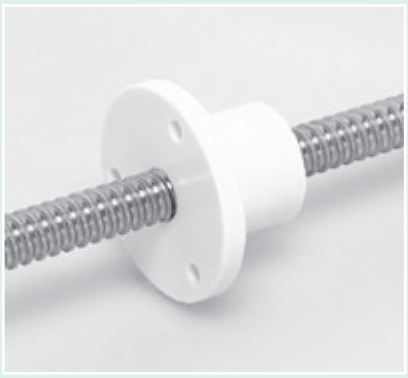
[1)] other materials on request

Example for screw only — **RGS 10x3 RH 350 G9 O G**

Example for nut only — **RGS 10x3 RFM RH G**

Rondo with standard round thread

Standard flange nut

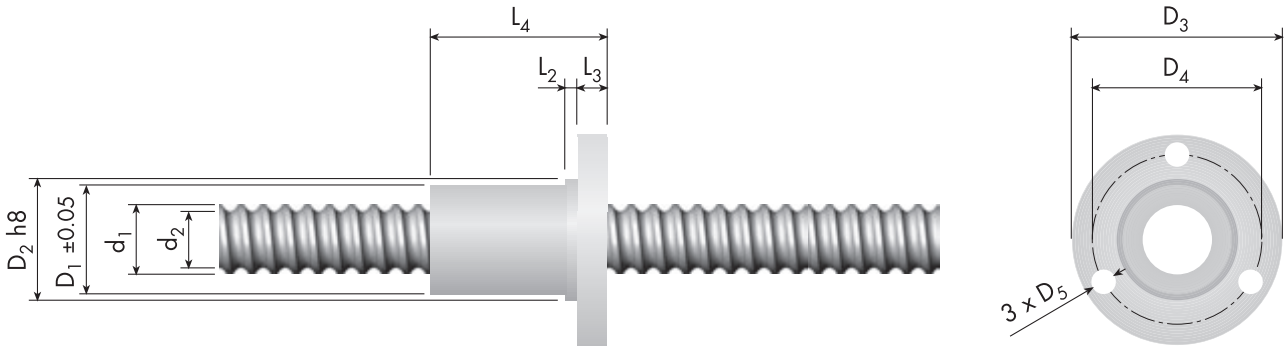


Legend

d_0 = nominal screw diameter [mm]
d_1 = outside screw diameter [mm]
d_2 = core diameter [mm]
p = pitch [mm]

Special designs available on request.
All specifications are subject to change without notice.
Quality management ISO 9001:2008

Rondo with standard round thread



Rondo	Dimensions										Load rates
	Screw		Nut								
$d_0 \times p$	d_1	d_2	D_1 ±0.05	D_2 h8	D_3	D_4 hole circle	D_5	L_2	L_3	L_4	C_{stat}
mm	mm		mm								N
right-hand threads											
6 x 2	5.9	4.5	20.5	21	38	29	4.2	3	5	25	600
8 x 2	7.9	6.5	20.5	21	38	29	4.2	3	5	25	800
10 x 3	9.9	7.8	23.5	24	42	32	4.2	3	5	25	1200
12 x 3	12.0	9.9	25.5	26	46	36	5.1	3	7	42	2000
12 x 4	12.0	9.8	25.5	26	46	36	5.1	3	7	42	2500
14 x 3	14.0	12.0	25.5	26	46	36	5.1	3	7	42	2400
14 x 4	14.0	11.5	25.5	26	46	36	5.1	3	7	42	3200
16 x 5	15.7	13.0	29.5	30	49	39	5.1	3	7	42	5000

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

Basic design / Materials / Precision

Basic design
Rondo screws are a true alternative to conventional trapezoidal screws. They deliver outstanding efficiency and quiet running due to their round thread profile.

Made of steel, the lead screws are combined with plastic flange nuts (outer dimensions equal those of standard Speedy flange nuts).

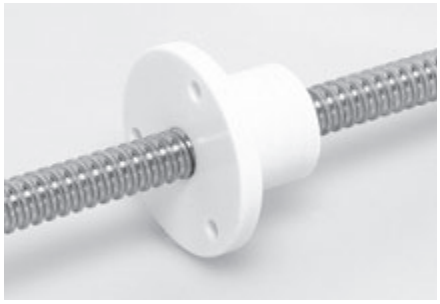
Materials

Screw
- standard: steel X20Cr13 (stainless) material N° 1.4021
- other materials on request

Nut
- standard: EX100 white
- other materials on request

Temperature range
EX100 nuts: –40 to +60 °C

Nut design
One standard nut design has been defined:



Flange nut type «RFM»

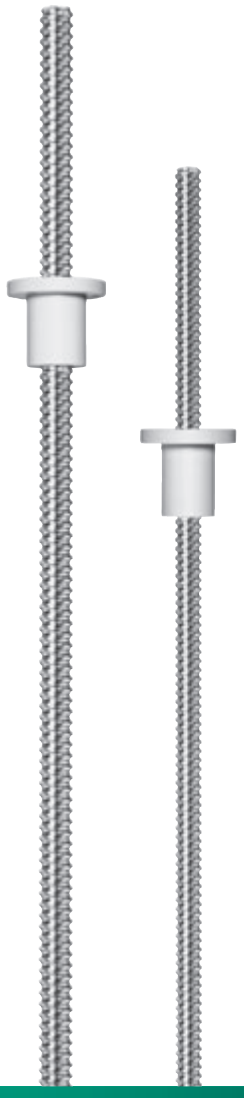
Of course, any other application-specific nut designs can be supplied on request including injection-molded solutions.

Lead accuracy
Standard
G9 = ≤ 0.1 mm/300 mm
(according to DIN 69051)
On request
other lead accuracies

Duty cycle
Load rates, lubrication notice and basic calculation with load factor f_L are based on a duty cycle of 10 % for a Rondo made of standard materials.

Factory length / Handling / Lubrication
See Speedy page 61.

Design fundamentals
See Speedy pages 62/63.



Contract work

As our name suggests, thread rolling is the core business of Eichenberger Gewinde AG. Not only do the buyers of standard products benefit from our expert know-how but also those manufacturers who require economical cold rolled threads for their mechanical parts and components.

State-of-the-art production methods, extensive product expertise and access to more than 1000 machine tools, enable us to meet each and every demand for rolled threads – however exotic they may be:

– pitches up to 6 x diameter
– spindle length up to 6 m
– spindle diameter from 2 to 160 mm
– high-helix thread profiles
– ball screw thread profiles
– all standard profiles
  (M, Tr, UNC, UNF, UNEF, Whitworth)
– multiple start threads including
  left-hand/right-hand threads
– special profiles
– worm gears
  (quality and price advantages)
– serrations and knurlings

Quality Management ISO 9001:2008

What materials are suitable?
– all metals that feature an extension of at least 6 % and do not exceed a tensile strength of 1300 N/mm^2
– high-alloy, corrosion and acid-resistant steel
– special aluminium alloys
– riveting-quality brass
– copper alloys
– threads can be rolled on hollow bodies and tubes only if wall thickness is sufficient; this wall thickness depends upon the type and depth of intended profile as well as material used. Please call or write for assistance.

What materials are not suitable?
– extremely brittle material such as Ms58, cast iron, etc.
– extremely soft materials such as lead
– synthetics
– wood.

We look forward to your challenge!

Contract work

The examples below illustrate the range of available cold-rolling applications. We may even inspire you to investigate innovative solutions. Indeed, we are convinced that rational cold-rolling solutions are available to solve your particular threading problem. Why not consider the benefits of cold rolling and profit from our know-how?

Trapezoidal thread
as per ground profile DIN 103
Flat trapezoidal thread as per DIN 380
Multiple trapezoidal thread,
incl. left/right

Ball screw profile
As a rule, ogival threaded profiles
are used

Special threads with special profiles
according to customer specifications

High-helix profiles
– multiple threads with pitch up to
6 x diameter
– synthetic or brass nuts

Worm-gear profiles
as per basic profile DIN 3976
Single or multiple gears may be rolled

Milled edges as per DIN 82
– concentric
– left/right

Serrations as per DIN 5481

Threads on awkward parts

Conical threads

About the company

Ever since the company was founded in 1953, the name Eichenberger Gewinde AG has been synonymous with premium-quality threads. A leading supplier of innovative linear power transmission products and a complete line of cold rolled threads, Eichenberger offers its customers unique products and comprehensive know-how.

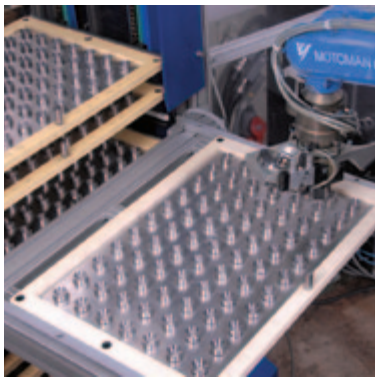
History

1953 Founding of a precision turning shop by Hans Eichenberger (sole proprietorship)
1976 Re-registering of the company as Eichenberger AG Tools and Machine Works
1986 Name change to Eichenberger Gewinde AG
1988 Development started on proprietary ball screws
1995 Replacement of individual fabrication by industrial production
1996 Kurt Husistein assumes leadership of the company
1998 Management buy out of Eichenberger Gewinde AG (APT Holding)
2004 Foundation of Eichenberger Motion AG (Automotive subsidiary)
2006 Openning of the production extension at Burg

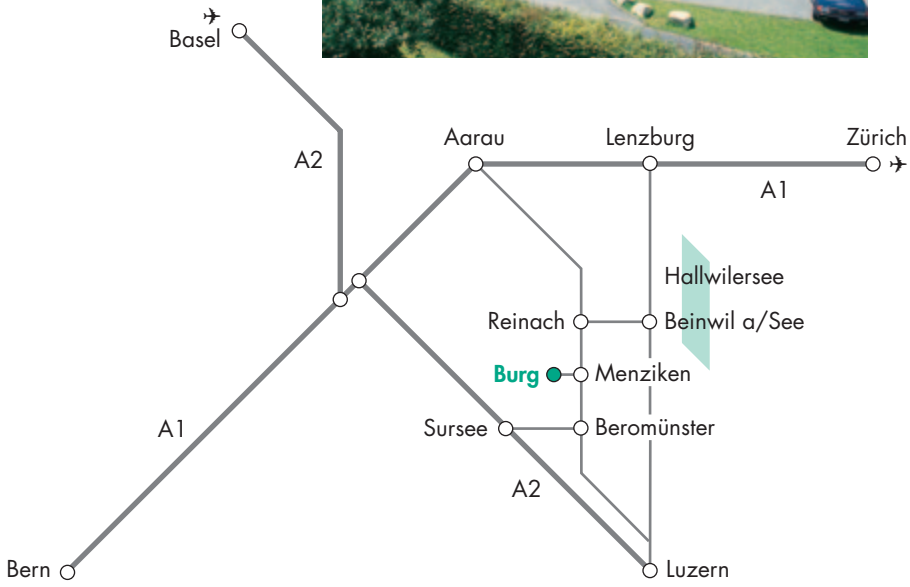
Development, Manufacturing and QM

«Quality first»: As an ISO 9001:2008 certified company we leave nothing to chance – from development and manufacturing to distribution.

Efficient processes, modern production tools and qualified personnel with a sense of responsibility guarantee a standard of quality which has made us the preferred partner for many renowned companies around the world.



Eichenberger Gewinde



When in Burg, follow the signs to Eichenberger Gewinde.

For detailed directions, please visit our website www.gewinde.ch and click «Directions».

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