



**Eichenberger** Gewinde



## Main Catalogue

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



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).





## **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.

- $\varnothing$  5–32 mm
- p 1–25 mm
- for high loads at medium moving speeds

pages 4/5 and 6–27



## **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.

- $\varnothing$  8–25 mm
- p 10–50 mm
- for medium loads at high moving speeds

pages 4/5 and 28–35



## **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.

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

pages 36/37 and 38–53



## **Rondo** round thread lead screws

The alternative to trapezoidal screws with remarkable efficiency.

- $\varnothing$  6–16 mm
- p 2–5 mm
- for medium loads at medium moving speeds
- slide screw unit

pages 36/37 and 54–58

Contract work:

## **Thread rolling**

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About the Company:

Eichenberger Gewinde AG

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# Ball screw product range



■ = standard range

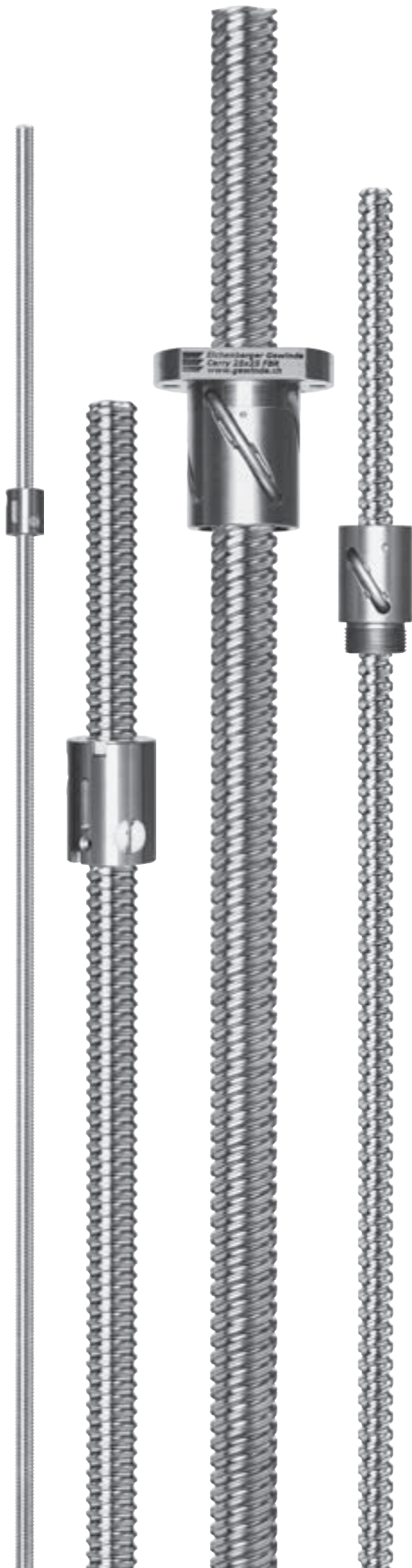
● = ECONOMY range

<sup>2)</sup> = also available with left-hand thread

Carry		type pages	d <sub>0</sub> x p	
Carry	ZYI 8/9		5 x 2 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 12 10 x 2 10 x 3 10 x 10 12 x 2 12 x 4 12 x 5 12.7 x 12.7 12.7 x 25.4	
	ZYR 10/11			
	FGI 12/13			
	FGR 14-17			
	FBI 18/19			
	FBR 20/21			
	ZYE 30/31			
	FBE 32/33			
		type pages	d <sub>0</sub> x p	

## Carry and Carry Speed-line ball screws





## **Carry** ball screws

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    - permissible maximum load
    - permissible buckling force

Visit [www.gewinde.ch](http://www.gewinde.ch) for the latest on existing and/or new products.



	KGT	16x5	FGR	RH	1	S	350	G7	A	O	M
<b>Example for complete ball screw</b> _____											
<b>Type of lead screw</b> _____ KGT = Carry ball screw											
<b>Nominal size (d<sub>0</sub>xp) [mm]</b> _____											
<b>Type of nut</b> _____ 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											
<b>Right-hand / left-hand thread</b> _____ RH = right-hand thread (standard) LH = left-hand thread (→ see dimensional charts)											
<b>Number of ball circulations</b> _____ 1 = 1 ball circulation 2 = 2 ball circulations 3 = 3 ball circulations 4 = 4 ball circulations											
<b>Wiper (Seal)</b> _____ S = with wipers (plastic or brushes) N = without wipers											
<b>Ball screw overall length [mm]</b> _____											
<b>Lead accuracy (class)</b> _____ 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)											
<b>Backlash</b> _____ A = standard backlash (see dimensional charts) R = reduced backlash upon specification											
<b>Screw end machining</b> _____ O = no end machining (cut by grinding, hardened ends; nut on mounting tube) E = end machining according to drawing											
<b>Assembly</b> _____ G = screw and nut separate M = screw and nut assembled according to drawing/specified orientation											
<b>Example for screw only</b> _____	KGT	16x5		RH			350	G7	O	G	
<b>Example for nut only</b> _____			FGR	RH	1	S			A	O	M

# 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 [-]

$S$  = lubrication hole (position not defined) [mm]

SA = wipers



K = plastic



B = brushes

T = standard backlash [mm]

<sup>3)</sup> = only on request

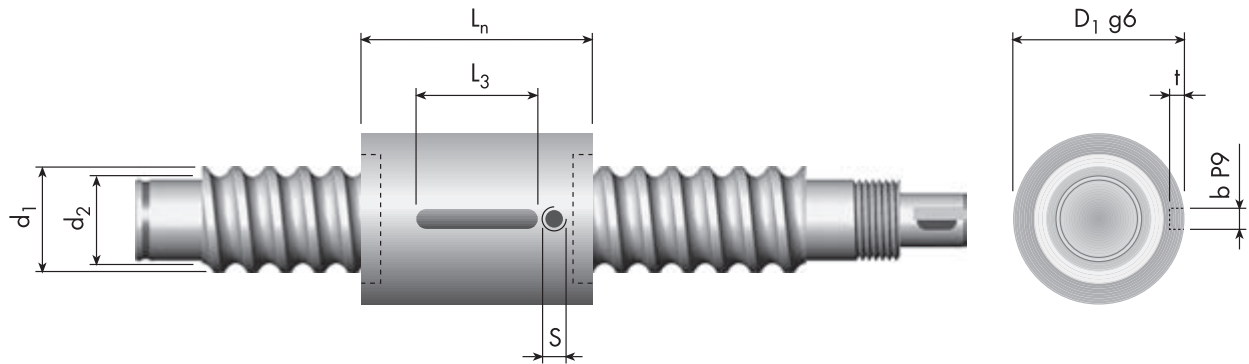
**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics. See page 25 for the appropriate calculations.

Special designs available on request.  
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**



# Carry type «ZYI»



Carry type «ZYI» $d_0 \times p$ mm	Dimensions											Load rates		
	Screw		Nut		$L_n$	$L_3$	$i$	$b$ P9	$t$	$S$	$SA$	$T$	$C_{dyn}$	$C_{stat}$
	$d_1$ mm	$d_2$ mm	$D_1$ g6 mm									N		
<b>right-hand threads</b>														
<b>5 x 2</b>	5.0	4.0	10	14	8	3x1	2	1.0	—	—	0.03	500	800	
<b>6 x 1</b>	6.0	5.0	12	14	8	3x1	2	1.0	—	—	0.03	600	1000	
<b>8 x 1</b>	8.0	7.0	14	14	8	3x1	2	1.2	—	—	0.03	700	1200	
<b>8 x 1.5</b>	8.0	6.7	14	14	8	3x1	2	1.2	—	—	0.04	800	1300	
<b>8 x 2</b>	8.0	6.5	16	20	8	3x1	2	1.2	—	—	0.05	1400	2000	
<b>8 x 3</b>	8.0	6.7	14	12	8	2x1	2	1.2	—	—	0.05	950	1500	
<b>10 x 2</b>	9.7	8.2	18	14	10	2x1	3	1.2	—	—	0.06	1250	2100	
<b>12 x 2</b>	12.0	10.6	20	15	10	2x1	3	1.2	—	—	0.06	1380	2500	
<b>14 x 4</b>	14.0	11.5	25	24	10	3x1	4	2.5	—	—	0.07	3900	6650	
<b>14 x 4</b>	14.0	11.5	25	32	10	3x1	4	2.5	∅ 4	K	0.07	3900	6650	
<b>16 x 5</b>	15.7	13.0	30	43	16	3x1	4	2.5	M5	K	0.07	9700	22000	
<b>20 x 5</b>	19.2	16.5	33	45	20	3x1	4	2.5	M5	K	0.07	10800	25000	
<b>25 x 5</b>	24.6	21.5	38	50	20	3x1	4	2.5	M5	K	0.07	11700	30000	
<b>32 x 5</b>	31.6	28.5	48	48	20	4x1	5	3.0	M5	K	0.07	19000	54000	
<b>left-hand threads</b>														
10 x 2 <sup>3)</sup>	9.7	8.2	18	14	10	2x1	3	1.2	—	—	0.06	1250	2100	
12 x 2 <sup>3)</sup>	12.0	10.6	20	15	10	2x1	3	1.2	—	—	0.06	1380	2500	
<b>16 x 5</b>	15.7	13.0	30	43	16	3x1	4	2.5	M5	K	0.07	9700	22000	
<b>20 x 5</b>	19.2	16.5	33	45	20	3x1	4	2.5	M5	K	0.07	10800	25000	

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://www.gewinde.ch)

# Carry type «ZJR»



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 [-]

$S$  = lubrication hole (position not defined) [mm]

SA = wipers



K = plastic



B = brushes

T = standard backlash [mm]

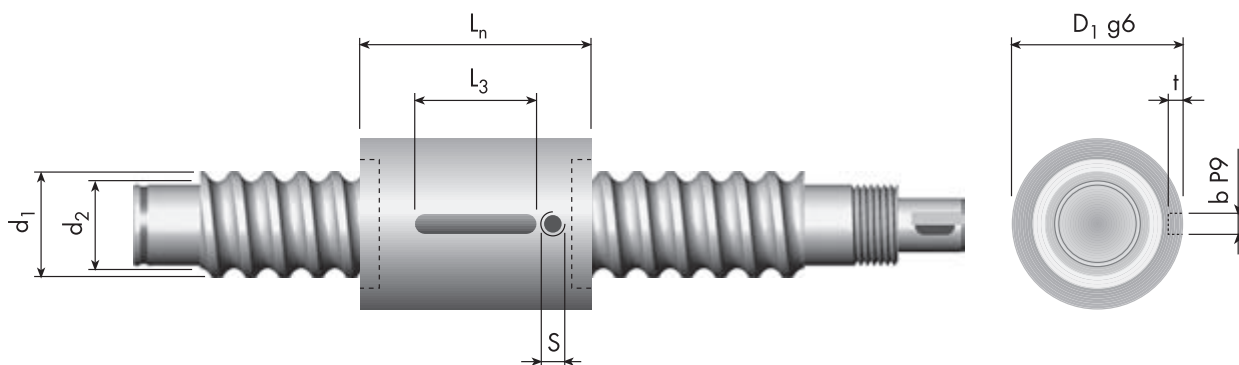
<sup>3)</sup> = only on request

**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics. See page 25 for the appropriate calculations.

Special designs available on request.  
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**

# Carry type «ZYZ»



Carry type «ZYZ» $d_0 \times p$ mm	Dimensions											Load rates		
	Screw		Nut		$L_n$	$L_3$	$i$	$b$ P9	$t$	$S$	$SA$	$T$	$C_{dyn}$	$C_{stat}$
	$d_1$ mm	$d_2$ mm	$D_1$ g6 mm									N		
<b>right-hand threads</b>														
<b>8 x 2</b>	8.0	6.5	18	14	8	1x3.5	2	1.2	—	—	0.06	2000	3200	
<b>8 x 2.5</b>	8.0	6.6	18	16	10	1x3.5	3	2.0	—	—	0.06	2000	3200	
<b>10 x 3</b>	9.9	7.8	22	24	10	1x3.5	3	2.0	—	—	0.06	2800	5000	
<b>10 x 3</b>	9.9	7.8	22	24	10	1x3.5	3	2.0	∅ 3.5	K	0.06	2800	5000	
<b>12 x 4</b>	12.0	9.8	26	24	10	1x3.5	3	1.8	—	—	0.07	5500	11000	
<b>12 x 4</b>	12.0	9.8	26	32	10	1x3.5	3	1.8	∅ 4	K	0.07	5500	11000	
<b>14 x 4</b>	14.0	11.5	29	24	16	1x3.5	4	2.5	—	—	0.07	8100	16000	
<b>14 x 4</b>	14.0	11.5	29	32	16	1x3.5	4	2.5	∅ 4	K	0.07	8100	16000	
<b>16 x 10</b>	15.7	13.0	32	45	16	2x2.5	4	2.5	—	—	0.07	17000	25000	
<b>16 x 10</b>	15.7	13.0	32	45	16	2x2.5	4	2.5	∅ 4	K	0.07	17000	25000	
<b>left-hand threads</b>														
<b>10 x 3</b>	9.9	7.8	22	24	10	1x3.5	3	2.0	—	—	0.06	2800	5000	
<b>10 x 3</b>	9.9	7.8	22	24	10	1x3.5	3	2.0	∅ 3.5	K	0.06	2800	5000	
<b>14 x 4</b>	14.0	11.5	29	24	16	1x3.5	4	2.5	—	—	0.07	8100	16000	
<b>14 x 4</b>	14.0	11.5	29	32	16	1x3.5	4	2.5	∅ 4	K	0.07	8100	16000	

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# 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 [-]

B = pin wrench hole (position not defined) [mm]

S = lubrication hole (position not defined) [mm]

SA = wipers



K = plastic



B = brushes

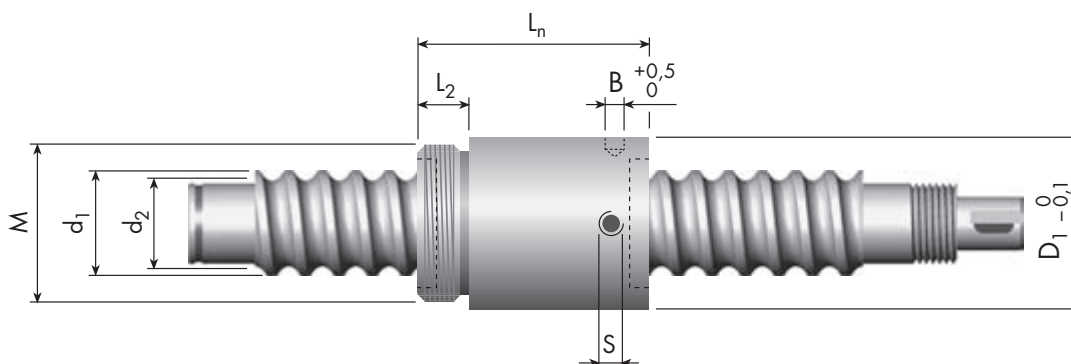
T = standard backlash [mm]

<sup>3)</sup> = 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 25 for the appropriate calculations.

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**Quality management ISO 9001:2000**



Carry type «FGI» $d_0 \times p$ mm	Dimensions											Load rates	
	Screw $d_1$ mm	$d_2$ mm	Nut $D_1$ 0/-0.1 mm	M	$L_n$	$L_2$	i	B +0.5/0	S	SA	T	$C_{dyn}$ N	$C_{stat}$
<b>right-hand threads</b>													
8 x 1.5	8.0	6.7	16	M14x1	22	8	3x1	2.5	—	—	0.04	800	1 300
8 x 2	8.0	6.5	16	M14x1	28	8	3x1	2.5	—	—	0.05	1 400	2 000
8 x 2.5	8.0	6.6	16	M14x1	24	8	3x1	2.5	—	—	0.05	1 400	2 100
8 x 3	8.0	6.7	16	M14x1	22	8	2x1	2.5	—	—	0.05	950	1 500
10 x 2	9.7	8.2	18	M16x1	22	8	2x1	2.5	—	—	0.06	1 250	2 100
12 x 2	12.0	10.6	20	M18x1	23	8	2x1	2.5	—	—	0.06	1 380	2 500
12 x 4	12.0	9.8	24	M20x1	39	10	3x1	2.5	∅ 4	K	0.07	4 000	6 800
14 x 4	14.0	11.5	25	M22x1.5	34	10	3x1	2.5	—	—	0.07	3 900	6 650
14 x 4	14.0	11.5	25	M22x1.5	38	10	3x1	2.5	∅ 4	K	0.07	3 900	6 650
16 x 5	15.7	13.0	30.2	M26x1.5	45	12	3x1	3.5	—	—	0.07	9 700	22 000
16 x 5	15.7	13.0	30.2	M26x1.5	50	12	3x1	3.5	M5	K	0.07	9 700	22 000
20 x 5	19.2	16.5	33	M30x1.5	47	12	3x1	4	M5	K	0.07	10 800	25 000
25 x 5	24.6	21.5	40	M38x1.5	57	12	3x1	4	M5	K	0.07	11 700	30 000
32 x 5	31.6	28.5	52	M48x1.5	55	15	4x1	4	M5	K	0.07	19 000	54 000
<b>left-hand threads</b>													
10 x 2 <sup>3)</sup>	9.7	8.2	18	M16x1	22	8	2x1	2.5	—	—	0.06	1 250	2 100
12 x 2 <sup>3)</sup>	12.0	10.6	20	M18x1	23	8	2x1	2.5	—	—	0.06	1 380	2 500
16 x 5 <sup>3)</sup>	15.7	13.0	30.2	M26x1.5	50	12	3x1	3.5	M5	K	0.07	9 700	22 000
20 x 5	19.2	16.5	33	M30x1.5	47	12	3x1	4	M5	K	0,07	10 800	25 000

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://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 [-]

$B$  = pin wrench hole (position not defined) [mm]

$S$  = lubrication hole (position not defined) [mm]

SA = wipers



K = plastic



B = brushes

T = standard backlash [mm]

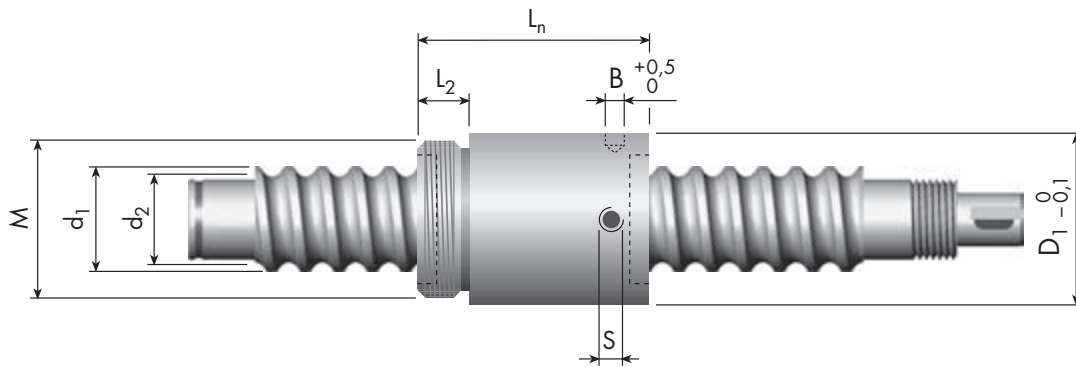
<sup>3)</sup> = only on request

**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics. See page 25 for the appropriate calculations.

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**Quality management ISO 9001:2000**

# Carry type «FGR» (1/2)



Carry type «FGR» $d_0 \times p$ mm	Dimensions											Load rates	
	Screw $d_1$ mm	$d_2$ mm	Nut $D_1$ 0/-0.1 mm	$M$	$L_n$	$L_2$	$i$	$B$ +0.5/0	$S$	$SA$	$T$	$C_{dyn}$ N	$C_{stat}$
<b>right-hand threads</b>													
6 x 2	5.7	4.6	16	M12x1	22	8	1x3.5	2.5	—	—	0.06	1700	2300
8 x 2	8.0	6.5	18	M14x1	24	8	1x3.5	2.5	—	—	0.06	2000	3200
8 x 2	8.0	6.5	18	M14x1	24	8	1x3.5	2.5	∅2	K	0.06	2000	3200
8 x 2.5	8.0	6.6	17.5	M15x1	24	8	1x3.5	2.5	—	—	0.06	2000	3200
10 x 2	9.7	8.2	19.5	M17x1	22	7	1x3.5	2.5	—	—	0.06	2300	4000
10 x 2	9.7	8.2	19.5	M17x1	22	7	1x3.5	2.5	∅2	K	0.06	2300	4000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	3	—	—	0.06	2800	5000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	3	∅2	K	0.06	2800	5000
10 x 10	9.8	7.9	23	M18x1	35	9	2x1.5	3	—	—	0.06	2500	4500
10 x 10	9.8	7.9	23	M18x1	35	9	2x1.5	3	∅4	K	0.06	2500	4500
12 x 4	12.0	9.8	26	M20x1	32	8	1x3.5	2.5	—	—	0.07	5500	11000
12 x 4	12.0	9.8	26	M20x1	34	10	1x3.5	2.5	∅4	K	0.07	5500	11000
12 x 5	12.0	9.5	26	M20x1	37	8	1x3.5	3	—	—	0.07	6600	12000
12 x 5	12.0	9.5	26	M20x1	37	8	1x3.5	3	∅4	K	0.07	6600	12000
12.7 x 12.7	13.1	10.3	29.5	M25x1.5	50	12	2x1.5	3	—	—	0.07	8000	15500
12.7 x 12.7	13.1	10.3	29.5	M25x1.5	50	12	2x1.5	3	M5	B	0.07	8000	15500
<b>left-hand threads</b>													
6 x 2	5.7	4.6	16	M12x1	22	8	1x3.5	2.5	—	—	0.06	1700	2300
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	3	—	—	0.06	2800	5000
10 x 3	9.9	7.8	21	M18x1	29	9	1x3.5	3	∅2	K	0.06	2800	5000

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://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 [-]

$B$  = pin wrench hole (position not defined) [mm]

$S$  = lubrication hole (position not defined) [mm]

SA = wipers



K = plastic



B = brushes

T = standard backlash [mm]

<sup>3)</sup> = only on request

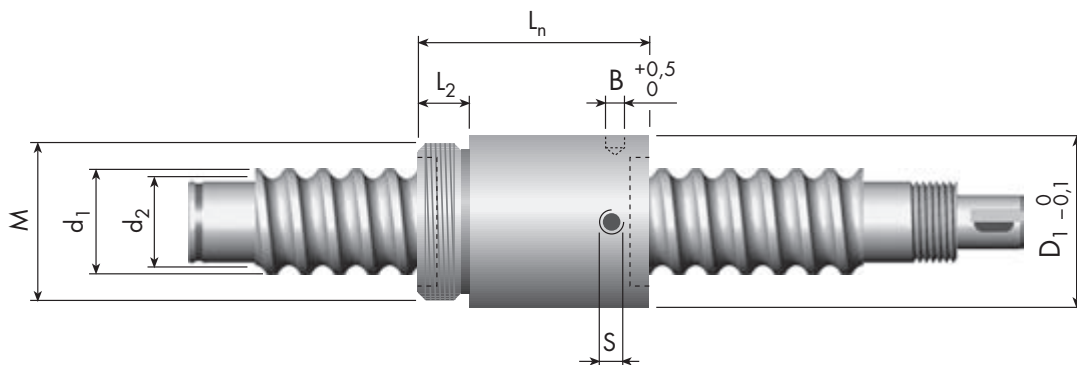
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**Quality management ISO 9001:2000**



# Carry type «FGR» (2/2)



Carry type «FGR» $d_0 \times p$	Dimensions											Load rates	
	Screw $d_1$	$d_2$	Nut $D_1$ 0/-0.1	M	$L_n$	$L_2$	i	B +0.5/0	S	SA	T	$C_{dyn}$	$C_{stat}$
mm	mm		mm		mm							N	
<b>right-hand threads</b>													
14 x 2	14.0	12.5	26	M22x1.5	32	10	2x2.5	3	—	—	0.06	4500	10000
14 x 2	14.0	12.5	26	M22x1.5	32	10	2x2.5	3	∅ 2	K	0.06	4500	10000
14 x 4	14.0	11.5	29	M22x1.5	32	8	1x3.5	3	—	—	0.07	8100	16000
14 x 4	14.0	11.5	29	M22x1.5	38	10	1x3.5	3	∅ 4	K	0.07	8100	16000
16 x 2	16.0	14.5	30	M26x1.5	28	12	1x2.5	3.5	—	—	0.06	2500	5500
16 x 2	16.0	14.5	30	M26x1.5	28	12	1x2.5	3.5	∅ 2	K	0.06	2500	5500
16 x 5	15.7	13.0	32	M26x1.5	42	12	1x3.5	4	—	—	0.07	12000	25000
16 x 5	15.7	13.0	32	M26x1.5	47	12	1x3.5	4	M5	K	0.07	12000	25000
16 x 10	15.7	13.0	32	M26x1.5	47	12	1x2.5	4	—	—	0.07	8500	12500
16 x 10	15.7	13.0	32	M26x1.5	52	12	1x2.5	4	∅ 4	K	0.07	8500	12500
16 x 10	15.7	13.0	32	M26x1.5	47	12	2x2.5	4	—	—	0.07	17000	25000
16 x 10	15.7	13.0	32	M26x1.5	52	12	2x2.5	4	∅ 4	K	0.07	17000	25000
20 x 10	19.5	16.5	38	M35x1.5	58	19	2x2.5	4	—	—	0.07	21000	51000
20 x 10	19.5	16.5	38	M35x1.5	58	19	2x2.5	4	∅ 4	B	0.07	21000	51000
20 x 20	20.0	16.5	38	M35x1.5	58	19	2x1.5	4	—	—	0.07	10000	22000
25 x 10	24.8	21.8	43	M40x1.5	58	19	2x2.5	4	—	—	0.07	21000	54000
25 x 10	24.8	21.8	43	M40x1.5	58	19	2x2.5	4	∅ 4	B	0.07	21000	54000
25 x 25	24.5	21.2	44	M40x1.5	72	20	2x1.5	4	∅ 4	B	0.08	10000	24000
25 x 25	24.5	21.2	44	M40x1.5	72	20	4x1.5	4	∅ 4	B	0.08	20000	48000
32 x 10	31.6	28.4	52	M48x1.5	62	19	2x2.5	4	∅ 4	B	0.07	20000	55000
<b>left-hand threads</b>													
14 x 4	14.0	11.5	29	M22x1.5	32	8	1x3.5	3	—	—	0.07	8100	16000
14 x 4	14.0	11.5	29	M22x1.5	38	10	1x3.5	3	∅ 4	K	0.07	8100	16000

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://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 [-]  
 $S$  = lubrication hole [mm]  
SA = wipers



K = plastic



B = brushes

T = standard backlash [mm]

<sup>3)</sup> = only on request

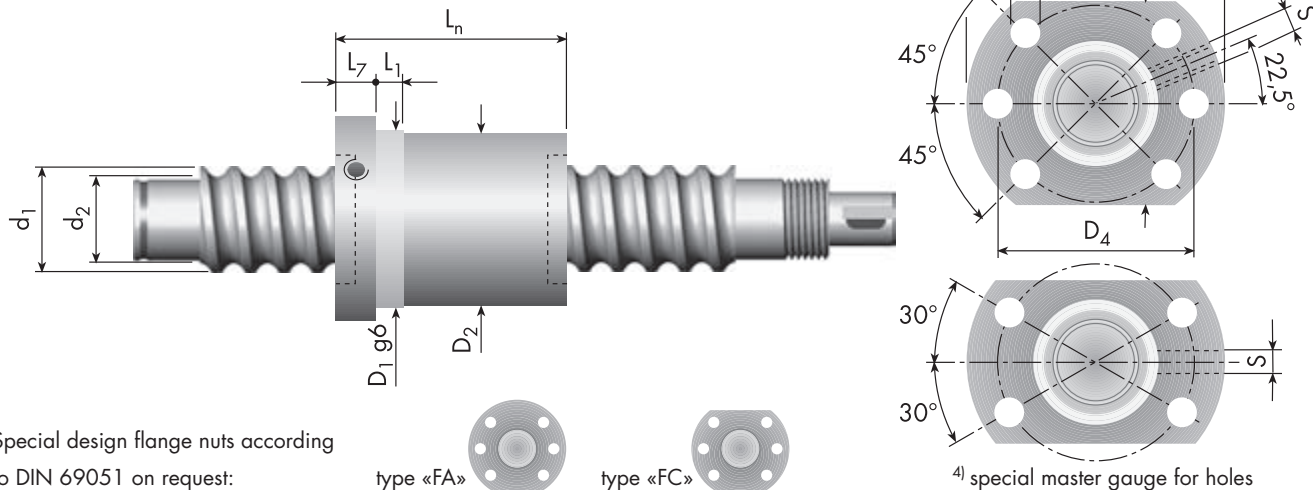
<sup>4)</sup> = special master gauge for holes; only 4 instead of 6 holes  
(for  $d_0 \times p = 8 \times 1, 8 \times 2$  and  $12 \times 5$ )

**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.  
See page 25 for the appropriate calculations.

Special designs available on request.  
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**

# Carry type «FBI»



Special design flange nuts according to DIN 69051 on request:



4) special master gauge for holes

Carry type «FBI» $d_0 \times p$ mm	Dimensions															Load rates	
	Screw $d_1$ mm	Nut $d_2$ mm	$D_1$ g6 mm	$D_2$	$D_4$ hole circle	$D_5$ H13	$D_6$ h13	$L_n$	$L_1$	$L_7$	$L_8$ h13	$i$	$S$	$SA$	$T$	$C_{dyn}$	$C_{stat}$
<b>right-hand threads</b>																	
<b>8 x 1</b> <sup>4)</sup>	8.0	7.0	14	13.5	21	3.4	27	18	4	4	18	3x1	ø 2	K	0.03	700	1200
<b>8 x 2</b> <sup>4)</sup>	8.0	6.5	16	15.5	22	3.4	28	30	4	6	19	3x1	ø 4	K	0.05	1400	2000
<b>12 x 5</b> <sup>4)</sup>	12.0	9.5	24	23.5	32	4.5	40	40	6	8	26	3x1	ø 4	K	0.07	5000	8600
<b>16 x 5</b>	15.7	13.0	28	27.8	38	5.5	48	45	6	10	40	3x1	M6	K	0.07	9700	22000
<b>20 x 5</b>	19.2	16.5	36	35.5	47	6.6	58	50	10	10	44	3x1	M6	K	0.07	10800	25000
<b>25 x 5</b>	24.6	21.5	40	39.5	51	6.6	62	50	10	10	48	3x1	M6	K	0.07	11700	30000
<b>25 x 5</b>	24.6	21.5	40	39.5	51	6.6	62	55	10	10	48	4x1	M6	K	0.07	14000	35000
<b>32 x 5</b>	31.6	28.5	50	49.5	65	9.0	80	57	10	12	62	4x1	M6	K	0.07	19000	54000
<b>left-hand threads</b>																	
<b>16 x 5</b> <sup>3)</sup>	15.7	13.0	28	27.8	38	5.5	48	45	6	10	40	3x1	M6	K	0.07	9700	22000
<b>20 x 5</b>	19.2	16.5	36	35.5	47	6.6	58	50	10	10	44	3x1	M6	K	0.07	10800	25000

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://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 [-]

$S$  = lubrication hole [mm]

SA = wipers



K = plastic



B = brushes

T = standard backlash [mm]

<sup>3)</sup> = only on request

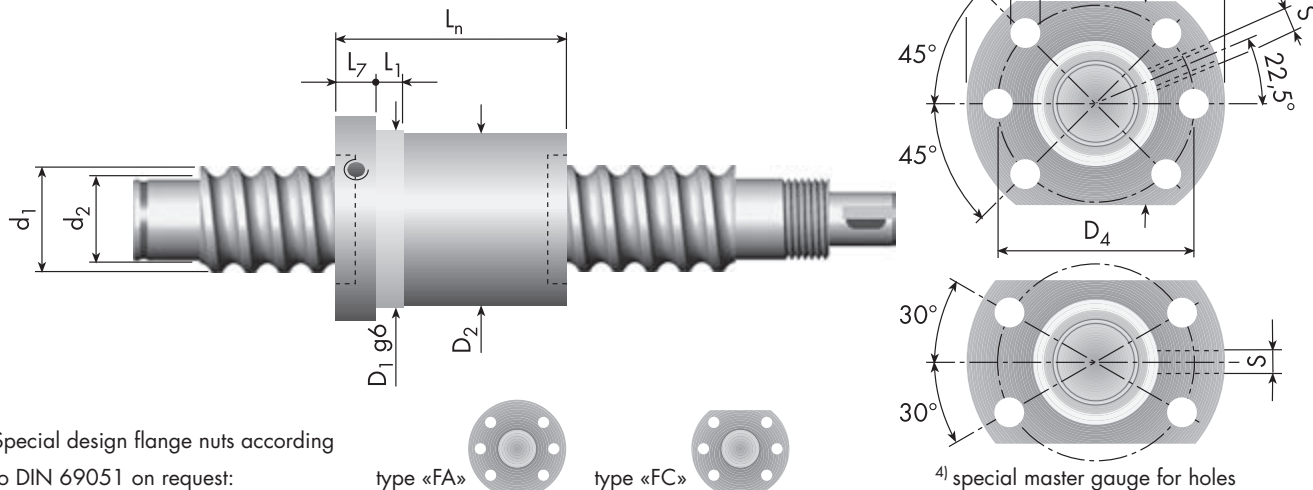
<sup>4)</sup> = special master gauge for holes; only 4 instead of 6 holes  
(for  $d_0 \times p = 8 \times 2, 10 \times 10, 12 \times 2, 12 \times 4$  and  $12 \times 5$ )

**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.  
See page 25 for the appropriate calculations.

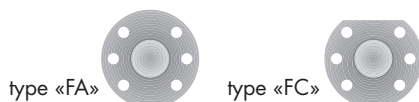
Special designs available on request.  
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**

# Carry type «FBR»



Special design flange nuts according to DIN 69051 on request:



<sup>4)</sup> special master gauge for holes

Carry type «FBR» $d_0 \times p$ mm	Dimensions																Load rates	
	Screw $d_1$ mm	$d_2$ mm	Nut $D_1$ g6 mm	$D_2$	$D_4$ hole circle	$D_5$ H13	$D_6$ h13	$L_n$	$L_1$	$L_7$	$L_8$ h13	$i$	S	SA	T	$C_{dyn}$	$C_{stat}$	
<b>right-hand threads</b>																		
8 x 2 <sup>4)</sup>	8.0	6.5	18	15.5	22	3.4	28	25	4	6	19	1x3.5	ø4	K	0.06	2000	3200	
10 x 10 <sup>4)</sup>	9.8	7.9	23	22.5	29	4.5	37	40	6	8	24	2x1.5	M5	K	0.06	2500	4500	
12 x 2 <sup>4)</sup>	12.0	10.6	22	21.5	29	4.5	37	30	5	8	24	1x3.5	ø4	K	0.06	2000	3200	
12 x 4 <sup>4)</sup>	12.0	9.8	26	25.5	32	4.5	39.5	36	5	8	28	1x3.5	M5	K	0.07	5500	11000	
12 x 5 <sup>4)</sup>	12.0	9.5	26	25.5	32	4.5	39.5	40	5	7	28	1x3.5	M5	K	0.07	6600	12000	
14 x 2	14.0	12.5	26	25.5	32	4.5	39.5	32	5	7	28	2x2.5	ø4	K	0.06	4500	10000	
14 x 4	14.0	11.5	29	28.6	38	5.5	48	40	6	8	36	1x3.5	M5	K	0.07	8100	16000	
16 x 2	16.0	14.5	30	29.5	38	5.5	48	45	6	10	40	2x2.5	M6	K	0.06	4500	11000	
16 x 2	16.0	14.5	30	29.5	38	5.5	48	45	6	10	40	3x2.5	M6	K	0.06	6000	15000	
16 x 10	15.7	13.0	32	31.5	43	6.6	54	52	6	12	44	2x2.5	M6	K	0.07	17000	25000	
20 x 10	19.5	16.5	38	37.5	50	6.6	62	55	7	10	48	2x2.5	M6	B	0.07	21000	51000	
25 x 10	24.8	21.8	43	42.5	55	6.6	65	55	7	10	50	2x2.5	M6	B	0.07	21000	54000	
25 x 25	24.5	21.2	44	43.5	56	6.6	70	67	10	12	52	2x1.5	M6	B	0.08	10000	24000	
25 x 25	24.5	21.2	44	43.5	56	6.6	70	67	10	12	52	4x1.5	M6	B	0.08	20000	48000	
32 x 10	31.6	28.4	52	51.5	67	9	82	62	10	12	64	2x2.5	M6	B	0.07	20000	55000	
<b>left-hand threads</b>																		
14 x 4	14.0	11.5	29	28.6	38	5.5	48	40	6	8	36	1x3,5	M5	K	0,07	8100	16000	

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://www.gewinde.ch)



## Basic design / Materials

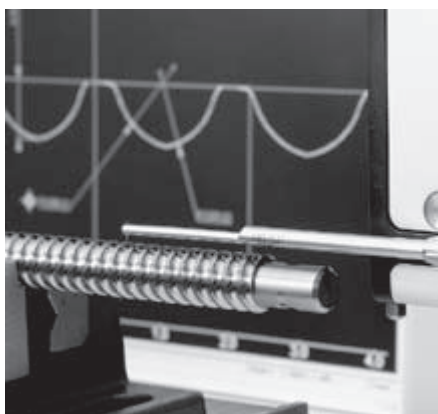
Carry screws are manufactured by the highly economical cold-rolling process which offers both significant cost savings but also maintains a precision previously often only available with machine-ground screws. Carry screws are complemented by a range of single steel nuts produced in a special cost-cutting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

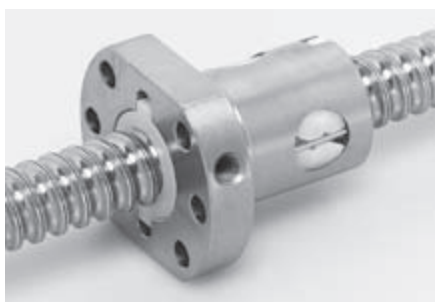
Standard are the following three types:



Cylindrical single nut type «ZY...»



Nut with mounting thread type «FG...»

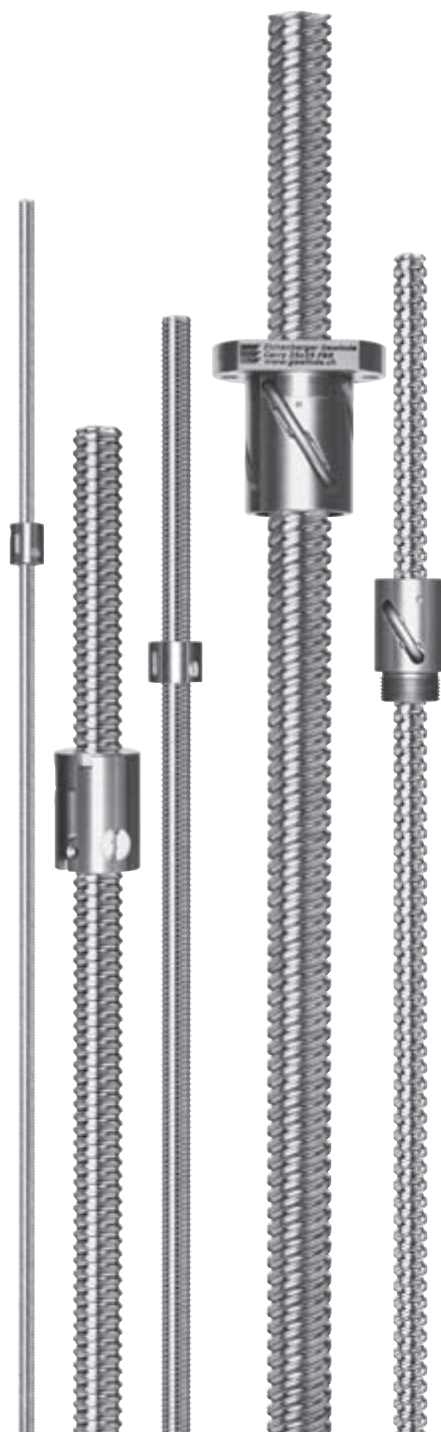


Flange nut type «FB...»

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

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

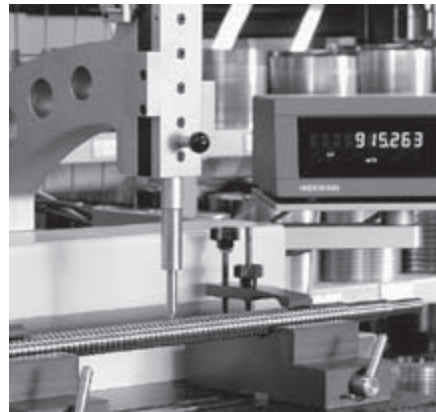
Eichenberger ball screws feature the following lead accuracies according to DIN 69051:

### Standard

- G9 =  $\leq 0,1$  mm/300 mm

### On request

- G7 =  $\leq 0,052$  mm/300 mm
- G5 =  $\leq 0,023$  mm/300 mm



## Reduced backlash

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

## Efficiency

The efficiency  $\eta$  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

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

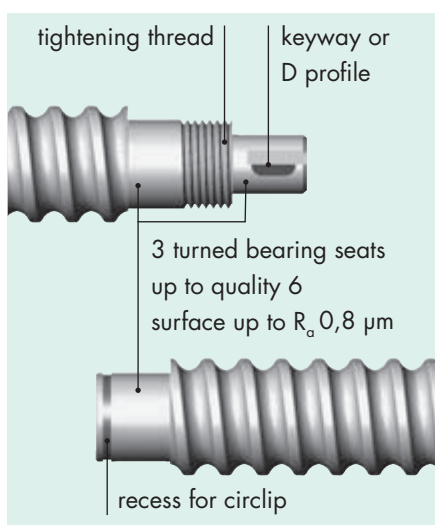
Ball screw ends are without any machining cut by grinding (standard).

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](http://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.

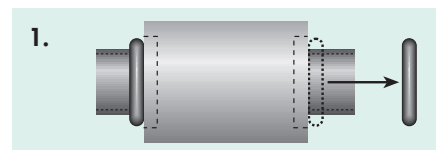
Please check for cleanness when mounting the ball screw. Dirt or foreign matter on the ball race – especially inside the nut – may cause increased wear and premature failure.

Please consult lubrication recommendation on page 23 before mounting or operating ball screws.

## Radial loads and torque

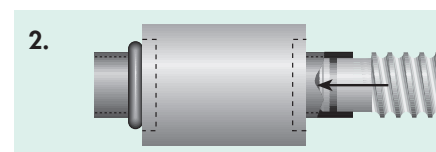
Radial loads or torque brought to bear upon the nut result in overload of individual contact surfaces, thus seriously affecting the service life of the ball screw assembly. Therefore it is important to properly mount the screw and to comply with all relevant form and positional tolerances.

## Assembling

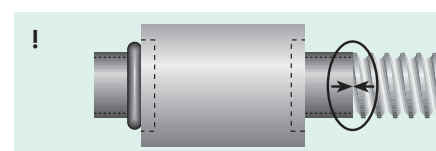


Remove transport lock (O-ring) on one side. Please keep sleeve and nut in horizontal position. Otherwise, the nut may slide from the sleeve and balls may fall out of the ball race.

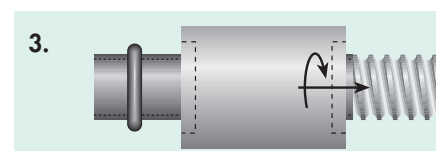
In the event such incident does occur, balls must be properly re-inserted to prevent damage to or blockage of the ball screw. If in doubt, please contact Eichenberger Gewinde AG.



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.



Gently turn nut onto the screw.



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

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

## «Suitability test» rotational speed characteristics

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

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

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

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

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]

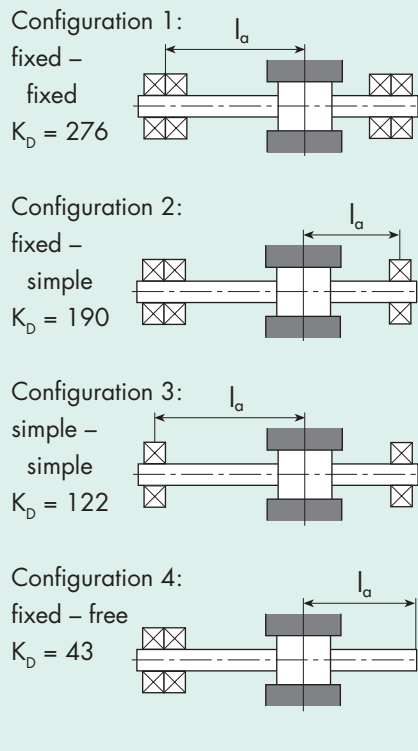
## Calculations at dynamic load:

### Critical rotational speed $n_{\text{per}}$

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

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

- $n_{\text{per}}$  = permissible rotational speed [ $\text{min}^{-1}$ ]
- $K_D$  = 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  $S_n = 0,5 \dots 0,8$  [-]



### Nominal service life $L_{10}$ or $L_h$

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

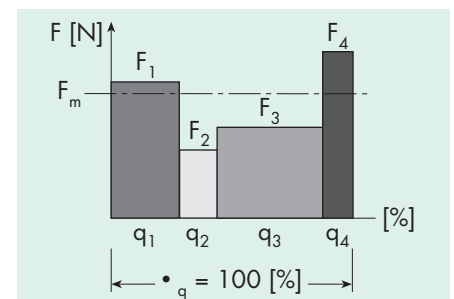
$$L_h = \frac{L_{10}}{n_m \cdot 60} \quad [\text{h}]$$

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

### Average axial load $F_m$

at constant rotational speed  $n_{\text{const}}$   
and dynamic load  $C_{\text{dyn}}$

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



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

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

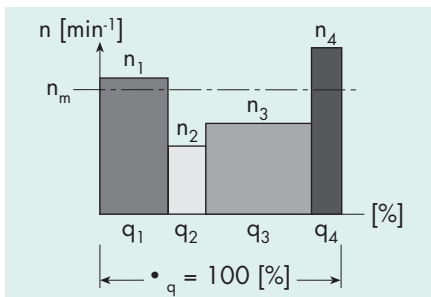


## Calculations at dynamic load (continuation):

### Average rotational speed $n_m$

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

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



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

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

### Average axial load $F_m$

at constant rotational speeds  $n_{const}$   
and dynamic load  $C_{dyn}$

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

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

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

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

### Efficiency $\eta$ (theoretical)

Depends upon the type of power transmission.

Case 1: torque  $\rightarrow$  linear movement

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

Case 2: axial force  $\rightarrow$  torque

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

whereby

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

$\eta$  = efficiency [%]

$\eta'$  = corrected efficiency [%]

$p$  = pitch [mm]

$d_0$  = nominal screw diameter [mm]

$\rho$  = angle of friction [°]

$$\rightarrow \rho = 0,30 \dots 0,60^\circ$$

### Efficiency $\eta_p$ (practical)

The efficiency  $\eta$  for Carry ball screws is better than 0.9.

### Driving torque $M$

Depends upon the type of power transmission.

Case 1: torque  $\rightarrow$  linear movement

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

Case 2: axial force  $\rightarrow$  torque

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

$M_a$  = input torque [Nm], case 1

$M_e$  = output torque [Nm], case 2

$F_a$  = axial force [N]

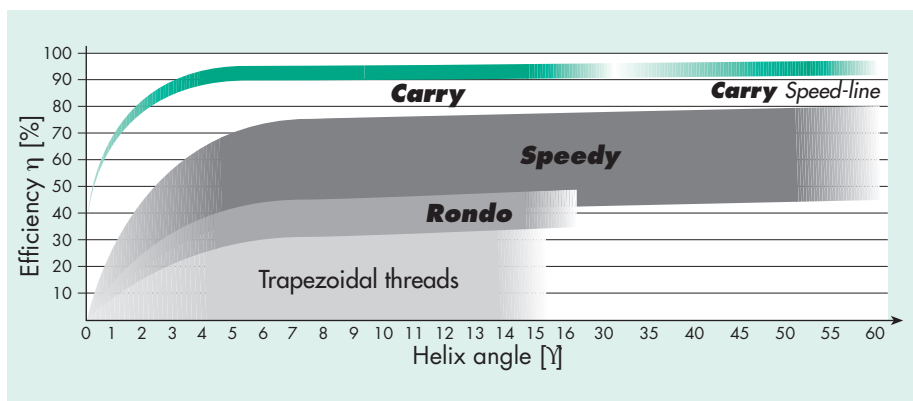
### Input performance $P$

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

$P$  = input performance [kW]

$n$  = rotational speed [ $\text{min}^{-1}$ ]

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) [-]

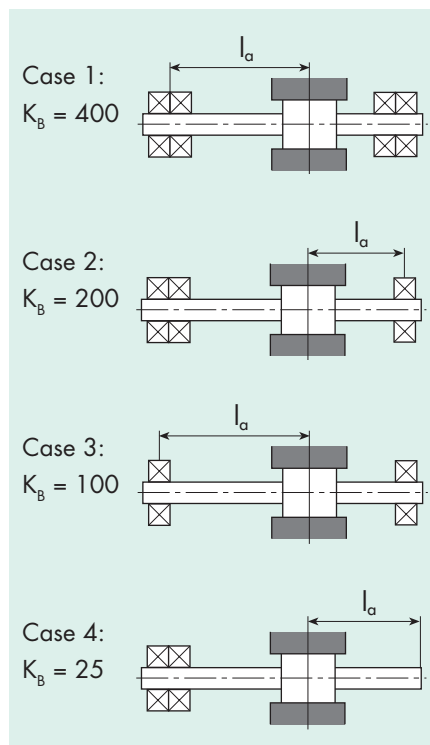
→ see below

$d_2$  = nominal screw diameter [mm]

$l_F$  = force-transferring length [mm]

$S_B$  = buckling safety factor

→ gen.  $S_B = 2...4$  [-]





## Carry Speed-line

- Order system Carry Speed-line. . . . . 29
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		K	G	E	1	6	x	5	0	F	B	E	R	H	3	S	4	5	0	G	9	A	O	M
<b>Example for complete ball screw</b> _____																								
<b>Type of lead screw</b> _____ KGE = high-helix ball screw Carry Speed-line																								
<b>Nominal size (d<sub>0</sub>xp) [mm]</b> _____																								
<b>Type of nut</b> _____ 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)																								
<b>Right-hand / left-hand thread</b> _____ RH = right-hand thread (standard)																								
<b>Number of ball circulations</b> _____ 2 = 2 ball circulations 3 = 3 ball circulations 4 = 4 ball circulations																								
<b>Wipers</b> _____ S = with wipers (plastic; integrated into end cap ball return)																								
<b>Ball screw overall length [mm]</b> _____																								
<b>Lead accuracy (class)</b> _____ 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)																								
<b>Backlash</b> _____ A = standard backlash (see technical data) R = reduced backlash upon specification																								
<b>Screw end machining</b> _____ O = no end machining (cut by grinding, hardened ends; nut on mounting tube) E = end machining according to drawing																								
<b>Assembly</b> _____ G = screw and nut separate M = screw and nut assembled according to drawing/specified orientation																								
<b>Example for screw only</b> _____																								
<b>Example for nut only</b> _____																								

# Carry Speed-line type «ZYE»



Cylindrical nut with end cap ball return



## Legend

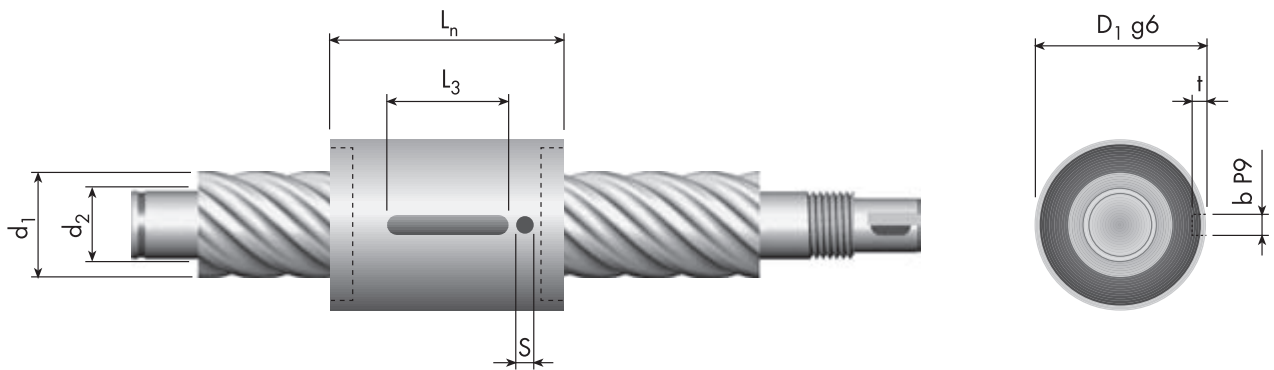
- $d_0$  = nominal screw diameter [mm]
- $d_1$  = outside screw diameter [mm]
- $d_2$  = core diameter [mm]
- $p$  = pitch [mm]
- $i$  = number of ball circulations [-]
- $S$  = lubrication hole [mm]
- SA = wipers
  - K = plastic
- T = standard backlash

**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.  
See page 25 for the appropriate calculations.

Special designs available on request.  
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**

# Carry Speed-line type «ZYE»



Carry S-line type «ZYE» d <sub>0</sub> x p	Dimensions											Load rates	
	Screw		Nut			i	b P9	t	S	SA	T	C <sub>dyn</sub>	C <sub>stat</sub>
d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub> g6	L <sub>n</sub>	L <sub>3</sub>	N								
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	N	N	
<b>right-hand threads</b>													
<b>8 x 12</b>	8.0	6.7	18	28	8	2x1.5	2	1.2	∅ 2	K	0.05	1 400	2 300
<b>12.7 x 25.4</b>	12.5	10.6	26	32	10	3x0.9	3	1.8	∅ 4	K	0.05	2 300	4 500
<b>16 x 10</b>	16.0	13.4	28	42	16	2x2.9	4	2.5	∅ 4	K	0.07	12 500	26 000
<b>16 x 16</b>	16.1	13.2	28	42	16	2x1.9	4	2.5	∅ 3	K	0.07	7 800	15 500
<b>16 x 50</b>	16.0	13.2	28	55	16	3x0.9	4	2.5	∅ 4	K	0.06	4 800	11 000
<b>20 x 20</b>	20.0	17.3	36	50	20	4x1.9	4	2.5	∅ 4	K	0.06	17 900	44 600
<b>25 x 25</b>	24.5	21.2	40	60	20	4x1.9	4	2.5	∅ 4	K	0.06	23 300	68 000

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://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 [-]

$S$  = lubrication hole [mm]

SA = wipers

K = plastic

T = standard backlash

<sup>4)</sup> = special master gauge for holes; only 4 instead of 6 holes  
(for  $d_0 \times p = 8 \times 12$  and  $12.7 \times 25.4$ )

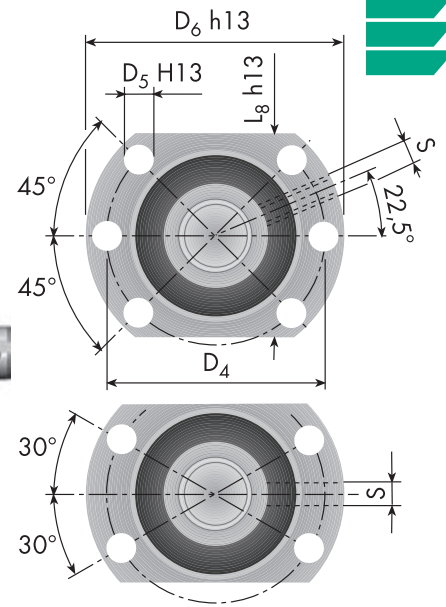
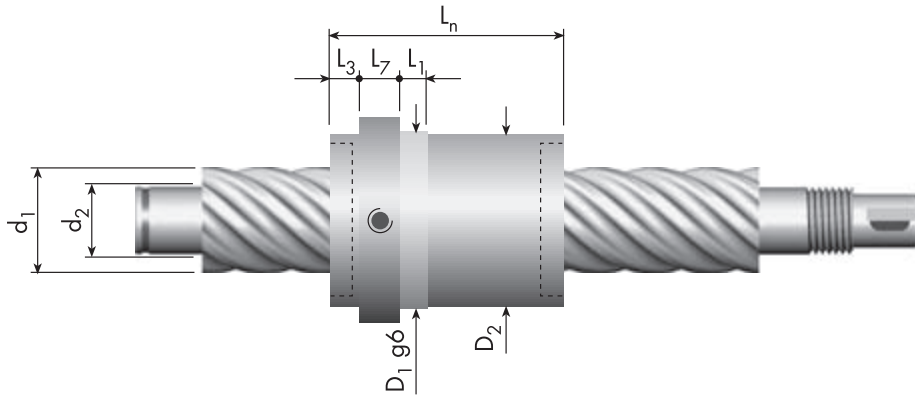
**Warning!** Note when selecting a ball screw that the maximum rotational speed depends on the system's rotational speed characteristics.  
See page 25 for the appropriate calculations.

Special designs available on request.  
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**



# Carry Speed-line type «FBE»



4) special master gauge for holes

Carry S-line type «FBE» $d_0 \times p$ mm	Dimensions															Load rates		
	Screw		Nut													$C_{dyn}$	$C_{stat}$	
	$d_1$	$d_2$	$D_1$ g6 mm	$D_2$	$D_4$ hole circle	$D_5$ H13	$D_6$ h13	$L_n$	$L_1$	$L_3$	$L_7$	$L_8$ h13	$i$	$S$	$SA$	$T$	N	
<b>right-hand threads</b>																		
<b>8 x 12</b> <sup>4)</sup>	8.0	6.7	18	17.8	25	3.4	30	28	4	6	4	20	2x1.5	ø 2	K	0.05	1400	2300
<b>12.7 x 25.4</b> <sup>4)</sup>	12.5	10.6	26	25.5	32	4.5	42	32	5	7	8	28	3x0.9	ø 4	K	0.05	2300	4500
<b>16 x 10</b>	16.0	13.4	28	27.8	42	5.5	52	42	10	10	10	40	2x2.9	ø 4	K	0.07	12500	26000
<b>16 x 16</b>	16.1	13.2	28	27.8	38	5.5	48	42	10	10	10	40	2x1.9	M6	K	0.07	7800	15500
<b>16 x 50</b>	16.0	13.2	28	27.8	38	5.5	48	55	10	10	10	40	3x0.9	ø 4	K	0.06	4800	11000
<b>20 x 20</b>	20.0	17.3	36	35.8	47	6.6	58	50	10	10	10	44	4x1.9	M6	K	0.06	17900	44600
<b>25 x 25</b>	24.5	21.2	40	39.8	51	6.6	62	60	10	10	10	48	4x1.9	ø 4	K	0.06	23300	68000

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://www.gewinde.ch)



## 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 =  $\leq 0,1$  mm/300 mm

### On request

up to max. 1200 mm screw length

- G7 =  $\leq 0,052$  mm/300 mm
- G5 =  $\leq 0,023$  mm/300 mm



## Reduced backlash

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

## Efficiency

The efficiency  $\eta$  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 23

## Factory length

### Ball screw ends

### Handling

### Radial loads and torque

### Assembling

See Carry page 24.

## Design fundamentals

See Carry pages 25–27.

# Slide lead screw product range



▲ = standard range

\* = on request

<sup>2)</sup> = also available with left-hand thread

Rondo		Speedy		Speedy		Speedy	
type	pages	type	pages	type	pages	type	pages
$d_0 / P_0$		$d_0 / P_0$		$d_0 / P_0$		$d_0 / P_0$	
5 / 5	5 / 20	▲	▲ <sup>2)</sup>	▲	▲ <sup>2)</sup>	▲	▲ <sup>2)</sup>
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	8 / 10	▲	▲	▲	▲	▲	▲
8 / 12	8 / 12	▲	▲	▲	▲	▲	▲
8 / 15	8 / 15	▲	▲	▲	▲	▲	▲
8 / 30	8 / 30	▲	▲ <sup>2)</sup>	▲	▲ <sup>2)</sup>	▲	▲
9 / 20	9 / 20	▲	▲	▲	▲	▲	▲
9.7 / 25.4	9.7 / 25.4	▲	▲	▲	▲ <sup>2)</sup>	▲	▲
10 x 3	10 x 3	▲	▲	▲	▲	▲	▲
10 / 10	10 / 10	▲	▲	▲	▲	▲	▲
10 / 12	10 / 12	▲	▲	▲	▲ <sup>2)</sup>	▲	▲
10 / 15	10 / 15	▲	▲	▲	▲	▲	▲
10 / 35	10 / 35	▲	▲ <sup>2)</sup>	▲	▲ <sup>2)</sup>	▲	▲
10 / 50	10 / 50	▲	▲	▲	▲	▲	▲
11 / 40	11 / 40	▲	▲	▲	▲	▲	▲
11 / 60	11 / 60	▲	▲	▲	▲	▲	▲
11.2 / 30.5	11.2 / 30.5	▲	▲	▲	▲	▲	▲
12 x 4	12 x 4	▲	▲	▲	▲	▲	▲
12 / 15	12 / 15	▲	▲	▲	▲ <sup>2)</sup>	▲	▲
12 / 25	12 / 25	▲	▲	▲	▲ <sup>2)</sup>	▲	▲
12 / 45	12 / 45	▲	▲ <sup>2)</sup>	▲	▲ <sup>2)</sup>	▲	▲
12.5 / 12.5	12.5 / 12.5	▲	*	▲	*	▲	▲
12.8 / 35.6	12.8 / 35.6	▲	▲	▲	▲	▲	▲
13 / 20	13 / 20	▲	▲	▲	▲	▲	▲
13 / 70	13 / 70	▲	▲	▲	▲ <sup>2)</sup>	▲	▲
14 x 4	14 x 4	▲	▲	▲	▲	▲	▲
14 / 8	14 / 8	▲	▲	▲	▲	▲	▲

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



type	round thread 56/57	inch thread 48/49	fine-pitch thread 46/47	standard thread 40-45	type
14 / 18					14 / 18
14 / 30				▲ <sup>2)</sup>	14 / 30
14.3 / 40.6		▲ <sup>2)</sup>			14.3 / 40.6
15 / 20				▲	15 / 20
15 / 80				▲ <sup>2)</sup>	15 / 80
16 x 5	▲				16 x 5
16 / 21				▲ <sup>2)</sup>	16 / 21
16 / 25				▲	16 / 25
16 / 35				▲	16 / 35
16.0 / 45.7		*			16.0 / 45.7
16 / 90				▲ <sup>2)</sup>	16 / 90
17.6 / 50.8		▲			17.6 / 50.8
18 / 16				▲	18 / 16
18 / 24				▲ <sup>2)</sup>	18 / 24
18 / 40				▲ <sup>2)</sup>	18 / 40
18 / 100				▲ <sup>2)</sup>	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				▲ <sup>2)</sup>	23 / 30
24 / 40				*	24 / 40
24 / 55				▲	24 / 55
25.7 / 76.2		▲ <sup>2)</sup>			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		▲ <sup>2)</sup>			32.0 / 96.5
34 / 32				*	34 / 32
34 / 80				▲	34 / 80
36 / 200				▲	36 / 200
type	round thread 56/57	inch thread 48/49	fine-pitch thread 46/47	standard thread 40-45	type
pages					pages

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



## **Speedy** high-helix lead screws

- Order system Speedy . . . . . 39
- Speedy with standard thread and standard flange nut  
non-preloaded/preloaded . . . . . 40-45
- Speedy with fine-pitch thread and standard flange nut  
non-preloaded/preloaded . . . . . 46/47
- Speedy with inch thread and standard flange nut  
non-preloaded/preloaded . . . . . 48/49
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- Factory length / Handling / Lubrication . . . . . 51
- Design fundamentals  
...at dynamic loads: . . . . . 52/53
  - critical rotational speed
  - efficiency
  - driving torque / required power
- Basic calculations: . . . . . 53
  - Maximum authorized load depending on speed



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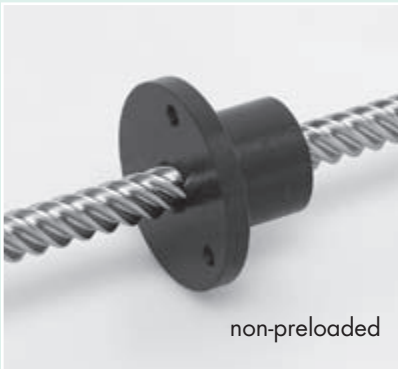


	SGS	18/100	SFM	RH	350	G9	O	M
<b>Example for complete high-helix lead screw</b> _____								
<b>Type of lead screw</b> _____ SGS = High-helix lead screw Speedy								
<b>Nomina size (d<sub>0</sub>/p<sub>0</sub>) [mm]</b> _____								
<b>Type of nut</b> _____ SFM = standard flange nut, non-preloaded, made of POM-C black <sup>1)</sup> SFV = standard flange nut, axial-preloaded, made of POM-C black <sup>1)</sup> SFT = standard flange nut, torsion-preloaded, made of EX100 white <sup>6)</sup> SBM = standard flange nut, non-preloaded, made of bronze SBV = standard flange nut, axial-preloaded, made of bronze <sup>3)</sup> SBT = standard flange nut, torsion-preloaded, made of bronze <sup>3)</sup> MSX = special design according to drawing			for nut only					
<b>Right-hand / left-hand thread</b> _____ RH = right-hand thread (standard) LH = left-hand thread (→ see dimensional charts)								
<b>Lead screw overall length [mm]</b> _____ (stainless steel quality X20Cr13, Material N° 1.4021) <sup>1)</sup>								for screw only
<b>Lead accuracy (class)</b> _____ G9 = ≤ 0.1 mm/300 mm (standard) GX = lead accuracy upon specification								for screw only
<b>End machining</b> _____ O = no end machining (cut by grinding; screw and nut separate) E = end machining according to drawing								for screw only
<b>Assembly</b> _____ G = screw and nut separate (standard) M = screw and nut assembled according to drawing/specified orientation								
<sup>1)</sup> other materials on request <sup>3)</sup> only on request <sup>6)</sup> available for square pitches and larger (with electro polished screws)								
<b>Example for screw only</b> _____	SGS	18/100		RH	350	G9	O	G
<b>Example for nut only</b> _____	SGS	18/100	SFM	RH	G			

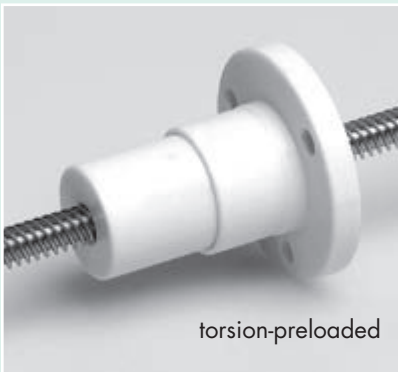
# Speedy with standard thread



## 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 ( $C_{stat\ bronze} = 1.3 \times C_{stat\ POM/EX100}$ )

B = bronze CuSn12, material N° 2.1052

<sup>3)</sup> = only on request

<sup>6)</sup> = not available with torsion-preload

Special designs available on request.

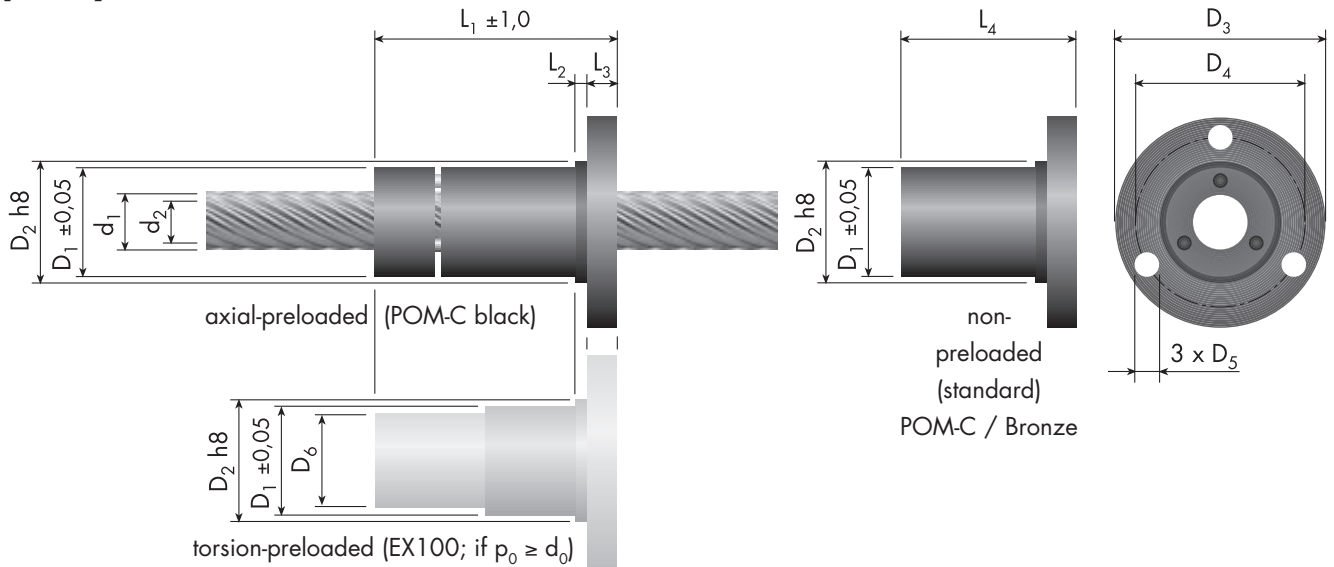
All specifications are subject to change without notice.

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# Speedy with standard thread (1/3)



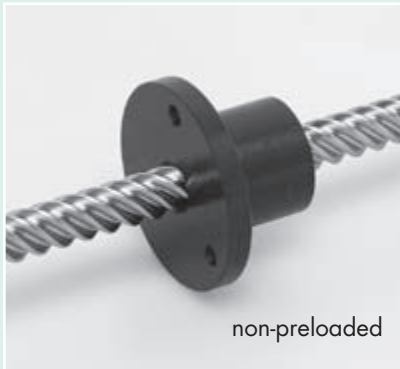
Speedy $d_0 / p_0$ mm	Dimensions											Load rates			
	Screw				Nut							POM / B		$C_{stat}$ for POM/EX100 N	
	$d_1$	$d_2$	$p$	$i$	$D_1$ $\pm 0,05$ mm	$D_2$ h8	$D_3$	$D_4$ hole circle	$D_5$	$D_6$	$L_1$	$L_2$	$L_3$	$L_4$	
<b>right-hand threads</b>															
8 / 10	8.2	5.5	10	4	23.5	24	42	32	4.2	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	1200
10 / 15	10.0	7.4	15	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1200
12 / 15	12.2	9.2	15	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1400
12 / 25	11.9	8.0	25	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1500
10 / 50	10.0	7.4	50	10	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1250
11 / 60	11.7	9.1	60	12	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1500
13 / 20	13.3	8.8	20	4	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1300
13 / 70	13.5	10.9	70	14	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1750
14 / 8 <sup>d)</sup>	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	1600
14 / 30	13.9	10.1	30	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1750
<b>left-hand threads</b>															
10 / 12	10.0	7.1	12	4	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1200
12 / 15	12.2	9.2	15	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1400
12 / 25	11.9	8.0	25	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1500
10 / 50	10.0	7.4	50	10	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1250
13 / 70	13.5	10.9	70	14	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1750
14 / 18	14.3	11.4	18	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1600
14 / 30	13.9	10.1	30	6	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1750

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://www.gewinde.ch)

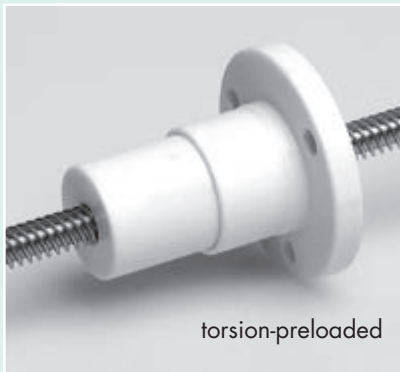
# Speedy with standard thread



## 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 ( $C_{stat\ bronze} = 1.3 \times C_{stat\ POM/EX100}$ )

B = bronze CuSn12, material N° 2.1052

<sup>3)</sup> = only on request

<sup>6)</sup> = not available with torsion-preload

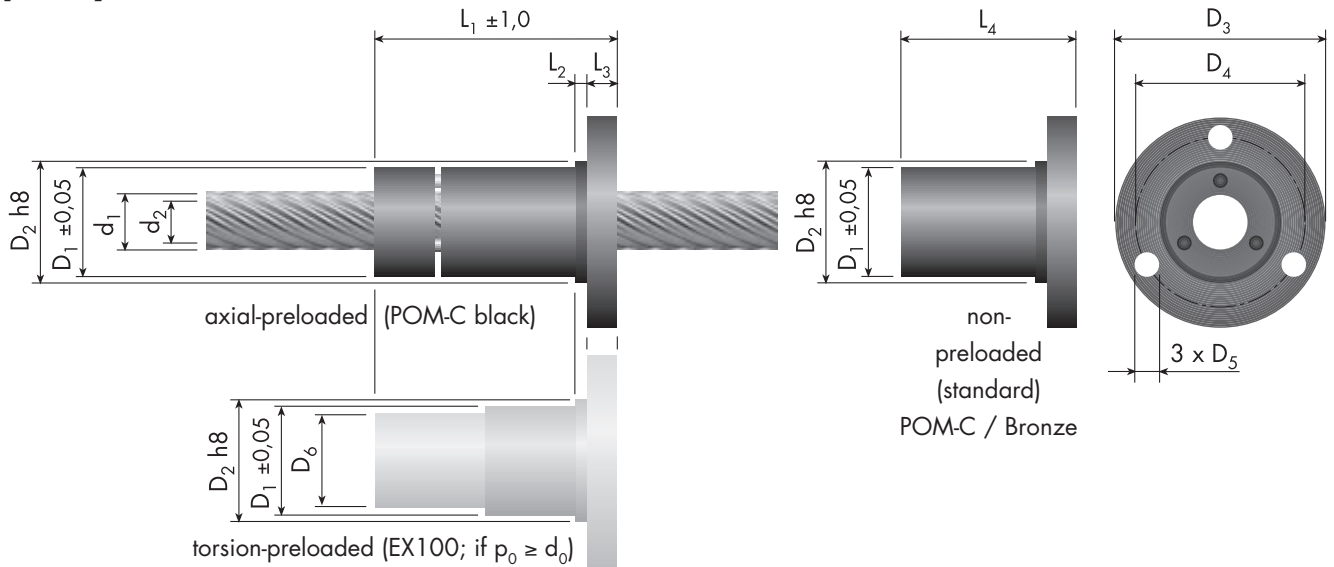
Special designs available on request.

All specifications are subject to change without notice.

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# Speedy with standard thread (2/3)



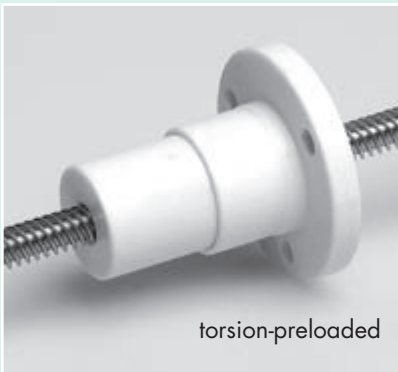
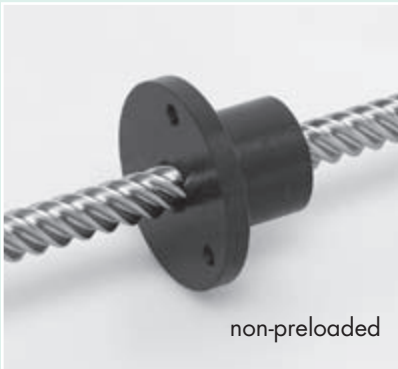
Speedy $d_0 / p_0$ mm	Dimensions											Load rates $C_{stat}$ for POM/EX100 N			
	Screw				Nut										
	$d_1$	$d_2$	$p$	$i$	$D_1$ $\pm 0,05$ mm	$D_2$ h8	$D_3$	$D_4$ hole circle	$D_5$	$D_6$	$L_1$	$L_2$	$L_3$	$L_4$ POM / B	
<b>right-hand threads</b>															
15 / 20	15.2	12.5	20	8	29.5	30	49	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
<b>left-hand threads</b>															
20 / 12 <sup>6)</sup>	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 <sup>3)</sup>	21.5	17.0	35	7	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 050
<b>right-hand threads</b>															
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](http://www.gewinde.ch)

# Speedy with Standard thread



## Standard flange nut, non-preloaded/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 ( $C_{stat\ bronze} = 1.3 \times C_{stat\ POM/EX100}$ )

B = bronze CuSn12, material N° 2.1052

<sup>3)</sup> = only on request

<sup>6)</sup> = not available with torsion-preload

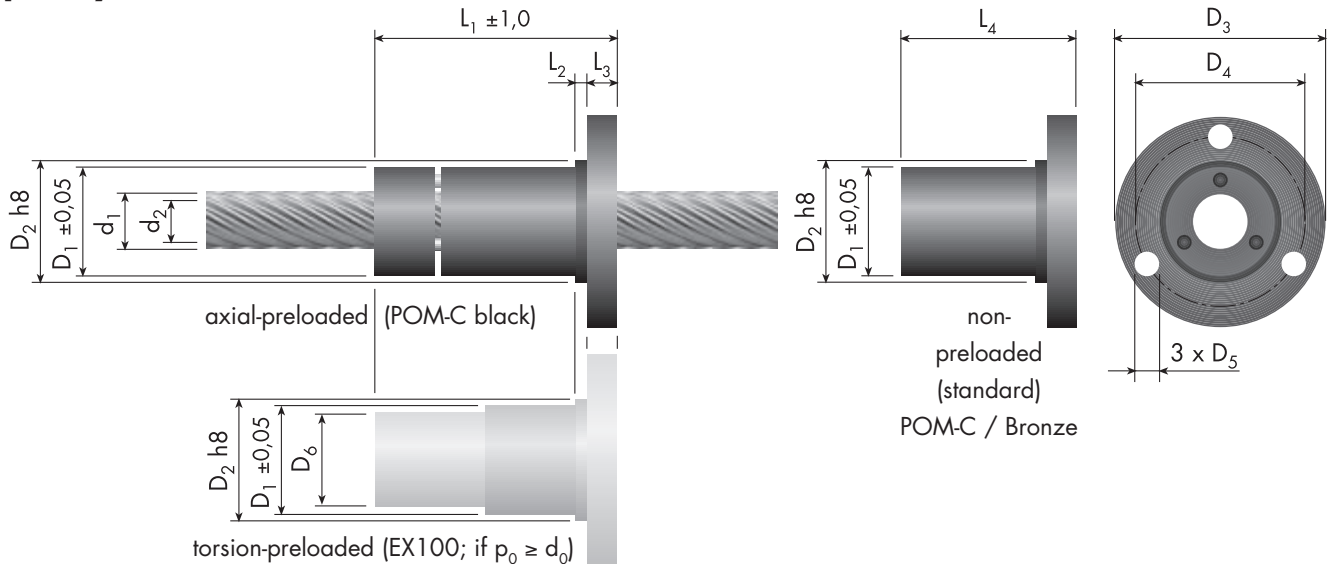
Special designs available on request.

All specifications are subject to change without notice.

**Quality management ISO 9001:2000**



# Speedy with standard thread (3/3)



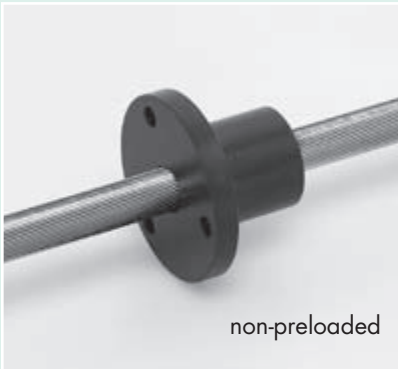
Speedy	Dimensions														Load rates	
	Screw				Nut											
$d_0 / p_0$	$d_1$	$d_2$	$p$	$i$	$D_1$	$D_2$	$D_3$	$D_4$	$D_5$	$D_6$	$L_1$	$L_2$	$L_3$	$L_4$	$C_{stat}$	
mm	mm	mm	mm	mm	$\pm 0,05$ mm	h8	hole circle							POM / B	for POM/EX100 N	
<b>right-hand threads</b>																
<b>22 / 20</b>	22.0	18.3	20	5	35.5	36	59	47	6.2	33	64	5	8	46 / 32	1 400	
<b>22 / 50</b>	22.0	18.1	50	10	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 750	
<b>23 / 30</b>	23.0	20.0	30	10	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 400	
<b>24 / 40</b> <sup>3)</sup>	24.3	19.8	40	8	35.5	36	59	47	6.2	33	64	5	8	46 / 32	2 300	
<b>24 / 55</b>	24.0	20.1	55	11	35.5	36	59	47	6.2	33	64	5	8	46 / 32	3 000	
<b>26 / 16</b> <sup>3) 6)</sup>	26.0	21.8	16	4	41.5	42	64	53	6.2	39	71	5	8	50 / 35	1 400	
<b>26 / 24</b>	26.0	22.3	24	6	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 000	
<b>26 / 60</b>	26.0	22.2	60	12	41.5	42	64	53	6.2	39	71	5	8	50 / 35	3 250	
<b>27 / 45</b> <sup>3)</sup>	27.0	22.5	45	9	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 550	
<b>28 / 65</b> <sup>3)</sup>	28.0	24.2	65	13	41.5	42	64	53	6.2	39	71	5	8	50 / 35	3 500	
<b>30 / 28</b>	30.0	26.5	28	7	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 000	
<b>30 / 50</b>	29.8	25.3	50	10	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2 800	
<b>30 / 70</b>	30.0	26.2	70	14	41.5	42	64	53	6.2	39	71	5	8	50 / 35	3 750	
<b>32 / 20</b> <sup>3)</sup>	32.0	27.8	20	5	49.5	50	80	65	9.0	—	—	10	12	70 / 50	2 000	
<b>32 / 75</b> <sup>3)</sup>	32.0	28.2	75	15	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4 000	
<b>34 / 32</b> <sup>3)</sup>	34.0	30.5	32	8	49.5	50	80	65	9.0	—	—	10	12	70 / 50	2 300	
<b>34 / 80</b>	34.0	30.2	80	16	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4 250	
<b>36 / 200</b>	36.0	33.4	200	40	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4 500	
<b>left-hand threads</b>																
<b>23 / 30</b>	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](http://www.gewinde.ch)

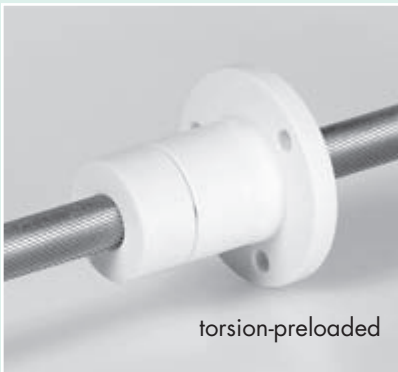
# Speedy with fine-pitch thread



## 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 ( $C_{stat\ bronze} = 1.3 \times C_{stat\ POM/EX100}$ )

B = bronze CuSn12, material N° 2.1052

<sup>3)</sup> = only on request

<sup>6)</sup> = not available with torsion-preload

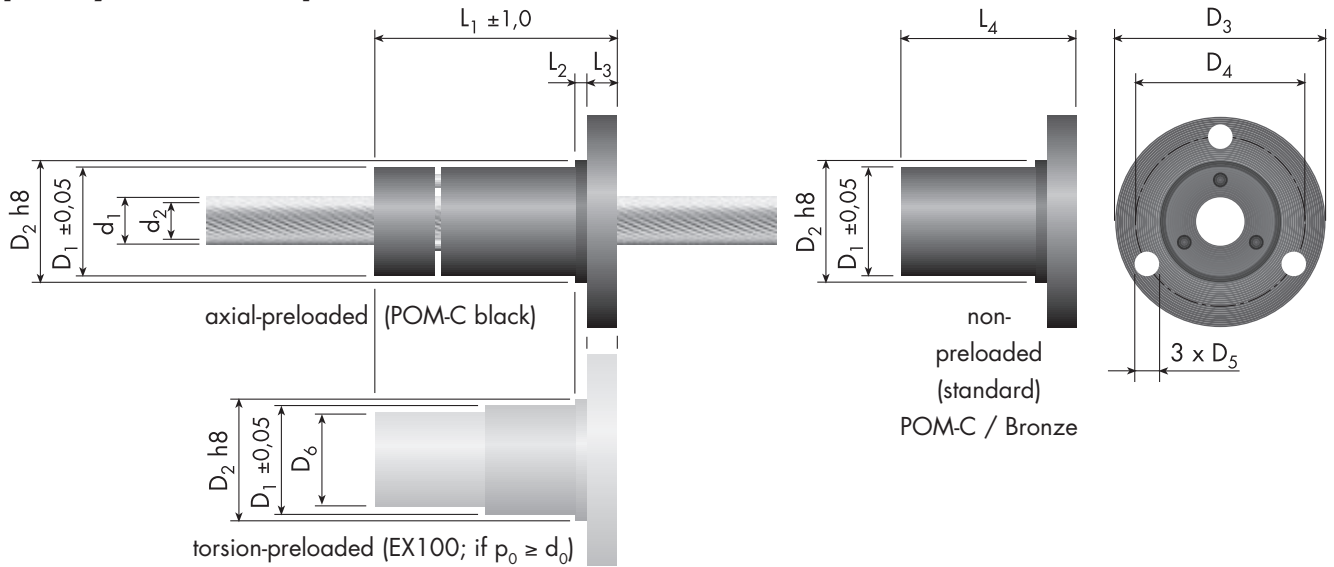
Special designs available on request.

All specifications are subject to change without notice.

**Quality management ISO 9001:2000**



# Speedy with fine-pitch thread



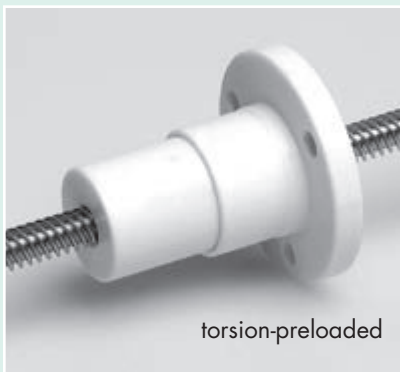
Speedy $d_0 / p_0$ mm	Dimensions														Load rates $C_{stat}$ for POM/EX100 N	
	Screw				Nut		hole circle		POM / B							
	$d_1$	$d_2$	$p$	$i$	$D_1$ $\pm 0,05$ mm	$D_2$ h8	$D_3$	$D_4$	$D_5$	$D_6$	$L_1$	$L_2$	$L_3$	$L_4$		
<b>right-hand threads</b>																
5 / 5	5.4	3.6	5	4	20.5	21	38	29	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 <sup>3)</sup>	12.3	10.4	12.5	10	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	750	
<b>left-hand threads</b>																
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](http://www.gewinde.ch)

# Speedy with inch thread



## Standard flange nut, non-preloaded/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 ( $C_{stat\ bronze} = 1.3 \times C_{stat\ POM/EX100}$ )

B = bronze CuSn12, material N° 2.1052

<sup>3)</sup> = only on request

<sup>6)</sup> = not available with torsion-preload

Special designs available on request.

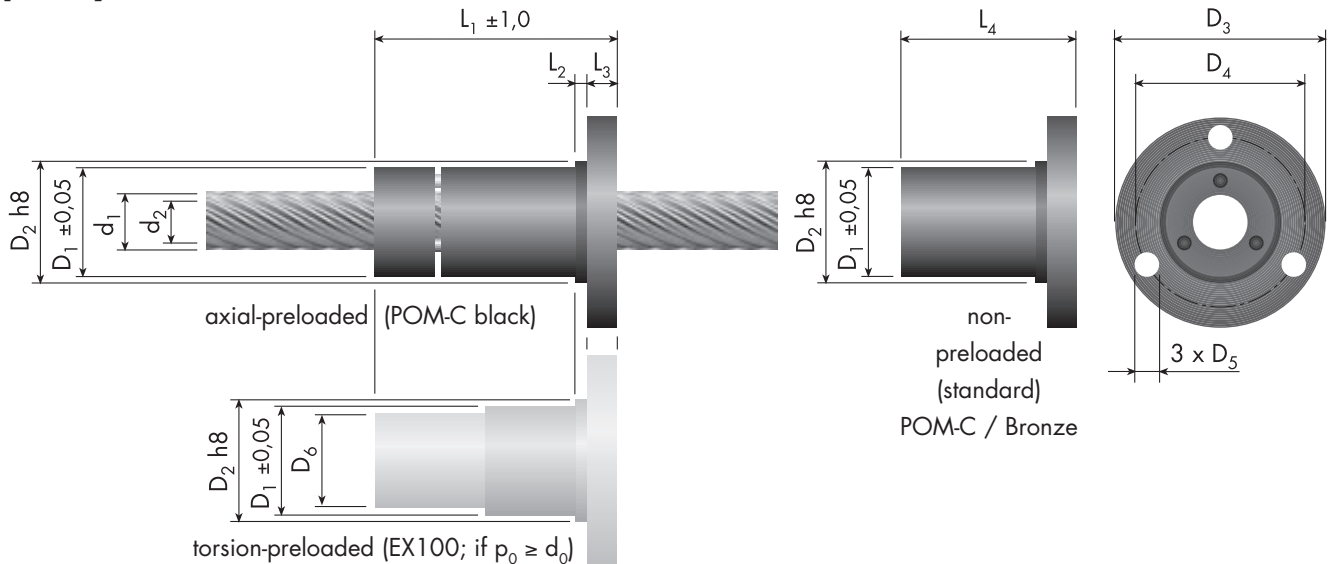
All specifications are subject to change without notice.

**Quality management ISO 9001:2000**





# Speedy with inch thread



Speedy $d_0 / p_0$ mm	Dimensions														Load rates $C_{stat}$ for POM/EX100 N	
	Screw				Nut		hole circle				POM / B					
	$d_1$	$d_2$	$p$	$i$	$D_1$ $\pm 0,05$ mm	$D_2$ h8	$D_3$	$D_4$	$D_5$	$D_6$	$L_1$	$L_2$	$L_3$	$L_4$		
<b>right-hand threads</b>																
<b>6.35 / 6.35</b>	6.4	4.4	6.35	4	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	850	
<b>6.35 / 12.7</b>	6.3	4.6	12.70	6	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	800	
<b>6.35 / 25.4</b>	6.35	4.2	25.40	10	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	700	
<b>7.94 / 12.7</b>	7.9	5.8	12.70	6	20.5	21	38	29	4.2	18.5	38	3	5	25 / 18	1100	
<b>9.7 / 25.4</b>	9.7	6.4	25.40	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / —	1200	
<b>11.2 / 30.5</b>	11.2	8.0	30.48	6	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1400	
<b>12.8 / 35.6</b>	12.8	9.6	35.56	7	23.5	24	42	32	4.2	21.5	38	3	5	25 / 18	1600	
<b>14.3 / 40.6</b>	14.4	11.2	40.64	8	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1800	
16.0 / 45.7 <sup>3)</sup>	16.0	12.8	45.72	9	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2000	
<b>17.6 / 50.8</b>	17.6	14.4	50.80	10	29.5	30	49	39	5.1	27	58	3	7	42 / 30	2200	
<b>25.7 / 76.2</b>	25.7	24.0	76.20	15	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2800	
<b>32.0 / 96.5</b>	32.2	29.0	96.52	19	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4600	
<b>left-hand threads</b>																
<b>9.7 / 25.4</b>	9.7	6.4	25.40	5	23.5	24	42	32	4.2	21.5	38	3	5	25 / —	1200	
<b>14.3 / 40.6</b>	14.4	11.2	40.64	8	25.5	26	46	36	5.1	23.5	58	3	7	42 / 30	1800	
<b>25.7 / 76.2</b>	25.7	24.0	76.20	15	41.5	42	64	53	6.2	39	71	5	8	50 / 35	2800	
<b>32.0 / 96.5</b>	32.2	29.0	96.52	19	49.5	50	80	65	9.0	—	—	10	12	70 / 50	4600	

The CAD data corresponding to the types shown above are available at [www.gewinde.ch](http://www.gewinde.ch)



## 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

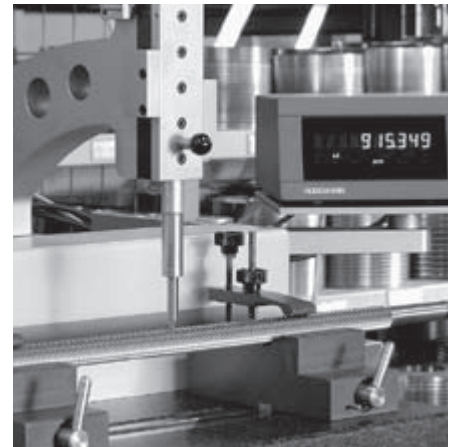
## Lead accuracy

### Standard

G9 =  $\leq 0,1$  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  $\eta$  depends on the helix angle and reaches values from ~0.5 to 0.75 (see chart on page 52).



# Factory length / Handling / Lubrication

## Factory length

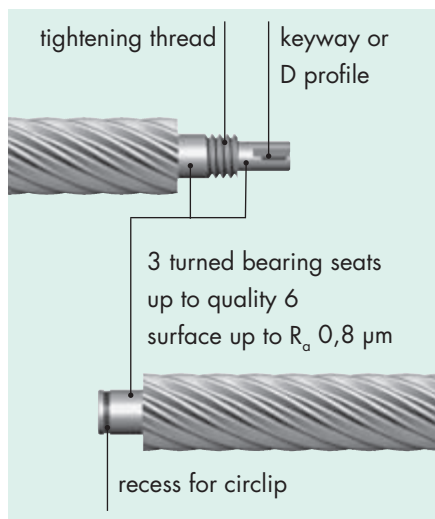
In general, Eichenberger screws are available as threaded rods, approx. 3 m long. Upon request, lengths up to 6 m are available, depending on diameter and supply market situation.

## 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](http://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:

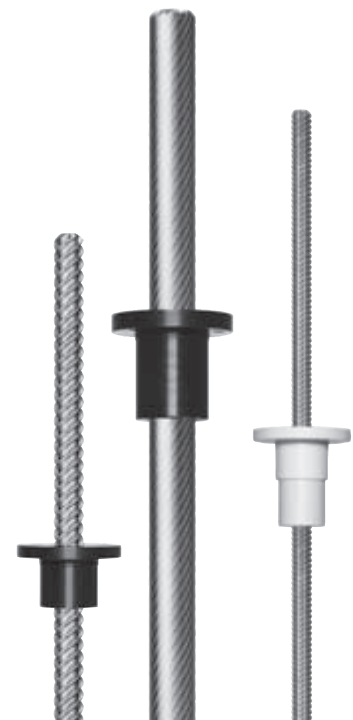
- Klüber Microlube GBU Y 131.

## 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.



Speedy high-helix lead screws



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.

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

$n_{per}$  = permissible rotational speed [min<sup>-1</sup>]

$K_D$  = 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

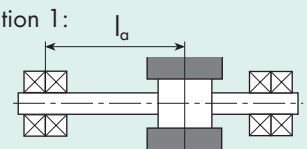
usually  $S_n = 0,5 \dots 0,8$  [-]

Configuration 1:

fixed –

fixed

$K_D = 276$

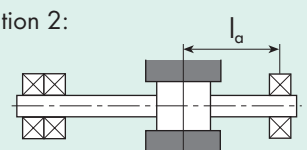


Configuration 2:

fixed –

simple

$K_D = 190$

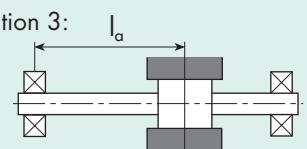


Configuration 3:

simple –

simple

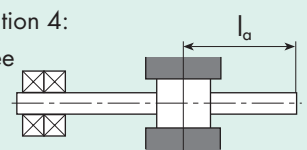
$K_D = 122$



Configuration 4:

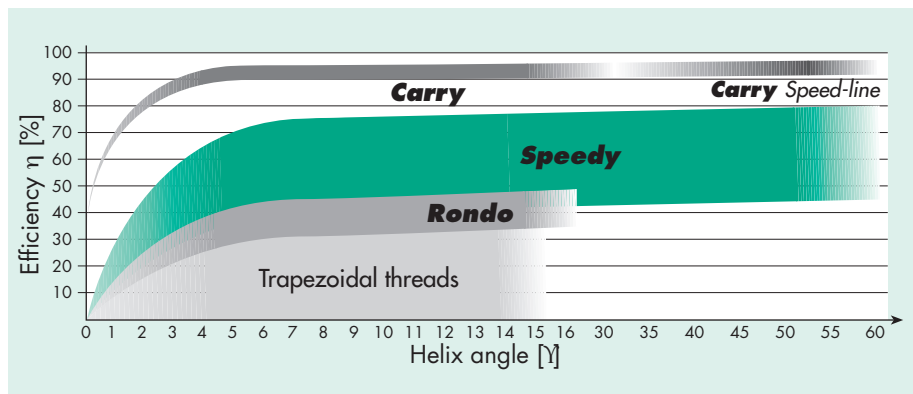
fixed – free

$K_D = 43$



## Efficiency $\eta_p$ (practical)

The efficiency  $\eta$  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]

$\eta$  = efficiency [%]

$\eta'$  = corrected efficiency [%]

$p$  = pitch [mm]

## Input performance P

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

$P$  = input performance [kW]

$n$  = rotational speed [ $\text{min}^{-1}$ ]

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

## Basic calculations

### Maximum authorized load depending on speed

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

$C_0$  = 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:  $F_{\text{per.}}$

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

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

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

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  $\approx 0.85$  [-]

It follows:

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

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



## **Rondo** round thread lead screws

- Order system Rondo . . . . . 55
- Rondo with standard round thread and standard flange nut. . . . . 56/57
- Basic design / Materials / Precision . . . . . 58
- Factory length / Handling / Lubrication . . . . . see Speedy, page 51
- Design fundamentals
  - ...at dynamic loads: . . . . . see Speedy, pages 52/53
    - critical rotational speed
    - efficiency
    - driving torque / required power
  - Basic calculations: . . . . . see Speedy, page 53
    - Maximum authorized load depending on speed

Visit [www.gewinde.ch](http://www.gewinde.ch) for the latest on existing and/or new products.

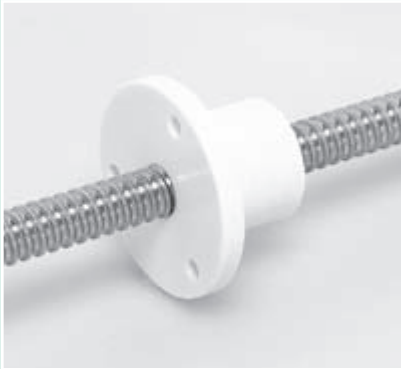


Example for complete round thread lead screw _____	RGS	10x3	RFM	RH	350	G9	O	M
<b>Type of lead screw</b> _____ RGS = Round thread lead screw Rondo								
<b>Nominal size (d<sub>0</sub>xp) [mm]</b> _____								
<b>Type of nut</b> _____ RFM = standard flange nut, made of EX100 white <sup>1)</sup> MSX = special design according to drawing			nut only					
<b>Right-hand / left-hand thread</b> _____ RH = right-hand thread (standard) LH = left-hand thread (on request)								
<b>Lead screw overall length [mm]</b> _____ standard steel quality: X20Cr13 (material N° 1.4021) <sup>1)</sup>					screw only			
<b>Lead accuracy (class)</b> _____ G9 = ≤ 0.1 mm/300 mm (standard) GX = lead accuracy upon specification						screw only		
<b>End machining</b> _____ O = no end machining (cut by grinding; screw and nut separate) E = end machining according to drawing							screw only	
<b>Assembly</b> _____ G = screw and nut separate (standard) M = screw and nut assembled according to drawing/specified orientation								
<sup>1)</sup> other materials on request								
<b>Example for screw only</b> _____	RGS	10x3		RH	350	G9	O	G
<b>Example for nut only</b> _____	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]

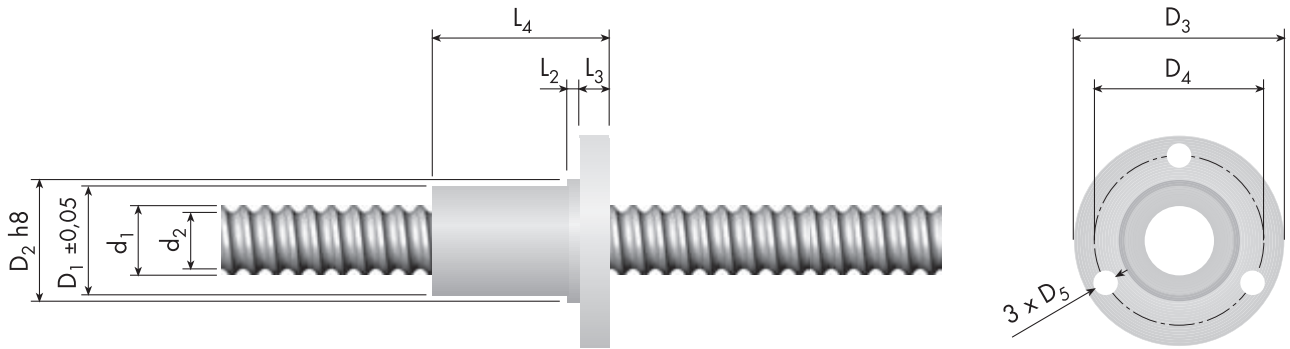
$d_2$  = core diameter [mm]

$p$  = pitch [mm]

Special designs available on request.  
All specifications are subject to change without notice.  
**Quality management ISO 9001:2000**



# Rondo with standard round thread



Rondo $d_0 \times p$ mm	Dimensions										Load rates
	Screw		Nut								$C_{stat}$ N
	$d_1$ mm	$d_2$	$D_1$ $\pm 0,05$ mm	$D_2$ h8	$D_3$	$D_4$ hole circle	$D_5$	$L_2$	$L_3$	$L_4$	
<b>right-hand threads</b>											
<b>6 x 2</b>	5.9	4.5	20.5	21	38	29	4.2	3	5	25	600
<b>8 x 2</b>	7.9	6.5	20.5	21	38	29	4.2	3	5	25	800
<b>10 x 3</b>	9.9	7.8	23.5	24	42	32	4.2	3	5	25	1200
<b>12 x 4</b>	12.0	9.8	25.5	26	46	36	5.1	3	7	42	2500
<b>14 x 4</b>	14.0	11.5	25.5	26	46	36	5.1	3	7	42	3200
<b>16 x 5</b>	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](http://www.gewinde.ch)



## 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 =  $\leq 0,1$  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 51.

## Design fundamentals

See Speedy pages 52/53.





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 9001:2000

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<sup>2</sup>
- 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 more assistance.

What materials are not suitable?

- extremely brittle material such as Ms58, cast iron, etc.
- extremely soft materials such as lead
- synthetics

We look forward to your challenge!



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  
 $6 \times$  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, etc.

Serrations as per DIN 5481

Threads on awkward parts

Conical threads





## Development, Manufacturing and QM

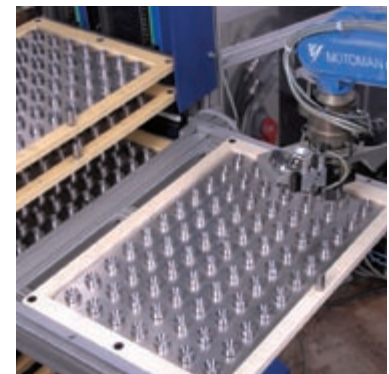
«Quality first»: As an ISO 9001:2000 certified company we leave nothing to chance – from development and manufacturing to distribution.

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.

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.

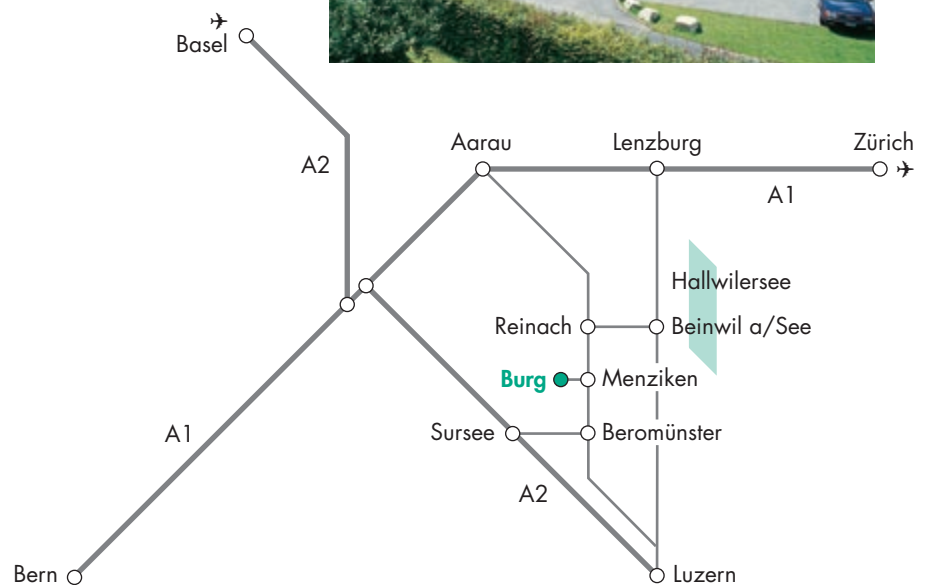
## History

- 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 Opening of the production extension at Burg





# Eichenberger Gewinde



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When in Burg, follow the signs to Eichenberger Gewinde.

For detailed directions, please visit our website [www.gewinde.ch](http://www.gewinde.ch) and click «Directions».

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