

Ball Screw Assemblies

ECO-Line

The Drive & Control Company



Ball Screw Assemblies

Product Overview

ECO-Line Ball Screw Assemblies

ECO-Line Ball Screws are available from stock as complete assemblies, with screw-in or flanged nuts.

The prefabricated end machining makes an easy combination with the fixed bearing (support block with bearing) LGL as a complete package possible.

The load capacity of the support bearing is critical. By friction welding the bearing journal we were able to enlarge smaller screw diameters and increase the load capacity.

This can simplify the choices for many customer specific transport applications. The construction and ordering process for new applications can also be handled more effectively.

Relaxed tolerances provide economical solutions. Every nut is assembled with clearance. The flanged nut comes standard with seals; the screw-in version offers seals as an option.

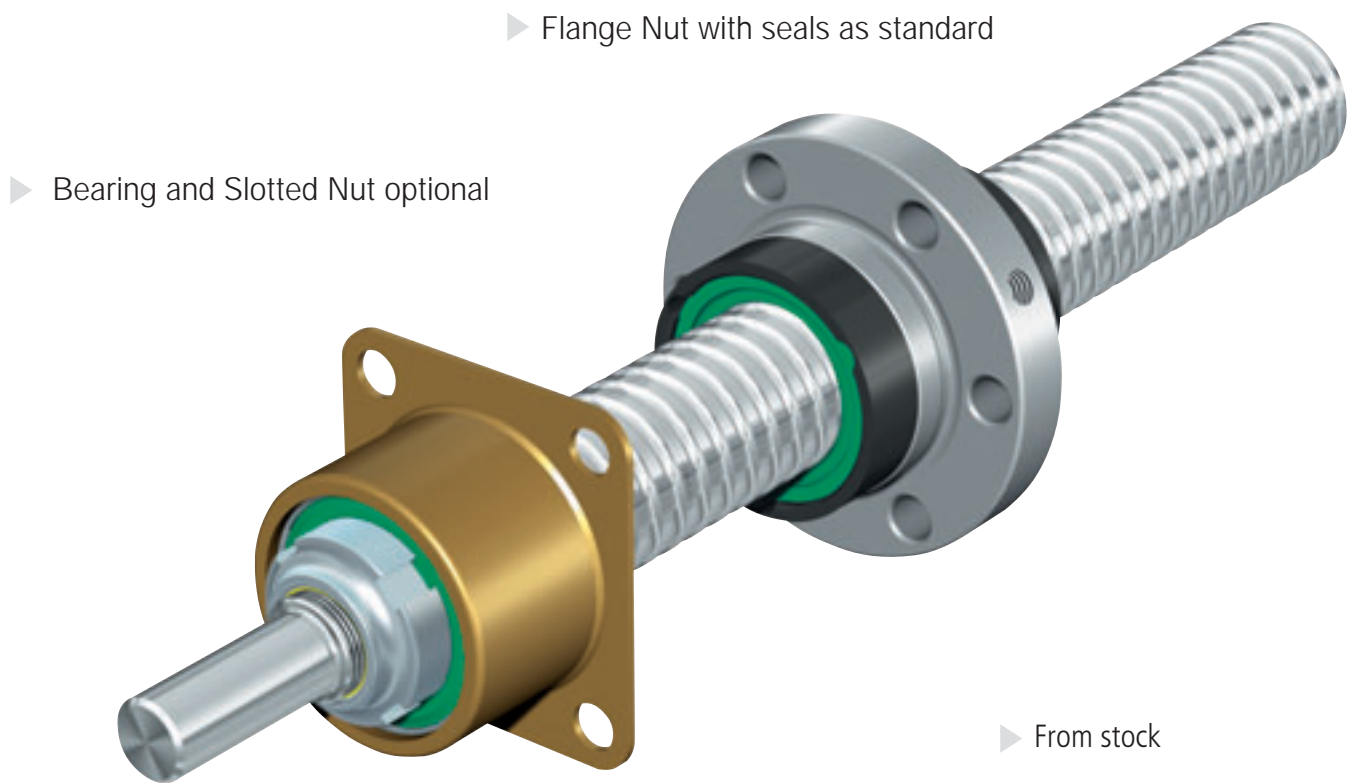
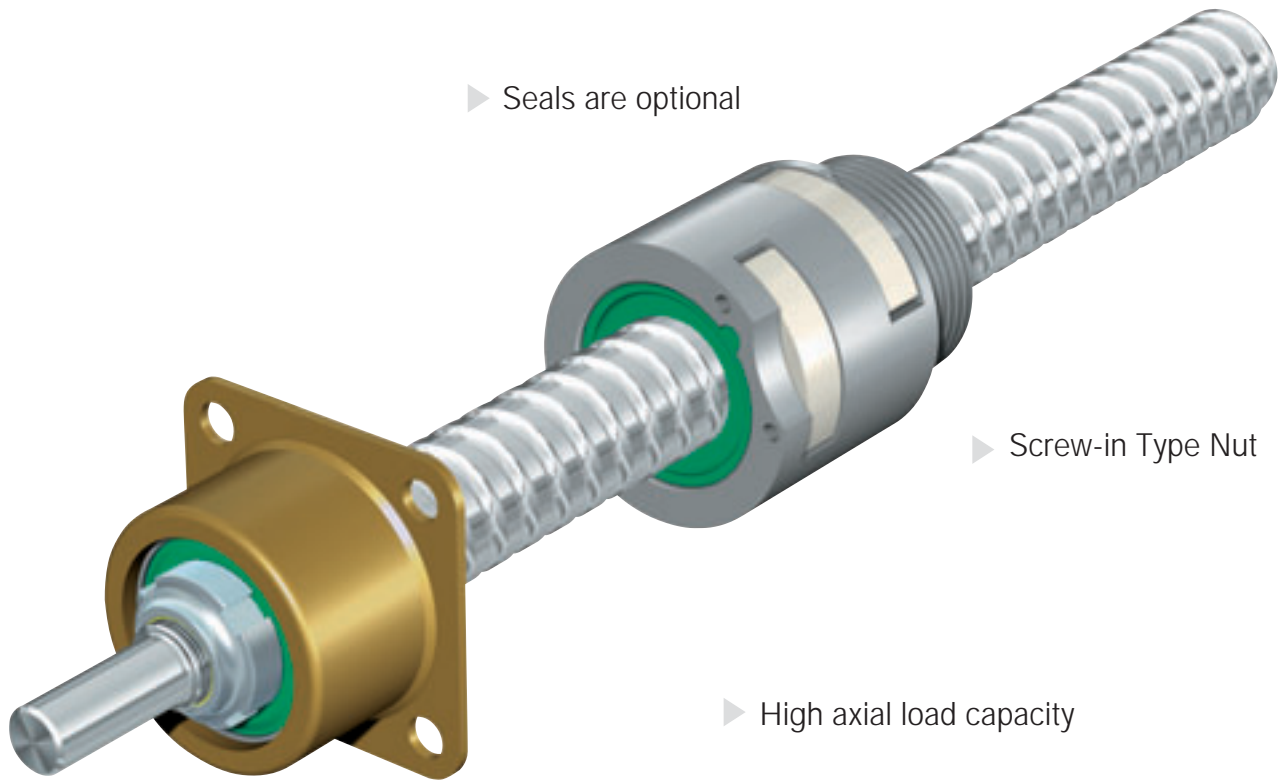
The ECO-Line Series is intended to be a very cost effective solution.

End bearing LGL

The end bearing LGL with angular contact ball bearing in an "X" arrangement makes an ideal accessory.

- High load capacity
- Very easy mounting with the flanged housing
- Corrosion resistant housing
- Seals provide protection from contaminants
- Simple preload of the fixed bearing
- Maintenance free for most application due to the large lubricant reservoir with initial greasing

Economical turnkey solutions made easy.



Ball Screw Assemblies

With Screw-in Single Nut

ECO-Line

Screw-in Single Nut ZEV-E-S with Rexroth mounting dimensions

Without seals

With backlash

Screw tolerance class T10

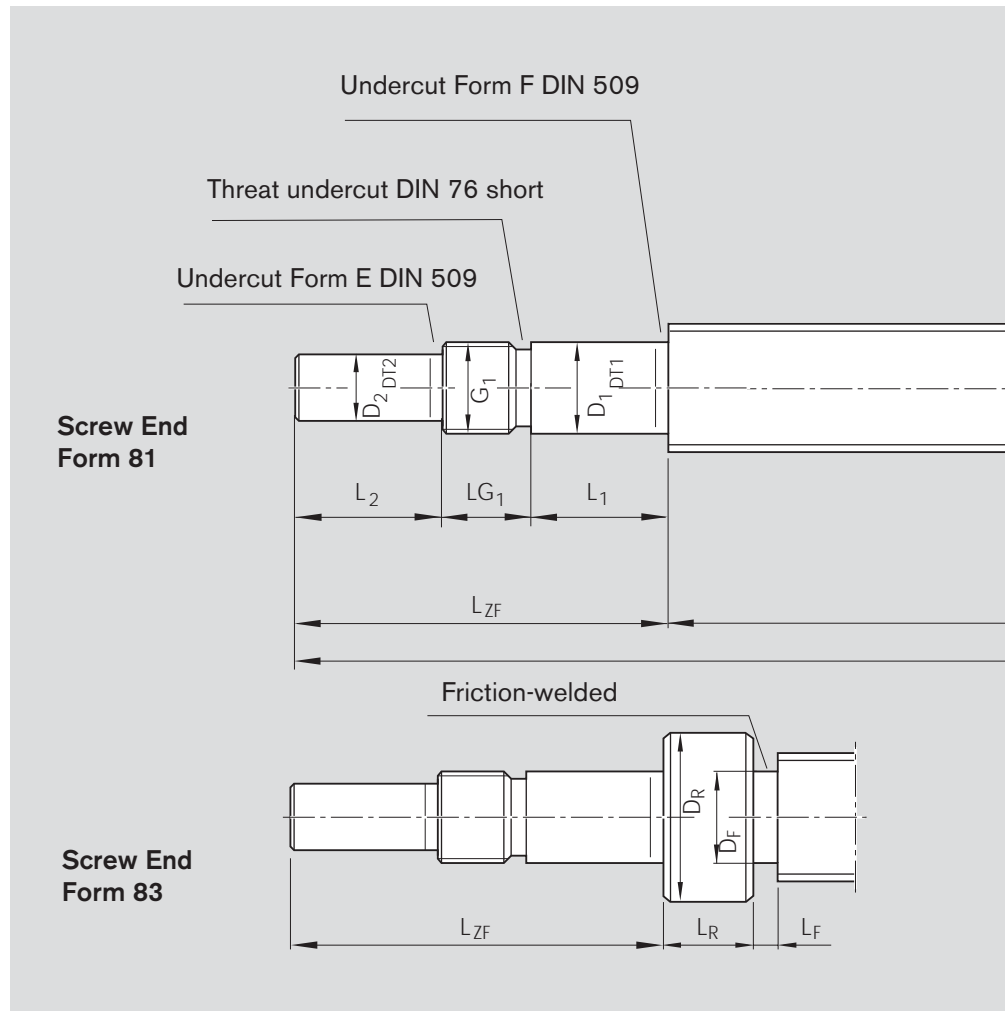
d_0 = Nominal diameter

P = Lead

(R = Right, L = Left)

D_w = Ball diameter

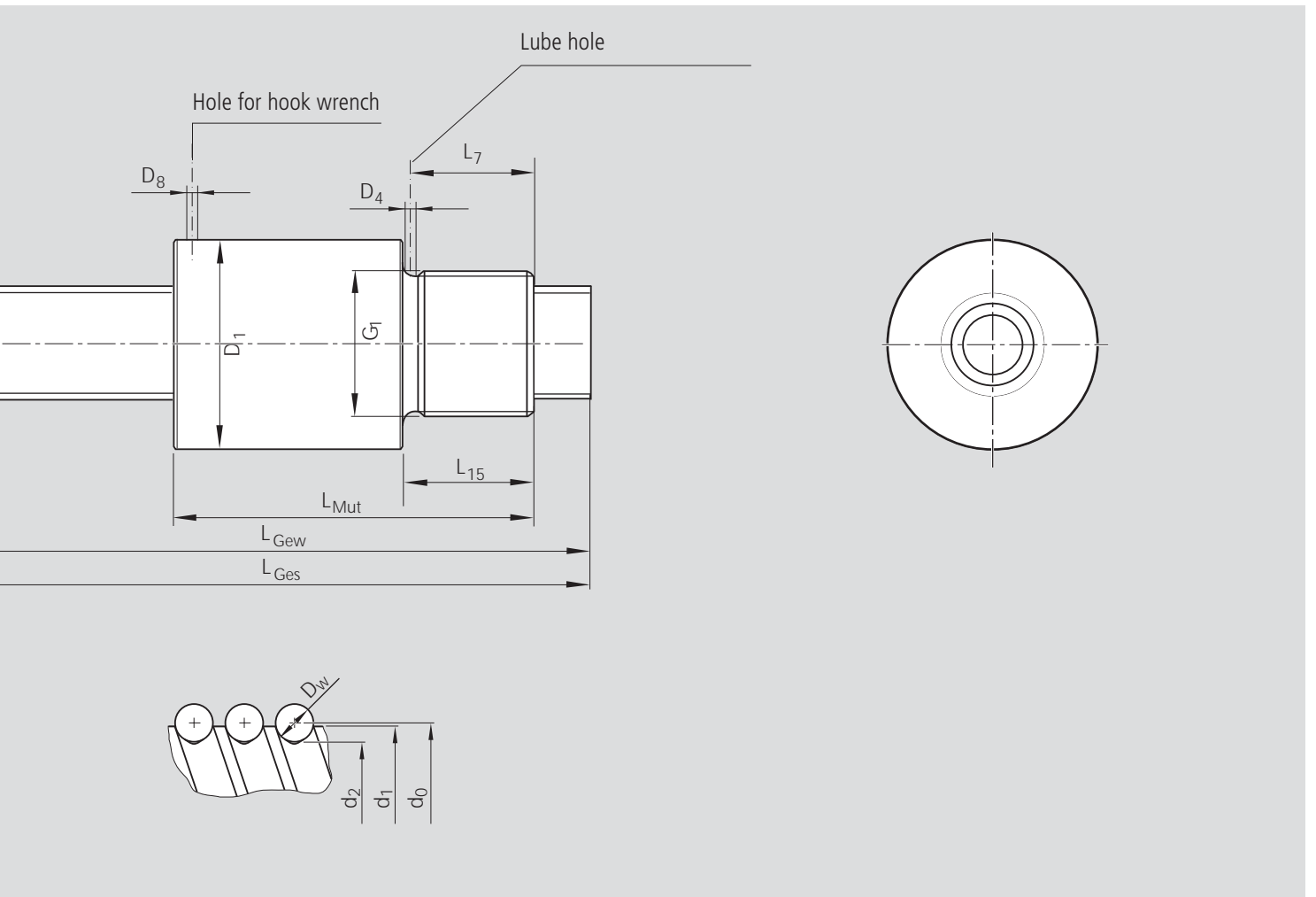
i = No. of turns



| Size $d_0 \times P \times D_w - i$ | Part No. | Basic load rating | | Max.Speed v_{max} [m/min] | L_{Ges} | L_{Gew} | |
|---------------------------------------|-------------|--------------------|-----------------------|-----------------------------------|-----------|-----------|--|
| | | dyn. C (N) | stat. C_0 (N) | | | | |
| 12 x 5R x 2 - 3 | 2540-000-01 | 2300 | 3500 | 30 | 400 | 317 | |
| 12 x 10R x 2 - 2 | 2540-000-02 | 1500 | 2200 | 60 | 400 | 317 | |
| 16 x 5R x 3 - 3 | 2540-000-03 | 5600 | 7100 | 25 | 550 | 467 | |
| 16 x 10R x 3 - 3 | 2540-000-04 | 5800 | 7400 | 50 | 550 | 467 | |
| 20 x 5R x 3 - 4 | 2540-000-05 | 8600 | 12900 | 20 | 550 | 490 | |

Ordering Code

| | | | | | | | | | | |
|---------|------------|---|---|-----|---|--------|--------|-----|---|---|
| ZEV-E-S | 12x5Rx2-3 | 0 | 0 | T10 | R | 83K121 | 00K120 | 400 | 0 | 1 |
| ZEV-E-S | 12x10Rx2-2 | 0 | 0 | T10 | R | 83K121 | 00K120 | 400 | 0 | 1 |
| ZEV-E-S | 16x5Rx3-3 | 0 | 0 | T10 | R | 83K122 | 00K160 | 550 | 0 | 1 |
| ZEV-E-S | 16x10Rx3-3 | 0 | 0 | T10 | R | 83K122 | 00K160 | 550 | 0 | 1 |
| ZEV-E-S | 20x5Rx3-4 | 0 | 0 | T10 | R | 81K122 | 00K200 | 550 | 0 | 1 |



| Nut Dimensions (mm) | | | | | | | | Backlash (mm) |
|-----------------------|----------------|----------------|----------------|--------------------------|----------------|-----------------|-----|---------------|
| D ₁ h10 | D ₄ | D ₈ | G ₁ | L _{Mut} ±0,3 | L ₇ | L ₁₅ | | |
| 25,5 | 2,7 | 3,2 | M20 x 1 | 36 | 8,5 | 10 | 0,1 | |
| 25,5 | 2,7 | 3,2 | M20 x 1 | 40 | 8,5 | 10 | 0,1 | |
| 32,5 | 2,7 | 4,2 | M26 x 1,5 | 40 | 10,5 | 12 | 0,1 | |
| 32,5 | 2,7 | 4,2 | M26 x 1,5 | 54 | 10,5 | 12 | 0,1 | |
| 38 | 2,7 | 8 | M35 x 1,5 | 50 | 12,5 | 14 | 0,1 | |

| Size | Form | Version | Screw Dimensions (mm) | | | | | | | | | | | | | | | |
|------|------|---------|-----------------------|------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|-----|----------------|----------------|-----|----------------|----------------|
| | | | d ₀ | P | d ₁ | d ₂ | L _{ZF} | D _R | L _R | D _F | L _F | D ₁ | DT1 | L ₁ | D ₂ | DT2 | L ₂ | G ₁ |
| 12 | 5 | 83 | 121 | 11,4 | 9,9 | 60 | 15 | 15 | 9,5 | 8 | 12 | h6 | 17 | 10 | h7 | 25 | M12x1 | 18 |
| 12 | 10 | | 121 | 11,4 | 9,9 | 60 | 15 | 15 | 9,5 | 8 | 12 | h6 | 17 | 10 | h7 | 25 | M12x1 | 18 |
| 16 | 5 | | 122 | 15,0 | 12,9 | 60 | 15 | 15 | 12,5 | 8 | 12 | h6 | 17 | 10 | h7 | 25 | M12x1 | 18 |
| 16 | 10 | | 122 | 15,0 | 12,9 | 60 | 15 | 15 | 12,5 | 8 | 12 | h6 | 17 | 10 | h7 | 25 | M12x1 | 18 |
| 20 | 5 | 81 | 122 | 19,0 | 16,9 | 60 | - | - | - | - | 12 | h6 | 17 | 10 | h7 | 25 | M12x1 | 18 |

Ball Screw Assemblies

With Single Nut with Flange

ECO-Line

Single Nut FBZ-E-S with Flange with Rexroth mounting dimensions

with seals

with backlash

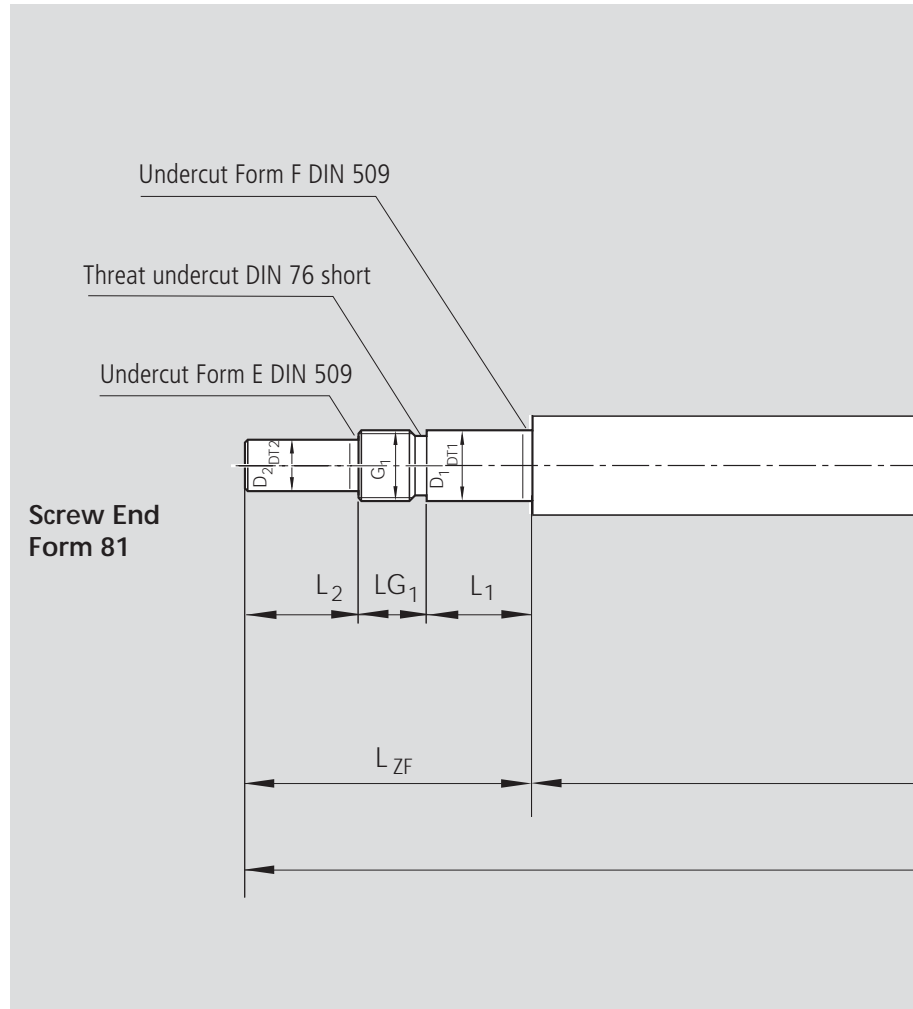
Screw tolerance class T10

d_0 = Nominal diameter

P = Lead (R=Right, L=Left)

D_w = Ball diameter

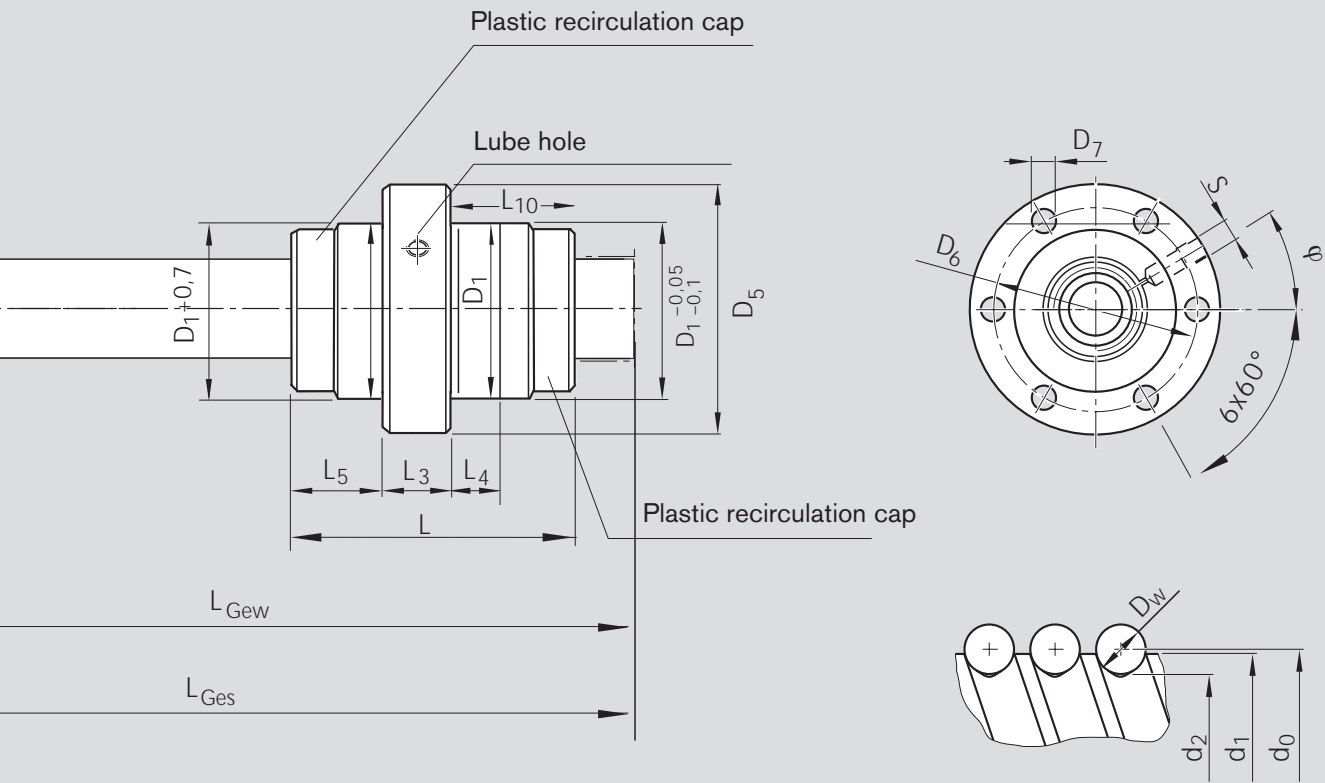
i = No. of turns



| Size $d_0 \times P \times D_w - i$ | Part number | Basic load rating | | Max. Speed v_{max} [m/min] | L_{Ges} | L_{Gew} | |
|---------------------------------------|-------------|-------------------|-----------------------|------------------------------------|-----------|-----------|--|
| | | dyn. C (N) | stat. C_0 (N) | | | | |
| 20 x 5R x 3 - 4 | 2540-000-06 | 8600 | 12900 | 20 | 550 | 490 | |
| 25 x 5R x 3 - 4 | 2540-000-07 | 9500 | 16300 | 16 | 700 | 640 | |
| 25 x 10R x 3 - 4 | 2540-000-08 | 9400 | 16200 | 32 | 700 | 640 | |
| 32 x 5R x 3,5 - 4 | 2540-000-09 | 13000 | 24000 | 13 | 1200 | 1120 | |
| 32 x 10R x 3,969 - 5 | 2540-000-10 | 19000 | 35000 | 25 | 1200 | 1120 | |

Ordering Code

| | | | | | | | | | | |
|---------|----------------|---|---|-----|---|--------|--------|------|---|---|
| FBZ-E-S | 20x5Rx3-4 | 1 | 0 | T10 | R | 81K122 | 00K200 | 550 | 0 | 1 |
| FBZ-E-S | 25x5Rx3-4 | 1 | 0 | T10 | R | 81K151 | 00K250 | 700 | 0 | 1 |
| FBZ-E-S | 25x10Rx3-4 | 1 | 0 | T10 | R | 81K151 | 00K250 | 700 | 0 | 1 |
| FBZ-E-S | 32x5Rx3,5-4 | 1 | 0 | T10 | R | 81K204 | 00K320 | 1200 | 0 | 1 |
| FBZ-E-S | 32x10Rx3,969-5 | 1 | 0 | T10 | R | 81K204 | 00K320 | 1200 | 0 | 1 |



Nut Dimensions (mm)

| D_1 | D_5 | D_6 | D_7 | L $\pm 0,5$ | L_3 | L_4 | L_5 | L_{10} | S | ϕ (°) |
|-------|-------|-------|-------|------------------|-------|-------|-------|----------|----|---------------|
| 33 | 58 | 45 | 6,6 | 40 | 10 | 6 | 15 | 15 | M6 | 30 |
| 38 | 63 | 50 | 6,6 | 43 | 10 | 6 | 16,5 | 16,5 | M6 | 30 |
| 38 | 63 | 50 | 6,6 | 62 | 10 | 16 | 16 | 36 | M6 | 30 |
| 48 | 73 | 60 | 6,6 | 46 | 12 | 6 | 17 | 17 | M6 | 30 |
| 48 | 73 | 60 | 6,6 | 77 | 12 | 16 | 20 | 45 | M6 | 30 |

Screw Dimensions (mm)

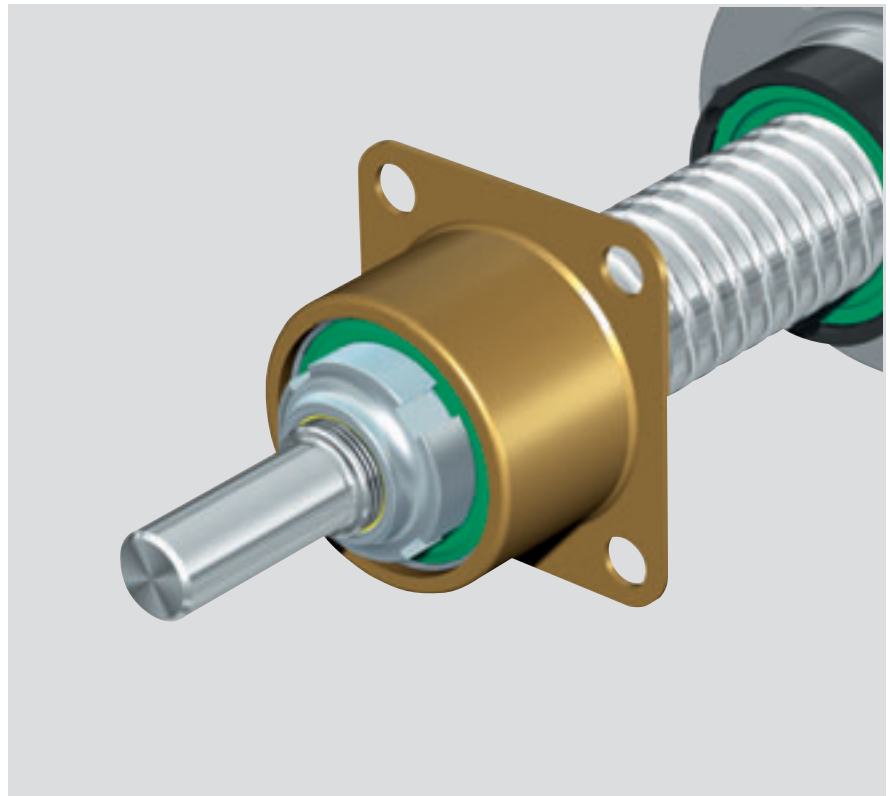
| Size | | Form | Version | Screw Dimensions (mm) | | | | | | | | | | | | | | | |
|-------|----|------|---------|-----------------------|-------|----------|-------|-------|-------|-------|-------|-----|-------|-------|-----|-------|-------|-----------------|--|
| d_0 | P | | | d_1 | d_2 | L_{ZF} | D_R | L_R | D_F | L_F | D_1 | DT1 | L_1 | D_2 | DT2 | L_2 | G_1 | LG ₁ | |
| 20 | 5 | 81 | 122 | 19,0 | 16,9 | 60 | - | - | - | - | 12 | h6 | 17 | 10 | h7 | 25 | M12x1 | 18 | |
| 25 | 5 | | 151 | 24,0 | 21,9 | 60 | - | - | - | - | 15 | h6 | 19 | 12 | h7 | 25 | M15x1 | 16 | |
| 25 | 10 | | 151 | 24,0 | 21,9 | 60 | - | - | - | - | 15 | h6 | 19 | 12 | h7 | 25 | M15x1 | 16 | |
| 32 | 5 | | 204 | 31,0 | 28,4 | 80 | - | - | - | - | 20 | h6 | 25 | 18 | h7 | 40 | M20x1 | 15 | |
| 32 | 10 | | 204 | 31,0 | 27,9 | 80 | - | - | - | - | 20 | h6 | 25 | 18 | h7 | 40 | M20x1 | 15 | |

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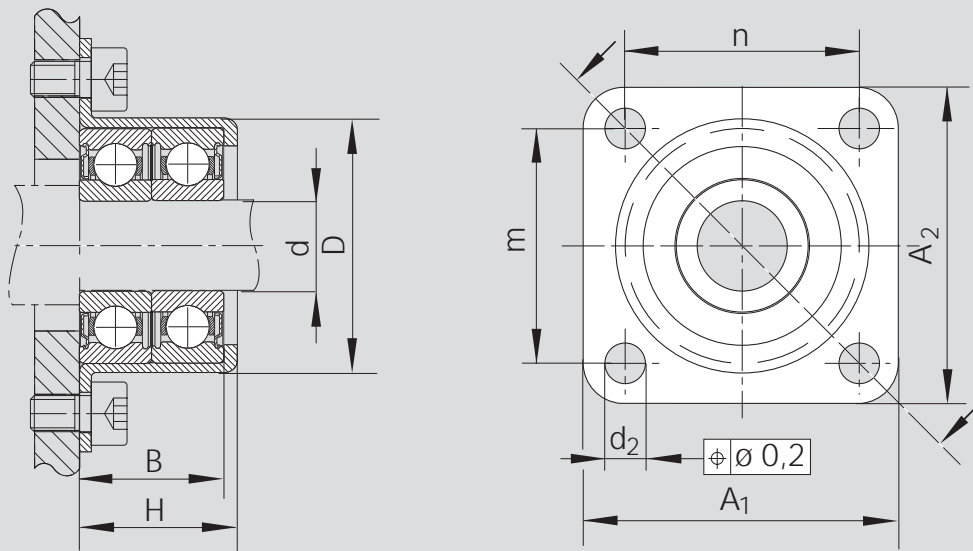
Bearing LGL

Fixed bearing with Angular-contact thrust ball bearing LGL

Suitable for Screw End
Forms on page 4-7



| Size | Angular-contact thrust ball bearing | | | | Slotted Nut | |
|--------------------|-------------------------------------|-------------|--------------------------------|-------|-------------|-------------|
| | Part number | Designation | Load ratings (axial) | | Designation | Part number |
| dyn. C (N) | | | stat. C ₀ (N) | | | |
| d ₀ x P | | | | | | |
| 12x5/10 | 8414-040-06 | LGL-A-1244 | 13200 | 17900 | NMG 12x1 | 8446-002-02 |
| 16x5/10 | 8414-040-06 | LGL-A-1244 | 13200 | 17900 | NMG 12x1 | 8446-002-02 |
| 20x5 | 8414-040-06 | LGL-A-1244 | 13200 | 17900 | NMG 12x1 | 8446-002-02 |
| 25x5/10 | 8414-041-06 | LGL-A-1547 | 16400 | 22400 | NMG 15x1 | 8446-011-02 |
| 32x5 | 8414-042-06 | LGL-A-2060 | 27500 | 40000 | NMG 20x1 | 8446-005-02 |



| Dimensions (mm) | | | | | | | | | | Weight bearing |
|-----------------|---------------------|----------------|----------------|----|----|----|----|----------------|--|----------------|
| d | D +0,03 -0,01 | A ₁ | A ₂ | n | m | H | B | d ₂ | | (kg) |
| 12 | 35,45 | 44 | 50 | 32 | 38 | 22 | 20 | 6,6 | | 0,12 |
| 12 | 35,45 | 44 | 50 | 32 | 38 | 22 | 20 | 6,6 | | 0,12 |
| 12 | 35,45 | 44 | 50 | 32 | 38 | 22 | 20 | 6,6 | | 0,12 |
| 15 | 38,45 | 47 | 51 | 35 | 39 | 24 | 22 | 6,6 | | 0,14 |
| 20 | 50,45 | 60 | 60 | 47 | 47 | 30 | 28 | 6,6 | | 0,30 |

Ball Screw Assemblies

Acceptance Conditions and Tolerance Grades

Permissible travel deviation

similar to DIN 69 051, Part 3
and ISO 3408-3

Symbol definitions

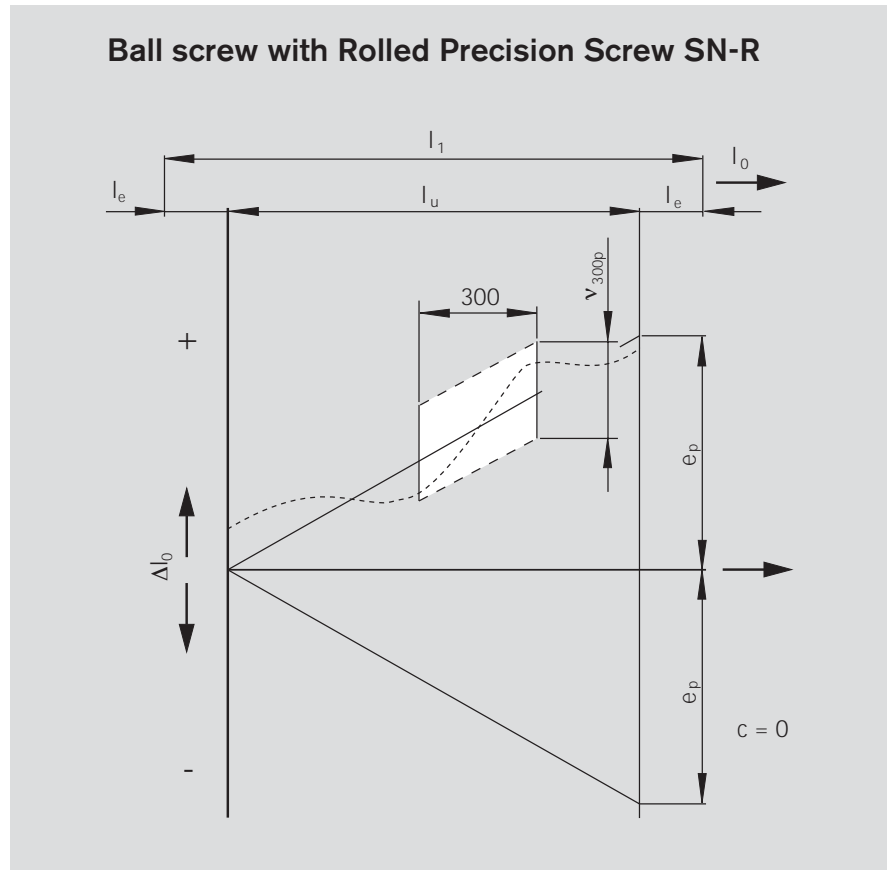
- l_0 = Nominal travel
- l_1 = Thread length
- Δl_0 = Travel deviation
- l_u = Useful travel
- l_e = Excess travel
- c = Travel compensation for useful travel, defined by use (standard: $c = 0$)
- e_p = Tolerance for actual mean travel deviation
- v_{up} = Permissible travel variation within useful travel l
- v_{300p} = Permissible travel deviation within 300 mm travel
- $v_{2\pi p}$ = Permissible travel deviation within 1 revolution

Subindices:

- p = Permissible
- a = Actual

Improved values

Values are more accurate than those defined in DIN 69 051, Part 3 and ISO 3408-3 (tolerance reduced by half).



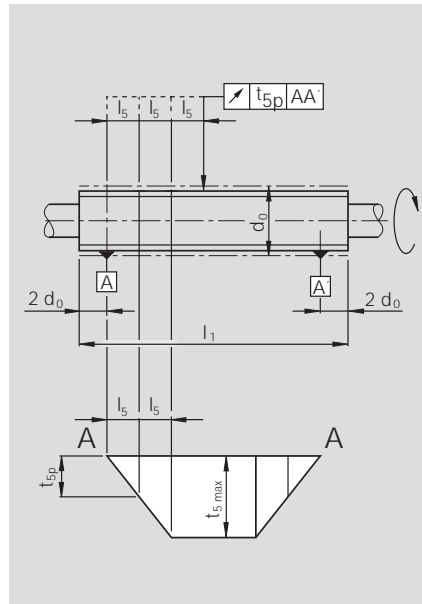
Tolerance grade T10

$$e_p = \frac{l_u}{300} \cdot v_{300p} \quad v_{300p} = 210 \mu\text{m}$$

Run-outs and location deviations

based on DIN 69 051, Part 3 and ISO 3408-3

Radial run-out t_5 of the outer diameter of the ball screw shaft over the length l_5 used to determine the straightness in relation to AA'.

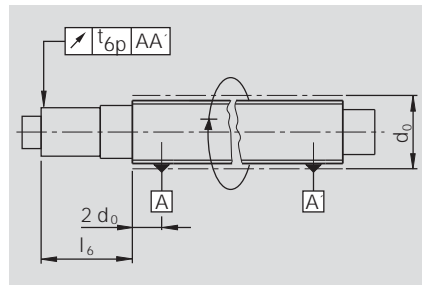


| d_0 | | l_5 | t_{5p} in μm for tolerance grade 10 |
|------------|-----------|-------|--|
| über above | bis up to | | |
| = 6 | 12 | 80 | 80 |
| 12 | 25 | 160 | 80 |
| 25 | 50 | 315 | 80 |
| 50 | 100 | 630 | 80 |
| 100 | 200 | 1250 | 80 |

| l_1/d_0 | | t_{5max} in μm for $l_1 \geq 4l_5$ for tolerance grade 10 |
|-----------|-------|--|
| above | up to | |
| | 40 | 160 |
| 40 | 60 | 240 |
| 60 | 80 | 400 |
| 80 | 100 | 640 |

Radial run-out t_6 of the bearing diameter in relation to AA' for $l_6 \leq l$.

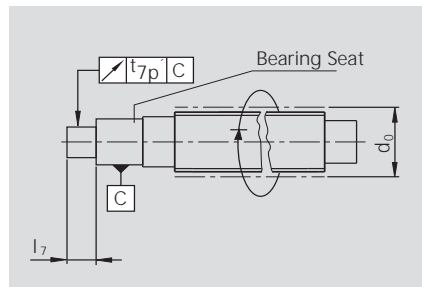
Where $l_6 > l$ then $t_{6a} \leq t_{6a} \cdot \frac{l_{6a}}{l}$



| Nominal diameter d_0 | | Ref. length l | t_{6p} in μm for $l_6 \leq l$ for tolerance grade 10 |
|------------------------|-------|-----------------|---|
| above | up to | | |
| 6 | 20 | 80 | 40 |
| 20 | 50 | 125 | 50 |
| 50 | 125 | 200 | 50 |
| 125 | 200 | 315 | 50 |

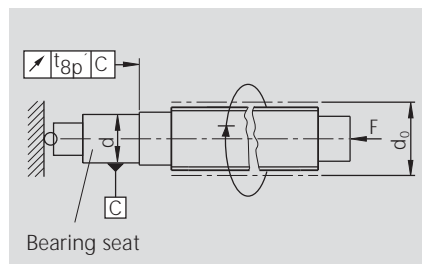
Coaxial deviation t_7 of the journal diameter of the ball screw shaft in relation to the bearing diameter for $l_7 \leq l$.

Where $l_7 > l$ then $t_{7a} \leq t_{7a} \cdot \frac{l_{7a}}{l}$



| Nominal diameter d_0 | | Ref. length l | t_{7p} in μm for $l_7 \leq l$ for tolerance grade 10 |
|------------------------|-------|-----------------|---|
| above | up to | | |
| = 6 | 20 | 80 | 12 |
| 20 | 50 | 125 | 12 |
| 50 | 125 | 200 | 16 |
| 125 | 200 | 315 | 25 |

Axial run-out t_8 of the shaft (bearing) face of the ball screw shaft in relation to the bearing diameter.



| Nominal diameter d_0 | | t_{8p} in μm for tolerance grade 10 |
|------------------------|-------|--|
| above | up to | |
| = 6 | 63 | 10 |
| 63 | 125 | 12 |
| 125 | 200 | 16 |

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