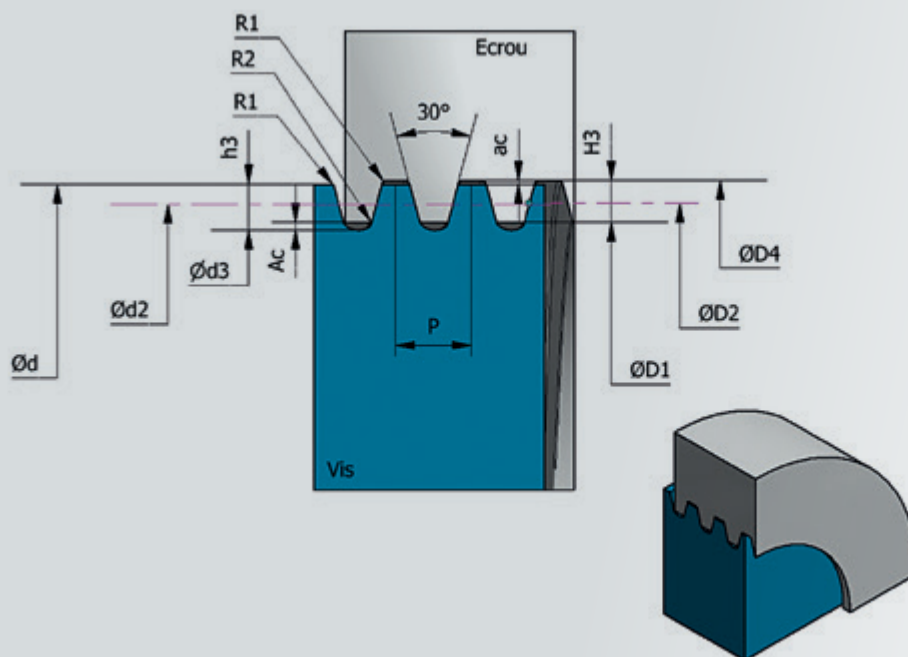


TRAPEZOIDAL NUTS AND SCREWS

Our threaded rods with trapezoidal threads are manufactured using a cold working (rolling) process, in accordance with ISO 2901/2902 and DIN103 with 7e tolerance.

The nut threads are created by chip removal. Thanks to our extensive range, we offer high-performance and reliable products that are perfectly suited to meet market demand.

DEFINITION OF THE TRAPEZOIDAL PROFILE



$\varnothing d$ = nominal diameter of the thread

P = threading pitch

$\varnothing d2 = d - 0.5P$

$\varnothing d3 = d - 2h3 = d - p - 2Ac$

ac = thread root clearance values

$Ac = ac + 0.075P$

(in the case of a rolled thread)

$h3 = 0.5P + Ac = 0.5P + ac + 0.075P$

$H3 = 0.5P + ac$

$\varnothing D1 = d - P$

$\varnothing D2 = d - 0.5P$

$\varnothing D4 = d + 2ac$

$R1 \text{ max} = 0.5ac$

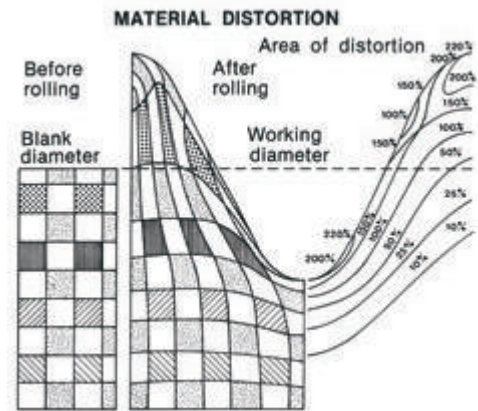
$R2 \text{ max} = ac$

SCREWS

The roller burnished sides create an excellent surface that:

- increases the lifespan of the nuts by reducing abrasion.
- increases efficiency by reducing friction.
- improves movement fluidity by reducing vibrations.

The process allows also a high production rate and significant savings in terms of material used.



Our offer includes three product ranges:

TR a precision range in C35 (1.0501) or C45 (1.0503)

Appreciated for its excellent rectitude and pitch precision features, and for its high resistance. We keep single left and right threads and double right threads in lengths of 3 meters up to and including Ø28, and in lengths of 6 meters for larger diameters.

TR-C15 a standard range in C15 (1.0401)

For simple and cost effective applications. This range is available exclusively in single right thread, in a length of 3 meters.

TRI a stainless steel range in AISI 316L (1.4404)

We keep single left and right threads and double right threads in lengths of 3 meters up to and including Ø28, and in lengths of 6 meters for larger diameters. This range features improved corrosion resistance compared with common stainless steels, such as 1.4301, 1.4305, etc.

NUTS

Our offer includes three material ranges:



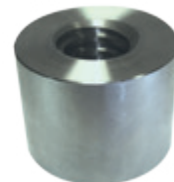
- **Nuts made of CuSn7ZnPb bronze.**

Used for manual or motorised drives with low to medium speeds and for use under heavy loads. Combination with steel or stainless steel screws provides good results, especially with adequate lubrication.



- **Nuts made of PA6.6 plastic.**

Used for manual or motorised drives with low to medium speeds and for use under moderate loads. Combination with steel or stainless steel screws provides good results, and reduced noise. These nuts can be used without lubrication, although this will shorten their lifespan.



- **Nuts made of stainless steel 11SMnPb37 (1.0737) or 11SMn37 (1.0736).**

Used for manual or motorised drives with low speeds, for tightening or blocking functions, or for static loads. Use with stainless steel screws is not advised.

PITCH PRECISION

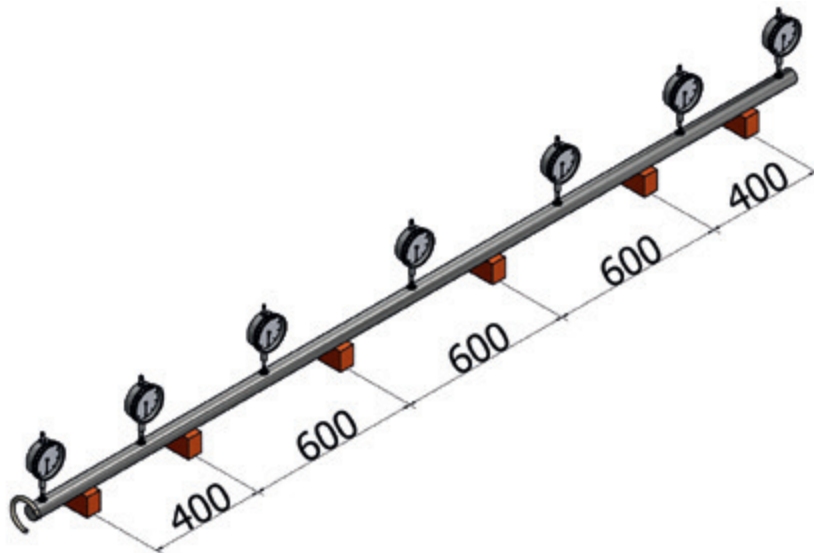
The precision of our screws is measured in microns for 300 mm of thread. This value is applicable as \pm in relation to the theoretical value.

Example : for a class 50 screw, the actual measured value of the pitch is included between 299.95 and 300.05

STRAIGHTNESS

Our screws are produced with straightness controls. This feature is measured according to the protocol given below. For one bar revolution, the maximum deviation is equal to \pm the declared rectitude value. Effective straightness features remove vibrations and permit use at higher speeds.

Example: for a given reference with a rectitude of 0.5, the value measured on each comparator, spaced as shown in the figure, must be less than 1mm for a full revolution of the bar.



LUBRICATION

The screw and nut system must be lubricated as often as possible. In principle, the system must be lubricated every 500 cycles. Obviously, this interval and the quality of lubricant must be adjusted to suit the application and the system's working environment.

We recommend you clean and grease the screw to ensure optimum lubrication:

- When it is dirty.
- Yearly, under normal operating conditions.
- Every 2 years, if used in a clean environment.

For standard use in a normal environment, use KP2K-30-type grease in accordance with DIN 51502.

This quality must be checked for each application.

Quantity of grease required for initial lubrication or after the screw has been thoroughly cleaned.
Provided for information only.

| Ø | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 36 | 40 | 44 | 50 | 60 | 70 | 80 | 100 | 120 | 140 | 160 |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Quantity (ml/m) | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 | 48 | 54 | 60 | 66 | 75 | 90 | 105 | 120 | 150 | 180 | 210 | 240 |

Less grease required for maintenance lubrication.

ORDER

All of our screws can be delivered, cut to a specified length. Unless specifically requested, the bars are delivered rough-cut with standard rectitude. We can deliver chamfered and/or straightened bars on request.

For all requests outside reference lengths and outside standard manufacturing characteristics, a preliminary costing is required.

According to your needs, we can also machine the ends of the screws or perform additional operations on our standard nuts.

SIZING THE SCREW/NUT SET

The load applied to the nut/screw set depends on the materials used, surface states, lubrication, frequency of use, speed, etc. Force is transferred from the screw to the nut through sliding friction, and a proportion of this force is transformed into heat. It is therefore important to size the system properly to reduce these losses. Contact pressure on the thread must be as low as possible to ensure the screw and nut function efficiently, while preventing premature wear and overheating (long-lasting lubrication).

The following calculations are used to correctly define the diameter of the screw and nut based on axial loads, speeds and assembly types.

CALCULATIONS

| | | |
|---|---|--|
| SLIDING SPEED | $V_g = \frac{N \cdot D_2 \cdot \pi}{60000}$ | V _g = sliding speed in m/s N = screw speed in rpm D ₂ = diameter on side of the screw in mm |
| NUT SPEED | $V = \frac{N \cdot P}{60}$ | V = linear nut speed in m/s N = screw speed in rpm P = pitch of the system in mm |
| NUT LENGTH | $L_1 = \frac{F \cdot P}{P_z \cdot D_2 \cdot \pi \cdot H_1 \cdot n}$ | L ₁ = nut length in mm F = total axial load in N P = pitch of the system in mm P _z = contact pressure in N/mm² (see table) H ₁ = contact height on the side in mm (≈ 0.5.P) n = number of threads |
| CONTACT PRESSURE ACCORDING TO THE LENGTH OF THE NUT | $P_z = \frac{F \cdot P}{L_1 \cdot D_2 \cdot \pi \cdot H_1 \cdot n}$ | P _z = contact pressure in N/mm² F = total axial load in N P = pitch of the system in mm L ₁ = nut height in mm D ₂ = diameter on the side of the screw in mm H ₁ = contact height on the side in mm (= 0.5.P) n = number of threads |
| HELIX ANGLE | $\tan \alpha = \frac{P}{D_2 \cdot \pi}$ | α = helix angle of the thread in ° P = pitch in mm D ₂ = diameter on the side of the screw in mm |

The acceptable contact pressure depends on the sliding speed and the material of the nut. The table shown below lists standard values for our nuts. For other materials, use 10 N/mm² as the standard value.

| Material | Sliding speed (m/s) | P _z (N/mm ²) |
|-----------|---------------------|-------------------------------------|
| Steel | 1.5 | 10 |
| Bronze | 1.5 | 10 |
| Polyamide | 0.6 | 1 |

| | | |
|------------------------|---------------------|---|
| FRICITION ANGLE | $\tan \rho = \mu G$ | ρ = friction angle in ° μG = see table below |
|------------------------|---------------------|---|

| | | | | |
|----------------------|---------------------|---------------------------|------------|--|
| REVERSIBILITY | Nut material | μG | | <p>The system cannot be inverted if $\alpha < \rho$</p> <p>The values can be changed lubrication, contact surface states, etc.</p> |
| | | dry | lubricated | |
| | Steel | 0.15 | 0.10 | |
| | Bronze | 0.10 | 0.05 | |
| | Polyamide | 0.10 | 0.05 | |

| | | |
|-------------------|--|--|
| EFFICIENCY | $\eta = \frac{\tan \alpha}{\tan (\alpha + \rho)}$ | η = efficiency of a translational rotational motion α = helix angle ρ = friction angle |
| | $\eta' = \frac{\tan (\alpha - \rho)}{\tan \alpha}$ | η' = efficiency of a translational rotational motion α = helix angle ρ = friction angle |

| | | |
|---------------------|--|---|
| DRIVE TORQUE | $M_a = \frac{F \cdot P}{2000 \cdot \pi \cdot \eta}$ | M_a = drive torque (converted from translational rotation) in Nm F = total axial load in N P = pitch of the system in mm η = efficiency of a translational rotational motion |
| | $M_e = \frac{F \cdot P \cdot \eta'}{2000 \cdot \pi}$ | M_e = drive torque (converted from translational rotation) in Nm F = total axial load in N P = pitch of the system in mm η' = efficiency of a translational rotational motion |

CRITICAL SPEED

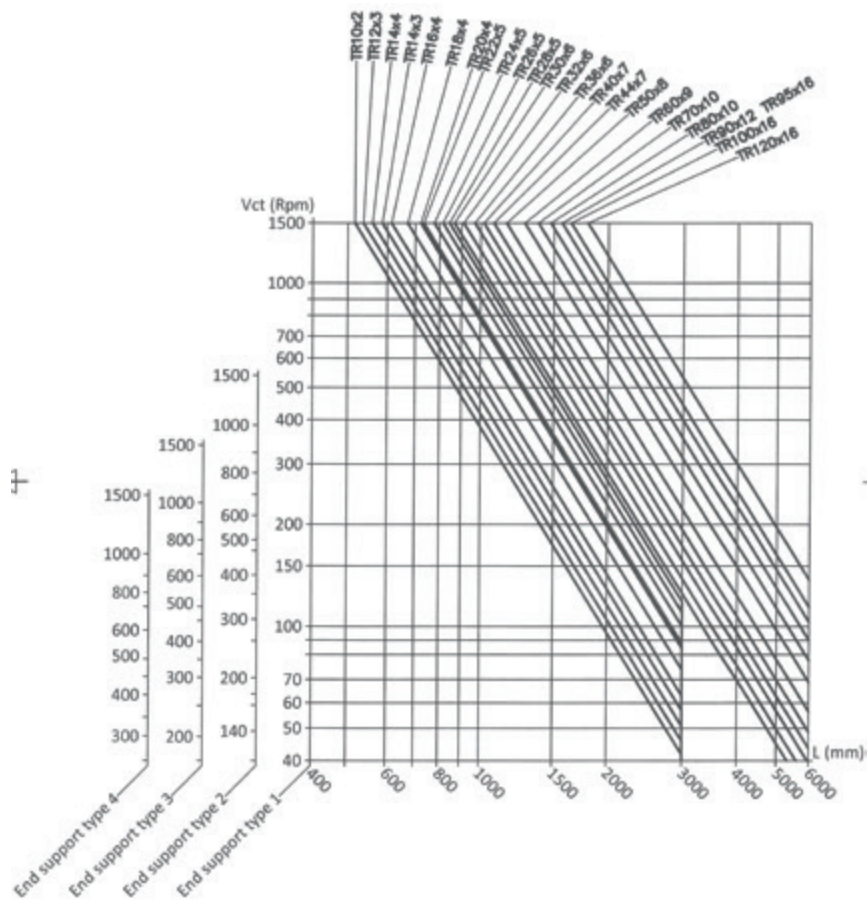
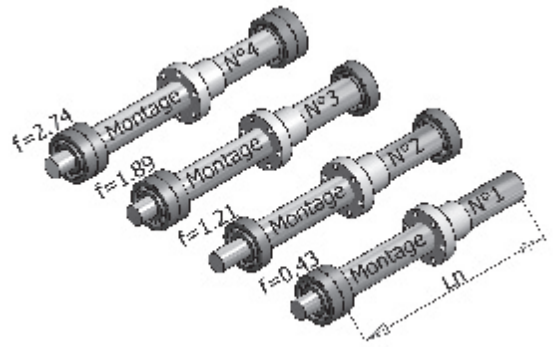
When rotating, the screws are subjected to axial loads and vibration. These depend on the free length of the screw, the assembly direction and the direction of the force (traction or compression). In the later case, a buckling calculation verification is required.

$$V_{ct} = \frac{D_3}{L^2} \cdot 1,1 \cdot 10^8$$

V_{ct} = critical speed in rpm
 D_3 = diameter of the screw core in mm
 L = screw length in mm

$$V_{adm} = V_{ct} \cdot 0,8 \cdot f$$

V_{adm} = corrected acceptable speed in rpm
 V_{ct} = critical speed in rpm
 f = correction factor due to the nature of the supports



BUCKLING

When a screw is working under compression, the effect of buckling increases in proportion to the screw length/ \varnothing ratio. It is therefore important to determine the diameter of the screw correctly, depending on load.

$$F_{cp} = \frac{21 \cdot 10^4 \cdot D_3^4 \cdot \pi^3 \cdot f}{64 \cdot L_{cp}^2}$$

F_{cp} = maximum acceptable axial compression force on the nut in N
 D_3 = thread root diameter of the screw in mm
 f = buckling correction factor due to the nature of the supports
 L_{cp} = length of the screw subject to compression in mm

