

## Installation

### Delivery condition

Normally, Rexroth ball screws are supplied initially greased with Dynalub grease. This makes possible relubrication using oil or grease, and cartridges and cans of this grease are available. If another lubricant is used, you will need to check that it is compatible with the initial lubrication grease. In special cases, a Ball Screw Assembly with only a preservative coating can be ordered and supplied using the appropriate ordering code.

#### Note

The selected lubricant must be in the nut before the machine is started.

### Cleaning

Various cleaning agents can be used to degrease and wash the assembly:

- aqueous cleaning agents
- organic cleaning agents

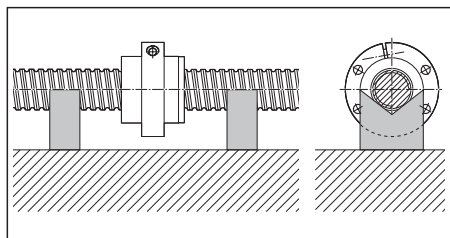
#### Note

Immediately after cleaning, thoroughly dry all parts and apply a preservative coating or anti-corrosion oil.

In all cases, take care to observe the appropriate legal regulations (environmental protection, health and safety at work, etc.) as well as the specifications for the cleaning agent (e.g. handling).

### Storage

Ball Screw Assemblies are high-quality systems that must be treated with due care. In order to prevent damage and contamination, the elements should not be removed from the protective wrapping until immediately before installation. Once they have been removed from the packaging, they must be set down on V-shaped cradles.



### Nut mounting

#### Preloaded single nut double nut

These versions are always supplied on the ready-mounted nut unit on the screw. You must not disassemble the nut unit and the screw. If this is unavoidable, please contact us.

**Note:** In the case of Ball Screw Assemblies with a front lube unit, do not rotate the nut and the front lube unit from the screw.

#### Single nut with standard backlash

#### Single nut with reduced backlash

#### Adjustable-preload single nut

You must only mount the nut unit on an end-machined screw using a mounting arbor. The screw journal is then used to center the mounting arbor. In the case of screw ends of Form "00", you can use a centering bore "Z" on the end face to place an auxiliary spigot in position for mounting. The external diameter of the arbor should be approximately 0.1 mm less than the root diameter of the screw. In most cases, you can use the supplied arbor with nut units. The start of the screw's thread must be rounded off carefully to avoid damage to the seal and the individual inner parts of the nut unit.



The individual mounting steps are described below.

Disassembly is carried out in the reverse order. Be particularly careful; otherwise, the nut or its individual internal parts could be damaged, which would lead to premature failure of the Ball Screw Assembly.

### Individual mounting steps

Carry out installation as follows:

Remove the retaining ring (➡ mounting instructions) on one side of the mounting arbor.



Push the mounting arbor with the nut to the start of the thread.

The arbor must be in contact on an axially backlash-free basis.

Now, carefully turn the nut unit onto the thread with slight axial pressure.



Do not remove the mounting arbor until the nut unit is located completely on the screw thread.



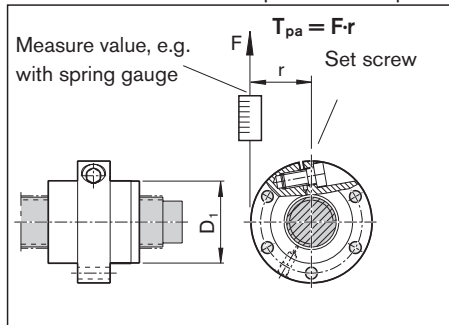
### Preloading of the adjustable-preload single nut

Measuring of the dynamic drag torque with SEM-E-S and SEM-E-C.

Use an adjusting screw to restrict the clearance of the nut that is ready-mounted on the screw such that the dynamic drag torque  $T_{p0}$  achieves the value in the table ➔ page 148 (with the Ball Screw Assembly lightly oiled).

You must carry out the inspection across the entire length of the thread; if the values are different from the ones in the table, correct the setting.

After you make the setting, the centering diameter  $D_1$  must match the values in the tables ➔ page 38 and 40. Cover the head of the screw with a protective cap.



$T_{pa}$  = currently measured dynamic drag torque

Assembly instructions are included with each delivery. If you need additional copies, please ask us.

### Installation in the machine

It is not normally necessary to remove the preservative coating before installation.

- If the Ball Screw Assembly is contaminated, you must clean it first (see “Cleaning”) and re-oil it
- Push the nut unit into the mounting bore, taking care to avoid any impact force or misalignment.
- Tighten the mounting screws using a torque wrench if necessary. Maximum tightening torque for the steel/steel material pairing ( $R_m \geq 370 \text{ N/mm}^2$ ), see table.

Steel/steel material pairing			
Screw diameter (mm)	Tightening torque (Nm)		
	Strength classes as per DIN ISO 898		
	8.8	10.9	12.9
M3	1.3	1.8	2.1
M4	2.7	3.8	4.6
M5	5.5	8.0	9.5
M6	9.5	13.0	16.0
M8	23.0	32.0	39.0
M10	46.0	64.0	77.0
M12	80.0	110.0	135.0
M14	125.0	180.0	215.0
M16	195.0	275.0	330.0
M18	280.0	400.0	470.0
M20	390.0	560.0	650.0

- The maximum tightening torques specified in the table below apply to the steel/aluminum or aluminum/aluminum material pairings ( $R_m \geq 280 \text{ N/mm}^2$ ). When driving screws into aluminum, the length of thread engagement should be at least 1.5 times the screw diameter.

### Mounting screws

**⚠ Always make sure the screws are secure where there are high screw loads!**

Steel/aluminum and aluminum/aluminum material pairings			
Screw diameter (mm)	Tightening torque (Nm)		
	Strength classes as per DIN ISO 898		
	8.8	10.9	12.9
M3	1.2	1.2	1.2
M4	2.4	2.4	2.4
M5	4.8	4.8	4.8
M6	8.5	8.5	8.5
M8	20.0	20.0	20.0
M10	41.0	41.0	41.0
M12	70.0	70.0	70.0
M14	110.0	110.0	110.0
M16	175.0	175.0	175.0
M18	250.0	250.0	250.0
M20	345.0	345.0	345.0

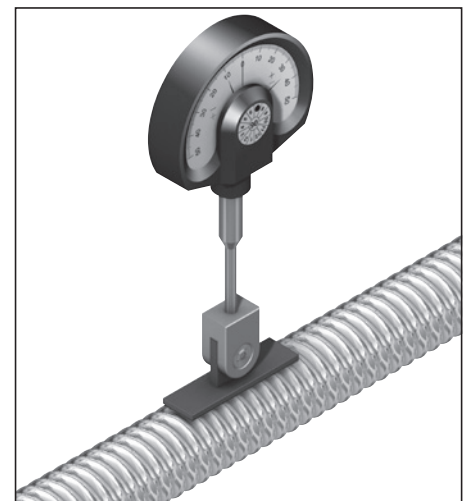
Tightening torques for fastening screws according to VDI 2230 where  $\mu_G = \mu_K = 0.125$

### Aligning the Ball Screw Assembly in the machine

A gauge<sup>1)</sup> with a self-aligning contact pad is available from Rexroth for easy alignment of the Ball Screw Assembly.

Two pads of different lengths are available which can be used depending on the screw lead:

- Part number R3305 131 19 length 33 mm for leads < 20
- Part number R3305 131 21 length 50 mm for leads > 20



1) The dial gauge is not supplied

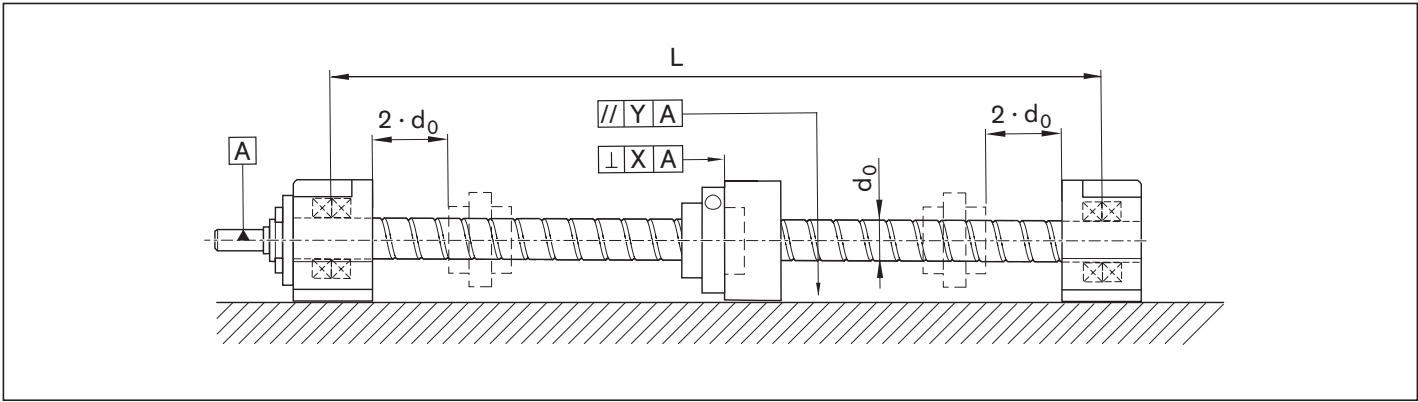
Installation Tolerances

⚠ Note

Any alignment errors can lead to premature failure of the Ball Screw Assembly, which means that they are not allowed!

To ensure that a BASA can actually achieve the calculated service life and performance, its system-related requirements and limitations must be taken into account at the design stage. Screw assemblies are not suitable for transferring radial forces and torques, such as may be caused by misalignments during installation. The following sections illustrate the most important principles for achieving designs that will be compatible with the screw drive system and its requirements.

When using BASAs, the specified installation tolerances must be observed when designing and building the adjoining structures. The first basic principle is: The higher the BASA's precision and preload, the more accurate the adjoining structures must be. This applies in particular to applications in which the nut travels close up to the end bearings since, in this area, the risk of distortive stresses and therefore of additional loads is very high.



Parallelism offset and details of the rectangularity between the screw shaft axis and the location face of the nut housing.

- L = distance between end bearings (mm)
- d<sub>0</sub> = nominal diameter of screw (mm)
- X = permissible deviation from rectangularity:  
The tolerance applies to a surface that must lie between two planes spaced at a distance X from each other which are perpendicular to the reference axis A. (mm)
- Y = Permissible parallelism offset between the guide and the Ball Screw Assembly (mm)

The adjacent table shows the most important recommended tolerances for Ball Screw Assemblies as a function of the preload.

These tolerances include the rectangularity of the nut housing (or adjoining structure) relative to the screw axis. The tolerances for parallelism between the guide and the Ball Screw Assembly must also be complied with.

Minimum distance of the nut from the end bearings > 2 • d<sub>0</sub>

Any alignment errors can lead to premature breakdown of the Ball Screw Assembly!

Preload option	X (mm)	Y (mm)
Backlash	0.04	0.04
Preloaded	0.02	0.02