

Direct Drive Linear Actuators

Technical Information



Lead Screws and Options

Technical Information

Lead screws parameters

Resolution (travel/step)

A lead screw combined with a stepper motor can achieve a positioning with a resolution of 10µm.

The resolution of the position depends on the pitch and number of steps per revolution:

$$P = \frac{P_h}{n}$$

With P_h the pitch of the screw and n the number of steps per revolution of the motor.

Driving the motor with half-stepping or microstepping will improve the resolution up to a certain extent.

The resolution must be balanced with another parameter: the precision.

Precision

The motor step angle accuracy is one parameter, together with the axial play between the nut and the lead screw, influencing the precision of the linear displacement. It varies between ± 3 and $\pm 10\%$ of a full step angle depending on the motor model (see line 9 on motor datasheet) and remains the same with microstepping. It is however not cumulative.

Axial play

An axial play up to 30µm is measured with optional nuts offered in this catalogue. However, it is possible to negate the axial play by implementing a preloading system in the design of the application (for instance with a spring mechanism).

The "zero" axial play between the lead screw and motor housing is ensured thanks to a preload of the motor ball bearings (in standard configuration: spring washer on rear ball bearing). An axial play up to 0.2 mm will occur if the axial load on the lead screw exceeds the ball bearing preload.

This does not cause any damage to the motor and is reversible. This occurs only while pulling on the shaft. On request, customization can overcome this limitation.

To avoid irreversibly damaging the motor, the maximum axial load should always remain under the maximal push force the motor can generate with a mounted lead screw.

Lead Screw

Linear actuation for positioning tasks

Series M1,2 x 0,25 x L1

Ordering information	L1 (mm) =
Order code (no bearing tip)	
Order code (with bearing tip)	
Nominal diameter	12
Pitch	
Material	

Backdriving

Backdriving the motors while applying an axial load on the lead screws is impossible. The pitch vs. diameter ratio does not allow it.

Force vs speed curves

The force that a linear system can provide depends on the type of screw and stepper motor selected. Torque vs speed curves for each solution are provided in this catalogue. Those curves do already consider a 40% safety factor on the motor torque as well as a conservative lead screw efficiency in the calculation.

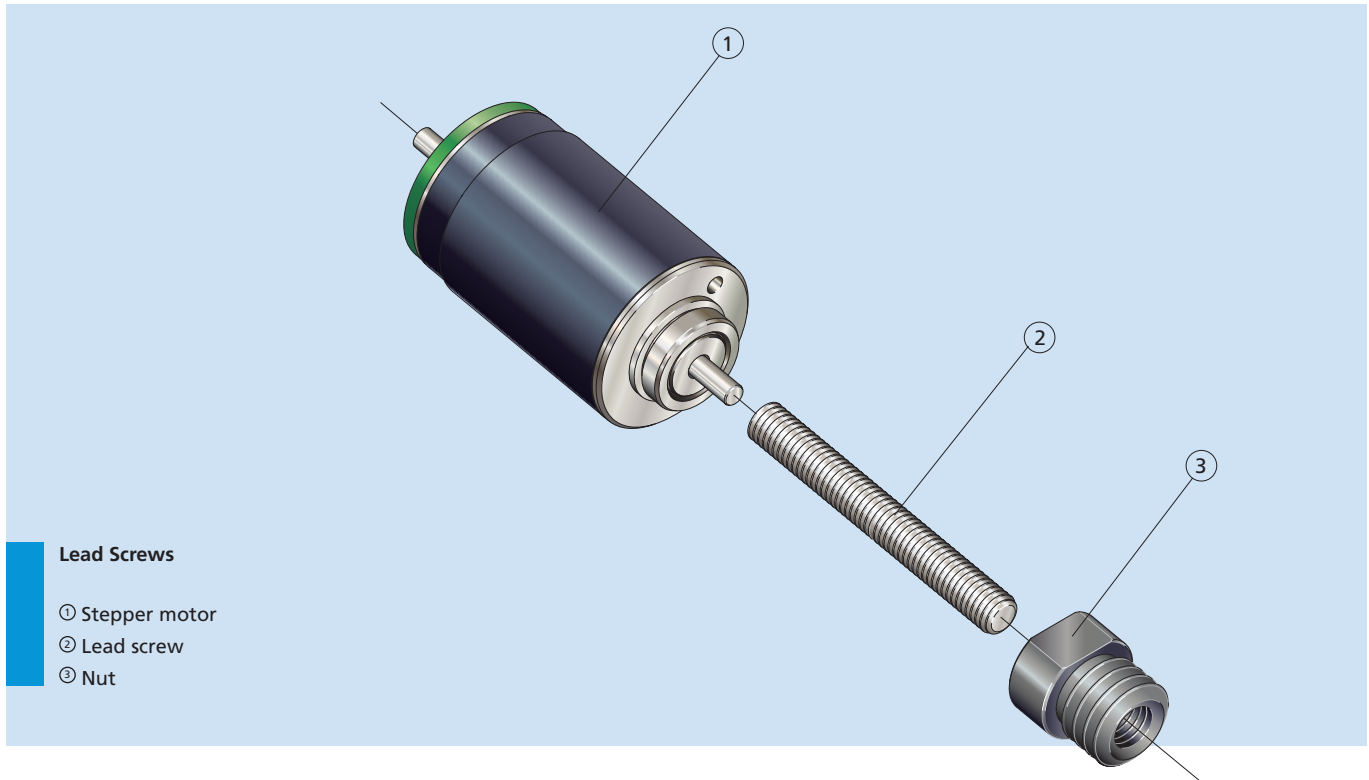
Tip for bearings

Ideally, the application should handle radial loads and the lead screw only axial loads. If it is not the case, it is possible to get lead screws with a tip suitable for bearing at its front end in order to handle radial loads. With this configuration, a special care to the alignment of the motor and bearing must be paid to not deteriorate the thrust force achievable. Optional mating ball bearings are available in the dedicated datasheet for options.

Nut

Optional nuts offered in this catalogue are shaped with a flat in order to prevent its rotations in the application. Alternatively, tapped holes on the application are a convenient solution since metric taps are readily available.

Lead Screws and Options



Lead Screws

- ① Stepper motor
- ② Lead screw
- ③ Nut

Features

Stepper motors can be used for more than just a rotation. When combined with lead screws, they provide a high accuracy linear positioning system that provides the benefits of a stepper (open loop control, long life, high torque density, etc.).

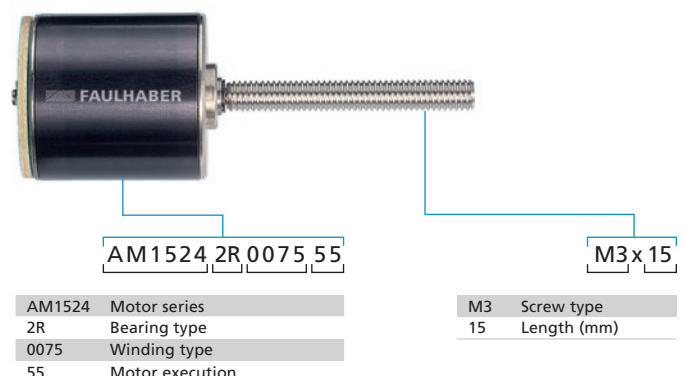
The lead screws available on stepper motors are all based on metric dimensions (M1.2 up to M3) and specifically designed to be assembled with stepper motors. The technique used to produce the thread ensures a very high precision and consistency of quality. A large choice of standard lengths is available from stock and customization is possible on request.

Such a combination is ideal for any application such as requiring accurate linear movement or lens adjustment (zoom, focus), microscope stages or medical syringes.

Benefits

- Cost effective positioning drive without encoder
- High accuracy
- Wide range of lead screws available
- Short lead time for standard length
- Flexibility offered by optional nuts and ball bearings
- Custom length on request

Product code








AM1524 2R 0075 55

M3 x 15

AM1524	Motor series
2R	Bearing type
0075	Winding type
55	Motor execution

M3	Screw type
15	Length (mm)

More information

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