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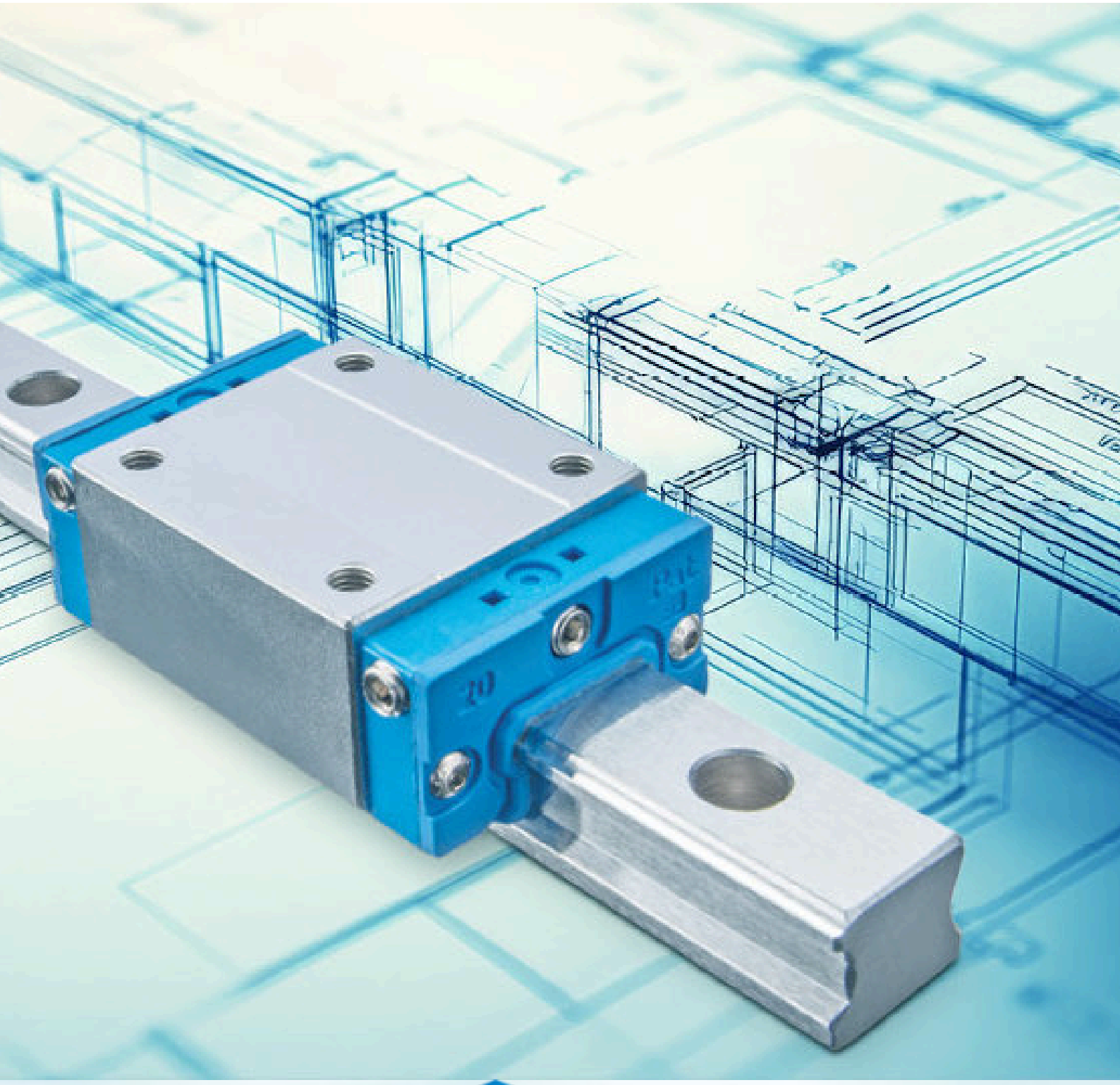
ALL ABOUT LINEAR MOTION



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Assembly of ball bushings

The installation of ball bushings is generally not complicated, on the contrary, it is fortunately relatively easy to carry out. There is therefore not a great deal to consider during assembly: It is only important to take the installation tolerances and ambient conditions into account. You can find detailed information on this as well as installation instructions in this article.

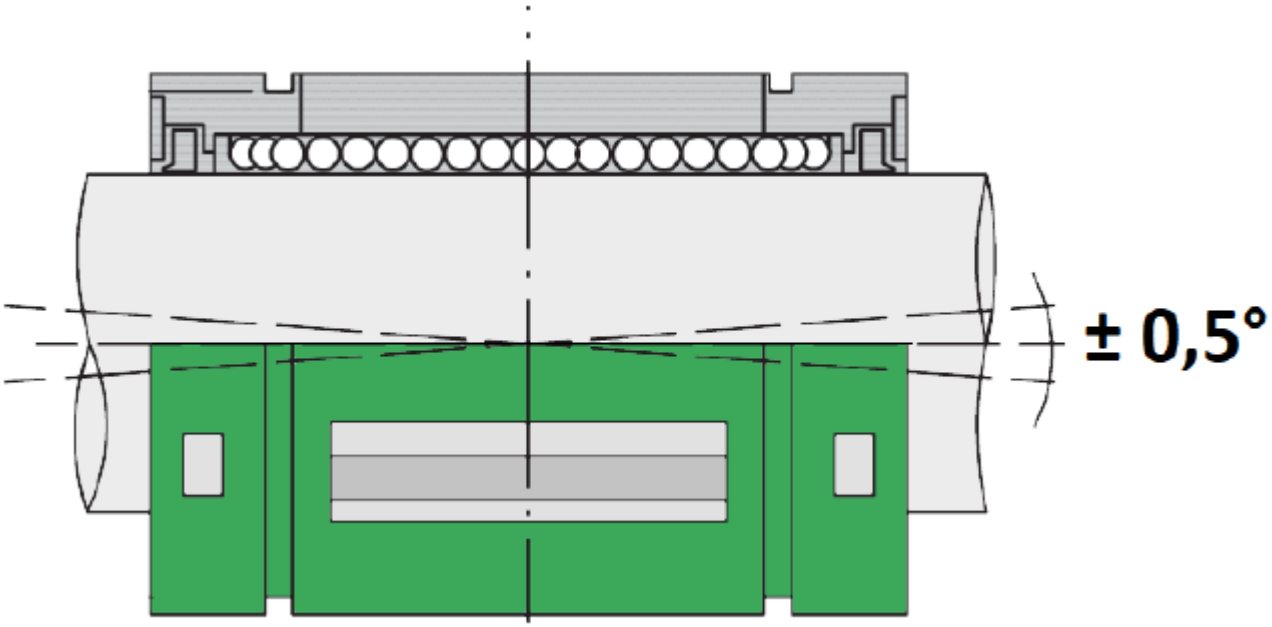
Assembly tolerances

In connection with the assembly of ball bushings, a few tolerances must be considered, which firstly depend on the type of ball bushing, i.e. ISO, JIS, super ball bushings and ball sleeves. The tolerances relate to the shaft diameter on the one hand and the housing bore diameter on the other.
Although there are various recommendations for the shaft diameter, an h6 shaft is recommended in most cases: To be precise, this is the standard recommendation for JIS and super ball bushings as well as for ball sleeves, while the h6 shaft is generally used for ISO ball bushings in applications with little or no clearance.
With regard to the housing bore diameter, i.e. the housing into which the ball bushing itself is mounted, an H7 bore can be named as the classic tolerance for a clearance fit. In applications with reduced clearance, a bore of size J7 is recommended.

	Shaft diameter		Housing bore diameter	
	Clearance fit	Transition fit	Clearance fit	Transition fit
ISO Ball Bushings	g6	h6	H7	J7
JIS Ball Bushings	h6	j6	H7	J7
Super Ball Bushings	h6	-	H7	-
Ball Sleeves	h6	-	H7	-

In this overview you can see the respective recommendations regarding shaft and housing bore diameters, considering the types of ball bushings.

Bending of the shafts

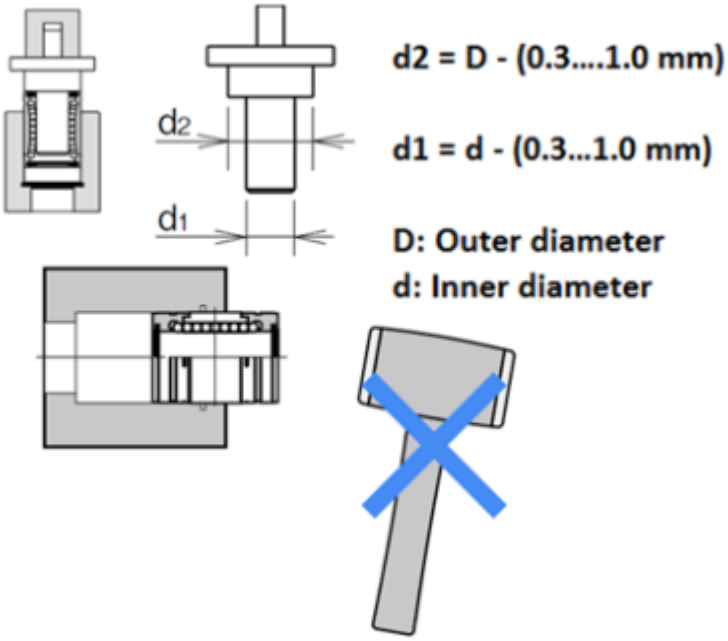


Many super ball bushings have the advantage that they can compensate for certain angular errors.

If long steel shafts are used as self-supporting shafts with closed ball bushings or if a shaft is subjected to too much load, there is a risk of bending of the steel shafts. As soon as these bending exceed permissible limits, reliable function can no longer be guaranteed as high peak loads occur at the ends of the ball bushings. On the one hand, the ball bushing then runs unevenly, and, on the other hand, the service life is significantly reduced. To counteract this tendency, there is a variant of the super ball bushings with tolerance compensation, which are able to compensate for angular errors of up to ±0,5°.

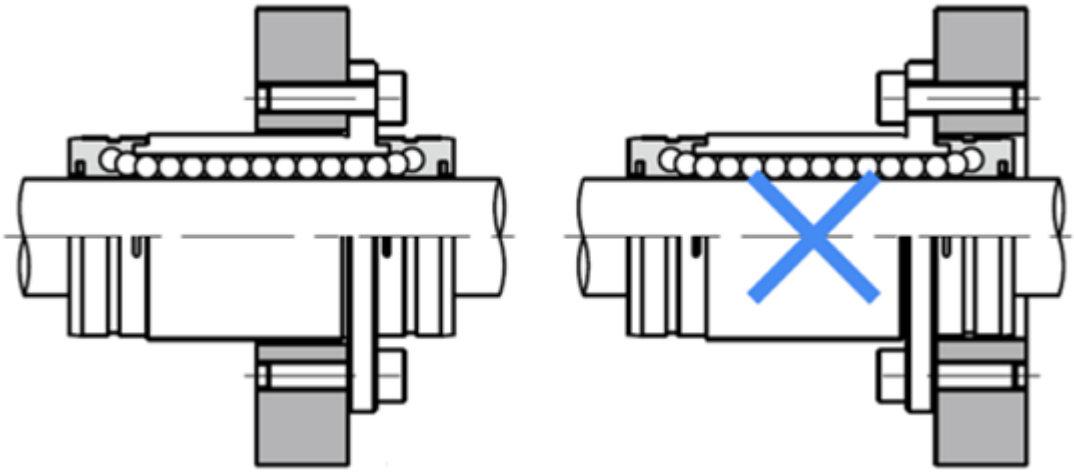
Assembly instructions

For mounting cylindrical ball bushings in housings, we recommend using an auxiliary tool that is adapted to the diameter of the ball bushing. This tool is required to carefully push the bushing into the housing. It is particularly important to note that only suitable auxiliary tools may be used.



Attention! Hammers are not suitable assembly tools for ball bushings.

If flanged ball bushings are to be fitted, it must also be ensured that they are carefully inserted into the housing. The ball bushing must only be fastened with the reference surface to the housing. This means that it is essential to ensure the correct installation direction: If it is installed the wrong way round, there is a risk of a bending moment acting on the ball bushing, which in turn can cause the flange on the ball bushing to break off, for example. If you want to install ball bushings in the unusual direction, this is possible with so-called reversing flange bushings; however, these are very rare on the market and are only used in specific applications.



In the sketch on the left, you can see the correct installation direction - please do not install in the opposite direction!

It is also important to pay attention to a few basic aspects when installing ball bushings on the shafts. Firstly, only deburred shafts may be used. Ball bushings must be carefully pushed onto the shaft and should not tilt. If parallel shafts are used, they must be aligned so that there are no misalignments between the two shafts.

Product selection

To round off this article, here are a few words on product selection, which is important in order to configure the right product for the installation. Of particular importance here are the criteria of *installation space*, *mounting options* and *environmental conditions*, which must always be considered in this context. The exact conditions involved can be seen in the table.

Installation space	Mounting options	Environmental conditions
• Possible system height • Possible system width • Number of parallel shafts • Number of ball bushings per shaft • Accessibility for maintenance	of the shaft: • Self-supporting, with shaft supports or with traverses • With support rails of the ball bushings: • Cylindrical ball bushing in a housing • Mounting via flange	• In case of pollution: Use ball bushings with a suitable sealing system • If aggressive substances: Use corrosion-resistant versions • If there are special environmental conditions, e.g. clean room: Selection of the optimal configuration (lubricants, seals)

With regard to installation space, mounting options and ambient conditions, there are a few things to consider when selecting a product.

You may also be interested in

Basics of linear motion

Are you new to the field of linear motion and want to get an overview of what is meant by “linear motion“ and what characterises linear systems? Then this article is perfect for you. What is a linear system? A linear system is a machine component that performs a translational movement. To ensure safe use and prevent the ingress of
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Types of ball bushings

Ball bushings, which are also known as “linear ball bearings“, are an important product in linear motion. This article deals with the different variants of ball bushings and their properties but first provides you with basic information regarding their history, characteristics and design.
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Types of screw drives

You may have heard of ball screws before. These are certainly the best known of the screw drives, but they are not the only ones, as trapezoidal screw drives are a second type. This article will focus on the former, but you will still find everything you need to know about both types here. Design, mode of operation and areas
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Types of linear guides

Linear guides are presented below as one type of linear system. Linear guides are among the most important guide systems on the market, mainly because they can be used universally. Types of linear guides A distinction is mainly made between two types of linear guides: Shaft guides and rail guides. Both can be subdivided into different types. Types of shaft
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Materials

This article is the right address for you if you want to find out more about the materials used in linear systems. First of all, all components that need to be robust are made of steel, including the rolling elements, the guide rails and the carriages. General information on the materials In addition to steel, various other materials are used
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Point, surface and line contact

If you have already dealt with the point and linear contact of rolling bearings, you will recognise a few things. As with rolling bearings, the rolling elements of linear guide systems have either a ball or roller shape. The contact with a raceway (rolling contact) is different for balls and rollers due to their round or elongated shape. With rolling
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