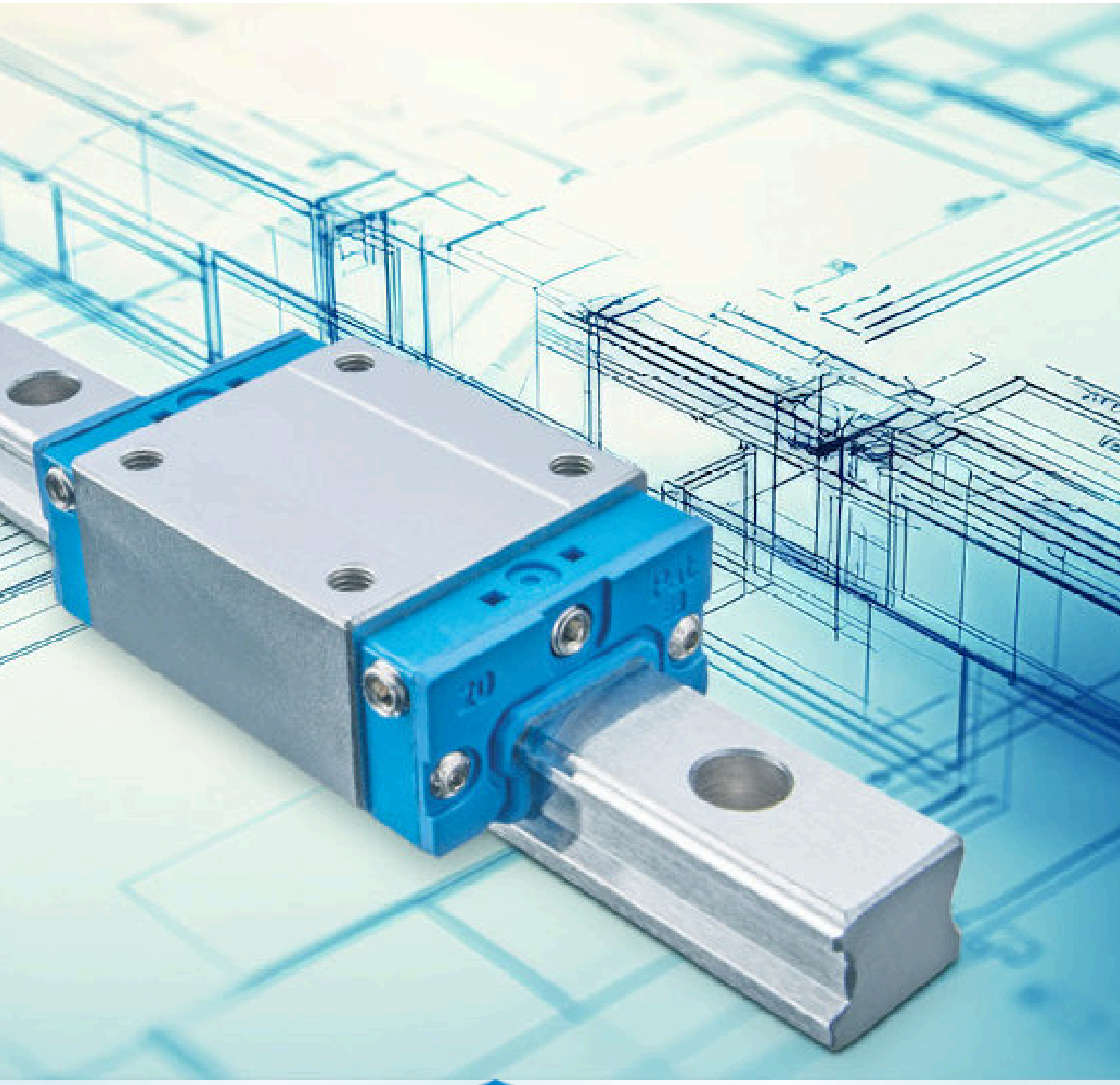
NTN

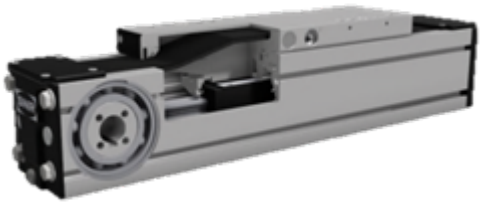
ALL ABOUT LINEAR MOTION



linearwizard.com

Types of linear axis

Alongside linear guides, screw drives and ball bushings linear axis are an important product in the field of linear motion. Although the first linear axis came onto the market in the early 1990s, they only became established as a standard component for industrial applications at the beginning of the current century. It should be emphasized that there is no uniform standard that defines the dimensions of linear axis and regulates the determination of their load ratings. With its SNR brand linear axis, NTN complies with the EU Machinery Directive and the associated standards. The linear axis presented below are SNR products, so it should be noted that the type designations listed are not transferable to other manufacturers.



Linear axis are available in countless shapes and sizes.

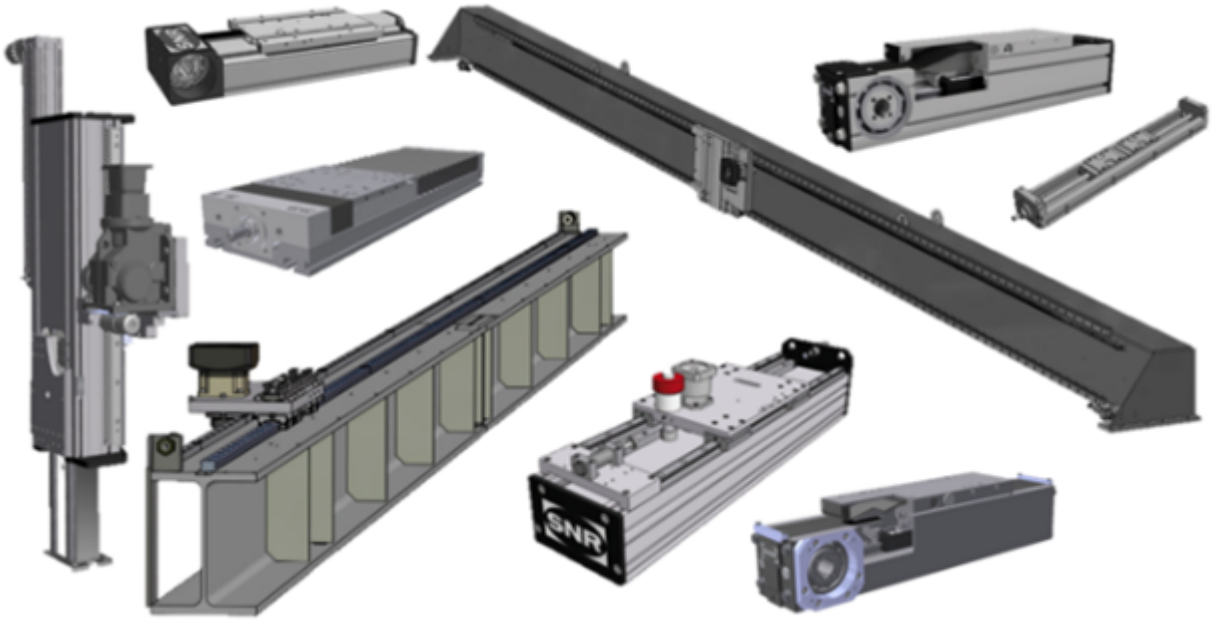
Areas of application

The areas of application for linear axis are diverse: they are used in battery cell production, in assembly systems in the automotive industry, in the handling of car and truck engines, in packaging machines, in the food industry and in robotic processes. Heavy-load axis can be found, for example, in the wood processing industry or assembly lines in engine production. In short, linear axis are just as suitable for simple handling tasks as they are for use in high-tech applications.

Customised linear axis

Unlike the standard version, customized linear axis are always adapted to the application-specific conditions and requirements. In concrete terms, this means that when designing a customized linear axis, all drive systems, i.e. toothed belt drives or toothed belt/ drives, ball screw drives or trapezoidal spindles, rack and pinion drives and linear motor drives can be selected. It is also possible to use all guide systems, i.e. linear guides, track roller guides and polymer track roller guides. The customized linear axis are therefore characterized by their great flexibility.
Another flexible feature is that the travel range and configuration can be fully customized and selected with millimeter precision using the required attachments. Various equipment variants can also be configured for special environmental conditions. The product range of SNR linear axis makes it possible to handle masses ranging from a few grams to several tonnes. Customized linear axis are also service-friendly and low-maintenance. Relubrication is carried out via easily accessible grease nipples in the slider section. In combinations of gantry axis with lifting or telescopic axis, all lubrication points are often brought together via hose lines to a central and easily accessible point. In addition, the use of linear guides with ball chains enables long-term maintenance-free operation.

In contrast to the standard linear axis, the customized axis have a continuous base profile into which the drive and deflection elements are integrated, resulting in an optimum stroke-to-total length ratio. They are optimally sealed, depending on the type, for example by felt or lip wipers or a specially shaped cover strip. The use of side seals, bellows or cover plates is also possible as an option, depending on the type.



Because customized linear axis are designed according to individual requirements, there are significant differences in their appearance.

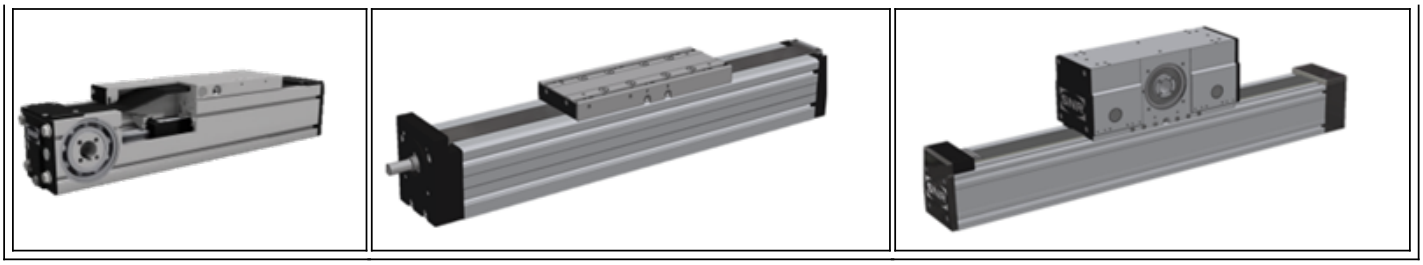
Customized linear axis are available in various series, including compact axis (AXC, AXF), parallel axis (AXDL), linear tables (AXLT), precision axis (AXBG), linear motor axis (AXLM) and heavy-load axis (AXS). The former and latter axis types are described in more detail in this article.

AXC linear axis

The AXC linear axis are compact axis based on lightweight, rigid aluminium profiles. A distinction can be made between five sizes, and there are also three different drive variants to choose from: toothed belt drive, toothed belt/ drive and spindle drive. Either a linear guide or a track roller guide can be used a guiding system. As they are located inside the profile, all guide and drive components are very well protected.

The features and characteristics that can be attributed to each of the three drive variants of the AXC linear axis can be seen in the table.

Toothed belt drive AXC_Z	Spindle drive AXC_S/T	Toothed belt drive ACX_A
• High dynamics • Standard version with hollow shaft • Compact design with partially integrated planetary gearboxes possible • Connection of parallel axis via connecting shafts	• Equipped with ball screws without clearance or trapezoidal screw spindles • Different spindle pitches can be selected • Reinforced spindle bearing optionally possible • Deflection belt drive for limited installation space	• Well suited as a Z-axis for vertical movements of light and medium loads • High dynamics due to low moving mass • Belt and deflection pulley integrated in the drive head



Depending on the application, the use of a toothed belt, spindle or toothed belt/ drive is recommended.

AXS linear axis

There are four types of AXS heavy-load axis, including gantry axis, lifting axis, beam axis and telescopic axis.

	Gantry axis	Lifting axis	Beam axis	Telescopic axis
Base	Aluminium or steel profiles	Aluminium profiles (special version with steel profiles)	Aluminium or steel profiles	Aluminium profiles
Sizes	4	3	2	5
Drive variants	Toothed belt drive Rack and pinion drive	Rack and pinion drive	Rack and pinion drive	Toothed belt/ drive combined with toothed belt drive Rack and pinion drive combined with toothed belt drive
Guiding system	Two linear guides in parallel*	Two linear guides in parallel, different table lengths	one linear guide, different table lengths	Two linear guides in parallel, different table lengths
Suitable for	Highly rigid profiles for unsupported use over long distances	High dynamic operating forces Masses over 2,000 kg possible	Use of two parallel support axis with large distances including tables with tolerance compensation system	Limited space horizontal and vertical use High travelling speeds of up to 10 m/s
Features	Lengths up to 12 m (one-piece) Several independently slider units can be mounted on an axis with rack and pinion drive	Vertical handling in line and area portals Optional balance cylinder for very high loads and/or safety brakes possible	Lengths up to 12 m (one-piece) Several independently moving slider units can be mounted	Optional balance cylinder for very high loads and/or safety brakes possible

* Gantry axis can be designed with tabletops of different lengths or without tabletops for direct combination with lifting or telescopic axis.

Gantry and beam axis can reach lengths of up to twelve meters in one piece.

Customized solutions

There are numerous options for special linear axis solutions. For example, there are axis with several sliders (e.g. toothed belt axis with several slider units) that are connected to each other or driven independently. Another example of a special axis is a ball bushing table. In general, however, a special axis can also be manufactured individually according to customer requirements.

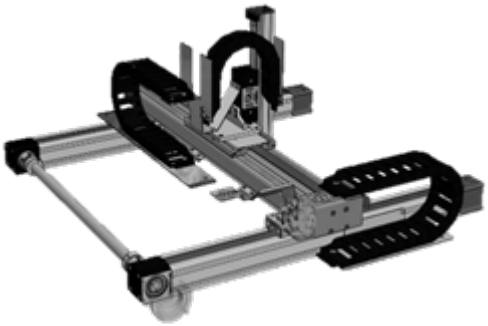
Standard linear axis (AXE)

The standard linear axis (AXE) have a toothed belt or toothed belt/□ drive and are considered easy to service and low-maintenance in the application. The latter means that relubrication is carried out using easily accessible grease nipples in the slider part of the linear axis. In addition, the use of ball chains enables long-term maintenance-free operation of the linear axis. The advantages of these standard linear axis are their internal guide components: The guides are accordingly protected from direct contamination on the inside, and the profile is also closed at the top by the toothed belt for smaller sizes and by cover strip for larger versions. They are also characterized by their modular design, which offers flexibility in terms of production and manufacturing locations and is therefore available to customers more quickly, as only standard components are used. AXE axes can be used horizontally as well as vertically.
Standard linear axis are available in several sizes (from 40 as the smallest up to 160 as the largest version), guide systems and, depending on the product, with cover strips.

Standard linear axis can be equipped with numerous standard accessories if required.
A wide range of accessories is available for standard linear axis. The accessories include – without listing all parts here – standard connecting elements such as sliding blocks or fastening strips, as well as one-stage planetary gearboxes, motor adapters, couplings, plug-in shafts and limit switches.

Standard axis systems

Standard axis systems are available in variants A and B, with variant B being the larger system. They can be selected as 3-axis or 2-axis systems (in the XY or YZ arrangements). A standard axis system includes all connecting elements, for example for connecting the linear axis to each other and for attaching the energy chains. In addition, all standard stroke lengths can be selected, and energy chains are also included as standard in the scope of delivery of a standard axis system. Only the selection of coupling cones and gearboxes has to be done separately.



Standard axis systems of variant A combine the linear axis AXE60Z, AXE110Z and AXE40A, those of variant B the linear axis AXE80Z, AXE160Z and AXE60A.

Configurator for linear axis

The NTN online configurators for standard linear axis are practical aid. Both AXE single axis and AXE axis systems can be configured. To generate a single axis, the tool requires the input of factors such as size, drive type and travel distance. In order to select an axis system, information is required on the travel ranges and table positions of the X, Y and Z axis, for example. The online configurators for AXE-single axis and AXE-axis systems can be found on the NTN website.

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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