item

Linear Guide System PS 4-15
Notes on Use and Installation

item

GENERAL

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General safety information

The data and the information contained in the Notes on Use and Installation are intended exclusively for product description and assembly. The information does not release the user from conducting their own assessments and checks. It should be noted that our products are subject to natural wear and tear as well as an aging process.
These Notes on Installation and Useinclude important information for the safe and appropriate use of the product. In the case of a sale, rent or other transmission of the product, the latter must be accompanied by the Notes on Use and Installation.
During the assembly, operation and maintenance of the driven linear unit, it must be ensured that all moving parts are secured against accidental switch-on or moving. Rotating and moving parts can lead to serious injury! Please make sure to read and observe the following safety precautions.

- Any work with or close to the driven linear unit must be performed under the motto “safety first”.
- Switch the drive unit off before you begin a task close to the driven linear unit.
- Secure the drive unit against accidental switch-on, e.g. by installing signs near the switch or remove the fuse from the power supply.
- Do not reach into the working area of the moving parts of the driven linear unit while it is operating.
- Secure the moving parts of the driven linear unit against accidental contact by installing protective devices and enclosures.
- Please take note of the applicable regulations for accident prevention and environmental protection in the country of use and the workplace.
- Use item products only in technically perfect condition.
- Non-use of original spare parts leads to the expiry of the warranty!
- Check if the product has obvious defects.
- Use the product exclusively within the range of performance described in the technical data.
- Make sure all the safety devices belonging to the product are available, suitably installed and fully functional.

You are not allowed to change the position of, avoid or disable safety devices.

The driven linear unit described here corresponds to the state-of-the-art and respects the general principles of safety at the date of printing of the present Notes on Use and Installation. Nonetheless, the hazard for personal injury and damage to property remains when the fundamental safety instructions and warning notices mentioned in the present Notes on Use and Installation are not observed.We accept no liability for any damage that may arise from them. In the interest of further development, we reserve ourselves the right to technical changes. Keep the present Notes on Use and Installation readily accessible to all users. Please take notice of the superordinate instructions for use of the complete machinery or equipment.The general hazard warning refers to the whole life cycle of the partly completed machinery.

1. Transport
Please note the transport instructions on the packaging. Make sure to leave the product in the original packaging and protect it from humidity and damage until assembly. Please note that moving parts are fixed and can cause no damage during transport.

2. Assembly
Always switch the relevant system component off-circuit before you assemble the product or plug/unplug it. Secure the system against re-starting. Lay the cables and conducts so that they cannot be damaged and nobody can trip over them. Avoid places with risk of slipping, tripping or falling.

3. Putting into service
Let the product acclimatise for some hours before putting it into service.Make sure the partly completed machinery is tightly and safely integrated to the complete machinery. Only put fully installed products into service.

4. During operation
Allow the access to the direct operational area of the system only to people authorised by the operator. This also applies for downtimes of the system. Moving parts must not be accidentally actuated. In case of emergency, error or other irregularities, switch off the system and secure it against restarting. Make sure people cannot be shut in the system’s danger zone.

5. Cleaning
Close all openings with appropriate protective devices so that no detergent can enter the system. Use no aggressive detergents. Do not use a high-pressure cleaner for the cleaning.

6. Putting into service and maintenance
Perform the required maintenance work in the time intervals described in the operating instructions. Make sure no connection line, connection or component is released until the system is under pressure and tension. Secure the system against restarting.

7. Disposal
Dispose of the product according to the national and international provisions of your country.

Correct use

The driven linear unit is a product in accordance with the Machinery Directive 2006/42/EC (partly completed machinery). The driven linear unit can only be used in accordance with the technical data and safety regulations of the present documentation. The internal rules and guidelines of the country of use must be respected. Unauthorised structural changes to the driven linear unit are not permitted. We accept no liability for any damage that may arise from them.

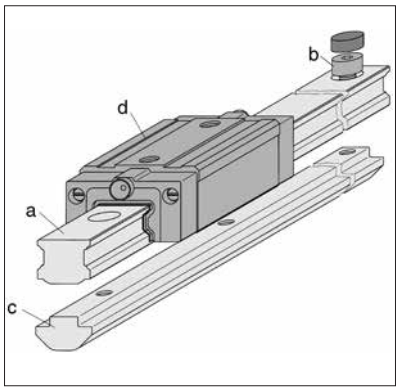
- You are authorised to assemble, operate and maintain the drive linear unit only if:
- The driven linear unit has been integrated to the complete machinery according to the intended applications and safety requirements.
- You have read the Notes on Use and Installation carefully and understood them.
- You are qualified.
- You have the authorisation of your company.
- You exclusively use the original accessories of the manufacturer.

In case of unsafe and inappropriate operation of the driven linear unit, there is a danger of serious injury from crush and shear points.

Inappropriate use
The inappropriate use refers to applications differing from the use authorised by the Notes on Use and Installation and the appropriate use. We accept no liability for any damage that may arise.

Application

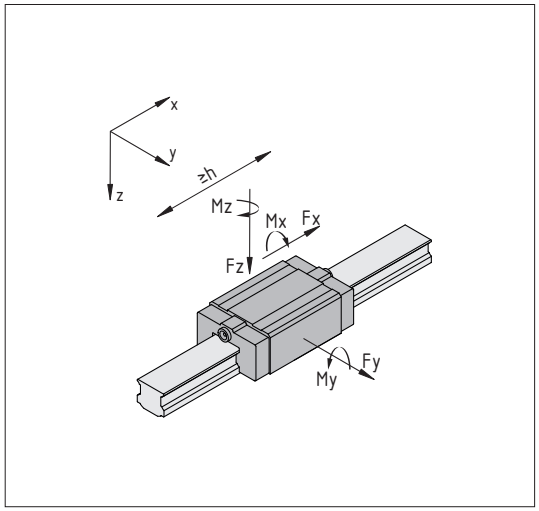
Four-row Linear Guide System (with full complement) on a steel profiled rail. The individual Linear Guide System carriages can be loaded from all directions and can absorb moments around all axes. The key features of Linear Guide System PS 4-15 are its high carrying capacity, rigidity and compact design. Each Linear Guide System carriage can be freely combined with every Linear Guide System rail, so that one or more carriages are possible per rail and carriages can be exchanged.
The Linear Guide System is pre-loaded when it leaves the factory.



The carriages must be used in combination in order to absorb high forces and moments.
Solutions involving several carriages on a single rail and several carriages on parallel rails are also possible.

Guide systems with parallel rails on a single support profile can be constructed on profile groove 8 without elaborate alignment due to the special fastening geometry employed by the rail. The use of parallel rails on different support constructions (i.e. steel frames) will require the amount of alignment and fastening typical for profile rail guides (machining of mounting surfaces, use of accurate spacing pieces etc.)

Technical Data



	PS 4-15
$F_y = F_z$	1,000 N *
M_x	15 Nm
$M_y = M_z$	10 Nm
C	7,200 N
C_0	14,500 N
$v_{max.}$	5 m/s
ϑ	-10 – +100 °C
$h_{min.}$	120 mm

*Note: The fastening of the guide rail does not enable the stated tensile forces of the PS4-15 linear guide system to be utilised to the full in all directions.

Note: The static and dynamic load factors and the static moment characterize the rolling-ball contact between the carriage and rail and can be used for calculating the service life.
For every application, it is necessary to check whether the 4 mm rail mounting screws will support the anticipated load. For some of the permissible loads (in particular M0x), the fastening strength lies below the load carrying capacity of the rolling-ball contact.

The load factors are identical for loads in all axes. The static load safety factor $S_0 = C_0 / P$ greater than 4 should always be selected.

The dynamic load factor C is based on a nominal service life of 100,000 m travel i.e. 90% of a large sample of identical bearings achieve this performance level without any sign of material fatigue.

In each individual case, however, it is important to check the link to the connecting structures in order to verify that it is able to support the forces and moments applied to the Linear Guide System!

The following values are guide values for the permissible load for fastening an individual guide rail on a profile groove:
Compressive loading: ca. 1 x C_0

Tensile loading:	ca. 0,5 x C_0
Lateral loading:	ca. 0,5 x C_0
Static moment:	ca. 0,2 x M_X

For a higher moment loading, provision should be made for a slide construction with two or more guide carriages on an arrangement of two rails, in order to prevent any torsional load on the individual guide rails and any tilting of the rail on the profile groove.

In order to maintain the permissible positional tolerances with this type of arrangement, the parallel guide rails must be mounted on a common supporting profile.

Connecting of two guide rails end facing (e. g. in order to elongate the guideway) should be avoided in principle.

Fig.1

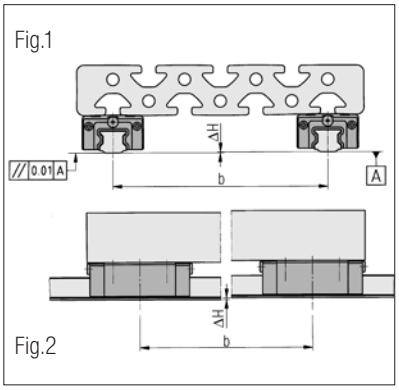


Fig.2

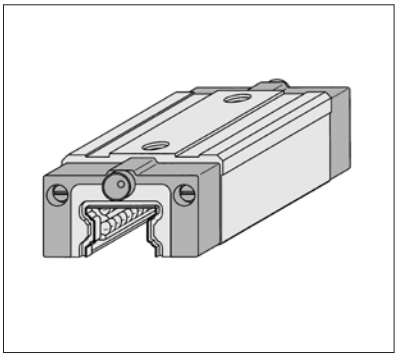
The base of the guide rail is designed to fit the Line 8 Profile groove. The guide rail is automatically centred on the profile groove with the aid of Groove Profile 8 Al M4-60. Alternatively, if the rail is to be mounted on flat surfaces (i.e. steel frames), the central strip of the base of the rail is ground to form a flat mounting surface. In this case, due account must be taken of the permissible dimensional tolerances for vertical alignment and parallelism.

The upper mating surface of the guide carriages must be constructed in such a way that it is possible to install a Line 8 Profile lengthways in the direction of travel of the carriage, with the best possible support being provided by the raised central rib (Fig. 1). The slide may naturally be constructed in a different form, however. In such cases, the only support surface is provided by the central rib at the rear of the carriage.

$\Delta H\ [\mu m] = 0.2 \times b\ [mm]$

Preparations for Assembly

Important Note: Care and cleanliness during assembly of a Linear Guide System are crucial for the correct functioning and long service life of this machine element. For this reason, all components, the work bench and the connecting structure must be kept clean. Compliance with the following instructions will ensure the greatest possible operating reliability by eliminating any errors during assembly.



The guide carriage is supplied in protective packaging. It is slid onto a plastic protective rail which retains the ball bearings in their raceways and provides protection against impact.

The upper surface of the guide rail is covered with film.

Do not remove this protective packaging until you are ready to place the carriage onto the guide rail. This will prevent any damage to the guides during assembly.

The end caps, which are screwed onto the ends of the guide carriage, should not be removed under any circumstances.

If they were to be removed, the re-circulating segments of the linear guides would be opened and dislodged. This would render the guide carriage unusable. In addition, tampering of this nature would invalidate any guarantee.

In order to ensure satisfactory operation of the Linear Guide System, all the securing screws should be tightened under controlled conditions with the torsional moments specified in these instructions and in accordance with the screw tightening schedule. In addition, the use of a chemical thread locking compound should be considered, particularly if there is any likelihood of the screws losing tension.

Check the cut edges of the guide rail and remove any burrs with an oilstone.

Gently push the guide carriage onto the guide rail. If undue force is applied, the seal on the head may be damaged.

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Installing the Guide Rail

As a result of the internal stresses generated when the guide rails are ground to shape, a rail in as-supplied condition may not be perfectly straight. However, this condition will be rectified when the rail is screwed onto the profile groove. For this reason, it may be advisable to obtain approximate alignment to the profile groove with a number of screws before the final tightening operation.

The 1,900 mm long guide rails are factory-prepared at both ends to accept the guide carriage.

If a rail is shortened, it is important to ensure that after it is fastened down, the carriage can be slid onto the rail at the non-shortened end.

If the guide is installed flush in an enclosing structure, the carriage must be placed onto the guide rail prior to assembly.

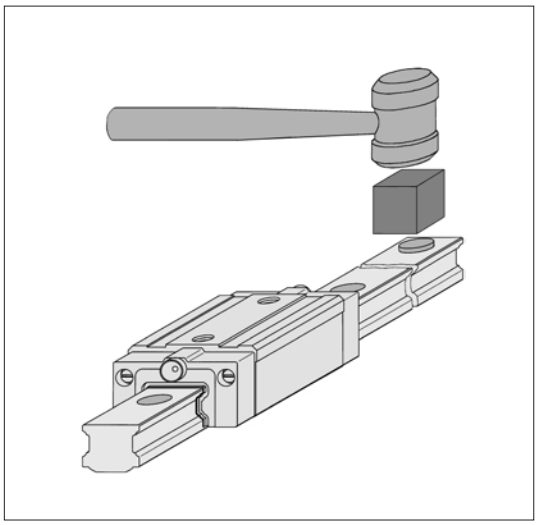
Cut Groove Profile 8 Al to the right length for the guide rail and insert it into the guide groove provided. The rail is 20 mm longer than Groove Profile 8 Al in order to allow space for any connecting elements of the connecting structure.

Place the guide rail onto the groove and remove the protective film from the top of the rail.

Insert the screws, DIN 912 M4x16 Property Class 10.9 (No. 0.0.406.75) into the holes in the guide rail and tighten them by hand. Avoid tilting the guide rail and ensure that it is aligned in terms of position and angle.

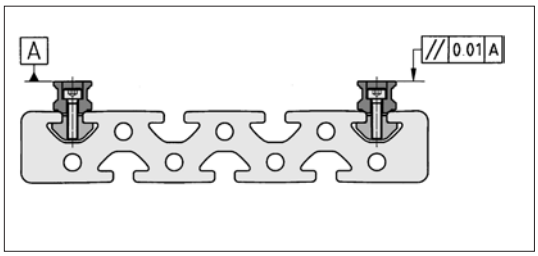
The recommended maximum tightening torque for these fastening screws is 4.8 Nm. Build up to this figure by tightening alternate screws in three stages:

Pass 1: to 2.0 Nm
Pass 2: to 3.5 Nm
Pass 3: to 4.8 Nm



Once the rail has been screwed down, insert the plastic plugs into the holes and secure them with the aid of a block. Remove the abraded plastic edge and deburr the hole with an oilstone.

It is not possible to remove the plastic plugs without irreparably damaging them. If you decide to remove the guide rail at a later date, the plastic plugs (No. 0.0.443.08) must be replaced before the Linear Guide System is returned to service. If this is not done, the wipers of the guide carriage will be damaged by running over the sharp edges of the holes.

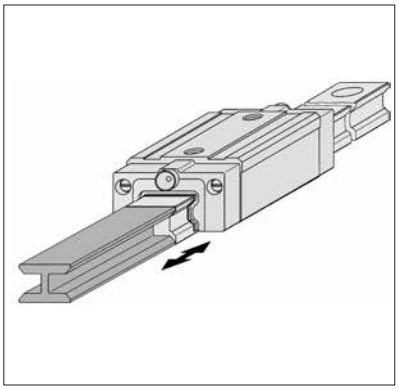


If a slide is located on two parallel guide rails, initially the fastening screws of both rails should only be lightly tightened.

The carriage plate is then aligned with all the guide carriages and screwed to them (M_A = 5.8 Nm, refer to section 'Setting up the Guide Carriage'). In order to ensure parallel alignment, this slide must then be moved a number of times along the rails. To protect the wipers during this operation, lengths of adhesive tape must be applied to the upper surfaces of the rails in order to cover the sharp edges of the holes. Only when both rails have been aligned in parallel and at the correct angle should the guide rails be screwed down by applying the tightening torque specified above, working from the centre of the rail to both ends; all the holes are then sealed with the plastic plugs.

Setting up the Guide Carriage and Lubricating the Linear Guide System

Remove the guide carriage from its packaging. If lubrication with grease is specified, withdraw the protective rail from the raceways and smear the ball bearings with grease. For oil lubrication the grease should be wiped from the ball rows carefully.



Place the carriage onto its protective rail in front of the guide rail and carefully slide it onto the guide rail, ensuring that it is correctly aligned.
When placing the carriage onto the rail, pay particular attention to the wipers at the head end:
they should not be dislodged from their seatings in the end caps and the lip seals should not be allowed to fold over.
If the lip seals of the wipers have been fold over despite of careful fitting the carriage, it can be aligned by pushing the carriage over the ends of the guide rail.

Carefully push the carriage once along the entire length of the guide rail and check the resistance to movement, particularly as the carriage passes over the plastic plugs (reset them if necessary). Any perceptible friction is principally attributable to the fact that the seals have not yet bedded in; this friction will diminish when the flexible elements have settled and adjusted to the rail.

Make sure that the guide carriage is supplied with the specified lubricant. Careful preparation greatly enhances the service life of the Linear Guide System. The Linear Guide System can be lubricated in two ways:

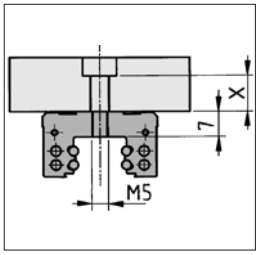
Oil lubrication:
Minimum oil volume 0.5 to 0.6 cm^3
Grade of oil: only EP-additive oils for mixed friction, CLP conforming to DIN 51 517 or HLP conforming to DIN 51 524
Viscosity grade: between ISO VG 32 and ISO VG 68 at an operating temperature range of 0°C to 70°C; other grades to be selected for lower or higher temperatures.
The oil can be topped up through the funnel-type lubrication nipples.

Grease lubrication:
nitial grease capacity 0.8 to 1.0 g or at least until grease is expelled.
Type of grease: lithium-saponified greases, mineral-oil based.
The carriages are initially lubricated with grease.
The initial volume of grease should be applied by hand to the chains of ball bearings; one stroke of the grease gun should then be applied to the grease nipple to ensure that the lubrication channels are filled.

A funnel-type lubrication nipple, with a 120° taper conforming to DIN 3405 (Form D), is located at each end of the carriage. However, it is only necessary to apply lubricant to one end of the carriage, while moving it gently forward and backward.

All types of lubrication give rise to lubricant seepage. For this reason, you should design the connecting structure to ensure reliable collection of the lubricant and ensure proper disposal.

Carefully place the slide structure onto the guide carriage(s) and move the loosely-mounted slide several times along the entire length of the rail without applying any load. Then securely assemble the components.In doing so, carefully select the correct screw length and, in particular, note the maximum permissible tightening torque for the screws: two M5 screws, Property Class 10.9, are supplied and these must be tightened to the permissible torque M_A = 5.8 Nm.



In the case of slide guides with two parallel guide rails, the fastening screws of the slide should be securely attached to the guide carriage, following parallel alignment. The loose screws of the rails should then be tightened in the sequence indicated, by applying the specified tightening torque (refer to the section 'Installing the Guide Rail').

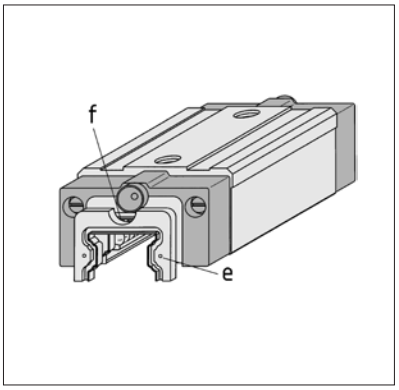
Once the guiding slides have been assembled, move the carriage again along the entire available length of the track and, in particular, check for backlash and consistent resistance to movement.After refilling with lubricant, the resistance to movement may briefly increase until, after a number of strokes, the lubricant has been evenly distributed.

Maintenance

Apart from errors during assembly, the principal causes of damage to Linear Guide System PS 4-15 are inadequate protection against contamination and lack of lubrication. Therefore, it is important to ensure that the wipers, which also perform a sealing function, are protected from damage. The lubrication intervals should be determined by the operating conditions of the Linear Guide System.

Replacing the Wipers

The wiper elements mounted at the head end of the guide carriages must be replaced if they are damaged or exhibit accelerated wear. Depending on the operating conditions, check the wipers at six-monthly intervals or if a visual check of the function of the wipers reveals excess seepage of lubricant. They must be replaced where necessary.



The wipers can be replaced even while the carriage is mounted on the guide rail.

Never unscrew the carriage end cap!

Insert a 1 mm diameter wire into the holes (e) in the wiper and prise the lateral parts from the end cap. Disengage the locating tab (f) of the wiper below the lubrication nipple using a normal flat-bladed screwdriver and withdraw the wiper from the guide rail.

Place a new wiper (No. 0.0.443.09) onto the guide rail and push it towards the end cap, ensuring precise alignment.

Using a normal flat-ended screwdriver, push the wiper carefully into the rear slots of the end cap. Take care to ensure that the locating hooks are not bent.

Push the guide carriage to ensure the wipers are properly engaged.

Re-lubrication

In principle, the precise date for subsequent lubrication and the volume of lubricant required should be determined under actual operating conditions. If the lubrication intervals are excessively long or if the volume of lubricant is inadequate, this will be indicated by a reddish-brown discoloration of the lubricant, primarily in the reversing position of the stroke movement. In such cases, re-lubricate immediately and correct the lubrication interval and volume of lubricant.
Clean the guide rail and the lubrication nipple.
Fill the guide carriage via a lubrication nipple with the following volumes of lubricant:
Oil injection lubrication: approx. 0.02 cm^3 per hour
Grease lubrication: reference value 0.5 g - 1.2 g or at least until fresh grease is expelled.

Move the guide carriage along the entire stroke or for a distance of at least twice the length of the guide carriage.Ensure that the guide rails are covered with a visible film of lubricant along their entire length. Apply additional lubricant if necessary.

Prior to any long period out of service and before resuming operation, the Linear Guide System should be re-lubricated with oil or grease.

item shall not be held liable for damage caused by incorrect installation and improper maintenance!

item Industrietechnik GmbH
Friedenstrasse 107-109
42699 Solingen
Germany

Phone +49 212 6580 0
Fax +49 212 6580 310

info@item24.com
item24.com