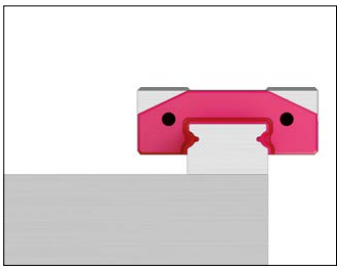
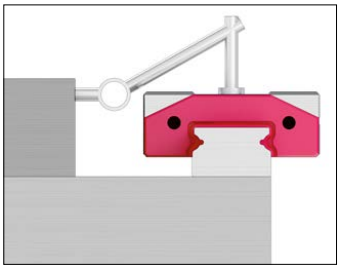
16 Installation and Adjustment Guidelines for MINIRAIL and MINISCALE PLUS

16.1 Methods for Aligning the Guideways

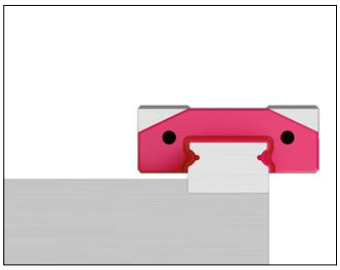
Alignment of the guide rails depends on the level of accuracy needed and must be specified in the construction phase of the machine, since this is when the number of reference surfaces as well as their positions are determined. A distinction is made between the following types of alignment:



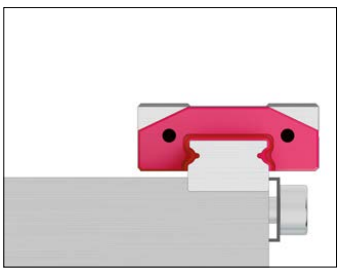
No reference edge available
- Alignment by hand without tools
- Not recommended
- Very low accuracy and lateral force absorption



No reference edge available
- Alignment by hand with tools, e. g. aligning gauge, guide strip, dial gauge, installation carriage
- Medium to high level of accuracy depending on the complexity
- Low accuracy and lateral force absorption



Lateral reference
- Alignment by means of pressing against the reference surface
- High level of accuracy, depending on the accuracy of the reference edge
- Very quick due to predefined reference edge



Lateral reference surface and additional lateral clamping
- Alignment by pressing against the reference surface with the help of lateral clamping elements
- Very high level of accuracy, depending on the accuracy of the reference edge
- Very quick due to predefined reference edge

16.2 Installation Methods

Different criteria must be taken into consideration when choosing an appropriate installation method and defining the number and arrangement of the lateral reference surfaces. These are:

16.2.1 Load
16.2.2 Accuracy
16.2.3 Installation time and engineering expense
16.2.4 Installation location and specifics

16.2.1 Load

Forces in the direction of tension/compression do not have any influence on the lateral reference surfaces. If side loads emerge which exceed the permitted lateral force, references and lateral clamping must be specified. Number and orientation depend on the forces that occur.

The reference surfaces should be arranged based on the direction of force of the main load. Lateral references should also be provided when vibration and impacts occur. They also increase the rigidity of the system.

16.2.2 Accuracy

Lateral reference surfaces are recommended if a high level of guideway accuracy is required. The references make installation easier and reduce the complexity involved in ensuring accuracy. The guideway accuracy is determined by the straightness of the reference surfaces and by the guide rail compression process and/or by the accuracy of the lateral clamping.

16.2.3 Installation Time and Engineering Expense

Reference surfaces make installation easier and reduce the complexity involved in aligning the guide rails.

With careful manual alignment of the guideway, it is possible to dispense with the need for lateral reference surfaces. When deciding on a method, the complexity of the installation should be carefully considered and compared with the design and technical manufacturing complexity.

16.2.4 Installation Location and Specifics

Reference surfaces and lateral clamping require additional installation space and access to the installation areas. It is therefore important to check whether the provided references and adjustments are compatible with the installation area in the machine.
Shown below are some typical installation methods which differ in terms of the number and orientation of the reference surfaces, the transferable lateral forces and the complexity of installation, and are intended to serve as a design aid.

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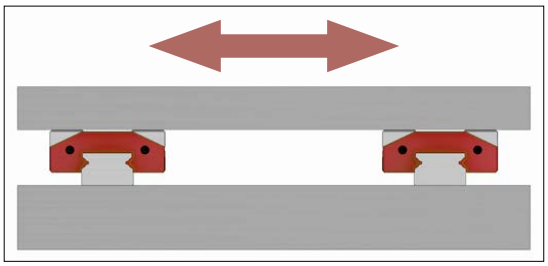
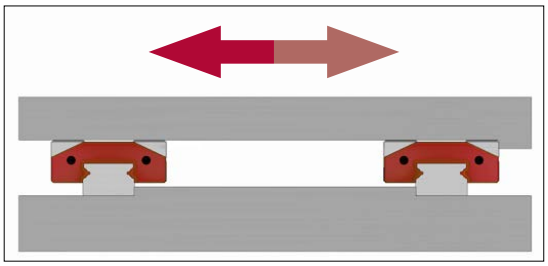
Installation option 1



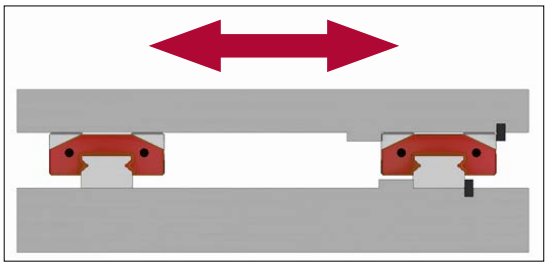
- No reference surfaces
- The forces are transferred by friction locking
- Long installation time and high engineering expense

Installation option 2



- Both guide rails with one reference
  Carriage side with opposite reference
- Simple installation
- High lateral force absorption from one direction, e.g. for hanging installation

Installation option 3



- A guide rail and carriage with reference and lateral clamping
- For high lateral forces from both directions (a guide rail with carriage will take the majority of the lateral force)
- Relatively simple installation

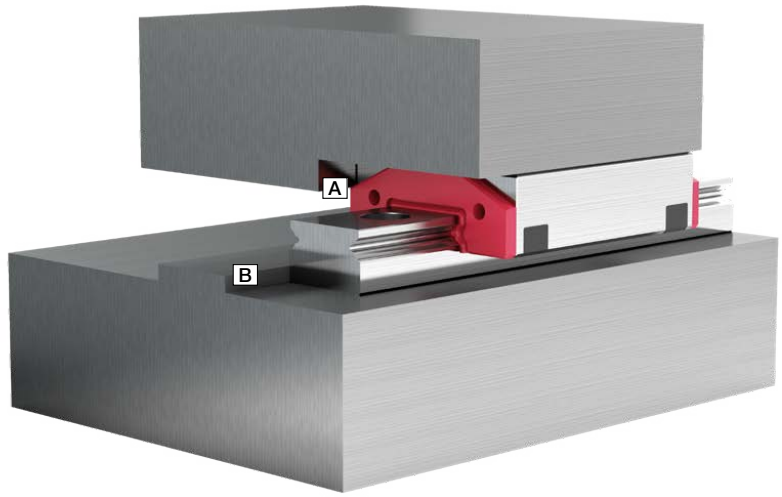
16.3 Preparing for the Installation

16.3.1 Required Tools and Equipment

- Oil stone
- Lubricant
- Torque wrench
- Fastening screws

16.3.2 Preparing the Reference Surfaces

- Check reference surfaces of the machine bed and mounting plate for shape and position accuracy.
- Clean all reference surfaces thoroughly. Remove ridges and surface irregularities with an oil stone.
- Use mineral spirits or rubbing alcohol to clean the reference and supporting surfaces of guideways and carriages. Do not use paint thinner!
- Clean dirty guideways with a soft, lint-free cloth. Do not use compressed air!
- Lightly oil the reference surfaces on the guideways and carriages.



Reference surfaces
A Reference on the mounting plate for the carriage
B Reference on the machine bed for the guideway (both sides of the guideway can be used as reference surfaces)

16 Installation and Adjustment Guidelines for MINIRAIL and MINISCALE PLUS

16.3.3 Lubrication of MINIRAIL

Initial lubrication
Unless specified otherwise, carriage and guideway are delivered separately (see chapter 18.1). They are delivered unlubricated and must have a suitable lubricant for the application applied before operating.

A) Oil lubrication
For lubrication with oil, mineral oil CLP (DIN 51517) or HLP (DIN 51524) with a viscosity range between ISO VG32 and ISO VG150 in accordance with DIN 51519 is recommended.

Guideway:
The tracks of the guideway should be coated in a thin film of oil using a lint-free cloth soaked with oil (also applies when using the optional LUBE-S. See chapter 8.1).

Carriage:
The wipers on the carriages each feature two lubrication holes (see chapter 7.1.8), so that the left and right ball recirculation pathways can be lubricated separately. During lubrication, the carriages should be moved along the entire length of the rail so that the lubricant is applied to both the carriage and guideway. Ensure both tracks are properly lubricated.

Relubrication set (MNW), contents 7 ml

A relubrication set with KLÜBER Structovis GHD can be ordered from SCHNEEBERGER, part number MNW.

B) Grease lubrication

For lubrication with grease, lubricating grease KP2K or KP1K is recommended in accordance with DIN 51825.

Guideway:
The tracks of the guideway should be coated in a thin film of grease using a lint-free cloth (also applies when using the optional LUBE-S. See chapter 8.1).

Carriage:
The following quantities of grease should be applied to the ball bearings with an applicator.

Short carriages	MNNS 7	MNNS 9	MNNS 12	MNNS 15
Grease quantity in cm^3	0.03	0.05	0.09	0.16

Standard carriages	MNN 7	MNN 9	MNN 12	MNN 15	MNN 14	MNN 18	MNN 24	MNN 42
Grease quantity in cm^3	0.04	0.09	0.15	0.25	0.05	0.11	0.20	0.33

Long carriages	MNNL 7	MNNL 9	MNNL 12	MNNL 15	MNNL 14	MNNL 18	MNNL 24	MNNL 42
Grease quantity in cm^3	0.05	0.11	0.20	0.35	0.07	0.14	0.26	0.45

Extra long carriages	MNNXL 7	MNNXL 9	MNNXL 12	MNNXL 15
Grease quantity in cm^3	0.07	0.14	0.26	0.45

After the ball bearings have been greased, the carriages should be moved along the entire length of the rail so that the lubricant is applied to both the carriage and guideway.

Relubrication intervals

The relubrication interval depends on many variables, e.g. load, working environment, speed, etc. and therefore cannot be calculated. The lubrication point must therefore be observed over a longer period of time.

A) Relubrication with oil

Relubrication set (MNW), contents 7 ml

A relubrication set with KLÜBER Structovis GHD can be ordered from SCHNEEBERGER, part number MNW.

The two lubrication holes in the front plates allow the ball recirculation pathways to be lubricated with oil directly (see chapter 7.1.8). Ensure both tracks are properly lubricated.

During lubrication, the carriages should be moved along the entire length of the rail so that the lubricant is applied to both the carriage and guideway.

B) Relubrication with grease

The tracks of the guideway should be coated in a thin film of grease using a lint-free cloth. The carriages should then be moved along the entire length of the rail so that the lubricant is applied to the ball bearings and distributed along the guideway.

16.3.4 Lubrication of MINISCALE PLUS

Please refer to the MINISCALE PLUS mounting instructions in the download section of **www.schneeberger.com**

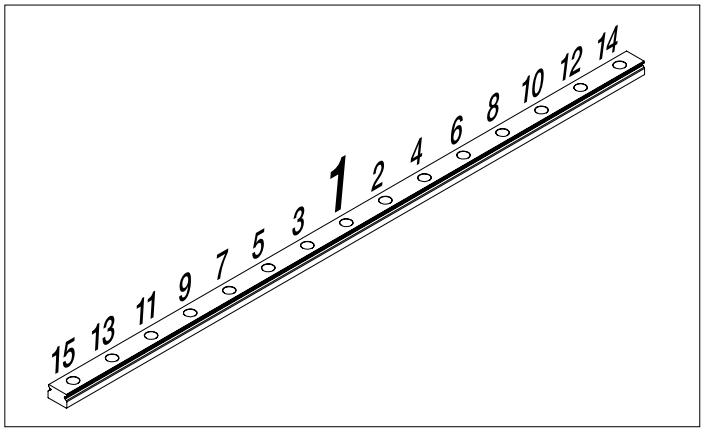
16.4 Installation

16.4.1 General

- Before installation, the guideway, machine bed, mounting plate and fastening screws must all be at room temperature
- Always tighten the fastening screws with a torque wrench. See chapter 16.5 for torque values
- Always press the reference surface of the guideway against the reference surface of the machine bed. The guideway can be located on both sides, the reference side of the carriage is opposite the carriage side with the company logo / type designation

16.4.2 MINIRAIL and MINISCALE PLUS

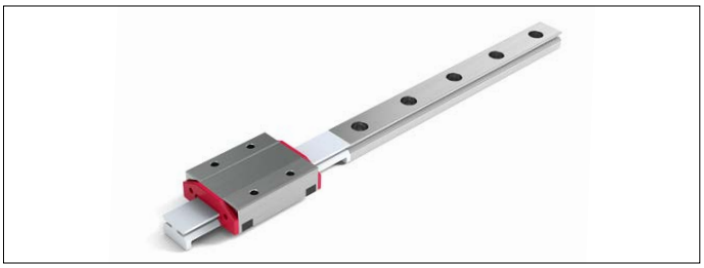
- Alternate between sides of the guideway, starting at the middle, when tightening fastening screws. Pay attention to guideways on multi-part MINIRAIL systems (chapter 8.2)



Fixing MINIRAIL guideways correctly

16.4.3 MINIRAIL

A protective plastic guideway is included on delivery (matched deliveries are the exception). The carriages should be transferred directly from the protective plastic guideway onto the steel guideway. This prevents dirt from getting into the carriages or the carriages from tilting which could lead to the loss of ball bearings.



Carriage on the protective plastic guideway before being transferred onto the steel guideway

16.5 Tightening Torques for the Fastening Screws

The recommended torque values can be found in the table. These values apply to oiled screws with a coefficient of friction of 0.12.

The coefficient of friction can be as low as 0.07 for lubricated screws. The corresponding torque values should be reduced by half.

The following table shows the torque values for the fastening screws of strength class 12.9 (friction coefficient 0.125) and of the strength class A2-70 (friction coefficient 0.2) in accordance with DIN 912:

Thread size	Maximum tightening torque in Ncm	
	Strength class 12.9	Strength class A2-70
M1.6	28	20
M2	60	30
M3	210	110
M4	500	260

16.6 Specific Information on MINISCALE PLUS

Information on installation and start-up of MINISCALE PLUS can be found in the download section of **www.schneeberger.com**.