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# 1 Information on these assembly instructions

## 1.1 Function and validity

The MONORAIL assembly instructions describe how to assemble the profile rail guide systems MONORAIL MR and MONORAIL BM.

## 1.2 Target group

SCHNEEBERGER has defined the following user groups:

- Product manufacturers
- Product users

The product manufacturer is the direct customer of SCHNEEBERGER. The product manufacturer installs the SCHNEEBERGER system in his machine and sells the end product to the product user.

These assembly instructions are intended for the product manufacturer.

## 1.3 Symbols used

**Action** → This is a single-step action.  
1. This is the first step of a multi-step action.

**Note** **Note**  
These are information and recommendations.

**Warning information** Warning information precedes the work step in which a hazard occurs. It has the following appearance:



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### **SIGNAL WORD**

Type and the source of the hazard.  
Consequences if the warning information is ignored.  
→ Measure to prevent damage or injury.

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Warning information is classified as follows by the signal word:

- **WARNING**  
This means that the risk of serious injury or significant material damage exists if the stipulated precautionary measures are not taken.
- **CAUTION**  
This means that there is a risk of slight injury or material damage if the stipulated precautionary measures are not taken.

## 1.4 Other literature

MONORAIL product catalog

## 2 For your safety

### 2.1 Authorized persons

MONORAIL may only be installed by specialists who have the necessary training, e.g. assemblers who have read and understood these instructions.

### 2.2 Correct use

MONORAIL is used for precision linear movements mainly in machine tool and special machine designs.

MONORAIL may only be used within the defined temperature range.

Ensure that the bearings of the carriages are not damaged, e.g. by aggressive substances.

### 2.3 General safety and protection measures

**Storage** Store the MONORAIL in its original packing until it is installed, and protect it against moisture and damage.

**Assembly** During installation, all components must be the same room temperature.

**Repairs** Use only SCHNEEBERGER original parts for repair work.

**Miscellaneous** Country-specific regulations, standards and directives on accident prevention must be observed.

SCHNEEBERGER accepts no liability for damage resulting from unauthorized modifications to the MONORAIL.

### 2.4 Environmentally responsible behavior

Do not allow lubricants to escape into the environment and dispose of them in an environmentally responsible way.

### 3 Description

#### 3.1 Product variants

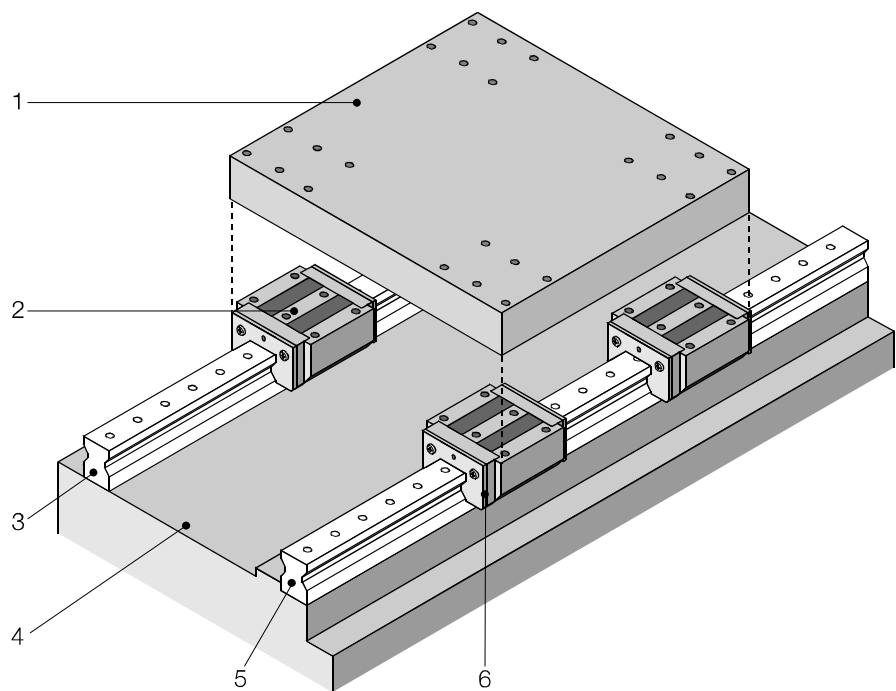
MONORAIL is a profile rail guide system. It consists of an individual rail with the associated carriage (MONORAIL guide) or several matching MONORAIL guides (MONORAIL system).

The following MONORAIL versions are available, depending on the guide elements:

- MONORAIL MR: Rollers as rolling elements
- MONORAIL BM: Balls as rolling elements

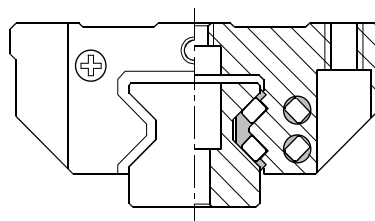
#### 3.2 Components

##### MONORAIL system

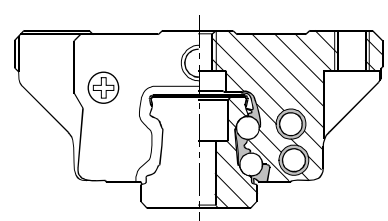


- 1 Mounting plate
- 2 Carriage
- 3 Rail 2
- 4 Machine bed
- 5 Rail 1 (reference rail, positioned on the stop surface in the machine bed)
- 6 Additional wiper (optional, for heavily contaminated environments)

##### Cross sections MONORAIL MR



##### Cross sections MONORAIL BM



## 4 Transport and storage

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### CAUTION

Rails can fall during transport and injure people.

- Suspend long rails at several points during transport with a crane.
  - Pay attention to the swivel range of the long rails.
- 

Always pay attention to the following when transporting and storing MONORAIL:

- Transport may only be carried out by persons who are authorized and trained by the product manufacturer.
- Transport in the original packaging.
- Protect against impacts and moisture.
- Do not bend cover strips; support them over the entire length during storage.

## 5 Preparations for assembly

### 5.1 Tools and auxiliary equipment required

- Oilstone
- Lubricant
- For lubrication, if high running accuracies are required use grease containing MoS<sub>2</sub>
- When installing plastic or brass plugs: use a plastic hammer
- When installing steel plugs MRZ for MONORAIL MR: use a hydraulic assembly tool MWH\*
- Torque wrench
- Mounting rails MRM\* for MONORAIL MR
- Fastening screws for the rails
- Open-end wrench for installing the lubrication connection pieces

\* available from SCHNEEBERGER

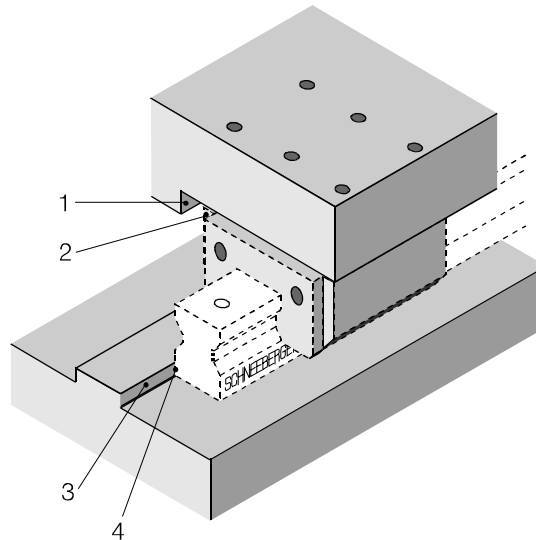
### 5.2 Checking the scope of delivery

MONORAIL is delivered ready for installation. The accessories are preassembled, with the exception of the lubrication connecting pieces, plugs, cover strips and protective covers. Assembly holes and lubrication connections are prepared in accordance with the order.

- Check the components for completeness and condition. When doing so, pay particular attention to possibly damaged cover strips, lubrication connection pieces, sealing rings, plugs, etc.

### 5.3 Preparing the locating sides

1. Check the locating sides of the machine bed and mounting plate for dimensional and position accuracy. If these do not meet the requirements, have the locating sides reworked.



- 1 Locating side, mounting plate
- 2 Locating side, carriage
- 3 Locating side, machine bed
- 4 Locating side, rail

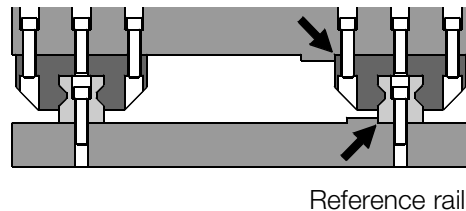
2. Clean all locating sides thoroughly. Remove burrs and unevenness with an oilstone.
3. Remove the corrosion protection from the rails and carriages using naphtha or mineral spirits. Do **not** use nitro!
4. Lightly oil the locating sides on the rails and carriages.

## 5.4 Determining installation variants

Different installation variants are recommended, depending on the requirements for the accuracy and the rigidity of the rails. These differ by way of customer-specific locating sides and therefore by way of the lateral guide.

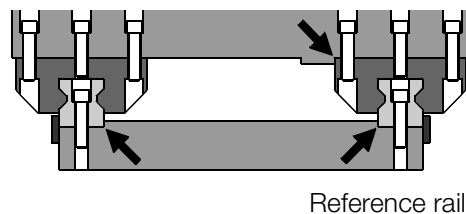
Four typical installation variants are described in more detail below:

### Installation variant 1



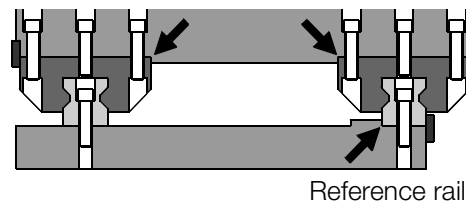
- On the side of the reference rail locating sides between machine bed and rails, mounting plate and carriage
- Mounting plate screwed onto the carriage from above

### Installation variant 2



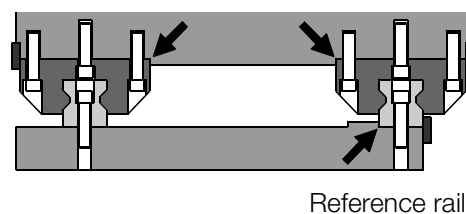
- On both rail sides locating sides between the machine bed and rail
- On the reference rail side locating sides between the mounting plate and carriage
- Mounting plate screwed onto the carriage from above

### Installation variant 3



- On the side of the reference rail locating side between machine bed and rail
- On both rail sides locating sides between the mounting plate and carriage
- Mounting plate screwed onto the carriage from above

### Installation variant 4



- On the reference rail side locating side between the machine bed and rail
- On both rail sides locating sides between the mounting plate and carriage
- Mounting plate screwed onto the carriage from below

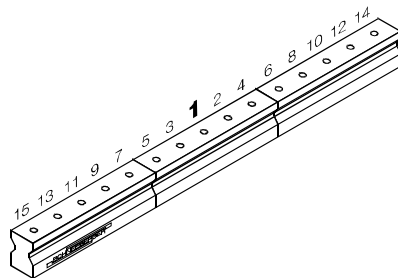
The rail which is placed on a locating side of the machine bed is designated the **reference rail** (rail 1).



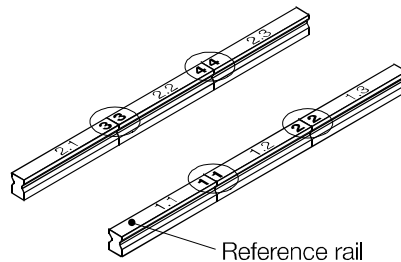
## 6 Installation

### 6.1 Important information on installation

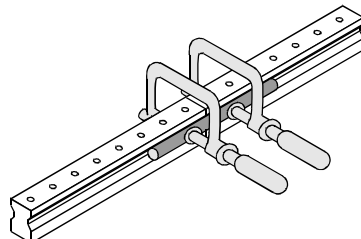
- Handling rails**
- The rails, machine bed, mounting plate and fastening screws must have the same room temperature at the start of installation.
  - Always clamp the rails with their locating side against the locating side of the machine bed.  
The locating side of the rails is on the side facing away from the name SCHNEEBERGER and the type number.
  - For high running accuracy and a good screw head position, grease the contact surface and the thread of the fastening screws with grease containing MoS<sub>2</sub>.
  - **Always** tighten the fastening screws with a torque wrench.  
See section 9.1 for the tightening torques.
  - Tighten the fastening screws **alternately** from the rail center and the rail train center.



- Multi-part rails are numbered and are identified on the butts. The rails must be fitted so that these numbers correspond.



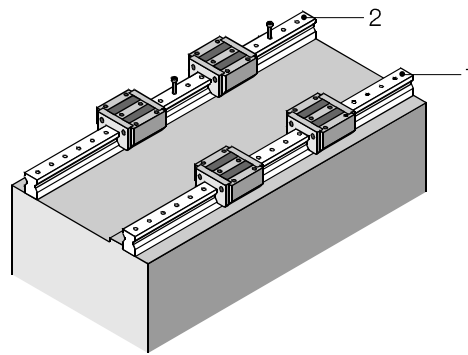
- Always install multi-part rails so that the rails touch each other. If there are no locating sides on the machine bed, fix the rail butts with a clamping device.



- Handling carriages**
- The carriages and rails form a unit. The carriages of different rails are **not** interchangeable with each other.
  - If possible, always leave the carriages on the rail. To run a carriage on and off for MONORAIL MR, use a mounting rail, see section 8.2. Always leave run-off carriages on the mounting rail.
  - Always clamp the locating sides of the carriages against the locating sides of the mounting plate. The locating side of a carriage is a ground side.
  - Have the lubricant connection change on the front plate of the carriage carried out only by SCHNEEBERGER.

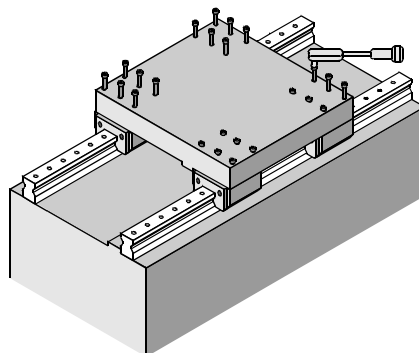
## 6.2 Installation variant 1

1. Clamp the reference rail against the locating side of the machine bed and screw it securely into place, see section 6.1.



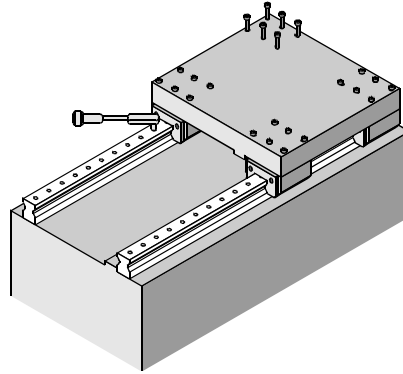
- 1 Reference rail  
2 Opposite rail

2. Align the opposite rail parallel and provisionally secure it.
3. Place the mounting plate on the carriages and gently tighten the fastening screws.
4. Clamp the mounting plate against the locating sides of the carriages on the secured reference rail and screw securely into place.



5. Securely screw a carriage on the not yet fastened rail on the mounting plate.
6. If carriages with additional wipers are protected by a mounting rail film, secure the mounting rail film to prevent it slipping, see section 7.2.

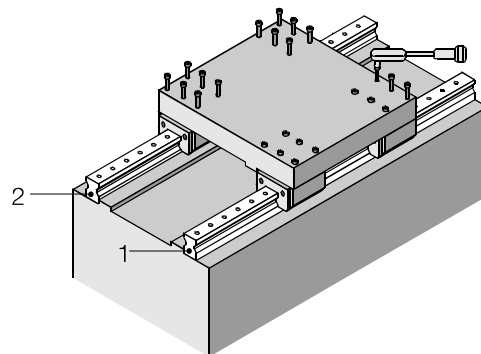
7. Slide the mounting plate with the carriage backwards and forwards and tighten the fastening screws of the unsecured rail securely next to the carriage, see section 6.1.



8. Securely screw on the mounting plate.

### 6.3 Installation variant 2

1. Clamp both rails against the locating sides and securely screw them into place, see section 6.1.
2. If necessary, fit clamping screws, clamping bars or conical bars.
3. Place the mounting plate on the carriages and gently tighten all fastening screws.
4. Clamp the mounting plate against the locating sides of the carriage on the reference rail and securely screw it to these two carriages.

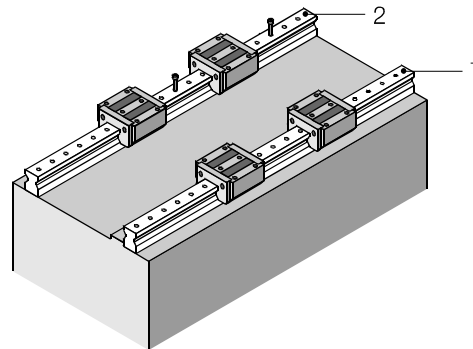


- 1 Reference rail
- 2 Opposite rail

5. If carriages with additional wipers are protected by a mounting rail film, secure the mounting rail film to prevent it slipping, see section 7.2.
6. Slide the mounting plate with carriage once over the entire rail length.
7. Securely screw the mounting plate into place.

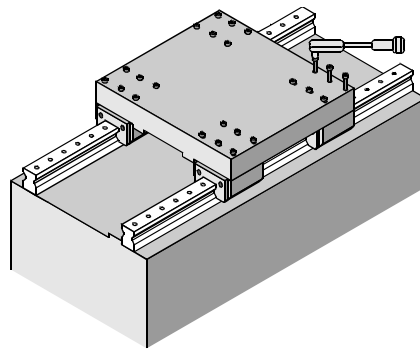
## 6.4 Installation variant 3

1. Clamp the reference rail against the locating side and screw it securely into place, see section 6.1.

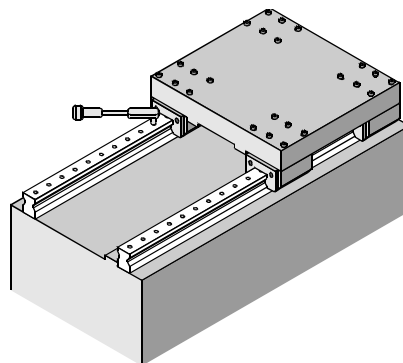


- 1 Reference rail
- 2 Opposite rail

2. Align the opposite rail parallel and provisionally secure it.
3. Place the mounting plate onto the carriages and gently tighten all fastening screws.
4. Clamp the mounting plate on every rail side against the locating sides of the carriages and securely screw into place.

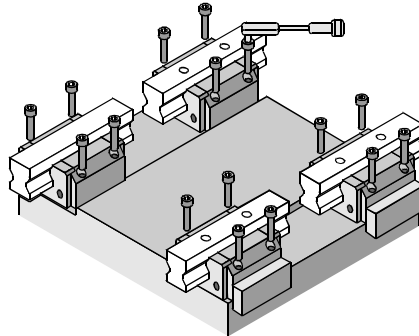


5. If carriages with additional wipers are protected by a mounting rail film, secure the mounting rail film to prevent it slipping, see section 7.2.
6. If necessary, fit clamping screws, clamping bars or conical bars.
7. Slide the mounting plate with the carriages backwards and forwards and tighten the fastening screws of the unscrewed rail securely next to the carriage, see section 6.1.

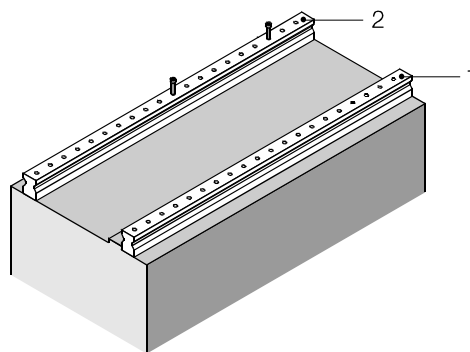


**6.5 Installation variant 4**

1. Run off the carriages, see section 8.2, with one mounting rail in each case for MONORAIL MR. When doing so, note that carriage and rail belong together.
2. Clamp the locating side of the carriage (ground side) against the locating sides of the mounting plate and screw securely into place.

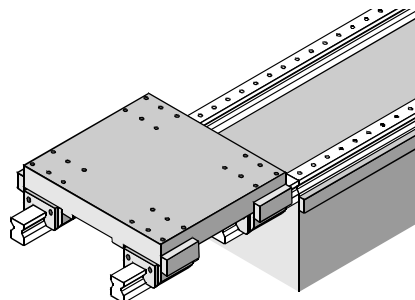


3. If carriages with additional wipers are protected by a mounting rail film, secure the mounting rail film to prevent it slipping, see section 7.2.
4. Clamp the reference rail against the locating sides on the machine bed and screw securely into place, see section 6.1.



- 1 Reference rail
- 2 Opposite rail

5. Align the opposite rail parallel and provisionally secure it.
6. If necessary, fit clamping screws, clamping bars or conical bars.
7. Place the mounting plate with the carriage onto the rail.



8. Slide the mounting plate with carriages backwards and forwards and tighten the fastening screws of the unsecured rail, securely next to the carriage, see section 6.1.

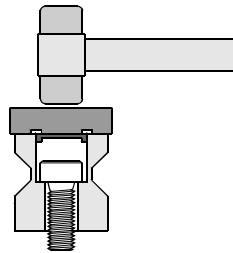
## 7 Completing assembly

### 7.1 Fitting the screw cover

In the case of **MONORAIL BM**, the fastening screws on the rails can **only** be covered with plastic plugs or cover strips.

#### Plastic or brass plug

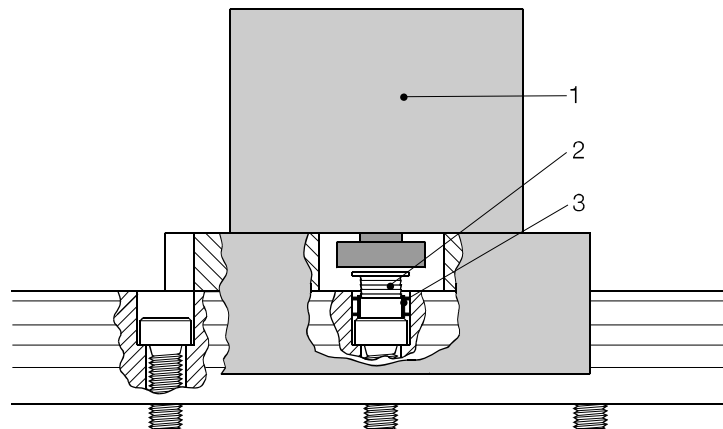
- Place the plugs onto the retaining holes of the rails and knock them in straight. To do this, use a plastic hammer or an intermediate piece.



#### Steel plug MRZ

Steel plugs are supplied pre-pressed. The hydraulic mounting tool MWH must be used for assembly.

1. Run the mounting tool onto the rail with the mounting rail MRM.



- 1 Hydraulic mounting tool MWH
- 2 Steel plug
- 3 Sleeve

2. Place the steel plug onto the head of the fastening screw in the rail.
3. Position the mounting tool exactly above the steel plug using the two semicircular bore holes.
4. Press in the steel plug.

## Notes

- Thread connection on the hydraulic cylinder ¼" – 18 NPT, max. pressure: 120·10<sup>3</sup> hPa (= 120 bar).
- To close the outermost rail bore holes, push out the hydraulic mounting tool over the end of the rail.

## Cover strip MAB/BAB

Cover strips can consist of several parts. The front edge of the first and last parts are rounded. The cover strips are attached to the rail surface with double-sided adhesive tape. The ideal bonding temperature is between +18 °C and +30 °C.



### CAUTION

Cover strips can bend during storage and transport, and can damage the wipers on the carriage.

- Support the cover strips over the entire length.
- Do not use bent cover strips.

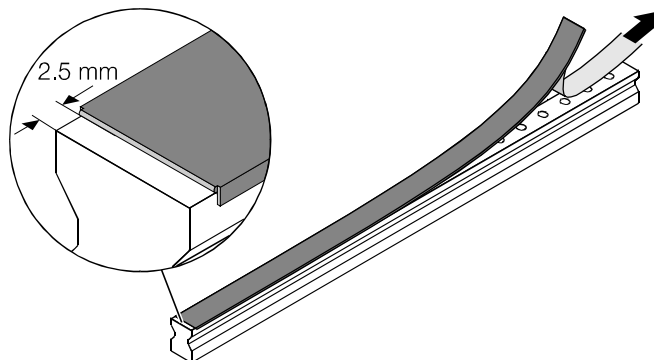


### CAUTION

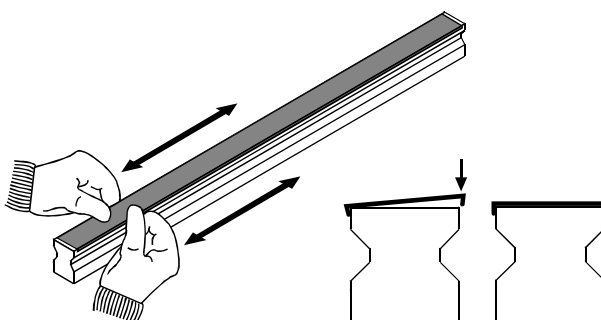
Risk of injury on the edges and ends of the cover strip.

- Wear gloves.

1. Run the carriage off the rail, see section 8.2.
2. Clean the top of the rail with mineral spirits. Do **not** use nitro.
3. Install the cover strip evenly. When doing so, pay attention to the following:
  - Fit the cover strip 2.5 mm from the rail edge.
  - Pull off the protective film (in sections in the case of long cover strips).

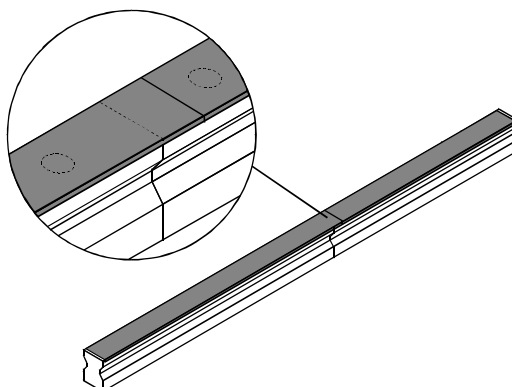


- Fix the cover strip onto the edges by applying gentle pressure.



#### Multi-part cover strips

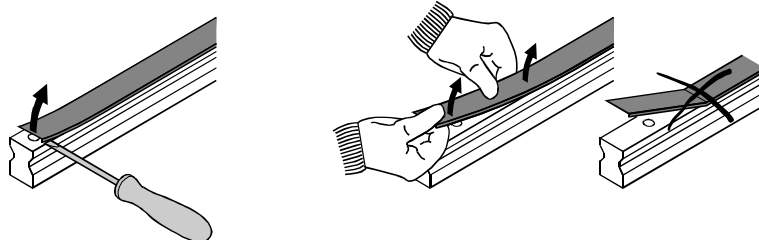
- In the case of multi-part cover strips, position and attach the next cover strip without any seams.
- In the case of multi-part rails, the cover strips and rails are not of the same length. Ensure that the butts of the rails and cover strips do not lie over each other.



4. Slightly oil the cover strip with lubricant, see section 9.2.
5. Run the carriages back onto the rail, see section 8.2.

#### Installation note

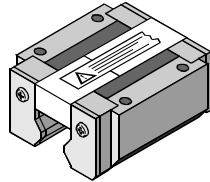
- It is possible to fit and remove the cover strip before bonding. There is no need to pull off the protective film. Tap the cover strip with gentle pressure onto the edges over the rail, see above.
- To remove non-stuck cover strips, raise one end of the cover strip with a screwdriver and carefully remove it. When doing so, ensure that the cover strip does **not** bend!





## 7.2 Removing assembly protective film for additional wipers (optional) for MONORAIL MR

Carriages with additional wipers ZAN/ZAV for MONORAIL MR are supplied with an assembly protective film if the rails are screwed from above and the fastening holes are covered with plugs. The assembly protective film protects the sealing lips during assembly and must not be removed until the fastening holes of the rails are closed.

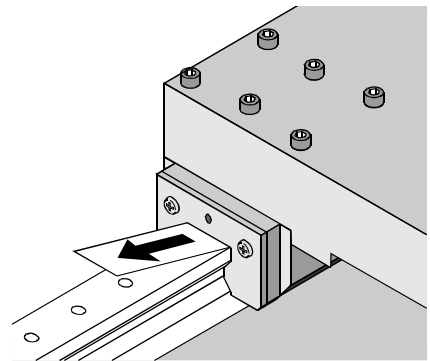
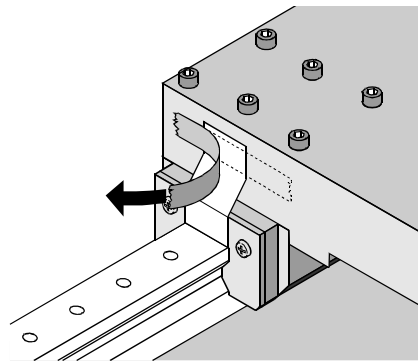


### CAUTION

Additional wipers can be damaged by the edges of the open fastening holes of the rails when the carriage is moved.

→ Do not remove the assembly protective film until after the retaining holes are closed.

→ Pull the assembly protective film out of the carriage in the rail direction.



### 7.3 Lubrication

1. Screw the lubrication connections into the carriages. When doing so, observe the following:
  - Connection pieces with cylindrical thread:  
minimum screw-in depth 4 mm at maximum tightening torque 1.5 Nm (thread depth in the front plate: 6 mm).
  - Connection piece with tapered thread:  
maximum screw-in depth in accordance with the thread length.
  - When lubricating from above, place the supplied sealing ring into the countersink of the front plate and, if necessary, improve the hold with some lubricating oil.
2. If central lubrication is present, connect the carriages to the central lubrication.
3. Carry out first lubrication of the carriages, see section 9.2. When doing so, move the carriages several times by more than three times their length.

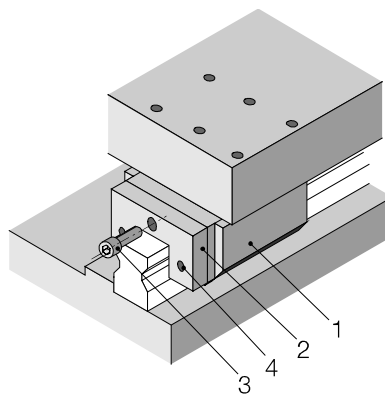
#### Note

Changes to the lubrication connections on the front plate of the carriages must be carried out by SCHNEEBERGER.

### 7.4 Installing the bellows FBM (optional) for MONORAIL MR

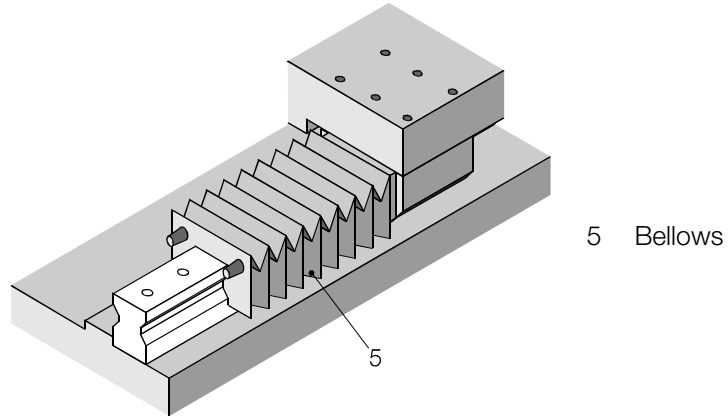
The bellows FBM protects a rail or a rail train. An adapter piece is required for rails with a magnetic scale.

1. Move the mounting plate approximately to the center of its travel.
2. Insert an adapter plate (2) in front of the first carriage (1) so that the counter bore in the fastening hole is on the side facing the carriage.
3. Screw on the adapter plate with the screw (3) supplied:  
maximum tightening torque 1.5 Nm.

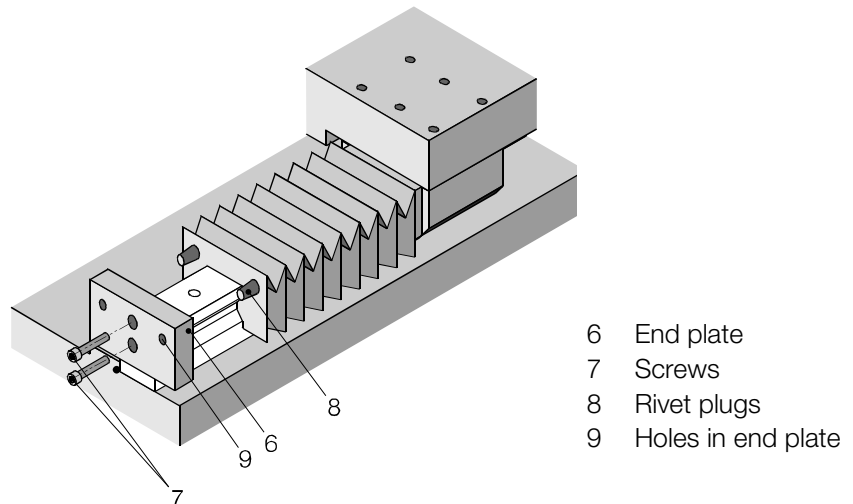


- 1 Carriage
- 2 Adapter plate
- 3 Screw
- 4 Hole in adapter plate

- Slide the bellows (5) onto the rail so that the trapezoidal bellows section runs exactly in the rail groove provided.



- Engage the rivet plugs on the end of the bellows into the corresponding holes (4) of the adapter plate.
- Insert the end plate (6) onto the rail end so that the side with the counter bores in the fastening holes is facing the carriage.



- Attach the end plate with the screws provided (7).
- Engage the rivet plugs (8) on the end of the bellows in the corresponding holes (9) on the end plate

## 8 Maintenance

### 8.1 Cleaning

- Clean only with mineral spirits. Do **not** use nitro.
- Clean dirty rails with a soft, lint-free cloth or fabric cloth. Do **not** use compressed air!

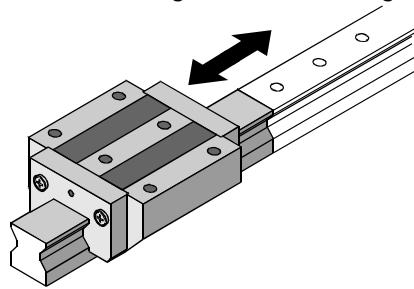
### 8.2 Running the carriage on and off the rail

#### MONORAIL MR

To make sure that the rollers do not fall out of the carriages, run the carriage on and off **only** with the mounting rail MRM!

The carriages are pushed onto the rails and form a unit together with the rail. To maintain the required tolerances, do **not** interchange the carriages of different rails with each other.

1. Run the carriage onto a mounting rail.



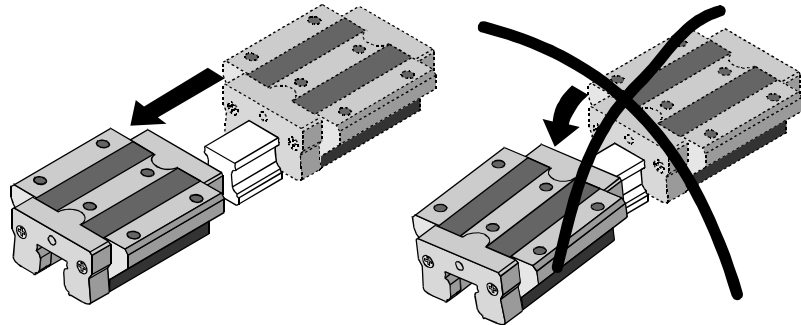
2. Leave the carriage on the mounting rail. Ensure that the carriage and the matching rail are not mixed up.
3. Run carriages individually from the mounting rail onto the associated rail. When doing so, observe the following for carriages with metal wipers ASM:
  - Slightly undo the fastening screws of the metal wiper on the front plate.
  - Run the carriage onto the rails.
  - Ensure that the radial air gap between metal wipers and rail is even and tighten the fastening screws again.

### MONORAIL BM

No mounting rail is required to run the carriage on and off.

The carriages are pushed onto the rails and form a unit together with the rail. To maintain the required tolerances, do **not** interchange the carriages of different rails with each other.

1. Run off the carriage parallel to the rail. When doing so, ensure that the carriage does not tip over.



2. Carefully and without tipping it, run the carriage back onto the relevant rail. To do this, position the carriage parallel to the rail and move it gently back and forth.

When doing so, observe the following for carriages with metal wipers ABM:

- Slightly undo the fastening screws of the metal wiper on the front plate.
- Run the carriage onto the rail.
- Ensure that the radial air gap between metal wipers and rail is even and tighten the fastening screws again.

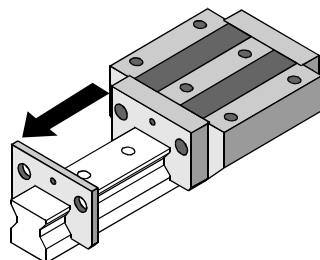
### 8.3 Replacing the additional caoutchouc wipers

Additional wipers are wear parts which are replaced when worn.

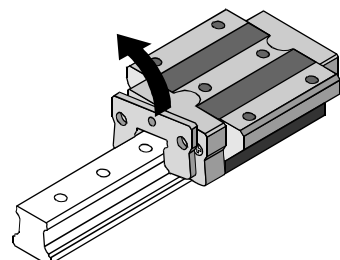
**MONORAIL MR** → Undo the screws on the front plate of the carriage, push off the additional wiper over the rail and push the new additional wiper back on.

**MONORAIL BM** → Undo the screws on the front plate of the carriage, remove the additional wiper directly from the rail and replace it.

#### MONORAIL MR



#### MONORAIL BM



## 9 Appendix

### 9.1 Tightening torques for rails and carriages

Tightening torques Strength class	Max. tightening torques in Nm for fastening screws DIN 912 ( $\mu = 0.125$ )							
	M4	M5	M6	M8	M10	M12	M14	M16
8.8	3	6	10	24	48	83	132	200
12.9	5	10	16	40	81	95	166	265

#### Notes

- When the screws are greased, the friction coefficient  $\mu$  can be reduced by as much as half. As the tightening torques required to reach the maximum permissible tightening force depend on the friction coefficient, they must be reduced accordingly. The values can be obtained from the screw manufacturer's information or from the specialist literature. If necessary, carry out tests to determine the actual friction coefficient.
- Refer to the screw manufacturer's information. This is always binding.

### 9.2 First lubrication before operating

Lubrication with grease Carriage type MR	Grease quantity per carriage in g (first greasing after assembly)				
	MR 25	MR 35	MR 45	MR 55	MR 65
MRA, MRC	1.8	2.8	5.0	8.0	–
MRB, MRD	2.1	3.5	6.3	10.1	18.0

Carriage type BM	Grease quantity per carriage in g (first greasing after assembly)					
	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
BMA, BMC	0.8	1.6	2.7	4.3	6.3	12.0
BMB, BMD	–	2.0	3.3	5.2	7.7	14.8

#### Notes

- SCHNEEBERGER recommends lubricating grease KP2K in accordance with DIN 51825.
- When greasing the carriage, move it by three times its length.

Lubrication with oil

Oil quantity per carriage in cm <sup>3</sup> (first oiling after assembly)				
MR 25	MR 35	MR 45	MR 55	MR 65
0.95	0.55	0.7	0.9	1.2

Oil quantity per carriage in cm <sup>3</sup> (first oiling after assembly)					
BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
0.2	0.5	0.6	0.9	1.1	1.2

**Notes**

- SCHNEEBERGER recommends mineral oil type CLP (DIN 51517) or HLP (DIN 51524) in the viscosity range ISO VG32 ... ISO VG100 (DIN 51519).
- Bed track oils CGLP can be used up to ISO VG220.
- In the case of vertical installation of the carriage, the lubrication connection must be in the upper front plate.
- Divide the above mentioned quantity accordingly when there are 2 lubrication connections per carriage.

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