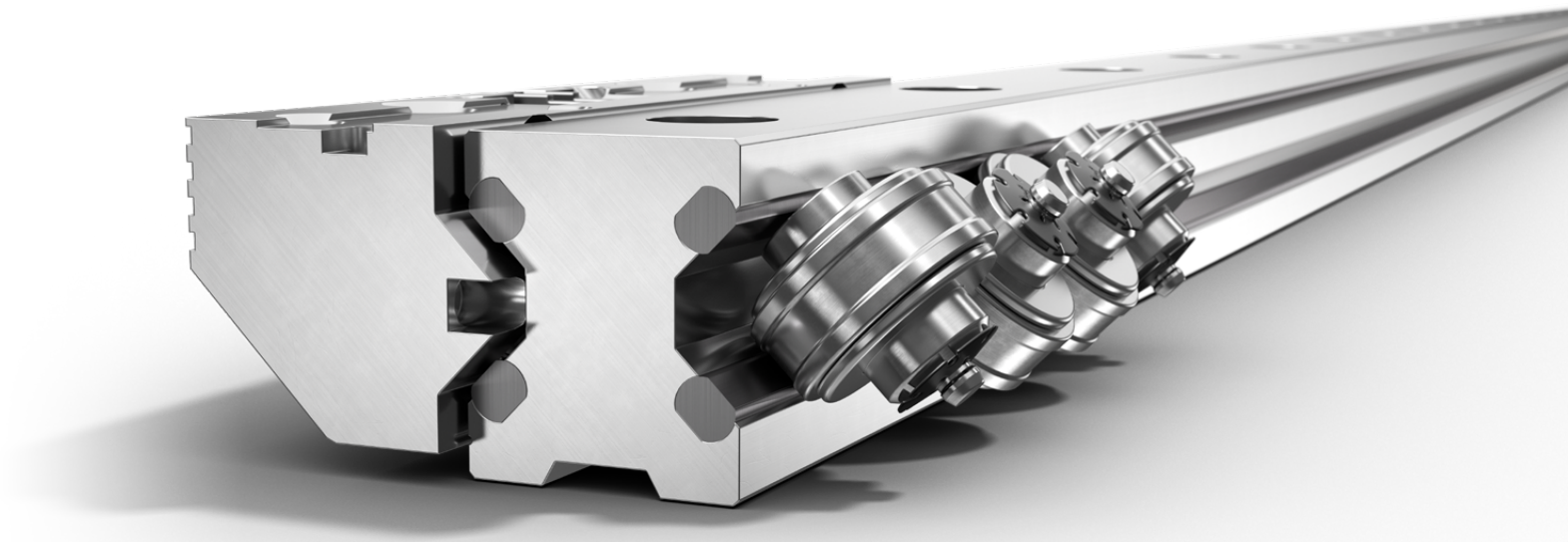
Technical documentation

Aluminum roller guide type FD



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1. Linear guides type FD

1.1 Available series

Name	Characteristics	Size	Application possibilities
FDA	• aluminum roller guides in **standard** design • inlaid steel raceways • rollers with needle bearings for easy and quiet running	12, 15, 20, 25, 35, 45	Suitable for linear motion applications in virtually all industries. Sealed track rollers for maintenance-free operation over the entire service life. Smooth, clean running.
FDB	• aluminum roller guides in **LowCost** design • inlaid steel raceways • ball bearing mounted rollers	12, 15, 20, 25, 35, 45	Suitable for linear motion applications in virtually all industries. Particularly suitable for cost-sensitive applications with reduced load and noise requirements.
FDC	• aluminum roller guides in **NIRO** design • Inserted raceways made of corrosion-free steel • Stainless steel track rollers with needle bearings for smooth and quiet running	12, 15, 20, 25, 35, 45	Suitable for linear motion applications in virtually all industries. Insensitive to environmental influences as well as moisture or cleaning agents.
FDD	• aluminum roller guides in **amagnetic** design • inlaid raceways made of amagnetic steel • rollers with needle bearings for easy and quiet running	25	Suitable for linear motion applications in virtually all industries. Amagnetic raceways without influence on prevailing magnetic fields (e.g. in medical technology or electronics manufacturing).
FDE	• aluminum roller guides in **lubricant-free** design • inlaid raceways made of steel • lubricant-free rollers for easy and quiet running	12, 15, 20, 25, 35, 45	Suitable for linear motion applications in virtually all industries. Special track rollers without lubricants.
FDG	• Aluminum roller guides in **NIRO-LowCost** Design • Inserted raceways made of corrosion-free steel • ball-bearing track rollers made of corrosion-free steel	12, 15, 20, 25, 35, 45	Suitable for linear motion applications in virtually all industries. Especially suitable for cost-sensitive applications in harsh environments or when using cleaning agents.
FDH	• Aluminum roller guides in **highly dynamic** design • Inserted raceways made of steel • track rollers with sealed angular contact ball bearings	25, 35, 45	Suitable for linear motion applications in virtually all industries. Track rollers with angular contact ball bearings for maximum acceleration and speed values, for example when using linear motors as a drive source.
FDI	• Aluminum roller guides in **vacuum-compatible** design • Inserted raceways made of corrosion-free steel • Rollers in full-needle, corrosion-free design	12, 15, 20, 25, 35, 45	For linear motion tasks in the vacuum range for low loads and dynamics. The cassettes are equipped with a lubricant suitable for vacuum and without plastic parts.

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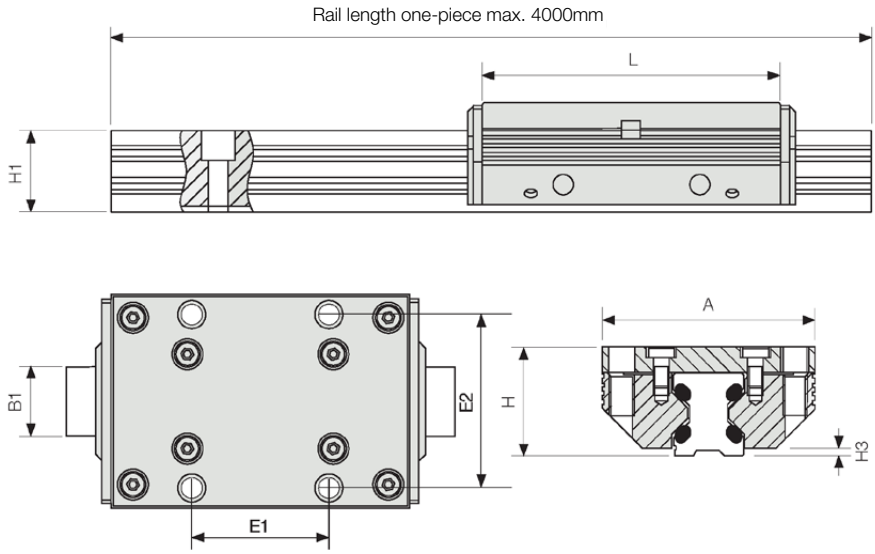

Dimensions

Size	Dimensions (mm)								Available series
	A	B1	H	H1	H3	L	E1	E2	
12	37	12.0	19	14.7	1.4	64	25	30	FDA, FDB, FDC, - , FDE, FDG, - , FDI
15	47	15.5	24	18.7	2.0	78	30	38	FDA, FDB, FDC, - , FDE, FDG, - , FDI
20	63	21.0	30	22.6	2.0	92	40	53	FDA, FDB, FDC, - , FDE, FDG, - , FDI
25	70	23.0	36	27.0	2.5	98	45	57	FDA, FDB, FDC, FDD, FDE, FDG, FDH, FDI
35	100	32.0	48	37.0	3.5	135	62	82	FDA, FDB, FDC, - , FDE, FDG, FDH, FDI
45	120	45.0	60	46.0	4.0	165	80	100	FDA, FDB, FDC, - , FDE, FDG, FDH, FDI

Characteristic

Franke linear systems are the best solution when it comes to speed and lightweight construction. Due to their design principle, Franke linear systems are highly dynamic, quiet and maintenance-free. Thanks to a modular design, Franke linear systems can be individually adapted to customer requirements. By using different rail profiles and roller shoes, special cassettes, variable track widths, you always get a solution optimized for your application. The sliding resistance is individually adjustable. The guide rails are available in one piece up to 4000mm and can be coupled endlessly.

Technical data

Material	Cassette plate, roller shoes and rail body: aluminum; track rollers and track rods depending on series: steel, stainless steel, amagn. steel
Operating temperature	–20 °C to +80 °C
Vmax	10 m/s
Installation position	any
Lubrication	lubricated for life, maintenance-free

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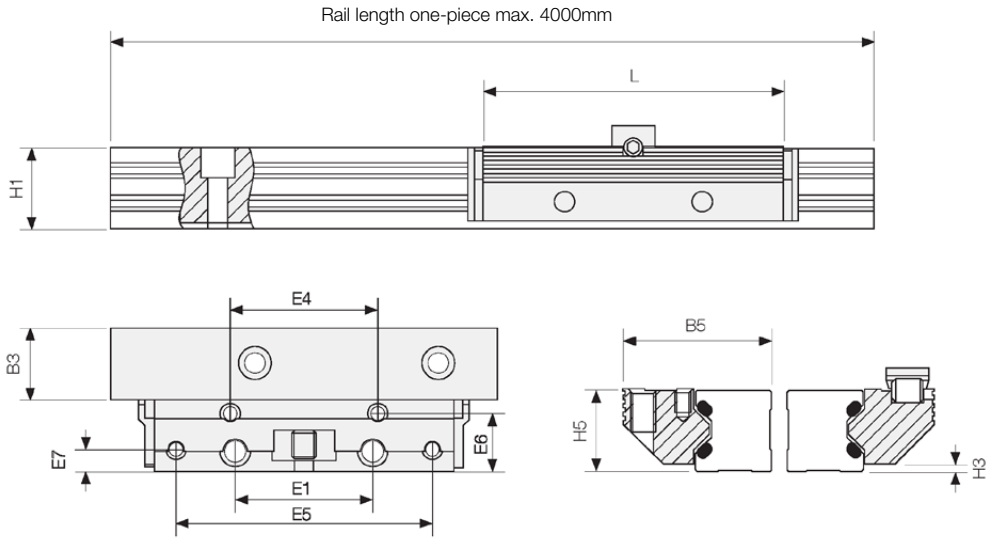

Dimensions

Size	Dimensions (mm)											Available series
	B3	B5	H1	H3	H5	L	E1	E4	E5	E6	E7	
12	12.00	24.4	14.7	1.4	15.0	64	25	29	57	9.7	3.4	FDA, FDB, FDC, - , FDE, FDG, - , FDI
15	15.25	30.9	18.7	2.0	19.0	78	30	34	68	12.4	4.9	FDA, FDB, FDC, - , FDE, FDG, - , FDI
20	20.00	40.9	22.6	2.0	23.0	92	40	42	80	16.9	5.9	FDA, FDB, FDC, - , FDE, FDG, - , FDI
25	25.00	48.4	27.0	2.5	27.5	98	45	48	84	19.4	7.4	FDA, FDB, FDC, FDD, FDE, FDG, FDH, FDI
35	35.00	68.9	37.0	3.5	37.5	135	62	67	117	28.4	8.9	FDA, FDB, FDC, - , FDE, FDG, FDH, FDI
45	45.00	82.4	46.0	4.0	46.5	165	80	83	146	30.9	9.9	FDA, FDB, FDC, - , FDE, FDG, FDH, FDI

Characteristic

Franke linear systems are the best solution when it comes to speed and lightweight construction. Due to their design principle, Franke linear systems are highly dynamic, quiet and maintenance-free. Thanks to a modular design, Franke linear systems can be individually adapted to customer requirements. By using different rail profiles and roller shoes, special cassettes, variable track widths or an integrated direct drive, you always get a solution optimized for your application. The sliding resistance is individually adjustable. The guide rails are available in one piece up to 4000mm and can be coupled endlessly.

Technical data

Material	Roller shoes and rail bodies: aluminum; track rollers and track rods depending on series: steel, stainless steel, amagn. steel
Operating temperature	–20 °C to +80 °C
Vmax	10 m/s
Installation position	any
Lubrication	lubricated for life, maintenance-free

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Franke aluminum linear systems have base bodies made of high-strength, anodized aluminum. Depending on the type, the rollers with needle or ball bearings are made of rolling bearing steel. Plastic end plates house felt wipers that keep the guide system clean.

2. Type FD - Franke Dynamic

2.1 Versions and system description

Franke aluminum roller guides are available as a double rail with cassette or as a single rail pair with a pair of roller shoes.

Double rail with cassette (Figure 1)
The double rail with cassette version is a ready-adjusted linear guide as standard. Cassette and rail have standard connection holes.

Single rail pair with roller shoe pair (Figure 2)
Single rails with roller shoes are part of the design with the advantage of variable guide width. The connecting plate is specified by the customer. The cassette or the pair of roller shoes of the standard type FDA runs over four crosswise arranged rollers with needle bearings on raceways made of tough spring steel. For applications with special requirements, other types are available, e.g. with stainless steel raceways or customer-specific special designs.

The aluminum roller guides are lubricated for life. Travel speeds of 10 m/s and accelerations of 40 m/s² can be implemented. The operating temperature of the guides is between -20 °C and +80 °C. Franke will be pleased to advise if solutions are required that are suitable for temperatures outside the range mentioned.

Rail-mounted cassettes are set backlash-free at the factory. It is possible to subsequently adjust the aluminum roller guides to the respective load situation via an integrated clearance adjustment. The clearance setting is best determined by measuring the sliding resistance in the unloaded state.

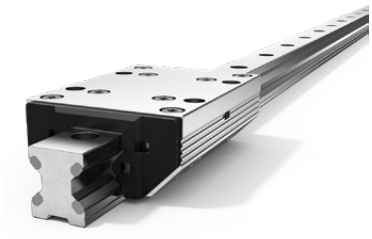

Figure 1: Double rail with cassette

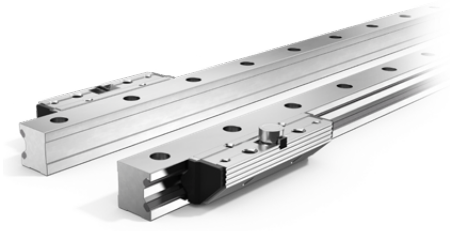

Figure 2: Single rail pair and roller shoe pair

For adjustment, the screw connection of the cassette plate on the adjustment side is loosened slightly. Then the threaded pin integrated in the longitudinal side of the cassette is readjusted. Turning the grub screw produces a displacement of the roller shoe and thus an increase or reduction of the preload.
The setting values of the individual types can be taken from Table 1.4.6 Sliding resistors. More detailed information on the assembly and adjustment of the guide is given in the assembly instructions for the aluminum roller guides.

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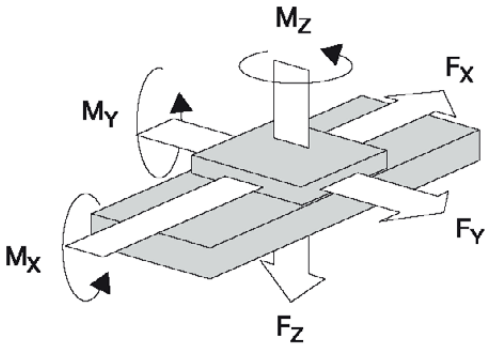
2.2 Design of the guides

The following parameters are required for a correct design of the guide:

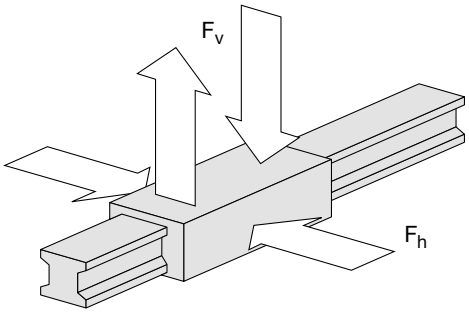
- selection of the arrangement
- all forces/moments applied or generated (dynamic/static), (see Figure 4)
- type of load (static, pulsating, alternating)
- environmental influences (e.g. temperature, humidity) or special operating conditions (e.g. clean room, vacuum)
- travel speed and acceleration
- stroke length
- target service life in km

All forces and torques occurring must be within the permissible limits.
The relevant data can be found on the pages for the types.



2.3 Calculation linear systems

2.3.1 Terms, dimensions



C	=	dynamic load rating	L	=	life time (km)
C_0	=	static load rating	M_{0cx}, 0_{cy}, 0_{cz}	=	perm. stat. Moment load ratingl (Nm)
D_a	=	diameter roller	M_{cx}, c_y, c_z	=	perm. static or dynamic torsional moment (Nm)
F	=	dynamic equivalent load	q_1, q_2	=	time share for F_1, F_2 (%)
F_a	=	off-center load	S	=	safety
F_0	=	equivalent static load			
F_1, F_2, F_n	=	individual loads			
F_h, F_v	=	horizontal force/vertical force			

2.3.2 Static calculation

A static calculation is sufficient for stationary load or minimum linear motion up to v ≤ 0.1 m/s. A sufficiently load bearing linear guide has been selected if the recommended static safety S is achieved.

static safety: $$S = \frac{C_0}{F_0}$$

The equivalent load is made up of the addition of the individual external loads F_v and F_h.

stat. equivalent load: $$F_0 = F_v + F_h$$

Under an off-center load F_a with a torsional moment M_0, the following relationship results:

$$F_0 = F_0 + C_0 \cdot \frac{M_x}{M_{0cx}} + C_0 \cdot \frac{M_{yz}}{M_{0cy,0cz}}$$

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2.3.4.2 Life time

$$L = \left(\frac{C}{F}\right)^{p} \cdot \pi \cdot D_a = \left(\frac{9000}{2400}\right)^{\frac{10}{3}} \cdot 3.14 \cdot 19 = 4890$$

The life time is 4890 kilometers.

2.4 Notes for adjacent construction

2.4.1 Subplate for type FD

When using single rails and roller shoes, a connecting plate (continuing construction) must also be provided. The roller shoes and the connecting plate together form the carriage.

Note on the design of the carriage connecting plate: For better alignment during assembly, the roller shoes have centering grooves. For this purpose, a centering bar is attached to the connecting plate (Figure 4). The dimensions for the manufacture of the centering bar are shown in Table 1. All other dimensions, tolerances and accuracies of the guides are given on the respective pages.

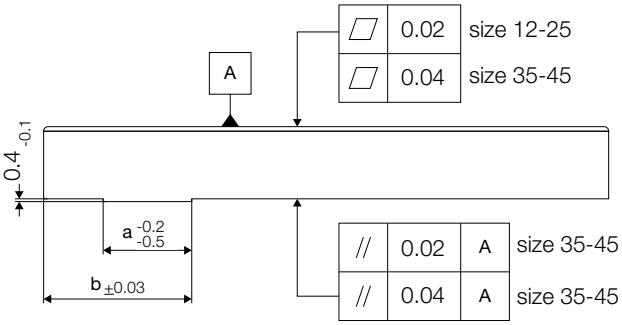

Figure 4: Centering bar

Size	a (mm)	b (mm)
12	4.5	9.6
15	5.0	12.6
20	7.5	16.1
25	10.5	17.6
35	12.5	26.1
45	15.5	31.1

Table 1: Dimensions centering bar

2.4.2 Multilane arrangements

For multilane arrangements, it is advisable to define a locating and a non-locating bearing side on the carriage plate. This is the best way to compensate for tolerances between the rails. For example, the non-locating bearing side can be designed with a driver and an anti-lift device. The locating bearing side performs the guiding function, while the non-locating bearing side compensates for parallelism and height tolerances. It is advisable to install the drive in the immediate vicinity of the guide side, as this is where the drive torques are absorbed.

2.4.3 Assembly area

The contact and contact surfaces have a decisive influence on the function and accuracy of the guideway. Inaccuracies can add up to the running accuracy of the guideway system. In double-track arrangements, for example, exact parallelism and height alignment is required. The accuracies for screw mounting and contact surfaces of the rails from Table 2 must be observed to ensure the running accuracy of the guidance:

Contact surface of the rail	Size 12 - 20 (mm)	Size 25 - 45 (mm)
Max. tolerance for parallelism	0.03/m	0.05/m
Max. flatness screw-on area	0.05/m	0.10/m

Table 2: Accuracies of support and contact surfaces

Please note the recommendation of flatness for the adjacent construction for cassettes:

Size 12 - 15: 0.03 mm
Size 20 - 45: 0.05 mm

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2.4.4 Mounting the rails

The alignment of the rails should be done by means of a ruler or a contact shoulder. Depending on the type of load, the guide rails should be either

1. be screwed together or
2. be screwed and pinned together or
3. be placed against a asset shoulder and screwed together (Figure 5).

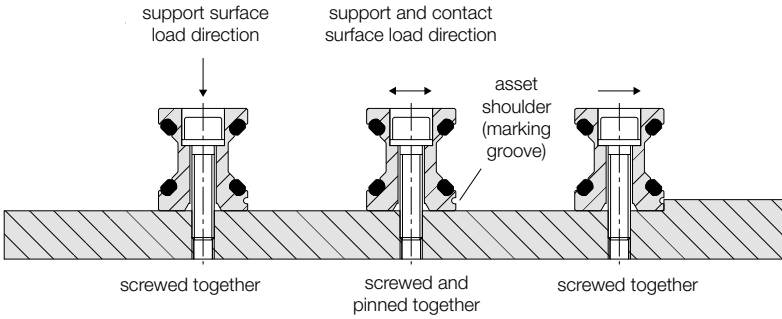


Figure 5: Mounting rail

The load-carrying capacity of the guidance is influenced by the connections between the guiding elements and the adjacent construction. Fastening to the adjacent construction is done using quality 8.8 screws with DIN 433 washers.

2.4.5 Assembly instructions for coupled rails

Rails over a length of 4000 mm are coupled according to Franke standard. The division according to Franke standard ensures a continuous, uniform hole pattern and optimum utilization of the rail length. Partitioning according to customer requirements is also possible.

Coupled rails are specially matched to each other. For correct assembly, the rails therefore have a consecutive production number (e.g. A/1-1/1-2/2/E).

The rails are additionally marked with a marking groove on the lower edge of the rail, which must always be on the same side. The rails must be aligned without gaps. Appropriate auxiliary cylinders are used for this purpose (Figure 6).
Dimensions for the design of the auxiliary cylinders can be found in Table 3. The cylinders are inserted into the raceway at the rail separation points and tensioned by using parallel screw clamps.
The appropriate tightening moments for the respective screw connections are given in Table 4.

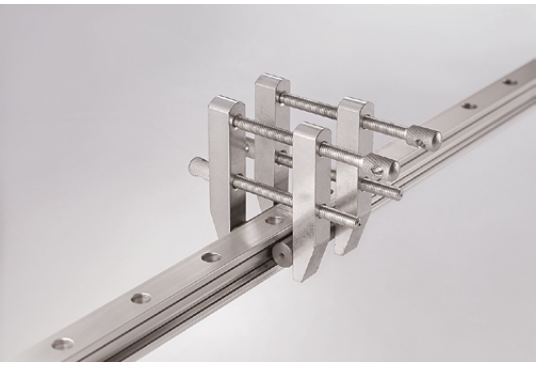


Figure 6: Coupled rails/auxiliary cylinder

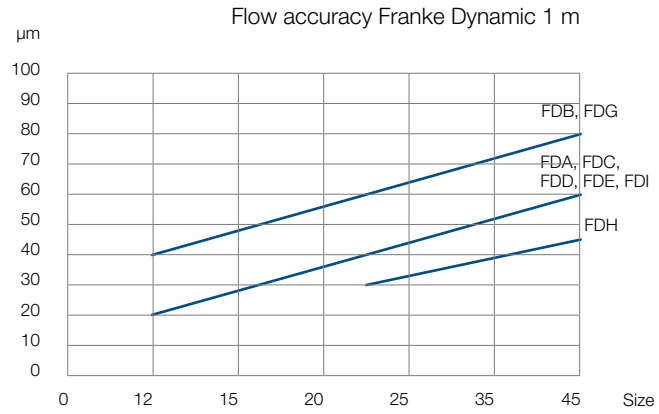
Size	Auxiliary cylinder (mm)
12	11
15	11
20	14
25	16
35	27
45	35

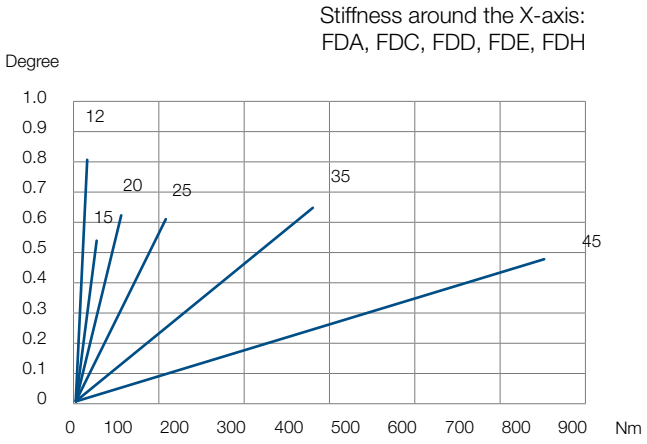
Table 3: Dimenstions auxiliary cylinder

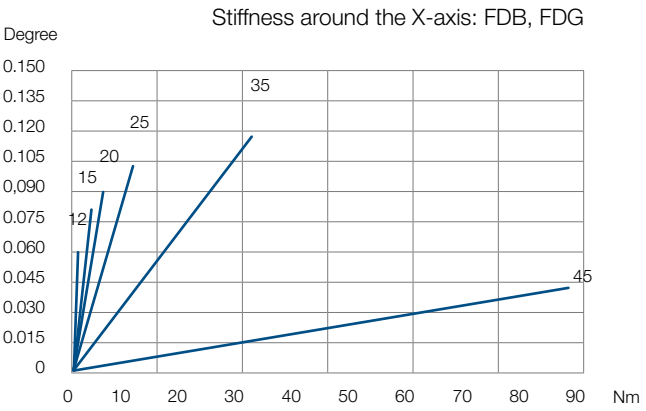
Screw	Tightening moment
M3	1.1
M4	2.5
M5	5.0
M6	8.5
M8	21.0
M10	41.0
M12	71.0

Table 4: Tightening moments for screw connections

2.4.6 Flow accuracy and stiffness







3. Linear tables/modules

3.1 Version

Franke linear systems are suitable, for example, for automation tasks in measuring and testing or for rationalization in handling and assembly. The selection ranges from strokes from 100 mm up to 7000 mm, the drive is via a spindle or belt drive. The lightweight aluminum construction combined with the integrated Franke guide system allows high load capacities and moment loads. For detailed technical data, please refer to the respective catalog pages.

3.2 Application area

For simple loads without acceleration and moment loads, we recommend using Franke linear systems with safety S ≥ 3. For dynamically occurring moments, a safety of S ≥ 6 should be used. The installation position is arbitrary, for vertical operation we recommend a stop or a brake.

The positioning accuracy of the linear systems of type FTB is ±0.052 / 300 mm (IT7) according to the spindle pitch accuracy. Other accuracies are possible on request. The repeatability is ≤ 0.01 mm. The running accuracy of the linear tables FTB is 0.03/300 mm. Franke linear tables can be used in a temperature range from -20 °C to +80 °C. The linear systems FTD 15 - 35 are suitable for continuous operation at temperatures from -30 °C to +80 °C. Please contact us for use in other temperature ranges.

3.3 Limit switch and reference switch

- Reference switch: Franke linear systems of the FTB series have inductive proximity switches that are set to stroke end position. Optionally, another proximity switch can be provided as a reference switch. In the case of linear modules of type FTC and FTD, it is possible to mount freely adjustable limit switches on the outside. Franke linear systems are equipped with PNP-nc 10-30VDC inductive limit and reference switches as standard. PNP-nc, NPN-nc and NPN-nc switches are available on request. Mounting or installation of a length measuring system with sine or square wave signal is possible on request. Rotary encoders can be mounted on the motor.
- Multi-axis units: Franke linear systems can be combined to form multi-axis units. The required angles and adapter plates are selected according to your needs. We supply completely assembled units, ready to use.

4. Assembly

4.1 General information

4.1.1 Symbols and signs used

1. Describes a sequence of actions step by step

Notes and recommendations (e.g. on tightening moments of screws)

There is a risk of property damage or the function of the roller guide will be impaired if the handling instructions are not followed.

4.1.2 Intended use

Franke aluminum roller guides are intended for precise linear movement of loads, e.g. in mechanical engineering, packaging and food processing machinery, handling, robotics and transport. Franke aluminum roller guides should be used exclusively in the intended temperature range of -20°C to +80°C.
Franke GmbH accepts no liability for damage caused by modifications to the linear guides that are not described in the documentation.

4.1.3 Protection and maintenance measures

Store Franke aluminum roller guides in the original packaging until assembly to protect them from moisture and damage. Use only Franke parts for assembly and repairs.

The aluminum roller guides are maintenance-free. The cassettes and roller shoes are lubricated for life.

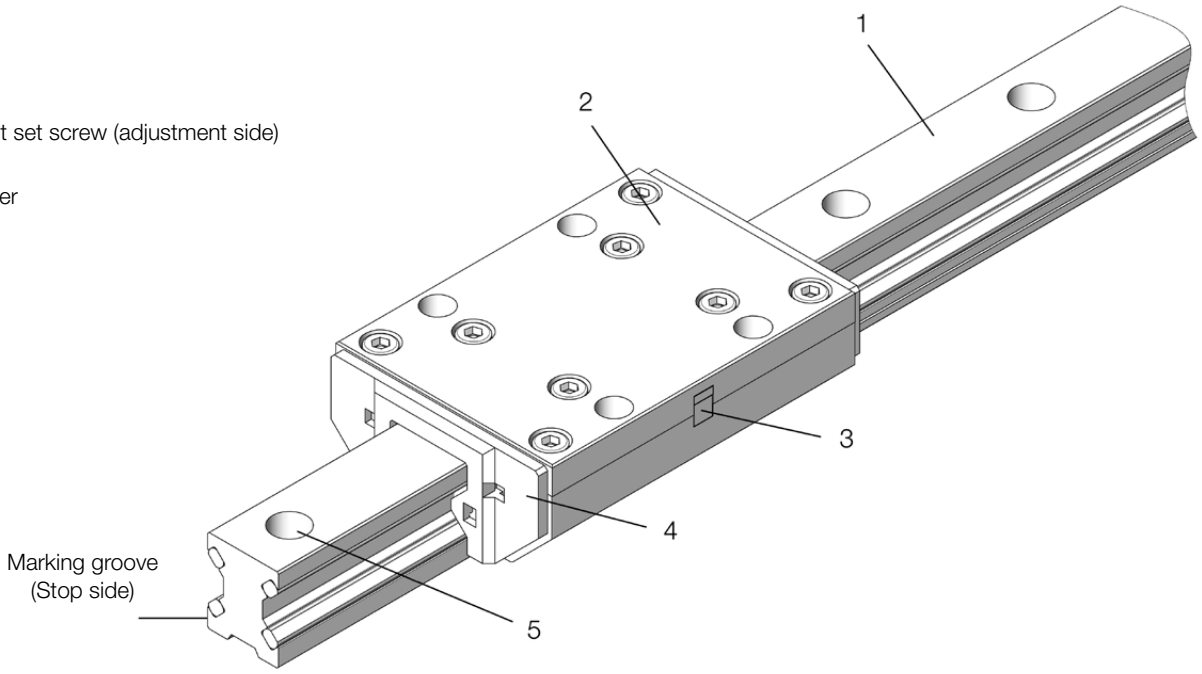
4.1.4 Preparation for assembly, tools and aids

- Torque wrench
- Fastening screws
- Allen wrench
- Allen round wrench
- Dial gauge
- Screwdriver
- Auxiliary cylinder for coupled rails
- Plastic hammer and plastic plate for screw covers

4.1.5 Overview guide varaints

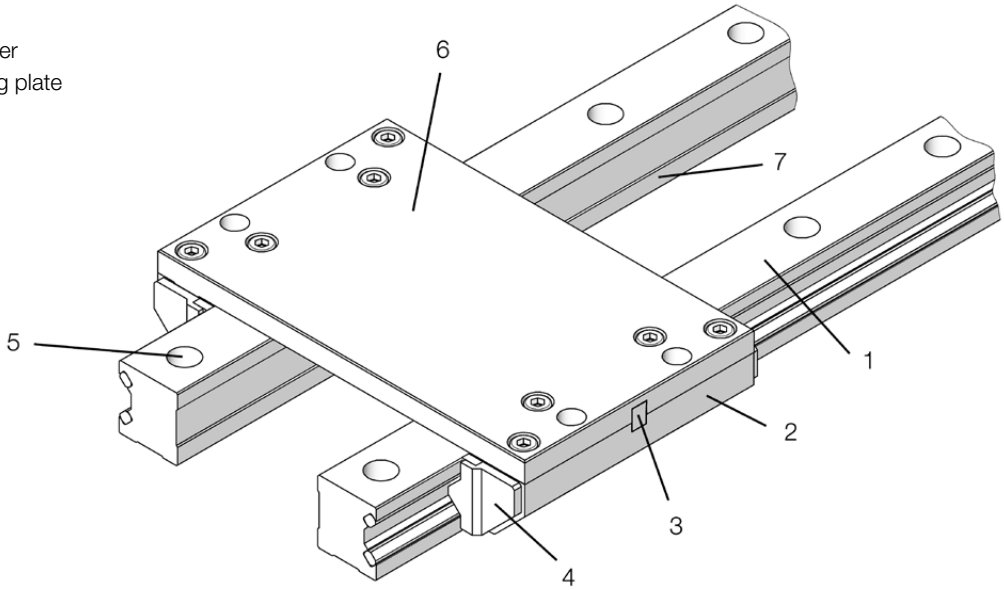
Double rail with cassette (Assembly see chapter 2)

1. Double rail
2. Cassette
3. Adjustment set screw (adjustment side)
4. Wiper
5. Screw cover



Single rails with pair of roller shoes (Assembly see chapter 3)

1. Single rail
2. Roller shoe
3. Adjustment set screw (adjustment side)
4. Wiper
5. Screw cover
6. Connecting plate
7. Stop side



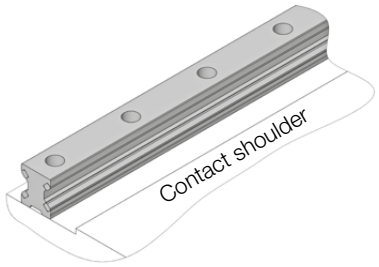
4.2 Assembly of double rail with cassette

The rails are fastened with screws. If possible, screw the double rails against a plant shoulder and use washers.

1. If necessary, pull the cassette off the rail. Check the contact surfaces for dirt and damage.

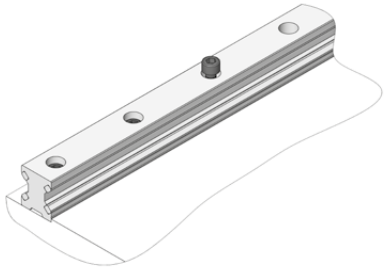
2. Place the rail with the stop side (marked with marking groove) against the contact shoulder.

3. Tighten the screws slightly, check the linearity of the rail.
   The values for this can be found in Table1: „Linearity double rail/single rail“.



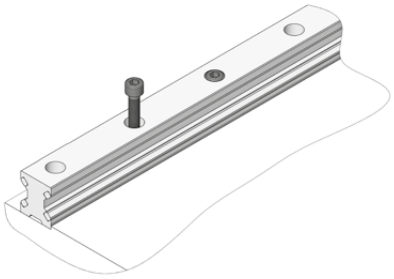
Rail size	max. tolerance linearity (mm/m)
12 - 20	0.5
25 - 45	0.3

Table 1: Linearity double rail/single rail



4. Screw the rail <u>from the center</u> outwards alternately.

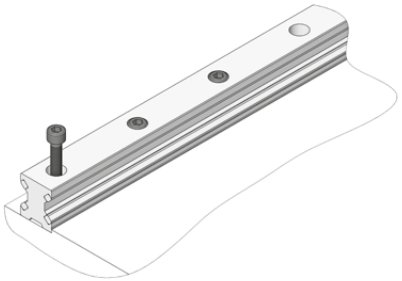
   Observe the specified screw torques (chapter 9).



a. Slide the cassette on the double rail.

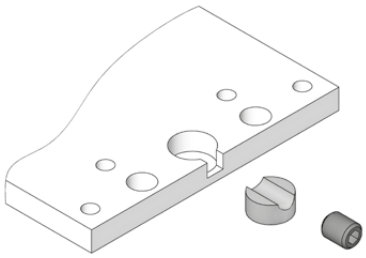
   Observe the correct arrangement of the fixed and adjustment sides of the cassette. The marking groove of the rail must be on the opposite side of the setting set screw.

b. Travel the stroke distance with the cassette.
   The cassette must run smoothly over the entire distance, otherwise check the assembly process.

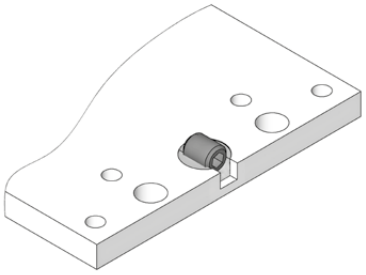


4.3 Assembly of single rails with pair of roller shoes

4.3.1 Assembly of the roller shoes (carriage)



The roller shoes are supplied paired to each other.
Assemble only the two roller shoes that you have taken from the same packaging onto one connection plate at a time.
The roller shoes have a centering groove for better fixing on the fixed side.
The connecting plate has a centering bar for this purpose.



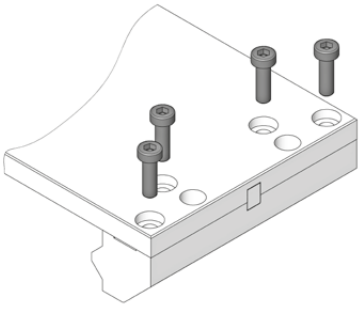
1. To mount the roller shoes, you first need the connecting plate with the adapter piece and the adjusting screw.

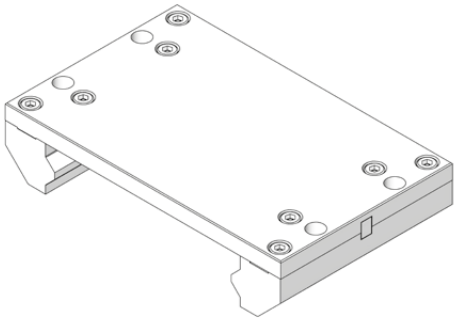
2. Place the adapter piece and the adjusting screw in the bore of the connecting plate.

3. Place the roller shoes on the connecting plate and screw them together. Press the fixed side (with centering groove) outward against the centering bar.

4. Screw all four fastening screws, as well as the two connection screws.

Observe the specified tightening torques (chapter 9).





4.3.2 Assembly of the single rails

The rails are fastened with screws.
If possible, screw the individual rails against a contact shoulder and use washers.

Assemble the first rail (fixed side):

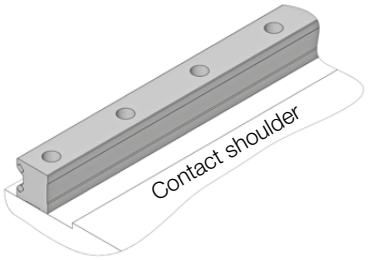
1. Check the contact surfaces for dirt and damage.

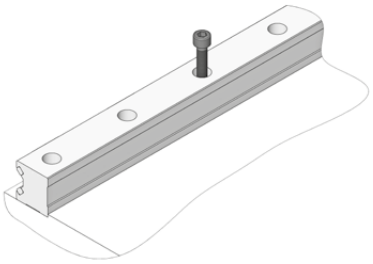
2. Place the rail with the stop side against the contact shoulder.

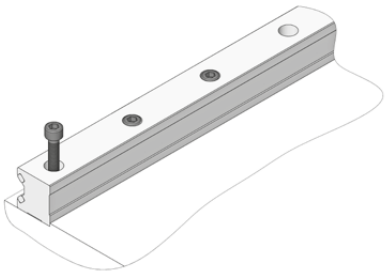
3. Tighten the screws lightly and check the linearity of the rail.
4. (for tolerance values, see Table 1, page 5).

5. Screw the rail from the center outwards alternately.

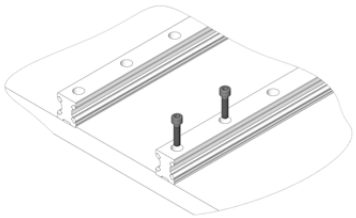
Observe the specified tightening torques (chapter 9).







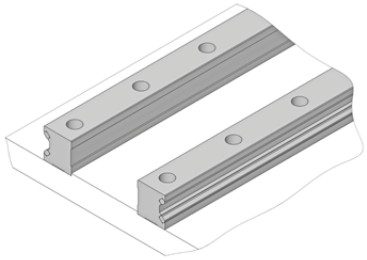
Mounting the second rail (setting side):



1. Place the second rail in its position. Align it parallel to the first rail. Tighten the screws slightly here as well.

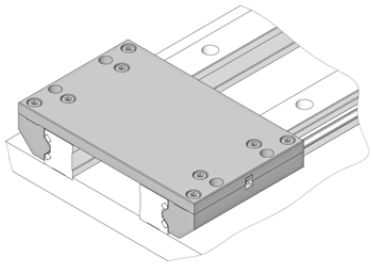
2. Check the parallelism of the two rails. The tolerance limits can be found in Table 2 „Parallelism of single rail“. Screw the rail alternately from the center to the outside.

Observe the specified tightening torques (chapter 9).



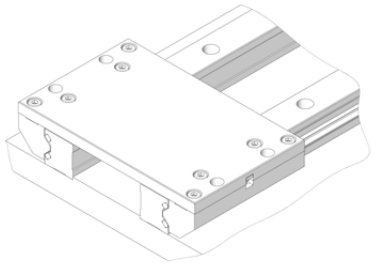
Rail size	max. tolerance parallelism (mm/m)
12 - 20	0.03
25 - 45	0.05

Table 2: Parallelism single rail



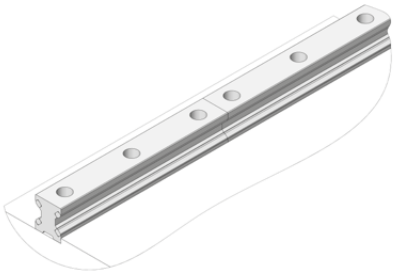
3. Slide the carriage onto the rails and set approximately the correct sliding resistance via the adjusting set screw. The exact setting is made later.

4. un the lifting section with the carriage. It must run evenly over the entire distance, otherwise check the assembly process.



4.4 Assembly of coupled double or single rails

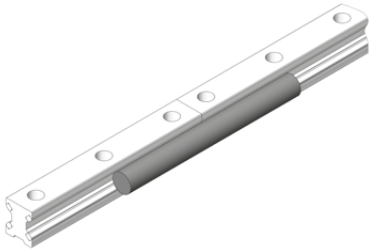
The rails of the aluminum roller guide can also be built up from several individual rails. Rails over a length of 4000 mm are coupled.



1. Check the contact surfaces for dirt and damage.

   Coupled rails are specially matched to each other. Place the rails with consecutive production number (e.g. A/1-1/2-2/3-3/E) one after the other.

   Random coupling is not possible. The marking groove must be on the same side throughout for double rails.

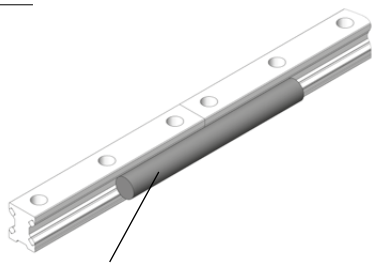


2. Align the rails without any gaps and tighten the screws lightly.

3. Then use auxiliary cylinders to align the transition exactly (see Table 3).

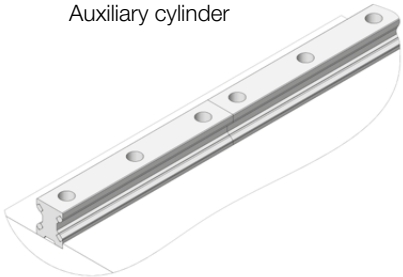
Rail size	12	15	20	25	35	45
Auxiliary cylinder Ø [mm]	11	11	14	16	27	35
Length [mm]	60	60	60	60	100	100

Table 3: Cylinder diameter



a. Insert the cylinders into the raceway at the point where the rails separate.

b. Clamp the cylinder using a parallel screw clamp.



4. Check the linearity (tolerances Table 1, page 5) and, in the case of single rails, also the parallelism of the rails (tolerances Table 2, page 8)

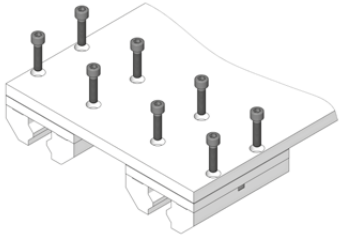
a. Now screw the rails together.

   Observe the specified tightening torques (chapter 9).

b. Slide the cassette or carriage onto the rails and adjust the sliding resistance as described in chapter 7.

4.5 Assembly of multilane arrangements

Cassettes that are mounted on the rail on delivery are already set to the correct sliding resistance.

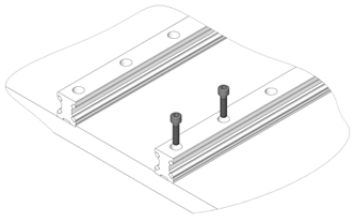


⚠ Do not exchange cassettes and rails at random here. You must adjust individually supplied, loose cassettes to the respective rails.

1. Screw the cassettes on the connecting plate.
2. Mount one of the double rails (guide rail) as described in chapter 2.

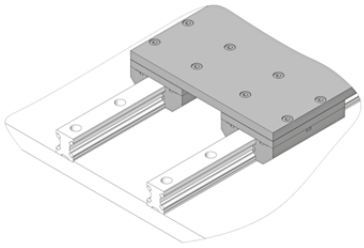
a. Place the second rail on your position. Roughly align it and lightly tighten the screws.

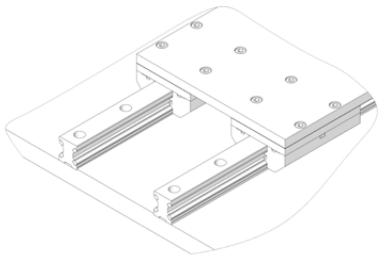
b. Slide the cassettes with the connecting plate (carriage) onto the rails.



3. To align the second rail in parallel, travel the entire rail section with the carriage. The permissible tolerances for parallelism can be found in Table 2, page 8.
4. Now screw the second rail.

Observe the specified tightening torques (chapter 9).

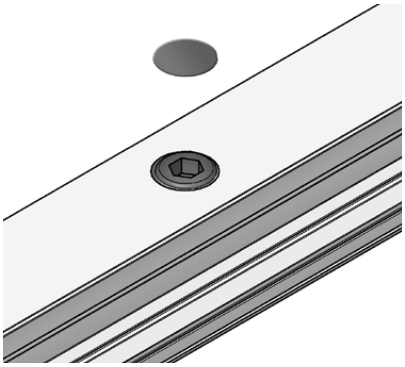


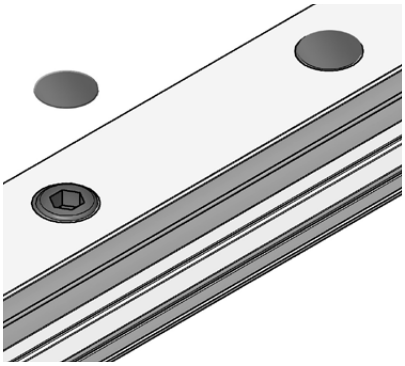


4.6 Assembly of screw covers

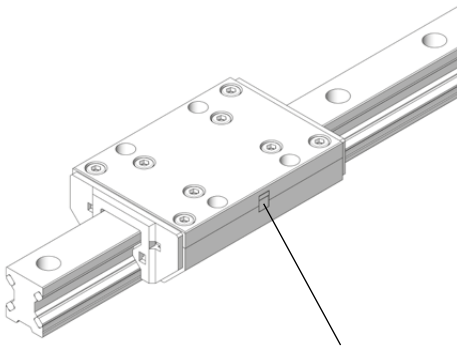
Use the covers provided to protect the wipers of the cassette and carriage.

1. Place the covers in the holes of the rail.
2. Cover the rail with a plastic plate and then tap the covers flat into the rail with a hammer.
3. Remove the burr if necessary.





4.7 Adjusting cassette or carriage



Adjusting set screw

Cassettes that are mounted on a rail on delivery already have the correct sliding resistance. Do not exchange cassettes and rails at random here. You must adjust individually delivered, loose cassettes to the respective rails:

1. Remove the wipers from the cassette or roller blocks (see chapter 8.2). Slide the cassette or roller carriage on the rail.

   ⚠ Observe the correct arrangement of the fixed and adjustment sides of the cassette. In the case of double rails, the marking groove of the rail must be on the opposite side of the setting set screw.

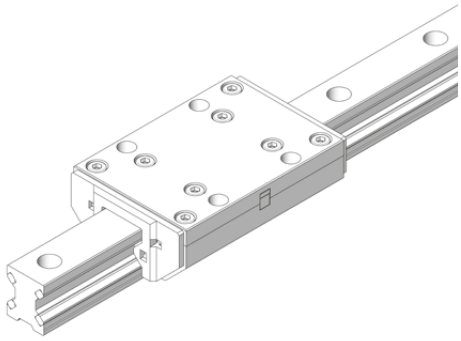
2. Loosen the four fixing screws on the adjustment side and tighten them slightly again.

3. Adjust the sliding resistance via the adjusting set screw. Turning the set screw produces a displacement of the roller shoe and thus an increase or reduction of the preload.

4. Tighten the four screws on the adjustment side again.

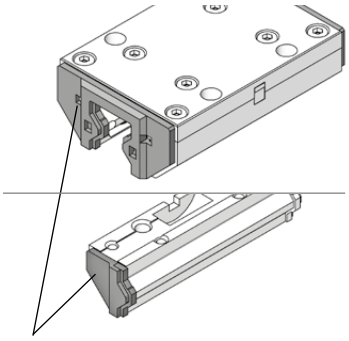
1. Check the slide resistance with a spring balance. Take the values from Table 4: „Guide values for slide resistances [N]“.

Repeat steps 2 to 4 until the correct slide resistance is set. Then tighten all fastening screws to the specified tightening torque (chapter 9).



Series		FDA	FDB	FDC	FDD	FDE	FDG	FDH	FDI
12	Min.	0.7	0.3	0.7	-	0.5	0.3	-	3.0
	Max.	1.3	0.6	1.3	-	1.0	0.6	-	4.0
15	Min.	1.0	0.4	1.0	-	0.8	0.4	-	3.0
	Max.	2.0	0.8	2.0	-	1.5	0.8	-	4.0
20	Min.	2.0	0.5	2.0	-	1.0	0.5	-	3.0
	Max.	3.0	1.0	3.0	-	2.0	1.0	-	5.0
25	Min.	4.0	0.8	4.0	4.0	1.5	0.8	2.0	6.0
	Max.	5.0	1.2	5.0	5.0	2.5	1.2	4.0	8.0
35	Min.	5.0	1.5	5.0	-	2.5	1.5	8.0	8.0
	Max.	7.0	2.5	7.0	-	3.5	2.5	10.0	10.0
45	Min.	6.0	1.5	6.0	-	3.0	1.5	5.0	8.0
	Max.	8.0	2.5	8.0	-	4.0	2.5	8.0	10.0

Table 4: Guide values for slide resistors [N]



Wiper

4.8 Wiper

If the wipers are supplied loose, they must be mounted on the cassette or roller shoes.

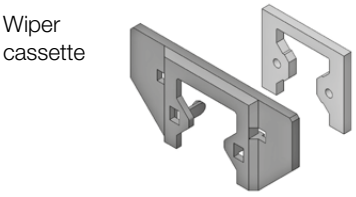
4.8.1 Assembly of wiper

1. Pull the cassette off the guide rail.

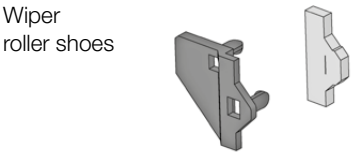
a. Soak the felt scraper with oil if necessary.

b. Place the felt wiper in the wiper plate and guide the snap lugs of the plate through the slot on the wiper. If you are using a metal wiper, insert it into the wiper plate before the felt wiper.

c. Now clip the wipers with the locks onto the roller shoes or cassette.



Wiper cassette



Wiper roller shoes

Make sure that you do not damage the wipers. You should replace the felt wipers after 6000 km at the latest.

The felt wipers are impregnated with „Mobil DTE26“ at the factory.
The service life of the felt wipers can be extended by regular re-oiling.

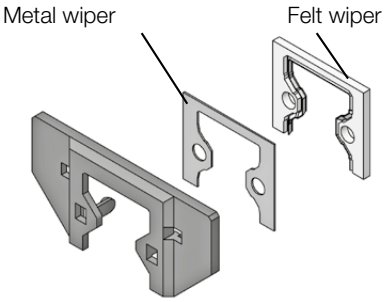
4.8.2 Disassembly of wiper

1. Pull the cassette or carriage off the guide rail.

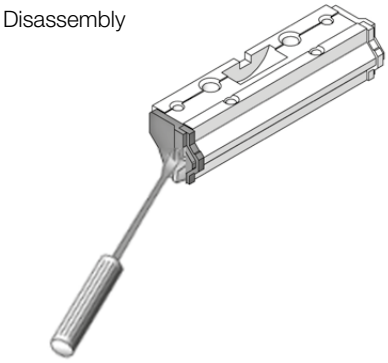
2. Insert a screwdriver on the same stripper side first into the inner and then into the outer recess and use it to disengage the snap lugs.

a. Repeat the process on the other side of the wiper.

b. Pull off the wiper.



Metal wiper Felt wiper



Disassembly

4.9 Tightening moments for screw fittings

Screw size	Tightening moment
M3	1.1
M4	2.5
M5	5.0
M6	8.5
M8	21.0
M10	41.0
M12	71.0

Table 5: Tightening moments for screw fittings [Nm]

For further information please contact our service team
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