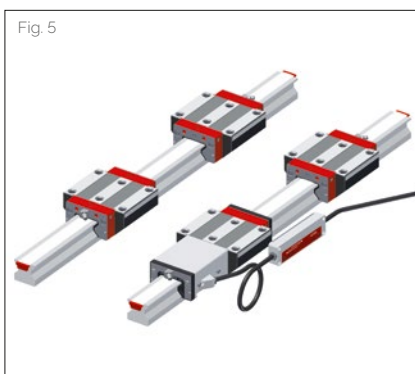


1 Overview of all MONORAIL products

Fig. 5

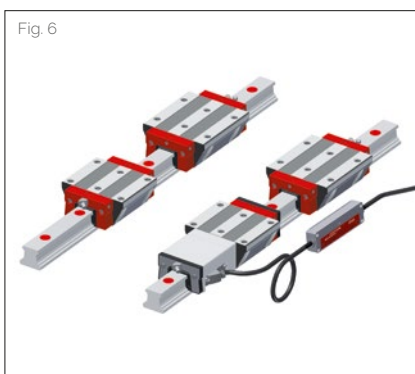


AMS 3B

(Fig. 5) The MONORAIL AMS 3B is an integrated magneto-resistive measuring system for absolute distance measurement based on the MONORAIL MR roller profile guideway. This results in the provision of a compact axis with linear measurement and guidance specially for machine tool applications. No additional assembly or adjustment of the measuring system is required, which is reflected by cost savings in machine design, manufacture and servicing. The accuracy and process reliability of the machine are also improved. The sturdy housing for the read-head has a complete wiper system consisting of longitudinal and cross wipers, which provide optimum protection for the measuring system. AMS 3B is available in both analog and digital versions.

The AMSA 3B analog version has a voltage interface of 1 Vpp for connection to all standard control systems, and forms the basis for the AMSD 3B digital version. The profile rails are thus identical and are compatible with both versions. The AMSD 3B version has an incremental, digital interface and a range of reading head options that permit different resolutions and allow the system to be adapted to control systems with different input frequencies.

Fig. 6



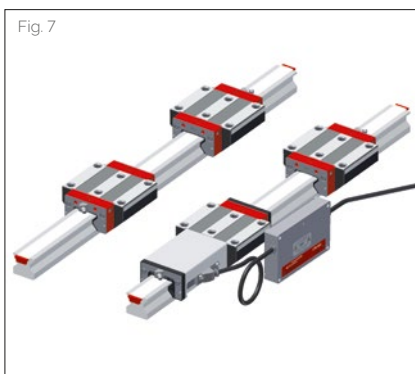
AMS 4B

(Fig. 6) The MONORAIL AMS 4B is an integrated magneto-resistive measuring system for distance measurement based on the MONORAIL BM ball profile guideway. In measuring terms, the AMS 4B is the same as the AMS 3B; it offers the same performance in terms of assembly, cost savings, accuracy and process reliability. AMS 4B products are preferred for use in applications that make major demands on travelling speed and require good resistance to acceleration and vibration.

AMSABS

(Fig. 7) The MONORAIL AMSABS is an integrated magneto-resistive measuring system for distance measurement with an absolute interface. The AMSABS 3B is based on the MONORAIL MR roller profile guideway, while the AMSABS 4B is based on the MONORAIL BM ball profile guideway. New features have been added to the proven benefits of the AMS products. These simplify the use of distance measuring systems in industrial environments. Because of the absolute nature of the measuring system for distance measurement, there is no longer any need for a reference run after switching on. This saves time, and thus saves costs. In addition, redundancy of information processing increases operational reliability. SCHNEEBERGER provides an absolute interface with various cable lengths to connect it with the SSI, SSI+SinCos, FANUC, Mitsubishi and Siemens Drive CliQ® controllers.

Fig. 7

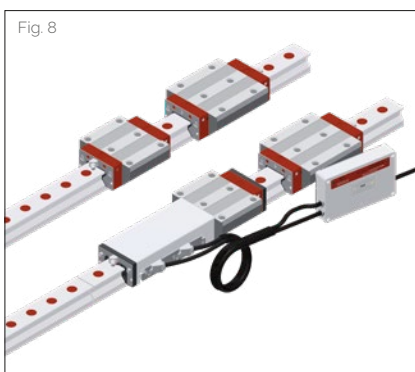


AMSABS 3L

(Fig. 8) The MONORAIL AMSA 3L is an integrated magneto-resistive measuring system for distance measurement based on the MONORAIL MR roller profile guideway with an analog voltage interface. It is SCHNEEBERGER's newest product, and is designed for use with very long axes. The AMSA 3L is made possible by the very precise construction of the measuring rails, in both mechanical and measuring terms. The special design of the rail joints, combined with the AMSA 3L reading head, means that it is possible to travel across the joints and to make the measuring axes as long as you wish.

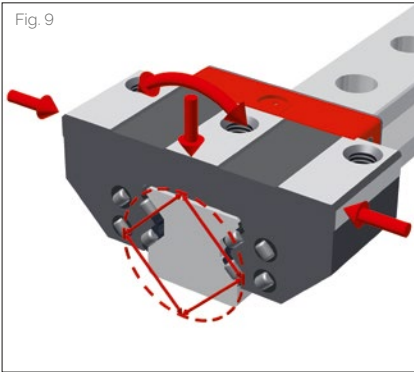
Other features of the AMSA 3L include fully interchangeable individual rails, carriages and reading heads, and reading heads with integrated electronics. A special production process also ensures that AMSA 3L components are widely available around the world. The AMSA 3L has an analog voltage interface of 1 Vpp for connection to all standard control systems.

Fig. 8



1.1 Features of the MONORAIL system

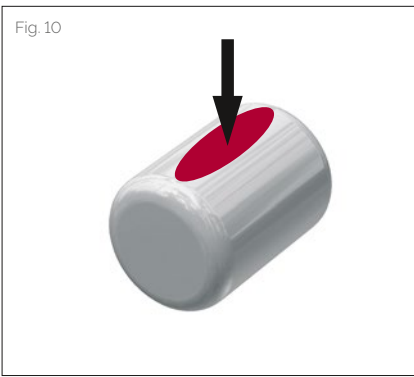
Fig. 9



1.1.1 O-geometry

(Fig. 9) Large internal spacings of the load carrying surfaces are implemented with what is called an O-arrangement of the guideway. In conjunction with roller tracks that are offset by 90°, this achieves a uniform and high absorption of forces from all directions and provides high moment rigidity.

Fig. 10



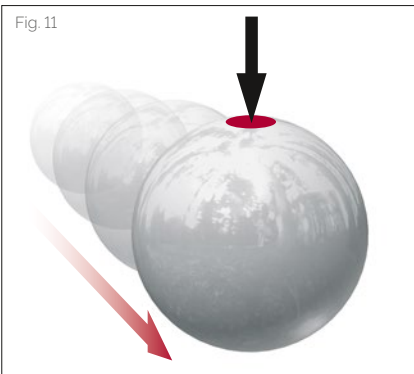
1.1.2 Roller with a convex 'barrel' profile

(Fig. 10) Linear guideways have a significant influence on the overall rigidity of a machine tool. With roller MONORAIL MR, the demonstrably high degree of rigidity is achieved by using rollers, with a convex profile, as rolling elements and the optimized cross-sections of the carriage and the rail.

Compared with a ball guide, a roller guide has a flat and much larger contact area, which results in a far greater load carrying capacity.

The barrel shape enables the contact surface to adjust to the particular load and provides a smooth transition from the load zone to the unloaded recirculation area. This results in a significant reduction in wear since it avoids edge loading coupled with minimum roller friction.

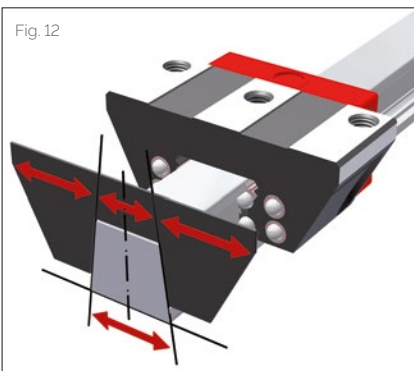
Fig. 11



1.1.3 Ball with 2-point contact

(Fig. 11) The MONORAIL BM is a modern, 4-row ball guide with O-geometry. Even when preloaded and under load, a ball that is in the load zone only contacts the track contour of the rail and the carriage at two diametrically opposed points. Compared to a guide with 4-point contact, the precision fit of the tracks to the ball provides significantly greater load carrying capacity. Friction is minimised as the balls roll more or less without any differential slip, which results in smooth, even running.

Fig. 12



1.1.4 Trapezoidal rail profile

(Fig. 12) The trapezoidal rail profile meant it was possible to optimize the carriage cross sections and the connection of the base surface of the rail to the sub-structure to achieve the highest possible rigidity. This rail profile enables easy servicing since additional wipers can be replaced directly on the rail without any complicated removal of the carriage.

1.1 Features of the MONORAIL system

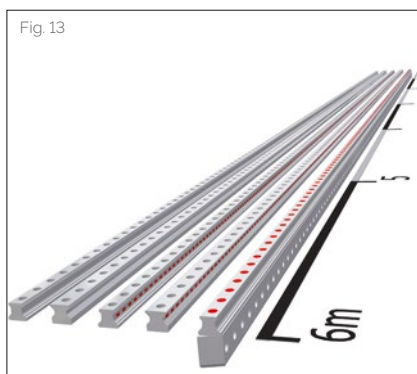


Fig. 13

1.1.5 In one piece up to 6 metres long

(Fig. 13) SCHNEEBERGER offers guideways for all its products in single piece lengths of up to six metres. As a result, fewer butt joints between rails are required on long guideways. This not only simplifies assembly work, but also offers improved accuracy and extends the service life of the system.

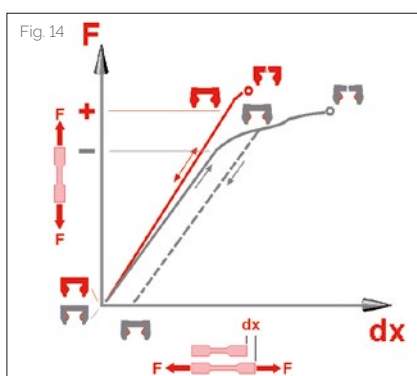


Fig. 14

1.1.6 Through-hardened carriages

(Fig. 14) The steel body of the carriage is a critical element if a machine is to have a long service life with a constant level of precision. In order to satisfy these high demands, even under extreme loads and without any plastic deformation of the carriage throughout its entire period of use, SCHNEEBERGER uses high-grade bearing steels in which not just the running surfaces, but the complete carriage body are hardened. Even when subjected to loads exceeding their recommended levels, MONORAIL carriages maintain their specification as no plastic deformation can occur.

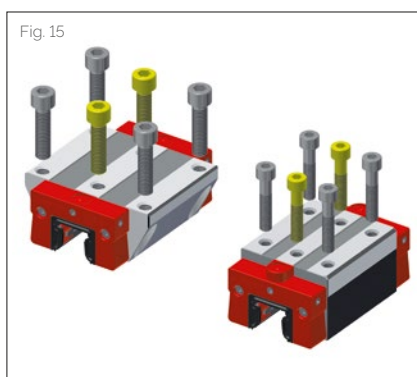


Fig. 15

1.1.7 6 attachment holes per carriage

(Fig. 15) When a carriage is subjected to tensile forces, the rigidity achieved is largely dependent on the way that it is connected to its surrounding structure. In order to achieve the maximum degree of rigidity, all SCHNEEBERGER carriages have six threaded fixing holes in the top of the carriage.

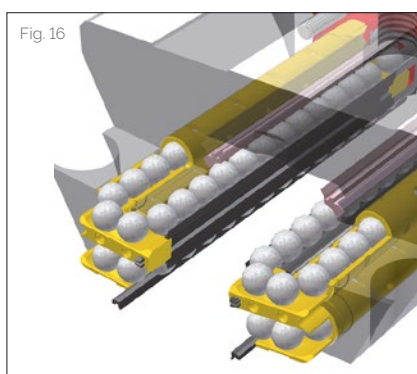


Fig. 16

1.1.8 Unique running characteristics

(Fig. 16) Particular attention was focused on the run-in area of the rollers from the unloaded to the loaded zone. This area was geometrically balanced to provide very smooth operation, i.e. minimum travel pulsation, pitch movement and noise for both low and high speed motion



1.1 Features of the MONORAIL system

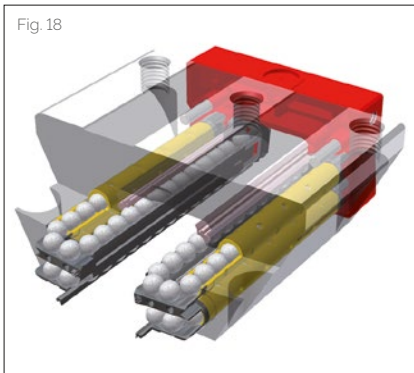
Fig. 17



1.1.9 Complete sealing

(Fig. 17) MONORAIL carriages are equipped as standard with twin-lipped cross wipers on the ends and top and bottom longitudinal wipers. Together with additional sealing of the gaps between the front plate and the steel body, these provide an exceptionally efficient sealing system. The ingress of dirt is therefore effectively prevented and lubrication losses are reduced to a minimum, which results in a significant increase in service life. Correct function of the wipers is improved even further by the smooth, ground surface of all sides of the rail. SCHNEEBERGER also offers various solutions to close the rail fixing holes perfectly flush.

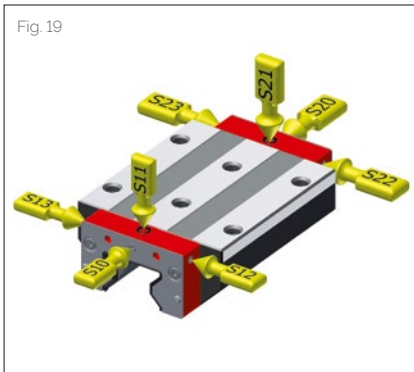
Fig. 18



1.1.10 Rolling element recirculation parts made of synthetic material

(Fig. 18) The return passage of the rolling elements has a substantial influence on the running properties of the carriage. For this reason, all SCHNEEBERGER products are fitted with synthetic recirculation parts. Apart from the reduction in noise, the synthetic components have been designed to form an additional reservoir of lubricant. The additional lubricant can substantially extend the service life of the carriage.

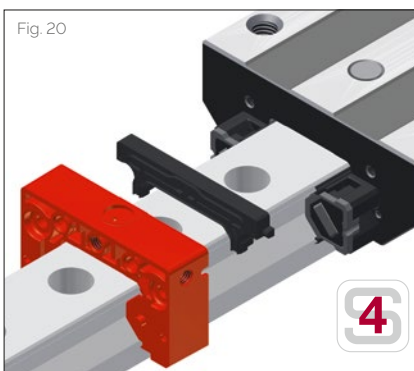
Fig. 19



1.1.11 Versatile lubrication connection

(Fig. 19) Carriages have a range of lubrication connections (on both sides on the front face, at the sides and on top) that can be prepared for connection to a lubrication supply in line with customers' specifications. This allows the connection of the lubrication supply to be connected in the best way to suit the type of lubrication and the specific installation involved. Where oil lubrication for special installation positions is required, both sides of the carriage can also be independently supplied with lubricant.

Fig. 20

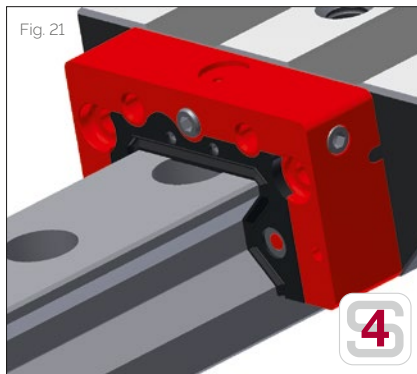


1.1.12 Visible configuration of the lubricant distribution

(Fig. 20) The visible configuration rules out any possibility of confusion. In standard lubricant distribution (black pin is visible), all four running surfaces have a lube connection. The lubricant is distributed on all tracks in the front plate and redirection units.

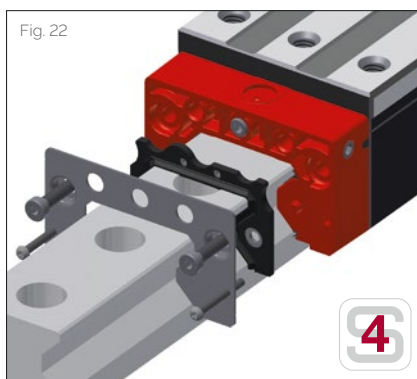
In separate lubricant distribution (gray pin is visible), two lube connections are used, which supply the right and left tracks separately.

1.1 Features of the MONORAIL system



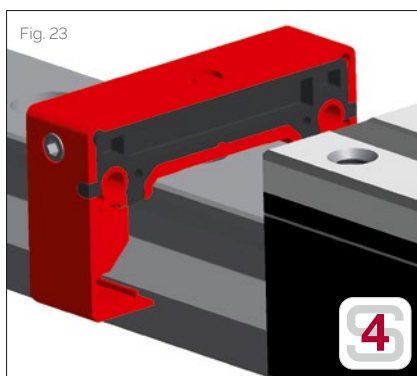
1.1.13 Replaceable wipers

(Fig. 21) The cross wiper is mounted as a separate element in the front plate housing and can be removed in an axial direction once the front panel has been removed. A hinge in the center of the wiper allows it to be deformed without being destroyed, and removed via the guideway. This ensures that the wiper can be replaced easily and without removing the carriage. A new wiper can be exchanged between two carriages with no any problem.



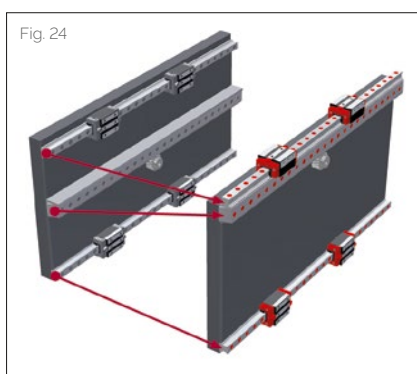
1.1.14 Front panel made of stainless steel

(Fig. 22) The front panel covers the red front plate and is firmly connected to the body by four screws. The outside of the front plate is therefore protected against environmental influences. The front panel also gives the front plate greater stability and the cross wiper is protected against damage. The front panel ensures precise attachment of accessories, such as additional wipers or lubrication plates.



1.1.15 Pressure-tight lubrication channels

(Fig. 23) The lubricator is firmly connected to the front plate by ultrasonic welding. As a result, pressure-tight lubrication channels are formed inside the components. The lubricant applied through the lube connection can get to the rolling elements and lubrication reservoirs safely and precisely, even at high pressures. This therefore ensures that the lubricant is sufficiently distributed, even when the carriage is static.

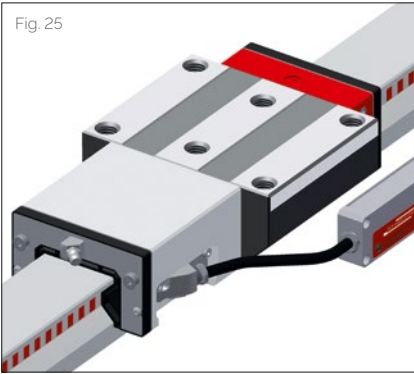


1.1.16 Integral racks

(Fig. 24) Rack systems offer a high-grade gear rack that is integrated into the guideway. Single piece rail lengths of 6 metres and the possibility to butt joint rails means very long traverse lengths can be achieved with a high degree of accuracy. Integral construction reduces the amount of manufacturing, assembly and logistics compared with a system with a separate rack, which results in substantial cost savings. It is now possible to construct a machine axis, that used to require three precision support surfaces with only two. It is no longer necessary to do any time consuming alignment work between the guide system and the rack.

1.1 Features of the MONORAIL system

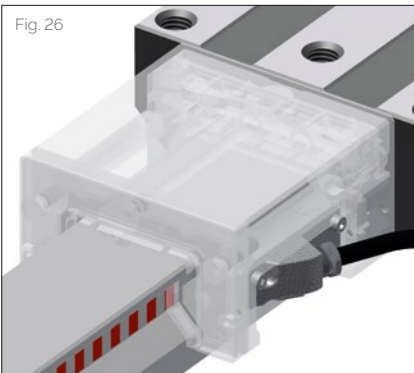
Fig. 25



1.1.17 Integrated linear scales

(Fig. 25) Combining a high-precision linear encoder with a MONORAIL guide rail results in an integrated measuring system that is simple to install without the need for any separate assembly or adjustment work. This provides cost-savings in the design, manufacture and maintenance of equipment. With its integrated systems, SCHNEEBERGER supplies solutions that offer a substantial reduction in complexity when constructing machine axes with direct linear scale systems.

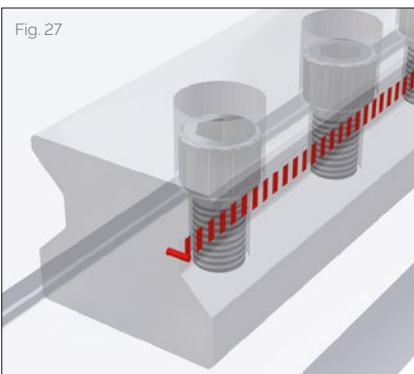
Fig. 26



1.1.18 Magneto-resistive measuring principle

(Fig. 26) The sensor is based on a specially adapted magneto-resistive measuring process. If any relative movement occurs between the sensor and the measuring scale, the change in field strength results in an easily measurable change in electrical resistance. Any interference caused by temperature, superimposed magnetic fields, displacement and ageing is minimised due to the bridge circuit. The sensing head works continuously, which ensures that the function of the sensor is not affected by any particles. The sensing process operates so well that no adjustment work is necessary after service exchange of a measuring head.

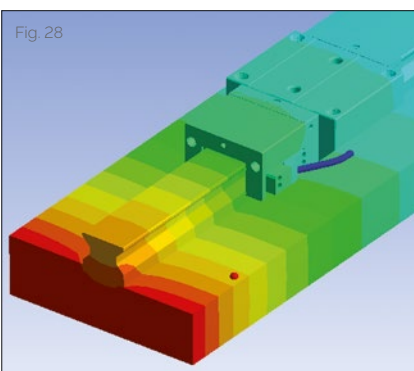
Fig. 27



1.1.19 Position measurement close to the process

(Fig. 27) A good thermal connection between the measuring system and the bed of the machine is provided, firstly, by the extensive connection of the guiderail to the integral measuring scale and, secondly, by the rigid attachment of the guiderail to the bed of the machine. The benefit of this is that changes in the temperature of the bed of the machine are transferred directly to the measuring system. The good thermal interconnection between the measuring standard, the guiderail and thus the bed of the machine means that these machines do not require any reference points or temperature sensors to achieve excellent process stability.

Fig. 28

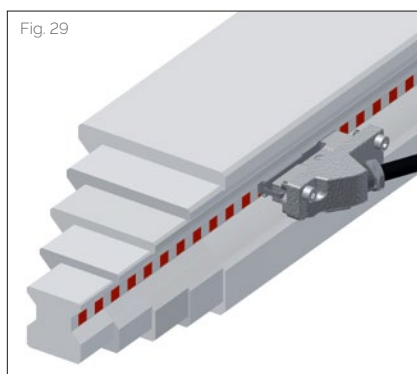


1.1.20 Thermal expansion like steel

(Fig. 28) The magnetic measuring scale is installed in a groove in the rail section. Use of a specially adapted ferromagnetic material ensures that the longitudinal expansion of the scale, caused by thermal influences, is identical to the expansion of the steel bed of a machine.

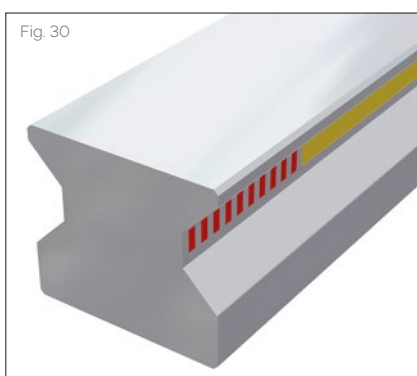
The measuring standard is firmly attached at both ends to the guide rail and has exactly the same rate of expansion as the guide rail. No compensation for temperature is therefore required when machining steel parts.

1.1 Features of the MONORAIL system



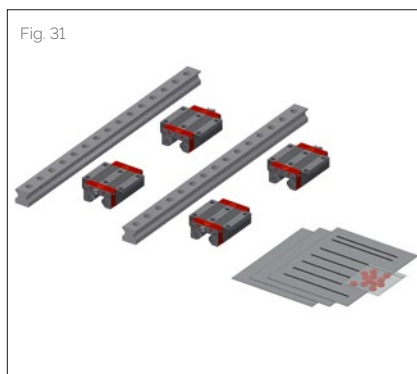
1.1.21 One reading head for all sizes

(Fig. 29) The measuring scale is positioned identically on all rail sizes, meaning a single reading head can be used for all sizes of the product group concerned. The measuring scale is fixed very robustly in the rail and any effect of wear is taken by the reading head slider. All reading heads can be used on all models of rail supplied. These 3 points mean that only a small service stock of reading heads is needed to support a high volume of installations. The new generation of reading heads offer increased waterproofness to IP68 and are made of rust-resistant materials. The connections between parts are also resistant to chemical substances. This ensures that SCHNEEBERGER AMS products retain their proven characteristics even in areas where they are constantly exposed to water, aggressive cooling lubricants or other emulsions.



1.1.22 Protected measuring scale

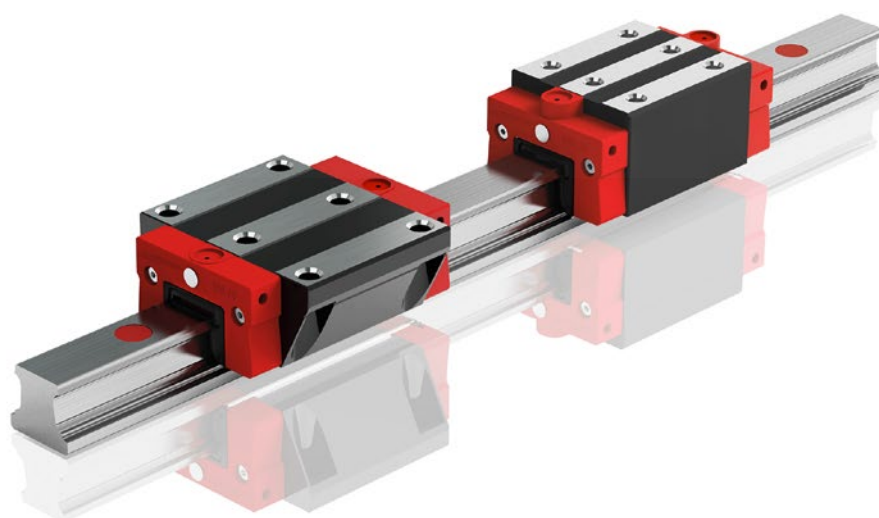
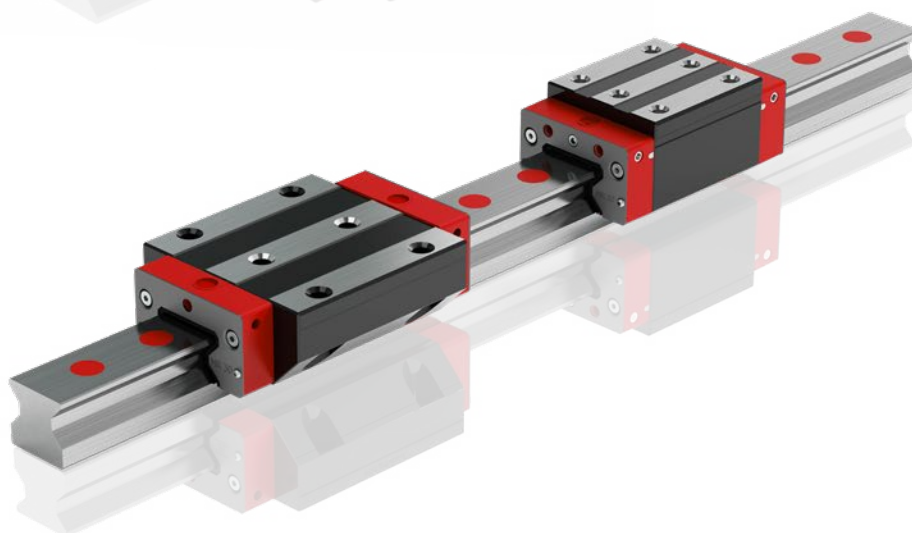
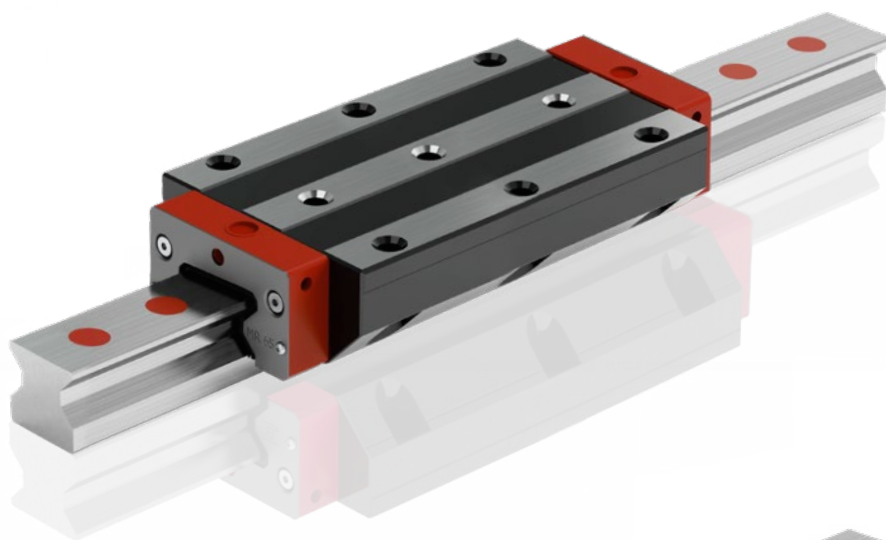
(Fig. 30) Following production, the integral measuring scale is protected from mechanical damage and magnetic interference by an extremely hard, non-magnetic cover strip. Using a special manufacturing process, the strip is laser welded to the rail which reliably protects the measuring scale from the effects of coolants and wear and tear. Measuring scales are consequently extremely robust and reliable.



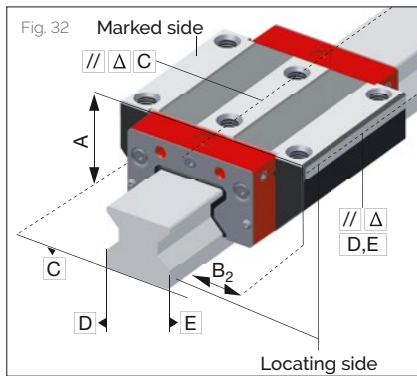
1.1.23 Supply of complete axis sets

(Fig 31) If required, SCHNEEBERGER products can be supplied as sets. This means that customers receive complete rail and carriage sets built up and checked to their requirements. The protection required is also adapted to suit individual requirements. Assembly by the customer is therefore limited to essential tasks such as aligning the systems to the surrounding structure, assembling the carriages, connection to the drive elements and lubrication system as well as hooking up the sensor system connection to the control system.









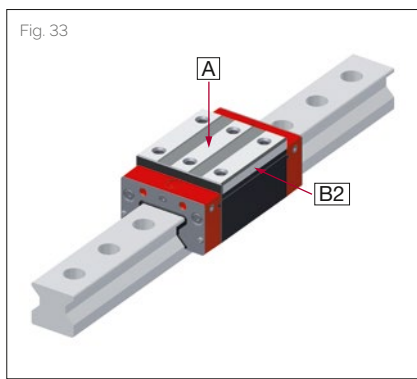
2.1 Features and options



2.1.1 Accuracy classes

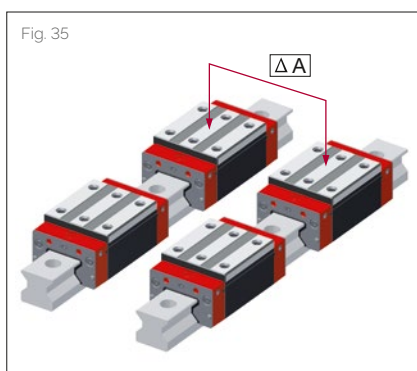
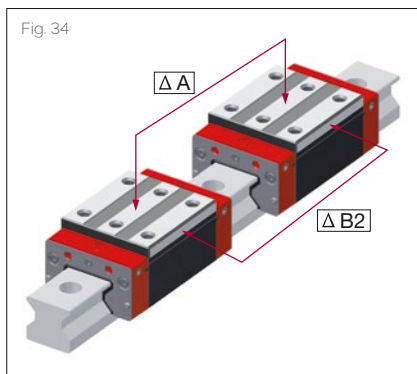
(Fig. 32) The four accuracy classes allow the user to select both the guid rails and the carriages in line with specific application and design requirements. Accuracy classes define the running accuracy of the rails and determine the dimensional tolerances of the carriages.

-  **G0** Highly accurate
-  **G1** Very accurate
-  **G2** Accurate
-  **G3** Standard



2.1.2 Dimensional tolerances

(Fig. 33) MONORAIL carriages and rails are manufactured independently of each other, both to very tight tolerances, and are therefore completely interchangeable. This means that any carriage can be used on any rail of the same size without any influence on the preload level because the preload is determined by the rolling elements of the carriage. For the dimensional differences between any carriages on any rail, the values from column one of the following table are applicable.



Accuracy classes	Tolerances between carriages and rails	Max. difference in measurement between the carriage on a rail when products are delivered as a system (rails with carriages)	Max. dimensional difference of the carriages between 2 or more rails, standard
	A/B2	ΔA/ΔB2	ΔA Standard
G0	± 5 μm	3 μm	10 μm
G1	± 10 μm	5 μm	20 μm
G2	± 20 μm	7 μm	40 μm
G3	± 30 μm	25 μm	60 μm
	Measured at the middle of the carriage and in any rail position Values only valid up to 1 m rail length	Measured at the middle of the carriage and at the same rail position The parameters are doubled for ball products and products delivered individually	Measured at the middle of the carriage and at the same rail position

2.1 Features and options

2.1.3 Matched carriages

All the carriages in a set are fitted one behind another on a production norm, and their top and side joint surfaces are ground smooth. Then the main dimensions A and B2 are measured on a test rail, and the carriages would then be paired up. There are two quality levels of carriage matching.

Matching carriages	Maximum dimensional differences between carriages in a pair
Version	$\Delta A/\Delta B2$
SLWGP0	3 μm
SLWGP1	5 μm

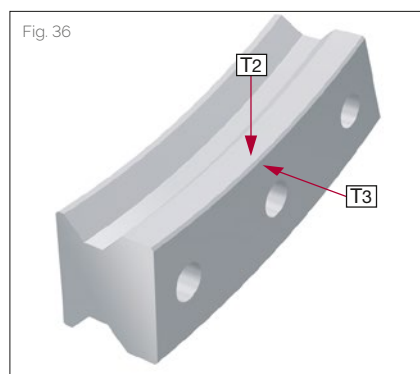
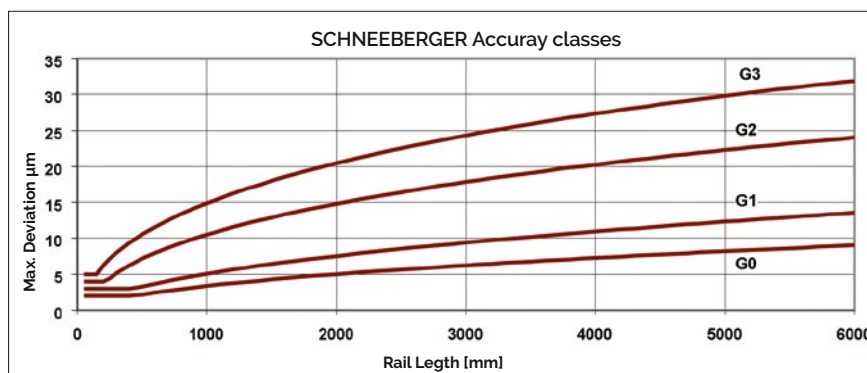
2.1.4 Matched rails

With "matched rails", we search the data to find suitable rails with similar characteristics. The criterion used for the selection process is the maximum difference in the run-off over the rail length, the so-called pairing tolerance. The range of all run-off reports for matched rails lies within this tolerance. Matched rails are available in four quality levels.

Matching rails	Mating tolerance
Version	
SLSGP0	5 μm
SLSGP1	10 μm
SLSGP2	15 μm
SLSGP3	20 μm

2.1.5 Running accuracy

The run-out accuracy of the carriages can be either linear or a wave-shaped within the tolerance limits. The maximum permissible deviation is defined by the accuracy class of a rail. The actual tolerance is determined from the above diagram as a function of rail length and accuracy class. Example: L 3 = 2000 mm with G2 accuracy gives a tolerance of 0.015 mm.



2.1.6 Straightness

(Fig. 36) To install profile guideway sections efficiently, it is essential to know the longitudinal degree of straightness and the curvature of a rail. As the rail section guideways are flexible components, they can deform longitudinally due to their own weight. Deformation can also be caused by the manufacturing process. In order to meet customers' installation requirements, rail straightness is optimised during manufacture. In addition to standard tolerances for rail deformation, SCHNEEBERGER offers special tolerances and / or inspection reports to a specific customer requirement.







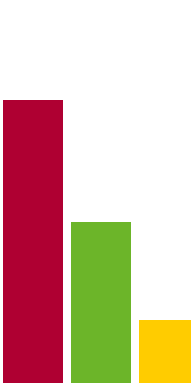
Standard

2.1 Features and options

2.1.7 Preload classes

The roller guideways are preloaded to enable them to work free of play under different load conditions. Basically, while preloading increases the rigidity of the guideway, it also affects operational life and increases the push force. SCHNEEBERGER guideways are available in various preload classes to address specific application requirements. The preload classes are dependent on the dynamic loading capacity C.



	V0	Very low
	V1	Low
	V2	Medium
	V3	High

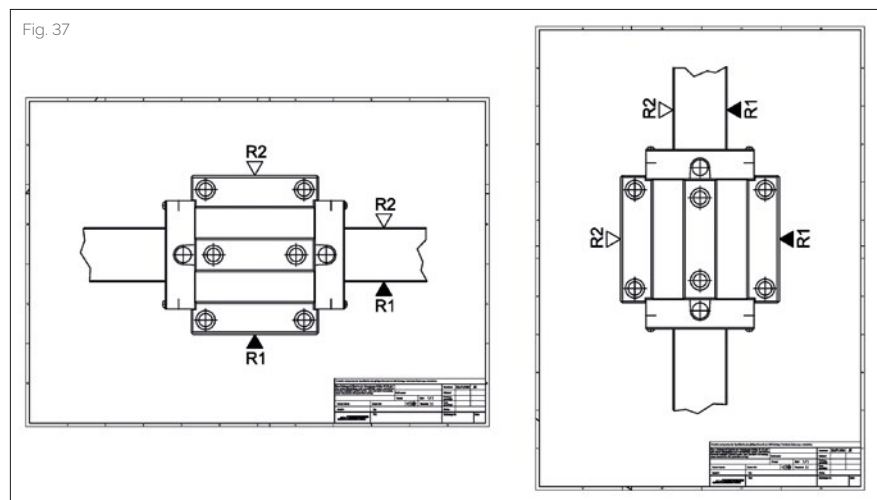
Preload classes			
V0	V1	V2	V3
Preload			
0 - 0.02 x C ₁₀₀	0.03 x C ₁₀₀	0.08 x C ₁₀₀	0.13 x C ₁₀₀
Operating conditions			
Very low-friction guideways for uniform loads, minimum vibrations	Low-friction guideways for uniform loads, slight vibrations	For high rigidity, medium, changing loads and vibrations	For highest rigidity, high impact / shock loads and vibrations, strongly changing, high loads and torques
Characteristics			
			
Rigidity	Service lifetime	Moving resistance	

2.1.8 Reference sides

(Fig. 37) Dependent on installation conditions of the products, the reference sides (attachment side) of the carriages and the section rails must be stated when placing an order.

A drawing of the products is the basis for this. R1 means below or right, R2 means top or left.

	R1	Reference bottom
	R2	Reference top

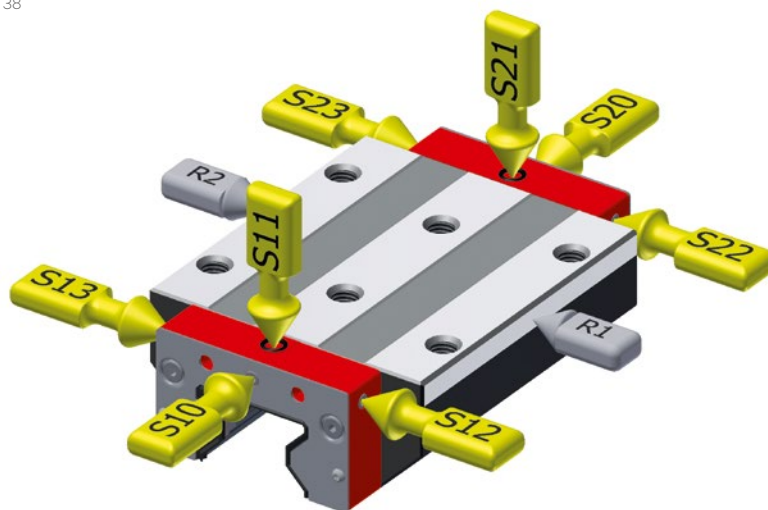


2.1 Features and options

2.1.9 Lubrication connections

(Fig. 38) Front plates and carriage bodies have a wide range of options for lubrication connection. It is therefore possible to optimise the lubrication supply to the carriage to meet structural design. Either a lubricating nipple or a central lubrication system can be screwed into each connection. As standard, all four tracks are lubricated through one connection.

Fig. 38

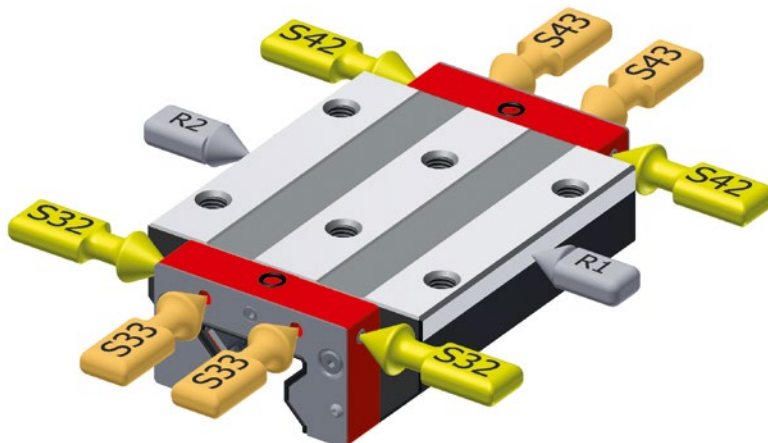












2.1.10 Separate carriage lube connections for specific mounting positions





(Fig. 39) As a special feature for certain installation positions, SCHNEEBERGER systems provide for the independent lubrication of both sides of a carriage (S32, S42). This enhances the lubrication of the guideway and thus the service life of the machine.

Position of lubrication connection is defined with line of sight to the location side R1 in accordance with the picture.

Fig. 39



-  S10 Left center
-  S20 Right center
-  S11 Top left
-  S21 Top right
-  S12 Lower left side
-  S22 Lower right side
-  S13 Upper left side
-  S23 Upper right side
-  S32 Left side
-  S42 Right side

-  S99 S10 + S12 + S13 + S20 + S22 + S23
locked using threaded pins
-  S98 S32 + S33 + S42 + S43
locked using threaded pins (only feasible for MR)
-  S49 For AMS with position of the housing P1:
S10 + S12 + S13 locked using threaded pins
-  S49 For AMS with position of the housing P3:
S20 + S22 + S23 locked using threaded pins

2.1 Features and options

2.1.11 Lubrication as delivered condition

The carriages fitted to guideways can be supplied with a wide variety of lubricants according to the demands of the application, storage life and the final type of lubrication. For applications that provide continuous lubrication during installation and operating phases, oiling with oil (LN) or a light application of grease (LG) are enough. A full application of grease (LV) is recommended for applications with manual lubrication.



Oil protect



Grease protect



Full greasing

2.1.12 Friction

Push force is an important value within the system properties of a guideway. In the case of profile guideways, this is largely dependent on the friction of the sealing system. There is also friction from rolling contact and sliding friction when changing direction and returning.

Application specific frictional forces, such as the type of lubrication, the amount of external load as well as speed, are also present.

To minimize friction, SCHNEEBERGER profile guideways are manufactured with special plastics. To adjust friction from seals, sealing systems are available which have been adjusted to the application.



2.1.13 Coating

For applications where special corrosion protection is necessary, such as in clean-room applications or due to high levels of humidity or when increased wear resistance of the surface is required, MONORAIL carriages and rails are available in hard-chrome plated versions.

The main advantages of applying this electroplated coating are:

- Excellent corrosion protection
- Very good wear resistance and surface load bearing capacity
- Smooth and good emergency running characteristics due to its micropearl structure
- Exceptional adhesion
- Consistent depth of coating

Please note that holes, threads and operating elements are not chrome-plated.



None



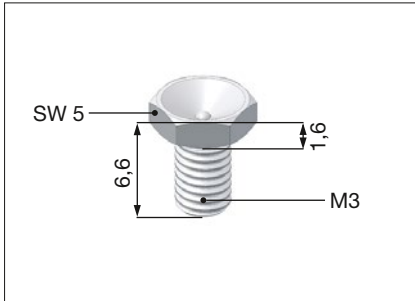
Hard chromium

2.2 Accessories for lubrication

2.2.1 Grease nipples

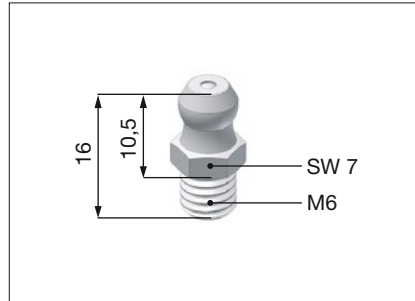
Grease nipple SN 3-T

Flush type grease nipple M3



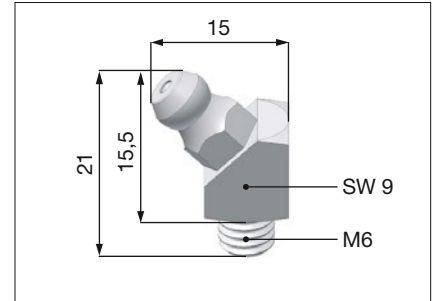
Grease nipple SN 6

Hydraulic-type grease nipple straight



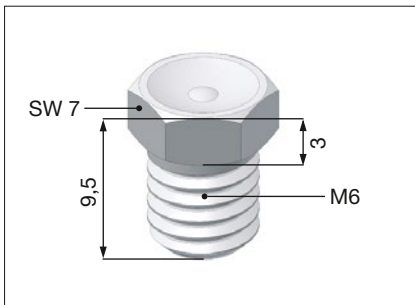
Grease nipple SN 6-45

Hydraulic-type grease nipple 45°



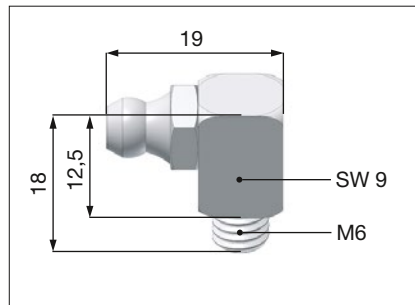
Grease nipple SN 6-T

Flush type grease nipple M6



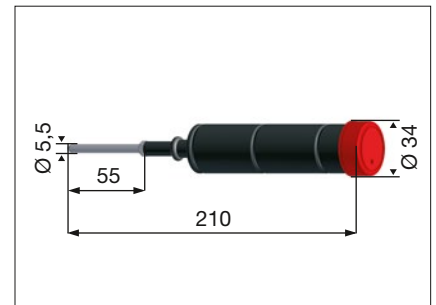
Grease nipple SN 6-90

Hydraulic-type grease nipple 90°



Grease gun SFP-T3

Grease gun for SN3-T and SN6-T



There are products having grease nipples, which can not be removed in the application. During rotation, this results in a collision between the grease nipple and:

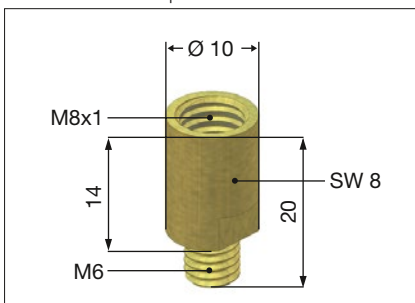
- the carriage
- the guide rail
- the connecting structure

In this case, the carriage must be removed from the guide rail to replace the grease nipple.

2.2.2 Lubrication adapters

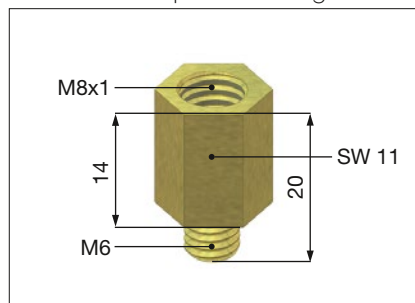
Lubrication adapter SA 6-RD-M8x1

Lubrication adapter M8 round-head



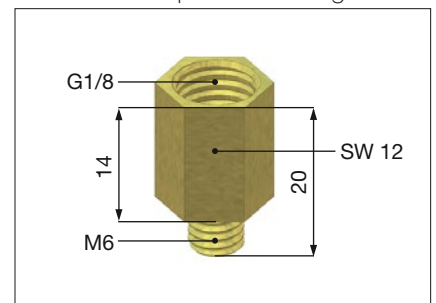
Lubrication adapter SA 6-6KT-M8x1

Lubrication adapter M8 hexagon head



Lubrication adapter SA 6-6KT-G1/8

Lubrication adapter G1/8 hexagon head

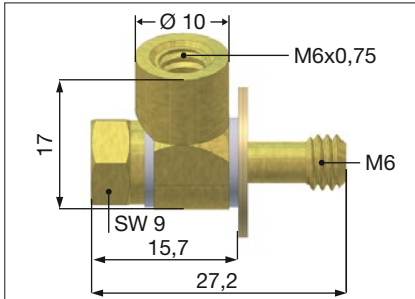


2.2 Accessories for lubrication

2.2.3 Pipe connection

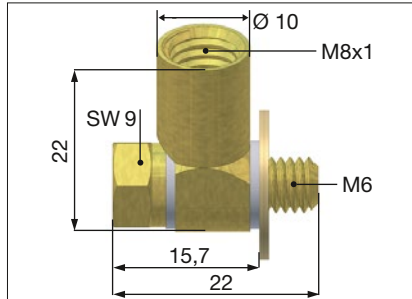
Swivel screw connection SV 6-M6-L

Swivel screw connection M6 long
(aluminum sealing)



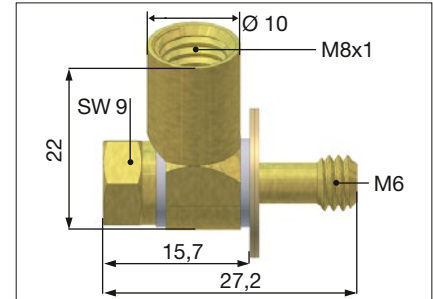
Swivel screw connection SV 6-M8

Swivel screw connection M8
(aluminum sealing)



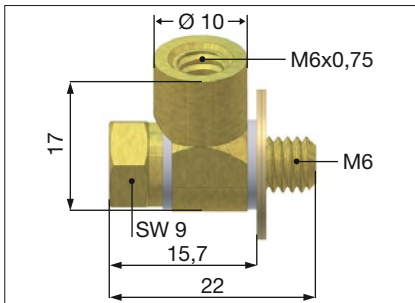
Swivel screw connection SV 6-M8-L

Swivel screw connection M8 long
(aluminum sealing)



Swivel screw connection SV 6-M6

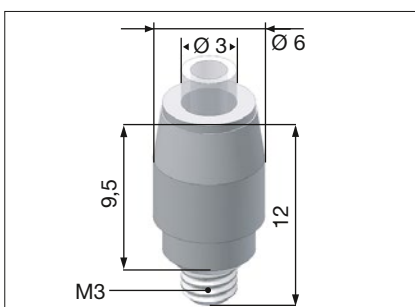
Swivel screw connection M6
(aluminum sealing)



2.2.4 Hose connection

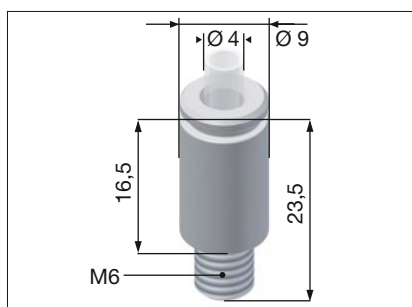
Screw-in connection SA 3-D3

Screw-in connection M3



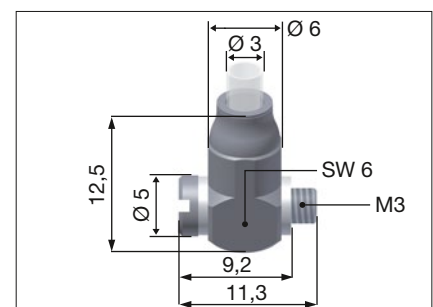
Screw-in connection SA 6-D4-RD

Screw-in connection M6



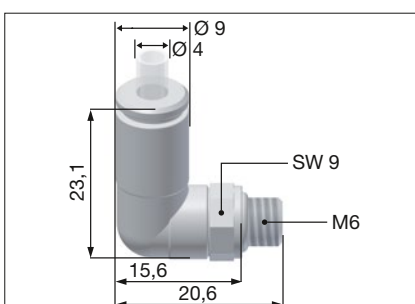
Swivel screw connection SV 3-D3

Swivel screw connection for hose
connection 3mm



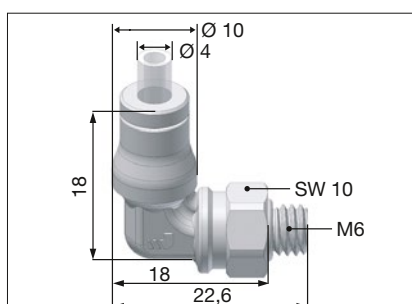
Swivel screw connection SV 6-D4-SW9

Swivel screw connection for hose
connection 4mm



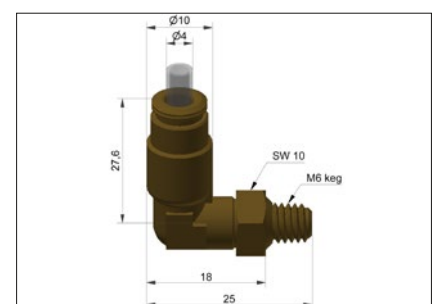
Swivel screw connection SV 6-D4-SW10

Swivel screw connection for hose
connection 4mm



Swivel screw connection SV 6-D4-I

Swivel screw connection for hose
connection 4mm



2.3 General technical data

General area of application under normal conditions of use

Movement	MR	BM
Maximum speed	3 m/s	5 m/s
Maximum acceleration	50 m/s ²	100 m/s ²

Higher values are permissible, but are dependent on the type of carriage, lubrication, position when installed, pretension and load.

Environment	MR	BM
Operating temperature	-40°C - + 80°C	-40°C - + 80°C
Stock temperature	-40°C - + 80°C	-40°C - + 80°C

We recommend storage in packaging that corresponds to the original condition. High humidity and extreme temperatures and temperature fluctuations must be avoided. Otherwise there is a risk of condensation, corrosion and possibly separation of the grease into thickener and oil.

Materials	
Rail	Roller bearing steel, hardened surfaces
Carriage	Roller bearing steel, fully hardened
Rolling element	Roller bearing steel, fully hardened
Synthetic parts	POM, PAPA, TPU injection moulded



Safety instructions!

Caution: Carriages can come loose from the guide rail if they are overloaded, inadequately lubricated or improperly serviced.

Appropriate design and technical safety measures need to be taken by the user, which prevent separation of carriage and guide rail in case of an error (e.g. due to loss of rolling element). A possible variant in a design measure is a safety clamp around the guide rail. The specifications of professional associations, relevant guidelines and standards for the application in question must also be observed.

Special characteristics

The product concept for BZ MONORAIL guides provides for the manufacture of one-piece section rail guides with integral racks up to 6 metres in length. These one-piece modules can be linked together to make axes of any length.

A prerequisite for this is that the butt transition joints are machined in a process specially developed for this purpose. The individual parts are installed and aligned using fixtures that are available separately.

Special cross-members are available for the safe transportation of the long individual rails. These aluminium trusses are designed to remain attached to the component while the toothed rail is installed and aligned and only finally removed after the latter has been finally fixed in place. This ensures that the rack can be safely transported, fitted and aligned without suffering any deformation.

In comparison to other screwed systems, BZ has a large number of connections between the rack and the guide rail thanks to the use of BM MONORAIL guides with fixing holes spaced half the normal distance apart. This means that very high lateral forces can be absorbed and compact designs with a high power density are possible. For details see SCHNEEBERGER application catalog

Tooth quality

SCHNEEBERGER MONORAIL BZ guideways are fitted with integral racks. The gearing used is specially designed for machine tool applications. 19°31'42" helical gearing using module 2.5 and module 2.0 is employed to reduce noise and to achieve smooth running. Dependent on customers' requirements, the teeth can be formed in two different qualities

For details see SCHNEEBERGER application catalog.

Order code:

DIN quality 5, hardened and ground -Q5H-

DIN quality 6, soft, milled -Q6S-

Comparison with other drive systems

Compared with other drive solutions used for linear movements, rack drives with BZ MONORAIL offer a number of benefits. Where ball screws are concerned, these are a way of implementing several independent movements on a guide system.

BZ MONORAIL has a superior drive rigidity, which is independent of the length of the axis and independent of temperature thanks to the modular style of construction.

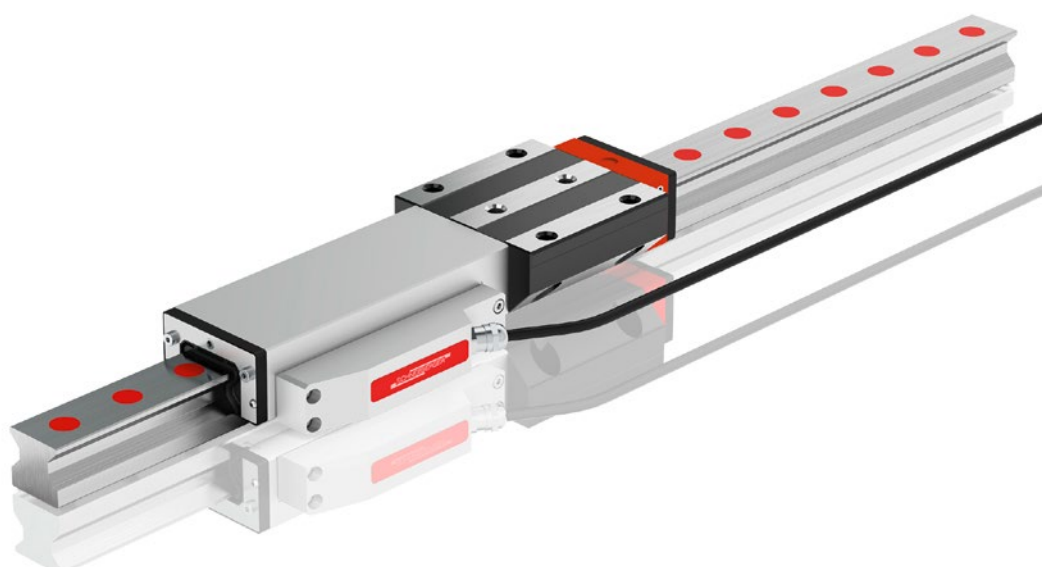
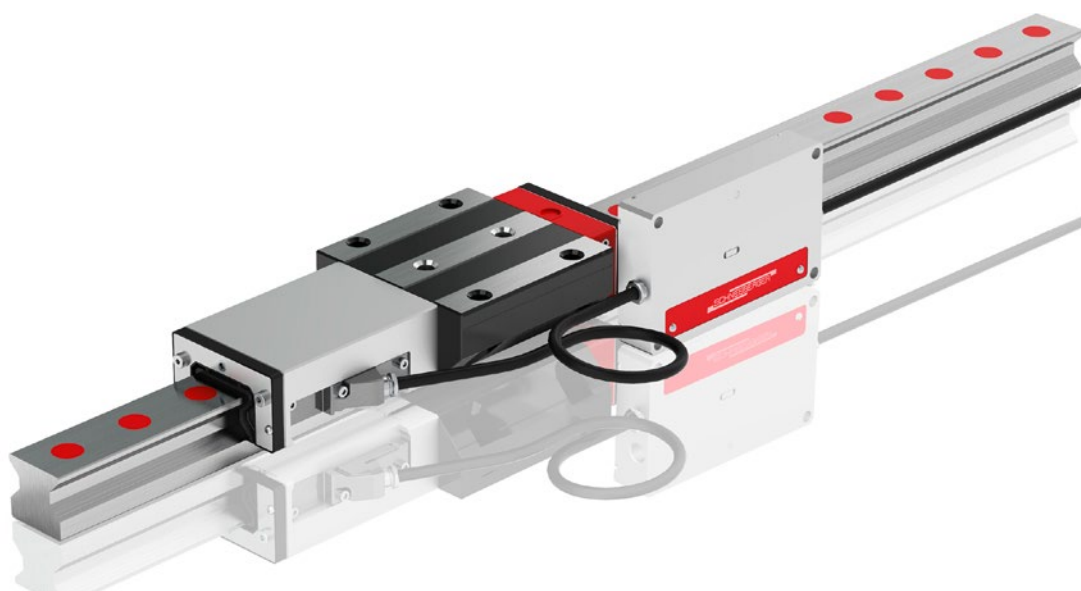
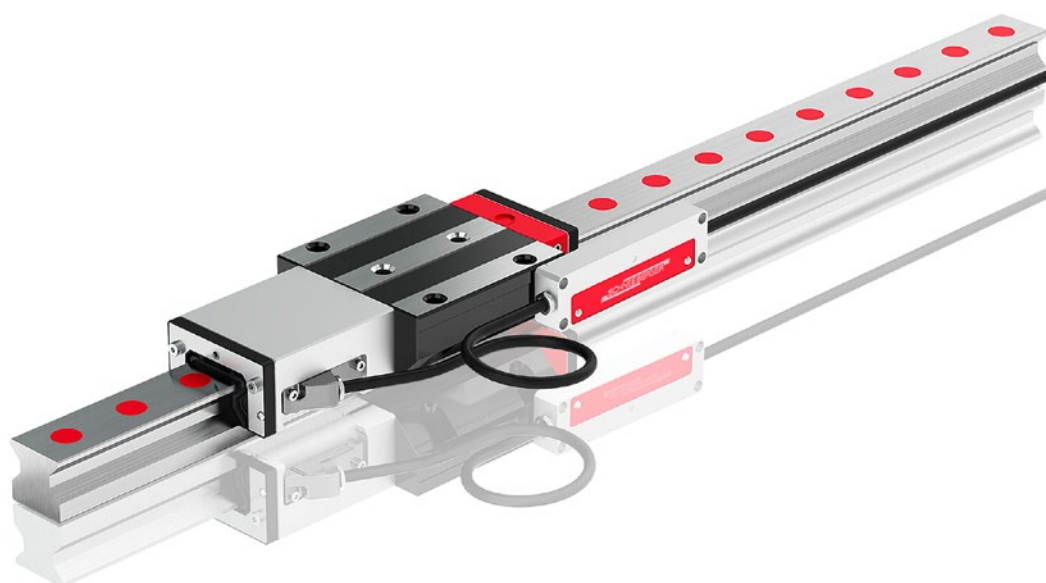
The rack elements are partially exchangeable when worn.

Accurately machined section rail guides and exceptionally precise rack segments result in a very smooth running pinion. The preload of the drive system thus remains constant along the full length and does not change in operation over time. In combination with suitable motors or gearboxes, self-locking vertical drives can be implemented in the event of power failure.

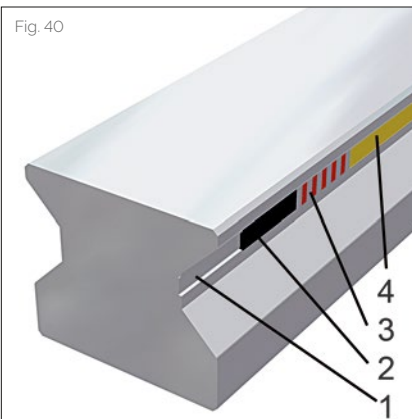
In comparison to linear motors, BZ MONORAIL systems represent an economical and simple alternative that offers a high degree of efficiency. They are the ideal solution when machining a wide range of materials on long axes and in the face of adverse operating conditions.

General technical data

General technical data q.v. chapter 2.1 Technical Data Guiding

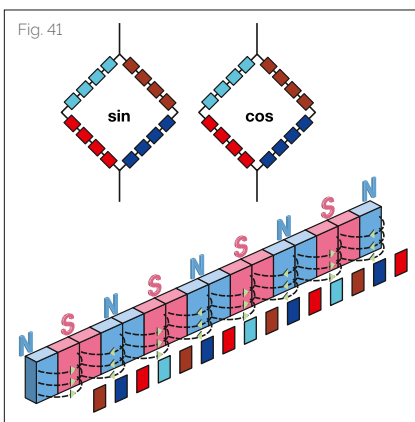


4.1 Magneto-resistive measuring method



4.1.1 How the measuring scale is made

(Fig. 40) The measuring strip contains two magnetic tracks: the fine incremental track with alternate N & S poles spaced at 200 μm intervals, and the reference track to determine the absolute position. The reference track can either have distance coded marks, marks set at regular intervals or even with only a single reference mark. The measuring strip is fully integrated into the rail section. It is manufactured by first grinding a slot (1) into the finished rail section into which a strip of magnetic material (2) is inserted. This magnetic material is ground and magnetised (3). To protect the scale, a through hardened cover strip, that is magnetically permeable is used and welded to the rail (4).

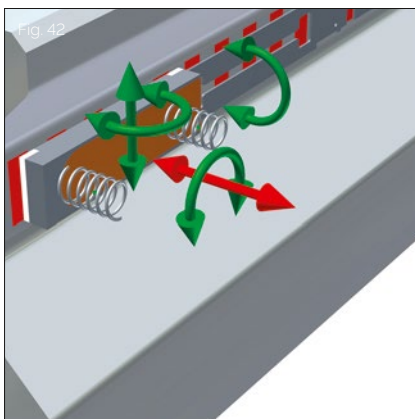


4.1.2 Magneto-resistive position sensor

(Fig. 41) A relative movement between the sensor and the scale, results in a change in field strength in the magneto-resistive material leading to a change in electrical resistance that can be easily measured. The electrical circuitry of the Wheatstone bridge sensor elements means that interference from fluctuations in temperature, ageing and magnetic interference fields are kept to a minimum.

Two sinusoidal shaped signals with a 90° phase shift are obtained from the incremental magnetisation as a result of the arrangement of the sickle-shaped sensor elements. To improve accuracy, the signals from 104 individual elements, in line with the direction of measurement, are averaged. As the structure of the sensor is adapted to the magnetic division period, the influence of magnetic interference is heavily suppressed.

i

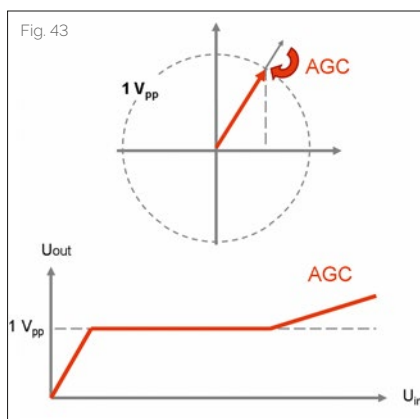


4.1.3 Positional independency of the sensor

(Fig. 42) All accuracy determining properties of the measuring signals (phase, differences in amplitude, harmonic wave characteristics, etc.) are anchored within the sensor. Therefore, even major deviations in position and twisting of the sensor do not lead to any reduction in signal quality: "The circuit remains stable."

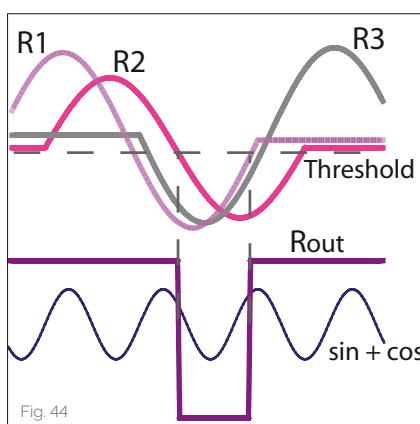
The direct benefits are a simple exchange of the measuring head without any need for adjustment, enhanced resistance against vibration and shock as well as a wide tolerance band for the operation of the measuring heads.

4.1 Magneto-resistive measuring method



4.1.4 Operating method of automatic gain control (AGC)

(Fig. 43) The current amplitude (represented by the periodic signals) is continually determined in the electronic measuring system. In the event of any deviations, the amplitude is adjusted. Therefore, a standard output signal is provided even in exceptional cases (installation errors, external errors or removal of the slider).



4.1.5 Reference point identification

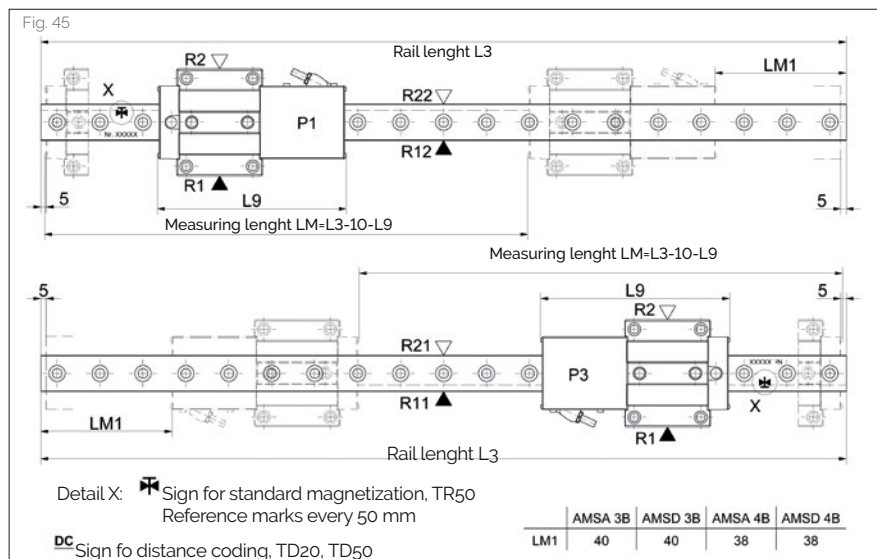
(Fig. 44) The second track carries the AMS reference marks to determine the absolute position and reference the system. The accuracy of the reference points is decisive for the machine's zero or home position. A reference point is represented by three magnetic reference markers on the reference point magnetisation. The rising and falling flanks of the reference impulse each represent one piece of reference information. The third piece of reference information is redundant and is employed to increase the operational reliability of the reference point identification system. This operating principle thus suppresses any magnetic interference and, in dubious circumstances, does not provide a reference signal whenever any interference is encountered.



4.2 Features and options

4.2.1 Magnetization

(Fig. 45) AMS MONORAIL products are available with different reference marks that are surface-engraved by a laser. The illustration shows the position of the measuring carriage when registering the first reference mark.



TR50 AMS with 50mm reference mark grid.

TD50 AMS with distance coded reference marks
Reference marks spaced at 50.2/49.8/50.4/49.6/50.6/49.4/.../... mm.

Reference points, 50mm pattern

Distance code, 50mm pattern

Reading head position and attachment sides

In the order designation, SCHNEEBERGER denotes the attachment position of the reading head, the position of the scale and the reference sides of rail and carriage as they are shown in the drawing above. For drawings in portrait format, the drawing shown must be rotated counter-clockwise by 90°. The following information must be included when placing an order:

Attachment side of the rail and scale position:

R11 Reference bottom, scale bottom

R12 Reference bottom, scale top

R21 Reference top, scale bottom

R22 Reference top, scale top

Reading head position:

P1 External (mounting) housing right, reading head top

P3 External (mounting) housing left, reading head bottom

Attachment side of carriage:

R1 Reference bottom

R2 Reference top

4.3 Read head interfaces

Interface TSU / TSD

12 pole round plug with union nut and female thread
Cable length: 3m



Fig. 46



Interface TRU / TRD

12 pole round plug with male thread
Cable length: 3m



Fig. 47



Interface TRH

17 pole round plug with male thread
Cable length: 3m



Fig. 48



Interface TMU / TMD

12 pole round plug built in a mounting base
Cable length: 0,3m



Fig. 49



Interface TMH

17 pole round plug built in a mounting base
Cable length: 0,3m



Fig. 50



Interface TDC

8 pole round plug with male thread built into the electronics housing



Fig. 51



4.3 Read head interfaces

Terminal layout

Fig. 52



Fig. 53



Fig. 54



Contact	Interfaces TSU / TRU / TMU		Interfaces TSD / TRD / TMD	
	Signal	Signaltype	Signal	Signaltype
1	-Ua2	- Cosine	- Ua2	A quad B signal
2	+5V Sensor	Supply voltage feed back	+5V Sensor	Supply voltage feed back
3	+Ua0	Reference signal	+Ua0	Reference signal synchronized
4	-Ua0	Reference signal	- Ua0	Reference signal synchronized
5	+Ua1	+ Sine	+Ua1	A quad B signal
6	-Ua1	- Sine	- Ua1	A quad B signal
7	-Uas	NC	- Oas	Error signal active low, minimum duration 20 ms
8	+Ua2	+ Cosine	+ Ua2	A quad B signal
9	-	NC	-	NC
10	0V (GND)	Supply voltage	0V (GND)	Supply voltage
11	0V Sensor	Supply voltage feed back	0V Sensor	Supply voltage feed back
12	+5 V	Supply voltage	+5 V	Supply voltage

Contact	TRH / TMH / TSH (Interface SSI / Fanuc / Mitsubishi)	
	Signal	Signal type
1 ^{1,2}	+5V sensor	Supply voltage feedback
2	-	NC
3	-	NC
4 ^{1,3}	0V sensor	Supply voltage feedback
5	-	internal parameterisation
6	TxD	internal parameterisation
7 ^{1,2}	+5V to 24V	Supply voltage
8	+CLK	+ Pulse
9	-CLK	- Pulse
10 ^{1,3}	0V (GND)	Supply voltage
11	-	inner screen
12	+Ua2	+ Cosine
13	- Ua2	- Cosine
14	+DATA	+ Data
15	+Ua1	+ Sine
16	- Ua1	- Sine
17	- DATA	- Data

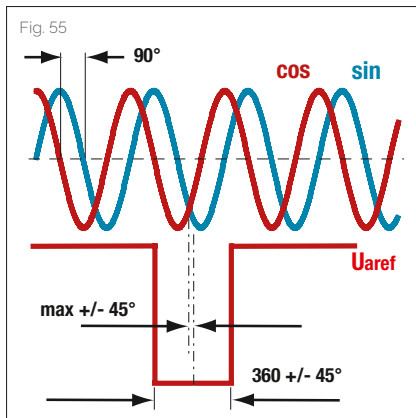
¹ If the controller is not using the line for supply voltage feedback, lines 1 and 7 and lines 4 and 10 can be combined to reduce the voltage drop or to permit longer cable lengths.

² The contacts 1 and 7 are interconnected on the AMS side

³ The contacts 4 and 10 are interconnected on the AMS side

Contact	Interface TDC	
	Signal	Function
1	+24 V	Power supply (positive)
2	(TXD for service only)	Communication with service program
3	RXP	Received data +
4	RXN	Received data -
5	GND (0V)	Power supply (negative)
6	TXN	Sent data -
7	TXP	Sent data +
8	(RXD for service only)	Communication with service program

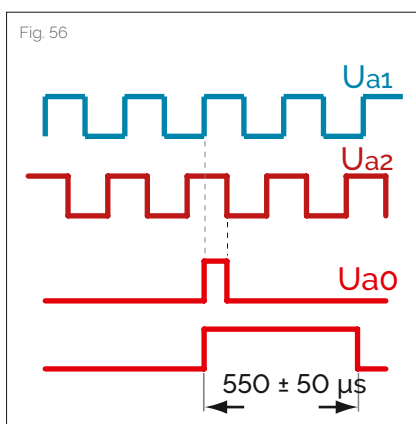
4.3 Read head interfaces



TSU/TRU/TMU analog voltage interfaces

(Fig. 55) The signals are shown inverted according to differential gain. The incremental signals are displaced by exactly 90° in their phasing. The levels after differential gain of the incremental signals and of the reference signals are 1 ± 0.1 Vpp. The incremental signals supply valid values between 0.6 Vpp and 1.2 Vpp.

On production standards, the reference pulse is set symmetrically to the intersection of sine and cosine (at 45°). The width and the phasing of the reference pulse is limited as shown in the illustration. On the receiver side, the precision of the reference mark can thus be increased by the additional use of the incremental information. This interface works with all standard control systems that support a 1 Vpp voltage interface.



TSD/TRD/TMD digital interfaces

(Fig. 56) The incremental signals A+, A-, B+, B- and the reference signals R+, R- transmit the data complementary according to RS 422. The illustration shows the positive signals. The levels of the individual signals are:

High > 2,5 V Low < 0,5 V

Rise and fall times are less than 20 ns. The minimum signal distances can be calculated from the maximum output frequency. The downstream electronics must be able to process the maximum output frequency without any problems.

Option ZN: The reference pulse is strictly synchronised with the incremental signals.

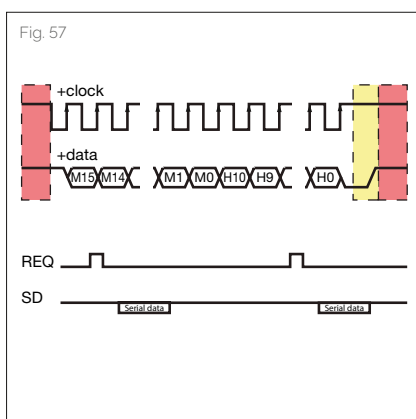
Option ZF: The reference pulse is extended to $550 \mu\text{s} \pm 50 \mu\text{s}$. This option is used with evaluation electronics that cannot process multiple short-term reference impulses

The following combinations of interpolation factor, maximum output frequency and reference impulse implementation are available for all reading head interfaces.

- 010-80-ZN $5 \mu\text{m}$, interpolation 10x, max. output frequency 8 MHz
- 050-80-ZN $1 \mu\text{m}$, interpolation 50x, max. output frequency 8 MHz
- 250-80-ZN $0,2 \mu\text{m}$, interpolation 250x, max. output frequency 8 MHz
- 010-80-ZF $5 \mu\text{m}$, interpolation 10x, max. output frequency 8 MHz
- 050-80-ZF $1 \mu\text{m}$, interpolation 50x, max. output frequency 8 MHz
- 250-80-ZF $0,2 \mu\text{m}$, interpolation 250x, max. output frequency 8 MHz

Order code:

-010-80-ZN- interpolation 10fach, max. output frequency 8 MHz, reference impulse standard



Absolute interfaces TRH / TMH / TSH

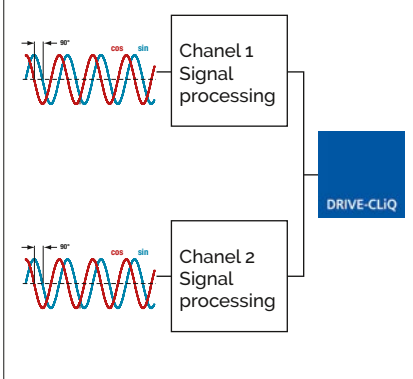
(Fig. 57) The absolute information can be transferred via fully digital interfaces, or via hybrid ones. In the case of the fully digital SSI interface, the first channel (+pulse) sends a clock signal from the receiver to the measuring system; the second channel (+data) simultaneously sends the absolute position values from the measuring system to the sequential electronics unit. Another example is the fully digital "Fanuc Serial Interface". The motor controller simply sends a request signal (REQ), rather than a pulse. From this, the measuring system calculates the clock rate, which it uses to send the position data and the supplementary data (SD) to the receiver.

The SSI+SinCos hybrid interface only sends the digital absolute initial position when it is switched on, and from then on it sends incremental additional 1 Vpp signals.

The SSI interface can be connected to any commercial controller with an SSI interface. The "Fanuc Serial Interface" is designed for a Fanuc controller, and the SSI+SinCos interface is designed for a Siemens controller.

4.3 Read head interfaces

Fig. 58



Absolute interface TDC

(Fig. 58) The absolute information of the measuring system is transmitted via the Drive CliQ® communication interface, which is a real-time serial interface for bidirectional data transfer with Siemens controllers. The connection of the measuring system is suitable for safety-oriented applications and facilitates the use of the SAFETY INTEGRATED functions that are available for the Siemens SINAMCS and SINUMERIK controllers. The system meets the requirements for functional safety according to IEC 61508-1:2010.

®Drive CLiQ is a registered trademark of Siemens

4.4 Accessories - Cables

KAO 12

Connecting cable, 12 pole, socket with female thread - plug with female thread

For read head:



Order code: **KAO 12-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 12-5**

Fig. 59



KAO 13

Connecting cable, 12 pole, socket with female thread - open ends

For read head:



Order code: **KAO 13-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 13-5**

Fig. 60



KAO 14

Extension cable, 12 pole, socket with male thread - plug with female thread

For read head:



Order code: **KAO 14-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 14-5**

Fig. 61



KAO 15

Extension cable, 12 pole, socket with female thread - plug with male thread

For read head:



Order code: **KAO 15-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 15-5**

Fig. 62



KAO 16

Connecting cable, 12 pole, socket with female thread - FANUC plug

For read head:



Order code: **KAO 16-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 16-5**

Fig. 63



KAO 20

Connecting cable, 17 pole, single shield, socket with female thread - FANUC plug

For read head:



Order code: **KAO 20-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 20-5**

Fig. 64



KAO 23

Connecting cable, 17 pole, double shield, socket with female thread - open ends

For read head:



Order code: **KAO 23-xx** (xx = length in m)

Available lengths: 3, 5, 10, 15 and 20m

Order example: **KAO 23-5**

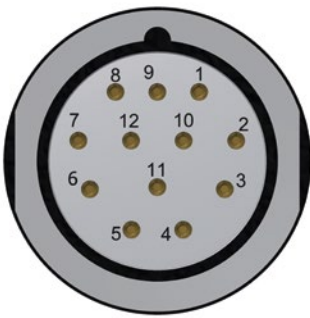
Fig. 65



4.4 Accessories - Cables

Terminal layout connection cable KAO 13

Fig. 66



Contact	Interfaces TRU / TMU		Open ends
	Signal	Signaltype	Color of the cables
1	-Ua2	- Cosine	pink
2	+5V Sensor	Supply voltage feed back	blue
3	+Ua0	Reference signal	red
4	-Ua0	Reference signal	black
5	+Ua1	+ Sine	brown
6	-Ua1	- Sine	green
7	-Uas	NC	purple
8	+Ua2	+ Cosine	gray
9	-	NC	-
10	0V (GND)	Supply voltage	white / green
11	0V Sensor	Supply voltage feed back	white
12	+5 V	Supply voltage	brown / green

Fig. 67



Contact	Interfaces TRD / TMD		Open ends
	Signal	Signaltype	Color of the cables
1	- Ua2	A quad B signal	pink
2	+5V Sensor	Supply voltage feed back	blue
3	+Ua0	Reference signal synchronized	red
4	- Ua0	Reference signal synchronized	black
5	+Ua1	A quad B signal	brown
6	- Ua1	A quad B signal	green
7	- Oas	Error signal active low, minimum duration 20 ms	purple
8	+ Ua2	A quad B signal	gray
9	-	NC	-
10	0V (GND)	Supply voltage	white / green
11	0V Sensor	Supply voltage feed back	white
12	+5 V	Supply voltage	brown / green

Terminal layout connection cable KAO 23

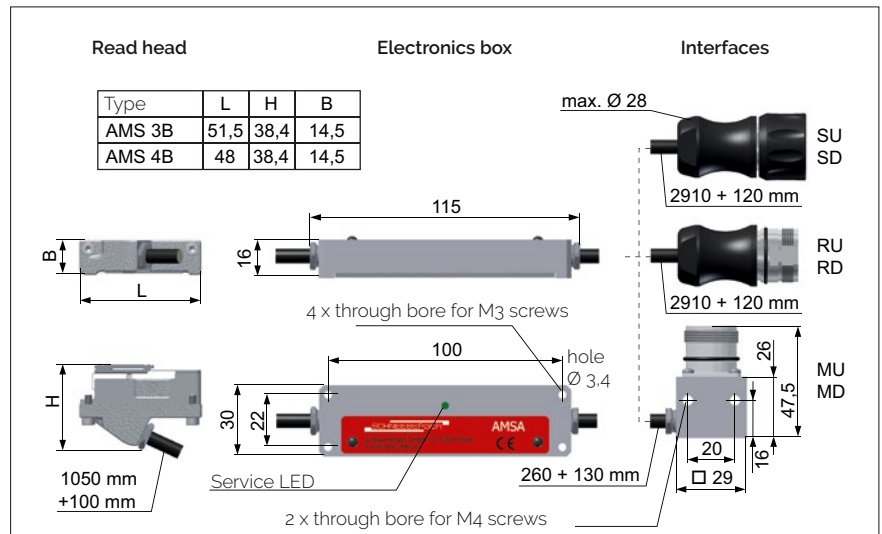
Fig. 68



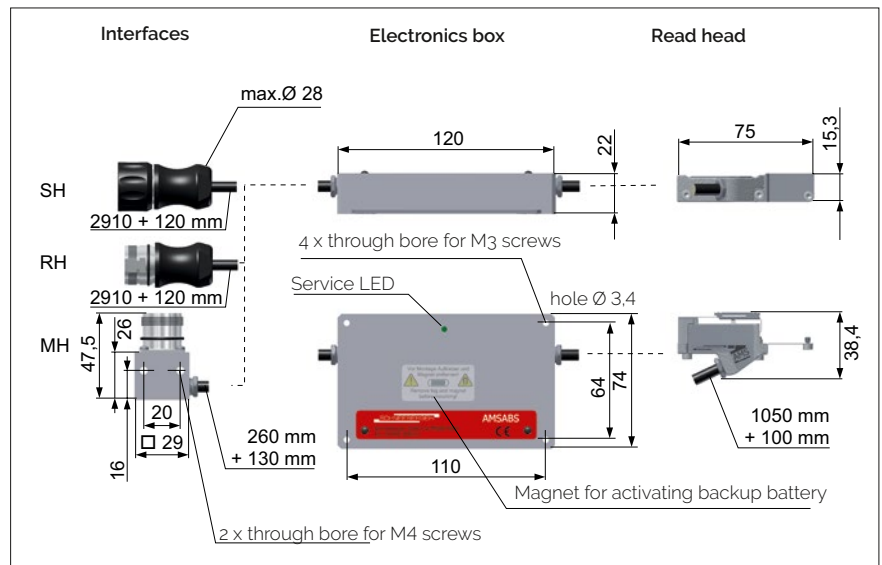
Contact	Interfaces TRH / TMH		Open ends
	Signal	Signal type	Color of the cables
1	+5V sensor	Supply voltage feedback	blue
2	-	NC	-
3	-	NC	-
4	0V sensor	Supply voltage feedback	white
5	-	Internal parameterisation	-
6	TxD	Internal parameterisation	-
7	+5V to 24V	Supply voltage	brown / green
8	+CLK	+ Pulse	gray
9	-CLK	- Pulse	pink
10	0V (GND)	Supply voltage	white / green
11	-	Inner screen	-
12	+Ua2	+ Cosine	brown
13	- Ua2	- Cosine	green
14	+DATA	+ Data	red
15	+Ua1	+ Sine	purple
16	- Ua1	- Sine	yellow
17	- DATA	- Data	black

4.5 Dimensions reading head

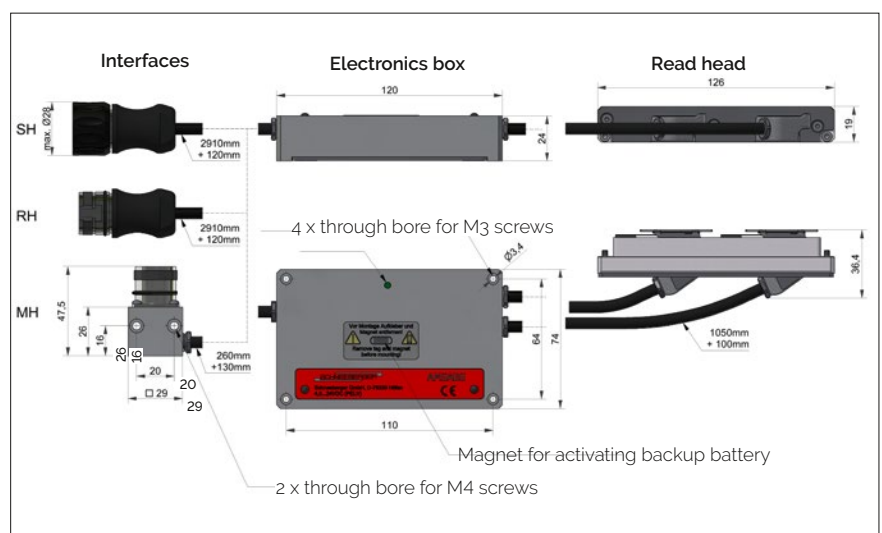
AMS 3B/4B



AMSABS 3B/4B

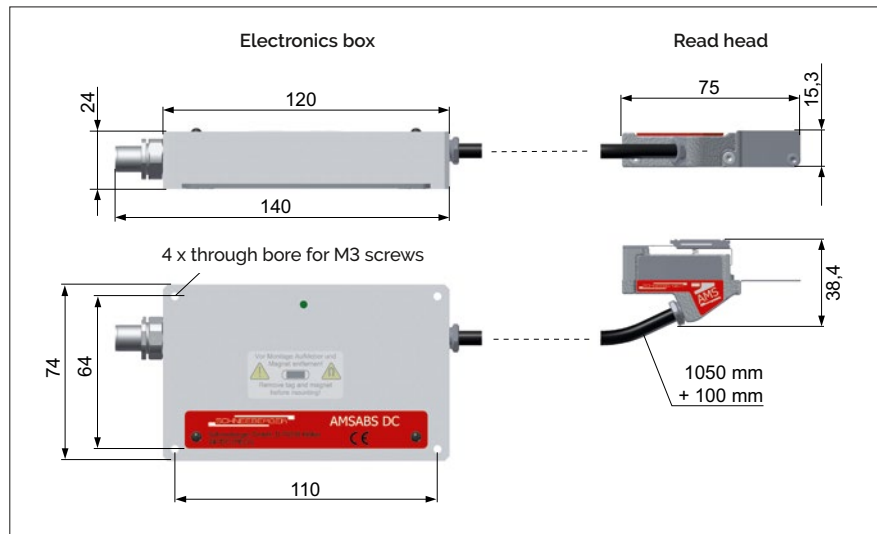


AMSA 3L



4.5 Dimensions reading head

AMSABS-DC



4.6 General technical data

System properties

Material measure	Magnetically hard periodic N-S graduation
Signal period	200 µm
Working temperature	0 °C - +70 °C
Working environment	
Protection class	IP 68 (IP 67 for AMSABS 3L)
Transportation temperature	-20 °C - +70 °C
Storable under the following storage conditions	3 years
Storage conditions	0° - 40° storage temperature < 75% humidity No chemical gases, vapors or liquids

	AMSA 3B AMSA 4B	AMSD 3B AMSD 4B
Accuracy class	+/- 5 µm / 1000 mm +/- 2 µm / 40 mm	+/- 5 µm / 1000 mm +/- 2 µm / 40 mm
Accuracy at the butt joint	-	-
Periodic deviation	+/- 0,7 µm	+/- 0,7 µm
Resolution	max. 0,0625 µm	0,2 / 1,0 / 5,0 µm
Hysteresis	< 0,5 µm	< 0,5 µm or digitally adjustable
Interface	Analog; 1 Vpp	Digital; Quadratur signals RS 422 with reference and error signals; Reference pulse width 90° or 500 µs
Supply voltage	5 V +/- 0,25 V	5 V +/- 0,25 V
Stromaufnahme	40 mA	110 mA
Max. Speed	AMSA 3B 3 m/s; AMSA 4B 5 m/s	3 m/s; Max. 1 m/s with resolution of 0,2 µm

Δx_{pp} = Max. deviation (the sum of all deviations)
 Δx_{SIS2} = Features of the read head



	AMSABS 3B TSS; TF1; TM1 AMSABS 4B TSS; TF1; TM1	AMSABS 3B TS1 AMSABS 4B TS1	AMSABS 3B TS2 AMSABS 4B TS2	AMSABS 3L TS3; TF1
Accuracy class	+/- 5 µm / 1000 mm +/- 2 µm / 40 mm	+/- 5 µm / 1000 mm +/- 2 µm / 40 mm	+/- 5 µm / 1000 mm +/- 2 µm / 40 mm	+/- 5 µm / 1000 mm +/- 2 µm / 40 mm
Accuracy at the butt joint	-	-	-	Δx_{pp} = +/- 7 µm Δx_{SIS2} = +/- 5 µm
Periodic deviation	+/- 0,7 µm	+/- 0,7 µm	+/- 0,7 µm	+/- 0,7 µm
Resolution	max. 0,09765625 µm; TM1 0,05 µm	max. 0,09765625 µm	0,050 µm	max. 0,09765625 µm
Hysteresis	< 0,5 µm	< 0,5 µm	< 0,5 µm	< 0,5 µm
Interface	Digital; TSS cycle synchronous serial interface (SSI); TF1 FANUC Serial Interface; TM1 Mitsubishi Serial Interface	Hybrid; Cycle synchronous serial and analogue interface 1 Vpp	Siemens Drive CliQ® communications protocol	Hybrid; Cycle synchronous serial and analogue interface 1 Vpp; TF1 FANUC Serial Interface
Supply voltage	5 V ± 10% or 24 V ± 10%	5 V ± 10% or 24 V ± 10%	24 V (19VDC..31VDC) (PELV EN50178)	5 V ± 10% or 24 V ± 10%
Current consumption	< 200 mA Outputs unloaded	< 200 mA Outputs unloaded	< 50 mA (typical at 24 V)	< 200 mA Outputs unloaded
Max. Speed	3 m/s	3 m/s	3 m/s	3 m/s

4.7 Order code and examples

Rails, carriages and accessories are always denoted by separate order codes. This also applies to different versions of rails and carriages.

The order codes for individual rails, carriages and accessories are in the data section of this catalogue from section 3 on. An attempt has been made here to code all versions by position in order to reduce the error rate in the ordering procedure.

Please use the following order schedule for orders that are to be supplied as a system:

Order code for MONORAIL systems

Set consisting of:

/ n x S

/ n x W

/ n x W (optional)

/ n x S (optional)

/ n x W (optional)

/ n x Z

NB

S = complete order code for a rail

W = complete order code for a carriage

Z = complete order code for an accessory

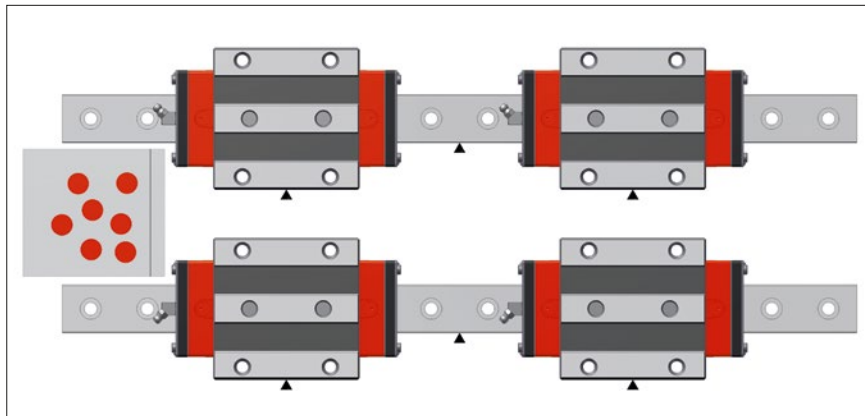
"/" = indicates everything that belongs to a set in an order

n = number, indicates products of the same type

Rails and carriages are assigned according to the order of the order items, i.e. first rail at the top, then the carriages of the first rail from left to right, then the second rail below with the carriages from left to right and so on. Cf order example 2.

This means that - if rail types and carriage types are different in the order placed - the carriages are always immediately below the relevant rail and in the sequence from left to right.

Example 1: Order without a layout sketch - same types of component



2 identical rails each with 2 identical carriages, accessories (additional wipers) can be clearly allocated due to the number.

Plugs for the rails are always supplied unfitted.

Set consisting of:

/ 2 x MR S 35-N-G1-KC-R1-918-19-19-CN

/ 4 x MR W 35-B-G1-V3-R1-CN-S10-LN

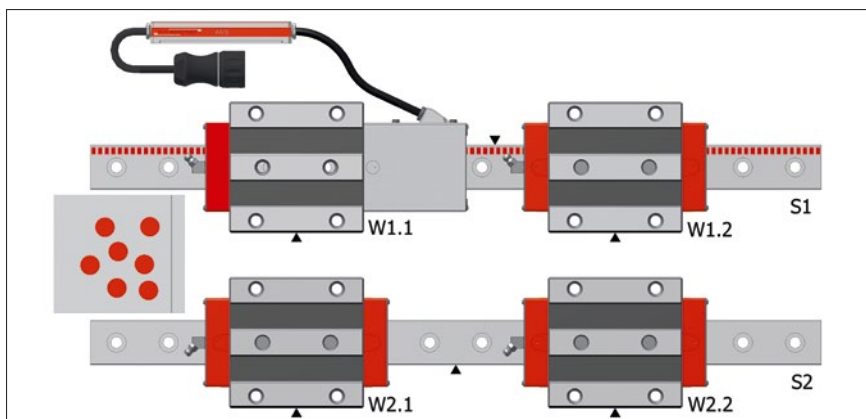
/ 2 x MRK 35 (50 pieces)

/ 8 x ZCV 35

/ 4 x SN 6-45

4.7 Order code and examples

Example 2: Order without a layout sketch - different types of component

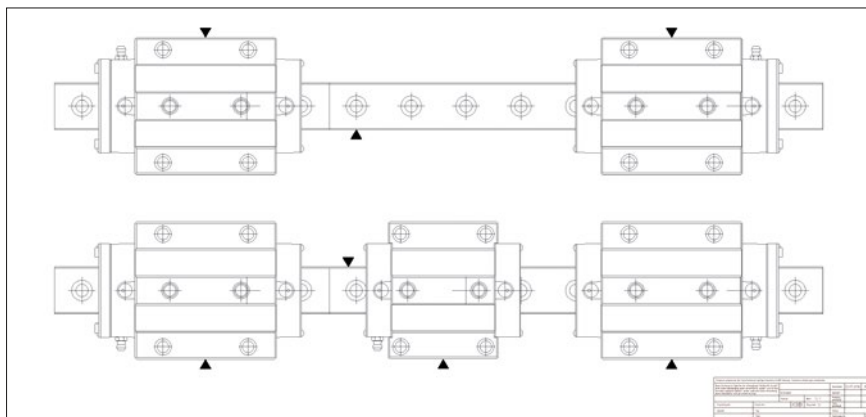


2 different rails and 2 different carriage types, uniform lubrication accessories, allocation and sequence of rails and carriages acc. to the sequence of the items in the order.

Set consisting of:

- / 1 x AMSA 3B S 35-N-G1-KC-R22-918-19-19-CN-TR50 (S1)
- / 1 x AMSA 3B W 35-B-P1-G1-V3-R1-CN-S10-LN-TSU (W1.1)
- / 1 x MR W 35-B-G1-V3-R1-CN-S10-LN (W1.2)
- / 1 x MR S 35-N-G1-KC-R1-918-19-19-CN (S2)
- / 2 x MR W 35-B-G1-V3-R1-CN-S10-LN (W2.1 + W2.2)
- / 2 x MRK 35 (50 Stück)
- / 4 x SN 6-45

Example 3: Order according to customer's layout sketch - different components



2 different rails, 2-part in each case, 5 different carriages.

The rails, carriages and accessories are impossible to allocate clearly without a layout sketch.

Set consisting of:

- / 1 x MR S 35-ND-G1-KC-R1-2478-19-19-CN (Teillängen L3 = 999mm/1479mm)
- / 1 x MR W 35-B-G1-V3-R2-CN-S13-LN
- / 1 x MR W 35-B-G1-V3-R2-CN-S23-LN
- / 1 x MR S 35-ND-G1-KC-R2-2478-19-19-CN (Teillängen L3 = 999mm/1479mm)
- / 1 x MR W 35-B-G1-V3-R1-CN-S12-LN
- / 1 x MR W 35-A-G1-V3-R1-CN-S12-LN
- / 1 x MR W 35-B-G1-V3-R1-CN-S22-LN
- / 5 x MRK 35 (125 Stück)
- / 4 x ZCV 35
- / 5 x SN 6

Important:

Apart from the order designation, further information is required for the troublefree order processing of special versions of MONORAIL systems. For this purpose, the order must include a layout sketch containing the following information:

- Part-lengths and the sequence of the segments for multipart rails
- Carriage type and position in the event of different carriage types on one rail
- Position of additional wipers, lubricating panels and lubricating accessories

4.7 Order code and examples

Example 1: Order a AMSABS 3L – Systems



An AMSABS 3L - rail line,
Assignment and sequence
of rails and cars according to
sequence of positions in the
order.

Set consisting of:

/ 2x AMSA 3L S 35 -N -G1 -KC -R22 -3000 -CN -TR40
/ 1x AMSABS 3L 35 -N -G1 -KC -R22 -3000 -CN -P0
/ 1x AMSABS 3L W 35 -A -P1 -G1 -V3 -R2 -CN -S49 -LN -TMH -TS3

- The system needs an AMSABS 3L S-P0 rail for referencing. This can be placed on any position within the rail line, where reachable by the measuring carriage AMSABS L W.
- All rails have the same system length.
- All rails are prepared for butt joint on both sides.



Configuration sheet for above example:

<input type="checkbox"/> AMSABS 3L 35-M3	<input type="checkbox"/> AMSABS 3L 35-M2	<input type="checkbox"/> AMSABS 3L 35-M1	<input checked="" type="checkbox"/> AMSABS 3L 35-P0	<input type="checkbox"/> AMSABS 3L 35-P1	<input type="checkbox"/> AMSABS 3L 35-P2	<input type="checkbox"/> AMSABS 3L 35-P3
<input type="checkbox"/> AMSA 3L 35	<input checked="" type="checkbox"/> AMSA 3L 35	<input checked="" type="checkbox"/> AMSA 3L 35		<input type="checkbox"/> AMSA 3L 35	<input type="checkbox"/> AMSA 3L 35	<input type="checkbox"/> AMSA 3L 35

4.8 Precautionary measures - General pointers

Please note the following pointers to ensure that your MONORAIL guideways remain in peak working condition throughout their service life:

All SCHNEEBERGER products are precision components that are appropriately protected and packaged at the factory for the purpose of transport. Systems must therefore be protected from vibrations, shock and humidity when being transported and stored.

Please note the pointers on transport and installation that accompany the measuring systems.

Installation of the guideways and the covering of the holes in the rails must be carried out by qualified staff. Please refer to the Download section of www.schneeberger.com for pointers on installation.

Guideways must be adequately supplied with a lubricant that is suited to their movements and load profile as well as to the conditions under which they are expected to operate. If necessary, please contact a lubricant supplier, who will be pleased to advise you on the choice of the correct lubricant. Recommendations will also be found at www.schneeberger.com.

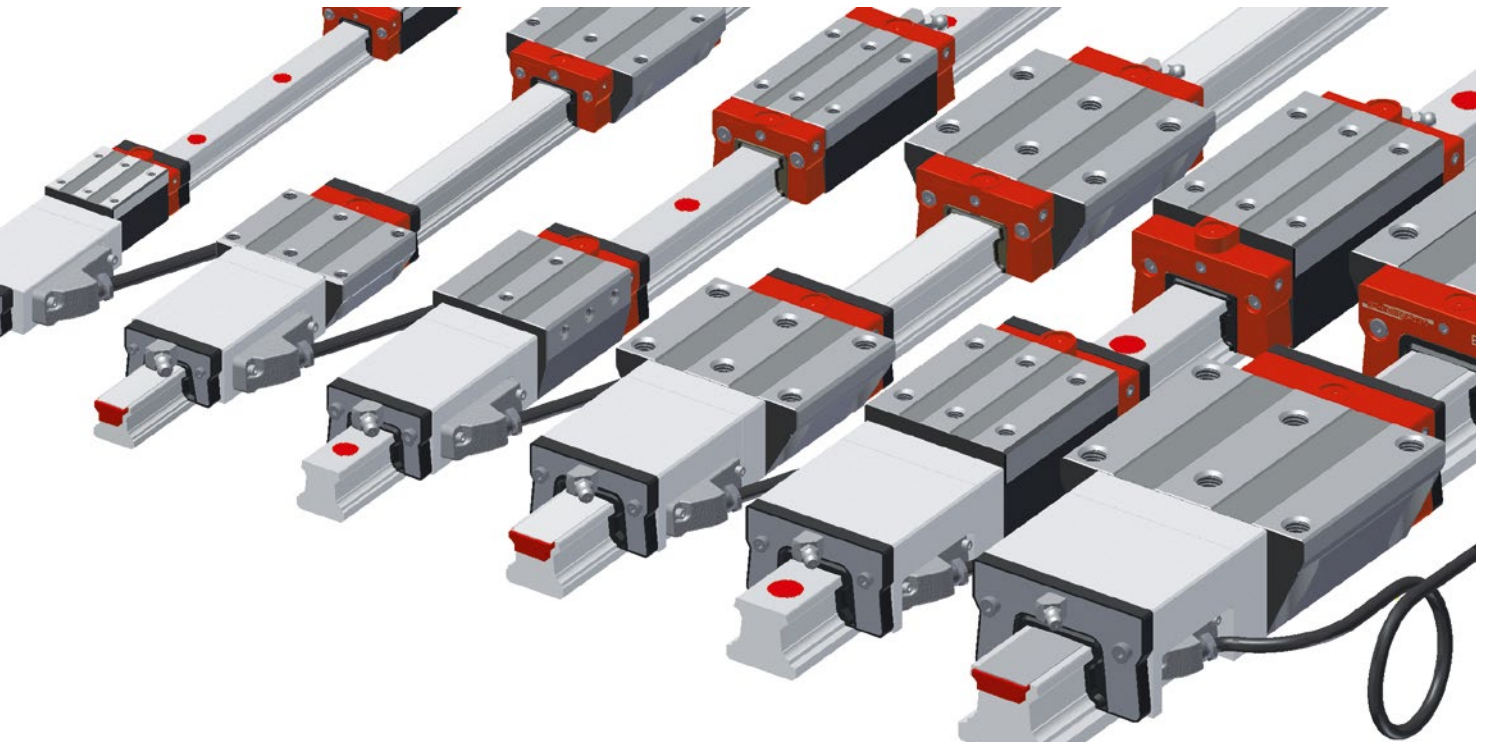
Prior to use, the compatibility of coolants and lubricants must be checked and verified by the user in order to preclude any detrimental effect(s) on the guideway. To protect them from dirt, hot metal chips and any direct contact with coolants, guideways should have covers fitted or be appropriately positioned.

If contact with dirt or coolant is anticipated in the course of machining operations, the fitting of additional wipers to the products is necessary. The long-term serviceability of these components must be assured by amended service intervals. Please refer to www.schneeberger.com for pointers on these products.

If the guideway gets into contact with hot chips an additional use of wipers is recommended. For further information please visit www.schneeberger.com.

The wipers on the ends as well as the additional wipers fitted to MONORAIL carriages must be examined at regular intervals for wear and tear and replaced if necessary.

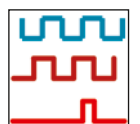
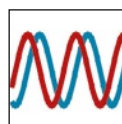
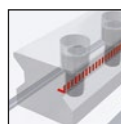
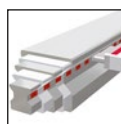
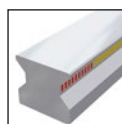
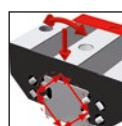
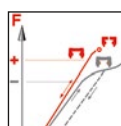
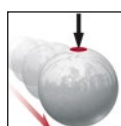
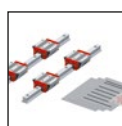
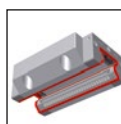
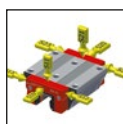
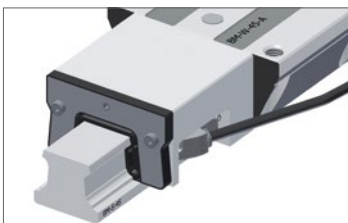
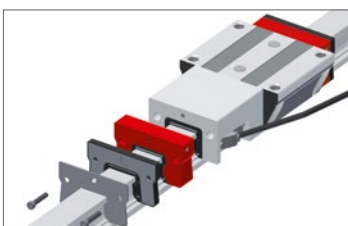
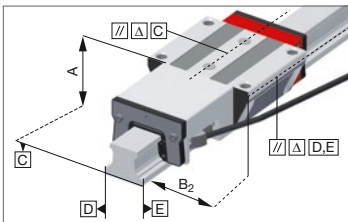




Features of System MONORAIL AMS 4B

SCHNEEBERGER's MONORAIL AMS 4B is an integrated measuring system for distance measurement for use on all protected machine tool axes with lower machining forces and high demands on system precision. Mechanically the AMS 4B is based on SCHNEEBERGER's MONORAIL BM ball guide with lengths up to 6 metres. The integration of the measurement system allows very compact axes to be put together.

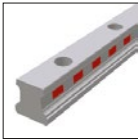
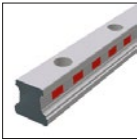

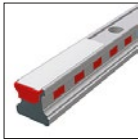
A digital interface with a range of different resolutions for different maximum speeds, and an analog 1Vpp (200 μ m signal period) interface are available as interfaces with the control system. Reference marks can be set at 50mm intervals or distance coded. Different options for carriage lubrication and sealing permit the best possible degree of adaptation to application requirements. The easily interchangeable reading head is identical for all sizes.



Details see chapter 1

10.1 Product overview AMS 4B rails

Product overview AMS 4B Rails





					
	N standard	ND standard, through hardened	C for cover strip	CD for cover strip, through hardened	
Buildsizes / Rail build forms					
Size 15		AMS 4B S 15-ND		AMS 4B S 15-CD	
Size 20	AMS 4B S 20-N				
Size 25	AMS 4B S 25-N		AMS 4B S 25-C		
Size 30	AMS 4B S 30-N				
Size 35	AMS 4B S 35-N				
Size 45	AMS 4B S 45-N		AMS 4B S 45-C		
Features					
Screwable from above	•	•	•	•	
Small assembly effort			•	•	
Great single-part system length	•		•		
For the support of metal covers		•			

i


Available options for AMS 4B Rails

Details see chapter 4.1



Accuracy

-  **G0** Highly accurate
-  **G1** Very accurate
-  **G2** Accurate
-  **G3** Standard





Straightness

-  **KC** Standard




Coating

-  **CN** None
-  **CH** Hard chromium

Locating sides

-  **R11** Ref.bottom, scale bottom
-  **R12** Ref.bottom, scale top
-  **R21** Ref.top, scale bottom
-  **R22** Ref.top, scale top

Magnetization

-  **TR50** 50 mm Raster
-  **TD20** 20 mm Code
-  **TD50** 50 mm Code








Available accessories for AMS 4B Rails

Details see chapter 10.4

Plugs Cover strips Assembly tools

10.2 Product overview AMS 4B Carriages





Product overview AMS 4B Carriages

							
	A standard	B standard, long	C compact, high	D compact, high, long	E compact, high, for lateral fixing	F compact	G compact, long
Buildsizes / Carriage build forms							
Size 15	AMS 4B W 15-A	AMS 4B W 15-B	AMS 4B W 15-C	AMS 4B W 15-D		AMS 4B W 15-F	AMS 4B W 15-G
Size 20	AMS 4B W 20-A	AMS 4B W 20-B	AMS 4B W 20-C	AMS 4B W 20-D			
Size 25	AMS 4B W 25-A	AMS 4B W 25-B	AMS 4B W 25-C	AMS 4B W 25-D	AMS 4B W 25-E	AMS 4B W 25-F	AMS 4B W 25-G
Size 30	AMS 4B W 30-A	AMS 4B W 30-B	AMS 4B W 30-C	AMS 4B W 30-D	AMS 4B W 30-E	AMS 4B W 30-F	AMS 4B W 30-G
Size 35	AMS 4B W 35-A	AMS 4B W 35-B	AMS 4B W 35-C	AMS 4B W 35-D	AMS 4B W 35-E	AMS 4B W 35-F	AMS 4B W 35-G
Size 45	AMS 4B W 45-A	AMS 4B W 45-B	AMS 4B W 45-C	AMS 4B W 45-D		AMS 4B W 45-F	AMS 4B W 45-G
Features							
Screwable from above	•	•	•	•		•	•
Screwable from below	•	•					
Screwable from the side					•		
For high loads and moments		•		•			•
For medium loads and moments	•		•		•	•	
For limited installation space						•	•




Available options for AMS 4B Carriages

Details see chapter 4.1



Accuracy

-  G0 Highly accurate
-  G1 Very accurate
-  G2 Accurate
-  G3 Standard



Preload

-  V0 Very Low
-  V1 Low
-  V2 Medium
-  V3 High







Reference side







-  R1 Ref. at bottom
-  R2 Ref. on top

Coating




-  CN None
-  CH Hard chromium

Lube connections







-  S10 Left center
-  S20 Right center
-  S11 Top left
-  S21 Top right
-  S12 Lower left side
-  S22 Lower right side

-  S13 Upper left side
-  S23 Upper right side
-  S32 Left side
-  S42 Right side
-  S49 P1: S10+S12+S13 locked using threaded pins
-  S49 P3: S20+S22+S23 locked using threaded pins

Lubrication

-  LN Oil protect
-  LG Grease protect
-  LV Full greasing

Interface

-  TMU TMU, analog, 0.3m
-  TRU TRU, analog, 3m
-  TSU TSU, analog, 3m
-  TMD TMD, digital, 0.3m
-  TRD TRD, digital, 3m
-  TSD TSD, digital, 3m

Reading head position

-  P1 Right top
-  P3 Left bottom

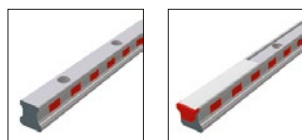
Available accessories for AMS 4B Carriages

Details see chapter 10.4

Additional wipers	Bellows	Assembly rails	Lubrication plates
Metal wiper	Lube nipples	Lube adapters	Cables

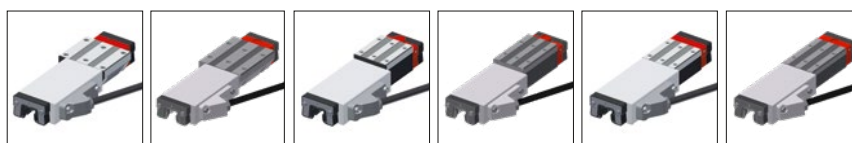
10.3 Technical data and options

AMS 4B Size 15 Dimensions and capacities



	AMS 4B S 15-ND	AMS 4B S 15-CD			
B1: Rail width	15	15			
J1: Rail height	15.7	15.7			
L3: Rail length max.	1500	1500			
L4: Spacing of fixing holes	60	60			
L5/L10: Position of first/last fixing hole	28.5	28.5			
Rail weight, specific (kg/m)	1.4	1.3			

Available options for AMS 4B S 15



	AMS 4B W 15-A	AMS 4B W 15-B	AMS 4B W 15-C	AMS 4B W 15-D	AMS 4B W 15-F	AMS 4B W 15-G	
A: System height	24	24	28	28	24	24	
A1: Half width of housing on opposite side	16.5	16.5	16.5	16.5	16.5	16.5	
A2: Half width of housing on reading head side	21.5	21.5	21.5	21.5	21.5	21.5	
A3: Projection of reading head	17.5	17.5	17.5	17.5	17.5	17.5	
B: Carriage width	47	47	34	34	34	34	
B2: Distance between locating faces	16	16	9.5	9.5	9.5	16	
C1: Position of center front lube hole*	4	4	8	8	4	4	
C3: Position of lateral lube hole	3.7	3.7	7.7	7.7	3.7	3.7	
C4: Position of lateral lube hole	9.3	17.3	11.3	19.3	11.3	19.3	
C7: Position of top lube hole	9.05	17.05	11.05	19.05	11.05	19.05	
J: Carriage height	20.4	20.4	24.4	24.4	20.4	20.4	
L1: Exterior fixing hole spacing	30	30	26	26	26	26	
L2: Interior fixing hole spacing	26	-	-	-	-	-	
L9: Carriage length with housing	117.6	117.6	117.6	117.6	117.6	117.6	
L11: Housing length	69.5	69.5	69.5	69.5	69.5	69.5	
L13: Total length measuring carriage	136.6	152.5	136.6	152.5	136.6	152.5	
Lw: Inner carriage body length	39.6	55.5	39.6	55.5	39.6	55.5	
N: Lateral fixing hole spacing	38	38	26	26	26	26	
O: Reference face height	7	7	6	6	6	6	
Capacities and weights							
C0: Static load capacity (N)	19600	22900	19600	22900	19600	22900	
C100: Dynamic load capacity (N)	9000	11400	9000	11400	9000	11400	
MOQ: Static cross moment capacity (Nm)	181	218	181	218	181	218	
MOL: Static longitud. moment capacity (Nm)	146	198	146	198	146	198	
MQ: Dyn. cross moment capacity (Nm)	83	108	83	108	83	108	
ML: Dyn. longitud. moment capacity (Nm)	67	96	67	96	67	96	
Carriage weight (kg)	0.8	0.5	0.8	0.8	0.7	0.7	

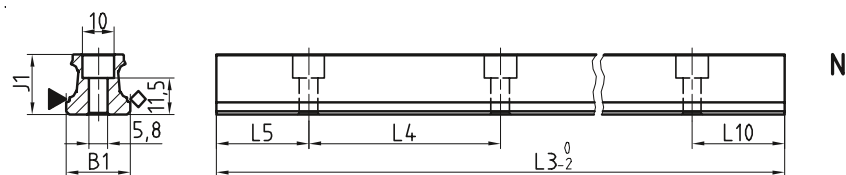
Available options for AMS 4B W 15



10.3 Technical data and options

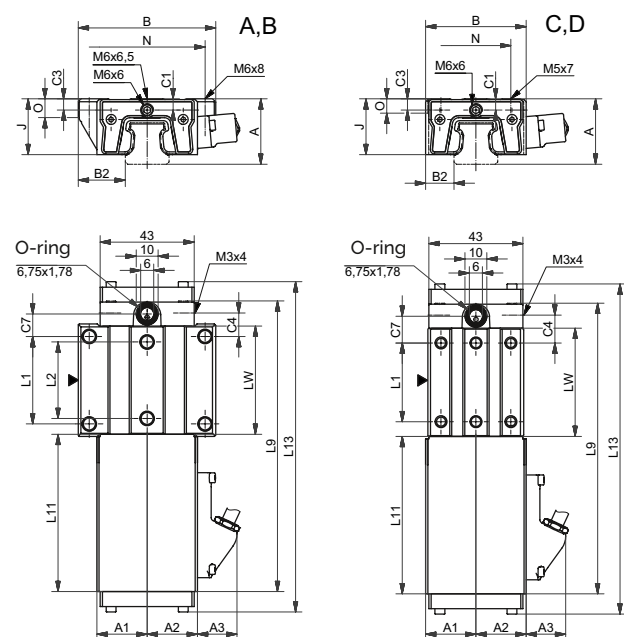
10.3.2 AMS 4B Size 20

AMS 4B S 20 Drawings



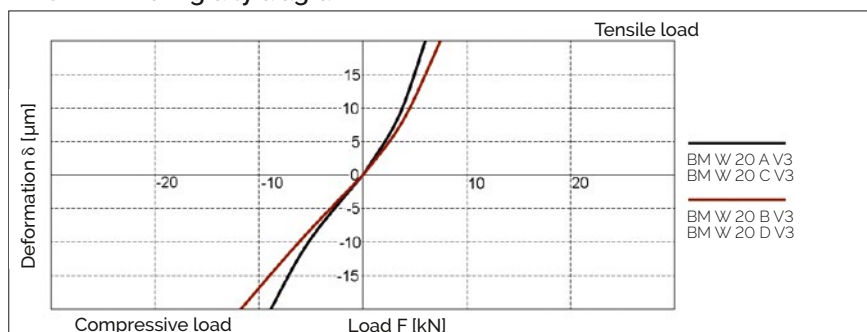
- ▼ = Locating side
◇ = Marked side

AMS 4B W 20 Drawings

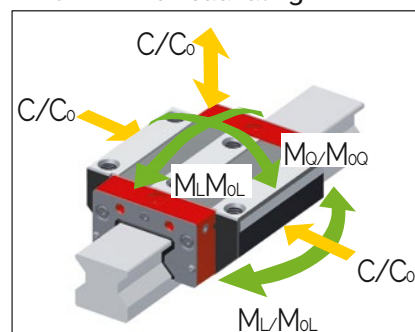


- ▼ = Locating side

AMS 4B W 20 Rigidity diagram

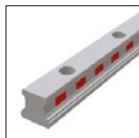


AMS 4B W 20 Load rating



10.3 Technical data and options

AMS 4B Size 20 Dimensions and capacities



	AMS 4B S 20-N				
B1: Rail width	20				
J1: Rail height	19				
L3: Rail length max.	3000				
L4: Spacing of fixing holes	60				
L5/L10: Position of first/last fixing hole	28.5				
Rail weight, specific (kg/m)	2.2				

Available options for AMS 4B S 20



	AMS 4B W 20-A	AMS 4B W 20-B	AMS 4B W 20-C	AMS 4B W 20-D		
A: System height	30	30	30	30		
A1: Half width of housing on opposite side	23.9	23.9	23.9	23.9		
A2: Half width of housing on reading head side	23.9	23.9	23.9	23.9		
A3: Projection of reading head	17.5	17.5	17.5	17.5		
B: Carriage width	63	63	44	44		
B2: Distance between locating faces	21.5	21.5	12	12		
C1: Position of center front lube hole*	5.2	5.2	5.2	5.2		
C3: Position of lateral lube hole	4.6	4.6	4.6	4.6		
C4: Position of lateral lube hole	10.75	18.75	12.75	13.75		
C7: Position of top lube hole	10.25	18.25	12.25	13.25		
J: Carriage height	25.5	25.5	25.5	25.5		
L1: Exterior fixing hole spacing	40	40	36	50		
L2: Interior fixing hole spacing	35	35	-	-		
L9: Carriage length with housing	132.5	148.5	132.5	148.5		
L11: Housing length	72	72	72	72		
L13: Total length measuring carriage	151.5	167.5	151.5	167.5		
Lw: Inner carriage body length	49.5	65.5	49.5	65.5		
N: Lateral fixing hole spacing	53	53	32	32		
O: Reference face height	8	8	6	6		
Capacities and weights						
C0: Static load capacity (N)	31400	41100	31400	41100		
C100: Dynamic load capacity (N)	14400	17400	14400	17400		
MOQ: Static cross moment capacity (Nm)	373	490	373	490		
MOL: Static longitud. moment capacity (Nm)	292	495	292	495		
MQ: Dyn. cross moment capacity (Nm)	171	206	171	206		
ML: Dyn. longitud. moment capacity (Nm)	134	208	134	208		
Carriage weight (kg)	1.0	1.2	0.9	1.0		

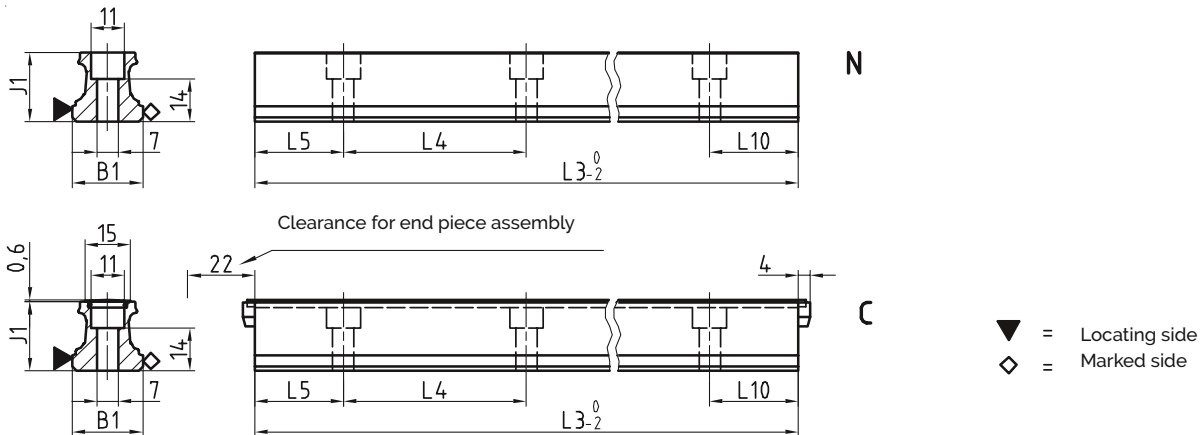
Available options for AMS 4B W 20



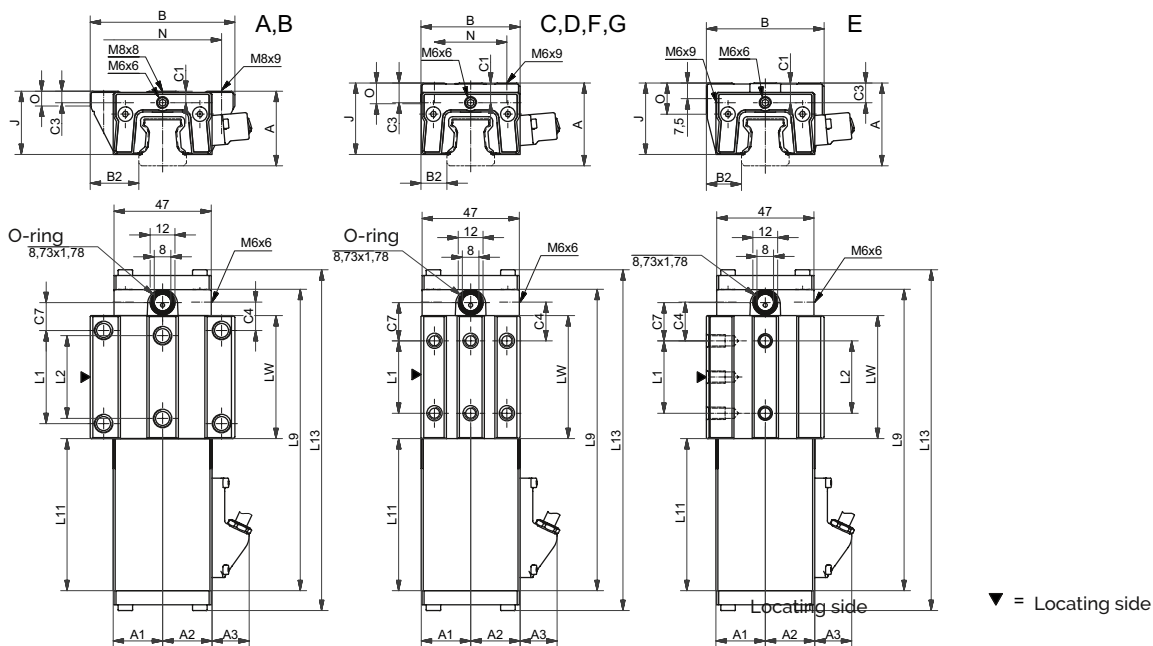
10.3 Technical data and options

10.3.3 AMS 4B Size 25

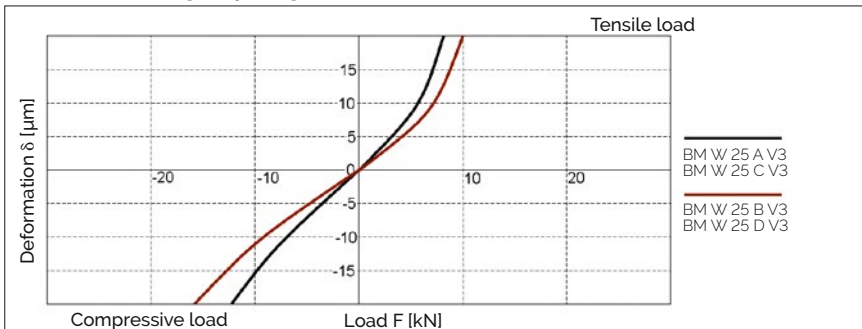
AMS 4B S 25 Drawings



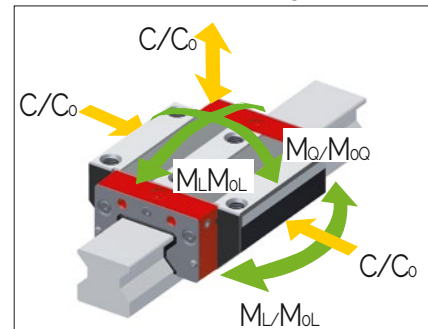
AMS 4B W 25 Drawings



AMS 4B W 25 Rigidity diagram

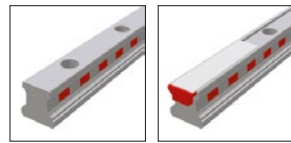


AMS 4B W 25 Load rating



10.3 Technical data and options

AMS 4B Size 25 Dimensions and capacities



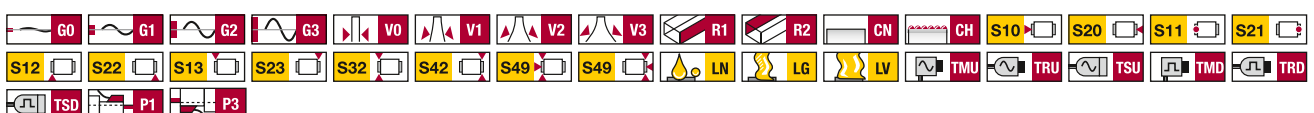
	AMS 4B S 25-N	AMS 4B S 25-C				
B1: Rail width	23	23				
J1: Rail height	22.7	22.7				
L3: Rail length max.	6000	3000				
L4: Spacing of fixing holes	60	60				
L5/L10: Position of first/last fixing hole	28.5	28.5				
Rail weight, specific (kg/m)	3.0	2.8				

Available options for AMS 4B S 25

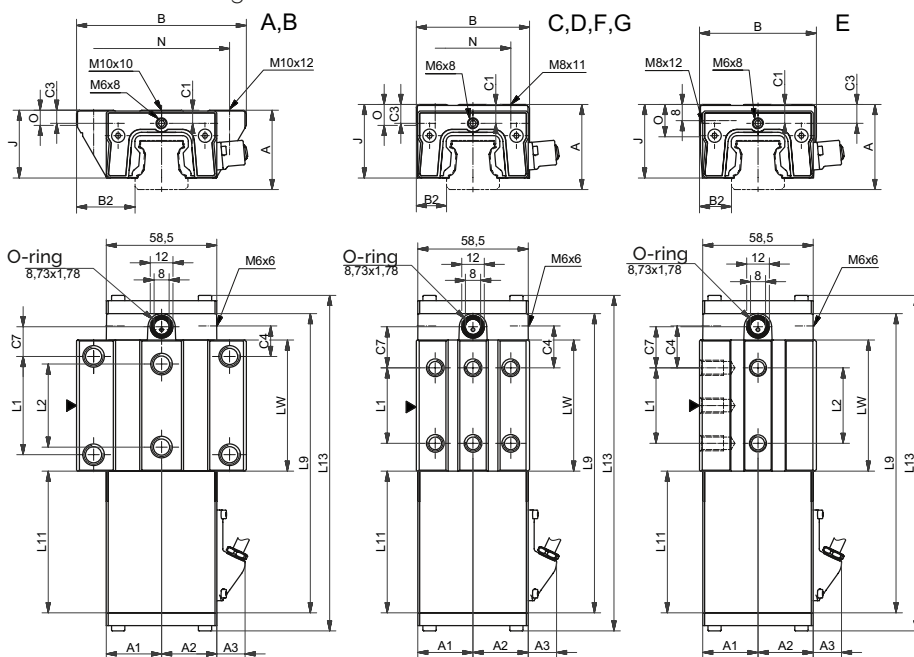


	AMS 4B W 25-A	AMS 4B W 25-B	AMS 4B W 25-C	AMS 4B W 25-D	AMS 4B W 25-E	AMS 4B W 25-F	AMS 4B W 25-G
A: System height	36	36	40	40	40	36	36
A1: Half width of housing on opposite side	23.9	23.9	23.9	23.9	23.9	23.9	23.9
A2: Half width of housing on reading head side	23.9	23.9	23.9	23.9	23.9	23.9	23.9
A3: Projection of reading head	17.3	17.3	17.3	17.3	17.3	17.3	17.3
B: Carriage width	70	70	48	48	57	48	48
B2: Distance between locating faces	23.5	23.5	12.5	12.5	17	12.5	12.5
C1: Position of center front lube hole*	5.5	5.5	9.5	9.5	9.5	5.5	5.5
C3: Position of lateral lube hole	5.5	5.5	9.5	9.5	9.5	5.5	5.5
C4: Position of lateral lube hole	13.75	23.25	18.75	20.75	18.75	18.75	20.75
C7: Position of top lube hole	13.5	23	18.5	20.5	18.5	18.5	20.5
J: Carriage height	30.5	30.5	34.5	34.5	34.5	30.5	30.5
L1: Exterior fixing hole spacing	45	45	35	50	35	35	50
L2: Interior fixing hole spacing	40	40	-	-	-	-	-
L9: Carriage length with housing	145.5	164.5	145.5	164.5	145.5	145.5	164.5
L11: Housing length	73.5	73.5	73.5	73.5	73.5	73.5	73.5
L13: Total length measuring carriage	165.1	184.1	165.1	184.1	165.1	165.1	184.1
Lw: Inner carriage body length	59.5	78.5	59.5	78.5	59.5	59.5	78.5
N: Lateral fixing hole spacing	57	57	35	35	-	35	35
O: Reference face height	7	7	11	11	15	71	71
Capacities and weights							
C0: Static load capacity (N)	46100	60300	46100	60300	46100	46100	60300
C100: Dynamic load capacity (N)	21100	25500	21100	25500	21100	21100	25500
MOQ: Static cross moment capacity (Nm)	631	825	631	825	631	631	825
MOL: Static longitud. moment capacity (Nm)	513	863	513	863	513	513	863
MQ: Dyn. cross moment capacity (Nm)	289	349	289	349	289	289	349
ML: Dyn. longitud. moment capacity (Nm)	235	365	235	365	235	235	365
Carriage weight (kg)	13	15	12	14	13	11	13

Available options for AMS 4B W 25



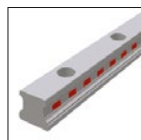
AMS 4B S 30 Drawings



A 3D schematic of a magnet assembly. The assembly consists of a central black rectangular block flanked by two red rectangular blocks. The entire assembly is mounted on a grey base. Labels with arrows indicate various properties and dimensions: C/C_0 (yellow arrow pointing to the top surface), M_L/M_{0L} (green curved arrow indicating longitudinal magnetization), M_Q/M_{0Q} (green curved arrow indicating quadrupole magnetization), and M_L/M_{0L} (green curved arrow indicating longitudinal magnetization at the bottom).

10.3 Technical data and options

AMS 4B Size 30 Dimensions and capacities



AMS 4B S 30-N

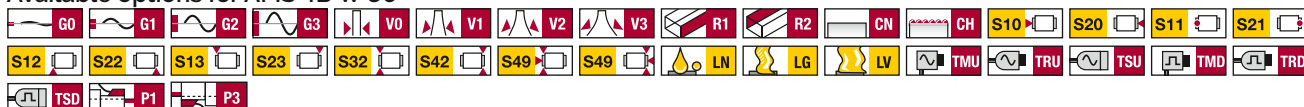
B1:	Rail width	28				
J1:	Rail height	26				
L3:	Rail length max.	6000				
L4:	Spacing of fixing holes	80				
L5/L10:	Position of first/last fixing hole	38.5				
	Rail weight, specific (kg/m)	4.3				

Available options for AMS 4B S 30



	AMS 4B W 30-A	AMS 4B W 30-B	AMS 4B W 30-C	AMS 4B W 30-D	AMS 4B W 30-E	AMS 4B W 30-F	AMS 4B W 30-G
A:	System height	42	42	45	45	45	42
A1:	Half width of housing on opposite side	29.3	29.3	29.3	29.3	29.3	29.3
A2:	Half width of housing on reading head side	29.3	29.3	29.3	29.3	29.3	29.3
A3:	Projection of reading head	14.4	14.4	14.4	14.4	14.4	14.4
B:	Carriage width	90	90	60	60	62	60
B2:	Distance between locating faces	31	31	16	16	17	16
C1:	Position of center front lube hole*	7	7	10	10	10	7
C3:	Position of lateral lube hole	6	6	9	9	9	6
C4:	Position of lateral lube hole	16.2	27.2	22.2	23.2	22.2	23.2
C7:	Position of top lube hole	15.7	26.7	21.7	22.7	21.7	22.7
J:	Carriage height	35.9	35.9	38.9	38.9	38.9	35.9
L1:	Exterior fixing hole spacing	52	52	40	60	40	60
L2:	Interior fixing hole spacing	44	44	-	-	40	-
L9:	Carriage length with housing	158.4	180.4	158.4	180.4	158.4	180.4
L11:	Housing length	75	75	75	75	75	75
L13:	Total length measuring carriage	178	200	178	200	178	200
Lw:	Inner carriage body length	69.4	91.4	69.4	91.4	69.4	91.4
N:	Lateral fixing hole spacing	72	72	40	40	-	40
O:	Reference face height	7.8	7.8	11	11	17	8
Capacities and weights							
C0:	Static load capacity (N)	63700	83300	63700	83300	63700	83300
C100:	Dynamic load capacity (N)	29200	35300	29200	35300	29200	35300
MOQ:	Static cross moment capacity (Nm)	1084	1414	1084	1414	1084	1414
MOL:	Static longitud. moment capacity (Nm)	829	1390	829	1390	829	1390
MQ:	Dyn. cross moment capacity (Nm)	497	599	497	599	497	599
ML:	Dyn. longitud. moment capacity (Nm)	380	589	380	589	380	589
	Carriage weight (kg)	1.8	2.2	1.7	1.9	1.7	1.8

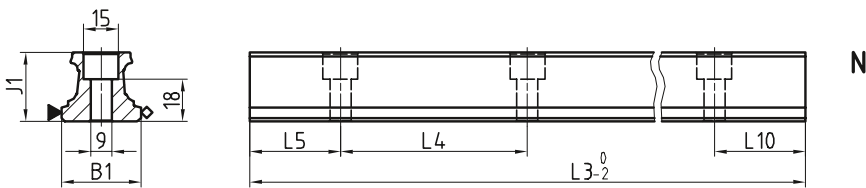
Available options for AMS 4B W 30



10.3 Technical data and options

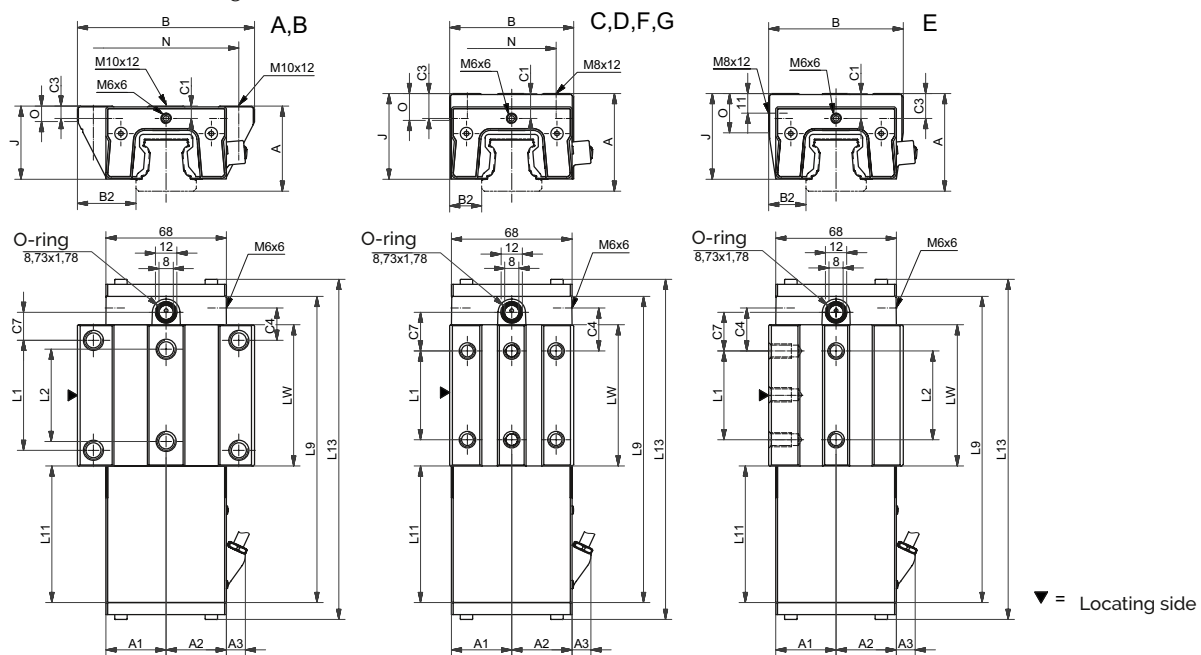
10.3.5 AMS 4B Size 35

AMS 4B S 35 Drawings

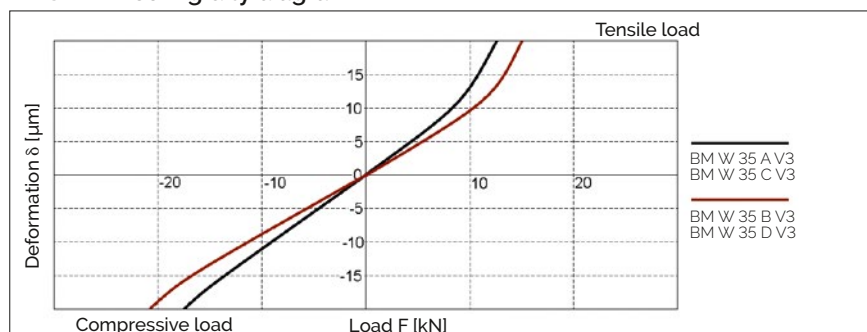


Locating side
Marked side

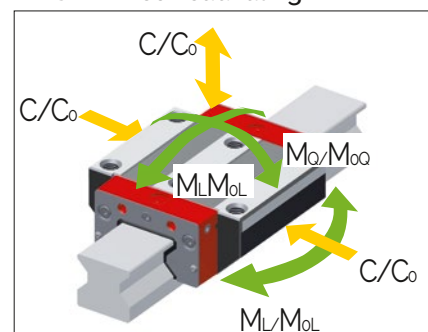
AMS 4B W35 Drawings



AMS 4B W 35 Rigidity diagram

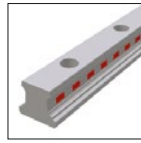


AMS 4B W 35 Load rating



10.3 Technical data and options

AMS 4B Size 35 Dimensions and capacities



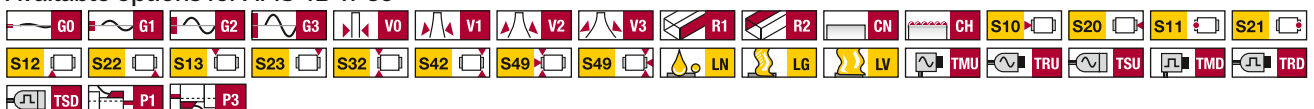
	AMS 4B S 35-N				
B1: Rail width	34				
J1: Rail height	29.5				
L3: Rail length max.	6000				
L4: Spacing of fixing holes	80				
L5/L10: Position of first/last fixing hole	38.5				
Rail weight, specific (kg/m)	5.4				

Available options for AMS 4B S 30



	AMS 4B W 35-A	AMS 4B W 35-B	AMS 4B W 35-C	AMS 4B W 35-D	AMS 4B W 35-E	AMS 4B W 35-F	AMS 4B W 35-G
A: System height	48	48	55	55	55	48	48
A1: Half width of housing on opposite side	34	34	34	34	34	34	34
A2: Half width of housing on reading head side	34	34	34	34	34	34	34
A3: Projection of reading head	101	101	101	101	101	101	101
B: Carriage width	100	100	70	70	76	70	70
B2: Distance between locating faces	33	33	18	18	21	18	18
C1: Position of center front lube hole*	7	7	14	14	14	7	7
C3: Position of lateral lube hole	6.5	6.5	13.5	13.5	13.5	6.5	6.5
C4: Position of lateral lube hole	18.3	31.05	24.3	26.05	24.3	24.3	26.05
C7: Position of top lube hole	15.8	28.55	21.8	23.55	21.8	21.8	23.55
J: Carriage height	41	41	48	48	48	41	41
L1: Exterior fixing hole spacing	62	62	50	72	50	50	72
L2: Interior fixing hole spacing	52	52	-	-	50	-	-
L9: Carriage length with housing	172.6	198.1	172.6	198.1	172.6	172.6	198.1
L11: Housing length	77	77	77	77	77	77	77
L13: Total length measuring carriage	192.2	217.7	192.2	217.7	192.2	192.2	217.7
Lw: Inner carriage body length	79.6	105.1	79.6	105.1	79.6	79.6	105.1
N: Lateral fixing hole spacing	82	82	50	50	-	50	50
O: Reference face height	8	8	15	15	22	8	8
Capacities and weights							
C0: Static load capacity (N)	84400	110300	84400	110300	84400	84400	110300
C100: Dynamic load capacity (N)	38700	46700	38700	46700	38700	38700	46700
MOQ: Static cross moment capacity (Nm)	1566	2048	1566	2048	1566	1566	2048
MOL: Static longitud. moment capacity (Nm)	1252	2104	1252	2104	1252	1252	2104
MQ: Dyn. cross moment capacity (Nm)	718	867	718	867	718	718	867
ML: Dyn. longitud. moment capacity (Nm)	574	891	574	891	574	574	891
Carriage weight (kg)	2.5	3.0	2.5	3.0	2.5	2.2	2.5

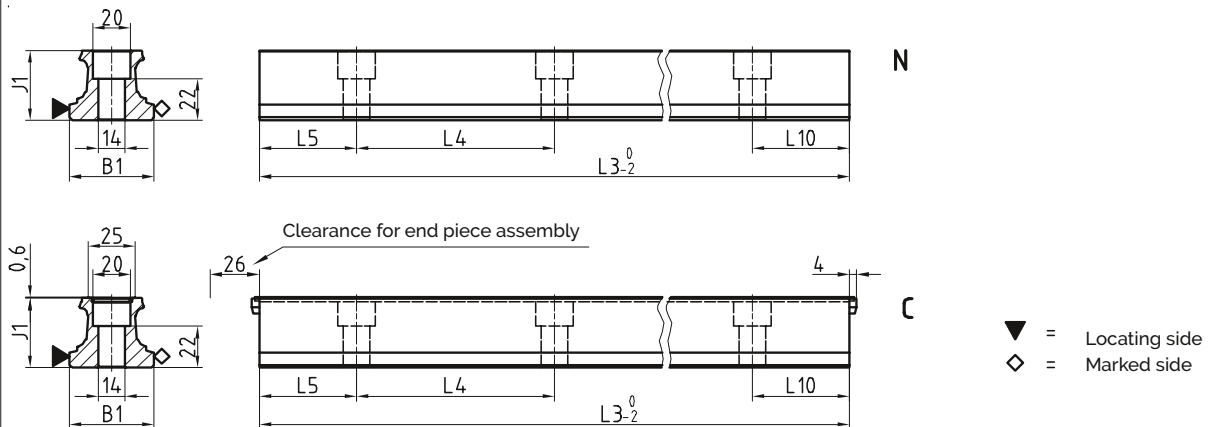
Available options for AMS 4B W 35



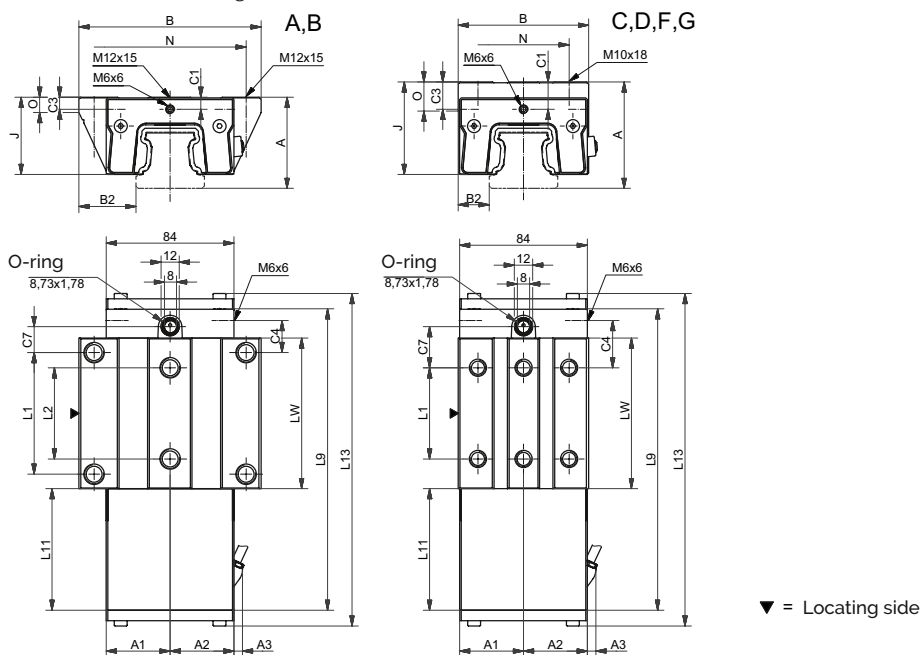
10.3 Technical data and options

10.3.6 AMS 4B Size 45

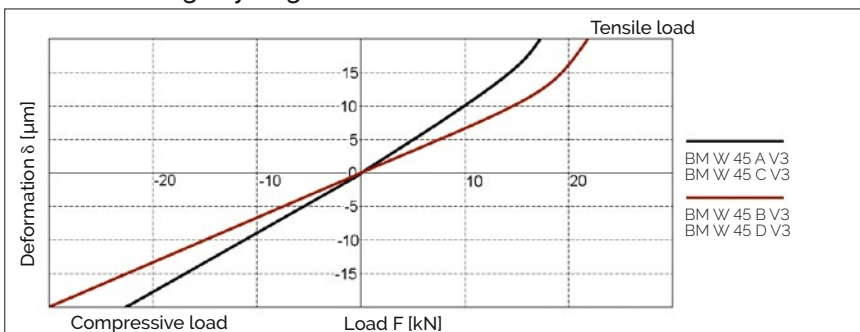
AMS 4B S 45 Drawings



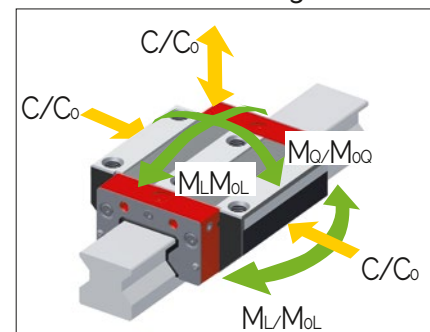
AMS 4B W 45 Drawings



AMS 4B W 45 Rigidity diagram

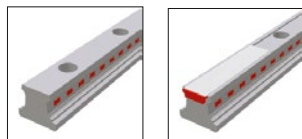


AMS 4B W 45 Load rating



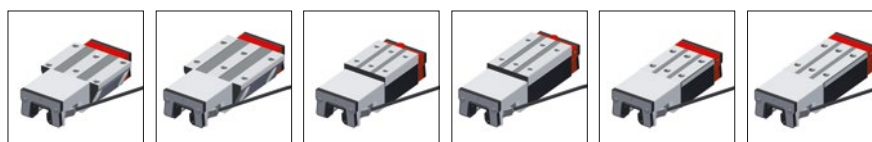
10.3 Technical data and options

AMS 4B Size 45 Dimensions and capacities



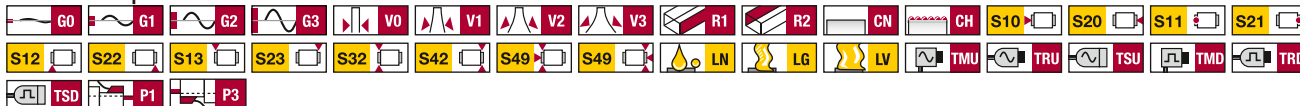
	AMS 4B S 45-N	AMS 4B S 45-C				
B1: Rail width	45	45				
J1: Rail height	37	37				
L3: Rail length max.	6000	6000				
L4: Spacing of fixing holes	105	105				
L5/L10: Position of first/last fixing hole	51	51				
Rail weight, specific (kg/m)	8.8	8.8				

Available options for AMS 4B S 45



	AMS 4B W 45-A	AMS 4B W 45-B	AMS 4B W 45-C	AMS 4B W 45-D	AMS 4B W 45-F	AMS 4B W 45-G	
A: System height	60	60	70	70	60	60	
A1: Half width of housing on opposite side	42	42	42	42	42	42	
A2: Half width of housing on reading head side	42	42	42	42	42	42	
A3: Projection of reading head	5	5	5	5	5	5	
B: Carriage width	120	120	86	86	86	86	
B2: Distance between locating faces	375	375	20.5	20.5	20.5	20.5	
C1: Position of center front lube hole*	8	8	18	18	8	8	
C3: Position of lateral lube hole	8	8	18	18	8	8	
C4: Position of lateral lube hole	2105	36.8	3105	36.8	3105	36.8	
C7: Position of top lube hole	1705	32.8	2705	32.8	2705	32.8	
J: Carriage height	50.8	50.8	60.8	60.8	50.8	50.8	
L1: Exterior fixing hole spacing	80	80	60	80	60	80	
L2: Interior fixing hole spacing	60	60	-	-	-	-	
L9: Carriage length with housing	198.1	229.6	198.1	229.6	198.1	229.6	
L11: Housing length	80	80	80	80	80	80	
L13: Total length measuring carriage	219.1	250.6	219.1	250.6	219.1	250.6	
Lw: Inner carriage body length	99.1	130.6	99.1	130.6	99.1	130.6	
N: Lateral fixing hole spacing	100	100	60	60	60	60	
O: Reference face height	10	10	19	19	10	10	
Capacities and weights							
C0: Static load capacity (N)	134800	176300	134800	176300	134800	176300	
C100: Dynamic load capacity (N)	61900	74700	61900	74700	61900	74700	
MOQ: Static cross moment capacity (Nm)	3193	4175	3193	4175	3193	4175	
MOL: Static longitud. moment capacity (Nm)	2498	4199	2498	4199	2498	4199	
MQ: Dyn. cross moment capacity (Nm)	1466	1769	1466	1769	1466	1769	
ML: Dyn. longitud. moment capacity (Nm)	1147	1779	1147	1779	1147	1779	
Carriage weight (kg)	4.1	5.1	4.2	5.2	3.6	4.4	

Available options for AMS 4B W 45



10.4 Accessories Overview

AMS 4B Rails accessories overview

Accessories	AMS 4B S 25	AMS 4B S 30	AMS 4B S 35	AMS 4B S 45	AMS 4B S 55	AMS 4B S 65	
Plugs:							
Plastic plugs	BRK 15	BRK 20	BRK 25	BRK 30	BRK 35	BRK 45	
Cover strips:							
Cover strip (spare part)	BAC 15	-	BAC 25	-	-	BAC 45	
End piece for cover strip (spare part)	EST 15-BAC	-	EST 25-BAC	-	-	EST 45-BAC	
Assembly tools:							
Installation tool for cover strip	BWC 15	-	BWC 25	-	-	BWC 45	

AMS 4B Rails accessories overview

Accessories	AMS 4B W 25	AMS 4B W 30	AMS 4B W 35	AMS 4B W 45	AMS 4B W 55	AMS 4B W 65	
Additional wipers:							
Additional wipers Viton	ZBV 15	ZBV 20	ZBV 25	ZBV 30	ZBV 35	ZBV 45	
Metal wiper	ABM 15-A	ABM 20-A	ABM 25-A	ABM 30-A	ABM 35-A	ABM 45-A	
Bellows:							
Bellows	-	FBB 20	FBB 25	FBB 30	FBB 35	FBB 45	
Adapter plate for bellows (spare part)	-	ZPB 20	ZPB 25	ZPB 30	ZPB 35	ZPB 45	
End plate for bellows (spare part)	-	EPB 20	EPB 25	EPB 30	EPB 35	EPB 45	
Assembly rails:							
Assembly rail	MBM 15	MBM 20	MBM 25	MBM 30	MBM 35	MBM 45	
Lubrication plates:							
Lubrication plate	SPL 15-BM	SPL 20-BM	SPL 25-BM	SPL 30-BM	SPL 35-BM	SPL 45-BM	
Front plates:							
Cross wiper for front plate (spare part)	QAS 15-STB	QAS 20-STB	QAS 25-STB	QAS 30-STB	QAS 35-STB	QAS 45-STB	
Lube nipples:							
Hydraulic-type grease nipple straight	-	SN 6	SN 6	SN 6	SN 6	SN 6	
Hydraulic-type grease nipple 45°	-	SN 6-45	SN 6-45	SN 6-45	SN 6-45	SN 6-45	
Hydraulic-type grease nipple 90°	-	SN 6-90	SN 6-90	SN 6-90	SN 6-90	SN 6-90	
Flush type grease nipple M3	SN 3-T	SN 3-T	-	-	-	-	
Flush type grease nipple M6	-	SN 6-T	SN 6-T	SN 6-T	SN 6-T	SN 6-T	
Grease gun for SN 3-T und SN 6-T	SFP-T3	SFP-T3	SFP-T3	SFP-T3	SFP-T3	SFP-T3	
Lube adapters:							
Lubrication adapter M8 round-head	-	SA 6-RD-M8x1	SA 6-RD-M8x1	SA 6-RD-M8x1	SA 6-RD-M8x1	SA 6-RD-M8x1	
Lubrication adapter M8 hexagon head	-	-	-	SA 6-6KT-M8x1	SA 6-6KT-M8x1	SA 6-6KT-M8x1	
Lubrication adapter G1/8 hexagon head	-	-	-	SA 6-6KT-G1/8	SA 6-6KT-G1/8	SA 6-6KT-G1/8	
Straight screw-in connection M3	SA 3-D3	SA 3-D3	-	-	-	-	
Straight screw-in connection M6	-	SA 6-D4-RD	SA 6-D4-RD	SA 6-D4-RD	SA 6-D4-RD	SA 6-D4-RD	
Swivel screw connection for pipe d=3 mm	SV 3-D3	SA 3-D3	-	-	-	-	
Swivel screw connection for pipe d=4 mm	-	SV 6-D4-SW9	SV 6-D4-SW9	SV 6-D4-SW9	SV 6-D4-SW9	SV 6-D4-SW9	
Swivel screw connection for pipe d=4 mm	-	SV 6-D4-SW10	SV 6-D4-SW10	SV 6-D4-SW10	SV 6-D4-SW10	SV 6-D4-SW10	
Swivel screw connection M6	-	SV 6-M6	SV 6-M6	SV 6-M6	SV 6-M6	SV 6-M6	
Swivel screw connection M6 long	-	SV 6-M6-L	SV 6-M6-L	SV 6-M6-L	SV 6-M6-L	SV 6-M6-L	
Swivel screw connection M8	-	SV 6-M8	SV 6-M8	SV 6-M8	SV 6-M8	SV 6-M8	
Swivel screw connection M8 long	-	SV 6-M8-L	SV 6-M8-L	SV 6-M8-L	SV 6-M8-L	SV 6-M8-L	
Cables:							
Connecting cable, 12-pole	KAO 12-X	KAO 12-X	KAO 12-X	KAO 12-X	KAO 12-X	KAO 12-X	
Connecting cable, 12-pole	KAO 13-X	KAO 13-X	KAO 13-X	KAO 13-X	KAO 13-X	KAO 13-X	
Extension cable, 12-pole	KAO 14-X	KAO 14-X	KAO 14-X	KAO 14-X	KAO 14-X	KAO 14-X	
Extension cable, 12-pole	KAO 15-X	KAO 15-X	KAO 15-X	KAO 15-X	KAO 15-X	KAO 15-X	
Connecting cable, 12-pole	KAO 16-X	KAO 16-X	KAO 16-X	KAO 16-X	KAO 16-X	KAO 16-X	

10.5 Order key Analog

Individual guide rails and carriages are ordered in accordance with the order codes described below.

AMS 4B carriages consist of guide carriage, casing and reading head. All MONORAIL BM carriages can also be used with AMS 4B rails. Q.v. chapter 2 and chapter 6.4 for the order key for accessories. Separate order codes are used in each case for rails, carriages and accessories. This also applies to different versions of rails and carriages. All guide components are supplied individually as standard, i.e. unassembled.

If required, SCHNEEBERGER can also supply rails and carriages assembled incl. accessories as complete systems. Please note the ordering instructions in chapter 2.4 if this applies. The order code for the AMS 4B systems is made up of two groups. For the AMS system with an analog interface, the code is AMSA. The AMS system with a digital interface is referred to as AMSD.

Order code for AMSA 4B Rails

	1x	AMSA 4B S	25	-N	-G2	-KC	-R12	-958	-29	-29	-CN	-TR50
Quantity												
Rail												
Size												
Type												
Accuracy												
Straightness												
Reference side												
Rail length L3												
Position of first fixing hole L5												
Position of last fixing hole L10												
Coating												
Magnetization												

NB

Q.v. chapter 10.1 to 10.3 for an overview of types, details of shapes, available options and accessories. Q.v. chapter 2 for a description of the options. If possible, standard lengths are preferred for L3 rail length. These are calculated with the table values in chapter 10.2 using the following formula: $L3 = n \times L4 + L5 + L10 \leq L3_{max}$.

Order code for AMSA 4B Carriages

	1x	AMSA 4B W	25	-A	-P1	-G2	-V1	-R1	-CN	-S10	-LN	-TSU
Quantity												
Carriage												
Size												
Type												
Reading head position												
Accuracy												
Preload												
Reference side												
Coating												
Lube connection												
Lubrication as delivered condition												
Interface												

NB

Q.v. chapter 10.1 to 10.3 for an overview of types, details of shapes, available options and accessories.

Q.v. chapter 2 for a description of the options.

Order code for AMSA 3B Reading head (spare part)

	1x	SMA 4B	-MU
Quantity			
Reading head			
Interface			

10.6 Order key Digital

Order code for AMSD 4B Rails

	1x	AMSD 4B S	25	-N	-G3	-KC	-R12	-958	-29	-29	-CN	-TR50
Quantity												
Rail												
Size												
Type												
Accuracy												
Straightness												
Reference side												
Rail length L3												
Position of first fixing hole L5												
Position of last fixing hole L10												
Coating												
Magnetization												

NB

Q.v. chapter 10.1 to 10.3 for an overview of types, details of shapes, available options and accessories. Q.v. chapter 2 for a description of the options. If possible, standard lengths are preferred for L3 rail length.

These are calculated with the table values in chapter 10.2 using the following formula: $L3 = n \times L4 + L5 + L10 \leq L3_{max}$.

Order code for AMSD 4B Carriages

	1x	AMSD 4B W	25	-A	-P1	-G3	-V1	-R1	-CN	-S10	-LN	-TSD	-050	-80	ZN
Quantity															
Carriage															
Size															
Type															
Reading head position															
Accuracy															
Preload															
Reference side															
Coating															
Lube connection															
Lubrication as delivered condition															
Interface															
Interpolation															
Frequency															
Reference pulse															

NB

Q.v. chapter 10.1 to 10.3 for an overview of types, details of shapes, available options and accessories. Q.v. chapter 2 for a description of the options.

Order code for AMSD 4B Reading head (spare part)

	1x	SMD 4B	-MD	-010	-80	-ZN
Quantity						
Reading head						
Interface						
Interpolation						
Frequency						
Reference pulse						

NB

Q.v. chapter 2 for a description of the options.