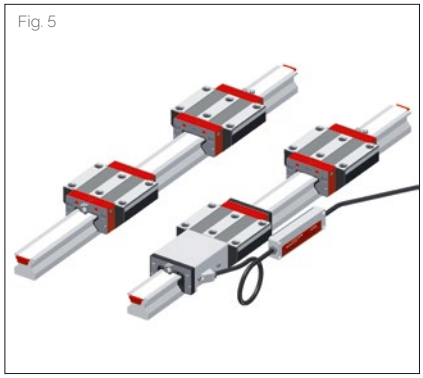
1 Overview of all MONORAIL products

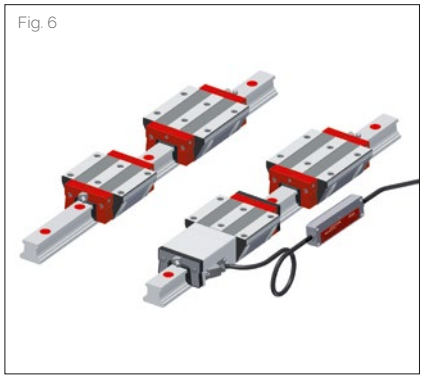
Fig. 5



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



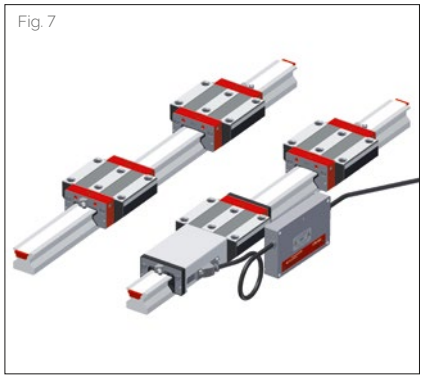
AMS 4B

(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.

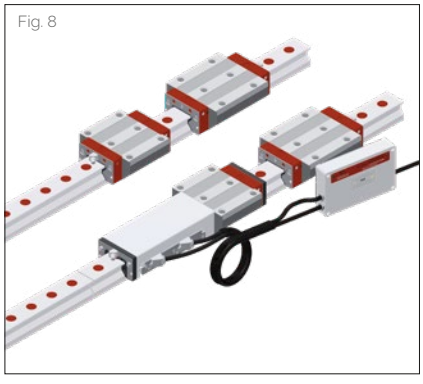
Fig. 7



AMSABS 3L

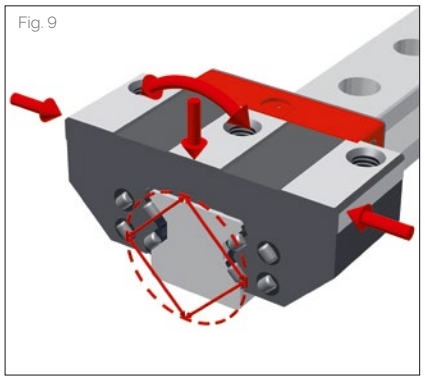
(Fig. 8) The MONORAIL AMSA 3L is an integrated magneto-resistive measuring system for distance measurement based on the MONORAIL MR roller profile guideway with an analog voltage interface. It is SCHNEEBERGER's newest product, and is designed for use with very long axes. The AMSA 3L is made possible 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

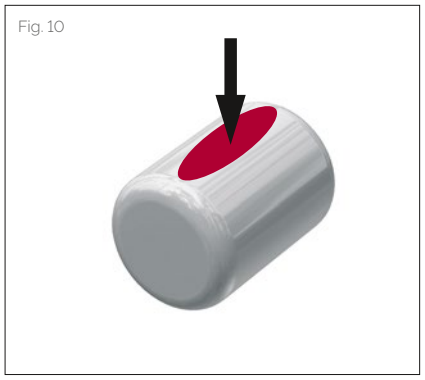
Fig. 9



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.

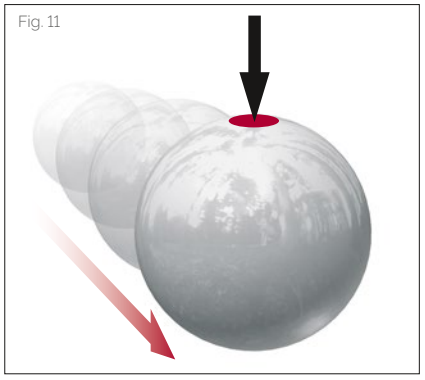
Fig. 10



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.

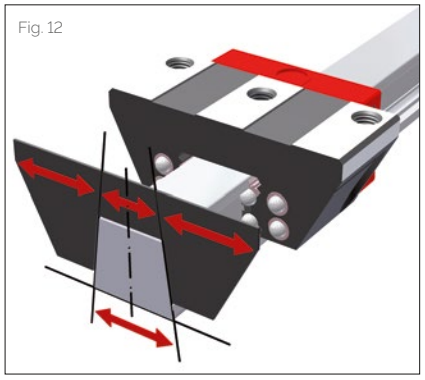
Fig. 11



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.

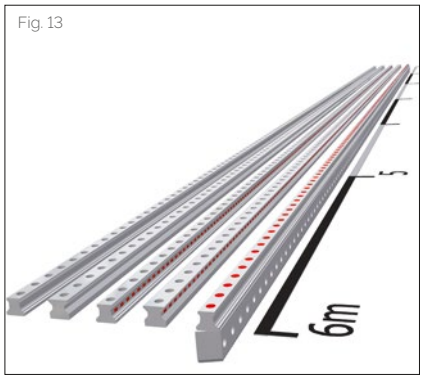
Fig. 12



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.

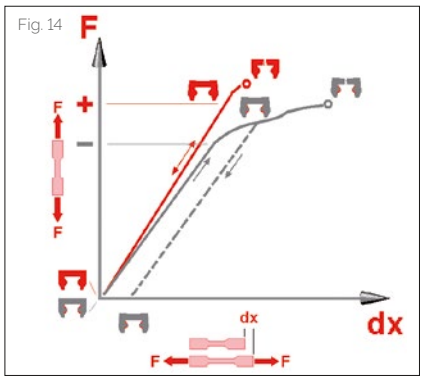
Fig. 13



1.1.5 In one piece up to 6 metres long

(Fig. 13) SCHNEEBERGER offers guiderails 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.

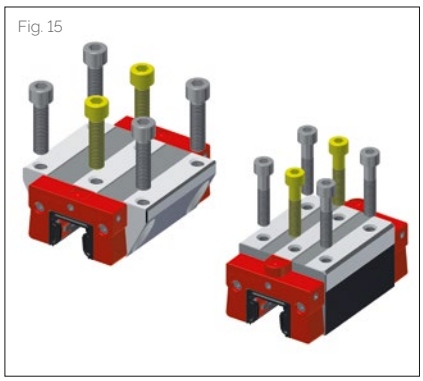
Fig. 14



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.

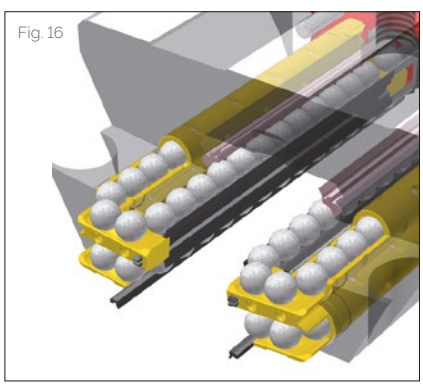
Fig. 15



1.1.7 6 attachment holes per carriage

(Fig. 15) When a carriage is 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

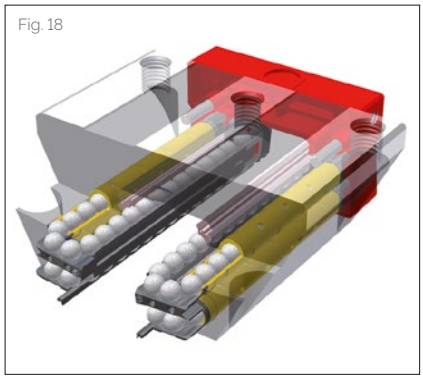
(Fig. 16) Particular attention was focused on the run-in area of the rollers from the unloaded to the loaded zone. This area was geometrically balanced to provide very smooth operation, i.e. minimum travel pulsation, pitch movement and noise for both low and high speed motion

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.

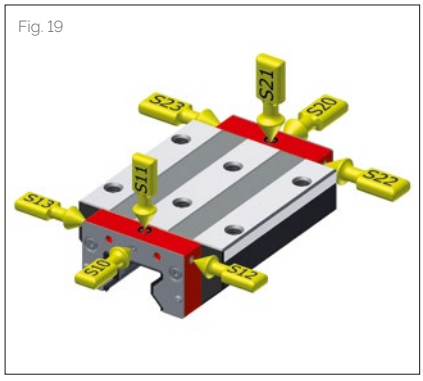
Fig. 18



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.

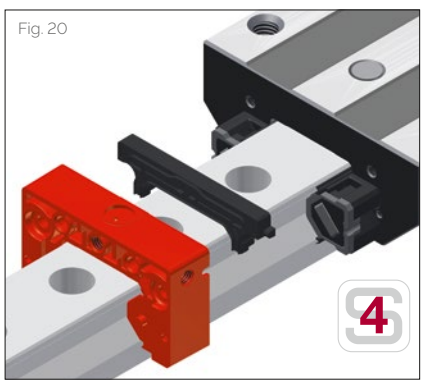
Fig. 19



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.

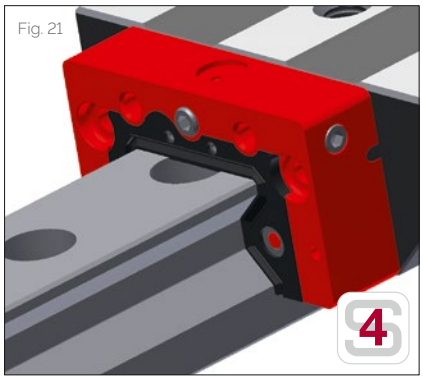


Fig. 21

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.

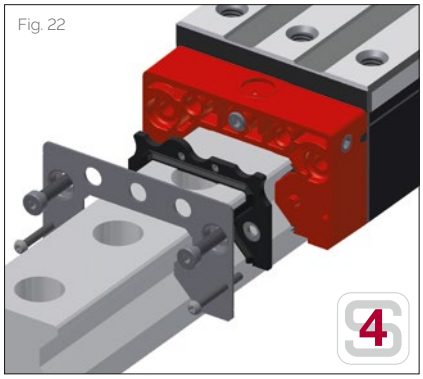


Fig. 22

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.

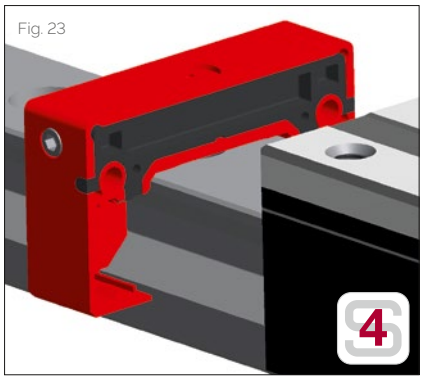


Fig. 23

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.

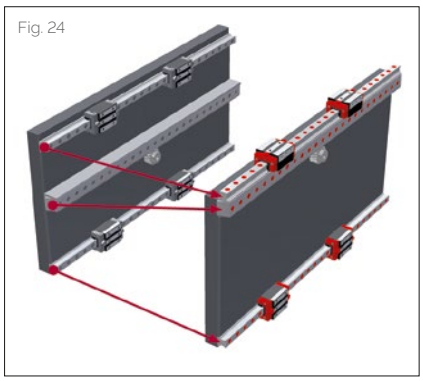
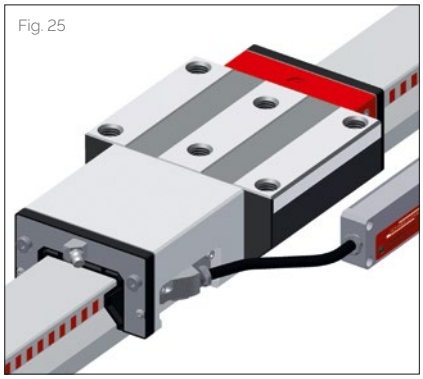


Fig. 24

1.1.16 Integral racks

(Fig. 24) Rack systems offer a high-grade gear rack that is integated into the guiderail. 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.

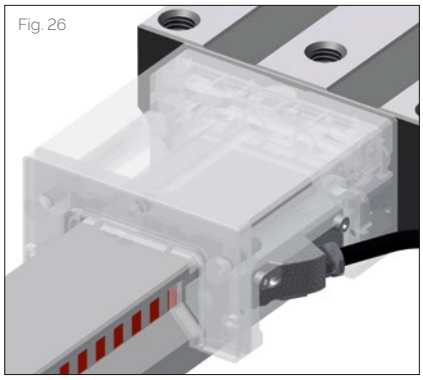
Fig. 25



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 seperate 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.

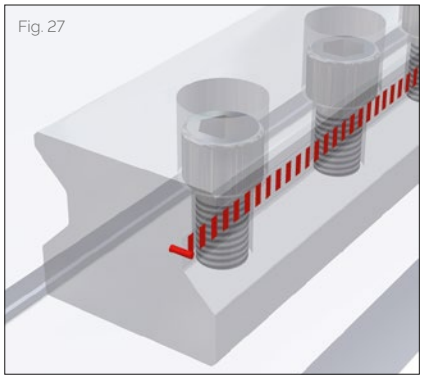
Fig. 26



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 necesary after service exchange of a measuring head.

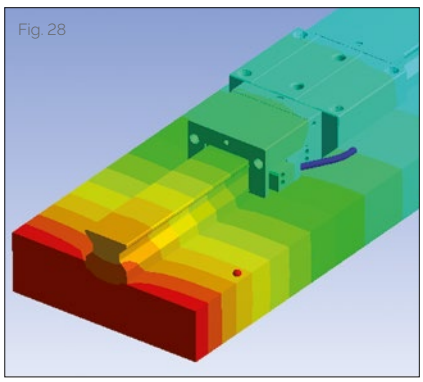
Fig. 27



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.

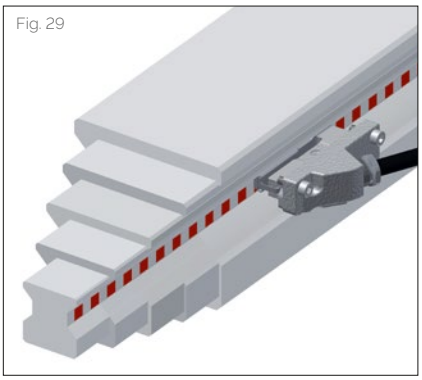
Fig. 28



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.

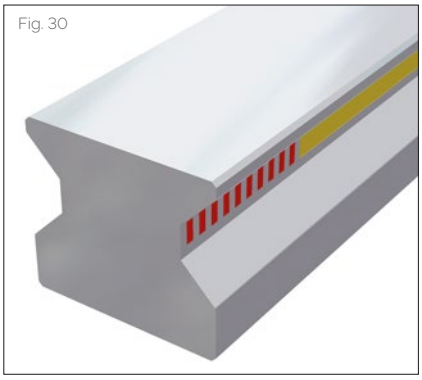
Fig. 29



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.

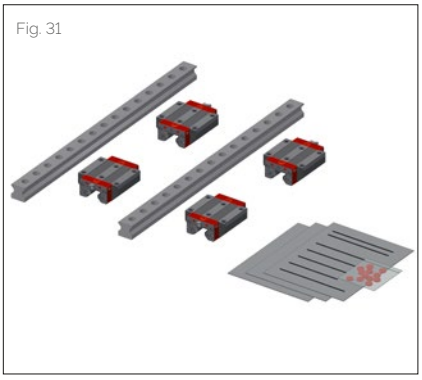
Fig. 30



1.1.22 Protected measuring scale

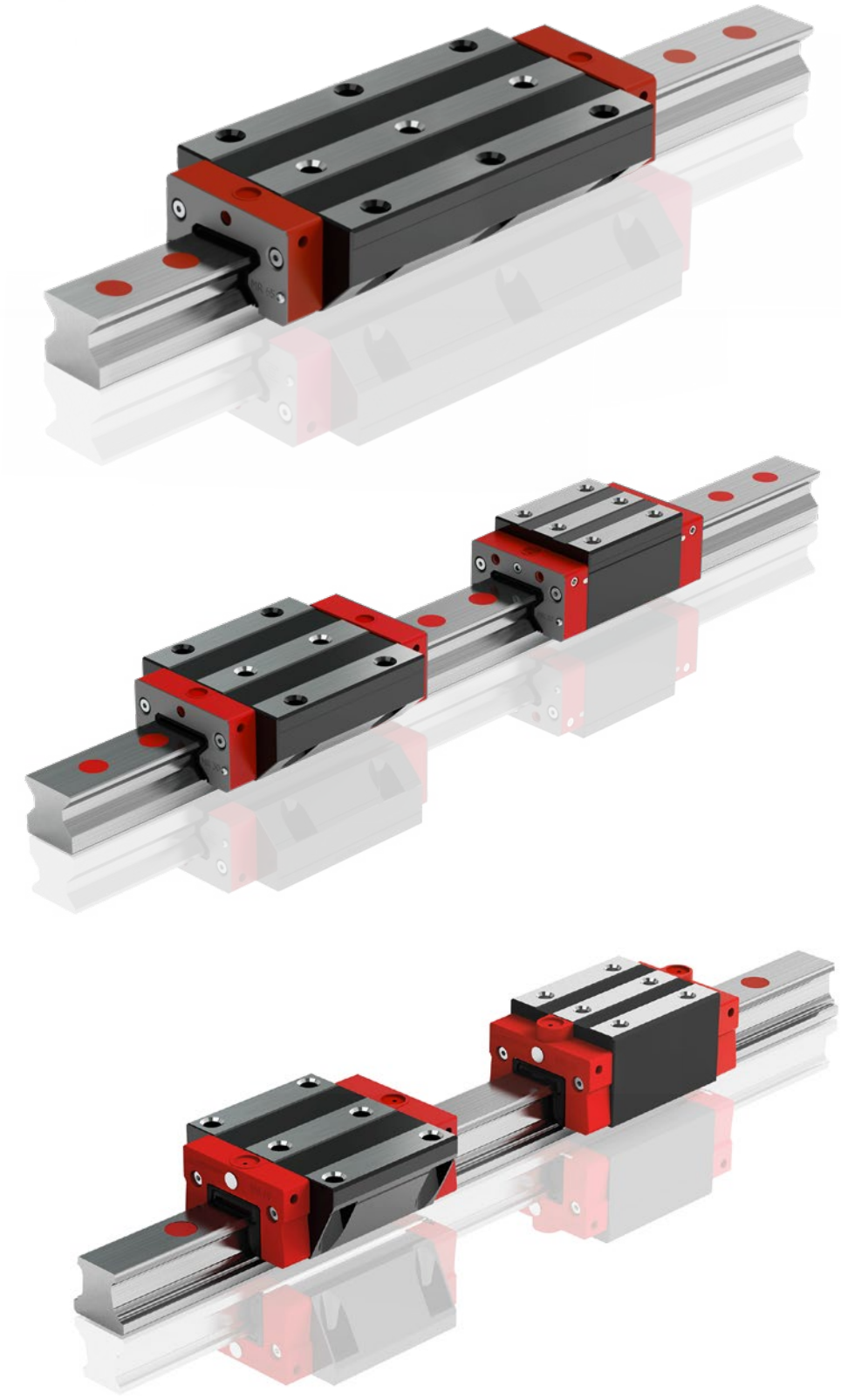
(Fig. 30) Following production, the integral measuring scale is protected from mechanical damage and magnetic interference by an extremely hard, non-magnetic cover strip.Using a special manufacturing process, the strip is laser welded to the rail which reliably protects the measuring scale from the effects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

Fig. 31



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.



Details see chapter 1

2.1 Features and options

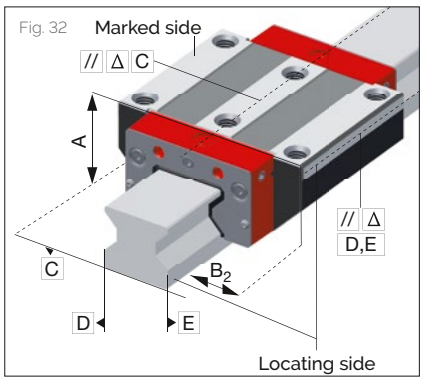


Fig. 32

2.1.1 Accuracy classes

(Fig. 32) The four accuracy classes allow the user to select both the guiderails 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

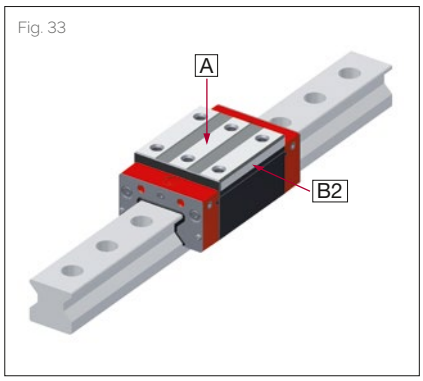


Fig. 33

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.

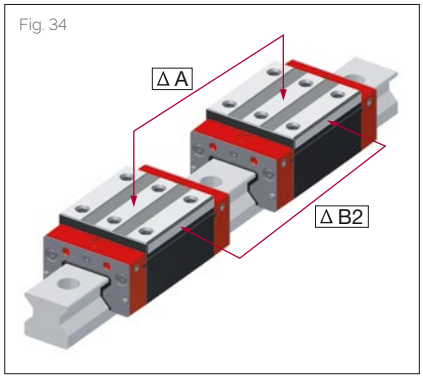


Fig. 34

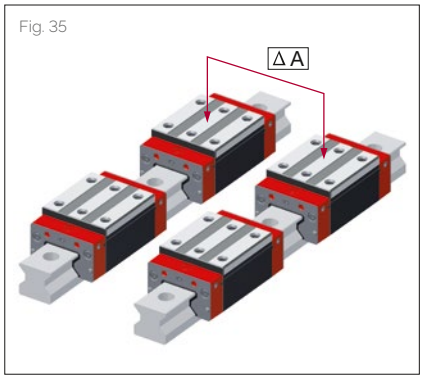


Fig. 35

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

2.1.3 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	ΔA/ΔB2
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.

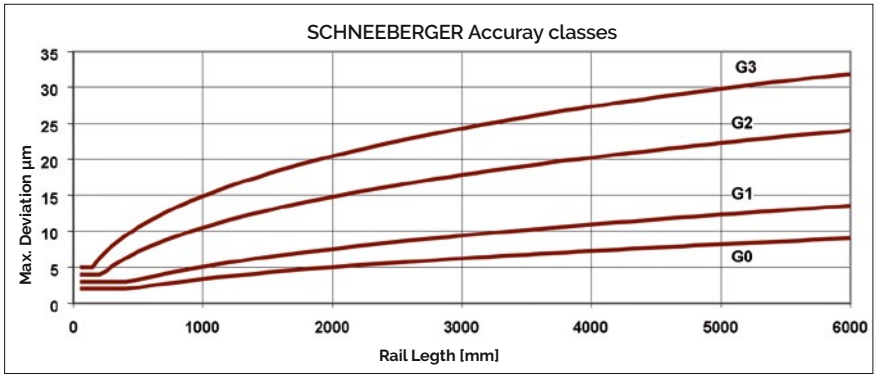
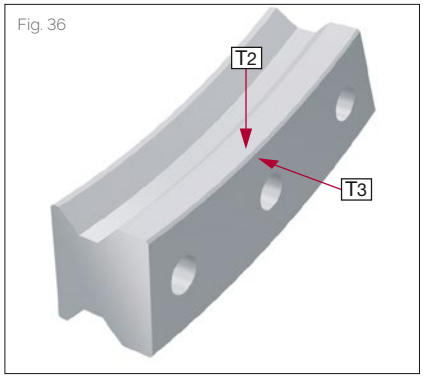


Fig. 36



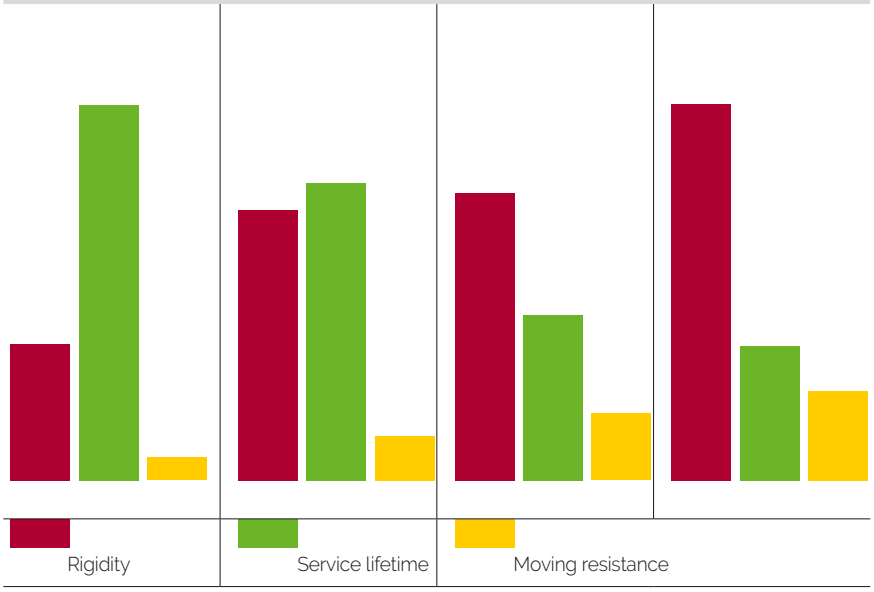
2.1.6 Straightness

(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.

KC Standard

2.1.7 Preload classes

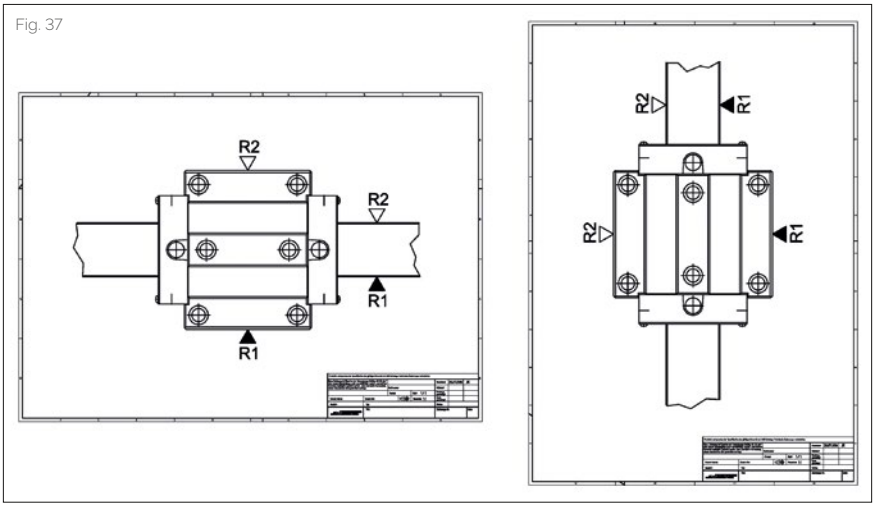
The roller guideways are preloaded to enable them to work free of play under different load conditions. Basically, while preloading increases the rigidity of the guideway, it also affects operational life and increases the push force. SCHNEEBERGER guideways are available in various preload classes to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

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.

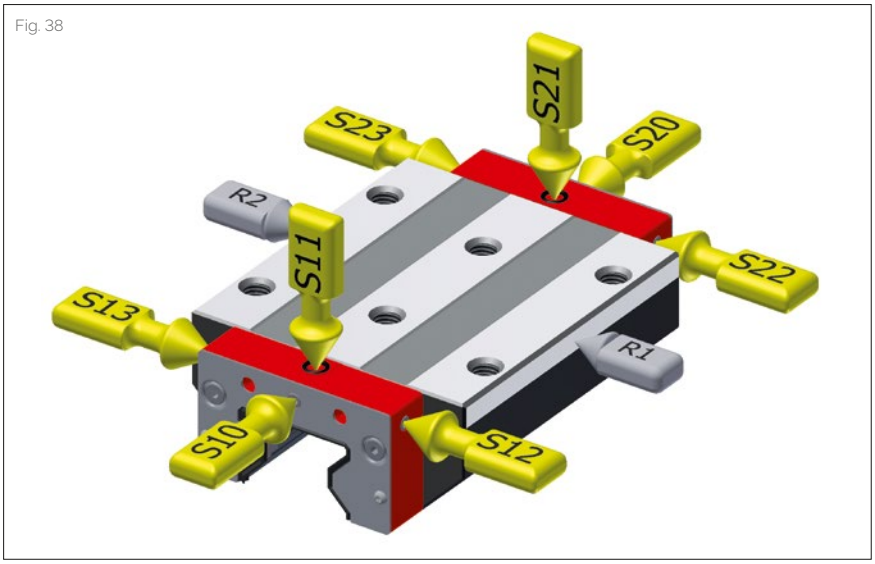
Fig. 37



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

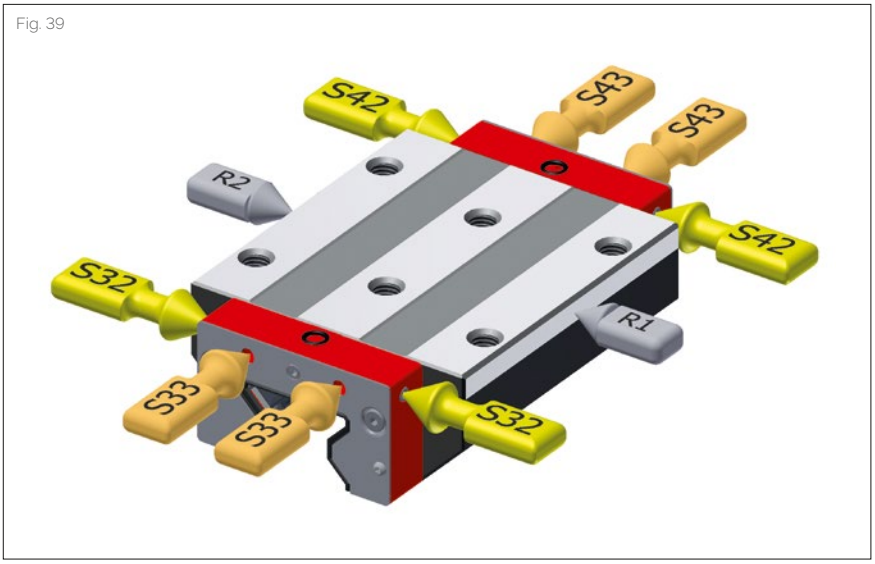


2.1.10 Separate carriage lube connections for specific mounting positions

(Fig. 39) As a special feature for certain installation positions, SCHNEEBERGER systems provide for the independant 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

2.1.11 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.

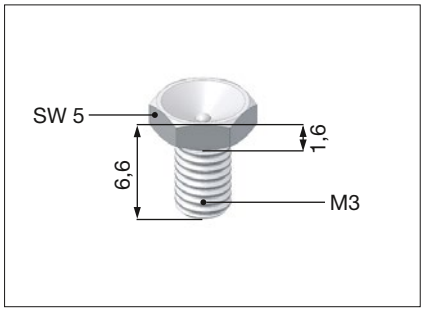
None

Hard chromium

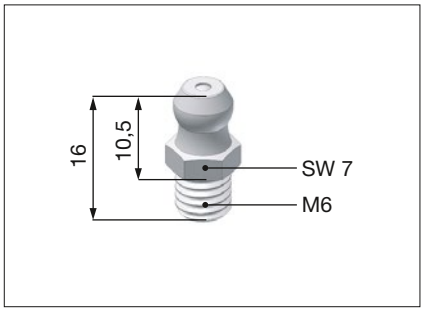
2.2 Accessories for lubrication

2.2.1 Grease nipples

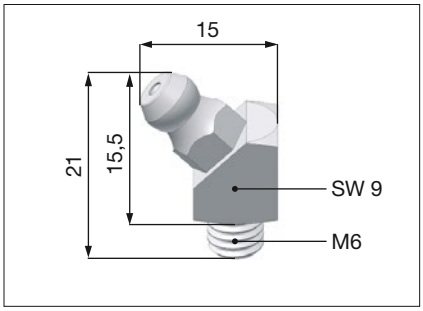
Grease nipple SN 3-T
Flush type grease nipple M3



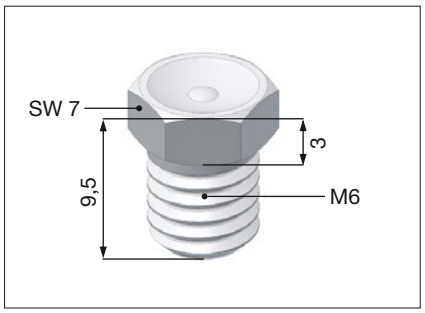
Grease nipple SN 6
Hydraulic-type grease nipple straight



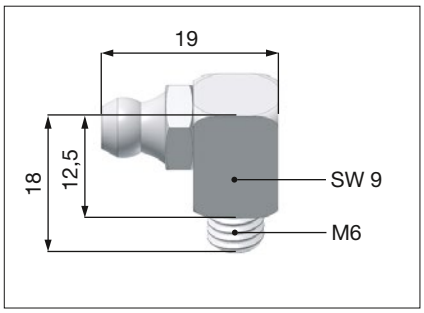
Grease nipple SN 6-45
Hydraulic-type grease nipple45°



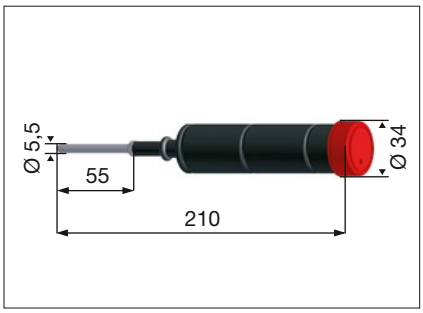
Grease nipple SN 6-T
Flush type grease nipple M6



Grease nipple SN 6-90
Hydraulic-type grease nipple 90°



Grease gun SFP-T3
Grease gun for SN3-T and SN6-T



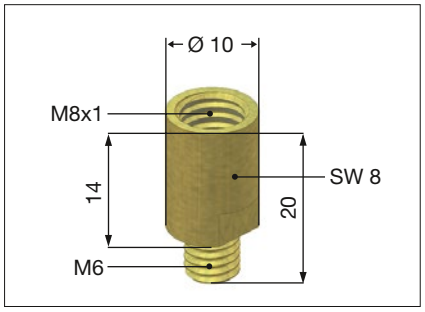
There are products having grease nipples, which can not be removed in the application. During rotation, this results in a collision between the grease nipple and:

- the carriage
- the guide rail
- the connecting structure

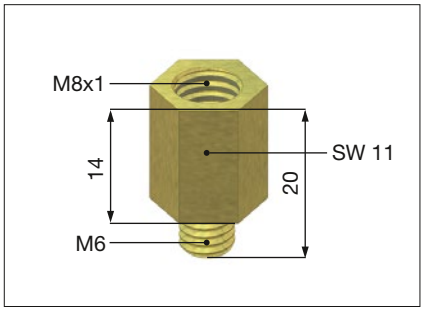
In this case, the carriage must be removed from the guide rail to replace the grease nipple.

2.2.2 Lubrication adapters

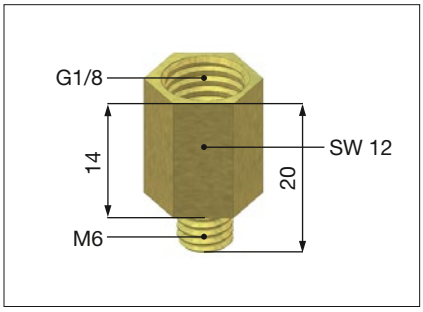
Lubrication adapter SA 6-RD-M8x1
Lubrication adapter M8 round-head



Lubrication adapter SA 6-6KT-M8x1
Lubrication adapter M8 hexagon head



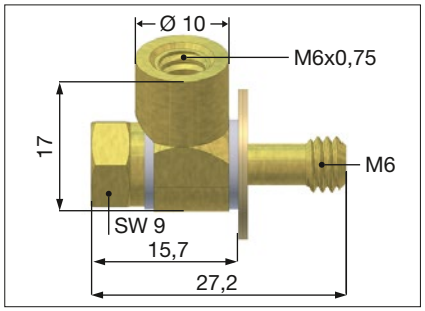
Lubrication adapter SA 6-6KT-G1/8
Lubrication adapter G1/8 hexagon head



2.2.3 Pipe connection

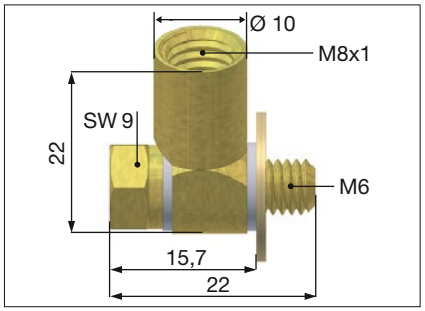
Swivel screw connection SV 6-M6-L

Swivel screw connection M6 long (aluminum sealing)



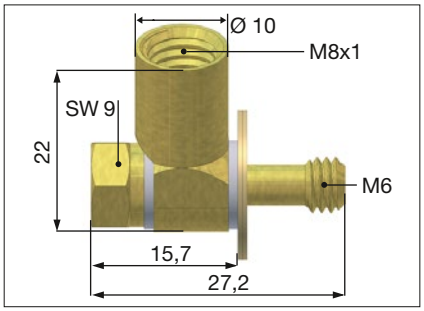
Swivel screw connection SV 6-M8

Swivel screw connection M8 (aluminum sealing)



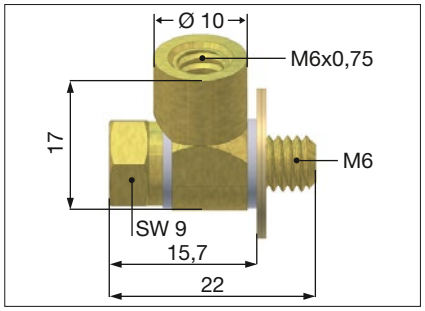
Swivel screw connection SV 6-M8-L

Swivel screw connection M8 long (aluminum sealing)



Swivel screw connection SV 6-M6

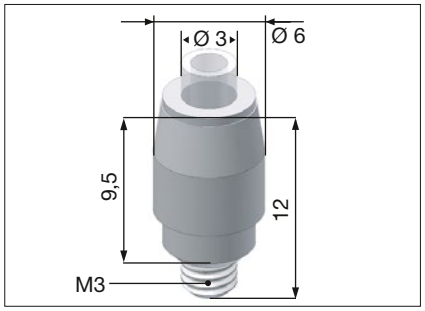
Swivel screw connection M6 (aluminum sealing)



2.2.4 Hose connection

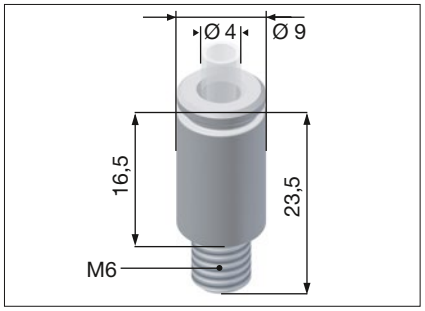
Screw-in connection SA 3-D3

Screw-in connection M3



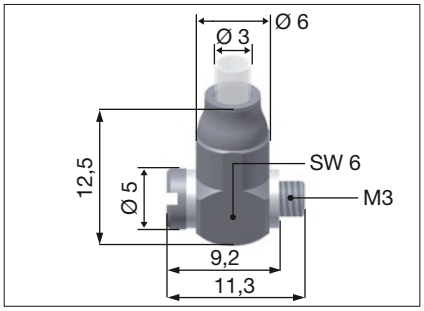
Screw-in connection SA 6-D4-RD

Screw-in connection M6



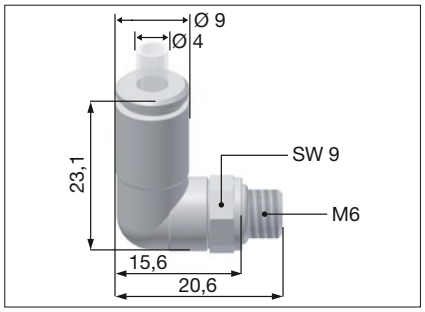
Swivel screw connection SV 3-D3

Swivel screw connection for hose connection 3mm



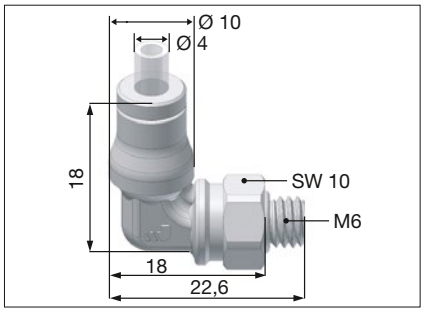
Swivel screw connection SV 6-D4-SW9

Swivel screw connection for hose connection 4mm



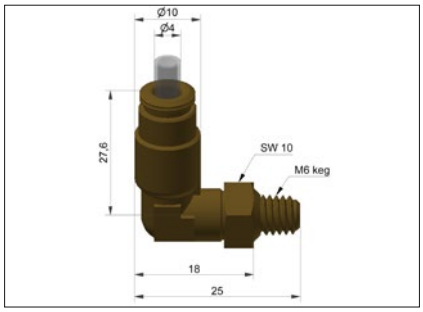
Swivel screw connection SV 6-D4-SW10

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/s2	100 m/s2

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-**

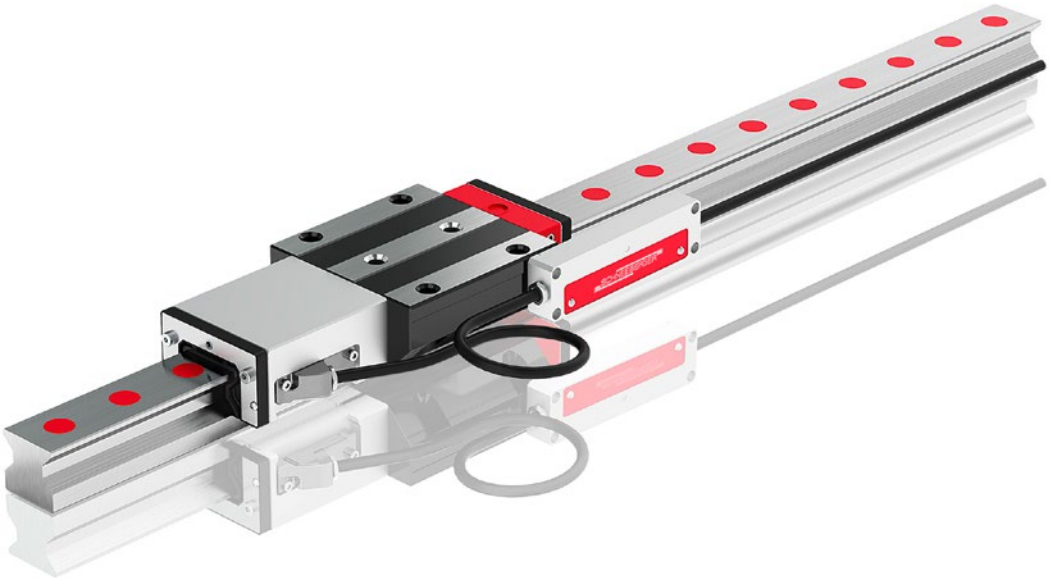
Comparison with other drive systems

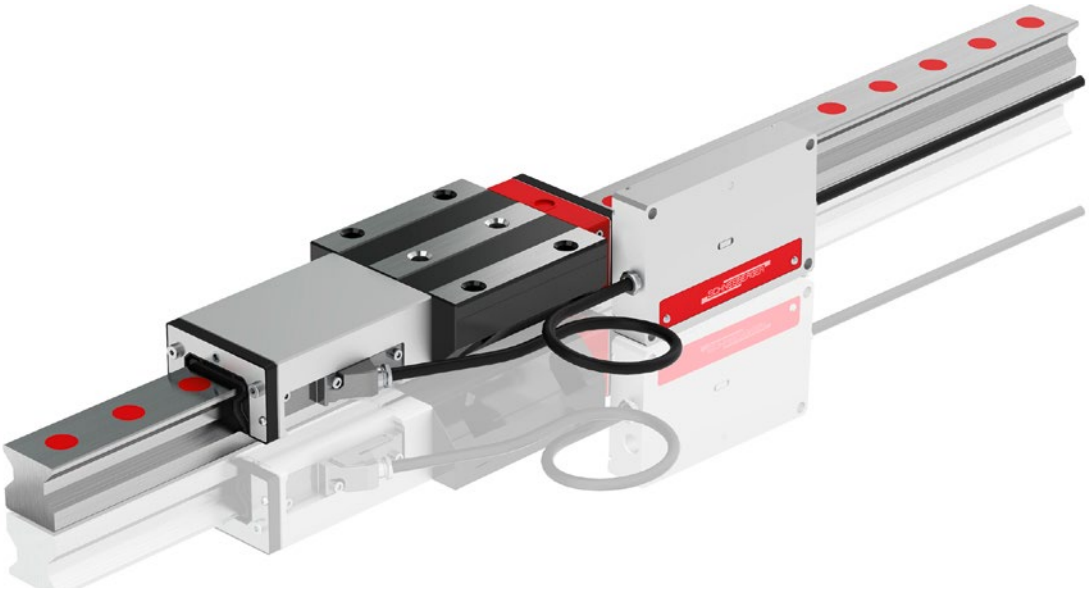
Compared with other drive solutions used for linear movements, rack drives with BZ MONORAIL offer a number of benefits. Where ball screws are concerned, these are a way of implementing several independent movements on a guide system.
BZ MONORAIL has a superior drive rigidity, which is independent of the length of the axis and independent of temperature thanks to the modular style of construction.

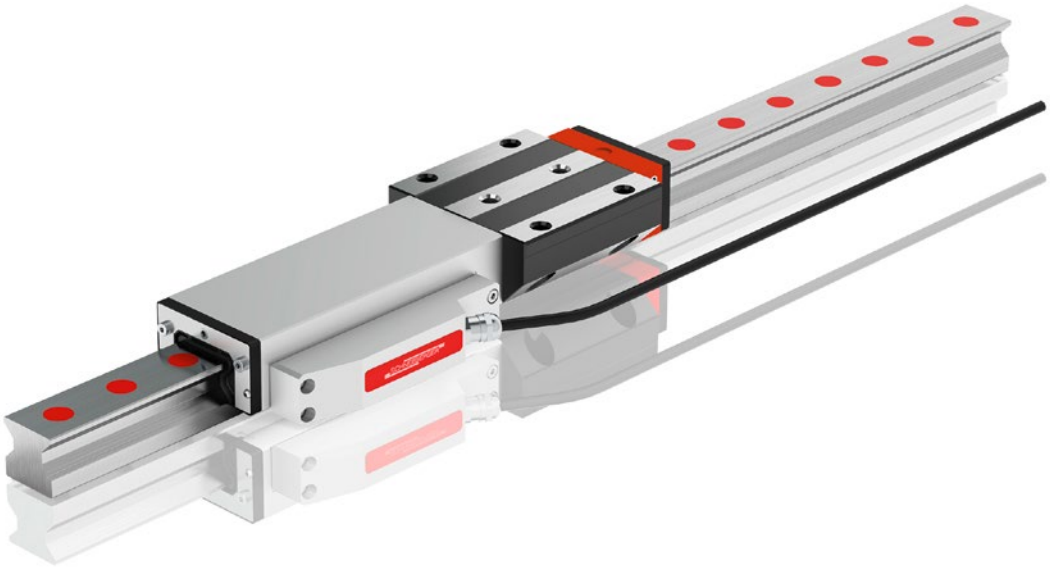
The rack elements are partially exchangeable when worn.
Accurately machined section rail guides and exceptionally precise rack segments result in a very smooth running pinion. The preload of the drive system thus remains constant along the full length and does not change in operation over time. In combination 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



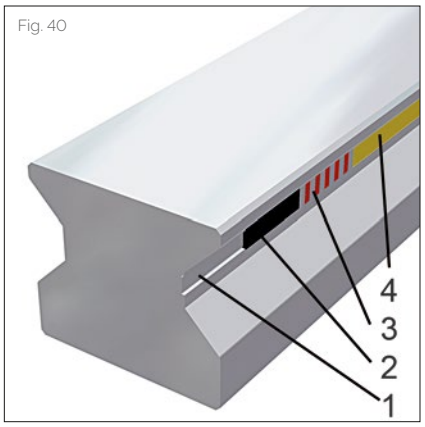




Details see chapter 1

4.1 Magneto-resistive measuring method

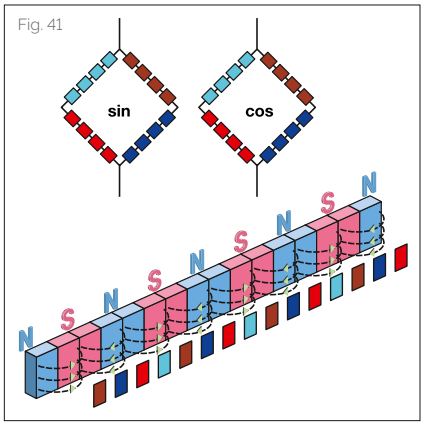
Fig. 40



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).

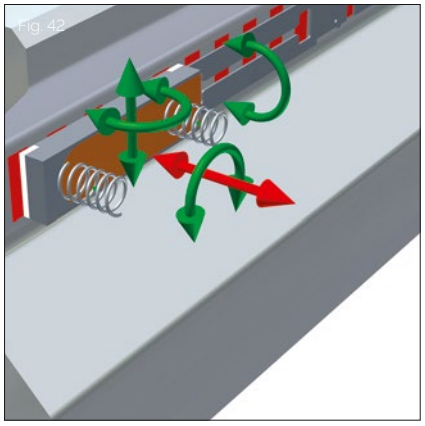
Fig. 41



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.

Fig. 42



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.

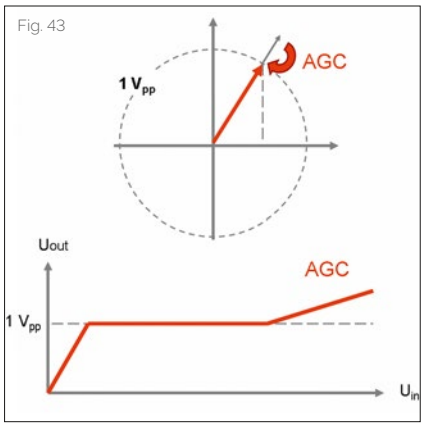


Fig. 43

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).

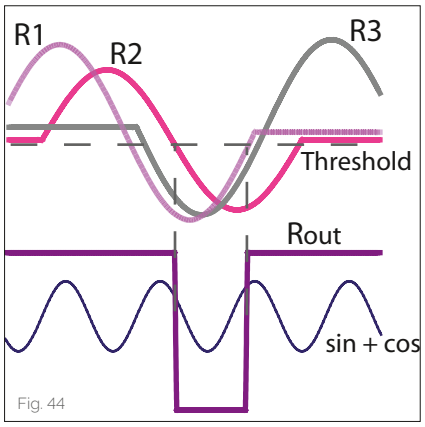


Fig. 44

4.1.5 Reference point identification

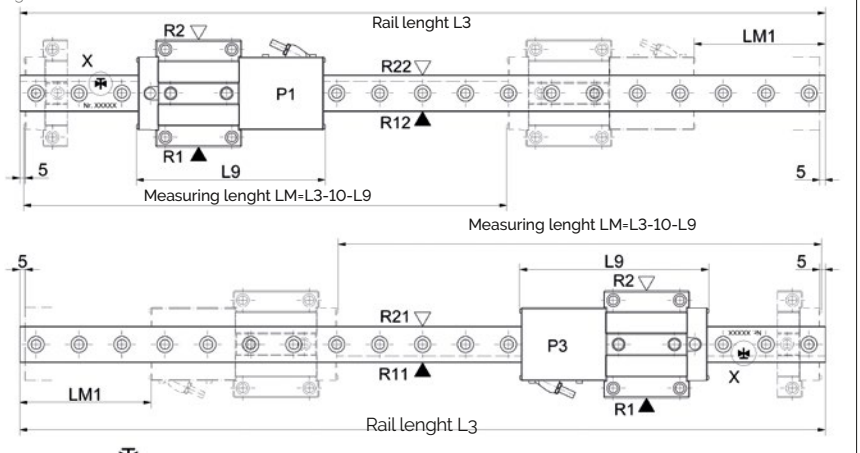
(Fig. 44) The second track carries the AMS reference marks to determine the absolute position and reference the system. The accuracy of the reference points is decisive for the machine's zero or home position. A reference point is represented by three magnetic reference markers on the reference point 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.

Fig. 45



	AMSA 3B	AMSD 3B	AMSA 4B	AMSD 4B
LM1	40	40	38	38

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.

TR50 Reference points, 50mm pattern

TD50 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

TSU
TSD

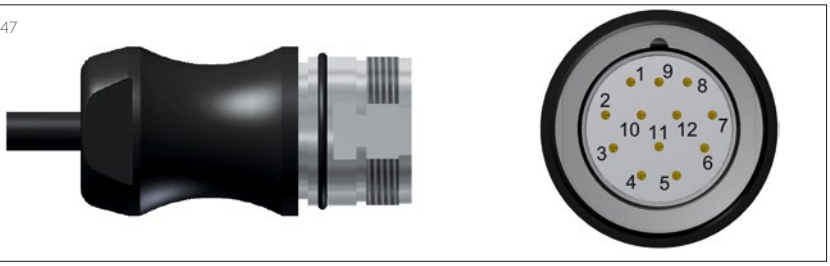
Fig. 46

Interface TRU / TRD

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

TRU
TRD

Fig. 47

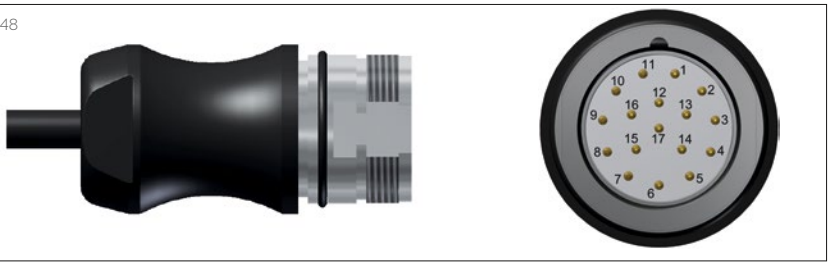


Interface TRH

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

TRH

Fig. 48

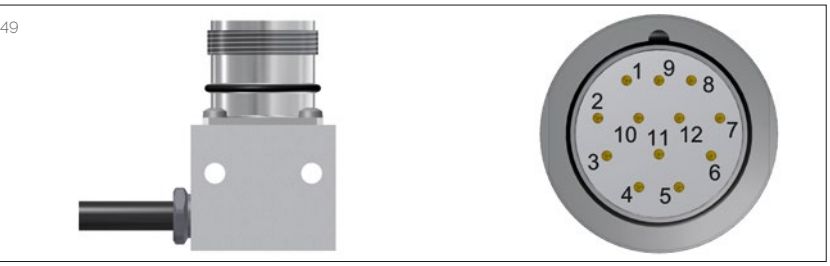


Interface TMU / TMD

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

TMU
TMD

Fig. 49

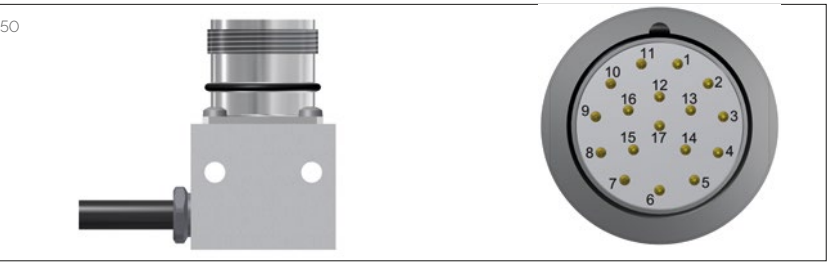


Interface TMH

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

TMH

Fig. 50



Interface TDC

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

TDC

Fig. 51

4.3 Read head interfaces

Terminal layout

Fig. 52

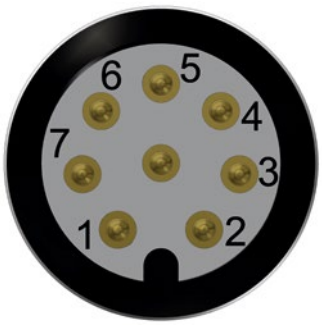
	Interfaces TSU / TRU / TMU		Interfaces TSD / TRD / TMD	
Contact	**Signal**	**Signaltype**	**Signal**	**Signaltype**
1	-Ua2	- Cosine	- Ua2	A quad B signal
2	+5V Sensor	Supply voltage feed back	+5V Sensor	Supply voltage feed back
3	+Ua0	Reference signal	+Ua0	Reference signal synchronized
4	-Ua0	Reference 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	+ Cosinue	+ 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

Fig. 53

	TRH / TMH / TSH (Interface SSI / Fanuc / Mitsubishi)	
Contact	**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

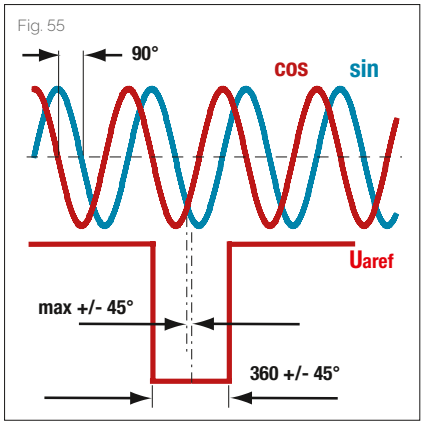
Fig. 54



	Interface TDC	
Contact	**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

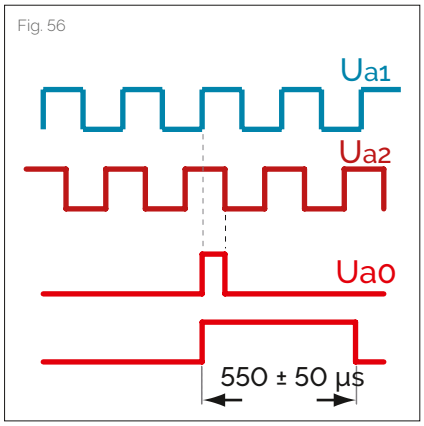
Fig. 55



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.

Fig. 56



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 µs +/- 50 µs. This option is used with evaluation electronics that cannot process multiple short-term reference impulses

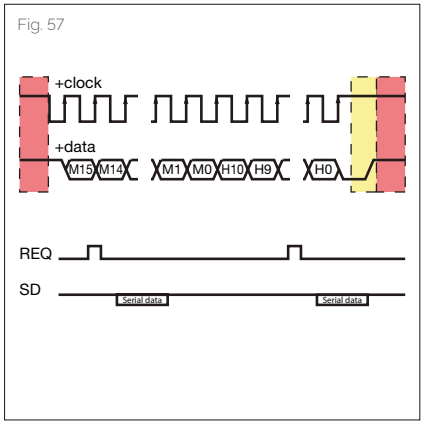
The following combinations of interpolation factor, maximum output frequency and reference impulse implementation are available for all reading head interfaces.

-010-80-ZN 5 µm, interpolation 10x, max. output frequency 8 MHz
-050-80-ZN 1 µm, interpolation 50x, max. output frequency 8 MHz
-250-80-ZN 0,2 µm, interpolation 250x, max.output frequency 8 MHz
-010-80-ZF 5 µm, interpolation 10x, max. output frequency 8 MHz
-050-80-ZF 1 µm, interpolation 50x, max. output frequency 8 MHz
-250-80-ZF 0,2 µm, interpolation 250x, max. output frequency 8 MHz

Order code:

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

Fig. 57

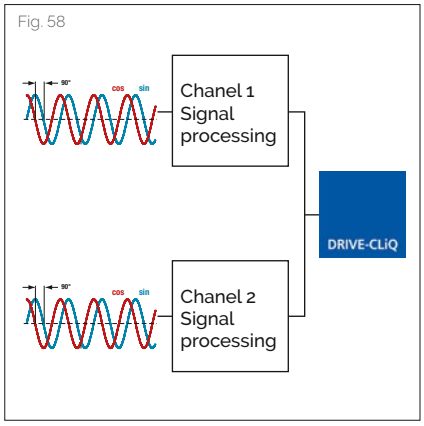


Absolute interfaces TRH / TMH / TSH

(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.

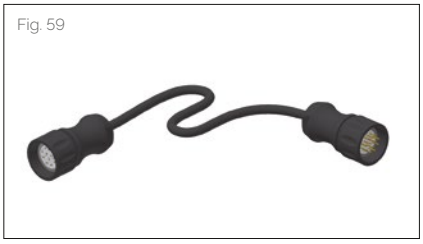
®Drive CLiQ is a registered trademark of Siemens

4.4 Accessories - Cables

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

For read head: TMU TRU TMD TRD
Order code: **KAO 12-xx** (xx = length in m)
Available lengths: 3, 5, 10, 15 and 20m
Order example: **KAO 12-5**

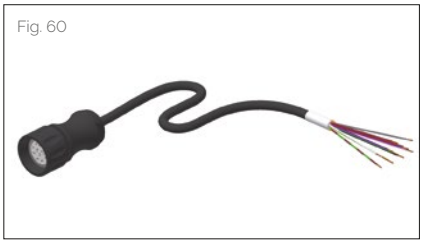
Fig. 59



KAO 13
Connecting cable, 12 pole, socket with female thread - open ends

For read head: TMU TRU TMD TRD
Order code: **KAO 13-xx** (xx = length in m)
Available lengths: 3, 5, 10, 15 and 20m
Order example: **KAO 13-5**

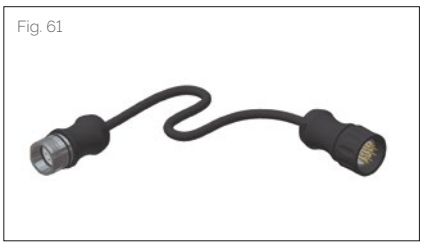
Fig. 60



KAO 14
Extension cable, 12 pole, socket with male thread - plug with female thread

For read head: TSU TSD
Order code: **KAO 14-xx** (xx = length in m)
Available lengths: 3, 5, 10, 15 and 20m
Order example: **KAO 14-5**

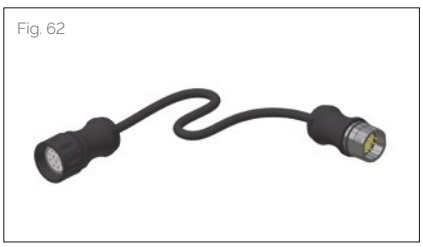
Fig. 61



KAO 15
Extension cable, 12 pole, socket with female thread - plug with male thread

For read head: TMU TRU TMD TRD
Order code: **KAO 15-xx** (xx = length in m)
Available lengths: 3, 5, 10, 15 and 20m
Order example: **KAO 15-5**

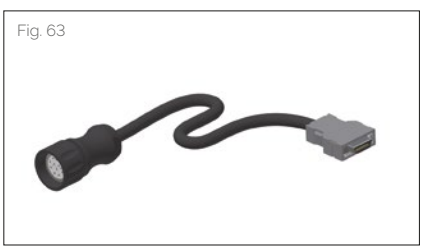
Fig. 62



KAO 16
Connecting cable, 12 pole, socket with female thread - FANUC plug

For read head: TMD TRD
Order code: **KAO 16-xx** (xx = length in m)
Available lengths: 3, 5, 10, 15 and 20m
Order example: **KAO 16-5**

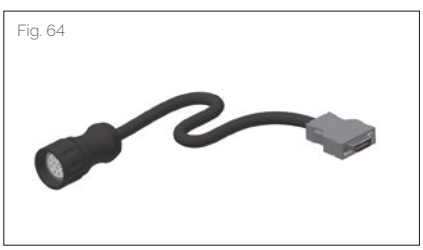
Fig. 63



KAO 20
Connecting cable, 17 pole, single shield, socket with female thread – FANUC plug

For read head: TMH TRH
Order code: **KAO 20-xx** (xx = length in m)
Available lengths: 3, 5, 10, 15 and 20m
Order example: **KAO 20-5**

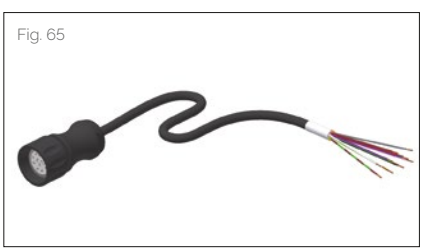
Fig. 64



KAO 23
Connecting cable, 17 pole, double shield, socket with female thread – open ends

For read head: TMH TRH
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

	Interfaces TRU / TMU		Open ends
Contact	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	+ Cosinue	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

	Interfaces TRD / TMD		Open ends
Contact	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

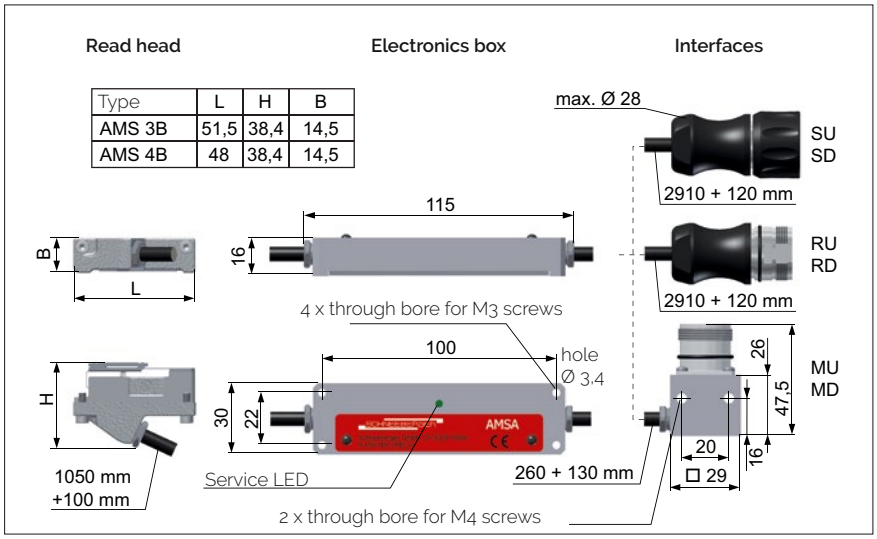
Terminal layout connection cable KAO 23

Fig. 68

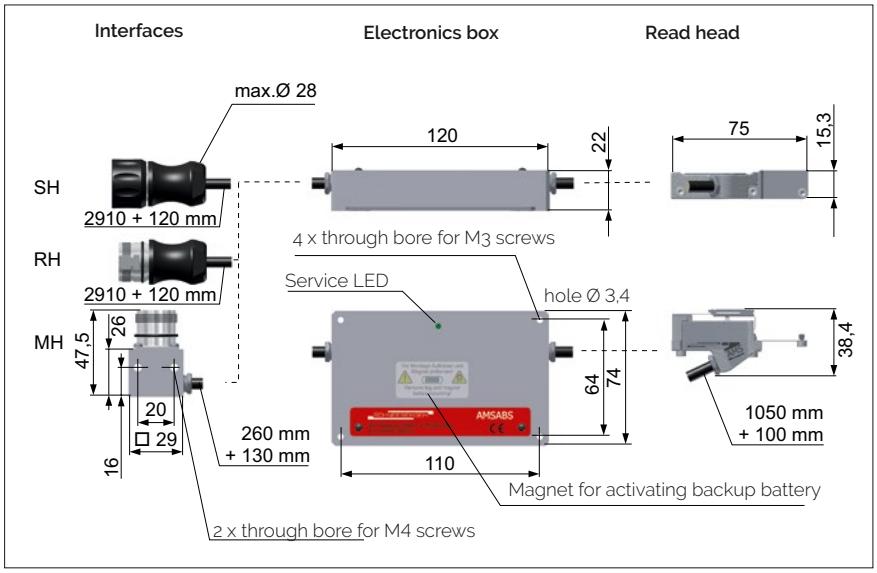
	Interfaces TRH / TMH		Open ends
Contact	Signal	Signal type	Color of the cables
1	+5V sensor	Supply voltage feedback	blue
2	-	NC	-
3	-	NC	-
4	0V sensor	Supply voltage feedback	white
5	-	Internal parameterisation	-
6	TxD	Iinternal parameterisation	-
7	+5V to 24V	Supply voltage	brown / green
8	+CLK	+ Pulse	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

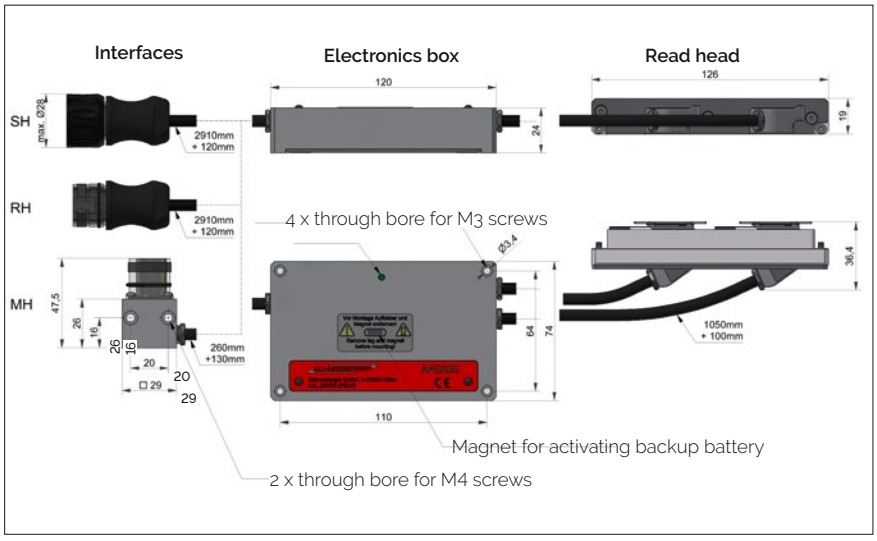
AMS 3B/4B



AMSABS 3B/4B

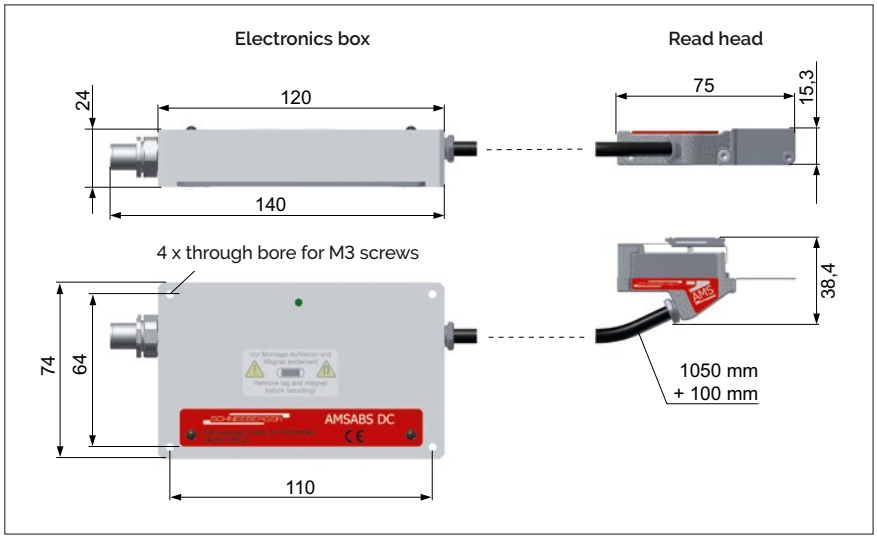


AMSA 3L



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_{S1S2} = 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_{S1S2} = +/- 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:

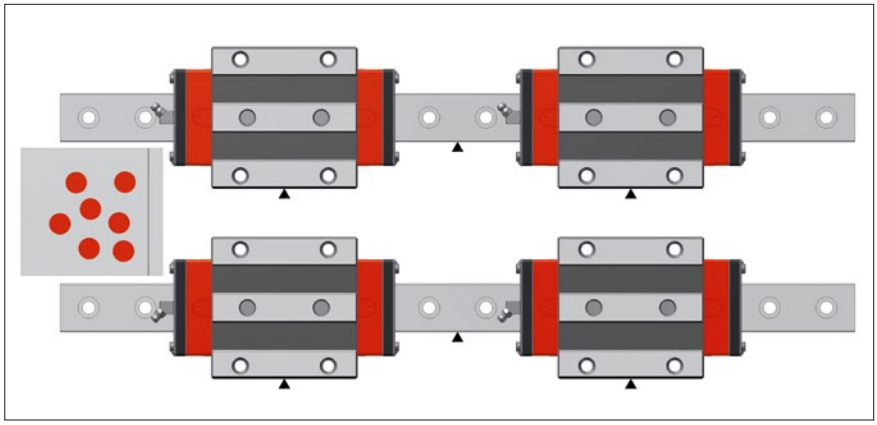
Order code for MONORAIL systems

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



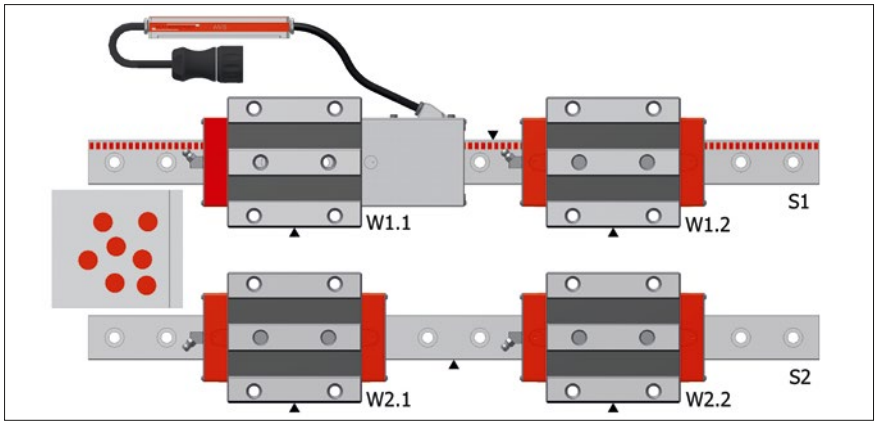
2 identical rails each with 2 identical carriages, accessories (additional wipers) can be clearly allocated due to the number.
Plugs for the rails are always supplied unfitted.

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

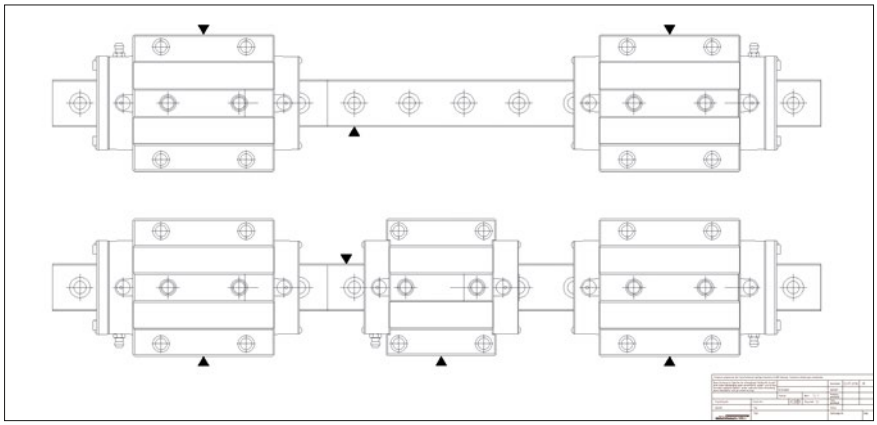


2 different rails and 2 different carriage types, uniform lubrication accessories, allocation and sequence of rails and carriages acc. to the sequence of the items in the order.

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



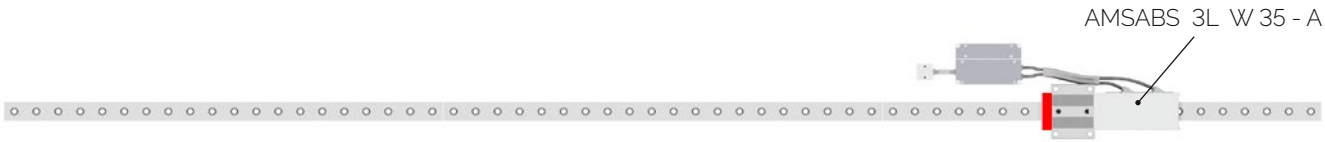
2 different rails, 2-part in each case,
5 different carriages.
The rails, carriages and accessories are impossible to allocate clearly without a layout sketch.

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:

☐ AMSABS 3L 35-M3	☐ AMSABS 3L 35-M2	☐ AMSABS 3L 35-M1	☑ AMSABS 3L 35-P0	☐ AMSABS 3L 35-P1	☐ AMSABS 3L 35-P2	☐ AMSABS 3L 35-P3
☐ AMSA 3L 35	☑ AMSA 3L 35	☑ AMSA 3L 35		☐ AMSA 3L 35	☐ AMSA 3L 35	☐ 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.

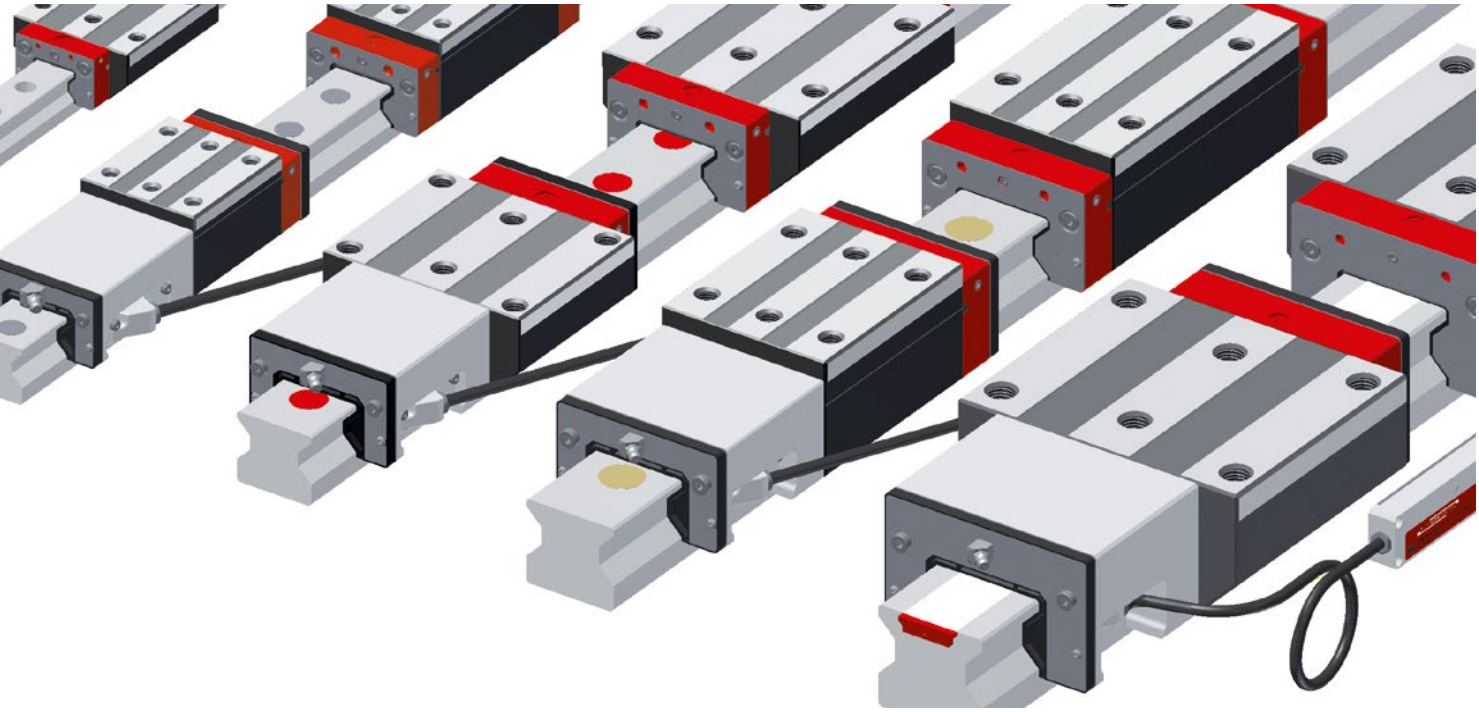
Guideways must be adequately supplied with a lubricant that is suited to their movements and load profile as well as to the conditions under which they are expected to operate. If necessary, please contact a lubricant supplier, who will be pleased to advise you on the choice of the correct lubricant.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

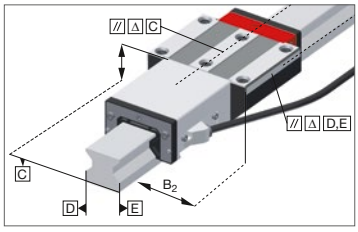
Prior to use, the compatibility of coolants and lubricants must be checked and verified by the user in order to preclude any detrimental effect(s) on the guideway.
To protect them from dirt, hot metal chips and any direct contact with coolants, guideways should have covers fitted or be appropriately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

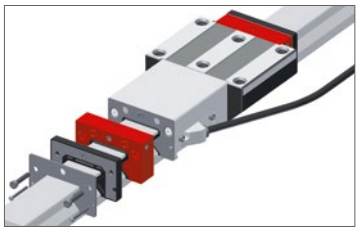
If contact with dirt or coolant is anticipated in the course of machining operations, the fitting of additional wipers to the products is necessary. The long-term serviceability of these components must be assured by amended service intervals. Please refer to www.schneeberger.com for pointers on these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

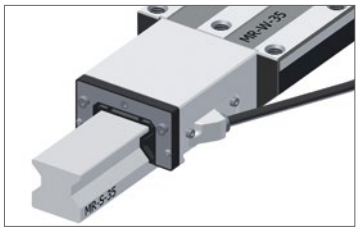
If the guideway gets into contact with hot chips an additional use of wipers is recommended. For further information please visit www.schneeberger.com.

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.



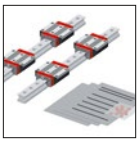


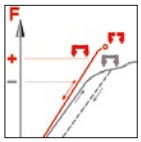


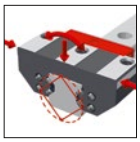
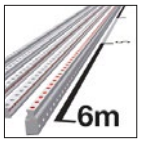


Features of System MONORAIL AMS 3B

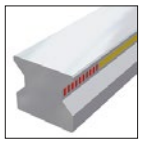
SCHNEEBERGER's MONORAIL AMS 3B is an integrated measuring system for distance measurement for use on all protected machine tool axes with high demands on system precision. Mechanically the AMS 3B is based on SCHNEEBERGER's MONORAIL MR roller guide with lengths up to 6 metres. The integration of the measurement 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 µm 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.

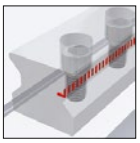
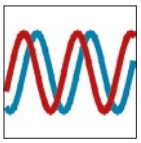
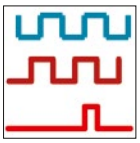






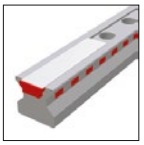




Details see chapter 1

9.1 Product overview AMS 3B rails

Product overview AMS 3B Rails

Buildsizes / Rail build form	N standard	C for cover strip			
Size 25	AMS 3B S 25-N	AMS 3B S 25-C			
Size 30	AMS 3B S 30-N				
Size 35	AMS 3B S 35-N	AMS 3B S 35-C			
Size 45	AMS 3B S 45-N	AMS 3B S 45-C			
Size 55	AMS 3B S 55-N	AMS 3B S 55-C			
Size 65	AMS 3B S 65-N	AMS 3B S 65-C			
Features					
Screwable from above	•	•			
Screwable from below					
Small assembly effort		•			
Great single-part system length	•	•			

Available options for AMS 3B 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 bottom
- 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 3B Rails

Details see chapter 9.4

Plugs Cover strips Assembly tools

9.2 Product overview AMS 3B Carriages

Product overview AMS 3B Carriages

Buildsizes / Carriage build forms	A standard	B standard, long	C compact, high	D compact, high, long	E compact, high, for lateral fixing	F compact	G compact, long
Size 25	AMS 3B W 25-A	AMS 3B W 25-B	AMS 3B W 25-C	AMS 3B W 25-D	AMS 3B W 25-E	AMS 3B W 25-F	AMS 3B W 25-G
Size 30	AMS 3B W 30-A	AMS 3B W 30-B	AMS 3B W 30-C	AMS 3B W 30-D		AMS 3B W 30-F	AMS 3B W 30-G
Size 35	AMS 3B W 35-A	AMS 3B W 35-B	AMS 3B W 35-C	AMS 3B W 35-D	AMS 3B W 35-E	AMS 3B W 35-F	AMS 3B W 35-G
Size 45	AMS 3B W 45-A	AMS 3B W 45-B	AMS 3B W 45-C	AMS 3B W 45-D		AMS 3B W 45-F	AMS 3B W 45-G
Size 55	AMS 3B W 55-A	AMS 3B W 55-B	AMS 3B W 55-C	AMS 3B W 55-D		AMS 3B W 55-F	AMS 3B W 55-G
Size 65	AMS 3B W 65-A	AMS 3B W 65-B	AMS 3B W 65-C	AMS 3B W 65-D			
Features							
Screwable from above	•	•	•	•		•	•
Screwable from below	•	•					
Screwable from the side					•		
For high loads and moments		•		•			•
For medium loads a. moments	•		•		•	•	
For limited installation space						•	•

Available options for AMS 3B Carriages

Details see chapter 4.1

Accuracy

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

Preload

- V1 Low
- V2 Medium
- V3 High

Reference side

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

Coating

- CN None
- CH Hard chromium

Reading head position

- P1 Right top
- P3 Left bottom

Note: P2 / P4 on request

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

Lube connections at P1

- S10 Left center
- S11 Top left
- S12 Lower left side
- S13 Upper left side
- S49 S10+S12+S13

locked using threaded pins

Lube connections at P3

- S20 Right center
- S21 Top right
- S22 Lower right side
- S23 Upper right side
- S49 S20+S22+S23

locked using threaded pins

Available accessories for AMS 3B Carriages

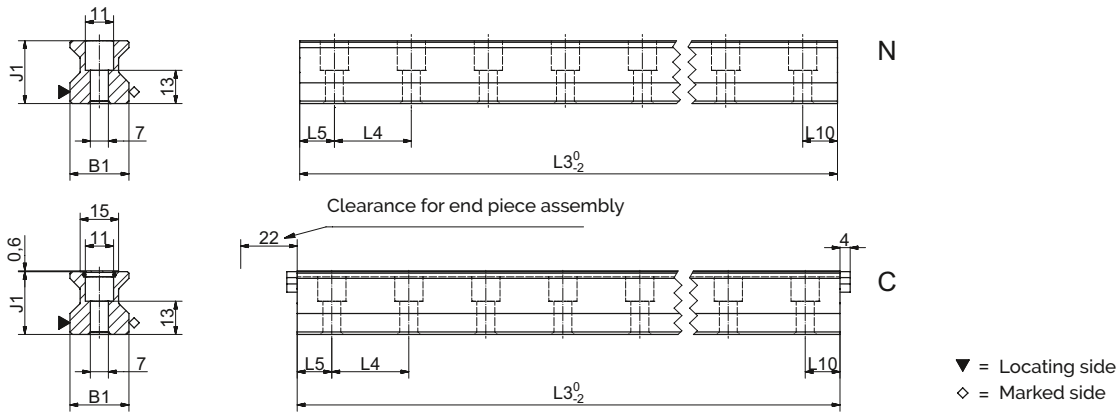
Details see chapter 9.4

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

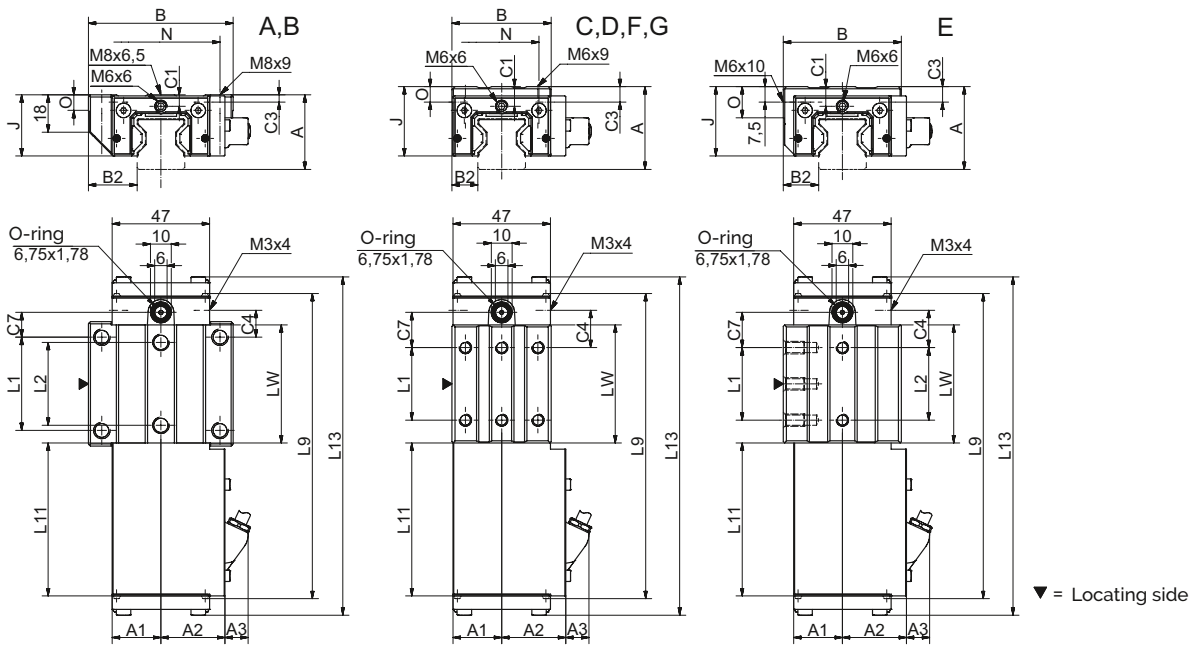
9.3 Technical data and options

9.3.1 AMS 3B Size 25

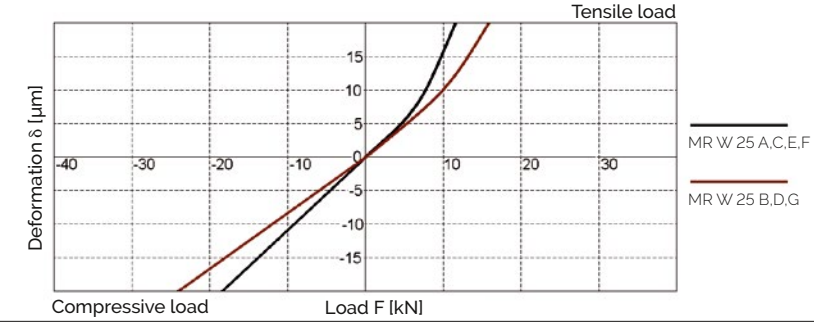
AMS 3B S 25 Drawings



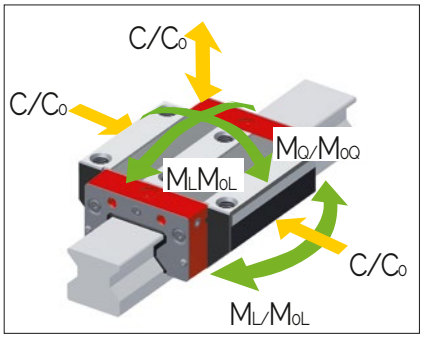
AMS 3B W 25 Drawings



AMS 3B W 25 Rigidity diagram

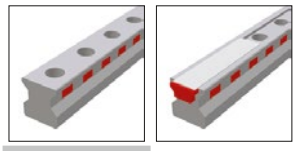


AMS 3B W 25 Load rating



9.3 Technical data and options

AMS 3B Size 25 Dimensions and capacities



		AMS 3B S 25-N	AMS 3B S 25-C					
B1:	Rail width	23	23					
J1:	Rail height	24.5	24.5					
L3:	Rail length max.	6000	3000					
L4:	Spacing of fixing holes	30	30					
L5/L10:	Position of first/last fixing hole	13.5	13.5					
Rail weight, specific (kg/m)		3.4	3.3					

Available options for AMS 3B S 25

G0 G1 G2 G3 KC CN CH R11 R12 R21 R22 TR50 TD20 TD50

		AMS 3B W 25-A	AMS 3B W 25-B	AMS 3B W 25-C	AMS 3B W 25-D	AMS 3B W 25-E	AMS 3B W 25-F	AMS 3B W 25-G
A:	System height	36	36	40	40	40	36	36
A1:	Half width of housing on opposite side	23.5	23.5	23.5	23.5	23.5	23.5	23.5
A2:	Half width of housing on reading head side	31	31	31	31	31	31	31
A3:	Projection of reading head	11.5	11.5	11.5	11.5	11.5	11.5	11.5
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	3.5	3.5	7.5	7.5	7.5	3.5	3.5
C4:	Position of lateral lube hole	13	24.2	18	21.7	18	18	21.7
C7:	Position of top lube hole	12	23.2	17	20.7	17	17	17
J:	Carriage height	29.5	29.5	33.5	33.5	33.5	29.5	29.5
L1:	Exterior fixing hole spacing	45	45	35	50	35	35	50
L2:	Interior fixing hole spacing	40	40	-	-	35	-	-
L9:	Carriage length with housing	148	170	148	170	148	148	170
L11:	Housing length	75.2	75.2	75.2	75.2	75.2	75.2	75.2
L13:	Total length measuring carriage	164.5	186.9	164.5	186.9	164.5	164.5	186.9
Lw:	Inner carriage body length	57	79.4	57	79.4	57	57	79.4
N:	Lateral fixing hole spacing	57	57	35	35	-	35	35
O:	Reference face height	7.5	7.5	7.5	7.5	15	7.5	7.5
Capacities and weights								
C0:	Static load capacitiy (N)	49800	70300	49800	70300	49800	49800	70300
C100:	Dynamic load capacity (N)	27700	39100	27700	39100	27700	27700	39100
M0Q:	Static cross moment capacity (Nm)	733	1035	733	1035	733	733	1035
M0L:	Static longitud. moment capacity (Nm)	476	936	476	936	476	476	936
MQ:	Dyn. cross moment capacity (Nm)	408	576	408	576	408	408	578
ML:	Dyn. longitud. moment capacity (Nm)	265	521	265	521	265	265	521
Carriage weight (kg)		1.3	1.5	1.2	1.3	1.3	1.1	1.2

Available options for AMS 3B W 25

G0 G1 G2 G3 V1 V2 V3 R1 R2 CN CH P1 S10 S11 S12 S13

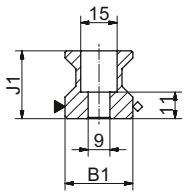
S49 P3 S20 S21 S22 S23 S49 LN LG LV TMU TRU TSU TMD TRD TSD

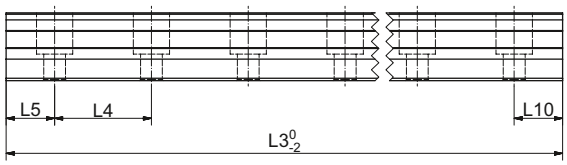
* Required to determine the rail length from the projected travel distance

9.3 Technical data and options

9.3.2 AMS 3B Size 30

AMS 3B S 30 Drawings

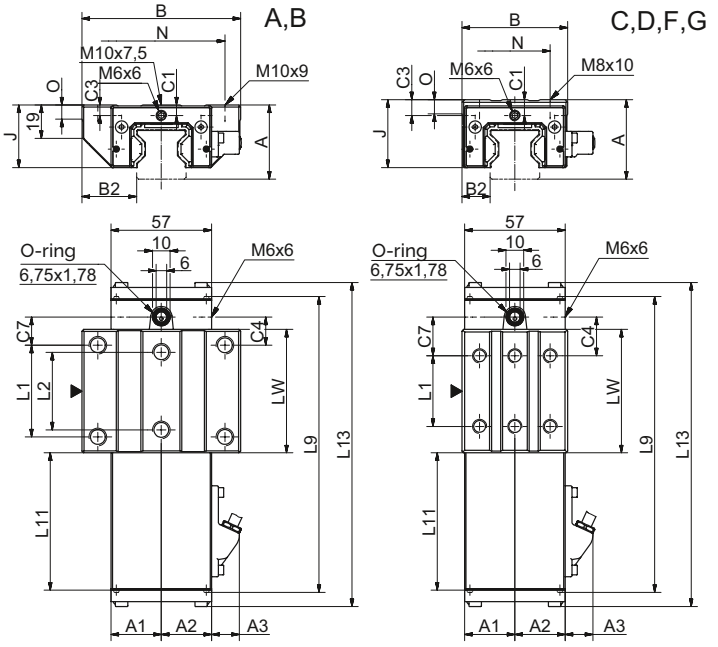




N

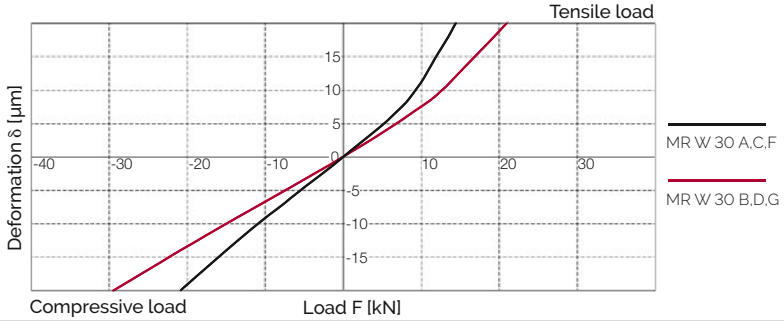
▼ = Locating side
◇ = Marked side

AMS 3B W 30 Drawings

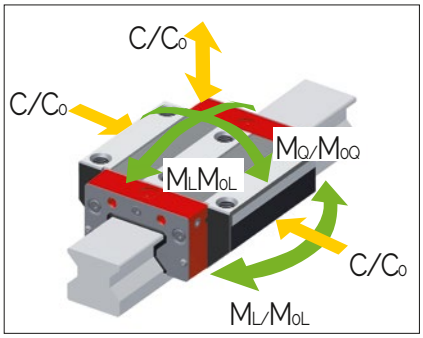


▼ Locating side

AMS 3B W 30 Rigidity diagram

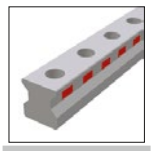


AMS 3B W 30 Load rating



9.3 Technical data and options

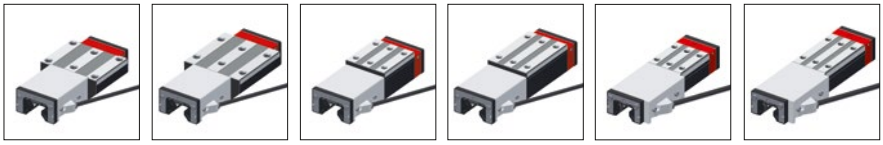
AMS 3B Size 30 Dimensions and capacities



		AMS 3B S 30-N
B1:	Rail width	28
J1:	Rail height	28
L3:	Rail length max.	6000
L4:	Spacing of fixing holes	40
L5/L10:	Position of first/last fixing hole	18.5
Rail weight, specific (kg/m)		4.6

Available options for AMS 3B S 30

G0 G1 G2 G3 KC CN CH R11 R12 R21 R22 TR50 TD20 TD50



		AMS 3B W 30-A	AMS 3B W 30-B	AMS 3B W 30-C	AMS 3B W 30-D	AMS 3B W 30-F	AMS 3B W 30-G
A:	System height	42	42	45	45	42	42
A1:	Half width of housing on opposite side	28.5	28.5	28.5	28.5	28.5	28.5
A2:	Half width of housing on reading head side	28.5	28.5	28.5	28.5	28.5	28.5
A3:	Projection of reading head	19.3	19.3	19.3	19.3	19.3	19.3
B:	Carriage width	90	90	60	60	60	60
B2:	Distance between locating faces	31	31	16	16	16	16
C1:	Position of center front lube hole*	6	6	9	9	6	6
C3:	Position of lateral lube hole	6	6	9	9	6	6
C4:	Position of lateral lube hole	16	26.5	22	22.5	22	22.5
C7:	Position of top lube hole	16	26.5	22	22.5	22	22.5
J:	Carriage height	35.5	35.5	38.5	38.5	35.5	35.5
L1:	Exterior fixing hole spacing	52	52	40	60	40	60
L2:	Interior fixing hole spacing	44	44	-	-	-	-
L9:	Carriage length with housing	169	190	169	190	169	190
L11:	Housing length	80	80	80	80	80	80
L13:	Total length measuring carriage	185.6	206.6	185.6	206.6	185.6	206.6
Lw:	Inner carriage body length	70	91	70	91	70	91
N:	Lateral fixing hole spacing	72	72	40	40	40	40
O:	Reference face height	8	8	8	8	8	8
Capacities and weights							
C0:	Static load capacitiy (N)	74900	98500	74900	98500	74900	98500
C100:	Dynamic load capacity (N)	39500	48900	39500	48900	39500	48900
M0Q:	Static cross moment capacity (Nm)	1332	1751	1332	1751	1322	1751
M0L:	Static longitud. moment capacity (Nm)	966	1614	966	1614	966	1614
MQ:	Dyn. cross moment capacity (Nm)	702	869	702	869	702	869
ML:	Dyn. longitud. moment capacity (Nm)	510	801	510	801	510	801
Carriage weight (kg)		1.8	2.2	1.6	1.9	1.5	1.7

* Required to determine the rail length from the projected travel distance

Available options for AMS 3B W 30

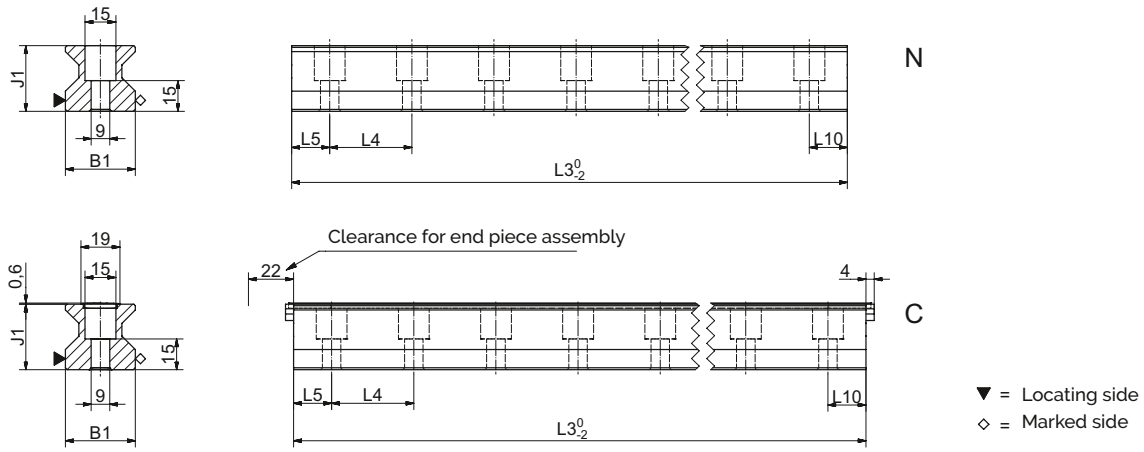
G0 G1 G2 G3 V1 V2 V3 R1 R2 CN CH P1 S10 S11 S12 S13

S49 P3 S20 S21 S22 S23 S49 LN LG LV TMU TRU TSU TMD TRD TSD

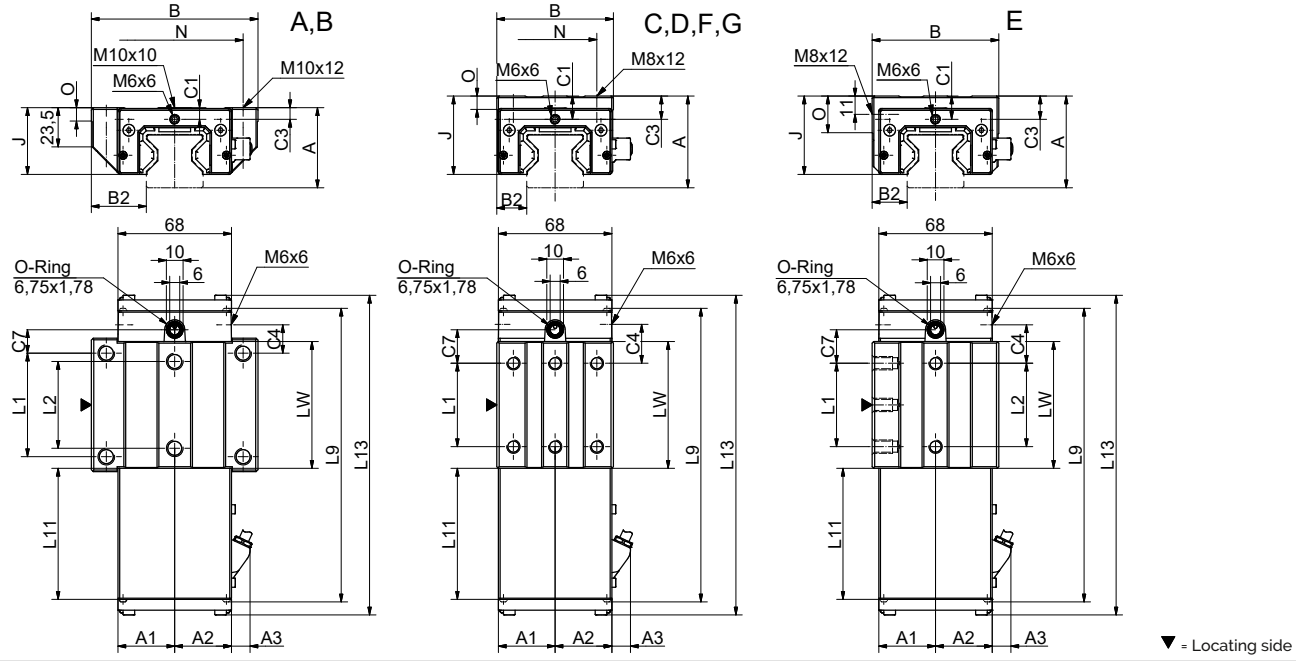
9.3 Technical data and options

9.3.3 AMS 3B Size 35

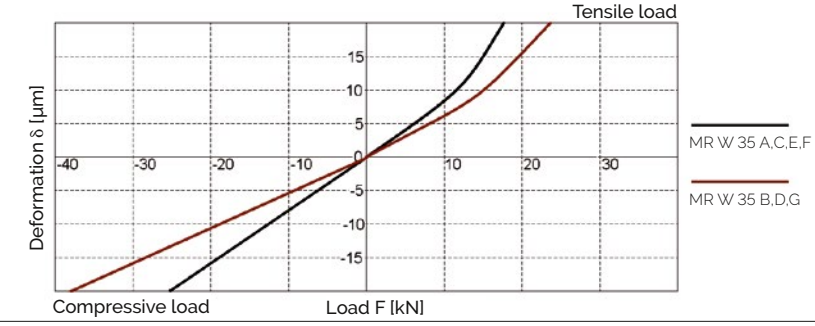
AMS 3B S 35 Drawings



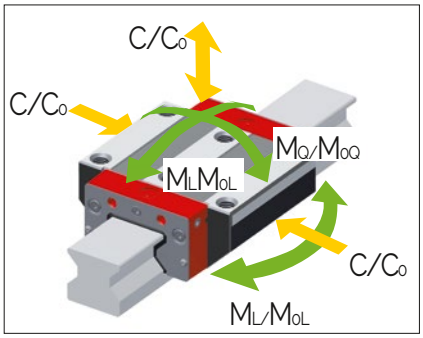
AMS 3B W 35 Drawings



AMS 3B W 35 Rigidity diagram

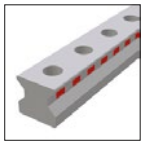


AMS 3B W 35 Load rating



9.3 Technical data and options

AMS 3B Size 35 Dimensions and capacities



		AMS 3B S 35-N	AMS 3B S 35-C
B1:	Rail width	34	34
J1:	Rail height	32	32
L3:	Rail length max.	6000	6000
L4:	Spacing of fixing holes	40	40
L5/L10:	Position of first/last fixing hole	18.5	18.5
Rail weight, specific (kg/m)		6.5	6.3

Available options for AMS 3B S 35

G0 G1 G2 G3 KC CN CH R11 R12 R21 R22 TR50 TD20 TD50

		AMS 3B W 35-A	AMS 3B W 35-B	AMS 3B W 35-C	AMS 3B W 35-D	AMS 3B W 35-E	AMS 3B W 35-F	AMS 3B 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	11.5	11.5	11.5	11.5	11.5	11.5	11.5
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*	6.5 / 7	6.5 / 7	13.5 / 14	13.5 / 14	13.5 / 14	6.5/7	6.5/7
C3:	Position of lateral lube hole	7	7	14	14	14	7	7
C4:	Position of lateral lube hole	17	30.5	23	25.5	23	23	25.5
C7:	Position of top lube hole	14	27.5	20	22.5	20	20	22.5
J:	Carriage height	40	40	47	47	47	40	40
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	176	204	176	204	176	176	204
L11:	Housing length	80.2	80.2	80.2	80.2	80.2	80.2	80.2
L13:	Total length measuring carriage	192.6	219.6	192.6	219.6	192.6	192.6	219.6
Lw:	Inner carriage body length	76	103	76	103	76	76	103
N:	Lateral fixing hole spacing	82	82	50	50	-	50	50
O:	Reference face height	8	8	8	8	22	8	8
Capacities and weights								
C0:	Static load capacitiy (N)	93400	128500	93400	128500	93400	93400	128500
C100:	Dynamic load capacity (N)	52000	71500	52000	71500	52000	52000	71500
M0Q:	Static cross moment capacity (Nm)	2008	2762	2008	2762	2008	2008	2762
M0L:	Static longitud. moment capacity (Nm)	1189	2214	1189	2214	1189	1189	2214
MQ:	Dyn. cross moment capacity (Nm)	1118	1537	1118	1537	1118	1118	1537
ML:	Dyn. longitud. moment capacity (Nm)	662	1232	662	1232	662	662	1232
Carriage weight (kg)		2.3	2.9	2.2	2.7	2.5	1.9	2.3

* Required to determine the rail length from the projected travel distance

Available options for AMS 3B W 35

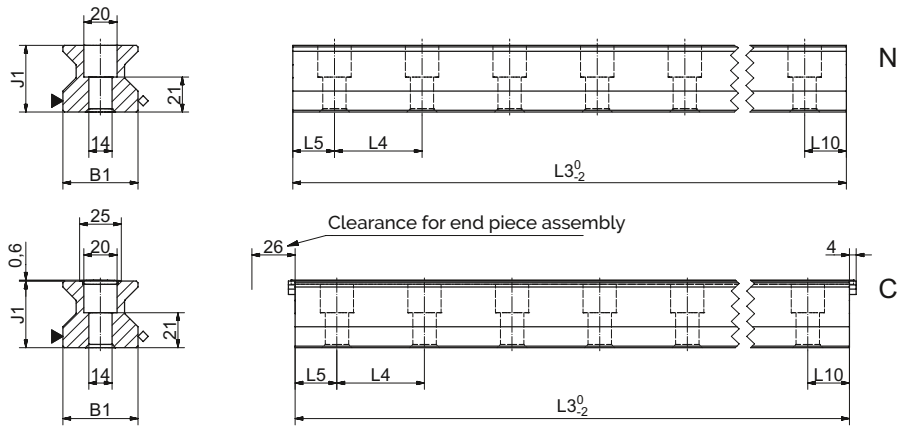
G0 G1 G2 G3 V1 V2 V3 R1 R2 CN CH P1 S10 S11 S12 S13

S49 P3 S20 S21 S22 S23 S49 LN LG LV TMU TRU TSU TMD TRD TSD

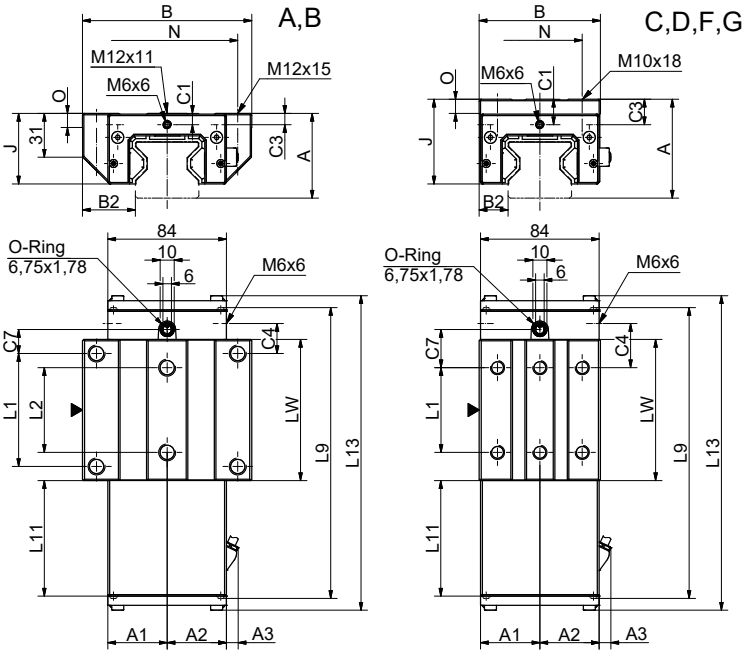
9.3 Technical data and options

9.3.4 AMS 3B Size 45

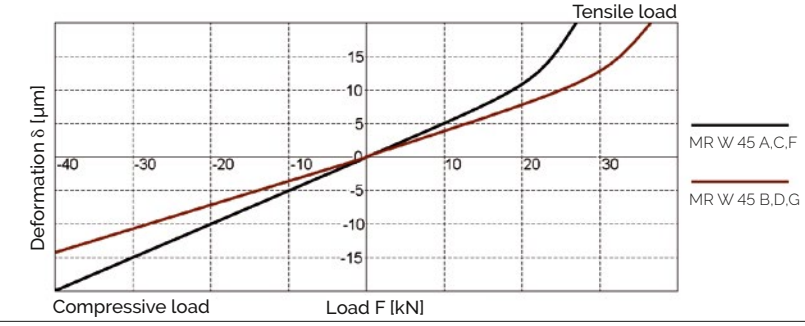
AMS 3B S 45 Drawings



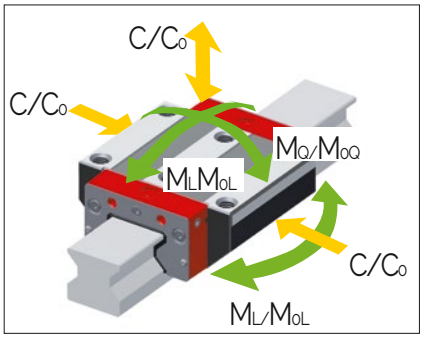
AMS 3B W 45 Drawings



AMS 3B W 45 Rigidity diagram

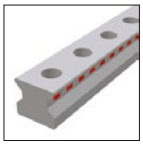


AMS 3B W 45 Load rating



9.3 Technical data and options

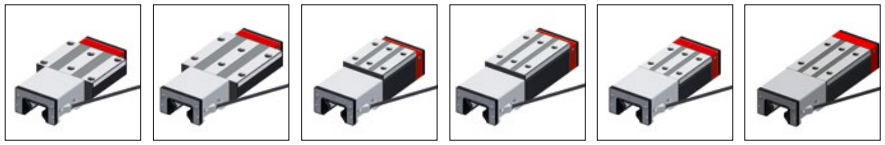
AMS 3B Size 45 Dimensions and capacities



		AMS 3B S 45-N	AMS 3B S 45-C
B1:	Rail width	45	45
J1:	Rail height	40	40
L3:	Rail length max.	6000	6000
L4:	Spacing of fixing holes	52.5	52.5
L5/L10:	Position of first/last fixing hole	25	25
Rail weight, specific (kg/m)		10.8	10.8

Available options for AMS 3B S 45

G0 G1 G2 G3 KC CN CH R11 R12 R21 R22 TR50 TD20 TD50



		AMS 3B W 45-A	AMS 3B W 45-B	AMS 3B W 45-C	AMS 3B W 45-D	AMS 3B W 45-F	AMS 3B 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	7.5	7.5	7.5	7.5	7.5	7.5
B:	Carriage width	120	120	86	86	86	86
B2:	Distance between locating faces	37.5	37.5	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	21.25	38.75	31.25	38.75	31.25	38.75
C7:	Position of top lube hole	17	34.5	27	34.5	27	34.5
J:	Carriage height	50	50	60	60	50	50
L1:	Exterior fixing hole spacing	80	80	60	80	60	80
L2:	Interior fixing hole spacing	60	60	-	-	-	-
L9:	Carriage length with housing	206	241	206	241	206	241
L11:	Housing length	83.6	83.6	83.6	83.6	83.6	83.6
L13:	Total length measuring carriage	223.7	258.7	223.7	258.7	223.7	258.7
Lw:	Inner carriage body length	100	135	100	135	100	135
N:	Lateral fixing hole spacing	100	100	60	60	60	60
O:	Reference face height	10	10	10	10	10	10
Capacities and weights							
C0:	Static load capacitiy (N)	167500	229500	167500	229500	167500	229500
C100:	Dynamic load capacity (N)	93400	127800	93400	127800	93400	127800
M0Q:	Static cross moment capacity (Nm)	4621	6333	4621	6333	4621	6333
M0L:	Static longitud. moment capacity (Nm)	2790	5161	2790	5161	2790	5161
MQ:	Dyn. cross moment capacity (Nm)	2577	3527	2577	3527	2577	3527
ML:	Dyn. longitud. moment capacity (Nm)	1556	2874	1556	2874	1556	2874
Carriage weight (kg)		4.0	5.1	3.8	4.8	3.1	3.9

Available options for AMS 3B W 45

* Required to determine the rail length from the projected travel distance

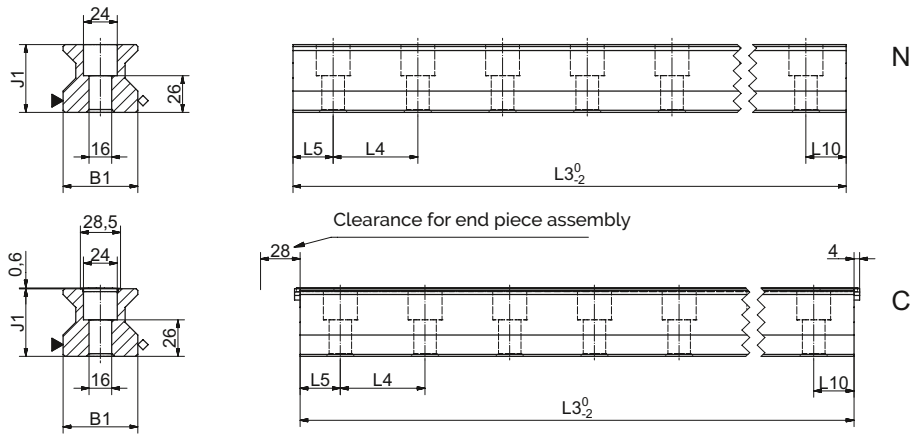
G0 G1 G2 G3 V1 V2 V3 R1 R2 CN CH P1 S10 S11 S12 S13

S49 P3 S20 S21 S22 S23 S49 LN LG LV TMU TRU TSU TMD TRD TSD

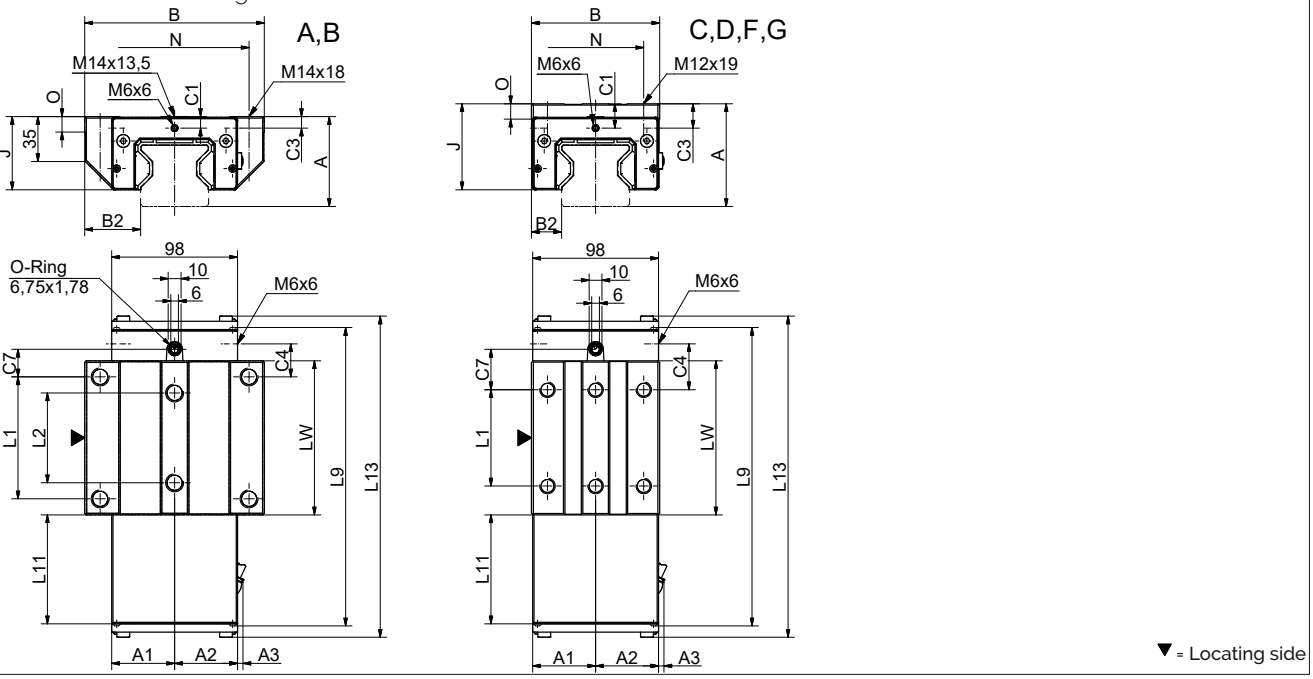
9.3 Technical data and options

9.3.5 AMS 3B Size 55

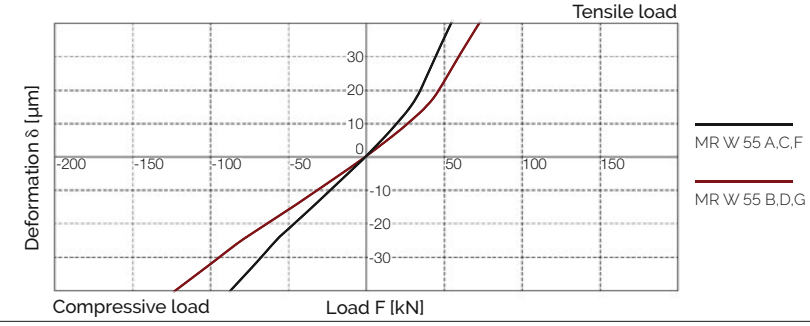
AMS 3B S 55 Drawings



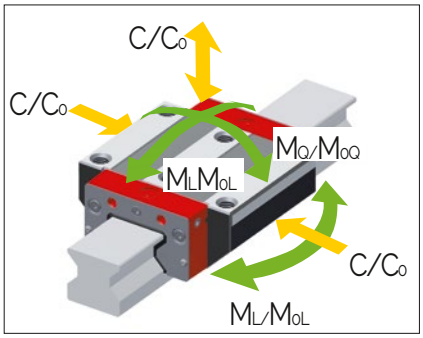
AMS 3B W 55 Drawings



AMS 3B W 55 Rigidity diagram



AMS 3B W 55 Load rating



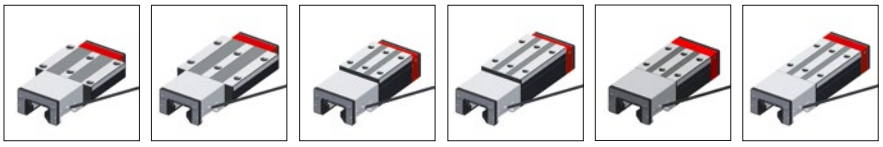
9.3 Technical data and options

AMS 3B Size 55 Dimensions and capacities

		AMS 3B S 55-N	AMS 3B S 55-C
B1:	Rail width	53	53
J1:	Rail height	48	48
L3:	Rail length max.	6000	6000
L4:	Spacing of fixing holes	60	60
L5/L10:	Position of first/last fixing hole	28.5	28.5
Rail weight, specific (kg/m)		15.2	14.9

Available options for AMS 3B S 55

G0 G1 G2 G3 KC CN CH R11 R12 R21 R22 TR50 TD20 TD50



		AMS 3B W 55-A	AMS 3B W 55-B	AMS 3B W 55-C	AMS 3B W 55-D	AMS 3B W 55-F	AMS 3B W 55-G
A:	System height	70	70	80	80	70	70
A1:	Half width of housing on opposite side	49	49	49	49	34	49
A2:	Half width of housing on reading head side	49	49	49	49	34	49
A3:	Projection of reading head	3.5	3.5	3.5	3.5	11.5	3.5
B:	Carriage width	140	140	100	100	100	100
B2:	Distance between locating faces	43.5	43.5	23.5	23.5	23.5	23.5
C1:	Position of center front lube hole*	9	9	19	19	9	9
C3:	Position of lateral lube hole	9	9	19	19	9	9
C4:	Position of lateral lube hole	25.75	46.75	35.75	46.75	35.75	46.75
C7:	Position of top lube hole	21.5	42.5	31.5	42.5	31.5	42.5
J:	Carriage height	57	57	67	67	57	57
L1:	Exterior fixing hole spacing	95	95	75	95	75	95
L2:	Interior fixing hole spacing	70	70	-	-	-	-
L9:	Carriage length with housing	233	275	233	275	233	275
L11:	Housing length	86.6	86.6	86.6	86.6	86.6	86.6
L13:	Total length measuring carriage	251.2	293.2	251.2	293.2	251.2	293.2
Lw:	Inner carriage body length	120	162	120	162	120	162
N:	Lateral fixing hole spacing	116	116	75	75	75	75
O:	Reference face height	12	12	12	12	12	12
Capacities and weights							
C0:	Static load capacitiy (N)	237000	324000	237000	324000	237000	324000
C100:	Dynamic load capacity (N)	131900	180500	131900	180500	131900	180500
M0Q:	Static cross moment capacity (Nm)	7771	10624	7771	10624	7771	10624
M0L:	Static longitud. moment capacity (Nm)	4738	8745	4325	8745	4738	8745
MQ:	Dyn. cross moment capacity (Nm)	4325	5919	4325	5919	4325	5919
ML:	Dyn. longitud. moment capacity (Nm)	2637	4872	2637	4872	2637	4872
Carriage weight (kg)		5.9	7.7	5.5	7.0	4.6	5.7

Available options for AMS 3B W 55

G0 G1 G2 G3 V1 V2 V3 R1 R2 CN CH P1 S10 S11 S12 S13

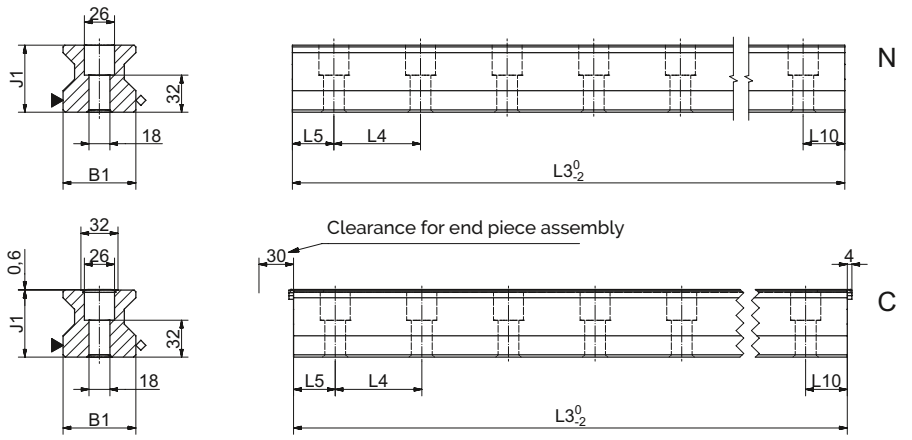
S49 P3 S20 S21 S22 S23 S49 LN LG LV TMU TRU TSU TMD TRD TSD

* Required to determine the rail length from the projected travel distance

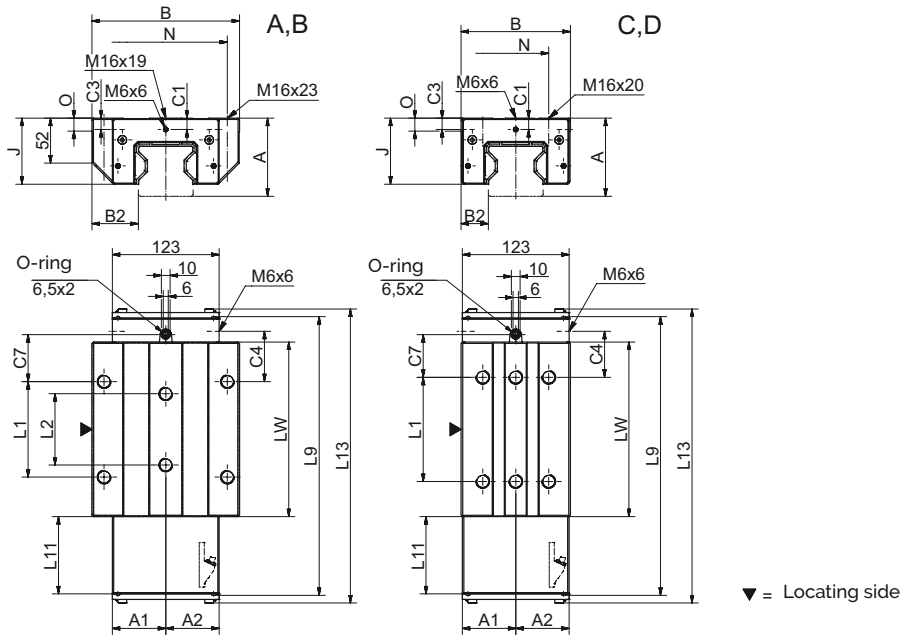
9.3 Technical data and options

9.3.6 AMS 3B Size 65

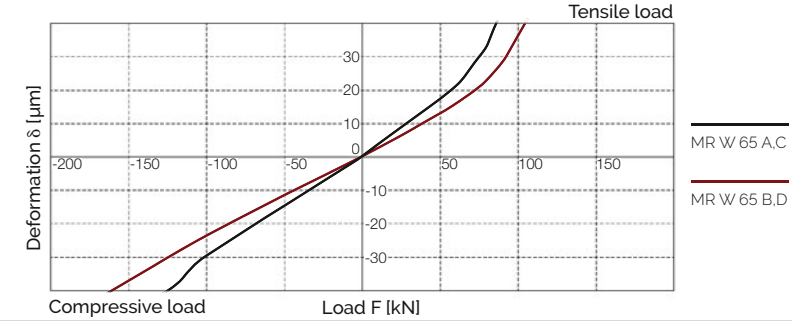
AMS 3B S 65 Drawings



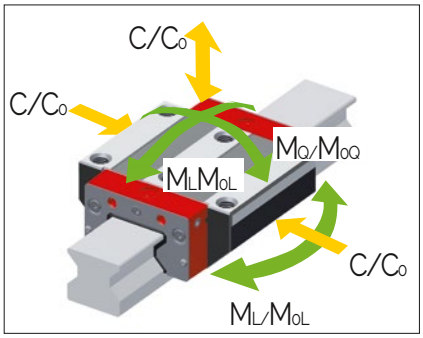
AMS 3B W 65 Drawings



AMS 3B W 65 Rigidity diagram

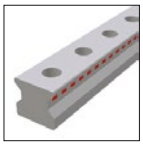


AMS 3B W 65 Load rating



9.3 Technical data and options

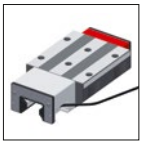
AMS 3B Size 65 Dimensions and capacities




		AMS 3B S 65-N	AMS 3B S 65-C					
B1:	Rail width	63	63					
J1:	Rail height	58	58					
L3:	Rail length max.	6000	6000					
L4:	Spacing of fixing holes	75	75					
L5/L10:	Position of first/last fixing hole	36	36					
Rail weight, specific (kg/m)		22.8	22.5					

Available options for AMS 3B S 65

G0 G1 G2 G3 KC CN CH R11 R12 R21 R22 TR50 TD20 TD50

		AMS 3B W 65-A	AMS 3B W 65-B	AMS 3B W 65-C	AMS 3B W 65-D			
A:	System height	90	90	90	90			
A1:	Half width of housing on opposite side	61.5	61.5	61.5	61.5			
A2:	Half width of housing on reading head side	61.5	61.5	61.5	61.5			
A3:	Projection of reading head	0	0	0	0			
B:	Carriage width	170	170	126	126			
B2:	Distance between locating faces	53.5	53.5	31.5	31.5			
C1:	Position of center front lube hole*	13	13	13	13			
C3:	Position of lateral lube hole	13	13	13	13			
C4:	Position of lateral lube hole	31.75	58	51.75	53			
C7:	Position of top lube hole	27.75	54	47.75	49			
J:	Carriage height	76	76	76	76			
L1:	Exterior fixing hole spacing	110	110	70	120			
L2:	Interior fixing hole spacing	82	82	-	-			
L9:	Carriage length with housing	269	321	269	321			
L11:	Housing length	90.7	90.7	90.7	90.7			
L13:	Total length measuring carriage	287.1	339.6	287.1	339.6			
Lw:	Inner carriage body length	148.5	201	148.5	201			
N:	Lateral fixing hole spacing	142	142	76	76			
O:	Reference face height	15	15	15	15			
Capacities and weights								
C0:	Static load capacitiy (N)	419000	530000	419000	530000			
C100:	Dynamic load capacity (N)	232000	295000	232000	295000			
M0Q:	Static cross moment capacity (Nm)	16446	20912	16446	20912			
M0L:	Static longitud. moment capacity (Nm)	10754	17930	10754	17930			
MQ:	Dyn. cross moment capacity (Nm)	9154	11640	9154	11640			
ML:	Dyn. longitud. moment capacity (Nm)	5954	9980	5954	9980			
Carriage weight (kg)		11.6	14.9	9.4	11.8			

* Required to determine the rail length from the projected travel distance

Available options for AMS 3B W 65

G0 G1 G2 G3 V1 V2 V3 R1 R2 CN CH P1 S10 S11 S12 S13

S49 P3 S20 S21 S22 S23 S49 LN LG LV TMU TRU TSU TMD TRD TSD

9.4 Accessories Overview

AMS 3B Rails accessories overview

Accessories	AMS 3B S 25	AMS 3B S 30	AMS 3B S 35	AMS 3B S 45	AMS 3B S 55	AMS 3B S 65
Plugs:						
Plastic plugs	MRK 25	MRK 30	MRK 35	MRK 45	MRK 55	MRK 65
Brass plugs	MRS 25	MRS 30	MRS 35	MRS 45	MRS 55	MRS 65
Steel plugs	MRZ 25	MRZ 30	MRZ 35	MRZ 45	MRZ 55	MRZ 65
Cover strips:						
Cover strip (spare part)	MAC 25	-	MAC 35	MAC 45	MAC 55	MAC 65
End piece for cover strip (spare part)	EST 25-MAC	-	EST 35-MAC	EST 45-MAC	EST 55-MAC	EST 65-MAC
Assembly tools:						
Installation tool for steel plugs	MWH 25	MWH 30	MWH 35	MWH 45	MWH 55	MWH 65
Hydraulic cylinder for MWH	MZH	MZH	MZH	MZH	MZH	MZH
Installation tool for cover strip	MWC 25	-	MWC 35	MWC 45	MWC 55	MWC 65

AMS 3B Carriages accessories overview

Accessories	AMS 3B W 25	AMS 3B W 30	AMS 3B W 35	AMS 3B W 45	AMS 3B W 55	AMS 3B W 65
Additional wipers:						
Additional wipers Viton	ZCV 25	ZCV 30	ZCV 35	ZCV 45	ZCV 55	ZCV 65
Metal wiper	ASM 25-A	ASM 30-A	ASM 35-A	ASM 45-A	ASM 55-A	ASM 65-A
Bellows:						
Bellows	FBM 25	-	FBM 35	FBM 45	FBM 55	FBM 65
Adapter plate for bellows (spare part)	ZPL 25	-	ZPL 35	ZPL 45	ZPL 55	ZPL 65
End plate for bellows (spare part)	EPL 25	-	EPL 35	EPL 45	EPL 55	EPL 65
Assembly rails:						
Assembly rail	MRM 25	MRM 30	MRM 35	MRM 45	MRM 55	MRM 65
Lubrication plates:						
Lubrication plate	SPL 25-MR	-	SPL 35-MR	SPL 45-MR	SPL 55-MR	SPL 65-MR
Front plates:						
Cross wiper (spare part)	QAS 25-STR	QAS 30-STR	QAS 35-STR	QAS 45-STR	QAS 55-STR	QAS 65-STR
Lube nippels:						
Hydraulic-type grease nipple straight	SN 6	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	SN 6-45
Hydraulic-type grease nipple 90°	SN 6-90	SN 6-90	SN 6-90	SN 6-90	SN 6-90	SN 6-90
Flush type grease nipple M3	SN 3-T	-	-	-	-	-
Flush type grease nipple M6	SN 6-T	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	SA 6-RD-M8x1
Lubrication adapter M8 hexagon head	-	-	SA 6-6KT-M8x1	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	SA 6-6KT-G1/8
Straight screw-in connection M3	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	SA 6-D4-RD
Swivel screw connection for pipe d=3 mm	SV 3-D3	-	-	-	-	-
Swivel screw connection for pipe d=4 mm	-	-	-	-	-	SV 6-D4-SW9
Swivel screw connection for pipe d=4 mm	-	-	-	-	-	SV 6-D4-SW10
Swivel screw connection M6	SV 6-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	SV 6-M6-L
Swivel screw connection M8	SV 6-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	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

9.5 Order key Analog

Individual guide rails and carriages are ordered in accordance with the order codes described below.
AMS 3B carriages consist of guide carriage, casing and reading head. All MONORAIL MR carriages can also be used with AMS 3B rails. Q.v. chapter 2.2 and chapter 5.4 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 4.8 if this applies.
The order code for the AMS 3B systems is made up of two groups. For the AMS system with an anolog interface, the code is AMSA. The AMS system with a digital interface is referred to as AMSD.

Order code for AMSA 3B Rails

	1x	AMSA 3B S	35	-N	-G1	-KC	-R12	-918	-19	-19	-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 9.1 to 9.3 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 9.2 using the following formula: $L3 = n \times L4 + L5 + L10 \leq L3max$.

Order code for AMSA 3B Carriages

	1x	AMSA 3B W	35	-A	-P1	-G1	-V3	-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 9.1 to 9.3 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 3B	-MU
Quantity			
Reading head			
Interface			

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

9.6 Order key Digital

Order code for AMSD 3B Rails

	1x	AMSD 3B S	-35	-N	-G1	-KC	-R12	-918	-19	-19	-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 9.1 to 9.3 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 9.2 using the following formula: $L3 = n \times L4 + L5 + L10 \leqslant L3max.$
Standard $L5 / L10 = (L4 / 2) - 1,5$

Order code for AMSD 3B Carriages

	1x	AMSD 3B W	-35	-A	-P1	-G1	-V3	-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 9.1 to 9.3 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 3B Reading head (spare part)

	1x	SMD 3B	-MD	-010	-80	-ZN
Quantity						
Reading head						
Interface						
Interpolation						
Frequency						
Reference pulse						

NB

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