

ABEC TECH

TECNOLOGIA LINEAL

La solución adecuada a su proyecto

Sistema MONO RIEL de
Guiado Lineal

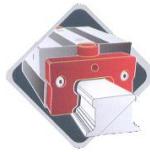
CALIDAD
COMPROMISO
COMPETITIVIDAD

SCHNEEBERGER
LINEAR TECHNOLOGY

«Essentials for the Best!»



Indice



1 Guías Lineales BM y MR

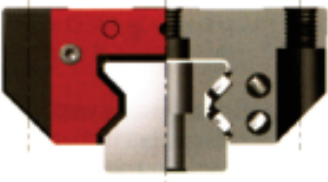
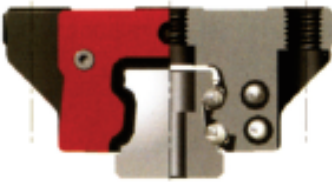
1.1 Campos de Aplicación y Condiciones operativas

Operating Conditions

BM			MR			Accuracy classes			G0	G1	G2	G3
						Fields of application			Measuring machines dressing units, special applications			CNC machines, CNC machining centers
Preload classes			V1			V2						
Operating conditions			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			



1.2 Característica y campo de aplicación

Type	Roller MONORAIL MR	Ball MONORAIL BM
Design		
Technical characteristics	4 roller tracks in O-geometry, rollers with convex surface, completely sealed carriages, main dimensions in accordance with DIN 645-1, many versions and lubrication possibilities as well as numerous accessories for a broad application range	4 rows of balls with 2-point contact in O-geometry, optimized track geometry with a low number of transitions, small number of components, reduced maintenance as a result of integrated lubricant reservoirs, completely sealed carriages, trapezoidal-shaped rail section for a high rigidity and easier replacement of parts subject to wear, main dimensions in accordance with DIN 645-1
Loading capacity	●●●●	●●
Rigidity	●●●●	●●●
Accuracy	●●●●	●●●●
Service lifetime	●●●●	●●●
Running characteristics/pulsation	●●	●●●●
Friction characteristics	●●	●●●●
Admissible speed	●●●	●●●●
Easy installation and maintainance	●●●	●●●●
Requirements on accuracy and rigidity of the surrounding structure	●●	●●●
Integrated measuring system	yes	yes
Integrated rack	yes	yes
Main fields of application	Machine tools for high metal removal performance capacities and long service lifetimes, machines/installations with minimum assembly dimensions, CNC machining centers, CNC lathes, CNC grinding machines, EDM machines, injection molding machines	Machine tools for smaller and medium metal removal performance capacities, auxiliary axes, wood processing machines, sheet-metal processing machines, water-jet/laser cutting installations, automatic punching/stamping machines, robotics, handling devices and automation technology, electronics and semiconductor technology, measuring technology, medical technology

●●●● = excellent

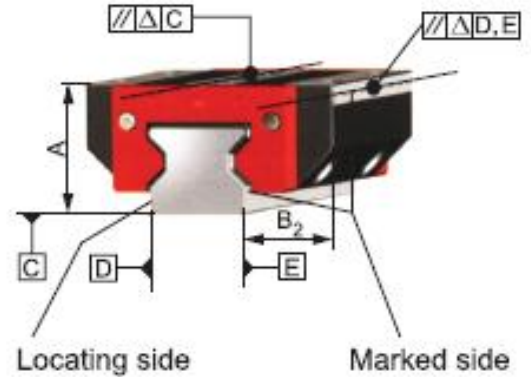
● = satisfactory



Datos técnicos

Clases de Precisión G0, G1, G2, G3

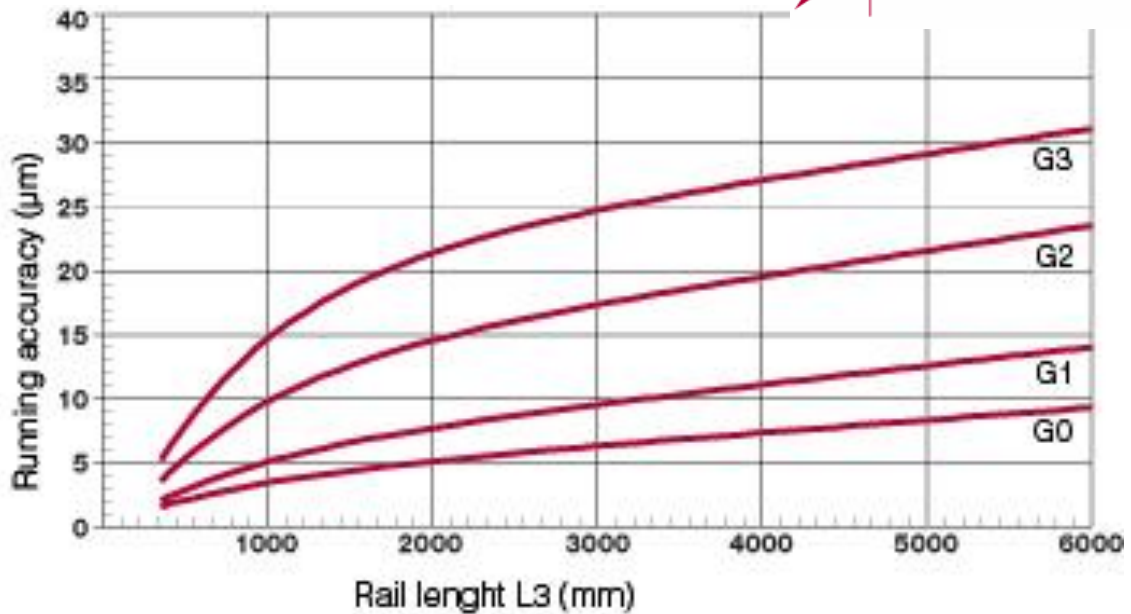
The four accuracy classes allow the user to select the configuration of MONORAIL guideways that best meets specific application-design requirements. The accuracy classes determine the dimensional tolerances and running accuracy of the carriages on the rails.



Tolerancia Dimensional

MONORAIL carriages and rails are manufactured independently of one another with a high precision and therefore are freely interchangeable. This means, that on a rail any carriage can be used and vice-versa any carriage can be utilised on any rail of the same size and this without any influence on the preload class, because the preload is generated by the corresponding rolling elements in the carriages. For the dimensional differences between any carriages on any rail, the values in the first column, in accordance with the following table, are applicable. When replacing individual carriages, please do not hesitate to contact a SCNNEEBERGER representative if needed.

Accuracy class	Tolerances between any carriages and rails	Max. measure difference between the carriage of a rail	Max. dimensional difference of the carriages between 2 or more rails standard/matched	
			ΔA standard	ΔA matched
G0	$\pm 5 \mu\text{m}$	$3 \mu\text{m}$	$10 \mu\text{m}$	$5 \mu\text{m}$
G1	$\pm 10 \mu\text{m}$	$5 \mu\text{m}$	$20 \mu\text{m}$	$7 \mu\text{m}$
G2	$\pm 20 \mu\text{m}$	$10 \mu\text{m}$	$40 \mu\text{m}$	$10 \mu\text{m}$
G3	$\pm 50 \mu\text{m}$	$25 \mu\text{m}$	$100 \mu\text{m}$	$25 \mu\text{m}$
	Measured at the middle of the carriage and in any rail position	Measured at the middle of the carriage and at the same rail position	Measured at the middle of the carriage and at the same rail position, Ordering information: - GP matched version to be indicated	



Running the carriages within the limits of the tolerance can take a linear or wave-shaped course. The height of the tolerance is determined from the adjacent diagram in respect of rail length and accuracy class. Example: L3 = 2000 mm with G2 results in a permissible tolerance of 0.015 mm

Clases de Precarga V1, V2, V3

Preloading increases the rigidity of the guideway but also affects operational life and increases translational resistance. The MONORAIL system is available in various preload classes corresponding to the individual accuracy classes to address specific application requirements. The preload is dependent on the dynamic loading capacity C. For more detailed information concerning the selection, see chapter 1.1 Operating Conditions.

Preload class	Preload	Accuracy class
V1	0.03 * C	G0, G1, G2, G3
V2	0.08 * C	G0, G1, G2, G3
V3	0.13 * C	G0, G1, G2, G3

Datos Generales

Velocidad y aceleración Permisible

General applications under normal operating conditions

Max. speed	MR	BM
V_{max}	3.0 m/s	5.0 m/s

Max. acceleration	MR	BM
A_{max}	50 m/s ²	100 m/s ²

Higher values are permissible. They depend on the carriage type, lubrication, installation orientation, preload and load. The approval of a SCHNEEBERGER representative should be obtained in such cases.

Temperatura permisible

MONORAIL MR and BM		
Continuous operation		Short-time *
Minimum	Maximum	
T= -4°C	T= 80°C	T= 120°C

- not applicable to bellows



Lubricación

An adequate lubrication is required to maintain the function of linear guideways, because lubricant protects against wear and corrosion and in addition reduces the friction. This also calls for a regular subsequent. Possible lubrications are both grease as well as liquid grease or oil.

As delivered condition

At delivery the carriages are preserved with mineral oil. This is sufficient as a protection for the assembly of the guideway. Before taking into operation it must be guaranteed that enough lubricant is in the carriages and on the beforehand cleaned rails. Quantities of lubricant for the initial lubrication, refer to the tables on page following

Lubrication connections

The front plates are fitted with several prepared lubrication connections with threads. These are located at the front and on the side (please refer to the table below). Here either a grease nipple can be attached or a central lubrication system connected. In doing so, both sides of carriages (i.e., all four tracks) are provided with lubricant.

The front plates furthermore are equipped with an O-ring seat on top for direct connection to a central lubrication system through the connection construction. Here too, both sides of the carriages are provided with lubricant.

In the standard version, the thread M6 (M3 in the case of BM15) at the center of the front plate (-SM) is foreseen for the connection of the lubrication system. From the factory, these lubrication bores in the front plate are closed on both sides with a cap plug. The corresponding cap plug for the required bore has to be removed by the customer. The other connections are closed.

If a lateral connection is required, then this has to be indicated on the order sheet. The lubrication connection selected is opened by SCHNEEBERGER and the one at the center closed.

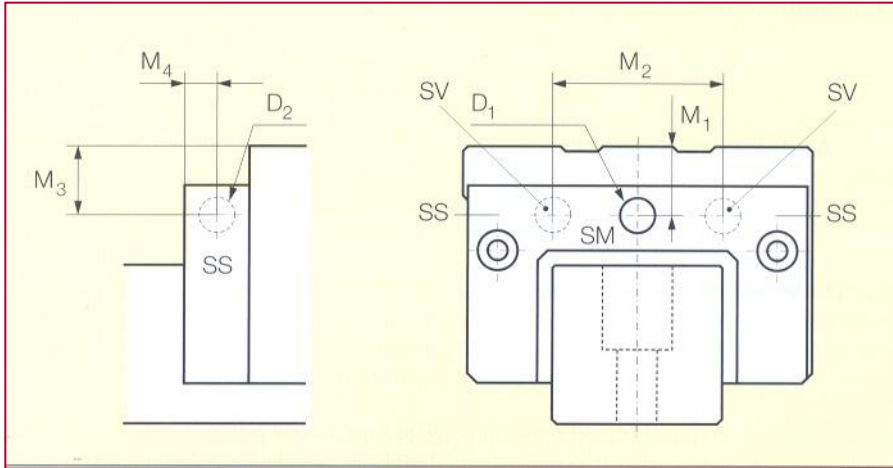
Ordering information: Front laterally: - SV (not for MR 25, MONORAIL BM)
Lateral: - SS (not for MR 25)

The lateral connections of the sizes BM 15 and BM20 are prepared so that an M 3 nipple can be attached.

For a lateral lubrication connection in the case of size MR 25, the intermediate plate ZPL 25 has to be used (please refer to chapter Wipers and Bellows)



Connection thread in the front plate and on the side



Type		Dimensions (mm)					
		M ₁	M ₂	M ₃	M ₄	D ₁	D ₂
MRA/B	25	5.5	-	-	-	M6	-
MRC/D/E	25	9.5	-	-	-	M6	-
MRA/B	35	7	32	7	6.5	M6	M6
MRC/D/E	35	14	32	14	6.5	M6	M6
MRA/B	45	8	40	8	7.5	M6	M6
MRC/D	45	18	40	18	7.5	M6	M6
MRA/B	55	9	50	9	8.5	M6	M6
MRC/D	55	19	50	19	8.5	M6	M6
MRB/D	65	13	64	13	12.5	M6	M6

Type		Dimensions (mm)					
		M ₁	M ₂	M ₃	M ₄	D ₁	D ₂
BMA/F	15	4	-	4	4	M3	M3
BMC	15	8	-	8	4	M3	M3
BMA/B	20	5.2	-	5.2	5	M6	M3
BMC/D	20	5.2	-	5.2	5	M6	M3
BMF/G	20	5.2	-	5.2	5	M6	M3
BMA/B	25	5.5	-	5.5	6	M6	M6
BMC/D/E	25	9.5	-	9.5	6	M6	M6
BMF/G	25	5.5	-	5.5	6	M6	M6
BMA/B	30	7	-	7	6	M6	M6
BMC/D/E	30	10	-	10	6	M6	M6
BMF/G	30	7	-	7	6	M6	M6
BMA/B	35	7	-	7	6.5	M6	M6
BMC/D/E	35	14	-	14	6.5	M6	M6
BMF/G	35	7	-	7	6.5	M6	M6
BMA/B	45	8	-	8	7.5	M6	M6
BMC/D	45	18	-	18	7.5	M6	M6



Información General

- *The lubrication connections are plastic threads. Therefore care must be taken when installing fittings.
- *Any retrofitting work on the end plates for changing the lubrication connection should be carried out by SCHNEEBERGER beforehand.
- *Grease nipples as well as lubrication adapter pieces are not included on the carriages and have to be ordered separately.

Orientación instalaciones especiales

In the case of oil lubrication and a horizontal or vertical installation, also no particular precautions have to be taken. Because of the small lubrication channel cross sectional areas in the front plates, this is also applicable for an installation with the guideways rotated by 180° around the longitudinal axis of the rails.

In the case vertical installation, the lubrication connection has to be provided in the upper front plate.

If, however, lubrication with oil and a different installation position (e.g., inclined by 10° to 170° around the longitudinal axis of the rail) are foreseen, the special measures are necessary, because oil on the basis of its lower viscosity has the tendency to flow downwards due to the force of gravity and therefore to flow towards one running track side.

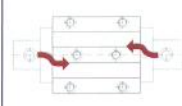
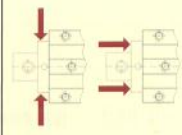

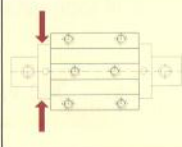
It has to be assured, that all 4 running tracks of the carriages are supplied with sufficient lubricant. Depending on the type of guideways, this takes place in a different manner.



Versatile lubrication possibilities

The carriages can be lubricated through various lubrication connections (from the front, either side or above). The geometry of the lubrication channels, combined with efficient sealing, reduces lubricant consumption. This provides both economic and environmental benefits.



Type	Measure	Ordering information	Lubrication connections number per carriage and installation positions*	
MR 25	Special front plate STP-SE	Special: -ST	2 × fronte -SM	
MR 35 - MR 65	Modified standard front plate	Special: -ST Drawing required	2 × laterally -SS or fronte laterally -SV	
BM 15 - BM 20	Supply the quantity of lubricant in a single pulse or in several pulses in close succession	-SM or -SS	1 × front -SM or laterally -SS	
BM 25 - BM 45	Special front plate	Special: -ST Drawing required	2 × laterally -SS	

Installation position *: When ordering, the required connections have to be indicated on the order sheet.

Quantities of lubricant, refer to the chapter lubrication with oil.

In case of special installation orientations, the customer should include an installation drawing with the inquiry, to obtain a recommendation from SCHNEEBERGER regarding lubrication! In case of a single lubrication connection per carriage, grease, or liquid grease, is preferred over oil.

Short stroke-genral lubrication remark

In the case of a stroke smaller than 2 x the carriage length, two lubrication connections are recommended, i.e., a lubrication from both ends.

If in the case of a short stroke the number of connections is doubled, then the total quantity of lubricant for subsequent lubrication nonetheless remains the same per carriage, i.e., the quantity per end is halved.



Lubrication with oil

For the lubrication using oil, SCHNEEBERGER recommends mineral oil CLP (DIN 51517) or HLP (DIN 51524) in the viscosity range of ISO VG 32 to ISO VG 100 in accordance with DIN 51519. Bed track oils CGLP up to ISO VG 220 can also be used

Initial lubrication prior to operation

Prior to operation, the carriages have to be filled with the indicated quantities for the first lubrication. In doing so, the oil quantity should be injected in a single impulse or in several impulses in short succession while the carriage is being moved. The indicated quantities are applicable per carriage with the once connection. If two connections per carriage are used, then the values have to be correspondingly halved.

In case of a special installation orientation or a short stroke, the lubrication guidelines in the corresponding chapters have to be followed.

Initial Lubrication						
Oil quantity per						
carriage in cm ³	MR 25	MR 35	MR 45	MR 55	MR 65	
Any Installation orientation	0,95	0,55	0,7	0,9	1,2	

Initial Lubrication						
Oil quantity per						
carriage in cm ³	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
Any Installation orientation	0,2	0,95	0,55	0,7	0,9	1,2

Subsequent lubrication intervals and quantities

The subsequent lubrication intervals depend on the load on the carriages and on external factors. As an indicative value, with a speed of $v < 1\text{m/s}$ and a load ratio $C/P > 2$, the following interval for subsequent lubrication can be assumed

Subsequent lubrication interval = 30 km



In the case of a special installation orientation or short stroke, the lubrication information in the corresponding chapter has to be observed.

Subsequent lubrication					
Oil quantity per carriage in cm ³	MR 25	MR 35	MR 45	MR 55	MR 65
Normal installation orientation	0,15	0,25	0,35	0,5	0,7
Special Installation orientation	0,95	0,55	0,7	0,9	1,2

Subsequent lubrication						
Oil quantity per carriage in cm ³	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
Normal installation orientation	0,07	0,17	0,2	0,3	0,35	0,4
Special Installation orientation	0,14	0,34	0,4	0,6	0,7	0,8

The values indicated above are only guideline values. An accurate determination of the quantities and intervals can only be done under real operating conditions. It is recommended to lubricate at least 1x per month and after a longer machine shut-down prior to putting it into operation again. In the case of unfavorable conditions, loads, climate, ambient conditions, a more frequent lubrication is necessary.

Initial greasing					
greasel quantity per carriage in cm ³	MR 25	MR 35	MR 45	MR 55	MR 65
MRA / MRC / MRE	1,9	2,9	5,3	8,4	-
MRB / MRD	2,2	3,7	6,6	10,6	18,9



Lubrication with grease

SCHNEEBERGER recommends KP2K grease in accordance with DIN 51825 or liquid grease GPOON an GPOOON accordance with DIN 51826.

Attention:

After the installation of the MONORAIL guideway, an initial greasing of the carriages has to take place. This also applies if the mounting of lubrication plates is additionally foreseen. The quantities indicated are applicable per carriage.

Initial greasing prior to operation

After the installation of the MONORAIL guideway, an initial greasing of the carriages has to take place. This also applies if the mounting of lubrication plates is additionally foreseen. The quantities indicated are applicable per carriage.

Initial greasing						
grease quantity per						
carriage in cm ³	MR 25	MR 35	MR 45	MR 55	MR 65	
MRA / MRC / MRE	1,9	2,9	5,3	8,4	-	
MRB / MRD	2,2	3,7	6,6	10,6	18,9	

Initial lubrication						
grease quantity per						
carriage in cm ³	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
BMA / BMC / BME / BMF	0,9	1,7	2,8	4,7	6,6	12,6
BMA / BMD / BMG	-	2,1	3,5	5,8	8,1	15,6

Subsequent lubrication interval = C/P .100 km



Subsequent lubrication intervals and quantities

The subsequent lubrication intervals depend on the load on the carriages and on external factors. As an indicative value, with a speed of $v \leq 1\text{m/sec}$ and a load ratio $C/P \geq 2$, the following interval for subsequent lubrication can be assumed

Subsequent lubrication interval = $C/P \cdot 100\text{ km}$

The quantity of grease to be provided in accordance with this interval can be taken from the following table.

Subsequent lubrication					
Grease quantity per					
carriage in cm ³	MR 25	MR 35	MR 45	MR 55	MR 65
MRA / MRC / MRE / MRF	0,4	1,1	2,1	3,2	-
MRB / MRD / MRG	0,5	1,3	2,4	4	7,4

Subsequent lubrication						
grasel quantity per						
carriage in cm ³	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
BMA / BMC / BME / BMF	0,3	0,6	1,1	1,7	2,5	5
BMB / BMD / BMG	-	0,8	1,4	2,1	3,2	6,1

The values indicated above are only guideline values. An accurate determination of the quantities and intervals can only be done under real operating conditions.

It is recommended to lubricate at least every 3 months.

In the case of unfavorable conditions, loads, climate, ambient conditions, a more frequent lubrication is necessary.



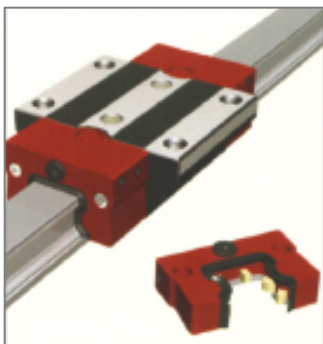
Lubrication plate SPL

The lubrication plate SPL thanks to its integrated oil reservoir makes possible an automatic and uniform supply of lubricating oil to the roller elements over a long period of time. As a result, the investment-and operating costs can be significantly reduced.

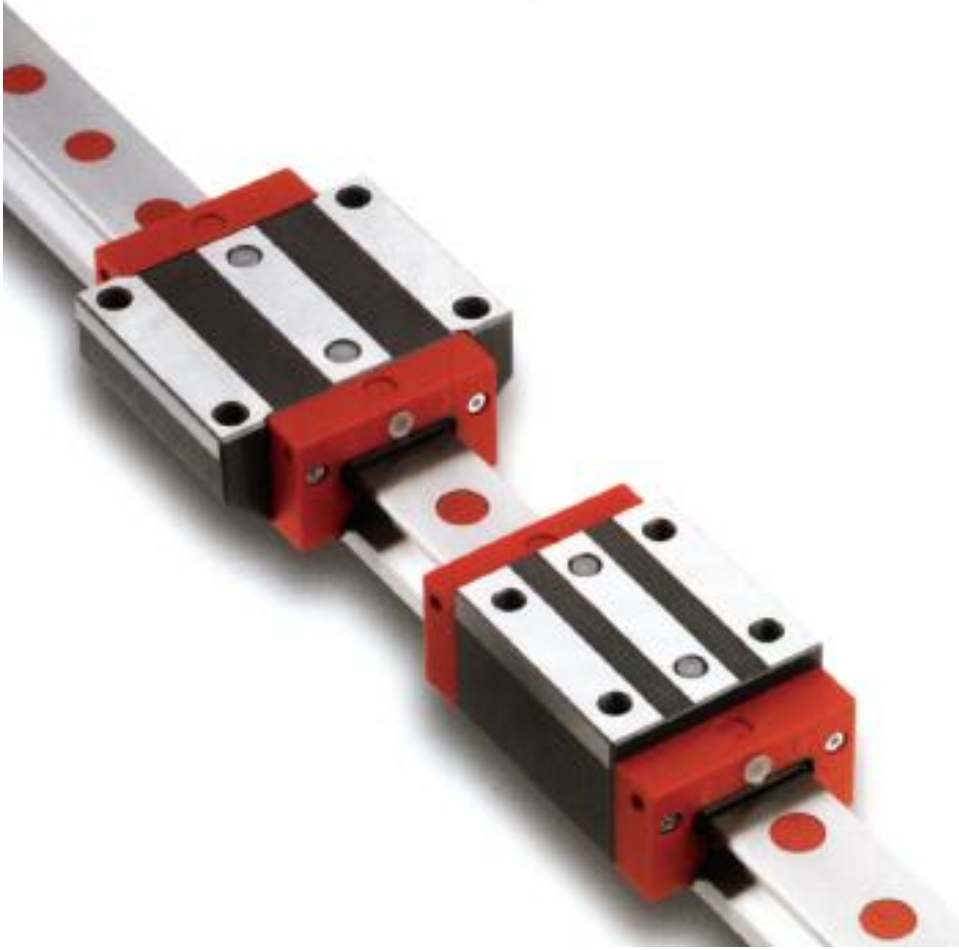
For maximum travelling distances without re-lubrication, the lubrication plates are always utilized in pairs. The lubrication plates have the same dimensions as the front plates of the carriages and are installed in front of these.

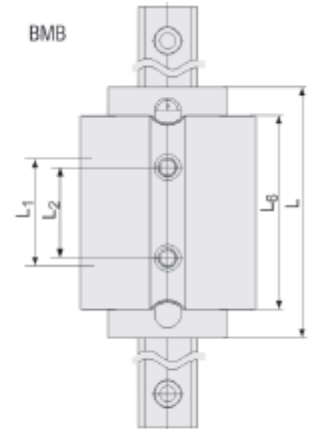
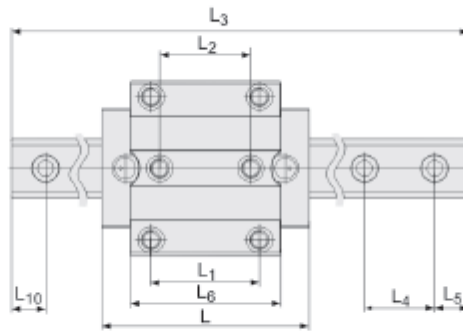
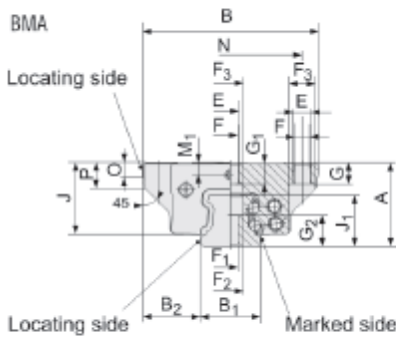


Dimensions SPL-BM			
Size	Width	Height	Thickness*
Dimensions in mm			
BM 15	33	20.5	8.5
BM 20	43	25.1	11
BM 25	47	30	12.7
BM 30	58.5	35.2	14
BM 35	68	40.5	16.2
BM 45	84	50.3	19.2

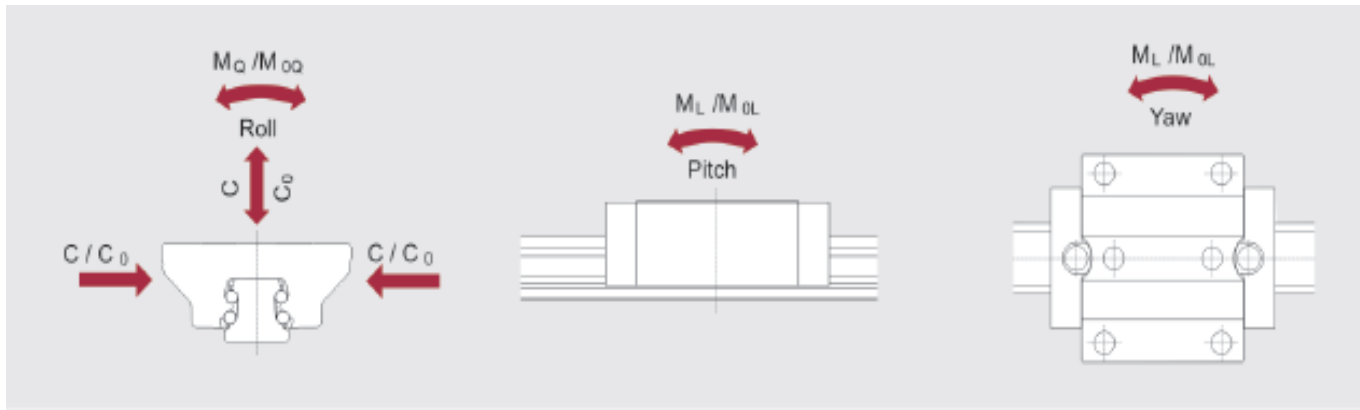


Dimensions SPL-MR			
Size	Width	Height	Thickness*
Dimensions in mm			
MR 25	47	29	12.7
MR 35	68	39.5	16.7
MR 45	84	49.5	19
MR 55	98	56.5	22
MR 65	123	75.5	25.2





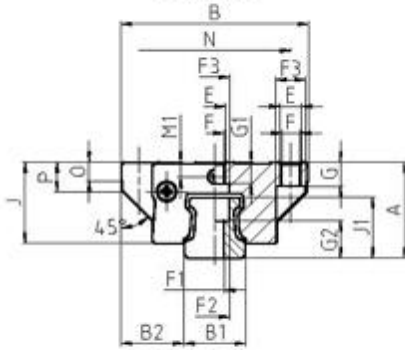
Type	Dimensions (mm)																	
	A	B	B ₁ *	B ₂	J	J ₁	L**	L ₁	L ₂	L ₄	L ₅ / L ₁₀	L ₆	N	E	F	F ₁	F ₂	F ₃
BMA 15	24	47	15	16	20.2	15.7	59.8	30	26	60	29	42.8	38	M 5	4.4	4.5	8	7.5
BMA 20	30	63	20	21.5	25.5	19	75.5	40	35	60	29	53.5	53	M 6	5.4	5.8	10	9.5
BMB 20							91.5					69.5						
BMA 25	36	70	23	23.5	30.5	22.7	89.3	45	40	60	29	64.3	57	M 8	6.8	7	11	11
BMB 25							108.3					83.3						
BMA 30	42	90	28	31	35.9	26	103	52	44	80	39	75	72	M10	8.5	9	15	15
BMB 30							125					97						
BMA 35	48	100	34	33	41	29.5	118	62	52	80	39	86	82	M10	8.5	9	15	15
BMB 35							143.5					111.5						
BMA 45	60	120	45	37.5	50.8	37	145	80	60	105	51.5	107	100	M12	10.5	14	20	18
BMB 45							176.5					138.5						



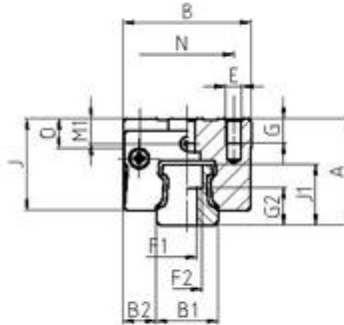
Ball Ø	G	G ₁	G ₂	M ₁	O	P	Loading capacities		Moments		Weight			
							C ₀ (N)	C (N)	M _{0Q} (Nm)	M _{0L} (Nm)	M _Q (Nm)	M _L (Nm)	Carriage (kg)	Rail (kg/m)
3.2	7	4.5	9.5	4	7	7	19600	9000	181	146	83	67	0.2	1.4
4.0	8	6.5	11.5	5.2	8	8	31400	14400	373	292	171	134	0.5	2.2
							41100	17400	490	495	206	208	0.6	2.2
4.8	9	8	14	5.5	7	11	46100	21100	631	513	289	235	0.7	3.0
							60300	25500	825	863	349	365	0.9	3.0
5.6	12	10	14.5	7	8	12	63700	29200	1084	829	497	380	1.2	4.3
							83300	35300	1414	1390	599	589	1.5	4.3
6.4	12	12	18	7	8	14	84400	38700	1566	1252	718	574	1.8	5.4
							110300	46700	2048	2104	867	891	2.3	5.4
7.9	15	15	22	8	10	17.5	134800	61900	3193	2498	1466	1147	3.3	8.8
							176300	74700	4175	4199	1769	1779	4.2	8.8



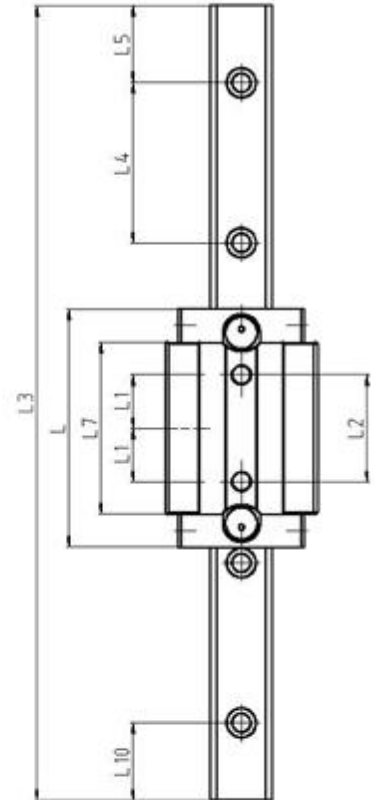
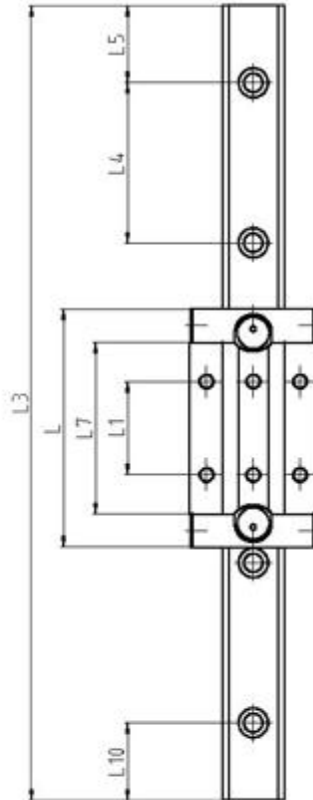
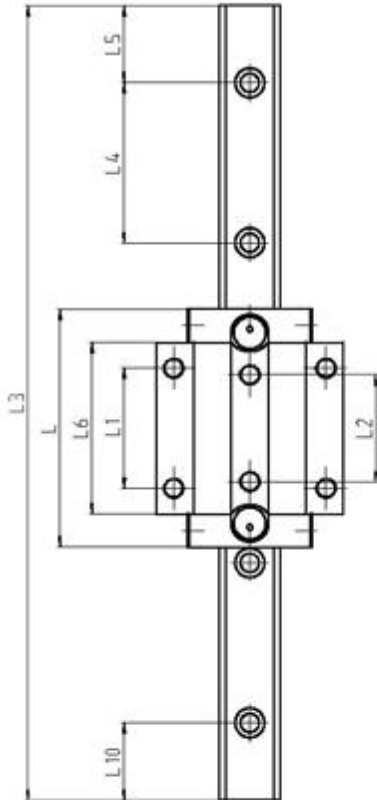
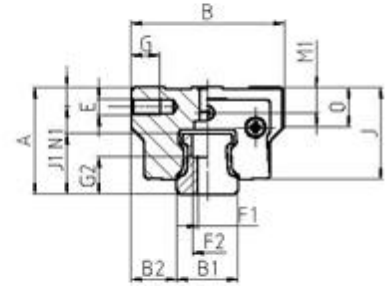
BMA, B



BMC, D, F, G, K



BME





	BM 15 A	BM 15 C	BM 15 F	BM 15 K
A: System height	24	28	24	24
B: Carriage width	47	34	34	34
B ₁ ±0.05: Rail width *	15	15	15	15
B ₂ : Distance locating faces	16	9.5	9.5	9.5
J: Carriage height	20.2	24.2	20.2	20.2
J ₁ : Rail height	15.7	15.7	15.7	15.7
L: Carriage length **	59.8	59.8	59.8	37.6
L ₁ : Carriage holes distance	30	26	26	-
L ₂ : Carriage holes distance	26	-	-	-
L ₄ : Rail holes distance	60	60	60	60
L ₅ /L ₁₀ : Rail hole distance	29	29	29	29
L ₆ : Carriage steel length	42.8	-	-	-
L ₇ : Carriage steel length	-	42.8	42.8	20.6
N: Carriage holes distance	38	26	26	26
N ₁ : Carriage holes distance	-	-	-	-
E: Carriage thread	M 5	M 4	M 4	M 4
F: Carriage through holes	4.4	-	-	-
F ₁ : Rail through holes	4.5	4.5	4.5	4.5
F ₂ : Rail counterbore	8	8	8	8
F ₃ : Carriage counterbore	7.5	-	-	-
Ball Ø	3.2	3.2	3.2	3.2
G: Carriage thread length	7	6	5	6
G ₁ : Carriage thread length	4.5	-	-	-
G ₂ : Rail hole length	9.5	9.5	9.5	9.5
M ₁ : Lube hole position	4	8	4	4
O: Carriage reference height	7	6	5.5	6
P: Carriage lateral height	7	-	-	-



	BM 20 A	BM 20 B	BM 20 C	BM 20 D	BM 20 F	BM 20 G	BM 20K
A: System height	30	30	30	30	30	30	28
B: Carriage width	63	63	44	44	44	44	44
B ₁ ±0.05: Rail width *	20	20	20	20	20	20	20
B ₂ : Distance locating faces	21.5	21.5	12	12	12	12	12
J: Carriage height	25.5	25.5	25.5	25.5	25.5	25.5	23.5
J ₁ : Rail height	19	19	19	19	19	19	19
L: Carriage length **	75.5	91.5	75.5	91.5	75.5	91.5	47.7
L ₁ : Carriage holes distance	40	40	36	50	36	50	-
L ₂ : Carriage holes distance	35	35	-	-	-	-	-
L ₄ : Rail holes distance	60	60	60	60	60	60	60
L ₅ /L ₁₀ : Rail hole distance	29	29	29	29	29	29	29
L ₆ : Carriage steel length	53.5	69.5	-	-	-	-	-
L ₇ : Carriage steel length	-	-	53.5	69.5	53.5	69.5	25.7
N: Carriage holes distance	53	53	32	32	32	32	32
N ₁ : Carriage holes distance	-	-	-	-	-	-	-
E: Carriage thread	M 6	M 6	M 5	M 5	M 5	M 5	M 5
F: Carriage through holes	5.4	5.4	-	-	-	-	-
F ₁ : Rail through holes	5.8	5.8	5.8	5.8	5.8	5.8	5.8
F ₂ : Rail counterbore	10	10	10	10	10	10	10
F ₃ : Carriage counterbore	9.5	9.5	-	-	-	-	-
Ball Ø	4.0	4.0	4.0	4.0	4.0	4.0	4.0
G: Carriage thread length	8	8	7	7	7	7	6
G ₁ : Carriage thread length	6.5	6.5	-	-	-	-	-
G ₂ : Rail hole length	11.5	11.5	11.5	11.5	11.5	11.5	11.5
M ₁ : Lube hole position	5.2	5.2	5.2	5.2	5.2	5.2	4.2
O: Carriage reference height	8	8	6	6	6	6	4
P: Carriage lateral height	8	8	-	-	-	-	-



	BM 25 A	BM 25 B	BM 25 C	BM 25 D	BM 25 E	BM 25 F	BM 25 G
A: System height	36	36	40	40	40	36	36
B: Carriage width	70	70	48	48	57	48	48
B ₁ ±0.05: Rail width *	23	23	23	23	23	23	23
B ₂ : Distance locating faces	23.5	23.5	12.5	12.5	17	12.5	12.5
J: Carriage height	30.5	30.5	34.5	34.5	34.5	30.5	30.5
J ₁ : Rail height	22.7	22.7	22.7	22.7	22.7	22.7	22.7
L: Carriage length **	89.3	108.3	89.3	108.3	89.7	89.3	108.3
L ₁ : Carriage holes distance	45	45	35	50	17.5	35	50
L ₂ : Carriage holes distance	40	40	-	-	35	-	-
L ₄ : Rail holes distance	60	60	60	60	60	60	60
L ₅ /L ₁₀ : Rail hole distance	29	29	29	29	29	29	29
L ₆ : Carriage steel length	64.3	83.3	-	-	-	-	-
L ₇ : Carriage steel length	-	-	64.3	83.3	64.3	64.3	83.3
N: Carriage holes distance	57	57	35	35	-	35	35
N ₁ : Carriage holes distance	-	-	-	-	7.5	-	-
E: Carriage thread	M 8	M 8	M 6	M 6	M 6	M 6	M 6
F: Carriage through holes	6.8	6.8	-	-	-	-	-
F ₁ : Rail through holes	7	7	7	7	7	7	7
F ₂ : Rail counterbore	11	11	11	11	11	11	11
F ₃ : Carriage counterbore	11	11	-	-	-	-	-
Ball Ø	4.8	4.8	4.8	4.8	4.8	4.8	4.8
G: Carriage thread length	9	9	9	9	9	9	9
G ₁ : Carriage thread length	8	8	-	-	-	-	-
G ₂ : Rail hole length	14	14	14	14	14	14	14
M ₁ : Lube hole position	5.5	5.5	9.5	9.5	9.5	5.5	5.5
O: Carriage reference height	7	7	11	11	15	7.5	7.5
P: Carriage lateral height	11	11	-	-	-	-	-



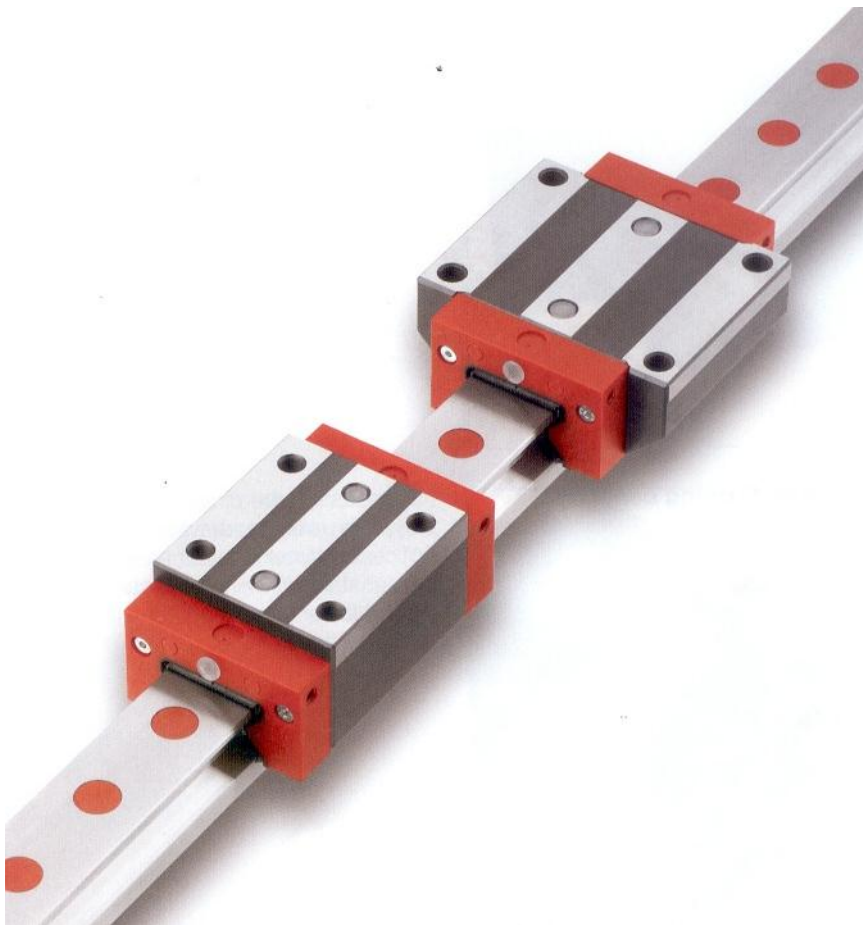
	BM 30 A	BM 30 B	BM 30 C	BM 30 D	BM 30 E	BM 30 F	BM 30 G
A: System height	42	42	45	45	45	42	42
B: Carriage width	90	90	60	60	62	60	60
B ₁ ±0.05: Rail width *	28	28	28	28	28	28	28
B ₂ : Distance locating faces	31	31	16	16	17	16	16
J: Carriage height	35.9	35.9	38.9	38.9	38.9	35.9	35.9
J ₁ : Rail height	26	26	26	26	26	26	26
L: Carriage length **	103	125	103	125	103.4	103	125
L ₁ : Carriage holes distance	52	52	40	60	20	40	60
L ₂ : Carriage holes distance	44	44	-	-	40	-	-
L ₄ : Rail holes distance	80	80	80	80	80	80	80
L ₅ /L ₁₀ : Rail hole distance	39	39	39	39	39	39	39
L ₆ : Carriage steel length	75	97	-	-	-	-	-
L ₇ : Carriage steel length	-	-	75	97	75	75	97
N: Carriage holes distance	72	72	40	40	-	40	40
N ₁ : Carriage holes distance	-	-	-	-	8.5	-	-
E: Carriage thread	M 10	M 10	M 8	M 8	M 8	M 8	M 8
F: Carriage through holes	8.5	8.5	-	-	-	-	-
F ₁ : Rail through holes	9	9	9	9	9	9	9
F ₂ : Rail counterbore	15	15	15	15	15	15	15
F ₃ : Carriage counterbore	15	15	-	-	-	-	-
Ball Ø	5.6	5.6	5.6	5.6	5.6	5.6	5.6
G: Carriage thread length	12	12	11	11	12	11	11
G ₁ : Carriage thread length	10	10	-	-	-	-	-
G ₂ : Rail hole length	14.5	14.5	14.5	14.5	14.5	14.5	14.5
M ₁ : Lube hole position	7	7	10	10	10	7	7
O: Carriage reference height	8	8	11	11	17	8	8
P: Carriage lateral height	12	12	-	-	-	-	-

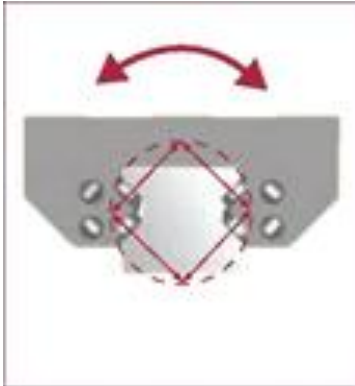


	BM 35 A	BM 35 B	BM 35 C	BM 35 D	BM 35 E	BM 35 F	BM 35 G
A: System height	48	48	55	55	55	48	48
B: Carriage width	100	100	70	70	76	70	70
B ₁ ±0.05: Rail width *	34	34	34	34	34	34	34
B ₂ : Distance locating faces	33	33	18	18	21	18	18
E: Carriage thread	M 10	M 10	M 8	M 8	M 8	M 8	M 8
F: Carriage through holes	8.5	8.5	-	-	-	-	-
F ₁ : Rail through holes	9	9	9	9	9	9	9
F ₂ : Rail counterbore	15	15	15	15	15	15	15
F ₃ : Carriage counterbore	15	15	-	-	-	-	-
G: Carriage thread length	12	12	12	12	12	12	12
G ₁ : Carriage thread length	12	12	-	-	-	-	-
G ₂ : Rail hole length	18	18	18	18	18	18	18
J: Carriage height	41	41	48	48	48	41	41
J ₁ : Rail height	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Ball Ø	6.4	6.4	6.4	6.4	6.4	6.4	6.5
L: Carriage length **	118	143.5	118	143.5	118.4	118	143.5
L ₁ : Carriage holes distance	62	62	50	72	25	50	72
L ₂ : Carriage holes distance	52	52	-	-	50	-	-
L ₄ : Rail holes distance	80	80	80	80	80	80	80
L ₅ /L ₁₀ : Rail hole distance	39	39	39	39	39	39	39
L ₆ : Carriage steel length	86	111.5	-	-	-	-	-
L ₇ : Carriage steel length	-	-	86	111.5	86	86	111.5
M ₁ : Lube hole position	7	7	14	14	14	7	7
N: Carriage holes distance	82	82	50	50	-	50	50
N ₁ : Carriage holes distance	-	-	-	-	11	-	-
O: Carriage reference height	8	8	15	15	22	8	8
P: Carriage lateral height	14	14	-	-	-	-	-



	BM 45 A	BM 45 B	BM 45 C	BM 45 D
A: System height	60	60	70	70
B: Carriage width	120	120	86	86
B ₁ ±0.05: Rail width *	45	45	45	45
B ₂ : Distance locating faces	37.5	37.5	20.5	20.5
J: Carriage height	50.8	50.8	60.8	60.8
J ₁ : Rail height	37	37	37	37
L: Carriage length **	145	176.5	145	176.5
L ₁ : Carriage holes distance	80	80	60	80
L ₂ : Carriage holes distance	60	60	-	-
L ₄ : Rail holes distance	105	105	105	105
L ₅ /L ₁₀ : Rail hole distance	51.5	51.5	51.5	51.5
L ₆ : Carriage steel length	107	138.5	-	-
L ₇ : Carriage steel length	-	-	107	138.5
N: Carriage holes distance	100	100	60	60
N ₁ : Carriage holes distance	-	-	-	-
E: Carriage thread	M 12	M 12	M 10	M 10
F: Carriage through holes	10.5	10.5	-	-
F ₁ : Rail through holes	14	14	14	14
F ₂ : Rail counterbore	20	20	20	20
F ₃ : Carriage counterbore	18	18	-	-
Ball Ø	7.9	7.9	7.9	7.9
G: Carriage thread length	15	15	18	18
G ₁ : Carriage thread length	15	15	-	-
G ₂ : Rail hole length	22	22	22	22
M ₁ : Lube hole position	8	8	18	18
O: Carriage reference height	10	10	19	19
P: Carriage lateral height	17.5	17.5	-	-





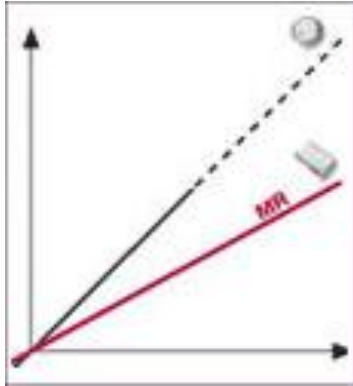
With the so-called O-arrangement of the guideway, a large internal spacing of supports is implemented. In conjunction with the roller running tracks offset by 90°, a uniform



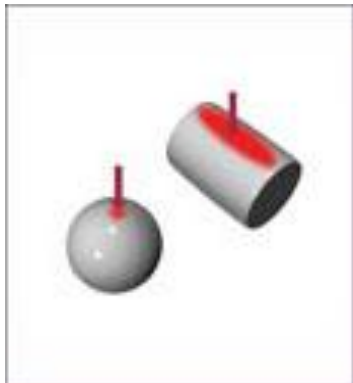
The running smoothness of the MONORAIL is the result of the optimized geometry of the roller tracks. Minimized guideway travel pulsation and uniform translation force are extremely important in demanding machining applications.



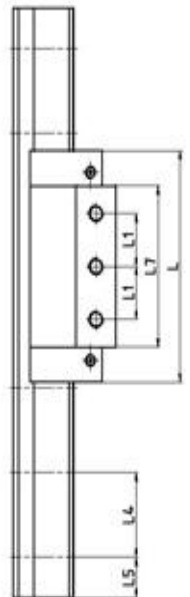
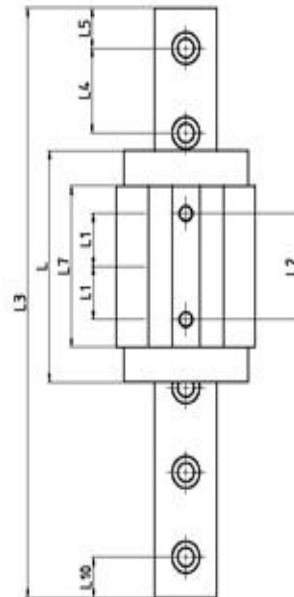
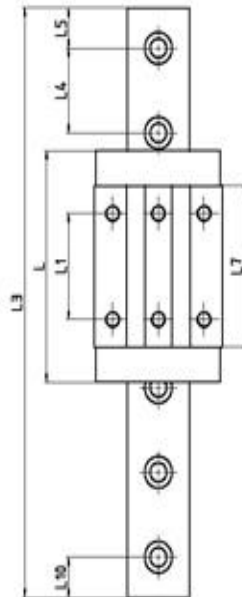
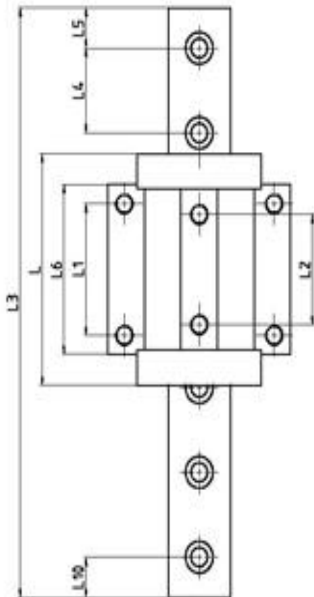
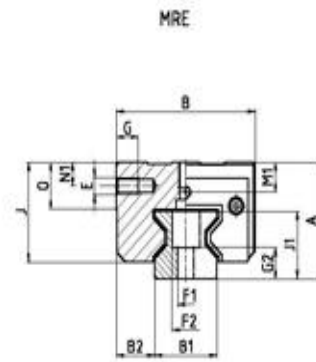
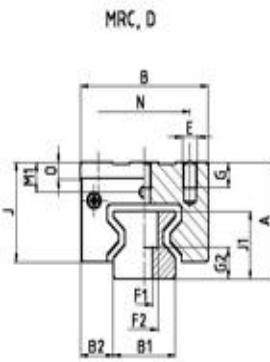
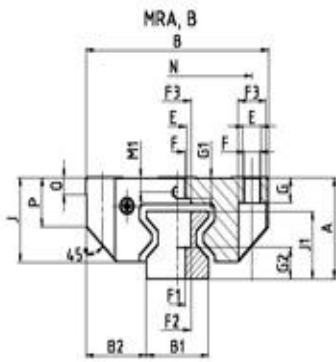
The rollers and running surfaces at the MONORAIL carriage are protected by integrated longitudinal and diagonal wipers on all sides. Furthermore, the double-lipped diagonal wipers minimize lubricant loss.



In contrast to the circular-arch ball guideway, the roller guideway has a flat and noticeably larger contact area. This results in a substantially higher load-bearing capacity and less wear, with minimum rolling friction.



In contrast to the circular-arch ball guideway, the roller guideway has a flat and noticeably larger contact area. This results in a substantially higher load-bearing capacity and less wear, with minimum rolling friction.





	MR 25 A	MR 25 B	MR 25 C	MR 25 D	MR 25 E
A: System height	36	36	40	40	40
B: Carriage width	70	70	48	48	57
B ₁ ±0.05: Rail width *	23	23	23	23	23
B ₂ : Distance locating faces	23.5	23.5	12.5	12.5	17
J: Carriage height	29.5	29.5	33.5	33.5	33.5
J ₁ : Rail height	24.5	24.5	24.5	24.5	24.5
L: Carriage length **	81	103.4	81	103.4	81
L ₁ : Carriage holes distance	45	45	35	50	17.5
L ₂ : Carriage holes distance	40	40	-	-	35
L ₄ : Rail holes distance	30	30	30	30	30
L ₅ /L ₁₀ : Rail hole distance	14	14	14	14	14
L ₆ : Carriage steel length	60	79.4	-	-	-
L ₇ : Carriage steel length	-	-	57	79.4	57
N: Carriage holes distance	57	57	35	35	-
E: Carriage thread	M 8	M 8	M 6	M 6	M 6
F: Carriage through holes	6.8	6.8	-	-	-
F ₁ : Rail through holes	7	7	7	7	7
F ₂ : Rail counterbore	11	11	11	11	11
F ₃ : Carriage counterbore	11	11	-	-	-
Roller Ø	3.2	3.2	3.2	3.2	3.2
G: Carriage thread length	9	9	9	9	10
G ₁ : Carriage thread length	6.5	6.5	-	-	-
G ₂ : Rail hole length	13	13	13	13	13
M ₁ : Lube hole position	5.5	5.5	9.5	9.5	9.5
O: Carriage reference height	7.5	7.5	7.5	7.5	15
P: Carriage lateral height	17.5	17.5	-	-	-



	MR 25 A	MR 25 B	MR 25 C	MR 25 D	MR 25 E
A: System height	36	36	40	40	40
B: Carriage width	70	70	48	48	57
B ₁ ±0.05: Rail width *	23	23	23	23	23
B ₂ : Distance locating faces	23.5	23.5	12.5	12.5	17
J: Carriage height	29.5	29.5	33.5	33.5	33.5
J ₁ : Rail height	24.5	24.5	24.5	24.5	24.5
L: Carriage length **	81	103.4	81	103.4	81
L ₁ : Carriage holes distance	45	45	35	50	17.5
L ₂ : Carriage holes distance	40	40	-	-	35
L ₄ : Rail holes distance	30	30	30	30	30
L ₅ /L ₁₀ : Rail hole distance	14	14	14	14	14
L ₆ : Carriage steel length	60	79.4	-	-	-
L ₇ : Carriage steel length	-	-	57	79.4	57
N: Carriage holes distance	57	57	35	35	-
E: Carriage thread	M 8	M 8	M 6	M 6	M 6
F: Carriage through holes	6.8	6.8	-	-	-
F ₁ : Rail through holes	7	7	7	7	7
F ₂ : Rail counterbore	11	11	11	11	11
F ₃ : Carriage counterbore	11	11	-	-	-
Roller Ø	3.2	3.2	3.2	3.2	3.2
G: Carriage thread length	9	9	9	9	10
G ₁ : Carriage thread length	6.5	6.5	-	-	-
G ₂ : Rail hole length	13	13	13	13	13
M ₁ : Lube hole position	5.5	5.5	9.5	9.5	9.5
O: Carriage reference height	7.5	7.5	7.5	7.5	15
P: Carriage lateral height	17.5	17.5	-	-	-



	MR 25 A	MR 25 B	MR 25 C	MR 25 D	MR 25 E
A: System height	36	36	40	40	40
B: Carriage width	70	70	48	48	57
B ₁ ±0.05: Rail width *	23	23	23	23	23
B ₂ : Distance locating faces	23.5	23.5	12.5	12.5	17
J: Carriage height	29.5	29.5	33.5	33.5	33.5
J ₁ : Rail height	24.5	24.5	24.5	24.5	24.5
L: Carriage length **	81	103.4	81	103.4	81
L ₁ : Carriage holes distance	45	45	35	50	17.5
L ₂ : Carriage holes distance	40	40	-	-	35
L ₄ : Rail holes distance	30	30	30	30	30
L ₅ /L ₁₀ : Rail hole distance	14	14	14	14	14
L ₆ : Carriage steel length	60	79.4	-	-	-
L ₇ : Carriage steel length	-	-	57	79.4	57
N: Carriage holes distance	57	57	35	35	-
E: Carriage thread	M 8	M 8	M 6	M 6	M 6
F: Carriage through holes	6.8	6.8	-	-	-
F ₁ : Rail through holes	7	7	7	7	7
F ₂ : Rail counterbore	11	11	11	11	11
F ₃ : Carriage counterbore	11	11	-	-	-
Roller Ø	3.2	3.2	3.2	3.2	3.2
G: Carriage thread length	9	9	9	9	10
G ₁ : Carriage thread length	6.5	6.5	-	-	-
G ₂ : Rail hole length	13	13	13	13	13
M ₁ : Lube hole position	5.5	5.5	9.5	9.5	9.5
O: Carriage reference height	7.5	7.5	7.5	7.5	15
P: Carriage lateral height	17.5	17.5	-	-	-



	MR 55 A	MR 55 B	MR 55 C	MR 55 D
A: System height	70	70	80	80
B: Carriage width	140	140	100	100
B ₁ ±0.05: Rail width *	53	53	53	53
B ₂ : Distance locating faces	43.5	43.5	23.5	23.5
J: Carriage height	57	57	67	67
J ₁ : Rail height	48	48	48	48
L: Carriage length **	163.5	205.5	163.5	205.5
L ₁ : Carriage holes distance	95	95	75	95
L ₂ : Carriage holes distance	70	70	-	-
L ₄ : Rail holes distance	60	60	60	60
L ₅ /L ₁₀ : Rail hole distance	29	29	29	29
L ₆ : Carriage steel length	120	162	-	-
L ₇ : Carriage steel length	-	-	120	162
N: Carriage holes distance	116	116	75	75
E: Carriage thread	M 14	M 14	M 12	M 12
F: Carriage through holes	12.5	12.5	16	16
F ₁ : Rail through holes	16	16	-	-
F ₂ : Rail counterbore	24	24	24	24
F ₃ : Carriage counterbore	20	20	-	-
Roller Ø	6	6	6	6
G: Carriage thread length	18	18	19	19
G ₁ : Carriage thread length	13.5	13.5	-	-
G ₂ : Rail hole length	26	26	26	26
M ₁ : Lube hole position	9	9	19	19
O: Carriage reference height	12	12	12	12
P: Carriage lateral height	34.5	34.5	-	-


MR 65 B
MR 65 D

A: System height	90	90
B: Carriage width	170	126
$B_1 \pm 0.05$: Rail width *	63	63
B_2 : Distance locating faces	53.5	31.5
J: Carriage height	76	76
J_1 : Rail height	58	58
L: Carriage length **	251	251
L_1 : Carriage holes distance	110	120
L_2 : Carriage holes distance	82	-
L_4 : Rail holes distance	75	75
L_5/L_{10} : Rail hole distance	36.5	36.5
L_6 : Carriage steel length	201	-
L_7 : Carriage steel length	-	201
N: Carriage holes distance	142	76
E: Carriage thread	M 16	M 16
F: Carriage through holes	14.5	-
F_1 : Rail through holes	18	18
F_2 : Rail counterbore	26	26
F_3 : Carriage counterbore	23	-
Roller \varnothing	7	7
G: Carriage thread length	23	20
G_1 : Carriage thread length	19	-
G_2 : Rail hole length	32	32
M_1 : Lube hole position	13	13
O: Carriage reference height	15	15
P: Carriage lateral height	51	-

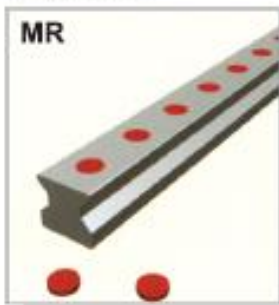


MR 100 B

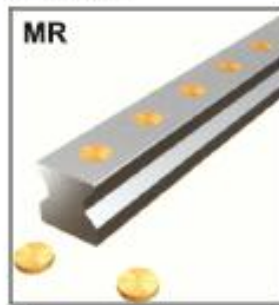
A:	System height	120
B:	Carriage width	250
$B_1 \pm 0.05$:	Rail width *	100
B_2 :	Distance locating faces	75
J:	Carriage height	100
J_1 :	Rail height	92
L:	Carriage length **	400
L_1 :	Carriage holes distance	200
L_2 :	Carriage holes distance	-
L_4 :	Rail holes distance	105
L_5/L_{10} :	Rail hole distance	51.5
L_6 :	Carriage steel length	308
L_7 :	Carriage steel length	-
N:	Carriage holes distance	220
E:	Carriage thread	M 20
F:	Carriage through holes	17.3
F_1 :	Rail through holes	26
F_2 :	Rail counterbore	39
F_3 :	Carriage counterbore	30
	Roller Ø	11.5
G:	Carriage thread length	26
G_1 :	Carriage thread length	10
G_2 :	Rail hole length	53
M_1 :	Lube hole position	12.5
O:	Carriage reference height	20
P:	Carriage lateral height	68.5



Plastic plug MRK



Brass plug MRS



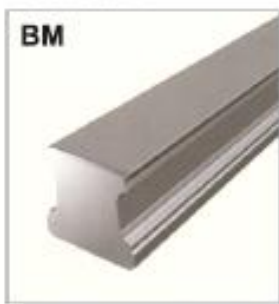
Two-piece steel plug MRZ



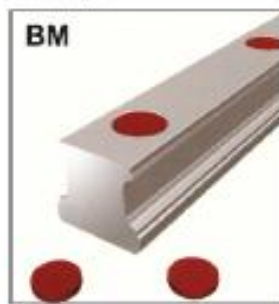
Rail cover strip MAC



Rail cover strip BAB



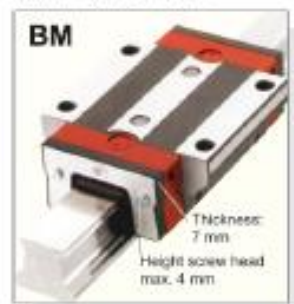
Plastic plugs BRK



Additional wipers ZBN-U / ZBV-U



Additional wipers ZBN / ZBV



Additional-wipers-ZCN / ZCV



Metal-wiper-ASM



Metal-wiper-ABM





TELEFAX

Please send this sheet along with the machine drawing and the data sheet to your SCHNEEBERGER-representative!

Address

Schneeberger GmbH
Productline MONORAIL
Gräfenau 12
D - 75339 Hoefen/Enz
Germany

phone: ++ 49 7081 782 - 0
fax: ++ 49 7081 782 - 229

RE: MONORAIL calculation program

Sender

Company:
Department: Person in charge:
Address:
Postcode, City:
Phone #: Fax #:

Specifications for the calculation

Name of the machine:

Predetermined MONORAIL-type:

- X-axis
- Y-axis
- Z-axis
- Additional axis

I expect the following results:

- Stiffness/elasticity
- Static reliability
- Life expectancy
- Quotation

Demanded values:

- Max. deformation at the working point μm
- Minimum life expectancy h

Further details:

Date

Signature



ABEC Tech

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