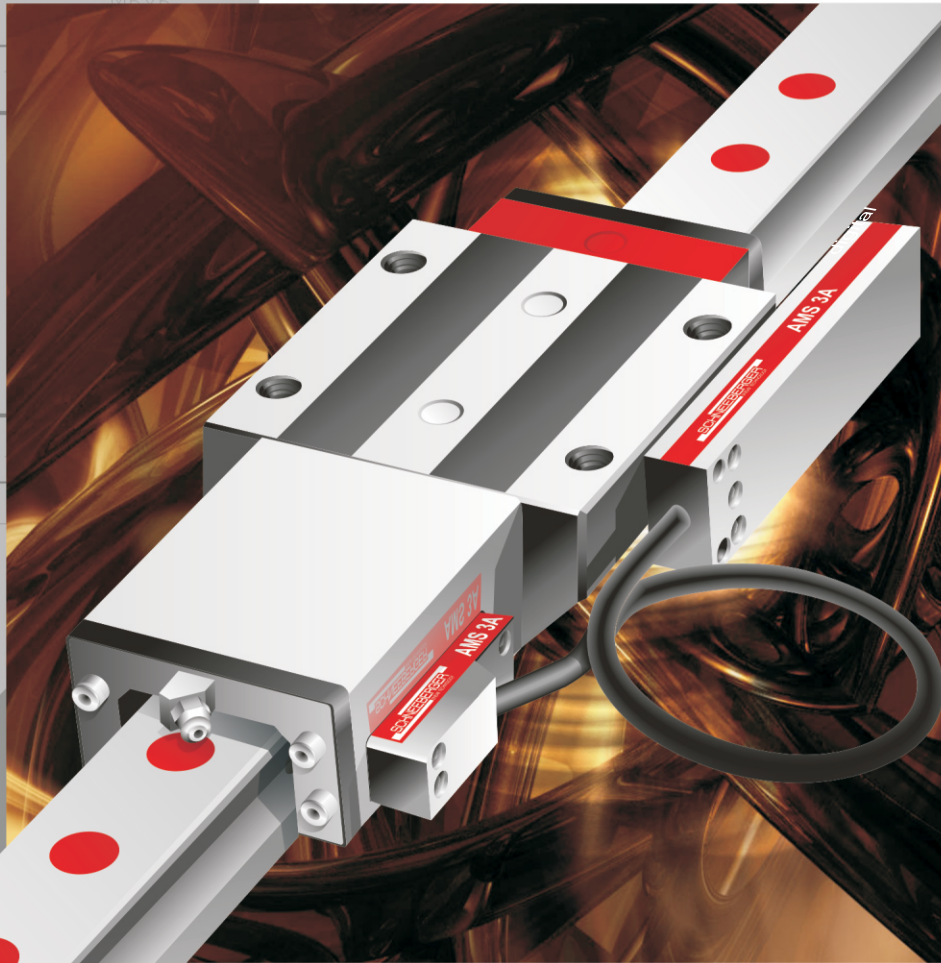




A solução adequada ao seu projeto



**Qualidade**  
**Comprometimento**  
**Pontualidade**  
**Competitividade**

**MONORAIL**  
Guias Lineares  
Miniguias

**SCHNEEBERGER**  
LINEAR TECHNOLOGY

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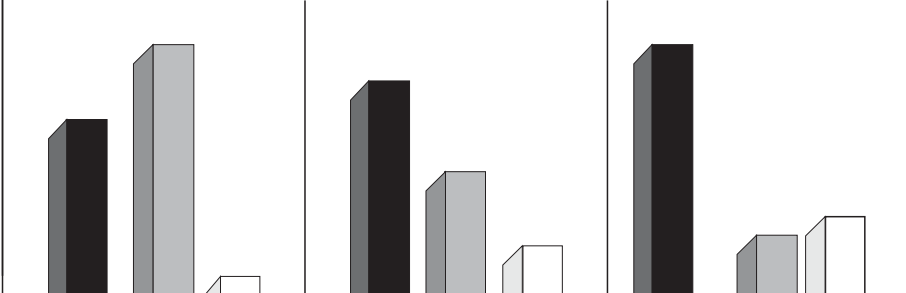
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## 1. Guias Lineares MR e BM

### 1.1 Campos de Aplicação e Condições Operacionais

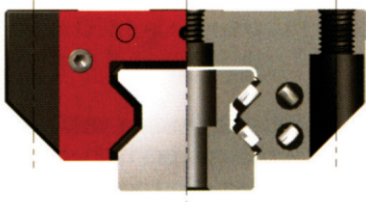
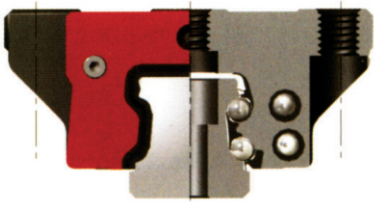
MONORAIL MR and BM – Fields of Application and Operating Conditions

#### Operating Conditions

BM			MR							
Preload classes			Accuracy classes							
V1			G0		G1		G2		G3	
Operating conditions			Fields of application							
Characteristics			CNC machines, CNC machining centers							
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	Measuring machines	dressing units,	special applications	Handling, robotics, auxiliary axes				
			<p>■ Rigidity</p> <p>■ Service lifetime</p> <p>□ Moving resistance</p>							

## 1.2 Características e Campos de Aplicação

Characteristics and Fields of Application

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

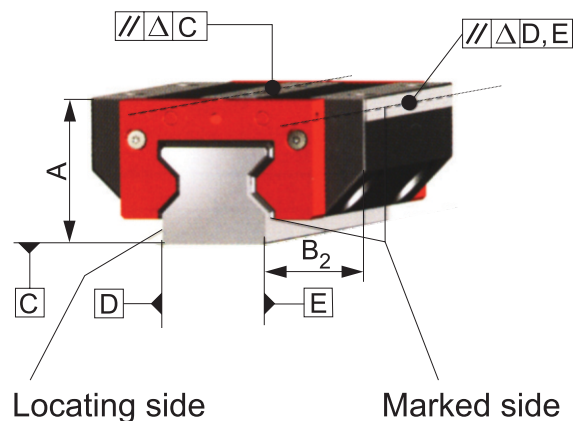
●●●● = excellent

● = satisfactory

## 1.3 Classes de Precisão e Tolerâncias Dimensionais

Accuracy classes G0, G1, G2 e 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.

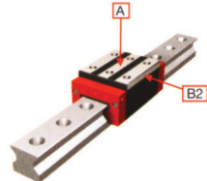
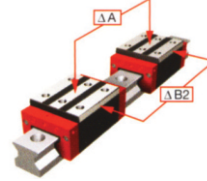
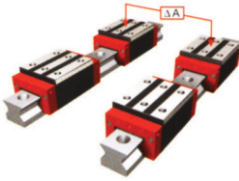


### Tolerâncias dimencionais

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 value from column one in accordance with the following table are applicable.

When replacing individual carriages, if so required please contact a SCHNEEBERGER representative.

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
	A / B <sub>2</sub>	A / Δ B <sub>2</sub>	Δ A standard    Δ A matched
G0	± 5 μm	3 μm	10 μm    5 μm
G1	± 10 μm	5 μm	20 μm    7 μm
G2	± 20 μm	10 μm	40 μm    10 μm
G3	± 50 μm	25 μm	100 μm    25 μm
			
	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 accuracy Δ of the carriages on the rails

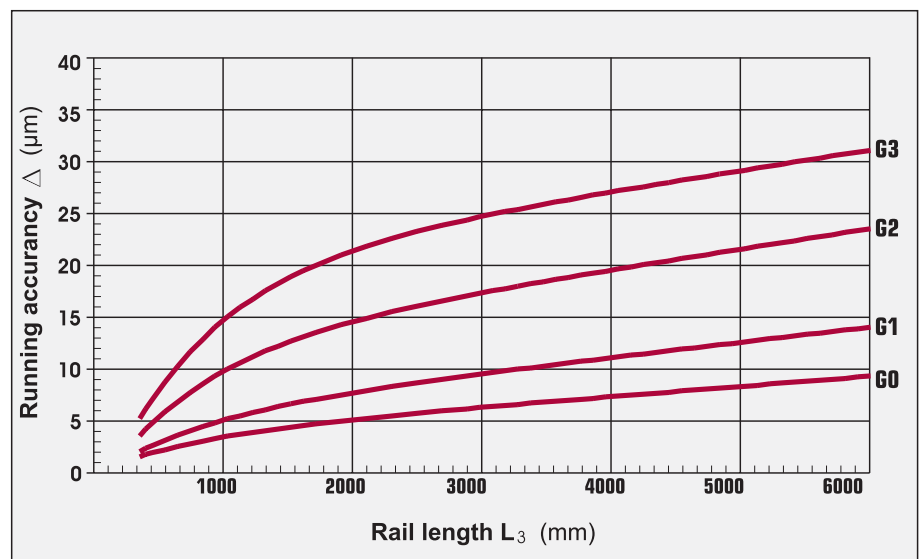
The running of the carriages within the limits of the tolerance can have a linear or wavelike course. The height of the tolerance is determined from the adjacent diagram in function of the rail length and the accuracy class. Example: L<sub>3</sub> = 2000 mm with G2 results in a permissible tolerance of 0.015 mm.

Preloading increases the rigidity of the guideway but also affects operational life and increases translation resistance.

The MONORAIL system is available in various preload classes that correspond 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 1.5 Operating Conditions.

### Precisão de deslocamento do carro sobre o trilho



### 1.4 Classes de Pré-carga

Preload classes V1, V2, V3

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*

\* Version G3-V3 for BM not available

## 2. Lubrificação

### 2.1 Lubrificação a óleo

Lubrication with oil

Initial lubrication prior to operation

Initial lubrication oil quantity per carriage in cm <sup>3</sup>	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 <sup>3</sup>	BM 15	BM 20	BM 25	BM 30	BM 35	BM 45
Any installation orientation	0.2	0.5	0.6	0.9	1.1	1.2

Subsequent lubrication interval = 30 km

Subsequent lubrication oil quantity per carriage in cm <sup>3</sup>	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 <sup>3</sup>	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

For the lubrication using oil, SCHNEEBERGER recommends mineral oil CLP (DIN 51517) or HLP (DIN 51524) in the viscosity range of ISO VG32 to ISO VG100 in accordance with DIN 51519. Bed track oils CGLP up to ISO VG220 can also be used.

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  $v$  1m/sec and a load ratio C/P 2, the following interval for subsequent lubrication can be assumed:

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.

### 2.2 Lubrificação a graxa

Lubrication with grease

Initial greasing grease quantity per carriage in cm <sup>3</sup>	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 greasing grease quantity per carriage in cm <sup>3</sup>	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
BMB/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  $v$  1 m/sec and a load ratio C/P 2, the following interval for subsequent lubrication can be assumed:

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 <sup>3</sup>	MR 25	MR 35	MR 45	MR 55	MR 65
MRA/MRC/BME/BMF	0.4	1.1	2.1	3.2	—
MRB/MRD/BMG	0.5	1.3	2.4	4	7.4

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.

Subsequent lubrication grease quantity per carriage in cm <sup>3</sup>	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

### 2.3 Placa de Lubrificação SPL

Lubrication plate SPL

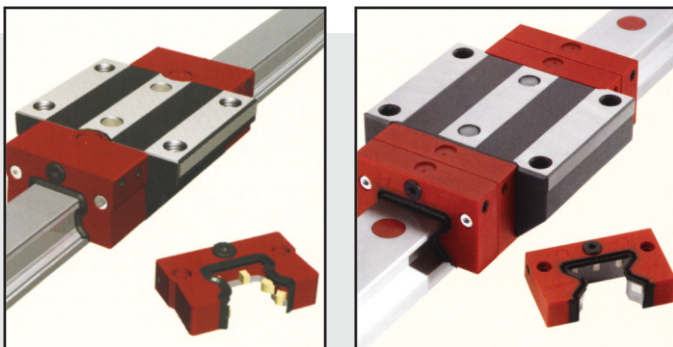
Dimensions SPL-MR Size	Width	Height	Thickness*
Dimensions in mm			
MR 25	47	29	12.7
MR 35	68	39.5	16.7
MR 45	84	49.5	19
MR 55	98	56.5	22
MR 65	123	75.5	25.2

\* = without centering cone in carriage longitudinal direction

The lubrication plate is utilized in such applications, where long lubrication intervals are demanded. It enables an automatic and uniform supplying of the roller elements with lubricating oil over a long period of time. In order to achieve maximum travelling distances without any re-lubrication, the lubrication plates are always installed in pairs - i.e., one lubrication plate per carriage end and respectively installed in front of the front plates.

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

\* = without centering cone in carriage longitudinal direction



## 2.4 Acessórios para Lubrificação

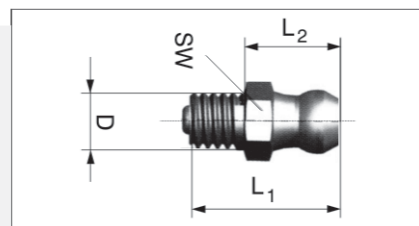
### Accessories

#### Greasing nipple

Hydraulic-type lubricating nipple, straight according to DIN 71412

Type	D	L <sub>1</sub>	L <sub>2</sub>	SW
SN 6	M6	16	10.5	7

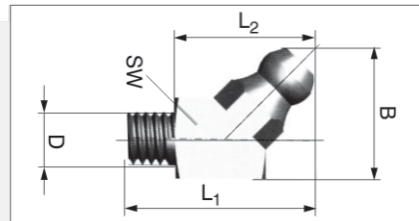
Application:  
 • BM 20 - 45  
 • MR 25 - 65



Hydraulic-type lubricating nipple, 45 deg according to DIN 71412

Typ	D	L <sub>1</sub>	L <sub>2</sub>	B	SW
SN 6-45	M6	21	15.5	15	9

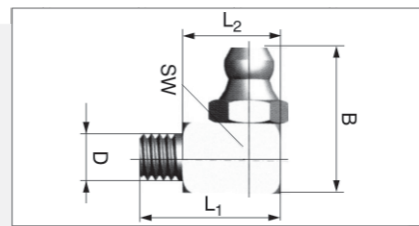
Application:  
 • BM 20 - 45  
 • MR 25 - 65



Hydraulic-type lubricating nipple, 90 deg according to DIN 71412

Typ	D	L <sub>1</sub>	L <sub>2</sub>	B	SW
SN 6-90	M6	18	12.5	19	9

Application:  
 • BM 20 - 45  
 • MR 25 - 65



#### Banjo fittings

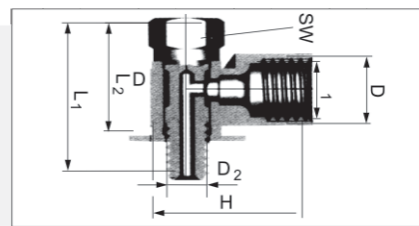
For tubing with ext. diameter  $\varnothing =$

SV 6-M 6 2.5 mm

SV 6-M 8 4 mm

Type	D <sub>1</sub>	D <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	H	D	SW
SV 6-M 6	M6X0.75*	M6	22	16	18	10	9
SV 6-M 8	M8X1*	M6	22	15.5	22	10	9

Application:  
 • BM 20-45  
 • MR 25-65

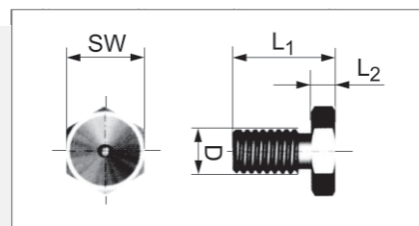


\* Counterbore in accordance with DIN 3854 and DIN 3862 for screwed pipe connections without soldering

#### Funnel type lubricating nipple M3

Type	D	L <sub>1</sub>	L <sub>2</sub>	SW
SN 3-T	M3	6.6	1.6	5

Application:  
 • BM 15  
 • BM 20 only laterally

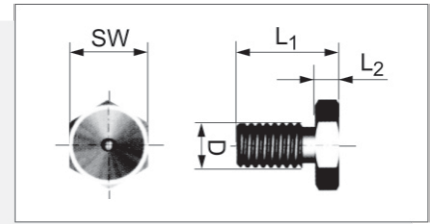




### Funnel type lubricating nipple M6

Type	D	L <sub>1</sub>	L <sub>2</sub>	SW
SN 6-T	M6	9.5	3	7

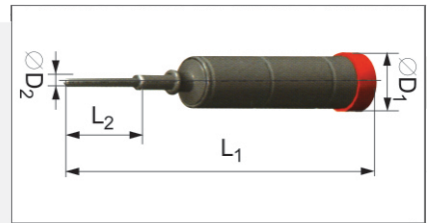
- Application:
- BM 20-45
  - MR 25-65



### Grease gun for funnel type lubricating nipple M3

Type	L <sub>1</sub>	L <sub>2</sub>	∅ D <sub>1</sub>	∅ D <sub>2</sub>
SFP-T3	210	55	34	5.5

- Application:
- BM 15
  - BM 20 only laterally



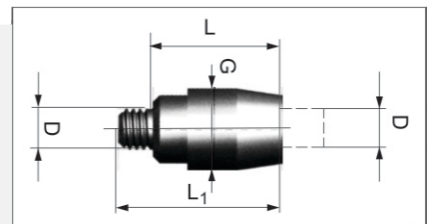
### Lubrication adapter

#### Straight screw-in connection M3

For tubing with ext. diameter  $\varnothing D_R = 3$  mm

Type	D	∅ G	L <sub>1</sub>	L <sub>2</sub>
SA 3-D3	M3	6	12	9.5

- Application:
- BM 15
  - BM 20 only laterally

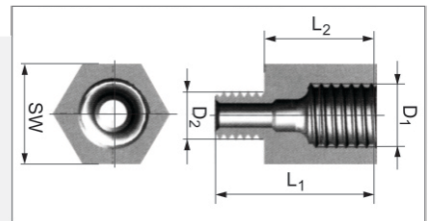


### Adapter with hexagon insert bit

For tubing with ext. diameter  $\varnothing = 4$  mm

Type	D <sub>1</sub>	D <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	SW
SA 6-6KT-G1/8	G1/8	M6	20	14	12
SA 6-6KT-M 8	M8 X 1*	M6	20	14	11

- Application:
- BM 30-45
  - MR 35-65

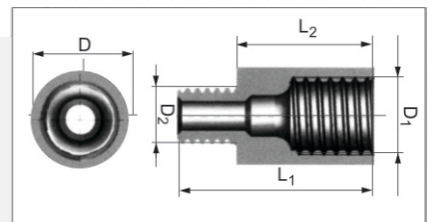


### Adapter, external round

For tubing with ext. diameter  $\varnothing = 4$  mm

Type	D <sub>1</sub>	D <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	∅ D
SA 6-RD-M 8	M8 1*	M6	20	14	10

- Application:
- BM 20-45
  - MR 25-65

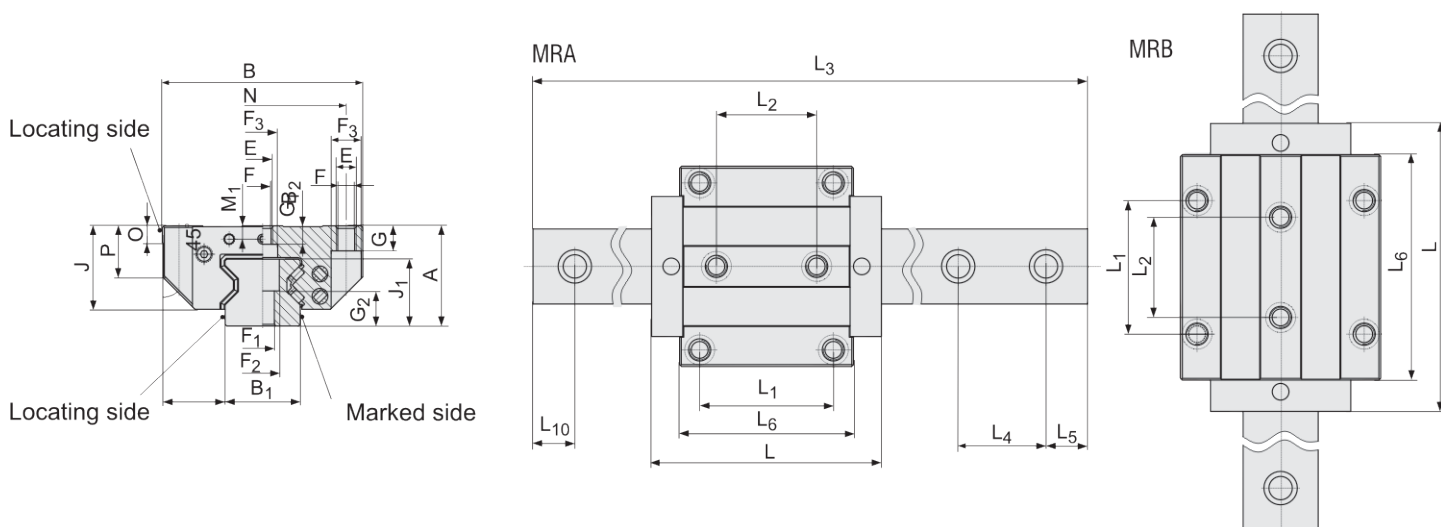


\* Counterbore in accordance with DIN 2353 for screwed pipe connections without soldering

All dimensions in mm

### 3. Guias Lineares de Rolos MR

Dimension tables, loading capacities MONORAIL MR



#### 3.1 Tabelas de Medidas e Capacidades - Tipo MRA e MRB

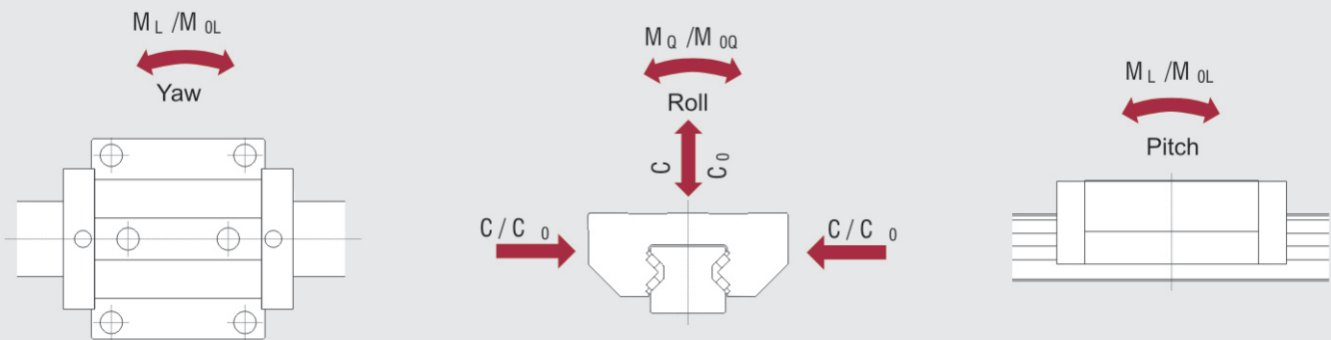
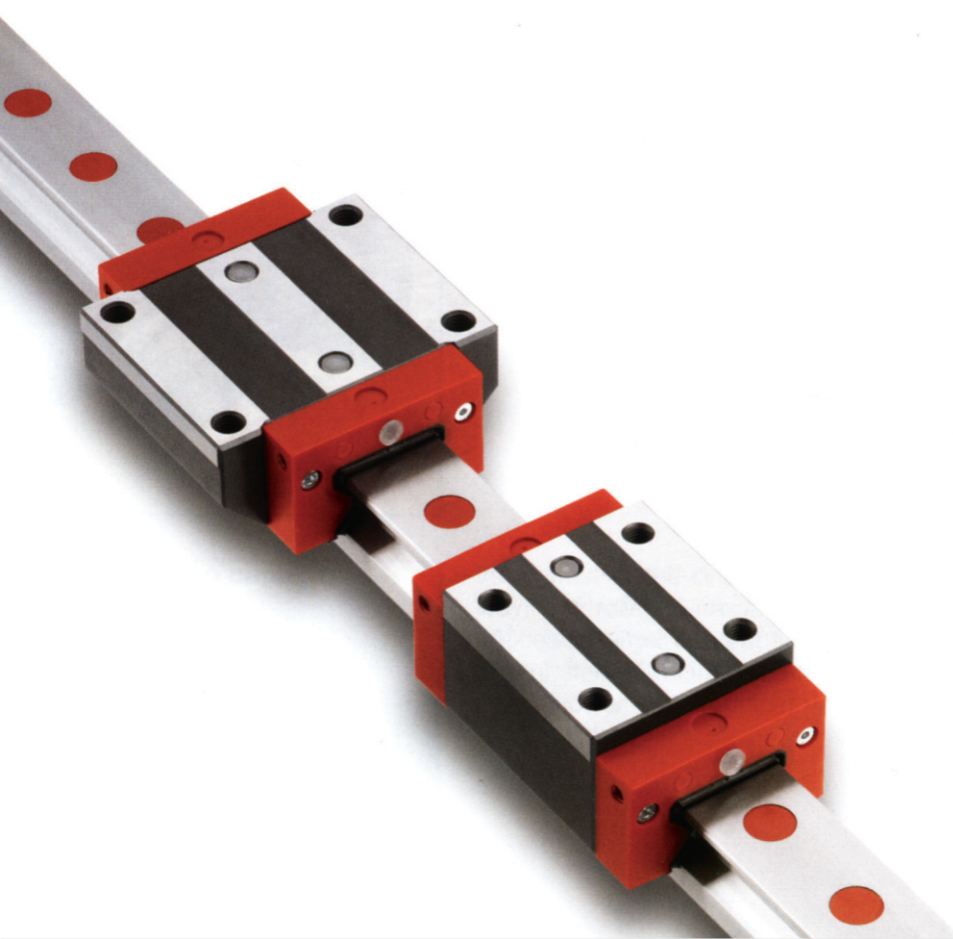
Carriage types MRA and MRB

Drawings in all common file formats are available on [www.schneeberger.com](http://www.schneeberger.com) unde Services.

Type	Dimensions (mm)																	
	A	B	B <sub>1</sub> *	B <sub>2</sub>	J	J <sub>1</sub>	L**	L <sub>1</sub>	L <sub>2</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>6</sub>	N	E	F	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>
MRA 25 MRB 25	36	70	23 ± 0.05	23.5	29.5	24.5	81	45	40	30	14	60 79.4	57	M 8	6.8	7	11	11
MRA 35 MRB 35	48	100	34 ± 0.05	33	40	32	109	62	52	40	19	80 103	82	M10	8.5	9	15	15
MRA 45 MRB 45	60	120	45 ± 0.05	37.5	50	40	137.5	80	60	52.5	25	104 135	100	M12	10.5	14	20	18
MRA 55 MRB 55	70	140	53 ± 0.05	43.5	57	48	163.5	95	70	60	29	120 162	116	M14	12.5	16	24	20
MRB 65	90	170	63 ± 0.05	53.5	76	58	205.5	110	82	75	36.5	201	142	M16	14.5	18	26	23

\* Lower tolerances on request

\*\* When using additional wipers, metal wipers and lubrication plates, the total length L is increasing.



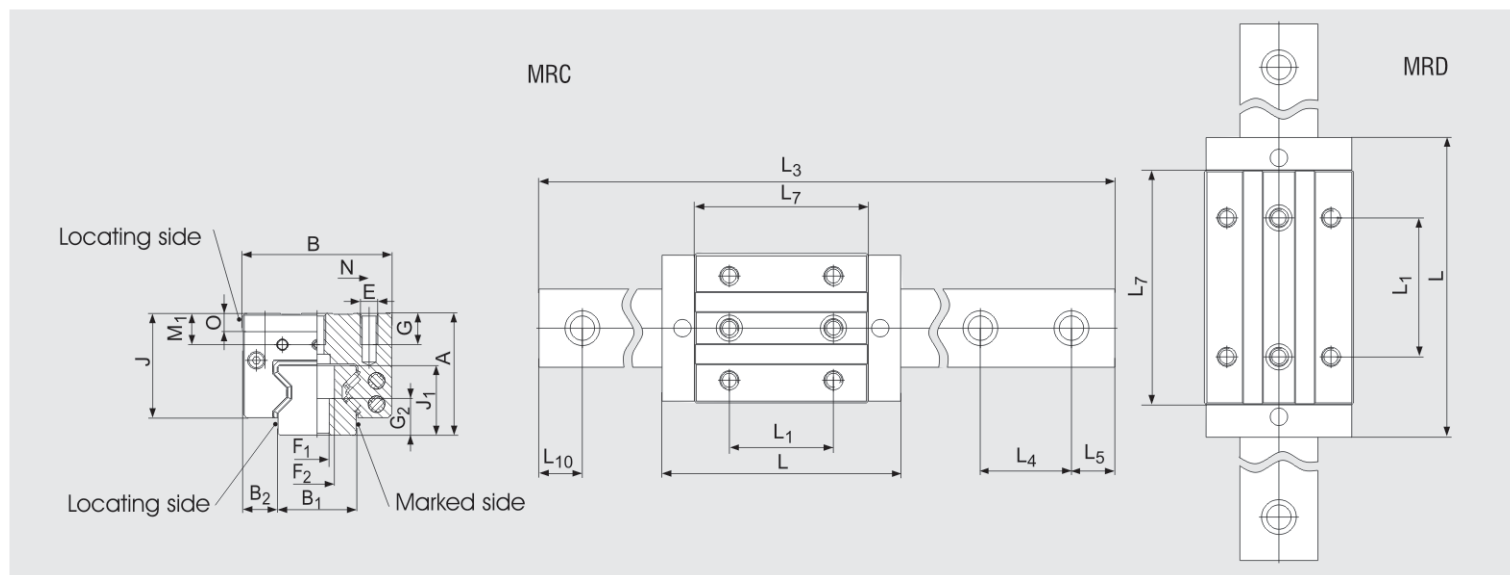
Roller Ø	G	G <sub>2</sub>	M <sub>1</sub>	O	P	
3.2	9	6.5	13	5.5	7.5	17.5
4.5	12	10	15	7	8	23
5	15	11	21	8	10	30.5
6	18	13.5	26	9	12	34.5
7	23	19	32	13	15	51

Loading capacities		Moments				Weights	
C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	Carriage (kg)	Rail (kg/m)
49 800	27 700	733	476	408	265	0.7	
70 300	39 100	1 035	936	576	521	0.9	3.4
93 400	52 000	2 008	1 189	1 118	662	1.6	
128 500	71 500	2 762	2 214	1 537	1 232	2.2	6.5
167 500	93 400	4 621	2 790	2 577	1 556	3.2	
229 500	127 800	6 333	5 161	3 527	2 874	4.3	10.7
237 000	131 900	7 771	4 738	4 325	2 637	5.0	
324 000	180 500	10 624	8 745	5 919	4 872	6.8	15.2
530 000	295 000	20 912	17 930	11 640	9 980	13.5	22.5

C<sub>0</sub> = Static loading capacity  
 C = Dynamic loading capacity (100 km)  
 M<sub>0</sub> = Static moment capacity  
 M = Dynamic moment capacity (100 km)

### 3.2 Tabela de Medidas e Capacidades MRC e MRD

Dimension tables, loading capacities MONORAIL MR  
Carriage types MRC and MRD

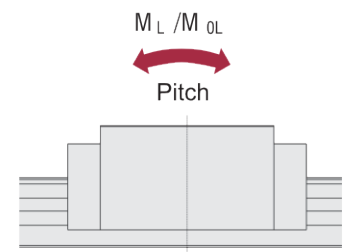
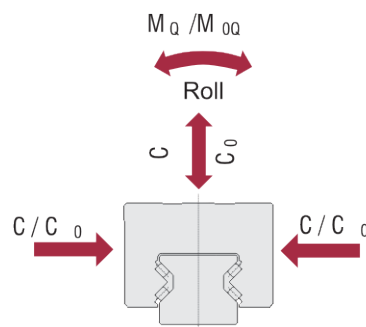
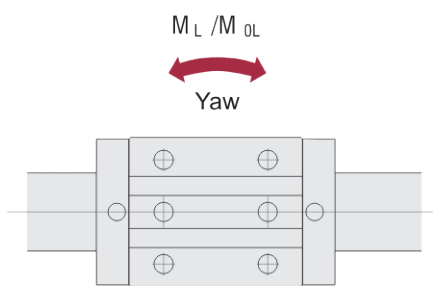
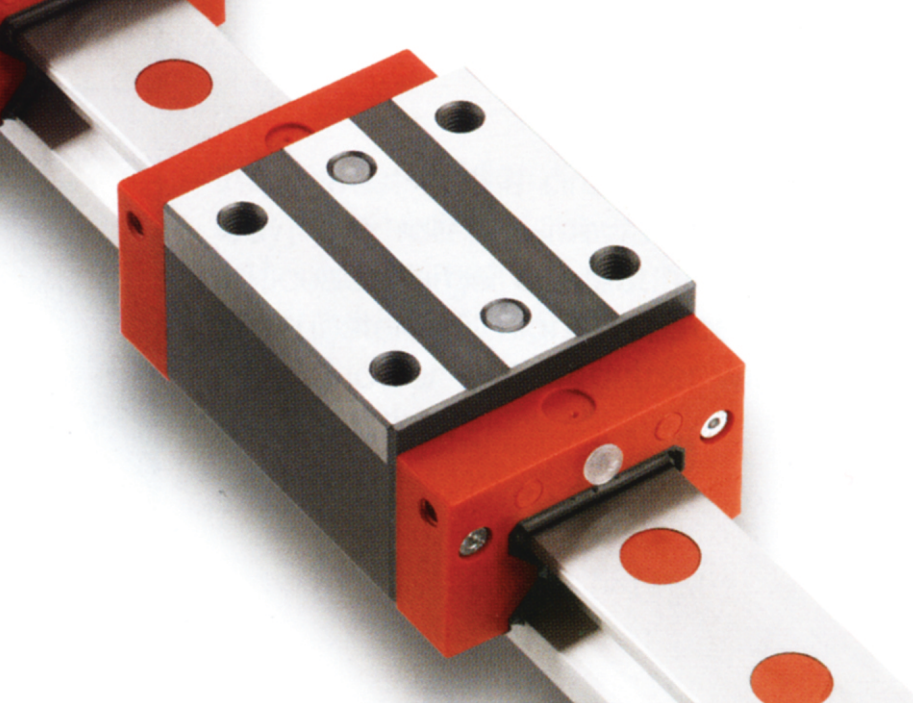


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Type	Dimensions (mm)														
	A	B	B <sub>1</sub> * ± 0.05	B <sub>2</sub>	J	J <sub>1</sub>	L**	L <sub>1</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>7</sub>	N	E	F <sub>1</sub>	F <sub>2</sub>
MRC 25	40	48	23	12.5	33.5	24.5	81	35	30	14	57	35	M 6	7	11
MRD 25							103.4	50	40	19	79.4				
MRC 35	55	70	34	18	47	32	109	50	40	19	76	50	M8	9	15
MRD 35							136	72			103				
MRC 45	70	86	45	20.5	60	40	137.5	60	52.5	25	100	60	M10	14	20
MRD 45							172.5	80			135				
MRC 55	80	100	53	23.5	67	48	163.5	75	60	29	120	75	M12	16	24
MRD 55							205.5	95			162				
MRD 65	90	126	63	31.5	76	58	251	120	75	36.5	201	76	M16	18	26

\*Lower tolerances on request

\*\*When using additional wipers, metal wipers and lubrication plates, the total length L is increasing.



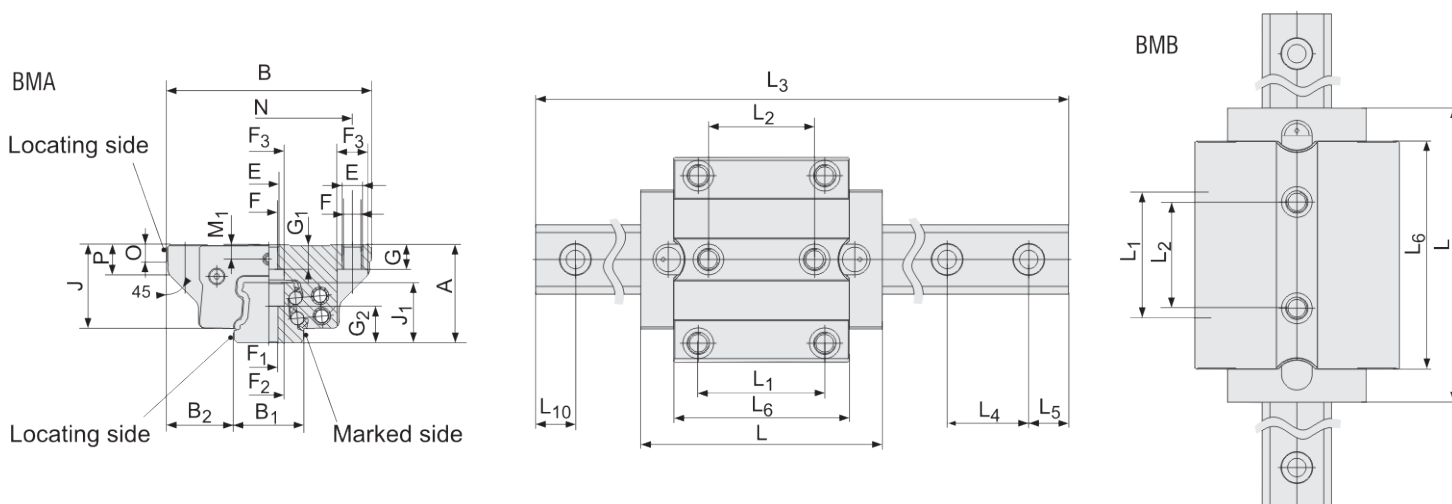
Roller $\varnothing$	G	G <sub>2</sub>	M <sub>1</sub>	O
3.2	9	13	9.5	7.5
4.5	12	15	14	8
5	18	21	18	10
6	19	26	19	12
7	20	32	13	15

Loading capacities		Moments				Weights	
C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	Carriage (kg)	Rail (kg/m)
49 800	27 700	733	476	408	265	0.6	3.4
70 300	39 100	1 035	936	576	521	0.7	6.5
93 400	52 000	2 008	1 189	1 118	662	1.5	10.7
128 500	71 500	2 762	2 214	1 537	1 232	2.0	15.2
167 500	93 400	4 621	2 790	2 577	1 556	3.0	22.5
229 500	127 800	6 333	5 161	3 527	2 874	4.0	
237 000	131 900	7 771	4 738	4 325	2 637	4.5	
324 000	180 500	10 624	8 745	5 919	4 872	6.1	
530 000	295 000	20 912	17 930	11 640	9 980	10.4	

C<sub>0</sub> = Static loading capacity  
 C = Dynamic loading capacity (100 km)  
 M<sub>0</sub> = Static moment capacity  
 M = Dynamic moment capacity (100 km)

## 4. Guias de Esferas BM

### Product features



### 4.1 Tabelas de Medidas e Capacidades - Tipo BMA e BMB

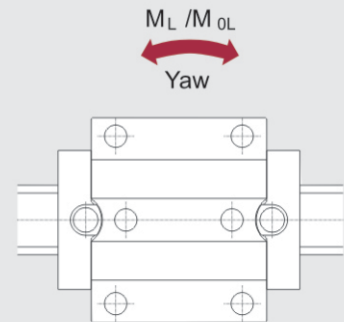
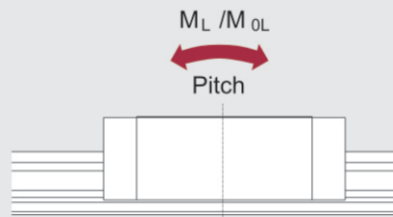
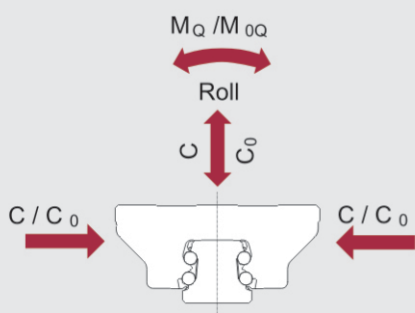
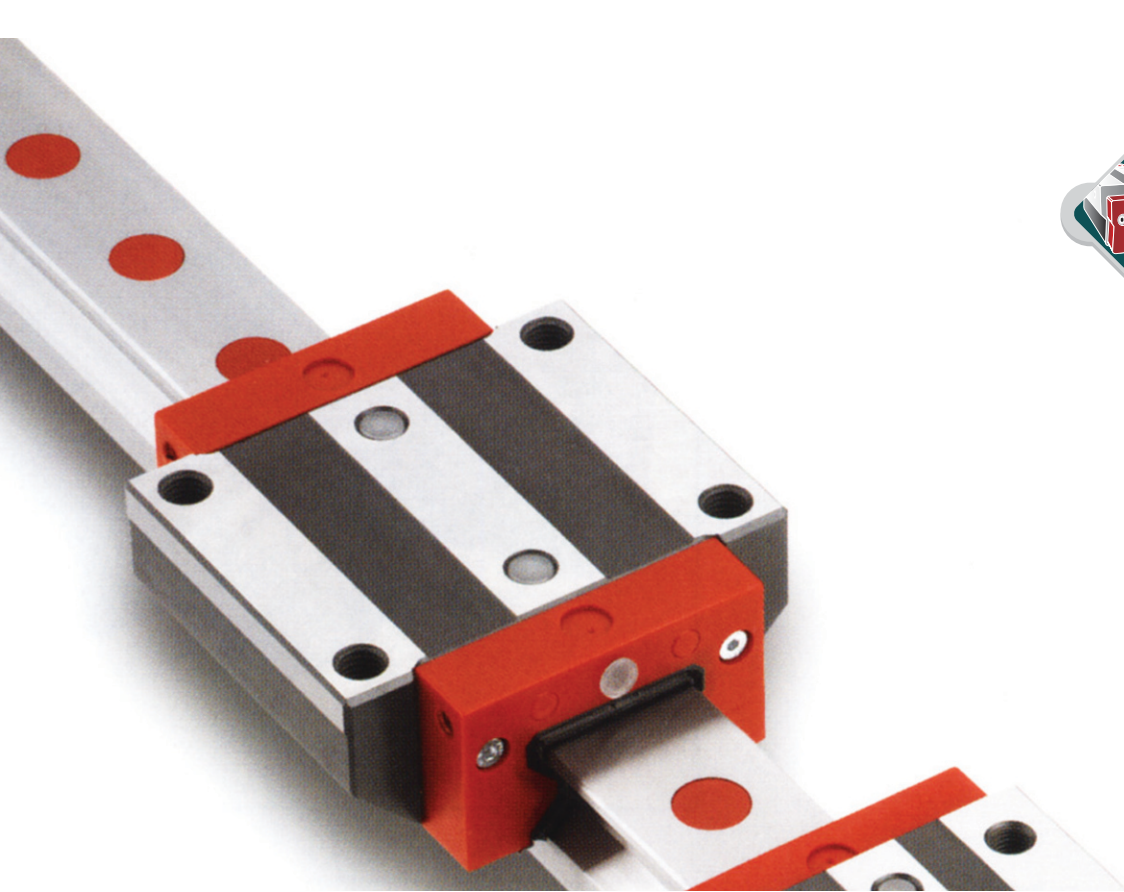
Dimension table, loading capacities MONORAIL BM  
Carriage types BMA and BMB

Drawing in all common file formats are available on [www.schneeberger.com](http://www.schneeberger.com) under Services.

Type	Dimensions (mm)																	
	A	B	B <sub>1</sub> *	B <sub>2</sub>	J	J <sub>1</sub>	L**	L <sub>1</sub>	L <sub>2</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>6</sub>	N	E	F	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>
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	M 10	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	M 10	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	M 12	10.5	14	20	18
BMB 45							176.5					138.5						

\*Lower tolerances on request

\*\*When using additional wipers, metal wipers and lubrication plates, the total length L is increasing.



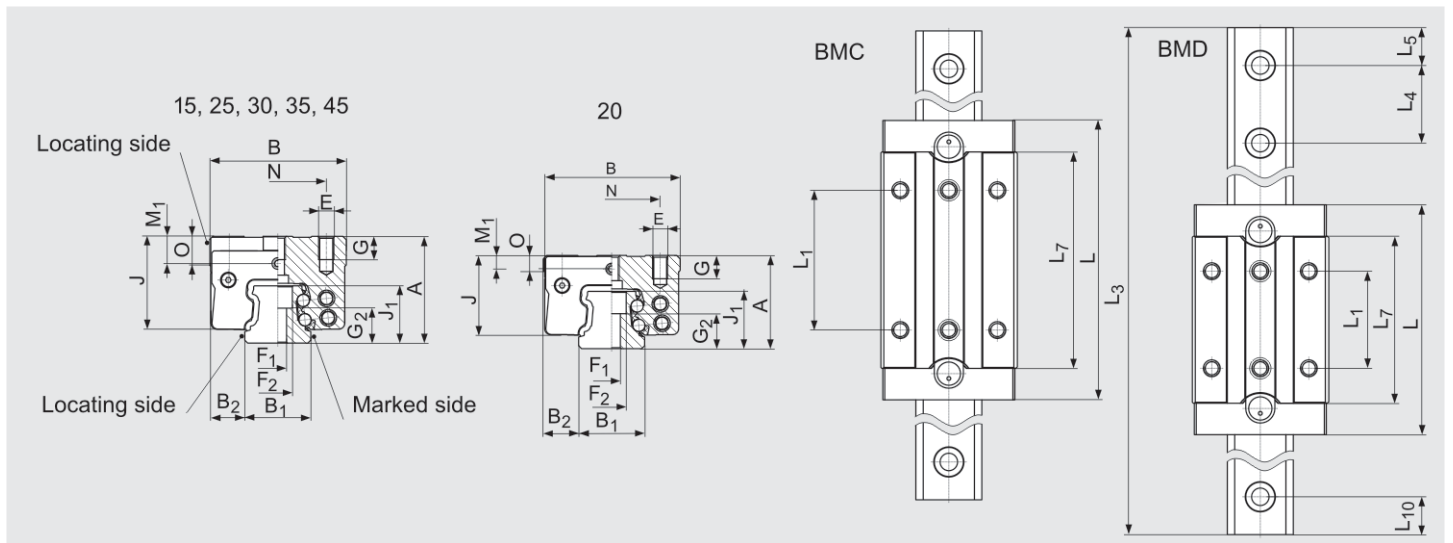
Ball ∅	G	G <sub>1</sub>	G <sub>2</sub>	M <sub>1</sub>	O	P
3.2	7	4.5	9.5	4	7	7
4.0	8	6.5	11.5	5.2	8	8
4.8	9	8	14	5.5	7	11
5.6	12	10	14.5	7	8	12
6.4	12	12	18	7	8	14
7.9	15	15	22	8	10	17.5

Loading capacities		Moments				Weight	
C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	Carriage (kg)	Rail (kg/m)
19 600	9 000	181	146	83	67	0.2	1.4
31 400	14 400	373	292	171	134	0.5	2.2
41 100	17 400	490	495	206	208	0.6	2.2
46 100	21 100	631	513	289	235	0.7	3.0
60 300	25 500	825	863	349	365	0.9	3.0
63 700	29 200	1 084	829	497	380	1.2	4.3
83 300	35 300	1 414	1 390	599	589	1.5	4.3
84 400	38 700	1 566	1 252	718	574	1.8	5.4
110 300	46 700	2 048	2 104	867	891	2.3	5.4
134 800	61 900	3 193	2 498	1 466	1 147	3.3	8.8
176 300	74 700	4 175	4 199	1 769	1 779	4.2	8.8

C<sub>0</sub> = Static loading capacity  
 C = Dynamic loading capacity (100 km)  
 M<sub>0</sub> = Static moment capacity  
 M = Dynamic moment capacity (100 km)

## 4.2 Tabelas de Medidas e Capacidades - Tipo BMC e BMD

Dimension table, loading capacities MONORAIL BM  
Carriage types BMC and BMD



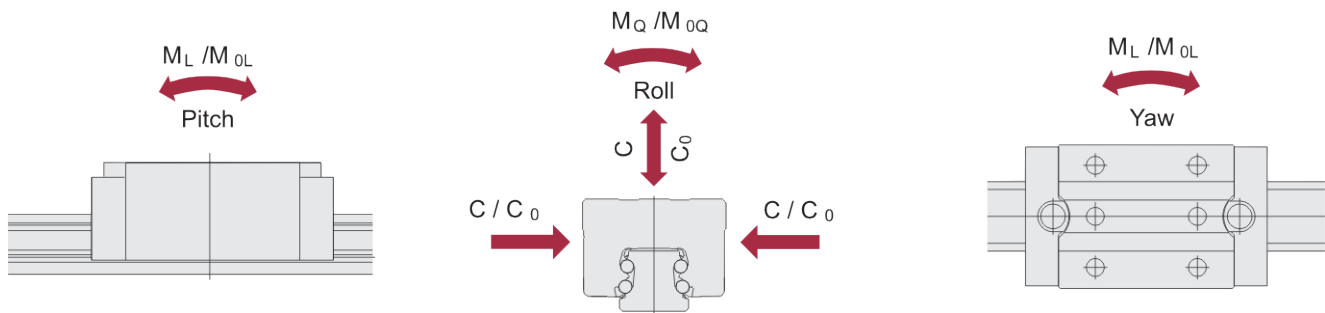
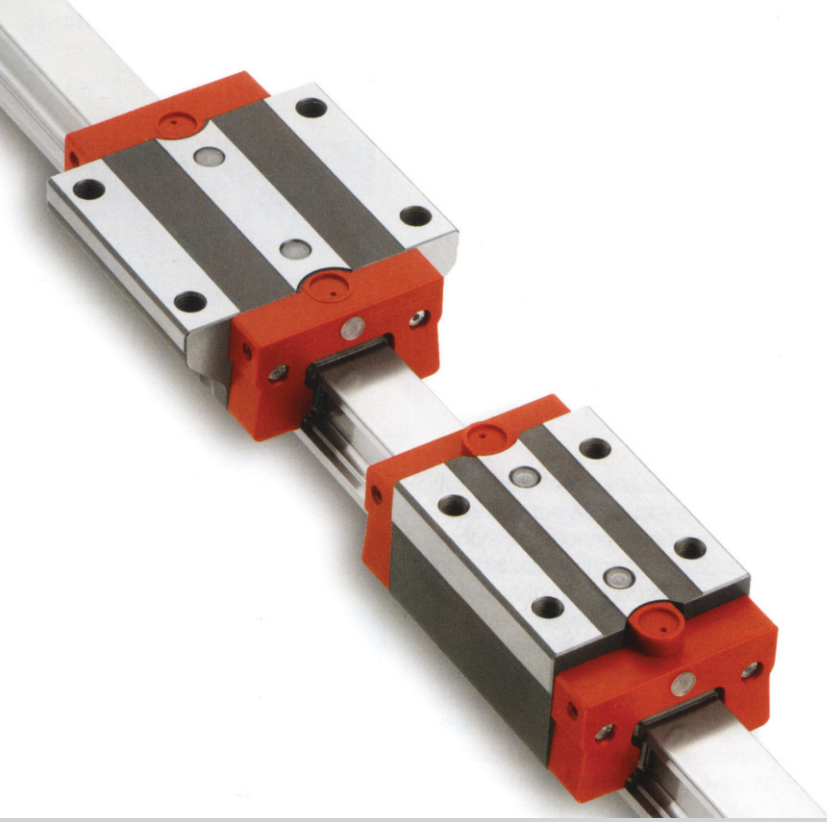
Drawings in all common file formats are available on [www.schneeberger.com](http://www.schneeberger.com) under Services.

Type	Dimensions (mm)													
	A	B +0.4	B <sub>1</sub> * ± 0.05	B <sub>2</sub>	J	J <sub>1</sub>	L**	L <sub>1</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>7</sub>	N	E	F <sub>1</sub>
BMC 15	28	34	15	9.5	24.2	15.7	59.8	26	60	29	42.8	26	M 4	4.5
BMC 20	30	44	20	12	25.5	19	75.5	36	60	29	53.5	32	M 5	5.8
BMD 20							91.5	50			69.5			
BMC 25	40	48	23	12.5	34.5	22.7	89.3	35	60	29	64.3	35	M 6	7
BMD 25							108.3	50			83.3			
BMC 30	45	60	28	16	38.9	26	103	40	80	39	75	40	M 8	9
BMD 30							125	60			97			
BMC 35	55	70	34	18	48	29.5	118	50	80	39	86	50	M 8	9
BMD 35							143.5	72			111.5			
BMC 45	70	86	45	20.5	60.8	37	145	60	105	51.5	107	60	M 10	14
BMD 45							176.5	80			138.5			

\* Lower tolerances on request

\*\* When using additional wipers, metal wipers and lubrication plates, the total length L is increasing.





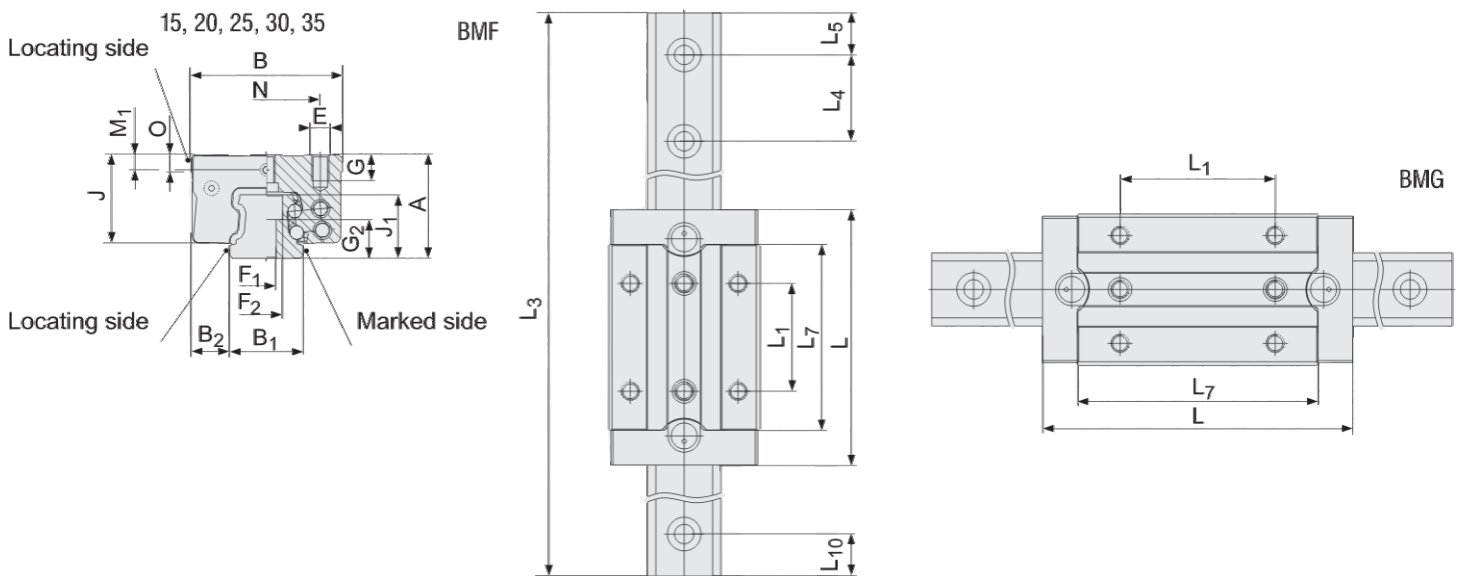
F <sub>2</sub>	Ball ∅	G	G <sub>2</sub>	M <sub>1</sub>	O
8	3.2	6	9.5	8	6
10	4.0	7	11.5	5.2	6
11	4.8	9	14	9.5	11
15	5.6	11	14.5	10	11
15	6.4	12	18	14	15
20	7.9	18	22	18	19

Loading capacities		Moments				Weight	
C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	Carriage (kg)	Rail (kg/m)
19 600	9 000	181	146	83	67	0.3	1.4
31 400	14 400	373	292	171	134	0.4	2.2
41 100	17 400	490	495	206	208	0.5	2.2
46 100	21 100	631	513	289	235	0.6	3.0
60 300	25 500	825	863	349	365	0.8	3.0
63 700	29 200	1 084	829	497	380	1.0	4.3
83 300	35 300	1 414	1 390	599	589	1.3	4.3
84 400	38 700	1 566	1 252	718	574	1.7	5.4
110 300	46 700	2 048	2 104	867	891	2.2	5.4
134 800	61 900	3 193	2 498	1 466	1 147	3.3	8.8
176 300	74 700	4 175	4 199	1 769	1 779	4.3	8.8

C<sub>0</sub> = Static loading capacity  
 C = Dynamic loading capacity (100 km)  
 M<sub>0</sub> = Static moment capacity  
 M = Dynamic moment capacity (100 km)

### 4.3 Tabelas de Medidas e Capacidades - BMF e BMG

Dimension table, loading capacities MONORAIL BM  
Carriage type BMF and BMG

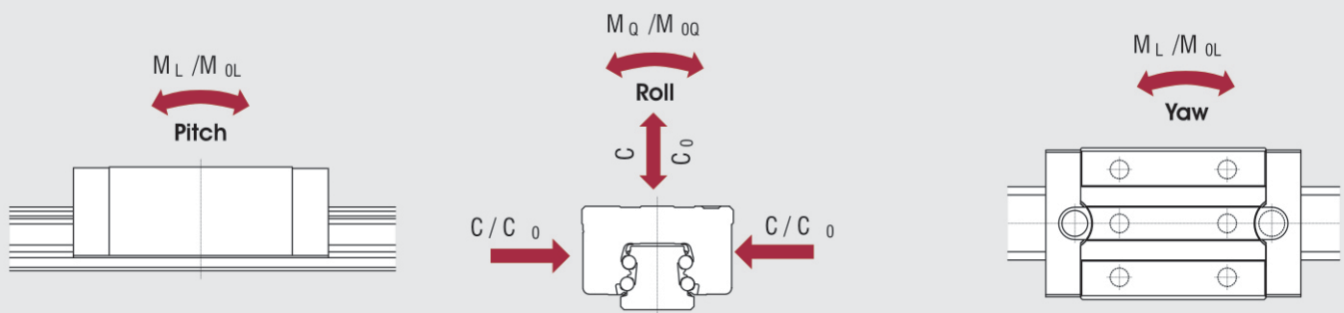
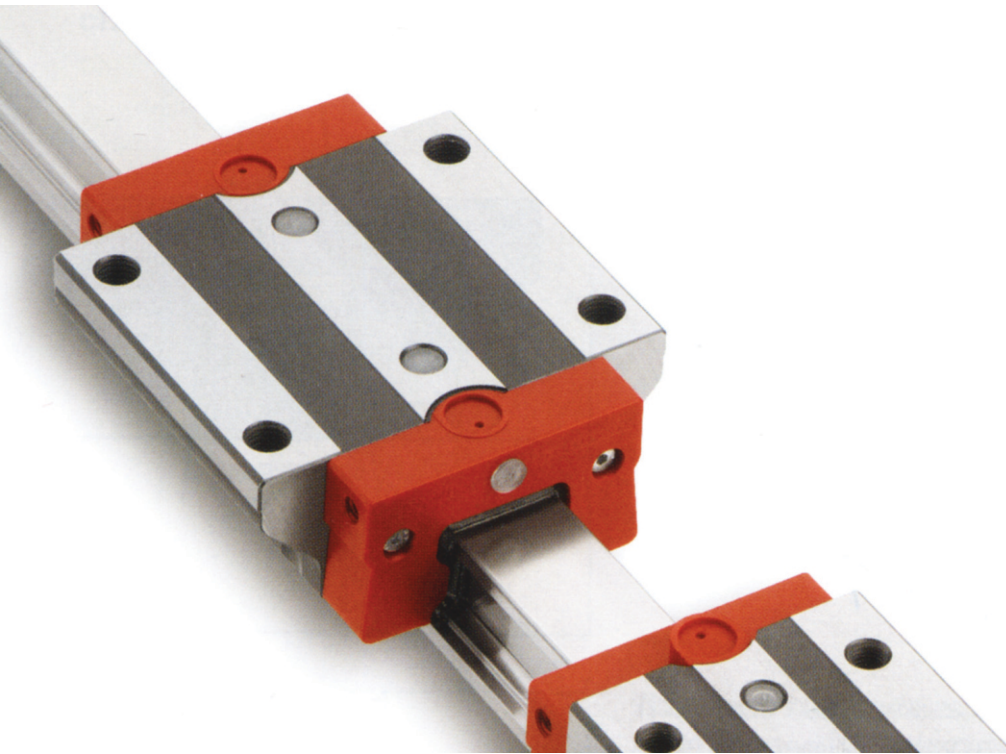


Drawing in all common file formats are available on [www.schneeberger.com](http://www.schneeberger.com) under Services.

Type	Dimension (mm)													
	A	B +0.4 0	B <sub>1</sub> * ± 0.05	B <sub>2</sub>	J	J <sub>1</sub>	L**	L <sub>1</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>7</sub>	N	E	F <sub>1</sub>
BMF 15	24	34	15	9.5	20.2	15.7	59.8	26	60	29	42.8	26	M 4	4.5
BMF 20	BMF 20 correspond to BMC 20.													
BMG 20	BMF 20 correspond to BMC 20.													
BMF 25	36	48	23	12.5	30.5	22.7	89.3	35	60	29	64.3	35	M 6	7
BMG 25	108.3													
BMF 30	42	60	28	16	35.9	26	103	40	80	39	75	40	M 8	9
BMG 30	125													
BMF 35	48	70	34	18	41	29.5	118	50	80	39	86	50	M 8	9
BMG 35	143.5													
								72			111.5			

\* Lower tolerances on request

\*\* When using additional wipers, metal wipers and lubrication plates, the total length L is increasing.



F <sub>2</sub>	Ball				
	∅	G	G <sub>2</sub>	M <sub>1</sub>	O
8	3.2	5	9.5	4	5.5
11	4.8	9	14	5.5	7.5
15	5.6	11	14.5	7	8
15	6.4	12	18	7	8

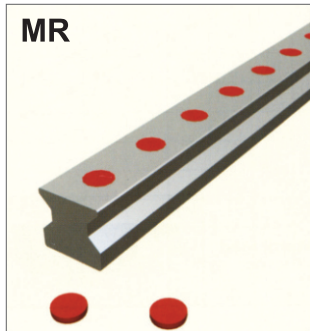
Loading capacities		Moments				Weight	
C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	Carriage (kg)	Rail (kg/m)
19 600	9 000	181	146	83	67	0.2	1.4
46 100	21 100	631	513	289	235	0.6	3.0
60 300	25 500	825	863	349	365	0.7	3.0
63 700	29 200	1 084	829	497	380	0.9	4.3
83 300	35 300	1 414	1 390	599	589	1.2	4.3
84 400	38 700	1 566	1 252	718	574	1.4	5.4
110 300	46 700	2 048	2 104	867	891	1.8	5.4

C<sub>0</sub> = Static loading capacity  
 C = Dynamic loading capacity (100 km)  
 M<sub>0</sub> = Static moment capacity  
 M = Dynamic moment capacity (100 km)

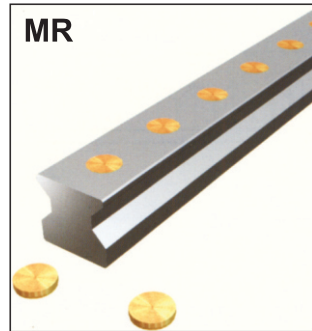
## 5. Acessórios para Guias Lineares MR e BM

Accessories to be ordered separately

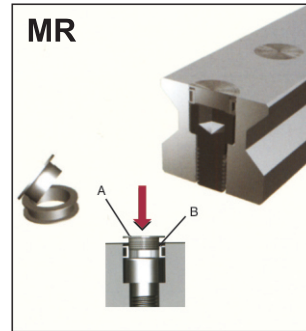
Plastic plug MRK



Brass plug MRS



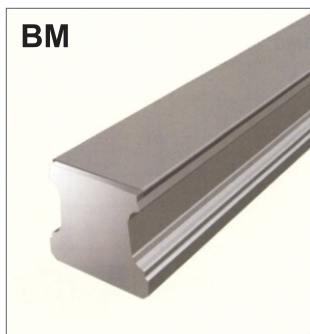
Two-piece steel plug MRZ



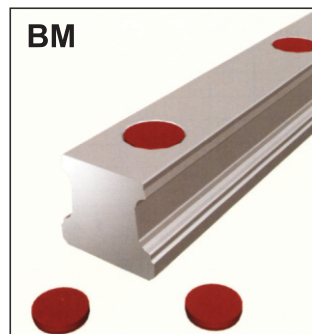
Rail cover strip MAC



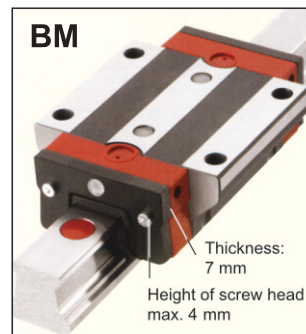
Rail cover strip BAB



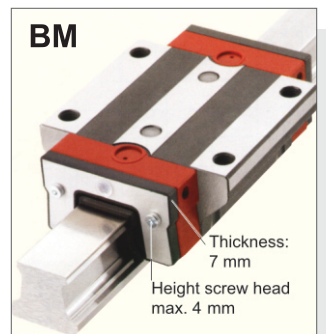
Plastic plugs BRK



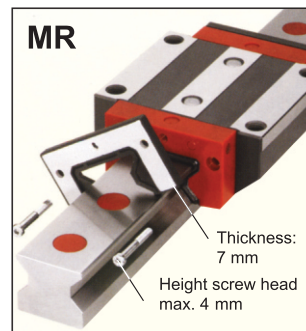
Additional wipers ZBN-U / ZBV-U



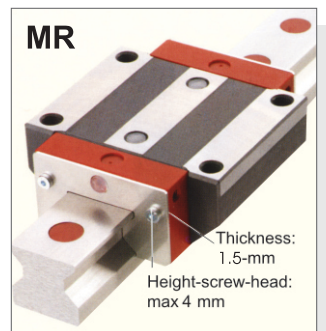
Additional wipers ZBN / ZBV



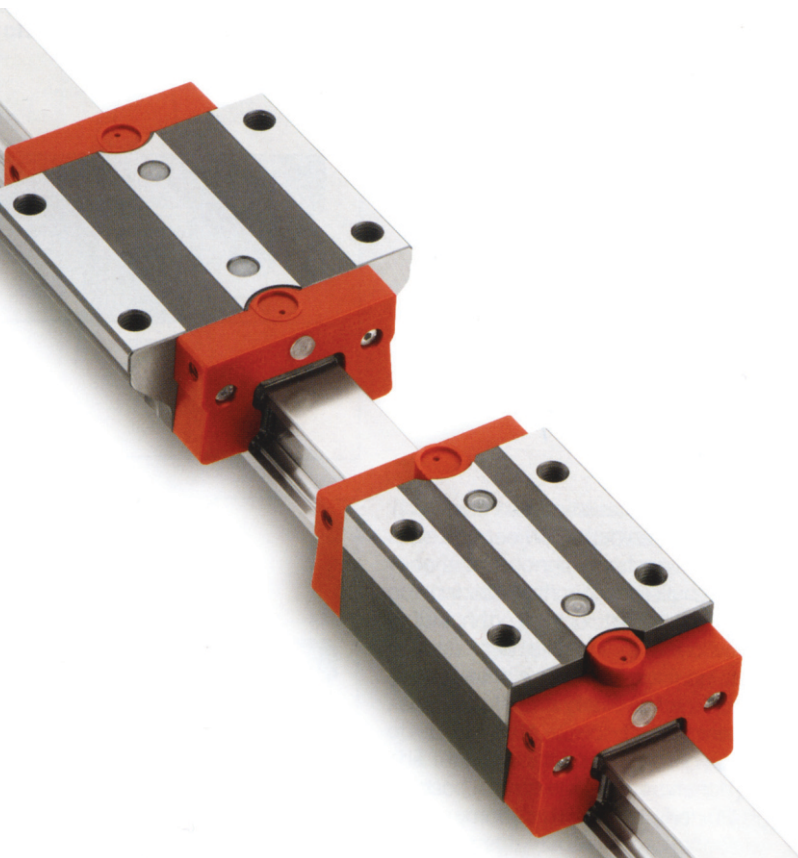
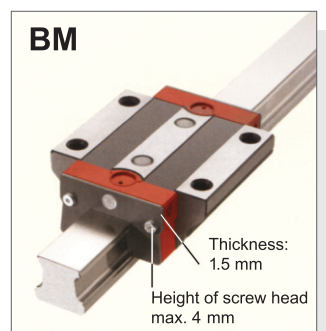
Additional-wipers-ZCN / ZCV

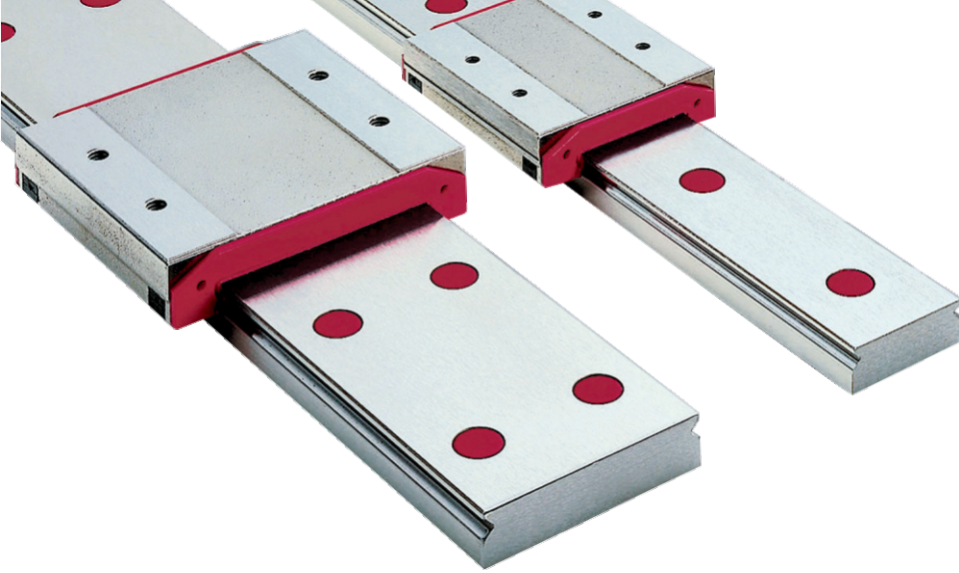


Metal-wiper-ASM



Metal-wiper-ABM





## 6. Miniguias

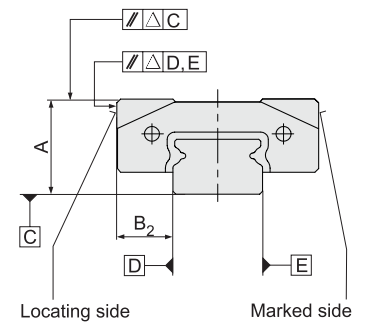
### 6.1 Classes de Precisão

#### Accuracy classes

The MINIRAIL guideways are available in two accuracy classes.

Accuracy class	Tolerances	
	<sup>1</sup> A and B <sub>2</sub>	<sup>2</sup> Δ A and B <sub>2</sub>
<b>G1</b>	±10 μm	7 μm
<b>G3</b>	±20 μm	15 μm

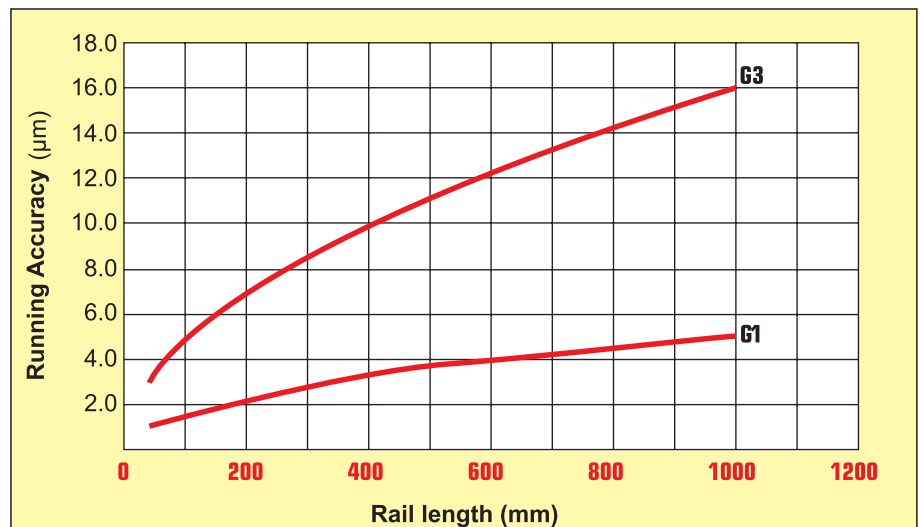
<sup>1</sup> Measuring referring to the center of the carriage  
<sup>2</sup> Dimension differences between two or more carriages measured at the middle of each carriage (mean value of both supports) and at the same rail tion



#### Running accuracy

Preloading increases the rigidity of the guideway but also affects operation life and increases translation resistance. The MINIRAIL system is available in two preload classes to address specific application requirements. The rail up to determines the preload classes.

#### Precisão de deslocamento do carro sobre o trilho



### 6.2 Classes de Pré-carga

Preload classes V0, V1

Preload class	Preload	Accuracy class
<b>V0</b>	near clearance to 0.01 · C	G3
<b>V1</b>	0 to 0.03 · C	G1, G3

C = Dynamic loading capacity (see chapter 3.1 and 3.2)

### 6.3 Comprimentos Standard dos Trilhos

Rail information  
Rail lengths

#### Custom rail lengths

Other rail lengths are available up to the maximum rail lengths above and are calculated

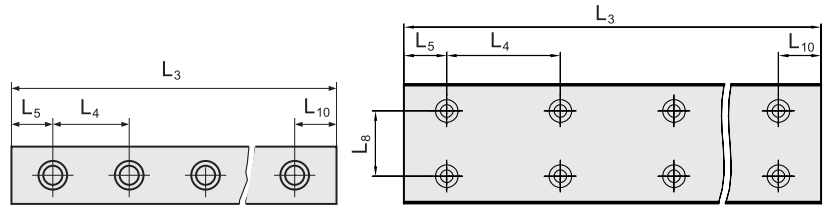
according to the following formula:

$$L_3 = (n - 1) L_4 + L_5 + L_{10}$$

$$n = 3, 4, 5 \dots$$

(n = number of attaching holes)

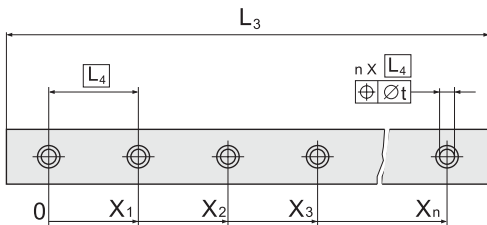
The following minimum and maximum values should be maintained for the starting holes) pitch  $L_5$  and the end hole pitch  $L_{10}$ .



Standard rail lengths $L_3$ (length in mm)					
Size	$L_4$	$L_5, L_{10}$	$L_8$	$L_3$	Max $L_3$
7	15	5	—	40, 55, 70, 85, ..., 355	355
9	20	7,5	—	55, 75, 95, 115, ..., 695	695
12	25	10	—	70, 95, 120, 145, ..., 945	945
15	40	15	—	70, 110, 150, 190, ..., 950	950
14	30	10	—	80, 110, 140, 170, ..., 380	380
18	30	10	—	80, 110, 140, 170, ..., 980	980
24	40	15	—	110, 150, 190, 230, ..., 950	950
42	40	15	23	110, 150, 190, 230, ..., 950	950

### 6.4 Tolerâncias dos Trilhos e dos Furos de Fixação

Tolerances for rail lengths and attaching holes



Minimum and maximum starting and end hole pitch $L_5, L_{10}$ (lengths in mm)								
Size	7	9	12	15	14	18	24	42
$L_5, L_{10}$ minimum	4	5	5	5	5	5	6	6
$L_5, L_{10}$ maximum	11	15	20	35	25	25	34	34

The position tolerance of the attaching holes and the length tolerance is:

Rail	$L_3, X_n = 300$ mm	$L_3, X_n > 300$ mm
$t$ (mm)	0.3	$\bullet X_n$
$L_3$	$\pm 0.3$	$\pm 0.001 \bullet L_3$

### 6.5 Lubrificação

Basic lubrication with grease

Basic lubrication with oil

Initial lubrication and re-lubrication until oil escapes.

Re-lubrication:

Initial lubrication and re-lubrication according to table.

Basic lubrication with grease per carriage in $cm^3$							
MNN 7	MNN 9	MNN 12	MNN 15	MNN 14	MNN 18	MNN 24	MNN 42
0.04	0.09	0.15	0.25	0.05	0.11	0.20	0.33

Recommended values:

The basic lubrication is sufficient for 3000 km of travel, based on the following factors:

load ratio  $C/P = 10$

speed = 1 m/s

stroke = 150 mm

## 6.6 Dados Gerais de Aplicação (condições normais)

General data

Permissible speeds  
and accelerations

Permissible operating  
temperatures

General applications under normal operating conditions:

Speeds up to	5 m/s
Accelerations up to	300 m/s <sup>2</sup>

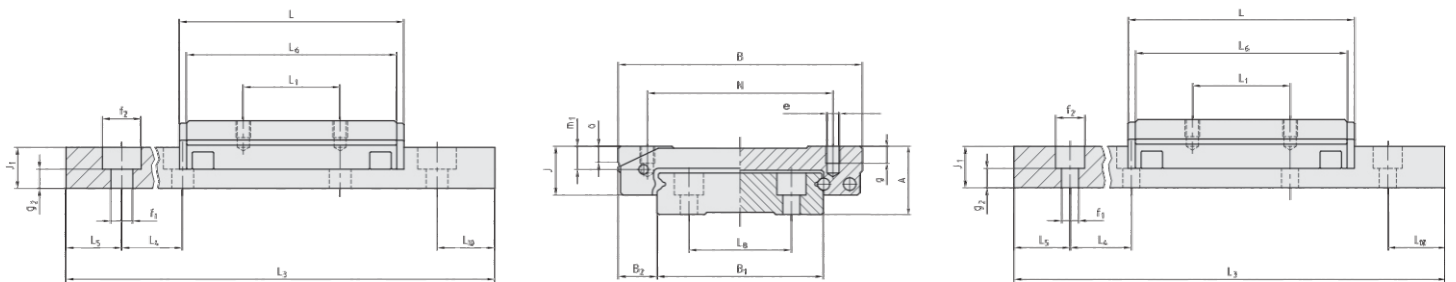
MINIRAIL guideways can be used at operating temperatures  
between -40°C and +80°C.

Short term temperatures up to +120°C are permissible.



## 6.7 Tabelas de Medidas e Capacidades - Tipos MN 14, 18, 24 e 42

Dimension table,  
loading capacities  
Sizes 14, 18, 24, 42



Type	Dimensions(mm)																			
	A	B	B <sub>1</sub>	B <sub>2</sub>	J	J <sub>1</sub>	L	L <sub>1</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>6</sub>	L <sub>8</sub>	N	e	f <sub>1</sub>	f <sub>2</sub>	g	g <sub>2</sub>	m <sub>1</sub>	o
MN 14	9	25	14	5.5	6.8	5.2	32.1	10	30	10	29.6	–	19	M3	3.5	6	2.8	2	3.3	2.2
MN 18	12	30	18	6	8.5	7	40	12	30	10	37	–	21	M3	3.5	6	3	2.5	4.3	3.1
MN 24	14	40	24	8	10	8.5	46.4	15	40	15	43.4	–	28	M3	4.5	8	3.5	4	4.75	3.9
MN 42	16	60	42	9	12	9.5	55.7	20	40	15	52.7	23	45	M4	4.5	8	4.5	5	5.5	4.9

Type	Loading capacities		Moments				Weights Carriage Rail	
	C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	(g)	(g/m)
<b>MN 14</b>	2340	1230	16.6	9.3	8.7	4.9	25	518.3
<b>MN 18</b>	3880	2140	35.5	19.4	19.6	10.7	47	914.6
<b>MN 24</b>	5630	3240	68.2	32.9	39.2	18.9	84	1473.0
<b>MN 42</b>	8110	4750	171.2	56.8	100.3	33.3	169	2828.4

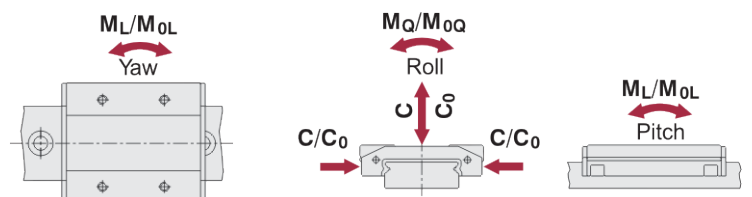
Loading capacities are calculated values, based on DIN 636-2

C<sub>0</sub> = static loading capacity

C = dynamic loading capacity (100 km)

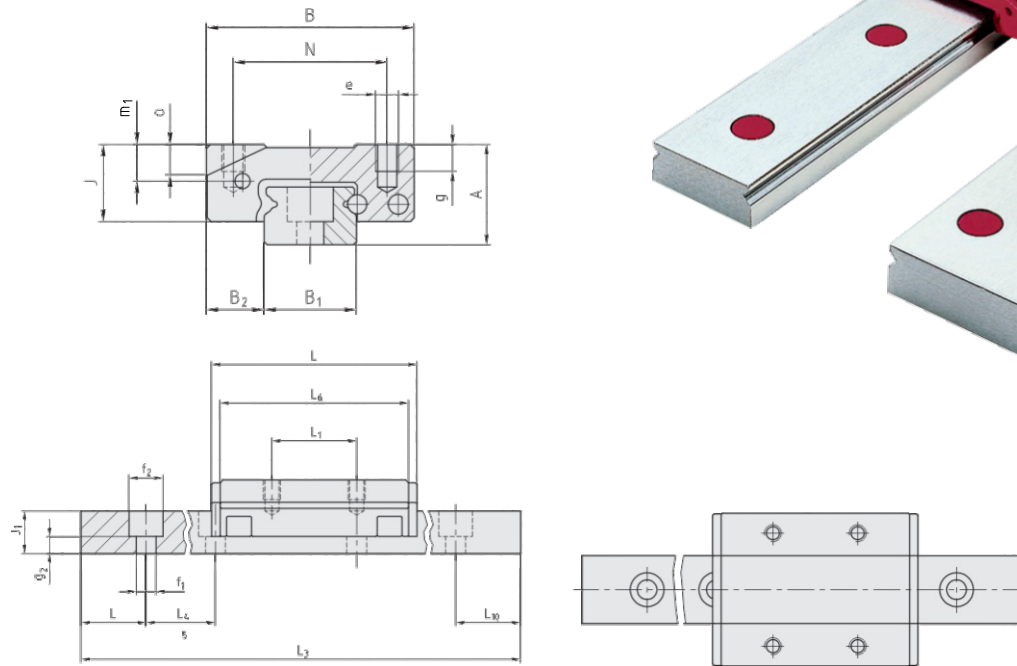
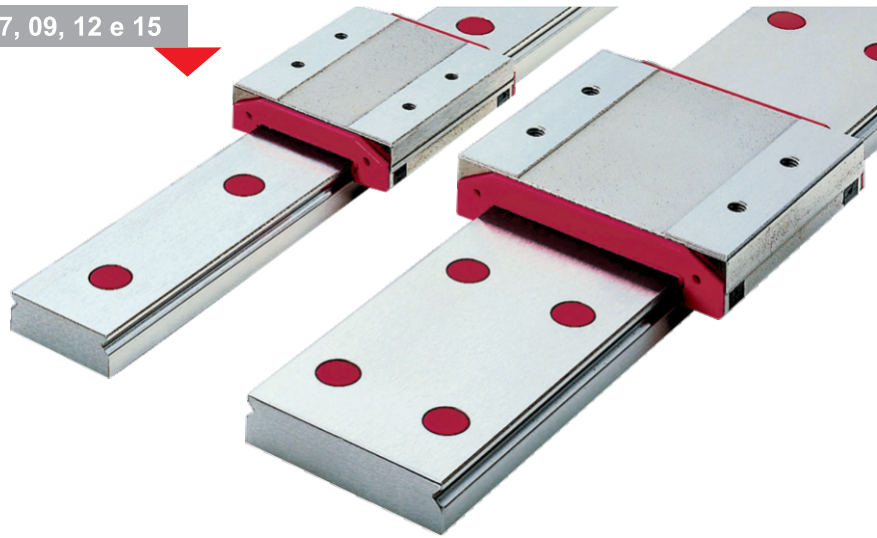
M<sub>0</sub> = static moment

M = dynamic moment (100 km)



## 6.8 Tabela de Modelos e Capacidades Tipos MN 07, 09, 12 e 15

Dimension table, loading capacities  
 Sizes 7, 9, 12, 15



Type	Dimensions(mm)																		
	A	B	B <sub>1</sub>	B <sub>2</sub>	J	J <sub>1</sub>	L	L <sub>1</sub>	L <sub>4</sub>	L <sub>5</sub> / L <sub>10</sub>	L <sub>6</sub>	N	e	f <sub>1</sub>	f <sub>2</sub>	g	g <sub>2</sub>	m <sub>1</sub>	o
MN 7	8	17	7	5	6.5	4.5	24.6	8	15	5	22.1	12	M2	2.4	4.2	2.5	2.2	3.1	2.5
MN 9	10	20	9	5.5	8	5.5	32	10	20	7.5	29	15	M3	3.5	6	3	2	3.8	3.1
MN 12	13	27	12	7.5	10	7.5	36.4	15	25	10	33.4	20	M3	3.5	6	3.5	3	4.75	3.9
MN 15	16	32	15	8.5	12	9.5	43.7	20	40	15	40.7	25	M3	3.5	6	4	5	5.55	4.9

Type	Loading capacities		Moments				Weights Carriage Rail	
	C <sub>0</sub> (N)	C (N)	M <sub>0Q</sub> (Nm)	M <sub>0L</sub> (Nm)	M <sub>Q</sub> (Nm)	M <sub>L</sub> (Nm)	(g)	(g/m)
<b>MN 7</b>	1560	925	5.6	4.3	3.3	2.5	12.8	216.3
<b>MN 9</b>	2770	1690	12.9	10.2	7.9	6.2	23.9	308.8
<b>MN 12</b>	3900	2510	23.8	16.3	15.3	10.4	47.4	597.9
<b>MN 15</b>	5620	3680	42.7	28.1	27.9	18.4	81.4	995.5

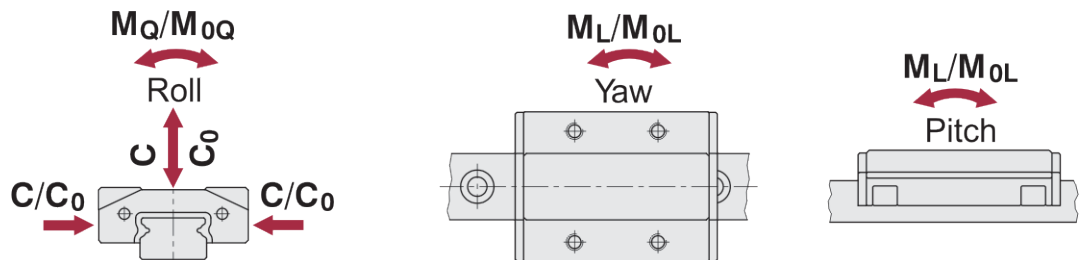
Loading capacities are calculated values, based on DIN 636-2

C<sub>0</sub> = static loading capacity

C = dynamic loading capacity (100 km)

M<sub>0</sub> = static moment

M = dynamic moment (100 km)







Av. Amazonas, 976 - CEP: 90240-542 - Porto Alegre/RS

Fone/Fax: 51 3337.1481 - 3337.2870

[vendas@ibatech.com.br](mailto:vendas@ibatech.com.br)

[www.ibatech.com.br](http://www.ibatech.com.br)