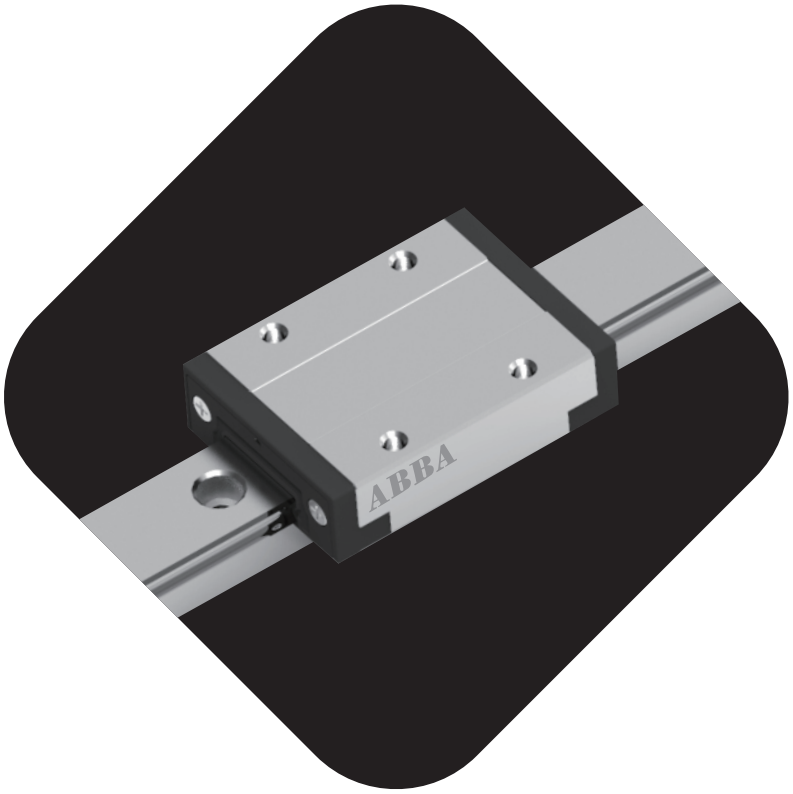
3

Miniature Linear Guide



3.1 Characteristics

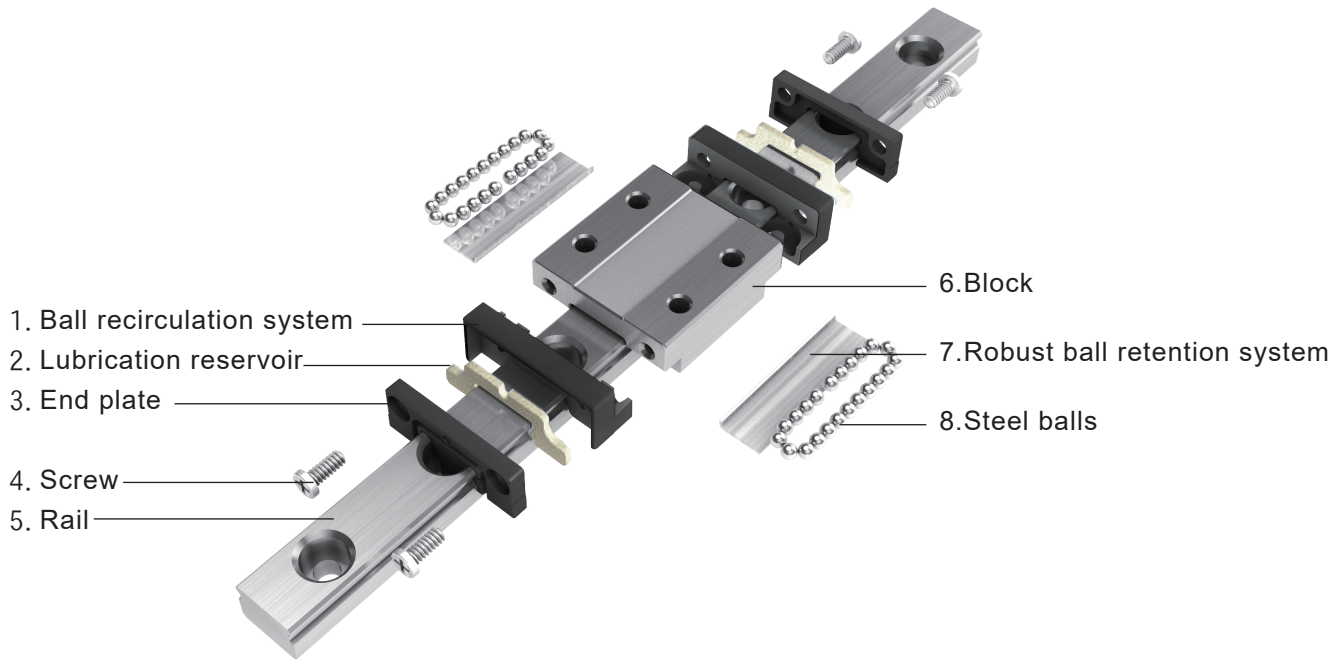
1. New anti-drop design of Robust Ball Retention System
2. Safe and quick mounting
3. Optimized ball recirculation
4. Smooth running for position accuracy
5. All BM blocks are factory pre-lubricated and equipped with a lubrication reservoir which secures the lubrication condition in the complete guiding system.
6. Optimized seal design
7. Reduced friction
8. Stainless steel components
9. Interchangeable according to ISO 12090-2

3.2 Product specification

The allowable use conditions of BM products are as follows :

Item	Allowable use condition
Speed	5 m/s
Acceleration	140 m/s^2
Ambient temperature	-20~ +80°C (With standard front seal) -20~ +100°C (With low friction shield)
Maximum dynamic load	<0.5 C
Maximum static load	<0.5 C_0
Minimum load	>0.001 C

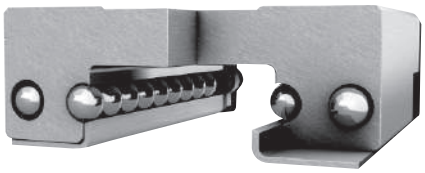
3.3 Construction



3.4 Advantage

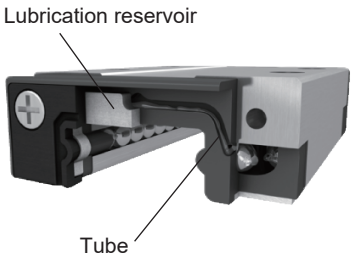
1 New anti-drop design of Robust Ball Retention System

- Safe and quick mounting
- Good accuracy due to anti-drop design
- Smooth running due to new Robust Ball Retention System



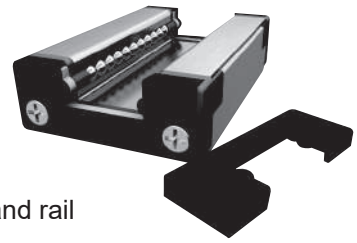
2 Lubrication reservoir

- Service life up to 20,000km
- Factory pre-lubricated with FDA-grade lubricants, lowering maintenance cost



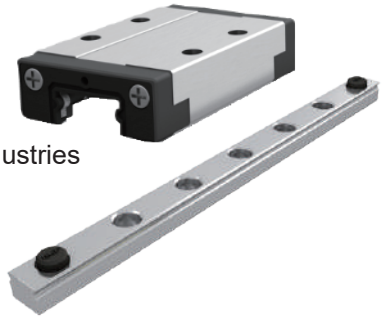
3 Optimized seal design

- Extend seal life due to good abrasion-resistant material
- Excellent dust protection due to minimal clearance between rail and Robust Ball Retention System
- Dustproof function and low friction due to optimized contact of seal and rail



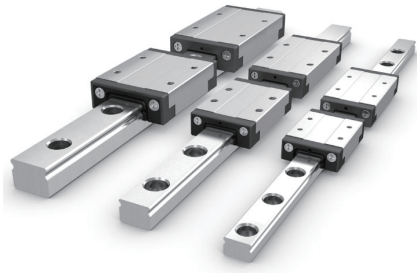
4 Stainless steel components

- Multi-purpose material for corrosion protection
- Suitable for sanitary environment such as the Medical and Food industries

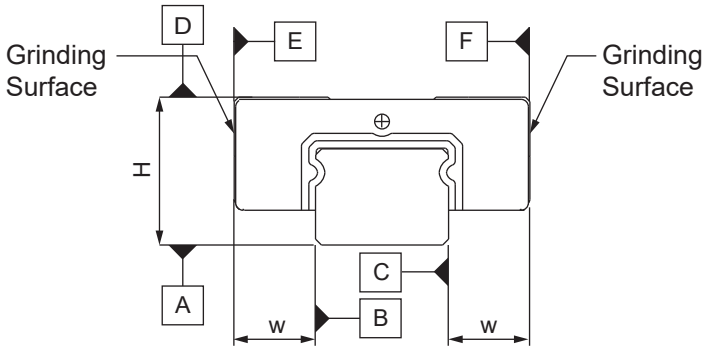


5 Optimized ball recirculation design

- Low noise, suitable for Medical and Office environments
- Smooth runnung, suitable for long-term operation



3.5 Accuracy Standard



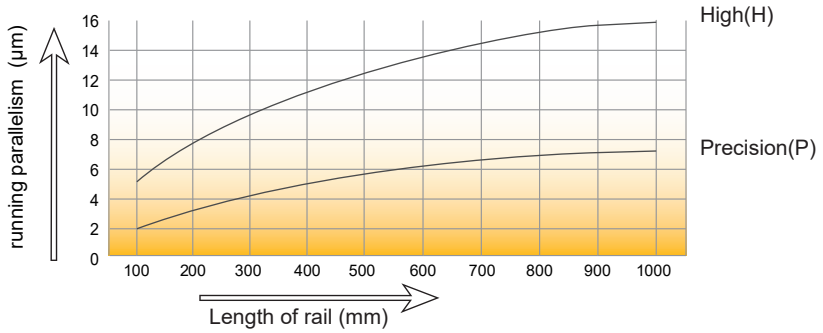


Fig.3.5.1 BM running parallelism

Unit: mm

Item	Grade	
	Precision (P)	High(H)
Tolerance of height (H)*	±0.010	±0.020
Tolerance of width (W)*	±0.015	±0.025
Difference of heights (△H)**	0.007	0.015
Difference of widths (△W)**	0.007	0.015
Running parallelism of Block side D relative to Rail side A	△C Refer to Fig.1	
Running parallelism of Block side E F relative to Rail side B C	△E & △F Refer to Fig.1	

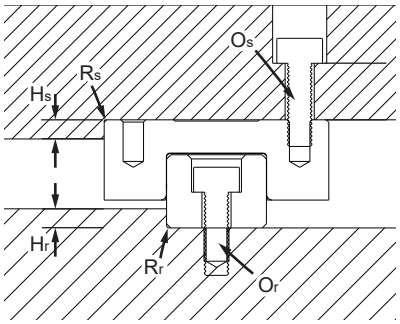
* The tolerances apply over the entire guide length for any combination of block and rail.
**The tolerance △H and △W relate to the ideal centre of the block. Each dimension is derived from the mean value of two measured points with identical centre distance.

3.6 Preload

Item / Class	Code	Preload	Description
No preload	Z0	0	The best running smoothness and minimum friction
Light preload	Z1	0~0.02C	Preloaded and has good running smoothness
Medium preload	Z2	0.02~0.08C	Higher preload and rigidity, but normal running smoothness

3.7 Suggestion in Assembly

3.7.1 Assembly design



Unit : mm

Item	Maximum Fillet of rail (Rr)	Maximum shoulder height (Hr) of rail		Maximum Fillet of block (Rs)	Maximum shoulder height (Hs) of block	Recommended size of rail lock bolt(Or)	Recommended size of block lock bolt (Os)
		Min.	Max.				
BMH 7	0.3	1.1	1.3	0.2	2.2	M2x5	M2
BMH 9	0.3	1.3	1.6	0.2	2.5	M3x8	M3
BMH 12	0.4	2	2.6	0.2	3.5	M3x10	M3
BMH 15	0.4	3	3.6	0.4	4.5	M3x10	M3
BMW 7	0.3	1.1	1.3	0.2	2.2	M3x5	M3
BMW 9	0.3	1.3	1.6	0.2	2.5	M3x8	M3
BMW 12	0.4	2	2.6	0.2	3.5	M3x10	M3
BMW 15	0.4	3	3.6	0.4	4.5	M4x12	M4

3.7.2 Recommended torque for mounting bolts of rail

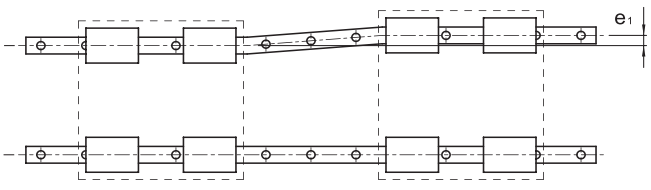
When installing the rail, the locking force of the mounting bolts will affect the overall assembly accuracy. Therefore, the uniformity of the locking force is very important. It is recommended to tighten the mounting bolts with a torque wrench according to the torque values in the table on the right.

Unit : kgf*cm

Nominal bolt model	Bolt torque
M2	3.3
M3	11.2
M4	26.5

3.7.3 Tolerance of mounting surface

Deviation in parallelism (e_1)



Unit : μm

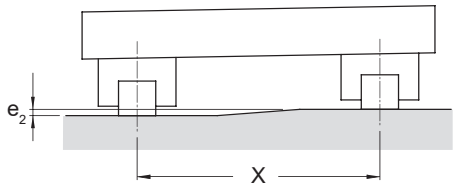
Nominal size	Parallelism error tolerance for 2 axes(e_1)		
	Z2	Z1	Z0
BMH 7	1	2	5
BMH 9	2	3	6
BMH 12	2	4	7
BMH 15	4	7	10
BMW 7	1	2	5
BMW 9	2	3	6
BMW 12	2	4	7
BMW 15	4	7	10

Height deviation in lateral direction(e_2)

Height deviation in lateral direction (e_2) can be calculated as follows:

$$e_2 = \frac{X \times f_{e2}}{500}$$

e_2 : Height deviation in lateral direction (μm)
X : Center distance between two rails (mm)
f_{e2} : Height deviation in lateral direction coefficient



Unit : μm

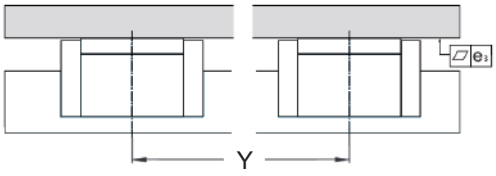
Nominal size	Height deviation in lateral direction coefficient (f_{e2})		
	Z2	Z1	Z0
BMH 7	36	60	120
BMH 9	39	65	130
BMH 12	42	70	140
BMH 15	50	75	150
BMW 7	36	60	120
BMW 9	39	65	130
BMW 12	42	70	140
BMW 15	50	75	150

Flatness in top mounting plane(e_3)

Flatness in top mounting plane (e_3) can be calculated as follows:

$$e_3 = \frac{Y \times f_{e_3}}{500}$$

e_3 : Flatness in top mounting plane (μm)
Y : Center distance between two blocks (mm)
f_{e3} : Flatness in top mounting plane deviation coefficient



Unit : μm

Nominal size	Flatness in top mounting plane deviation coefficient (f_{e3})
BMH 7	25
BMH 9	27
BMH 12	29
BMH 15	35
BMW 7	25
BMW 9	27
BMW 12	29
BMW 15	35

3.8 Running resistance

The maximum running resistance value of the series is based on the validation result with no load and lubricant viscosity grade 460 under room temperature.. The detailed data is shown in the table on the below:

Standard

Nominal size	Block type	Maximum running resistance (g)					
		Standard front seal			Low friction shield		
		Z2	Z1	Z0	Z2	Z1	Z0
BMH 7	U0	300	170	100	270	140	70
	LU	300	170	100	270	140	70
BMH 9	U0	300	170	100	270	140	70
	LU	300	170	100	270	140	70
BMH 12	U0	310	180	110	280	150	80
	LU	310	180	110	280	150	80
BMH 15	U0	310	180	120	280	150	90
	LU	310	180	120	280	150	90

Wide

Nominal size	Block type	Maximum running resistance (g)					
		Standard front seal			Low friction shield		
		Z2	Z1	Z0	Z2	Z1	Z0
BMW 7	U0	350	200	100	320	170	70
	LU	350	200	100	320	170	70
BMW 9	U0	350	200	100	320	170	70
	LU	350	200	100	320	170	70
BMW 12	U0	460	250	110	430	220	80
	LU	460	250	110	430	220	80
BMW 15	U0	460	330	120	430	300	90
	LU	460	330	120	430	300	90

3.9 Lubrication

3.9.1 Factory pre-lubrication

The medical lubricant Klüber PARALIQ P460 is added to the inside of the BM block and the self-lubrication system. This lubricant complies with FDA's safety guidelines sec. 21 CFR 178.3570 regulations, and has passed NSF H1 level certification.

3.9.2 Grease re-lubrication

1. Lubricating oil can be injected into the block through the lubrication holes on both sides of the block by using a syringe, and the block must slide back and forth on the rail several times during lubrication to ensure sufficient lubrication inside the block.

Lubrication hole

2. Lubricition amount :

Standard Unit: mm^3

Nominal size	Amount
BMH 7	50
BMH 9	70
BMH 12	90
BMH 15	150

Wide Unit: mm^3

Nominal size	Amount
BMW 7	60
BMW 9	90
BMW 12	140
BMW 15	200

3. Re-lubrication intervals recommendation
The relubrication interval will vary greatly due to application conditions (such as load, speed, ambient temperature, pollution... etc.). Generally, it is recommended to be at least every 1000km or every year (whichever comes first) must be relubricated.

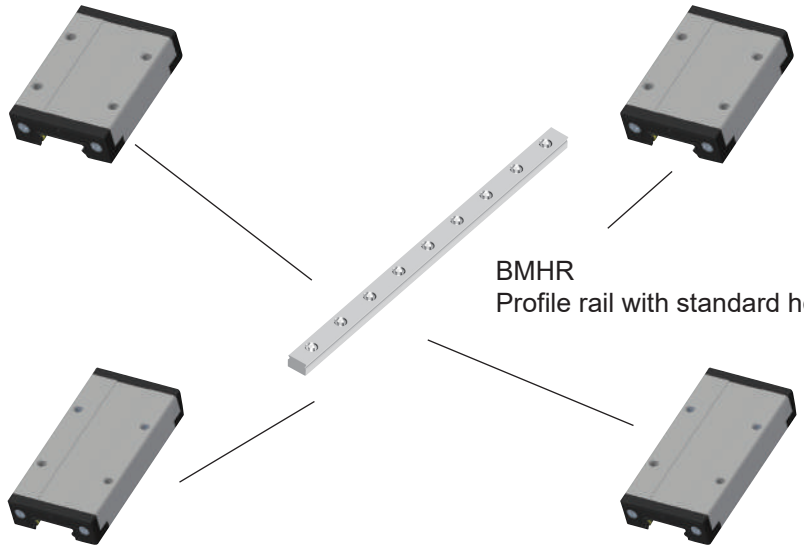
4. Recommended lubricating oil : Klüber PARALIQ P 460

3.10 Product overview

3.10.1 BMHC/BMHR Standard type

BMHC-U0-0
Standard type, Standard length, Low friction shield

BMHC-U0-S
Standard type, Standard length,
Front seal



BMHR
Profile rail with standard holes

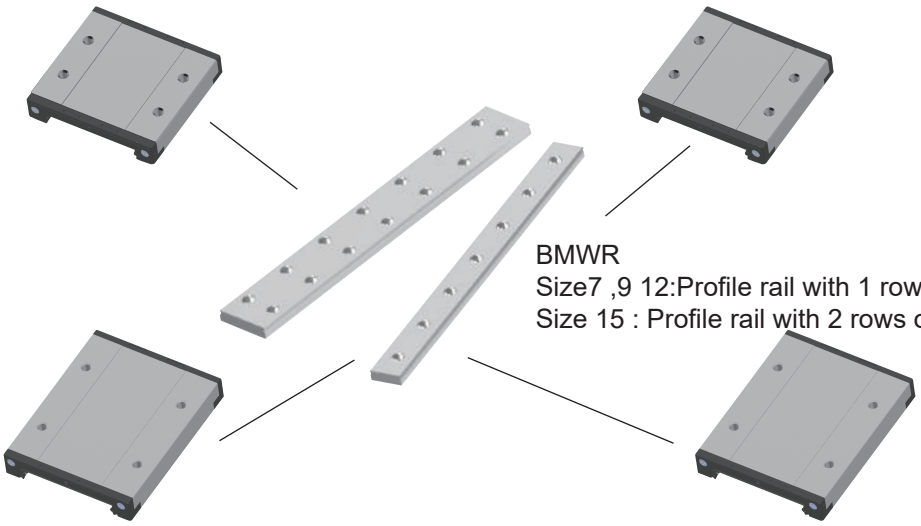
BMHC-LU-0
Standard type, Extended length, Low friction shield

BMHC-LU-S
Standard type, Extended length, Front seal

3.10.2 BMWC/BMWR Wide type

BMWC-U0-0
Wide type, Standard length, Low friction shield

BMWC-U0-S
Wide type, Standard length, Front seal

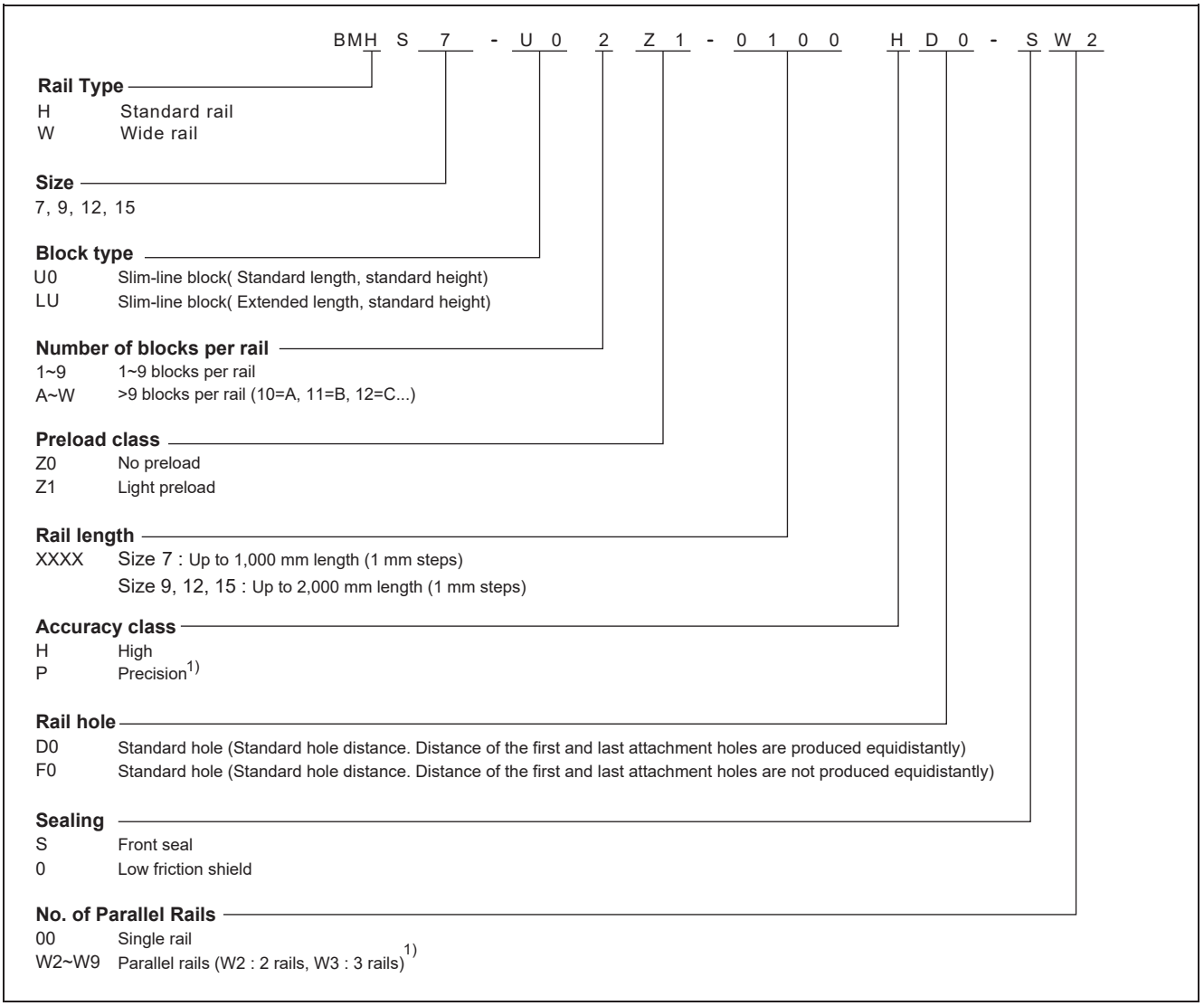


BMWR
Size7 ,9 12:Profile rail with 1 row of standard holes
Size 15 : Profile rail with 2 rows of standard holes

BMWC-LU-0
Wide type, Extended length, Low friction shield

BMWC-LU-S
Wide type, Extended length, Front seal

3.11 Ordering key of System



1) Available as system

3.12 Ordering key of Rail

BMH R 7 - 0 1 0 0 H D 0

Rail Type
H Standard rail
W Wide rail

Size
7, 9, 12, 15

Rail length
XXXX Size 7 : Up to 1,000 mm length (1 mm steps)
Size 9, 12, 15 : Up to 2,000 mm length (1 mm steps)

Accuracy class
H High

Rail hole
D0 Standard hole (Standard hole distance. Distance of the first and last attachment holes are produced equidistantly)
F0 Standard hole (Standard hole distance. Distance of the first and last attachment holes are not produced equidistantly)

3.13 Ordering key of Block

BMH C 7 - U 0 Z 1 - H S

Rail Type
H Standard rail
W Wide rail

Size
7, 9, 12, 15

Block type
U0 Slim-line block(Standard length, standard height)
LU Slim-line block(Extended length, standard height)

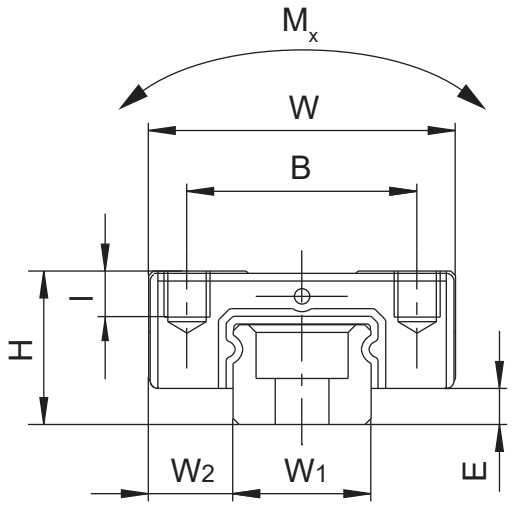
Preload class
Z0 No preload
Z1 Light preload

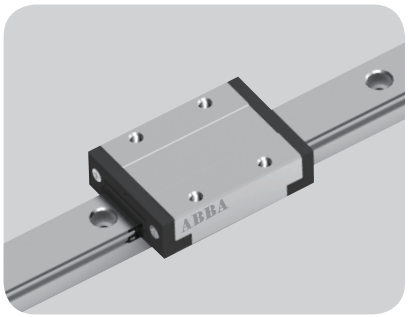
Accuracy class
H High

Sealing
S Front seal
0 Low friction shield

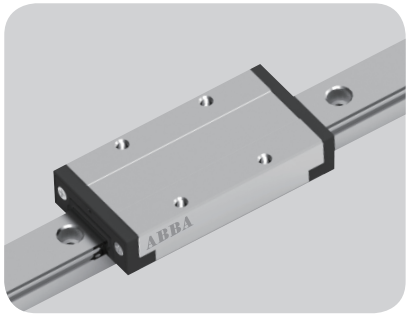
3.14 Dimension of Linear Guide

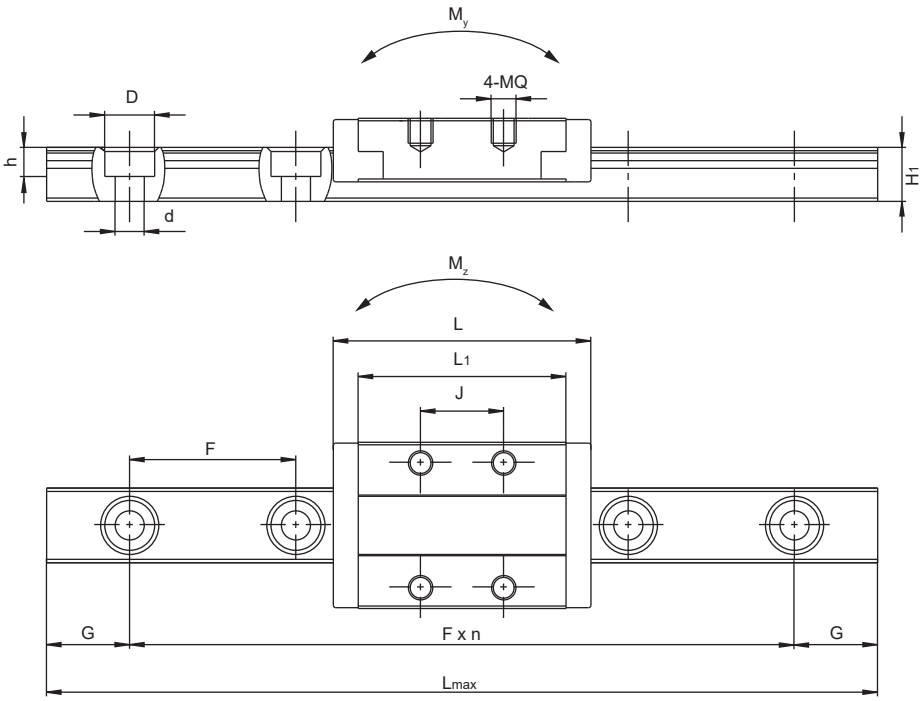
3.14.1 BMHC-U0/LU Standard type





Model No.	Assembly (mm)				Block (mm)				Rail (mm)			
	H	W	W2	E	L	BxJ	MQxl	L1	W1	H1	F	dxDxh
BMHC7U0 **BMHC7LU**	8	17	5	1.5	23.5 31.5	12x8 12x13	M2x2.5	18 26	7	4.8	15	2.5x4.5x2.5
BMHC9U0 **BMHC9LU**	10	20	5.5	2.35	31 40.5	15x10 15x16	M3x3	25 34.4	9	6.5	20	3.5x6x3.5
BMHC12U0 **BMHC12LU**	13	27	7.5	3.35	35 46.5	20x15 20x20	M3x3.5	29 40.5	12	8.8	25	3.5x6x4.5
BMHC15U0 **BMHC15LU**	16	32	8.5	4	44 62	25x20 25x25	M3x4	37 55	15	9.5	40	3.5x6x4.5

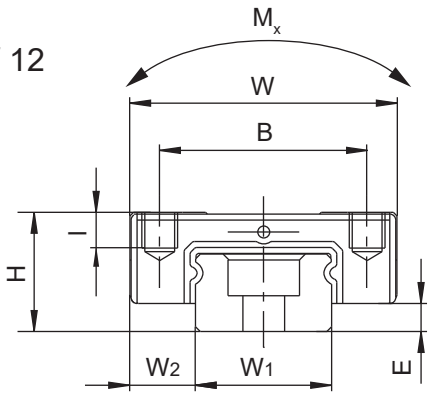


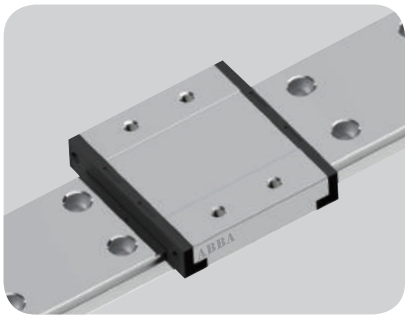


Model No.	Ref. data (mm)			Basic load rating (Kgf)		Static moment (Kgf*m)			Weight	
	Lmax	Gmin	Gmax	(C)	(C0)	Mx	My	Mz	Block (Kg)	Rail (Kg/m)
BMHC7U0	1000	4.5	11	117	149	0.47	0.27	0.27	0.01	0.23
BMHC7LU				163	245	0.81	0.89	0.89	0.02	
BMHC9U0	2000	5	15	218	285	1.17	0.76	0.76	0.02	0.4
BMHC9LU				293	438	1.89	2.04	2.04	0.03	
BMHC12U0	2000	5	20	321	397	2.19	1.19	1.19	0.04	0.75
BMHC12LU				456	642	3.66	3.40	3.40	0.06	
BMHC15U0	2000	5	35	500	596	3.97	2.44	2.44	0.09	1.05
BMHC15LU				706	998	6.53	6.45	6.45	0.13	1.05

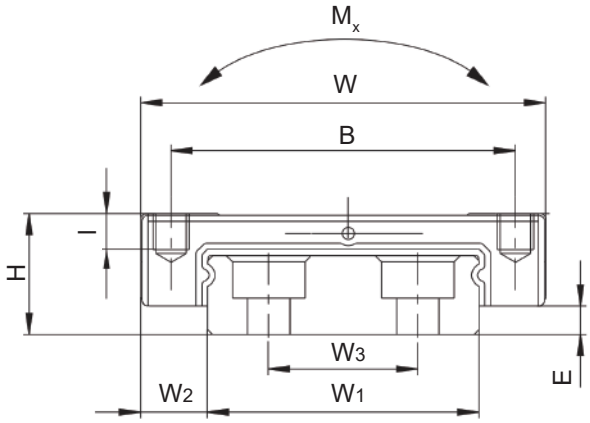
3.14.2 BMWC-U0/LU Wide type

For BMWC 7 / 9 / 12

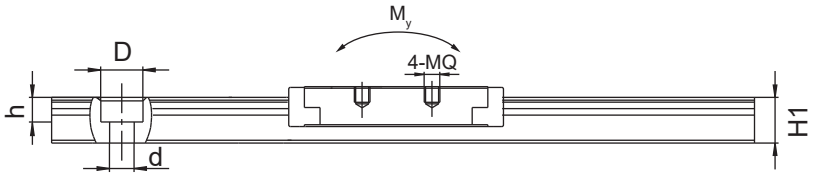


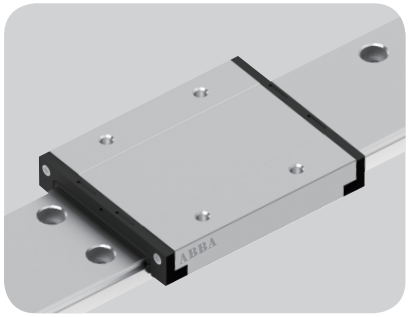


For BMWC 15

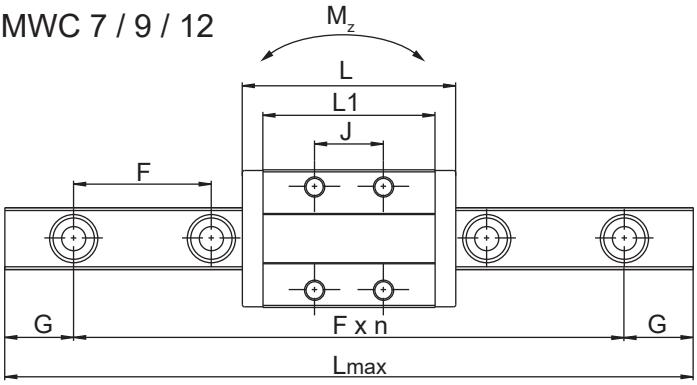


Model No.	Assembly (mm)					Block (mm)				Rail (mm)			
	H	W	W2	W3	E	L	BxJ	MQxl	L1	W1	H1	F	dxDxh
BMWC7U0 **BMWC7LU**	9	25	5.5	-	2	31 41.5	19x10 19x19	M3x3	25.5 36	14	5.2	30	3.5x6x3.5
BMWC9U0 **BMWC9LU**	12	30	6	-	2.5	39 50.5	21x12 23x24	M3x3	33 44.5	18	7	30	3.5x6x4.5
BMWC12U0 **BMWC12LU**	14	40	8	-	3	43.5 58	28x15 28x28	M3x3.5	37.5 52	24	8.5	40	4.5x8x4.5
BMWC15U0 **BMWC15LU**	16	60	9	23	4	55.5 74.5	45x20 45x35	M4x4.5	48.5 67.5	42	9.5	40	4.5x8x4.5

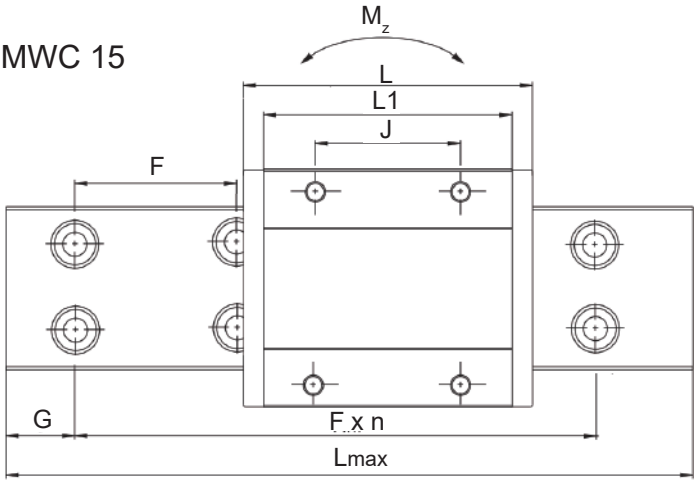




For BMWC 7 / 9 / 12



For BMWC 15



Model No.	Ref. data (mm)			Basic load rating (Kgf)		Static moment (Kgf*m)			Weight	
	Lmax	Gmin	Gmax	(C)	(C0)	Mx	My	Mz	Block (Kg)	Rail (Kg/m)
BMWC7U0	2000	5	25	157	224	1.50	0.65	0.65	0.02	0.54
BMWC7LU				213	352	2.34	1.61	1.61	0.03	
BMWC9U0	2000	5	25	277	413	3.69	1.76	1.76	0.05	0.94
BMWC9LU				366	596	5.27	3.68	3.68	0.07	
BMWC12U0	2000	6	34	398	540	7.04	2.91	2.91	0.09	1.53
BMWC12LU				546	846	9.87	5.90	5.90	0.12	
BMWC15U0	2000	6	34	642	866	18.23	5.54	5.54	0.19	2.97
BMWC15LU				841	1274	24.65	10.76	10.76	0.26	