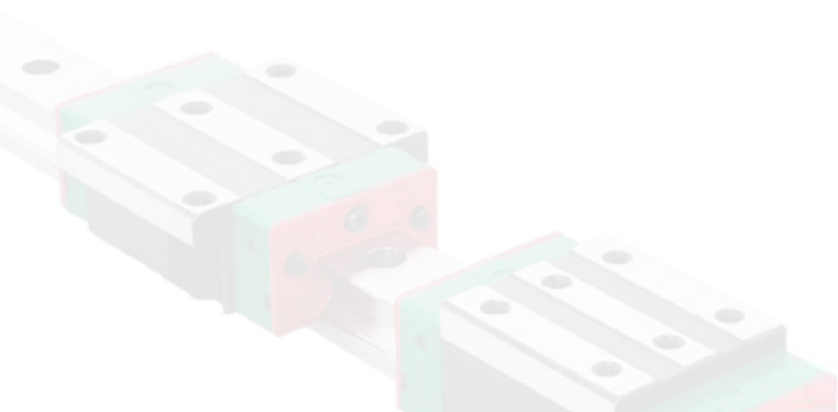




Linear Guideway

Technical Information



MG Series

Miniature Type

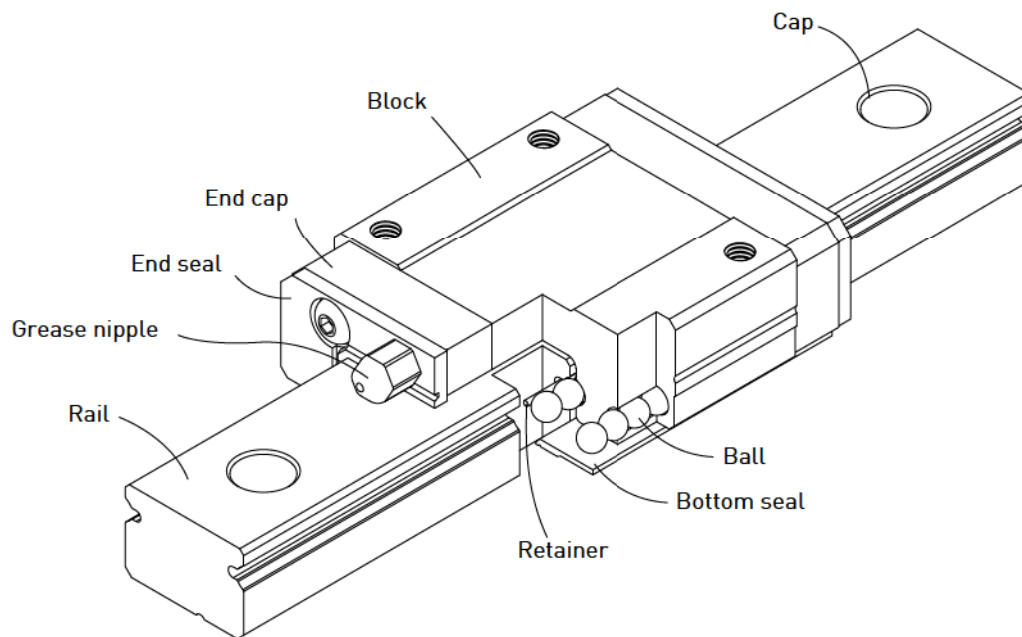
2-4 MG Series - Miniature Linear Guideway

2-4-1 Features of MGN Series

Design features of narrow type miniature guideways- MGN:

1. Tiny and light weight, suitable for miniature equipment.
2. Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy.
3. Steel balls are held by a miniature retainer to avoid balls from falling out, even when the blocks are removed from the rail.
4. Interchangeable types are available in certain precision grades.

2-4-2 Construction of MGN Series



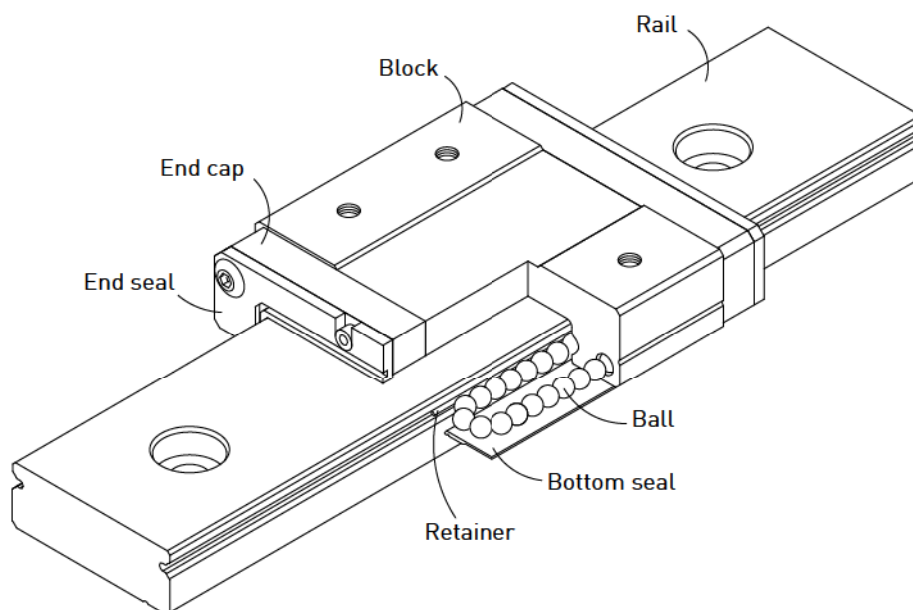
- Rolling circulation system: Block, rail, ball, end cap and retainer
- Lubrication system: Grease nipple is available for MGN15, lubricated by grease gun. MGN7, 9, 12 are lubricated by the hole at the side of the end cap.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

2-4-3 Features of MGW Series

Design features of wide type miniature guideways- MGW:

1. The enlarged width design increases the capacity of moment loading.
2. Gothic arch contact design has high rigidity characteristic in all directions.
3. Steel balls are held by a miniature retainer to avoid balls from falling out, even when the blocks are removed from the rail.

2-4-4 Construction of MGW Series



- Rolling circulation system: Block, rail, ball, end cap and retainer
- Lubrication system: Grease nipple is available for MGW15, lubricated by grease gun. MGN5-0, MGN7-0, MGN9-0, MGN12-0 are lubricated by the hole at the side of the end cap.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

MG Series

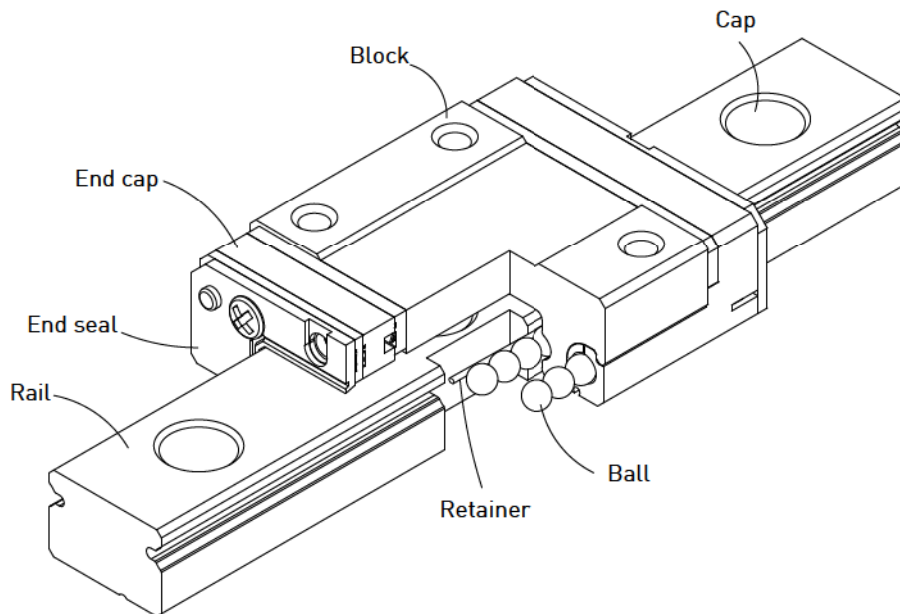
Miniature Type

2-4-5 Features of MGN-0 Series

Design features of narrow type miniature guideways- MGN-0:

1. Reduce 20% weight of block by using resin in the recirculation unit. The compact size and light weight is suitable for miniaturized machinery.
2. Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy.
3. Interchangeable types are available in certain precision grades.
4. The design of resin recirculation unit which is able to eliminate the collision with the metal block.
5. Integrated design for recirculation system.

2-4-6 Construction of MGN-0 Series



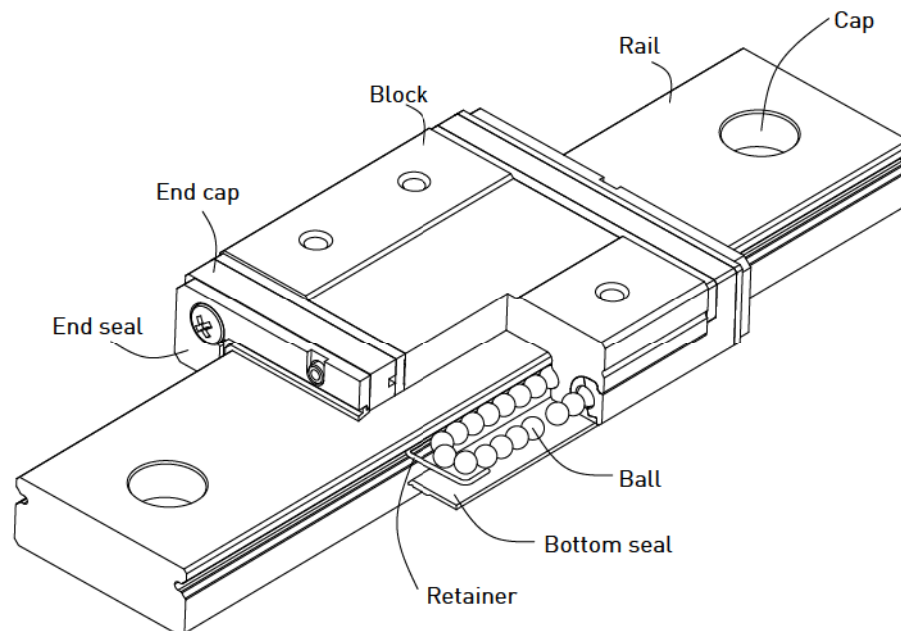
- Rolling circulation system: Block, rail, ball, end cap and retainer
- Lubrication system: Grease nipple is available for MGN15-0, lubricated by grease gun. MGN5-0, MGN7-0, MGN9-0, MGN12-0 are lubricated by the hole at the side of the end cap.
- Dust protection system. End seal, bottom seal (optional size 9,12,15), cap (size12,15)

2-4-7 Features of MGW-0 Series

Design features of wide type miniature guideways- MGW-0:

1. The enlarged width design increases the capacity of moment loading.
2. Gothic arch contact design has high rigidity characteristic in all directions.
3. Steel balls are held by a miniature retainer to keep balls from falling out, even when the blocks are removed from the rail.
4. Integrated design for recirculation system, which reduce 20% weight of block by using resin in the recirculation unit.

2-4-8 Construction of MGW-0 Series



- Rolling circulation system: Block, rail, ball, end cap and retainer
- Lubrication system: Grease nipple is available for MGW15-0, lubricated by grease gun. MGW5-0, MGW7-0, MGW9-0, MGW12-0 are lubricated by the hole at the side of the end cap.
- Dust protection system: End seal, bottom seal (optional size 9, 12, 15), cap (size12, 15)

2-4-9 Application

MGN/MGW series can be used in various applications, such as semiconductor equipment, PCB /IC equipment, medical, robotics, measuring equipment, automation equipment, and other miniature sliding machinery.

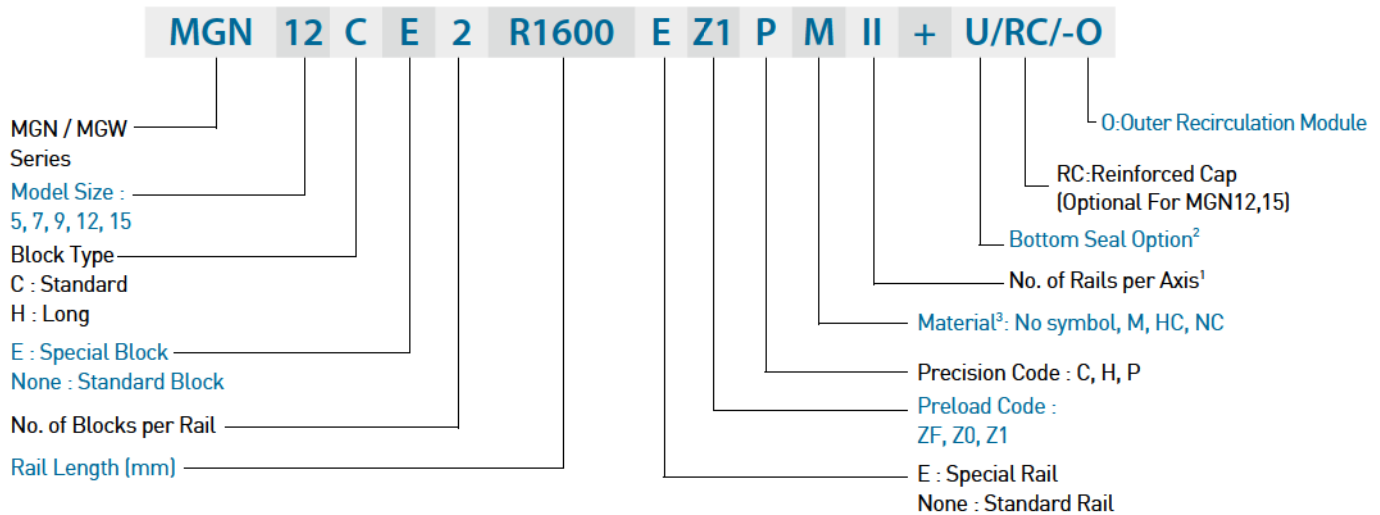
2-4-10 Model Number of MG Series

MG Series linear guideway can be classified into non-interchangeable and interchangeable types, which are the same size. The interchangeable type is more convenient due to replaceable rails; however, the precision is less than non-interchangeable type. With strict dimension and quality control, the interchangeable type linear guideways are a suitable choice for customers when rails don't need to be paired. The model number contains information for the size, type, accuracy, preload, and so on.

MG Series

Miniature Type

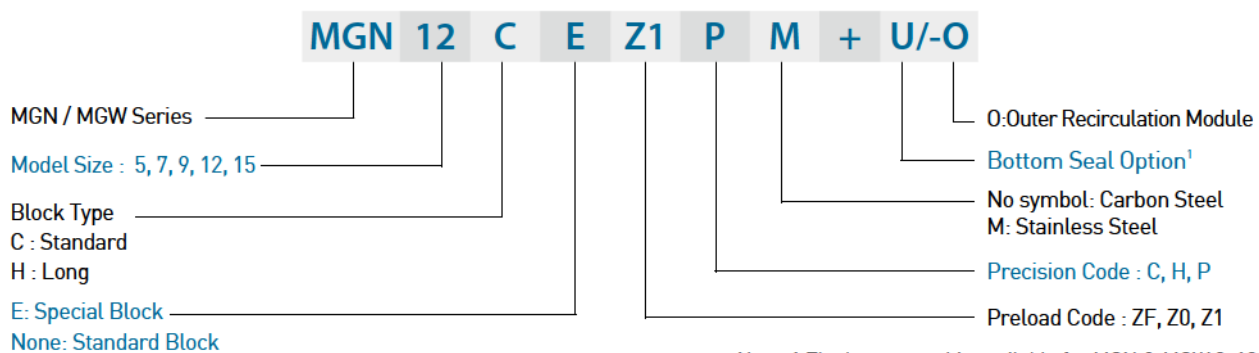
(1) Non-interchangeable type



- Note: 1. Symbol for No. of rails used on the same plane.
 No symbol indicates single rail in a axis.
 2. The bottom seal is available for MGN & MGW 9, 12, 15.
 3. No symbol: Carbon Steel
 M: Stainless Steel
 HC: Carbon Steel+Hard Chrome Treatment
 NC: Carbon Steel+Chemical Black Chrome Treatment
 4. MG5 is only supplied with outer recirculation module.

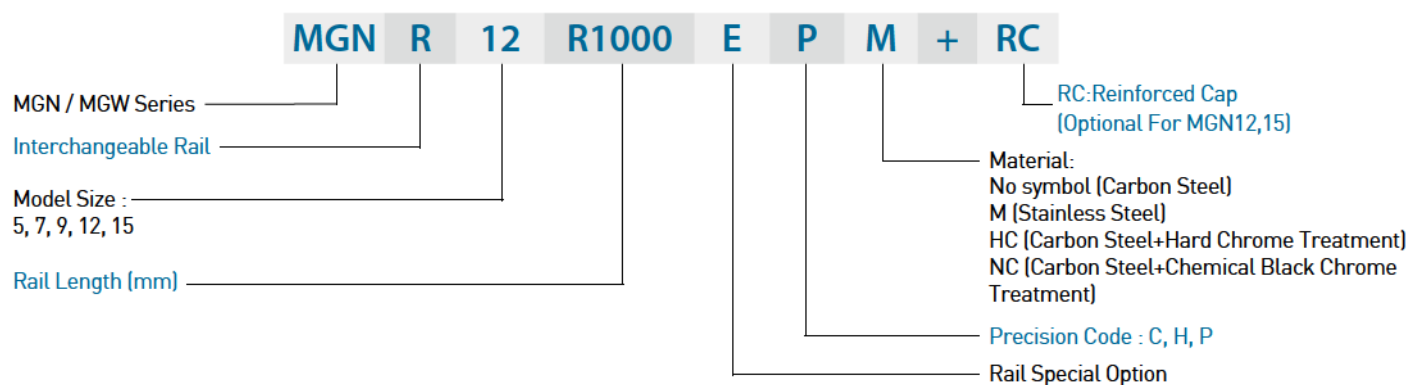
(2) Interchangeable type

○ Interchangeable Block



- Note: 1.The bottom seal is available for MGN & MGW 9, 12, 15.
 2.MG5 is only supplied with outer recirculation module.

○ Interchangeable Rail

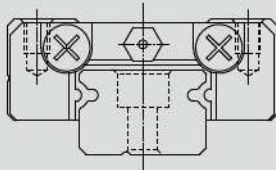
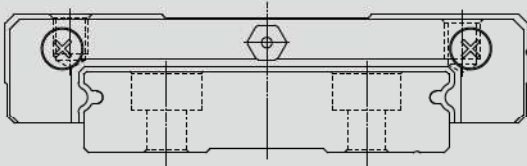


2-4-11 Types

(1) Block types

HIWIN offers two types of linear guideways, flange and square types.

Table 2-4-1 Block Types

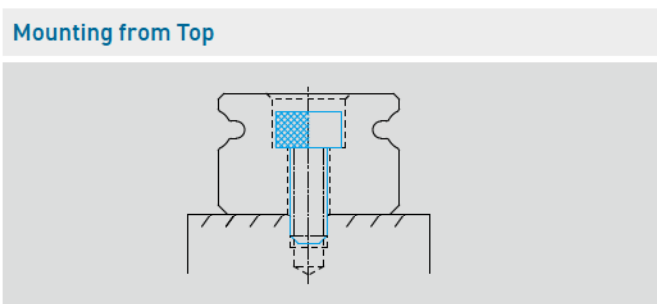
Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Applications
Square	MGN-C MGN-H		8	100	- Printer - Robotics - Precision measure equipment - Semiconductor equipment
			↓	↓	
Flange	MGW-C MGW-H		16	2000	
			↓	↓	
			9	100	
			↓	↓	
			16	2000	
			↓	↓	

*Please refer to the chapter 2-4-14 for the dimensional detail.

(2) Rail types

HIWIN offers standard top mounting type.

Table 2-4-2 Rail Types

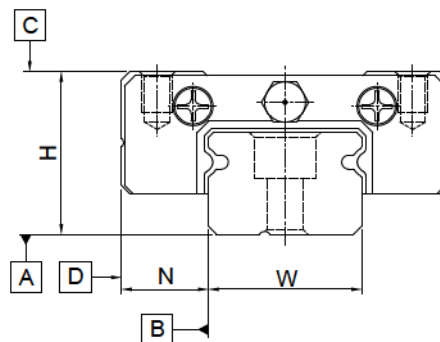


MG Series

Miniature Type

2-4-12 Accuracy Classes

The accuracy of MGN/MGW series can be classified into three classes: normal (C), high (H), precision (P). Choices for different accuracy classes are available according to various requirements.



(1) Accuracy of non-interchangeable guideways

Table 2-4-3 Accuracy Standard of Non-interchangeable Type

Unit: mm

Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.04	± 0.02	± 0.01
Dimensional tolerance of width N	± 0.04	± 0.025	± 0.015
Pair Variation of height H	0.03	0.015	0.007
Pair Variation of width N (Master Rail)	0.03	0.02	0.01
Running parallelism of block surface C to surface A	See Table 2-4-5		
Running parallelism of block surface D to surface B	See Table 2-4-5		

(2) Accuracy of interchangeable guideways

Table 2-4-4 Accuracy Standard of Interchangeable Type

Unit: mm

Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	± 0.04	± 0.02	± 0.01
Dimensional tolerance of width N	± 0.04	± 0.025	± 0.015
One Set	Pair Variation of height H	0.03	0.015
	Pair Variation of width N	0.015	0.007
	Pair Variation of width N (Master Rail)	0.03	0.02
		0.07	0.04
		0.02	
Running parallelism of block surface C to surface A	See Table 2-4-5		
Running parallelism of block surface D to surface B	See Table 2-4-5		

(3) Accuracy of running parallelism

The running parallelism C to A and D to B are related to the rail length.

Table 2-4-5 Accuracy of Running Parallelism

Rail Length			Accuracy (μm)			Rail Length			Accuracy (μm)		
(mm)	(C)	(H)	(P)	(mm)	(C)	(H)	(P)	(mm)	(C)	(H)	(P)
~ 50	12	6	2	1,000 ~ 1,200	25	18	11	1,200 ~ 1,300	25	18	11
50 ~ 80	13	7	3	1,300 ~ 1,400	26	19	12	1,400 ~ 1,500	27	19	12
80 ~ 125	14	8	3.5	1,500 ~ 1,600	28	20	13	1,600 ~ 1,700	29	20	14
125 ~ 200	15	9	4	1,700 ~ 1,800	30	21	14	1,800 ~ 1,900	30	21	15
200 ~ 250	16	10	5	1,900 ~ 2,000	31	22	15	2,000 ~	31	22	16
250 ~ 315	17	11	5								
315 ~ 400	18	11	6								
400 ~ 500	19	12	6								
500 ~ 630	20	13	7								
630 ~ 800	22	14	8								
800 ~ 1,000	23	16	9								

2-4-13 Preload

MGN/MGW series provides three different preload levels for various applications.

Table 2-4-6 Preload Classes

Class	Code	Preload	Accuracy
Light Clearance	ZF	Clearance 4~10μm	C
Very Light Preload	Z0	0	C~P
Light Preload	Z1	0.02C	C~P

Note: "C" in column preload means basic dynamic load rating.

2-4-14 Dust Proof Accessories

End seals and standard accessories fixed on both sides of the block can prevent dust from entering the block, so the accuracy and service life of a linear guideway can be maintained. Bottom seals are fixed under the skirt portion of the block to prevent dust from entering. Customers can order bottom seals by adding the mark "+U" followed by the model number. Sizes 9, 12 and 15 provide bottom seals as an option, but size 5, 7 do not offer the option due to the space limit of H₁. Note that "H1" would be reduced if bottom seals are attached, be aware of possible interference between block and mounting surface.

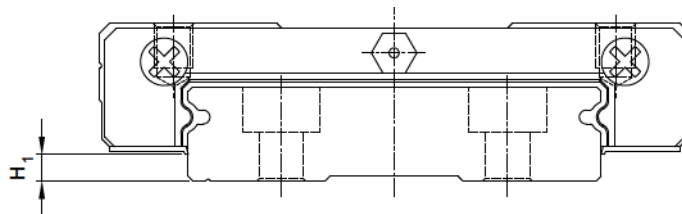


Table 2-4-7

Size	Bottom seal	H ₁ mm	Size	Bottom seal	H ₁ mm
MGN 5	-	-	MGW 5	-	-
MGN 7	-	-	MGW 7	-	-
MGN 9	●	1	MGW 9	●	1.9
MGN 12	●	2	MGW 12	●	2.4
MGN 15	●	3	MGW 15	●	2.4

MG Series

Miniature Type

2-4-15 Mounting Surface Accuracy Tolerance

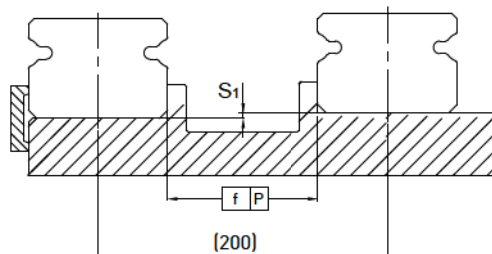


Table 2-4-8 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	ZF	Z0	Z1
MG5	2	2	2
MG7	3	3	3
MG9	4	4	3
MG12	9	9	5
MG15	10	10	6

Table 2-4-9 Max. Tolerance of Reference Surface Height (S_1)

unit: μm

Size	Preload classes		
	ZF	Z0	Z1
MG5	20	20	2
MG7	25	25	3
MG9	35	35	6
MG12	50	50	12
MG15	60	60	20

Table 2-4-10 Permissible Error of Mounting Surface

unit: mm

Size	Flatness of the Mounting Surface
MG5	0.015/200
MG7	0.025/200
MG9	0.035/200
MG12	0.050/200
MG15	0.060/200

Note: The values above are suitable for preload of ZF/Z0. For preload of Z1 or using two(or more) rails on the same plane, 50% or less of the values above are recommended.

2-4-16 Cautions for Installation

○ Shoulder heights and fillets

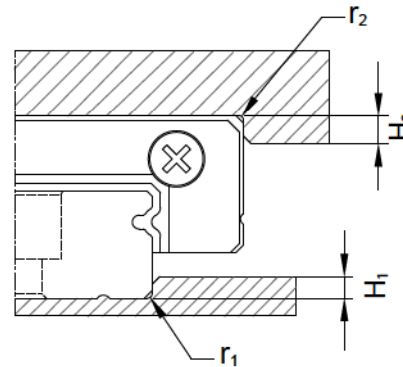


Table 2-4-11 Shoulder Heights and Fillets

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height H_1 (mm)	Shoulder height H_2 (mm)
MGN5	0.1	0.2	1.2	2
MGN 7	0.2	0.2	1.2	3
MGN 9	0.2	0.3	1.7	3
MGN 12	0.3	0.4	1.7	4
MGN 15	0.5	0.5	2.5	5
MGW5	0.1	0.2	1.2	2
MGW 7	0.2	0.2	1.7	3
MGW 9	0.3	0.3	2.5	3
MGW 12	0.4	0.4	3	4
MGW 15	0.4	0.8	3	5

○ Tightening torque of bolts for installation

Improper tightening of rail mounting bolts will seriously affect the accuracy of the linear guideway. The following table lists the recommended tightening torque for the specific bolt sizes.

Table 2-4-12 Tightening Torque

Size	Bolt size	Torque, N-cm (kgf-cm)		
		Iron	Casting	Aluminum
MGN5	M2×0.4P×6L	57(5.9)	39.2(4)	29.4(3)
MGN7	M2×0.4P×6L	57(5.9)	39.2(4)	29.4(3)
MGN9	M3×0.5P×8L	186(19)	127(13)	98(10)
MGN12	M3×0.5P×8L	186(19)	127(13)	98(10)
MGN15	M3×0.5P×10L	186(19)	127(13)	98(10)
MGW5	M2.5×0.45P×7L	118(12)	78.4(8)	58.8(6)
MGW7	M3×0.5P×6L	186(19)	127(13)	98(10)
MGW9	M3×0.5P×8L	186(19)	127(13)	98(10)
MGW12	M4×0.7P×8L	392(40)	274(28)	206(21)
MGW15	M4×0.7P×10L	392(40)	274(28)	206(21)

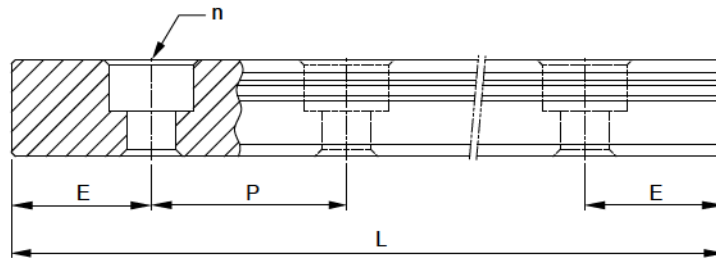
Note : 1 kgf = 9.81 N

MG Series

Miniature Type

2-4-17 Standard and Maximum Lengths of Rail

Hiwin offers standard lengths of rail for instant requirements. For non-standard rail lengths, it's recommended that the E value is no greater than 1/2 of the pitch(P) to prevent instability at the end of the rail, and the E value should be no less than Emin to avoid a broken mounting hole.



$$L = (n-1) \times P + 2 \times E \quad \text{Eq.2.4}$$

L : Total length of rail (mm)

n : Number of mounting holes

P : Distance between any two holes (mm)

E : Distance from the center of the last hole to the edge (mm)

Table 2-4-13

unit: mm

Item	MGNR5	MGNR7	MGNR9	MGNR12	MGNR15	MGWR5	MGWR7	MGWR9	MGWR12	MGWR15
Standard Length L (n)	40(3)	40(3)	55(3)	70(3)	70(2)	50(3)	80(3)	80(3)	110(3)	110(3)
	55(4)	55(4)	75(4)	95(4)	110(3)	70(4)	110(4)	110(4)	150(4)	150(4)
	70(5)	70(5)	95(5)	120(5)	150(4)	90(5)	140(5)	140(5)	190(5)	190(5)
	100(7)	85(6)	115(6)	145(6)	190(5)	110(6)	170(6)	170(6)	230(6)	230(6)
	130(9)	100(7)	135(7)	170(7)	230(6)	130(7)	200(7)	200(7)	270(7)	270(7)
	160(11)	130(9)	155(8)	195(8)	270(7)	150(8)	260(9)	230(8)	310(8)	310(8)
			175(9)	220(9)	310(8)	170(9)		260(9)	350(9)	350(9)
			195(10)	245(10)	350(9)			290(10)	390(10)	390(10)
			275(14)	270(11)	390(10)			350(14)	430(11)	430(11)
			375(19)	320(13)	430(11)			500(19)	510(13)	510(13)
				370(15)	470(12)			710(24)	590(15)	590(15)
				470(19)	550(14)			860(29)	750(19)	750(19)
Pitch (P)	15	15	20	25	40	20	30	30	40	40
	Distance to End (E _s)	5	5	7.5	10	15	5	10	10	15
Max. Standard Length	250(17)	595(40)	1195(60)	1995(80)	1990(50)	250(13)	590(20)	1970(66)	1990(50)	1990(50)
Max. Length	250 ⁴	600	1200 ⁵	2000	2000	250 ⁴	600 ⁶	2000	2000	2000

Note: 1. Tolerance of E value for standard rail is 0.5~0.5 mm. Tolerance of E value for jointed rail is 0~0.3 mm.

2. Maximum standard length indicates the max. rail length with standard E value on both sides.

3. If smaller E value is needed, please contact HIWIN.

4. MGNR5, MGWR5 are only supplied with stainless steel.

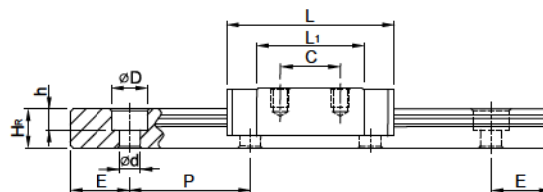
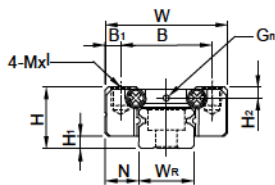
5. MGNR9 of stainless steel is supplied with the maximum length of 1200mm; MGNR9 of carbon steel is supplied with the maximum length of 1000mm.

6. MGWR7 of stainless steel is supplied with the maximum length of 600mm; MGWR7 of carbon steel is supplied with the maximum length of 2000mm.

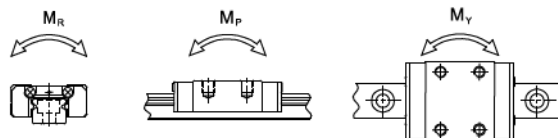
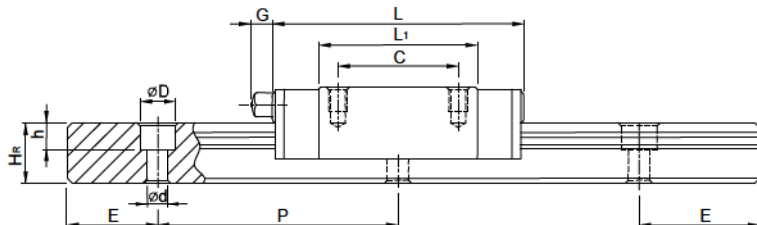
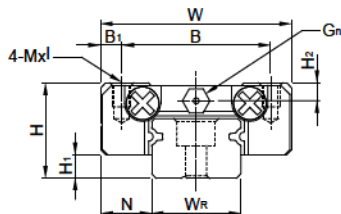
2-4-18 Dimensions for MGN/MGW Series

(1) MGN-C / MGN-H

MGN7, MGN9, MGN12



MGN15



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)										Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	G	G _s	MxL	H ₂	W _R	H _R	D	h	d	P	E	(mm)	C(kN)	C ₁ (kN)				M _R	M _P	M _Y	Block	Rail
																									N-m	N-m	N-m	kg	kg/m		
MGN 7C	8	1.5	5	17	12	2.5	8	13.5	22.5	-	Ø1.2	M2x2.5	1.5	7	4.8	4.2	2.3	2.4	15	5	M2x6	0.98	1.24	4.70	2.84	2.84	0.010	0.22			
MGN 7H							13	21.8	30.8													1.37	1.96	7.64	4.80	4.80	0.015				
MGN 9C	10	2	5.5	20	15	2.5	10	18.9	28.9	-	Ø1.4	M3x3	1.8	9	6.5	6	3.5	3.5	20	7.5	M3x8	1.86	2.55	11.76	7.35	7.35	0.016	0.38			
MGN 9H							16	29.9	39.9													2.55	4.02	19.60	18.62	18.62	0.026				
MGN 12C	13	3	7.5	27	20	3.5	15	21.7	34.7	-	Ø2	M3x3.5	2.5	12	8	6	4.5	3.5	25	10	M3x8	2.84	3.92	25.48	13.72	13.72	0.034	0.65			
MGN 12H							20	32.4	45.4													3.72	5.88	38.22	36.26	36.26	0.054				
MGN 15C	16	4	8.5	32	25	3.5	20	26.7	42.1	4.5	M3	M3x4	3	15	10	6	4.5	3.5	40	15	M3x10	4.61	5.59	45.08	21.56	21.56	0.059	1.06			
MGN 15H							25	43.4	58.8													6.37	9.11	73.50	57.82	57.82	0.092				

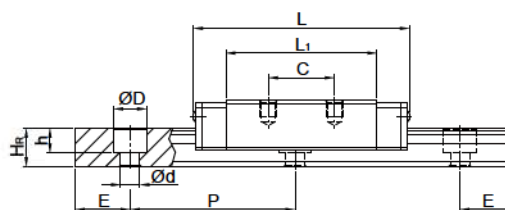
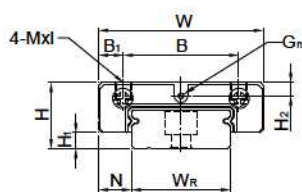
Note : 1 kgf = 9.81 N

MG Series

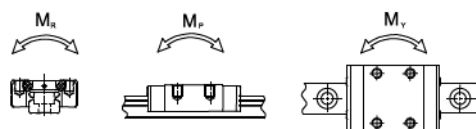
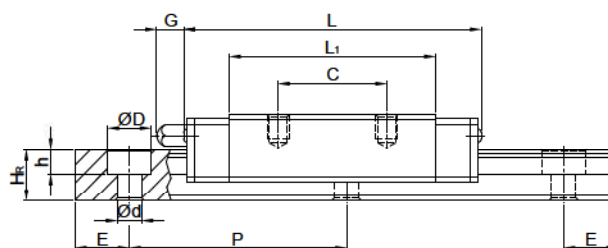
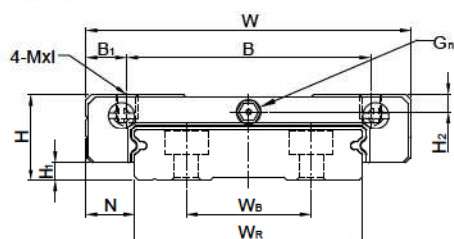
Miniature Type

(2) MGW-C / MGW-H

MGW7, MGW9, MGW12



MGW15

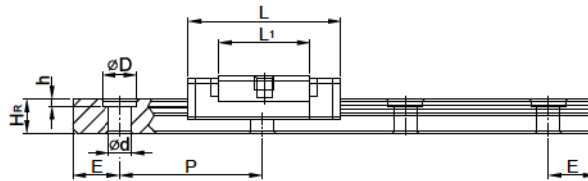
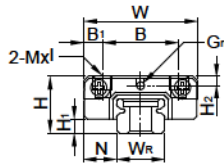


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)										Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
																											M _x	M _y	M _z	Block	Rail
	H	H ₁	N	W	B	B ₁	C	L ₁	L	G	G _s	MxL	H ₂	W _B	W _S	H _B	D	h	d	P	E	(mm)	C(kN)				C _s (kN)	N-m	N-m	N-m	kg
MGW7C	9	1.9	5.5	25	19	3	10	21	31.2	-	Ø1.2	M3x3	1.85	14	-	5.2	6	3.2	3.5	30	10	M3x6	1.37	2.06	15.70	7.14	7.14	0.020	0.51		
MGW7H							19	30.8	41														1.77	3.14	23.45	15.53	15.53	0.029			
MGW9C	12	2.9	6	30	21	4.5	12	27.5	39.3	-	Ø1.2	M3x3	2.4	18	-	7	6	4.5	3.5	30	10	M3x8	2.75	4.12	40.12	18.96	18.96	0.040	0.91		
MGW9H							23	35.5	50.7														3.43	5.89	54.54	34.00	34.00	0.057			
MGW12C	14	3.4	8	40	28	6	15	31.3	46.1	-	Ø1.2	M3x3.6	2.8	24	-	8.5	8	4.5	4.5	40	15	M4x8	3.92	5.59	70.34	27.80	27.80	0.071	1.49		
MGW12H							28	45.6	60.4														5.10	8.24	102.70	57.37	57.37	0.103			
MGW15C	16	3.4	9	60	45	7.5	20	38	54.8	5.2	M3	M4x4.2	3.2	42	23	9.5	8	4.5	4.5	40	15	M4x10	6.77	9.22	199.34	56.66	56.66	0.143	2.86		
MGW15H							35	57	73.8														8.93	13.38	299.01	122.60	122.60	0.215			

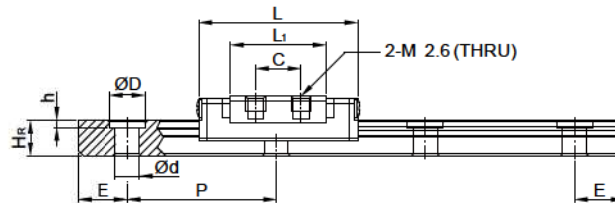
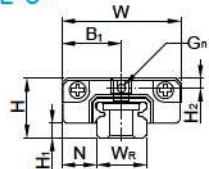
Note : 1 kgf = 9.81 N

(3) MGN-C-O / MGN-H-O

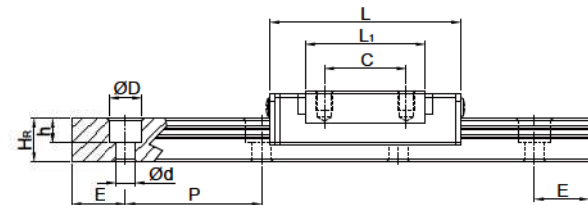
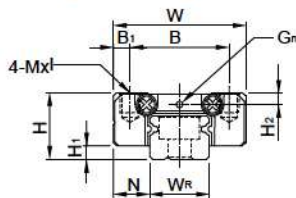
MGN5-O



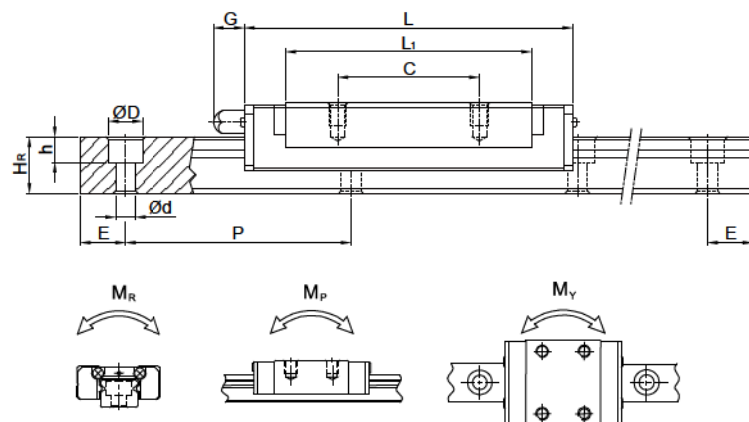
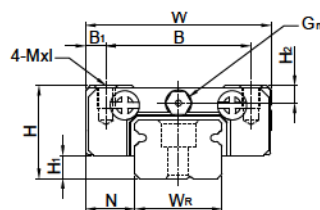
MGN5HL-O



MGN7-O, MGN9-O, MGN12-O



MGN15-O

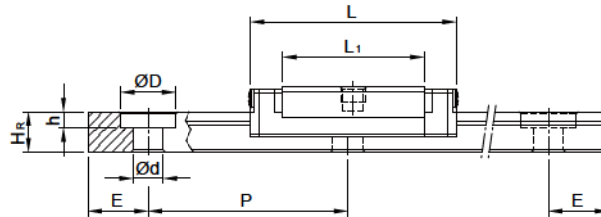
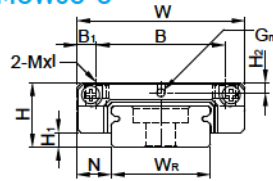


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)										Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	G	G _s	MxI	H ₂	W _R	H _R	D	h	d	P	E	(mm)	C(kN)	C _s (kN)				M _R N-m	M _P N-m	M _Y N-m	Block kg	Rail kg/m
MGN 5C-O					8	2	-	9.6	16			M2x1.5											0.54	0.84	2	1.3	1.3	0.003			
MGN 5H-O	6	1.5	3.5	12	8	2	-	12.6	19	-	0.8	M2x1.5	1	5	3.6	3.6	0.8	2.4	15	5	M2x6	0.67	1.08	2.6	2.3	2.3	0.004	0.15			
MGN 5HL-O					-	6	7	12.6	19			M2.6-THRU										0.67	1.08	2.6	2.3	2.3	0.004				
MGN7C-O					12	2.5	8	13.5	22.5			M2×2.5										0.98	1.24	4.70	2.84	2.84	0.008				
MGN7H-O	8	1.5	5	17	12	2.5	13	21.8	30.8	-	Ø1.2	M2×2.5	1.5	7	4.8	4.2	2.3	2.4	15	5	M2x6	1.37	1.96	7.64	4.80	4.80	0.012	0.22			
MGN 9C-O					15	2.5	10	19.4	30			M3x3										2.01	2.84	13.05	8.97	8.97	0.012				
MGN9H-O	10	2.2	5.5	20	15	2.5	16	29.3	39.9	-	Ø1.4	M3x3	1.8	9	6.5	6	3.5	3.5	20	7.5	M3x8	2.5	3.93	19.71	21.47	21.47	0.02	0.38			
MGN 12C-O					20	3.5	15	22	35			M3x3.5										2.84	3.92	25.48	13.72	13.72	0.025				
MGN12H-O	13	3	7.5	27	20	3.5	20	34.6	47.6	-	Ø2	M3x3.5	2.5	12	8	6	4.5	3.5	25	10	M3x8	4.27	5.9	38.4	37.49	37.49	0.047	0.65			
MGN 15C-O					25	3.5	20	26.7	41.3			M3x4										4.61	5.59	45.08	21.56	21.56	0.057				
MGN 15H-O	16	4	8.5	32	25	3.5	25	43.4	58	4.50	M3	M3x4	3	15	10	6	4.5	3.5	40	15	M3x10	6.37	9.11	73.5	57.82	57.82	0.088	1.06			

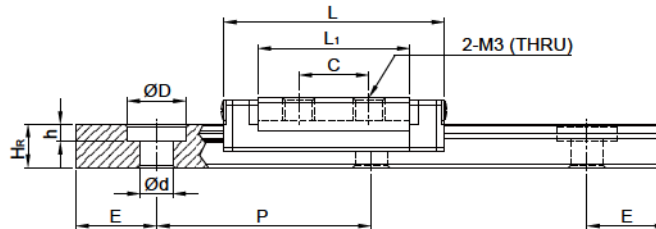
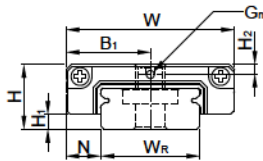
Note : 1 kgf = 9.81 N

(4) MGW-C-0 / MGW-H-0

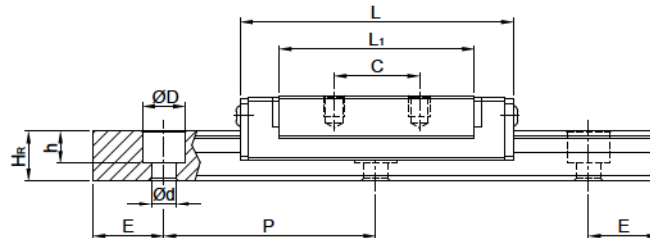
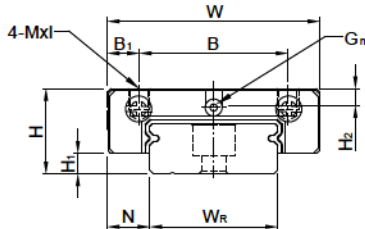
MGW5C-0



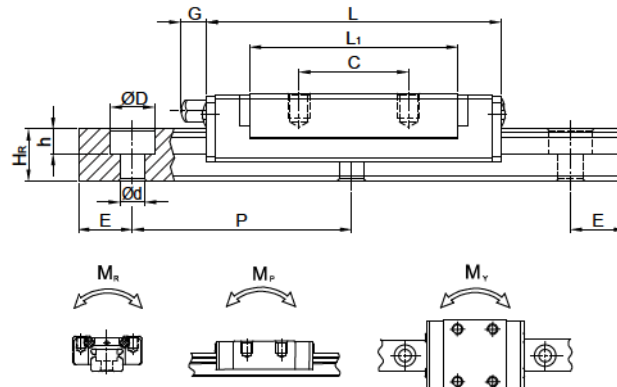
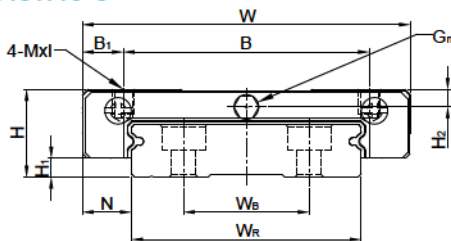
MGW5CL-0



MGW7-0, MGW9-0, MGW12-0



MGW15-0



Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)								Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H ₁	N	W	B	B ₁	C	L ₁	L	G	G _s	MxL	H ₂	W _R	W _B	H _R	D	h	d	P	E	(mm)	C(kN)	C _s (kN)	M _R N-m	M _P N-m	M _Y N-m	Block kg	Rail kg/m
MGW 5C-0	6.5	1.5	3.5	17	13	2	-	14.1	20.5	-	Ø0.8	M2.5x1.5	1	10	-	4	5.5	1.6	3	20	5	M2.5X7	0.68	1.18	5.5	2.7	2.7	0.006	0.34
MGW 5CL-0					-	8.5	6.5	14.1	20.5	-	M3-THRU	0.68											1.18	5.5	2.7	2.7	0.006		
MGW 7C-0	9	1.9	5.5	25	19	3	10	21	31.2	-	Ø1.2	M3x3	1.85	14	-	5.2	6	3.2	3.5	30	10	M3x6	1.37	2.06	15.70	7.14	7.14	0.018	0.51
MGW 7H-0					19	3	19	30.8	41	-	M3x3	1.77											3.14	23.45	15.53	15.53	0.026		
MGW 9C-0	12	2.95	6	30	21	4.5	12	27.5	39.7	-	Ø1.2	M3x3	2.65	18	-	7	6	4.5	3.5	30	10	M3x8	2.75	4.12	40.12	18.96	18.96	0.038	0.91
MGW 9H-0					23	3.5	24	38.5	50.7	-	M3x3	3.43											5.89	54.54	34.00	34.00	0.053		
MGW 12C-0	14	3.45	8	40	28	6	15	31.3	45.1	-	Ø1.2	M3x3.6	2.8	24	-	8.5	8	4.5	4.5	40	15	M4x8	3.92	5.59	70.34	27.8	27.8	0.066	1.49
MGW 12H-0					28	6	28	45.6	59.4	-	M3x3.6	5.1											8.24	102.7	57.37	57.37	0.093		
MGW 15C-0	16	3.45	9	60	45	7.5	20	38	53.8	5.2	M3	M4x4.2	3.2	42	23	9.5	8	4.5	4.5	40	15	M4x10	6.77	9.22	199.34	56.66	56.66	0.138	2.86
MGW 15H-0					M4x4.2	8.93	13.38	299.01	122.60			122.60											0.200						

Note : 1 kgf = 9.81 N