Linear Guideways

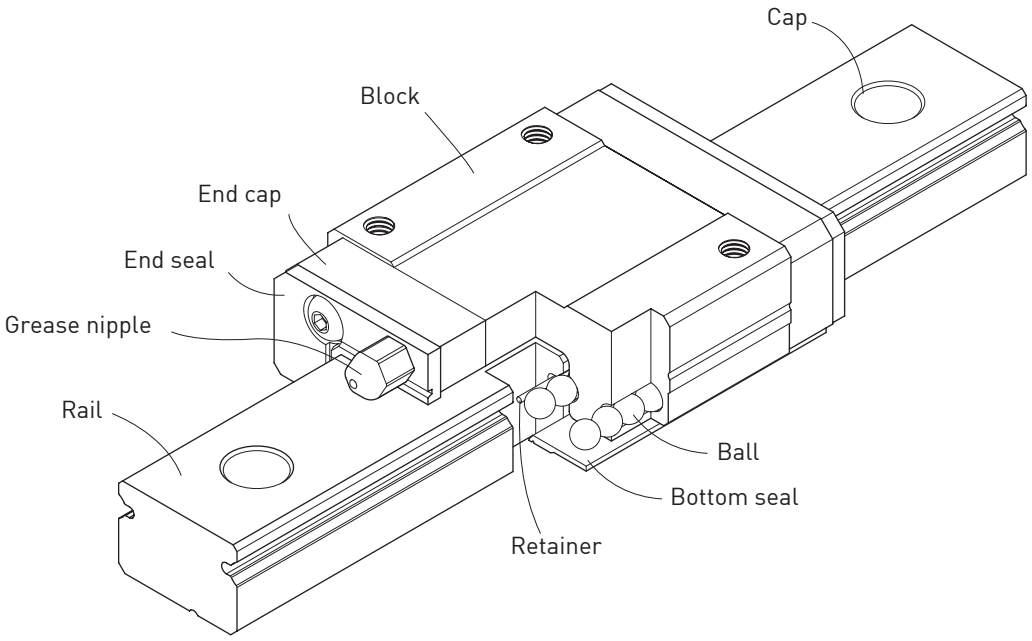
MG Series

2-4 MG Series - Miniature Linear Guideway

2-4-1 Features of MGN Series

1. Tiny and light weight, suitable for miniature equipment.
2. All materials for block and rail, including rolling balls and ball retainers, are in special grade of stainless steel for anti-corrosion purpose.
3. Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy.
4. Steel balls will be held by miniature retainer to avoid balls from falling out even when the blocks are removed from the rail installation.
5. Interchangeable types are available in certain precision grades.

2-4-2 Construction of MGN Series



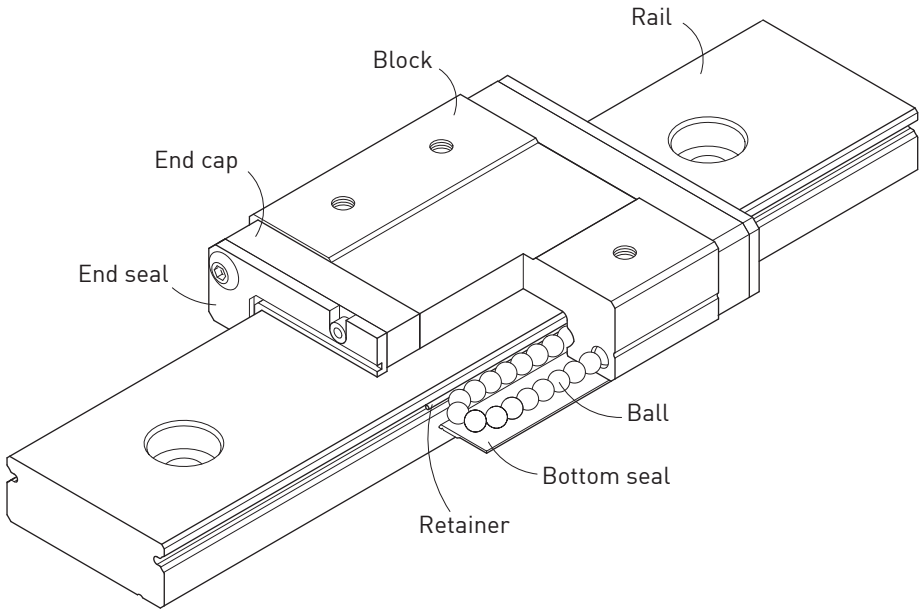
- Rolling circulation system: Block, rail, end cap and retainer
- Lubrication system: Grease nipple is available for MGN15, lubricated by grease gun.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

2-4-3 Features of MGW Series

Design feature of wide type miniature guideway-MGW:

1. The design of enlarged width increases the capacity of moment load.
2. Gothic arch contact design has high rigidity characteristic in all directions.
3. Steel balls will be held by miniature retainer to avoid the balls from falling out even when the block are removed from the rail installation.
4. All metallic components are made of stainless steel for anti-corrosion purpose.

2-4-4 Configuration of MGW Series



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

2-4-5 Application

MGN/MGW series is available for various applications, such as semiconductor equipments, PCB /IC equipments, medication, robotics, measuring equipments, automation equipments, and other miniature sliding machinery.

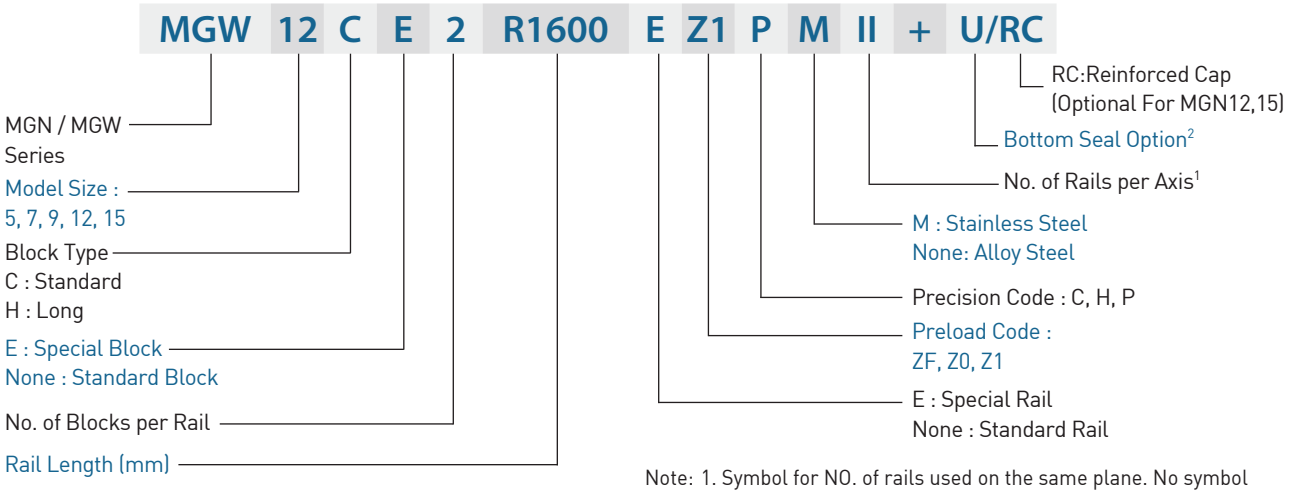
2-4-6 Model Number of MGN/MGW Series

MGN and MGW 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 would be a rather suitable choice for customers when rails don't need to be paired. The model number contains information of the size, type, accuracy, preload, and so on.

Linear Guideways

MG Series

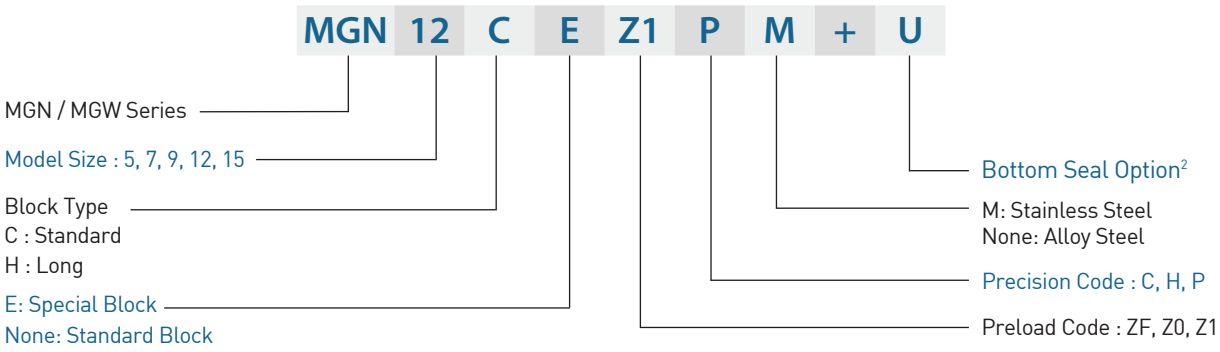
(1) Non-interchangeable type



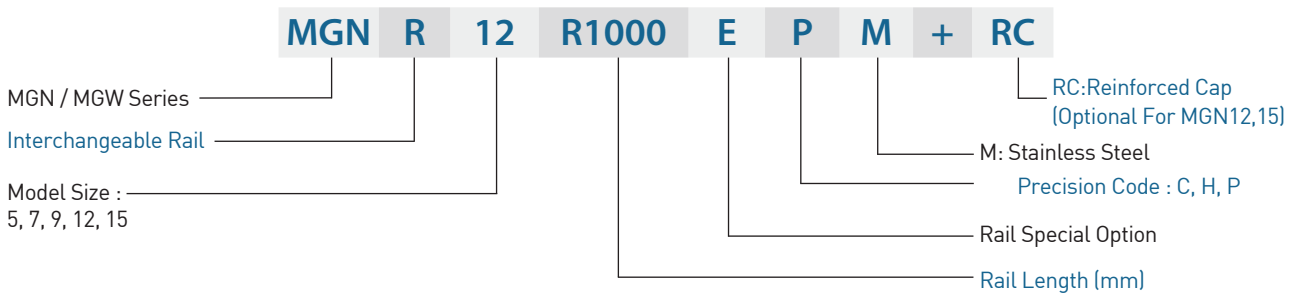
Note: 1. Symbol for NO. of rails used on the same plane. No symbol indicates single rail in an axis.
2. The bottom seal is available for MGN & MGW 9, 12, 15.

(2) Interchangeable type

- **Interchangeable Block**

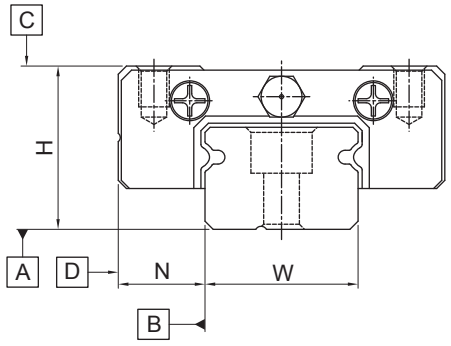


- **Interchangeable Rail**



2-4-7 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 2-4-1 **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	According to Table 2-4-3		
Running parallelism of block surface D to surface B	According to Table 2-4-3		

(2) Accuracy of interchangeable guideways

Table 2-4-2 **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	0.007
	Pair Variation of width N	0.03	0.02	0.01
Pair Variation of width N (Master Rail)		0.07	0.04	0.02
Running parallelism of block surface C to surface A		According to Table 2-4-3		
Running parallelism of block surface D to surface B		According to Table 2-4-3		

Linear Guideways

MG Series

(3) Accuracy of running parallelism

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

Table 2-4-3 **Accuracy of Running Parallelism**

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

2-4-8 Preload

MGN/MGW series provide three preload levels for various applications.

Table 2-4-4 **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.

2-4-9 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 and 7 do not offer the option due to the space limit of H_1. Note that "H_1" would be reduced if bottom seal's attached, interference between block and mounting surface should be awared of.

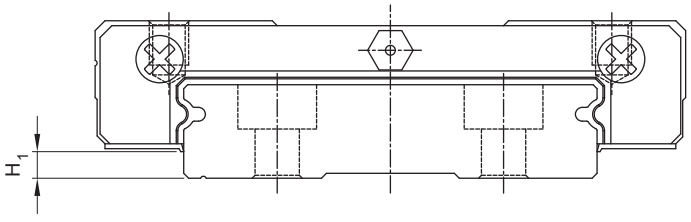


Table 2-4-5

Size	Bottom seal	H_1 mm	Size	Bottom seal	H_1 mm
MGN5	-	-	MGW5	-	-
MGN7	-	-	MGW7	-	-
MGN9	●	1	MGW9	●	2.1
MGN12	●	2	MGW12	●	2.6
MGN15	●	3	MGW15	●	2.6

2-4-10 Mounting Surface Accuracy Tolerance

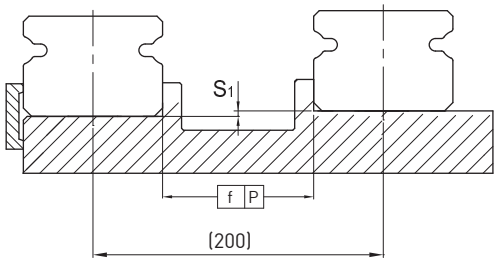


Table 2-4-6 **Max. Parallelism Tolerance (P)** unit: μm

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 2-4-7 **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 2-4-8 **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.

Linear Guideways

MG Series

2-4-11 Cautions for Installation

- Shoulder heights and fillets

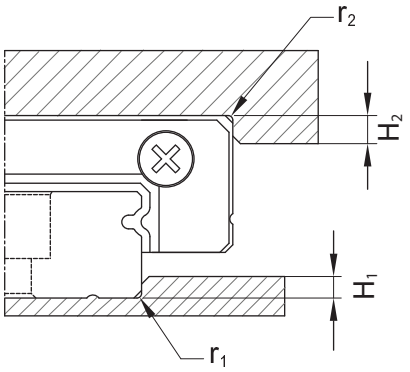


Table 2-4-9 **Shoulder Heights and Fillets**

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
MGN7	0.2	0.2	1.2	3
MGN9	0.2	0.3	1.7	3
MGN12	0.3	0.4	1.7	4
MGN15	0.5	0.5	2.5	5
MGW5	0.1	0.2	1.2	2
MGW7	0.2	0.2	1.7	3
MGW9	0.3	0.3	2.5	3
MGW12	0.4	0.4	3	4
MGW15	0.4	0.8	3	5

- Tightening torque of bolts for installation

Inappropriate or over 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 sizes of bolts.

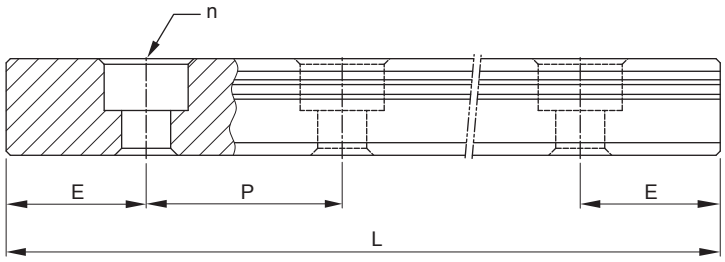
Table 2-4-10 **Tightening Torque**

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

2-4-12 Standard and Maximum Lengths of Rail

Hiwin offers stanard length of rail for instant requirements. For non-standard rail length, it's recommended that the E value not to be greater than half fo the pitch(P) to avoid instability at the end of the rail, and the E value not to be less than Emin in order to prevent breaking the end 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 2-4-11

unit: mm

Item	MGNR 5M	MGNR 7M	MGNR 9M	MGNR 12M	MGNR 15M	MGWR 5M	MGWR 7M	MGWR 9M	MGWR 12M	MGWR 15M
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)
				570 (23)	670 (17)				910 (23)	910 (23)
				695 (28)	870 (22)				1070 (27)	1070 (27)
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	15
Max. Standard Length	250 (17)	595 (40)	995 (40)	1995 (80)	1990 (50)	250 (13)	590 (20)	1190 (40)	1990 (50)	1990 (50)
Max. Length	250	600	1000	2000	2000	250	600	1200	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. The specification with "M" mark stands for stainless steel.
4. If smaller E value is needed, please contact HIWIN.

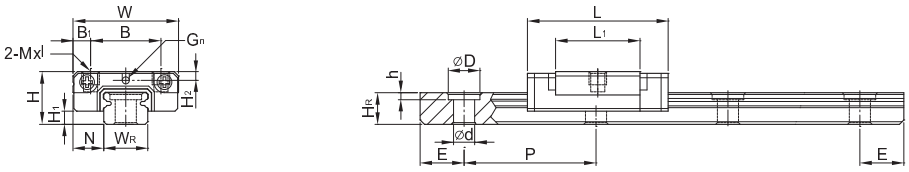
Linear Guideways

MG Series

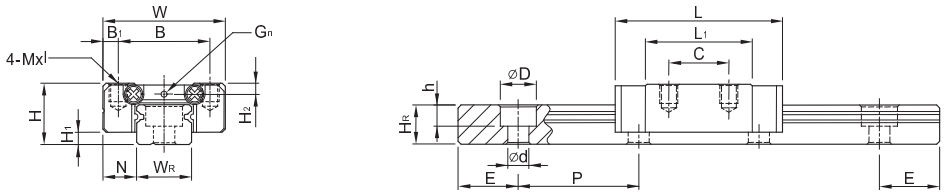
2-4-13 Dimensions for MGN/MGW Series

(1) MGN-C / MGN-H

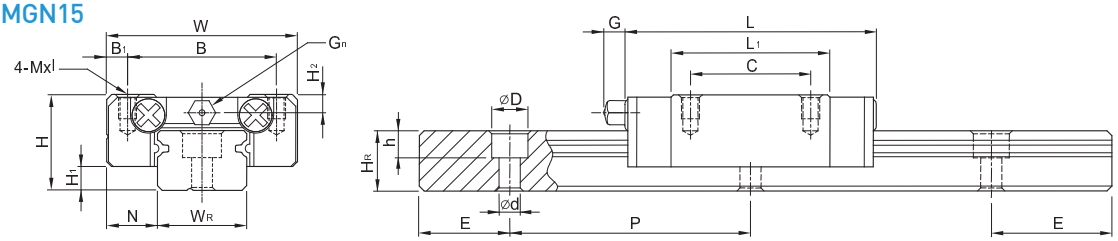
MGN5

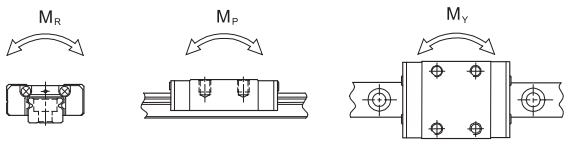


MGN7, MGN9, MGN12



MGN15



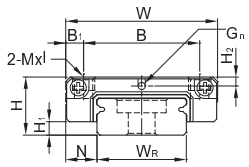


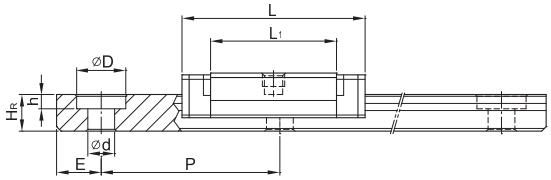
Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)										Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	G	G_n	Mxl	H_2	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R N-m	M_P N-m	M_Y N-m	Block kg	Rail kg/m
MGN5C	6	1.5	3.5	12	8	2	-	9.6	16	-	Ø0.8	M2x1.5	1	5	3.6	3.6	0.8	2.4	15	5	M2x6	0.54	0.84	2	1.3	1.3	0.008	0.15
MGN7C	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
MGN7H							13	21.8	30.8													1.37	1.96	7.64	4.80	4.80	0.015	
MGN9C	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
MGN9H							16	29.9	39.9													2.55	4.02	19.60	18.62	18.62	0.026	
MGN12C	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
MGN12H							20	32.4	45.4													3.72	5.88	38.22	36.26	36.26	0.054	
MGN15C	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
MGN15H							25	43.4	58.8													6.37	9.11	73.50	57.82	57.82	0.092	

Note : 1 kgf = 9.81 N

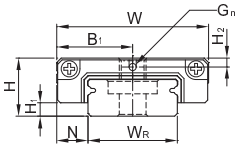
(2) MGW-C / MGW-H

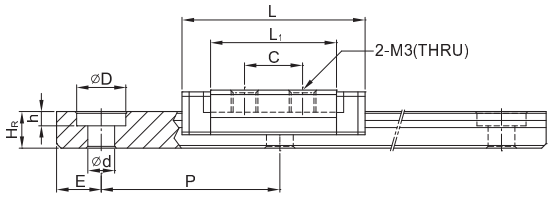
MGW5C



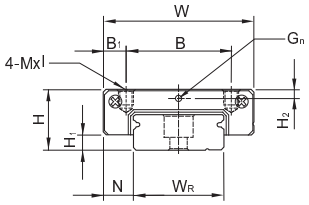


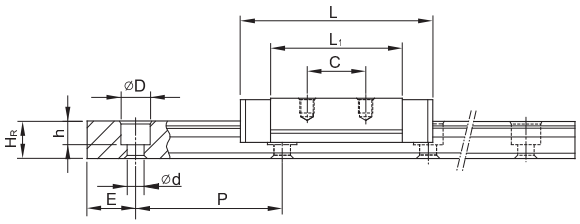
MGW5CL



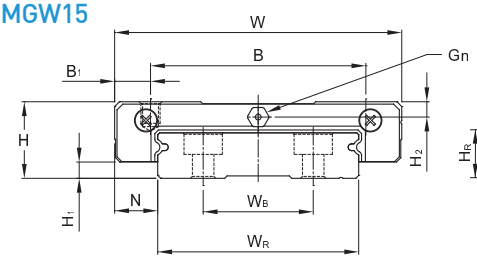


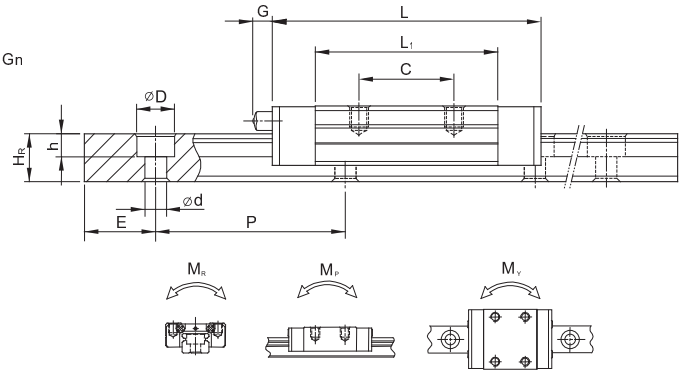
MGW7, MGW9, MGW12





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	
	H	H_1	N	W	B	B_1	C	L_1	L	G	G_n	Mxl	H_2	W_R	W_B	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R N-m	M_P N-m	M_Y N-m	Block kg	Rail kg/m
MGW5C	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	0.016	0.34
MGW5CL					-	-	6.5					M3-THRU																	
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	3.5	24	38.5	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