



# Linear Guideway

Technical Information

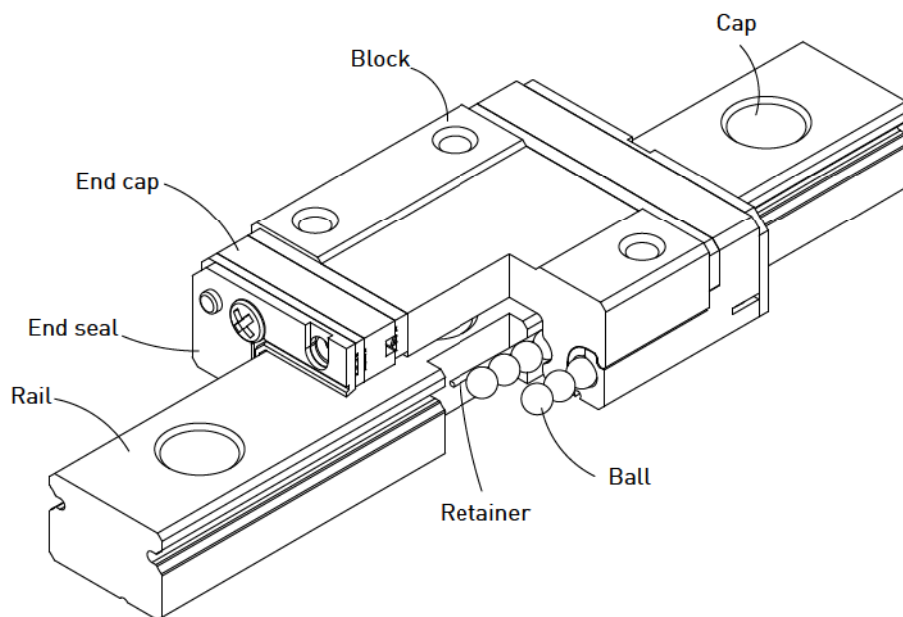
## Miniature Linear Guideways PM Series

## 2-5 PM Series - Miniature Linear Guideway

### 2-5-1 Features of PMN Series

1. Reduce 20% weight of block by using resin in the recirculation unit. The compact size and light weight is suitable for miniturized machinery.
2. Stainless linear guideway. Block, rail and stainless components such as ball retainers provide excellent corrosion resistance.
3. Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy.
4. Interchangeable types are available in certain precision grades.
5. The design of low noise resin recirculation unit which is able to eliminate the collision with the metal block.
6. Integrated design in recirculation system.

### 2-5-2 Construction of PMN Series



- Rolling circulation system: Block, rail, end cap and retainer
- Dust protection system: End seal, bottom seal (optional size 9,12), cap (size12)

### 2-5-3 Application

PMN series is suitable for limited space installations and available for use in various applications, such as semiconductor equipment, PCB assembly equipment, medical equipment, robotics, measuring equipment, office automation equipment, and other miniature sliding machinery.

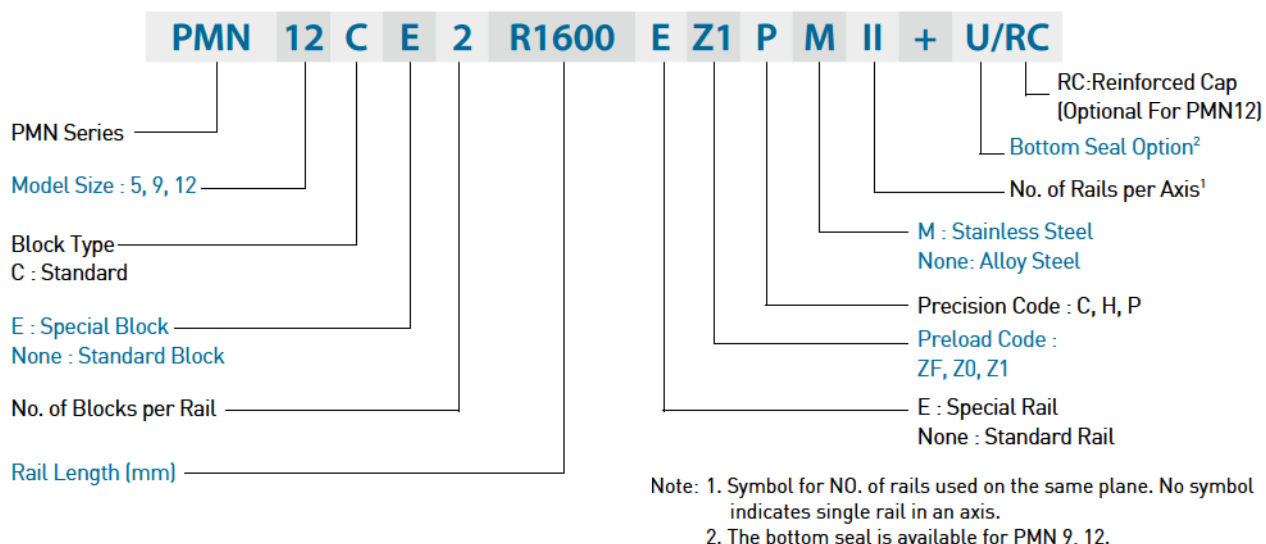
### 2-5-4 Model Number of PMN Series

PMN 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 of the size, type, accuracy, preload, and so on.

## PM Series

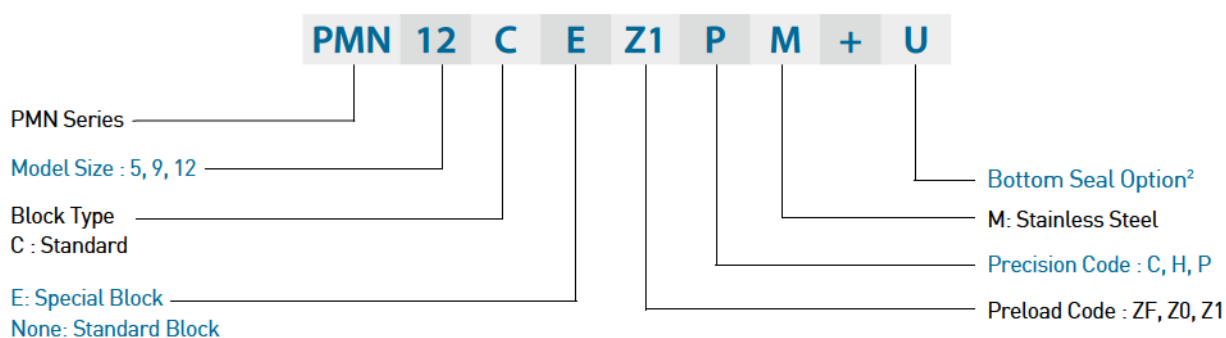
### Miniature

#### (1) Non-interchangeable type

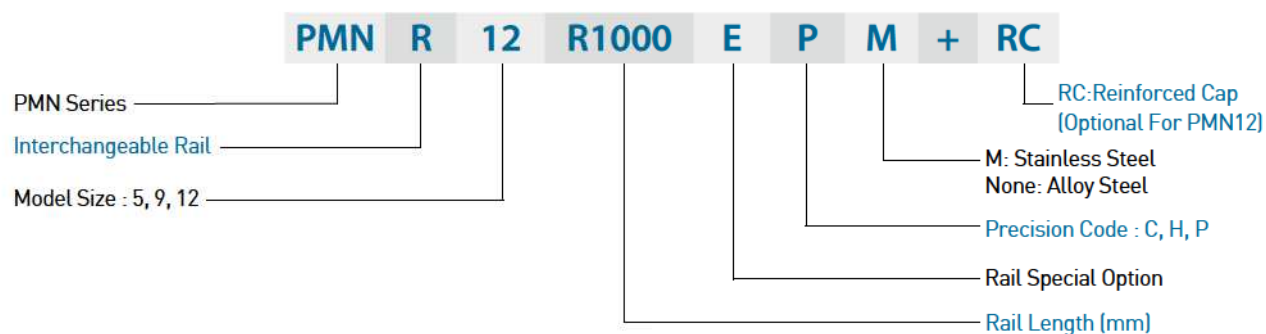


#### (2) Interchangeable type

##### ○ Interchangeable Block



##### ○ Interchangeable Rail

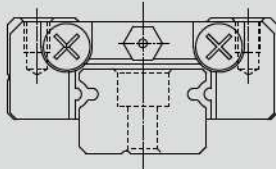
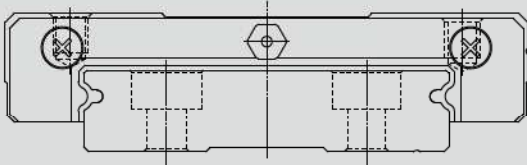


## 2-5-5 Types

### (1) Block types

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

Table 2-5-1 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Applications
Square	PMN-C PMN-H		8	100	<ul style="list-style-type: none"> <li>Printer</li> <li>Robotics</li> <li>Precision measure equipment</li> <li>Semiconductor equipment</li> </ul>
			↓	↓	
Flange	PMW-C PMW-H		16	2000	
			↓	↓	
			9	100	
			16	2000	

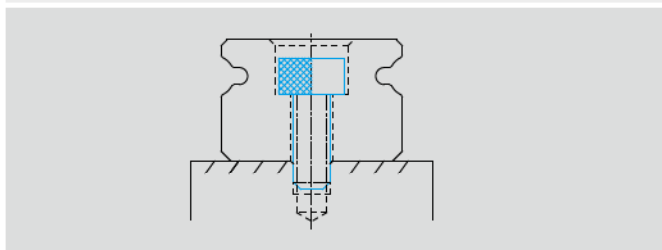
\*Please refer to the chapter 2-5-12 for the dimensional detail.

### (2) Rail types

HIWIN offers standard top mounting type.

Table 2-5-2 Rail Types

#### Mounting from Top

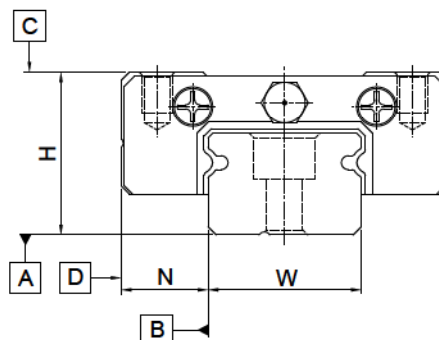


## PM Series

### Miniature

### 2-5-6 Accuracy Classes

The accuracy of PMN 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 2-5-3 Accuracy Standard of Non-interchangeable Type

Unit: mm

Accuracy Classes	Normal (C)	High (H)	Precision (P)
Dimensional tolerance of height H	$\pm 0.04$	$\pm 0.02$	$\pm 0.01$
Dimensional tolerance of width N	$\pm 0.04$	$\pm 0.025$	$\pm 0.015$
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 2-5-5		
Running parallelism of block surface D to surface B	See Table 2-5-5		

#### (2) Accuracy of interchangeable guideways

Table 2-5-4 Accuracy Standard of Interchangeable Type

Unit: mm

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

### (3) Accuracy of running parallelism

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

**Table 2-5-5 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				

## 2-5-7 Preload

PMN series provides three different preload levels for various applications.

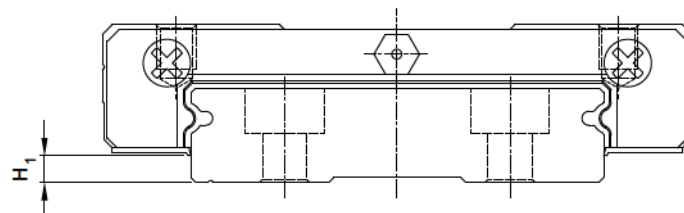
**Table 2-5-6 Preload Classes**

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.

## 2-5-8 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 provide bottom seals as an option. Note that "H1" would reduced if bottom seals are attached, be aware of possible interference between block and mounting surface.



**Table 2-5-7**

Size	Bottom seal	H <sub>1</sub> mm
PMN9	●	1
PMN12	●	2

PM Series

Miniature

2-5-9 Mounting Surface Accuracy Tolerance

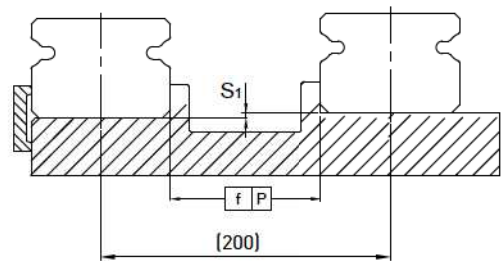


Table 2-5-8 Max. Parallelism Tolerance (P) unit: μm

Size	Preload classes		
	ZF	Z0	Z1
PM5	2	2	2
PM9	4	4	3
PM12	9	9	5

Table 2-5-9 Max. Tolerance of Reference Surface Height (S<sub>1</sub>) unit: μm

Size	Preload classes		
	ZF	Z0	Z1
PM5	20	20	2
PM9	35	35	6
PM12	50	50	12

Table 2-5-10 Permissible Error of Mounting Surface unit: mm

Size	Flatness of the Mounting Surface
PM5	0.015/200
PM9	0.035/200
PM12	0.050/200

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.

## 2-5-10 Cautions for Installation

### ○ Shoulder heights and fillets

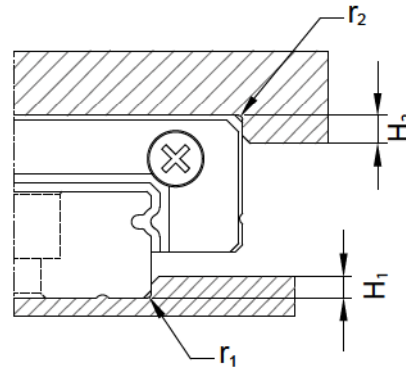


Table 2-5-11 Shoulder Heights and Fillets

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)
PMN 5	0.1	0.2	1.2	2
PMN 9	0.2	0.3	1.7	3
PMN 12	0.3	0.4	1.7	4
PMW 5	0.1	0.2	1.2	2

### ○ 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 sizes of bolts.

Table 2-5-12 Tightening Torque

Size	Bolt size	Torque, N-cm (kgf-cm)		
		Iron	Casting	Aluminum
PMN 5	M2×0.4P×6L	57(5.9)	39.2(4)	29.4(3)
PMN 9	M3×0.5P×8L	186 (19)	127 (13)	98 (10)
PMN 12	M3×0.5P×8L	186 (19)	127 (13)	98 (10)
PMW 5	M2.5×0.45P×7L	118(12)	78.4(8)	58.8(6)

Note : 1 kgf = 9.81 N

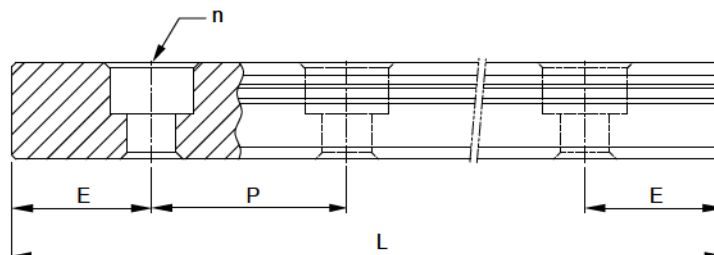


## PM Series

### Miniature

#### 2-5-11 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 2-5-13

unit: mm

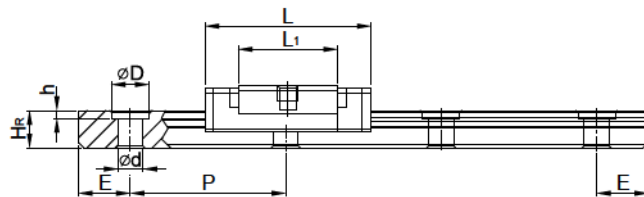
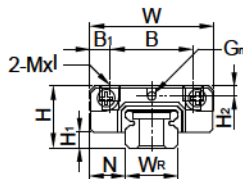
Item	PMNR 5M	PMNR 9M	PMNR 12M	PMWR 5M
Standard Length L (n)	40 (3)	55 (3)	70 (3)	50 (3)
	55 (4)	75 (4)	95 (4)	70 (4)
	70 (5)	95 (5)	120 (5)	90 (5)
	100 (7)	115 (6)	145 (6)	110 (6)
	130 (9)	135 (7)	170 (7)	130 (7)
	160 (11)	155 (8)	195 (8)	150 (8)
		175 (9)	220 (9)	170 (9)
		195 (10)	245 (10)	
		275 (14)	270 (11)	
		375 (19)	320 (13)	
			370 (15)	
			470 (19)	
			570 (23)	
			695 (28)	
Pitch [P]	15	20	25	20
Distance to End [E <sub>s</sub> ]	5	7.5	10	5
Max. Standard Length	250 (17)	1195 (60)	1995 (80)	250 (13)
Max. Length	250	1200	2000	250

- 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.

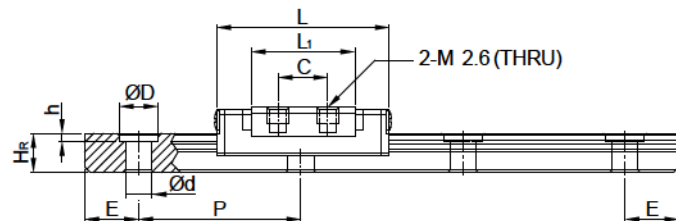
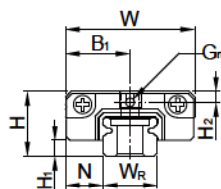
## 2-5-12 Dimensions for PMN Series

### (1)PMN-C/PMN-H

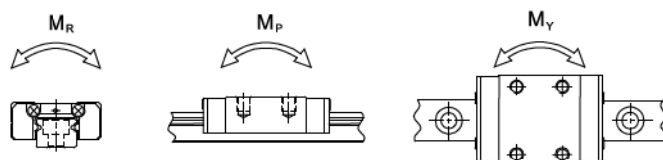
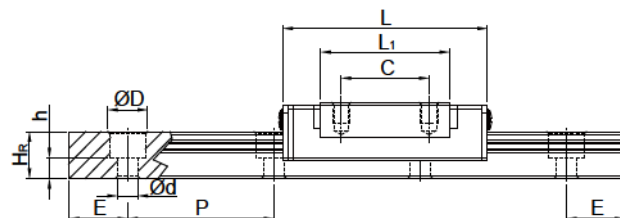
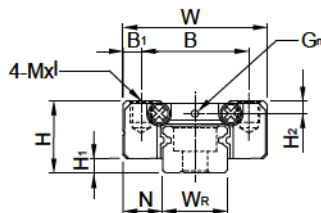
#### PMN5C , PMN5H



#### PMN5HL



#### PMN9, PMN12



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 <sub>z</sub>	M <sub>y</sub>	M <sub>x</sub>	Block	Rail
	H	H <sub>1</sub>	N	W	B	B <sub>1</sub>	C	L <sub>1</sub>	L	G	G <sub>s</sub>	MxL	H <sub>2</sub>	W <sub>R</sub>	H <sub>R</sub>	D	h	d	P	E	(mm)	C(kN)	C <sub>s</sub> (kN)	N-m	N-m	N-m	kg	kg/m			
PMN5C					8	2	-	9.6	16			M2x1.5										0.54	0.84	2	1.3	1.3	0.008				
PMN5H	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	0.01	0.15			
PMN5HL					-	6	7	12.6	19			M2.6-THRU										0.67	1.08	2.6	2.3	2.3	0.01				
PMN9C	10	2.2	5.5	20	15	2.5	10	19.4	30	-	Ø1.4	M3x3	1.8	9	6.5	6	3.5	3.5	20	7.5	M3x8	2.01	2.84	13.05	8.97	8.97	0.012	0.38			
PMN12C	13	3	7.5	27	20	3.5	15	22	35	-	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	0.025	0.65			

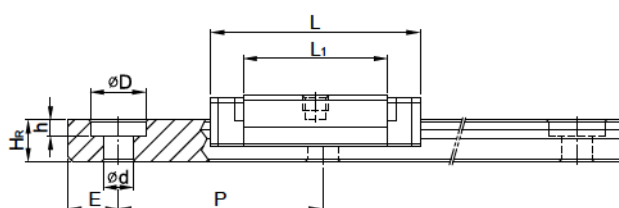
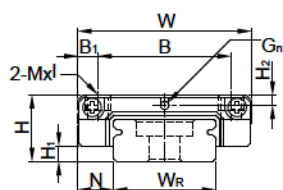
Note : 1 kgf = 9.81 N

## PM Series

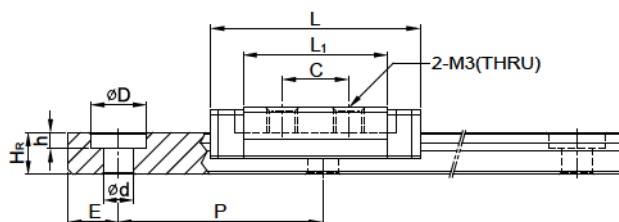
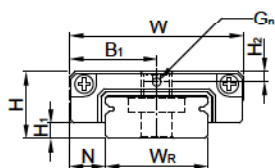
### Miniature

#### (2)PMW-C

##### PMW5C



##### PMW5CL



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 <sub>1</sub>	N	W	B	B <sub>1</sub>	C	L <sub>1</sub>	L	G	G <sub>s</sub>	MxL	H <sub>2</sub>	W <sub>R</sub>	H <sub>R</sub>	D	h	d	P	E	(mm)	C(kN)	C <sub>0</sub> (kN)	M <sub>z</sub>	M <sub>p</sub>	M <sub>y</sub>	Block	Rail	
																								N-m	N-m	N-m	kg	kg/m	
PMW5C	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	
PMW5CL					-	8.5	6.5					M3-THRU																	

Note : 1 kgf = 9.81 N



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