

# Linear Guideways

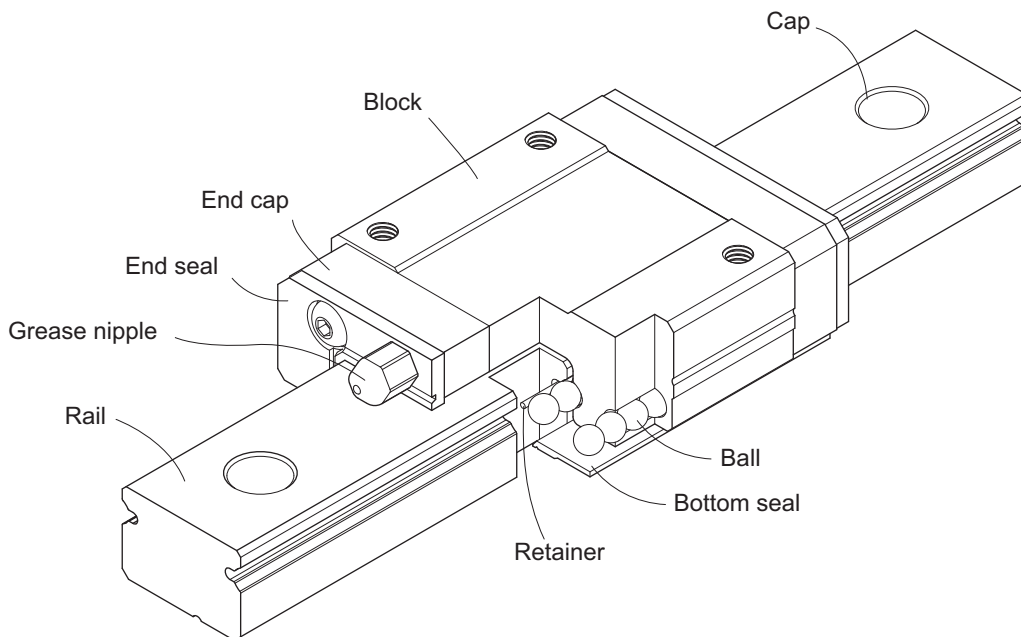
## MG Series

### 2-3 MG Series - Miniature Linear Guideway

#### 2-3-1 Features of MGN Series

1. Tiny and light weight, suitable for miniature equipment.
2. All materials in special grade of stainless steel for anti-corrosion size 9 and 12 are also available in alloy steel.
3. Gothic arch contact design can sustain the load from all directions and offer high rigidity and high accuracy.
4. Steel balls will be held by miniature retainer to avoid the balls from falling out even when the blocks are removed from the rail installation.
5. Interchangeable types are available in certain precision grades.

#### 2-3-2 Construction of MGN Series



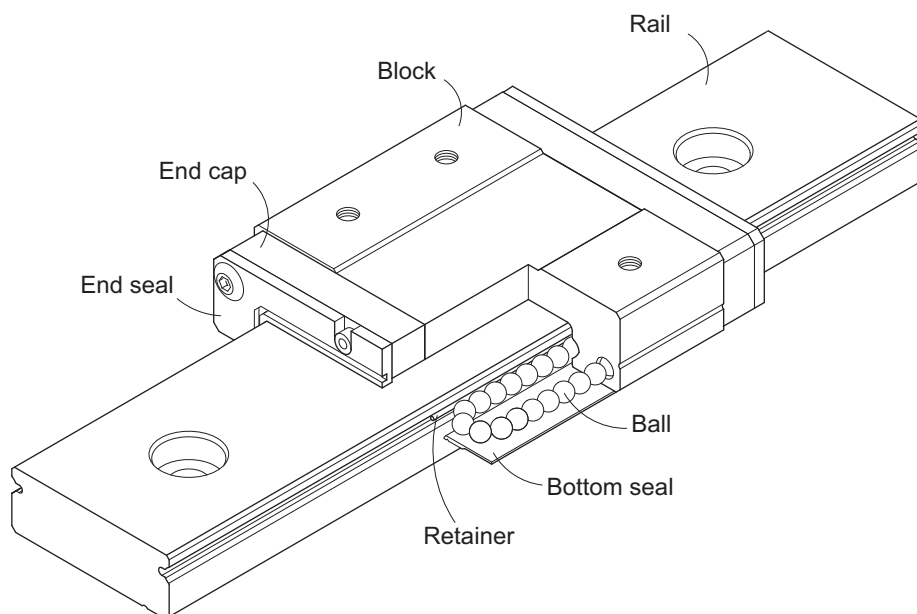
- Rolling circulation system: Block, rail, end cap and retainer
- Lubrication system: The grease nipple is available for MGN15, grease gun can be used for lubricating.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

### 2-3-3 Feature of MGW Series

The design feature of wide type miniature guideway-MGW:

1. The design of enlarged width has increased 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.

### 2-3-4 Configuration of MGW Series



- Rolling circulation system: Block, rail, end cap and retainer
- Lubrication system: The grease nipple is available for MGW15, grease gun can be used for lubricating.
- Dust protection system: End seal, bottom seal (optional size 9,12,15), cap (size12,15)

### 2-3-5 Application

MGN/MGW series can be used in many fields, such as semiconductor equipment, PCB assembly equipment, medical equipment, robotics, measuring equipment, office automation equipment, and other miniature sliding machinery.

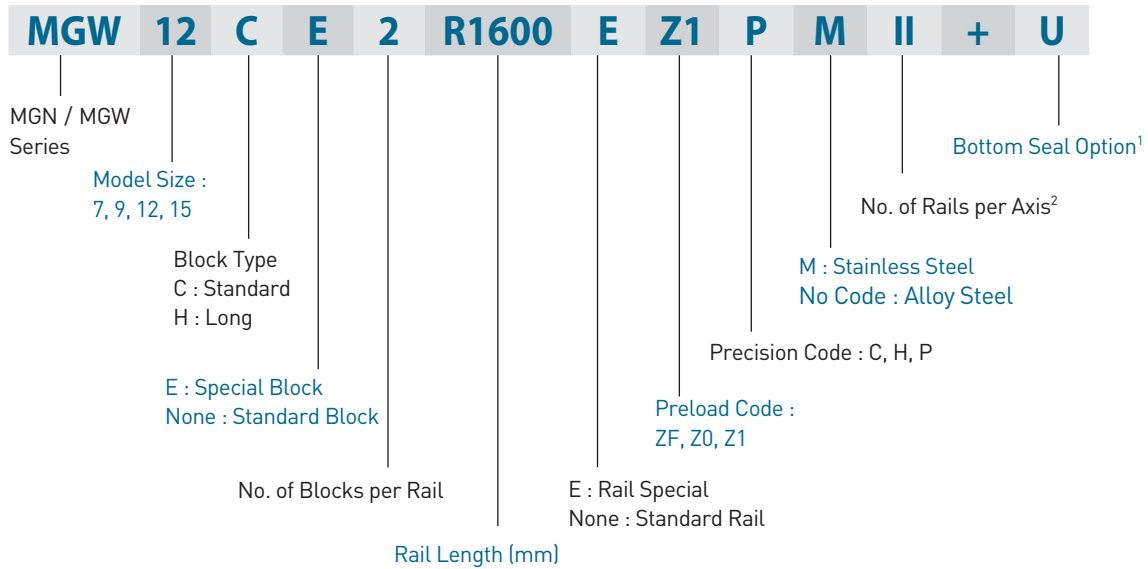
### 2-3-6 Model Number of MGN/MGW Series

MGN and MGW series linear guideway can be classified into non-interchangeable and interchangeable types. The sizes of two types are same. The interchangeable type is more convenient due to rails can be replaced. However, its precision is less than non-interchangeable type. Because of strict dimensional control, the interchangeable type linear guideway is a smart choice for customers when rails don't need to be paired for an axis. The model number contains the information of the size, type, accuracy class, preload class, and more.

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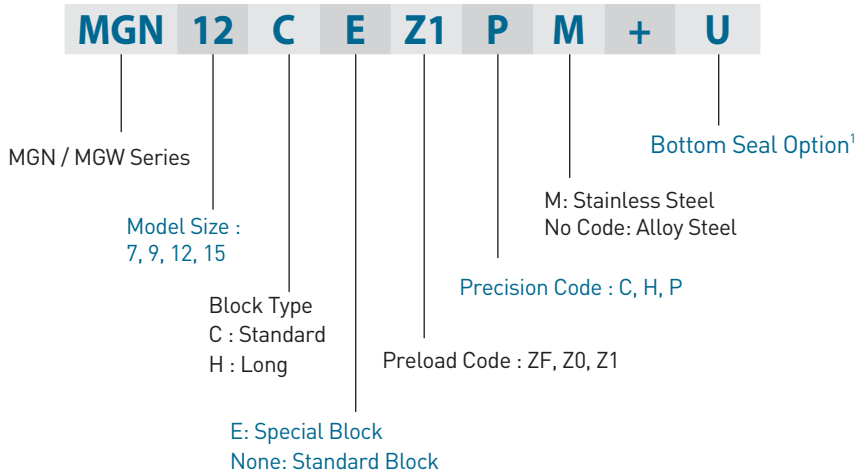
### (1) Non-interchangeable type



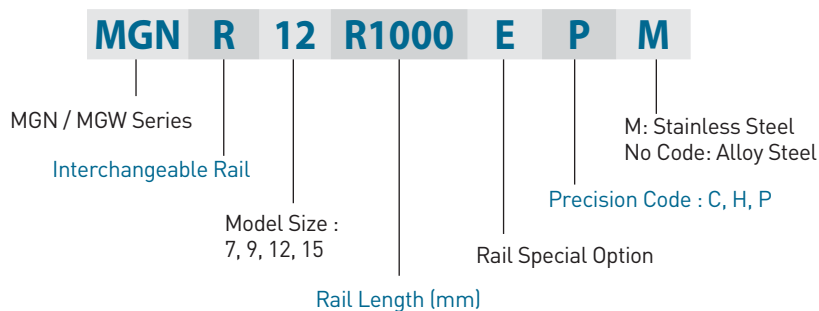
Note: 1. The bottom seal is available for MGN & MGW 9, 12, 15.  
2. The roman numerals express the number of rails used in one axis. No symbol indicates single rail in an axis.

### (2) Interchangeable type

#### ○ Interchangeable Block

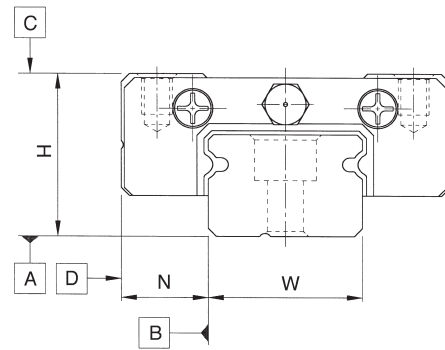


#### ○ Interchangeable Rail



### 2-3-7 Accuracy Classes

The accuracy of MGN/MGW series can be classified into three classes: normal (C), high (H), precision (P), super precision(SP), ultra precision (UP). Customers can select the proper linear guideway by the required accuracy of the application.



#### (1) Non-interchangeable

The accuracy values are taken at the central part of each block.

Table 2.45 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 2.47 |          |               |
| Running parallelism of block surface D to surface B | According to Table 2.47 |          |               |

#### (2) Interchangeable

Height variation between the interchangeable and non-interchangeable types is minimal.

Table 2.46 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  | 0.03     | 0.02          |
| Pair Variation of width N (Master Rail)             | 0.07                       | 0.04     | 0.02          |
| Running parallelism of block surface C to surface A | According to Table 2.47    |          |               |
| Running parallelism of block surface D to surface B | According to Table 2.47    |          |               |

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### (3) Accuracy of running parallelism

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

Table 2.47 Accuracy of Running Parallelism

| Rail Length<br>(mm) | Accuracy (μm) |     |     | Rail Length<br>(mm) | Accuracy (μm) |     |     |
|---------------------|---------------|-----|-----|---------------------|---------------|-----|-----|
|                     | (C)           | (H) | (P) |                     | (C)           | (H) | (P) |
| 50 & under          | 12            | 6   | 2   | 315 ~ 400           | 18            | 11  | 6   |
| 50 ~ 80             | 13            | 7   | 3   | 400 ~ 500           | 19            | 12  | 6   |
| 80 ~ 125            | 14            | 8   | 3.5 | 500 ~ 630           | 20            | 13  | 7   |
| 125 ~ 200           | 15            | 9   | 4   | 630 ~ 800           | 22            | 14  | 8   |
| 200 ~ 250           | 16            | 10  | 5   | 800 ~ 1,000         | 23            | 16  | 9   |
| 250 ~ 315           | 17            | 11  | 5   | 1,000 ~ 1,200       | 25            | 18  | 11  |

### 2-3-8 Preload

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

Table 2.48 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.

### 2-3-9 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 12 and 15 provide bottom seals as an option, but sizes 7 and 9 do not offer the option due to the space limit of H<sub>1</sub>. If the linear guideway is equipped with a bottom seal, the lateral mounting surface of the rail must not exceed H<sub>1</sub>.

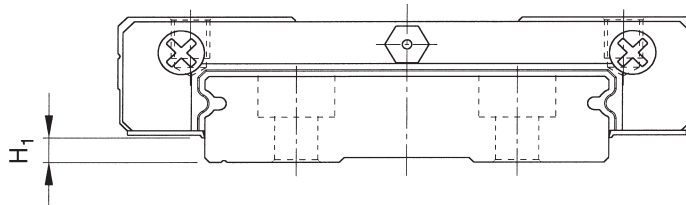


Table 2.49

| Size   | Bottom seal | H <sub>1</sub> mm |
|--------|-------------|-------------------|
| MGN 7  | -           | -                 |
| MGN 9  | -           | -                 |
| MGN 12 | ●           | 2                 |
| MGN 15 | ●           | 3                 |
| MGW 7  | -           | -                 |
| MGW 9  | -           | -                 |
| MGW 12 | ●           | 2.6               |
| MGW 15 | ●           | 2.6               |

## 2-3-10 Cautions for Installation

- Shoulder heights and fillets

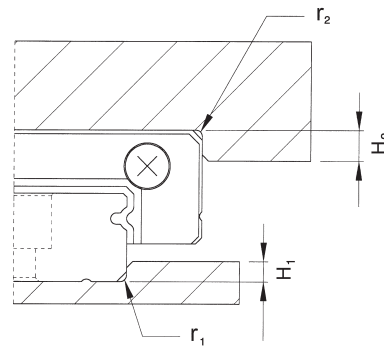


Table 2.50 Shoulder Heights and Fillets

| Size   | Max. radius of fillets<br>$r_1$ (mm) | Max. radius of fillets<br>$r_2$ (mm) | Shoulder height<br>$H_1$ (mm) | Shoulder height<br>$H_2$ (mm) |
|--------|--------------------------------------|--------------------------------------|-------------------------------|-------------------------------|
| 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                             |
| 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

Improperly tightening the 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 2.51 Tightening Torque

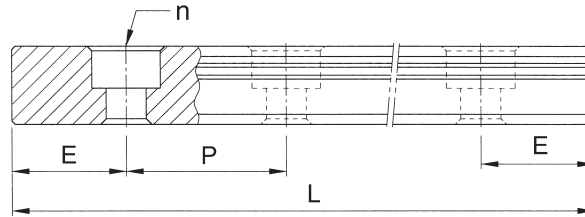
| Size   | Bolt size | Torque (kgf-cm) |
|--------|-----------|-----------------|
| MGN 7  | M2        | 5.9             |
| MGN 9  | M3        | 19              |
| MGN 12 | M3        | 19              |
| MGN 15 | M3        | 19              |
| MGW 7  | M3        | 19              |
| MGW 9  | M3        | 19              |
| MGW 12 | M4        | 40              |
| MGW 15 | M4        | 40              |

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### 2-3-11 Standard and Maximum Lengths of Rail

HIWIN stocks standard lengths of rail. If a non-standard length is required, it is recommended to specify the E value to be not greater than 1/2 of the pitch (P) to avoid instability at the end of the rail, and the E value should not be less than E<sub>min</sub> in order to prevent breaking the end mounting hole.



$$L = (n - 1) \cdot P + 2 \cdot E \quad \dots \dots \dots \text{Eq.2.3}$$

- 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 2.52

unit: mm

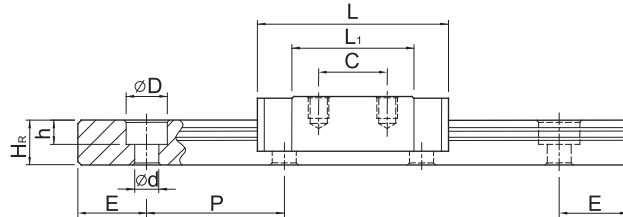
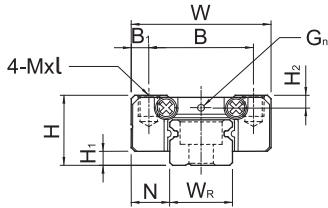
| Item                              | MGNR    | MGNR    | MGNR    | MGNR    | MGWR    | MGWR     | MGWR     | MGWR     |
|-----------------------------------|---------|---------|---------|---------|---------|----------|----------|----------|
|                                   | 7M      | 9M      | 12M     | 15M     | 7M      | 9M       | 12M      | 15M      |
| Standard Length L(n)              | 40(3)   | 55(3)   | 70(3)   | 70(2)   | 80(3)   | 80(3)    | 110(3)   | 110(3)   |
|                                   | 55(4)   | 75(4)   | 95(4)   | 110(3)  | 110(4)  | 110(4)   | 150(4)   | 150(4)   |
|                                   | 70(5)   | 95(5)   | 120(5)  | 150(4)  | 140(5)  | 140(5)   | 190(5)   | 190(5)   |
|                                   | 85(6)   | 115(6)  | 145(6)  | 190(5)  | 170(6)  | 170(6)   | 230(6)   | 230(6)   |
|                                   | 100(7)  | 135(7)  | 170(7)  | 230(6)  | 200(7)  | 200(7)   | 270(7)   | 270(7)   |
|                                   | 130(9)  | 155(8)  | 195(8)  | 270(7)  | 260(9)  | 230(8)   | 310(8)   | 310(8)   |
|                                   |         | 175(9)  | 220(9)  | 310(8)  |         | 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      | 20      | 25      | 40      | 30      | 30       | 40       | 40       |
| Distance to End (E <sub>s</sub> ) | 5       | 7.5     | 10      | 15      | 10      | 10       | 15       | 15       |
| Max. Standard Length              | 595(40) | 995(40) | 995(40) | 990(25) | 590(20) | 980(33)  | 1150(29) | 1150(29) |
| Max. Length                       | 600     | 1000    | 1000    | 1000    | 1000    | 1000     | 1200     | 1200     |

- 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 means the max. rail length with standard E value on both sides.
- 3. The specification with "M" mark are stainless steel and without "M" mark are alloy steel.
- 4. If smaller E value is needed, please contact HIWIN.

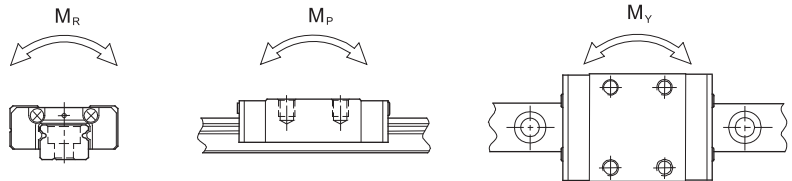
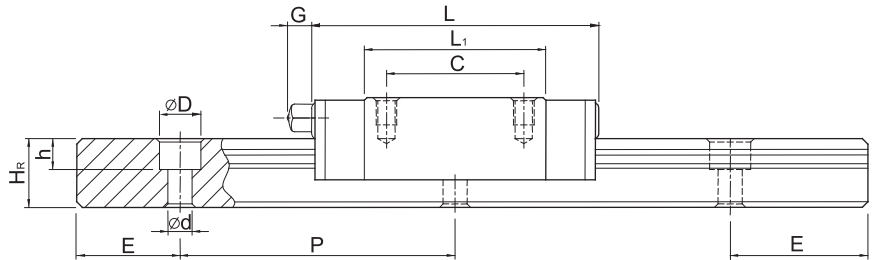
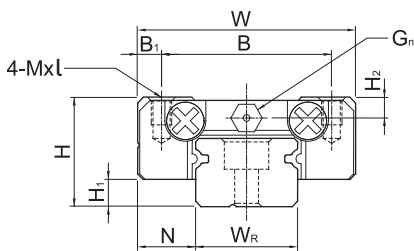
## 2-3-12 Dimensions for MGN/MGW Series

### (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 (mm) | Basic Dynamic Load Rating C(kgf) | Basic Static Load Rating C <sub>0</sub> (kgf) | 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>n</sub> | Mxl    | H <sub>2</sub> | W <sub>R</sub>          | H <sub>R</sub> | D   | h   | d   |                             |                                  |   | P                   | E   | M <sub>R</sub> | M <sub>P</sub> | M <sub>Y</sub> | Block | Rail |
|           | kgf                         | kgf            | kgf                      | kgf | kgf | kgf            | kgf | kgf            | kgf  | kgf | kgf            | kgf    | kgf            | kgf                     | kgf            | kgf | kgf | kgf |                             |                                  |   | kgf                 | kgf | kgf            | kgf-m          | kgf-m          | kgf-m | g    |
| 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  | 100                 | 127 | 0.48           | 0.29           | 0.29           | 10    | 0.22 |
| MGN 7H    |                             |                |                          |     |     |                | 13  | 21.8           | 30.8 |     |                |        |                |                         |                |     |     |     |                             |                                  |   | 140                 | 200 | 0.78           | 0.49           | 0.49           | 15    |      |
| MGN 9C    | 10                          | 2              | 5.5                      | 20  | 15  | 2.5            | 10  | 18.9           | 28.9 | -   | Ø1.2           | M3x3   | 1.8            | 9                       | 6.5            | 6   | 3.5 | 3.5 | 20                          | 7.5                              | M3x8  | 190                 | 260 | 1.2            | 0.75           | 0.75           | 16    | 0.38 |
| MGN 9H    |                             |                |                          |     |     |                | 16  | 29.9           | 39.9 |     |                |        |                |                         |                |     |     |     |                             |                                  |   | 260                 | 410 | 2              | 1.9            | 1.9            | 26    |      |
| MGN 12C   | 13                          | 3              | 7.5                      | 27  | 20  | 3.5            | 15  | 21.7           | 34.7 | -   | Ø1.4           | M3x3.5 | 2.5            | 12                      | 8              | 6   | 4.5 | 3.5 | 25                          | 10                               | M3x8  | 290                 | 400 | 2.6            | 1.4            | 1.4            | 34    | 0.65 |
| MGN 12H   |                             |                |                          |     |     |                | 20  | 32.4           | 45.4 |     |                |        |                |                         |                |     |     |     |                             |                                  |   | 380                 | 600 | 3.9            | 3.7            | 3.7            | 54    |      |
| MGN 15C   | 16                          | 4              | 8.5                      | 32  | 25  | 3.5            | 20  | 26.7           | 42.1 | 4.5 | CN3S           | M3x4   | 3              | 15                      | 10             | 6   | 4.5 | 3.5 | 40                          | 15                               | M3x10   | 470                 | 570 | 4.6            | 2.2            | 2.2            | 59    | 1.06 |
| MGN 15H   |                             |                |                          |     |     |                | 25  | 43.4           | 58.8 |     |                |        |                |                         |                |     |     |     |                             |                                  |   | 650                 | 930 | 7.5            | 5.9            | 5.9            | 92    |      |

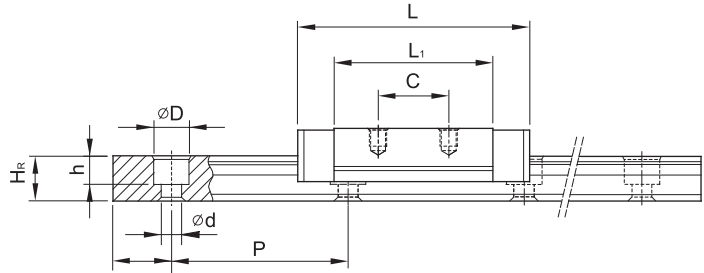
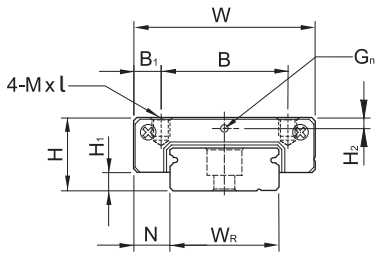


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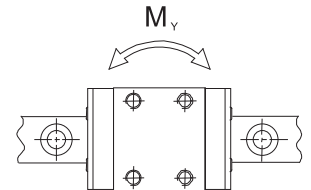
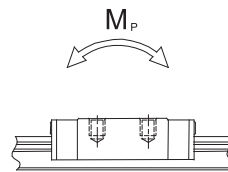
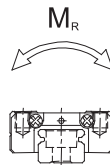
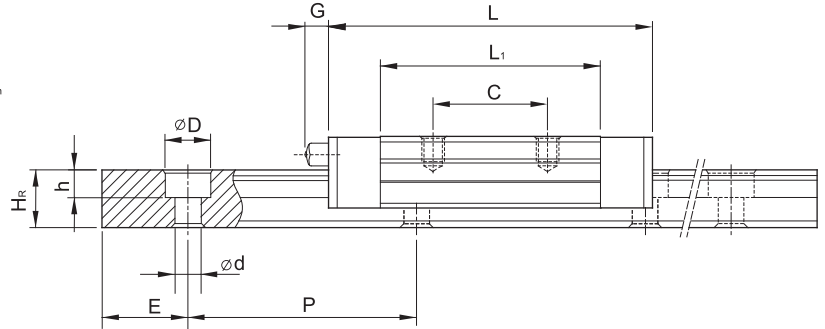
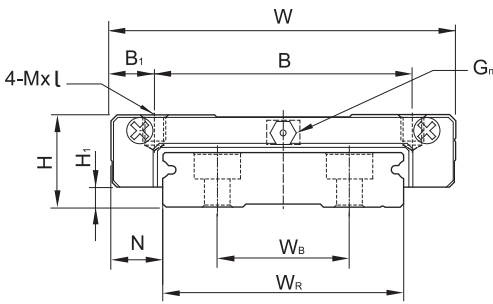
## MG Series

### (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 (mm) | Basic Dynamic Load Rating C (kgf) | Basic Static Load Rating C <sub>0</sub> (kgf) | 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>n</sub> | MxL    | H <sub>2</sub>          | W <sub>R</sub> | W <sub>B</sub> | H <sub>R</sub> | D |                             |                                   |   | h                   | d     | P    | E      | M <sub>R</sub> | M <sub>P</sub> | M <sub>Y</sub> | Block g | Rail kg/m |
|           | kgf-m                       | kgf-m          | kgf-m                    | g  | kg/m |                |    |                |      |     |                |        |                         |                |                |                |   |                             |                                   |   |                     |       |      |        |                |                |                |         |           |
| MGW 7C    | 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  | 140  | 210    | 1.6            | 0.73           | 0.73           | 20      | 0.51      |
| MGW 7H    |                             |                |                          |    |      |                | 19 | 30.8           | 41   |     |                |        |                         |                |                |                |   |                             |                                   |   |                     | 180   | 320  | 2.39   | 1.58           | 1.58           | 29             |         |           |
| MGW 9C    | 12                          | 2.9            | 6                        | 30 | 21   | 4.5            | 12 | 27.5           | 39.3 | -   | Ø1.4           | M3x3   | 2.4                     | 18             | -              | 7              | 6 | 4.5                         | 3.5                               | 30  | 10                  | M3x8  | 280  | 420    | 4.09           | 1.93           | 1.93           | 40      | 0.91      |
| MGW 9H    |                             |                |                          |    | 23   | 3.5            | 24 | 38.5           | 50.7 |     |                |        |                         |                |                |                |   |                             |                                   |   |                     | 350   | 600  | 5.56   | 3.47           | 3.47           | 57             |         |           |
| MGW 12C   | 14                          | 3.4            | 8                        | 40 | 28   | 6              | 15 | 31.3           | 46.1 | -   | Ø1.4           | M3x3.6 | 2.8                     | 24             | -              | 8.5            | 8 | 4.5                         | 4.5                               | 40  | 15                  | M4x8  | 400  | 570    | 7.17           | 2.83           | 2.83           | 71      | 1.49      |
| MGW 12H   |                             |                |                          |    |      |                | 28 | 45.6           | 60.4 |     |                |        |                         |                |                |                |   |                             |                                   |   |                     | 520   | 840  | 10.47  | 5.85           | 5.85           | 103            |         |           |
| MGW 15C   | 16                          | 3.4            | 9                        | 60 | 45   | 7.5            | 20 | 38             | 54.8 | 5.2 | CN3S           | M4x4.2 | 3.2                     | 42             | 23             | 9.5            | 8 | 4.5                         | 4.5                               | 40  | 15                  | M4x10 | 690  | 940    | 20.32          | 5.78           | 5.78           | 143     | 2.86      |
| MGW 15H   |                             |                |                          |    |      |                | 35 | 57             | 73.8 |     |                |        |                         |                |                |                |   |                             |                                   |   |                     | 910   | 1410 | 30.48  | 12.5           | 12.5           | 215            |         |           |