RG Series
High Rigidity Roller Type
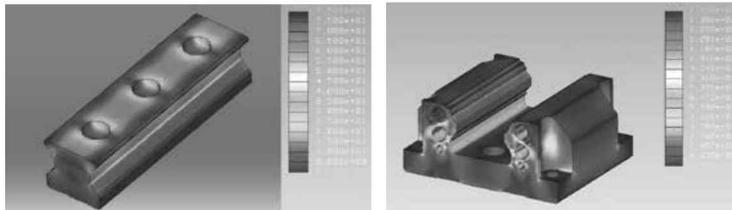
2-9 RG Series – High Rigidity Roller Type Linear Guideway

2-9-1 Advantages and features

The new RG series from HIWIN features a roller as the rolling element instead of steel balls. The roller series offers super high rigidity and very high load capacities. The RG series is designed with a 45-degree angle of contact. Elastic deformation of the linear contact surface, during load, is greatly reduced thereby offering greater rigidity and higher load capacities in all 4 load directions.The RG series linear guideway offers high performance for high-precision manufacturing and achieving longer service life.

(1) Optimal design
FEM analysis was performed to determine the optimal structure of the block and the rail. The unique design of the circulation path allows the RG series linear guideway to offer smoother linear motion.


(2) Super high rigidity
The RG series is a type of linear guideway that uses rollers as the rolling elements. Rollers have a greater contact area than balls so that the roller guideway features higher load capacity and greater rigidity. The figure shows the rigidity of a roller and a ball with equal volume.
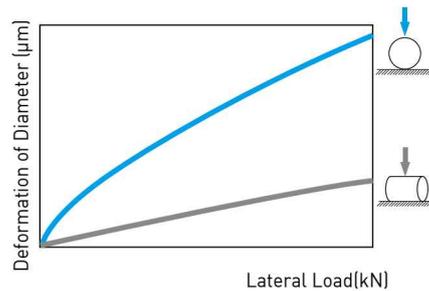
(3) Super high load capacity
With the four rows of rollers arranged at a contact angle of 45-degrees, the RG series linear guideway has equal load ratings in the radial, reverse radial and lateral directions. The RG series has a higher load capacity in a smaller size than conventional, ball-type linear guideways.
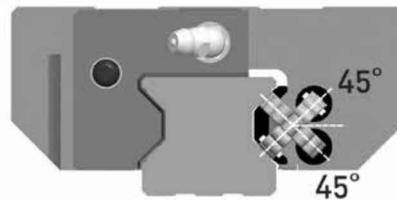
(4) Operating life increased
Compare with the ball element, the contact pressure of rolling element is distributed on the line region. Therefore, stress concentration was reduced siginificantly and the RG series offers longer running life. The nominal life of RG series can be calculated by using Eq.

The acting load will affect the nominal life of a linear guideway. Based on the selected basic dynamic rated load and the actual load. The nominal life of ball type and roller type linear guideway can be calculated by Eq.2.5 respectively.

$$L = \left(\frac{C}{P}\right)^{\frac{10}{3}} \cdot 100 \text{km} = \left(\frac{C}{P}\right)^{\frac{10}{3}} \cdot 62 \text{mile} \quad \cdots\cdots\cdots\cdots \text{Eq. 2.5}$$

If the environmental factors are taken into consideration, the nominal life is influenced greatly by the motion conditions, the hardness of the raceway, and the temperature of the linear guideway. The relationship between these factors is expressed in Eq.2.6.

$$L = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P}\right)^{\frac{10}{3}} \cdot 100 \text{km} = \left(\frac{f_h \cdot f_t \cdot C}{f_w \cdot P}\right)^{\frac{10}{3}} \cdot 62 \text{mile} \quad \cdots\cdots\cdots \text{Eq. 2.6}$$

L : Nominal life f_h : Hardness factor
C : Basic dynamic load rating f_t : Temperature factor
P : Actual load f_w : Load factor

(5) Test Data
1. Nominal life test

Model of the test system

Table 2-9-1

Tested model 1: RGH35CA
Preload: ZA class
Max. Speed: 60m/min
Acceleration: 1G
Stroke: 0.55m
Lubrication: grease held every 100km
External load: 15kN
Traveling distance: 1135km

Test results:
The nominal life of RGH35CA is 1000km.
After traveling 1135km, fatigue flaking did not appear on the surface of the raceway or rollers.

2. Durability Test

Tested model 2: RGW35CC
Preload: ZA class
Max. Speed: 120m/min
Acceleration: 1G
Stroke: 2m
Lubrication: oil feed rate: 0.3cm³/hr
External load: 0kN
Traveling distance: 15000km

Test results:
Fatigue flaking did not appear on the surface of the raceway or rollers after traveling 15000km.
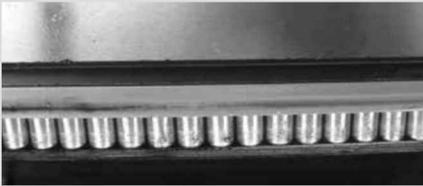
Note: The data listed are from samples.

2-9-2 Construction of RG Series
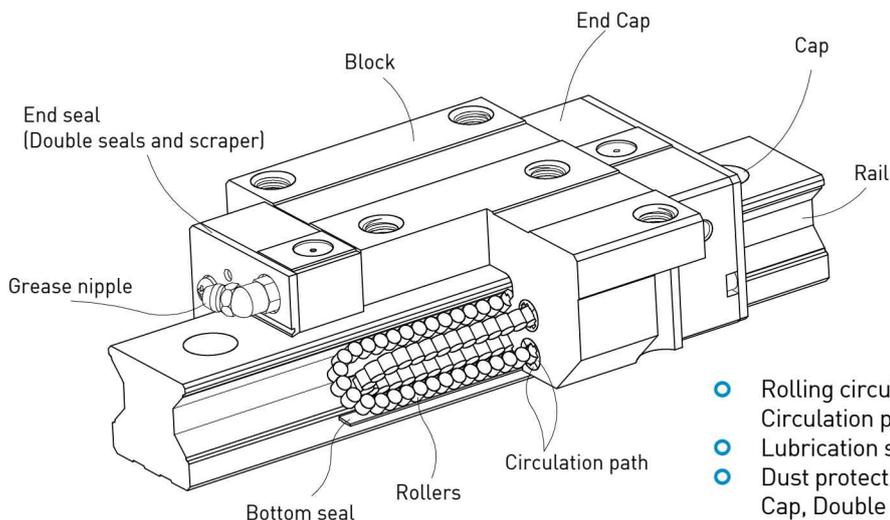
- Rolling circulation system: Block, Rail, End cap, Circulation path, rollers
- Lubrication system: Grease nipple and piping joint
- Dust protection system: End seal, Bottom seal, Cap, Double seals and Scraper

RG Series
High Rigidity Roller Type

2-9-3 Model Number of RG series

RG series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of strict dimensional control, the interchangeable type linear guideways are a wise choice for customers when rails do not need to be matched for an axis. The model number of the RG series identifies the size, type, accuracy class, preload class, etc.

(1) Non-interchangeable type

RG W 35 C C E 2 R 1640 E ZA P II + KK/E2+RC

RG Series

Block Type
W : Flange Type
H : Square Type
L : Square Type (Low)[3]
S : Square (Ultra low)
F : Flange (Ultra low)

Model size
15, 20, 25, 30, 35, 45, 55, 65

Load Type
C : Heavy Load
H : Super Heavy Load

Block Mounting
A : Mounting From Top
C : Top or Bottom

E: Special Block
None: Standard Block

No. of Blocks per Rail

RC:
Reinforced Cap

E2: Self-Lubricant[4]

Dust Protection[2]

No. of Rails per matched set [1]

Precision Code: H, P, SP, UP

Preload Code: Z0, ZA, ZB

E: Special Rail
None: Standard Rail

Rail Length (mm)

Rail Mounting Type
R : Mounting From Top
T : Bottom

Note: 1. The roman numerals express a matched set of rails.
2. No symbol indicates standard protection (end seal and bottom seal).
   ZZ : End seal, bottom seal and scraper
   KK: Double seals, bottom seal and scraper.
   DD: Double seals and bottom seal
3. Block type RGL is the low profile design of RGH (square type), the assembled height is same as RGW (flange type) in same size.
4. E2 does not apply to RGS/RGF.

(2) Interchangeable type
Model Number of RG Block

RG W 25 C C E ZA P + ZZ/E2

RG Series

Block Type
W : Flange Type
H : Square Type
L : Square Type (Low)[3]
S : Square (Ultra low)
F : Flange (Ultra low)

Model size
15, 20, 25, 30, 35, 45, 55, 65

Load Type
C : Heavy Load
H : Super Heavy Load

E2: Self-Lubricant[4]

Dust Protection[2]

Precision Code : H, P

Preload Code : Z0, ZA

E: Special Block
None: Standard block
Block Mounting Type
A : Mounting From Top
C : Top or Bottom

○ **Model Number of RG Rail**

RG R 25 R 1240 E P + RC

RG Series
Interchangeable Rail
Model size
15,20,25, 30, 35, 45, 55, 65
Rail Mounting Type
R : Mounting From Top
T : Bottom

RC:Reinforced Cap
Precision Code : H, P
E: Special Rail,
None: Standard Rail
Rail Length (mm)

2-9-4 Types

(1) Block types

HIWIN offers two types of guide blocks, flange and square type. Because of the low assembly height and large mounting surface, the flange type is excellent for heavy moment load applications.

Table 2-9-2 **Block Types**

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Applications
Square	RGH-CA RGH-HA		28 ↓ 90	100 ↓ 4000	○ Automation Systems ○ Transportation equipment ○ CNC machining centers ○ Heavy duty cutting machines
Square (low)	RGL-CA RGL-HA		24 ↓ 70	100 ↓ 4000	○ CNC grinding machines ○ Injection molding machines ○ Plano millers ○ Devices requiring high rigidity ○ Devices requiring high load capacity
Square (Ultra low)	RGS-CA RGS-HA		44 ↓ 52	100 ↓ 4000	○ Electric discharge machines
Flange	RGW-CC RGW-HC		24 ↓ 90	100 ↓ 4000	
Flange (Ultra low)	RGF-CC RGF-HC		44 ↓ 52	100 ↓ 4000	

RG Series
High Rigidity Roller Type

(2) Rail types

In addition to the standard top mounting type, HIWIN also offers the bottom mounting type of rails.

Table 2-9-3 **Rail Types**

Mounting from Top	Mounting from Bottom

2-9-5 Accuracy Classes

The accuracy of the RG series can be classified into four classes: high (H), precision (P), super precision (SP) and ultra precision (UP). Customers may choose the class by referencing the accuracy requirements of the applied equipment.

(1) Accuracy of non-interchangeable

Table 2-9-4 **Accuracy Standards**   Unit: mm

Item	RG - 15, 20			
Accuracy Classes	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Dimensional tolerance of width N	± 0.03	0 - 0.03	0 - 0.015	0 - 0.008
Variation of height H	0.01	0.006	0.004	0.003
Variation of width N	0.01	0.006	0.004	0.003
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			
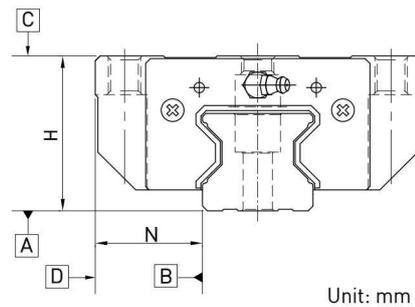
Table 2-9-5 **Accuracy Standards**   Unit: mm

Item	RG - 25, 30, 35			
Accuracy Classes	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dimensional tolerance of height H	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Dimensional tolerance of width N	± 0.04	0 - 0.04	0 - 0.02	0 - 0.01
Variation of height H	0.015	0.007	0.005	0.003
Variation of width N	0.015	0.007	0.005	0.003
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

Table 2-9-6 **Accuracy Standards**   Unit: mm

Item	RG - 45, 55			
Accuracy Classes	**High** (H)	**Precision** (P)	**Super Precision** (SP)	**Ultra Precision** (UP)
Dimensional tolerance of height H	± 0.05	0 - 0.05	0 - 0.03	0 - 0.02
Dimensional tolerance of width N	± 0.05	0 - 0.05	0 - 0.03	0 - 0.02
Variation of height H	0.015	0.007	0.005	0.003
Variation of width N	0.02	0.01	0.007	0.005
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

Table 2-9-7 **Accuracy Standards**   Unit: mm

Item	RG - 65			
Accuracy Classes	**High** (H)	**Precision** (P)	**Super Precision** (SP)	**Ultra Precision** (UP)
Dimensional tolerance of height H	± 0.07	0 - 0.07	0 - 0.05	0 - 0.03
Dimensional tolerance of width N	± 0.07	0 - 0.07	0 - 0.05	0 - 0.03
Variation of height H	0.02	0.01	0.007	0.005
Variation of width N	0.025	0.015	0.01	0.007
Running parallelism of block surface C to surface A	See Table 2-9-12			
Running parallelism of block surface D to surface B	See Table 2-9-12			

(2) Accuracy of interchangeable

Table 2-9-8 **Accuracy Standards**   Unit: mm

| Item	RG - 15, 20	
Accuracy Classes	**High** (H)	**Precision** (P)
Dimensional tolerance of height H	± 0.03	± 0.015
Dimensional tolerance of width N	± 0.03	± 0.015
Variation of height H	0.01	0.006
Variation of width N	0.01	0.006
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

Table 2-9-9 **Accuracy Standards**   Unit: mm

Item	RG - 25, 30, 35	
Accuracy Classes	**High** (H)	**Precision** (P)
Dimensional tolerance of height H	± 0.04	± 0.02
Dimensional tolerance of width N	± 0.04	± 0.02
Variation of height H	0.015	0.007
Variation of width N	0.015	0.007
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

Table 2-9-10 **Accuracy Standards**   Unit: mm

Item	RG - 45, 55	
Accuracy Classes	**High** (H)	**Precision** (P)
Dimensional tolerance of height H	± 0.05	± 0.025
Dimensional tolerance of width N	± 0.05	± 0.025
Variation of height H	0.015	0.007
Variation of width N	0.02	0.01
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

Table 2-9-11 **Accuracy Standards**   Unit: mm

Item	RG - 65	
Accuracy Classes	**High** (H)	**Precision** (P)
Dimensional tolerance of height H	± 0.07	± 0.035
Dimensional tolerance of width N	± 0.07	± 0.035
Variation of height H	0.02	0.01
Variation of width N	0.025	0.015
Running parallelism of block surface C to surface A	See Table 2-9-12	
Running parallelism of block surface D to surface B	See Table 2-9-12	

(3) Accuracy of running parallelism

Table 2-9-12 **Accuracy of Running Parallelism**

Rail Length (mm)	Accuracy (µm)			
	H	P	SP	UP
~ 100	7	3	2	2
100 ~ 200	9	4	2	2
200 ~ 300	10	5	3	2
300 ~ 500	12	6	3	2
500 ~ 700	13	7	4	2
700 ~ 900	15	8	5	3
900 ~ 1,100	16	9	6	3
1,100 ~ 1,500	18	11	7	4
1,500 ~ 1,900	20	13	8	4
1,900 ~ 2,500	22	15	10	5
2,500 ~ 3,100	25	18	11	6
3,100 ~ 3,600	27	20	14	7
3,600 ~ 4,000	28	21	15	7

2-9-6 Preload

A preload can be applied to each guideway using oversized rollers. Generally, a linear motion guideway has negative clearance between the raceway and rollers to improve stiffness and maintain high precision. The RG series linear guideway offers three standard preloads for various applications and conditions.

Table 2-9-13

Class	Code	Preload	Condition
Light Preload	Z0	0.02C~ 0.04C	Certain load direction, low impact, low precision required
Medium Preload	ZA	0.07C~0.09C	High rigidity required, high precision required
Heavy Preload	ZB	0.12C~ 0.14C	Super high rigidity required, with vibration and impact

Note:The "C" in the preload column denotes basic dynamic load rating.

The figure shows the relationship between the rigidity, friction and nominal life. A preload no larger than ZA would be recommended for smaller model sizes to avoid over-preload affecting the life of the guideway.
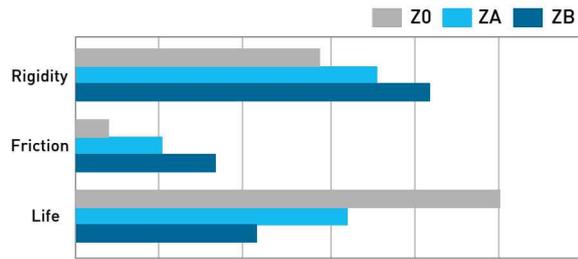
○ Stiffness performance

Stiffness depends on preload. The following table shows stiffness value of each size.

Table 2-9-14 **Radial stiffness for RG Series**

Load type	Series / Size	Stiffness for diffetent preload level(N/μm)		
		Z0	ZA	ZB
Heavy load	RG 15C	497	729	786
	RG 20C	611	881	946
	RG 25C	670	1067	1219
	RG 30C	869	1164	1393
	RG 35C	1043	1324	1606
	RG 45C	1617	1920	2483
	RG 55C	1759	2169	2761
	RG 65C	2533	3045	3868
Super heavy load	RG 20H	820	1188	1275
	RG 25H	857	1385	1567
	RG 30H	1109	1500	1780
	RG 35H	1405	1810	2186
	RG 45H	2175	2608	3397
	RG 55H	2422	3030	3860
	RG 65H	3514	4286	5412

2-9-7 Lubrication

(1) Grease

○ Grease nipple

M6x0.75P — RG25 RG30 RG35 RGS35 RGS45 RGF35 RGF45	PT1/8 — RG45 RG55 RG65
NO.34320001	NO.34320003

M4x0.7P — RG15 RG20	M6x0.75P — RG25 RG30 RG35 RGS35 RGS45 RGF35 RGF45	PT1/8 — RG45 RG55 RG65
NO.34310002	NO.34310008(OPTION)	NO.3431000B(OPTION)

RG Series
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○ **Mounting location**

(1) The standard location of the grease fitting is at either end of the block.
(2) Alternatively, the nipple may be mounted on the side of the block. For side installation, contact HIWIN to pre-drill the block at the desired location.
(3) Mounting the nipple on the top of the block requires an adaptor or o-ring depending on different series. HIWIN will pre-drill the holes to accommodate the application's requirement. For non-standard location, please contact HIWIN.
(4) Oil piping joints may also be used at these locations for lubrication. For customers who need to lubricate from the top on a standard block, HIWIN will pre-tap the block and add a recessed o-ring. Please contact HIWIN for more information.
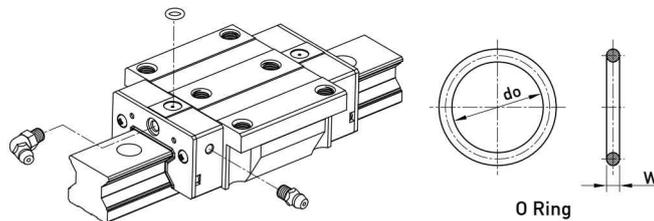
Table 2-9-15 **O-Ring size and max. permissible depth for piercing**

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T_{max} (mm)
RG15	2.5±0.15	1.5±0.15	3.45
RG20	2.5±0.15	1.5±0.15	4
RG25	7.5±0.15	1.5±0.15	5.8
RG30	7.5±0.15	1.5±0.15	6.2
RG35	7.5±0.15	1.5±0.15	8.65
RG45	7.5±0.15	1.5±0.15	9.5
RG55	7.5±0.15	1.5±0.15	11.6
RG65	7.5±0.15	1.5±0.15	14.5
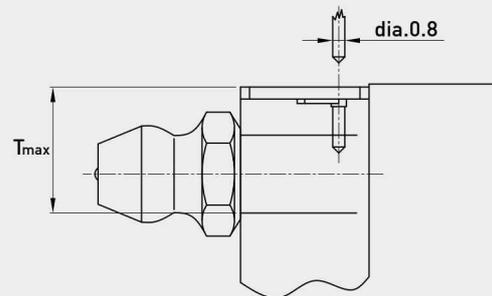
○ **The oil amount for a block filled with grease**

Table 2-9-16 **The oil amount for a block filled with grease**

Size	Heavy Load(cm³)	Super Heavy Load(cm³)	Size	Heavy Load(cm³)	Super Heavy Load(cm³)
RG15	3	-	RG35	12	14
RG20	5	6	RG45	19	23
RG25	7	8	RG55	28	35
RG30	9	10	RG65	52	63

○ **Frequency of replenishment**
Check the grease every 100 km, or every 3-6 months.

(2) Oil

The recommended viscosity of oil is about 32~150cSt. If you need to use oil-type lubrication, please inform us.

Types of oil piping joint

LF-64	LF-76	LF-78-F
M6x0.75P 10 7 8 4 16.5 M4x0.7P Ø5 RG15 RG20 NO.97000EA1	M8x1.0P 18 10 10 3 19.5 M6x0.75P Ø8 RG25 RG30 RG35 RGS35 RGS45 RGF35 RGF45 NO.970002A1	M8x1.0P 18 10 10 22.5 PT 1/8 RG45 RG55 RG65 NO.97003HA1

	LF-86	LF-88-F
	11 PT 1/8 11 12 5 23.5 M6x0.75P Ø8 RG25 RG30 RG35 RGS35 RGS45 RGF35 RGF45 NO.970004A1	12 12 PT 1/8 12 24.3 PT 1/8 RG45 RG55 RG65 NO.97003JA1

	SF-76	SF-78
	10 M8x1.0P 10 19.5 3 M6x0.75P Ø8 RG25 RG30 RG35 RGS35 RGS45 RGF35 RGF45 NO.970001A1	10 M8x1.0P 10 20 2 PT 1/8 Ø10 RG45 RG55 RG65 NO.970005A1

	SF-86	SF-88
	11 PT 1/8 12 23.5 5 M6x0.75P Ø8 RG25 RG30 RG35 RGS35 RGS45 RGF35 RGF45 NO.970003A1	PT 1/8 12 12 25 5 PT 1/8 Ø11 RG45 RG55 RG65 NO.970007A1

Oil feeding rate

Table 2-9-17 **oil feed rate**

Size	Feed rate (cm³/hr)	Size	Feed rate (cm³/hr)
RG15	0.14	RG35	0.23
RG20	0.14	RG45	0.3
RG25	0.167	RG55	0.367
RG30	0.2	RG65	0.433

RG Series
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2-9-8 Dust Proof Accessories

(1) Codes of accessories
If the following accessories are needed, please add the code followed by the model number.

Table 2-9-18

No symbol: Standard Protection (End seal + Bottom Seal)

ZZ (End seal + Bottom Seal + Scraper)

DD (Double seals + Bottom Seal)

KK (Double seals + Bottom Seal + Scraper)
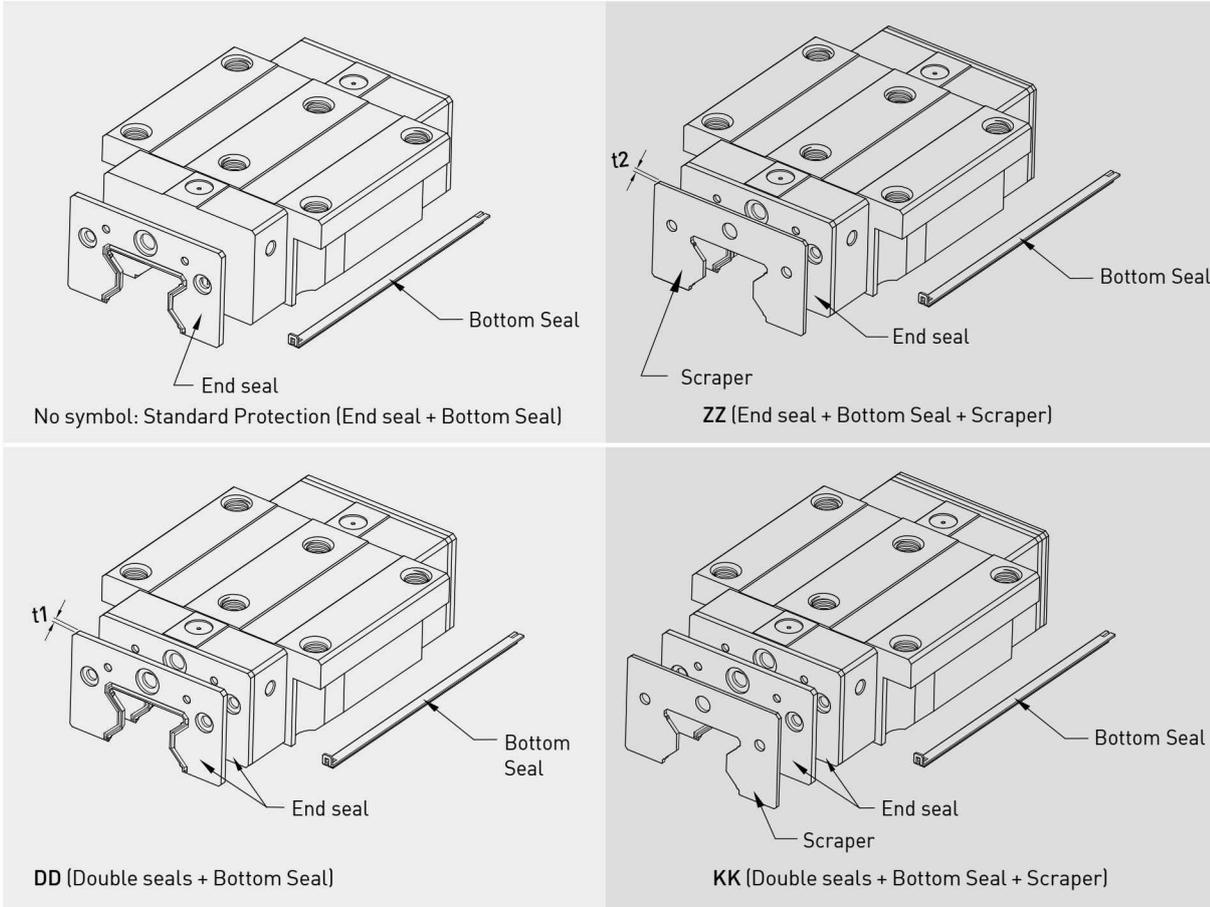
(2) End seal and bottom seal
To prevent life reduction caused by iron chips or dust entering the block.

(3) Double seals
Enhances the wiping effect, foreign matter can be completely wiped off.

Table 2-9-19 **Dimensions of end seal**

Size	Thickness (t1) (mm)	Size	Thickness (t1) (mm)
RG15 ES	2.2	RG35 ES	2.5
RG20 ES	2.2	RG45 ES	3.6
RG25 ES	2.2	RG55 ES	3.6
RG30 ES	2.4	RG65 ES	4.4

(4) Scraper

The scraper removes high-temperature iron chips and larger foreign objects.

Table 2-9-20 **Dimensions of scraper**

Size	Thickness (t2) (mm)	Size	Thickness (t2) (mm)
RG15 SC	1.0	RG35 SC	1.5
RG20 SC	1.0	RG45 SC	1.5
RG25 SC	1.0	RG55 SC	1.5
RG30 SC	1.5	RG65 SC	1.5

(5) Bolt caps for rail mounting holes

Caps are used to cover the mounting holes to prevent chips or other foreign objects from collecting in the holes. The caps will be enclosed in each rail package.

Table 2-9-21 **Dimensions of Bolt Caps for Rail Mounting Holes**

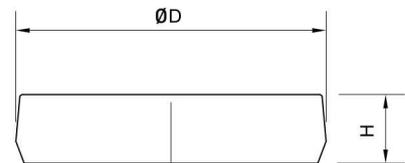| Rail size	Bolt size	Diameter(D) (mm)	Thickness(H) (mm)	Rail size	Bolt size	Diameter(D) (mm)	Thickness(H) (mm)
RGR15	M4	7.65	1.1	RGR35	M8	14.20	3.5
RGR20	M5	9.65	2.5	RGR45	M12	20.25	4.5
RGR25	M6	11.15	2.5	RGR55	M14	23.25	5
RGR30	M8	14.2	3.5	RGR65	M16	26.35	5

(6) Dimensions of block equipped with the dustproof parts
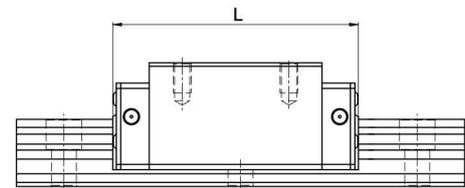
Table 2-9-22 **Overall block length**

unit: mm

Size	Overall block length (L)			
	SS	ZZ	DD	KK
RG15C	68.0 (70.4)	70.0 (74.4)	72.4 (74.8)	74.4 (78.8)
RG20C	86.0 (88.4)	88.0 (92.4)	90.4 (92.8)	92.4 (96.8)
RG20H	106.0 (108.4)	108.0 (112.4)	110.4 (112.8)	112.4 (116.8)
RG25C	97.9 (101.5)	99.9 (105.9)	102.3 (105.9)	104.3 (110.3)
RG25H	114.4 (118)	116.4 (122.4)	118.8 (122.4)	120.8 (126.8)
RG30C	109.8 (113.4)	112.8 (118.8)	114.6 (118.2)	117.6 (123.6)
RG30H	131.8 (135.4)	134.8 (140.8)	136.6 (140.2)	139.6 (145.6)
RG35C	124.0 (129.4)	127.0 (135.0)	129.0 (134.4)	132.0 (140.0)
RG35H	151.5 (156.9)	154.5 (162.5)	156.5 (161.9)	159.5 (167.5)
RG45C	153.2 (156.4)	156.2 (164.2)	160.4 (163.6)	163.4 (171.4)
RG45H	187.0 (190.2)	190.0 (198.0)	194.2 (197.4)	197.2 (205.2)
RG55C	183.7 (186.9)	186.7 (194.7)	190.9 (194.1)	193.9 (201.9)
RG55H	232.0 (235.2)	235.0 (243.0)	239.2 (242.4)	242.2 (250.2)
RG65C	232.0 (236.0)	235.0 (245.0)	240.8 (244.8)	243.8 (253.8)
RG65H	295.0 (299.0)	298.0 (308.0)	303.8 (307.8)	306.8 (316.8)

Note : The marking of "( )" denotes the maximum block length with screws, lips of end seals, etc.

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2-9-9 Friction

The maximum value of resistance per end seal are as shown in the table.

Table 2-9-23 **Seal Resistance**

Size	Resistance N (kgf)	Size	Resistance N (kgf)
RG15	2.45 (0.25)	RG35	4.61 (0.47)
RG20	2.9 (0.3)	RG45	4.91 (0.5)
RG25	3.43 (0.35)	RG55	5.89 (0.6)
RG30	4.22 (0.43)	RG65	7.36 (0.75)

Note: 1. 1kgf=9.81N

2. Please inform HIWIN if low friction request is required.

2-9-10 The Accuracy Tolerance of Mounting Surface

(1) The accuracy tolerance of rail-mounting surface

As long as the accuracy requirements of the mounting surfaces shown in the following tables are met, the high accuracy, high rigidity and long life of the RG series linear guideway will be maintained without any difficulty.

○ **The parallelism tolerance of reference surface (P)**
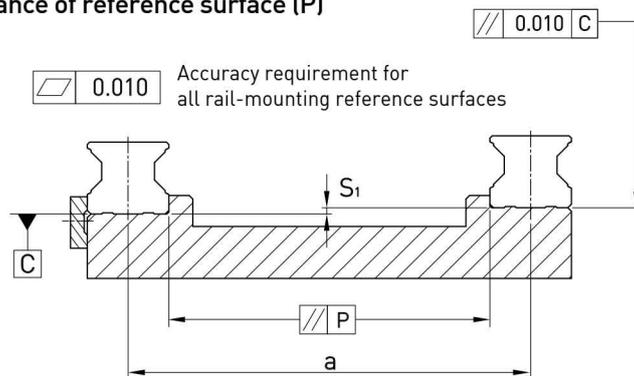
Table 2-9-24 **Max. Parallelism Tolerance (P)**

unit: μm

Size	Preload classes		
	Light Preload (Z0)	Medium Preload (ZA)	Heavy Preload (ZB)
RG15	5	3	3
RG20	8	6	4
RG25	9	7	5
RG30	11	8	6
RG35	14	10	7
RG45	17	13	9
RG55	21	14	11
RG65	27	18	14

○ **The accuracy tolerance of reference surface height (S₁)**

$$S_1 = a \times K - T_H$$

S_1 : Max. tolerance of height
a : Distance between paired rails
K : Coefficient of tolerance of height

Table 2-9-25 **Coefficient of tolerance of height**

Size	Preload classes		
	Light Preload (Z0)	**Medium Preload** (ZA)	**Heavy Preload** (ZB)
K	2.2×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

(2) The accuracy tolerance of block-mounting surface

○ **The tolerance of the height of reference surface when two or more pieces are used in parallel (S₂)**
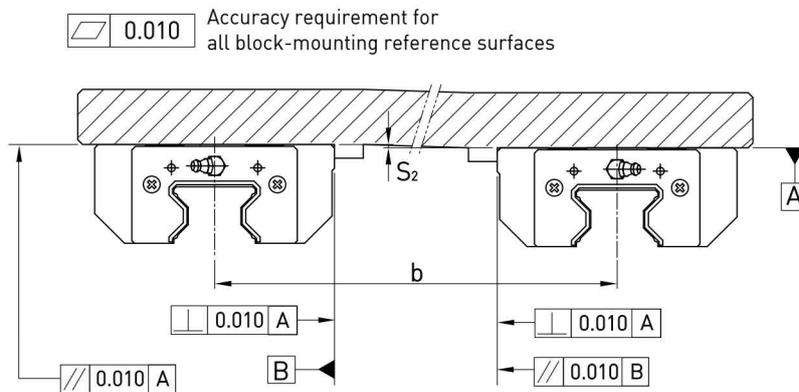
$$S_2 = b \times 4.2 \times 10^{-5}$$

S_2 : Max. tolerance of height
b : Distance between paired blocks

○ **The tolerance of the height of reference surface when two or more pieces are used in parallel (S₃)**
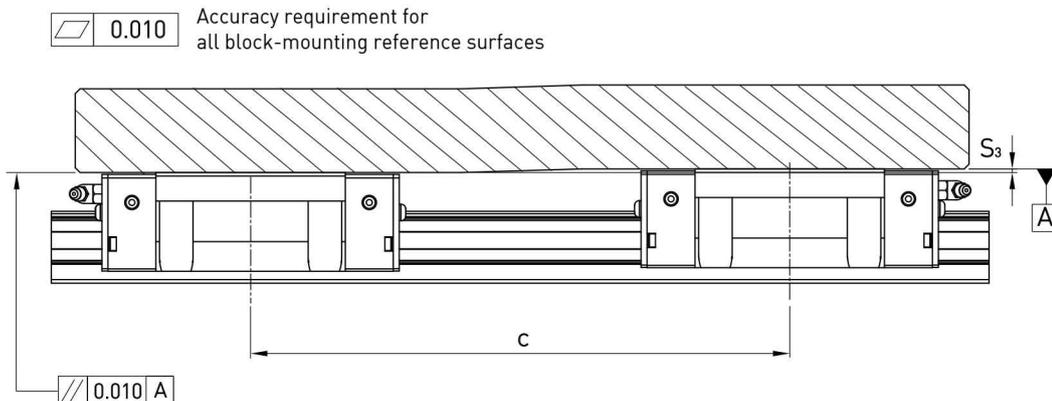
$$S_3 = c \times 4.2 \times 10^{-5}$$

S_3 : Max. tolerance of height
c : Distance between paired blocks

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2-9-11 Cautions for Installation

(1) Shoulder heights and fillets

IImproper shoulder heights and fillets of mounting surfaces will cause a deviation in accuracy and the interference with the rail or block. As long as the recommended shoulder heights and fillets are followed, installation inaccuracies should be eliminated.
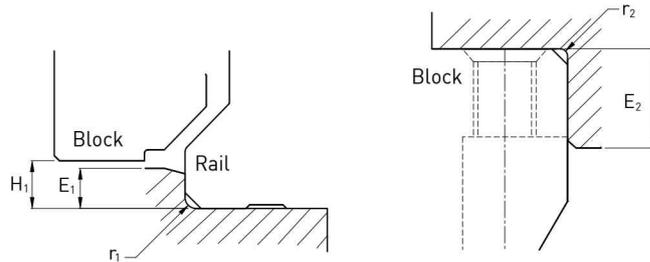
Table 2-9-26

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height beside the rail E_1 (mm)	Shoulder height beside the block E_2 (mm)	Clearance under block H_1 (mm)
RG15	0.5	0.5	3	4	4
RG20	0.5	0.5	3.5	5	5
RG25	1.0	1.0	5	5	5.5
RG30	1.0	1.0	5	5	6
RG35	1.0	1.0	6	6	6.5
RG45	1.0	1.0	7	8	8
RG55	1.5	1.5	9	10	10
RG65	1.5	1.5	10	10	12

(2) Tightening Torque of Mounting Bolts

Improper tightening of mounting bolts will seriously influence the accuracy of a linear guideway. The following tightening torque for the different sizes of bolt is recommended.

Table 2-9-27 **Tightening Torque of Mounting Bolts for Rail Installation**

Size	Bolt size	Torque N-cm(kgf-cm)		
		Iron	Casting	Aluminum
RG15	M4×0.7P×16L	392 (40)	274 (28)	206 (21)
RG20	M5×0.8P×20L	883 (90)	588 (60)	441 (45)
RG25	M6×1P×20L	1373 (140)	921 (94)	686 (70)
RG30	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)
RG35	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)
RG45	M12×1.75P×35L	11772 (1200)	7840 (800)	5880 (600)
RG55	M14×2P×45L	15696 (1600)	10500 (1100)	7840 (800)
RG65	M16×2P×50L	19620 (2000)	13100 (1350)	9800 (1000)

Table 2-9-28 **Tightening Torque of Mounting Bolts for Block Installation**

Size	Bolt size	Torque N-cm(kgf-cm) Iron	Size	Bolt size	Torque N-cm(kgf-cm) Iron
RGH/L15	M4x0.7P	392 (40)	RGH/L/S35	M8x1.25P	3041 (310)
RGW15	M5x0.8P	883 (90)	RGW/F35	M10x1.5P	6760 (689)
RGH/L20	M5x0.8P	883 (90)	RGH/L/S45	M10x1.5P	6760 (689)
RGW20	M6x1P	1373 (140)	RGW/F45	M12x1.75P	11772 (1200)
RGH/L25	M6x1P	1373 (140)	RGH/L55	M12x1.75P	11772 (1200)
RGW25	M8x1.25P	3041 (310)	RGW55	M14x2P	15696 (1600)
RGH/L30	M8x1.25P	3041 (310)	RGH/L65	M16x2P	19620 (2000)
RGW30	M10x1.5P	6760 (689)	RGW65	M16x2P	19620 (2000)

Note: 1. 1 kgf = 9.81 N
2. When the mounting bolt holes are located on the middle of flange block, the tightening torque should be decrease to 60%.

2-9-12 Standard and Maximum Lengths of Rail

HIWIN offers a number of standard rail lengths. Standard rail lengths feature end mounting hole placements set to predetermined values (E). For non-standard rail lengths, be sure to specify the E-value to be no greater than 1/2 the pitch (P) dimension. An E-value greater than this will result in unstable rail ends.
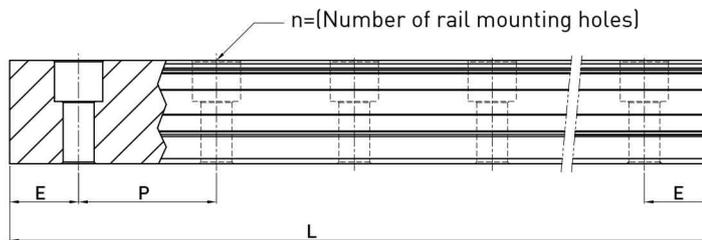
Table 2-9-29   unit: mm

Item	RGR15	RGR20	RGR25	RGR30	RGR35	RGR45	RGR55	RGR65
Standard Length L(n)	160 (5)	220 (7)	220 (7)	280 (7)	280 (7)	570 (11)	780 (13)	1,270 (17)
	220 (7)	280 (9)	280 (9)	440 (11)	440 (11)	885 (17)	1020 (17)	1,570 (21)
	340 (11)	340 (11)	340 (11)	600 (15)	600 (15)	1,200 (23)	1,260 (21)	2,020 (27)
	460 (15)	460 (15)	460 (15)	760 (19)	760 (19)	1,620 (31)	1,500 (25)	2,620 (35)
	580 (19)	640 (21)	640 (21)	1,000 (25)	1,000 (25)	2,040 (39)	1,980 (33)	-
	700 (23)	820 (27)	820 (27)	1,640 (41)	1,640 (41)	2,460 (47)	2,580 (43)	-
	940 (31)	1000 (33)	1,000 (33)	2,040 (51)	2,040 (51)	2,985 (57)	2,940 (49)	
	1120 (37)	1180 (39)	1,240 (41)	2,520 (63)	2,520 (63)	3,090 (59)	3,060 (51)	-
	1360 (45)	1360 (45)	1,600 (53)	3,000 (75)	3,000 (75)	-	-	-
Pitch (P)	30	30	30	40	40	52.5	60	75
Distance to End (E$_s$)	20	20	20	20	20	22.5	30	35
Max. Standard Length	4,000 (133)	4,000 (133)	4,000 (133)	4,000 (100)	4,000 (100)	3,982.5 (76)	3,960 (66)	3,970 (53)
Max. Length	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000

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. If different E value is needed, please contact HIWIN.

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2-9-13 Dimensions for RG series

(1) RGH-CA / RGH-HA

Note : 1. 1 kgf = 9.81 N
2. The theoretical dynamic rated load is C100R, if necessary C50R conversion formula is as follows : C50R = 1.23 x C100R

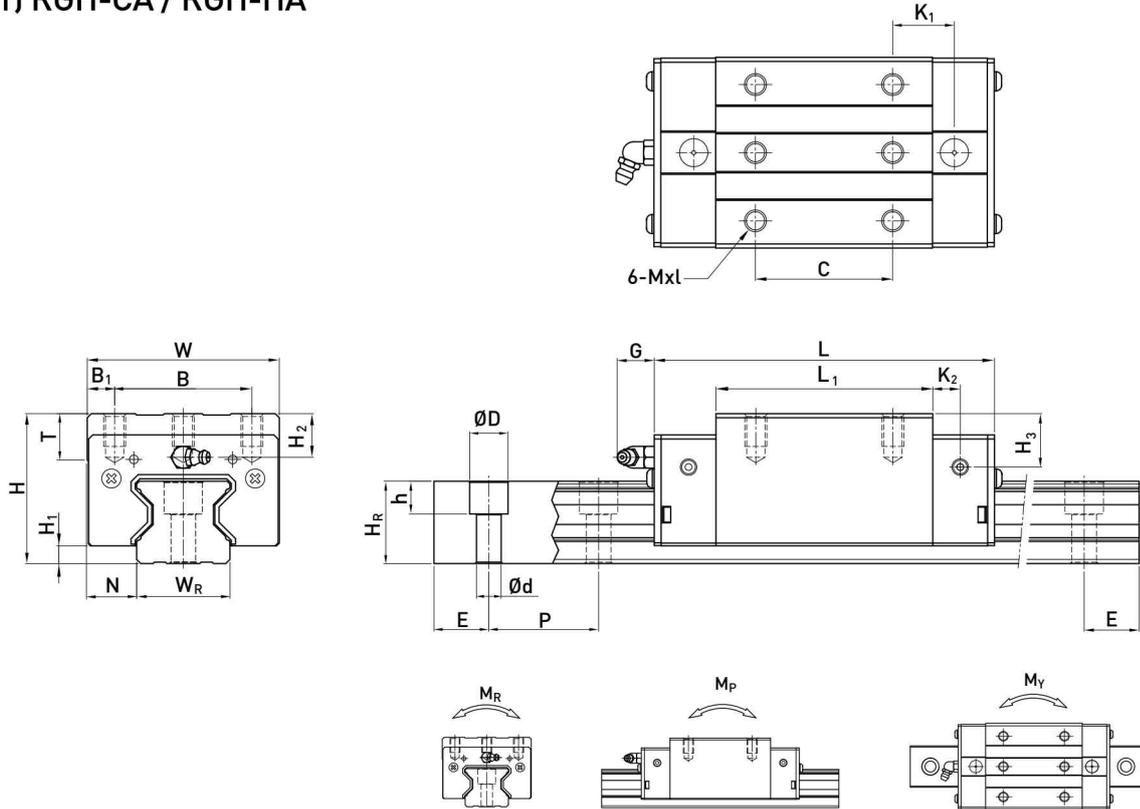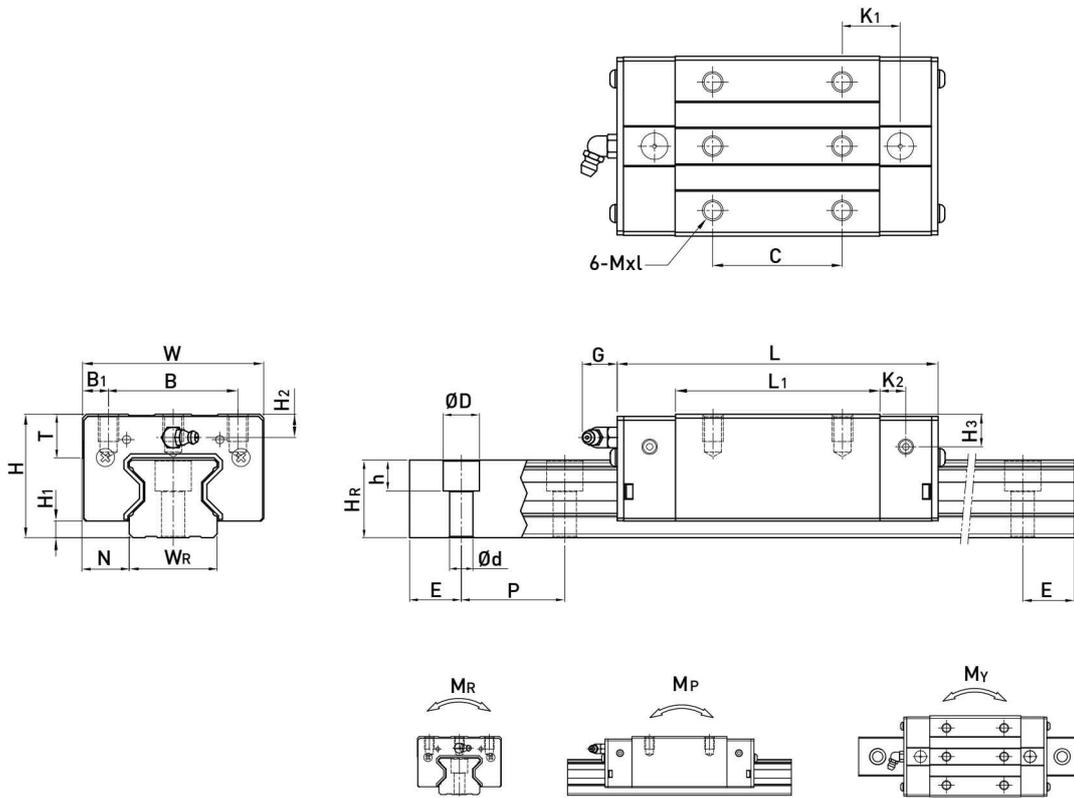| Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)														Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	K_2	G	Mxl	T	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
RGH15CA	28	4	9.5	34	26	4	26	45	68	13.4	4.7	5.3	M4 x 8	6	7.6	10.1	15	16.5	7.5	5.7	4.5	30	20	M4 x16	11.3	24	0.311	0.173	0.173	0.20	1.8
RGH20CA	34	5	12	44	32	6	36	57.5	86	15.8	6	5.3	M5 x 8	8	8.3	8.3	20	21	9.5	8.5	6	30	20	M5 x20	21.3	46.7	0.647	0.46	0.46	0.40	2.76
RGH20HA							50	77.5	106	18.8															26.9	63	0.872	0.837	0.837	0.53	
RGH25CA	40	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12	M6 x 8	9.5	10.2	10	23	23.6	11	9	7	30	20	M6 x20	27.7	57.1	0.758	0.605	0.605	0.61	3.08
RGH25HA							50	81	114.4	21.5															33.9	73.4	0.975	0.991	0.991	0.75	
RGH30CA	45	6	16	60	40	10	40	71	109.8	23.5	8	12	M8 x10	9.5	9.5	10.3	28	28	14	12	9	40	20	M8 x25	39.1	82.1	1.445	1.06	1.06	0.90	4.41
RGH30HA							60	93	131.8	24.5															48.1	105	1.846	1.712	1.712	1.16	
RGH35CA	55	6.5	18	70	50	10	50	79	124	22.5	10	12	M8 x12	12	16	19.6	34	30.2	14	12	9	40	20	M8 x25	57.9	105.2	2.17	1.44	1.44	1.57	6.06
RGH35HA							72	106.5	151.5	25.25															73.1	142	2.93	2.6	2.6	2.06	
RGH45CA	70	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10x17	16	20	24	45	38	20	17	14	52.5	22.5	M12 x35	92.6	178.8	4.52	3.05	3.05	3.18	9.97
RGH45HA							80	139.8	187	37.9															116	230.9	6.33	5.47	5.47	4.13	
RGH55CA	80	10	23.5	100	75	12.5	75	125.5	183.7	37.75	12.5	12.9	M12x18	17.5	22	27.5	53	44	23	20	16	60	30	M14 x45	130.5	252	8.01	5.4	5.4	4.89	13.98
RGH55HA							95	173.8	232	51.9															167.8	348	11.15	10.25	10.25	6.68	
RGH65CA	90	12	31.5	126	76	25	70	160	232	60.8	15.8	12.9	M16 x20	25	15	15	63	53	26	22	18	75	35	M16x50	213	411.6	16.20	11.59	11.59	8.89	20.22
RGH65HA							120	223	295	67.3															275.3	572.7	22.55	22.17	22.17	12.13	

(2) RGL-CA / RGL-HA

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	H₁	N	W	B	B₁	C	L₁	L	K₁	K₂	G	Mxl	T	H₂	H₃	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C₀ (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
RGL15CA	24	4	9.5	34	26	4	26	45	68	13.4	4.7	5.3	M4X5.5	6	3.6	6.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	11.3	24	0.311	0.173	0.173	0.15	1.8
RGL20CA	30	5	12	44	32	6	36	57.5	86	15.8	6	5.3	M5X6	8	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	21.3	46.7	0.647	0.46	0.46	0.32	2.76
RGL20HA							50	77.5	106	18.8															26.9	63	0.872	0.837	0.837	0.42	
RGL25CA	36	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12	M6X8	9.5	6.2	6	23	23.6	11	9	7	30	20	M6x20	27.7	57.1	0.758	0.605	0.605	0.51	3.08
RGL25HA							50	81	114.4	21.5															33.9	73.4	0.975	0.991	0.991	0.63	
RGL30CA	42	6	16	60	40	10	40	71	109.8	23.5	8	12	M8X10	9.5	6.5	7.3	28	28	14	12	9	40	20	M8x25	39.1	82.1	1.445	1.06	1.06	0.80	4.41
RGL30HA							60	93	131.8	24.5															48.1	105	1.846	1.712	1.712	1.03	
RGL35CA	48	6.5	18	70	50	10	50	79	124	22.5	10	12	M8X12	12	9	12.6	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.27	6.06
RGL35HA							72	106.5	151.5	25.25															73.1	142	2.93	2.6	2.6	1.65	
RGL45CA	60	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10X17	16	10	14	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	2.47	9.97
RGL45HA							80	139.8	187	37.9															116	230.9	6.33	5.47	5.47	3.20	
RGL55CA	70	10	23.5	100	75	12.5	75	125.5	183.7	37.75	12.5	12.9	M12X18	17.5	12	17.5	53	44	23	20	16	60	30	M14x45	130.5	252	8.01	5.4	5.4	3.91	13.98
RGL55HA							95	173.8	232	51.9															167.8	348	11.15	10.25	10.25	5.32	

Note : 1. 1 kgf = 9.81 N

2. The theoretical dynamic rated load is C_{100R}, if necessary C_{50R} conversion formula is as follows : $C_{50R} = 1.23 \times C_{100R}$

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(3) RGW-CC / RGW-HC

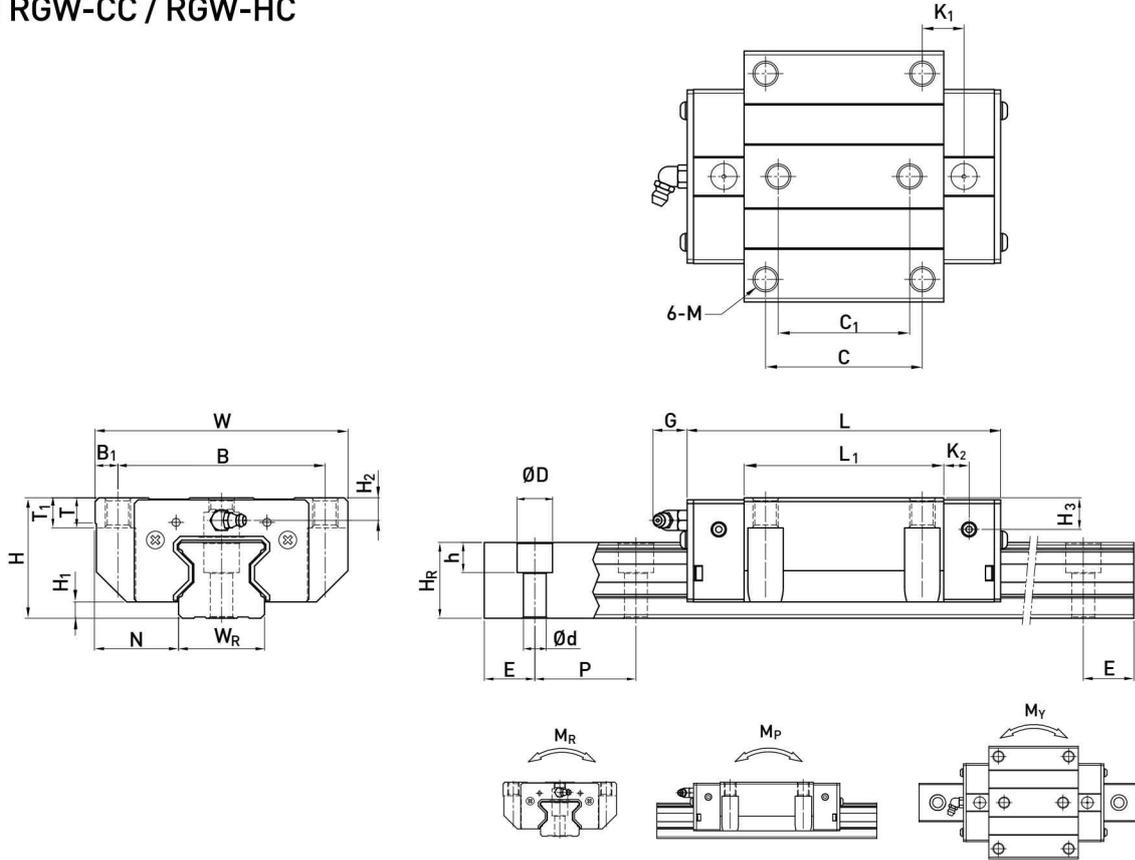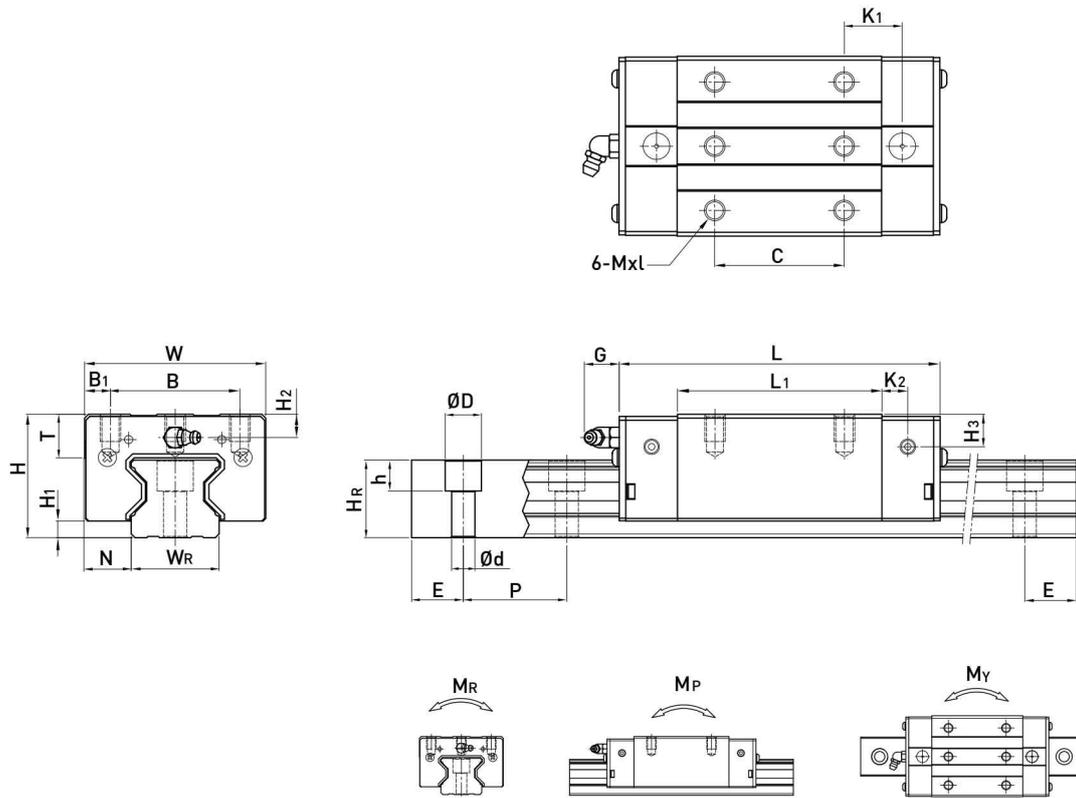| Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)																Dimensions of Rail (mm)							Mounting Bolt for Rail	Basic Dynamic Load Rating	Basic Static Load Rating	Static Rated Moment			Weight	
	H	H_1	N	W	B	B_1	C	C_1	L_1	L	K_1	K_2	G	M	T	T_1	H_2	H_3	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C_0 (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
RGW15CC	24	4	16	47	38	4.5	30	26	45	68	11.4	4.7	5.3	M5	6	6.95	3.6	6.1	15	16.5	7.5	5.7	4.5	30	20	M4x16	11.3	24	0.311	0.173	0.173	0.22	1.8
RGW20CC	30	5	21.5	63	53	5	40	35	57.5	86	13.8	6	5.3	M6	8	10	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	21.3	46.7	0.647	0.46	0.46	0.47	2.76
RGW20HC									77.5	106	23.8																26.9	63	0.872	0.837	0.837	0.63	
RGW25CC	36	5.5	23.5	70	57	6.5	45	40	64.5	97.9	15.75	7.25	12	M8	9.5	10	6.2	6	23	23.6	11	9	7	30	20	M6x20	27.7	57.1	0.758	0.605	0.605	0.72	3.08
RGW25HC									81	114.4	24																33.9	73.4	0.975	0.991	0.991	0.91	
RGW30CC	42	6	31	90	72	9	52	44	71	109.8	17.5	8	12	M10	9.5	10	6.5	7.3	28	28	14	12	9	40	20	M8x25	39.1	82.1	1.445	1.06	1.06	1.16	4.41
RGW30HC									93	131.8	28.5																48.1	105	1.846	1.712	1.712	1.52	
RGW35CC	48	6.5	33	100	82	9	62	52	79	124	16.5	10	12	M10	12	13	9	12.6	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.75	6.06
RGW35HC									106.5	151.5	30.25																73.1	142	2.93	2.6	2.6	2.40	
RGW45CC	60	8	37.5	120	100	10	80	60	106	153.2	21	10	12.9	M12	14	15	10	14	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	3.43	9.97
RGW45HC									139.8	187	37.9																116	230.9	6.33	5.47	5.47	4.57	
RGW55CC	70	10	43.5	140	116	12	95	70	125.5	183.7	27.75	12.5	12.9	M14	16	17	12	17.5	53	44	23	20	16	60	30	M14x45	130.5	252	8.01	5.4	5.4	5.43	13.98
RGW55HC									173.8	232	51.9																167.8	348	11.15	10.25	10.25	7.61	
RGW 65CC	90	12	53.5	170	142	14	110	82	160	232	40.8	15.8	12.9	M16	22	23	15	15	63	53	26	22	18	75	35	M16x50	213	411.6	16.20	11.59	11.59	11.63	20.22
RGW 65HC									223	295	72.3																275.3	572.7	22.55	22.17	22.17	16.58	

Note : 1. 1 kgf = 9.81 N
2. The theoretical dynamic rated load is C_{100R}, if necessary C_{50R} conversion formula is as follows : $C_{50R} = 1.23 \times C_{100R}$

(4) RGS-CA/RGS-HA

Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)													Dimensions of Rail (mm)							Mounting Bolt for Rail (mm)	Basic Dynamic Load Rating C(kN)	Basic Static Load Rating C₀ (kN)	Static Rated Moment			Weight	
	H	H₁	N	W	B	B₁	C	L₁	L	K₁	K₂	G	Mxl	T	H₂	H₃	W_R	H_R	D	h	d	P	E				M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
RGS35CA	44	6.5	18	70	50	10	50	79	124	22.5	10	12	M8x9	12	6.5	7.8	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.12	6.06
RGS35HA							72	106.5	151.5	25.25															73.1	142	2.93	2.6	2.6	1.45	
RGS45CA	52	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10x11	16	7	7	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	1.96	9.97
RGS45HA							80	139.8	187	37.9															116	230.9	6.33	5.47	5.47	2.5	

Note : 1. 1 kgf = 9.81 N

2. The theoretical dynamic rated load is C_{100R}, if necessary C_{50R} conversion formula is as follows : $C_{50R} = 1.23 \times C_{100R}$

RG Series

High Rigidity Roller Type

(5) RGF-CC/RGF-HC

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	H₁	N	W	B	B₁	C	C₁	L₁	L	K₁	K₂	G	M	T	T₁	H₂	H₃	W_R	H_R	D	h	d	P	E	(mm)	C(kN)	C₀ (kN)	M_R kN-m	M_P kN-m	M_Y kN-m	Block kg	Rail kg/m
RGF35CC	44	6.5	33	100	82	9	62	52	79	124	16.5	10	12	M10	12	13	6.5	7.8	34	30.2	14	12	9	40	20	M8x25	57.9	105.2	2.17	1.44	1.44	1.52	6.06
RGF35HC									106.5	151.5	30.25																73.1	142	2.93	2.6	2.6	2.08	
RGF45CC	52	8	37.5	120	100	10	80	60	106	153.2	21	10	12.9	M12	14	15	7	7	45	38	20	17	14	52.5	22.5	M12x35	92.6	178.8	4.52	3.05	3.05	2.67	9.97
RGF45HC									139.8	187	37.9																116	230.9	6.33	5.47	5.47	3.56	

Note : 1. 1 kgf = 9.81 N

2. The theoretical dynamic rated load is C₁₀₀ᵣ, if necessary C₅₀ᵣ conversion formula is as follows : C₅₀ᵣ = 1.23 x C₁₀₀ᵣ

(6) Dimensions for RGR-T (Rail Mounting from Bottom)
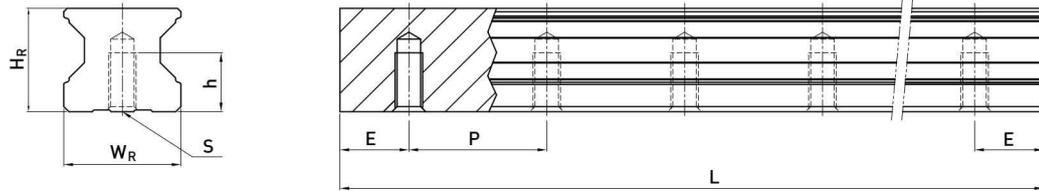
Model No.	Dimensions of Rail (mm)						Weight
	W_R	H_R	S	h	P	E	(kg/m)
RGR15T	15	16.5	M5×0.8P	8	30	20	1.86
RGR20T	20	21	M6×1P	10	30	20	2.76
RGR25T	23	23.6	M6×1P	12	30	20	3.36
RGR30T	28	28	M8×1.25P	15	40	20	4.82
RGR35T	34	30.2	M8×1.25P	17	40	20	6.48
RGR45T	45	38	M12×1.75P	24	52.5	22.5	10.83
RGR55T	53	44	M14×2P	24	60	30	15.15
RGR65T	63	53	M20×2.5P	30	75	35	21.24