



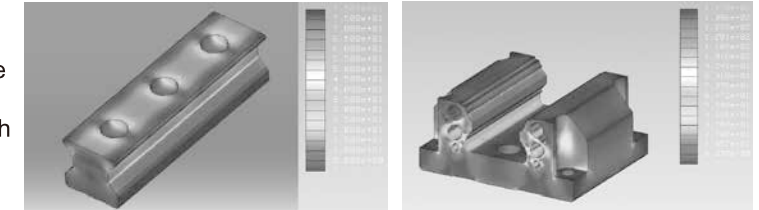
2-5 R Series – High Rigidity Roller Type Linear Guideway

2-5-1 Advantages and Features of R Series

The new R series from LIMON features a roller as the rolling element instead of steel balls. The roller series offers super high rigidity and very high load capacities. The R 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 R series linear guideway offers high performance for high-precision manufacturing and achieving longer service life.

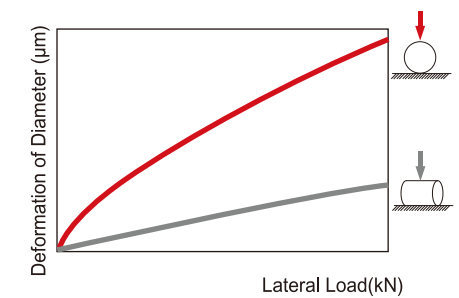
(1) Optimal design

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



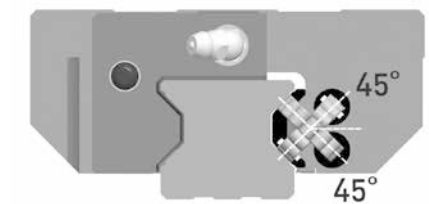
(2) Super high rigidity

The R 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

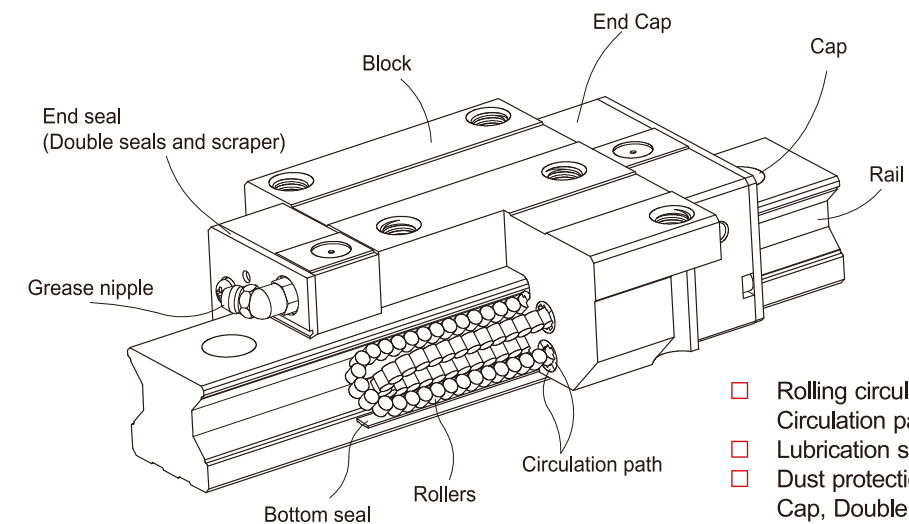
With the four rows of rollers arranged at a contact angle of 45-degrees, the R series linear guideway has equal load ratings in the radial, reverse radial and lateral directions. The R series has a higher load capacity in a smaller size than conventional, ball-type linear guideways.



(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 significantly and the R series offers longer running life. The nominal life of R series can be calculated by using Eq.

2-5-2 Construction of R Series



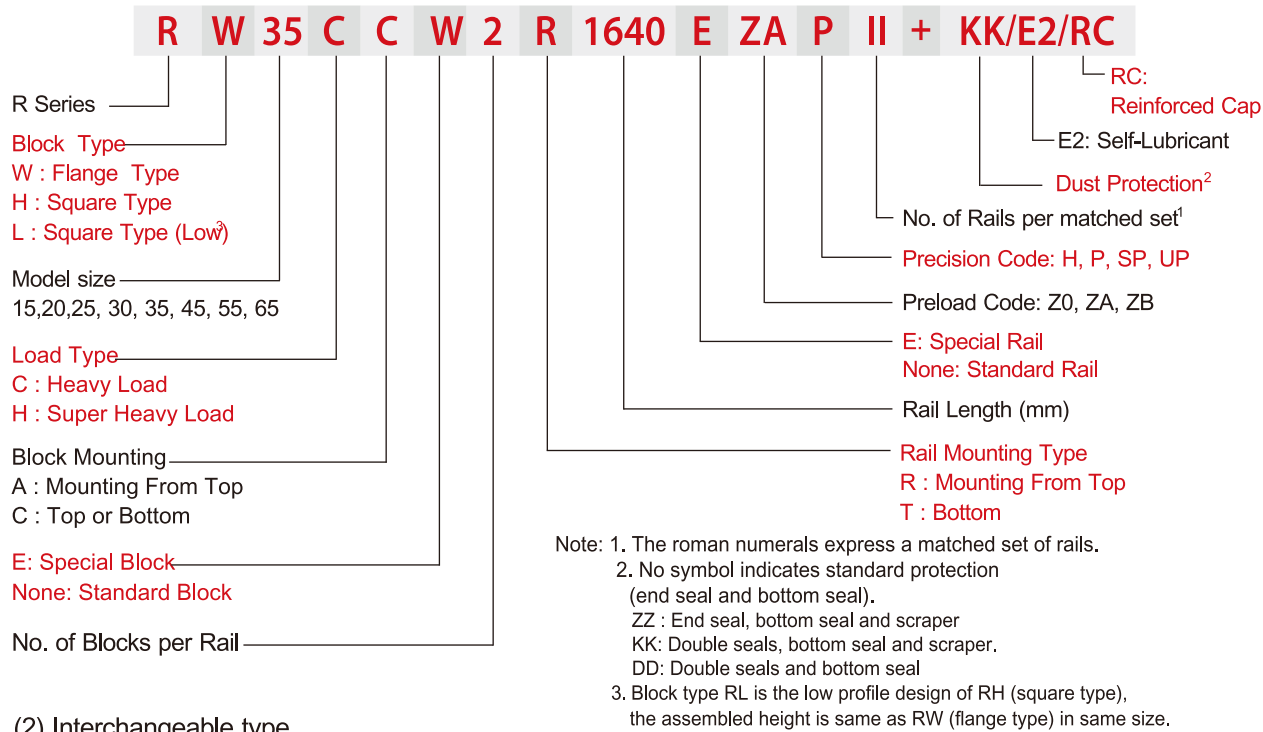
- Rolling circulation system: Block, Rail, End cap, Circulation path, rollers
- Lubrication system: Grease nipple and piping joint
- Dust protection system: End seal, Bottom seal, Cap, Double seals and Scraper



2-5-3 Model Number of R series

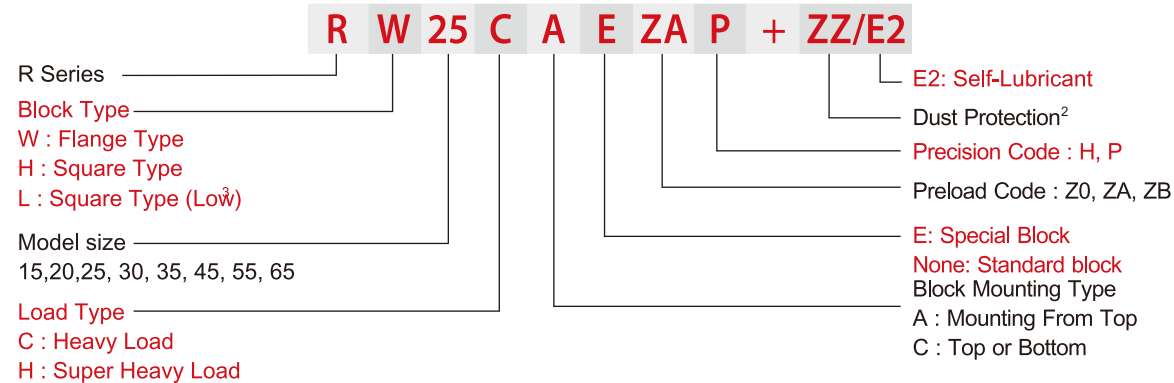
R series linear guideways are classified into non-interchangeable and interchangeable types. The sizes of these two types are the same as one another. The main difference is that the interchangeable type of blocks and rails can be freely exchanged and they can maintain P-class accuracy. Because of strict 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 R series identifies the size, type, accuracy class, preload class, etc.

(1) Non-interchangeable type

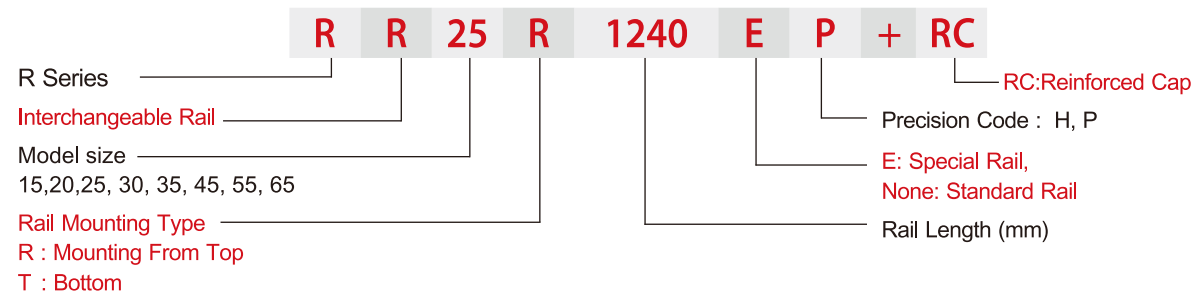


(2) Interchangeable type

□ Model Number of R Block



□ Model Number of R Rail



2-5-4 Types

(1) Block types

LIMON 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 2-5-1 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Applications
Square	RH-CA RH-HA		28	100	<input type="checkbox"/> Automation Systems <input type="checkbox"/> Transportation equipment <input type="checkbox"/> CNC machining centers <input type="checkbox"/> Heavy duty cutting machines <input type="checkbox"/> CNC grinding machines
			90	4000	
Square	RL-CA RL-HA		24	100	<input type="checkbox"/> Injection molding machines <input type="checkbox"/> Plano millers <input type="checkbox"/> Devices requiring high rigidity <input type="checkbox"/> Devices requiring high load capacity
			70	4000	
Flange	RW-CC RW-HC		24	100	<input type="checkbox"/> Electric discharge machines
			90	4000	

(2) Rail types

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

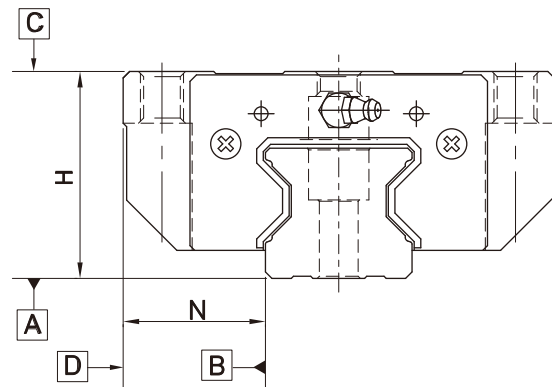
Table 2-5-2 Rail Types





2-5-5 Accuracy

The accuracy of the R 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 2-5-3 Accuracy Standards Unit: mm

Item	R - 15, 20			
	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 2-5-11			
Running parallelism of block surface D to surface B	See Table 2-5-11			

Table 2-5-4 Accuracy Standards Unit: mm

Item	R - 25, 30, 35			
	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 2-5-11			
Running parallelism of block surface D to surface B	See Table 2-5-11			

Table 2-5-5 Accuracy Standards Unit: mm

Item	R - 45, 55			
	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 2-5-11			
Running parallelism of block surface D to surface B	See Table 2-5-11			



Table 2-5-6 Accuracy Standards Unit: mm

Item	R - 65			
	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 2-5-11			
Running parallelism of block surface D to surface B	See Table 2-5-11			

(2) Accuracy of interchangeable

Table 2-5-7 Accuracy Standards Unit: mm

Item	R - 15, 20	
	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 2-5-11	
Running parallelism of block surface D to surface B	See Table 2-5-11	

Table 2-5-8 Accuracy Standards Unit: mm

Item	R - 25, 30, 35	
	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 2-5-11	
Running parallelism of block surface D to surface B	See Table 2-5-11	

Table 2-5-9 Accuracy Standards Unit: mm

Item	R - 45, 55	
	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 2-5-11	
Running parallelism of block surface D to surface B	See Table 2-5-11	



Table 2-5-10 Accuracy Standards

Item	R - 65	
	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 2-5-11	
Running parallelism of block surface D to surface B	See Table 2-5-11	

Unit: mm

(3) Accuracy of running parallelism

Table 2-5-11 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

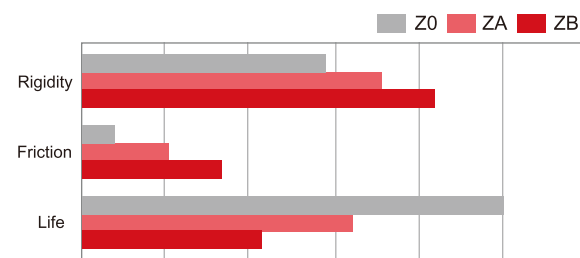
2-5-6 Preload

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 R series linear guideway offers three standard preloads for various applications and conditions.

Table 2-5-12

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

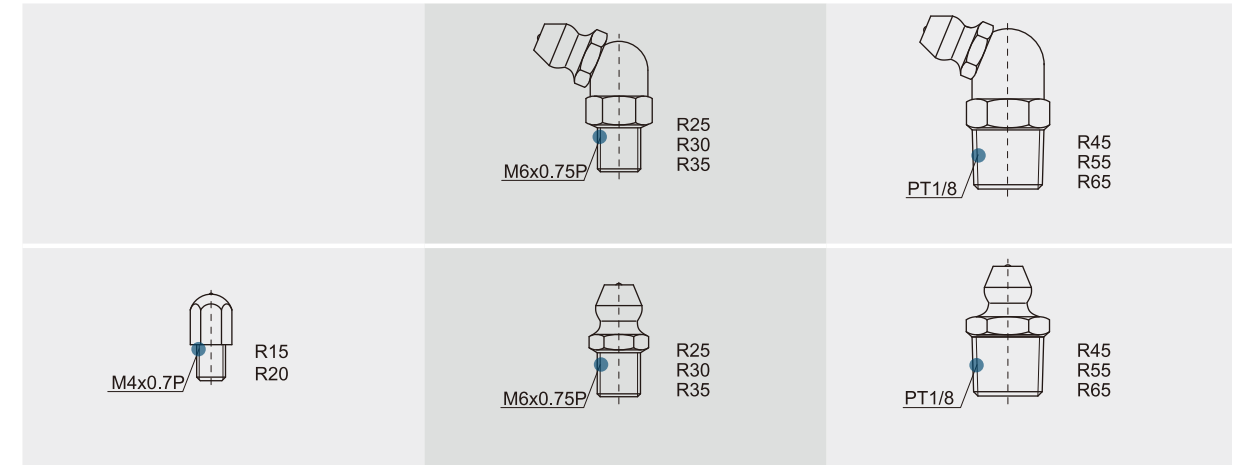
The figure shows the relationship between the rigidity, friction and nominal life. A preload no larger than ZA would be recommended for smaller model sizes to avoid over-preload affecting the life of the guideway.



2-5-7 Lubrication

(1) Grease

- Grease nipple



- Mounting location

The standard location of the grease fitting is at both ends of the block, but the nipple can be mounted in the side or the top of block. For lateral installation, we recommend that the nipple be mounted at the non-reference side, otherwise please contact us. It is possible to carry out the lubrication by using an oil-piping joint. The figure shows the locations of the grease fitting.

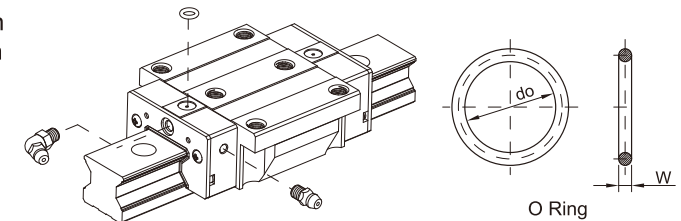


Table 2-5-13 O-Ring size and max. permissible depth for piercing

Size	O-Ring		Lube hole at top: max. permissible depth for piercing
	do (mm)	W (mm)	T _{max} (mm)
R15	2.5±0.15	1.5±0.15	3.45
R20	2.5±0.15	1.5±0.15	4
R25	7.5±0.15	1.5±0.15	5.8
R30	7.5±0.15	1.5±0.15	6.2
R35	7.5±0.15	1.5±0.15	8.65
R45	7.5±0.15	1.5±0.15	9.5
R55	7.5±0.15	1.5±0.15	11.6
R65	7.5±0.15	1.5±0.15	14.5

- The oil amount for a block filled with grease

Table 2-5-14 The oil amount for a block filled with grease

Size	Heavy Load(cm ³)	Super Heavy Load(cm ³)	Size	Heavy Load(cm ³)	Super Heavy Load(cm ³)
R15	3	-	R35	12	14
R20	5	6	R45	19	23
R25	7	8	R55	28	35
R30	9	10	R65	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.

Oil feeding rate

Table 2-5-15 oil feed rate

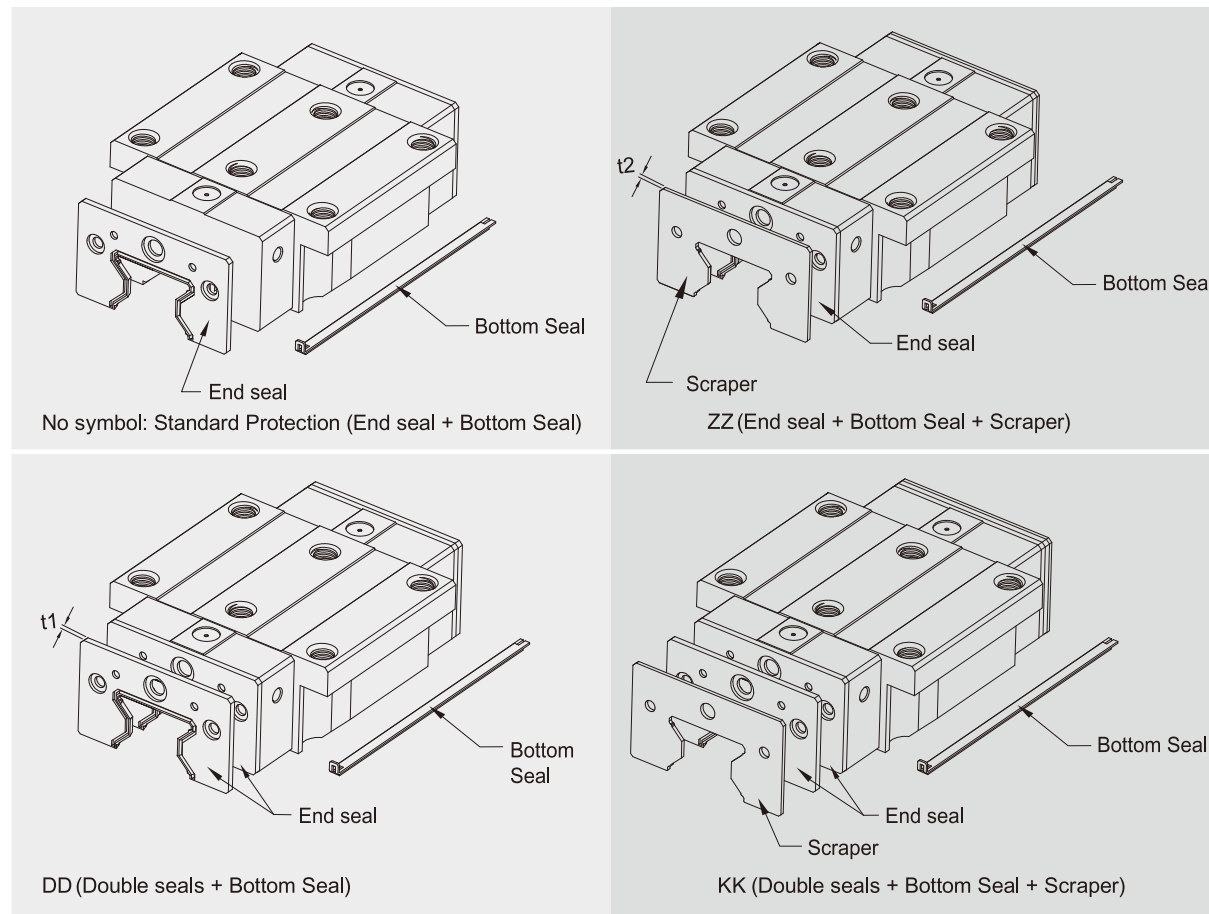
Size	Feed rate (cm ³ /hr)
R15	0.14
R20	0.14
R25	0.167
R30	0.2
R35	0.23
R45	0.3
R55	0.367
R65	0.433

2-5-8 Dust Proof Accessories

(1) Codes of accessories

If the following accessories are needed, please add the code followed by the model number.

Table 2-5-16



(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 2-5-17 Dimensions of end seal

Size	Thickness (t1) (mm)	Size	Thickness (t1) (mm)
R15 ES	2.2	R35 ES	2.5
R20 ES	2.2	R45 ES	3.6
R25 ES	2.2	R55 ES	3.6
R30 ES	2.4	R65 ES	4.4

(4) Scraper

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

Table 2-5-18 Dimensions of scraper

Size	Thickness (t2) (mm)	Size	Thickness (t2) (mm)
R15 SC	1.0	R35 SC	1.5
R20 SC	1.0	R45 SC	1.5
R25 SC	1.0	R55 SC	1.5
R30 SC	1.5	R65 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.

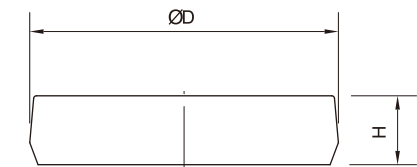


Table 2-5-19 Dimensions of Bolt Caps for Rail Mounting Holes

Rail size	Bolt size	Diameter(D) (mm)	Thickness(H) (mm)	Rail size	Bolt size	Diameter(D) (mm)	Thickness(H) (mm)
RR 15	M4	7.65	1.1	RR 35	M8	14.2	3.3
RR 20	M5	9.65	2.2	RR 45	M12	20.25	4.6
RR 25	M6	11.15	2.5	RR 55	M14	23.5	5.5
RR 30	M8	14.2	3.3	RR 65	M16	26.6	5.5



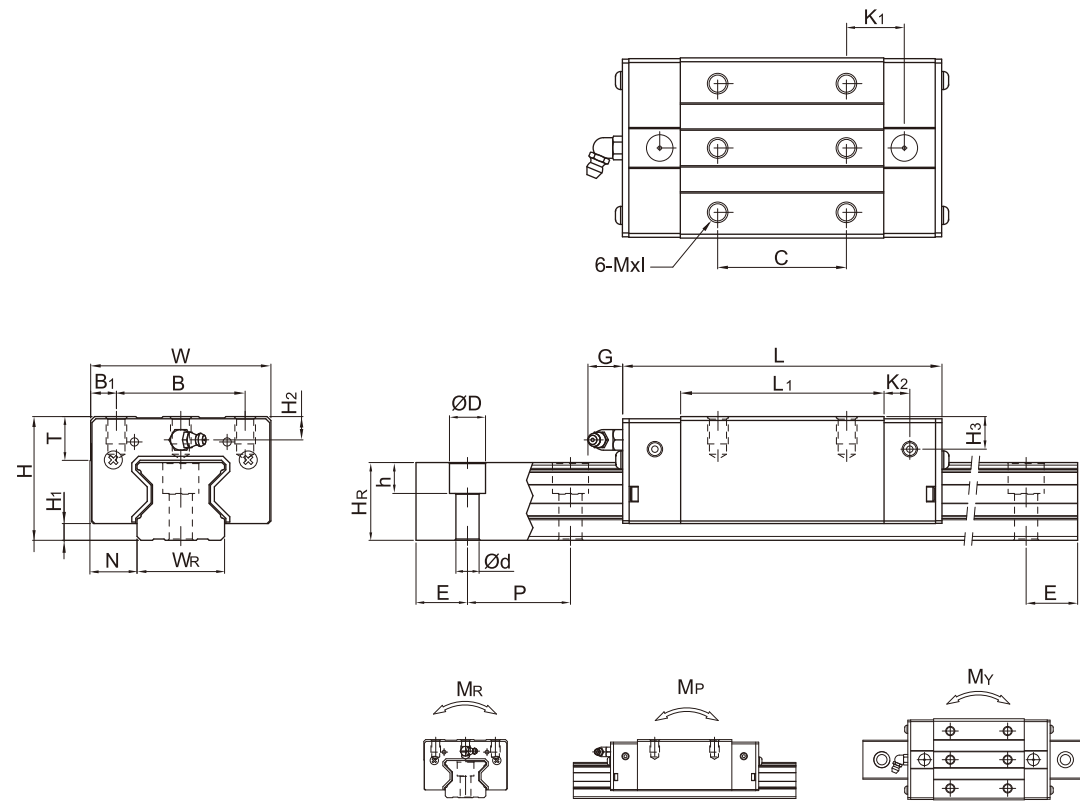
Linear Guideways

Ball Screw

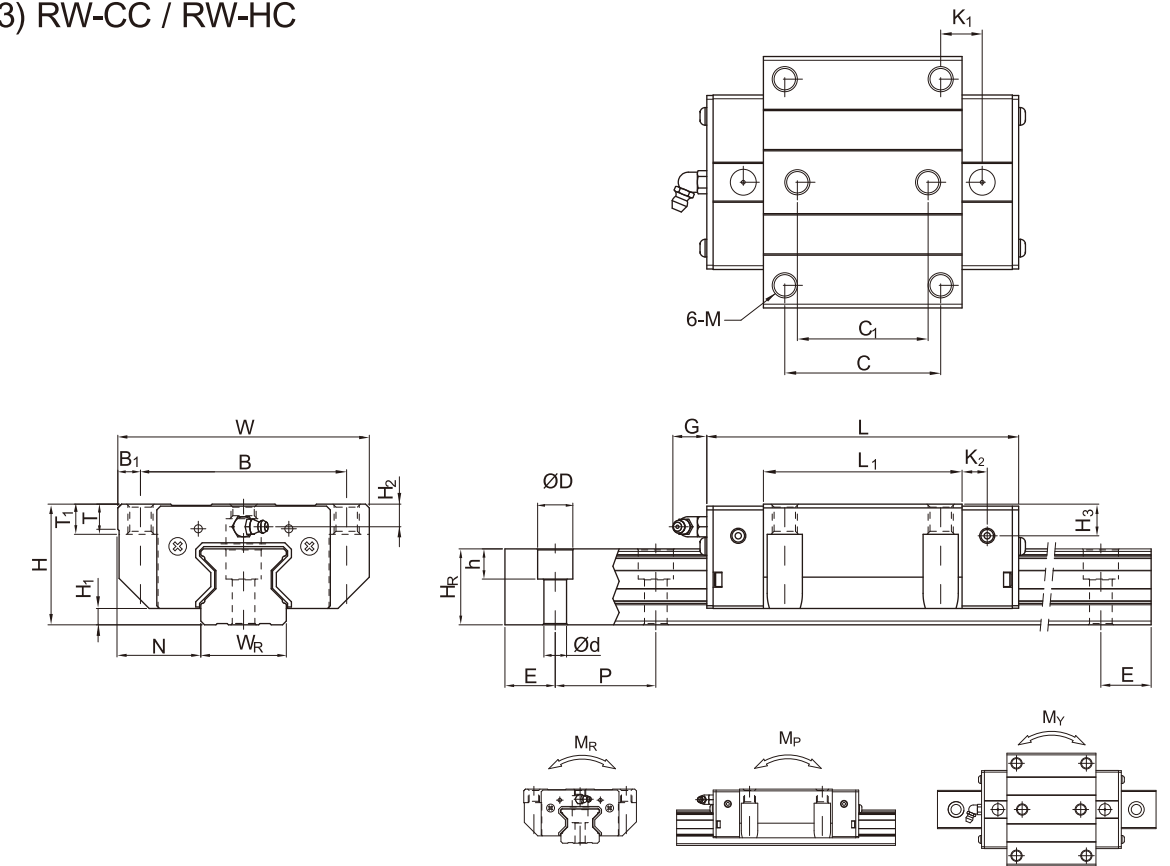
Support

Linear Bushing

(2) RL-CA / RL-HA



(3) RW-CC / RW-HC



Linear Guideways

Ball Screw

Support

Linear Bushing

Model No.	Dimensions of Assembly (mm)		Dimensions of Block (mm)													Dimensions of Rail (mm)		Mounting Bolt for Rail (mm)	Basic Dynamic Load Rating C ₀ (kN)	Basic Static Load Rating C ₀ (kN)	Static Rated Moment			Weight							
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	MxI	T	H ₂	H ₃	W _R				H _R	D	h	d	P	E	M _R	M _P	M _Y	Block kg	Rail kg/m
RL15CA	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
RL20CA	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
RL20HA	30	5	12	44	32	6	50	77.5	106	18.8	6	5.3	M5x6	8	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	26.9	63	0.872	0.837	0.837	0.42	2.76
RL25CA	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
RL25HA	36	5.5	12.5	48	35	6.5	50	81	114.4	21.5	7.25	12	M6x8	9.5	6.2	6	23	23.6	11	9	7	30	20	M6x20	33.9	73.4	0.975	0.991	0.991	0.63	3.08
RL30CA	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
RL30HA	42	6	16	60	40	10	60	93	131.8	24.5	8	12	M8x10	9.5	6.5	7.3	28	28	14	12	9	40	20	M8x25	48.1	105	1.846	1.712	1.712	1.03	4.41
RL35CA	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
RL35HA	48	6.5	18	70	50	10	72	106.5	151.5	25.25	10	12	M8x12	12	9	12.6	34	30.2	14	12	9	40	20	M8x25	73.1	142	2.93	2.6	2.6	1.65	6.06
RL45CA	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
RL45HA	60	8	20.5	86	60	13	80	139.8	187	37.9	10	12.9	M10x17	16	10	14	45	38	20	17	14	52.5	22.5	M12x35	116	230.9	6.33	5.47	5.47	3.20	9.97
RL55CA	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
RL55HA	70	10	23.5	100	75	12.5	95	173.8	232	51.9	12.5	12.9	M12x18	17.5	12	17.5	53	44	23	20	16	60	30	M14x45	167.8	348	11.15	10.25	10.25	5.32	13.98

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 x C_{100R}

Model No.	Dimensions of Assembly (mm)		Dimensions of Block (mm)													Dimensions of Rail (mm)		Mounting Bolt for Rail (mm)	Basic Dynamic Load Rating C ₀ (kN)	Basic Static Load Rating C ₀ (kN)	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	M _R	M _P	M _Y	Block kg	Rail kg/m
RW15CC	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
RW20CC	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
RW20HC	30	5	21.5	63	53	5	40	35	77.5	106	23.8	6	5.3	M6	8	10	4.3	4.3	20	21	9.5	8.5	6	30	20	M5x20	26.9	63	0.872	0.837	0.837	0.63	2.76
RW25CC	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
RW25HC	36	5.5	23.5	70	57	6.5	45	40	81	114.4	24	7.25	12	M8	9.5	10	6.2	6	23	23.6	11	9	7	30	20	M6x20	33.9	73.4	0.975	0.991	0.991	0.91	3.08
RW30CC	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
RW30HC	42	6	31	90	72	9	52	44	93	131.8	28.5	8	12	M10	9.5	10	6.5	7.3	28	28	14	12	9	40	20	M8x25	48.1	105	1.846	1.712	1.712	1.52	4.41
RW35CC	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
RW35HC	48	6.5	33	100	82	9	62	52	106.5	151.5	30.25	10	12	M10	12	13	9	12.6	34	30.2	14	12	9	40	20	M8x25	73.1	142	2.93	2.6	2.6	2.40	6.06
RW45CC	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
RW45HC	60	8	37.5	120	100	10	80	60	139.8	187	37.9	10	12.9	M12	14	15	10	14	45	38	20	17	14	52.5	22.5	M12x35	116	230.9	6.33	5.47	5.47	4.57	9.97
RW55CC	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
RW55HC	70	10	43.5	140	116	12	95	70	173.8	232	51.9	12.5	12.9	M14	16	17	12	17.5	53	44	23	20	16	60	30	M14x45	167.8	348	11.15	10.25	10.25	7.61	13.98
RW 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
RW 65HC	90	12	53.5	170	142	14	110	82	223	295	72.3	15.8	12.9	M16	22	23	15	15	63	53	26	22	18	75	35	M16x50	275.3	572.7	22.55	22.17	22.17	16.58	20.22

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 x C_{100R}