

QR Series

Roller Type

2-11 QR series - Roller Type Linear Guideway, with SynchMotion™ Technology

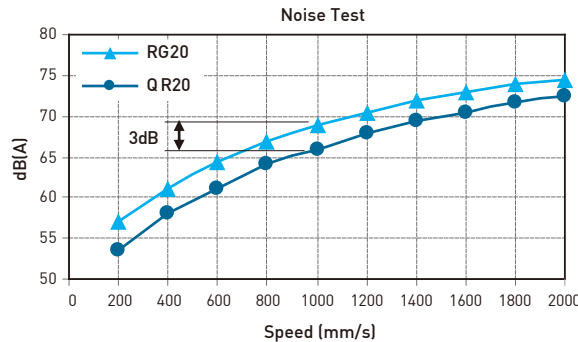
HIWIN-QR series offers super high rigidity and very high load capacities. The HIWIN-QR series with SynchMotion™ Technology offers low friction, smooth movement, quieter operation and longer running life. In the industry where high accuracy, low noise and high rigidity is required, the QR series is interchangeable with the RG series.

2-11-1 Advantages and features

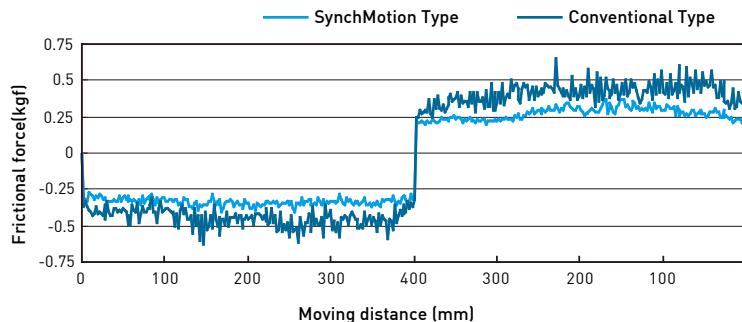
(1) Super high load capacity in linear guideway, with the four rows of rollers arranged at a contact angle of 45-degrees, the QR series linear guideway has equal load ratings in the radial, reverse radial and lateral directions. The QR series has a higher load capacity in a smaller size than conventional,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



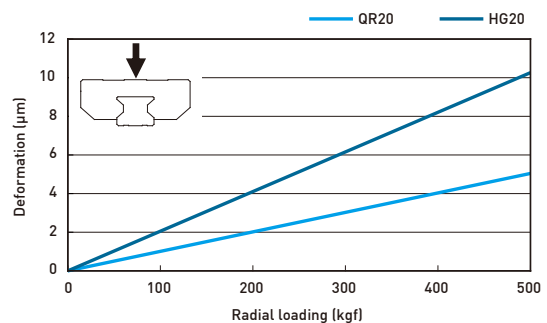
(2) Low Noise Design With SynchMotion™ technology, rolling elements are interposed between the partitions of SynchMotion™ to provide improved circulation. Due to the elimination of contact between the rolling elements, collision noise and sound levels are drastically reduced.



(3) Smooth Movement In standard linear guideways, rolling elements on the load side of the guide block begin rolling and push their way through the raceway. When they contact other rolling elements they create counter-rotational friction. This results in a great variation of rolling resistance. The QR linear guideway, with SynchMotion™ technology prevents this condition.



(4) The QR series is a type of linear guideway that uses rollers as the rolling elements. 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.



(5) Sample test
1. Nominal life test

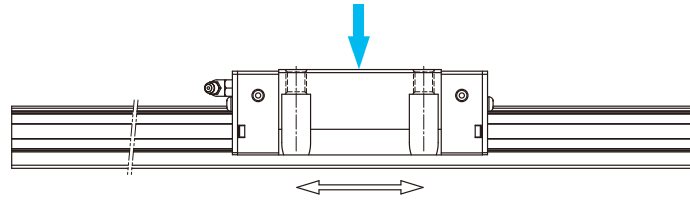
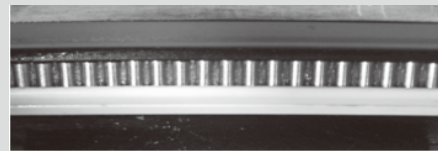


Table 2-11-1

Tested model 1: QRW20CC
 Preload: ZA class
 Max speed: 28m/min
 Acceleration: 1G
 Stroke: 0.2m
 Lubrication: grease held every 100 km
 External: 8.6 kN
 Traveling distance: 1024km

Test results:

The nominal life of QRW20 is 1000km. After traveling 1024km, fatigue flaking did not appear on the surface of the raceway or rollers. And roller chain is not broken in this case.



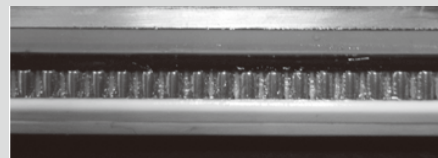
2. Durability Test

Table 2-11-2

Tested model 2: QRH20CA
 Preload: Z0 class
 Max speed: 180m/min
 Acceleration: 3G
 Stroke: 0.23m
 Oil feed rate: 0.14cm³/hr
 External: 0km (No loading)
 Traveling distance: 10586km

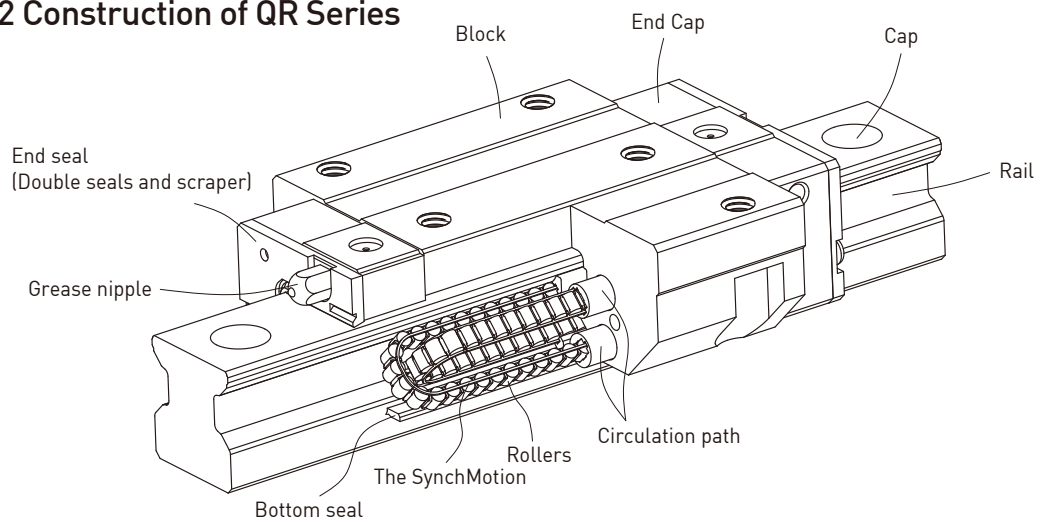
Test results:

After traveling 10586km, fatigue flaking did not appear on the surface of the raceway or rollers. And roller chain is not broken in this case.



Note: The data listed are from samples.

2-11-2 Construction of QR Series



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

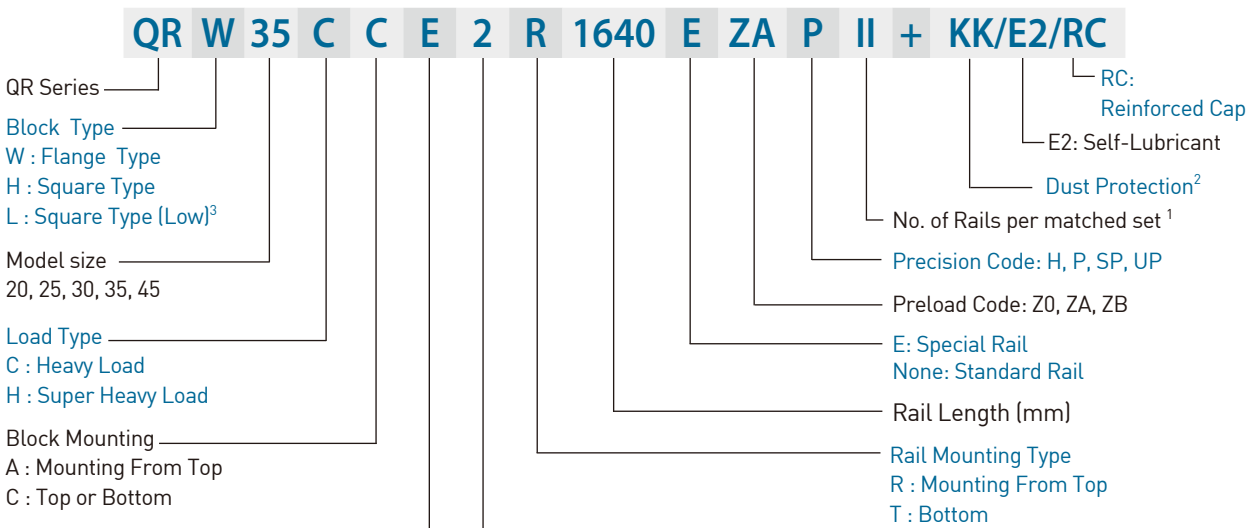
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2-11-3 Model Number of QR series

QR 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 QR series identifies the size, type, accuracy class, preload class, etc.

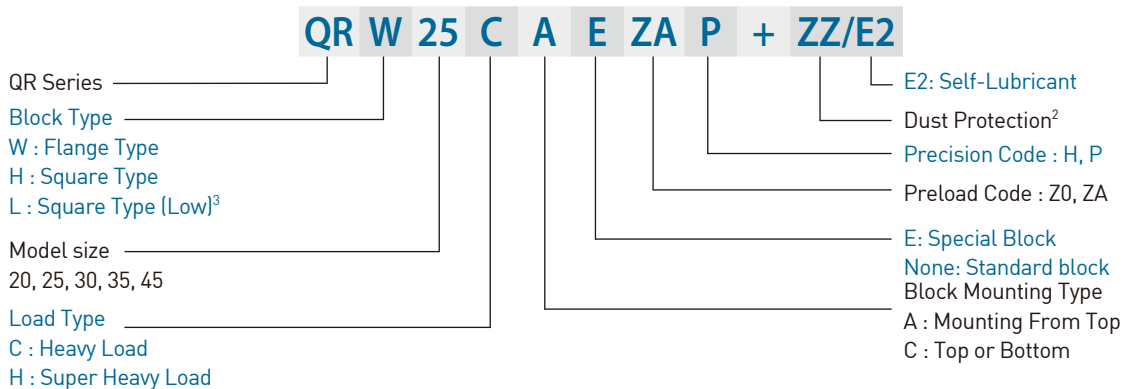
(1) Non-interchangeable type



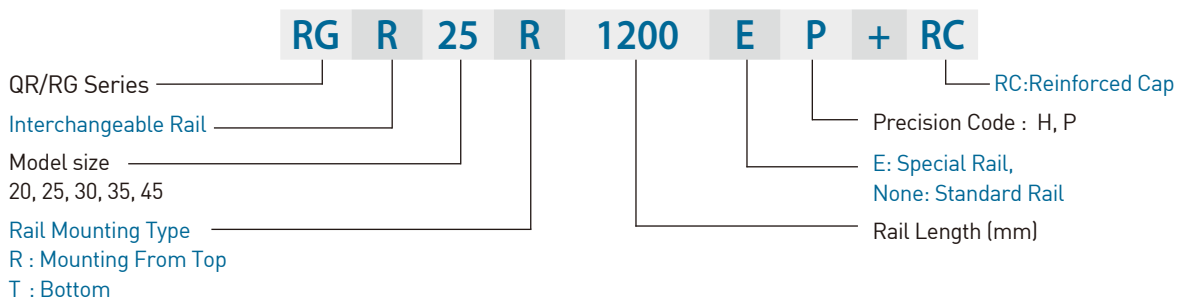
- Note: 1. The roman numerals express a matched set of rails.
 2. No symbol indicates standard protection (end seal and bottom seal).
 ZZ : End seal, bottom seal and scraper
 KK: Double seals, bottom seal and scraper.
 DD: Double seals and bottom seal
 3. Block type QRL is the low profile design of QRH (square type), the assembled height is same as QRW (flange type) in same size.

(2) Interchangeable type

○ Model Number of RG Block



○ Model Number of QR Rail (QR and RG share the identical rails)

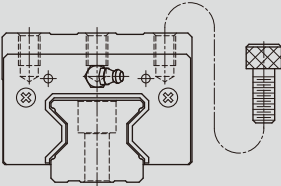
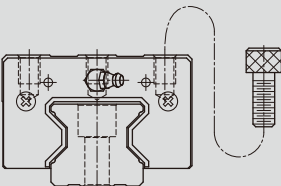
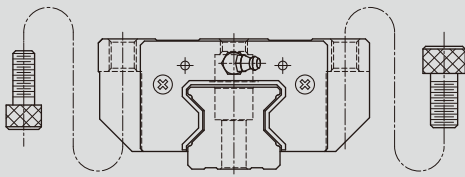


2-11-4 Types

(1) Block types

HIWIN QR series 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.

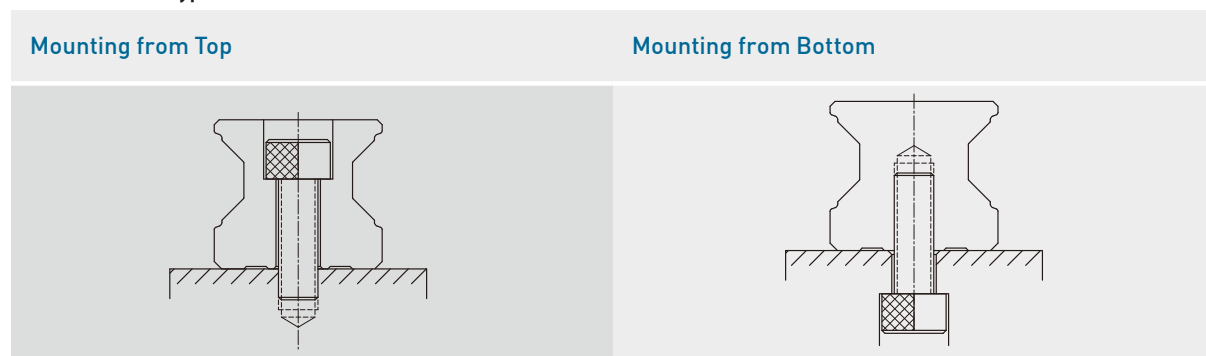
Table 2-11-3 Block Types

Type	Model	Shape	Height (mm)	Rail Length (mm)	Main Applications
Square	QRH-CA QRH-HA		34	100	<ul style="list-style-type: none"> ○ Automation Systems ○ Transportation equipment ○ CNC machining centers ○ Heavy duty cutting machines ○ CNC grinding machines ○ Injection molding machines ○ Plano millers ○ Devices requiring high rigidity ○ Devices requiring high load capacity ○ Electric discharge machines
			↓	↓	
70	4000				
Square (low)	QRL-CA QRL-HA		30	100	
			↓	↓	
60	4000				
Flange	QRW-CC QRW-HC		30	100	
			↓	↓	
60	4000				

(2) Rail types

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

Table 2-11-4 Rail Types

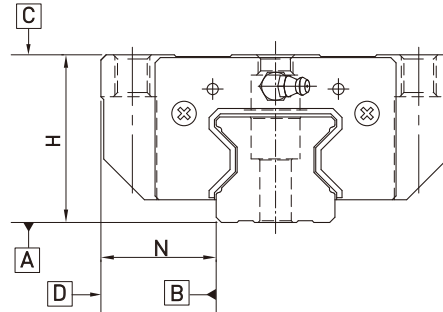


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2-11-5 Accuracy Classes

The accuracy of the QR 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 2-11-5 Accuracy Standards

Unit: mm

Item	QR - 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 2-11-11			
Running parallelism of block surface D to surface B	See Table 2-11-11			

Table 2-11-6 Accuracy Standards

Unit: mm

Item	QR- 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 2-11-11			
Running parallelism of block surface D to surface B	See Table 2-11-11			

Table 2-11-7 Accuracy Standards

Unit: mm

Item	QR - 45			
	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 2-11-11			
Running parallelism of block surface D to surface B	See Table 2-11-11			

(2) Accuracy of interchangeable

Table 2-11-8 Accuracy Standards

Unit: mm

Item	QR - 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 2-11-11	
Running parallelism of block surface D to surface B	See Table 2-11-11	

Table 2-11-9 Accuracy Standards

Unit: mm

Item	QR- 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 2-11-11	
Running parallelism of block surface D to surface B	See Table 2-11-11	

Table 2-11-10 Accuracy Standards

Unit: mm

Item	QR - 45	
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 2-11-11	
Running parallelism of block surface D to surface B	See Table 2-11-11	

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(3) Accuracy of running parallelism

Table 2-11-11 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

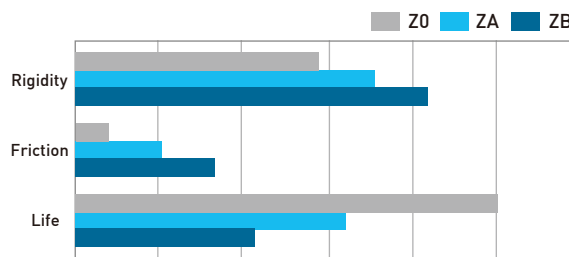
2-11-6 Preload

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

Table 2-11-12

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.

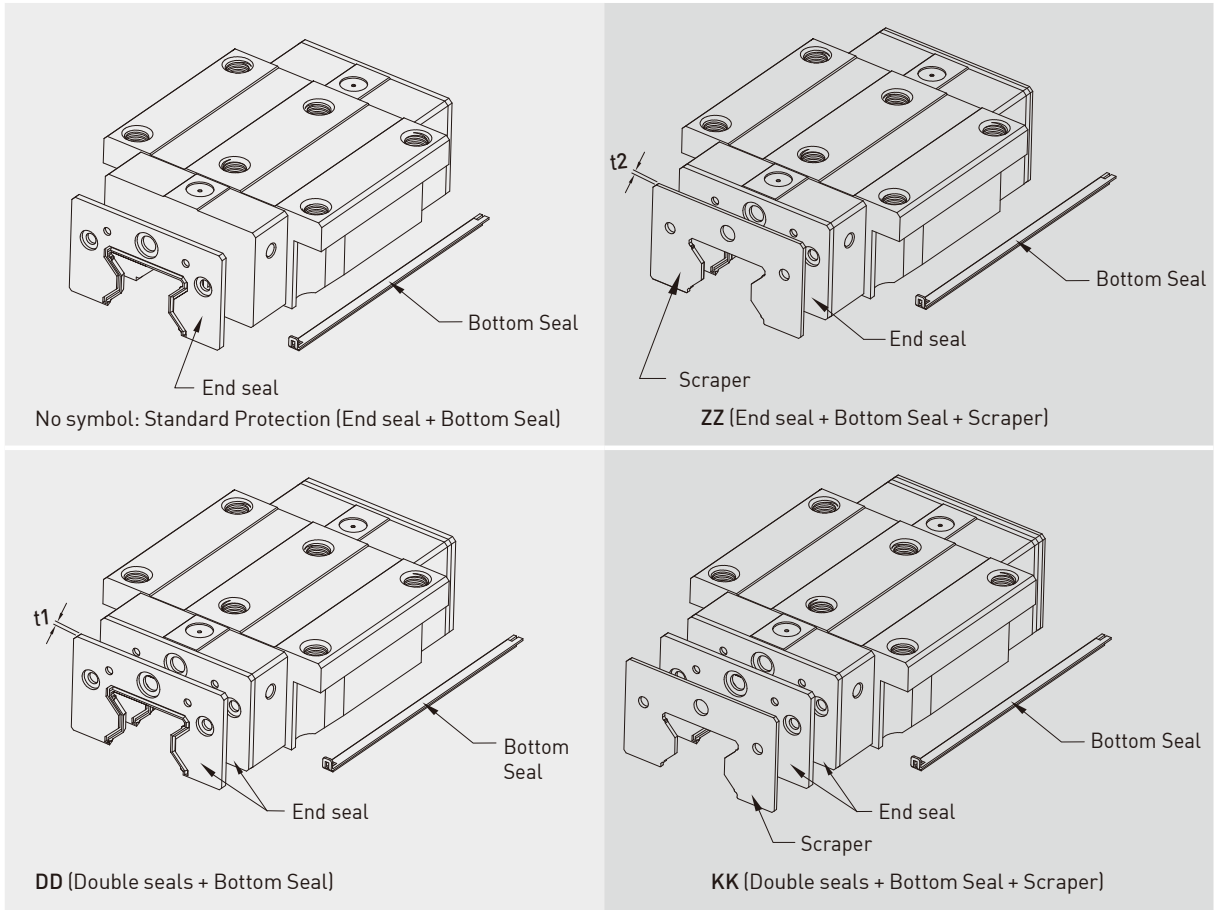


2-11-7 Dust Proof Accessories

(1) Codes of accessories

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

Table 2-11-13



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(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 2-11-14 Dimensions of end seal

Size	Thickness (t1) (mm)	Size	Thickness (t1) (mm)
QR20 ES	2.2	QR35 ES	2.5
QR25 ES	2.2	QR45 ES	3.6
QR30 ES	2.4		

(4) Scraper

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

Table 2-11-15 Dimensions of scraper

Size	Thickness (t2) (mm)	Size	Thickness (t2) (mm)
QR20 SC	1.0	QR35 SC	1.5
QR25 SC	1.0	QR45 SC	1.5
QR30 SC	1.5		

(5) Dimensions of block equipped with the dustproof parts

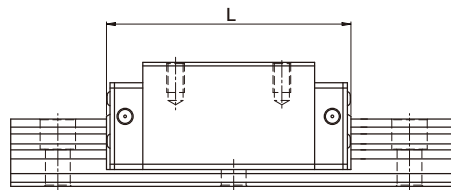


Table 2-11-16 Overall block length

unit: mm

Size	Overall block length (L)			
	SS	ZZ	DD	KK
QR20C	86.0 (88.4)	88.0 (92.4)	90.4 (92.8)	92.4 (96.8)
QR25C	97.7 (101.5)	99.9 (105.9)	102.3 (105.9)	104.3 (110.3)
QR25H	112.9 (116.5)	114.9 (120.9)	117.3 (120.9)	119.3 (125.3)
QR30C	109.8 (113.4)	112.8 (118.8)	114.6 (118.2)	117.6 (123.6)
QR30H	131.8 (135.4)	134.8 (140.8)	136.6 (140.2)	139.6 (145.6)
QR35C	124.0 (129.4)	127.0 (135.0)	129.0 (134.4)	132.0 (140.0)
QR35H	151.5 (156.9)	154.5 (162.5)	156.5 (161.9)	159.5 (167.5)
QR45C	153.2 (156.4)	156.2 (164.2)	160.4 (163.6)	163.4 (171.4)
QR45H	187.0 (190.2)	190.0 (198.0)	194.2 (197.4)	197.2 (205.2)

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

2-11-8 Friction

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

Table 2-11-17 Seal Resistance

Size	Resistance N (kgf)	Size	Resistance N (kgf)
QR 20 ES	2.45 [0.25]	QR 35 ES	3.53 [0.36]
QR 25 ES	2.74 [0.28]	QR 45 ES	4.21 [0.43]
QR 30 ES	3.31 [0.31]		

2-11-9 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 QR series linear guideway will be maintained without any difficulty.

○ The parallelism tolerance of reference surface (P)

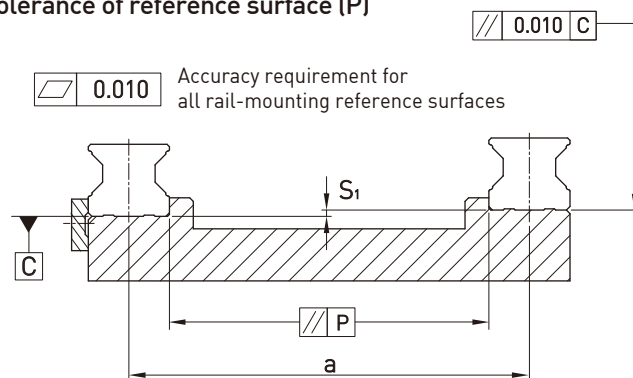


Table 2-11-18 Max. Parallelism Tolerance (P)

unit: μm

Size	Preload classes		
	Light Preload (Z0)	Medium Preload (ZA)	Heavy Preload (ZB)
QR20	8	6	4
QR25	9	7	5
QR30	11	8	6
QR35	14	10	7
QR45	17	13	9

○ The accuracy tolerance of reference surface height (S₁)

$$S_1 = a \times K$$

S₁ : Max. tolerance of height

a : Distance between paired rails

K : Coefficient of tolerance of height

Table 2-11-19 Coefficient of tolerance of height

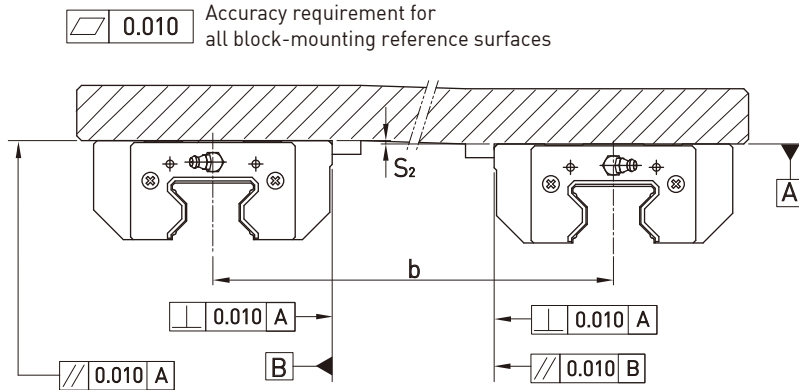
Size	Preload classes		
	Light Preload (Z0)	Medium Preload (ZA)	Heavy Preload (ZB)
K	2.2×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

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(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 (S_2)

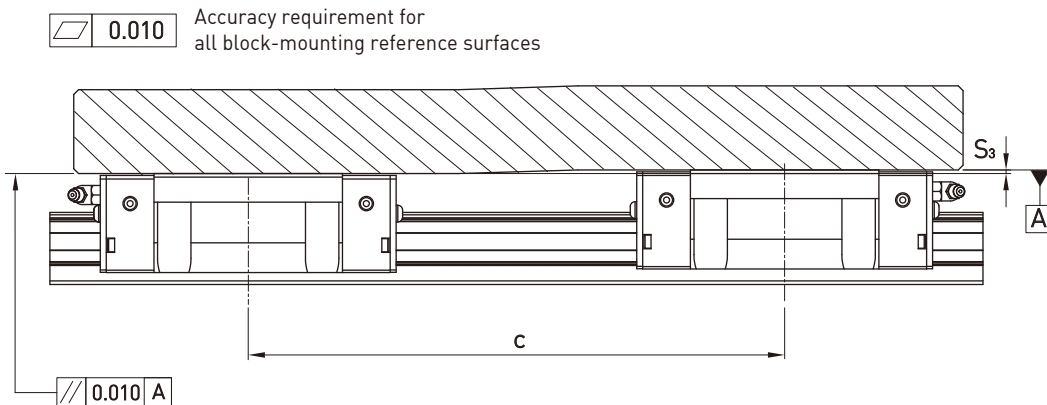


$$S_2 = b \times 4.2 \times 10^{-5}$$

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 (S_3)



$$S_3 = c \times 4.2 \times 10^{-5}$$

S_3 : Max. tolerance of height

c : Distance between paired blocks

2-11-10 Cautions for Installation

(1) Shoulder heights and fillets

Improper shoulder heights and fillets of mounting surfaces will cause a deviation in accuracy and interference with the chamfered part of the rail or block.

By following the recommended shoulder heights and fillets, accuracy problems in installation can be eliminated.

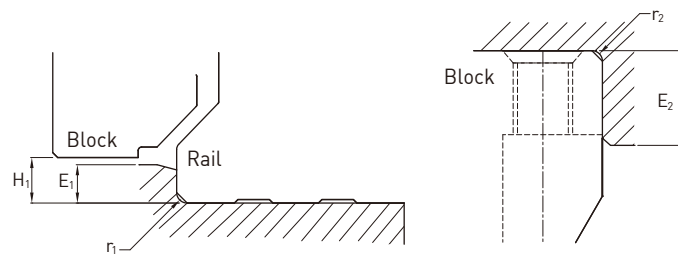


Table 2-11-20

Size	Max. radius of fillets r_1 (mm)	Max. radius of fillets r_2 (mm)	Shoulder height of the rail E_1 (mm)	Shoulder height of the block E_2 (mm)	Clearance under block H_1 (mm)
QR20	0.5	0.5	3.5	5	5
QR25	1.0	1.0	5	5	5.5
QR30	1.0	1.0	5	5	6
QR35	1.0	1.0	6	6	6.5
QR45	1.0	1.0	7	8	8

(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 2-11-21

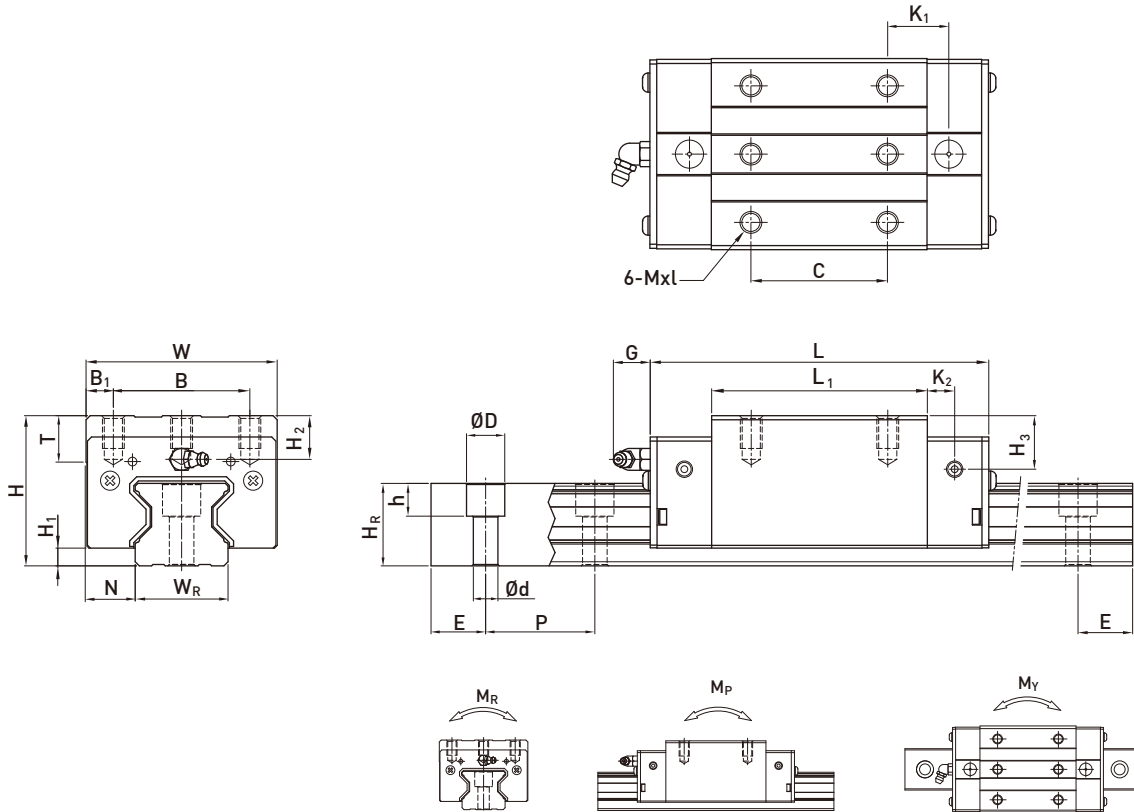
Size	Bolt size	Torque N-cm(kgf-cm)		
		Iron	Casting	Aluminum
QR20	M5×0.8P×20L	883 (90)	588 (60)	441 (45)
QR25	M6×1P×20L	1373 (140)	921 (94)	686 (70)
QR30	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)
QR35	M8×1.25P×25L	3041 (310)	2010 (205)	1470 (150)
QR45	M12×1.75P×35L	11772 (1200)	7840 (800)	5880 (600)

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2-11-11 Dimensions for QR series

(1) QRH-CA / QRH-HA

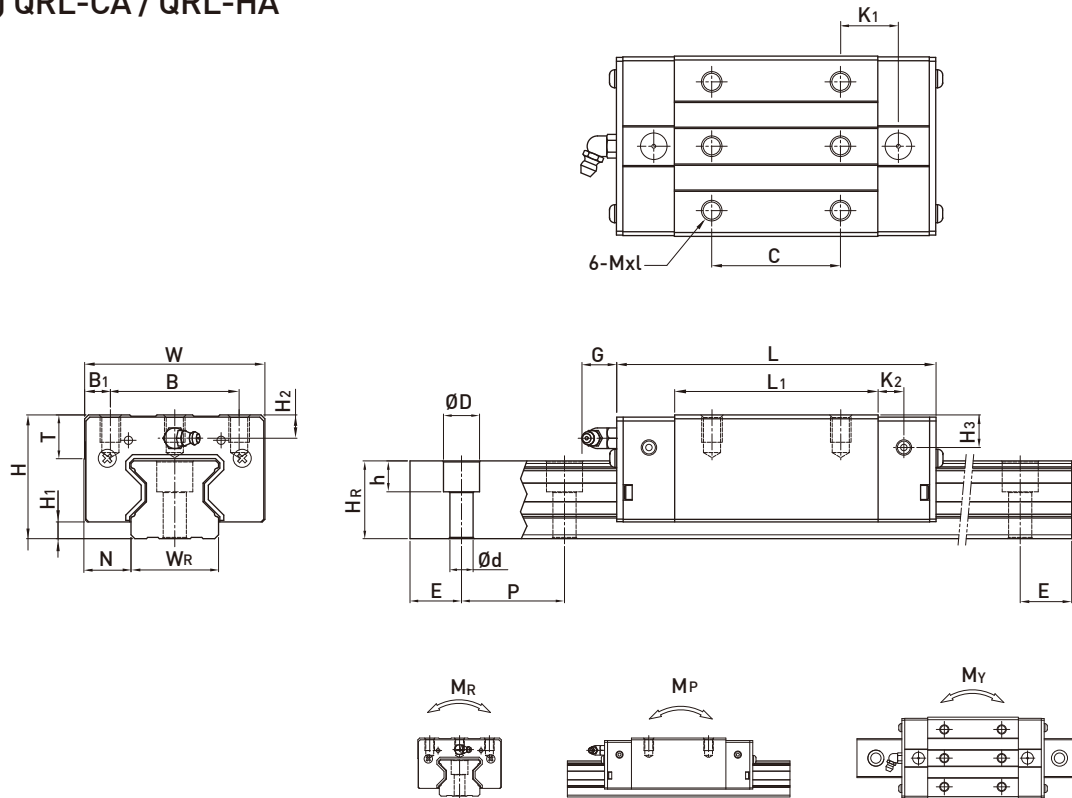


Model No.	Dimensions of Assembly (mm)			Dimensions of Block (mm)													Dimensions of Rail (mm)					Mounting Bolt for Rail (mm)	Basic Dynamic Load Rating C(kN)	Basic Static Load Rating C ₀ (kN)	Static Rated Moment			Weight			
	H	H ₁	N	W	B	B ₁	C	L ₁	L	K ₁	K ₂	G	Mxl	T	H ₂	H ₃	W _R	H _R	D	h	d				P	E	M _R	M _P	M _Y	Block	Rail
	kgf	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm				mm	mm	mm	kN-m	kN-m	kN-m	kg
QRH20CA	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 x 20	26.3	38.9	0.591	0.453	0.453	0.40	2.76
QRH25CA	40	5.5	12.5	48	35	6.5	35	66	97.9	20.75	7.25	12	M6 x 8	9.5	10.2	10	23	23.6	11	9	7	30	20	M6 x 20	38.5	54.4	0.722	0.627	0.627	0.60	3.08
QRH25HA							50	81	112.9	21.5							23	23.6	11	9	7	30	20	M6 x 20	44.7	65.3	0.867	0.907	0.907	0.74	3.08
QRH30CA	45	6	16	60	40	10	40	71	109.8	23.5	8	12	M8 x 10	9.5	9.5	10.3	28	28	14	12	9	40	20	M8 x 25	51.5	73.0	1.284	0.945	0.945	0.89	4.41
QRH30HA							60	93	131.8	24.5							28	28	14	12	9	40	20	M8 x 25	64.7	95.8	1.685	1.63	1.63	1.15	4.41
QRH35CA	55	6.5	18	70	50	10	50	79	124	22.5	10	12	M8 x 12	12	16	19.6	34	30.2	14	12	9	40	20	M8 x 25	77.0	94.7	1.955	1.331	1.331	1.56	6.06
QRH35HA							72	106.5	151.5	25.25							34	30.2	14	12	9	40	20	M8 x 25	95.7	126.3	2.606	2.335	2.335	2.04	6.06
QRH45CA	70	8	20.5	86	60	13	60	106	153.2	31	10	12.9	M10 x 17	16	20	24	45	38	20	17	14	52.5	22.5	M12 x 35	123.2	156.4	3.959	2.666	2.666	3.16	9.97
QRH45HA							80	139.8	187	37.9							45	38	20	17	14	52.5	22.5	M12 x 35	150.8	208.6	5.278	4.694	4.694	4.10	9.97

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}

(2) QRL-CA / QRL-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 C ₀ (kN)	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	M _R	M _P	M _Y	Block	Rail
	kg	kg/m	kN-m	kN-m	kN-m	kg	kg/m																								
QRL20CA	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	26.3	38.9	0.591	0.453	0.453	0.32	2.76
QRL25CA	36	5.5	12.5	48	35	6.5	35	66	97.9	20.75	7.25	12	M6x8	9.5	6.2	6	23	23.6	11	9	7	30	20	M6x20	38.5	54.4	0.722	0.627	0.627	0.50	3.08
QRL25HA							50	81	112.9	21.5														M6x20	44.7	65.3	0.867	0.907	0.907	0.62	
QRL30CA	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	51.5	73.0	1.284	0.945	0.945	0.79	4.41
QRL30HA							60	93	131.8	24.5														M8x25	64.7	95.8	1.685	1.63	1.63	1.02	
QRL35CA	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	77.0	94.7	1.955	1.331	1.331	1.26	6.06
QRL35HA							72	106.5	151.5	25.25														M8x25	95.7	126.3	2.606	2.335	2.335	1.63	
QRL45CA	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	123.2	156.4	3.959	2.666	2.666	2.45	9.97
QRL45HA							80	139.8	187	37.9														M12x35	150.8	208.6	5.278	4.694	4.694	3.17	

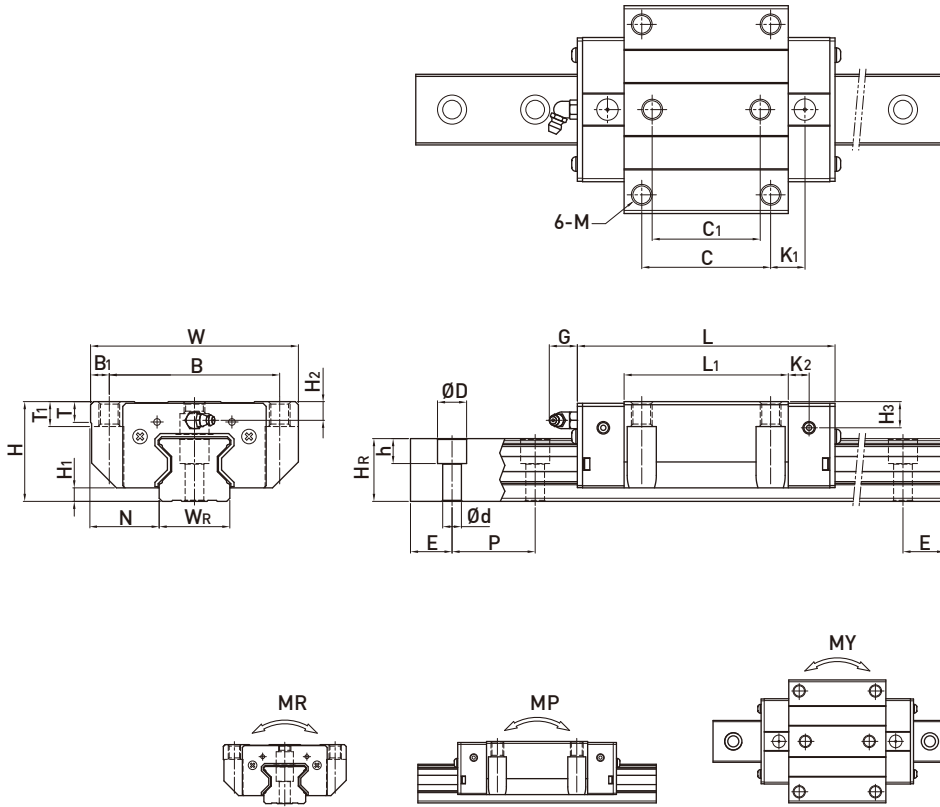
Note : 1. 1 kgf = 9.81 N

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}

QR Series

Roller Type

(3) QRW-CC / QRW-HC



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 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	
QRW20CC	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	26.3	38.9	0.591	0.453	0.453	0.47	2.76	
QRW25CC	36	5.5	23.5	70	57	6.5	45	40	66	97.9	15.75	7.25	12	M8	9.5	10	6.2	6	23	23.6	11	9	7	30	20	M6x20	38.5	54.4	0.722	0.627	0.627	0.71	3.08	
QRW25HC									81	112.9	24																23	23.6	11	9	7	30	20	M6x20
QRW30CC	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	51.5	73.0	1.284	0.945	0.945	1.15	4.41	
QRW30HC									93	131.8	28.5																28	28	14	12	9	40	20	M8x25
QRW35CC	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	77.0	94.7	1.955	1.331	1.331	1.74	6.06	
QRW35HC									106.5	151.5	30.25																12	13	9	12.6	34	30.2	14	12
QRW45CC	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	123.2	156.4	3.959	2.666	2.666	3.41	9.97	
QRW45HC									139.8	187	37.9																14	15	10	14	45	38	20	17

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}