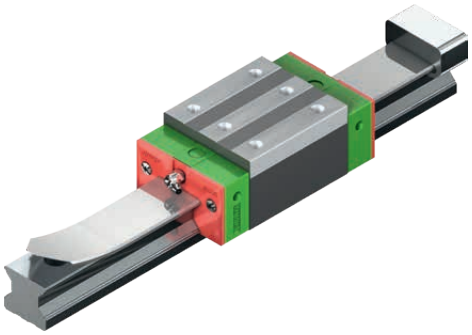
3.7 CRG series

3.6.15 Properties of the CRG series linear guideways

Roller guides with cover strip for heavy-duty applications with maximum requirements on load ratings and torque capacity. The HIWIN linear guideways of the CRG series use rollers rather than balls as rolling elements. The CRG series offers extremely high rigidity and a very high load capacity. It is designed with a 45° contact angle. The linear contact surface dramatically reduces deformation caused by loading, thereby achieving extremely high rigidity and load capacity in all 4 load directions. The linear guideways of the CRG series are thus ideally suited for use in high-precision manufacturing.
A cover strip is available as an option – dirt ingress and wear of the sealing lip are thus permanently reduced to a minimum. Thanks to the mounting aid, the cover strip can be installed in just a few steps.

3.6.16 Layout of CRG series

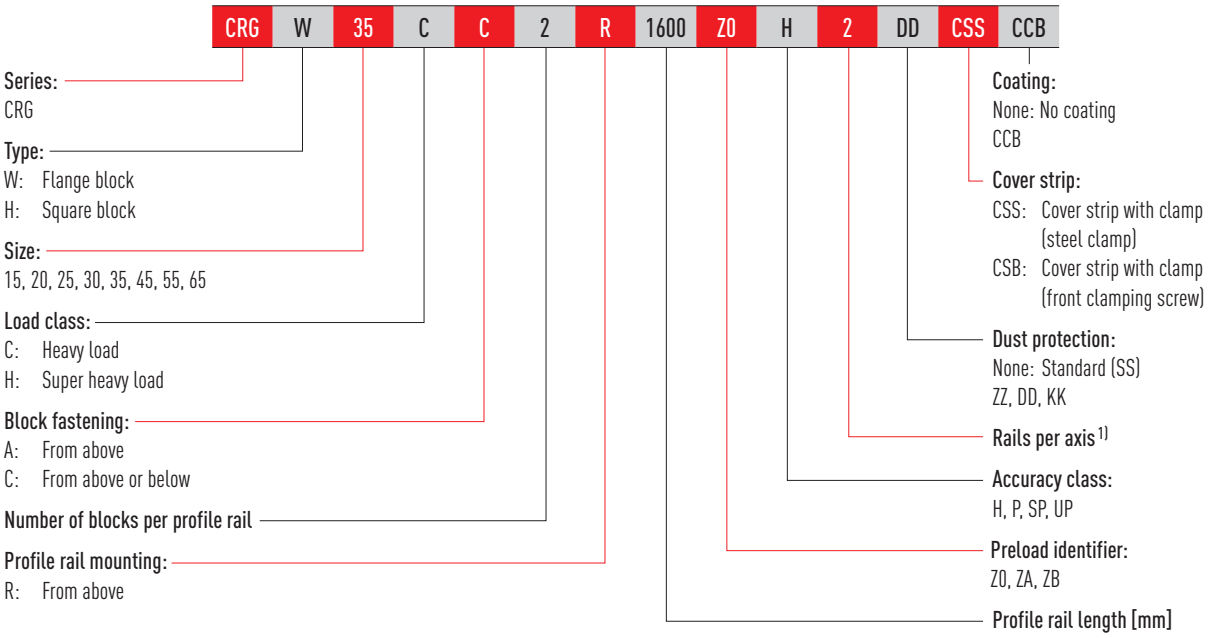
- Backlash-free, four-row recirculating roller guide with optimum dust protection even in the standard version.
- Easy installation, better protection against dirt ingress and wear of the end seals with cover strip.



Properties:

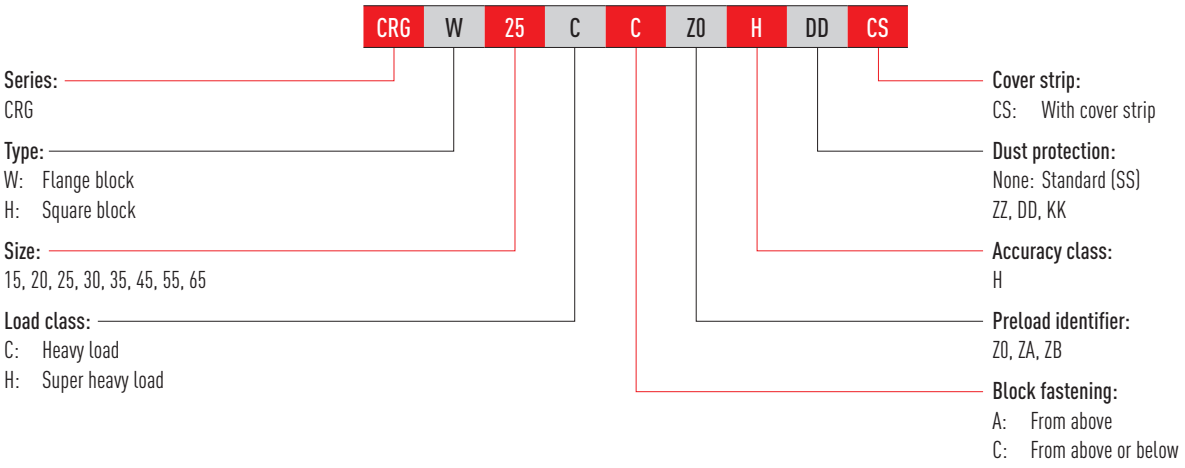
- Backlash-free
- Exchangeable
- Very high load ratings
- Very high rigidity
- Low displacement forces even with high preload
- Cover strip

3.7.1 Order code of CRG series

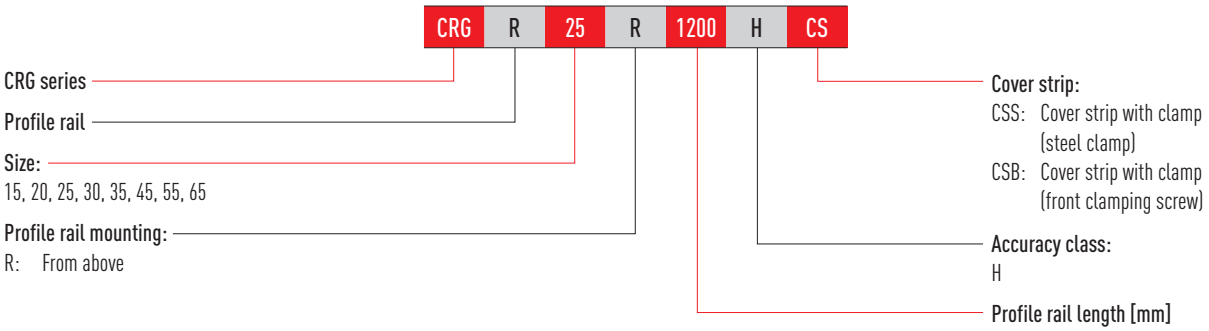


Interchangeable models

- Order code of CRG block



- Order code of CRG profile rail



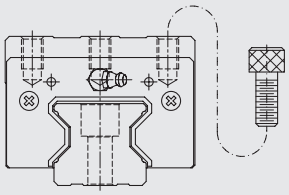
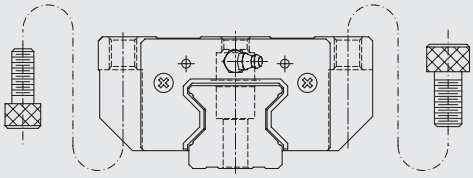
Note:

1) The number 2 is also a quantity indication, i.e. one piece of the article described above consists of one pair of rails. No number is given for single profile rails. In the case of multi-part rails, the joint is offset as standard.

3.7.2 Block types

HIWIN offers block and flange blocks for its linear guideways. Due to the low installation height and the larger mounting surface, flange blocks are better suited for large loads.

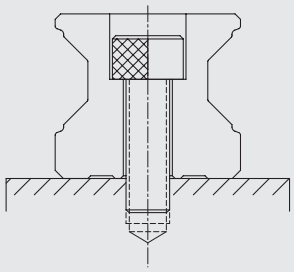
Table 3.109 **Block types**

Type	Series/size	Layout	Height [mm]	Typical applications
Square type	CRGH-CA CRGH-HA		28 – 90	○ Automation technology ○ Transport technology ○ CNC machining centres ○ High performance cutting machines ○ CNC grinding machines ○ Injection moulding machines ○ Portal milling machines ○ Machines and systems with high required rigidity ○ Machines and systems with high required load ratings ○ Spark erosion machines
Flange type	CRGW-CC CRGW-HC		24 – 90	

3.7.3 Profile rail type

Profile rail with standard fastening from above.

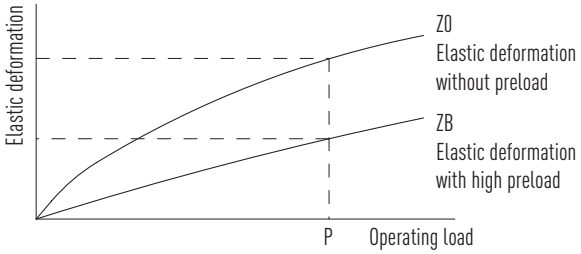
Table 3.110 **Profile rail type**

Fastening from above

CRGR_R

3.7.4 Preload

Definition

Each linear guideway can be preloaded via the ball size. The curve shows that the rigidity doubles at high preload. The RG/QR series of linear guideways offers three standard preloads for different applications and conditions.

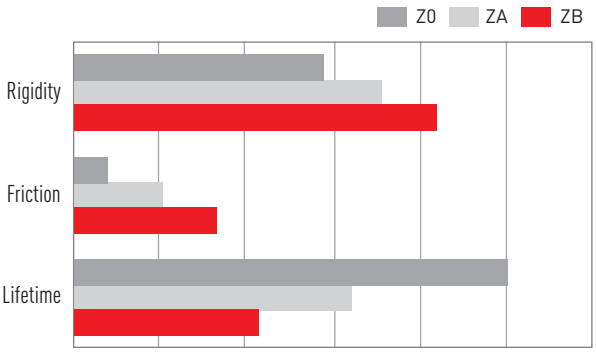


Preload identifier

Table 3.111 **Preload identifier**

Identifier	Preload		Application
Z0	Slight preload	0.02 – 0.04 C_{dyn}	Constant load direction, low jolting and low required accuracy
ZA	Medium preload	0.07 – 0.09 C_{dyn}	High precision required
ZB	High preload	0.12 – 0.14 C_{dyn}	Very high rigidity and precision required, vibration and jolting

The figure shows the relationship between rigidity, frictional resistance and nominal service life. For smaller size models, preload is not recommended above ZA to avoid preload-related reductions in service life.



3.7.5 Load ratings and torques

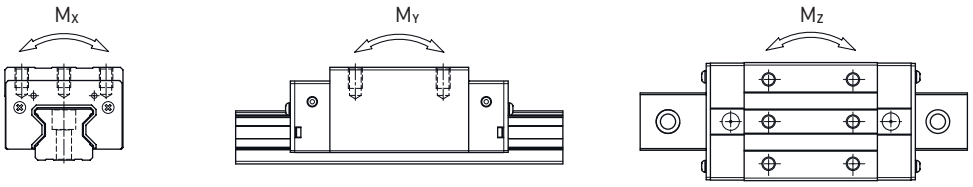


Table 3.112 **Load ratings and torques for CRG series**

Series/Size	Dynamic load rating C_{dyn} [N] [1]	Static load rating C_0 [N]	Static moment [Nm]		
			M_{0X}	M_{0Y}	M_{0Z}
CRG_15C	11,300	24,000	311	173	173
CRG_20C	21,300	46,700	647	460	460
CRG_20H	26,900	63,000	872	837	837
CRG_25C	27,700	57,100	758	605	605
CRG_25H	33,900	73,400	975	991	991
CRG_30C	39,100	82,100	1,445	1,060	1,060
CRG_30H	48,100	105,000	1,846	1,712	1,712
CRG_35C	57,900	105,200	2,170	1,440	1,440
CRG_35H	73,100	142,000	2,930	2,600	2,600
CRG_45C	92,600	178,800	4,520	3,050	3,050
CRG_45H	116,000	230,900	6,330	5,470	5,470
CRG_55C	130,500	252,000	8,010	5,400	5,400
CRG_55H	167,800	348,000	11,150	10,250	10,250
CRG_65C	213,000	411,600	16,200	11,590	11,590
CRG_65H	275,300	572,700	22,550	22,170	22,170

[1] Dynamic load rating for 100,000 m travel path

3.7.6 Rigidity

The rigidity depends on the preload. With the formula F 3.18, the deformation can be calculated depending on the rigidity.

F 3.23

$$\delta = \frac{P}{k}$$

- δ Deformation [μm]
- P Operating load [N]
- k Rigidity value [N/μm]

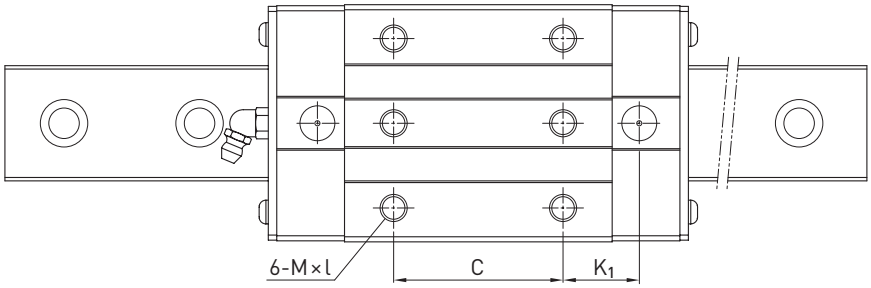
Table 3.113 **Radial rigidity of CRG series**

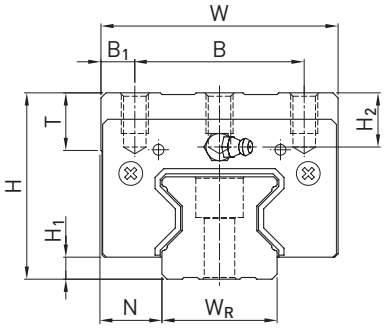
Load type	Series/ Size	Rigidity depending on the preload		
		Z0	ZA	ZB
Heavy load	CRG_15C	482	504	520
	CRG_20C	586	614	633
	CRG_25C	682	717	740
	CRG_30C	809	849	876
	CRG_35C	954	1,002	1,035
	CRG_45C	1,433	1,505	1,554
	CRG_55C	1,515	1,591	1,643
	CRG_65C	2,120	2,227	2,300
Super heavy load	CRG_20H	786	823	848
	CRG_25H	873	917	947
	CRG_30H	1,083	1,136	1,173
	CRG_35H	1,280	1,344	1,388
	CRG_45H	1,845	1,938	2,002
	CRG_55H	2,079	2,182	2,254
	CRG_65H	2,931	3,077	3,178

Unit: N/μm

3.7.7 Dimensions of the CRG blocks

3.7.7.1 CRGH dimensions





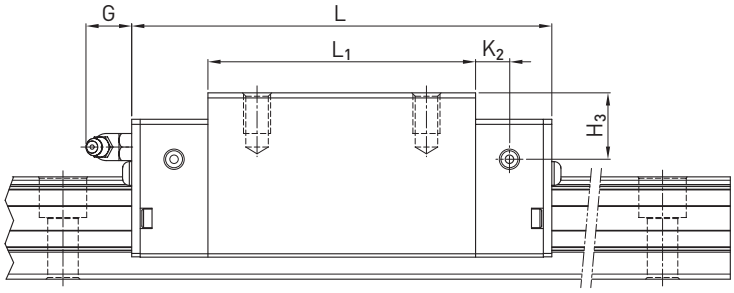
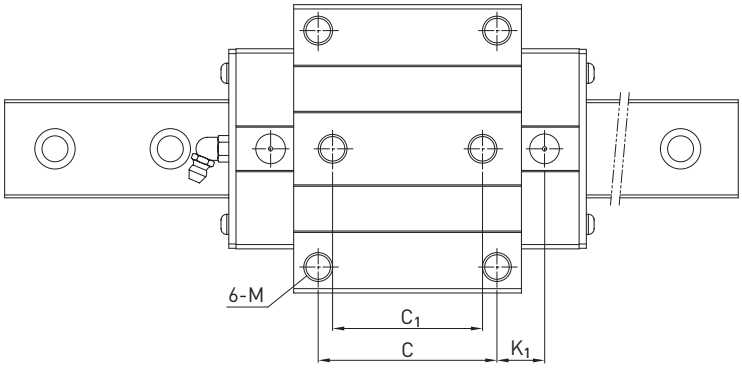
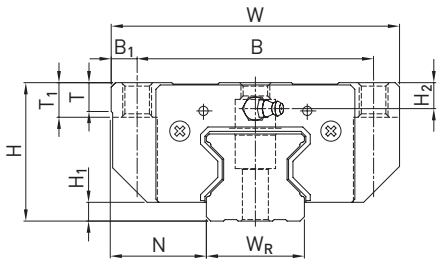


Table 3.114 **Dimensions of the block**

Series/size	Installation dimensions [mm]			Dimensions of the block [mm]													Load ratings [N]		Weight [kg]
	H	H_1	N	W	B	B_1	C	L_1	L	K_1	K_2	G	M × l	T	H_2	H_3	C_{dyn}	C_0	
CRGH15CA	28	4.0	9.5	34	26	4.0	26	45.0	68.0	13.40	4.70	5.3	M4 × 8	6.0	7.6	10.1	11,300	24,000	0.20
CRGH20CA	34	5.0	12.0	44	32	6.0	36	57.5	86.0	15.80	6.00	5.3	M5 × 8	8.0	8.3	8.3	21,300	46,700	0.40
CRGH20HA							50	77.5	106.0	18.80							26,900	63,000	0.53
CRGH25CA	40	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12.0	M6 × 8	9.5	10.2	10.0	27,700	57,100	0.61
CRGH25HA							50	81.0	114.4	21.50							33,900	73,400	0.75
CRGH30CA	45	6.0	16.0	60	40	10.0	40	71.0	109.8	23.50	8.00	12.0	M8 × 10	9.5	9.5	10.3	39,100	82,100	0.90
CRGH30HA							60	93.0	131.8	24.50							48,100	105,000	1.16
CRGH35CA	55	6.5	18.0	70	50	10.0	50	73.0	124.0	22.50	10.00	12.0	M8 × 12	12.0	16.0	19.6	57,900	105,200	1.57
CRGH35HA							72	106.5	151.5	25.25							73,100	142,000	2.06
CRGH45CA	70	8.0	20.5	86	60	13.0	60	106.0	153.2	31.00	10.00	12.9	M10 × 17	16.0	20.0	24.0	92,600	178,800	3.18
CRGH45HA							80	139.8	187.0	37.90							116,000	230,900	4.13
CRGH55CA	80	10.0	23.5	100	75	12.5	75	125.5	183.7	37.75	12.50	12.9	M12 × 18	17.5	22.0	27.5	130,500	252,000	4.89
CRGH55HA							95	173.8	232.0	51.90							167,800	348,000	6.68
CRGH65CA	90	12.0	31.5	126	76	25.0	70	160.0	232.0	60.80	15.80	12.9	M16 × 20	25.0	15.0	15.0	213,000	411,600	8.89
CRGH65HA							120	223.0	295.0	67.30							275,300	572,700	12.13

3.7.7.2 CRGW dimensions





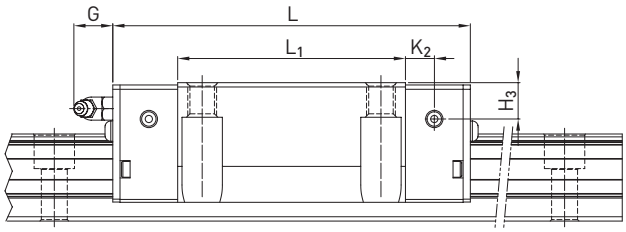


Table 3.115 **Dimensions of the block**

Series/size	Installation dimensions [mm]			Dimensions of the block [mm]														Load ratings [N]		Weight [kg]
	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	C_{dyn}	C_0	
CRGW15CC	24	4.0	16.0	47	38	4.5	30	26	45.0	68.0	11.40	4.70	5.3	M5	6.0	6.95	3.6	6.1	11,300	24,000	0.22
CRGW20CC	30	5.0	21.5	63	53	5.0	40	35	57.5	86.0	13.80	6.00	5.3	M6	8.0	10.00	4.3	4.3	21,300	46,700	0.47
CRGW20HC									77.5	106.0	23.80								26,900	63,000	0.63
CRGW25CC	36	5.5	23.5	70	57	6.5	45	40	64.5	97.9	15.75	7.25	12.0	M8	9.5	10.00	6.2	6.0	27,700	57,100	0.72
CRGW25HC									81.0	114.4	24.00								33,900	73,400	0.91
CRGW30CC	42	6.0	31.0	90	72	9.0	52	44	71.0	109.8	17.50	8.00	12.0	M10	9.5	10.00	6.5	7.3	39,100	82,100	1.16
CRGW30HC									93.0	131.8	28.50								48,100	105,000	1.52
CRGW35CC	48	6.5	33.0	100	82	9.0	62	52	79.0	124.0	16.50	10.00	12.0	M10	12.0	13.00	9.0	12.6	57,900	105,200	1.75
CRGW35HC									106.5	151.5	30.25								73,100	142,000	2.40
CRGW45CC	60	8.0	37.5	120	100	10.0	80	60	106.0	153.2	21.00	10.00	12.9	M12	14.0	15.00	10.0	14.0	92,600	178,800	3.43
CRGW45HC									139.8	187.0	37.90								116,000	230,900	4.57
CRGW55CC	70	10.0	43.5	140	116	12.0	95	70	125.5	183.7	27.75	12.50	12.9	M14	16.0	17.00	12.0	17.5	130,500	252,000	5.43
CRGW55HC									173.8	232.0	51.90								167,800	348,000	7.61
CRGW65CC	90	12.0	53.5	170	142	14.0	110	82	160.0	232.0	40.80	15.80	12.9	M16	22.0	23.00	15.0	15.0	213,000	411,600	11.63
CRGW65HC									223.0	295.0	72.30								275,300	572,700	16.58

3.7.8 Dimensions of the CRG rail

3.7.8.1 Dimensions CRGR_R

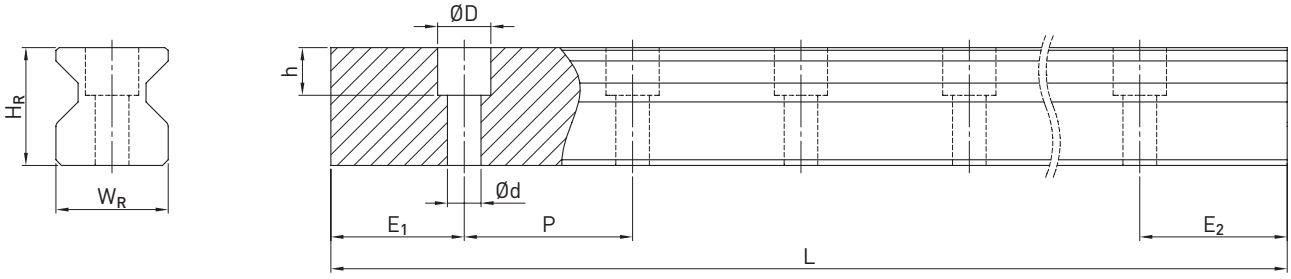


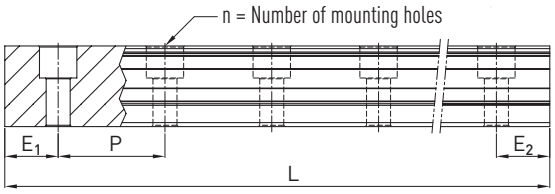
Table 3.116 **Dimensions of profile rail CRGR_R**

Series/size	Assembly screw for rail [mm]	Dimensions of the rail [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	Min. length [mm]	$E_{1/2}$ min [mm] [1]	$E_{1/2}$ min [mm] [2]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	H_R	D	h	d	P							
CRGR15R	M4 × 20	15	16.5	7.5	5.7	4.5	30.0	4,000	3,960.0	72	6	14	24.0	1.70
CRGR20R	M5 × 25	20	21.0	9.5	8.5	6.0	30.0	4,000	3,960.0	74	7	16	23.0	2.66
CRGR25R	M6 × 30	23	23.6	11.0	9.0	7.0	30.0	4,000	3,960.0	76	8	17	22.0	3.08
CRGR30R	M8 × 35	28	28.0	14.0	12.0	9.0	40.0	4,000	3,920.0	98	9	18	31.0	4.41
CRGR35R	M8 × 35	34	30.2	14.0	12.0	9.0	40.0	4,000	3,920.0	98	9	24	31.0	6.06
CRGR45R	M12 × 45	45	38.0	20.0	17.0	14.0	52.5	4,000	3,937.5	129	12	27	40.5	9.97
CRGR55R	M14 × 55	53	44.0	23.0	20.0	16.0	60.0	4,000	3,900.0	148	14	29	46.0	13.98
CRGR65R	M16 × 65	63	53.0	26.0	22.0	18.0	75.0	4,000	3,900.0	180	15	30	60.0	20.22

[1] $E_{1/2}$ min without cover strip and with cover strip (clamp: steel clamp)
[2] $E_{1/2}$ min with cover strip (clamp: front clamping screw)

3.7.8.2 Calculation of the length of profile rails

HIWIN offers profile rains in customised lengths. To make sure the end of the profile rail does not become unstable, the value E should not exceed half the distance between the mounting holes (P). At the same time, the value $E_{1/2}$ should be between $E_{1/2}$ min and $E_{1/2}$ max so that the mounting hole does not break out.



F 3.24

$$L = (n - 1) \times P + E_1 + E_2$$

L Total length of the profile rail [mm]
n Number of mounting holes
P Distance between two mounting holes [mm]
$E_{1/2}$ Distance from the centre of the last mounting hole to the end of the profile rail [mm].

3.7.8.3 Steel clamp

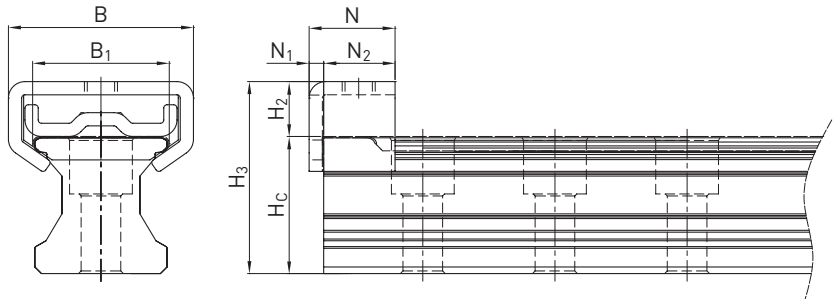


Table 3.117 **Dimensions of CRG profile rail with steel clamp**

Series/size	Dimensions of the rail with steel clamp [mm]							
	H_3	H_R	H_C	N	N_1	N_2	B	B_1
CRG_15	20.5	16.7	3.8	15	2.2	12.8	21.00	15.8
CRG_20	28.4	21.2	7.2	13	2.2	10.8	28.00	20.7
CRG_25	33.8	23.8	10.0	15	2.2	12.8	30.70	23.9
CRG_30	37.4	28.2	9.2	12	2.2	9.8	34.00	28.9
CRG_35	41.6	30.4	11.2	18	2.2	15.8	40.00	34.8
CRG_45	50.2	38.2	12.0	18	2.2	15.8	53.58	45.6
CRG_55	55.4	44.2	11.2	18	2.2	15.8	58.60	53.7
CRG_65	65.2	53.2	12.0	18	2.2	15.8	71.80	63.6

3.7.8.4 Front-side clamping screw

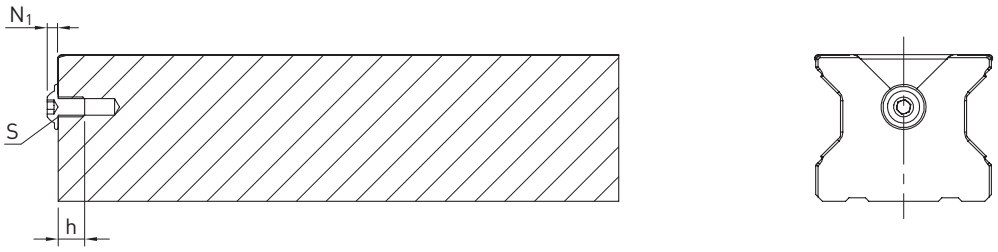


Table 3.118 **Dimensions of front-side clamping screw**

Series/Size	S [mm]	h [mm]	N_1 [mm]
CRG_15	M3	5	1.65
CRG_20	M4	5	2.20
CRG_25	M4	5	2.20
CRG_30	M4	5	2.20
CRG_35	M6	9	3.30
CRG_45	M6	9	3.30
CRG_55	M6	9	3.30
CRG_65	M6	9	3.30

3.7.9 Sealing systems

Different sealing systems are available for HIWIN blocks. You can find an overview on Page 22. The following table shows the total length of the blocks with different sealing systems. Appropriate sealing systems are available for these sizes.

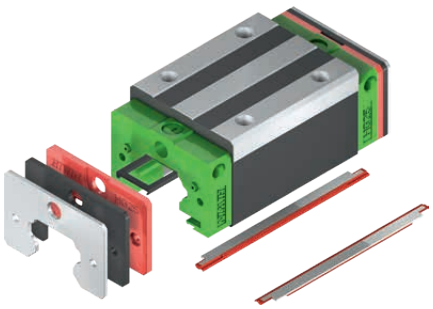


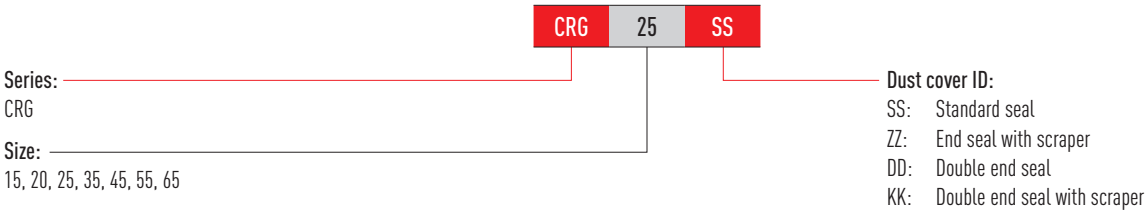
Table 3.119 **Total length of block with different sealing systems**

Series/size	Total length L (including screws)			
	SS	ZZ	DD	KK
CRG15C	68.0	70.0	72.4	74.4
CRG20C	86.0	88.0	90.4	92.4
CRG20H	106.0	108.0	110.4	112.4
CRG25C	97.9	99.9	102.3	104.3
CRG25H	114.4	116.4	118.8	120.8
CRG30C	109.8	112.8	114.6	117.6
CRG30H	131.8	134.8	136.6	139.6
CRG35C	124.0	127.0	129.0	132.0
CRG35H	151.5	154.5	156.5	159.5
CRG45C	153.2	156.2	160.4	163.4
CRG45H	187.0	190.0	194.2	197.2
CRG55C	183.7	186.7	190.9	193.9
CRG55H	232.0	235.0	239.2	242.2
CRG65C	232.0	235.0	240.8	243.8
CRG65H	295.0	298.0	303.8	306.8

Unit: mm

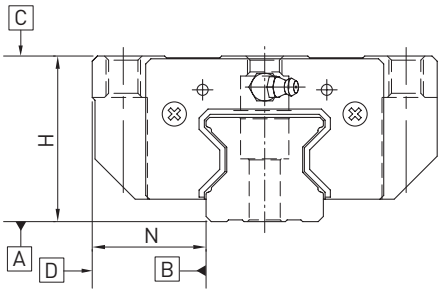
3.7.9.1 Designation of the seal sets

The seal sets are always shipped complete with the installation materials and include the supplemental parts for the standard seal.



3.7.10 Tolerances depending on the accuracy class

The CRG series are available in four accuracy classes according to the parallelism between block and rail, height accuracy H and width accuracy N. The selection of the accuracy class is determined by the requirements of the machine.



3.7.10.1 Parallelism

Parallelism of locating surfaces D and B of the block and rail and of top block surface C to mounting surface A of the rail. Ideal installation of the linear guideway and the measurement in the centre of the block are prerequisites.

Table 3.120 **Tolerance of parallelism between block and profile rail**

Rail length [mm]	Accuracy class			
	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 – 1100	16	9	6	3
1100 – 1500	18	11	7	4
1500 – 1900	20	13	8	4
1900 – 2500	22	15	10	5
2500 – 3100	25	18	11	6
3100 – 3600	27	20	14	7
3600 – 4000	28	21	15	7

Unit: µm

3.7.10.2 Accuracy – height and width

Height tolerance of H
Permissible absolute dimension deviation of height H, measured between the centre of bolting surface C and rail underside A, with any position of the block on the rail.

Height variance of H
Permissible deviation of height H between several blocks on one rail, measured at the same position of the rail.

Width tolerance of N
Permissible absolute dimension deviation of width N, measured between the centre of bolting surfaces D and B, with any position of the block on the rail.

Width variance of N
Permissible deviation of width N between several blocks on one rail, measured at the same position of the rail.

Table 3.121 **Tolerances of width and height**

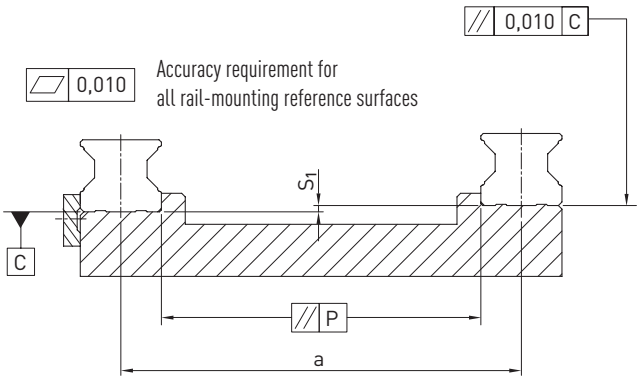
Series/size	Accuracy class	Height tolerance of H	Width tolerance of N	Height variance of H	Width variance of N
CRG_15, 20	H (high)	± 0.03	± 0.03	0.01	0.01
	P (precision)	0/– 0.03 [1)] ± 0.015 [2)]	0/– 0.03 [1)] ± 0.015 [2)]	0.006	0.006
	SP (super precision)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (ultra precision)	0/– 0.008	0/– 0.008	0.003	0.003
CRG_25, 30, 35	H (high)	± 0.04	± 0.04	0.015	0.015
	P (precision)	0/– 0.04 [1)] ± 0.02 [2)]	0/– 0.04 [1)] ± 0.02 [2)]	0.007	0.007
	SP (super precision)	0/– 0.02	0/– 0.02	0.005	0.005
	UP (ultra precision)	0/– 0.01	0/– 0.01	0.003	0.003
CRG_45, 55	H (high)	± 0.05	± 0.05	0.015	0.02
	P (precision)	0/– 0.05 [1)] ± 0.025 [2)]	0/– 0.05 [1)] ± 0.025 [2)]	0.007	0.01
	SP (super precision)	0/– 0.03	0/– 0.03	0.005	0.007
	UP (ultra precision)	0/– 0.02	0/– 0.02	0.003	0.005
CRG_65	H (high)	± 0.07	± 0.07	0.02	0.025
	P (precision)	0/– 0.07 [1)] ± 0.035 [2)]	0/– 0.07 [1)] ± 0.035 [2)]	0.01	0.015
	SP (super precision)	0/– 0.05	0/– 0.05	0.007	0.01
	UP (ultra precision)	0/– 0.03	0/– 0.03	0.005	0.007

Unit: mm

[1)] Assembled linear guideway
[2)] Unassembled linear guideway

3.7.10.3 Permissible tolerances of the mounting surface

Once the requirements for the accuracy of the mounting surfaces are met, the high accuracy, rigidity and service life of the RG/QR series linear guideways are achieved.



Tolerance of parallelism of reference surface (P)

Table 3.122 **Maximum tolerance for parallelism (P)**

Series/Size	Preload class		
	Z0	**ZA**	**ZB**
CRG_15	5	3	3
CRG_20	8	6	4
CRG_25	9	7	5
CRG_30	11	8	6
CRG_35	14	10	7
CRG_45	17	13	9
CRG_55	21	14	11
CRG_65	27	18	14

Unit: µm

Tolerance of height of reference surface (S_1)

F 3.25 $$S_1 = a \times K - T_H$$

S_1 Maximum height tolerance [mm]
a Distance between rails [mm]
K Coefficient of height tolerance
T_H Tolerance of height according to Table 3.121

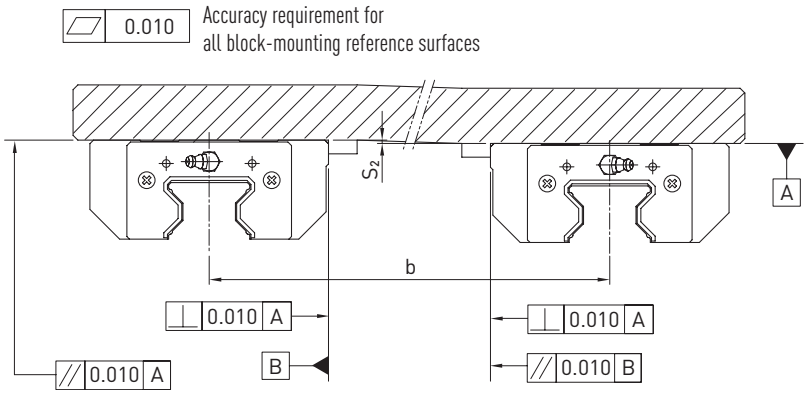
Table 3.123 **Coefficient of height tolerance (K)**

Series/Size	Preload class		
	Z0	**ZA**	**ZB**
CRG_15 – 65	2.2×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

Note: If $S_1 < 0$, select another tolerance class!

Height tolerance for mounting surface on block

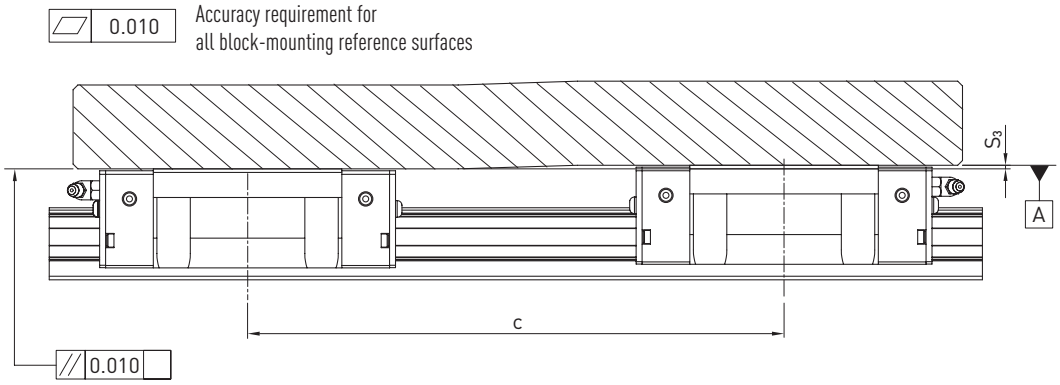
- The height tolerance of the reference surface when two or more blocks are used in parallel (S_2)



F 3.26 $S_2 = b \times 4{,}2 \times 10^{-5}$

S_2 Maximum height tolerance [mm]
b Distance between blocks [mm]

- The height tolerance of the reference surface when two or more blocks are used in parallel (S_3)



F 3.27 $S_3 = c \times 4{,}2 \times 10^{-5}$

S_3 Maximum height tolerance [mm]
c Distance between blocks [mm]

3.7.11 Shoulder heights and edge roundings

Inaccurate shoulder heights and edge roundings of mounting surfaces impair accuracy and may conflict with the block or rail profile. The following shoulder heights and edge profiles must be observed to avoid assembly problems.

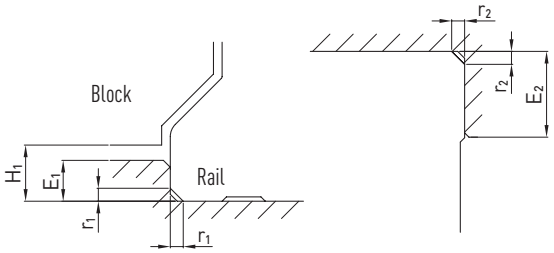


Table 3.124 **Shoulder heights and edge roundings**

Series/Size	Max. radius of edges r_1	Max. radius of edges r_2	Shoulder height of the reference edge of rail E_1	Shoulder height of the reference edge of block E_2	Clearance height under block H_1
CRG_15	0.5	0.5	3.0	4.0	4.0
CRG_20	0.5	0.5	3.5	5.0	5.0
CRG_25	1.0	1.0	5.0	5.0	5.5
CRG_30	1.0	1.0	5.0	5.0	6.0
CRG_35	1.0	1.0	6.0	6.0	6.5
CRG_45	1.0	1.0	7.0	8.0	8.0
CRG_55	1.5	1.5	9.0	10.0	10.0
CRG_65	1.5	1.5	10.0	10.0	12.0

Unit: mm