3.4 WE/QW series

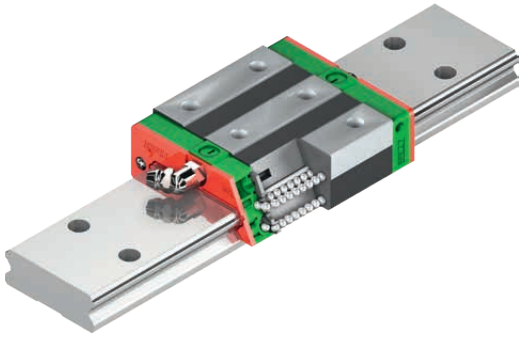
3.4.1 Properties of the WE and QW series linear guideway

Wide type, for maximum torque loads. The HIWIN linear guideways of the WE series are based on proven HIWIN technology. Due to their large rail width and low overall height, they enable a compact design and high torque capacity.

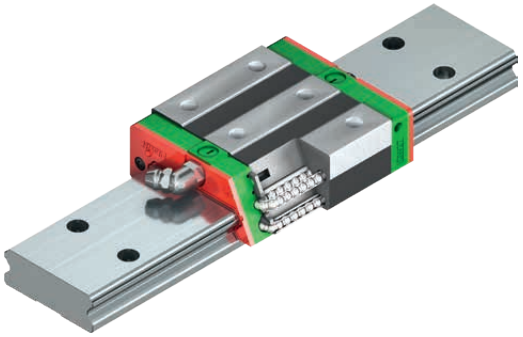
The models of the QW series with SynchMotion™ technology offer all the advantages of the standard WE series. Controlled movement of the balls at a defined distance also results in improved synchronous performance, higher reliable travel speeds, extended lubrication intervals and less running noise. Since the installation dimensions of the QW blocks are identical to those of the WE blocks, they are also mounted on the WER standard rail and can thus be easily interchanged. For further information, see Page 24.

3.4.2 Layout of WE/QW series

- Four-row linear guideway
- 45° contact angle
- The ball retainers prevent the balls from falling out when the block is removed
- Low installation height
- Wide linear guideway for high torque capacity
- Large mounting surface on block
- SynchMotion™ technology (QW series)



Layout of WE series



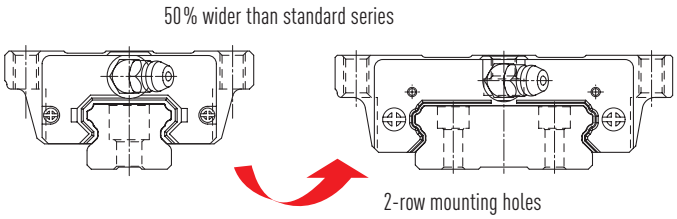
Layout of QW series

Advantages:

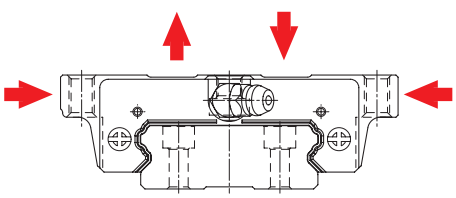
- Compact and cost-effective design due to high torque capacity
- High efficiency due to low friction losses

Additional advantages of QW series:

- Improved synchronous performance
- Optimised for higher travel speeds
- Extended relubrication intervals
- Reduced running noise
- Higher dynamic load rating



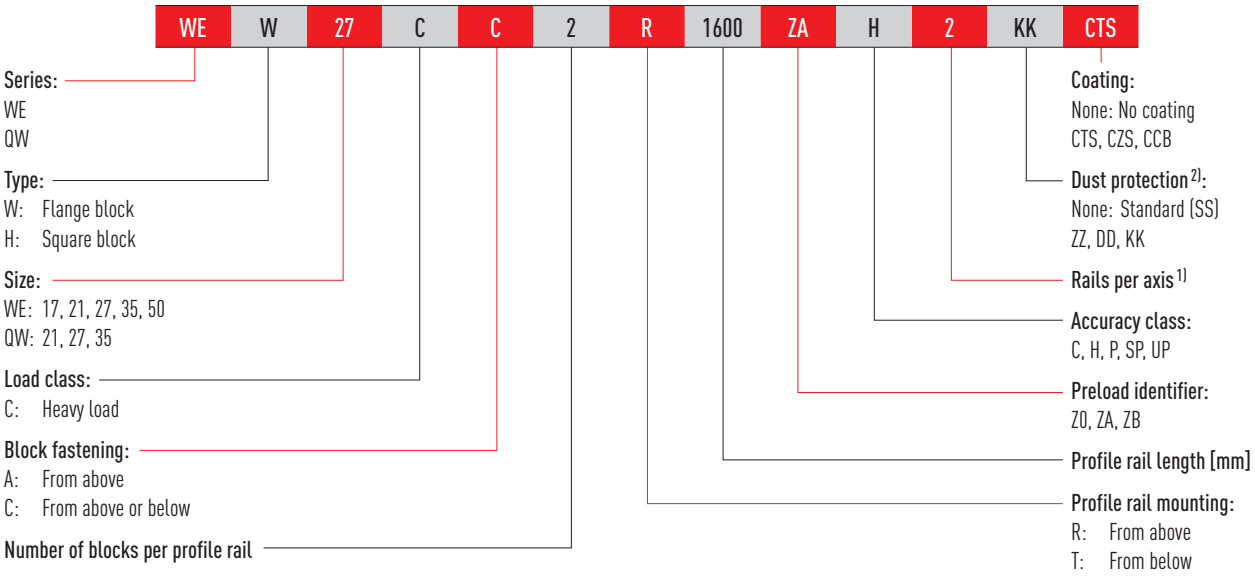
- The large-area mounting surface of the block supports the transmission of higher torques
- The 45° arrangement of the ball tracks allows for high loads from all directions



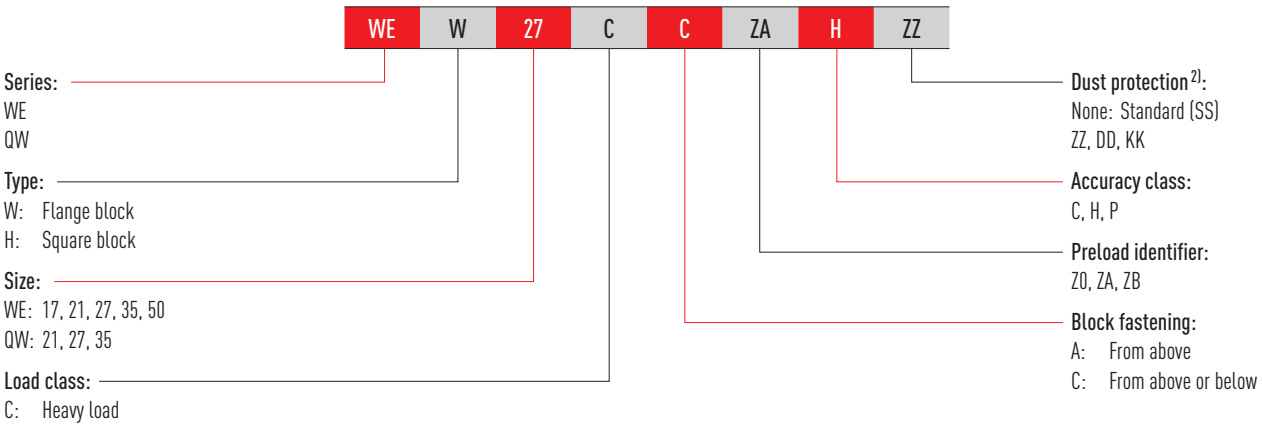
3.4.3 Order codes of WE/QW series

For WE/QW linear guideways , there is a distinction made between assembled and non-assembled models. The dimensions of both models are the same. The main difference is that, in the unassembled models, blocks and profile rails can be freely interchanged. Block and profile rail can be ordered separately and mounted by the customer. Their accuracy reaches class P.

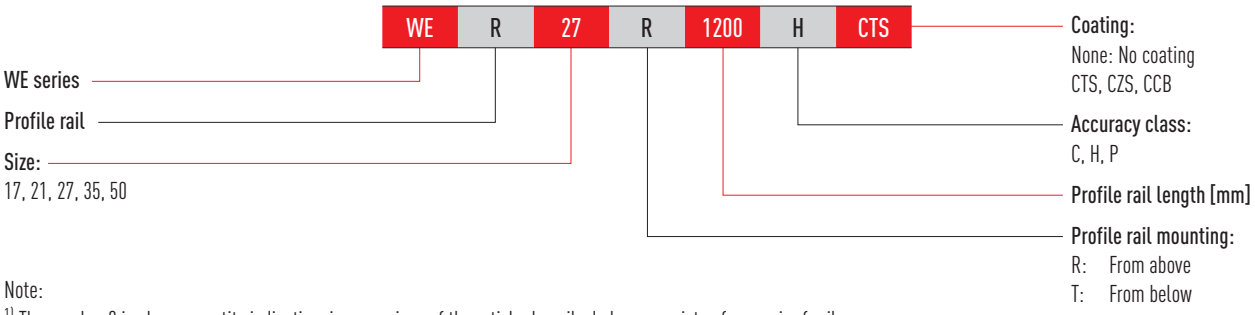
Order code for linear guideway (assembled)



Order number of block (not assembled)



Order number of profile rail (not assembled)



Note:

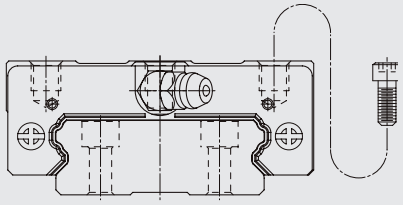
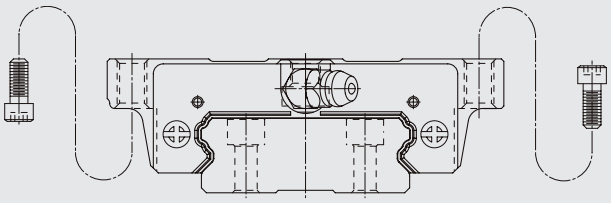
[1] The number 2 is also a quantity indication, i.e. one piece of the article described above consists of one pair of rails. No number is given for single profile rails. In the case of multi-part rails, the joint is offset as standard.

[2] An overview of the individual sealing systems can be found on Page 22

3.4.4 Block types

HIWIN offers block and flange block versions. Due to the larger mounting surface, flange blocks are better suited for large loads.

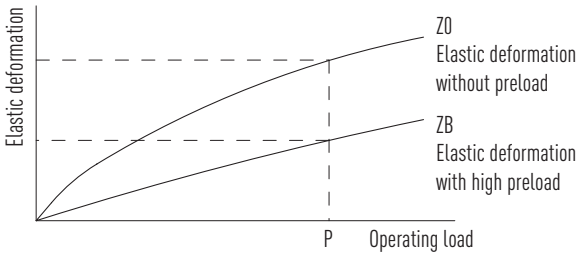
Table 3.58 **Block types**

Type	Series/size	Layout	Height [mm]	Typical applications
Square type	WEH-CA QWH-CA		17 – 50	○ Automation ○ Handling industry ○ Measuring and testing technology ○ Semiconductor industry ○ Injection moulding machines ○ Linear axes
Flange type	WEW-CC QWW-CC			

3.4.5 Preload

Definition

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



Preload identifier

Table 3.59 **Preload identifier**

Identifier	Preload		Application	Example applications
Z0	Slight preload	0 – 0.02 C_{dyn}	Constant load direction, little vibration, less accuracy required	○ Transport technology ○ Automatic packaging machines ○ X-Y axis in industrial machines ○ Welding machines
ZA	Medium preload	0.03 – 0.05 C_{dyn}	High accuracy required	○ Machining centres ○ Z axes in industrial machines ○ Eroding machines ○ NC lathes ○ Precision X-Y table ○ Measuring technology
ZB	High preload	0.06 – 0.08 C_{dyn}	High rigidity required, vibration and jolting	○ Machining centres ○ Grinding machines ○ NC lathes ○ Horizontal and vertical milling machines ○ Z-axis of machine tools ○ High performance cutting machines

3.4.6 Load ratings and torques

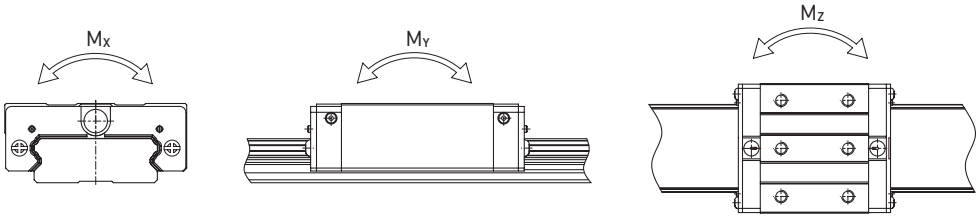


Table 3.60 **Load ratings and torques for WE/QW series**

Series/Size	Dynamic load rating C_{dyn} [N] [1]	Static load rating C_0 [N]	Static moment [Nm]		
			M_{0X}	M_{0Y}	M_{0Z}
WE_17C	5,230	9,640	150	62	62
WE_21C	7,210	13,700	230	100	100
QW_21C	9,000	12,100	210	90	90
WE_27C	12,400	21,600	420	170	170
QW_27C	16,000	22,200	420	200	200
WE_35C	29,800	49,400	1,480	670	670
QW_35C	36,800	49,200	1,510	650	650
WE_50C	61,520	97,000	4,030	1,960	1,960

[1] Dynamic load rating for 50,000 m travel path

3.4.7 Rigidity

The rigidity depends on the preload. With the formula F 3.12, the deformation can be calculated depending on the rigidity.

F 3.12

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

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

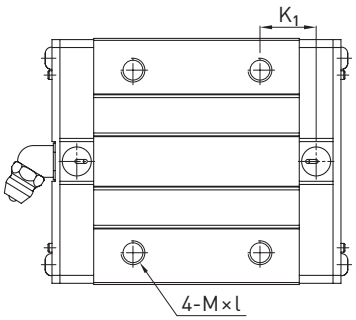
Table 3.61 **Radial rigidity of WE/QW series**

Load type	Series/ Size	Rigidity depending on the preload		
		Z0	**ZA**	**ZB**
Heavy load	**WE_17C**	128	166	189
	WE_21C	154	199	228
	QW_21C	140	176	200
	WE_27C	187	242	276
	QW_27C	183	229	260
	WE_35C	281	364	416
	QW_35C	277	348	395
	WE_50C	428	554	633

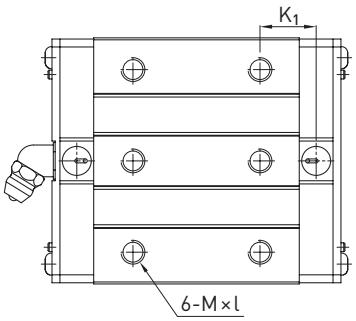
Unit: N/µm

3.4.8 Dimensions of the WE/QW blocks

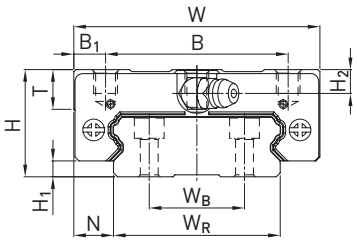
3.4.8.1 WEH/QWH



WE_17
WE/QW_21



WE/QW_27
WE/QW_35
WE_50



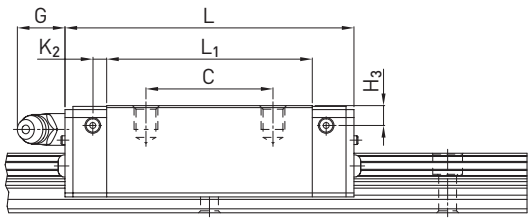


Table 3.62 **Dimensions of the block**

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	
WEH17CA	17	2.5	8.5	50	29	10.5	15	35.0	50.6	–	3.10	4.9	M4 × 5	6.0	4.0	3.0	5,230	9,640	0.12
WEH21CA	21	3.0	8.5	54	31	11.5	19	41.7	59.0	14.68	3.65	12.0	M5 × 6	8.0	4.5	4.2	7,210	13,700	0.20
QWH21CA	21	3.0	8.5	54	31	11.5	19	41.7	59.0	14.68	3.65	12.0	M5 × 6	8.0	4.5	4.2	9,000	12,100	0.20
WEH27CA	27	4.0	10.0	62	46	8.0	32	51.8	72.8	14.15	3.50	12.0	M6 × 6	10.0	6.0	5.0	12,400	21,600	0.35
QWH27CA	27	4.0	10.0	62	46	8.0	32	56.6	73.2	15.45	3.15	12.0	M6 × 6	10.0	6.0	5.0	16,000	22,200	0.35
WEH35CA	35	4.0	15.5	100	76	12.0	50	77.6	102.6	18.35	5.25	12.0	M8 × 8	13.0	8.0	6.5	29,800	49,400	1.10
QWH35CA	35	4.0	15.5	100	76	12.0	50	83.0	107.0	21.50	5.50	12.0	M8 × 8	13.0	8.0	6.5	36,800	49,200	1.10
WEH50CA	50	7.5	20.0	130	100	15.0	65	112.0	140.0	28.05	6.00	12.9	M10 × 15	19.5	12.0	10.5	61,520	97,000	3.16

For dimensions of the rail, see Page 88, for standard as well as optional lubrication adapter, see Page 150.

3.4.8.2 WEW/QWW

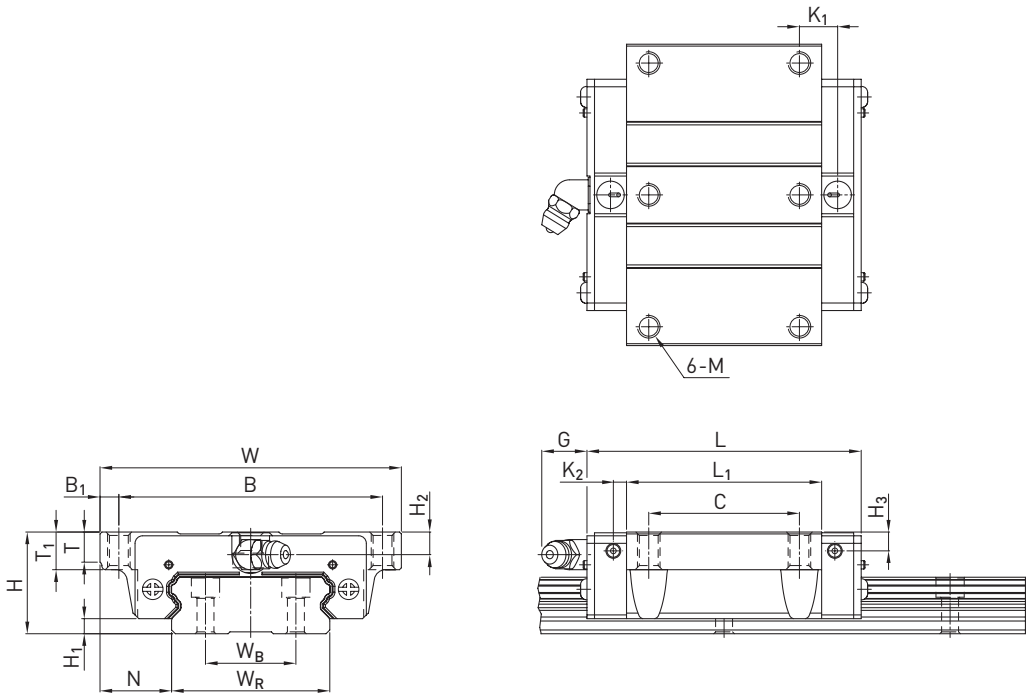


Table 3.63 **Dimensions of the block**

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	T	T_1	H_2	H_3	C_{dyn}	C_0	
WEW17CC	17	2.5	13.5	60	53	3.5	26	35.0	50.6	—	3.10	4.9	M4	5.3	6	4.0	3.0	5,230	9,640	0.13
WEW21CC	21	3.0	15.5	68	60	4.0	29	41.7	59.0	9.68	3.65	12.0	M5	7.3	8	4.5	4.2	7,210	13,700	0.23
QWW21CC	21	3.0	15.5	68	60	4.0	29	41.7	59.0	9.68	3.65	12.0	M5	7.3	8	4.5	4.2	9,000	12,100	0.23
WEW27CC	27	4.0	19.0	80	70	5.0	40	51.8	72.8	10.15	3.50	12.0	M6	8.0	10	6.0	5.0	12,400	21,600	0.43
QWW27CC	27	4.0	19.0	80	70	5.0	40	56.6	73.2	15.45	3.15	12.0	M6	8.0	10	6.0	5.0	16,000	22,200	0.43
WEW35CC	35	4.0	25.5	120	107	6.5	60	77.6	102.6	13.35	5.25	12.0	M8	11.2	14	8.0	6.5	29,800	49,400	1.26
QWW35CC	35	4.0	25.5	120	107	6.5	60	83.0	107.0	21.50	5.50	12.0	M8	11.2	14	8.0	6.5	36,800	49,200	1.26
WEW50CC	50	7.5	36.0	162	144	9.0	80	112.0	140.0	20.55	6.00	12.9	M10	14.0	18	12.0	10.5	61,520	97,000	3.71

For dimensions of the rail, see Page 88, for standard as well as optional lubrication adapter, see Page 150.

3.4.9 Dimensions of WE profile rails

3.4.9.1 Dimensions WER_R

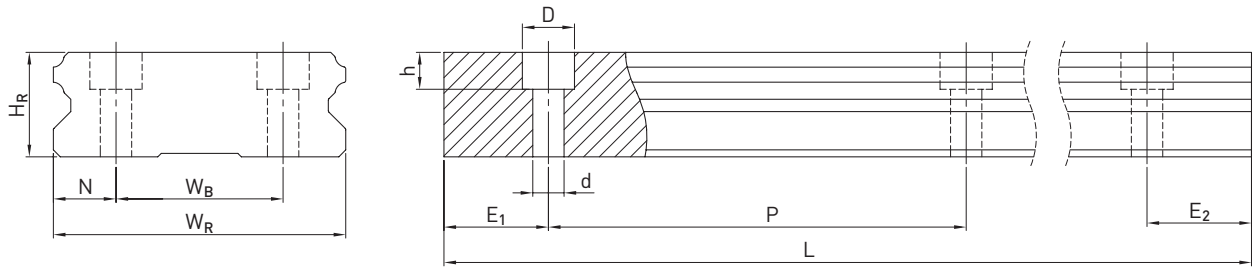


Table 3.64 **Dimensions of profile rail WER_R**

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]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	W_B	H_R	D	h	d	P						
WER17R	M4 × 12	33	18	9.3	7.5	5.3	4.5	40	4,000	3,960	52	6	34	2.2
WER21R	M4 × 16	37	22	11.0	7.5	5.3	4.5	50	4,000	3,950	62	6	44	3.0
WER27R	M4 × 20	42	24	15.0	7.5	5.3	4.5	60	4,000	3,900	72	6	54	4.7
WER35R	M6 × 25	69	40	19.0	11.0	9.0	7.0	80	4,000	3,920	96	8	72	9.7
WER50R	M8 × 30	90	60	24.0	14.0	12.0	9.0	80	4,000	3,920	98	9	71	14.6

3.4.9.2 Dimensions WER_T

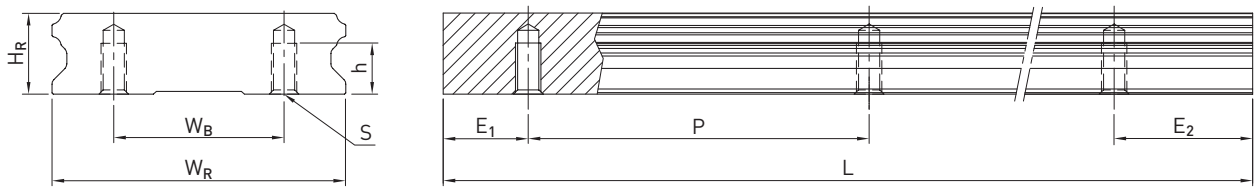


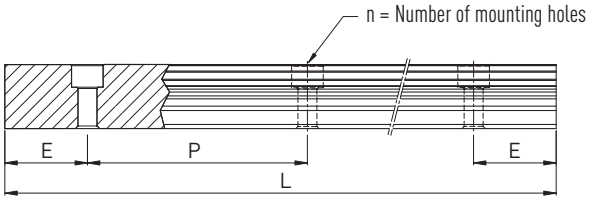
Table 3.65 **Dimensions of profile rail WER_T**

Series/size	Dimensions of the rail [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	Min. length [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	W_B	H_R	S	h	P						
WER21T	37	22	11	M4	7.0	50	4,000	3,950	62	6	44	3.0
WER27T	42	24	15	M5	7.5	60	4,000	3,900	72	6	54	4.7
WER35T	69	40	19	M6	12.0	80	4,000	3,920	96	8	72	9.7

Note:
1. The tolerance for E is +0,5 to −1 mm for standard, for joint connections 0 to −0.3 mm.
2. If no information is provided on the $E_{1/2}$ dimensions, the maximum number of mounting holes is determined taking into account $E_{1/2}$ min.
3. The rails are shortened to the desired length. If no information on the $E_{1/2}$ dimensions is provided, then the rails are manufactured symmetrically.

3.4.9.3 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 3.13

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

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].

3.4.9.4 Cover caps for mounting holes of profile rails

The cover caps are used to keep the mounting holes free of chips and dirt. The standard plastic cover caps accompany each profile rail. Optional cover caps have to be ordered separately.

Table 3.66 **Cover caps for mounting holes of profile rails**

Rail	Screw	Article number			Ø D [mm]	Height H [mm]
		Plastic (200 units)	Brass [1]	Steel [1]		
WER17R	M4	5-002218	5-001344	–	7.5	1.2
WER21R	M4	5-002218	5-001344	–	7.5	1.2
WER27R	M4	5-002218	5-001344	–	7.5	1.2
WER35R	M6	5-002221	5-001355	5-001357	11.0	2.8
WER50R	M8	5-002222	5-001360	5-001362	14.0	3.5

[1] Not recommended for coated rails.

3.4.10 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.

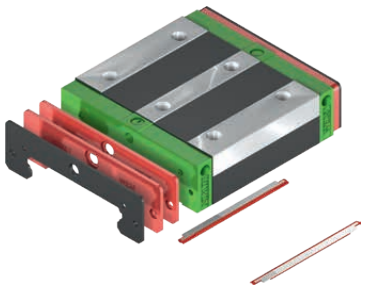


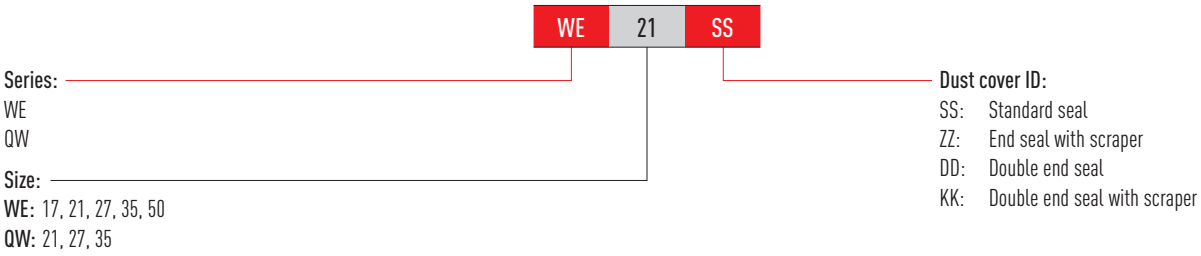
Table 3.67 **Total length of block with different sealing systems**

Series/size	Total length L (including screws)			
	SS	**DD**	**ZZ**	**KK**
WE_17C	50.6	53.8	52.6	55.8
WE/QW_21C	59.0	63.0	61.0	65.0
WE/QW_27C	72.8	76.8	74.8	78.8
WE/QW_35C	102.6	106.6	105.6	109.6
WE_50C	140.0	145.0	142.0	147.0

Unit: mm

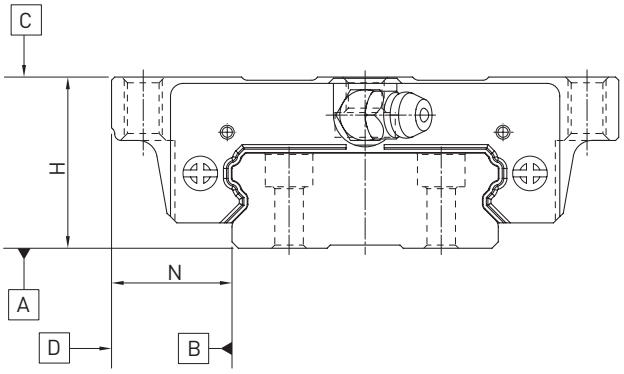
3.4.10.1 Designation of the seal sets

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



3.4.11 Tolerances depending on the accuracy class

The WE and QW series are available in five 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.



3.4.11.1 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 3.68 **Tolerance of parallelism between block and profile rail**

Rail length [mm]	Accuracy class				
	C	H	P	SP	UP
– 100	12	7	3	2	2
100 – 200	14	9	4	2	2
200 – 300	15	10	5	3	2
300 – 500	17	12	6	3	2
500 – 700	20	13	7	4	2
700 – 900	22	15	8	5	3
900 – 1100	24	16	9	6	3
1100 – 1500	26	18	11	7	4
1500 – 1900	28	20	13	8	4
1900 – 2500	31	22	15	10	5
2500 – 3100	33	25	18	11	6
3100 – 3600	36	27	20	14	7
3600 – 4000	37	28	21	15	7

Unit: µm

3.4.11.2 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.

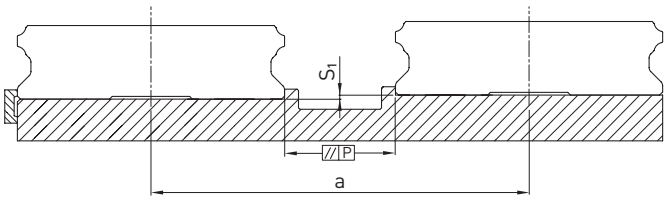
Table 3.69 **Tolerances of width and height**

Series/size	Accuracy class	Height tolerance of H	Width tolerance of N	Height variance of H	Width variance of N
WE_17, 21 **QW_21**	C (Normal)	± 0.1	± 0.1	0.02	0.02
	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
WE_27, 35 **QW_27, 35**	C (Normal)	± 0.1	± 0.1	0.02	0.03
	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
WE_50	C (Normal)	± 0.1	± 0.1	0.03	0.03
	H (high)	± 0.05	± 0.05	0.02	0.02
	P (precision)	0/– 0.05 [1] ± 0.025 [2]	0/– 0.05 [1] ± 0.025 [2]	0.01	0.01
	SP (super precision)	0/– 0.03	0/– 0.03	0.01	0.01
	UP (ultra precision)	0/– 0.02	0/– 0.02	0.01	0.01

Unit: mm

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

3.4.11.3 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 WE and QW series linear guideways are achieved.



Tolerance of parallelism of reference surface (P):

Table 3.70 **Maximum tolerance for parallelism (P)**

Series/Size	Preload class		
	Z0	**ZA**	**ZB**
WE_17	20	15	9
WE/QW_21	25	18	9
WE/QW_27	25	20	13
WE/QW_35	30	22	20
WE_50	40	30	27

Unit: μm

Tolerance of height of reference surface (S_1):

F 3.14 $$S_1 = a \times K$$

S_1 Maximum height tolerance [mm]
a Distance between rails [mm]
K Coefficient of height tolerance

Table 3.71 **Coefficient of height tolerance (K)**

Series/Size	Preload class		
	Z0	**ZA**	**ZB**
WE_17	1.3×10^{-4}	0.4×10^{-4}	—
WE/QW_21	2.6×10^{-4}	1.7×10^{-4}	0.9×10^{-4}
WE/QW_27	2.6×10^{-4}	1.7×10^{-4}	0.9×10^{-4}
WE/QW_35	2.6×10^{-4}	1.7×10^{-4}	1.4×10^{-4}
WE_50	3.4×10^{-4}	2.2×10^{-4}	1.8×10^{-4}

3.4.12 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.

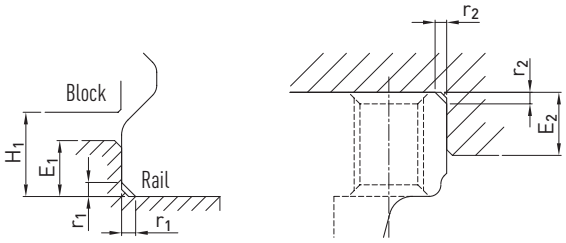


Table 3.72 **Shoulder heights and edge roundings**

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
WE_17	0.4	0.4	2.0	4.0	2.5
WE/QW_21	0.4	0.4	2.5	5.0	3.0
WE/QW_27	0.5	0.5	3.0	7.0	4.0
WE/QW_35	0.5	0.5	3.5	10.0	4.0
WE_50	0.8	0.8	6.0	10.0	7.5

Unit: mm