HIWIN®

Linear Guideways

Linear Guideways
Accessories

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Note:
The technical data in this catalogue may
be changed without prior notice.

Linear guideways

Linear guideways & accessories

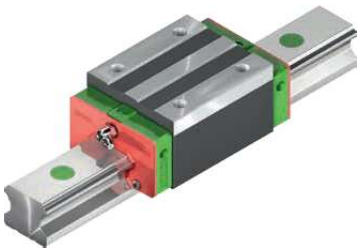
A linear guideway makes it possible to move in a linear motion with rolling elements. The use of balls and rollers between the rail and block in a linear guideway makes precise linear movements possible. Compared with a standard sliding guide, the friction coefficient here is just one fiftieth. The high efficiency and zero backlash mean that the linear guideway can be used in various ways.

Assembly instructions and catalogue for download

Here you can download the corresponding assembly instructions and the current catalogue as PDF files.

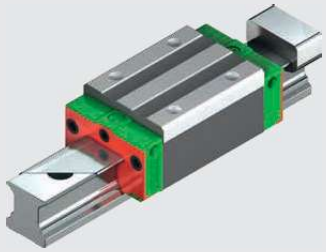
Contents

1. Product overview



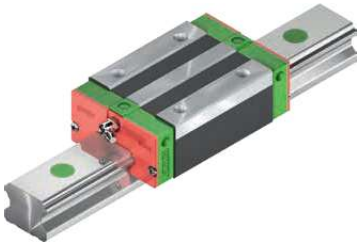
Linear guideway of HG and QH series Page 32

- Standard series in X arrangement
- Block with SynchMotion™ technology (QH series)
- Optionally available in corrosion-resistant steel (HG15, HG20 and HG25)



Linear guideway CG series Page 50

- Standard series in O arrangement
- Optional: Rail with cover strip

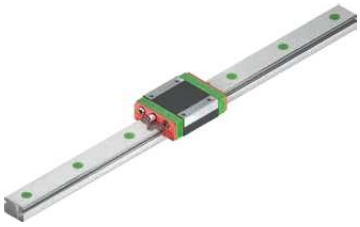


Linear guideway of EG and QE series Page 68

- Flat type
- Especially for applications with limited installation space
- Block with SynchMotion™ technology (QE series)

Linear guideway of WE and QW series Page 82

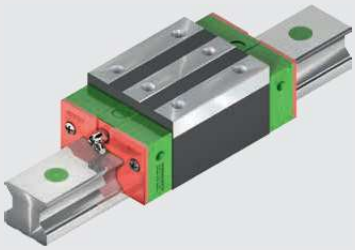
- Wide type
- For maximum torque loads
- Block with SynchMotion™ technology (QW series)



Linear guideway MG series

Page 94

- Thin and wide design
- Miniature type for the most compact applications
- Dual-row linear guideways
- Made of corrosion-resistant steel as standard



Linear guideway of RG and QR series

Page 108

- Roller guides for heavy-duty applications
- With maximum requirements on load ratings and torque capacity
- Block with SynchMotion™ technology (QR series)

Linear guideway CRG series

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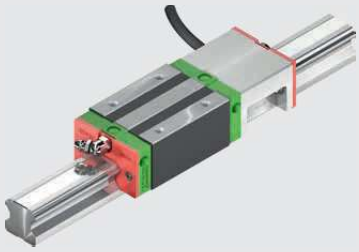
- Roller guides for heavy-duty applications
- With maximum requirements on load ratings and torque capacity
- Rail with cover strip



Linear guideway PG series

Page 142

- HG, QH, CG series with integrated positioning measuring system
- Contactless positioning measurement
- Signal output in real time

Accessories

Page 150

- Lubricating nipple
- Lubrication adapter
- Push-in fittings

2. General information

2.1 Properties and advantages

1. High positioning accuracy
A carriage supported by a linear guideway only has to overcome rolling friction. The difference between static and dynamic rolling friction is very small, which means that the breakaway force is only slightly higher than the moving force. No stick-slip effects occur.

2. Long service life with particularly precise movement
With a sliding guide, errors in accuracy can occur due to different lubricant film thicknesses. Due to the sliding friction and frequent lack of lubrication, high wear and thus decreasing accuracy occurs. In contrast, the linear guideway has the advantage of very low rolling friction, combined with extremely low wear. The guideway accuracy remains almost constant over the entire service life.

3. High velocity with low drive force
Due to the low friction coefficient, only low drive forces are required. The required drive power remains low even with reversing movements.

4. Equal load capacity in all directions
Due to the design-related forced guidance, a linear guideway can absorb forces in vertical and horizontal directions.

5. Simple installation and interchangeability
Installing a linear guideway is simple. With a milled or ground mounting surface, high accuracy is achieved when assembly instructions are followed. Conventional sliding guides require considerably more assembly work due to scraping of the sliding surfaces. Replacing individual components is not possible without scraping. However, linear guideways can be replaced without further effort.

6. Simple lubrication
With sliding guides, insufficient lubrication leads to destruction of the sliding surfaces. The lubricant must be supplied to the sliding surfaces at many points. The linear guideway requires only minimum lubrication, which is produced by a simple supply line to the block. As a variant, HIWIN also supplies blocks with an integrated and replaceable long-term lubrication unit, which ensures long-term lubrication.

7. Corrosion protection
Blocks and profile rails can be supplied with various coatings to achieve optimum corrosion protection. The individual processes are selected depending on the application. For optimal selection of the coating, data on the environmental conditions and the corrosive substances is needed. Linear guideways are available in various materials and coatings for different requirements and applications.

2.2 Selection principles

Determination of the selection conditions

- Machine base
- Maximum installation space
- Desired accuracy
- Required rigidity
- Load type
- Travel path
- Travel speed, acceleration
- Frequency of use
- Service life
- Environmental conditions

Selection of the series

- HG and CG series – grinding, milling, drilling machines, lathes, machining centres, woodworking
- EG series – automation technology, high-speed transport, semiconductor assembly, precision measuring equipment
- WE series – single axes with high torque loads M_X
- MG series – miniature technology, semiconductor assembly, medical technology
- RG series – machining centres, injection moulding machines, machines and systems with high rigidity

Determination of the accuracy class

- Classes: C, H, P, SP, UP, depending on the required accuracy

Determining the size and number of blocks

- Depending on empirical values
- Depending on type of load
- If a ballscrew is used, the nominal size of the linear guideways and the ballscrew should be similar, e.g. 32 mm ballscrew and 35 mm profile rail.

Calculating the maximum block load

- The calculation is based on the example calculation in section 2.5. The static support stability factor of the selected profile rail guideway must exceed the corresponding value in the static support stability factor table.

Determining the preload

- The preload depends on the stiffness requirements and the accuracy of the mounting surface.

Determining the rigidity

- The deformation (δ) is determined using the stiffness table in the respective chapter. Stiffness is increased by higher preload and larger guideway dimensions

Calculating the service life

- The required service life must be calculated taking into account the speed and frequency. The example calculation in section 2.4 provides an orientation.

Selecting the type of lubrication

- Grease lubrication via lubricating nipple
- Oil lubrication via connection line

Selection finished

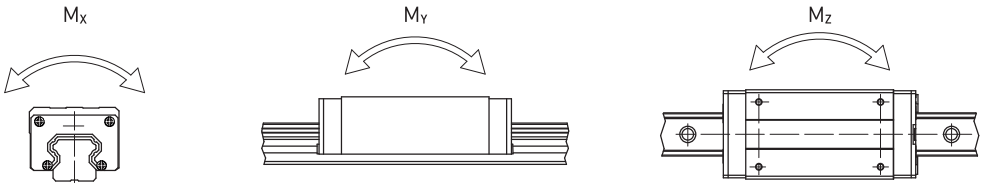
2.3 Load ratings

2.3.1 Static load rating C_0

If a linear guideway system is subjected to excessive loads or impacts during movement or at a standstill, localised permanent deformation occurs between the track and balls. As soon as this permanent deformation exceeds a certain level, it affects smooth operation of the guideway. According to its basic definition, the static load rating corresponds to a static load that causes permanent deformation of 0.0001 × ball diameter at the contact point that is loaded the most. The values are given in the tables for each linear guideway system. Using these tables, the designer can select a suitable linear guideway system. The maximum static load to which a linear guideway system is subjected must not exceed the static load rating.

2.3.2 Permissible static moment M_0

The permissible static moment is the moment which, in a defined direction and size, corresponds to the maximum possible load on the moving parts by the basic static load rating. The permissible static moment is defined for linear motion systems for three directions: M_X, M_Y and M_Z.



2.3.3 Static support stability

For profile rail systems at rest and slow motion, the static support stability must be taken into account, which depends on the environmental and operating conditions. Increased support stability is particularly important for guideways that are subjected to impact loads, see Table 2.1. The static support stability can be calculated according to F 2.1.

F 2.1

$$f_{SL} = \frac{C_0}{P} \; ; \quad f_{SM} = \frac{M_0}{M}$$

f_{SL}	Static support stability
f_{SM}	Static support stability for torque load
C_0	Static load rating [N]
M_0	Permissible static moment [Nm]
P	Static equivalent load [N]
M	Static equivalent moment [Nm]

Note: The linear guideway's load-bearing capacity is often restricted – not by its load-bearing strength, but by the screw connection. We therefore recommend checking the screw connection's maximum permissible load-bearing capacity in accordance with VDI 2230.

Table 2.1 **Static support stability**

Load	f_{SL}; f_{SM} [min.]
Normal load	1.25 – 3.00
With jolting and vibration	3.00 – 5.00

2.3.4 Dynamic load rating C_{dyn}

The dynamic load rating is the load, defined in terms of direction and size, at which a linear guideway achieves a nominal service life of a 50 km [1] (HG, QH, EG, QE, CG, WE, QW, MG) or 100 km [1] (RG, QR) travel path. The dynamic load rating is specified for each guideway in the dimension tables. It can be used to calculate the service life of a particular guideway.

[1] The dynamic load rating of linear guideways is specified for a service life of a 50 or 100 km travel path, depending on the manufacturer. The following factors can be used to convert the basic dynamic load rating: C_{dyn} 50 km = 1.26 × C_{dyn} 100 km (HG, QH, EG, QE, CG, WE, QW, MG series)
C_{dyn} 50 km = 1.23 × C_{dyn} 100 km (RG, QR series)

2.4 Service life calculation

2.4.1 Definition of service life

The constant and repeated loading of tracks and balls of a linear guideway causes fatigue on the track surface. In the end, so-called pitting formation occurs.
The service life of a linear guideway is defined as the total travel distance covered until pitting occurs on the surface of the track or balls.

2.4.2 Nominal service life (L)

The service life can be very different even if linear guideways are manufactured in the same way and used under the same movement conditions. Therefore, the nominal service life is taken as a reference value for estimating the service life of a linear guideway.
The nominal service life corresponds to the total travel path achieved without failure by 90% of a group of identical linear guideways used under the same conditions.

2.4.2.1 Calculation of the nominal service life

The actual load influences the nominal service life of a linear guideway. Using the selected dynamic load rating and the equivalent dynamic load, the nominal service life can be calculated using the formulas F 2.2 and F 2.3.

Formulas for calculation of the nominal service life

HG, QH, EG, QE, CG, WE, QW, MG series:

F 2.2

$$L = \left(\frac{C_{dyn}}{P}\right)^3 \times 50\,km$$

RG, QR series:

F 2.3

$$L = \left(\frac{C_{dyn}}{P}\right)^{10/3} \times 100\,km$$

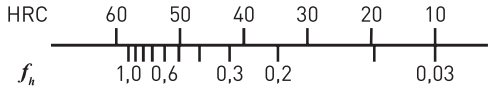
L	Nominal service life [km]
C_{dyn}	Dynamic load rating [N]
P	Dynamic equivalent load [N]

2.4.2.2 Factors of nominal service life

The type of load, the hardness of the track and the temperature of the guideway have a considerable influence on the nominal service life. The relationship between these factors are shown by formulas F 2.4 and F 2.5.

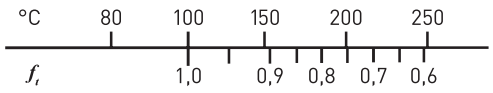
Hardness factor (f_h)

The tracks of the linear guideways have a hardness of 58 HRC. A hardness factor of 1.0 therefore applies. If the hardness differs, the hardness factor according to the adjacent figure must be taken into account. If the specified hardness is not achieved, the permissible load is reduced. In this case, the dynamic load rating and the static load rating must be multiplied by the hardness factor.



Temperature factor (f_t)

The application range of the standard profile rails is between –10 and 80 °C ambient temperature. For ambient temperatures up to 150 °C, the use of linear guideways with steel deflection system is required (marked with the suffix "SE" in the order code). Short-term ambient temperatures of up to 180 °C are possible. However, we recommend consulting our technical support for this. If the temperature of a linear guideway exceeds 100 °C, the permissible load and the service life are reduced. That is why the dynamic load rating and the static load rating must be multiplied by the temperature factor.



Load factor (f_w)

To take into account external influences on the service life of the profile rails which are not directly included in the calculation (e.g. vibrations, jolting and high speed), the dynamic equivalent load is multiplied by the load factor according to Table 2.2. For short-stroke applications (stroke < 2 × block lengths), the calculated load factor must be doubled.

Table 2.2 **Load factor**

Type of load	Travel speed	f_w
No jolting and vibration	At 15 m/min	1.0 – 1.2
Normal load	15 m/min – 60 m/min	1.2 – 1.5
Minor jolting	60 m/min – 120 m/min	1.5 – 2.0
With jolting and vibration	Greater than 120 m/min	2.0 – 3.5

Formulas for calculation of the nominal service life (considering all factors)

HG, QH, EG, QE, CG, WE, QW, MG series:

F 2.4

$$L = \left(\frac{f_h \times f_t \times C_{dyn}}{f_w \times P} \right)^3 \times 50\,km$$

RG, QR series:

F 2.5

$$L = \left(\frac{f_h \times f_t \times C_{dyn}}{f_w \times P} \right)^{10/3} \times 100\,km$$

L	Nominal service life [km]
f_h	Hardness factor
C_{dyn}	Dynamic load rating [N]
f_t	Temperature factor
P	Dynamic equivalent load [N]
f_w	Load factor

2.4.3 Service life (L_h)

The service life in hours is calculated from the nominal service life with the aid of the travel speed and movement frequency.

Formulas for calculation of the service life (L_h)

HG, QH, EG, QE, CG, WE, QW, MG series:

F 2.6

$$L_h = \frac{L}{v \times 60} = \frac{\left(\frac{C_{dyn}}{P} \right)^3 \times 50.000}{v \times 60}$$

RG, QR series:

F 2.7

$$L_h = \frac{L}{v \times 60} = \frac{\left(\frac{C_{dyn}}{P} \right)^{10/3} \times 100.000}{v \times 60}$$

L_h	Service life [h]
L	Nominal service life [m]
v	Velocity [m/min]
C_{dyn}/P	Load rating/Load ratio

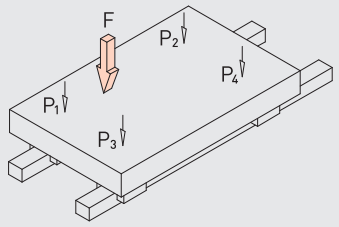
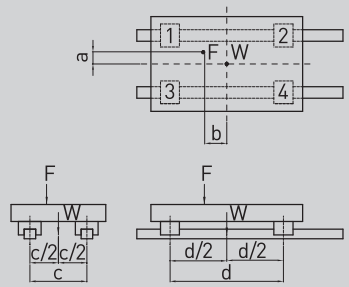
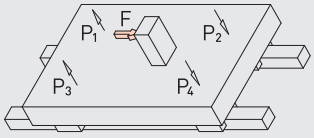
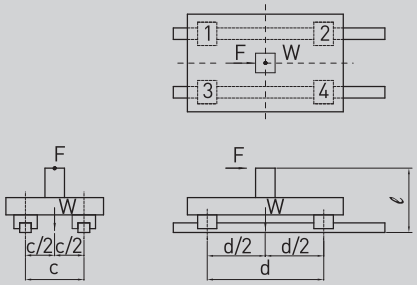
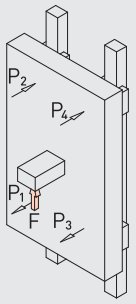
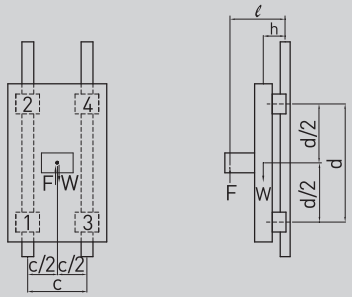
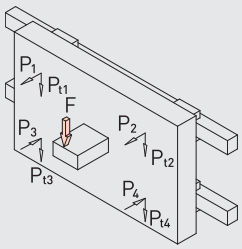
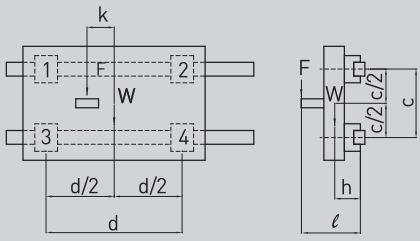
2.5 Operating load

2.5.1 Calculation of load

When calculating the loads acting on a linear guideway, various factors must be taken into account, e.g. the centre of gravity of the load, the approach of the movement force and the mass inertia at the beginning and end of the movement. To obtain a correct value, each parameter must be taken into account.

Load on a block

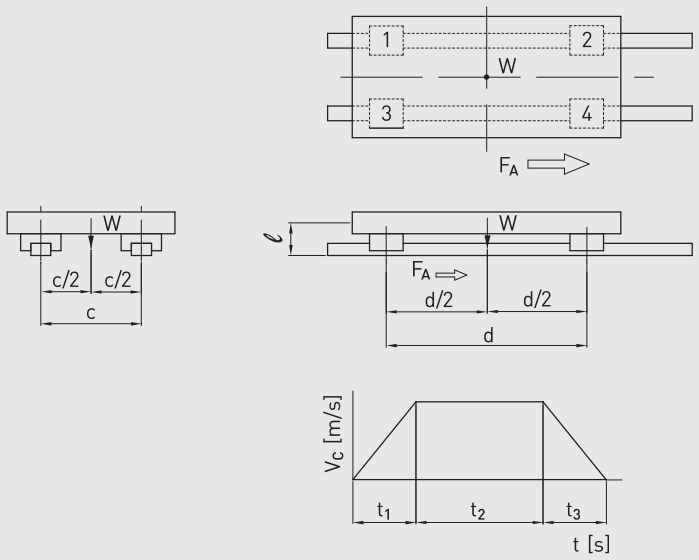
Table 2.3 **Examples of the calculation of the load on a block**

Typical examples	Load distribution	Load on a block
		$P_1 = \frac{W}{4} + \frac{F}{4} + \frac{F \times a}{2c} + \frac{F \times b}{2d}$ $P_2 = \frac{W}{4} + \frac{F}{4} + \frac{F \times a}{2c} - \frac{F \times b}{2d}$ $P_3 = \frac{W}{4} + \frac{F}{4} - \frac{F \times a}{2c} + \frac{F \times b}{2d}$ $P_4 = \frac{W}{4} + \frac{F}{4} - \frac{F \times a}{2c} - \frac{F \times b}{2d}$
		$P_1 = P_3 = \frac{F \times l}{2d}$ $P_2 = P_4 = \frac{W}{4} + \frac{F \times l}{2d}$
		$P_1 = P_2 = P_3 = P_4 = -\frac{W \times h}{2d} + \frac{F \times l}{2d}$
		$P_1 = P_2 = -\frac{W \times h}{2c} - \frac{F \times l}{2c}$ $P_3 = P_4 = \frac{W \times h}{2c} + \frac{F \times l}{2c}$ $P_{t1} = P_{t3} = \frac{W}{4} + \frac{F}{4} + \frac{F \times k}{2d}$ $P_{t2} = P_{t4} = \frac{W}{4} + \frac{F}{4} - \frac{F \times k}{2d}$

$P_1 ... P_4$ Load on a single block
W Weight of load
F Movement force; additionally occurring force
l Lever arm F
c Rail distance
d Block distance
a, b, k Distance to centre of gravity
h Lever arm centre of gravity W

Load and mass inertia

Table 2.4 **Examples of the calculation of load and mass inertia**

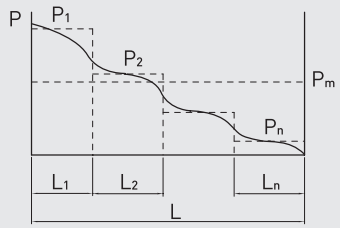
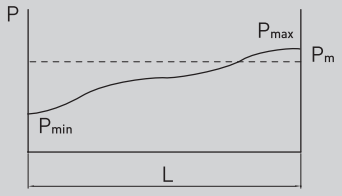
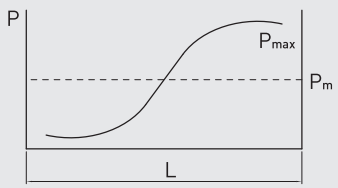
Consideration of acceleration and braking	Load on a block
	○ Constant velocity $P_1 \ldots P_4 = \frac{W}{4}$ ○ Acceleration $P_1 = P_3 = \frac{W}{4} + \frac{1}{2} \times \frac{W}{g} \times \frac{v_c}{t_1} \times \frac{l}{d}$ $P_2 = P_4 = \frac{W}{4} - \frac{1}{2} \times \frac{W}{g} \times \frac{v_c}{t_1} \times \frac{l}{d}$ ○ Braking $P_1 = P_3 = \frac{W}{4} - \frac{1}{2} \times \frac{W}{g} \times \frac{v_c}{t_3} \times \frac{l}{d}$ $P_2 = P_4 = \frac{W}{4} + \frac{1}{2} \times \frac{W}{g} \times \frac{v_c}{t_3} \times \frac{l}{d}$

$P_1 \ldots P_4$ Load on a single block [N]
W Weight of load [N]
F Movement force
F_A Reaction force
g Gravitational acceleration [m/s²]
v_c Velocity [m/s]
t_1 Acceleration time [s]
t_2 Constant travel time [s]
t_3 Braking time [s]
c Rail distance [m]
d Block distance [m]
l Distance to underside of rail – travel block centre of gravity [m]

2.5.2 Calculation of the equivalent load for variable loads

If the load on a linear guideway varies greatly, an equivalent load must be included in the calculation of the service life. The equivalent load is defined as the load that causes the same wear on the bearings as the variable loads. It can be calculated according to Table 2.5.

Table 2.5 **Examples of the calculation of the equivalent load (P_m)**

Step-wise change	Uniform change	Sinusoidal change
		
$P_m = \sqrt[3]{\frac{1}{L}\left(P_1^3 \times L_1 + P_2^3 \times L_2 + \ldots + P_n^3 \times L_n\right)}$	$P_m = \frac{1}{3}\left(P_{min} + 2 \times P_{max}\right)$	$P_m = 0{,}65 \times P_{max}$

P_m Equivalent load
P_n Variable load
P_{min} Smallest load
P_{max} Largest load
L Total travel path
L_n Travel path with load P_n

2.6 Friction and lubrication

2.6.1 Frictional resistance

The use of rolling elements in the linear guideway essentially reduces the friction to the rolling friction of the rolling elements. The friction coefficient of linear guideways is thus very small, up to one fiftieth of the value of traditional sliding guides. In general, the friction coefficient is about 0.004, depending on the series. If the load is only 10% or less of the basic dynamic load rating, most of the frictional resistance is generated by the wipers and by the grease and friction between the rolling elements. If the operating load becomes greater than 10% of the dynamic load rating, the load provides most of the frictional resistance.

F 2.8

$$F = \mu \times W + S$$

F	Frictional force [N]
S	Frictional resistance [N]
μ	Friction coefficient
W	Load [N]

2.6.2 Lubrication

The linear guideways, like all rolling bearings, require adequate lubrication. Both grease and oil may be used in general. The lubricant is a constructional element and should be taken into consideration when designing a machine. The lubricants reduce wear, protect against dirt, reduce corrosion and lengthen service life. Dirt can settle and solidify on unprotected profile rails. This dirt must be removed on a regular basis.

For wall mounting, we generally recommend grease or low-viscosity lubricant; for oil lubrication, we generally ask that you consult us, as insufficient lubrication may occur depending on the installation position.

HIWIN offers greases for different requirements:

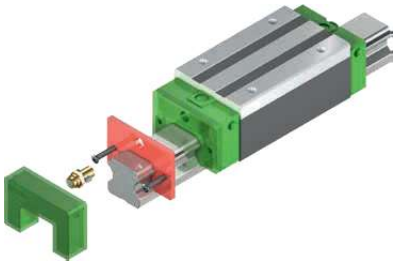
- HIWIN G01: Heavy-duty applications
- HIWIN G02: Clean room and vacuum applications
- HIWIN G03 Clean room and vacuum applications with high velocities
- HIWIN G04: Applications with high speeds
- HIWIN G05: Standard applications
- HIWIN G06: Short stroke and high frequency applications
- HIWIN G07: Applications at low temperatures

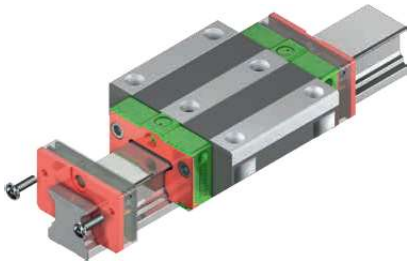
Information on HIWIN lubricants can be found in the Accessories chapter on Page 151. Detailed information on HIWIN lubricants and lubrication of the linear guideways can be found in the **"Linear guideways"** assembly instructions at www.hiwin.de.

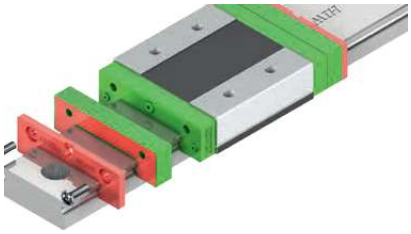
2.6.3 Long-term lubrication unit

The long-time lubrication unit considerably increases lubrication intervals. Depending on the application and ambient conditions, it can achieve lifetime lubrication.
It also considerably reduces lubricant consumption, as only the required quantity of lubricant is applied.
The compact construction and special design allows the block to be fitted in any position without impairing the lubrication function.

The long-time lubrication unit can be used at ambient temperatures of –10 °C to +60 °C.
The long-time lubrication units are available for the HG/QH, CG, EG/QE, MG and RG series. The corresponding dimensions and the running performance can be found in the chapter of the corresponding series. HG/QH series: Page 32, CG series: Page 50, EG/QE series: Page 68, MG series: Page 94, RG series: Page 108.







Applications

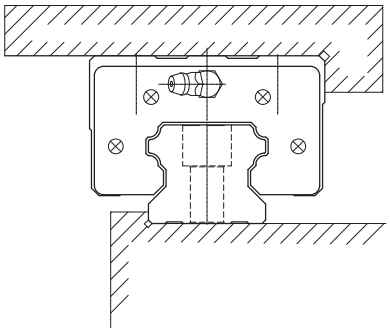
- Machine tools
- Production machines: Injection moulding machines, paper industry, textile machines, food industry, woodworking machines
- Electronics industry: Semiconductor industry, robotics, cross tables, measuring and testing machines
- Other areas: Medical equipment, automation, handling technology

2.7 Installation position

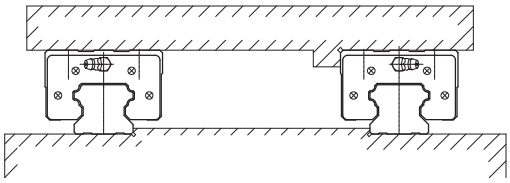
2.7.1 Examples of typical installation positions

A linear guideway can take loads up/down and to the right/left. The installation position depends on the requirements of the machine and the load direction. The accuracy of the profile rail is determined by how straight and level the contact surfaces are because the profile rail is pressed against them when the screws are tightened. Profile rails that are not pressed against a contact surface may have greater tolerances in terms of straightness. The typical installation positions are shown below: Information on mounting tolerances is given in the chapters of the individual series.

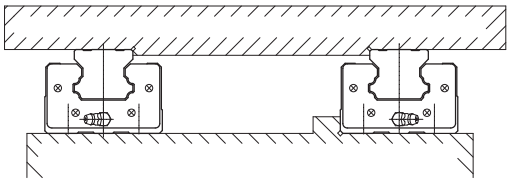
A profile edge at a reference edge:
The reference edge is marked by arrows on the top of the rail. For very short rail sections, the marking is on the front side of the rail.



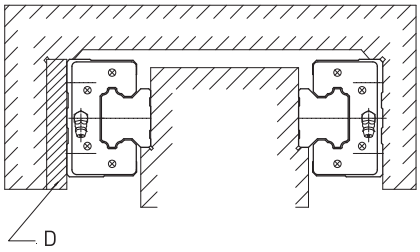
Two profile rails with moving block:



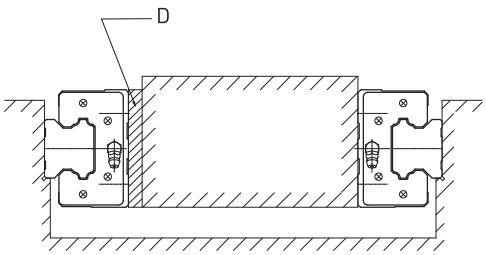
Two profile rails with fixed block:



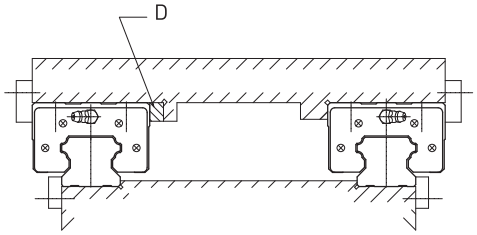
Two external blocks:



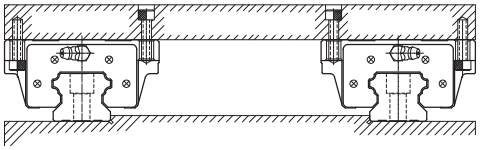
Two internal blocks:



Structure with assembled surface:



Block model HGW_C with different mounting directions:



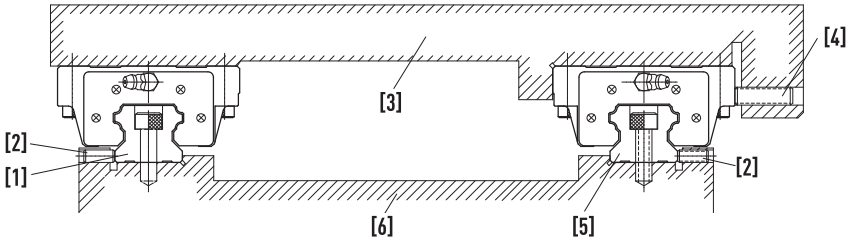
D Spacer

2.8 Assembly

Depending on the required accuracy as well as the load on the linear guideway caused by jolting and vibrations, the following three mounting methods are recommended.

2.8.1 Mounting the profile rails with reference edge and clamps

If the machine is subjected to strong vibrations, jolting or lateral forces, guideways and blocks may shift. To avoid this problem and to achieve high rigidity and guiding accuracy, mounting the linear guideway with reference edges and clamps on both sides is recommended.

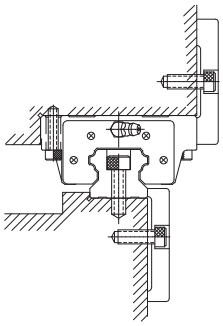


[1] Follow-on side
[2] Guide clamping screw
[3] Carriage
[4] Block clamping screw
[5] Reference side
[6] Machine bed

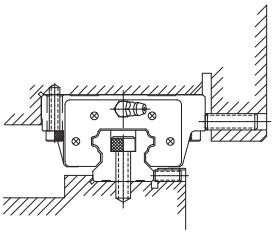
2.8.1.1 Mounting types

The following four mounting types are recommended.

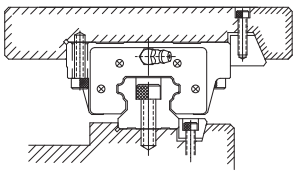
Mounting with a clamping plate:



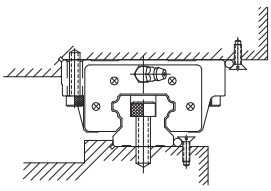
Mounting with clamping screws:



Mounting with terminal blocks:

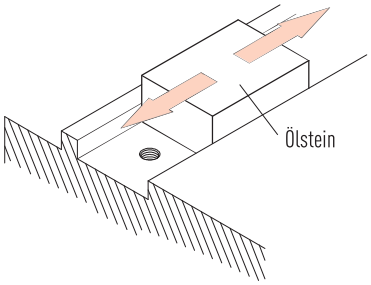


Mounting with needle rollers:

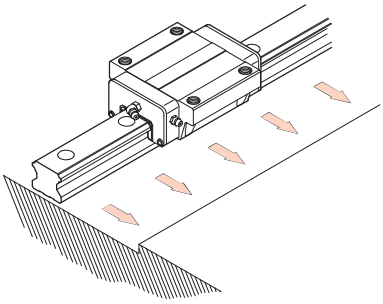


2.8.1.2 Assembly of the profile rails

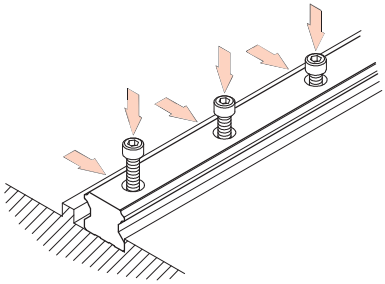
1) Before starting, remove all dirt from the surface of the machine



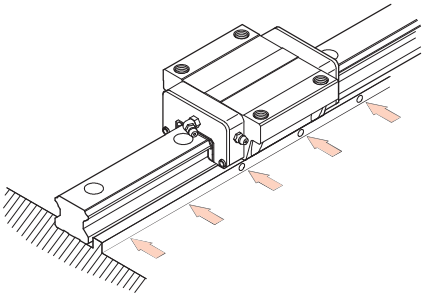
2) Carefully place the profile rail on the bed and hold it firmly against the reference edge



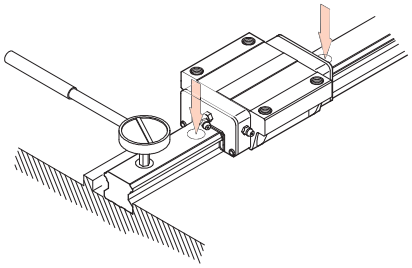
3) When aligning the profile rail on the bed, check whether the threads of the inserted screws engage



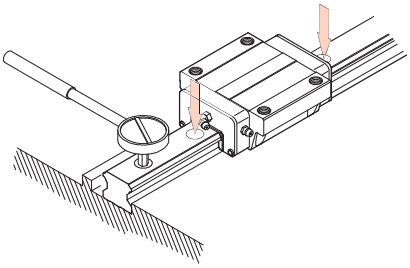
4) Tighten clamping screws one after the other to ensure good contact between the profile rail and the reference edge



5) Working in three steps, tighten all rail fixing screws to the specified tightening torque using a torque spanner

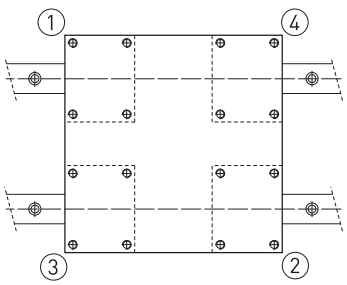


6) Mount the second profile rail in the same way



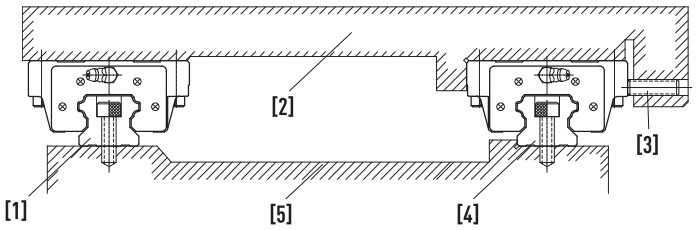
2.8.1.3 Mounting the block

- Carefully place carriage on the block. Then temporarily tighten the carriage fixing screws.
- Press the block against the reference edge of the carriage and align the carriage by tightening the clamping screws.
- To mount the carriage evenly, tighten the fixing screws on the reference side and the follow-on side in four passes.



2.8.2 Mounting the profile rails with reference edge and without clamps

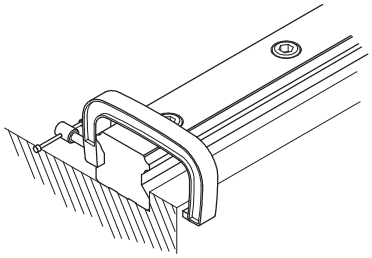
To ensure parallelism between the reference and follow-on rail without clamping screws, the following methods are recommended for mounting. The installation of the block remains as previously described.



[1] Follow-on rail
[2] Carriage
[3] Block clamping screw
[4] Reference rail
[5] Machine bed

2.8.2.1 Mounting the profile rail on the reference side

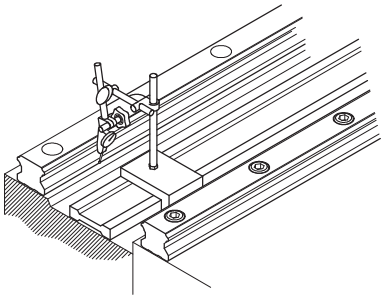
Place the guideway on the mounting surface of the machine bed. Lightly tighten the fixing screws and then press the guideway against the reference edge of the machine bed using a screw clamp. Then tighten the fixing screws one after the other to the specified torque.



2.8.2.2 Mounting the profile rail on the follow-on side

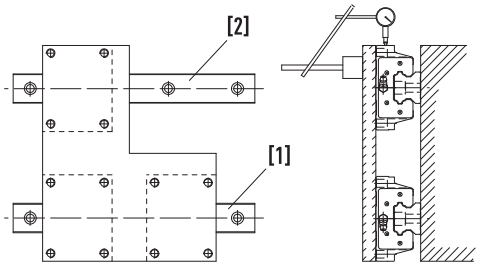
Align to a ruler:

Place the ruler between the guideways and align it parallel to the reference edge on the reference side using a dial gauge. When the guideway on the follow-on side is aligned parallel to the reference side, tighten the fixing screws one after the other, working from one end of the guideway to the other.



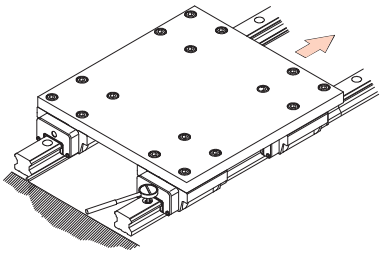
With the help of a plate:

Mount a plate on two blocks on the reference rail. Loosely attach a block to the plate to the follow-on rail. Then attach a dial gauge to the plate and place the sensor on the side of the block of the follow-on rail. Then move the plate from one end to the other and align the follow-on rail parallel to the reference rail. Then tighten the fixing screws one after the other.

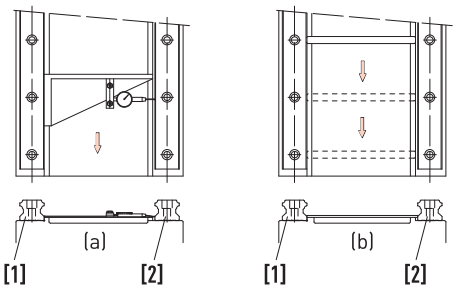


[1] Reference rail
[2] Follow-on rail

Alignment on the reference rail:
When the reference rail is correctly installed, mount one plate firmly on two blocks on the reference rail and one of the two blocks on the follow-on rail. Then move the plate from one end of the rails to the other, tightening the fixing screws of the follow-on rail.

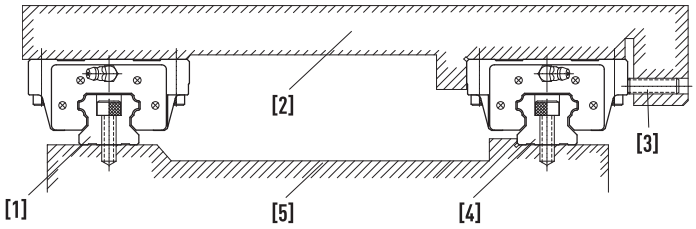


With the help of a gauge:
Determine the position of the follow-on rail using a special gauge and tighten the fixing screws with the specified torque.



[1] Reference rail
[2] Follow-on rail

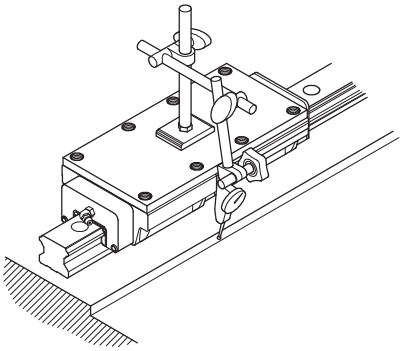
2.8.3 Mounting the profile rails without reference edge and without clamps
To ensure parallelism of the reference and follow-on rail even without a reference edge on the reference side, the following type of mounting is recommended. Mounting of the block remains as previously described.



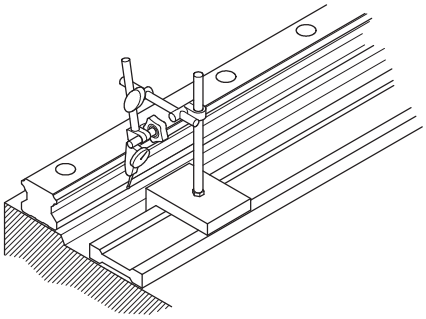
[1] Follow-on rail
[2] Carriage
[3] Block clamping screw
[4] Reference rail
[5] Machine bed

2.8.3.1 Mounting the profile rail on the reference side

Alignment at a provisional reference edge:
Connect two blocks close together with a plate. Use an edge on the machine bed to align the rail from one end to the other. Move the block to test and then tighten the fixing screws one after the other to the specified torque.

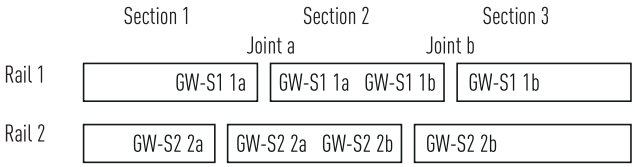


Align to a ruler:
Align the rail from end to end using a dial gauge on a ruler. Make sure to tighten the fixing screws firmly one after the other.
The assembly of the follow-on rail corresponds to the procedure of section 2.8.2.2, "Mounting the profile rail on the follow-on side".



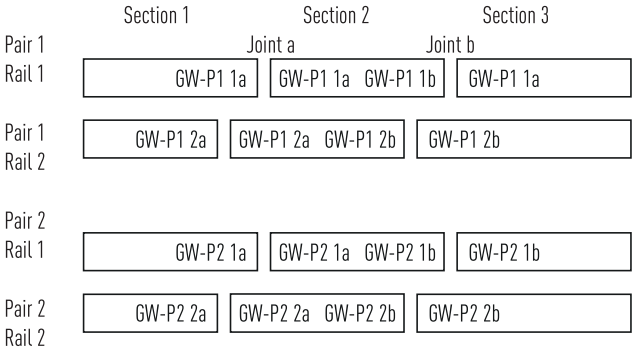
2.8.4 Attached profile rails

Attached (multi-part) rails must be mounted according to the applied markings. The joints on each section are marked consecutively in alphabetical order and with the rail or pair number so that each rail section can be clearly assigned.

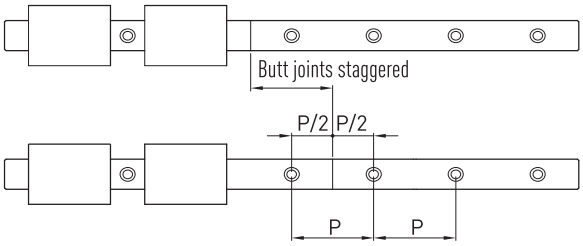


Each joint is labelled on the top of the rail. The label serves as an aid for initial assembly and can be removed at any time without leaving any residue.

Note: After initial assembly of the profile rails, the labels must be removed.



With paired multi-part rails, it is recommended that the butt joints be mounted with an offset.



2.8.5 Tightening torques of the fixing screws

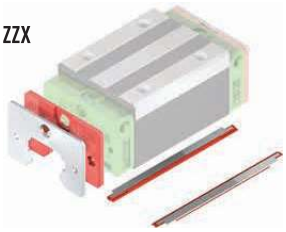
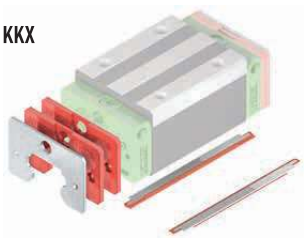
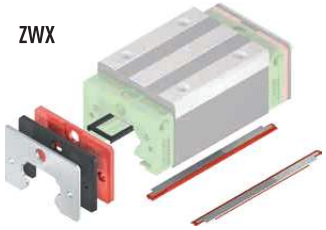
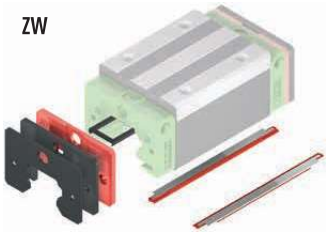
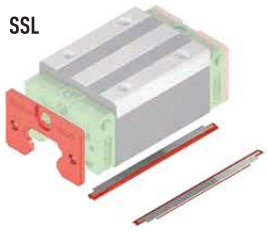
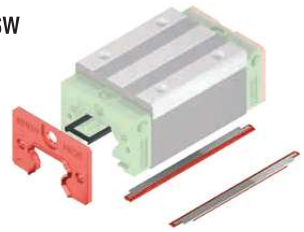
Insufficient tightening of the fixing screws severely affects the accuracy of the linear guideway; the tightening torques of the fastening screws according to ISO 4762-12.9 can be taken from the assembly instructions.

2.9 Sealing systems

On the one hand, the HIWIN end seals prevent the ingress of foreign substances such as dust particles, chips or liquid into the ball tracks of the block; on the other hand, they reduce lubricant loss. HIWIN offers various sealing systems for the different environmental conditions of your application. The effectiveness of the end seal has a direct influence on the service life of the linear guideway and should therefore be taken into account at the design stage and selected to suit the environmental conditions of your application.

Table 2.6 **Overview of sealing systems**

Protection of the end seal from mechanical damage

	Smooth running seal Good sealing effect, minimum displacement resistance	**Standard end seal** Very good sealing effect, minor displacement resistance	**Double standard end seal** Improved sealing effect, average displacement resistance	**Optimised end seal** Optimal protection against finest dusts and liquids, increased displacement resistance
Scraper (Air gap 0.1 – 0.2 mm)		**ZZX** 	**KKX** 	**ZWX** 
Scraper (Air gap 0.4 – 0.5 mm)		**ZZ** 	**KK** 	**ZW** 
Without scraper	**SSL** 	**SS**[1] 	**DD** 	**SW** 

Sealing effect and displacement resistance higher

[1] Standard

Note: The sealing systems available in each case can be found in the chapter of the series in the Sealing systems section.

Table 2.7 **Selection guide for sealing systems**

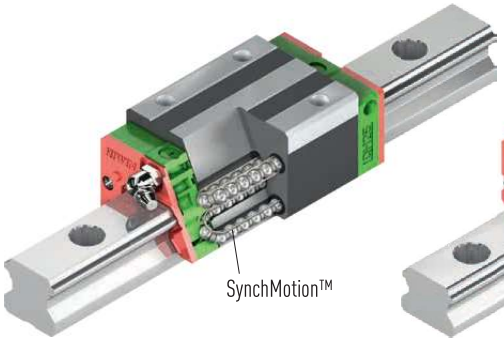
	ZZX See SS, additionally sharp-edged particles, possibly also hot particles or particles adhering to the rail ≥ 0.2 mm, e.g. chips, welding beads Typical applications: o Turning, milling, drilling o Welding applications	**KKX** See DD, additionally sharp-edged particles, possibly also hot particles or particles adhering to the rail ≥ 0.2 mm, e.g. chips, welding beads Typical applications: o See ZWX	**ZWX** See SW, additionally sharp-edged particles, possibly also hot particles or particles adhering to the rail ≥ 0.2 mm, e.g. chips, welding beads Typical applications: o CNC machining centre o Woodworking (e.g. MDF)
	ZZ See SS, additionally sharp-edged particles, possibly also hot particles or particles adhering to the rail ≥ 0.4 mm, e.g. chips, welding beads Typical applications: o Turning, milling, drilling o Welding applications	**KK** See DD, additionally sharp-edged particles, possibly also hot particles or particles adhering to the rail ≥ 0.4 mm, e.g. chips, welding beads Typical applications: o See ZW	**ZW** See SW, additionally sharp-edged particles, possibly also hot particles or particles adhering to the rail ≥ 0.4 mm, e.g. chips, welding beads Typical applications: o Turning, milling, drilling (with cooling lubricants) o Solid wood processing with coarse chips
SSL For applications with very low dirt and dust exposure Typical applications: o Measuring technology o Testing technology	**SS (standard variants)** For applications with low dirt and dust exposure Typical applications: o Automation technology o Pick & place o Handling	**DD** For applications with heavy dirt and dust exposure (alternatively if SW is not available) Typical applications: o See SW	**SW** For applications with heavy dirt and dust exposure, especially very fine dust and cooling lubricants Typical applications: o Wood, stone, glass processing o Grinding machines

2.10 SynchMotion™ technology

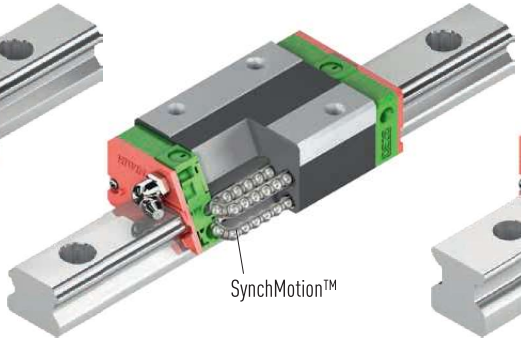
The innovative SynchMotion™ technology reduces contact between the rolling elements and the block. Similar to the ball cage of a standard ball bearing, the rolling elements are kept at a defined distance from each other by SynchMotion™ technology. Counter-rotating friction, as occurs in conventional linear guideways, is thus prevented and synchronisation fluctuations are significantly reduced. Even at high speeds, no uncontrolled ball movements occur. SynchMotion™ technology also improves lubricant transport within the block and lubricant storage.

Advantages:

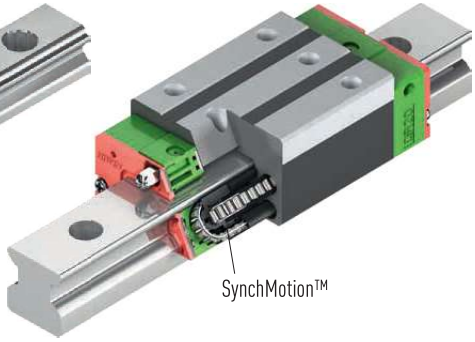
- Improved synchronous performance
- Optimised for high travel speeds
- Improved lubrication properties
- Reduced running noise
- Higher dynamic load rating



QH series



QE series



QR series

Table 2.8 **Availability of SynchMotion™ technology for HIWIN linear guideways**

Series	Sizes									
	15	20	21	25	27	30	35	45	55	65
QH	●	●	–	●	–	●	●	●	–	–
QE	●	●	–	●	–	●	●	–	–	–
QW	–	–	●	–	●	–	●	–	–	–
QR	–	–	–	●	–	●	●	●	–	–

Dimensionally identical and compatible with the HG, EG, WE and RG blocks, the blocks with SynchMotion™ technology are mounted on the standard rail and are therefore very easy to exchange.

2.11 Heat-resistant linear guideways

For continuous operation at temperatures above 80 °C, "solid steel" blocks with steel deflection systems are used. The standard end seals are replaced by heat-resistant end seals and the plastic cover caps of the profile rail by brass cover caps.

Special properties:

- Good temperature resistance
- Operating temperature up to 150 °C
- Temperature peaks of up to 180 °C.

Application areas:

- Devices for heat treatment
- Welding devices
- Devices for glass production
- Devices for use in a vacuum.

Table 2.9 **Series with available steel deflection system option**

Series	Size
HG	15, 20, 25, 30, 35, 45, 55, 65
EG	20, 25
MGN	7, 9, 12, 15
MGW	12, 15

Article number: For the steel deflection system option, add identifier "/SE" to the order code. See the structure of the order code in the chapter on the individual series.
HG: from Page 32, EG: from Page 68, MG: from Page 95

Order example:

HG	W	25	C	C	ZA	H	ZZ	SE

Note: Heat-resistant linear guideways with steel deflector generally have poorer running properties than comparable standard linear guideways with plastic deflector and are always supplied assembled as linear guideways.

2.12 Corrosion-resistant linear guideways

Linear guideways are available in various materials and coatings for different requirements and applications.

2.12.1 HIWIN coating HICOAT CZS

2.12.1.1 Features and properties

HICOAT CZS is a very thin zinc coating that provides very good corrosion protection, even in radii and chamfers. Smaller bare spots remain protected against corrosion by the cathodic protection effect. This results in a significantly longer service life compared to uncoated parts. CZS coating available for the HG, EG, CG and WE series. Note: Not for series RG, MG, PG, QH, QE, QR and QW.

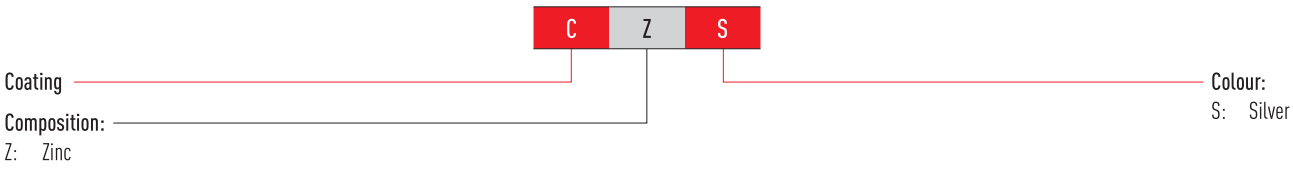
Specific features:

- Very good corrosion protection
- Cr(VI)-free
- One-piece and multi-piece rails available from stock
- End preservation with zinc spray (see below)
- Possible interaction between coating, ambient medium and lubricant should be checked on a case-by-case basis

Technical data:

- Salt spray test according to DIN EN ISO 9227 (with unloaded rail): 300 hours
- Salt spray test according to DIN EN ISO 9227 (with loaded rail): 99 hours
- Maximum rail length (one-piece): 4.0 meters

2.12.1.2 Order code for CZS coatings



2.12.1.3 Corrosion test

CZS-coated profile rails were tested in comparison with an uncoated profile rail.

New rail in CZS coating

Rail with CZS coating – after 6 months of outdoor storage

Rail (unloaded) with CZS coating – after 99 hours of salt spray test (according to DIN EN ISO 9227)

Uncoated rail – after 4 hours of salt spray test

2.12.1.4 Rail end

The rail ends are preserved with zinc spray. In order to achieve reliable corrosion protection at the uncoated rail ends as well, a high-quality zinc spray (zinc content 99%) is used. The rail ends of single-piece rails and the outer ends of multi-piece rails are preserved with zinc spray approx. 2 mm beyond the cut edge as shown in Fig. 2.1. Rail ends at joints are supplied with a greased, uncoated cut edge (see Fig. 2.2).
Note: The mounting holes and the process-related contact points on the underside of the rail may have lower coating thicknesses or isolated bare spots. The inner side of the block is generally not coated.

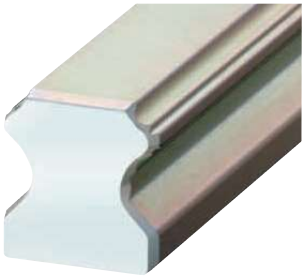


Fig. 2.1 **Rail end preserved with zinc spray**

Fig. 2.2 **Joint uncoated**

2.12.2 HIWIN coating HICOAT CTS

2.12.2.1 Features and properties

HICOAT CTS is a thin film chromium plating that provides good corrosion protection and very good wear protection. The high wear resistance results from the very high hardness of the coating. The CTS coating is Cr(VI)-free and food safe. It is available for the HG, EG, CG and WE series.

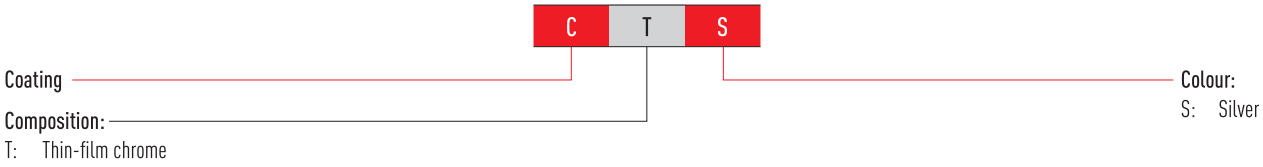
Specific features:

- Very good wear protection
- Good corrosion protection
- Cr(VI)-free
- One-piece rails available from stock (end preservation with zinc spray, see below)
- Multi-piece rails are delivered including coated ends (longer delivery time)
- Food safe

Technical data:

- Salt spray test according to DIN EN ISO 9227 (with unloaded rail): 96 hours
- Salt spray test according to DIN EN ISO 9227 (with loaded rail): 22 hours
- Maximum rail length (one-piece): 4.0 meters

2.12.2.2 Order code for CTS coatings



2.12.2.3 Corrosion test

CTS-coated profile rails were tested in comparison with an uncoated profile rail.

New rail in CTS coating

Rail with CTS coating - after 1 month of outdoor storage

Rail (unloaded) with CTS coating - after 22 hours of salt spray test (according to DIN EN ISO 9227)

Uncoated rail – after 4 hours of salt spray test

2.12.2.4 Rail end

For one-piece rails, the rail ends are preserved with zinc spray as shown in the adjacent figure. In order to achieve reliable corrosion protection at the uncoated rail ends as well, a high-quality, food-safe zinc spray (zinc content 99%) is used. Multi-piece rails are delivered with coated rail ends (longer delivery time).
Note: The mounting holes may have lower coating thicknesses or isolated bare spots. The inner side of the block is generally not coated.

2.12.3 Coating HICOAT CCB

2.12.3.1 Features and properties

HICOAT CCB is a very thin chromium oxide layer with a cured synthetic resin coating. It is characterised by good corrosion protection combined with very good running properties. The very thin layer thickness enables use with all HIWIN linear guideways, especially with the MG and RG series.

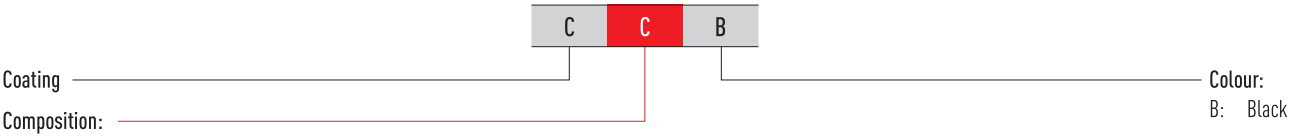
Specific features:

- Very thin layer thickness
- Very good running properties
- Good corrosion protection
- Cr(VI)-free
- Including coated rail end
- Available from Taiwan stock

Technical data:

- Salt spray test according to DIN EN ISO 9227 (with unloaded rail): 24 hours
- Maximum rail length (one-piece): 4.0 meters

2.12.3.2 Order code for CCB coatings



2.12.3.3 Corrosion test

CCB-coated profile rails were tested in comparison with an uncoated profile rail.

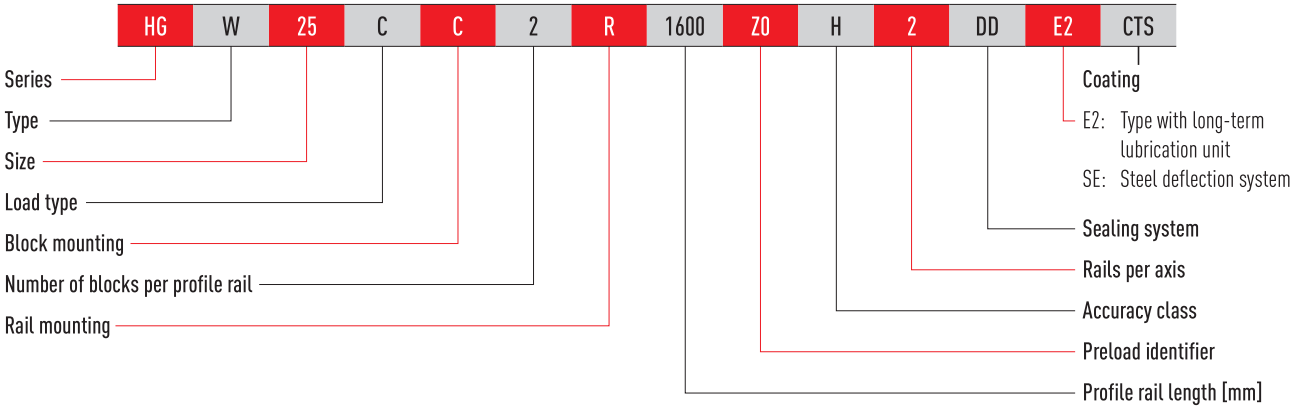
New rail in CCB coating

Rail (unloaded) with CCB coating - after 24 hours of salt spray test (according to DIN EN ISO 9227)

Uncoated rail – after 4 hours of salt spray test

2.12.3.4 Order codes for coated linear guideways

Order code for linear guideway (assembled)



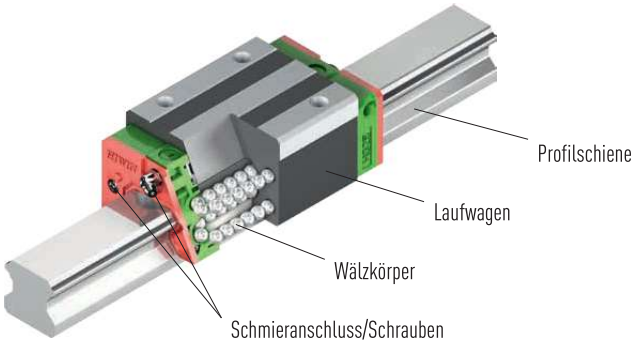
2.12.4 Corrosion-resistant steel HIRES

2.12.4.1 Features and properties

HIRES is a corrosion-resistant steel that offers better corrosion protection than standard rolling bearing steel. The properties such as rigidity, hardness, load ratings and dimensions are the same when compared to the standard version. Details on these properties can be found in the chapter on the respective series.
The following series are available in corrosion-resistant steel: HG15, HG20 and HG25, MG02-MG15.

The components labelled in the picture are made of corrosion-resistant steel:

Abb. 2.3 **Components made of corrosion-resistant steel**



Specific features::

- All steel parts made of corrosion-resistant steel in accordance with DIN EN 10088
- Good corrosion protection
- Same technical properties as the standard version
- One-piece and multi-piece rails available
- Optionally with stainless steel deflector
- Various sealing systems available

Technical data:

- Salt spray test according to DIN EN ISO 9227 (with unloaded rail): 32 hours
- Maximum rail length (one-piece): 2.0 meters

Application areas:

- Food processing, food transport, food storage
- Clean room or vacuum applications
- Semiconductors
- Medical technology
- Automation
- In humid environments (water mist/water spray)
- Use of cleaning agents

2.12.4.2 Order codes for corrosion-resistant linear guideways

M: Corrosion-resistant steel

2.12.4.3 Corrosion test

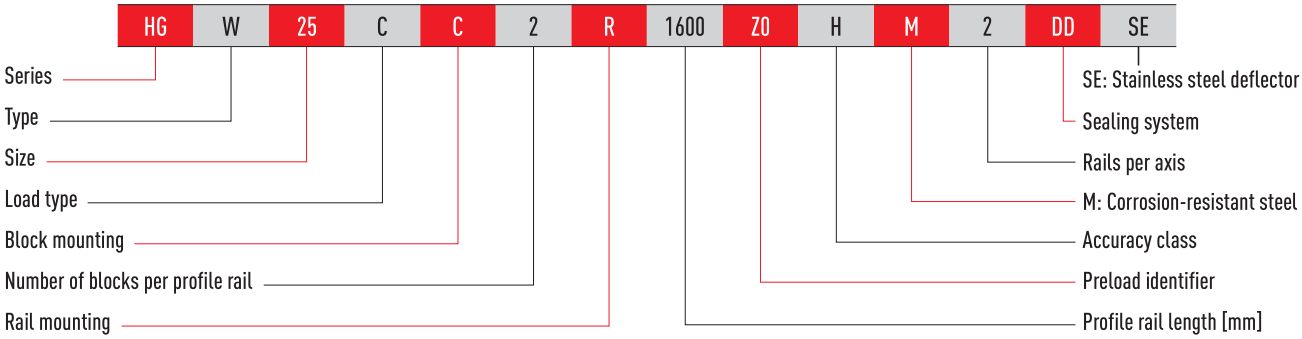
Profile rails made of corrosion-resistant steel were tested in comparison to a standard profile rail.

New HIRES rail

HIRES rail (unloaded) after 32 hours salt spray test (according to DIN EN ISO 9227)

Standard rail - after 4 hours salt spray test

2.12.4.4 Order code Profile rail guide made of corrosion-resistant steel (assembled)



3. Linear guideways: Series

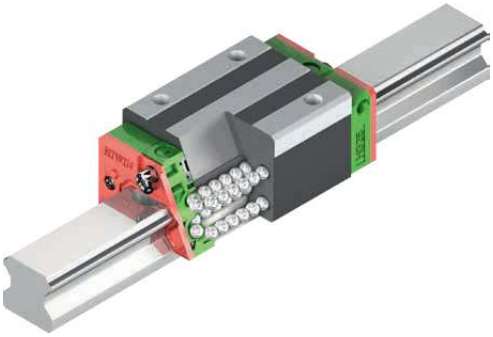
3.1 HG/QH series

3.1.1 Properties of the HG and QH series linear guideways

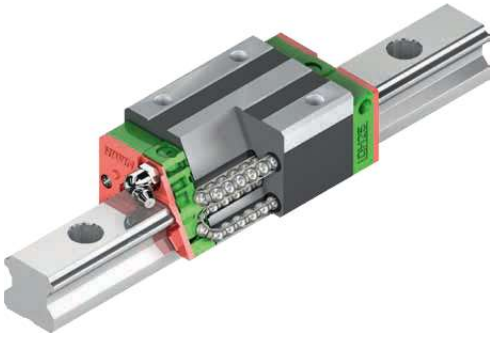
Standard series in X arrangement. The HIWIN linear guideways of the HG series with four ball tracks are designed for high loads and rigidities. Due to the 45° arrangement of the ball tracks, the HG series can take loads from all directions equally.
Low displacement forces and high efficiency are additional features of the HG series. The ball retainers prevent the balls from falling out when pulled from the profile rail during installation of the blocks.
The models of the QH series with SynchMotion™ technology offer all the advantages of the standard HG 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 QH blocks are identical to those of the HG blocks, they are also mounted on the HGR standard rail and can thus be easily interchanged. For further information, see Page 24. Sizes 15, 20 and 25 are also available in corrosion-resistant steel.

3.1.2 Layout of HG/QH series

- Four-row recirculating ball bearing guide
- 45° contact angle of the ball tracks
- The ball retainers prevent the balls from falling out when the block is removed
- Different sealing variants, depending on application area
- 6 connection options for lubricating nipples
- SynchMotion™ technology (QH series)
- Size 15. 20. 25 also available in corrosion-resistant steel



Layout of HG series



Layout of QH series

Advantages:

- Backlash-free
- Exchangeable
- High accuracy
- Highly resilient in all loading directions
- Low friction losses even with preload from optimised ball tracks and 2-point contact

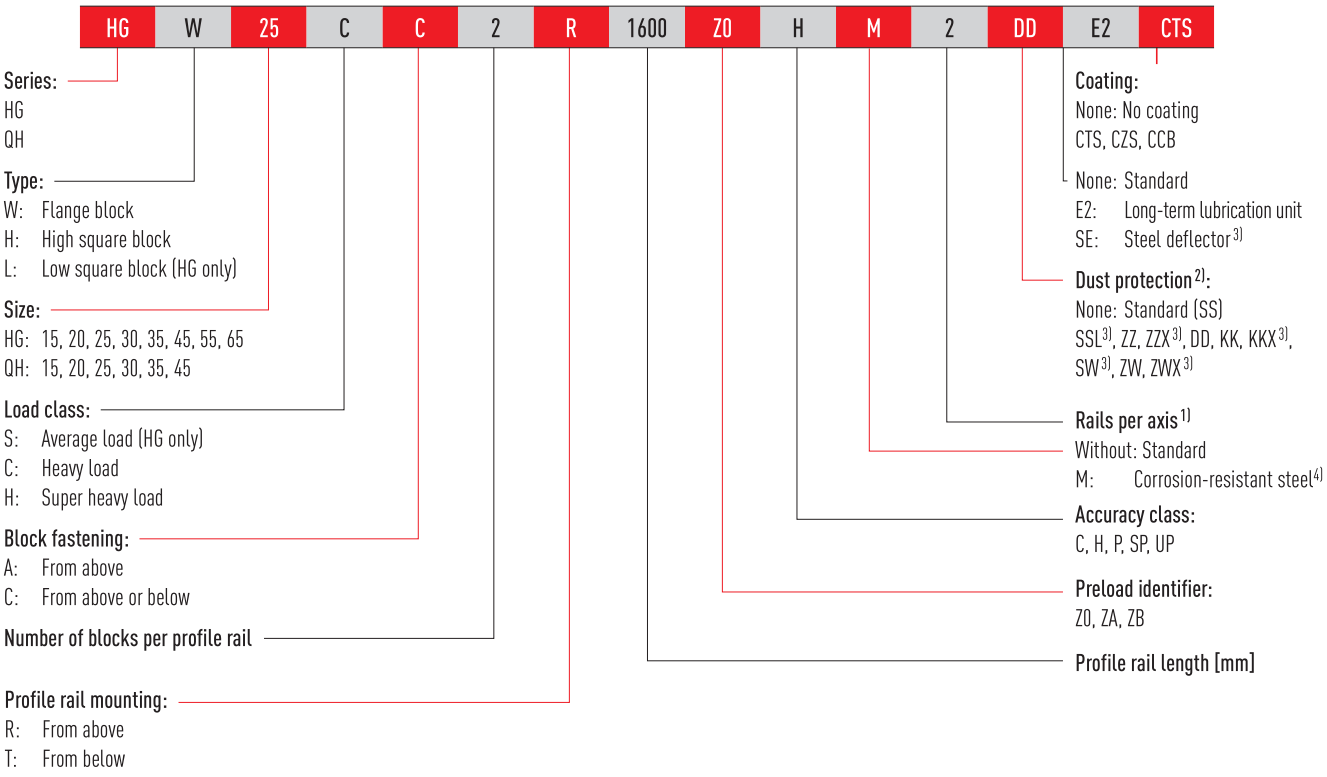
Additional advantages of QH series:

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

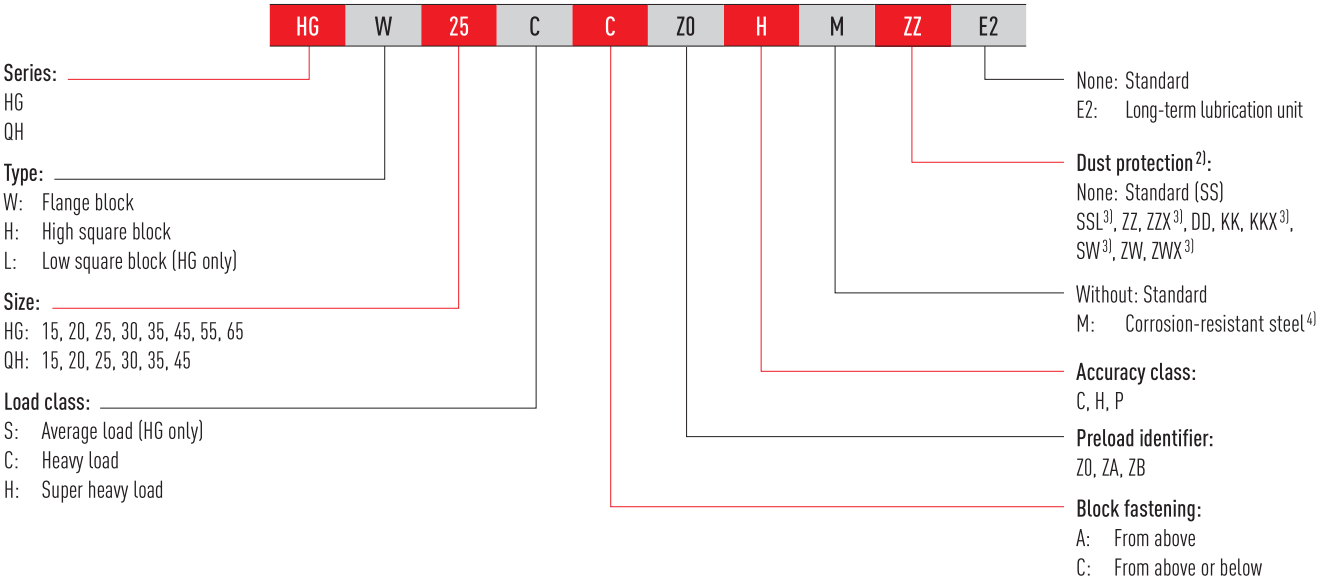
3.1.3 Order codes of HG/QH series

For HG/QH 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 code Carriage (not mounted)



Note:

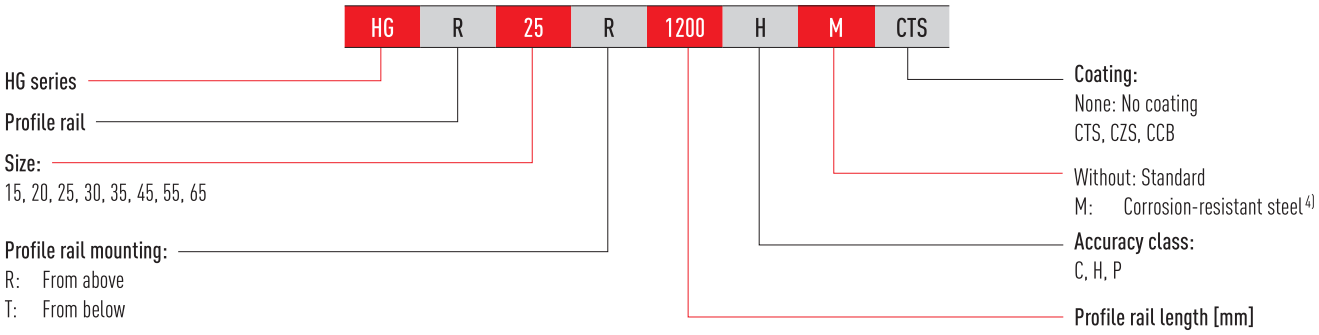
1) The number 2 is also a quantity indication, i.e. one piece of the article described above consists of one pair of rails.
No number is given for single profile rails. In the case of multi-part rails, the joint is offset as standard.

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

3) Not available for QH

4) Corrosion-resistant steel available in: HG series, H and W type, size 15-25, load type C, preload Z0 and ZA, accuracy class H. More information in chapter 2.12.4

Order number of profile rail (not assembled)

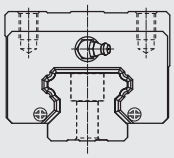
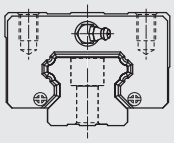
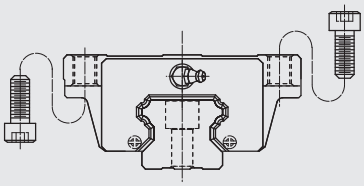


Note:
4) Corrosion-resistant steel available in: HG series, H and W type, size 15-25, load type C, preload Z0 and ZA, accuracy class H. More information in chapter 2.12.4

3.1.4 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 3.1 **Block types**

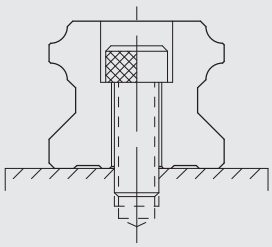
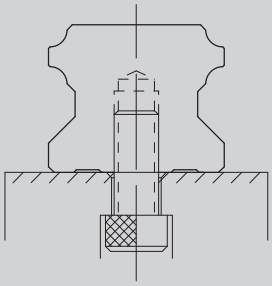
Type	Series/size	Layout	Height [mm]	Typical applications
High square type	HGH-CA HGH-HA		28 – 90	○ Machining centres ○ NC lathes ○ Grinding machines ○ Precision milling machines ○ High performance cutting machines ○ Automation technology ○ Transport technology ○ Measuring technology ○ Machines and devices with high required positioning accuracy
Low square type	HGL-CA HGL-HA		24 – 70	
Flange type	HGW-CC HGW-HC		24 – 90	

1) Optional type on request

3.1.5 Profile rail types

In addition to profile rails with standard fastening from above, HIWIN also offers rails for fastening from below.

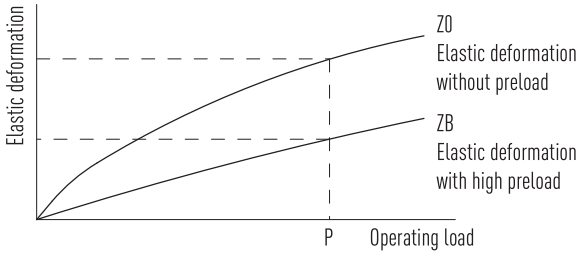
Table 3.2 **Profile rail types**

Fastening from above	Fastening from below
	
HGR_R	HGR_T

3.1.6 Preload

Definition

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



Preload identifier

Table 3.3 **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	0.05 – 0.07 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	Over 0.1 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

3.1.7 Load ratings and torques

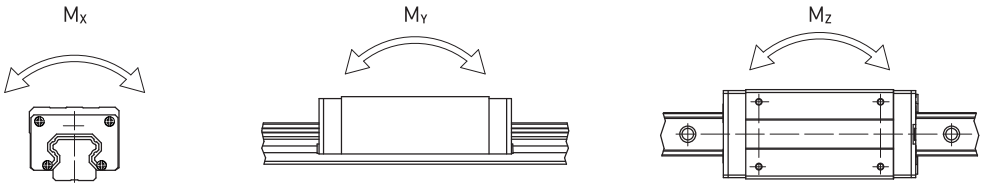


Table 3.4 **Load ratings and torques for series HG/QH**

Series/Size	Dynamic load rating C_{dyn} [N] [1]	Static load rating C_0 [N]	Static moment [Nm]		
			M_{0X}	M_{0Y}	M_{0Z}
HG_15C	14,700	23,470	120	100	100
QH_15C	17,940	19,860	100	80	80
HG_20S	16,840	22,570	130	80	80
HG_20C	27,100	36,680	270	200	200
QH_20C	30,000	33,860	260	190	190
HG_20H	32,700	47,960	350	350	350
QH_20H	35,700	42,310	310	270	270
HG_25S	26,930	36,560	310	160	160
HG_25C	34,900	52,820	420	330	330
QH_25C	41,900	48,750	390	310	310
HG_25H	42,200	69,070	560	570	570
QH_25H	50,610	60,940	500	450	450
HG_30C	48,500	71,870	660	530	530
QH_30C	58,260	66,340	600	500	500
HG_30H	58,600	93,990	880	920	920
QH_30H	70,320	88,450	830	890	890
HG_35C	64,600	93,990	1,160	810	810
QH_35C	78,890	86,660	1,070	760	760
HG_35H	77,900	122,770	1,540	1,400	1,400
QH_35H	95,230	115,550	1,450	1,330	1,330
HG_45C	103,800	146,710	1,980	1,550	1,550
QH_45C	119,400	135,420	1,830	1,380	1,380
HG_45H	125,300	191,850	2,630	2,680	2,680
QH_45H	144,130	180,560	2,470	2,410	2,410
HG_55C	153,200	211,230	3,690	2,640	2,640
HG_55H	184,900	276,230	4,880	4,570	4,570
HG_65C	213,200	287,480	6,650	4,270	4,270
HG_65H	277,800	420,170	9,380	7,380	7,380

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

3.1.8 Rigidity

The rigidity depends on the preload. With the formula F 3.1, the deformation can be calculated depending on the rigidity.

F 3.1

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

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

Table 3.5 **Radial rigidity of HG/QH series**

Load type	Series/ Size	Rigidity depending on the preload		
		ZO	ZA	ZB
Average load	HG_20S	124	210	270
	HG_25S	195	320	360
Heavy load	HG_15C	196	365	483
	QH_15C	174	292	384
	HG_20C	232	460	678
	QH_20C	221	396	542
	HG_25C	292	539	705
	QH_25C	254	419	548
	HG_30C	354	618	823
	QH_30C	326	526	716
	HG_35C	395	642	865
	QH_35C	375	566	762
	HG_45C	505	738	980
	QH_45C	480	644	850
	HG_55C	609	828	1,092
	HG_65C	716	918	1,201
Super heavy load	HG_20H	300	611	824
	QH_20H	294	534	735
	HG_25H	378	715	935
	QH_25H	332	567	739
	HG_30H	453	820	1,093
	QH_30H	420	699	945
	HG_35H	509	855	1,150
	QH_35H	487	757	1,010
	HG_45H	649	970	1,298
	QH_45H	620	853	1,128
	HG_55H	789	1,085	1,445
	HG_65H	946	1,221	1,599

Unit: N/μm

3.1.9 Dimensions of the HG/QH blocks

3.1.9.1 HGH/QHH

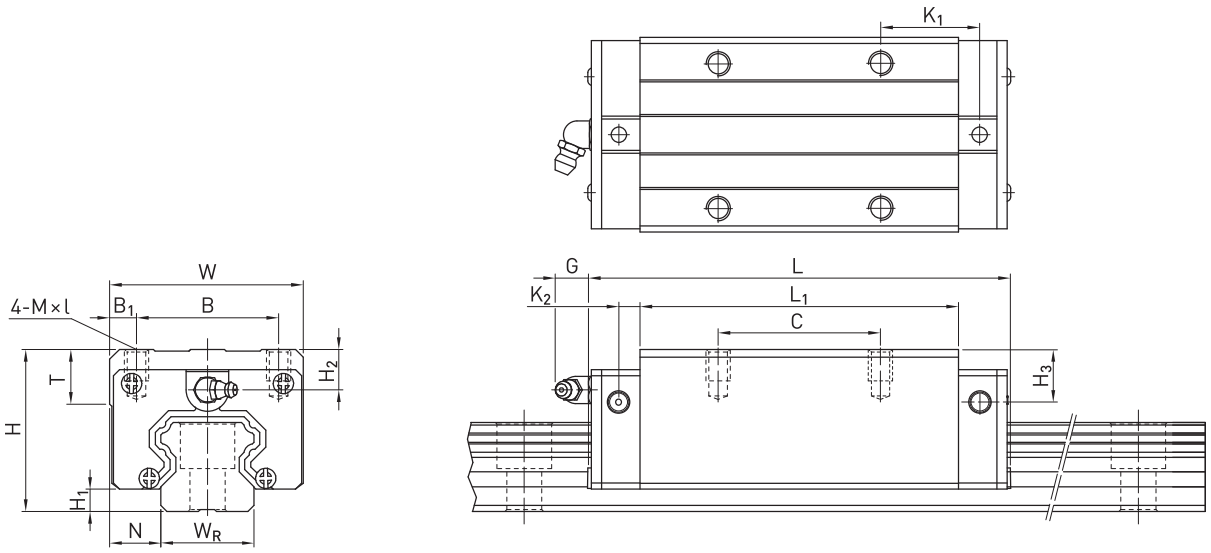


Table 3.6 **Dimensions of the block**

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	
HGH15CA	28	4.3	9.5	34	26	4.0	26	39.4	61.4	10.00	4.85	5.3	M4 × 5	6.0	7.95	7.7	14,700	23,470	0.18
QHH15CA	28	4.0	9.5	34	26	4.0	26	39.4	61.4	10.00	5.00	5.3	M4 × 5	6.0	7.95	8.2	17,940	19,860	0.18
HGH20CA	30	4.6	12.0	44	32	6.0	36	50.5	77.5	12.25	6.00	12.0	M5 × 6	8.0	6.00	6.0	27,100	36,680	0.30
HGH20HA							50	65.2	92.2	12.60							32,700	47,960	0.39
QHH20CA	30	4.6	12.0	44	32	6.0	36	50.5	76.7	11.75	6.00	12.0	M5 × 6	8.0	6.00	6.0	30,000	33,860	0.29
QHH20HA							50	65.2	91.4	12.10							35,700	42,310	0.38
HGH25CA	40	5.5	12.5	48	35	6.5	35	58.0	84.0	15.70	6.00	12.0	M6 × 8	8.0	10.00	9.0	34,900	52,820	0.51
HGH25HA							50	78.6	104.6	18.50							42,200	69,070	0.69
QHH25CA	40	5.5	12.5	48	35	6.5	35	58.0	83.4	15.70	6.00	12.0	M6 × 8	8.0	10.00	9.0	41,900	48,750	0.50
QHH25HA							50	78.6	104.0	18.50							50,610	60,940	0.68
HGH30CA	45	6.0	16.0	60	40	10.0	40	70.0	97.4[1)]	20.25	6.00	12.0	M8 × 10	8.5	9.50	13.8	48,500	71,870	0.88
HGH30HA							60	93.0	120.4[2)]	21.75							58,600	93,990	1.16
QHH30CA	45	6.0	16.0	60	40	10.0	40	70.0	97.4	19.50	6.25	12.0	M8 × 10	8.5	9.50	9.0	58,260	66,340	0.87
QHH30HA							60	93.0	120.4	21.75							70,320	88,450	1.15
HGH35CA	55	7.5	18.0	70	50	10.0	50	80.0	112.4	20.60	7.00	12.0	M8 × 12	10.2	16.00	19.6	64,600	93,990	1.45
HGH35HA							72	105.8	138.2	22.50							77,900	122,770	1.92
QHH35CA	55	7.5	18.0	70	50	10.0	50	80.0	113.6	19.00	7.50	12.0	M8 × 12	10.2	15.50	13.5	78,890	86,660	1.44
QHH35HA							72	105.8	139.4	20.90							95,230	115,550	1.90
HGH45CA	70	9.5	20.5	86	60	13.0	60	97.0	139.4	23.00	10.00	12.9	M10 × 17	16.0	18.50	30.5	103,800	146,710	2.73
HGH45HA							80	128.8	171.2	28.90							125,300	191,850	3.61
QHH45CA	70	9.2	20.5	86	60	13.0	60	97.0	139.4	23.00	10.00	12.9	M10 × 17	16.0	18.50	20.0	119,400	135,420	2.72
QHH45HA							80	128.8	171.2	29.09							144,130	180,560	3.59
HGH55CA	80	13.0	23.5	100	75	12.5	75	117.7	166.7	27.35	11.00	12.9	M12 × 18	17.5	22.00	29.0	153,200	211,230	4.17
HGH55HA							95	155.8	204.8	36.40							184,900	276,230	5.49
HGH65CA	90	15.0	31.5	126	76	25.0	70	144.2	200.2	43.10	14.00	12.9	M16 × 20	25.0	15.00	15.0	213,200	287,480	7.00
HGH65HA							120	203.6	259.6	47.80							277,800	420,170	9.82

[1)] 98.8 for type SE
[2)] 121.8 for type SE
For dimensions of the rail, see Page 41, for standard as well as optional lubrication adapter, see Page 150.

3.1.9.2 HGL

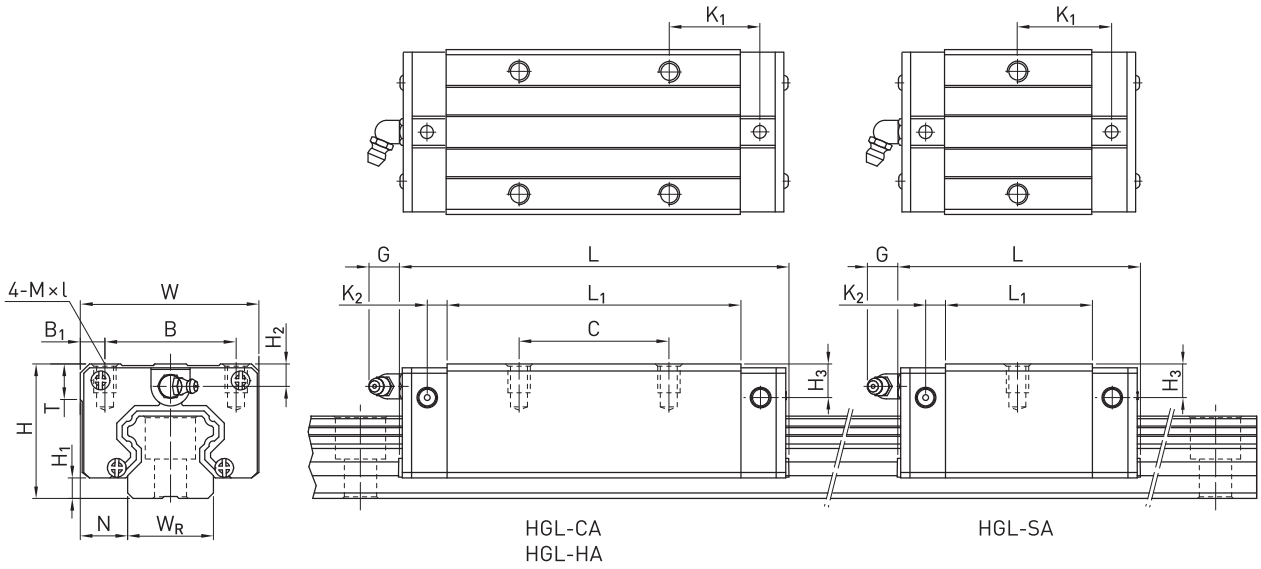


Table 3.7 **Dimensions of the block**

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	
HGL15CA	24	4.3	9.5	34	26	4.0	26	39.4	61.4	10.00	4.85	5.3	M4 × 4	6.0	3.95	3.7	14,700	23,470	0.14
HGL25SA	36	5.5	12.5	48	35	6.5	—	38.2	64.2	23.20	6.00	12.0	M6 × 6	8.0	6.00	5.0	26,930	36,560	0.32
HGL25CA							35	58.0	84.0	15.70							34,900	52,820	0.42
HGL25HA							50	78.6	104.6	18.50							42,200	69,070	0.57
HGL30CA	42	6.0	16.0	60	40	10.0	40	70.0	97.4[1)]	20.25	6.00	12.0	M8 × 10	8.5	6.50	10.8	48,500	71,870	0.78
HGL30HA							60	93.0	120.4[2)]	21.75							58,600	93,990	1.03
HGL35CA	48	7.5	18.0	70	50	10.0	50	80.0	112.4	20.60	7.00	12.0	M8 × 12	10.2	9.00	12.6	64,600	93,990	1.14
HGL35HA							72	105.8	138.2	22.50							77,900	122,770	1.52
HGL45CA	60	9.5	20.5	86	60	13.0	60	97.0	139.4	23.00	10.00	12.9	M10 × 17	16.0	8.50	20.5	103,800	146,710	2.08
HGL45HA							80	128.8	171.2	28.90							125,300	191,850	2.75
HGL55CA	70	13.0	23.5	100	75	12.5	75	117.7	166.7	27.35	11.00	12.9	M12 × 18	17.5	12.00	19.0	153,200	211,230	3.25
HGL55HA							95	155.8	204.8	36.40							184,900	276,230	4.27

[1)] 98.8 for type SE
[2)] 121.8 for type SE
For dimensions of the rail, see Page 41, for standard as well as optional lubrication adapter, see Page 150.

3.1.9.3 HGW/QHW

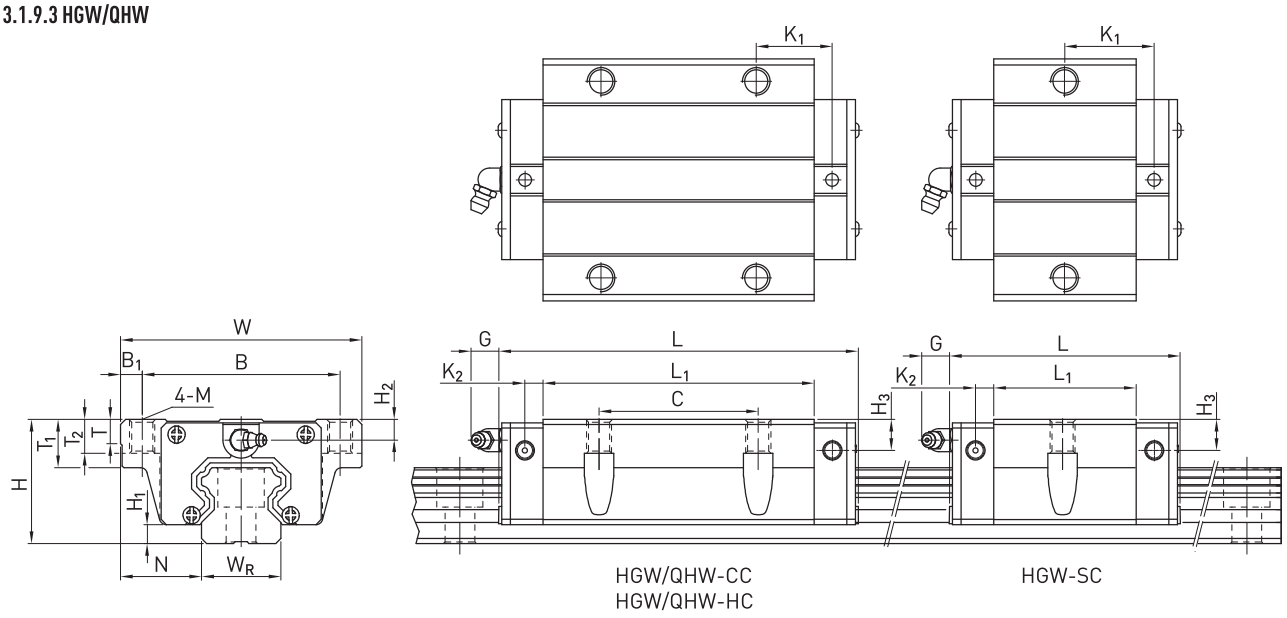


Table 3.8 **Dimensions of the block**

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	M	G	T	T_1	T_2	H_2	H_3	C_{dyn}	C_0	
HGW15CC	24	4.3	16.0	47	38	4.5	30	39.4	61.4	8.00	4.85	M5	5.3	6.0	8.9	7.0	3.95	3.7	14,700	23,470	0.17
QHW15CC	24	4.0	16.0	47	38	4.5	30	39.4	61.4	8.00	5.00	M5	5.3	6.0	8.9	7.0	3.95	4.2	17,940	19,860	0.17
HGW20SC	30	4.6	21.5	63	53	5.0	–	29.5	54.3	19.65	6.00	M6	12.0	8.0	10.0	9.5	6.00	6.0	16,840	22,570	0.28
HGW20CC							40	50.5	77.5	10.25									27,100	36,680	0.40
HGW20HC								65.2	92.2	17.60									32,700	47,960	0.52
QHW20CC	30	4.6	21.5	63	53	5.0	40	50.5	76.7	9.75	6.00	M6	12.0	8.0	10.0	9.5	6.00	6.0	30,000	33,860	0.40
QHW20HC								65.2	91.4	17.10									35,700	42,310	0.52
HGW25SC	36	5.5	23.5	70	57	6.5	–	38.2	64.2	23.20	6.00	M8	12.0	8.0	14.0	10.0	6.00	5.0	26,930	36,560	0.42
HGW25CC							45	58.0	84.0	10.70									34,900	52,820	0.59
HGW25HC								78.6	104.6	21.00									42,200	69,070	0.80
QHW25CC	36	5.5	23.5	70	57	6.5	45	58.0	83.4	10.70	6.00	M8	12.0	8.0	14.0	10.0	6.00	5.0	41,900	48,750	0.59
QHW25HC								78.6	104.0	21.00									50,610	60,940	0.80
HGW30CC	42	6.0	31.0	90	72	9.0	52	70.0	97.4 [1]	14.25	6.00	M10	12.0	8.5	16.0	10.0	6.50	10.8	48,500	71,870	1.09
HGW30HC								93.0	120.4 [2]	25.75									58,600	93,990	1.44
QHW30CC	42	6.0	31.0	90	72	9.0	52	70.0	97.4	13.50	6.25	M10	12.0	8.5	16.0	10.0	6.50	6.0	58,260	66,340	1.09
QHW30HC								93.0	120.4	25.75									70,320	88,450	1.44
HGW35CC	48	7.5	33.0	100	82	9.0	62	80.0	112.4	14.60	7.00	M10	12.0	10.1	18.0	13.0	9.00	12.6	64,600	93,990	1.56
HGW35HC								105.8	138.2	27.50									77,900	122,770	2.06
QHW35CC	48	7.5	33.0	100	82	9.0	62	80.0	113.6	13.00	7.50	M10	12.0	10.1	18.0	13.0	8.50	6.5	78,890	86,660	1.56
QHW35HC								105.8	139.4	25.90									95,230	115,550	2.06
HGW45CC	60	9.5	37.5	120	100	10.0	80	97.0	139.4	13.00	10.00	M12	12.9	15.1	22.0	15.0	8.50	20.5	103,800	146,710	2.79
HGW45HC								128.8	171.2	28.90									125,300	191,850	3.69
QHW45CC	60	9.2	37.5	120	100	10.0	80	97.0	139.4	13.00	10.00	M12	12.9	15.1	22.0	15.0	8.50	10.0	119,400	135,420	2.79
QHW45HC								128.8	171.2	28.90									144,130	180,560	3.69
HGW55CC	70	13.0	43.5	140	116	12.0	95	117.7	166.7	17.35	11.00	M14	12.9	17.5	26.5	17.0	12.00	19.0	153,200	211,230	4.52
HGW55HC								155.8	204.8	36.40									184,900	276,230	5.96
HGW65CC	90	15.0	53.5	170	142	14.0	110	144.2	200.2	23.10	14.00	M16	12.9	25.0	37.5	23.0	15.00	15.0	213,200	287,480	9.17
HGW65HC								203.6	259.6	52.80									277,800	420,170	12.89

[1] 98.8 for type SE; [2] 121.8 for type SE

For dimensions of the rail, see Page 41, for standard as well as optional lubrication adapter see Page 150.

3.1.10 Dimensions of the HG rail

The HG profile rail is used for both the HG and QH blocks.

3.1.10.1 Dimensions HGR_R

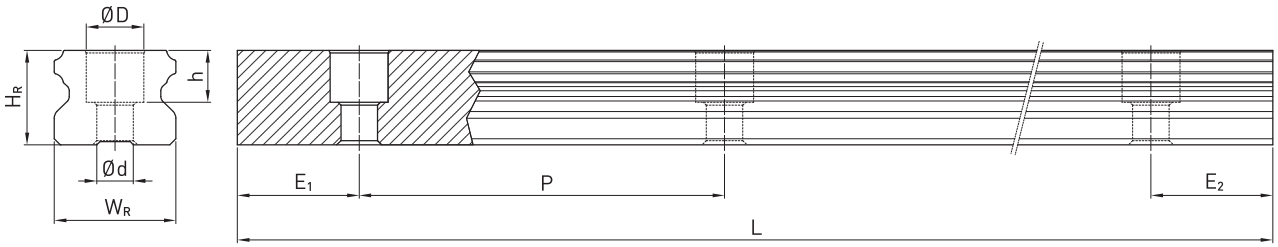


Table 3.9 **Dimensions of profile rail HGR_R**

Series/size	Assembly screw for rail [mm]	Dimensions of the rail [mm]						Max. length [mm] [2]	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	H_R	D	h	d	P						
HGR15R	M4 × 20	15	15.0	7.5	5.3	4.5	60	4,000	3,900	72	6	54	1.45
HGR20R	M5 × 20	20	17.5	9.5	8.5	6.0	60	4,000/5,600 [1]	3,900/5,520 [1]	74	7	53	2.21
HGR25R	M6 × 25	23	22.0	11.0	9.0	7.0	60	4,000/5,600 [1]	3,900/5,520 [1]	76	8	52	3.21
HGR30R	M8 × 30	28	26.0	14.0	12.0	9.0	80	4,000/5,600 [1]	3,920/5,520 [1]	98	9	71	4.47
HGR35R	M8 × 35	34	29.0	14.0	12.0	9.0	80	4,000/5,600 [1]	3,920/5,520 [1]	98	9	71	6.30
HGR45R	M12 × 45	45	38.0	20.0	17.0	14.0	105	4,000/5,600 [1]	3,885/5,460 [1]	129	12	93	10.41
HGR55R	M14 × 55	53	44.0	23.0	20.0	16.0	120	4,000/5,600 [1]	3,840/5,440 [1]	148	14	106	15.08
HGR65R	M16 × 65	63	53.0	26.0	22.0	18.0	150	4,000/5,600 [1]	3,750/5,350 [1]	180	15	135	21.18

[1] Optional type on request
[2] Max. length of corrosion-resistant steel: 1,860mm

3.1.10.2 Dimensions HGR_T

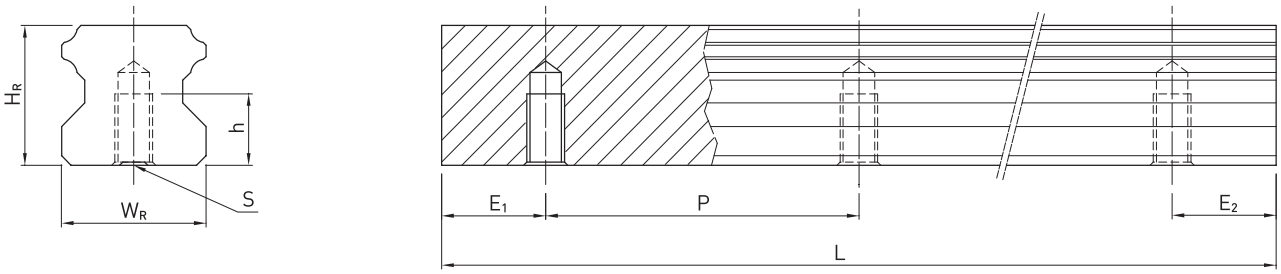


Table 3.10 **Dimensions of profile rail HGR_T**

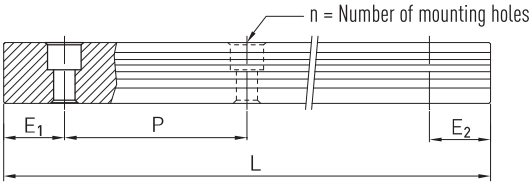
Series/size	Dimensions of the rail [mm]					Max. length [mm] [2]	Max. length $E_1 = E_2$ [mm]	Min. length [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	H_R	S	h	P						
HGR15T	15	15.0	M5	8	60	4,000	3,900	72	6	54	1.48
HGR20T	20	17.5	M6	10	60	4,000	3,900	74	7	53	2.29
HGR25T	23	22.0	M6	12	60	4,000	3,900	76	8	52	3.35
HGR30T	28	26.0	M8	15	80	4,000	3,920	98	9	71	4.67
HGR35T	34	29.0	M8	17	80	4,000	3,920	98	9	71	6.51
HGR45T	45	38.0	M12	24	105	4,000	3,885	129	12	93	10.87
HGR55T	53	44.0	M14	24	120	4,000	3,840	148	14	106	15.67
HGR65T	63	53.0	M20 [1]	30	150	4,000	3,750	180	15	135	21.73

[1] Deviates from DIN 645
[2] Max. length of corrosion-resistant steel: 1,860mm

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.

3.1.10.3 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 3.2

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

- 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].

3.1.10.4 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.

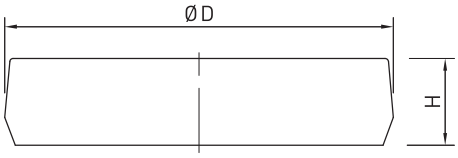


Table 3.11 **Cover caps for mounting holes of profile rails**

Rail	Screw	Article number			Ø D [mm]	Height H [mm]
		Plastic (200 units)	Brass [1]	Steel [1]		
HGR15R	M4	5-002218	5-001344	–	7.5	1.2
HGR20R	M5	5-002220	5-001350	5-001352	9.5	2.5
HGR25R	M6	5-002221	5-001355	5-001357	11.0	2.8
HGR30R	M8	5-002222	5-001360	5-001362	14.0	3.5
HGR35R	M8	5-002222	5-001360	5-001362	14.0	3.5
HGR45R	M12	5-002223	5-001324	5-001327	20.0	4.0
HGR55R	M14	5-002224	5-001330	5-001332	23.0	4.0
HGR65R	M16	5-002225	5-001335	5-001337	26.0	4.0

[1] Not recommended for coated rails.

3.1.11 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.

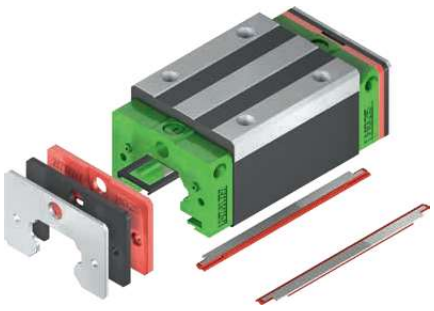


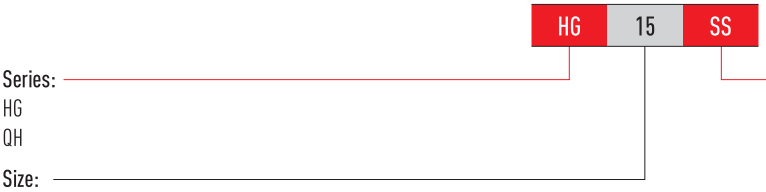
Table 3.12 **Total length of block with different sealing systems**

Series/size	Total length L (including screws)									
	SS	SSL	ZZ	ZZX	DD	KK	KKX	SW	ZW	ZWX
HG_15C	61.4	61.4	69.0	69.0	68.0	75.6	75.6	63.2	71.0	71.0
QH_15C	61.4	–	68.4	–	68.0	75.0	–	–	–	–
HG_20S	56.5	56.5	57.5	57.5	59.5	62.5	62.5	57.5	–	61.3
HG_20C	77.5	77.5	82.5	82.5	82.5	87.5	87.5	78.5	86.3	82.3
QH_20C	76.7	–	81.9	–	81.7	86.9	–	–	–	–
HG_20H	92.2	92.2	97.2	97.2	97.5	102.2	102.2	93.2	101.0	97.0
QH_20H	91.4	–	96.6	–	96.4	101.6	–	–	–	–
HG_25C	84.0	84.0	89.0	92.0	89.0	94.0	97.0	85.0	92.8	91.8
QH_25C	83.4	–	89.4	–	88.4	94.4	–	–	–	–
HG_25H	104.6	104.6	109.6	112.6	109.6	114.6	114.6	105.6	113.4	112.4
QH_25H	104.4	–	110.0	–	109.0	115.0	–	–	–	–
HG_30C	97.4	97.4	105.4	108.4	104.8	112.8	115.8	99.0	107.2	105.8
QH_30C	97.4	–	104.8	–	104.8	112.2	–	–	–	–
HG_30H	120.4	120.4	128.4	131.4	127.8	135.8	138.8	122.0	130.2	128.8
QH_30H	120.4	–	127.8	–	127.8	135.2	–	–	–	–
HG_35C	112.4	–	120.4	123.4	119.8	127.8	130.8	115.2	123.4	122.4
QH_35C	113.6	–	119.0	–	118.6	124.0	–	–	–	–
HG_35H	138.2	–	146.2	149.2	145.6	153.6	156.6	141.0	149.2	148.2
QH_35H	139.4	–	144.8	–	144.4	149.8	–	–	–	–
HG_45C	139.4	–	150.0	153.0	149.4	160.0	160.0	140.0	148.8	144.8
QH_45C	139.4	–	147.2	–	146.6	154.4	–	–	–	–
HG_45H	171.2	–	181.8	184.8	181.2	191.8	194.8	171.8	180.6	176.6
QH_45H	171.2	–	179.0	–	178.4	186.2	–	–	–	–
HG_55C	166.7	–	177.1	180.1	177.1	187.5	190.5	163.7	–	172.9
HG_55H	204.8	–	215.2	218.2	215.2	225.5	228.5	201.8	–	211.0
HG_65C	200.2	–	208.2	211.2	209.2	217.2	220.2	196.2	–	203.4
HG_65H	259.6	–	267.6	270.6	268.6	276.6	258.6	255.6	–	262.8

Unit: mm

3.1.11.1 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.



Series:
HG
QH

Size:
HG: 15, 20, 25, 30, 35, 45, 55, 65
QH: 15, 20, 25, 30, 35, 45

Dust cover ID:
SS: Standard seal
SSL: Smooth running seal without scraper
ZZ: End seal with scraper
ZZX: End seal with optimised scraper
DD: Double end seal
KK: Double end seal with scraper
KKX: Double end seal with optimised scraper
SW: End seal with double sealing lip
ZW: End seal with double sealing lip and scraper
ZWX: End seal with double sealing lip and optimised scraper

3.1.12 Long-term lubrication unit

Further information on the lubrication unit can be found in the general information In section "2.6.3 Long-term lubrication unit" on Page 15.
The following drawing shows the dimension (L) for a single-sided lubrication unit (standard). The dimension for a double-sided lubrication unit results from the dimension L + V + T. The E2 long-term lubrication unit is available with the sealing systems named in the table.

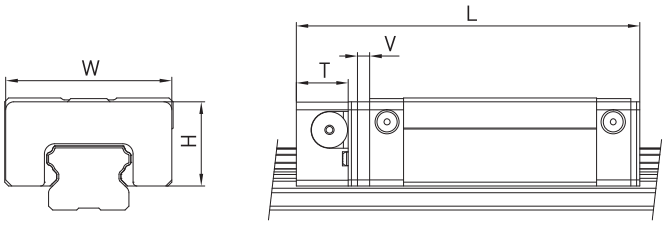


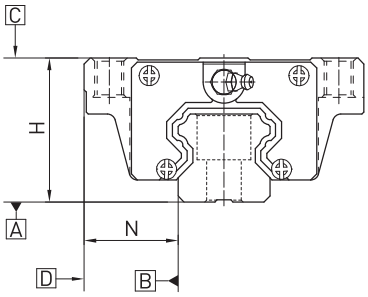
Table 3.13 **Dimensions of the block with lubrication unit E2**

Model	Dimensions of the block [mm]								Max running performance [2] [km] E2 single-sided	Max running performance [2] [km] E2 double-sided
	W	H	T	V	L_{SS} [1]	L_{ZZ} [1]	L_{DD} [1]	L_{KK} [1]		
HG_15C	32.4	19.5	12.5	3.0	75.4	80.5	82.0	87.1	10,000	20,000
QH_15C	32.4	19.5	12.5	3	75.4	–	–	–	20,000	30,000
HG_20S	43.0	24.4	13.5	3.5	70.9	73.0	75.0	78.0	10,000	20,000
HG_20C	43.0	24.4	13.5	3.5	93.5	95.6	97.5	100.6	10,000	20,000
QH_20C	43	24.4	13.5	3.5	93.1	–	–	–	20,000	30,000
HG_20H	43.0	24.4	13.5	3.5	108.2	110.2	112.2	115.2	10,000	20,000
QH_20H	43	24.4	13.5	3.5	107.8	–	–	–	20,000	30,000
HG_25C	46.4	29.5	13.5	3.5	100.0	102.0	104.0	107.0	10,000	20,000
QH_25C	46.4	29.5	13.5	3.5	100.2	–	–	–	20,000	30,000
HG_25H	46.4	29.5	13.5	3.5	120.6	122.6	124.6	127.6	10,000	20,000
QH_25H	46.4	29.5	13.5	3.5	120.8	–	–	–	20,000	30,000
HG_30C	58.0	35.0	13.5	3.5	112.9	118.0	119.9	125.0	10,000	20,000
QH_30C	58	35	13.5	3.5	112.9	–	–	–	20,000	30,000
HG_30H	58.0	35.0	13.5	3.5	135.9	141.0	142.9	148.0	10,000	20,000
QH_30H	58	35	13.5	3.5	135.9	–	–	–	20,000	30,000
HG_35C	68.0	38.5	13.5	3.5	127.9	133.4	135.3	140.8	10,000	20,000
QH_35C	68	35.5	16	3.5	129.3	–	–	–	20,000	30,000
HG_35H	68.0	38.5	13.5	3.5	153.7	159.2	161.1	166.6	10,000	20,000
QH_35H	68	35.5	16	3.5	155.1	–	–	–	20,000	30,000
HG_45C	82.0	49.0	16.0	4.5	157.2	162.1	166.1	171.7	10,000	20,000
QH_45C	82	49	16	4.5	158.3	–	–	–	20,000	30,000
HG_45H	82.0	49.0	16.0	4.5	189.0	193.9	197.9	203.5	10,000	20,000
QH_45H	82	49	16	4.5	190.1	–	–	–	20,000	30,000
HG_55C	97.0	55.5	16.0	4.5	183.9	189.6	193.8	200.0	10,000	20,000
HG_55H	97.0	55.5	16.0	4.5	222.0	227.7	231.9	238.1	10,000	20,000
HG_65C	121.0	69.0	16.0	4.5	219.2	220.7	226.7	229.7	10,000	20,000
HG_65H	121.0	69.0	16.0	4.5	278.6	280.1	286.1	289.1	10,000	20,000

[1] Total length depending on the selected dust protection. SS = Standard dust protection
[2] Further details can be found in the assembly instructions in the "Lubrication" chapter

3.1.13 Tolerances depending on the accuracy class

The HG and QH 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.



3.1.13.1 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 3.14 **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

3.1.13.2 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 3.15 **Tolerances of width and height**

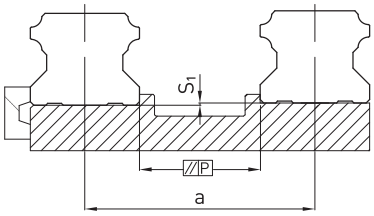
Series/size	Accuracy class	Height tolerance of H	Width tolerance of N	Height variance of H	Width variance of N
HG_15, 20 **QH_15, 20**	C (Normal)	± 0.1	± 0.1	0.02	0.02
	H (high)	± 0.03	± 0.03	0.01	0.01
	P (precision)	0/– 0.03 [1] ± 0.015 [2]	0/– 0.03 [1] ± 0.015 [2]	0.006	0.006
	SP (super precision)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (ultra precision)	0/– 0.008	0/– 0.008	0.003	0.003
HG_25, 30, 35 **QH_25, 30, 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
HG_45, 55 **QH_45**	C (Normal)	± 0.1	± 0.1	0.03	0.03
	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
HG_65	C (Normal)	± 0.1	± 0.1	0.03	0.03
	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

3.1.13.3 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 HG and QH series linear guideways are achieved.



Tolerance of parallelism of reference surface (P):

Table 3.16 **Maximum tolerance for parallelism (P)**

Series/Size	Preload class		
	Z0	**ZA**	**ZB**
HG/QH_15	25	18	–
HG/QH_20	25	20	18
HG/QH_25	30	22	20
HG/QH_30	40	30	27
HG/QH_35	50	35	30
HG/QH_45	60	40	35
HG_55	70	50	45
HG_65	80	60	55

Unit: µm

Tolerance of height of reference surface (S_1):

F 3.3 $S_1 = a \times K$

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

Table 3.17 **Coefficient of height tolerance (K)**

Series/Size	Preload class		
	Z0	**ZA**	**ZB**
HG/QH_15	2.6×10^{-4}	1.7×10^{-4}	–
HG/QH_20	2.6×10^{-4}	1.7×10^{-4}	1.0×10^{-4}
HG/QH_25	2.6×10^{-4}	1.7×10^{-4}	1.4×10^{-4}
HG/QH_30	3.4×10^{-4}	2.2×10^{-4}	1.8×10^{-4}
HG/QH_35	4.2×10^{-4}	3.0×10^{-4}	2.4×10^{-4}
HG/QH_45	5.0×10^{-4}	3.4×10^{-4}	2.8×10^{-4}
HG_55	6.0×10^{-4}	4.2×10^{-4}	3.4×10^{-4}
HG_65	7.0×10^{-4}	5.0×10^{-4}	4.0×10^{-4}

3.1.14 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.

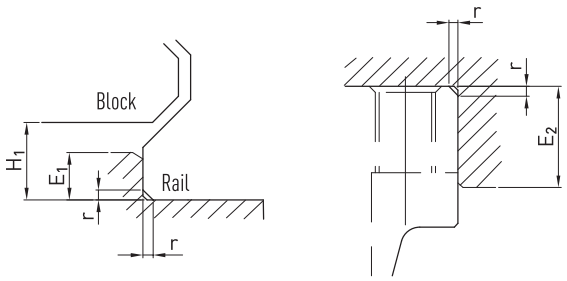


Table 3.18 **Shoulder heights and edge roundings**

Series/Size	Max. radius of edges r	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
HG_15	0.5	3.0	4.0	4.3
QH_15	0.5	3.0	4.0	4.0
HG/QH_20	0.5	3.5	5.0	4.6
HG/QH_25	1.0	5.0	5.0	5.5
HG/QH_30	1.0	5.0	5.0	6.0
HG/QH_35	1.0	6.0	6.0	7.5
HG/QH_45	1.0	8.0	8.0	9.5
HG_55	1.5	10.0	10.0	13.0
HG_65	1.5	10.0	10.0	15.0

Unit: mm