HIWIN®

Linear Guides

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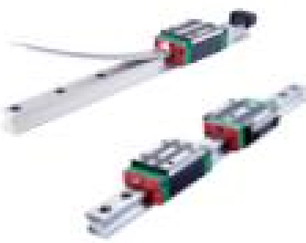
HIWIN® *INDUSTRIE 4.0 Best Partner*

Multi Axis Robot
Pick and place / Assembly / Packaging / Semiconductors / Electro-Optical Industry / Automotive Industry / Food Industry
- Articulated robots
- Delta Robots
- SCARA robots
- Wafer Robots
- Electric Grippers
- Integrated electric gripper
- Rotary Joint

Linear axes
Precision / Semiconductors / Medical Industry / FPD
- KK, SK
- KS, KA
- KU, KE, KC

Medical equipment
Hospitals / Rehabilitation Centres
- Robotic Gait Training System
- Hygiene System
- Robotic Endoscope Holder

Ballscrews
Precision / Rolled
- Super S Series
- Super T Series
- Mini Roller
- High Load Series
- Ball Spline



Linear Guides
Automation / Semiconductors / Medical Industry
- HG, EG, WE, MG, CG
- QGH, QE, QW, QR
- RG, E2, PG, SE, RC

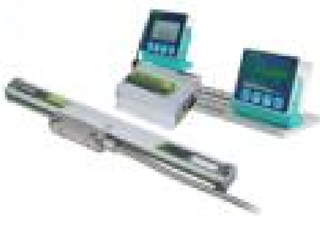
Rotary Tables
Aerospace / Medical /Automotive Industry / Machine Tools / Industrial Machines
- RAB-800
- RAB-500

Bearings
Machine tools / Robots
- BSB bearings
- Linear bearings
- Supports

Drives and Servo motors
Semiconductors / Packaging Machines / SMT / Food Industry / LCD
- D1, D1-N, D2T
- 50W - 2000W motors

Torque motors
Inspection / Test Equipment / Machine Tools / Robots
- Rotary tables -TMS, TMY, TMN
- TMRW Series

Systems with Linear Motors
Automatic transport / AOI application / Precision / Semiconductors
- Iron-core linear motor
- Coreless linear motor
- Turbo LMT Linear Motor
- Planar servo motor
- Air bearing platform
- X-Y Stage
- Gantry systems



Measuring and positioning systems
Cutting machines / Traditional machines / Milling machines
- High resolution
- Signal transfer
- High precision
- High efficiency

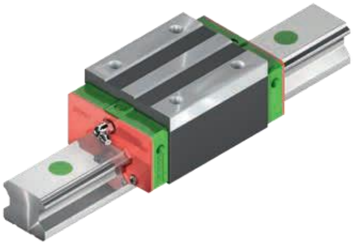
Linear Guide Systems

Linear Guides & accessories

A linear guide allows you to achieve linear motion based on the use of rolling bodies, such as balls or rollers. The linear guide obtains an extremely precise linear motion through the recirculation of the rolling bodies between the rail and the block. The coefficient of friction of a linear guide is only one fiftieth of that of a traditional sliding system.
The exceptional efficiency and complete absence of backlash means that linear guides can be used in various ways.

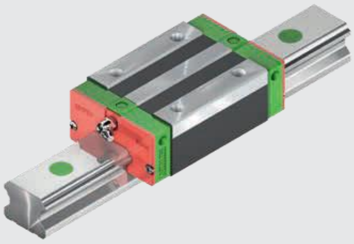
Index

1. Product overview



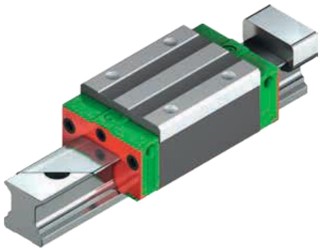
Linear guides, HG and QH series Pg. 29

- Guide with 4 recirculating balls
- Contact angle of 45°
- High load capacity in all directions
- High Stiffness
- Block with SynchMotion™ technology (QH series)



Linear guides, EG and QE series Pg. 47

- Guide with 4 recirculating balls
- Contact angle of 45°
- High load capacity in all directions
- Reduced mounting height
- Block with SynchMotion™ technology (QE series)

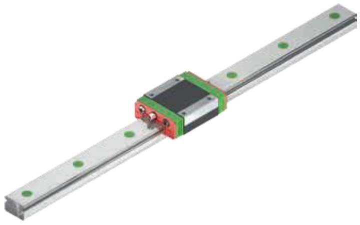


Linear guides, CG series Pg. 62

- Guide with 4 recirculating balls
- O-shaped arrangement with contact angle of 45°
- High torsional load capacity, in particular high roll stiffness
- Optional: rail with cover plate

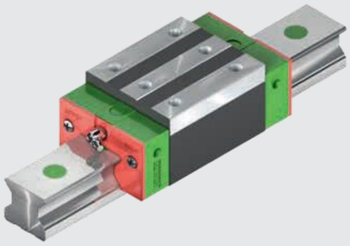
Linear guides, WE and QW series Pg. 77

- Guide with 4 recirculating balls
- Contact angle of 45°
- High moment load capacity
- Suitable for single-guide applications
- Reduced mounting height
- Carriage with SynchMotion™ technology (QW series)



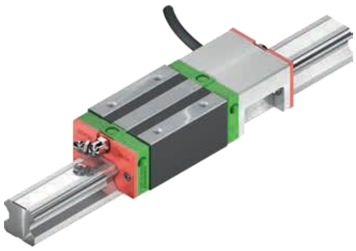
Linear guides, MG series Pg. 89

- Guide with 2 recirculating balls
- Contact angle of 45°
- Compact execution
- Available in narrow and wide version



Linear guides, RG and QR series Pg. 102

- 4 roller recirculation guide
- 45° contact angle
- Roller recirculation system
- Very high load capacity
- Maximum rigidity and precision
- Carriage with SynchMotion™ technology (QR series)



Linear guides, PG series Pg. 119

- HG series with integrated positioning system
- Zero-contact distance measurement
- Simple mounting and assembly
- Real-time outgoing signal

Accessories Pg. 126

- Grease nipple
- Lubrication adapter
- Pressure fittings

2. General Information

2.1 Benefits and features

1. Maximum positioning precision
A board mounted on a linear guide only has to overcome the rolling friction. The difference between static and dynamic coefficient of friction is negligible, so the first detachment force is equal, net of seals, to the force necessary to maintain motion. Stick-slip effects are non-existent.

2. Long life and extreme precision of movement
In a traditional type system, differences in lubricant thickness can cause precision errors. Grinding friction and often insufficient lubrication increase wear, reducing the degree of precision. On the contrary, the linear guide has a very low rolling friction, combined with an extremely low degree of wear. Consequently, the precision of the guide remains practically unchanged throughout its useful life.

3. High speed with reduced driving force
The low coefficients of friction allow the use of small driving forces. As a result, the power required is low even in the presence of alternating motion with high dynamics.

4. Constant load capacity in all directions
Thanks to a special design, a linear guide can support loads both vertically and horizontally.

5. Ease of installation and interchangeability
Installing a linear guide is quite simple. After milling or grinding the mounting surface, just follow the installation procedure to obtain an extremely precise motion.
Traditional guides require a much higher assembly effort, since the sliding surfaces must be scraped. Unless appropriately scraped, individual components are not interchangeable. On the contrary, linear guides are interchangeable without any type of modification and/or intervention.

6. Simplicity of lubrication
In a traditional guide system, insufficient lubrication destroys the contact surfaces. Lubricant must be applied at many points along the sliding surfaces. A linear guide only requires minimal lubrication, which can be carried out thanks to a simple system centralized directly on the block. HIWIN can also provide blocks with an integrated oil lubrication system, thanks to an interchangeable oil tank, for prolonged lubrication, applied at the front of the block.

7. Protection against corrosion
For optimal corrosion protection, the blocks and rails can be supplied with different coatings. The individual procedures selected depend on the application. Data on environmental conditions and corrosive substances are necessary to choose the optimal coating. The MG miniaturized linear guide is produced in stainless steel (SUS 420).

2.2 Selection criteria

Set selection conditions
- Type of equipment
- Space limitations
- Desired precision
- Required stiffness
- Type of loads
- Stroke Length
- Speed of movement, acceleration
- Frequency of use
- Useful life
- Environmental conditions

Select the series
- HG and CG series - Grinding machines, milling machines and drilling machines, lathes, machining centres, woodworking
- EG series - Automatic Equipment, High Speed Transfer Devices, Semiconductor Equipment, Precision Measurement Tools
- WE series - Single axle with high moment load Mx
- MG series - Miniature devices, semiconductor equipment, medical equipment.
- RG series - Machining centres, injection moulding machines, high rigidity machines and systems, deformation machines.

Select the precision
- Classes C, H, P, SP, UP, depending on equipment precision.

Determine the size and number of blocks
- Depending on empirical values
- Depending on the type of load
- If the guide is associated with a recirculating ball screw, the size of the linear guide must be close to that of the screw, e.g., recirculating ball screw from 32, rail from 35.

Calculate the maximum load of the block
- Calculate the maximum load with reference to the load calculation examples (see Chapter 2.5) Check that the static safety factor of the selected rail is higher than the nominal static safety factor (see Chapter 2.3.3)

Select the pre-load
- The pre-load depends on the rigidity and precision requirements of the mounting surface.

Determine stiffness
- Calculate the strain (δ) using the stiffness values table; stiffness increases with increasing pre-load and guide size.

Calculate useful life
- Calculate the useful life requirements based on the speed and frequency of the movement: refer to the examples of duration calculation (see Chapter 2.4).

Choose the type of lubrication
- Grease introduced by grease nipple.
- Oil delivered via the connecting line

End of selection

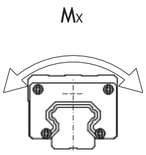
2.3 Load coefficients

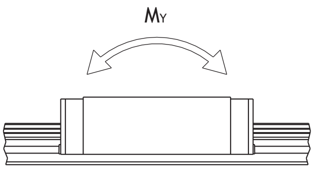
2.3.1 Static load coefficient C_0

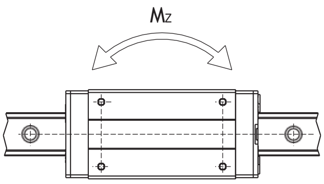
When the linear guide is subjected to an excessive load or is impacted in both static and dynamic conditions, a permanent local deformation occurs between the block and the rolling bodies. If it exceeds a certain limit, this permanent deformation prevents the correct operation of the linear guide. In general, the static load coefficient is defined as the static load of constant entity and direction that determines a total permanent deformation equal to 1/10,000 of the diameter of the rotating body, at the point of contact that undergoes the maximum stress. This value is indicated in the dimensional tables of the individual linear guides. These tables can be used as a reference to choose the most suitable linear guide. The maximum static load applied to a linear guide must not exceed the static load coefficient.

2.3.2 Permissible static moment M_0

The permissible static moment is the moment with specific direction and magnitude present when the maximum stress of the rolling bodies is equal to the stress induced by the static load coefficient. The permissible static moment is defined for three directions (MX, MY and MZ) for linear motion systems.







2.3.3 Static safety factor

It is necessary to take into account the static safety factor, which depends on the environmental and operating conditions, when the driving system is static or moving at low speed.
A high safety factor is particularly important for collision-prone guides (see Table 2.1). F 2.1 can be used to calculate the static load.

F 2.1

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

f_{SL} Static safety factor
f_{SM} Static safety factor for moment
C_0 Static load coefficient (N)
M_0 Permissible static moment [Nm]
P Equivalent static workload [N]
M Equivalent static moment [Nm]

It should be noted that: The load capacity of the linear guide is often limited not so much by the resistance to the load but by the connection with the fastening screws to the structure.
As a result, it is advisable to check the maximum permissible load capacity of the block/rail mechanical connection to both the table and the base.

Table 2.1 **Static safety factor**

Load condition	f_{SL}; f_{SM} [min.]
Normal load	3.00 – 5.00
With shocks and vibrations	5.00 – 7.00
With high intensity shocks/vibrations/working forces	> 7.00

2.3.4 Dynamic Load Coefficient C_{dyn}

The dynamic load coefficient is defined as the maximum load with constant entity and direction that determines a nominal service life of 50 km [1)] (HG, QH, EG, QE, CG, WE, QW, MG) o 100 km [1)] (RG, QR). The values of the dynamic load coefficient of the individual blocks are shown in the dimensional tables can be used to calculate the useful life of the chosen linear guide.

[1)] The dynamic load coefficient of linear guides is defined for a nominal life of 50 or 100 km, depending on the manufacturer. The following factors can be used to convert the dynamic load coefficient:
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 Calculating useful life

2.4.1 Definition of useful life
Repeatedly and continuously loading the raceway and the rolling bodies of a linear guide causes fatigue wear of the raceway itself. Ultimately, this leads to a phenomenon known as “pitting”. The duration of a linear guide is defined as the total distance travelled until signs of wear and fatigue occur on the surface of the raceway or rolling stock.

2.4.2 Nominal Duration (L)
The useful life can vary considerably even when linear guides are produced in the same way or used in the same movement conditions. The nominal duration must therefore be considered **an approximate estimate of the useful life of a linear guide.** The nominal duration is the total distance that 90% of a lot of 100 guides used in identical conditions can travel without wearing out.

2.4.2.1 Calculation of nominal duration
The acting load affects the nominal duration of a linear guide, which can be calculated with formulas F 2.2 and F 2.3, using the selected dynamic load coefficient and equivalent dynamic load.

Formulas for calculating the nominal duration (L)

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

F 2.2

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

RG, QR series:

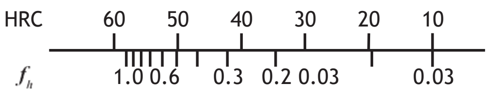
F 2.3

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

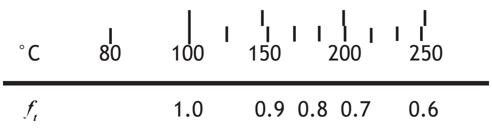
L Nominal duration [km]
C_{dyn} Dynamic load coefficient [N]
P Equivalent dynamic load [N]

2.4.2.2 Factors affecting nominal duration
The type of load, the hardness of the raceway and the temperature of the guide have a considerable impact on the nominal life. Formulas F 2.4 and F 2.5 show the relationship between these factors.

Hardness factor (f_h)
The raceway has a hardness of 58~62 HRC.The hardness factor is 1.0. If the hardness is not this, you must use the hardness factor indicated on the right. If the specified hardness cannot be obtained, the permissible load is reduced. In this situation, the dynamic load coefficient and the static load coefficient must be multiplied by the hardness factor in the calculation.



Temperature factor (f_t)
Standard raceways can be used in an ambient temperature range of -10°C to +80°C. At temperatures up to 150°C, linear guides with a metal end cap (identified in the type code by the addition of "/SE") must be used. With this model, applications with ambient temperatures up to 180°C are possible. However, we suggest you contact our technical support for confirmation. If the temperature of a linear guide exceeds 100°C, the permissible load and useful life decrease. As a result, it is necessary to multiply the static and dynamic load coefficients by the temperature factor.



Load factor (f_w)
The equivalent dynamic load must be multiplied by the load factor in accordance with the indications in Table 2.2. This takes into account external effects on the useful life of the raceway that are not directly included in the calculations (e.g. high vibrations, shocks and speeds). For short stroke applications (stroke < 2 x block length), the determined load factor must be doubled.

Table 2.2 **Load Factor**		
Load Type	Service Speed	f_w
No shocks or vibrations	up to 15 m/min	1.0 – 1.2
Normal load	15 m/min to 60 m/min	1.2 – 1.5
Mild shocks	60 m/min to 120m/min	1.5 – 2.0
With shocks and vibrations	over 120 m/min	2.0 – 3.5

Formula for calculation of the nominal duration (taking into account the above 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 duration [km]
f_h Hardness factor
C_{dyn} Dynamic load coefficient [N]
f_t Temperature factor
P Equivalent dynamic load [N]
f_w Load factor

2.4.3 Calculation of useful life (L_h)
To calculate the useful life in hours starting from the nominal duration, the speed and frequency of movement are used.

Formula for calculating useful 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

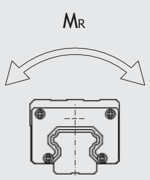
$$L_h = \frac{L}{v \times 60} = \frac{\left(\frac{C_{dyn}}{P}\right)^{10/3} \times 100{,}000}{v \times 60}$$

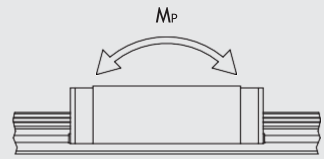
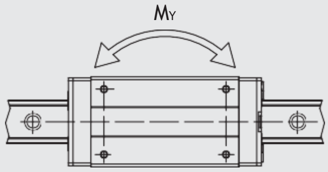
L_h Duration [h]
L Nominal duration [m]
v Speed [m/min]
C_{dyn}/P Ratio between load coefficient and load

2.5 Applied loads

2.5.1 Applied loads
The calculation of the loads acting on a linear guide is influenced by numerous factors, such as the position of the centre of gravity of the object, the position of the control and the inertial forces at stop and start. To obtain the correct value, each parameter must be carefully evaluated.

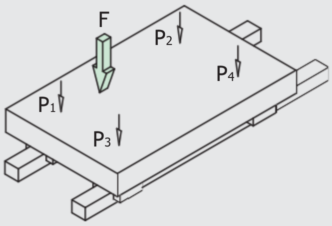
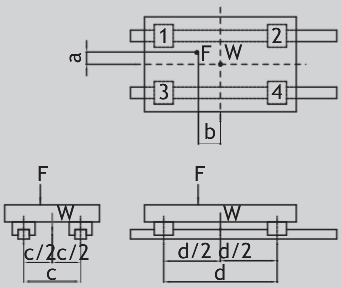
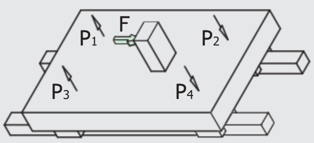
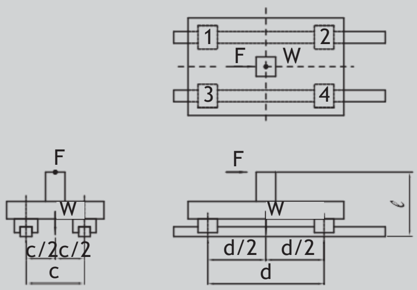
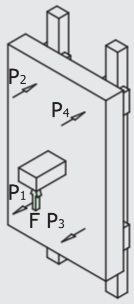
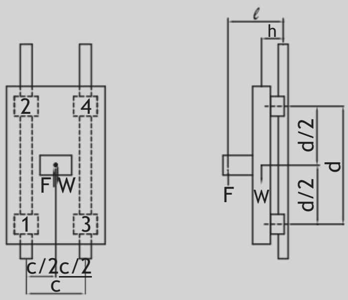
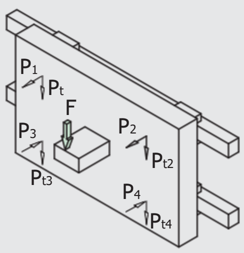
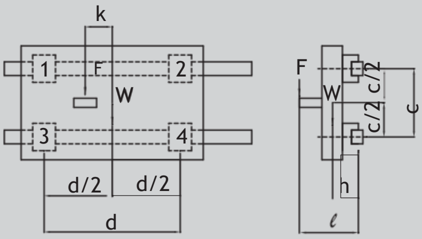
Loads on single block in case of applied moment

	Pm (Static equivalent load) = $\frac{M_r}{MO_r} \times C_0$ Pm (Dynamic equivalent load) = $\frac{M_r}{M_r\,din} \times C$

	Pm (Static equivalent load) = $\frac{M_P}{MO_P} \times C_0$ Pm (Dynamic equivalent load) = $\frac{M_P}{M_P\,din} \times C$
	Pm (Static equivalent load) = $\frac{M_Y}{MO_Y} \times C0$ Pm (Dynamic equivalent load) = $\frac{M_Y}{M_Y\,din} \times C$

Loads on a table with two guides (two blocks/rail)

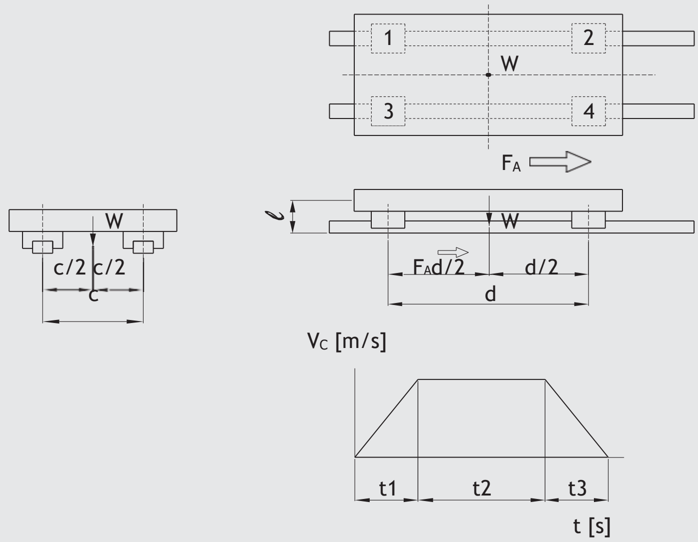
Table 2.3 **Load on a single block (calculation examples)**

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

$P_1 \dots P_4$ Load on single block
W Load weight
F Force required for motion; other external acting force
l Distance between external force and block
c Distance between rails
d Distance between blocks
a, b, k Distance between external force and geometric centre
h Distance between centre of gravity and system drive

Load and inertial force

Table 2.4 **Loads with inertial forces (calculation examples)**

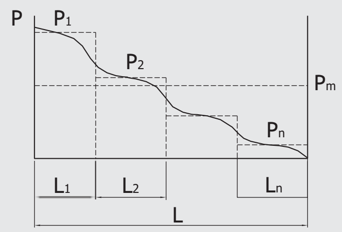
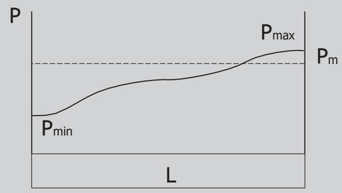
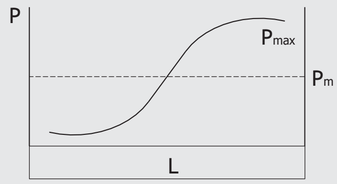
Application of acceleration and deceleration	Load on a single block
	Constant speed: $P_1 \ldots P_4 = \frac{W}{4}$
	Acceleration: $P_1 = P_3 = \frac{W}{4} + \frac{1}{2} \times \frac{W}{g} \times \frac{V_C}{t_1} \times \frac{l}{d}$; $P_2 = P_4 = \frac{W}{4} - \frac{1}{2} \times \frac{W}{g} \times \frac{V_C}{t_1} \times \frac{l}{d}$
	Deceleration: $P_1 = P_3 = \frac{W}{4} - \frac{1}{2} \times \frac{W}{g} \times \frac{V_C}{t_3} \times \frac{l}{d}$; $P_2 = P_4 = \frac{W}{4} + \frac{1}{2} \times \frac{W}{g} \times \frac{V_C}{t_3} \times \frac{l}{d}$

$P_1 \ldots P_4$ Load on single block
W Load weight
F Motion Force
F_A Reaction Force
g Gravitational acceleration [m/s^2]
v_c Speed [m/s]
t_1 Acceleration time[s]
t_2 Constant speed time [s]
t_3 Deceleration time/s [s]
c Distance between rails [m]
d Distance between blocks [m]
l Distance between centre of gravity and block [m]

2.5.2 Calculation of the equivalent load in the case of variable load

If the load applied to a linear guide varies considerably, an equivalent load must be used to calculate the duration. The equivalent load is a load that causes the same wear on bearings under variable load conditions. It can be calculated using Table 2.5.

Table 2.5 **Calculation examples of equivalent load (P_m)**

Gradual variation	Constant variation	Sinusoidal variation
		
$P_m = \sqrt[3]{\frac{1}{L}\left(P1^3 \times L_1 + P_2^3 \times L_2 + \ldots + P_n^3 \times L_n\right)}$	$P_m = \frac{1}{3}\left(P_{min} + 2 \times P_{max}\right)$	$P_m = 0.65 \times P_{max}$

P_m Equivalent load
P_n Variable load
P_{min} Minimum load
P_{max} Maximum load
L Total distance travelled
L_n Distance travelled with load P_n

2.6 Friction and lubrication

2.6.1 Friction

The use of rolling bodies in linear guidance mainly reduces friction, which is of the rolling type. This makes the coefficient of friction of a linear guide very low, up to 1/50 of that of a traditional guide. In general, the coefficient of friction of a linear guide is about 0.004, depending on the series.I If the load is less than or equal to 10% of the dynamic load coefficient, the drag is mainly due to the viscosity of the grease, the friction between the rolling bodies and the seals. If instead the acting load is greater than 10% of the dynamic load coefficient, the resistance to advancement is mainly due to the acting load.

F 2.8

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

F Friction [N]
S Resistance due to friction [N]
μ Coefficient of friction
W Load [N]

2.6.2 Lubrication

Like any other ball or roller bearing, linear guiding requires proper lubrication. In theory, both oil and grease can be used to lubricate. Lubricant is a fundamental element and must be considered when designing a machine. Lubricants reduce wear, protect against contamination, reduce corrosion and their properties prolong service life. Dirt can accumulate on unprotected guides. This dirt must be removed regularly.

HIWIN produces greases for various needs:

- HIWIN G01: for heavy-duty applications
- HIWIN G02: for cleanroom and vacuum applications
- HIWIN G03: for high speed cleanroom and vacuum applications
- HIWIN G04: for high speed applications
- HIWIN G05: for standard applications

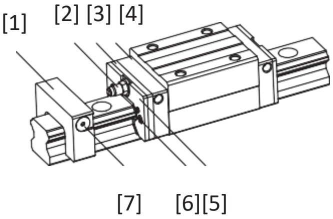
For more information about HIWIN lubricants, see the Accessories section on Page 130. In addition, details on HIWIN lubricants and on the lubrication of linear guides are also available in the manual **“HIWIN linear guide assembly instructions”** on the website www.hiwin.it.

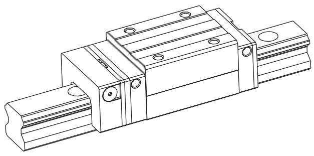
2.6.3 Integrated lubrication unit E2

The oil system E2 consists of a grease nipple inserted in the recirculation head, on the one side, which crosses the end seal and reaches the interchangeable oil tank, applied externally to the block. There is no need to disassemble the block to change the oil tank. The lubricant passes from the oil tank to the grease nipple through appropriate felt pads which in turn send the oil to the rail recirculation tracks.

The oil grease nipple E2 is available for the HG, EG and RG series. The relative dimensions, lubricant volumes and replacement frequencies are indicated in the sections of the various series. HG series: Page 42, EG series: Page 58, RG series: Page 112.

The oil grease nipple E2 can be used with ambient temperatures between -10°C and +60°C. The frequency of replacement depends essentially on loads and environmental conditions. Environmental influences such as high loads, vibration and dirt increase the frequency of replacement.





[1] Oil tank
[2] Connecting joint
[3] Grease nipple
[4] Deflection system
[5] Closure seal
[6] Screw
[7] Sealed cap

Applications

- Machine Tools
- Production machines, injection moulding machines, paper industry, textile machines, food industry, woodworking machines.
- Electronics industry, semiconductor industry, robotic technology, cross tables, measuring and testing machines.
- Other sectors, medical equipment, automation, industrial handling.

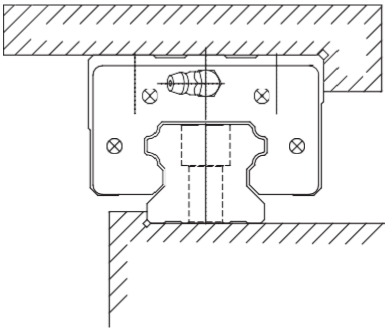
2.7 Mounting configuration

2.7.1 Examples of typical mounting positions

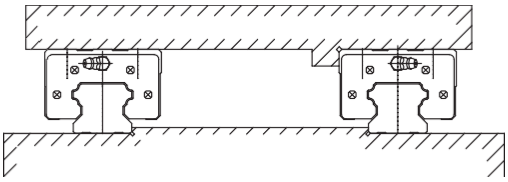
Linear guides have the same load capacity in radial, reverse radial and lateral direction. The mounting position depends on the requirements of the machine and the load direction. The precision of the rail depends on the straightness and flatness of the installation surfaces, since it is not a self-supporting element and adapts to the structure on which it is applied.

The rails mounted on an improperly machined surface may have greater tolerances in terms of straightness. Some typical configurations are illustrated below: details of the assembly tolerances are available in the sections of the various series.

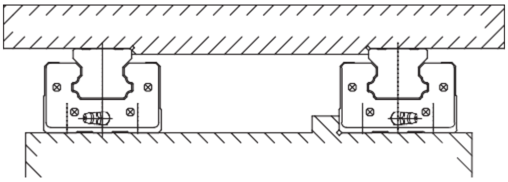
Reference bar of an edge:
The reference edge is identified by arrows on the top of the rail. For very short rails, the identification marks are on the front part of the rail.



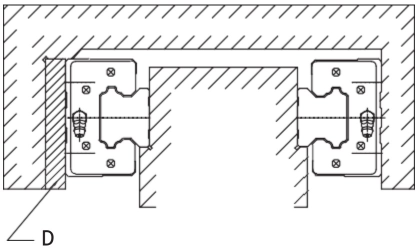
Pair of rails with mobile block:



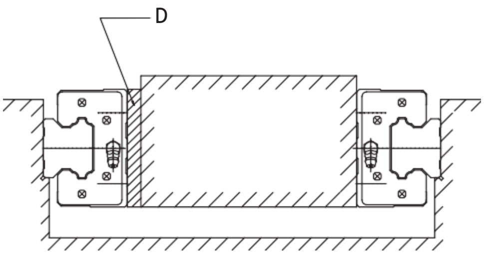
Pair of rails with permanently installed block:



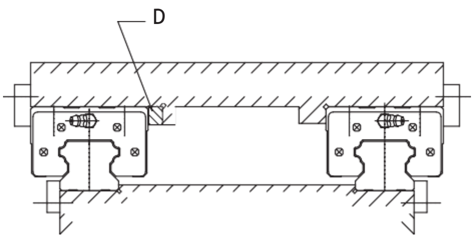
Pair of external blocks



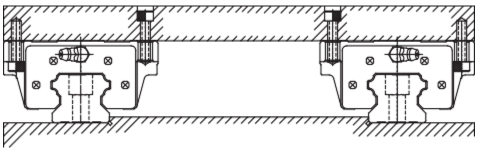
Pair of internal blocks



Mounting with all reference surfaces locked:



HGW..C type block with mounting holes in different directions.



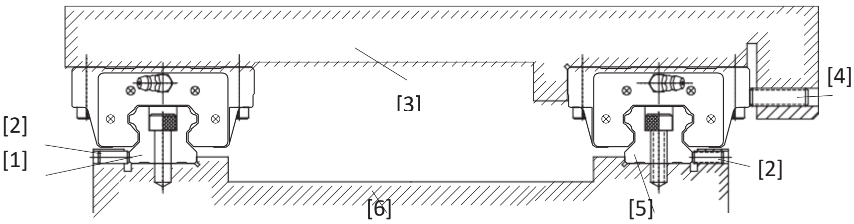
D Thickness

2.8 Assembly

We suggest the following three types of installation depending on the precision of movement required and the extent of shocks or vibrations.

2.8.1 Installation of rails with reference guide and adjusting screw

In machines subject to strong vibrations and impacts or lateral forces, a displacement of rails and blocks may occur. To avoid this inconvenience and achieve high rigidity and precision of movement, it is advisable to assemble the linear guide with reference planes and clamps on both sides.

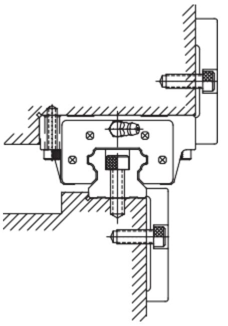


[1] Auxiliary guide
[2] Guide adjusting screw
[3] block
[4] Block adjusting screw
[5] Reference guide
[6] Machine base

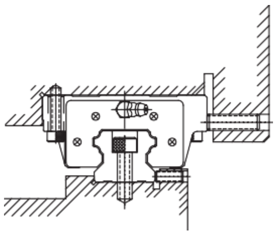
2.8.1.1 Types of mounting

We suggest the following four mounting methods:

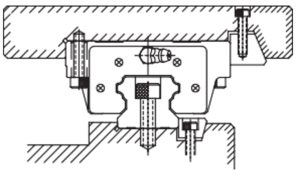
Mounting with locking plate:



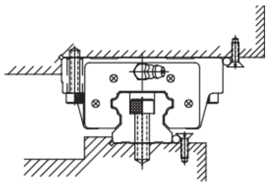
Mounting with adjusting screw:



Mounting with locking wedge:

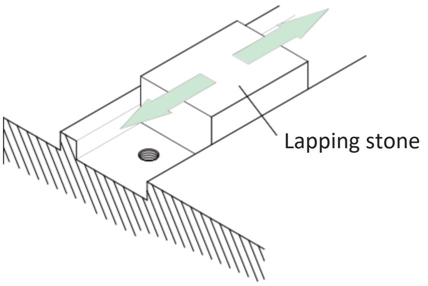


Roller mounting:

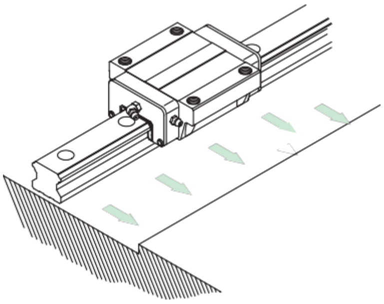


2.8.1.2 Rail installation

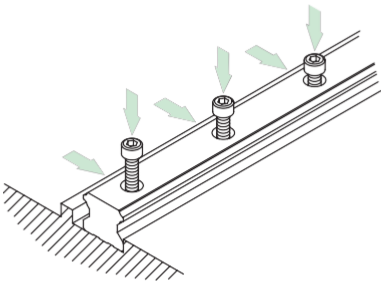
1) Before starting, remove all dirt from the mounting surface of the machine.



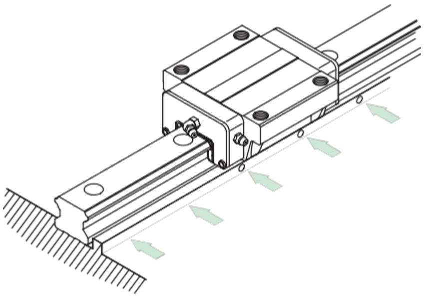
2) Gently place the rail on the base and bring it into close contact with the base abutment.



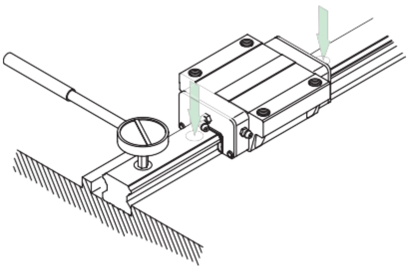
3) While the rail is resting on the base abutment surface, check the correct insertion of the threaded stem when inserting the screw into the fixing hole.



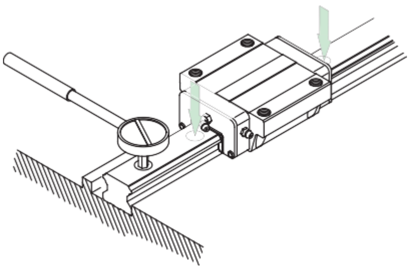
4) Tighten the adjusting screws in sequence to ensure optimal contact between the rail and the base abutment.



5) Tighten the fastening screws using a torque wrench with the specified torque.

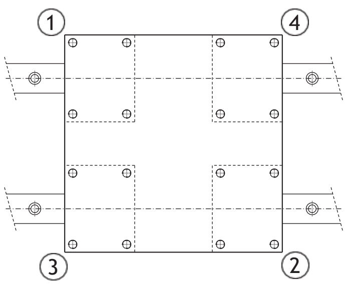


4) Mount the second rail in the same way.



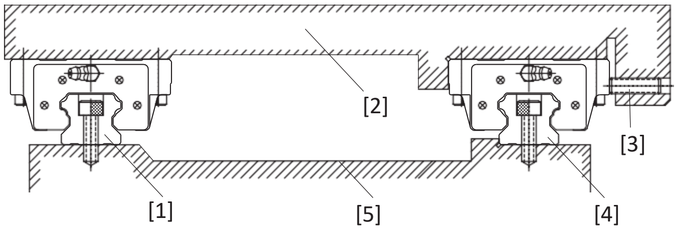
2.8.1.3 Installing blocks

- Gently place the table on the blocks. Provisionally tighten the block fastening screws.
- Push the blocks against the table counter and align the table by tightening the adjusting screws.
- To secure the table evenly, tighten the fastening screws on the reference guide and the auxiliary guide in sequence from 1 to 4.



2.8.2 Installing rails with reference plane without thrust screws

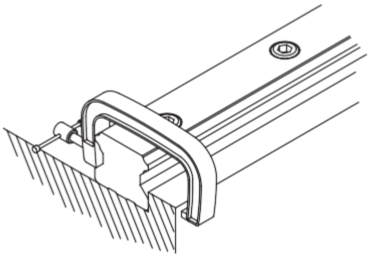
To ensure parallelism between the auxiliary guide and the master guide without using adjusting screws, it is advisable to install the rails by one of the methods shown below. Follow the procedure shown above to install the block.



[1] Auxiliary rail
[2] Block
[3] Block thrust screw
[4] Master rail
[5] Machine base

2.8.2.1 Installing the rail on the side of the master guide

Arrange the rail on the base mounting plane. Tighten the fastening screws temporarily, then use a clamp to push the rail against the lateral abutment of the base. Tighten the fastening screws sequentially by applying the specified torque.



2.8.2.2 Installing the rail on the side of the auxiliary guide

Control line-based method:
Using a comparator, place a control line between the rails, parallel to the lateral abutment of the rail on the side of the master guide. When the rail on the side of the auxiliary guide is parallel to that of the master guide, tighten the fastening screws in sequence from one end of the rail to the other.

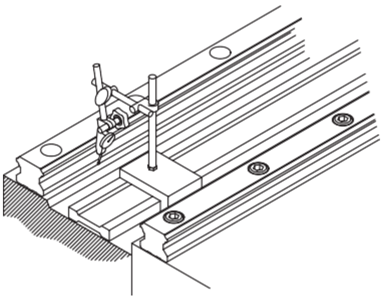
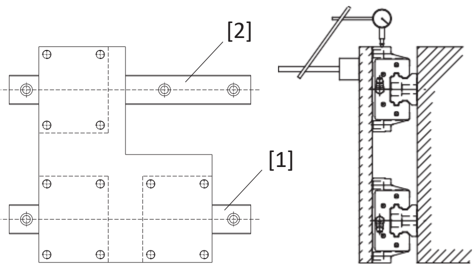


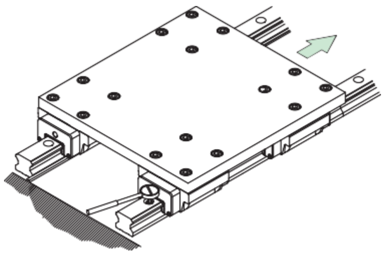
Table-based method:
Attach the two blocks to the table on the side of the master guide. Temporarily attach a block to the table on the side of the auxiliary guide. Attach a comparator to the surface of the table and bring it into contact with the side of the auxiliary guide block. Move the table from one end of the rail to the other and align the auxiliary rail in parallel with the master rail.
Tighten the fastening screws in sequential order.



[1] Master rail
[2] Auxiliary rail

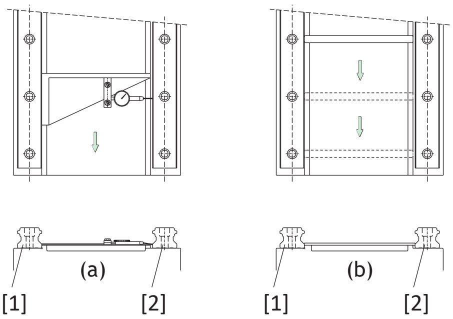
Master guide-based method

When the master guide is properly tightened, fully fasten both the master guide blocks and one of the two auxiliary guide blocks to the table. Then, move the table from one end of the rail to the other, fully tightening the auxiliary guide fastening screws.



Mounting mask-based method:

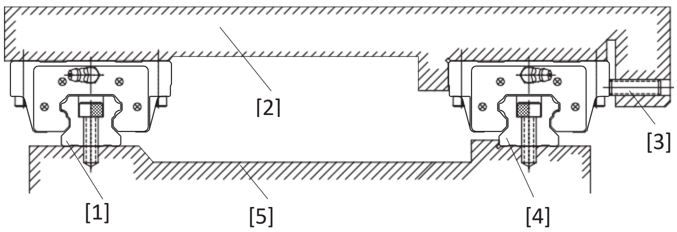
Using a special mounting mask (template), check that the auxiliary rail is in the correct position, then tighten the fastening screws sequentially by applying the specified torque.



[1] Master rail
[2] Auxiliary rail

2.8.3 Installing rails with reference plane and with thrust screw

It is advisable to use the following method to ensure the parallelism between the auxiliary guide and the master guide when there is no reference plane. Follow the procedure shown above to install the block.

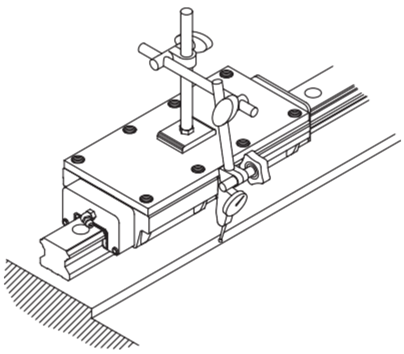


[1] Auxiliary rail
[2] Table
[3] Block thrust screw
[4] Auxiliary rail
[5] Machine base

2.8.3.1 Installing the rail on the side of the master guideway

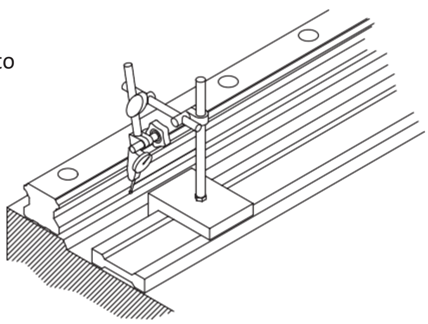
Alignment to a provisional abutment:

Secure two blocks in close contact using the plate. Use the support available on the base to align the rail from one end to the other. Move the blocks and tighten the fastening screws in sequence applying the specified torque.



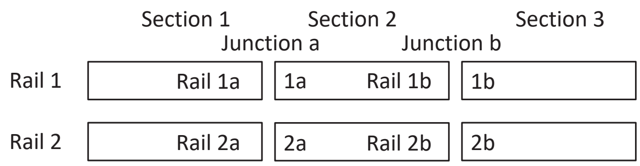
Alignment to a control line:

Use a comparator and a control line to align the rail from one end to the other. Fully tighten the fastening screws in sequence. The following rail is mounted as described in paragraph 2.8.2.2 “Installing the rail on the side of the auxiliary guide”.



2.8.4 Junction rail

To install a junction rail (made of several pieces) it is necessary to follow the arrows shown on the individual segments. The junctions of each section are identified in sequential alphabetical order, as well as by the rail/pair number, so that each section can be clearly positioned.



2.8.5 Tightening torques of fastening screws

Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 2.6 **Tightening torques of fastening screws according to ISO 4762-12.9**

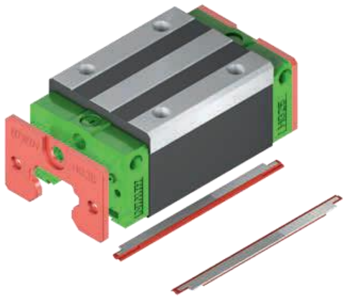
Screw size	Torque [Nm]	Screw size	Torque [Nm]
M2	0.6	**M8**	30
M3	2	**M10**	70
M4	4	**M12**	120
M5	9	**M14**	160
M6	13	**M16**	200

2.9 Sealing systems

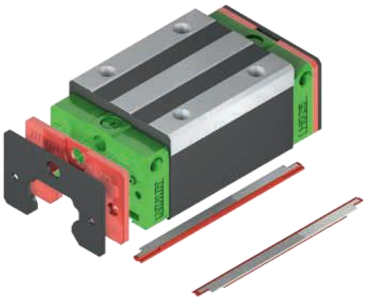
2.9.1 Sealing systems SS, ZZ, DD, KK

The HIWIN front seals firstly prevent the entry of foreign bodies such as dust, particulates, splinters or liquids into the block running tracks and, secondly, reduce lubricant losses. HIWIN offers different sealing systems depending on the environmental conditions of application. The effectiveness of the front seals has a direct impact on the useful life of the linear guide and consequently must be taken into account at the design stage and selected in order to adapt perfectly to the environmental conditions of application.

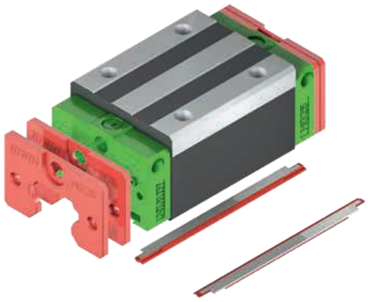
SS (standard):
Front seals and lower seals
- For use in environments with little dirt and dust
- Minimal increase in frictional forces



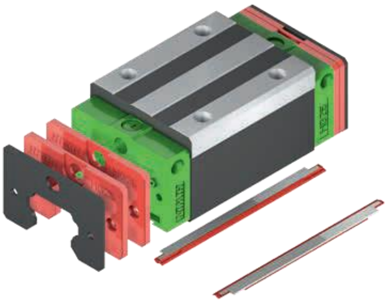
ZZ:
Front seals with lower seals and sheet metal.
- For applications associated with hot chips or sharp dirt particles.
- The metal sheet protects the front seal and prevents damage.



DD:
Double front seals and lower seals
- For applications associated with substantial amounts of dirt and dust.
- The double front seal is effective in preventing dirt from entering the block.



KK:
Double front seal, internal seals and sheet metal
- For applications associated with considerable amounts of dirt and dust, hot splinters or sharp dirt particles.
- The metal sheet protects the front seal and prevents damage



Availability of the SS, ZZ, DD and KK sealing systems:
The SS, ZZ, DD and KK sealing systems are available for all series and all sizes. The only exception is the MG and MG-O series, for which only the SS standard sealing system is available.

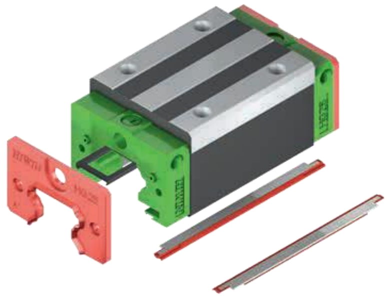
2.9.2 SW and ZW sealing systems for optimal dust protection

The SW and ZW sealing systems allow HIWIN linear guides to be used even in areas with high amounts of dirt. The sealing systems offer optimal protection against the ingress of dirt, dust and liquids. The front seal is oil- and grease-resistant and extremely wear-resistant.

Properties:
- Double lip front seal
- Optimised bottom seal.
- Additional top seal
- Steel scraper

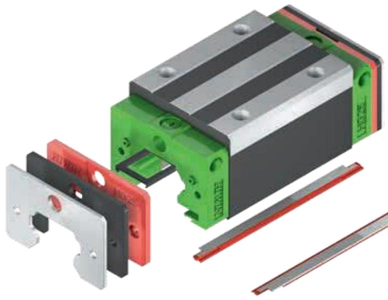
Advantages:
- Optimal dust protection
- Longer life
- Greater protection of the internal lubricant
- Lower maintenance costs

SW:
Double lip front seal and additional top seal
- Optimal dust protection
- The additional upper seal blocks the ingress of dust from the top of the rail.
- The optimised lower seal protects from dust on the side of the rail.



ZW*:
Double lip front seal, optimised bottom seal, additional top seal and sheet metal.
- Optimal dust protection
- The additional top seal blocks dust from entering from the top of the rail.
- The optimised lower seal protects from dust on the side of the rail.
- The scraper also protects against particles and chips and prevents damage to the seal itself.

* **N.B.** An optimised stainless steel sheet metal sheet is available in Germany (contact HIWIN srl for information).



Dust testing for SW and ZW sealing systems
Accurate tests have shown that the service life of SW and ZW sealing systems is ten times longer than standard sealing systems in the event of high dust levels.

Test conditions:
- Sealed room in which MDF powder is circulated
- v = 1.3 m/s
- Grease lubrication

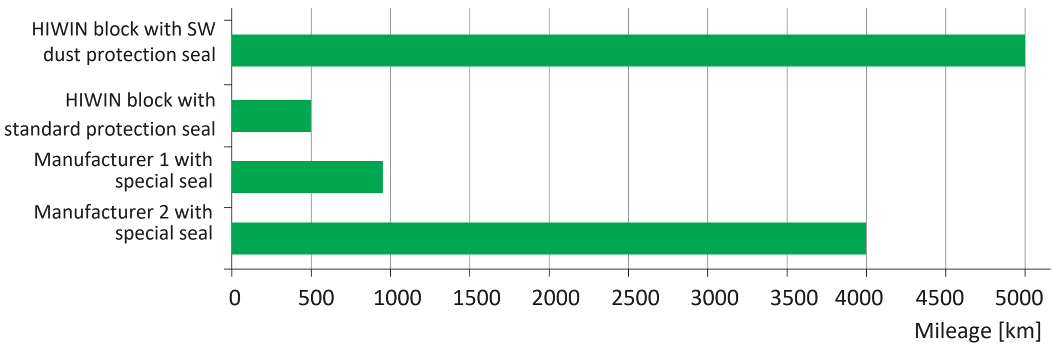


Table 2.7 **Availability of SW and ZW sealing systems**

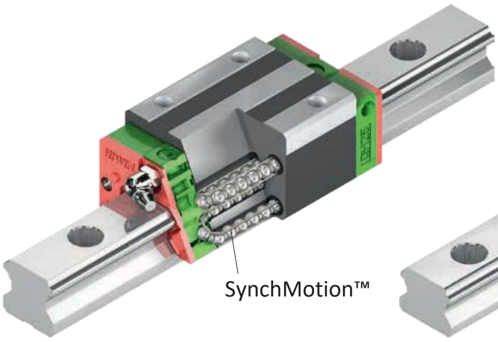
Series	Dimensions							
	15	**20**	**25**	**30**	**35**	**45**	**55**	**65**
HG	○	●■	●■	●■	●■	●■	○ □	○ □
GC	○	○	○	○	○	○		
RG	—	—	—	—	—	○ □	○ □	○ □

● SW sealing system
■ ZW sealing system
○ SW sealing system (no top seal and optimised bottom seal)
□ ZW sealing system (no top seal and optimised bottom seal)

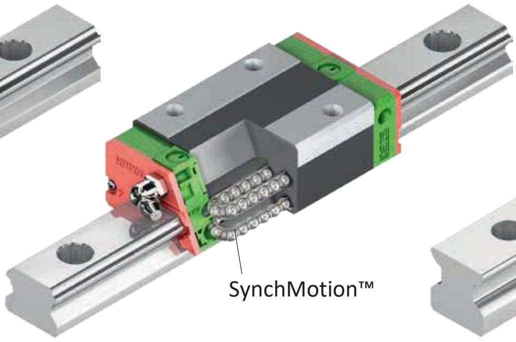
2.10 SynchMotion™ Technology

Innovative SynchMotion™ technology reduces contact between rolling elements and the block. Like the cage in a classic ball bearing, keeping the rolling elements at a defined distance from each other, SynchMotion™ technology performs and achieves the same goal. The mutual friction present in the standard linear guides is therefore eliminated and the variations in the resistance to advancement are considerably reduced. There are no uncontrolled movements of the balls, even at high speeds. SynchMotion™ technology also improves the distribution of lubricant within the block for storage.

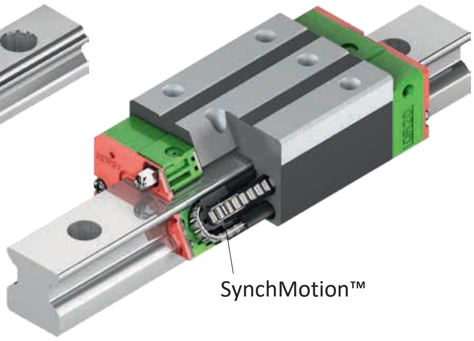
Advantages:
- Improved fluidity of movement
- Increased permissible speeds and accelerations
- Increased lubrication intervals
- Greater quietness
- Higher dynamic load capacity



QH series



QE Series



QR Series

Table 2.8 **Availability of SynchMotion™ technology for HIWIN linear guides.**

Series	Size									
	15	**20**	**21**	**25**	**27**	**30**	**35**	**45**	**55**	**65**
QH	●	●	—	●	—	●	●	●	—	—
QE	●	●	—	●	—	●	●	—	—	—
QW	—	—	●	—	●	—	●	—	—	—
QR	—	—	—	●	—	●	●	●	—	—

Blocks with SynchMotion™ technology are identical in size, are compatible with HG, EG, WE and RG blocks, fit the standard track and are therefore 100% interchangeable with full complement blocks.

2.11 Linear guides for high temperature

High-temperature blocks have recirculation heads made of steel to be able to work beyond 80°C. Standard front seals are replaced with heat-resistant seals and, instead of plastic caps, the rail is supplied with brass caps.

Special properties:
- High temperature resistance
- Working temperature up to 150 °C.
- Temperature peaks up to 180 °C.

Areas of use:
- Heat treatment devices
- Welding devices
- Glass-making devices
- Vacuum-use devices

Table 2.9 **Series with steel recirculation head**

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

Order code: Add the identification code "/SE" to the order code for the steel-headed option. Refer to the structure of the order codes in the chapter of each series. HG: from Page 29, EG from Page 47, MG: from Page 90

Order example:

HG	W	25	C	C	ZA	H	ZZ	SE

2.12 HIWIN anti-corrosion treatments for linear guides

2.12.1 HIWIN HICOAT CZS* coating

* **Note:** treatment can be provided by HIWIN Germany;
for information contact HIWIN srl.

2.12.1.1 Features

HICOAT CZS is a very thin zinc coating that offers good anti-corrosion protection, including on spokes and chamfers. Smaller uncoated parts are protected by cathodic anti-corrosion protection. Compared to uncoated parts, this leads to significantly longer lifetimes. The CZS coating is available for the HG, EG and CG series.

Specific characteristics

- Excellent corrosion protection
- Cr(VI)-free
- Protection of the ends of the rails by means of zinc spray (for details read below)
- The possible interactions between coating, environment and lubricant must be tested on a case-by-case basis

Technical data

- Salt spray test according to DIN EN ISO 9227 (with rail not loaded): 300 hours
- Maximum rail length (single piece): 4.0 m.

2.12.1.2 Order code for CZS coatings

C Z S

Coating: C

Composition: Z: Zinc

Colour: S: Silver

2.12.1.3 Corrosion test

In this test, CZS coated profiles were compared with an uncoated profile.

New rail with CZS coating

Rail with CZS coating after 6 months of outdoor storage

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

Uncoated rail - after 4 hours of salt spray test

2.12.2 HIWIN srl corrosion treatments

2.12.2.1 Manganese Phosphate

Features

Thin coating with manganese phosphate, optimal as a basic protection against water or medium-aggressive environments and in the presence of contained loads.
Treatment applicable on rails.
Technical information: see table

2.12.2.2 Niploy

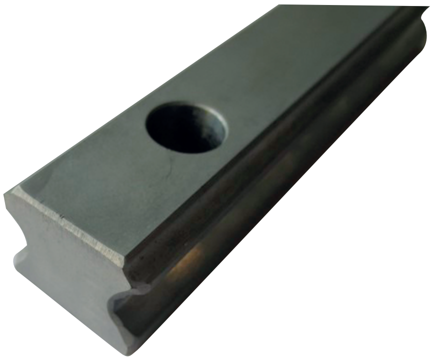
Features

Thanks to the contribution of a thin nickel-based layer, this coating is suitable for protection from water and medium-aggressive environments. The superior surface hardness makes the Nyploy suitable for medium/high load applications and for the food industry.
Possibility of polishing the sliding tracks of the balls for greater sliding of the guides. Applicable on rails.
Technical information: see table

2.12.2.3 Armoloy

Characteristics

With a coating with a very high concentration of pure chromium, this treatment offers good corrosion protection and, thanks to the very high surface hardness, excellent wear resistance making it possible to use this treatment even in applications with high loads. Its high biting property makes Armoloy suitable also in the food sector. Applicable on rails and blocks.
Technical information: see table



2.12.2.4 Stainless steel

Features

HIWIN produces Linear Guides (blocks, rails and balls) in stainless steel (AISI 440) available for the HG series in sizes 15, 20 and 25 and for the EG series in size 15.
The characteristics of the material make it possible to maintain rigidity, hardness and load capacity similar to non-stainless steel models.

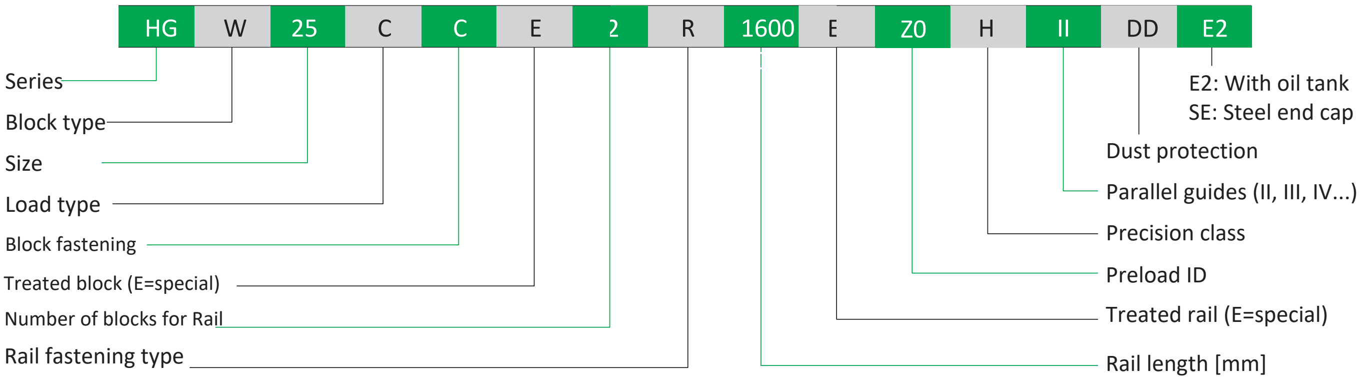
Table 3.0 **Technical information**

	Material contributed	Colour	Thickness	Surface hardness	Degree of protection	Max rail L	Food industry
Phosphating	Manganese phosphate	Matte black	3 µm	-	96 h in salt spray [1]	1560mm	☒
Niploy	88% Nickel 10% Phosphorus	Silver	5-10 µm controllable	550-1000 HV	-	4000mm	☑
Armoloy	98% Pure chrome	Satin silver	2-12 µm controllable	1200-1300 HV	72 h in salt spray [1]	4000mm	☑

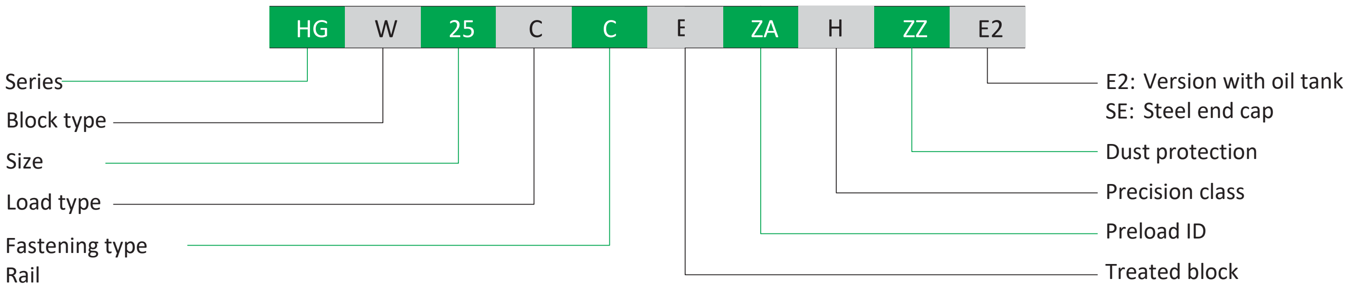
[1] according to DIN EN ISO 9227; test applied on unloaded rail. The legislation provides for a minimum duration of 24 hours for phosphating.

2.12.3 Order code for coated linear guides

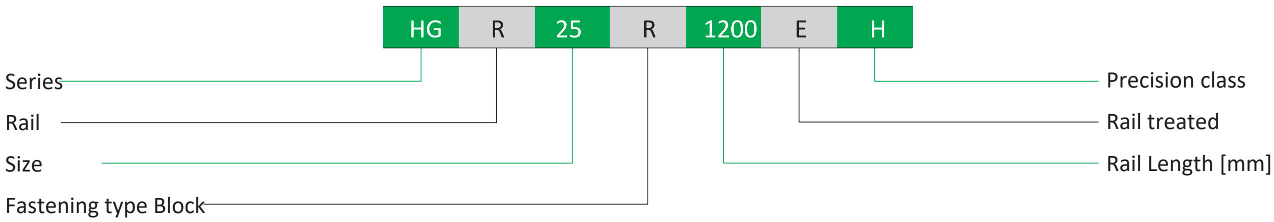
Order code for linear guides (fully assembled)



Block order code (not mounted)



Order code for rail (not mounted)



E= treatment available

E= only for Armoloy blocks
E= for Armoloy rails
E= phosphating
E= niploy

Specify the type of treatment requested on the order

3. Linear guides

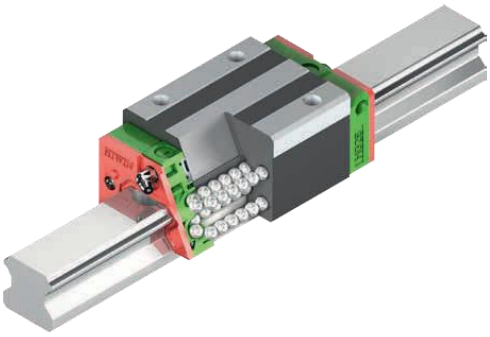
3.1 HG and QH series

3.1.1 Characteristics of the HG and QH series linear guides

The HIWIN linear guides of the HG type with four recirculations have a great load capacity and excellent rigidity. Thanks to the 45° arrangement of the four recirculations, the HG guides have the same load capacity in all directions. Other features of the HG series are low frictional forces and high efficiency. The retaining elements of the balls prevent them from falling during disassembly of the block.
The QH series models with SynchMotion™ technology offer all the advantages of the standard HG series. In addition, thanks to the controlled movement of the balls spaced from the cage, they are characterised by an improvement in smoothness, understood as linearity and fluidity of movement, gives greater speeds, by longer lubrication intervals and less noise. Since the mounting dimensions of QH blocks are identical to those of HG blocks, they can also be mounted on the standard HGR rail and are therefore exactly interchangeable.
For more information, see Page 24.

3.1.2 HG/QH series structure

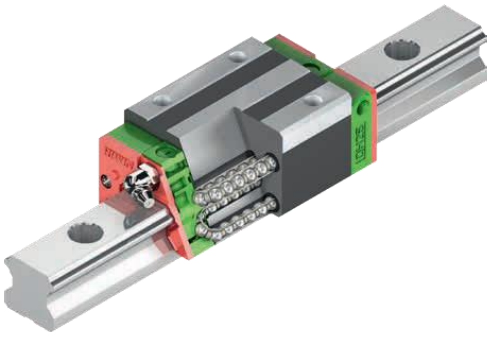
- Guide with 4 recirculating balls
- Contact angle 45°
- The retaining elements of the balls prevent them from falling during disassembly of the block
- There are different types of seals depending on the field of application
- 6 possible connection positions of the grease nipple or lube adapter
- SynchMotion™ technology (QH series)



HG series structure

Advantages:

- Exempt from clearance
- Interchangeable
- High precision
- High load capacity in all directions
- High efficiency and low friction even in the event of preload thanks to the circular arc contact of the balls on the raceways



QH series structure

Additional benefits of the QH series:

- Improved sliding
- Optimised for higher speeds and accelerations
- Longer lubrication intervals
- Low noise level
- Increased dynamic load capacity

3.1.3 Order codes for HG/QH series

The HG/QH linear guides can be managed assembled or interchangeable. The sizes of both models are identical. The main difference lies in the fact that in the case of the interchangeable models the blocks and the rails can be replaced and managed freely. Blocks and rails can be ordered separately and assembled by the customer. The precision category extends to P.

Order code for linear guides (fully assembled)

HG	W	25	C	C	E	2	R	1600	E	Z0	H	II	DD	E2

Series:
HG
QH

Block type:
W: Flanged block
H: Upper compact block
L: Lowered compact block (HG only)

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

Load type:
S: Medium load (HG only)
C: High load
H: Ultra-high load

Block fastening:
A: From the top
C: From the top or bottom

Block (E=special)

None: Standard
E2: Oil lubrication unit [3)]
SE: steel heads [3)]

Seals [2)]
None: Standard (SS)
ZZ, DD, KK, SW [3)], ZWX [3)]

No. parallel guides [1)] (Roman no.)

Precision class:
C, H, P, SP, UP

Preload:
Z0, ZA, ZB

Rail (E=special) Rail

Length [mm]

Rail Fastening:
R: From the top
T: From the bottom

Number of blocks per Rail

Block order code (not mounted)

HG	W	25	C	C	E	Z0	H	ZZ	E2

Series:
HG
QH

Block type:
W: Flanged block
H: Upper compact block
L: Lowered compact block (HG only)

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

Load type:
S: Medium load (HG only)
C: High load
H: Ultra-high load

None: Standard
E2: oil lubrication unit [3)]
SE: steel heads [3)]

Dust protection [2)]
None: Standard (SS) ZZ,
DD, KK, SW [3)], ZWX [3)]

Precision class:
C, H, P

Preload:
Z0, ZA, ZB

Block (E=special)

Block fastening:
A: From the top
C: From the top or bottom

Order code for rail (not mounted)

HG	R	25	R	1200	E	H

HG series

Rail

Dimensions:
15, 20, 25, 30, 35, 45, 55, 65

Precision class:
C, H, P

Rail (E=special)

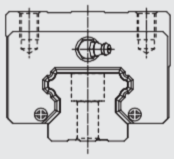
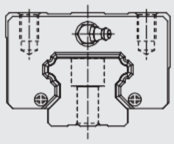
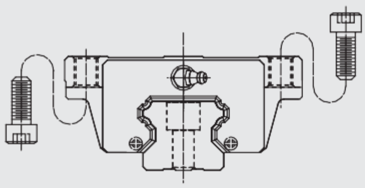
Rail Length [mm]

Rail Fastening:
R: From the top
T: From the bottom

Notes:
[1)] The Roman numeral indicates the number of guides whose parallel is foreseen and means that an element of the article described above refers numerically to a guide.
[2)] Overview of individual sealing systems on page 22
[3)] Not available for QH

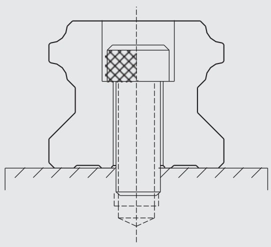
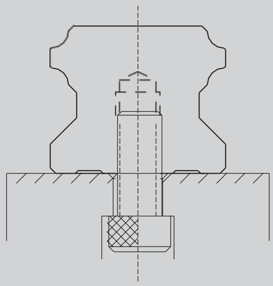
3.1.4 Block Types
HIWIN offers compact and flanged blocks for each driving model.

Table 3.1 **Block types**

Type	Series/ dimensions	Structu	Height [mm]	Length Rail [mm]	Characteristic Applications
Upper compact block	HGH-CA HGH-HA		28 – 90	100 – 4,000	○ Machining centres ○ NC Lathes ○ Grinding Machines ○ Precision milling cutters ○ High precision cutting machines ○ Automation ○ Transport technologies ○ Measuring technologies ○ Machines and equipment that require high positioning precision
Lowered compact block	HGL-CA HGL-HA		24 – 70		
Flanged block	HGW-CC HGW-HC		24 – 90		

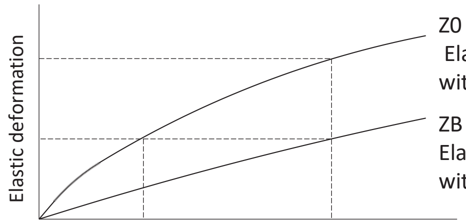
3.1.5 Rail Types
In addition to rails with standard fastening system from above,
HIWIN also provides rails with fastening system from below

Table 3.2 **Rail Types**

Fastening from the top	Fastening from the bottom
	
HGR_R	HGR_T

3.1.6 Preload

Definition
A preload can be applied to each type of guide depending on the size of the balls. The curve shows that the stiffness is doubled when a preload is applied.
The HG/QH series offers three standard preload classes, for various applications and conditions.



Preload ID

Table 3.3 **Preload ID**

ID	Preload		Usage	Examples of use
ZO	Lightweight preload	0 – 0.02 C_{dyn}	Constant load direction, small impact, low precision.	o Transport technology, o Automatic packaging machines o X-Y Axis for industrial machines o Welding machines
ZA	Medium preload	0.05 – 0.07 C_{dyn}	High precision required	o Machine tools o Z axes in industrial machines o Machines for EDM o NC lathes o Precision X-Y benches o Measuring technology
ZB	Heavy preload	0.1 C_{dyn}	High structural rigidity required Presents shock and vibration	o Machine tools o Grinding machine o C Lathes o Horizontal and vertical milling cutters o Z Axis in machine tools o High performance cutting machines

3.1.7 Load capacity and moments

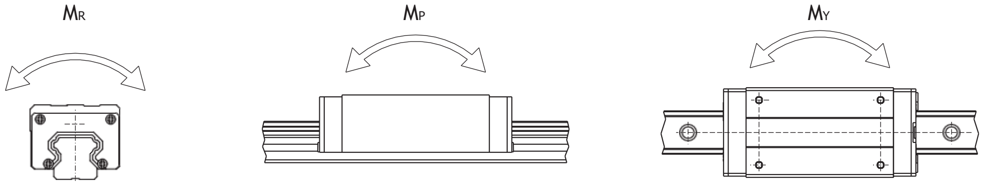


Table 3.4 **Load capacity and moments of the HG/QH series**								
Series/ Size	Dynamic Load Capacity C_{dyn} [N] [1)]	Static Load Capacity C_0 [N]	Dynamic Moment [Nm] M_R	M_P	M_Y	Static Moment [Nm] M_{0R}	M_{0P}	M_{0Y}
HG_15C	14.700	23.470	76	67	67	120	100	100
QH_15C	17.940	19.860	90	84	84	100	80	80
HG_20S [2)]	12,190	16,110	99	61	61	130	80	80
HG_20C	27.100	36.680	178	126	126	270	200	200
QH_20C	35.260	33.860	231	171	171	260	190	190
HG_20H	32.700	47.960	208	203	203	350	350	350
QH_20H	42.520	42.310	268	230	230	310	270	270
HG_25S [2)]	24,290	18,650	239	123	123	310	160	160
HG_25C	34.900	52.820	301	240	240	420	330	330
QH_25C	41.900	48.750	361	294	294	390	310	310
HG_25H	42.200	69.070	374	379	379	560	570	570
QH_25H	50.610	60.940	451	410	410	500	450	450
HG_30C	48.500	71.870	494	396	396	660	530	530
QH_30C	58.260	66.340	588	491	491	600	500	500
HG_30H	58.600	93.990	600	630	630	880	920	920
QH_30H	70.320	88.450	722	623	623	830	890	890
HG_35C	64.600	93.880	832	577	577	1.160	810	810
QH_35C	78.890	86.660	1.019	720	720	1.070	760	760
HG_35H	77.900	122.770	1.011	918	918	1.540	1.400	1.400
QH_35H	95.230	115.550	1.233	1.135	1.135	1.450	1.330	1.330
HG_45C	103.800	146.710	1.497	1.169	1.169	1.980	1.550	1.550
QH_45C	119.400	135.420	1.723	1.295	1.295	1.830	1.380	1.380
HG_45H	125.300	191.850	1.825	1.857	1.857	2.630	2.680	2.680
QH_45H	144.130	180.560	2.097	2.041	2.041	2.470	2.410	2.410
HG_55C	153.200	211.230	2.843	2.039	2.039	3.690	2.640	2.640
HG_55H	184.900	276.230	3.464	3.242	3.242	4.880	4.570	4.570
HG_65C	213.200	287.480	5.049	3.245	3.245	6.650	4.270	4.270
HG_65H	277.800	420.170	6.449	5.068	5.068	9.380	7.380	7.380

[1)] Dynamic load capacity for a distance travelled of 50,000 m
[2)] Available HIWIN Germany. For info contact HIWIN srl

3.1.8 Stiffness

The stiffness depends on the preload. With formula F 3.1 it is possible to determine the deformation according to the stiffness.

F 3.1

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

δ Deformation [μm]
P Service load [N]
k Stiffness [N/μm]

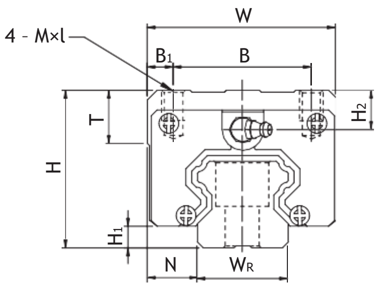
Table 3.5 **Radial stiffness of the HG/QH series**

Load class	Series/ Size	Stiffness according to preload		
		Z0	**ZA**	**ZB**
Medium load	**HG_20S**	130	170	190
Heavy load	**HG_15C**	200	260	290
	QH_15C	180	230	260
	HG_20C	250	320	360
	QH_20C	230	290	320
	HG_25C	300	390	440
	QH_25C	270	350	400
	HG_30C	370	480	550
	QH_30C	330	430	500
	HG_35C	410	530	610
	QH_35C	370	480	550
	HG_45C	510	660	750
	QH_45C	460	590	680
	HG_55C	620	800	910
	HG_65C	760	980	1.120
Super heavy load	**HG_20H**	310	400	460
	QH_20H	280	360	410
	HG_25H	390	510	580
	QH_25H	350	460	520
	HG_30H	480	620	710
	QH_30H	430	560	640
	HG_35H	530	690	790
	QH_35H	480	620	710
	HG_45H	650	850	970
	QH_45H	590	770	870
	HG_55H	790	1.030	1.180
	HG_65H	1.030	1.330	1.520

Unit: N/μm

3.1.9 HG/QH block dimensions

3.1.9.1 HGH/QHH



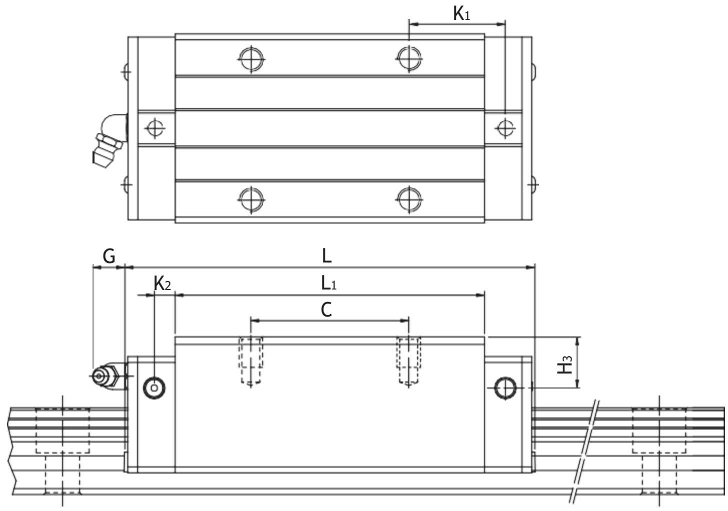


Table 3.6 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]													Load coefficients [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	35.260	33.860	0.29
QHH20HA							50	65.2	91.4	12.10							42.520	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	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	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	93.880	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

3.1.9.2 HGL

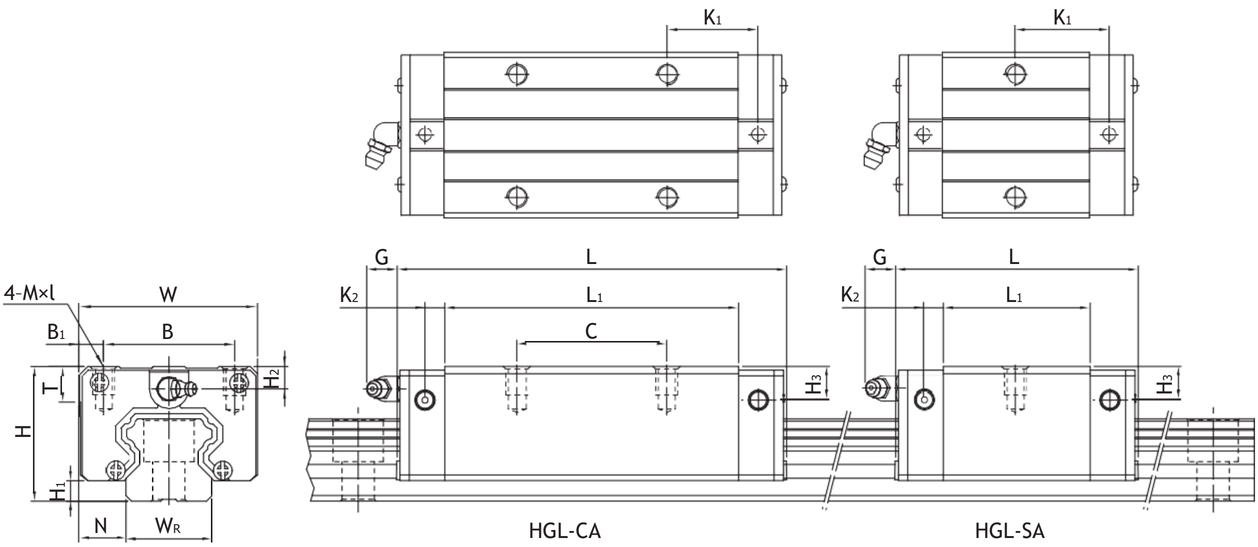


Table 3.7 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]													Load coefficients [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[3]	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	18,650	24,290	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	93.880	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 SE version; [2] 121.8 for SE version [3] Available HIWIN Germany. For info contact HIWIN srl
For rail dimensions, see Page 38; for standard and optional lubrication fittings see Page 126

3.1.9.3 HGW/QHW

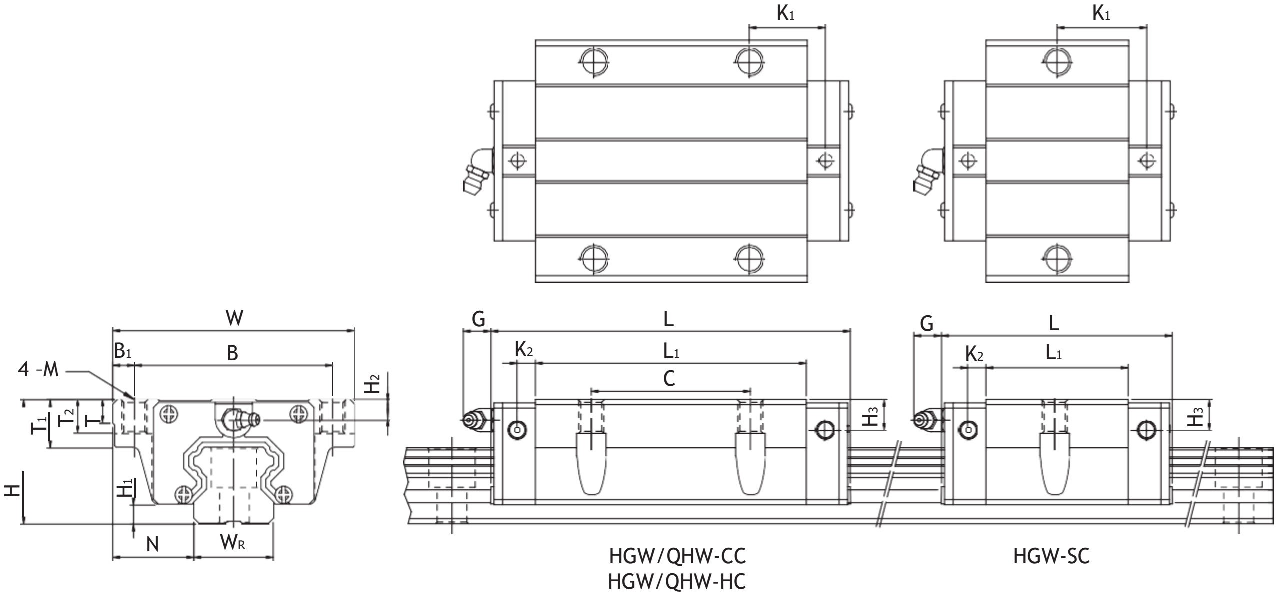


Table 3.8 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Carriage dimensions [mm]															Load coefficients [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[3]	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	12,190	16,110	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	35.260	33.860	0.40
QHW20HC								65.2	91.4	17.10									42.520	42.310	0.52
HGW25SC[3]	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	18,650	24,290	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	93.880	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	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 SE version; [2] 121.8 for SE version [3] Available HIWIN Germany. For information contact HIWIN srl

For rail dimensions, see Page 38; for standard and optional lubrication fittings see Page 126

3.1.10 HG rail dimensions

The HG rail is used for both HG and QH blocks

3.1.10.1 HGR_R dimensions

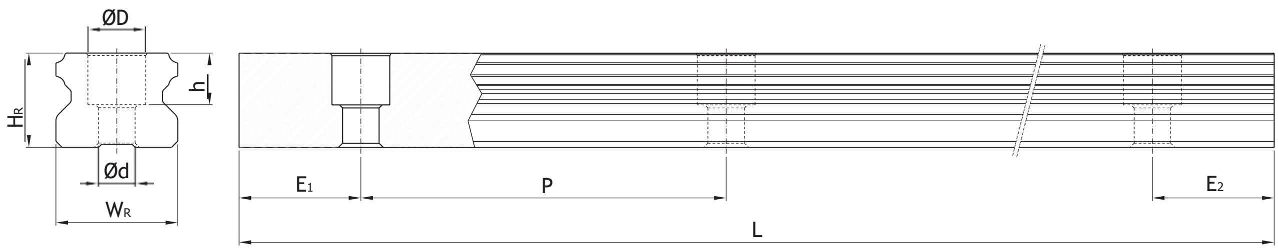


Table 3.9 **HGR_R rail**

Series/ Size	Mounting screw for rail [mm]	Rail dimensions [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	H_R	D	h	d	P					
HGR15R	M4 × 16	15	15.0	7.5	5.3	4.5	60	4.000	3,900	6	54	1.45
HGR20R	M5 × 16	20	17.5	9.5	8.5	6.0	60	4.000	3,900	7	53	2.21
HGR25R	M6 × 20	23	22.0	11.0	9.0	7.0	60	4.000	3,900	8	52	3.21
HGR30R	M8 × 25	28	26.0	14.0	12.0	9.0	80	4.000	3,920	9	71	4.47
HGR35R	M8 × 25	34	29.0	14.0	12.0	9.0	80	4.000	3,920	9	71	6.30
HGR45R	M12 × 35	45	38.0	20.0	17.0	14.0	105	4.000	3,885	12	93	10.41
HGR55R	M14 × 45	53	44.0	23.0	20.0	16.0	120	4,000/5,600	3,840/5,400	14	106	15.08
HGR65R	M16 × 50	63	53.0	26.0	22.0	18.0	150	4,000/5,600	3,750/5,400	15	135	21.18

3.1.10.2 HGR_T dimensions

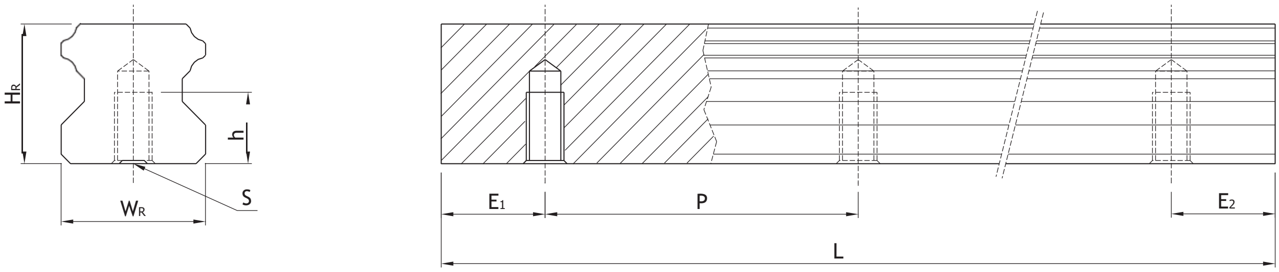


Table 3.10 **HGR_T rail dimensions**

Series/ Size	Rail dimensions [mm]					Max. length [mm]	Max. length $E_1 = E_2$ [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	6	54	1.48
HGR20T	20	17.5	M6	10	60	4,000	3,900	7	53	2.29
HGR25T	23	22.0	M6	12	60	4,000	3,900	8	52	3.35
HGR30T	28	26.0	M8	15	80	4,000	3,920	9	71	4.67
HGR35T	34	29.0	M8	17	80	4,000	3,920	9	71	6.51
HGR45T	45	38.0	M12	24	105	4,000	3,885	12	93	10.87
HGR55T	53	44.0	M14	24	120	4,000	3,840	14	106	15.67
HGR65T	63	53.0	M20 [1)]	30	150	4,000	3,750	15	135	21.73

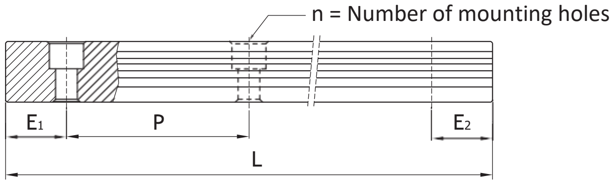
[1)] Deviation from DIN 645

Note:

1. Without indicating the size E1/2, considering E1/2 min you can determine the maximum number of mounting holes
2. The rails are cut to the desired length. Without any indication of the size E1/2 symmetrical will be performed

3.1.10.3 Calculation of the length of the rails

HIWIN offers rails with custom lengths. To prevent the last part of the rail from becoming unstable, the value of E must not exceed half the pitch (P). At the same time, the value E1/2 must be between E1/2 min and E1/2 max so as not to interfere with the mounting hole.



F 3.2

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

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

3.1.10.4 Anchor screw tightening torques

Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 3.11 **Tightening torques of fastening screws according to ISO 4762-12.9**

Series/Size	Screw Size	Torque[Nm]	Series/Size	Screw Size	Torque[Nm]
HG/QH_15	M4 × 16	4	**HG/QH_35**	M8 × 25	30
HG/QH_20	M5 × 16	9	**HG/QH_35**	M10	70
HG/QH_25	M6 × 20	13	**HG/QH_45**	M12 × 35	120
HG/QH_30	M8 × 25	30	**HG_55**	M14 × 45	160
HG/QH_30	M10	70	**HG_65**	M16 × 50	200

3.1.10.5 Caps for rail mounting holes

The caps are used to prevent chips and dirt from entering the mounting holes. The standard plastic caps are supplied together with the individual rails. Additional optional caps must be ordered separately.

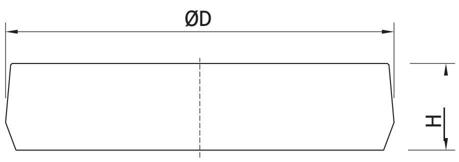


Table 3.12 **Caps for rail mounting holes**

Rail	Screw	Article Number					Ø D [mm]	Height H [mm]
		Plastic		**Brass**		**Steel**		
		GmbH	**TW**	**GmbH**	**TW**			
HGR15R	M4	5-002218	950002C1	5-001344	95000FA1	—	7.5	1.2
HGR20R	M5	5-002220	950003D2	5-001350	95000GA1	5-001352	9.5	2.5
HGR25R	M6	5-002221	950004D2	5-001355	95000HA1	5-001357	11.0	2.8
HGR30R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
HGR35R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
HGR45R	M12	5-002223	950007D2	5-001324	95000JA1	5-001327	20.0	4.0
HGR55R	M14	5-002224	950008C2	5-001330	95000KA1	5-001332	23.0	4.0
HGR65R	M16	5-002225	950009D1	5-001335	95000LA1	5-001337	26.0	4.0

3.1.11 Sealing systems

Various sealing systems are available for HIWIN blocks.
An overview is also available on page 22. The following table shows the total length of the blocks with the different sealing systems.
Sealing systems are available for these sizes

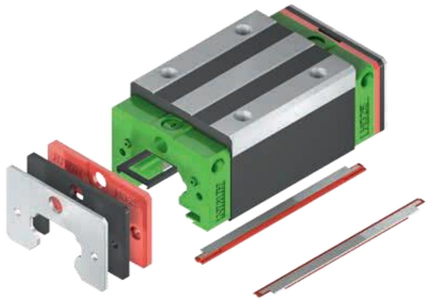


Table 3.13 **Overall length of blocks with different sealing systems**

Series/ Size	Total Length L					
	SS	**DD**	**ZZ**	**KK**	**SW**	**ZW**
HG_15C	61.4	68.0	69.0	75.6	63.2	—
QH_15C	61.4	68.0	68.4	75.0	—	—
HG_20S [1]	56.5	59.5	57.5	62.5	57.5	61.3
HG_20C	77.5	82.5	82.5	87.5	78.5	82.3
QH_20C	76.7	81.7	81.9	86.9	—	—
HG_20H	92.2	97.5	97.2	102.2	93.2	97.0
QH_20H	91.4	96.4	96.6	101.6	—	—
HG_25C	84.0	89.0	89.0	94.0	85.0	91.8
QH_25C	83.4	88.4	89.4	94.4	—	—
HG_25H	104.6	109.6	109.6	114.6	105.6	112.4
QH_25H	104.4	109.0	110.0	115.0	—	—
HG_30C	97.4	104.8	105.4	112.8	99.0	105.8
QH_30C	97.4	104.8	104.8	112.2	—	—
HG_30H	120.4	127.8	128.4	135.8	122.0	128.8
QH_30H	120.4	127.8	127.8	135.2	—	—
HG_35C	112.4	119.8	120.4	127.8	115.2	122.4
QH_35C	113.6	118.6	119.0	124.0	—	—
HG_35H	138.2	145.6	146.2	153.6	141.0	148.2
QH_35H	139.4	144.4	144.8	149.8	—	—
HG_45C	139.4	149.4	150.0	160.0	140.0	144.8
QH_45C	139.4	146.6	147.2	154.4	—	—
HG_45H	171.2	181.2	181.8	191.8	171.8	176.6
QH_45H	171.2	178.4	179.0	186.2	—	—
HG_55C	166.7	177.1	177.1	187.5	163.7	172.9
HG_55H	204.8	215.2	215.2	225.5	201.8	211.0
HG_65C	200.2	209.2	208.2	217.2	196.2	203.4
HG_65H	259.6	268.6	267.6	276.6	255.6	262.8

Unit: mm [1] Available HIWIN Germany. For info contact HIWIN srl

3.1.11.1 Sealing set coding

Sealing sets are always supplied complete with mounting screws and include the appropriate necessary parts in addition to the standard seal.

HG | 15 | SS

Series:
HG
QH

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

Dust protection identifier:
SS: Standard seal
ZZ: Front seal with scraper
DD: Double front seal
KK: Double front seal with metal sheet
SW: Double lip front seal
ZW: Front seal with double lip and metal plate

3.1.12 Friction

The table shows the maximum resistance to advancement of the individual front seals. Depending on the classification of the seal (SS, DD, ZZ, KK) it will be necessary to multiply the value correspondingly. The values indicated are valid for blocks on untreated rails. Higher frictional forces are created on treated rails.

Table 3.14 **Resistance to advancement of standard front seals**

Series/Size	Friction [N]	Series/Size	Friction [N]
HG/QH_15	1.2	**HG_45**	3.9
HG/QH_20	1.6	**QH_45**	5.3
HG/QH_25	2.0	**HG_55**	4.7
HG/QH_30	2.7	**HG_65**	5.8
HG/QH_35	3.1		

3.1.13 E2 lubrication unit

For details of the lubrication unit please refer to the general information in the dedicated section "2.6.3 E2 oil lubrication unit" on Page 15.

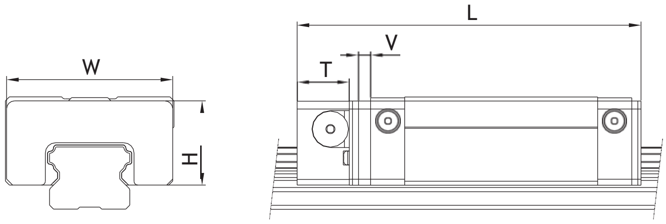


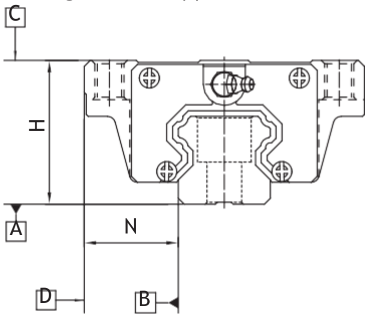
Table 3.15 **Block dimensions with E2 lubrication**

Series/ Size	Block dimensions [mm]								Oil quantity [cm³]
	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	1.6
HG_20S	43.0	24.4	13.5	3.5	70.9	73.0	75.0	78.0	3.9
HG_20C	43.0	24.4	13.5	3.5	93.5	95.6	97.5	100.6	3.9
HG_20H	43.0	24.4	13.5	3.5	108.2	110.2	112.2	115.2	3.9
HG_25C	46.4	29.5	13.5	3.5	100.0	102.0	104.0	107.0	5.1
HG_25H	46.4	29.5	13.5	3.5	120.6	122.6	124.6	127.6	5.1
HG_30C	58.0	35.0	13.5	3.5	112.9	118.0	119.9	125.0	7.8
HG_30H	58.0	35.0	13.5	3.5	135.9	141.0	142.9	148.0	7.8
HG_35C	68.0	38.5	13.5	3.5	127.9	133.4	135.3	140.8	9.8
HG_35H	68.0	38.5	13.5	3.5	153.7	159.2	161.1	166.6	9.8
HG_45C	82.0	49.0	16.0	4.5	157.2	162.1	166.1	171.7	18.5
HG_45H	82.0	49.0	16.0	4.5	189.0	193.9	197.9	203.5	18.5
HG_55C	97.0	55.5	16.0	4.5	183.9	189.6	193.8	200.0	25.9
HG_55H	97.0	55.5	16.0	4.5	222.0	227.7	231.9	238.1	25.9
HG_65C	121.0	69.0	16.0	4.5	219.2	220.7	226.7	229.7	50.8
HG_65H	121.0	69.0	16.0	4.5	278.6	280.1	286.1	289.1	50.8

1) Total length depending on the dust protection selected. SS = standard dust protection

3.1.14 Tolerances according to the precision class

The HG and QH series are available in five different precision classes, depending on the parallelism between blocks and rails and on the precision of the height H and width N. The choice is determined by the requirements of the machine in which the linear guides are applied. HIWIN srl manages up to the class P in its premises.



3.1.14.1 Parallelism

Parallelism between the abutment surface of the block D and B of the rail B and parallelism between the upper surface of the block C and the support surface of the rail A.

Table 3.16 **Parallelism tolerance between block and rail**

Rail length [mm]	Precision 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

Units: µm

3.1.14.2 Precision – height and width

Height tolerance H
Maximum absolute deviation of height H, measured between the upper surface of block C and the lower surface of rail A for any position of the block on the rail.

Height variation H
Maximum relative deviation of the height H between two or more blocks on the same rail or on parallel rails. Measured in the same position as the rail.

Width tolerance N
Maximum absolute deviation of the width N, measured between the abutment surfaces of the block and the rail D and B for any position of the block on the rail.

Width variation N
Maximum relative deviation of the width N between different blocks on the same rail, measured in the same position of the rail.

Table 3.17 **Height and width tolerances of non-interchangeable models**

Series/Size	Precision class	Height tolerance H	Width tolerance N	Height variation H	Width variation 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 (Precise)	0/– 0.03 [1)]	0/– 0.03 [1)]	0.006	0.006
	SP (Super Precise)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (Ultra Precise)	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 (Precise)	0/– 0.04 [1)]	0/– 0.04 [1)]	0.007	0.007
	SP (Super Precise)	0/– 0.02	0/– 0.02	0.005	0.005
	UP (Ultra Precise)	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 (Precise)	0/– 0.05 [1)]	0/– 0.05 [1)]	0.007	0.01
	SP (Super Precise)	0/– 0.03	0/– 0.03	0.005	0.007
	UP (Ultra Precise)	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 (Precise)	0/– 0.07 [1)]	0/– 0.07 [1)]	0.01	0.015
	SP (Super Precise)	0/– 0.05	0/– 0.05	0.007	0.01
	UP (Ultra Precise)	0/– 0.03	0/– 0.03	0.005	0.007

Unit: mm

[1)] Fully assembled linear guide

3.1.14.3 Permissible tolerances of mounting surfaces

To make the most of the very high precision, rigidity and durability of the HG/QH guides, it is necessary to respect the surface processing tolerances for mounting.

reference surface parallelism (P):

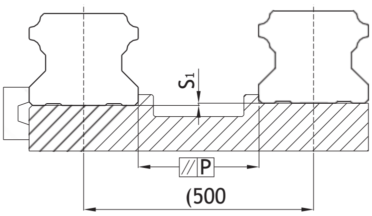


Table 3.18 **Maximum parallelism tolerance (P)**			
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
HG/QH_15	25	18	—
HG/QH_20	25	20	18
HG/QH_25	30	22	20
HG/QH_30	40	30	27
HG/QH_35	50	35	30
HG/QH_45	60	40	35
HG_55	70	50	45
HG_65	80	60	55

Unit: µm

Table 3.19 **Maximum tolerance of the difference in height of the reference surface (S_1)**			
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
HG/QH_15	130	85	—
HG/QH_20	130	85	50
HG/QH_25	130	85	70
HG/QH_30	170	110	90
HG/QH_35	210	150	120
HG/QH_45	250	170	140
HG_55	300	210	170
HG_65	350	250	200

Unit: µm

3.1.15 Stop heights and connecting radius

If the mounting surface shoulder heights and fittings are not correct, the precision will be different from that expected and there will be an interference with the rail or block profile. By respecting the heights and the fittings provided for the shoulders, it is possible to eliminate any installation errors.

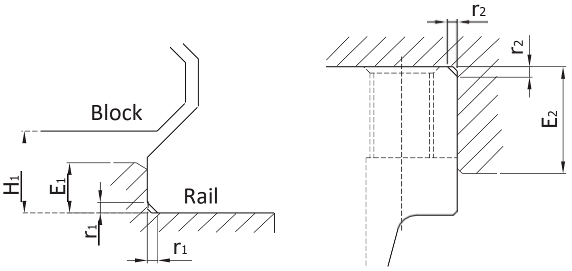


Table 3.20 **Stop heights and connecting radius**

Series/Size	Max bevel radius r	Rail reference shoulder height E1	Block reference shoulder height E_2	Free clearance 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

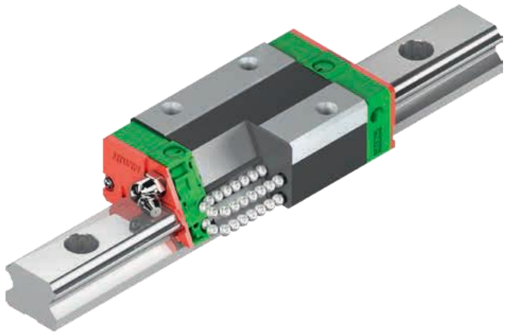
3.2 EG and QE series

3.2.1 Characteristics of the EG and QE series linear guides

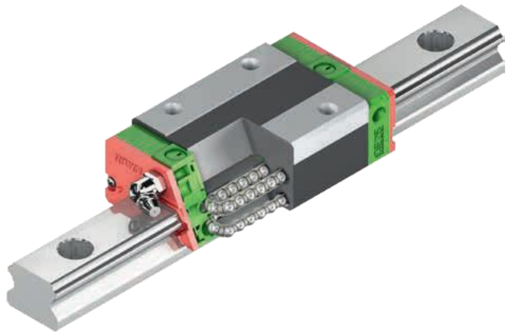
HIWIN EG type linear guides with four recirculations have a low overall height, which makes them ideal for applications that present space limitations.
Despite this, the EG series has the same characteristics as the HG series - good load capacity, low frictional forces and high efficiency. The retaining elements are designed to retain the balls inside the block when the block is removed from the rail.
The QE series models with SynchMotion™ technology offer all the advantages of the standard EG series. The orderly and well-spaced sliding of the balls thanks to the cage also brings an improvement in the response of the linear system, an increase in the permissible speed limits, an increase in re-lubrication intervals and a reduction in noise during movement.
Since the mounting dimensions of QE blocks are identical to those of EG blocks, they can also be mounted on the standard EGR rail and are therefore exactly interchangeable. For more information, see Page 24.

3.2.2 EG/QE series structure

- Guide with 4 recirculating balls
- Contact angle 45°
- The retaining elements of the balls prevent the balls themselves from falling during disassembly of the rail block
- There are different types of seals depending on the field of application
- 6 possible connection positions of the grease nipple or adapter for lubrication
- SynchMotion™ Technology (QE series)



EG series structure



QE series structure

Advantages:

- Exempt from clearance
- Interchangeable
- High precision
- High load capacity in all directions
- High efficiency and low friction even in case of preload thanks to the circular arc contact of the balls on the raceways.

Additional QE series benefits:

- Best linear system response
- Optimised for higher speeds and acceleration
- Longer lubrication intervals
- Low noise level
- Increased dynamic load capacity

3.2.3 Order codes for EG/QE series

The EG/QE linear guides can be managed assembled or interchangeable. The sizes of both models are identical. The main difference lies in the fact that in the case of the interchangeable models the blocks and the rails can be replaced and managed freely. Block and rails can be ordered separately and assembled by the customer. The precision category extends to P.

Order code for linear guides (fully assembled)

EG	W	25	C	C	E	2	R	1600	E	ZA	H	II	DD	E2

Series:
EG
QE

Block type:
W: Flanged block
H: Compact block

Size:
EG: 15, 20, 25, 30, 35
QE: 15, 20, 25, 30, 35

Load type:
S: Medium load
C: Heavy load

Block fastening:
A: From the top
C: From the top or bottom

E = special block

No. of blocks per rail

Rail fastening:
R: From the top
T: From the bottom
U From the top with larger mounting hole (EG/QE15, EG/QE30)

Rail length [mm]

E = special rail

Preload ID: Z0, ZA, ZB

Precision class: C, H, P, SP, UP

No. Parallel guides [1] (ROMAN NUMBER)

Seals: [2]
None: Standard (SS)
ZZ, DD, KK

None: Standard
E2: Oil Lubrication Unit
SE: Steel heads [3]

Block order code (not mounted)

EG	W	25	C	C	E	Z0	H	ZZ	E2

Series:
EG
QE

Block type:
W: Flanged trolley
H: Compact block

Dimensions:
EG: 15, 20, 25, 30, 35
QE: 15, 20, 25, 30, 35

Load type:
S: Average load
C: Heavy load

Block fastening:
A: From the top
C: From the top or bottom

E = special block

Preload ID: Z0, ZA, ZB

Precision class: C, H, P

Dust protection [2]:
None: Standard (SS)
ZZ, DD, KK

None: Standard
E2: Oil lubrication unit
SE: Steel heads [3]

Order code for rail (not mounted)

EG	R	25	R	1200	E	H

EG series

Rail

Dimensions:
15, 20, 25, 30, 35

Rail fastening:
R: From the top
T: From the bottom
U From the top with larger mounting hole (EG/QE15, EG/QE30)

Rail length [mm]

E = special rail

Precision class: C, H, P

Notes:

[1] The Roman numeral “II” indicates the number of guides whose parallel is expected and means that an element of the article described above refers numerically to a guide. A code for single rails is not specified. By default, the joined rails are delivered with staggered joints.

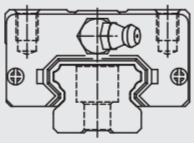
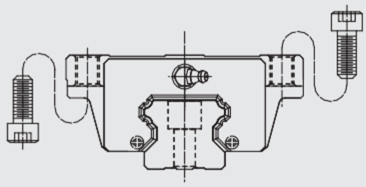
[2] Overview of individual sealing systems on page 22

[3] Only available for EG 20 and EG 25.

3.2.4 Block Types

HIWIN offers compact and flanged blocks for each driving model.

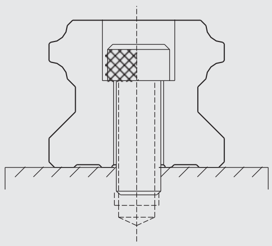
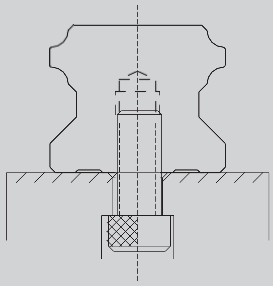
Table 3.21 **Block Types**

Type	Series/ Size	Structure	Tolerance [mm]	Rail Length [mm]	Characteristic
Compact	EGH-SA EGH-CA		24 – 48	100 – 4,000	o Machine tools o NC Lathes o Grinding machines o Precision milling cutters o High precision cutting machines o Automation o Transport technologies, o Measuring technologies, o Machines and equipment that require high positioning precision
Flanged block	EGW-SC EGW-CC				

3.2.5 Rail Types

In addition to rails with standard fastening system from above,
HIWIN also provides rails with fastening system from below

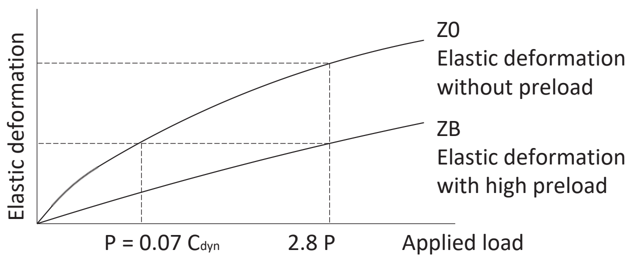
Table 3.22 **Rail Types**

Fixing from above	Fastening from the bottom
	
EGR_R	EGR_T

3.2.6 Preload

Definition

A preload can be applied to each type of guide depending on the size of the balls.
The curve shows that stiffness is doubled when a preload is applied. The EG/QE
series offers three standard preload classes for various applications and conditions.

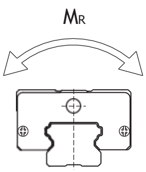


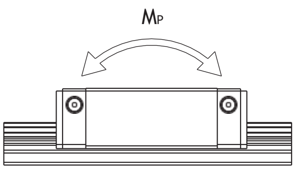
Preload ID

Table 3.23 **Preload ID**

ID	Preload		Application	Examples of use
ZO	Lightweight preload	0 – 0.02 C_{dyn}	Constant load direction, small impact; low precision	o Transport technology, o Automatic packaging machines o X-Y axis for industrial machines o Welding machines
ZA	Medium preload	0.03 – 0.05 C_{dyn}	High levels of precision required	o Machine tools o Z axes in industrial machines o Machines for EDM o NC lathes o X-Y precision tables o Measurement technologies
ZB	High preload	0.06 – 0.08 C_{dyn}	High structural rigidity required, presence of shocks and vibrations	o Machine tools o Grinding machines o NC Lathes o Horizontal and vertical milling cutters o Z axes in machine tools, o High-performance cutting machines

3.2.7 Load capacity and moments





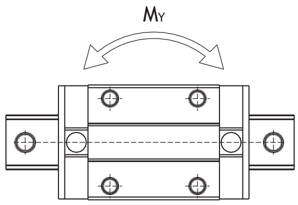


Table 3.24 **EG/QE series load capacity and moments**

Series/ Size	Dynamic load capacity C_{dyn} [N] [1)]	Static load coeff. C_0 [N]	Dynamic moment [Nm]			Static moment [Nm]		
			M_R	M_P	M_Y	M_{0R}	M_{0P}	M_{0Y}
EG_15S	5,350	9,400	45	22	22	80	40	40
QE_15S	8,560	8,790	68	29	29	70	30	30
EG_15C	7,830	16,190	62	48	48	130	100	100
QE_15C	12,530	15,280	98	73	73	120	90	90
EG_20S	7,230	12,740	73	34	34	130	60	60
QE_20S	11,570	12,180	123	47	47	130	50	50
EG_20C	10,310	21,130	107	78	78	220	160	160
QE_20C	16,500	20,210	171	122	122	210	150	150
EG_25S	11,400	19,500	134	70	70	230	120	120
QE_25S	18,240	18,900	212	96	96	220	100	100
EG_25C	16,270	32,400	190	160	160	380	320	320
QE_25C	26,030	31,490	305	239	239	370	290	290
EG_30S	16,420	28,100	233	122	122	400	210	210
QE_30S	26,270	27,820	377	169	169	400	180	180
EG_30C	23,700	47,460	339	274	274	680	550	550
QE_30C	37,920	46,630	544	414	414	670	510	510
EG_35S	22,660	37,380	339	187	187	560	310	310
QE_35S	36,390	36,430	609	330	330	610	330	330
EG_35C	33,350	64,840	504	354	354	980	690	690
QE_35C	51,180	59,280	863	648	648	1,000	750	750

[1)] Dynamic load capacity for a distance travelled of 50,000 m

3.2.8 Stiffness

The stiffness depends on the preload. With formula F 3.3 it is possible to determine the deformation according to the stiffness.

F 3.3

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

δ Deformation (µm)
P Service load (N)
k Stiffness [N/µm]

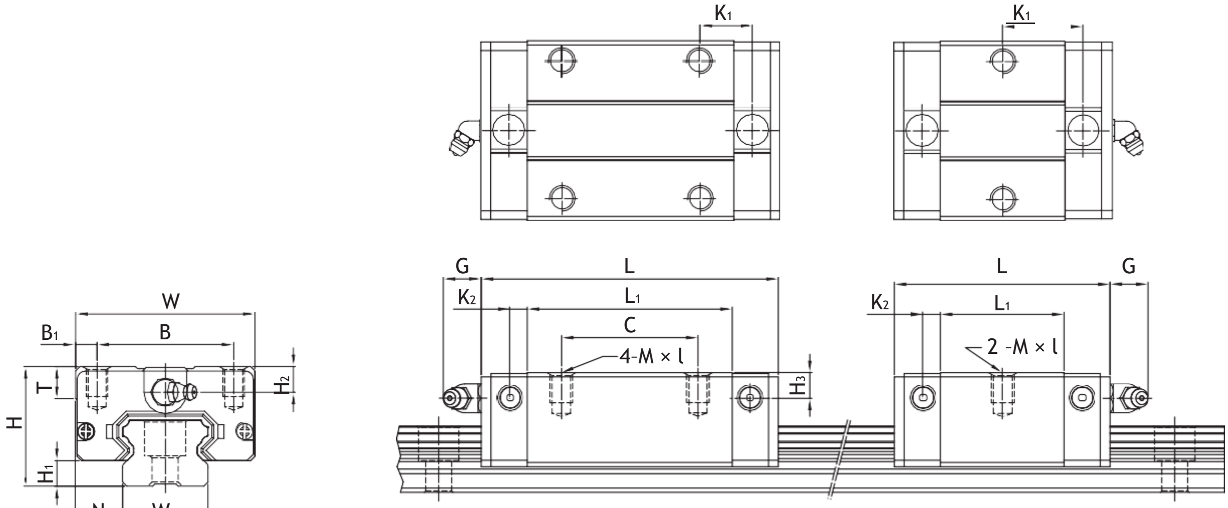
Table 3.25 **Radial stiffness of the EG/QE series**

Load class	Series/Size	Stiffness depending on the preload.		
		Z0	**ZA**	**ZB**
Medium load	**EG_15S**	105	126	141
	QE_15S	96	115	128
	EG_20S	126	151	168
	QE_20S	116	139	153
	EG_25S	156	187	209
	QE_25S	137	165	184
	EG_30S	184	221	246
	QE_30S	169	203	226
	EG_35S	221	265	295
	QE_35S	214	257	287
Heavy load	**EG_15C**	172	206	230
	QE_15C	157	187	209
	EG_20C	199	238	266
	QE_20C	183	219	245
	EG_25C	246	296	329
	QE_25C	219	263	293
	EG_30C	295	354	395
	QE_30C	271	326	363
	EG_35C	354	425	474
	QE_35C	333	399	445

Unit: N/µm

3.2.9 EG/QE block dimensions

3.2.9.1 EGH/QEH



EGH/QEH-CA EGH/QEH-SA

Table 3.26 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]													Load coefficients 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	
EGH15SA	24	4.5	9.5	34	26	4.0	—	23.1	40.1	14.80	3.50	5.7	M4 × 6	6.0	5.5	6.0	5,350	9,400	0.09
EGH15CA							26	39.8	56.8	10.15							7,830	16,190	0.15
QEH15SA	24	4.0	9.5	34	26	4.0	—	23.1	40.1	14.80	3.50	5.7	M4 × 6	6.0	5.5	6.0	8,560	8,790	0.09
QEH15CA							26	39.8	56.8	10.15							12,530	15,280	0.15
EGH20SA	28	6.0	11.0	42	32	5.0	—	29.0	50.0	18.75	4.15	12.0	M5 × 7	7.5	6.0	6.0	7,230	12,740	0.15
EGH20CA							32	48.1	69.1	12.30							10,310	21,130	0.24
QEH20SA	28	6.0	11.0	42	32	5.0	—	29.0	50.0	18.75	4.15	12.0	M5 × 7	7.5	6.0	6.5	11,570	12,180	0.15
QEH20CA							32	48.1	69.1	12.30							16,500	20,210	0.23
EGH25SA	33	7.0	12.5	48	35	6.5	—	35.5	59.1	21.90	4.55	12.0	M6 × 9	8.0	8.0	8.0	11,400	19,500	0.25
EGH25CA							35	59.0	82.6	16.15							16,270	32,400	0.41
QEH25SA	33	6.2	12.5	48	35	6.5	—	35.5	60.1	21.90	5.00	12.0	M6 × 9	8.0	8.0	8.0	18,240	18,900	0.24
QEH25CA							35	59.0	83.6	16.15							26,030	31,490	0.40
EGH30SA	42	10.0	16.0	60	40	10.0	—	41.5	69.5	26.75	6.00	12.0	M8 × 12	9.0	8.0	9.0	16,420	28,100	0.45
EGH30CA							40	70.1	98.1	21.05							23,700	47,460	0.76
QEH30SA	42	10.0	16.0	60	40	10.0	—	41.5	67.5	25.75	6.00	12.0	M8 × 12	9.0	8.0	9.0	26,270	27,820	0.44
QEH30CA							40	70.1	96.1	20.05							37,920	46,630	0.75
EGH35SA	48	11.0	18.0	70	50	10.0	—	45.0	75.0	28.50	7.00	12.0	M8 × 12	10.0	8.5	8.5	22,660	37,380	0.74
EGH35CA							50	78.0	108.0	20.00							33,350	64,840	1.10
QEH35SA	48	11.0	18.0	70	50	10.0	—	51.0	76.0	30.30	6.25	12.0	M8 × 12	10.0	8.5	8.5	36,390	36,430	0.58
QEH35CA							50	83.0	108.0	21.30							51,180	59,280	0.90

For rail dimensions, see Page 54; for standard and optional lubrication fittings see Page 126

3.2.9.2 EGW/QEW

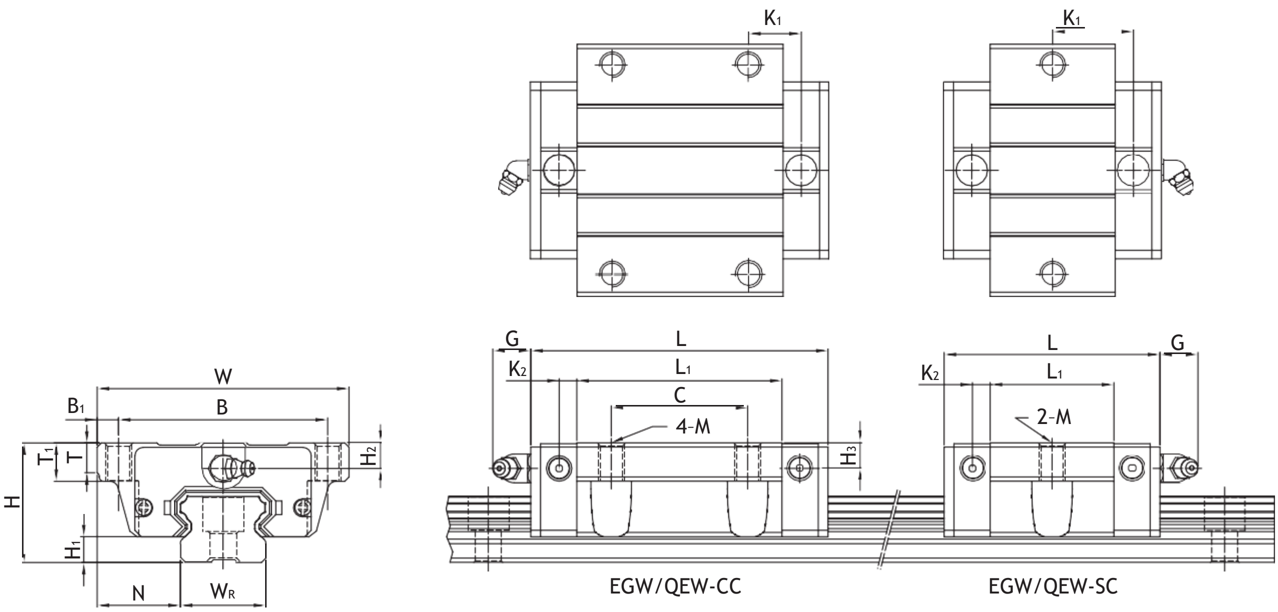


Table 3.27 **Block dimensions**

Series/ Size	Mounting size [mm]			Block dimensions [mm]														Load coefficients [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	
EGW15SC	24	4.5	18.5	52	41	5.5	—	23.1	40.1	14.80	3.50	5.7	M5	5.0	7	5.5	6.0	5,350	9,400	0.12
EGW15CC							26	39.8	56.8	10.15								7,830	16,190	0.21
QEW15SC	24	4.0	18.5	52	41	5.5	—	23.1	40.1	14.80	3.50	5.7	M5	5.0	—	5.5	6.0	8,560	8,790	0.12
QEW15CC							26	39.8	56.8	10.15								12,530	15,280	0.21
EGW20SC	28	6.0	19.5	59	49	5.0	—	29.0	50.0	18.75	4.15	12.0	M6	7.0	9	6.0	6.0	7,230	12,740	0.19
EGW20CC							32	48.1	69.1	12.30								10,310	21,130	0.32
QEW20SC	28	6.0	19.5	59	49	5.0	—	29.0	50.0	18.75	4.15	12.0	M6	7.0	—	6.0	6.5	11,570	12,180	0.19
QEW20CC							32	48.1	69.1	12.30								16,500	20,210	0.31
EGW25SC	33	7.0	25.0	73	60	6.5	—	35.5	59.1	21.90	4.55	12.0	M8	7.5	10	8.0	8.0	11,400	19,500	0.35
EGW25CC							35	59.0	82.6	16.15								16,270	32,400	0.59
QEW25SC	33	6.2	25.0	73	60	6.5	—	35.5	60.1	21.90	5.00	12.0	M8	7.5	—	8.0	8.0	18,240	18,900	0.34
QEW25CC							35	59.0	83.6	16.15								26,030	31,490	0.58
EGW30SC	42	10.0	31.0	90	72	9.0	—	41.5	69.5	26.75	6.00	12.0	M10	7.0	10	8.0	9.0	16,420	28,100	0.62
EGW30CC							40	70.1	98.1	21.05								23,700	47,460	1.04
QEW30SC	42	10.0	31.0	90	72	9.0	—	41.5	67.5	25.75	6.00	12.0	M10	7.0	—	8.0	9.0	26,270	27,820	0.61
QEW30CC							40	70.1	96.1	20.05								37,920	46,630	1.03
EGW35SC	48	11.0	33.0	100	82	9.0	—	45.0	75.0	28.50	7.00	12.0	M10	10.0	13	8.5	8.5	22,660	37,380	0.91
EGW35CC							50	78.0	108.0	20.00								33,350	64,840	1.40
QEW35SC	48	11.0	33.0	100	82	9.0	—	51.0	76.0	30.30	6.25	12.0	M10	10.0	13	8.5	8.5	36,390	36,430	0.77
QEW35CC							50	83.0	108.0	21.30								51,180	59,280	1.19

For rail dimensions, see Page 54; for standard and optional lubrication fittings see Page 126

3.2.10 EG rail dimensions

The EG rail is used for both EG and QE blocks.

3.2.10.1 EGR_R dimensions

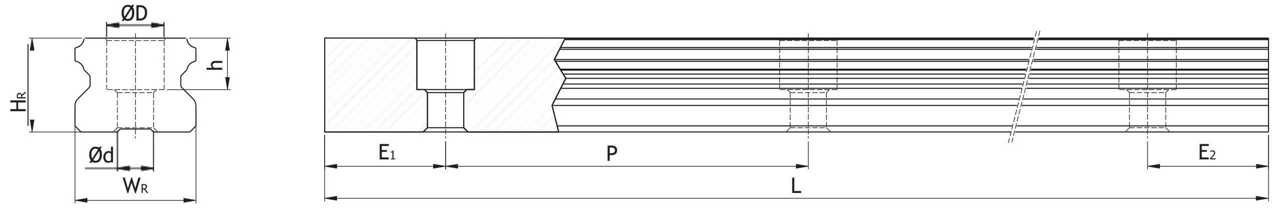


Table 3.28 **EGR_R rail**

Series/ Size	Mounting screw for rail [mm]	Rail size [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	**H_R**	**D**	**h**	**d**	**P**					
EGR15R	M3 × 16	15	12.5	6.0	4.5	3.5	60	4.000	3.900	6	54	1.25
EGR20R	M5 × 16	20	15.5	9.5	8.5	6,0	60	4.000	3,900	7	53	2.08
EGR25R	M6 × 20	23	18.0	11.0	9.0	7,0	60	4.000	3,900	8	52	2.67
EGR30R	M6 × 25	28	23.0	11.0	9.0	7,0	80	4.000	3.920	9	71	4.35
EGR35R	M8 × 25	34	27.5	14.0	12.0	9,0	80	4.000	3,920	9	71	6.14

3.2.10.2 EGR_U dimensions (larger mounting holes)

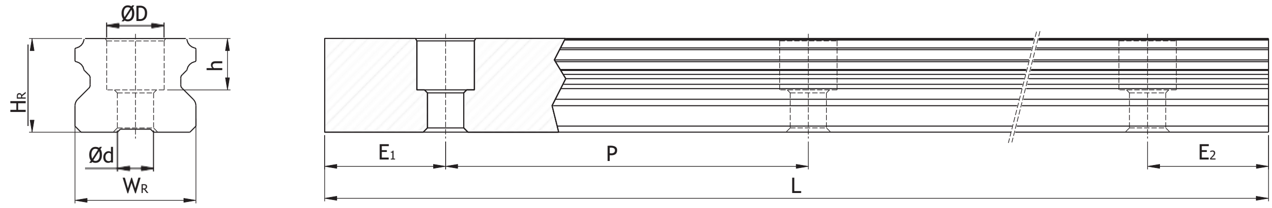
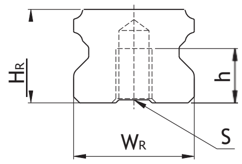


Table 3.29 **EGR_U rail dimensions**

Series/ Size	Mounting screw for rail [mm]	Rail dimensions [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	**H_R**	**D**	**h**	**d**	**P**					
EGR15U	M4 × 16	15	12.5	7.5	5.3	4.5	60	4.000	3.900	6	54	1.23
EGR30U	M8 × 25	28	23.0	14.0	12.0	9.0	80	4.000	3.920	9	71	4.23

Note:
1. The tolerance for E corresponds to a value between +0.5 and 1 mm.
2. Without indicating the size E1/2, considering E1/2 min it is possible to determine the maximum number of mounting holes.
3. The rails are cut to the desired length. Without any indication of the size E1/2 symmetrical will be performed.

3.2.10.3 EGR_T dimensions (rail mounting from the bottom)



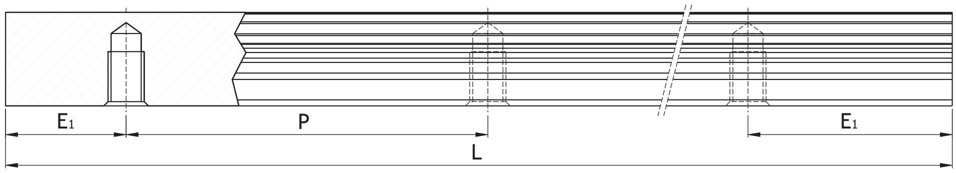


Table 3.30 **EGR_T rail dimensions**

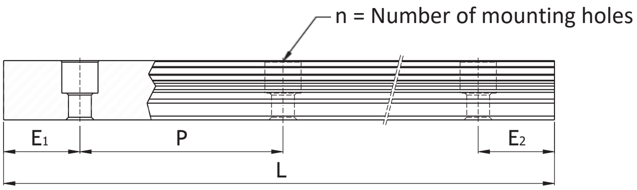
Series/ Size	Rail dimensions [mm]					Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	**H_R**	**S**	**h**	**P**					
EGR15T	15	12.5	M5	7	60	4.000	3.900	6	54	1.26
EGR20T	20	15.5	M6	9	60	4.000	3.900	7	53	2.15
EGR25T	23	18.0	M6	10	60	4.000	3.900	8	52	2.79
EGR30T	28	23.0	M8	14	80	4.000	3.920	9	71	4.42
EGR35T	34	27.5	M8	17	80	4.000	3.920	9	71	6.34

Note:

1. Without indicating the size E1/2, considering E1/2 min it is possible to determine the maximum number of mounting holes.
2. The rails are cut to the desired length. Without any indication of the size E1/2 symmetrical will be performed.

3.2.10.4 Calculation of the length of the rails

HIWIN offers rails with custom lengths.
At the same time, the value E1/2 must be between E1/2 min and E1/2 max so as not to interfere with the mounting hole.



F 3.4

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

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

3.2.10.5 Anchor screw tightening torques

Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 3.31 **Tightening torques of fastening screws according to ISO 4762-12.9**

Series/Size	Screw size	Torque [Nm]	Series/Size	Dimensions	Torque [Nm]
EG/QE_15	M3 × 16	2	**EG/QE_30**	M6 × 25	13
EG/QE_15U	M4 × 16	4	**EG/QE_30U**	M8 × 25	30
EG/QE_20	M5 × 16	9	**EG/QE_35**	M8 × 25	30
EG/QE_25	M6 × 20	13			

3.2.10.6 Caps for rail mounting holes

The caps are used to prevent chips and dirt from entering the mounting holes. The standard plastic caps are supplied together with individual rails. Additional optional caps must be ordered separately.

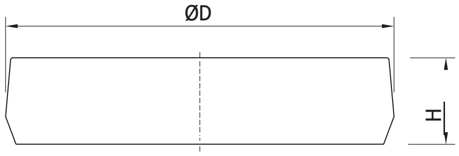


Table 3.32 **Caps for rail mounting holes**

Rail	Screw	Article number					Ø D [mm]	Height H [mm]
		Plastic		Brass		Steel		
		GmbH	TW	GmbH	TW			
EGR15R	M3	5-002217	950001B1	5-001340	95000EA1	—	6.0	1.2
EGR20R	M5	5-002220	950003D2	5-001350	95000GA1	5-001352	9.5	2.5
EGR25R	M6	5-002221	950004D2	5-001355	95000HA1	5-001357	11.0	2.8
EGR30R	M6	5-002221	950004D2	5-001355	95000HA1	5-001357	11.0	2.8
EGR35R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
EGR15U	M4	5-002218	950002C1	5-001344	95000EA1	—	7.5	1.2
EGR30U	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5

3.2.11 Sealing systems

Several sealing systems are available for HIWIN blocks. An overview is also available on page 22. The following table shows the overall length of the blocks with the different sealing systems. Sealing systems are available for these sizes.

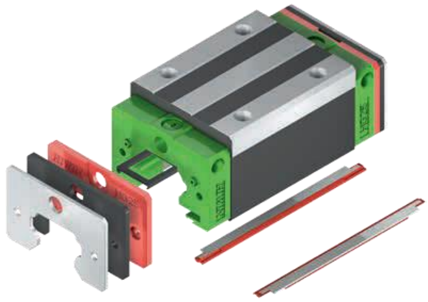


Table 3.33 **Overall length of blocks with different sealing systems**

Series/ Size	Total length L			
	SS	**DD**	**ZZ**	**KK**
EG_15S	40.1	44.1	41.7	45.7
QE_15S	40.1	44.1	42.1	46.1
EG_15C	56.8	60.8	58.4	62.4
QE_15C	56.8	60.8	58.8	62.8
EG_20S	50.0	54.0	51.6	55.6
QE_20S	50.0	54.0	52.0	56.0
EG_20C	69.1	73.1	70.7	74.7
QE_20C	69.1	73.1	71.1	75.1
EG_25S	59.1	63.1	61.1	65.1
QE_25S	60.1	65.1	62.1	67.1
EG_25C	82.6	86.6	84.6	88.6
QE_25C	83.6	88.6	85.6	90.6
EG_30S	69.5	73.5	71.5	75.5
QE_30S	67.5	72.5	69.5	74.5
EG_30C	98.1	102.1	100.1	104.1
QE_30C	96.1	101.1	98.1	103.1
EG_35S	75.0	79.0	78.0	82.0
QE_35S	76.0	80.0	79.0	83.0
EG_35C	108.0	112.0	111.0	115.0
QE_35C	108.0	112.0	111.0	115.0

Unit: mm

3.2.11.1 Sealing set coding

Sealing sets are always supplied complete with mounting screws and include the appropriate necessary parts in addition to the standard seal.

EG 15 SS

Series:
EG
QE

Dimensions:
EG: 15, 20, 25, 30, 35
QE: 15, 20, 25, 30, 35

Dust protection:
SS: Standard seal
ZZ: Front seal with metal sheet
DD: Double front seal
KK: Double front seal with metal sheet

3.2.12 Friction
The table shows the maximum resistance to advancement of the individual front seals. Depending on the classification of the seal (SS, ZZ, DD, KK) it will be necessary to multiply the value correspondingly. The values indicated are valid for blocks on untreated rails. Higher frictional forces are created on treated rails.

Table 3.34 **Resistance to advancement of standard front seals**

Series/Size	Friction [N]	Series/Size	Friction [N]
EG_15	1.0	**QE_15**	1.1
EG_20	1.0	**QE_20**	1.4
EG_25	1.0	**QE_25**	1.7
EG_30	1.5	**QE_30**	2.1
EG_35	2.0	**QE_35**	2.3

3.2.13 E2 lubrication unit
For details of the lubrication unit please refer to the general information in the dedicated section “2.6.3 E2 oil lubrication unit” on Page 15.

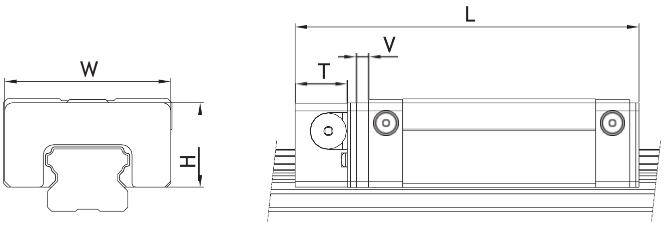


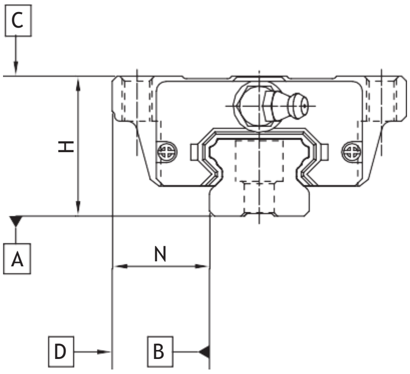
Table 3.35 **Block dimensions with E2 lubrication unit**

Model/Size	Block dimensions [mm]								Oil quantity [cm³]
	W	**H**	**T**	**V**	L_{SS} 1)	L_{ZZ} 1)	L_{DD} 1)	L_{KK} 1)	
EG_15S	33.3	18.7	11.5	3.0	54.6	56.2	58.6	60.2	1.7
EG_15C	33.3	18.7	11.5	3.0	71.3	72.9	75.3	76.9	1.7
EG_20S	41.3	20.9	13.0	3.0	66.0	67.6	70.0	71.6	2.9
EG_20C	41.3	20.9	13.0	3.0	85.1	86.7	89.1	90.7	2.9
EG_25S	47.3	24.9	13.0	3.0	75.1	77.1	79.1	81.1	4.8
EG_25C	47.3	24.9	13.0	3.0	98.6	100.6	102.6	104.6	4.8
EG_30S	59.3	31.0	13.0	3.0	85.5	87.5	89.5	91.5	8.9
EG_30C	59.3	31.0	13.0	3.0	114.1	116.1	118.1	120.1	8.9

1) Total length depending on the dust protection selected. SS = standard dust protection

3.2.14 Tolerances according to the precision class

The EG and QE series are available in five different precision classes, depending on the parallelism between blocks and rails and the precision of height H and width N.
The choice is determined by the requirements of the machine to which the linear guides are applied. HIWIN srl manages up to class P in its premises.



3.2.14.1 Parallelism

Parallelism between the abutment surface of the block D and the rail B and parallelism between the upper surface of the block C and the support surface of the rail A. The measurement is considered with rail mounted in optimal conditions and in the centre of each block.

Table 3.36 **Tolerance of the parallelism between the block and rail**

Rail length [mm]	Precision 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

3.2.14.2 Precision – height and width

Height tolerance H
Maximum absolute deviation of height H, measured between the upper surface of block C and the lower surface of rail A for any position of the block on the rail.

Height variation H
Maximum relative deviation of the height H between two or more blocks on the same rail or on rails in parallel, measured in the same position as the rail.

Width tolerance N
Maximum absolute deviation of the width N, measured between the abutment surfaces of the block D and the rail B for any position of the block on the rail.

Width variation N
Maximum relative deviation of the width N between two or more blocks on the same rail, measured in the same position as the rail.

Table 3.37 **Height and width tolerance**

Series/Size	Precision class	Height tolerance H	Width tolerance N	Height variation H	Width variation N
EG_15, 20 QE_15, 20	C (Normal)	± 0.1	± 0.1	0.02	0.02
	H (High)	± 0.03	± 0.03	0.01	0.01
	P (Precise)	0/– 0.03 [1)]	0/– 0.03 [1)]	0.006	0.006
	SP (Super Precise)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (Ultra Precise)	0/– 0.008	0/– 0.008	0.003	0.003
EG_25, 30, 35 QE_25, 30, 35	C (Normal)	± 0.1	± 0.1	0.02	0.03
	H (High)	± 0.04	± 0.04	0.015	0.015
	P (Precise)	0/– 0.04 [1)]	0/– 0.04 [1)]	0.007	0.007
	SP (Super Precise)	0/– 0.02	0/– 0.02	0.005	0.005
	UP (Ultra Precise)	0/– 0.01	0/– 0.01	0.003	0.003

Unit: mm

[1)] Fully assembled linear guide

3.2.14.3 Permissible tolerances of mounting surfaces.

To make the most of the very high precision, rigidity and durability of the EG/QE guides, it is necessary to respect the machining tolerances of the mounting surfaces

Reference surface parallelism (P):

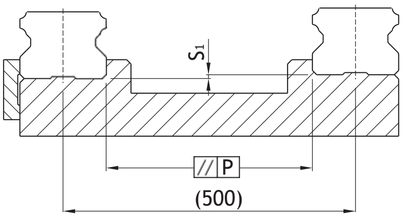


Table 3.38 **Maximum parallelism tolerance (P)**			
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
EG/QE_15	25	18	—
EG/QE_20	25	20	18
EG/QE_25	30	22	20
EG/QE_30	40	30	27
EG/QE_35	50	35	30

Unit: µm

Table 3.39 **Maximum tolerance of the difference in height of the reference surface (S_1)**			
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
EG/QE_15	130	85	—
EG/QE_20	130	85	50
EG/QE_25	130	85	70
EG/QE_30	170	110	90
EG/QE_35	210	150	120

Unit: µm

3.2.15 Stop heights and connecting radius

If the heights and fittings of the mounting surface shoulders are incorrect, the precision will be different from that expected and there will be an interference with the profile of the rail or block. By respecting the heights and fittings provided for the shoulders, it is possible to eliminate any installation errors.

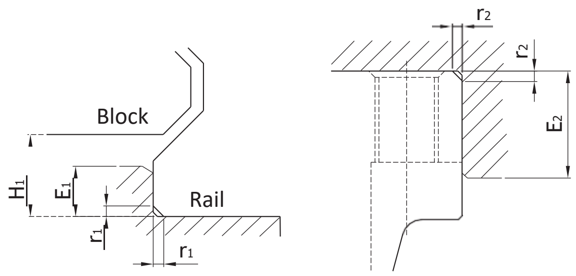


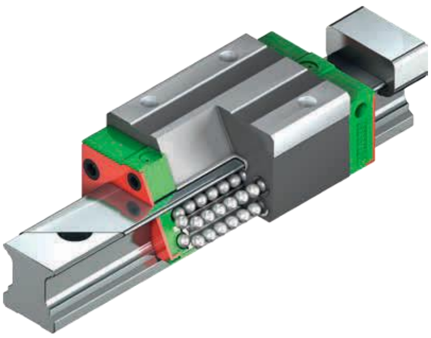
Table 3.40 **Stop heights and connecting radius**					
Series/Size	Max. bevel radius r_1	Max. bevel radius r_2	Rail reference shoulder height E_1	Reference shoulder height Block E_2	Free clearance under block H_1
EG/QE_15	0.5	0.5	2.7	5.0	4.5
EG/QE_20	0.5	0.5	5.0	7.0	6.0
EG/QE_25	1.0	1.0	5.0	7.5	7.0
EG/QE_30	1.0	1.0	7.0	7.0	10.0
EG_35	1.0	1.0	7.5	9.5	11.0
QE_35	1.0	1.5	7.5	9.5	11.0

Unit: mm

3.3 CG series

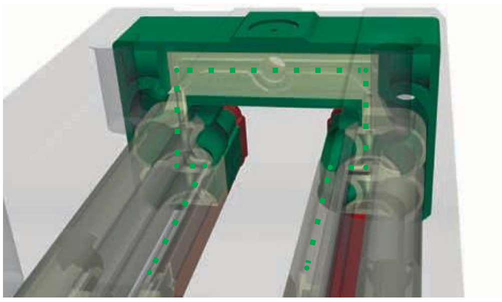
3.3.1 Characteristics of the CG series linear guides
Thanks to the O-shaped configuration of the tracks, the HIWIN CG series linear guides guarantee a high torsion load capacity, especially in the direction Mr.
The modified track geometry ensures high load coefficients.
The new flexible seal adapts perfectly by adhering to the rail profile and offers high and constant dust protection.
To protect the front seal from mechanical damage, the CG series is fitted as standard with a metal sheet in front of the seal. A cover strip (or sheet metal cover) is also available upon request to permanently minimise dust ingress and lip wear. Thanks to the special tool, the cover strip is easily installed in a few steps.
For optimal lubricant distribution, the block is equipped with an additional channel system that conveys the lubricant to the centre of the block directly on the balls in the work area. This allows longer lubrication intervals, with significant advantages particularly for short stroke applications.

3.3.2 CG series structure
4 recirculating ball guide without clearance and with the best dust protection already in the standard version.

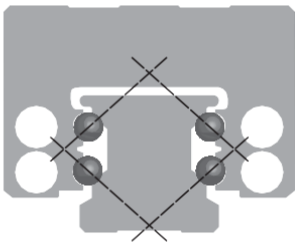


Easy assembly, better protection from dust and wear of the front seal, thanks to the cover strip.

Lubrication system optimised for longer lubrication intervals and short stroke applications.



O-shaped configuration and optimised track geometry for greater load capacity and better torsion resistance.



Advantages:
- Exempt from clearance
- Interchangeable
- High precision
- High resistance to moments, especially in the direction Mr.
- Optional cover strip.

3.3.3 CG series order codes
CG linear guides can be managed assembled or interchangeable. The dimensions of both models are identical. The main difference is that blocks and rails can be replaced and managed freely in the case of interchangeable models.
Blocks and rails can be ordered separately and assembled by the customer. Precision reaches class P.

Order code for linear guides (fully assembled)

CG	W	25	C	C	E	2	R	1600	E	Z0	H	I	DD	CS

Series:
GC

Block type:
W: Flanged trolley
H: Compact block

Size:
15, 20, 25, 30, 35, 45

Load type:
C: Heavy load
H: Super heavy load

Block fastening:
A: From the top
C: From the top or bottom

E = special block

None: Standard
CS:Cover strip

Dust protection 2) :
None: Standard (SS)
ZZ, SW, ZWX

No. parallel guides 1)
(Roman numeral)

Precision class: C, H, P, SP, UP

Preload ID: Z0, ZA, ZB

E = special rail

Rail length [mm]

Rail fastening:
R: From the top

No. of blocks per rail

Block order code (not mounted)

CG	W	25	C	C	E	Z0	H	DD	CS

Series:
GC

Block type:
W: Flanged block
H: Compact block

Size:
15, 20, 25, 30, 35, 45

Load type:
C: Heavy load
H: Super heavy load

None: Without Cover strip
CS: With Cover Strip

Dust protection 2) :
None: Standard (SS)
ZZ, SW, ZWX

Precision class: C, H, P

Preload: Z0, ZA, ZB

E = special block

Block Fastening
From top and bottom

Rail order code

CG	R	2	R	1200	E	H	CS

Series CG

Rail

Size
15, 20, 25, 30, 35, 45

Rail fastening:
R: From the top

None: Without Cover strip
CS: With Cover Strip

Precision class:
C, H, P

E = special rail

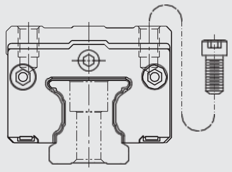
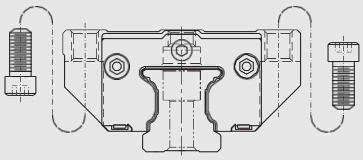
Rail length [mm]

Note:
1) The Roman numeral "II" indicates the number of guides whose parallel is expected and means that an element of the article described above refers numerically to a guide. In the case of single rails, no figure is indicated. By default, the joined rails are delivered with staggered joints.
2) Overview of individual sealing systems on page 22

3.3.4 Block types

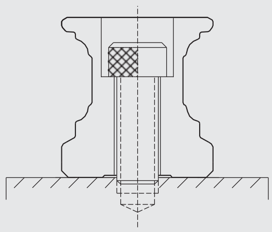
HIWIN offers compact and flanged blocks for each driving model.

Table 3.41 **Block types**

Type	Series/ Size	Structure	Tolerance [mm]	Rail Length [mm]	Characteristic applications
Compact type	CGH-CA CGH-HA		28 – 70	250 – 4,000	○ Woodworking ○ Machine Tools ○ NC Lathes ○ Grinding machines ○ Precision milling cutters ○ High-perf. cutting machines ○ Automation technologies ○ Transport technologies ○ Measuring technologies ○ Machines and equipment that require high positioning precision
Flanged block	CGW-CC CGW-HC		24 – 60		

3.3.5 Rail Types

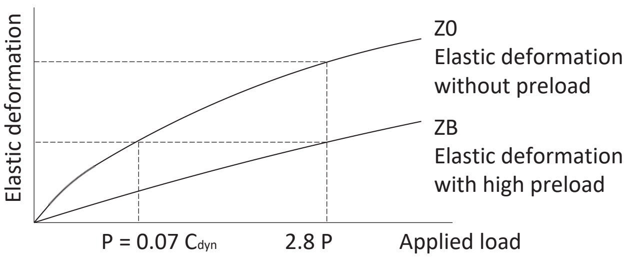
Table 3.42 **Rail Types**

Fastening from the top

CGR_R

3.3.6 Preload

Definition

A preload can be applied to each type of guide depending on the size of the balls. The curve shows that stiffness is doubled when a preload is applied.The CG series offers three standard preload classes, for various applications and conditions.



Preload ID

Table 3.43 **Preload ID**

ID	Preload		Application	Examples of use
ZO	Lightweight preload	0 – 0.02 C_{dyn}	Constant load direction, small impact, low precision	o Transport technology, o Automatic packaging machines o X-Y axis for industrial machines o welding machines
ZA	Medium preload	0.05 – 0.07 C_{dyn}	High levels of precision required	o Machine tools o Axes Z in industrial machines o Machines for EDM o NC lathes o X-Y precision tables o Measuring technology
ZB	High preload	above 0.1 C_{dyn}	High structural rigidity required, presence of shocks and vibrations	o Machine tools o Grinding machines o NC Lathes o Horizontal and vertical milling cutters o Z axes in machine tools, o High performance cutting machines

3.3.7 Load capacity and moments

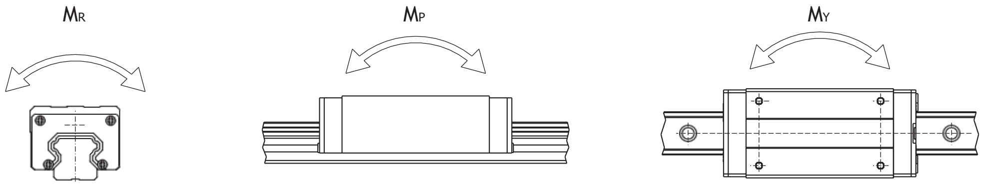


Table 3.44 **CG series load capacity and moments**

Series/ Size	Dynamic Load Capacity C_{dyn} [N] [1]	Static load capacity C_0 [N]	Dynamic moment [Nm]			Static moment [Nm]		
			M_R	M_P	M_Y	M_{0R}	M_{0P}	M_{0Y}
CG_15C	14,700	19,520	143	105	105	190	140	140
CG_20C	23,700	30,510	287	218	218	370	280	280
CG_20H	28,600	39,900	344	344	344	480	480	480
CG_25C	34,960	43,940	477	390	390	600	490	490
CG_25H	40,500	54,080	554	546	546	740	730	730
CG_30C	46,000	55,190	792	583	583	950	700	700
CG_30H	58,590	78,180	1,011	921	921	1,350	1,230	1,230
CG_35C	61,170	79,300	1,334	841	841	1,730	1,090	1,090
CG_35H	77,900	112,340	1,705	1,400	1,400	2,460	2,020	2,020
CG_45C	103,830	122,040	3,037	2,076	2,076	3,570	2,440	2,440
CG_45H	124,430	217,200	2,893	2,549	2,549	5,050	4,450	4,450

[1] Dynamic load capacity for a distance travelled of 50,000 m

3.3.8 Stiffness

The stiffness depends on the preload. With formula F 3.5 it is possible to determine the deformation according to the stiffness.

F 3.5

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

δ Deformation [µm]
P Service load
k Stiffness [N/µm]

Table 3.45 **Radial stiffness of the CG series**

Load class	Series/ Size	Stiffness depending on the preload.		
		Z0	**ZA**	**ZB**
Heavy load	**CG_15C**	224	291	332
	CG_20C	271	415	483
	CG_25C	338	440	574
	CG_30C	447	553	757
	CG_35C	468	610	800
	CG_45C	554	717	820
Super heavy load	**CG_20H**	361	467	534
	CG_25H	414	536	612
	CG_30H	492	638	729
	CG_35H	566	733	838
	CG_45H	742	961	1.099

Unit: N/µm

3.3.9 CG block dimensions

3.3.9.1 CGH

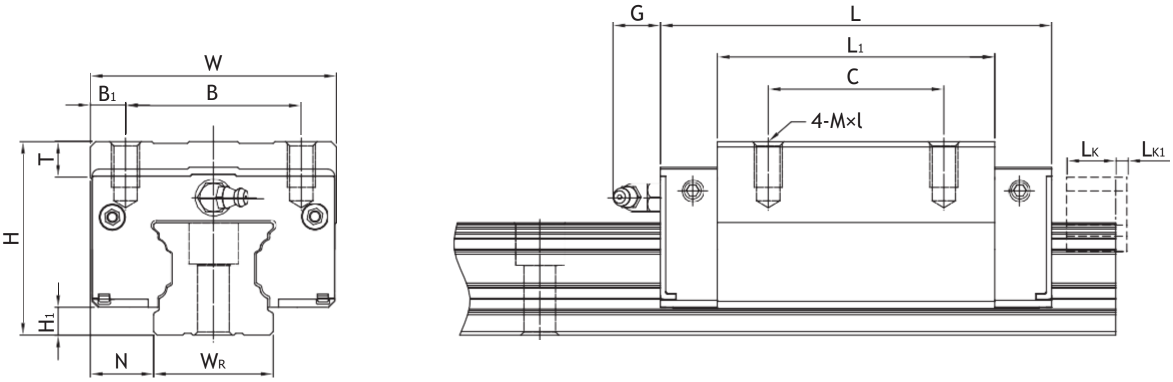


Table 3.46 **Block**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]											Weight load [N]		Coefficients [KG]
	H	**H_1**	**N**	**W**	**B**	**B_1**	**C**	**L_1**	**L**	**G**	**M x l**	**T**	**L_K**	**L_{K1}**	C_{dyn}	C_0	
CGH15CA	28	4.1	9.5	34	26	4.0	26	39.6	58.2	6.0	M4 × 6	6.0	12.8	2.2	14,700	19,520	0.15
CGH15HA							26	53,6	72,6						17,600	25,530	0,25
CGH20CA	30	4.6	12.0	44	32	6.0	36	52.5	74.9	6.0	M5 × 6	8.0	10.8	2.2	23,700	30,510	0.33
CGH20HA							50	68.5	90.9						28,600	39,900	0.46
CGH25CA	40	6.1	12.5	48	35	6.5	35	61.0	84.0	12.0	M6 × 8	8.0	12.8	2.2	34,960	43,940	0.59
CGH25HA							50	78.4	101.4						40,500	54,080	0.71
CGH30CA	45	7.0	16.0	60	40	10.0	40	69.0	97.4	12.0	M8 × 10	9.5	9.8	2.2	46,000	55,190	0.94
CGH30HA							60	91.5	119.9						58,590	78,180	1.24
CGH35CA	55	7.6	18.0	70	50	10.0	50	79.0	111.4	12.0	M8 × 13	10.2	15.8	2.2	61,170	79,300	1.62
CGH35HA							72	103.4	135.8						77,900	112,340	2.38
CGH45CA	70	9.7	20.5	86	60	13.0	60	97.2	137.6	12.9	M10 × 17	16.0	15.8	2.2	103,530	122,040	3.01
CGH45HA															124,430	217,200	

For rail dimensions, see Page 69; for standard and optional lubrication fittings see Page 126

3.3.9.2 CGW

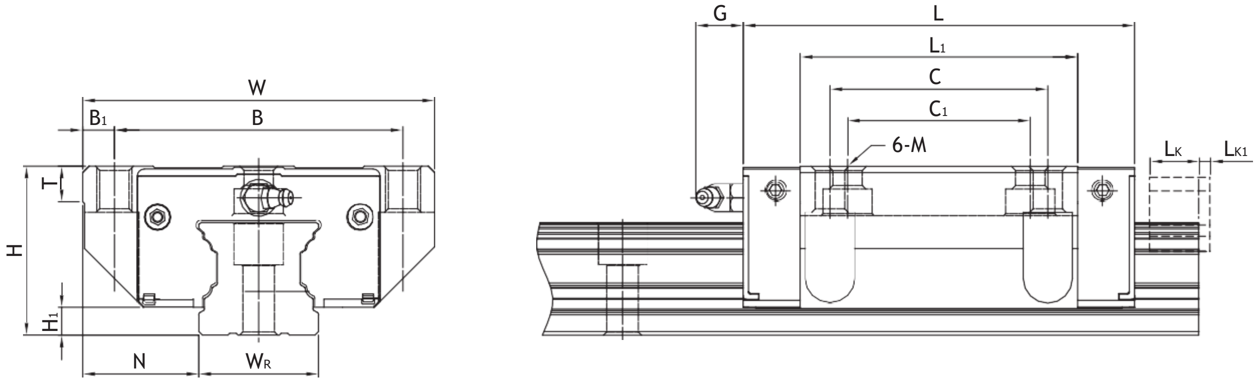


Table 3.47 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]												Load coefficients [N]		Weight [KG]
	H	H_1	N	W	B	B_1	C	C_1	L_1	L	G	M	T	L_K	L_{K1}	C_{dyn}	C_0	
CGW15CC	24	4.1	16.0	47	38	4.5	30	26	39.6	58.2	6.0	M5	6.0	12.8	2.2	14,700	19,520	0.14
CGW15HC									53,6	72,6						17,600	25,530	0.36
CGW20CC	30	4.6	21.5	63	53	5.0	40	35	52.5	74.9	6.0	M6	6.5	10.8	2.2	23,700	30,510	0.47
CGW20HC									68.5	90.9						28,600	39,900	0.53
CGW25CC	36	6.1	23.5	70	57	6.5	45	40	61.0	84.0	12.0	M8	7.0	12.8	2.2	34,960	43,940	0.68
CGW25HC									78.6	104.6						42,180	57,460	0.90
CGW30CC	42	7.0	31.0	90	72	9.0	52	44	69.0	97.4	12.0	M10	10.5	9.8	2.2	46,000	55,190	1.19
CGW30HC									91.5	119.9						58,590	78,180	1.37
CGW35CC	48	7.6	33.0	100	82	9.0	62	52	79.0	111.4	12.0	M10	10.1	15.8	2.2	61,170	79,300	1.79
CGW35HC									103.4	135.8						77,900	112,340	2.45
CGW45CC	60	9.7	37.5	120	100	10.0	80	60	97.2	137.6	12.9	M12	15.1	15.8	2.2	103,530	122,040	3.00
CGW45HC									132.3	172.3						124,430	217,200	

For rail dimensions, see Page 69; for standard and optional lubrication fittings see Page 126

3.3.10 CG rail dimensions

3.3.10.1 CGR_R rail dimensions

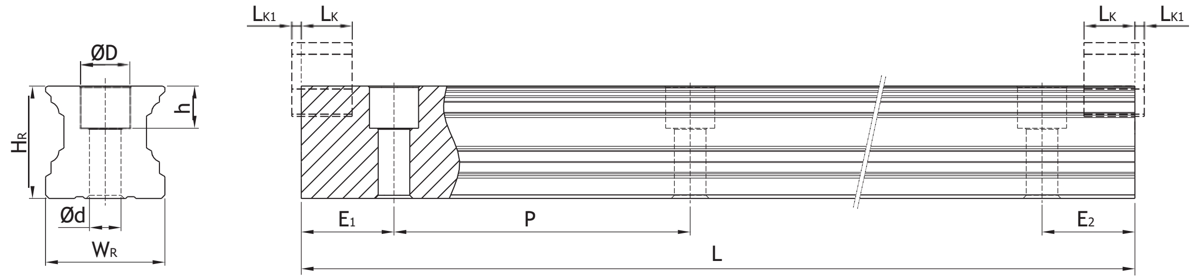


Table 3.48 **CGR_R rail dimensions**

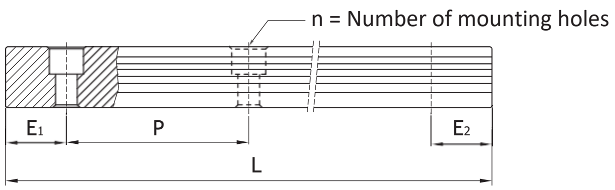
Series/ Size	Mounting screw for rail [mm]	Rail dimensions [mm]								Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]
		W_R	H_R	D	h	d	P	L_K	L_{K1}				
CGR15R	M4 × 16	15	16.20	7.5	5.9	4.5	60	13	2	4,000	3,900	6	54
CGR20R	M5 × 20	20	20.60	9.5	8.5	6.0	60	11	2	4,000	3,900	7	53
CGR25R	M6 × 22	23	24.30	11.0	9.0	7.0	60	13	2	4,000	3,900	8	52
CGR30R	M8 × 25	28	28.40	14.0	12.4	9.0	80	10	2	4,000	3,920	9	71
CGR35R	M8 × 30	34	31.90	14.0	12.0	9.0	80	16	2	4,000	3,920	9	71
CGR45R	M12 × 35	45	39.85	20.0	17.0	14.0	105	16	2	4,000	3,885	12	93

Note:

1. Without indicating the size $E_{1/2}$, considering $E_{1/2}$ min it is possible to determine the maximum number of mounting holes.
2. The rails are cut to the desired length. Without any indication of the size $E_{1/2}$ symmetrical will be performed

3.3.10.2 Calculation of the length of the rails

HIWIN offers rails with custom lengths.
At the same time, the value $E_{1/2}$ must be between $E_{1/2}$ min and $E_{1/2}$ max so as not to interfere with the mounting hole.



F 3.6

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

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

3.3.10.3 Anchor screw tightening torques

Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 3.49 **Tightening torques of fastening screws according to ISO 4762-12.9**

Series/Size	Screw size	Torque [Nm]	Series/Dimensions	Screw size	Torque [Nm]
CG_15	M4 × 16	4	**CG_30**	M10	70
CG_20	M5× 16	9	**CG_35**	M8 × 25	30
CG_25	M6 × 20	13	**CG_35**	M10	70
CG_30	M8 × 25	30	**CG_45**	M12 × 35	120

3.3.10.4 Caps for rail mounting holes

The caps are used to prevent chips and dirt from entering the mounting holes. The standard plastic values are supplied together with the individual rails.
Additional optional caps must be ordered separately.

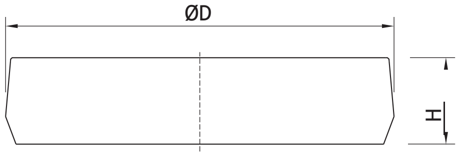
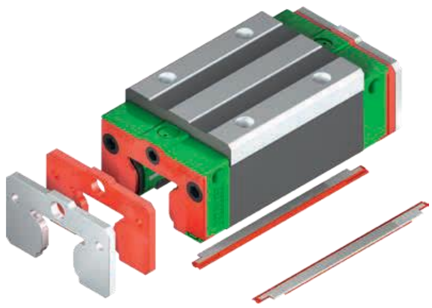


Table 3.50 **Caps for rail mounting holes**

Rail	Screw	Article number					Ø D [mm]	Height H [mm]
		Plastic		**Brass**		**Steel**		
		GmbH	**TW**	**GmbH**	**TW**			
CGR15R	M4	5-002218	950002C1	5-001344	95000FA1	—	7.5	1.2
CGR20R	M5	5-002220	950003D2	5-001350	95000GA1	5-001352	9.5	2.5
CGR25R	M6	5-002221	950004D2	5-001355	95000HA1	5-001357	11.0	2.8
CGR30R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
CGR35R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
CGR45R	M12	5-002223	950007D2	5-001324	95000JA1	5-001327	20.0	4.0
CGR55R	M14	5-002224	950008C2	5-001324	95000KA1	5-001332	23.0	4.0
CGR65R	M16	5-002225	950009D1	5-001324	95000LA1	5-001337	26.0	4.0

3.3.11 Sealing systems



Various sealing systems are available for HIWIN blocks. An overview is also available on page 22.
The following table shows the total length of the blocks with the different sealing systems. Sealing systems are available for these sizes

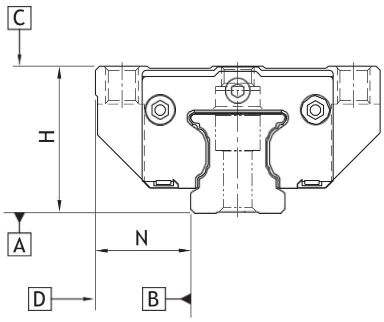
Table 3.51 **Overall length of blocks with different sealing systems**

Series/ Size	Total length L					
	SS	**ZZ**	**DD**	**DD+CS**	**SW***	**ZWX***
CG15C	58.2	61.2	63.8	63.8	63.2	66.2
CG15H	72,6	75,6			77,6	80,6
CG20C	74.9	77.9	80.5	80.5	79.9	82.9
CG20H	90.9	93.9	96.5	96.5	95.9	98.9
CG25C	84.0	90.0	89.0	89.0	89.0	95.0
CG25H	104.6	110.6	106.4	106.4	109.6	115.6
CG30C	97.4	103.4	103.8	103.0	102.8	108.8
CG30H	118.9	124.9	126.3	125.5	124.3	130.3
CG35C	111.4	117.4	117.8	117.0	116.8	122.8
CG35H	137.4	143.4	142.2	141.4	142.8	148.8
CG45C	137.6	143.6	145.6	145.6	143.0	149.0
CG45H	172.3	178.3	182.0	182.0	177.7	183.7

Unit: mm
* Only available from OG

3.3.12 Tolerances according to the class of precision

The CG series is available in five different precision classes, depending on the parallelism between blocks and rails and the precision of the height H and width N. The choice is determined by the requirements of the machine in which the linear guides are applied. HIWIN srl manages up to class P in its premises.



3.3.12.1 Parallelism

Parallelism between the abutment surface of the block D and the rail B and parallelism between the upper surface of the block C and the support surface of the rail A.
The measurement is considered with rail mounted in optimal conditions and in the centre of each block.

Table 3.52 **Block and rail parallelism tolerance**

Rail length [mm]	Precision 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

3.3.12.2 Precision – height and width

Height tolerance H
Maximum absolute deviation of height H, measured between the upper surface of block C and the lower surface of rail A for any position of the block on the rail.

Height variation H
Maximum relative deviation of the height H between two or more blocks on the same rail or on rails in parallel, measured in the same position as the rail.

Width tolerance N
Maximum absolute deviation of the width N, measured between the abutment surfaces of the block D and the rail B for any position of the block on the rail.

Width variation N
Maximum relative deviation of the width N between two or more blocks on the same rail, measured in the same position as the rail.

Table 3.53 **Height and tolerances**

Series/dimensions	Precision class	Height tolerance H	Width tolerance N	Height variation H	Width variation N
CG_15, 20	C (Normal)	± 0.1	± 0.1	0.02	0.02
	H (High)	± 0.03	± 0.03	0.01	0.01
	P (Precise)	0/– 0.03 [1)]	0/– 0.03 [1)]	0.006	0.006
	SP (Super precise)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (Ultra precise)	0/– 0.008	0/– 0.008	0.003	0.003
CG_25, 30, 35	C (Normal)	± 0.1	± 0.1	0.02	0.03
	H (High)	± 0.04	± 0.04	0.015	0.015
	P (Precise)	0/– 0.04 [1)]	0/– 0.04 [1)]	0.007	0.007
	SP (Super precise)	0/– 0.02	0/– 0.02	0.005	0.005
	UP (Ultra precise)	0/– 0.01	0/– 0.01	0.003	0.003
CG_45	C (Normal)	± 0.1	± 0.1	0.03	0.03
	H (High)	± 0.05	± 0.05	0.015	0.02
	P (Precise)	0/– 0.05 [1)]	0/– 0.05 [1)]	0.007	0.01
	SP (Super precise)	0/– 0.03	0/– 0.03	0.005	0.007
	UP (Ultra precise)	0/– 0.02	0/– 0.02	0.003	0.005

Unit: mm

[1)] Fully assembled linear guide

3.3.12.3 Permissible tolerances of mounting surfaces

To make the most of the precision, rigidity and durability of the CG guides it is necessary to respect the surface processing tolerances

Tolerance for reference surface parallelism (P)

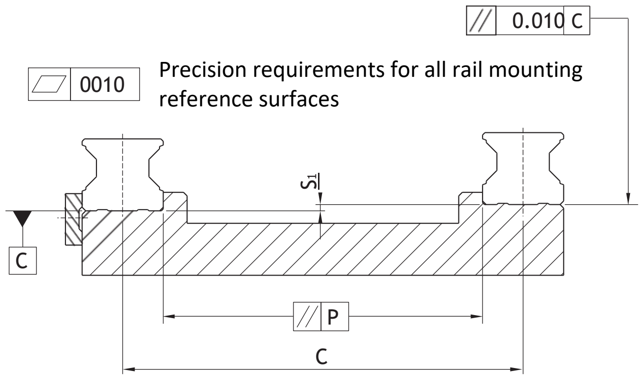


Table 3.54 **Maximum parallelism tolerance (P)**			
Series/Size	Preload class		
	Z0	ZA	ZB
CG_15	9	5	4
CG_20	11	7	5
CG_25	12	8	6
CG_30	14	9	7
CG_35	15	11	8
CG_45	19	12	10
Unit: μm			

Reference surface height difference tolerance $(S)_1$

F 3.7 $S_1 = C \times K - T_H$

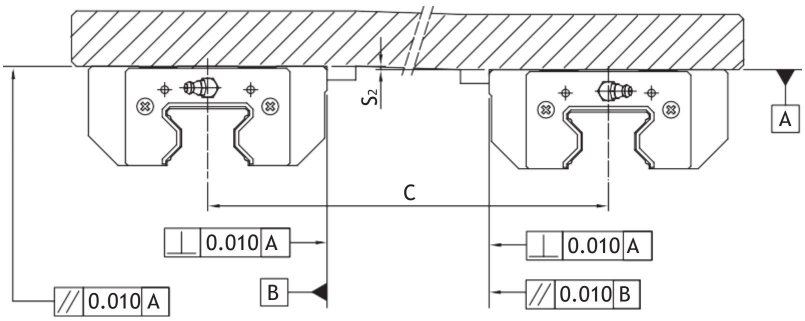
S_1 Max. height tolerance [mm]
C Distance between rails [mm]
K Height tolerance coefficient
T_H Height tolerance H according to Table 3.53

Table 3.55 **Height tolerance coefficient (K)**			
Series/Size	Preload class		
	Z0	ZA	ZB
CG_15 – CG_45	2.8×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

Block mounting surface height difference tolerance

- The reference surface height tolerance with the parallel mounting of two or more blocks (S_2)

⏥ 0010 Precision requirements for all reference surfaces for block assembly

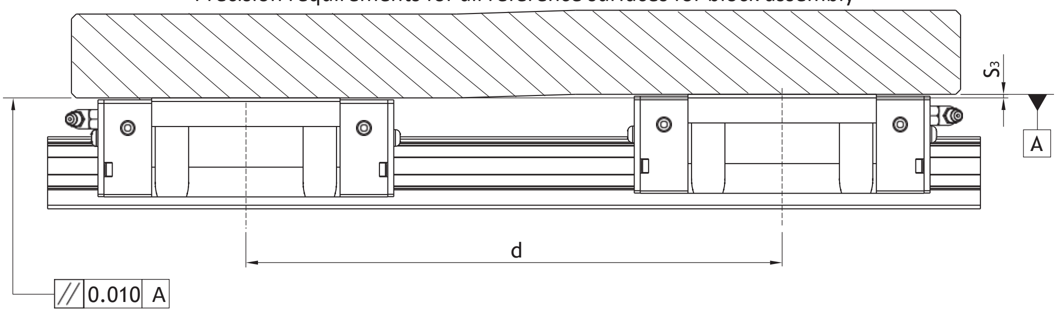


F 3.8 $S_2 = C \times K$

S_2 Max. height tolerance [mm]
C Wheelbase between rails [mm]
K Height tolerance coefficient

- The tolerance in height of the reference surface with the parallel mounting of two or more blocks (S_3)

⏥ 0010 Precision requirements for all reference surfaces for block assembly



F 3.9 $S_3 = d \times K$

S_3 Max. height tolerance [mm]
d Spacing between the blocks [mm]
K Height tolerance coefficient

Table 3.56 **Height tolerance coefficient (K)**

Series/Size	Load type	
	CG_C	**CG_H**
CG_15 – CG_45	4.2×10^{-5}	3.0×10^{-5}

3.3.13 Stop heights and connecting radius

If the mounting surface shoulder heights and fittings are not correct, the precision will be different from that expected and there will be an interference with the rail or block profile. By respecting the heights and the fittings provided for the shoulders, it is possible to eliminate any installation errors.

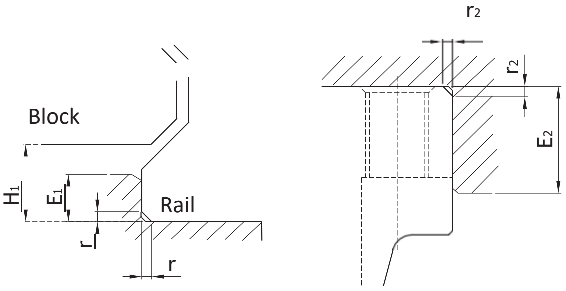


Table 3.57 **Stop heights and connecting radius**

Series/Size	Max bevel radius r	Rail reference shoulder height E_1	Block reference shoulder height E_2	Free clearance under block H_1
CG_15	0.5	3.0	4.0	4.3
CG_20	0.5	3.5	5.0	4.6
CG_25	1.0	5.0	5.0	6.1
CG_30	1.0	5.0	5.0	7.0
CG_35	1.0	6.0	6.0	7.6
CG_45	1.0	8.0	8.0	9.5

Unit: mm

3.4 WE/QW series

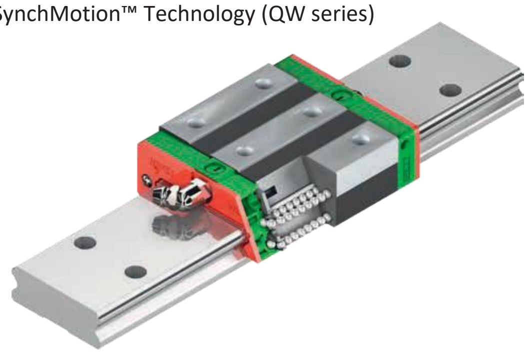
3.4.1 Characteristics of the WE and QW series linear guides

The HIWIN WE series linear guides are based on the consolidated HIWIN technology. Thanks to the particular width of the rails and the lowered configuration, a compact guide with high resistance to twisting moments has been created.

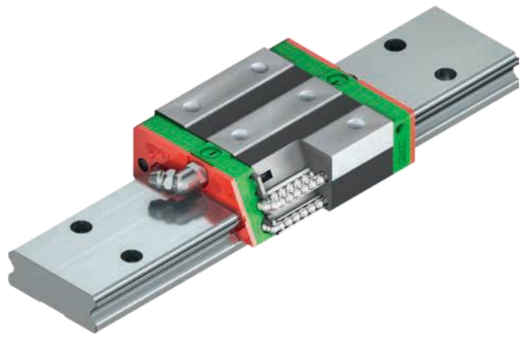
The QW series models with SynchMotion™ technology offer all the advantages of the standard WE series. In addition, thanks to the controlled movement of the balls spaced from the cage, they are characterised by an improvement in smoothness, understood as linearity and fluidity of movement, gives greater speeds, by longer lubrication intervals and less noise. Since the mounting dimensions of the QW blocks are identical to those of the WE blocks, they can also be mounted on the WER rail and are therefore exactly interchangeable. For more information, see Page 24

3.4.2 WE/QW series structure

- Guide with 4 recirculating balls
- Angle of contact 45°
- The retaining elements of the balls prevent the balls themselves from falling during disassembly of the block
- reduced installation height
- Wide rails for high torsional strength
- Wide mounting surface for block
- SynchMotion™ Technology (QW series)



WE series structure



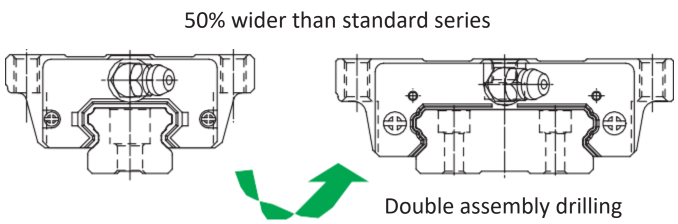
QW series structure

Advantages:

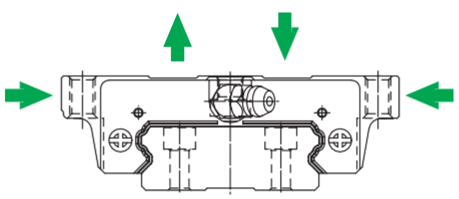
- Compact construction with high moment capacity
- Maximum performance efficiency thanks to minimal friction losses

Additional QW series benefits:

- Improved sliding
- Optimised for higher speeds and accelerations
- Lower lubrication frequency
- Low noise level
- Increased dynamic load capacity



- Wide block mounting surface resists higher moments
- The 45° arrangement of the recirculations allows a high level of stress from all directions



3.4.3 Order codes for WE/QW series

WE/QW linear guides are divided into mounted and unmounted models. The sizes of both models are identical. The main difference lies in the fact that, in the case of unmounted models, the blocks and rails can be freely replaced. block and rails can be ordered separately and assembled by the customer. Precision reaches class P.

Order code for linear guides (fully assembled)

WE	W	27	C	C	E	2	R	1600	E	ZA	H	II	KK

- Series: WE, QW
- Block type: W: Flanged block; H: Compact block
- Size: WE: 17, 21, 27, 35, 50; QW: 21, 27, 35
- Load type: C: Heavy load
- Block fastening: A: From the top; C: From top or bottom
- E = Special Block
- No. of blocks per rail
- Rail fastening: R: From the top
- Rail Length [mm]
- E = Special Rail
- Preload ID: Z0, ZA, ZB
- Precision class: C, H, P, SP, UP
- Rails for axle sets [1]
- Dust protection [2]: None: Standard (SS); ZZ, DD, KK

Block order code (not mounted)

WE	W	27	C	C	E	ZA	H	Z

- Series: WE QW
- Block type: W: Flanged block; H: Compact block
- Dimensions: WE: 17, 21, 27, 35, 50; QW: 21, 27, 35
- Load type: C: Heavy load
- Block fastening: A: From the top; C: From top or bottom
- E = Special Block
- Preload ID: Z0, ZA, ZB
- Precision class: C, H, P
- Dust protection [2]: None: Standard (SS); ZZ, DD, KK

Order code for rail (unmounted)

WE	R	27	R	1200	E	H

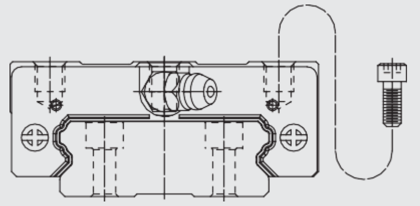
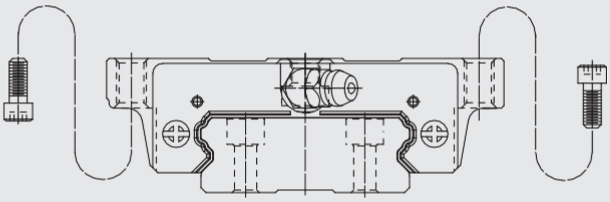
- WE Series
- Rail
- Dimensions: 17, 21, 27, 35, 50
- Rail fastening: R: From the top
- Rail Length [mm]
- E = Special Rail
- Precision class: C, H, P

Note:
[1] The Roman numeral "II" indicates the number of guides whose parallel is expected and means that an element of the article described above refers uniquely to a guide. In the case of single rails, no figures are indicated. By default, the joined rails are delivered with staggered joints.
[2] Overview of individual sealing systems on page 22

3.4.4 Block types

HIWIN offers compact and flanged blocks for each driving model.

Table 3.58 **Block types**

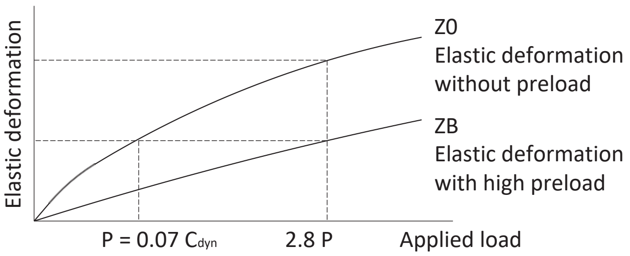
Type	Series/ Size	Structure	Tolerance [mm]	Rail length [mm]	Characteristic applications
Compact type	WEH-CA QWH-CA		17 – 50	100 – 4,000	○ Automation ○ Industrial Handling ○ Measurement and quality control technologies ○ Semiconductor industry ○ Injection moulding machines ○ Linear axes
Flanged block	WEW-CC QWW-CC				

3.4.5 Preload

Definition

A preload can be applied to each type of guide depending on the size of the balls. The curve shows that the stiffness is doubled when a preload is applied.

The WE/QW series offers three standard preload classes, for various applications and conditions.

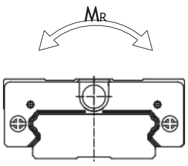


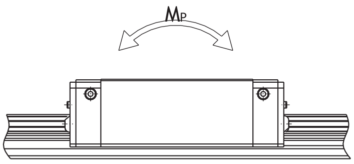
Preload

Table 3.59 **Preload ID**

ID	Preload		Application	Sample applications
ZO	Lightweight preload	$0 – 0.02\ C_{dyn}$	Constant load direction, small impact, low precision	○ Transport technology, ○ Automatic packaging machines ○ X-Y axis for industrial machines ○ welding machines
ZA	Medium preload	$0.03 – 0.05\ C_{dyn}$	High precision required	○ Machine tools ○ Z axes in industrial machines ○ Machines for EDM ○ NC lathes ○ Precision X-Y benches ○ Measurement technologies
ZB	High preload	$0.06 – 0.08\ C_{dyn}$	High structural rigidity required, presence of shocks and vibrations	○ Machine tools ○ Grinding machines ○ NC Lathes ○ Horizontal and vertical milling cutters ○ Z axes in machine tools, ○ High-performance cutting machines

3.4.6 Load capacity and moments





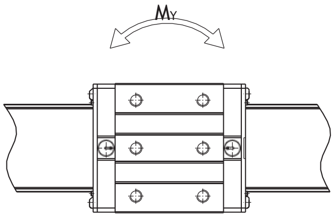


Table 3.60 **WE/QW series load capacity and moments**

Series/ Size	Dynamic load capacity C_{dyn} [N] [1)]	Static load capacity C_0 [N]	Dynamic moment [Nm]			Static moment [Nm]		
			M_R	M_P	M_Y	M_{OR}	M_{OP}	M_{OY}
WE_17C	5,230	9,640	82	34	34	150	62	62
WE_21C	7,210	13,700	122	53	53	230	100	100
QW_21C	9,000	12,100	156	67	67	210	90	90
WE_27C	12,400	21,600	242	98	98	420	170	170
QW_27C	16,000	22,200	303	144	144	420	200	200
WE_35C	29,800	49,400	893	405	405	1,480	670	670
WE_35C	36,800	49,200	1,129	486	486	1,510	650	650
WE_50C	61,520	97,000	2,556	1,244	1,244	4,030	1,960	1,960

1) Dynamic load capacity for a distance travelled of 50,000 m

3.4.7 Stiffness

The stiffness depends on the preload.
With formula F 3.10 it is possible to determine the deformation according to the stiffness.

F 3.10

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

δ Deformation [µm]
P Service load [N]
k Stiffness [N/µm]

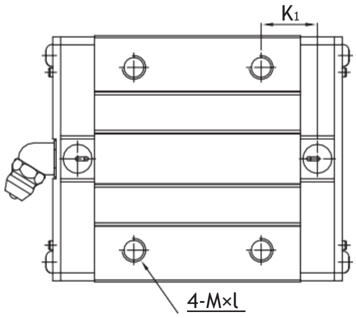
Table 3.61 **Radial Stiffness for WE/QW Series**

Load class	Series/ Size	Stiffness 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

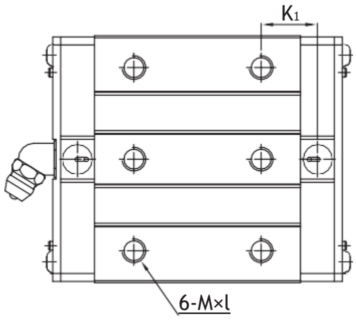
Unit: N/µm

3.4.8 WE/QW block dimensions

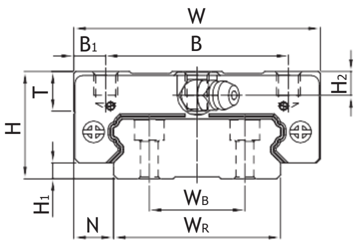
3.4.8.1 WEH/QWH



WE_17
WE/QW_21



WE/QW_27
WE/QW_35
WE_50



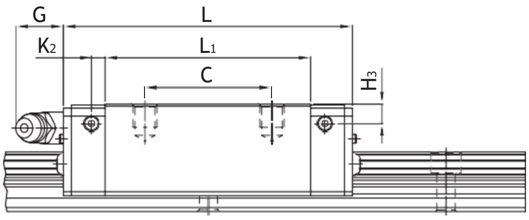
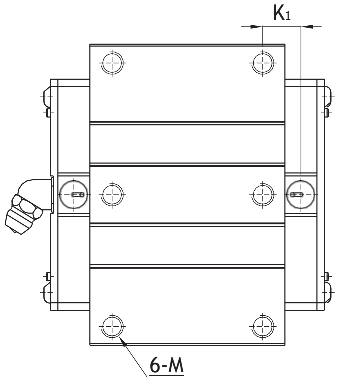


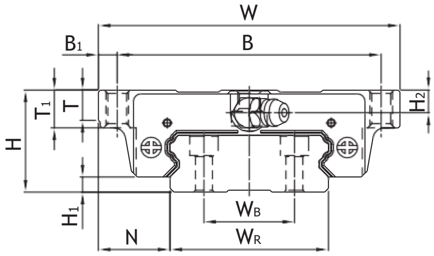
Table 3.62 **Block dimensions**

Series/ Size	Mounting size [mm]			Block dimensions [mm]													Load coefficient [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	73.0	107.0	21.5	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 rail dimensions, see Page 83; for standard and optional lubrication fittings see Page 126

3.4.8.2 WEW/QWW





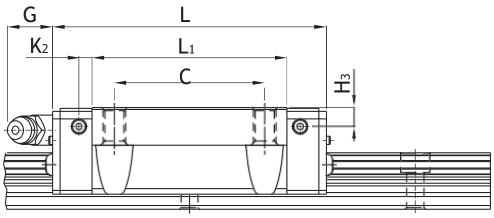


Table 3.63 **Block dimensions**

Series/ Size	Mounting size [mm]			Block dimensions [mm]															Load coefficient [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 rail dimensions, see Page 83; for standard and optional lubrication fittings see Page 126

3.4.9 WE rail dimensions

3.4.9.1 WER_R dimensions

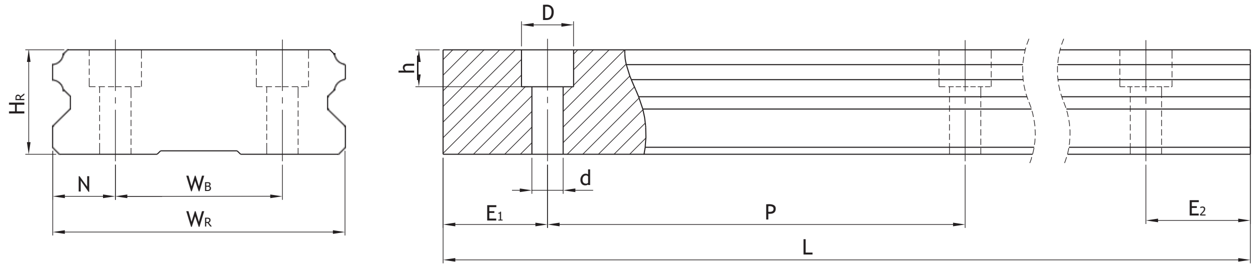


Table 3.64 **WER_R rail dimensions**

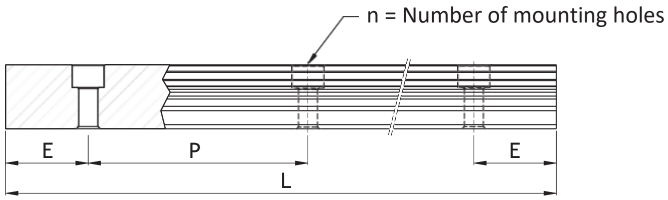
Series/ Size	Mounting screw for rail [mm]	Rail dimensions [mm]							Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	**W_B**	**H_R**	**D**	**h**	**d**	**P**					
WER17R	M4 × 12	33	18	9.3	7.5	5.3	4.5	40	4,000	3,960	6	34	2.2
WER21R	M4 × 12	37	22	11.0	7.5	5.3	4.5	50	4,000	3,950	6	44	3.0
WER27R	M4 × 16	42	24	15.0	7.5	5.3	4.5	60	4,000	3,900	6	54	4.7
WER35R	M6 × 20	69	40	19.0	11.0	9.0	7.0	80	4,000	3,920	8	72	9.7
WER50R	M8 × 25	90	60	24.0	14.0	12.0	9.0	80	4,000	3,920	9	71	14.6

Notes:

1. Without indicating the size E1/2, considering E1/2 min it is possible to determine the maximum number of mounting holes.
2. The rails are cut to the desired length. Without any indication of the size E1/2 symmetrical will be performed.

3.4.9.2 Calculation of the length of the rails

HIWIN offers rails with custom lengths.
At the same time, the value E1/2 must be between E1/2 min and E1/2 max so as not to interfere with the mounting hole.



F 3.11

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

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

3.4.9.3 Anchor screw tightening torques

Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 3.65 **Tightening torques of the mounting bolts according to ISO 4762-12.9**

Series/Size	Screw size	Torque [Nm]	Series/Size	Screw size	Torque [Nm]
WE_17	M4	4	**WE/QW_35**	M6	13
WE/QW_21	M4	4	**WE_50**	M8	30
WE/QW_27	M4	4			

3.4.9.4 Caps for rail mounting holes

The caps are used to prevent chips and dirt from entering the mounting holes. The standard plastic caps are supplied together with individual rails. Additional optional caps must be ordered separately.

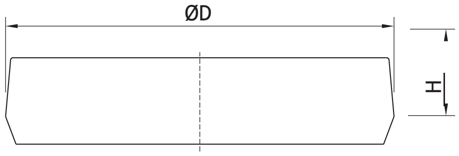


Table 3.66 **Caps for rail mounting holes**

Rail	Screw	Article number					Ø D [mm]	Height H [mm]
		Plastic		**Brass**		**Steel**		
		GmbH	**TW**	**GmbH**	**GmbH**			
WER17R	M4	5-002218	950002C1	5-001344	95000FA1	–	7.5	1.2
WER21R	M5	5-002220	950003D2	5-001350	95000GA1	5-001352	9.5	2.5
WER27R	M6	5-002221	950004D2	5-001355	95000HA1	5-001357	11.0	2.8
WER35R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
WER50R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5

3.4.10 Sealing systems

Several sealing systems are available for HIWIN blocks. An overview is also available on page 22. The following table shows the total length of the blocks with the different sealing systems. Sealing systems are available for these sizes.

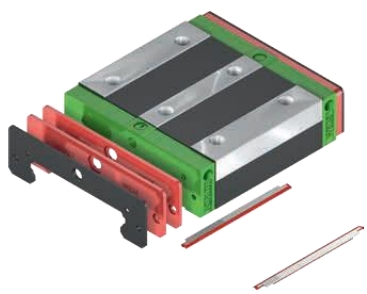


Table 3.67 **Overall length of blocks with different sealing systems**

Series/ Size	Total length L			
	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

3.4.11 Sealing set coding

Sealing sets are always supplied complete with mounting screws and include the appropriate necessary parts in addition to the standard seal.

WE 21 SS

Series:
WE
QW

Dimensions:
WE: 17, 21, 27, 35, 50
QW: 21, 27, 35

Dust protection identifier:
SS: Standard seal
ZZ: Front seal with metal sheet
DD: Double front seal
KK: Double front seal with metal sheet

3.4.12 Friction

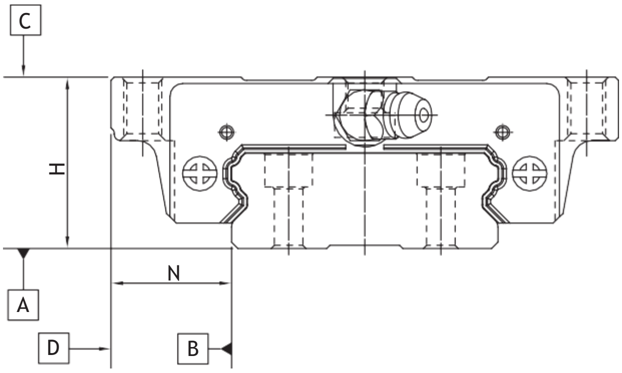
The table shows the maximum resistance to advancement of the individual front seals. Depending on the classification of the seal (SS, ZZ, DD, KK) it will be necessary to multiply the value correspondingly. The values indicated are valid for blocks on untreated rails.
Higher frictional forces are created on treated rails.

Table 3.68 **Seal resistance to advancement**

Series/Size	Friction [N]	Series/Size	Friction [N]
WE_17	1.2	**WE/QW_35**	3.9
WE/QW_21	2.0	**WE_50**	3.9
WE/QW_27	2.9		

3.4.13 Tolerances according to the precision class

The WE and QW e series are available in five different precision classes, depending on the parallelism between blocks and rails and the precision of the height H and width N. The choice is determined by the requirements of the machine in which the linear guides are applied. HIWIN srl manages up to class P in its premises.



3.4.14 Parallelism

Parallelism between the abutment surface of the block D and the rail B and parallelism between the upper surface of the block C and the support surface of the rail A. The measurement is considered with the rail mounted in optimal conditions and in the centre of each block.

Table 3.69 **Tolerance of the parallelism between the block and rail**

Rail length [mm]	Precision 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

3.4.14.1 Precision – height and width

Height tolerance H
Maximum absolute deviation of height H, measured between the upper surface of block C and the lower surface of rail A for any position of the block on the rail.

Height variation H
Maximum relative deviation of the height H between two or more blocks on the same rail or on rails in parallel, measured in the same position as the rail.

Width tolerance N
Maximum absolute deviation of the width N, measured between the abutment surfaces of the block D and the rail B for any position of the block on the rail.

Width variation N
Maximum relative deviation of the width N between two or more blocks on the same rail, measured in the same position as the rail.

Table 3.70 **Height and width tolerance**

Series/dimensions	Precision class	Height tolerance H	Width tolerance N	Height variation H	Width variation 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/– 0.03 [1)]	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/– 0.04 [1)]	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/– 0.05 [1)]	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)] Fully assembled linear guide

3.4.14.2 Permissible tolerances of mounting surfaces

To make the most of the precision, rigidity and durability of the WE and QW guides, surface processing tolerances must be respected.

Reference surface parallelism (P):

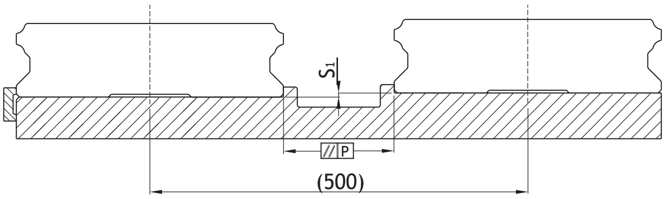


Table 3.71 **Maximum parallelism tolerance (P)**			
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
WE_17	20	15	9
WE/QW_21	25	18	9
WE/QW_27	25	20	13
WE/QW_35	30	22	20
WE_50	40	30	27

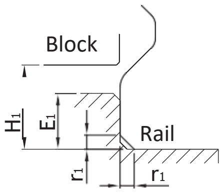
Unit: µm

Table 3.72 **Maximum reference surface height difference tolerance d_1 (S)**			
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
WE_17	65	20	—
WE/QW_21	130	85	45
WE/QW_27	130	85	45
WE/QW_35	130	85	70
WE_50	170	110	90

Unit: µm

3.4.15 Stop heights and connecting radius

If the mounting surface shoulder heights and fittings are not correct, the precision will be different from that expected and there will be an interference with the rail or block profile. In order to avoid problems during assembly, it is necessary to follow the following stop heights and the following recommended bevel radii.



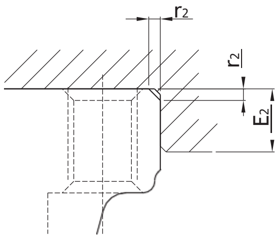


Table 3.73 **Stop heights and connecting radius**					
Series/Size	Max. bevel radius r_1	Max. bevel radius r_2	Rail reference shoulder height E_1	Block reference shoulder height E_2	Free clearance under block H_1
WE_17	0.4	0.4	2.0	4.0	2.5
WE/QW_21	0.4	0.4	2.5	5.0	3.0
WE/QW_27	0.5	0.5	3.0	7.0	4.0
WE/QW_35	0.5	0.5	3.5	10.0	4.0
WE_50	0.8	0.8	6.0	10.0	7.5

Unit: mm

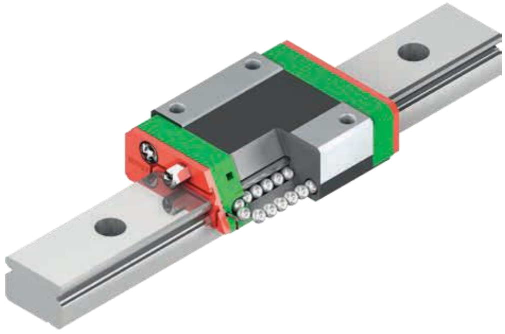
3.5 Series MG

3.5.1 Characteristics of the MG series linear guides

The HIWIN MGN series linear guides are based on the consolidated HIWIN technology. The Gothic arc profile of the tracks supports the load in all directions and is particularly rigid and precise. Thanks to its compact and lightweight construction, it is particularly suitable for use in small devices.

3.5.2 MGN series structure

- Guide with 2 recirculating balls
- Gothic arc profile of the tracks
- Stainless steel block and balls
- Stainless steel rails
- Compact and lightweight construction
- The balls are separated from the miniature retaining elements
- Lubrication connection available for MGN15
- Sealing elements
- Interchangeable models are available in various precision classes



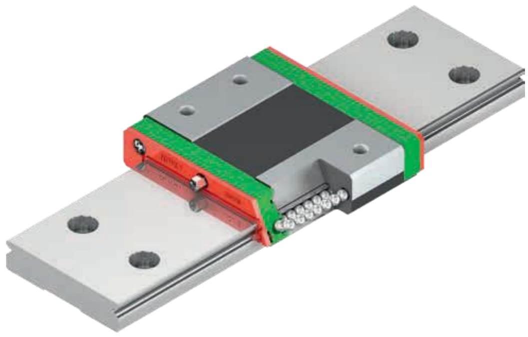
MGN series structure

3.5.3 Characteristics of the MGW series linear guides

The HIWIN MGW series linear guides are based on the consolidated HIWIN technology. The Gothic arc profile of the tracks supports the load in all directions and is particularly rigid and precise. Thanks to the wider rail, compared to the MGN series, the MGW series is able to respond much better to loads at torsional moments.

3.5.4 MGW series structure

- Guide with 2 recirculating balls
- Gothic arc profile of the tracks
- Stainless steel block and balls
- Standard or stainless steel rails
- Compact and lightweight construction
- The balls are retained by a miniature holder
- Lubrication fitting available for MGW15
- Closing seal
- Interchangeable models are available in various precision classes



MGW series structure

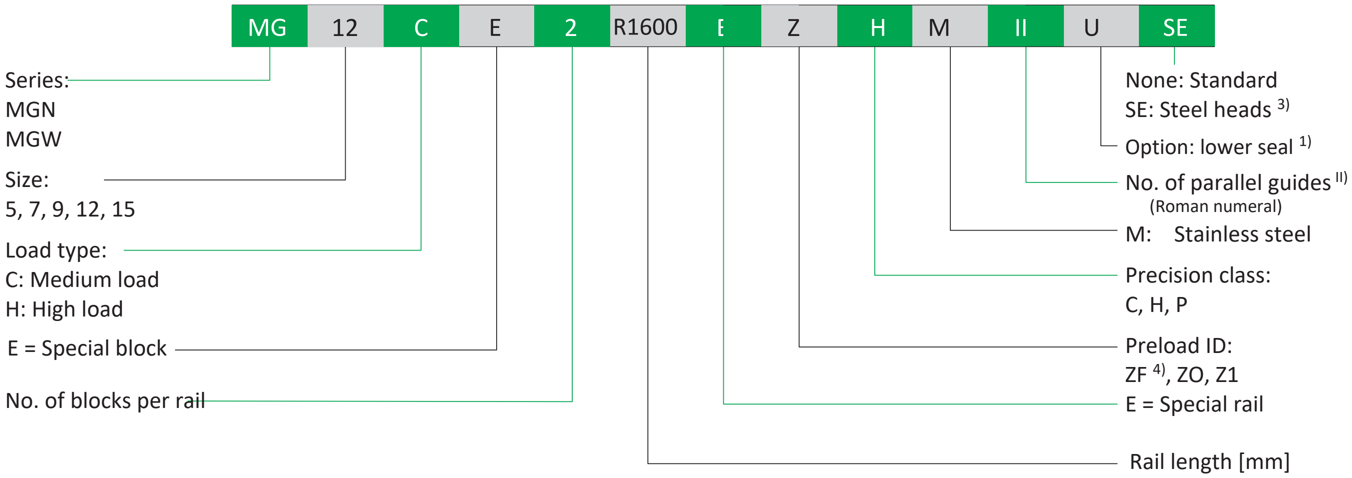
3.5.5 MG series applications

The MGN and MGW series can be used in the most diverse areas, for example in the semiconductor industry, in the production of electronic board components, in medical technology, in automation and in other contexts that require miniaturised guides.

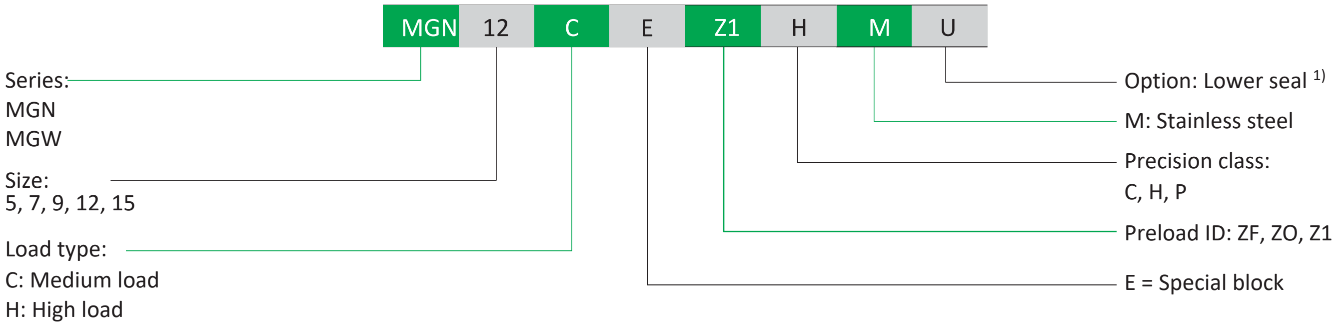
3.5.6 MG series order codes

The MGN and MGW linear guides can be managed assembled or interchangeable. The sizes of both models are identical. The main difference is that in the case of interchangeable models the blocks and rails can be replaced and operated freely. Blocks and rails can be ordered separately and assembled by the customer.

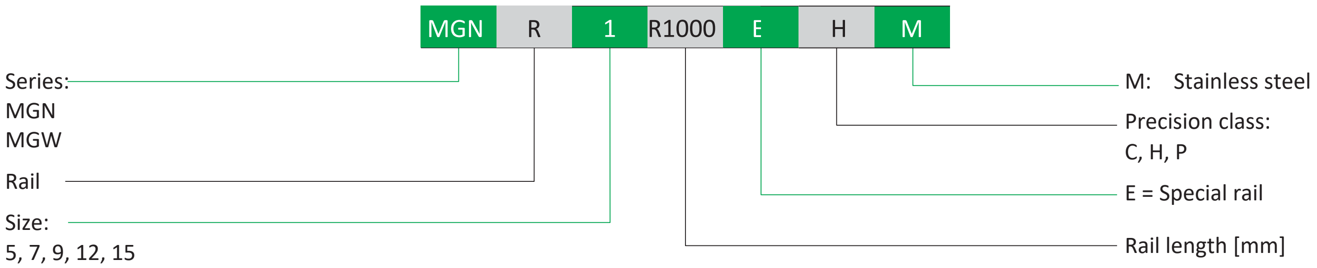
Order code for linear guides (fully assembled)



Block order code (not mounted)



Order code for rail (not mounted)



Note:

[1] Available for the MGN and MGW series in sizes 12 and 15.

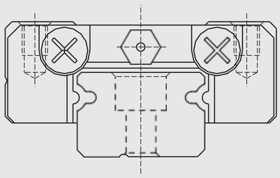
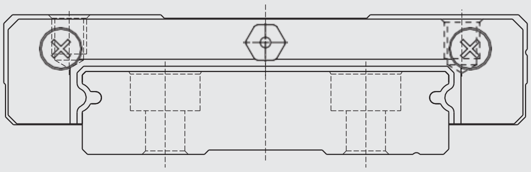
[II] The Roman numeral indicates the number of guides whose parallel is expected and means that an element of the article described above refers numerically to a guide. In the case of single rails, no figures are indicated. By default, the joined rails are delivered with staggered joints.

[3] Available for MGN 7, 9, 12, 15 and MGW 12, 15.

[4] Not available for paired rails and for MG 5

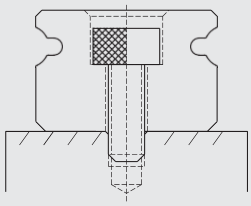
3.5.7 Block types

Table 3.74 **Block types**

Type	Series/ Size	Structure	Tolerance [mm]	Rail length [mm]	Characteristic applications
Narrow variant	MGN-C MGN-H		8 – 16	250 – 2.000	Automation technology High speed transport equipment Precision measurement tools Semiconductor production equipment
Wide variant	MGW-C MGW-H		9 – 16		

3.5.8 Rail Types

Table 3.75 **Rail Types**

Upper fastening

MG_R

3.5.9 Preload

MGN/MGW series offer three preloads, suitable for different applications and conditions

Table 3.76 **Preload ID**

ID	Preload	Precision class
ZF	Slight clearance: 4 – 10µm	C, H
Z0	No clearance, very slight preload	C – P
Z1	Slight preload: 0 – 0.02 C_{dyn}	C – P

[1)] Not available for size 5

3.5.10 Load capacity and moments

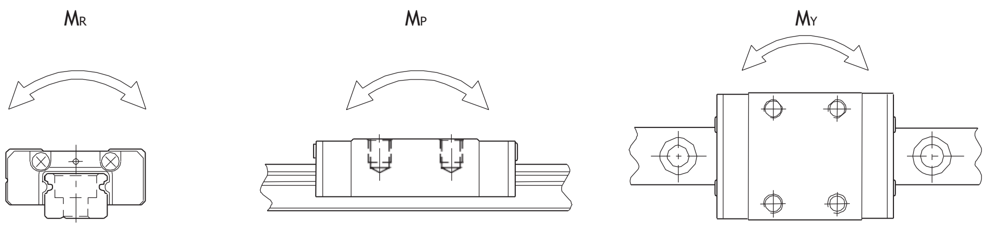


Table 3.77 **MG series load capacity and moments**

Series/ Size	Base dynamic load capacity C_{dyn} [N] [1)]	Static load capacity C_0 [N]	Dynamic moment [Nm]			Static moment [Nm]		
			M_R	M_P	M_Y	M_{OR}	M_{OP}	M_{OY}
MGN05C	540	840	1.3	0.8	0.8	2.0	1.3	1.3
MGN05H	670	1,080	1.6	1.4	1.4	2.6	2.3	2.3
MGN07C	980	1,245	3.0	2.0	2.0	4.7	2.8	2.8
MGN07H	1,370	1,960	5.0	3.0	3.0	7.6	4.8	4.8
MGN09C	1,860	2,550	8.0	5.0	5.0	11.8	7.4	7.4
MGN09H	2,550	4,020	12.4	11.8	11.8	19.6	18.6	18.6
MGN12C	2,840	3,920	18.0	10.0	10.0	25.5	13.7	13.7
MGN12H	3,720	5,880	24.0	23.0	23.0	38.2	36.3	36.3
MGN15C	4,610	5,590	37.0	18.0	18.0	45.1	21.6	21.6
MGN15H	6,370	9,110	52.0	41.0	41.0	73.5	57.8	57.8
MGW05C	680	1,180	3.2	1.6	1.6	5.5	2.7	2.7
MGW07C	1,370	2,060	10.0	4.0	4.0	15.7	7.1	7.1
MGW07H	1,770	3,140	13.0	8.0	8.0	23.5	15.5	15.5
MGW09C	2,750	4,120	27.0	12.0	12.0	40.1	18.0	18.0
MGW09H	3,430	5,890	32.0	20.0	20.0	54.5	34.0	34.0
MGW12C	3,920	5,590	50.0	19.0	19.0	70.3	27.8	27.8
MGW12H	5,100	8,240	64.0	36.0	36.0	102.7	57.4	57.4
MGW15C	6,770	9,220	149.0	42.0	42.0	199.3	56.7	56.7
MGW15H	8,930	13,380	196.0	80.0	80.0	299.0	122.6	122.6

[1)] Dynamic load capacity for a distance travelled of 50,000 m

3.5.11 Stiffness

The stiffness depends on the preload. With formula F 3.12 it is possible to determine the deformation according to the stiffness.

F 3.12

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

δ Deformation [µm]
P Service load [N]
k Stiffness [N/µm]

Table 3.78 **Radial Stiffness for MGN series**

Load class	Series/ Size	Stiffness according to preload	
		Z0	**Z1**
Medium load	**MGN07C**	26	33
	MGN09C	37	48
	MGN12C	44	56
	MGN15C	57	74
High load	**MGN07H**	39	51
	MGN09H	56	73
	MGN12H	63	81
	MGN15H	87	113

Unit: N/µm

Table 3.79 **Radial stiffness of the MGW series**

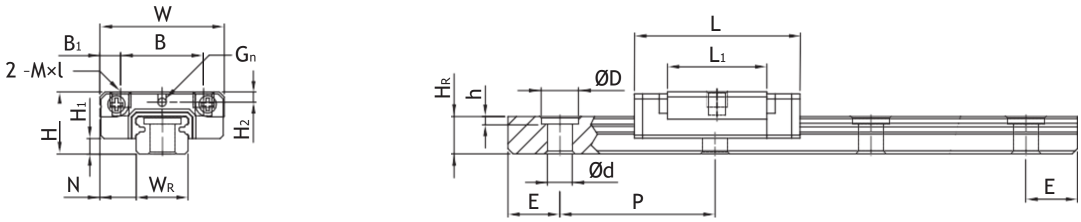
Load class	Series/ Size	Stiffness according to preload	
		Z0	**Z1**
Medium load	**MGW07C**	38	49
	MGW09C	55	71
	MGW12C	63	81
	MGW15C	78	101
High load	**MGW07H**	54	70
	MGW09H	74	95
	MGW12H	89	114
	MGW15H	113	145

Unit: N/µm

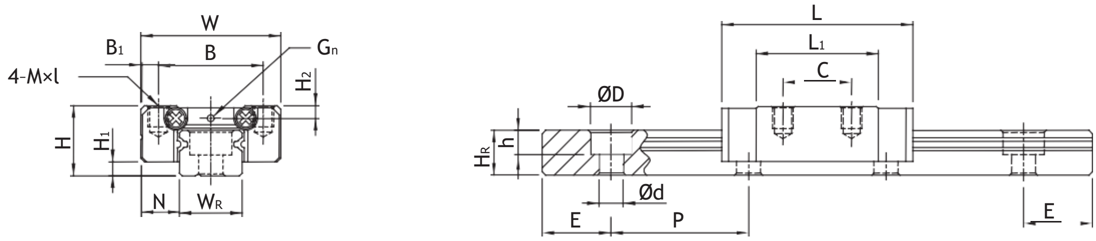
3.5.12 MG block dimensions

3.5.12.1 MGN

MGN05



MGN07, MGN09, MGN12



MGN15

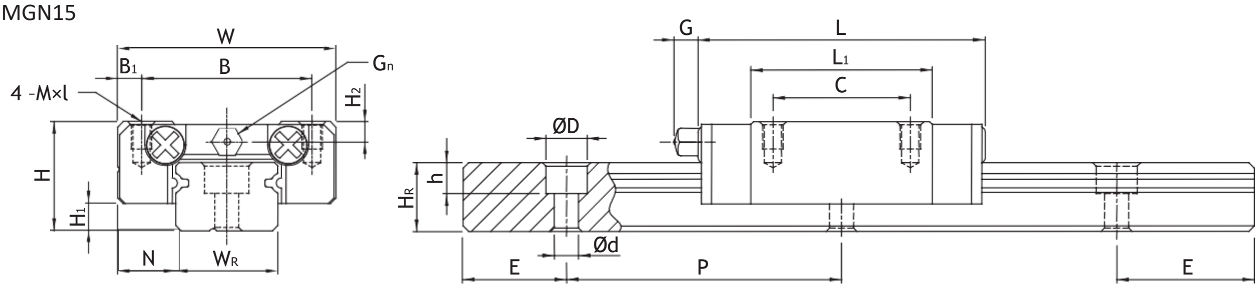


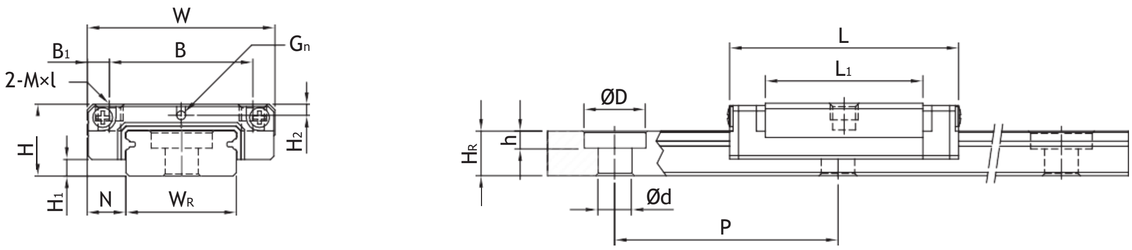
Table 3.80 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]										Load coefficients [N]		Weight [kg]
	H	H_1	N	W	B	B_1	C	L_1	L	G	G_n	M × l	H_2	C_{dyn}	C_0	
MGN05C	6	1.5	3.5	12	8	2.0	—	9.6	16.0	—	Ø 0.8	M2 × 1.5	1.0	540	840	0.008
MGN05H							—	12.6	19.0					670	1,080	0.010
MGN07C	8	1.5	5.0	17	12	2.5	8	13.5	22.5	—	Ø 1.2	M2 × 2.5	1.5	980	1,245	0.010
MGN07H							13	21.8	30.8					1,372	1,960	0.020
MGN09C	10	2.0	5.5	20	15	2.5	10	18.9	28.9	—	Ø 1.4	M3 × 3	1.8	1,860	2,550	0.020
MGN09H							16	29.9	39.9					2,550	4,020	0.030
MGN12C	13	3.0	7.5	27	20	3.5	15	21.7	34.7	—	Ø 2	M3 × 3.5	2.5	2,840	3,920	0.030
MGN12H							20	32.4	45.4					3,720	5,880	0.050
MGN15C	16	4.0	8.5	32	25	3.5	20	26.7	42.1	4.5	M3	M3 × 4	3.0	4,610	5,590	0.060
MGN15H							25	43.4	58.8					6,370	9,110	0.090

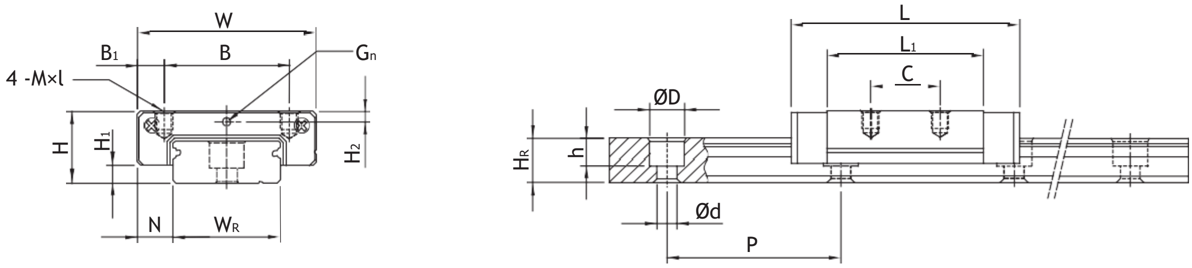
For rail dimensions, see Page 96; for standard and optional lubrication fittings see Page 126

3.5.12.2 MGW

MGW05



MGW07, MGW09, MGW12



MGW15

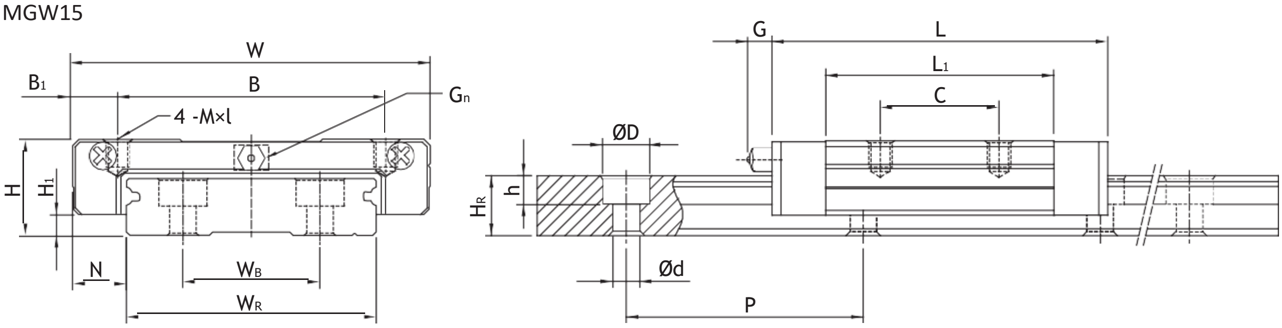


Table 3.81 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]										Load coefficients [N]		Weight [kg]
	H	**H_1**	**N**	**W**	**B**	**B_1**	**C**	**L_1**	**L**	**G**	**G_n**	**M × l**	**H_2**	**C_{dyn}**	**C_0**	
MGW05C	6.5	1.5	3.5	17	13	2.0	—	14.1	20.5	—	Ø 1.2	M2.5 × 1.5	1.00	680	1,180	0.02
MGW07C	9.0	1.9	5.5	25	19	3.0	10	21.0	31.2	—	Ø 1.2	M3 × 3	1.85	1,370	2,060	0.02
MGW07H							19	30.8	41.0					1,770	3,140	0.03
MGW09C	12.0	2.9	6.0	30	21	4.5	12	27.5	39.3	—	Ø 1.4	M3 × 3	2.40	2,750	4,120	0.04
MGW09H					23	3.5	24	38.5	50.7					3,430	5,890	0.06
MGW12C	14.0	3.4	8.0	40	28	6.0	15	31.3	46.1	—	Ø 2	M3 × 3.6	2.80	3,920	5,590	0.07
MGW12H							28	45.6	60.4					5,100	8,240	0.10
MGW15C	16.0	3.4	9.0	60	45	7.5	20	38.0	54.8	5.2	M3	M4 × 4.2	3.20	6,770	9,220	0.14
MGW15H							35	57.0	73.8					8,930	13,380	0.22

For rail dimensions, see Page 96; for standard and optional lubrication fittings see Page 126

3.5.13 MG rail dimensions

3.5.13.1 MGN_R dimensions

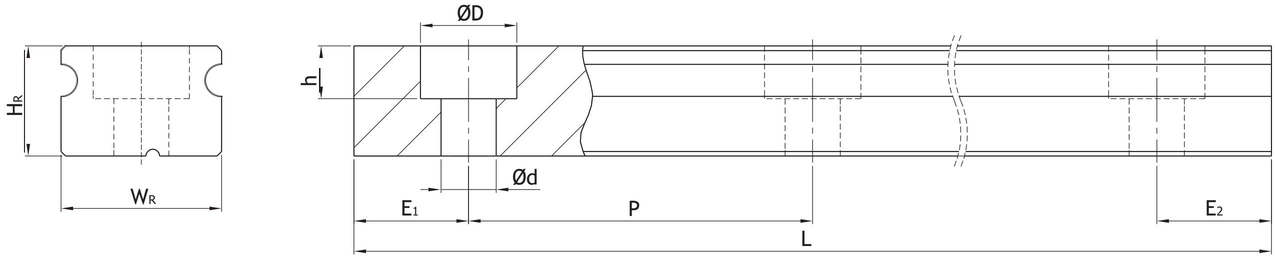


Table 3.82 **MGN_R rail dimensions**

Series/ Size	Mounting screw for rail [mm]	Rail dimensions [mm]						Max. length [mm]	Max length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	H_R	D	h	d	P					
MGNR05R	M2 × 6	5	3.6	3.6	0.8	2.4	15	250	225	4	11	0.15
MGNR07R	M2 × 6	7	4.8	4.2	2.3	2.4	15	600	585	5	12	0.22
MGNR09R	M3 × 8	9	6.5	6.0	3.5	3.5	20	1.200	1.180	5	15	0.38
MGNR12R	M3 × 8	12	8.0	6.0	4.5	3.5	25	2.000	1.975	5	20	0.65
MGNR15R	M3 × 10	15	10.0	6.0	4.5	3.5	40	2.000	1.960	6	34	1.06

3.5.13.2 MGW_R dimensions

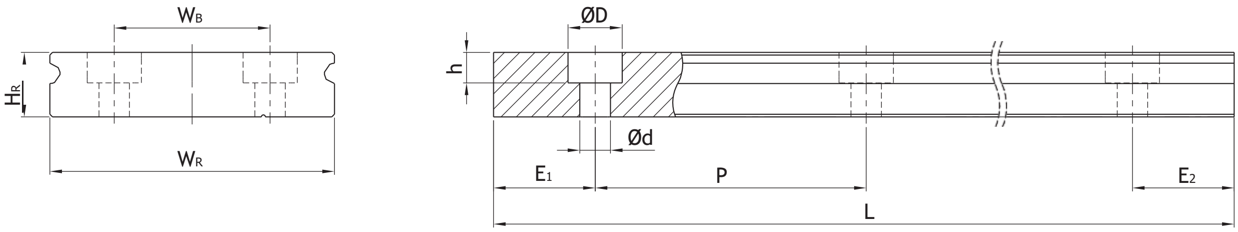


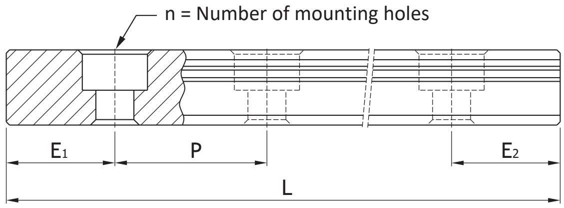
Table 3.83 **MGW_R rail dimensions**

Series/ Size	Screws per rail [mm]	Rail size [mm]							Max. length [mm]	Max length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	H_R	W_B	D	h	d	P					
MGWR05R	M2.5 × 7	10	4.0	—	5.5	1.6	3.0	20	250	220	4	11	0.34
MGWR07R	M3 × 6	14	5.2	—	6.0	3.2	3.5	30	600	570	6	24	0.51
MGWR09R	M3 × 8	18	7.0	—	6.0	4.5	3.5	30	1,200	1,170	6	24	0.91
MGWR12R	M4 × 8	24	8.5	—	8.0	4.5	4.5	40	2,000	1,960	8	32	1.49
MGWR15R	M4 × 10	42	9.5	23	8.0	4.5	4.5	40	2,000	1,960	8	32	2.86

Note:

1. Without indicating the size $E_{1/2}$, considering $E_{1/2}$ min it is possible to determine the maximum number of mounting holes.
2. The rails are cut to the desired length. Without any indication of the size $E_{1/2}$ symmetrical will be performed.

3.5.13.3 Calculation of the length of the rails
HIWIN offers rails with custom lengths.
At the same time, the value $E_{1/2}$ must be between E1/2 min and E1/2 max so as not to interfere with the mounting hole.



F 3.13 $L = (n - 1) \times P + E_1 + E_2$

L Total rail length [mm]
n Number of mounting holes
P Distance between the two mounting holes [mm]
E1/2 Distance from first to last hole from the rail end [mm]

3.5.13.4 Anchor screw tightening torques
Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 3.84 **Tightening torques of fastening screws according to ISO 4762-12.9**

Series/Size	Screw size	Torque [Nm]	Series/Size	Screw size	Torque [Nm]
MGN05	M2 × 6	0.6	**MGW05**	M2.5 × 7	1.2
MGN07	M2 × 6	0.6	**MGW07**	M3 × 6	2.0
MGN09	M3 × 8	2.0	**MGW09**	M3 × 8	2.0
MGN12	M3 × 8	2.0	**MGW12**	M4 × 8	4.0
MGN15	M3 × 10	2.0	**MGW15**	M4 × 10	4.0

3.5.13.5 Caps for rail mounting holes
The caps are used to prevent chips and dirt from entering the mounting holes. The standard plastic caps are supplied together with the individual rails.

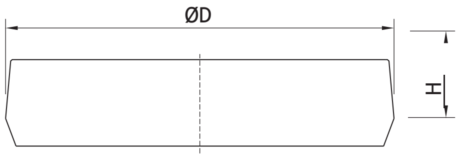


Table 3.85 **Caps for rail mounting holes**

Rail	Screw	Article number				Ø D [mm]	Height H [mm]
		Plastic		**Brass**			
		GmbH	**TW**	**GmbH**	**TW**		
MGNR09R	M3	5-002217[1)]	950001B1	5-001340[1)]	95000EA1	6	1.2
MGNR12R	M3	5-002217	950001B1	5-001340	95000EA1	6	1.2
MGNR15R	M3	5-002217	950001B1	5-001340	95000EA1	6	1.2
MGWR09R	M3	5-002217	950001B1	5-001340	95000EA1	6	1.2
MGWR12R	M4	5-002215	95000XA2	—	—	8	1.2
MGWR15R	M4	5-002215	95000XA2	—	—	8	1.2

1) Standard: no caps. Specify in the order if the caps are required; it is possible to mount them only with lowered cylindrical head bolts according to DIN 7984

3.5.14 Sealing systems

The MG series blocks are fitted with standard front seals on both sides to prevent dust from entering the block. You can also order the bottom seals by adding “+U” followed by the model number. For sizes 12 and 15 the bottom seals are available as an option, while this option is not available for sizes 5, 7 and 9 due to the size limits of H_1. If the linear guide is fitted with a lower seal, the side mounting surface of the rail must not be greater than H_1.

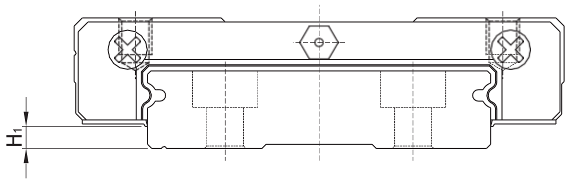
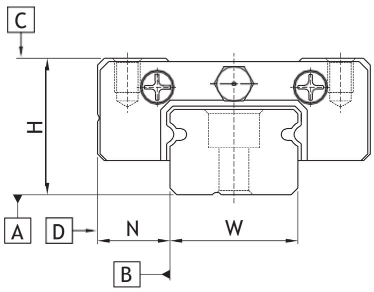


Table 3.86 **Overall dimensions H_1**

Series/Size	Lower seal	H_1	Series/Size	Lower seal	H_1
MGN05	—	—	**MGW05**	—	—
MGN07	—	—	**MGW07**	—	—
MGN09	—	—	**MGW09**	—	—
MGN12	●	2.0	**MGW12**	●	2.6
MGN15	●	3.0	**MGW15**	●	2.6

3.5.15 Tolerances according to the precision class

The MG series are available in three different precision classes, depending on the parallelism between blocks and rails and the precision of the height H and width N. The choice is determined by the requirements of the machine in which the linear guides are applied. HIWIN srl manages up to class P in its premises.



3.5.15.1 Parallelism

Parallelism between the abutment surface of the block D and the rail B and parallelism between the upper surface of the block C and the support surface of the rail A. The measurement is considered with the rail mounted in optimal conditions and in the centre of each block.

Table 3.87 **Tolerance of the parallelism between the block and rail**

Rail length [mm]	Precision class		
	C	**H**	**P**
– 50	12	6	2.0
50 – 80	13	7	3.0
80 – 125	14	8	3.5
125 – 200	15	9	4.0
200 – 250	16	10	5.0
250 – 315	17	11	5.0
315 – 400	18	11	6.0
400 – 500	19	12	6.0
500 – 630	20	13	7.0
630 – 800	22	14	8.0
800 – 1000	23	16	9.0
1000 – 1200	25	18	11.0
1200 – 1300	25	18	11.0
1300 – 1400	26	19	12.0
1400 – 1500	27	19	12.0
1500 – 1600	28	20	13.0
1600 – 1700	29	20	14.0
1700 – 1800	30	21	14.0
1800 – 1900	30	21	15.0
1900 – 2000	31	22	15.0

Unit: µm

3.5.15.2 Precision – height and width

Height tolerance H
Maximum absolute deviation of height H, measured between the upper surface of block C and the lower surface of rail A for any position of the block on the rail.

Height variation H
Maximum relative deviation of the height H between two or more blocks on the same rail or on rails in parallel, measured in the same position as the rail.

Width tolerance N
Maximum absolute deviation of the width N, measured between the abutment surfaces of the block D and the rail B for any position of the block on the rail.

Width variation N
Maximum deviation relative to the width N between two or more blocks on the same rail, measured in the same position of the rail.

Table 3.88 **Height and width tolerance**

Series/Size	Precision class	Height tolerance H	Width tolerance N	Height variation H	Width variation N
MG_05 – MG_15	C (Normal)	± 0.04	± 0.04	0.03	0.3
	H (High)	± 0.02	± 0.025	0015	0.02
	P (Precise)	± 0.01	± 0.015	0007	0.01

Unit: mm

3.5.15.3 Permissible tolerances of mounting surfaces

To make the most of the precision, rigidity and durability of the MG guides it is necessary to respect the surface processing tolerances.

Reference surface parallelism (P):

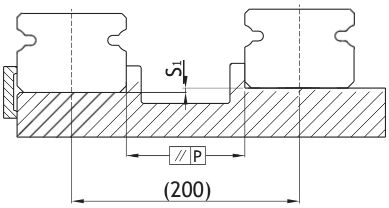


Table 3.89 **Maximum tolerance for parallelism (P)**

Series/Size	Preload class		
	ZF	**Z0**	**Z1**
MG_05	2	2	2
MG_07	3	3	3
MG_09	4	4	3
MG_12	9	9	5
MG_15	10	10	6

Unit: µm

Table 3.90 **Maximum reference surface height tolerance (S_1)**

Series/Size	Preload class		
	ZF	**Z0**	**Z1**
MG_05	20	20	2
MG_07	25	25	3
MG_09	35	35	6
MG_12	50	50	12
MG_15	60	60	20

Unit: µm

Table 3.91 **Mounting surface requirements**

Series/Size	Flatness required for mounting surface
MG_05	0.015/200
MG_07	0.025/200
MG_09	0.035/200
MG_12	0.050/200
MG_15	0.060/200

Note: The values in the table are valid for preload classes ZF and Z0. For Z1 or if several rails are mounted on the same surface, it is advisable to use 50 % or less of the above values.

3.5.16 Stop heights and connecting radius

If the shoulder heights and different connection radius of the mounting surfaces are incorrect, the precision will be different from that expected and an interference will occur with the rail or block profile. By respecting the heights and the fittings provided for the shoulders, it is possible to eliminate any installation errors.

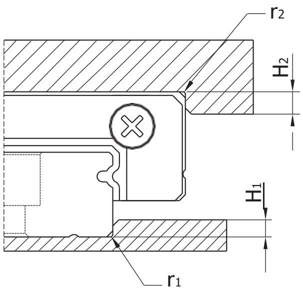


Table 3.92 **Stop heights and connecting radius**

Series/Size	Max bevel radius r_1	Max bevel radius r_2	Shoulder height H_1	Shoulder height H_2
MGN05	0.1	0.2	1.2	2
MGN07	0.2	0.2	1.2	3
MGN09	0.2	0.3	1.7	3
MGN12	0.3	0.4	1.7	4
MGN15	0.5	0.5	2.5	5
MGW05	0.1	0.2	1.2	2
MGW07	0.2	0.2	1.7	3
MGW09	0.3	0.3	2.5	3
MGW12	0.4	0.4	3.0	4
MGW15	0.4	0.8	3.0	5

Unit: mm

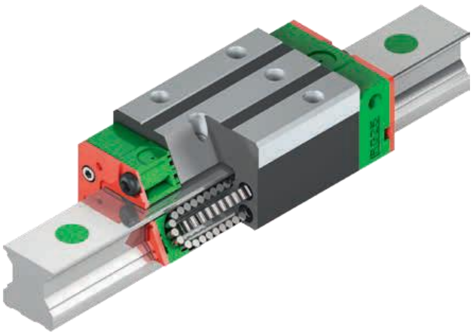
3.6 RG and QR series

3.6.1 Characteristics of the RG and QR series linear guides

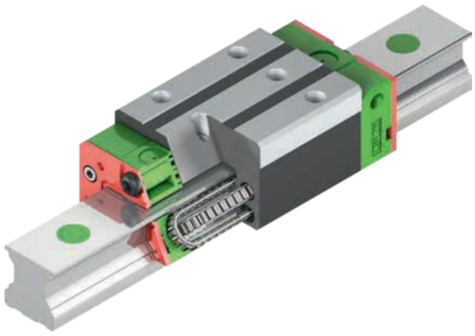
In the HIWIN RG series linear guides the rolling body consists of a roller, rather than a ball. The RG series offers extremely high rigidity and load capacity. These guides have a contact angle of 45°. The elastic deformation of the linear contact surface is considerably reduced, therefore the guide offers significantly higher levels of rigidity and load capacity in all four load directions. The linear guides of the RG series are therefore ideal for the very high precision industry.
The models of the QR series with SynchMotion™ technology offer all the advantages of the standard RG series. In addition, thanks to the controlled movement of the caged rollers, they are characterised by improved sliding, understood as linearity and fluidity of movement, higher speeds, longer lubrication intervals and less noise. Since the mounting dimensions of QR blocks are identical to those of RG blocks, they can also be mounted on the standard RGR rail and are therefore exactly interchangeable. For more information, see Page 24

3.6.2 RG/QR Series Structure

- Guide with 4 recirculating rollers
- 45° contact angle
- Different types of seals are available depending on the field of application
- 6 possible grease nipple and adapter connection options for lubrication
- SynchMotion™ Technology (QR series)



RG series structure



QR series structure

Advantages:

- Exempt from clearance
- Interchangeable
- Very high load coefficients
- Maximum rigidity
- Low forward forces even with high preload

Additional QR series benefits:

- Improved sliding
- Optimised for higher speeds and accelerations
- Longer lubrication intervals
- Low noise level
- Increased dynamic load capacity

3.6.3 Order codes for RG/QR series

The RG/QR linear guides can be managed assembled or interchangeable. The sizes of both models are identical. The main difference lies in the fact that in the case of interchangeable models the blocks and rails can be replaced and managed freely. The series code indicates the measurement, type, precision class, preload class and so on.

Order code for linear guides (fully assembled)

RG	W	35	C	C	E	2	R	1640	E	Z	P	I	KK	E2

Series:
RG
QR

Block type:
W: Flanged block
H: Compact block

Size:
RG: 15, 20, 25, 30, 35, 45, 55, 65
QR: 25, 30, 35, 45

Load type:
C: Heavy load
H: Super heavy load

Block fastening:
A: From the top
C: From the top and bottom

E = Special block

No. of blocks per rail

Rail Fastening:
R: From the top
T: From the bottom

Rail Length [mm]

E = Special Rail

Preload ID:
Z0, ZA, ZB

Precision class:
H, P, SP, UP

No. parallel rails [1)]

Dust protection: [2)]
None: Standard (SS)
ZZ, DD, KK, SW [3)], ZW [3)]

None: Standard
E2: Oil lubrication unit [3)]

Block order code (not mounted)

RG	W	25	C	C	E	ZA	H	ZZ	E2

Series:
RG
QR

Block type:
W: Flanged block
H: Compact block

Size:
RG: 15, 20, 25, 30, 35, 45, 55, 65
QR: 25, 30, 35, 45

Load type:
C: Heavy load
H: Super heavy load

Block fastening:
A: From the top
C: From top or bottom

E = Special block

Preload ID: Z0, ZA, ZB

Precision class: H, P

Dust protection [2)]:
None: Standard (SS) ZZ, DD, KK, SW [3)], ZWX [3)]

None: Standard
E2: Oil lubrication unit [3)]

Order code for rail (not mounted)

RG	R	25	R	1240	E	H

RG series

Rail

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

Rail fastening [mm]
R: From the top
T: From the bottom

Rail length [mm]

E = Special rail

Precision class: H

Notes:

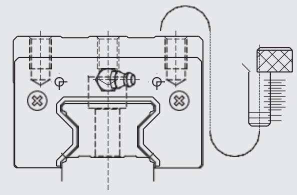
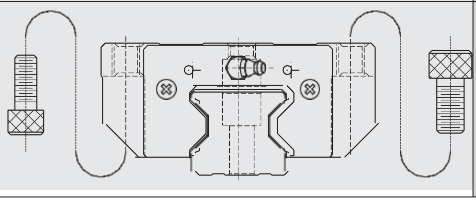
[1)] The Roman numeral indicates the number of guides whose parallel is expected and means that an element of the article described above refers numerically to a guide. In the case of single rails, no figures are indicated. By default, the joined rails are delivered with staggered joints

[2)] Overview of individual sealing systems on page 22

[3)] Only available for RG.

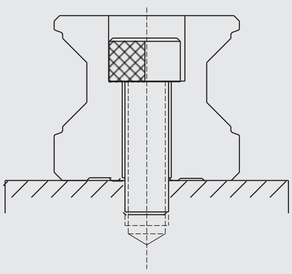
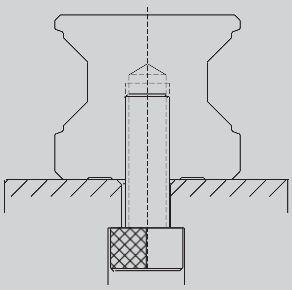
3.6.4 Block types
For its linear guides, HIWIN offers compact and flanged blocks. Thanks to the lower height and the wider mounting surface, flanged blocks are more suitable in the event of high loads.

Table 3.93 **Block types**

Type	Series/ Size	Structure	Tolerance [mm]	Rail length [mm]	Characteristic applications
Compact type	RGH-CA RGH-HA		28 – 90	100 – 4.000	○ Automation technologies ○ Transport technology, ○ CNC Machine tools, ○ High-performance cutting machines ○ CNC grinding machines ○ Injection moulding machines ○ Portal milling cutters ○ Machines and equipment requiring high structural rigidity ○ Machines and equipment requiring high load capacity ○ EDM machines
Flanged block	RGW-CC RGW-HC		24 – 90		

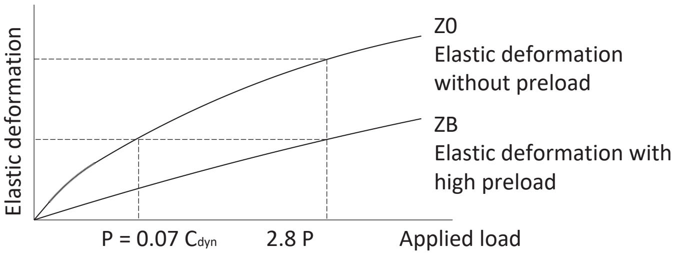
3.6.5 Rail Types
In addition to rails with standard fastening system from the top,
HIWIN also provides rails with fastening system from the bottom

Table 3.94 **Rail types**

Fastening from the top	Fastening from the bottom
	
RGR_R	RGR_T

3.6.6 Preload

Definition
A preload can be applied to each type of guide depending on the size of the balls. The curve shows that the stiffness is doubled when a preload is applied.
The RG/QR series offers three standard preload classes, for various applications and conditions.

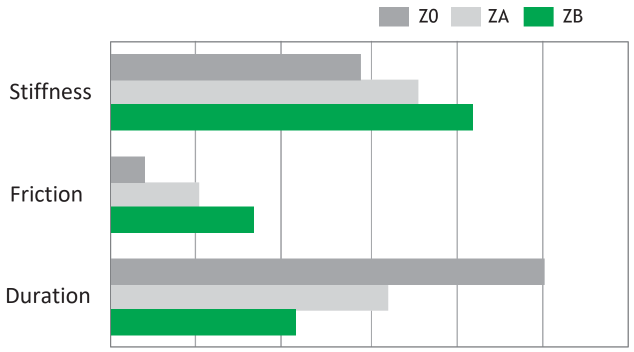


Preload ID

Table 3.95 **Preload ID**

ID	Preload		Application
ZO	Lightweight preload	0.02 – 0.04 C_{dyn}	Constant load direction, limited shocks, limited precision requirements
ZA	Medium preload	0.07 – 0.09 C_{dyn}	High precision requirements
ZB	High preload	0.12 – 0.14 C_{dyn}	Extremely high rigidity requirements, presence of shocks and vibrations

The graph highlights the relationship between stiffness, feed resistance and nominal life. To avoid that the duration of the guide is reduced by an excessive preload, for smaller sizes it is advisable to use preloads not exceeding ZA.



3.6.7 Load capacity and moments

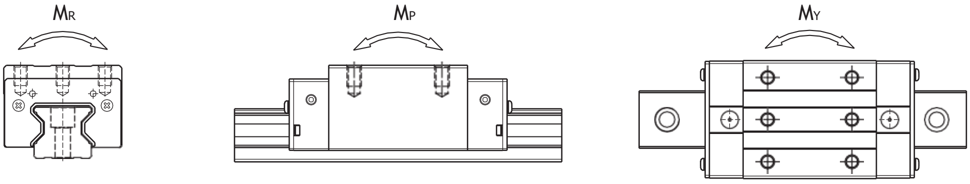


Table 3.96 **RG/QR series load capacity and moments**

Series/ Size	Dynamic Load Capacity C_{dyn} [N] [1)]	Static load capacity C_0 [N]	Dynamic moment [Nm]			Static moment [Nm]		
			M_R	M_P	M_Y	M_{0R}	M_{0P}	M_{0Y}
RG_15C	11,300	24,000	147	82	82	311	173	173
RG_20C	21,300	46,700	296	210	210	647	460	460
RG_20H	26,900	63,000	373	358	358	872	837	837
RG_25C	27,700	57,100	367	293	293	758	605	605
QR_25C	38,500	54,400	511	444	444	722	627	627
RG_25H	33,900	73,400	450	457	457	975	991	991
QR_25H	44,700	65,300	594	621	621	867	907	907
RG_30C	39,100	82,100	688	504	504	1,445	1,060	1,060
QR_30C	51,500	73,000	906	667	667	1,284	945	945
RG_30H	48,100	105,000	845	784	784	1,846	1,712	1,712
QR_30H	64,700	95,800	1,138	1,101	1,101	1,685	1,630	1,630
RG_35C	57,900	105,200	1,194	792	792	2,170	1,440	1,440
QR_35C	77,000	94,700	1,590	1,083	1,083	1,955	1,331	1,331
RG_35H	73,100	142,000	1,508	1,338	1,338	2,930	2,600	2,600
QR_35H	95,700	126,300	1,975	1,770	1,770	2,606	2,335	2,335
RG_45C	92,600	178,800	2,340	1,579	1,579	4,520	3,050	3,050
QR_45C	123,200	156,400	3,119	2,101	2,101	3,959	2,666	2,666
RG_45H	116,000	230,900	3,180	2,748	2,748	6,330	5,470	5,470
QR_45H	150,800	208,600	3,816	3,394	3,394	5,278	4,694	4,694
RG_55C	130,500	252,000	4,148	2,796	2,796	8,010	5,400	5,400
RG_55H	167,800	348,000	5,376	4,942	4,942	11,150	10,250	10,250
RG_65C	213,000	411,600	8,383	5,997	5,997	16,200	11,590	11,590
RG_65H	275,300	572,700	10,839	10,657	10,657	22,550	22,170	22,170

[1)] Dynamic load capacity for a distance travelled of 100,000 m

3.6.8 Stiffness

The stiffness depends on the preload. With formula F 3.14 it is possible to determine the deformation according to the stiffness.

F 3.14 $$\delta = \frac{P}{k}$$

δ Deformation [µm]
P Service load [N]
k Stiffness [N/µm]

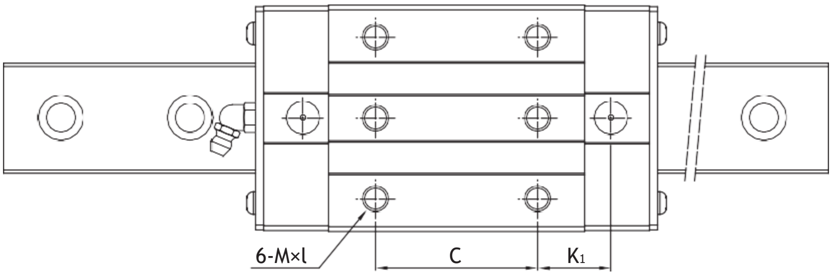
Table 3.97 **Radial stiffness of the RG/QR series**

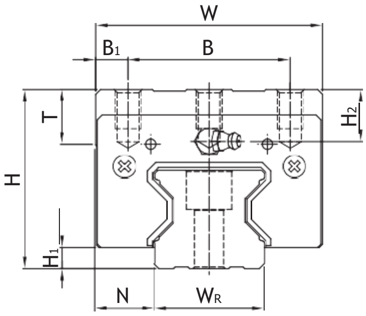
Load class	Series/Size	Stiffness according to preload		
		Z0	**ZA**	**ZB**
Heavy load	**RG_15C**	482	504	520
	RG_20C	586	614	633
	RG_25C	682	717	740
	QR_25C	616	645	665
	RG_30C	809	849	876
	QR_30C	694	726	748
	RG_35C	954	1.002	1.035
	QR_35C	817	856	882
	RG_45C	1.433	1.505	1.554
	QR_45C	1.250	1.310	1.350
	RG_55C	1.515	1.591	1.643
	RG_65C	2.120	2.227	2.300
Super heavy load	**RG_20H**	786	823	848
	RG_25H	873	917	947
	QR_25H	730	770	790
	RG_30H	1.083	1.136	1.173
	QR_30H	910	950	980
	RG_35H	1.280	1.344	1.388
	QR_35H	1.090	1.140	1.170
	RG_45H	1.845	1.938	2.002
	QR_45H	1.590	1.660	1.720
	RG_55H	2.079	2.182	2.254
	RG_65H	2.931	3.077	3.178

Unit: N/µm

3.6.9 RG/QR block dimensions

3.6.9.1 RGH/QRH





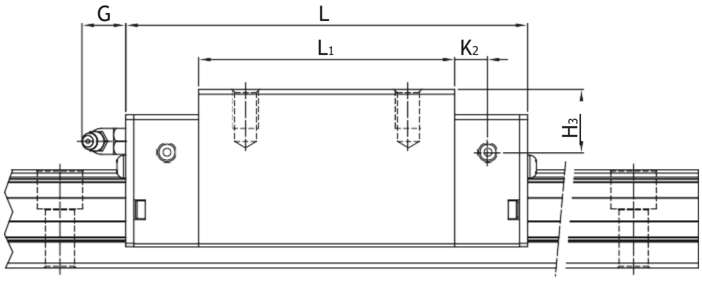


Table 3.98 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]													Load coefficients [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	
RGH15CA	28	4.0	9.5	34	26	4.0	26	45.0	68.0	13.40	4.70	5.3	M4 × 8	6.0	7.6	10.1	11,300	24,000	0.20
RGH20CA	34	5.0	12.0	44	32	6.0	36	57.5	86.0	15.80	6.00	5.3	M5 × 8	8.0	8.3	8.3	21,300	46,700	0.40
RGH20HA							50	77.5	106.0	18.80							26,900	63,000	0.53
RGH25CA	40	5.5	12.5	48	35	6.5	35	64.5	97.9	20.75	7.25	12.0	M6 × 8	9.5	10.2	10.0	27,700	57,100	0.61
RGH25HA							50	81.0	114.4	21.50							33,900	73,400	0.75
QRH25CA	40	5.5	12.5	48	35	6.5	35	66.0	9.9	20.75	7.25	12.0	M6 × 8	9.5	10.2	10.0	38,500	54,400	0.60
QRH25HA							50	81.0	112.9	21.50							44,700	65,300	0.74
RGH30CA	45	6.0	16.0	60	40	10.0	40	71.0	109.8	23.50	8.00	12.0	M8 × 10	9.5	9.5	10.3	39,100	82,100	0.90
RGH30HA							60	93.0	131.8	24.50							48,100	105,000	1.16
QRH30CA	45	6.0	16.0	60	40	10.0	40	71.0	109.8	23.50	8.00	12.0	M8 × 10	9.5	9.5	10.3	51,500	73,000	0.89
QRH30HA							60	93.0	131.8	24.50							64,700	95,800	1.15
RGH35CA	55	6.5	18.0	70	50	10.0	50	79.0	124.0	22.50	10.00	12.0	M8 × 12	12.0	16.0	19.6	57,900	105,200	1.57
RGH35HA							72	106.5	151.5	25.25							73,100	142,000	2.06
QRH35CA	55	6.5	18.0	70	50	10.0	50	79.0	124.0	22.50	10.00	12.0	M8 × 12	12.0	16.0	19.6	77,000	94,700	1.56
QRH35HA							72	106.5	151.5	25.25							95,700	126,300	2.04
RGH45CA	70	8.0	20.5	86	60	13.0	60	106.0	153.2	31.00	10.00	12.9	M10 × 17	16.0	20.0	24.0	92,600	178,800	3.18
RGH45HA							80	139.8	187.0	37.90							116,000	230,900	4.13
QRH45CA	70	8.0	20.5	86	60	13.0	60	106.0	153.2	31.00	10.00	12.9	M10 × 17	16.0	20.0	24.0	123,200	156,400	3.16
QRH45HA							80	139.8	187.0	37.90							150,800	208,600	4.10
RGH55CA	80	10.0	23.5	100	75	12.5	75	125.5	183.7	37.75	12.50	12.9	M12 × 18	17.5	22.0	27.5	130,500	252,000	4.89
RGH55HA							95	173.8	232.0	51.90							167,800	348,000	6.68
RGH65CA	90	12.0	31.5	126	76	25.0	70	160.0	232.0	60.80	15.80	12.9	M16 × 20	25.0	15.0	15.0	213,000	411,600	8.89
RGH65HA							120	223.0	295.0	67.30							275,300	572,700	12.13

For rail dimensions, see Page 110; for standard and optional lubrication fittings see Page 126

3.6.9.2 RGW/QRW

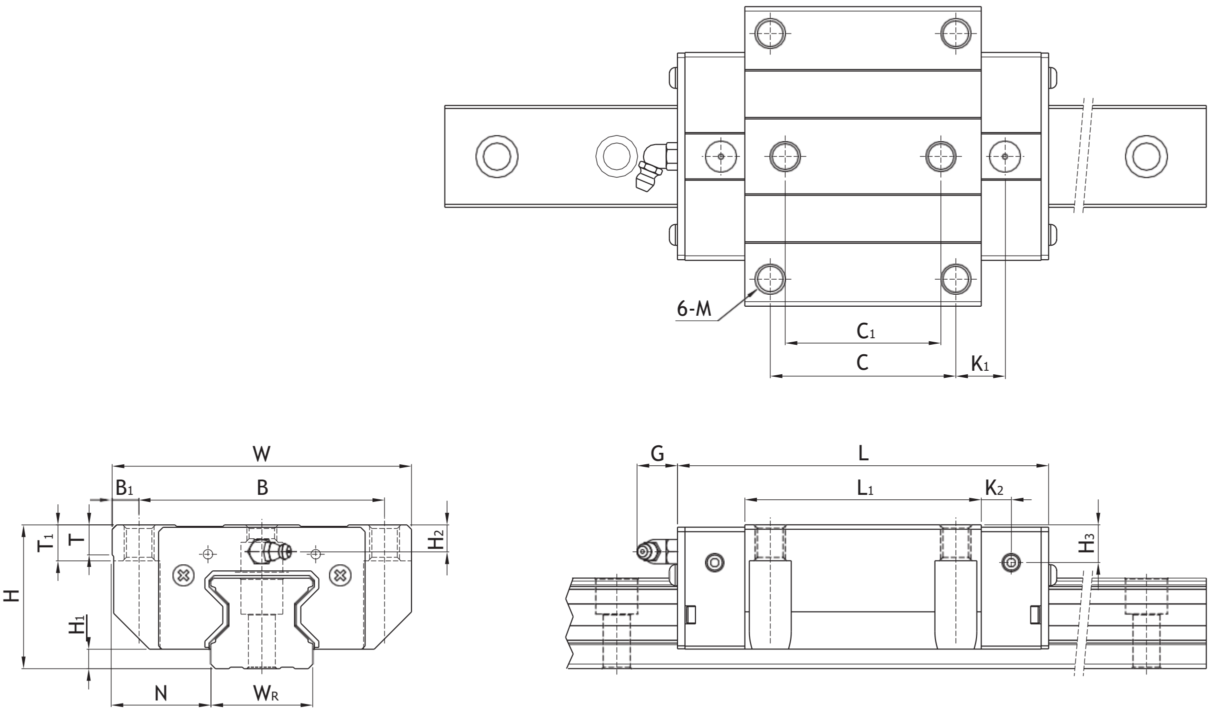


Table 3.99 **Block dimensions**

Series/ Size	Mounting dimensions [mm]			Block dimensions [mm]															Load coefficients [N]		Weight [kg]
	H	H_1	N	W	B	B_1	C	C_1	L_1	L	K_1	K_2	G	M	T	T_1	H_2	H_3	C_{dyn}	C_0	
RGW15CC	24	4.0	16.0	47	38	4.5	30	26	45.0	68.0	11.40	4.70	5.3	M5	6.0	7	3.6	6.1	11,300	24,000	0.22
RGW20CC	30	5.0	21.5	63	53	5.0	40	35	57.5	86.0	13.80	6.00	5.3	M6	8.0	10	4.3	4.3	21,300	46,700	0.47
RGW20HC									77.5	106.0	23.80								26,900	63,000	0.63
RGW25CC	36	5.5	23. 5	70	57	6.5	45	40	64.5	97.9	15.75	7.25	12.0	M8	9.5	10	6.2	6.0	27,700	57,100	0.72
RGW25HC									81.0	114.4	24.00								33,900	73,400	0.91
QRW25CC	36	5.5	23.5	70	57	6.5	45	40	66.0	97.9	15.75	7.25	12.0	M8	9.5	10	6.2	6.0	38,500	54,400	0.71
QRW25HC									81.0	112.9	24.00								44,700	65,300	0.90
RGW30CC	42	6.0	31.0	90	72	9.0	52	44	71.0	109.8	17.50	8.00	12.0	M10	9.5	10	6.5	7.3	39,100	82,100	1.16
RGW30HC									93.0	131.8	28.50								48,100	105,000	1.52
QRW30CC	42	6.0	31.0	90	72	9.0	52	44	71.0	109.8	17.50	8.00	12.0	M10	9.5	10	6.5	7.3	51,500	73,000	1.15
QRW30HC									93.0	131.8	28.50								64,700	95,800	1.51
RGW35CC	48	6.5	33.0	100	82	9.0	62	52	79.0	124.0	16.50	10.00	12.0	M10	12.0	13	9.0	12.6	57,900	105,200	1.75
RGW35HC									106.5	151.5	30.25								73,100	142,000	2.40
QRW35CC	48	6.5	33.0	100	82	9.0	62	52	79.0	124.0	16.50	10.00	12.0	M10	12.0	13	9.0	12.6	77,000	94,700	1.74
QRW35HC									106.5	151.5	30.25								95,700	126,300	2.38
RGW45CC	60	8.0	37.5	120	100	10.0	80	60	106.0	153.2	21.00	10.00	12.9	M12	14.0	15	10.0	14.0	92,600	178,800	3.43
RGW45HC									139.8	187.0	37.90								116,000	230,900	4.57
QRW45CC	60	8.0	37.5	120	100	10.0	80	60	106.0	153.2	21.00	10.00	12.9	M12	14.0	15	10.0	14.0	123,200	156,400	3.41
QRW45HC									139.8	187.0	37.90								150,800	208,600	4.54
RGW55CC	70	10.0	43.5	140	116	12.0	95	70	125.5	183.7	27.75	12.50	12.9	M14	16.0	17	12.0	17.5	130,500	252,000	5.43
RGW55HC									173.8	232.0	51.90								167,800	348,000	7.61
RGW65CC	90	12.0	53.5	170	142	14.0	110	82	160.0	232.0	40.80	15.80	12.9	M16	22.0	23	15.0	15.0	213,000	411,600	11.63
RGW65HC									223.0	295.0	72.30								275,300	572,700	16.58

For rail dimensions, see Page 110; for standard and optional lubrication fittings see Page 126

3.6.10 RG rail dimensions
The RG rail is used for both RG and QR blocks.

3.6.10.1 RGR_R dimensions

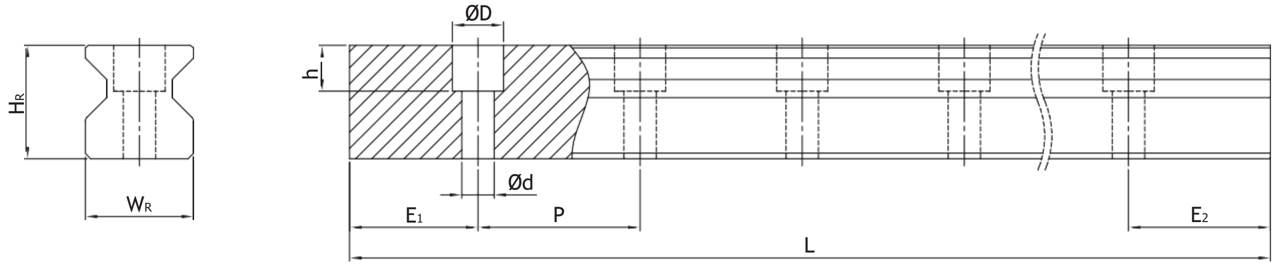


Table 3.10 **RGR_R rail dimensions**

Series/ Size	Mounting screw for rail [mm]	Rail dimensions [mm]						Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
		W_R	H_R	D	h	d	P					
RGR15R	M4 × 16	15	16.5	7.5	5.7	4.5	30.0	4.000	3,960.0	6	24.0	1.70
RGR20R	M5 × 20	20	21.0	9.5	8.5	6.0	30.0	4.000	3,960.0	7	23.0	2.66
RGR25R	M6 × 20	23	23.6	11.0	9.0	7.0	30.0	4.000	3,960.0	8	22.0	3.08
RGR30R	M8 × 25	28	28.0	14.0	12.0	9.0	40.0	4.000	3,920.0	9	31.0	4.41
RGR35R	M8 × 25	34	30.2	14.0	12.0	9.0	40.0	4.000	3,920.0	9	31.0	6.06
RGR45R	M12 × 35	45	38.0	20.0	17.0	14.0	52.5	4.000	3,937.5	12	40.5	9.97
RGR55R	M14 × 45	53	44.0	23.0	20.0	16.0	60.0	4,000/5,600	3,900.0/5,400	14	46.0	13.98
RGR65R	M16 × 50	63	53.0	26.0	22.0	18.0	75.0	4,000/5,600	3,900.0/5,400	15	60.0	20.22

3.6.10.2 RGR_T dimensions (rail mounting from the bottom)

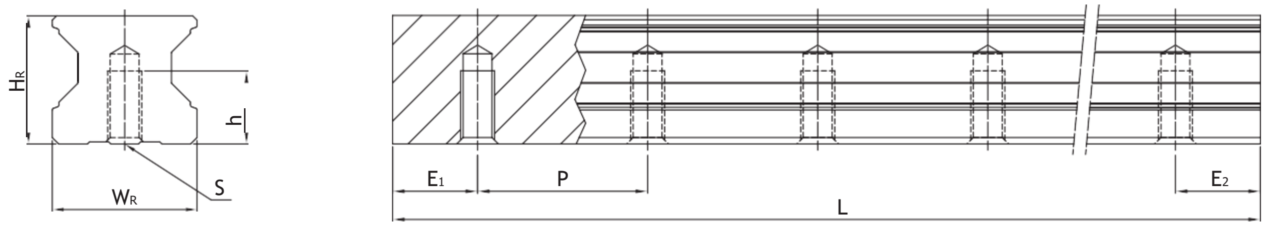


Table 3.101 **RGR_T rail dimensions**

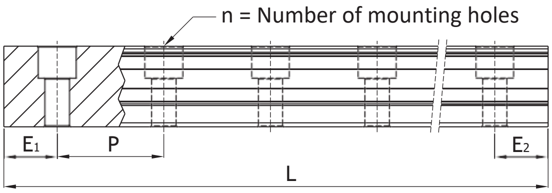
Series/ Size	Rail dimensions [mm]					Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	H_R	S	h	P					
RGR15T	15	16.5	M5	8.0	30.0	4,000	3,960.0	6	24.0	1.86
RGR20T	20	21.0	M6	10.0	30.0	4,000	3,960.0	7	23.0	2.76
RGR25T	23	23.6	M6	12.0	30.0	4,000	3,960.0	8	22.0	3.36
RGR30T	28	28.0	M8	15.0	40.0	4,000	3,920.0	9	31.0	4.82
RGR35T	34	30.2	M8	17.0	40.0	4,000	3,920.0	9	31.0	6.48
RGR45T	45	38.0	M12	24.0	52.5	4,000	3,937.5	12	40.5	10.83
RGR55T	53	44.0	M14	24.0	60.0	4,000/5,600	3,900.0/5,400	14	46.0	15.15
RGR65T	63	53.0	M20[1)]	30.0	75.0	4,000	3,900.0	15	60.0	21.24

[1)] Deviation from DIN 645

Notes:
1. Without indicating the size E1/2, considering E1/2 min it is possible to determine the maximum number of mounting holes.
2. The rails are cut to the desired length. Without any indication of the size E1/2 symmetrical will be performed

3.6.10.3 Calculation of the length of the rails

HIWIN offers rails with custom lengths.
At the same time, the value $E_{1/2}$ must be between $E_{1/2}$ min and $E_{1/2}$ max so as not to interfere with the mounting hole.



F 3.15

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

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

3.6.10.4 Anchor screw tightening torques

Insufficient tightening of the fastening screws seriously compromises the precision of the linear guide. It is advisable to use the following tightening torques, depending on the size of the screws.

Table 3.102 **Tightening torques of fastening screws according to ISO 4762-12.9**

Series/Dimensions	Screw size	Torque [Nm]	Series/Size	Screw size	Torque [Nm]
RG_15	M4 × 16	4	**RG/QR_35**	M8 × 25	31
RG_20	M5 × 20	9	**RG/QR_45**	M12 × 35	120
RG/QR_25	M6 × 20	14	**RG_55**	M14 × 45	160
RG/QR_30	M8 × 25	31	**RG_65**	M16 × 50	200

3.6.10.5 Caps for rail mounting holes

The caps are used to prevent chips and dirt from entering the mounting holes. The standard plastic caps are supplied together with individual rails. Additional optional caps must be ordered separately.

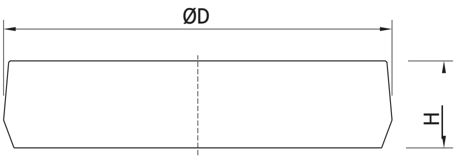


Table 3.103 **Caps for rail mounting holes**

Rail	Screw	Article Number					Ø D [mm]	Height H [mm]
		Plastic		**Brass**		**Steel**		
		GmbH	**TW**	**GmbH**	**TW**			
RGR15R	M4	5-002218	950002C1	5-001344	95000FA1	–	7.5	1.2
RGR20R	M5	5-002220	950003D2	5-001350	95000GA1	5-001352	9.5	2.5
RGR25R	M6	5-002221	950004D2	5-001355	95000HA1	5-001357	11.0	2.8
RGR30R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
RGR35R	M8	5-002222	950005D2	5-001360	95000IA1	5-001362	14.0	3.5
RGR45R	M12	5-002223	950007D2	5-001324	95000JA1	5-001327	20.0	4.0
RGR55R	M14	5-002224	950008C2	5-001330	95000KA1	5-001332	23.0	4.0
RGR65R	M16	5-002225	950009D1	5-001335	95000LA1	5-001337	26.0	4.0

3.6.11 Sealing systems
Various sealing systems are available for HIWIN blocks. An overview is also available on page 22.
The following table shows the overall length of the blocks with the different sealing systems. Sealing systems are available for these sizes.

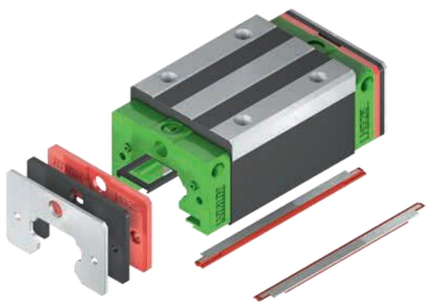


Table 3.104 **Overall length of blocks with different sealing systems**

Series/Size	Total length L					
	SS	**DD**	**ZZ**	**KK**	**SW**	**ZW**
RG_15C	68.0	72.4	70.0	74.4	—	—
RG_20C	86.0	90.4	88.0	92.4	—	—
RG_20H	106.0	110.4	108.0	112.4	—	—
RG_25C	97.9	102.3	99.9	104.3	—	—
QR_25C	97.7	102.3	99.9	104.3	—	—
RG_25H	114.4	118.8	116.4	120.8	—	—
QR_25H	112.9	117.3	114.9	119.3	—	—
RG_30C	109.8	114.6	112.8	117.6	—	—
QR_30C	109.8	114.6	112.8	117.6	—	—
RG_30H	131.8	136.6	134.8	139.6	—	—
QR_30H	131.8	136.6	134.8	139.6	—	—
RG_35C	124.0	129.0	127.0	132.0	—	—
QR_35C	124.0	129.0	127.0	132.0	—	—
RG_35H	151.5	156.5	154.5	159.5	—	—
QR_35H	151.5	156.5	154.5	159.5	—	—
RG_45C	153.2	160.4	156.2	163.4	156.5	166.2
QR_45C	153.2	160.4	156.2	163.4	—	—
RG_45H	187.0	194.2	190.0	197.2	190.3	200.0
QR_45H	187.0	194.2	190.0	197.2	—	—
RG_55C	183.7	190.9	186.7	193.9	186.9	198.3
RG_55H	232.0	239.2	235.0	242.2	235.2	246.6
RG_65C	232.0	240.8	235.0	243.8	235.2	245.3
RG_65H	295.0	303.8	298.0	306.8	298.2	308.3

Unit: mm

3.6.11.1 Sealing set coding
Sealing sets are always supplied complete with mounting screws and include the appropriate necessary parts in addition to the standard seal.

RG	25	SS

Series:
RG QR

Dimensions:
RG: 15, 20, 25, 30, 35, 45, 55, 65
QR: 25, 30, 35, 45

Dust protection identifier:
SS: Standard seal
ZZ: Front seal with sheet metal
DD: Double front seal
KK: Double front seal with metal sheet
SW: Front seal with double lip
ZW: Front seal with double lip and metal plate

3.6.12 Friction

The table shows the maximum resistance to advancement of the individual front seals. Depending on the classification of the seal (SS, DD, ZZ, KK) it will be necessary to multiply the value correspondingly. The values indicated are valid for blocks on untreated rails. Higher frictional forces are created on treated rails.

Table3.105 **Resistance to advancement of single seals**

Series/Size	Friction [N]	Series/Size	Friction [N]
RG_15	2.0	**RG/QR_35**	3.5
RG_20	2.5	**RG/QR_45**	4.2
RG/QR_25	2.8	**RG_55**	5.1
RG/QR_30	3.3	**RG_65**	6.7

3.6.13 E2 lubrication unit

For details of the lubrication unit please refer to the general information in the dedicated section “2.6.3 E2 oil lubrication unit” on Page 15.

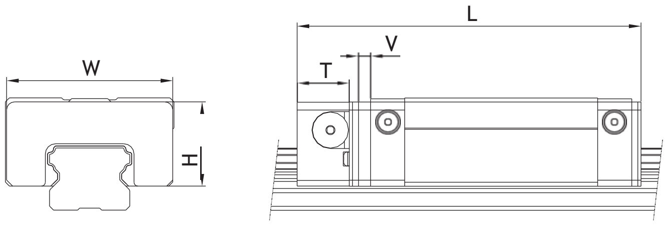


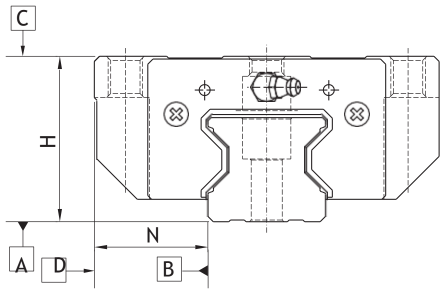
Table 3.106 **Block dimensions with E2 lubrication unit**

Series/ Size	Block dimensions [mm]								Oil quantity [cm^3]
	W	H	T	V	L_{SS} 1)	L_{ZZ} 1)	L_{DD} 1)	L_{KK} 1)	
RG_25C	46.8	29.2	13.5	3.5	114.9	116.9	119.3	121.3	5.0
RG_25H	46.8	29.2	13.5	3.5	131.4	133.4	135.8	137.8	5.0
RG_30C	58.8	34.9	13.5	3.5	126.8	129.8	131.6	134.6	7.5
RG_30H	58.8	34.9	13.5	3.5	148.8	151.8	153.6	156.6	7.5
RG_35C	68.8	40.3	13.5	3.5	141.0	144.0	146.0	149.0	10.7
RG_35H	68.8	40.3	13.5	3.5	168.5	171.5	173.5	176.5	10.7
RG_45C	83.8	50.2	16.0	4.5	173.7	176.7	180.9	183.9	18.5
RG_45H	83.8	50.2	16.0	4.5	207.5	210.5	214.7	217.7	18.5
RG_55C	97.6	58.4	16.0	4.5	204.2	207.2	211.4	214.4	26.5
RG_55H	97.6	58.4	16.0	4.5	252.5	255.5	259.7	262.7	26.5
RG_65C	121.7	76.1	16.0	4.5	252.5	255.5	261.3	264.3	50.5
RG_65H	121.7	76.1	16.0	4.5	315.5	318.5	324.3	327.3	50.5

1) Total length depending on the dust protection selected. SS = standard dust protection

3.6.14 Tolerances according to the precision class

The RG and QR series are available in four different precision classes, depending on the parallelism between blocks and rails and the precision of height H and width N.
The choice is determined by the requirements of the machine in which the linear guides are applied. HIWIN srl manages up to class P in its premises.



3.6.14.1 Parallelism

Parallelism between the abutment surface of the block D and the rail B and parallelism between the upper surface of the block C and the support surface of the rail A. The measurement is considered with the rail mounted in optimal conditions and in the centre of each block.

Table 3.107 **Parallelism tolerance between block and rail**

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

Unit: µm

3.6.14.2 Precision – height and width

Height tolerance H
Maximum absolute deviation of height H, measured between the upper surface of block C and the lower surface of rail A for any position of the block on the rail.

Height variation H
Maximum relative deviation of the height H between two or more blocks on the same rail or on rails in parallel, measured in the same position as the rail.

Width tolerance N
Maximum absolute deviation of the width N, measured between the abutment surfaces of the block D and the rail B for any position of the block on the rail.

Width variation N
Maximum relative deviation of the width N between two or more blocks on the same rail, measured in the same position as the rail.

Table 3.108 **Height and width tolerance**

Series/Dimensions	Precision class	Height tolerance H	Width tolerance N	Height variation H	Width variation N
RG_15, 20	H (High)	± 0.03	± 0.03	0.01	0.01
	P (Precise)	0/– 0.03 [1)]	0/– 0.03 [1)]	0.006	0.006
	SP (Super precise)	0/– 0.015	0/– 0.015	0.004	0.004
	UP (Ultra precise)	0/– 0.008	0/– 0.008	0.003	0.003
RG_25, 30, 35 **QR_25, 30, 35**	H (High)	± 0.04	± 0.04	0.015	0.015
	P (Precise)	0/– 0.04 [1)]	0/– 0.04 [1)]	0.007	0.007
	SP (Super precise)	0/– 0.02	0/– 0.02	0.005	0.005
	UP (Ultra precise)	0/– 0.01	0/– 0.01	0.003	0.003
RG_45, 55 **QR_45**	H (High)	± 0.05	± 0.05	0.015	0.02
	P (Precise)	0/– 0.05 [1)]	0/– 0.05 [1)]	0.007	0..01
	SP (Super precise)	0/– 0.03	0/– 0.03	0.005	0.007
	UP (Ultra precise)	0/– 0.02	0/– 0.02	0.003	0.005
RG_65	H (High)	± 0.07	± 0.07	0.02	0.025
	P (Precise)	0/– 0.07 [1)]	0/– 0.07 [1)]	0.01	0.015
	SP (Super precise)	0/– 0.05	0/– 0.05	0.007	0.01
	UP (Ultra precise)	0/– 0.03	0/– 0.03	0.005	0.007

Unit: mm
[1)] Fully assembled linear guide

3.6.14.3 Permissible tolerances of mounting surfaces
To make the most of the very high precision, rigidity and durability of the RG and QR guides, it is necessary to respect the machining tolerances of the mounting surfaces.

Tolerance for reference surface parallelism (P)

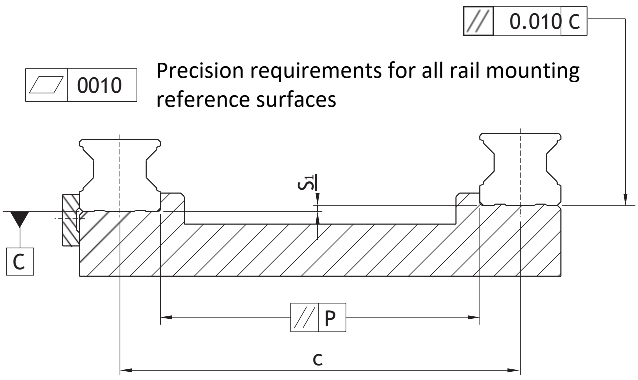


Table 3.109	**Maximum tolerance for parallelism (P**		
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
RG_15	5	3	3
RG_20	8	6	4
RG/QR_25	9	7	5
RG/QR_30	11	8	6
RG/QR_35	14	10	7
RG/QR_45	17	13	9
RG_55	21	14	11
RG_65	27	18	14

Unit: µm

Reference surface height tolerance (S_1)

F 3.16 $S_1 = c \times K$

S_1 Max. height tolerance [mm]
c Wheelbase between rails [mm]
K Height tolerance coefficient

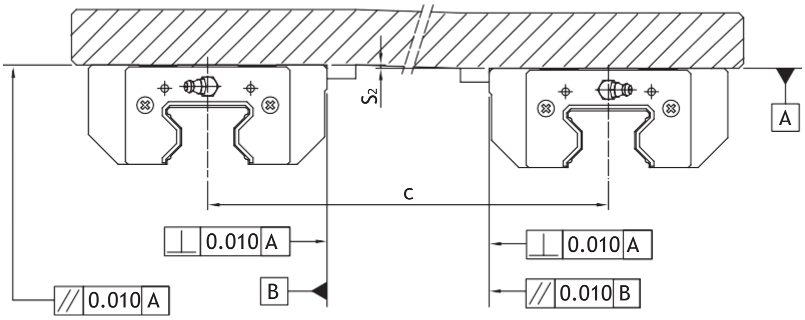
Table 3.110	**Height tolerance coefficient (K)**		
Series/Size	Preload class		
	Z0	**ZA**	**ZB**
RG_15 – 65/QR_25 – 45	2.2×10^{-4}	1.7×10^{-4}	1.2×10^{-4}

Block mounting surface height tolerance

- The tolerance of the height of the reference surface with the parallel use of two or more blocks (S_2)

▱	0010

Precision requirements for all reference surfaces for block mounting



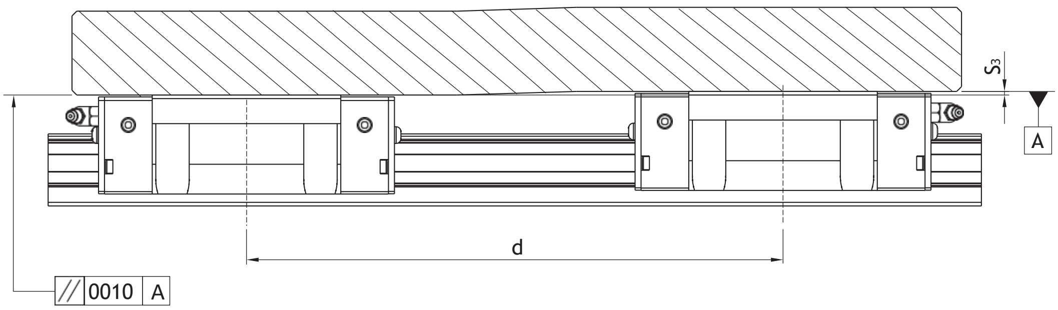
F 3.17 $S_2 = c \times 4.2 \times 10^{-5}$

S_2 Max. height tolerance [mm]
c Wheelbase between blocks in parallel [mm]

- The tolerance of the height of the reference surface with the parallel use of two or more blocks (S_3)

▱	0010

Precision requirements for all reference surfaces for block mounting



F 3.18 $S_3 = d \times 4.2 \times 10^{-5}$

S_3 Max. height tolerance [mm]
d Wheelbase between blocks in series [mm]

3.6.15 Stop heights and connecting radius
If the heights of the shoulders and the different radius of connection of the mounting surfaces are incorrect, the precision will be different from that expected and an interference will occur with the profile of the rail or block. By respecting the heights and the fittings provided for the shoulders, it is possible to eliminate any installation errors.

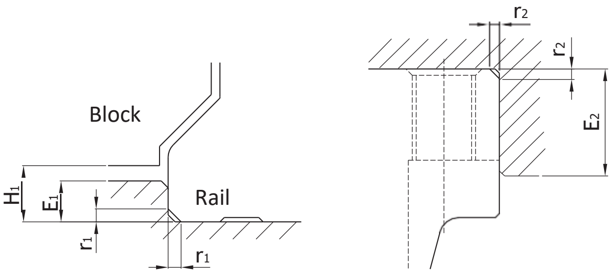


Table3.111 **Stop heights and connecting radius**

Series/Size	Max bevel radius r_1	Max bevel radius r_2	Rail stop height E_1	Block stop height E_2	Free clearance under block H_1
RG_15	0.5	0.5	3.0	4.0	4.0
RG_20	0.5	0.5	3.5	5.0	5.0
RG/QR_25	1.0	1.0	5.0	5.0	5.5
RG/QR_30	1.0	1.0	5.0	5.0	6.0
RG/QR_35	1.0	1.0	6.0	6.0	6.5
RG/QR_45	1.0	1.0	7.0	8.0	8.0
RG_55	1.5	1.5	9.0	10.0	10.0
RG_65	1.5	1.5	10.0	10.0	12.0

Unit: mm

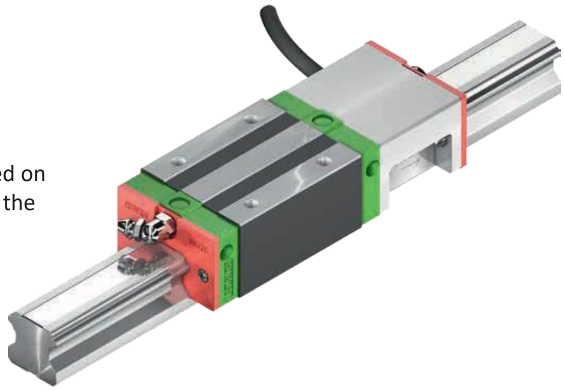
3.7 PG Series

3.7.1 Characteristics of the PG series linear guides

The HIWIN PG series linear guides are a special version of the HG/QH series with the integrated MAGIC system for position measurement. The position measurement systems of the MAGIC series are optimised for the measurement of linear displacements and, in particular, for axes driven by linear motors. The measuring system consists of a magnetic strip integrated in a stainless steel carrier tape and a reading head. The robust case with excellent electrical shielding and real-time signal output makes the HIWIN MAGIC series a position measurement system suitable for the most sophisticated applications.
In the PG series the reading head is fixed directly on the block of the HG/QH series. The magnetic tape is integrated in a dedicated groove and made on the upper face of the HGR rail. The MAGIC position measuring system is also available as a rail-independent model. The customer can choose the position of the magnetic tape and the reading head. For further details, refer to the catalogue "Electric drive technology - linear motors, torque motors, positioning measurement systems"

3.7.2 PG series structure

- HG/QH series block
- HG/QH series rail with dedicated groove for measuring scale.
- The encoder can be mounted on HG-20, HG-25, QH-20 and QH-25
- Mounting instructions:
  Looking at the block reference guide, the encoder must be mounted on the left in the standard configuration. The encoder cable is also on the side of the reference guide. (see sheet 3.7.6, page 122)



Advantages:

- Non-contact measurement with analogue 1Vpp or digital TTL output signal
- Resolution up to 1µm
- Encoder and housing protected from dust, moisture, oil and chips
- Encoder with metal housing and IP67 protection mode
- Easy assembly
- Real-time outgoing signal
- Special housing for EMC optimisation

3.7.3 PG series order codes

PG	H	W	20	C	A	1	/2	T	1600	ZA	H

PG Series

H: Based on the HG
Q series: Based on the QH series

Block type:
W: Flanged block
H: High compact block
L: Low compact block

Size:
20, 25 [1)]

Load type:
C: Heavy load
H: Super heavy load

Precision class:
H

Preload ID:
Z0, ZA, ZB

Rail Length [mm]

Rail Fastening:
R: From the top
T: From below (HGR20 only)

Axle set blocks [2)]

Total number of blocks with sensors /total number of blocks

Block Fastening:
A: From the top
C: From the top or bottom

Continuation of the order code for PG series

1	/2	KK	E2	M	A	M	2500	L	1

Number of rails with measuring system

Total rails

Dust protection:
SS, ZZ [4)]

None: Standard
E2: With E2 oil lubrication unit

Type of measurement system:
M: MAGIC

Output signal:
A: Analogue 1 V_{PP}
D: Digital TTL

Orientation encoder : [7)]
1: Orientation 1 (default)
2: Orientation 2
3: Orientation 3
4: Orientation 4

Cable assembly:
L: Free end [5)]
R: M17 circular connector (male)
S: Sub-D connector for PMED display [6)]

Cable length [mm] [5)]

Index:
M: Multi-Index

Notes:
[1)] Compared to the standard MGR25 rail without groove, the fastening screws are M5 instead of M6.
[2)] For the PG series, the total number of blocks per axle is specified (all the blocks of the ordered article).
[3)] The digit 2 is also a quantitative datum and means that an element of the article described above is composed of a pair of guides. In the case of single rails, no figure is indicated. By default, the joined rails are delivered with staggered joints.
[4)] Unless otherwise specified, the blocks is supplied with standard dust protection (standard front seal and bottom seal). For an overview of the individual sealing systems, see Page 22
[5)] For the version with free end, the standard cable width is 5000 mm.
[6)] The display should be ordered separately
[7)] see Chapter 3.7.6

3.7.4 PG block dimensions

The following figure shows a HGH20CA/HGH25CA block. Modules with blocks HG20, HG25, QH20 and QH25 can also be used. The overall dimensions change accordingly. The dimensions of all the blocks are highlighted in Table 3.112.

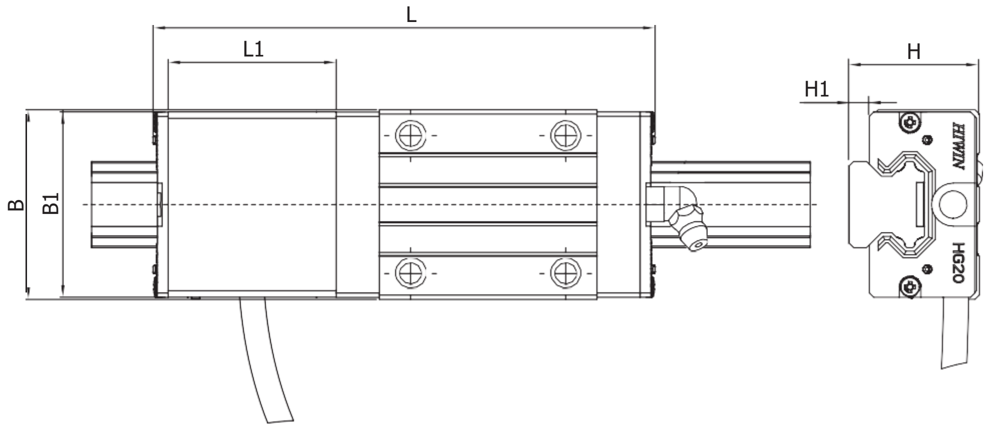


Table 3.112 **Block dimensions**

Series/Size	L [mm]	L1 [mm]	B [mm]	B1 [mm]	H [mm]	H1 [mm]
HG_20C	118.0	41.5	44	43.0	30	4.6
HG_20H	132.7	41.5	44	43.0	30	4.6
HG_25C	124.5	41.5	48	46.4	40	5.5
HG_25H	145.1	41.5	48	46.4	40	5.5
QH_20C	117.2	41.5	44	43.0	30	4.6
QH_20H	131.9	41.5	44	43.0	30	4.6
QH_25C	123.9	41.5	48	46.4	40	5.5
QH_25H	144.5	41.5	48	46.4	40	5.5

Unit: mm

3.7.5 PG rail dimensions

3.7.5.1 Rail with groove, mounting from the top

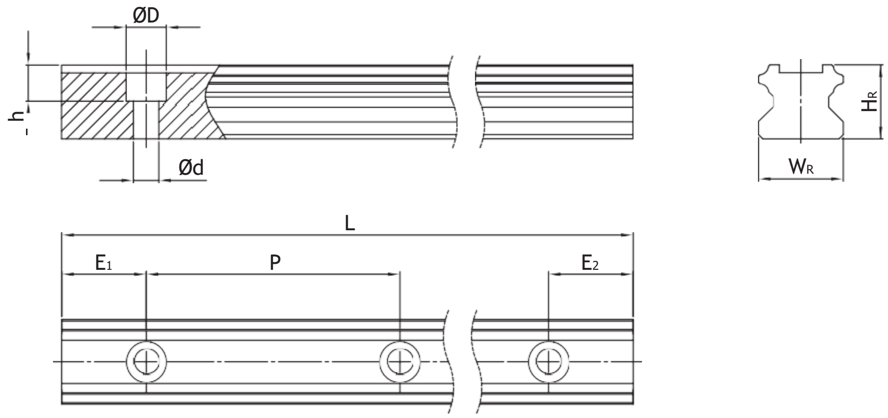


Table **3.113 HGR_R G1 rail dimensions**

Series/ Size	Rail dimensions [mm]						Max. length [mm]	Max. length E_1 = E_2 [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	**H_R**	**D**	**h**	**d**	**P**					
HGR20R G1	20	17.5	9.5	8.5	6.0	60	4,000	3,900	7	53	2.05
HGR25R G1C	23	22.0	9.5	8.5	6.0	60	4,000	3,900	7	53	3.05

3.7.5.2 Rail with groove, mounting from bottom

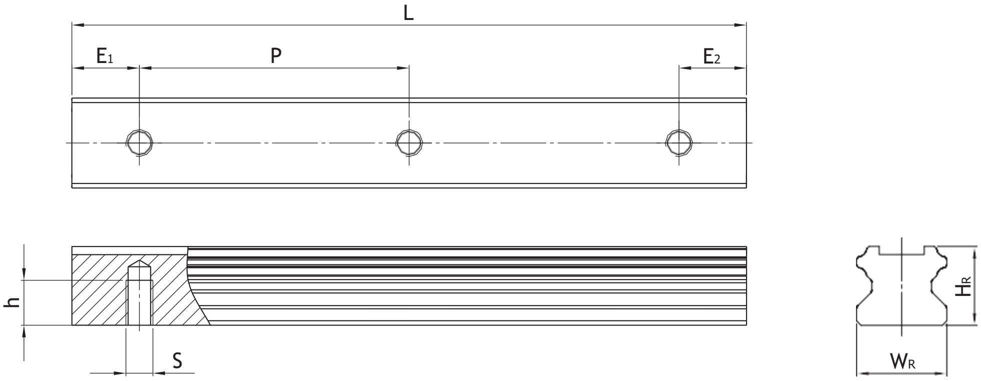


Table 3.114	HGR_T G1 rail dimensions									
Series/ Size	Rail dimensions [mm]					Max. length [mm]	Max. length $E_1 = E_2$ [mm]	$E_{1/2}$ min [mm]	$E_{1/2}$ max [mm]	Weight [kg/m]
	W_R	H_R	S	h	P					
HGR20T G1	20	17.5	M6	10	60	4,000	3,900	7	53	2.13

3.7.5.3 Anchor screw tightening torques

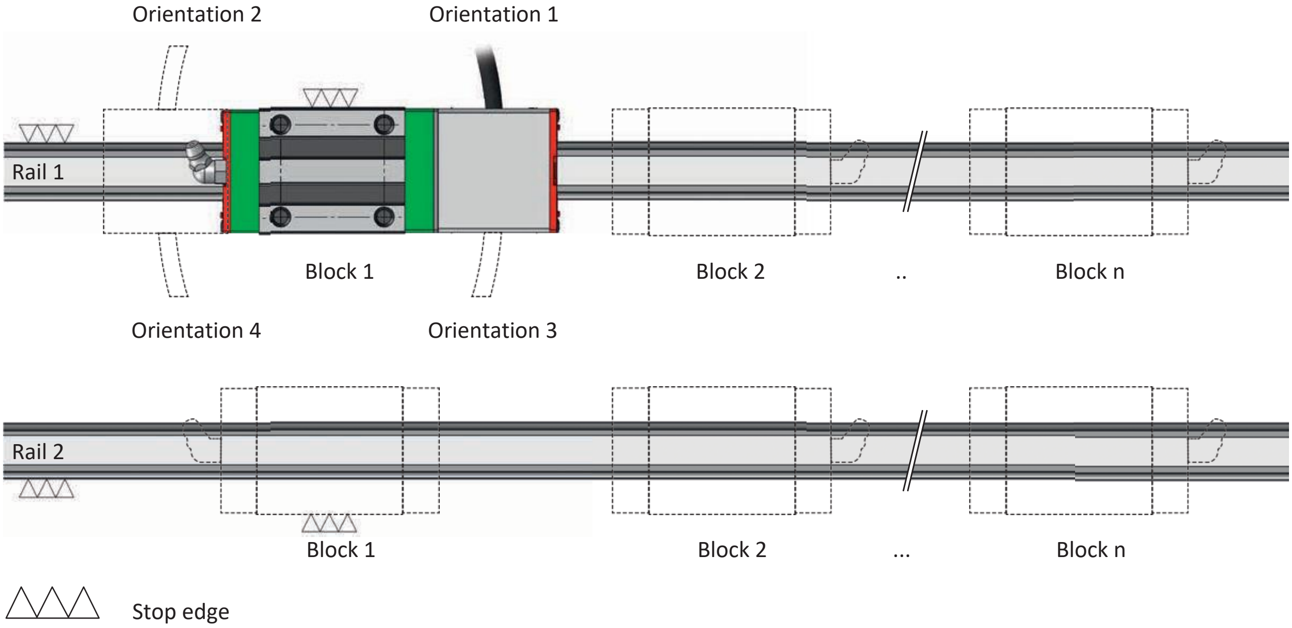
Insufficient tightening of the fastening screws severely compromises the precision of the linear guide; accordingly, we recommend the following tightening torques depending on the size of the screws.

Table 3.115 Tightening torques of fastening screws according to ISO 4762-12.9					
Series/Size	Screw size	Torque [Nm]	Series/Size	Screw size	Torque [Nm]
HGR20R G1	M5 × 16	9	**HGR25R G1C**	M5 × 20	9
HGR20T G1	M6	13			

3.7.6 Orientation of the HIWIN MAGIC-PG encoder

Depending on the order code (chapter 3.7.3), the HIWIN MAGIC-PG encoder is available with orientations 1 to 4, as shown below. In the absence of specific requests, the encoder is supplied with default orientation (orientation 1).

In the case of several blocks on the same rail or pair of rails, the encoder will be mounted on block 1, rail 1, as indicated below. If a particular orientation is required, the request must be made at the level of the MAGIC-PG design board (www.hiwin.it).



3.7.7 HIWIN MAGIC and HIWIN MAGIC-PG position measurement system specifications

Table3.116 **HIWIN MAGIC and HIWIN MAGIC-PG electrical and mechanical properties**

	1 V_{PP} (analogue)	TTL (digital)
Electrical properties		
Output signal specifications	sin/cos, 1 V_{PP} (0.85 V_{PP} – 1.2 V_{PP})	Reconciliation signal according to RS422
Resolution	Infinite, signal period 1 mm	1 µm
Bi-directional repeat precision	0.003 mm	0.002 mm
Absolute precision	± 20 µm/m	
Reference signal [1)]	Periodic index pulse at a distance of 1 mm	
Phase angle	90° ± 0.1° el	90°
CC Component	2.5 V ± 0.3 V	—
Distortion factor	Tip. < 0.1%	—
Operating voltage	5 V ± 5 %	
Energy consumption	Tip. 35 mA, max. 70 mA	Tip. 70 mA, max. 120 mA
Max. measuring speed	10 m/s	5 m/s
EMC Class	3, pursuant to CEI 801	
Mechanical characteristics		
Housing material	Aluminium alloy, the encoder bottom is made of stainless steel	
MAGIC encoder dimensions	L × W × H: 45 × 12 × 14 mm	
Standard cable length [2)]	5m	
Min. cable bending radius	40 mm	
Protection class	IP67	
Operating temperature	0 °C to +50 °C	
MAGIC encoder weight	80 g	
MAGIC-PG encoder weight	80 g	
Blocks suitable for MAGIC-PG	HG-20, HG-25, QH-20, QH-25	

[1)] Can be used with proximity switch
[2)] For use in power chains we recommend our pre-assembled encoder cable with a round M17 connector (joint, female) pre-assembled on one side, which corresponds to the optional round M17 connector (male) of the encoder.For more details, contact your trusted HIWIN contact person.

Table 3.117 **Magnetic scale properties**

Property	Magnetic scale (with stainless steel cover strip)
Precision class [1)]	± 20 µm/m
Linear expansion coefficient	11.5×10^{-6} m/K
Period	1mm
Magnetic thickness scale	1.70 ± 0.10 mm
Magnetic thickness scale + protective tape	1.85 ± 0.15 mm
Width	10.05 ± 0.10 mm
Maximum length	24m
Magnetic remainder	> 240 mT
Pole crossing (north/south pole distance)	1mm
Individual reference indices	Optional
Material	Elastomers, nitrile and EPDM
Temperature range	from 0 °C to +50 °C
Weight	70 g/m

[1)] at 20 °C

Separate magnetic strip (left) without protective tape and integrated into a profiled guide (right) with stainless steel protective tape

3.7.8 MAGIC positioning measuring system wiring

3.7.8.1 Allocation of cables (analogue and digital variants)

A high-quality 8-conductor cable is used (1 for each signal of V1+, V1-, V2+, V2- and V0+, V0- or A, Ā, B, B̄ and Z, Z̄) for the digital variant suitable for mobile installation.

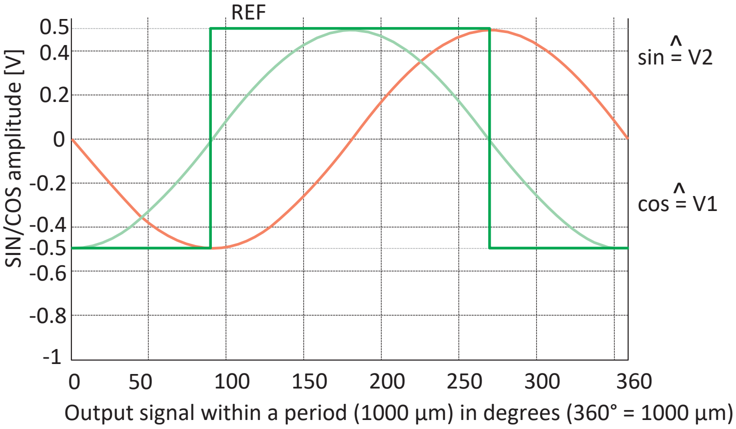
In cable chains we generally recommend our pre-assembled extensions, which have been specially designed for use in these lines. The extension cords come with a round connector on one end (female) or customised.

3.7.8.2 MAGIC measuring system output signal

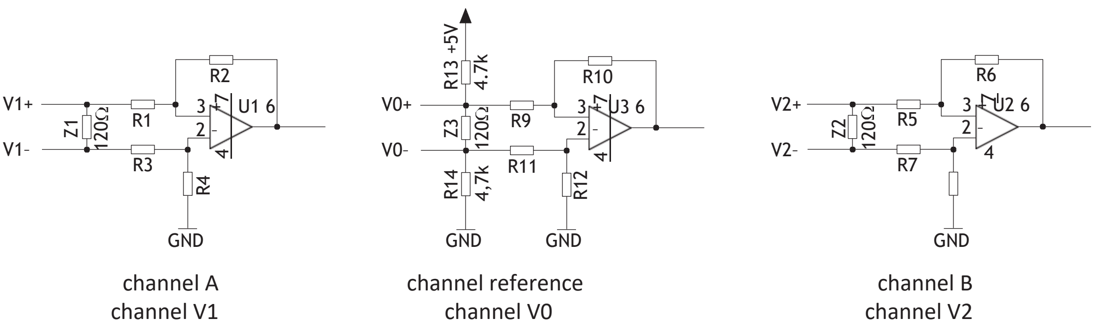
(analogue) 1 sin/cos 1 V_{PP} signal

The HIWIN MAGIC sin/cos 1 VPP interface is based on Siemens specifications. The period of the sinusoidal output signal is 1 mm. The period of the reference signal is 1 mm.

Differential analogue signals downstream of the reading electronics (analogue version)



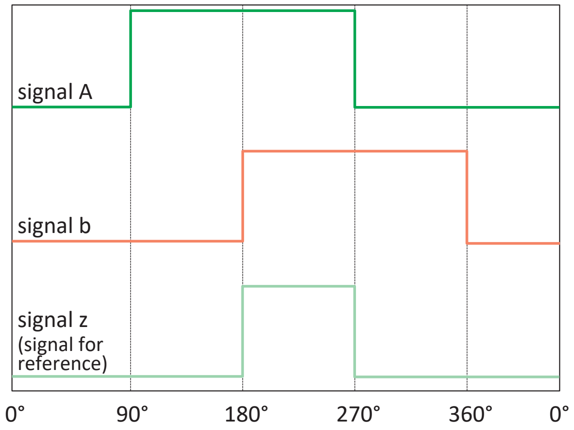
Recommended reading electronics for sin/cos 1 VPP signal



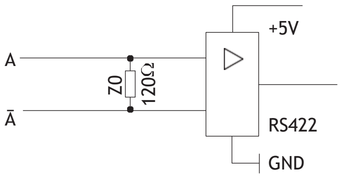
TTL output (digital)

The signals on channels A and B have a phase shift of 90° (according to the RS422 specification of DIN 66259). Recommended terminal resistance Z = 120 O.
Output signals: A, Ā, B, B̄ and Z, Z̄. The single reference pulse and the definition of a minimum pulse duration are possible as options.

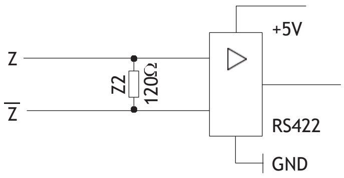
MAGIC encoder signals (TTL version)



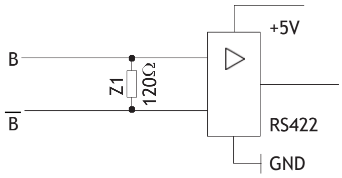
Recommended reading electronics for TTL signal



channel A



reference channel

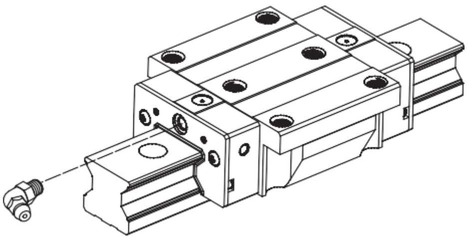


channel B

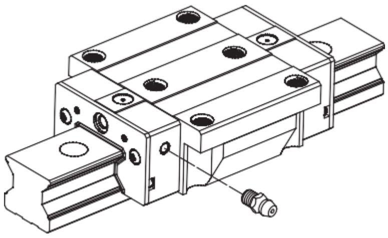
4. Accessories

4.1 Adapters for lubrication systems

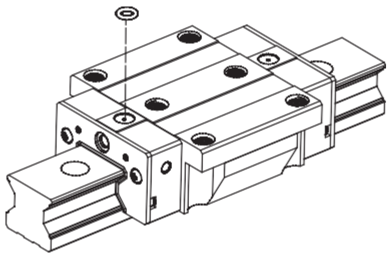
The standard position of the lubrication nipple of a block is the front position **(1)**. The opposite lubrication hole is closed by a screw. Lubrication can also be done through one of the four side holes **(2)** on the recirculation unit or from above **(3)**. Nipples, adapters or quick coupling connectors can be used.



(1) Front lubrication



(2) Side lubrication



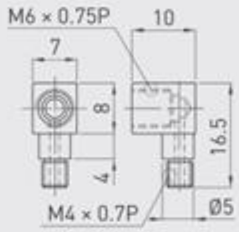
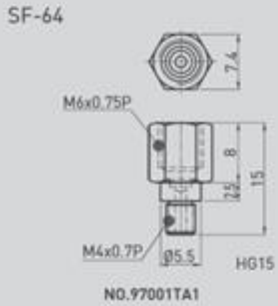
(3) Lubrication from the top

Table 4.1 **Block types/thread size summary**

Block Type	Front/side thread size
HG_15	M4
HG_20, HG_25, HG_30, HG_35	M6 × 0.75
HG_45, HG_55, HG_65	1/8 PT
QH_15	M4
QH_20, QH_25, QH_30, QH_35	M6 × 0.75
QH_45	1/8 PT
EG_15	M4
EG_20, EG_25, EG_30, EG_35	M6 × 0.75
QE_15	M4
QE_20, QE_25, QE_30, QE_35	M6 × 0.75
CG_15_20	M3
CG_25, CG_30, CG_35	M6 × 0.75
WE_17	M3
WE_21, WE_27, WE_35, QW_21, QW_27, QW_35	M6 × 0.75
WE_50	1/8 PT
MG_15	M3
RG_15, RG_20	M4
RG_25, RG_30, RG_35	M6 × 0.75
RG_45, RG_55, RG_65	1/8 PT
QR_25, QR_30, QR_35	M6 × 0.75
QR_45	1/8 PT

4.1.1 Lubrication nipples and fittings

<table>
<tr><th colspan="2">Table 4.2 Nipples M3 x 0.5P</th></tr>
<tr><td></td><td></td></tr>
<tr><td>Art. No.: 20-000275 (Gmbh) / 34310006 (TW)
(Standard)</td><td>Art. No.: 20-000370 (Gmbh)
(Optional)</td></tr>
</table>

<table>
<tr><th colspan="2">Table 4.3 M4 × 0.7P lubrication nipples and fittings</th></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>LF-64 Art. No.: 20-000019 (Gmbh) / 97000EA1</td><td>SF64 Art. No.: 970001TA1 (TW)</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Art. No.: 20-000272 (Gmbh) / 34310002 (TW)
(Standard)</td><td>Art. No.: 20-000325 (Gmbh)
(Optional)</td></tr>
</table>

The indicated article codes are valid for standard dust protection. Optional dust protection article codes are required.

Table 4.4 **M6 × 0.75P lubrication nipples and fittings**

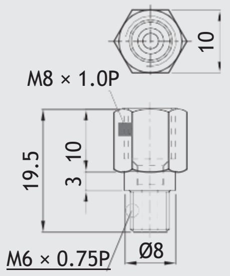
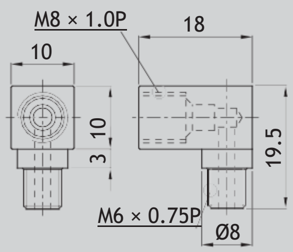
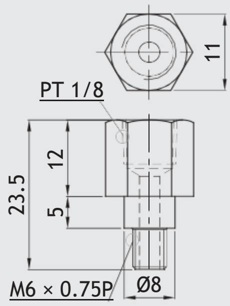
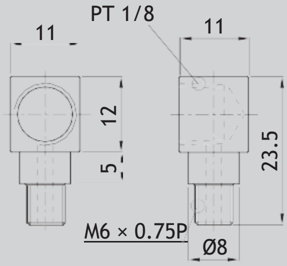
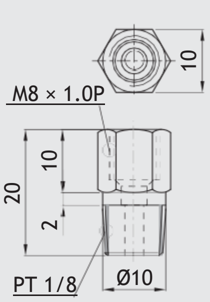
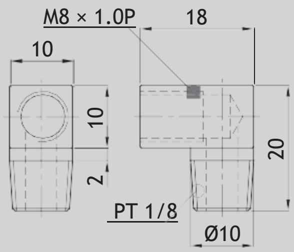
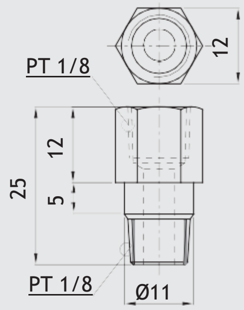
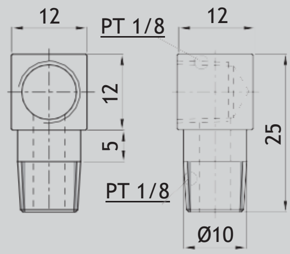
			
SF-76 Art. No.: 20-000006 (Gmbh) 970001A1 (TW)	**LF-76 Art. No.: 20-000007 (Gmbh) 970002A1 (TW)**	**SF-86 Art. No.: 20-000008 (Gmbh) 970003A1 (TW)**	**LF-86 Art. No.: 20-000009 (Gmbh) 970004A1 (TW)**
			
Art. No.: 20-000273 (Gmbh) 34310003 (TW) (Optional)	**Art. No.: 20-000283 (GmbH)** (Optional)	**Art. No.: 20-000290 (GmbH) 34320001 (TW)** (Standard)	

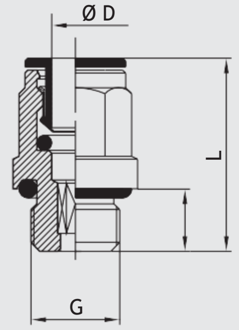
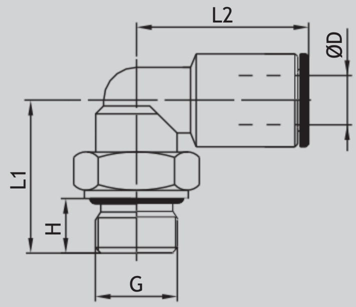
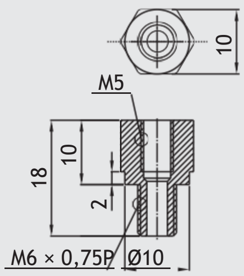
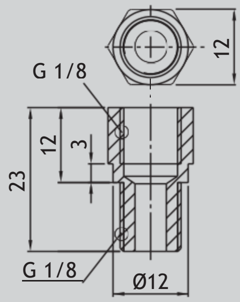
Table 4.5 **1/8 PT lubrication nipples and fittings**

			
SF-78 Art. No.: 20-000010 (Gmbh) 970005A1 (TW)	**LF-78 Art. No.: 20-000011 (Gmbh) 970006A1 (TW)**	**SF-88 Art. No.: 20-000012 (Gmbh) 970007A1 (TW)**	**LF-88 Art. No.: 20-000013 (Gmbh) 970008A1 (TW)**
			
Art. No.: 20-000280 (Gmbh) 3431000B (TW) (Optional)	**Art. No.: 20-000292 (GmbH) 34320003 (TW)** (Standard)		

The indicated article codes are valid for standard dust protection. Optional dust protection article codes are required.

4.1.2 Quick couplings

Table 4.6 **Quick couplings**

	
Rapid straight fitting	Quick connect 90° plug
	
Art. No.: 20-000416 – M5 Adapter 1)	**Art. No.: 20-000418** – G 1/8 Adapter 1)

The adapters shown are necessary for quick couplings with M5 or G 1/8 thread. The quick couplings with M6 thread are screwed into the block without adapter.

Table 4.7 **Quick coupling dimensions**

Article number	G	Ø D	Shape	H	L	L1	L2
20-000439	M5 × 0.8	4	Straight	4	20.5	—	—
20-000462	M5 × 0.8	6	Straight	4	22.5	—	—
20-000465	M5 × 0.8	4	Angled	4	—	14.5	18
20-000466	M5 × 0.8	6	Angled	4	—	14.5	21
8-12-0127	M6 × 0.75	4	Straight	5	23.5	—	—
20-000463	M6 × 0.75	6	Straight	4	22.5	—	—
8-12-0128	M6 × 0.75	4	Angled	5	—	15.5	18
8-12-0138	M6 × 0.75	6	Angled	5	—	15.5	21
8-12-0131 (Gmbh) SHC4R8P (TW)	G 1/8	4	Straight	6	20.0	—	—
8-12-0136 (Gmbh) SHC6R8P (TW)	G 1/8	6	Straight	6	24.0	—	—
8-12-0130 (Gmbh) LHC4R8P (TW)	G 1/8	4	Angled	6	—	20.0	20
8-12-0137 (Gmbh) LHC6R8P (TW)	G 1/8	6	Angled	6	—	20.0	21

The indicated article codes are valid for standard dust protection. Optional dust protection article codes are required.

5. Linear Guide assembly instructions

5.1 Lubrication and basic information

Linear systems must be adequately supplied with lubricant to ensure correct operation and long life.
These lubrication instructions are intended to assist the user in choosing the appropriate lubricants and lubricant quantities and in determining the appropriate lubrication ranges. The information provided herein does not exempt the user from the obligation to carry out practical tests to verify the specific lubrication intervals and to make the necessary adjustments. After each lubrication process it is necessary to check if the part of the machine is still adequately lubricated (check the protective lubricant cover).

Lubricants

- reduce wear protect
- against dirt protect
- against corrosion

Lubricant is a design element and must be considered already in the design phase of a machine. When choosing the lubricant, the maximum variation in working temperature and the operating and environmental conditions must be taken into account.

5.2 Safety

CAUTION!

Incorrect choice of lubricant

The use of the wrong lubricant can cause damage to things and pollute the environment.

- Use the correct type of lubricant (grease, oil) as specified in these assembly instructions!
- Observe the manufacturer's safety data sheets!

5.2.1 Correct use of lubricants

As far as possible, avoid prolonged and repeated contact with the skin. If necessary, rinse with soap and water. If necessary, apply a hand cream at the end of the work.
If necessary, wear protective clothing resistant to oil (e.g. gloves, apron).
Do not wash your hands with petroleum, solvents, or refrigerant lubricants that may be or are already mixed with water. The sprayed oil must be sucked up at the point at which it forms.
Wear protective goggles to avoid contact with eyes.
If the lubricant still comes into contact with the eyes, rinse the affected area with plenty of water. If eye irritation persists, consult an ophthalmologist.
Under no circumstances should vomiting be induced if the lubricant is accidentally swallowed. Seek medical attention immediately. As a rule, safety data sheets are available for lubricants, in accordance with regulation 91/155/EEC.
Here you will find detailed information on the protection of health and the environment and the prevention of accidents.
Most lubricants are harmful to water. For this reason, lubricants must never penetrate the soil, water or sewage.

5.2.2 Safety indications for the storage of lubricants

Lubricants should be stored in tightly closed packaging in a cool, dry place. They must be protected from direct sunlight and frost.

Lubricants must not be stored together with:

- Food
- Oxidising agents

5.3 Housing for lubrication fittings

HIWIN blocks offer configurations for the installation of a lubrication connection:
- On the front
- Lateral
- from the top

Not all blocks are equipped with lubrication fittings

5.3.1 Lubrication fitting at front

A lubrication fitting can be installed on both sides of the block. Each unused lubrication fitting is sealed with a sealing screw. This is the HIWIN standard configuration.

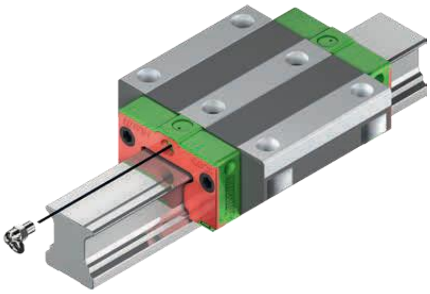


Fig. 5.1 **Lubrication fitting on the front**

5.3.2 Lubrication fitting on the side

CAUTION!
Incorrect opening of the lubrication hole causes damage to the block! ▸ It is advisable to consult HIWIN for creation of the hole. It is advisable at the time of order to request the preparation.

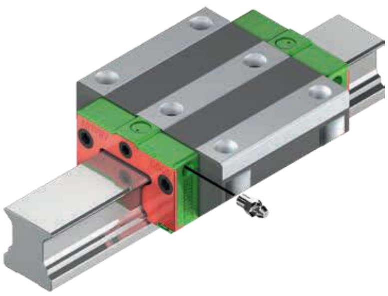


Fig. 5.2 **Lubrication fitting on the side**

The block has four pre-holes, one on each side of each of the two heads. Two operations are necessary in order to apply the lubrication fitting: the first is the complete drilling of the existing pre-hole, the second is its scraping.
These two operations are necessary for all HG, QH, EG, QE, CG, WE, QW, RG and QR series.
The maximum thread depth according to table 8.1 must not be exceeded. Then clean the hole, which must be free of chips and other impurities.
Finally, the side lubrication fitting must be opened at the base of the hole with a hot metal drill.

5.3.3 Lubrication fitting at the top

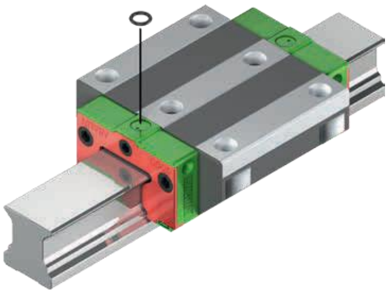


Fig. 5.3 **Lubrication fitting at the top**

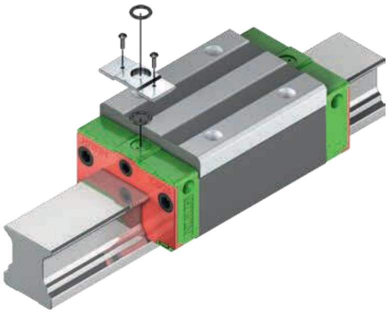


Fig. 5.4 **Lubrication fitting at the top (HGH, CGH, RGH)**

Alternatively, the block can be lubricated from the top. In this case, an O-ring is used as a seal. See Table 5.1 for O-ring size. If you order the block with the top lubrication option selected, the lubrication hole will be opened and the required O-ring will be included. If the block is ordered without this option, the hole must first be opened. For "high" block models, an adapter with two o-rings will also be provided, as in the figure.

An additional recess is present in the flare for the O-ring.

⇪ Open the recess with a 0.8 mm diameter tip up to a maximum depth of Tmax according to table 8.2

Once opened, the holes for lubrication from the top cannot subsequently be closed with a screw cap.

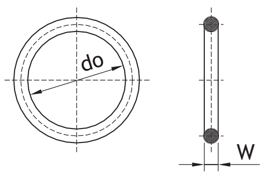


Fig. 5.5 **O-ring to cover the lubrication fitting on the top**

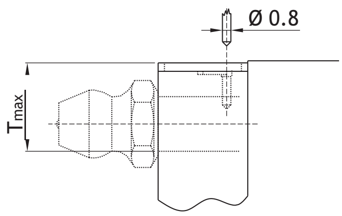


Fig. 5.6 **Maximum drilling depth T_{max}**

Table 5.1 **O-ring specification for covering the lubrication connection on top**

Series/ Dimensions	O-ring				Lubrication hole at top
	Article number		**do [mm]**	**W [mm]**	**Max. depth T_{max} [mm]**
	TW	**GMBH**	**do [mm]**	**do [mm]**	
HG/QH_15	3451001C	20-000386	2.5 ± 0.15	1.5 ± 0.15	3.75
HG/QH_20	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	5.70
HG/QH_25	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	5.80
HG/QH_30	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	6.30
HG/QH_35	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	8.80
HG/QH_45	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	8.20
HG_55	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	11.80
HG_65	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	10.80
EG/QE_15	3451001B	20-000386	2.5 ± 0.15	1.5 ± 0.15	6.90
EG/QE_20	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	8.40
EG/QE_25	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	10.40
EG/QE_30	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	10.40
EG/QE_35	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	10.80
CG_15	3451001B	20-000386	2.5 ± 0.15	1.5 ± 0.15	3.75
CG_20	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	5.70
CG_25	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	5.80
CG_30	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	6.30
CG_35	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	8.80
CG_45	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	8.20
WE_21	3451001B	20-000386	2.5 ± 0.15	1.5 ± 0.15	4.20
WE_27	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	5.80
WE/QW_35	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	7.60
QW_21	3451001B	20-000386	2.5 ± 0.15	1.5 ± 0.15	4.20
QW_27	3451001C	20-000387	4.5 ± 0.15	1.5 ± 0.15	5.80
RG_15	3451001B	20-000386	2.5 ± 0.15	1.5 ± 0.15	3.45
RG_20	3451001B	20-000386	2.5 ± 0.15	1.5 ± 0.15	4.00
RG/QR_25	3451000W	20-000376	7.5 ± 0.15	1.5 ± 0.15	5.80
RG/QR_30	3451000W	20-000376	7.5 ± 0.15	1.5 ± 0.15	6.20
RG/QR_35	3451000W	20-000376	7.5 ± 0.15	1.5 ± 0.15	8.65
RG/QR_45	3451000W	20-000376	7.5 ± 0.15	1.5 ± 0.15	9.50
RG_55	3451000W	20-000376	7.5 ± 0.15	1.5 ± 0.15	11.60
RG_65	3451000W	20-000376	7.5 ± 0.15	1.5 ± 0.15	14.50

**It may be necessary to use a spacer
(HIWIN lubrication adapter) to mount the lubrication system.**

5.3.4 Spacers (lubrication adapter)

In the HG, RG and CG series (HGH, RGH and CGH models), spacers must be fitted (TCN lubrication adapter, Top-CoNnector) to compensate for the height difference between the recirculation system and the block mounting surface. The adapters are only supplied assembled, the appropriate O-ring is included in the order of this option.

Availability of TCN lubrication adapter:

- HG_25, HG_30, HG_35
- RG_25, RG_30, RG_35, RG_45, RG_55
- CG_15, CG_20, CG_25, CG_30, CG_35, CG_45

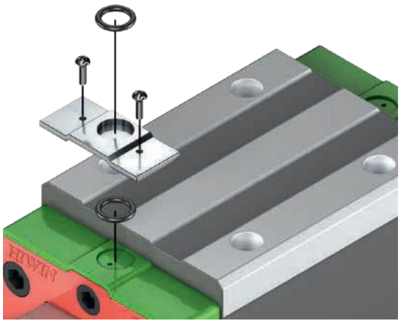


Fig. 5.7 **Lubrication adapter structure**

5.4 Use of a centralised lubrication system

It is advisable to perform the initial lubrication (see Chapter 5.12) separately before connecting to a central lubrication system, using a manual lubricator. It is also important to ensure that all hoses and connecting elements are filled with lubricant and do not contain air pockets.
Long pipes and narrow pipe diameters should be avoided. The pipes must be installed on a slope.
The pulse count results from the partial quantities and dimensions of the piston distributor.
In addition, the rules of the manufacturer of the lubrication system must be complied with.

5.5 Lubrication pressure

HIWIN linear guides can be lubricated with oil, grease or low viscosity grease, depending on the specific application. The lubrication pressure required depends on the size, the lubricant, the length of the supply line and the type of lubrication fitting used.

Minimum lubrication pressure on the block:

- Grease or low viscosity grease: 6 bar
- Lubricating oil: 3 bar

The maximum allowed lubrication pressure for the block is 30 bar.

CAUTION!

Excessive lubrication pressure or amount of lubricant can damage the block.
Seals on blocks with double seals, SW seals or ZWX seals could be subject to this drawback.

- Perform lubrication according to the assembly instructions.
- Make sure to use the right lubrication pressure levels and lubricant quantity.

5.6 Lubricant selection

Oils, greases or low viscosity greases can be used as lubricants. The same lubricants used for anti-friction bearings are used. As a rule, the choice of a lubricant and the supply method can be modified to adapt to the lubrication of the other machine components.
Essentially, choosing a lubricant depends on the operating temperature and various factors related to operation, such as load, vibration, oscillations or short stroke applications. Special requirements, such as the use in combination with strong or aggressive means, in clean rooms, vacuum or in the food industry, must also be taken into account.

Grease lubrication
For grease lubrication, lubricating greases are recommended for rolling bearings and friction bearings based on mineral oil and with thickeners according to DIN 51825 (K1K, K2K). In heavy-duty applications it is advisable to use EP additives (KP1K, KP2K), class 1 or 2 NLGI. The use of greases of other consistency classes is possible with the prior approval of the lubricant supplier.

Lubrication with low viscosity grease
In centralised lubrication systems, low viscosity greases are often used, as they are distributed more effectively throughout the system due to their reduced consistency.

Oil lubrication
Lubricating oils offer the advantage of a more uniform distribution and reach the contact surfaces more effectively. However, due to their properties, they tend to leak more easily from blocks, causing, in some cases, such as in vertical assemblies, contamination of the underlying parts of the machine. For this reason, higher amounts of lubricant are needed than grease lubrication. As a rule, oil lubrication is only suitable when using a centralised lubrication system or for products equipped with a lubrication unit.

5.6.1 Recommended lubricants

Examples of applications and the most suitable lubricants are given in the table below.

CAUTION!

Using the wrong grease can cause damage!
Greases with solid particles such as graphite or MOS_2 can cause damage.
- Do not use greases containing solid particles such as graphite or $MOS_2$2!

The information on lubricants is used as an example and as an aid in the selection. Other lubricants can be selected after clarifying the specific application with the lubricant supplier. In addition, the instructions of the manufacturer of the lubrication system must be complied with.

Table 5.2 **Recommended lubricants - grease, low viscosity grease and oil**

Application Type	Grease		Low viscosity grease		Oil	
	Manufacturer	**Name**	**Manufacturer**	**Name**	**Manufacturer**	**Name**
Standard	HIWIN	G05	Klüber Lubrication München	MICROLUBE GB 00	Klüber Lubrication München	Klüberoil GEM 1-150 N
	Klüber Lubrication München	MICROLUBE GL 261	Mobil	Mobilux EP 004	FUCHS	GEARMASTER CLP 320
	Mobil	Mobilux EP 1	FUCHS	GEARMASTER LI 400	FUCHS	RENOLIN CLP 150
	FUCHS	LAGERMEISTER BF 2	FUCHS	RENOLIT EPLITH 00	–	–
	LUBCON	Turmogrease CAK 2502	–	–	–	–
	FUCHS	RENOLIT LZR 2 H	–	–	–	–
	Klüber Lubrication München [1]	ISOFLEX TOPAS AK 50 [1]	–	–	–	–
For heavy-duty applications	HIWIN	G01	It is advisable to consult a lubricant manufacturer regarding the use of these heavy-duty lubricants.			
	Klüber Lubrication München	Klüberlub BE 71-501				
	FUCHS	LAGERMEISTER EP 2				
	LUBCON	TURMOGREASE Li 802 EP				
	FUCHS	RENOLIT LZR 2 H				
For cleanroom applications	HIWIN	G02	It is advisable to consult a lubricant manufacturer regarding the use of these heavy-duty lubricants.		Klüber Lubrication München	Klüber Tyreno Fluid E-95V
	Klüber Lubrication München	ISOFLEX TOPAS NCA 152			Mobil	Mobilgear 626
	FUCHS	GLEITMO 591			FUCHS	RENOLIN CLP 100
Per Cleanroom applications high speed	HIWIN	G03	–	–	–	–
	Klüber Lubrication München	ISOFLEX TOPAS NCA 52	–	–	–	–

[1] Recommended for MG series

Table 5.3 **Recommended lubricants - grease, low viscosity grease and oil (continued)**

Application Type	Grease		Low viscosity grease		Oil	
	Manufacturer	**Name**	**Manufacturer**	**Name**	**Manufacturer**	**Name**
High speeds	HIWIN	G04	Klüber Lubrication München	ISOFLEX TOPAS NCA 5051	Klüber	Klüberoil GEM 1-46 N
	Klüber Lubrication München	ISOFLEX NCA 15	Mobil	Mobilux EP 004	FUCHS	RENOLIN ZAF B 46 HT
	LUBCON	Turmogrease Highspeed L 252	FUCHS	GEARMASTER LI 400	–	–
	FUCHS	RENOLIT HI-Speed 2	FUCHS	RENOLIT SF 7-041	–	–
For applications in the food industry pursuant to USDA H1	Klüber Lubrication München	Klübersynth UH1 14-151	Klüber Lubrication München	Klübersynth UH1 14-1600	Klüber	Klüberoil 4 UH1-68 N
	Mobil	Mobilgrease FM 102	Mobil	Mobilgrease FM 003	–	–
	FUCHS	GERALYN 1	FUCHS	GERALYN 00	–	–

Description of application types

Standard applications
Load: max. 15% of dynamic load coefficient
Temperature range: -10 °C to +80 °C
Speed: < 1 m/s

For heavy-duty applications
Load: max. 50% of dynamic load coefficient
Temperature range: 0 °C to +80 °C
Speed: < 1 m/s

For cleanroom applications
Load: max. 50% of dynamic load coefficient
Temperature range: -10 °C to +80 °C
Speed: < 1 m/s

For high speed cleanroom applications
Load : max. 50% of dynamic load coefficient
Temperature range: -10 °C to + 80 °C
Speed: < 1 m/s

Applications with high speeds
Load: max. 50% of dynamic load coefficient
Temperature range: -10 °C to +80 °C
Speed: < 1 m/s

Applications in the food industry pursuant to USDA H1
Load: max. 15% of dynamic load coefficient
Temperature range: -10 °C to +80 °C
Speed: < 1 m/s

5.7 HIWIN lubricants

Table 5.4 **Overview of HIWIN greases**

Type of grease	Usage	Article number	
		70g cartridge 	**400 g cartridge** 
G01	For heavy-duty applications	**GMBH** 20-000335 **TW** 7M000JA1	**GMBH** 20-000336 **TW** 7M0007A1
G02	For cleanroom applications	**GMBH** 20-000338 **TW** 7M0009A1	**GMBH** 20-000339 **TW** 7M000AA1
G03	For high speed cleanroom applications	**GMBH** 20-000341 **TW** 7M000CA1	**GMBH** 20-000342 **TW** 7M000DA1
G04	Applications with high speeds	**GMBH** 20-000344 **TW** 7M000KA1	**GMBH** 20-000345 **TW** 7M000GA1
G05	Standard grease	**GMBH** 20-000347 **TW** 7M000LA1	**GMBH** 20-000348 **TW** 7M000MA1

5.8 Miscibility

Always check the miscibility of the different lubricants. Lubricating oils based on mineral oil of the same classification (e.g. CL) and similar viscosity (at most one class difference) can be mixed. Greases can be mixed if their base oil and the type of thickener are the same. The viscosity of the base oil must be similar. The maximum difference in the NLGI class is one level.
The use of lubricants other than those listed may mean shorter lubrication intervals and reduced performance. Chemical reactions between plastics, lubricants and preservatives can also occur.

Table 5.5 **Miscibility of HIWIN greases**

	G01	G02	G03	G04	G05
G01	■	■	■	●	●
G02	■	■	■	■	■
G03	■	■	■	■	■
G04	●	■	■	■	■
G05	●	■	■	■	■

■ miscible
● partially miscible

Table 5.6 **Compatibility of basically lubricated products with HIWIN greases**

	G01	G02	G03	G04	G05
QH, QE, QW, QR	●	■	■	■	■

■ miscible
● partially miscible

Tip:
If only partially miscible lubricants are used, the old grease should be removed as much as possible before the new grease is introduced. The amount of re-lubrication of the new grease must be increased temporarily. If immiscible lubricants are used, the old grease must be completely removed before introducing the new grease.

5.9 Grease pumps and lubrication adapters

A1: Hydraulic coupling
Suitable for conical grease nipples according to DIN 71412, external diameter 15 mm

Fig. 5.8 **A1**
*(Article Number TW34900007)

A2: Hollow extension
Suitable for conical or ball grease nipples according to DIN 71412/ DIN 3402, external diameter 10 mm

Fig. 5.9 **A2**

A3: Hollow extension with lubrication adapter
Suitable for ball grease nipples according to DIN 3402, outer diameter 6 mm

Fig. 5.10 **A3**

A4: Ball extension
Suitable for funnel grease nipples according to DIN 3405, external diameter 6 mm

Fig. 5.11 **A4**

A5: Pointed extension with lubrication adapter

Fig. 5.12 **A5**

A6: Angle point extension with lubrication adapter

Fig. 5.13 **A6**

Set of lubrication adapters and nozzles

Fig. 5.14 **Lubrication adapter and nozzles A3, A4, A5, A6**

GN-400C set: Large grease pump and A1, A2 Adapters

Fig. 5.15 **GN-400C**
*Included in the set provided by GMBH

GN-80M Set: Small grease pump and A1, A2 adapters

Fig. 5.16 **GN-80M**

5.10 Standard lubrication on delivery

Depending on the product group, HIWIN linear guides are supplied or protected with basic lubrication or with initial lubrication.

- **Protected blocks** are completely coated with an anti-corrosion oil. Before putting into service, a first lubrication must be performed according to Chapter 5.11**.**
- **The blocks with basic lubrication** are supplied with a reduced amount of grease. Lubrication channels are largely free of lubrication grease. This facilitates the change of lubricant and allows the transition from grease to oil lubrication. Basic lubrication is sufficient for putting the linear guide into service. Once it has been successfully commissioned, **a first lubrication must take place according to Chapter 5.11.**
- **The blocks with initial lubrication** are supplied with the amount of grease recommended according to Chapter 5.13 (on request).

Table 5.7 **Standard lubrication for blocks mounted on rails**

Series	Lubrication status
HG, EG, CG, WE, QH, QE, QW, QR	Initial lubrication
RG, MG	Preserved

Table 5.8 **Standard lubrication for blocks not mounted on rails**

Series	Lubrication status
HG, EG, CG, WE, RG, MG	Preserved
QH, QE, QW, QR	Basic lubrication

A grease suitable for rolling and sliding bearings with mineral oil as base oil and thickeners according to DIN 51825 (K2K), class 2 NLGI is used for the basic lubrication of linear guides. Base oil viscosity per QR: 100 mm2/s at 40 °C; viscosity of base oil for QH, QE, QW: 200 mm2/s at 40 °C.

The lubrication status may deviate from the standard mentioned here; the lubrication status in the relevant order documents is binding.

5.11 Initial lubrication at commissioning

CAUTION!

Danger of damage to linear guides in the event of missing or incorrect lubrication!
Missing initial lubrication or excessive amount of lubricant or excessive lubrication pressure can damage or destroy the product.

- Never operate the linear guide without a first lubrication!
- Follow the procedure indicated to avoid damaging the

With initial lubrication the blocks are supplied with the amount of grease necessary to achieve the specified lubrication intervals. The mandatory first lubrication operation allows the desired lubrication intervals to be reached. Once performed, the lubrication channels are completely filled with grease so it is no longer possible to switch from grease to oil lubrication without a complete cleaning of the block.

5.11.1 Performance

- Apply the amount of grease indicated in Chapter 5.13 by slowly pressing the pump to grease.
- Move the block about three times its length.
- Repeat this process twice more.
- Move the block along the entire travel path and check the entire profiled guide to see if a lubricant film can be detected.

  The initial lubrication process of the linear guide has been performed.

If it is not possible to detect a film of lubricant along the entire length of the profiled guide, increase the amount of lubricant used.

5.11.2 Initial lubrication for short stroke applications

For short stroke applications (stroke < 2 × block length), the initial lubrication must be carried out as follows.

Stroke < 2 × block length:
Install lubrication connections on both sides of the block and carry out lubrication as indicated in Chapter 5.11.1 for the corresponding lubrication connection.

Stroke < 0.5 × block length: Consult HIWIN.

5.11.3 Initial lubrication - MG Series

For size 15, a grease nipple is available for grease lubrication in the case of the miniaturised MG type.
For sizes 5, 7, 9 and 12 it is advisable to use a suitable spray grease (e.g. FUCHS PLANTO Multispray S).

- Apply lubricant evenly to the ball bearing raceways along the entire length of the profile rail.
- Move the block along the entire stroke.
- If necessary, remove excess grease.

- The initial lubrication process of the MG linear guide has been performed.

If a minimum resistance to displacement is required or the environmental conditions are very clean, it is advisable to lubricate the MG series with oil (see Chapter 5.13.4).

5.12 Changing lubricant

Before switching to a different lubricant, the entire block must be thoroughly cleaned.

Removal of existing lubricant is only necessary if the lubricants are not miscible.

5.13 Lubricant quantity

The quantities of lubricant indicated below are reference values, which may vary depending on the environmental conditions.

If the linear guides are mounted vertically, laterally or with the guide at the top, the amounts of re-lubrication must be increased by about 50.

5.13.1 Amount of lubricant for grease lubrication

Table 5.9 **Quantity of lubricant for grease lubrication - HG, QH, EG, QE, CG, WE, QW, RG, QR series**

Size	Partial amount of initial lubrication [cm^3]			Re-lubrication quantity [cm^3]		
	Medium load (S)	**For heavy-duty applications (C).**	**For super-heavy-duty applications (H)**	**Medium load (S)**	**For heavy-duty applications (C).**	**For heavy-duty applications (C).**
15, 17	0.2 (3 ×)	0.3 (3 ×)	—	0,2	0,3	—
20, 21	0.3 (3 ×)	0.5 (3 ×)	0.7 (3 ×)	0,3	0,5	0,7
25, 27	0.4 (3 ×)	0.8 (3 ×)	1.0 (3 ×)	0,4	0,8	1,0
30	0.6 (3 ×)	1.3 (3 ×)	1.7 (3 ×)	0,6	1,3	1,7
35	0.8 (3 ×)	1.9 (3 ×)	2.4 (3 ×)	0,8	1,9	2,4
45	—	3.8 (3 ×)	4.6 (3 ×)	—	3,8	4,6
50, 55	—	6.3 (3 ×)	7.7 (3 ×)	—	6,3	7,7
65	—	10.0 (3 ×)	13.5 (3 ×)	—	10,0	13,5

Table 5.10 **Quantity of lubricant for grease lubrication - MG series**

Size	Partial amount of initial lubrication [cm^3]		Re-lubrication quantity [cm^3]	
	Medium load (C)	**High load (H)**	**Medium load (C)**	**High load (H)**
MGN15	0.04 (3 ×)	0.06 (3 ×)	0,04	0,06
MGW15	0.07 (3 ×)	0.09 (3 ×)	0,07	0,09

5.13.2 Amount of lubricant for low viscosity grease lubrication

The quantities for lubrication with low viscosity grease are identical to the quantities of grease lubricant.

5.13.3 Dimensions of the piston distributors per feeding unit (one-line systems) for lubrication with low viscosity grease

To ensure sufficient lubrication, the following minimum dimensions must be respected for piston distributors. The interval between the individual lubrication pulses results from the amount of re-lubrication, the re-lubrication interval and the size of the piston distributor:

$$\text{Interval between lubrication pulses [km]} = \frac{\text{piston distributor size [cm}^3\text{]}}{\text{Re-lubrication quantity [cm}^3\text{].}} \times \text{Re-lubrication range [km]}$$

5.13.4 Quantity of lubricant for oil lubrication

When using a centralised lubrication system, ensure that all hoses and fittings are filled with lubricant and do not contain air pockets. Long pipes and narrow pipe diameters should be avoided. The pipes must be installed on a slope.
The pulse count results from the partial quantities and dimensions of the piston distributor. The interval between two pulses can be calculated from the ratio between the number of pulses and the re-lubrication interval.
In addition, the rules of the manufacturer of the lubrication system must be complied with.

Table 5.11 **Quantity of lubricant for oil lubrication - HG, QH, EG, QE, CG, WE, QW, RG, QR series**

Size	Partial amount of initial lubrication [cm ^{3}]			Re-lubrication quantity [cm ^{3}].		
	Medium load (S)	**For heavy-duty applications (C).**	**For super-heavy-duty applications (H)**	**Medium load (S)**	**For heavy-duty applications (C).**	**For super-heavy-duty applications (H)**
15, 17	0.3 (3 ×)	0.3 (3 ×)	—	0.3	0.3	—
20, 21	0.5 (3 ×)	0.5 (3 ×)	0.5 (3 ×)	0.5	0.5	0.5
25, 27	0.7 (3 ×)	0.8 (3 ×)	1.0 (3 ×)	0.7	0.8	1.0
30	0.9 (3 ×)	1.0 (3 ×)	1.2 (3 ×)	0.9	1.0	1.2
35	1.2 (3 ×)	1.5 (3 ×)	1.8 (3 ×)	1.2	1.5	1.8
45	—	1.7 (3 ×)	2.0 (3 ×)	—	1.7	2.0
50, 55	—	2.5 (3 ×)	2.8 (3 ×)	—	2.5	2.8
65	—	4.5 (3 ×)	4.8 (3 ×)	—	4.5	4.8

In the case of the MG miniaturised guide, it is advisable to carry out oil lubrication through the profiled guide. In this case, apply the lubricant evenly, for example with a suitable brush, on the ball guides over the entire length of the profiled guide. Then slide the block all the way and remove the excess oil.

5.13.5 Dimensions of the piston distributors for the supply unit (one-line systems) for lubrication with oil

To ensure sufficient lubrication, the following minimum dimensions must be respected for piston distributors. The interval between the individual lubrication pulses results from the amount of re-lubrication, the re-lubrication interval and the size of the piston distributor:

$$\text{Interval between lubrication pulses [km]} = \frac{\text{piston distributor size [cm}^3\text{]}}{\text{Re-lubrication quantity [cm}^3\text{]}} \times \text{Re-lubrication range [km]}$$

5.14 Re-lubrication

CAUTION!

Danger of damage to linear guides in the event of insufficient lubrication!
Too little or too much lubricant/lubrication can damage or destroy the product.
- Ensure sufficient and regular re-lubrication!
- Follow the procedure indicated to avoid damaging the product!

Lubrication intervals strongly depend on operating conditions (loads, speed, acceleration) and environmental conditions (temperature, fluids, dirt, etc.). Environmental influences such as high loads, vibration, long travel distances and dirt can reduce lubrication intervals. Once the lubrication interval has elapsed, enter the amount of lubricant as specified in Chapter 5.13 by operating the distributor in a single action or adjusting the central lubrication system accordingly.

Ensure that oil film is visible throughout the guide. If this is not the case, increase the amount of lubricant.

5.14.1 Re-lubrication ranges for grease lubrication

Among other conditions, the re-lubrication intervals depend on the load ratio P/Cdyn, where P stands for the equivalent dynamic load and Cdyn stands for the dynamic load coefficient.

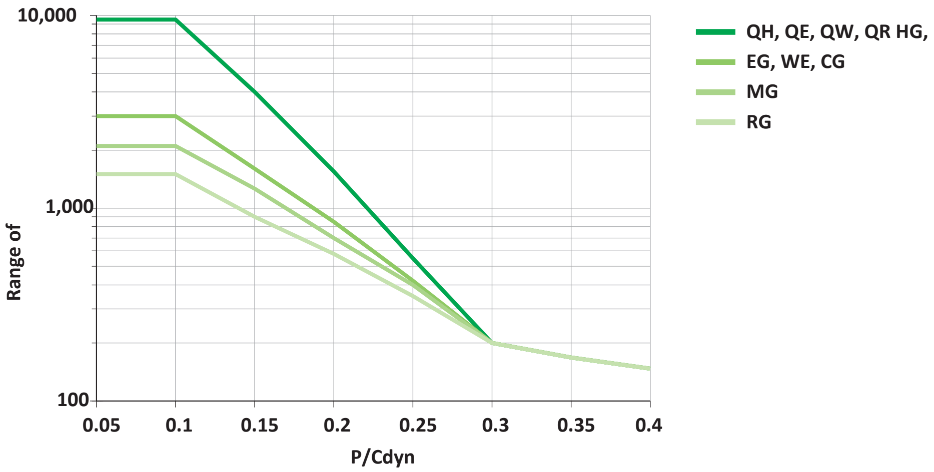


Fig. 5.17 **Re-lubrication intervals based on load for grease lubrication**

Re-lubrication intervals may be reduced in the following conditions. In these cases, refer to HIWIN: v > 3 m/s, a > 30 m/s2, contact with fluids, temperatures < 20 °C or > 30 °C, dirty environmental conditions.

5.14.2 Re-lubrication ranges for lubrication with low viscosity grease

The re-lubrication intervals for low viscosity grease lubrication are reduced by 25% compared to the re-lubrication intervals for grease lubrication (see Chapter 5.14.1).

5.14.3 Re-lubrication ranges for oil lubrication

The re-lubrication intervals for lubrication with oil are reduced by 50% compared to the re-lubrication intervals with grease (see Chapter 5.14.1)

5.15 Disposal

CAUTION!

Danger caused by substances dangerous to the environment!
Danger to the environment depends on the type of substance used.
- Thoroughly clean contaminated parts before disposal!
- Clarify the requirements for safe disposal with disposal companies and possibly with the competent authorities!

Fluids	
Lubricants	Dispose of as hazardous waste in an environmentally friendly manner
Dirty cleaning cloths	Dispose of as hazardous waste in an environmentally friendly manner
Blocks	
Steel components	Dispose of separately
Plastic components	Dispose of as non-recyclable waste
Rails	
Steel components	Dispose of separately
Plastic bolt caps	Dispose of as non-recyclable waste

5.17 Lubrication accessories

5.17.1 E2 self-lubricating kit for the HG, EG series

The self-lubricating kit E2 consists of a lubrication unit **[5]** located between the red front green recirculation head **[3]** and the seal **[4]**, a fitting **[2]** and an interchangeable oil tank **[1]**. The lubricant in the oil tank passes through the connection element and goes to the lubrication unit, from where it is transferred to the tracks of the rail, thanks to four felt pads that for capillarity spread a thin film of lubricant.

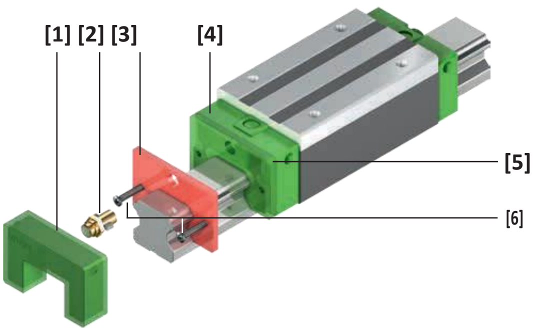


Fig. 5.18 **Exploded view of E2 self-lubricating blocks for HG, EG and RG series**

Table 5.12 **Key for Fig. 5.18**

Pos.	Name
1	Oil tank
2	Fitting
3	Front seal
4	Recirculation head
5	Case with felt
6	Fastening screws

Assembly

- If necessary, disassemble the existing grease nipple and closing seals.
- Place the lubrication unit **[5]** on the block.
- Place the closing seal/s **[3]** in front of the lubrication unit **[5]**.
- Tighten the fastening screws **[6]**.
- Install the fitting **[2]**.

Note: Not available on blocks equipped with SW seal

The size of the screws and fitting may vary depending on the type of dust protection used.

- Push the oil tank **[1]** onto the lubrication unit until you hear a click.

- The self-lubricating block E2 has been mounted.

5.17.2 E2 self-lubricating block for the CG series (Only available in Germany)

The E2 self-lubricating kit for the CG series consists of a lubrication unit with oil tank **[2]** and an additional closing seal **[1]**. The four ball rolling tracks are lubricated via the four felt of the ball lubrication unit **[2]** is lubricated via the lubrication unit.

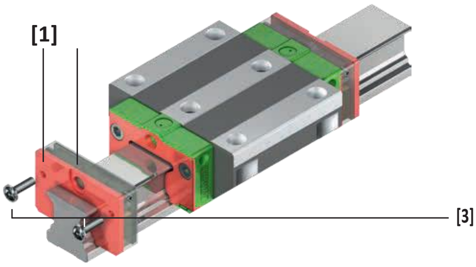


Fig. 5.19 **Exploded drawing of the self-lubricating block E2 for the CG series**

Table 5.13 **Key for Fig. 5.19**

Pos.	Name
1	Closing seal
2	Lubrication unit with oil tank
3	Fastening screws

Assembly

- If necessary, disassemble the existing grease nipple and seal (s).
- Place the lubrication unit **[2]** on the block.
- Place the closing seal/s **[1]** in front of the lubrication unit **[2]**.
- Tighten the fastening screws **[3]**.

The size of the screws and fitting may vary depending on the type of dust protection used.

- The E2 self-lubricating kit has been mounted.

5.17.3 Substitution intervals

Oil tank replacement intervals are highly dependent on loads and environmental conditions. Environmental influences such as high loads, vibrations and dirt reduce replacement intervals

Table 5.13 shows the maximum interval between oil tank fill level checks.

The oil tank can be filled with an injector through the side filling holes or the entire component can be replaced.

Table 5.14 **Quantity of oil in the tank**

Model	Quantity of oil [cm 3]	Mileage [km]
HG15E2	1.6	2.000
HG20E2	3.9	4.000
HG25E2	5.1	6.000
HG30E2	7.8	8.000
HG35E2	9.8	10.000
HG45E2	18.5	20.000
HG55E2	25.9	30.000
HG65E2	50.8	40.000
EG15E2	1.7	2.000
EG20E2	2.9	3.000
EG25E2	4.8	5.000
EG30E2	8.9	9.000
RG25E2	5.0	6.000
RG30E2	7.5	8.000
RG35E2	10.7	10.000
RG45E2	18.5	20.000
RG55E2	26.5	30.000
RG65E2	50.5	40.000

Standard oil:
Mobil SHC 636
Fully synthetic based on hydrocarbons (PAO)
Degree of viscosity: ISO VG 680
Alternatively oils of the same classification and viscosity may be used.

5.18 Appendix

5.18.1 Maximum speeds and accelerations for HIWIN linear guides

For HIWIN linear guides the following maximum speeds and accelerations are allowed 1):

Table 5.15 **Maximum permissible speeds and accelerations for HIWIN linear guides**

Model	Maximum speed v_{max} [m/s]	Max. acceleration to $_{max}$ [m/s²]
QH, QE, QW	5	50
HG, EG, CG, WE, QR	4	40
RG	3	30
MG	2	30

1) Higher values are possible depending on the application. Consult HIWIN on this topic.

5.18.2 Tightening torques for fastening screws

Insufficient tightening of the fastening screws strongly compromises the precision of the linear guide; therefore, the following tightening torques are recommended for the relative screw sizes.

Table 5.16 **Tightening torques of fastening screws according to ISO 4762-12.9**

Screw size	Torque [Nm]	Screw size	Torque [Nm]
M2	0.6	**M8**	31
M3	2.0	**M10**	70
M4	4.0	**M12**	120
M5	9.0	**M14**	160
M6	14.0	**M16**	200

The load capacity of the linear guide is often limited not by its load resistance but by the screw connection. It is therefore recommended to check the maximum permissible capacity of the screw connection pursuant to VDI 2230.

In the RG, QR and CG series, the blocks are each equipped with 2 additional threaded holes. Upon delivery these are sealed with green coloured closing caps.
To obtain a high rigidity of the linear guide even in the presence of high loads, it is recommended to use all the threaded holes available to fasten the adjacent construction.

5.19 HIWIN Italia standard assemblies

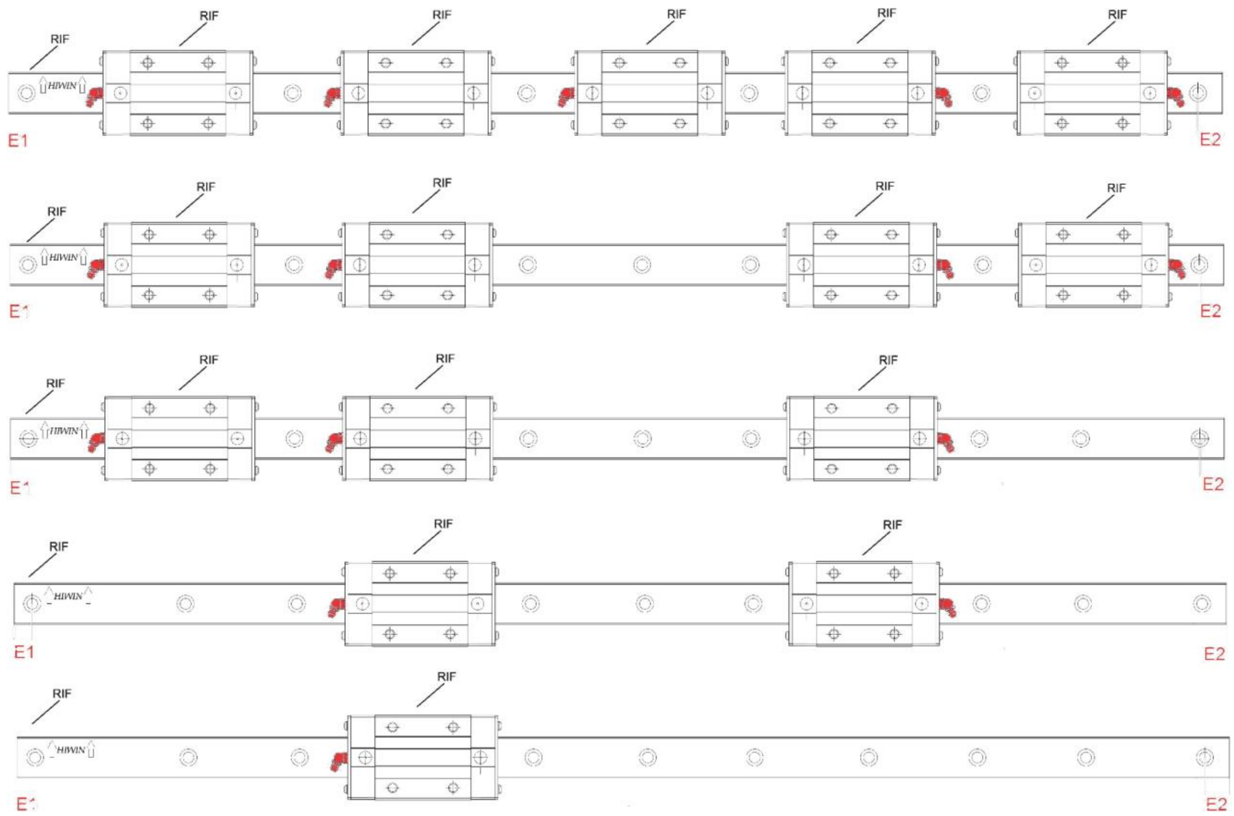


Fig. 5.20 **Position and direction of nipples**

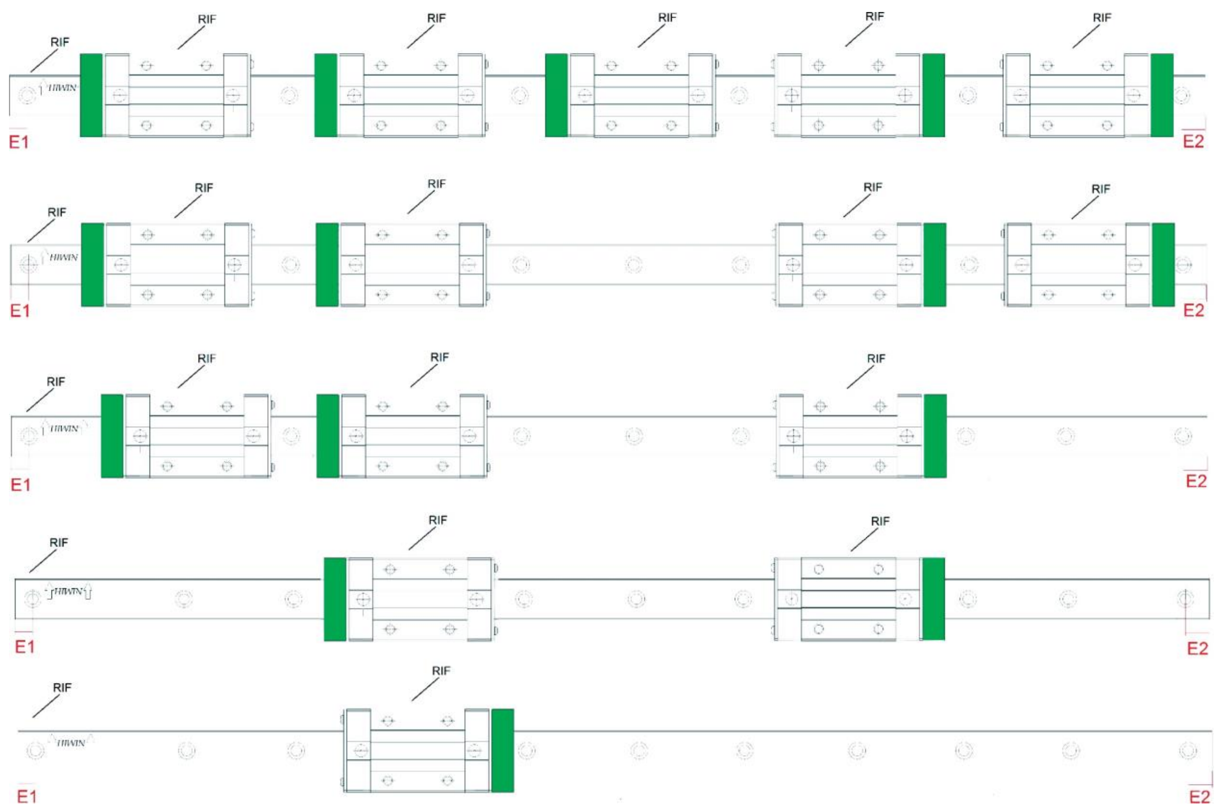
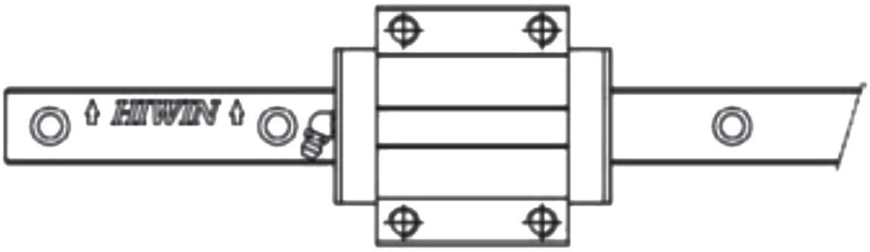


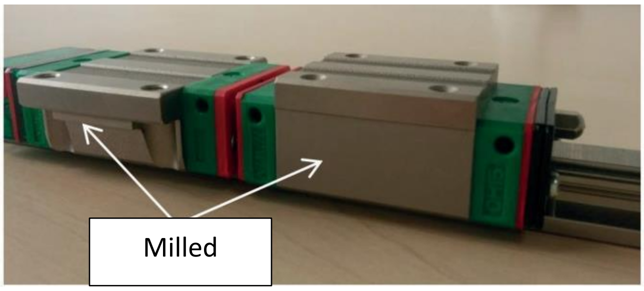
Fig. 5.21 **Kit E2**

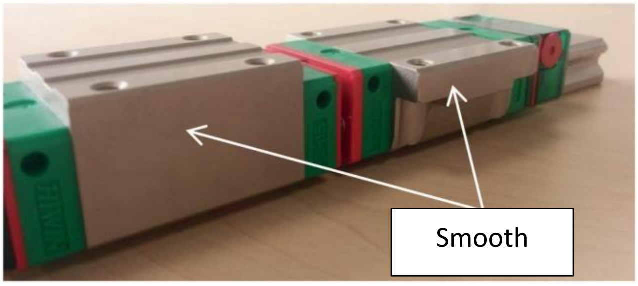
Below are illustrative examples of the Hiwin Standards for guide assemblies and junctions managed in Italy.

5.19.1 References for assembly



Both side faces of the rail are ground; the side indicated by the arrow was measured during the quality check.

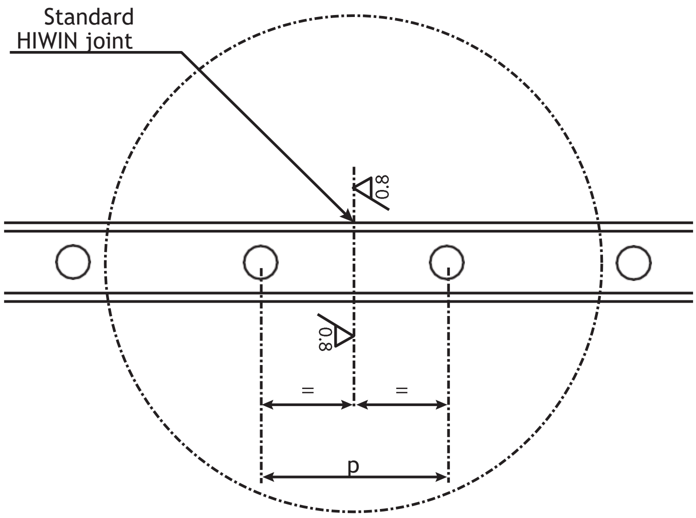




The reference face of the blocks is characterised by lateral milling; the side indicated by the arrow was measured during the quality check.

5.19.2 Standard HIWIN joint

With the term Standard HIWIN joint we mean when the joint cut is placed in the middle of the pitch of a rail, below we show an example:



***p = Rail step**

Both sides of the joint are ground to achieve a smooth joint.
If a NON-standard joint is desired, it must be specified on the drawing and will be indicated on the rail specification with an “E” = special rail before the precision class.

Example:

HGR25R4500 EC

Maximum laminations

With regard to the composition of the various sections and the maximum length of a single section, reference is made directly to the catalogue page with the dimensions of the desired rail.

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Note:
The technical data in this catalogue can be modified without notice.

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