

STAR – Ball Rail Systems

STAR – Linear Motion Technology

Ball Rail Systems

Standard Ball Rail Systems

Ball Rail Systems with Aluminum Runner Blocks

Super Ball Rail Systems

Wide Ball Rail Systems

Accessories

Miniature Ball Rail Systems

Cam Roller Guides

Roller Rail Systems

Linear Bushings and Shafts

Linear Bushings

Linear Sets

Shafts

Shaft Support Rails

Shaft Support Blocks

Ball Transfer Units

Screw Drives

Precision Ball Screw Assemblies

End Bearings and Housings

Linear Motion Systems

Linear Motion Slides

Linear Modules

Compact Modules

Ball Rail Tables

ALU-STAR Profile System

Controllers, Motors, Electrical Accessories

Linear Actuators

Rexroth Star GmbH
D-97419 Schweinfurt



REG. No.
1617 - 03




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Roller Rail is a trademark of Rexroth Star GmbH, Germany.



Ball Rail Systems

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STAR – Ball Rail Systems

Product Overview

STAR Ball Rail Systems were specially developed for use in machine tools and industrial robots calling for compact, rolling-element linear motion guideways. Ball Rails are available in various accuracy classes, each with extremely high load capacity and high rigidity.

These compact assemblies are available in 8 common sizes and offer the same high load capacities in all four main load directions.

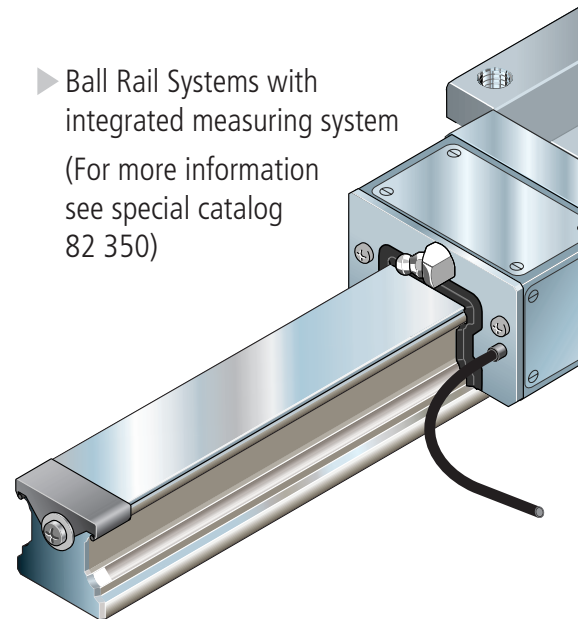
Make up your own compact linear motion guideways from interchangeable standard stock elements...

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time. This makes infinite combinations possible within each accuracy class.

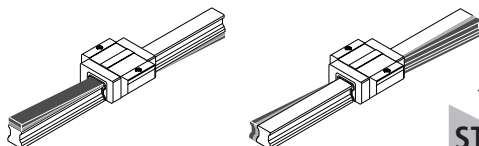
Each element can be individually ordered and separately stocked.


Both sides of the guide rail can be used as reference edges.

- ▶ Ball Rail Systems with integrated measuring system
(For more information see special catalog 82 350)



For the majority of all applications:
STAR Runner Blocks, steel version

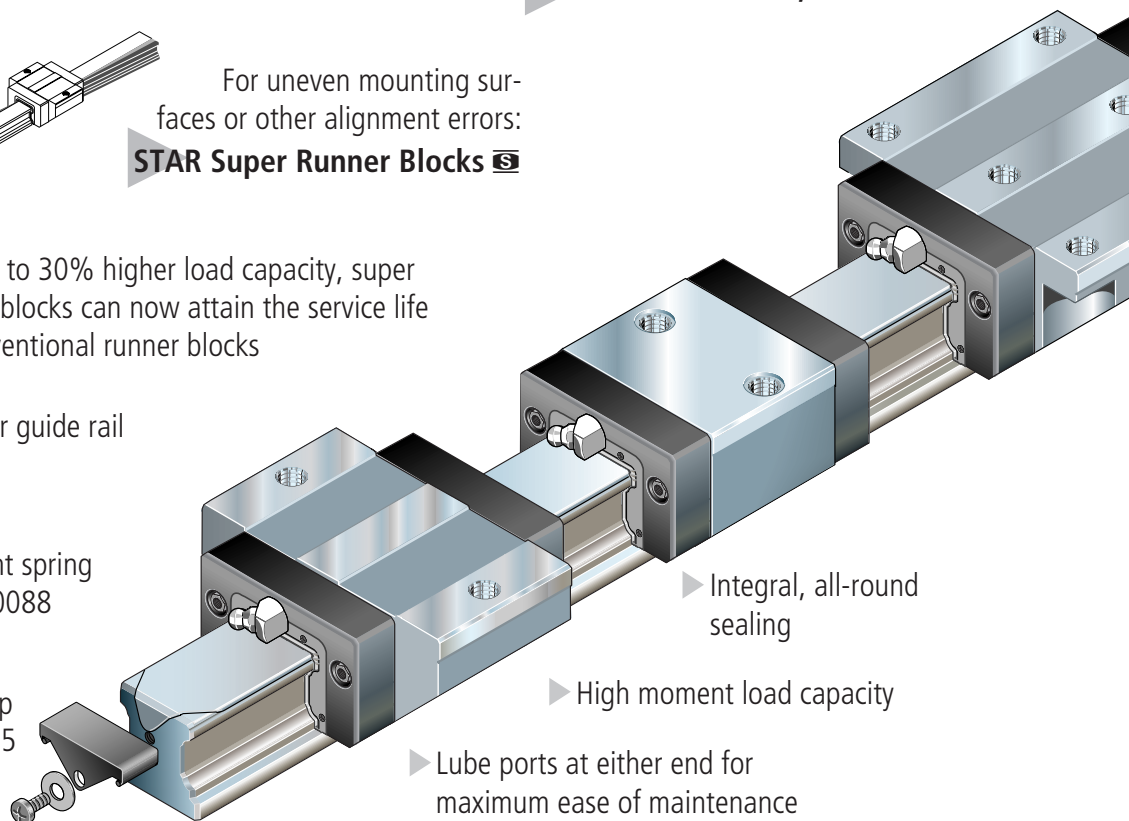


For uneven mounting surfaces or other alignment errors:
STAR Super Runner Blocks 

- ▶ Thanks to 30% higher load capacity, super runner blocks can now attain the service life of conventional runner blocks

Proven Rail Seal cover strip for guide rail mounting holes:

- ▶ One cover for all holes
- ▶ Material: corrosion resistant spring steel to DIN 17230 / EN 10088
- ▶ Easy clip-on mounting
- ▶ 0.3 mm Rail Seal cover strip as standard for sizes 35 - 65



- ▶ Integral, all-round sealing
- ▶ High moment load capacity
- ▶ Lube ports at either end for maximum ease of maintenance
- ▶ One guide rail profile for all runner blocks

30% higher dynamic load capacities and moments as standard in accuracy classes P, H and N (others on request):

- extends service life by a factor of 2.2
- field-proven
- identical in all four main load directions

For lightweight applications:

STAR Runner Blocks, aluminum version

- ▶ Simline runner blocks for all configurations

For low-noise applications:

STAR Runner Blocks with spacer balls

- ▶ Various preload classes

- ▶ Mounting of attachments to runner block from above or below

- ▶ Optimized entry-zone geometry and the high number of balls per track greatly reduce variations in elastic deflection

- ▶ Smooth, light running due to optimized ball recirculation and ideal track geometry

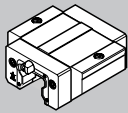

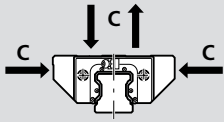
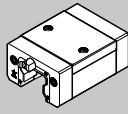

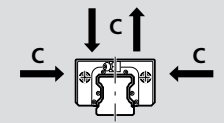
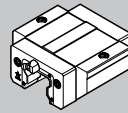
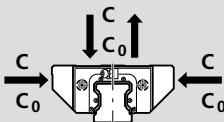
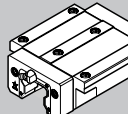
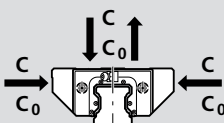
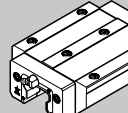
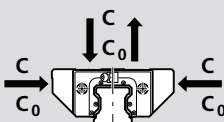
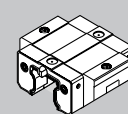
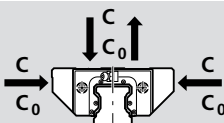
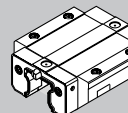
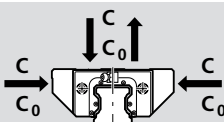
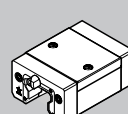
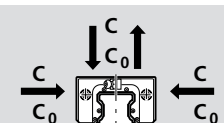
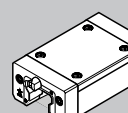
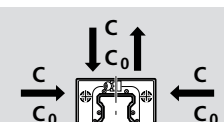
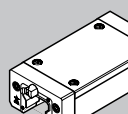
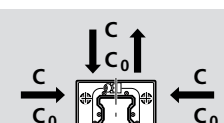
- ▶ End face mounting holes for attachment of bellows, lubrication plates or scraper plates

- ▶ Guide rail with mounting hole plugs

For high moment loads:
STAR Wide Ball Rail Systems

STAR – Ball Rail Systems

Product Overview with Load Capacities

| | | Page | |
|---|--|---|---|
| Super runner blocks, steel version with self-aligning feature |   Standard width, short 1661- | 28 |  |
| |   Slimline, short 1662- | 30 |  |
| Runner blocks, steel version |  Standard width, short 1665- | 44 |  |
| |  Standard width, long 1651- | 46 |  |
| Special versions: All steel runner blocks in accuracy class N (clearance and preload 0.02 C) are also available: <ul style="list-style-type: none"> – with zinc-iron coating and yellow chromating (part numbers 16...4-30), – with low-friction seal (part numbers 16...4-11). |  Standard width, long 1653- | 48 |  |
| |  Standard width, short, low profile 1663- | 50 |  |
| Preferred versions: 1651,- 1653-, 1622- and 1623-. |  Standard width, low profile 1693- | 52 |  |
| |  Slimline, short 1666- | 54 |  |
|  Slimline 1622- | 56 |  | |
|  Slimline, long 1623- | 58 |  | |

30% higher load capacities as standard in accuracy classes P, H and N

| Size | 15 | 20 | 25 | 30 | 35 | 45 | 55 | 65 | |
|------------------|---------------------------|----------------------------|---------------|---------------|---------------|---------------|----------------|----------------|--|
| Basis (m) | Load capacities | | | | | | | | |
| 100 000 | C (N) 3 900 | 10 100 | 11 400 | 15 800 | 21 100 | – | – | – | |
| 50 000 | C (N) 4 900 | 12 700 | 14 400 | 19 900 | 26 600 | – | – | – | |
| | C ₀ (N) – | – | – | – | – | – | – | – | |
| 100 000 | C (N) 3 900 | 10 100 | 11 400 | 15 800 | 21 100 | – | – | – | |
| 50 000 | C (N) 4 900 | 12 700 | 14 400 | 19 900 | 26 600 | – | – | – | |
| | C ₀ (N) – | – | – | – | – | – | – | – | |
| 100 000 | C (N) 5 400 | 12 400 | 15 900 | 22 100 | 29 300 | – | – | – | |
| 50 000 | C (N) 6 800 | 15 600 | 20 000 | 27 800 | 36 900 | – | – | – | |
| | C ₀ (N) 8 100 | 13 600 | 18 200 | 24 800 | 32 400 | – | – | – | |
| 100 000 | C (N) 7 800 | 18 800 | 22 800 | 31 700 | 41 900 | 68 100 | 98 200 | 160 000 | |
| 50 000 | C (N) 9 800 | 23 700 | 28 700 | 40 000 | 52 800 | 85 800 | 123 700 | 201 600 | |
| | C ₀ (N) 13 500 | 24 400 | 30 400 | 41 300 | 54 000 | 85 700 | 121 400 | 192 700 | |
| 100 000 | C (N) 10 000 | 24 400 | 30 400 | 40 000 | 55 600 | 90 400 | 124 200 | 211 900 | |
| 50 000 | C (N) 12 600 | 30 700 | 38 300 | 50 400 | 70 000 | 113 900 | 156 500 | 267 000 | |
| | C ₀ (N) 20 200 | 35 200 | 45 500 | 57 800 | 81 000 | 128 500 | 170 000 | 289 000 | |
| 100 000 | C (N) – | 9 600¹⁾ | 15 900 | – | – | – | – | – | |
| 50 000 | C (N) – | 12 100 | 20 000 | – | – | – | – | – | |
| | C ₀ (N) – | 13 600 | 18 200 | – | – | – | – | – | |
| 100 000 | C (N) – | 14 500¹⁾ | 22 800 | – | – | – | – | – | |
| 50 000 | C (N) – | 18 300 | 28 700 | – | – | – | – | – | |
| | C ₀ (N) – | 24 400 | 30 400 | – | – | – | – | – | |
| 100 000 | C (N) 5 400 | 12 400 | 15 900 | 22 100 | 29 300 | – | – | – | |
| 50 000 | C (N) 6 800 | 15 600 | 20 000 | 27 800 | 36 900 | – | – | – | |
| | C ₀ (N) 8 100 | 13 600 | 18 200 | 24 800 | 32 400 | – | – | – | |
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| | C ₀ (N) 20 200 | 35 200 | 45 500 | 57 800 | 81 000 | 128 500 | 170 000 | 289 000 | |

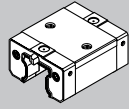
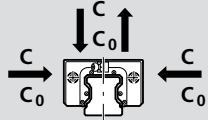
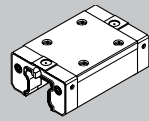
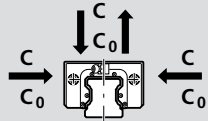
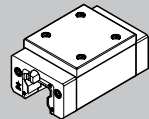
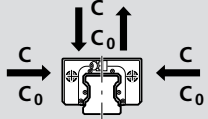
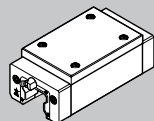
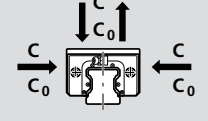
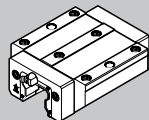
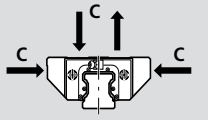
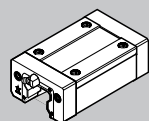
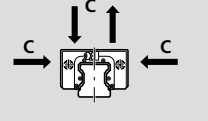
¹⁾ Conventional load capacities

Basis:

Determination of dynamic load capacity C is based on a travel life of 100,000 m to DIN 636. Load capacities on the basis of 50,000 m are also given for comparison.

STAR – Ball Rail Systems

Product Overview with Load Capacities

| | | Page | |
|--|--|-----------|---|
| Runner blocks, steel version |  <p>Slimline, short, low profile 1664-</p> | 60 |  |
| |  <p>Slimline, low profile 1694-</p> | 62 |  |
| |  <p>Slimline, high 1621-</p> | 64 |  |
| |  <p>Slimline, high, long 1624-</p> | 66 |  |
| Runner blocks, aluminum version |  <p>Standard width 1631-</p> | 76 |  |
| |  <p>Slimline 1632-</p> | 78 |  |

Observe maximum load!
(for details, see individual types)

30% higher load capacities as standard in accuracy classes P, H and N

| Size | 15 | 20 | 25 | 30 | 35 | 45 | 55 | 65 | |
|------------------|------------------------|--------------|----------------------------|---------------|---------------|---------------|---------------|----------------|---|
| Basis (m) | Load capacities | | | | | | | | |
| 100 000 | C (N) | – | 9 600¹⁾ | 15 900 | – | – | – | – | – |
| 50 000 | C (N) | – | 12 100 | 20 000 | – | – | – | – | – |
| | C ₀ (N) | – | 13 600 | 18 200 | – | – | – | – | – |
| 100 000 | C (N) | – | 14 500¹⁾ | 22 800 | – | – | – | – | – |
| 50 000 | C (N) | – | 18 300 | 28 700 | – | – | – | – | – |
| | C ₀ (N) | – | 24 400 | 30 400 | – | – | – | – | – |
| 100 000 | C (N) | 7 800 | – | 22 800 | 31 700 | 41 900 | 68 100 | 98 200 | – |
| 50 000 | C (N) | 9 800 | – | 28 700 | 40 000 | 52 800 | 85 800 | 123 700 | – |
| | C ₀ (N) | 13 500 | – | 30 400 | 41 300 | 54 000 | 85 700 | 121 400 | – |
| 100 000 | C (N) | – | – | 30 400 | 40 000 | 55 600 | 90 400 | 124 200 | – |
| 50 000 | C (N) | – | – | 38 300 | 50 400 | 70 000 | 113 900 | 156 500 | – |
| | C ₀ (N) | – | – | 45 500 | 57 800 | 81 000 | 128 500 | 170 000 | – |
| 100 000 | C (N) | 7 800 | – | 22 800 | 31 700 | 41 900 | – | – | – |
| 50 000 | C (N) | 9 800 | – | 28 700 | 40 000 | 52 800 | – | – | – |
| | C ₀ (N) | – | – | – | – | – | – | – | – |
| 100 000 | C (N) | 7 800 | – | 22 800 | 31 700 | 41 900 | – | – | – |
| 50 000 | C (N) | 9 800 | – | 28 700 | 40 000 | 52 800 | – | – | – |
| | C ₀ (N) | – | – | – | – | – | – | – | – |

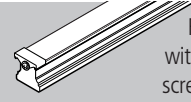
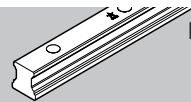
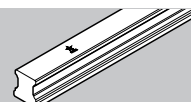
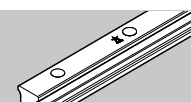

¹⁾ Conventional load capacities

Basis:

Determination of dynamic load capacity C is based on a travel life of 100,000 m to DIN 636. Load capacities on the basis of 50,000 m are also given for comparison.

STAR – Ball Rail Systems

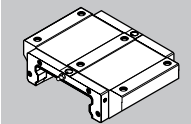
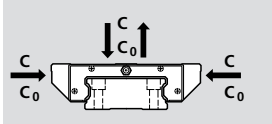
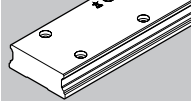
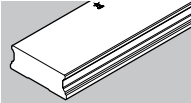
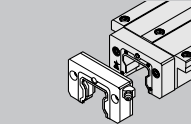
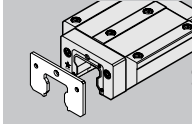
Product Overview with Load Capacities

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|--------------------|--|-----------|--|--|
| Guide rails |  For mounting from above, with Rail Seal cover strip and screw-down protective caps* 1605-6.- | 80 | | |
| |  For mounting from above, with plastic (or steel) mounting hole plugs* 1605-0.- (1606-0.-) | 82 | | |
| |  For mounting from below* 1607-. | 84 | | |
| |  For mounting from above – thin dense chrome plated 1645-. | 86 | | |
| |  For mounting from below – thin dense chrome plated 1647-. | 88 | | |
| | <ul style="list-style-type: none"> - Rail Seal mounting hole cover strip - Mounting hole plugs - Protective caps | | | |

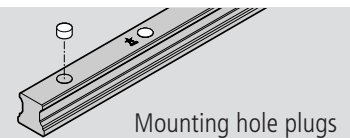
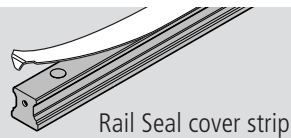
*Also available as special version: zinc-iron coating with yellow chromating in accuracy class N

Basis for load capacities p. 11:

Determination of load dynamic capacity C is based on a travel life of 100,000 m to DIN 636. Load capacities on the basis of 50,000 m are also given for comparison.

| | | | | |
|--|---|------------|---|--|
| Wide Ball Rail Systems Runner Blocks, steel version |  Wide 1671-. | 96 |  | |
| Wide Ball Rail Systems Guide rails |  Wide, for mounting from above* 1675-. | 98 | | |
| Wide Ball Rail Systems Guide rails |  Wide, for mounting from below* 1677-. | 100 | | |
| Accessories |  Front lube unit | 102 |  Scraper plate | |

| Size | 15 | 20 | 25 | 30 | 35 | 45 | 55 | 65 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|
| Max. length per one-piece section (mm) | | | | | | | | |
| | 3 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 |
| | 3 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 |
| | 3 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 | 4 000 |
| | 1 980 | 1 980 | 1 980 | 2 000 | 2 000 | 1 995 | 1 920 | 1 950 |
| | 1 980 | 1 980 | 1 980 | 2 000 | 2 000 | 1 995 | 1 920 | 1 950 |



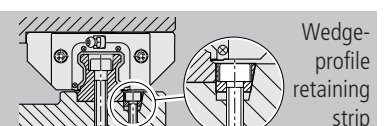
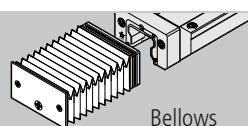
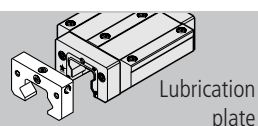
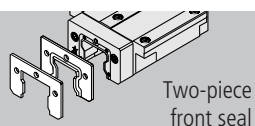
30% higher load capacities in accuracy classes P, H and N

| Size | 20/40 | 25/70 | 35/90 |
|------------------|----------------------------------|---------------|---------------|
| Basis (m) | Load capacities | | |
| 100 000 | C (N) 15 600¹⁾ | 30 400 | 58 200 |
| 50 000 | C (N) 19 600 | 38 300 | 73 300 |
| | C ₀ (N) 24 100 | 45 500 | 86 300 |

Max. length per one-piece section (mm)

| | | | |
|--|-------|-------|-------|
| | 4 000 | 4 000 | 4 000 |
| | 4 000 | 4 000 | 4 000 |

1) Conventional load capacities



STAR – Ball Rail Systems

General Technical Data and Calculations

General Notes

The general technical data and calculations apply to all Ball Rail Systems (all runner blocks and rails).

Specific technical data referring to the individual types is given separately.

Preload classes

To cater to the widest possible range of applications, STAR Ball Rail Systems are available in four different preload classes.

Since excessive preload can cause a reduction in service life, we recommend that the preload should not be more than 1/3 of the load F acting on the bearing.

Linear motion systems with parallel rails

– Observe the permissible parallelism offset of the rails for the selected preload class (see tables provided with the various types).

– When mounting accuracy class N Ball Rail Systems, we recommend using the type with clearance or the preload class 0.02 C, in order to avoid tolerance-related distortions.

Speed

$$v_{\max} = 3 \text{ m/s}$$

Speeds of up to 5 m/s are possible. Service life is limited by wear of plastic parts.

Tests have confirmed travel life of 50 - 100 x 10⁵ m without failure.

Acceleration

$$a_{\max} = 250 \text{ m/s}^2$$

Only with preloaded systems.

With non pre-loaded systems:

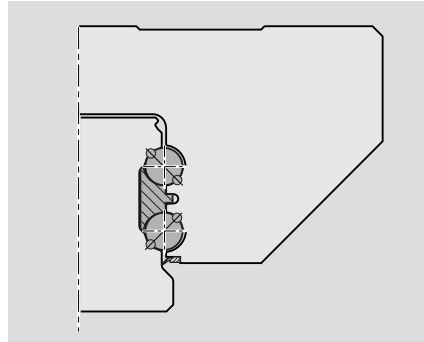
$$a_{\max} = 50 \text{ m/s}^2$$

Temperature resistance

$$t_{\max} = 100 \text{ }^{\circ}\text{C}$$

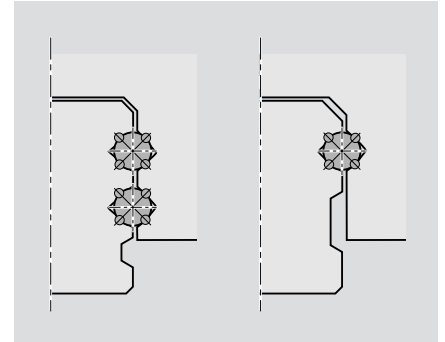
Friction

The friction coefficient μ of STAR Ball Rail Systems is appr. 0.002 to 0.003 (without friction of the seals).



STAR's special design with 4 ball circuits ensures that the balls **make contact at two points** regardless of the direction of loading.

This reduces friction to a minimum.



Other rail systems with 2 or 4 ball circuits and **4-point ball contact** have many times the friction coefficient: Due to differential slip when load is applied from the side and with comparable preload when no external load is applied, the Gothic track design brings about a higher friction (depending on the conformity of the fit and the load this may be up to approx. 5 times the friction coefficient).

This high friction level leads to greater build-up of heat.

Seals

The purpose of seals is to prevent dirt, swarf etc. from penetrating inside the runner block and thus shortening its service life.

Universal Seals

Universal Seals are incorporated as standard in STAR runner blocks.

They provide equal sealing performance on guide rails with and without rail seal cover strips.

Suitable for applications requiring good sealing.

Low Friction Seals

Low friction seals are available as an option and are mounted in-factory prior to shipment.

Suitable for applications requiring minimal friction.

Front Seal

Front Seals can be ordered separately for mounting by the customer.

For use in environments with fine dirt or metal particles and cooling or cutting fluids.

Scraper plates

Scraper plates can be ordered separately for mounting by the customer.

For use in environments subject to coarse dirt or swarf.

STAR – Ball Rail Systems

General Technical Data and Calculations

Definition of dynamic load capacity

The radial loading of constant magnitude and direction which a linear rolling bearing can theoretically endure for a nominal life of 10^5 meters distance traveled (to DIN 636 Part 2).

The dynamic load capacities given in the tables are mostly 30% above DIN values. They have been proven in tests.

Definition of static load capacity

The static loading in the direction of load which corresponds to a calculated stress of 4200 MPa at the center of the most heavily loaded rolling-element/raceway (rail) contact with a ball conformity of ≤ 0.52 .

Note:
With this contact stress, a permanent total deformation of the rolling element and the raceway will occur at the contact point corresponding to approx. 0.0001 times the rolling element diameter (to DIN 636 Part 2).

Definition and calculation of the nominal life

The calculated service life which an individual linear rolling bearing, or a group of apparently identical rolling element bearings operating under the same conditions, can

attain with a 90% probability, with contemporary, commonly used materials and manufacturing quality under conventional operating conditions (to DIN 636 Part 2).

Calculate the nominal life L or L_h according to formulas (1), (2) or (3):

Nominal life with constant speed

| | | |
|-----|--|---|
| (1) | $L = \left(\frac{C}{F}\right)^3 \cdot 10^5$ | L = nominal life (m) |
| (2) | $L_h = \frac{L}{2 \cdot s \cdot n \cdot 60}$ | L_h = nominal life (h) |
| | | C = dynamic load capacity (N) |
| | | F = equivalent load (N) |
| | | s = length of stroke (m) |
| | | n = stroke repetition rate (complete cycles/min.) (min^{-1}) |

Nominal life with variable speed

| | | |
|-----|---|---|
| (3) | $L_h = \frac{L}{60 \cdot v_m}$ | L = nominal life (m) |
| (4) | $v_m = \frac{t_1 \cdot v_1 + t_2 \cdot v_2 + \dots + t_n \cdot v_n}{100}$ | L_h = nominal life (h) |
| | | v_m = average speed (m/min) |
| | | v_1, v_2, \dots, v_n = discrete speed steps (m/min) |
| | | t_1, t_2, \dots, t_n = percentage of stroke covered at v_1, v_2, \dots, v_n (%) |

Equivalent dynamic load on bearing for calculation of service life

– with variable load on bearing

If the bearing is subjected to variable loads, the equivalent dynamic load F must be calculated according to formula (5):

| | | |
|-----|---|--|
| (5) | $F_1 = \sqrt[3]{F_1^3 \cdot \frac{q_1}{100} + F_2^3 \cdot \frac{q_2}{100} + \dots + F_n^3 \cdot \frac{q_n}{100}}$ | F = equivalent load (N) |
| | | F_1, F_2, \dots, F_n = discrete load steps (N) |
| | | q_1, q_2, \dots, q_n = percentage of stroke covered under F_1, F_2, \dots, F_n (%) |

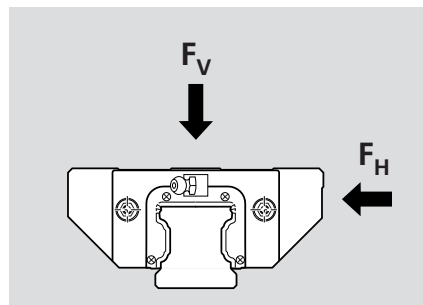
– with combined load on bearing

The equivalent dynamic load F resulting from combined vertical and horizontal loads is calculated according to formula (6):

Note:

The structure of the Ball Rail System permits this simplified calculation.

| | | |
|-----|---------------------|---|
| (6) | $F = F_V + F_H $ | F = equivalent dynamic load (N) |
| | | F_V = external dynamic load, vertical (N) |
| | | F_H = external dynamic load, horizontal (N) |



Note

If F_V and F_H involve several different load levels, they have to be calculated separately using formula (5).

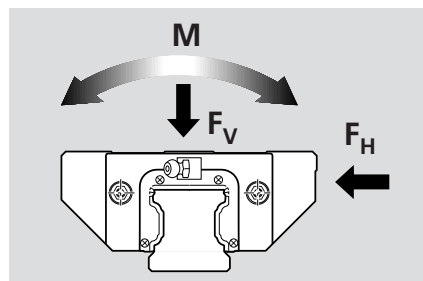
An external load acting at an angle on the runner block is to be broken down into its F_V and F_H components and these values then used in formula (6).

– with combined load in combination with a moment

With a combined external load – vertical and horizontal – in conjunction with a moment, calculate the equivalent dynamic load F according to formula (7):

Formula (7) applies only when using a single rail.

| | | |
|-----|---|---|
| (7) | $F = F_V + F_H + C \cdot \frac{ M }{M_t}$ | F = equivalent dynamic load (N) |
| | | F_V, F_H = external dynamic loads (N) |
| | | M = dynamic moment (Nm) |
| | | C = dynamic load capacity * (N) |
| | | M_t = permissible dyn. moment * (Nm) |
| | | * see tables |



Note

If F_V and F_H involve several different load levels, they have to be calculated separately using formula (5).

An external load acting at an angle on the runner block is to be broken down into its F_V and F_H components and these values then used in formula (7).

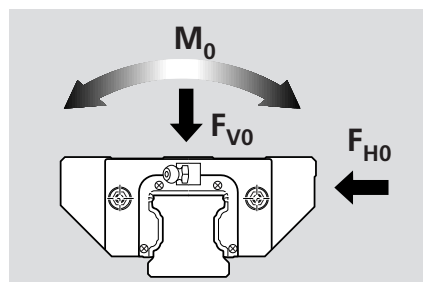
Equivalent static load on bearing

With a combined external static load – vertical and horizontal – in conjunction with a static moment, calculate the equivalent static load F_0 according to formula (8).

The equivalent static load F_0 must not exceed the static load capacity C_0 .

Formula (8) applies only when using a single rail.

| | | |
|-----|--|--|
| (8) | $F_0 = F_{V0} + F_{H0} + C_0 \cdot \frac{ M_0 }{M_{t0}}$ | F_0 = equivalent static load (N) |
| | | F_{V0}, F_{H0} = external static loads (N) |
| | | M_0 = static moment (Nm) |
| | | C_0 = static load capacity * (N) |
| | | M_{t0} = permissible static moment * (Nm) |
| | | * see tables |



Note

An external load acting at an angle on the runner block is to be broken down into its F_{V0} and F_{H0} components and these values then used in formula (8).

STAR – Ball Rail Systems

General Mounting Instructions

General Notes

The following notes relating to mounting apply to all Ball Rail Systems.

However, different specifications exist with regard to the parallelism of the guide rails and to mounting the runner blocks with mounting screws and locating pins.

This information is provided separately alongside the descriptions of the individual types.

STAR Ball Rail Systems are high-grade quality products. Particular care must be taken during transportation and subsequent mounting.

All steel components are protected with anti-corrosion oil. Preservative substances do not need to be removed provided the recommended lubricants are used.

Mounting examples

Guide rails:

Each guide rail has ground reference faces on both sides.

Options for lateral retention:

- 1 Reference edge
- 2 Clamping strip
- 3 Wedge-profile retaining strip

Note

Guide rails without lateral retention must be aligned straight and parallel, preferably using a straightedge.

(Guideline values for permissible side loads without additional lateral retention are provided with the descriptions for the different types.)

Runner blocks:

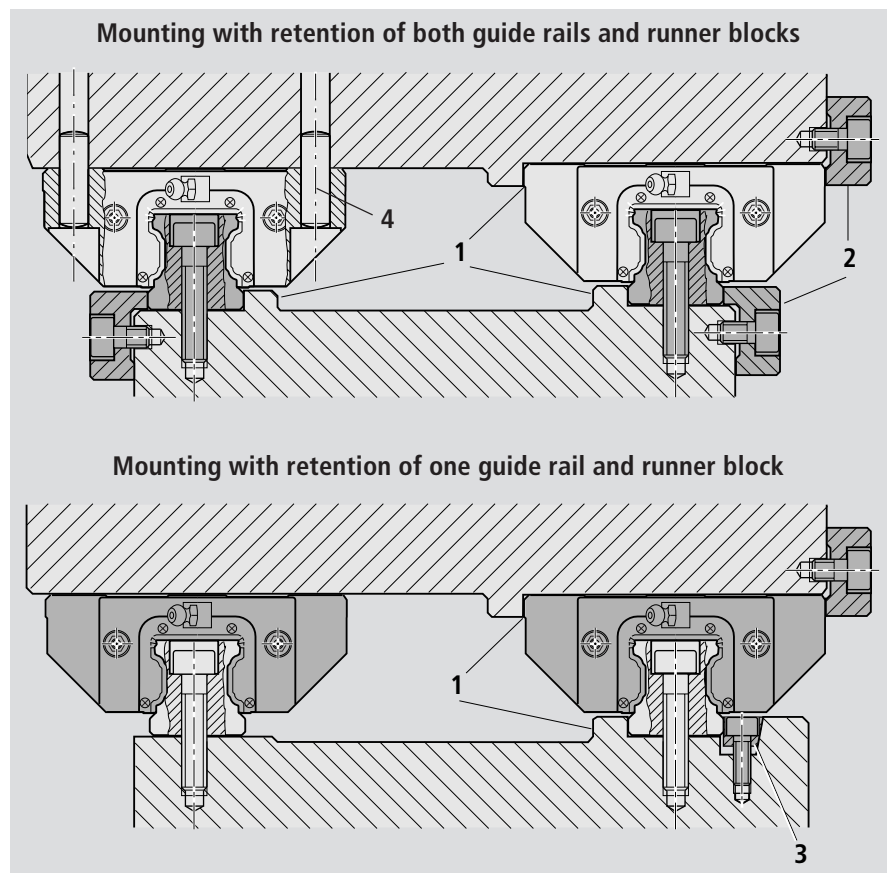
Each runner block has a ground reference edge on one side (dimension V_1 in the dimension drawing).

Options for additional lateral retention:

- 1 Reference edge
- 2 Clamping strip
- 4 Pinning

Note

Once the runner blocks have been mounted, they should slide easily back and forth.



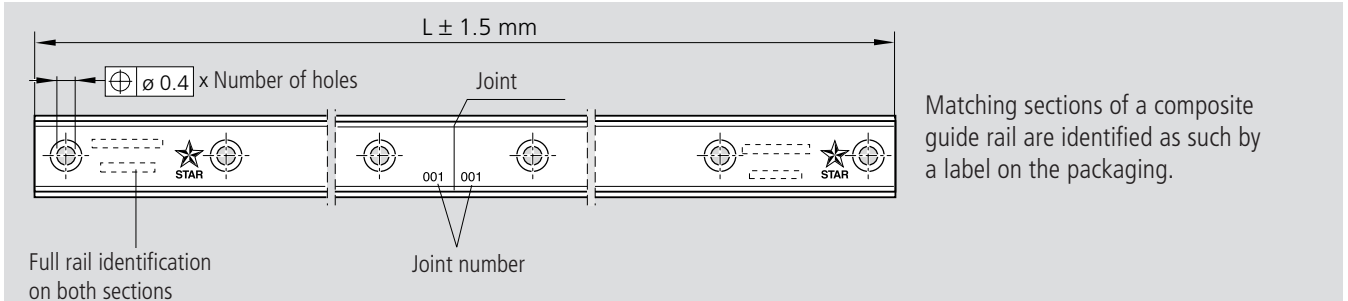
Mounting instructions

For detailed mounting instructions see "Mounting Instructions for Ball Rail Systems" RDEFI 82 270.



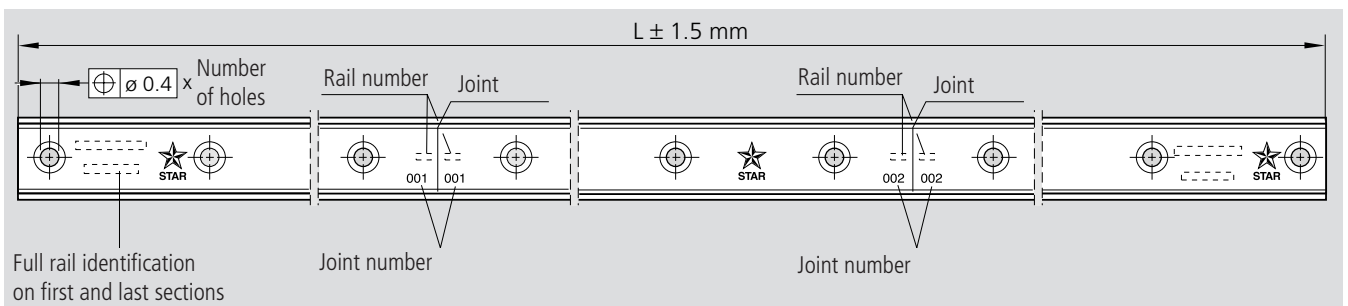
Composite guide rails

Rails made up of two sections



Rails made up of three or more sections

All sections of the same rail have the same number.



STAR – Ball Rail Systems

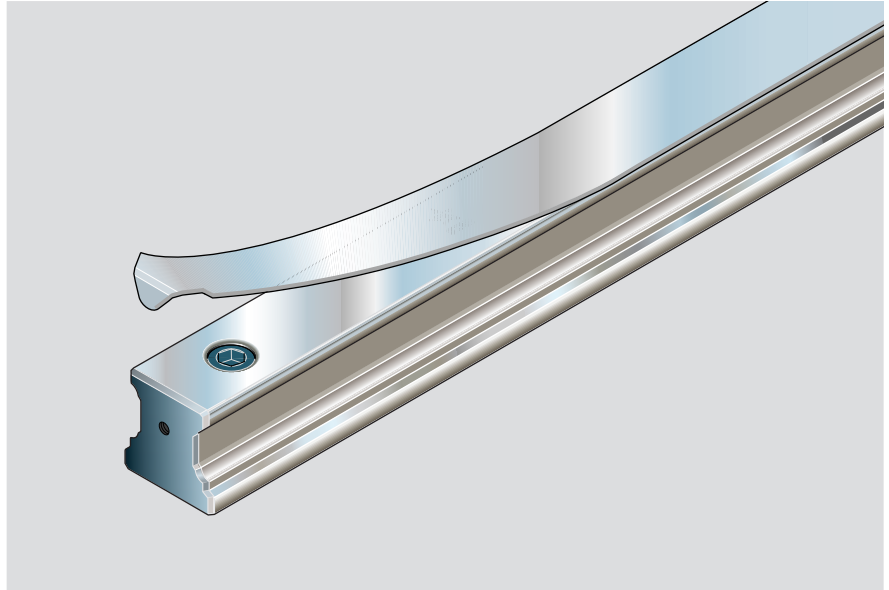
Mounting Instructions for Rail Seal Cover Strip and Mounting Hole Plugs

Advantages of the Rail Seal

The Rail Seal is easy to clip on and remove.

- This considerably facilitates and speeds up the mounting process:
 - no need to plug each single hole.
 - no time delay while waiting for adhesive to harden when using adhesive tape.
- The Rail Seal can be mounted and removed up to 4 times)

The Rail Seal is a precision-machined part that must be handled with great care. It must on no account be bent.



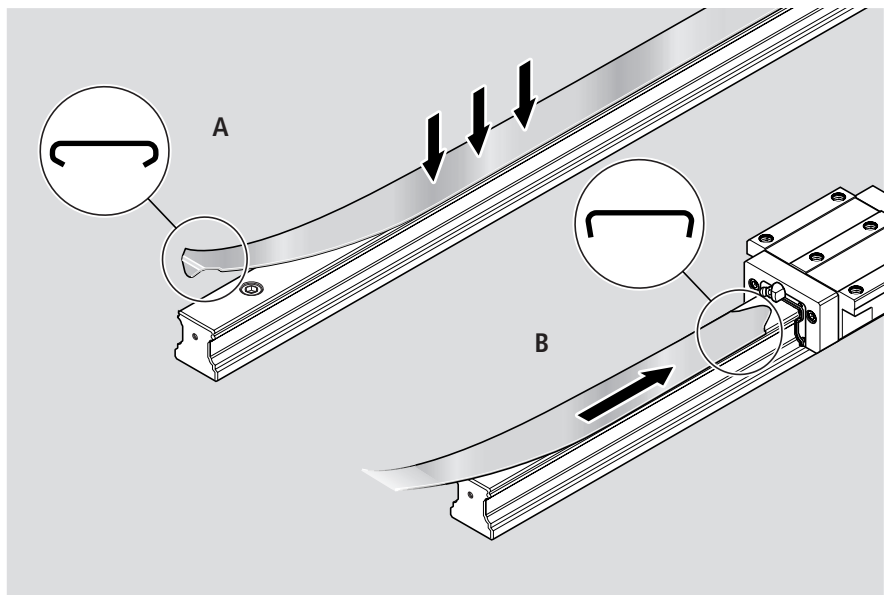
Versions/Functions

A Snap-fit Rail Seal (standard)

- The Rail Seal is clipped on before the runner block is mounted and fits tightly.

B Sliding-fit Rail Seal

- For mounting or replacing a Rail Seal when the runner block or superstructure cannot be removed.
- A section of the snap-fit Rail Seal is very slightly widened and can then be easily slid under the runner block.

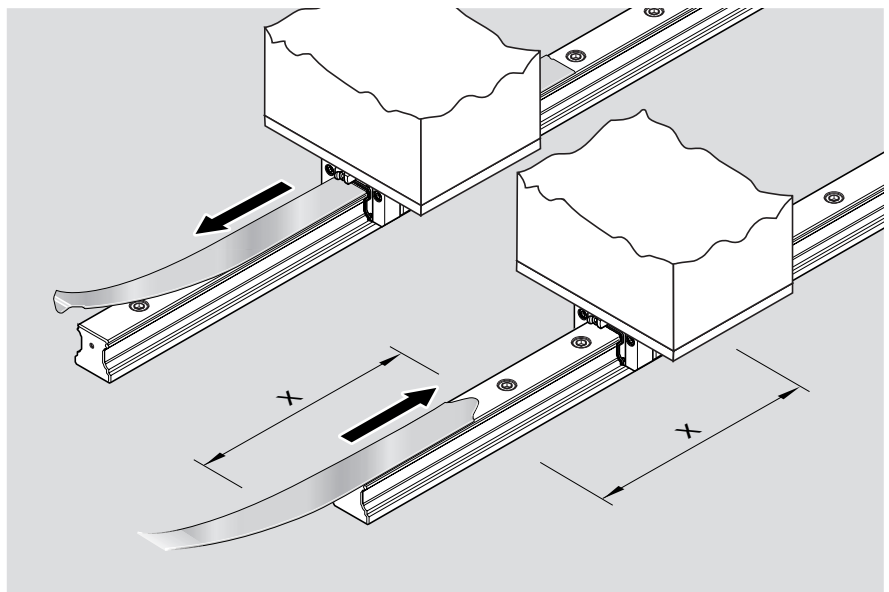


An arbor (available as an option) for 0.15 mm Rail Seals or a special expanding tool for 0.3 mm Rail Seals can be used to create the sliding fit after installation in order to be able to remove a Rail Seal.

The main advantage is that the length **X** of the sliding fit can be optimized to suit the installation conditions.

Observe the detailed mounting instructions!

For part numbers see chapter "Rail Seal cover strips, protective caps, mounting hole plugs".



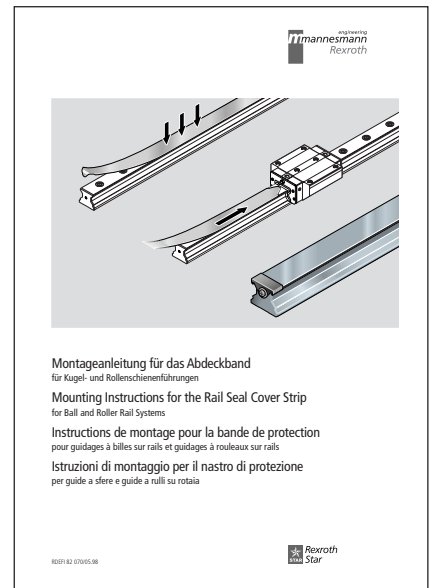
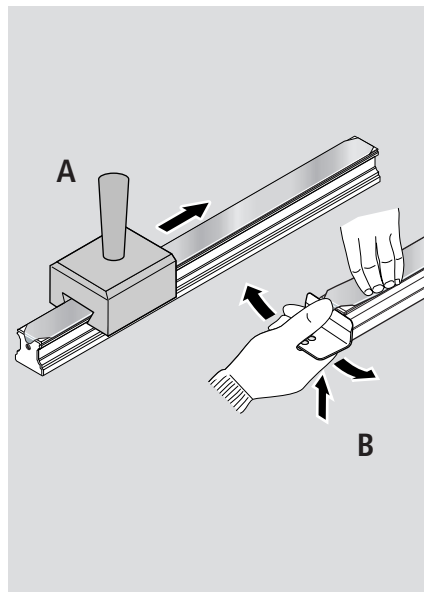
Mounting the Rail Seal

Mounting Tool Set for 0.3 mm Rail Seal

This consists of a mounting tool (A) to help clip on the cover strip and an angled lift-off plate (B) to remove it.

| Size | Part number |
|------|---------------------------------------|
| | Mounting tool + lift-off plate |
| 25 | 1619-210-80 |
| 30 | 1619-710-80 |
| 35 | 1619-310-60 |
| 45 | 1619-410-60 |
| 55 | 1619-510-60 |
| 65 | 1619-610-60 |

For more detailed information on how to mount cover strips, see "Mounting Instructions for Rail Seal Cover Strip" RDEFI 82 070.



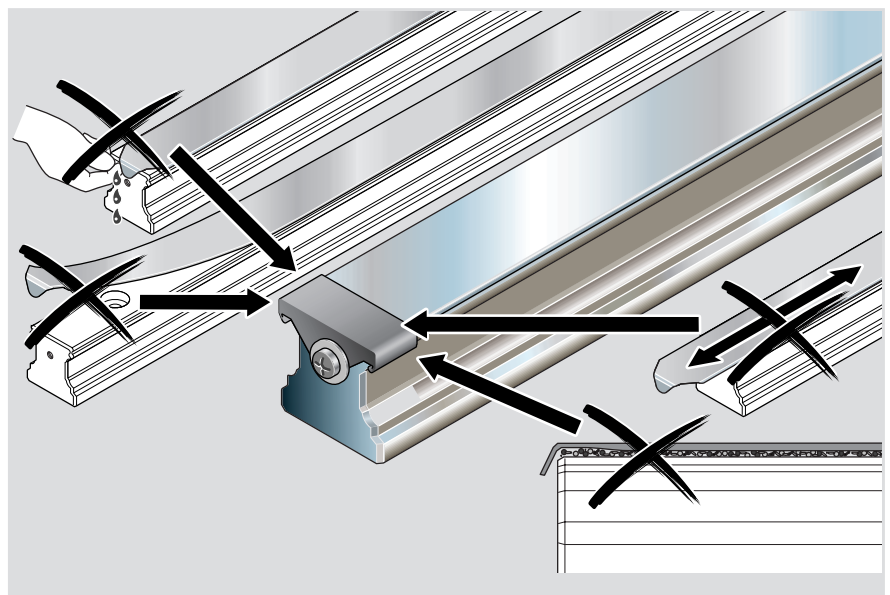
Protective Caps

STAR uses protective caps to secure the Rail Seal.

Protective caps can:

- prevent injuries
- prevent involuntary lifting of the Rail Seal and related ingress of dirt
- fix the Rail Seal in place

For part numbers see chapter "Rail Seal cover strips, protective caps, mounting hole plugs".



Inserting the Mounting Hole Plugs

For more detailed information on how to insert plastic or steel mounting hole plugs, see "Mounting Instructions for Ball Rail Systems" RDEFI 82 270.

For part numbers of mounting hole plugs see chapter "Rail Seal cover strips, protective caps, mounting hole plugs".



STAR – Ball Rail Systems

Product Overview Super Runner Blocks Steel Version

- ▶ Automatically compensates for errors in alignment of up to 10' arc about two axes
- ▶ Extra-compact design
- ▶ Identical load capacities in all four main directions
- ▶ Wider permissible tolerances for parallelism and height of mounting surfaces
- ▶ Accuracy classes H and N
- ▶ Preload classes: clearance and 2% preload
- ▶ Smooth running due to optimized ball recirculation and entry-zone geometry

Make up your own compact linear motion guideways from interchangeable standard stock elements...

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time. This makes infinite combinations possible within each accuracy class.

Self-alignment

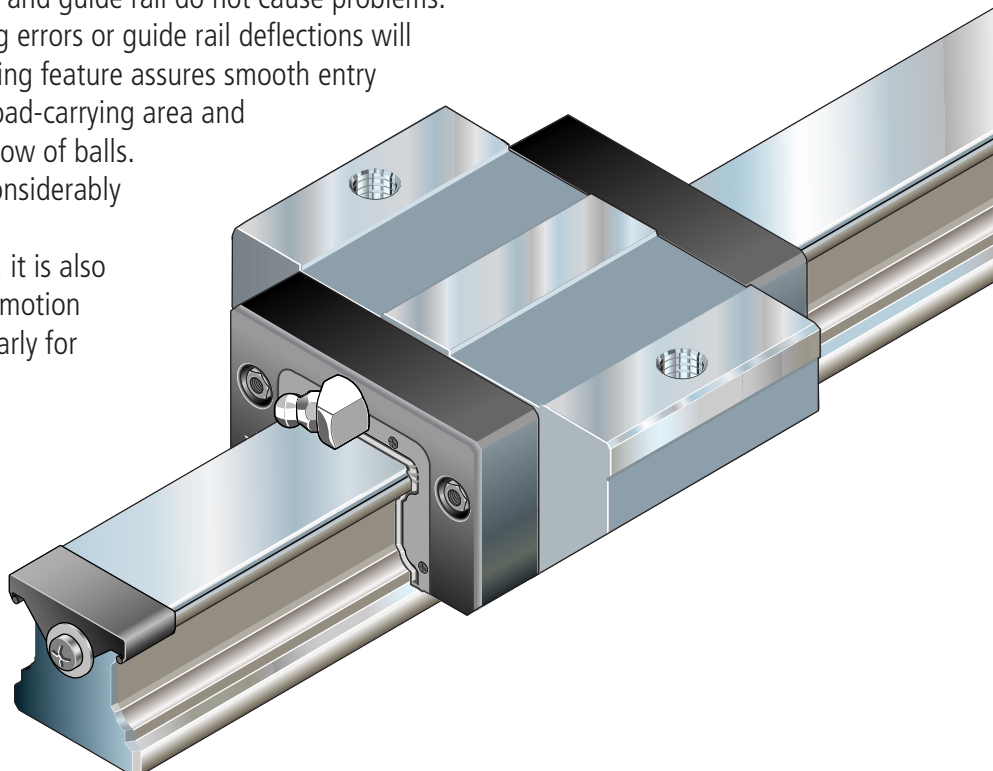
The STAR Super Runner Block with self-aligning feature automatically compensates for errors in alignment to 10' of arc with no reduction in the load carrying capacity as a result of runner block edges pressing on the rail. The centre of the mating surfaces supporting the steel load bearing plates serve as a rocking fulcrum. Therefore slight errors in alignment between runner block and guide rail do not cause problems.

Also, inaccuracies in machining, mounting errors or guide rail deflections will automatically be corrected. The self-aligning feature assures smooth entry and exit of the balls into and out of the load-carrying area and uniform load distribution over the entire row of balls. The result is extra-smooth running and considerably longer service life.

With two runner blocks on one guide rail, it is also possible to produce tilt-free linear rolling motion guides with a high load capacity, particularly for handling applications.

Proven Rail Seal cover strip for guide rail mounting holes:

- ▶ One cover for all holes
- ▶ Material: corrosion resistant spring steel to DIN 17230 / EN 10088
- ▶ Easy clip-on mounting

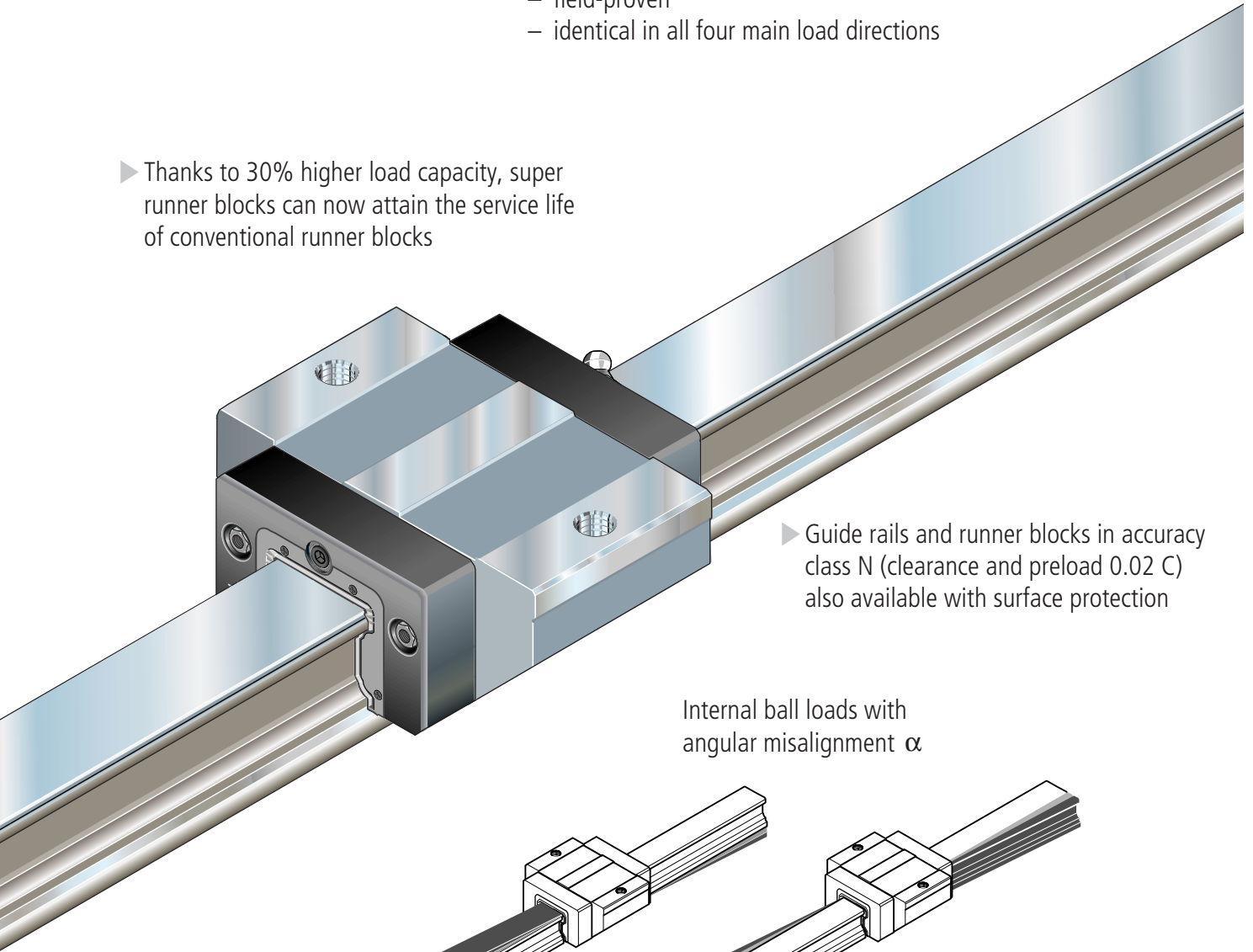


**30% higher dynamic load capacities and moments
as standard in accuracy classes H and N
(others on request):**

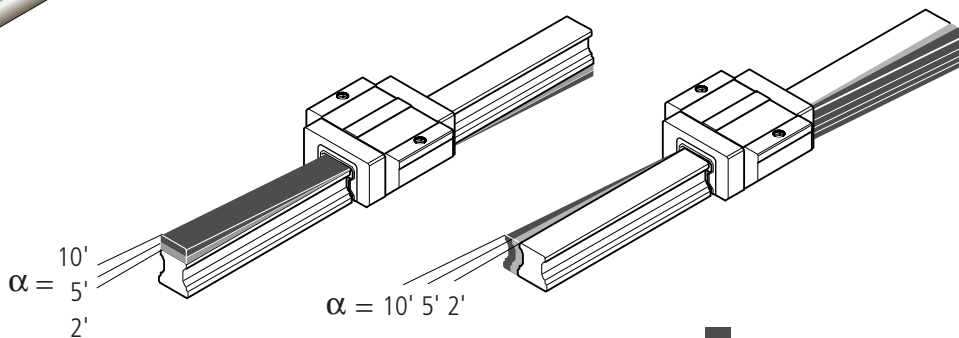
- extends service life by a factor of 2.2
- field-proven
- identical in all four main load directions

► Thanks to 30% higher load capacity, super runner blocks can now attain the service life of conventional runner blocks

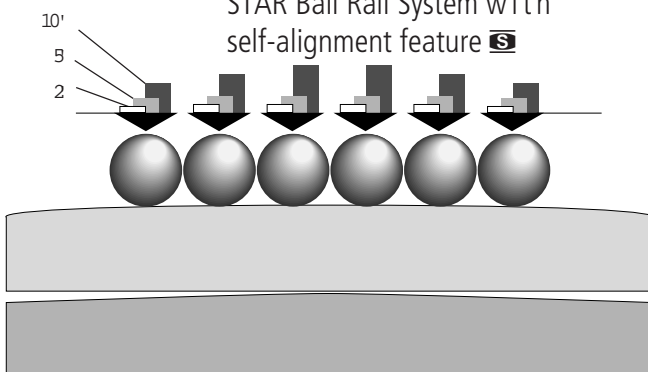
► Guide rails and runner blocks in accuracy class N (clearance and preload 0.02 C) also available with surface protection



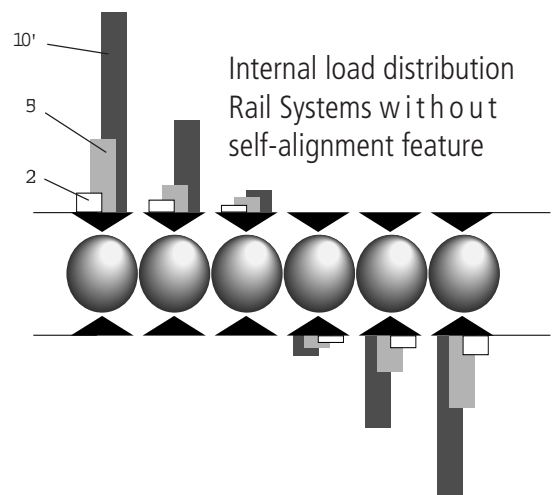
Internal ball loads with angular misalignment α



Internal load distribution
STAR Ball Rail System with self-alignment feature **S**

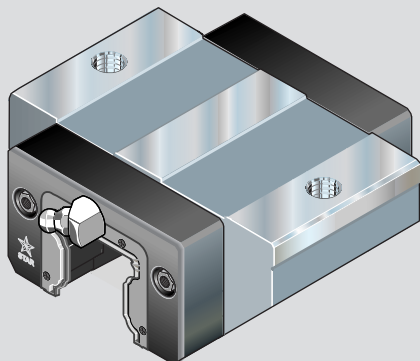


Internal load distribution
Rail Systems without self-alignment feature

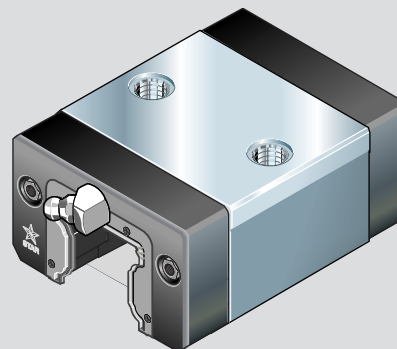


STAR – Ball Rail Systems

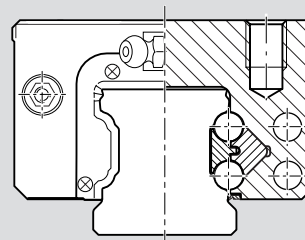
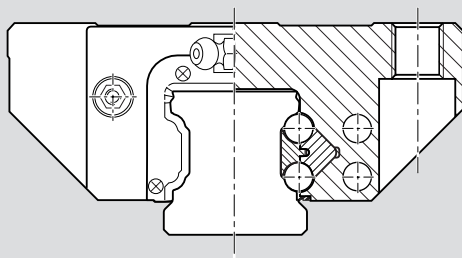
Product Description Super Runner Blocks



Standard width, short



Slimline, short



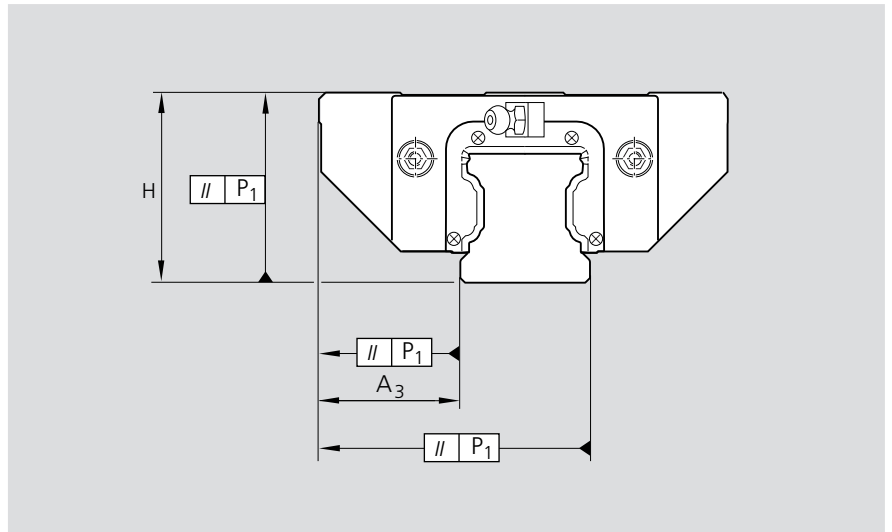
The Ball Rail System consists of:

- A guide rail with all surfaces ground and ball track zones hardened
- A steel runner block with
 - hardened and ground steel load bearing plates with ball tracks
 - cage designed for optimum ball recirculation
 - integral all-round sealing of all tracks
 - bearing steel balls.

Technical Data Super Runner Blocks

Accuracy classes and their tolerances (µm)

STAR Ball Rail Systems with Super runner blocks are offered in two different accuracy classes.



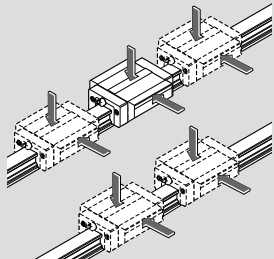
Built-in interchangeability through precision machining

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time.

A runner block can be used without problems on various guide rails of the same size, for example.

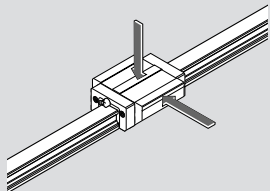
This applies equally to the use of different runner blocks on one and the same guide rail.

| Accuracy classes | Dimensional tolerance (µm) | | Max. difference in dimensions H and A ₃ on the same rail ΔH, ΔA ₃ (µm) |
|------------------|----------------------------|----------------|--|
| | H | A ₃ | |
| H | ± 40 | ± 20 | 15 |
| N | ± 100 | ± 40 | 30 |



Measured at middle of runner block:

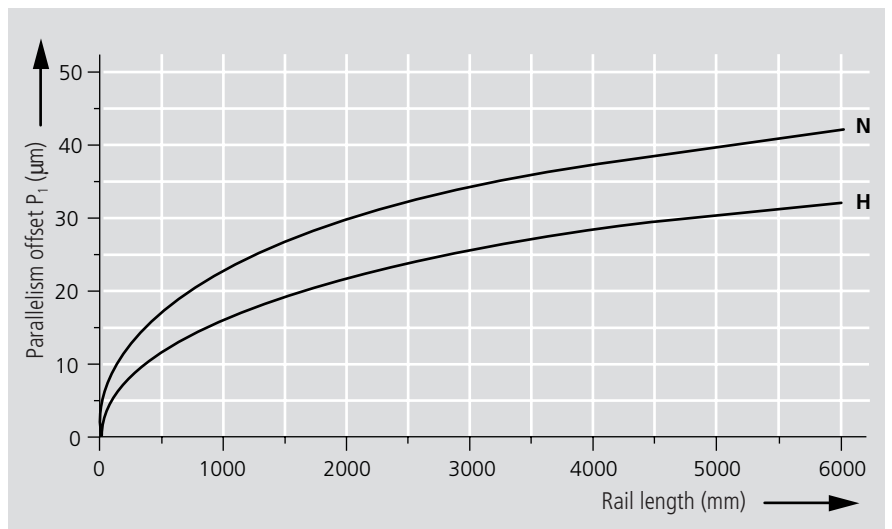
For any runner block/rail combination at any position on rail



For different runner blocks at same position on rail

Parallelism offset P₁ of the Ball Rail System in service

Measured at middle of runner block



STAR – Ball Rail Systems

Technical Data – Super Runner Blocks

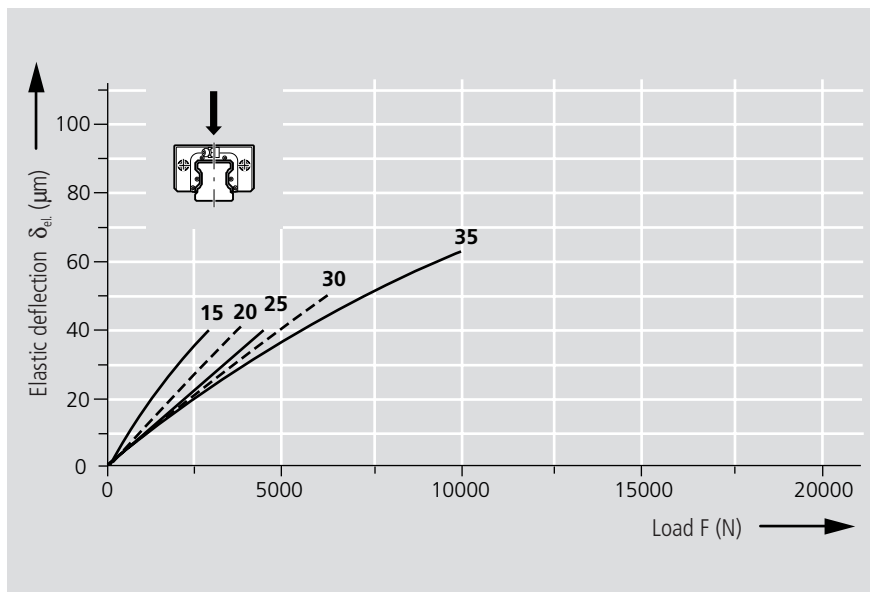
Rigidity of the Ball Rail System
at 0.02 C preload

Super Runner Block 1662-
Slimline, short

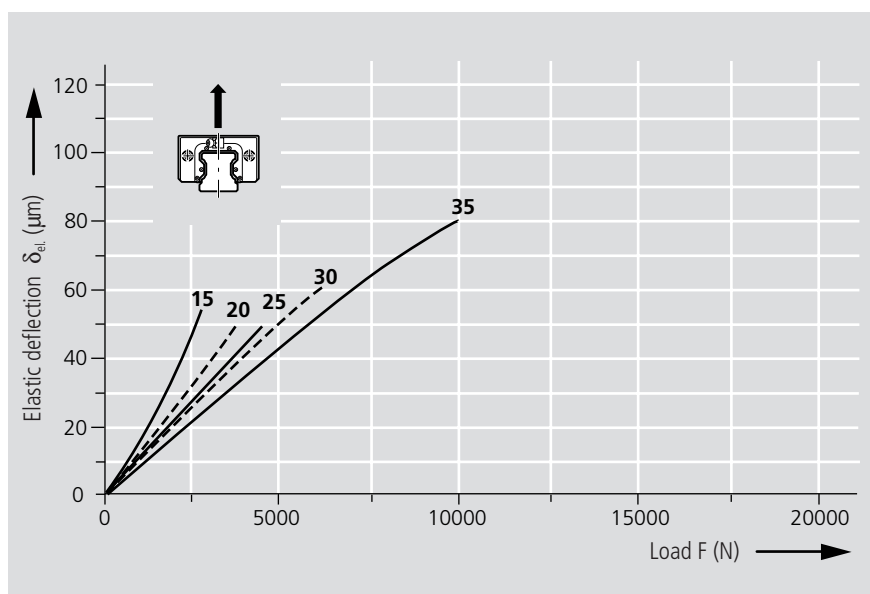
————— measured values
- - - - - calculated values

Runner block mounted with two
screws, screw strength class 8.8

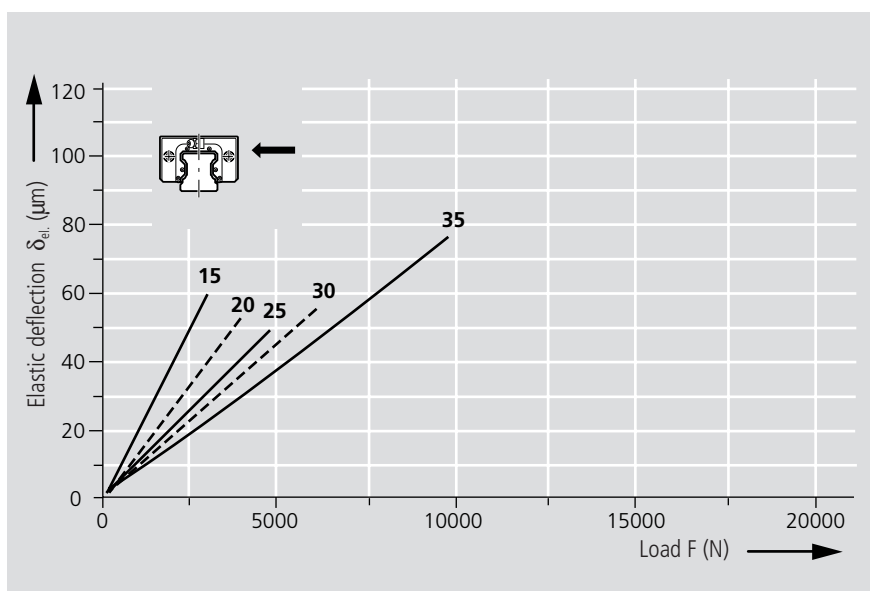
1. Down load



2. Lift-off load



3. Side load



Mounting Instructions

Reference edges, corner radii, mounting screw sizes and tightening torque

Runner block 1661-:

- Standard width, short

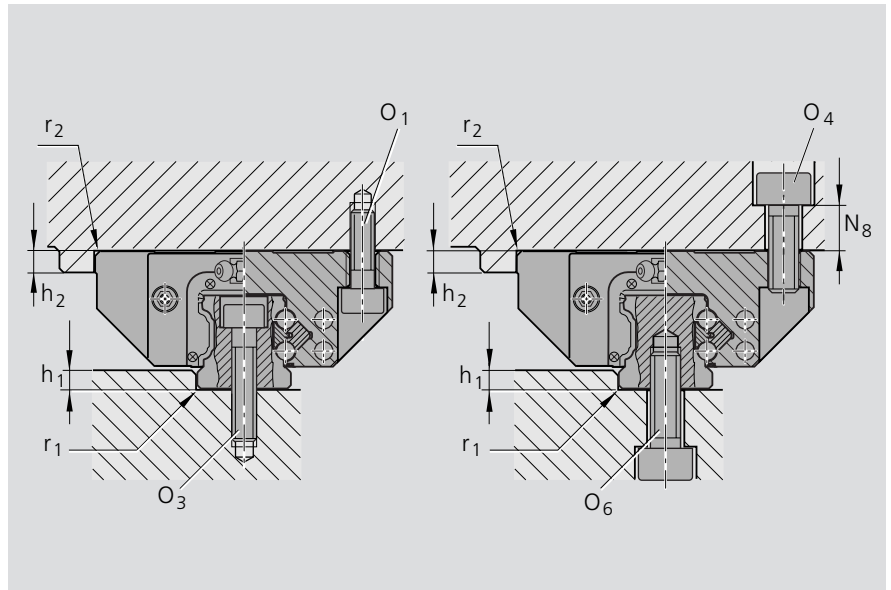
Guide rails:

left:

- For mounting from above 1605-

right:

- For mounting from below 1607-



Runner block 1662-:

- Slimline, short

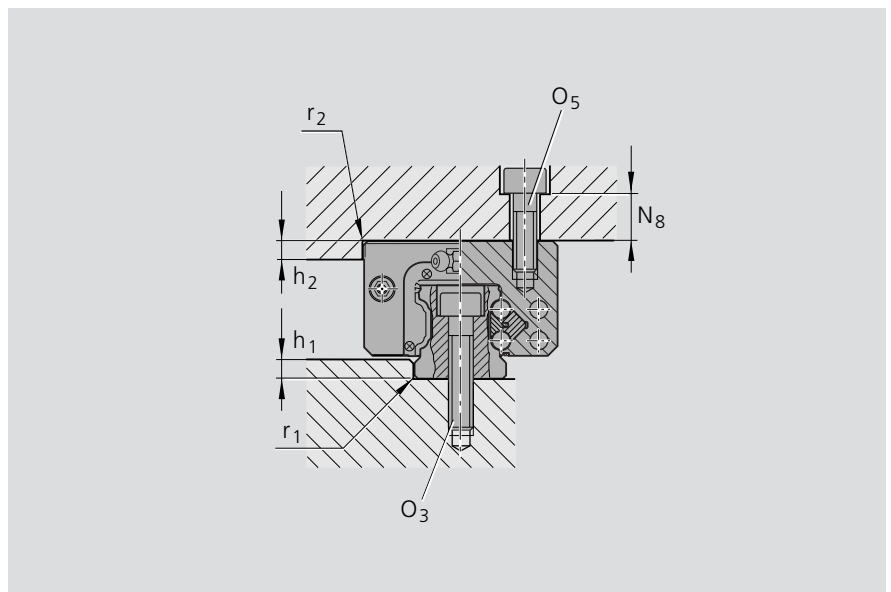
Guide rails:

- For mounting from above 1605-

Note

The indicated combinations represent examples. It is possible to combine any runner block with any of the offered guide rail types for any given size.

Screw mounting of runner blocks using two screws is fully sufficient up to maximum load. (See maximum permissible force and moment loads indicated under the individual types.)



Dimensions and recommended limits for side load if no additional lateral retention is provided

| Size | h ₁ | | r ₁ | h ₂ | r ₂ | O ₁ | O ₄ | O ₅ | O ₃ | O ₆ | N ₈ |
|------|----------------|--------------|----------------|----------------|----------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------|
| | min. (mm) | max. (mm) | max. (mm) | (mm) | max. (mm) | DIN 912 2 pcs. | DIN 912 2 pcs. | DIN 912 2 pcs. | DIN 912 (rail) | DIN 912 (rail) | (mm) |
| 15 | 2.5 | 3.5 | 0.4 | 4 | 0.6 | M4x12 | M5x12 | M4x12 | M4x20 | M5x12 | 6 |
| 20 | 2.5 | 4.0 | 0.6 | 5 | 0.6 | M5x16 | M6x16 | M5x16 | M5x25 | M6x16 | 9 |
| 25 | 3.0 | 5.0 | 0.8 | 5 | 0.8 | M6x20 | M8x20 | M6x18 | M6x30 | M6x20 | 10 |
| 30 | 3.0 | 5.0 | 0.8 | 6 | 0.8 | M8x25 | M10x20 | M8x20 | M8x30 | M8x20 | 10 |
| 35 | 3.5 | 6.0 | 0.8 | 6 | 0.8 | M8x25 | M10x25 | M8x25 | M8x35 | M8x25 | 13 |

| Screw strength class | Runner blocks | | | Guide rails | |
|----------------------|---------------|--------|--------|-------------|--------|
| 8.8 | 0.15 C | 0.23 C | 0.15 C | 0.16 C | 0.16 C |
| 12.9 | 0.25 C | 0.37 C | 0.25 C | 0.28 C | 0.28 C |

Tightening torque of the mounting screws

| Nm | Screw size | | | | | | | |
|------|------------|-----|-----|----|-----|-----|-----|-----|
| | M4 | M5 | M6 | M8 | M10 | M12 | M14 | M16 |
| 8.8 | 2.7 | 5.5 | 9.5 | 23 | 46 | 80 | 125 | 195 |
| 12.9 | 4.6 | 9.5 | 16 | 39 | 77 | 135 | 215 | 340 |

STAR – Ball Rail Systems

Mounting Instructions – Super Runner Blocks

Locating pins

If the recommended values for permissible side forces are exceeded, the runner block must be additionally fixed by means of locating pins or reference edges.

Recommended dimensions for the pin holes are indicated in the drawings and table.

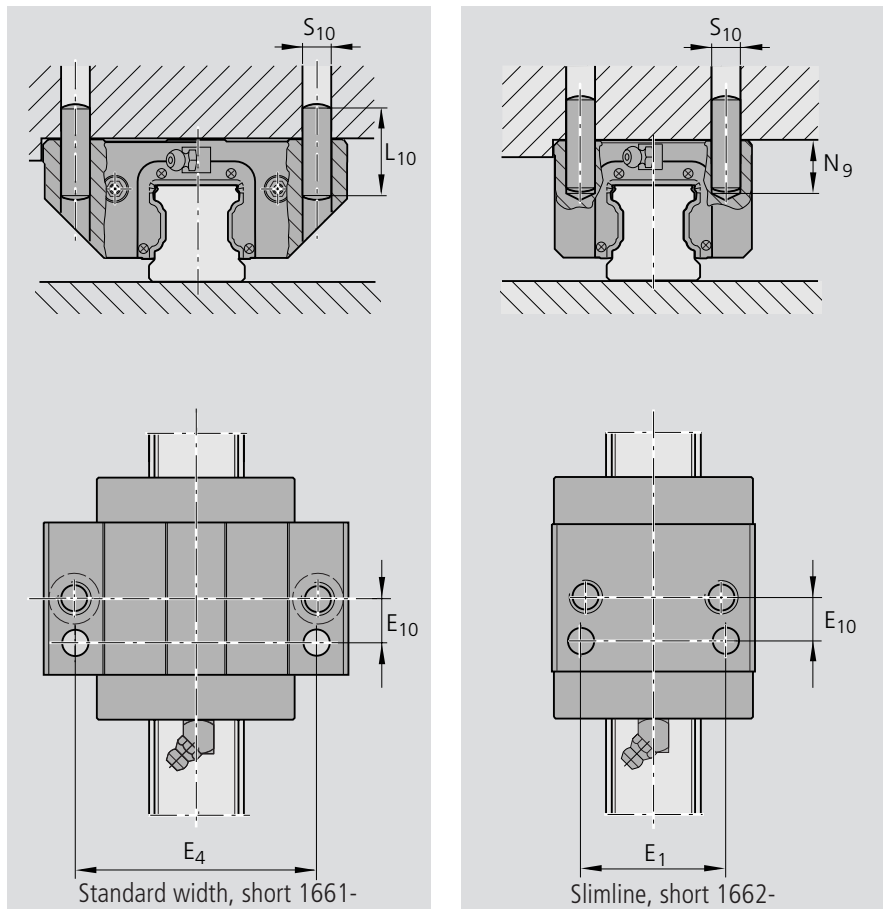
Possible pin types

- Taper pin (hardened) or
- Straight pin DIN 6325

Note

Ready-drilled holes made for production reasons may exist at the recommended pin hole positions ($\varnothing < S_{10}$). These may be extended and bored open to accommodate the locating pins.

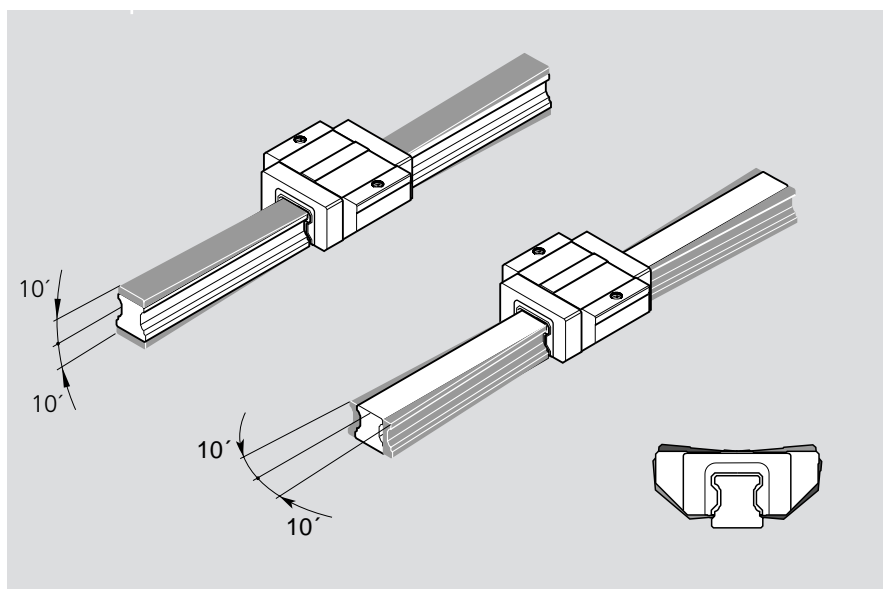
Only prepare the pin holes after the installation is complete (see also "General Mounting Instructions").



Pin dimensions and recommended positions for pin holes

| Size | Dimensions (mm) | | | | | |
|------|---|----------|-------|-------|----------|-------------|
| | Taper pin (hardened) Straight pin (DIN 6325) | | E_1 | E_4 | E_{10} | N_9 (max) |
| | S_{10} | L_{10} | | | | |
| 15 | 4 | 18 | 26 | 38 | 9 | 3.0 |
| 20 | 5 | 24 | 32 | 53 | 10 | 3.5 |
| 25 | 6 | 32 | 35 | 55 | 11 | 7.0 |
| 30 | 8 | 36 | 40 | 70 | 14 | 10.0 |
| 35 | 8 | 40 | 50 | 80 | 15 | 12.0 |

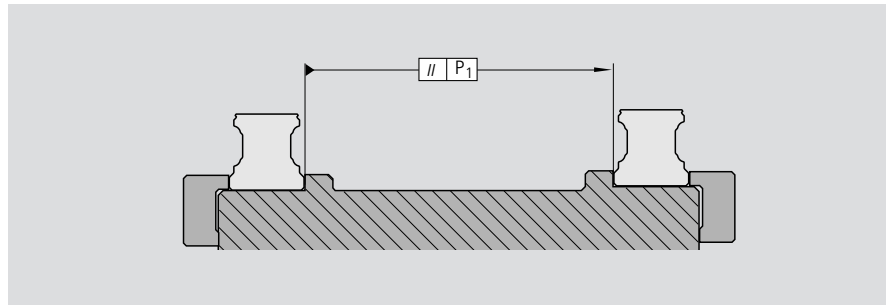
Permissible error in alignment on the guide rail and on the runner block



Parallelism of the rails after mounting

measured at the guide rails and at the runner blocks

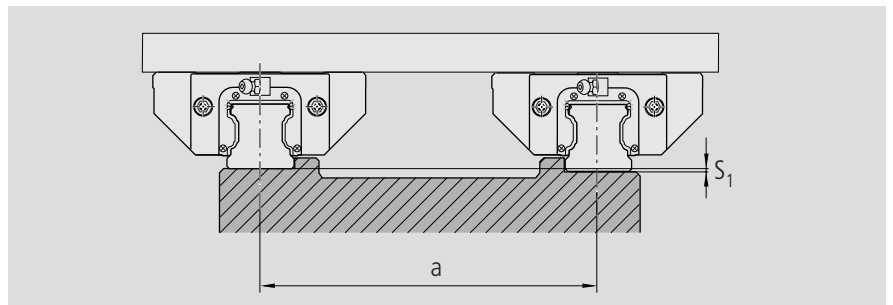
The parallelism offset P_1 causes a slight increase in preload on one side of the assembly. If the tolerances given in the table are not exceeded, reduction in travel life will as a rule be negligible.



| Size | Parallelism offset P_1 (mm) | |
|------|--|----------------|
| | up to approx. 10 μm clearance | Preload 0.02 C |
| 15 | 0.025 | 0.017 |
| 20 | 0.029 | 0.021 |
| 25 | 0.032 | 0.023 |
| 30 | 0.035 | 0.026 |
| 35 | 0.040 | 0.030 |

Vertical offset and nonlinearity

Provided the permissible vertical offset S_1 and a max. deviation from straightness of $\pm 10'$ in the longitudinal direction are not exceeded, any resultant reduction in travel life will as a rule be negligible.



Permissible vertical offset in the transverse direction

The permissible offset S_1 includes the tolerance for dimension H as given in the table under "Technical Data".

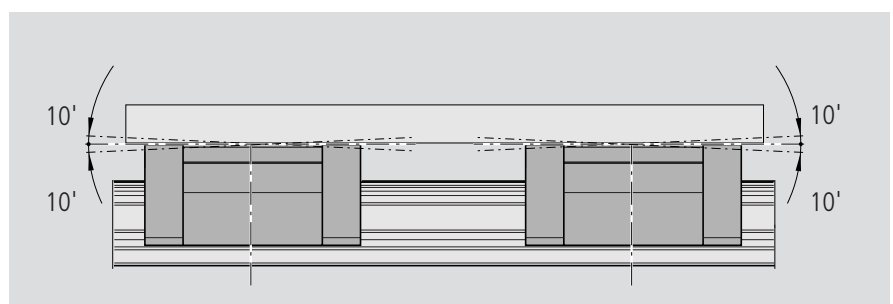
$$S_1 = a \cdot Y$$

S_1 = Permissible vertical offset (mm)
 a = Distance between rails (mm)
 Y = Calculation factor

| Calculation factor | for preload class | |
|--------------------|--|-------------------|
| | up to approx. 10 μm clearance | Preload 0.02 C |
| Y | $8 \cdot 10^{-4}$ | $6 \cdot 10^{-4}$ |

Permissible deviation from straightness in the longitudinal direction with two consecutive runner blocks

The runner blocks can automatically compensate for a nonlinearity of $10'$ in the longitudinal direction.



STAR – Ball Rail Systems

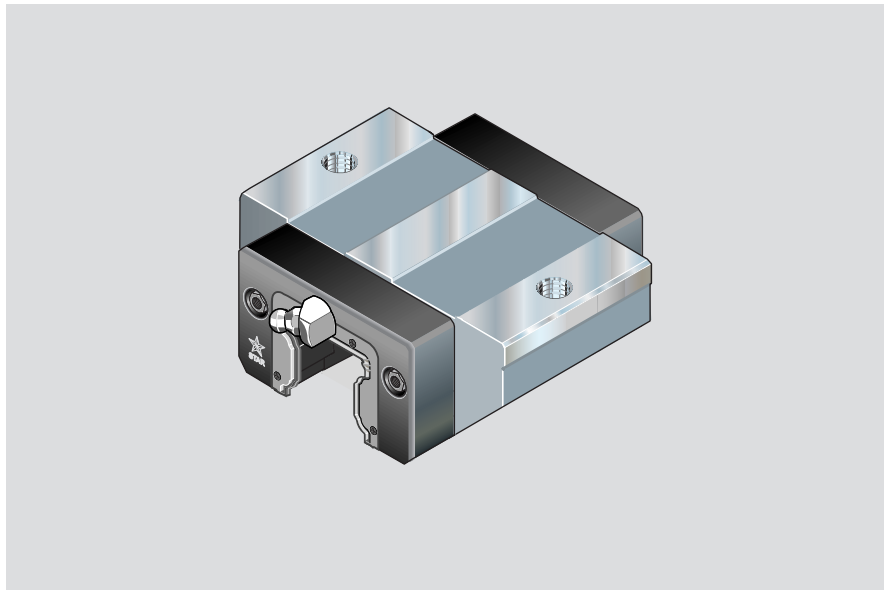
Super Runner Blocks Steel Version

Super Runner Block with self-aligning feature 1661-Standard width, short

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



Part numbers

| Size | Accuracy class | Part numbers for runner block for preload class | |
|------|----------------|---|----------------|
| | | up to approx. 10 μm clearance | Preload 0.02 C |
| 15 | H | 1661-193-10 | 1661-113-10 |
| | N | 1661-194-10 | 1661-114-10 |
| 20 | H | 1661-893-10 | 1661-813-10 |
| | N | 1661-894-10 | 1661-814-10 |
| 25 | H | 1661-293-10 | 1661-213-10 |
| | N | 1661-294-10 | 1661-214-10 |
| 30 | H | 1661-793-10 | 1661-713-10 |
| | N | 1661-794-10 | 1661-714-10 |
| 35 | H | 1661-393-10 | 1661-313-10 |
| | N | 1661-394-10 | 1661-314-10 |

Permissible load

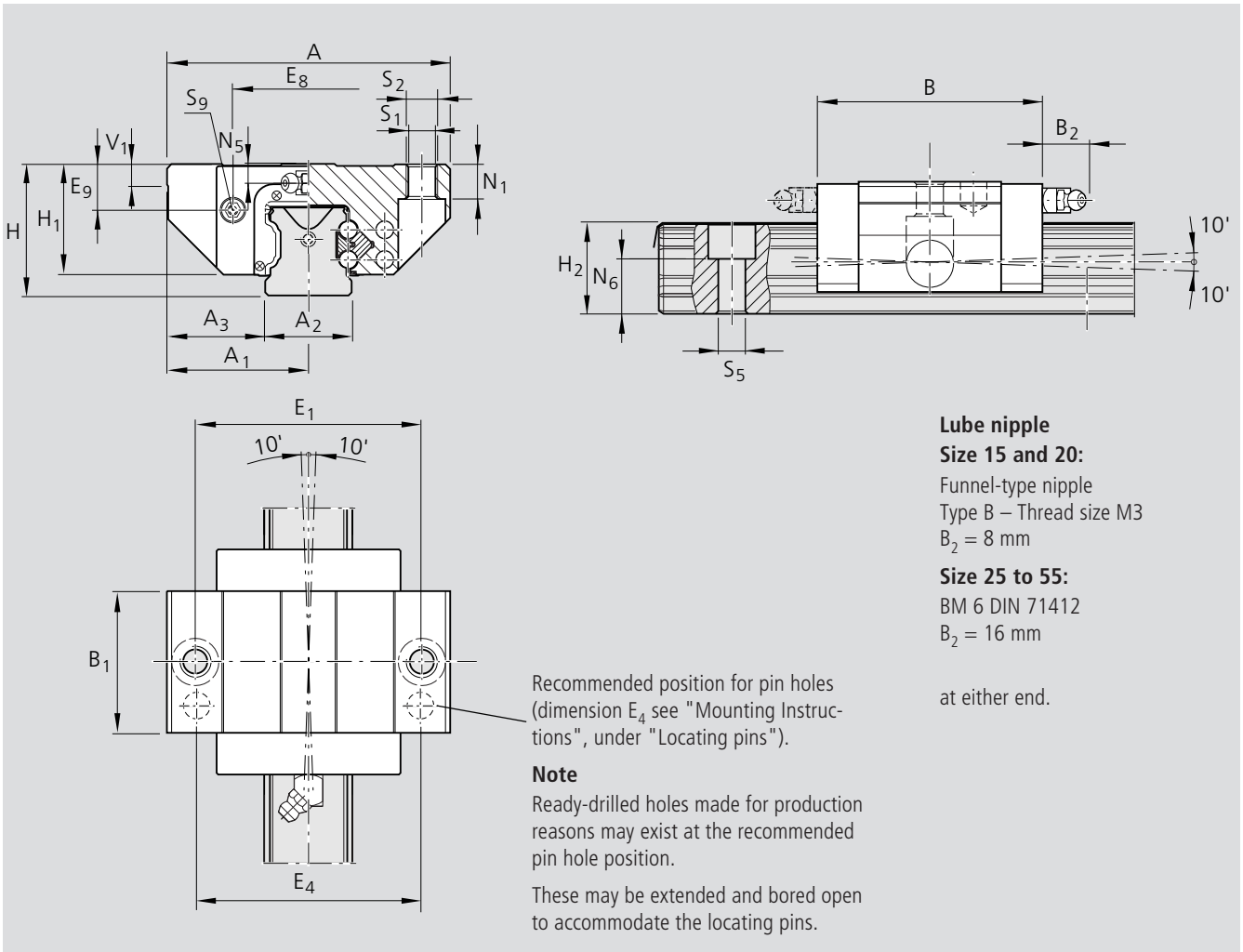
When calculating the service life, use the maximum load capacity figure.

The permissible load is only limited for statistical purposes (see table).

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C** and **M_t** in the table should be multiplied by 1.26.



| Dimensions (mm) | | | | | | | | | | | | | | | | |
|-----------------|-----|----------------|----------------|----------------|------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|--|
| Size | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₈ | E ₉ | N ₁ | |
| 15 | 47 | 23.5 | 15 | 16.0 | 40.5 | 25.7 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 38 | 24.55 | 6.7 | 5.0 | |
| 20 | 63 | 31.5 | 20 | 21.5 | 52.5 | 31.9 | 30 | 25.4 | 20.7 | 20.55 | 6.0 | 53 | 32.4 | 7.3 | 7.5 | |
| 25 | 70 | 35.0 | 23 | 23.5 | 61.5 | 38.6 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 57 | 38.3 | 11.5 | 9.0 | |
| 30 | 90 | 45.0 | 28 | 31.0 | 71.5 | 45.0 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 72 | 48.4 | 14.6 | 11.0 | |
| 35 | 100 | 50.0 | 34 | 33.0 | 79.0 | 51.4 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 82 | 58.0 | 17.5 | 12.0 | |

¹⁾ Dimension H_2 with Rail Seal cover strip

²⁾ Dimension H_2 without Rail Seal cover strip

| Dimensions (mm) | | | | | | | | Load capacities (N) | Permissible load (N) | Moments (Nm) | |
|-----------------|----------------|--------------------------------|----------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|---------------------|
| Size | N ₅ | N ₆ ^{±0.5} | S ₁ | S ₂ | S ₅ | S ₉ | Mass (kg) | C dyn. | F _{max} | M _t dyn. | M _t max. |
| 15 | 4.0 | 10.3 | 4.4 | M5 | 4.4 | M2.5-3.5 deep | 0.19 | 3 900 | 1 500 | 39 | 15 |
| 20 | 4.7 | 13.2 | 5.4 | M6 | 6.0 | M3-5 deep | 0.43 | 10 100 | 3 900 | 130 | 50 |
| 25 | 5.5 | 15.2 | 6.8 | M8 | 7.0 | M3-5 deep | 0.50 | 11 400 | 4 400 | 170 | 65 |
| 30 | 6.0 | 17.0 | 8.6 | M10 | 9.0 | M3-5 deep | 0.90 | 15 800 | 6 100 | 270 | 105 |
| 35 | 7.0 | 20.5 | 8.6 | M10 | 9.0 | M3-5 deep | 1.35 | 21 100 | 8 100 | 450 | 175 |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

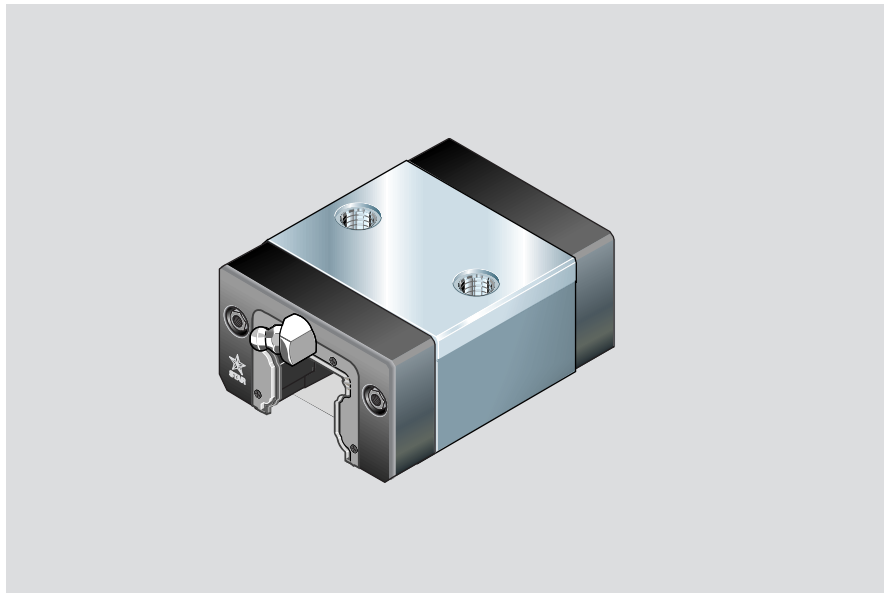
Super Runner Blocks Steel Version

Super Runner Block with self-aligning feature 1662-Slimline, short

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



Part numbers

| Size | Accuracy class | Part numbers for runner block for preload class | |
|------|----------------|---|----------------|
| | | up to approx. 10 μm clearance | Preload 0.02 C |
| 15 | H | 1662-193-10 | 1662-113-10 |
| | N | 1662-194-10 | 1662-114-10 |
| 20 | H | 1662-893-10 | 1662-813-10 |
| | N | 1662-894-10 | 1662-814-10 |
| 25 | H | 1662-293-10 | 1662-213-10 |
| | N | 1662-294-10 | 1662-214-10 |
| 30 | H | 1662-793-10 | 1662-713-10 |
| | N | 1662-794-10 | 1662-714-10 |
| 35 | H | 1662-393-10 | 1662-313-10 |
| | N | 1662-394-10 | 1662-314-10 |

Permissible load

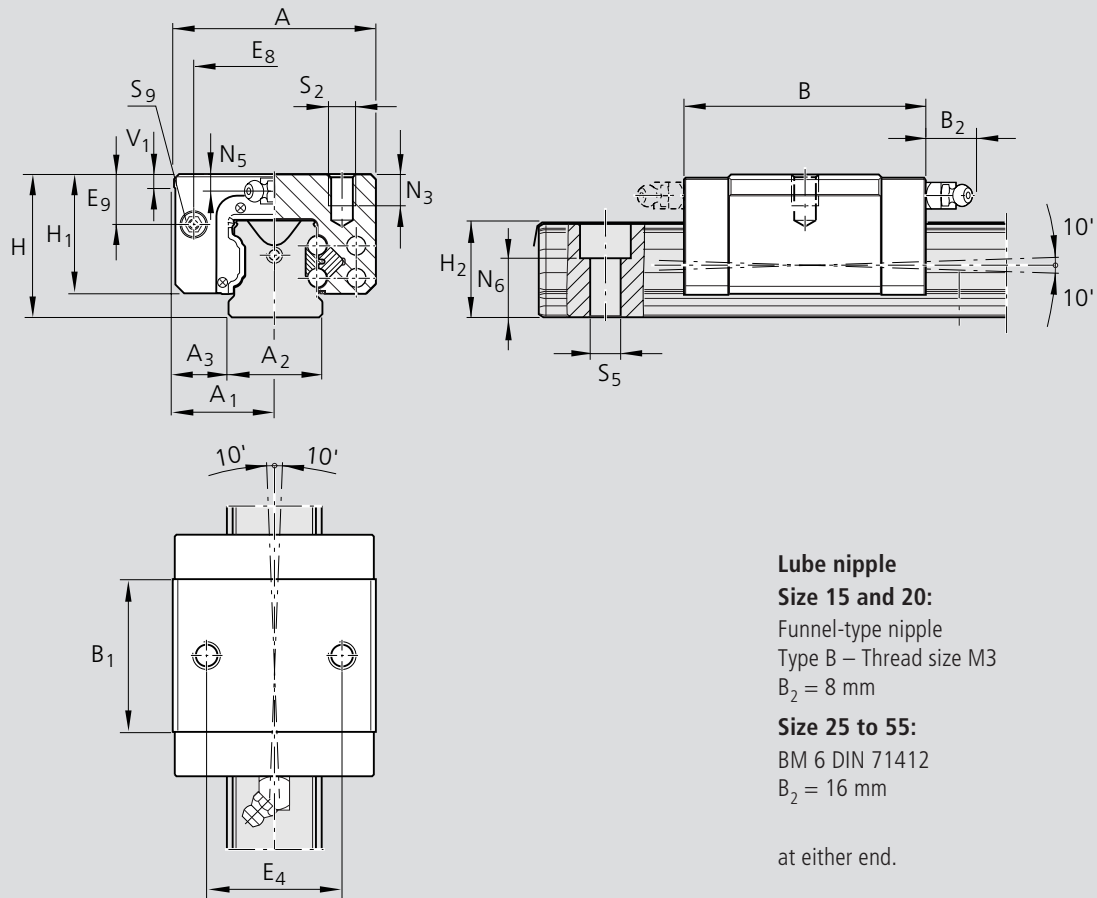
When calculating the service life, use the maximum load capacity figure.

The permissible load is only limited for statistical purposes (see table).

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C** and **M_t** in the table should be multiplied by 1.26.



Lube nipple

Size 15 and 20:

Funnel-type nipple
Type B – Thread size M3
B₂ = 8 mm

Size 25 to 55:

BM 6 DIN 71412
B₂ = 16 mm

at either end.

| Dimensions (mm) | | | | | | | | | | | | | | | |
|-----------------|----|----------------|----------------|----------------|------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|
| Size | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₈ | E ₉ | N ₃ |
| 15 | 34 | 17 | 15 | 9.5 | 40.5 | 25.7 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 26 | 24.55 | 6.7 | 6.0 |
| 20 | 44 | 22 | 20 | 12.0 | 52.5 | 31.9 | 30 | 25.4 | 20.7 | 20.55 | 6.0 | 32 | 32.4 | 7.3 | 7.5 |
| 25 | 48 | 24 | 23 | 12.5 | 61.5 | 38.6 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 35 | 38.3 | 11.5 | 9.0 |
| 30 | 60 | 30 | 28 | 16.0 | 71.5 | 45.0 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 40 | 48.4 | 14.6 | 12.0 |
| 35 | 70 | 35 | 34 | 18.0 | 79.0 | 51.4 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 50 | 58.0 | 17.5 | |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | Mass (kg) | Load capacities (N) | Permissible load (N) | Moments (Nm) | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|---------------------|
| | N ₅ | N ₆ ^{±0.5} | S ₂ | S ₅ | S ₉ | | C dyn. | F _{max} | M _t dyn. | M _t max. |
| 15 | 4.0 | 10.3 | M4 | 4.4 | M2.5-3.5 deep | 0.12 | 3 900 | 1 500 | 39 | 15 |
| 20 | 4.7 | 13.2 | M5 | 6.0 | M3-5 deep | 0.30 | 10 100 | 3 900 | 130 | 50 |
| 25 | 5.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.40 | 11 400 | 4 400 | 170 | 65 |
| 30 | 6.0 | 17.0 | M8 | 9.0 | M3-5 deep | 0.65 | 15 800 | 6 100 | 270 | 105 |
| 35 | 7.0 | 20.5 | M8 | 9.0 | M3-5 deep | 0.95 | 21 100 | 8 100 | 450 | 175 |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Product Overview – Runner Blocks, Steel Version

STAR Ball Rail Systems were specially developed for use in machine tools and industrial robots calling for compact, rolling-element linear motion guideways. Ball Rails are available in various accuracy classes, each with extremely high load capacity and high rigidity.

These compact assemblies are available in 8 common sizes and offer the same high load capacities in all four main load directions.

Make up your own compact linear motion guideways from interchangeable standard stock elements...

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time. This makes infinite combinations possible within each accuracy class.

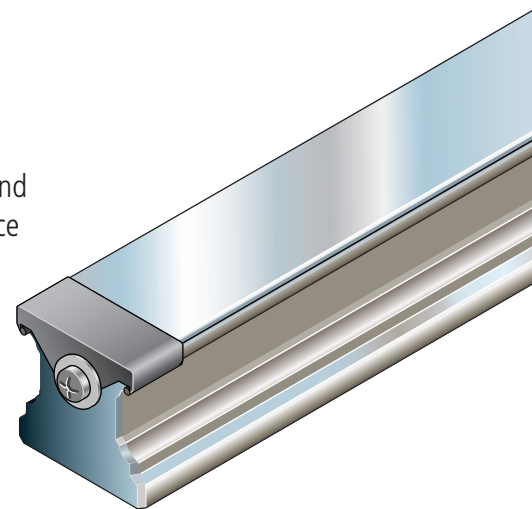
Each element can be individually ordered and separately stocked. Both sides of the guide rail can be used as reference edges. The runner block is simply pushed onto the rail.

▶ Mounting of attachments to runner block from above or below

▶ Improved rigidity under lift-off and side loading conditions when additional mounting screws are used in holes provided at the center of the runner block

▶ Lube port possible at either end for added ease of maintenance

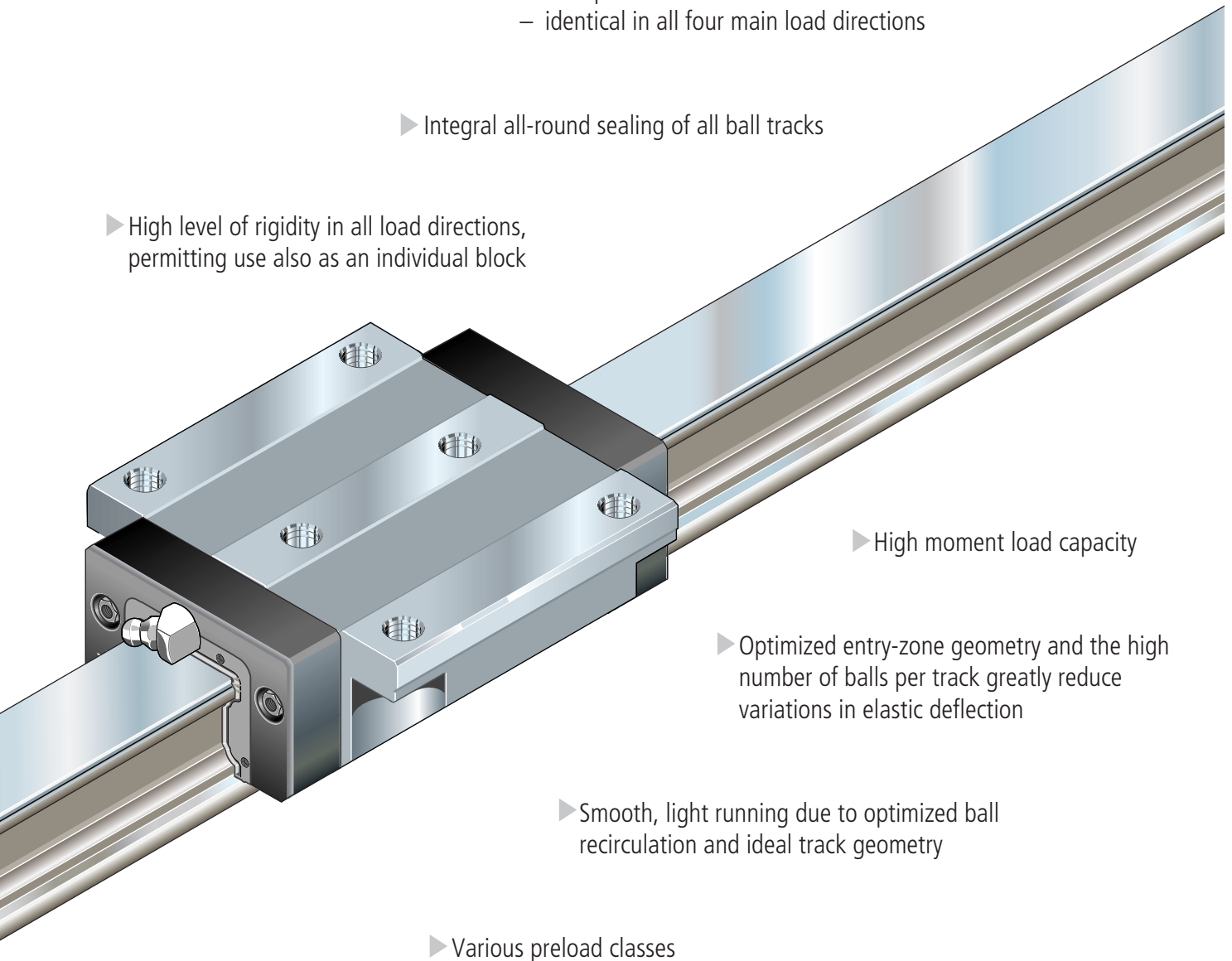
▶ Guide rails and runner blocks in accuracy class N (clearance and preload 0.02 C) also available with surface protection



▶ End face mounting holes for attachment of bellows or scraper plates

**30% higher dynamic load capacities and moments
as standard in accuracy classes P, H and N
(others on request):**

- extends service life by a factor of 2.2
- field-proven
- identical in all four main load directions

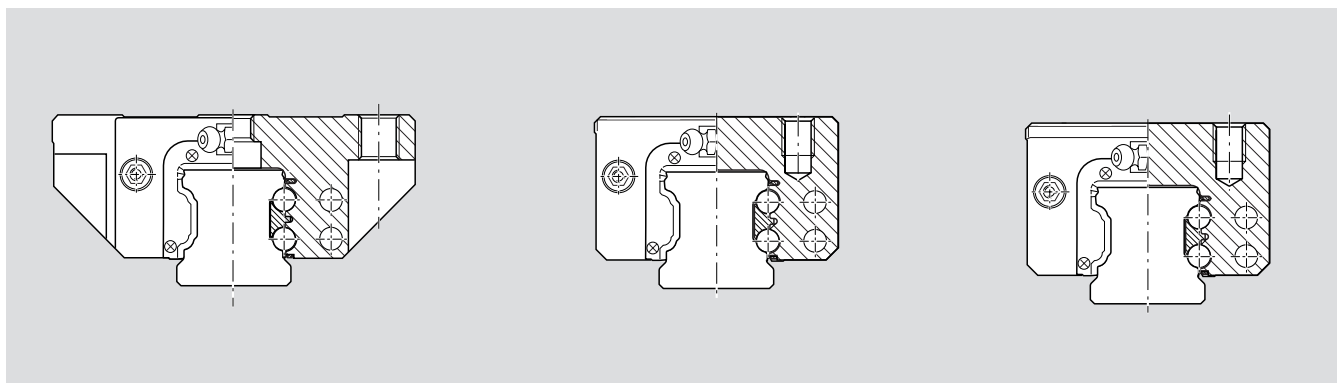
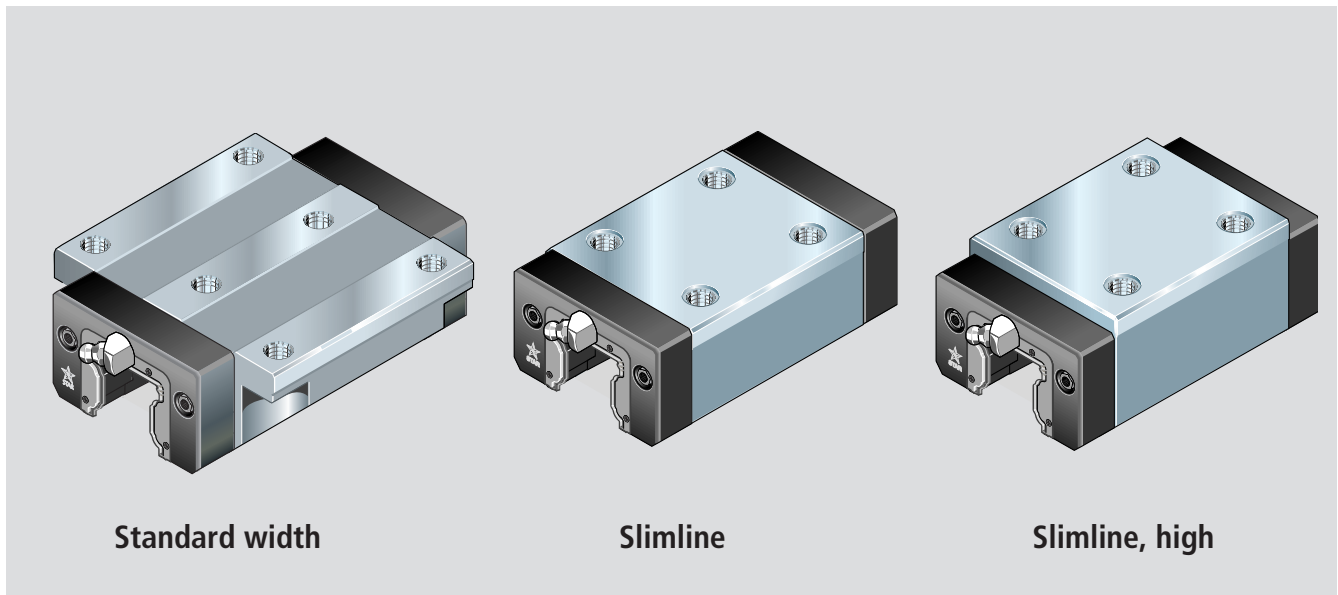


Proven Rail Seal cover strip for guide rail mounting holes:

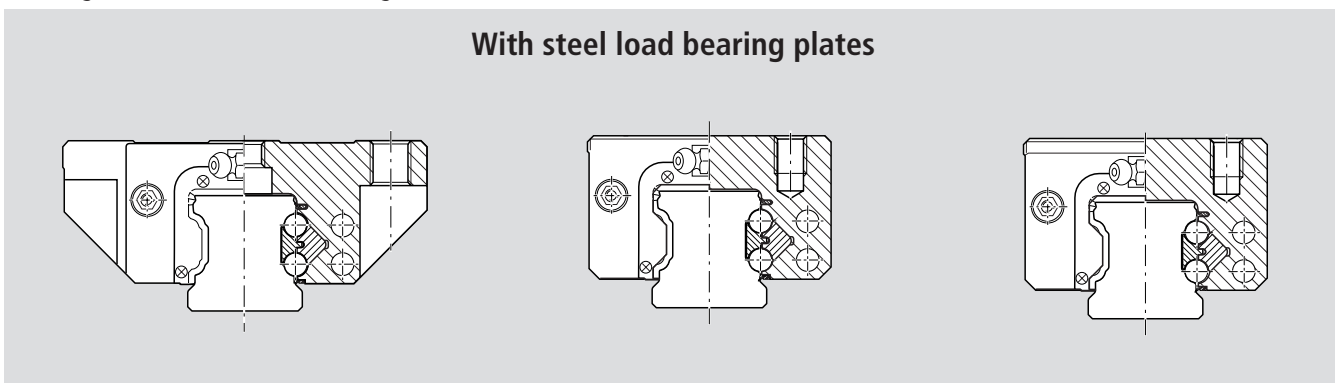
- ▶ One cover for all holes
- ▶ Material: corrosion resistant spring steel to DIN 17230 / EN 10088
- ▶ Easy clip-on mounting

STAR – Ball Rail Systems

Product Description Runner Blocks, Steel Version



These figures are also valid for the long versions.



The Ball Rail System consists of:

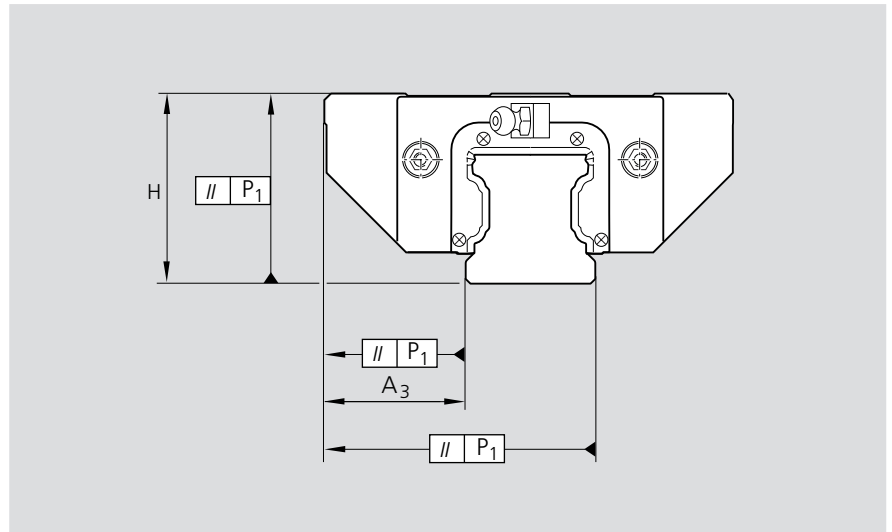
- A guide rail with all surfaces ground and ball track zones hardened
- A runner block with all surfaces ground and ball track zones hardened, made of rolling bearing steel or with hardened and ground steel load bearing plates with
 - cage designed for optimum ball recirculation
 - integral all-round sealing of all ball tracks
 - bearing steel balls

Technical Data

Accuracy classes and their tolerances (µm)

STAR Ball Rail Systems are offered in up to five different accuracy classes.

For available versions see table "Part Numbers".



Built-in interchangeability through precision machining

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time.

A runner block can be used without problems on various guide rails of the same size, for example.

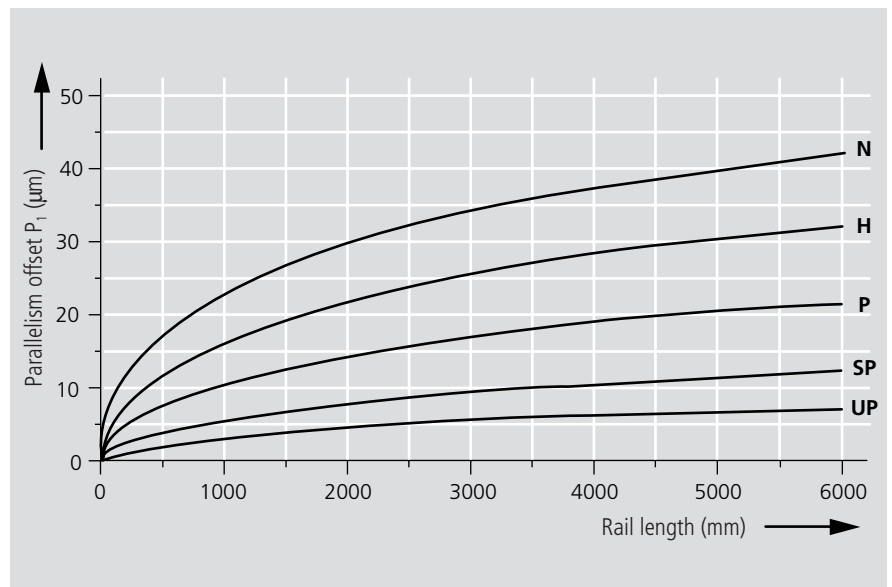
This applies equally to the use of different runner blocks on one and the same guide rail.

| Accuracy classes | Dimensional tolerances H and A ₃ (µm) | | Max. difference in dimensions H and A ₃ on the same rail Δ H, Δ A ₃ (µm) |
|------------------|--|----------------|--|
| | H | A ₃ | |
| UP | ± 5 | ± 5 | 3 |
| SP | ± 10 | ± 7 | 5 |
| P | ± 20 | ± 10 | 7 |
| H | ± 40 | ± 20 | 15 |
| N | ± 100 | ± 40 | 30 |

| Measured at middle of runner block: | For any runner block/rail combination at any position on rail | For different runner blocks at same position on rail |
|-------------------------------------|---|--|
| | | |

Parallelism offset P₁ of the Ball Rail System in service

Measured at middle of runner block



STAR – Ball Rail Systems

Technical Data – Runner Blocks, Steel Version

Rigidity of the Ball Rail System at 0.08 C preload

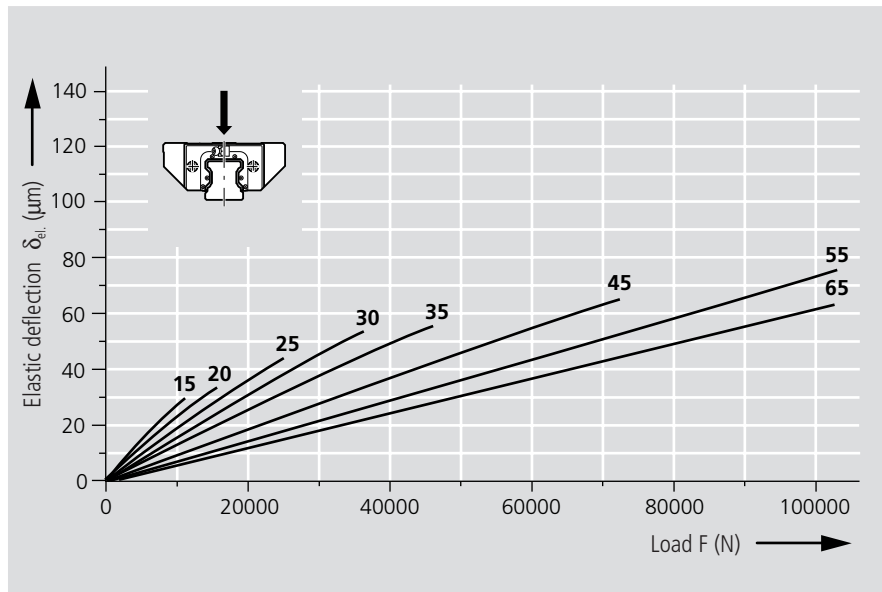
Runner block 1651-
Standard width

————— measured values

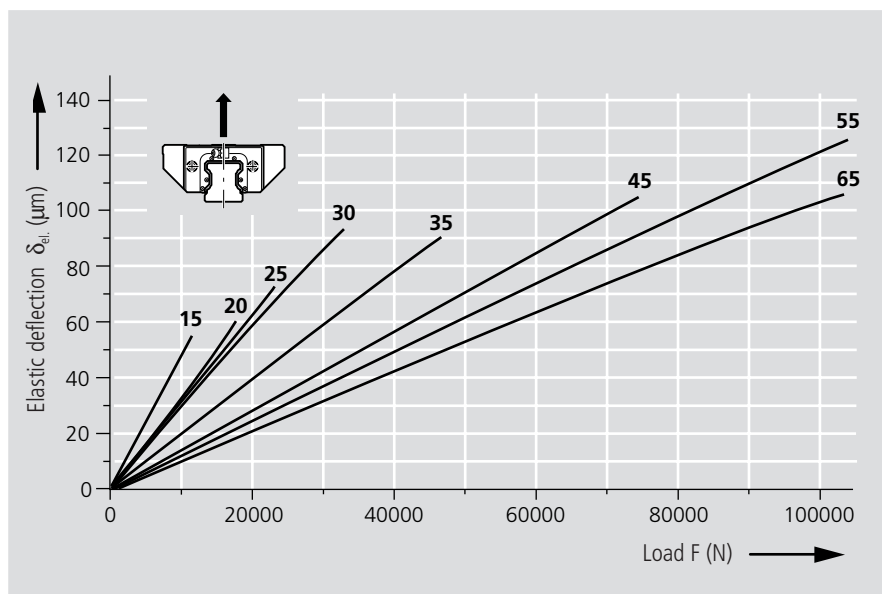
Runner block mounted using six screws:

- 4 outer screws of strength class 12.9
- 2 centerline screws of strength class 8.8

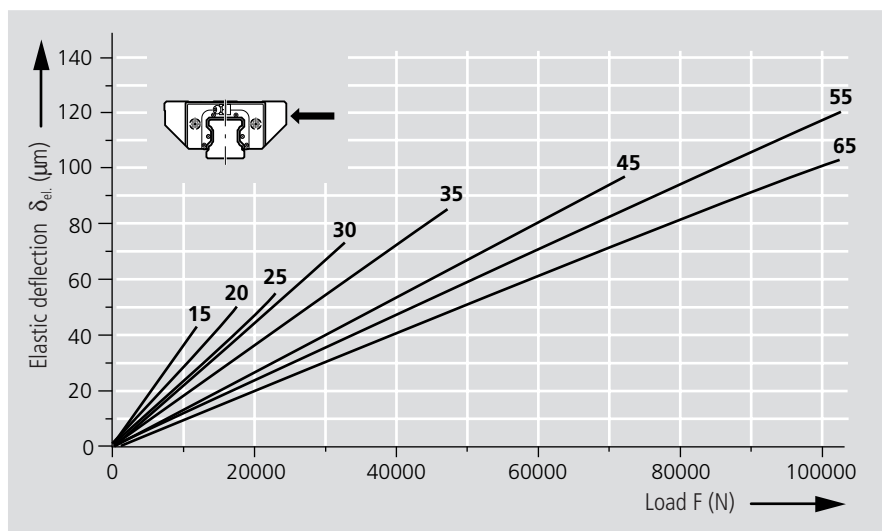
1. Down load



2. Lift-off load



3. Side load



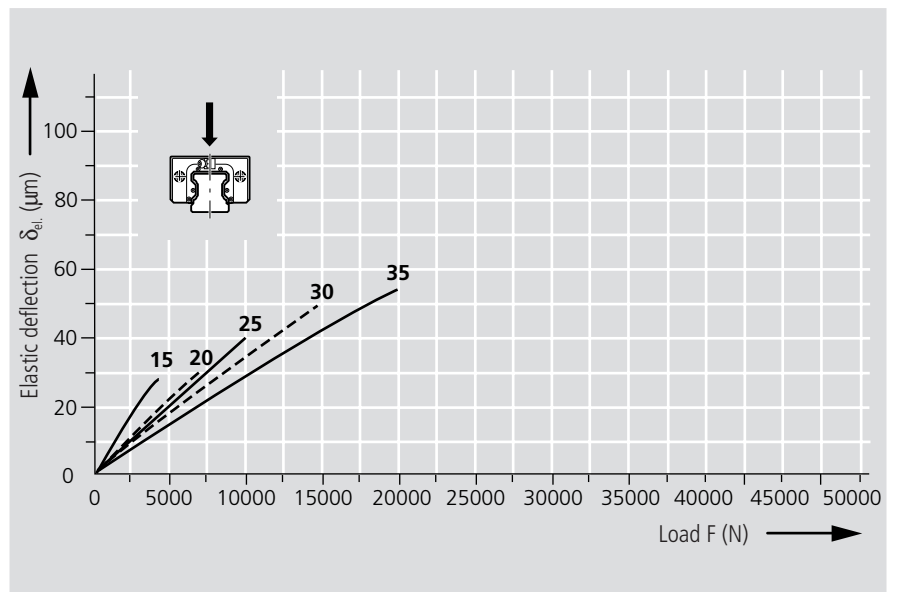
Rigidity of the Ball Rail System at 0.02 C preload

Runner block 1666-Slimline, short

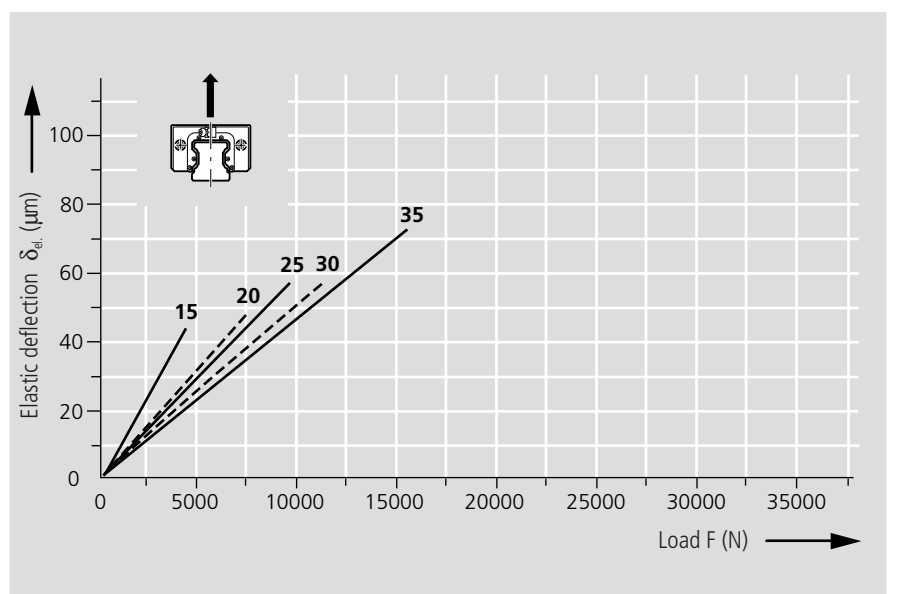
————— measured values
 - - - - - calculated values

Runner block mounted with two screws, screw strength class 8.8

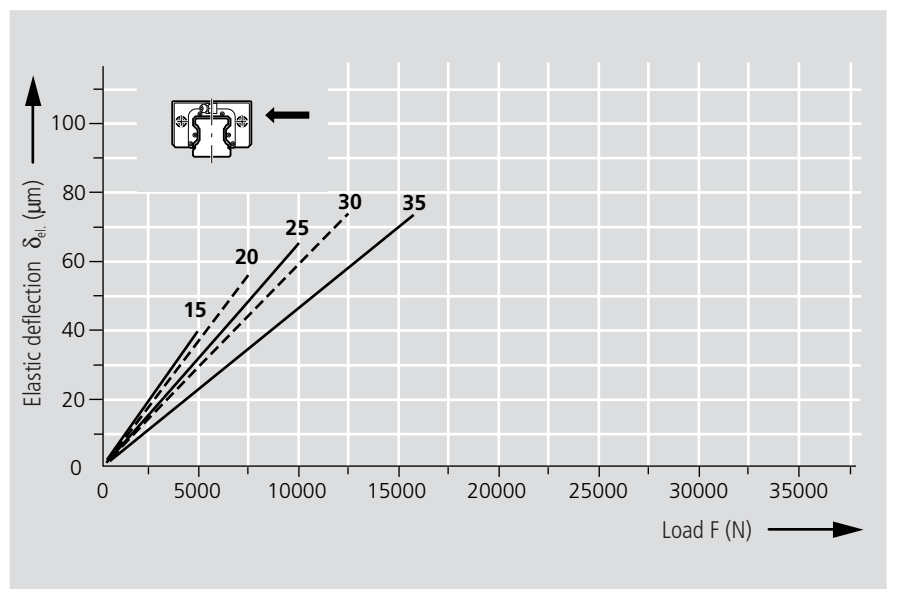
1. Down load



2. Lift-off load



3. Side load



STAR – Ball Rail Systems

Mounting Instructions

For guide rails with runner block
1621-, 1622-, 1623-, 1624-, 1651-, 1653-, 1694-

Reference edges, corner radii,
mounting screw sizes and
tightening torque

Runner block 1651-, 1653-

– Standard width

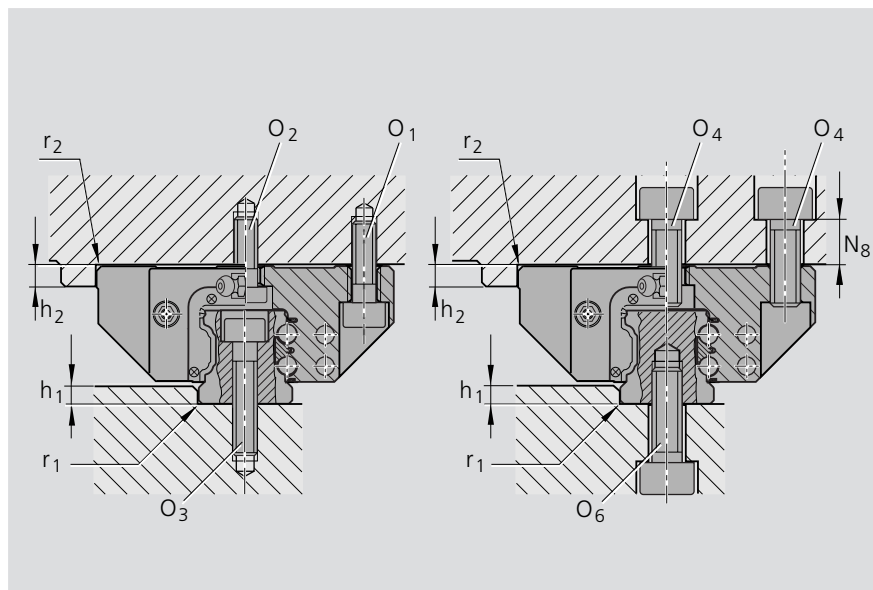
Guide rails

left:

– For mounting from above 1605-, 1645-

right:

– For mounting from below 1607-, 1647



Runner block 1621-, 1622-, 1623-, 1624-, 1694-

– Slimline

Guide rail

– For mounting from above 1605-, 1645-

Note

The indicated combinations represent examples. It is on principle possible to combine any runner block with all the offered guide rail types.

Dimensions and recommended limits for side load if no additional lateral retention is provided

1) When mounting the runner block from above using only 4 O₄ screws:

- Permissible side force 1/3 lower
- Lower rigidity

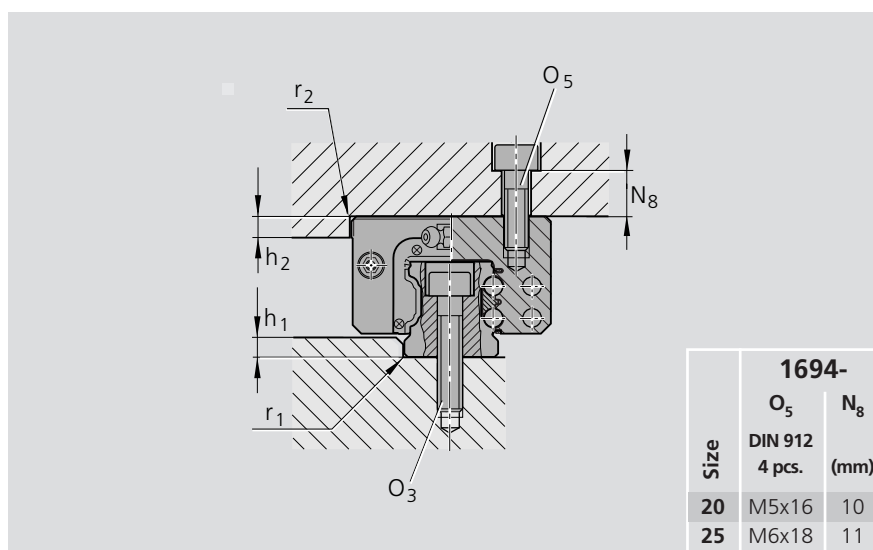
2) For runner block mounting with 6 screws:

- Tighten the centerline screws with the torque for strength class 8.8

3) When mounting with 2 O₂ screws and 4 O₁ screws

– Runner block 1621-, 1622-, 1651-, 1694-

– Runner block 1623-, 1624-, 1653-



| Size | 1694- | |
|------|-------------------------------------|------------------------|
| | O ₅ DIN 912 4 pcs. | N ₈ (mm) |
| 20 | M5x16 | 10 |
| 25 | M6x18 | 11 |

| Size | h ₁ | | r ₁ | | h ₂ | | r ₂ | | O ₁ | O ₂ ²⁾ | O ₄ ¹⁾²⁾ | O ₅ | O ₃ | O ₆ | N ₈ |
|------|----------------|-----------|----------------|-----------|----------------|-----------|----------------|-----------|-------------------|------------------------------|--------------------------------|-------------------|----------------|----------------|----------------|
| | min. (mm) | max. (mm) | min. (mm) | max. (mm) | min. (mm) | max. (mm) | min. (mm) | max. (mm) | DIN 912 4 pcs. | DIN 6912 2 pcs. | DIN 912 6 pcs. | DIN 912 4 pcs. | DIN 912 | DIN 912 | (mm) |
| 15 | 2.5 | 3.5 | 0.4 | 4 | 0.6 | 0.6 | M4x12 | M4x10 | M5x12 | M4x12 | M4x20 | M5x12 | 6 | | |
| 20 | 2.5 | 4.0 | 0.6 | 5 | 0.6 | 0.6 | M5x16 | M5x12 | M6x16 | M5x16 | M5x25 | M6x16 | 9 | | |
| 25 | 3.0 | 5.0 | 0.8 | 5 | 0.8 | 0.8 | M6x20 | M6x16 | M8x20 | M6x18 | M6x30 | M6x20 | 10 | | |
| 30 | 3.0 | 5.0 | 0.8 | 6 | 0.8 | 0.8 | M8x25 | M8x16 | M10x20 | M8x20 | M8x30 | M8x20 | 10 | | |
| 35 | 3.5 | 6.0 | 0.8 | 6 | 0.8 | 0.8 | M8x25 | M8x20 | M10x25 | M8x25 | M8x35 | M8x25 | 13 | | |
| 45 | 4.5 | 8.0 | 0.8 | 8 | 0.8 | 0.8 | M10x30 | M10x25 | M12x30 | M10x30 | M12x45 | M12x30 | 14 | | |
| 55 | 7.0 | 10.0 | 1.2 | 10 | 1.0 | 1.0 | M12x40 | M12x30 | M14x40 | M12x35 | M14x50 | M14x40 | 20 | | |
| 65 | 7.0 | 10.0 | 1.2 | 14 | 1.0 | 1.0 | M14x45 | M14x35 | M16x45 | M16x40 | M16x60 | M16x45 | 22 | | |

| Screw strength class | Runner blocks | | | Guide rails | | |
|----------------------|---------------|----------------------|--------|-------------|--------|--------|
| | | | | | | |
| 8.8 | 0.11 C | 0.15 C ³⁾ | 0.23 C | 0.11 C | 0.06 C | 0.06 C |
| 12.9 | 0.18 C | 0.22 C ³⁾ | 0.35 C | 0.18 C | 0.10 C | 0.10 C |
| 8.8 | 0.08 C | 0.13 C ³⁾ | 0.18 C | 0.08 C | 0.04 C | 0.04 C |
| 12.9 | 0.14 C | 0.18 C ³⁾ | 0.26 C | 0.14 C | 0.07 C | 0.07 C |

Tightening torque of the mounting screws

| | M4 | M5 | M6 | M8 | M10 | M12 | M14 | M16 |
|------|-----|-----|-----|----|-----|-----|-----|-----|
| 8.8 | 2.7 | 5.5 | 9.5 | 23 | 46 | 80 | 125 | 195 |
| 12.9 | 4.6 | 9.5 | 16 | 39 | 77 | 135 | 215 | 340 |

Locating pins

If the recommended values for permissible side forces are exceeded (see table), the runner block must be additionally fixed by means of locating pins or reference edges.

Recommended dimensions for the pin holes are indicated in the drawings and table.

Possible pin types

- Taper pin (hardened) or
- Straight pin DIN 6325

Note

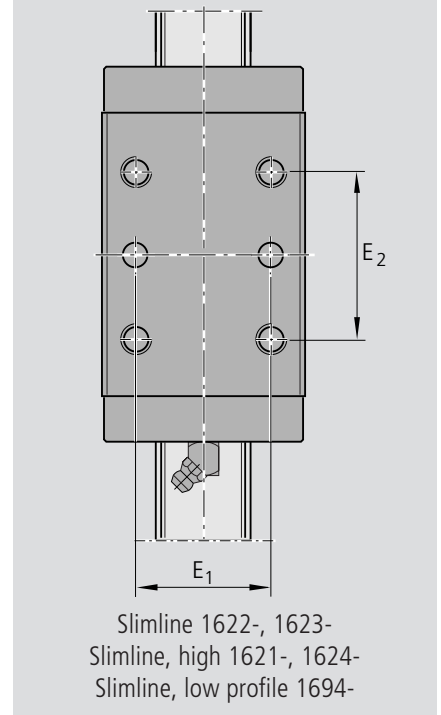
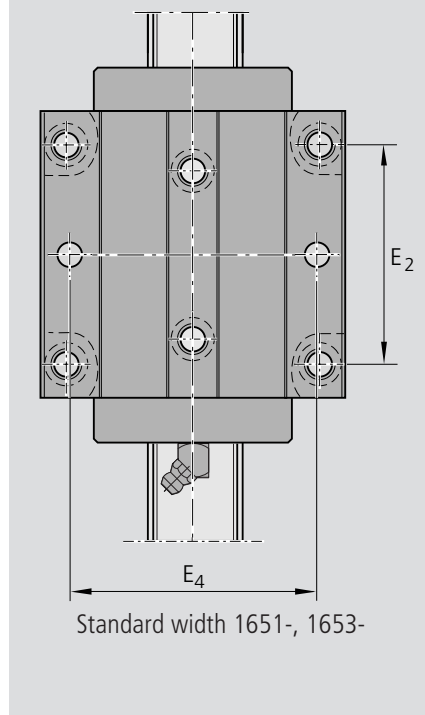
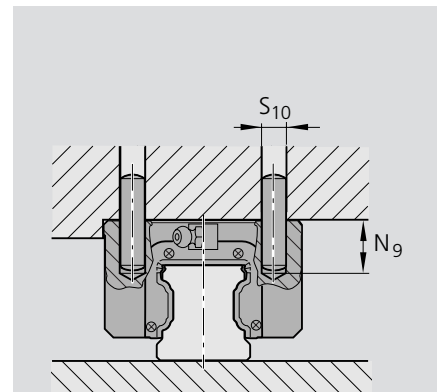
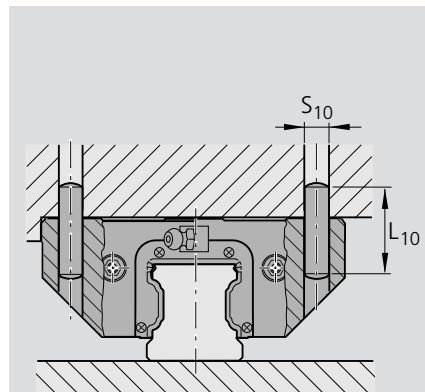
Ready-drilled holes made for production reasons may exist at the recommended pin hole positions ($\varnothing < S_{10}$).

These may be extended and bored open to accommodate the locating pins.

If the locating pins have to be driven in at another point (e.g. when the lube port is central), dimension E_2 must not be exceeded in the longitudinal direction (for dimension E_2 , see the tables for the individual types).

Observe dimensions E_1 and E_4 !

Only prepare the pin holes after the installation is complete (see also "General Mounting Instructions").



| Size | Dimensions (mm) | | | | | |
|------|--|----------|-------|-------|-------------|-------------|
| | Taper pin (hardened) or Straight pin (DIN 6325) | | 1694- | | | |
| | S_{10} | L_{10} | E_1 | E_4 | N_9 (max) | N_9 (max) |
| 15 | 4 | 18 | 26 | 38 | 6.0 | – |
| 20 | 5 | 24 | 32 | 53 | 7.5 | 6.5 |
| 25 | 6 | 32 | 35 | 55 | 9.0 | 7.0 |
| 30 | 8 | 36 | 40 | 70 | 12.0 | – |
| 35 | 8 | 40 | 50 | 80 | 13.0 | – |
| 45 | 10 | 50 | 60 | 98 | 18.0 | – |
| 55 | 12 | 60 | 75 | 114 | 19.0 | – |
| 65 | 14 | 60 | 76 | 140 | 22.0 | – |

STAR – Ball Rail Systems

Mounting Instructions

For rail systems with runner block 1665-, 1666-

Reference edges, corner radii, mounting screw sizes and tightening torque

Runner block 1665-

– Standard width, short

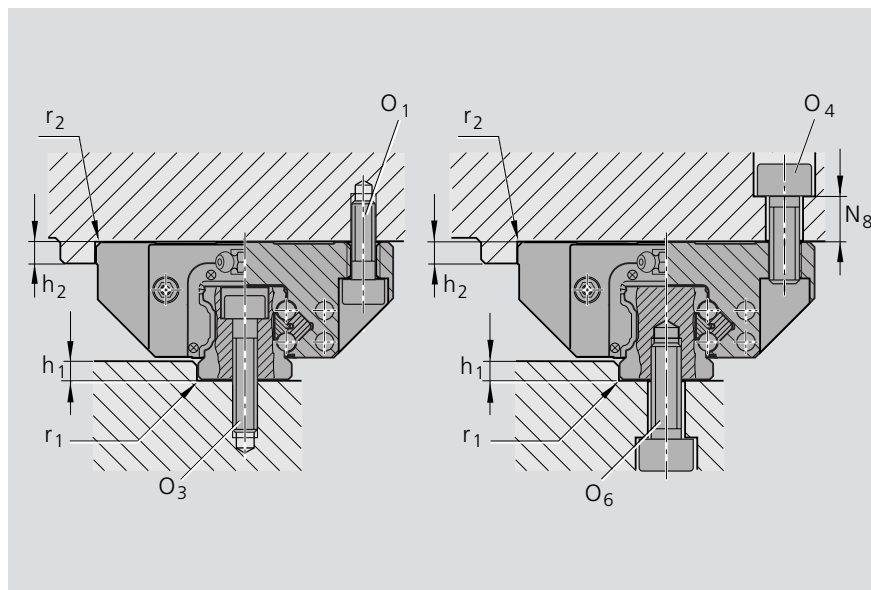
Guide rails

left:

– For mounting from above 1605-

right:

– For mounting from below 1607-



Runner block 1666-

– Slimline, short

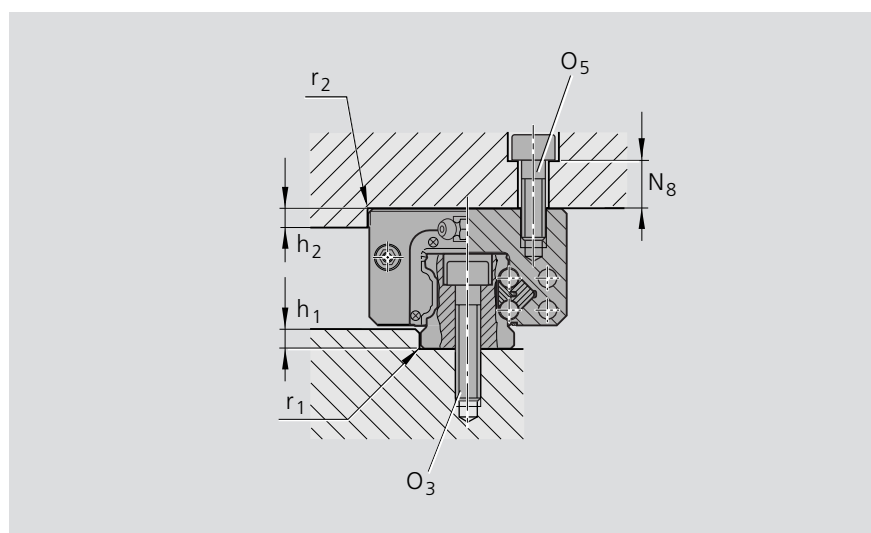
Guide rails

– For mounting from above 1605-

Note

The indicated combinations represent examples. It is on principle possible to combine any runner block with all the offered guide rail types.

Screw mounting of runner blocks using two screws is fully sufficient up to maximum load. (See maximum permissible force and moment loads indicated under the individual types.)



Dimensions and recommended limits for side load if no additional lateral retention is provided (Runner blocks 1665-, 1666-)

| Size | h ₁ | | r ₁ | h ₂ | r ₂ | O ₁ | O ₄ | O ₅ | O ₃ | O ₆ | N ₈ |
|------|----------------|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | min. (mm) | max. (mm) | max. (mm) | (mm) | max. (mm) | DIN 912 2 pcs. | DIN 912 2 pcs. | DIN 912 2 pcs. | DIN 912 (rail) | DIN 912 (rail) | (mm) |
| 15 | 2.5 | 3.5 | 0.4 | 4 | 0.6 | M4x12 | M5x12 | M4x12 | M4x20 | M5x12 | 6 |
| 20 | 2.5 | 4.0 | 0.6 | 5 | 0.6 | M5x16 | M6x16 | M5x16 | M5x25 | M6x16 | 9 |
| 25 | 3.0 | 5.0 | 0.8 | 5 | 0.8 | M6x20 | M8x20 | M6x18 | M6x30 | M6x20 | 10 |
| 30 | 3.0 | 5.0 | 0.8 | 6 | 0.8 | M8x25 | M10x20 | M8x20 | M8x30 | M8x20 | 10 |
| 35 | 3.5 | 6.0 | 0.8 | 6 | 0.8 | M8x25 | M10x25 | M8x25 | M8x35 | M8x25 | 13 |

| Screw strength class | Runner blocks | | | Guide rails | |
|----------------------|---------------|--------|--------|-------------|--------|
| | 8.8 | 0.08 C | 0.12 C | 0.08 C | 0.09 C |
| | 12.9 | 0.13 C | 0.21 C | 0.13 C | 0.15 C |

Tightening torque of the mounting screws

| Nm | Screw size | | | | | | | |
|------|------------|-----|-----|----|-----|-----|-----|-----|
| | M4 | M5 | M6 | M8 | M10 | M12 | M14 | M16 |
| 8.8 | 2.7 | 5.5 | 9.5 | 23 | 46 | 80 | 125 | 195 |
| 12.9 | 4.6 | 9.5 | 16 | 39 | 77 | 135 | 215 | 340 |

Locating pins

If the recommended values for permissible side forces are exceeded, the runner block must be additionally fixed by means of locating pins or reference edges.

Recommended dimensions for the pin holes are indicated in the drawings and table.

Possible pin types

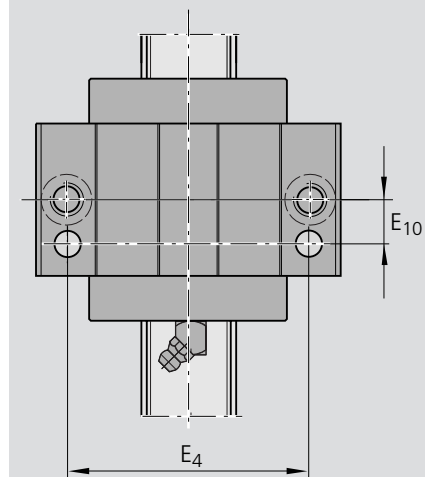
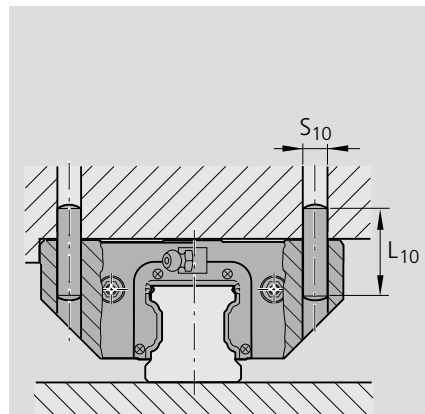
- Taper pin (hardened) or
- Straight pin DIN 6325

Note

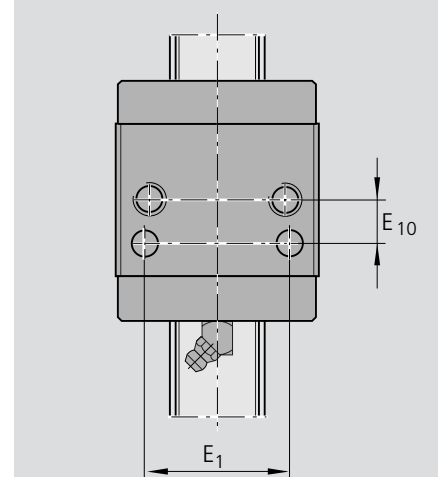
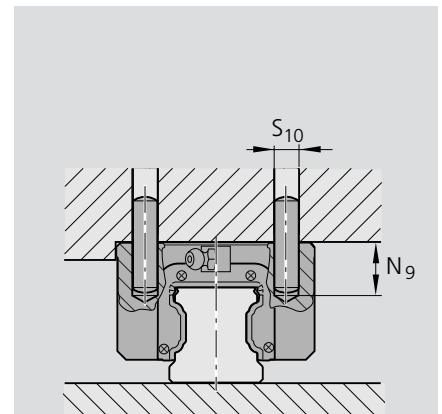
Ready-drilled holes made for production reasons may exist at the recommended pin hole positions ($\varnothing < S_{10}$).

These may be extended and bored open to accommodate the locating pins.

Only prepare the pin holes after the installation is complete (see also "General Mounting Instructions").



Standard width, short 1665-



Slimline, short 1666-

| Size | Dimensions (mm) | | | | | |
|-----------------|--|----|----------------|----------------|-----------------|----------------------|
| | Taper pin (hardened) or Straight pin (DIN 6325) | | E ₁ | E ₄ | E ₁₀ | N ₉ (max) |
| S ₁₀ | L ₁₀ | | | | | |
| 15 | 4 | 18 | 26 | 38 | 9 | 3.0 |
| 20 | 5 | 24 | 32 | 53 | 10 | 3.5 |
| 25 | 6 | 32 | 35 | 55 | 11 | 7.0 |
| 30 | 8 | 36 | 40 | 70 | 14 | 10.0 |
| 35 | 8 | 40 | 50 | 80 | 15 | 12.0 |

STAR – Ball Rail Systems

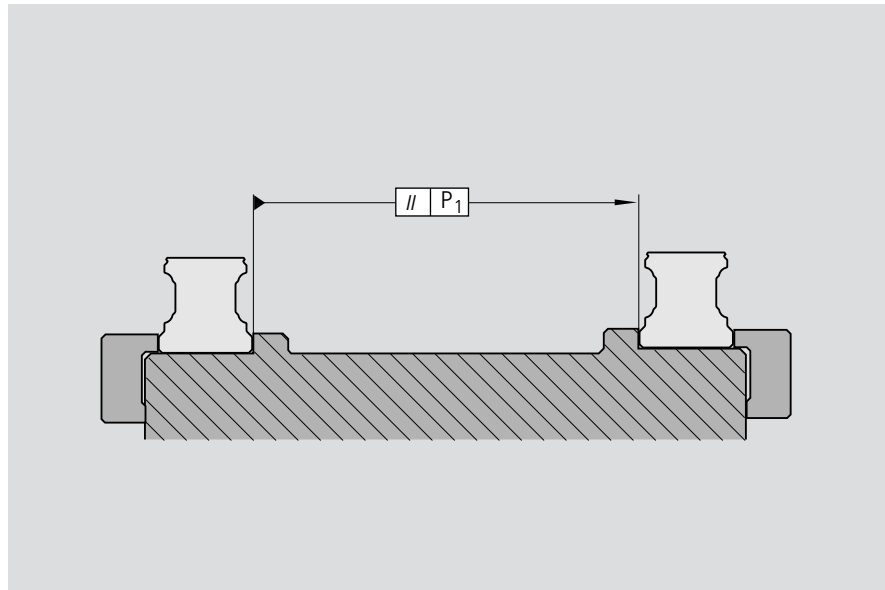
Mounting Instructions – Runner Blocks, Steel Version

Parallelism offset of the rails after mounting

measured at the guide rails and at the runner blocks

The values for parallelism offset P_1 apply to all runner blocks of the standard range.

Values around 20% higher are permissible for the runner block 1665- (standard width, short) and 1666- (slimline, short).



Note

The parallelism offset P_1 causes a slight increase in preload on one side of the assembly.

If the tolerances given in the table are not exceeded, reduction in travel life will as a rule be negligible.

The given values apply to precision mounting. For standard mounting, double the stated values can be used.

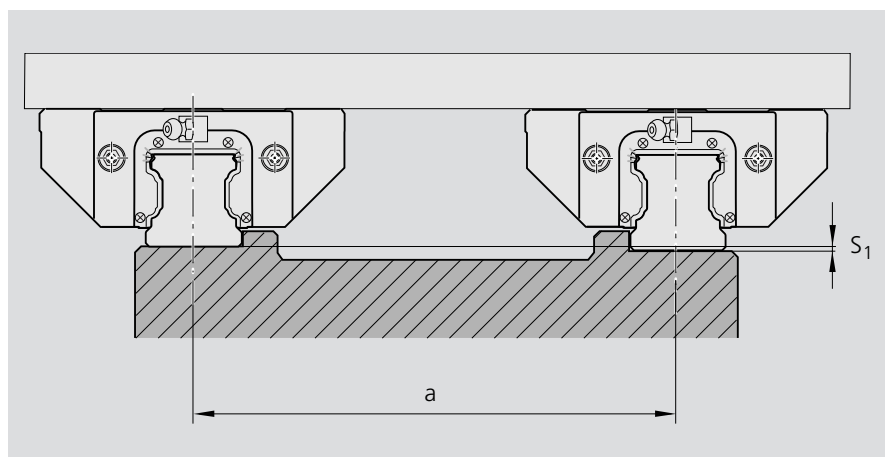
| Size | Parallelism offset P_1 (mm) | | | |
|------|--|----------------|----------------|----------------|
| | up to approx. 10 μm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 15 | 0.015 | 0.009 | 0.005 | 0.004 |
| 20 | 0.018 | 0.011 | 0.006 | 0.004 |
| 25 | 0.019 | 0.012 | 0.007 | 0.005 |
| 30 | 0.021 | 0.014 | 0.009 | 0.006 |
| 35 | 0.023 | 0.015 | 0.010 | 0.007 |
| 45 | 0.028 | 0.019 | 0.012 | 0.009 |
| 55 | 0.035 | 0.025 | 0.016 | 0.011 |
| 65 | 0.048 | 0.035 | 0.022 | 0.016 |

Vertical offset

The vertical offset values apply to all runner blocks of the standard program.

Values around 20% higher are permissible for the runner block 1665- (standard width, short) and 1666- (slimline, short).

If the admissible vertical offset S_1 and S_2 is not exceeded, reduction in travel life will as a rule be negligible.



Permissible vertical offset in the transverse direction

The permissible vertical offset S_1 includes the tolerance for dimension H in accordance with the table given in the "Technical Data" section.

$$S_1 = a \cdot Y$$

S_1 = permissible vertical offset (mm)
 a = distance between rails (mm)
 Y = calculation factor

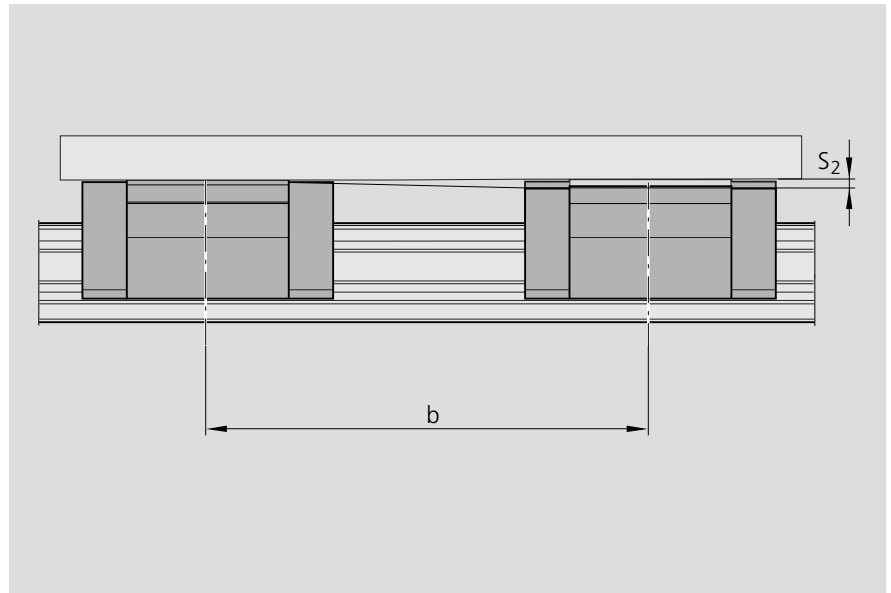
| Calculation factor | for preload class | | | |
|--------------------|--|---------------------|---------------------|---------------------|
| | up to approx. 10 μm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| Y | $4.3 \cdot 10^{-4}$ | $2.8 \cdot 10^{-4}$ | $1.7 \cdot 10^{-4}$ | $1.2 \cdot 10^{-4}$ |

Permissible vertical offset in the longitudinal direction

The permissible vertical offset S_2 includes the tolerance "Max. difference in dimension H on the same rail" in accordance with the table given in the "Technical Data" section.

Values around 40% higher are permissible for the runner block 1665- (standard width, short) and 1666- (slimline, short).

Values around 30% lower are permissible for runner block 1653- (standard width long), 1623- (slimline, long) and 1624- (slimline, high, long).



$$S_2 = b \cdot 4.3 \cdot 10^{-5}$$

S_2 = permissible vertical offset (mm)

b = distance
between runner blocks (mm)

STAR – Ball Rail Systems

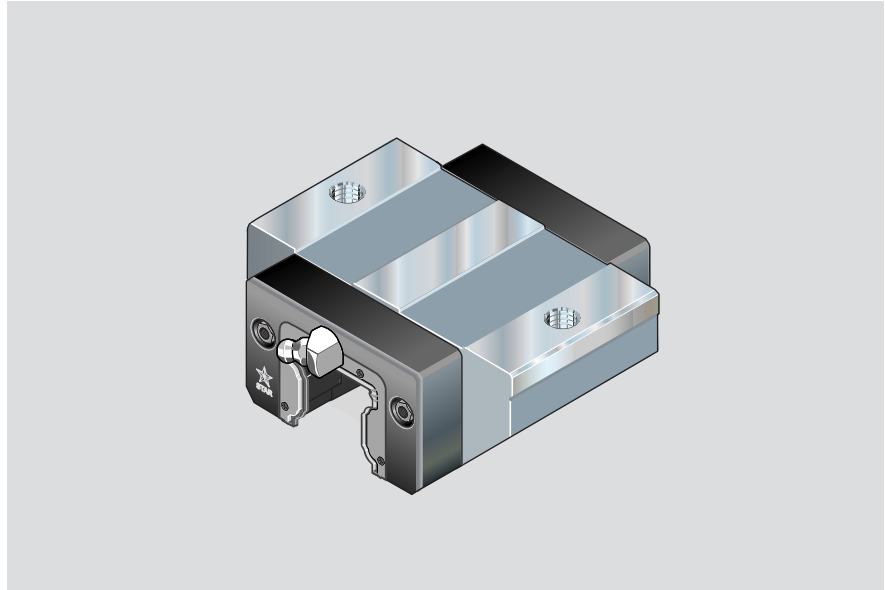
Runner Blocks, Steel Version

Runner Block 1665- Standard width, short

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



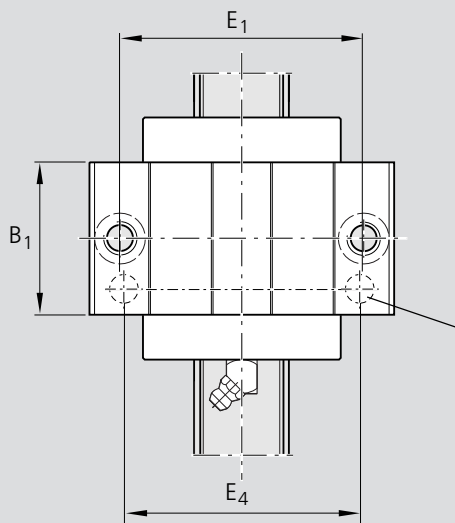
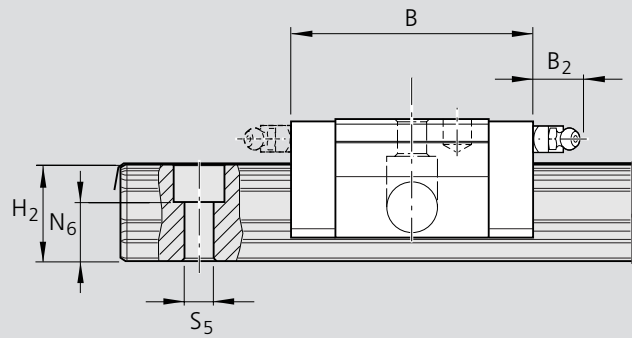
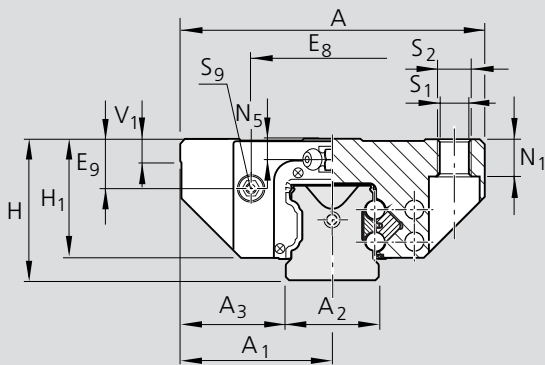
Part numbers

| Size | Accuracy class | Part numbers for runner block for preload class | |
|------|----------------|---|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 15 | H | 1665-193-10 | 1665-113-10 |
| | N | 1665-194-10 | 1665-114-10 |
| 20 | H | 1665-893-10 | 1665-813-10 |
| | N | 1665-894-10 | 1665-814-10 |
| 25 | H | 1665-293-10 | 1665-213-10 |
| | N | 1665-294-10 | 1665-214-10 |
| 30 | H | 1665-793-10 | 1665-713-10 |
| | N | 1665-794-10 | 1665-714-10 |
| 35 | H | 1665-393-10 | 1665-313-10 |
| | N | 1665-394-10 | 1665-314-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



Recommended position for pin holes (dimension E_4 see "Mounting Instructions", under "Locating pins").

Note

Ready-drilled holes made for production reasons may exist at the recommended pin hole position.

These may be extended and bored open to accommodate the locating pins.

Lube nipple

Size 15 and 20:

Funnel-type nipple
Type B – Thread size M3
 $B_2 = 8$ mm

Size 25 to 35:

BM 6 DIN 71412
 $B_2 = 16$ mm

at either end.

Dimensions (mm)

| Size | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₈ | E ₉ | N ₁ |
|------|-----|----------------|----------------|----------------|------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|
| 15 | 47 | 23.5 | 15 | 16.0 | 40.5 | 25.7 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 38 | 24.55 | 6.7 | 5.0 |
| 20 | 63 | 31.5 | 20 | 21.5 | 52.5 | 31.9 | 30 | 25.4 | 20.7 | 20.55 | 6.0 | 53 | 32.4 | 7.3 | 7.5 |
| 25 | 70 | 35.0 | 23 | 23.5 | 61.5 | 38.6 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 57 | 38.3 | 11.5 | 9.0 |
| 30 | 90 | 45.0 | 28 | 31.0 | 71.5 | 45.0 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 72 | 48.4 | 14.6 | 11.0 |
| 35 | 100 | 50.0 | 34 | 33.0 | 79.0 | 51.4 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 82 | 58.0 | 17.5 | 12.0 |

¹⁾ Dimension H_2 with Rail Seal cover strip

²⁾ Dimension H_2 without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|-----------------------|---------------------|-----------------------|
| | N ₅ | N ₆ ^{±0.5} | S ₁ | S ₂ | S ₅ | S ₉ | | C dyn. | C ₀ stat. | M _t dyn. | M _{t0} stat. | M _L dyn. | M _{L0} stat. |
| 15 | 4.0 | 10.3 | 4.4 | M5 | 4.4 | M2.5-3.5 deep | 0.19 | 5 400 | 8 100 | 52 | 80 | 19 | 28 |
| 20 | 4.7 | 13.2 | 5.4 | M6 | 6.0 | M3-5 deep | 0.43 | 12 400 | 13 600 | 150 | 170 | 52 | 58 |
| 25 | 5.5 | 15.2 | 6.8 | M8 | 7.0 | M3-5 deep | 0.50 | 15 900 | 18 200 | 230 | 260 | 82 | 94 |
| 30 | 6.0 | 17.0 | 8.6 | M10 | 9.0 | M3-5 deep | 0.90 | 22 100 | 24 800 | 380 | 430 | 133 | 150 |
| 35 | 7.0 | 20.5 | 8.6 | M10 | 9.0 | M3-5 deep | 1.35 | 29 300 | 32 400 | 640 | 700 | 200 | 220 |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Runner Blocks, Steel Version

Runner Block 1651-

Standard width

Special versions:

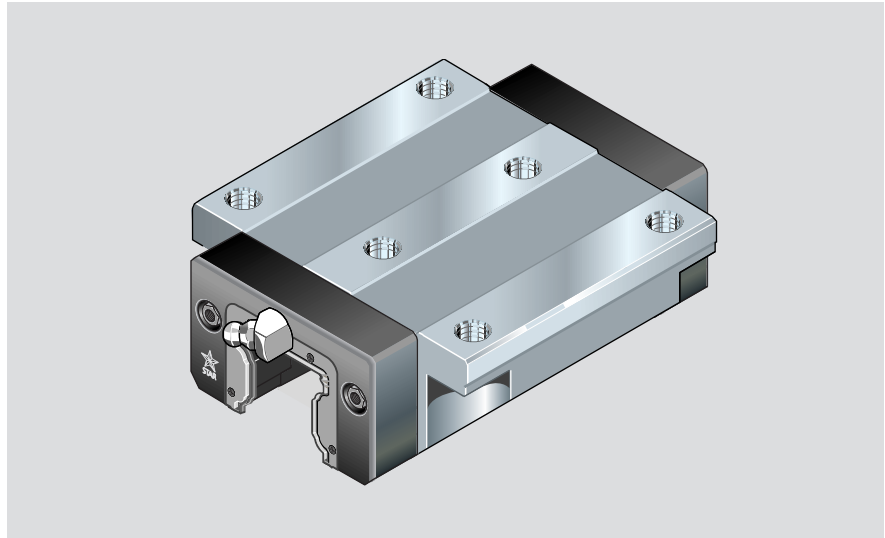
Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).

Size 15 to 35 in accuracy class H (clearance and preload 0.02 C) also available as low noise runner blocks with spacer balls.

Dynamic load capacities and moments are reduced by 35%.

(Part numbers 1651-...3-12)



Part numbers

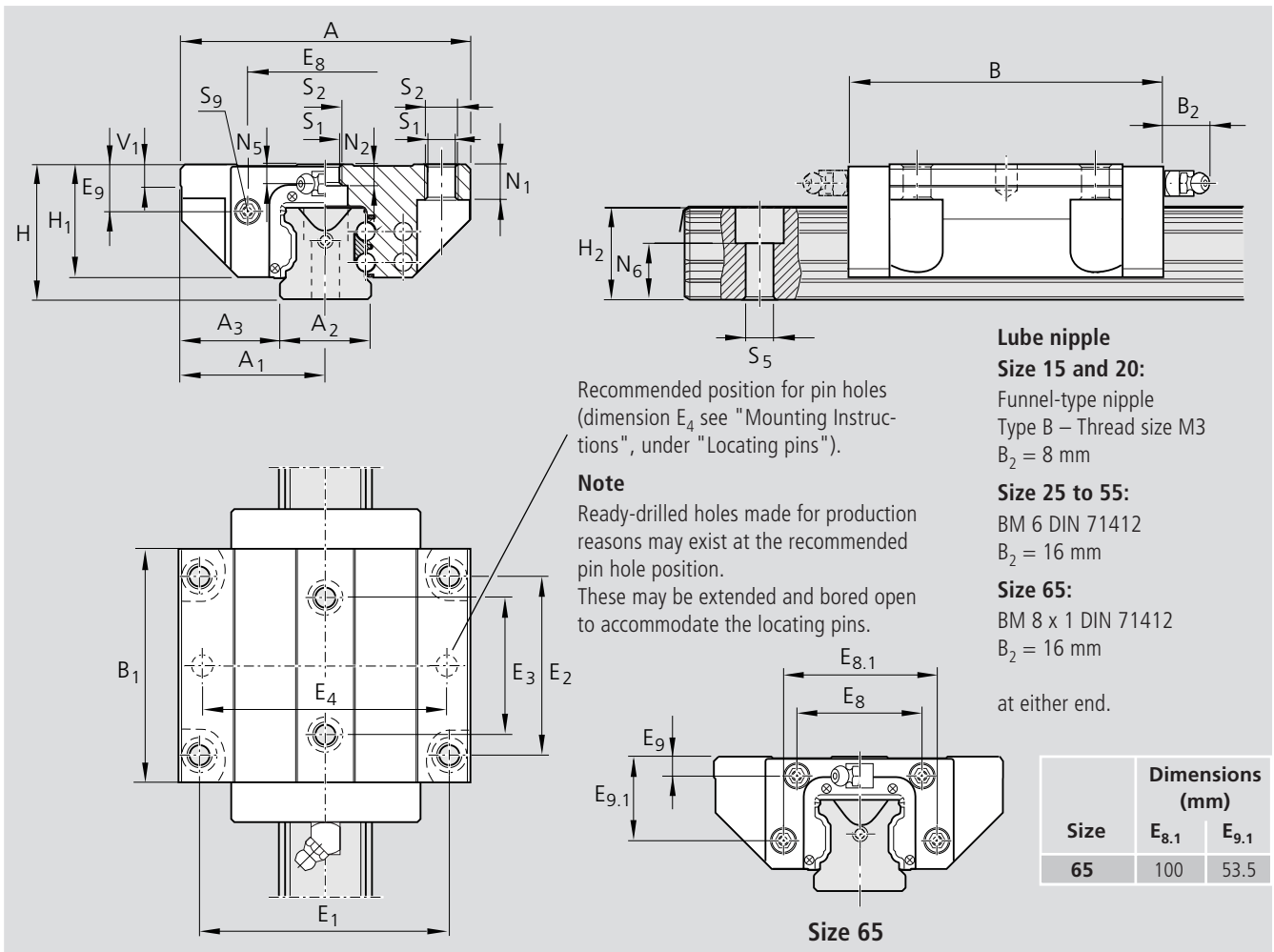
* 30% higher dynamic load capacities on request

| Size | Accuracy class | Part numbers for runner blocks for preload class | | | |
|------|----------------|--|----------------|----------------|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 15 | UP | | 1651-119-10* | 1651-129-10* | 1651-139-10* |
| | SP | | 1651-111-10* | 1651-121-10* | 1651-131-10* |
| | P | | 1651-112-10 | 1651-122-10 | 1651-132-10 |
| | H | 1651-193-10 | 1651-113-10 | 1651-123-10 | |
| | N | 1651-194-10 | 1651-114-10 | 1651-124-10 | |
| 20 | UP | | 1651-819-10* | 1651-829-10* | 1651-839-10* |
| | SP | | 1651-811-10* | 1651-821-10* | 1651-831-10* |
| | P | | 1651-812-10 | 1651-822-10 | 1651-832-10 |
| | H | 1651-893-10 | 1651-813-10 | 1651-823-10 | |
| | N | 1651-894-10 | 1651-814-10 | 1651-824-10 | |
| 25 | UP | | 1651-219-10* | 1651-229-10* | 1651-239-10* |
| | SP | | 1651-211-10* | 1651-221-10* | 1651-231-10* |
| | P | | 1651-212-10 | 1651-222-10 | 1651-232-10 |
| | H | 1651-293-10 | 1651-213-10 | 1651-223-10 | |
| | N | 1651-294-10 | 1651-214-10 | 1651-224-10 | |
| 30 | UP | | 1651-719-10* | 1651-729-10* | 1651-739-10* |
| | SP | | 1651-711-10* | 1651-721-10* | 1651-731-10* |
| | P | | 1651-712-10 | 1651-722-10 | 1651-732-10 |
| | H | 1651-793-10 | 1651-713-10 | 1651-723-10 | |
| | N | 1651-794-10 | 1651-714-10 | 1651-724-10 | |
| 35 | UP | | 1651-319-10* | 1651-329-10* | 1651-339-10* |
| | SP | | 1651-311-10* | 1651-321-10* | 1651-331-10* |
| | P | | 1651-312-10 | 1651-322-10 | 1651-332-10 |
| | H | 1651-393-10 | 1651-313-10 | 1651-323-10 | |
| | N | 1651-394-10 | 1651-314-10 | 1651-324-10 | |
| 45 | UP | | 1651-419-10* | 1651-429-10* | 1651-439-10* |
| | SP | | 1651-411-10* | 1651-421-10* | 1651-431-10* |
| | P | | 1651-412-10 | 1651-422-10 | 1651-432-10 |
| | H | 1651-493-10 | 1651-413-10 | 1651-423-10 | |
| | N | 1651-494-10 | 1651-414-10 | 1651-424-10 | |
| 55 | UP | | 1651-519-10* | 1651-529-10* | 1651-539-10* |
| | SP | | 1651-511-10* | 1651-521-10* | 1651-531-10* |
| | P | | 1651-512-10* | 1651-522-10* | 1651-532-10* |
| | H | 1651-593-10* | 1651-513-10* | 1651-523-10* | |
| | N | 1651-594-10* | 1651-514-10* | 1651-524-10* | |
| 65 | UP | | 1651-619-10* | 1651-629-10* | 1651-639-10* |
| | SP | | 1651-611-10* | 1651-621-10* | 1651-631-10* |
| | P | | 1651-612-10* | 1651-622-10* | 1651-632-10* |
| | H | 1651-693-10* | 1651-613-10* | 1651-623-10* | |
| | N | 1651-694-10* | 1651-614-10* | 1651-624-10* | |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for C , M_t and M_l in the table should be multiplied by 1.26.



| Size | Dimensions (mm) | | | | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-----|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₃ | E ₈ | E ₉ | N ₁ | N ₂ | |
| 15 | 47 | 23.5 | 15 | 16.0 | 54 | 39.2 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 38 | 30 | 26 | 24.55 | 6.7 | 5.0 | 4.4 | |
| 20 | 63 | 31.5 | 20 | 21.5 | 70 | 49.6 | 30 | 25.0 | 20.7 | 20.55 | 6.0 | 53 | 40 | 35 | 32.4 | 7.3 | 7.5 | 5.2 | |
| 25 | 70 | 35.0 | 23 | 23.5 | 81 | 57.8 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 57 | 45 | 40 | 38.3 | 11.5 | 9.0 | 7.0 | |
| 30 | 90 | 45.0 | 28 | 31.0 | 94 | 67.4 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 72 | 52 | 44 | 48.4 | 14.6 | 11.0 | 8.0 | |
| 35 | 100 | 50.0 | 34 | 33.0 | 105 | 77.0 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 82 | 62 | 52 | 58.0 | 17.5 | 12.0 | 10.2 | |
| 45 | 120 | 60.0 | 45 | 37.5 | 133 | 97.0 | 60 | 50.0 | 40.15 | 39.85 | 10.0 | 100 | 80 | 60 | 70.0 | 21.0 | 15.0 | 12.4 | |
| 55 | 140 | 70.0 | 53 | 43.5 | 159 | 115.5 | 70 | 57.0 | 48.15 | 47.85 | 12.0 | 116 | 95 | 70 | 80.0 | 22.3 | 18.0 | 13.5 | |
| 65 | 170 | 85.0 | 63 | 53.5 | 188 | 139.6 | 90 | 76.0 | 60.15 | 59.85 | 15.0 | 142 | 110 | 82 | 76.0 | 11.0 | 23.0 | 14.0 | |

¹⁾ Dimension H_2 with Rail Seal cover strip

²⁾ Dimension H_2 without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | | Load capacities (N) | | | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|-----------------------|---------------------|-----------------------|--|--|
| | N ₅ | N ₆ ^{±0.5} | S ₁ | S ₂ | S ₅ | S ₉ | Mass (kg) | C dyn. | C ₀ stat. | M _t dyn. | M _{t0} stat. | M _L dyn. | M _{L0} stat. | | |
| | | | | | | | | C | | M _t | | M _L | | | |
| 15 | 4.0 | 10.3 | 4.4 | M5 | 4.4 | M2.5-3.5deep | 0.23 | 7 800 | 13 500 | 74 | 130 | 40 | 71 | | |
| 20 | 4.7 | 13.2 | 5.4 | M6 | 6.0 | M3-5deep | 0.55 | 18 800 | 24 400 | 240 | 310 | 130 | 165 | | |
| 25 | 5.5 | 15.2 | 6.8 | M8 | 7.0 | M3-5deep | 0.70 | 22 800 | 30 400 | 320 | 430 | 180 | 240 | | |
| 30 | 6.0 | 17.0 | 8.6 | M10 | 9.0 | M3-5deep | 1.10 | 31 700 | 41 300 | 540 | 720 | 290 | 380 | | |
| 35 | 7.0 | 20.5 | 8.6 | M10 | 9.0 | M3-5deep | 1.75 | 41 900 | 54 000 | 890 | 1 160 | 440 | 565 | | |
| 45 | 8.0 | 23.5 | 10.5 | M12 | 14.0 | M4-7deep | 3.15 | 68 100 | 85 700 | 1 830 | 2 310 | 890 | 1 130 | | |
| 55 | 9.0 | 29.0 | 12.5 | M14 | 16.0 | M5-8deep | 5.20 | 98 200 | 121 400 | 3 100 | 3 860 | 1 540 | 1 905 | | |
| 65 | 16.0 | 38.5 | 14.5 | M16 | 18.0 | M4-7deep | 10.25 | 160 000 | 192 700 | 6 300 | 7 610 | 3 160 | 3 815 | | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Runner Blocks, Steel Version

Runner block 1653-

Standard width, long

Special versions:

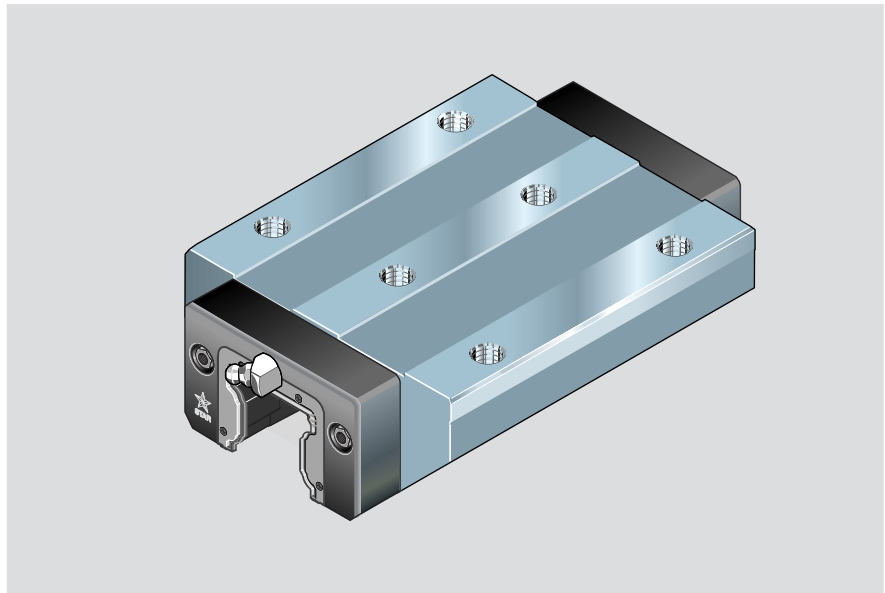
Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).

Size 15 to 35 in accuracy class H (clearance and preload 0.02 C) also available as low noise runner blocks with spacer balls.

Dynamic load capacities and moments are reduced by 35%.

(Part numbers 1653-..3-12)



Part numbers

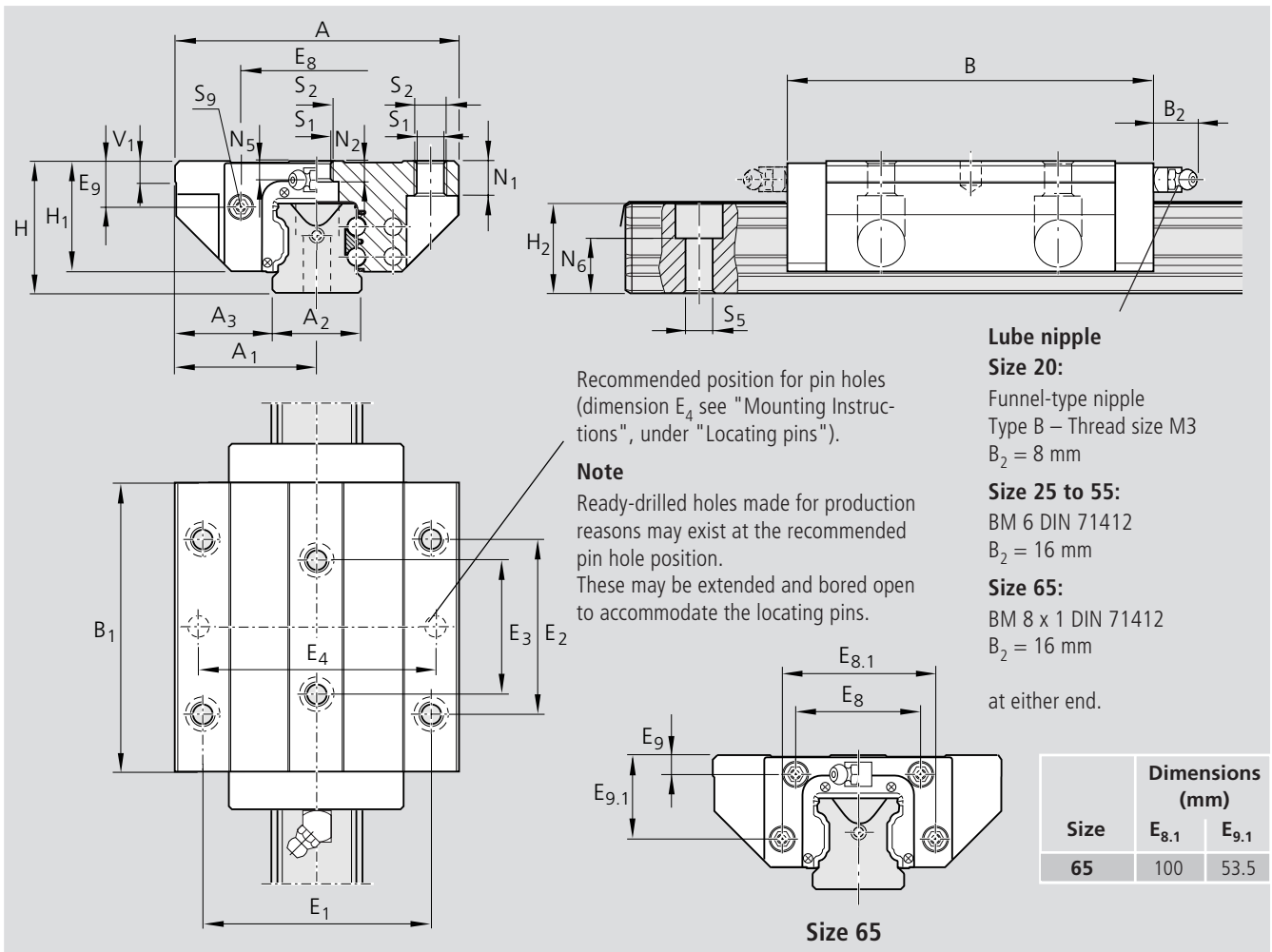
* 30% higher dynamic load capacities on request

| Size | Accuracy class | Part numbers for runner blocks for preload class | | | |
|------|----------------|--|----------------|----------------|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 15 | N | 1653-194-10 | 1653-114-10 | | |
| 20 | UP | | 1653-819-10* | 1653-829-10* | 1653-839-10* |
| | SP | | 1653-811-10* | 1653-821-10* | 1653-831-10* |
| | P | | 1653-812-10 | 1653-822-10 | 1653-832-10 |
| | H | 1653-893-10 | 1653-813-10 | 1653-823-10 | |
| | N | 1653-894-10 | 1653-814-10 | 1653-824-10 | |
| 25 | UP | | 1653-219-10* | 1653-229-10* | 1653-239-10* |
| | SP | | 1653-211-10* | 1653-221-10* | 1653-231-10* |
| | P | | 1653-212-10 | 1653-222-10 | 1653-232-10 |
| | H | 1653-293-10 | 1653-213-10 | 1653-223-10 | |
| | N | 1653-294-10 | 1653-214-10 | 1653-224-10 | |
| 30 | UP | | 1653-719-10* | 1653-729-10* | 1653-739-10* |
| | SP | | 1653-711-10* | 1653-721-10* | 1653-731-10* |
| | P | | 1653-712-10 | 1653-722-10 | 1653-732-10 |
| | H | 1653-793-10 | 1653-713-10 | 1653-723-10 | |
| | N | 1653-794-10 | 1653-714-10 | 1653-724-10 | |
| 35 | UP | | 1653-319-10* | 1653-329-10* | 1653-339-10* |
| | SP | | 1653-311-10* | 1653-321-10* | 1653-331-10* |
| | P | | 1653-312-10 | 1653-322-10 | 1653-332-10 |
| | H | 1653-393-10 | 1653-313-10 | 1653-323-10 | |
| | N | 1653-394-10 | 1653-314-10 | 1653-324-10 | |
| 45 | UP | | 1653-419-10* | 1653-429-10* | 1653-439-10* |
| | SP | | 1653-411-10* | 1653-421-10* | 1653-431-10* |
| | P | | 1653-412-10 | 1653-422-10 | 1653-432-10 |
| | H | 1653-493-10 | 1653-413-10 | 1653-423-10 | |
| | N | 1653-494-10 | 1653-414-10 | 1653-424-10 | |
| 55 | UP | | 1653-519-10* | 1653-529-10* | 1653-539-10* |
| | SP | | 1653-511-10* | 1653-521-10* | 1653-531-10* |
| | P | | 1653-512-10* | 1653-522-10* | 1653-532-10* |
| | H | 1653-593-10* | 1653-513-10* | 1653-523-10* | |
| | N | 1653-594-10* | 1653-514-10* | 1653-524-10* | |
| 65 | UP | | 1653-619-10* | 1653-629-10* | 1653-639-10* |
| | SP | | 1653-611-10* | 1653-621-10* | 1653-631-10* |
| | P | | 1653-612-10* | 1653-622-10* | 1653-632-10* |
| | H | 1653-693-10* | 1653-613-10* | 1653-623-10* | |
| | N | 1653-694-10* | 1653-614-10* | 1653-624-10* | |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



| Size | Dimensions (mm) | |
|------|-----------------|-----------|
| | $E_{8.1}$ | $E_{9.1}$ |
| 65 | 100 | 53.5 |

| Size | Dimensions (mm) | | | | | | | | | | | | | | | | | | |
|------|-----------------|-------|-------|-------|-------|-------|----|-------|------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | A | A_1 | A_2 | A_3 | B | B_1 | H | H_1 | $H_2^{1)}$ | $H_2^{2)}$ | V_1 | E_1 | E_2 | E_3 | E_8 | E_9 | N_1 | N_2 | |
| 15 | 47 | 23.5 | 15 | 16.0 | 68.5 | 53.6 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 38 | 30 | 26 | 24.55 | 6.7 | 5.0 | 4.4 | |
| 20 | 63 | 31.5 | 20 | 21.5 | 86.0 | 65.6 | 30 | 25.0 | 20.7 | 20.55 | 6.0 | 53 | 40 | 35 | 32.4 | 7.3 | 7.5 | 5.2 | |
| 25 | 70 | 35.0 | 23 | 23.5 | 103.0 | 79.5 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 57 | 45 | 40 | 38.3 | 11.5 | 9.0 | 7.0 | |
| 30 | 90 | 45.0 | 28 | 31.0 | 116.0 | 89.4 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 72 | 52 | 44 | 48.4 | 14.6 | 11.0 | 8.0 | |
| 35 | 100 | 50.0 | 34 | 33.0 | 133.0 | 105.5 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 82 | 62 | 52 | 58.0 | 17.5 | 12.0 | 10.2 | |
| 45 | 120 | 60.0 | 45 | 37.5 | 170.0 | 133.5 | 60 | 50.0 | 40.15 | 39.85 | 10.0 | 100 | 80 | 60 | 70.0 | 21.0 | 15.0 | 12.4 | |
| 55 | 140 | 70.0 | 53 | 43.5 | 200.0 | 155.5 | 70 | 57.0 | 48.15 | 47.85 | 12.0 | 116 | 95 | 70 | 80.0 | 22.3 | 18.0 | 13.5 | |
| 65 | 170 | 85.0 | 63 | 53.5 | 243.0 | 194.6 | 90 | 76.0 | 60.15 | 59.85 | 15.0 | 142 | 110 | 82 | 76.0 | 11.0 | 23.0 | 14.0 | |

¹⁾ Dimension H_2 with Rail Seal cover strip

²⁾ Dimension H_2 without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|------|-----------------|-----------------|-------|-------|-------|---------------|--------|-----------|---------------------|------------|----------------|------------|----------------|--|
| | N_5 | $N_6^{\pm 0.5}$ | S_1 | S_2 | S_5 | S_9 | C dyn. | | C_0 stat. | M_t dyn. | M_{t0} stat. | M_L dyn. | M_{L0} stat. | |
| 15 | 4.0 | 10.3 | 4.4 | M5 | 4.4 | M2.5-3.5 deep | 0.32 | 10 000 | 20 200 | 130 | 190 | 98 | 150 | |
| 20 | 4.7 | 13.2 | 5.4 | M6 | 6 | M3-5 deep | 0.80 | 24 400 | 35 200 | 310 | 450 | 225 | 330 | |
| 25 | 5.5 | 15.2 | 6.8 | M8 | 7 | M3-5 deep | 1.00 | 30 400 | 45 500 | 430 | 650 | 345 | 510 | |
| 30 | 6.0 | 17.0 | 8.6 | M10 | 9 | M3-5 deep | 1.60 | 40 000 | 57 800 | 690 | 1 000 | 495 | 715 | |
| 35 | 7.0 | 20.5 | 8.6 | M10 | 9 | M3-5 deep | 2.45 | 55 600 | 81 000 | 1 200 | 1 740 | 830 | 1 215 | |
| 45 | 8.0 | 23.5 | 10.5 | M12 | 14 | M4-7 deep | 4.50 | 90 400 | 128 500 | 2 440 | 3 470 | 1 700 | 2 425 | |
| 55 | 9.0 | 29.0 | 12.5 | M14 | 16 | M5-8 deep | 7.50 | 124 200 | 170 000 | 3 950 | 5 400 | 2 630 | 3 600 | |
| 65 | 16.0 | 38.5 | 14.5 | M16 | 18 | M4-7 deep | 14.15 | 211 900 | 289 000 | 8 370 | 11 420 | 6 000 | 8 190 | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Runner Blocks, Steel Version

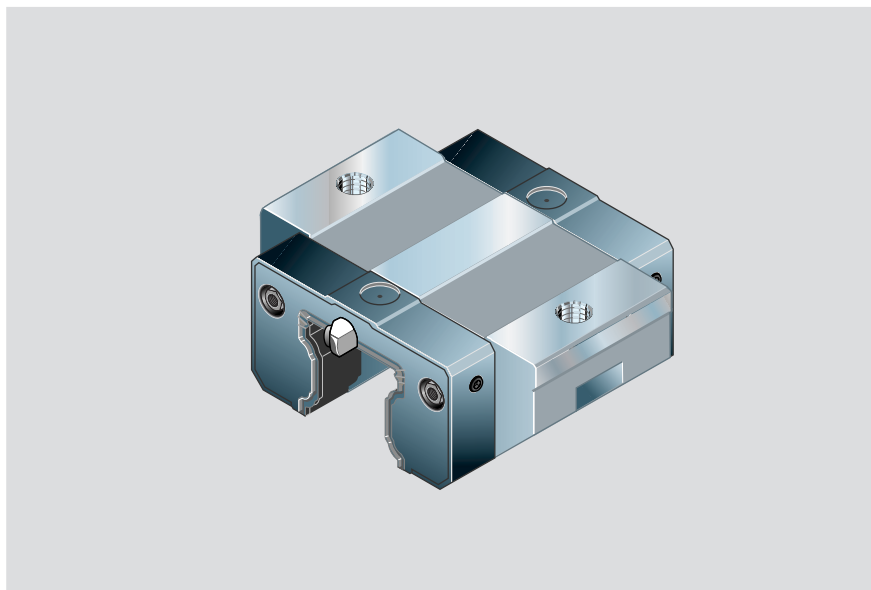
Runner block 1663-

Standard width, short, low profile

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



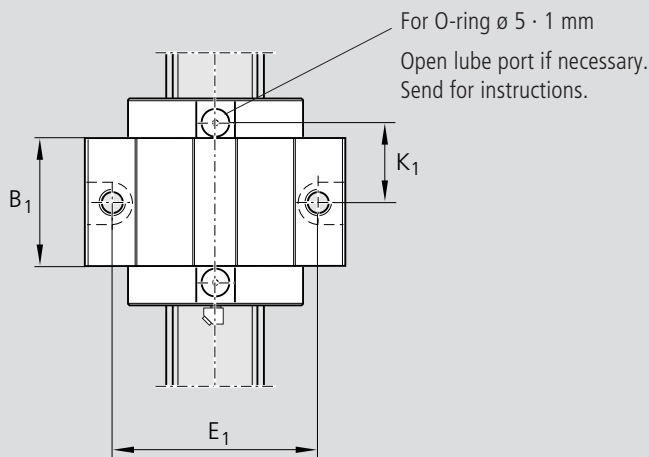
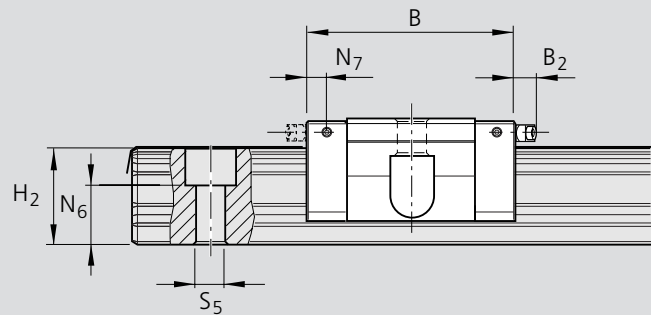
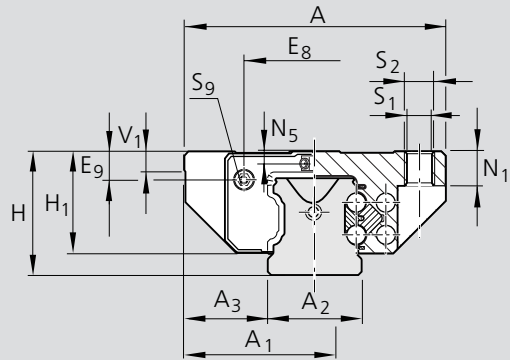
Part numbers

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 20 | H | 1663-893-10 | 1663-813-10 |
| | N | 1663-894-10 | 1663-814-10 |
| 25 | H | 1663-293-10 | 1663-213-10 |
| | N | 1663-294-10 | 1663-214-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



Lube port with additional anti-twist feature.

Lube nipple

Funnel-type nipple
Type B – Thread size M3
B₂ = 8 mm

at either end.

Size 25:

Provided with ports at side.

| Dimensions (mm) | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----------------|----------------|----------------|----|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|--|
| Size | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₈ | E ₉ | K ₁ | N ₁ | N ₅ | | |
| 20 | 59 | 29.5 | 20 | 19.5 | 55 | 31.9 | 28 | 23.0 | 20.7 | 20.55 | 6.0 | 49 | 30.5 | 5.6 | 20.1 | 7.7 | 3.6 | | |
| 25 | 73 | 36.5 | 23 | 25.0 | 62 | 38.6 | 33 | 26.5 | 24.4 | 24.25 | 7.5 | 60 | 38.3 | 8.5 | 24.5 | 9.3 | 4.1 | | |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| | | | | | | | | Load capacities (N) | | Moments (Nm) | | | |
|------|--------------------------------|----------------|----------------|----------------|----------------|----------------|-----------|---------------------|--------|----------------|-------|----------------|-------|
| Size | Dimensions (mm) | | | | | | Mass (kg) | C | | M _t | | M _L | |
| | N ₆ ^{±0.5} | N ₇ | S ₁ | S ₂ | S ₅ | S ₉ | | dyn. | stat. | dyn. | stat. | dyn. | stat. |
| 20 | 13.2 | – | 5.4 | M6 | 6.0 | M3-5 deep | 0.43 | 9 600 | 13 600 | 120 | 170 | 40 | 58 |
| 25 | 15.2 | 6.0 | 6.8 | M8 | 7.0 | M3-5 deep | 0.50 | 15 900* | 18 200 | 235 | 260 | 82 | 94 |

* 30% higher dynamic load capacity

STAR – Ball Rail Systems

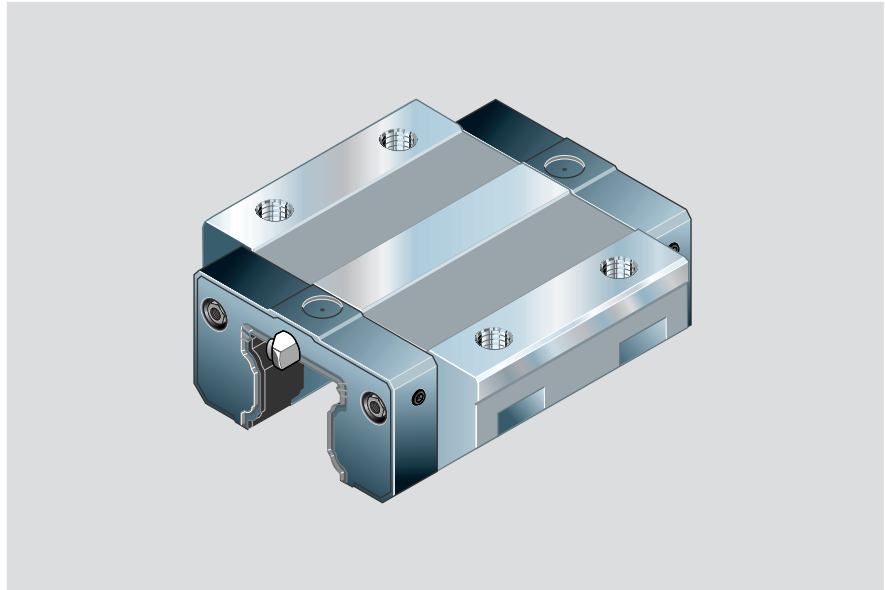
Runner Blocks, Steel Version

Runner block 1693- Standard width, low profile

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



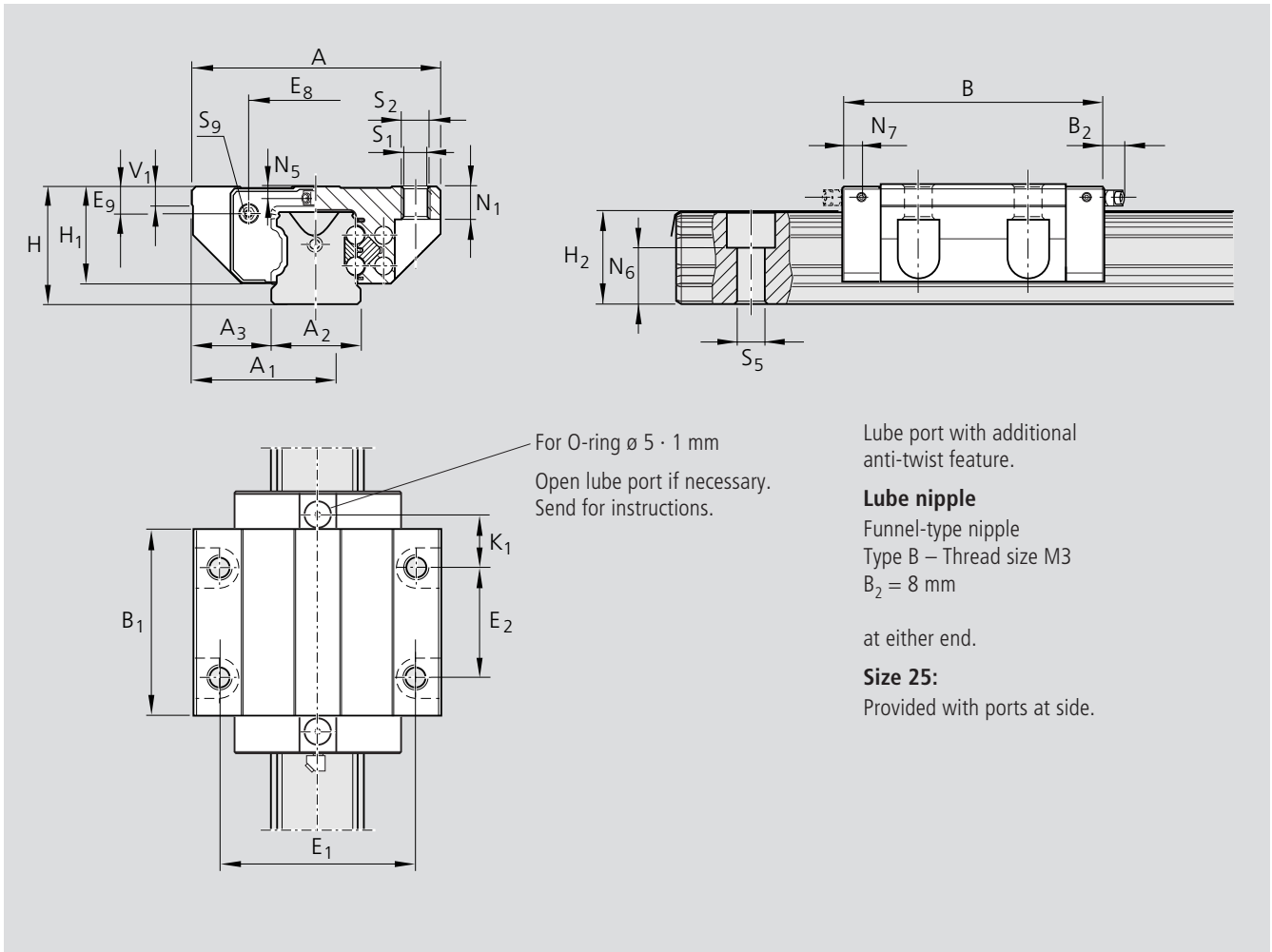
Part numbers

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 20 | H | 1693-893-10 | 1693-813-10 |
| | N | 1693-894-10 | 1693-814-10 |
| 25 | H | 1693-293-10 | 1693-213-10 |
| | N | 1693-294-10 | 1693-214-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



| Dimensions (mm) | | | | | | | | | | | | | | | | | | |
|-----------------|----|----------------|----------------|----------------|------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Size | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | K ₁ | N ₁ | N ₅ |
| 20 | 59 | 29.5 | 20 | 19.5 | 72.5 | 49.6 | 28 | 23.0 | 20.7 | 20.55 | 6.0 | 49 | 32 | 30.5 | 5.6 | 13.0 | 7.7 | 3.6 |
| 25 | 73 | 36.5 | 23 | 25.0 | 81.0 | 57.8 | 33 | 26.5 | 24.4 | 24.25 | 7.5 | 60 | 35 | 38.3 | 8.5 | 16.6 | 9.3 | 4.1 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| | | | | | | | | Load capacities (N) | | Moments (Nm) | | | |
|-----------------|--------------------------------|----------------|----------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|-----------------------|---------------------|-----------------------|
| Dimensions (mm) | | | | | | | | | | | | | |
| Size | N ₆ ^{±0.5} | N ₇ | S ₁ | S ₂ | S ₅ | S ₉ | Mass (kg) | C dyn. | C ₀ stat. | M _t dyn. | M _{t0} stat. | M _L dyn. | M _{L0} stat. |
| 20 | 13.2 | – | 5.4 | M6 | 6.0 | M3-5 deep | 0.50 | 14 500 | 24 400 | 190 | 310 | 100 | 165 |
| 25 | 15.2 | 6.0 | 6.8 | M8 | 7.0 | M3-5 deep | 0.65 | 22 800* | 30 400 | 320 | 430 | 180 | 240 |

* 30% higher dynamic load capacity

STAR – Ball Rail Systems

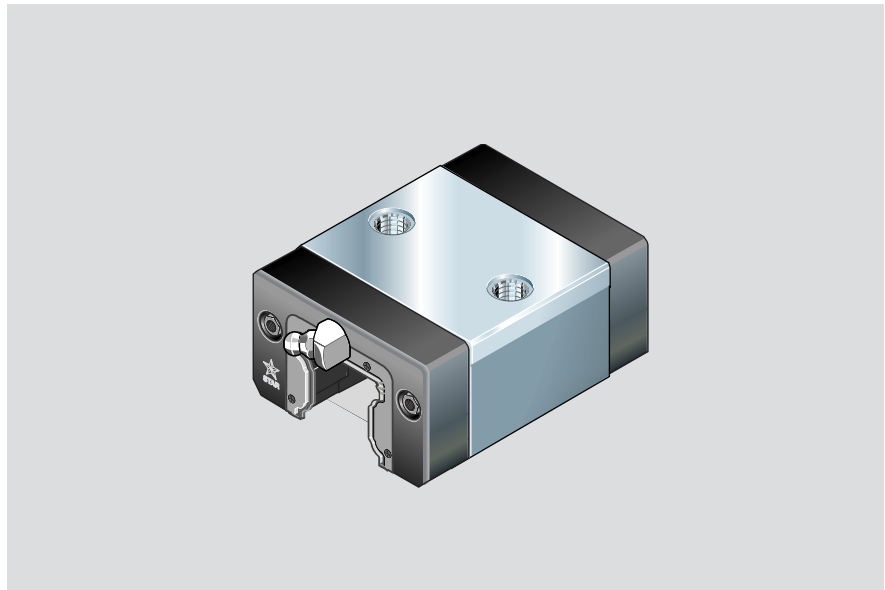
Runner Blocks, Steel Version

Runner block 1666- Slimline, short

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



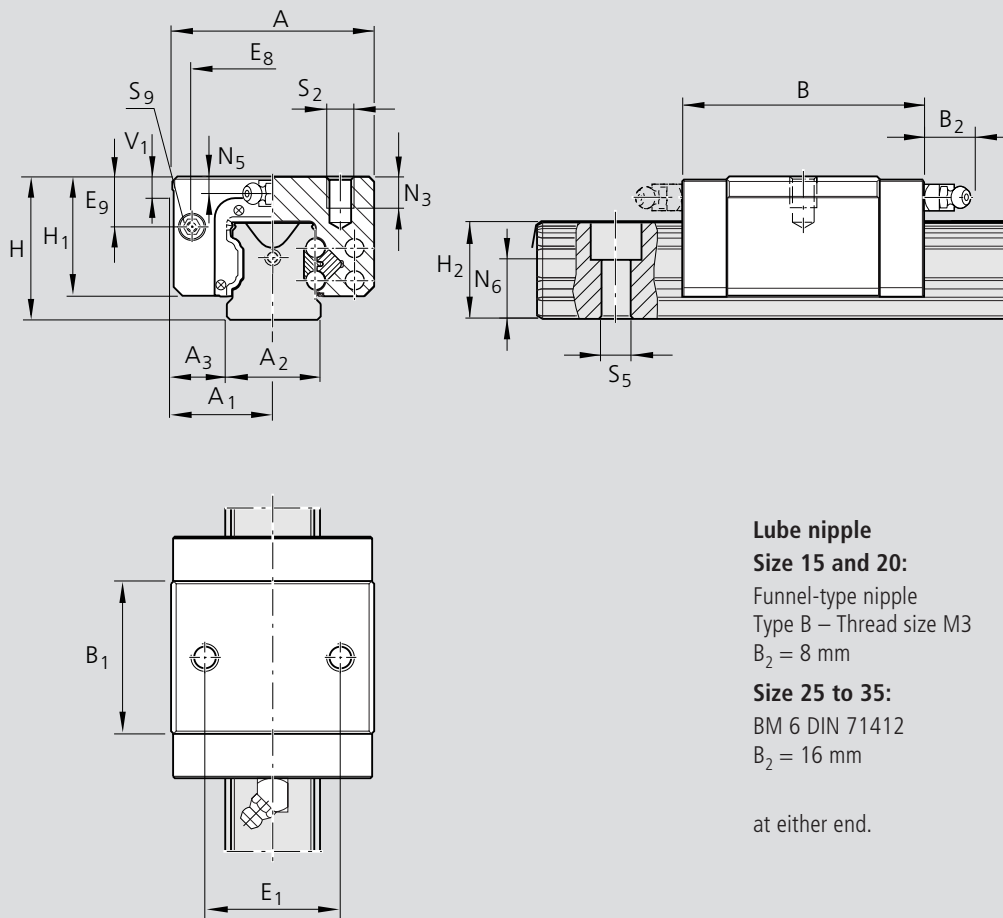
Part numbers

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 15 | H | 1666-193-10 | 1666-113-10 |
| | N | 1666-194-10 | 1666-114-10 |
| 20 | H | 1666-893-10 | 1666-813-10 |
| | N | 1666-894-10 | 1666-814-10 |
| 25 | H | 1666-293-10 | 1666-213-10 |
| | N | 1666-294-10 | 1666-214-10 |
| 30 | H | 1666-793-10 | 1666-713-10 |
| | N | 1666-794-10 | 1666-714-10 |
| 35 | H | 1666-393-10 | 1666-313-10 |
| | N | 1666-394-10 | 1666-314-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



Lube nipple

Size 15 and 20:

Funnel-type nipple
 Type B – Thread size M3
 $B_2 = 8 \text{ mm}$

Size 25 to 35:

BM 6 DIN 71412
 $B_2 = 16 \text{ mm}$

at either end.

| Size | Dimensions (mm) | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₈ | E ₉ | N ₃ |
| 15 | 34 | 17 | 15 | 9.5 | 40.5 | 25.7 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 26 | 24.55 | 6.7 | 6.0 |
| 20 | 44 | 22 | 20 | 12.0 | 52.5 | 31.9 | 30 | 25.4 | 20.7 | 20.55 | 6.0 | 32 | 32.4 | 7.3 | 7.5 |
| 25 | 48 | 24 | 23 | 12.5 | 61.5 | 38.6 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 35 | 38.3 | 11.5 | 9.0 |
| 30 | 60 | 30 | 28 | 16.0 | 71.5 | 45.0 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 40 | 48.4 | 14.6 | 12.0 |
| 35 | 70 | 35 | 34 | 18.0 | 79.0 | 51.4 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 50 | 58.0 | 17.5 | 13.0 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|------|-----------|---------------------|----------------|--------------|----------------|-------|--|
| | N ₅ | N ₆ ^{±0.5} | S ₂ | S ₅ | S ₉ | C | | C ₀ | M _t | | M _L | | |
| | | | | | | dyn. | | stat. | dyn. | stat. | dyn. | stat. | |
| 15 | 4.0 | 10.3 | M4 | 4.4 | M2.5-3.5 deep | 0.12 | 5 400 | 8 100 | 52 | 80 | 19 | 28 | |
| 20 | 4.7 | 13.2 | M5 | 6.0 | M3-5 deep | 0.30 | 12 400 | 13 600 | 150 | 170 | 52 | 58 | |
| 25 | 5.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.40 | 15 900 | 18 200 | 230 | 260 | 82 | 94 | |
| 30 | 6.0 | 17.0 | M8 | 9.0 | M3-5 deep | 0.65 | 22 100 | 24 800 | 380 | 430 | 133 | 150 | |
| 35 | 7.0 | 20.5 | M8 | 9.0 | M3-5 deep | 0.95 | 29 300 | 32 400 | 640 | 700 | 200 | 220 | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Runner Blocks, Steel Version

Runner block 1622-

Slimline

Special versions:

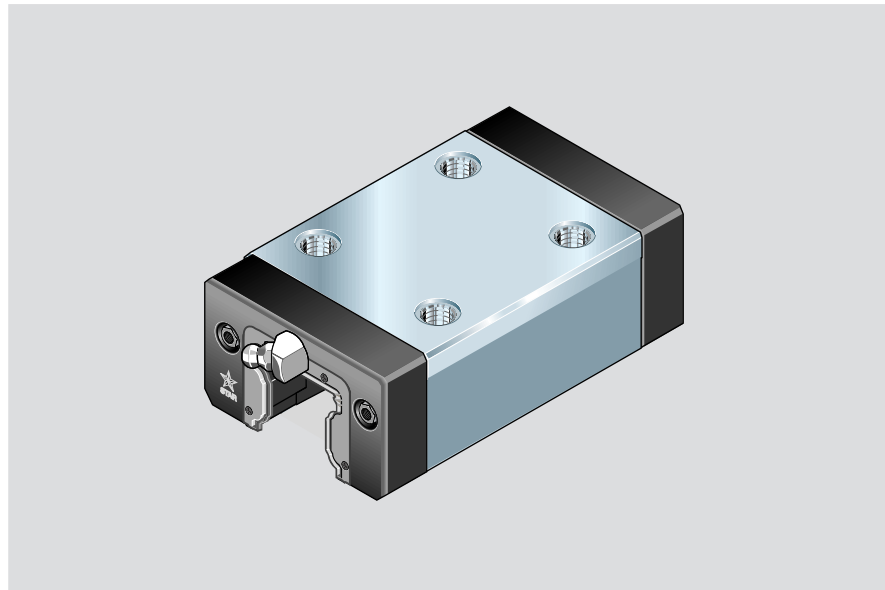
Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).

Size 15 to 35 in accuracy class H (clearance and preload 0.02 C) also available as low noise runner blocks with spacer balls.

Dynamic load capacities and moments are reduced by 35%.

(Part numbers 1622-...3-12)



Part numbers

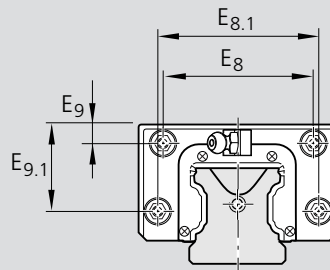
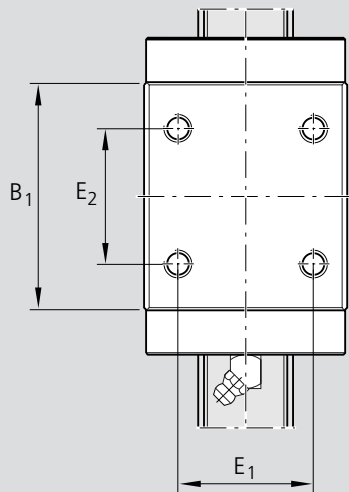
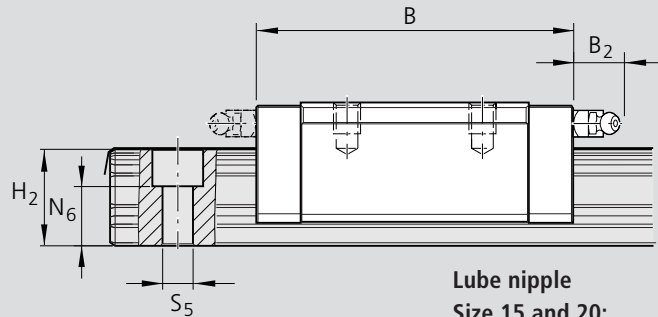
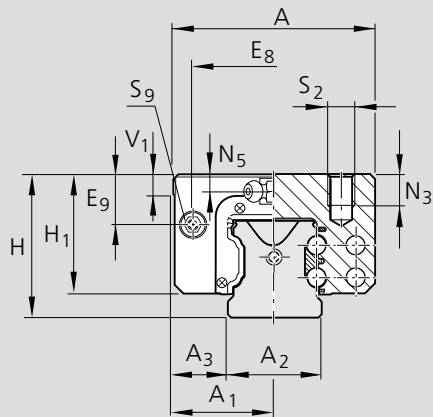
* 30% higher dynamic load capacities on request

| Size | Accuracy class | Part numbers for runner blocks for preload class | | | |
|------|----------------|--|----------------|----------------|----------------|
| | | up to approx. 10 μm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 15 | P | | 1622-112-10 | 1622-122-10 | 1622-132-10 |
| | H | 1622-193-10 | 1622-113-10 | 1622-123-10 | |
| | N | 1622-194-10 | 1622-114-10 | 1622-124-10 | |
| 20 | P | | 1622-812-10 | 1622-822-10 | 1622-832-10 |
| | H | 1622-893-10 | 1622-813-10 | 1622-823-10 | |
| | N | 1622-894-10 | 1622-814-10 | 1622-824-10 | |
| 25 | P | | 1622-212-10 | 1622-222-10 | 1622-232-10 |
| | H | 1622-293-10 | 1622-213-10 | 1622-223-10 | |
| | N | 1622-294-10 | 1622-214-10 | 1622-224-10 | |
| 30 | P | | 1622-712-10 | 1622-722-10 | 1622-732-10 |
| | H | 1622-793-10 | 1622-713-10 | 1622-723-10 | |
| | N | 1622-794-10 | 1622-714-10 | 1622-724-10 | |
| 35 | P | | 1622-312-10 | 1622-322-10 | 1622-332-10 |
| | H | 1622-393-10 | 1622-313-10 | 1622-323-10 | |
| | N | 1622-394-10 | 1622-314-10 | 1622-324-10 | |
| 45 | P | | 1622-412-10 | 1622-422-10 | 1622-432-10 |
| | H | 1622-493-10 | 1622-413-10 | 1622-423-10 | |
| | N | 1622-494-10 | 1622-414-10 | 1622-424-10 | |
| 55 | P | | 1622-512-10* | 1622-522-10* | 1622-532-10* |
| | H | 1622-593-10* | 1622-513-10* | 1622-523-10* | |
| | N | 1622-594-10* | 1622-514-10* | 1622-524-10* | |
| 65 | P | | 1622-612-10* | 1622-622-10* | 1622-632-10* |
| | H | 1622-693-10* | 1622-613-10* | 1622-623-10* | |
| | N | 1622-694-10* | 1622-614-10* | 1622-624-10* | |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



Lube nipple

Size 15 and 20:

Funnel-type nipple
Type B – Thread size M3
B₂ = 8 mm

Size 25 to 55:

BM 6 DIN 71412
B₂ = 16 mm

Size 65:

BM 8 x 1 DIN 71412
B₂ = 16 mm

at either end.

| Size | Dimensions (mm) | |
|------|------------------|------------------|
| | E _{8.1} | E _{9.1} |
| 65 | 100 | 53.5 |

Size 65

| Size | Dimensions (mm) | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-----|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | N ₃ |
| 15 | 34 | 17 | 15 | 9.5 | 54 | 39.2 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 26 | 26 | 24.55 | 6.7 | 6.0 |
| 20 | 44 | 22 | 20 | 12.0 | 70 | 49.6 | 30 | 25.4 | 20.7 | 20.55 | 6.0 | 32 | 36 | 32.4 | 7.3 | 7.5 |
| 25 | 48 | 24 | 23 | 12.5 | 81 | 57.8 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 35 | 35 | 38.3 | 11.5 | 9.0 |
| 30 | 60 | 30 | 28 | 16.0 | 94 | 67.4 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 40 | 40 | 48.4 | 14.6 | 12.0 |
| 35 | 70 | 35 | 34 | 18.0 | 105 | 77.0 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 50 | 50 | 58.0 | 17.5 | 13.0 |
| 45 | 86 | 43 | 45 | 20.5 | 133 | 97.0 | 60 | 50.0 | 40.15 | 39.85 | 10.0 | 60 | 60 | 70.0 | 21.0 | 18.0 |
| 55 | 100 | 50 | 53 | 23.5 | 159 | 115.5 | 70 | 57.0 | 48.15 | 47.85 | 12.0 | 75 | 75 | 80.0 | 22.3 | 19.0 |
| 65 | 126 | 63 | 63 | 31.5 | 188 | 139.6 | 90 | 76.0 | 60.15 | 59.85 | 15.0 | 76 | 70 | 76.0 | 11.0 | 21.0 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | Mass (kg) | Load capacities (N) | | | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|--------|-----------|----------------------|----------------------|---------------------|-----------------------|---------------------|-----------------------|--|--|
| | N ₅ | N ₆ ^{+0.5} | S ₂ | S ₅ | S ₉ | C dyn. | | C ₀ stat. | C | | M _t | | M _L | | |
| | | | | | | | | | C ₀ stat. | M _t dyn. | M _{t0} stat. | M _L dyn. | M _{L0} stat. | | |
| 15 | 4.0 | 10.3 | M4 | 4.4 | M2.5-3.5 deep | 0.15 | 7 800 | 13 500 | 74 | 130 | 40 | 71 | | | |
| 20 | 4.7 | 13.2 | M5 | 6.0 | M3-5 deep | 0.40 | 18 800 | 24 400 | 240 | 310 | 130 | 165 | | | |
| 25 | 5.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.55 | 22 800 | 30 400 | 320 | 430 | 180 | 240 | | | |
| 30 | 6.0 | 17.0 | M8 | 9.0 | M3-5 deep | 0.90 | 31 700 | 41 300 | 540 | 720 | 290 | 380 | | | |
| 35 | 7.0 | 20.5 | M8 | 9.0 | M3-5 deep | 1.20 | 41 900 | 54 000 | 890 | 1 160 | 440 | 565 | | | |
| 45 | 8.0 | 23.5 | M10 | 14.0 | M4-7 deep | 2.30 | 68 100 | 85 700 | 1 830 | 2 310 | 890 | 1 130 | | | |
| 55 | 9.0 | 29.0 | M12 | 16.0 | M5-8 deep | 3.80 | 98 200 | 121 400 | 3 100 | 3 860 | 1 540 | 1 905 | | | |
| 65 | 16.0 | 38.5 | M16 | 18.0 | M4-7 deep | 6.90 | 160 000 | 192 700 | 6 300 | 7 610 | 3 160 | 3 815 | | | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Runner Blocks, Steel Version

Runner block 1623-

Slimline, long

Special versions:

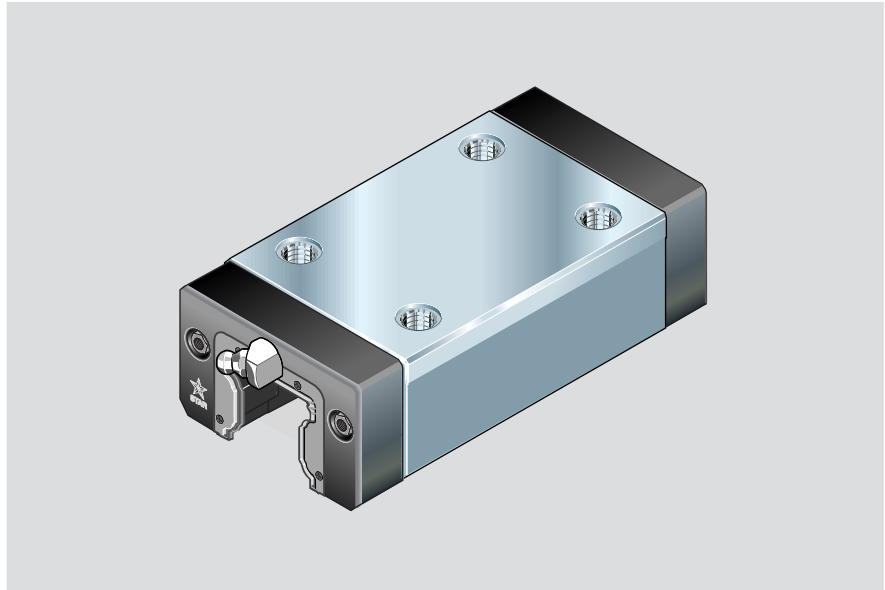
Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).

Size 15 to 35 in accuracy class H (clearance and preload 0.02 C) also available as low noise runner blocks with spacer balls.

Dynamic load capacities and moments are reduced by 35%.

(Part numbers 1623-...3-12)



Part numbers

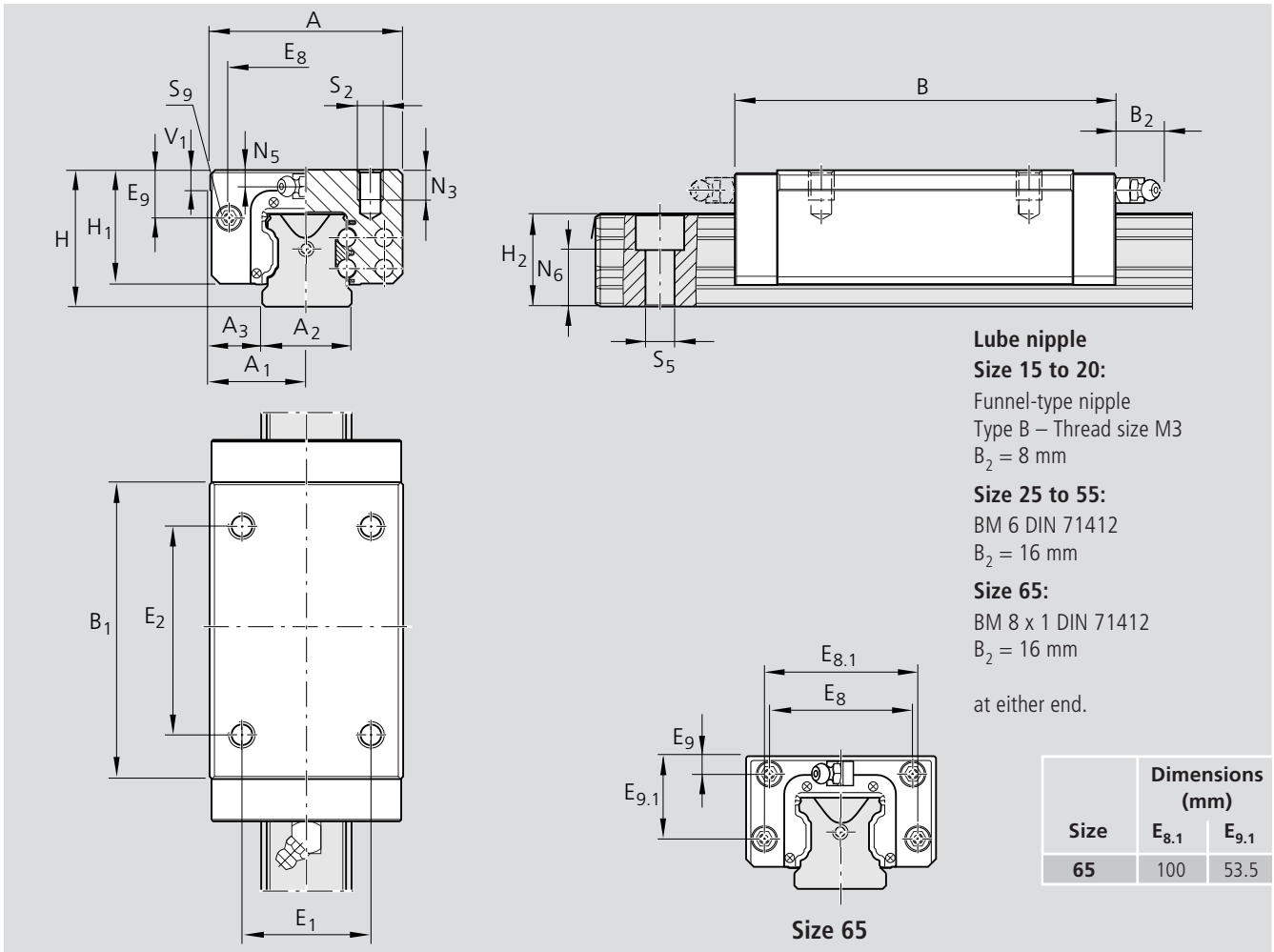
* 30% higher dynamic load capacities on request

| Size | Accuracy class | Part numbers for runner blocks for preload class | | | |
|------|----------------|--|----------------|----------------|----------------|
| | | up to approx. 10 μm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 15 | N | 1623-194-10 | 1623-114-10 | | |
| | P | | 1623-812-10 | 1623-822-10 | 1623-832-10 |
| 20 | H | 1623-893-10 | 1623-813-10 | 1623-823-10 | |
| | N | 1623-894-10 | 1623-814-10 | 1623-824-10 | |
| | P | | 1623-212-10 | 1623-222-10 | 1623-232-10 |
| 25 | H | 1623-293-10 | 1623-213-10 | 1623-223-10 | |
| | N | 1623-294-10 | 1623-214-10 | 1623-224-10 | |
| | P | | 1623-712-10 | 1623-722-10 | 1623-732-10 |
| 30 | H | 1623-793-10 | 1623-713-10 | 1623-723-10 | |
| | N | 1623-794-10 | 1623-714-10 | 1623-724-10 | |
| | P | | 1623-312-10 | 1623-322-10 | 1623-332-10 |
| 35 | H | 1623-393-10 | 1623-313-10 | 1623-323-10 | |
| | N | 1623-394-10 | 1623-314-10 | 1623-324-10 | |
| | P | | 1623-412-10 | 1623-422-10 | 1623-432-10 |
| 45 | H | 1623-493-10 | 1623-413-10 | 1623-423-10 | |
| | N | 1623-494-10 | 1623-414-10 | 1623-424-10 | |
| | P | | 1623-512-10* | 1623-522-10* | 1623-532-10* |
| 55 | H | 1623-593-10* | 1623-513-10* | 1623-523-10* | |
| | N | 1623-594-10* | 1623-514-10* | 1623-524-10* | |
| | P | | 1623-612-10* | 1623-622-10* | 1623-632-10* |
| 65 | H | 1623-693-10* | 1623-613-10* | 1623-623-10* | |
| | N | 1623-694-10* | 1623-614-10* | 1623-624-10* | |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



| Size | Dimensions (mm) | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | N ₃ |
| 15 | 34 | 17 | 15 | 9.5 | 68.5 | 53.6 | 24 | 19.8 | 16.3 | 16.2 | 5.0 | 26 | 26 | 24.55 | 6.7 | 6.0 |
| 20 | 44 | 22 | 20 | 12.0 | 86.0 | 65.6 | 30 | 25.4 | 20.7 | 20.55 | 6.0 | 32 | 50 | 32.4 | 7.3 | 7.5 |
| 25 | 48 | 24 | 23 | 12.5 | 103.0 | 79.5 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 35 | 50 | 38.3 | 11.5 | 9.0 |
| 30 | 60 | 30 | 28 | 16.0 | 116.0 | 89.4 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 40 | 60 | 48.4 | 14.6 | 12.0 |
| 35 | 70 | 35 | 34 | 18.0 | 133.0 | 105.5 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 50 | 72 | 58.0 | 17.5 | 13.0 |
| 45 | 86 | 43 | 45 | 20.5 | 170.0 | 133.5 | 60 | 50.0 | 40.15 | 39.85 | 10.0 | 60 | 80 | 70.0 | 21.0 | 18.0 |
| 55 | 100 | 50 | 53 | 23.5 | 200.0 | 155.5 | 70 | 57.0 | 48.15 | 47.85 | 12.0 | 75 | 95 | 80.0 | 22.3 | 19.0 |
| 65 | 126 | 63 | 63 | 31.5 | 243.0 | 194.6 | 90 | 76.0 | 60.15 | 59.85 | 15.0 | 76 | 120 | 76.0 | 11.0 | 21.0 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|-----------------------|---------------------|-----------------------|
| | N ₅ | N ₆ ^{±0.5} | S ₂ | S ₅ | S ₉ | | C dyn. | C ₀ stat. | M _t dyn. | M _{t0} stat. | M _L dyn. | M _{L0} stat. |
| 15 | 4.0 | 10.3 | M4 | 4.4 | M2.5-3.5 deep | 0.2 | 10 000 | 20 200 | 130 | 190 | 98 | 150 |
| 20 | 4.7 | 13.2 | M5 | 6.0 | M3-5 deep | 0.5 | 24 400 | 35 200 | 310 | 450 | 225 | 330 |
| 25 | 5.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.7 | 30 400 | 45 500 | 430 | 650 | 345 | 510 |
| 30 | 6.0 | 17.0 | M8 | 9.0 | M3-5 deep | 1.1 | 40 000 | 57 800 | 690 | 1 000 | 495 | 715 |
| 35 | 7.0 | 20.5 | M8 | 9.0 | M3-5 deep | 1.7 | 55 600 | 81 000 | 1 200 | 1 740 | 830 | 1 215 |
| 45 | 8.0 | 23.5 | M10 | 14.0 | M4-7 deep | 3.1 | 90 400 | 128 500 | 2 440 | 3 470 | 1 700 | 2 425 |
| 55 | 9.0 | 29.2 | M12 | 16.0 | M5-8 deep | 4.8 | 124 200 | 170 000 | 3 950 | 5 400 | 2 630 | 3 600 |
| 65 | 16.0 | 38.5 | M16 | 18.0 | M4-7 deep | 9.8 | 211 900 | 289 000 | 8 370 | 11 420 | 6 000 | 8 190 |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Runner Blocks, Steel Version

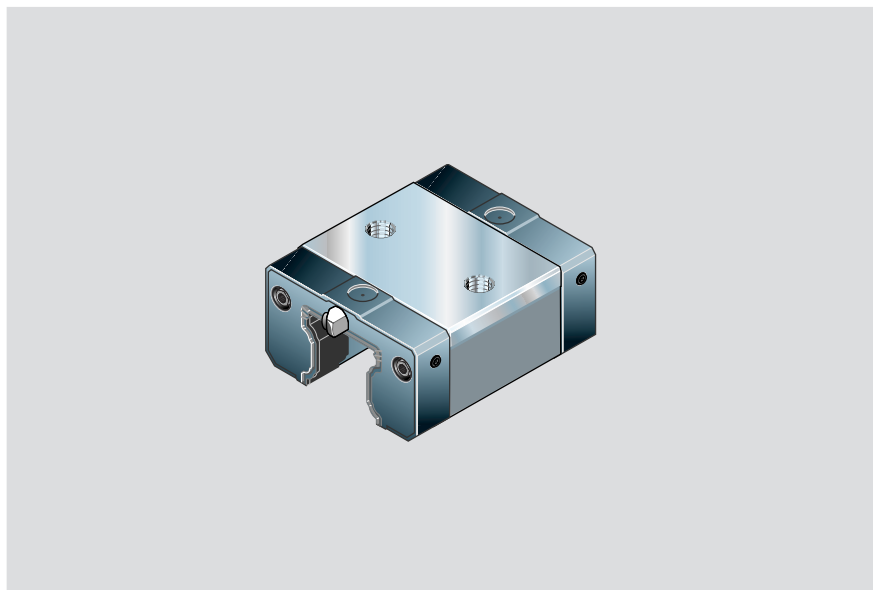
Runner block 1664-

Slimline, short, low profile

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



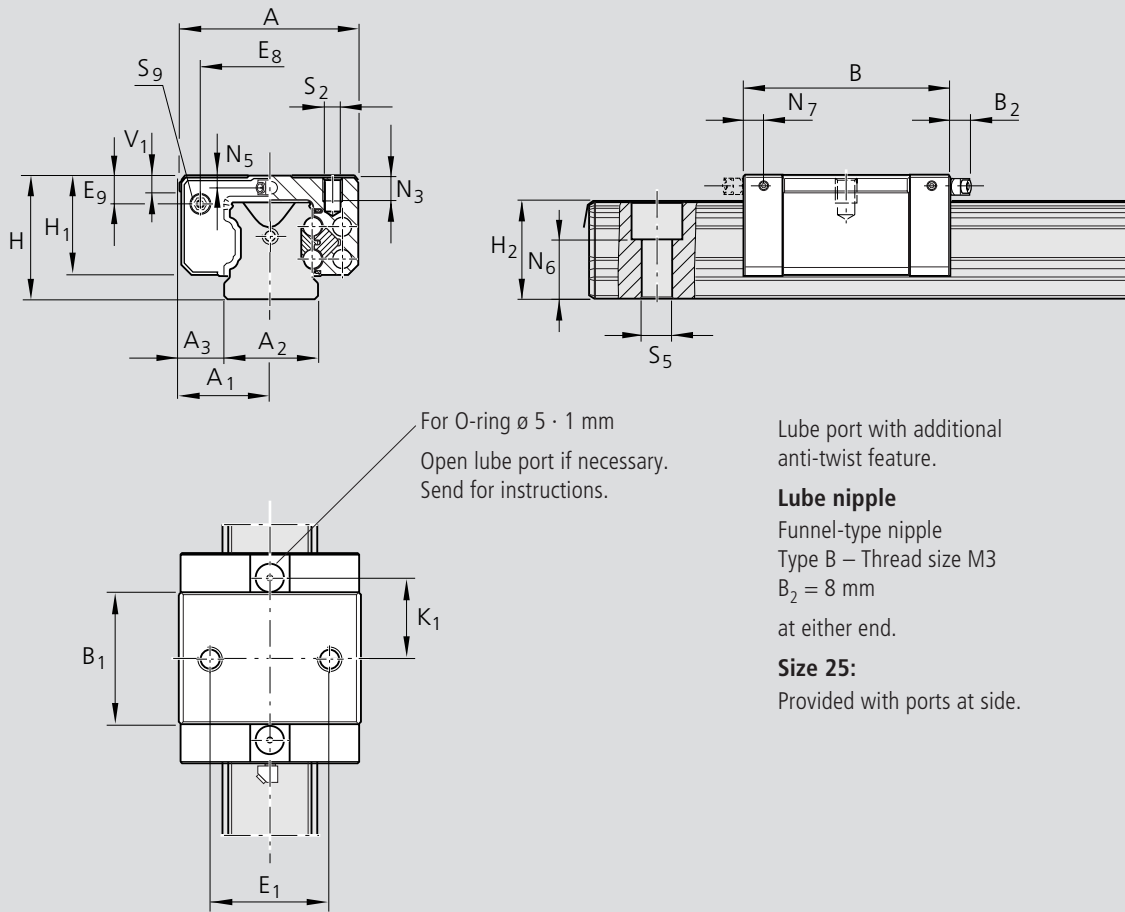
Part numbers

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 20 | H | 1664-893-10 | 1664-813-10 |
| | N | 1664-894-10 | 1664-814-10 |
| 25 | H | 1664-293-10 | 1664-213-10 |
| | N | 1664-294-10 | 1664-214-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



| Dimensions (mm) | | | | | | | | | | | | | | | | |
|-----------------|----|----------------|----------------|----------------|----|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Size | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₈ | E ₉ | K ₁ | N ₃ |
| 20 | 42 | 21 | 20 | 11.0 | 55 | 31.9 | 28 | 23.0 | 20.7 | 20.55 | 6.0 | 32 | 30.5 | 5.6 | 20.1 | 6.3 |
| 25 | 48 | 24 | 23 | 12.5 | 62 | 38.6 | 33 | 26.5 | 24.4 | 24.25 | 7.5 | 35 | 38.3 | 8.5 | 24.5 | 7.0 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Dimensions (mm) | | | | | | | | Load capacities (N) | | Moments (Nm) | | | |
|-----------------|----------------|--------------------------------|----------------|----------------|----------------|----------------|-----------|---------------------|----------------------|---------------------|-----------------------|---------------------|-----------------------|
| Size | N ₅ | N ₆ ^{±0.5} | N ₇ | S ₂ | S ₅ | S ₉ | Mass (kg) | | | | | | |
| | | | | | | | | C dyn. | C ₀ stat. | M _t dyn. | M _{t0} stat. | M _L dyn. | M _{L0} stat. |
| 20 | 3.6 | 13.2 | – | M5 | 6.0 | M3-5 deep | 0.30 | 9 600 | 13 600 | 120 | 170 | 40 | 58 |
| 25 | 4.1 | 15.2 | 6.0 | M6 | 7.0 | M3-5 deep | 0.40 | 15 900* | 18 200 | 235 | 260 | 82 | 94 |

* 30% higher dynamic load capacity

STAR – Ball Rail Systems

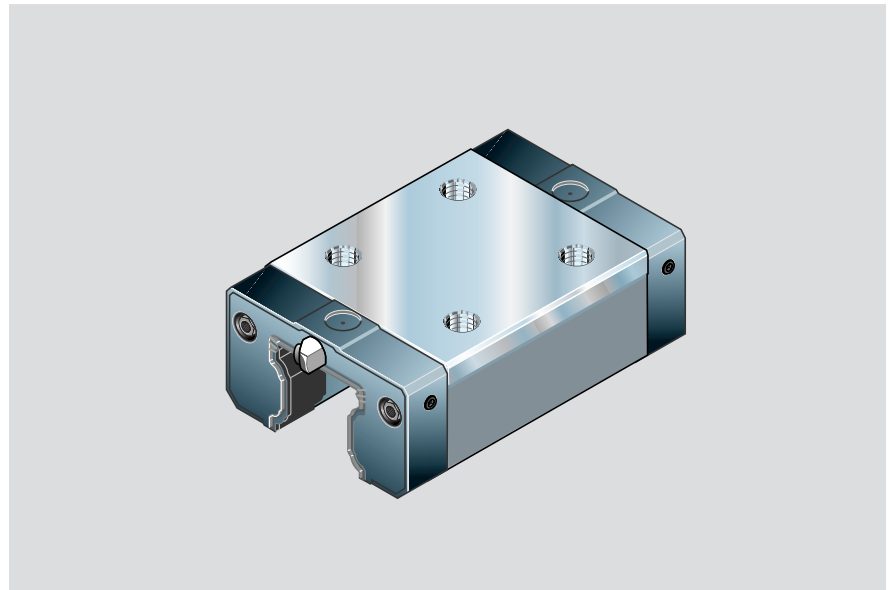
Runner Blocks, Steel Version

Runner block 1694- Slimline, low profile

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



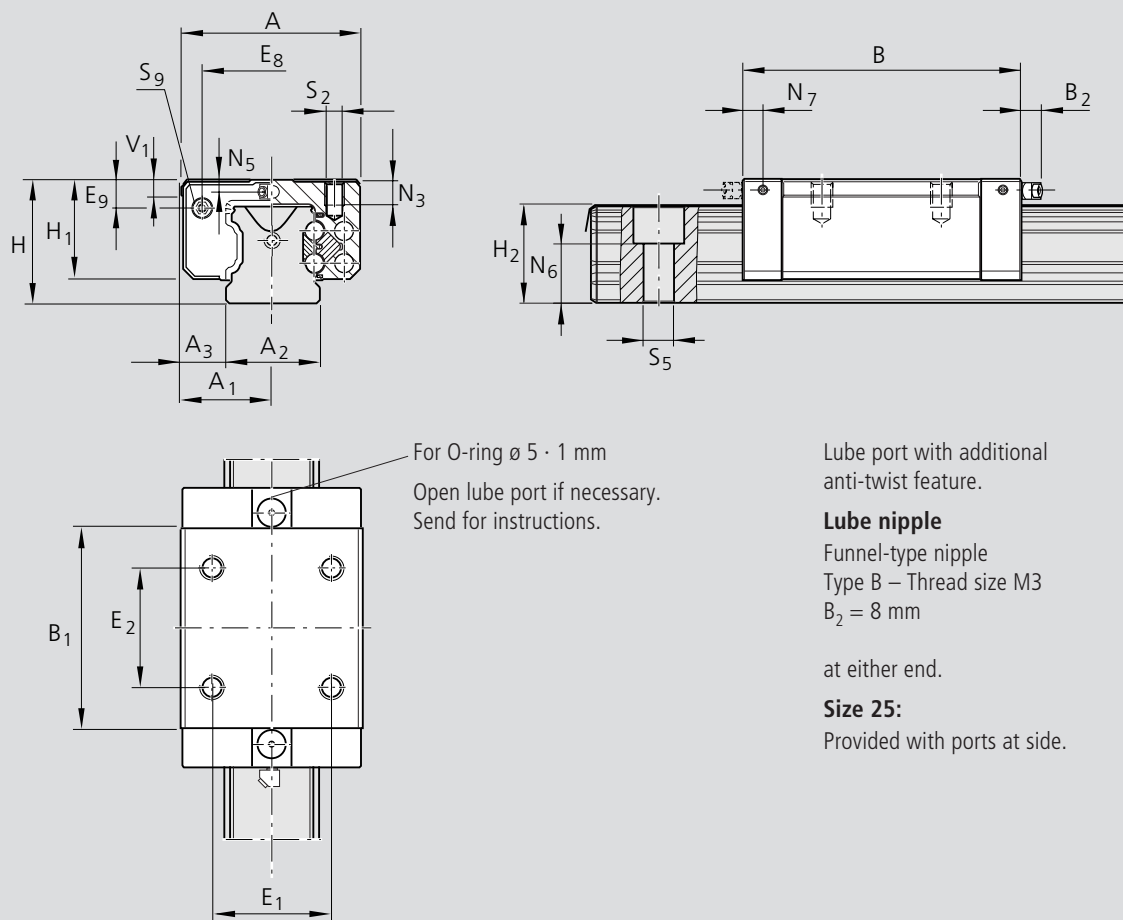
Part numbers

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 20 | H | 1694-893-10 | 1694-813-10 |
| | N | 1694-894-10 | 1694-814-10 |
| 25 | H | 1694-293-10 | 1694-213-10 |
| | N | 1694-294-10 | 1694-214-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



| Maße (mm) | | | | | | | | | | | | | | | | | |
|-----------|----|----------------|----------------|----------------|------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Größe | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | K ₁ | N ₃ |
| 20 | 42 | 21 | 20 | 11.0 | 72.5 | 49.6 | 28 | 23.0 | 20.7 | 20.55 | 6.0 | 32 | 32 | 30.5 | 5.6 | 13.0 | 6.3 |
| 25 | 48 | 24 | 23 | 12.5 | 81.0 | 57.8 | 33 | 26.5 | 24.4 | 24.25 | 7.5 | 35 | 35 | 38.3 | 8.5 | 16.6 | 7.0 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Dimensions (mm) | | | | | | | | Load capacities (N) | | | | Moments (Nm) | | | |
|-----------------|----------------|--------------------------------|----------------|----------------|----------------|----------------|-----------|---------------------|----------------------|----------------|-----------------------|----------------|-----------------------|--|--|
| Size | N ₅ | N ₆ ^{±0.5} | N ₇ | S ₂ | S ₅ | S ₉ | Mass (kg) | C | | M _t | | M _L | | | |
| | | | | | | | | dyn. | C ₀ stat. | dyn. | M _{t0} stat. | dyn. | M _{L0} stat. | | |
| 20 | 3.6 | 13.2 | – | M5 | 6.0 | M3-5 deep | 0.40 | 14 500 | 24 400 | 190 | 310 | 100 | 165 | | |
| 25 | 4.1 | 15.2 | 6.0 | M6 | 7.0 | M3-5 deep | 0.55 | 22 800* | 30 400 | 320 | 430 | 180 | 240 | | |

* 30% higher dynamic load capacity

STAR – Ball Rail Systems

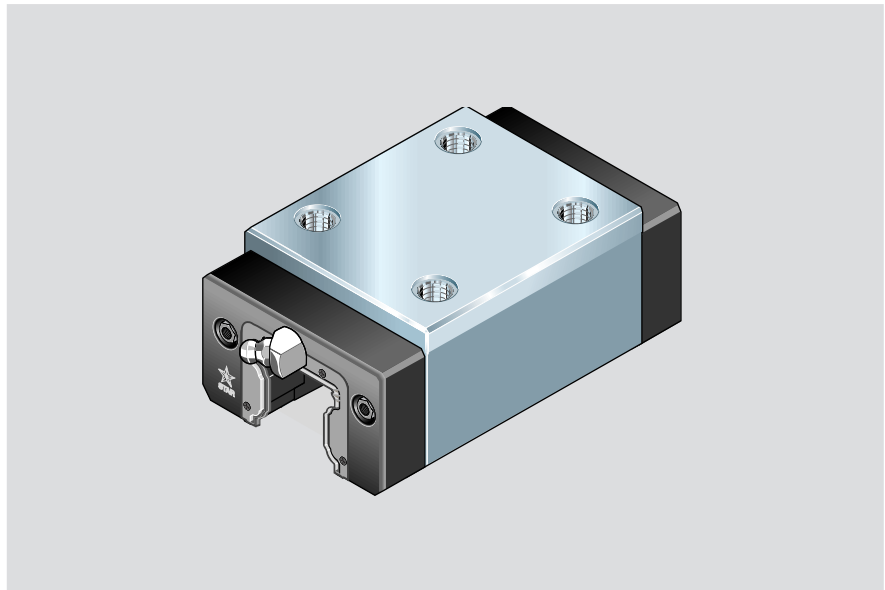
Runner Blocks, Steel Version

Runner block 1621- Slimline, high

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



Part numbers

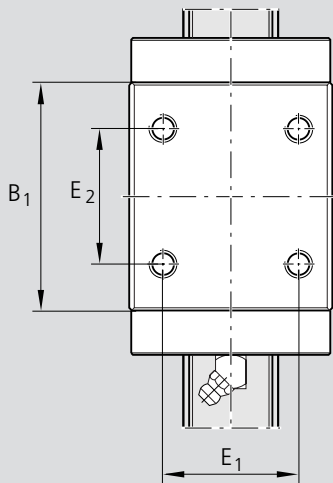
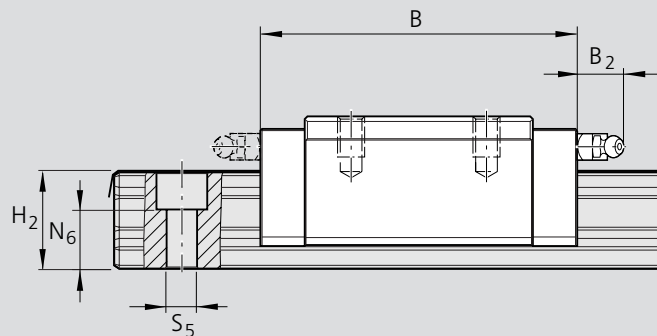
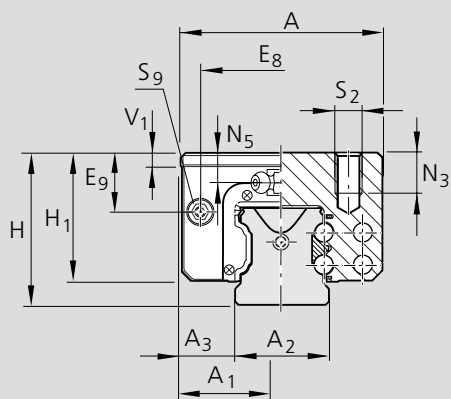
* 30% higher dynamic load capacities on request

| Size | Accuracy class | Part numbers for runner blocks for preload class | | | |
|------|----------------|--|----------------|----------------|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 15 | P | | 1621-112-10 | 1621-122-10 | 1621-132-10 |
| | H | 1621-193-10 | 1621-113-10 | 1621-123-10 | |
| | N | 1621-194-10 | 1621-114-10 | 1621-124-10 | |
| 25 | P | | 1621-212-10 | 1621-222-10 | 1621-232-10 |
| | H | 1621-293-10 | 1621-213-10 | 1621-223-10 | |
| | N | 1621-294-10 | 1621-214-10 | 1621-224-10 | |
| 30 | P | | 1621-712-10 | 1621-722-10 | 1621-732-10 |
| | H | 1621-793-10 | 1621-713-10 | 1621-723-10 | |
| | N | 1621-794-10 | 1621-714-10 | 1621-724-10 | |
| 35 | P | | 1621-312-10 | 1621-322-10 | 1621-332-10 |
| | H | 1621-393-10 | 1621-313-10 | 1621-323-10 | |
| | N | 1621-394-10 | 1621-314-10 | 1621-324-10 | |
| 45 | P | | 1621-412-10 | 1621-422-10 | 1621-432-10 |
| | H | 1621-493-10 | 1621-413-10 | 1621-423-10 | |
| | N | 1621-494-10 | 1621-414-10 | 1621-424-10 | |
| 55 | P | | 1621-512-10* | 1621-522-10* | 1621-532-10* |
| | H | 1621-593-10* | 1621-513-10* | 1621-523-10* | |
| | N | 1621-594-10* | 1621-514-10* | 1621-524-10* | |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



Lube nipple

Size 15:
 Funnel-type nipple
 Type B – Thread size M3
 $B_2 = 8 \text{ mm}$

Size 25 to 55:
 BM 6 DIN 71412
 $B_2 = 16 \text{ mm}$

at either end.

| Size | Dimensions (mm) | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | N ₃ |
| 15 | 34 | 17 | 15 | 9.5 | 54.0 | 39.2 | 28 | 23.8 | 16.3 | 16.20 | 5.0 | 26 | 26 | 24.55 | 10.7 | 6 |
| 25 | 48 | 24 | 23 | 12.5 | 81.0 | 57.8 | 40 | 33.5 | 24.4 | 24.25 | 7.5 | 35 | 35 | 38.3 | 15.5 | 9 |
| 30 | 60 | 30 | 28 | 16.0 | 94.0 | 67.4 | 45 | 38.0 | 28.5 | 28.35 | 7.0 | 40 | 40 | 48.4 | 17.6 | 12 |
| 35 | 70 | 35 | 34 | 18.0 | 105.0 | 77.0 | 55 | 47.0 | 32.15 | 31.85 | 8.0 | 50 | 50 | 58.0 | 24.5 | 13 |
| 45 | 86 | 43 | 45 | 20.5 | 133.0 | 97.0 | 70 | 60.0 | 40.15 | 39.85 | 10.0 | 60 | 60 | 70.0 | 31.0 | 18 |
| 55 | 100 | 50 | 53 | 23.5 | 159.0 | 115.5 | 80 | 67.0 | 48.15 | 47.85 | 12.0 | 75 | 75 | 80.0 | 32.3 | 19 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|------|-----------|---------------------|----------------|--------------|----------------|-------|--|
| | N ₅ | N ₆ ^{±0.5} | S ₂ | S ₅ | S ₉ | C | | C ₀ | M _t | | M _L | | |
| | | | | | | | | | dyn. | stat. | dyn. | stat. | |
| 15 | 8.0 | 10.3 | M4 | 4.4 | M2.5-3.5 deep | 0.20 | 7 800 | 13 500 | 74 | 130 | 40 | 71 | |
| 25 | 9.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.65 | 22 800 | 30 400 | 320 | 430 | 180 | 240 | |
| 30 | 9.0 | 17.0 | M8 | 9.0 | M3-5 deep | 1.00 | 31 700 | 41 300 | 540 | 720 | 290 | 380 | |
| 35 | 14.0 | 20.5 | M8 | 9.0 | M3-5 deep | 1.50 | 41 900 | 54 000 | 890 | 1 160 | 440 | 565 | |
| 45 | 18.0 | 23.5 | M10 | 14.0 | M4-7 deep | 3.00 | 68 100 | 85 700 | 1 830 | 2 310 | 890 | 1 130 | |
| 55 | 19.0 | 29.0 | M12 | 16.0 | M5-8 deep | 4.70 | 98 200 | 121 400 | 3 100 | 3 860 | 1 540 | 1 905 | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

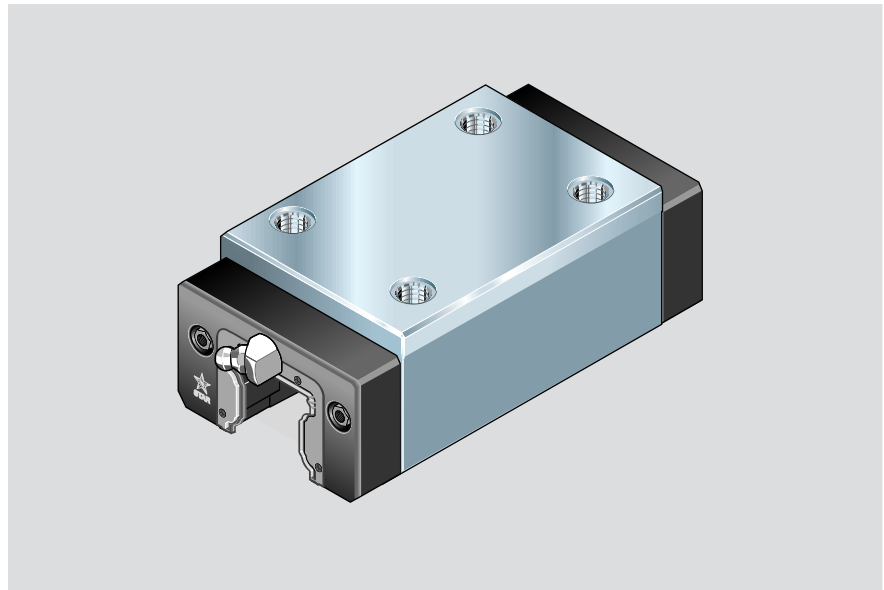
Runner Blocks, Steel Version

Runner block 1624- Slimline, high, long

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (part numbers 16...4-30),
- with low friction seals (part numbers 16...4-11).



Part numbers

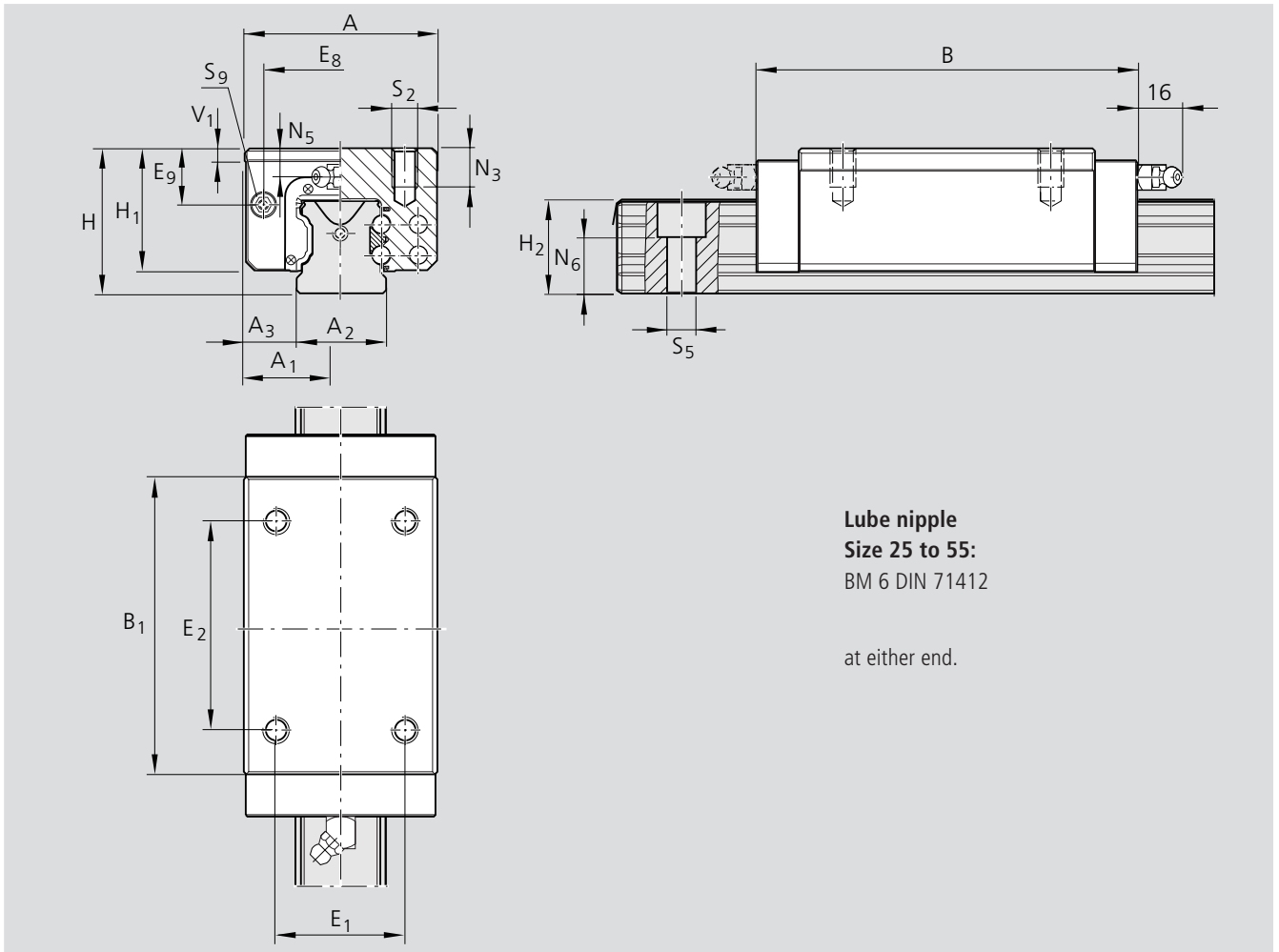
* 30% higher dynamic load capacities on request

| Size | Accuracy class | Part numbers for runner blocks for preload class | | | |
|------|----------------|--|----------------|----------------|----------------|
| | | up to approx. 10 μm clearance | Preload 0.02 C | Preload 0.08 C | Preload 0.13 C |
| 25 | P | | 1624-212-10 | 1624-222-10 | 1624-232-10 |
| | H | 1624-293-10 | 1624-213-10 | 1624-223-10 | |
| | N | 1624-294-10 | 1624-214-10 | 1624-224-10 | |
| 30 | P | | 1624-712-10 | 1624-722-10 | 1624-732-10 |
| | H | 1624-793-10 | 1624-713-10 | 1624-723-10 | |
| | N | 1624-794-10 | 1624-714-10 | 1624-724-10 | |
| 35 | P | | 1624-312-10 | 1624-322-10 | 1624-332-10 |
| | H | 1624-393-10 | 1624-313-10 | 1624-323-10 | |
| | N | 1624-394-10 | 1624-314-10 | 1624-324-10 | |
| 45 | P | | 1624-412-10 | 1624-422-10 | 1624-432-10 |
| | H | 1624-493-10 | 1624-413-10 | 1624-423-10 | |
| | N | 1624-494-10 | 1624-414-10 | 1624-424-10 | |
| 55 | P | | 1624-512-10* | 1624-522-10* | 1624-532-10* |
| | H | 1624-593-10* | 1624-513-10* | 1624-523-10* | |
| | N | 1624-594-10* | 1624-514-10* | 1624-524-10* | |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26.



| Size | Dimensions (mm) | | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-----|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|--|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | | N ₃ |
| 25 | 48 | 24 | 23 | 12.5 | 103 | 79.5 | 40 | 33.5 | 24.4 | 24.25 | 7.5 | 35 | 50 | 38.3 | 15.5 | | 9 |
| 30 | 60 | 30 | 28 | 16.0 | 116 | 89.4 | 45 | 38.0 | 28.5 | 28.35 | 7.0 | 40 | 60 | 48.4 | 17.6 | | 12 |
| 35 | 70 | 35 | 34 | 18.0 | 133 | 105.5 | 55 | 47.0 | 32.15 | 31.85 | 8.0 | 50 | 72 | 58.0 | 24.5 | | 13 |
| 45 | 86 | 43 | 45 | 20.5 | 170 | 133.5 | 70 | 60.0 | 40.15 | 39.85 | 10.0 | 60 | 80 | 70.0 | 31.0 | | 18 |
| 55 | 100 | 50 | 53 | 23.5 | 200 | 155.5 | 80 | 67.0 | 48.15 | 47.85 | 12.0 | 75 | 95 | 80.0 | 32.3 | | 19 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|------|-----------|---------------------|----------------|--------------|----------------|-------|--|
| | N ₅ | N ₆ ^{±0.5} | S ₂ | S ₅ | S ₉ | C | | C ₀ | M _t | | M _L | | |
| | | | | | | | | | dyn. | stat. | dyn. | stat. | |
| 25 | 9.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.85 | 30 400 | 45 500 | 430 | 650 | 345 | 510 | |
| 30 | 9.0 | 17.0 | M8 | 9.0 | M3-5 deep | 1.25 | 40 000 | 57 800 | 690 | 1 000 | 495 | 715 | |
| 35 | 14.0 | 20.5 | M8 | 9.0 | M3-5 deep | 2.10 | 55 600 | 81 000 | 1 200 | 1 740 | 830 | 1 215 | |
| 45 | 18.0 | 23.5 | M10 | 14.0 | M4-7 deep | 4.00 | 90 400 | 128 500 | 2 440 | 3 470 | 1 700 | 2 425 | |
| 55 | 19.0 | 29.0 | M12 | 16.0 | M5-8 deep | 6.00 | 124 200 | 170 000 | 3 950 | 5 400 | 2 630 | 3 600 | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

Product Overview – Runner Blocks, Aluminum Version

STAR Ball Rail Systems with aluminum runner blocks were specifically developed for use in industrial robots and general purpose machines calling for compact, rolling-element linear motion guideways and are available in different accuracy classes, each with high load capacity and high rigidity.

These compact and weight-saving assemblies are available in 6 common sizes and offer the same high dynamic load capacities in all four main load directions.

Make up your own compact linear motion guideways from interchangeable standard stock elements...

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time. This makes infinite combinations possible within each accuracy class.

Each element can be individually ordered and separately stocked.

Both sides of the guide rail can be used as reference edges.

The runner block is simply pushed onto the rail.

▶ Lube ports possible at either end for added ease of maintenance

▶ Very low weight: 60% lighter than the equivalent steel version

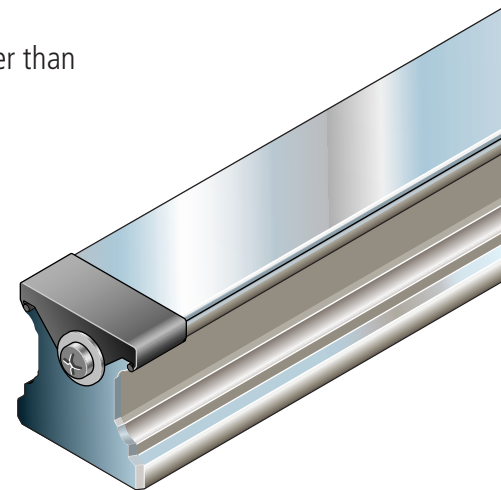
▶ Greater permissible parallelism offset as well as greater permissible vertical and horizontal offset of mounting surfaces

▶ Guide rails in accuracy class N also available with surface protection

▶ End face mounting holes for attachment of bellows or scraper plates

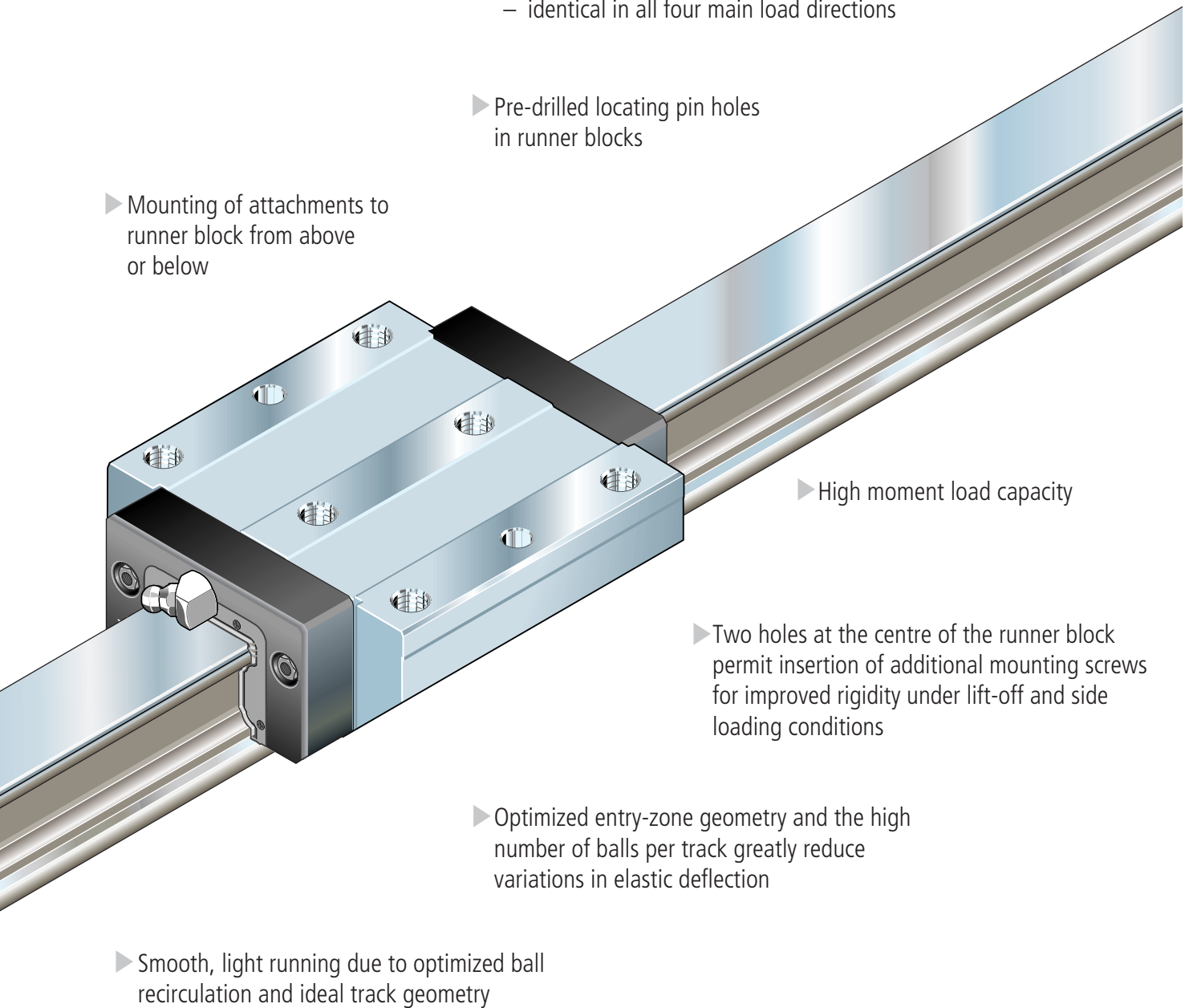
▶ Accuracy classes H and N can be combined with any of the rails in each accuracy class

▶ For mounting from above or below



**30% higher dynamic load capacities and moments
as standard in accuracy classes H and N
(others on request)**

- extends service life by a factor of 2.2
- field-proven
- identical in all four main load directions

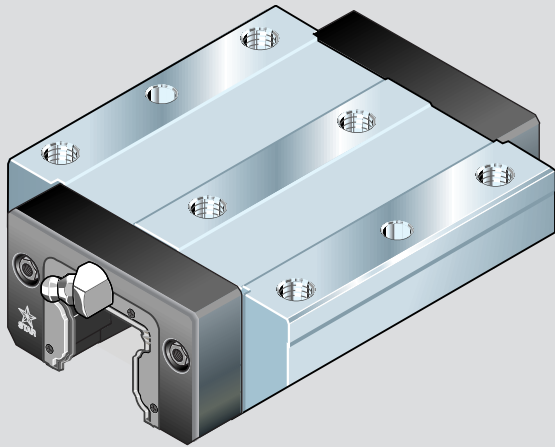


Proven Rail Seal cover strip for guide rail mounting holes:

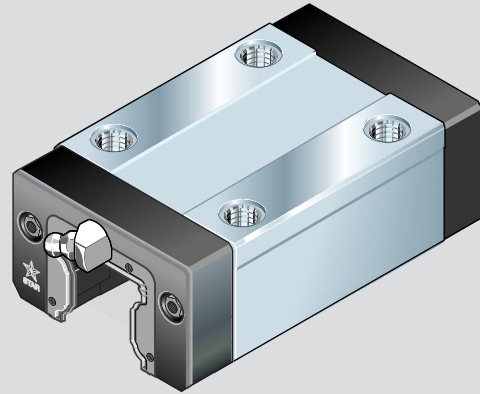
- ▶ One cover for all holes
- ▶ Material: corrosion resistant spring steel to DIN 17230 / EN 10088
- ▶ Easy clip-on mounting

STAR – Ball Rail Systems

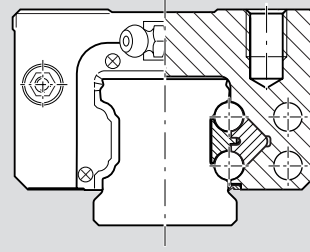
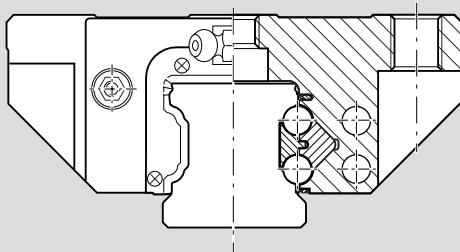
Product Description – Runner Blocks, Aluminum Version



Standard width



Slimline



The Ball Rail System consists of:

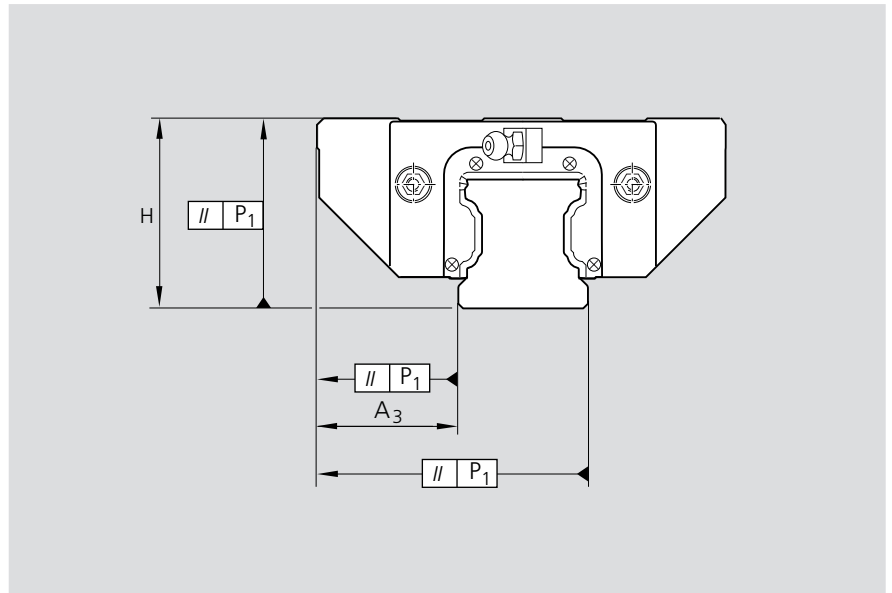
- A guide rail with all surfaces ground and ball track zones hardened
- A high-strength aluminum alloy runner block with
 - hardened and ground steel load bearing plates with ball tracks
 - cage designed for optimum ball recirculation
 - integral all-round sealing of all tracks
 - bearing steel balls

Technical Data – Runner Blocks, Aluminum Version

Accuracy classes and their tolerances (µm)

STAR Ball Rail Systems with runner blocks in aluminum are offered in two different accuracy classes.

However, these can be combined with guide rails of all accuracy classes.



Built-in interchangeability through precision machining

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time.

A runner block can be used without problems on various guide rails of the same size, for example.

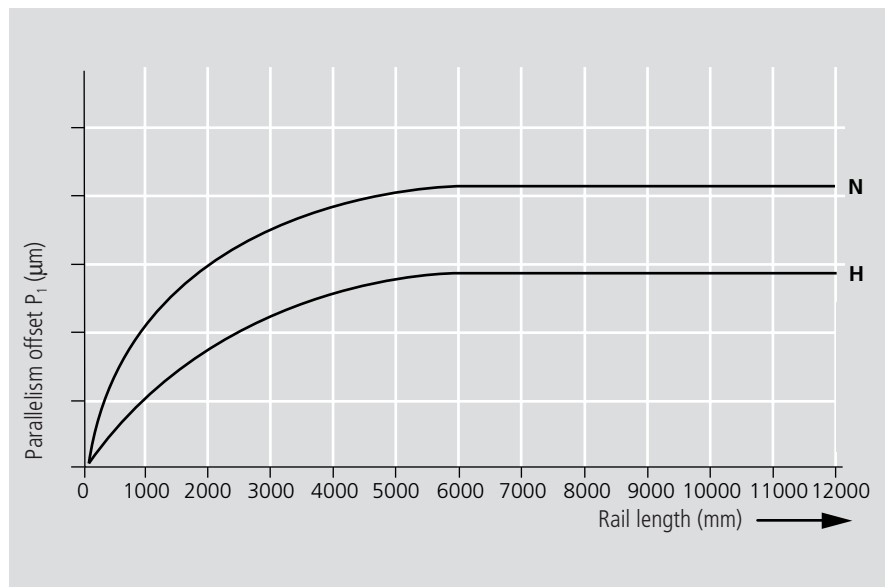
This applies equally to the use of different runner blocks on one and the same guide rail.

| Accuracy classes | Dimensional tolerances H and A ₃ (µm) | | Max difference in dimensions H and A ₃ on the same rail Δ H, Δ A ₃ (µm) |
|------------------|--|----------------|---|
| | H | A ₃ | |
| H | ± 40 | ± 20 | 15 |
| N | ± 100 | ± 40 | 30 |

| | | |
|-------------------------------------|--|---|
| Measured at middle of runner block: | | For any runner block/rail combination at any position on rail |
| | | For different runner blocks at same position on rail |

Parallelism offset P₁ of the Ball Rail System in service

Measured at middle of runner block



STAR – Ball Rail Systems

Technical Data – Runner Blocks, Aluminum Version

Rigidity of the Ball Rail System
at 0.02 C preload

Runner block 1631-
Standard width

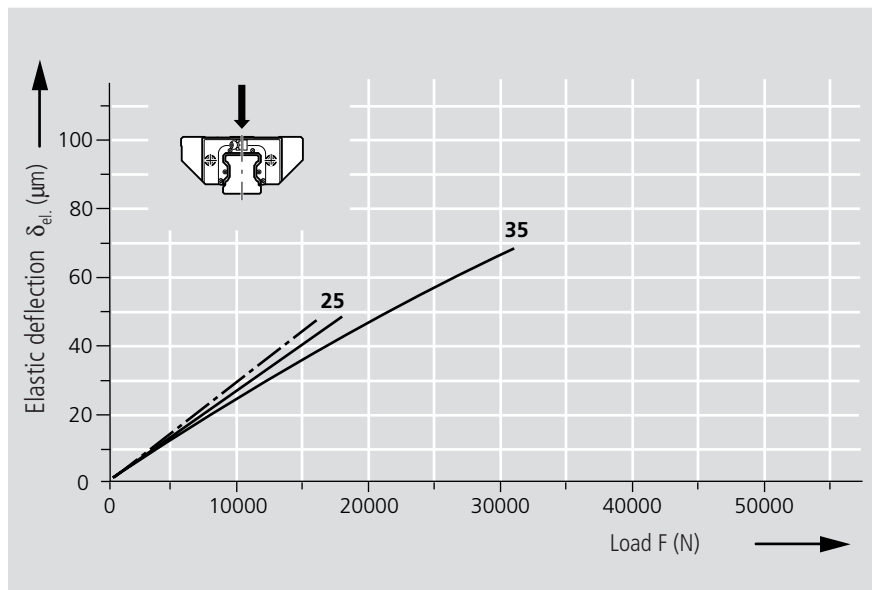
————— measured values

Runner block mounted with 6
screws, screw strength 8.8

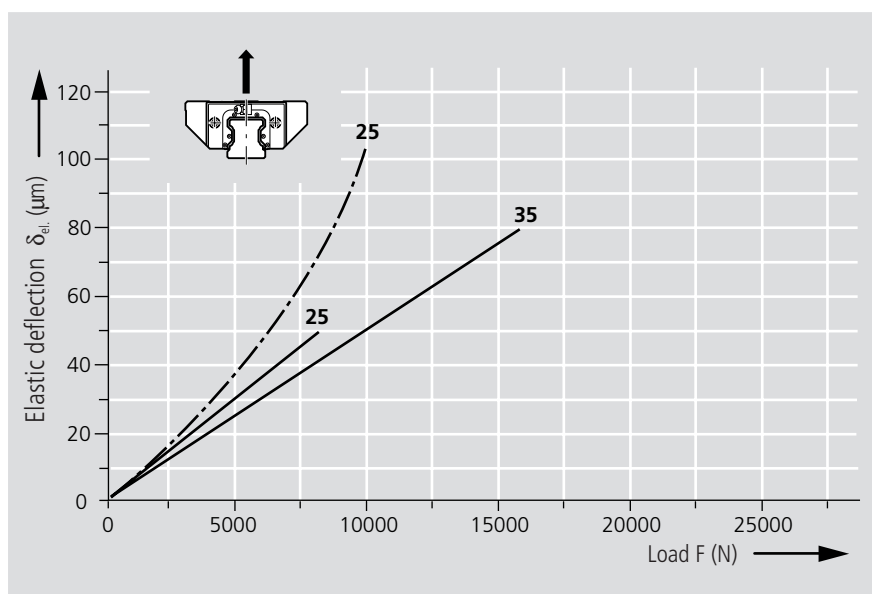
- - - - - measured values

Runner block mounted with 4
screws, screw strength 8.8

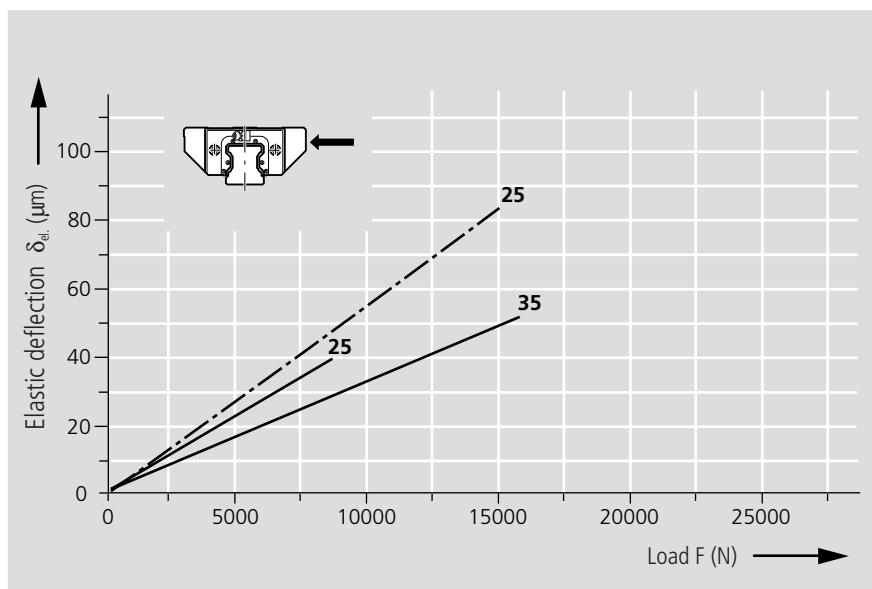
1. Down load



2. Lift-off load



3. Side load



Mounting Instructions – Aluminum Runner Blocks

Reference edges, corner radii, mounting screw sizes and tightening torque

Runner block 1631-

– Standard width

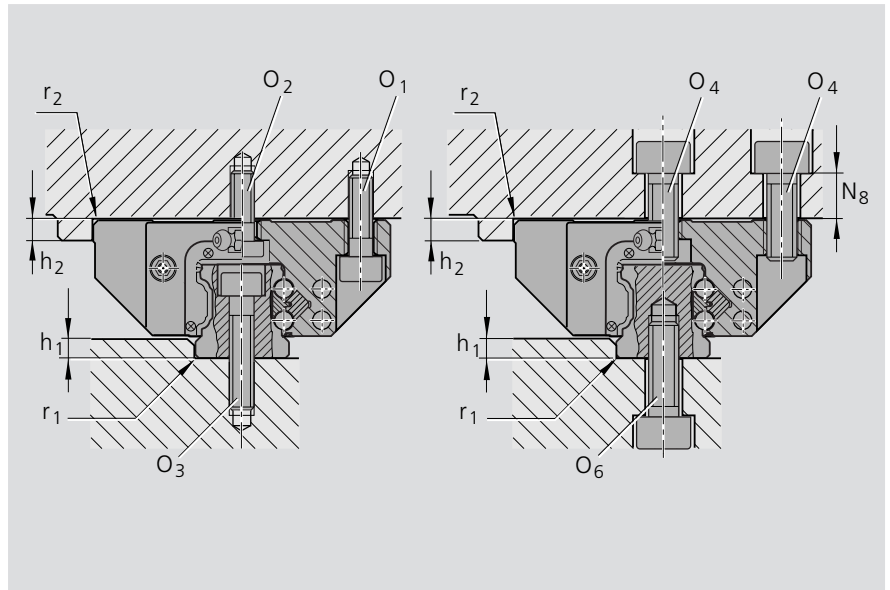
Guide rails

left:

– For mounting from above 1605, 1645-

right:

– For mounting from below 1607, 1647-



Runner block 1632-

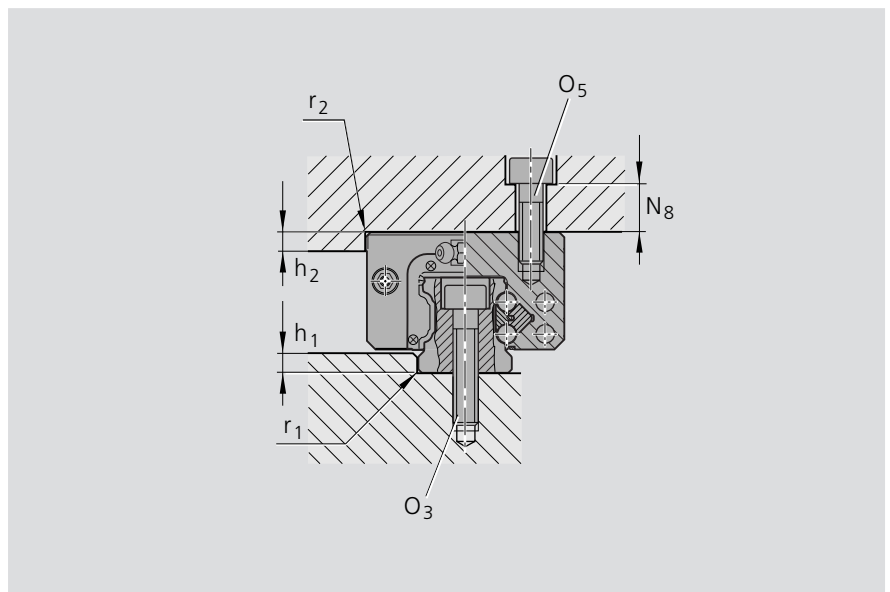
– Slimline

Guide rails

– For mounting from above 1605-, 1645-

Note

The indicated combinations represent examples. It is on principle possible to combine any runner block with all the offered guide rail types.



Dimensions and recommended limits for side load if no additional lateral retention is provided

| Size | h ₁ | | r ₁ | | h ₂ | r ₂ | O ₁ | O ₂ | O ₄ | O ₅ | O ₃ | O ₆ | N ₈ |
|------|----------------|-----------|----------------|-----------|----------------|----------------|-------------------|--------------------|-------------------|-------------------|----------------|----------------|----------------|
| | min. (mm) | max. (mm) | min. (mm) | max. (mm) | (mm) | (mm) | DIN 912 4 pcs. | DIN 6912 2 pcs. | DIN 912 6 pcs. | DIN 912 4 pcs. | DIN 912 | DIN 912 | (mm) |
| 15 | 2.5 | 3.5 | 0.4 | 0.4 | 4 | 0.6 | M4x12 | M4x10 | M5x12 | M4x12 | M4x20 | M5x12 | 6 |
| 25 | 3.0 | 5.0 | 0.8 | 0.8 | 5 | 0.8 | M6x20 | M6x16 | M8x20 | M6x18 | M6x30 | M6x20 | 10 |
| 30 | 3.0 | 5.0 | 0.8 | 0.8 | 6 | 0.8 | M8x25 | M8x16 | M10x20 | M8x20 | M8x30 | M8x20 | 10 |
| 35 | 3.5 | 6.0 | 0.8 | 0.8 | 6 | 0.8 | M8x25 | M8x20 | M10x25 | M8x25 | M8x35 | M8x25 | 13 |

| Screw strength class | Runner blocks | | | | Guide rails | |
|----------------------|---------------|----------------------|--------|--------|-------------|--------|
| 8.8 | 0.11 C | 0.15 C ¹⁾ | 0.23 C | 0.11 C | 0.06 C | 0.06 C |

¹⁾ When mounting with 4 O₁ screws and 2 O₂ screws

Tightening torque of the mounting screws

| Nm | Screw sizes | | | | | | | |
|-----|-------------|-----|-----|----|-----|-----|-----|-----|
| | M4 | M5 | M6 | M8 | M10 | M12 | M14 | M16 |
| 8.8 | 2.7 | 5.5 | 9.5 | 23 | 46 | 80 | 125 | 195 |

STAR – Ball Rail Systems

Mounting Instructions – Aluminum Runner Blocks

Locating pins

If the recommended values for permissible side forces are exceeded, the runner block must be additionally fixed by means of locating pins or reference edges.

Possible pin types

- Taper pin (hardened) or
- Straight pin DIN 6325

Note

Runner block Standard width 1631-:

Pin holes already predrilled as illustrated

Runner block Slimline 1632-:

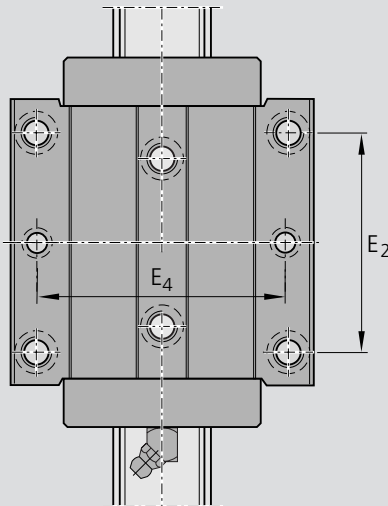
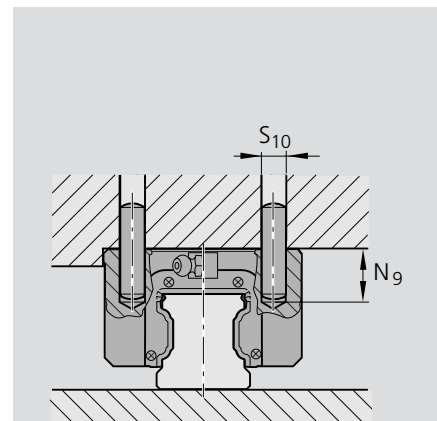
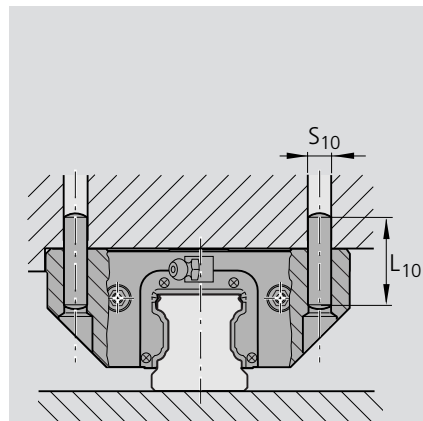
Recommended dimensions for the pin holes are indicated in the drawings and table.

For both types of runner blocks:

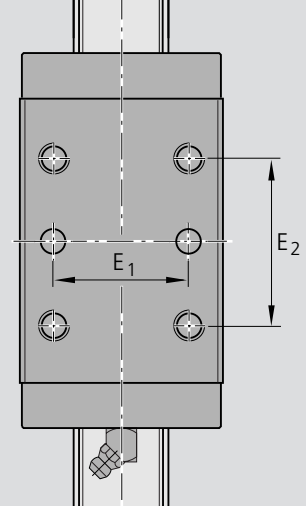
If the locating pins have to be driven in at another point (e.g. when the lube port is central), dimension E_2 must not be exceeded in the longitudinal direction (for dimension E_2 , see the tables for the individual types).

Observe dimensions E_1 and E_4 !

Only prepare the pin holes after the installation is complete (see also "General Mounting Instructions").



Standard width 1631-



Slimline 1632-

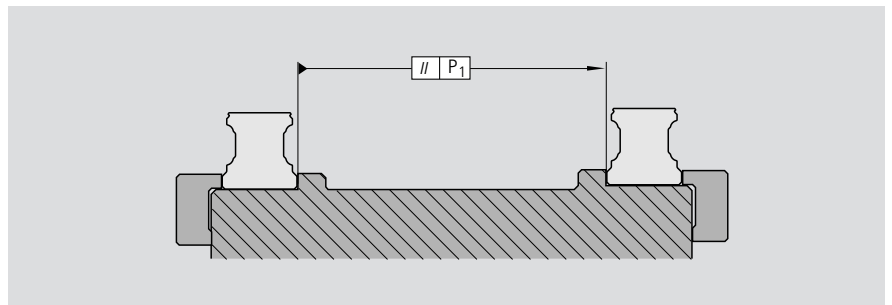
| Size | Taper pin (hardened) Straight pin (DIN 6325) | | Dimensions (mm) | | |
|------|---|----------|-----------------|-------|-------------|
| | S_{10} | L_{10} | E_1 | E_4 | N_9 (max) |
| 15 | 4 | 18 | 26 | 38 | 6.0 |
| 25 | 6 | 32 | 35 | 55 | 9.0 |
| 30 | 8 | 36 | 40 | 70 | 12.0 |
| 35 | 8 | 40 | 50 | 80 | 13.0 |

Parallelism of the rails after mounting

measured at the guide rails and at the runner blocks

The parallelism offset P_1 causes a slight increase in preload on one side of the assembly. If the tolerances given in the table are not exceeded, reduction in travel life will as a rule be negligible.

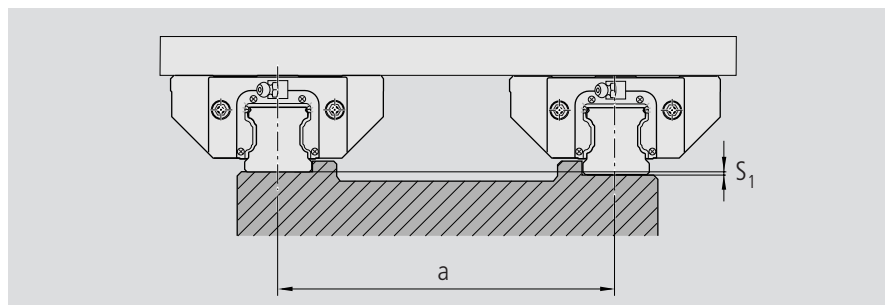
The given values apply to precision mounting. For standard mounting, double the stated values can be used.



| Size | Parallelism offset P_1 (mm) | |
|------|---|-------------------|
| | up to approx. 10 μm clearance | Preload 0.02 C |
| 15 | 0.021 | 0.014 |
| 25 | 0.026 | 0.017 |
| 30 | 0.029 | 0.019 |
| 35 | 0.035 | 0.022 |

Vertical offset

Provided the permissible vertical offset S_1 and S_2 is not exceeded, any resultant reduction in travel life will as a rule be negligible.



Permissible vertical offset in the transverse direction

The permissible vertical offset S_1 includes the tolerance for dimension H in accordance with the table given in the "Technical Data" section.

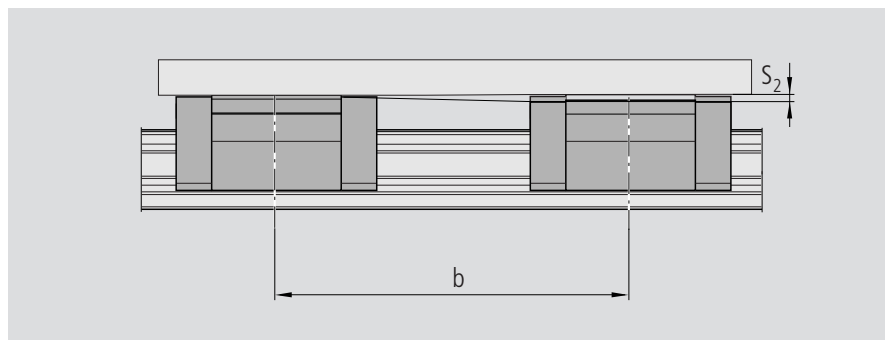
$$S_1 = a \cdot Y$$

S_1 = Permissible vertical offset (mm)
 a = Distance between rails (mm)
 Y = Calculation factor

| Calculation factor | for preload class | |
|--------------------|---|-------------------|
| | up to approx. 10 μm clearance | Preload 0.02 C |
| Y | $7 \cdot 10^{-4}$ | $5 \cdot 10^{-4}$ |

Permissible vertical offset in the longitudinal direction

The permissible vertical offset S_2 takes into account the tolerance for the "max. difference in dimensions H on the same rail" according to the table given in the "Technical Data" section.



$$S_2 = b \cdot 6 \cdot 10^{-5}$$

S_2 = Permissible vertical offset (mm)
 b = Distance between
runner blocks (mm)

STAR – Ball Rail Systems

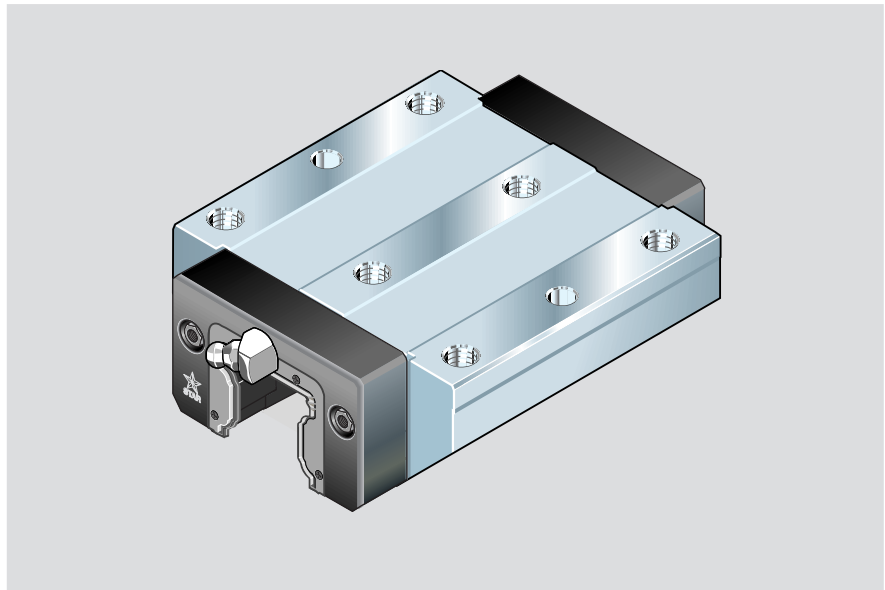
Runner Blocks, Aluminum Version

Runner block 1631- Standard width

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are available:

- with low-friction seals (Part numbers 16...4-11).



Part numbers

Sizes 45 and 55 available as special versions.

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 15 | H | 1631-193-10 | 1631-113-10 |
| | N | 1631-194-10 | 1631-114-10 |
| 25 | H | 1631-293-10 | 1631-213-10 |
| | N | 1631-294-10 | 1631-214-10 |
| 30 | H | 1631-793-10 | 1631-713-10 |
| | N | 1631-794-10 | 1631-714-10 |
| 35 | H | 1631-393-10 | 1631-313-10 |
| | N | 1631-394-10 | 1631-314-10 |

Permissible load

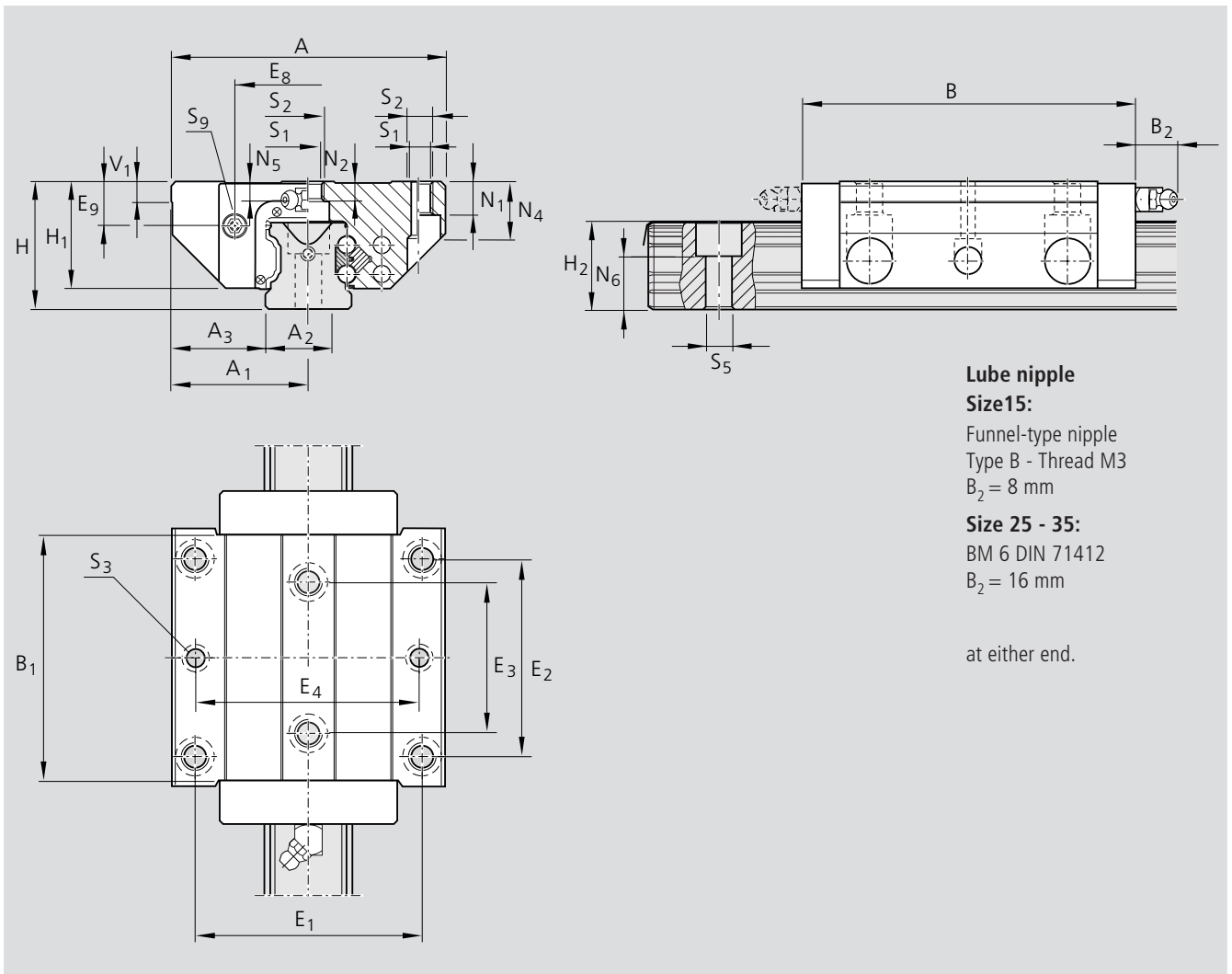
When calculating the service life, use the maximum load capacity figure.

The permissible load is only limited for statistical purposes (see table).

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for C , M_t and M_L in the table should be multiplied by 1.26.



| Size | Dimensions (mm) | | | | | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₃ | E ₄ | E ₈ | E ₉ | N ₁ | N ₂ | N ₄ |
| 15 | 47 | 23.5 | 15 | 16.0 | 54 | 39.2 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 38 | 30 | 26 | 38 | 24.55 | 6.7 | 5 | 4.4 | 10 |
| 25 | 70 | 35.0 | 23 | 23.5 | 81.0 | 57.8 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 57 | 45 | 40 | 55 | 38.3 | 11.5 | 9 | 7.0 | 18 |
| 30 | 90 | 45.0 | 28 | 31.0 | 94.0 | 67.4 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 72 | 52 | 44 | 70 | 48.4 | 14.6 | 11 | 8.0 | 18 |
| 35 | 100 | 50.0 | 34 | 33.0 | 105.0 | 77.0 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 82 | 62 | 52 | 80 | 58.0 | 17.5 | 12 | 10.2 | 21 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | | | Mass (kg) | Load capacities (N) C dyn. | Permissible load (N) F _{max} | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|-----------|-------------------------------|--|---------------------|---------------------|---------------------|--|
| | N ₅ | N ₆ ^{+0.5} | S ₁ | S ₂ | S ₃ | S ₅ | S ₉ | M _t dyn. | | | | M _t max. | M _L dyn. | M _L max. | |
| 15 | 4.0 | 10.3 | 4.4 | M5 | 3.7 | 4.4 | M2.5-3.5 deep | 0.15 | 7 800 | 3 000 | 74 | 29 | 40 | 16 | |
| 25 | 5.5 | 15.2 | 6.8 | M8 | 5.7 | 7.0 | M3-5 deep | 0.35 | 22 800 | 8 800 | 320 | 125 | 180 | 70 | |
| 30 | 6.0 | 17.0 | 8.6 | M10 | 7.7 | 9.0 | M3-5 deep | 0.45 | 31 700 | 12 200 | 540 | 210 | 290 | 110 | |
| 35 | 7.0 | 20.5 | 8.6 | M10 | 7.7 | 9.0 | M3-5 deep | 0.80 | 41 900 | 16 200 | 890 | 345 | 440 | 170 | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

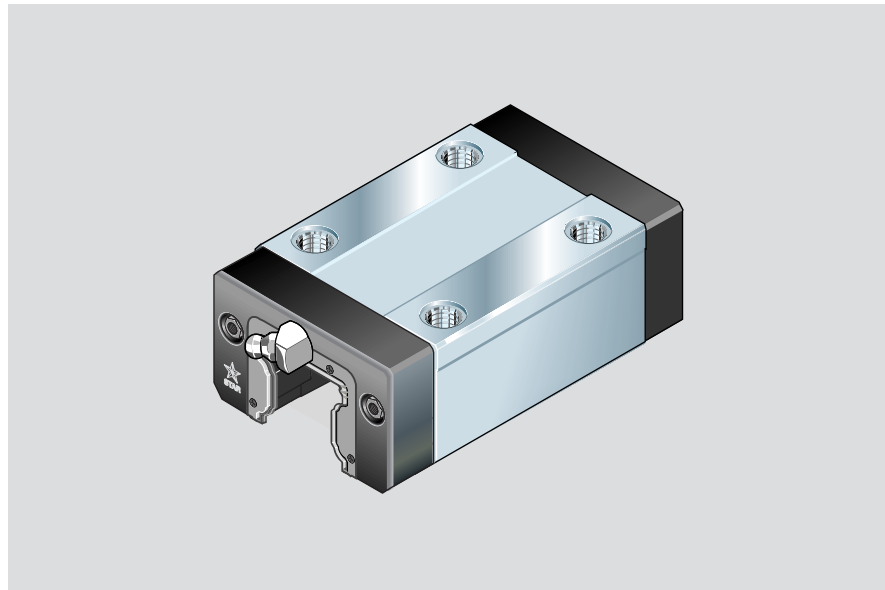
Runner Blocks, Aluminum Version

Runner block 1632- Slimline

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are available:

- with low-friction seals (Part numbers 16...4-11).



Part numbers

Sizes 45 and 55 available as special versions.

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|------|----------------|--|----------------|
| | | up to approx. 10 μm clearance | Preload 0.02 C |
| 15 | H | 1632-193-10 | 1632-113-10 |
| | N | 1632-194-10 | 1632-114-10 |
| 25 | H | 1632-293-10 | 1632-213-10 |
| | N | 1632-294-10 | 1632-214-10 |
| 30 | H | 1632-793-10 | 1632-713-10 |
| | N | 1632-794-10 | 1632-714-10 |
| 35 | H | 1632-393-10 | 1632-313-10 |
| | N | 1632-394-10 | 1632-314-10 |

Permissible load

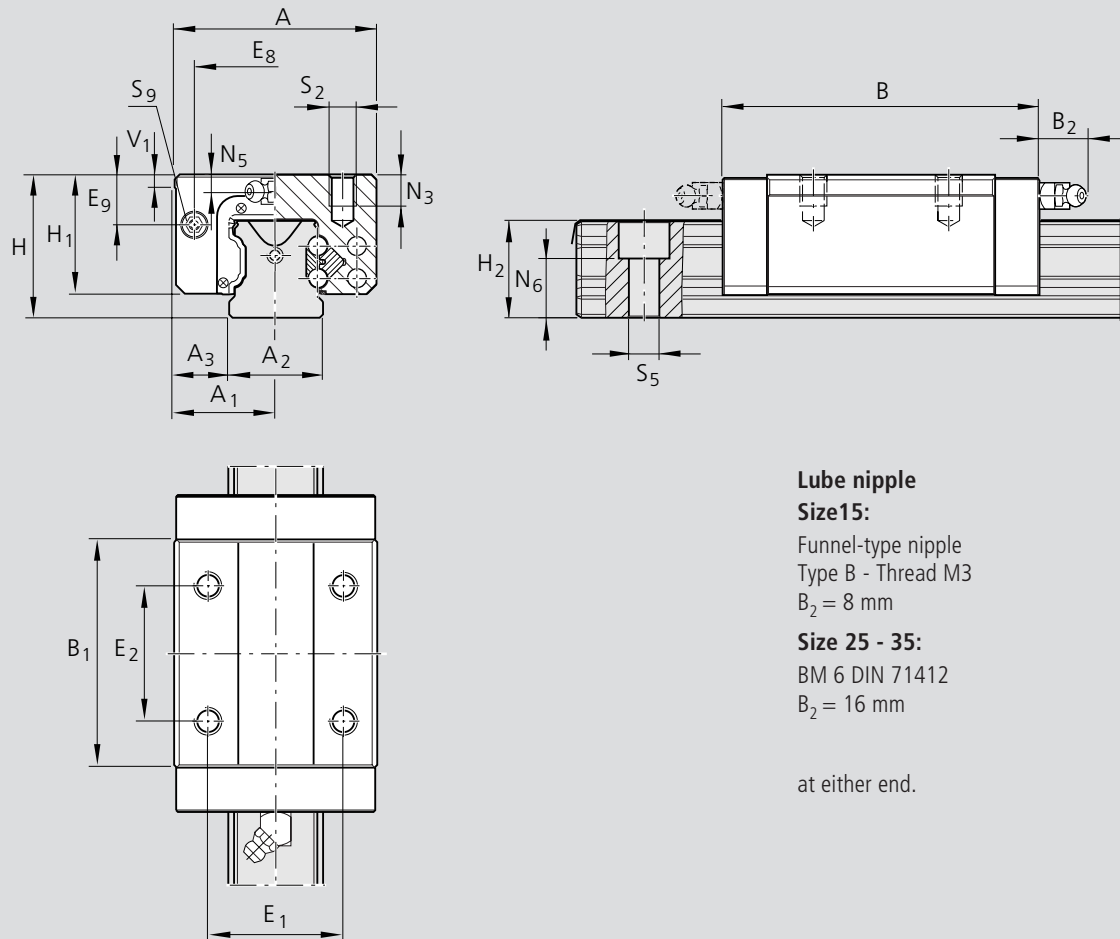
When calculating the service life, use the maximum load capacity figure.

The permissible load is only limited for statistical purposes (see table).

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for C , M_t and M_L in the table should be multiplied by 1.26.



Lube nipple

Size15:

Funnel-type nipple
Type B - Thread M3
B₂ = 8 mm

Size 25 - 35:

BM 6 DIN 71412
B₂ = 16 mm

at either end.

| Size | Dimensions (mm) | | | | | | | | | | | | | | | |
|------|-----------------|----------------|----------------|----------------|-------|----------------|----|----------------|------------------------------|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | A | A ₁ | A ₂ | A ₃ | B | B ₁ | H | H ₁ | H ₂ ¹⁾ | H ₂ ²⁾ | V ₁ | E ₁ | E ₂ | E ₈ | E ₉ | N ₃ |
| 15 | 34 | 17 | 15 | 9.5 | 53.5 | 39.2 | 24 | 19.8 | 16.3 | 16.20 | 5.0 | 26 | 26 | - | - | 6 |
| 25 | 48 | 24 | 23 | 12.5 | 81.0 | 57.8 | 36 | 29.5 | 24.4 | 24.25 | 7.5 | 35 | 35 | 38.3 | 11.5 | 9 |
| 30 | 60 | 30 | 28 | 16.0 | 94.0 | 67.4 | 42 | 35.0 | 28.5 | 28.35 | 7.0 | 40 | 40 | 48.4 | 14.6 | 12 |
| 35 | 70 | 35 | 34 | 18.0 | 105.0 | 77.0 | 48 | 40.0 | 32.15 | 31.85 | 8.0 | 50 | 50 | 58.0 | 17.5 | 13 |

¹⁾ Dimension H₂ with Rail Seal cover strip

²⁾ Dimension H₂ without Rail Seal cover strip

| Size | Dimensions (mm) | | | | | | Mass (kg) | Load capacities (N) C dyn. | Permissible load (N) F _{max} | Moments (Nm) | | | |
|------|-----------------|--------------------------------|----------------|----------------|----------------|----------------|-----------|-------------------------------|--|----------------|------|------|--|
| | N ₅ | N ₆ ^{±0.5} | S ₂ | S ₅ | S ₉ | M _t | | | | M _L | | | |
| | | | | | | dyn. | | | | max. | dyn. | max. | |
| 15 | 4.0 | 10.3 | M4 | 4.4 | M2.5-3.5 deep | 0.08 | 7 800 | 3 000 | 74 | 29 | 40 | 16 | |
| 25 | 5.5 | 15.2 | M6 | 7.0 | M3-5 deep | 0.25 | 22 800 | 8 800 | 320 | 125 | 180 | 70 | |
| 30 | 6.0 | 17.0 | M8 | 9.0 | M3-5 deep | 0.45 | 31 700 | 12 200 | 540 | 290 | 290 | 110 | |
| 35 | 7.0 | 20.5 | M8 | 9.0 | M3-5 deep | 0.60 | 41 900 | 16 200 | 890 | 440 | 440 | 170 | |

30% higher dynamic load capacities and moments

STAR – Ball Rail Systems

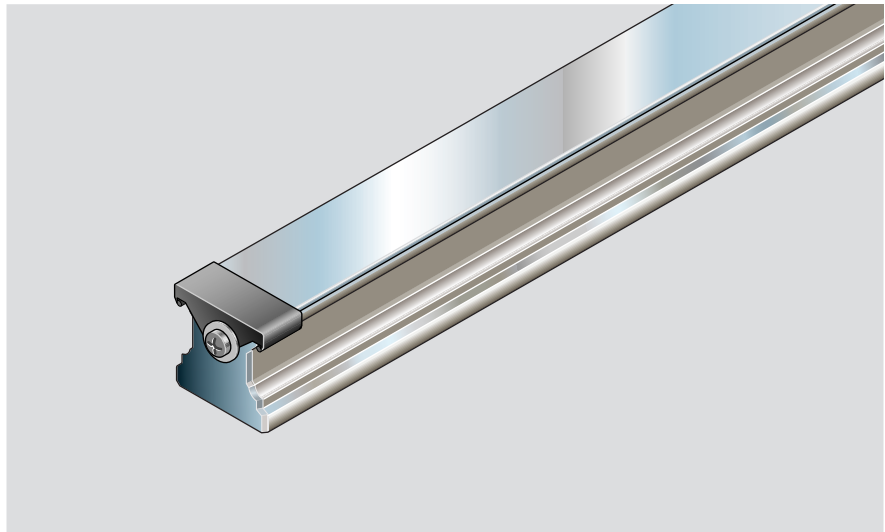
Guide Rails with Rail Seal Mounting Hole Cover Strip

Guide rails 1605-.6. -

For mounting from above, with Rail Seal and screw-down protective caps

Note

The guide rails are also available as composite rails, see Ordering Example 3.



Part numbers and rail lengths

| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | | | | | | | | | | | | | | |
|------|----------------|---|---|---------------------|---|--|--|--|--|-----|---|--|--|--|--|-----|--|--|--|--|--|
| | | One-piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Mounting screw holes n _B / Rail length L (mm) | | | | | | | | | | | | | | | | |
| 15 | UP | 1605-169-31,.... | 1605-169-3,.... | 60 | 2 / 116 7 / 416 12 / 716 20 / 1196 40 / 2396 3 / 176 8 / 476 13 / 776 22 / 1316 50 / 2996 4 / 236 9 / 536 14 / 836 25 / 1496 60 / 3596 5 / 296 10 / 596 16 / 956 30 / 1796 66 / 3956 6 / 356 11 / 656 18 / 1076 35 / 2096 For size 15: max. 50/2996 | | | | | | | | | | | | | | | | |
| | SP | 1605-161-31,.... | 1605-161-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-162-31,.... | 1605-162-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-163-31,.... | 1605-163-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-164-31,.... | 1605-164-3,.... | | | | | | | | | | | | | | | | | | |
| 20 | UP | 1605-869-31,.... | 1605-869-3,.... | | | | | | | | | | | | | | | | | | |
| | SP | 1605-861-31,.... | 1605-861-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-862-31,.... | 1605-862-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-863-31,.... | 1605-863-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-864-31,.... | 1605-864-3,.... | | | | | | | | | | | | | | | | | | |
| 25 | UP | 1605-269-31,.... | 1605-269-3,.... | | | | | | | | | | | | | | | | | | |
| | SP | 1605-261-31,.... | 1605-261-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-262-31,.... | 1605-262-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-263-31,.... | 1605-263-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-264-31,.... | 1605-264-3,.... | | | | | | | | | | | | | | | | | | |
| 30 | UP | 1605-769-31,.... | 1605-769-3,.... | 80 | 2 / 156 7 / 556 12 / 956 20 / 1596 40 / 3196 3 / 236 8 / 636 13 / 1036 22 / 1756 50 / 3996 4 / 316 9 / 716 14 / 1116 25 / 1996 5 / 396 10 / 796 16 / 1276 30 / 2396 6 / 476 11 / 876 18 / 1436 35 / 2796 | | | | | | | | | | | | | | | | |
| | SP | 1605-761-31,.... | 1605-761-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-762-31,.... | 1605-762-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-763-31,.... | 1605-763-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-764-31,.... | 1605-764-3,.... | | | | | | | | | | | | | | | | | | |
| 35 | UP | 1605-369-61,.... | 1605-369-6,.... | | | | | | | | | | | | | | | | | | |
| | SP | 1605-361-61,.... | 1605-361-6,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-362-61,.... | 1605-362-6,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-363-61,.... | 1605-363-6,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-364-61,.... | 1605-364-6,.... | | | | | | | | | | | | | | | | | | |
| 45 | UP | 1605-469-61,.... | 1605-469-6,.... | | | | | | | 105 | 2 / 206 7 / 731 12 / 1256 20 / 2096 38 / 3986 3 / 311 8 / 836 13 / 1361 22 / 2306 4 / 416 9 / 941 14 / 1466 25 / 2621 5 / 521 10 / 1046 16 / 1676 30 / 3146 6 / 626 11 / 1151 18 / 1886 35 / 3671 | | | | | | | | | | |
| | SP | 1605-461-61,.... | 1605-461-6,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-462-61,.... | 1605-462-6,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-463-61,.... | 1605-463-6,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-464-61,.... | 1605-464-6,.... | | | | | | | | | | | | | | | | | | |
| 55 | UP | 1605-569-61,.... | 1605-569-6,.... | 120 | 2 / 236 7 / 836 12 / 1436 20 / 2396 3 / 356 8 / 956 13 / 1556 22 / 2636 4 / 476 9 / 1076 14 / 1676 25 / 2996 5 / 596 10 / 1196 16 / 1916 30 / 3596 6 / 716 11 / 1316 18 / 2156 33 / 3956 | | | | | | | | | | | | | | | | |
| | SP | 1605-561-61,.... | 1605-561-6,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-562-61,.... | 1605-562-6,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-563-61,.... | 1605-563-6,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-564-61,.... | 1605-564-6,.... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1605-669-61,.... | 1605-669-6,.... | | | | | | | | | | | | | 150 | 2 / 296 7 / 1046 12 / 1796 20 / 2996 3 / 446 8 / 1196 13 / 1946 22 / 3296 4 / 596 9 / 1346 14 / 2096 25 / 3746 5 / 746 10 / 1496 16 / 2396 26 / 3896 6 / 896 11 / 1646 18 / 2696 | | | | |
| | SP | 1605-661-61,.... | 1605-661-6,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-662-61,.... | 1605-662-6,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-663-61,.... | 1605-663-6,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-664-61,.... | 1605-664-6,.... | | | | | | | | | | | | | | | | | | |

Special version:

Zinc-iron coating with yellow chromating
in accuracy class N.

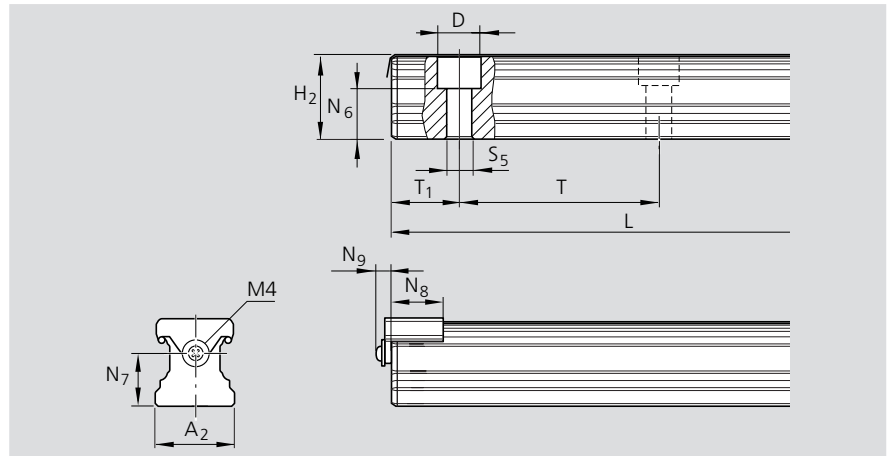
Part numbers:

1646-.64-3. (end faces uncoated)

1646-.64-4. (end faces coated)

¹⁾ Dimension H_2 with Rail Seal

²⁾ For sizes 20 – 45, one-piece guide rails up to approx. 6000 mm in length can be supplied in special cases.



| Size | Dimension (mm) | | | | | | | | | | | | Mass kg/m |
|------|----------------|------------|-----------------|-------|-------|-------|------|-------|--------------------|--------------|-----|-----------------|--------------|
| | A_2 | $H_2^{1)}$ | $N_6^{\pm 0.5}$ | N_7 | N_8 | N_9 | D | S_5 | $T_{15}^{\pm 0.5}$ | $T_{1\ min}$ | T | $L_{\max}^{2)}$ | |
| 15 | 15 | 16.3 | 10.3 | 9.8 | 14.0 | 6.5 | 7.4 | 4.4 | 28.0 | 12 | 60 | 3000 | 1.4 |
| 20 | 20 | 20.7 | 13.2 | 13.0 | 14.0 | 6.5 | 9.4 | 6.0 | 28.0 | 13 | 60 | 4000 | 2.4 |
| 25 | 23 | 24.4 | 15.2 | 15.0 | 15.2 | 6.5 | 11.0 | 7.0 | 28.0 | 13 | 60 | 4000 | 3.2 |
| 30 | 28 | 28.5 | 17.0 | 18.0 | 15.2 | 7.0 | 15.0 | 9.0 | 38.0 | 16 | 80 | 4000 | 5.0 |
| 35 | 34 | 32.15 | 20.5 | 22.0 | 18.0 | 7.0 | 15.0 | 9.0 | 38.0 | 16 | 80 | 4000 | 6.8 |
| 45 | 45 | 40.15 | 23.5 | 30.0 | 20.0 | 7.0 | 20.0 | 14.0 | 50.5 | 18 | 105 | 4000 | 10.5 |
| 55 | 53 | 48.15 | 29.0 | 30.0 | 20.0 | 7.0 | 24.0 | 16.0 | 58.0 | 20 | 120 | 4000 | 16.2 |
| 65 | 63 | 60.15 | 38.5 | 40.0 | 20.0 | 7.0 | 26.0 | 18.0 | 73.0 | 21 | 150 | 4000 | 22.4 |

Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35 with Rail Seal,
accuracy class H,

rail length 1756 mm,

($21 \cdot T$, number of holes $n_B = 22$)

Ordering data: **1605-363-61, 1756 mm**

Part numbers for composite guide rails

For rail lengths over L_{\max} the part numbers given here are also valid except that the dot after the figure **3**. or **6**. is replaced by the number of sections.

See Ordering Example 3.

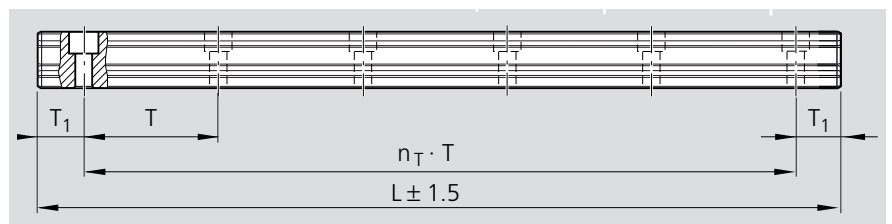
Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T_{15}
- If T_{15} cannot be used, then
 - Select an end space T_1 between T_{15} and $T_{1\ min}$
 - Do not go below the minimum spacing $T_{1\ min}$!

Note

- $T_1, T_{1\ min}, T_{15}$ are the same at either end of the rail.



| | |
|--|---|
| $L = n_B \cdot T - 4$ <p>OR</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | L = rail length (mm) T = hole spacing*) (mm) T_{15} = preferred dimension*) (mm) n_B = number of holes n_T = number of spaces *) see tables for values |
|--|---|

Ordering example 2 (up to L_{\max}):

Guide rail size 35 with Rail Seal,

accuracy class H,

rail length 1676 mm,

($20 \cdot T$, preferred dimension $T_{15} = 38$ mm;

number of holes $n_B = 21$)

Ordering data:

Part number, length (mm)

$T_{15} / n_T \cdot T / T_{15}$ (mm)

1605-363-61, 1676 mm

38 / 20 · 80 / 38 mm

Rail lengths above L_{\max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{\max}):

Guide rail size 35 with Rail Seal,
accuracy class H,

rail length 5063 mm, **2** sections

($62 \cdot T$, preferred dimension $T_{15} = 38$ mm;

number of holes $n_B = 63$)

Ordering data:

Part number and number of sections,
length (mm)

$T_{15} / n_T \cdot T / T_{15}$ (mm)

1605-363-62, 5036 mm

38 / 62 · 80 / 38 mm

STAR – Ball Rail Systems

Guide Rails with Mounting Hole Plugs

Guide rails 1605-.0.-

for mounting from above,
complete with plastic mounting
hole plugs

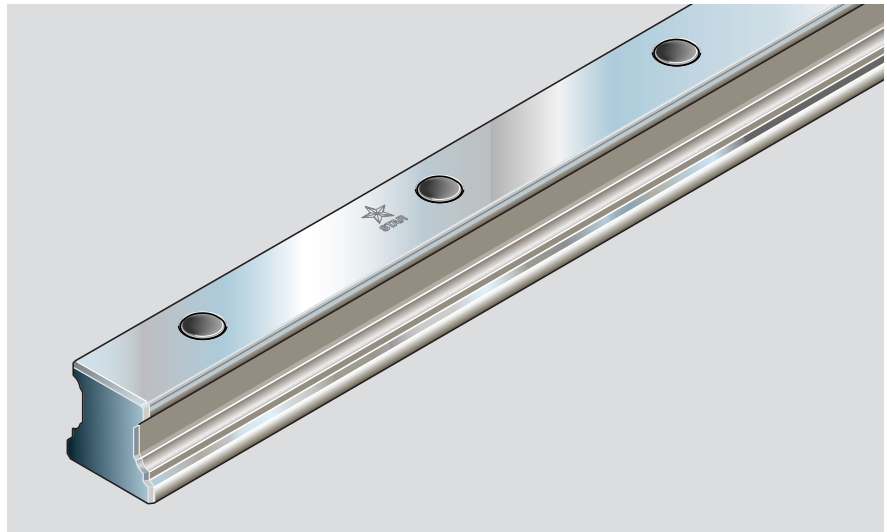
For special applications:

- Guide rails with steel mounting hole plugs for sizes 25 to 65 in accuracy classes SP, P, H, N

Part numbers: **1606-.5.-**

Steel mounting hole plugs to be ordered separately.

Observe the mounting instructions for steel mounting hole plugs.



Part numbers and rail lengths

| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | | | | | | | | | | | | | | |
|------|----------------|---|---|---------------------|---|--|--|--|--|-----|---|--|--|--|--|-----|--|--|--|--|--|
| | | One-piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Number of holes n_B / Rail length L (mm) | | | | | | | | | | | | | | | | |
| 15 | UP | 1605-109-31,.... | 1605-109-3,.... | 60 | 2 / 116 7 / 416 12 / 716 20 / 1196 40 / 2396 3 / 176 8 / 476 13 / 776 22 / 1316 50 / 2996 4 / 236 9 / 536 14 / 836 25 / 1496 60 / 3596 5 / 296 10 / 596 16 / 956 30 / 1796 66 / 3956 6 / 356 11 / 656 18 / 1076 35 / 2096 For size 15: max. 50/2996 | | | | | | | | | | | | | | | | |
| | SP | 1605-101-31,.... | 1605-101-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-102-31,.... | 1605-102-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-103-31,.... | 1605-103-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-104-31,.... | 1605-104-3,.... | | | | | | | | | | | | | | | | | | |
| 20 | UP | 1605-809-31,.... | 1605-809-3,.... | | | | | | | | | | | | | | | | | | |
| | SP | 1605-801-31,.... | 1605-801-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-802-31,.... | 1605-802-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-803-31,.... | 1605-803-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-804-31,.... | 1605-804-3,.... | | | | | | | | | | | | | | | | | | |
| 25 | UP | 1605-209-31,.... | 1605-209-3,.... | | | | | | | | | | | | | | | | | | |
| | SP | 1605-201-31,.... | 1605-201-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-202-31,.... | 1605-202-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-203-31,.... | 1605-203-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-204-31,.... | 1605-204-3,.... | | | | | | | | | | | | | | | | | | |
| 30 | UP | 1605-709-31,.... | 1605-709-3,.... | 80 | 2 / 156 7 / 556 12 / 956 20 / 1596 40 / 3196 3 / 236 8 / 636 13 / 1036 22 / 1756 50 / 3996 4 / 316 9 / 716 14 / 1116 25 / 1996 5 / 396 10 / 796 16 / 1276 30 / 2396 6 / 476 11 / 876 18 / 1436 35 / 2796 | | | | | | | | | | | | | | | | |
| | SP | 1605-701-31,.... | 1605-701-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-702-31,.... | 1605-702-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-703-31,.... | 1605-703-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-704-31,.... | 1605-704-3,.... | | | | | | | | | | | | | | | | | | |
| 35 | UP | 1605-309-31,.... | 1605-309-3,.... | | | | | | | | | | | | | | | | | | |
| | SP | 1605-301-31,.... | 1605-301-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-302-31,.... | 1605-302-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-303-31,.... | 1605-303-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-304-31,.... | 1605-304-3,.... | | | | | | | | | | | | | | | | | | |
| 45 | UP | 1605-409-31,.... | 1605-409-3,.... | | | | | | | 105 | 2 / 206 7 / 731 12 / 1256 20 / 2096 38 / 3986 3 / 311 8 / 836 13 / 1361 22 / 2306 4 / 416 9 / 941 14 / 1466 25 / 2621 5 / 521 10 / 1046 16 / 1676 30 / 3146 6 / 626 11 / 1151 18 / 1886 35 / 3671 | | | | | | | | | | |
| | SP | 1605-401-31,.... | 1605-401-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-402-31,.... | 1605-402-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-403-31,.... | 1605-403-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-404-31,.... | 1605-404-3,.... | | | | | | | | | | | | | | | | | | |
| 55 | UP | 1605-509-31,.... | 1605-509-3,.... | 120 | 2 / 236 7 / 836 12 / 1436 20 / 2396 3 / 356 8 / 956 13 / 1556 22 / 2636 4 / 476 9 / 1076 14 / 1676 25 / 2996 5 / 596 10 / 1196 16 / 1916 30 / 3596 6 / 716 11 / 1316 18 / 2156 33 / 3956 | | | | | | | | | | | | | | | | |
| | SP | 1605-501-31,.... | 1605-501-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-502-31,.... | 1605-502-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-503-31,.... | 1605-503-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-504-31,.... | 1605-504-3,.... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1605-609-31,.... | 1605-609-3,.... | | | | | | | | | | | | | 150 | 2 / 296 7 / 1046 12 / 1796 20 / 2996 3 / 446 8 / 1196 13 / 1946 22 / 3296 4 / 596 9 / 1346 14 / 2096 25 / 3746 5 / 746 10 / 1496 16 / 2396 26 / 3896 6 / 896 11 / 1646 18 / 2696 | | | | |
| | SP | 1605-601-31,.... | 1605-601-3,.... | | | | | | | | | | | | | | | | | | |
| | P | 1605-602-31,.... | 1605-602-3,.... | | | | | | | | | | | | | | | | | | |
| | H | 1605-603-31,.... | 1605-603-3,.... | | | | | | | | | | | | | | | | | | |
| | N | 1605-604-31,.... | 1605-604-3,.... | | | | | | | | | | | | | | | | | | |

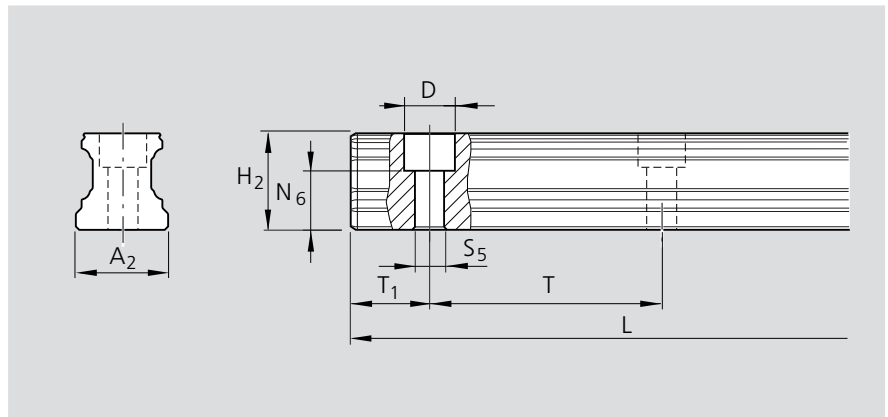
Special version:

Zinc-iron coating with yellow chromating
in accuracy class N.

Part numbers:

1646-.14-3. (end faces uncoated)

1646-.14-4. (end faces coated)



¹⁾ Dimension H₂ with Rail Seal

²⁾ For sizes 20 – 45, one-piece guide rails
up to approx. 6000 mm in length can be
supplied in special cases

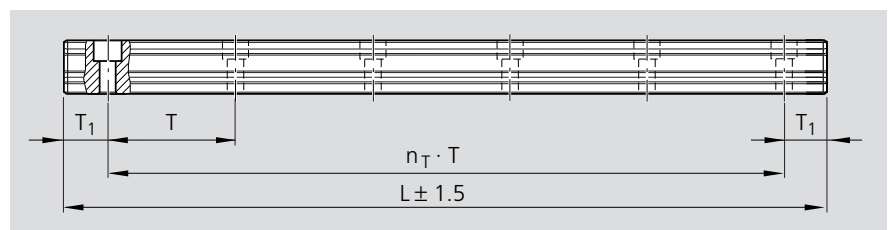
| Size | Dimensions (mm) | | | | | | | | | Mass kg/m |
|------|-----------------|------------------------------|--------------------------------|------|----------------|---------------------------------|--------------------|-----|--------------------------------|--------------|
| | A ₂ | H ₂ ¹⁾ | N ₆ ^{±0.5} | D | S ₅ | T ₁₅ ^{±0.5} | T _{1 min} | T | L _{max} ²⁾ | |
| 15 | 15 | 16.20 | 10.3 | 7.4 | 4.4 | 28.0 | 10 | 60 | 3000 | 1.4 |
| 20 | 20 | 20.55 | 13.2 | 9.4 | 6.0 | 28.0 | 10 | 60 | 4000 | 2.4 |
| 25 | 23 | 24.25 | 15.2 | 11.0 | 7.0 | 28.0 | 10 | 60 | 4000 | 3.2 |
| 30 | 28 | 28.35 | 17.0 | 15.0 | 9.0 | 38.0 | 12 | 80 | 4000 | 5.0 |
| 35 | 34 | 31.85 | 20.5 | 15.0 | 9.0 | 38.0 | 12 | 80 | 4000 | 6.8 |
| 45 | 45 | 39.85 | 23.5 | 20.0 | 14.0 | 50.5 | 16 | 105 | 4000 | 10.5 |
| 55 | 53 | 47.85 | 29.0 | 24.0 | 16.0 | 58.0 | 18 | 120 | 4000 | 16.2 |
| 65 | 63 | 59.85 | 38.5 | 26.0 | 18.0 | 73.0 | 20 | 150 | 4000 | 22.4 |

Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35,
accuracy class H,
rail length 1756 mm,
(21 · T, number of holes n_B = 22)
Ordering data: **1605-303-31, 1756 mm**



| | |
|--|--|
| $L = n_B \cdot T - 4$ <p>or</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | <p>L = rail length (mm)</p> <p>T = hole spacing*) (mm)</p> <p>T₁₅ = preferred dimension*) (mm)</p> <p>n_B = number of holes</p> <p>n_T = number of spaces</p> <p>*) see tables for values</p> |
|--|--|

Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T₁₅
- If T₁₅ cannot be used, then
 - Select an end space T₁ between T₁₅ and T_{1 min}
 - Do not go below the minimum spacing T_{1 min}!

Note

- T₁, T_{1 min}, T₁₅ are the same at either end of the rail.

Ordering example 2 (up to L_{max}):

Guide rail size 35,
accuracy class H,
rail length 1676 mm,
(20 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 21)

Ordering data:

Part number, length (mm)
T₁₅ / n_T · T / T₁₅ (mm)

1605-303-31, 1676 mm
38 / 20 · 80 / 38 mm

Rail lengths above L_{max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{max}):

Guide rail size 35,
accuracy class H,
rail length 5063 mm, 2 sections
(62 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 63)

Ordering data:

Part number and number of sections,
length (mm)
T₁₅ / n_T · T / T₁₅ (mm)

1605-303-32, 5036 mm
38 / 62 · 80 / 38 mm

STAR – Ball Rail Systems

Guide Rails

Guide rail 1607-

For mounting from below

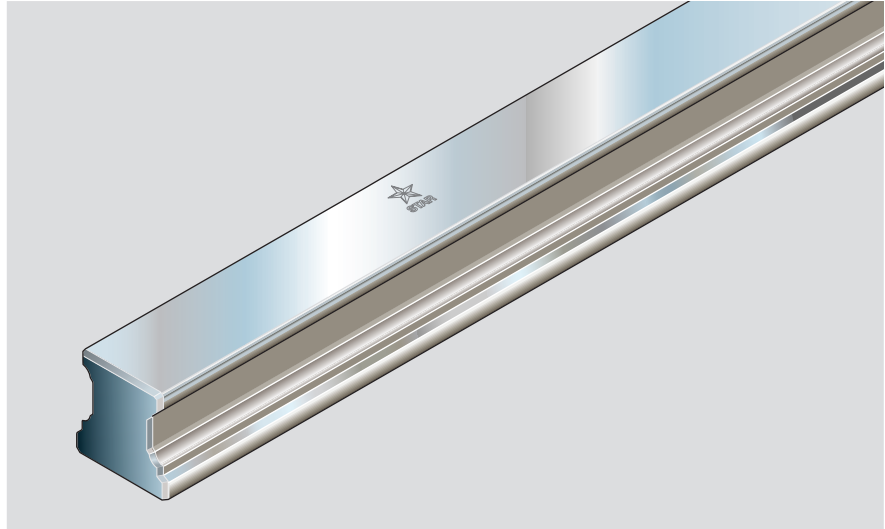
Special version:

Zinc-iron coating with yellow chromating in accuracy class N.

Part numbers:

1648-.14-3. (end faces uncoated)

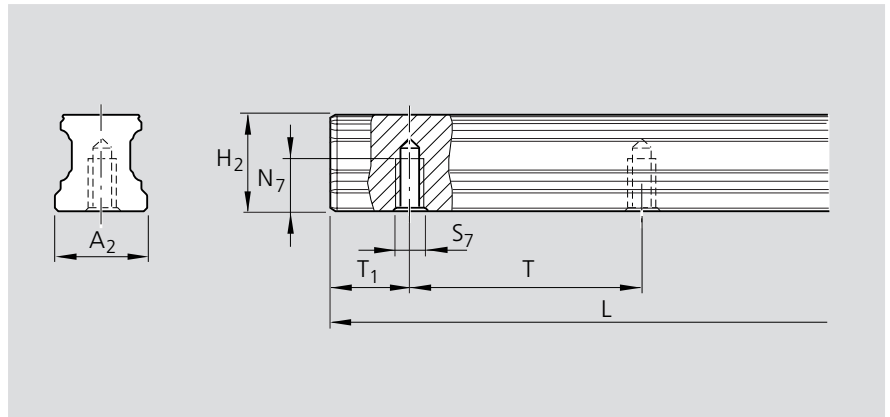
1648-.14-4. (end faces coated)



Part numbers and rail lengths

| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | | | | | | | | | | | | | | |
|------|----------------|---|---|---------------------|--|-----------|-----------|-----------|-----------|-----|---------|-----------|-----------|-----------|-----------|-----|---------|-----------|-----------|-----------|-----------|
| | | One-piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Number of holes n_b / Rail length L (mm) | | | | | | | | | | | | | | | | |
| 15 | UP | 1607-109-31,..... | 1607-109-3,..... | 60 | 2 / 116 | 7 / 416 | 12 / 716 | 20 / 1196 | 40 / 2396 | | | | | | | | | | | | |
| | SP | 1607-101-31,..... | 1607-101-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-102-31,..... | 1607-102-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-103-31,..... | 1607-103-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-104-31,..... | 1607-104-3,..... | | | | | | | | | | | | | | | | | | |
| 20 | UP | 1607-809-31,..... | 1607-809-3,..... | | | | | | | 60 | 3 / 176 | 8 / 476 | 13 / 776 | 22 / 1316 | 50 / 2996 | | | | | | |
| | SP | 1607-801-31,..... | 1607-801-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-802-31,..... | 1607-802-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-803-31,..... | 1607-803-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-804-31,..... | 1607-804-3,..... | | | | | | | | | | | | | | | | | | |
| 25 | UP | 1607-209-31,..... | 1607-209-3,..... | | | | | | | | | | | | | 60 | 4 / 236 | 9 / 536 | 14 / 836 | 25 / 1496 | 60 / 3596 |
| | SP | 1607-201-31,..... | 1607-201-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-202-31,..... | 1607-202-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-203-31,..... | 1607-203-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-204-31,..... | 1607-204-3,..... | | | | | | | | | | | | | | | | | | |
| 30 | UP | 1607-709-31,..... | 1607-709-3,..... | 80 | 5 / 296 | 10 / 596 | 16 / 956 | 30 / 1796 | 66 / 3956 | | | | | | | | | | | | |
| | SP | 1607-701-31,..... | 1607-701-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-702-31,..... | 1607-702-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-703-31,..... | 1607-703-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-704-31,..... | 1607-704-3,..... | | | | | | | | | | | | | | | | | | |
| 35 | UP | 1607-309-31,..... | 1607-309-3,..... | | | | | | | 80 | 6 / 356 | 11 / 656 | 18 / 1076 | 35 / 2096 | | | | | | | |
| | SP | 1607-301-31,..... | 1607-301-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-302-31,..... | 1607-302-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-303-31,..... | 1607-303-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-304-31,..... | 1607-304-3,..... | | | | | | | | | | | | | | | | | | |
| 45 | UP | 1607-409-31,..... | 1607-409-3,..... | | | | | | | | | | | | | 105 | 2 / 156 | 7 / 556 | 12 / 956 | 20 / 1596 | 40 / 3196 |
| | SP | 1607-401-31,..... | 1607-401-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-402-31,..... | 1607-402-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-403-31,..... | 1607-403-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-404-31,..... | 1607-404-3,..... | | | | | | | | | | | | | | | | | | |
| 55 | UP | 1607-509-31,..... | 1607-509-3,..... | 120 | 3 / 236 | 8 / 636 | 13 / 1036 | 22 / 1756 | 50 / 3996 | | | | | | | | | | | | |
| | SP | 1607-501-31,..... | 1607-501-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-502-31,..... | 1607-502-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-503-31,..... | 1607-503-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-504-31,..... | 1607-504-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | 150 | 4 / 316 | 9 / 716 | 14 / 1116 | 25 / 1996 | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | | | | | | | 150 | 5 / 396 | 10 / 796 | 16 / 1276 | 30 / 2396 | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | 150 | 6 / 476 | 11 / 876 | 18 / 1436 | 35 / 2796 | | | | | | | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 45 | UP | 1607-409-31,..... | 1607-409-3,..... | | | | | | | 105 | 2 / 206 | 7 / 731 | 12 / 1256 | 20 / 2096 | 38 / 3986 | | | | | | |
| | SP | 1607-401-31,..... | 1607-401-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-402-31,..... | 1607-402-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-403-31,..... | 1607-403-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-404-31,..... | 1607-404-3,..... | | | | | | | | | | | | | | | | | | |
| 55 | UP | 1607-509-31,..... | 1607-509-3,..... | | | | | | | | | | | | | 120 | 3 / 311 | 8 / 836 | 13 / 1361 | 22 / 2306 | |
| | SP | 1607-501-31,..... | 1607-501-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-502-31,..... | 1607-502-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-503-31,..... | 1607-503-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-504-31,..... | 1607-504-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | 150 | 4 / 416 | 9 / 941 | 14 / 1466 | 25 / 2621 | | | | | | | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | 150 | 5 / 521 | 10 / 1046 | 16 / 1676 | 30 / 3146 | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | | | | | | | 150 | 6 / 626 | 11 / 1151 | 18 / 1886 | 35 / 3671 | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | 150 | 2 / 236 | 7 / 836 | 12 / 1436 | 20 / 2396 | | | | | | | | | | | | | |
| | SP | 1607-501-31,..... | 1607-501-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-502-31,..... | 1607-502-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-503-31,..... | 1607-503-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-504-31,..... | 1607-504-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | 150 | 3 / 356 | 8 / 956 | 13 / 1556 | 22 / 2636 | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | | | | | | | 150 | 4 / 476 | 9 / 1076 | 14 / 1676 | 25 / 2996 | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | 150 | 5 / 596 | 10 / 1196 | 16 / 1916 | 30 / 3596 | | | | | | | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | 150 | 6 / 716 | 11 / 1316 | 18 / 2156 | 33 / 3956 | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | | | | | | | 150 | 2 / 296 | 7 / 1046 | 12 / 1796 | 20 / 2996 | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | 150 | 3 / 446 | 8 / 1196 | 13 / 1946 | 22 / 3296 | | | | | | | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | 150 | 4 / 596 | 9 / 1346 | 14 / 2096 | 25 / 3746 | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | | | | | | | | | | | | | 150 | 5 / 746 | 10 / 1496 | 16 / 2396 | 26 / 3896 | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |
| 65 | UP | 1607-609-31,..... | 1607-609-3,..... | 150 | 6 / 896 | 11 / 1646 | 18 / 2696 | | | | | | | | | | | | | | |
| | SP | 1607-601-31,..... | 1607-601-3,..... | | | | | | | | | | | | | | | | | | |
| | P | 1607-602-31,..... | 1607-602-3,..... | | | | | | | | | | | | | | | | | | |
| | H | 1607-603-31,..... | 1607-603-3,..... | | | | | | | | | | | | | | | | | | |
| | N | 1607-604-31,..... | 1607-604-3,..... | | | | | | | | | | | | | | | | | | |

Dimensions and masses



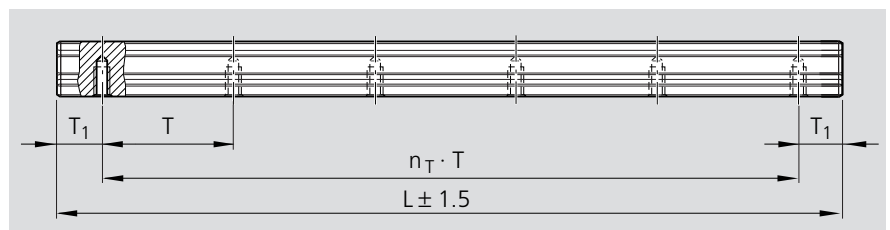
| Size | Dimensions (mm) | | | | | | | | Mass kg/m |
|------|-----------------|----------------|----------------|----------------|---------------------------------|-------------------|-----|------------------|--------------|
| | A ₂ | H ₂ | N ₇ | S ₇ | T ₁₅ ^{±0.5} | T _{1min} | T | L _{max} | |
| 15 | 15 | 16.20 | 7.5 | M5 | 28.0 | 10 | 60 | 3000 | 1.4 |
| 20 | 20 | 20.55 | 8.0 | M6 | 28.0 | 10 | 60 | 4000 | 2.4 |
| 25 | 23 | 24.25 | 12.0 | M6 | 28.0 | 10 | 60 | 4000 | 3.2 |
| 30 | 28 | 28.35 | 15.0 | M8 | 38.0 | 12 | 80 | 4000 | 5.0 |
| 35 | 34 | 31.85 | 15.0 | M8 | 38.0 | 12 | 80 | 4000 | 6.8 |
| 45 | 45 | 39.85 | 19.0 | M12 | 50.5 | 16 | 105 | 4000 | 10.5 |
| 55 | 53 | 47.85 | 22.0 | M14 | 58.0 | 18 | 120 | 4000 | 16.2 |
| 65 | 63 | 59.85 | 25.0 | M16 | 73.0 | 20 | 150 | 4000 | 22.4 |

Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35,
accuracy class H,
rail length 1756 mm,
(21 · T, number of holes n_B = 22)
Ordering data: **1607-303-31, 1756 mm**



Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T₁₅
- If T₁₅ cannot be used, then
 - Select an end space T₁ between T₁₅ and T_{1min}
 - Do not go below the minimum spacing T_{1min}!

Note

- T₁, T_{1min}, T₁₅ are the same at either end of the rail.

| | |
|--|--|
| $L = n_B \cdot T - 4$ <p>or</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | L = rail length (mm) T = hole spacing*) (mm) T ₁₅ = preferred dimension*) (mm) n _B = number of holes n _T = number of spaces *) see tables for values |
|--|--|

Ordering example 2 (up to L_{max}):

Guide rail size 35,
accuracy class H,
rail length 1676 mm,
(20 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 21)

Ordering data:

Part number, length (mm)
T₁₅ / n_T · T / T₁₅ (mm)
1607-303-31, 1676 mm
38 / 20 · 80 / 38 mm

Rail lengths above L_{max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{max}):

Guide rail size 35,
accuracy class H,
rail length 5063 mm, 2 sections
(62 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 63)

Ordering data:

Part number and number of sections,
length (mm)
T₁₅ / n_T · T / T₁₅ (mm)
1607-303-32, 5036 mm
38 / 62 · 80 / 38 mm

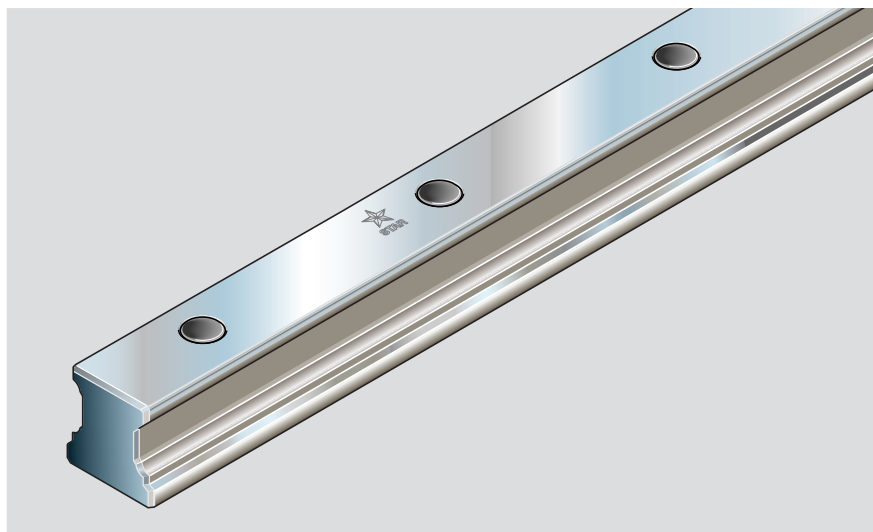
STAR – Ball Rail Systems

Guide Rails

Guide rail
Thin dense chrome plated
1645-

for mounting from above,
complete with plastic mounting
hole plugs

– Mounting holes are not chrome plated



Part numbers and rail lengths

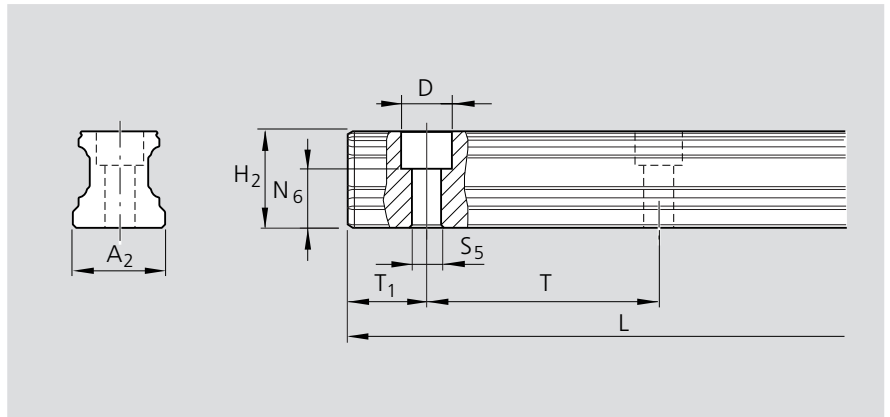
| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | |
|---------|----------------|---|---|---------------------|--|-----------|------------------|------------------|
| | | One piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Number of holes n_B / Rail length L (mm) | | | |
| 15 | H | 1645-103-31,.... | 1645-103-3,..... | 60 | 2 / 116 | 7 / 416 | 12 / 716 | 20 / 1196 |
| | | | | | 3 / 176 | 8 / 476 | 13 / 776 | 22 / 1316 |
| 20 | H | 1645-803-31,.... | 1645-803-3,..... | | 4 / 236 | 9 / 536 | 14 / 836 | 25 / 1496 |
| | | | | | 5 / 296 | 10 / 596 | 16 / 956 | 30 / 1796 |
| 25 | H | 1645-203-31,.... | 1645-203-3,..... | | 6 / 356 | 11 / 656 | 18 / 1076 | 32 / 1916 |
| | | | | | 30 | H | 1645-703-31,.... | 1645-703-3,..... |
| 3 / 236 | 8 / 636 | 13 / 1036 | 22 / 1756 | | | | | |
| 35 | H | 1645-303-31,.... | 1645-303-3,..... | 80 | 4 / 316 | 9 / 716 | 14 / 1116 | 24 / 1916 |
| | | | | | 5 / 396 | 10 / 796 | 16 / 1276 | |
| 45 | H | 1645-403-31,.... | 1645-403-3,..... | 105 | 6 / 476 | 11 / 876 | 18 / 1436 | |
| | | | | | 2 / 206 | 7 / 731 | 12 / 1256 | |
| | | | | | 3 / 311 | 8 / 836 | 13 / 1361 | |
| | | | | | 4 / 416 | 9 / 941 | 14 / 1466 | |
| | | | | | 5 / 521 | 10 / 1046 | 16 / 1676 | |
| | | | | | 6 / 626 | 11 / 1151 | 18 / 1886 | |
| 55 | H | 1645-503-31,.... | 1645-503-3,..... | 120 | 2 / 236 | 7 / 836 | 12 / 1436 | |
| | | | | | 3 / 356 | 8 / 956 | 13 / 1556 | |
| | | | | | 4 / 476 | 9 / 1076 | 14 / 1676 | |
| | | | | | 5 / 596 | 10 / 1196 | 15 / 1796 | |
| 65 | H | 1645-603-31,.... | 1645-603-3,..... | 150 | 6 / 716 | 11 / 1316 | | |
| | | | | | 2 / 296 | 7 / 1046 | 12 / 1796 | |
| | | | | | 3 / 446 | 8 / 1196 | | |
| | | | | | 4 / 596 | 9 / 1346 | | |
| | | | | | 5 / 746 | 10 / 1496 | | |
| | | | | | 6 / 896 | 11 / 1646 | | |

Recommended runner blocks

When using a combination of guide rails and runner blocks of different accuracy classes, the dimensions H and A_3 change by approx. 20 μm .
 (For dimensions H and A_3 see "Accuracy classes and their tolerances" under runner blocks, technical data)

| Size | Accuracy class | Recommended runner blocks | |
|------|----------------|--|------------------------------|
| | | Runner blocks up to approx. 10 μm clearance | Runner blocks preload 0.02 C |
| 15 | H | 16..-193-10 | |
| 20 | H | 16..-893-10 | |
| 25 | H | 16..-293-10 | |
| 30 | H | 16..-793-10 | |
| 35 | H | 16..-393-10 | 16..-313-10 |
| 45 | H | 16..-493-10 | 16..-413-10 |
| 55 | H | 16..-593-10 | 16..-513-10 |
| 65 | H | 16..-693-10 | 16..-613-10 |

Dimensions and masses



Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35,
accuracy class H,
rail length 1756 mm,
($21 \cdot T$, number of holes $n_B = 22$)
Ordering data: **1645-303-31, 1756 mm**

| Size | Dimensions (mm) | | | | | | | | | Mass kg/m |
|------|-----------------|-------|-----------------|------|-------|--------------------|--------------|-----|------------|--------------|
| | A_2 | H_2 | $N_6^{\pm 0.5}$ | D | S_5 | $T_{15}^{\pm 0.5}$ | $T_{1 \min}$ | T | L_{\max} | |
| 15 | 15 | 16.20 | 10.3 | 7.4 | 4.4 | 28.0 | 10 | 60 | 1980 | 1.4 |
| 20 | 20 | 20.55 | 13.2 | 9.4 | 6.0 | 28.0 | 10 | 60 | 1980 | 2.4 |
| 25 | 23 | 24.25 | 15.2 | 11.0 | 7.0 | 28.0 | 10 | 60 | 1980 | 3.2 |
| 30 | 28 | 28.35 | 17.0 | 15.0 | 9.0 | 38.0 | 12 | 80 | 2000 | 5.0 |
| 35 | 34 | 31.85 | 20.5 | 15.0 | 9.0 | 38.0 | 12 | 80 | 2000 | 6.8 |
| 45 | 45 | 39.85 | 23.5 | 20.0 | 14.0 | 50.5 | 16 | 105 | 1995 | 10.5 |
| 55 | 53 | 47.85 | 29.0 | 24.0 | 16.0 | 58.0 | 18 | 120 | 1920 | 16.2 |
| 65 | 63 | 59.85 | 38.5 | 26.0 | 18.0 | 73.0 | 20 | 150 | 1950 | 22.4 |

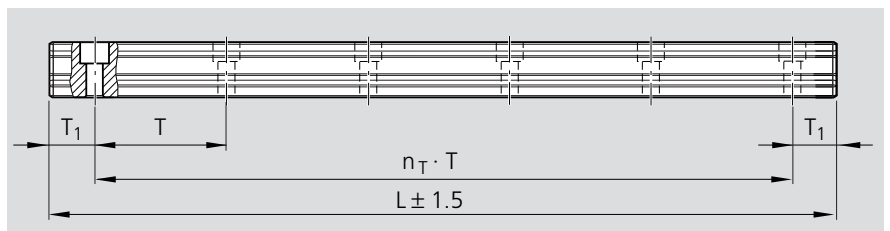
Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T_{15}
- If T_{15} cannot be used, then
 - Select an end space T_1 between T_{15} and $T_{1 \min}$
 - Do not go below the minimum spacing $T_{1 \min}$!

Note

- $T_1, T_{1 \min}, T_{15}$ are the same at either end of the rail.
- The length L_{\max} is also the standard length for chrome plated rails.
- The end faces are thin dense chrome plated and finished as a joint for end to end mounting.
- The end faces of shorter rails are not chrome plated.



| | |
|--|---|
| $L = n_B \cdot T - 4$ <p>or</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | <p>L = rail length (mm)</p> <p>T = hole spacing*) (mm)</p> <p>T_{15} = preferred dimension*) (mm)</p> <p>n_B = number of holes</p> <p>n_T = number of spaces</p> <p>*) see tables for values</p> |
|--|---|

Ordering example 2 (up to L_{\max}):

Guide rail size 35,
accuracy class H,
rail length 1676 mm,
($20 \cdot T$, preferred dimension $T_{15} = 38$ mm;
number of holes $n_B = 21$)

Ordering data:

Part number, length (mm)
 $T_{15} / n_T \cdot T / T_{15}$ (mm)

1645-303-31, 1676 mm
38 / 20 · 80 / 38 mm

Rail lengths above L_{\max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{\max}):

Guide rail size 35,
accuracy class H,
rail length 3676 mm, 2 sections
($45 \cdot T$, preferred dimension $T_{15} = 38$ mm;
number of holes $n_B = 46$)

Ordering data:

Part number and number of sections,
length (mm)
 $T_{15} / n_T \cdot T / T_{15}$ (mm)

1645-303-32, 3676 mm
38 / 45 · 80 / 38 mm

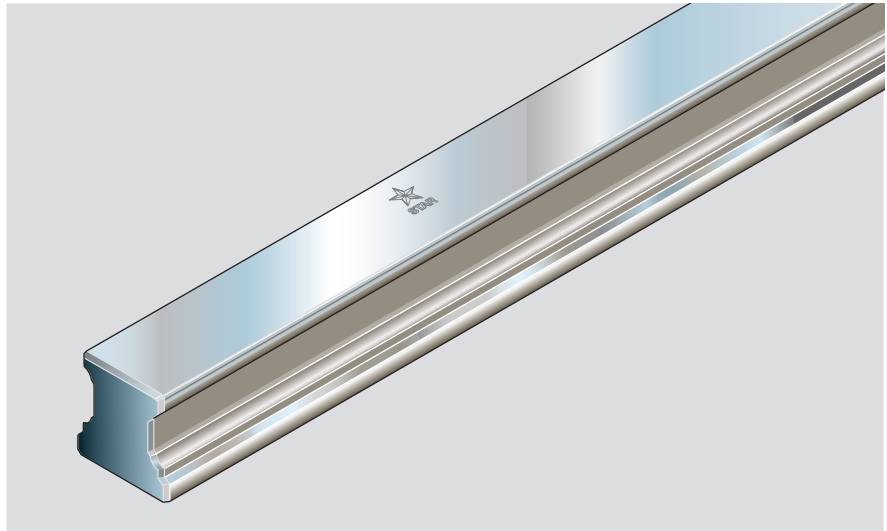
STAR – Ball Rail Systems

Guide Rails

Guide rail
Thin dense chrome plated
1647-

For mounting from below

– Mounting holes are not chrome plated



Part numbers and rail lengths

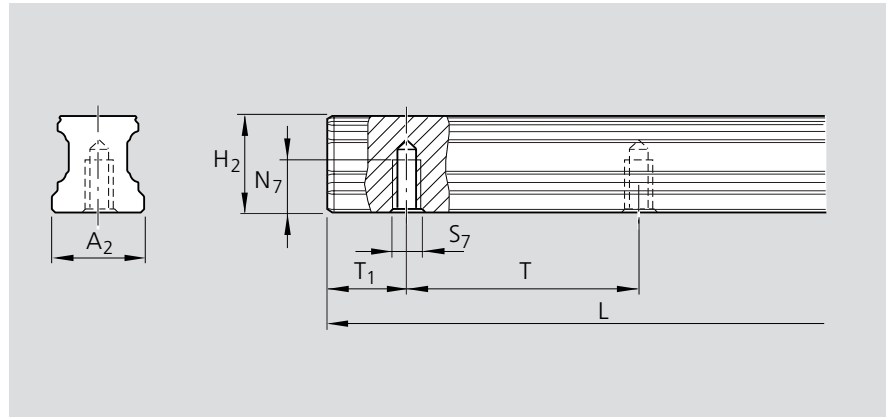
| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | | |
|------|----------------|---|---|---------------------|--|-----------|-----------|-----------|--|
| | | One-piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Number of holes n_g / Rail length L (mm) | | | | |
| 15 | H | 1647-103-31,..... | 1647-103-3,..... | 60 | 2 / 116 | 7 / 416 | 12 / 716 | 20 / 1196 | |
| | | | | | 3 / 176 | 8 / 476 | 13 / 776 | 22 / 1316 | |
| 20 | H | 1647-803-31,..... | 1647-803-3,..... | 60 | 4 / 236 | 9 / 536 | 14 / 836 | 25 / 1496 | |
| | | | | | 5 / 296 | 10 / 596 | 16 / 956 | 30 / 1796 | |
| 25 | H | 1647-203-31,..... | 1647-203-3,..... | 60 | 6 / 356 | 11 / 656 | 18 / 1076 | 32 / 1916 | |
| | | | | | | | | | |
| 30 | H | 1647-703-31,..... | 1647-703-3,..... | 80 | 2 / 156 | 7 / 556 | 12 / 956 | 20 / 1596 | |
| | | | | | 3 / 236 | 8 / 636 | 13 / 1036 | 22 / 1756 | |
| 35 | H | 1647-303-31,..... | 1647-303-3,..... | 80 | 4 / 316 | 9 / 716 | 14 / 1116 | 24 / 1916 | |
| | | | | | 5 / 396 | 10 / 796 | 16 / 1276 | | |
| 45 | H | 1647-403-31,..... | 1647-403-3,..... | 105 | 6 / 476 | 11 / 876 | 18 / 1436 | | |
| | | | | | | | | | |
| 55 | H | 1647-503-31,..... | 1647-503-3,..... | 120 | 2 / 206 | 7 / 731 | 12 / 1256 | | |
| | | | | | 3 / 311 | 8 / 836 | 13 / 1361 | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 4 / 416 | 9 / 941 | 14 / 1466 | | |
| | | | | | 5 / 521 | 10 / 1046 | 16 / 1676 | | |
| 55 | H | 1647-503-31,..... | 1647-503-3,..... | 120 | 6 / 626 | 11 / 1151 | 18 / 1886 | | |
| | | | | | | | | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 2 / 236 | 7 / 836 | 12 / 1436 | | |
| | | | | | 3 / 356 | 8 / 956 | 13 / 1556 | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 4 / 476 | 9 / 1076 | 14 / 1676 | | |
| | | | | | 5 / 596 | 10 / 1196 | 15 / 1796 | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 6 / 716 | 11 / 1316 | | | |
| | | | | | | | | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 2 / 296 | 7 / 1046 | 12 / 1796 | | |
| | | | | | 3 / 446 | 8 / 1196 | | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 4 / 596 | 9 / 1346 | | | |
| | | | | | 5 / 746 | 10 / 1496 | | | |
| 65 | H | 1647-603-31,..... | 1647-603-3,..... | 150 | 6 / 896 | 11 / 1646 | | | |
| | | | | | | | | | |

Recommended runner blocks

When using a combination of guide rails and runner blocks of different accuracy classes, the dimensions H and A_3 change by approx. 20 μm .
(For dimensions H and A_3 see "Accuracy classes and their tolerances" under runner blocks, technical data)

| Size | Accuracy class | Recommended runner blocks | |
|------|----------------|---|---------------------------------|
| | | Runner blocks up to approx. 10 μm clearance | Runner blocks preload 0.02 C |
| 15 | H | 16..-193-10 | |
| 20 | H | 16..-893-10 | |
| 25 | H | 16..-293-10 | |
| 30 | H | 16..-793-10 | |
| 35 | H | 16..-393-10 | 16..-313-10 |
| 45 | H | 16..-493-10 | 16..-413-10 |
| 55 | H | 16..-593-10 | 16..-513-10 |
| 65 | H | 16..-693-10 | 16..-613-10 |

Dimensions and masses



Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35,
accuracy class H,
rail length 1756 mm,
($21 \cdot T$, number of holes $n_B = 22$)
Ordering data: **1647-303-31, 1756 mm**

| Size | Dimensions (mm) | | | | | | | | Mass kg/m |
|------|-----------------|-------|-------|-------|--------------------|------------|-----|-----------|--------------|
| | A_2 | H_2 | N_7 | S_7 | $T_{15}^{\pm 0.5}$ | T_{1min} | T | L_{max} | |
| 15 | 15 | 16.20 | 7.5 | M5 | 28.0 | 10 | 60 | 1980 | 1.4 |
| 20 | 20 | 20.55 | 8.0 | M6 | 28.0 | 10 | 60 | 1980 | 2.4 |
| 25 | 23 | 24.25 | 12.0 | M6 | 28.0 | 10 | 60 | 1980 | 3.2 |
| 30 | 28 | 28.35 | 15.0 | M8 | 38.0 | 12 | 80 | 2000 | 5.0 |
| 35 | 34 | 31.85 | 15.0 | M8 | 38.0 | 12 | 80 | 2000 | 6.8 |
| 45 | 45 | 39.85 | 19.0 | M12 | 50.5 | 16 | 105 | 1995 | 10.5 |
| 55 | 53 | 47.85 | 22.0 | M14 | 58.0 | 18 | 120 | 1920 | 16.2 |
| 65 | 63 | 59.85 | 25.0 | M16 | 73.0 | 20 | 150 | 1950 | 22.4 |

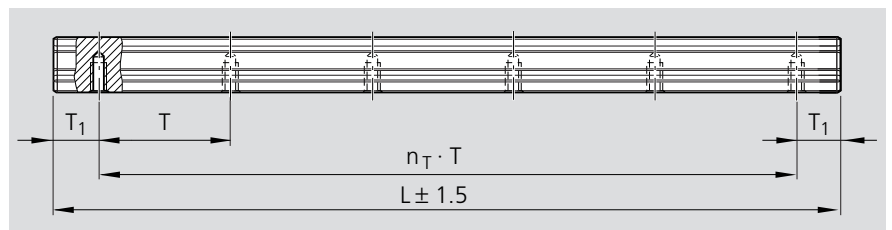
Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T_{15}
- If T_{15} cannot be used, then
 - Select an end space T_1 between T_{15} and T_{1min}
 - Do not go below the minimum spacing T_{1min} !

Note

- T_1, T_{1min}, T_{15} are the same at either end of the rail.
- The length L_{max} is also the standard length for chrome plated rails.
- The end faces are thin dense chrome plated and finished as a joint for end to end mounting.
- The end faces of shorter rails are not chrome plated.



| | |
|--|---|
| $L = n_B \cdot T - 4$ <p>or</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | <p>L = rail length (mm)</p> <p>T = hole spacing*) (mm)</p> <p>T_{15} = preferred dimension*) (mm)</p> <p>n_B = number of holes</p> <p>n_T = number of spaces</p> <p>*) see tables for values</p> |
|--|---|

Ordering example 2 (up to L_{max}):

Guide rail size 35,
accuracy class H,
rail length 1676 mm,
($20 \cdot T$, preferred dimension $T_{15} = 38$ mm;
number of holes $n_B = 21$)

Ordering data:

Part number, length (mm)
 $T_{15} / n_T \cdot T / T_{15}$ (mm)

1647-303-31, 1676 mm
38 / 20 · 80 / 38 mm

Rail lengths above L_{max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{max}):

Guide rail size 35,
accuracy class H,
rail length 3676 mm, 2 sections
($45 \cdot T$, preferred dimension $T_{15} = 38$ mm;
number of holes $n_B = 46$)

Ordering data:

Part number and number of sections,
length (mm)
 $T_{15} / n_T \cdot T / T_{15}$ (mm)

1647-303-32, 3676 mm
38 / 45 · 80 / 38 mm

STAR – Ball Rail Systems

Rail Seal Mounting Hole Cover Strip, Protective Caps, Mounting Hole Plugs

Guide Rails with Rail Seal

– Shipment

One-piece guide rails:

One-piece guide rails are shipped with the rail seal already clipped on.

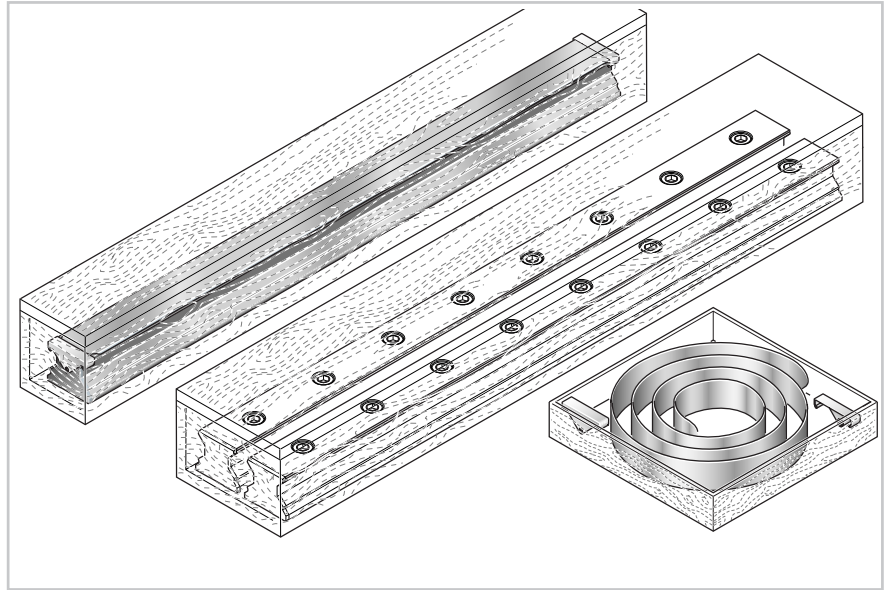
Composite guide rails:

For composite guide rails, a one-piece rail seal to cover the total length is supplied separately.

Standard version:

Snap-fit Rail Seal.

Rail seal with prefabricated sliding fit available on request. Please state dimension for sliding fit in clear text.



Separate standard snap-fit rail seal 1619-

(as spare/replacement part)

Ordering example:

- Guide rail size 35
- Guide rail length 2696 mm

Ordering data:

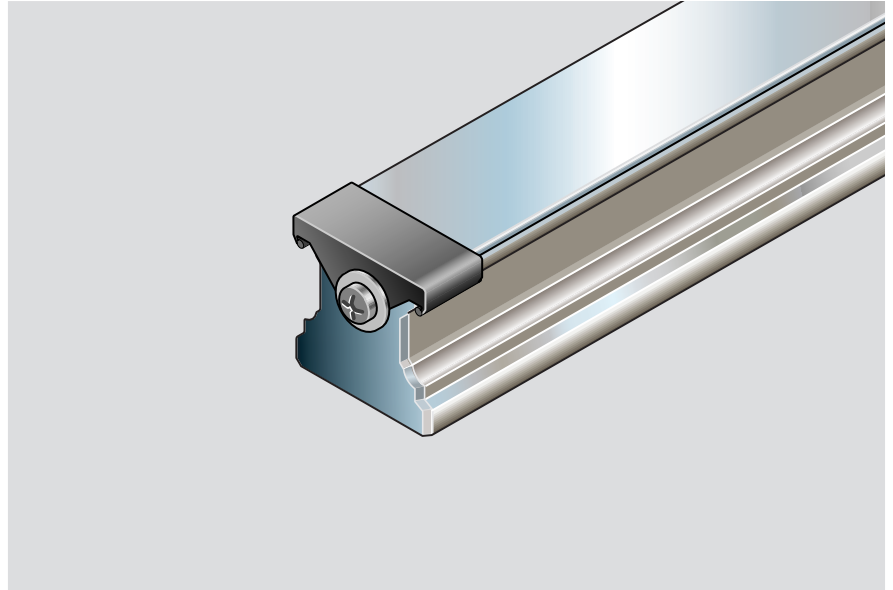
Part number, length (mm)

1619-330-20, 2696 mm

| Size | Standard Rail Seal Part numbers, length (mm) |
|------|---|
| 15 | 1619-130-00, |
| 20 | 1619-830-00, |
| 25 | 1619-230-00, |
| 30 | 1619-730-00, |
| 35 | 1619-330-20, |
| 45 | 1619-430-20, |
| 55 | 1619-530-20, |
| 65 | 1619-630-20, |

Protective Caps

STAR recommends the use of screw-down protective caps.



Part numbers for protective caps

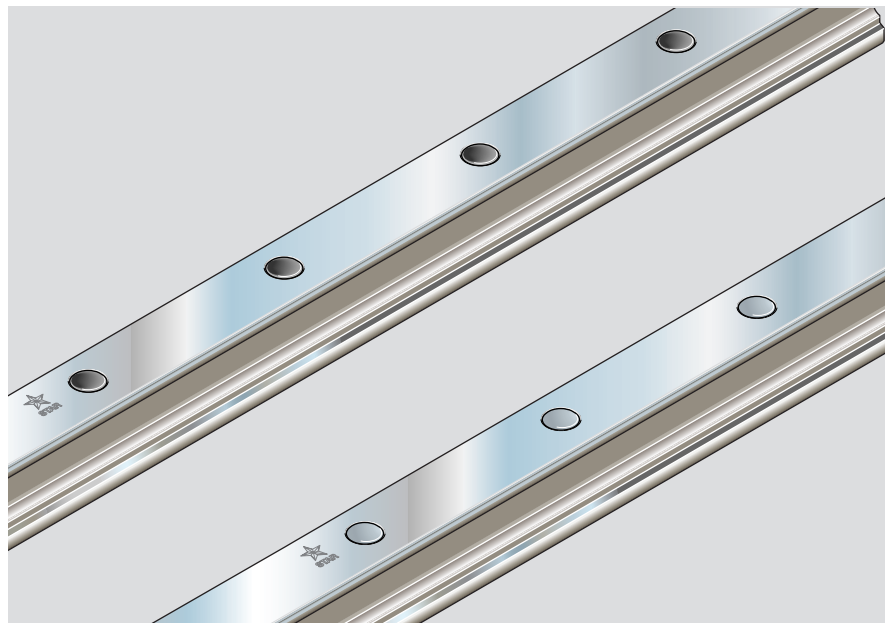
| Size | Protective caps | |
|------|-----------------|-------------|
| | Part numbers | |
| 15 | 1619-139-00 | 1619-139-20 |
| 20 | 1619-839-00 | 1619-839-20 |
| 25 | 1619-239-00 | 1619-239-20 |
| 30 | 1619-739-00 | 1619-739-20 |
| 35 | 1619-339-00 | 1619-339-20 |
| 45 | 1619-439-00 | 1619-439-20 |
| 55 | 1619-539-00 | 1619-539-20 |
| 65 | 1619-639-00 | 1619-639-20 |

Mounting Hole Plugs

| Part numbers for Mounting Hole Plugs | | |
|--------------------------------------|-------------|-------------|
| Size | Plastic | Steel |
| 15 | 1605-100-80 | – |
| 20 | 1605-800-80 | – |
| 25 | 1605-200-80 | 1606-200-75 |
| 30 | 1605-300-80 | 1606-300-75 |
| 35 | 1605-300-80 | 1606-300-75 |
| 45 | 1605-400-90 | 1606-400-75 |
| 55 | 1605-500-90 | 1606-500-75 |
| 65 | 1605-600-90 | 1606-600-75 |

A mounting jig with instruction leaflet is available for mounting steel mounting hole plugs.

| Size | Part numbers |
|------|--------------|
| 25 | 1619-210-00 |
| 35 | 1619-310-00 |
| 45 | 1619-410-00 |
| 55 | 1619-510-00 |
| 65 | 1619-610-00 |



STAR – Ball Rail Systems

Product Survey - Wide Ball Rail System

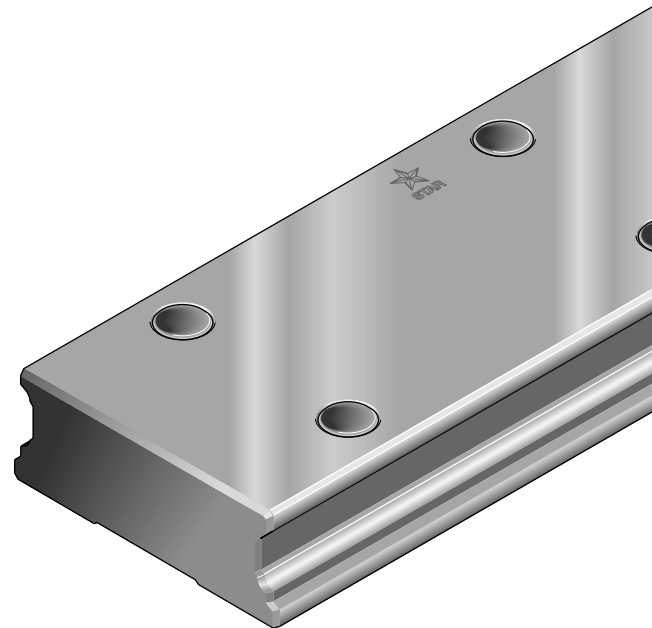
Due to very high moment and torsional rigidity, particularly suitable for single rail applications

Make up your own compact linear motion guideways from interchangeable standard stock elements...

STAR manufactures its guide rails and runner blocks with such high precision, especially in the ball track zone, that each individual component element can be replaced by another at any time.

This makes infinite combinations possible within each accuracy class.

- ▶ High moment load capacity
- ▶ Four lube ports at either end for added ease of maintenance
- ▶ Innovative cage design allows for longer lubrication intervals
- ▶ Integral all-round sealing of all ball tracks
- ▶ Guide rails and runner blocks in accuracy class N (clearance and preload 0.02 C) also available with surface protection
- ▶ End face mounting holes for attachment of bellows or scraper plates



30% higher dynamic load capacities and moments as standard in accuracy classes P, H and N (except sizes 20-40):

- extends service life by a factor of 2.2
- field-proven
- identical in all four main load directions

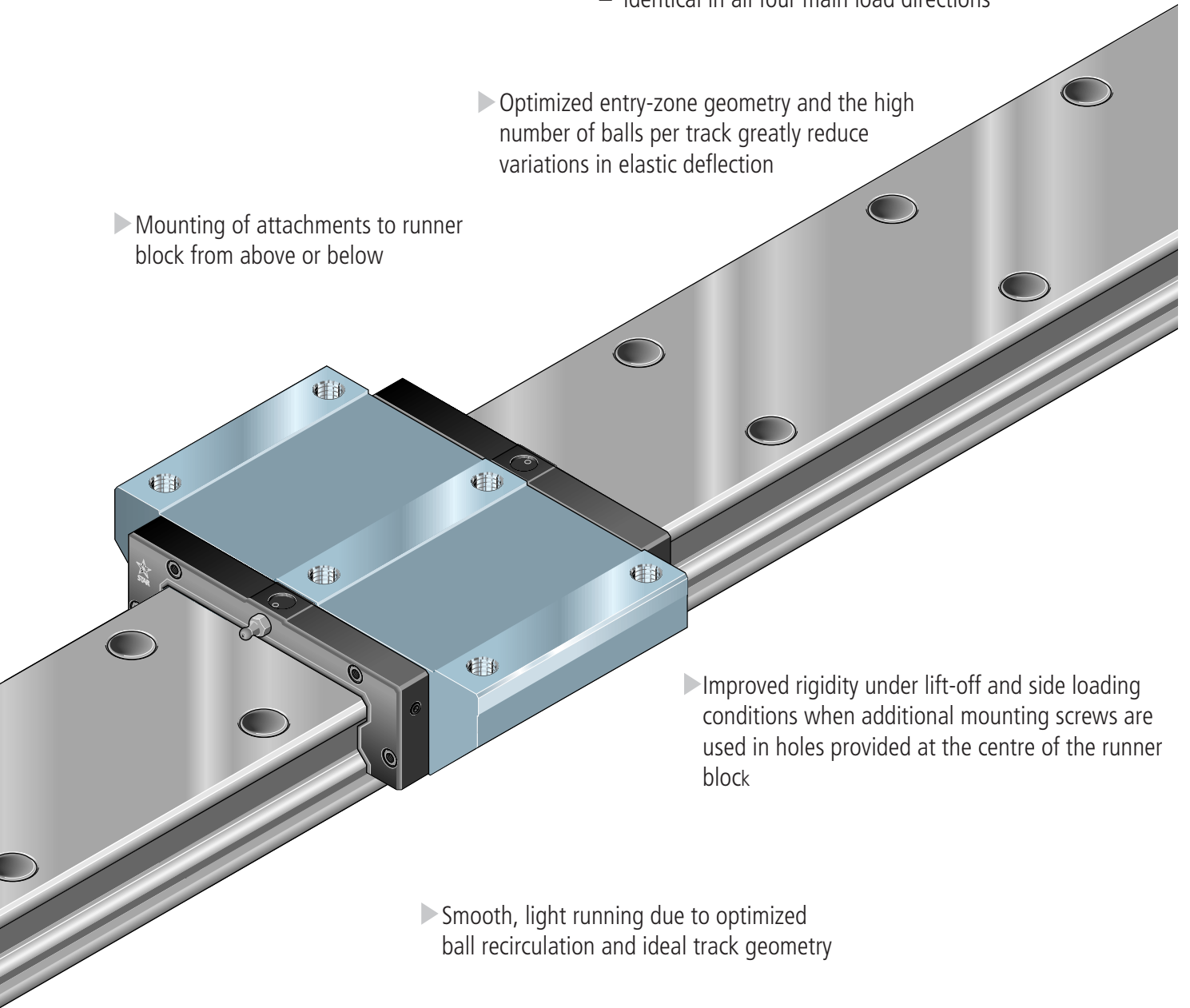
▶ Optimized entry-zone geometry and the high number of balls per track greatly reduce variations in elastic deflection

▶ Mounting of attachments to runner block from above or below

▶ Improved rigidity under lift-off and side loading conditions when additional mounting screws are used in holes provided at the centre of the runner block

▶ Smooth, light running due to optimized ball recirculation and ideal track geometry

▶ Guideway with minimal clearance or light preload



STAR – Ball Rail Systems

Technical Data – Wide Ball Rail Systems

Rigidity of the wide Ball Rail System at 0.02 C preload

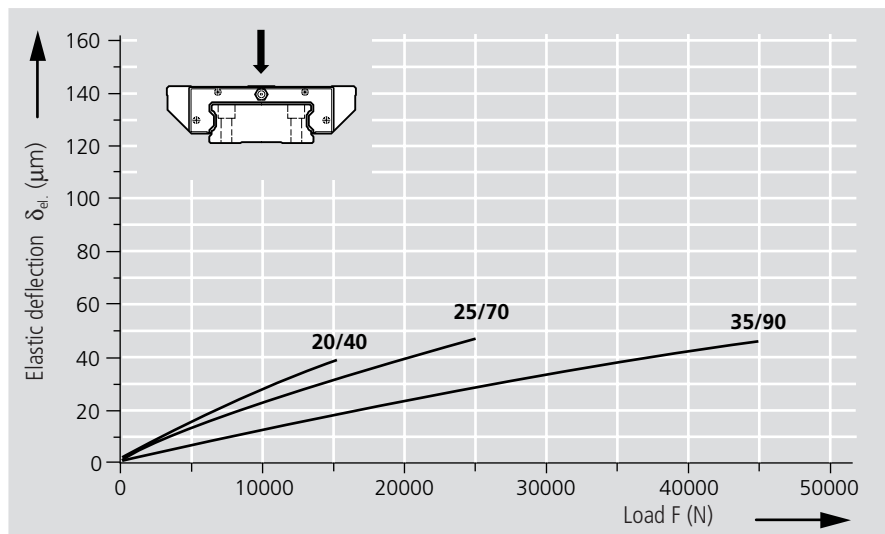
Runner block 1671-
Wide

————— measured values

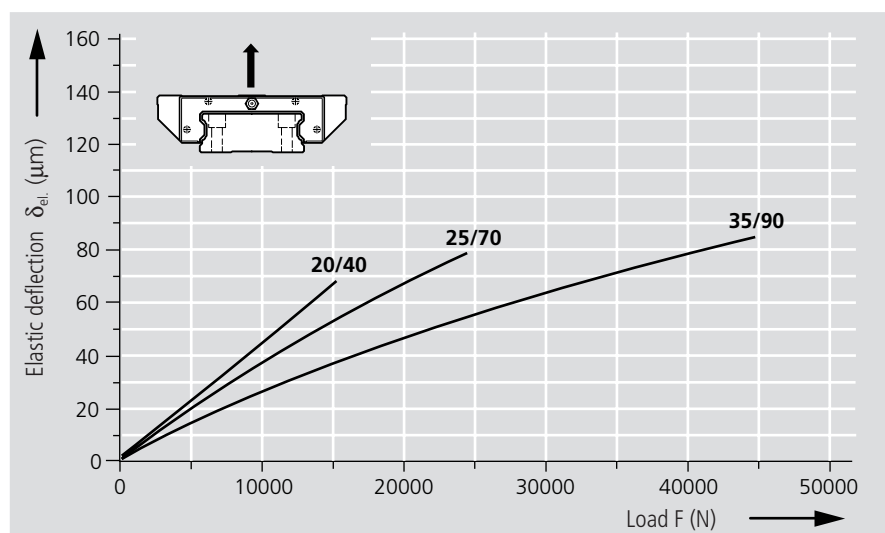
Runner block mounted with six screws:

- 4 outer screws of strength class 12.9
- 2 centerline screws of strength class 8.8

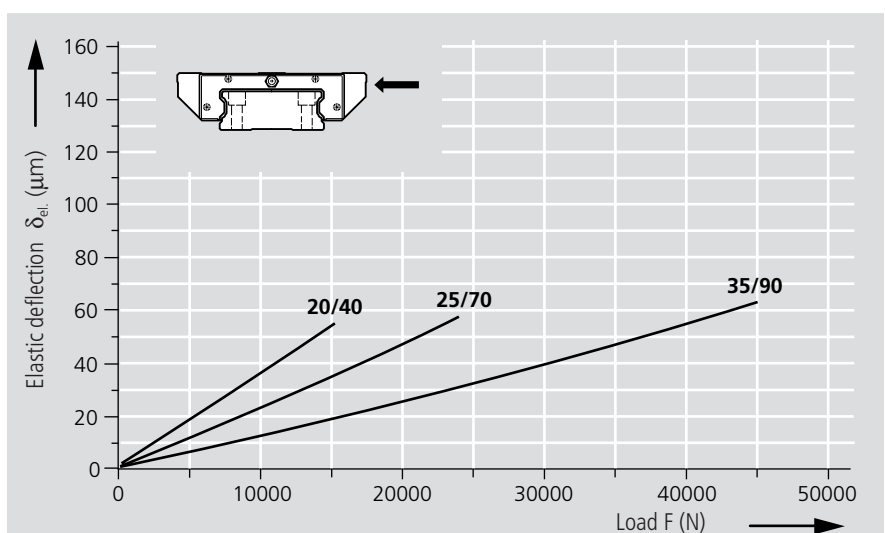
1. Down load



2. Lift-off load



3. Side load



Mounting Instructions

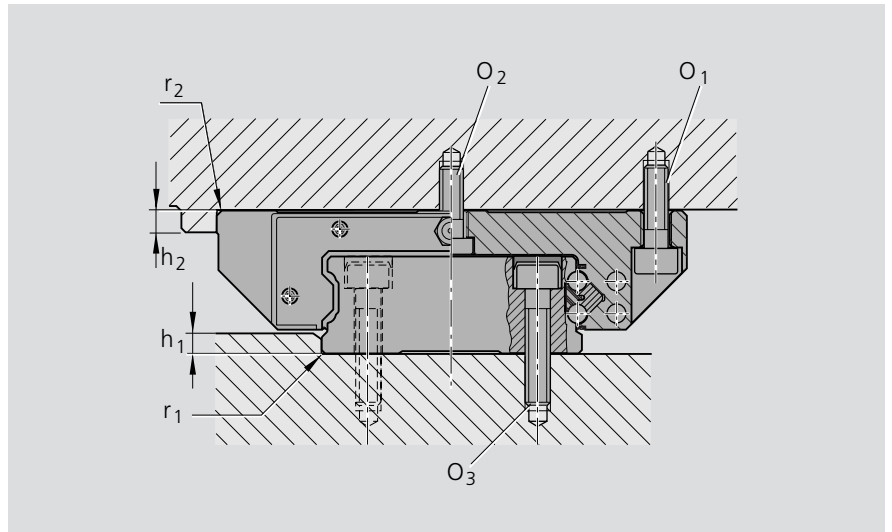
Reference edges, corner radii, mounting screw sizes and tightening torque

Runner block 1671-

– Wide

Guide rail:

– Wide, for mounting from above 1675-

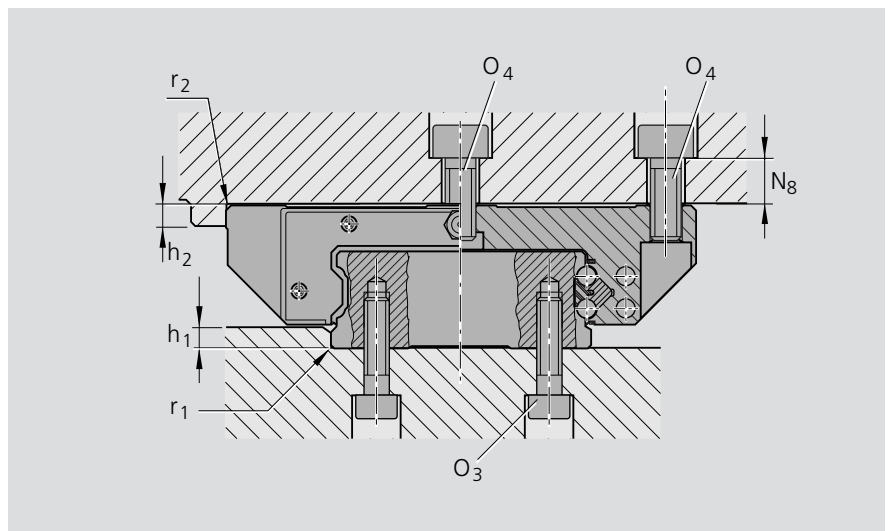


Runner block 1671-

– Wide

Guide rail:

– Wide, for mounting from below 1677-



Dimensions and recommended limits for side load if no additional lateral retention is provided

1) When mounting the runner block from above using only 4 O₄ screws:
 - Permissible side force 1/3 lower
 - Lower stiffness

2) For runner block mounting with 6 screws:
 - Tighten the centerline screws with the torque for strength class 8.8.

3) When mounting with 2 O₂ screws and 4 O₁ screws

| Size | h ₁ | | r ₁ | h ₂ | | r ₂ | O ₁ DIN 912 4 pcs. | O ₂ ²⁾ DIN 6912 2 pcs. | O ₄ ¹⁾²⁾ DIN 912 6 pcs. | O ₃ DIN 912 | N ₈ (mm) |
|-------|----------------|------|----------------|----------------|------|----------------|-------------------------------------|--|---|---------------------------|------------------------|
| | min. | max. | | min. | max. | | | | | | |
| 20/40 | 2.0 | 3.0 | 0.5 | 4 | 0.5 | M5x16 | M5x12 | M6x16 | M4x20 | 9.5 | |
| 25/70 | 3.0 | 4.5 | 0.8 | 5 | 0.8 | M6x20 | M6x16 | M8x20 | M6x30 | 10.0 | |
| 35/90 | 3.5 | 6.0 | 0.8 | 6 | 0.8 | M8x25 | M8x20 | M10x25 | M8x35 | 13.0 | |

| Screw strength class | Runner block | | | Rails | |
|----------------------|--------------|--------|----------------------|--------|--------|
| | 8.8 | 0.08 C | 0.11 ³⁾ C | 0.16 C | 0.08 C |
| | 12.9 | 0.13 C | 0.16 ³⁾ C | 0.24 C | 0.13 C |

Tightening torque of the mounting screws

| Nm | M4 | M5 | M6 | M8 | M10 |
|------|-----|-----|-----|-----|-----|
| | 8.8 | 2.7 | 5.5 | 9.5 | 23 |
| 12.9 | 4.6 | 9.5 | 16 | 39 | 77 |

STAR – Ball Rail Systems

Wide Ball Rail Systems

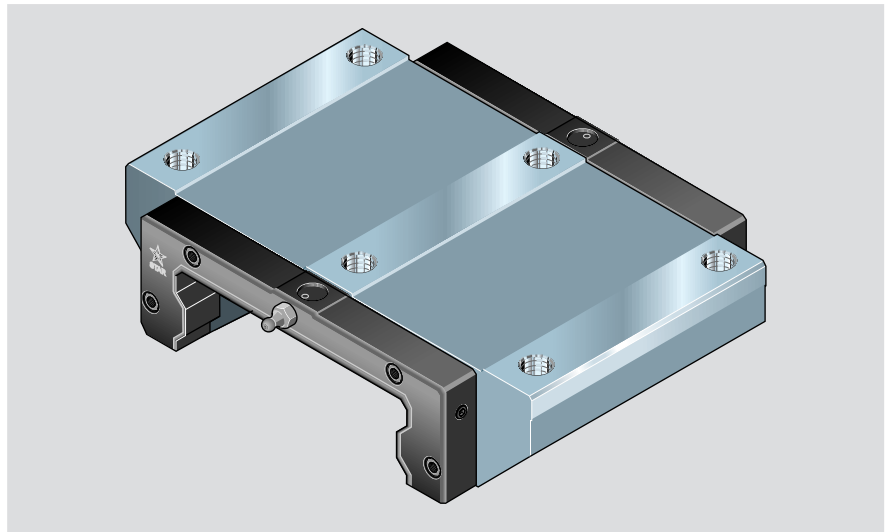
Runner blocks steel version 1671-

Wide

Special versions:

Runner blocks in accuracy class N (clearance and preload 0.02 C) are also available:

- with zinc-iron coating and yellow chromating (Part numbers 16...4-30).



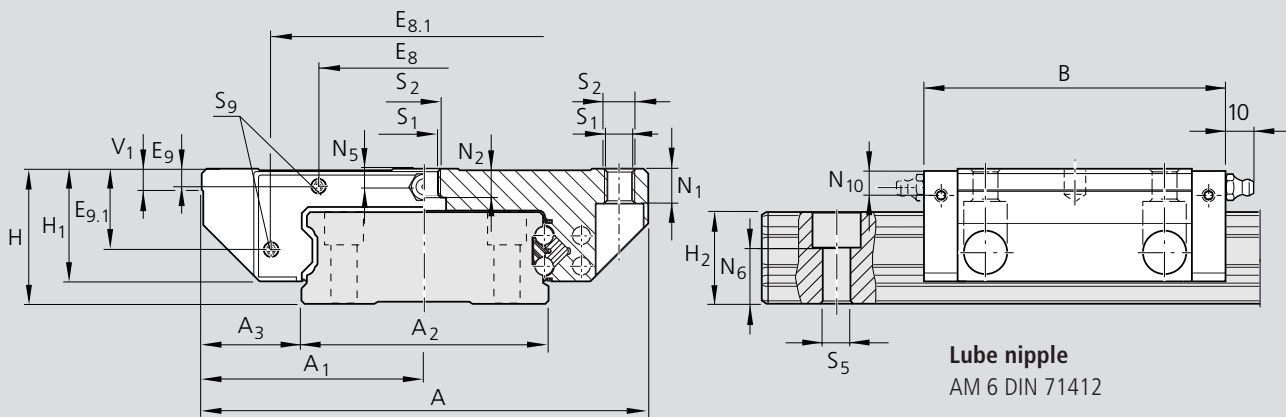
Part numbers

| Size | Accuracy class | Part numbers for runner blocks for preload class | |
|-------|----------------|--|----------------|
| | | up to approx. 10 µm clearance | Preload 0.02 C |
| 20/40 | P | | 1671-812-10 |
| | H | 1671-893-10 | 1671-813-10 |
| | N | 1671-894-10 | 1671-814-10 |
| 25/70 | P | | 1671-212-10 |
| | H | 1671-293-10 | 1671-213-10 |
| | N | 1671-294-10 | 1671-214-10 |
| 35/90 | P | | 1671-312-10 |
| | H | 1671-393-10 | 1671-313-10 |
| | N | 1671-394-10 | 1671-314-10 |

Note on dynamic load capacities and moments (see table)

Determination of dynamic load capacities and moments is based on a travel life of 100,000 m.

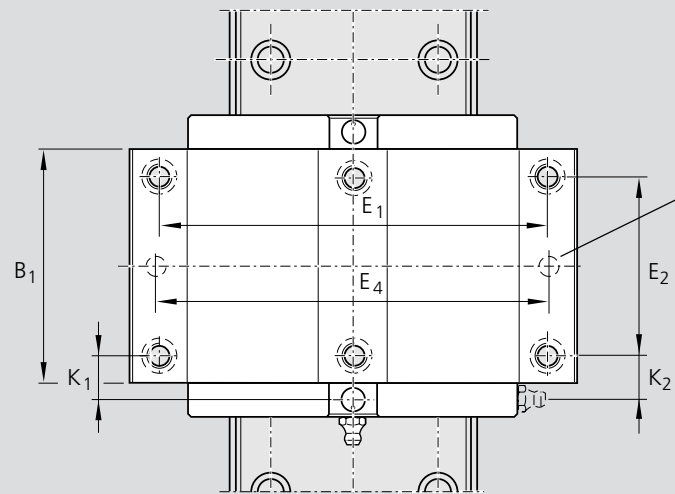
For comparison with the 50,000 m travel sometimes applied for rail-type guideways, the figures for **C**, **M_t** and **M_L** in the table should be multiplied by 1.26 .



Lube nipple
AM 6 DIN 71412

connectable to any side.

The runner block features two additional lube ports for the connecting structure.



Recommended position for pin holes (dimension E_4 , see table).

Note
Ready-drilled holes made for production reasons may exist at the recommended pin hole position.

These may be extended and bored open to accommodate the locating pin.

| Size | Dimensions (mm) | | |
|-------|-----------------|--------|-------|
| | E_4 | ϕ | Depth |
| 20/40 | 70 | 4.7 | 7 |
| 25/70 | 107 | 5.7 | 8 |
| 35/90 | 144 | 7.7 | 8 |

| Dimensions (mm) | | | | | | | | | | | | | | | | | | | |
|-----------------|-----|-------|-------|-------|-----|-------|----|-------|-------|-------|-------|-------|-------|-----------|-------|-----------|-------|-------|-------|
| Size | A | A_1 | A_2 | A_3 | B | B_1 | H | H_1 | H_2 | V_1 | E_1 | E_2 | E_8 | $E_{8.1}$ | E_9 | $E_{9.1}$ | N_1 | N_2 | N_5 |
| 20/40 | 80 | 40 | 42 | 19.0 | 73 | 52.0 | 27 | 23.5 | 19.05 | 6.0 | 70 | 40 | 36.0 | 57.5 | 3.55 | 15.5 | 7.7 | 3.7 | 4.0 |
| 25/70 | 120 | 60 | 69 | 25.5 | 105 | 79.5 | 35 | 30.0 | 23.40 | 7.5 | 107 | 60 | 70.2 | 90.7 | 5.6 | 20.3 | 9.0 | 7.0 | 5.5 |
| 35/90 | 162 | 81 | 90 | 36.0 | 142 | 113.6 | 50 | 42.5 | 32.00 | 8.0 | 144 | 80 | 79.0 | 116.0 | 6.8 | 29.9 | 14.0 | 12.0 | 9.0 |

| Size | Dimensions (mm) | | | | | | | Mass (kg) | Load capacities (N) | | Moments (Nm) | | | |
|-------|-----------------|----------|-------|-------|-------|-------|---------------|-----------|---------------------|-------------|--------------|----------------|------------|----------------|
| | $N_6^{\pm 0.5}$ | N_{10} | S_1 | S_2 | K_1 | K_2 | S_9 | | C dyn. | C_0 stat. | M_t dyn. | M_{t0} stat. | M_L dyn. | M_{L0} stat. |
| 20/40 | 13.2 | 5.5 | 5.4 | M6 | 10.6 | 11.0 | M2.5-3.5 deep | 0.45 | 15 600 | 24 100 | 370 | 640 | 116 | 200 |
| 25/70 | 14.4 | 8.0 | 6.4 | M8 | 15.4 | 16.3 | M3-5 deep | 1.70 | 30 400* | 45 500 | 1 130 | 1 690 | 345 | 510 |
| 35/90 | 20.5 | 9.0 | 8.4 | M10 | 22.8 | 24.8 | M3-5 deep | 3.70 | 58 200* | 86 300 | 2 880 | 4 270 | 920 | 1 370 |

* 30 % higher dynamic load capacities and moments



STAR – Ball Rail Systems

Wide Ball Rail Systems

Guide Rail 1675-

Wide, for mounting from above

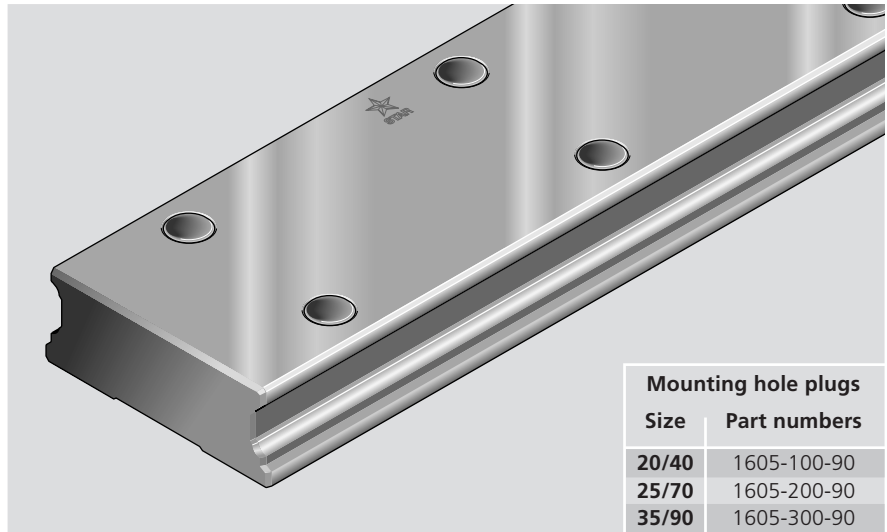
- Plastic mounting hole plugs are supplied along with the rail.
Reordering data: see table inset on right for part numbers.

- For special applications:
Guide rails for steel mounting hole plugs, Part numbers: **1676-.5.-**

Steel mounting hole plugs to be ordered separately.

A mounting jig with instruction leaflet is available for mounting steel mounting hole plugs.

| Size | Part numbers Mounting jig |
|--------------|------------------------------|
| 25/70 | 1619-210-40 |
| 35/90 | 1619-310-40 |



| Mounting hole plugs | |
|---------------------|--------------|
| Size | Part numbers |
| 20/40 | 1605-100-90 |
| 25/70 | 1605-200-90 |
| 35/90 | 1605-300-90 |

Special version:

Zinc-iron coating with yellow chromating
in accuracy class N.

Part numbers:

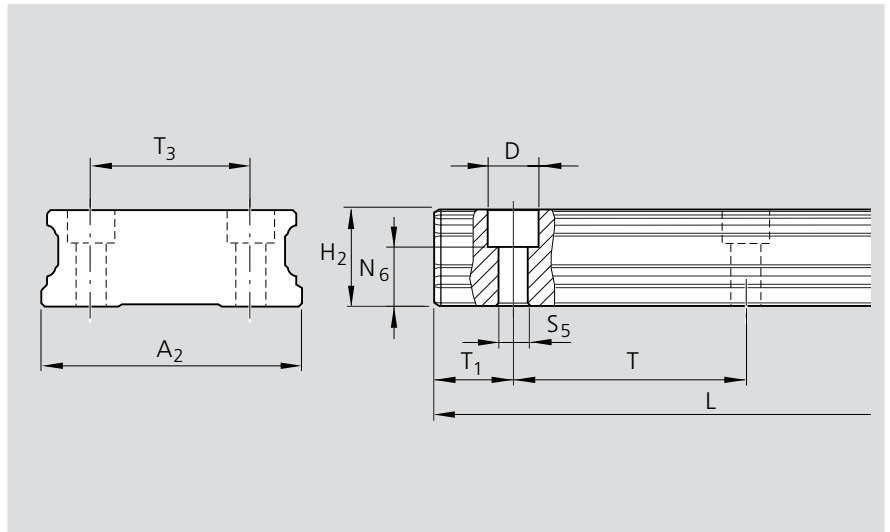
1674-.14-3. (end faces uncoated)

1674-.14-4. (end faces coated)

Part numbers and rail lengths

| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | | |
|--------------|----------------|---|---|---------------------|--|----------|-----------|-----------|-----------|
| | | One-piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Mounting screw holes n_B / Rail length L (mm) (per row) | | | | |
| 20/40 | P | 1675-802-31,..... | 1675-802-3,..... | 60 | 2 / 116 | 7 / 416 | 12 / 716 | 20 / 1196 | 40 / 2396 |
| | H | 1675-803-31,..... | 1675-803-3,..... | | 3 / 176 | 8 / 476 | 13 / 776 | 22 / 1316 | 50 / 2996 |
| | N | 1675-804-31,..... | 1675-804-3,..... | | 4 / 236 | 9 / 536 | 14 / 836 | 25 / 1496 | 60 / 3596 |
| 25/70 | P | 1675-202-31,..... | 1675-202-3,..... | 80 | 5 / 296 | 10 / 596 | 16 / 956 | 30 / 1796 | 66 / 3956 |
| | H | 1675-203-31,..... | 1675-203-3,..... | | 6 / 356 | 11 / 656 | 18 / 1076 | 35 / 2096 | |
| | N | 1675-204-31,..... | 1675-204-3,..... | | 2 / 156 | 7 / 556 | 12 / 956 | 20 / 1596 | 40 / 3196 |
| 35/90 | P | 1675-302-31,..... | 1675-302-3,..... | 80 | 3 / 236 | 8 / 636 | 13 / 1036 | 22 / 1756 | 50 / 3996 |
| | H | 1675-303-31,..... | 1675-303-3,..... | | 4 / 316 | 9 / 716 | 14 / 1116 | 25 / 1996 | |
| | N | 1675-304-31,..... | 1675-304-3,..... | | 5 / 396 | 10 / 796 | 16 / 1276 | 30 / 2396 | |
| 35/90 | H | 1675-303-31,..... | 1675-303-3,..... | 80 | 6 / 476 | 11 / 876 | 18 / 1436 | 35 / 2796 | |
| | N | 1675-304-31,..... | 1675-304-3,..... | | | | | | |

Dimensions and masses



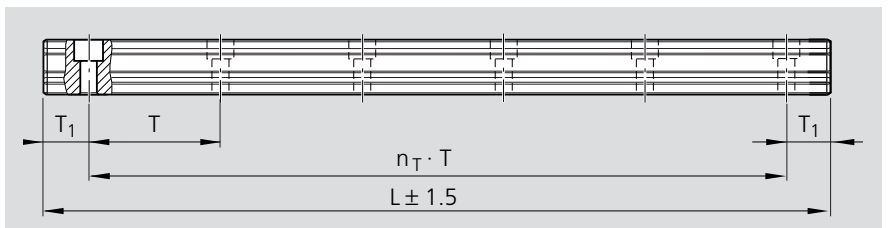
| Size | Dimensions (mm) | | | | | | | | | | Mass kg/m |
|-------|-----------------|----------------|--------------------------------|------|----------------|---------------------------------|-------------------|----|----------------|------------------|--------------|
| | A ₂ | H ₂ | N ₆ ^{±0.5} | D | S ₅ | T ₁₅ ^{±0.5} | T _{1min} | T | T ₃ | L _{max} | |
| 20/40 | 42 | 19.05 | 13.2 | 7.4 | 4.4 | 28 | 10 | 60 | 24 | 4 000 | 5.3 |
| 25/70 | 69 | 23.40 | 14.4 | 11.0 | 7.0 | 38 | 10 | 80 | 40 | 4 000 | 11.6 |
| 35/90 | 90 | 32.00 | 20.5 | 15.0 | 9.0 | 38 | 12 | 80 | 60 | 4 000 | 21.0 |

Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35/90,
accuracy class H,
rail length 1756 mm,
(21 · T, number of holes n_B = 22
giving 44 holes in 2 rows)
Ordering data: **1675-303-31, 1756 mm**



Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T₁₅
- If T₁₅ cannot be used, then
 - Select an end space T₁ between T₁₅ and T_{1min}
 - Do not go below the minimum spacing T_{1min}!

Note

- T₁, T_{1min}, T₁₅ are the same at either end of the rail.

| | |
|--|---|
| $L = n_B \cdot T - 4$ <p>or</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | L = rail length (mm) T = hole spacing*) (mm) T ₁₅ = preferred dimension*) (mm) n _B = number of holes per row n _T = number of spaces *) see table for values |
|--|---|

Ordering example 2 (up to L_{max}):

Guide rail size 35/90,
accuracy class P,
rail length 1676 mm,
(20 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 21 giving 42 holes
in 2 rows)

Ordering data:

Part number, length (mm)
T₁₅ / n_T · T / T₁₅ (mm)
1675-302-31, 1676 mm
38 / 20 · 80 / 38 mm

Rail lengths above L_{max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{max}):

Guide rail size 35/90,
accuracy class P,
rail length 5036 mm, 2 sections
(62 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 63 giving 126 holes
in 2 rows)

Ordering data:

Part number and number of sections,
length (mm)
T₁₅ / n_T · T / T₁₅ (mm)
1675-302-32, 5036 mm
38 / 62 · 80 / 38 mm

STAR – Ball Rail Systems

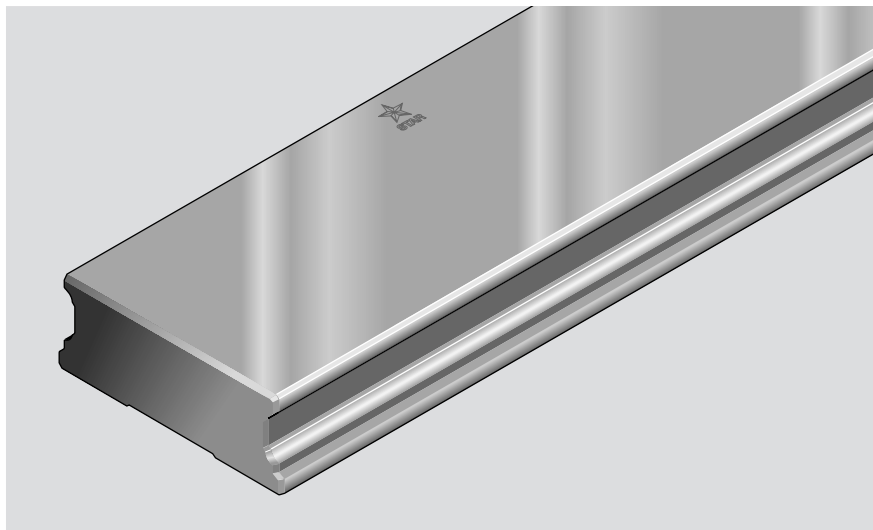
Wide Ball Rail Systems

Guide rail 1677-

Wide, for mounting from below

Special version:

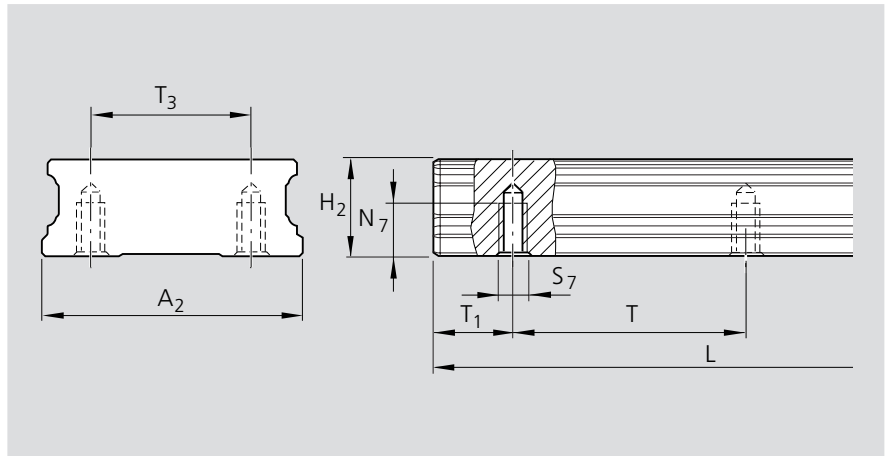
Zinc-iron coating with yellow chromating
in accuracy class N available on request.



Part numbers and rail lengths

| Size | Accuracy class | Guide Rail | | Hole spacing T (mm) | Recommended rail length | | | | |
|-------|----------------|---|---|---------------------|--|----------|-----------|-----------|-----------|
| | | One-piece Part number, Rail length L (mm) | Composite Part number, Number of sections Rail length L (mm) | | Mounting screw holes n_B / Rail length L (mm) (per row) | | | | |
| 20/40 | P | 1677-802-31,.... | 1677-802-3,..... | 60 | 2 / 116 | 7 / 416 | 12 / 716 | 20 / 1196 | 40 / 2396 |
| | H | 1677-803-31,.... | 1677-803-3,..... | | 3 / 176 | 8 / 476 | 13 / 776 | 22 / 1316 | 50 / 2996 |
| | N | 1677-804-31,.... | 1677-804-3,..... | | 4 / 236 | 9 / 536 | 14 / 836 | 25 / 1496 | 60 / 3596 |
| 25/70 | P | 1677-202-31,.... | 1677-202-3,..... | 80 | 5 / 296 | 10 / 596 | 16 / 956 | 30 / 1796 | 66 / 3956 |
| | H | 1677-203-31,.... | 1677-203-3,..... | | 6 / 356 | 11 / 656 | 18 / 1076 | 35 / 2096 | |
| | N | 1677-204-31,.... | 1677-204-3,..... | | 2 / 156 | 7 / 556 | 12 / 956 | 20 / 1596 | 40 / 3196 |
| 35/90 | P | 1677-302-31,.... | 1677-302-3,..... | 80 | 3 / 236 | 8 / 636 | 13 / 1036 | 22 / 1756 | 50 / 3996 |
| | H | 1677-303-31,.... | 1677-303-3,..... | | 4 / 316 | 9 / 716 | 14 / 1116 | 25 / 1996 | |
| | N | 1677-304-31,.... | 1677-304-3,..... | | 5 / 396 | 10 / 796 | 16 / 1276 | 30 / 2396 | |
| | | | | | 6 / 476 | 11 / 876 | 18 / 1436 | 35 / 2796 | |

Dimensions and masses



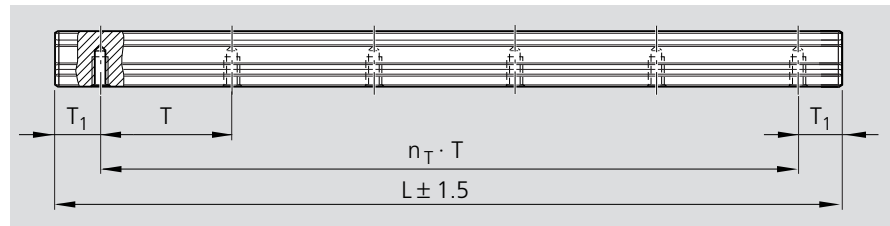
| Size | Dimensions (mm) | | | | | | | | | Mass kg/m |
|-------|-----------------|----------------|----------------|----------------|----------------------|-------------------|----|----------------|------------------|--------------|
| | A ₂ | H ₂ | N ₇ | S ₇ | T ₁₅ ±0.5 | T _{1min} | T | T ₃ | L _{max} | |
| 20/40 | 42 | 19.05 | 7.5 | M5 | 28 | 10 | 60 | 24 | 4 000 | 5.3 |
| 25/70 | 69 | 23.40 | 12.0 | M6 | 38 | 10 | 80 | 40 | 4 000 | 11.6 |
| 35/90 | 90 | 32.00 | 15.0 | M8 | 38 | 12 | 80 | 60 | 4 000 | 21.0 |

Ordering a guide rail

- Wherever possible, the recommended rail lengths as per table should be used.

Ordering example 1:

Guide rail size 35/90,
accuracy class H,
rail length 1756 mm,
(21 · T, number of holes n_B = 22
giving 44 holes in 2 rows)
Ordering data: **1677-303-31, 1756 mm**



Intermediate lengths

Calculation of rail length L and ordering examples:

- The preferred dimension is T₁₅
- If T₁₅ cannot be used, then
 - Select an end space T₁ between T₁₅ and T_{1min}
 - Do not go below the minimum spacing T_{1min}!

Note

- T₁, T_{1min}, T₁₅ are the same at either end of the rail.

| | |
|--|---|
| $L = n_B \cdot T - 4$ <p>or</p> $L = n_T \cdot T + 2 \cdot T_{15}$ | L = rail length (mm) T = hole spacing*) (mm) T ₁₅ = preferred dimension*) (mm) n _B = number of holes per row n _T = number of spaces *) see table for values |
|--|---|

Ordering example 2 (up to L_{max}):

Guide rail size 35/90,
accuracy class P,
rail length 1676 mm,
(20 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 21 giving 42 holes
in 2 rows)

Ordering data:

Part number, length (mm)
T₁₅ / n_T · T / T₁₅ (mm)
1677-302-31, 1676 mm
38 / 20 · 80 / 38 mm

Rail lengths above L_{max} are made up of fitted rail sections mounted end to end.

Ordering example 3 (over L_{max}):

Guide rail size 35/90,
accuracy class P,
rail length 5036 mm, 2 sections
(62 · T, preferred dimension T₁₅ = 38 mm;
number of holes n_B = 63
giving 126 holes in 2 rows)

Ordering data:

Part number and number of sections,
length (mm)
T₁₅ / n_T · T / T₁₅ (mm)
1677-302-32, 5036 mm
38 / 62 · 80 / 38 mm

STAR – Ball Rail Systems

Accessories, Standard Ball Rail Systems

Lubrication plate

- Material: aluminum
- Versions:
 - Standard (for standard lube nipple)
 - G 1/8 connection

Mounting:

The parts required for mounting on the runner block are supplied along with the optional attachments.

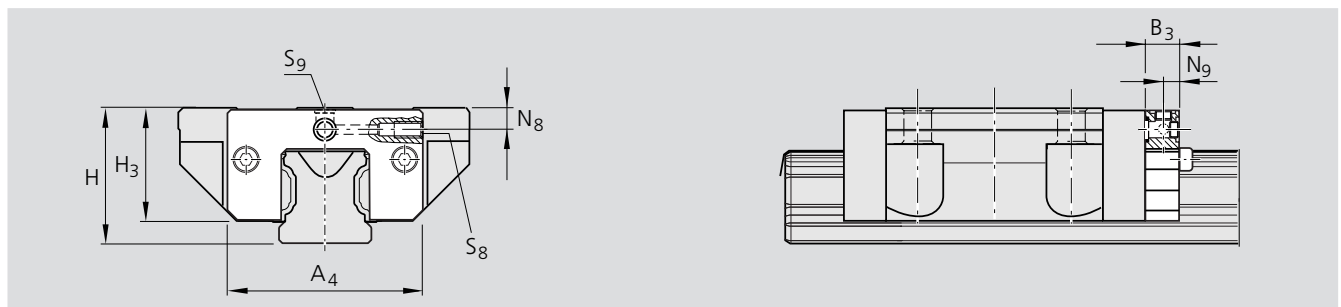
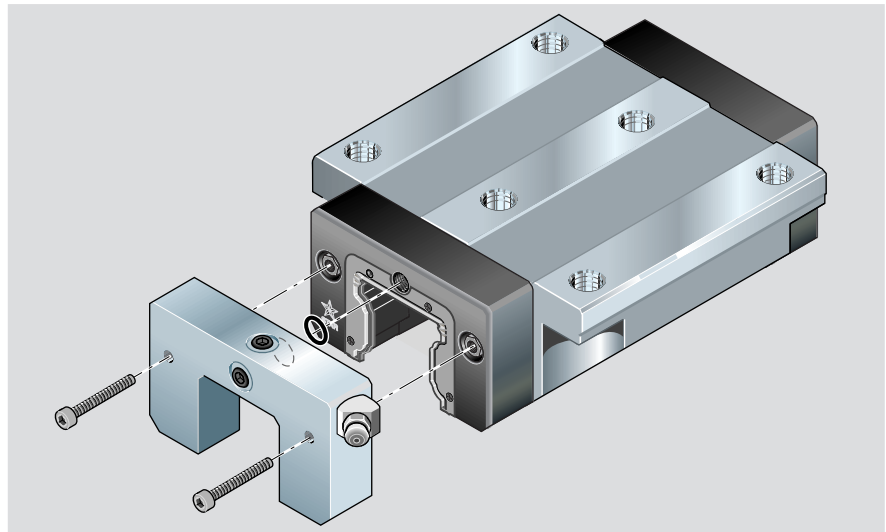
Size 25 - 65:

The runner block lube nipple can be used.

Size 15 and 20:

A funnel-type lube nipple with a knock-in spigot is supplied ready for insertion.

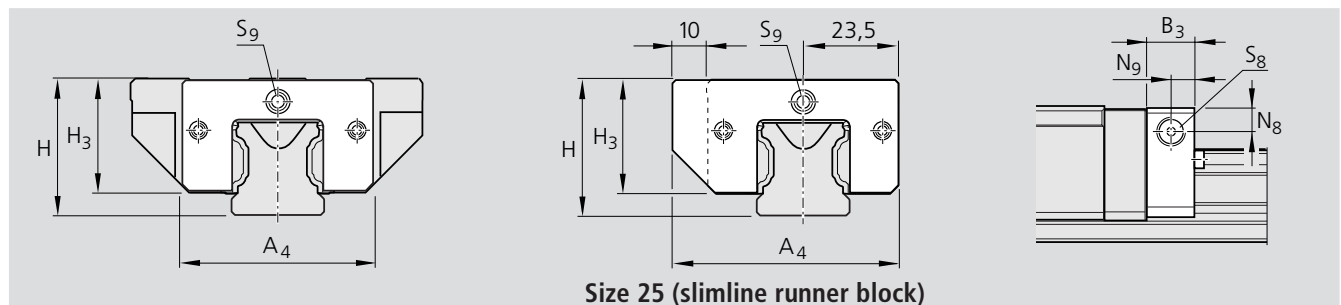
For mounting details, see "Mounting Instructions for Ball Rail Systems".



Standard lubrication plate

Part numbers, dimensions and masses.

| Size | Part numbers | Dimensions (mm) | | | | | | | | Mass (g) |
|------|--------------|-----------------|----------------|----|----------------|----------------|----------------|----------------|----------------|----------|
| | | A ₄ | B ₃ | H | H ₃ | N ₈ | N ₉ | S ₈ | S ₉ | |
| 15 | 1620-111-20 | 32 | 11 | 24 | 19.0 | 3.4 | 5.5 | ∅3 | M3 | 15 |
| 20 | 1620-811-20 | 42 | 12 | 30 | 24.8 | 3.5 | 6.0 | ∅3 | M3 | 25 |
| 25 | 1620-211-20 | 47 | 12 | 36 | 28.3 | 6.0 | 6.0 | M6 | M3 | 30 |
| 30 | 1620-711-20 | 59 | 12 | 42 | 33.8 | 8.0 | 6.0 | M6 | M6 | 45 |
| 35 | 1620-311-20 | 69 | 12 | 48 | 39.1 | 8.0 | 6.0 | M6 | M6 | 60 |
| 45 | 1620-411-20 | 85 | 12 | 60 | 48.5 | 8.0 | 6.0 | M6 | M6 | 85 |
| 55 | 1620-511-20 | 98 | 12 | 70 | 56.0 | 9.0 | 6.0 | M6 | M6 | 115 |
| 65 | 1620-611-20 | 124 | 14 | 90 | 75.7 | 18.0 | 7.0 | M8x1 | M8x1 | 250 |



Size 25 (slimline runner block)

Lubrication plate G 1/8

Part numbers, dimensions and masses.

With slimline runner block size 25, remember that the lubrication plate will project at the side.

| Size | Part numbers | Dimensions (mm) | | | | | | | | Mass (g) |
|------|--------------|-----------------|----------------|----|----------------|----------------|----------------|----------------|-----|----------|
| | | A ₄ | B ₃ | H | H ₃ | N ₈ | N ₉ | S ₈ | | |
| 25 | 1620-211-30 | 57 | 16 | 36 | 28.3 | 7.0 | 8 | G 1/8 - 8 tief | 40 | |
| 30 | 1620-711-30 | 59 | 16 | 42 | 33.8 | 7.0 | 8 | G 1/8 - 8 tief | 59 | |
| 35 | 1620-311-30 | 69 | 16 | 48 | 39.1 | 8.0 | 8 | G 1/8 - 8 tief | 79 | |
| 45 | 1620-411-30 | 85 | 16 | 60 | 48.5 | 8.0 | 8 | G 1/8 - 8 tief | 112 | |
| 55 | 1620-511-30 | 98 | 16 | 70 | 56.0 | 9.0 | 8 | G 1/8 - 8 tief | 152 | |
| 65 | 1620-611-30 | 124 | 16 | 90 | 75.7 | 18.0 | 8 | G 1/8 - 8 tief | 285 | |

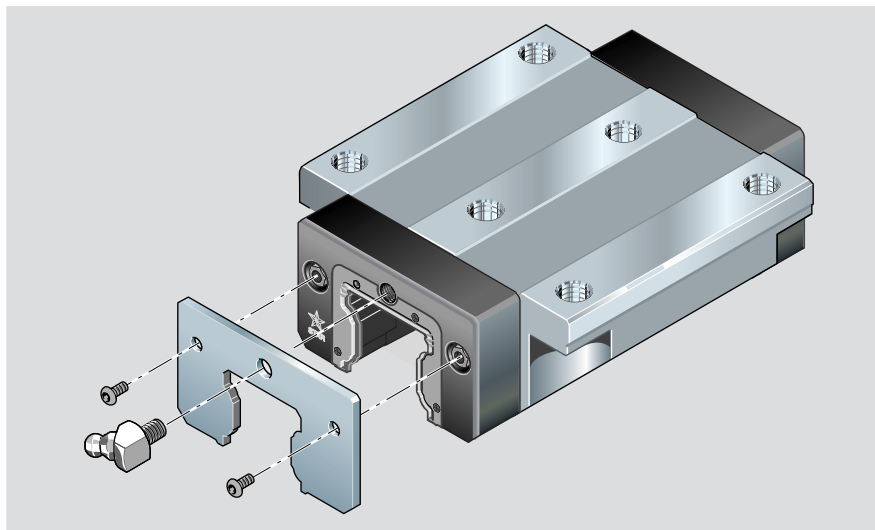
Scraper plate

- Material: corrosion resistant spring steel to DIN 17230 / EN 10088
- Finish: bright

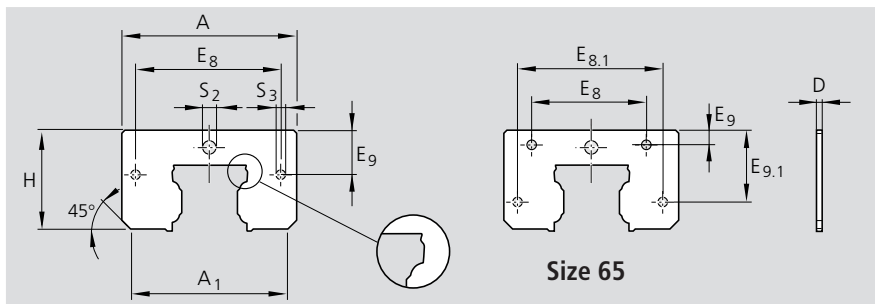
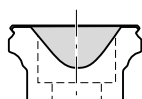
Mounting:

The mounting screws are supplied with the scraper plate.

When mounting, ensure that there is a uniform gap between runner block and scraper plate.



Scraper plates for guide rails with Rail Seal cover strips.

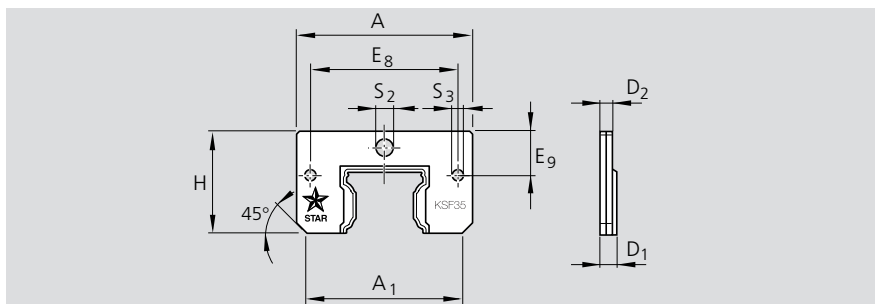


*) Scraper plates for guide rails without Rail Seal
from size 35, Part numbers: 1620-.10-30



| Size | Part numbers | Dimensions (mm) | | | | | | | | | | Mass (g) |
|------|--------------|-----------------|----------------|------|----------------|------------------|----------------|------------------|----------------|----------------|-----|----------|
| | | A | A ₁ | H | E ₈ | E _{8.1} | E ₉ | E _{9.1} | S ₂ | S ₃ | D | |
| 15 | 1620-110-30 | 33 | 26.4 | 19.2 | 24.55 | – | 6.3 | – | ∅4 | ∅3.5 | 1.0 | 4 |
| 20 | 1620-810-30 | 42 | 40.0 | 24.8 | 32.4 | – | 6.8 | – | ∅4 | ∅4 | 1.0 | 6 |
| 25 | 1620-210-30 | 47 | 41.6 | 29.5 | 38.3 | – | 11.0 | – | ∅7 | ∅4 | 1.0 | 8 |
| 30 | 1620-710-30 | 59 | 52.8 | 34.7 | 48.4 | – | 14.1 | – | ∅7 | ∅4 | 1.0 | 12 |
| 35* | 1620-310-40 | 69 | 60.9 | 40.1 | 58.0 | – | 17.0 | – | ∅7 | ∅4 | 1.0 | 16 |
| 45* | 1620-410-40 | 85 | 76.7 | 50.0 | 70.0 | – | 20.5 | – | ∅7 | ∅5 | 2.0 | 50 |
| 55* | 1620-510-40 | 98 | 89.8 | 56.4 | 80.0 | – | 21.8 | – | ∅7 | ∅6 | 2.0 | 65 |
| 65* | 1620-610-40 | 124 | 113.2 | 74.7 | 76.0 | 100 | 10.0 | 52.5 | ∅9 | ∅5 | 2.5 | 140 |

Two-piece front seal



| Size | Part numbers | Dimensions (mm) | | | | | | | | | | Mass (g) |
|------|--------------|-----------------|----------------|------|----------------|----------------|----------------|----------------|----------------|----------------|----|----------|
| | | A | A ₁ | H | E ₈ | E ₉ | S ₂ | S ₃ | D ₁ | D ₂ | | |
| 15 | 1619-121-20 | 32 | 27 | 19.0 | 24.55 | 6.3 | ∅3.5 | ∅3.5 | 3.0 | 2.2 | 6 | |
| 20 | 1619-821-20 | 42 | 39 | 24.3 | 32.4 | 6.8 | ∅4 | ∅4 | 3.3 | 2.5 | 8 | |
| 25 | 1619-221-20 | 47 | 42 | 29.0 | 38.3 | 11.0 | ∅7 | ∅4 | 3.3 | 2.5 | 10 | |
| 30 | 1619-721-20 | 59 | 53 | 34.5 | 48.4 | 14.1 | ∅7 | ∅4 | 4.5 | 3.3 | 18 | |
| 35 | 1619-321-30 | 69 | 61 | 39.5 | 58.0 | 17.0 | ∅7 | ∅4 | 4.5 | 3.3 | 25 | |
| 45 | 1619-421-30 | 85 | 77 | 49.5 | 70.0 | 20.5 | ∅7 | ∅5 | 5.5 | 4.0 | 55 | |

STAR – Ball Rail Systems

Accessories, Standard Ball Rail Systems

Protective bellows

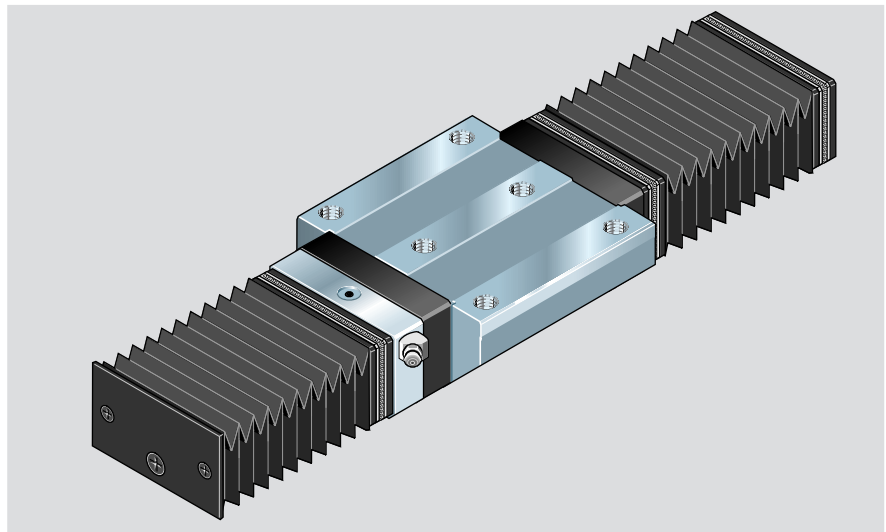
- Material: Bellows-type protective cover of polyurethane-coated polyester fabric
 - Aluminum lubrication plates
- The runner block lube nipple can be used.

Heat resistant bellows

- Material: Nomex fabric, metallized on both sides.
- Non combustible, non flammable
- Resistant to sparks, welding splashes and hot chips
- Temperature resistance:
Temperatures of up to 200°C near the protective metal coat possible.
Operating temperature for the entire bellows: 100°C.

Available in sizes 25-55.

The runner block lube nipple can be used.



Part numbers, Bellows

Example: 1620-306-00, 36 folds

| | |
|----------------|-----|
| Standard | = 0 |
| Fire resistant | = 5 |
| Type 1 to 9 | |

Bellows size 35, standard version, type 6 (with FLU* and end plate), number of folds: 36

* FLU = front lube unit

| Size | Typ 1 with lubrication plate and end plate | | Typ 2 with mounting frame and end plate | | Typ 3 with 2 lubrication plates | |
|------|--|-----------------------|--|-----------------------|---------------------------------------|-----------------------|
| | Typ 6 with FLU* and end plate | Number of folds | Number of folds | Number of folds | Typ 7 with 2 FLU* | Number of folds |
| 15 | 1620-10.-00 | ... | 1620-102-00 | ... | 1620-10.-00 | ... |
| 20 | 1620-80.-00 | ... | 1620-802-00 | ... | 1620-80.-00 | ... |
| 25 | 1620-20.-00 | ... | 1620-202-00 | ... | 1620-20.-00 | ... |
| 30 | 1620-70.-00 | ... | 1620-702-00 | ... | 1620-70.-00 | ... |
| 35 | 1620-30.-00 | ... | 1620-302-00 | ... | 1620-30.-00 | ... |
| 45 | 1620-40.-00 | ... | 1620-402-00 | ... | 1620-40.-00 | ... |
| 55 | 1620-50.-00 | ... | 1620-502-00 | ... | 1620-50.-00 | ... |
| 65 | 1620-60.-00 | ... | 1620-602-00 | ... | 1620-60.-00 | .. |
| 25 | 1620-25.-00 | ... | 1620-252-00 | ... | 1620-25.-00 | ... |
| 30 | 1620-75.-00 | ... | 1620-752-00 | ... | 1620-75.-00 | ... |
| 35 | 1620-35.-00 | ... | 1620-352-00 | ... | 1620-35.-00 | ... |
| 45 | 1620-45.-00 | ... | 1620-452-00 | ... | 1620-45.-00 | ... |
| 55 | 1620-55.-00 | ... | 1620-552-00 | ... | 1620-55.-00 | ... |

| Size | Typ 4 with 2 mounting frames | | Typ 5 with lubrication plate and mounting frame (MF) | | Typ 9 Bellows, loose supply (spare part) | |
|------|------------------------------------|-----------------------|--|-----------------------|--|-----------------------|
| | Number of folds | Number of folds | Typ 8 with FLU* and MF | Number of folds | Number of folds | Number of folds |
| 15 | 1620-104-00 | ... | 1620-10.-00 | ... | 1600-109-00 | ... |
| 20 | 1620-804-00 | ... | 1620-80.-00 | ... | 1600-809-00 | ... |
| 25 | 1620-204-00 | ... | 1620-20.-00 | ... | 1600-209-00 | ... |
| 30 | 1620-704-00 | ... | 1620-70.-00 | ... | 1600-709-00 | ... |
| 35 | 1620-304-00 | ... | 1620-30.-00 | ... | 1600-309-00 | ... |
| 45 | 1620-404-00 | ... | 1620-40.-00 | ... | 1600-409-00 | ... |
| 55 | 1620-504-00 | ... | 1620-50.-00 | ... | 1600-509-00 | ... |
| 65 | 1620-604-00 | ... | 1620-60.-00 | ... | 1600-609-00 | ... |
| 25 | 1620-254-00 | ... | 1620-25.-00 | ... | 1600-259-00 | ... |
| 30 | 1620-754-00 | ... | 1620-75.-00 | ... | 1600-759-00 | ... |
| 35 | 1620-354-00 | ... | 1620-35.-00 | ... | 1600-359-00 | ... |
| 45 | 1620-454-00 | ... | 1620-45.-00 | ... | 1600-459-00 | ... |
| 55 | 1620-554-00 | ... | 1620-55.-00 | ... | 1600-559-00 | ... |

Mounting instructions

The bellows are delivered preassembled ready for installation, complete with the screws required for attachment to the guide rail.

In types 1 and 2, thread size M4 10 mm deep and countersunk 2 x 45° must be tapped in each end face of the rail.

Size 25 - 65:

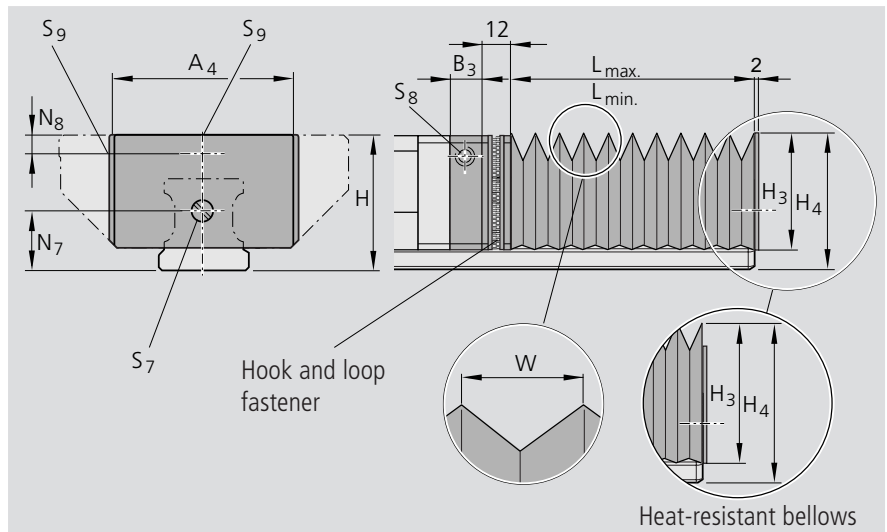
The runner block lube nipple can be used.

Size 15 and 20:

A funnel-type lube nipple with knock-in spigot is supplied.

For mounting details, see "Mounting Instructions for Lubrication Plates and Bellows".

Dimensions: Bellows



| Size | Dimensions (mm) | | | | | | | | | | | Factor | |
|------|-----------------|----------------|----|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|--------|--|
| | A ₄ | B ₃ | H | H ₃ | H ₄ | N ₇ | N ₈ | S ₇ | S ₈ | S ₉ | W | U | |
| 15 | 45 | 11 | 24 | 26.5 | 31.5 | 11 | 3.4 | M4 | ∅3 | M3 | 19.9 | 1.18 | |
| 20 | 42 | 12 | 30 | 24.0 | 29.2 | 13 | 3.5 | M4 | ∅3 | M3 | 10.3 | 1.33 | |
| 25 | 45 | 12 | 36 | 28.5 | 35.0 | 15 | 6.0 | M4 | M6 | M3 | 12.9 | 1.32 | |
| 30 | 55 | 12 | 42 | 34.0 | 41.0 | 18 | 8.0 | M4 | M6 | M6 | 15.4 | 1.25 | |
| 35 | 64 | 12 | 48 | 39.0 | 47.0 | 22 | 8.0 | M4 | M6 | M6 | 19.9 | 1.18 | |
| 45 | 83 | 12 | 60 | 49.0 | 59.0 | 30 | 8.0 | M4 | M6 | M6 | 26.9 | 1.13 | |
| 55 | 96 | 12 | 70 | 56.0 | 69.0 | 30 | 9.0 | M4 | M6 | M6 | 29.9 | 1.12 | |
| 65 | 120 | 14 | 90 | 75.0 | 89.0 | 40 | 18.0 | M4 | M8x1 | M8x1 | 40.4 | 1.08 | |

Dimensions: Heat-resistant bellows

| Size | Dimensions (mm) | | | | | | | | | | | Factor | |
|------|-----------------|----------------|----|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------|--------|--|
| | A ₄ | B ₃ | H | H ₃ | H ₄ | N ₇ | N ₈ | S ₇ | S ₈ | S ₉ | W | U | |
| 25 | 62 | 12 | 36 | 39.0 | 44.5 | 15 | 6.0 | M4 | M6 | M3 | 25.9 | 1.25 | |
| 30 | 67 | 12 | 42 | 42.0 | 47.5 | 18 | 8.0 | M4 | M6 | M6 | 25.9 | 1.25 | |
| 35 | 76 | 12 | 48 | 47.0 | 54.0 | 22 | 8.0 | M4 | M6 | M6 | 29.9 | 1.21 | |
| 45 | 90 | 12 | 60 | 55.0 | 64.0 | 30 | 8.0 | M4 | M6 | M6 | 32.9 | 1.18 | |
| 55 | 104 | 12 | 70 | 63.0 | 75.0 | 30 | 9.0 | M4 | M6 | M6 | 37.9 | 1.16 | |

Bellows design formulas

| | |
|--|--|
| $L_{max} = (\text{Stroke} + 30) \cdot U$ $L_{min} = L_{max} - \text{Stroke}$ $\text{No. of folds} = \frac{L_{max}}{W} + 2$ | L_{max} = Bellows extended L_{min} = Bellows compressed Stroke in mm U = Calculation factor W = Maximum extension (mm) |
|--|--|

Rail length formula

| | | |
|--|-------------------------------|-------------------------------|
| | $L = L_{min} + L_{max} + L_A$ | $L = \text{Rail length (mm)}$ |
|--|-------------------------------|-------------------------------|

STAR – Ball Rail Systems

Accessories, Wide Ball Rail Systems

Wide lubrication plate, G 1/8

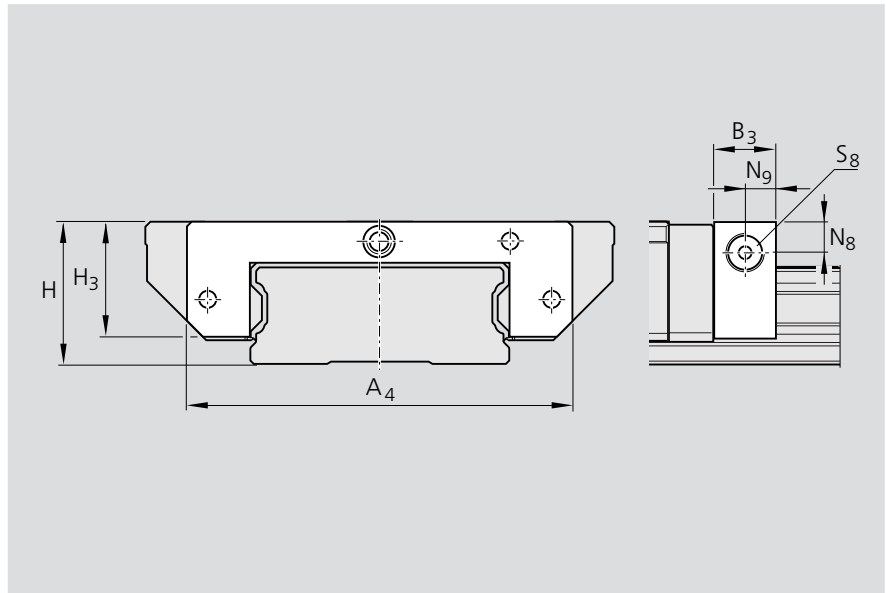
– Material: aluminum

Mounting:

The parts required for mounting on the runner block are supplied along with the optional attachments.

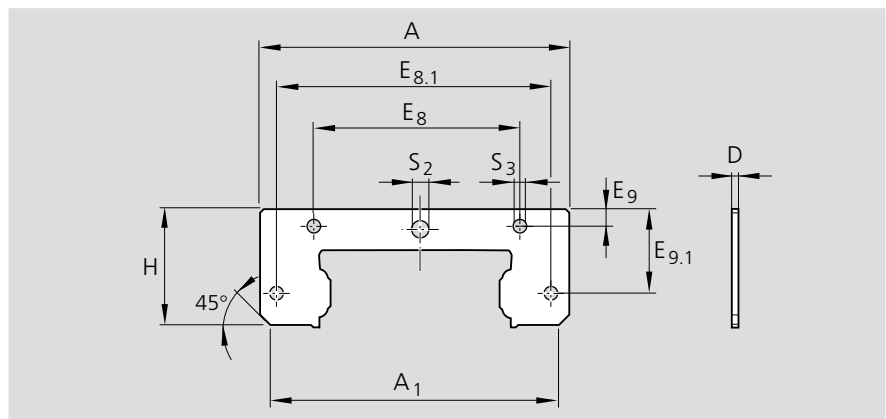
The runner block lube nipple can be used.

For mounting details, see "Mounting Instructions for Ball Rail Systems".



| Size | Part numbers | Dimensions (mm) | | | | | | | Mass (g) |
|-------|--------------|-----------------|----------------|----|----------------|----------------|----------------|----------------|----------|
| | | A ₄ | B ₃ | H | H ₃ | N ₈ | N ₉ | S ₈ | |
| 25/70 | 1670-201-30 | 101 | 16 | 36 | 29 | 7.7 | 8 | G 1/8 - 8 tief | 65 |
| 35/90 | 1670-301-30 | 129 | 16 | 42 | 41 | 8.3 | 8 | G 1/8 - 8 tief | 120 |

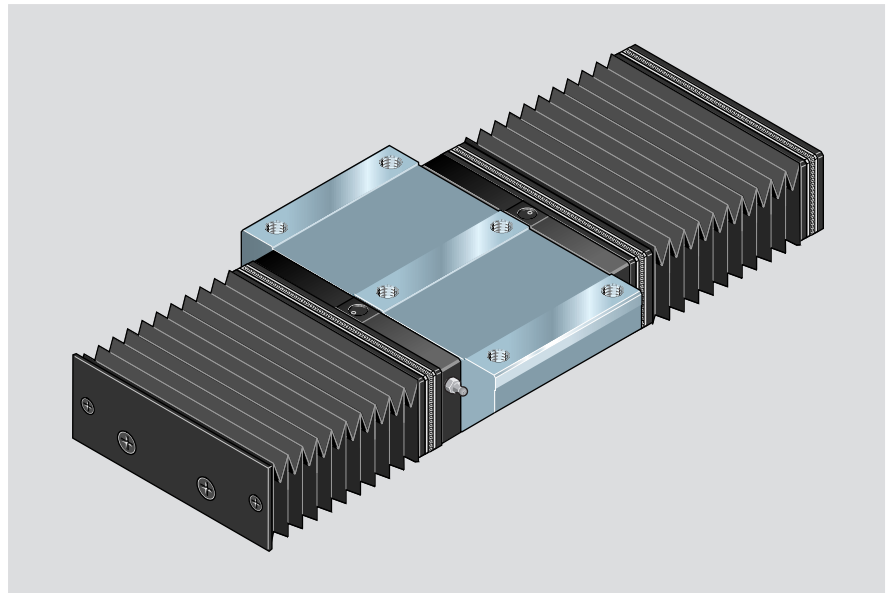
Wide scraper plate



| Size | Part numbers | Dimensions (mm) | | | | | | | | | | Mass (g) |
|-------|--------------|-----------------|----------------|------|----------------|------------------|----------------|------------------|----------------|----------------|-----|----------|
| | | A | A ₁ | H | E ₈ | E _{8.1} | E ₉ | E _{9.1} | S ₂ | S ₃ | D | |
| 25/70 | 1670-210-00 | 101 | 92.7 | 28.6 | 70.2 | 90.7 | 5.1 | 19.7 | ∅7 | ∅4 | 1.0 | 14 |
| 35/90 | 1670-310-00 | 129 | 124.2 | 40.8 | 79.0 | 116 | 5.6 | 28.7 | ∅7 | ∅4 | 1.0 | 25 |

Wide bellows

- Material: Bellows-type protective cover of polyurethane-coated polyester fabric
- The runner block lube nipple can be used.



Part numbers, Bellows

Ordering example for bellows

Size 35/90, Type 2,
Number of folds: 36
1670-302-00, 36 folds

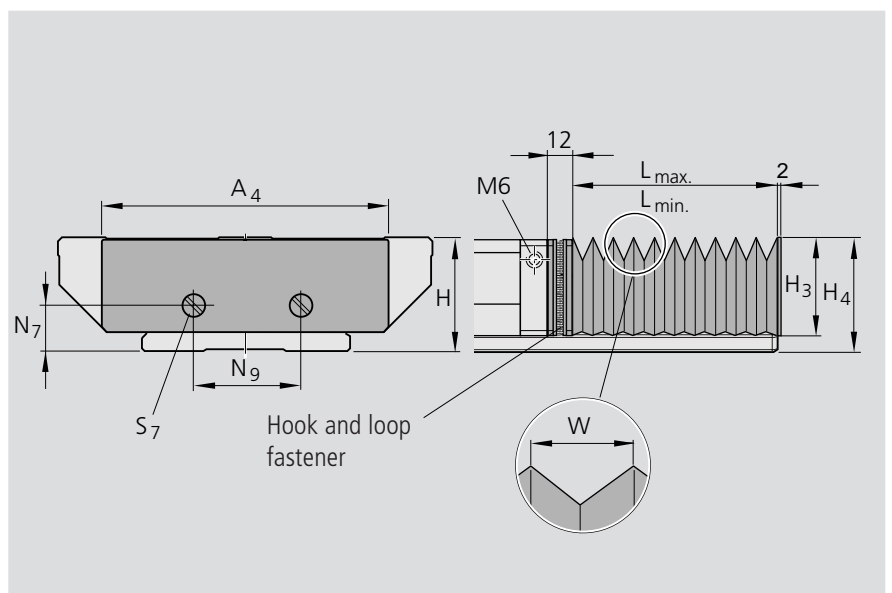
| Size | Typ 2 | | Typ 4 | | Typ 9 | |
|-------|-----------------------------------|-----------------|------------------------|-----------------|------------------------------------|-----------------|
| | with mounting frame and end plate | Number of folds | with 2 mounting frames | Number of folds | Bellows, loose supply (spare part) | Number of folds |
| 25/70 | 1670-202-00 | ... | 1670-204-00 | ... | 1670-209-00 | ... |
| 35/90 | 1670-302-00 | ... | 1670-304-00 | ... | 1670-309-00 | ... |

Mounting instructions

The bellows are delivered preassembled ready for installation, complete with the screws required for attachment to the guide rail.

In types 2 and 4, two threads size M4 10 mm deep and countersunk 2 x 45° must be tapped in each end face of the rail.

The runner block lube nipple can be used.



Dimensions: Bellows

| Size | Dimensions (mm) | | | | | | | | Factor U |
|-------|-----------------|----|----------------|----------------|----------------|----------------|----------------|------|----------|
| | A ₄ | H | H ₃ | H ₄ | N ₇ | N ₉ | S ₇ | W | |
| 25/70 | 101 | 35 | 29 | 35 | 14.0 | 26 | M4 | 12.9 | 1.25 |
| 35/90 | 128 | 50 | 42 | 49 | 21.5 | 40 | M4 | 19.9 | 1.18 |

STAR – Ball Rail Systems

Accessories, Wide Ball Rail Systems

Bellows design formulas

$$L_{\max} = (\text{Stroke} + 30) \cdot U$$

$$L_{\min} = L_{\max} - \text{Stroke}$$

$$\text{No. of folds} = \frac{L_{\max}}{W} + 2$$

L_{\max} = Bellows extended

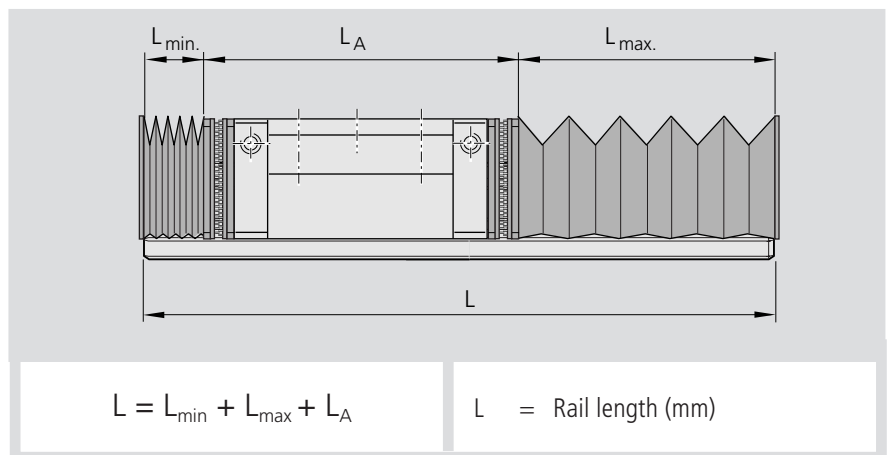
L_{\min} = Bellows compressed

Stroke in mm

U = Calculation factor

W = Maximum extension (mm)

Rail length formula



Mounting Instructions for Accessories

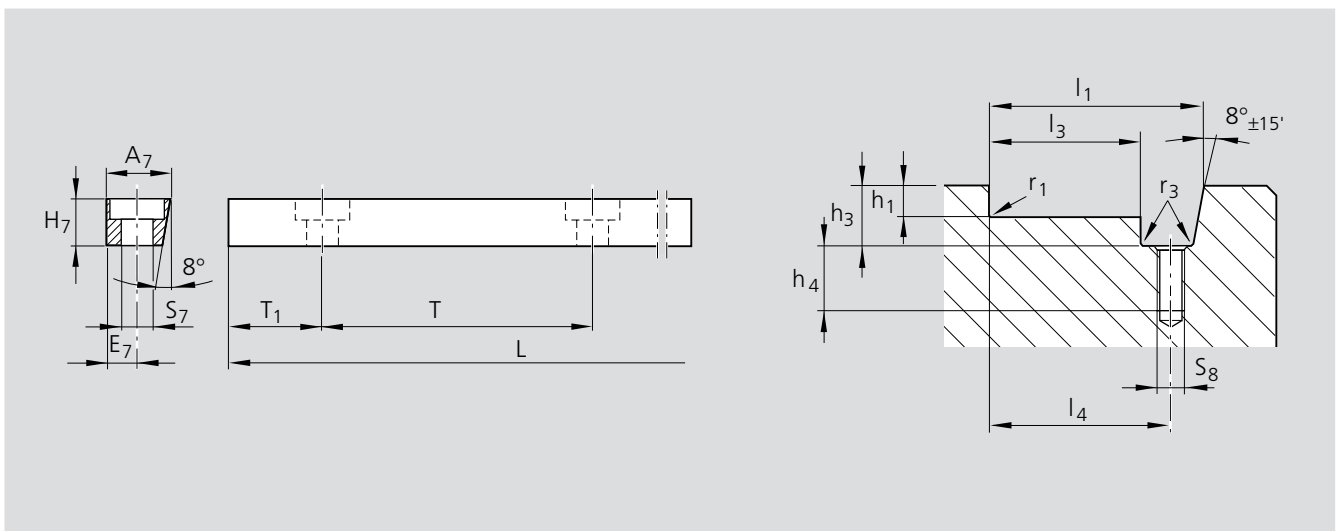
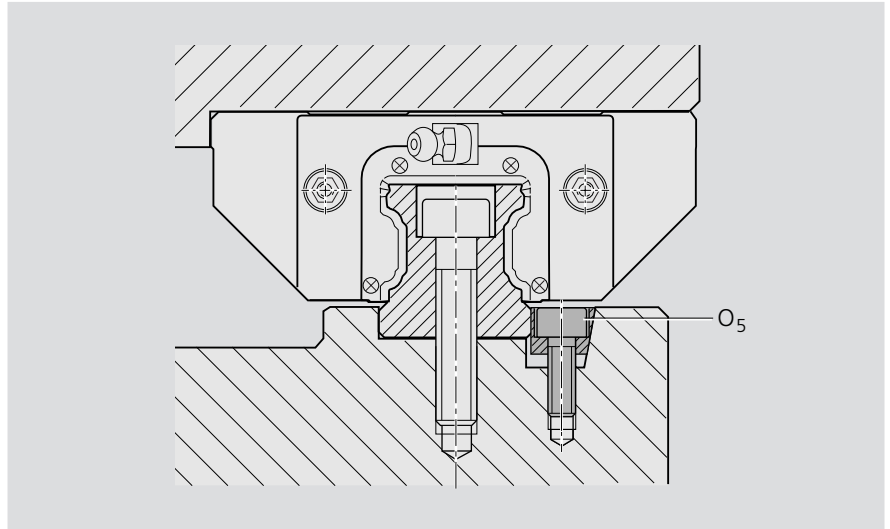
For details of how to mount accessories such as the lubrication plate, bellows etc, see Mounting Instructions for Ball Rail Systems RDEFI 82 270.



Accessories, General

Wedge profile for Ball Rail Systems - Lateral retention

- Material: steel
- Finish: black



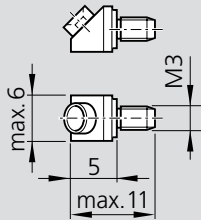
Part numbers and dimensions

| Size | Part numbers | Wedge profile | | | | | | | Wedge profile groove | | | | | | | | | |
|------|--------------|-----------------|----------------|----------------|----------------|-----|----------------|-----|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | Dimensions (mm) | | | | | | | Dimensions (mm) | | | | | | | | | |
| | | A ₇ | E ₇ | H ₇ | S ₇ | T | T ₁ | L | O ₅ | h ₁ | h ₃ | h ₄ | l ₁ | l ₃ | l ₄ | S ₈ | r ₁ | r ₃ |
| 15 | 1619-200-01 | 12 | 6 | 10 | 5.5 | 60 | 28.5 | 957 | M5x20 | -0.2 | +1 | +2 | ±0.05 | -0.1 | ±0.1 | | max. | max. |
| 20 | | | | | | | | | | 3.5 | 12.5 | 15 | 27 | 15 | 21 | M5 | 0.4 | 0.5 |
| 25 | | | | | | | | | | 4 | 12.5 | 15 | 32 | 20 | 26 | M5 | 0.5 | 0.5 |
| 30 | | | | | | | | | | 5 | 12.5 | 15 | 35 | 23 | 29 | M5 | 0.8 | 0.5 |
| 35 | | | | | | | | | | 5 | 12.5 | 15 | 40 | 28 | 34 | M5 | 0.8 | 0.5 |
| 45 | 1619-400-01 | 19 | 9 | 16 | 9.0 | 105 | 51.0 | 942 | M8x25 | 8 | 19.0 | 16 | 64 | 45 | 54 | M8 | 0.8 | 0.5 |
| 55 | | | | | | | | | | 10 | 19.0 | 16 | 72 | 53 | 62 | M8 | 1.2 | 0.5 |
| 65 | | | | | | | | | | 10 | 19.0 | 16 | 82 | 63 | 72 | M8 | 1.2 | 0.5 |

STAR – Ball Rail Systems

Accessories, General

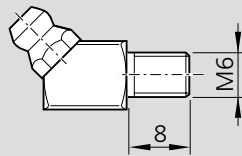
Funnel-type lube nipple



(Supplied as standard)

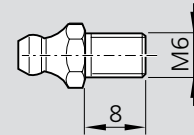
Part number
8417-004-09

Hydraulic-type lube nipple



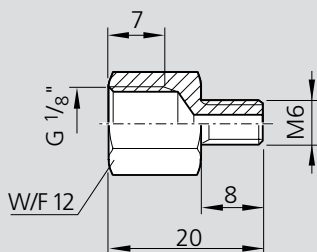
(Supplied as standard)

Part number
8417-007-02

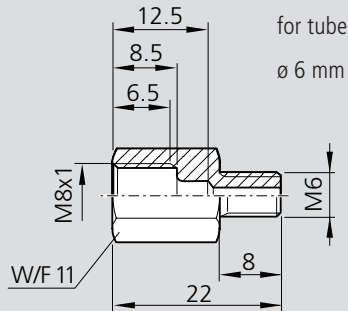


Part number
8417-008-02

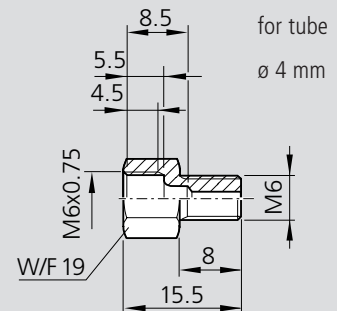
Reducing adapters



Part number
8455-030-34

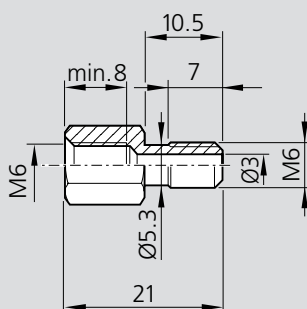


Part number
8455-030-37



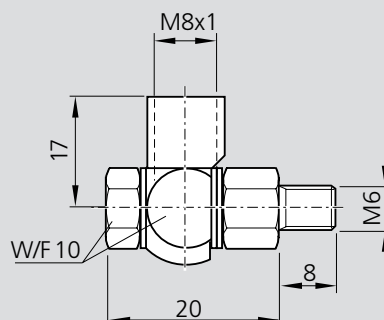
Part number
8455-030-38

Extension



Part number
8455-030-69

Swiveling screw fitting



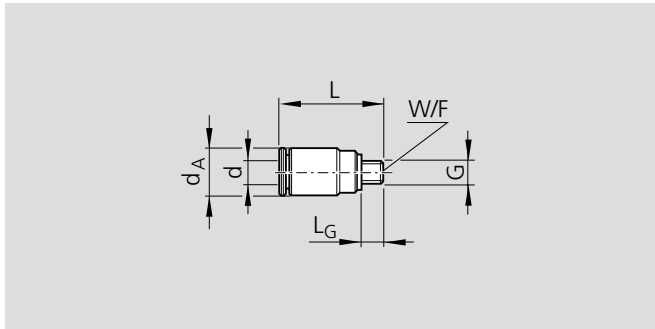
Part number
8417-018-09

Accessories, General

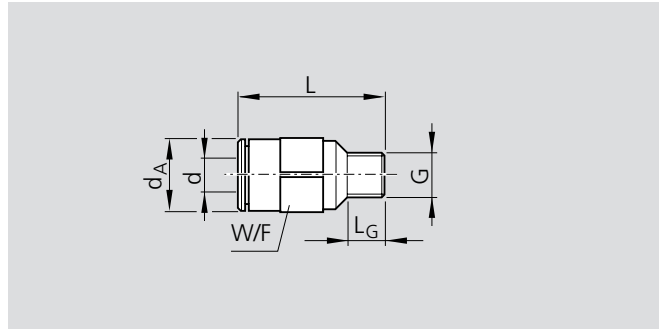
Fittings for plastic hoses

For runner blocks without scraper plates

Straight fitting

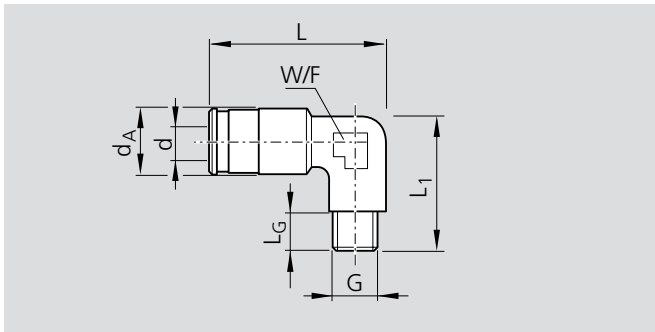


| Part numbers | Dimensions (mm) | | | | | |
|--------------|-----------------|---|------|-----|----|----------------|
| | d _A | d | L | W/F | G | L _G |
| 8417-010-09 | 5.8 | 3 | 12.5 | 1.5 | M3 | 3 |
| 8417-011-09 | 7.8 | 3 | 13.5 | 2.0 | M5 | 4 |



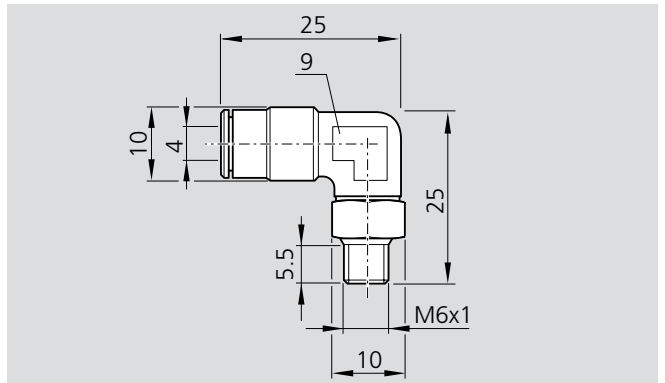
| Part numbers | Dimensions (mm) | | | | | |
|--------------|-----------------|---|----|-----|------|----------------|
| | d _A | d | L | W/F | G | L _G |
| 8417-013-09 | 11.0 | 4 | 21 | 10 | M6x1 | 5.5 |
| 8417-014-09 | 13.5 | 6 | 21 | 12 | M6x1 | 5.5 |

Elbow fitting



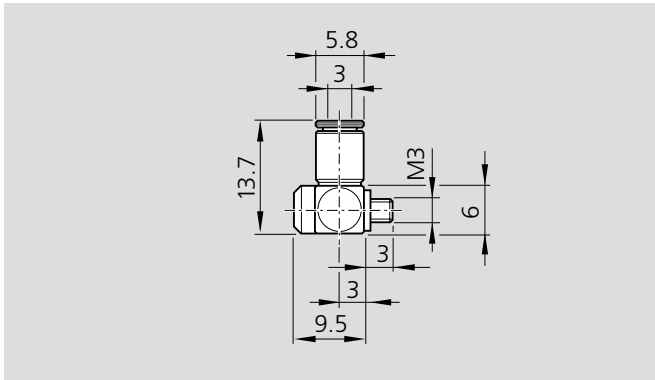
| Part numbers | Dimensions (mm) | | | | | | |
|--------------|-----------------|---|----|----------------|-----|------|----------------|
| | d _A | d | L | L ₁ | W/F | G | L _G |
| 8417-016-09 | 11.0 | 4 | 24 | 19 | 9 | M6x1 | 5.5 |
| 8417-017-09 | 13.5 | 6 | 27 | 21 | 10 | M6x1 | 5.5 |

Rotary elbow fitting



| Part number |
|-------------|
| 8417-015-09 |

Swiveling elbow fitting



| Part number |
|-------------|
| 8417-012-09 |

STAR – Ball Rail Systems

Maintenance and Lubrication

Maintenance

Dirt can settle and encrust on guide rails, especially when these are not enclosed. To ensure that seals and Rail Seal cover strips will retain their functionality, this dirt must be removed at regular intervals.

It is advisable to run the machine through a full "cleaning cycle" over the entire installed rail length at least twice a day, but no later than the end of every 8-hour shift. Always run a cleaning cycle before shutting down the machine.

Lubrication

Star Ball Rail Systems are delivered filled with an anti-corrosion agent. Either oil or grease can be used as a lubricant.

Before start-up, make sure the system has sufficient initial lubrication.

Grease Lubricants

We recommend a grease lubricant to DIN 51825:

- K2K
 - For higher loads:
 - KP2K
 - Consistency class NLGI 2 to DIN 51818
- Observe the manufacturer's instructions.

Short stroke.

Stroke < 2 runner block lengths:

- Provide 2 lube ports per runner block and lubricate these!

Stroke < 0.5 runner block length:

- Provide 2 lube ports per runner block and lubricate these!
- Move the runner block 2x runner block length per lubricating cycle. If this is not possible, please consult Star.

Lubricant quantities as per Table 1.

Apply the specified lubricant quantity per lube port.

| Size | Grease lubricants | |
|-------|---|---|
| | Initial lubrication partial quantity (cm ³) | In-service lubrication (cm ³) |
| 15 | 0.4 (x 3) | 0.4 |
| 20 | 0.7 (x 3) | 0.7 |
| 25 | 1.4 (x 3) | 1.4 |
| 30 | 2.2 (x 3) | 2.2 |
| 35 | 2.2 (x 3) | 2.2 |
| 45 | 4.7 (x 3) | 4.7 |
| 55 | 9.4 (x 3) | 9.4 |
| 65 | 15.4 (x 3) | 15.4 |
| 20/40 | 1.0 (x 3) | 1.0 |
| 25/70 | 1.4 (x 3) | 1.4 |
| 35/90 | 2.7 (x 3) | 2.7 |

Table 1

| Size | In-service lubrication intervals under normal operating conditions |
|------|--|
| | Travel (km) |
| | Load ≤ 0,15 C |
| 15 | 1000 |
| 20 | 1000 |
| 25 | 1000 |
| 30 | 1000 |
| 35 | 500 |
| 45 | 250 |
| 55 | 150 |
| 65 | 100 |

Table 2

Always lubricate runner blocks before start up (initial lubrication)

Initial lubrication requires a total of three times the partial quantity given in Table 1:

1. Apply the first partial quantity of lubricant as per Table 1 to runner block.
2. Slide runner blocks back and forth over at least three times the block length for three full cycles.
3. Repeat steps 1. and 2. twice more
4. Check whether a film of lubricant is visible on the guide rail.


In-service lubrication of runner blocks

- Once the in-service lubrication interval as given in Table 2 is reached, apply the lubricant quantity as stated in Table 1.

If the equipment is to operate in an environment subject to dirt or vibration and shock loads, etc., we recommend shortening the in-service lubrication interval.

The smaller the load, the longer the intervals between in-service lubrication will be.

Oil lubricants

 Add the entire oil quantity in one go!

Lubrication interval ≤ 40000 m

| Size | Oil Lubrication Initial and in-service lubrication (cm ³) |
|-------|---|
| 15 | 0.4 |
| 20 | 0.7 |
| 25 | 0.8 |
| 30 | 1.1 |
| 35 | 1.2 |
| 45 | 2.2 |
| 55 | 3.6 |
| 65 | 6.0 |
| 20/40 | 0.7 |
| 25/70 | 1.1 |
| 35/90 | 1.8 |

Table 3

One-point oil lubrication

Notes

Recommended interval between two pulses: 10 seconds.

Example for size 45:

4 pulses of 0.6 cm³ each in 50 seconds.

The quantities listed in the table are valid for:

$F \leq 0.3 C$

$v \leq 1 \text{ m/s}$

Lubrication interval $\leq 40,000 \text{ m}$

If the equipment is to operate in an environment subject to dirt or vibration and shock loads, etc., we recommend shortening the in-service lubrication interval.

| Size | Lubricant quantities for one-point oil lubrication | |
|-------|--|-----------------------|
| | Oil lubricant quantity / pulse (cm ³) | Pulses per lube cycle |
| 15 | 0.6 | 1 |
| 20 | 0.6 | 2 |
| 25 | 0.6 | 2 |
| 30 | 0.6 | 2 |
| 35 | 0.6 | 2 |
| 45 | 0.6 | 4 |
| 55 | 1.5 | 3 |
| 65 | 1.5 | 4 |
| 20/40 | 0.6 | 2 |
| 25/70 | 0.6 | 2 |
| 35/90 | 0.6 | 3 |

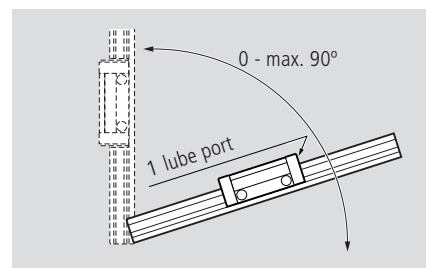
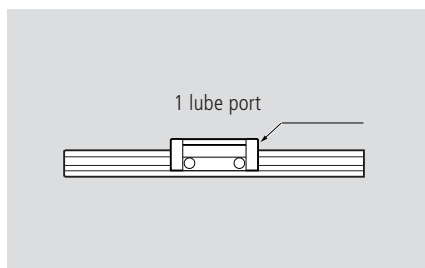
Table 4

Stroke > 2 runner block lengths:

– Provide 1 lube port per runner block.

Oil lubricant to ISO VG 220.

Lubricant quantities to Table 4.



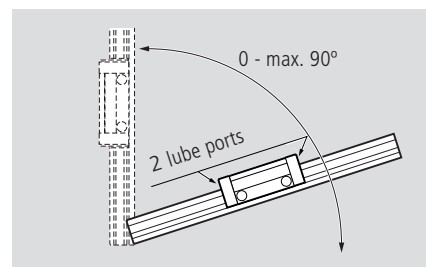
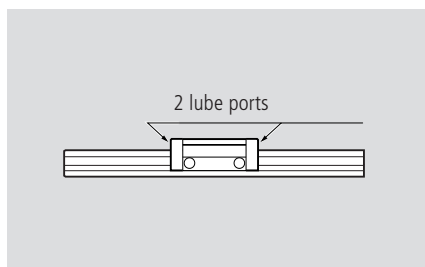
Stroke < 2 runner block lengths:

- Provide 2 lube ports per runner block.

Oil lubricant to ISO VG 220.

Lubricant quantities to Table 4.

Apply the specified lubricant quantity per lube port.



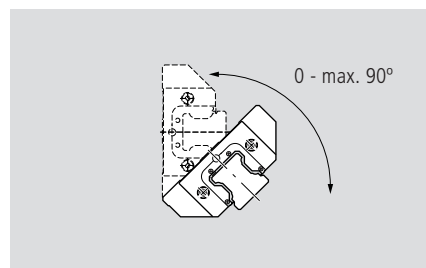
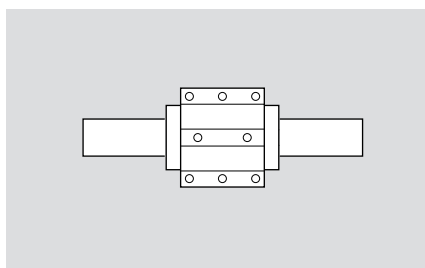
Installation at an angle about the centerline

Stroke < 2 runner block lengths:

– Provide 2 lube ports per runner block.

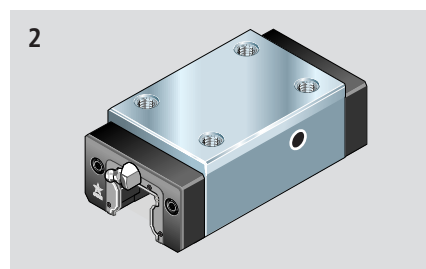
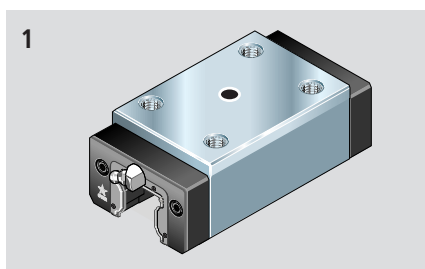
Add the lubricant quantity as specified in Table 4 in one pulse.

If this is not possible, please consult STAR.



Special Lube Ports

Lube ports mounted on the top (1) or on the sides (2) are available on request.



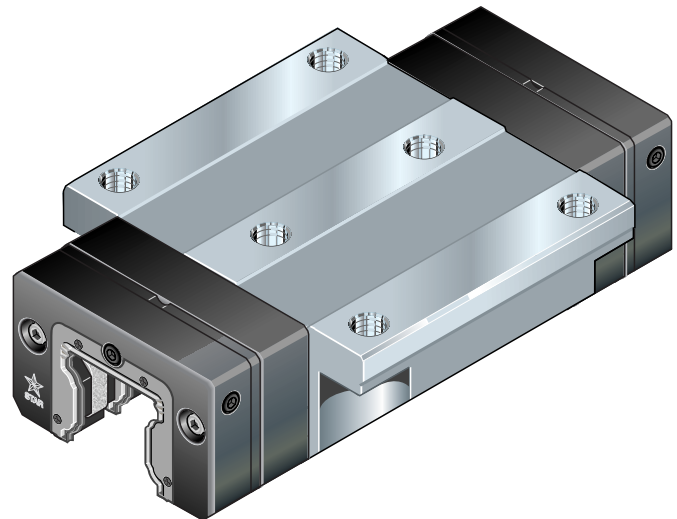
STAR – Ball Rail Systems

Front Lube Unit

Advantages during mounting and in service:

- Up to 10,000 km travel
- Only initial lubrication of the runner block necessary
- Front Lube Units at both runner block ends
- Minimal lubricant loss
- Reduced oil consumption
- No lubricant lines
- Max. operating temperature 60C°

► Ports provided at end and side for convenient refilling using lube nipple



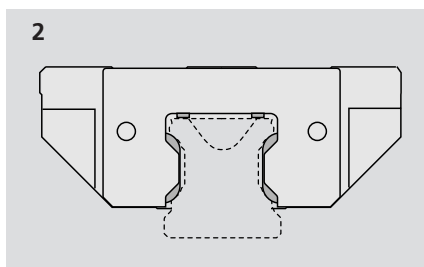
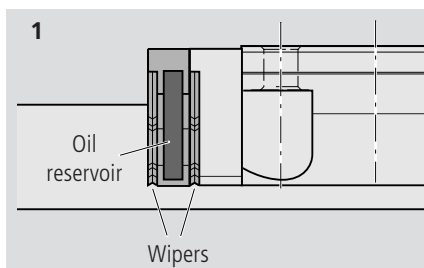
► Lube port on end face also suitable for lubricating runner block with grease

| Size | Travel under normal operating conditions |
|------|--|
| | Travel (km) |
| | Load ≤ 0,15 C |
| 15 | 10000 |
| 20 | 10000 |
| 25 | 10000 |
| 30 | 10000 |
| 35 | 4000 |
| 45 | 2500 |
| 55 | 1500 |
| 65 | 1000 |

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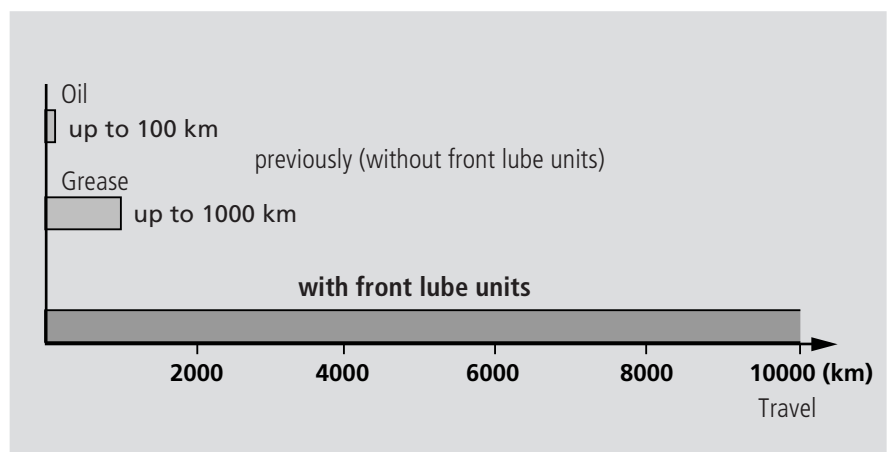
Runner block with two front lubrication units

Oil consumption comparison (Ball Rail System size 25)



Specially designed oil distribution channels ensure that lubricant is applied only where needed: directly to the ball tracks and the guide rail surfaces (2).

| Front lubrication units | Lubricant quantity per lubrication cycle (cm ³) | Travel (m) | Consumption (cm ³ /km) |
|-------------------------|---|------------------|-----------------------------------|
| without | 1.2 | 20 000 | 0.06 → 100 % |
| with | 5.2 | 5 000 000 | 0.00104 → 1.73 % |



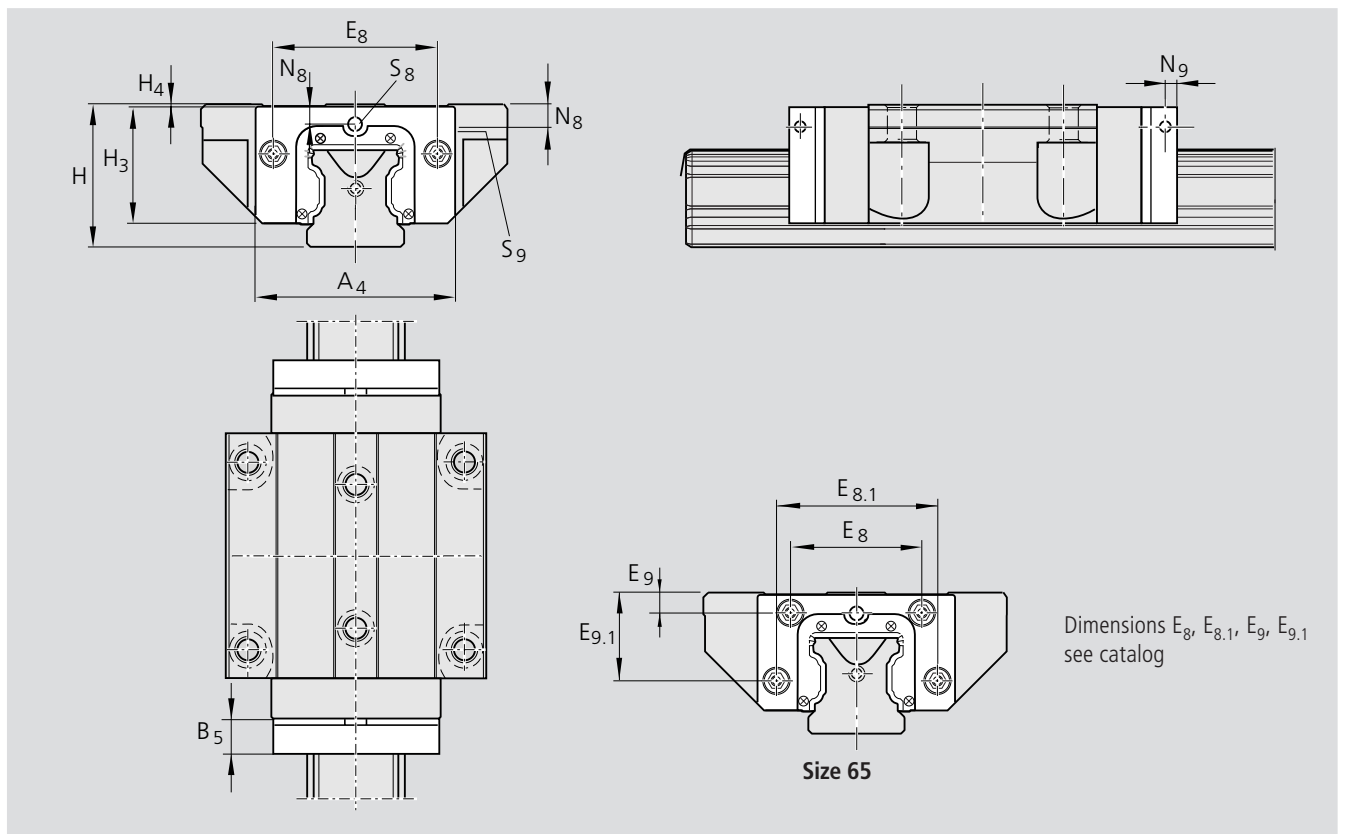
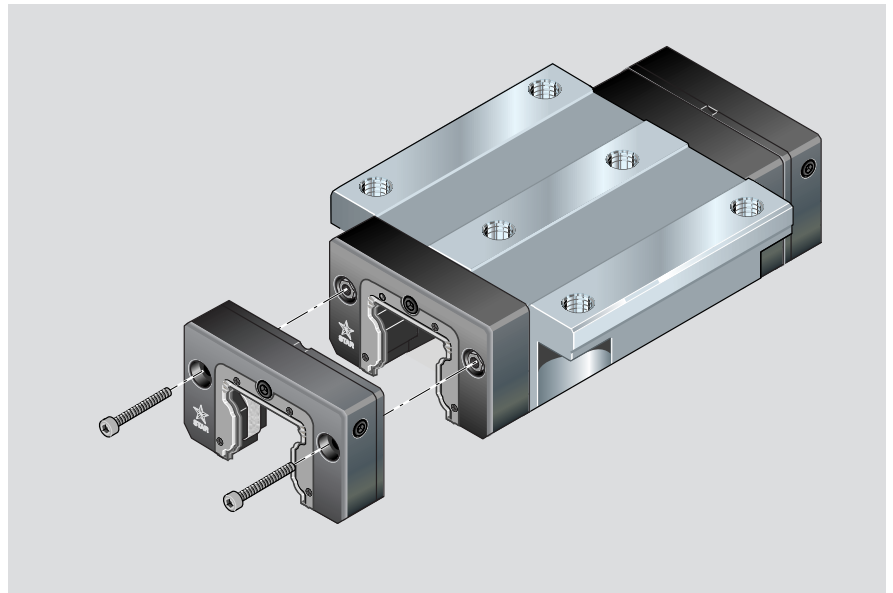
Front Lube Units for Ball Rail Systems

- Material: special plastic.

Mounting instructions:

Comes complete with coated mounting screws and lubricating nipple.

Front Lube Units with the part numbers stated below: ...-00 are supplied ready-filled with oil and can be mounted immediately.



Part numbers, dimensions.

| Size | Part numbers | Dimensions (mm) | | | | | | | | | Oil (cm ³) |
|------|--------------|-----------------|----------------|----|----------------|----------------|----------------|----------------|----------------|----------------|------------------------|
| | | A ₄ | B ₅ | H | H ₃ | H ₄ | N ₈ | N ₉ | S ₈ | S ₉ | |
| 15 | 1619-125-00 | 31.8 | 11.5 | 24 | 19.2 | 0.20 | 3.4 | 5 | M3 | M3 | 1.00 |
| 20 | 1619-825-00 | 43.0 | 12.5 | 30 | 24.8 | 0.50 | 3.4 | 5 | M3 | M3 | 2.20 |
| 25 | 1619-225-00 | 47.0 | 13.0 | 36 | 29.3 | 0.50 | 5.2 | 5 | M6 | M6 | 2.60 |
| 30 | 1619-725-00 | 58.8 | 14.5 | 42 | 34.8 | 0.75 | 5.5 | 6 | M6 | M6 | 3.85 |
| 35 | 1619-325-00 | 69.0 | 16.0 | 48 | 39.8 | 0.55 | 6.6 | 6 | M6 | M6 | 5.70 |
| 45 | 1619-425-00 | 84.0 | 17.0 | 60 | 49.8 | 0.50 | 8.0 | 7 | M6 | M6 | 9.60 |
| 55 | 1619-525-00 | 99.0 | 18.0 | 70 | 56.8 | 0.75 | 8.5 | 8 | M6 | M6 | 14.50 |
| 65 | 1619-625-00 | 124.2 | 19.0 | 90 | 75.8 | 1.00 | 15.2 | 8 | M8 | M8 | 30.00 |
| 20 | 1619-826-00 | 41.0 | 12.5 | 28 | 22.8 | 0.50 | 2.4 | – | M3 | – | 1.8 |
| 25 | 1619-226-00 | 47.0 | 13.0 | 33 | 26.3 | 0.50 | 3.8 | 5 | M6 | M3 | 2.5 |


Ball Rail Systems, low profile:
Sizes 20 and 25 in preparation.

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