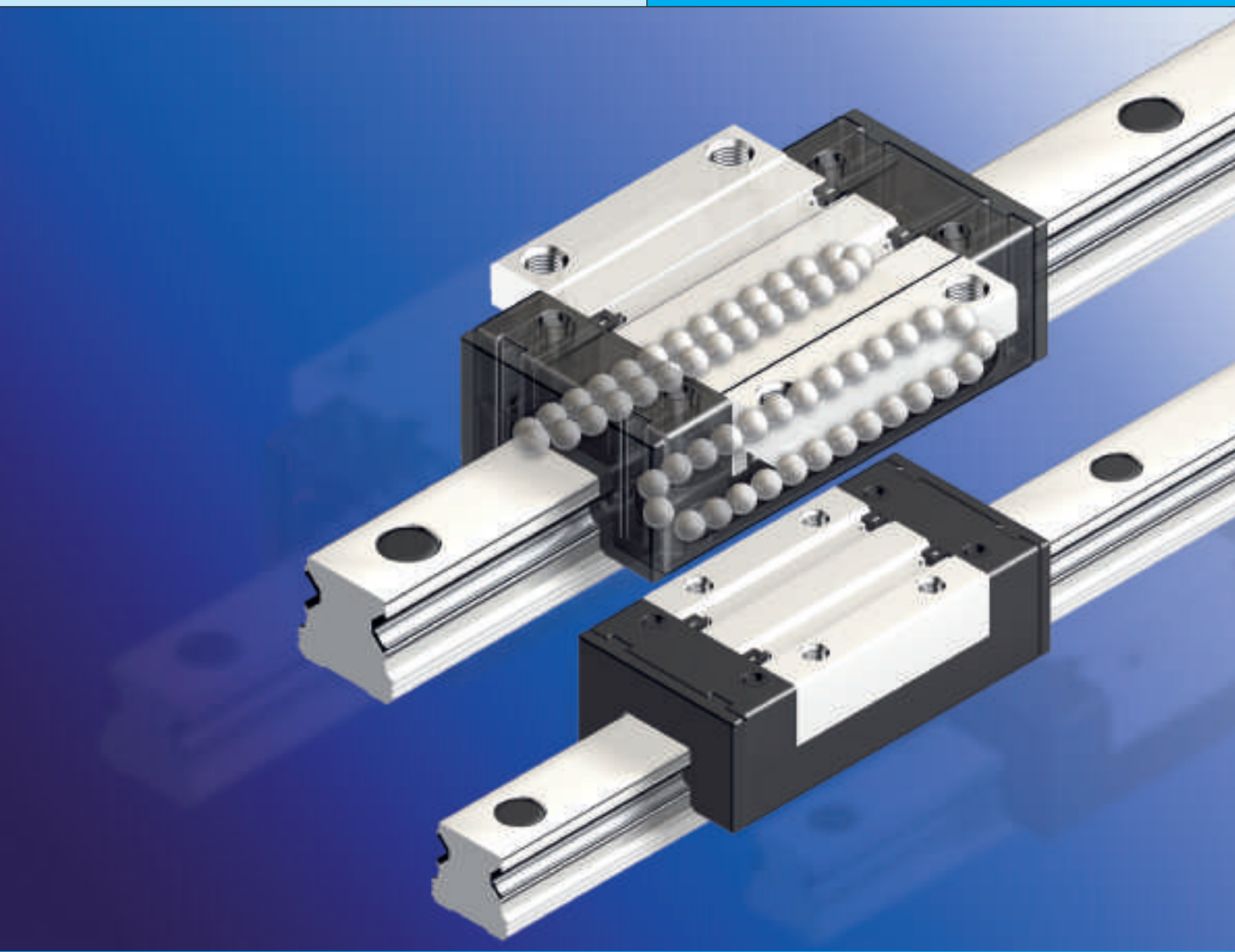
Alulineartechnik AG

ALUMINIUM RAIL GUIDES



LIGHTWEIGHT COST EFFECTIVE INTERCHANGEABLE

Alulin

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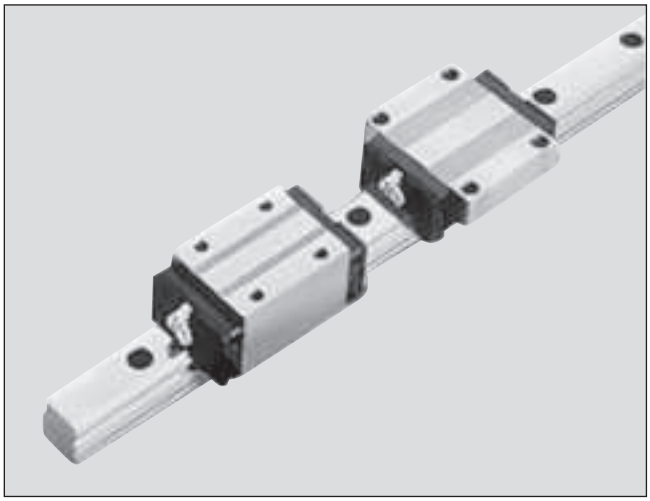
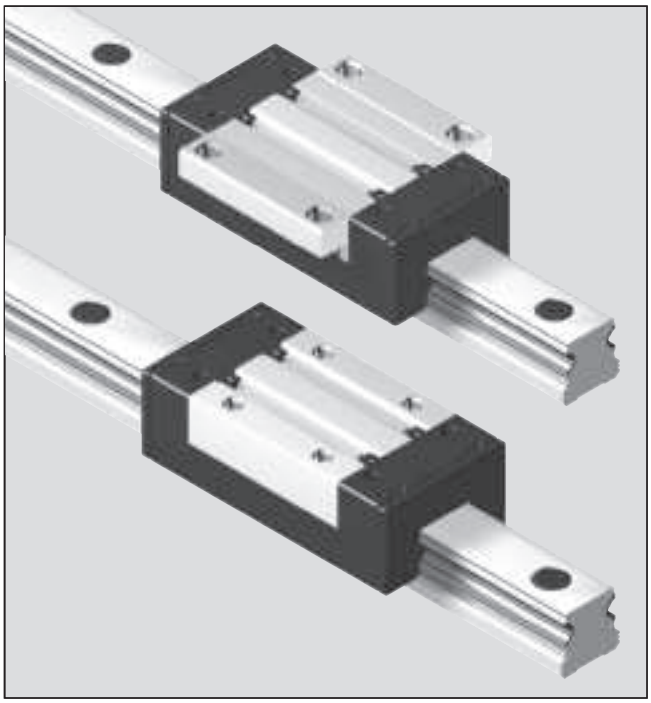
Introduction

General Information

Alulins accurate profile rails and ball bearing runner blocks are designed especially for all sorts of linear movements and are therefore suitable for use in most types of machinery. The rails consist of wrought aluminium having two pressed-in hardened stainless steel shafts serving as the raceways for the balls of the runner blocks. Advantages are the light weight and corrosive-resistant materials. Fixing holes in the attachment surfaces enable machine parts to be directly mounted onto the runner blocks. With this combination it is possible for us to offer a guide system which achieves a good price/performance ratio.





Advantages

- Compact, light-weight design; 60% weight saving versus steel versions.
- Same connection dimensions as steel ball rail systems.
- Much greater parallelism and height offsets of mounting bases possible.
- Insensitive in an aggressive environment (dust, shavings).
- Significantly better corrosion resistance in comparison with the steel versions.
- Runner blocks initially greased in-factory, therefore provided with long-term lubrication.
- Due to ball retainers in the runner blocks, runner blocks can be removed from the rail without any loss of balls.
- Complete interchangeability between runner blocks and rails.
- Both sides of rail are reference edges. The runner block has one reference edge, which can be verified by turning it on the rail.

Application Range

Speed	v_{max}	=	**2 m/s**
Acceleration	a_{max}	=	**30 m/s²**
Temperature	T_{max}	=	**60° C**

Following the directions on left, our system can be insertet in many application areas such as food and packaging industry, light machinery, handling technology, jigs and fixtures, assembly technology, positioning units, manual displacement systems, machine enclosures, house and building technology and many more.

Accuracy Information

Accuracy

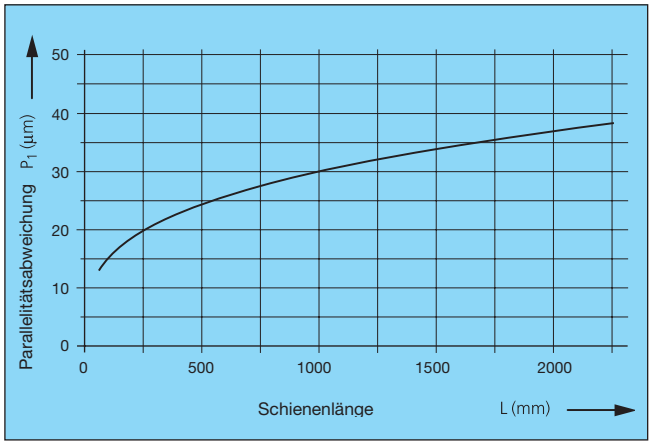
Rails are produced according to the high precision class “P”. Runner blocks according to the standard class “0” or the high precision class “P”. Each individual component element can be replaced by another at any time.

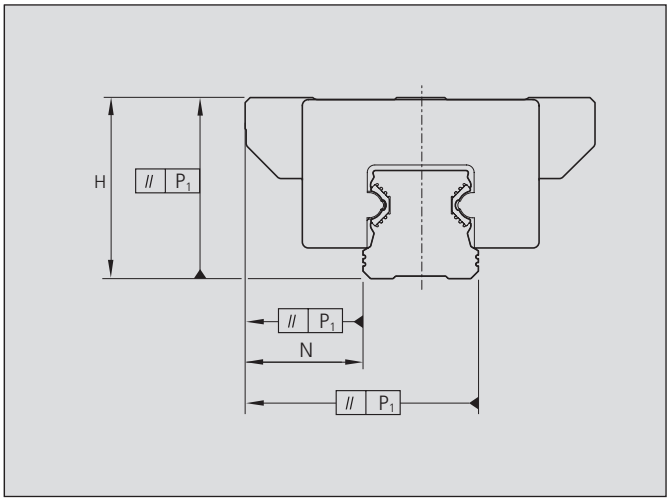
Tolerances for dimension “H”:

Mounting more than one runner block, tolerance of the runner blocks (stock standard) is just about +/- 60 µm. Tolerance of the precise runner block is within +/- 30 µm. For any runner block/rail combination at any position, tolerance is within +/- 115 µm (stock standard), precise runner blocks within +/- 100 µm.

Tolerances for dimension “N”:

Mounting more than one runner block, tolerance of the runner blocks (stock standard) is just about +/- 60 µm. Tolerance of the precise runner block is within +/- 30 µm. For any runner block/rail combination at any position, tolerance is within +/- 50µm (stock standard), precise runner blocks within +/- 40 µm.





Deviation of Parallelism

Please view the table on the left for parallelism values.

Preload (“V”)

Generally we deliver runner blocks and guiding rails without preload. Minimal clearance exists between runner block and rail. Usually two runner blocks are mounted on one or two rails. With two rails and use of more than one runner block per rail, this clearance is usually equalized by parallelism tolerances.

If required, this linear guide system will be delivered with preload. Please note, we recommend this only when greater displacement force is accepted or possible.

Precision Parts (“P”)

The product range also includes runner blocks with even smaller tolerances on dimensions. They were specially designed for applications requiring such precision. For details see above.

General Mounting Instructions

Parallelism

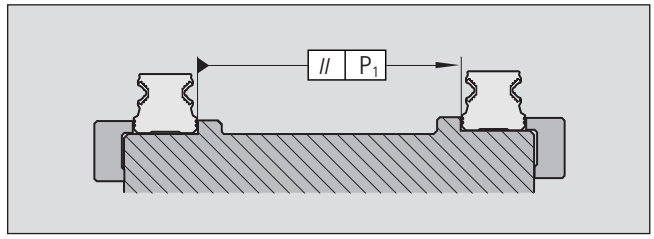
Parallelism of the installed rails measured at the guide rails and at the runner blocks.

The parallelism offset P1 causes a slight increase in preload on one side of the assembly.

As long as values specified in the table are met, the effect of parallelism offsets on the service life can generally be neglected.

Through the deviation in parallelism (P1) the preload is increased on one side. If table values are adhered to, the infl0uence on the service life is generally negligible.

Profiled rail systems allow substantially higher installation tolerances compared to steel rail systems.

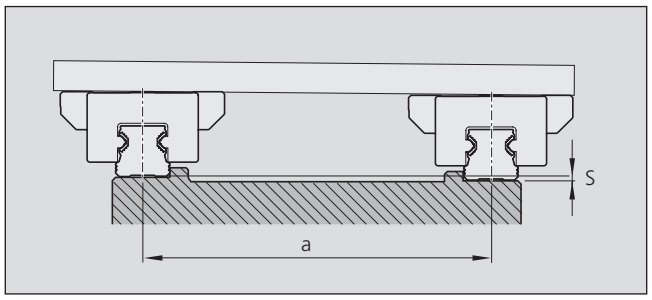


Size	Permissible deviation in parallelism P_{max}	
	Standard	Preload
15	0,027	0,018
20	0,031	0,021
25	0,034	0,022

Values in mm

Height deviation

Given adherence to the permissable height deviation “S”, the influence on the service life can generally be neglected.



Calculation factor	Standard	Preload
f	$1{,}2 \cdot 10^{-3}$	$0{,}75 \cdot 10^{-3}$

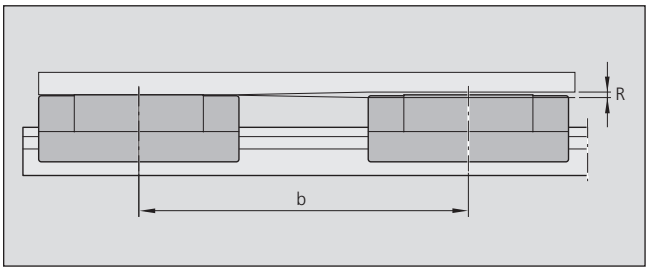
Permissable height deviation in lateral direction “S”

$S \leqq a \cdot f$

S = Permissible height deviation (mm)
a = distance between rails (mm)
f = Calculation factor

Permissible height deviation in longitudinal direction

Given adherence to the permissable height deviation “R”, the influence on the service life can generally be neglected.



Permissible height deviation in longitudinal direction

$R \leqq b \cdot g$

R = Permissible height deviation (mm)
b = Distance between runner blocks (mm)
g = Calculation factor

Calculation factor	Standard	Preload
g	$6 \cdot 10^{-4}$	$2{,}1 \cdot 10^{-4}$

Calculation of linear guiding size

1. Pre-select the runnerblock

2. Determine F_{comb}

3. Calculate the ratio of the dynamic load capacity "C" of the selected runner block relative to F_{comb}. (F_{comb} devided by "C").

If $F_{comb}/C > 0,4$: runner block is sized too small.
Select the next largest size and repeat the calculation (step 2 and 3).

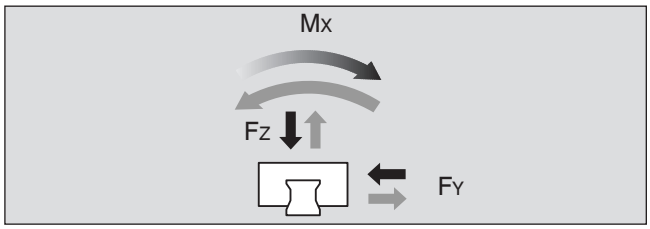
The ratio must always be $F_{comb}/C \leq 0,4$:, otherwise F_{max} will be exceeded.

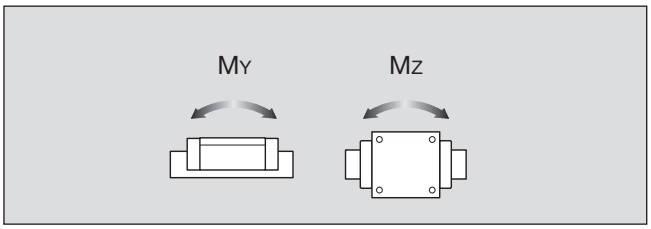
Note:

The load ratio F_{comb}/C is the quotient of the equivalent dynamic load on the bearing divided by the dynamic load capacity "C".

Please control dynamic demand of bolted joints.

Calculation of load on bearing for a runner block





F_{comb}	=	combined equivalent load	(N)
F_Y, F_z	=	dynamic loads	(N)
M_x	=	torque of the X-axis [1]	(Nm)
M_y	=	torque of the Y-axis [2]	(Nm)
M_z	=	torque of the Z-axis [2]	(Nm)
M_t	=	dynamic torsional moment load capacity	(Nm)
M_L	=	dynamic longitudinal moment load capacity	(Nm)
C	=	dynamic load capacity	(N)
b	=	operating factors	

For values, see runner blocks on page 9 and 10.
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For values, see table „Recommended values for operating factors "b".

1) Torque Mx will only be fully effective in an application with one guide rail.
2) Torque My or Mx will only be fully effective when only one runner block is mounted on one guide rail.

$$F_{comb} = b \cdot \left(|F_Z| + |F_Y| + C \cdot \frac{|M_x|}{M_t} + C \cdot \frac{|M_Y|}{M_L} + C \cdot \frac{|M_Z|}{M_L} \right)$$

Recommended operating factors b

1,0	Clean environment, low technical demands, manual operation
1,2	In a linear motion axis with ball screw drive
1,5	Linear motion axis with toothed belt drive
2,0	Auxiliary axis of machine tool not subject to dirt
6,0	Linear motion axis with pneumatic drive
9,0	In very dirty environments

Note:

Not for use in applications like:
- main axis of a machine tool
- aggressive dust environment
- oscillating conveyors
- danger to life and limb (e.g. insecure overhead installation)

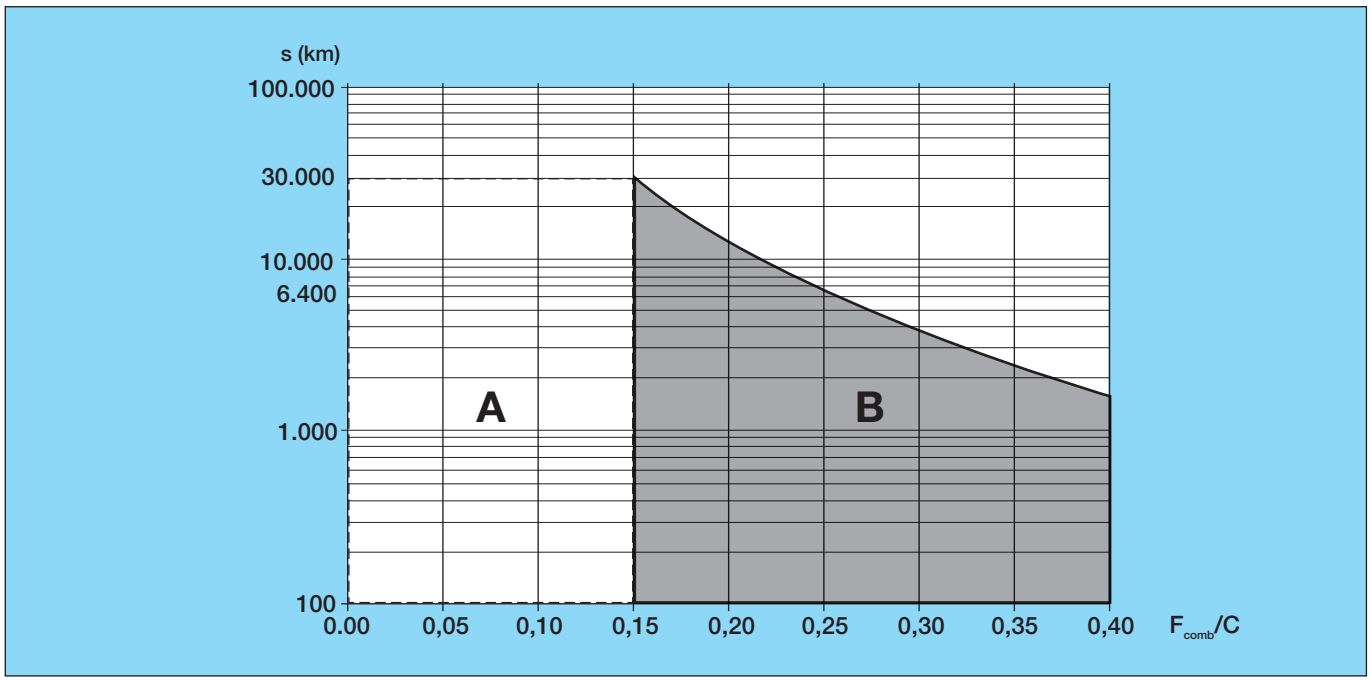
Lubrication Concept

We aim to achieve a lifetime lubrication, which we define as at least 30.000 km.
The following conditions apply:
- initial greasing with Dynalub 510
- maximum speed Vmax = 2 m/s
- mounted seal unit
- clean environment
- no exposure to metal-working fluids
- ambient temperature T = 20 to 30° C

Lifetime lubrication applies only to a ratio $F_{comb}/C \leq 0{,}15$, values are found on page 9 and zone A in the graph below.

For $F_{comb}/C = 0{,}25$ (as shown in zone B in the graph below), relubrication is necessary after a distance traveled s = 6.400 km.
By distance traveled ≥6.400 km, runnerblock should be dismantled, re-lubricated and supplied with new seal units.

Value $F_{comb}/C > 0{,}40$, then F_{max} is exceeded.



Please note:

- Take account oft the general service life of lubricants

- If other lubricants are used, this may lead to a reduction in the relubrication intervals, the achievable travel in short-stroke applications and the load capacities. Possible chemical interactions between the plastic materials, lubricants and preservative oils must also be taken into account.

- Do not use greases with solid particles such as graphite or MoS2!

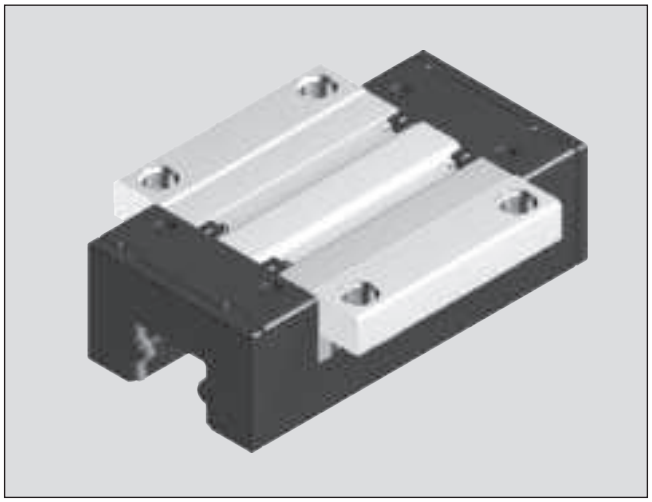
- If your application involves more demanding environmental requirements such as clean room, vacuum, food industry, increased exposure to fluids or aggressive media, extreme temperatures, please consult us. These situations must be investigated on a case by case basis and may require the use of a special lubricant. Be sure to have all the information concerning your application at hand when contacting us.

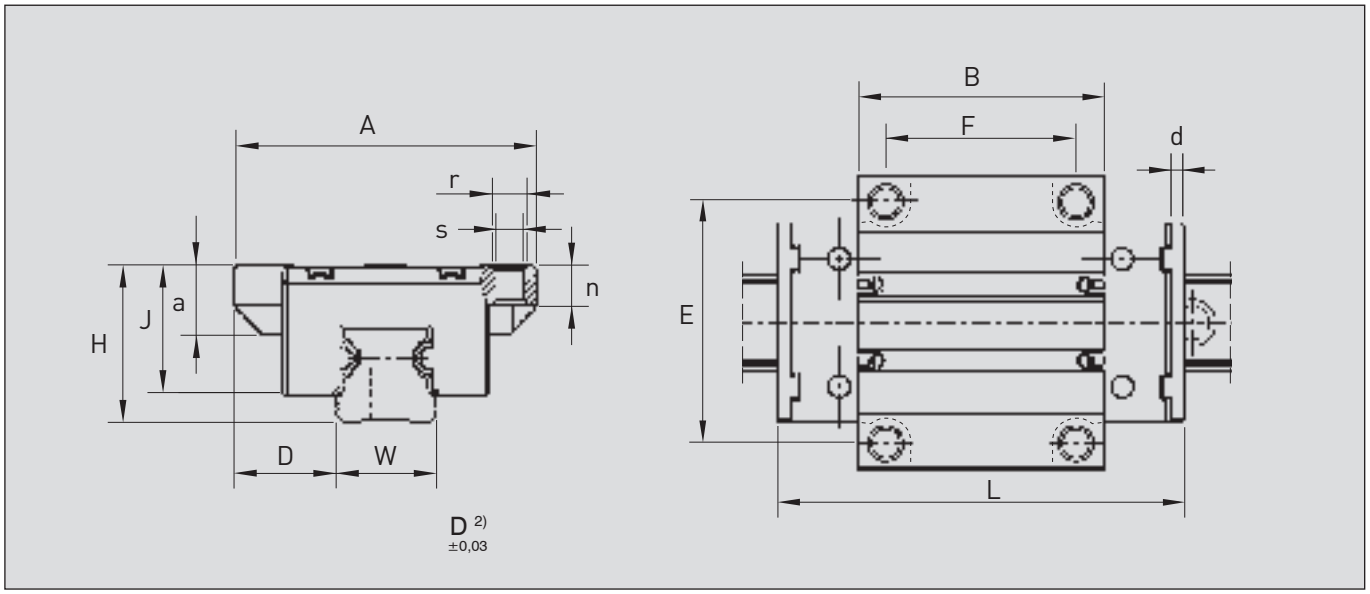
Flanged Ball Runner Block

ALULIN®

This light-weight aluminium runner block is designed for cost-effective applications such as assembly and handling processes.

Mounting dimensions are identical to those of the guiding rails and in accordance to DIN 645-1. Mounting possible from above and below. Runner block consists of wrought aluminium alloy with a tensile strength of 350 N/mm², balls and running tracks of hardened anti-friction bearing steel. All other parts are made of polyamide. The runner block is greased in-factory and has already mounted seal units, which can easily be replaced.





Order ref. no.	A	H 1) ±0,03	W	D 2) ±0,03	L	B	E	F	s	r	n	J	a max	d	weight (kg)
FNS-1500	47	24	15	16,0	64,0	37,8	38	30	4,3	M5	6,0	19,8	11	2,5	0,08
FNS-2000	63	30	20	21,5	85,9	51,5	53	40	5,3	M6	8,0	24,7	13	2,8	0,18
FNS-2500	70	36	23	23,5	96,0	58,0	57	45	6,7	M8	9,3	29,9	17	3,0	0,26

Please insert **V for PRELOAD** (“Vorspannung”), e.g. FNS-150V
Please insert **P for PRECISION**, e.g. FNS-25PV

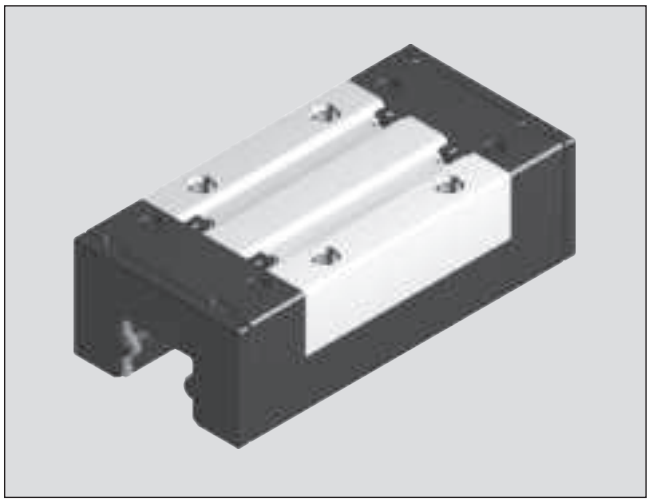
Size	Dynamic load cpapcities (N) 3) C dyn.	F 4) max	Torque (Nm) 3) M_t dyn.	$M_{t,max}$ 4) stat.	M_L dyn.	$M_{L,max}$ 4) stat.
15	5 000	2 000	36	14	29	12
20	11 000	4 400	101	40	89	35
25	16 000	6 400	165	66	147	59

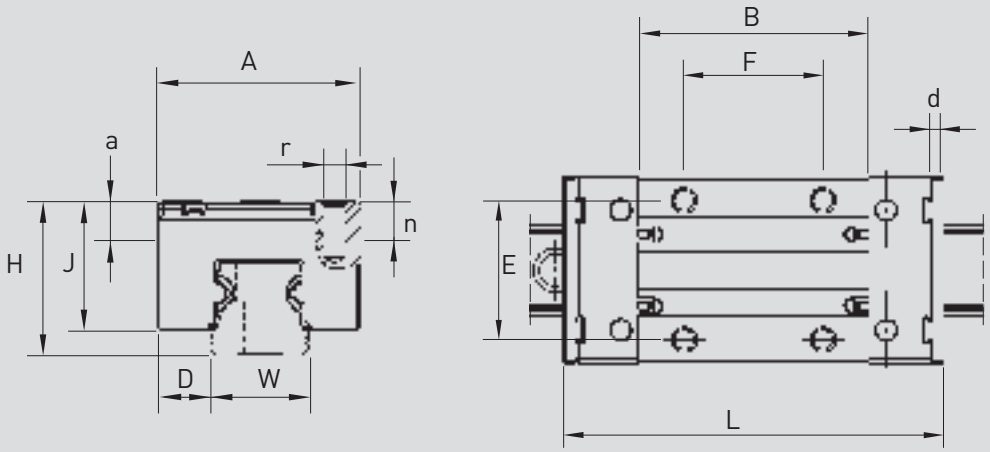
1) Tolerance on one guide rail. May differ due to different production charges by +/- 0,12
2) Tolerance on one guide rail. May differ due to different production charges by +/- 0,07
3) Determination of the dynamic load capacities and torques is based on a travel life of 100.000 m.
4) Due to mechanical operations of guide rails and runner block with thier different materials, it is not possible to clearly indicate a load rating. In this case never exceed Fmax or Mmax. Otherwise malfunction or damage may occur.

Standard Runner Block

This light-weight standard runner block has the same features as the flanged runner block on page 9. It is only slimmer and is designed for mounting from above.

Mounting dimensions are identical to those of the flanged runner and in accordance to DIN 645-1. Mounting possible from above. Runner block consists of wrought aluminium alloy with a tensile strength of 350 N/mm², balls and running tracks of hardened anti-friction bearing steel.





Order ref. no.	A	H [1] ±0,03	W	D [2] ±0,03	L	B	E	F	r	n	J	a	d	weight (kg)
GNS-1500	34	24	15	9,5	64,0	37,8	26	26	M4	6,0	19,8	4,1	2,5	0,07
GNS-2000	44	30	20	12,0	85,9	51,5	32	36	M5	7,5	24,7	5,5	2,8	0,15
GNS-2500	48	36	23	12,5	96,0	58,0	35	35	M6	9,0	29,9	6,4	3,0	0,22

Please insert **V for PRELOAD** (“Vorspannung”), e.g. GNS-200V
Please insert **P for PRECISION**, e.g. GNS-15PV

Size	Dynamic load capcities (N) [3] C dyn.	F_{max} [4]	Torque (Nm) [3] M_t dyn.	$M_{t,max}$ [4] stat.	M_L dyn.	$M_{L,max}$ [4] stat.
15	5 000	2 000	36	14	29	12
20	11 000	4 400	101	40	89	35
25	16 000	6 400	165	66	147	59

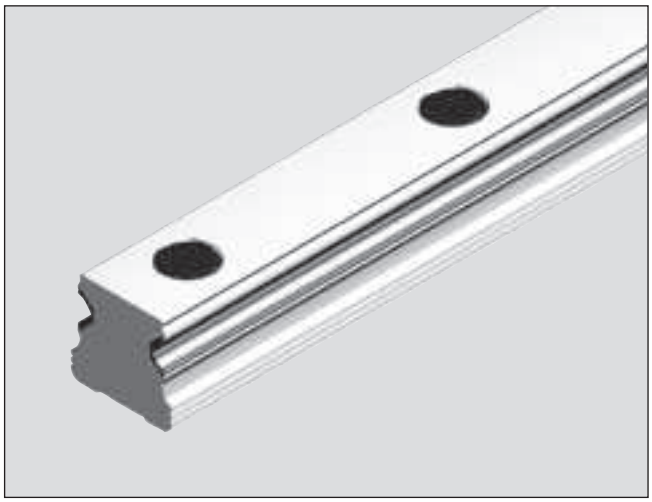
[1] Tolerance on one guide rail. May differ due to different production charges by +/- 0,12
[2] Tolerance on one guide rail. May differ due to different production charges by +/- 0,07
[3] Determination of the dynamic load capacities and torque is based on a travel life of 100.000 m.
[4] Due to mechanical operations of guide rails and runner block with thier different materials, it is not possible to clearly indicate a load rating. In this case never exceed Fmax or Mmax. Otherwise malfunction or damage may occur.

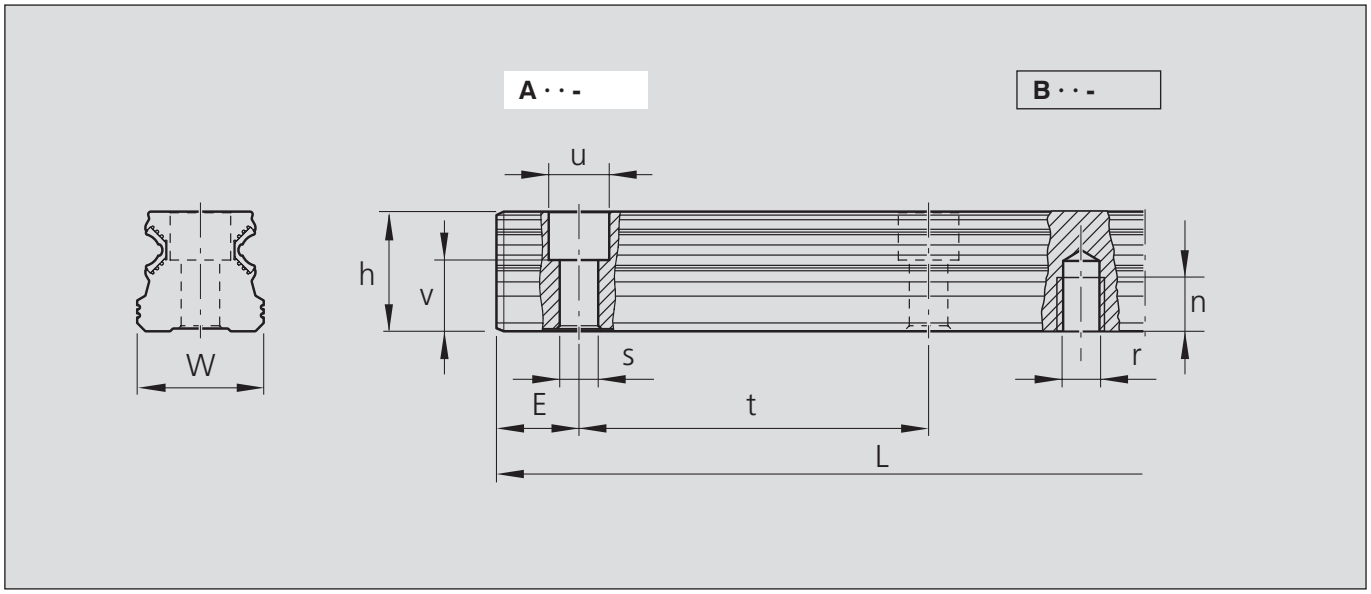
Corrosion-Resistant Profiled Rail

ALULIN®

The rails consist of a wrought aluminium alloy, the raceways of hardened and corrosion-resistant steel. Advantages in comparison with steel rails, are the light weight and cost-efficiency. Surface irregularities are evened out due to material properties.
We recommend, that due to the aluminium-and-steel structure, rails should be ordered ready-made and only be separated in exceptional cases.
Order no. **A**..-... rails are for mounting from above, **B**..-... for mounting from below.

Mounting caps (plastic and metal) can be ordered separately.





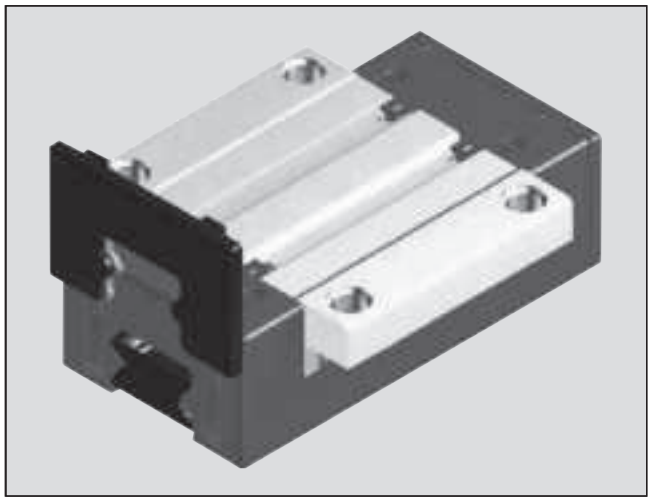
Order ref. no	W	h	u	v	s	E	E_{min}	r	n	t	L_{max}	weight kg/m
A15-....	15	14,0	7,4	8,1	4,4	28	10			60	4000	0,57
B15-....	15	14,0				28	10	M5	7	60	4000	0,57
A20-....	20	19,0	9,4	11,6	6,0	28	10			60	4000	0,98
B20-....	20	19,0				28	10	M6	9	60	4000	0,98
A25-....	23	21,8	11,0	12,9	7,0	28	10			60	4000	1,25
B25-....	23	21,8				28	10	M6	12	60	4000	1,25

Please insert rail lengths in mm.

Mounting caps
oSP-315
oSP-320
oSP-325

[1] Please order separately.

Accessoires

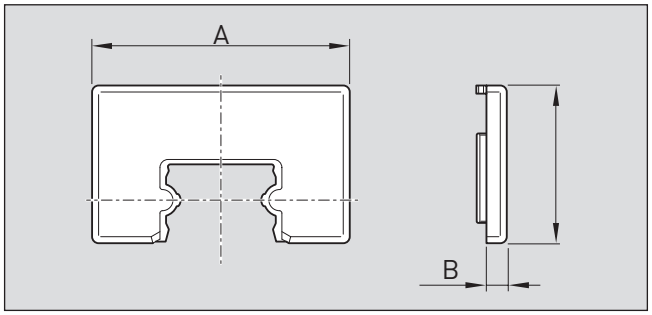


Seal Unit

- All runner blocks are delivered with greased seal units.

Mounting directions:

- Mounting is not possible, when runner is mounted on rail.
- To remove seal unit, pull it upwards.
- Slip the new seal onto the runner block.
- Mount runner block onto the rail.



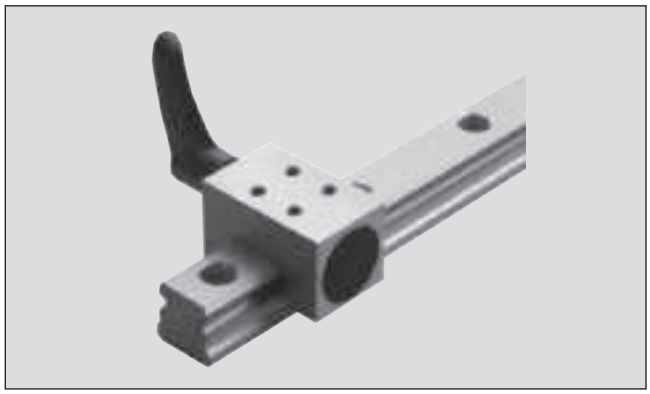
Order ref. no.	Measurements (mm)		
	A	B	H
DE15	31,7	2,5	19,4
DE20	43,2	2,8	24,3
DE25	47,2	3,0	26,5

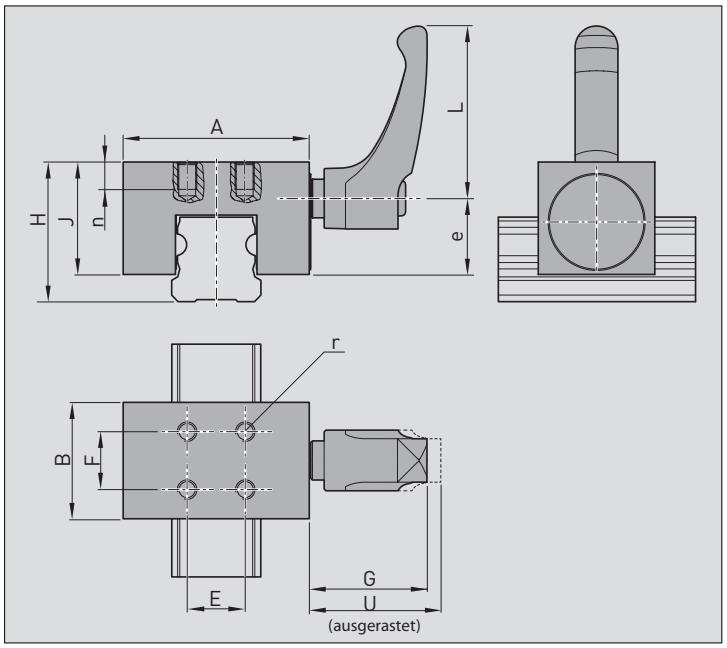
Manual Clamping Unit

Manual clamping unit dHK
for aluminium rail systems

A·····

B·····





Order ref. no.	Torsional	Measurements (mm)											
		A	B	e	H	J	E	F	L	G	U	n	r
dHK-1500	130 N / 3 Nm	34	20	12,9	24	19,8	10	10	40	29,9	33,3	6	M3
dHK-2000	250 N / 3 Nm	44	24	16,0	30	24,0	12	12	40	29,9	33,4	6	M4
dHK-2500	330 N / 3 Nm	48	30	19,6	36	29,0	15	15	44	29,8	33,3	7	M5

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