

Technical Data

Travel 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.

Acceleration

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

Only with preloaded systems. For non-preloaded systems: $a_{\max} = 50 \text{ m/s}^2$

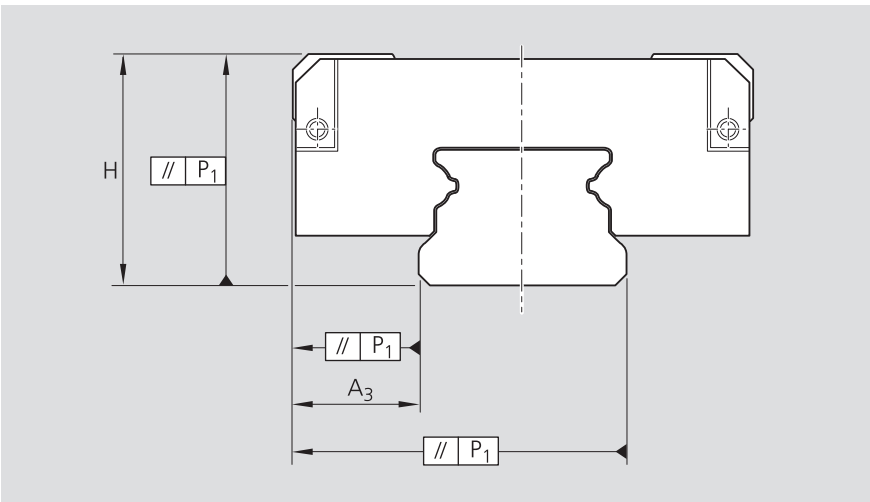
Operating temperature range

$$-10 \text{ }^\circ\text{C} \dots 80 \text{ }^\circ\text{C}$$

Brief peaks up to 100 °C are permissible.

Accuracy classes and their tolerances (µm)

Miniature Ball Rail Systems are offered in 3 different accuracy classes.

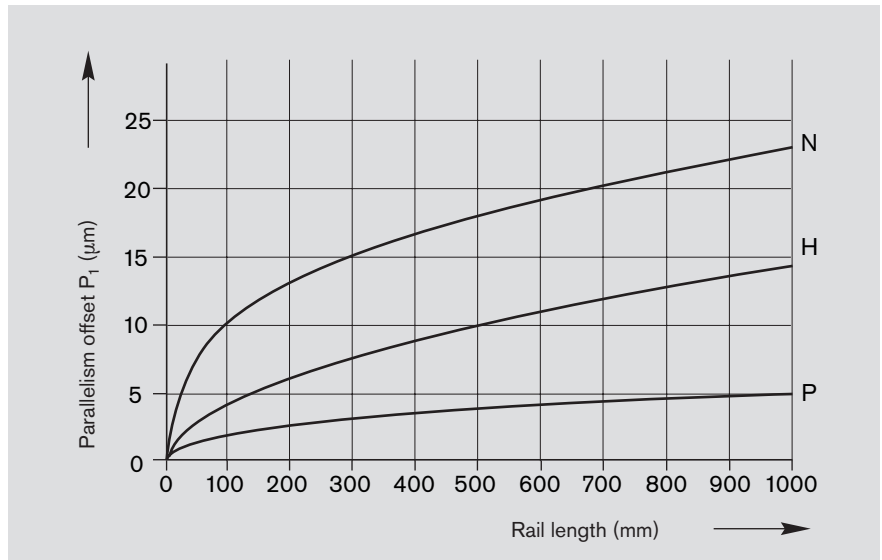


Accuracy class	Dimensional tolerance (µm)		Max. difference in dimensions H and A ₃ on the same rail ΔH, ΔA ₃ (µm)
	H	A ₃	
P	± 10	± 10	7
H	± 20	± 20	15
N	± 30	± 30	20

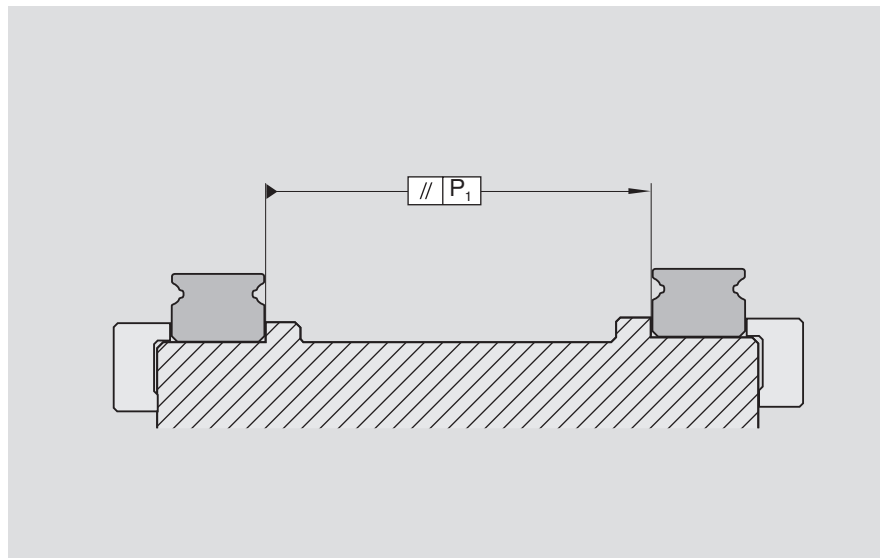
Measured at middle of runner block ¹⁾		For any block/rail combination at any position on rail
		For different runner blocks at same position on rail

1) For dimensions H and ΔH, the middle of the runner block is calculated from the mean of the two measuring points shown.

Parallelism offset P_1 of the Ball Rail System in service



Parallelism offset of the installed rails measured on the guide rails and on the runner blocks



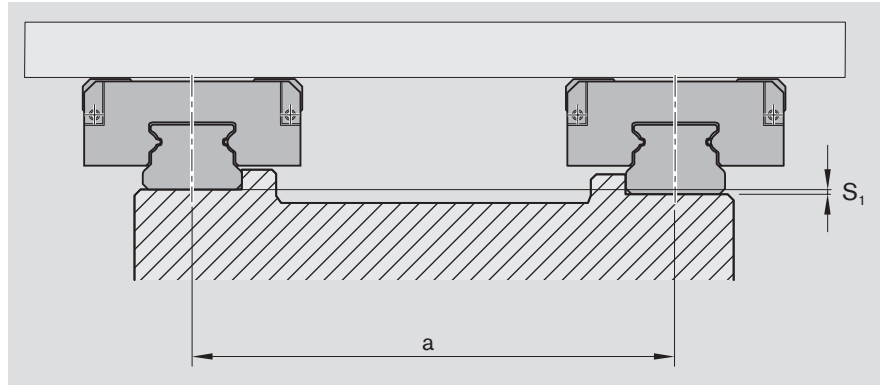
Size	Parallelism offset P_1 (mm)	
	Clearance	Preload
Standard Guide Rails R0445		
7	0.004	0.002
9/M3	0.005	0.002
12	0.008	0.004
15	0.017	0.008
20	0.025	0.016
Wide Guide Rails R0455		
9/M3	0.010	0.004
12 B	0.014	0.006
15 B	0.018	0.011

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Vertical offset

Permissible vertical offset in transverse direction S_1

The permissible vertical offset S_1 includes the tolerance for dimension H (see accuracy classes).



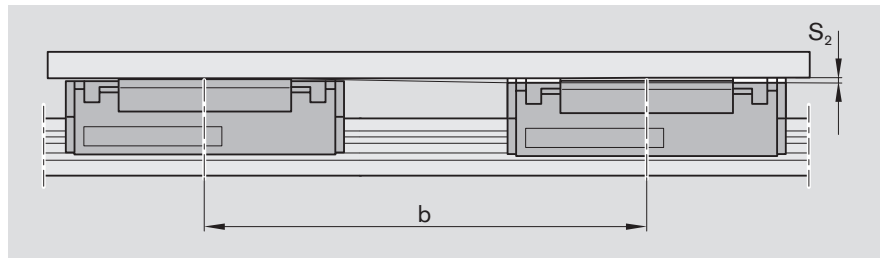
$$S_1 = a \cdot Y$$

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

Calculation factor	For preload class	Clearance	Preload
Y		$3.0 \cdot 10^{-4}$	$1.5 \cdot 10^{-4}$

Permissible vertical offset in longitudinal direction S_2

The permissible vertical offset S_2 includes the tolerance "max difference of dimension H on the same rail" ΔH (see accuracy classes).



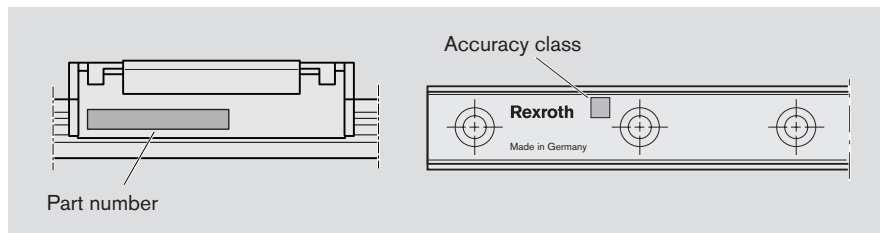
$$S_2 = b \cdot 7 \cdot 10^{-5}$$

S_2 = permissible vertical offset (mm)
 b = distance between runner blocks (mm)

Preload and clearance

Preload class	Accuracy class			
	P 1	1	H 9	N 9
Preload and clearance	~0 to moderate preload	~0 to moderate preload	~0 to moderate clearance	Moderate clearance to moderate preload

Markings on runner block and guide rail



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General Notes

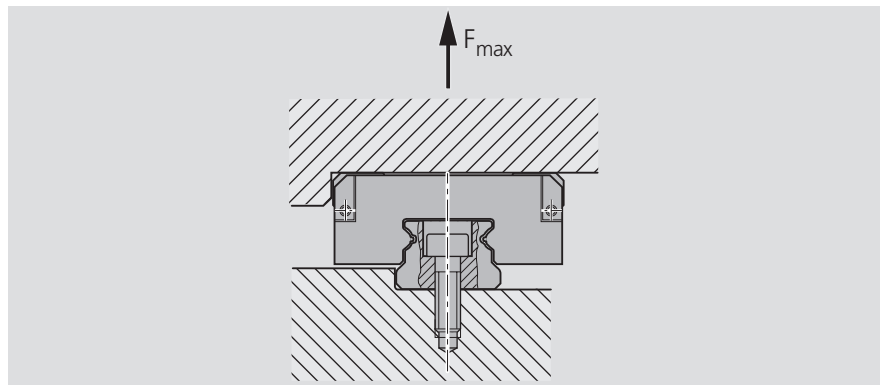
The screw connections specified in the DIN 645-1 standard can be overstressed due to the high performance capability of profiled rail systems. The most critical point is the screw connection between the guide rail and the mounting base. If the lift-off loads (F) or moments (M_t) are higher than the respective load values given in the table, the screw connections must be recalculated separately.

The data applies for the following conditions:

- Mounting screw quality 12.9
- Screws tightened using a torque wrench
- Screws lightly oiled
(For screws in quality 8.8, an approximation factor of 0.6 can be applied)

Miniature Ball Rail Systems

Guide Rails	Runner blocks R0442			Runner blocks R0444	
	Size	F _{max.} (N)	M _{tmax.} (Nm)	F _{max.} (N)	M _{tmax.} (Nm)
R0445	7	1000	3.2	1150	3.7
	12	-	-	4300	23.7
	15	3740	26.0	4280	30.0
	No restriction for sizes				
R0445	R0442:	9/M3, 12 and 20			
	R0444:	9/M3			
R0455	R0441,R0443:	9/M3, 12 and 15			



Friction and seals

The total frictional drag of the runner block is the sum of the frictional drag of the runner block and the frictional drag of the seals (see tables at right).

The runner blocks come standard with low-friction seals.

Part number: R044. ... 01

(See "Part numbers for runner blocks" tables)

Special versions:

Runner blocks are also available with N seals (excellent wiping action).

Part number: R044. ... 00

(otherwise as in "Part numbers for runner blocks" tables)

Sizes 15, 20, 9/M3 wide, 12 wide, 15 wide and long runner blocks sizes 9/M3, 12 and 15 have additional longitudinal seals for full sealing.

Size	Frictional drag of runner blocks (without seals)		Frictional drag of seals		
	with clearance (N)	with preload (N)	Low-friction seal (-01) (N)	N-Seal (-00) (N)	
Standard runner block R0442					
7	< 0.1	< 0.1	~0	0.1	
9/M3	< 0.1	< 0.1	~0	0.5	
12	< 0.1	< 0.2	~0	0.9	
15	< 0.2	< 0.4	~0	1.2 ¹⁾	
20	< 0.2	< 0.5	~0	1.5 ¹⁾	
Long runner block R0444					
7	< 0.1	< 0.3	~0	0.2	
9/M3	< 0.2	< 0.4	~0	0.6 ¹⁾	
12	< 0.2	< 0.4	~0	0.9 ¹⁾	
15	< 0.2	< 0.5	~0	1.0 ¹⁾	
Wide runner block R0443					
9/M3	< 0.2	< 0.3	~0	1.4 ¹⁾	
12	< 0.2	< 0.3	~0	1.6 ¹⁾	
15	< 0.2	< 0.4	~0	1.8 ¹⁾	
Wide, long runner block R0441					
9/M3	< 0.2	< 0.4	~0	1.5 ¹⁾	
12	< 0.2	< 0.4	~0	1.8 ¹⁾	
15	< 0.2	< 0.5	~0	2.0 ¹⁾	

1) with longitudinal seal