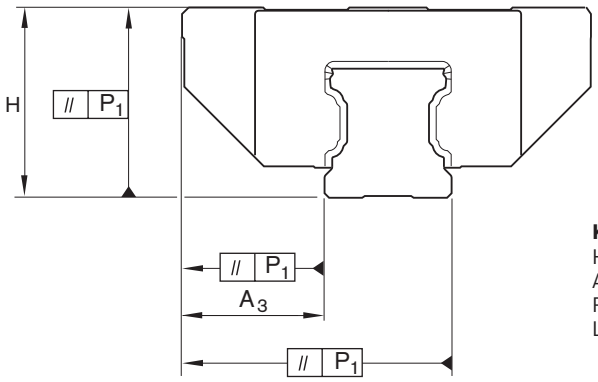
Accuracy classes

Accuracy classes and their tolerances

In ball rail systems, the ball runner blocks are available in six accuracy classes and the guide rails in five accuracy classes. For details of the available ball runner blocks and guide rails, see the “Part numbers” tables.

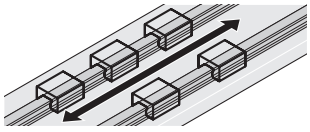
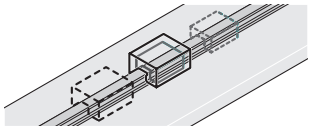


Key to illustration

H	= Height tolerance	(µm)
A_3	= Side tolerance	(µm)
P_1	= Parallelism offset	(µm)
L	= Rail length	(mm)

Precision manufacturing process makes interchangeability easy

Rexroth manufactures its ball guide rails and ball 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. For example, a ball runner block can be used without problems on various guide rails of the same size. Similarly, different ball runner blocks can also be used on one and the same ball guide rail.

	H / A_3	ΔH, ΔA_3
		
Measured at middle of runner block	For any ball runner block/rail combination at any position on rail	For different ball runner blocks at same position on rail

Ball rail system made of steel, aluminum, Resist NR and Resist NRII

Accuracy classes	**Tolerances of the dimensions** (µm)		**Max. differences of dimensions H and A_3 on one rail** (µm)
	H	**A_3**	**ΔH, ΔA_3**
N	±100	±40	30
H	±40	±20	15
P	±20	±10	7
XP[1)]	±11	±8	7
SP	±10	±7	5
UP	±5	±5	3

1) Ball runner block in accuracy class XP, ball guide rail with accuracy class SP

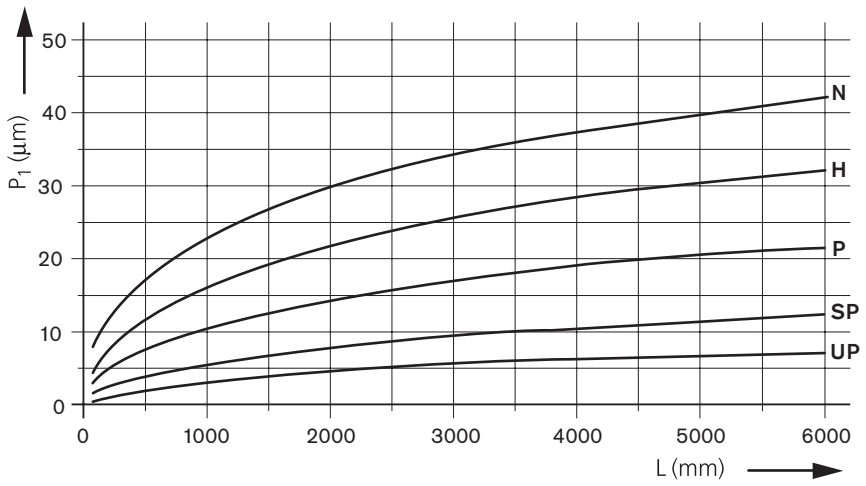
Ball rail system, Resist CR, matte-silver hard chrome plated

Accuracy classes	**Tolerances of the dimensions** (µm)				**Max. differences of dimensions H and A_3 on one rail** (µm)	
	H		**A_3**		**ΔH, ΔA_3**	
	Ball runner block/ball guide rail	**Ball guide rail**	**Ball runner block/ball guide rail**	**Ball guide rail**	**Ball runner block/ball guide rail**	**Ball guide rail**
H	+47 -38	+44 -39	±23	+19 -24	18	15

Accuracy classes

Parallelism offset P_1 of the ball rail system in operation Values measured in the middle of the runner block with ball rail systems without surface coating.

In the case of Resist CR hard chrome-plated ball guide rails, the values can increase up to 2 µm.



Tolerances for combination of accuracy classes

Ball runner block			Ball guide rails N (µm)	H (µm)	P (µm)	SP (µm)	UP (µm)
N	Tolerance dimension H	(µm)	**±100**	**±48**	±32	±23	±19
	Tolerance dimension A_3	(µm)	**±40**	**±28**	±22	±20	±19
	Max. diff. in dimensions H and A_3 on one rail	(µm)	**30**	**30**	30	30	30
H	Tolerance dimension H	(µm)	**±92**	**±40**	**±24**	±15	±11
	Tolerance dimension A_3	(µm)	**±32**	**±20**	**±14**	±12	±11
	Max. diff. in dimensions H and A_3 on one rail	(µm)	**15**	**15**	**15**	15	15
P	Tolerance dimension H	(µm)	±88	**±36**	**±20**	**±11**	±7
	Tolerance dimension A_3	(µm)	±28	**±16**	**±10**	**±8**	±7
	Max. diff. in dimensions H and A_3 on one rail	(µm)	7	**7**	**7**	**7**	7
XP	Tolerance dimension H	(µm)	±88	**±36**	**±20**	**±11**	±7
	Tolerance dimension A_3	(µm)	±28	**±16**	**±10**	**±8**	±7
	Max. diff. in dimensions H and A_3 on one rail	(µm)	7	**7**	**7**	**7**	7
SP	Tolerance dimension H	(µm)	±87	±35	**±19**	**±10**	**±6**
	Tolerance dimension A_3	(µm)	±27	±15	**±9**	**±7**	**±6**
	Max. diff. in dimensions H and A_3 on one rail	(µm)	5	5	**5**	**5**	**5**
UP	Tolerance dimension H	(µm)	±86	±34	±18	**±9**	**±5**
	Tolerance dimension A_3	(µm)	±26	±14	±8	**±6**	**±5**
	Max. diff. in dimensions H and A_3 on one rail	(µm)	3	3	3	**3**	**3**

Recommendations for combining accuracy classes

Recommended with **relatively large ball runner block distances** and long strokes:
Ball guide rail in higher accuracy class than ball runner blocks.
Recommended with **small ball runner block distances** and short strokes:
Ball runner blocks in higher accuracy class than ball guide rail.

Selection criterion Travel accuracy

Perfected ball entry and exit zones in the ball runner blocks and optimized spacing of the mounting holes in the guide rails provide very high travel accuracy with very low pulsation. Particularly suitable for high-precision metal-cutting machining, measuring technology, high-precision scanners, eroding technology, etc. (see “Application examples” in the chapter entitled “Product description of high-precision steel ball runner blocks BSHP”.