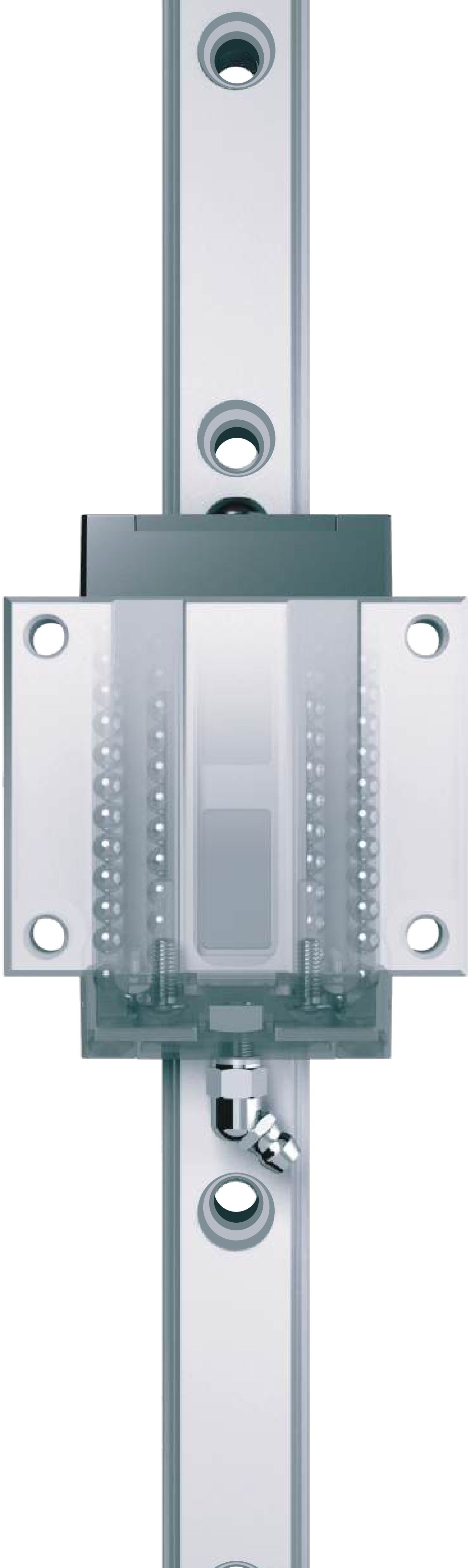
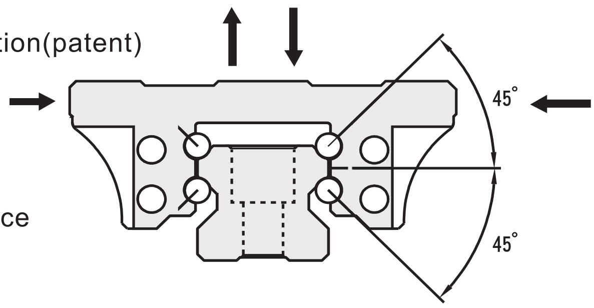
1
Standard Linear Guide

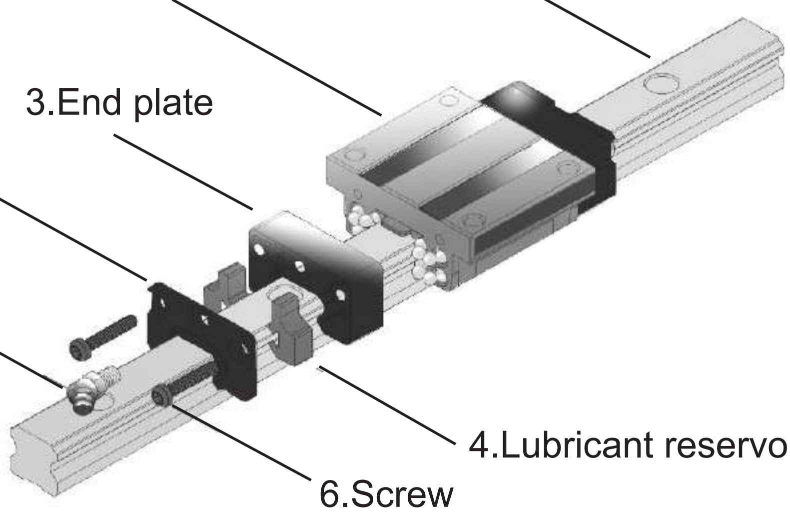


1.1 Characteristics

1. Built-in long life lubrication(patent)
2. Equivalent loading capacity in four directions
3. Smooth running due to new ball re-circulation(patent)
4. High rigidity: 4-row angular contact
5. International standard dimension
6. High accuarcy, low friction, low maintenance
7. High speed, low noise
8. Integral all-round sealing
9. Interchangeability
10. Green production

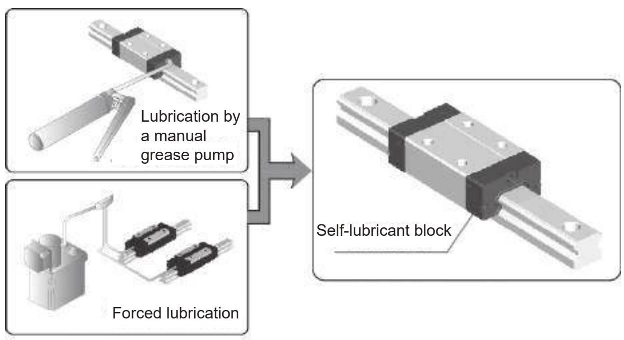


1.2 Construction

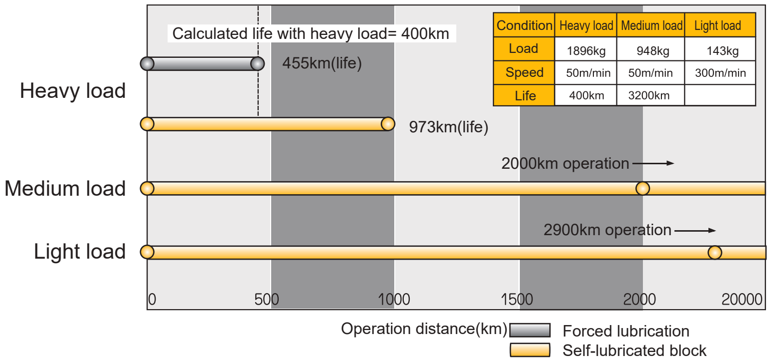


1.3 Advantage

1 **Maintence free - No need for frequent periodic lubrication or automatic lubrication systems.**

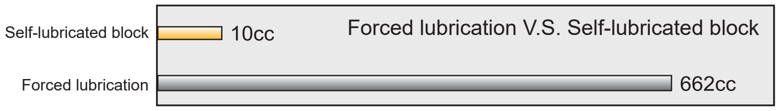


2 Extended intervals between maintenance.



Condition	Heavy load	Medium load	Light load
Load	1896kg	948kg	143kg
Speed	50m/min	50m/min	300m/min
Life	400km	3200km	

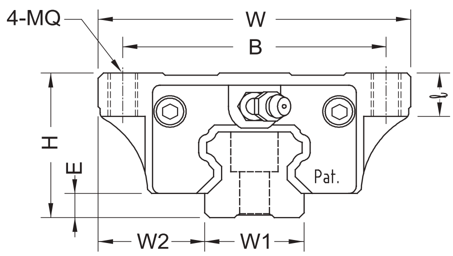
3 Curtailing lubrication cost.

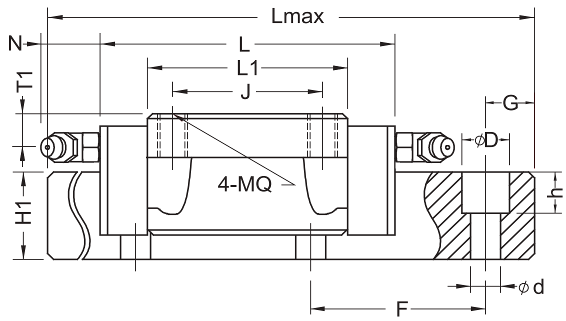


Forced lubrication:0.03cc/6min X 8h/day X 276day X 1year=662cc
Operation distance=3500km/year

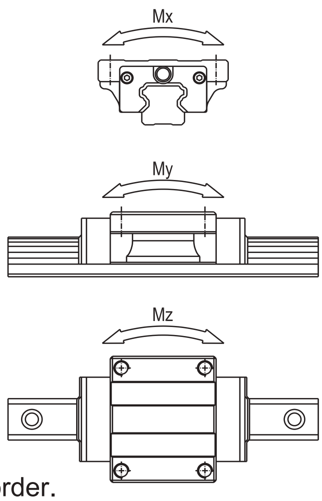
4 No oil leakage concern, easy for cleaning.

1.4 Interchangeability Notice





1. Check the mounting height (H)
2. Check the mounting width (W2)
3. Check the block length (L)
4. Check the block's body size (L1)
5. Check the hole diameter and pitches on the block (BXJ)
6. Check the rail width (W1)
7. Check the pitch of the rail (F)
8. Check the hole diameter and rail size (dxDxh)
9. When a specific length is required, please advise the (G) values in your order.



1.5 Accuracy Selection

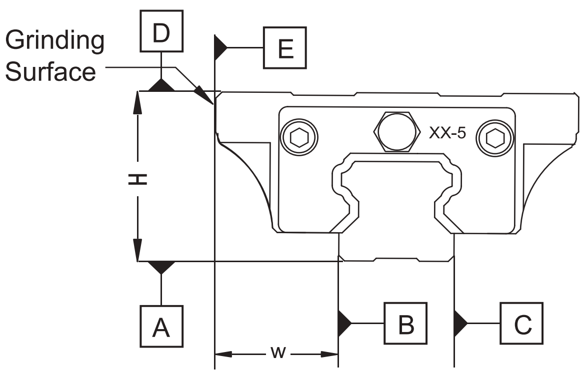
We have three grades for your selection: Normal(N)/ High(H)/ Precision(P)

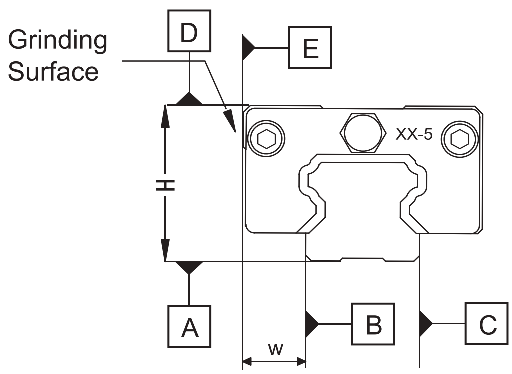
The accuracy of linear guides can be divided into three types: Running parallelism, Tolerance, and Difference of heights and widths. (As several blocks are used on one rail, or as several shafts are installed on the same surface, the Difference of heights and widths of each model are specified.)

	Application	N	H	P
NC Machine tools	Machining Center			○
	Lathe			○
	Milling Machine			○
	Boring Machine			○
	Jig Borer			○
	Grinding Machine			○
	Electro-discharge Machine			○
	Punching Press Machine		○	○
	Laser Cutting Machine		○	○
	Wood Working Machine	○	○	○
	NC Drilling Machine		○	○
	Milling Center		○	○
	Packaging Machine	○		
	ATC	○		
	Wire Cut Machine			○
	Grinding Wheel Machine		○	○

	Application	N	H	P
Industrial Robots	Orthogonal Type	○	○	○
	Multi-joint Type	○	○	
Semiconductor Machines	Wire Bonder			○
	Prober			○
	Inserter Machine		○	○
	PCB Driller		○	○
Other Machines	Injection Molding Machine	○	○	
	Measuring Machine			○
	Business Machine	○	○	
	Transporting Machine	○	○	
	X-Y Table		○	○
	Painting Machine	○	○	
	Welding Machine	○	○	
	Medical Machine	○	○	
	Digitizer		○	○
	Test Equipment			○

1.6 Accuracy Standard





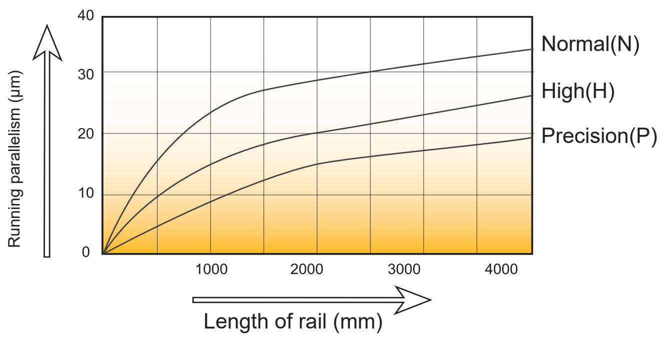


Fig.1.6.1 BR rail length and running parallelism

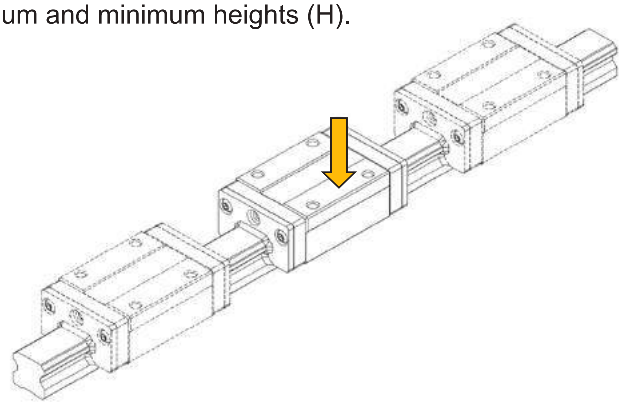
Unit : mm

ITEM	GRADE		
	Normal (N)	High (H)	Precision (P)
Tolerance of height (H)	± 0.1	± 0.04	$^{\ 0}_{-0.04}$
Tolerance of width (W)	± 0.1	± 0.04	$^{\ 0}_{-0.04}$
Difference of heights (△H)	0.03	0.02	0.01
Difference of widths (△W)	0.03	0.02	0.01
Running parallelism between the block surface $\boxed{D}$ and rail surface $\boxed{A}$	△C Refer to Fig.1.6.1		
Running parallelism between the block surface $\boxed{E}$ and rail surface $\boxed{B}$ and $\boxed{C}$	△D Refer to Fig.1.6.1		

1.6.1 Definitions

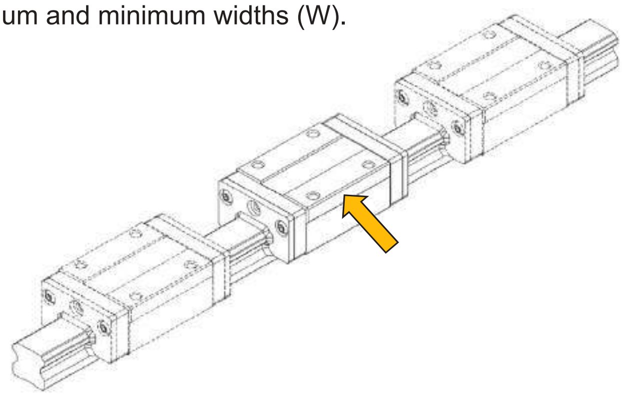
1 Difference of heights (△H)

The difference is obtained by measuring the different blocks on the same rail position in terms of the difference between the maximum and minimum heights (H).



2 Difference of widths (△W)

The difference is obtained by measuring the different blocks on the same rail position in terms of the difference between the maximum and minimum widths (W).



3 Running parallelism

This is refer to the running parallelism tolerance between the two reference planes of rail and block when the block is moved along the entire rail length, the rail being screwed to the reference plane.

1.7 Preload

1 Radial clearance

The radial clearance of the linear guide means the radial movement of the central portion of the block when the linear guide is fixed, moving the block up and down lightly at the center of its length. There are five types of radial clearances: ZF (Clearance), Z0 (No Preload), Z1 (Light preload), Z2 (Medium preload), and Z3 (Heavy preload). The radial clearance of the linear block has a significant impact on the running accuracy, load resistance and rigidity, so it is important to choose the clearance appropriately according to the application. In general, considering the impact of vibration caused by reciprocating motion, choosing a negative clearance will bring good effects on service life and accuracy.

2 Preload

The purpose of tpreload is to increase the rigidity of the block and eliminate the internal load applied to the steel ball in advance, such as clearance. The codes Z1, Z2, and Z3 of the ABBA linear guide indicate that the clearance value is negative after the preload is applied. The method of adjusting the preload is to change the size of the steel ball. Generally, the work of adjusting the preload must be completed at the original factory. If distributors or customers would like to adjust the preload by themselves, please contact the factory for related technical information.

Choice of radial clearance and preload

	ZF (Clearance)	Z0 (No Preload)	Z1 (Light preload)	Z2 (Medium preload)	Z3 (Heavy preload)
Conditions of Use	Nearly no precision is required and sliding resistance is very small	The load direction is constant, the vibration and impact are small, and the two axes are used side by side. The accuracy is not required, but small sliding resistance is required.	Cantilever load or moment acts, one axis is used, and high accuracy is required during light load	High rigidity is required, with vibration or impact, heavy cutting machine tools etc.	With highest rigidity requirements and extreme impact resistance
Application	Conveyor	Flame cutting machine Automatic packaging machine Welding machine Robotic arm Injection molding machine	Grinding table feed shaft Automatic coating machine High-speed material supply-device PCB punching machine Precision XY Stage	Machining Center CNC lathe Grinding wheel feed shaft Milling machine Boring machine	Steel plate cutting machine Punch

3 Consider load and life during preload

When using preload to linear guide, it is necessary to consider the preload load for life calculation due to the internal load in the block beforehand.

4 Rigidity

When linear guide is borne to a load, steel balls, blocks, or rails are elastically deformed within the allowable load range. At this time, the ratio of the load to the displacement is the rigidity value. With the increase of the preload amount, the rigidity of the linear guide also increases. For the 4-directions equivalent loading capacity type of ABBA, the effect of the preload can keep the external load until increasing up to about 2.8 times the preload.

Table 1.7.1 Preload class and preload force

Item / Class	Code	Preload force
Clearance	ZF	0
No preload	Z0	0
Light preload	Z1	0~0.02 C
Medium preload	Z2	0.02C~0.05 C
Heavy preload	Z3	0.05C~0.07 C

C: Basic dynamic load rating

Table 1.7.2 Relationship between optional precision and preload of linear guide

Unit : μm

Accuracy	Non-interchangeable type			Interchangeable type	
	P	H	N	N	H
Preload	-	-	ZF	ZF	-
	Z0	Z0	Z0	Z0	Z0
	Z1	Z1	Z1	Z1	Z1
	Z2	Z2	Z2	-	-
	Z3	Z3	Z3	-	-

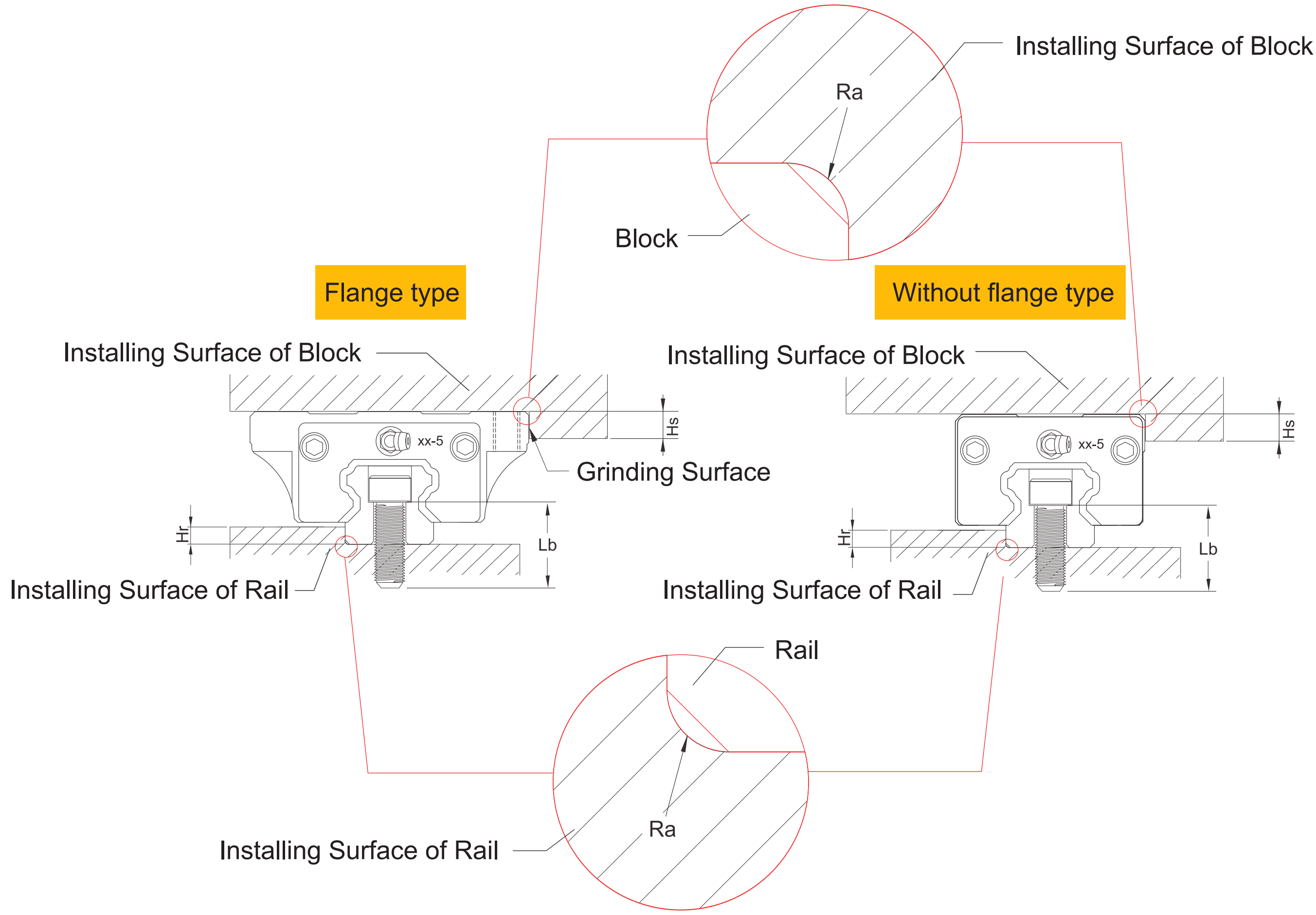
Note:
The interchangeable type is packaged for rail and block separately, which can be assembled by the customer with guaranteed accuracy. Non-interchangeable rail and block have been assembled and packed together. After receiving the goods, users cannot disassemble, exchange, or change the direction of the blocks, otherwise the product may lose its original accuracy.

1.8 Surface treatment

The surface of the rails and blocks of ABBA standard linear guides can do surface treatment for anti-rust or aesthetic purposes. The standard surface treatment options which we currently provide are as follows:

Code	Surface treatment	Coating Hardness	Color	Salt spray test (ASTM B-117)	RoHS	REACH	Maximum rail length
H	Hard chromium	800 ~ 1300 HV	GlossSilver	24 hours	No	No	3850 mm
T	Trivalent chromium	700 ~ 800 HV	Gloss Silver	24 hours	Yes	Yes	4000 mm
B	Black oxidation	-	Gloss black	-	Yes	Yes	4000 mm

1.9 Suggestion in Assembly



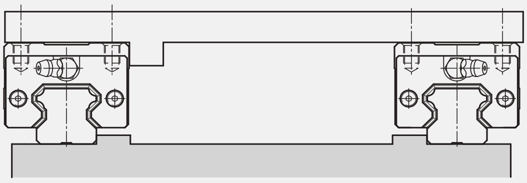
Unit : mm

Item	Maximum Fillet of rail (R_a)	Maximum shoulder height (H_r) of rail		Maximum shoulder height (H_s) of block		Rail Bolt length suggestion(L_b)	Recommended size of block lock bolt		
							Locked from above		Locked from below
		Min.	Max.	Min.	Max.		Flange type	Without flange type	Flange type
BR-15	0.6	2.5	3.5	3	4	M4x20	M5	M4	M4
BR-20	0.6	2.5	4	4	5	M5x25	M6	M5	M5
BR-25	0.8	3	5	4	5	M6x30	M8	M6	M6
BR-30	0.8	3	5	4	6	M8x30	M10	M8	M8
BR-35	0.8	3.5	6	5.5	6	M8x35	M10	M8	M8
BR-45	0.8	4.5	8	6	8	M12x45	M12	M10	M10

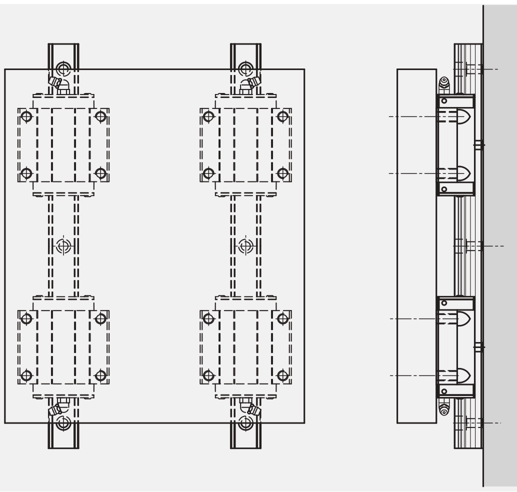
1.10 Configuration of Linear Guide

The linear guide can be configured differently according to the demand of the machine structure and the load direction. The main configuration methods are as follows. When using oil lubrication, the lubricating oil path of the block will vary due to different configuration methods. Please specify the configuration method when ordering.

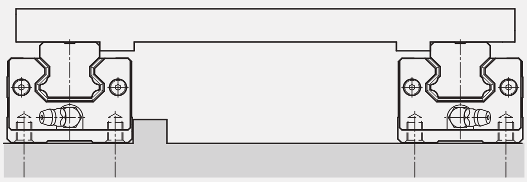
Horizontal mode



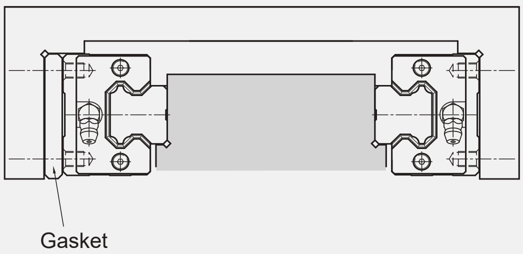
Vertical mode



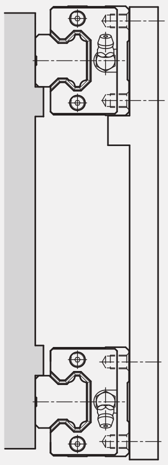
Inverted mode



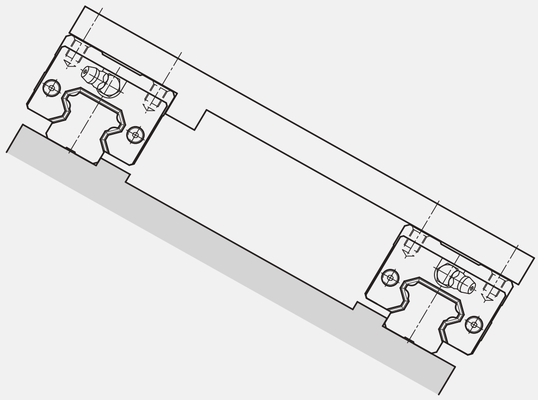
Relative mode



Wall hanging mode

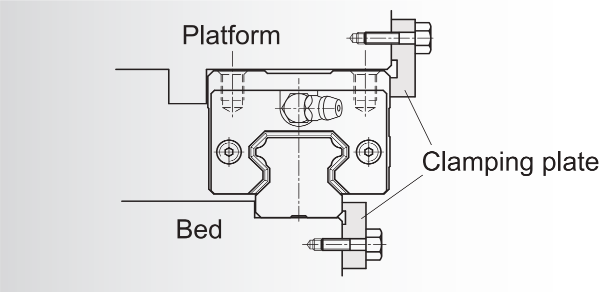


Tilt mode



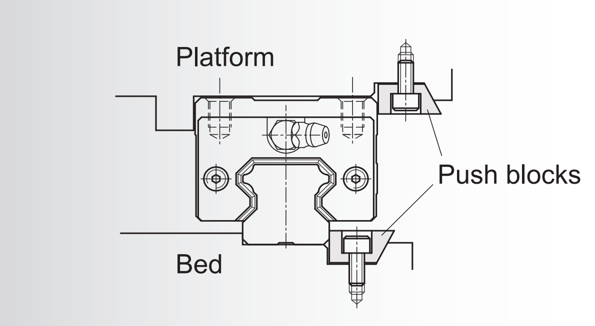
1.11 Fixing method of Linear Guide

When there is vibration or impact force in the machine, the rail and block are likely to deviate from the original fixed position, which affects the running accuracy and service life. To avoid this situation, it is recommended to fix the rail and block according to the following fixing methods.



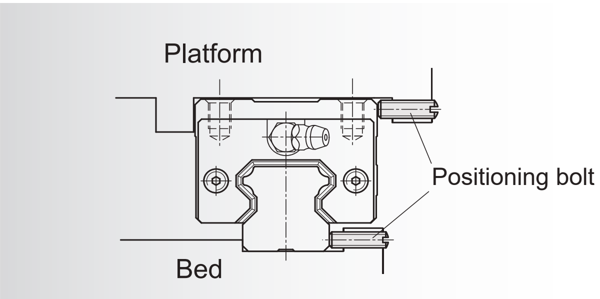
Clamping plate fixing method

In this method, the sides of the rail and block need to protrude slightly from the edges of the bed and the platform, and the clamping plate needs to be processed to prevent interference with the corners of the rail or block during installation.



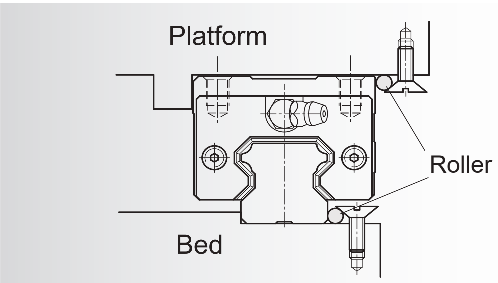
Push fixing method

This method applies pressure by locking the push block. Excessive locking force can easily cause the rail to bend or the outer shoulder to deform, so please pay more attention to the appropriateness of the locking force when installing.



Positioning bolt fixing method

Due to installation space constraints, the size of the bolts should not be too large.

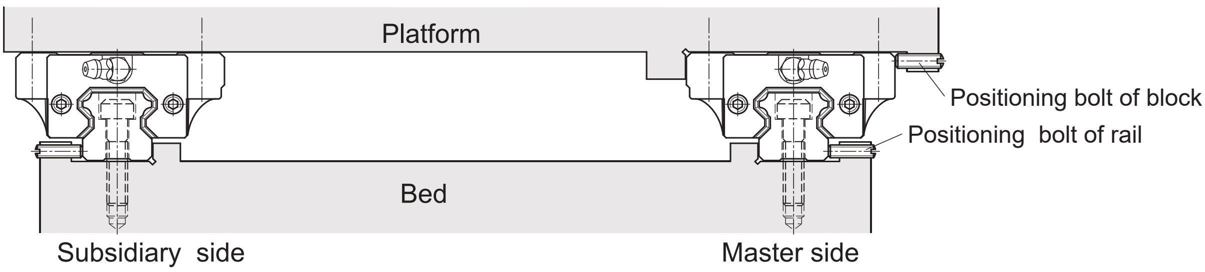


Roller fixing method

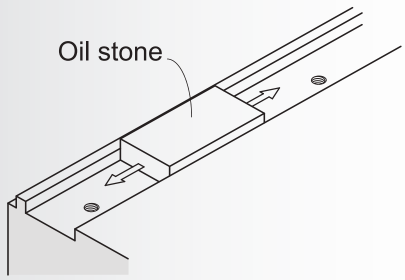
The roller uses the slant of the bolt head to push the pressure, so please pay more attention to the position of the bolt head.

1.12 Installation of linear guides

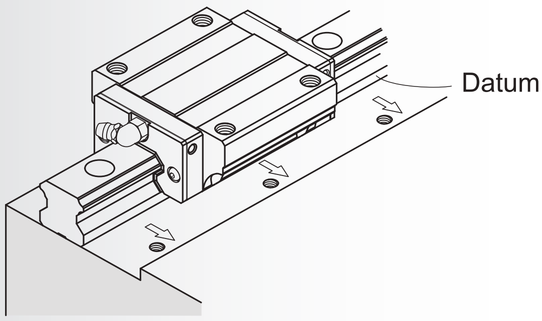
1.12.1 Installation with vibration and stirke in the machine with high rigidity and high accurcy required



1 Installation of rail

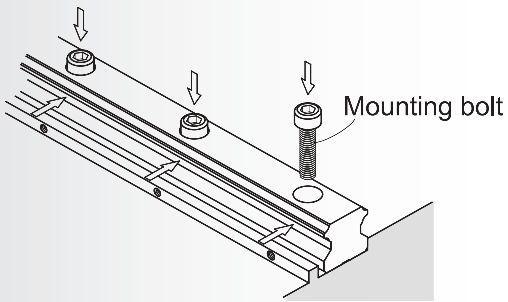


1.Be sure to remove the processing burrs and dirt on the installation surface of the bed before installation.

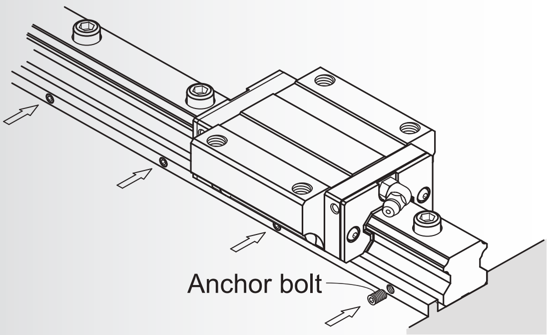


2. Place the linear guide on the bed, so that the master surface of the rail is attached to the side mounting surface of the bed.

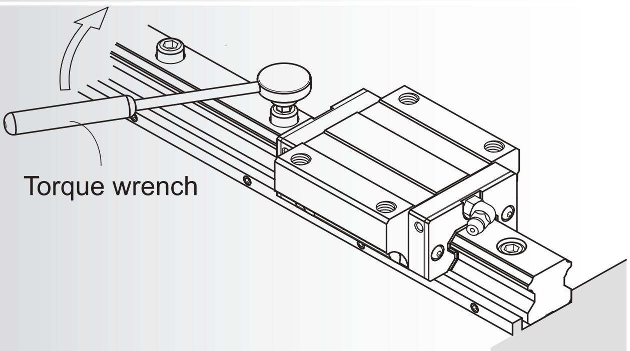
Note:
Both sides of the ABBA linear guide can be used as the master surface.



3. Lock the assembly bolts, but do not fully tighten them, and make the master surface of the rails as close as possible to the side mounting surface of the bed. Please pay attention to whether the bolt holes and the assembly bolts match before installation.

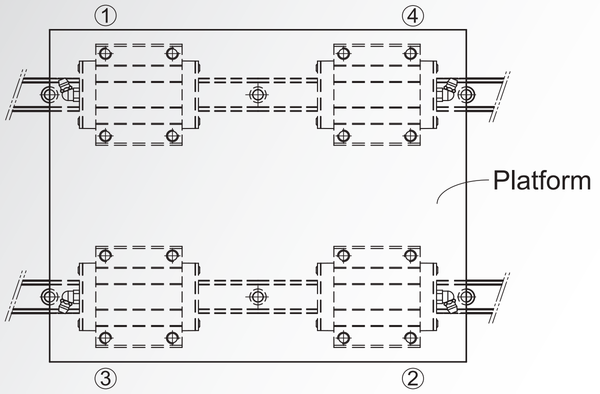


4. Tighten the rail positioning bolts in order to make the rail and the bed side mounting surface closely fit.



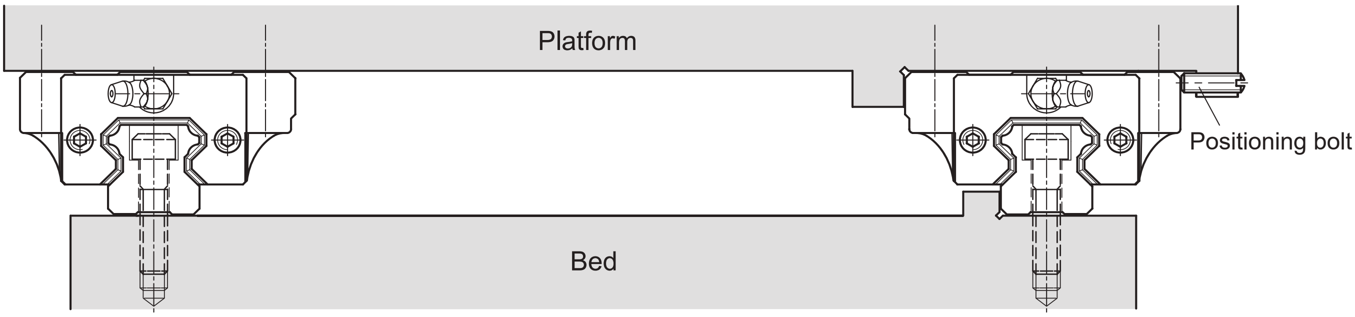
5. Use a torque wrench to tighten the mounting bolts according to the specified torque value. The tightening order of the mounting bolts is sequentially locked from the center of the rail to both ends.Stable accuracy can be obtained by this method.
6.Install the remaining paired rails please follow steps 1 to 5.

2 Installation of block

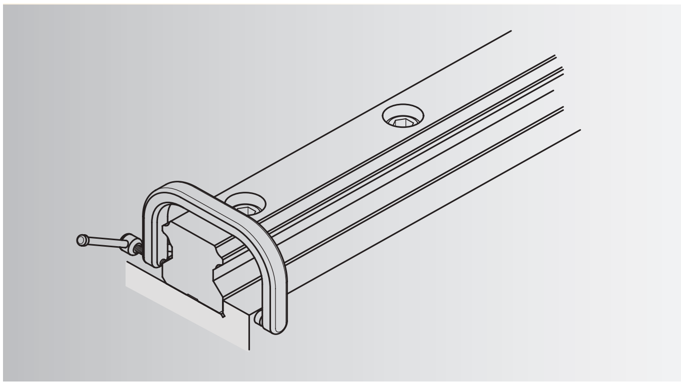


1. Install the platform on the block and lock the block mounting bolts, but not fully tightened.
2. Use the positioning bolts to lock the master surface of the block and the lateral mounting surface of the platform to position the platform.
3. Tighten the block mounting bolts in the order of the diagonal of the block from ① to ④.

1.12.2 Installation of rail without positioning bolts

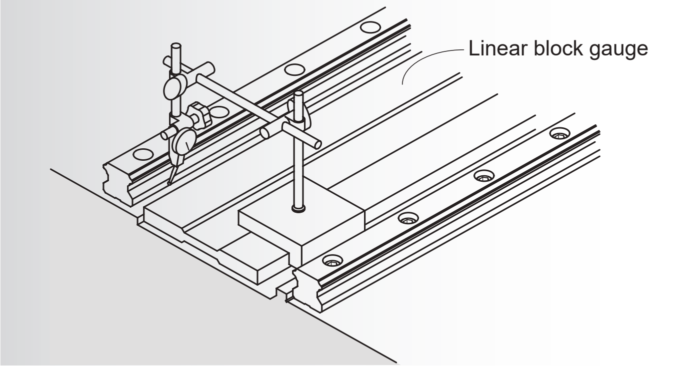


1 Installation of master side rail



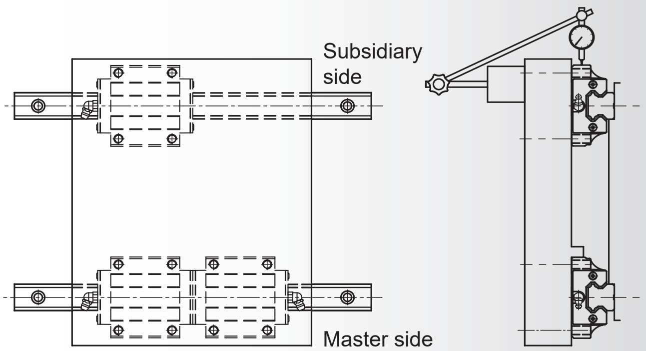
Lock the assembly bolts, but do not fully tighten them. Use a vise to press the rail master surface against the bed's lateral mounting surface, and then use a torque wrench to tighten the rail mouting bolts in order according to the specified torque value.

2 Installation of subsidiary side rail



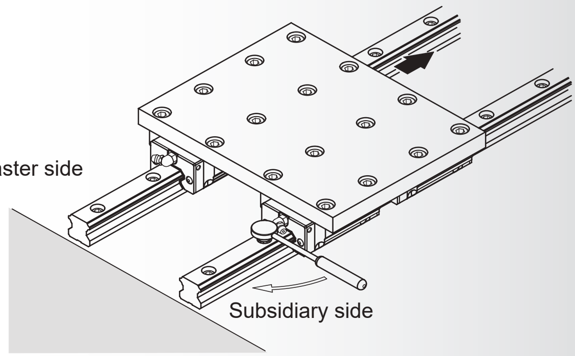
Linear block gauge method

Place the linear block gauge between the two rails, use the micrometer to adjust it to the reference side of rail parallel to the reference surface, and then use the linear block gauge as a reference to adjust the straightness of the driven side of rail by using the micrometer. The rail mounting bolts are tightened in sequence from the end of shaft.



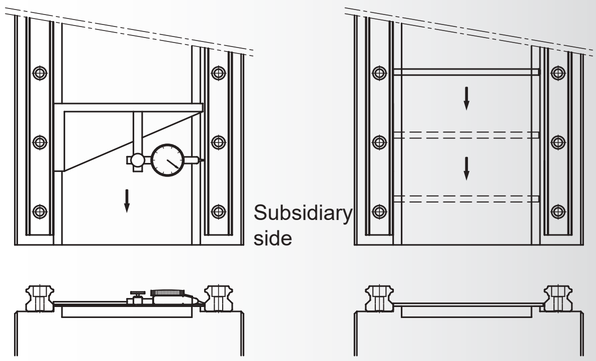
Moving platform method

The two blocks on the reference side are fixed and locked on the platform, and the rail on the driven side and one block are locked on the bed and platform individually, but not completely locked tightly. Fix the micrometer on the platform, and make its probe contact the side of the subsidiary side block, move the platform from the shaft end to calibrate the parallelism of the subsidiary side rail, and simultaneously tighten the mounting bolts in sequence.



Imitating the reference side rail method

The two blocks on the master side and one block on the subsidiary side are fixed and locked on the platform, while the rail on the subsidiary side and the other block are locked on the bed and the platform indivisually, but not completely locked tightly. Move the platform from the shaft end, adjust the parallelism of the subsidiary side rail according to the change of rolling resistance, and simultaneously tighten the mounting bolts in sequence.

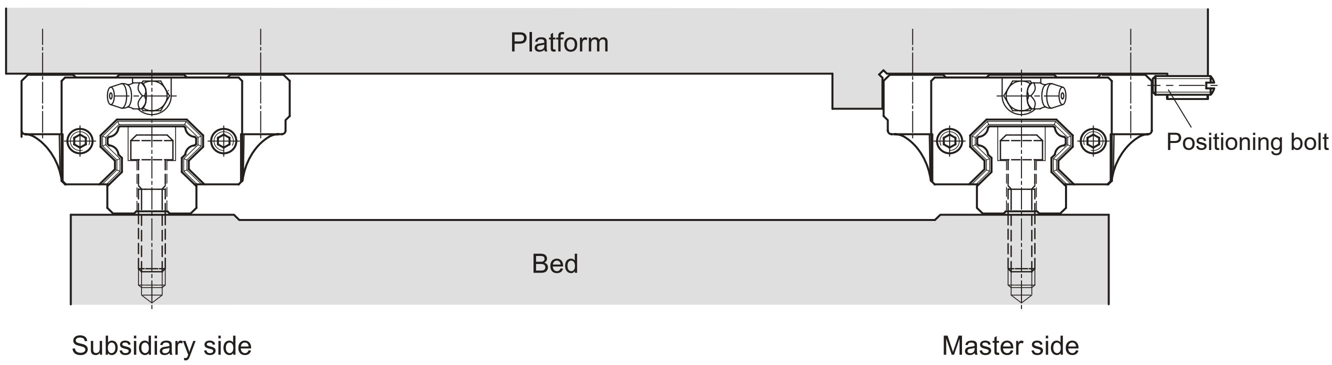


Special tool installation method

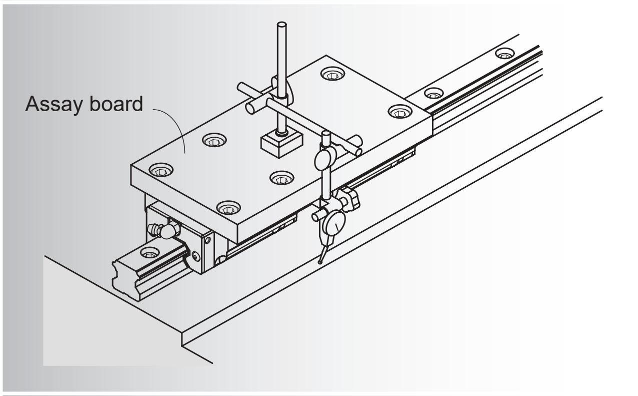
Use a special tool to adjust the parallelism of the subsidiary side rail to the master surface according to the installation interval based on the lateral master surface of the master side rail, and simultaneously tighten the mounting bolts in sequence.

3 Installation of the block is the same as the previous example

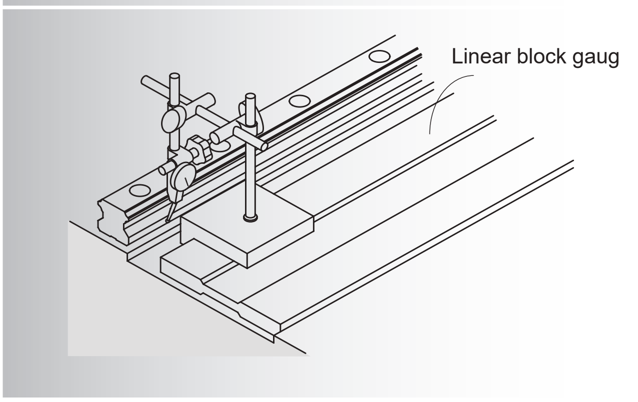
1.12.3 Installation of rails without lateral positioning surfaces



1 Installation of master side rail



Use the false datum method
Hold the two blocks tightly and fix them on the measuring plate, and use the micrometer to calibrate the straightness of the rail from the end of the shaft, and then tighten the mounting bolts in sequence.



Linear block gauge method
The rails were first locked on the bed with mounting bolts, but not completely locked. Based on a linear block gauge, a micrometer was used to calibrate the straightness of the rails from the shaft end, and at the same time tighten the mounting bolts in order.

2 Installation of subsidiary side rail and block is the same as the previous example

1.12.4 Recommended torque for mounting bolts of rail

When installing the rail, the locking force of the mounting bolts will affect the overall assembly accuracy. Therefore, the uniformity of the locking force is very important. It is recommended to tighten the mounting bolts with a torque wrench according to the torque values in the table on the right. Different mounting surfaces and bolt strengths have different bolt torque.

Bolt torque value

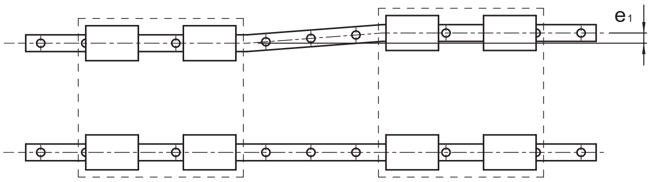
Unit : kgf*cm

Bolt strength	Nominal bolt model	Mounting surface material: Steel or cast iron	Mounting surface material: Aluminum
8.8	M4	25	19
	M5	52	38
	M6	88	65
	M8	220	157
	M10	440	314
	M12	770	539
	M14	1240	884
	M16	2000	1426
12.9	M4	49	32
	M5	95	63
	M6	162	108
	M8	392	265
	M10	794	529
	M12	1373	912
	M14	2067	1378
	M16	3333	2222

1.12.5 Permissible deviations of mounting

Due to the design of the 4-row X-shaped of the ABBA linear guide, it has excellent self-aligning ability. Even if the mounting surface is slightly skewed or deviation, it can still have smooth linear motion. The following is an explanation for the ABBA linear guide can correct the maximum error on the mounting surface.
However, for high-precision applications, the mounting surface must are with enough rigidity. And the permissible deviations of mounting are also need to be cut in half.

Deviation in parallelism (e_1)



Unit : μm

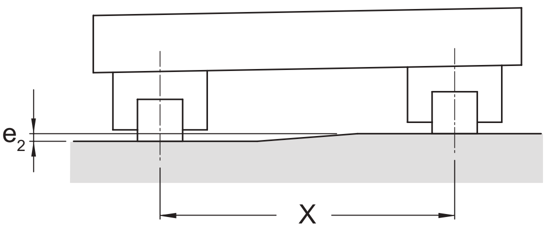
Nominal size	Parallelism error tolerance for 2 axes (e_1): Z3	Z2	Z1	Z0	ZF
15	10	13	18	25	35
20	12	18	20	25	35
25	15	20	22	30	42
30	20	27	30	40	55
35	22	30	35	50	68
45	25	35	40	60	85

Height deviation in lateral direction (e_2)

Height deviation in lateral direction (e_2) can be calculated as follows:

$$e_2 = \frac{X \times f_{e2}}{500}$$

e_2 : Height deviation in lateral direction (μm)
X : Center distance between two rails (mm)
f_{e2} : Height deviation in lateral direction coefficient



Unit : μm

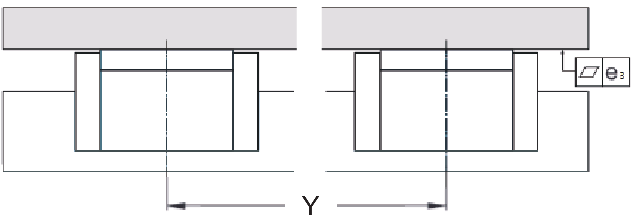
Nominal size	Height deviation in lateral direction coefficient (f_{e2}): Z3	Z2	Z1	Z0	ZF
15	40	45	85	130	190
20	45	50	85	130	190
25	60	70	85	130	195
30	80	90	110	170	250
35	100	120	150	210	290
45	110	140	170	250	350

Flatness in top mounting plane (e_3)

Flatness in top mounting plane (e_3) can be calculated as follows:

$$e_3 = \frac{Y \times f_{e3}}{500}$$

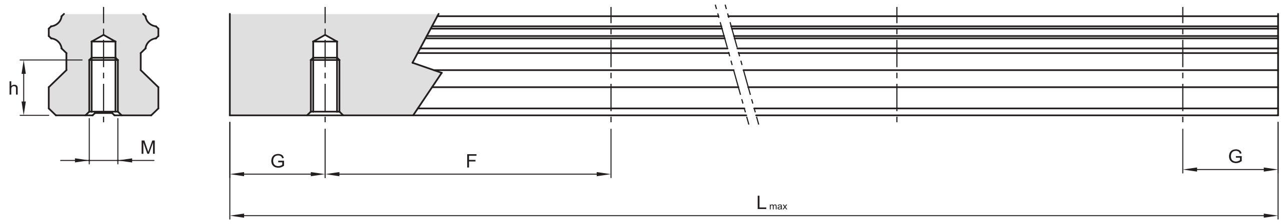
e_3 : Flatness in top mounting plane (μm)
Y : Center distance between two blocks (mm)
f_{e3} : Flatness in top mounting plane deviation coefficient



Unit : μm

Nominal size	Flatness in top mounting plane deviation coefficient (f_{e3}): Short block	Standard length block	Extended length block
15	28	20	14
20	28	20	14
25	28	20	14
30	33	24	17
35	33	24	17
45	33	24	17

1.13 Dimension of blind hole

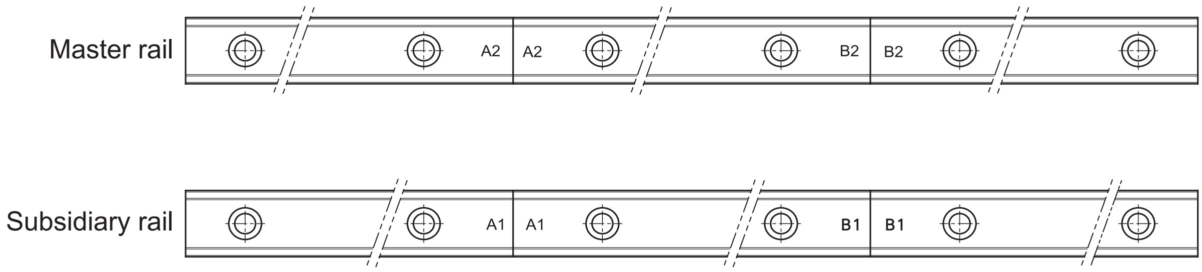


Nominal size	Screw size (M)	Screw Tread h (mm)
15	M5	8
20	M6	10
25	M6	12
30	M8	15
35	M8	17
45	M12	24

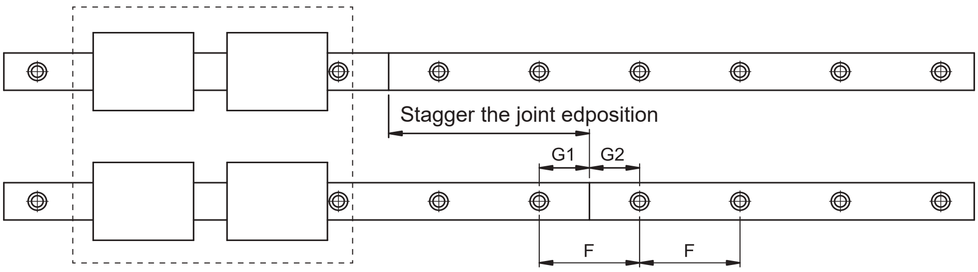
1.14 Indication and assembling of Linear Guide

1.14.1 Jointed rail

1. Jointed rails can be ordered if a rail length is required that exceeds maximum length of rail. Refer to below for markings.



2. To avoid accuracy problems due to discrepancies between the two rails such as matched pair, butt-joint rails, the jointed positions should be staggered as below.



Note:
ABBA gives priority to the accuracy and smoothness of the joint, so G1 + G2 = F, but it is not guaranteed that G1 = G2 = F/2.

1.14.2 Definition of the end distance (G value)

The end distance (G value) of ABBA linear guide is selected as follows:
If customers have no special requirements, the calculation of standard end distance is as follows:
Total length of rail/Rail mounting hole distance = Integer * Hole distance + Remainder
Remainder/2 = End distance
But if the distance from the end to the edge of the nearest mounting hole is less than 5mm,
(Remainder+Rail mounting hole distance)/2 = End distance

Example 1 :

BRS25-A0C2Z0-00250ND0-00S00 type linear guide
Total length of rail= 260, Rail mounting hole distance= 60
Total length of rail 260 / Rail mounting hole distance 60 = 4*60+20
End distance= 20/2= 10mm
But the hole diameter of the rail (D value) = 11mm, so the radius = 5.5mm
From the end of the rail to the edge of the nearest mounting hole
10-5.5 = 4.5mm < 5mm,
Then increase its end distance to (20+60) / 2 = 40mm,
Meet the requirements after increasing the end distance

Example 2 :

BRS35-LRC2Z1-09800ND0-00S00 type linear guide
Total length of rail= 9800, Rail mounting hole distance= 80
Total length of rail 9800 / Rail mounting hole distance 80 = 122*80+40
End distance= 40/2= 20mm
But the hole diameter of the rail (D value) = 14mm, so the radius = 7mm
From the end of the rail to the edge of the nearest mounting hole
20-7 = 13mm > 5mm,
Meet the requirements

1.15 Definition of load rating and coefficient

1.15.1 Definition of load rating

Basic static load rating: C_0

We define the basic static load rating C_0 as a static load of constant magnitude acting in one direction under which the sum of the permanent deformations of rolling elements and raceway equals 0.0001 times of the diameter of the rolling elements.

Basic dynamic load rating: C

When each group of identical linear motion system is applied independently under the same condition, basic dynamic load rating C is the load of constant magnitude acting in one direction that results in a nominal life of 50km.

1.15.2 Static safety factor fs

Static safety factor : fs

Static safety factor fs is the ratio of the basic static load rating C_0 to the load acting on the linear guide system.

$$fs=(fc * C_0)/P \quad \text{or} \quad fs=(fc * M_0)/M$$

fs : Static safety factor
C_0: Basic static load rating
P : Design load
fc : Contact factor
M_0: Static permissible moment
M : Design moment

Reference value of static safety factor fs shown below:

Operating condition	Load condition	Minimum fs
Normally stationary	Small impact and deflection	1.0 ~ 1.3
	Big impact or twisting load is applied	2.0 ~ 3.0
Normally moving	Small impact or twisting load is applied	1.0 ~ 1.5
	Big impact or twisting load is applied	2.5 ~ 5.0

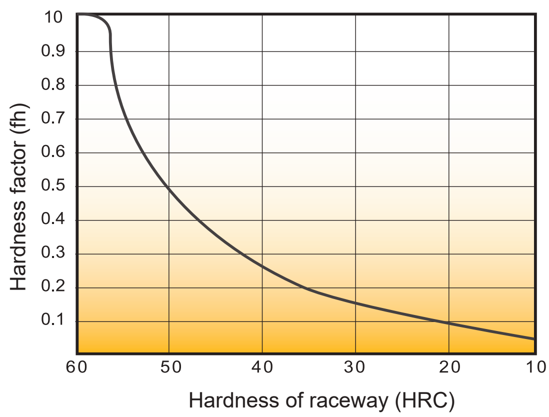
1.15.3 Contact factor fc

In linear motion system, it is hard to obtain identical load distribution due to moments, errors and other factors on the mounting surfaces. When multiple blocks on a rail are used in close contact, the basic load ratings C and C_0 corresponding with contact factors are shown aside.

Numbers of blocks in close contact	Contact factor fc
2	0.81
3	0.72
4	0.66
5	0.61
Normal operation	1

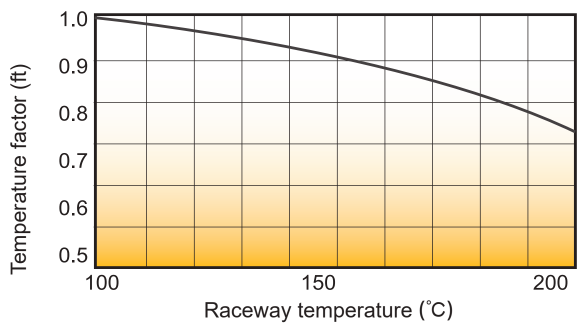
1.15.4 Hardness factor fh

For linear motion system, its optimum load carrying capacity is HRC 58 to 64 hardness on the race-ways.
If the hardness is under HRC 58, both the basic dynamic load rating and basic static load rating should be multiplied by hardness factor fh.



1.15.5 Temperature factor ft

When a linear motion system is subject to tempera-ture above 100˚C, the temperature factor should be taken in to consideration.



1.15.6 Load factor fw

The load acting on an block is resulting from acceleration, impact loads and vibration. It is extremely difficult to quantify these additional dynamic forces.
So in order to estimate the impact of this load on system life, the load must be multiplied by factor fw.
Depending on he mean speed and strength of the impact load, the suggested fw values listed in the table below.

Vibration & impact	Speed (V)	fw
Light external vibrations or impacts	At low speed $V \leqq 15m/min$	1~1.5
Small external vibrations or impacts	At medium speed $15 < V \leqq 60m/min$	1.5~2.0
Significant external vibrations or impacts	At high speed $V > 60m/min$	2.0~3.5

1.15.7 Minimum stroke factor fm

When the single trip of running stroke is shorter than the length of the iron piece of the block, the operating life of the block will be reduced. At this time, minimum stroke factor fm must be multiplied by the calculation result of the life.

Length of block iron / single trip of running stroke	fm
1	1
0.9	0.91
0.8	0.82
0.7	0.73
0.6	0.63
0.5	0.54
0.4	0.44
0.3	0.34
0.2	0.23

1.16 Life calculation formula

Given the basic dynamic load rating C and equivalent load P, the life of the linear guide is calculated as follows:

$$L = fs * \left(\frac{fh * ft * fc}{fw} * \frac{C}{P}\right)^3 * 50$$

L: Nominal life (km)

(When a batch of the same linear motion system moves one by one under the same conditions, 90% of them can reach the total running distance without surface peeling.)

P: Equivalent load

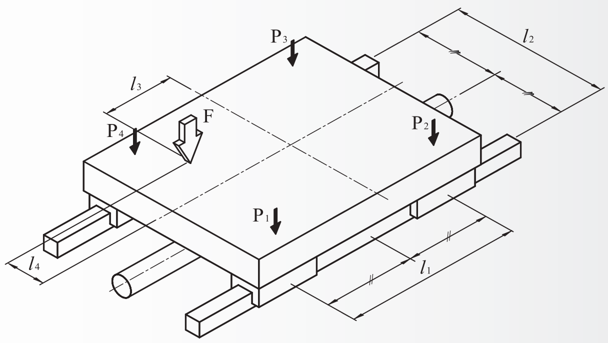
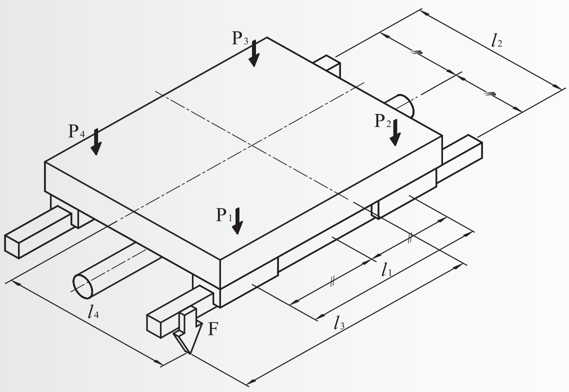
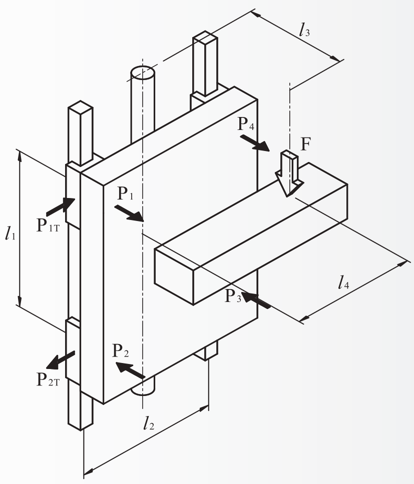
Use the following formula to calculate the nominal life (L). When the stroke length and reciprocation times are constant, the life can be calculated as follows

$$Ln = \frac{L * 10^6}{2 * Ls * N_1 * 60}$$

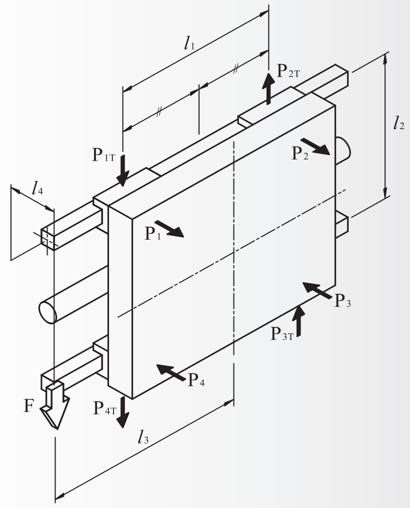
Ln: Life time (h)
Ls: Stroke length (mm)
N_1:Reciprocation times/per minute (min^{-1})

1.17 Calculation of workload

The load acting on the linear guide will change depending on the position of the gravity of the object, the thrust position, and the inertial force generated by the acceleration and deceleration as start and stop during operation. Therefore, when using a linear guide, various conditions of usage must be considered to calculate the correct workload.

Mode	Use configuration	Block load calculation formula
Constant velocity motion of horizontal usage or static		$P_1=\frac{F}{4}+\frac{F\cdot l_3}{2\cdot l_1}-\frac{F\cdot l_4}{2\cdot l_2}$ $P_2=\frac{F}{4}-\frac{F\cdot l_3}{2\cdot l_1}-\frac{F\cdot l_4}{2\cdot l_2}$ $P_3=\frac{F}{4}-\frac{F\cdot l_3}{2\cdot l_1}+\frac{F\cdot l_4}{2\cdot l_2}$ $P_4=\frac{F}{4}+\frac{F\cdot l_3}{2\cdot l_1}+\frac{F\cdot l_4}{2\cdot l_2}$
Constant velocity motion of horizontal cantilever usage or static		$P_1=\frac{F}{4}+\frac{F\cdot l_3}{2\cdot l_1}+\frac{F\cdot l_4}{2\cdot l_2}$ $P_2=\frac{F}{4}-\frac{F\cdot l_3}{2\cdot l_1}+\frac{F\cdot l_4}{2\cdot l_2}$ $P_3=\frac{F}{4}-\frac{F\cdot l_3}{2\cdot l_1}-\frac{F\cdot l_4}{2\cdot l_2}$ $P_4=\frac{F}{4}+\frac{F\cdot l_3}{2\cdot l_1}-\frac{F\cdot l_4}{2\cdot l_2}$
Constant velocity motion of vertital usage or static		$P_1=P_2=P_3=P_4=\frac{F\cdot l_3}{2\cdot l_1}$ $P_{1T}=P_{2T}=P_{3T}=P_{4T}=\frac{F\cdot l_4}{2\cdot l_1}$

Constant velocity motion of Wall hanging usage or static

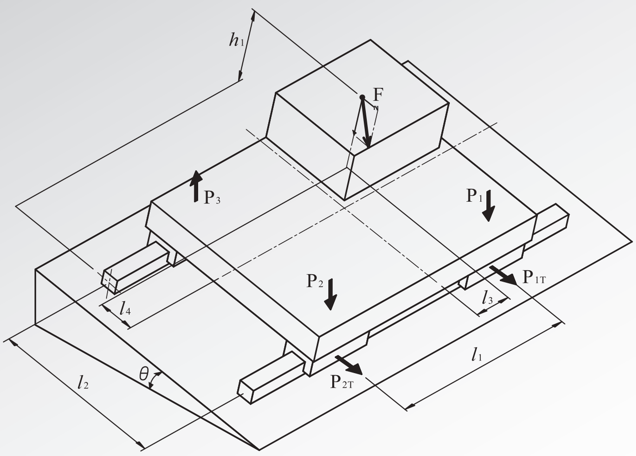


$$P_1 = P_2 = P_3 = P_4 = \frac{F \cdot l_4}{2 \cdot l_2}$$

$$P_{1T} = P_{4T} = \frac{F}{4} + \frac{F \cdot l_3}{2 \cdot l_1}$$

$$P_{2T} = P_{3T} = \frac{F}{4} - \frac{F \cdot l_3}{2 \cdot l_1}$$

Side tilting usage



$$P_1 = \frac{F \cdot cos\theta}{4} + \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} - \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_2}$$

$$P_2 = \frac{F \cdot cos\theta}{4} - \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} - \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_2}$$

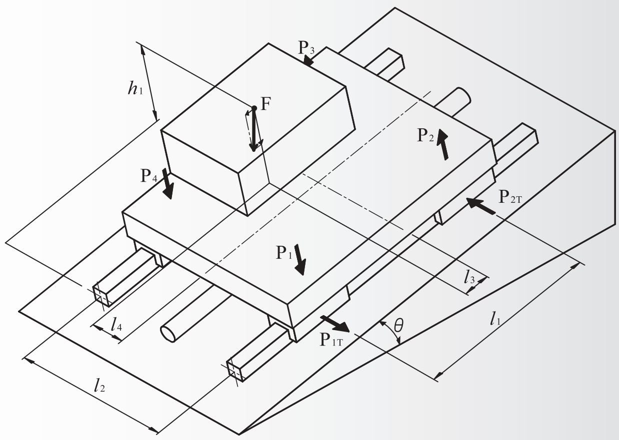
$$P_3 = \frac{F \cdot cos\theta}{4} - \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} + \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_2}$$

$$P_4 = \frac{F \cdot cos\theta}{4} + \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} + \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_2}$$

$$P_{1T} = P_{4T} = \frac{F \cdot sin\theta}{4} + \frac{F \cdot sin\theta \cdot l_3}{2 \cdot l_1}$$

$$P_{2T} = P_{3T} = \frac{F \cdot sin\theta}{4} - \frac{F \cdot sin\theta \cdot l_3}{2 \cdot l_1}$$

Front tilting usage



$$P_1 = \frac{F \cdot cos\theta}{4} + \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} - \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_1}$$

$$P_2 = \frac{F \cdot cos\theta}{4} - \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} - \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_1}$$

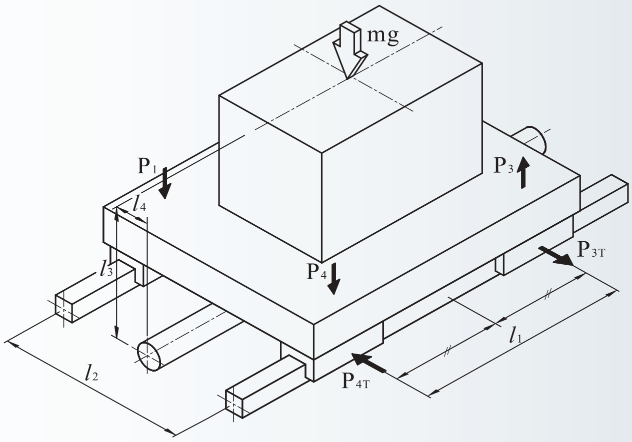
$$P_3 = \frac{F \cdot cos\theta}{4} - \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} + \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_1}$$

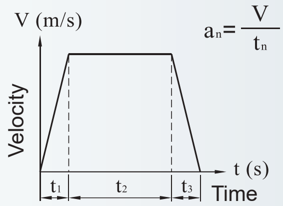
$$P_4 = \frac{F \cdot cos\theta}{4} + \frac{F \cdot cos\theta \cdot l_3}{2 \cdot l_1} + \frac{F \cdot cos\theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot sin\theta \cdot h_1}{2 \cdot l_1}$$

$$P_{1T} = P_{4T} = + \frac{F \cdot sin\theta \cdot l_4}{2 \cdot l_1}$$

$$P_{2T} = P_{3T} = - \frac{F \cdot sin\theta \cdot l_4}{2 \cdot l_1}$$

Horizontal usage with inertia effect





Speed-time relationship diagram

As accelerating

$$P_1 = P_4 = \frac{mg}{4} - \frac{m \cdot a_1 \cdot l_3}{2 \cdot l_1}$$

$$P_2 = P_3 = \frac{mg}{4} + \frac{m \cdot a_1 \cdot l_3}{2 \cdot l_1}$$

$$P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot a_1 \cdot l_4}{2 \cdot l_1}$$

As constant speed

$$P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{mg}{4}$$

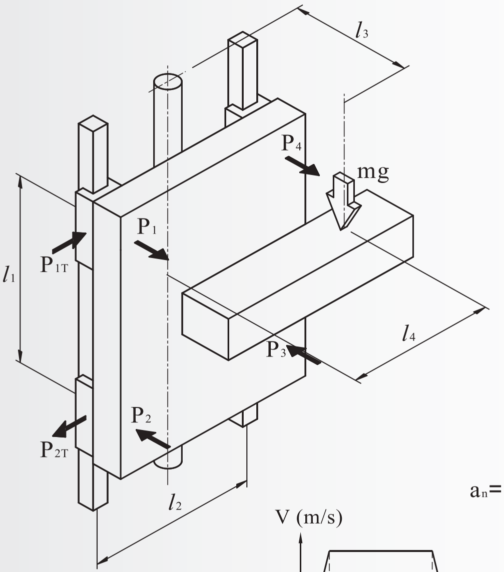
As decelerating

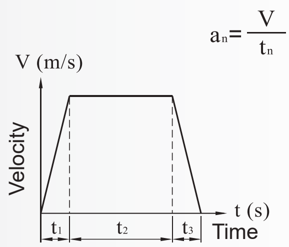
$$P_1 = P_4 = \frac{mg}{4} + \frac{m \cdot a_3 \cdot l_3}{2 \cdot l_1}$$

$$P_2 = P_3 = \frac{mg}{4} - \frac{m \cdot a_3 \cdot l_3}{2 \cdot l_1}$$

$$P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot a_3 \cdot l_4}{2 \cdot l_1}$$

Vertical usage with inertia effect





Speed-time relationship diagram

As accelerating

$$P_1 = P_2 = P_3 = P_4 = \frac{m \cdot (g + a_1) \cdot l_3}{2 \cdot l_1}$$

$$P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot (g + a_1) \cdot l_4}{2 \cdot l_1}$$

As constant speed

$$P_1 = P_2 = P_3 = P_4 = \frac{m \cdot g \cdot l_3}{2 \cdot l_1}$$

$$P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot g \cdot l_4}{2 \cdot l_1}$$

As decelerating

$$P_1 = P_2 = P_3 = P_4 = \frac{m \cdot (g - a_3) \cdot l_3}{2 \cdot l_1}$$

$$P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot (g - a_3) \cdot l_4}{2 \cdot l_1}$$

1.18 Calculation of equivalent load

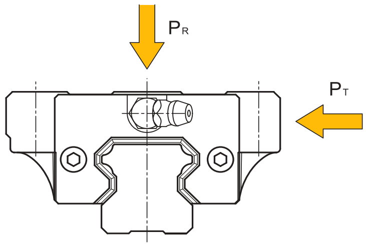
The block of the linear guide can withstand loads and moments in radial, reverse-radial, and lateral directions at the same time. When there are multi-directional loads, all loads can be converted into equivalent loads in the radial or lateral direction. Then calculate its life or static safety factor.
ABBA's BR series linear guides are designed with equal load capacity in four directions. When two or more (including two) rails are used in pairs, the equivalent load is calculated as follows.

$$P_E = |P_R| + |P_T|$$

P_E : Equivalent load (kgf)

P_R : Radial or reverse radial load (kgf)

P_T : Lateral load (kgf)



In the case of a single rail, the equivalent load must take into account the moment effect, and its calculation formula is as follows.

$$P_E = |P_R| + |P_T| + C_0 \cdot \frac{|M|}{M_R}$$

P_E : Equivalent load (kgf)

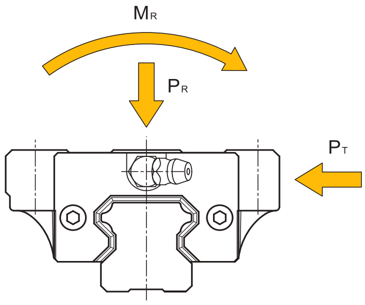
P_R : Radial or reverse radial load (kgf)

P_T : Lateral load (kgf)

C_0 : Basic static load rating (kgf)

M : Calculation torque (kgf *m)

M_R : Allowable static torque (kgf *m)



1.19 Calculation of average load with variable load

When the block in operation is subjected to a variable load, the average load equivalent to the fatigue life of the block can be obtained according to the varying load conditions to calculate its fatigue life. The basic calculation formula for the average load of rolling elements as steel balls is shown below.

$$P_m = \sqrt[i]{\frac{1}{L}\sum_{n=1}^{n}(P_n^{i} \cdot L_n)}$$

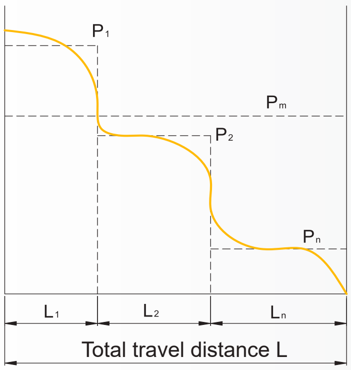
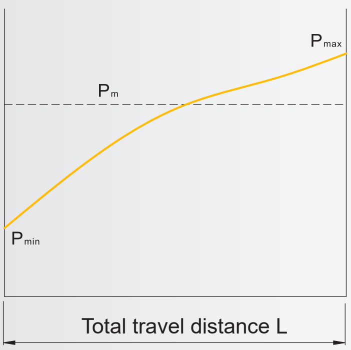
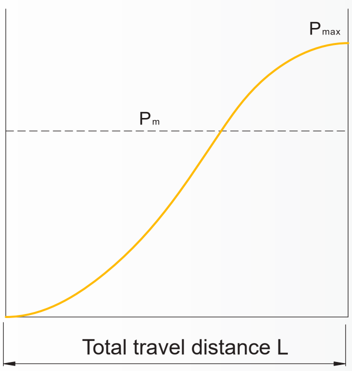
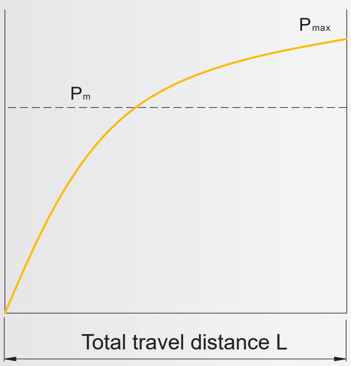
P_m : Average load (kgf)

P_n : Variable load (kgf)

L : Total travel distance (mm)

L_n : Traveling distance as load P_n working

Calculation example of average load

Variable load types			Average load calculation
Grade variable load	Load P		$P_m = \sqrt[3]{\frac{1}{L}(P_1^{\,3} \cdot L_1 + P_2^{\,3} \cdot L_2 \cdots\cdots + P_n^{\,3} \cdot L_n)}$ P_m : Average load (kgf) P_n : Variable load (kgf) L : Total travel distance (mm) L_n : Traveling distance as load P_n working
Monotonic variable load	Load P		$P_m \cong \frac{1}{3}(P_{min} + 2 \cdot P_{max})$ P_m : Average load (kgf) P_{min} : Minimum load (kgf) P_{max} : Maximum load (kgf)
Sinusoidal variable load	Load P		$P_m \cong 0.65 \cdot P_{max}$ P_m : Average load (kgf) P_{max} : Maximum load (kgf)
	Load P		$P_m \cong 0.75 \cdot P_{max}$ P_m : Average load (kgf) P_{max} : Maximum load (kgf)

1.20 Friction

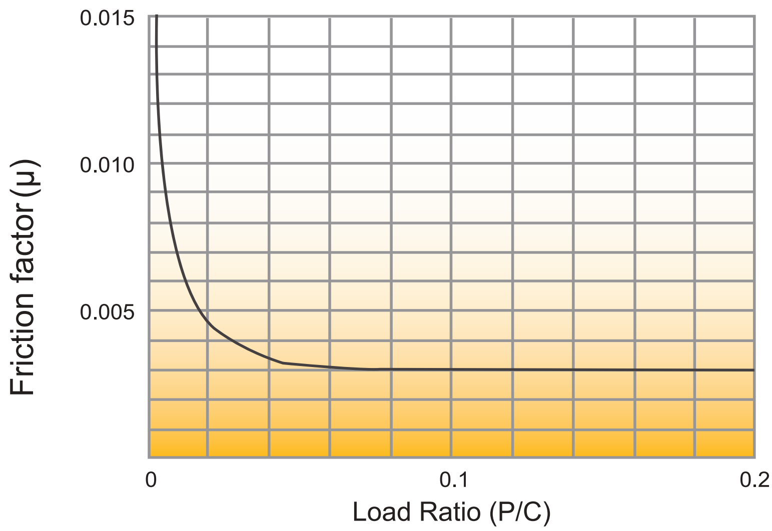
Refer to the following formula to calculate friction

$F = \mu * W + f$

F : Friction (kgf)   W : Load (kgf)

μ : Friction factor   f : Running resistance of standard dust wiper

μ : Friction factor



P : Load (kgf)

C : Basic dynamic load rating (kgf)

f: Friction resistance of standard front seal

Unit : kgf

Friction resistance	
Model	Standard front seal
BR15	0.4
BR20	0.5
BR25	0.6
BR30	0.8
BR35	0.95
BR45	1.4

Note:
The value is based on the block with standard front seal at both ends and added with Grease No.2.

1.21 Lubrication

1.21.1 Factory pre-lubrication

BR blocks are factory pre-lubricated with Grease No.2 and the lubricant reservoir is factory pre-lubricated with Grease No.00.

1.21.2 Grease re-lubrication

1 Re-lubrication intervals recommendation

1. Norminal size 30 and below: per 100km; nominal size 35 and above: per 40km
2. Make supplimentary periodically per 3 months.

Re-lubrication intervals should be apply upon one of above condition comes first.

2 Grease inputting recommendation

Recommended whether for first or relubrication, you should

1. Wipe off the anti-rust oil on the surface of the rail and block to prevent it from diluting the grease.
2. Fill the entire space inside the block with grease until it just overflows.

Note:
Because the block scraper of ABBA has a good scraping and sealing effect, so the grease on the surface of the rail can not enter the block, nor can it have lubrication effect.

3 Recommended re-lubricition amount

Unit : ml

<table>
<tr><th colspan="6">Recommended re-lubricition amount</th></tr>
<tr><th>Nominal size</th><th>Amount</th><th>Nominal size</th><th>Amount</th><th>Nominal size</th><th>Amount</th></tr>
<tr><td>BRC15A0</td><td rowspan="3">2～3</td><td>BRC25R0</td><td>3～4</td><td>BRD35A0</td><td rowspan="3">6～8</td></tr>
<tr><td>BRC15R0</td><td>BRC25U0</td><td rowspan="2">2～3</td><td>BRD35R0</td></tr>
<tr><td>BRC15U0</td><td>BRC25SU</td><td>BRD35U0</td></tr>
<tr><td>BRC15SU</td><td>1～2</td><td>BRC25LA</td><td rowspan="5">4～6</td><td>BRD35SU</td><td>4～6</td></tr>
<tr><td>BRC20A0</td><td rowspan="4">2～3</td><td>BRC25LR</td><td>BRD35LA</td><td rowspan="2">7～10</td></tr>
<tr><td>BRC20R0</td><td>BRC30A0</td><td>BRD35LR</td></tr>
<tr><td>BRC20U0</td><td>BRC30R0</td><td>BRD45A0</td><td rowspan="3">9～14</td></tr>
<tr><td>BRC20SU</td><td>BRC30U0</td><td>BRD45R0</td></tr>
<tr><td>BRC20LA</td><td rowspan="3">3～4</td><td>BRC30SU</td><td>3～5</td><td>BRD45U0</td></tr>
<tr><td>BRC20LR</td><td>BRC30LA</td><td rowspan="2">6～8</td><td>BRD45LA</td><td rowspan="2">11～17</td></tr>
<tr><td>BRC25A0</td><td>BRC30LR</td><td>BRD45LR</td></tr>
</table>

Table 1.21.1

4 Grease performance

Item	No. 00	No. 2
Base oil	Mineral oil	Mineral oil
Soap base	Lithium	Lithium
Drop point°C	168	180
Appearance	Amber	Amber
Viscosity of base oil (cSt, @ 40 °C)	170	200
Viscosity of base oil (cSt, @ 100 °C)	15.5	16

Table 1.20.2

1.21.3 Oil re-lubrication

1 First time re-lubrication: apply to whole internal block, please refer to table 1.20.1 for appropriate grease amount.

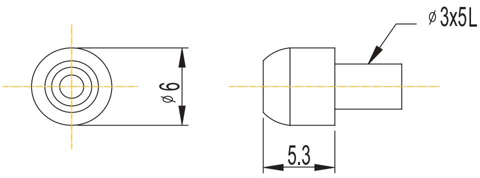
2 Re-lubricaton amount: Q=n/150 (cm^3/hrs)
n: Nominal size of rail (mm)

3 Recommended lubrication oil spec.
Oil mist lubrication: ISO VG32~68
Clearance oil lubrication: ISO VG68~220
Oil type : DIN 51517 CLP or CGLP

1.22 Grease nipple(standard)

P080391 (NLA01)

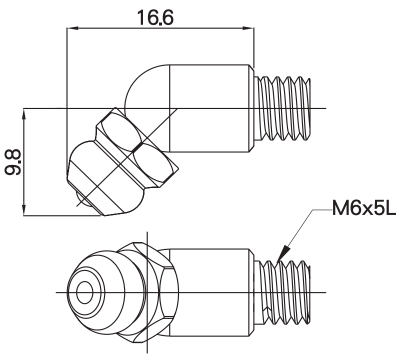
Standard front seal	15	○	20		25		30		35		45	
Standard front seal + U type metal frame scraper plate	15	○	20		25		30		35		45	



● **Note:** ○: Be applicable
Unmarked: Not applicable

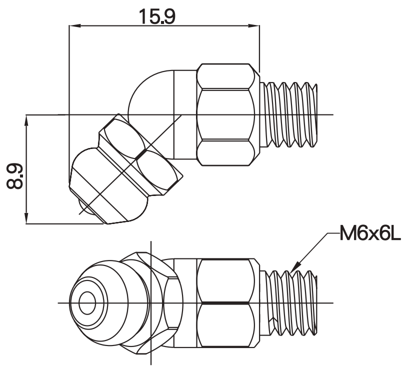
P080396

Standard front seal	15		20	○	25		30		35		45	
Standard front seal + U type metal frame scraper plate	15		20		25		30		35		45	



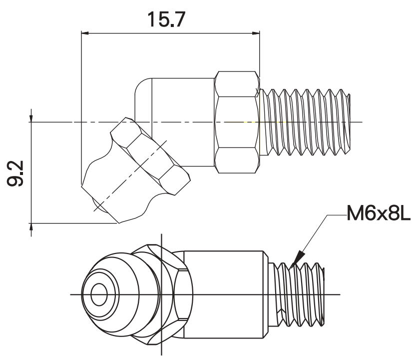
P080397 (NLB02)

Standard front seal	15		20		25	○	30	○	35	○	45	
Standard front seal + U type metal frame scraper plate	15		20		25		30		35		45	



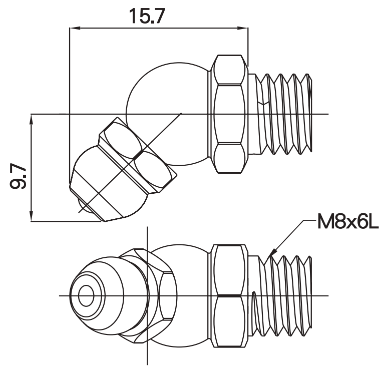
P080395 (NLB03)

Standard front seal	15		20		25		30		35		45	
Standard front seal + U type metal frame scraper plate	15		20	○	25	○	30	○	35	○	45	



P080398 (NLB04)

Standard front seal	15		20		25		30		35		45	○
Standard front seal + U type metal frame scraper plate	15		20		25		30		35		45	○

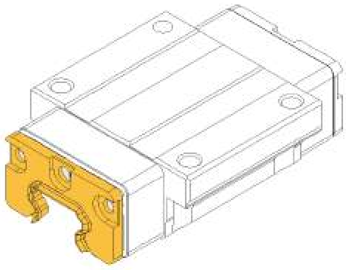


Note:
For optional pipe nipples or other special nipples, please contact ABBA or ABBA authorized distributors.

1.23 Accessories

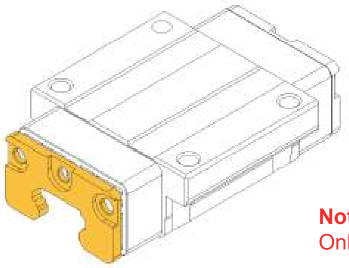
1.23.1 Standard front seal

Standard front seals are contact seals that can prevent external contaminants from entering the block
Standard front seal is suitable for normal environment.



1.23.2 Low friction shield

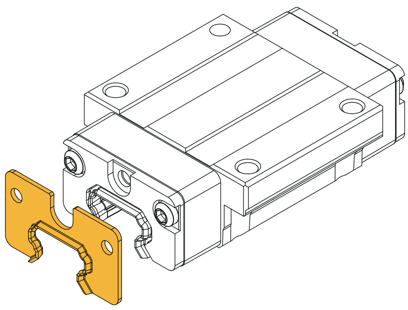
Low friction shields are non-contact seals that can reduce running resistance caused by standard front seals. It is suitable for environments that require low running resistance and no external pollutants, such as clean rooms etc.



Note:
Only SIZE15-30 can be selected, please contact ABBA for other sizes.

1.23.3 Scraper plate

Scraper plates are non-contact seals that needs to be placed outside the seal. Its function is to prevent the seal from being damaged by larger pollutants or hot metal chips. Suitable for environments with large pollutants or metal chips, such as milling machines etc.

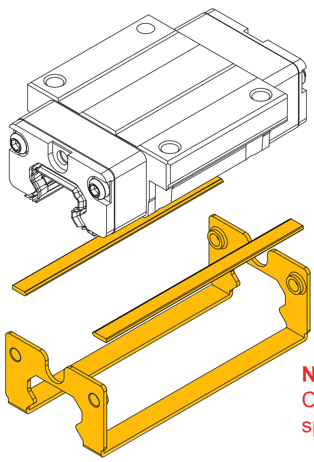


Unit : mm

Model	Thickness
BR15	1
BR20	1
BR25	1.5
BR30	1
BR35	1
BR45	1

1.23.4 U type metal frame + side seals

U type metal frames can hold two side seals and change the block dimension values of L and E as below table. Refer to P38~43 for definition of L and E.



Unit : mm

Model	L	E
BR15	68	2.6
BR20	79.8	3
BR25	90	5
BR30	111	7
BR35	111	7.5
BR45	140.2	12

Note:
Currently only standard blocks are available. For other specifications, please contact ABBA or ABBA authorized distributors.

1.24 BR Lubrication reservoir kit

BR lubrication reservoir kit is run by high oil content of reservoir and optimization of film forming designed to provide adequate and proper amount of lubricant to grooves of rails, thus reaching good effect of environmental protection and extend relubrication intervals.

1.24.1 Characteristics

1 Effectivily extend the relubrication intervals

Make supplimentary periodically up to 4000km

2 High reliability and interchangeability

- End-users can install or replace BR lubrication reservoir kit by themselves easily.
- Replace BR lubrication reservoir kit on the rail directly without moving the block out.

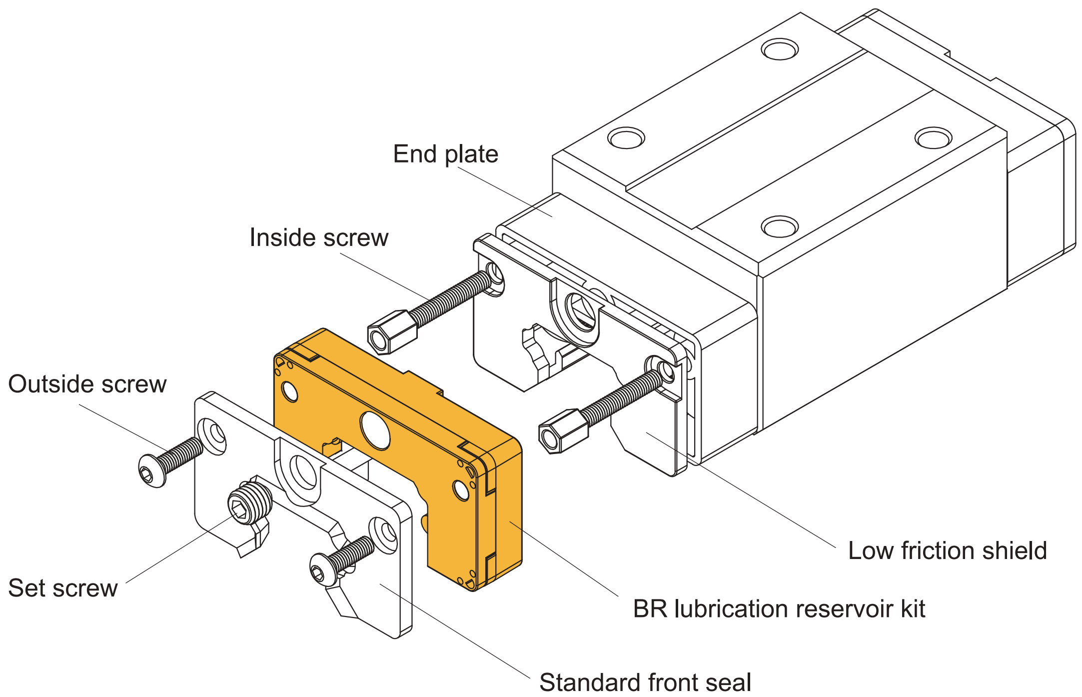
3 Friendly to environment

Through optimization of the film forming methods to reduce the waste of lubrication oil, thus preventing environmental pollutions.

4 High-performance lubrication oil

- Using the lubrication oil which is compliance with ISO3448, viscosity grade 680.
  Perfectly compatible with the lubrication oil of blocks.
- Allowable temperature range: -10~50˚C(working continuosly) or -10~80˚C(working temporarilly)

1.24.2 Construction

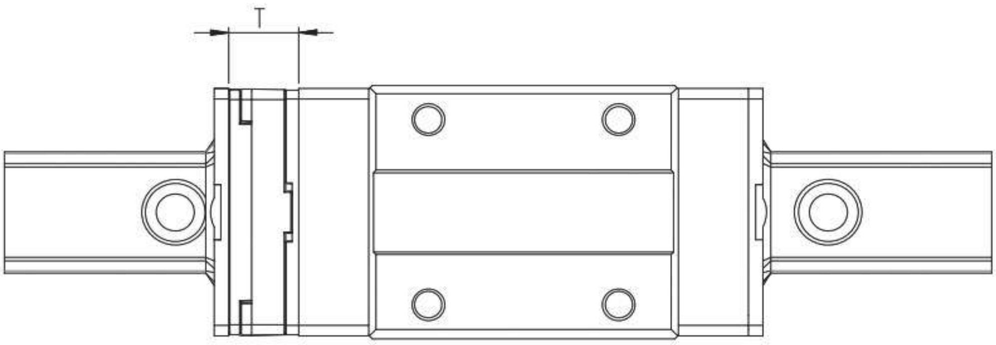


1.24.3 Applicable scope

- Series : BR series
- Size : 15 / 20 / 25 / 30
- Block : available for all blocks types
- End plate : available for standard end plate only
- Preload : available for all preload classes
- Accuracy : available for all accuracy classes
- Maximum load : less than or equal to 0.3C
- Maximum speed : less than or equal to 1 m/s
- Allowable temperature range : -10~50℃ (continuous operation)
  -10~80℃ (short-term use)

1.24.4 Installation size

BR lubrication reservoir kit will increase the length of block.
Please refer to the below table for thickness T.



Unit : mm

Size	BR lubrication reservoir kit thickness T
15	13
20	13
25	13
30	10

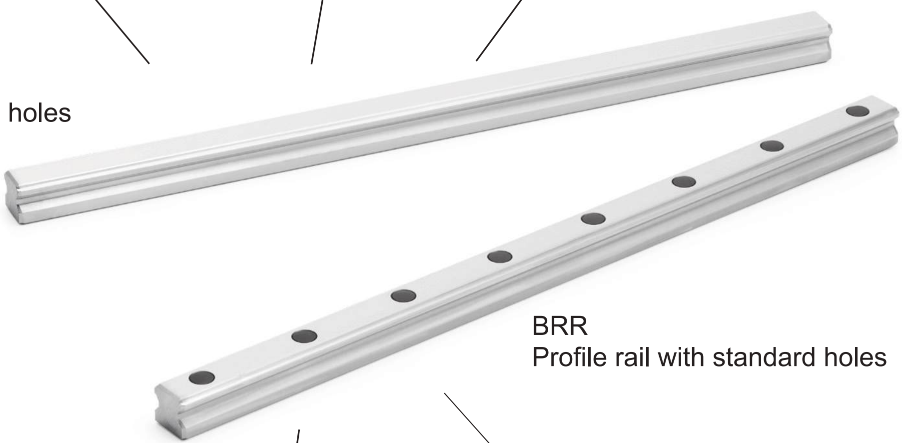
1.25 Product overview

BRC-A0
BRD-A0
Flanged block, standard length, standard height

BRC-R0
BRD-R0
Slim-line block, standard length, extended height

BRC-U0
BRD-U0
Slim-line block, standard length, standard height

BRR
Profile rail with blind holes



BRR
Profile rail with standard holes

BRC-LA
BRD-LA
Flanged block, extended length, standard height

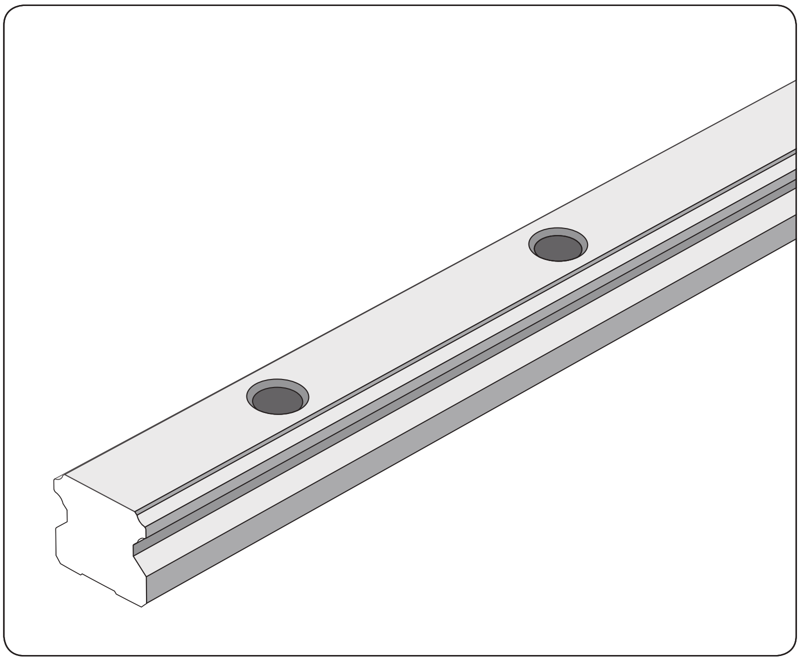
BRC-LR
BRD-LR
Slim-line block, extended length, extended height

BRC-SU
BRD-SU
Slim-line block, short length, standard height

1.26 Rail drilling method

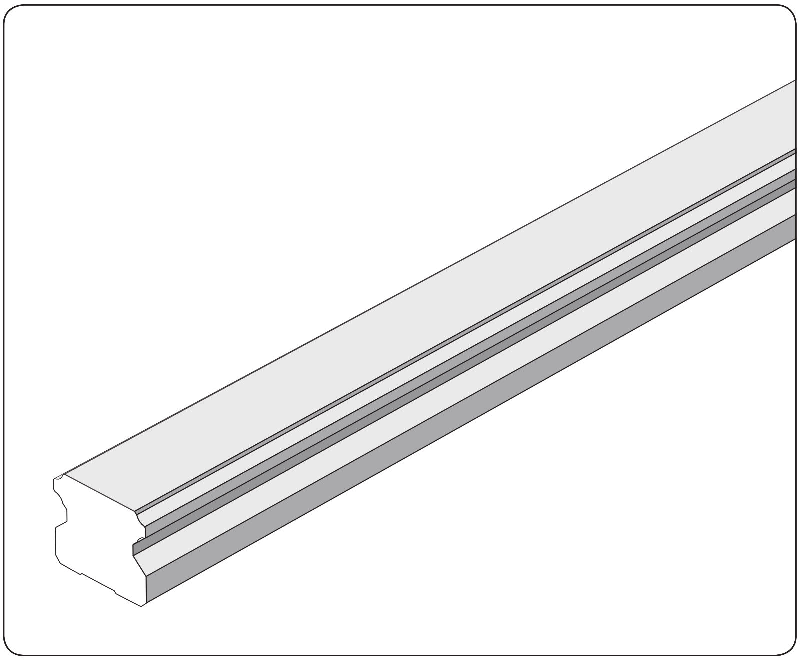
D0 Standard hole

For upper installation, plastic hole plugs are equipped as standard.



D4 Blind hole

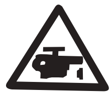
For underneath installation with blind hole.



1.27 Maintenance and usage of Linear Guide

Since ABBA Linear Guides are very precise products, please pay careful attention to the following:

ABBA's Linear Guides will be rust-proofed before leaving the factory. Therefore, please clean the rust-proof oil before use and fill it with lubricant immediately. If the product is rusted due to not input lubrication, we will not be able to do free repair.



Check lubrication daily

If you do not use the product within one month after purchasing the product, please do anti-rust treatment regularly. The anti-rust treatment time also needs to be adjusted according to the regional temperature.

Regular maintenance

ABBA's Linear Guides have self-lubricating blocks (depending on the model), which greatly saves the lubricants cost and reduces the maintenance times. Please check the operating conditions regularly. If there is no oil film on the surface of the rails, please fill in the lubricant immediately. If the rail surface is contaminated by dust and metal dust, please clean it with kerosene before filling it with lubricant.

Check lubrication daily

Avoid dust

Do not disassemble the block by yourself lest foreign matter enter the block, which will affect the accuracy and shorten the service life. In addition, the rail should be placed on an appropriate surface, otherwise the rail will be deformed.

Prohibition of disassembly

If the linear blocks are installed vertically, please pay special attention to the sliding of the block. If the block accidentally falls, please find an ABBA authorized distributors for assistance immediately.

Prohibition of disassembly

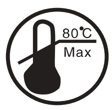
Avoid Slipping off

Be sure to use the product in a clean environment, and install a protective cover on the outside of the product to prevent the entry of dust and metal dust, which will affect the accuracy and service life of the product.

Avoid dust

If the product is used in a harsh environment, such as a corrosive environment, ABBA also provides surface treatment products. Please refer to Chapter 1.8 for detail information.

The applicable ambient temperature of the product is from -20℃ to +80℃.



Notice temperature limit

For non-interchangeable products, you cannot arbitrarily replace the block or change its installation direction, otherwise the accuracy of the product cannot be guaranteed.

1.28 Ordering key of System

B R S 1 5 - A 0 C 2 Z 1 - 1 0 8 0 0 N D 0 - A 0 S W 2

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

Block type [1]

A0	Flanged block(Standard length, Standard height)
LA	Flanged block(Extended length, Standard height)
SU	Slim-line block(Short length, Standard height)
U0	Slim-line block(Standard length, Standard height)
R0	Slim-line block(Standard length, Extended height)
LR	Slim-line block(Extended length, Extended height)

End Cap Type [2]

C	Standard End Cap(for 15, 20, 25, 30)
D	Short End Cap(for 15, 20, 25, 30, 35, 45)

Number of blocks per rail

1~9	1~9 blocks per rail
A~W	>9 blocks per rail (10=A, 11=B, 12=C...)

Preload class [3]

ZF	Clearance, Preload=0
Z0	No preload, Preload=0
Z1	Light preload, Preload=0~0.02C
Z2	Medium preload, 0.02~0.05C
Z3	Heavy preload, 0.05~0.07C

Rail length
00080~99999 mm(1 mm steps)

Accuracy class [3]

N	Normal
H	High
P	Precision

Rail hole

D0	Standard hole(Standard hole distance, the distance of the first and last attachment holes is produced equidistantly.)
D4	Blind hole(Standard hole distance, the distance of the first and last attachment holes is produced equidistantly.)

Joint rail [4]

A	Yes
0	No

Rail treatment

0	Standard (anti-rust oil)
B	Black oxidation
H	Hard chromium
T	Trivalent chromium

Sealing [5]

S	Standard front seal (only end seal)
1	Standard front seal + Scraper plate
0	Low friction shield
V	BR lubrication reservoir kit + Standard front seal
W	BR lubrication reservoir kit + Standard front seal + Scraper plate
U	Standard front seal + U type metal frame + side seals

No. of parallel rails [6]

00	Single rail
W2~W9	Parallel rails (W2 : 2 rails, W3 : 3 rails)

1) Nipple/set screw quantity per block
   A. Size 15 : 0° nipple(2pcs)
   B. Size 20/25/30/35/45 : 45°nipple(1pc)+ screw(1 pc)

2) C: End cap with Self-lubricant part
   D: End cap without Self-lubricant part

3) Refer to following table for limitation

System			
Accuracy	P	H	N
Preload	-	-	ZF
	Z0	Z0	Z0
	Z1	Z1	Z1
	Z2	Z2	Z2
	Z3	Z3	Z3

4) N and H class and their parallel used products are allowed to be joint rails. For other joint rails requirements, please contact ABBA.

5) Block type cross table
●/○ : Block type available
● : Sealing U type, Standard seal + Metal frame to hold two side seals

BRC (Standard End Cap)	A0	LA	SU	U0	R0	LR
15	●		○	●	●	
20	●	○	○	●	●	○
25	●	○	○	●	●	○
30	●	○	○	●	●	○
35						
45						

BRD (Short End Cap)	A0	LA	SU	U0	R0	LR
15	○		○	○	○	
20	○	○	○	○	○	○
25	○	○	○	○	○	○
30	○	○	○	○	○	○
35	●	○	○	●	●	○
45	●	○		●	●	○

6) Use in parallel or on the same surface, consistent with the description of difference.

1.29 Ordering key of Rail

B R R 1 5 - 1 0 8 0 0 N D 0 - A 0

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

Rail length
00080~99999 mm (1 mm steps)

Accuracy class

N	Normal
H	High

Rail hole

D0	Standard hole(Standard hole distance, the distance of the first and last attachment holes is produced equidistantly.)
D4	Blind hole(Standard hole distance, the distance of the first and last attachment holes is produced equidistantly.)

Join rail track [1)]

A	Yes
0	No

Rail treatment

0	Standard (anti-rust oil)

1) N and H class and their parallel used products are allowed to be jointed rails. For other jointed rails requirements, please contact ABBA.

1.30 Ordering key of Block

B R C 1 5 - A 0 Z 1 - N 0 S

End Cap Type [1)]

C	Standard End Cap(for 15, 20, 25, 30)
D	Short End Cap(for 15, 20, 25, 30, 35, 45)

Size

15, 20, 25, 30, 35, 45

Block type [2)]

A0	Flanged block(Standard length, Standard height)
LA	Flanged block(Extended length, Standard height)
SU	Slim-line block(Shot length, Standard height)
U0	Slim-line block(Standard length, Standard height)
R0	Slim-line block(Standard length, Extended height)
LR	Slim-line block(Extended length, Extended height)

Preload class [3)]

ZF	Clearance, Preload=0
Z0	No preload, Preload=0
Z1	Light preload, Preload=0~0.02C

Accuracy class [3)]

N	Normal
H	High

Block treatment

0	Standard (anti-rust oil)

Sealing [4)]

S	Standard front seal (only end seal)

1) C: End cap with Self-lubricant part
   D: End cap without Self-lubricant part

2) Nipple/set screw quantity per block
   A. Size 15 : 0˚ nipple(2pcs)
   B. Size 20/25/30/35/45 : 45˚nipple(1pc)+ screw(1 pc)

3) Refer to following table for limitation

Block			
Accuracy	P	H	N
Preload	-	-	ZF
	-	Z0	Z0
	-	Z1	Z1

4) Block type cross table

●/○ : Block type available

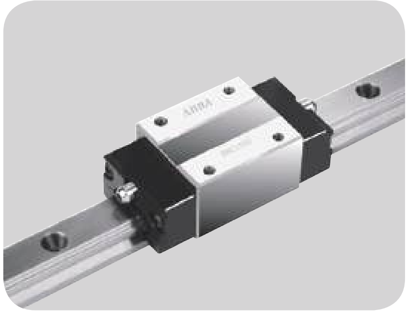
● : Sealing U type, Standard seal + Metal frame to hold two side seals

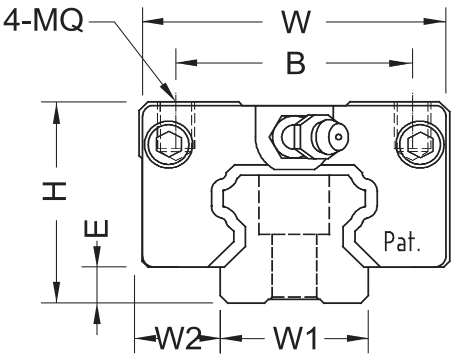
BRC (Standard End Cap)	A0	LA	SU	U0	R0	LR
15	●		○	●	●	
20	●	○	○	●	●	○
25	●	○	○	●	●	○
30	●	○	○	●	●	○
35						
45						

BRD (Short End Cap)	A0	LA	SU	U0	R0	LR
15	○		○	○	○	
20	○	○	○	○	○	○
25	○	○	○	○	○	○
30	○	○	○	○	○	○
35	●	○	○	●	●	○
45	●	○		●	●	○

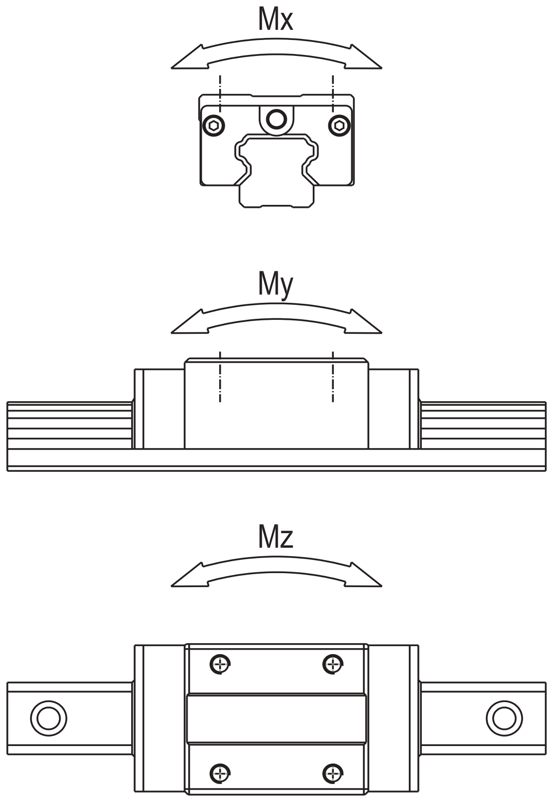
1.31 Dimension of Linear Guide

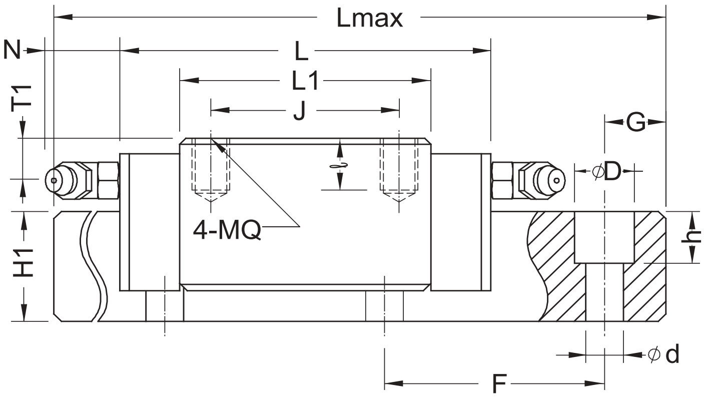
1.31.1 BRC-R0/LR, BRD-R0/LR





Model No.	Assembly (mm)				Block (mm)							Rail (mm)			
	H	W	W2	E	L	BxJ	MQxℓ	L1	Oil hole	T1	(N)	W1	H1	F	dxDxh
BRC15R0	28	34	9.5	4.6	66	26x26	M4x6	40	⌀ 3	8.3	5	15	14	60	4.5x7.5x5.8
BRD15R0					56										
BRC20R0	30	44	12	5	77.8	32x36	M5x8	48.8	M6x1	7	15.6	20	18	60	6x9.5x9.0
BRD20R0					67.8										
BRC20LR					92.4	32x50		63.4							
BRD20LR					82.4										
BRC25R0	40	48	12.5	7	88	35x35	M6x10	57	M6x1	11.8	15.6	23	22	60	7x11x9.5
BRD25R0					78										
BRC25LR					110.1	35x50		79.1							
BRD25LR					100.1										
BRC30R0	45	60	16	9	109	40x40	M8x13	72	M6x1	10	15.6	28	26	80	9x14x12.5
BRD30R0					99										
BRC30LR					131.3	40x60		94.3							
BRD30LR					121.3										
BRD35R0	55	70	18	9.5	109	50x50	M8x13	80	M6x1	15	15.6	34	29	80	9x14x12.5
BRD35LR					134.8	50x72		105.8							
BRD45R0	70	86	20.5	14	138.2	60x60	M10x16.5	105	M8x1	18.5	16	45	38	105	14x20x17.5
BRD45LR					163	60x80		129.8							

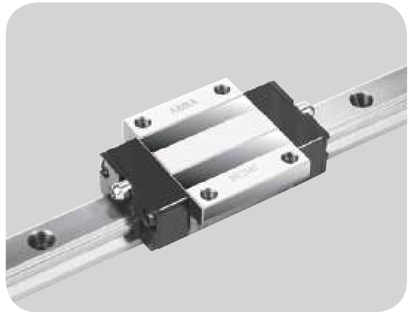


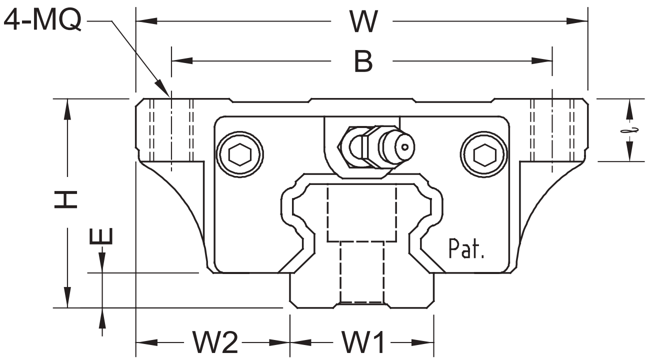


Model No.	Ref. data (mm)		Basic load rating (Kgf)		Static moment (Kgf*m)			Weight	
	Lmax	G	C	C0	Mx	My	Mz	Block (Kg)	Rail (Kg/m)
BRC15R0	4000	20	850	1350	10.1	6.8	6.8	0.19	1.4
BRD15R0									
BRC20R0	4000	20	1400	2400	24	14.6	14.6	0.31	2.6
BRD20R0									
BRC20LR			1650	3000	30	23.8	23.8	0.47	
BRD20LR									
BRC25R0	4000	20	1950	3200	36.8	22.8	22.8	0.45	3.6
BRD25R0									
BRC25LR			2600	4600	52.9	45.5	45.5	0.56	
BRD25LR									
BRC30R0	4000	20	2850	4800	67.2	43.2	43.2	0.91	5.2
BRD30R0									
BRC30LR			3600	6400	89.6	75.4	75.4	1.2	
BRD30LR									
BRD35R0	4000	20	3850	6200	105.4	62	62	1.5	7.2
BRD35LR			4800	8300	141.1	109.8	109.8	1.9	
BRD45R0	4000	22.5	6500	10500	236.3	137.8	137.8	2.3	12.3
BRD45LR			7700	13000	292.5	210.9	210.9	2.8	

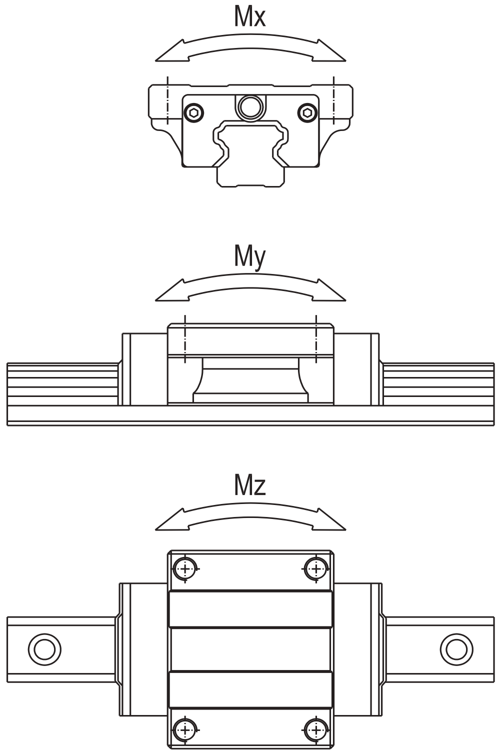
Note: BR35 and BR45 are not equipped with self-lubricant parts.

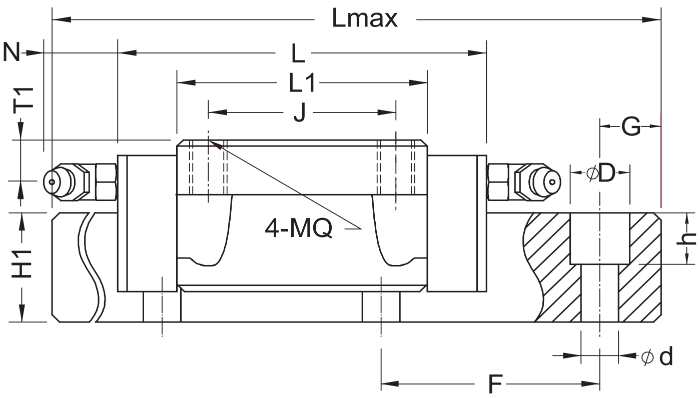
BRC-A0/LA, BRD-A0/LA





Model No.	Assembly (mm)				Block (mm)							Rail (mm)			
	H	W	W2	E	L	BxJ	MQxℓ	L1	Oil hole	T1	(N)	W1	H1	F	dxDxh
BRC15A0	24	47	16	4.6	66	38x30	M5x8	40	ø 3	4.3	5	15	14	60	4.5x7.5x5.8
BRD15A0					56										
BRC20A0	30	63	21.5	5	77.8	53x40	M6x9	48.8	M6x1	7	15.6	20	18	60	6x9.5x9.0
BRD20A0					67.8										
BRC20LA					92.4			63.4							
BRD20LA					82.4										
BRC25A0	36	70	23.5	7	88	57x45	M8x12	57	M6x1	7.8	15.6	23	22	60	7x11x9.5
BRD25A0					78										
BRC25LA					110.1			79.1							
BRD25LA					100.1										
BRC30A0	42	90	31	9	109	72x52	M10x12	72	M6x1	7	15.6	28	26	80	9x14x12.5
BRD30A0					99										
BRC30LA					131.3			94.3							
BRD30LA					121.3										
BRD35A0	48	100	33	9.5	109	82x62	M10x13	80	M6x1	8	15.6	34	29	80	9x14x12.5
BRD35LA					134.8			105.8							
BRD45A0	60	120	37.5	14	138.2	100x80	M12x15	105	M8x1	8.5	16	45	38	105	14x20x17.5
BRD45LA					163			129.8							

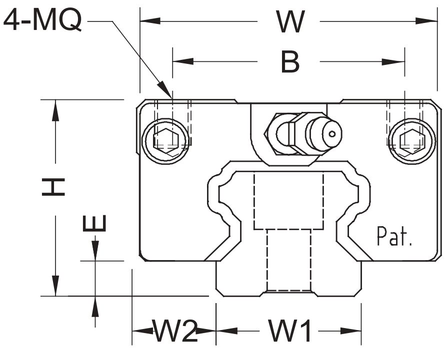




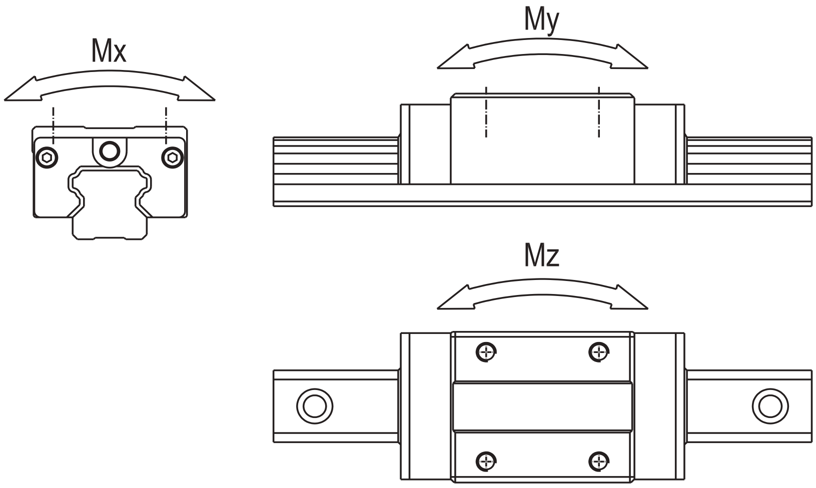
Model No.	Ref. data (mm)		Basic load rating (Kgf)		Static moment (Kgf*m)			Weight	
	Lmax	G	C	C_0	Mx	My	Mz	Block (Kg)	Rail (Kg/m)
BRC15A0	4000	20	850	1350	10.1	6.8	6.8	0.21	1.4
BRD15A0									
BRC20A0	4000	20	1400	2400	24	14.6	14.6	0.4	2.6
BRD20A0									
BRC20LA			1650	3000	30	23.8	23.8	0.52	
BRD20LA									
BRC25A0	4000	20	1950	3200	36.8	22.8	22.8	0.57	3.6
BRD25A0									
BRC25LA			2600	4600	52.9	45.5	45.5	0.72	
BRD25LA									
BRC30A0	4000	20	2850	4800	67.2	43.2	43.2	1.1	5.2
BRD30A0									
BRC30LA			3600	6400	89.6	75.4	75.4	1.4	
BRD30LA									
BRD35A0	4000	20	3850	6200	105.4	62	62	1.6	7.2
BRD35LA			4800	8300	141.1	109.8	109.8	2	
BRD45A0	4000	22.5	6500	10500	236.3	137.8	137.8	2.7	12.3
BRD45LA			7700	13000	292.5	210.9	210.9	3.6	

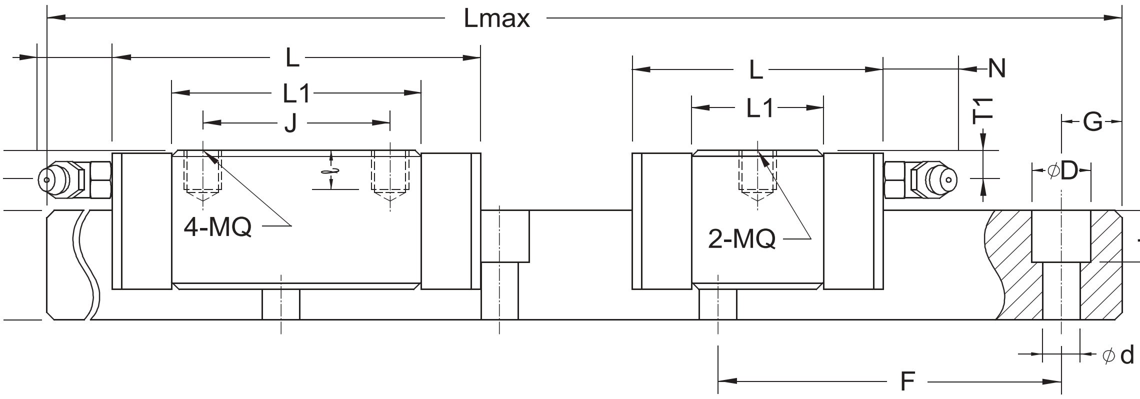
Note: BR35 and BR45 are not equipped with self-lubricant parts.

1.31.3 BRC-SU/U0, BRD-SU/U0



Model No.	Assembly (mm)				Block (mm)							Rail (mm)			
	H	W	W2	E	L	BxJ	MQxℓ	L1	Oil hole	T1	(N)	W1	H1	F	dxDxh
BRC15U0	24	34	9.5	4.6	66	26x26	M4x5.6	40	ø3	4.3	5	15	14	60	4.5x7.5x5.8
BRD15U0					56										
BRC15SU					47.6	26x -		21.6							
BRD15SU					37.6										
BRC20U0	28	42	11	5	77.8	32x32	M5x6.4	48.8	M6x1	5	15.6	20	18	60	6x9.5x9.0
BRD20U0					67.8										
BRC20SU					57	32x -		28							
BRD20SU					47										
BRC25U0	33	48	12.5	7	88	35x35	M6x8	57	M6x1	4.8	15.6	23	22	60	7x11x9.5
BRD25U0					78										
BRC25SU					62.5	35x -		31.5							
BRD25SU					52.5										
BRC30U0	42	60	16	9	109	40x40	M8x11.5	72	M6x1	7	15.6	28	26	80	9x14x12.5
BRD30U0					99										
BRC30SU					75.6	40x -		38.6							
BRD30SU					65.6										
BRD35U0	48	70	18	9.5	109	50x50	M8x11.2	80	M6x1	8	15.6	34	29	80	9x14x12.5
BRD35SU					74.7	50x -		45.7							
BRD45U0	60	86	20.5	14	138.2	60x60	M10x13	105	M8x1	8.5	16	45	38	105	14x20x17.5





Model No.	Ref. data (mm)		Basic load rating (Kgf)		Static moment (Kgf*m)			Weight	
	Lmax	G	C	C_0	Mx	My	Mz	Block (Kg)	Rail (Kg/m)
BRC15U0	4000	20	850	1350	10.1	6.8	6.8	0.17	1.4
BRD15U0									
BRC15SU			520	680	5.1	1.8	1.8	0.1	
BRD15SU									
BRC20U0	4000	20	1400	2400	24	14.6	14.6	0.26	2.6
BRD20U0									
BRC20SU			950	1400	7	4.9	4.9	0.17	
BRD20SU									
BRC25U0	4000	20	1950	3200	36.8	22.8	22.8	0.38	3.6
BRD25U0									
BRC25SU			1250	1750	17.5	6.9	6.9	0.21	
BRD25SU									
BRC30U0	4000	20	2850	4800	67.2	43.2	43.2	0.81	5.2
BRD30U0									
BRC30SU			1750	2400	33.6	11.6	11.6	0.48	
BRD30SU									
BRD35U0	4000	20	3850	6200	105.4	62	62	1.2	7.2
BRD35SU			2500	3650	62.1	20.9	20.9	0.8	
BRD45U0	4000	22.5	6500	10500	236.3	137.8	137.8	2.1	12.3

Note: BR35 and BR45 are not equipped with self-lubricant parts.