

Airtac

Linear Guide(2023B) Europe

- LSH Series Standard Linear Guide
- LSD Series Low Profile Type Linear Guide
- LRW Series Miniature Linear Guide (Widened)
- LRM Series Miniature Linear Guide
- LGC Series Crossed Roller Way



AirTAC ● Linear Guide

Products Catalog-2023B

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AirTAC International Group

Corporate Profile

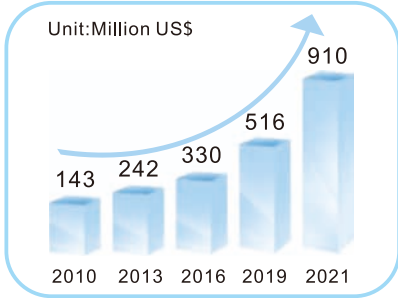


2019:
AirTAC Ningbo the second
Production base established



2018:
AirTAC USA established

Annual revenue over the years



2016-2018:
AirTAC(Guangdong/Tianjin
/Fujian) Intelligent Company
established



2012-2015:
AirTAC Singapore, AirTAC
Japan, AirTAC Malaysia,
AirTAC Thailand established



2015:
AirTAC (Jiangsu)
established



2010:
AirTAC IPO In Taiwan
(Stock code:1590.TW)



2016:
New production
base of AirTAC
Tainan established

2011:
Expanded China Sales
and R&D center



2008:
AirTAC Italy
established



2002:
AirTAC Ningbo
established

1988:
AirTAC Taiwan
established



1998:
AirTAC Guangdong
established





Corporate Profile



● **2019**
AirTAC Ningbo the second Production base established

AirTAC Ningbo the second Production base
Land area: 266,667m²
Add: No.89, Nandu Rd., Fenghua District, Ningbo, Zhejiang, China

● **2016**
New production base of AirTAC Tainan established

Taiwan Tainan Production base
Land area: 71,333m²
Add: No.28, Kanxi Rd., Xinshi District, Tainan, Taiwan



● **2002**
AirTAC Ningbo established

AirTAC Ningbo the first Production base
Land area: 240,000m²
Add: No.88, Siming E. Rd., Fenghua District, Ningbo, Zhejiang, China



● **1998**
AirTAC Guangdong established

AirTAC Guangdong
Land area: 26,667m²
Add: No.7, Kaixuan Rd., Nanhai District, Foshan, Guangdong, China





Manufacturing Equipment

Injection molding Equipment Array (Japan-made)



Cryogenic-treatment Equipment



Machining Equipment Array (Japan-made)

EFD Induction Hardening Equipment (Norway-made)



IPSEN Carburising Equipment (Germany-made)



Grinding Machine Array



Precision Drilling Machine (Japan-made)



Auto-assembly Line



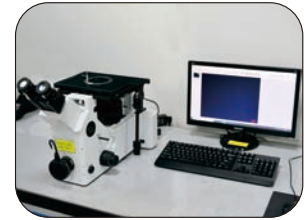
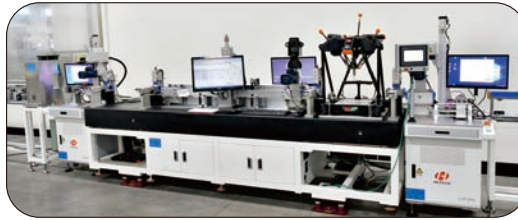


Detection Equipment-R&D Experimental Equipment

Zeiss Coordinate Measuring Machine(CMM)(Germany-made)

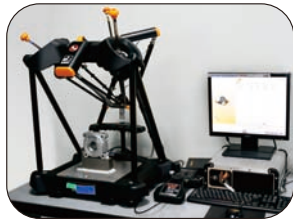


Rail Accuracy Classification Equipment



Metallographic Analysis(Japan-made)

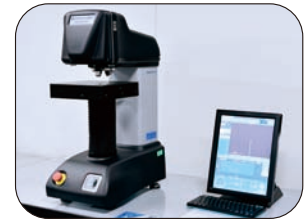
Renishaw Equator



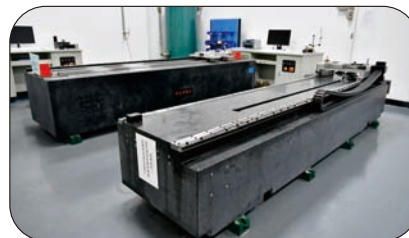
Chemical Analysis Equipment
(Germany-made)



Hardness Detection Equipment
(Netherlands-made)



Linear guide accuracy
Measurement Equipment



Linear guide life span Test Equipment

Linear guide complex
performance Test Equipment





Global Network of Marketing&Service

AirTAC International Group has more than 100 direct sales branches/sales sections in Chinese mainland, and thousands of distributors around the world, mainly located in Europe, the United States and Asia, etc., forming a perfect sales network and after-sales service system, which can provide customers with convenient services at any time.



Overseas Market

- USA
- Japan
- UK
- France
- Finland
- Germany
- Thailand
- Korea
- Australia
- Mexico
- Argentina
- South Africa
- Italy
- Singapore
- Malaysia
- Greece
- Sweden
- Denmark
- India
- Brazil
- Netherlands
- Sri Lanka
- Colombia
- Jordan
- VietNam
- Indonesia
- Israel
- Turkey
- Kuwait
- Austria
- Saudi Arabia
- Peru
- Canada
- Iran
- Syria
- ...





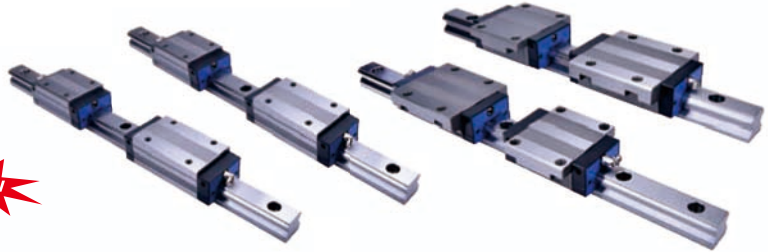
Linear Guide Selection

P2

LSH Series Standard Linear Guide

P10

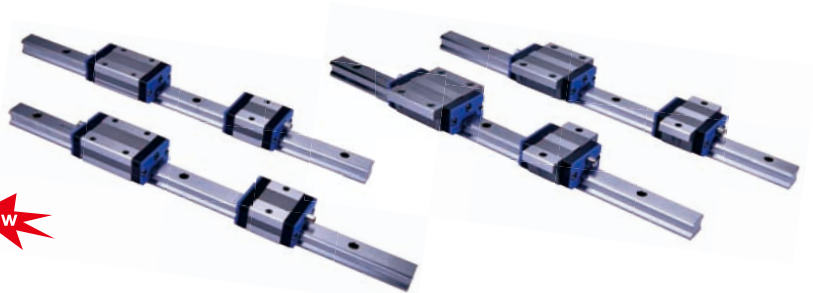
- Standard type(N) and Long type(L) are available, one block and two blocks type are available
- Square type(H), Flange type top-mount(F1), Flange type bottom-mount(F2), Flange type top or bottom mount(F3) block are available
- LSH15、20、25、30、35、45; **New**
- Block with double oil scrapers(DD) or oil scraper+metal scraper(ZZ) type are available **New**



LSD Series Low Profile Type Linear Guide

P27

- Short type(S) and Standard type(N) are available, one block and two blocks type are available
- Square type(H), Flange type top-mount(F1), Flange type bottom-mount(F2), Flange type top or bottom mount(F3) block are available
- LSD15、20、25、30、35;
- Block with double oil scrapers(DD) or oil scraper+metal scraper(ZZ) type are available **New**



LRW Series Miniature Linear Guide (Widened)

New

P46

- Standard type(N) and Long type(L) are available, one block and two blocks type are available
- LRW7、9、12、15



LRM Series Miniature Linear Guide

P53

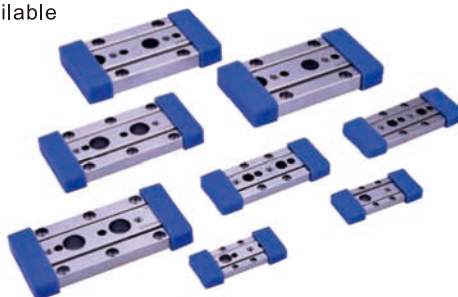
- Standard type(N) and Long type(L) are available, one block and two blocks type are available
- LRM5、7、9、12、15。



LGC Series Crossed Roller Way

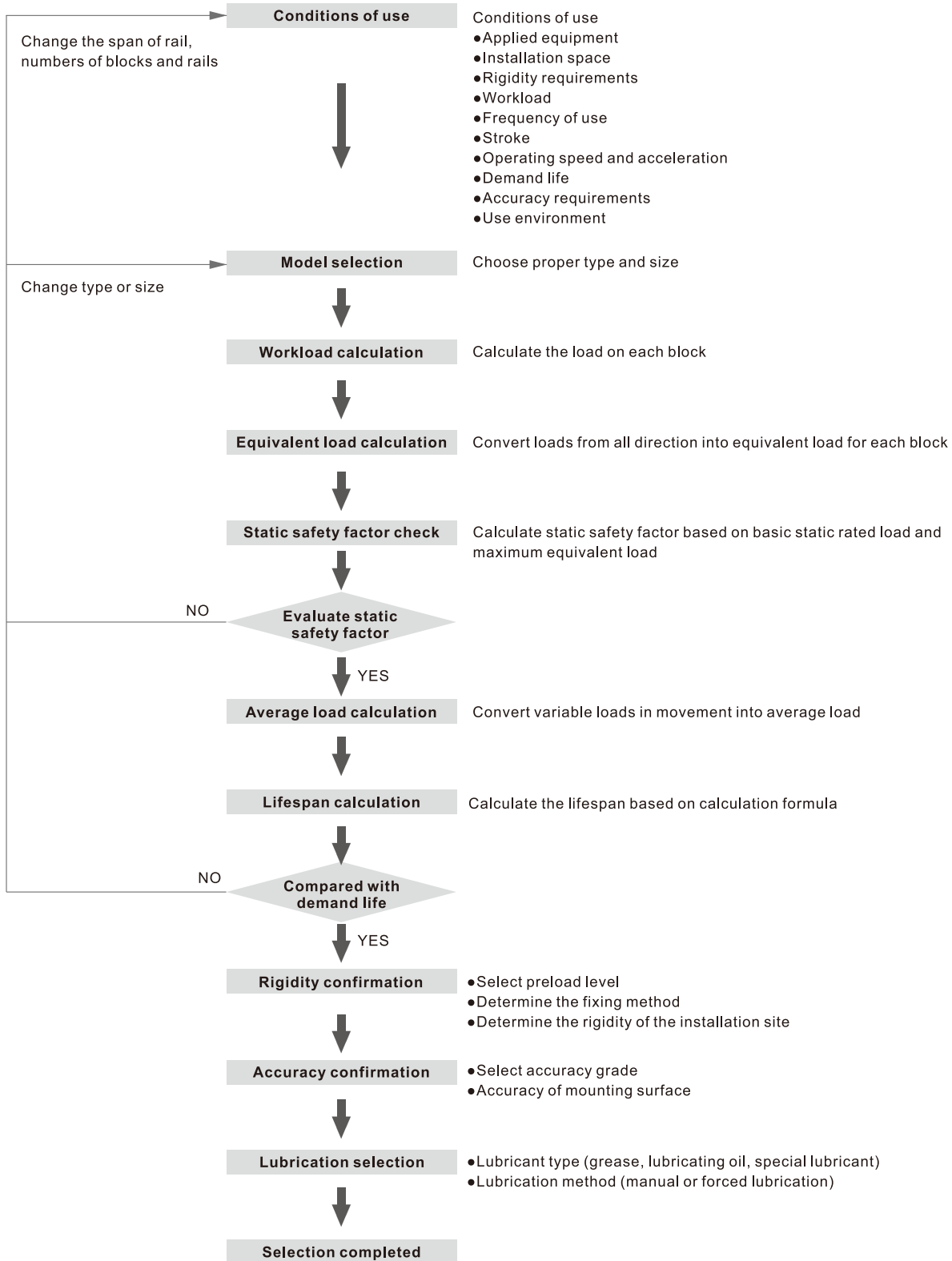
P60

- Accuracy class: High-accuracy and precision grade are available
- Three-row type and four-row type are available
- Roller diameter: $\Phi 1.5$ 、 $\Phi 2$ 、 $\Phi 3$ 、 $\Phi 4$ 、 $\Phi 6$



Linear Guide Selection

How to select Linear Guide



Linear Guide Selection

Load Capacity and Rating Life

1. Basic static load rating (C_0)

When a linear guide absorbs a large force or impact in a static or low-speed movement, it will cause permanent deformation either on rollers and groove. When sum of deformation on groove and rollers exceeds a certain limit, it will affect the smoothness of its linear movement.

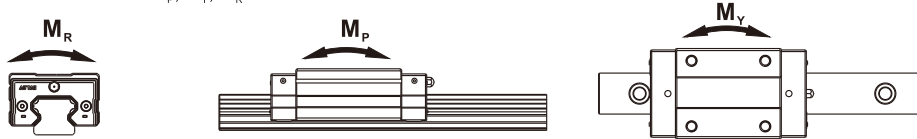
Basic static load rating is defined as the magnitude of a given stress applied at where the stress is the biggest caused the sum of permanent deformation on groove and roller is 1/10000 of the diameter of the rollers.

2. Allowable static moment (M_0)

When torque is applied on a linear guide, rollers in the both ends of block will endure the major stress force.

Allowable static moment is defined as a given moment applied and raised stress force on linear guide which will cause sum of permanent deformation on groove and roller is 1/10000 of the diameter of the rollers.

Static moment is defined in three directions as M_P , M_Y , M_R .



3. Static safety factor (f_s)

During vibration, impact or sudden start and stop, the inertia force or torque will raise huge loads on linear guide. For this kind of situation, it is necessary to put static safety factor into consideration. Static safety factor is a ratio of the basic static load rating to the calculated working load as shown in following formula.

The reference of static safety factor for different conditions is shown in following table:

Use machinery	Load condition	f_s
General industrial machinery	General load conditions	1.0~1.3
	When there is vibration or shock	2.0~3.0
Machine tool	General load conditions	1.0~1.5
	When there is vibration or shock	2.5~7.0

$$f_s = \frac{C_0}{P} \text{ or } f_s = \frac{M_0}{M}$$

f_s : Static safety factor

C_0 : Basic static load rating (N)

M_0 : Allowable static moment (N·m)

P : Calculation load (N)

M : Calculation moment (N·m)

4. Basic dynamic load rating (C)

Basic Dynamic Load rating is defined as the maximum allowable load and can be applied on the same specification of linear guides. This will result in a nominal life of 50 KM operation for linear guide.

5. Life calculation

•Life

When a linear guide is with bearings loaded during operation, the groove and rollers will constantly endure stress force. Once reaching fatigue, the surface will peel off and damage. The life of a given linear guide is defined as the moving distance of a linear guide in which peeling occurs due to fatigue.

•Nominal life

Actual lifespan of linear guide varies enormously. The lifespan of each guide can be different even though they come from the same product batch under the same condition. Therefore, nominal life is usually chosen as bench mark to evaluate lifespan. Nominal life is defined as the moving distance for 90% of linear guides from the same production batch which can perform under the same working condition without peeling.

•Life factor

1. Hardness factor (f_H)

Surface hardness of rollers must be HRC 58~62. A softer hardness will reduce load-bearing performance and static load rating.

Therefore allowable moment must be multiplied by a hardness factor as correlation shown on the right chart.

Our hardness requirement for linear guide is HRC58~62, therefore $f_H = 1.0$.

2. Temperature factor (f_T)

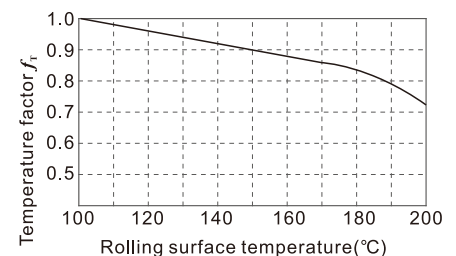
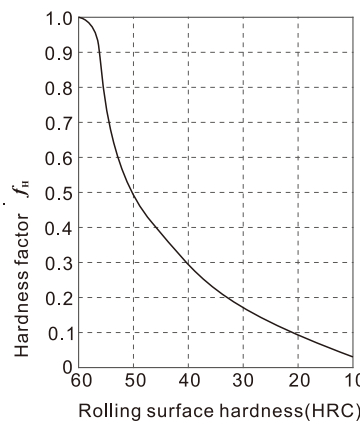
High temperature environment will affect lifespan of the linear guide.

Therefore, static load rating and allowable moment must be multiplied by a temperature factor f_T as correlation shown on the right graph.

Certain parts of our linear guide are made of plastic and rubber, hence working in temperature higher than 100°C is not recommended.

3. Load factor (f_w)

Although loads on a given linear guide can be calculated, it will usually come with vibration or hitting in actual use. This makes actual loads higher than calculated figure. Hence, in heavy vibration or hitting condition, please divide basic dynamic load rating (C) by following empirical load factor.



Working Conditions	Use speed	f_w
Smooth without impact	$V \leq 15\text{m/min}$	1.0~1.2
Common impact and vibration	$15\text{m/min} < V \leq 60\text{m/min}$	1.2~1.5
Moderate impact and vibration	$60\text{m/min} < V \leq 120\text{m/min}$	1.5~2.0
Strong impact and vibration	$V \geq 120\text{m/min}$	2.0~3.5

Linear Guide Selection

4. Contact factor (f_c)

When multiple blocks on the linear guide are used in close contact with each other, it is difficult to evenly distribute the load due to moment torque or the accuracy of the mounting surface. Hence, when using multiple blocks in close contact, multiply the basic load rating (C or C0) by the corresponding contact factor in the table below.

Note: Take into account the contact factor in the table below if uneven load distribution is expected in a large machine.

Number of blocks used in close contact	2	3	4	5	≥6	Normal use
Contact factor f_c	0.81	0.72	0.66	0.61	0.6	1

•Calculation of nominal life(L)

The nominal life will vary based on applied load. Hardness and working temperature will also have great effects on lifespan of a linear guide. Putting all factors into consideration, nominal life can be calculated by following formula.:

$$L = \left(\frac{f_H \times f_T \times f_C}{f_W} \times \frac{C}{P} \right)^3 \times 50Km$$

- L : Nominal life (km)
- C : Basic dynamic load rating (N)
- P : Workload (N)
- f_w : Load factor
- f_H : Hardness factor
- f_T : Temperature factor
- f_c : Contact factor

•Calculation of service life time(L_h)

If stroke length and repeating time are known, service life time (L_h) can be derived based on rated life (L)

$$L_h = \frac{L \times 10^3}{2 \times l_s \times n_1 \times 60}$$

- L_h : Service life time (hr)
- L : Rated life (km)
- l_s : Stroke length (m)
- n_1 : Rounds per minute (min^{-1})

Calculation of working load

Load effect on a linear guide will be affected by its center of mass, position of thrust and inertia force occurring by acceleration when starting or stopping, etcetera. Therefore, most applications of working conditions must be put into consideration in order to acquire accurate nominal life.

Working load calculation

Type	Operation condition	Load on each block
Horizontal use uniform motion Or at rest		$P_1 = \frac{F}{4} + \frac{Fl_3}{2l_1} - \frac{Fl_2}{2l_2}$ $P_2 = \frac{F}{4} - \frac{Fl_3}{2l_1} - \frac{Fl_2}{2l_2}$ $P_3 = \frac{F}{4} - \frac{Fl_3}{2l_1} + \frac{Fl_2}{2l_2}$ $P_4 = \frac{F}{4} + \frac{Fl_3}{2l_1} + \frac{Fl_2}{2l_2}$
Horizontal cantilever use uniform motion Or at rest		$P_1 = \frac{F}{4} + \frac{Fl_3}{2l_1} + \frac{Fl_2}{2l_2}$ $P_2 = \frac{F}{4} - \frac{Fl_3}{2l_1} + \frac{Fl_2}{2l_2}$ $P_3 = \frac{F}{4} - \frac{Fl_3}{2l_1} - \frac{Fl_2}{2l_2}$ $P_4 = \frac{F}{4} + \frac{Fl_3}{2l_1} - \frac{Fl_2}{2l_2}$
Vertical use uniform motion Or at rest		$P_1 = P_2 = P_3 = P_4 = \frac{Fl_3}{2l_1}$ $P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{Fl_4}{2l_2}$
Wall-mounted use uniform motion Or at rest		$P_1 = P_2 = P_3 = P_4 = \frac{Fl_4}{2l_2}$ $P_{1T} = P_{4T} = \frac{F}{4} + \frac{Fl_3}{2l_1}$ $P_{2T} = P_{3T} = \frac{F}{4} - \frac{Fl_3}{2l_1}$

Linear Guide Selection

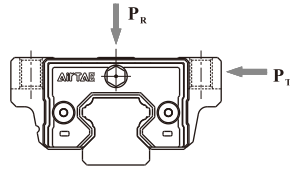
Type	Operation condition	Load on each block
Lateral Slope		$P_1 = \frac{F \cdot \cos \theta}{4} + \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} - \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_2}$ $P_2 = \frac{F \cdot \cos \theta}{4} - \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} - \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_2}$ $P_3 = \frac{F \cdot \cos \theta}{4} - \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} + \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_2}$ $P_4 = \frac{F \cdot \cos \theta}{4} + \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} + \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_2}$ $P_{1T} = P_{2T} = \frac{F \cdot \sin \theta}{4} + \frac{F \cdot \sin \theta \cdot l_2}{2 \cdot l_1}$ $P_{2T} = P_{3T} = \frac{F \cdot \sin \theta}{4} - \frac{F \cdot \sin \theta \cdot l_2}{2 \cdot l_1}$
Axial Slope		$P_1 = \frac{F \cdot \cos \theta}{4} + \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} - \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_1}$ $P_2 = \frac{F \cdot \cos \theta}{4} - \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} - \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_1}$ $P_3 = \frac{F \cdot \cos \theta}{4} - \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} + \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} - \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_1}$ $P_4 = \frac{F \cdot \cos \theta}{4} + \frac{F \cdot \cos \theta \cdot l_2}{2 \cdot l_1} + \frac{F \cdot \cos \theta \cdot l_4}{2 \cdot l_2} + \frac{F \cdot \sin \theta \cdot h_i}{2 \cdot l_1}$ $P_{1T} = P_{2T} = + \frac{F \cdot \sin \theta \cdot l_2}{2 \cdot l_1}$ $P_{2T} = P_{3T} = - \frac{F \cdot \sin \theta \cdot l_2}{2 \cdot l_1}$
Use horizontally with inertial force		<p>When accelerating</p> $P_1 = P_4 = \frac{mg}{4} - \frac{m \cdot a_i \cdot l_2}{2 \cdot l_1}$ $P_2 = P_3 = \frac{mg}{4} + \frac{m \cdot a_i \cdot l_2}{2 \cdot l_1}$ $P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot a_i \cdot l_2}{2 \cdot l_1}$ <p>When decelerating</p> $P_1 = P_4 = \frac{mg}{4} + \frac{m \cdot a_i \cdot l_2}{2 \cdot l_1}$ $P_2 = P_3 = \frac{mg}{4} - \frac{m \cdot a_i \cdot l_2}{2 \cdot l_1}$ $P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot a_i \cdot l_2}{2 \cdot l_1}$ <p>At constant speed</p> $P_1 = P_2 = P_3 = P_4 = \frac{mg}{4}$
Use Vertically with inertial force		<p>When accelerating</p> $P_1 = P_2 = P_3 = P_4 = \frac{m \cdot (g + a_i) \cdot l_2}{2 \cdot l_1}$ $P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot (g + a_i) \cdot l_2}{2 \cdot l_1}$ <p>When decelerating</p> $P_1 = P_2 = P_3 = P_4 = \frac{m \cdot (g - a_i) \cdot l_2}{2 \cdot l_1}$ $P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{m \cdot (g - a_i) \cdot l_2}{2 \cdot l_1}$ <p>At constant speed</p> $P_1 = P_2 = P_3 = P_4 = \frac{mg \cdot l_2}{2 \cdot l_1}$ $P_{1T} = P_{2T} = P_{3T} = P_{4T} = \frac{mg \cdot l_2}{2 \cdot l_1}$

Linear Guide Selection

Calculation of equivalent load

A block can bear force as well as torque from all axial and radial directions. When multiple loads are applied, these loads can be combined as an equivalent axial and radial load for the calculation of nominal life or static safety factor.

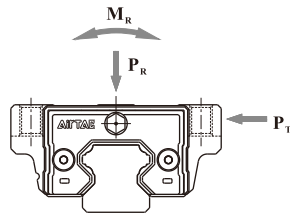
Our linear guide can bear loads in four directions, up, down, left, and right. So when using linear slides, it may be subjected to vertical load (P_R) and lateral load (P_T) at the same time. When two or more linear guides are used, the equivalent load (P_E) can be converted according to the following formula.



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

P_E : Equivalent load (N)
 P_R : Radial load (N)
 P_T : Lateral load (N)

In the case of single linear guide, equivalent load must take torque into account, see following formula.



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

P_E : Equivalent load (N)
 P_R : Radial load (N)
 P_T : Lateral load (N)
 C_0 : Basic static load rating (N)
 M : Calculated torque (N·m)
 M_R : Allowable static moment (N·m)

Calculation of average load

The real-time acting load for a block during movement is always variable. One can derive average load for the use of rated life calculation based on different applications. Average load when rollers are steel ball is as follows:

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

P_m : Average load (N)
 P_n : Variable load (N)
 L : Total Working Distance (mm)
 L_n : Moving distance when load P_n applied (mm)
 e : Exponent (for steel ball: 3)

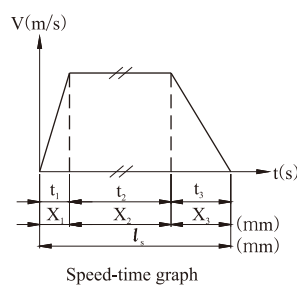
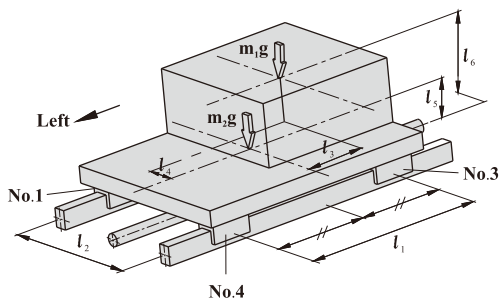
Average load calculation example

Varying load type	Average load calculation
<p>Interval Variable Load</p>	$P_m = e \sqrt{\frac{1}{L} \cdot (P_1^e \cdot L_1 + P_2^e \cdot L_2 + \dots + P_n^e \cdot L_n)}$ <p> P_m : Average load (N) P_n : Variable load (N) L : Total Working Distance (mm) L_n : Moving distance when load P_n applied (mm) e : Exponent (for steel ball: 3) </p>
<p>Monotonic variable load</p>	$P_m \approx \frac{1}{3} (P_{min} + 2 \cdot P_{max})$ <p> P_m : Average load (N) P_{min} : Minimum load (N) P_{max} : Maximum load (N) </p>

Varying load type	Average load calculation
<p>Sinusoidal variable load</p>	$P_m \approx 0.65 \cdot P_{max}$ <p>P_m: Average load (N) P_{max}: Maximum load (N)</p>
	$P_m \approx 0.75 \cdot P_{max}$ <p>P_m: Average load (N) P_{max}: Maximum load (N)</p>

Calculation example

Conditions of Use	Load calculation of each block
<p>Model : LSH30HL2X2520S20BP-M6(2 pcs)</p> <p>Basic dynamic load rating : $C = 45.7 \text{ KN}$</p> <p>Basic static load rating : $C_0 = 73.1 \text{ KN}$</p> <p>Mass $m_1 = 700\text{kg}$ $m_2 = 450\text{kg}$</p> <p>Speed $V = 0.75\text{m/s}$</p> <p>Time $t_1 = 0.05\text{s}$ $t_2 = 1.9\text{s}$ $t_3 = 0.15\text{s}$</p> <p>Acceleration $a_1 = 15\text{m/s}^2$ $a_3 = 5\text{m/s}^2$</p> <p>Travel Distance $l_5 = 1500\text{mm}$</p> <p>Distance $l_1 = 650\text{mm}$ $l_2 = 450\text{mm}$ $l_3 = 135\text{mm}$ $l_4 = 60\text{mm}$ $l_5 = 175\text{mm}$ $l_6 = 400\text{mm}$</p>	<p>At constant speed, the radial load P_n</p> $P_1 = \frac{m_1 g}{4} - \frac{m_1 g \cdot l_3}{2l_1} + \frac{m_2 g \cdot l_4}{2l_2} + \frac{m_2 g}{4} = 2562\text{N}$ $P_2 = \frac{m_1 g}{4} + \frac{m_1 g \cdot l_3}{2l_1} + \frac{m_2 g \cdot l_4}{2l_2} + \frac{m_2 g}{4} = 3987\text{N}$ $P_3 = \frac{m_1 g}{4} + \frac{m_1 g \cdot l_3}{2l_1} - \frac{m_2 g \cdot l_4}{2l_2} + \frac{m_2 g}{4} = 3073\text{N}$ $P_4 = \frac{m_1 g}{4} - \frac{m_1 g \cdot l_3}{2l_1} - \frac{m_2 g \cdot l_4}{2l_2} + \frac{m_2 g}{4} = 1648\text{N}$ <p>Acceleration is toward left, the radial load $P_n a_i$</p> $P_1 a_i = P_1 - \frac{m_1 a_i \cdot l_3}{2l_1} - \frac{m_2 a_i \cdot l_4}{2l_2} = -1577\text{N}$ $P_2 a_i = P_2 + \frac{m_1 a_i \cdot l_3}{2l_1} + \frac{m_2 a_i \cdot l_4}{2l_2} = 8127\text{N}$ $P_3 a_i = P_3 + \frac{m_1 a_i \cdot l_3}{2l_1} + \frac{m_2 a_i \cdot l_4}{2l_2} = 7212\text{N}$ $P_4 a_i = P_4 - \frac{m_1 a_i \cdot l_3}{2l_1} - \frac{m_2 a_i \cdot l_4}{2l_2} = -2492\text{N}$ <p>Lateral load $P_t a_i$</p> $P_t a_i = -\frac{m_1 a_i \cdot l_4}{2l_1} = -485\text{N}$ $P_t a_i = \frac{m_2 a_i \cdot l_4}{2l_2} = 485\text{N}$ $P_t a_i = \frac{m_1 a_i \cdot l_4}{2l_1} = 485\text{N}$ $P_t a_i = -\frac{m_2 a_i \cdot l_4}{2l_2} = -485\text{N}$



Conditions of Use

Model : LSH30HL2X2520S20BP-M6(2 pcs)

Basic dynamic load rating : $C=45.7 \text{ KN}$

Basic static load rating : $C_0=73.1 \text{ KN}$

Mass $m_1=700\text{kg}$ $m_2=450\text{kg}$

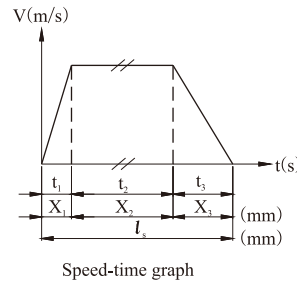
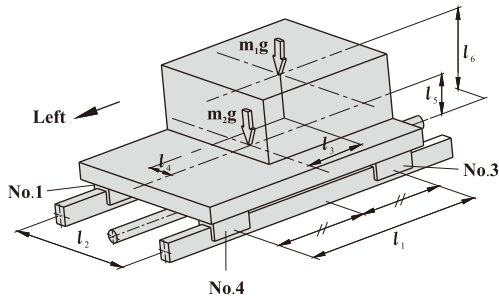
Speed $V=0.75\text{m/s}$

Time $t_1=0.05\text{s}$ $t_2=1.9\text{s}$ $t_3=0.15\text{s}$

Acceleration $a_1=15\text{m/s}^2$ $a_3=5\text{m/s}^2$

Travel Distance $l_5=1500\text{mm}$

Distance $l_1=650\text{mm}$ $l_2=450\text{mm}$ $l_3=135\text{mm}$ $l_4=60\text{mm}$ $l_5=175\text{mm}$ $l_6=400\text{mm}$



Load calculation of each block

Deceleration is toward left, the radial load P_r,la_3

$$P_1la_3 = P_1 + \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} + \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 3942\text{N}$$

$$P_2la_3 = P_2 - \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} - \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 2607\text{N}$$

$$P_3la_3 = P_3 - \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} - \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 1693\text{N}$$

$$P_4la_3 = P_4 + \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} + \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 3028\text{N}$$

Lateral load P_t,la_3

$$P_t,la_3 = \frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = 162\text{N}$$

$$P_t,la_3 = -\frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = -162\text{N}$$

$$P_t,la_3 = -\frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = -162\text{N}$$

$$P_t,la_3 = \frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = 162\text{N}$$

Acceleration is toward right, the radial load P_r,ra_1

$$P_1ra_1 = P_1 + \frac{m_1 \cdot a_1 \cdot l_6}{2l_1} + \frac{m_2 \cdot a_1 \cdot l_5}{2l_1} = 6702\text{N}$$

$$P_2ra_1 = P_2 - \frac{m_1 \cdot a_1 \cdot l_6}{2l_1} - \frac{m_2 \cdot a_1 \cdot l_5}{2l_1} = -152\text{N}$$

$$P_3ra_1 = P_3 - \frac{m_1 \cdot a_1 \cdot l_6}{2l_1} - \frac{m_2 \cdot a_1 \cdot l_5}{2l_1} = -1067\text{N}$$

$$P_4ra_1 = P_4 + \frac{m_1 \cdot a_1 \cdot l_6}{2l_1} + \frac{m_2 \cdot a_1 \cdot l_5}{2l_1} = 5787\text{N}$$

Lateral load P_t,ra_1

$$P_t,ra_1 = \frac{m_1 \cdot a_1 \cdot l_4}{2l_1} = 485\text{N}$$

$$P_t,ra_1 = -\frac{m_1 \cdot a_1 \cdot l_4}{2l_1} = -485\text{N}$$

$$P_t,ra_1 = -\frac{m_1 \cdot a_1 \cdot l_4}{2l_1} = -485\text{N}$$

$$P_t,ra_1 = \frac{m_1 \cdot a_1 \cdot l_4}{2l_1} = 485\text{N}$$

Deceleration is toward right, the radial load P_r,ra_3

$$P_1ra_3 = P_1 - \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} - \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 1183\text{N}$$

$$P_2ra_3 = P_2 + \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} + \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 5367\text{N}$$

$$P_3ra_3 = P_3 + \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} + \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 4452\text{N}$$

$$P_4ra_3 = P_4 - \frac{m_1 \cdot a_3 \cdot l_6}{2l_1} - \frac{m_2 \cdot a_3 \cdot l_5}{2l_1} = 268\text{N}$$

Lateral load P_t,ra_3

$$P_t,ra_3 = -\frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = -162\text{N}$$

$$P_t,ra_3 = \frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = 162\text{N}$$

$$P_t,ra_3 = \frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = 162\text{N}$$

$$P_t,ra_3 = -\frac{m_1 \cdot a_3 \cdot l_4}{2l_1} = -162\text{N}$$

Equivalent load calculation

At constant speed

$$P_{E1} = P_1 = 2562\text{N}$$

$$P_{E2} = P_2 = 3987\text{N}$$

$$P_{E3} = P_3 = 3073\text{N}$$

$$P_{E4} = P_4 = 1648\text{N}$$

When acceleration is toward left

$$P_{E1}la_i = |P_1la_i| + |P_t,la_i| = 2062\text{N}$$

$$P_{E2}la_i = |P_2la_i| + |P_t,la_i| = 8611\text{N}$$

$$P_{E3}la_i = |P_3la_i| + |P_t,la_i| = 7697\text{N}$$

$$P_{E4}la_i = |P_4la_i| + |P_t,la_i| = 2976\text{N}$$

Conditions of Use

Model : LSH30HL2X2520S20BP-M6(2 pcs)
 Basic dynamic load rating : $C=45.7 \text{ KN}$
 Basic static load rating : $C_0=73.1 \text{ KN}$
 Mass $m_1=700\text{kg}$ $m_2=450\text{kg}$
 Speed $V=0.75\text{m/s}$
 Time $t_1=0.05\text{s}$ $t_2=1.9\text{s}$ $t_3=0.15\text{s}$
 Acceleration $a_1=15\text{m/s}^2$ $a_3=5\text{m/s}^2$
 Travel Distance $l_s=1500\text{mm}$
 Distance $l_1=650\text{mm}$ $l_2=450\text{mm}$ $l_3=135\text{mm}$ $l_4=60\text{mm}$ $l_5=175\text{mm}$ $l_6=400\text{mm}$

Equivalent load calculation

When deceleration is toward left

$$P_{E1}l a_3 = |P_1l a_3| + |Pt_1l a_3| = 4104\text{N}$$

$$P_{E2}l a_3 = |P_2l a_3| + |Pt_2l a_3| = 2769\text{N}$$

$$P_{E3}l a_3 = |P_3l a_3| + |Pt_3l a_3| = 1854\text{N}$$

$$P_{E4}l a_3 = |P_4l a_3| + |Pt_4l a_3| = 3189\text{N}$$

When acceleration is toward right

$$P_{E1}r a_i = |P_1r a_i| + |Pt_1r a_i| = 7186\text{N}$$

$$P_{E2}r a_i = |P_2r a_i| + |Pt_2r a_i| = 637\text{N}$$

$$P_{E3}r a_i = |P_3r a_i| + |Pt_3r a_i| = 1551\text{N}$$

$$P_{E4}r a_i = |P_4r a_i| + |Pt_4r a_i| = 6272\text{N}$$

When deceleration is toward right

$$P_{E1}r a_s = |P_1r a_s| + |Pt_1r a_s| = 1344\text{N}$$

$$P_{E2}r a_s = |P_2r a_s| + |Pt_2r a_s| = 5529\text{N}$$

$$P_{E3}r a_s = |P_3r a_s| + |Pt_3r a_s| = 4614\text{N}$$

$$P_{E4}r a_s = |P_4r a_s| + |Pt_4r a_s| = 430\text{N}$$

Calculation of static safety factor

We now know that the maximum equivalent load occurs on No.2 slider. Therefore, one can calculate static safety factor based on it in following formula

$$f_s = \frac{C_0}{P_{E2}l a_3} = \frac{73.1 \times 10^3}{8611} = 8.49$$

Calculation of the average load of each slider P_{mn}

$$P_{m1} = \sqrt[3]{\frac{(P_{E1}l a_1^3 X_1 + P_{E2}l a_1^3 X_2 + P_{E1}l a_1^3 X_3 + P_{E1}r a_1^3 X_1 + P_{E1}^3 X_2 + P_{E1}r a_1^3 X_3)}{2l_s}}$$

$$= 2701\text{N}$$

$$P_{m2} = \sqrt[3]{\frac{(P_{E2}l a_1^3 X_1 + P_{E2}l a_1^3 X_2 + P_{E2}l a_1^3 X_3 + P_{E2}r a_1^3 X_1 + P_{E2}^3 X_2 + P_{E2}r a_1^3 X_3)}{2l_s}}$$

$$= 4077\text{N}$$

$$P_{m3} = \sqrt[3]{\frac{(P_{E3}l a_1^3 X_1 + P_{E3}l a_1^3 X_2 + P_{E3}l a_1^3 X_3 + P_{E3}r a_1^3 X_1 + P_{E3}^3 X_2 + P_{E3}r a_1^3 X_3)}{2l_s}}$$

$$= 3188\text{N}$$

$$P_{m4} = \sqrt[3]{\frac{(P_{E4}l a_1^3 X_1 + P_{E4}l a_1^3 X_2 + P_{E4}l a_1^3 X_3 + P_{E4}r a_1^3 X_1 + P_{E4}^3 X_2 + P_{E4}r a_1^3 X_3)}{2l_s}}$$

$$= 1873\text{N}$$

Calculation of rated life L_n

Assuming $f_w=1.5$ and according to rated life formula, the rated life can be calculated as follows:

$$L_1 = \left(\frac{C}{f_w P_{m1}}\right)^3 \times 50 = 71758\text{Km}$$

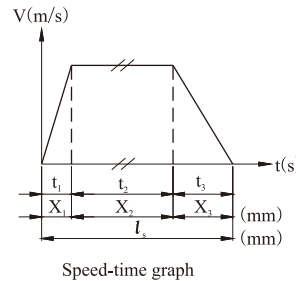
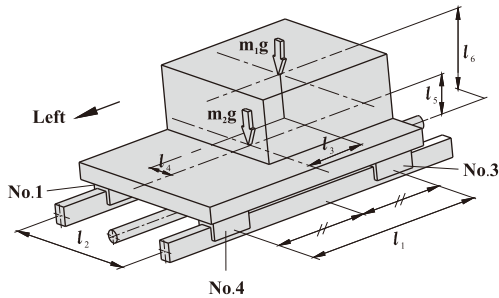
$$L_3 = \left(\frac{C}{f_w P_{m3}}\right)^3 \times 50 = 43641\text{Km}$$

$$L_2 = \left(\frac{C}{f_w P_{m2}}\right)^3 \times 50 = 20865\text{Km}$$

$$L_4 = \left(\frac{C}{f_w P_{m4}}\right)^3 \times 50 = 215195\text{Km}$$

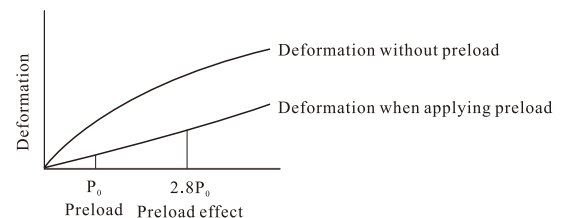
Calculation conclusion

Choose the minimum from four sliders to represent rated life, which is 20865 Km on No.2 slider



Preload and rigidity

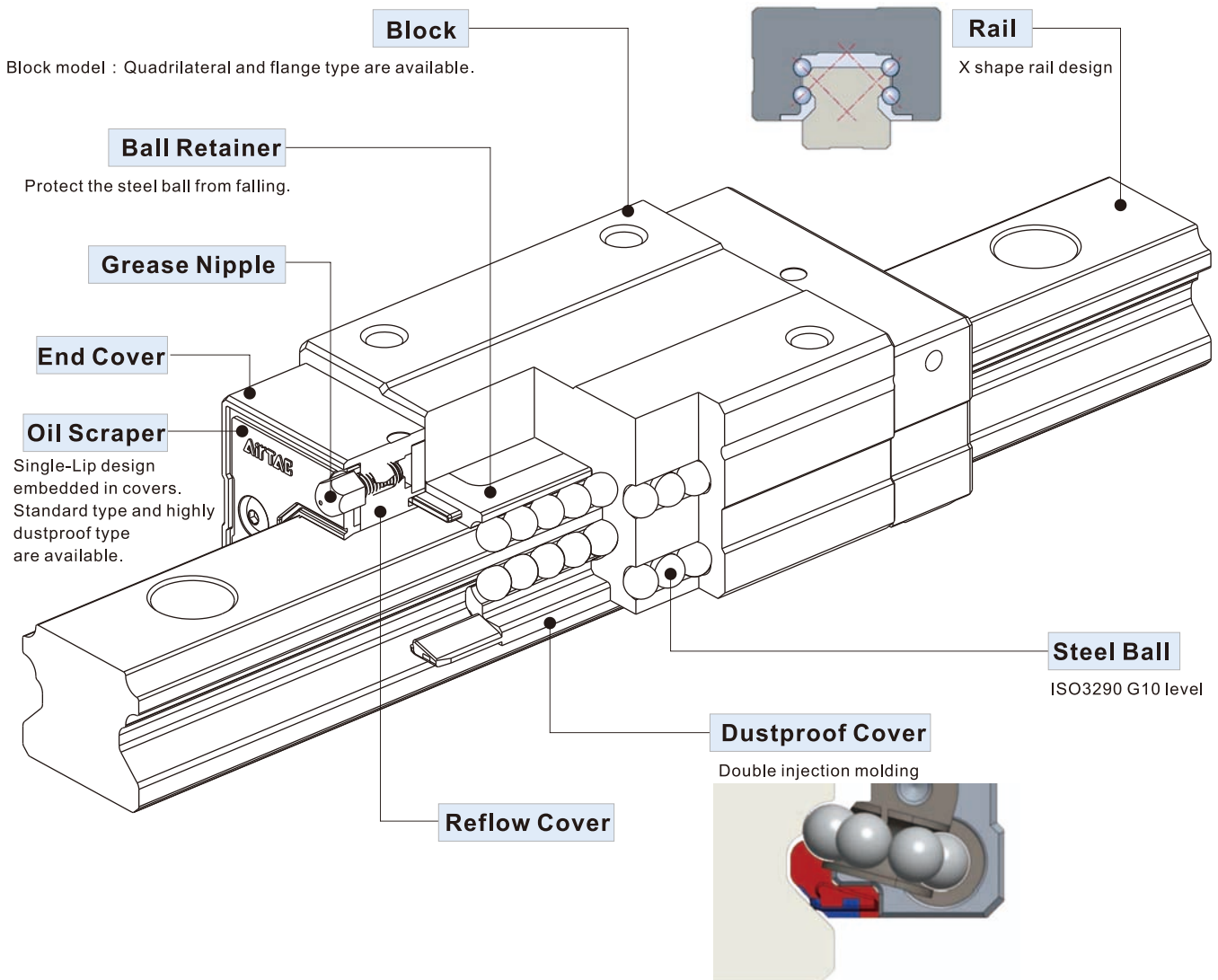
Preload spec can be applied to enhance rigidity. As the graph shows on the right, the effectiveness of preload can maintain until external load reaches 2.8 times of preload strength. In other words, rigidity increases 2.8 times. Preload is applied by choosing bigger diameter of rollers to increase interference between rollers and groove and raise initial loads. Therefore when calculating rated life, preload should be put into consideration.





LSH Series Standard Type Linear Guide

Product Introduction



Product Features

1. With self-adjustment ability

X-shaped (45° - 45°) of curved groove on cross section design makes it self-aligning. Even small misalignment exists on the mounting surface, this design can help absorb it and maintain high precision, smooth and stable linear motion.

2. High rigidity, equal load on four direction design

The 45-degree contact angle design of the four rows of steel balls and the raceway allow the steel balls to achieve the ideal two-point contact, and can withstand the action and reaction force from the radial and lateral direction. Meanwhile, pre-load can be applied to increase extra rigidity if necessary.

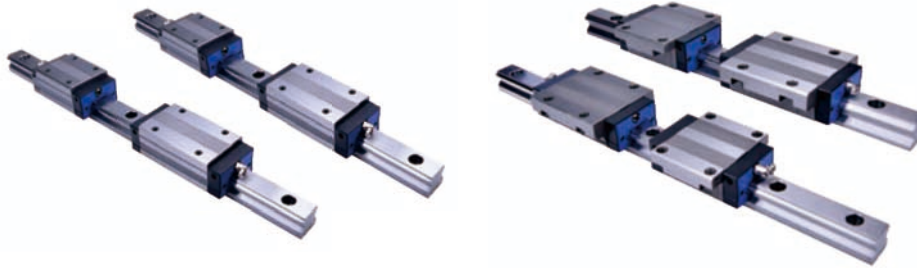
3. Interchangeable

Because of the strict control on manufacturing process, the dimensional accuracy is stable and within the set tolerance. Besides the ball retainer design can prevent steel balls from falling out. Therefore when assembling, blocks are interchangeable within the same spec and still maintain consistency of pre-load and accuracy.



Standard Type Linear Guide

LSH Series



Order Information(Combined)

LSH 15 H N 1 X220 S20 A H - AM6 - B - T - □

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

① Model Code	LSH:Standard Type Linear Guide					
② Rail Width	15: 15mm	20: 20mm	25: 23mm	30: 28mm	35: 34mm	45: 45mm
③ Block Style	H: Square type		F1: Flange type, Mounting from top F2: Flange type, Mounting from bottom F3: Flange type, Mounting from top or bottom			
④ Block type	N: Standard L: Long [w/o 15 series]					
⑤ Number of Block	1: One 2: Two [Note: Amount of block on a single set of linear guide]					
⑥ Length of Rail	220:220mm [Defined by customer]					
⑦ Position of first mounting hole	S □ : Distance from end of rail to the center of first mounting hole (It is recommended to be greater than minimum margin) [Standard margin pitch is 20 or 22.5mm]					
⑧ Preload	A: Standard clearance		B: Light Preload		C: Medium Preload	
⑨ Accuracy	N: Normal		H: High		P: Precision	
⑩ Nipple /adapter type	M4: M4 Nipple		M6: M6 Nipple		P01: PT1/8 Nipple	
	AM6: M4 to M6		A01: M6 to PT1/8		A01: PT1/8 to PT1/8	
	LM6: M4 to M6		L01: M6 to PT1/8		L01: PT1/8 to PT1/8	
			SM6: M6 Nipple		SP01: PT1/8 Nipple	
⑪ Packing type	Blank: the block and rail are assembled B: block and rail are put separately					
⑫ Rail type	Blank: Top-mount T: Bottom-mount					
⑬ Dust proof	Blank: Standard DD: Double oil scrapers ZZ: Oil scraper + metal scraper [Note 1]					

LSH15/20/25/30/35 margin pitch is 20mm,
LSH45 margin pitch is 22.5mm,
Customer can define a non-standard margin pitch.

[Note 1] Refer to P25 for highly dust proof type.

Standard Type Linear Guide

LSH Series

Butt-jointed Order Information

LSH 15 H N 1X3920 T 3900T3920A H-AM6-B - T - □

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯

Butt-jointed end margin: 1/2P ,
Position of the first and last
hole is defined by customer.

① Model Code	LSH:Standard Type Linear Guide		
② Rail Width	15: 15mm 20: 20mm 25: 23mm 30: 28mm 35: 34mm 45: 45mm		
③ Block Style	H: Square type F1: Flange type, Mounting from top F2: Flange type, Mounting from bottom F3: Flange type, Mounting from top or bottom		
④ Block type	N: Standard L: Long [w/o 15 series]		
⑤ Number of Block	1: One 2: Two [Note: Amount of block on a single set of linear guide]		
⑥ Length of first Rail	3920:3920mm[Defined by customer]		
⑦ Butt-jointed mark	T: Rail Butt-jointed mark (Butt-jointed end margin:1/2P) [P is the standard hole distance]		
⑧ Length of second Rail	3900:3900mm[Defined by customer]		
⑨ Butt-jointed mark	Blank: two rails joint T: Rail Butt-jointed mark (Butt-jointed end margin:1/2P) [P is the standard hole distance]		
⑩ Length of third Rail	Blank: two rails joint 3920:3920mm.....[Defined by customer]		
⑪ Preload	A: Standard clearance B: Light Preload C: Medium Preload		
⑫ Accuracy	N : Normal H : High		
⑬ Nipple /adapter type	M4: M4 Nipple	M6: M6 Nipple	P01: PT1/8 Nipple
	I type	A01: M6 to PT1/8 I type	A01: PT1/8 to PT1/8 I type
	AM6: M4 to M6	AM8: M6 to M8	AM8: PT1/8 to M8
	L type	L01: M6 to PT1/8 L type	L01: PT1/8 to PT1/8 L type
	Lm6: M4 to M6	LM8: M6 to M8	LM8: PT1/8 to M8
		SM6: M6 Nipple	SP01: PT1/8 Nipple
⑭ Packing type	Blank: the block and rail are assembled B: block and rail are put separately		
⑮ Rail type	Blank: Top-mount T: Bottom-mount		
⑯ Dust proof	Blank: Standard DD: Double oil scrapers ZZ: Oil scraper + metal scraper [Note 1]		

[Note 1] Refer to P25 for highly dust proof type.

Add: Number of joints cannot be more than 2 times(three rails at most).

For LSH15/20/25, maximum length of jointed rail is 11800mm.

For LSH30/35, it's 11880. For LSH45, it's 11805.

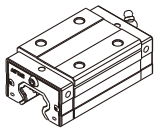
Customization is needed for joint times more than standard.

LSH Series

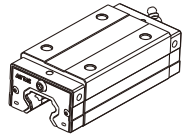
1. Block Order Information

LSH 15 BK- H N - H - D-AM6-□

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨



N: Standard



L: Long

① Model Code	LSH:Standard Type Linear Guide					
② Rail Width	15: 15mm	20: 20mm	25: 23mm	30: 28mm	35: 34mm	45: 45mm
③ Block Code	BK: Block					
④ Block Style	H: Square type F1: Flange type, Mounting from top F2: Flange type, Mounting from bottom F3: Flange type, Mounting from top or bottom					
⑤ Block type	N: Standard L: Long [w/o 15 series]					
⑥ Accuracy	N: Normal H: High					
⑦ Group code	SA	SB	SC	B	C	E [Note1]
⑧ Nipple /adapter type	15	M4: M4 Nipple	20 25 30 35	M6: M6 Nipple	45	P01: PT1/8 Nipple
		Am6: M4 to M6		A01: M6 to PT1/8		A01: PT1/8 to PT1/8
	L type	L01: M6 to PT1/8	L type	L01: PT1/8 to PT1/8	L type	
		LM6: M4 to M6	LM8: M6 to M8	LM8: PT1/8 to M8		
			SM6: M6 Nipple		SP01: PT1/8 Nipple	

⑨ Dust proof Blank: Standard DD: Double oil scrapers ZZ: Oil scraper + metal scraper [Note 2]

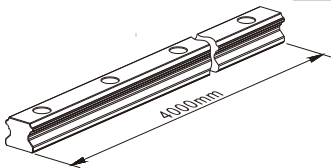
[Note1]: When selecting rails and bearings, the different pairing codes can change the units preload. details see "preload pairing chart".

[Note 2] Refer to P25 for highly dust proof type.

2. Rail(4m) Order Information

LSH 15 RL X 4000-H - D - T

① ② ③ ④ ⑤ ⑥ ⑦



① Model Code	LSH:Standard Type Linear Guide					
② Rail Width	15: 15mm	20: 20mm	25: 23mm	30: 28mm	35: 34mm	45: 45mm
③ Rail Code	RL: Rail					
④ Rail Length	4000 : 4000mm					
⑤ Accuracy	N: Normal H: High					
⑥ Group code	E [Note]					
⑦ Rail type	Blank: Top-mount T: Bottom-mount					

Note: ● Standard length of LSH rail is four meters.

● For LSH15/20/25, both margin pitch of rail are 20mm.

● For LSH30/35, one side of margin pitch is 20mm, the other side is 60mm.

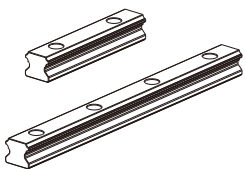
● For LSH45, one side of margin pitch is 22.5mm, the other side is 92.5mm.

● When selecting rails and bearings, the different pairing codes can change the units preload. details see "preload pairing chart".

3. Rail Order Information

LSH 15 RL X 220-S20 -H - D - T

① ② ③ ④ ⑤ ⑥ ⑦ ⑧



LSH15/20/25/30/35 margin pitch is 20mm,
LSH45 margin pitch is 22.5mm,
Customer can define a non-standard margin pitch.

① Model Code	LSH:Standard Type Linear Guide					
② Rail Width	15: 15mm	20: 20mm	25: 23mm	30: 28mm	35: 34mm	45: 45mm
③ Rail Code	RL: Rail					
④ Rail Length	220:220mm[Defined by the customer]					
⑤ Position of first mounting hole	S□ : Distance from end of rail to the center of first mounting hole (It is recommended to be greater than minimum margin) [Standard margin pitch is 20mm]					
⑥ Accuracy	N: Normal H: High					
⑦ Group code	E [Note]					
⑧ Rail type	Blank: Top-mount T: Bottom-mount					

Note: When selecting rails and bearings, the different pairing codes can change the units preload. details see "preload pairing chart".

LSH Series

4. Rail/Block preload pairing chart

When customer orders rail/block, please choose the pairing code of rail/block in accordance with the needed preload of linear guide(combined). Details please refer to the "preload pairing chart".

Model	Rail pairing code	Block pairing code	Preload grade	Model	Rail pairing code	Block pairing code	Preload grade	Model	Rail pairing code	Block pairing code	Preload grade
LSH15	E	E	Standard clearance	LSH30	E	E	Standard clearance	LSH35 LSH45	E	E	Standard clearance
LSH20		C	Light preload			C	Light preload			B	Light preload
LSH25		SA	Medium preload			SB	Medium preload			SC	Medium preload

Accessory Order Code

L - P- AM6 - □

① ② ③ ④

①Accessory Code	L: Linear Guide Accessory						
②Nipple/adaptor Code	P: Nipple/adaptor						
③Nipple/adaptor type	15	M4: M4 Nipple	Nipple	M6: M6 Nipple	Nipple	P01: PT1/8 Nipple	Nipple
		AM6: M4 to M6	I type	SM6: M6 Nipple	I type	SP01: PT1/8 Nipple	I type
		LM6: M4 to M6	L type	A01: M6 to PT1/8	I type	P01A01: PT1/8 to PT1/8	I type
				AM8: M6 to M8	L type	P01AM8: PT1/8 to M8	L type
45	L01: M6 to PT1/8	L type	P01L01: PT1/8 to PT1/8	L type			
	LM8: M6 to M8		P01LM8: PT1/8 to M8				
④Block type	Blank: Standard ZZ: High dustproof block(both DD and ZZ type)						

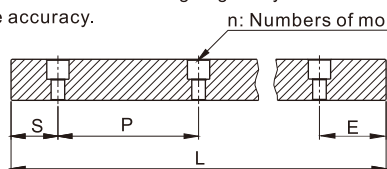
L - P- LM8-P2

① ② ③

①Accessory Code	L: Linear Guide Accessory	
②Nipple/adaptor Code	P: Nipple/adaptor	
③Adapter type	20	LM8-P2: Adapter assembly
	25	
	30	
	35	
	45	
		<p>For M8 adapter female thread</p>

Rail Specification

The edge pitch of first mounting hole (S) and last mounting hole (E) should not be greater than 1/2P. Overlong edge may induce unstable installation and affect the accuracy.



$$L = (n-1) \times P + S + E$$

L: Total length of rail(mm)

n: Numbers of mounting holes on rail

P: Distance between bolt holes(mm)

S: Edge of first mounting hole(mm)

E: Edge of last mounting hole(mm)

Model	LSH15	LSH20	LSH25	LSH30	LSH35	LSH45
Pitch(P)	60	60	60	80	80	105
Standard Edge Pitch(S)	20	20	20	20	20	22.5
Min. Edge Pitch(S/E min)	5	6	7	8	8	11
Max. Edge Pitch(S/E max)	55	54	53	72	72	94
Maximum length of rail for standard edge	4000	4000	4000	3960	3960	3930
Maximum length(Lmax)	4000	4000	4000	4000	4000	4000

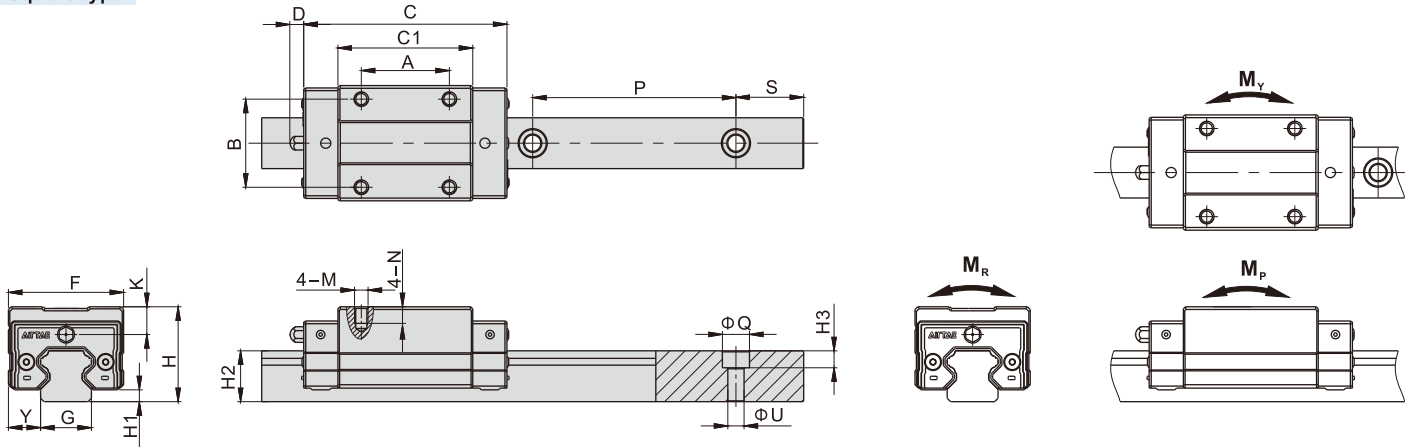
Note:

- Joint rail must be chosen if length of rail exceeds the maximum.
- When deciding edge pitch, it should be within the range of above table. There would be risk of broken hole if pitch is out of range.
- Maximum length of rail for standard' means the maximum length of rail can be chosen when both sides of edge pitches are standard.

LSH Series

Specifications and Dimensions

Square type

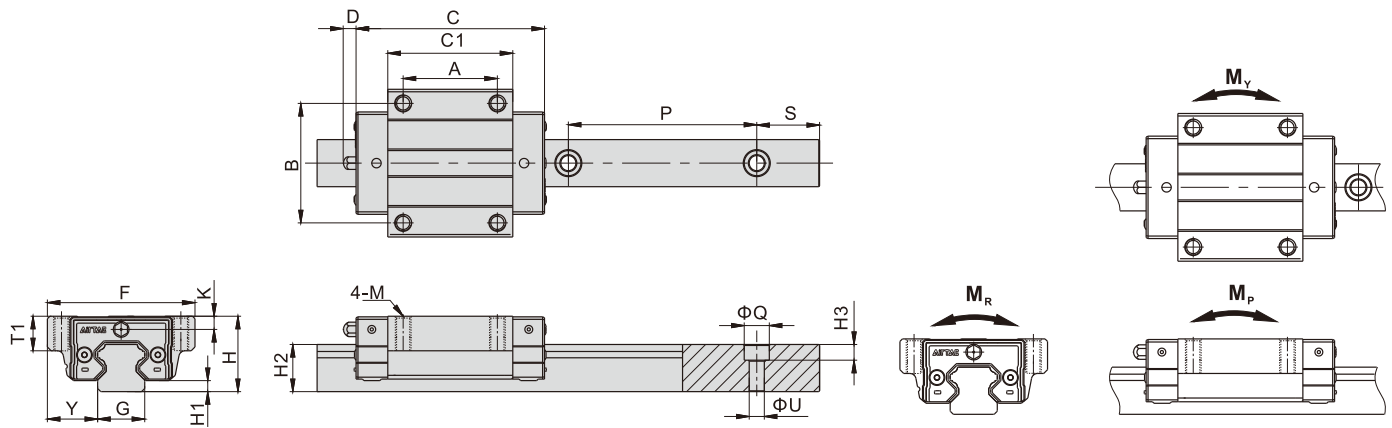


Model/Item	External Dimension (mm)							Block Dimension (mm)							Rail Dimension (mm)						
	H	H1	F	Y	C			C1	A	B	K	D	M	N	G	H2	P	S	ΦQ	ΦU	H3
					Standard (Blank)	Double oil scrapers(DD)	Oil scraper+Metal scraper(ZZ)														
LSH15HN	28	3.5	34	9.5	60	67	64.5	40	26	26	8.3	6	M4X0.7	5	15	15	60	20	8	4.8	5.3
LSH20HN	30	4.3	44	12	76.5	84.5	81	52	36	32	6.5	12.5	M5X0.8	6	20	17.5	60	20	9.5	5.8	8.5
LSH20HL	30	4.3	44	12	90.5	98.5	95	66	50	32	6.5	12.5	M5X0.8	6	20	17.5	60	20	9.5	5.8	8.5
LSH25HN	40	6.5	48	12.5	83.5	91.5	88	58.5	35	35	10.9	12.5	M6X1.0	8	23	22	60	20	11.2	7	9
LSH25HL	40	6.5	48	12.5	105	113	109.5	80	50	35	10.9	12.5	M6X1.0	8	23	22	60	20	11.2	7	9
LSH30HN	45	6.5	60	16	95.5	103.5	100.5	70.5	40	40	11	13	M8X1.25	10	28	26	80	20	14.2	9	12
LSH30HL	45	6.5	60	16	118	126	123	93	60	40	11	13	M8X1.25	10	28	26	80	20	14.2	9	12
LSH35HN	55	7	70	18	109	118	114	80	50	50	16.2	12.5	M8X1.25	12	34	29	80	20	14.2	9	12
LSH35HL	55	7	70	18	134.5	143.5	139.5	105.5	72	50	16.2	12.5	M8X1.25	12	34	29	80	20	14.2	9	12
LSH45HN	70	10	86	20.5	132	141	137	98	60	60	20	16	M10X1.5	17	45	38	105	22.5	20	14	17
LSH45HL	70	10	86	20.5	164	173	169	130	80	60	20	16	M10X1.5	17	45	38	105	22.5	20	14	17

Model/Item	Mounting Screw	Dynamic Load Rating(kN)	Static Load Rating(kN)	Static Rated Moment (kN.m)			Weight	
				Cr	Mp	Mv	Block(kg)	Rail(kg/m)
LSH15HN	M4	11.3	17.9	0.12	0.12	0.12	0.2	1.43
LSH20HN	M5	18.6	28.6	0.27	0.25	0.25	0.33	2.23
LSH20HL	M5	22.2	37.6	0.35	0.34	0.34	0.41	2.23
LSH25HN	M6	26.9	39.4	0.44	0.38	0.38	0.53	3.32
LSH25HL	M6	32.9	53.0	0.58	0.57	0.57	0.7	3.32
LSH30HN	M8	37.4	55.0	0.66	0.67	0.67	0.91	4.5
LSH30HL	M8	45.7	73.1	0.88	0.91	0.91	1.17	4.5
LSH35HN	M8	50.8	72.3	1.05	0.92	0.92	1.26	6.37
LSH35HL	M8	61.9	96.1	1.52	1.45	1.45	1.68	6.37
LSH45HN	M12	80.7	110.3	1.95	1.62	1.62	2.72	10.7
LSH45HL	M12	98.5	146.9	2.59	2.92	2.92	3.60	10.7

LSH Series

Flange type, Top-Mount



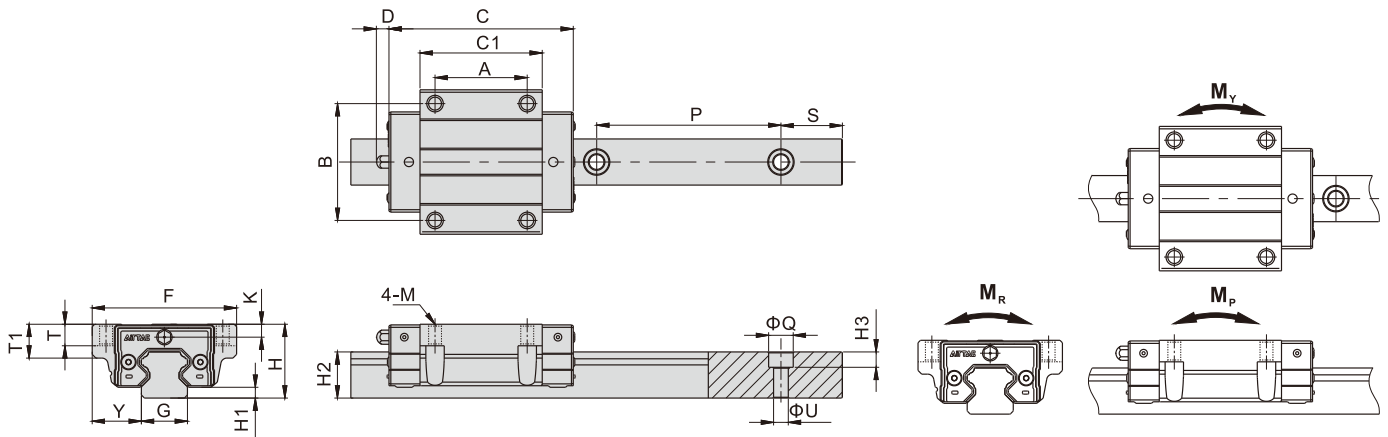
Model\Item	External Dimension (mm)							Block Dimension (mm)							Rail Dimension (mm)						
	H	H1	F	Y	C			C1	A	B	K	D	M	T1	G	H2	P	S	φQ	φU	H3
					Standard (Blank)	Double oil scrapers(DD)	Oil scraper+Metal scraper(ZZ)														
LSH15F1N	24	3.5	47	16	60	67	64.5	40	30	38	4.3	6	M5X0.8	11	15	15	60	20	8	4.8	5.3
LSH20F1N	30	4.3	63	21.5	76.5	84.5	81	52	40	53	6.5	12.5	M6X1.0	10	20	17.5	60	20	9.5	5.8	8.5
LSH20F1L	30	4.3	63	21.5	90.5	98.5	95	66	40	53	6.5	12.5	M6X1.0	10	20	17.5	60	20	9.5	5.8	8.5
LSH25F1N	36	6.5	70	23.5	83.5	91.5	88	58.5	45	57	6.9	12.5	M8X1.25	16	23	22	60	20	11.2	7	9
LSH25F1L	36	6.5	70	23.5	105	113	109.5	80	45	57	6.9	12.5	M8X1.25	16	23	22	60	20	11.2	7	9
LSH30F1N	42	6.5	90	31	95.5	103.5	100.5	70.5	52	72	8	13	M10X1.5	18	28	26	80	20	14.2	9	12
LSH30F1L	42	6.5	90	31	118	126	123	93	52	72	8	13	M10X1.5	18	28	26	80	20	14.2	9	12
LSH35F1N	48	7	100	33	109	118	114	80	62	82	9.2	12.5	M10X1.5	21	34	29	80	20	14.2	9	12
LSH35F1L	48	7	100	33	134.5	143.5	139.5	105.5	62	82	9.2	12.5	M10X1.5	21	34	29	80	20	14.2	9	12
LSH45F1N	60	10	120	37.5	132	141	137	98	80	100	10	16	M12X1.75	22	45	38	105	22.5	20	14	17
LSH45F1L	60	10	120	37.5	164	173	169	130	80	100	10	16	M12X1.75	22	45	38	105	22.5	20	14	17

Model\Item	Mounting Screw	Dynamic Load Rating(kN)	Static Load Rating(kN)	Static Rated Moment (kN.m)			Weight	
		C	C ₀	M _R	M _P	M _V	Block(kg)	Rail(kg/m)
LSH15F1N	M4	11.3	17.9	0.12	0.12	0.12	0.2	1.43
LSH20F1N	M5	18.6	28.6	0.27	0.25	0.25	0.40	2.23
LSH20F1L	M5	22.2	37.6	0.35	0.34	0.34	0.8	2.23
LSH25F1N	M6	26.9	39.4	0.44	0.38	0.38	0.59	3.32
LSH25F1L	M6	32.9	53.0	0.58	0.57	0.57	0.85	3.32
LSH30F1N	M8	37.4	55.0	0.66	0.67	0.67	1.09	4.5
LSH30F1L	M8	45.7	73.1	0.88	0.91	0.91	1.38	4.5
LSH35F1N	M8	50.8	72.3	1.05	0.92	0.92	1.32	6.37
LSH35F1L	M8	61.9	96.1	1.52	1.45	1.45	1.8	6.37
LSH45F1N	M12	80.7	110.3	1.95	1.62	1.62	2.77	10.7
LSH45F1L	M12	98.5	146.9	2.59	2.92	2.92	3.67	10.7

LSH Series

Flange type, Bottom-Mount

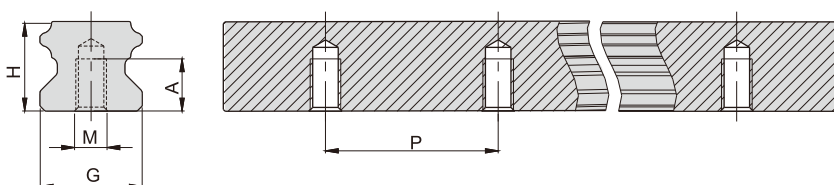
Flange type, Top or Bottom-Mount



Model/Item	External Dimension(mm)							Block Dimension(mm)							Rail Dimension(mm)								
	H	H1	F	Y	C			C1	A	B	K	D	M		T	T1	G	H2	P	S	ΦQ	ΦU	H3
					Standard (Blank)	Double oil scrapers(DD)	Oil scraper+Metal scraper(ZZ)						Bottom-Mount	Top or Bottom-Mount									
LSH15F2(F3)N	24	3.5	47	16	60	67	64.5	40	30	38	4.3	6	Φ4.5	M5X0.8	7	11	15	15	60	20	8	4.8	5.3
LSH20F2(F3)N	30	4.3	63	21.5	76.5	84.5	81	52	40	53	6.5	12.5	Φ5.7	M6X1.0	9.5	10	20	17.5	60	20	9.5	5.8	8.5
LSH20F2(F3)L	30	4.3	63	21.5	90.5	98.5	95	66	40	53	6.5	12.5	Φ5.7	M6X1.0	9.5	10	20	17.5	60	20	9.5	5.8	8.5
LSH25F2(F3)N	36	6.5	70	23.5	83.5	91.5	88	58.5	45	57	6.9	12.5	Φ6.8	M8X1.25	10	16	23	22	60	20	11.2	7	9
LSH25F2(F3)L	36	6.5	70	23.5	105	113	109.5	80	45	57	6.9	12.5	Φ6.8	M8X1.25	10	16	23	22	60	20	11.2	7	9
LSH30F2(F3)N	42	6.5	90	31	95.5	103.5	100.5	70.5	52	72	8	13	Φ9	M10X1.5	10	18	28	26	80	20	14.2	9	12
LSH30F2(F3)L	42	6.5	90	31	118	126	123	93	52	72	8	13	Φ9	M10X1.5	10	18	28	26	80	20	14.2	9	12
LSH35F2(F3)N	48	7	100	33	109	118	114	80	62	82	9.2	12.5	Φ9	M10X1.5	13	21	34	29	80	20	14.2	9	12
LSH35F2(F3)L	48	7	100	33	134.5	143.5	139.5	105.5	62	82	9.2	12.5	Φ9	M10X1.5	13	21	34	29	80	20	14.2	9	12
LSH45F2(F3)N	60	10	120	37.5	132	141	137	98	80	100	10	16	Φ11	M12X1.75	15	22	45	38	105	22.5	20	14	17
LSH45F2(F3)L	60	10	120	37.5	164	173	169	130	80	100	10	16	Φ11	M12X1.75	15	22	45	38	105	22.5	20	14	17

Model/Item	Mounting Screw	Dynamic Load Rating(kN)	Static Load Rating(kN)	Static Rated Moment (kN.m)			Weight		
				CR	MR	MP	MV	Block(kg)	Rail(kg/m)
LSH15F2(F3)N	M4	11.3	17.9		0.12	0.12	0.12	0.2	1.43
LSH20F2(F3)N	M5	18.6	28.6		0.27	0.25	0.25	0.40	2.23
LSH20F2(F3)L	M5	22.2	37.6		0.35	0.34	0.34	0.8	2.23
LSH25F2(F3)N	M6	26.9	39.4		0.44	0.38	0.38	0.59	3.32
LSH25F2(F3)L	M6	32.9	53.0		0.58	0.57	0.57	0.85	3.32
LSH30F2(F3)N	M8	37.4	55.0		0.66	0.67	0.67	1.09	4.5
LSH30F2(F3)L	M8	45.7	73.1		0.88	0.91	0.91	1.38	4.5
LSH35F2(F3)N	M8	50.8	72.3		1.05	0.92	0.92	1.32	6.37
LSH35F2(F3)L	M8	61.9	96.1		1.52	1.45	1.45	1.8	6.37
LSH45F2(F3)N	M12	80.7	110.3		1.95	1.62	1.62	2.77	10.7
LSH45F2(F3)L	M12	98.5	146.9		2.59	2.92	2.92	3.67	10.7

Dimension of bottom-mount type rail



Model/Item	G	H	M	A	P
LSH15T	15	15	M5X0.8	8	60
LSH20T	20	17.5	M6X1.0	10	60
LSH25T	23	22	M6X1.0	12	60
LSH30T	28	26	M8X1.25	15	80
LSH35T	34	29	M8X1.25	17	80
LSH45T	45	38	M12X1.75	24	105

LSH Series

Accuracy

LSH standard type linear guide comes with 3 accuracy levels.

Accuracy Model	Accuracy Standards (mm)								
	N: Normal			H: High			P: Precision		
	15/20	25/30/35	45	15/20	25/30/35	45	15/20	25/30/35	45
Tolerance of height H	±0.1			±0.03	±0.04	±0.05	±0.015	±0.02	±0.025
Variation of height ΔH	0.02	0.025	0.03	0.01	0.015		0.006	0.007	
Tolerance of width Y	±0.1			±0.03	±0.04	±0.05	±0.015	±0.02	±0.025
Variation of width ΔY	0.02	0.03		0.01	0.015	0.02	0.006	0.007	0.01
Parallelism of C-surface relative to A-surface	Parallelism of raceway (Refer to Table 1)								
Parallelism of D-surface relative to B-surface	Parallelism of raceway (Refer to Table 1)								

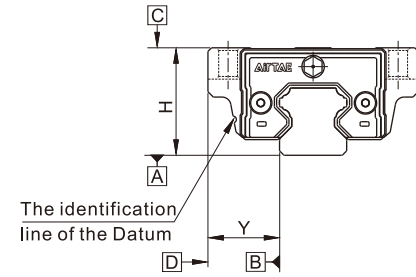


Table 1 : Parallelism of the raceway

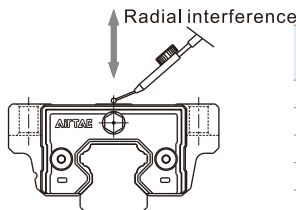
Rail Length(mm) Accuracy		100 under	100~200	200~300	300~500	500~700	700~900	900~1100	1100~1500	1500~1900	1900~2500	2500~3100	3100~3600	3600~4000
		Parallelism of the raceway(μm)	N	12	14	15	17	20	22	24	26	28	31	33
	H	7	9	10	12	13	15	16	18	20	22	25	27	28
	P	3	4	5	6	7	8	9	11	13	15	18	20	21

Preload Level

1. Preload interference

The LSH standard type Linear Guide has three preload categories: A, B and C.

Choosing suitable preload level will enhance rigidity, precision and torsion resistant performance of the linear guide.



Model	Radial interference(μm)		
	Standard clearance(A)	Light Preload(B)	Medium Preload(C)
LSH15	-4~+2	-12~-4	-22~-14
LSH20	-5~+2	-13~-5	-23~-15
LSH25	-6~+2	-14~-6	-24~-16
LSH30	-7~+2	-16~-7	-29~-20
LSH35	-8~+2	-21~-11	-34~-24
LSH45	-9~+2	-25~-16	-38~-27

2. Common Application

Refer to following table for suitable application of different preload grade:

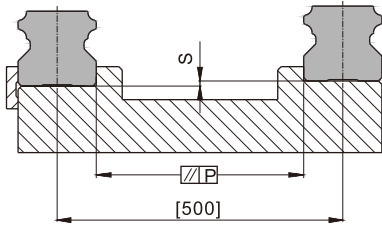
Preload grade	Requirement	Common Application
Standard clearance(A)	One axial movement, small vibration and impact, accuracy requirement is low	Conveyor Machine, Semiconductor Equipment, Stage Equipment, Press Machine, Welding Machine and other light movement equipments
Light Preload(B)	Equipment that requires light-load and high-precision.	Z-axis movement for industrial use, NC lathe, EDM, Precision XY platform, Vertical machine center, measurement instrument, material feeder or industrial robot
Medium Preload(C)	Equipment that requires high rigidity, large vibration and shock.	Machining centers, NC lathes, grinders, vertical or horizontal milling machines, boring machines, tool guides, heavy cutting machines.

LSH Series

Installation Illustration

1. Allowable tolerance of mounting surface

LSH series is an arc-shape, two-point contact design of linear guide. Its self-centering feature allows some tolerance on mounting surface without affecting the smoothness of linear motion. The allowable tolerance is indicated in following table:

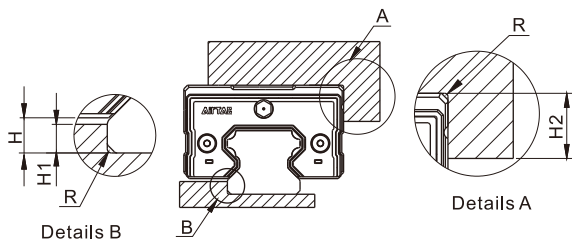


Model	Allowable tolerance of parallelism P(μm)			Allowable tolerance of top and bottom S(μm)		
	Standard clearance(A)	Light Preload(B)	Medium Preload(C)	Standard clearance(A)	Light Preload(B)	Medium Preload(C)
LSH15	25	18	13	130	85	35
LSH20	25	20	18	130	85	50
LSH25	30	22	20	130	85	70
LSH30	40	30	27	170	110	90
LSH35	50	35	30	210	150	120
LSH45	60	40	35	250	170	140

Note: The value in the table is the allowable value when the distance between the two linear guides is 500mm, and the allowable value is proportional to the distance between the two linear guides.

2. Height and Chamfer of Reference Edge

In order to ensure accurate installation of LSH Linear Guide, the contact space should not exceed the given figures in following table.



Model	Unit : mm			
	H	H1	H2	R(Max)
LSH15	3.5	3	4	0.5
LSH20	4.3	3.5	5	0.5
LSH25	6.5	5	5	1
LSH30	6.5	5	5	1
LSH35	7	6	6	1
LSH45	10	8	8	1

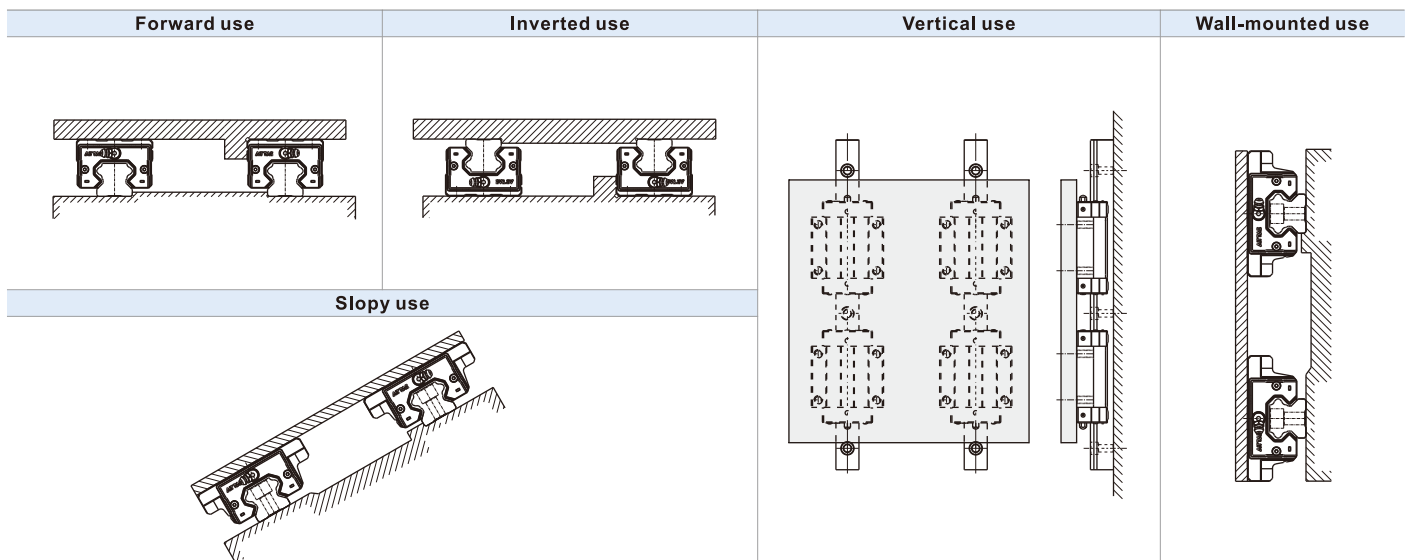
3. Screw Tighten Torque

When installing linear guide, whether the screws are well tighten and surface is well contacted will affect accuracy significantly. Please refer to following table for tightening force to ensure a perfect installation.

Model	Screw size	Tighten Torque(N.cm)		
		Iron	Casting	Aluminum alloy
LSH15	M4	412	274	206
LSH20	M5	882	588	441
LSH25	M6	1370	921	686
LSH30	M8	3040	2010	1470
LSH35	M8	3040	2010	1470
LSH45	M12	11800	7840	5880

4. Installation and Application

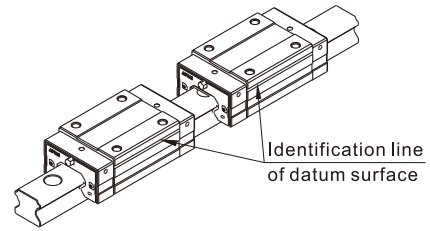
Linear guide installation methods can be divided into the followings. For installations other than forward installation, the lubricant may fail.



LSH Series

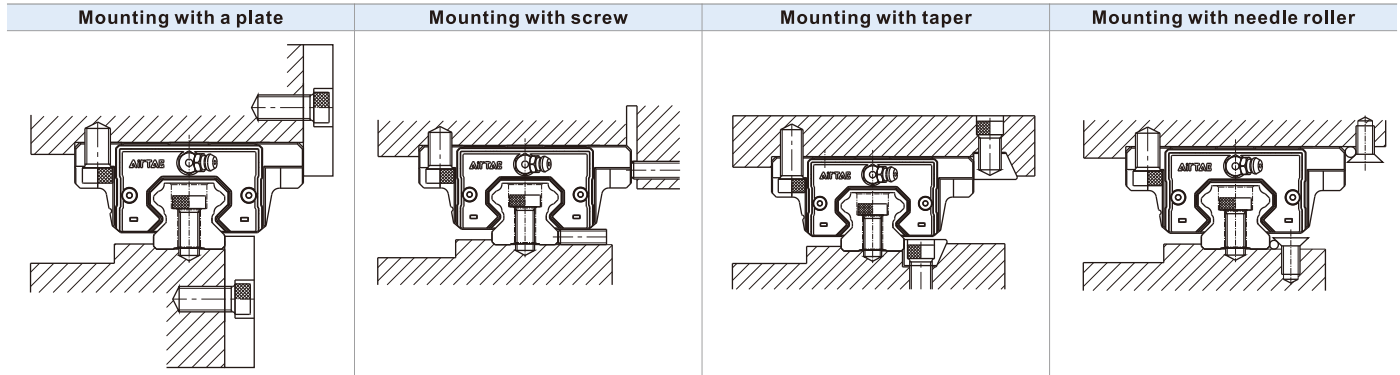
5. Datum plane

- Datum plane for installation must be ground or finely milled to ensure accuracy.
- Both sides of Rail can be used as the datum plane.
- For multi-blocks on a rail, identification line on blocks should be put on the same side to ensure moving accuracy.



6. Fixation Method

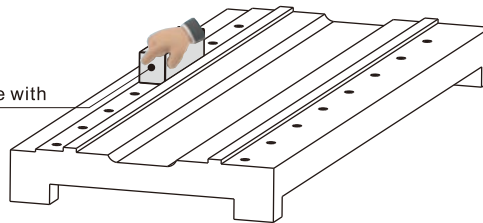
Rails and blocks are possible to be displaced while the machine is subjected to vibrations and impacts thus to affect the accuracy. In order to avoid those difficulties and achieve high running accuracy, the following four methods are recommended for fixing.



7. Rail Installation

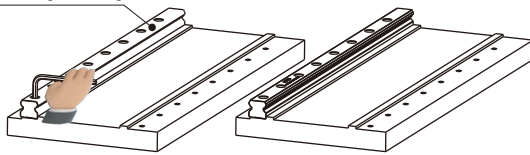
A. Before installing the rail, remove all dirt from the mounting surface with oil stone, and then wipe with a clean cloth.

Remove all dirt from the mounting surface with oil stone, and then wipe with a clean cloth

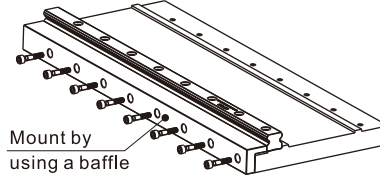


B. Place the rail gently on the bed firstly, then put the bolts into the mounting holes and pre-tighten them, place the rail ① into close contact with the datum plane of the bed by using the baffle, tighten the bolts with appropriate torque to fix the rail. Refer to "3. Screw tighten torque" for recommended torque value.

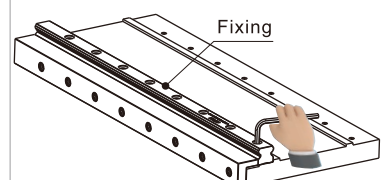
Pre-tightening



Tighten the screws after the side of the rail ① is correctly in line with the datum plane



Mount by using a baffle
Place the rail ① into close contact with the datum plane (Rail can be locked by various accessories: needle roller+taper or pressing block)



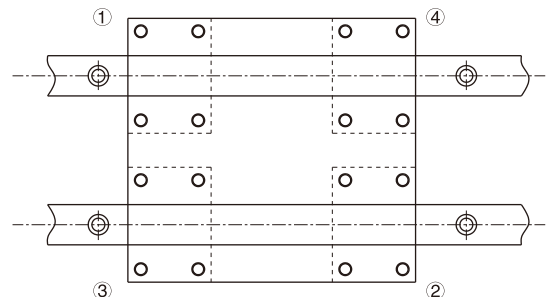
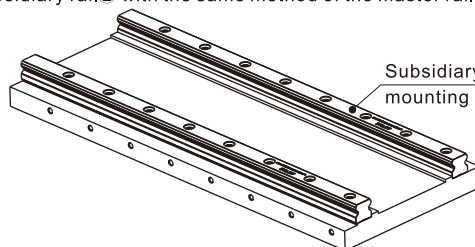
Tighten the screws with appropriate torque to fix the rail ①

8. Block Installation

- Temporarily fix the table on the block by using the mounting bolts.
- Push the block datum plane against the side datum plane of the table and position the block by tightening the set screws.
- Tighten the mounting bolts in 1 to 4 sequences to fix the table on the block.

9. Subsidiary Rail Installation

Under the condition that the subsidiary rail has a reference datum plane, remove all dirt from the mounting surface with oil stone, and then wipe with a clean cloth, mount the subsidiary rail ② with the same method of the master rail ①.



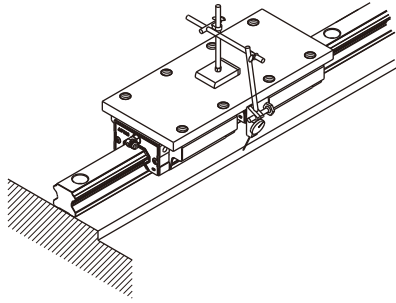
Under the condition that the subsidiary rail ② has a reference datum plane, remove all dirt from the mounting surface with oil stone, and then wipe with a clean cloth,

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10. Rail Installation without Side Datum Surface

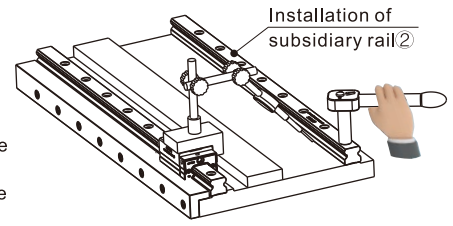
Using a provisional datum plane

Use the datum plane provided on the bed for straight alignment of the rail from one end to the other, attention must be paid to fix two blocks in close contact on the measuring plate.



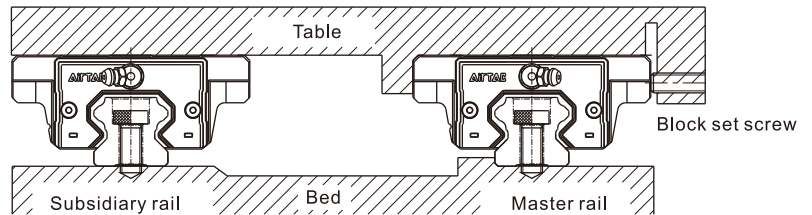
Using a straight-edge

Put the straight-edge between the two rails and use a dial gauge to adjust straight-edge in parallel with the side datum plane of the master rail. Use the dial gauge to ensure the straightness of the subsidiary rail by using the straight-edge as reference, then tighten the mounting bolts in proper sequence when the subsidiary rail is parallel to the master rail.



11. Rail Installation without Set Screws

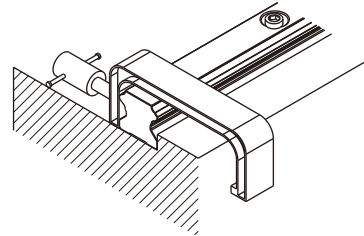
To ensure parallelism between the subsidiary rail and the master rail in the condition without set screws, the following installation methods are recommended, and the installation of the block is the same as mentioned previously.



Installation of the master rail

Using a vice

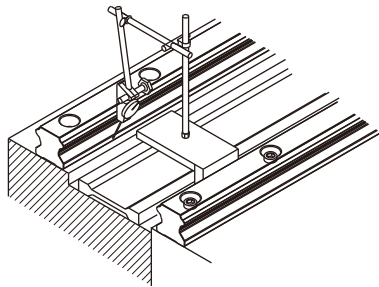
Put the rail on the bed mounting surface and temporarily fasten the mounting bolts, then push the rail against the side datum plane of the bed by using a vice to ensure the rail position. Tighten the mounting bolts in proper sequence with specific torque.



Installation of the subsidiary rail

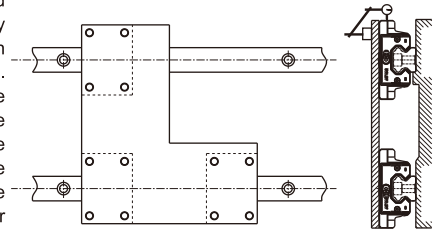
Using a straight-edge

Put the straight-edge between the two rails and use a dial gauge to adjust straight-edge in parallel with the side datum plane of the master rail. Use the straight-edge to ensure the straightness of the subsidiary rail, then tighten the mounting bolts in proper sequence with specific torque.



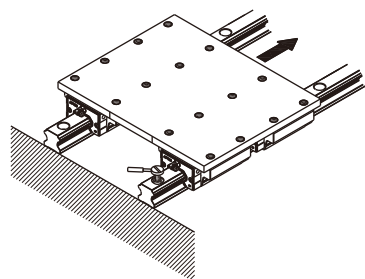
Using a table

Fix two blocks on the master rail to the table, and temporarily fix the subsidiary rail to the bed and one block on the subsidiary rail to the table. Place the gauge against the side surface of the block on the subsidiary rail, move the table from one end of the rail to the other end, then tighten the mounting bolts in proper sequence with specific torque while aligning the subsidiary rail parallel to the master rail.



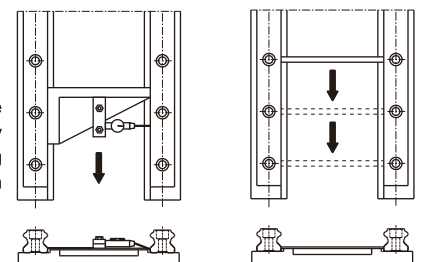
Following the master rail

Fix the table to the two blocks on the master rail and one of the two blocks on the subsidiary rail, temporarily fix the other block on the subsidiary rail to the table and subsidiary rail to the bed. Moving the table from one end of the master rail and tighten the mounting bolts on the subsidiary rail in proper sequence with specific torque at the same time.



Using a jig

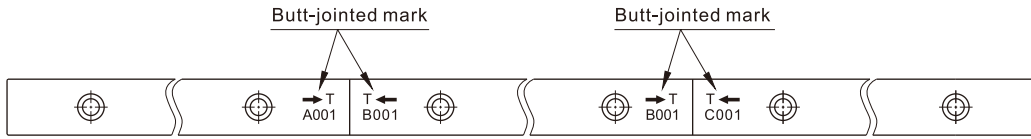
Use a special jig to help ensure the position of the subsidiary rail, and tighten the mounting bolts in proper sequence with specific torque.



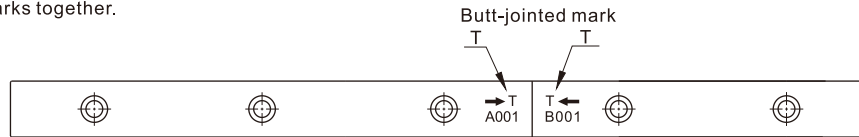
LSH Series

12. Rail Butt-jointed

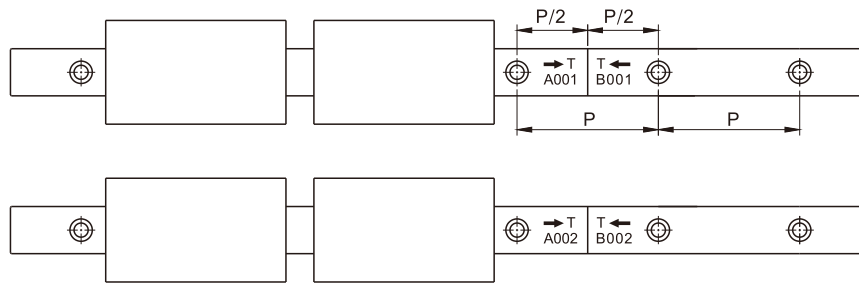
- When it comes to butt-jointed rail installation, it must follow the butt-jointed marks shown below.
- In order to avoid the accuracy caused by installing the matched jointed rails, it is recommended to stagger the butt-jointed positions, see figure below.



- When jointing rails, it must follow group marks on rail to ensure the accuracy of linear guide. These marks are located on the top surface at joint side. Please put the same group marks together.



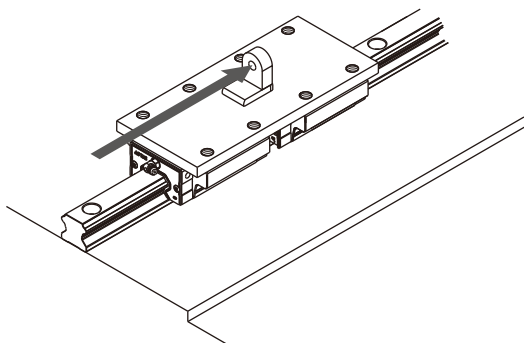
- Be aware serial number of group mark when assemble. A001 and B001 are in a group, so as to A002 and B002 and so on.
- Be aware the installation direction while assembly, the serial numbers are not upside down and arrows point to each other.



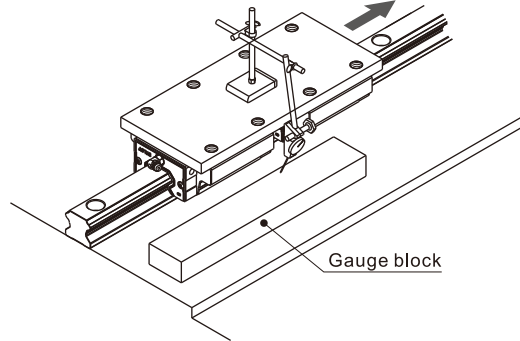
13. Measurement Method after Installation

When measuring running accuracy of the block, two blocks should be fixed on an inspection table in close contact to obtain stable accuracy.

When using a dial gauge, a provisional benchmark (like a straight-edge) is recommended to put as close as possible to the block for accurate measurement.



Method using an autocollimator



Method using a dial gauge

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Lubrication method

When a linear guide is well lubricated, it can reduce wear and increase lifespan significantly. Lubrication has the following benefits :

- Reduces friction of the rollers and raceway to minimize wear.
- The grease film between contact surface can prevent roller fatigue.
- Prevent rust.

1. Lubrication Grease

Use the correct grade of lubrication. While lubricating, a grease gun can be used to pump grease into slider through the grease nipple on it. The suitable condition for lube is when working speed is under 60 m/min and not in cooling process.

•Nipple type	L-P-M4	L-P-M6	L-P-SM6	L-P-P01	L-P-SP01
Grease nipple type	<p>LSH15 M4X0.7P</p>	<p>LSH20 LSH25 LSH30 LSH35 M6X0.75P</p>	<p>LSH20 LSH25 LSH30 LSH35 M6X0.75P</p>	<p>LSH45 PT1/8</p>	<p>LSH45 PT1/8</p>

•Grease amount

LSH series linear guide is well lubricated with 'Shell Alvania grease S2' in factory. Customers are recommended to use identical or the same grade of lubricant. After lubrication, block needs to be moved back and forth at least three times for the length of three blocks and repeat at least twice. Check if the surface of rail is well covered by grease film.

Model	Grease amount for the first lubrication(cm ³)		Replenishment amount(cm ³)	
	Standard type	Long type	Standard type	Long type
LSH15	0.9	-	0.3	-
LSH20	1.8	2.7	0.6	0.9
LSH25	3.6	4.5	1.1	1.4
LSH30	5.4	7.2	1.7	2.2
LSH35	8.1	10	2.5	3
LSH45	8.4	10.4	2.8	3.5

•Lubrication frequency

Although the linear guides are well lubricated at the factory and retains grease well, frequent lubrication is still necessary to avoid undesirable wear. Recommended lubrication period is every 100km of movement or every 3~6 months. (Refer to table on the top for suggested amount)

2. Lubricating oil

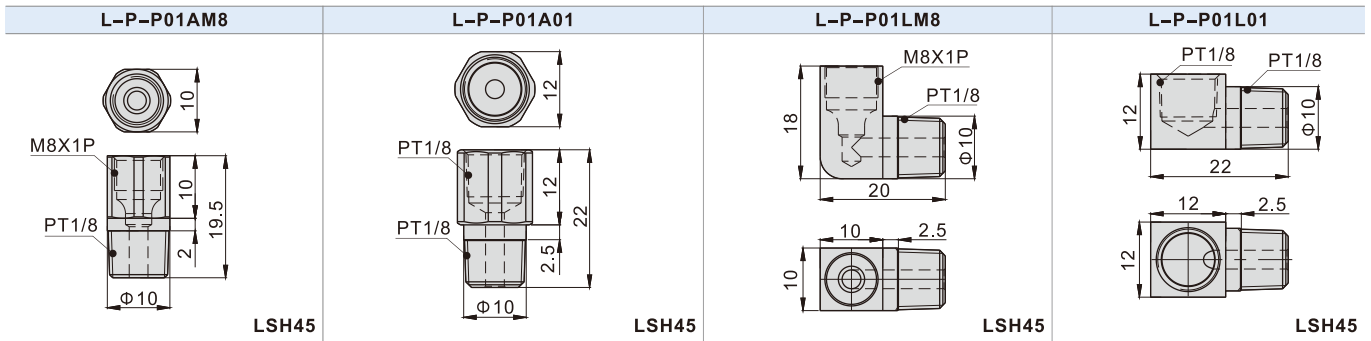
Recommended oil viscosity for lubrication use is about 30 to 150 cst.

Lubrication oil is suitable for all kinds of load and impact application, but not for high temperature use due to its tendency of vaporization.

•Adaptor

L-P-AM6	L-P-AM8	L-P-A01	
<p>M6X0.75P M4X0.7P LSH15</p>	<p>M8X1P M6X0.75P LSH35 LSH30 LSH25 LSH20</p>	<p>PT1/8 M6X0.75P LSH35 LSH30 LSH25 LSH20</p>	
L-P-LM6	L-P-LM8	L-P-L01	L-P-LM8-P2
<p>M6X0.75P M4X0.7P LSH15</p>	<p>M8X1P M6X0.75P LSH35 LSH30 LSH25 LSH20</p>	<p>PT1/8 M6X0.75P LSH35 LSH30 LSH25 LSH20</p>	<p>Inner bushing (Use with soft tube, for hard tube is unnecessary)</p> <p>LSH45 LSH35 LSH30 LSH25 LSH20</p>

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Note: After installation, the top surface of adaptor may be higher than block. Be careful about the interference while moving.

Lubrication method

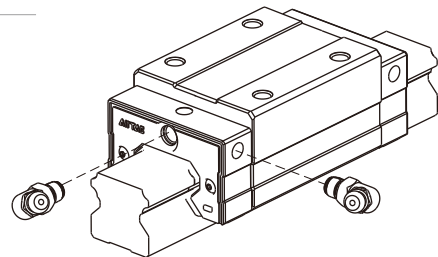
Oil supply rate

Loss of lubrication oil is faster than lubrication grease. Pay attention to sufficiency of oil while using.

Model	Oil amount for the first lubrication(cm ³)	Feeding Speed(cm ³ /hr)
LSH15	0.6	0.2
LSH20	0.6	0.2
LSH25	0.9	0.3
LSH30	0.9	0.3
LSH35	0.9	0.3
LSH45	0.9	0.3

3. Grease nipple/adaptor installation

- Grease nipple or adaptor can be installed in the two sides of block for manual or automatic lubrication based on customer's requirement.
- There are a secondary set of lubricating ports on the side of the block. When using, it is not recommended to use the side with datum line unless necessary.
- Lateral nipple installation is not recommended for flange type blocks. (The grease / oil nipple may interfere with block)
- If lateral lubrication is needed for above spec, please contact us for customization.

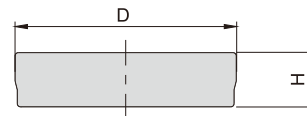


Bolt hole plug

1. Plug type

In order to prevent metal swarf or external objects from entering blocks and affecting precision and lifespan, customers must put plugs into holes during installation. Every rail is equipped with default plugs.

Model	Bolt	Diameter(D)(mm)	Thickness(H)(mm)
LSH15	M4	8.15	1.1
LSH20	M5	9.65	2.5
LSH25	M6	11.4	2.5
LSH30	M8	14.4	3.5
LSH35	M8	14.4	3.5
LSH45	M12	20.2	4.5



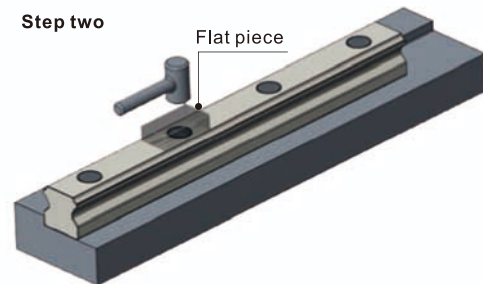
2. Plug installation Steps

Step one



Place the plug in counterbore.

Step two



Place the flat piece on mounting hole, hit the piece vertically with a plastic hammer and fix the plug into counterbore.

Note :

- Please make sure the plugs do not protrude the rail surface.
- After installation, please clean the surface before use.

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Dust prevention illustration

1. Code and structure

AirTAC provides the following dust prevention accessories for the linear guides working in dusty environment, if the following accessories are demanded, please add the corresponding code when ordering.

Code	Blank: Standard	DD: Double oil scrapers	ZZ: Metal scraper + Oil scraper
Structure	<p>Top seal Side seal Oil scraper</p>	<p>Top seal Side seal (Enhanced) Double oil scrapers (Double lips, enhanced)</p>	<p>Top seal Side seal (Enhanced) oil scrapers (Double lips, enhanced) Metal scraper</p>

2. Test for high dust prevention

2.1. Test item

Test medium	Wood chip	Iron filing	Gravel
Running distance	500km	500km	500km

2.2. Test equipment

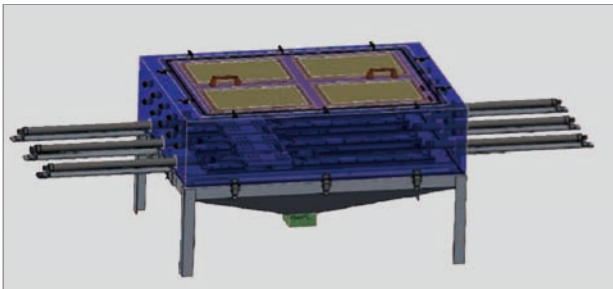


Figure1: Dust tester (Appearance)



Figure2: Dust tester (Inside)

2.3. Test condition

AirTAC adopts the industry's first dust tester (Figure 1) to simulate real working conditions, 360° without dead angles, all-round dust invasion (Figure 2). The dustproof test simulates multiple application scenarios, fully fill the air with wood chips, iron filings and gravels and are strictly tested to ensure the quality and dustproof effect of each block.

2.4. Test result

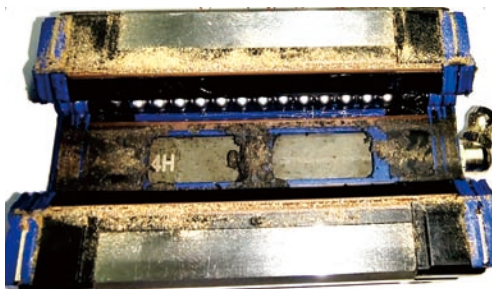


Figure3: Steel balls



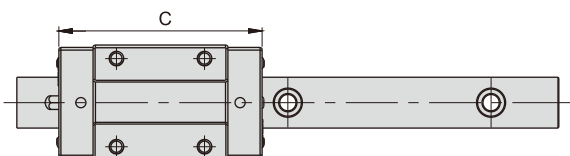
Figure4: Steel balls

Result: It can be seen from the Figure 3 and 4 that little amount of dust enters the inside of the block after testing, and the steel ball surface is still smooth, the block still runs smoothly and the performance is not affected.

Note: The above test results are obtained from AirTAC lab.

3. Dimensions

Highly dustproof type blocks have different length compared with the standard blocks (only dimension C is different from the standard, the others keep same), see the table on the right for details.

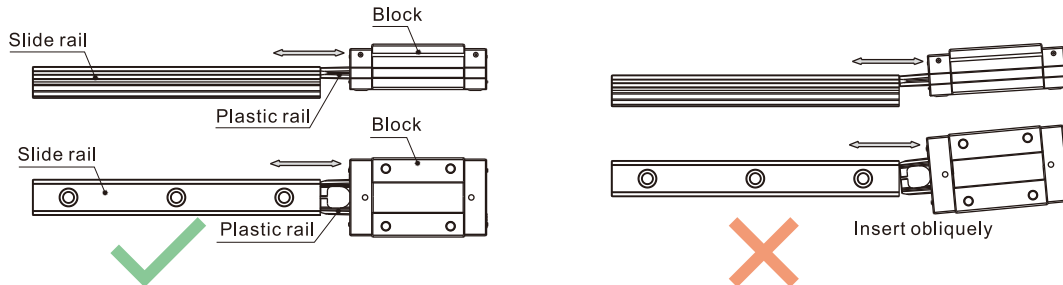


Model	Type	Length C(mm)		
		Standard (Blank)	Double oil scrapers(DD)	Oil scraper+Metal scraper(ZZ)
LSH15□N	Standard	60	67	64.5
LSH20□N	Standard	76.5	84.5	81
LSH20□L	Long	90.5	98.5	95
LSH25□N	Standard	83.5	91.5	88
LSH25□L	Long	105	113	109.5
LSH30□N	Standard	95.5	103.5	100.5
LSH30□L	Long	118	126	123
LSH35□N	Standard	109	118	114
LSH35□L	Long	134.5	143.5	139.5
LSH45□N	Standard	132	140.5	136.5
LSH45□L	Long	163.5	172	168

Precautions on use

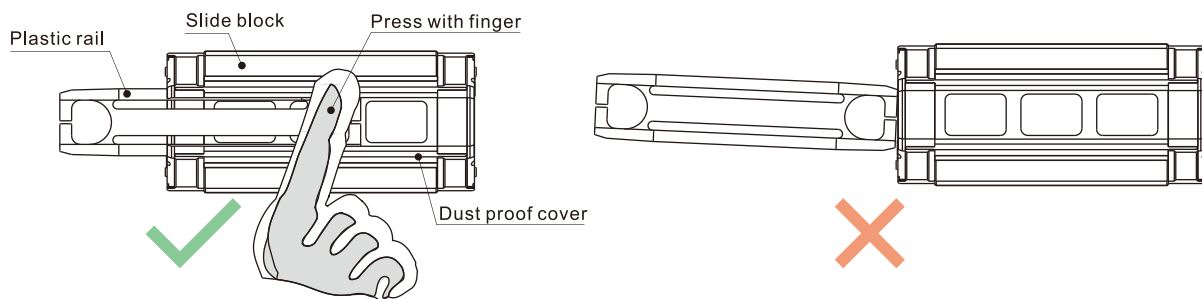
1. Block disassembly

With ball retainers and a dustproof cover, normally the balls are prevented from falling out when block is removed from rail. However, if obliquely insert rail into blocks or quickly assembled or disassembled, there is a risk for balls of falling out. Please carefully assemble the linear guide or use plastic rails to assist.



2. Plastic rail installation

A plastic rail is equipped for individual block set. Please do not remove plastic rail whenever it is not necessary. If plastic rail falls out and needs to be reinstalled, press the dustproof covers with fingers and install slowly to prevent balls from falling out due to misalignment of plastic rail.



Press the dust-proof covers and insert plastic rail in alignment.

Without pressing dust-proof covers or insert plastic rail obliquely.

3. Caution

- Parts may slide out if linear guide is put unevenly. Please be careful.
- Hitting or dropping linear guide could have huge effect on accuracy and lifespan even though appearance may remain intact. Please be careful.
- Do not disassemble linear guide as external objects may enter blocks and cause accuracy problem.

4. Lubrication

- Linear guide have been treated with anti-rust oil during production. Before use, wipe the rail and treat it with lubrication.
- Do not mix lubricating oil (grease) with different properties.
- After lubrication, move block back and forth for the length of three blocks long and repeat at least 2 times to ensure there is a grease file on rail.

5. Use

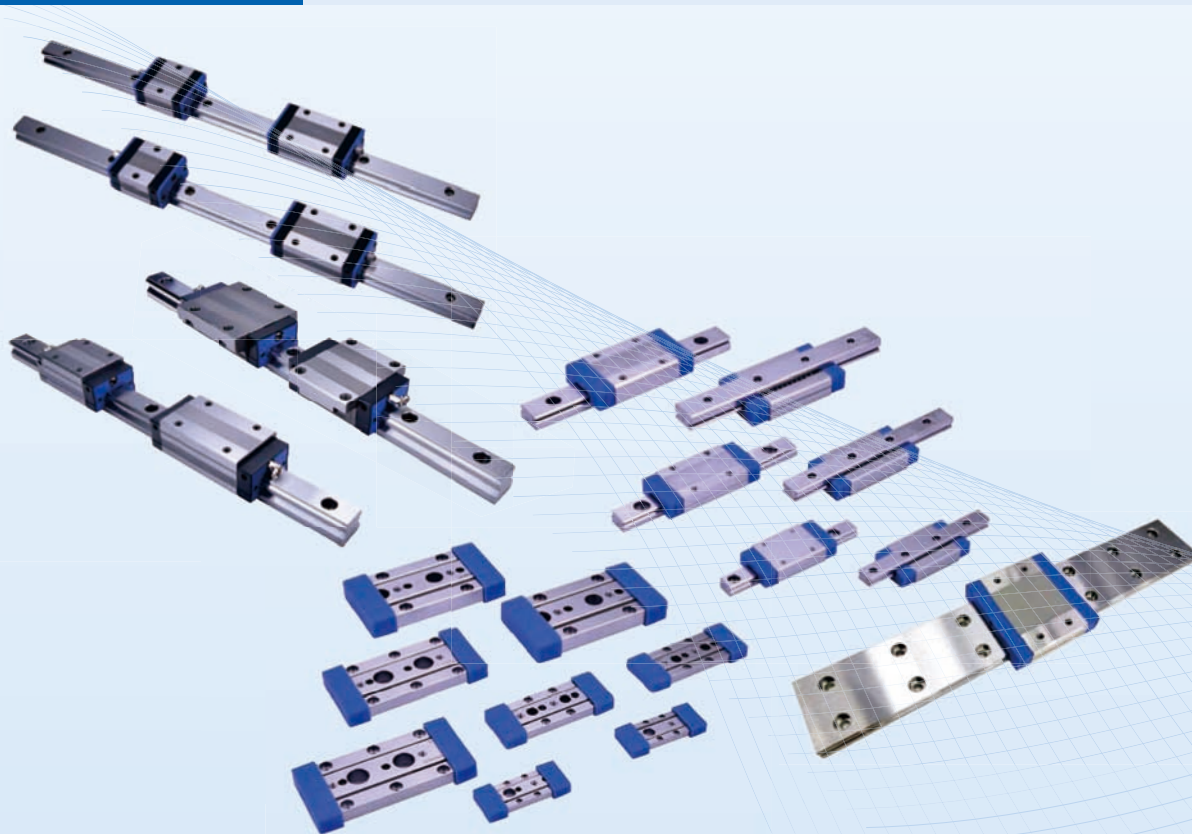
- The operating environment temperature should not exceed 80°C, and the maximum temperature should not exceed 100°C.
- Do not separate blocks from rail whenever it is not necessary. If you need to separate them, please use plastic rails to prevent steel balls from falling out.

6. Storage

- When storing blocks, rails or linear guide set, please be sure that anti-rust oil is well applied and product is well sealed as well as placed horizontally. Avoid humidity and high temperatures environment.

AirTAC INTERNATIONAL GROUP

Europe



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