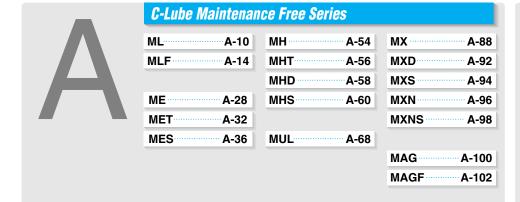






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C-Lube Maintenance Free MUL MX 🛕 MAG 🛕

Linear Way

Linear Roller Way

Flat Roller Cage

LWL B

LWE B

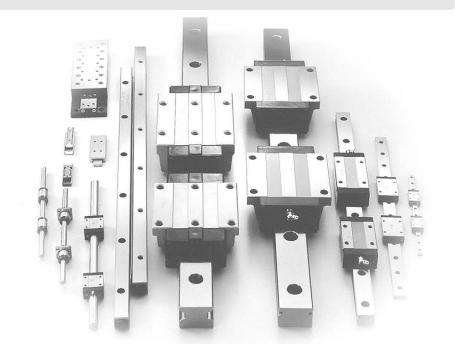
LWE…Q

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LWFH |

LWU···B

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Linear Ball Spline Series LSAG LSB D-52 D-38 LSAGF D-42 LS D-58

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STSI

BG

Linear Ball Spline LSB

CRWG CRWUG

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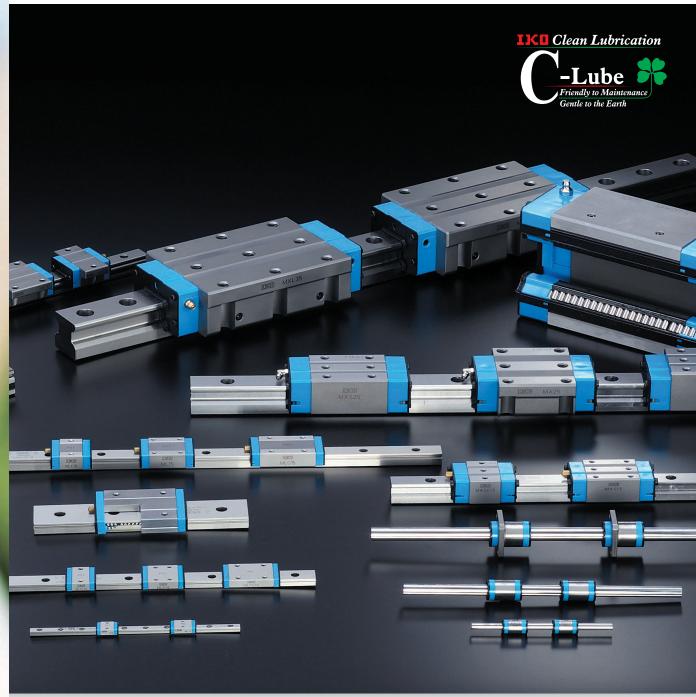
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CRWUG Crossed Roller Way CRWG CRW CRWU **Precision Linear Slide** BWU BSP, BSPG, BSR **Linear Bushing** LMG LBE LK LMS ST STSI BG Stroke Rotary Bushing







IXU Linear Motion Rolling Guides are produced at a quality level approved by **ISO-14001** and **ISO-9001** using a production system that reduces negative impact on the global environment.

This catalog adopts the **SI** system (system of international units) in conformance with **ISO** (International Organization for Standardization) Standard 1000. The specifications and dimensions of products in this catalog are subject to change without prior notice.

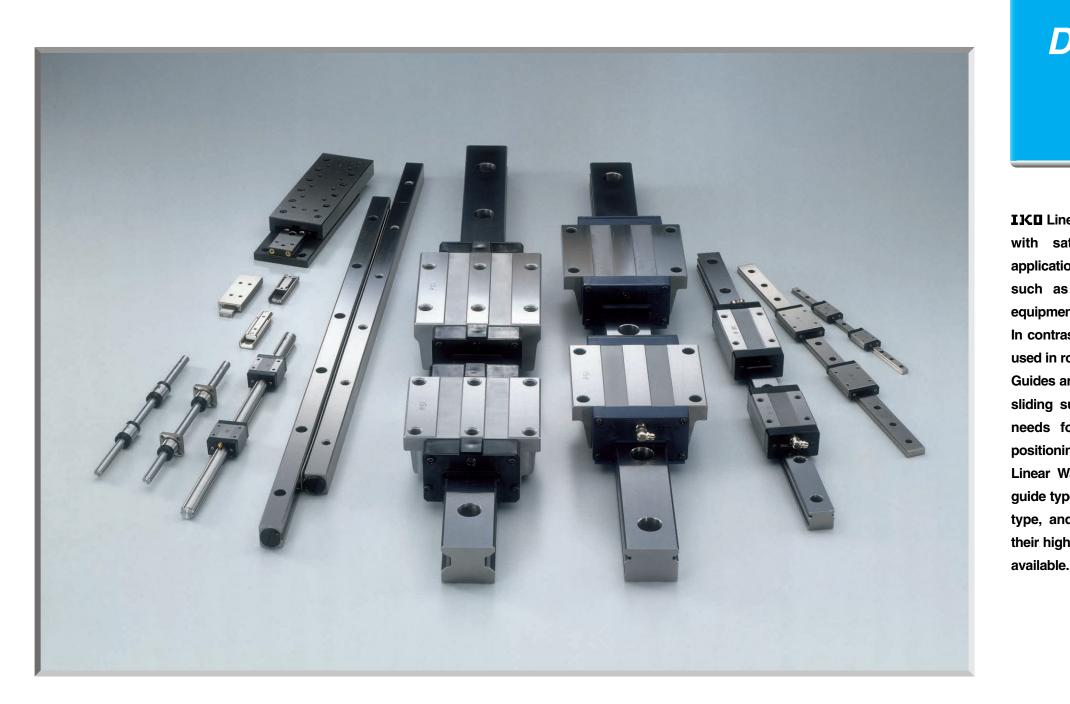
In the table of dimensions, standard products are referred to using identification numbers marked with _____ . The identification numbers marked with _____ refer to our semi-standard products.

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General Description

with satisfactory results for various applications requiring precision positioning such as semi-conductor manufacturing equipment and large-sized machine tools. In contrast to conventional rolling bearings used in rotating parts, Linear Motion Rolling Guides are the products applicable to plane sliding surfaces, and meet the increasing needs for linear motion and precision positioning in machines and equipment. Linear Way and Linear Roller Way of rail guide type, Linear Ball Spline of shaft guide type, and other products, recognized for their high quality and excellent features, are

Advantages of Linear Motion Rolling Guides

Advantages of Linear Motion Rolling Guides compared with conventional plain guides are as follows.

1

High positioning accuracy

Superior response characteristics to micro-feeding and accurate positioning performance can be achieved owing to the stable frictional characteristics of rolling friction with small differences between dynamic and static (start-up) friction and small variations in friction due to velocity changes.

2

Reductions in machine size and power consumption

The low frictional resistance allows the use of smaller drive units, which makes it possible to design more compact and lighter machines with less power consumption. So the machine cost and power cost can be saved. In addition, machines can be operated at higher speeds, achieving higher machine efficiency.

3

Highly reliable accuracy in long run operations

Owing to very little wear of raceways and rolling elements, high accuracy and reliability of machines and equipment are maintained in long run operations. In addition, the thinner oil films needed to lubricate Linear Motion Rolling Guides in comparison with conventional plain guides reduce errors caused by variations in oil film thickness.

4

Improvement of product reliability from first design

Reliability of the machines and equipment is improved from the first stage of the design, because the life of Linear Motion Rolling Guides can be estimated by using the established life calculation formulas based on rolling contact fatigue.

5

Simple design for lubrication

In most cases, grease lubrication is sufficient, which requires only a simple design for lubrication and simple maintenance.

6

6

Guide mechanism free from play

By giving a preload, the rigidity of Linear Motion Rolling Guides can be increased and a guide mechanism free from play can be designed. A preloaded rolling guide also achieves smooth motion even without any clearance.

Features of IKO Linear Motion Rolling Guides

IKD Linear Motion Rolling Guides have the following features.

1

A choice between ball types and roller types assures the best selection for any application

IKO offers two basic design concepts: steel ball types and cylindrical roller types. Steel ball types are most suited for general purpose applications requiring a light to medium load capacity and low frictional resistance. Cylindrical roller types, in comparison, are most often selected for machines needing a high load capacity and very high rigidity.

2

A wide selection of various types for all kinds of industrial uses

Suitable designs in rail guide types and shaft guide types as well as limited motion types and endless motion types are all parts of **IKU**'s standard product lines.

3

A functional simplicity in structure yields high reliability

IKU Linear Motion Rolling Guides feature functional and simple designs. Compared to more complicated designs needing extra steps in manufacturing, the simplicity of **IKU** designs reduce the potential processing errors that might occur during the various stages of production. Mounting errors can also be eliminated.

4

Process reductions in designing and assembling

Typical **IKO** Linear Motion Rolling Guides are made into one complete unit of linear motion rolling guide mechanism, and their sizes and accuracy are standardized. Design, assembly and maintenance time of machines and equipment can be reduced greatly by adopting these products.

5

Superior performance and high quality through advanced manufacturing techniques

IKU's precision manufacturing technology and quality control have been developed to achieve and maintain an internationally recognized reputation as a manufacturer of top quality needle roller bearings and other precision machine components. This firm commitment to manufacturing excellence is reflected in the superior performance and high quality of **IKU** Linear Motion Rolling Guides.

Features of IKO interchangeable specification products

Interchangeable specification products are available in Linear Way, Linear Roller Way, and Linear Ball Spline series of **IKD** Linear Motion Rolling Guides. As slide units/external cylinders and track rails/spline shafts of these products are interchangeable, product selection can be made more freely and easily meeting the customer's needs.

1

Easy addition and replacement of parts

Slide units/external cylinders can be added or replaced on a track rail/spline shaft as required, and even slide units/external cylinders of different types can be assembled on a same track rail/spline shaft. When replacement of parts must be made urgently, for example, due to a design change, it can be made without delay.

2

Short delivery term

As slide units/external cylinders and track rails/spline shafts are stocked separately, these parts can be delivered promptly.

3

High accuracy and high preload

Interchangeability is achieved by rigorous accuracy control of individual parts. As a result, one-step higher accuracy and preload can be offered.

4

Improved efficiency at assembly work

Interchangeable specification products can be assembled without specially selecting slide units/external cylinders and track rails/spline shafts for assembly. So efficiency at assembly work can be improved.

5

A wide range of variations

A wide range of variations in types, sizes, materials, etc. are available, so an optimum product can be selected by the customer for each application.

6

Special specifications

Standard products are available with abundant optional special specifications to meet the diversified needs. These special specification products can be ordered by simply adding the supplemental code to the end of the identification number.

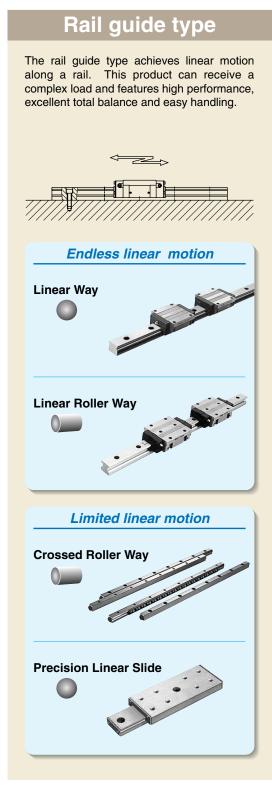
IKO proposes interchangeable specification Linear Motion Rolling Guides for free and easy product selection by the user.

	Rolling element	Series name	Material	Variation	Reference pag
		C-Lube Linear Way ML	Stainless steel	6 types, 37 sizes	A-2~
		C-Lube Linear Way ME	Carbon steel	9 types, 45 sizes	A-18~
C-Lube	Ball		Carbon steel	8 types, 40 sizes	A 04
Maintenance Free series		C-Lube Linear Way MH	Stainless steel	4 types, 12 sizes	A-34~
	Roller	C-Lube Linear Roller Way Super MX	High Carbon steel	13 types, 75 sizes	A-70 ∼
	Ball	C-Lube Linear Ball Spline MAG	High Carbon steel	4 types, 20 sizes	A-100 ~
			High carbon steel	2 types, 8 sizes	
		Linear Way L	Stainless steel	6 types, 38 sizes	B-2∼
		Linear Way E	High carbon steel	9 types, 45 sizes	
Linear Way series	Ball		Stainless steel	9 types, 36 sizes	B-30 ∼
			High carbon steel	8 types, 52 sizes	
		Linear Way H	Stainless steel	6 types, 24 sizes	B-74 ∼
			High carbon steel	3 types, 9 sizes	
		Linear Way F	Stainless steel	1 type, 3 sizes	B-110 ∼
Linear Roller Way		Linear Bollor Way	High carbon steel	9 types, 69 sizes	
series	Roller	Linear Roller Way Super X	Stainless steel	3 types, 15 sizes	C-2~
Linear Ball Spline		Linear Ball Spline G	High carbon steel	8 types, 56 sizes	D-28 ~
series	Ball	Block type	High carbon steel	2 types, 14 sizes	
		Block type Linear Ball Spline	Stainless steel	1 type, 3 sizes	D-46 ∼

Types of IKO Linear Motion Rolling Guides

classified according to the guide type, motion type and rolling element type. Three guide types, namely, rail guide type, shaft guide type and flat guide type are available. Each of them is divided into the endless motion type in which rolling elements are recirculated to achieve endless linear motion and the limited motion type without rolling element re-circulation. These types are divided again into ball types and roller types. Each of these guides has its own features.





Shaft guide type The shaft guide type achieves linear motion along a shaft. This product is easy to handle and suitable for relatively low load conditions. Some shaft guide products can achieve both rotation and reciprocating linear motion.

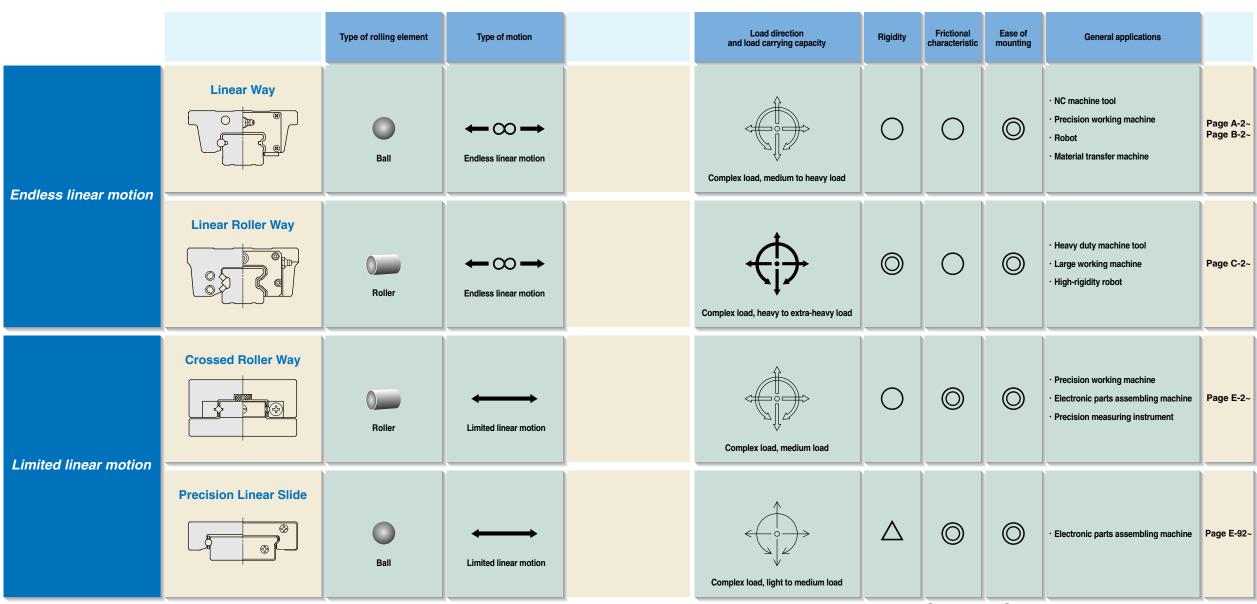


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1N=0.102kgf=0.2248lbs. 1mm=0.03937inch Rail guide type Rail guide type

Rail guide type linear motion rolling guides are easy to mount and can receive complex loads. Man-hours for mounting them on machines and equipment and for designing the guide mechanism can be saved, and consequently the overall machine cost can be reduced greatly. Linear Roller Way can be used for applications subjected to a large load and Linear Way for general-purpose applications.

For applications with a relatively small load requiring smooth and precise motion, use Crossed Roller Way or Precision Linear Slide.



Remarks:

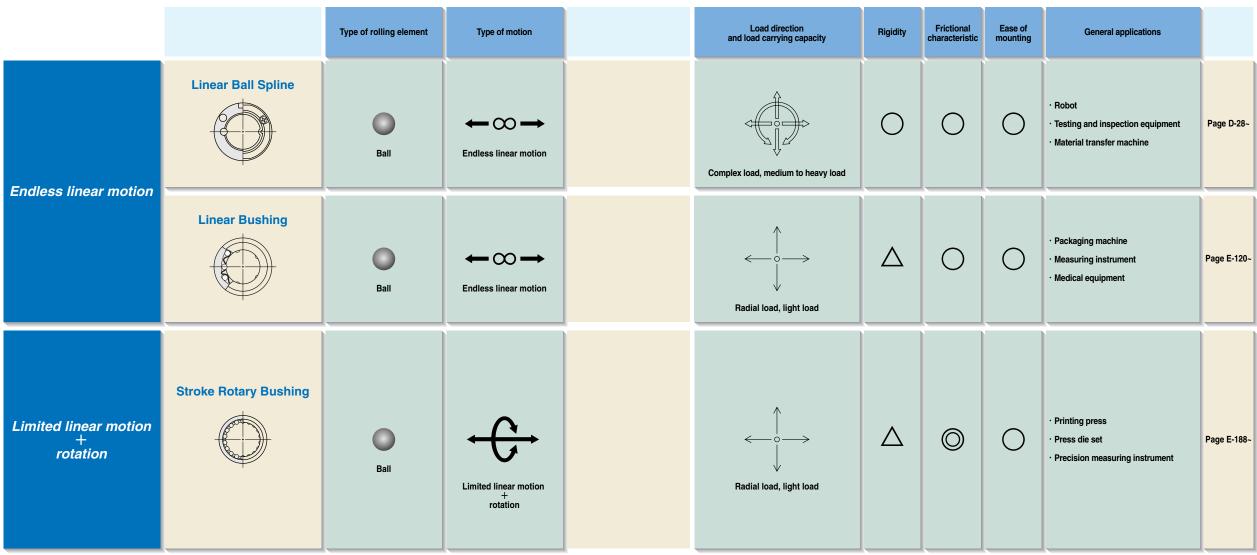
© Excellent,

○ Good,

△ Fair

Shaft Guide Type Shaft Guide Type

Shaft guide type linear motion rolling guides feature easy mounting. These guides can be used to reduce man-hours for mounting them on machines and equipment, and consequently to save greatly the overall system cost. Stroke Rotary Bushings make both linear reciprocating motion and rotation and can be used on rotary shafts. Linear Ball Splines can be used as rotary shafts to transmit torque when combined with shaft support bearings.



Remarks:

© Excellent,

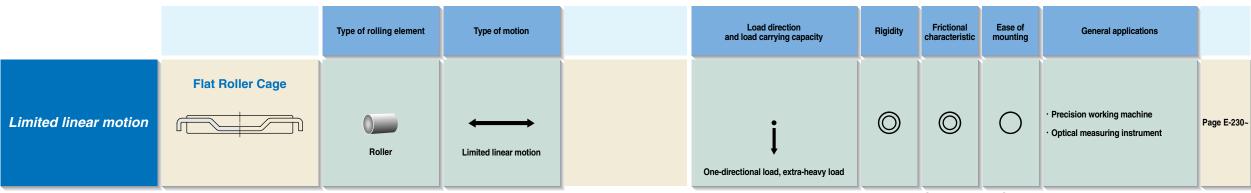
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Flat Guide Type

Flat Guide Type

Flat guide type linear motion rolling guides can receive only a uni-directional load but feature high rigidity in the load direction. A guide surface must be prepared for these rolling guides by surface hardening such as heat treatment and precision surface finishing.



Remarks:

© Excellent,

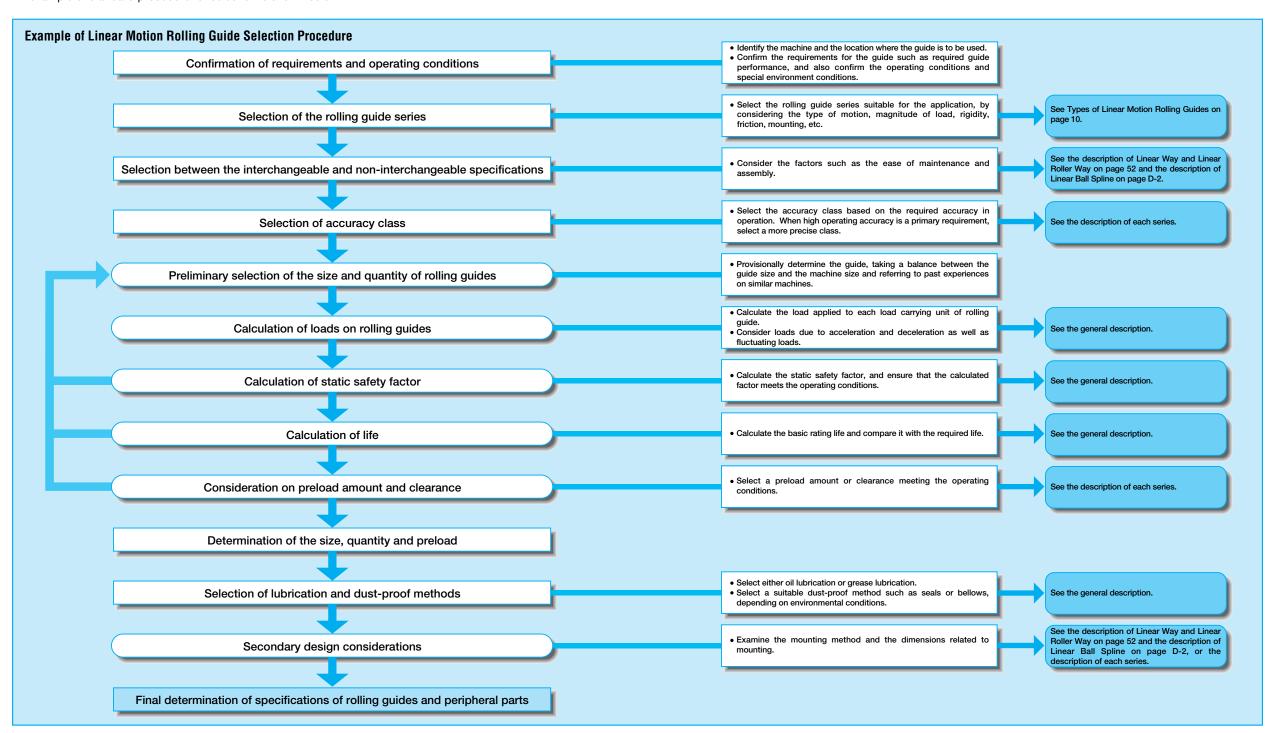
○ Good,

△ Fair

Outline of Linear Motion Rolling Guide Selection Procedure

Selection of an optimum linear motion rolling guide is made with careful consideration on various factors from the basic items to the details.

An example of standard procedure for selection is shown below.



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Basic Dynamic Load Rating and Life

Life of Linear Motion Rolling Guides

When linear motion rolling guides are operated over a certain period, they will eventually wear out even under normal operating conditions. This is because the raceways and rolling elements of linear motion rolling guides are subjected to repeated loads and will be damaged by rolling contact fatigue of material characterized by the formation of scale-like wear fragments (fatigue flaking). These damaged rolling guides can no longer be used. The life of linear motion rolling guide is defined as the total traveling distance accomplished before the first evidence of fatigue flaking appears on one of the raceways or rolling elements. There is a variation in life because material fatigue is a statistical phenomenon. The basic rating life is therefore calculated statistically.

Basic dynamic load rating C (Complying with ISO 14728-1)⁽¹⁾

The basic dynamic load rating of linear motion rolling guide is the constant load both in direction and magnitude that gives the basic rating life as shown in Table 1, when a group of identical rolling guides are individually operated.

The basic dynamic load rating may be corrected for the direction of applied load. For details, see the description of each series.

Note(1): This standard is not applicable on some series.

Rating life

The basic rating life of linear motion rolling guide is defined as the total traveling distance that 90% of a group of identical rolling guides can be operated individually under the same conditions free from any material damage caused by rolling fatigue.

However, the basic rating life of Stroke Rotary Bushing is represented by the total number of revolutions.

Series	Basic rating life for bas dynamic load rating
Linear Way	
Linear Roller Way	
Linear Ball Spline	50×10 ³ m
Precision Linear Slide	
Linear Bushing	
Crossed Roller Way	100100
Flat Roller Cage	100×10 ³ m
Stroke Rotary Bushing	10 ⁶ rev.

Life calculation

Life calculation formula

Table 2 shows the relationship between the basic rating life, basic dynamic load rating and applied load of the linear motion rolling guides.

In the life calculation for practical applications, load factor, temperature factor, hardness factor, etc. are taken into consideration. See Table 3 for Stroke Rotary Bushing.

	Basic rating life	calculation formula	
Series	unit : 10 ³ m	unit : hours	Symbols
Linear Way Precision Linear Slide Linear Bushing	$L = 50 \left(\frac{C}{P}\right)^3$		
Linear Ball Spline	$L = 50 \left(\frac{C}{P}\right)^3$ $L = 50 \left(\frac{T}{M}\right)^3$	$L_{\rm h} = \frac{10^6 L}{2S n_1 \times 60}$	L: Basic rating life, 10³m C: Basic dynamic load rating, N T: Dynamic torque rating, N⋅m P: Dynamic equivalent load (or applied load), N M: Applied torque, N⋅m Lh: Basic rating life in hours, h
Linear Roller Way	$L = 50 \left(\frac{C}{P}\right)^{10/3}$		S: Stroke length, mm n: Number of strokes per minute cpm
Crossed Roller Way Flat Roller Cage	$L = 100 \left(\frac{C}{P}\right)^{10/3}$		•

	Bas	sic rating life calculation formula	
Type of motion	unit : 10 ⁶ rev.	unit : hours	Symbols
Rotation			 L : Basic rating life, 10⁶ rev. C : Basic dynamic load rating, N
Combined motion of otation and reciprocating inear motion	$L = \left(\frac{C}{P}\right)^3$	$L_{\rm h} = \frac{10^6 L}{60\sqrt{(D_{\rm pw} n)^2 + (10 {\rm S} n_1)^2 / D_{\rm pw}}}$	P: Applied load, N Lh: Basic rating life in hours, h n: Rotation speed, rpm m: Number of strokes per minute, cpm S: Stroke length, mm
Reciprocating linear motion		$L_{\rm h} = \frac{10^6 L}{600S n_1/\pi D_{\rm pw}}$	S : Stroke length, mm Dpw: Pitch diameter of ball set, mm (Dpw≒1.15Fw) Fw : Diameter of inscribed circle, mm

20

Temperature factor

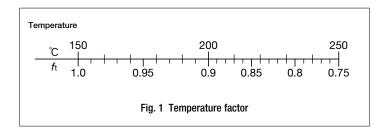
Since the allowable contact stress of rolling guides will gradually decrease when the operating temperature of the rolling guide rises over 150°C, the basic dynamic load rating must be corrected for temperature.

$$C_t = f_t C$$
(1.1)

where, Ct: Basic dynamic load rating considering a temperature rise, N

ft: Temperature factor (See Fig. 1.)

C: Basic dynamic load rating, N



Hardness factor

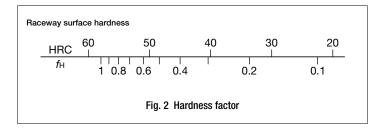
The raceway surface hardness must be 58 to 64HRC. When the hardness is lower than 58HRC, the basic dynamic load rating must be corrected by the following formula.

$$C_{H} = f_{H} C$$
 (1.2)

where, CH: Basic dynamic load rating considering hardness, N

 $f_{\rm H}$: Hardness factor (See Fig. 2.)

C: Basic dynamic load rating, N



Basic Static Load Rating and Static Safety Factor

■ Basic static load rating C₀ (Complying with ISO 14728-2)⁽¹⁾

The basic static load rating of linear motion rolling guide is defined as the static load which gives the contact stress as shown in Table 4 at the center of the contact area between the rolling element and the raceway receiving the maximum load.

If a large load or a heavy shock is applied to a rolling guide when it is stationary or running at a relatively low speed, a local permanent deformation may be made on the rolling elements and/or the raceway surfaces of the slide unit, track rail, external cylinder, shaft, etc. When this permanent deformation becomes larger than a certain size, it will prevent smooth rolling motion and cause the guide to generate noise or vibrate, resulting in degradation in traveling performance and eventually early-stage damage.

The basic static load rating is used in combination with the static safety factor to give the load that may cause the permanent deformation exceeding this limit.

The basic static load rating may be corrected for the applied load direction. For details, see the description of each series.

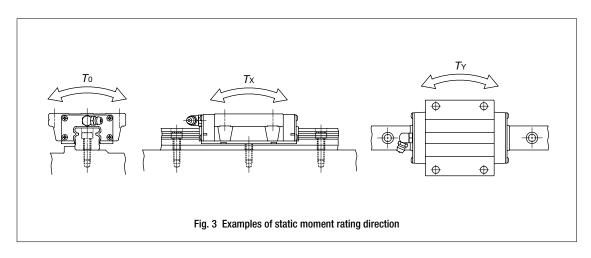
Note(1): This standard is not applicable on some series.

Series	Maximum contact stress	
Linear Way	4 200 MPa	
Linear Ball Spline	4 200 MFa	
Linear Roller Way		
Crossed Roller Way	4 000 MPa	
Roller Way	4 000 MPa	
Flat Roller Cage		

Static moment rating

The static moment rating is defined as the static moment which gives the contact stress as shown in Table 4 at the center of the contact area between the rolling element and the raceway receiving the maximum load when the moment shown in the examples of Fig. 3 is applied.

Generally, like the basic static load rating, the static moment rating is used in combination with the static safety factor to give the limiting load for normal rolling motion.



Static safety factor

The basic static load rating and the static moment rating (or static torque rating) are considered as the theoretical allowable limit of load for normal rolling motion. In practice, this limit must be corrected by the static safety factor considering the operating conditions and performance required of linear motion rolling guides. The static safety factor is obtained by the formulas below, and Tables 5.1 to 5.4 give standard values of this factor. For moment or torque load, the formula (1.4) is a representative formula. The static safety factor is calculated in each direction by applying the static moment rating and the maximum moment in that direction.

$$fs = \frac{C_0}{P_0}$$
(1.3)

$$fs = \frac{T_0}{M_0}$$
(1.4)

24

where, fs: Static safety factor

Co: Basic static load rating, N

Po: Static equivalent load

(or applied static load (maximum load)), N

*T*₀: Static moment rating, N⋅m (or static torque rating)

*M*₀: Moment or torque, N⋅m

(maximum moment or maximum torque)

Table 5.1 Static safety factor

Tubic of Culture curvey function				
Operating conditions	fs			
Operation with vibration and/or shocks	3~5			
High operating performance	2~4			
Normal operation	1~3			

Remark: This table does not apply to Linear Roller Way, Linear Ball Spline, Linear Bushing and Stroke Rotary Bushing.

Table 5.2 Static safety factor of Linear Roller Way

Operating conditions	fs
Operation with vibration and/or shocks	4 ~6
High operating performance	3 ~5
Normal operation	2.5~3

Table 5.3 Static safety factor of Linear Ball Spline

Operating conditions	fs
Operation with vibration and/or shocks	5~7
High operating performance	4~6
Normal operation	3~5

Remark: It is recommended to adopt a static safety factor of 5 or more for Angular type Linear Ball Spline.

Table 5.4 Static safety factor of Linear Bushing and Stroke Rotary Bushing

Operating conditions	fs
Operation with vibration and/or shocks	2.5
Quiet operation	2
Normal operation	1.5

Equivalent Load

Dynamic equivalent load

When a load is applied in a direction other than that of the basic dynamic load rating of Linear Way or Linear Roller Way or a complex load is applied, the dynamic equivalent load must be calculated to obtain the basic rating life.

Obtain the downward and lateral conversion loads from the loads and moments in various directions.

$$F_{re} = k_r |F_r| + \frac{C_0}{T_0} |M_0| + \frac{C_0}{T_X} |M_X| \cdots (1.5)$$

$$F_{ae} = k_a |F_a| + \frac{C_0}{T_V} |M_Y| \cdots (1.6)$$

where, F_{re} : Downward conversion load, N

Fae: Lateral conversion load, N

F_r: Downward load, N

Fa: Lateral load, N

 M_0 : Moment in the T_0 direction, N·m

Mx: Moment in the Tx direction. N·m

 M_Y : Moment in the T_Y direction, $N \cdot m$

 k_r , k_a : Conversion factors for load direction (See Table 7.)

C₀: Basic static load rating, N

 T_0 : Static moment rating in the T_0 direction, N·m

Tx: Static moment rating in the Tx direction, $N \cdot m$

 T_Y : Static moment rating in the T_Y direction, N • m

Obtain the dynamic equivalent load from the downward and lateral conversion loads.

$$P = X F_{re} + Y F_{ae} \cdots (1.7)$$

P: Dynamic equivalent load, N

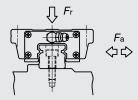
X、Y: Dynamic equivalent load factor (See Table 6.)

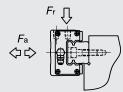
Fre: Downward conversion load, N Fae: Lateral conversion load, N

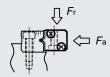
Table 6	Dynamic equivalent load	factor

Condition	Х	Υ
Fre ≧ Fae	1	0.6
$ F_{re} < F_{ae} $	0.6	1

Table 7 Conversion factor for load direction







Linear Way LM Linear Way M

1.13

1

1

1

0.70

0.73

0.76

Linear Way and Linear Roller Way

Linear Way U

C-Lube Linear Roller Way Super MX

Linear Roller Way Super X

Linear Way Module LM

Linear Way Module M

Linear Way H Side Mounting type

Linear Roller Way M Conversion factor k_{a} Series and size $F_r \ge 0$ $F_r < 0$ C-Lube Linear Way ML 1 1.19 15~30 1 1 1 C-Lube Linear Way ME 35~45 1.19 1.28 1.19 8~12 C-Lube Linear Way MH 15~30 1 1 1 1.28 1 1.19 35~45 C-Lube Linear Way MUL 1.19 1 1.13 Ball retained type 1 Linear Way L Ball non-retained type 1 1 0.88 1 15~30 Linear Way E 35~45 1 1.13 1.19 Low Decibel Linear Way E 1 1 1 8~12 1.13 1 1 15~30 Linear Way H 35~65 1 1.13 1.19 85 1.28 1.23 15~30 1 0.84 Linear Way H Side Mounting type $35\sim65(^{1})$ 1 0.95 33~42 1 Linear Way F 69 1 1 1.13 1.19 1 1.13 Linear Way FH

Note(1): The upper value in the k_a column is the value when the load is applied to the right and the lower value is the value when the load is applied to the left in the above sketch.

1

1

1

1

1

1

1

1

1.13

1.28

Remark: Fr is the downward load. (When its value is smaller than zero, it is an upward load.)

25, 30

40~130

1~ 5

6

Static equivalent load Po

When a load is applied in a direction other than that of the basic static load rating of Linear Way or Linear Roller Way or a complex load is applied, the static equivalent load must be calculated to obtain the static safety factor.

$$P_0 = k_{0r}|F_r| + k_{0a}|F_a| + \frac{C_0}{T_0}|M_0| + \frac{C_0}{T_X}|M_X| + \frac{C_0}{T_Y}|M_Y| \cdots (1.8)$$

where, Po: Static equivalent load, N

Fr: Downward load, N

Fa: Lateral load, N

 M_0 : Moment in the T_0 direction, N·m

Mx: Moment in the Tx direction, $N \cdot m$

 M_Y : Moment in the T_Y direction, $N \cdot m$

k₀r, k₀a : Conversion factors for load direction (See Table 8.)

C₀: Basic static load rating, N

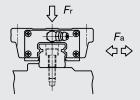
 T_0 : Static moment rating in the T_0 direction, N·m

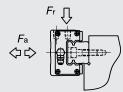
Tx: Static moment rating in the Tx direction, $N \cdot m$

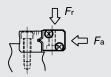
 T_Y : Static moment rating in the T_Y direction, N·m

26 27 1mm=0.03937inch

Table 8 Conversion factor for load direction







Linear Way LM Linear Way M Linear Roller Way M

Linear Way and Linear Roller Way

Linear Way H Side Mounting type

Series and size		Conversion factor		
		k	Or	K 0a
	$F_r \ge 0$	Fr < 0		
C-Lube Linear Way ML		1	1	1.19
C Luba Linear Way ME	15~30	1	1	1
C-Lube Linear Way ME	35~45	1	1.19	1.28
	8~12	1	1	1.19
C-Lube Linear Way MH	15~30	1	1	1
	35~45	1	1.19	1.28
C-Lube Linear Way MUL		1	1	1.19
Barra Ward	Ball retained type	1	1	1.19
Linear Way L	Ball non-retained type	1	1	0.84
	15~30	1	1	1
Linear Way E	35~45	1	1.19	1.28
Low Decibel Linear Way E		1	1	1
	8~12	1	1	1.19
	15~30	1	1	1
Linear Way H	35~65	1	1.19	1.28
	85	1	1.43	1.34
	15~30	1	1	1
Linear Way H Side Mounting type	35~65 (¹)	1	1	0.78 0.93
	33~42	1	1	1
Linear Way F	69	 1	1	1.19
Linear Way FH		1	1.19	1.28
,	25, 30	 1	1	1.19
Linear Way U	40~130	 1	1	1
C-Lube Linear Roller Way Super MX		1	1	1
Linear Roller Way Super X		1	1	1
Linear Way Module LM		 1	1	0.60
<u> </u>	1~ 5	1	1.19	0.64
Linear Way Module M	6	 1	1.43	0.67

Note(1): The upper value in the k_{0a} column is the value when the load is applied to the right and the lower value is the value when the load is

applied to the left in the above sketch. **Remark**: F_r is the downward load. (When its value is smaller than zero, it is an upward load.)

Applied Load

In some series of Linear Motion Rolling Guides excluding Linear Way and Linear Roller Way, the dynamic load rating and static load rating corrected for the direction of the theoretical applied load are used for calculating the basic rating life and static safety factor. For details, see the description of each series.

Load factor

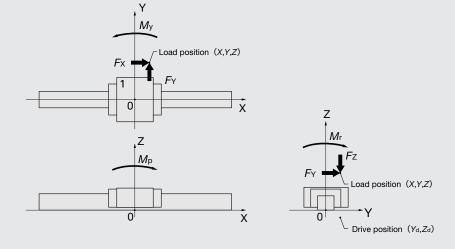
Due to vibration and/or shocks during machine operation, the actual load on each rolling guide becomes greater in many cases than the theoretically calculated load. The applied load is generally calculated by multiplying the theoretically calculated load by the load factor indicated in Table 9.

Operating conditions	fw
Smooth operation free from vibration and/or shocks	1 ~1.2
ormal operation	1.2~1.5
peration with vibration and/or shocks	1.5~3

Calculation of load

Table 10.1 to Table 10.6 show calculation examples of the loads applied on Linear Motion Rolling Guides incorporated in machines or equipment.

Table 10.1 One track rail and one slide unit



	Load applied on the slide unit				
Slide unit No.	Downward load	Lateral load	Moment in the T₀ direction	Moment in the Tx direction	Moment in the T _Y direction
	Fr	Fa	M 0	<i>M</i> ×	M _Y
1	Fz	Fy	<i>M</i> r	Mр	Му

Remark: The moment loads in each direction M_r , M_p , and M_y can be obtained by the following formulae.

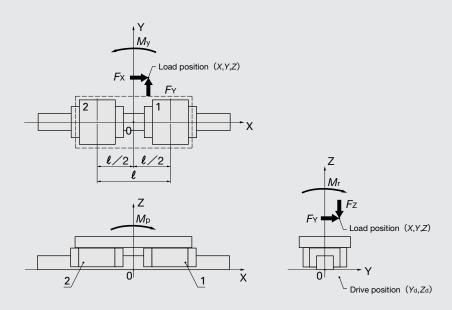
$$M_r = F_Y Z + F_Z Y$$

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$$M_p = F_X (Z - Z_d) + F_Z X$$

$$M_{y} = -F_{X} (Y - Y_{d}) + F_{Y} X$$

Table 10.2 One track rail and two slide units



	Load applied on the slide unit			
Slide unit No.	Downward load $F_{ m r}$	Lateral load Fa	Moment in the T_0 direction M_0	
1	$\frac{F_z}{2} + \frac{M_p}{\ell}$	$\frac{F_{Y}}{2} + \frac{M_{Y}}{\ell}$	<u>Mr</u> 2	
2	$\frac{F_z}{2} - \frac{M_p}{\ell}$	$\frac{F_{Y}}{2} - \frac{M_{y}}{\ell}$	<u>Mr</u> 2	

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Remark: The moment loads in each direction M_r , M_p , and M_y can be obtained by the following formulae.

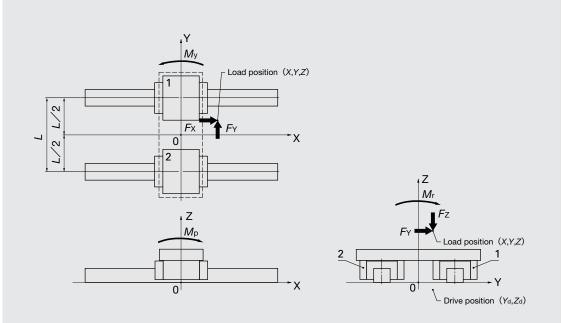
$$M_r = F_Y Z + F_Z Y$$

$$M_{\rm p} = F_{\rm X} (Z - Z_{\rm d}) + F_{\rm Z} X$$

$$M_{y} = -F_{X} (Y - Y_{d}) + F_{Y} X$$

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Table 10.3 Two track rails and one slide unit on each track rail



	Load applied on the slide unit			
Slide unit No.	Downward load $F_{ m r}$	Lateral load F _a	Moment in the T_X direction M_X	Moment in the T_Y direction M_Y
1	$\frac{Fz}{2} + \frac{M_r}{L}$	<u>F</u> _Y 2	<u>M</u> _P 2	<u>M</u> _y 2
2	$\frac{F_z}{2} - \frac{M_r}{L}$	<u>F</u> _Y 2	<u>M</u> _P 2	<u>M</u> _y 2

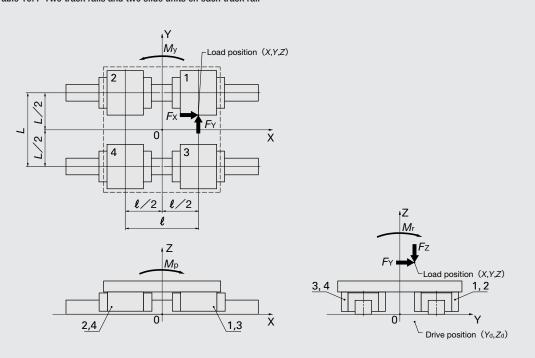
Remark: The moment loads in each direction M_r , M_p , and M_y can be obtained by the following formulae.

$$M_r = F_Y Z + F_Z Y$$

$$M_{\rm p} = F_{\rm X} (Z - Z_{\rm d}) + F_{\rm Z} X$$

$$M_{y} = -F_{X} (Y - Y_{d}) + F_{Y} X$$

Table 10.4 Two track rails and two slide units on each track rail



	Load applied o	on the slide unit
Slide unit No.	Downward load Fr	Lateral load F _a
1	$\frac{F_z}{4} + \frac{M_r}{2L} + \frac{M_p}{2\ell}$	$\frac{F_{Y}}{4} + \frac{M_{y}}{2\ell}$
2	$\frac{F_Z}{4} + \frac{M_r}{2L} - \frac{M_P}{2\ell}$	$\frac{F_{Y}}{4} - \frac{M_{Y}}{2 \ell}$
3	$\frac{F_Z}{4} - \frac{M_r}{2L} + \frac{M_P}{2\ell}$	$\frac{F_{Y}}{4} + \frac{M_{Y}}{2\ell}$
4	$\frac{F_z}{4} - \frac{M_r}{2L} - \frac{M_p}{2\ell}$	$\frac{F_{Y}}{4} - \frac{M_{Y}}{2\ell}$

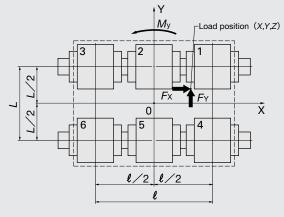
Remark: The moment loads in each direction M_r , M_p , and M_y can be obtained by the following formulae.

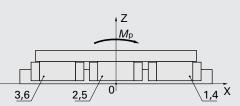
$$M_r = F_Y Z + F_Z Y$$

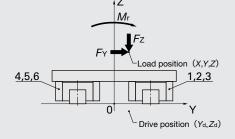
$$M_{\rm p} = F_{\rm X} (Z - Z_{\rm d}) + F_{\rm Z} X$$

$$M_{y} = -F_{X} (Y - Y_{d}) + F_{Y} X$$

Table 10.5 Two track rails and three slide units on each track rail







	Load applied on the slide unit		
Slide unit No.	Downward load Fr	Lateral load Fa	
1	$\frac{F_Z}{6} + \frac{M_r}{3L} + \frac{M_P}{2\ell}$	$\frac{F_{\text{Y}}}{6} + \frac{M_{\text{y}}}{2 \ell}$	
2	$\frac{F_Z}{6} + \frac{M_r}{3L}$	<u>F_Y</u> 6	
3	$\frac{F_Z}{6} + \frac{M_r}{3L} - \frac{M_P}{2\ell}$	$\frac{F_{Y}}{6} - \frac{M_{y}}{2\ell}$	
4	$\frac{F_Z}{6} - \frac{M_r}{3L} + \frac{M_P}{2\ell}$	$\frac{F_{Y}}{6} + \frac{M_{y}}{2\ell}$	
5	$\frac{F_Z}{6} - \frac{M_r}{3\ell}$	<u>F_Y</u> 6	
6	$\frac{F_{\rm Z}}{6} - \frac{M_{\rm r}}{3L} - \frac{M_{\rm P}}{2\ell}$	$\frac{F_{\rm Y}}{6} - \frac{M_{\rm y}}{2\ell}$	

Remark: The moment loads in each direction M_r , M_p , and M_y can be obtained by the following formulae.

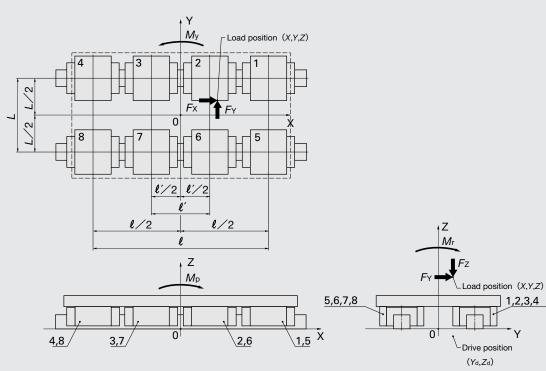
 $M_r = F_Y Z + F_Z Y$

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 $M_p = F_X (Z - Z_d) + F_Z X$

 $M_y = -F_X (Y - Y_d) + F_Y X$

Table 10.6 Two track rails and four slide units on each track rail



	Load applied on the slide unit		
Slide unit No.	Downward load	Lateral load	
	Fr	Fa	
1	$\frac{Fz}{8} + \frac{Mr}{4L} + \frac{Mp}{2} \frac{\ell}{\ell^2 + \ell^2}$	$\frac{F_{Y}}{8} + \frac{M_{y}}{2} \frac{\ell}{\ell^{2} + \ell^{2}}$	
2	$\frac{F_Z}{8} + \frac{M_r}{4L} + \frac{M_p}{2} \frac{\ell'}{\ell^2 + \ell'^2}$	$\frac{F_{Y}}{8} + \frac{M_{Y}}{2} \frac{\ell'}{\ell^2 + \ell'^2}$	
3	$\frac{F_z}{8} + \frac{M_r}{4L} - \frac{M_p}{2} \frac{\ell'}{\ell^2 + \ell'^2}$	$\frac{F_{Y}}{8} - \frac{M_{y}}{2} \frac{\ell'}{\ell'^{2} + \ell'^{2}}$	
4	$\frac{F_Z}{8} + \frac{M_r}{4L} - \frac{M_p}{2} \frac{\ell}{\ell^2 + \ell^2}$	$\frac{F_{Y}}{8} - \frac{M_{y}}{2} \frac{\ell}{\ell^{2} + \ell^{2}}$	
5	$\frac{F_Z}{8} - \frac{M_r}{4L} + \frac{M_p}{2} \frac{\ell}{\ell^2 + \ell^2}$	$\frac{F_{Y}}{8} + \frac{M_{y}}{2} \frac{\ell}{\ell^{2} + \ell^{2}}$	
6	$\frac{F_{Z}}{8} - \frac{M_{r}}{4L} + \frac{M_{p}}{2} \frac{\ell'}{\ell^{2} + \ell'^{2}}$	$\frac{F_{Y}}{8} + \frac{M_{y}}{2} \frac{\ell'}{\ell^2 + \ell'^2}$	
7	$\frac{F_{Z}}{8} - \frac{M_{r}}{4L} - \frac{M_{p}}{2} \frac{\ell'}{\ell^{2} + \ell'^{2}}$	$\frac{F_{Y}}{8} - \frac{M_{Y}}{2} \frac{\ell'}{\ell'^2 + \ell'^2}$	
8	$\frac{F_Z}{8} - \frac{M_r}{4L} - \frac{M_p}{2} \frac{\ell}{\ell^2 + \ell^{2}}$	$\frac{F_{Y}}{8} - \frac{M_{y}}{2} \frac{\ell}{\ell^{2} + \ell^{2}}$	

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Remark: The moment loads in each direction M_r , M_p , and M_y can be obtained by the following formulae.

 $M_r = F_Y Z + F_Z Y$

 $M_{\rm p} = F_{\rm X} (Z - Z_{\rm d}) + F_{\rm Z} X$

 $M_{y} = -F_{X} (Y - Y_{d}) + F_{Y} X$

Mean equivalent load for fluctuating load

When the load on the rolling guide fluctuates, the mean equivalent load P_m is used in place of the load P in the life calculation formula.

The mean equivalent load is a constant load which gives the basic rating life equal to that for the fluctuating load. It is obtained by the following formula.

$$P_{\rm m} = \sqrt[\rho]{\frac{1}{L} \int_0^L P_{\rm n}^{\rho} dL}$$
(1.9)

where, Pm: Mean equivalent load, N

L: Total traveling distance, m

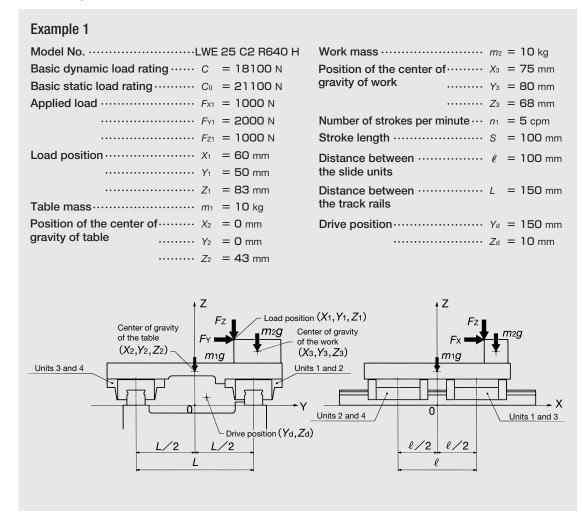
P_n: Fluctuating load, N

p: Exponent (Ball guide: 3, roller guide: 10/3)

Table 11 gives calculation examples of the mean equivalent load for typical fluctuating loads.

Exa	mple	Calculation formula
① Step load	P P ₁ P ₂ P _m	$P_{\rm m} = \sqrt[\rho]{\frac{1}{L}} (P_{\rm l}^{\ \rho} \ L_1 + P_2^{\ \rho} \ L_2 + \dots + P_{\rm n}^{\ \rho} \ L_{\rm n})$ where, L_1 : Total traveling distance under load P_1 , m L_2 : Total traveling distance under load P_2 , m $L_{\rm n}$: Total traveling distance under load $P_{\rm n}$, m
② Monotonously changing load	P Pmax Pm	$P_{ m m} \doteqdot rac{1}{3}(2P_{ m max}+P_{ m min})$ where, $P_{ m max}$: Maximum value of fluctuating load, N $P_{ m min}$: Minimum value of fluctuating load, N

Examples of Load and Life Calculation



The life and static safety factor under the above conditions are calculated as follows. Load factor f_w is assumed to be 1.5.

1 Load on the slide unit

Moments that occur due to the applied load and the table weight act around each coordinate axis of the Linear Motion Rolling Guide as shown below.

$$M_r = \Sigma (F_Y Z) + \Sigma (F_Z Y) = F_{Y1} Z_1 + F_{Z1} Y_1 + m_1 g Y_2 + m_2 g Y_3$$

 $= 2000 \times 83 + 1000 \times 50 + 10 \times 9.8 \times 0 + 10 \times 9.8 \times 80 \stackrel{.}{=} 224000$
 $M_p = \Sigma \{F_X (Z - Z_d)\} + \Sigma (F_Z X) = F_{X1} (Z_1 - Z_d) + F_{Z1} X_1 + m_1 g X_2 + m_2 g X_3$
 $= 1000 \times (83 - 10) + 1000 \times 60 + 10 \times 9.8 \times 0 + 10 \times 9.8 \times 75 \stackrel{.}{=} 140000$
 $M_y = -\Sigma \{F_X (Y - Y_d)\} + \Sigma (F_Y X) = -F_{X1} (Y_1 - Y_d) + F_{Y1} X_1$
 $= -1000 \times (50 - 150) + 2000 \times 60 = 220000$
where, M_r : Moment in the rolling direction, $N \cdot mm$

 $M_{\rm V}$: Moment in the yawing direction, N • mm

The loads applied on each slide unit are calculated according to Table 10.4 on page 33.

$$F_{r1} = \frac{\sum F_Z}{4} + \frac{M_r}{2L} + \frac{M_p}{2\ell} = \frac{F_{z1} + m_1 g + m_2 g}{4} + \frac{M_r}{2L} + \frac{M_p}{2\ell}$$

$$= \frac{1000 + 10 \times 9.8 + 10 \times 9.8}{4} + \frac{224000}{2 \times 150} + \frac{140000}{2 \times 100} \stackrel{=}{=} 1750$$

$$F_{r2} = \frac{\sum F_Z}{4} + \frac{M_r}{2L} - \frac{M_p}{2\ell} = \frac{F_{z1} + m_1 g + m_2 g}{4} + \frac{M_r}{2L} - \frac{M_p}{2\ell} \stackrel{=}{=} 346$$

$$F_{r3} = \frac{\sum F_Z}{4} - \frac{M_r}{2L} + \frac{M_p}{2\ell} = \frac{F_{z1} + m_1 g + m_2 g}{4} - \frac{M_r}{2L} + \frac{M_p}{2\ell} \stackrel{=}{=} 252$$

$$F_{r4} = \frac{\sum F_Z}{4} - \frac{M_r}{2L} - \frac{M_p}{2\ell} = \frac{F_{z1} + m_1 g + m_2 g}{4} - \frac{M_r}{2L} - \frac{M_p}{2\ell} \stackrel{=}{=} -1150$$

$$F_{a1} = F_{a3} = \frac{\sum F_Y}{4} + \frac{M_Y}{2\ell} = \frac{F_{Y1}}{4} + \frac{M_Y}{2\ell}$$

$$= \frac{2000}{4} + \frac{220000}{2 \times 100} = 1600$$

$$F_{a2} = F_{a4} = \frac{\sum F_Y}{4} - \frac{M_Y}{2\ell} = \frac{F_{Y1}}{4} - \frac{M_Y}{2\ell} = -600$$

2Basic rating life

The upward/downward load and lateral load are converted into the conversion loads by formulas (1.5) and (1.6) on page 25.

$$F_{re1} = k_r |F_{r1}| = 1 \times 1750 = 1750$$

$$F_{re2} = k_r |F_{r2}| = 1 \times 346 = 346$$

$$F_{re3} = k_r |F_{r3}| = 1 \times 252 = 252$$

$$F_{re4} = k_r |F_{r4}| = 1 \times 1150 = 1150$$

$$F_{ae1} = k_a |F_{a1}| = 1 \times 1600 = 1600$$

$$F_{ae2} = k_a |F_{a2}| = 1 \times 600 = 600$$

$$F_{ae3} = k_a |F_{a3}| = 1 \times 1600 = 1600$$

$$F_{ae4} = k_a |F_{a4}| = 1 \times 600 = 600$$

where, k_r , k_a : Conversion factors for load direction (See Table 7 on page 26.)

The dynamic equivalent load is calculated by formula (1.7) on page 25.

$$P_1 = X |F_{re1}| + Y |F_{ae1}| = 1 \times 1750 + 0.6 \times 1600 = 2710$$

$$P_2 = X |F_{re2}| + Y |F_{ae2}| = 0.6 \times 346 + 1 \times 600 \stackrel{.}{=} 808$$

$$P_3 = X |F_{re3}| + Y |F_{ae3}| = 0.6 \times 252 + 1 \times 1600 \stackrel{.}{=} 1750$$

$$P_4 = X |F_{re4}| + Y |F_{ae4}| = 1 \times 1150 + 0.6 \times 600 = 1510$$

The basic rating life of slide unit 1 receiving the largest dynamic equivalent load is calculated. The basic rating life is obtained by the formula given in Table 2 on page 21 while considering the load factor f_w .

$$L_1 = 50 \left(\frac{C}{f_w P_1} \right)^3 = 50 \times \left(\frac{18100}{1.5 \times 2710} \right)^3 \stackrel{\cdot}{=} 4410$$

$$L_{h1} = \frac{10^6 L_1}{25 n_1 \times 60} = \frac{10^6 \times 4410}{2 \times 100 \times 5 \times 60} = 73500$$

As the result of the above calculation, the basic rating life is about 73500 hours.

Static safety factor

The static equivalent load is calculated from the upward/downward load and lateral load by formula (1.8) on page 27.

$$P_{01} = k_{0r} |F_{r1}| + k_{0a} |F_{a1}| = 1 \times 1750 + 1 \times 1600 = 3350$$

$$P_{02} = k_{0r} |F_{r2}| + k_{0a} |F_{a2}| = 1 \times 346 + 1 \times 600 = 946$$

$$P_{03} = k_{0r} |F_{r3}| + k_{0a} |F_{a3}| = 1 \times 252 + 1 \times 1600 = 1852$$

$$P_{04} = k_{0r} |F_{r4}| + k_{0a} |F_{a4}| = 1 \times 1150 + 1 \times 600 = 1750$$

where, kor, koa: Conversion factors for load direction (See Table 8 on page 28.)

The static safety factor of slide unit 1 receiving the largest static equivalent load is obtained. The static safety factor is calculated by formula (1.3) on page 24.

$$f_{\rm s1} = \frac{C_0}{P_{01}} = \frac{21100}{3350} \doteq 6.3$$

As the result of the above calculation, the static safety factor is about 6.3.

Example 2	
Model NoLWH 45 C2 R1050 B H	
Basic dynamic load rating \cdots $C = 74600 \text{ N}$	Distance between ····· ℓ = 200 mm
Basic static load rating $\cdots \sim C_0 = 80200 \text{ N}$	the slide units
Static moment rating $\cdots \tau_0 = 1610 \mathrm{N} \cdot \mathrm{m}$	Stroke length · · · · · S = 500 mm
in the To direction	Number of strokes per minute \cdots $n_1 = 6$ cpm
Table mass $m_1 = 100 \text{ kg}$	Maximum travel speed · · · · · · V = 100 mm/s
Position of the center of $X_1 = 50 \text{ mm}$	Time spent for acceleration $\cdots t_1 = 0.1 s$
gravity of table $\dots Y_1 = 0 \text{ mm}$	Time spent during constant \cdots $t_2 = 4.9 \text{ s}$
$Z_1 = 80 \text{ mm}$	speed motion
Work mass m ₂ = 1000 kg	Time spent for deceleration \cdots $t_3 = 0.1 s$
Position of the center of $X_2 = 200 \text{ mm}$	Drive position ····· Y _d = 60 mm
gravity of work $\dots Y_2 = 10 \text{ mm}$	$Z_d = -20 \text{ mm}$
$Z_2 = 130 \text{ mm}$	
+ Z	↓Z Inertia force of
	the work
Position of center of gravity of the work Stroke	Inertia force of
(X_2,Y_2,Z_2)	the table
↓ <i>m</i> 1 <i>g</i> Position of center of	
gravity of the table	
(X ₁ ,Y ₁ ,Z ₁)	
0 Y	0 X
Unit 2 Drive position	Unit 1
(Y_d,Z_d)	1/2 1/2
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The life and static safety factor under the above conditions are calculated as follows. Load factor f_w is assumed to be 1.5.

1 Load on the slide unit

Moments that occur due to the applied load, the table weight and the inertia force act around each coordinate axis of the Linear Motion Rolling Guide as shown below.

·During acceleration at the start of motion

$$\begin{split} M_{r} &= \sum (F_{Y} Z) + \sum (F_{Z} Y) = m_{1} g Y_{1} + m_{2} g Y_{2} = 100 \times 9.8 \times 0 + 1000 \times 9.8 \times 10 \stackrel{.}{=} 98000 \\ M_{p} &= \sum \{F_{X} (Z - Z_{d})\} + \sum (F_{Z} X) \\ &= m_{1} \frac{V}{1000 \times t_{1}} (Z_{1} - Z_{d}) + m_{2} \frac{V}{1000 \times t_{1}} (Z_{2} - Z_{d}) + m_{1} g X_{1} + m_{2} g X_{2} \\ &= 100 \times \frac{100}{1000 \times 0.1} \times (80 + 20) + 1000 \times \frac{100}{1000 \times 0.1} \times (130 + 20) \\ &+ 100 \times 9.8 \times 50 + 1000 \times 9.8 \times 200 \stackrel{.}{=} 2169000 \\ M_{y} &= -\sum \{F_{X} (Y - Y_{d})\} + \sum (F_{Y} X) \\ &= -m_{1} \frac{V_{\text{max}}}{1000 \times t_{1}} (Y_{1} - Y_{d}) - m_{2} \frac{V_{\text{max}}}{1000 \times t_{2}} (Y_{2} - Y_{d}) \end{split}$$

 $=-100 \times \frac{100}{1000 \times 0.1} \times (0-60) - 1000 \times \frac{100}{1000 \times 0.1} \times (10-60) = 56000$

During constant speed motion

$$M_r = m_1 g Y_1 + m_2 g Y_2 = 98000$$

 $M_p = m_1 g X_1 + m_2 g X_2 = 2010000$
 $M_y = 0$

 $M_r = m_1 g Y_1 + m_2 g Y_2 = 98000$

During deceleration at the end of motion

$$M_{\rm p} = -m_1 \frac{V_{\rm max}}{t_1} (Z_1 - Z_{\rm d}) - m_2 \frac{V_{\rm max}}{t_1} (Z_2 - Z_{\rm d}) + m_1 g X_1 + m_2 g X_2 \stackrel{.}{=} 1850000$$

$$M_{\rm y} = m_1 \frac{V_{\rm max}}{t_1} (Y_1 - Y_{\rm d}) + m_2 \frac{V_{\rm max}}{t_2} (Y_2 - Y_{\rm d}) = -56000$$

where, M_r : Moment in the rolling direction, N • mm

 $M_{\rm p}$: Moment in the pitching direction, N • mm

 $M_{\rm y}$: Moment in the yawing direction, N • mm

The loads applied on each slide unit are calculated according to Table 10.2 on page 31.

·During acceleration at the start of motion

$$F_{r1} = \frac{\sum F_Z}{2} + \frac{M_P}{\ell} = \frac{m_1 g + m_2 g}{2} + \frac{M_P}{\ell} = \frac{100 \times 9.8 + 1000 \times 9.8}{2} + \frac{2169000}{200} \stackrel{.}{=} 16200$$

$$F_{r2} = \frac{\sum F_Z}{2} - \frac{M_P}{\ell} = \frac{m_1 g + m_2 g}{2} - \frac{M_P}{\ell} \stackrel{.}{=} -5460$$

$$F_{a1} = \frac{\sum F_Y}{2} + \frac{M_Y}{\ell} = 280$$

$$F_{a2} = \frac{\sum F_Y}{2} - \frac{M_Y}{\ell} = -280$$

$$M_{01} = M_{02} = \frac{M_r}{2} = 49000$$

During constant speed motion

$$F_{r1} = \frac{100 \times 9.8 + 1000 \times 9.8}{2} + \frac{2010000}{200} = 15400$$

$$F_{r2} = -4660$$

$$F_{r2} = -4660$$

$$F_{a1} = F_{a2} = 0$$

$$M_{01} = M_{02} = 49000$$

·During deceleration at the end of motion

$$F_{r1} = \frac{100 \times 9.8 + 1000 \times 9.8}{2} + \frac{1850000}{200} = 14600$$

$$F_{r2} = -3860$$

$$F_{a1} = -280$$

$$M_{01} = M_{02} = 49000$$

2Basic rating life

The upward/downward load, lateral load, and moment in the T_0 direction are converted into the conversion loads by formulas (1.5) and (1.6) on page 25, and the dynamic equivalent load is calculated by formula (1.7).

During acceleration at the start of motion

$$F_{\text{re1}} = k_r \left| F_{\text{r1}} \right| + \frac{C_0}{T_0} \left| M_{01} \right| = 1 \times 16200 + \frac{80200}{1610} \times \frac{49000}{1000} \stackrel{.}{=} 18600$$

$$F_{\text{re2}} = 1 \times 5460 + \frac{80200}{1610} \times \frac{49000}{1000} \stackrel{.}{=} 7900$$

$$F_{ae1} = k_a |F_{a1}| = 1.28 \times 280 = 358$$

$$F_{\text{ae2}} = 1.28 \times 280 = 358$$

$$P_1 = X F_{\text{re1}} + Y F_{\text{ae1}} = 1 \times 18600 + 0.6 \times 358 = 18800$$

$$P_2 = X F_{re2} + Y F_{ae2} = 1 \times 7900 + 0.6 \times 358 = 8110$$

During constant speed motion

$$F_{\text{re1}} = 1 \times 15400 + \frac{80200}{1610} \times \frac{49000}{1000} = 17800$$

$$F_{\text{re2}} = 1 \times 4660 + \frac{80200}{1610} \times \frac{49000}{1000} = 7100$$

$$F_{\text{ae1}} = 0$$

$$F_{ae2} = 0$$

$$P_1 = 17800$$

$$P_2 = 7100$$

·During deceleration at the end of motion

$$F_{\text{re1}} = 1 \times 14600 + \frac{80200}{1610} \times \frac{49000}{1000} = 17000$$

$$F_{\text{re2}} = 1 \times 3860 + \frac{80200}{1610} \times \frac{49000}{1000} = 6300$$

$$F_{\text{ae1}} = 1.28 \times 280 = 358$$

$$F_{\text{ae2}} = 1.28 \times 280 = 358$$

$$P_1 = 1 \times 17000 + 0.6 \times 358 = 17200$$

$$P_2 = 1 \times 6300 + 0.6 \times 358 = 6510$$

Because the dynamic equivalent load changes stepwise along the traveling distance, the average load is calculated from 1 in Table 11 on page 36.

$$P_{m1} = \sqrt[3]{\frac{1}{S}} \left(P_1^3 \frac{V_{\text{max}} t_1}{2} + P_2^3 V_{\text{max}} t_2 + P_3^3 \frac{V_{\text{max}} t_3}{2} \right)$$

$$= \left\{ \frac{1}{500} \times \left(18800^3 \times \frac{100 \times 0.1}{2} + 17800^3 \times 100 \times 4.9 + 17200^3 \times \frac{100 \times 0.1}{2} \right) \right\}^{1/3} \stackrel{.}{=} 17800$$

$$P_{m2} = \left\{ \frac{1}{500} \times \left(8110^3 \times \frac{100 \times 0.1}{2} + 7100^3 \times 100 \times 4.9 + 6510^3 \times \frac{100 \times 0.1}{2} \right) \right\}^{1/3} \stackrel{.}{=} 7110$$

The basic rating life of slide unit 1 receiving the largest dynamic equivalent load is calculated. The basic rating life is obtained by the formula given in Table 2 on page 21 while considering the load factor fw.

$$L_1 = 50 \left(\frac{C}{\text{fw } P_{\text{m1}}} \right)^3 = 50 \left(\frac{74600}{1.5 \times 17800} \right)^3 \stackrel{.}{=} 1090$$

$$L_{h1} = \frac{10^6 L_1}{25 n_1 \times 60} = \frac{10^6 \times 1090}{2 \times 500 \times 6 \times 60} = 3030$$

As the result of the above calculation, the basic rating life is about 3030 hours.

3Static safety factor

The static equivalent load is calculated from the upward/downward load and lateral load by formula (1.8) on page 27.

·During acceleration at the start of motion

$$P_{01} = k_{0r}|F_{r1}| + k_{0a}|F_{a1}| + \frac{C_0}{T_0}|M_{01}| = 1 \times 16200 + 1.28 \times 280 + \frac{80200}{1610} \times \frac{49000}{1000} = 19000$$

$$P_{02} = k_{0r} |F_{r2}| + k_{0a} |F_{a2}| + \frac{C_0}{T_0} |M_{02}| = 1.19 \times 5460 + 1.28 \times 280 + \frac{80200}{1610} \times \frac{49000}{1000} = 9300$$

During constant speed motion

$$P_{01} = 1 \times 15400 + 1.28 \times 0 + \frac{80200}{1610} \times \frac{49000}{1000} = 19000$$

$$P_{02} = 1.19 \times 4660 + 1.28 \times 0 + \frac{80200}{1610} \times \frac{49000}{1000} = 7990$$

·During deceleration at the end of motion

$$P_{01} = 1 \times 14600 + 1.28 \times 280 + \frac{80200}{1610} \times \frac{49000}{1000} = 17400$$

$$P_{02} = 1.19 \times 3860 + 1.28 \times 280 + \frac{80200}{1610} \times \frac{49000}{1000} = 7390$$

The static safety factor of slide unit 1 during acceleration at the start receiving the largest static equivalent load is calculated. The static safety factor is obtained by formula (1.3) on page 24.

$$f_s = \frac{C_0}{P_{01}} = \frac{80200}{19000} \stackrel{.}{=} 4.2$$

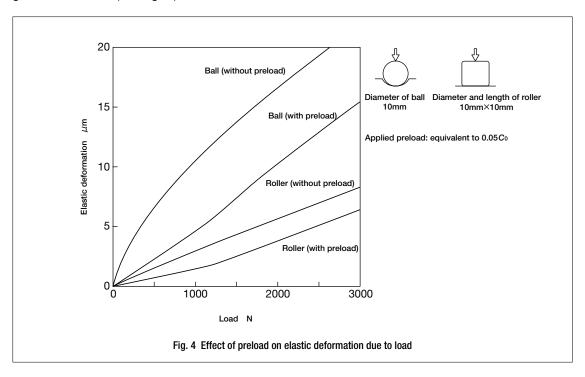
As the result of the above calculation, the static safety factor is about 4.2.

Preload

Purpose of preload

A clearance may be given to linear motion rolling guides, when the load is small and very smooth motion is required. However, in many cases, preload is preferred, because it eliminates play in the guide mechanism and increases the rigidity of rolling guide.

Preload is given by applying an internal stress, in advance, to the contact area between raceways and rolling elements. When a load is applied on the preloaded rolling guide, elastic deformation due to the load is smaller compared to that without preload by the effect of this internal stress, and the rigidity of rolling guide is increased. (See Fig. 4.)



Setting preload

The preload amount is determined by considering the characteristics of the machines and equipment on which the rolling guide is mounted and the nature of load acting on the rolling guide. The standard amount of preload for linear motion rolling guides is, in general, approx. 1/3 of load when the rolling elements are balls (steel balls) and approx. 1/2 of load when they are rollers (cylindrical rollers). If the rolling guides are required to have very high rigidity to withstand vibration or fluctuating load, a larger preload may be applied.

Cautions on Preload Selection

Even when high rigidity must be obtained, excessive preload should be avoided, because it will produce an excessive stress between rolling elements and raceways, and eventually result in short life of rolling guides. It is important to apply a proper amount of preload, considering the operating conditions. When linear motion rolling guides must be used with a large preload, consult **IKD** for further information. Linear Bushing and Stroke Rotary Bushing should never be given a large amount of preload.

Friction

Friction of Linear Motion Rolling Guides

The static friction (start-up friction) of linear motion rolling guides is much lower than that of conventional plain guides. Also, the difference between static friction and dynamic friction is small, and friction varies little when velocity changes. These are excellent features of linear motion rolling guides, and account for their ability to reduce power consumption, suppress operating temperature rise, and increase traveling

Since frictional resistance and variation are small, high speed response to motion commands and high accuracy positioning can be achieved.

Friction coefficient

The frictional resistance of rolling guides varies with their type, load, traveling speed and lubricant used. Generally speaking, lubricants or seals are major factors in determining the frictional resistance in light load and high speed applications, while the magnitude of load is the major factor in heavy load and low speed applications. The frictional resistance of rolling guides actually depends on various factors, but the following formula is used for practical purposes.

$$F = \mu P$$
 (1.10)

where, F: Frictional resistance, N

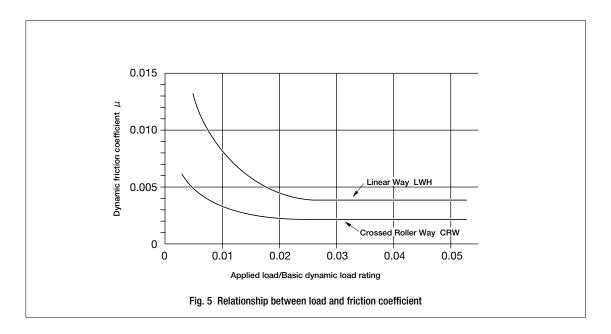
 μ : Dynamic friction coefficient

P: Load, N

For sealed guides, seal resistance is added to the above value, but this resistance varies greatly with the interference amount of seal lip and lubrication conditions.

Where the methods of lubrication and mounting are correct and the load is moderate, the friction coefficients of linear motion rolling guide in operation are within the range shown in Table 12. Generally, friction coefficient is large under small load. Fig. 5 gives typical examples of this relationship.

Series	Dynamic friction coefficient $\mu(1)$
Linear Way	0.0040~0.0060
Linear Roller Way	0.0020~0.0040
Linear Ball Spline	0.0020~0.0040
Crossed Roller Way	0.0010~0.0030
Precision Linear Slide	0.0010~0.0020
Linear Bushing	0.0020~0.0030
Stroke Rotary Bushing	0.0006~0.0012
Flat Roller Cage	0.0010~0.0030



Lubrication

Purpose of lubrication

The purpose of lubrication for linear motion rolling guides is to keep raceways, rolling elements, etc. from direct metal-to-metal contact, and thereby reduce friction and wear and prevent heat generation and seizure. When an adequate oil film is formed between the raceways and rolling elements at the rolling contact area, the contact stress due to load can be moderated. Lubrication is important for ensuring the reliability of linear motion rolling guides.

Selection of lubricant

To obtain the full performance of linear motion rolling guides, it is necessary to select an appropriate lubricant and lubrication method by considering the type, load and speed of each linear motion rolling guide. However, as compared with plain guides, lubrication of linear motion rolling guides is much simpler. Only a small amount of lubricant is needed and the replenishment interval is longer, so maintenance can be greatly reduced. Oil and grease are the two most commonly used lubricants for linear motion rolling guides.

Grease lubrication

For grease lubrication of linear motion rolling guides, lithium-soap base grease (Consistency No.2 of JIS) is commonly used. For rolling guides operating under heavy load conditions, grease containing extreme pressure additives is recommended.

In clean and high-vacuum environments, where low dust generation performance and low vaporization characteristics are required, greases containing a synthetic base oil or a soap other than the lithium-soap base are used. For applications in these environments, due consideration is necessary to select a grease type that is suitable for the special operating conditions and achieves satisfactory lubrication performance at the same time.

Grease Replenishment Interval

The quality of any grease will gradually deteriorate as operating time passes. Therefore, periodic relubrication is necessary. The relubrication interval varies depending on the operating conditions of the rolling guides. A six month interval is generally recommended and, if the machine operation consists of reciprocating motions with many cycles and long strokes, relubrication every three months is recommended.

Grease Replenishment Method

New grease must be supplied through a grease feed device such as a grease nipple until old grease is discharged. After grease is replenished, running in is performed and excess grease will be discharged from the inside of rolling guide. Discharged grease must then be removed before starting the operation.

The amount of grease required for standard replenishment is about 1/3 to 1/2 of the free space inside the linear motion rolling guide. When grease is supplied from a grease nipple for the first time, there will be grease lost in the replenishment path. The amount lost should be taken into consideration.

Generally, immediately after grease is replenished, frictional resistance tends to increase. If running-in is performed for 10 to 20 reciprocating cycles after excess grease is discharged, frictional resistance becomes small and stable.

For applications where low frictional resistance is required, the replenishment amount of grease may be reduced, but it must be kept to an appropriate level so as not to give a bad influence on the lubrication performance.

46 1mm=0.03937inch

Mixing of Different Grease Types

Mixing different types of greases may result in changing the properties of base oil, soap base, or additives used, and, in some cases, severely deteriorate the lubrication performance or cause a trouble due to chemical changes of additives. Old grease should therefore be removed thoroughly before filling with new

Grease Brands for Linear Motion Rolling Guides

Name		Base oil	Thickener	Service range ℃	Remarks
ALVANIA GREASE EP2	SHELL	Mineral oil	Lithium	-20~+110	General applications, contains extreme pressure additives
ALVANIA GREASE S2	SHELL	Mineral oil	Lithium	-25~+120	General applications
MULTEMP PS NO.2	KYODO OIL	Synthetic oil, mineral oil	Lithium	-50~+130	General applications
IKO CLEAN ENVIRONMENT GREASE CG2	NIPPON THOMPSON	Synthetic oil	Urea	-40~+200	For clean environment, long life
IKU CLEAN ENVIRONMENT GREASE CGL	NIPPON THOMPSON	Synthetic oil, mineral oil	Lithium/Calcium	-30~+120	For clean environment, Low friction
DEMNUM GREASE L-200 (1)	DAIKIN	Synthetic oil	Ethylene tetra-fluoride	-60~+300	For clean environment
FOMBLIN YVAC3 (1)	AUSIMONT	Synthetic oil	Ethylene tetra-fluoride	-20~+200	For vacuum environment
IKO ANTI-FRETTING CORROSION GREASE	NIPPON THOMPSON	Synthetic oil	Urea	−50~+170	Fretting-proof
6459 GREASE N	SHELL	Mineral oil	Poly-urea	_	Fretting-proof

Note(1): Set a little shorter replenishment interval.

Remark: When using a grease type, check the selected type according to the manufacturer's catalog of grease.

For applications other than those described above, consult **IKO** for further information.

Oil lubrication

For oil lubrication, heavy loads require a higher oil viscosity and higher operating speeds require a lower viscosity. Generally, for linear motion rolling guides operating under heavy loads, lubrication oil with a viscosity of about 68 mm²/s is used. For linear motion rolling guides under light loads at high speeds, lubrication oil with a viscosity of about 13 mm²/s is used.

Operating Environment

Operating temperature

When linear motion rolling guides are operated at a temperature exceeding 150°C, the basic dynamic load rating must be corrected by using the temperature factor.

Some linear motion rolling guides comprise synthetic resin components. When they are used at high temperature, these components may not endure the high temperature. The maximum operating temperature for these linear motion rolling guides is 120°C. For continuous operation, they can be operated at temperatures not exceeding 100°C. C-Lube Linear Way must be used under 80°C (maximum). If the operating temperature exceeds 100°C, consult **IKO** for further information.

Dust protection

Purpose of dust protection

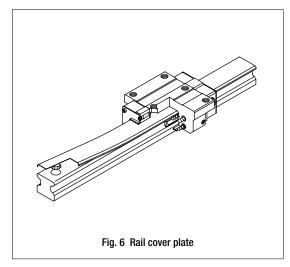
To obtain the full performance of linear motion rolling guides, it is important to protect them from the intrusion of dust and other harmful foreign matter. Select an effective sealing or dust-protection device to withstand any operating conditions that might be imposed.

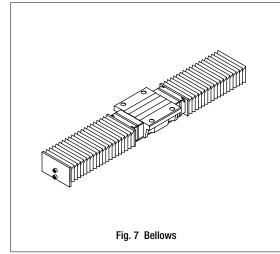
Method of dust protection

Sealed types are available in some linear motion rolling guide series.

Linear Way and Linear Roller Way have end seals as a standard specification. In addition, double seals or scrapers are provided as special specifications for improvement in dust protection performance. Caps for covering the track rail mounting holes and a rail cover plate (Fig. 6) for covering the top surface of the track rail will further increase the reliability for dust protection.

However, when a large amount of dust or foreign particles are floating in air, or when large foreign substances such as chips or sand fall onto raceways, dust protection becomes difficult. In this case, it is recommended to cover the entire guide mechanism with bellows (Fig. 7), telescopic shields, etc.





48 1mm=0.03937inch

Linear Way Linear Roller Way



Description of Linear Way and Linear Roller Way ···	·52
C-Lube Linear Way ML ·····	-A-2
C-Lube Linear Way ME·····	·A-18
C-Lube Linear Way MH·····	A-40
C-Lube Linear Way MUL	A-60
C-Lube Linear Roller Way Super MX ······	·A-70
C-Lube Linear Ball Spline MAG ·····	A-100
Linear Way L ·····	B-2
Linear Way E ·····	B-30
Low Decibel Linear Way E	B-56
Linear Way H·····	B-74
Linear Way F ·····	B-110
Linear Way U·····	B-130
Linear Way Module ·····	B-142
Linear Roller Way Super X ······	·C-2

Features of Linear Way and Linear Roller Way

IKD Linear Way and Linear Roller Way are linear motion rolling guides which achieve endless linear motion of a slide unit along a track rail by re-circulating rolling elements inside the slide unit. Slide units and track rails are fixed on machines and equipment with mounting bolts, and a highly accurate linear motion can readily be obtained.

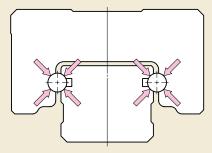
As compared with other types of linear motion rolling guides, Linear Way and Linear Roller Way have the following features.

Lower manufacturing cost

It is not necessary to prepare a guide plane on machines and equipment by heat treatment and surface finishing. A large reduction in man-hour and cost can be achieved in the design and manufacturing of linear motion guide mechanism.

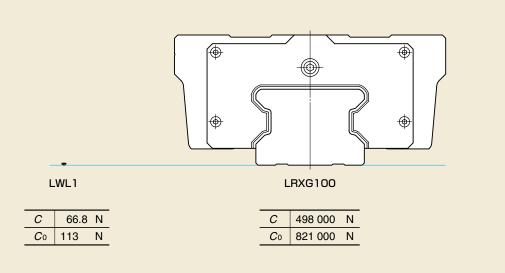
Large load capacity in any directions

Loads in any directions can be received without making a complicated guide structure. A linear motion rolling guide mechanism can readily be obtained that can withstand moment load and complex load.



Wide range of selections for high degree of design freedom

A wide range of variations in types and sizes makes it possible to select a model most suitable for the operating conditions. Size variations range from track rail width 1 mm to 100 mm.



High rigidity for achieving compact design of machines and equipment

Because the track rail is firmly fixed on the mating mounting surface over its total length, high rigidity can be obtained in comparison with shaft type guides which may be affected by shaft bending.

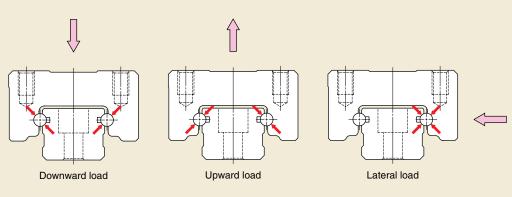
Features of Linear Way

IKO Linear Way features the design in which large diameter steel balls are arranged in two rows with each ball making four-point contact with the raceways, and has following advantages over other types.

1

Large load capacity in any directions

The simple two-row raceway design makes it possible to incorporate large diameter steel balls for high load ratings. Loads in any directions can almost uniformly be received.



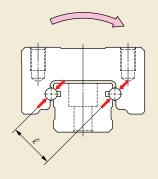
Load acting on rolling elements in each loading direction

2

54

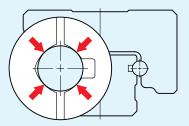
Excellent strength against moment load and complex load

A large moment load capacity can be obtained, since the moment arm distance ℓ is long as shown in the figure. Load capacity under complex load is also large.



When To moment is applied

Four-points contact structure

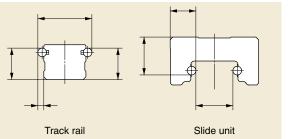


3

High accuracy with simple structure

The simple two-row raceway design minimizes the number of potential errors in manufacturing and measurement, and high dimensional accuracy of raceways can be obtained.

Interchangeable specification products can be manufactured benefiting from this feature by rigorous control of the dimensional accuracy of individual slide units and track rails.



Measurement of raceway accuracy

4

Smooth operation and low noise

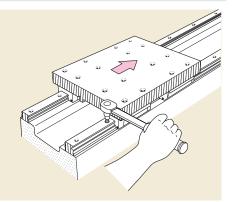
Smooth and quiet operation is achieved, because all raceway contours are precisely ground and the ball re-circulating routes are designed based on the analysis of optimal functional characteristics.

5

Accurate and simple installation

Accurate parallel mounting of two track rails can be made by aligning the attendant rail to the datum rail. Because the rigidity in the lateral direction is high, frictional resistance of poorly aligned two rails will steeply increase giving a warning so that misalignment can be easily detected and corrected. Potential troubles due to misalignment during actual operation such as short life, degradation in guide accuracy can therefore be eliminated in advance.

It is easy to butt-joint track rails to form longer lengths.

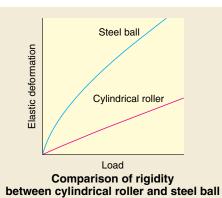


Features of Linear Roller Way

IKO Linear Roller Way features the design in which four rows of cylindrical rollers are arranged in a highly rigid casing in a well balanced form. The rollers in each row are arranged in parallel to each other and not crossed alternately. These linear motion rolling guides achieve smooth motion with high rigidity, high accuracy and high reliability.

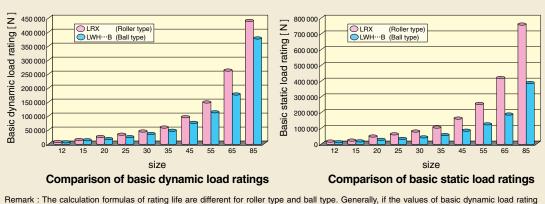
Super high rigidity

Very high rigidity is achieved owing to the excellent elastic deformation characteristics of cylindrical rollers which give smaller elastic deformation under load as compared with steel balls, and, in addition, to a large number of cylindrical rollers incorporated in the slide unit.



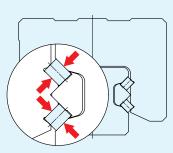
Super high load capacity

Cylindrical rollers give a larger contact area compared to steel balls, so higher load capacity is attainable when cylindrical rollers are used. Incorporating a large number of cylindrical rollers, Linear Roller Way has a very high load rating.



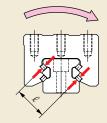
are the same, the life of the roller type is longer.

Parallel arrangement



Excellent load balance and moment load capacity

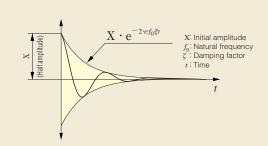
Cylindrical rollers are arranged in a well-balanced form so that they can uniformly withstand loads in all directions. In addition, rows are arranged in such a way that the moment arm distance ℓ between the loading points is large under T_0 moment. A high moment load capacity can be obtained.

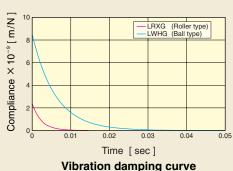


When To moment is applied

Excellent vibration characteristics

As compared with ball types of the same size, these guides have higher rigidity and give smaller deformation under repeated fluctuating load. The natural frequency is high, and the vibration damping time is short.





High running performance

The optimum design based on the analysis of roller re-circulation behavior achieves smooth and quiet

Remark: Features mentioned above are those of C-Sleeve Linear Roller Way Super MX and Linear Roller Way Super X which are the typical roller guides.

56 1mm=0.03937inch

		Series		Referen
		Miniature Maintenance Free Linear Way C-Lube Linear Way ML		C-Lube Linear Way ML is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of miniature type Linear Way L series to achieve maintenance free operations for a long period of time.
	Maintenance Free Series C-Lube Linear Way C-Lube Linear Roller Way C-Lube Linear Ball Spline	Compact Maintenance Free Linear Way C-Lube Linear Way ME		C-Lube Linear Way ME is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of compact type Linear Way LWE series to achieve maintenance free operations for a long period of time.
		High Rigidity Maintenance Free Linear Way C-Lube Linear Way MH		C-Lube Linear Way MH is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of high rigidity type Linear Way LWH series to achieve maintenance free operations for a long period of time.
		U-shaped Maintenance Free Linear Way C-Lube Linear Way MUL		C-Lube Linear Way MUL is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of U shaped track rail type Linear Way LWUL series to achieve maintenance free operations for a long period of time.
		Maintenance Free Linear Roller Way C-Lube Linear Roller Way Super MX		C-Lube Linear Roller Way Super MX is a high performance roller type linear motion rolling guide,featuring high reliability,high rigidity,high accuracy and smooth motion which is required from machine tool, semiconductor manufacturing and liquid crystal manufacturing equipments.
		Maintenance Free Linear ball Spline C-Lube Linear Ball Spline MAG		A maintenance free type has been released for IKO Ball Spline MAG having an overwhelmingly high market share in the field of semiconductor and liquid crystal manufacturing systems that are forced to be operated in severe operating conditions of high acceleration/deceleration motion.
Linear Motion Rolling Guides	Linear Way	Miniature Type Linear Way Linear Way L	# *	This is the smallest of the Linear Ways. Sizes with track rail width as small as 1mm and upward are made available owing to the simple and compact design of 1)CD Linear Way.
		Compact Type Linear Way Linear Way E		Lower, narrower and shorter. Compactness has been pursued in every dimension.
		Low Decibel Linear Way Low Decibel Linear Way E		Plastic separators are incorporated to eliminate direct contact between balls and thus achieve smooth and quiet motion.
		High Rigidity Type Linear Way Linear Way H		Incorporating large diameter steel balls as rolling elements, the product of this series has large load ratings.
		Wide Rail Type Linear Way Linear Way F		As a wide track rail is used, a large moment load as well as a complex load can be received. This series is best suited to a single row rail arrangement, which provides a simple guide structure.
		U-shaped Track Rail Linear Way Linear Way U		By adopting a U-shaped track rail, rigidity against moment and torsion is greatly improved.
	Linear Way Module	Linear Way Module LM Linear Way Module M		The product of this series requires the smallest mounting space. A track rail and a slide member are designed as a set, and two sets are arranged in parallel for standard applications.
	Linear Roller Way	Linear Roller Way Super X		Cylindrical rollers are used as rolling elements, and arranged in four rows with the rollers in each row being aligned in parallel to each other. Excellent load carrying performance is obtained in all directions. The mounting dimensions of this series are interchangeable with those of Linear Way H, so these two series can be exchanged readily.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch 58

Maintenance Free Linear Motion Rolling Guide Series

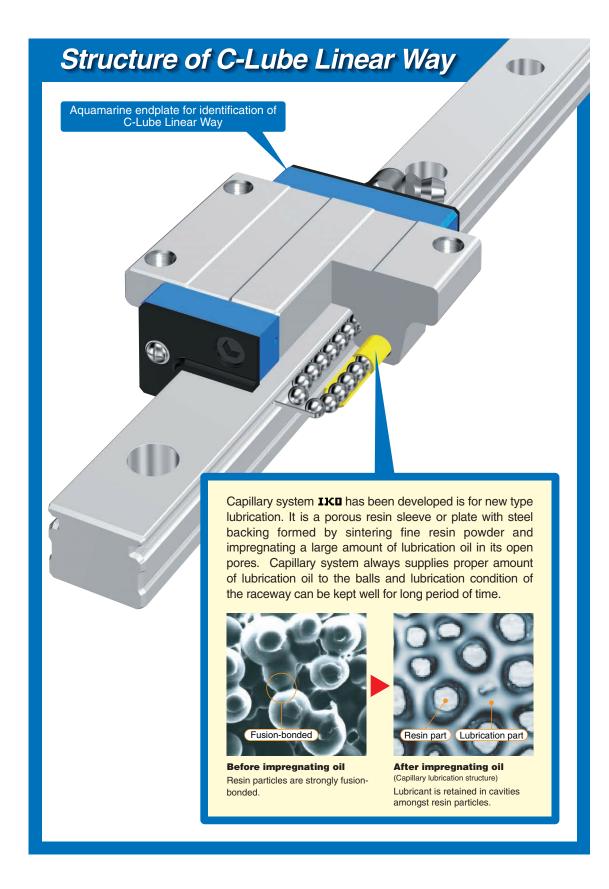
This Maintenance Free series can reduce the man-hours for troublesome lubrication control and achieve long-term maintenance free operations. In Maintenance Free series, Miniature type C-Lube Linear Way ML, Compact type C-Lube Linear Way ME, High Rigidity type C-Lube Linear Way MH, U-shaped track rail type C-Lube Linear Way MUL, C-Lube Linear Roller Way Super MX, C-Lube Linear Ball Spline MAG and Linear (Roller) Ways with self lubrication Capillary plate are available.



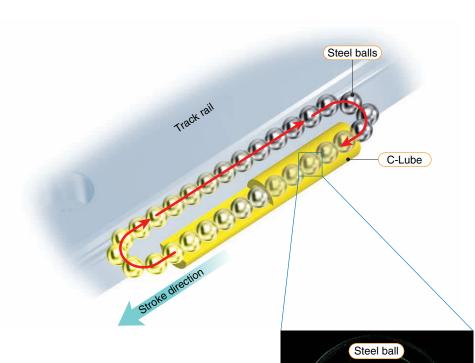
Feature of C-Lube Linear Way Maintenance free for 20,000km or 5 years Interchangeable is newly available. Maintenance Free Ecology Ability of lubrication is maintained for C-Lube contributes to global long term, the cost of lubrication environment protection because the management and system can be amount of lubricant can be minimized. reduced. Smoothness Compactness No increase in carriage length unlike Light and smooth running is a bolt-on external lubrication parts. achieved by the improvement of No loss of available stroke length design. It is designed not to have when replacing standard unit. contact to track rail and this has brought a very smooth friction.

61

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch



C-Lube lubrication mechanism

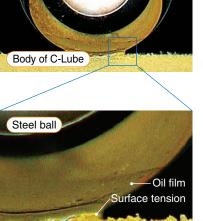


Lubricant is distributed by the circulation of the steel balls.

Lubricant is supplied directly to the steel balls. As the steel circulate, the lubricant is distributed to the loading area along the track rail. This results in adequate lubrication being properly maintained in the loading area for a long time.



The surface of C-Lube is always covered with the lubricant. Lubricant is continuously supplied to the surface of steel ball by surface tension in the contact of C-Lube surface and steel balls. New oil permeates automatically from the core of C-Lube to the internal surface that comes in contact with steel balls.



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

63

Body of C-Lube

Interchangeable Specification

IKO Linear Way and Linear Roller Way include interchangeable specification products. The track rails and the slide units of this specification can be handled separately and can be assembled to make a set as required.

The interchangeable specification guides are produced with the original precision manufacturing technology, making the most of the **IKD** guide designs: namely, the simple two-row raceway and four-point contact ball design of ball types, and the unique four-row raceway and parallel recirculating roller design of roller types. The dimensional accuracy of both slide units and track rails is strictly controlled to achieve the interchangeability of higher standard.



Wide range of variations

The models for which the interchangeable specification is applicable are indicated by a star-mark $(\mbox{$\frac{1}{2}$})$ in the table of dimensions of each series.

C-Lube Linear Way ML

(page A-2 to page A-17)
6 types and 37 models

C-Lube Linear Way ME

(page A-18 to page A-39)
18 types and 81 models

C-Lube Linear Roller Way Super MX

(page **A-70** to page **A-99**)

13 types and 75 models

Linear Way L

(page B-2 to page B-29) 8 types and 46 models

Linear Way H

(page B-74 to page B-109) 14 types and 76 models

C-Lube Linear Way MH (page A-40 to page A-61) 12 types and 52 models

C-Lube Linear Ball Spline MAG

(page A-100 to page A-109)
4 types and 20 models

Linear Way E

(page B-30 to page B-55)
18 types and 81 models

Linear Way F

(page B-110 to page B-129)
4 types and 12 models

Linear Roller Way Super X

(page C-2 to page C-33)
12 types and 84 models

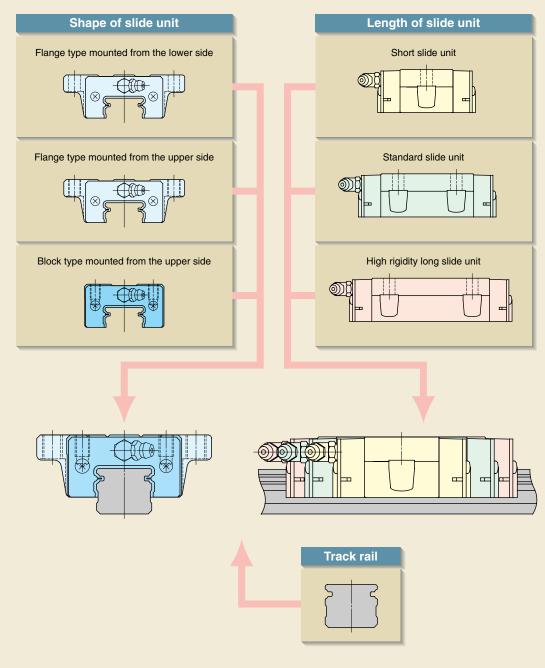
Linear Ball Spline G

(page **D-28** to page **D-45**) **8 types and 56 models**

Block type Linear ball Spline

(page **D-46** to page **D-53**) **3 types and 17 models**

Features of interchangeable specification products [1] Interchangeable slide unit Various types of slide units with different sectional shapes and lengths are prepared. All of these slide units can be freely mounted on the same track rail. Track rails can be butt-jointed for use.(1) Shape of slide unit Length of slide unit



Note(1): When butt-jointing track rails are required, place an order specifying "butt-jointing interchangeable track rail" of special specification.

65

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

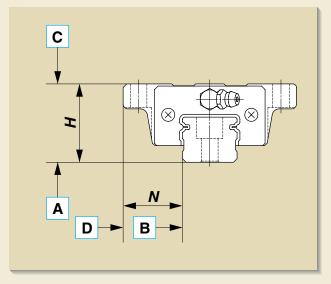
Features of interchangeable specification products [2] Interchangeable with high accuracy

Three accuracy classes, Ordinary, High and Precision are prepared for the interchangeable specification products so that these products can be used for applications requiring high running accuracy.

Height variation among multiple sets is also controlled at a high accuracy level, ensuring that these products can be used for parallel track rail arrangement.

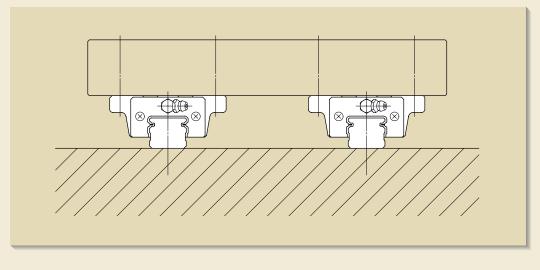
Standard accuracy specifications : up to Precision class

Tolerances of Dimensions H and N Tolerances of Dimensions H and N in one set Parallelism in operation of plane C to plane A Parallelism in operation of plane D to plane B



Parallel arrangement of multiple sets using standard specification products

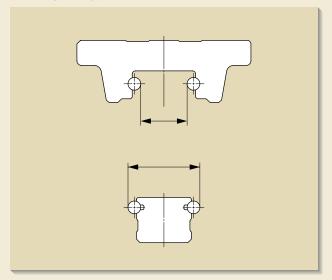
The dimensional variation of H among multiple sets is specified.



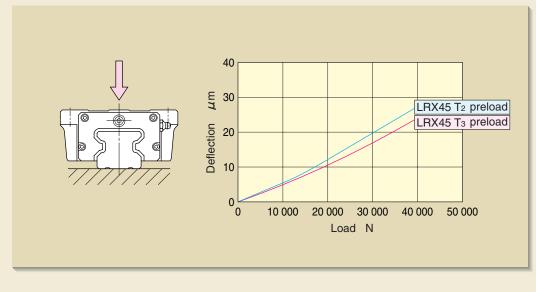
Features of interchangeable specification products [3] Interchangeable with preload

High accuracy dimensional control owing to a simple structure has made it possible to realize the interchangeability among preloaded slide units. In the interchangeable specification products, several preload types are prepared so that these products can be used for applications requiring one step higher rigidity.

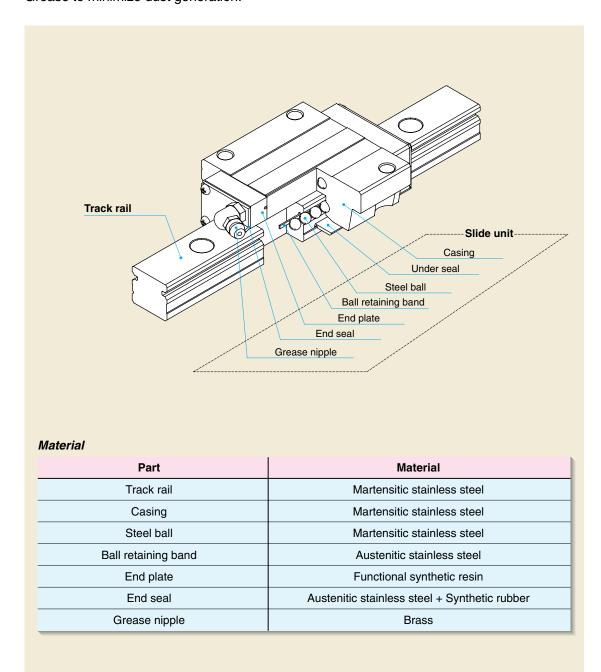
High accuracy dimensional control realizing heavy preload

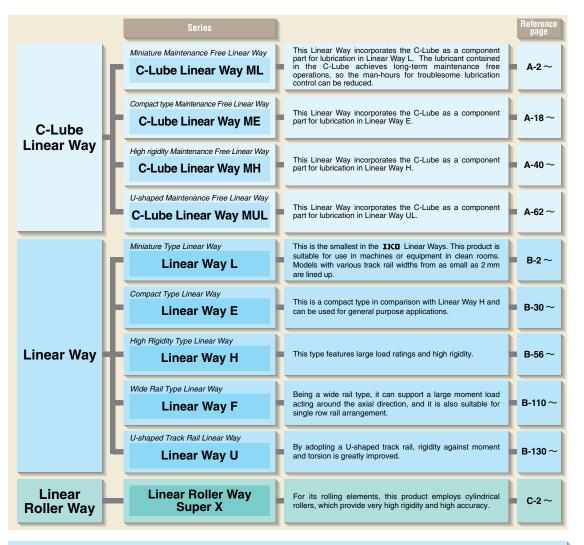


Slide units with the same preload symbol are interchangeable for achieving high rigidity



IKO Linear Way and Linear Roller Way include products in which stainless steel is used for product components. Stainless steel components are more resistant to corrosion than high carbon steel components, so these products are most suitable for applications where the use of oil or grease (including rust preventive oil) should be avoided or kept to a minimum. The stainless series is suitable for use in clean rooms and can be used with **IKO** Clean Grease to minimize dust generation.





When combined with the following special specifications, IKO Stainless series Linear Way and Linear Roller Way will provide a specification more suitable for each

IKO Low Dust Generation Grease for Clean Environment CG2 /YCG

IKU CG2 grease is a low dust generation grease consists of synthetic base oil and urea type thickener. This grease has superior performance for wide range of temperature, lubrication performance, rust prevention and oxidation stability.

IKO Low Dust Generation Grease for Clean Environment CGL /YCL

IKO CGL grease has blended soaps for thickener and synthetic oil and petrolatum with low fluid point for base oil. In addition to its superior low dust generating, feature, it provides minimal level of rolling resistance as well as high lubricating and rust preventing performance.

IKO Anti-Fretting Corrosion Grease AF2 /YAF

IKO AF2 grease is an Anti-Fretting Corrosion Grease consists of synthetic base oil and urea type thickener. It is suitable to very short stroke application that general grease cannot be used because of fretting corrosion or false brinellina.

Stainless Steel End Plate /BS

A steel end plate (austenitic stainless steel) is used in place of the synthetic resin end plate of the standard specification. Linear Way and Linear Roller Way of this specification can be used in high vacuum and its heat resistance is improved as well. When placing an order for this item, specify it together with the special specification "With no end seal" (/N). A change in grease type to vacuum or heat-resistant grease should also be considered.

Linear Way and Linear Roller Way for Special Environment

To meet requirements in various environmental conditions, **IKO** Linear Way and Linear Roller Way must be modified in terms of their material, lubricating grease, surface treatment, dust protection methods, etc.

General fields of application and principal methods in special environments are shown below.

Clean Environment

When Linear Way and Linear Roller Way are used in clean environments such as a clean room, the environment must not be polluted by the dust generated from them, and also superior corrosion resistance is required for them, since rust preventive oil cannot be used.

Dust generation from Linear Way and Linear Roller Way is mainly caused by lubricant spattering, which can be avoided by using low dust generation grease for clean environment.

As a corrosion prevention measure, Stainless Linear Way and Linear Roller Way can be used or black chrome surface treatment can be performed to improve corrosion resistance.

Corrosion prevention

Stainless Linear Way and Linear Roller Way

Black chrome surface treatment Fluorine black chrome surface treatment

Lubricant spatter protection

Low dust generation grease for clean environment

Vacuum Environment

When Linear Way and Linear Roller Way are used in vacuum environments, the environment must not be polluted and the degree of vacuum must not be lowered by the gas emitted from them, and also superior corrosion resistance is required for them, since rust preventive oil cannot be used. Gases emitted from synthetic resin components and lubricant spatters are the main causes of pollution. Components and lubricant must be properly selected as a preventive measure. Corrosion resistance will be improved by using Stainless Linear Way and Linear Roller Way.

Corrosion and gas emission prevention

Stainless Linear Way and Linear Roller Way

Stainless steel end plate

Lubricant

Vacuum grease

High Temperature

When Linear Way is used at high temperature, heat resistance of synthetic resin components and steel components must be examined, and special measures must be taken, if necessary.

Stainless Linear Way with stainless steel end plates of special specification can be used together with high temperature grease.

Material

Stainless Linear Way

Stainless steel end plate Seal for special environment

Lubricant

High temperature grease

Dust Protection

If foreign matter such as metal or wooden chips fall onto the raceways of Linear Way and Linear Roller Way, the life or accuracy of these guides may be affected adversely. Therefore, measures must be taken to prevent intrusion of foreign matter.

Bellows covering the entire linear motion mechanism is effective for dust protection. Also, double end seals are often used to protect the guides from intrusion of foreign matter. As dust accumulated in mounting holes may intrude into the slide unit and attach to the raceways, mounting holes can be covered using caps or rail cover plates.

High sealing performance

Linear Roller Way Super X

Linear Way H Ultra Sealed Type

Sealing

Double end seals

Scrapers

Track rail mounting hole

Caps

Rail cover plate

Bellows

Specially prepared bellows

Female threads for bellows

Spatter Protection

Hot welding spatters adhering firmly on track rails cannot be removed by ordinary dust protection measures. Special measures for preventing adhesion and removing adhered spatters are

Welding spatters and similar foreign substances can be removed easily by applying fluorine black chrome surface treatment and providing a scraper at the same time.

Spatter adhesion protection

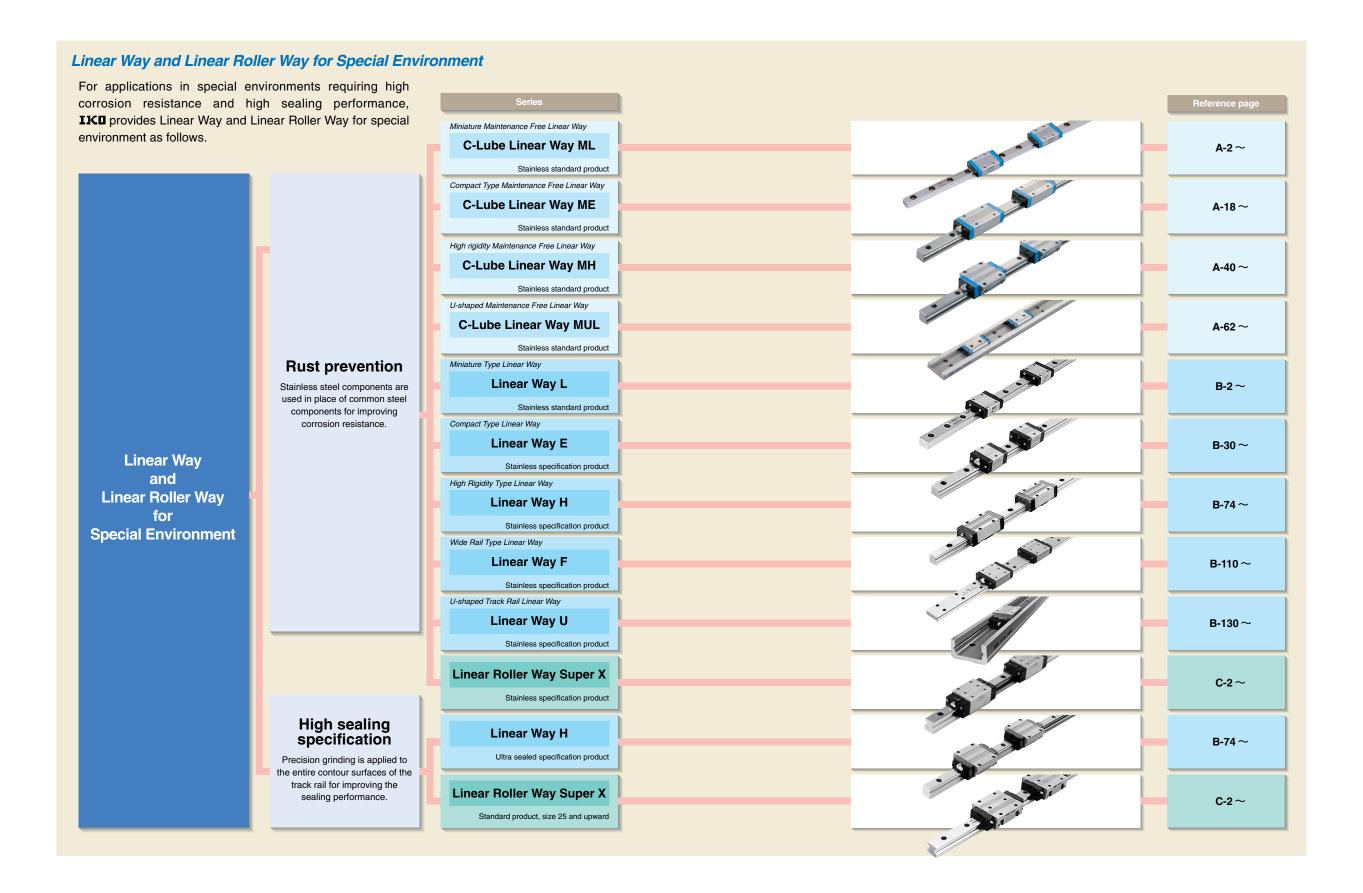
Fluorine black chrome surface treatment

Sealing

Scrapers

Dust protection

Caps (aluminum caps) Rail cover plate



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Optional Special Specifications for Special Environment

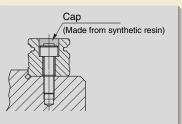
IKO Linear Way and Linear Roller Way with the following special specifications are available for various special environment applications. For details of supplemental codes, see pages 88 and 89.

Dust protection

With caps for rail mounting holes /F

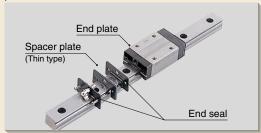
The caps prevent dust and other harmful foreign matter from accumulating in rail mounting holes and intruding into the slide unit.

Aluminum caps are also available. Consult ${\bf IK0}$ for further information.



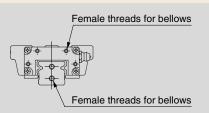
With double end seals /V

The double end seals improve the dust protection performance.



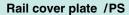
With female threads for bellows /J

Female threads for attaching bellows are provided at the ends of the slide unit and track rail.

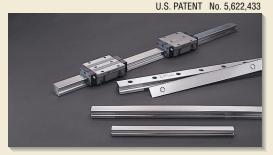


C-Wiper /RC

C-Wiper is the superior dust protective component against cutting chips and/or coolant of machine tool, lath and grinding machine. C-Wiper is always contacting to the top surface of track rail by its all wiping surface. Continuous dust protection performance provides better machine reliability under severe working condition.

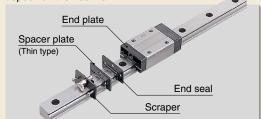


The top surface of the track rail is completely covered with a rail cover plate to prevent intrusion of foreign matter into the slide unit from track rail mounting holes.



With scrapers /Z

Scrapers are mounted on the outside of end seals to remove large particles of dust or foreign matter that deposit on the track rail.

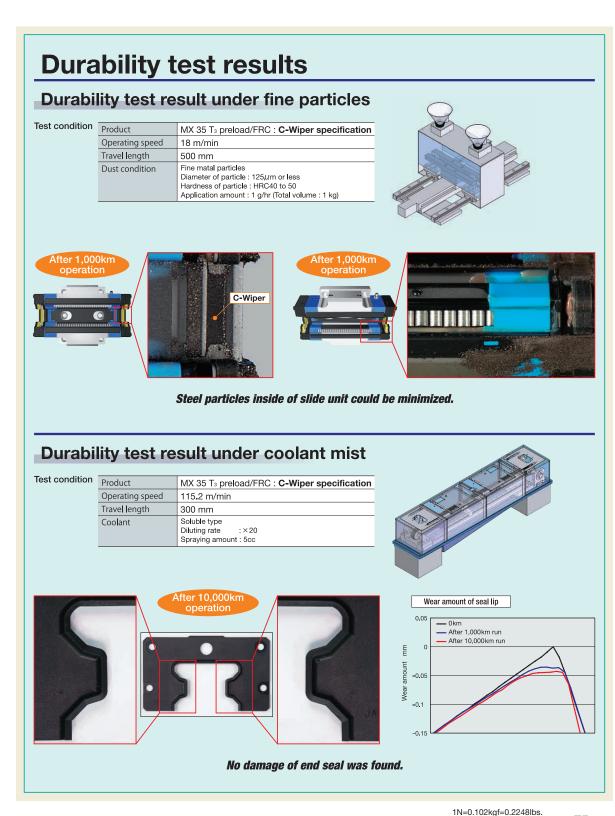


Bellows (available product)

This is a covering for dust protection to cover the exposed part of the track rail.



Inner seal End seal C-Wiper Scraper



75

74 1m=0.03937inch

Lubrication

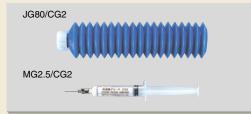
Capillary plate /Q

Re-lubrication interval can be made longer and maintenance time and cost can be saved by incorporating this lubrication part.



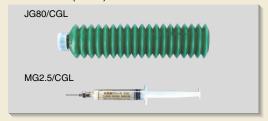
IKO Low Dust Generation Grease for Clean Environment CG2

This grease is used for low dust generation in clean rooms. Bellow type container JG80/CG2 (80g), miniature grease injector type MG10/CG2 (10ml) and MG2.5/CG2 (2.5ml) are available.



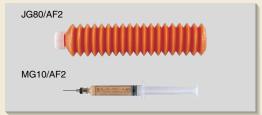
IKO Low Dust Generation Grease for Clean Environment CGL

This grease is used for low dust generation in clean rooms. Bellow type container JG80/CGL (80g) and miniature grease injector type MG2.5/CGL (2.5ml) are available.



IKO Anti-Fretting Corrosion Grease AF2

IKO AF2 grease is suitable to very short stroke application that general grease cannot be used because of fretting corrosion or false brinelling. Bellow type container JG80/AF2 (80g) and miniature grease injector type MG10/AF2 (10ml) are available.



Others

Miniature grease injector type for Alvania EP grease 2 (MG2.5/EP2) is available. When special grease is required for vacuum or high temperature, consult **IKD** for information.

Corrosion prevention

Black chrome surface treatment /L

A black chrome permeable film is formed on the track rail or slide unit surface to improve corrosion resistance.

Fluorine black chrome surface treatment /LF

Fluorine resin coating is performed on top of the black chrome permeable film for further improvement in corrosion resistance. This treatment also effectively prevents foreign matter from adhering to the surface.



Others

With stainless steel end plates /BS

The end plates are replaced with stainless steel end plates.



With seals for special environment /RE

The end seals and under seals are changed to seals for special environment that can be used at high temperatures. For use at high temperatures, this specification is combined with the specification "with stainless steel end plates" (/BS) and/or "specified grease" (/YCG).

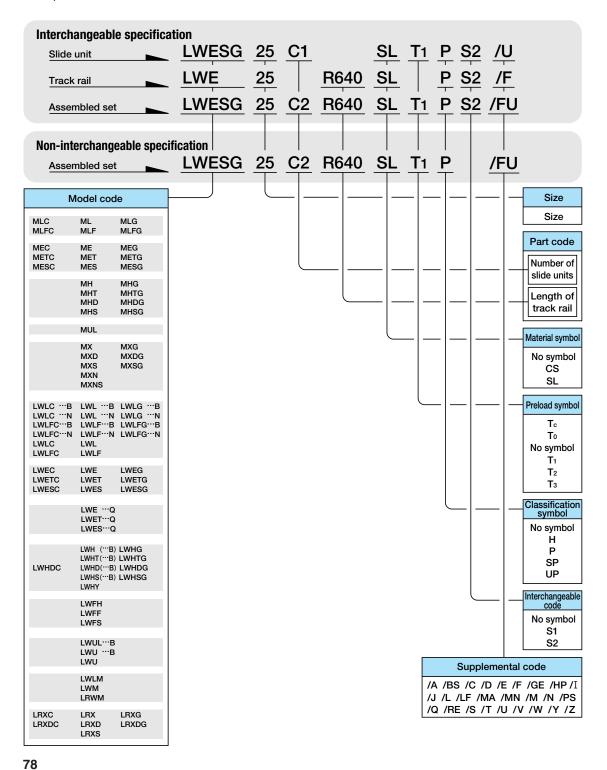


The photo shows a combined specification of "with seals for special environment" (/RE) and "with stainless steel end plates" (/BS).

76 77 1mm=0.03937inch

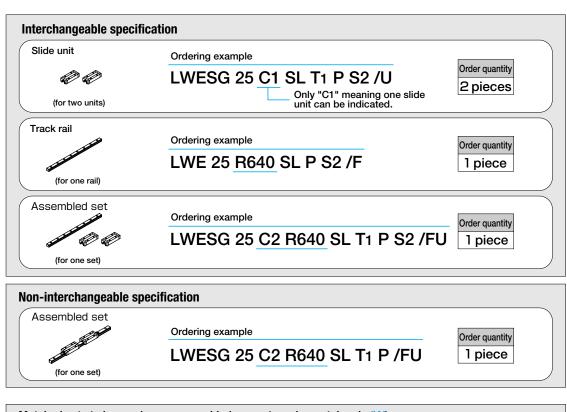
Identification Number

Identification numbers of IKD Linear Way and Linear Roller Way consist of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code, and any supplemental codes. Examples of identification numbers are shown below. For details of specifications, see the description of each series.



For Ordering

When ordering assembled sets of Linear Way or Linear Roller Way, indicate the number of sets which is always represented by the number of track rails. For ordering the slide units and track rails of interchangeable specification separately, indicate the number of slide units and track rails, respectively. Examples of ordering are shown below.





Load Rating

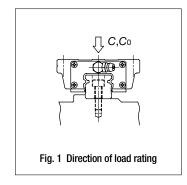
The load ratings of **IKD** Linear Way and Linear Roller Way are defined for downward load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating c

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Linear Ways or Linear Roller Ways are individually operated and 90% of the units in the group can travel 50×10^3 meters free from material damage due to rolling contact fatigue.

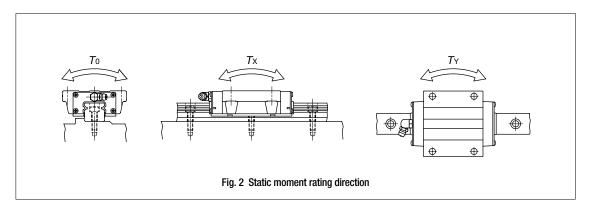
Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.



Static moment rating To,Tx,TY

The static moment rating is defined as the static moment load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load when a moment is loaded.



Accuracy

Five classes of accuracy, Ordinary, High, Precision, Super Precision, and Ultra Precision are specified for **IKU** Linear Way and Linear Roller Way. Table 1 summarizes applicable accuracy classes for each series, and Tables 2.1 to 2.4 show accuracy of each series. For details of applicable classes, see the description of each series.

For the accuracy of series other than those shown in Table 2, consult **IKU** for further information.

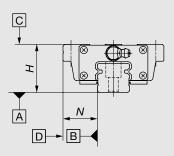
Table 1	Accuracy	classes
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Classification (symbol) Series	Ordinary (No symbol)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
C-Lube Linear Way ML	_	☆	☆	_	_
C-Lube Linear Way ME	\Rightarrow	☆	☆	0	_
C-Lube Linear Way MH	_	☆	☆	0	_
C-Lube Linear Way MUL	0	0	_	_	_
C-Lube Linear Roller Way Super MX	_	☆	☆	0	0
Linear Way L	_	☆	☆	_	_
Linear Way E	☆	☆	☆	0	_
Low Decibel Linear Way E	0	0	0	_	_
Linear Way H(1)	_	☆	☆	0	_
Linear Way F	_	☆	☆	0	_
Linear Way U	0	0	_	_	_
Linear Roller Way Super X	_	☆	☆	0	0
Linear Way Module	_	0	0	0	_

Note(1): For the size 8 to 12 models, the classification for Linear Way L is applicable.

Remark: In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

Table 2.1 Accuracy of Linear Way and Linear Roller Way



unit: mm

Classification (symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dim. <i>H</i> tolerance	±0.080	±0.040	±0.020	±0.010	±0.008
Dim. N tolerance	±0.100	±0.050	±0.025	±0.015	±0.010
Dim. variation of \boldsymbol{H} (1)	0.025	0.015	0.007	0.005	0.003
Dim. variation of N (¹)	0.030	0.020	0.010	0.007	0.003
Dim. variation of \boldsymbol{H} for multiple assembled sets (2)	0.045 0.035 0.025				
Parallelism in operation of C to A	See Fig. 3.1.				
Parallelism in operation of D to B	See Fig. 3.1.				

Note(1): It means the size variation between slide units mounted on the same track rail.

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(2): It applies to the interchangeable specification products.

Remark 1: The accuracy of C-Lube Linear Way ML, Linear Way L and the size 8 to 12 models of Linear Way H is shown in Table 2.2.

2: The accuracy of Linear Way U and C-Lube Linear Way MUL is shown in Table 2.3.
3: The accuracy of Linear Way Module is shown in Table 2.4.

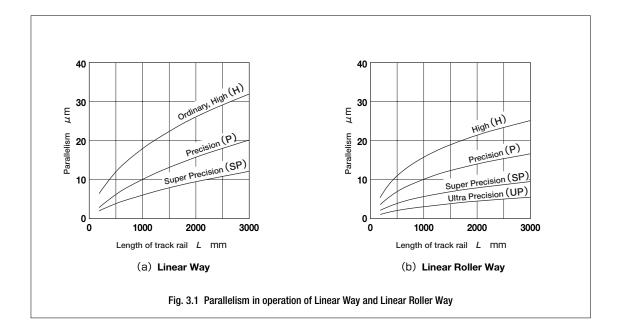
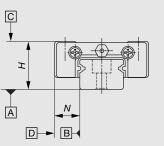


Table 2.2 Accuracy of Linear Way L (size 2 or larger) and C-Lube Linear Way ML



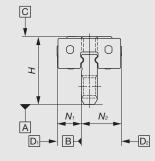
		unit : mm
Classification (Symbol)	High (H)	Precision (P)
Dim. <i>H</i> tolerance	±0.020	±0.010
Dim. N tolerance	±0.025	±0.015
Dim. variation of $\boldsymbol{H}^{(1)}$	0.015	0.007
Dim. variation of N (1)	0.020	0.010
Dim. variation of $oldsymbol{\mathcal{H}}$ for multiple assembled sets (2)	0.030	0.020
Parallelism in operation of C to A	See Fi	g. 3.2.
Parallelism in operation of D to B	See Fi	g. 3.2.

Note(1): It means the size variation between slide units mounted on the same track rail.

(2): It applies to the interchangeable specification products.

Remark: The accuracy given in this table also applies to C-Lube Linear Way L and the size 8 to 12 models of Linear Way H.

Table 2.3 Accuracy of Linear Way L for LWL 1-Y



	unit : mm
Item	Tolerance
Dim. H tolerance	±0.020
Dim. N_1 and N_2 tolerance	±0.025

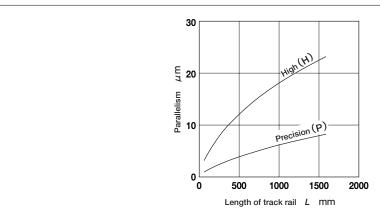
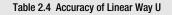
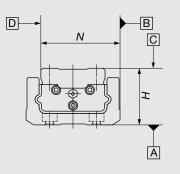


Fig. 3.2 Parallelism in operation of Linear Way L (Size 2 or larger) and C-Lube Linear Way ML



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		unit : mm
Classification (Symbol)	Ordinary (No symbol)	High (H)
Dim. H tolerance	±0.100	±0.050
Dim. N tolerance	±0.100	±0.050
Dim. variation of $\boldsymbol{H}^{(1)}$	0.050	0.040
Dim. variation of N (1)	0.050	0.040
Parallelism in operation of C to A	See Fi	g. 3.3.
Parallelism in operation of D to B	See Fi	g. 3.3.

Note(1): It means the size variation between slide units mounted on the same track rail.

Remark: Also applicable to C-Lube Linear Way MUL.

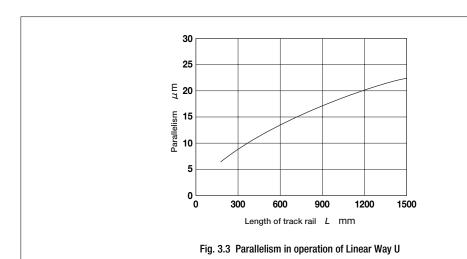
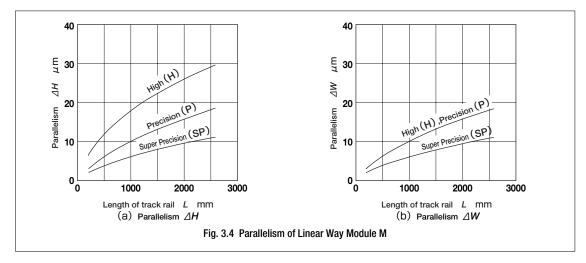


Table 2.5 Accuracy of Linear Way Module // ΔH/L A Α В // ΔW/L B unit: mm Classification Precision Super Precision High (H) (P) (SP) Dim. *H* tolerance ± 0.040 ± 0.020 ±0.010 ±0.050 ±0.025 ±0.015 Dim. W tolerance Dim. variation of $\boldsymbol{H}^{(1)}$ 0.015 0.007 0.005 0.020 0.010 0.007 Dim. variation of W(1)

Note(1): It means the size variation between slide members mounted on the same track rail.

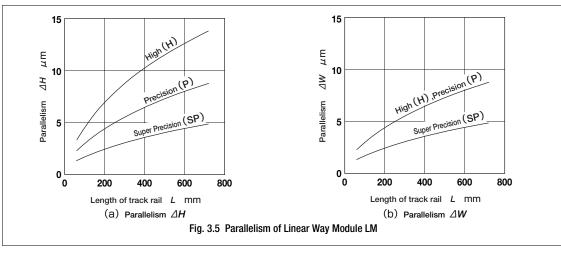
Parallelism of track rail $\Delta \boldsymbol{H}$

Parallelism of track rail arDelta



See Figs. 3.4 and 3.5.

See Figs. 3.4 and 3.5.



Preload

The average amount of preload for IKU Linear Way and Linear Roller Way is shown in Table 3. When both rigidity and vibration characteristics are important, the standard preload amount is 1/3 of the applied load for Linear Way and 1/2 for Linear Roller Way.

A summary of applicable preload types is shown in Table 4. For details, see the description of each series.

Table 3 Preload amount

Table 3 Freibau allibuilt			
Item Preload type	Symbol	Preload amount	Application
Clearance	Тс	0 (1)	Very smooth motion To absorb slight misalignment
	To	0(2)	Very smooth motion
Standard	(No symbol)	0(3)	Smooth and precise motion
Light preload	T1	0.02 <i>C</i> 0	Minimum vibration Load is evenly balanced. Smooth and precise motion
Medium preload	T 2	0.05 <i>C</i> 0	Medium vibration Medium overhung load
Heavy preload	Тз	0.08 <i>C</i> 0	Vibration and/or shocks Large overhung load Heavy cutting

Note(¹): Clearance of about 10µm
(²): Zero or minimal amount of clearance
(³): Zero or minimal amount of preload
Remark: Co means the basic static load rating.

Table 4 Preload type

Preload type (Symbol) Series	Clearance (Tc)	Clearance (T ₀)	Standard (No symbol)	Light preload (T ₁)	Medium preload (T ₂)	Heavy preload (T ₃)
C-Lube Linear Way ML	-	☆	☆	☆	_	_
C-Lube Linear Way ME	☆	_	☆	☆	0	_
C-Lube Linear Way MH	_	_	☆	☆	0	0
C-Lube Linear Way MUL	_	_	0	0	_	_
C-Lube Linear Roller Way Super MX	_	_	☆	☆	☆	☆
Linear Way L	_	☆	☆	☆	_	_
Linear Way E	☆	_	☆	☆	0	_
Low Decibel Linear Way E	_	_	0	0	_	_
Linear Way H	_	O(1)	☆	☆	☆	☆
Linear Way F	_	_	☆	☆	0	_
Linear Way U	_	_	0	0	_	_
Linear Roller Way Super X	_	_	☆	☆	☆	☆

87

Note(¹): It applies to size 8 to 12 models.

Remark: In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

1N=0.102kgf=0.2248lbs. 86 1mm=0.03937inch

Special Specifications

IKO Linear Way and Linear Roller Way of the special specifications shown in Table 5 are available. In some cases, however, special specifications may not be applicable. For details, see the description of each series. When a special specification is required, add the applicable supplemental code to the end of the identification number. When a combination of several special specifications is required, arrange their supplemental codes in alphabetical order.

Table 5.1 Special specifications for Linear Way and Linear Roller Way

Special specification	Supplemental code	C-Lube Linear Way ML	C-Lube Linear Way ME	C-Lube Linear Way MH	C-Lube Linear Way MUL	C-Lube Linear Roller Way Super MX	Linear Way L	Linear Way E	Low Decibel Linear Way E
Butt-jointing track rails (Non-interchangeable specification)	Α	0	0	0	_	0	0	0	_
Stainless steel end plates	BS	-	_	-	_	_	0	☆	_
Chamfered reference surface	С	_	_	_	_	_	_	_	_
Opposite reference surfaces arrangement	D	☆	☆	☆	_	☆	☆	☆	0
Specified rail mounting hole positions	E	☆	☆	☆	0	☆	☆	☆	_
Caps for rail mounting holes	F	_	☆	☆	_	☆	_	☆	0
Changed pitch of slide unit middle mounting holes	GE	_	_	_	_	☆	_	_	_
Half pitch of track rail mounting holes	HP	_	_	_	_	☆	_	_	_
Inspection sheet (Non-interchangeable specification)	I	0	0	0	_	0	0	0	_
Female threads for bellows	J	_	☆	☆	_	☆	_	☆	_
Black chrome surface treatment	L	0	☆	☆	0	☆	0	☆	0
Fluorine black chrome surface treatment	LF	_	☆	☆	_	☆	0	☆	0
With track rail mounting bolt	MA	_	☆	☆	0	_	_	☆	0
Without track rail mounting bolt	MN	☆	_	☆	_	☆	☆	_	_
Change of mounting hole and female thread sizes	М	_	☆	_	_	_	0	☆	0
No end seal	N	☆	☆	☆	_	☆	☆	☆	_
Rail cover plate (Non-interchangeable specification)	PS	_	_	0	_	_	_	_	_
Capillary plate (Non-interchangeable specification)	Q	_	_	_	_	_	☆	☆	0
Seal for special environment	RE	_	-	_	_	_	0	☆	_
Track rail with stopper pins (Non-interchangeable specification)	S	0	_	_	_	_	0	_	_
Butt-jointing interchangeable track rail (Interchangeable specification)	Т	_	☆	☆	_	☆	_	☆	_
Under seals	U	☆	☆	_	0	_	☆	☆	_
Double end seals	V	_	☆	☆	_	☆	_	☆	0
Matched sets to be used as an assembled group	W	0	0	0	0	0	0	0	0
Specified grease	Υ	_	_	_	_	_	0	☆	0
Scrapers	Z	_	☆	☆	_	☆	_	☆	0

Note(¹) : Including Linear Way LM and Linear Roller Way M.

Remark 1: The mark ☆ indicates that interchangeable specification products are available.

2: For the details of special specifications applicable to each series and combinations of special specifications, see the description of each series.

Table 5.2 Special specifications for Linear Way and Linear Roller Way

Special specification	Supplemental code	Linear Way H	Linear Way F	Linear Way U	Linear Roller Way Super X	Linear Way Module M(1)
Butt-jointing track rails (Non-interchangeable specification)	Α	0	0	-	0	0
Stainless steel end plates	BS	☆	_	_	_	-
Chamfered reference surface	С	_	☆	_	_	_
Opposite reference surfaces arrangement	D	☆	☆	-	☆	_
Specified rail mounting hole positions	E	☆	☆	0	☆	0
Caps for rail mounting holes	F	☆	☆	_	☆	0
Changed pitch of slide unit middle mounting holes	GE	_	_	_	☆	_
Half pitch of track rail mounting holes	HP	_	_	_	☆	_
Inspection sheet (Non-interchangeable specification)	I	0	0	-	0	0
Female threads for bellows	J	☆	☆	_	☆	-
Black chrome surface treatment	L	☆	☆	0	☆	0
Fluorine black chrome surface treatment	LF	☆	☆	-	☆	0
With track rail mounting bolt	MA	_	_	0	_	-
Without track rail mounting bolt	MN	☆	☆	0	☆	0
Change of mounting hole and female thread sizes	М	_	_	_	_	-
No end seal	N	☆	☆	_	☆	-
Rail cover plate (Non-interchangeable specification)	PS	0	_	_	0	-
Capillary plate (Non-interchangeable specification)	Q	☆	☆	0	☆	-
C-Wiper	RC	_	_	_	0	-
Seal for special environment	RE	☆	_	_	_	_
Track rail with stopper pins (Non-interchangeable specification)	S	-	_	_	-	_
Butt-jointing interchangeable track rail (Interchangeable specification)	Т	☆	_	_	☆	-
Under seals	U	☆	☆	0	-	-
Inner seal	UR	-	-	-	0	-
Double end seals	V	☆	☆	-	☆	-
Matched sets to be used as an assembled group	W	0	0	0	0	0
Specified grease	Υ	☆	☆	-	☆	0
Scrapers	Z	☆	☆	_	☆	_

Note(1) : Including Linear Way LM.

Remark 1 : The mark $\stackrel{1}{\cancel{\sim}}$ indicates that interchangeable specification products are available.

2: For the details of special specifications applicable to each series and combinations of special specifications, see the description of

88 1mm=0.03937inch

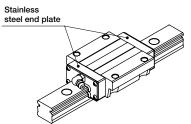
Butt-jointing track rails /A

			_
-	⊕ 4−B1⇔ ⇔ 4−B1 ⊕	⊕ 4−B2 ⇒ ⇔ 4−B2 ⊕	

When the required length of non-interchangeable specification track rail exceeds the maximum length indicated in the description of each series, two or more track rails can be used by butt-jointing them in the direction of linear motion. For the length and the number of butt-jointing track rails, consult **IK** for further information.

With stainless steel end plates **BS**

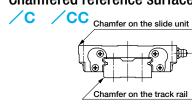




The standard synthetic resin end plates are replaced with stainless steel end plates, keeping the total length of slide unit unchanged.

When superior heat resistance is required, it is recommended to apply this specification in combination with the "with no end seal (/N)" specification.

Chamfered reference surface



Chamfering is additionally made at the edges of reference mounting surfaces of slide unit and track rail.

For the corner radius of mating mounting parts, see Table 23.2 on page 120.

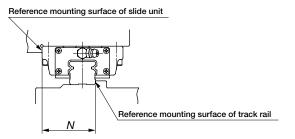
and track rail.

Chamfering is additionally made at the edge of reference mounting surface of track rail. (2) /CC

Chamfering is additionally made at the edges of reference mounting surfaces of slide unit

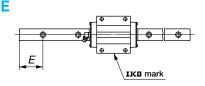
Opposite reference surfaces arrangement /D





The reference mounting surface of track rail is made opposite to the standard side. The accuracy of dimension N including parallelism in operation is the same with that of standard specification.

Specified rail mounting hole positions



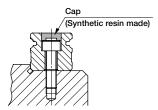
The mounting hole positions of track rail can be specified by specifying dimension E at the left end, which is the distance from the mounting hole nearest to the left end of the track rail to the left end face of the track rail in sight of IKD mark on the slide unit.

When ordering, add the dimension (in mm)

Dimension E can be specified in a limited range. Consult **IKD** for further information.

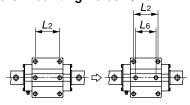
With caps for rail mounting holes /F





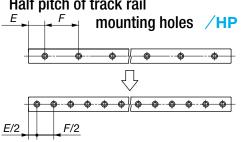
Specially prepared caps for track rail mounting holes are appended. These caps cover the track rail mounting holes to improve the sealing performance in the linear motion direction. Aluminum caps are also available. Consult **IKD** for further information.

Changed pitch of slide unit middle mounting holes /GE



The pitch length between the two middle mounting holes of slide unit of Linear Roller Way Super X is changed. For this dimension. see the description of each series.

Half pitch of track rail



The pitch of the track rail mounting holes is changed to 1/2 of the dimension F of standard type. Track rail mounting bolts are appended in the same number as that of mounting holes.

Inspection sheet /I



The inspection sheet recording dimensions *H* and *N*, dimensional variations of *H* and *N*, and parallelism in operation of the slide unit (or slide member) is attached for each set.

Ceramic ball specification / HB

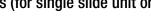


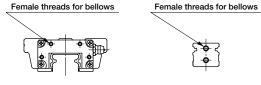
Silicon nitride ceramics balls are incorporated in the slide unit to realize high-speed operation and low running noise. In addition, the rigidity has been improved because of the minimal elastic deformation of ceramic characteristic.

90 91 1mm=0.03937inch

With female threads for bellows (for single slide unit or track rail) /J /JR /JL

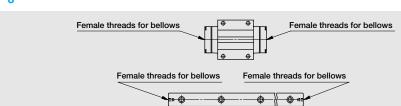
Track rail





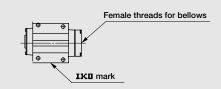
Female threads for mounting bellows are provided on the interchangeable slide unit or the interchangeable track rail. For details of related dimensions, see the description of each series.

(1)



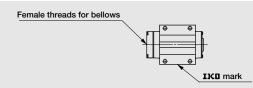
Female threads are provided at both ends of the slide unit or the track rail.

/JR



Female threads are provided at the right end of the slide unit in sight of **IKD** mark.

(3) /JL



Female threads are provided at the left end of the slide unit in sight of **IKD** mark.

With female threads for bellows (for assembled set) /J /JJ /JR /JS /JJS

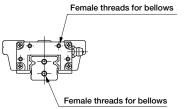






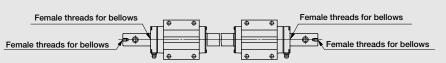






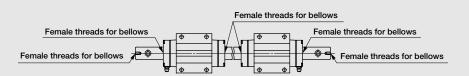
For an assembled set of interchangeable or non-interchangeable specification, female threads for mounting bellows are provided on the slide unit and the track rail. For details of related dimensions, see the description of each series.

(1) /J



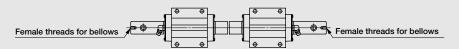
Female threads are provided at both ends of the track rail, and at the slide unit ends which are the closest to the track rail ends. (In case only one slide unit is assembled, female threads are provided at both ends.)

(2) /JJ

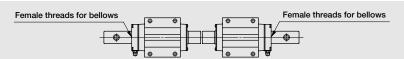


Female threads are provided at both ends of the track rail, and at all ends of all slide units. (Applicable, when the number of slide units is two or more. In case only one slide unit is assembled, indicate "/J".)

(3) /JR

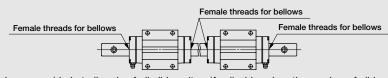


Female threads are provided at both ends of the track rail.



Female threads are provided at the slide unit ends which are the closest to the track rail ends. (In case only one slide unit is assembled, female threads are provided at both ends.)

(5) /JJS



Female threads are provided at all ends of all slide units. (Applicable, when the number of slide units is two or more. In case only one slide unit is assembled, indicate "/JS".)

Black chrome surface treatment

/LC /LR /LCR

After forming a black permeable chrome film, the surface is coated with acrylic resin for improvement in corrosion resistance.

(1) /LC

Treatment is applied to the casing.

/LR

Treatment is applied to the track rail.

(3) /LCR

Treatment is applied to the casing and the track rail.

Fluorine black chrome surface treatment

/LFC /LFR /LFCR

U.S. PATENT NO. 5,564,188 NO. 5.374.126

After forming a black permeable chrome film, the surface is coated with fluorine resin for further improvement in corrosion resistance. This treatment is also effective in preventing the adhesion of foreign substances on the surface.

(1) /LFC

Treatment is applied to the casing.

/LFR

Treatment is applied to the track rail.

(3) /LFCR

Treatment is applied to the casing and the

With track rail mounting bolts **∕MA**(¹)

Track rail mounting bolts are appended according to the number of mounting holes.

Without track rail mounting bolts

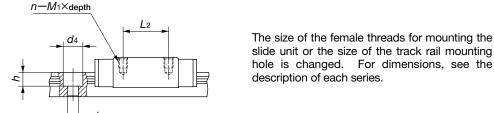
/MN(1)

Track rail mounting bolts are not appended.

Change of mounting hole size and female thread size /M2(1) /M3(1) /M4(1)







The female threads for mounting the LWL5 slide unit are changed to M2.

The female threads for mounting LWL9 and LWL12 slide units are changed to M3, and the track rail mounting holes are changed to holes for M3.

The female threads for mounting LWLF14 and LWLF18 slide units are changed to M3.

(3) /M4

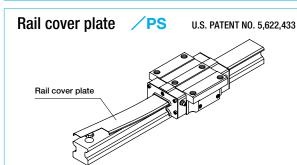
The track rail mounting holes for M3 of LWE15 are changed to holes for M4.

Note(1): For assembling /MA, /MN, /M2, /M3, /M4, please indicate as shown below.

Combination of /MA and /M4: /MA4 Combination of /MN and /M2: /MN2 Combination of /MN and /M3: /MN3 No end seal End pressure plate End pressure plate

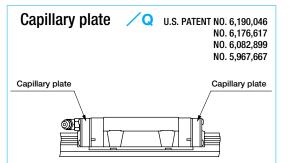
End seals at both ends of slide unit are replaced by end pressure plates (not in contact with the track rail) to reduce frictional resistance. The under seals are not assembled.

This specification is not effective for dust protection.



After mounting the track rail, the top surface of track rail is covered with a U-shaped thin stainless steel plate for further improvement in sealing performance. The rail cover plate is delivered as assembled on the track rail. Standard end seals must be replaced with the special end seals.

When mounting the cover plate, refer to the attached instruction manual for rail cover plate.



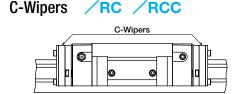
The capillary plate is assembled inside the end seal of the slide unit. It is impregnated with lubricant so that re-lubrication interval can be made longer. For the total length of the slide unit with capillary plate, see the description of each series.

Track rail with stopper pins /S Stopper pin Stopper pin

To prevent the slide unit of Linear Way L from slipping off, a stopper pin is provided at both ends of the track rail. For related dimensions, see the description of Linear Way L.

Seal for special environment / RE

The standard end seals and under seals are changed to seals for special environment that can be used at high temperature.



C-Wipers are attached on the slide unit for additional dust protection.

The slide unit with C-Wipers has also Inner Seal (/UR) and Scraper. Total lengths of slide unit with C-Wipers are shown in Table 9.

C-Wipers are provided at the ends of slide units which are closest to the end of the track rail. In case only one slide unit is assembled, C-Wipers are provided at the both ends of side unit.

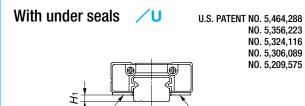
(2) /RCC

C-Wipers are provided at both ends of all slide units. Applicable when the number of slide units to be two or more. In case one slide unit, indeicate "/RC".

Butt-jointing interchangeable track rail (for interchangeable specification)

A special interchangeable track rail of which both ends are finished for butt-jointing is provided. Use the track rails having the same interchangeable code for butt-jointing. For the non-interchangeable specification, indicate "butt-jointing track rail (/A)".

1N=0.102kgf=0.2248lbs. 94 1mm=0.03937inch

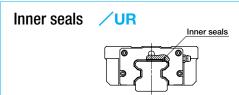


To prevent foreign substances intruding from the lower side of Linear Way, seals are provided on the bottom faces of slide unit. For size H_1 , see the description of each series.



For C-Sleeve Linear Way MUL and Linear Way LWUL, rubber seals are attached to upper side face of the slide unit to prevent foreign materials from entering from the upper side.

For dimensions with upper seals, please see the description of each series.



Inner seals are provided inside of slide unit, where recirculation area is effectively protected from dust collected on upper surface of track rail.

With double end seals (for single slide unit) /V /VR /VL

Double end seals are provided on the interchangeable slide unit for more effective dust protection. For the total length of the slide unit with double end seals, see the description of each series.

(1) **/V**

Double end seals are provided at both ends of the slide unit.

Double end seals are provided at the right end of the slide unit in sight of **IKD** mark.

(3) /VL

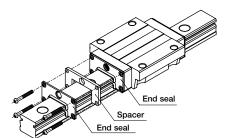
96

Double end seals are provided at the left end of the slide unit in sight of **IKO** mark.

With double end seals (for assembled set) /V /VV



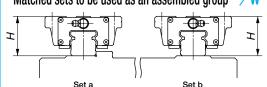
Double end seals are provided on the slide unit of assembled set of interchangeable specification or non-interchangeable specification for more effective dust protection. For the total length of the slide unit with double end seals, see the description of each series.



Double end seals are provided at the ends of slide units which are the closest to the ends of the track rail. (In case only one slide unit is assembled, double end seals are provided at both ends.)

Double end seals are provided at all ends of all slide units. (Applicable when the number of slide units is two or more. In case only one slide unit is assembled. indicate "/V".)

Matched sets to be used as an assembled group



For two or more sets of Linear Way or Linear Roller Way used on the same plane, the dimensional variation of H of Linear Way or Linear Roller Way is kept within the specified

The dimensional variation of dimension H in matched sets is the same as that of a single set. Indicate the number of sets after "/W". Order the number of sets in a grorp. Please refer Page 80 for ordering.

Specified grease

/YCG/YCL/YAF/YBR/YNG

The type of pre-packed grease in the slide unit can be changed by a supplemental code. Rust preventive oil is applied.

- (1) / YCG IKD Low Dust Generation Grease for Clean Environment CG2 is pre-packed.
- (2) / YCL IKD Low Dust Generation Grease for Clean environment CGL is pre-packed.
- (3) YAF IKO Anti-Fretting Corrosion Grease AF2 is pre-packed.
- (4) / YBR MOLYCOTE BR2 Plus Grease (Dow Corning) is pre-packed.
- (5) / YNG No grease is pre-packed.

With scrapers (for single slide unit) /Z /ZR /ZL

Metal scrapers are provided on the slide unit of interchangeable specification. The scraper (noncontact type) is used to effectively remove large particles of dust or foreign matter adhering to the track rail. For the total length of the slide unit with scrapers, see the description of each series.

(1) /z

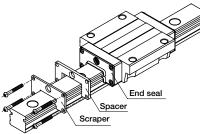
Scrapers are provided at both ends of the slide unit.

A scraper is provided at the right end of the slide unit in sight of **IKD** mark.

A scraper is provided at the left end of the slide unit in sight of **IKO** mark.

With scrapers (for assembled set) /Z /ZZ





Metal scrapers are provided on the slide unit of assembled set of interchangeable specification or non-interchangeable specification.

The scraper (non-contact type) is used to effectively remove large particles of dust or foreign matter adhering to the track rail. For the total length of the slide unit with scrapers, see the description of each series.

Scrapers are provided at the ends of slide units which are the closest to the ends of the track rail. (In case only one slide unit is assembled, scrapers are provided at both ends.)

(2)

Scrapers are provided at all ends of all slide units. (Applicable when the number of slide units is two or more. In case only one slide unit is assembled, indicate "/Z".)

97 1mm=0.03937inch

Lubrication and Dust Protection

IKO Linear Way and Linear Roller Way are most generally lubricated with grease, which allows for easy lubrication control. A grease nipple for grease replenishment is provided on each slide unit of Linear Way and Linear Roller Way of standard specification (except some models). Parts such as piping joints are also available, and can be delivered if required.

IKO Linear Way and Linear Roller Way are provided with special rubber seals for dust protection. But, if a large amount of fine contaminants are present, or if large particles of foreign matter may fall on the track rail, it is recommended to provide bellows and other protective covers.

The size 2, 3, 4, and 6 models of Linear Way L are not provided with seals.

Pre-packed grease

98

A high quality lithium-soap base grease shown in Table 6 is pre-packed in **IKO** Linear Way and Linear Roller Way. A special grease can be pre-packed by specifying "Specified grease" of the special specification on page 97. For the interval and amount of grease replenishment, see "General description".

Series	Pre-packed grease
C-Lube Linear Way ML	MULTEMP PS No.2 (KYODO YUSHI)
C-Lube Linear Way ME	ALVANIA EP GREASE 2
C-Lube Linear Way MH	(SHELL)
C-Lube Linear Way MUL	MULTEMP PS No.2(KYODO YUSH
C-Lube Linear Roller Way Super MX	ALVANIA EP GREASE 2(SHELL)
Linear Way L	MULTEMP PS No.2(KYODO YUSH
Linear Way E	
Low Decibel Linear Way E	
Linear Way H(¹)	
Linear Way F	ALVANIA EP GREASE 2 (SHELL)
Linear Way U(2)	(61.1212)
Linear Roller Way Super X	
Linear Way Module	1

Parts for lubrication

IKO Linear Way and Linear Roller Way are provided with a grease nipple or oil hole for grease replenishment. Table 7 shows parts for lubrication applicable to each series. However, Linear Way L Ball Non-retained type is not provided a grease nipple and oil hole. For re-lubrication of this type, apply grease directly to the raceways of the track rail.

	ML	15 20	A-M3	A-5120V A-5240V B-5120V B-5240V	-
C-Lube Linear Way ML		25	B-M4	A-8120V B-8120V	M4
		10 14 18 24	Oil hole	Mini-grease injector	_
	MLF	30 42	A-M3	A-5120V A-5240V B-5120V B-5240V	-
C-Lube Linear Way ME	ME	15	A-M4	A-5120V A-5240V B-5120V B-5240V	M4
C-Lube Lillear Way ME	IVIE	20 25 30	B-M6	Grease gun available on the market	M6
		35 45	JIS 4 type	Grease guir available on the market	PT1/8
		8 10	Oil hole	Mini-grease injector	-
		12	A-M3	A-5120V A-5240V B-5120V B-5240V	-
C-Lube Linear Way MH	MH	15	A-M4	A-5120V A-5240V B-5120V B-5240V	-
		20 25 30 35 45	B-M6	Grease gun available on the market	M6 PT1/8
C-Lube Linear Way MUL	MUL	25 30	Oil hole	Mini-grease injector	-
		15	A-M4	A-5120V A-5240V B-5120V B-5240V	M4
C-Lube Linear	MX	20 25	B-M4	A-8120V B-8120V	M4
Roller Way Super MX		30	B-M6		M6
		35	JIS 1 type	Grease gun available on the market	IVIO
		45 55 65	JIS 2 type		PT1/8
		5 7 9 12	Oil hole	Mini-grease injector	-
	LWL ···B	15 20	A-M3	A-5120V A-5240V B-5120V B-5240V	-
Linear Way L Ball Retained type		25	B-M4	A-8120V B-8120V	M4
		10 14 18 24	Oil hole	Mini-grease injector	_
	LWLFB	30 42	A-M3	A-5120V A-5240V B-5120V B-5240V	-
	1.)4/5	15	A-M4	A-5120V A-5240V B-5120V B-5240V	M4
Linear Way E	LWE	20 25 30	B-M6	0	M6
		35 45	JIS 4 type	Grease gun available on the market	PT1/8
Low Decibel	LME	15	A-M4	A–5120V A–5240V B–5120V B–5240V	M4
Linear Way E	LWEQ	20 25 30	B-M6	Grease gun available on the market	M6
		35	JIS 4 type	Grease guit avaliable on the market	PT1/8

Remark: The above table shows representative model codes, but is applicable to all other models.

When "Oil hole" is described in the grease nipple column, an oil hole is provided in place of a grease nipple.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **99**

Table 7.2	Parts for I	uhrication

100

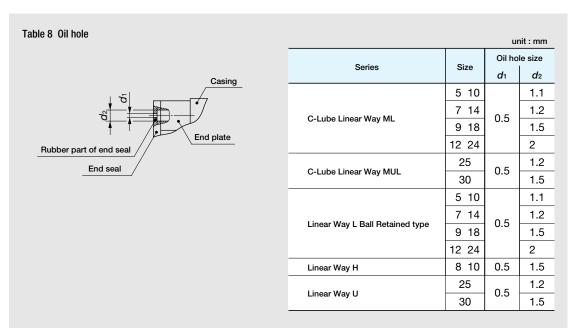
Carrian	Madalaada	Ci		Grease nipple	Nominal size of female threads
Series	Model code	Size	Туре	Applicable supply nozzle type	for piping
		8 10	Oil hole	Mini-grease injector	-
		12	A-M3	A–5120V A–5240V B–5120V B–5240V	_
Linear Way H	LWH···B	15	A-M4	A–5120V A–5240V B–5120V B–5240V	M4
		20 25 30	B-M6		M6
		35 45 55 65 85	JIS B type	Grease gun available on the market	PT1/8
	LWFH	40 60 90	JIS A-M6F		M6
		33	A-M3	A-5120V A-5240V B-5120V B-5240V	_
Linear Way F	LWFF	37	A-M4	A–5120V A–5240V B–5120V B–5240V	M4
		42 69	B-M6	Grease gun available on the market	M6
	LWUL···B	25 30	Oil hole	Mini-grease injector	_
Linear Way U	LWU···B	40 50	A-M4	A–5120V A–5240V B–5120V B–5240V	M4
	LWO	60 86 100 130	JIS A-M6F	Grease gun available on the market	M6
		12	A-M3	A–5120V A–5240V B–5120V B–5240V	_
		15	A-M4	A–5120V A–5240V B–5120V B–5240V	M4
Linear Roller Way Super X	LRX	20 25	B-M4	A-8120V B-8120V	M4
		30	B-M6		M6
		35	JIS A-M6F	Grease gun available on the market	M6
		45 55 65 85	JIS A-PT1/8	Grease gun avallable on the market	PT1/8
		100	JIS A-PT1/4]	PT1/4

Remark: The above table shows representative model codes, but is applicable to all other models.

When "Oil hole" is described in the grease nipple column, an oil hole is provided in place of a grease nipple.

Oil hole

Some models of C-Lube Linear Way ML, C-Lube Linear Way MUL, Linear Way L Ball Retained type and Linear Way H are provided with an oil hole as shown in Table 8. (See also Table 7.) For grease replenishment, use a syringe type dispenser. The specially prepared miniature greaser is also available.



Miniature greaser

The miniature greaser is specially prepared for grease replenishment for Linear Way with an oil hole shown in Table 8. Table 9 shows the types of grease and specifications of the miniature greaser.



Identification number	Grease name	Content	Outside diameter of injector needle	
MG10/MT2	MULTEMP PS No.2 (KYODO YUSHI)	10ml		
MG10/CG2	IKD Low Dust Generation Grease for Clean Environment CG2	101111		
MG2.5/EP2(1)	Alvania EP Grease 2 [Shell]		#1mm	
MG2.5/CG2	IXD Low Dust Generation Grease for Clean Environment CG2	2.5ml	φ1mm	
MG2.5/CGL	IKD Low Dust Generation Grease for Clean Environment CGL	2.51111		
MG2.5/AF2	IX□ Anti-Fretting Corrosion Grease AF2			

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **101**

Grease nipple and supply nozzle

Tables 10.1 and 10.2 show the specifications of grease nipples and applicable types of supply nozzles. Table 11 shows the specifications of supply nozzles.

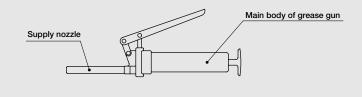
	Grease nipple	Applicable supply nozzl		
Туре	Shape and dimension	Туре	Shape	
A-M3	Width across flats 4 M3 C1 4	A-5120V A-5240V	Straight type	
A-M4	Width across flats 4.5	B-5120V B-5240V		
B- M 4	Width across flats 6 M4	A-8120V B-8120V	Straight type with angle	

	Grease nipple		Applicable supply nozzle
Туре	Shape and dimension	Туре	Shape
В-М6	Equivalent to A-M6F Width across flats 8 M6 × 0.75		Straight type
JIS 1 type	$\frac{\phi 6.6}{\phi 4.8}$ Width across flats 7 $\frac{\nabla}{\nabla}$		φ Φ D(1)
JIS 2 type	φ6.6 φ4.8 Width across flats 10 PT1/8 Wigg 66	Product available on the market	Chuck type
JIS 4 type	Equivalent to A-M6F Width across flats 10 PT1/8		Hose type
JIS A-PT1/4	φ6.6 φ4.8 Width across flats 14 PT1/4 YWWY 22 27 28 27 28 29 20 20 20 20 20 20 20 20 20		φ D(1)

Note(1): For straight type, chuck type and hose type supply nozzles available on the market, it is recommended to use one with an outside diameter (D) of 13 mm or less.

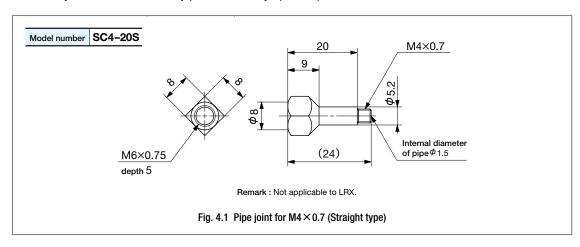
Table 11 Applicable supply nozzles Туре Shape and dimension 120 Width across flats 12 Width across flats 12 A-5120V PT1/8 240 29 Width across flats 12 Width across flats 12 A-5240V PT1/8 120 Width across flats 12 Width across flats 12 B-5120V PT1/8 240 29 Width across flats 12 Width across flats 12 B-5240V PT1/8 120 Width across flats 14 Width across flats 15 A-8120V PT1/8 120 Width across flats 15 Width across flats 14 B-8120V

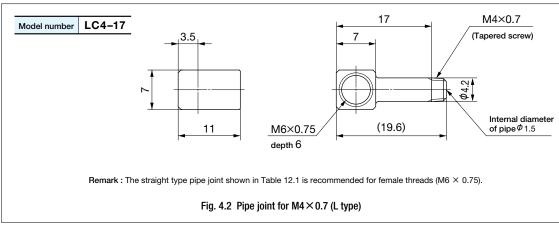
Remark: The supply nozzles shown in the table can be mounted on the main body of a common grease gun available on the market (shown below). If these supply nozzles are required, consult **IKD** by specifying the supply nozzle type.

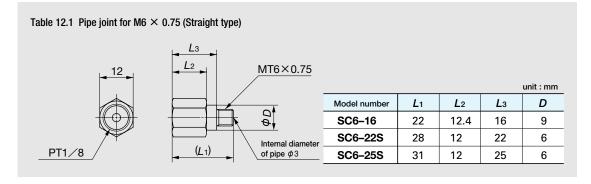


Pipe joints

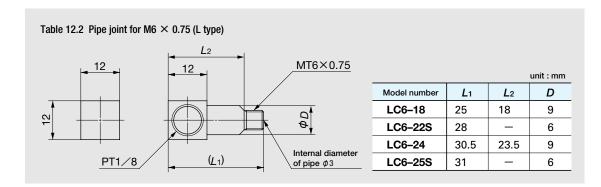
When applying centralized grease or oil lubrication, detach the grease nipple or stop cock from the slide unit, and replace them with pipe joints, which are prepared for various piping female thread sizes. Use them after comparing the dimension of the pipe joints and the dimension H_3 in the dimension table of each series, because the top face of some pipe joints is at the same or higher level with the top face of slide unit. Fig. 4.1 and 4.2, Tables 12.1, 12.2, 13.1 and 13.2 show model numbers and dimensions of pipe joints. Note that some of them are not applicable for the slide units of special specifications. Pipe joints can be mounted on Linear Way and Linear Roller Way prior to delivery upon request. Consult **IKD** for further information.

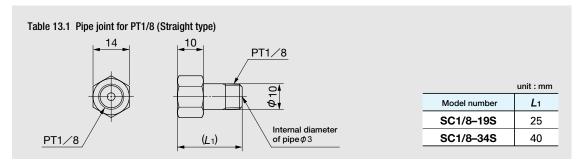


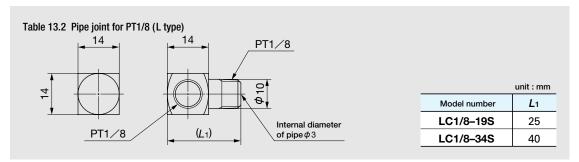




104 105 1mm=0.03937inch







Bellows

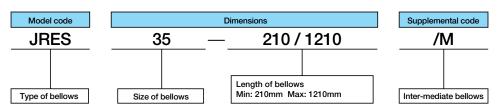
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Dimensions of bellows specially prepared for **IKD** Linear Way and Linear Roller Way are shown in Tables 15.1 and 15.2. These bellows are manufactured to match the dimensions of each series for easy mounting and effective dust protection.

For special bellows to be used in an upside-down position or those made of heat-resistant material, consult **IKD** for further information.

Identification number of bellows

The identification number of bellows consists of a model code, dimensions, and any supplemental codes. Its standard arrangement is shown below.



Calculation of minimum length of bellows

The minimum necessary length of bellows is determined, by first calculating the necessary number of accordion pleats as follows.

$$ns = \frac{S}{\ell smax - \ell smin}$$

where, *ns*: Number of pleats (Raise decimal fractions.)

S: Length of stroke, mm

ℓSmax: Maximum length of one pleat (See Tables 15.1 and 15.2.)

 $\ensuremath{\emph{L}}\xspace$ Smin: Minimum length of one pleat (See Tables 15.1 and 15.2.)

 $L\min = ns \times \ell s\min + m \times 5 + 10$

Lmax = S+Lmin

where, Lmin: Minimum length of bellows, mm

Lmax: Maximum length of bellows, mm

m: Number of internal guide plates (See Table 14.)

Type of	Dimension P of	bellows (1) mm	Number of internal guide plates, <i>m</i>
bellows	over	incl.	ramber of internal guide plates, 77
JEF JRES	_	35	$m=\frac{ns}{7}-1$
JES	_	22	$m = \frac{ns}{16}$ but $m = 0$, when $ns \le 20$
JHS JFS JFFS	22	25	$m = \frac{ns}{12}$ but $m = 0$, when $ns \le 18$
JFFO	25	35	$m=\frac{ns}{8}$

Note(1): For dimension *P*, see Tables 15.1 and 15.2.

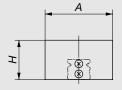
Remark: In calculating the number of internal guide plates *m*, raise the decimal fractions for JEF and JRES and omit the decimal fractions for others.

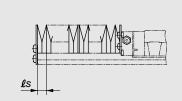
Intermediate bellows

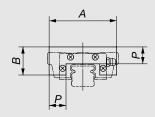
Another type of mounting plate is used for mounting bellows between slide units. Add the supplemental code "/M" onto the identification number when ordering.

Reinforced bellows are also available, which are specially designed for use on long track rails or for lateral mounting. The width A of reinforced bellows is greater than that of standard type bellows. For these reinforced bellows, consult **IKU**.

Table 15.1 Dimensions of bellows and applicable models

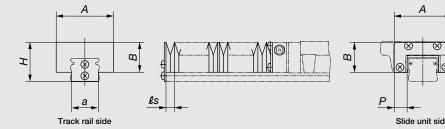






Track rail side

туре I



туре ∏

unit: mm

Series	Size	Bellows model code	Туре	н	Α	а	В	P	ℓsmin	ℓsmax
	15	JEF15		23.5	34	14	17	8	2	9
	20	JEF20		27.5	40	19	21	9	2	10
0.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	25	JEF25		32	46	22	24	10	2	11
C-Lube Linear Way ME	30	JES30	П	42	70	27	35	15	2	14
	35	JES35		48	85	33	40	18	2	18.5
	45	JES45		60	105	44	50	22	2	23.5
	15	JHS15		31(²)	55	-	19.5	15	2	14
	20	JHS20	I	35(²)	60	_	25	15	2	14
C. Luba Linaan Way May	25	JHS25		39(²)	64	_	29.5	15	2	14
C-Lube Linear Way MH	30	JHS30		42	70	_	35	15	2	14
	35	JHS35		48	85	_	40	18	2	18.5
	45	JHS45		60	105	_	50	22	2	23.5
	15	JEF15		23.5	34	14	17	8	2	9
	20	JEF20		27.5	40	19	21	9	2	10
Linear Way E	25	JEF25	п	32	46	22	24	10	2	11
Linear Way E	30	JES30	"	42	70	27	35	15	2	14
	35	JES35		48	85	33	40	18	2	18.5
	45	JES45		60	105	44	50	22	2	23.5

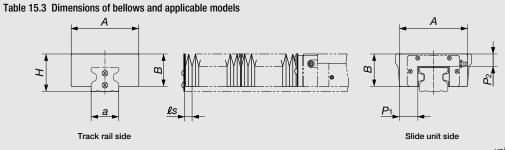
Note(1): Not applicable for LWHY series.

- (2): The height of bellows may become higher than the height H of Linear Way. Check H dimension of Linear Way shown in the table of dimensions of each series.
- (3): The width of bellows may become larger than the width W2 of Linear Way. Check W2 dimension of Linear Way shown in the table of dimensions of each series.

Table 15.2 Dimensions of bellows and applicable models unit : mm										
Series	Size	Bellows model code	Туре	Н	Α	а	В	P	ℓsmin	ℓsmax
	15	JHS15		31(²)	55	-	19.5	15	2	14
	20	JHS20		35(²)	60	-	25	15	2	14
	25	JHS25		39(²)	64	-	29.5	15	2	14
Lincon Way H/1)	30	JHS30	I	42	70	-	35	15	2	14
Linear Way H(1)	35	JHS35	٠.	48	85	_	40	18	2	18.5
	45	JHS45		60	105	-	50	22	2	23.5
	55	JHS55		70	120	-	57	25	2	28
	65	JHS65		90	158	-	76	35	2	42
	33	JFFS33	Π	26(²)	66(³)	-	23	15	2	15
	37	JFFS37	Π	27.5(²)		_	24	15	2	15
	40	JFS40	I	32(²)	80	_	27	15	2	14
Linear Way F	42	JFFS42	Π	30.5(2)	76(³)	_	27.5	15	2	15
	60	JFS60	I	36(²)	100	_	30	15	2	14
	69	JFFS69	Π	36(²)	106	_	31.5	15	2	15
	90	JFS90	I	50	150	_	43	22	2	23.5

Note(1): Not applicable for LWHY series.

- (2): The height of bellows may become higher than the height H of Linear Way. Check H dimension of Linear Way shown in the table of dimensions of each series.
- (3): The width of bellows may become larger than the width W_2 of Linear Way. Check W_2 dimension of Linear Way shown in the table of dimensions of each series.



unit	: 111111	

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Series	Size	Bellows model code	Н	Α	а	В	P 1	P 2	ℓsmin	ℓsmax
	15	JRES 15	34(1)	55(²)	14	30	17.5	15	2	15
	20	JRES 20	39(1)	60(²)	19	34	15	15	2	15
	25	JRES 25	42(1)	65(²)	22	36	16.5	15	2	15
C-Lube Linear	30	JRES 30	46(1)	70(²)	27	39.5	15	15	2	15
Roller Way Super MX	35	JRES 35	48	88(²)	33	41.5	24	15	2	15
	45	JRES 45	60	108(²)	44	52	29	20	2	21
	55	JRES 55	70	122(²)	52	61	31	22	2	23.5
	65	JRES 65	88	140(²)	61	76	25	25	2	30
	15	JRES 15	34(1)	55(²)	14	30	17.5	15	2	15
	20	JRES 20	39(1)	60(²)	19	34	15	15	2	15
	25	JRES 25	42(1)	65(²)	22	36	16.5	15	2	15
	30	JRES 30	46(1)	70(²)	27	39.5	15	15	2	15
Linear Roller Way Super X	35	JRES 35	48	88(²)	33	41.5	24	15	2	15
Linear Holler Way Super A	45	JRES 45	60	108(²)	44	52	29	20	2	21
	55	JRES 55	70	122(²)	52	61	31	22	2	23.5
	65	JRES 65	88	140(²)	61	76	25	25	2	30
	85	JRES 85	107	180	82	89	30	30	2	36
	100	JRES100	115	214	96	100	35	35	2	45

Note(1): The height of bellows may become higher than the height H of Linear Roller Way. Check H dimension of Linear Roller Way shown in the table of dimensions of each series.

(2): The height of bellows may become higher than the height H of Linear Way. Check H dimension of Linear Roller Way shown in the table of dimensions of each series.

1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

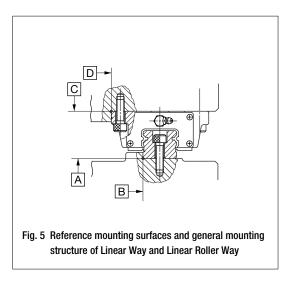
Precautions for Use

Mounting structure

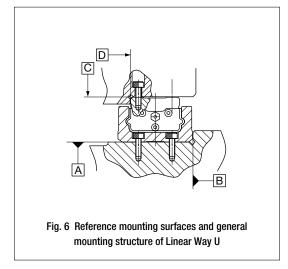
Mounting surface, reference mounting surface, and general mounting structure

To mount Linear Way or Linear Roller Way, correctly fit the reference mounting surfaces B and D of the slide unit and the track rail to the reference mounting surfaces of the table and the bed, and then fix them tightly. (See Figs. 5 and 6.)

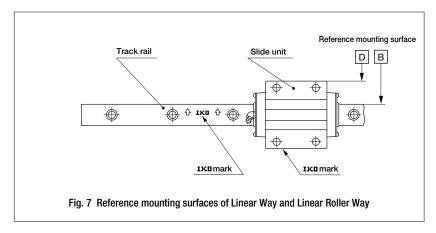
The reference mounting surfaces B and D and mounting surfaces A and C of Linear Way or Linear Roller Way are accurately finished by grinding. Stable and high accuracy linear motion can be obtained by finishing the mating mounting surfaces of machines or equipment with high accuracy and correctly mounting the guide on these surfaces.

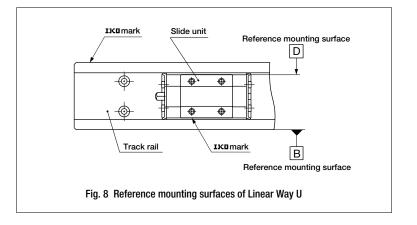


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The slide unit reference mounting surface is always the side surface opposite to the **IKO** mark. The track rail reference mounting surface is identified by locating the **IKO** mark on the top surface of the track rail. The track rail reference mounting surface is the side surface above the **IKO** mark (in the direction of the arrow). (See Figs. 7 and 8.)

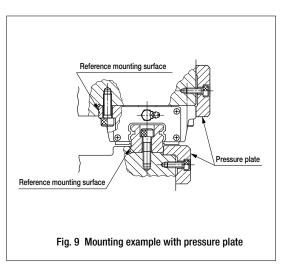


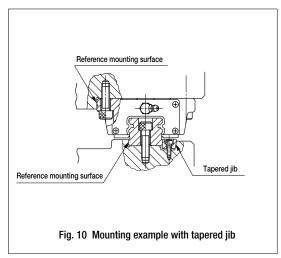


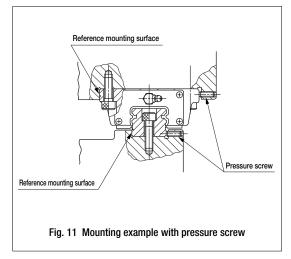
Load direction and mounting structure

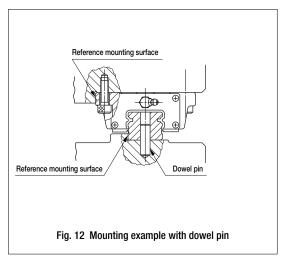
When a lateral load, alternate load, or fluctuating load is applied to Linear Way or Linear Roller Way, firmly fix the side faces of the slide unit and track rail as shown in Fig. 9 and Fig. 10.

When the applied load is small or the operating conditions are not too severe, mounting methods shown in Fig. 11 and Fig. 12 are also used.









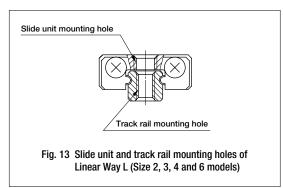
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **111**

Mounting of Linear Way L (For the size 2, 3, 4 and 6)

The general mounting structure of Linear Way L is similar to that shown in Fig. 5. The slide unit of this series is mounted by tightening bolts in the female threads of the slide unit.

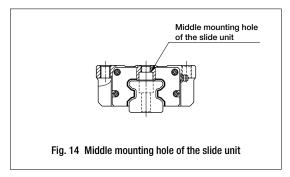
For the size 2, 3, 4 and 6 models, the female threads for mounting the slide unit and the track rail are through holes. (See Fig. 13.) If the fixing depth of the mounting bolts is too long, the bolts will interfere with the slide unit or track rail. resulting in poor traveling accuracy and short life. The fixing depth of the mounting bolts should be kept within the values shown in the table of dimensions.

The mounting bolts for the track rail are not appended to the tapped rail specification products. Prepare bolts with a fixing depth not exceeding H₄ shown in the dimension table.



Mounting of C-Lube Linear Roller Way Super MX and Linear Roller Way Super X

The general mounting structure of C-Lube Linear Roller Way Super MX and Linear Roller Way Super X is similar to that shown in Fig. 5. Some slide units are provided with one or two mounting thread holes in the middle of width (See Fig. 14.) so that an applied load can be received with good load balance. When designing machines or equipment, ensure that these middle mounting holes of the slide unit can be securely tightened to obtain maximum performance of the guide.



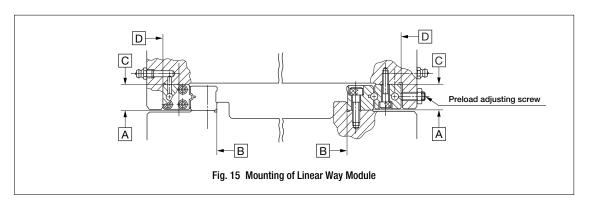
Mounting of Linear Way Module

Fig. 15 shows the standard mounting structure of Linear Way Module. As a convenient means to eliminate play or give preload, preload adjusting screws are often used in linear motion rolling guides.

Set the preload adjusting screws at the positions of fixing bolts of slide member and in the middle of the height of slide member, and then press the slide member by tightening the screw.

For mounting the slide member of Linear Way Module LM, it is recommended to fix the slide member from the table side, because the allowance for preload adjustment in the bolt hole of slide member is small. In this case, the bolt hole and the counter bore in the table should be made larger to give the adjustment allowance.

The preload amount differs depending on the operating conditions of machines or equipment. An excessive preload will result in short bearing life and raceway damage. The preload amount for general application should be adjusted to a zero or slight minus clearance in the ideal case.



Specifications of mounting parts

Accuracy of mounting surfaces

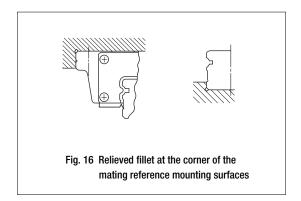
The life and other performances of Linear Way and Linear Roller Way are greatly affected by the accuracy of the mounting surfaces of machines and equipment and the mounting accuracy. Poor accuracy may result in producing a larger load than the calculated load, and eventually lead to short life, etc.

Reliable operation of linear motion rolling guide is ensured by providing high manufacturing and mounting accuracy of mounting parts and designing a mounting structure so as to keep the accuracy and performance, while considering the required linear motion accuracy, rigidity and other related operating conditions.

As an example, the standard values of parallelism between two track rail mounting surfaces when multiple sets are used, are shown in Table 30 on page 126.

Corner radius and shoulder height of reference mounting surfaces

It is recommended to make a relieved fillet at the corner of the mating reference mounting surfaces as shown in Fig. 16. However, in some series, corner radii R_1 and R_2 shown in Fig. 17 can also be used. Tables 16.1 to 27.3 show recommended shoulder heights and corner radii of the mating reference mounting surfaces.



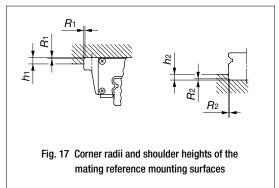
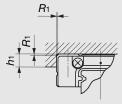
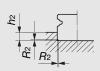


Table 16.1 Shoulder heights and corner of the mating reference mounting of C-Lube Linear Way ML standard type





Slide uni

Track rail

unit: mm

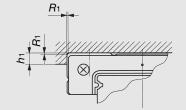
	Slide	e unit	Track rail			
Model number	Shoulder height Comer radius Shoulder he h1 R1 (max.) h2			Comer radius R2 (max.)		
ML 5	2	0.3	0.8	0.2		
ML 7	2.5	0.2	1.2	0.2		
ML 9	3	0.2	1.5	0.2		
ML 12	4	0.2	2.5	0.2		
ML 15	4.5	0.2	3	0.2		
ML 20	5	0.2	4	0.2		
ML 25	6.5	0.7	4	0.7		

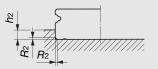
Note(1): For models with under seals (/U), it is use h₂ values 1mm smaller than the values in the table.

However, for "with under seals" of the size 9 models, 0.8mm is recommended. Remark: The above table shows representative model numbers but is applicable to all models.

112 113 1mm=0.03937inch

Table 16.2 Shoulder heights and corner of the mating reference mounting of C-Lube Linear Way ML wide rail type





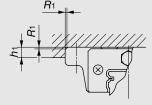
Slide unit

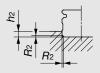
unit: mm

				unit : min
	Slide unit		Trac	k rail
Model number	Shoulder height <i>h</i> 1	Comer radius R1 (max.)	Shoulder height(1) h2	Comer radius R2 (max.)
MLF 10	2	0.3	1.2	0.2
MLF 14	2.5	0.2	1.2	0.2
MLF 18	3	0.2	2.5	0.2
MLF 24	4	0.2	2.5	0.2
MLF 30	4.5	0.2	2.5	0.2
MLF 42	5	0.2	3	0.2

Note(1): For models with under seals (/U), it is use h_2 values 1mm smaller than the values in the table. Remark: The above table shows representative model numbers but is applicable to all models.

Table 17 Shoulder heights and corner of the mating reference mounting of C-Lube Linear Way ME





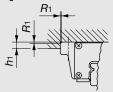
Track rail

Slide unit

	Slid	e unit	Track rail		
Model number	Shoulder height h1	Comer radius R1 (max.)	Shoulder height h2	Comer radius R2 (max.)	
ME(T) 15	4	1	3	0.5	
MES 15	4	0.5	3	0.5	
ME(T) 20	5	1	3	0.5	
MES 20	5	0.5	3	0.5	
ME(T) 25	6	1	4	1	
MES 25	ь	1 4	4	'	
ME(T) 30	8	1	5	1	
MES 30	0	'	5	Į.	
ME(T) 35	8	1	6	1	
MES 35	O	l I	0	ļ	
ME(T) 45	8	1.5	7	1.5	
MES 45	0	1.5	/	1.5	

Remark: The above table shows representative model numbers but is applicable to all models.

Table 18 Shoulder heights and corner of the mating reference mounting of C-Lube Linear Way MH



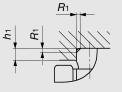


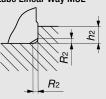
unit : mm

	Slide unit		Trac	k rail
Model number	Shoulder height <i>h</i> 1	Comer radius R_1 (max.)	Shoulder height <i>h</i> 2	Comer radius R2 (max.)
MHT 8···SL	3.5	0.5	1.6(¹)	0.2
MHD 8···SL	4	0.5	1.6(¹)	0.2
MHT 10···SL	4.5	0.5	1.9(¹)	0.2
MHD 10···SL	5	0.5	1.9(¹)	0.2
MHT 12	6	0.5	2.7(¹)	0.7
MHD 12	6	0.5	2.7(1)	0.7
MH 15	4	0.5	3	0.5
MH 20	5	0.5	3	0.5
MH 25	6	1	4	1
MH 30	8	1	5	1
MH 35	8	1	6	1
MH 45	8	1.5	7	1.5

Note(1): For models with under seals (/U),it is recommended to use h2 values 0.6mm smaller than the values in the table. Remark: The above table shows representative model numbers but is applicable to all models.

Table 19 Shoulder heights and corner of the mating reference mounting of C-Lube Linear Way MUL





Slide unit

Track rail

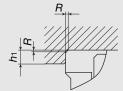
unit : mm

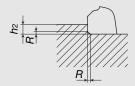
	Slide unit		Track rail	
Model number	Shoulder height <i>h</i> 1	Comer radius R1 (max.)	Shoulder height h2	Comer radius R2 (max.) (¹)
MUL 25	1.5	0.2	2.5	_
MUL 30	2.5	0.2	3	_

Note(1): Please provide a relieved fillet as shown on Fig.16.

114 115 1mm=0.03937inch

Table 20 Shoulder height and radius of the reference mounting of C-Lube Linear Roller Way Super MX





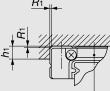
Slide un

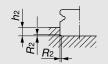
ктан

Model number	Slide unit Shoulder height <i>h</i> 1	Track rail Shoulder height <i>h</i> 2	Relieved radius R (max.)
MX 15	4	3	0.5
MX 20	5	4	0.5
MX 25	6	5	1
MX 30	8	5.5	1
MX 35	8	5.5	1
MX 45	8	7	1.5
MX 55	10	8	1.5
MX 65	10	10	1.5

Remark: The table shows representative model numbers but is applicable to all models of the same size.

Table 21.1 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way L standard type





Slide unit

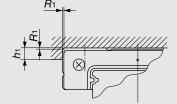
unit : mm

	Slide	unit	Trac	k rail	
Model number	Shoulder height <i>h</i> 1	Corner radius R1 (max.)	Shoulder height(1) h2	Corner radius R2 (max.)	
LWL 1	1.3	_	_	_	
LWL 1···Y	1.5	_	2	_	
LWL 2	1	0.1	0.5	0.05	
LWL 3	1.2	0.15	0.8	0.1	
LWL 5···B	2	0.3	0.8	0.2	
LWL 5	2	0.3	0.8	0.2	
LWL 7···B	2.5	0.2	1.2	0.2	
LWL 7	2.5	0.2	1.2	0.2	
LWL 9···B	3	0.2	1.5	0.2	
LWL 9···BCS		0.4			
LWL 9		0.2			
LWL 12···B		0.2	2.5	0.2	
LWL 12···BCS	4	0.4			
LWL 12	4	0.2			
LWL 12···CS		0.4			
LWL 15···B	4.5	0.2			
LWL 15····BCS	4.5	0.4	3	0.2	
LWL 15	4	0.2	3	0.2	
LWL 15···CS	7	0.4			
LWL 20···B	5	0.2	4	0.2	
LWL 20···BCS	5	0.4	7	0.2	
LWL 25···B	6.5	0.7	4	0.7	

Note(1): For models with under seals (/U), it is recommended to use h₂ values 1mm smaller than the values in the table. However, for "with under seals" of the size 9 models, 0.8mm is recommended.

Remark: The above table shows representative model numbers but is applicable to all models.

Table 21.2 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way L wide rail type





Slide unit

Track rail

unit : mm

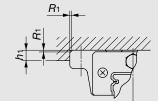
117

	Slide	unit	Track rail	
Model number	Shoulder height <i>h</i> 1	Corner radius R1 (max.)	Shoulder height(1) h2	Corner radius R2 (max.)
LWLF 4	1.5	0.1	0.8	0.1
LWLF 6	2	0.1	0.8	0.1
LWLF 10···B	2	0.3	1.2	0.2
LWLF 14···B	2.5	0.0	1.0	0.0
LWLF 14	2.5	0.2	1.2	0.2
LWLF 18···B		0.2	2.5	
LWLF 18 ··· BCS	3	0.4	2.5	0.0
LWLF 18		0.2	1.5	0.2
LWLF 18 ···CS		0.4		
LWLF 24···B	4	0.2	2.5	0.2
LWLF 24 ···BCS	4	0.4		
LWLF 24	3	0.2		
LWLF 24 ···CS	3	0.4		
LWLF 30 ···B	4.5	0.2	0.5	0.2
LWLF 30 ···BCS	4.5	0.4	2.5	
LWLF 42···B	Е	0.2	3	
LWLF 42 ··· BCS	5	0.4	3	0.2
LWLF 42	4	0.2	2.5	0.2
LWLF 42 ···CS	4	0.4	2.5	

Note(¹): For models with under seals (/U), it is recommended to use h_2 values 1mm smaller than the values in the table. Remark: The above table shows representative model numbers but is applicable to models.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Table 22 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way E





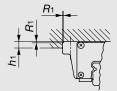
Track rail

unit : mm

				unit.min
	Slide	e unit	Trac	k rail
Model number	Shoulder height	Corner radius	Shoulder height	Corner radius
	<i>h</i> 1	R 1(max.)	h ₂	R 2(max.)
LWE(T) 15	4	1.0	3	0.5
LWES 15	4	0.5	3	0.5
LWE(T) 20	5	1	3	0.5
LWES 20	5	0.5	3	0.5
LWE(T) 25	6	1	4	1
LWES 25	ь	Į.	4	1
LWE(T) 30	8	1	5	1
LWES 30	0	ı	5	'
LWE(T) 35	8	1	6	1
LWES 35	0	Į.	U	ı
LWE(T) 45	8	1.5	7	1.5
LWES 45	0	1.0	,	1.0

Remark: The above table shows representative model numbers but is applicable to all models.

Table 23 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way H





Slide unit

Track rail

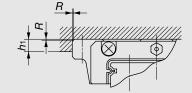
unit : mm

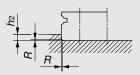
	Slide	unit	Trac	k rail
Model number	Shoulder height <i>h</i> 1	Corner radius	Shoulder height h 2	Corner radius
	111	R1(max.)	112	R 2(max.)
LWHT 8····SL	3.5	0.5	1.6(¹)	0.2
LWHD 8···SL	4	0.5	1.6(¹)	0.2
LWHT 10···SL	4.5	0.5	1.9(¹)	0.2
LWHD 10···SL	5	0.5	1.9(¹)	0.2
LWHT 12	6	0.5	2.7(1)	0.7
LWHD 12	6	0.5	2.7(1)	0.7
LWH 15···B	4	0.5	3	0.5
LWH 20···B	5	0.5	3	0.5
LWH 25B	6	1	4	1
LWH 30···B	8	1	5	1
LWH 35B	8	1	6	1
LWH 45···B	8	1.5	7	1.5
LWH 55B	10	1.5	8	1.5
LWH 65B	10	1.5	10	1.5

Note(¹): For models with under seals (/U), it is recommended to use h₂ values 0.6mm smaller than the values in the table.

Remark: The above table shows representative model numbers but is applicable to all models.

Table 24.1 Shoulder heights and corner radius of the mating reference mounting surfaces of Linear Way F





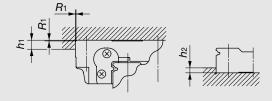
Track rail

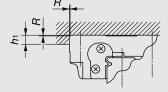
Slide unit

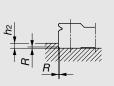
unit: mm

Model number	Slide unit Shoulder height <i>h</i> 1	Track rail Shoulder height <i>h</i> 2	Corner radius R (max.)
LWFF 33 LWFS 33	4	2	0.4
LWFF 37 LWFS 37	5	2.5	0.4
LWFF 42	5	2.5	0.4
LWFF 69	5	3.5	0.8

Table 24.2 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way F







Slide unit

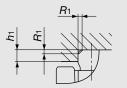
Track rail

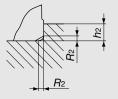
When supplemental code "/CC" is specified

unit : mm

Model number	Slide Shoulder height <i>h</i> 1	e unit Corner radius R 1(max.)	Track rail Shoulder height <i>h</i> 2	Corner radius for "/CC" specification $oldsymbol{R}$ (max.)
LWFH 40	4	0.3	3	1
LWFH 60	6	0.5	4	1
LWFH 90	8	0.5	6	1

Table 25 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way U





Slide unit

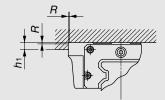
Track rail

unit :	

	Slide unit		Track rail	
Model number	Shoulder height <i>h</i> 1	Corner radius R1 (max.)	Shoulder height <i>h</i> 2	Corner radius R2 (max.) (1)
LWUL 25···B	1.5	0.2	2.5	-
LWUL 30···B	2.5	0.2	3	-
LWU 40···B	3	0.5	5	1
LWU 50···B	3	0.5	7	2
LWU 60···B	3	0.5	9	2
LWU 86···B	4	0.5	11	2
LWU 100	4	0.5	13	1
LWU 130	5	1	14	2

Note(1): For the size 25 and 30 models, provide a relieved fillet as shown on Fig. 16.

Table 26 Shoulder heights and corner radius of the mating reference mounting surfaces of Linear Roller Way Super X





Track rail

Slide unit

2.5

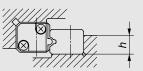
unit: mm Track rail Shoulder height Slide unit Corner radius Shoulder height Model number R(max.) h2 *h*1 LRXD 10···SL 0.3 4 LRX 12 4 2 0.5 LRX 15 4 3 0.5 5 0.5 LRX 20 4 LRX 25 6 5 1 LRX 30 5.5 8 LRX 35 8 5.5 LRX 45 8 1.5 LRX 55 10 8 1.5 LRX 65 10 10 1.5 LRX 85 14 2.5 14

13

14 Remark: The above table shows representative model numbers but is applicable to all models.

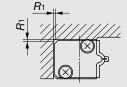
LRX 100

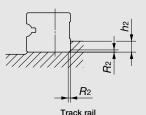
Table 27.1 Shoulder height of the mating reference mounting surface of Linear Way Module LM



	unit : mm
Model number	h
LWLM 7	4
LWLM 9	5
LWLM 11	6

Table 27.2 Shoulder height and corner radius of the mating reference mounting surfaces of Linear Way Module M





Slide member

unit : mm

	Slide member	Trac	k rail
Model number	Corner radius $m{R}$ 1(max.)	Shoulder height h 2	Corner radius R 2(max.)
LWM 1	0.8	4	0.8
LWM 2	1	5	1
LWM 3	1	5	1
LWM 4	1.5	6	1
LWM 5	1.5	6	1
LWM 6	1.5	8	1.5

Operating conditions

Multiple slide units mounted in close distance

When multiple slide units are used in close distance to each other, the actual load may be greater than the calculated load depending on the accuracy of the mounting surfaces and the reference mounting surfaces of the machine. It is suggested in such cases to assume a greater load than the calculated load.

For lateral or upside-down mounting

When mounting Linear Way E or Linear Way F slide units in lateral or reverse (upside-down) position, specify slide units with under seals (supplemental code "/U"), if necessary, to prevent foreign particles from intruding into the slide units.

Operating speed

The limiting values for operating speed of Linear Way or Linear Roller Way depend on various operating conditions such as the type of motion, magnitude of applied load, lubrication conditions, mounting accuracy, and ambient temperature.

Based on the experiences and actual practice, standard values of maximum speed under general operating conditions are given in Table 28 for reference.

Table 28 Standard maximum speed			
Model size	Maximum speed m/min		
35	180		
45	120		
55	100		
65	75		

Operating temperature

The maximum operating temperature is 120°C and a continuous operation is possible at temperatures up to 100°C. When the temperature exceeds 100°C, consult **IKU**.

In the case of C-Lube Linear Way and the models "with Capillary plates" of special specification, operate below 80°C.

Cleaning

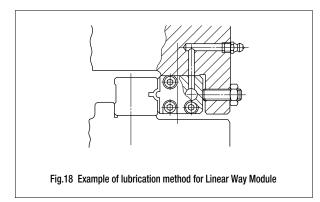
Do not wash C-Lube Linear Way with organic solvent and/or white kerosene, which have the ability of removing fat, nor leave them in contact with the above agents.

Oil supply point for lubrication

When lubrication oil is fed by gravity, sufficient amounts of oil may not reach to the raceways which are located higher than the supply point. In such cases, it is necessary to examine the lubrication route and supply point. Consult **IKD** for further information.

Lubrication of Linear Way Module

A grease nipple is not provided on the slide member of Linear Way Module, but a lubrication hole is provided on it to supply lubricant directly to the steel ball re-circulation route. By preparing a lubricant supply route in the mating machine parts as shown in Fig.18, lubrication can be carried out readily .



Precautions for Mounting

When mounting multiple sets at the same time

- Interchangeable specification product
 In the case of an interchangeable specification product, assemble a slide unit and a track rail with the same interchangeable code ("S1" or "S2")
- Non-interchangeable specification product
 Use an assembly of slide unit and track rail as delivered without changing the combination.
- Matched sets to be used as an assembled group
 Special specification products of matched sets (supplemental code "/W") are delivered as a group in
 which dimensional variations are specially controlled. Mount them without mixing with the sets of another
 group.

Assembling a slide unit and a track rail

• Assembling of C-Lube Linear Way ML and Linear Way L

When assembling C-Lube Linear Way ML or Linear Way L, correctly fit the grooves of the slide unit mounted on a dummy rail (steel ball holder) to the grooves of the track rail, and then move the slide unit gently from the dummy rail to the track rail in parallel direction.

Steel balls are retained in C-Lube Linear Way ML and Linear Way L Ball Retained type, so the slide unit can be separated freely from the track rail. However, the slide unit can be assembled on the track rail much easier by using the dummy rail.

The Linear Way L slide unit of interchangeable specification is delivered as assembled on a dummy rail. In Linear Way L Ball Non-Retained type, steel balls are not retained. When separating the slide unit from the track rail, a dummy rail (steel ball holder) should be used.

The dummy rail (steel ball holder) is appended as an accessory to models shown in Table 29. The steel ball holder for other models are also available. If required, consult **IKB** for further information.

Tahla 20	Models to which a steel hall holder is annended	

C-Lube Line	ear Way ML	Linear	Way L
Standard type	Wide Rail type	Standard type	Wide Rail type
MLC 5	MLFC 10	LWL 2	LWLF 4
ML 5	MLF 10	LWLC 3	LWLFC 6
MLC 7	MLFC 14	LWL 3	LWLF 6
ML 7	MLF 14	LWLC 5···B	LWLFC 10···B
MLG 7	MLFG 14	LWL 5···B	LWLF 10···B
MLC 9	MLFC 18	LWLC 7···B	LWLFC 14···B
ML 9	MLF 18	LWL 7···B	LWLF 14···B
MLG 9	MLFG 18	LWLG 7···B	LWLFG 14···B
MLG 12	MLFG 24	LWLC 9···B	LWLFC 18···B
MLG 15	MLFG 30	LWL 9···B	LWLF 18···B
MLG 20	MLFG 42	LWLG 9···B	LWLFG 18···B
MLG 25	_	LWLG 12···B	LWLFG 24···B
-	_	LWLG 15···B	LWLFG 30···B
-	_	LWLG 20···B	LWLFG 42···B
_	_	LWLG 25···B	_

Remark: For Linear Way L series, also applicable to high carbon steel products.

• Assembling of types other than C-Lube Linear Way ML and Linear Way L

When assembling the slide unit on the track rail, correctly fit the grooves of the slide unit to the grooves of the track rail and move the slide unit gently in parallel direction. Rough handling will result in seal damage or dropping of steel balls.

The interchangeable specification slide unit is provided with a dummy rail. And, the size 12, 15, 20, 25 and 30 models of Linear Roller Way Super X are appended with a dummy rail. This dummy rail should be used for assembly.

Handling of C-Lube Linear Way ML, Linear Way L and Linear Way Module LM

In C-Lube Linear Way ML, Linear Way L Ball Retained type and Linear Way Module LM, steel balls are retained with a steel ball retaining band. However, these products must be handled with care to prevent the steel balls from falling out.

Mounting accuracy

Inadequate mounting accuracy of Linear Way and Linear Roller Way will affect the operating accuracy and life adversely, so mounting must be carried out with care. When multiple sets are mounted, the parallelism between the two mounting surfaces of machines must be prepared, in general, as shown in Table 30. In the case of Linear Way, if mounting parallelism is poor, frictional resistance will steeply increase giving a warning signal, which can be used to perform high accuracy mounting. For details, see "Mounting" on page 128.

Table 30 Parallelism between two mounting surfaces					unit : μm
Class	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)	Ultra Precision (UP)
Parallelism	3	0	20	10	6

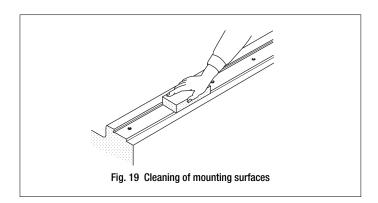
Cleaning of mounting surfaces

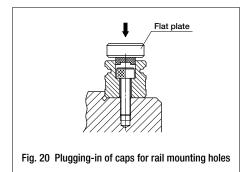
When mounting Linear Way or Linear Roller Way, first clean all mounting and reference mounting surfaces. (See Fig. 19.)

- Remove burrs and blemishes from the reference mounting surfaces and mounting surfaces of the machine or equipment, on which Linear Way or Linear Roller Way will be mounted, using an oil-stone, etc., and then wipe the surfaces with clean cloth.
- Remove rust preventive oil and dirt from the reference mounting surfaces and mounting surfaces of Linear Way or Linear Roller Way with clean cloth.

Plugging-in of caps for rail mounting holes

 When plugging the caps of special specification ("with caps for rail mounting holes, supplemental code /F") into the mounting holes of track rail, tap in the cap gently by applying a flat plate on the top face of the cap until the top face of the cap becomes level with the top face of the track rail.





Tightening torque of mounting bolts

The standard torque values for Linear Way and Linear Roller Way mounting bolts are shown in Tables 31.1 and 31.2. When machines or equipment are subjected to severe vibration, shock, large fluctuating load, or moment load, the bolts should be tightened with a torque 1.2 to 1.5 times higher than the standard torque values shown.

When the mating member material is cast iron or aluminum, tightening torque should be lowered in accordance with the strength characteristics of the material.

Table 31.1 Tightening torque of mounting bolts of Linear Way and Linear Roller Way

	Tightening torque N∙m		
Bolt size	Carbon steel bolt (In case strength division 12.9)	Stainless steel bolt (Property division A2-70)	
M 3×0.5	1.7	1.1	
M 4×0.7	4.0	2.5	
M 5 × 0.8	7.9	5.0	
M 6×1	13.3	8.5	
M 8 × 1.25	32.0	20.4	
M 10 × 1.5	62.7	_	
M 12 × 1.75	108	_	
M 14 × 2	172	_	
M 16 × 2	263	_	
M 20 × 2.5	512	_	
M 24 × 3	882 (746)(1)	_	
M 30 × 3.5	1 750 (1 480)(¹)	_	

Note(1): The values in () show recommended tightening torque for strength division 10.9.

Remark 1: For C-Lube Linear Way ML, Linear Way L, Linear Way LM and the size 8, 10 and 12 models of Linear Way H, see Table 31.2.

2 : Tightening torque for the slide unit middle mounting holes of the size 15, 20, 25, 30 and 35 models of Linear Roller Way Super X flange type is recommended to be 70 to 80 % of the values in the table.

Table 31.2 Tightening torque of mounting bolts of C-Lube Linear Way ML, Linear Way L, Linear Way LM and the size 8, 10 and 12 models of Linear Way H

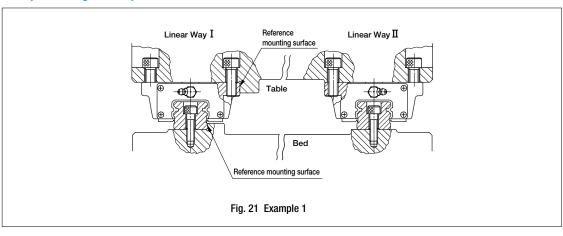
	Tightening torque N⋅m		
Bolt size	Carbon steel bolt (Strength division 8.8)	Stainless steel bolt (Property division A2-70)	
M 1 × 0.25	_	0.04	
M 1.4 × 0.3	_	0.10	
M 1.6 × 0.35	_	0.15	
M 2 × 0.4	_	0.31	
M 2.3 × 0.4	_	0.48	
M 2.5 × 0.45	_	0.62	
M 2.6 × 0.45	_	0.70	
M 3 × 0.5	1.2	1.1	
M 4 × 0.7	2.8	2.5	
M 5 × 0.8	5.6	5.0	
M 6 × 1	_	8.5	

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **1**

Mounting Examples

The general mounting procedure for Linear Way and Linear Roller Way is shown in Examples 1 to 3 using a Linear Way as an example. The mounting procedure for Linear Way Module is shown in Example 4.

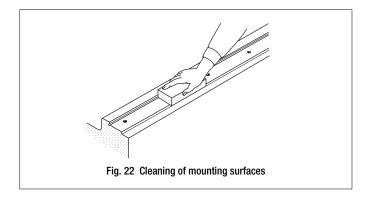
Example 1 For general operation



For operations under normal conditions without shocks, prepare one mating reference mounting surface on the table and the bed respectively, and proceed as follows. (See Fig. 21.)

Cleaning of mounting surfaces

- Remove burrs and blemishes from the reference mounting surfaces and mounting surfaces of the machine using an oil-stone, etc. and then wipe the surfaces with clean cloth. (See Fig. 22.)
- Remove rust preventive oil and dirt from the reference mounting surfaces and mounting surfaces of Linear Way with clean cloth.

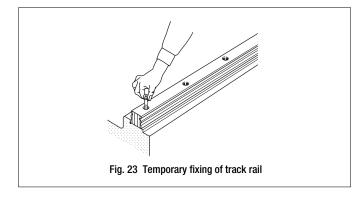


2 Temporary fixing of Linear Way I and II track rails

 Correctly fit the reference mounting surface of Linear Way I track rail onto the mating reference mounting surface of the bed, and temporarily fix the track rail with mounting bolts. (See Fig. 23.)

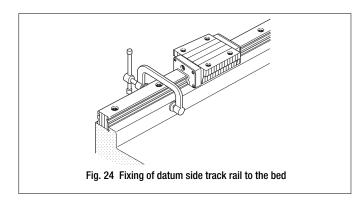
During installation, ensure that track rail mounting bolts do not interfere with the mounting holes.

• Temporarily fix Linear Way II track rail onto the bed.



3 Final fixing of Linear Way I track rail

- Firmly push the reference mounting surface of Linear Way I track rail to the mating reference mounting surface of the bed using a small vise or clamp. Tighten the track rail mounting bolt at the position where the vise or clamp is applied. Fix the track rail by progressively moving the position of the vise or clamp from one rail end to the other. (See Fig. 24.)
- At this stage, leave Linear Way II track rail temporarily fixed.



$\mbox{\em 4}$ Temporary fixing of Linear Way $I\mbox{\em I}$ and $\mbox{\em I}\mbox{\em slide}$ slide units

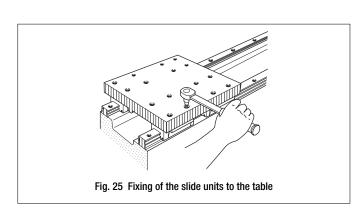
- After locating all slide units to their respective table mounting positions, gently place the table on them.
- Temporarily fix Linear Way I and II slide units to the table.

\bullet Final fixing of Linear Way I slide units

• Fix the Linear Way $\, I \,$ slide units to the table while correctly fitting the reference mounting surfaces of slide units to the mating reference mounting surface of the table.

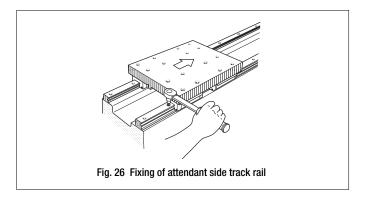
⑥ Fixing of Linear Way **Ⅱ** slide units

 Correctly fix one of the slide units of Linear Way II in relation to the linear motion direction and leave other slide units temporarily tightened with mounting bolts. (See Fig. 25.)



7 Final fixing of Linear Way **1** track rail

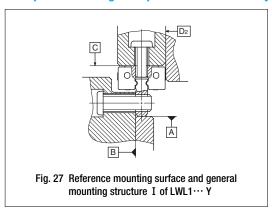
 While moving the table by hand and ensuring its smooth movement, fix the Linear Way II track rail to the bed with the mounting bolts. During this procedure, tighten the mounting bolt immediately behind the fixed slide unit of Linear Way II, while progressively moving the table from one rail end to the other. (See Fig. 26.)

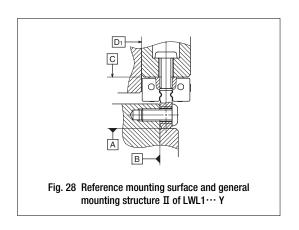


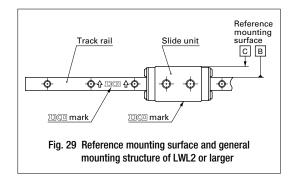
❸ Final fixing of other Linear Way **II** slide units

• Fix all Linear Way II slide units that have been left temporarily fixed to the table.

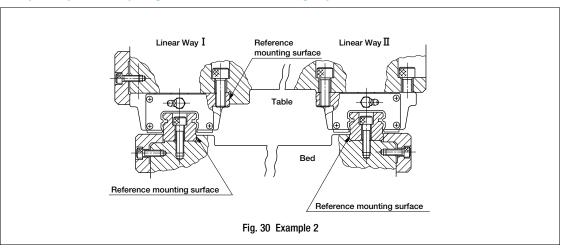
Example 2 Mounting example of Micro Linear Way







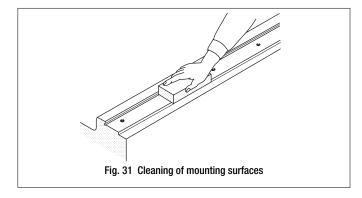
Example 3 Operation requiring accurate movement and rigidity



When machines using Linear Way require high running accuracy and rigidity, prepare two mating reference mounting surfaces on the bed and one mating reference mounting surface on the table, then perform the following procedure. (See Fig. 30.)

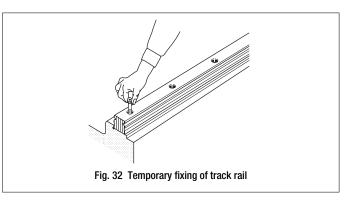
1 Cleaning of mounting surfaces and reference mounting surfaces

- Remove burrs and blemishes from mounting surfaces and reference mounting surfaces of the machine using an oil-stone, etc., and then wipe the surfaces with clean cloth. (See Fig. 31.)
- Remove rust preventive oil and dirt from Linear Way reference mounting surfaces and mounting surfaces with clean cloth.



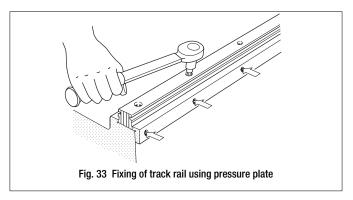
2 Temporary fixing of Linear Way I and II track rails

Correctly fit the reference mounting surfaces of Linear Way I and II track rails onto the mating reference mounting surfaces of the bed, and temporarily fix the track rails with mounting bolts. (See Fig. 32.)



\odot Final fixing of Linear Way I and II track rails

- Firmly press the reference mounting surface of Linear Way I track rail to the mating reference surface of the bed with pressure plates or pressure screws. Tighten the mounting bolt of the track rail at the pressure plate or screw position from one end of the track rail to the other in succession. (See Fig. 33.)
- Fix Linear Way II track rail in the same way.



4 Temporary fixing of Linear Way I and II slide units

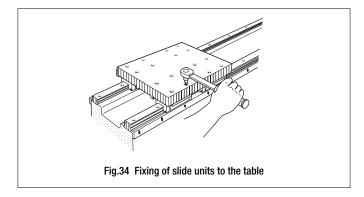
• After locating all slide units to their respective table mounting positions, gently place the table on them. Temporarily fix Linear Way I and II slide units to the table.

6 Final fixing of Linear Way I slide units

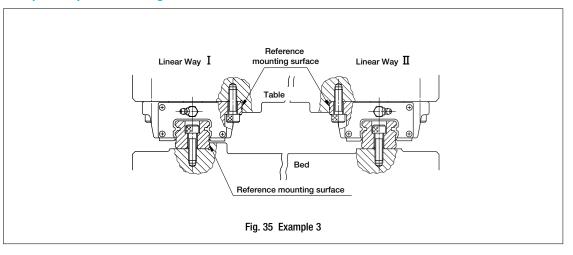
• Fix the Linear Way I slide units to the table while correctly fitting the reference mounting surfaces of the slide units to the mating reference mounting surface of the table using pressure plates or pressure

6 Final fixing of Linear Way II slide units

• Move the table by hand to ensure smooth movement, then fix the Linear Way II slide units to the table with mounting bolts. (See Fig. 34.)



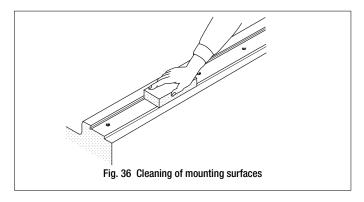
Example 4 Separate mounting of slide units from track rails



When the slide units assembled on the track rail cannot be securely fixed to the table due to table construction, prepare one reference mounting surface on the bed and two reference mounting surfaces on the table, then proceed as follows. (See Fig. 35.)

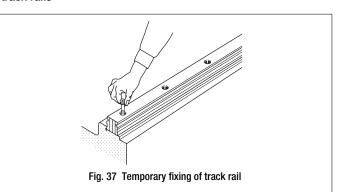
Cleaning of mounting surfaces

- · Remove burrs and blemishes from reference mounting surfaces and mounting surfaces of the machine using an oil-stone, etc., and then wipe the surfaces with clean cloth. (See Fig. 36.)
- Remove rust preventive oil and dirt from Linear Way reference mounting surfaces and mounting surfaces with clean cloth.



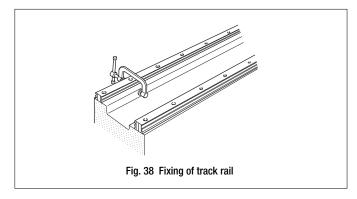
2 Temporary fixing of Linear Way I and II track rails

- · Correctly fit the reference mounting surface of Linear Way I track rail onto the mating reference mounting surface of the bed, and temporarily fix the track rail with mounting bolts. (See Fig. 37.)
- During installation, ensure that the track rail mounting bolts do not interfere with the mounting holes.
- Temporarily fix Linear Way II track rail onto the bed.



3 Final fixing of Linear Way I track rail

- \bullet Firmly push the reference mounting surface of Linear Way I track rail to the mating reference mounting surface of the bed using a small vise or clamp. Tighten the track rail mounting bolt at the position of the vise or clamp. Fix the track rail by progressively moving the vise or clamp from one rail end to the other. (See Fig. 38.)
- \bullet At this stage, leave Linear Way ${\rm I\hspace{-.1em}I}$ track rail temporarily fixed.

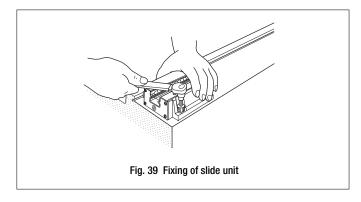


4 Separation of slide units from track rails

• After noting the respective markings which identify correct assembly positions of slide units on Linear Way I and II track rails, separate slide units from track rails.

⑤ Fixing of Linear Way I and II slide units

• Correctly fit the reference mounting surfaces of Linear Way I and II slide units to the mating reference mounting surfaces of the table and fix the slide units as shown in the figure. (See Fig. 39.)



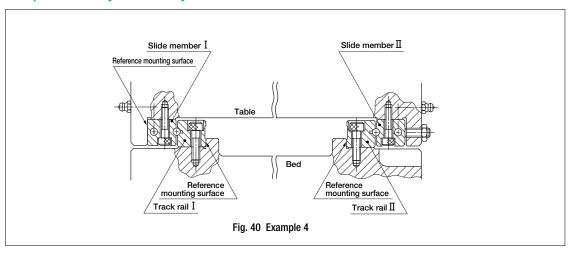
6 Installing slide units on track rails

• Gently and gradually install the slide units which are fixed on the table onto the track rails which are fixed or temporarily tightened on the bed. Take care to maintain parallelism of the table to the track rails as the table is slid onto the rails.

Fixing of Linear Way II track rail

• Fix the track rail of Linear Way ${\rm I\!I}$ while checking the smooth motion by moving the table. At this time, tighten the mounting bolt right behind the fixed slide unit of Linear Way ${\rm I\!I}$ just passed. Fix the track rail by repeating this procedure from one rail end to the other.

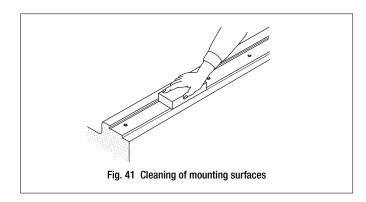
Example 5 Assembly of Linear Way Module



Generally, two sets of Linear Way Modules are used in parallel as shown in Fig. 36. They are usually mounted according to the following procedure. (See Fig. 40.)

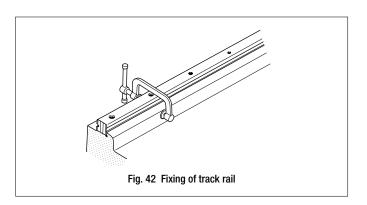
Cleaning of mounting surfaces

- Remove burrs and blemishes from reference mounting surfaces and mounting surfaces of the machine using an oil-stone, etc., and then wipe the surfaces with clean cloth. (See Fig. 41.)
- Remove rust preventive oil and dirt from Linear Way Module reference mounting surfaces and mounting surfaces with clean cloth.



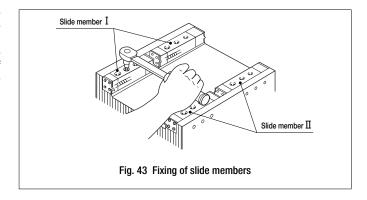
2 Fixing of track rails

 Correctly fit the reference mounting surfaces of Track Rails I and II to the reference mounting surfaces of the bed and bring them in close contact using a small vise, etc. Tighten the mounting bolt at the position of the vise. (See Fig. 42.)



3 Fixing of slide members

 Tighten the mounting bolts and fix the slide member I to the table while correctly fitting the reference mounting surface of the slide member to the mating reference mounting surface of the table. Temporarily fix the slide member II. (See Fig. 43.)

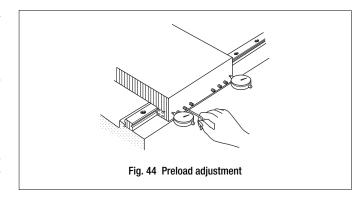


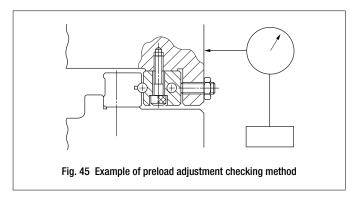
Installing slide members on track rails

• Gently and gradually install the slide members fixed to the table onto the track rails fixed to the bed, taking care to maintain parallelism between the table and the track rails.

\bullet Final fixing of slide member II

- While measuring the clearance with a dial gauge as shown in Fig. 44, tighten all preload adjusting screws starting from the screw in the center.
- When the dial gauge indicates no deflection while the table is pushed to right and left in the direction perpendicular to the rails, the preload is zero or very light.
- After adjusting preload, fix slide members II by tightening the mounting bolts.





Mounting methods of datum track rail

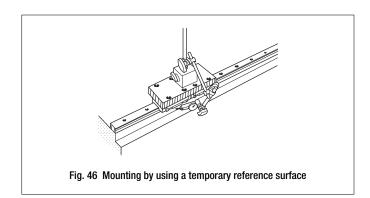
The following methods may be used to mount the datum track rails of **IKO** Linear Way and Linear Roller Way. Select the method most suited to the specifications of the machine or equipment.

Use of mating reference mounting surface of bed

Firmly push the reference mounting surface of the track rail against the mating reference mounting surface of the bed using a small vise or clamp. Tighten the mounting bolt at the position of the vise. Fix the track rail by repeating this procedure from one end of the rail to the other in succession.

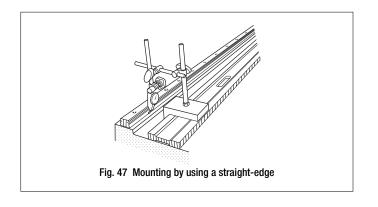
2 Use of a temporary reference surface

Prepare a temporary reference surface near the mounting surface of the bed and temporarily fix the track rail. Next, fix an indicator stand on the top face of the slide unit as shown in Fig. 46. Apply the indicator probe to the temporary reference surface and fix the track rail by tightening the mounting bolts in succession from one end of the track rail to the other while checking the straightness of the slide unit movement.



3 Use of straight-edge

After temporarily fixing the track rail, apply an indicator probe to the reference mounting surface of the track rail as shown in Fig. 47. Tighten the mounting bolts one by one, while progressively checking the straightness of the track rail in reference to the straight-edge from one end of the track rail to the other.



Mounting methods of attendant track rail

The following methods may be used to mount the attendant track rail. Select the method most suited to the specifications of the machine or equipment.

• Use of reference mounting surface

Firmly push the reference mounting surface of the track rail against the reference mounting surface of the bed using a pressure plate or small vise. Fix the track rail by tightening the mounting bolt at the position of the pressure plate or vise. Tighten the mounting bolts one by one starting from one end of the track rail to the other.

2 Use of mounted datum track rail as the reference

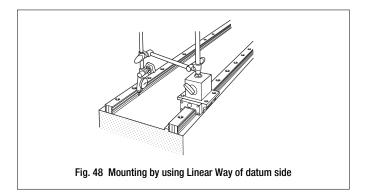
Fix the datum track rail correctly, fix one attendant slide unit correctly in the direction of motion, and temporarily fix the other slide units and the attendant track rail. Then, fix the attendant track rail by tightening the mounting bolts one by one from one end of the track rail to the other while checking the smooth movement.

3 Use of straight-edge

After fixing the track rail temporarily, apply the indicator probe to the reference mounting surface of the track rail (as shown in Fig. 44). While checking the straightness in reference to the straight-edge, fix the attendant track rail by tightening the mounting bolts one by one from one end of the track rail to the other.

4 Use of datum side Linear Way

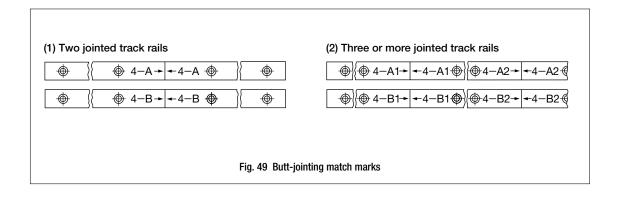
As shown in Fig. 48, set an indicator stand on the top face of the datum slide unit and apply the indicator probe to the reference mounting surface of the attendant track rail. While checking parallelism of the two rails, fix the attendant rail by tightening mounting bolts one by one from one end of the track rail to the other.



Mounting method for butt-jointing track rails

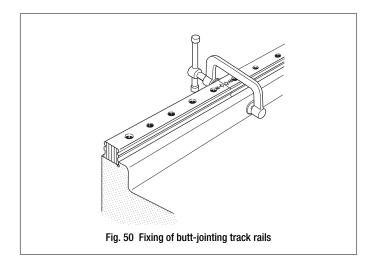
When using butt-jointing track rails, indicate whether a butt-jointing track rail of special specification (non-interchangeable specification, supplemental code "/A") or a butt-jointing interchangeable track rail (interchangeable specification, supplemental code "/T") is to be mounted.

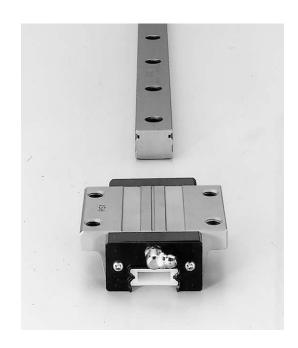
For butt-jointing track rails of non-interchangeable specification, a match mark as shown in Fig. 49 is indicated on the top face of track rail end. Procedures for mounting jointing track rails are generally as follows.



• Joint the track rails end-to-end in accordance with the match marks, and temporarily fix the rails onto the bed. The butt-jointing interchangeable track rail of interchangeable specification does not require matching butt-jointing rail ends, because the rail is prepared for free combination.

② Fit the reference mounting surfaces of the track rails onto the reference mounting surface of the bed, then fix all track rails one by one. While performing this procedure, tightly press the reference mounting surface of each track rail with a small vise, etc. against the reference mounting surface of the bed at the butt-jointing position so that the track rails at the butt-jointing position are connected without a step. (See Fig. 50.)





C-Lube Linear Ways

Description of each series and Table of dimensions















In the table of dimensions, standard products are referred to using identification numbers marked with _______. The identification numbers marked with _______ refer to our semi-standard products.

C-Lube Linear Way ML

ML/MLF

IKO C-Lube Linear Way ML is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of miniature type Linear Way L series to achieve maintenance free operations for a long period of time.

Long-term maintenance free

The lubricant in the C-Lube keeps the lubrication performance for a long period of time and achieves long-term maintenance free operations. (5 years and 20,000km)

So man-hours for troublesome lubrication control can be reduced.

Lightweight and compact

The C-Lube is incorporated in the lightweight and compact slide unit of miniature type Linear Way L series without changing the external dimensions of the slide unit

Smooth and light motion

As the C-Lube is not in contact with the track rail, frictional resistance does not increase. A smooth and light motion is ensured.

Stainless Steel

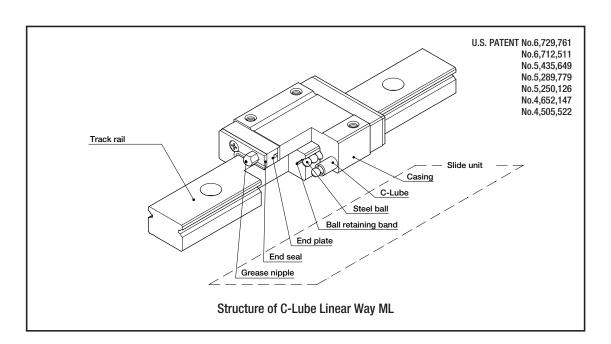
The metal components are manufactured from corrosion resistant stainless steel. So this series is most suitable for use in clean rooms and also for applications where the use of lubricants and rust preventive oil should be avoided or kept to a minimum.

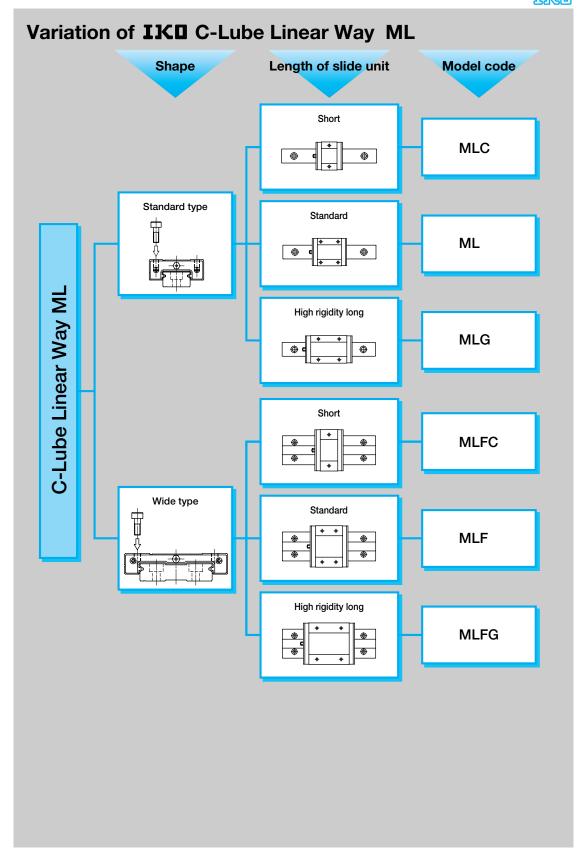
Ball retained type

The slide unit incorporates ball retaining bands, which prevent steel balls from dropping when the slide unit is separated from the track rail. So handling is easy.

Interchangeability

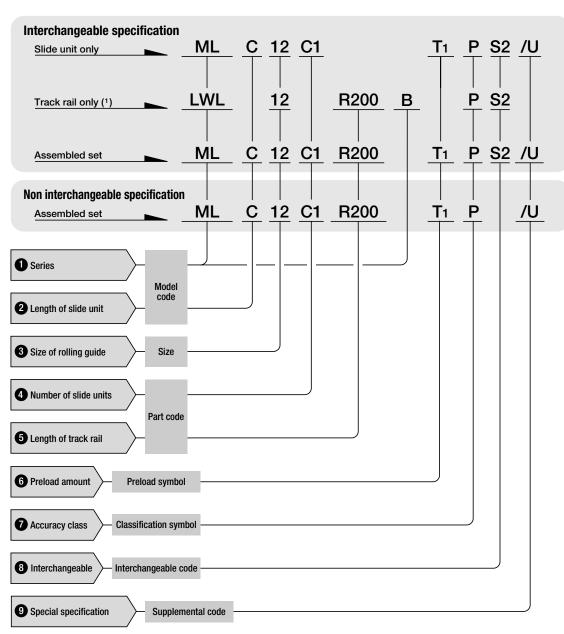
The track rails and the slide units of interchangeable specification can be handled separately and can be assembled to make a set as required. Three types of slide units with different lengths are prepared. The best type and size can be selected these entire slide units can be freely assembled on the same track rail.





Identification number and specification

The specification of C-Lube Linear Way ML is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol and any supplemental codes. For details of each specification, see page 78.



Note(1): In case ordering track rail only, model code should be changed as shown below.

Track rail of interchangeable ML → Model code LWL···B (Ex: LWL9R160BHS2)

Track rail of interchangeable MLF → Model code LWLF···B (Ex: LWLF42R320BHS2)

1 Series

Standard type : ML Wide type : MLF

2 Length of slide unit

Short : C

Standard : No symbol

High rigidity long: G

Applicable size and shape of slide unit are shown in

Table 1 and 2.

3 Size

Table 1 Type and size of standard type C-Lube Linear Way ML

Туре	Stainless steel							
Size	Short MLC	Standard ML	High rigidity long MLG					
5	☆	☆	_					
7	☆	☆	☆					
9	☆	☆	☆					
12	☆	☆	☆					
15	☆	☆	☆					
20	☆	☆	☆					
25	☆	☆	☆					

Remark: The mark 🕸 indicates that it is also applicable to interchangeable specification.

Table 2 Type and size of wide type C-Lube Linear Way MLF

Туре	Stainless steel							
Size	Short MLFC	Standard MLF	High rigidity long MLFG					
10	☆	☆	_					
14	☆	☆	☆					
18	☆	☆	☆					
24	☆	☆	☆					
30	☆	☆	☆					
42	☆	☆	☆					

Remark: The mark 🖈 indicates that it is also applicable to interchangeable specification.

4 Number of slide unit

Assembled set : C

For an assembled set, indicate the number of slide units assembled on one track rail. For an interchangeable slide unit only, "C1" can be indicated.

Slide unit only : C1

Track rail only : R

Assembled set :R

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on

page A-8.

5 Length of track rail

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

6 Preload amount

: **T**o Clearance Standard : No symbol

Light preload

Specify this items for an assembled set or an interchangeable single slide unit.

Applicable preload and size are shown in Table 3. For detail of preload amount, see page 86.

Table 3 Preload of C-Lube Linear Way ML/MLF

: T1

Si	ize	Preload and symbol						
Standard type	Wide type	Clearance (T ₀)	Standard (No symbol)	Light preload (T ₁)				
5	10	☆	☆	_				
7	14	☆	☆	☆				
9	18	☆	☆	☆				
12	24	☆	☆	☆				
15	30	☆	☆	☆				
20	20 42		☆	☆				
25	_	☆	☆	☆				

Remark: The mark \nleq indicates that it is also applicable to interchangeable specification. Only standard preload is applicable for/HB. (Ceramic ball specification)

7 Accuracy class

High class : H In interchangeable specification, please combine same accuracy codes on both slide unit and track

Precision class : P

rail. For detail of accuracy, see page 81.

8 Interchangeable

Interchangeable : S2

Specify this item for the interchangeable specification products. Assemble track rails and slide units

with the same interchangeable code.

9 Special specifications

Applicable special specifications are shown in Table 4. When a combination of several special specifications is required, please refer Table 5 and arrange their supplemental codes in alphabetical order. For detail of specifications, see page 88.

Table 4 Applicable specifications

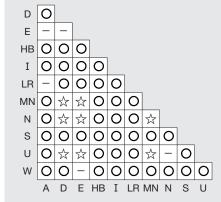
Specifications		Assembled set	Track rail only	Slide unit only	Dimension
Butt jointing track rail	Α	0	_	_	
Opposite reference surfaces arrangement	D	☆	_	_	
Specified rail mounting hole positions		☆	☆	_	
Ceramic ball specification	НВ	O (1)	_	_	
Appending inspection sheet	I	0	_	_	
Black chrome surface treatment	LR	(2)	_	_	
Without track rail mounting bolts	MN	☆	☆	_	
No rubber end seals	N	☆	_	☆	
Track rail with stopper pins	S	0	_	_	See Table 6
Under seals	U	☆(3)	_	☆(3)	See Table 7
Matched sets to be used as an assembled group	W	0	_	_	

Note(1): Applicable to size 7, 9, 12 and 15.

(2): Not applicable to size 5 and 10.
(3): Not applicable to size 5, 7, 10 and 14.

Remark: The mark ☆ indicates that it is also applicable to interchangeable specification.

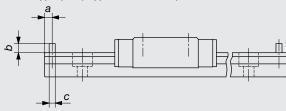
Table 5 Combination of special specifications



Remark 1: In the table, the mark \bigcirc indicates that this combination can be made.

- 2: The mark 🕸 indicates that the combination is available for also interchangeable specification.
- 3: When a combination of several special specifications is required, arrange their supplemental codes in alphabetical order.

Table 6 Dimension of track rail with stopper pins (Supplemental code: /S)

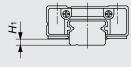


Model number	а	b	С
ML 5	2	2	1.6
ML 7		2.5	
ML 9		3	
ML 12	2.5	3	2
ML 15		4	
ML 20		5	
ML 25	3.5	5	

			unit : mm
Model number	а	b	С
MLF 10		2	1.6
MLF 14			
MLF 18	2.5	3	
MLF 24			2
MLF 30		4	
MLF 42		5	

Remark: The table shows representative model numbers but is also applicable to all types of the same size.

Table 7 H1 dimension of slide unit with under seals (Supplemental code: /U)



unit: mm

Model number	H ₁
ML 9	1
ML 12	2
ML 15	3
ML 20	4
ML 25	5(¹)

Model number	H ₁
MLF 18	
MLF 24	2
MLF 30	
MLF 42	3

Note(1): H1 dimension of size 25 (ML25) is the same as the dimension without under seals.

Remark: The table shows representative model numbers but is applicable to all models of the same size of ML and MLF

Track rail length

Standard and maximum lengths of track rail are shown in Table 8.1 and 8.2.

Track rail in any lengths are also available. Simply indicate the necessary length of track rail in millimeter (mm) in the identification number.

- In non-interchangeable specification, for track rail longer than the maximum length shown in Table 8.1 and 8.2, butt-jointing track rails are available upon request. In this case, indicate supplemental code "/A" in the identification number.
- E dimensions at both ends are the same unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions (supplemental code "/E") of special specification.

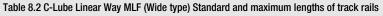
Table 8.1 C-Lube Linear Way ML (Standard type) Standard and maximum lengths of track rails									
			n(Num	ber of mounting holes)					
		1							
		717							
	_		V2A V2D						
<u> </u>	F -	 E ►							
-	L	-		unit : mm					
Model number	ML 5	ML 7	ML 9	ML 12					

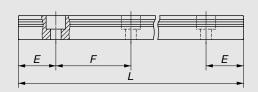
Model number				
Item	ML 5	ML 7	ML 9	ML 12
Standard length $L(n)$	60(4) 60(4) 60(3) 90(6) 90(6) 80(4) 105(7) 120(8) 120(6) 120(8) 150(10) 160(8) 150(10) 180(12) 220(11) 240(16) 280(14)		80(4) 120(6) 160(8) 220(11)	100(4) 150(6) 200(8) 275(11) 350(14) 475(19)
Mounting hole pitch F	15	15	20	25
E	7.5	7.5	10	12.5
Reference _ Over (Incl.)	4	4.5	4.5	5
dimension <i>E</i> (1) Under	11.5	12	14.5	17.5
Maximum length(2)	210 (510)	300 (990)	860 (1 200)	1 000 (1 450)
Maximum number of track rails for butt jointing	5	7	2	2
Maximum length of butt jointing track rails	915	1 905	1 660	1 925
Model number	ML 15	ML 20	ML 25	
Standard length $L(n)$	160(4) 240(6) 320(8) 440(11) 560(14) 680(17)	180(3) 240(4) 360(6) 480(8) 660(11) 840(14)	240(4) 300(5) 360(6) 480(8) 660(11) 900(15)	
Mounting hole pitch F	40	60	60	
E	20	30	30	
Reference Over (Incl.)	5.5	8	9	
dimension <i>E</i> (¹) Under	25.5	38	39	
Maximum length(2)	1 000 (1 480)	960 (1 800)	960 (1 800)	
Maximum number of track rails for butt jointing	2	2	2	
Maximum length of butt jointing track rails	1 880	1 740	1 740	

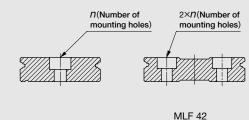
Note(1): Not applied to optional specification "track rail stopper pins" (supplemental code "/S")

(2): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult IKD.

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.







					unit : mn
Mo	del number	MLF 10	MLF 14	MLF 18	MLF 24
Standard length $L(n)$		60(3) 80(4) 120(6) 160(8) 220(11) 280(14)	90(3) 120(4) 150(5) 180(6) 240(8) 300(10)	90(3) 120(4) 150(5) 180(6) 240(8) 300(10)	120(3) 160(4) 240(6) 320(8) 400(10) 480(12)
Mounting hole pitch	n F	20	30	30	40
E		10	15	15	20
Reference	Over (Incl.)	4.5	5.5	5.5	6.5
dimension E (1)	Under	14.5	20.5	20.5	26.5
Maximum length(2)		300 (500)	300 (990)	690 (1 860)	680 (1 960)
Maximum number of track ra	ils for butt jointing	7	8	3	3
Maximum length of butt jo	inting track rails	1 840	1 950	1 920	1 840
Mo	del number	MLF 30	MLF 42		
Standard length $L(n)$		160(4) 240(6) 320(8) 440(11) 560(14) 680(17)	160(4) 240(6) 320(8) 440(11) 560(14) 680(17)		
Mounting hole pitch	n F	40	40		
E		20	20		
Reference	Over (Incl.)	6.5	6.5		
dimension $\boldsymbol{E}^{(1)}$	Under	26.5	26.5		
Maximum length(2)		680 (2 000)	680 (2 000)		
Maximum number of track ra	ils for butt jointing	3	3		
Maximum length of butt jointing track rails		1 840	1 840		

 $\textbf{Note(1)}: Not \ applied \ to \ optional \ specification \ "track \ rail \ stopper \ pins" \ (supplemental \ code \ "/S")$

(2): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult IKD.

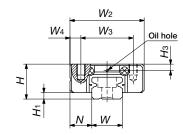
Remark 1 : The above table shows representative model numbers but is applicable to all models of the same size.

2: "Maximum number of butt-jointing track rails" and "Maximum length of butt-jointing track rails" do not apply to the track rails of interchangeable specification and tapped rail specification.

^{2: &}quot;Maximum number of butt-jointing track rails" and "Maximum length of butt-jointing track rails" do not apply to the track rails of interchangeable specification and tapped rail specification.

IXI C-Lube Linear Way ML Standard type

MLC ML **MLG**

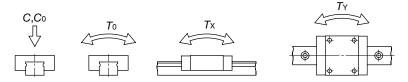


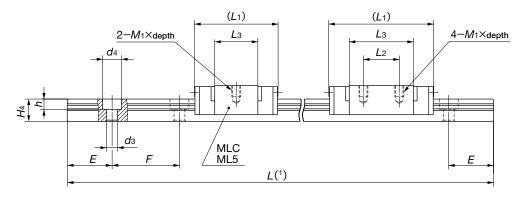
Model number		Interchangeable	Mass (Reference)		Dimension of assembly mm		Dimension of slide unit mm							
		Interch	Slide unit	Track rail (per 100mm)	Н	H 1	N	W 2	W 3	W 4	L 1	L ₂	Lз	<i>M</i> ₁×depth
MLC	5	☆	3.4	12	6	1	3.5	12	8	2	16		9.6	MOVAE
ML	5	☆	4.3	12	6	'	3.5	12	8	2	19	_	12.6	M2×1.5
MLC	7	☆	6.7								19	_	9.6	
ML	7	☆	9.1	22	8	8 1.5	1.5 5	17	12	2.5	23.5	8	14.3	M2×2.5
MLG	7	☆	13								31	12	21.6	
MLC	9	☆	11						20 15		21.5	_	11.9	
ML	9	☆	18	35	10	10 2	2 5.5	5.5 20		15 2.5	30	10	20.8	M3×3
MLG	9	☆	26								40.5	15	30.9	
MLC	12	☆	22								25	_	13	
ML	12	☆	34	65	13	3	7.5	.5 27	27 20 3.5	3.5	34	15	21.6	M3×3.5
MLG	12	☆	48								44	20	32	

Note(¹): Track rail lengths L are shown in Table 8.1 on page A-8.
(²): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

- Remark 1: The mark ☆ indicates that it is also applicable to interchangeable specification.

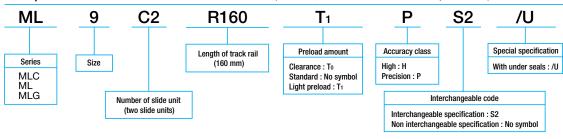
 2: The appended bolts for mounting track rails are stainless hexagon socket head bolts of JIS B1176 or equivalent, or stainless cross-recessed head cap screws for precision equipment.
 - 3: Oil hole is provided for ML5 to ML12 models.
 - 4: For specification of oil hole, see page 101.





			Dimens	sion of t	track ra	il		Appended mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ting(2)
		l	l	l	ı	ı	l		С	C ₀	T 0	Tx	T _Y
Нз	W	H 4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
	_							Cross-recessed head cap screw for precision	562	841	2.2	1.4 8.5	1.2 7.2
1.2	5	3.7	2.4	3.6	8.0	7.5	15	equipment M2×6	676	1 090	2.9	2.3 12.8	1.9 10.8
									937	1 140	4.1	1.8 14.9	1.5 12.5
1.5	7	5	2.4	4.2	2.3	7.5	15	Hexagon socket head bolt	1 330	1 890	6.9	4.7 28.2	3.9
								M2×6	1 690	2 650	9.7	8.8 50.7	7.4 42.5
									1 180	1 480	6.9	2.9	2.4
								Hexagon socket				21.4 9.1	18.0 7.6
2.2	9	6	3.5	6	3.5	10	20	head bolt M3×8	1 810	2 760	12.8	51.1	42.9
								IVISAO	2 370	4 030	18.7	18.7 98.3	15.7 82.5
									2 210	2 380	140	5.3	4.5
								Hexagon socket	2 2 1 0	2 300	14.8	41.7	35.0
2.7	12	8	3.5	6.5	4.5	12.5	25	head bolt M3×8	3 330	4 290	26.6	15.4 93.1	12.9 78.2
								IVIO	4 310	6 200	38.4	30.6 168	25.7 141

Example of identification number for assembled set (For details, see "Identification number and specification".)

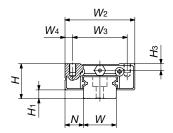


%In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ML → Model code LWL···B (Ex: LWL9R160BPS2)

A

IXI C-Lube Linear Way ML Standard type

MLC ML MLG



Model number	Interchangeable	Mass (I	Reference) g		mensioi issemb mm					Dimen	sion of mm	slide u	nit	
	Interch	Slide unit	Track rail (per 100mm)	Н	H ₁	N	W ₂	W 3	W 4	<i>L</i> ₁	L ₂	L 3	L ₄	<i>M</i> ₁×depth
MLC 15	☆	43								32	_	17.8	36	
ML 15	☆	63	107	16	4	8.5	32	25	3.5	42	20	27.9	47	M3×4
MLG 15	☆	93								57	25	42.8	62	
MLC 20	☆	89								38	_	22.3	42	
ML 20	☆	130	156	20	5	10	40	30	5	50	25	34.6	55	M4×6
MLG 20	☆	189								68	30	52.3	72	
MLC 25	☆	189								55	_	31.9	65	
ML 25	☆	305	243	25	5	12.5	48	35	6.5	78	35	55.7	89	M6×7
MLG 25	☆	405								98	40	75.5	108	

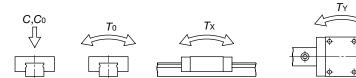
Note(1): Track rail lengths L are shown in Table 8.1 on page A-8.

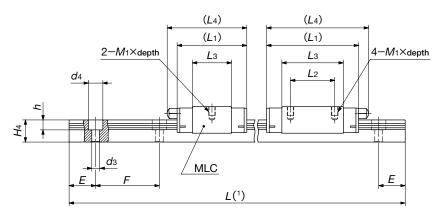
(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

Remark 1 : The mark $\not \simeq$ indicates that it is also applicable to interchangeable specification.

2: The appended bolts for mounting track rails are stainless hexagon socket head bolts of JIS B1176 or equivalent, or stainless cross-recessed head cap screws for precision equipment.

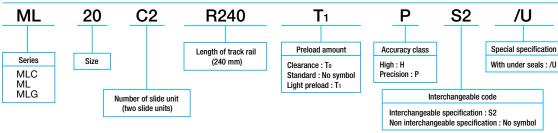
3: For specification of grease nipple, see page 99.





		С	Dimensi	on of tr mm	ack rai	I		Appended mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ting(2)
			l	l	l		1		С	C ₀	T 0	Tx	T _Y
Н з	W	H 4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
								Hexagon socket	3 490	3 890	30.0	11.7 84.5	9.8 70.9
3.1	15	10	3.5	6.5	4.5	20	40	head bolt M3×10	4 980	6 490	50.0	29.7 172	24.9 144
								WISKI	6 620	9 740	75.0	63.9 338	53.6 284
									4 580	5 300	54.0	19.4 134	16.3 112
4.2	20	11	6	9.5	5.5	30	60	Hexagon socket head bolt M5×14	6 650	9 080	92.6	52.7 280	44.2 235
								IVI5 / 14	8 510	12 900	131	102 529	85.7 444
									9 120	10 600	128	57.4 380	48.1 319
5	23	15	7	11.0	9.0	30	60	Hexagon socket head bolt M6×16	13 500	18 500	223	163 887	137 744
								INIO X ID	16 700	25 200	303	293 1 480	246 1 240

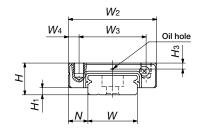
Example of identification number for assembled set (For details, see "Identification number and specification".)



※In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable ML → Model code LWL···B (Ex: LWL20R240BPS2)

IXO C-Lube Linear Way MLF Wide type

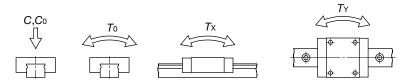


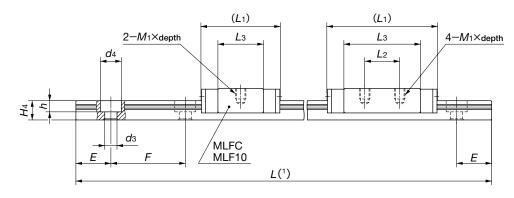


Model I	number	Interchangeable	Mass ((Reference) g		mension assembl mm					Dimens	sion of mm	slide un	it	
		Interch	Slide unit	Track rail (per 100mm)	Н	<i>H</i> 1	N	W 2	W 3	W 4	L 1	L ₂	L 3	<i>M</i> ₁×depth	Н з
MLFC	10	☆	6.1	28	6.5	1.5	3.5	17	13	2	20.5		13.6	MOE VAE	1.3
MLF	10	☆	7.6	20	0.5	1.5	3.5	'/	13	2	24.5		17.6	M2.5 ×1.5	1.3
MLFC	14	☆	13								22.5	-	13		
MLF	14	☆	20	54	9	2	5.5	25	19	3	31.5	10	22	M3 ×3	1.7
MLFG	14	☆	29								42	19	32.5		
MLFC	18	☆	26						21	4.5	26.5	_	16.6		
MLF	18	☆	42	90	12	3	6	30	21	4.5	39	12	28.6	M3 ×3	2.5
MLFG	18	☆	59						23	3.5	50.5	24	40.4		
MLFC	24	☆	46								30.5	_	17.7		
MLF	24	☆	74	139	14	3	8	40	28	6	44	15	31	M3 ×3.5	3.2
MLFG	24	☆	108								59	28	46.3		

- Note(¹): Track rail lengths L are shown in Table 8.2 on page A-9.
 (²): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Tv) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.
- Remark 1: The mark ½ indicates that it is also applicable to interchangeable specification.

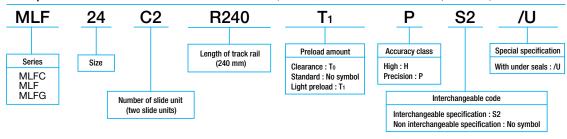
 2: The appended bolts for mounting track rails are stainless hexagon socket head bolts of JIS B1176 or equivalent, or stainless cross-recessed head cap screws for precision equipment.
 - 3: Oil hole is provided for MLF10 to MLF24 models.
 - 4: For specification of oil hole, see page 101.





		Dimens	sion of tr mm	ack rail			Appended mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ating(2)
				l				С	C ₀	T 0	T _X	T _Y
W	H 4	d 3	d ₄	h	E	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
10	4	2.9	4.8	1.6	10	20	Cross-recessed head cap screw for precision	712	1 180	6.1	2.6 14.9	2.2 12.5
10	4	2.9	4.0	1.0	10	20	equipment M2.5×7	849	1 510	7.8	4.2 22.4	3.5 18.8
								1 240	1 700	12.2	3.8 24.6	3.2 20.7
14	5.5	3.5	6	3.2	15	30	Hexagon socket head bolt M3×8	1 770	2 840	20.3	10.1 54.7	8.4 45.9
							WISA	2 320	4 160	29.8	21.0 104	17.6 87.6
								1 510	2 120	19.4	5.5 35.9	4.7 30.1
18	7	3.5	6.5	4.5	15	30	Hexagon socket head bolt M3×8	2 280	3 810	34.9	16.9 90.1	14.2 75.6
							IVISAO	2 870	5 300	48.5	31.9 159	26.7 134
								2 800	3 340	40.7	9.7 67.6	8.2 56.8
24	8	4.5	8	4.5	20	40	Hexagon socket head bolt M4×10	4 310	6 200	75.6	30.6 168	25.7 141
							IVI4 ^ IU	5 620	9 060	111	63.3 321	53.1 270

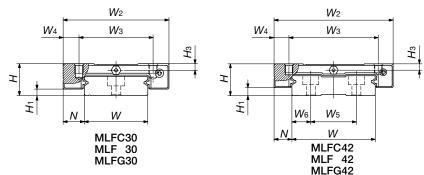
Example of identification number for assembled set (For details, see "Identification number and specification".)



%In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable MLF → Model code LWLF···B (Ex: LWLF14R240BPS2)

IXO C-Lube Linear Way MLF Wide type

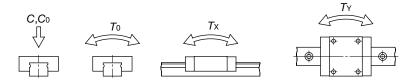


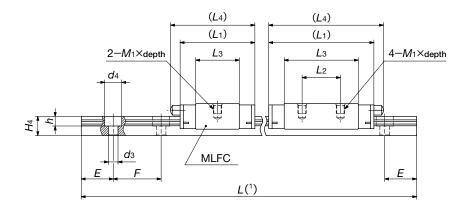


														_	
Model number	Interchangeable	Mass ((Reference) g		nensior ssemb mm					Din		n of slid mm	e unit		
	Interch	Slide unit	Track rail (per 100mm)	Н	<i>H</i> ₁	N	W 2	W 3	W 4	<i>L</i> ₁	L ₂	L ₃	L4	<i>M</i> ₁×depth	H 3
MLFC 30	☆	70								35.5	-	20.5	40		
MLF 30	☆	111	198	15	3	10	50	35	7.5	50	18	34.8	54	M4×4.5	3.1
MLFG 30	☆	167								68.5	35	53.8	73		
MLFC 42	☆	95								41.5	_	25.7	46		
MLF 42	☆	138	294	16	4	9	60	45	7.5	55	20	39.4	60	M4×4.5	3.2
MLFG 42	☆	200								74.5	35	58.7	79		

Note(1): Track rail lengths L are shown in Table 8.2 on page A-9.

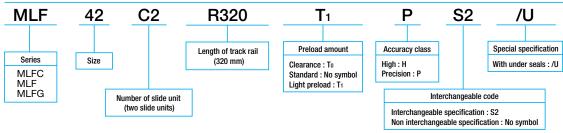
- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.
- Remark 1: The mark & indicates that it is also applicable to interchangeable specification.
 - 2: The appended bolts for mounting track rails are stainless hexagon socket head bolts of JIS B1176 or equivalent, or stainless cross-recessed head cap screws for precision equipment.
 - 3: For specification of grease nipple, see page 99.





		С	Dimens	sion of mm	track i	rail					Basic static load rating(2)	Static	moment ra	ating(2)
W	H4	W 5	W 6	d 3	d ₄	h	E	F	mm Bolt size x length	С	C ₀	T 0	T _X	T _Y
~ ~ ~	114	VVS	776	us	U4	"	L	′	Boit size x length	N	N	N∙m	N∙m	N∙m
										3 890	4 540	69.1	15.4	13.0
									Hexagon socket	0 000	4 540	00.1	107	89.9
30	9	l _		4.5	8	4.5	20	40	head bolt	5 970	8 440	128	48.7	40.8
30	3			4.5	٥	4.5	20	40	M4×12	3 370	0 440	120	259	217
										7 810	12 300	187	100	84.3
										7 010	12 300	107	508	426
										5 440	6 810	144	30.8	25.8
									Hayagan agakat	5 440	0010	144	180	151
42	10	23	ا م د	4.5	8	4.5	20	40	Hexagon socket head bolt	7 050	9 840	209	61.3	51.4
42	10	23	9.5	4.5	0	4.5	20	40	M4×12	7 050	3 640	203	333	280
									101-17/12	9 520	15 100	321	140	117
										9 520	15 100	321	674	565

Example of identification number for assembled set (For details, see "Identification number and specification".)



*In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable MLF → Model code LWLF···B (Ex: LWLF42R320BPS2)

ME/MET/MES

IKO C-Lube Linear Way ME is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of compact type Linear Way E series to achieve maintenance free operations for a long period of time.

Long-term maintenance free

The lubricant in the C-Lube keeps the lubrication performance for a long period of time and achieves long-term maintenance free operations. (5 years and 20,000km)

So man-hours for troublesome lubrication control can be reduced.

Lightweight and compact

The C-Sleeve is incorporated in the lightweight and compact slide unit of miniature type Linear Way E series without changing the external dimensions of the slide unit.

Smooth and light motion

As the C-Lube is not in contact with the track rail, frictional resistance does not increase. A smooth and light motion is ensured.

Various lengths of slide unit

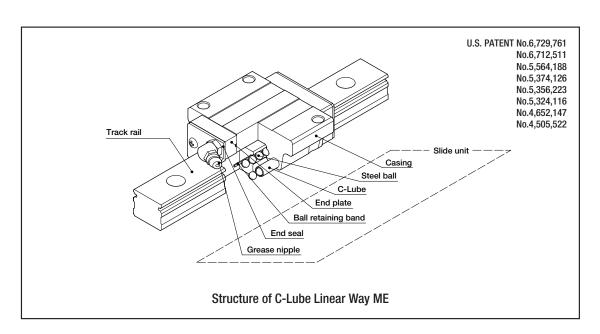
In addition to the standard slide unit, a short type slide unit and a high rigidity long type slide unit both having the same sectional dimensions with the standard slide unit are available.

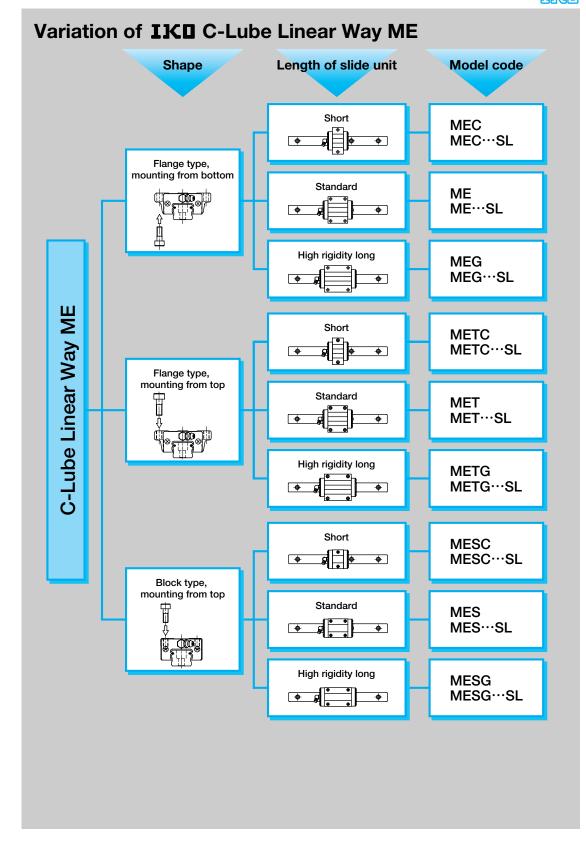
Flange type and block type

Slide units are available in three different sectional shapes; two flange types for different mounting directions and one block type with a narrow width.

Interchangeability

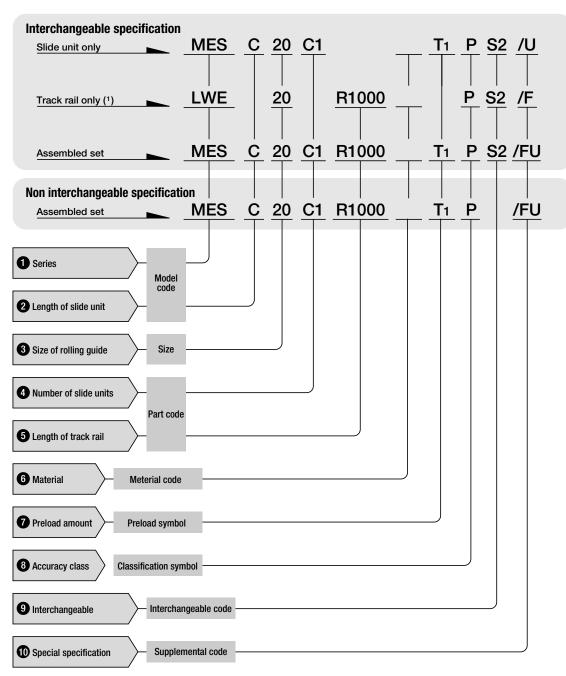
The track rails and the slide units of interchangeable specification can be handled separately and can be assembled to make a set as required. Three types of slide units with different lengths are prepared. The best type and size can be selected these entire slide units can be freely assembled on the same track rail.





Identification number and specification

The specification of C-Lube Linear Way ME is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol and any supplemental codes. For details of each specification, see page 78.



Note(1): In case ordering track rail only, model code should be changed as shown below.

Track rail of interchangeable ME → Model code LWE (Ex: LWE15R1000PS2)

1 Series

Flange type, mounting from bottom : ME
Flange type, mounting from top : MET

Block type, mounting from top : MES

2 Length of slide unit

Short : C
Standard : No symbol

High rigidity long : G

Applicable size and shape of slide unit are shown in Table 1.1 to 1.3 below.

3 Size

Type and size of C-Lube Linear Way ME

Table 1.1 Flange type, mounting from bottom

Туре		Carbon steel			Stainless steel	
Size	Short MEC	Standard ME	High rigidity long MEG	Short MEC···SL	Standard ME···SL	High rigidity long MEG···SL
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	_	_	_	_
45	1	☆	_	1	_	_

Table 1.2 Flange type, mounting from top

Туре		Carbon steel			Stainless steel	
Size	Short METC	Standard MET	High rigidity long METG	Short METC···SL	Standard MET···SL	High rigidity long METG···SL
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	_	_	_	_
45	_	☆	_	_	_	_

Table 1.3 Block type, mounting from top

Туре		Carbon steel			Stainless steel	
Size	Short MESC	Standard MES	High rigidity long MESG	Short MESC···SL	Standard MES···SL	High rigidity long MESG···SL
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	_	_	_	_
45	_	☆	_	_	_	_

Remark: 🕸 marks indicates that interchangeable products are available.

4 Number of slide unit

Assembled set : **C**()

Slide unit only

For an assembled set, indicate the number of slide units assembled on one track rail. For an interchangeable slide unit only, "C1" can be indicated.

5 Length of track rail

: **R**O Assembled set

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on

: RO Track rail only

: C1

6 Material

Stainless steel : SL Specify this items for an assembled set or an interchangeable track rail of C-Lube Linear Way ME size 15 to 30.

7 Preload amount

Clearance

: **T**c

Standard : No symbol

Light preload : T₁ Medium preload : **T**2 Specify this items for an assembled set or an interchangeable single slide unit.

Applicable preload and size are shown in Table 3.

For detail of preload amount, see page 86.

8 Accuracy class

Ordinary

: No symbol In interchangeable specification, please combine same accuracy codes on both slide unit and track : H High class rail. For combination of accuracy and preload, see

: P Precision class Table 2.

Detail of accuracy is shown in page 81. : SP Super precision

Table 2 Combination of accuracy and preload

Table 2 combination of accuracy and prefoad									
Accuracy class and symbol	Ordinary class	High class	Precision class	Super precision class					
Preload class and symbol	(No symbol)	(H)	(P)	(SP)					
Clearance (Tc)	☆	_	_	_					
Standard (No symbol)	☆	☆	☆	0					
Light preload (T1)	_	☆	☆	0					
Medium preload (T2)	_	0	0	0					
Pomark : The mark & indicates that it is	also applicable:	to interchanges	hla specificatio	n					

Remark : The mark ☆ indicates that it is also applicable to interchangeable specification.

9 Interchangeable

Interchangeable : S2 Specify this item for the interchangeable specification products. Assemble track rails and slide units with the same interchangeable code.

10 Special specifications

Applicable special specifications are shown in Table When a combination of several special specifications is required, please refer Table 4 and arrange their supplemental codes in alphabetical order. For detain of specifications are show on page

Table 3 Applicable specifications

Specifications	Supplemental code	Set product	Track rail only	Slide unit only	Dimension
Butt jointing track rail	Α	0	-	_	
Opposite reference surfaces arrangement	D	☆	_	_	
Specified rail mounting hole positions	Е	☆	☆	_	
Caps for rail mounting holes	F	☆	☆	_	
Appending inspection sheet	I	0	_	_	
Female threads for bellows	J	☆	☆	☆	See table 5
Black chrome surface treatment	Г	☆	_	_	
Fluoric black chrome surface treatment	LF	☆	_	_	
With track rail mounting bolts	MA	☆	☆	_	See table 6
Change of mounting hole size	M4	☆(1)	☆(1)	_	See table 7
No rubber end seals	N	☆	_	☆	
Butt jointing interchangeable track rail	Т	☆(2)	☆	_	
Under seals	U	☆	_	☆	See table 8
Double end seals	٧	☆	<u> </u>	☆	See table 9
Matched sets to be used as an assembled group	W	0	_	_	
Scrapers	Z	☆	<u> </u>	☆	See table 10

Note(1): Applicable to size 15

(2): Not applicable to non interchangeable specification

Remark: The mark ☆ indicates that it is also applicable to interchangeable specification.

Table 4 Combination of special specifications

D	0														
Е	_	_										F	Rema		: In t : The
F	0	☆	☆												inte
I	0	0	0	0											: Wh : Wh
J	0	☆	☆	☆	0										the
L	0	☆	☆	☆	0	☆									
LF	0	☆	☆	☆	0	☆	_								
MA	0	☆	☆	☆	0	☆	☆	☆							
M4	0	☆	☆	☆	0	☆	☆	☆	☆						
Ν	0	☆	☆	_	0	_	☆	☆	☆	☆					
Т	_	☆	☆	☆	_	_	☆	☆	☆	☆	☆				
U	0	☆	☆	☆	0	☆	☆	☆	☆	☆	_	☆			
٧	0	☆	☆	☆	0	*	☆	☆	☆	☆	_	☆	☆		
W	0	0	_	0	0	0	0	0	0	0	0	_	0	0	
Z	0	☆	☆	☆	0	*	☆	☆	☆	☆	_	☆	☆	*	0
	Α	D	Е	F	Ι	J	L	LF	MA	M4	N	Т	U	٧	W

Remark 1: In the table, the mark \bigcirc indicates that this combination can be made.

- 2: The mark $\stackrel{\star}{\approx}$ indicates that the combination is available for also interchangeable specification.
- 3: When the specification with \bigstar is required, please consult **IKO**.
- 4: When a combination of several specifications is required, arrange their supplemental codes in alphabetical order.

												unit : mm
					Slide	unit					Track	k rail
Model number	a1	a 2	<i>b</i> 1	b 2	b 3	b4	M1×depth	L1(2)	Нз	a 3	a 4	M2×depth
ME(T) C 15(1)								58				
ME(T) 15(1)			18		12			74				
ME(T) G 15(1)	3	12		16		28	M3×6	87	5.7	4	7	M3× 6
MESC 15(1)	٦	12		10	3	20	IVI3×6	58	5.7	-	/	IVI3A 0
MES 15(1)			9					74				
MESG 15(1)								87				
ME(T) C 20								64				
ME(T) 20			19.5		12.5	34	M3×6	83			8	M3× 6
ME(T) G 20	3	15		20				99	6	4		
MESC 20	٦	13		20				64	6			
MES 20			11		4			83				
MESG 20								99				
ME(T) C 25								76				
ME(T) 25			23.5		16.5			100				
ME(T) G 25	3.5 17	17		26		40	M3×6	119	7	5	9	M4× 8
MESC 25			20		40	IVISAU	76	,		3	IVI4A 0	
MES 25			11		4			100				
MESG 25								119				
ME(T) C 30								83				
ME(T) 30			28		20			112				
ME(T) G 30	5	17		34		50	M3×6	144	11	6	14	M4× 8
MESC 30	5	' /		34		30	IVIOAU	83	11	"	14	1444 0
MES 30			13		5			112				
MESG 30								144				
ME (T) C 35			30		20			93				
ME(T) 35	6	20	30	40	20	60	M3×6	126	13	7	15	M4× 8
MESC 35	0	20	15	40	5	00	IVIOAU	93	13	/	15	10147 0
MES 35			10		ິວ			126				
ME(T) 45	7	26	35	50	23	74	M4×8	138	15	8	19	M5×10
MES 45	,	20	18	50	6	/4	1014/0	130	10	0	19	IVIOATO

Note(1): The specification and mounting positions of grease nipple are different from those of the standard specification product. Size 15 models are provided with a special specification grease nipple (NPB2 type). For detail of dimensions, consult IKO for further

Table 6 Appended bolts size for mounting track rail (Supplemental code /MA)

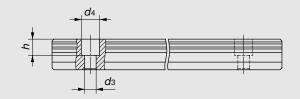
Model number	Bolt size
ME 15	M 3×16
WE 13	M 4×16(1)
ME 20	M 5×16
ME 25	M 6×20
ME 30	M 6×25
ME 35	M 8×30
ME 45	M10×35

Note(1): Applicable to track rail with supplemental code "/M4".

Remark 1: The table shows representative model numbers but is applicable to all models of the same size.

2: Hexagon socket bolts of JIS B 1176 strength division 12.9 are appended.

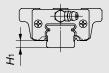
Table 7 Changed size of mounting holes (Supplemental code /M4) for size 15



			unit . min
Model number	d 3	d4	h
ME 15	4.5	8	6

Remark: The table shows representative model number but is applicable to all model of the same size

Table 8 H1 dimension of slide unit with under seals (Supplemental code /U)



unit	:	mm
uiiii	٠	

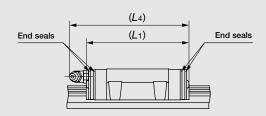
Model number	H1
ME 15	5
ME 20	5
ME 25	6
ME 30	7
ME 35	8
ME 45	10

Remark : The table shows representative model numbers but is applicable to all models of the same size.

⁽²): The values are for the slide unit with female threads for bellows at both ends.

Remark 1: The table shows representative model numbers but is applicable to all models of the same size.

Table 9 Slide unit with double end seals (Supplemental code /V, /VV)



		m	

unit: mm

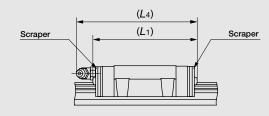
Model number	<i>L</i> 1	L 4
MEC 15	48	50
ME 15	64	66
MEG 15	76	78
MEC 20	54	68
ME 20	73	87
MEG 20	89	103
MEC 25	67	80
ME 25	91	104
MEG 25	110	123

		unit : mm
Model number	<i>L</i> 1	L4
MEC 30	78	89
ME 30	107	118
MEG 30	138	150
MEC 35	88	101
ME 35	121	134
ME 45	137	148

Remark 1 : The table shows representative model numbers but is applicable to all models of the same size.

2: The total lengths of slide unit with double end seals at both ends are shown.

Table 10 Slide unit with scrapers (Supplemental code /Z, /ZZ)



Model number	<i>L</i> 1	L 4
MEC 15	48	50
ME 15	64	66
MEG 15	77	79
MEC 20	55	69
ME 20	75	88
MEG 20	90	104
MEC 25	69	81
ME 25	93	105
MEG 25	112	124

A-26

Model number	<i>L</i> 1	L 4
MEC 30	79	90
ME 30	108	119
MEG 30	140	151
MEC 35	89	101
ME 35	122	134
ME 45	138	148

Remark 1: The table shows representative model numbers but is applicable to all models of the same size.

2: The total lengths of slide unit with scrapers at both ends are shown.

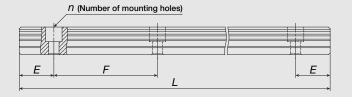
Track rail length

Standard and maximum lengths of track rail are shown in Table 11.

Track rail in any lengths are also available. Simply indicate the necessary length of track rail in millimeter (mm) in the identification number.

- In non-interchangeable specification, for track rail longer than the maximum length shown in Table 11, butt-jointing track rails are available upon request. In this case, indicate supplemental code "/A" in the identification number.
- E dimensions at both ends are the same unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions (supplemental code "/E") of special specification. For detail, see page 91.

Table 11 C-Lube Linear Way ME Standard and maximum lengths of track rails



unit: mm

										unit . min
Model number	ME 15	ME 20	ME 25	ME 30	ME 35	ME 45	ME15···SL	ME20···SL	ME25···SL	ME30···SL
	160(3)	220 (4)	220 (4)	280 (4)	280 (4)	570 (6)	160(3)	220 (4)	220 (4)	280 (4)
	220 (4)	280 (5)	280 (5)	440 (6)	440 (6)	885 (9)	220 (4)	280 (5)	280 (5)	440 (6)
	280 (5)	340 (6)	340 (6)	600 (8)	600(8)	1 200 (12)	280 (5)	340 (6)	340 (6)	600 (8)
	340 (6)	460 (8)	460 (8)	760 (10)	760 (10)	1 620 (16)	340 (6)	460 (8)	460 (8)	760 (10)
0: 1 11 11 (m)	460 (8)	640 (11)	640 (11)	1 000 (13)	1 000 (13)	2 040 (20)	460 (8)	640 (11)	640 (11)	1 000 (13)
Standard length $L(n)$	640 (11)	820 (14)	820 (14)	1 240 (16)	1 240 (16)	2 460 (24)	640 (11)	820 (14)	820 (14)	
	820 (14)	1 000 (17)	1 000 (17)	1 640 (21)	1 640 (21)	2 985 (29)	820 (14)	1 000 (17)	1 000 (17)	
		1 240 (21)	1 240 (21)	2 040 (26)	2 040 (26)					
			1 600 (27)	2 520 (32)	2 520 (32)					
				3 000 (38)	3 000 (38)					
Mounting hole pitch F	60	60	60	80	80	105	60	60	60	80
E (1)	20	20	20	20	20	22.5	20	20	20	20
Reference Over (Incl.)	6	8	9	9	10	12	6	8	9	9
dimension E (²) Under	36	38	39	49	50	64.5	36	38	39	49
Maximum length (3)(4)	1 600 (2 980)	2 200 (2 980)	2 980 (4 000)	3 000 (3 960)	3 000 (3 960)	2 985 (3 930)	1 200 (1 600)	1 200 (1 960)	1 200 (1 960)	1 200 (1 960)
	(2 980)	(2 980)	(4 000)	(3 960)	(3 960)	(3 930)	(1600)	(1960)	(1 960)	(1960

Note(1): When specifying a butt-jointing interchangeable track rail (supplimental code "/T"), pay attention to the E dimension at the butt-jointing part.

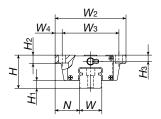
- (2) : Not applicable to the track rail with female threads for bellows (Supplemental code /J).
- (3): The dimension "E" of stainless steel product is the half value of dimension "F".

(4): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult for further **IXD** information.

Remark: The table shows representative model numbers but is also applicable to all the models in the same size.

Flange type, mounting from bottom **MEC**

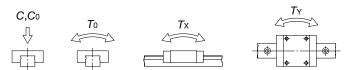
ME MEG

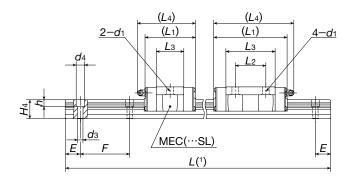


Model number	Interchangeable	Mass (Re	eference)		nensioi issemb mm					Dime	ension m	of slide m	unit			
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L ₃	L4	d1	H2	Нз
MEC 15	☆	0.11								41	_	22.4	45			
MEC 15···SL	☆	0											-10			
ME 15	☆	0.18	1.57	24	5.8	18.5	52	41	5.5	57	26	38.4	61	4.5	7	4.5
ME 15···SL	☆															
MEG 15	☆	0.24								70	36	51.1	74			
MEG 15···SL	☆															
MEC 20	☆	0.18								47	_	24.7	59			
MEC 20···SL	☆															
ME 20	☆	0.30	2.28	28	6	19.5	59	49	5	66.5	32	44.2	79	5.5	9	5.5
ME 20···SL	☆															
MEG 20	☆	0.39								82	45	60.1	95			
MEG 20···SL	☆	0.00														
MEC 25	☆	0.33								59	_	32	71			
MEC 25···SL	☆	0.00										02	, ,			
ME 25	☆	0.54	3.09	33	7	25	73	60	6.5	83	35	56	95	7	10	6.5
ME 25SL	☆	0.54	3.03	33	′	25	/3	00	0.5	03	3	50	33	′	10	0.5
MEG 25	☆	0.70								100		75	111			
MEG 25···SL	☆	0.72								102	50	75	114			

Note(1): Track rail lengths L are shown in Table 11 on page A-27.

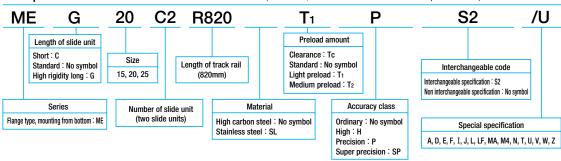
- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- Values in parentheses are applicable to the track rail of supplemental code "/M4" of special specification.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.





	l	Dimens	ion of t mm	rack rai	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Statio	moment rat	ting(³)
	ı	ı	l	ı	ı	l	mm	С	C ₀	T 0	Tx Tx	TY
W	H 4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
								5 240	5 480	43.8	21.3 149	21.3 149
15	14.5	3.6 (4.5)	6.5 (8)	4.5 (6)	20	60	M3×16 (M4×16)	7 640	9 390	75.1	57.6 333	57.6 333
		(110)	(2)					9 340	12 500	100	99.5 533	99.5 533
								7 580	7 340	78.9	31.5 235	31.5 235
20	16	6	9.5	8.5	20	60	M5×16	11 600	13 400	145	95.6 561	95.6 561
								14 400	18 300	197	172 918	172 918
								12 400	12 300	153	71.8 480	71.8 480
23	19	7	11	9	20	60	M6×20	18 100	21 100	262	195 1 090	195 1 090
								22 200	28 200	349	336 1 740	336 1 740

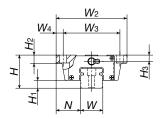
Example of identification number of assembled set (For details, see "Identification number and specification".)



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ME → Model code LWE (Ex:LWE20R820PS2)

Flange type, mounting from bottom MEC

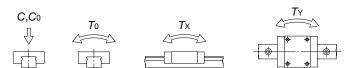
ME **MEG**

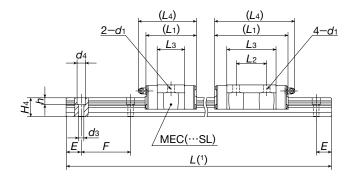


Model number	Interchangeable	Mass (Re	eference)		nensioi ssemb mm					Dime	ension m	of slide m	unit			
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L ₃	L 4	d ₁	H 2	Нз
MEC 30	☆	0.58								68	_	36	78			
MEC 30···SL ME 30	☆															
ME 30···SL	☆	0.99	5.09	42	10	31	90	72	9	97	40	64.8	107	9	10	8
MEG 30	☆	1.50								128.5	60	96.5	139			
MEG 30···SL	☆	1.50								120.5		30.3	133			
MEC 35	☆	0.84	6.05	48	11	33	100	82	9	78	1	41.6	90	9	13	10
ME 35	☆	1.52	6.85	48	11	33	100	62	9	111	50	74.6	123	9	13	10
ME 45	☆	2.46	11.2	60	14	37.5	120	100	10	125	60	81.4	136	11	15	13

Note(1): Track rail lengths L are shown in Table 11 on page A-27.

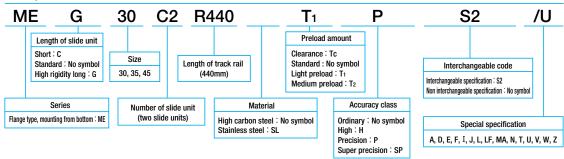
(2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.





	l	Dimens	sion of t	rack ra	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Statio	moment rat	ting(3)
	I	I	I	ı	I	I	mm	С	C 0	T 0	Tx	<i>T</i> Y
W	H 4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
								20 600	18 800	287	129 855	129 855
28	25	7	11	9	20	80	M 6×25	29 500	31 300	479	328 1 920	328 1 920
								39 200	47 000	718	704 3 670	704 3 670
34	28	9	14	12	20	80	M 8×30	29 900	26 800	412	176 1 190	162 1 100
34	20	9	14	12	20	60	IVI 6 × 30	42 900	44 700	686	448 2 660	412 2 450
45	34	11	17.5	14	22.5	105	M10×35	61 100	60 200	1 210	672 4 070	618 3 750

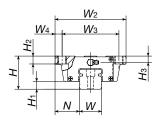
Example of identification number of assembled set (For details, see "Identification number and specification".)



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ME → Model code LWE (Ex:LWE30R440PS2)

^{(3):} The directions of basic dynamic load rating (C), basic static load rating (C) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

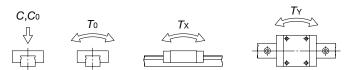
Flange type, mounting from top METC MET METG

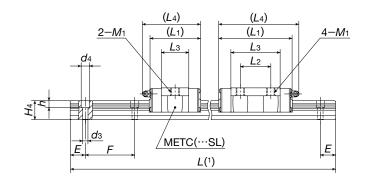


Model number	Interchangeable	Mass (Re	eference)		nension ssemb mm					Dime	ension m	of slide m	unit			
	Interch	Slide unit kg	Track rail kg/m	Н	H1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L ₃	L4	M 1	H 2	Н з
METC 15	☆	0.11								41	_	22.4	45			
METC 15···SL	☆															
MET 15 MET 15···SL	☆	0.18	1.57	24	5.8	18.5	52	41	5.5	57	26	38.4	61	M5	7	4.5
METG 15	☆	0.24								70	36	51.1	74			
METG 15···SL	☆	0.24								/0	30	51.1	/4			
METC 20	☆	0.18								47	1	24.7	59			
METC 20···SL	☆															
MET 20···SL	☆	0.30	2.28	28	6	19.5	59	49	5	66.5	32	44.2	79	M6	9	5.5
METG 20	₩															
METG 20···SL	☆	0.39								82	45	60.1	95			
METC 25	☆	0.33								59	-	32	71			
METC 25···SL	☆	0.00										02	, ,			
MET 25	☆	0.54	3.09	33	7	25	73	60	6.5	83	35	56	95	M8	10	6.5
MET 25···SL	☆	0.01	0.00		'		'`		0.0			50				0.0
METG 25	☆	0.72								102	50	75	114			
METG 25···SL	☆	0.72								102	50	75	114			

Note(1): Track rail lengths L are shown in Table 11 on page A-27.

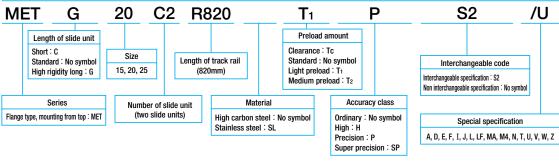
- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- Values in parentheses are applicable to the track rail of supplemental code "/M4" of special specification.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.





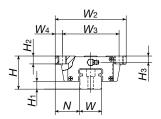
		Dimens	ion of t	rack rai	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Statio	moment rat	ting(³)
	I	I	l	ı	l	l	mm	С	C ₀	T 0	Tx	TY
W	H4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
								5 240	5 480	43.8	21.3 149	21.3 149
15	14.5	3.6 (4.5)	6.5	4.5	20	60	M3×16 (M4×16)	7 640	9 390	75.1	57.6 333	57.6 333
		(110)	(2)	(-)				9 340	12 500	100	99.5 533	99.5 533
								7 580	7 340	78.9	31.5 235	31.5 235
20	16	6	9.5	8.5	20	60	M5×16	11 600	13 400	145	95.6 561	95.6 561
								14 400	18 300	197	172 918	172 918
								12 400	12 300	153	71.8 480	71.8 480
23	19	7	11	9	20	60	M6×20	18 100	21 100	262	195 1 090	195 1 090
								22 200	28 200	349	336 1 740	336 1 740

Example of identification number of assembled set (For details, see "Identification number and specification".)



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ME → Model code LWE (Ex:LWE20R820PS2)

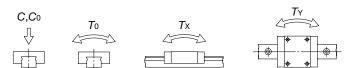
Flange type, mounting from top METC **MET METG**

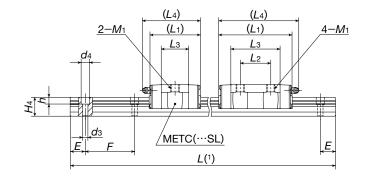


Model number	Interchangeable	Mass (Re	eference)		nensioi ssemb mm					Dime	ension m	of slide m	unit			
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L 3	L4	<i>M</i> 1	H 2	Н з
METC 30···SL	☆	0.58								68	_	36	78			
MET 30···SL	☆	0.99	5.09	42	10	31	90	72	9	97	40	64.8	107	M10	10	8
METG30···SL	☆	1.50								128.5	60	96.5	139			
METC35	☆	0.84	0.05	40	4.4	00	100	00		78	-	41.6	90	B440	10	10
MET 35	☆	1.52	6.85	48	11	33	100	82	9	111	50	74.6	123	M10	13	10
MET 45	☆	2.46	11.2	60	14	37.5	120	100	10	125	60	81.4	136	M12	15	13

Note(1): Track rail lengths L are shown in Table 11 on page A-27.

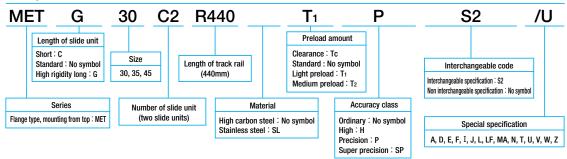
(2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.





	ı	Dimens	sion of t	rack rai	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Statio	moment ra	ting(³)
	1		I	l	I	l	mm	С	C ₀	T 0	Tx	TY T
W	H4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
								20 600	18 800	287	129 855	129 855
28	25	7	11	9	20	80	M 6×25	29 500	31 300	479	328 1 920	328 1 920
								39 200	47 000	718	704 3 670	704 3 670
34	28	9	14	12	20	80	M 8×30	29 900	26 800	412	176 1 190	162 1 100
	20	9	14	12	20	80	IVI 6 × 30	42 900	44 700	686	448 2 660	412 2 450
45	34	11	17.5	14	22.5	105	M10×35	61 100	60 200	1 210	672 4 070	618 3 750

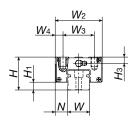
Example of identification number of assembled set (For details, see "Identification number and specification".)



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ME → Model code LWE (Ex:LWE30R440PS2)

^{(3):} The directions of basic dynamic load rating (C), basic static load rating (C) and static moment rating (To, Tx and Tr) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

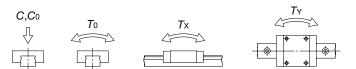
Block type, mounting from top MESC **MES MESG**

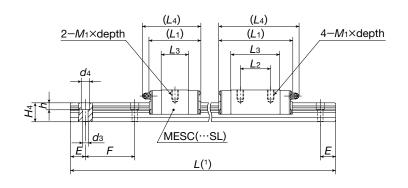


Model number	Interchangeable	Mass (Re	eference)		nensio ssemb mm				l	Dimensi	ons of mm	slide ur	nit	
	arch	Slide unit	Track rail	н	H1	N	W ₂	W ₃	W ₄	L ₁	L ₂	L3	L ₄	<i>M</i> 1×depth
	Inte	kg	kg/m				***	***	774				ī	Miracpui
MESC 15	☆	0.09								41		22.4	45	
MESC 15···SL	☆	0.09								41		22.4	40	
MES 15	☆	0.14	1.57	24	5.8	9.5	34	26	4	57	26	38.4	61	M4×7
MES 15···SL	☆	0.14	1.57	24	5.6	9.5	34	20	4	57	20	30.4	01	IVI4 ^ /
MESG 15	☆	0.18								70	36	51.1	74	
MESG 15···SL	☆	0.16								70	30	31.1	/4	
MESC 20	☆	0.15								47	_	24.7	59	
MESC 20···SL	☆	0.15								47		24.7	55	
MES 20	☆	0.25	2.28	28	6	11	42	32	5	66.5	32	44.2	79	M5×8
MES 20···SL	☆	0.25	2.20	20	0	'''	42	32	9	00.5	32	44.2	75	IVIDAO
MESG 20	☆	0.32								82	45	60.1	95	
MESG 20···SL	☆	0.32								02	40	00.1	90	
MESC 25	☆	0.26								59	_	32	71	
MESC 25···SL	☆	0.20								59		32	,	
MES 25	☆	0.41	3.09	33	7	12.5	48	35	6.5	83	35	56	95	M6×9
MES 25···SL	☆	0.41	3.09	33	,	12.5	40	35	0.5	03	35	50	95	IVIOAS
MESG 25	☆	0.54								102	EO	75	114	
MESG 25···SL	☆	0.54								102	50	75	114	

- Note(1): Track rail lengths L are shown in Table 11 on page A-27.
 (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
 - Values in parentheses are applicable to the track rail of supplemental code "/M4" of special specification.

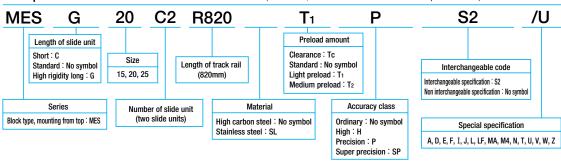
 (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact





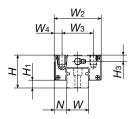
		[Dimensi	ons of mm	track ra	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Static	moment ra	ting(3)
		1		I	1			mm	С	C ₀	T 0	Tx	TY
Нз	W	H4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
									5 240	5 480	43.8	21.3 149	21.3 149
4.5	15	14.5	3.6 (4.5)	6.5	4.5 (6)	20	60	M3×16 (M4×16)	7 640	9 390	75.1	57.6 333	57.6 333
			, , ,	, , ,					9 340	12 500	100	99.5 533	99.5 533
									7 580	7 340	78.9	31.5 235	31.5 235
5.5	20	16	6	9.5	8.5	20	60	M5×16	11 600	13 400	145	95.6 561	95.6 561
									14 400	18 300	197	172 918	172 918
									12 400	12 300	153	71.8 480	71.8 480
6.5	23	19	7	11	9	20	60	M6×20	18 100	21 100	262	195 1 090	195 1 090
									22 200	28 200	349	336 1 740	336 1 740

Example of identification number of assembled set (For details, see "Identification number and specification".)



 $\ensuremath{\ensuremath{\%}}$ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ME → Model code LWE (Ex:LWE20R820PS2)

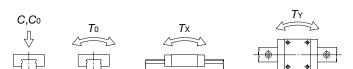
Block type, mounting from top MESC **MES MESG**

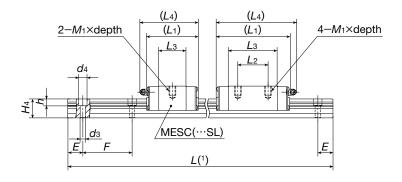


Model number	Interchangeable	Mass (Re	eference)		nensio ssemb mm					Dimensi	ons of mm	slide ur	nit	
	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	L 1	L2	L ₃	L4	<i>M</i> ₁×depth
MESC 30	☆	0.46								68	_	36	78	
MESC 30···SL	☆	0.46								00		30	/0	
MES 30	☆	0.70	г оо	40	10	10		40	10	07	40	C4 0	107	M OV10
MES 30···SL	☆	0.78	5.09	42	10	16	60	40	10	97	40	64.8	107	M 8×12
MESG 30	☆	4.40								100 5		00.5	100	
MESG 30···SL	☆	1.13								128.5	60	96.5	139	
MESC 35	☆	0.67	6.05	48	11	18	70	FO	10	78	ı	41.6	90	M 8×12
MES 35	☆	1.21	6.85	48	11	10	70	50	10	111	50	74.6	123	IVI OX IZ
MES 45	☆	2.05	11.2	60	14	20.5	86	60	13	125	60	81.4	136	M10×15

Note(1): Track rail lengths L are shown in Table 11 on page A-27.

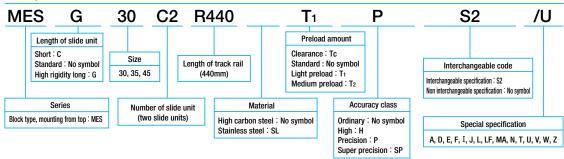
(2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.





		Γ	Dimensi	ons of	track ra	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Static	moment ra	ting(3)
		1		1	1	1 _	l _	mm	С	C ₀	T 0	Tx	T _Y
Нз	W	H 4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
									20 600	18 800	287	129 855	129 855
8	28	25	7	11	9	20	80	M 6×25	29 500	31 300	479	328 1 920	328 1 920
									39 200	47 000	718	704 3 670	704 3 670
10	34	28	9	14	12	20	80	M 8×30	29 900	26 800	412	176 1 190	162 1 100
10	34	20	9	14	12	20	80	IVI 6×30	42 900	44 700	686	448 2 660	412 2 450
13	45	34	11	17.5	14	22.5	105	M10×35	61 100	60 200	1 210	672 4 070	618 3 750

Example of identification number of assembled set (For details, see "Identification number and specification".)



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable ME → Model code LWE (Ex:LWE30R440PS2)

^{(3):} The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

MH/MHT/MHD/MHS

IKO C-Lube Linear Way MH features the largest load ratings and rigidity among all ball types and incorporating the C-Lube as a components part for lubrication in the slide unit to achieve maintenance free operations for a long period of time.

Long-term maintenance free

The lubricant in the C-Lube keeps the lubrication performance for a long period of time and achieves long-term maintenance free operations. (5 years and 20,000km) So man-hours for troublesome lubrication control can be reduced.

Interchangeability

Interchangeable specification is also available. The track rails and the slide units of interchangeable specification can be handled separately and can be assembled to make a set as required. Two types of slide units with different lengths are prepared. The best type and size can be selected these entire slide units can be freely assembled on the same track rail.

Light weight and compact

The C-Lube is incorporated in the slide unit of High Rigidity type Linear Way H series without changing the external dimensions of the slide unit.

Smooth and light motion

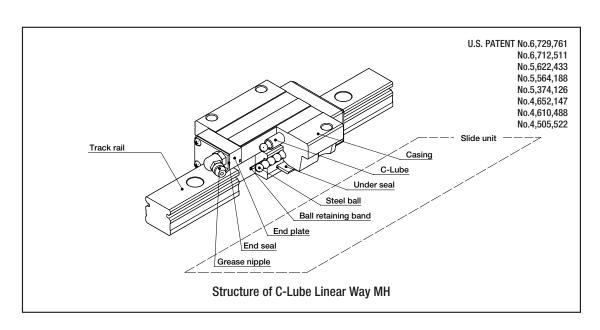
As the C-Lube is not in contact with the track rail, frictional resistance does not increase. A smooth and light motion is ensured.

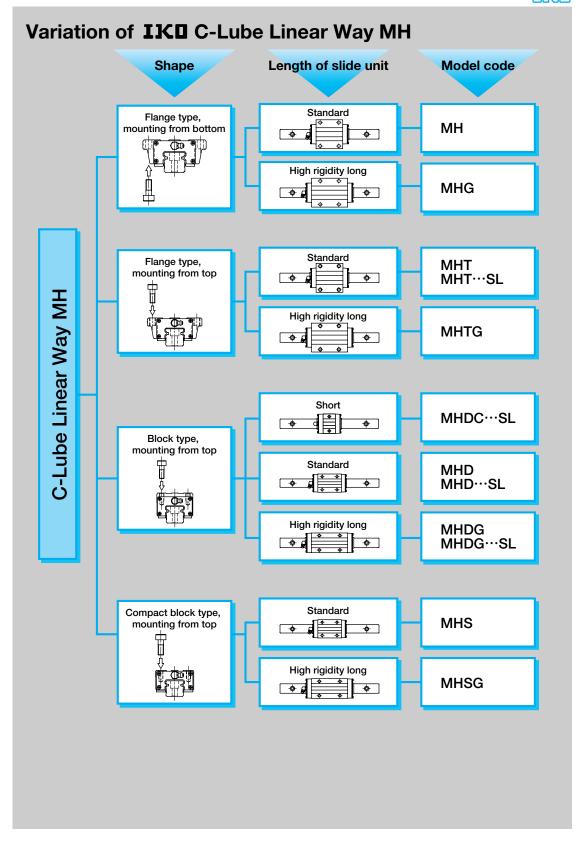
Flange type and block type

Four kinds of slide units are available; two flange types for different mounting directions and two kinds of narrow block type with different height and mounting dimensions.

Length of slide unit

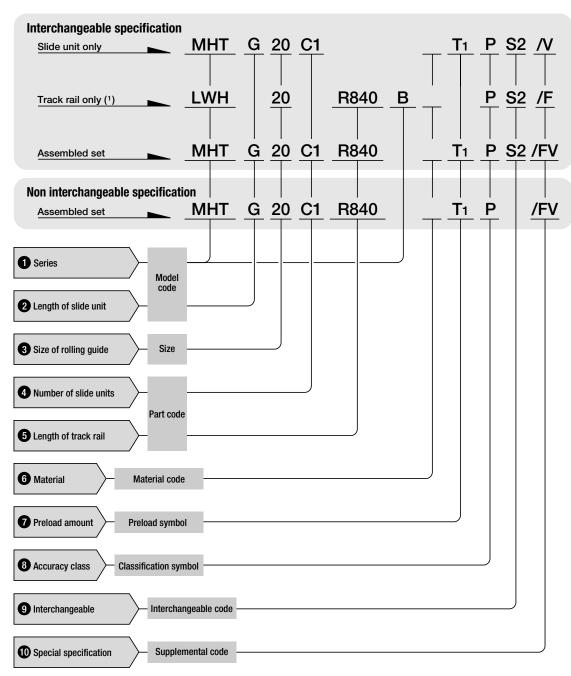
A standard type slide unit and a high rigidity long type slide unit both having the same sectional dimensions are available.





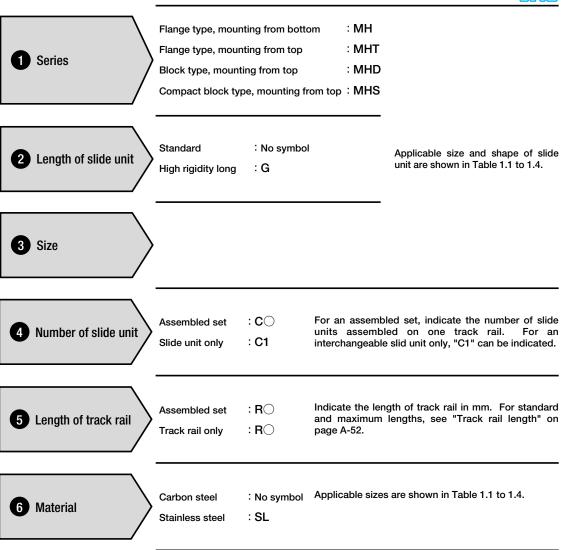
Μ̈́H,

The specification of C-Lube Linear Way MH is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol and any supplemental codes. For details of each specification, see page 78.



Note(¹): In case ordering track rail only, model code should be changed as shown below.

Track rail of interchangeable MH → Model code LWH (Ex: LWH15R900BPS2)



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Type and size of standard type C-Lube Linear Way MH Table 1.1 Flange type, mounting from bottom

Туре	Carbon steel						
Size	Standard MH	High rigidity long MHG					
15	☆	_					
20	☆	☆					
25	☆	☆					
30	☆	☆					
35	☆	☆					
45	☆	☆					

Table 1.2 Flange type, mounting from top

Туре	Carbon steel								
Size	Standard MHT	Standard MHT···SL							
8 (1)	-	_	☆						
10 (1)	_	_	☆						
12 (1)	☆	_	☆						
15	☆	_	_						
20	☆	☆	_						
25	☆	☆	_						
30	☆	☆	_						
35	☆	☆	_						
45	☆	☆	_						

Note(1): Size 8, 10 and 12 can be mounted also from bottom.

Remark : The mark $\not \simeq$ indicates that it is also applicable to interchangeable specification.

Table 1.3 Block type, mounting from top

Туре	Carbo	n steel		Stainless steel					
Size	Standard MHD	High rigidity long MHDG	Short MHDC···SL	Standard MHD···SL	High rigidity long MHDG···SL				
8	_	_	☆	☆	☆				
10	-	_	☆	☆	☆				
12	☆	☆ _		☆	☆				
15	☆	_	_	_	_				
20	_	_	_	_	_				
25	☆	☆	_	_	_				
30	☆	☆	_	_	_				
35	☆	☆	_	_	_				
45	☆ ☆		_	_	_				

Table 1.4 Compact block type, mounting from top

Туре	Carbo	n steel
Size	Standard MHS	High rigidity long MHSG
15	☆	_
20	☆	☆
25	☆	☆
30	☆	☆

 $\textbf{Remark}: \textbf{The mark} \not \simeq \textbf{indicates that it is also applicable to interchangeable specification}.$

Clearance

: No symbol Standard

Light preload : T₁

: **T**o

Applicable preload and size are shown in Table 2. : **T**2 Medium preload For detail of preload amount, see page 86.

interchangeable single slide unit.

Specify this items for an assembled set or an

: **T**3 Heavy preload

Table 2 Preload of C-Lube Linear Way MH

	Preload class and symbol									
Size	Clearance (To)	Standard (No symbol)	Light preload (T1)	Medium preload (T2)	Heavy preload (T3)					
8	0	☆	0	_	_					
10	0	☆	_	_						
12	0	☆	0	_	_					
15	_	- ☆ ☆ (0	0					
20	_	☆	☆	0	0					
25	_	☆	☆	0	0					
30	_	☆	☆	0	0					
35	_	☆	☆	0	0					
45	_	☆	☆	0	0					

Remark: The mark \$\pm\$ indicates that it is also applicable to interchangeable specification.

8 Accuracy class

7 Preload amount

: H High class

Precision class : P

: SP Super precision

In interchangeable specification, please combine same accuracy codes on both slide unit and track rail. For combination of accuracy and preload, see Table 3.

Detail of accuracy is shown in page 81.

Table 3 Accuracy class and size

		Accuracy class	
Size	High class	Precision class	Super precision
	(H)	(P)	(SP)
8	☆	☆	_
10	☆	☆	_
12	☆	☆	_
15	☆	☆	0
20	☆	☆	0
25	☆	☆	0
30	☆	☆	0
35	☆	☆	0
45	☆	☆	0

Remark: The mark \$\pm\$ indicates that it is also applicable to interchangeable specification.

9 Interchangeable

Interchangeable : S2 Specify this item for the interchangeable specification products. Assemble track rails and slide units with the same interchangeable code.

Applicable special specifications are shown in Table 4. When a combination of several special specifications is required, please refer Table 5 and arrange their supplemental codes in alphabetical order. For detain of specifications are shown on page 88.

Table 4 Applicable enecification

Specifications	Supplemental code	Set product	Track rail only	Slide unit only	Dimension
Butt jointing track rail	Α	O(1)	_	_	
Opposite reference surfaces arrangement	D	☆	_	_	
Specified rail mounting hole positions	Е	☆	☆	_	
Caps for rail mounting holes	F	☆ (2)	☆ (2)	_	
Appending inspection sheet	I	0	_	_	
Female threads for bellows	J	☆(3)	☆(3)	☆(3)	See table 6.1, 6.2 and 6.3
Black chrome surface treatment	L	☆(4)(8)	☆(3)	_	
Fluoric black chrome surface treatment	LF	☆(3)	_	_	
With track rail mounting bolts (Applicable to set order)	MA	☆	_	_	See table 7
Without track rail mounting bolts (Applicable to track rail order)	MN	1	☆	_	
No rubber end seals	Ν	☆	_	☆	
Rail cover plate for track rail (1)	PS	O(5)	_	_	
Butt jointing interchangeable track rail	Т	$^{\updownarrow}(^3)(^6)$	☆(3)	_	
Under seals	U	☆ (⁷)	_	☆ (⁷)	See table 8
Double end seals	٧	☆(3)	_	☆(3)	See table 9
Matched sets to be used as an assembled group	W	0	_	_	
Scrapers	Z	☆(3)	_	☆(3)	See table10

interchangeable specification.

their supplemental codes in alphabetical order.

Note(1): Not applicable to size 12 carbon steel model.

- (2): Not applicable to size 8 and 10.
- (3): Not applicable to size 8, 10 and 12.
- (4): Only "LR" is applicable to size 8, 10 and 12.
- (5): Not applicable to size 8, 10, 12 and 15.
- (6): Not applicable to non-interchangeable specification.
- (7): Applicable to size 8, 10 and 12.
- (8): Not applicable top size 8, 10 and 12 of non-interchangeable specification.

Remark: The mark ☆ indicates that it is also applicable to interchangeable specification.

Table 5 Combination of special specifications

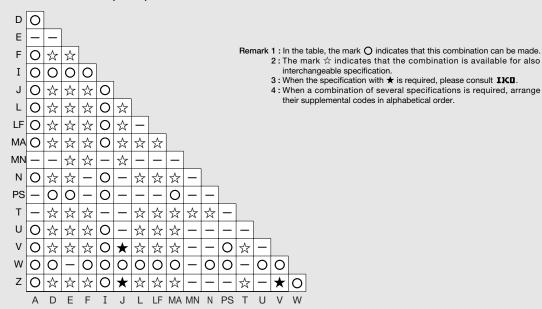
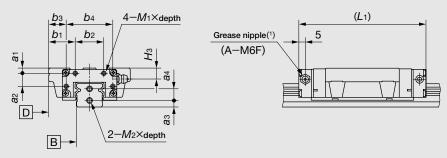


Table 6.1 Female threads for bellows for flange type MH (Supplemental code /JJ)



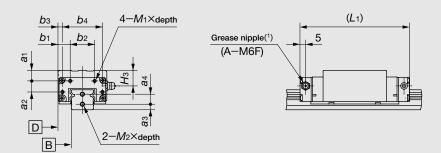
	it	

													unit . mm	
Mandal	Slide unit					Track rail								
Model numi	ber	a 1	a 2	<i>b</i> 1	b 2	b 3	b4	<i>M</i> 1×depth	L1(2)	Н з	a 3	a 4	<i>M</i> 2×depth	
MH (T)	15	3	7	15.5	16	9.5	28	M3×6	83	6.5	4	8	M3× 6	
MH (T)	20	4	10	20.5	22	13.5	36	M3×6	99	8.5	5	_	May o	
MH (T) G	20	4	10	20.5	22	13.5	30	1013/0	128	0.5	5	9	M4× 8	
MH (T)	25	4	13	22	26	15	40	M3×6	110	8.5	5	12	M4× 8	
MH (T) G	25	4	13	22	20	15	, 40	40	IVISAU	133	0.5	5	12	10147 0
MH (T)	30	5	17	28	34	20	50	M3×6	128	11	6	14	M4× 8	
MH (T) G	30] 5	''	20	34	20	50	IVISAO	154	1 '	ь	14	IVI4⊼ 8	
MH (T)	35	6	20	20	40	20	60	M3×6	137	13	7	15	May o	
MH (T) G	35	0 4	20	30	40	20	00	bu ivi3×b	165	13	′	15	M4× 8	
MH (T)	45	7	26	25	F0	22	74	M4×8	160	15	8	10	M5×10	
MH (T) G	45	′	26	35	50	23	/4	IVI4×8	203	15	٥	19	I VISA IU	

Note(1): The specification and mounting positions of grease nipple are different from those of the standard specification product. Size 15 models are provided with a special specification grease nipple (NPB2 type). For detail of dimensions, consult IKO for further

(2): The values are for the slide unit with female threads for bellows at both ends.

Table 6.2 Female threads for bellows for block type MHD (Supplemental code /JJ)

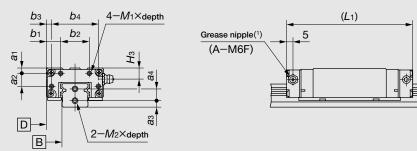


unit: mm Slide unit Track rail Model number **a**1 **a**2 b1 b2 bз b4 M₁×depth L1(2) Нз **a**3 **a**4 M₂×depth 83 7 7 9 16 28 M3×6 10.5 4 M3× 6 MHD 3 8 15 MHD 25 110 8 13 11 26 M3×6 12.5 5 12 M4× 8 40 4 133 MHDG 25 MHD 30 128 8 17 13 34 50 M3×6 14 5 14 6 M4× 8 154 MHDG 30 MHD 35 137 13 20 15 40 5 60 M3×6 20 7 15 M4× 8 165 MHDG 35 MHD 45 160 17 26 50 25 18 6 74 M4×8 8 19 M5×10 203 MHDG 45

Note(1): The specification and mounting positions of grease nipple are different from those of the standard specification product. Size 15 models are provided with a special specification grease nipple (NPB2 type). For detail of dimensions, consult IKO for further information.

(2): The values are for the slide unit with female threads for bellows at both ends.

Table 6.3 Female threads for bellows for compact block type MHS (Supplemental code /JJ)



unit · m

Model nur						Slide	unit				Track rail			
woder nur	nber	a 1	a 2	<i>b</i> 1	b ₂	b 3	b4	<i>M</i> 1×depth	L1(2)	Н з	a 3	a 4	<i>M</i> 2×depth	
MHS	15	3	7	9	16	3	28	M3×6	83	6.5	4	8	M3×6	
MHS	20	4	10	11	22	4	36	M3×6	99	8.5	5	19	M4×8	
MHSG	20	4	10	''	22	4	30	36	IVISAO	128	0.5	5	19	IVI4^6
MHS	25	4	4	13	11	26	4	40	M3×6	110	8.5	5	12	M4×8
MHSG	25	4	13	11	11 26	26 4	4 40	40 1013	IVI3AO	133	0.5	5	12	IVI4^6
MHS	30	5	17	13	34	5	50	M3×6	128	11	6	14	M4×8	
MHSG	30]	17	13	34	5	50	50 1013/6	154	11	"	14	IVI4×8	

Note(1): The specification and mounting positions of grease nipple are different from those of the standard specification product. Size 15 models are provided with a special specification grease nipple (NPB2 type). For detail of dimensions, consult **IKO** for further information

(2): The values are for the slide unit with female threads for bellows at both ends.

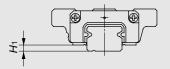
Table 7 Appended bolts size for mounting track rail of MH (Supplemental code /MA)

Model number	Bolt size
MH 8···SL	M 2× 8
MH 10···SL	M 3× 8
MH 12	M 3×12
MH 15	M 4×16
MH 20	M 5×18
MH 25	M 6×22
MH 30	M 8×28
MH 35	M 8×28
MH 45	M12×35

Remark 1: The table shows representative model numbers but is applicable to all models of the same size.

2: Hexagon socket bolts of JIS B 1176 strength division 12.9 are appended.

Table 8 H1 dimension of slide unit with under seals (Supplemental code /U)



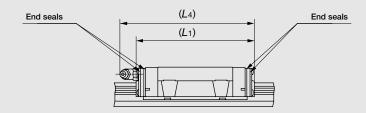
unit: mm

	4111.7 111111
Model number	<i>H</i> 1
MH 8···SL	1.5
MH 10···SL	1.8
MH 12	3.2

Remark 1 : The table shows representative model numbers but is also applicable to all models in the same size of MH series.

2 : H₁ dimension of size 12 models is the same as the dimension without under

Table 9 Slide unit with double end seals (Supplemental code /VV)



unit	:	mm

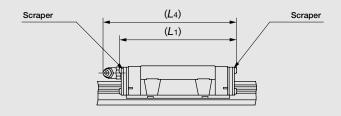
<i>L</i> 1	L 4
72	77
91	104
119	133
104	116
127	139
122	134
148	160
	72 91 119 104 127 122

Model number	<i>L</i> 1	L4
MH 35	133	146
MHG 35	161	173
MH 45	159	170
MHG 45	202	213

Remark 1 : The table shows representative model numbers but is applicable to all models of the same size.

2 : The total lengths of slide unit with double end seals at both ends are shown.

Table 10 Slide unit with scrapers (Supplemental code /ZZ)



u			

Model number	<i>L</i> 1	L 4
MH 15	73	75
MH 20	91	104
MHG 20	119	133
MH 25	104	116
MHG 25	126	139
MH 30	124	135
MHG 30	150	161

Model number	<i>L</i> 1	L4
MH 35	133	146
MHG 35	161	174
MH 45	160	171
MHG 45	203	214

Remark 1 : The table shows representative model numbers but is applicable to all models of the same size.

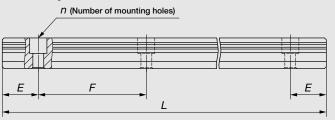
2 : The total lengths of slide unit with scrapers at both ends are shown.

Standard and maximum lengths of track rail are shown in Table 11.1 and 11.2.

Track rail in any lengths are also available. Simply indicate the necessary length of track rail in millimeter (mm) in the identification number.

- In non-interchangeable specification, for track rail longer than the maximum length shown in Table 11.1 and 11.2, butt-jointing track rails are available upon request. In this case, indicate supplemental code "/A" in the identification number.
- E dimensions at both ends are the same unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions (supplemental code "/E") of special specification. For detail, see page 91.

Table 11.1 Standard and maximum lengths of MH



unit: mm

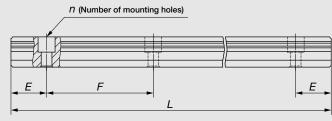
Model number	MH 12	MH 15	MH 20	MH 25	MH 30
	80(2)	180(3)	240(4)	240(4)	480(6)
	160(4)	240(4)	480(8)	480(8)	640(8)
	240(6)	360(6)	660(11)	660(11)	800(10)
	320(8)	480(8)	840(14)	840(14)	1 040(13)
Standard length $L(n)$	400(10)	660(11)	1 020(17)	1 020(17)	1 200(15)
	480(12)	900(15)	1 200(20)	1 200(20)	1 520(19)
	560(14)	1 200(20)	1 500(25)	1 500(25)	2 000(25)
	640(16)			1 980(33)	
	720(18)				
Mounting hole pitch F	40	60	60	60	80
E	20	30	30	30	40
Reference Over (Incl.)	5.5	7	8	9	10
dimension E (1) Under	25.5	37	38	39	50
Maximum length (2)	1 480	1 500 (3 000)	1 980 (3 000)	3 000 (3 960)	2 960 (4 000)
Model number Item	MH 35	MH 45			
	480(6)	840(8)			
	640(8)	1 050(10)			
0, 1, 1, 1, 1, (n)	800(10)	1 260(12)			
Standard length $L(n)$	1 040(13)	1 470(14)			
	1 200(15)	1 995(19)			
	1 520(19)				
Mounting hole pitch F	80	105			
Е	40	52.5			
Reference Over (Incl.)	10	12.5			
dimension E (1) Under	50	65			
Maximum length (2)	2 960 (4 000)	2 940 (3 990)			

Note (1): Not applied to optional specification "female threads for bellows" (supplemental code "/J", "/JJ")

(2): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult IKI

Remark: The above table shows representative model number but is applicable to all models of the same size.

Table 11.2 Standard and maximum length of MH····SL (Stainless models)



unit: mm

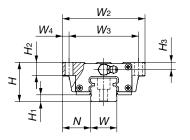
Model number	MH 8···SL	MH 10···SL	MH 12···SL
	40(2)	50(2)	80(2)
	80(4)	100(4)	160(4)
	120(6)	150(6)	240(6)
	160(8)	200(8)	320(8)
Standard length $L(n)$	200(10)	250(10)	400(10)
Otaliaala ioligal = (11)	240(12)	300(12)	480(12)
	280(14)	350(14)	560(14)
		400(16)	640(16)
		450(18)	720(18)
		500(20)	
Mounting hole pitch F	20	25	40
E	10	12.5	20
Reference Over (Incl.	4.5	5	5.5
dimension E (1) Under	14.5	17.5	25.5
Maximum length (2)	480 (1 000)	850 (1 000)	1 000 (1 480)

Note (1): Not applied to optional specification "female threads for bellows" (supplemental code "/J", "/JJ")

(2): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult **IKU**.

Remark: The above table shows representative model number but is applicable to all models of

Flanged shape, mounting from bottom MH MHG



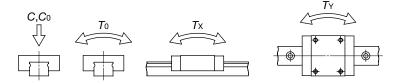
Model n	Model number		Mass (Re	Dimension of assembly mm			Dimension of slide unit mm								
			Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W2	W 3	W 4	<i>L</i> 1	L2	L 3	L4	d1
МН	15	☆	0.22	1.47	24	4.5	16	47	38	4.5	66	30	44.2	69	4.5
МН	20	☆	0.47	2.56	30	5	21.5	63	53	5	83	40	56	95	6
MHG	20	☆	0.69	2.50	30	5	21.0	03	33		112	40	84.8	124	U
МН	25	☆	0.69	3.50	36	6.5	23.5	70	57	6.5	95	45	63.9	106	7
MHG	25	☆	0.91	3.50		0.5	23.5	70	57	0.5	118	40	86.6	129	,
МН	30	☆	1.28	4.82	42	7	31	90	72	9	113	52	80.6	124	9
MHG	30	☆	1.69	4.02	42	'	, 31	30	72	5	139	52	106.6	150	
МН	35	☆	1.79	6.85	48	8	33	100	82	9	123	62	86.2	135	9
MHG	35	☆	2.35	0.63	40	0	33			9	151	UZ	114	163	
МН	45	☆	3.17	10.7	60	10	37.5	120	100		147	80	103.4	158	11
MHG	45	☆	4.34	10.7	UU	10	37.3	120	100	10	190	60	146.6	201	' '

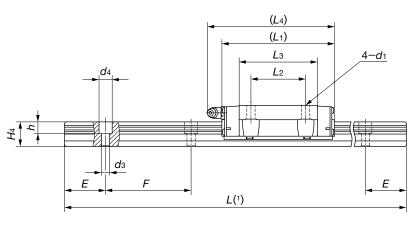
Note(1): Track rail lengths L are shown in Table 11.1 on page A-52.

(2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.

Remark 1 : The mark \(\frac{1}{2} \) indicates that the combination is available for also interchangeable specification.

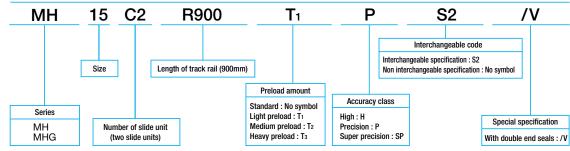
2: For the shape of grease nipple, see page 99.





			I	Dimens	ion of t	rack ra	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Static	moment r	ating(3)
	I			I	I	1	l	I	mm	С	C ₀	T 0	Tx.	<i>T</i> Y
H 2	Нз	W	H 4	dз	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
7	4.5	15	15	4.5	8	6	30	60	M 4×16	11 600	13 400	112	95.6 556	95.6 556
10	5.5	20	18	6	9.5	8.5	30	60	M 5×10	18 100	21 100	232	195 1 090	195 1 090
10	5.5	20	18	б	9.5	8.5	30	60	M 5×18	24 100	31 700	349	421 2 140	421 2 140
10	6.5	23	22	7	11	9	30	60	M 6×22	25 200	28 800	362	309 1 690	309 1 690
	0.5	23	22	,	' '	9	30	60	IVI 6×22	30 800	38 300	483	533 2 740	533 2 740
10	8	28	25	9	14	12	40	80	M 8×28	35 400	40 700	623	536 2 820	536 2 820
	8	20	25	9	14	12	40	80	IVI 6 ^ 26	42 700	53 200	814	894 4 460	894 4 460
13	10	34	28	9	14	12	40	80	M 8×28	48 700	53 700	823	631 3 480	579 3 190
	10	34	20	9	14	12	40	80	IVI 6 ^ 26	59 500	71 600	1 100	1 090 5 570	1 000 5 110
15	13	45	34	14	20	17	52.5	105	M12×35	74 600	80 200	1 610	1 150 6 190	1 060 5 690
	13	45	34	14	20	17	52.5	105	IVI 12 × 35	95 200	114 000	2 280	2 240 11 100	2 020 10 200

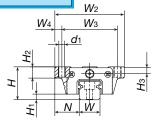
Example of identification number for assembled set (For details, see "Identification number and specification".)

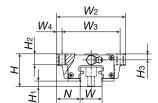


※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable MH → Model code LWH (Ex: LWH15R900BPS2)

^{(3):} The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

Flange type, mounting from Top MHT **MHTG**





MHT 8···SL MHT10···SL MHT12 (...SL)

Model numbe	Interchangeable	Mass (Re	eference)		mensic assemb					Γ	Dimen	sion of mm	slide ı	unit			
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L 2	L ₃	L 4	d 1(4)	<i>M</i> 1	H 2	Н з
MHT 8S	L ☆	0.015	0.32	10	2.1	8	24	19	2.5	24	10	15.3	_	1.9	M 2.3	3.5	2
MHT 10S	L ☆	0.031	0.47	12	2.4	10	30	24	3	32	12	21.4	_	2.6	М 3	4.5	2.5
MHT 12	☆	0.100	0.00	19	2.2	1.4	40	32	4	46	15	21.0	Ε0.	2.4	NA 4	_	4
MHT 12S	L ☆	0.108	0.86	19	3.2	14	40	32	4	46	15	31.6	50	3.4	M 4	6	4
MHT 15	☆	0.22	1.47	24	4.5	16	47	38	4.5	66	30	44.2	69	_	M 5	7	4.5
MHT 20	☆	0.47	2.50	2.56 30	30 5	21.5	63	53	5	83	40	56	95		NA C	10	5.5
MHTG 20	☆	0.69	2.56			21.5	03	53	5	112	40	84.8	124] _	M 6	10	5.5
MHT 25	☆	0.69	2.50		٠.	22.5	70		٥.	95	45	63.9	106		MO	10	٠.
MHTG 25	☆	0.91	3.50	36	6.5	23.5	70	70 57	7 6.5	118	45	86.6	129] _	M 8	10	6.5
MHT 30	☆	1.28	4.00	40	_	0.1	-00	70		113		80.6	124		N440	10	
MHTG 30	☆	1.69	4.82	42	7	31	90	72	9	139	52	106.6	150	1 -	M10	10	8
MHT 35	☆	1.79	0.05	40		00	100	00		123	00	86.2	135		N/10	10	40
MHTG 35	☆	2.35	6.85	48	8	33	100	82	9	151	62	114	163	-	M10	13	10
MHT 45	☆	3.17	10.7		10	07	120	100	10	147	80	103.4	158		N/10	45	12
MHTG 45	☆	4.34	10.7	60	10	37.5	120	100	10	190	80	146.6	201		M12	15	13

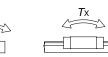
Note(1): Track rail lengths L are shown in Table 11.1 and 11.2 on page A-52 and A-53.

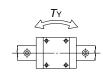
- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.
- (4): MHT8···SL, MHT10···SL, MHT12 and MHT12···SL can be mounted also from bottom direction.

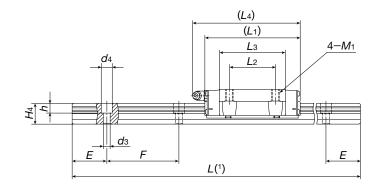
Remark 1 : The mark ☆ indicates that interchangeable specification products are available.

- 2: For dimensions of grease nipple and oil hole, see page 99.
- 3: Oil hole is provided for size 8 and 10 models.



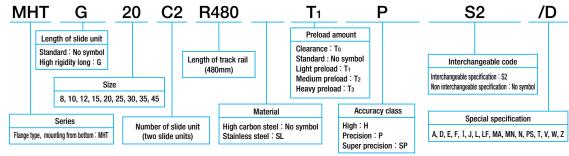






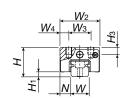
	ı	Dimens	ion of t mm	rack rai	il		Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Statio	moment rate	ting(3)
	ı	ı	l	ı	ı	l	mm	С	C ₀	T 0	Tx	<i>T</i> Y
W	H4	d 3	d4	h	E	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
8	6	2.4	4.2	2.3	10	20	M 2× 8	1 510	2 120	8.8	5.5 32.0	4.7 26.9
10	7	3.5	6	3.5	12.5	25	M 3× 8	2 640	3 700	19.2	13.3 73.8	11.1 61.9
12	10.5	3.5	6	4.5	20	40	M 3×12	6 260	8 330	51.6	44.7 237	37.5 199
15	15	4.5	8	6	30	60	M 4×16	11 600	13 400	112	95.6 556	95.6 556
	18	_	0.5	0.5	00	-00	M EVAO	18 100	21 100	232	195 1 090	195 1 090
20	18	6	9.5	8.5	30	60	M 5×18	24 100	31 700	349	421 2 140	421 2 140
	00	7	4.4		00	-00	M OVO	25 200	28 800	362	309 1 690	309 1 690
23	22	/	11	9	30	60	M 6×22	30 800	38 300	483	533 2 740	533 2 740
	0.5	_	4.4	10	40	00	M OVO	35 400	40 700	623	536 2 820	536 2 820
28	25	9	14	12	40	80	M 8×28	42 700	53 200	814	894 4 460	894 4 460
	00		4.4	10	40	-00	Mayo	48 700	53 700	823	631 3 480	579 3 190
34	28	9	14	12	40	80	M 8×28	59 500	71 600	1 100	1 090 5 570	1 000 5 110
45	24	1.4	20	17	F2 F	105	Manyar	74 600	80 200	1 610	1 150 6 190	1 060 5 690
45	34	14	20	17	52.5	105	M12×35	95 200	114 000	2 280	2 240 11 100	2 050 10 200

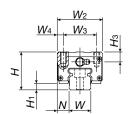
Example of identification number of assembled set (For details, see "Identification number and specification".)



 $\mbox{\%}$ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable MHT → Model code LWH (Ex: LWH20R480BPS2)

Block type, mounting from top MHDC MHD MHDG





MHD (C,G) 8···SL MHD (C,G) 10···SL MHD (C,G) 12···SL MHD 12

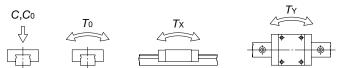
Model number	Interchangeable	Mass (Re	deference) Dimension of assembly mm			Dimensions of slide unit mm								
	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L4	<i>M</i> ₁×depth
MHDC 8···SL	☆	0.008								18	_	9.0		
MHD 8···SL	☆	0.013	0.32	11	2.1	4	16	10	3	24	10	15.3	_	M 2 × 2.5
MHDG 8···SL	☆	0.018								30.5	10	21.7		
MHDC 10···SL	☆	0.018								24	ı	13.4		
MHD 10···SL	☆	0.026	0.47	13	2.4	5	20	13	3.5	32	12	21.4	_	M 2.6× 3
MHDG 10···SL	☆	0.035								40	12	29.4		
MHDC 12···SL	☆	0.057								34	ı	19.6	38	
MHD 12	☆	0.089	0.86	20	3.2	7.5	27	15	6	46		31.6	50	M 4 × 5
MHD 12···SL	☆	0.069	0.00	20	3.2	7.5	21	15		40	15	31.0		IVI 4 ^ 5
MHDG 12···SL	☆	0.115								58		43.6		
MHD 15	☆	0.23	1.47	28	4.5	9.5	34	26	4	66	26	44.2	69	M 4 ×10
MHD 25	☆	0.64	3.50	40	6.5	12.5	48	35	6.5	95	35	63.9	106	M 6 ×12
MHDG 25	☆	0.78	3.50	40	0.5	12.5	40	35	0.5	118	50	86.6	129	IVI 6 12
MHD 30	☆	1.12	4.82	45	7	16	60	40	10	113	40	80.6	124	M 0 V16
MHDG 30	☆	1.44	4.02	45	,	10	60	40	10	139	60	106.6	150	M 8 ×16
MHD 35	☆	1.74	C OF	EE	8	18	70	ΕO	10	123	50	86.2	135	M 8 ×16
MHDG 35	☆	2.26	6.85	55	0	10	/0	50	10	151	72	114	163	
MHD 45	☆	3.30	10.7	70	10	20.5	06	60	12	147	60	103.4	158	
MHDG 45	☆	4.57	10.7	/0	10	20.5	86	60	13	190	80	146.6	201	M10 ×20

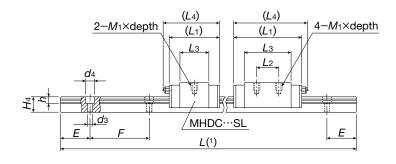
Note(1): Track rail lengths L are shown in Table 11.1 and 11.2 on page A-52 and A-53.

- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

Remark 1 : The mark \(\frac{1}{2}\) indicates that interchangeable specification products are available.

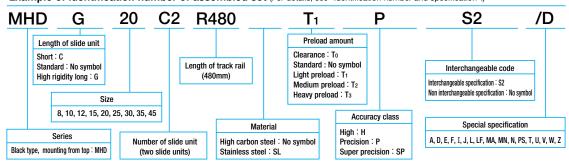
- 2: For dimensions of grease nipple and oil hole, see page 99.
- 3: Oil hole is provided for size 8 and 10 models.





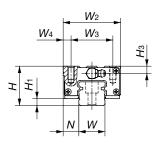
	Dimensions of track rail mm							Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3) Basic static load rating(3)		Static moment rating(3)			
		1			1		l _	mm	С	C ₀	T 0	Tx	T _Y	
Нз	W	H4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N•m	
									1 050	1 270	5.3	2.2 15.5	1.8 13.0	
3	8	6	2.4	4.2	2.3	10	20	M 2× 8	1 510	2 120	8.8	5.5 32.0	4.7 26.9	
									1 910	2 970	12.3	10.4 55.4	8.8 46.4	
									1 920	2 350	12.2	5.8 37.1	4.8 31.2	
3.5	10	7	3.5	6	3.5	12.5	25	M 3× 8	2 640	3 700	19.2	13.3 73.8	11.1 61.9	
									3 280	5 050	26.2	23.8 123	20.0 103	
									4 560	5 300	32.8	19.4 117	16.3 98.5	
5	12	10.5	3.5	6	4.5	20	40	M 3×12	6 260	8 330	51.6	44.7 237	37.5 199	
									7 780	11 400	70.4	80.4 399	67.5 335	
8.5	15	15	4.5	8	6	30	60	M 4×16	11 600	13 400	112	95.6 556	95.6 556	
10.5		00	_	44		00	-00	M CVOC	25 200	28 800	362	309 1 690	309 1 690	
10.5	23	22	7	11	9	30	60	M 6×22	30 800	38 300	483	533 2 740	533 2 740	
11	28	25	9	14	12	40	00	M 8×28	35 400	40 700	623	536 2 820	536 2 820	
11	28	25	9	14	12	40	80	IVI 8 × 28	42 700	53 200	814	894 4 460	894 4 460	
17	34	20	9	14	12	40	00	Mayon	48 700	53 700	823	631 3 480	579 3 190	
17	34	28	9	14	12	40	80	M 8×28	59 500	71 600	1 100	1 090 5 570	1 000 5 110	
23	45	24	1.4	20	17	52.5	105	M12×35	74 600	80 200	1 610	1 150 6 190	1 060 5 690	
23	45	34	14	20	17	52.5	105	IVI 12 × 35	95 200	114 000	2 280	2 240 11 100	2 050 10 200	

Example of identification number of assembled set (For details, see "Identification number and specification".)



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable MHD → Model code LWH (Ex:LWH20R480BPS2)

Compact block type, mounting from top MHS MHSG



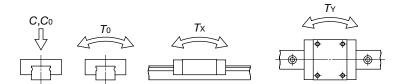
Model number	Interchangeable	Mass (Re	Reference) Dimension of assembly mm			Dimension of slide unit mm						unit		
sss. nambor		Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L 2	Lз	L4	<i>M</i> 1×depth
MHS 15	☆	0.18	1.47	24	4.5	9.5	34	26	4	66	26	44.2	69	M4× 8
MHS 20	☆	0.35	2.56	30	5	12	44	32	6	83	36	56	95	M5×10
MHSG 20	☆	0.52	2.56					32		112	50	84.8	124	
MHS 25	☆	0.54	3.50	36	6 6.5	12.5	48	35	6.5	95	35	63.9	106	M6×12
MHSG 25	☆	0.66	3.50							118	50	86.6	129	IVIO A 12
MHS 30	☆	1.00	4.02	42 7	_	16	60	40	10	113	40	80.6	124	MOV40
MHSG 30	☆	1.29	4.82		,			40	10	139	60	106.6	150	M8×16

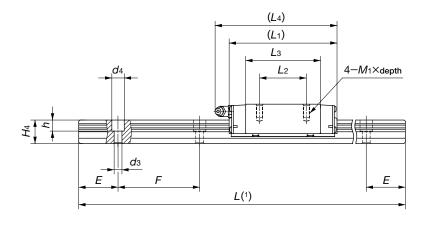
Note(1): Track rail lengths L are shown in Table 11.1 on page A-52.

- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

Remark 1 : The mark 🕏 indicates that the combination is available for also interchangeable specification.

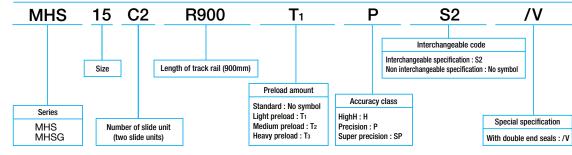
2: For the shape of grease nipple, see page 99.





	Dimension of track rail mm						Recommended mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Static moment rating(3)			
		١	١.	١.	١.	_	_	mm	С	C ₀	T 0	Tx	T Y
Нз	W	H4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N•m
4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
	00	10		0.5	0.5	00	00	MENAO	18 100	21 100	232	195 1 090	195 1 090
5.5	20	18	6	9.5	8.5	30	60	M5×18	24 100	31 700	349	421 2 140	421 2 140
6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
0.5	23	22	/	11	9	30	60	IVIO × 22	30 800	38 300	483	533 2 740	533 2 740
8	20	25	0	14	10	40	00	Moveo	35 400	40 700	623	536 2 820	536 2 820
ŏ	28	25	9	14	12	40	80	M8×28	42 700	53 200	814	894 4 460	894 4 460

 $\textbf{Example of identification number for assembled set} \quad \textbf{(For details, see "Identification number and specification".)}$



※ In case ordering track rail only, model code is changed as shown below. Track rail of interchangeable MHS → Model code LWH (Ex: LWH15R900BPS2)

C-Lube Linear Way MUL

MUL

IKO C-Lube Linear Way MUL is a linear motion rolling guide, incorporating the C-Lube as a components part for lubrication in the slide unit of miniature type Linear Way LWUL series to achieve maintenance free operations for a long period of time.

Long-term maintenance free

The lubricant in the C-Lube keeps the lubrication performance for a long period of time and achieves long-term maintenance free operations. (5 years and 20,000km)

So man-hours for troublesome lubrication control can be reduced.

Lightweight and compact

The C-Lube is incorporated in the lightweight and compact slide unit of miniature type Linear Way LWLU series without changing the external dimensions of the slide unit.

Smooth and light motion

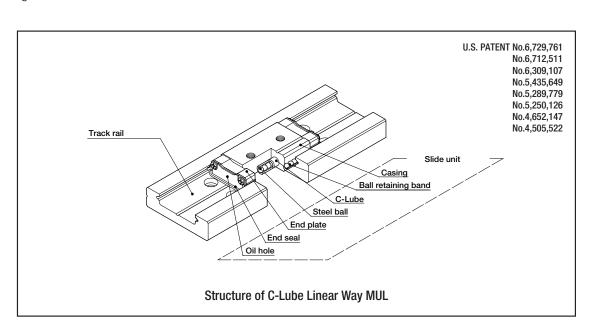
As the C-Lube is not in contact with the track rail, frictional resistance does not increase. A smooth and light motion is ensured.

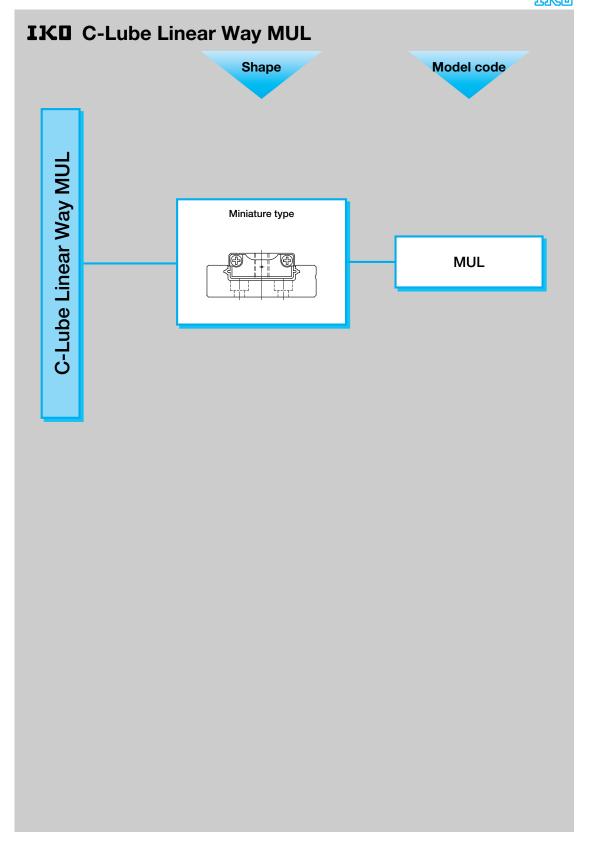
Stainless Steel

The metal components are manufactured from corrosion resistant stainless steel. So this series is most suitable for use in clean rooms and also for applications where the use of lubricants and rust preventive oil should be avoided or kept to a minimum.

U-shaped track rail

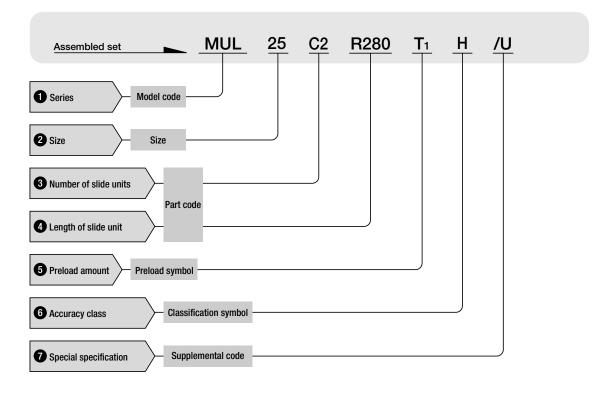
Rigidity of track rail under moment and torsion is very much increased by adopting the U-shaped design. The track rail can, therefore, be mounted on machines and equipment as structural members, either in a cantilever position or supported at both ends, so they can be combined an assembled freely.

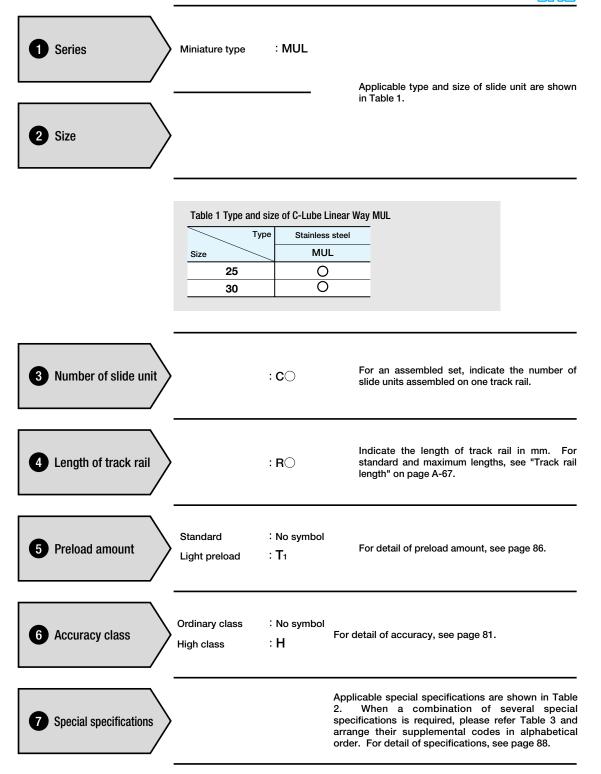




Identification number and specification

The specification of C-Lube Linear Way MUL is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol and any supplemental codes. For details of each specification, see page 78.





Specifications	Supplemental code	Dimension
Specified rail mounting hole positions	Е	
Black chrome surface treatment on track rail	LR	
With track rail mounting bolts	MA	See Table 4.
With upper seals	U	See Table 5.
Matched sets to be used as an assembled group	W	

Table 3 Combination of special specifications



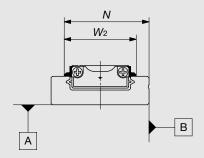
Remark: When a combination of several special specifications is required, arrange their supplemental codes in alphabetical order.

Table 4 Size for track rail mounting bolt (Supplemental code /MA)

Model code	Bolt size
MUL 25	Cross-recessed head cap screw for precision equipment M2.5×6
MUL 30	Hexagon socket head bolt (¹) M2.5×6

Note(1): The property division A2-70 of JIS B 1176 hexagon socket head bolt is recommended.

Table 5 Dimension of slide unit with upper seals (Supplemental code: /U)



unit : mn

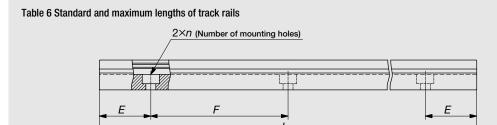
Model number	N	W 2		
MUL 25	21.4	18		
MUL 30	25.9	22		

Track rail length

Standard and maximum lengths of track rail are shown in Table 6.

Track rail in any lengths are also available. Simply indicate the necessary length of track rail in millimeter (mm) in the identification number. For the tolerance of E dimensions and track rail length, consult **IKD** for further information.

• E dimensions at both ends are the same unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions (supplemental code "/E") of special specification. Please see page 91.

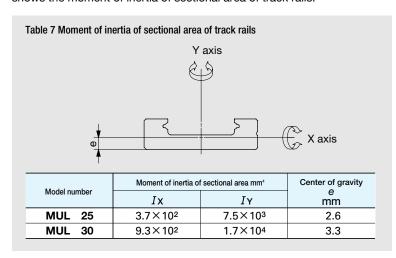


			unit : mm		
Item	Model number	MUL 25	MUL 30		
Standard length L	(n)	105(3) 140(4) 175(5) 210(6) 245(7) 280(8)	120(3) 160(4) 200(5) 240(6) 280(7) 320(8)		
Mounting hole pito	ch F	35	40		
E		17.5	20		
Reference	Over (Incl.)	4.5	4.5		
dimension E	Under	22	24.5		
Maximum length (1)	420	480		
waxiinum lengin (,	(840)	(960)		

Note (1): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult **IKU**.

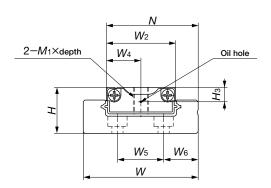
Geometrical moment of inertia

High rigidity design of C-Lube Linear Way MUL is achieved by adopting a U-shaped track rail. Table 7 shows the moment of inertia of sectional area of track rails.



IKO C-Lube Linear Way MUL

MUL



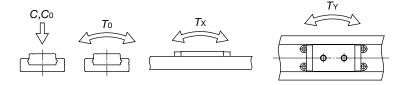
Model number	Mass (R	asse	sion of mbly m	Dimension of slide unit mm									
Woder Hamber	Slide unit	Track rail (per 100mm)	Н	N	W 2	W 4	<i>L</i> 1	L2	L ₃	<i>M</i> 1×depth	Нз	W	H4
MUL 25	13	87	9	19.4	14	7	31	12	22	M3×5	2.9	24.9	6.7
MUL 30	28	139	12	23.9	18	9	38	14	28.6	M4×7	3.75	29.9	8.7

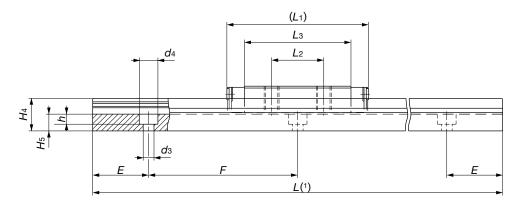
Note(1): Track rail lengths L are shown in Table 6 on page A-68.

(2): Track rail mounting bolts are not appended. For recommended bolts, see Table 4 on page A-57.

(3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

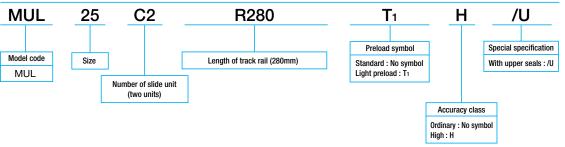
Remark: For the dimension of oil hole, please see page 99.





	Dimension of track rail mm					Appended mounting bolt for track rail(2) mm	0()	load rating(3)	,	noment ra	J.,		
H 5	W 5	W 6	d 3	d 4	h	E	F	Bolt size x length	C N	C₀ N	<i>T</i> ₀ N•m	<i>T</i> x N∙m	<i>T</i> Y N∙m
3.2	9	8	2.9	4.8	1.6	17.5	35	Cross-recessed head cap screw for precision equipment M2.5×6	1 770	2 840	20.3	10.1 53.7	8.4 45.0
4.5	12	9	2.9	5	2.7	20	40	Hexagon socket head bolt M2.5×6	2 280	3 810	34.9	16.9 87.5	14.2 73.4

Example of identification number (For details, see "Identification number and specification".)



A-69

C-Lube Linear Roller Way Super MX

MX/MXD/MXS/MXN/MXNS

IKO C-Lube Linear Roller Way Super MX is a high performance roller type linear motion rolling guide, featuring high reliability, high rigidity, high accuracy and smooth motion which are required from machine tools, semiconductor manufacturing and liquid crystal manufacturing equipments. Cylindrical rollers are incorporated as rolling elements in four rows, arranged in parallel to each other. Owing to its small elastic deformation, stable operation is ensured even under heavy or fluctuating loads. This series is also suitable for applications with vibration and shocks.

With IKO original C-Lube technology, its performance makes us different from others, providing superior cost performance for your machines. Maintenance free for 20,000km or 5 years minimizes the amount of lubricant required and contributes to the global environment protection.

Super high rigidity

Rigidity of linear motion rolling guide has a large influence to the performance of machines or equipment in which they are assembled.

Very high rigidity of C-Lube Linear Roller Way Super MX is achieved owing to the excellent elastic deformation characteristics of cylindrical rollers which give smaller elastic deformation under load as compared with steel balls. In addition, a large number of cylindrical rollers are incorporated in the slide unit.

Accurate positioning with excellent friction characteristics

As compared with the slide guides and ball type linear motion rolling guides, roller type has superior frictional characteristics and gives lower frictional resistance under preload. Good response to micro feeding and high positioning accuracy can thus be achieved.

Excellent vibration damping characteristics

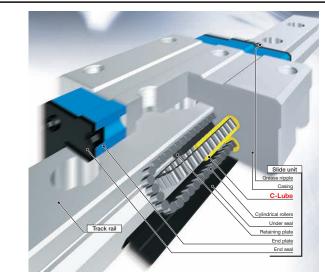
As compared with ball types in the same size, C-Lube Linear Roller Way Super MX has higher rigidity and gives much smaller deformation value under repeated fluctuating load. The natural frequency is high, and the vibration damping time can be very short.

Maintenance free for saving-resources

Maintenance free has the ability to maintain lubrication for a long time, reducing the amount of labor required for troublesome lubrication maintenance. The capillary lubrication body continuously supplies lubricant for long period of time even after original grease inside is completely exhausted.

Interchangeability among types of slide unit

Various types of slide units with different sectional shapes and lengths are prepared. All of these slide units can be mounted on the same track rails freely as



Structure of C-Lube Linear Roller Way Super MX

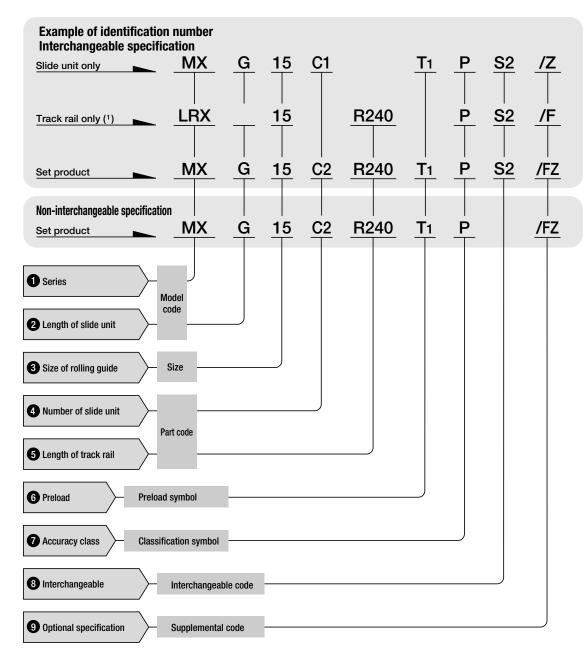
No. 5,193,914 No. 5,564,188 No. 5,374,126 No. 5,622,433 No. 6,176,617 No. 5,967,667 No. 5,464,288

U.S. PATENT No. 5.800.064

C-Lube Linear Roller Way Super MX series Length of slide unit Model code Shape MXC (1) Flange type mounted from top/bottom(1) MX(1)MXG(1) MXL Super MX **MXDC** Block type mounted from top **MXD** High rigidity long **MXDG** Roller Way Extra high rigidity long **MXDL MXSC** Linear Compact block type mounted from top **MXS** C-Lube High rigidity long **MXSG** Extra high rigidity long **MXSL** Low section flange type MXN mounted from top **MXNG** Low section block type **MXNS** mounted from top High rigidity long **MXNSG** Note(1): Size 20 (MX20, MXD20 and MXS20) can be mounted from top only. For mounting from bottom, MXH can be used, which have the same dimensions as those of above models

Identification number

The specification of C-Lube Linear Roller Way Super MX is identified by the identification number, which consists of a model code, a size, a part code, a preload symbol, a classification symbol, interchangeable code and optional supplemental codes.



Note(1): In case ordering track rail only, model code should be changed as shown below. MX / MXD / MXS → LRX (Ex: LRX15R240HS2)

1 Series

Flange type mounted from top/bottom : $\boldsymbol{M}\boldsymbol{X}$ Block type mounted from top : MXD Compact block type mounting from top: MXS Low section flange type mounted from top: MXN Low section block type mounted from top: MXNS

2 Length of slide unit

Short : S Standard : No symbol

: G High rigidity long Extra high rigidity long : L

3 Size of rolling guide

15, 20, 25, 30, 35, 45, 55, 65

4 Number of slide units

: **C**O (with track rail) : C1 Slide unit only

(Ex: MX15C2R220H)

slide units assembled on one track rail. For an interchangeable slide unit only, "C1" can be

(Ex: MX15C1HS2) indicated.

5 Length of track rail

:RO Set product (Ex:MX15C2R220H) (with slide unit) Track rail only

(Interchangeable series)

Set product

: **R**O (Ex:LRX15R220H2) (Interchangeable series)

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" in Table 12.1 on page A-86.

For an assembled set, indicates the number of

Table 1.1 Type and size of C-Lube Linear Roller Way Super MX (Flanged shape, mounting from top and bottom)

Model code	Carbon steel								
Size	Short MXC	Standard MX	High rigidity long MXG	Extra high rigidity long MXL					
15	☆	☆	☆	_					
20(1)	☆	☆	☆	0					
25	☆	☆	☆	0					
30	☆	☆	☆	0					
35	☆	☆	☆	0					
45	☆	☆	☆	0					
55	☆	☆	☆	_					
65	☆	☆	☆	_					

Note(1): MXC20, MX20 and MXG20 can be mounted from top side only. For mounting from bottom, MXH20 and MXHG20 can be used. Remark: 💢 marks are also applicable for interchangeable specification.

> 1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Table 1.2 Type and size of C-Lube Linear Roller Way Super MX (Blocked shape, mounting from top)

Model code		Carbon steel									
Size	Short MXDC	Standard MXD	High rigidity long MXDG	Extra high rigidity long MXDL							
15	☆	☆	☆	_							
20	☆	☆	☆	0							
25	☆	☆	☆	0							
30	☆	☆	☆	0							
35	☆	☆	☆	0							
45	\Rightarrow	☆	☆	0							
55	☆	☆	☆	_							
65	☆	☆	☆	_							

Table 1.3 Type and size of C-Lube Linear Roller Way Super MX (Compact blocked shape, mounting from top)

Model code	Carbon steel											
Size	Short MXSC	Standard MXS	High rigidity long MXSG	Extra high rigidity long MXSL								
15	$\stackrel{\wedge}{\simeq}$	☆	☆	_								
20	☆	☆	☆	0								
25	☆	☆	☆	0								
30	☆	☆	☆	0								

Remark: 🛱 marks are also applicable for interchangeable specification.

Table 1.4 Type and size of C-Lube Linear Roller Way Super MX (Low section flange type)

		· · · · · · · · · · · · · · · · · · ·
Model code	Carbo	n steel
Size	Standard MXN	High rigidity long MXNG
35	☆	☆
45	☆	☆
55	\Rightarrow	☆

Remark: ☆ marks are also applicable for interchangeable specification.

Table 1.5 Type and size of C-Lube Linear Roller Way Super MX (Low section block type)

Model code	Carbo	Carbon steel								
Size	Standard MXNS	High rigidity long MXNSG								
35	☆	☆								
45	☆	☆								
55	☆	☆								

Remark: ☆ marks are also applicable for interchangeable specification.

6 Preload amount

Standard : No symbol

Specify this item for an assembled set or a single Light preload : **T**1 slide unit.

For applicable preload amount, see Table 2. For Medium preload : T2 details of preload amount, see page 86.

Heavy preload : **Т**з

Table 2 Applicable preload class Preload class and code Model code Light preload | Medium preload | Heavy preload Standard (T₁) (T_2) (T₃) (No symbol) 15 $\overline{\circ}$ ☆ 20 $\stackrel{\wedge}{\sim}$ $\stackrel{\wedge}{\sim}$ $\stackrel{\leftrightarrow}{\sim}$ 0 $\overline{\circ}$ 25 $\stackrel{\wedge}{\sim}$ $\stackrel{\leftrightarrow}{\simeq}$ 0 30 \circ $\stackrel{\wedge}{\simeq}$ $\stackrel{\leftrightarrow}{\sim}$ \circ 0 0 ☆ ☆ 35 0 0 45 $\stackrel{\leftrightarrow}{\sim}$ $\stackrel{\wedge}{\sim}$ 55 0 0 $\stackrel{\wedge}{\sim}$ $\stackrel{\wedge}{\sim}$ 65 0 0 ☆ ☆

Remark: 🛱 marks are also applicable for interchangeable specification.

7 Accuracy class

: H High : P Precision : SP Super precision

Super precision class (SP) and Ultra precision class (UP) are applicable to Non-interchangeable products only. In the interchangeable specification, please combine the same accuracy codes on both slide unit and track rail.

Ultra precision

: UP

		Accuracy cl	ass and code	
Model code	High (H)	Precision (P)	Super precision (SP)	Ultra precision
15	☆	☆	0	0
20	☆	☆	0	0
25	☆	☆	0	0
30	☆	☆	0	0
35	☆	☆	0	0
45	☆	☆	0	0
55	☆	☆	0	0
65	☆	☆	0	0

8 Interchangeable specification

Interchangeable : S2 In C-Lube Linear Roller Way, slide unit and track rail can be supplied separately by indicating interchangeable code S2.

9 Special specification

For applicable special specifications, see Table 4. When several special specifications are combined, see Table 5. For details of special specifications, see page 86.

Table 4 Applicable optional specifications										
Specifications	Supplemental	Intercl	hangeable specif	ication	Dimension					
Specifications	code	Set product	Track rail only	Slide unit only	Dimension					
Butt jointing track rail	Α	0	_	_						
Opposite reference surfaces arrangement	D	\Rightarrow	_	_						
Specified rail mounting hole positions	Е	☆	☆	_						
Caps for rail mounting holes	F	☆	☆	_						
Changed pitch of slide unit middle mounting holes	GE	☆(2)	_	☆(2)	Refer to Table 6					
Half pitch of track rail mounting holes	HP	☆	☆	_						
Append an inspection sheet	I	0	_	_						
Female threads for bellows	J	\Rightarrow	☆	☆	Refer to Table 7.1 to 7.4					
Black chrome surface treatment	L	\rightleftarrows	☆	_						
Fluoric black chrome surface treatment	LF	☆	_	_						
With track rail mounting bolts	MA	☆	_	_						
Without track rail mounting bolts	MN	ı	☆	_						
No rubber end seals	N	☆(3)	_	☆(3)						
C-Wiper (1)	RC	O(4)(5)	_	_	Refer to Table 8					
Butt-jointing interchangeable track rail	Т	☆	☆	_						
Inner seal	UR	O(4)(5)	_	_						
Double end seals	V	☆	_	☆	Refer to Table 9.1 and 9.2					
Matched sets to be used as an assembled group	W	0	_	_						

Refer to Table 10.1 and 10.2

Note(1): Inner seal and scraper are also assembled thus, "/RC" and "/Zh" are not necessary.
(2): Applicable to MX, MXG, MXH20 and MXHG20.

- (3): Not applicable to size 55, 65, all sizes of low section flange type and low section block type.
- (4): Applicable to size 35, 45, 55 and 65.

Scrapers

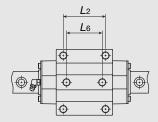
(5): Applicable to size 25 and 30 of Extra high rigidity long type and all types of size 35 to 65.

Remark: 💢 marks are also applicable for interchangeable combination.

Table 5 Combination of supplemental codes DO E - -F O ☆ ☆ GE O ☆ ☆ ☆ $HP - | \updownarrow | - | \updownarrow | \diamondsuit$ 1000000 J O & & & & - O LF O & & & & O & -MA O & & & & O & & & $MN - |-| \Leftrightarrow | \Leftrightarrow |-| \Leftrightarrow |-| \Leftrightarrow |-|-|$ $N \bigcirc \diamondsuit \bigcirc - \diamondsuit \bigcirc \bigcirc - \bigcirc \bigcirc \diamondsuit \bigcirc -$ V O ☆ ☆ ☆ ☆ O ★ ☆ ☆ ☆ - | - | ☆ w|0|0|-|0|0|0|0|0|0|-|0|-|0| A D E F GEHP I J L LF MA MN N T V W Remarks 1: O marks indicates that the combination can be made. 2: A marks are also applicable for interchangeable specification.

- 3: marks indicate that this combination cannot be made.
- 4 : If ★ marks are required, please consult **IK□**.
- 5: If a combination of special specifications is required, indicate the supplemental codes in alphabetical order.
- 6: In/RC, /UR and /Z are also assembled.

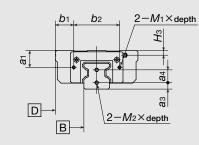
Table 6 Pitch of slide unit middle mounting holes (Supplemental code /GE)

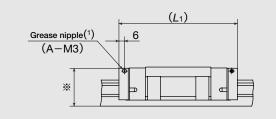


	unit : mm
L2	L 6
30	26
40	35
45	40
52	44
62	52
80	60
95	70
110	82
	30 40 45 52 62 80 95

Note(1): Also applicable to MXH(G)20

Table 7.1 Female threads for bellows (Supplemental code /J, /JJ) Flange type, size 15, 20, 25 and 30





unit: mm

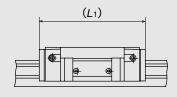
Maralal accords an			Slid	le unit			Track rail			
Model number	a 1	<i>b</i> 1	b2	<i>M</i> 1×depth	L1 (2)	Нз	a 3	a4	<i>M</i> 2×depth	
MXC 15					67					
MX 15	10.5	10.5	26		83	1	4	8	M3×6	
MXG 15					99					
MXC 20(3)					81					
MX 20(3)	12	13.5	36		101	2	5	10	Mayo	
MXG 20(3)	12	13.5	36		121					
MXL 20(3)				M3×6	143					
MXC 25					89	4		12		
MX 25	15.5	15	40		113					
MXG 25	15.5	15	40		128		6		M4×8	
MXL 25					152					
MXC 30					100					
MX 30	10.5	20	F0		128	4.0	_	14		
MXG 30	18.5	20	50		149	4.8	7	14		
MXL 30					177					

Note(1): The specification and mounting position if grease nipple are different from those of the standard product. A-M4 is the grease nipple for size 30. For specification of grease nipple, refer page 102.

(2): L_1 is the total length for the slide unit with female threads for bellows at both ends.

(3): Also applicable to MXHC20, MXH20, MXHG20 and MXHL20.

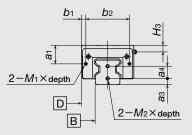
Remark: For the size 15 and 20, the dimension % is higher than the dimension H. For details, consult **IK** for future information.

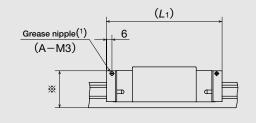


											uiiit . iiiiii
Mandal acceptance				Slic	de unit					Track ra	il
Model number	a 1	a 2	b 1	b ₂	b 3	b 4	<i>M</i> 1×depth	L1 (1)	a 3	a4	<i>M</i> 2×depth
MXC 35								99			M4× 8
MX 35	6	16	30	40	20	60	M3× 6	131	8	16	
MXG 35	0	16	30	40	20	60	IVI3 A 0	159			
MXL 35								191			
MXC 45								123		10	
MX 45	7	04	0.5		00	7.		163			
MXG 45] ′	21	35	50	23	74		203		19
MXL 45							M4× 8	243	10		M5×10
MXC 55								145			
MX 55	7	27	40	60	26	88		193		24	
MXG 55								247			
MXC 65								191			
MX 65	8.7	37	47.5	75	31	108	M5×10	255	14	28	M6×12
MXG 65								319			

 $Note(1): L_1$ is the total length for the slide unit with female threads for bellows at both ends.

Table 7.3 Female threads for bellows (Supplemental code /J, /JJ) Block type, size 15, 20, 25 and 30





									unit : m						
Model number		ı		e unit		1		Track rail	1						
	a 1	<i>b</i> 1	b ₂	<i>M</i> 1×depth	L1 (2)	Нз	a 3	a 4	M2×depth						
MXDC 15					67										
MXD 15	14.5				83	5									
MXDG 15		4	26		99		4	8	M3×6						
MXSC 15		_	20		67				IVIO						
MXS 15	10.5				83	1									
MXSG 15					99										
MXDC 20					81										
MXD 20	16				101	6									
MXDG 20	'0				121			10							
MXDL 20		4	36		143		5								
MXSC 20		-	30		81				10						
MXS 20	12										101	2			
MXSG 20	12				121				M4×8						
MXSL 20					143										
MXDC 25				M3×6	89		6								
MXD 25	19.5			IVISAU	113	8									
MXDG 25	19.5				128	•									
MXDL 25		4	40		152			12							
MXSC 25		4	40		89		٥	12							
MXS 25	45.5				113	_									
MXSG 25	15.5				128	4									
MXSL 25					152										
MXDC 30					100										
MXD 30	24.5				128	7.0									
MXDG 30	21.5				149	7.8									
MXDL 30		_		50	177	1	_								
MXSC 30		5	50		100		7	14							
MXS 30	40.5				128	1									
MXSG 30	18.5				149	4.8									
MXSL 30					177	1									

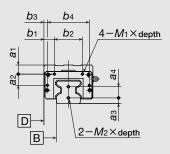
Note(1): The specification and mounting position if grease nipple are different from those of the standard product. A-M4 is the grease nipple for size 30. For specification of grease nipple, refer page 102.

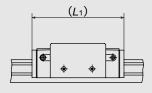
(2): L_1 is the total length for the slide unit with female threads for bellows at both ends.

Remarks 1: The table shows representative model numbers only and is also applicable to same model of stainless series.

2: For the size 15 and 20, the dimension % is higher than the dimension H. For details, consult **IKO** for future information.

Table 7.4 Female threads for bellows (Supplemental code /J, /JJ) Block type, size 35, 45, 55 and 65



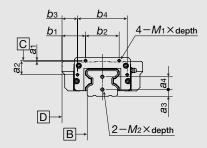


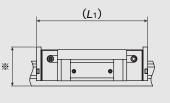
unit : mm

											unit . min
Mandalassaslassa		Slide unit								Track rail	
Model number	a1	a 2	<i>b</i> 1	b 2	b 3	b4	M₁×depth	L1 (1)	a 3	a 4	<i>M</i> 2×depth
MXDC 35								99			
MXD 35	10	40	45	40	_	00	MOV 0	131		4.0	MAN
MXDG 35	13	16	15	40	5	60	M3× 6	159	8	16	M4× 8
MXDL 35]							191			
MXDC 45								123			
MXD 45	1	0.1	10			7.		163		40	
MXDG 45	17	21	18	50	6	74		203		19	
MXDL 45]						M4× 8	243	10		M5×10
MXDC 55								145			
MXD 55	17	27	20	60	6	88		193		24	
MXDG 55	1							247			
MXDC 65								191			
MXD 65	8.7	37	25.5	75	9	108	M5×10	255	14	28	M6×12
MXDG 65	1							319	1		

Note(1): L_1 is the total length for the slide unit with female threads for bellows at both ends.

Table 7.5 Female threads for bellows (Supplemental code /J, /JJ) Low section flange type, size 35, 45 and 55





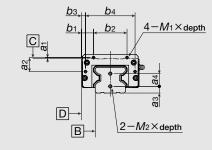
unit: mm

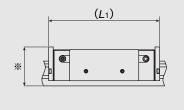
		Slide unit								Track rail		
Model number	a 1 (1)	a 2	b 1	b ₂	b 3	b4	M ₁ ×depth	L1 (2)	a 3	a4	<i>M</i> 2×depth	
MXN 35	2	16	30	40	20	60	M3× 6	131	8	16	M4× 8	
MXNG 35		10	30	40	20	00	IVIS A U	159	0	10	1014 ^ 0	
MXN 45	1	21	35	50	23	74		163		19		
MXNG 45	ļ.	21	30	50	23	/4	M4× 8	203	10	19	M5×10	
MXN 55	0	27	40	60	26	88	10147 0	193	10	24	IVISATO	
MXNG 55	U	21	40	00	20	00		247		24		

Note(1): Dimension at shows gap between mounting surface C and female thread.
(2): Table shows the total length for the slide unit with female threads for bellows at the both ends.

Remark: Dimension ** is higher than the dimension *H. For detail, consult IKO for future information.

Table 7.6 Female threads for bellows (Supplemental code /J, /JJ) Low section block type, size 35, 45 and 55





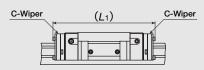
unit : mm

	Slide unit								Track rail		
Model number	a1 (1)	a 2	b 1	b ₂	b 3	b 4	<i>M</i> 1×depth	L1(2)	a 3	a4	<i>M</i> 2×depth
MXNS 35	2	16	15	40	5	60	M3× 6	131	8	16	M4× 8
MXNSG 35		10	15	40	5	00	IVI3 A U	159	0	10	IVI4A 0
MXNS 45	1	21	18	50	6	74		163		19	
MXNSG 45	ļ	21	10	50	O	74	M4× 8	203	10	19	M5×10
MXNS 55	0	27	20	60	6	88	1014 ^ 0	193] 10	24	IVIS A TU
MXNSG 55		2/	20	50	O	- 00		247			

Note(1): Dimension at shows gap between mounting surface C and female thread.
(2): Table shows the total length for the slide unit with female threads for bellows at the both ends.

Remark: Dimension ** is higher than the dimension *H. For detail, consult **IKO** for future information.

Table 8 Slide unit with C-Wiper (Supplemental code /RC)



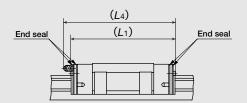
unit: mm

Model number	L1 (1)
MXC 35	123
MX 35	155
MXG 35	183
MXC 45	149
MX 45	189
MXG 45	229
MXC 55	172
MX 55	220
MXG 55	274
MXC 65	223
MX 65	287
MXG 65	351

Note(1): L1 is the total length for the slide unit with C-Wiper at both ends.

Remark: The table shows representative model numbers only and is also applicable to same size of MX.

Table 9.1 Slide unit with double end seals (Supplemental code $\,$ /V, $\,$ /VV) Size 15, 20, 25 and 30 $\,$



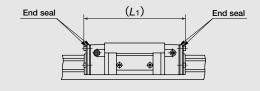
unit : mm

Model number	<i>L</i> 1	L 4	Model number	<i>L</i> 1	L4
MXC 15	58	60	MXC 25	83	92
MX 15	74	76	MX 25	107	116
MXG 15	90	92	MXG 25	122	131
MXC 20	73	83	MXL 25	146	155
MX 20	93	103	MXC 30	93	106
MXG 20	113	123	MX 30	121	134
MXL 20	135	145	MXG 30	142	155
			MXL 30	170	183

Remarks 1: The table shows representative model numbers only and is also applicable to same size of MX.

2: Table shows the total length for the slide unit with double seals at both ends.

Table 9.2 Slide unit with double end seals (Supplemental code $\,$ /V, $\,$ /VV) Size 35, 45, 55 and 65



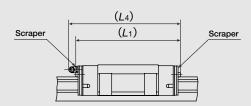
unit : mm

Model number	<i>L</i> 1	Model number	<i>L</i> 1
MXC 35	101	MXC 55	149
MX 35	133	MX 55	197
MXG 35	161	MXG 55	251
MXL 35	193	MXC 65	192
MXC 45	127	MX 65	256
MX 45	167	MXG 65	320
MXG 45	207		
MXL 45	247		

Remarks 1: The table shows representative model numbers only and is also applicable to same size of MX.

2: Table shows the total length for the slide unit with double seals at both ends.

Table 10.1 Slide unit with scrapers (Supplemental code /Z, /ZZ) Size 15, 20, 25 and 30



unit	:	mm

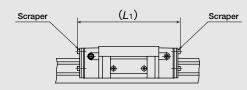
Model number	<i>L</i> 1	L4
MXC 15	60	61
MX 15	76	77
MXG 15	92	93
MXC 20	74	83
MX 20	94	103
MXG 20	114	123
MXL 20	137	146
	•	

<i>L</i> 1	L4
85	93
109	117
124	132
148	156
96	107
124	135
145	156
173	184
	85 109 124 148 96 124 145

Remarks 1: The table shows representative model numbers only and is also applicable to same size of MX.

2: Table shows the total length for the slide unit with scrapers at both ends.

Table 10.2 Slide unit with scrapers (Supplemental code /Z, /ZZ) Size 35, 45, 55 and 65



unit: mm

Model number	<i>L</i> 1
MXC 35	103
MX 35	135
MXG 35	163
MXL 35	195
MXC 45	129
MX 45	169
MXG 45	209
MXL 45	249

<i>L</i> 1
151
199
253
194
258
322

Remarks 1: The table shows representative model numbers only and is also applicable to same size of MX.

2: Table shows the total length for the slide unit with scrapers at both ends.

Mounting slide unit

In the slide unit, mounting holes are also prepared on the middle of slide unit (see Fig.1) to support any direction of load and moment in good balance.

It is recommended to fix all mounting holes to have full performance of products.

For mounting slide unit of Compact block type, insertion depth shown in Table 11 is recommended to keep certain fixing strength.

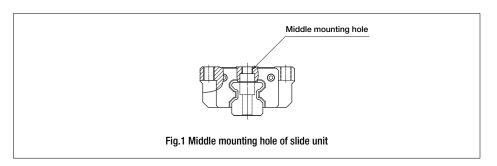


Table 11.1 Insertion screw depth of slide unit mounting holes for compact block type

	unit : mm
Model number	Recommended minimum depths
MXS 15	4.5
MXS 20	5.5
MXS 25	7
MXS 30	9

Model number

MXNS 35 MXNS 45

MXNS 55

Remarks: The table shows representative model numbers only and is also applicable to same size of MX.

Table 11.2 Insertion screw depth of slide unit mounting holes for low section block type

Recommended

unit : mm	
ed minimum depths	
8.5	
10.5	

14 Remarks: The table shows representative model numbers only and is also applicable to same size of MX.

> 1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

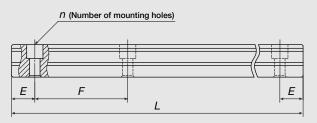
Standard and maximum lengths of track rails are shown in Table 12.1 and 12.2.

Track rail in any length are also available. Simply indicate the necessary length of track rail in millimeter (mm) in the identification number.

In non-interchangeable specification, for track rail longer than the maximum length shown in Table 12.1 and 12.2, butt-jointing track rails are available upon request. In this case, indicate supplemental code "/A" in the identification number.

E dimensions at both ends are the same unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions (supplemental code "/E") of special specification.

Table 12.1 Standard and maximum lengths of track rails



unit: mm

Model number Item	MX 15	MX 20	MX 25	MX 30	MX 35
	180(3)	240(4)	240(4)	480(6)	480(6)
	240(4)	480(8)	480(8)	640(8)	640(8)
	360(6)	660(11)	660(11)	800(10)	800(10)
Standard length $L(n)$	480(8)	840(14)	840(14)	1 040(13)	1 040(13)
	660(11)	1 020(17)	1 020(17)	1 200(15)	1 200(15)
		1 200(20)	1 200(20)	1 520(19)	1 520(19)
		1 500(25)	1 500(25)		
Mounting hole pitch F	60	60	60	80	80
E	30	30	30	40	40
Reference Over (Incl.)	7	8	9	10	10
dimension E (1) Under	37	38	39	50	50
Maximum length (2)	1 500 (1 980)	1 980 (3 000)	3 000 (3 960)	2 960 (4 000)	2 960 (4 000)
Model number	MX 45	MX 55	MX 65	,	, , , , , ,
	840(8)	840(7)	1 500(10)		
	1 050(10)	1 200(10)	1 950(13)		
Standard length $L(n)$	1 260(12)	1 560(13)	3 000(20)		
	1 470(14)	1 920(16)			
	1 995(19)	3 000(25)			
Mounting hole pitch F	105	120	150		
E	52.5	60	75		
Reference Over (Incl.)	12.5	15	17		
dimension E (1) Under	65	75	92		
Maximum length (2)	2 940 (3 990)	3 000 (3 960)	3 000 (3 900)		

Note(1): Not applicable to the track rail with female threads for bellows (Supplemental code /J).

Table 12.2 Standard and maximum lengths of track rails (Half pitch specification /HP)

unit : mm

Model number	MX 15···/HP	MX 20···/HP	MX 25···/HP	MX 30···/HP	MX 35···/HP
Tion .	180(6)	240(8)	480(16)	480(12)	480(12)
	240(8)	480(16)	660(22)	640(16)	640(16)
	360(12)	660(22)	840(28)	800(20)	800(20)
Standard length $L(n)$	480(16)	840(28)	1 020(34)	1 040(26)	1 040(26)
	660(22)	1 020(34)	1 200(40)	1 200(30)	1 200(30)
		1 200(40)	1 500(50)	1 520(38)	1 520(38)
		1 500(50)			
Mounting hole pitch F	30	30	30	40	40
Е	15	15	15	20	20
Reference Over (Incl.)	7	8	9	10	10
dimension E (1) Under	22	23	24	30	30
Maximum length (2)	1 500	1 980	3 000	2 960	2 960
Model number	(1 980)	(3 000)	(3 960)	(4 000)	(4 000)
Item	MX 45···/HP	MX 55···/HP	MX 65···/HP		
	840(16)	840(14)	1 500(20)		
	1 050(20)	1 200(20)	1 950(26)		
Standard length $L(n)$	1 260(24)	1 560(26)	3 000(40)		
	1 470(28)	1 920(32)			
	1 995(38)	3 000(50)			
Mounting hole pitch F	52.5	60	75		
Е	26.25	30	37.5		
Reference Over (Incl.)	12.5	15	17		
dimension E (1) Under	38.75	45	54.5		
Maximum length (2)	2 940 (3 990)	3 000 (3 960)	3 000 (3 975)		

Remark: The above table shows representative model number but is applicable to all models of the same size.

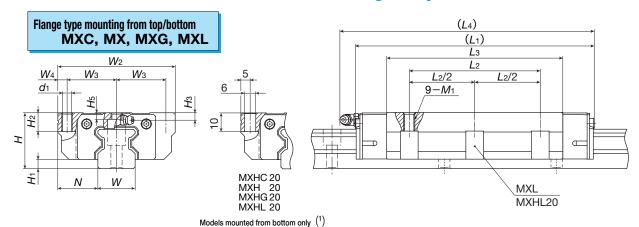
^{(2):} The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult IKD for further

Remarks 1: The table shows representative model numbers and is also applicable to all models in the same size.

^{2:} In half pitch specification ("/HP"), refer Table 12.2.

Note (¹): Not applied to optional specification "female threads for bellows" (supplemental code "/J", "/JJ")
(²): The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult **IKD**.

IK C-Lube Linear Roller Way Super MX



	Models mounted from bottom only (*) ———————————————————————————————————															
Model number	Interchangeable		, ,		nensio ssemb mm						Di	mensic	ns of s mm	lide un	it	
Woder Humber	Intercha	Slide unit kg	Track rail(2) kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L 2	Lз	L 4	d1	M 1	H 2
MXC 15	☆	0.13								52	ı	24	55			
MX 15	☆	0.20	1.65	24	4	16	47	19	4.5	68	30	40	71	4.4	M 5	7
MXG 15	☆	0.28								84	30	56	87			
MXC 20 (1)	☆	0.29								66	-	31.6	74			
MX 20 (1)	☆	0.44	2.73	30	5	21.5	63	26.5	5	86	40	51.6	94	(¹)	(¹) M 6	10
MXG 20 (1)	☆	0.61	2./3	30	5	21.5	03	20.5	5	106	40	71.6	114		IVI 6	10
MXL 20 (1)		0.80								128	70	94.1	136			
MXC 25	☆	0.44								74	-	36	83			
MX 25	☆	0.67	3.59	36	6	23.5	70	28.5	6.5	98	45	60	107	7	M 8	10
MXG 25	☆	0.84	3.59	36	0	23.5	/0	28.5	0.5	113	45	75	122	,	IVI 8	10
MXL 25		1.08								137	70	99	146			
MXC 30	☆	0.78								85	-	42.4	95			
MX 30	☆	1.20	5.01	42	6.5	31	90	36	9	113	52	70.4	123	8.5	M10	10
MXG 30	☆	1.58	5.01	42	0.5	31	90	30	9	134	52	91.4	144	0.5	IVITU	10

2.03 Note(1): MXC20, MX20, MXG20 and MXL20 can be mounted from top only.

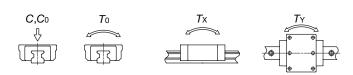
- For mounting from bottom, MXHC20, MXH20, MXHG20 and MXHL20 which has same dimensions as above model, can be used.
- (2): Track rail length L are shown in Table 12.1.
- (3): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (4): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

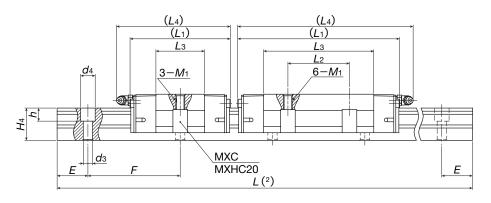
162

80

119.4 172

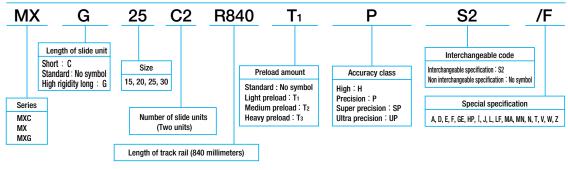
- Remark 1: The mark $\frac{1}{1}$ indicates that interchangeable specification products are available.
 - 2: For grease nipple specification, see Table 10.1 and 10.2 on page 102 and 103.
 - 3: A grease nipple mounting thread is provided on the left and right end plates respectively.





			Di	imensi	on of t mm	rack ra	ail		Recommended Mounting bolt for track rail(3)	Basic dynamic load rating(4)	Basic static load rating(4)	Statio	moment ra	ting(4)
			I	l	I		l	I	mm	С	C ₀	7 0	Tx.	<i>T</i> Y
Нз	H 5	W	H4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
										7 730	12 000	113	50.6 457	50.6 457
3.5	3	15	16.5	4.5	8	6	30	60	M4×16	11 500	20 000	188	136 942	136 942
										14 900	28 000	263	262 1 590	262 1 590
										16 100	26 400	341	150 1 260	150 1 260
								60 M5×20		23 400	42 700	550	379	379
4	3.5	20	21	6	9.5	8.5	30	60	M5×20	30 100	58 900	760	2 520 713	2 520 713
										37 200	77 200	996	4 200 1 210	4 200 1 210
										21 600	33 800	500	6 560 213	6 560 213
													1 810 573	1 810 573
5	5	23	24.5	7	11	9	30	60	M6×25	32 100	56 300	833	3 800 885	3 800 885
										38 200	70 300	1 040	5 380 1 530	5 380 1 530
										47 400	92 800	1 370	8 480	8 480
										29 200	44 600	808	329 2 740	329 2 740
		-00				40	40		80 M8×28	43 400	74 400	1 350	883 5 780	883 5 780
6.5	5.5	28	28	9	14	12	40	80		53 200	96 700	1 750	1 470 8 740	1 470 8 740
										65 600	126 000	2 290	2 500 13 600	2 500 13 600

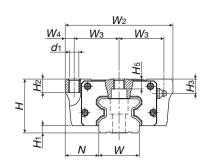
Example of identification number of assembled set (For details, see "Identification number and specification".)

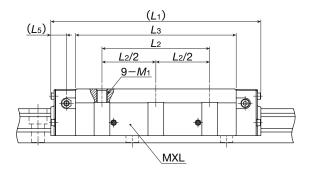


MXL 30

IXO C-Lube Linear Roller Way Super MX

Flange type mounting from top/bottom MXC, MX, MXG, MXL





Model number	Interchangeable	Mass	(Ref.)		nension ssemb mm						Di	mensio	ons of s mm	slide un	it	
woder number	Intercha	Slide unit kg	Track rail(2) kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L 5	d ₁	M 1	H 2
MXC 35	☆	1.13								92	_	46.6				
MX 35	☆	1.76	0.00	48	٥.	22	100	41		124	62	78.6	107	0.5	N410	10
MXG 35	☆	2.41	6.88	48	6.5	33	100	41	9	152	62	106.6	12.7	8.5	M10	13
MXL 35		3.00								184	100	138.6				
MXC 45	☆	2.11								114	_	59				
MX 45	☆	3.26	10.8	60	8	37.5	120	50	10	154	80	99	17.5	10.5	M12	15
MXG 45	☆	4.60	10.6	60	0	37.5	120	50	10	194	80	139	17.5	10.5	IVITZ	15
MXL 45		5.66								234	120	179				
MXC 55	☆	3.49								136	_	72				
MX 55	☆	5.42	14.1	70	9	43.5	140	58	12	184	95	120	20	12.5	M14	17
MXG 55	☆	7.93								238	33	174				
MXC 65	☆	7.18								180		95				
MX 65	☆	11.5	22.6	90	12	53.5	170	71	14	244	110	159	26.3	14.5	M16	23
MXG 65	☆	16.0								308	110	223				

Note(1): Track rail length L are shown in Table 12.1.

- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

Remark 1 : The mark 💢 indicates that interchangeable specification products are available.

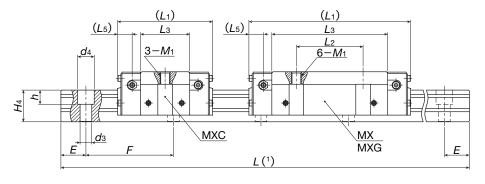
- 2: For grease nipple specification, see Table 10.1 and 10.2 on page 102 and 103.
- 3: A grease nipple mounting thread is provided on the left and right end plates respectively.



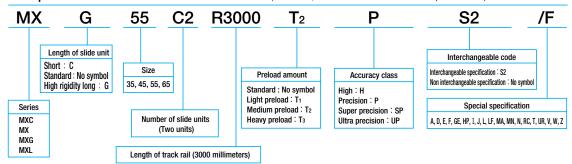






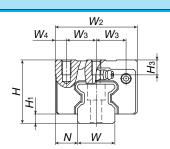


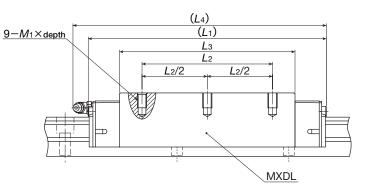
			Di	imensi	on of t mm	rack r	ail		Recommended Mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Static moment rating(3)		
Нз	 H 5	w	ļ ,,,	40	٠.		E	F	mm	С	C ₀	T 0	T _X	TY
H 3	H 5	VV	H 4	d 3	d4	h	E	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
										39 500	60 000	1 300	506 3 950	506 3 950
				_						58 700	100 000	2 170	1 360 8 470	1 360 8 470
13	7	34	32	9	14	12	40	80	M 8×35	74 200	135 000	2 930	2 440 13 800	2 440 13 800
										90 800	175 000	3 800	4 060 21 300	4 060
										64 100	95 600	2 660	1 010	1 010
										95 400	159 000	4 430	7 800 2 700	7 800 2 700
16	11	45	38	14	20	17	52.5	105	M12×40				16 800 5 220	16 800 5 220
										124 000	223 000	6 200	29 000	29 000
										151 000	287 000	7 980	8 560 44 400	8 560 44 400
										99 700	149 000	4 830	1 880 14 400	1 880 14 400
16	14	53	43	16	23	20	60	120	M14×45	148 000 248 000 8 0		8 040	5 040 31 100	5 040 31 100
										198 000	359 000	11 700	10 400	10 400
								150		100 000	000 000	11700	57 000	57 000
										174 000	0 249 000 9 790	9 790	4 200 32 200	4 200 32 200
18	18.5	63	56	18	26	22	75		M16×60	260 000	415 000	16 300	11 300	11 300
		"		.					00 101 10 × 60				69 300 21 800	69 300 21 800
										337 000	581 000	22 800	120 000	120 000



IKO C-Lube Linear Roller Way Super MX

Block type mounting from top MXD, MXDG





MXD MXDG

	IVIZ	KDG													
Model number	Interchangeable	Mass	(Ref.)		nensioi ssemb mm					Dime	nsions m	of slide m	unit		
Woder Humber	Intercha	Slide unit kg	Track rail(1) kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L ₃	L 4	<i>M</i> ₁×depth	Нз
MXDC 15	☆	0.13								52	–	24	55		
MXD 15	☆	0.19	1.65	28	4	9.5	34	13	4	68	26	40	71	M4× 8	7.5
MXDG 15	☆	0.26								84	20	56	87		
MXDC 20	☆	0.25								66	_	31.6	74		
MXD 20	☆	0.38	0.70		_	10		10		86	36	51.6	94	MEN	
MXDG 20	☆	0.52	2.73	34	5	12	44	16	6	106	50	71.6	114	M5× 8	8
MXDL 20		0.67								128	70	94.1	136		
MXDC 25	☆	0.36								74	_	36	83		
MXD 25	☆	0.55	0.50	40		10.5	40	47.5	0.5	98	35	60	107	MOVAO	
MXDG 25	☆	0.68	3.59	40	6	12.5	48	17.5	6.5	113	50	75	122	M6×12	9
MXDL 25		0.88								137	70	99	146		
MXDC 30	☆	0.60								85	_	42.4	95		
MXD 30	☆	0.92	F 04	45	0.5	10	00	00	10	113	40	70.4	123	M0×40	0.5
MXDG 30	☆	1.18	5.01	45	6.5	16	60	20	10	134	60	91.4	144	M8×12	9.5
MXDL 30		1.52								162	80	119.4	172		

Note(1): Track rail length L are shown in Table 12.1.

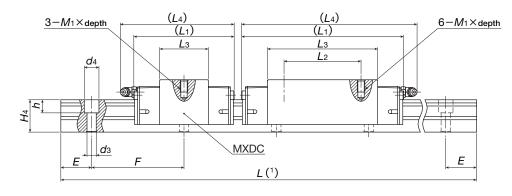
- (2): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.
- Remark 1 : The mark 💢 indicates that interchangeable specification products are available.
 - 2: For grease nipple specification, see Table 10.1 and 10.2 on page 102 and 103.
 - 3 : A grease nipple mounting thread is provided on the left and right end plates respectively.



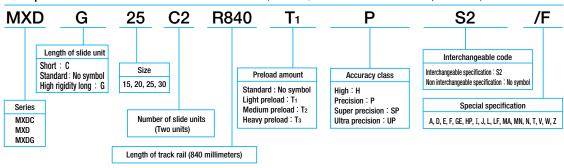




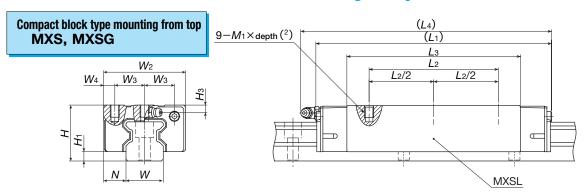




	D	imensi	on of t	rack rai	il		Recommended Mounting bolt for track rail(2)	Basic dynamic load rating(3)	Basic static load rating(3)	Stat	ic moment ratio	ng(³)
	I		I			1	mm	С	C ₀	T 0	Tx	<i>T</i> Y
W	H 4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N•m	N∙m	N•m
								7 730	12 000	113	50.6 457	50.6 457
15	16.5	4.5	8	6	30	60	M4×16	11 500	20 000	188	136 942	136 942
								14 900	28 000	263	262 1 590	262 1 590
								16 100	26 400	341	150 1 260	150 1 260
20	21		٥٠	٥٠	20	-00	MEXAG	23 400	42 700	550	379 2 520	379 2 520
20	21	6	9.5	8.5	30	60	M5×20	30 100	58 900	760	713 4 200	713 4 200
								37 200	77 200	996	1 210 6 560	1 210 6 560
								21 600	33 800	500	213 1 810	213 1 810
00	04.5	_			00	00	M6×25	32 100	56 300	833	573 3 800	573 3 800
23	24.5	7	11	9	30	60	IVID × 25	38 200	70 300	1 040	885 5 380	885 5 380
								47 400	92 800	1 370	1 530 8 480	1 530 8 480
								29 200	44 600	808	329 2 740	329 2 740
00	00			40	40	00	Movae	43 400	74 400	1 350	883 5 780	883 5 780
28	28	9	14	12	40	80	M8×28	53 200	96 700	1 750	1 470 8 740	1 470 8 740
								65 600	126 000	2 290	2 500 13 600	2 500 13 600



IKO C-Lube Linear Roller Way Super MX



MXS MXSG

Model number	Interchangeable	Mass	(Ref.)		nensioi ssemb mm					Dime	nsions m	of slide m	e unit		
Woder Humber	Interch	Slide unit kg	Track rail(1) kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L 4	M₁×depth(²)	Нз
MXSC 15	☆	0.099								52	_	24	55		
MXS 15	☆	0.15	1.65	24	4	9.5	34	13	4	68	26	40	71	M4× 5.5	3.5
MXSG 15	☆	0.21								84	20	56	87		
MXSC 20	☆	0.21								66	_	31.6	74		
MXS 20	☆	0.31	2.73	30	5	40	44	16	6	86	36	51.6	94	M5× 6.5	4
MXSG 20	☆	0.42	2./3	30	5	12	44	10	0	106	50	71.6	114	1015 \ 0.5	4
MXSL 20		0.55								128	70	94.1	136		
MXSC 25	☆	0.30								74	_	36	83		
MXS 25	☆	0.47	2.50	36	_	10.5	48	17.5	6.5	98	35	60	107	M6× 9	5
MXSG 25	☆	0.57	3.59	36	6	12.5	48	17.5	0.5	113	50	75	122	IVIOX 9	5
MXSL 25		0.74								137	70	99	146		
MXSC 30	☆	0.54								85	-	42.4	95		
MXS 30	☆	0.83	E 01	42	6.5	16	60	20	10	113	40	70.4	123	MO > 11	6.5
MXSG 30	☆	1.05	5.01 42	6.5	16	60	20	0 10	10 134	60	91.4	144	M8×11	6.5	
MXSL 30		1.37								162	80	119.4	172		

Note(1): Track rail length L are shown in Table 12.1.

- (2): Insertion screw depth for MXS15, MXS20 and MXS25 are shown in Table 11.
- (3): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
- (4): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.

Remark 1: The mark 💢 indicates that interchangeable specification products are available

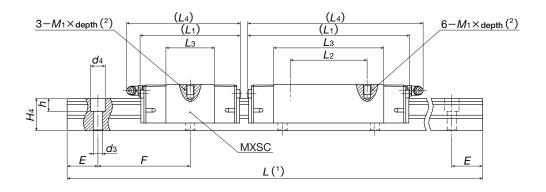
- 2: For grease nipple specification, see Table 10.1 and 10.2 on page 102 and 103.
- 3: A grease nipple mounting thread is provided on the left and right end plates respectively.



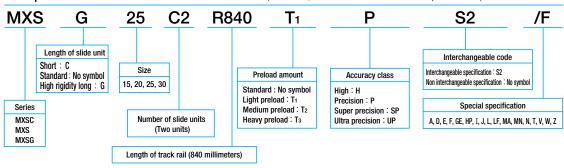




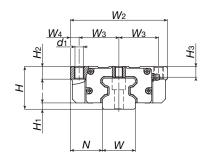


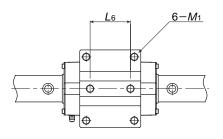


	D	imensi	on of to	rack rai	il		Recommended Mounting bolt for track rail(3)	Basic dynamic load rating(4)	Basic static load rating(4)	Stat	ic moment ratii	ng(⁴)
							mm	С	C ₀	T 0	Tx	<i>T</i> Y
W	H4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
								7 730	12 000	113	50.6 457	50.6 457
15	16.5	4.5	8	6	30	60	M4×16	11 500	20 000	188	136 942	136 942
								14 900	28 000	263	262 1 590	262 1 590
								16 100	26 400	341	150 150 1 260	150 1 260
								23 400 42 700		550	379 2 520	379 2 520
20	21	6	9.5	8.5	30	60	M5×20	30 100	58 900	760	713 4 200	713 4 200
								37 200	77 200	996	1 210 6 560	1 210 6 560
								21 600	33 800	500	213 1 810	213 1 810
								32 100	56 300	833	573 3 800	573 3 800
23	24.5	7	11	9	30	60	M6×25	38 200	70 300	1 040	885 5 380	885 5 380
								47 400	92 800	1 370	1 530 8 480	1 530 8 480
								29 200	44 600	808	329 2 740	329 2 740
		_						43 400 74 400		1 350	883 5 780	883 5 780
28	28	9	14	12	40	80	M8×28	53 200	96 700	1 750	1 470 8 740	1 470 8 740
								65 600	126 000	2 290	2 500 13 600	2 500 13 600



Flange type mounting from top MXN, MXNG





Model number	Interchangeable	Mass	(Ref.)	l	nensioi ssemb mm	-					Di	mensio	ns of s mm	lide un	it	
Model number	Intercha	Slide unit kg	Track rail(1) kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	L1	L 2	L 3	L 5	L 6	d 1(2)	M 1
MXN 35	☆	1.55	6.88	44	6.5	33	100	41	9	124	62	78.6	12.7	52	8.5	M10
MXNG 35	☆	2.13	0.00	44	0.5	33	100	41	9	152	02	106.6	12.7	52	0.5	IVIIO
MXN 45	☆	2.58	10.8	52	8	37.5	120	50	10	154	80	99	17.5	60	10.5	M12
MXNG 45	☆	3.73	10.6	52	0	37.5	120	50	10	194	80	139	17.5	60	10.5	IVIIZ
MXN 55	☆	4.61	14.1	63	9	43.5	140	58	12	184	95	120	20	70	12.5	M14
MXNG 55	☆	6.94	14.1	03	9	43.5	140	58	12	238	95	174	20	70	12.5	IVI 14

- Note(1): Track rail length L are shown in Table 12.1 and 12.2 on page A-86 and A-87.
 - (2): Not applicable to middle mounting holes of slide unit. Their mounting direction is only downward. (3): It is recommended to secure actual screwing depth should not exceed the maximum screwing depth in the table.
 - (4): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
 - (5): The directions of basic dynamic load rating (C), basic static load rating (C) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.
- Remark 1: The mark ½ indicates that interchangeable specification products are available.

 2: For grease nipple specification, see Table 10.1 and 10.2 on page 102 and 103.

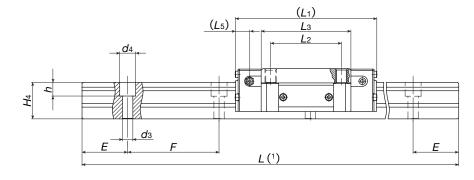
 - 2 : In size 35 female threads for grease nipple are prepared on both side faces and front face of end plate. Thread size of front face is smaller than other threads thus, please consult IXO if grease nipple for front face is required.



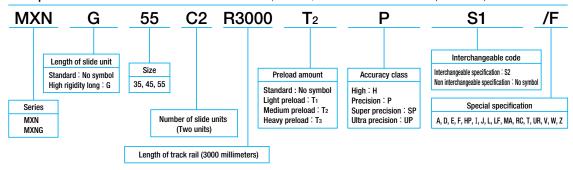




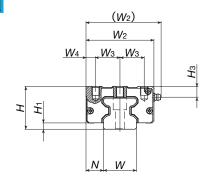




				Di	mensi	on of t	track r	ail			Basic dynamic load rating(5)	Basic static load rating(5)	Static	moment ra	ating(5)
Maximum screwing	H2	Н з	W	H 4	d 3	d4	h	E	F	mm	С	C ₀	T 0	Tx	TY
depth(3)										Bolt size × length	N	N	N∙m	N∙m	N∙m
											58 700	100 000	2 170	1 360	1 360
11	13	11	34	32	9	14	12	40	80	M 8×35	56 700	100 000	2 170	8 470	8 470
11	13	''	34	32	١	14	12	40	00	IVI 0/33	74 200	135 000	2 930	2 440	2 440
											74 200	135 000	2 330	13 800	13 800
											95 400	159 000	4 430	2 700	2 700
13	15	13.5	45	38	14	20	17	52.5	105	M12×40	95 400	159 000	4 430	16 800	16 800
13	10	13.5	40	30	'4	20	' /	32.5	105	IVI 12 × 40	124 000	223 000	6 200	5 220	5 220
											124 000	223 000	0 200	29 000	29 000
											148 000	248 000	8 040	5 040	5 040
19	17	16	53	43	16	23	20	60	120	M14×45	146 000	246 000	6 040	31 100	31 100
19	17	10	53	43	10	23	20	00	120	IVI 14 ^ 45	198 000	359 000	11 700	10 400	10 400
											190 000	359 000	11 /00	57 000	57 000



Flange type mounting from top **MXNS, MXNSG**



Model number	Interchangeable	Mass	(Ref.)	l	nensio ssemb mm						Di	mensio	ons of s mm	slide ur	it						
Model number	Intercha	Slide unit kg	Track rail(1) kg/m	н	<i>H</i> 1	N	<i>W</i> 1	W 2	W 3	W 4	<i>L</i> 1	L 2	L3	L 5	M₁×depth(²)						
MXNS 35	☆	1.08	6 00	44	6.5	18	80	70	25	10	124	50	78.6	12.7	M 8× 9						
MXNSG 35	☆	1.42	6.88	44	44 6.5	0.5	00	70	25	10	152	72	106.6		IVI OA 9						
MXNS 45	☆	1.84	10.0			0 00 5	06	96	0 00	10	154	60	99	17.5	N410×11						
MXNSG 45	☆	2.58	10.8	52	52 8	8 20.5	96	86	30	13	194	80	139	17.5	M10×11						
MXNS 55	☆	3.31	14.1		22.5	110	100	27.5	7.5.40.5	184	75	120	20	M12×15							
MXNSG 55	☆	4.83	14.1	14.1	14.1	14.1	14.1	14.1	14.1 63	63 9	9 23.5		112	100	37.5	12.5	238	95	174	20	IVIIZXIS

- Note(1): Track rail length L are shown in Table 12.1 and 12.2 on page A-86 and A-87.
 - (2): It is recommended to secure actual screw depth should not be exceed the maximum screwing depth in table 18.2 on page 32. Especially the screwing depth of middle mounting threads in width direction should not be exceed maximum screwing depth in the table.
 - (3): Track rail mounting bolts are not appended. Hexagon socket bolts of JIS B 1176 strength division 12.9 or equivalent are recommended.
 - (4): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx and Ty) are shown in the sketches below. The upper values in the Tx and Ty column apply to one slide unit, and the lower values apply to two units in close contact.
- Remark 1: The mark \(\foatin \) indicates that interchangeable specification products are available.

 2: For grease nipple specification, see Table 10.1 and 10.2 on page 102 and 103.

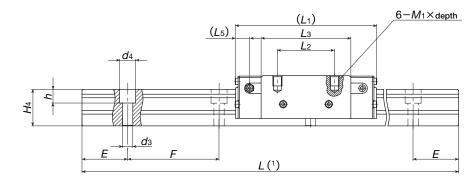
 - 3: In size 35 female threads for grease nipple are prepared on both side faces and front face of end plate. Thread size of front face is smaller than other threade thus, please consult **IXO** if grease nipple for front face is required.



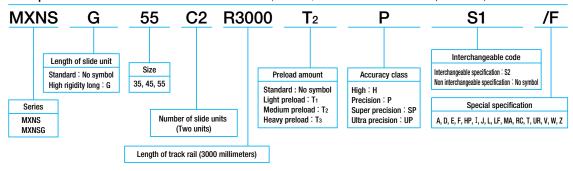








			D	imensi	on of t	rack r	ail			Basic dynamic load rating(4)	Basic static load rating(4)	Static	moment ra	ting(4)
Maximum	Нз	w	H4	dз	d4	h	E	F	mm	С	C ₀	T 0	Tx	T Y
depth(2)	110				"	"	_	'	Bolt size × length	N	N	N∙m	N∙m	N∙m
										58 700	100 000	2 170	1 360	1 360
11	11	34	32	9	14	12	40	80	M 8×35	30 700	100 000	2 170	8 470	8 470
		34	32	"	'-	'2	40	00	W UX33	74 200	135 000	2 930	2 440	2 440
										74 200	135 000	2 330	13 800	13 800
										95 400	159 000	4 430	2 700	2 700
13	13.5	45	38	14	20	17	52.5	105	M12×40	95 400	159 000	4 430	16 800	16 800
13	13.5	45	30	14	20	'/	52.5	105	10112 ^ 40	124 000	223 000	6 200	5 220	5 220
										124 000	223 000	6 200	29 000	29 000
										149 000	249 000	0.040	5 040	5 040
19	16	53	43	16	23	20	60	120	M14×45	148 000	248 000	8 040	31 100	31 100
19	10	53	43	16	23	20	60	120	IVI 14 × 45	100 000	250,000	11 700	10 400	10 400
										198 000	359 000	11 700	57 000	57 000



C-Lube Linear Ball Spline MAG

MAG/MAGF

Maintenance free type has been released for IKO C-Lube Linear Ball Spline MAG having an overwhelmingly high market share in the field of semiconductor and liquid crystal manufacturing systems that are forced to be operated in severe operating conditions of high acceleration/deceleration motion.

Maintenance free

The IKD original lubricating component, C-Lube, is incorporated in the external cylinder and the end plate. Its effectiveness had been proven by endurance tests. This can reduce the cost of the whole system as a result of reduction in the lubrication mechanism in the system and also reduce the running cost as a result of reduction in the man-hours for lubricational maintenance.

In addition, grease is prepacked in the external cylinder as standard, so that maintenance free operation for even longer time is achieved.

Ecology

Regarding the prepacked lubricant in the C-Lube, only the amount of lubricant required to maintain the lubrication performance of the rolling guide is supplied, so that a small amount of lubricant is consumed even for a long-time running while keeping the lubrication performance.

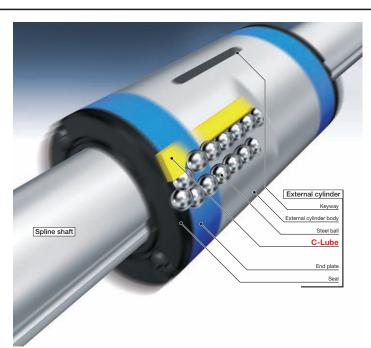
High rigidity and compactness

Large-diameter steel balls are arranged in two rows and are in four-point contact with the raceways. With this structure, this is a high-rigidity and compact-sized Ball Spline. C-Lube Linear Ball Spline MAG adopts a unique steel ball retaining method requiring no ball retainer, and has a small external diameter of external cylinder for the shaft diameter.

Interchangeable specification

The external cylinder and the spline shaft can be ordered separately and a single unit can be delivered. The product type, accuracy, and preload type can be combined freely.

This is a high-level interchangeable system product. This is the product customer can order for the least quantity when needed, and its delivery time is short.



U.S. PATENT No.4.799.803 No.4,505,522 No.5,490,729 No.4,505,522 No.4,390,215 No.6,190,046 No.6,176,617 No.6.082.899 No.5,967,667 No.5,464,288 No.5,356,223

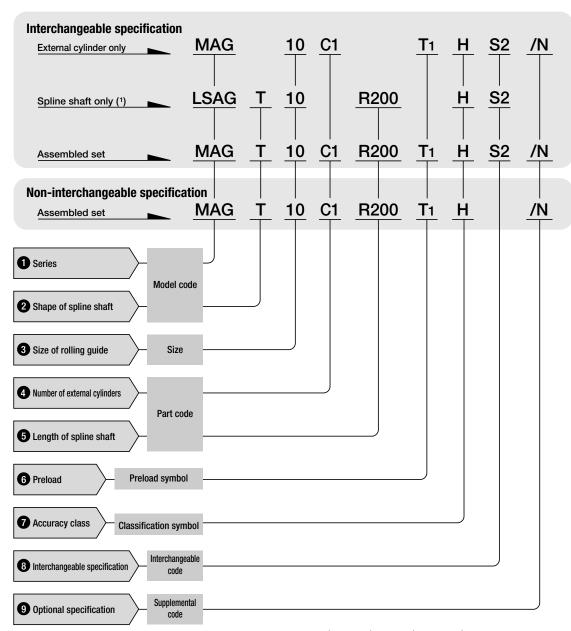
Structure of C-Lube Linear Ball Spline MAG

C-Lube Linear Ball Spline MAG series Length of Shape Shaft shape Model code external cylinder Standard type MAG Solid shaft Standard **MAGT** Hollow shaft C-Lube Linear Ball Spline MAG Flange type **MAGF** Solid shaft Standard **MAGFT** Hollow shaft

> 1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification Number

The specification of C-Lube Linear Ball Spline MAG is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol, an interchangeable code, and any supplemental codes.



Note(1): In case ordering spline shaft only, model code should be changed as LSAG (Solid shaft) or LSAGT (Hollow shaft).

Standard type : MAG 1 Series Flange type : MAGF

For applicable models and sizes, see Table 1.

For the model code of a spline shaft of C-Lube Linear Way MAG, indicate LSAG(T)regardless the external cylinder model to be combined.

2 Shape of spline shaft

Solid shaft : No symbol

: T Hollow shaft

3 Size of rolling guide

5, 6, 8, 10, 12

For applicable models and sizes, see Table 1.

Model	Standard model	Flanged model
ize	MAG	MAGF
5	☆	☆
6	☆	☆
8	☆	☆
10	☆	☆
12	☆	☆

4 Number of external cylinder

: **C**() Assembled set

External cylinder only: C1

For an assembled set, indicate the number of external cylinder assembled on one spline shaft. For an interchangeable external cylinder only, "C1" is indicated.

5 Length of spline shaft

: **R**O Assembled set

Spline shaft only

Indicate the length of spline shaft in mm. For standard and maximum length, see dimension table from page A-107 and A-109.

: **R**O

6 Preload

Standard : No symbol

Light preload: T1

Specify this item for an assembled set or an interchangeable external cylinder. Applicable preload and size are shown in Table 3. For detail of preload amount, see Table 7 on page D-15.

7 Accuracy class

Ordinary : No symbol

High class : H

Precision class : P

The precision class (P) applies to non-interchangeable specification only. For interchangeable specification products, assemble

external cylinder and a spline shaft of the same accuracy class. For details of accuracy classes, see page D-11.

8 Interchangeable specification

Interchangeable code : S2

External cylinder and spline shaft can be supplied separately by interchangeable code S2.

9 Optional specification

) /N, /S

For applicable optional specifications, see Table 2.

Table 2 Special specifications

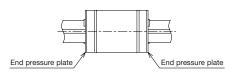
Special specifications	Supplemental code	Applicable size
No end seal	/N (1)	5~12
Stainless steel spline shaft	/S (2)(3)	5~12

Note(1): Applicable to interchangeable external cylinder and assembled set

- (2): Applicable to non-interchangeable specification
- (3): Not applicable to the hollow shaft.

No end seal





End seals at both ends of external cylinder are replaced by steel pressure plate. It does not contact to spline shaft in order to reduce frictional resistance. This is not effective for dust protection.

Stainless steel spline shaft



The material of the solid spline shaft is changed to stainless steel. The load rating will be a value obtained by multiplying the load rating for the high carbon steel spline shaft by a factor of 0.8.

Moment of inertia of sectional area and section modulus of spline shaft

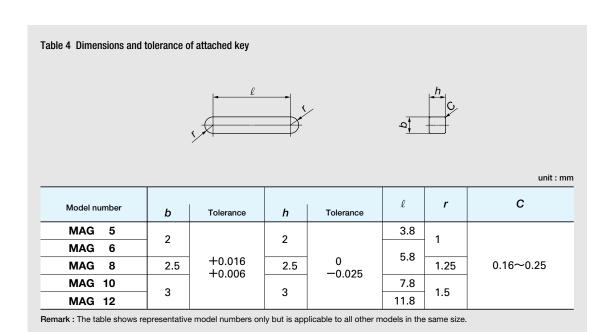
Moment of inertia of sectional area and section modulus of the spline shaft are shown in Table 3.

able 3 Moment of inerti	a of sectional area and sec	tion modulus		
Model number	Moment of inertia of	sectional area mm4	Section mo	dulus mm ³
Model Hambel	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
MAG 5	29	29	12	12
MAG 6	61	61	21	21
MAG 8	190	190	49	49
MAG 10	470	460	95	94
MAG 12	990	960	170	160

Remark: The table shows representative model numbers only but is applicable to all models of the same size.

Dimensions of key

The sunk keys shown in Table 4 are provided with the external cylinder.



Others

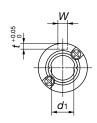
Load rating, Accuracy, Pleload, Lubrication, Dust protection, Precautions for use and mounting, please refer D-8.

MAG, MAGF

C-Lube Linear Ball Spine MAG: Standard type

MAG • MAGT





Bore dia. of hollow shaft of MAGT

	Interchangeable	N	lass (Ref.) g		Dimension	and to	olerance mm		xternal cylin	nder										
Model number	Intercha	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	<i>L</i> 1	L2	w	Tolerance	t	l	d	Tolerance							
MAG 5	☆	4.8	14.9	10	0	18	9.4	2	+0.014	1.2	6	5	0							
MAGT 5	☆	4.0	12.4	10	-0.009	10	3.4	2	0	1.2	O	5	-0.012							
MAG 6	☆	8.9	19	12	0	21	12.4	2	+0.014	1.2	8	6	0							
MAGT 6	☆	0.3	16.5	'2	-0.011	21	12.4	2	0	1.2	0	O	-0.012							
MAG 8	☆	15.9	39	15	0	25	146	2.5	+0.014	1.5	8.5	8	0							
MAGT 8	☆	15.5	33		5 -0.011	25	14.6	6 2.5	0	1.5	0.5		-0.015							
MAG 10	☆	31.5	60.5	19	0	30	18.2	18.2 3	+0.014	1.8	11	10	0							
MAGT 10	☆	31.5	51	19	-0.013	30	10.2	3	0	1.0	11	10	-0.015							
MAG 12	☆	44	87.5	21	0	35	23	3	+0.014	1.8	15	12	0							
MAGT 12	☆	44	66	21	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	35	35	35	35	35	35	35	35	23	3	0	1.0	13	12	-0.018

Note(1): Dimension d_1 indicates the maximum diameter when machining is done at the shaft ends.

- (2): Lengths indicated are standard length. Spline shafts in different lengths are also available. Simply indicate the necessary length of spline shaft (mm) in the identification number.
- (3): The directions of dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx and Tx) are shown in the sketches below.

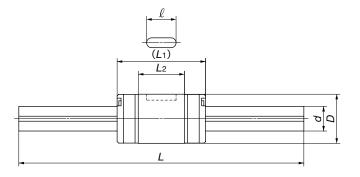
The upper values in the Tx and Ty columns apply to one external cylinder, and the lower values apply to two external cylinders in close contact. Remark: The mark 🛱 indicates that interchangeable specification products are available.



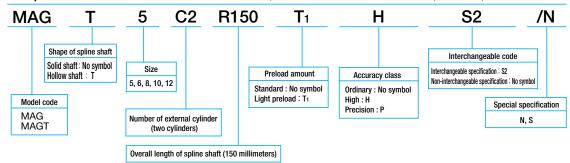








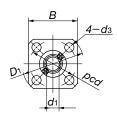
		Dimension of spline shaft mm		Basic dynamic load rating (3)	Basic static load rating(3)	Dynamic torque rating(3)	Static torque rating(3)	Static mome	ent rating(3)
				С	C ₀	Τ	T 0	T x	<i>T</i> Y
d ₁ (1)	d 2	L (2)	Maximum length	N	N	N∙m	N∙m	N∙m	N∙m
4.0	_	100 150	000	507	044	1.0	1.0	1.0	1.8
4.2	2	100 150	200	587	641	1.8	1.9	7.9	13.6
5.2	_	150 200	300	711	855	2.5	3.0	1.7	3.0
5.2	2	150 200	300	/''	855	2.5	3.0	11.7	20.3
7	_	150 200 250	500	1 190	1 330	5.5	6.2	3.3	5.6
,	3	150 200 250	400	1 190	1 330	5.5	6.2	22.0	38.1
8.9	_	200 300	600	1 880	2 150	10.9	12.5	7.0	12.1
6.9	4	200 300	600	1 000	2 150	10.9	12.5	41.5	71.9
10.9	_	200 300 400	800	2 180	2 690	14.8	10.2	10.6	18.3
10.9	6	200 300 400	600	2 180	2 690	14.8	18.3	59.1	102



C-Lube Linear Ball Spine MAG: Flange type

MAGF • MAGFT





Bore dia. of hollow shaft of MAGT

	ngeable	М	ass (Ref.) g		Dimer	nsion a	and tol	erance mm		ternal	cylind	er				
Model number	Interchangeable	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	<i>L</i> 1	L ₂	<i>D</i> 1	В	E	τ	pcd	d 3	d	Tolerance	
MAGF 5	☆	8.9	14.9	10	0	18	9.4	23	18	7	2.7	17	3.4	5	0	
MAGFT 5	☆	0.9	12.4	10	-0.009	10	9.4	23	10		2.7	'/	3.4	5	-0.012	
MAGF 6	☆	13.9	19	12	0	21	12.4	25	20	7	2.7	19	3.4	6	0	
MAGFT 6	☆	13.9	16.5	12	-0.011	21	12.4	25	20	,	2.7	19	3.4	0	-0.012	
MAGF 8	☆	23.5	39	15	, 0	25	146	20	22	9	3.8	22	3.4	8	0	
MAGFT 8	☆	23.5	33	15	-0.011	25	14.0	14.6 28	8 22	3	3.0	22	3.4	8	-0.015	
MAGF 10	☆	45	60.5	10	0	30	18.2	36	28	10	4.1	28	4.5	10	0	
MAGFT 10	☆	45	51	19	-0.013	30	10.2	30	20	10	4.1	20	4.5	10	-0.015	
MAGF 12	☆	59	87.5	0.1	0	25	22	20	20	10	4	30	4.5	12	0	
MAGFT 12	☆	1 29	66	21	$\begin{vmatrix} 21 & 0 \\ -0.013 \end{vmatrix}$	35	23	23 3	38	38 30	30 10	4	30	4.5	12	-0.018

Note(1): Dimension d_1 indicates the maximum diameter when machining is done at the shaft ends.

- (2): Lengths indicated are standard length. Spline shafts in different lengths are also available. Simply indicate the necessary length of spline shaft (mm) in the identification number.
- (3): The directions of dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx and Ty) are shown in the sketches below.

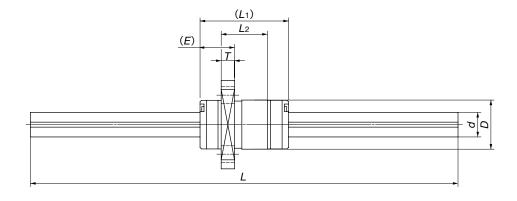
The upper values in the Tx and Ty columns apply to one external cylinder, and the lower values apply to two external cylinders in close contact. **Remark**: The mark x indicates that interchangeable specification products are available.



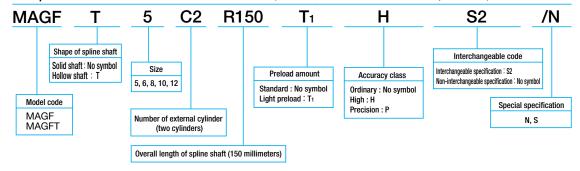








	D	imension of spline shaft mm		Basic dynamic load rating(3)	Basic static load rating(3)	Dynamic torque rating(3)	Static torque rating(3)	Static mom	ent rating(3)
			l .	С	C ₀	Т	T 0	Tx	T _Y
d ₁ (1)	d ₂	L ⁽²⁾	Maximum length	N	N	N∙m	N∙m	N∙m	N∙m
4.0	_	100 150	200	F07	C41	1.0	1.0	1.0	1.8
4.2	2	100 150	200	587	641	1.8	1.9	7.9	13.6
	_	150, 200	200	711	055	2.5	0.0	1.7	3.0
5.2	2	150 200	300	711	855	2.5	3.0	11.7	20.3
7	_	150 200 250	500	1 190	1 330	5.5	6.2	3.3	5.6
,	3	150 200 250	400	1 190	1 330	5.5	0.2	22.0	38.1
8.9	_	200 300	600	1 000	2.150	10.0	10.5	7.0	12.1
8.9	4	200 300	600	1 880	2 150	10.9	12.5	41.5	71.9
10.0	_	200 200 400	000	2.100	2 000	14.0	10.0	10.6	18.3
10.9	6	200 300 400	800	2 180	2 690	14.8	18.3	59.1	102





Linear Ways

Description of each series and Table of dimensions















In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

Linear Way L

LWL/LWLF

IKO Linear Way L is a miniature type linear motion rolling guide, incorporating two rows of steel balls arranged in four point contact with the raceways. Although it is small in size, it provides stable accuracy and rigidity owing to its simple design even in operations under fluctuating loads with changing direction and magnitude or complex loads. The standard products are made from stainless steel, and a wide range of variations in shapes and sizes are available for selections suitable for each application.

Interchangeable

The ball-retained type includes interchangeable specification products. The dimensions of slide units and track rails of this specification are individually controlled, so that the slide units and track rails can be combined, added or exchanged freely.

Standard type and wide rail type

Slide units and track rails are provided in two widths: standard type and wide rail type. The wide rail type is suitable for single row rail arrangement.

Length of slide unit

The slide unit of stainless steel, ball retained type is further classified into three types: short type, standard type and high rigidity long type. All of these slide units are equal in sectional dimensions but different in slide unit lengths, which can be selected suiting the requirements in each application.

S

Stainless steel type and high carbon steel type

The stainless steel type has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, disk read devices, and semiconductor manufacturing equipment.

The high carbon steel type permits additional working to track rails and is used for general purpose applications such as material transfer machines and handling equipment.

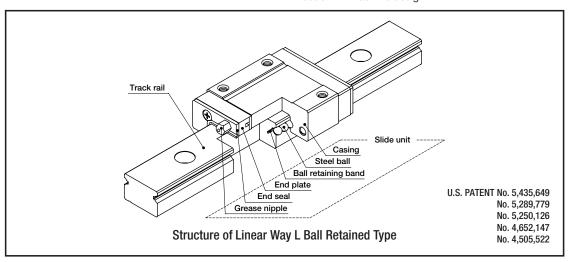
Ball retained type

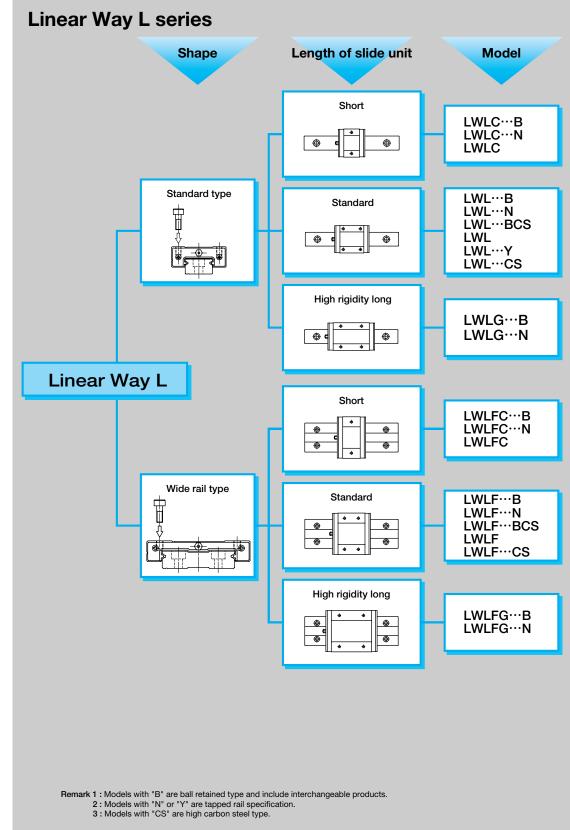
The slide unit of ball retained type incorporates ball retaining bands, which prevent steel balls from dropping when the slide unit is separated from the track rail. So handling is easy.

Ta

Tapped rail specification

In addition to the standard specification track rail which is fixed by inserting bolts downward in the mounting holes, the tapped rail specification track rail that has tapped screw holes is available, so an optimum mounting direction can be selected, giving more freedom in machine design.

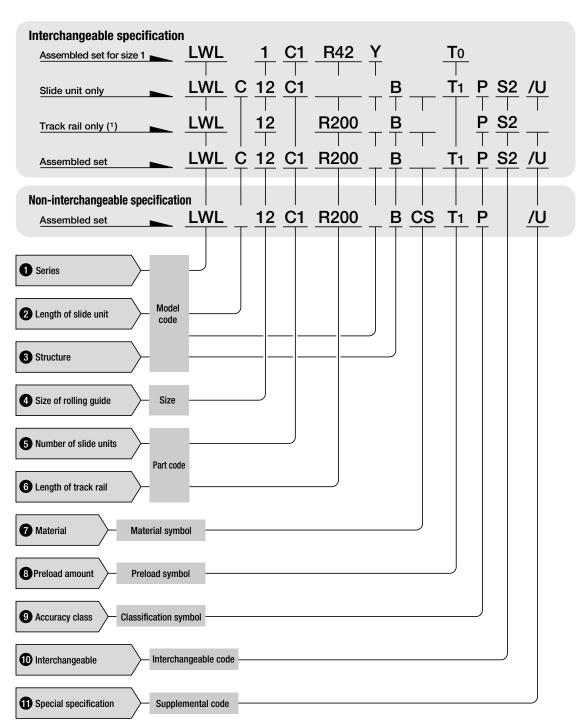




1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

The specification of Linear Way L is indicated by the identification number, consisting of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page 78.



Note(1): For the model code of a single track rail of interchangeable specification, indicate "LWL····B" or "LWLF···B" regardless of the slide unit type to be combined.

Standard type : LWL
Wide rail type : LWLF

2 Length of slide unit

Short : C
Standard : No symbol

High rigidity long : G

For available slide unit models, materials and sizes, see Tables 1.1, 1.2, 2.1 and

The track rails of the size 2 and 3 models are of the tapped rail specification, but "N" is not attached to the model code.

3 Structure

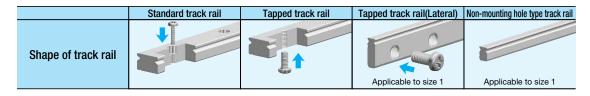
Standard track rail specification

Ball retained type : B

Ball non-retained type : No symbol

Tapped track rail specification : N

Tapped track rail (Lateral) specification : Y Applicable to size 1





5 Number of slide units

Assembled set : C

Slide unit only : C1

For an assembled set, indicate the number of slide units assembled on one track rail. For a slide unit,

only "C1" can be indicated.

6 Length of track rail

Assembled set : R

Track rail only $: R \bigcirc$

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on

page B-12 to B-14.

7 Material

Stainless steel made : No symbol

High carbon steel made : CS

For applicable material types, see Tables 1.1, 1.2, 2.1

and 2.2.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

B-5

Table 1.1 Models and sizes of Linear Way L standard type (Ball retained type)

			, , ,	3. 7								
Model		Standard track	rail specification		Тарре	ed track rail specifi	cation					
	S	tainless steel mad	e	High carbon steel made	S	Stainless steel mad	le					
	Short	Standard	High rigidity long	Standard	Short	Standard	High rigidity long					
Size	LWLCB	LWL···B	LWLG…B	LWLBCS	LWLC…N	LWL…N	LWLG…N					
5	☆	☆	_	_	0	0	_					
7	☆	☆	☆	_	0	0	0					
9	☆	☆	☆	☆	0	0	0					
12	☆	☆	☆	☆	_	_	_					
15	☆	☆	☆	☆	_	_	_					
20	☆	☆	☆	☆	_							
25	☆	☆	☆	_	1	_	_					

Remark: The mark \$\pm\$ indicates that interchangeable specification products are available.

Table 1.2 Models and sizes of Linear Way L standard type (Ball non-retained type)

					,, ,	
Model	Standard track	rail specification	Tapped track rail specification			Non-mounting hole track rail specification
	Stainless steel made	High carbon steel made	S	tainless steel mad	е	Stainless steel made
	Standard	Standard	Short	Standard	Standard	Standard
Size	LWL	LWLCS	LWLC	LWL	LWL···Y	LWL
1	_	_	_	_	0	0
2	_	_	_	0	_	_
3	_	_	0	0	_	_
5	0	_	_	_	_	_
7	0	_	_	-	_	_
9	0	_	_	_	_	_
12	0	0	_	_	_	_
15	0	0	_	_	_	_

Table 2.1 Models and sizes of Linear Way L wide rail type (Ball retained type)

Model		Standard track	rail specification	Тарре	ed track rail specifi	cation	
	S	Stainless steel made			Stainless steel made		
	Short	Standard	High rigidity long	Standard	Short	Standard	High rigidity long
Size	LWLFC···B	LWLF…B	LWLFGB	LWLFBCS	LWLFCN	LWLFN	LWLFGN
10	☆	☆	_	_	0	0	_
14	$\stackrel{\wedge}{\sim}$	☆	☆	_	0	0	0
18	☆	☆	☆	☆	0	0	0
24	☆	☆	☆	☆		_	_
30	☆	☆	☆	☆	_	_	_
42	☆	☆	☆	☆	_	_	0

Remark: The mark ☆ indicates that interchangeable specification products are available.

Table 2.2 Models and sizes of Linear Way L wide rail type (Ball non-retained type)

	Table 2.2 Models and Sizes of Efficial Way E wide rail type (ball from Tetained type)					
Standa	rd track rail specif	Tapped track rail specification				
Stainless steel made		High carbon steel made	Stainless steel made			
Short Standard		Standard	Short	Standard		
LWLFC	LWLF	LWLFCS	LWLFCN	LWLFN		
_	0	_	_	_		
0	0	_	0	0		
_	0	_	_	_		
_	0	0		_		
_	0	0	_	_		
_	0	0		_		
	Stainless s Short	Stainless steel made Short Standard	Short Standard Standard	Stainless steel made High carbon steel made Stainless s Short Standard Standard Short		

8 Preload amount

 ${\sf Clearance} \quad : \textbf{T}_0$

Standard : No symbol

Light preload : T1

Specify this item for an assembled set or a single slide unit. For applicable preload amount, see Table 3. For details of preload amount, see page 86.

Size		Preload type			
Standard type	Wide rail type	Clearance (T ₀)	Standard (No symbol)	Light preload (T1)	
1	_	0	_	_	
2	4	0	_	_	
3	6	0	_	_	
5	10	☆	☆	_	
7	14	☆	☆	☆	
9	18	☆	☆	☆	
12	24	☆	☆	☆	
15	30	☆	☆	☆	
20	42	☆	☆	☆	
25	_	☆	☆	☆	

Remark: The mark \(\frac{1}{2} \) indicates that it is also applicable to interchangeable specification products.



High : H
Precision : P

For the interchangeable specification, combine slide units and track rails of the same class. For details of accuracy, see page 81.

*Accuracy class is not applicable to size 1.



 ${\tt Interchangeable}: S2$

In Linear Way L, slide unit and track rail can be supplied separately by indicating interchangeable code S2.



For applicable special specifications, see Table 4. When several special specifications are required, see Table 5. Special specifications are not applicable to size 1.

For details of special specifications, see page 88.

Table 4	Special	specifications

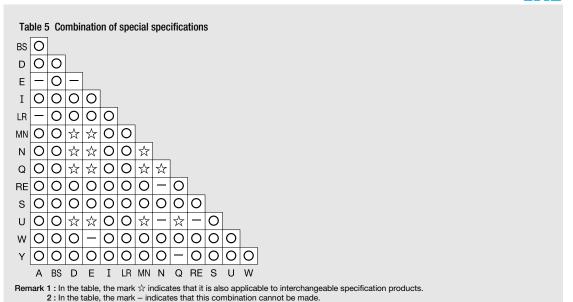
Special specification	Supplemental code	Assembled set	Track rail only	Slide unit only	Dimension
Butt-jointing track rail	Α	O(1)(2)(3)	_	_	
Stainless steel end plates	BS	O(4)	_	_	
Opposite reference surfaces arrangement	D	☆	_	_	
Specified rail mounting hole positions	Е	☆	☆	_	
Inspection sheet	I	0	_	_	
Black chrome surface treatment (track rail)	LR	O(5)	_	_	
Supplied without track rail mounting bolt	MN	☆(2)(6)	☆	_	
No end seal	N	☆	_	☆	
Capillary plates	Q	☆	_	☆	See Table 7.
Seals for special environment	RE	O(7)	_	_	
Track rail with stopper pins	S	0	_	_	See Table 8.
Under seals	U	☆(8)	_	☆(9)	See Table 9
Matched sets to be used as an assembled group	W	0	_	_	
Specified grease	Υ	O(10)	_	_	

Note(1): Not applicable to high carbon steel type.

- (2): Not applicable to tapped rail specification products.
- (3): Not applicable to size 2, 3, 4 and 6 models.
- (4): Not applicable to size 25 models. (5): Not applicable to size 2, 3, 4, 5, 6 and 10 models.
- (6): Not applicable to size 2 and 3 models.
- (7): Not applicable to size 2, 3, 4 and 25 models.
- (8): Not applicable to size 2, 3, 4, 5, 6, 7, 10 and 14 models.
- (9): Not applicable to size 5, 7, 10 and 14 models.
- (10): Only /YNG is applicable to size 2 and 4 models.

Remarks 1 :The mark ☆ indicates that it is also applicable to interchangeable specification products.

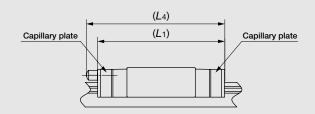
2 :Not applicable to size 1.



3: When several special specifications are combined, arrange the supplemental codes alphabetically.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Table 7 Slide unit with Capillary plates (Supplemental code /Q)

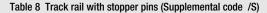


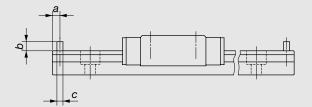
unit · mm

Model number	<i>L</i> ₁	L 4
LWLC 5···B	22	_
LWL 5···B	25	_
LWLC 7···B	27	_
LWL 7···B	31.5	_
LWLG 7···B	39	_
LWLC 9···B	30	_
LWL 9···B	39	_
LWLG 9···B	49	_
LWLC 12···B	33	_
LWL 12···B	42	_
LWLG 12···B	52	_
LWLC 15···B	42	46
LWL 15···B	52	57
LWLG 15···B	67	72
LWLC 20···B	48	52
LWL 20···B	60	65
LWLG 20···B	78	82
LWLC 25···B	63.5	74
LWL 25B	87.5	98
LWLG 25···B	107.5	118

		unit . mm
Model number	<i>L</i> ₁	L4
LWLFC 10···B	26.5	_
LWLF 10···B	30.5	_
LWLFC 14···B	30.5	_
LWLF 14···B	39.5	_
LWLFG 14···B	50	_
LWLFC 18···B	34.5	_
LWLF 18···B	47	_
LWLFG 18···B	58.5	_
LWLFC 24···B	38.5	_
LWLF 24···B	52	_
LWLFG 24···B	67	_
LWLFC 30···B	45.5	50
LWLF 30···B	60	64
LWLFG 30···B	78.5	83
LWLFC 42···B	51.5	56
LWLF 42···B	65	70
LWLFG 42···B	84.5	89

Remark: The above table shows representative model numbers but is applicable to all models.



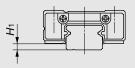


Model number Ball retained type	а	b	c
LWL 5···B	2	2	1.6
LWL 7···B		2.5	
LWL 9···B		3	
LWL 12···B	2.5	ა 	2
LWL 15···B		4	_
LWL 20···B		5	
LWL 25···B	3.5	5	

			unit : mm
Model number Ball retained type	а	b	С
LWLF 10···B		2	1.6
LWLF 14···B			
LWLF 18···B	2.5	3	
LWLF 24···B	2.5		2
LWLF 30···B		4	
LWLF 42···B		5	

Remark: The above table shows representative model numbers but is also applicable to all models of the same size.

Table 9 H dimension of slide unit with under seals (Supplemental code /U)



Model number Ball retained type	<i>H</i> 1
LWL 9···B	1
LWL 12···B	2
LWL 15···B	3
LWL 20…B	4
LWL 25···B	5(1)

	unit : mm
Model number	H ₁
Ball retained type	111
LWLF 18···B	
LWLF 24···B	2
LWLF 30···B	2
-	
LWLF 42···B	3

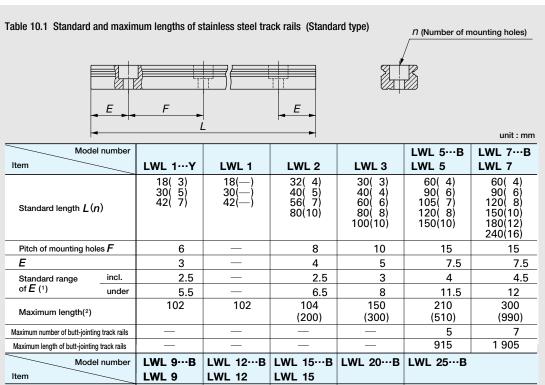
Note(1): This dimension is the same as that without under seals.

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Track rail length

Standard and maximum lengths of track rails are shown in Tables 10.1, 10.2 and 10.3. Track rails in any length are also available. Simply indicate the necessary length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IKB** for further information.

- For non-interchangeable track rails longer than the maximum length shown in Tables 10.1, 10.2 and 10.3, butt-jointing track rails are available upon request. In this case, indicate "/A" in the identification number.
- E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.

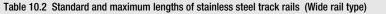


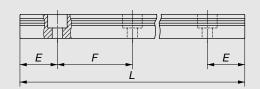
Maximum length of butt-jointing track	raiis					313	1 303
Model nun	_ II -	LWL 9···B	LWL 12···B		LWL 20···B	LWL 25B	
Item	_	LWL 9	LWL 12	LWL 15			
Standard length $L(n)$		60(3) 80(4) 120(6) 160(8) 220(11) 280(14)	100(4) 150(6) 200(8) 275(11) 350(14) 475(19)	160(4) 240(6) 320(8) 440(11) 560(14) 680(17)	180(3) 240(4) 360(6) 480(8) 660(11) 840(14)	240(4) 300(5) 360(6) 480(8) 660(11) 900(15)	
Pitch of mounting holes F		20	25	40	60	60	
E		10	12.5	20	30	30	
Standard range inc	ol.	4.5	5	5.5	8	9	
of E (1) ur	der	14.5	17.5	25.5	38	39	
Maximum length(2)		860 (1 200)	1 000 (1 450)	1 000 (1 480)	960 (1 800)	960 (1 800)	
Maximum number of butt-jointing track rails		2	2	2	2	2	
Maximum length of butt-jointing track	rails	1 660	1 925	1 880	1 740	1 740	

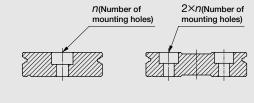
Note(1): Not applicable to the track rail with stopper pins (/S).

(2): The track rails of LWL 2, LWL 3 and LWL ···B can be manufactured up to the maximum lengths shown in parentheses. Consult **IKB** for further information.

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.







LWLF 42···B LWLF 42

unit: mm

					unit : mm
Mode	l number	LWLF 4	LWLF 6	LWLF 10···B	LWLF 14···B
Item					LWLF 14
Standard length L (r	1)	40(4) 60(6) 70(7) 80(8) 100(10)	60(4) 90(6) 105(7) 120(8) 150(10)	60(3) 80(4) 120(6) 160(8) 220(11) 280(14)	90(3) 120(4) 150(5) 180(6) 240(8) 300(10)
Pitch of mounting hole	es F	10	15	20	30
E		5	7.5	10	15
Standard range	incl.	3.5	4.5	4.5	5.5
of E (¹)	under	8.5	12	14.5	20.5
Maximum length(2)		180 (300)	240 (300)	300 (500)	300 (990)
Maximum number of butt-jointing track rails		_	_	7	8
Maximum length of butt-jointing track rails		_	_	1 840	1 950
Mode	l number	LWLF 18···B	LWLF 24···B	LWLF 30···B	LWLF 42···B
Item		LWLF 18	LWLF 24		LWLF 42
Standard length $L(r)$	1)	90(3) 120(4) 150(5) 180(6) 240(8) 300(10)	120(3) 160(4) 240(6) 320(8) 400(10) 480(12)	160(4) 240(6) 320(8) 440(11) 560(14) 680(17)	160(4) 240(6) 320(8) 440(11) 560(14) 680(17)
Pitch of mounting hole	es F	30	40	40	40
E		15	20	20	20
Standard range	incl.	5.5	6.5	6.5	6.5
of E (¹)	under	20.5	26.5	26.5	26.5
Maximum length(2)		690 (1 860)	680 (1 960)	680 (2 000)	680 (2 000)
Maximum number of butt-jointing	g track rails	3	3	3	3

Note(1): Not applicable to the track rail with stopper pins (/S).

(2): The track rails of LWLF 4, LWLF 6 and LWLF···B can be manufactured up to the maximum lengths shown in parentheses. Consult **IKB** for further information.

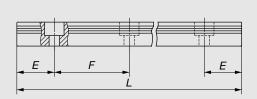
Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.

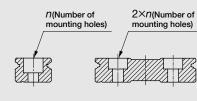
2: "Maximum number of butt-jointing track rails" and "Maximum length of butt-jointing track rails" do not apply to the track rails of interchangeable specification and tapped rail specification.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

^{2: &}quot;Maximum number of butt-jointing track rails" and "Maximum length of butt-jointing track rails" do not apply to the track rails of interchangeable specification and tapped rail specification.

Table 10.3 Standard and maximum lengths of high carbon steel track rails (Standard type, Wide rail type)





LWLF 42····BCS LWLF 42···· CS

					unit : mm
Model	l number	LWL 9···BCS	LWL 12···BCS	LWL 15···BCS	LWL 20···BCS
Item			LWL 12··· CS	LWL 15··· CS	
Standard length $L(y)$	n)	80(4) 160(8) 220(11) 280(14) 380(19) 500(25) 600(30)	100(4) 200(8) 275(11) 350(14) 475(19) 600(24) 700(28)	160(4) 320(8) 440(11) 560(14) 680(17) 800(20) 920(23)	180(3) 240(4) 360(6) 480(8) 660(11) 900(15) 1 020(17)
Pitch of mounting hole	es F	20	25	40	60
E		10	12.5	20	30
Standard range	incl.	4.5	5	5.5	8
of E (1)	under	14.5	17.5	25.5	38
Maximum length		1 000	1 500	1 520	1 560
Model	number	LWLF 18···BCS	LWLF 24···BCS	LWLF 30···BCS	LWLF 42···BCS
Item		LWLF 18··· CS	LWLF 24··· CS		LWLF 42··· CS
Standard length $L(I)$	n)	90(3) 180(6) 240(8) 300(10) 420(14) 510(17) 600(20)	120(3) 240(6) 320(8) 400(10) 600(15) 720(18) 800(20)	160(4) 320(8) 440(11) 560(14) 680(17) 800(20) 920(23)	160(4) 320(8) 440(11) 560(14) 680(17) 800(20) 920(23)
Pitch of mounting hole	es F	30	40	40	40
E		15	20	20	20
Standard range	incl.	5.5	6.5	6.5	6.5
of E (1)	under	20.5	26.5	26.5	26.5
Maximum length		1 500	1 520	1 600	1 600

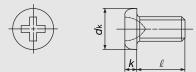
Note(1): Not applicable to the track rail with stopper pins (/S).

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Mounting bolt

Mounting bolts for the slide unit and the track rail of tapped rail specification are available as shown in Table 11.1 and 11.2. Consult **IKI** for further information.

Table 11.1 Cross recessed head screw for precision equipment

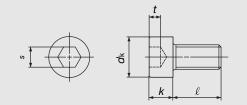


				unit : min
D - H - i (-A)		Dim	nension	
Bolt size (d)	Pitch of screw(P)	dk	k	l
M1	0.25	1.8	0.45	3, 4, 5
M1.4 (1)	0.3	2.5	8.0	2.5, 3, 4
M1.6 (1)	0.35	2.8	0.85	4, 5, 6
M2 (1)	0.4	3.5	1	3, 4, 5

Note(1): Based on "Cross recessed head screw (#0) for precision equipment" of Japanese Standard (JCIS)10-70

Remark: Dimensions of the screws shown in the above table are different from those of the appended mounting bolts for track rail.

Table 11.2 Hexagon socket head bolt



unit: mm

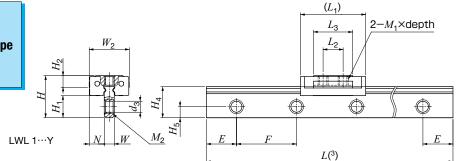
D-H-:/ A			Dimension	n		
Bolt size(d)	Pitch of screw(P)	d k	k	s	t	ℓ
M1.4	0.3	2.6	1.4	1.3	0.6	2.5, 3, 4
M1.6 (1)	0.35	3	1.6	1.5	0.7	4, 5,6
M2 (1)	0.4	3.8	2	1.5	1	3, 4, 5

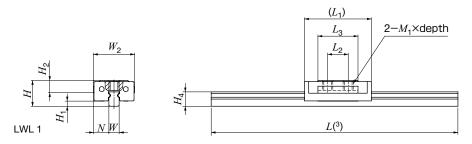
Note(1): Based on JIS B 1176

1N=0.102kgf=0.2248lbs. B-14 B-15 1mm=0.03937inch

Linear Way L: Standard type

Tapped track rail
LWL ···Y
Ball non-retained type
LWLC
LWL





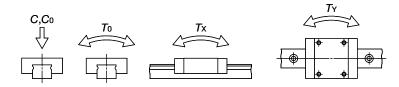
Model number		s(Ref.)		ensior ssemb mm				Dime	ensions of mm	slide unit		
	Slide unit	Track rail (per 100 mm)	Н	<i>H</i> ₁	N	W 2	L ₁	L ₂	L 3	<i>M</i> ₁×depth	H 2	W
LWL 1···Y	0.16	2.1	4.2	2.2	1.5	4	6.5	2	3.9	M1 ×0.9	1.2	1
LWL 1	0.10	1.0	2.5	0.5	1.5	-	0.5	2	3.3	WII A0.9	1.2	'
LWL 2	0.9	2.8	3.2	0.7	2	6	12.4	4	8.8	M1.4×1.1	_	2
LWLC 3	1.0	5.3	4	1	2.5	8	12	3.5	6.7	M1.6×1.3		3
LWL 3	1.6	0.0	4 1	2.5	0	16	5.5	10.7	M2 ×1.3	_	, s	

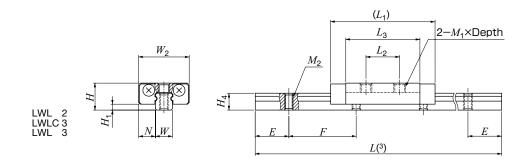
Note(1): Prepare track rail mounting bolts according to mounting structure.

- (2): Fixing thread depth of bolt ℓ must be less than H_4 .
- (3): Track rail lengths are shown in Table 10.1 on page B-12.
- (4): The direction of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remarks 1 : Metal parts are made of stainless steel.

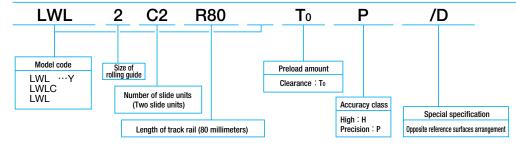
- 2: Do not disassemble a slide unit from the track rail because steel balls are not retained. No end seal is attached.
- 3: For mounting slide unit, the bolts M1.6 or smaller are shown on page B-15. Consult **IKI** if required.





	Dir	nensions m	of track m	rail		track rail	Basic dynamic load rating(4)	Basic static load rating(4)	Static n	noment ra	ating(4)
	I			l	ı	mm	С	C ₀	T 0	Tx	<i>T</i> Y
H 4	H 5	M 2	d 3	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
3.1	1.1	M1.4 Through	1.1	3	6	M1× ℓ or M1.4× ℓ (¹) (Not appended)	66.8	113	0.06	0.07	0.09
1.4	_	_	_	_	_	_	00.0	113	0.00	0.47	0.56
2	_	M1 Through	_	4	8	M1 $\times \ell$ (2) (Not appended)	211	381	0.42	0.54 2.9	0.64 3.4
2.6		M1.6		5	10	M1.6× ℓ (²)	251	361	0.58	0.39 2.9	0.47 3.4
2.0		Through	_	3	10	(Not appended)	353	587	0.94	0.98 5.9	1.2 7.0

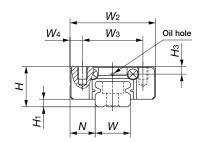
Example of identification number of assembled set (For details, see "Identification number and specification".)

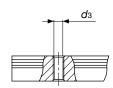


B-17

IND Linear Way L: Standard type

Ball retained type
LWLC···B
LWLG···B
Tapped track rail
LWLC···N
LWLC···N
LWLG···N
Ball non-retained type
LWLC
LWLC





Tapped rail specification LWL···N

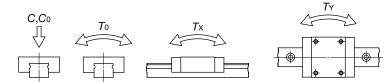
Model number	Interchangeable	N	Dimensions of assembly mm			Dimensions of slide unit mm							
	Interch	Slide unit	Track rail (per 100 mm)	Н	<i>H</i> ₁	N	W 2	W 3	W 4	<i>L</i> ₁	L ₂	L 3	<i>M</i> ₁ ×depth
LWLC 5···B	☆	3.4	12							16		9.6	_
LWLC 5···N		3.4	13	6	1	3.5	12	8	2	10	_	3.0	M2 ×1.5
LWL 5···B	☆	4.4	12		'	5.5	12			19		12.6	WIZ X 1.5
LWL 5···N		4.4	13							13		12.0	
LWLC 7···B	☆	7.1	22							19	_	9.6	
LWLC 7···N		7.1	24							13		3.0	
LWL 7···B	☆	10	22	8	1.5	5	17	12	2.5	23.5	8	14.3	M2 ×2.5
LWL 7···N			24		1.5	3	'/	12	2.0	23.5		14.5	IVIZ 7 Z.3
LWLG 7···B	☆	1//	22							31	12	21.6	
LWLG 7···N		14	24							31	12	21.0	

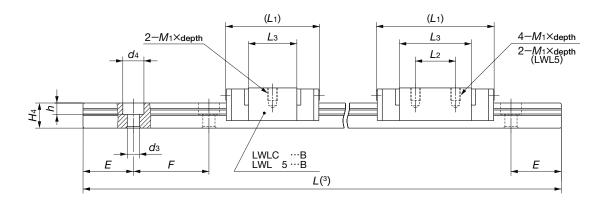
Note(1): Prepare track rail mounting bolts with a fixing depth less than H_4 .

- (2): Track rail lengths are shown in Table 10.1 on page B-12.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches

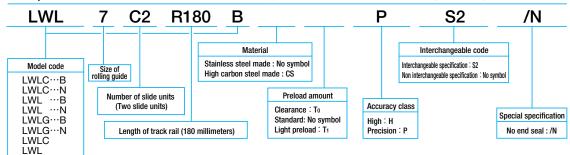
below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

- Remark 1: The mark 🖈 indicates that interchangeable specification products are available.
 - 2: The appended bolts for mounting track rails are hexagon socket head bolts of JIS B 1176 or equivalent, or cross recessed head screws for precision equipment. For stainless steel type Linear Way L, stainless steel bolts or screws are appended.
 - 3: For mounting slide unit, the bolts M2 or smaller are shown on page B-15. Consult **IKD** for further information.
 - 4 : The ball non-retained type models (LWL2, LWLC3, LWL3, LWL5, LWL7) are not provided with an oil hole.
 - 5: The specification of oil hole is shown on page 101.





		D	imensio	ns of t mm	rack ra	ail			Basic dynamic load rating (4)	Basic static load rating(4)	Static moment rating(4)			
		l				I	l	111111	С	C ₀	T 0	T _X	T _Y	
Нз	W	H 4	d 3	d ₄	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m	
			2.4	3.6	0.8			Cross recessed head screw for precision equipment M2 × 6	562	841	2.2	1.4	1.2	
1.2	5	3.7	M2.5 Through	_	_	7.5	15	M2.5 \times ℓ (2) (Not appended)	002	541	2.2	8.5	7.2	
1.2	3	3.7	2.4	3.6	0.8	7.5	13	Cross recessed head screw for precision equipment M2 × 6	676	1 090	2.9	2.3	1.9	
			M2.5 Through	_	_			M2.5 \times ℓ (2) (Not appended)	070	1 030	2.3	12.8	10.8	
			2.4	4.2	2.3			Hexagon socket head bolt M2 × 6	937	1 140	4.1	1.8	1.5	
			M3 Through	_	_			M3 $\times \ell$ (2) (Not appended)	337	1 140	4.1	14.9	12.5	
1.5	7	5	2.4	4.2	2.3	7.5	15	Hexagon socket head bolt M2 × 6	1 330	1 890	6.9	4.7	3.9	
1.5	,	5	M3 Through	_	_	7.5	15	M3 $\times \ell$ (2) (Not appended)	1 330	1 890	0.3	28.2	23.6	
			2.4	4.2	2.3			Hexagon socket head bolt M2 × 6	1 690	2 650	9.7	8.8	7.4	
			M3 Through	_	_			M3 $\times \ell$ (2) (Not appended)	1 090	2 000	3.7	50.7	42.5	



IND Linear Way L: Standard type

Ball retained type LWLC···B LWL ···B

LWL ···B CS (High carbon steel made)

LWLG…B

Tapped track rail

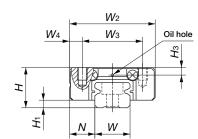
LWLC...N

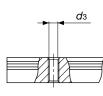
LWL ···N LWLG···N

Ball non-retained type

LWL

LWL ...CS (High carbon steel made)



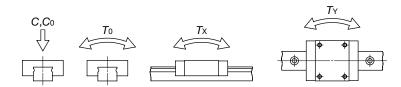


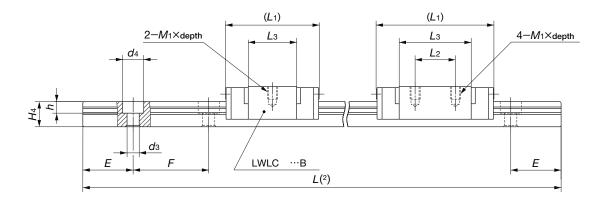
Tapped rail specification LWL···N

Model number	Interchangeable	N	g asse			Dimensions of assembly mm			Dimensions of slide unit mm						
	Interch	Slide unit	Track rail (per 100 mm)	Н	<i>H</i> ₁	N	W 2	W 3	W 4	<i>L</i> ₁	L ₂	L 3	<i>M</i> ₁×depth		
LWLC 9···B	☆	11	35							21.5		11.9			
LWLC 9···N		11	37							21.5		11.9			
LWL 9···B	☆		35						2.5						
LWL 9···B CS	☆	19	35	10	2	5.5	20	15		30	10	20.8	M3 ×3		
LWL 9···N			37	37											
LWLG 9···B	☆	28	35							40.5	15	30.9			
LWLG 9···N		20	37							40.5	15	30.5			
LWLC 12···B	☆	22								25	ı	13			
LWL 12···B	☆	35	65							34	15	21.6	M3 ×3.5		
LWL 12···B CS	☆	33	65		3	7.5	27	20	3.5	34	15	21.0	1010 / 0.0		
LWLG 12···B	☆	51								44	20	32			
LWL 12···CS		34	75							34	15	21	M3 ×3		

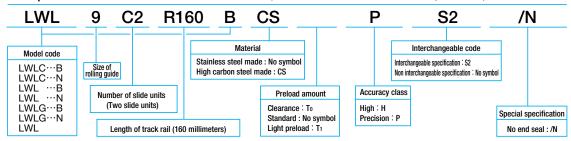
Note(1): Prepare track rail mounting bolts with a fixing depth less H4.

- (2): Track rail lengths are shown in Table 10.1 on page B-12 and Table 10.3 on page B-14.
- (3): The directions of basic dynamic load rating (C), basic static load rating (C0) and static moment rating (T0, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: The mark \$\frac{1}{2}\$ indicates that interchangeable specification products are available.
 - 2: The appended bolts for mounting track rails are hexagon socket head bolts of JIS B 1176 or equivalent.
 - For stainless steel type Linear Way L, stainless steel bolts are appended.
 - 3: The ball non-retained type models (LWL9, LWL12, LWL12···CS) are not provided with an oil hole or grease nipple.
 - 4: An oil hole is provided for size 9 and 12 models of ball retained type and tapped rail specification products.
 - 5: The specification of oil hole is shown on page 101.





		D	imensio	ns of t mm	rack ra	ail		Mounting bolt for track rail		Basic static load rating(3)	Static r	noment r	ating(3)
	.,,	١	.	١,	١.		_		С	C ₀	T 0	Tx.	T _Y
Нз	W	H 4	d 3	d ₄	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
			3.5	6	3.5			M3 × 8	4 400	4 400		2.9	2.4
			M4 Through	-	_			M4 $\times \ell$ (1) (Not appended)	1 180	1 480	6.9	21.4	18.0
2.2	9	6	3.5	6	3.5	10	20	M3 × 8	1 810	2 760	12.8	9.1 51.1	7.6 42.9
			M4 Through	-	_			M4 $\times \ell$ (1) (Not appended)					
			3.5	6	3.5			M3 × 8	2 370	4 030	18.7	18.7	15.7
			M4 Through	-	_			M4 $\times \ell$ (1) (Not appended)	2 370	4 030	18.7	98.3	82.5
									2 210	2 380	14.8	5.3 41.7	4.5 35.0
2.7	12	8	3.5	6.5	4.5	12.5	25	M3 × 8	3 330	4 290	26.6	15.4 93.1	12.9 78.2
									4 310	6 200	38.4	30.6 168	25.7 141
_		8.5	3.5	6.5	4.5			M3 ×10	2 860	3 530	23.3	12.0 78.0	14.3 92.9



Linear Way L: Standard type

Ball retained type LWLC···B

LWL ···B

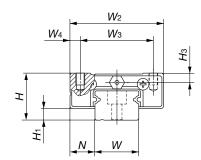
LWL ...B CS (High carbon steel made)

LWLG...B

Ball non-retained type

LWL

LWL ...CS (High carbon steel made)



Model number	Interchangeable	N	flass (Ref.) g	Dimensions of assembly mm			f Dimensions of slide unit mm							
	Interch	Slide unit	Track rail (per 100 mm)	н	<i>H</i> ₁	N	W 2	W 3	W 4	<i>L</i> ₁	L ₂	L ₃	L 4	<i>M</i> ₁×depth
LWLC 15···B	☆	42								32	_	17.7	36	
LWL 15···B	☆	64	107							42	00	07.0	47	
LWL 15···B CS	☆	04	107	16	4	8.5	32	25	3.5	42	20	27.8	47	M3×4
LWLG 15···B	☆	95								57	25	42.7	62	
LWL 15···CS		57	130							42	20	26.8	_	
LWLC 20···B	☆	89								38	_	22.3	42	
LWL 20···B	☆	133	156	20			40			50	25	34.6	55	M4×6
LWL 20···B CS	☆	133	150	20	5	10	40	30	5	50	25	34.6	55	101470
LWLG 20···B	☆	196								68	30	52.3	72	
LWLC 25···B	☆	190								55	_	31.9	65	
LWL 25···B	☆	310			5	12.5	5 48	35	35 6.5	78	35	55.7	89	M6×7
LWLG 25···B	☆	413								98	40	75.5	108	

Note(1): Track rail lengths are shown in Table 10.1 on page B-12 and Table 10.3 on page B-14.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

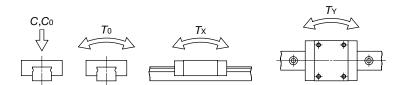
Remark 1: The mark ☆ indicates that interchangeable specification products are available.

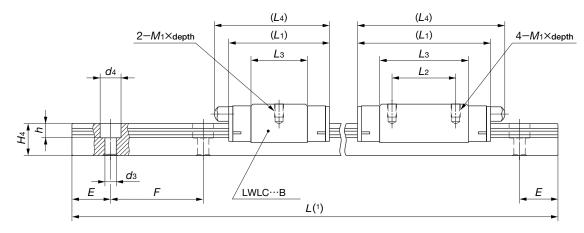
2: The appended bolts for mounting track rails are hexagon socket head bolts of JIS B 1176 or equivalent.

For stainless steel type Linear Way L, stainless steel bolts are appended.

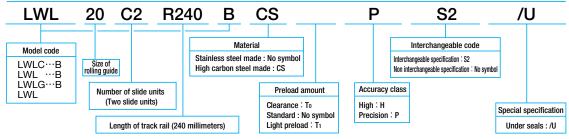
3: The ball non-retained type models (LWL15, LWL15···CS) are not provided with an oil hole or grease nipple.

4: The specifications of oil hole and grease nipple are shown on page 99.



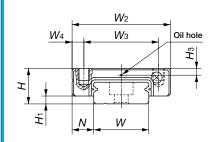


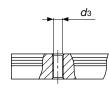
		D	imensio	ns of t mm	rack ra	ail		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	ing(2)	
						_			С	C ₀	T 0	T _X	TY
Нз	W	H 4	d 3	d ₄	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
							40	M3×10	3 490	3 890	30.0	11.7 84.5	9.8 70.9
3.1	15	10	3.5	6.5	4.5	20			4 980	6 490	50.0	29.7 172	24.9 144
									6 620	9 740	75.0	63.9 338	53.6 284
_		11						M3×12	4 760	5 690	47.2	24.6 155	29.4 184
								M5×14	4 580	5 300	54.0	19.4 134	16.3 112
4.2	20	11	6	9.5	5.5	30	60		6 650	9 080	92.6	52.7 280	44.2 235
									8 510	12 900	131	102 529	85.7 444
								M6×16	9 120	10 600	128	57.4 380	48.1 319
5	23	15	7	11.0	9.0	30	60		13 500	18 500	223	163 887	137 744
									16 700	25 200	303	293 1 480	246 1 240



IKD Linear Way L: Wide rail type

Ball retained type LWLFC···B LWLF ···B LWLFG...B **Tapped track rail** LWLFC...N LWLF ···N **LWLFG···N Ball non-retained type** LWLFC **LWLF**





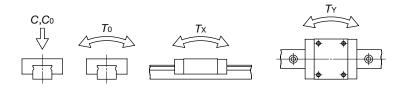
Tapped rail specification LWLF···N

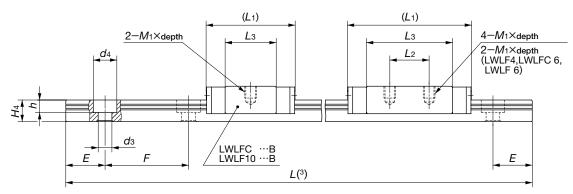
	<u>e</u>	N	/lass (Ref.)	Dim	ensior	ns of	Dimensions of slide unit								
Model number	ngeab		g		assembly mm			mm							
Model number	Interchangeable	Slide unit	Track rail (per 100 mm)	н	<i>H</i> ₁	N	W 2	W 3	W 4	<i>L</i> ₁	L 2	Lз	<i>M</i> ₁×depth		
LWLF 4(1)		2.1	6.8	4	1	3	10	_	5	17	6.5	11.9	M2 ×1.3		
LWLFC 6(1)		2.4	13		1	3	12	_	6	15	4.5	9.8			
LWLFC 6···N(1)		2.4	12	4.5							4.5	9.0	N40 ×4.0		
LWLF 6(1)		3.4	13							20	8	14.6	M2 ×1.6		
LWLF 6N(1)		3.4	12							20	0	14.0			
LWLFC 10···B	☆	5.9	28	6.5	1.5	3.5	17			20.5		13.6			
LWLFC 10···N		5.9	29					13		20.5		13.0	M2.5×1.5		
LWLF 10···B	☆	7.5	28					13	2	24.5		17.0			
LWLF 10···N		7.5	29							24.5		17.6			
LWLFC 14···B	☆	10	54							22.5		10			
LWLFC 14···N		13	56							22.5	_	13			
LWLF 14···B	☆	0.1	54					40		21.5	10	20			
LWLF 14···N		21	56	9	2	5.5	25	19	3	31.5	10	22	M3 ×3		
LWLFG 14···B	☆	0.4	54							40	10	20.5			
LWLFG 14···N		31	56	•						42	19	32.5			

Note(1): Size 4 and 6 models are not provided with end seals.

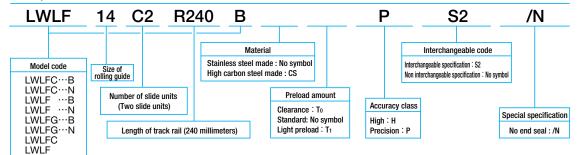
- (2): Prepare track rail mounting bolts with a fixing depth less H_4 .
- (4): Track rail lengths are shown in Table 10.2 on page B-13 and Table 10.3 on page B-14.

 (4): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: The mark $\stackrel{\wedge}{\bowtie}$ indicates that interchangeable specification products are available.
 - 2: The appended bolts for mounting track rails are hexagon socket head bolts of JIS B 1176 or equivalent, or cross-recessed head screws for precision equipment.
 - For stainless steel type Linear Way L, stainless steel bolts or screws are appended.
 - 3: The mounting bolts M2 or smaller are shown on page B-15. Consult **IKU** for further information.
 - 4: The ball non-retained type models (LWLF4, LWLFC6, LWLF6, LWLF14) are not provided with an oil hole.



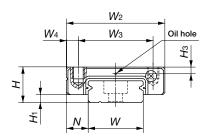


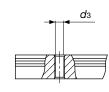
		D	imensio	ns of t mm	rack ra	ail		Mounting bolt for track rail	Basic dynamic load rating(4)	Basic static load rating(4)	Static moment rating(4)			
		l			l			111111	С	C ₀	T 0	Tx	T _Y	
Нз	W	H 4	d 3	d ₄	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m	
_	4	2.6	1.8	2.8	0.75	5	10	Cross recessed head screw for precision equipment M1.6×5	390	677	1.4	1.3 7.1	1.5 8.4	
			2.4	4	1.5			Cross recessed head screw for precision equipment M2 ×4	334	542	1.7	0.84	1.0	
	6	2.8	M3 Through	_	_	7.5	15	M3 $\times \ell$ (2) (Not appended)	334	342	1.7	5.1	6.1	
	0	2.0	2.4	4	1.5			Cross recessed head screw for precision equipment M2 ×4	443	813	2.5	1.8	2.2	
			M3 Through	_	_			M3 $\times \ell$ (2) (Not appended)	443			9.9	11.8	
		4	2.9	4.8	1.6	- 10	20	Cross recessed head screw for precision equipment M2.5 ×7	710	1 180	6.1	2.6	2.2	
	10		M3 Through	_	_			M3 $\times \ell$ (2) (Not appended)	712	1 100	0.1	14.9	12.5	
1.3	10		2.9	4.8	1.6			Cross recessed head screw for precision equipment M2.5 ×7	0.40	1.510	7.0	4.2	3.5	
			M3 Through	_	_			M3 $\times \ell$ (2) (Not appended)	849	1 510	7.8	22.4	18.8	
			3.5	6	3.2			Hexagon socket head bolt M3 × 8		4.700	40.0	3.8	3.2	
			M4 Through	_	_			M4 $\times \ell$ (2) (Not appended)	1 240	1 700	12.2	24.6	20.7	
			3.5	6	3.2	15 30	00	Hexagon socket head bolt M3 × 8		0.040	00.0	10.1	8.4	
1.7	14	5.5	M4 Through	_	_		30	M4 $\times \ell$ (2) (Not appended)	1 770	2 840	20.3	54.7	45.9	
			3.5	6	3.2			Hexagon socket head bolt M3 × 8				21.0	17.6	
			M4 Through	_	_			M4 \times ℓ (2) (Not appended)	2 320	4 160	29.8	104	87.6	



IK Linear Way L: Wide rail type

Ball retained type LWLFC···B LWLF ···B LWLF ...B CS (High carbon steel made) LWLFG···B **Tapped track rail** LWLFC...N LWLF ···N LWLFG...N **Ball non-retained type** LWLF LWLF ···CS (High carbon steel made)





Tapped rail specification LWLF···N

Model number	Interchangeable		/lass (Ref.) g		ensior ssemb mm		Dimensions of slide unit mm							
	Interch	Slide unit	Track rail (per 100 mm)	Н	<i>H</i> 1	N	W 2	Wз	W 4	<i>L</i> 1	L2	Lз	<i>M</i> 1×depth	
LWLFC 18···B	☆	26	90		3	6	30	21	4.5	26.5	_	16.6		
LWLFC 18···N		20	92							20.5		10.0		
LWLF 18···B	☆		90							39	12			
LWLF 18···BCS	☆	44	30	12								28.6	M3 ×3	
LWLF 18···N			92	12										
LWLFG 18···B	☆	61	90					23		50.5	24	40.4		
LWLFG 18···N			92							30.3	24	40.4		
LWLF 18····CS		39	98					21	4.5	39	12	27.6	M3 ×3	
LWLFC 24···B	☆	45								30.5	_	17.7		
LWLF 24···B	☆	76	139							44	15	31	M3 ×3.5	
LWLF 24···BCS	☆	/0	139	14	3	8	40	28	6	44	15	31	IVIO ~ 3.5	
LWLFG 24···B	☆	111								59	28	46.3		
LWLF 24···CS		74	150							44	15	31	M3 ×3	

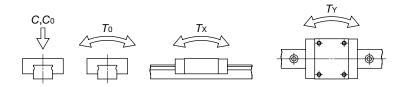
Note(1): Prepare track rail mounting bolts with a fixing depth less H_4 .

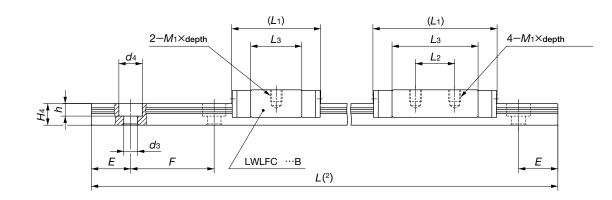
- (2): Track rail lengths are shown in Table 10.2 on page B-13 and Table 10.3 on page B-14.
- (3): The directions of basic dynamic load rating (C), basic static load rating (C) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1 : The mark 🔀 indicates that interchangeable specification products are available.

- 2: The appended bolts for mounting track rails are hexagon socket head bolts of JIS B 1176 or equivalent.
- For stainless steel type Linear Way L, stainless steel bolts are appended.

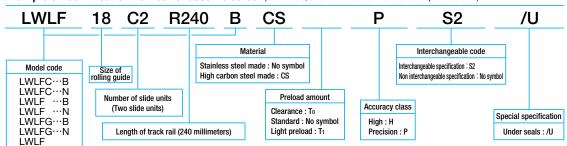
 3: The ball non-retained type models (LWLF18, LWLF18···CS, LWLF24, LWLF24···CS) are not provided with an oil hole or grease nipple.
- 4: An oil hole is provided for size 18 and 24 models of ball retained type and tapped rail specification products.
- 5: The specification of oil hole is shown on page 101.





		D	imensio	ns of t mm	rack ra	ail		Mounting bolt for track rail mm	load rating(3)	Basic static load rating(3)	Static moment rating(3)		
									С	C ₀	T 0	Tx	TY
Нз	W	H4	dз	d4	h	Ε	F	Bolt size×length	N	N	N∙m	N∙m	N∙m
			3.5	6.5	4.5			M3× 8	1 510	2 120	19.4	5.5	4.7
			M4 Through	-	_			$M4 \times \ell$ (1) (Not appended)	1510	2 120	13.4	35.9	30.1
2.5		7	3.5	6.5	4.5		5 30	M3× 8	2 280	3 810	34.9	16.9 90.1	14.2 75.6
	18		M4 Through	-	_	15		$M4 \times \ell$ (1) (Not appended)					
			3.5	6.5	4.5			M3× 8	2 870	5 300	48.5	31.9	26.7
			M4 Through	ı	_			$M4 \times \ell$ (1) (Not appended)	2870	5 300	48.5	159	134
-		7.5	3.5	6.5	4.5			M3× 8	2 620	3 950	37.5	17.5 94.4	20.9 113
									2 800	3 340	40.7	9.7 67.6	8.2 56.8
3.2	24	8	4.5	8 4.5 20 40	40	M4×10	4 310	6 200	75.6	30.6 168	25.7 141		
									5 620	9 060	111	63.3 321	53.1 270
_		8.5							3 790	5 290	66.7	25.6 145	30.5 172

Example of identification number of assembled set (For details, see "Identification number and specification".)



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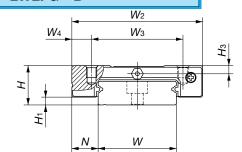
Linear Way L: Wide rail type

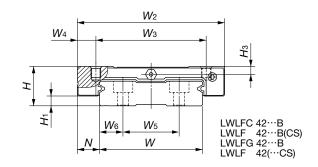
Ball retained type LWLFC···B

LWLF ···B LWLF ...B CS (High carbon steel made) LWLFG···B

Ball non-retained type **LWLF**

LWLF ... CS (High carbon steel made)



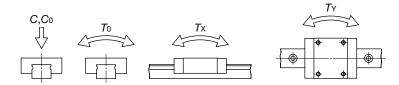


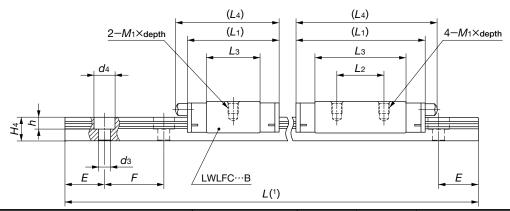
Model number	Interchangeable	M		ensio semb mm		Dimensions of slide unit mm								
Wodel Humber	Interch	Slide unit	Track rail (per 100 mm)	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L 4	<i>M</i> 1×depth
LWLFC 30···B	☆	70								35.5	_	20.5	40	
LWLF 30···B	☆	110	198	15	3	10	50	35	7.5	F0	18	34.8	54	M4×4.5
LWLF 30···B CS	☆	112		15	3 3	10				50		34.0	54	W14×4.5
LWLFG 30···B	☆	170								68.5	35	53.8	73	
LWLFC 42···B	☆	95								41.5	ı	25.3	46	
LWLF 42···B	☆	140	294		4					55	20	39	60	
LWLF 42···B CS	☆	140	234	16	4	9	60	45	7.5	ວວ	20	38	00	M4×4.5
LWLFG 42···B	☆	204								74.5	35	58.3	79	
LWLF 42···CS		140	300		3					55	20	39.5	_	

Note(1): Track rail lengths are shown in Table 10.2 on page B-13 and Table 10.3 on page B-14.

- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (T_0, T_X, T_Y) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: The mark 💢 indicates that interchangeable specification products are available.
 - 2: The appended bolts for mounting track rails are hexagon socket head bolts of JIS B 1176 or equivalent.
 - For stainless steel type Linear Way L, stainless steel bolts are appended.

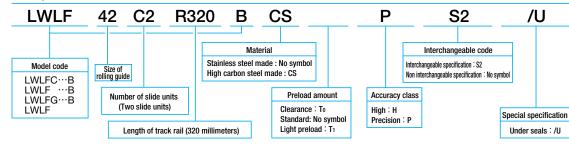
 3: The ball non-retained type models (LWLF 42, LWLF 42···CS) are not provided with an oil holes or grease nipple.
 - 4: The specifications of oil hole and grease nipple are shown on page 99.





			Dime		ns of mm	track	rail			Mounting bolt for track rail mm	Basic dynamic load rating(2) Basic static load rating(2)		Static moment rating(2)			
		l	l	l	١.						С	C ₀	T 0	T X	T _Y	
Нз	W	H 4	W 5	W 6	d 3	d4	h	E	F	Bolt size × length	N	N	N∙m	N∙m	N∙m	
											3 890	4 540	69.1	15.4 107	13.0 89.9	
3.1	30	9	_	_	4.5	8	4.5	20	40	M4 ×12	5 970	8 440	128	48.7 259	40.8 217	
											7 810	12 300	187	100 508	84.3 426	
											5 030	6 050	128	24.8 164	20.8 137	
3.2	42	10	23	9.5	4.5	8	4.5	20	40	M4 ×12	7 050	9 840	209	61.3 333	51.4 280	
											9 200	14 400	305	126 644	106 541	
_											6 320	8 540	186	52.4 291	62.4 347	

Example of identification number of assembled set (For details, see "Identification number and specification".)



Linear Way E

LWE/LWET/LWES

IKO Linear Way E is a linear motion rolling guide, featuring a compact slide unit which performs endless linear motion along a track rail. Two rows of steel balls are arranged in four point contact with the raceways. This design ensures stable high accuracy and rigidity in operations even under fluctuating loads with changing direction and magnitude or complex loads. A wide range of variations in shapes and sizes are available. This series is a compact type suitable for general applications.

Interchangeable

Linear Way E includes interchangeable specification products. The dimensions of slide units and track rails of this specification are individually controlled, so that the slide units and track rails can be combined, added or exchanged freely.

Compact design

Lower, narrower, and shorter. Compactness has been pursued in every dimension.

Flange type and block type

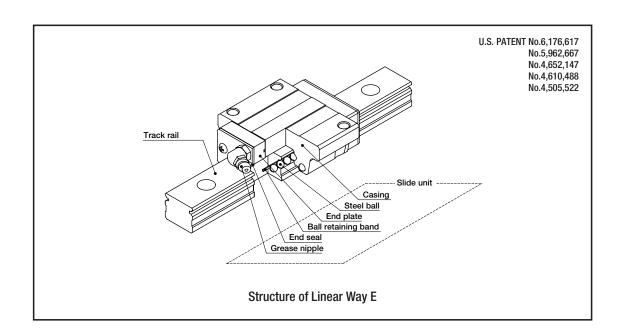
Slide units are available in three different sectional shapes; two flange types for different mounting directions and one block type with a narrow width.

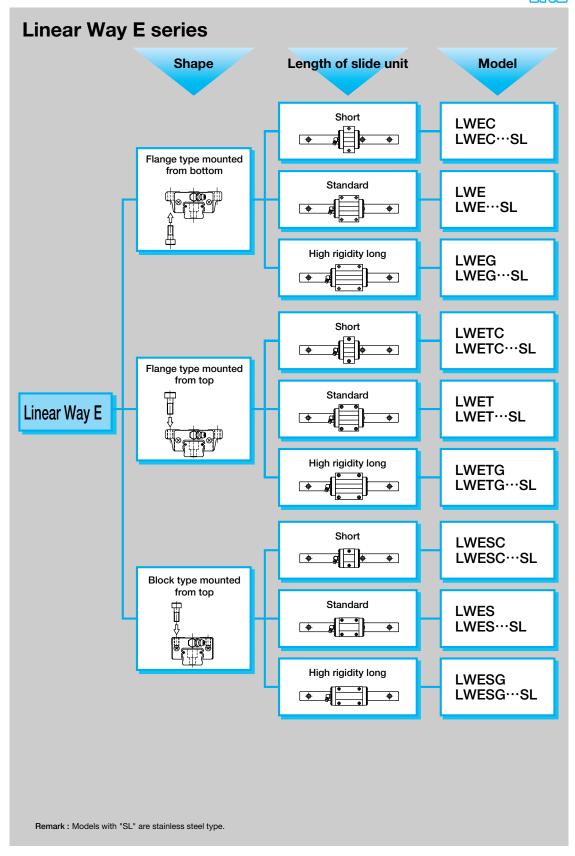
Variable lengths of slide unit

In addition to the standard slide unit, a short type slide unit and a high rigidity long type slide unit both having the same sectional dimensions with the standard slide unit are available.

Stainless steel type

The stainless steel type has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, semiconductor and FPD manufacturing equipment.



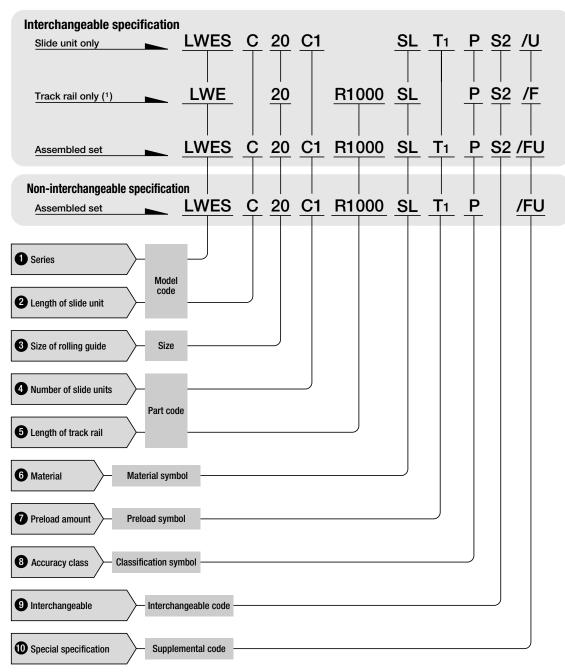


1N=0.102kgf=0.2248lbs. B-31

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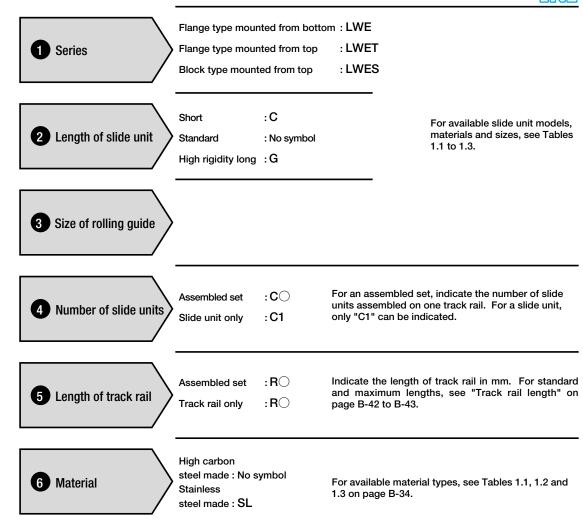
Identification number and specification

The specification of Linear Way E is indicated by the identification number, consisting of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page 78.



Note(1): For the model code of a single track rail of interchangeable specification, indicate "LWE" regardless of the slide unit type to be combined.

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Models and sizes of Linear Way E

Table 1.1 Flange type mounted from bottom

Model		High carbon steel made		Stainless steel made						
Size	Short LWEC	Standard LWE	High rigidity long LWEG	Short LWEC···SL	Standard LWE…SL	High rigidity long LWEG…SL				
15	\Rightarrow	\Rightarrow	☆	$\stackrel{\wedge}{\sim}$	☆	☆				
20	☆	\Rightarrow	☆	$\stackrel{\wedge}{\simeq}$	☆	☆				
25	☆	☆	☆	☆	☆	☆				
30	☆	\Rightarrow	☆	☆	☆	☆				
35	☆	☆	_	_	_	_				
45	_	☆	_	_	_	_				

Table 1.2 Flange type mounted from top

Model		High carbon steel made		Stainless steel made						
Size	Short LWETC	Standard LWET	High rigidity long LWETG	Short LWETC···SL	Standard LWET…SL	High rigidity long				
15	☆	☆	☆	☆	☆	☆				
20	☆	☆	☆	☆	☆	☆				
25	☆	☆	☆	☆	☆	☆				
30	☆	☆	☆	☆	☆	☆				
35	☆	☆	_	_	_	_				
45	_	☆	_	_	_	_				

Table 1.3 Block type mounted from top

	High carbon steel made		Stainless steel made						
Short LWESC	Standard LWES	High rigidity long LWESG	Short LWESC···SL	Standard LWES…SL	High rigidity long LWESG…SL				
\Rightarrow	☆	☆	$\stackrel{\wedge}{\simeq}$	☆	☆				
\Rightarrow	☆	☆	$\stackrel{\wedge}{\simeq}$	☆	☆				
☆	☆	☆	☆	☆	☆				
☆	☆	☆	☆	☆	☆				
☆	☆	_	_	_	_				
_	☆	_	_	_	_				
	LWESC ☆ ☆ ☆	Short Standard LWESC LWES A A A A A A A A A A A A A A A	Short Standard LWESC LWES LWESG ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆	Short LWESC LWES LWESG LWESC…SL ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆	Short Standard LWESC LWES LWESG LWESC···SL LWES···SL				

Remark: The mark ☆ indicates that interchangeable specification products are available.



8 Accuracy class

Clearance :**T**c Standard : No symbol

Specify this item for an assembled set or a single For applicable combinations of accuracy and preload

amount, see Table 2. For details of preload amount, see page 86.

: T1 Light preload $\text{Medium preload }: T_2$

Ordinary : No symbol

: H High :P Precision

Super precision : SP

For applicable combinations of accuracy and preload amount, see Table 2. In case of interchangeable specification products, assemble slide units and track rails of the same class. For details of accuracy, see

page 81.

Table 2 Ac	curacy class	and preioa
------------	--------------	------------

Accuracy class (Symbol) Preload (Symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)
Clearance (Tc)	$\stackrel{\wedge}{\simeq}$	_	_	_
Standard (No symbol)	$\stackrel{\wedge}{\sim}$	☆	☆	0
Light preload (T ₁)	-	☆	☆	0
Medium preload (T2)	1	0	0	0

Remark: The mark ☆ indicates that interchangeable specification products are available.

9 Interchangeable code

Select group 1 : S1 Select group 2 : S2

Specify this item for interchangeable specification products. Assemble track rails and slide units with the same interchangeable code.

Performance and accuracy of "S1" group and "S2" group are the same.

10 Special specification

For applicable special specifications, see Table 3. When several special specifications are required, see Table 4. For details of special specifications, see page 88.

Table 3 Special specifications					
Special specification	Supplemental code	Assembled set	Track rail only	Slide unit only	Dimension
Butt-jointing track rail	Α	0	_	_	
Stainless steel end plates	BS	☆ (¹)	_	1	
Opposite reference surfaces arrangement	D	☆	1	ı	
Specified rail mounting hole positions	E	☆	☆	_	
Caps for rail mounting holes	F	☆	☆	-	
Inspection sheet	I	0	_	-	
Female threads for bellows	J	☆ (²)	☆ (2)	☆ (²)	See Table 5.1,Table 5.2.
Black chrome surface treatment	L	☆	☆	_	
Fluorine black chrome surface treatment	LF	☆	_	-	
Supplied with track rail mounting bolt	MA	☆	☆	1	See Table 6.
Changed size of mounting holes	M4	☆ (³)	☆ (³)	1	See Table 7.
No end seal	N	☆	_	\Rightarrow	
Capillary plates	Q	☆	_	☆	See Table 8.
Seals for special environment	RE	☆ (1)	_	☆ (1)	
Butt-jointing interchangeable track rail	Т	☆ (4)	☆	_	

 $\stackrel{\wedge}{\sim}$

☆

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See Table 9.

See Table 10.

See Table 11.

Note(1): Not applicable to size 35 and 45 models.

Matched sets to be used as an assembled group

(2): Not applicable to stainless steel made interchangeable specification products.

3 : For combinations marked ★. consult **IK** for further information.

4: When several special specifications are required, arrange the supplemental codes alphabetically.

U

٧

W

Υ

Ζ

(3): Applicable to size 15 models.

Under seals

Scrapers

Double end seals

Specified grease

(4) : Not applicable to non-interchangeable specification products.

Remark: In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

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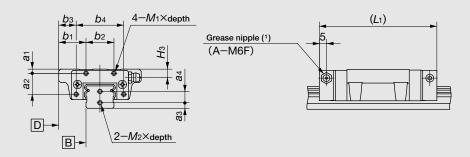
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☆

☆

Table 4 Combination of special specifications BS O DO☆ E — ☆ — FO☆☆☆ I 0 0 0 0 0 J O A A A A O LFOXXXXOX-MA O A A A A O A A A M4 O & & & & O & & & & & N O か か か - O - か か か か RE O & & & O & & & & & - & T - ☆ ☆ ☆ ☆ - - ☆ ☆ ☆ ☆ ☆ ☆ ☆ U O ☆ ☆ ☆ ☆ ◇ O ☆ ☆ ☆ ☆ ☆ ← - ☆ ☆ ☆ V O ☆ ☆ ☆ ☆ ○ ★ ☆ ☆ ☆ ☆ - - ☆ ☆ ☆ w 0 0 0 - 0 0 0 0 0 0 0 0 0 - 0 0 Y O & & & O & & & & & & - & & & & O A BS D E F I J L LF MA M4 N Q RE T U V W Y Remark 1: In the table, the mark \$\psi\$ indicates that it is also applicable to interchangeable specification products. 2: In the table, the mark – indicates that this combination cannot be made.

Table 5.1 Female threads for bellows for flange type slide unit (Supplemental code /J, /JJ)



uı	ш	٠	1111	ı

Model number				Track rail								
Woder Humber	a 1	a 2	<i>b</i> 1	b 2	b 3	b4	<i>M</i> 1×depth	L1(2)	Н з	a 3	a 4	<i>M</i> 2×depth
LWE (T) C 15								58				
LWE (T) 15	3	12	18	16	12	28	M3×6	74	5.7	4	7	M3× 6
LWE(T)G 15								87				
LWE(T)C 20								64				
LWE (T) 20	3	15	19.5	20	12.5	34	M3×6	83	6	4	8	M3× 6
LWE(T)G 20								99				
LWE(T)C 25								76				
LWE (T) 25	3.5	17	23.5	26	16.5	40	M3×6	100	7	5	9	M4× 8
LWE(T)G 25								119				
LWE(T)C 30								83				
LWE(T) 30	5	17	28	34	20	50	M3×6	112	11	6	14	M4× 8
LWE(T)G 30								144				
LWE(T)C 35	6	20	30	40	20	60	Maye	93	13	7	15	B4454 C
LWE(T) 35	O	20	30	40	20	60	M3×6	126	13	′	15	M4× 8
LWE(T) 45	7	26	35	50	23	74	M4×8	138	15	8	19	M5×10

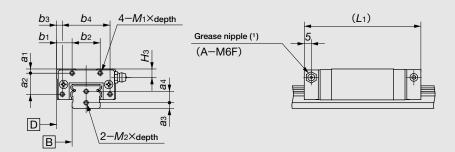
Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Size 15 models are provided with a special specification grease nipple (NPB2 type).

For details of dimensions, consult **IKO** for further information.
(2): The values for a slide unit with female threads for bellows at both ends are shown.

Remark: The above table shows representative model numbers but is also applicable to stainless steel type models of the same size.

Table 5.2 Female threads for bellows for block type slide unit (Supplemental code /J, /JJ)



unit: mm

Model number						Slide unit						Trac	k rail
Wioder Humber	;1	а1	a 2	b 1	b ₂	b 3	b4	<i>M</i> 1×depth	L1(2)	Н з	a 3	a4	<i>M</i> 2×depth
LWESC 1	15								58				
LWES 1	15	3	12	9	16	3	28	M3×6	74	5.7	4	7	M3× 6
LWESG 1	15								87				
LWESC 2	20								64				
LWES 2	20	3	15	11	20	4	34	M3×6	83	6	4	8	M3× 6
LWESG 2	20								99				
LWESC 2	25								76				
LWES 2	25	3.5	17	11	26	4	40	M3×6	100	7	5	9	M4× 8
LWESG 2	25								119				
LWESC 3	30								83				
LWES 3	30	5	17	13	34	5	50	M3×6	112	11	6	14	M4× 8
LWESG 3	30								144				
LWESC 3	35	6	20	15	40	F	60	Move	93	12	7	15	MAY 0
LWES 3	35	O	20	15	40	5	60	M3×6	126	13	/	15	M4× 8
LWES 4	15	7	26	18	50	6	74	M4×8	138	15	8	19	M5×10

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Size 15 models are provided with a special specification grease nipple (NPB2 type).

For details of dimensions, consult **IXO** for further information.

(2): The values for a slide unit with female threads for bellows at both ends are shown.

Remark: The above table shows representative model numbers but is also applicable to stainless steel type models of the same size.

Table 6 Recommended track rail mounting bolt size (Supplemental code /MA)

Model number	Recommended bolt size
LWE 15	M 3×16
LWE 15	M 4×16(1)
LWE 20	M 5×16
LWE 25	M 6×20
LWE 30	M 6×25
LWE 35	M 8×30
LWE 45	M10×35

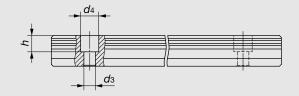
Note(1): Applicable to the track rail of supplemental code "/M4" of special Specification.

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.

2: Hexagon socket head bolts of strength division 12.9 of JIS B

- 1176 are recommended.3: For stainless Linear Way E, stainless steel bolts are appended when specified supplemental code "/MA".

Table 7 Changed size of mounting holes (Supplemental code /M4)



unit: mm

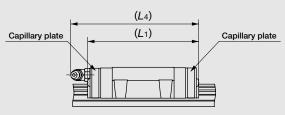
Model number	d 3	d ₄	h
LWE 15	4.5	8	6

Remark: The above table shows a representive model number but is applicable to all models of size 15.

1mm=0.03937inch

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Table 8 Slide unit with Capillary plates (Supplemental code /Q)



unit : mn

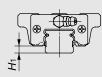
Model numbe	r <i>L</i> 1	L 4
LWEC 15	52	55
LWE 15	68	71
LWEG 15	81	83
LWEC 20	58	71
LWE 20	78	91
LWEG 20	94	106
LWEC 25	70	83
LWE 25	94	107
LWEG 25	113	126

		unit . mm
Model number	<i>L</i> ₁	L ₄
LWEC 30	80	91
LWE 30	109	119
LWEG 30	141	151
LWEC 35	90	102
LWE 35	123	135
LWE 45	138	148

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Table 9 H1 dimension of slide unit with under seals (Supplemental code /U)

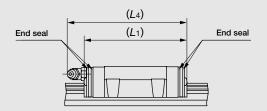
unit : mm



Model number	H ₁
LWE 15	5
LWE 20	5
LWE 25	6
LWE 30	7
LWE 35	8
LWE 45	10

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Table 10 Slide unit with double end seals (Supplemental code /V, /VV)



unit : mm

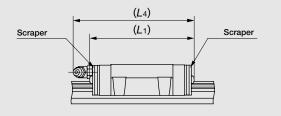
Model nu	mber	<i>L</i> ₁	L 4
LWEC	15	48	50
LWE	15	64	66
LWEG	15	76	78
LWEC	20	54	68
LWE	20	73	87
LWEG	20	89	103
LWEC	25	67	80
LWE	25	91	104
LWEG	25	110	123

		unit: min
Model number	<i>L</i> ₁	L ₄
LWEC 30	78	89
LWE 30	107	118
LWEG 30	138	150
LWEC 35	88	101
LWE 35	121	134
LWE 45	137	148

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.

2: The values for a slide unit with double end seals at both ends are shown.

Table 11 Slide unit with scrapers (Supplemental code /Z, /ZZ)



unit : mm

Model number	<i>L</i> ₁	L 4
LWEC 15	48	50
LWE 15	64	66
LWEG 15	77	79
LWEC 20	55	69
LWE 20	75	88
LWEG 20	90	104
LWEC 25	69	81
LWE 25	93	105
LWEG 25	112	124

Model number	<i>L</i> ₁	L 4		
LWEC 30	79	90		
LWE 30	108	119		
LWEG 30	140	151		
LWEC 35	89	101		
LWE 35	122	134		
LWE 45	138	148		

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.

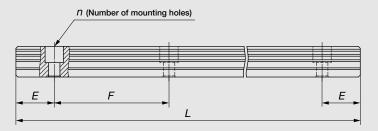
2: The values for a slide unit with scrapers at both ends are shown.

Track rail length

Standard and maximum lengths of track rails are shown in Tables 12.1 and 12.2. Track rails in any length are also available. Simply indicate the necessary length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IK** for further information.

- For non-interchangeable track rails longer than the maximum length shown in Tables 12.1 and 12.2, butt-jointing track rails are available upon request. In this case, indicate "/A" in the identification number.
- E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.

Table 12.1 Standard and maximum lengths of high carbon steel track rails

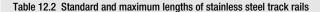


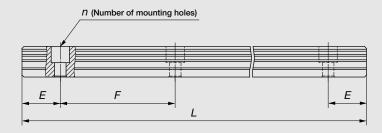
unit: mm

Mode	el number	LWE 15	LWE 20	LWE 25	LWE 30	LWE 35	LWE 45		
		160 (3)	220 (4)	220 (4)	280 (4)	280 (4)	570 (6)		
		220 (4)	280 (5)	280 (5)	440 (6)	440 (6)	885 (9)		
		280 (5)	340 (6)	340 (6)	600(8)	600(8)	1 200 (12)		
		340 (6)	460 (8)	460 (8)	760 (10)	760 (10)	1 620 (16)		
Standard langth /	(n)	460 (8)	640 (11)	640 (11)	1 000 (13)	1 000 (13)	2 040 (20)		
Standard length $L(n)$		640 (11)	820 (14)	820 (14)	1 240 (16)	1 240 (16)	2 460 (24)		
		820 (14)	1 000 (17)	1 000 (17) 1 640 (21)		1 640 (21)	2 985 (29)		
			1 240 (21)	1 240 (21)	2 040 (26)	2 040 (26)			
				1 600 (27)	2 520 (32)	2 520 (32)			
					3 000 (38)	3 000 (38)			
Pitch of mounting	holes F	60	60	60	80	80	105		
E (1)	20 20		20 20		20 20		20	20	22.5
Standard range	incl.	6	8	9	9	10	12		
of <i>E</i> (²)	under	36	38	39	49	50	64.5		
Maximum length (3)		1 600 (2 980)	2 200 (2 980)	2 980 (4 000)	3 000 (3 960)	3 000 (3 960)	2 985 (3 930)		

Note(1): When specifying a butt-jointing interchangeable track rail (supplemental code "/T"), pay attention to the E dimension at the butt-jointing part.
(2): Not applicable to the track rail with female threads for bellows (supplemental code "/J").
(3): Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult **IKU** for further information.

Remark: The above table shows representative model numbers but is applicable to all models of the same size.





Mode	el number	LWE 15···SL	LWE 20···SL	LWE 25···SL	LWE 30···SL
Standard length	L (n)	160(3) 220(4) 280(5) 340(6) 460(8) 640(11) 820(14)	220(4) 280(5) 340(6) 460(8) 640(11) 820(14) 1 000(17)	220(4) 280(5) 340(6) 460(8) 640(11) 820(14) 1 000(17)	280(4) 440(6) 600(8) 760(10) 1 000(13)
Pitch of mounting I	noles F	60	60	60	80
E (1)		20	20	20	20
Standard range	incl.	6	8	9	9
of <i>E</i> (2)	under	36	38	39	49
Maximum length (3)(4)		1 200 (1 600)	1 200 (1 960)	1 200 (1 960)	1 200 (1 960)

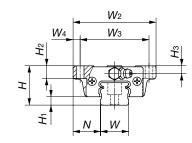
Note(1): When specifying a butt-jointing interchangeable track rail (supplemental code "/T"), pay attention to the E dimension at the butt-

- (2): Not applicable to the track rail with female threads for bellows (supplemental code "/J").
- (3): The E dimension for the rail with the maximum length is 1/2 of the F dimension.
- (4): Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult IKB for further information.

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Flange type mounted from bottom **LWEC** LWE **LWEG** LWEC···SL (Stainless steel made) LWE ...SL (Stainless steel made)

LWEG···SL (Stainless steel made)

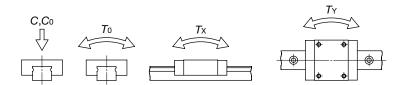


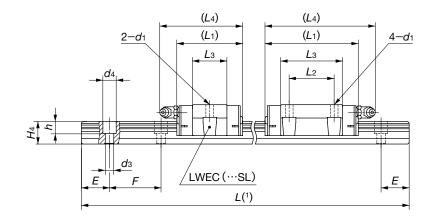
Model number		Mass (Ref.) Mass (Ref.) Slide unit Track rack rack rack rack rack rack rack		Dimensions of assembly mm			Dimensions of slide unit mm								
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	L 1	L2	Lз	L4	d1	
LWEC 15	☆	0.11								41		22.4	45		
LWEC 15···SL	☆	0.11								41		22.4	45		
LWE 15	☆	0.18	1.57	24	E 0	5.8 18.5	E2	52 41	1 5.5	57	26	38.4	61	4.5	
LWE 15···SL	☆			24	5.6		52			57	20	30.4	61	4.5	
LWEG 15	☆		0.24								70	36	51.1	74	
LWEG 15···SL	☆	0.24								70	30	51.1	74		
LWEC 20	☆	0.10	0.18								47	_	24.5	59	
LWEC 20···SL	☆	0.18								47		24.5	59		
LWE 20	☆	0.20	2.28	28	6	19.5	59	49	5	66.5	32	44	79	5.5	
LWE 20···SL	☆	0.30	2.28	28	O	19.5	59	49	ס	00.5	32	44	/9	5.5	
LWEG 20	☆	0.40								82	45	59.9	95		
LWEG 20···SL	☆	0.40								02	45	59.9	95		

Note(1): Track rail lengths are shown in Table 12.1 on page B-42 and Table 12.2 on page B-43.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Tx columns apply to one slide unit, and the lower values apply to two slide units in close contact.

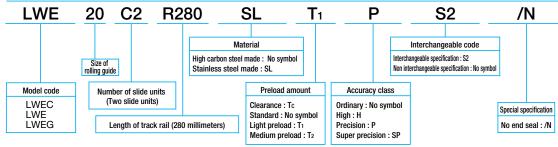
Remark 1 : The mark 🕏 indicates that interchangeable specification products are available.





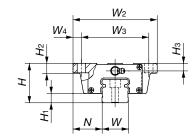
								Basic dynamic load rating(2)	Basic static load rating(2)	Statio	moment rat	ing(²)										
	ı		l	I	l	I	I		С	C ₀	T 0	Tx.	T Y									
H 2	Н з	W	H4	d 3	d4	h	E	F	N	N	N∙m	N∙m	N∙m									
												5 240	5 480	43.8	21.3 149	21.3 149						
7	4.5	15	14.5	3.6	6.5	4.5	20	60	7 640	9 390	75.1	57.6 333	57.6 333									
									9 340	12 500	100	99.5 533	99.5 533									
																		7 570	7 340	78.9	31.5 235	31.5 235
9	5.5	20	16	6	9.5	8.5	20	60	11 600	13 400	145	95.6 561	95.6 561									
									14 400	18 300	197	172 918	172 918									

Example of identification number of assembled set (For details, see "Identification number and specification".)



^{2:} Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended for high carbon steel model. The hexagon socket head bolts of JIS B1176 property division A2-70 or equivalent are recommended for stainless steel models. Recommended bolt sizes are shown in Table 6 on page B-39. 3: For grease nipple specifications, see page 99.

Flange type mounted from bottom **LWEC** LWE **LWEG** LWEC···SL (Stainless steel made) LWE ···SL (Stainless steel made) LWEG···SL (Stainless steel made)



Model number	Interchangeable	Mass (nension ssemb mm					Dime	nsions mi	of slide m	unit	
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L4	d ₁
LWEC 25	☆	0.00										22	71	
LWEC 25···SL	☆	0.33								59		32	71	
LWE 25	☆	0.55	2.00	22	7	25	73		6.5	83	25	F.C.	0.5	
LWE 25···SL	☆	0.55	3.09	33	/	25	/3	60	6.5	83	35	56	95	7
LWEG 25	☆	0.73								102	50	75	114	
LWEG 25···SL	☆	0.73								102	50	75	114	
LWEC 30	☆	0.58								68		36	78	
LWEC 30···SL	☆	0.58								68		36	/8	
LWE 30	☆	0.99	5.09	42	10	31	90	72	9	97	40	64.8	107	9
LWE 30···SL	☆	0.99	5.09	42	10	31	90	/2	9	97	40	64.8	107	9
LWEG 30	☆	1.50								128.5	60	96.5	139	
LWEG 30···SL	☆	1.50								128.5	bU	96.5	139	
LWEC 35	☆	0.84	6.85	48	11	33	100	82		78	_	41.6	90	
LWE 35	☆	1.52	0.85	48		33	100	82	9	111	50	74.6	123	9
LWE 45	☆	2.46	11.2	60	14	37.5	120	100	10	125	60	81.4	136	11

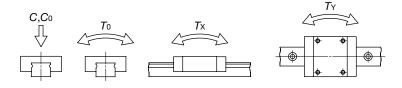
Note(¹): Track rail lengths are shown in Table 12.1 on page B-42 and Table 12.2 on page B-43.

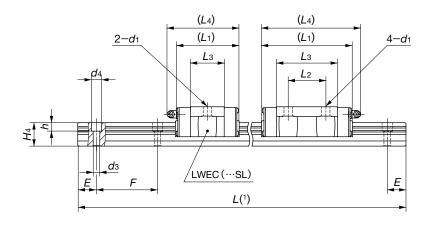
(²): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The mark ☆ indicates that interchangeable specification products are available.

2 : Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended for high carbon steel model. The hexagon socket head bolts of JIS B1176 property division A2-70 or equivalent are recommended for stainless steel models. Recommended bolt sizes are shown in Table 6 on page B-39.

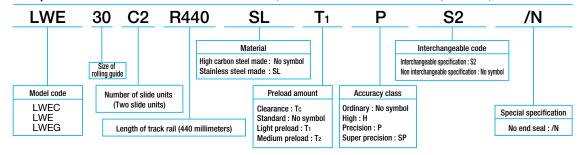
3: For grease nipple specifications, see page 99.



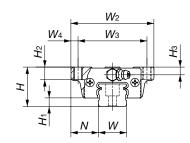


			Г	Dimensi	ons of t mm	rack ra	il		Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment rati	ng(²)
				l				F 60	С	C ₀	T 0	Tx	TY
H2	Нз	W	H4	d 3	d4	h	Ε	F	N	N	N∙m	N∙m	N∙m
									12 400	12 300	153	71.8 480	71.8 480
10	6.5	23	19	7	11	9	20	60	18 100	21 100	262	195 1 090	195 1 090
									22 200	28 200	349	336 1 740	336 1 740
									20 600	18 800	287	129 855	129 855
10	8	28	25	7	11	9	20	80	29 500	31 300	479	328 1 920	328 1 920
									39 200	47 000	718	704 3 670	704 3 670
				_					29 900	26 800	412	176 1 190	162 1 100
13	10	34	28	9	14	12	20	80	29 900 42 900	44 700	686	448 2 660	412 2 450
15	13	45	34	11	17.5	14	22.5	105	61 100	60 200	1 210	672 4 070	618 3 750

Example of identification number of assembled set (For details, see "Identification number and specification".)



Flange type mounted from top **LWETC LWET LWETG** LWETC ··· SL (Stainless steel made) LWET ···SL (Stainless steel made) LWETG···SL (Stainless steel made)



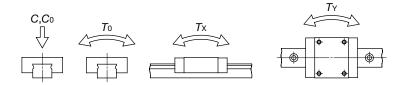
Model number	Interchangeable	Mass	(Ref.)		nension assemb mm					Dime	nsions m	of slide m	unit	
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W3	W 4	<i>L</i> 1	L2	L3	L4	<i>M</i> 1
LWETC 15	☆	0.11								41		22.4	45	
LWETC 15···SL	☆	0.11								41		22.4	45	
LWET 15	☆	0.10	1.57	24	5.8	18.5	52	41	5.5	57	26	38.4	61	M 5
LWET 15···SL	☆	0.18	1.57	24	5.6	10.5	52	41	5.5	57	20	30.4	01	IVI 5
LWETG 15	☆	0.24								70	36	51.1	74	
LWETG 15···SL	☆									70	30	51.1	74	
LWETC 20	☆									47	_	24.5	59	
LWETC 20···SL	☆	0.16								47		24.5	อย	
LWET 20	☆	0.30	2.28	28	6	19.5	59	49	5	66.5	32	44	79	M 6
LWET 20···SL	☆	0.30	2.28	28	O	19.5	59	49	5	00.5	32	44	/9	IVI 6
LWETG 20	☆	0.40								82	45	E0.0	95	
LWETG 20···SL	☆									82	45	59.9	95	

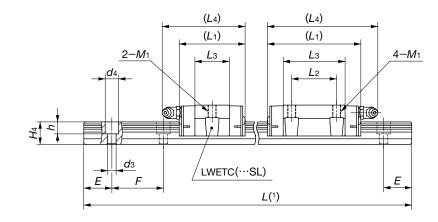
Note(1): Track rail lengths are shown in Table 12.1 on page B-42 and Table 12.2 on page B-43.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tx columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1 : The mark 🕏 indicates that interchangeable specification products are available.

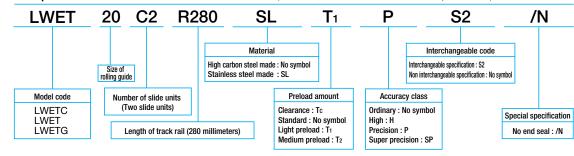
2: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended for high carbon steel model. The hexagon socket head bolts of JIS B1176 property division A2-70 or equivalent are recommended for stainless steel models. Recommended bolt sizes are shown in Table 6 on page B-39. 3: For grease nipple specifications, see page 99.





			Г	Dimensi	ons of	track ra	il		Basic dynamic load rating(2)	Basic static load rating(2)	Statio	moment rat	ing(²)
	l		l	l .	١.	١.	_	_	С	C ₀	T 0	Tx	<i>T</i> Y
H2	Нз	W	H4	d 3	d4	h	Ε	F	N	N	N∙m	N∙m	N∙m
									5 240	5 480	43.8	21.3 149	21.3 149
7	4.5	15	14.5	3.6	6.5	4.5	20	60	7 640	9 390	75.1	57.6 333	57.6 333
									9 340	12 500	100	99.5 533	99.5 533
								9 340 7 570		7 340	78.9	31.5 235	31.5 235
9	5.5	20	16	6	9.5	8.5	20	60	11 600	13 400	145	95.6 561	95.6 561
									14 400	18 300	197	172 918	172 918

Example of identification number of assembled set (For details, see "Identification number and specification".)



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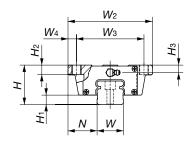
Flange type mounted from top

LWETC

LWET

LWETC

LWETC ····SL (Stainless steel made)
LWET ····SL (Stainless steel made)
LWETG ····SL (Stainless steel made)



Model number	Interchangeable	Mass	(Ref.)		nension ssemb mm					Dime	nsions m	of slide m	unit	
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W2	W 3	W 4	<i>L</i> 1	L2	L3	L4	<i>M</i> 1
LWETC 25	☆	0.00								F0	_	22	71	
LWETC 25···SL	☆	0.33								59	_	32	71	
LWET 25	☆	0.55	0.00	00	_	0.5	70	00	0.5	00	0.5	F0	0.5	
LWET 25···SL	☆	0.55	3.09	33	7	25	73	60	6.5	83	35	56	95	M 8
LWETG 25	☆	0.73								100	F0	7.	111	
LWETG 25···SL	☆	0.73								102	50	75	114	
LWETC 30	☆	0.50								-00			70	
LWETC 30···SL	☆	0.58								68	_	36	78	
LWET 30	☆		5 00	40	40			70			40		407	
LWET 30····SL	☆	0.99	5.09	42	10	31	90	72	9	97	40	64.8	107	M 10
LWETG 30	☆	4.50								400 5		00.5	100	
LWETG 30····SL	☆	1.50								128.5	60	96.5	139	
LWETC 35	☆	0.84	0.05	40	44		400	0.5		78	_	41.6	90	B4 46
LWET 35	☆	1.52	6.85	48	11	33	100	82	9	111	50	74.6	123	M 10
LWET 45	☆	2.46	11.2	60	14	37.5	120	100	10	125	60	81.4	136	M 12

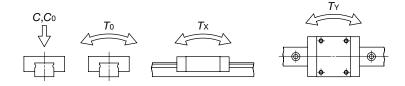
Note(1): Track rail lengths are shown in Table 12.1 on page B-42 and Table 12.2 on page B-43.

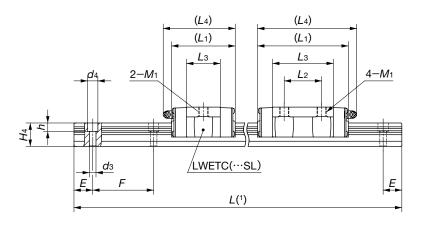
(2): The directions of basic dynamic load rating (*C*), basic static load rating (*C*o) and static moment rating (*T*o, *Tx*, *Ty*) are shown in the sketches below. The upper values in the *Tx* and *Ty* columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The mark ☆ indicates that interchangeable specification products are available.

2: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended for high carbon steel model. The hexagon socket head bolts of JIS B1176 property division A2-70 or equivalent are recommended for stainless steel models. Recommended bolt sizes are shown in Table 6 on page B-39.

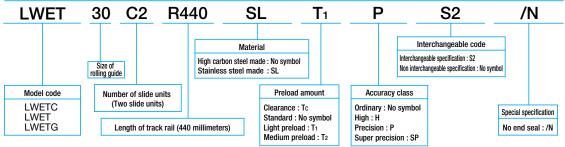
3: For grease nipple specifications, see page 99.





			C)imensi	ons of t mm	rack ra	il		Basic dynamic load rating(2)	Basic static load rating(2)	Statio	moment rat	ing(²)
					,,		_	_	С	C 0	T 0	T x	T Y
H2	Нз	W	H4	d 3	d4	h	Ε	F	N	N	N∙m	N∙m	N∙m
									12 400	12 300	153	71.8 480	71.8 480
10	6.5	23	19	7	11	9	9 20 6		18 100	21 100	262	195 1 090	195 1 090
									22 200	28 200	349	336 1 740	336 1 740
								20 600		18 800	287	129 855	129 855
10	8	28	25	7	11	9	20	80	29 500	31 300	479	328 1 920	328 1 920
								39 200		47 000	718	704 3 670	704 3 670
40	10		-			40	-		29 900	26 800	412	176 1 190	162 1 110
13	10	34	28	9	14	12	20	0 80	44 700	686	448 2 660	412 2 450	
15	13	45	34	11	17.5	14	22.5	105	61 100	60 200	1 210	672 4 070	618 3 750

 $\textbf{Example of identification number of assembled set} \quad \textbf{(For details, see "Identification number and specification".)}$



Linear Way E: Block type

Block type mounted from top

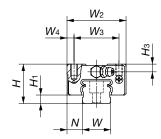
LWESC LWES

LWESG

LWESC ···SL (Stainless steel made)

LWES ···SL (Stainless steel made)

LWESG ···SL (Stainless steel made)



Model number	Interchangeable	Mass	(Ref.)		nension ssembl mm					Dime		of slide m	unit
	Interch	Slide unit kg 0.09	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L 3	L4
LWESC 15	☆	0.00								41	_	22.4	45
LWESC 15···SL	☆	0.09								41		22.4	45
LWES 15	☆	0.14	1.57	24	5.8	9.5	34	26	4	57	26	38.4	61
LWES 15···SL	☆	0.14	1.57	24	5.6	9.0	34	20	4	57	20	30.4	01
LWESG 15	☆	0.18								70	36	51.1	74
LWESG 15···SL	☆									70	30	31.1	/4
LWESC 20	☆									47	_	24.5	59
LWESC 20···SL	☆	0.15								47		24.5	
LWES 20	☆	0.25	2.28	28	6	11	42	32	5	66.5	32	44	79
LWES 20···SL	☆	0.25	2.20	20	0	11	42	32	ິ	00.0	32	44	/3
LWESG 20	☆	0.33								82	45	59.9	95
LWESG 20···SL	☆	0.33								02	45	59.9	90

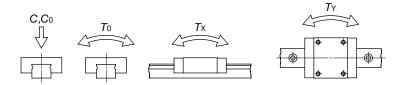
Note(1): Track rail lengths are shown in Table 12.1 on page B-42 and Table 12.2 on page B-43.

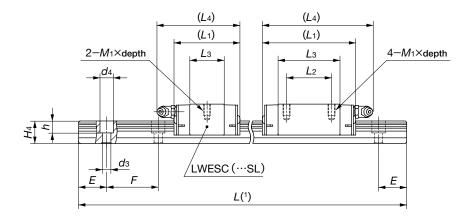
(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The mark ☆ indicates that interchangeable specification products are available.

2: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended for high carbon steel model. The hexagon socket head bolts of JIS B1176 property division A2-70 or equivalent are recommended for stainless steel models. Recommended bolt sizes are shown in Table 6 on page B-39.

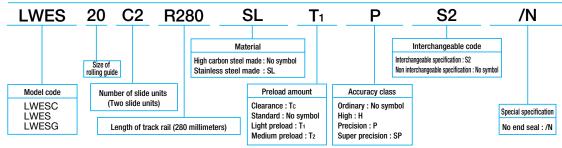
3: For grease nipple specifications, see page 99.





			С	Dimensi	ons of t	track ra	il		Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ting(²)
	1		l		l .	l .	l _	l _	С	C ₀	T 0	Tx.	T Y
<i>M</i> 1×depth	Нз	W	H 4	d 3	d4	h	Ε	F	N	N	N∙m	N∙m	N∙m
									5 240	5 480	43.8	21.3 149	21.3 149
M4×7	4.5	15	15 14.5 3.6 6.5 4.5 20		60	7 640	9 390	75.1	57.6 333	57.6 333			
							9 340	12 500	100	99.5 533	99.5 533		
									7 570	7 340	78.9	31.5 235	31.5 235
M5×8	5.5 20 16 6 9.5 8.5 20		60	11 600	13 400	145	95.6 561	95.6 561					
			20 16 6 9.5 8.5 20			14 400	18 300	197	172 918	172 918			

Example of identification number of assembled set (For details, see "Identification number and specification".)



IK Linear Way E: Block type

Block type mounted from top

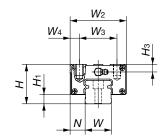
LWESC LWES

LWESG

LWESC ···SL (Stainless steel made)

LWES ···SL (Stainless steel made)

LWESG ···SL (Stainless steel made)



Model number	Interchangeable	Mass	(Ref.)		nension ssembl mm					Dime	nsions mi	of slide m	unit
	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L4
LWESC 25	☆	0.26								F0		22	71
LWESC 25···SL	☆	0.26								59		32	71
LWES 25	☆	0.40	0.00		_	10.5	40			-00			0.5
LWES 25···SL	☆	0.42	3.09	33	7	12.5	48	35	6.5	83	35	56	95
LWESG 25	☆	0.55								400		7.	444
LWESG 25···SL	☆	0.55								102	50	75	114
LWESC 30	☆	0.40								00			70
LWESC 30···SL	☆	0.46								68		36	78
LWES 30	☆	0.70	F 00	40	40	10		40	4.0	07	40	24.0	407
LWES 30···SL	☆	0.78	5.09	42	10	16	60	40	10	97	40	64.8	107
LWESG 30	☆	1.10								100.5	00	00.5	100
LWESG 30···SL	☆	1.13								128.5	60	96.5	139
LWESC 35	☆	0.67	0.05	40	44	10	7.0		4.0	78		41.6	90
LWES 35	☆	1.21	6.85	48	11	18	70	50	10	111	50	74.6	123
LWES 45	☆	2.05	11.2	60	14	20.5	86	60	13	125	60	81.4	136

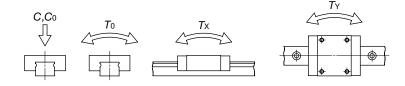
Note(1): Track rail lengths are shown in Table 12.1 on page B-42 and Table 12.2 on page B-43.

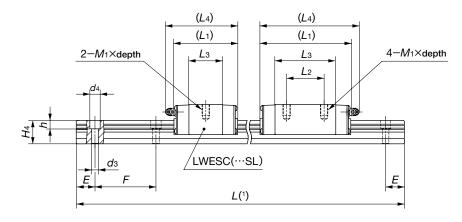
(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1 : The mark 🛱 indicates that interchangeable specification products are available.

2: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended for high carbon steel model. The hexagon socket head bolts of JIS B1176 property division A2-70 or equivalent are recommended for stainless steel models. Recommended bolt sizes are shown in Table 6 on page B-39.

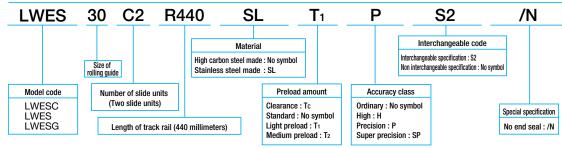
3: For grease nipple specifications, see page 99.





			С	Dimensi	ons of t	rack ra	il		Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ting(²)
			1	ı			ı	I	С	C ₀	T 0	Tx	<i>T</i> Y
<i>M</i> 1×depth	Нз	W	H 4	dз	d4	h	E	F	N	N	N∙m	N∙m	N∙m
							9 20		12 400	12 300	153	71.8 480	71.8 480
M 6× 9	6.5	23	19	7	11	9 20 6		60	18 100	21 100	262	195 1 090	195 1 090
					22 200	28 200	349	336 1 740	336 1 740				
									20 600	18 800	287	129 855	129 855
M 8×12	8	28	25	7	11	9	20	80	29 500	31 300	479	328 1 920	328 1 920
									39 200	47 000	718	704 3 670	704 3 670
									29 900	26 800	412	176 1 190	162 1 100
M 8×12	10	34	28	9	14	12	20	80	42 900	44 700	686	448	412
									42 900	44 700	080	2 660	2 450
M10×15	13	45	34	11	17.5	14	22.5	105	61 100	60 200	1 210	672 4 070	618 3 750

Example of identification number of assembled set (For details, see "Identification number and specification".)



Low Decibel Linear Way E

LWE···Q/LWES···Q

IKO Low Decibel Linear Way E is a linear motion rolling guide for smooth and quiet motion. Its low noise characteristic has been achieved by adopting optimum design based on a thorough analysis of ball recirculation behavior and sound quality. Plastic separators are incorporated to eliminate direct contact between balls and thus achieve smooth and quiet motion.

Low Decibel Linear Way E is suitable for production equipment or machinery, in which a large number of linear motion rolling guides are incorporated, and can be used to help reduce the noise level in factory and create a human-friendly environment.

Low decibel

Plastic separators are incorporated to eliminate direct contact between balls and thus achieve smooth and quiet motion.

Compact design

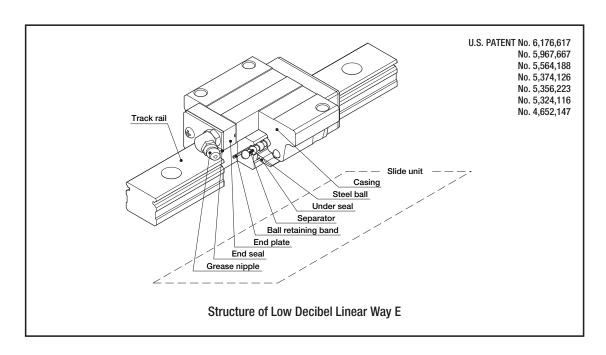
Lower, narrower, and shorter. Compactness has been pursued in every dimension.

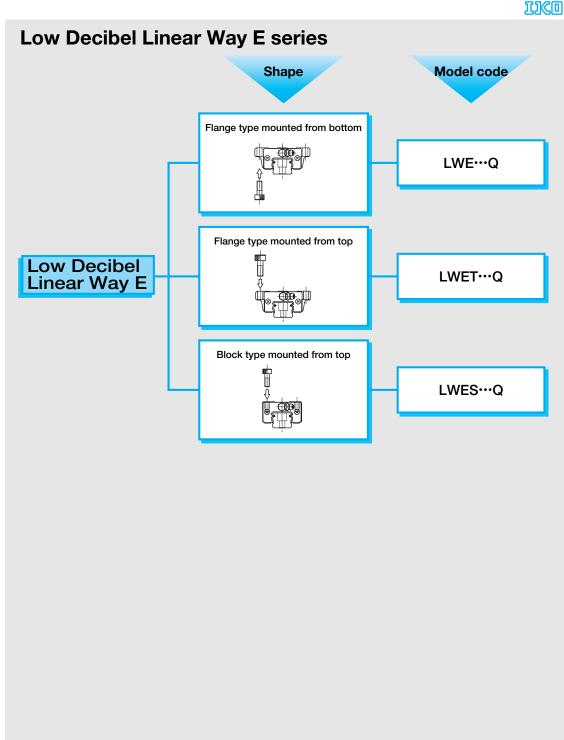
Flange type and block type

Slide units are available in three different sectional shapes; two flange types for different mounting directions and one block type with a narrow width.

Dimensional interchangeability with Linear Way E

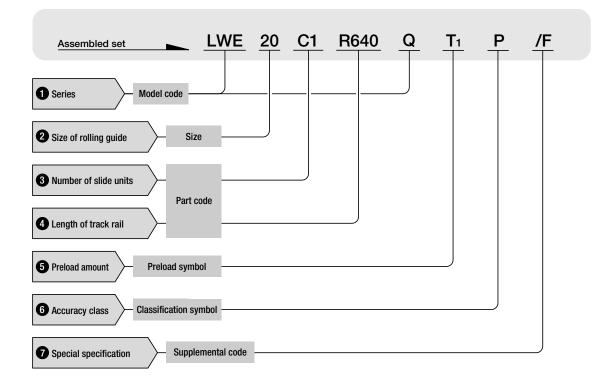
The mounting dimensions are the same as those of Linear Way E. So this guide can replace Linear Way E (LWE) with little modifications of machines or





Identification number and specification

The specification of Low Decibel Linear Way E is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol and any supplemental codes. For details of each specification, see page 78.



1 Series

Flange type mounted from bottom: LWE ...Q
Flange type mounted from top : LWET...Q

Block type mounted from top : LWES···Q

For available slide unit models and sizes, see Table 1.

2 Size of rolling guide

Model		High carbon steel made	
Size	Flange type mounted from bottom LWE···Q	Flange type mounted from top LWET···Q	Block type mounted from top LWES…Q
15	0	0	0
20	0	0	0
25	0	0	0
30	0	0	0
35	0	0	0

3 Number of slide units

: **C** \bigcirc

Indicate the number of slide units assembled on one track rail.

4 Length of track rail

: RO

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-67.

5 Preload amount

Standard : No symbol

Light preload : T1

For applicable combinations of accuracy and preload amount, see Table 2. For details of preload amount, see page 86.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

B-59

Ordinary : No symbol

: н High : P Precision

For applicable combinations of accuracy and preload amount, see Table 2. For details of accuracy, see page 81.

Super precision : SP

Tahle 2	Accuracy	rlace	and	nrelnar	ł

Table 2 Accuracy class and proload				
Accuracy class (Symbol) Preload (Symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)
Standard (No symbol)	0	0	0	0
Light preload (T1)	_	0	0	0

7 Special specification

For applicable special specifications, see Table 3. When several special specifications are required, see Table 4. For details of special specifications, see page 88.

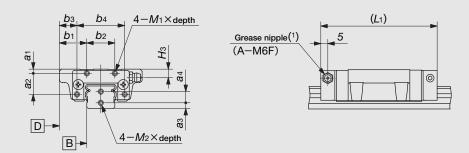
Table 3 Special specifications

Special specification	Supplemental code	Assembled set	Dimension
Opposite reference surfaces arrangement	D	0	
Specified rail mounting hole positions	Е	0	
Caps for rail mounting holes	F	0	
Inspection sheet	I	0	
Female threads for bellows	J	0	See Table 5.1, Table 5.2.
Black chrome surface treatment	L	0	
Fluorine black chrome surface treatment	LF	0	
Supplied with track rail mounting bolt	MA	0	See Table 6.
Changed size of mounting holes	M4	O (1)	See Table 7.
Capillary plates	Q	0	See Table 8.
Double end seals	V	0	See Table 9.
Matched sets to be used as an assembled group	W	0	
Specified grease	Υ	0	
Scrapers	Z	0	See Table 10.

Note(1): Applicable to size 15 models.

Table 4 Combination of special specifications
E
F O O
I O O O
J O O O O
L 0 0 0 0 0
LF O O O O O -
MA O O O O O O
M4
Q O O O O O O O
V O O O O O O O O O
W O - O O O O O O O
Y 0 0 0 0 0 0 0 0 - 0 0
z 0 0 0 0 0 0 0 0 - 0 0 0
DEFIJLFMAM4QVWY
Remark: When several special specifications are required, arrange the supplemental codes alphabetically.

Table 5.1 Female threads for bellows for flange type slide unit (Supplemental code /J, /JJ)



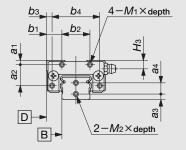
Model number		Slide unit									Track rail		
Woder Humber	a 1	a 2	b 1	b 2	b 3	b ₄	<i>M</i> 1×depth	<i>L</i> ₁ (²)	Н з	a 3	a 4	<i>M</i> 2×depth	
LWE(T) 15Q	3	12	18	16	12	28	M3×6	74	5.7	4	7	M3×6	
LWE(T) 20Q	3	15	19.5	20	12.5	34	M3×6	83	6	4	8	M3×6	
LWE (T) 25Q	3.5	17	23.5	26	16.5	40	M3×6	100	7	5	9	M4×8	
LWE(T) 30Q	5	20	25	40	20	50	M3×6	111	10	6	14	M4×8	
LWE(T) 35Q	6	20	30	40	20	60	M3×6	125	11	7	15	M4×8	

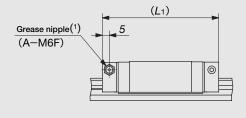
Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Size 15 models are provided with a special specification grease nipple (NPB2 type). For details of dimensions, consult **IKB** for further information.

(2): The values for a slide unit with female threads for bellows at both ends are shown.

Table 5.2 Female threads for bellows for block type slide unit (Supplemental code /J, /JJ)





unit: mm

M	lodel number		Slide unit									Track rail		
101	louer number	a 1	a 2	b 1	b 2	b 3	b4	<i>M</i> 1×depth	$L_1(^2)$	Н з	a 3	a 4	<i>M</i> 2×depth	
LW	/ES 15···Q	3	12	9	16	3	28	M3×6	74	5.7	4	7	M3×6	
LW	/ES 20Q	3	15	11	20	4	34	M3×6	83	6	4	8	M3×6	
LW	/ES 25Q	3.5	17	11	26	4	40	M3×6	100	7	5	9	M4×8	
LW	/ES 30Q	5	20	10	40	5	50	M3×6	111	10	6	14	M4×8	
LW	/ES 35Q	6	20	15	40	5	60	M3×6	125	11	7	15	M4×8	

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Size 15 models are provided with a special specification grease nipple (NPB2 type). For details of dimensions, consult **IK** for further information.

(2): The values for a slide unit with female threads for bellows at both ends are shown.

Table 6 Recommended track rail mounting bolt size (Supplemental code /MA)

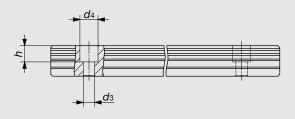
Model number	Recommended bolt size
LWE 15 O	M3×16
LWE 15···Q	M4×16(1)
LWE 20···Q	M5×16
LWE 25···Q	M6×20
LWE 30···Q	M6×25
LWE 35···Q	M8×30

Note(1): Applicable to the track rail of supplemental code "/M4" of special

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.

2: Hexagon socket head bolts of strength division 12.9 of JIS B 1176 are recommended.

Table 7 Changed size of mounting holes (Supplemental code /M4)

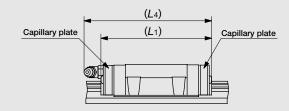


unit: mm

Model number	d 3	d ₄	h
LWE 15···Q	4.5	8	6

Remark: The above table shows a representative model number but is applicable to all models of size 15.

Table 8 Slide unit with Capillary plates (Supplemental code /Q)

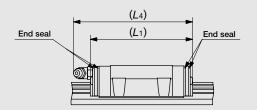


unit: mm

Model number	<i>L</i> ₁	L 4
LWE 15···Q	68	71
LWE 20···Q	78	91
LWE 25Q	94	107
LWE 30···Q	109	119
LWE 35···Q	124	135

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Table 9 Slide unit with double end seals (Supplemental code /V, /VV)

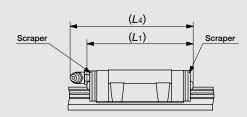


unit: mm

Model number	<i>L</i> 1	L 4
LWE 15····Q	64	66
LWE 20···Q	73	87
LWE 25Q	91	104
LWE 30····Q	107	118
LWE 35····Q	121	134

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Table 10 Slide unit with scrapers (Supplemental code /Z, /ZZ)



unit: mm

Model number	<i>L</i> ₁	L4
LWE 15···Q	64	66
LWE 20···Q	75	88
LWE 25Q	93	105
LWE 30···Q	109	119
LWE 35···Q	123	135

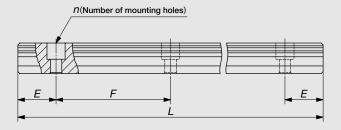
Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Track rail length

Standard and maximum lengths of track rails are shown in Table 11. When requiring track rails in any other length, consult **IKU** for further information. For the tolerances of *E* dimension and track rail length, consult **IKU** for further information.

• E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.

Table 11 Standard and maximum lengths of track rails



unit : mm

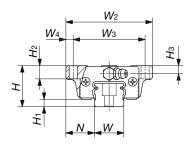
Model	number	LWE 15···Q	LWE 20···Q	LWE 25Q	LWE 30···Q	LWE 35Q
Standard length <i>L</i>	160 (3) 220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14)		220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14) 1 000 (17) 1 240 (21)	220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14) 1 000 (17) 1 240 (21) 1 600 (27)	280 (4) 440 (6) 600 (8) 760 (10) 1 000 (13) 1 240 (16) 1 640 (21) 2 040 (26) 2 520 (32) 3 000 (38)	280 (4) 440 (6) 600 (8) 760 (10) 1 000 (13) 1 240 (16) 1 640 (21) 2 040 (26) 2 520 (32) 3 000 (38)
Pitch of mounting ho	oles F	60	60	60	80	80
E		20	20	20	20	20
Standard range	incl.	6	8	9	9	10
of <i>E</i> (¹)	under	36	38	39	49	50
Maximum length		1 600	2 200	2 980	3 000	3 000

Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J").

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Like Low Decibel Linear Way E: Flange type

Flange type mounted from bottom LWE ...Q

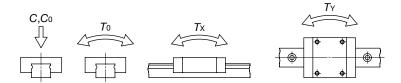


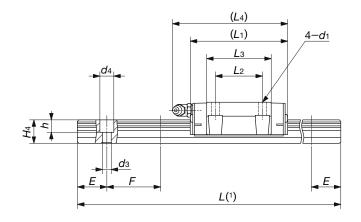
Madel mush on	Mass	(Ref.)	Dimensions of assembly mm			Dimensions of slide unit mm							
Model number	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L4	d1
LWE 15···Q	0.18	1.57	24	5	18.5	52	41	5.5	57	26	38.4	61	4.5
LWE 20···Q	0.30	2.28	28	5	19.5	59	49	5	66.5	32	44	79	5.5
LWE 25···Q	0.56	3.09	33	6	25	73	60	6.5	83	35	56	95	7
LWE 30····Q	0.97	5.04	42	10	31	90	72	9	95.5	40	64.8	106	9
LWE 35····Q	1.53	6.84	48	11	33	100	82	9	109.5	50	76.6	122	9

Note(1): Track rail lengths are shown in Table 11 on page B-67.

(2): The directions of basic dynamic load rating (C), basic static load rating (C_0) and static moment rating (T_0 , T_X , T_Y) are shown in the sketches below. The upper values in the T_X and T_Y columns apply to one slide unit, and the lower values apply to two slide units in close contact.

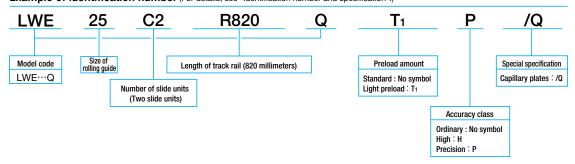
2: For grease nipple specifications, see page 99.





		Dimensions of track rail mm							Basic dynamic load rating(2)	Basic static load rating(2)	Static moment rating(2)		
Нз	H 5	W	H 4	d 3	d4	h	E	F	C N	C ₀	<i>T</i> ₀ N•m	<i>T</i> x N•m	T _Y
7	4.5	15	14.5	3.6	6.5	4.5	20	60	6 550	8 610	68.9	53.0 307	53.0 307
9	5.5	20	16	6	9.5	8.5	20	60	10 500	13 400	145	100 557	100 557
10	6.5	23	19	7	11	9	20	60	15 500	19 400	240	175 1 010	175 1 010
10	8	28	25	7	11	9	20	80	21 600	26 400	398	278 1 570	278 1 570
13	10	34	28	9	14	12	20	80	30 500	37 600	687	482 2 530	482 2 530

Example of identification number (For details, see "Identification number and specification".)



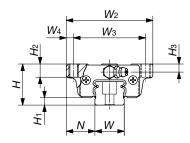
B-69

Remark 1: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended.

Recommended bolt sizes are shown in Table 6 on page B-64.

Like Low Decibel Linear Way E: Flange type

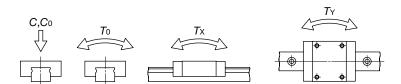
Flange type mounted from top LWET ...Q

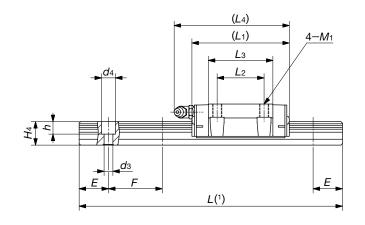


	Mass	Dimensions of assembly mm			Dimensions of slide unit mm								
Model number	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L 4	M 1
LWET 15···Q	0.18	1.57	24	5	18.5	52	41	5.5	57	26	38.4	61	M 5
LWET 20····Q	0.30	2.28	28	5	19.5	59	49	5	66.5	32	44	79	M 6
LWET 25···Q	0.56	3.09	33	6	25	73	60	6.5	83	35	56	95	M 8
LWET 30···Q	0.97	5.04	42	10	31	90	72	9	95.5	40	64.8	106	M10
LWET 35···Q	1.53	6.84	48	11	33	100	82	9	109.5	50	76.6	122	M10

Note(1): Track rail lengths are shown in Table 11 on page B-67.

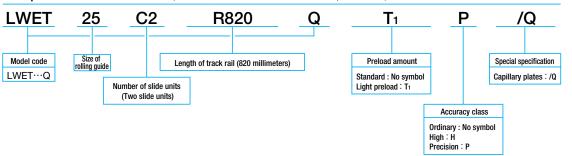
- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended. Recommended bolt sizes are shown in Table 6 on page B-64.
 - 2: For grease nipple specifications, see page 99.





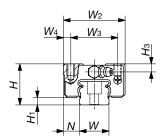
			Г	Dimensi	ons of	track ra	il		Basic dynamic load rating(2)	Basic static load rating(2)	Static moment rating(2)		
H 2	Н з	w	H4	dз	d4	h	E	F	С	C ₀	T 0	T x	T _Y
					-				N	N	N∙m	N∙m	N∙m
7	4.5	15	14.5	3.6	6.5	4.5	20	60	6 550	8 610	68.9	53.0 307	53.0 307
9	5.5	20	16	6	9.5	8.5	20	60	10 500	13 400	145	100 557	100 557
10	6.5	23	19	7	11	9	20	60	15 500	19 400	240	175 1 010	175 1 010
10	8	28	25	7	11	9	20	80	21 600	26 400	398	278 1 570	278 1 570
13	10	34	28	9	14	12	20	80	30 500	37 600	687	482 2 530	482 2 530

Example of identification number (For details, see "Identification number and specification".)



Like Low Decibel Linear Way E: Block type

Block type mounted from top LWES ...Q



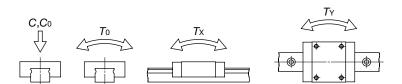
	Mass (Ref.)		Dimensions of assembly mm			Dimensions of slide unit mm						
Model number	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L4
LWES 15···Q	0.14	1.57	24	5	9.5	34	26	4	57	26	38.4	61
LWES 20····Q	0.25	2.28	28	5	11	42	32	5	66.5	32	44	79
LWES 25···Q	0.43	3.09	33	6	12.5	48	35	6.5	83	35	56	95
LWES 30···Q	0.75	5.04	42	10	16	60	40	10	95.5	40	64.8	106
LWES 35···Q	1.20	6.84	48	11	18	70	50	10	109.5	50	76.6	122

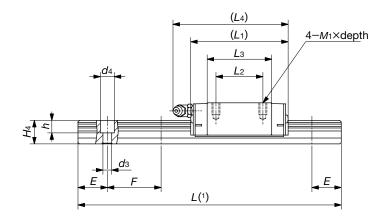
Note(1): Track rail lengths are shown in Table 11 on page B-67.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: Track rail mounting bolts are not appended. Hexagon socket bolt of JIS B1176 strength division 12.9 or equivalent are recommended. Recommended bolt sizes are shown in Table 6 on page B-64.

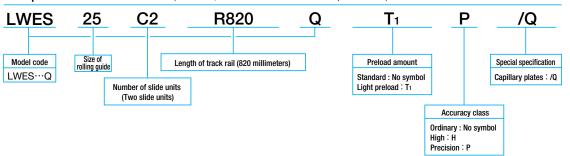
2: For grease nipple specifications, see page 99.





		Dimensions of track rail mm							Basic dynamic load rating(2)	Basic static load rating(2)	Static moment rating(2)		
<i>M</i> 1×depth	Н з	w	H 4	d 3	d4	h	E	F	С	C ₀	T 0	T x	TY
Windeptii	110			u o	U		_	•	N	N	N∙m	N∙m	N∙m
M4× 7	4.5	15	14.5	3.6	6.5	4.5	20	60	6 550	8 610	68.9	53.0 307	53.0 307
M5× 8	5.5	20	16	6	9.5	8.5	20	60	10 500	13 400	145	100 557	100 557
M6× 9	6.5	23	19	7	11	9	20	60	15 500	19 400	240	175 1 010	175 1 010
M8×12	8	28	25	7	11	9	20	80	21 600	26 400	398	278 1 570	278 1 570
M8×12	10	34	28	9	14	12	20	80	30 500	37 600	687	482 2 530	482 2 530

Example of identification number (For details, see "Identification number and specification".)



B-73

Linear Way H

LWH···B/LWHT···B/LWHS···B/LWHY

IKO Linear Way H incorporates two rows of large diameter steel balls in four point contact with the raceways and provides stable high accuracy and rigidity in operations even under fluctuating loads with changing direction and magnitude or complex loads. This series features the largest load ratings and rigidity among all ball types. A wide range of variations in shapes and sizes are available for selecting a model suitable for each application.

Interchangeable

Linear Way H includes interchangeable specification products.

The dimensions of slide units and track rails of this specification are individually controlled, so that the slide units and track rails can be combined, added or exchanged freely.

Flange type and block type

Slide units are available in five different sectional shapes: two flange types for different mounting directions and three narrow block types that are different in height and mounting directions.

Length of slide unit

A standard type slide unit and a high rigidity long type slide unit both having the same sectional dimensions are available.

Stainless steel type

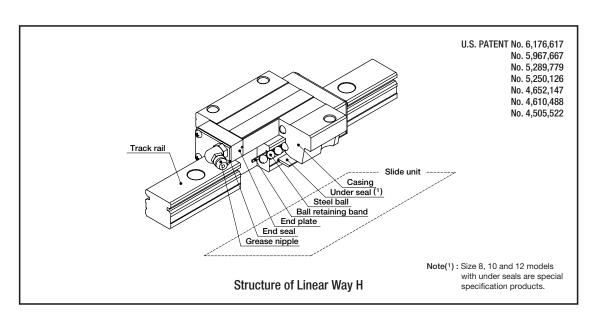
The stainless steel type has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, semiconductor and FPD manufacturing equipment.

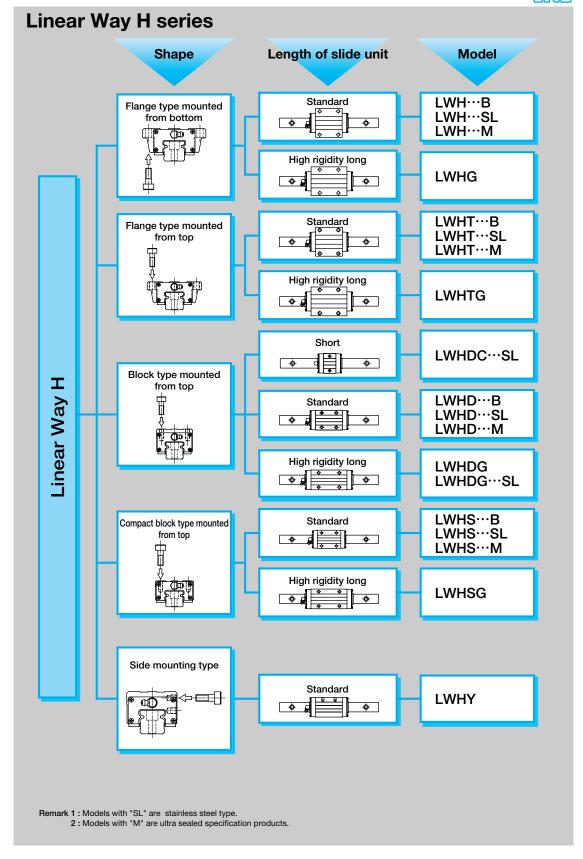
Ultra sealed specification

The track rail of this specification is ground on all surfaces, and is combined with a slide unit with specially designed end seals and under seals. Excellent dust protection performance is provided.

Miniature size

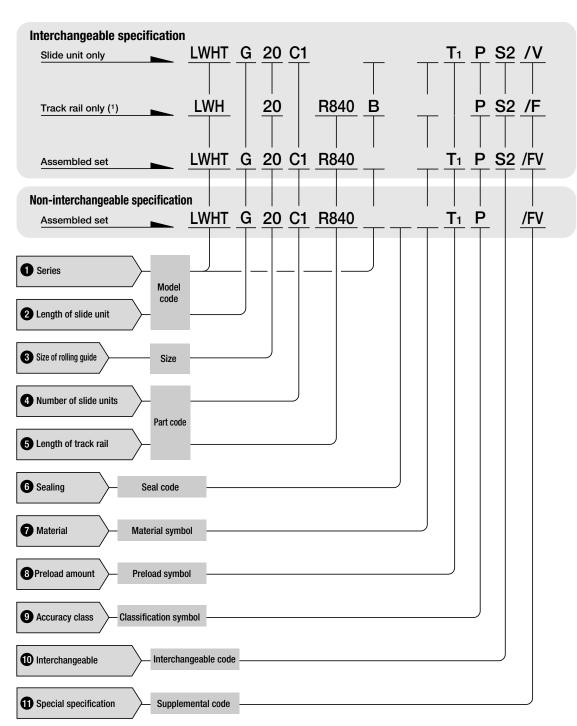
Miniature size models with track rail widths of 8 mm, 10 mm and 12 mm are available for use in the extended application range of Linear Way H.



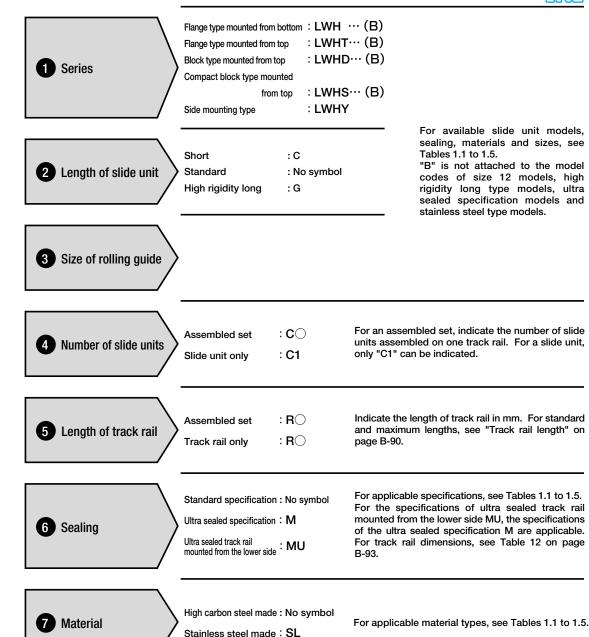


Identification number and specification

The specification of Linear Way H is indicated by the identification number, consisting of a model code, a size, a part code, a seal code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page 78.



Note(1): For the model code of a single track rail of interchangeable specification, indicate "LWH····B" (high carbon steel made) or "LWH···SL" (stainless steel made) regardless of the slide unit type to be combined.



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

B-76

Table 1.1 Models and sizes of Linear Way H flange type mounted from bottom								
Model		Standard specification						
	High carbor	High carbon steel made Stainless steel made						
Size	Standard LWH···B	High rigidity long LWHG	Standard LWH···SL	Standard LWH···M				
15	☆	_	☆	0				
20	☆	\Rightarrow	☆	0				
25	☆	☆	☆	0				
30	☆	☆	☆	0				
35	☆	☆	_	0				
45	☆	☆	_	0				
55	\Rightarrow	☆	_	_				
65	☆	☆	_	_				
85	_	0	_	_				

 $\textbf{Remark}: \textbf{The mark} \not \leftrightarrows \textbf{indicates that interchangeable specification products are available}.$

Table 1.2 Models and sizes of Linear Way H flange type mounted from top

Model		Standard specificatio	n	Ultra sealed specification
	High carbor	n steel made	Stainless steel made	High carbon steel made
Size	Standard LWHT···B	High rigidity long LWHTG	Standard LWHT···SL	Standard LWHT····M
8 (1)	_	_	☆	_
10 (¹)	_	_	☆	_
12 (¹)	☆ (2)	_	☆	_
15	☆	_	☆	0
20	☆	☆	☆	0
25	\Rightarrow	☆	☆	0
30	\Rightarrow	☆	☆	0
35	☆	☆	_	0
45	☆	☆	_	0
55	☆	☆	_	_
65	☆	☆	_	_
85	_	0	_	_

Note(¹): This model can also be mounted from the lower side.

(²): "····B" is not attached to the model code.

Remark: The mark ☆ indicates that interchangeable specification products are available.

Table 1.3 Models and sizes of Linear Way H block type mounted from top

Model		St	andard specification	on		Ultra sealed specification
	High carbor	n steel made		Stainless steel made		High carbon steel made
Size	Standard LWHD···B	High rigidity long LWHDG	Short LWHDC···SL	Standard LWHD····SL	High rigidity long LWHDG…SL	Standard LWHD···M
8	ı	_	$\stackrel{\wedge}{\simeq}$	☆	☆	_
10	_	_	☆	☆	☆	_
12	☆ (1)	_	\Rightarrow	☆	☆	_
15	\Rightarrow	_	_	_	_	0
25	☆	☆	_	_	_	0
30	☆	☆	_	_	_	0
35	☆	☆	_	_	_	0
45	☆	☆		_	_	0
55	☆	☆	_	_	_	_
65	☆	☆	_	_	_	_

Note(¹): "····B" is not attached to the model code.

Remark: The mark ☆ indicates that interchangeable specification products are available.

Table 1.4 Models and sizes of Linear Way H compact block type mounted from top

Model		n	Ultra sealed specification	
	High carbon	Stainless steel made	High carbon steel made	
Size	Standard LWHS···B	High rigidity long LWHSG	Standard LWHS····SL	Standard LWHS····M
15	☆	_	☆	0
20	☆	☆	☆	0
25	☆	☆	☆	0
30	☆	☆	☆	0

Remark: The mark \$\pm\$ indicates that interchangeable specification products are available.

Table 1.5 Models and sizes of Linear Way H side mounting type

able 1.0 medele and elect of Emedi way it elde mediting type							
Model	Standard specification						
	High carbon steel made						
	Standard						
Size	LWHY						
15	0						
20	0						
25	0						
30	0						
35	0						
45	0						
55	0						
65	0						

Remark: Only non-interchangeable specification products are available for this type.

Light preload : T1

Specify this item for an assembled set or a single slide unit. For applicable preload amount, see Table 2. For details of preload amount, see page 86.

Medium preload : T2 Heavy preload : T₃

11 Special specification

Table 2 Applicable preload types

	2.0 p. 0.0000 tj p.				
		Pre	eload type (Symb	ool)	
Size	Clearance	Standard	Light preload	Medium preload	
	(T ₀)	(No symbol)	(T ₁)	(T ₂)	(T ₃)
8	0	$\stackrel{\wedge}{\simeq}$	0	_	_
10	0	\Rightarrow	0	_	_
12	0	☆	0	_	_
15	_	☆	☆	☆	☆
20	_	\Rightarrow	☆	☆	☆
25	_	\Rightarrow	☆	☆	☆
30	_	☆	☆	☆	☆
35	_	☆	☆	☆	☆
45	_	$\stackrel{\wedge}{\simeq}$	☆	☆	☆
55	_	☆	☆	☆	☆
65	_	☆	☆	☆	☆
85	_	0	0	0	0

Remark 1 : The mark ☆ indicates that it is also applicable to interchangeable specification products. 2: For the stainless steel type, medium preload (T₂) and heavy preload (T₃) are not applicable.

9 Accuracy class

High : H

 ${\sf Precision} \quad : {\sf P}$ Super precision: SP For applicable accuracy, see Table 3. For the interchangeable specification, combine slide units and track rails of the same class. For details of accuracy, see page 81.

Table 3 Applicable accuracy class

	Acc	uracy class (Sym	ibol)
Size	High (H)	Precision (P)	Super precision (SP)
8	☆	☆	_
10	$\stackrel{\wedge}{\sim}$	☆	_
12	☆	☆	_
15	☆	☆	0
20	☆	☆	0
25	☆	☆	0
30	☆	☆	0
35	☆	☆	0
45	☆	☆	0
55	☆	☆	0
65	☆	☆	0
85	0	0	0

Remark: The mark \$\pri\$ indicates that it is also applicable to interchangeable specification products.

10 Interchangeable code

Select group 1: S1

Select group 2 : S2

Specify this item for interchangeable specification products. Combine track rails and slide units with the same interchangeable code.

Performance and accuracy of "S1" group and "S2" group are the same.

For applicable special specifications, see Table 4. When several special specifications are required, see Table 5. For details of special specifications, see page 88.

LWH, LWHT, LWHD, LWHS, LWHY

Special specification	Supplemental code	Assembled set	Track rail	Slide unit	Dimension
Butt-jointing track rail	Α	O (¹)	_	_	
Stainless steel end plates	BS	☆ (²)(³)	_	☆ (²)	
Opposite reference surfaces arrangement	D	☆ (³)	_	_	
Specified rail mounting hole positions	E	☆	☆	_	
Caps for rail mounting holes	F	☆ (5)	☆ (5)	_	
Inspection sheet	I	0	_	_	
Female threads for bellows	٦	☆ (³)(6)	☆ (6)(7)	☆ (6)(7)	See Table 6.1, Table 6.2, Table 6.3.
Black chrome surface treatment	L	☆ (⁸)	☆ (6)	_	
Fluorine black chrome surface treatment	LF	☆ (⁶)(¹³)	_	_	
Supplied without track rail mounting bolt	MN	☆	☆	_	
No end seal	Ζ	☆ (⁴)	_	☆	
Rail cover plate	PS	O (4)(9)(10)	_	_	
Capillary plates	Q	☆ (3)(4)	_	☆	See Table 7.
Seals for special environment	RE	☆ (2)(4)	_	☆ (2)	
Butt-jointing interchangeable track rail	Т	☆ (6)(11)	☆ (6)	_	
Under seals(12)	U	☆ (12)	_	☆ (12)	See Table 8.

☆ (6)

☆ (6)

_

See Table 9.

See Table 10.

Note(1): Not applicable to size 12 of high carbon steel made models.

- (2): Applicable to size 15, 20, 25 and 30 models.
- (3): Not applicable to the side mounting type (model code: LWHY).
- (4): Not applicable to ultra sealed specification products.
- (5): Not applicable to size 8 and 10 models.

Matched sets to be used as an assembled group

Table 4 Special specifications

Double end seals

Specified grease

Scrapers

- (6): Not applicable to size 8, 10 and 12 models.
- (7): Not applicable to stainless steel made interchangeable specification products.
- (8): Only "LR" is applicable to size 8, 10 and 12 models.
- (9): Not applicable to size 8, 10, 12, 15 and 20 models.
- (10): Applicable to high carbon steel type.
- (1): Not applicable to non-interchangeable specification products.
- (12): Applicable to size 8, 10 and 12 models.
- (13): Not applicable to size 8, 10 and 12 models of interchangeable specification.

Remark 1: In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

☆ (6)

☆ (13)

☆ (6)

0

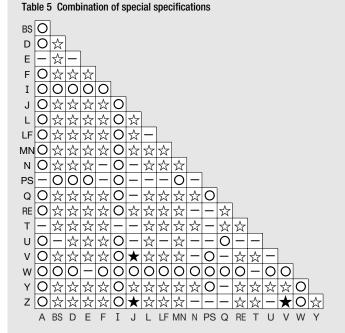
٧

W

Υ

Ζ

2: For size 85 models, no special specifications are applicable.

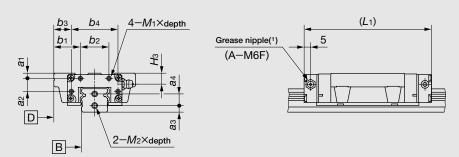


Remark 1 : In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

- 2: In the table, the mark indicates that this combination cannot be made.
- 3: The combinations marked ★ are applicable to non-interchangeable specification products. For combinations of interchangeable specification products, consult IKO for further information.
- 4: When several special specifications are required, arrange the supplemental codes alphabetically.

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Table 6.1 Female threads for bellows for flange type (Supplemental code /J, /JJ)

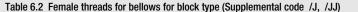


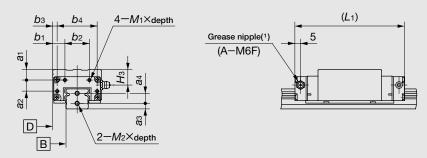
		m	

													unit : mm	
Madalas						Slide	unit					Track rail		
Model nu	umber	a 1	a 2	<i>b</i> 1	b 2	b 3	b4	M₁×depth	L1(2)	Н з	a 3	a 4	<i>M</i> ₂×depth	
LWH (T)	15…B								83					
LWH (T)	15…SL	3	7	15.5	16	9.5	28	M3× 6	03	6.5	4	8	M3× 6	
LWH (T)	15⋯ M								86					
LWH (T)	20…B								99					
LWH (T)	20…SL	4	10	20.5	22	13.5	36	M3× 6	33	8.5	5	9	M4× 8	
LWH (T)	20…M	4	10	20.5	22	13.5	36	IVI3^ 6	103	0.5	5	9	IVI4^ 0	
LWH (T) G	20								128					
LWH (T)	25…B								110					
LWH (T)	25…SL	4	13	22	26	15	40	M3× 6	110	8.5	5	12	M4× 8	
LWH (T)	25…M	4	4	13	22	20	15	40	IVI3A U	115	6.5	5	12	14147 0
LWH (T) G	25								133					
LWH (T)	30…B								128					
LWH (T)	30…SL	5	17	28	34	20	50	M3× 6	120	11	6	14	M4× 8	
LWH (T)	30⋯M	5	5	ŭ ''	20	34	20	30	NO NION O	133	11	"	14	1014^ 0
LWH (T) G	30								154					
LWH (T)	35…B								137					
LWH (T)	35…M	6	20	30	40	20	60	M3× 6	143	13	7	15	M4× 8	
LWH (T) G	35								165					
LWH (T)	45…B								160					
LWH (T)	45⋯ M	7	26	35	50	23	74	M4× 8	167	15	8	19	M5×10	
LWH (T) G	45								203					
LWH (T)	55…B	7	32	40	60	27	86	M4× 8	196	17	8	25	M5×10	
LWH (T) G	55	/ 32	32	40	60		86	IVI4X 8	248	17	0	25	M5×10	
LWH (T)	65…B	10	46	50	70	32	106	M5×10	240	20	10	28	M6×12	
LWH (T) G	65	10	40	50	70	32	100	INIOVIO	314	20	10	20	IVIUAIZ	

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Size 15 models are provided with a special specification grease nipple (NPB2 type). For details of dimensions, consult **IX0** for further information.





ur			

			Slide unit								Track rail		
Model n	umber	a 1	a 2	<i>b</i> 1	b ₂	b 3	b4	M ₁ ×depth	L1(2)	Нз	a 3	a 4	M ₂ ×depth
LWHD	15…B	7	7	9	16	3	28	M3× 6	83	10.5	4	8	M3× 6
LWHD	15…M		,	9	10	3	20	WISK 0	86	10.5	4	0	1412~ 0
LWHD	25…B								110				
LWHD	25…M	8	13	11	26	4	40	M3× 6	115	12.5	5	12	M4× 8
LWHDG	25								133				
LWHD	30···B								128				
LWHD	30···M	8	17	13	34	5	50	M3× 6	133	14	6	14	M4× 8
LWHDG	30								154				
LWHD	35···B								137				
LWHD	35···M	13	20	15	40	5	60	M3× 6	143	20	7	15	M4× 8
LWHDG	35								165				
LWHD	45…B								160				
LWHD	45…M	17	26	18	50	6	74	M4× 8	167	25	8	19	M5×10
LWHDG	45								203				
LWHD	55···B	47	00	00	00	_	00	Max	196	0.7		0.5	MEXALO
LWHDG	55	1/	17 32	20	60	7	86	M4× 8	248	27	8	25	M5×10
LWHD	65···B	40	40	00	70	10	100	MEXAG	240	00	10	00	Movaa
LWHDG	65	10	46	28	70	10	106	M5×10	314	20	10	28	M6×12

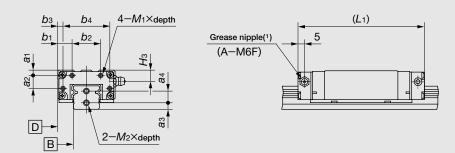
Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

Size 15 models are provided with a special specification grease nipple (NPB2 type). For details of dimensions, consult **IKB** for further information.

^{(2):} The values are for the slide unit with female threads for bellows at both ends.

^{(2):} The values are for the slide unit with female threads for bellows at both ends.

Table 6.3 Female threads for bellows for compact block type (Supplemental code /J, /JJ)



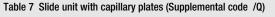
rall		

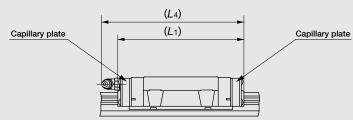
unit: mm

	Slide unit								Track rail					
Model n	number	a 1	a 2	<i>b</i> 1	b 2	b 3	b4	<i>M</i> 1×depth	L1(2)	Н з	a 3	a 4	<i>M</i> 2×depth	
LWHS	15…B								83					
LWHS	15…SL	3	7	9	16	3	28	M3×6	65	6.5	4	8	M3×6	
LWHS	15⋯ M								86					
LWHS	20···B								99					
LWHS	20SL		10	11	22	_	36	M3×6	99	8.5	5	9	M4×8	
LWHS	20···M	4] 4	10	11	22	4	36	IVI3×6	103	0.5	5	9	101470
LWHSG	20								128					
LWHS	25…B								110					
LWHS	25SL] ,	10	11	20	_	40	Mayo	110	0.5	5	10	Mayo	
LWHS	25…M	4	13	11	26	4	40	40 M3×6	115	8.5	5	12	M4×8	
LWHSG	25								133					
LWHS	30···B								100					
LWHS	30SL] _	47	10		_		Marka	128	4.4			Mayo	
LWHS	30M	5	17	7 13	34	5	50	M3×6	133	11	6	14	M4×8	
LWHSG	30								154					

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product. Size 15 models are provided with a special specification grease nipple (NPB2 type). For details of dimensions, consult IKD for further

(2): The values are for the slide unit with female threads for bellows at both ends.





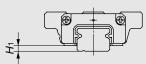
unit: mm

Model no	umber	<i>L</i> 1	L4		
LWHDC	8SL	26	_		
LWHD	8SL	32	_		
LWHDG	8SL	39	_		
LWHDC	10SL	34			
LWHD	10SL	42	-		
LWHDG	10SL	50	_		
LWHDC	12SL	44	48		
LWHD	12	56	60		
LWHD	12SL	50	60		
LWHDG	12SL	68	72		
LWH	15…B	75	70		
LWH	15SL	75	78		
LWH	20…B	00	105		
LWH	20SL	92	105		
LWHG	20	121	134		

Model number	<i>L</i> ₁	L 4		
LWH 25B	105	117		
LWH 25···SL	103	117		
LWHG 25	127	139		
LWH 30B	125	135		
LWH 30···SL	125	135		
LWHG 30	151	161		
LWH 35B	134	146		
LWHG 35	162	174		
LWH 45B	160	170		
LWHG 45	203	213		
LWH 55B	196	207		
LWHG 55	248	258		
LWH 65B	246	253		
LWHG 65	320	327		

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Table 8 H dimension of slide unit with under seals (Supplemental code /U)



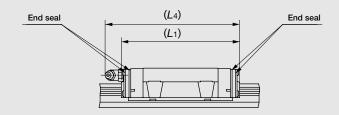
	Wille Filling
Model number	H ₁
LWH 8···SL	1.5
LWH 10···SL	1.8
LWH 12	3.2

Remark 1: The above table shows representative model numbers but is applicable to all

models of the same size.

2: H1 dimension of size 12 models is the same as the dimension without under seals.

Table 9 Slide unit with double end seals (Supplemental code /V, /VV)



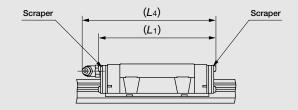
Model	number	<i>L</i> ₁	L4		
LWH	15…B	72	77		
LWH	15…SL	/2	//		
LWH	15⋯ M	71	76		
LWH	20…B	01	104		
LWH	20SL	91	104		
LWH	20···M	90	103		
LWHG	20	119	133		
LWH	25…B	104	110		
LWH	25…SL	104	116		
LWH	25…M	103	115		
LWHG	25	127	139		
LWH	30···B	100	104		
LWH	30SL	122	134		
LWH	30···M	121	133		
LWHG	30	148	160		

		unit : mm
Model number	<i>L</i> ₁	L4
LWH 35B	100	140
LWH 35···M	133	146
LWHG 35	161	173
LWH 45···B	159	170
LWH 45···M	158	170
LWHG 45	202	213
LWH 55···B	196	206
LWHG 55	247	258
LWH 65···B	241	251
LWHG 65	316	326

Remark 1: The above table shows representative model numbers but is applicable to all models of the same size.

2: The values are for the slide unit with double end seals at both ends.

Table 10 Slide unit with scrapers (Supplemental code /Z, /ZZ)



unit : mm

Model r	number	<i>L</i> 1	L4
LWH	15…B	73	75
LWH	15…SL	/3	75
LWH	15⋯ M	72	74
LWH	20…B	91	104
LWH	20…SL	91	104
LWH	20…M	90	101
LWHG	20	119	133
LWH	25…B	104	116
LWH	25…SL	104	110
LWH	25…M	103	113
LWHG	25	126	139

nber	<i>L</i> ₁	L4
30…B	124	125
30…SL	124	135
30···M	123	131
30	150	161
35…B	100	146
35…M	133	140
35	161	174
45…B	160	171
45…M	159	170
45	203	214
55…B	196	207
55	248	258
65…B	242	252
65	317	326
	30···B 30···SL 30···M 30 35···B 35···M 35 45···B 45···B 45···B 55···B	30···B 30···SL 30···SL 30···SL 30 30 150 35···B 35···M 35 161 45···B 160 45···B 159 45 203 55···B 196 55 248 55···B 242

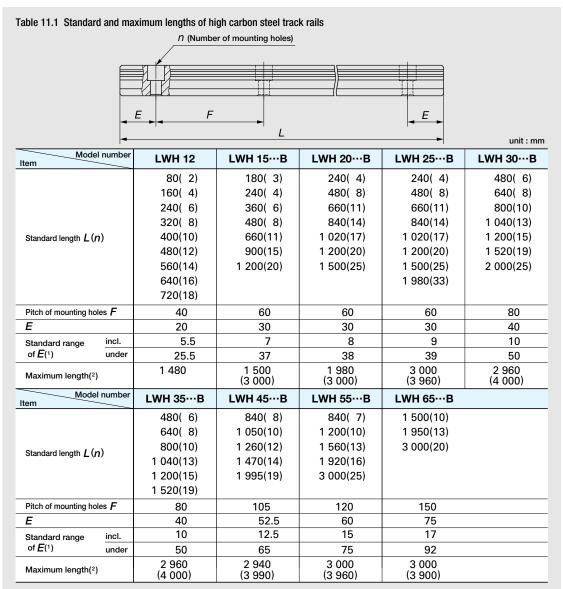
Remark 1 : The above table shows representative model numbers but is applicable to all models of the same size.

2 : The values are for the slide unit with scrapers at both ends.

Track rail length

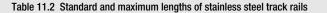
Standard and maximum lengths of track rails are shown in Tables 11.1, 11.2 and 11.3. Track rails of any length are also available. Simply indicate the required length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IKO** for further information.

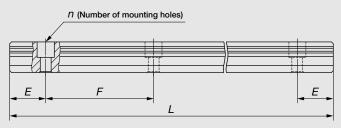
- For track rails of non-interchangeable specification longer than the maximum length shown in Tables 11.1, 11.2 and 11.3, butt-jointing track rails are available upon request. In this case, indicate "/A" in the identification number.
- *E* dimensions at both ends are the same and are within the standard range of *E* unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.



Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J").

(2): Track rails with the maximum lengths in parentheses can be manufactured. Consult **IXII** for further information.





					unit : mm	
Mod Item	el number	LWH 8····SL	LWH 10···SL	LWH 12···SL	LWH 15···SL	
		40(2)	50(2)	80(2)	180(3)	
		80(4)	100(4)	160(4)	240(4)	
		120(6)	150(6)	240(6)	360(6)	
		160(8)	200(8)	320(8)	480(8)	
0		200(10)	200(10)	250(10)	400(10)	660(11)
Standard length $L(n)$,	240(12)	300(12)	480(12)		
		280(14)	350(14)	560(14)		
			400(16)	640(16)		
			450(18)	720(18)		
			500(20)			
Pitch of mounting hole	s F	20	25	40	60	
E		10	12.5	20	30	
Standard range	incl.	4.5	5	5.5	7	
of E (1)	under	14.5	17.5	25.5	37	
Maximum length(2)		480	850	1 000	1 200	
maximam rongan()		(1 000)	(1 000)	(1 480)	(1 500)	
Mod	el number	LWH 20···SL	LWH 25···SL	LWH 30···SL		
		240(4)	240(4)	480(6)		
Standard length L(n)	١	480(8)	480(8)	640(8)		
Standard length L (11)	'	660(11)	660(11)	800(10)		
		840(14)	840(14)	1 040(13)		
Pitch of mounting hole	s F	60	60	80		
E		30	30	40		
Standard range	incl.	8	9	10		
of <i>E</i> (¹)	under	38	39	50		
Maximum length(2)		1 200	1 200	1 200	_	
waximum length(2)		(1 980)	(1 980)	(2 000)		

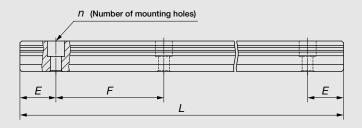
Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J").

(2): Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult IKD for further information.

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Remark: The above table shows representative model numbers but is applicable to all models of the same size. For the ultra sealed specification, see Table 11.3 on page B-92.

Table 11.3 Standard and maximum lengths of ultra sealed type high carbon steel track rails

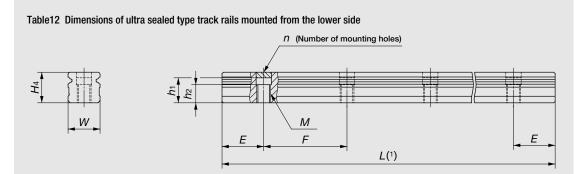


Model	number	LWH 15···M	LWH 20···M	LWH 25···M	LWH 30···M	LWH 35M	LWH 45···M
		180(3)	240(4)	240(4)	480(6)	480(6)	840(8)
		240(4)	480(8)	480(8)	640(8)	640(8)	1 050(10)
		360(6)	660(11)	660(11)	800(10)	800(10)	1 260(12)
Standard length L	Standard length $L(n)$		840(14)	840(14)	1 040(13)	1 040(13)	1 470(14)
		660(11)	1 020(17)	1 020(17)	1 200(15)	1 200(15)	1 995(19)
			1 200(20)	1 200(20)	1 520(19)	1 520(19)	
Pitch of mounting halos F			1 500(25)	1 500(25)			
Pitch of mounting I	noles F	60	60	60	80	80	105
E		30	30	30	40	40	52.5
Standard range	incl.	7	8	9	10	10	12.5
of E (¹)	under	37	38	39	50	50	65
Maximum length		1 500	1 980	3 000	2 960	2 960	2 940
Maximum number of butt-	laximum number of butt-jointing rails		3	3	3	3	3
Maximum length of butt-jo	inting rails	4 200	5 640	8 700	8 480	8 480	8 295

Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J"). Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Specification of ultra sealed type track rail mounted from the lower side

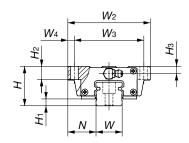
In this specification, aluminum caps are press-fitted into the track rail mounting holes in advance and the track rail is fixed from the mounting surface side. As the top surface of the track rail is flat, close contact with seals can be obtained, further improving the sealing effect.



Mode	Model number					Dimensions mm			
		kg/m	W	H 4	E	F	М	h1 (2)	h2
LWH	15···MU								
LWHT	15···MU	1.47	15	15	30	60	M 6	12	9
LWHD	15···MU	1.47	15	15	30	00	IVI O	12	3
LWHS	15···MU								
LWH	20···MU								
LWHT	20···MU	2.56	20	18	30	60	M 8	13.5	9.5
LWHS	20···MU								
LWH	25MU			22					
LWHT	25MU	3.50	23		30	60	M10	18	13
LWHD	25MU	0.50	25		50		14110	10	10
LWHS	25···MU								
LWH	30MU				40	80	M12		
LWHT	30···MU	4.82	28	25				20	13
LWHD	30···MU	1.02	20					20	10
LWHS	30···MU								
LWH	35···MU								
LWHT	35···MU	6.85	34	28	40	80	M12	23	16
LWHD	35···MU								
LWH	45···MU								
LWHT	45…MU	10.7	45	34	52.5	105	M16	29	17
LWHD	45···MU								

Note(¹): For the track rail length, see Table 11.3 on page B-92.
(²): The mounting bolt length should be less than the h¹ dimension.
Remark: The track rail mounting bolts are not appended.

Flange type mounted from bottom LWH ···B **LWHG** LWH ···SL(Stainless steel made) LWH ...M(Ultra sealed type)



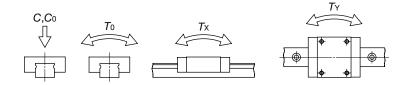
Model number	Interchangeable	Mass	ss (Ref.) Dimensions assembly mm				Dimensions of slide unit mm							
Wiodel Humber	Intercha	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L 2	Lз	L4	d1
LWH 15B	☆													
LWH 15···SL	☆	0.22	1.47	24	24 4.5	16	47	38	4.5	66	30	44.6	69	4.5
LWH 15···M														
LWH 20B	☆					21.5	63	53	5					
LWH 20···SL	☆	0.48		30	0 5					83	40	57.2	95	0
LWH 20···M			2.56								40			6
LWHG 20	☆	0.71								112		86	124	
LWH 25···B	☆													
LWH 25···SL	☆	0.70	2.50	20	0.5	22.5	70		0.5	95	45	64.7	106	7
LWH 25···M			3.50	36	6.5	23.5	70	57	6.5		45			7
LWHG 25	☆	0.93								118		87.4	129	

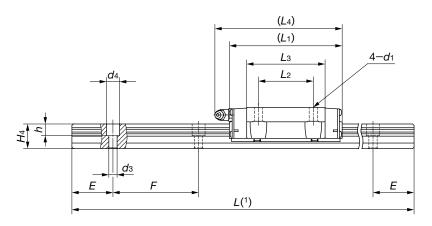
Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tv) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The mark ☆ indicates that interchangeable specification products are available.

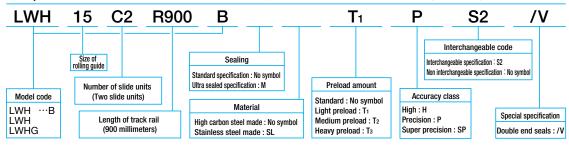
- 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
- For stainless steel type Linear Way H, stainless steel bolts are appended.
- 3: For grease nipple specifications, see page 99.





	Dimensions of track rail mm								Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static moment rating(2)			
H2	Нз	W	H 4	d 3	d4	h	E	F	Bolt size x length	С	C ₀	T 0	Tx	T _Y	
112	113	77	114	us	U4	"	L	'	Boil Size X length	N	N	N∙m	N∙m	N∙m	
7	4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556	
10	5.5	20	18	6	9.5	8.5	30	60	M5×18	18 100	21 100	232	195 1 090	195 1 090	
										24 100	31 700	349	421 2 140	421 2 140	
10	6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690	
										30 800	38 300	483	533 2 740	533 2 740	

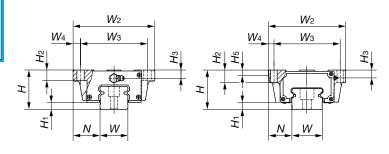
Example of identification number of assembled set (For details, see "Identification number and specification".)



Flange type mounted from bottom LWH …B

LWHG

LWH ····SL(Stainless steel made)
LWH ····M(Ultra sealed type)



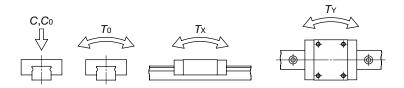
LWHG85

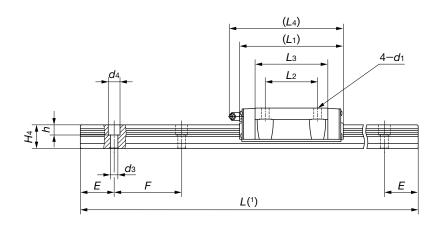
Model number	Interchangeable	Mass	s (Ref.)	Dimensions of assembly mm			Dimensions of slide unit mm							
Wodel Humber	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L ₂	Lз	L4	d1
LWH 30···B	☆													
LWH 30····SL	☆	1.28	4.00	42	7		90	70		113		80.6	124	•
LWH 30M			4.82	42	,	31	90	72	9		52			9
LWHG 30	☆	1.69								139		106.6	150	
LWH 35···B	☆	1.79								123		86.2	135	
LWH 35M		1.73	6.85	48	8	33	100	82	9	123	62	00.2	133	9
LWHG 35	☆	2.35								151		114	163	
LWH 45···B	☆	3.17								147		103.4	158	
LWH 45···M		3.17	10.7	60	10	37.5	120	100	10	147	80	103.4	136	11
LWHG 45	☆	4.34								190		146.6	201	
LWH 55B	☆	5.30	15.5	70	13	43.5	140	116	12	183	95	132	194	14
LWHG 55	☆	7.40	15.5	/0	13	43.5	140	110	12	235	95	183.6	246	14
LWH 65···B	☆	12.3	22.2	00	1.4	F2 F	170	140	14	229	110	164	239	10
LWHG 65	☆	17.6	22.2	90	14	53.5	170	142	14	303	110	238.8	313	16
LWHG 85		25.9	34.6	110	16	65	215	185	15	318	140	240	-	18

Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

Remark 1: The mark 🛱 indicates that interchangeable specification products are available.

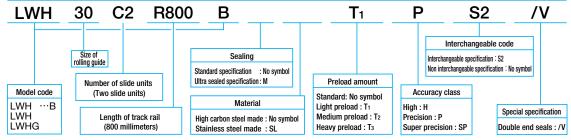
3 : For grease nipple specifications, see page 99.





				Di	mensi	ons of mm	track	rail		Mounting bolt for track rail	Basic static load rating(2)	Static moment rating(2)			
	I	1		l	l	I	l		l		С	C ₀	T 0	Tx	T _Y
H 2	Нз	H 5	W	H 4	d 3	d4	h	E	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
10	8		28	25	9	14	12	40	80	M 8×28	35 400	40 700	623	536 2 820	536 2 820
											42 700	53 200	814	894 4 460	894 4 460
13	10	_	34	28	9	14	12	40	80	M 8×28	48 700	53 700	823	631 3 480	579 3 190
											59 500	71 600	1 100	1 090 5 570	1 000 5 110
15	13	_	45	34	14	20	17	52.5	105	M12×35	74 600	80 200	1 610	1 150 6 190	1 160 5 690
											95 200	114 000	2 280	2 240 11 100	2 050 10 200
17	14	_	53	41	16	23	20	60	120	M14×45	113 000	121 000	2 870	2 210 11 600	2 030 10 600
	14		อง	41	10	23	20	00	120	IVI 14 × 45	142 000	168 000	3 970	4 120 20 200	3 780 18 500
23	20		63	48	18	26	22	75	150	M16×50	176 000	184 000	5 180	4 130 22 000	3 790 20 200
	20		03	40	10	20		/3	150	IVI IO A 50	229 000	269 000	7 560	8 530 41 500	7 810 38 100
30	22	15	85	58	26	39	30	90	180	M24×60	374 000	384 000	11 900	11 100 55 100	11 100 55 300

 $\textbf{Example of identification number of assembled set} \ \ \textbf{(For details, see "Identification number and specification".)}$



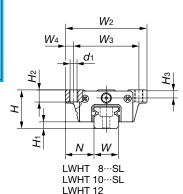
^{(2):} The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.

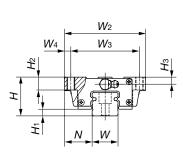
The many a indicated an artificial relationship of the state and a state

Flange type mounted from top LWHT …B

LWHT ...E

LWHT ····SL(Stainless steel made)
LWHT ····M(Ultra sealed type)



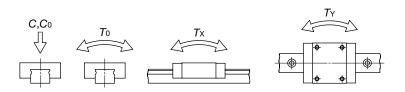


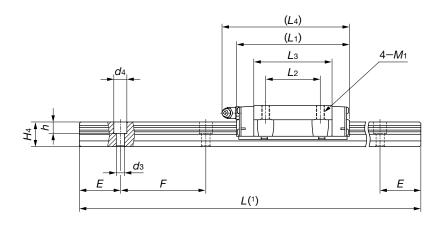
Model number	Interchangeable	Mas	s (Ref.)	Dimensions of assembly mm			Dimensions of slide unit mm							
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L4	d1(3)
LWHT 8····SL	☆	0.015	0.32	10	2.1	8	24	19	2.5	24	10	15.3	_	1.9
LWHT 10····SL	☆	0.032	0.47	12	2.4	10	30	24	3	32	12	21.4	_	2.6
LWHT 12	☆	0.11	0.86	19	3.2	14	40	32	_	46	15	21.0	50	3.4
LWHT 12····SL	☆	0.11	0.86	19	3.2	14	40	32	4	46	15	31.6	50	3.4
LWHT 15···B	☆													
LWHT 15····SL	☆	0.22	1.47	24	4.5	16	47	38	38 4.5	66	30	44.6	69	_
LWHT 15···M														
LWHT 20···B	☆													
LWHT 20····SL	☆	0.48	2.56	30	5	21.5	63	53	_	83	40	57.2	95	_
LWHT 20···M			2.56	30	5	21.5	63	53	5		40			
LWHTG 20	☆	0.71								112		86	124	
LWHT 25···B	☆													
LWHT 25····SL	☆	0.70	3.50	36	6.5	23.5	70	57	6.5	95	45	64.7	106	
LWHT 25···M			3.50	30	0.5	23.5	/0	5/	0.5		45			
LWHTG 25	☆	0.93								118		87.4	129	

Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- (3): LWHT8···SL, LWHT10···SL and LWHT12···SL can also be mounted from the lower side.
- Remark 1: The mark ☆ indicates that interchangeable specification products are available.

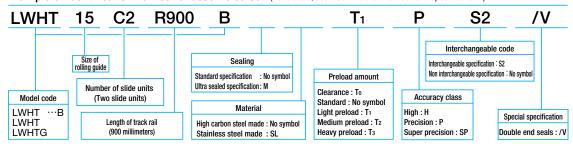
 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
 - 2: The appended track rail mounting botts are nexagon socket head botts of JIS B 1176 or eq For stainless steel type Linear Way H, stainless steel bolts are appended.
 - 3: For grease nipple and oil hole specifications, see page 99.
 - 4: LWHT8···SL and LWHT10···SL are provided with an oil hole.





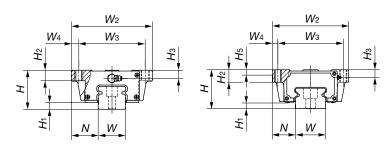
				Di	mensio	ons of mm	track ı	ail		Mounting bolt for track rail mm		Basic static load rating(2)			rating(2)
											С	C ₀	T 0	Tx.	T Y
M 1	H 2	Нз	W	H4	d 3	d4	h	Ε	F	Bolt size x length	N	N	N∙m	N∙m	N∙m
M2.3	3.5	2	8	6	2.4	4.2	2.3	10	20	M2× 8	1 510	2 120	8.8	5.5 32.0	4.7 26.9
МЗ	4.5	2.5	10	7	3.5	6	3.5	12.5	25	M3× 8	2 640	3 700	19.2	13.3 73.8	11.1 61.9
M4	6	4	12	10.5	3.5	6	4.5	20	40	M3×12	6 260	8 330	51.6	44.7 237	37.5 199
M5	7	4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
M6	10	5.5	20	18	6	9.5	8.5	30	60	M5×18	18 100	21 100	232	195 1 090	195 1 090
											24 100	31 700	349	421 2 140	421 2 140
M8	10	6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
											30 800	38 300	483	533 2 740	533 2 740

Example of identification number of assembled set (For details, see "Identification number and specification".)



IKD Linear Way H: Flange type

Flange type mounted from top LWHT ···B **LWHTG** LWHT ···SL(Stainless steel made) **LWHT** ... M (Ultra sealed type)

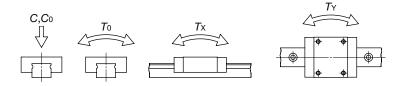


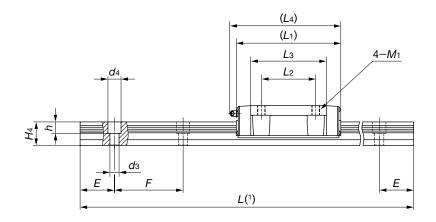
LWHTG 85

Model number	Interchangeable	Mass	(Ref.)		nension ssemb mm					Di	mensio	ns of slic	de unit	
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	L 1	L2	L 3	L4	M 1
LWHT 30···B	☆													
LWHT 30···SL	☆	1.28	4.82	42	7	31	90	72	9	113	52	80.6	124	M 10
LWHT 30···M			4.02	42	,	31	90	/2	9		52			IVI IU
LWHTG 30	☆	1.69								139		106.6	150	
LWHT 35···B	☆	1.79								123		86.2	135	
LWHT 35···M		1.79	6.85	48	8	33	100	82	9	123	62	00.2	133	M 10
LWHTG 35	☆	2.35								151		114	163	
LWHT 45···B	☆	3.17								147		103.4	158	
LWHT 45···M		3.17	10.7	60	10	37.5	120	100	10	147	80	103.4	100	M 12
LWHTG 45	☆	4.34								190		146.6	201	
LWHT 55···B	☆	5.30	15.5	70	13	43.5	140	116	12	183	95	132	194	M 14
LWHTG 55	☆	7.40	15.5	/0	13	43.5	140	116	12	235	95	183.6	246	IVI 14
LWHT 65···B	☆	12.3	22.2	90	14	53.5	170	142	14	229	110	164	239	M 16
LWHTG 65	☆	17.6	22.2	90	14	53.5	170	142	14	303	110	238.8	313	IVI IO
LWHTG 85		25.9	34.6	110	16	65	215	185	15	318	140	240		M 20

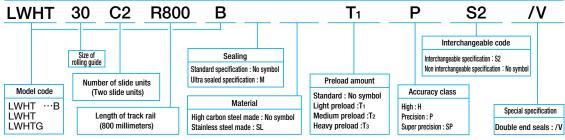
Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

3: For grease nipple specifications, see page 99.





				Dii	mensio	ons of mm	track i	rail		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment r	ating(2)
								1	1		С	C ₀	T 0	Tx	T _Y
H ₂	Нз	H 5	W	H 4	d з	d4	h	E	F	Bolt size X length	N	N	N∙m	N∙m	N∙m
10	8	_	28	25	9	14	12	40	80	M 8×28	35 400	40 700	623	536 2 820	536 2 820
											42 700	53 200	814	894 4 460	894 4 460
13	10	_	34	28	9	14	12	40	80	M 8×28	48 700	53 700	823	631 3 480	579 3 190
											59 500	71 600	1 100	1 090 5 570	1 000 5 110
15	13	_	45	34	14	20	17	52.5	105	M12×35	74 600	80 200	1 610	1 150 6 190	1 060 5 690
											95 200	114 000	2 280	2 240 11 100	2 050 10 200
17	14		53	41	16	23	20	60	120	M14×45	113 000	121 000	2 870	2 210 11 600	2 030 10 600
	14		53	41	10	23	20	00	120	10114745	142 000	168 000	3 970	4 120 20 200	3 780 18 500
23	20		63	48	18	26	22	75	150	M16×50	176 000	184 000	5 180	4 130 22 000	3 790 20 200
	20		03	40	10	20		/3	130	M16×50	229 000	269 000	7 560	8 530 41 500	7 810 38 100
35	22	15	85	58	26	39	30	90	180	M24×60	374 000	384 000	11 900	11 100 55 100	11 100 55 300



^{(2):} The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The mark \(\frac{\pi}{\pi} \) indicates that inter/kanta // Collatins apply to the slide tills, and the lower values apply to the slide tills, and the lowe

IK Linear Way H: Block type

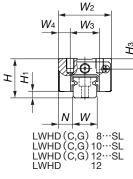
Block type mounted from top

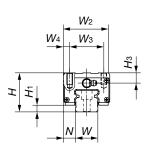
LWHD ···B **LWHDG**

LWHDC…SL(Stainless steel made)

LWHD ...SL(Stainless steel made) LWHDG···SL(Stainless steel made)

LWHD ...M (Ultra sealed type)





Model number	Interchangeable	Mass	s (Ref.)		nensio ssemb mm					Dimens		of slide	e unit	
Woder Hamber	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L4	<i>M</i> ₁×depth
LWHDC 8SL	☆	0.008								18	-	9.0		
LWHD 8····SL	☆	0.013	0.32	11	2.1	4	16	10	3	24	10	15.3	_	M2 × 2.5
LWHDG 8SL	☆	0.018								30.5	10	21.7		
LWHDC 10····SL	☆	0.018								24	-	13.4		
LWHD 10···SL	☆	0.027	0.47	13	2.4	5	20	13	3.5	32	12	21.4	_	M2.6× 3
LWHDG 10···SL	☆	0.036								40	12	29.4		
LWHDC 12···SL	☆	0.058								34	_	19.6	38	
LWHD 12	☆	0.091	0.86	20	3.2	7.5	27	15	6	46		31.6	50	M4 × 5
LWHD 12···SL	☆	0.091	0.86	20	3.2	7.5	21	15	ь	46	15	31.6	50	IVI4 X 5
LWHDG 12···SL	☆	0.118								58		43.6	62	
LWHD 15···B	☆	0.00	1 47	20	4.5	٥٠	24	20	4		20	44.0	-00	M4 ×10
LWHD 15···M		0.23	1.47	28	4.5	9.5	34	26	4	66	26	44.6	69	M4 ×10
LWHD 25···B	☆	0.05								0.5	25	C4 7	100	
LWHD 25···M		0.65	3.50	40	6.5	12.5	48	35	6.5	95	35	64.7	106	M6 ×12
LWHDG 25	☆	0.80								118	50	87.4	129	

Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tx) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

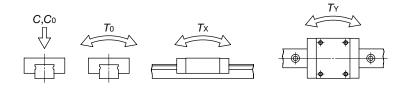
Remark 1: The mark $\stackrel{\wedge}{\bowtie}$ indicates that interchangeable specification products are available.

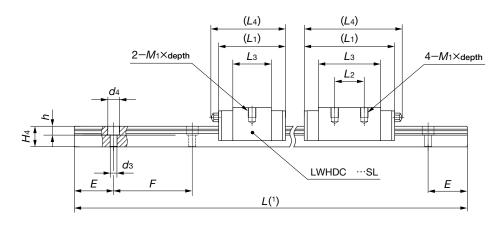
2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.

For stainless steel type Linear Way H, stainless steel bolts are appended.

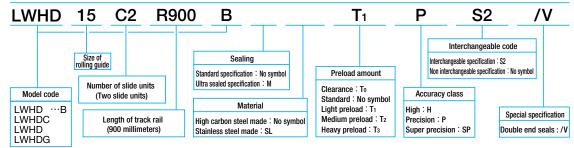
3: For grease nipple and oil hole specifications, see page 99.

4: LWHD8···SL and LWHD10···SL are provided with an oil hole.



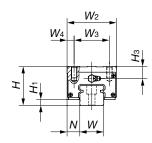


		D	imensi	ons of	track ra	ail		Mounting bolt for track rail	Basic dynamic load rating(2)	Basic static load rating(2)		noment rat	ing(²)
		l	١.	١.	١.	l _	_		С	C ₀	T 0	Tx	T Y
Н з	W	H 4	d 3	d4	h	E	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
									1 050	1 270	5.3	2.2 15.5	1.8 13.0
3	8	6	2.4	4.2	2.3	10	20	M2× 8	1 510	2 120	8.8	5.5 32.0	4.7 26.9
									1 910	2 970	12.3	10.4	8.8
									1 920	2 350	12.2	55.4 5.8	46.4
3.5	10	7	3.5	6	3.5	12.5	25	M3× 8	2 640	3 700	19.2	37.1 13.3	31.2 11.1
0.0			0.0		0.0				3 280	5 050	26.2	73.8 23.8	61.9 20.0
											-	123 19.4	103 16.3
									4 560	5 300	32.8	117	98.5
5	12	10.5	3.5	6	4.5	20	40	M3×12	6 260	8 330	51.6	44.7 237	37.5 199
									7 780	11 400	70.4	80.4 399	67.5 335
8.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
10.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
									30 800	38 300	483	533 2 740	533 2 740



IK Linear Way H: Block type

Block type mounted from top LWHD ···B **LWHDG** LWHD ...M (Ultra sealed type)



Model number	Interchangeable	Mass	s (Ref.)		nensio sseml mm					Dimen	sions o	of slide u	nit	
	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L 2	L 3	L4	<i>M</i> ₁×depth
LWHD 30···B	☆	1.10								440	40	00.0	104	
LWHD 30···M		1.12	4.82	45	7	16	60	40	10	113	40	80.6	124	M8 ×16
LWHDG 30	☆	1.44								139	60	106.6	150	
LWHD 35···B	☆	4.74								400	F0	00.0	405	
LWHD 35···M		1.74	6.85	55	8	18	70	50	10	123	50	86.2	135	M8 ×16
LWHDG 35	☆	2.26								151	72	114	163	
LWHD 45···B	☆	0.00								4.47	-00	100.4	450	
LWHD 45···M		3.30	10.7	70	10	20.5	86	60	13	147	60	103.4	158	M10×20
LWHDG 45	☆	4.57								190	80	146.6	201	
LWHD 55···B	☆	5.36	45.5	00	10	00.5	100	75	10.5	183	75	132	194	M40×05
LWHDG 55	☆	7.20	15.5	80	13	23.5	100	75	12.5	235	95	183.6	246	M12×25
LWHD 65···B	☆	9.80	00.0	00		04.5	100	70	0.5	229	70	164	239	MACYOS
LWHDG 65	☆	14.3	22.2	90	14	31.5	126	76	25	303	120	238.8	313	M16×30

Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

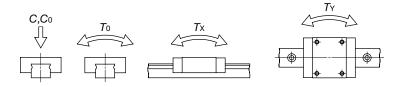
(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

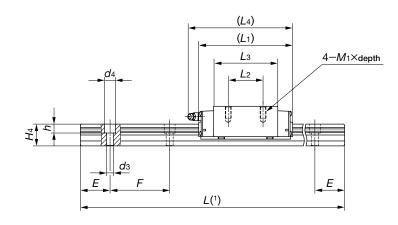
Remark 1: The mark ½ indicates that interchangeable specification products are available.

2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.

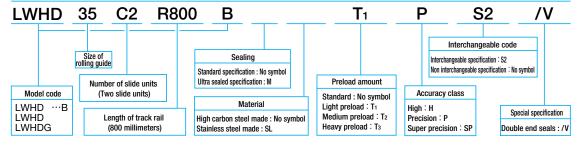
For stainless steel type Linear Way H, stainless steel bolts are appended.

3: For grease nipple specifications, see page 99.





		D	imensi	ons of t	track ra	til		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ting(²)
									С	C ₀	T 0	Tx	T Y
Нз	W	H 4	d 3	d4	h	E	F	Bolt size X length	N	N	N∙m	N∙m	N∙m
11	28	25	9	14	12	40	80	M8 ×28	35 400	40 700	623	536 2 820	536 2 820
									42 700	53 200	814	894 4 460	894 4 460
17	34	28	9	14	12	40	80	M8 ×28	48 700	53 700	823	631 3 480	579 3 190
									59 500	71 600	1 100	1 090 5 570	1 000 5 110
23	45	34	14	20	17	52.5	105	M12×35	74 600	80 200	1 610	1 150 6 190	1 060 5 690
									95 200	114 000	2 280	2 240 11 100	2 050 10 200
									113 000	121 000	2 870	2 210 11 600	2 030 10 600
24	53	41	16	23	20	60	120	M14×45	142 000	168 000	3 970	4 120 20 200	3 780 18 500
		40	10				450	0 14407450	176 000	184 000	5 180	4 130 22 000	3 790 20 200
20	63	48	18	26	22	75	150	M16×50	229 000	269 000	7 560	8 530 41 500	7 810 38 100



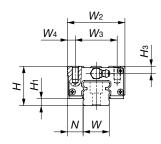
IN Linear Way H: Compact block type

Compact block type mounted from top LWHS ···B

LWHSG

LWHS ···SL (Stainless steel made)

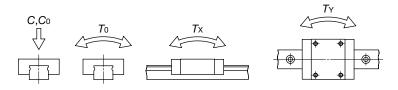
LWHS ···M(Ultra sealed type)

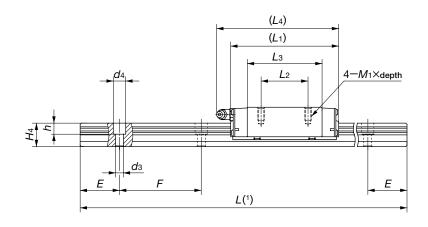


Model number	Interchangeable	Mass	(Ref.)		nension ssemb mm					Dii	mensi	ons of slid	de unit	
Wodor Harrison	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L 3	L4	<i>M</i> ₁×depth
LWHS 15···B	☆													
LWHS 15···SL	☆	0.18	1.47	24	4.5	9.5	34	26	4	66	26	44.6	69	M4× 8
LWHS 15···M														
LWHS 20···B	☆													
LWHS 20···SL	☆	0.36	2.56	30	5	12	44	32	6	83	36	57.2	95	M5×10
LWHS 20···M			2.56	30	5	12	44	32	6					IVIS × IU
LWHSG 20	☆	0.53								112	50	86	124	
LWHS 25···B	☆													
LWHS 25···SL	☆	0.55	2.50	36	6.5	12.5	48	35	6.5	95	35	64.7	106	M6×12
LWHS 25···M			3.50	36	6.5	12.5	48	35	6.5					IVID X 12
LWHSG 25	☆	0.67								118	50	87.4	129	
LWHS 30···B	☆													
LWHS 30···SL	☆	1.00	4.82	42	7	16	60	40	10	113	40	80.6	124	M8×16
LWHS 30···M			4.62	42	,	מו	60	40	10					IVIO A 10
LWHSG 30	☆	1.29								139	60	106.6	150	

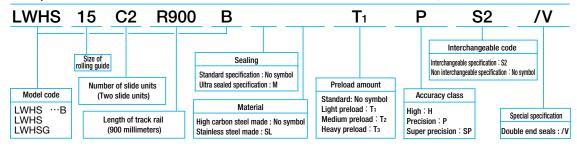
Note(1): Track rail lengths are shown in Table 11.1 on page B-90, Table 11.2 on page B-91 and Table 11.3 on page B-92.

3: For grease nipple specifications, see page 99.





		D	imensi	ons of t	track ra	il		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment ra	ting(²)
		l	l	I	l		l		С	C ₀	T 0	Tx	<i>T</i> Y
Нз	W	H 4	d 3	d4	h	Ε	F	Bolt size X length	N	N	N∙m	N∙m	N∙m
4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
5.5	20	18	6	9.5	8.5	30	60	M5×18	18 100	21 100	232	195 1 090	195 1 090
									24 100	31 700	349	421 2 140	421 2 140
6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
									30 800	38 300	483	533 2 740	533 2 740
8	28	25	9	14	12	40	80	M8×28	35 400	40 700	623	536 2 820	536 2 820
									42 700	53 200	814	894 4 460	894 4 460



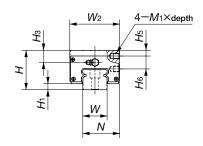
^{(2):} The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The mark 5½ indicates that interchangeable specification products are available.

2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent. For stainless steel type Linear Way H, stainless steel bolts are appended.

Linear Way H: Side mounting type

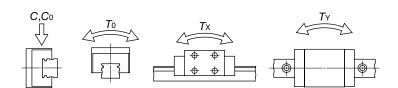


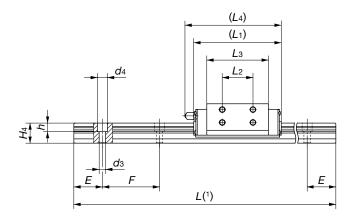


Model number	Mass	(Ref.)		nension assemb mm					Dime	ensions mr	of slide unit n	
woder number	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	<i>L</i> 1	L2	Lз	L4	<i>M</i> 1×depth	Нз
LWHY 15	0.23	1.47	28	4.5	24.3	34	66	18	44.6	69	M 4× 4	8.5
LWHY 20	0.36	2.56	30	5	31.5	43.7	83	25	57.2	95	M 5× 5	5.5
LWHY 25	0.65	3.50	40	6.5	35	47.7	95	30	64.7	106	M 6× 6	10.5
LWHY 30	1.12	4.82	45	7	43.5	59.7	113	40	80.6	124	M 6× 7	11
LWHY 35	1.74	6.85	55	8	51.5	69.7	123	43	86.2	135	M 8× 9	17
LWHY 45	3.30	10.7	70	10	65	85.7	147	55	103.4	158	M10×11	23
LWHY 55	5.36	15.5	80	13	76	99.7	183	70	132	194	M12×13	24
LWHY 65	9.80	22.2	90	14	94.5	126	229	85	164	239	M16×16	20

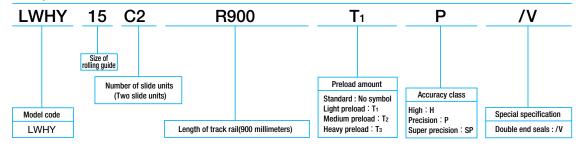
Note(1): Track rail lengths are shown in Table 11.1 on page B-90.

^{2:} For grease nipple specifications, see page 99.





		Dimensions of track rail mm					Mounting bolt for track rail	Basic dynamic load rating(2)	Basic static load rating(2)	Stati	c moment ra	ating(²)		
	1			l	I	1	l		"""	С	C ₀	T 0	Tx	T Y
H 5	H 6	W	H 4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N•m
4	9	15	15	4.5	8	6	30	60	M 4×16	9 360	13 900	116	99.2	99.2 577
													577 202	202
4	10	20	18	6	9.5	8.5	30	60	M 5×18	14 500	21 900	241	1 130	1 130
	10	22	22	_	11	0	20		MCVOO	20.100	20,000	270	320	320
6	12	23	22	7	11	9	30	60	M 6×22	20 100	29 800	376	1 750	1 750
8	14	28	25	9	14	12	40	80	M 8×28	28 100	42 200	646	556	556
	14	20	25	9	14	12	40	80	IVI 0 ^ 20	20 100	42 200	040	2 930	2 930
8	18	34	28	9	14	12	40	80	M 8×28	31 200	43 500	878	665	601
	10	34	20	3	14	12	40	80	IVI OAZO	31 200	43 300	0/0	3 600	3 310
10	22	45	34	14	20	17	52.5	105	M12×35	47 600	65 000	1 720	1 200	1 100
		45	34	14	20	17	52.5	105	WIIZASS	47 000	05 000	1 /20	6 420	5 900
12	25	53	41	16	23	20	60	120	M14×45	71 200	98 300	3 050	2 300	2 110
	25	- 33	71	10	23	20	00	120	WITTA	71200	30 300	3 000	12 000	11 000
12	30	63	48	18	26	22	75	150	M16×50	110 000	149 000	5 510	4 280	3 930
12	30	03	70	''	20	~~	/ 3	130	10110750	1 10 000	1-5 000	3310	22 800	21 000



^{(2):} The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.

Linear Way F

LWFH/LWFF/LWFS

IXU Linear Way F is a linear motion rolling guide, featuring a wide track rail along which a highly rigid slide unit performs endless linear motion. A large number of large diameter steel balls are incorporated in two rows and in four point contact with the raceways, so stable high accuracy and rigidity can be obtained in operations even under fluctuating loads with changing direction and magnitude or complex loads. Being a wide rail type, it can support a large moment load acting around the axial direction, and it is also suitable for single row rail arrangement.

Wide structure

Because the distance between the load points under a moment load is large, this guide has high load capacity under moment load and complex load.

Flange type and block type

Three types of slide units are available; two flange types of different dimension series and one block type with a narrower width.

Stainless steel type

The stainless steel type has excellent corrosion resistance and is the most suitable for machines and equipment used in clean environments, for example, medical equipment, and semiconductor and FPD manufacturing equipment.

Interchangeable

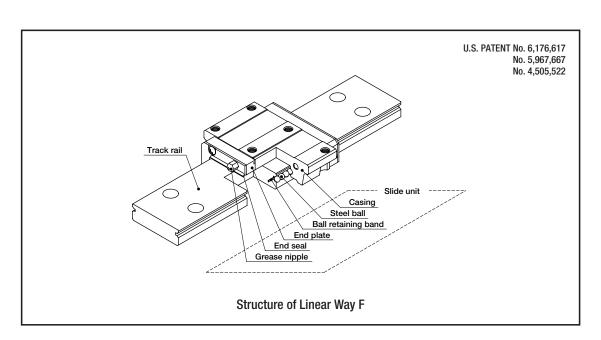
Linear Way F includes interchangeable specification products. The dimensions of slide units and track rails of this specification are individually controlled, so that the slide units and track rails can be combined, added or exchanged freely.

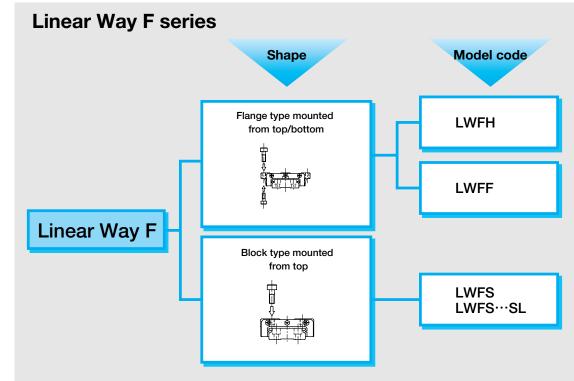
Good load balance

Owing to the simple two row design, large diameter steel balls are incorporated to receive loads in all directions with high load ratings.

High rigidity

Steel balls are arranged in four point contact with the raceways in a highly rigid casing, and they are tightly held in their position without play. So high rigidity in all directions is obtained.





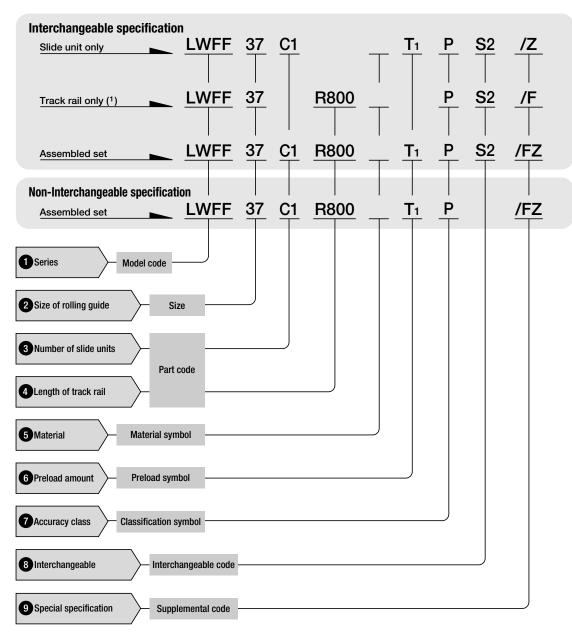


Remark: Models with "SL" are stainless steel type.

1mm=0.03937inch

Identification number and specification

The specification of Linear Way F is indicated by the identification number, consisting of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page 78.



Note(1): For the model code of a single track rail of interchangeable specification of LWFS, indicate "LWFF". Track rail of interchangeable LWFS → Model code LWFF (Ex: LWFF37R800PS2/F)

1 Series

Flange type mounted from top/bottom: LWFH

LWFF

Block type mounted from top : LWFS

> For available models and sizes of slide units, see Table 1.

2 Size of rolling guide

Model	Flang	e type	Block	type
	High carbor	steel made	High carbon steel made	Stainless steel made
Size	LWFH	LWFF	LWFS	LWFS…SL
33	_	☆	☆	☆
37	_	☆	☆	☆
40	☆	_	_	_
42	_	☆	_	☆
60	☆	_	_	_
69	_	☆	_	_
90	☆	_	_	_

3 Number of slide units

: CO Assembled set

Slide unit only

Track rail only

For an assembled set, indicate the number of slide units assembled on one track rail. For a slide unit, : C1

only "C1" can be indicated.

4 Length of track rail

: RO Assembled set

: R()

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on

page B-122.

5 Material

High carbon steel made : No symbol

Stainless steel made : SL For applicable material types, see Table 1.

Standard : No symbol

: T1 Light preload

Specify this item for an assembled set or a single slide unit. For applicable amount, see Table 2. For details of preload amount, see page 86.

: T2

Medium preload

Table 2 Applicable preload types

Tubio 2 Applioubio	prototta typos		
	Pı	reload type (Symb	ol)
Size	Standard (No symbol)	Light preload (T ₁)	Medium preload (T ₂)
		(,	(1-)
33	☆	☆	0
37	☆	☆	0
40	☆	☆	0
42	☆	☆	0
60	☆	☆	0
69	☆	☆	0
90	☆	☆	0

Remark: The mark ☆ indicates that it is also applicable to interchangeable specification products.

7 Accuracy class

High : н

For applicable accuracy, see Table 3. For the interchangeable specification, combine slide units : P Precision and track rails of the same class. For details of accuracy, see page 81.

Super precision : SP

Table 3 Applicable	able 3 Applicable accuracy class					
Size	Accuracy class (Symbol) High Precision Super precision					
Size	(H)	(P)	(SP)			
33	☆	$\stackrel{\wedge}{\Delta}$	0			
37	☆	☆	0			
40	☆	☆	0			
42	☆	☆	0			
60	☆	☆	0			
69	☆	☆	0			
90	☆	☆	0			
Remark: The mark 🛱 indicates that it is also applicable to interchangeable specification pro						

8 Interchangeable code

: S1 Select group 1

Select group 2

: S2

Specify this item for interchangeable specification products. Combine track rails and slide units with the same interchangeable code.

Performance and accuracy of "S1" group and "S2" group are the same.

For applicable special specifications, see Tables 4.1 and 4.2. When several special specifications are 9 Special specification required, see Table 5. For details of special specifications, see page 88.

LWFH, LWFF, LWFS

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

T-61- 4-4	0		- 4 1	14/51
Table 4.1	Special	specifications	OT I	∟WFH

Special specification	Supplemental code	Assembled set	Track rail	Slide unit	Dimension
Butt-jointing track rail	Α	0	_	_	
Chamfered reference surface	С	O (1)	_	_	See Fig. 1.
Opposite reference surfaces arrangement	D	☆	_	_	
Specified rail mounting hole positions	E	☆	☆	_	
Caps for rail mounting holes	F	☆	☆	_	
Inspection sheet	I	0	_	_	
Female threads for bellows	J	☆	☆	☆	See Table 6.1.
Black chrome surface treatment	L	☆	_	_	
Fluorine black chrome surface treatment	LF	☆	_	_	
Supplied without track rail mounting bolt	MN	☆	☆	_	
No end seal	N	☆	_	☆	
Capillary plates	Q	☆	_	☆	See Table 7.
Under seals	U	☆	_	☆	See Table 8.
Matched sets to be used as an assembled group	W	0	_	_	
Specified grease	Υ	☆	_	_	
Scrapers	Z	☆	-	☆	See Table 10.

Note(1): Applicable to size 40 and 60 models.

Remark: In the table, the mark 🕏 indicates that it is also applicable to interchangeable specification products.

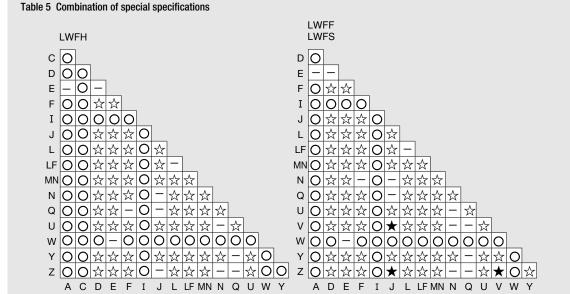
Table 4.2 Special specifications of LWFF, LWFS

Special specification	Supplemental code	Assembled set	Track rail	Slide unit	Dimension
Butt-jointing track rail	Α	0	_	_	
Opposite reference surfaces arrangement	D	☆	_	_	
Specified rail mounting hole positions	E	☆	☆	_	
Caps for rail mounting holes	F	\Rightarrow	☆	_	
Inspection sheet	I	0	_	_	
Female threads for bellows	J	☆(1)	☆(1)	☆	See Table 6.2.
Black chrome surface treatment	L	☆	_	_	
Fluorine black chrome surface treatment	LF	☆	_	_	
Supplied without track rail mounting bolt	MN	☆	☆	_	
No end seal	N	☆	_	☆	
Capillary plates	Q	☆	_	☆	See Table 7.
Under seals	U	☆(2)	_	☆(2)	See Table 8.
Double end seals	V	☆	_	☆	See Table 9.
Matched sets to be used as an assembled group	W	0	_	_	
Specified grease	Υ	☆	_	_	
Scrapers	Z	☆	_	☆	See Table 10.

Note(1): Not applicable to stainless steel made interchangeable specification products.

(2): The H₁ dimension is the same as the dimension of standard products (without under seals).

Remark: In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.



Remark 1: In the table, the mark 🛱 indicates that it is also applicable to interchangeable specification products.

- 2: In the table, the mark indicates that this combination cannot be made.
- 3 : The combinations marked ★ are applicable to non-interchangeable specification products. For combinations of interchangeable specification products, consult **IKO** for further information.
- 4: When several special specifications are required, arrange the supplemental codes alphabetically.

LWFH, LWFF, LWFS

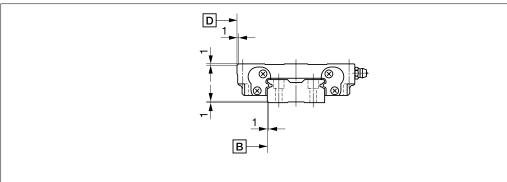
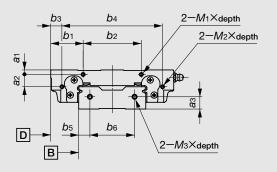


Fig. 1 Chamfers on reference surfaces (Supplemental code /CC)

Table 6.1 Female threads for bellows of LWFH (Supplemental code /J, /JJ)

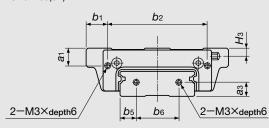


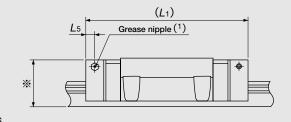
unit	:	mr

		Slide unit								Track rail			
Model number	a 1	a 2	b 1	b 2	b 3	b ₄	<i>M</i> 1×depth	<i>M</i> 2×depth	a 3	b 5	b 6	<i>M</i> 3×depth	
LWFH 40	3	_	23.5	35	_	_	M3×6	_	9	8	24	M3×6	
LWFH 60	4	11	29	52	10	90	M3×6	M3×3	11	10	40	M4×8	
LWFH 90	6	17	41	80	13	136	M3×5	M3×5	13	15	60	M4×8	

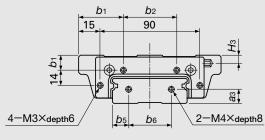
Table 6.2 Female threads for bellows of LWFF, LWFS (Supplemental code /J, /JJ)

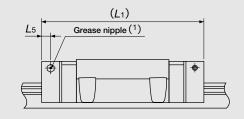
Size: 33,37,42





Size: 69





unit: mm

		Slide unit						Track rail			
Model number	a 1	b 1	b 2	L ₁ (²)	L 5	Н з	a 3	b 5	b 6		
LWFF 33	4	8.25	8.25		40.5	4	_	7.5	18		
LWFS 33	4	3.25	43.5	71	5	_	6	7.5	10		
LWFF 37	6	10	10 48	78	5	1	6.5	8.5	20		
LWFS 37	0	3	40	/0	5	-	0.5	0.0	20		
LWFF 42	0.5	12	EG	92	7	4.5	8	9	24		
LWFS 42···SL	9.5	3	56	32	/	4.5	0	ש	24		
LWFF 69	9	35	50	125	7	5	11	14.5	40		

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product.

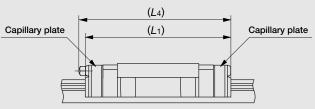
For grease nipple specifications, see page 98.

(2): The values for a slide unit with female threads for bellows at both ends are shown.

Remark: For the size 33 and 37 models, the dimension indicated by an asterisk (%) is higher than the H dimension of Linear Way F.

For details, consult **IKO** for further information.

Table 7 Slide unit with capillary plates (Supplemental code /Q)



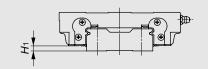
unit : mm

Model number	<i>L</i> 1	L 4
LWFH 40	78	_
LWFH 60	98	
LWFH 90	131	
LWFF 33	64	67
LWFF 37	73	75
LWFF 42	86	99
LWFF 69	121	133

Model number	<i>L</i> 1	L 4
LWFS 33	64	67
LWFS 33···SL	64	67
LWFS 37	73	75
LWFS 37···SL	/3	/5
LWFS 42···SL	86	99

Table 8 H1 dimension of slide unit with under seals (Supplemental code /U)

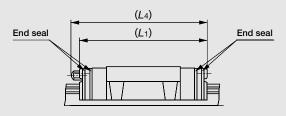
unit : mm



Model number	<i>H</i> ₁
LWFH 40	3
LWFH 60	4
LWFH 90	5

Remark: The H_1 dimension of LWFF and LWFS is the same as that without under seals.

Table 9 LWFF and LWFS slide units with double end seals (Supplemental code /VV)

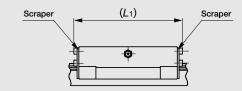


unit : mm

Model number	<i>L</i> ₁	L4		
LWFF 33	61	64		
LWFS 33] "	04		
LWFF 37	- 70	74		
LWFS 37	70	/4		
LWFF 42	82	96		
LWFF 69	117	130		

Remark: The above dimensions are for slide units with double end seals at both ends.

Table 10.1 LWFH slide unit with scrapers (Supplemental code /ZZ)

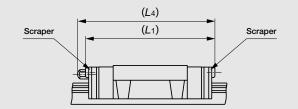


unit: mm

Model number	<i>L</i> 1
LWFH 40	79.2
LWFH 60	99.2
LWFH 90	130

Remark: The above values are for slide units with scrapers at both ends.

Table 10.2 LWFF and LWFS slide units with scrapers (Supplemental code /ZZ)



unit: mm

		unit . mm
Model number	L 1	L 4
LWFF 33	60	64
LWFS 33	62	64
LWFF 37	71	75
LWFS 37	71	75
LWFF 42	84	97
LWFF 69	119	131

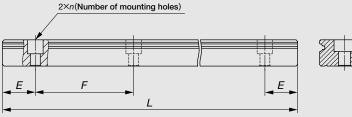
Remark: The above values are for slide units with scrapers at both ends.

Track rail length

Standard and maximum lengths of track rails are shown in Table 11.1 and 11.2. Track rails of any length are also available. Simply indicate the required length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IKO** for further information.

- For track rails longer than the maximum length shown in Table 11.1 and 11.2, butt-jointing track rails are available upon request. In this case, indicate "/A" in the identification number.
- E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.

Table 11.1 Standard and maximum lengths of high carbon steel track rails



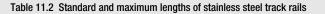


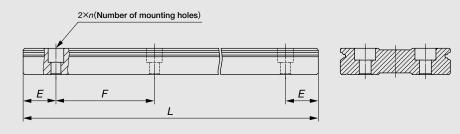
unit: mm

Mode	el number	LWFH 40	LWFH 60	LWFH 90	
		180(3)	240(3)	480(6)	
		240(4)	480(5)	640(8)	
		360(6)	640(8)	800(10)	
Standard length $L(n)$		480(8)	800(10)	1 040(13)	
		660(11)	1 040(13)	1 200(15)	
		840(14)		1 520(19)	
Pitch of mounting hole	s F	60	80	80	
E		30	40	40	
Standard range	incl.	8	10	10	
of <i>E</i> (¹)	under	38	50		
Maximum length(2)		1 500	1 520	1 520	
Mode	el number	LWFF 33 LWFS 33	LWFF 37 LWFS 37	LWFF 42	LWFF 69
		120(3)	150(3)	180(3)	320(4)
		200(5)	250(5)	240(4)	480(6)
Standard length $L(n)$		320(8)	400(8)	360(6)	800(10)
Standard length L (11)		480(12)	500(10)	480(8)	1 040(13)
		560(14)	600(12)	660(11)	1 280(16)
			800(16)	840(14)	1 600(20)
Pitch of mounting hole	s F	40	50	60	80
E		20	25	30	40
Standard range	incl.	7	7	7	9
of <i>E</i> (1)	under	27	32	37	49
Maximum length(2)		1 600	2 000	1 980	2 000

Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J").

(2): Track rails exceeding the maximum length can also be manufactured. Consult **IKD** for further information.





unit: mm

Item	odel number	LWFS 33···SL	LWFS 37···SL	LWFS 42···SL		
		120(3)	150(3)	180(3)		
		200(5)	250(5)	240(4)		
. ,	,	320(8)	400(8)	360(6)		
Standard length L (n)	480(12)	500(10)	480(8)		
		560(14)	600(12)	660(11)		
			800(16)	840(14)		
Pitch of mounting ho	oles F	40	50	60		
E		20	25	30		
Standard range	incl.	7	7	7		
of <i>E</i> (1)	under	27	32	37		
Maximum length(2)		1 200	1 200	1 200		

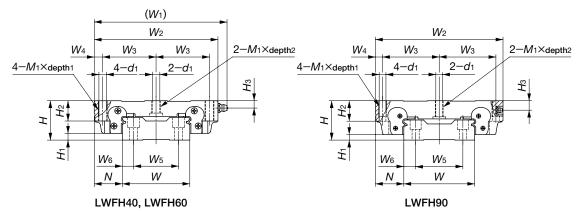
Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J").

(2): Track rails exceeding the maximum length can also be manufactured. Consult IKD for further information.

1mm=0.03937inch

IK Linear Way F: Flange type

Flange type mounted from top/bottom **LWFH**



Model number	angeable	Mass (Ref.) Slide unit Track rail kg kg/m			ensio sseml mm	bly					Di	imensi	ons of mm	slide	unit		
	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W ₁	W 2	W 3	W 4	L 1	L 2	L 5	d ₁	<i>M</i> 1×depth1	depth2	H 2
LWFH 40	☆	0.58	4.60	27	5	21	92	82	37	4	70	60	27.5	4.3	M 5×14	8	14
LWFH 60	☆	1.29	8.60	35	6	25	120	110	47.5	7.5	90	75	45	6.7	M 8×18	11	18
LWFH 90	☆	4.06	16.5	50	7	36	_	162	72	9	120	100	60	8.6	M10×20	20.5	26

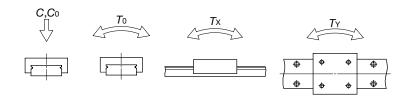
Note(1): Track rail lengths are shown in Table 11.1 on page B-122.

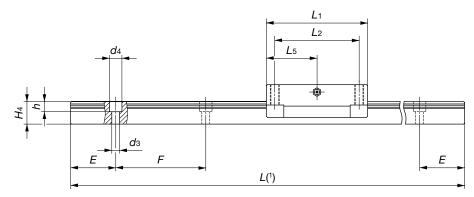
- *Note(1): Track fall lengths are shown in Table 11.1 on page 8-122.

 (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tv) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

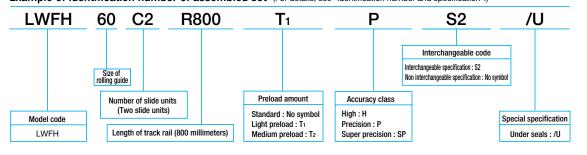
 *Remark 1: The mark 1/2 indicates that interchangeable specification products are available.

 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
- - 3 : For grease nipple specifications, see page 99.



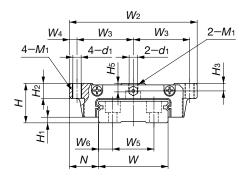


	Dimensions of track rail mm										Basic dynamic load rating(2)	Basic static load rating(2)		ic moment r	ating(2)
Нз	w	H 4	W 5	W 6	d 3	d4	h	E	F	Bolt size x length	C N	C₀ N	<i>T</i> ₀ N•m	<i>T</i> x N∙m	<i>T</i> Y N∙m
6.5	40	16	24	8	4.5	7.2	6	30	60	M4×16	12 600	16 600	280	108 612	99.3 563
6.5	60	20	40	10	7	11	9	40	80	M6×22	16 100	23 500	600	210 1 090	193 998
12	90	25.5	60	15	9	14	12	40	80	M8×28	31 600	43 300	1 650	513 2 680	470 2 460



Linear Way F: Flange type

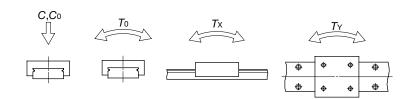
Flange type mounted from top/bottom **LWFF**

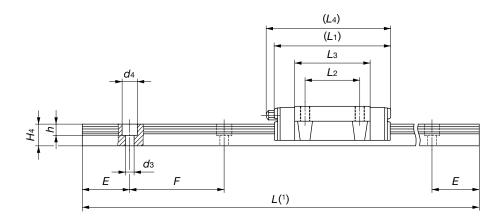


Model number	Interchangeable	Mass	(Ref.)		ensioi ssemb mm						Dimer	nsions o mm		unit		
	Interch	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L4	d1	<i>M</i> 1	H 2
LWFF 33	☆	0.14	2.41	17	2.5	13.5	60	26.5	3.5	53.5	26	35.3	56	3.3	M4	6
LWFF 37	☆	0.23	3.05	21	3	15.5	68	30	4	62	29	40	66	4.4	M5	8
LWFF 42	☆	0.49	4.30	27	3	19	80	35	5	75	40	52.2	86	5.3	M6	10
LWFF 69	☆	1.40	9.51	35	4	25.5	120	53.5	6.5	109	60	79.5	119	7	M8	14

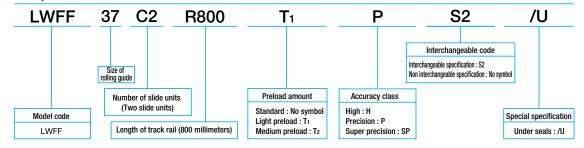
Note(1): Track rail lengths are shown in Table 11.1 on page B-122.

- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: The mark $\frac{1}{3}$ indicates that interchangeable specification products are available.
 - 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent. 3: For grease nipple specifications, see page 99.





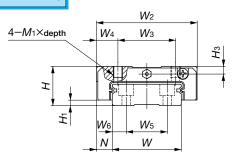
				Dim	ensior	ns of t mm	rack i	rail				Basic dynamic load rating(2)	Basic static load rating(2)		ic moment ı	rating(2)
Нз	H 5	W	H 4	W 5	W 6	d 3	d4	h	E	F	Bolt size x length	C N	C ₀ N	<i>T</i> ₀ N•m	<i>T</i> x N∙m	<i>T</i> Y N•m
3.2	3.7	33	10	18	7.5	4.6	8	6	20	40	M4×10	6 530	8 610	146	49.0 289	49.0 289
4	4.5	37	11.5	22	7.5	4.6	8	6	25	50	M4×12	9 840	12 200	235	80.0 480	80.0 480
6	7	42	14	24	9	4.6	8	6	30	60	M4×16	15 500	19 400	424	165 904	165 904
8	8	69	19.5	40	14.5	7	11	9	40	80	M6×22	34 900	44 100	1 560	581 2 940	488 2 460

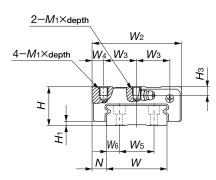


IN Linear Way F: Block type

Block type mounted from top **LWFS**

LWFS···SL (Stainless steel made)





LWFS 33(····SL) LWFS 37(····SL)

LWFS 42···SL

Model number		Mass (Ref.		Dimensions of assembly mm			Dimensions of slide unit mm							
Model number	Interchangeable	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L ₂	Lз	L 4	<i>M</i> ₁×depth
LWFS 33	☆													
LWFS 33···SL	☆	0.13	2.41	17	2.5	8.5	50	29	10.5	53.5	15	35.3	56	M4×5
LWFS 37	☆	0.20	3.05	21	3	8.5	54	31	11.5	62	19	40	66	M5×6
LWFS 37···SL	☆	0.20	3.05	Z I	3	6.5	54	31	11.5	02	19	40	00	INIONO
LWFS 42···SL	☆	0.40	4.30	27	3	10	62	23	8	75	32	52.2	86	M6×6

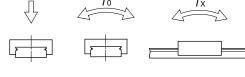
Note(1): Track rail lengths are shown in Table 11.1 on page B-122 and Table 11.2 on page B-123.

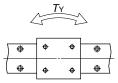
(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

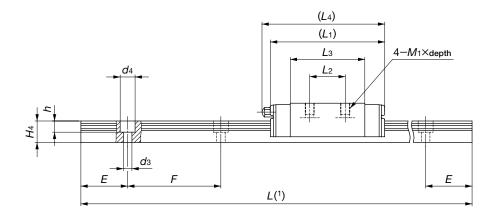
Remark 1: The mark 💢 indicates that interchangeable specification products are available.

- 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent. For stainless steel type Linear Way F, stainless steel bolts are appended.
- 3: For grease nipple specifications, see page 99.



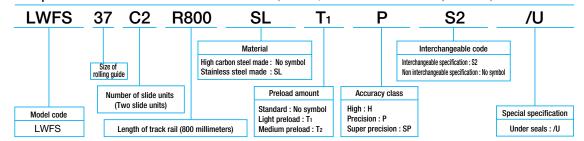






		Dimensions of track rail mm								Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)		moment ra	iting(²)
Нз	W	H 4	W 5	W 6	d 3	d4	h	E	F	Bolt size x length	C	C ₀	<i>T</i> 0	Tx	TY
											IN	N	N∙m	N∙m	N∙m
3.2	33	10	18	7.5	4.6	8	6	20	40	M4×10	6 530	8 610	146	49.0 289	49.0 289
4	37	11.5	22	7.5	4.6	8	6	25	50	M4×12	9 840	12 200	235	80.0 480	80.0 480
6	42	14	24	9	4.6	8	6	30	60	M4×16	15 500	19 400	424	165 904	165 904

Example of identification number of assembled set (For details, see "Identification number and specification".)



Linear Way U

LWU

IKO Linear Way U is a linear motion rolling guide featuring a track rail with a U-shaped cross section. Raceways are provided on the inside surface of the track rail, and a slide unit mounted inside the track rail travels along the raceways.

The U-shaped track rail has much higher rigidity as compared with the track rail with a rectangular cross section, especially under moment and torsion. Therefore, in addition to the conventional way of fastening a track rail on a mounting base, it can be used by itself as a structural member of machines and equipment, in a cantilever position or being supported at both ends.

U-shaped track rail

Rigidity of track rail under moment and torsion is very much increased by adopting the U-shaped design. The track rails can, therefore, be mounted on machines and equipment as structural members, either in a cantilever position or supported at both ends, so they can be combined and assembled freely.

High precision and rigidity

Large diameter steel balls in the slide unit are arranged in two rows, and makes contact with the raceways at four points. Stable high precision and rigidity are thus obtained even under fluctuating loads with changing direction and magnitude or complex loads.

Ball retained type

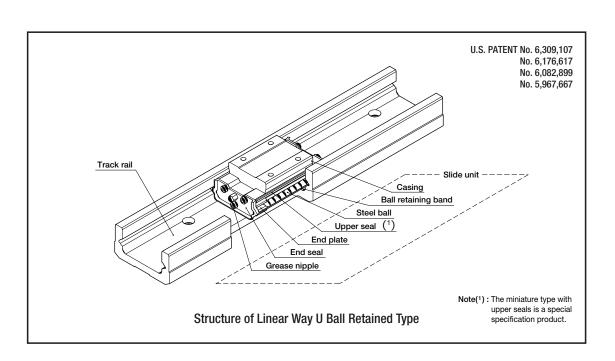
The slide unit of ball retained type incorporates ball retaining bands, which prevent steel balls from dropping when the slide unit is separated from the track rail. So handling is easy.

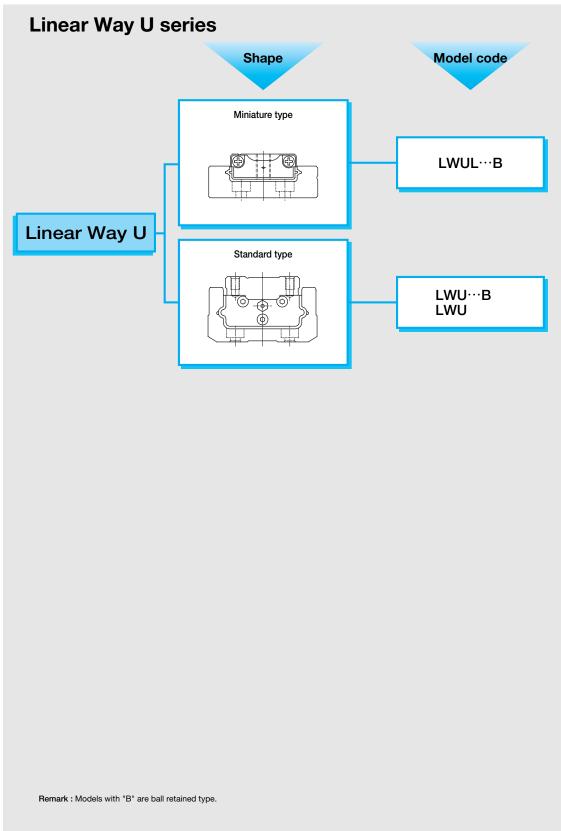
U.S. PATENTED

Additional work on track rail is possible

Additional work can be made on track rails of standard type, so that drive mechanisms and other peripheral devices can be fixed directly to the track rails.

(* Note that additional work cannot be made near the raceways of track rail. For details, consult **IKO** for further information.)

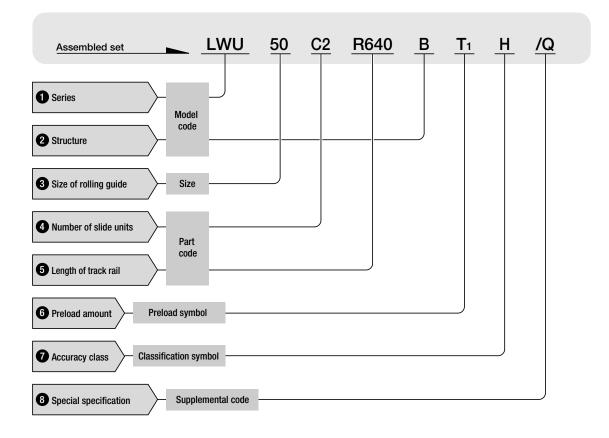




1N=0.102kgf=0.2248lbs.

Identification number and specification

The specification of Linear Way U is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol and any supplemental codes. For details of each specification, see page 78.



Miniature type: LWUL Standard type: LWU

2 Structure

Ball retained type : B
Ball non-retained type : No symbol

For available models and sizes, see Table 1.

3 Size of rolling guide

Model	Miniature type	Standa	ard type
	Stainless steel made	High carbo	n steel made
Size	Ball retained type LWUL…B	Ball retained type LWU…B	Ball non-retained type
25	0	_	_
30	0	_	_
40	_	0	0
50	_	0	0
60	_	0	0
86	_	0	0
100	_	_	0
130	_	_	0

4 Number of slide units

Indicate the number of slide units assembled on one track rail.

5 Length of track rail

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-136.

6 Preload amount

Standard : No symbol

For details of preload amount, see page 86.

: RO

nt preload : T1

: No symbol Ordinary

: H

High

For details of accuracy, see page 81.

8 Special specification

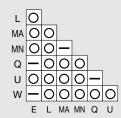
For applicable special specifications, see Table 2. When several special specifications are required, see Table 3. For details of special specifications, see

Table 2 Special specifications

Special specification	Supplemental code	Dimension
Specified rail mounting hole positions (1)	Е	
Black chrome surface treatment (2)	L	
Supplied with track rail mounting bolt (3)	MA	See Table 4
Supplied without track rail mounting bolt (1)	MN	
Capillary plates (3)	Q	See Table 5
Upper seals (1)	U	See Table 6
Matched sets to be used as an assembled group	W	

- Note(1): Applicable to size 25 and 30 models.
 (2): Only "LR" is applicable to size 25 and 30 models.
 - (3): Not applicable to size 25 and 30 models.

Table 3 Combination of special specifications



Remark: When several special specifications are required, arrange the supplemental codes alphabetically.

Table 4 Recommended track rail mounting bolt size (Supplemental code /MA)

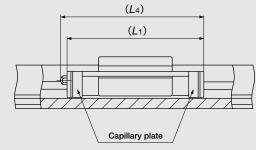
Model number	Recommended bolt size
LWU 40···B	M 3× 8
LWU 50···B	M 4×10
LWU 60···B	M 5×12
LWU 86···B	M 6×16
LWU 100	M 8×20
LWU 130	M10×25

Remark 1 : The above table shows representative model numbers but is

applicable to all models of the same size.

2: Hexagon socket head bolts of strength division 12.9 of JIS B 1176 are recommended.

Table 5 Slide unit with capillary plates (Supplemental code /Q)

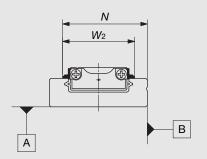


unit : mm

		u
Model number	<i>L</i> 1	L 4
LWU 40···B	67	68
LWU 50···B	82	83
LWU 60···B	95	102
LWU 86···B	142	148
LWU 100	166	172
LWU 130	190	196

Remark: The above table shows representative model numbers but is applicable to all models of the same size.

Table 6 Slide unit with upper seals (Supplemental code /U)



unit: mm

Model number	N	W 2
LWUL 25···B	21.4	18
LWUL 30···B	25.9	22

LWU LWU…B,

Track rail length

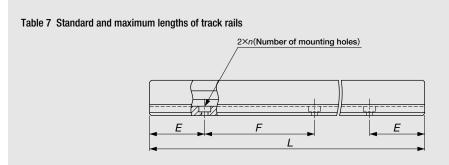
Standard and maximum lengths of track rails are shown in Table 7.

For miniature type, track rails in any length are also available. Simply indicate the necessary length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IKU** for further information.

• E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.

For standard type, when requiring track rails in any length other than the standard length, consult **IKO** for further information.

• For ball non-retained type track rails longer than the maximum length shown in Table 6, butt-jointing track rails are available upon request. When requiring, consult **IKD** for further information.



nit		

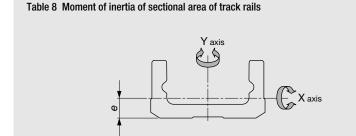
Mode	l number	LWUL 25···B	LWUL 30···B	LWU 40···B LWU 40	LWU 50···B LWU 50
Standard length $L(n)$		105(3) 140(4) 175(5) 210(6) 245(7) 280(8)	120(3) 160(4) 200(5) 240(6) 280(7) 320(8)	180(3) 240(4) 300(5) 360(6) 420(7) 480(8)	240(3) 320(4) 400(5) 480(6) 560(7) 640(8)
Pitch of mounting holes	F	35	40	60	80
E		17.5	20	30	40
Standard range of E	incl.	4.5	4.5	_	_
Standard range of L	under	22	22 24.5 —		_
Maximum length(1)		420 480 (840) (960) 720		800	
Mode	l number	LWU 60···B LWU 60	LWU 86···B LWU 86	LWU 100	LWU 130
Standard length $L\left(n ight)$		300(3) 400(4) 500(5) 600(6) 700(7) 800(8)	300(3) 400(4) 500(5) 600(6) 700(7) 800(8)	450(3) 600(4) 750(5) 900(6) 1 050(7) 1 200(8)	450(3) 600(4) 750(5) 900(6) 1 050(7) 1 200(8)
Pitch of mounting holes	F	100	100	150	150
E		50	50	75	75
Maximum length(1)		1 000	1 200	1 500	1 500

Note(1): Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult **IKO** for further information.

Remark: M8 female threads for hanging bolt are provided on the track rail of size 100 model. And M10 female threads for hanging bolt are provided on the track rail of size 130 model.

Moment of inertia of sectional area

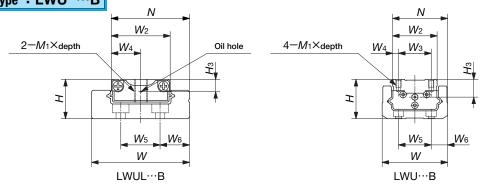
Table 8 shows the moment of inertia of sectional area of track rails.



Madal	number	Moment of inertia of	Center of gravity	
Model	number	Ιx	ΙΥ	e mm
LWUL	25…B	3.7×10 ²	7.5×10 ³	2.6
LWUL	30…B	9.3×10 ²	1.7×10 ⁴	3.3
LWU	40…B	1.0×10 ⁴	6.8×10 ⁴	6.6
LWU	40	1.0 × 104	6.9×10 ⁴	0.0
LWU	50…B	2.8×10 ⁴	1.7×10 ⁵	8.7
LWU	50	2.8 ^ 104	1.7 × 103	0.7
LWU	60···B	6.3×10 ⁴	3.9×10 ⁵	10.7
LWU	60	6.3 ^ 104	3.9 \ 103	10.8
LWU	86···B	2.4×10 ⁵	1.6×106	14.6
LWU	86	2.4 ^ 105	1.0 \ 100	14.6
LWU	100	5.9×10 ⁵	3.3×10 ⁶	18.8
LWU	130	1.4×10 ⁶	8.8×10 ⁶	23.0

IKD Linear Way U

Ball retained type Miniature type: LWUL···B Standard type : LWU ···B

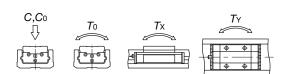


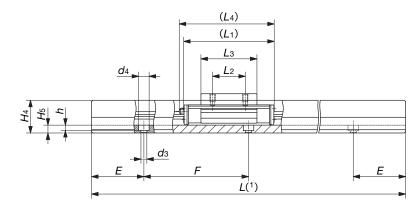
Model number	Mass	Mass (Ref.)		Dimensions of assembly mm		Dimensions of slide unit mm							
	Slide unit kg	Track rail kg/m	н	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L4	<i>M</i> 1×depth	Нз
LWUL 25···B	0.013	0.87	9	19.4	14	_	7	31	12	22	_	M3× 5	2.9
LWUL 30···B	0.029	1.39	12	23.9	18	_	9	38	14	28.6	_	M4× 7	3.75
LWU 40···B	0.12	2.65	24	33	26	18	4	55	18	31.5	59	M3× 5	10.5
LWU 50···B	0.27	4.06	30	42	34	25	4.5	70	25	42.8	73	M4× 6	13.5
LWU 60···B	0.40	6.66	35	49	38	28	5	83	28	52.4	90	M5× 8	14.5
LWU 86···B	1.32	14.1	48	71	56	46	5	130	46	93	136	M6×12	25.5

- Note(1): Track rail lengths are shown in Table 7 on page B-136.

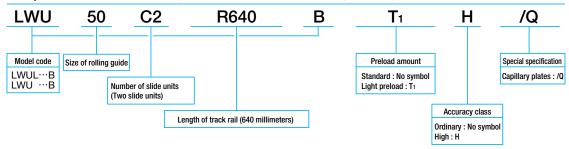
 (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: For grease nipple and oil hole specifications, see page 99.

 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent, or cross-recessed head screws for precision equipment. For stainless steel type Linear Way U, stainless steel bolts or screws are appended.
 - 3: Track rail mounting bolts are not appended to model size 40, 50, 60 and 88. Hexagon socket head cap bolts of JIS B 1176 in strength division 12.9 are recommended. Please see Table 4 on page B-134.



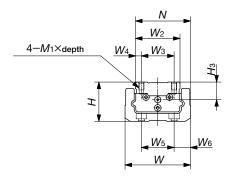


	Dimensions of track rail mm									Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static r	noment ra	ating(2)
W	H 4	H 5	W 5	W 6	d 3	d4	h	E	F	Bolt size x length	C N	C ₀	<i>T</i> ₀ N•m	<i>T</i> x N•m	<i>T</i> Y N∙m
24.9	6.7	3.2	9	8	2.9	4.8	1.6	17.5	35	Cross recessed head screw for precision equipment M2.5×6	1 770	2 840	20.3	10.1 53.7	8.4 45.0
29.9	8.7	4.5	12	9	2.9	5	2.7	20	40	Hexagon socket head bolt M2.5×6	2 280	3 810	34.9	16.9 87.5	14.2 73.4
40	19	5	18	11	3.4	6.5	3.1	30	60	Not appended	8 410	9 780	134	53.0 351	53.0 351
50	25	6	25	12.5	4.5	8	4.1	40	80	Not appended	13 500	15 800	280	114 711	114 711
60	30	8	28	16	5.5	9.5	5.4	50	100	Not appended	18 800	21 600	425	181 1 150	181 1 150
86	42	13	46	20	7	11	7	50	100	Not appended	41 400	51 500	1 470	764 4 120	764 4 120



IKO Linear Way U

Ball non-retained type Standard type : LWU



Model number	Mass	asse	sions of embly nm		Dimensions of slide unit mm									
	Slide unit kg	Track rail kg/m	Н	N	W 2	W 3	W 4	<i>L</i> 1	L2	L3	L4	<i>M</i> ₁×depth	Нз	W
LWU 40	0.12	2.66	24	33	26	18	4	55	18	31.5	59	M 3× 5	10.5	40
LWU 50	0.27	4.08	30	42	34	25	4.5	70	25	42.8	73	M 4× 6	13.5	50
LWU 60	0.40	6.69	35	49	38	28	5	83	28	52.4	90	M 5× 8	14.5	60
LWU 86	1.32	14.1	48	71	56	46	5	130	46	93	136	M 6×12	25.5	86
LWU 100	2.20	21.5	58	82	65	50	7.5	154	50	111	158	M 8×15	29	99.5
LWU 130	4.49	33.0	72	109	88	70	9	178	70	132	182	M10×20	35.5	130

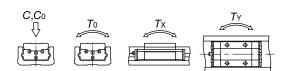
Note(1): Track rail lengths are shown in Table 7 on page B-136.

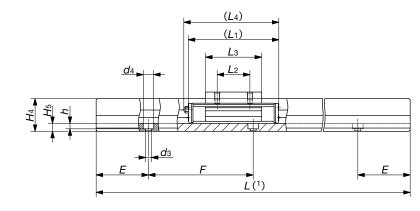
(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.

Remark 1: Track rail mounting bolts are not appended. Hexagon socket head cap bolts of JIS B 1176 in strength division 12.9 are recommended.

Please see Table 4 on page B-134.

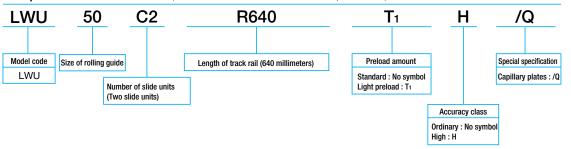
2: For grease nipple specifications, see page 99.





	Dimensions of track rail mm								Basic dynamic load rating(2)	Basic static load rating(2)	Stati	Static moment rating(2)		
H 4	H 5	W 5	W 6	d 3	d4	h	E	F	С	C ₀	T 0	Tx	TY	
									N	N	N∙m	N∙m	N∙m	
19	5	18	11	3.4	6.5	3.1	30	60	8 410	9 780	134	53.0 351	53.0 351	
25	6	25	12.5	4.5	8	4.1	40	80	13 500	15 800	280	114 711	114 711	
30	8	28	16	5.5	9.5	5.4	50	100	18 800	21 600	425	181 1 150	181 1 150	
42	13	46	20	7	11	7	50	100	41 400	51 500	1 470	764 4 120	764 4 120	
52	17	50	24.5	9	14	9	75	150	54 600	68 500	2 230	1 210 6 460	1 210 6 460	
65	20	70	30	11	17.5	10.6	75	150	70 300	88 800	3 920	1 830 9 630	1 830 9 630	

Example of identification number (For details, see "Identification number and specification".)



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Linear Way Module

LWLM/LWM

IKO Linear Way Module is a compact linear motion rolling guide for endless linear motion, and consists of a set of track rail and slide member which forms the smallest unit of linear motion mechanism. Various models are available for selection suitable for each application. In general, two sets are used in parallel.

Compact

The one row, four point contact design has achieved a compact product, which can be mounted in a very small space. It can be easily adapted to the structure of machines and equipment, providing a high degree of freedom in machine design.

Low height

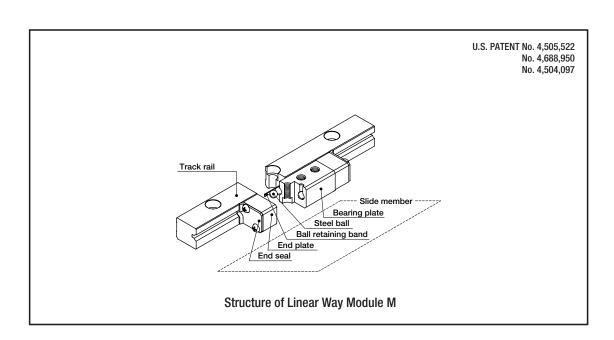
As the sectional height is low, Linear Way Modules can be easily adapted to the structure of machines and equipment.

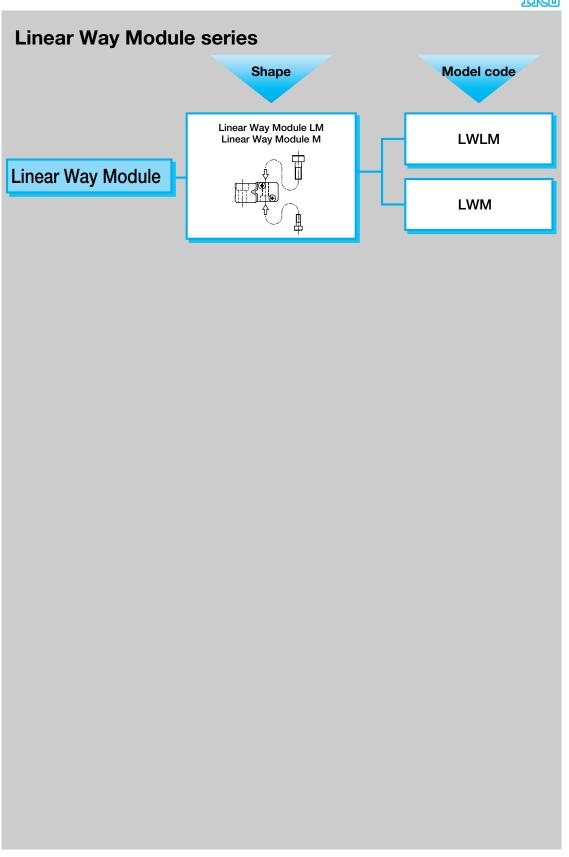
Linear Way Module LM

As stainless steel components are used, Linear Way Module LM has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, disk read devices, and semi-conductor manufacturing

Linear Way Module M

Linear Way Module M is a standard type, incorporating steel balls as rolling elements.

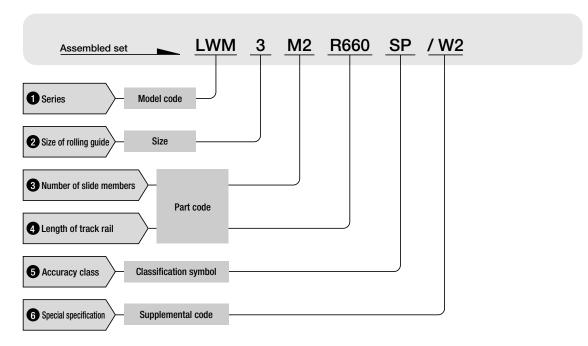




1N=0.102kgf=0.2248lbs. B-142 B-143 1mm=0.03937inch

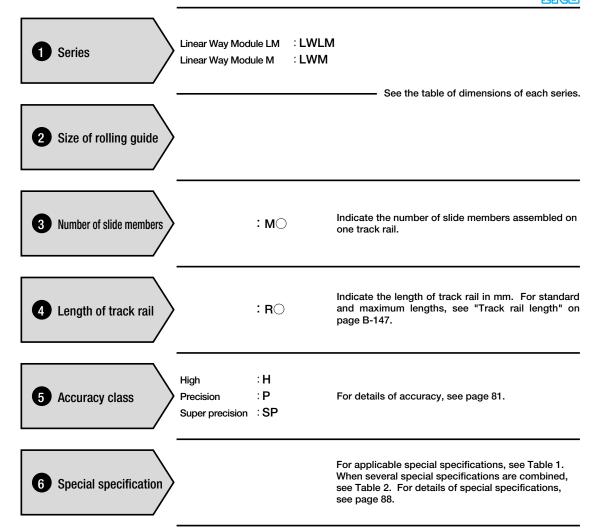
Identification number and specification

The specification of Linear Way Module is indicated by the identification number, consisting of a model code, a size, a part code, a classification symbol and any supplemental codes. For details of each specification, see page 78.



Remark: Above identification number indicates an assembled set consisting of one track rail and two slide members (in case of above example).

It is needed to place an order of two sets of above, when two rails are set in parallel.



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

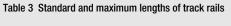
Special specification	Supplemental code	Linear Way LM	Linear Way M	Linear Roller Way M
Butt-jointing track rail	Α	_	0	0
Specified rail mounting hole positions	E	0	0	0
Caps for rail mounting holes	F	_	0	0
Inspection sheet	I	0	0	0
Black chrome surface treatment	LR	_	0	0
Fluorine black chrome surface treatment	LFR	_	0	0
Supplied without track rail mounting bolt	MN	0	O (1)	O (1)
Matched sets to be used as an assembled group	W	0	0	0
Specified grease	Y	0	0	0

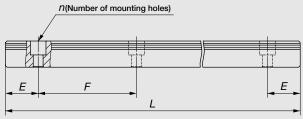
Table 2 Combination of special specifications	
E —	
FOO	
I 0000	
MN O O O O O O	
w O - O O O O	
Y 0000000	
A E F I LR LFRMN W	
Remark 1: In the table, the mark – indicates that this combination cannot be made. 2: When several special specifications are required, arrange the supplemental codes alphabetically.	

Track rail length

Standard and maximum lengths of track rails are shown in Table 3. Track rails in any length are also available. Simply indicate the necessary length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IKD** for further information.

- For track rails of Linear Way Module M longer than the maximum length shown in Table 3, butt-jointing track rails are available upon request. In this case, indicate "/A" in the identification number.
- E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 91.





unit : mr

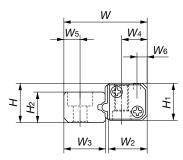
Item	number	LWLM 7	LWLM 9	LWLM 11			
		60(3)	100(4)	160(4)			
	\	80(4)	150(6)	240(6)			
Standard length L (n)	120(6)	200(8)	320(8)			
		160(8)	275(11)	440(11)			
Pitch of mounting holes	F	20	25	40			
E		10	12.5	20			
otarida di farige	ncl.	4.5	5	5.5			
of E	ınder	14.5	17.5	25.5			
		240	350	520			
Maximum length(1)		(500)	(900)	(1 000)			
Model I	number	LWM 1	LWM 2	LWM 3	LWM 4	LWM 5	LWM 6
		240(6)	240(4)	480(8)	800(10)	800(8)	1 200(10)
Standard length L ((n)	360(9)	360(6)	660(11)	1 040(13)	1 200(12)	1 920(16)
		480(12)	480(8)	840(14)	1 200(15)	1 500(15)	2 520(21)
Pitch of mounting holes	F	40	60	60	80	100	120
E		20	30	30	40	50	60
Standard range in	ncl.	7	8	9	10	12	13
of E	ınder	27	38	39	50	62	73
Maximum length		1 240	1 260	1 260	1 520	1 500	2 520

Note(1): Track rails with the maximum lengths shown in parentheses can also be manufactured for LWLM. Consult **IKO** for further information.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Linear Way Module





Model number	Mass (Ref.) Dimensions o assembly mm		mbly	Dimensions of slide member mm												
Woder Humber	Slide member	Track rail g/m	Н	w	<i>H</i> 1	W 2	W 4	W 6	<i>L</i> 1	L 3	<i>F</i> 1	d ₁	d2	h1	M 1	d 5
LWLM 7	10	210	7	15	6.6	7.8	5	2.5	38	24	12	1	I	_	M2.6	1
LWLM 9	16	390	8.5	18	8	8.6	5.5	2.2	45	29.2	15	_	_	_	МЗ	1.5
LWLM 11	32	590	11	23	10	11.8	7	3	52	32.8	15	2.55	5	3	МЗ	2

Note(1): Track rail lengths are shown in Table 3 on page B-147.

(2): Track rail lengths are shown in Table 3 on page B-147.

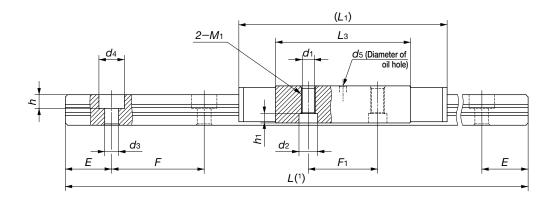
(2): The directions of basic dynamic load rating (C) and basic static load rating (Co) are shown in the sketch below.

(3): In LWLM7, counter bore is not provided to the track rail. Total height of track rail including bolt head is 7.4mm.

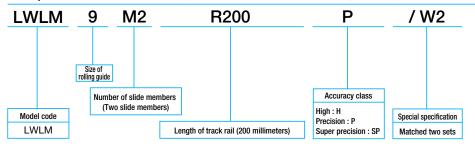
Remark 1: The appended track rail mounting bolts are hexagon socket head stainless steel bolts of JIS B 1176 or equivalent.

2: Slide member mounting bolts are not appended.



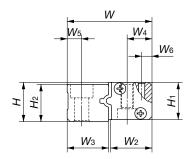


			Di		of track r	Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)			
	H2	W 3	W 5	d 3	d4	h	E	F	Bolt size x length	C N	C ₀
•	4.8	6.8	3.3	3(3)	-(³)	- (3)	10	20	M 2.6× 8(³)	1 730	2 020
-	6.6	9	3.5	3	5.5	3	12.5	25	M 2.6× 8	2 780	3 150
_	8	10.8	5	3.5	6	4.5	20	40	M 3 × 8	4 080	4 240



IKO Linear Way Module





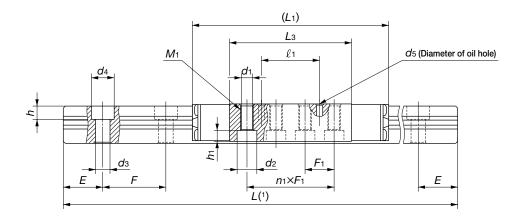
Model number	ass		asse	sions of mbly m	Dimensions of slide me mm						nembe	ember		
	Slide member	Track rail g/m	Н	w	<i>H</i> 1	W 2	W 4	W 6	<i>L</i> 1	Lз	n1×F1	d ₁	d ₂	h1
LWM 1	0.07	1.20	14	28	13	14.6	9	4	65	41.2	2×13	3.4	6.5	3.1
LWM 2	0.11	1.93	17	35	16	17	10	4	75	47.2	2×15	4.4	8	4.1
LWM 3	0.17	2.71	19	41	18	20	12	5	95	58.8	3×14	5.4	9.5	5.2
LWM 4	0.32	3.49	21	51	20	25	15	6	125	80.6	3×20	6.8	11	6.2
LWM 5	0.56	5.25	25	63	24	30	18	8	145	94.8	4×20	6.8	11	6.2
LWM 6	1.35	7.56	31	78	30	40	24	11	180	131	5×22	8.6	14	8.2

Note(1): Track rail lengths are shown in Table 3 on page B-147.

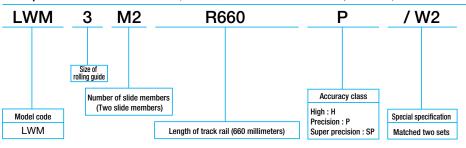
(2): The directions of basic dynamic load rating (C) and basic static load rating (Co) are shown in the sketch below.

Remark: The appended slide member and track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.





			Mounting bolt for slide member mm			Dime	nsions m	of trai	ck rail				Basic dynamic load rating(²)	Basic static load rating(2)
<i>M</i> 1	ℓ1	d 5	Bolt size x length	H2	W 3	W 5	d 3	d4	h	E	F	Bolt size x length	N	N N
M 4	13	2	M3×14	13	13	5.5	4.5	8	4.5	20	40	M 4×14	4 720	6 410
M 5	15	3	M4×18	16	17	6	6	9.5	5.4	30	60	M 5×18	7 150	9 240
M 6	_	3	M5×20	18	20	7	7	11	6.5	30	60	M 6×20	13 700	16 600
M 8	_	3	M6×22	20	25	9	9	14	9	40	80	M 8×22	23 200	27 400
M 8	20	3	M6×28	24	31	12	11	17.5	11	50	100	M10×25	35 300	41 000
M10	_	3	M8×35	30	36	14	14	20	13	60	120	M12×35	74 100	80 900





Linear Roller Way

Description and Table of dimensions



In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

Linear Roller Way Super X

LRX/LRXD/LRXS

IKO Linear Roller Way Super X is a high performance roller type linear motion rolling guide, featuring high reliability, high rigidity, high accuracy, and smooth motion. Four rows of cylindrical rollers are incorporated in a highly rigid casing with good balance, and the cylindrical rollers in each row are arranged in parallel to each other. Owing to its small elastic deformation, stable operation is ensured even under heavy or fluctuating loads. This series is also suitable for applications with vibration and shocks. Various models and sizes are available to meet requirements in each application.

Interchangeable

Linear Roller Way Super X includes interchangeable specification products. The dimensions of slide units and track rails of this specification are individually controlled, so that the slide units and track rails can be combined, added or exchanged freely.

Variable length of slide unit

Three types of slide units, the short slide unit, the standard slide unit and the high rigidity long slide unit with the same sectional dimensions are available for selection suitable for each application.

Flange type and block type

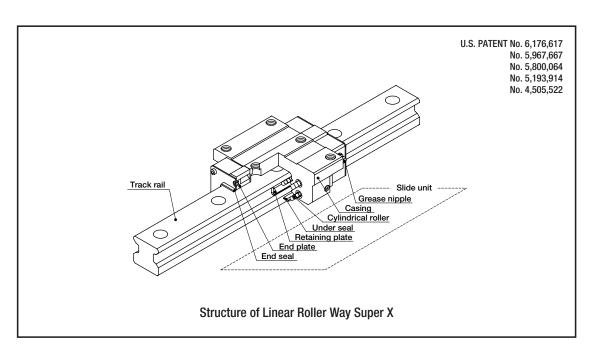
Slide units are available in two different sectional shapes: the flange type for mounting from both upper and lower sides and the block type with a narrow width.

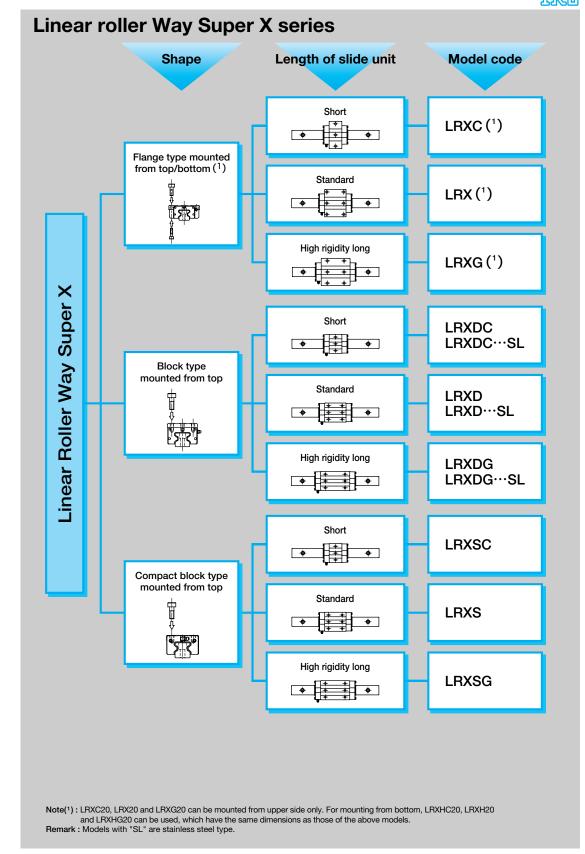
Dimensional interchangeability with the ball type

The mounting dimensions are the same as those of ball type Linear Way H. So this guide can replace the ball type with little modifications of machines or equipment.

Stainless steel type

The stainless steel type has excellent corrosion resistance, and is best suited for machines and equipment used in clean environments, for example, medical equipment and semi-conductor manufacturing equipment.

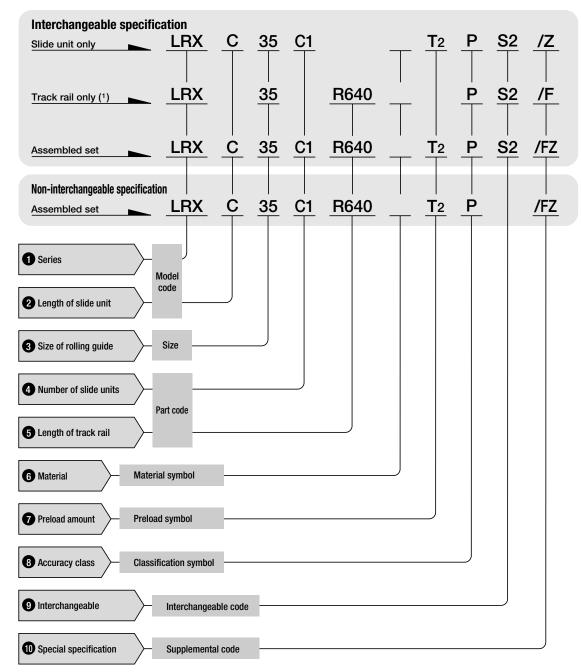




1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

The specification of Linear Roller Way Super X is indicated by the identification number, consisting of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page 78.



Note(1): For the model code of a single track rail of interchangeable specification, indicate "LRX" regardless of the slide unit type to be combined.

Flange type mounted from both the upper/lower side : LRX 1 Series : LRXD Block type mounted from the upper side : LRXS Compact block type mounting from the upper side

2 Length of slide unit

: C Short Standard : No symbol High rigidity long : G

For available slide unit models, materials and sizes, see Tables 1.1, 1.2 and 1.3.

3 Size of rolling guide

4 Number of slide units

: **C** \bigcirc Assembled set

Slide unit

Track rail

: C1

For an assembled set, indicate the number of slide units assembled on one track rail. For a slide unit, only "C1" can be indicated.

5 Length of track rail

: **R**〇 Assembled set

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page C-14.

:RO

6 Material

High carbon steel made : No symbol

Stainless steel made

For available material types, see Tables 1.1, 1.2 and

1.3.

ahle 1 1	Modele and cizee	of Linear Roller Way Super	Y flance type

Model	Н	igh carbon steel mad	de
Size	Short LRXC	Standard LRX	High rigidity long LRXG
12	$\stackrel{\wedge}{\simeq}$	☆	☆
15	☆	☆	☆
20 (1)	☆	☆	☆
25	☆	☆	☆
30	☆	☆	☆
35	\Rightarrow	☆	☆
45	\Rightarrow	☆	☆
55	\Rightarrow	☆	☆
65	☆	☆	☆
85	_	0	0
100	_	_	0

Note(1): LRXC20, LRX20 and LRXG20 can be mounted from top side only. For mounting from bottom side, LRXHC20, LRXH20 and LRXHG20 can be used, which have the same dimensions as those of the above models. Remark : The mark \precsim indicates that interchangeable specification products are

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

C-5

Model	High	carbon steel r	nade	Sta	inless steel ma	ade
Size	Short LRXDC	Standard LRXD	High rigidity long LRXDG	Short LRXDC···SL	Standard LRXD····SL	High rigidity long LRXDG…SL
10	1	1	_	_	0	_
12	$\stackrel{\wedge}{\simeq}$	$\stackrel{\wedge}{\sim}$	☆	☆	\Rightarrow	\Rightarrow
15	☆	☆	☆	☆	\Rightarrow	☆
20	$\stackrel{\wedge}{\simeq}$	$\stackrel{\wedge}{\sim}$	☆	☆	\Rightarrow	☆
25	☆	☆	☆	☆	\Rightarrow	☆
30	☆	☆	☆	☆	☆	☆
35	$\stackrel{\wedge}{\sim}$	☆	☆	_	_	_
45	☆	☆	☆	_	_	_
55	☆	☆	☆	_	_	_
65	☆	☆	☆	_	_	_

Remark : The mark 💢 indicates that interchangeable specification products are available.

Table 1.3 Models and sizes of Linear Roller Way Super X Compact block type

			•
Model	Н	igh carbon steel mad	de
Size	Short LRXSC	Standard LRXS	High rigidity long LRXSG
15	☆	☆	☆
20	☆	☆	☆
25	☆	☆	☆
30	☆	☆	☆

Remark: The mark ☆ indicates that interchangeable specification products are available.

7 Preload amount

Standard : No symbol

Light preload : T1

Medium preload : **T**2

Heavy preload

slide unit.

For applicable preload amount, see Table 2. For details of preload amount, see page 86.

Specify this item for an assembled set or a single

: **T**3

Table 2 Applicable preload types

Table 2 Applicable	preioau types			
		Preload typ	oe (Symbol)	
Size	Standard	Light preload		Heavy preload
	(No symbol)	(T ₁)	(T ₂)	(T ₃)
10	0	0	_	_
12	☆	☆	0	0
15	☆	☆	☆	0
20	☆	☆	☆	0
25	0	☆	☆	0
30	0	☆	☆	0
35	0	0	☆	☆
45	0	0	☆	☆
55	0	0	☆	☆
65	0	0	☆	☆
85	0	0	0	0
100	0	0	0	0

Remark: The mark 🖈 indicates that it is also applicable to interchangeable specification products.

8 Accuracy class

High Precision

: P : SP Super precision Ultra precision : UP

For applicable accuracy, see Table 3. In case of interchangeable specification products, assemble slide units and track rails of the same class. For details of accuracy, see page 81.

ļ	able	3	Applicable	accuracy	ciass

: H

		Accuracy	/(Symbol)	
Size	High (H)	Precision (P)	Super precision (SP)	Ultra precision (UP)
10	0	0	0	0
12	☆	☆	0	0
15	☆	☆	0	0
20	☆	☆	0	0
25	☆	☆	0	0
30	☆	☆	0	0
35	☆	☆	0	0
45	☆	☆	0	0
55	☆	☆	0	0
65	☆	☆	0	0
85	0	0	0	0
100	0	0	0	0

Remark : The mark ☆ indicates that it is also applicable to interchangeable specification products.

: S2

9 Interchangeable code

Interchangeable specification

Specify this item for interchangeable specification products. Assemble track rails and slide units with the interchangeable code.

10 Special specification

For applicable special specifications, see Table 4. When several special specifications are combined, see Table 5. For details of special specifications, see page 88.

	Supplemental	Inte	erchangeable specifica	tion	Non-interchangeable
Optional specification	code	Slide unit	Track rail	Assembled set	specification
Butt-jointing track rails	/A	-		_	0
Opposite reference surfaces arrangement	/D	-	-	0	0
Specified rail mounting hole positions	/E	_	0	0	0
Caps for rail mounting holes	/F	_	0	0	O(2)
Changed pitch of slide unit middle mounting holes	∕GE	O(1)(3)	_	O(1)(3)	O(1)(2)(3)(4)
Half pitch of track rail mounting holes	/HP	_	0	0	O(2)(5)
Inspection sheet	/ I	_	_	_	0
Female threads for bellows	/10	O(3)(6)	O(3)(6)	O(3)(6)	O(2)(3)(5)
Black chrome surface treatment	/LO	_	_	0	O(2)(4)(5)
Fluorine black chrome surface treatment	/LFO	_	_	0	O(2)(4)(5)
Without track rail mounting bolts	∕MN	_	0	0	0
No end seal	/N	O(7)	_	O(7)	O(7)
Rail cover plate for track rail	/PS	_	_	_	O(8)
Capillary plates	/Q	0	_	0	O(5)
Butt-jointing interchangeable track rail	/T	_	0	0	_
Double end seals	/vo	0	_	0	O(2)
Matched sets to be used as an assembled group	/wo	_	_	_	O(4)(5)
Specified grease	/YO	_	_	0	0
Scrapers	/zo	0	_	0	O(2)

Note(1): Applicable to LRX, LRXG, LRXH20 and LRXHG20.

(2): Not applicable to size 10 models.(LRXD10···SL)

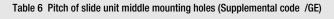
(3): Not applicable to size 12 models.

(4): Not applicable to size 85 models.

(5): Not applicable to size 100 models.
(6): Not applicable to stainless steel models.
(7): Not applicable to size 55,65,85 and 100 models.
(8): Applicable to size 35, 45 and 55 models.

Ia	ble 5	Co	mbir	iatio	n of	spec	cial s	pec	itica	tions	3												
D	0																						
Ε	_	-																					
F	0	☆	☆																				
GE	0	☆	☆	☆																			
HP	_	☆	_	☆	☆																		
I	0	0	0	0	0	0																	
J	0	☆	☆	☆	☆	_	0																
L	0	∜	$\stackrel{\wedge}{\sim}$	☆	☆	☆	0	☆															
LF	0	∜	$\stackrel{\wedge}{\sim}$	☆	☆	☆	0	☆	_														
MN	0	☆	$\stackrel{\wedge}{\sim}$	☆	☆	☆	0	☆	☆	☆													
N	0	☆	☆	_	☆	☆	0	_	☆	☆	☆												
PS	_	0	0	_	0	0	0	0	_	_	0	_											
Q	0	☆	☆	☆	☆	☆	0	_	☆	☆	☆	$\stackrel{\wedge}{\boxtimes}$	0		,								
Т	_	☆	$\stackrel{\wedge}{\sim}$	☆	☆	☆	_	_	☆	☆	☆	$\stackrel{\wedge}{\nabla}$	_	$\stackrel{\wedge}{\nabla}$									
V	0	☆	$\stackrel{\wedge}{\sim}$	☆	☆	☆	0	*	☆	☆	☆	_	0	_	☆		,						
W	0	0	_	0	0	0	0	0	0	0	0	0	0	0	_	0							
Υ	0	☆	☆	☆	☆	☆	0	☆	☆	☆	☆	☆	0	_	☆	☆	0		1				
Z	0	☆	☆	☆	☆	☆	0	*	☆	☆	☆	_	_	_	☆	*	0	☆					
	Α	D	Ε	F	GE	HP	I	J	L	LF	MN	N	PS	Q	T	٧	W	Υ					
Rei	mark																						
											eable natio						are a	availa	ble.				

5: If a combination of special specifications is required, indicate the supplemental codes in alphabetical order.



	L2 L6
, ————————————————————————————————————	
[# + + +

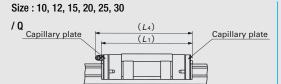
4: If the ★ marks are required, please consult **IKI**.

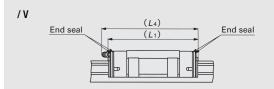
		unit : mm
Model number	L2	L ₆
LRX(G) 15	30	26
LRX(G) 20(1)	40	35
LRX(G) 25	45	40
LRX(G) 30	52	44
LRX(G) 35	62	52
LRX (G) 45	80	60
LRX(G) 55	95	70
LRX(G) 65	110	82
LRXG 100	200	150

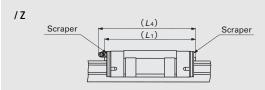
Note(1): Also applicable to LRXH(G)20 models that are mounted from

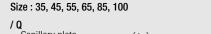
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

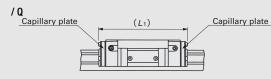
Table 7 Slide unit with capillary plates (Supplemental code /Q), with double end seals (Supplemental code /V), and with scrapers (Supplemental code /Z)

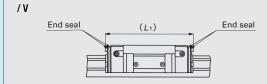


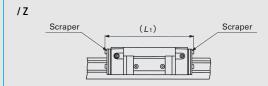












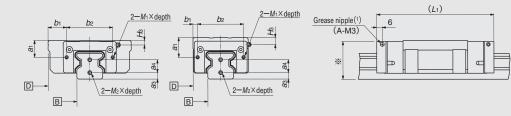
						unit : mm						
Model number	With capaillary plates (/Q)		With double end seals(1) (/V)		With scrapers(1) (/Z)		Model number	With capaillary plates (/Q)	With double end seals(1) (/V)	With scrapers(1)		
	L ₁	L ₄	L 1	L ₄	L ₁	L ₄		L 1	L 1	L 1		
LRXD 10···SL	43.5	_	_	_	_	_	LRXC 35	103	101	103		
LRXC 12	47	50	44	46	45	48	LRX 35	135	133	135		
LRX 12	57	60	54	57	56	58	LRXG 35	163	161	163		
LRXG 12	68	71	65	67	66	69	LRXC 45	127	127	129		
LRXC 15	63	64	58	60	60	61	LRX 45	167	167	169		
LRX 15	79	80	74	76	76	77	LRXG 45	207	207	209		
LRXG 15	95	96	90	92	92	93	LRXC 55	149	149	151		
LRXC 20	76	85	73	83	75	84	LRX 55	197	197	199		
LRX 20	96	105	93	103	95	104	LRXG 55	251	251	253		
LRXG 20	116	125	113	123	115	124	LRXC 65	198	193	194		
LRXC 25	85	94	83	92	85	93	LRX 65	262	257	258		
LRX 25	109	118	107	116	109	117	LRXG 65	326	321	322		
LRXG 25	124	133	122	131	124	132	LRX 85	341	338	339		
LRXC 30	96	108	93	106	96	107	LRXG 85	413	410	411		
LRX 30	124	136	121	134	124	135	LRXG 100	_	376	378		
LRXG 30	145	157	142	155	145	156						

Note(1): The values for a slide unit with double end seals or scrapers at both ends are shown

Remark: The above table shows representative model numbers and is also applicable to all models in the same size.

Table 8.1 Female threads for bellows (Supplemental code /J)

Size: 15, 20, 25, 30



									unit : mm
Model number			Slid	le unit				Track rail	<u> </u>
Wodernamber	a ₁	b 1	b ₂	$M_1 \times_{\text{depth}}$	L ₁ (3)	Н₃	a ₃	a ₄	<i>M</i> ₂×depth
LRXC 15					67				
LRX 15	10.5	10.5			83	1			
LRXG 15					99				
LRXDC 15			1		67				
LRXD 15	14.5	4	26	M3X6	83	5	4	8	M3X6
LRXDG 15					99				
LRXSC 15					67				
LRXS 15	10.5	4			83	1			
LRXSG 15					99				
LRXC 20(2)					81				
LRX 20(2)	12	13.5			101	2			
LRXG 20(2)					121				
LRXDC 20					81				
LRXD 20	16	4	36	M3X6	101	6	5	10	M4X8
LRXDG 20					121				
LRXSC 20					81				
LRXS 20	12	4			101	2			
LRXSG 20					121				
LRXC 25					89				
LRX 25	15.5	15			113	4			
LRXG 25					128				
LRXDC 25					89				
LRXD 25	19.5	4	40	M3X6	113	8	6	12	M4X8
LRXDG 25					128				
LRXSC 25					89				
LRXS 25	15.5	4			113	4			
LRXSG 25					128				
LRXC 30					100				
LRX 30	18.5	20			128	4.8			
LRXG 30					149				
LRXDC 30					100				
LRXD 30	21.5	5	50	M3X6	128	7.8	7	14	M4X8
LRXDG 30					149				
LRXSC 30]				100				
LRXS 30	18.5	5			128	4.8			
LRXSG 30					149				

Note(1): The specification and mounting position of grease nipple are different from those of the standard specification product. The grease nipple of the size 30 models is A-M4. For grease nipple specifications, see Table 12.

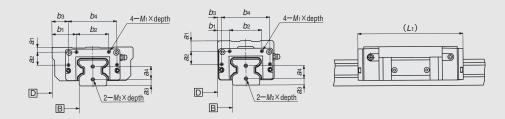
(2) : Also applicable to LRXHC 20, LRXH 20 and LRXHG 20.

(a): The values for a slide unit with female threads for bellows at both ends are shown.

Remark: For the size 15 and 20 models of flange type and compact block type, the dimension "**" is higher than the dimension H of the assembly. For details, consult IXO for further information.

Table 8.2 Female threads for bellows (Supplemental code /J)

Size: 35, 45, 55, 65, 85



	Τ			Sli	de unit					Track ra	unit : mn		
Model number	a ₁	a 2	b 1	b ₂	b ₃	b 4	<i>M</i> ₁×depth	L ₁ (1)	a 3	a4	<i>M</i> ₂×depth		
LRXC 35							aopin	99					
LRX 35	6	16	30		20			131					
LRXG 35						60	M3X 6	159		16	M4X 8		
LRXDC 35				40	5	60	IVISA 6	99	8				
LRXD 35	13	16	15					131					
LRXDG 35								159					
LRXC 45								123			M5X10		
LRX 45	7	21	35		23			163	10	19			
LRXG 45				- 50		74	M4X 8	203					
LRXDC 45	17			30		'4	IVI4A 0	123					
LRXD 45		21	18		6			163					
LRXDG 45								203					
LRXC 55		7 27	27 40	- 60			M4X 8	145			M5X10		
LRX 55	7				26	- 88		193	10	24			
LRXG 55								247					
LRXDC 55				00				145					
LRXD 55	17	27	20		6			193					
LRXDG 55								247					
LRXC 65								192					
LRX 65	8.7	37	47.5		31			256	14	28			
LRXG 65				75		108	M5X10	320			M6X12		
LRXDC 65				'				192					
LRXD 65	8.7	8.7	8.7	37	25.5		9			256			
LRXDG 65								320					
LRX 85	15	45	62.5	90	37.5	140	M6X10	334	14.5	38	M6X12		
LRXG 85	13	73	02.5	30	37.3	140	14107(10	406	17.5	50	WIONIZ		

Note(1): The values for the slide units with female threads for bellows at the both ends.

Mounting slide unit of Compact block type

For mounting slide unit of Compact block type, insertion depth shown in Table 9 is recommended to keep certain fixing strength.

Table 9 Insertion depths for mounting Compact block type slide unit

Model number	Recommended screw-in depths
LRXS 15	4.5
LRXS 20	5.5
LRXS 25	7
LRXS 30	9

Remark: The table shows representative model number but is applicable to all models of the same size.



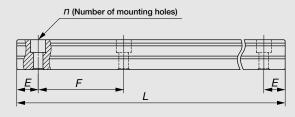
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Track rail length

Standard and maximum lengths of track rails are shown in Tables 10.1 and 10.2. Track rails in any length are also available. Simply indicate the necessary length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult **IKO** for further information.

- For non-interchangeable track rails longer than the maximum length shown in Tables 10.1 and 10.2, butt-jointing track rails are available upon request. In this case, indicate "/A" in the identification
- E dimensions at both ends are the same and are within the standard range of E unless otherwise specified. To change these dimensions, specify the specified rail mounting hole positions "/E" of special specification. For details, see page 88.

Table 10.1 Standard and maximum lengths of high carbon steel track rails



unit: mm

Model number	LRX 12	LRX 15	LRX 20	LRX 25	LRX 30	LRX 35
Standard length $L(n)$	80(2) 160(4) 240(6) 320(8) 400(10) 480(12) 560(14) 640(16) 720(18)	180(3) 240(4) 360(6) 480(8) 660(11)	240(4) 480(8) 660(11) 840(14) 1 020(17) 1 200(20) 1 500(25)	240(4) 480(8) 660(11) 840(14) 1 020(17) 1 200(20) 1 500(25)	480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19)	480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19)
Pitch of mounting holes ${m F}$	40	60	60	60	80	80
E	20	30	30	30	40	40
Standard range incl.	5.5	7	8	9	10	10
of E (1) under	25.5	37	38	39	50	50
Maximum length(2)	1 480	1 500 (1 980)	1 980 (3 000)	3 000	2 960 (4 000)	2 960 (4 000)
Model number	LRX 45	LRX 55	LRX 65	LRX 85	LRXG 100	
Standard length $L(n)$	840(8) 1 050(10) 1 260(12) 1 470(14) 1 995(19)	840(7) 1 200(10) 1 560(13) 1 920(16) 3 000(25)	1 500(10) 1 950(13) 3 000(20)	1 620(9) 1 980(11) 2 340(13) 2 700(15)	1 500(10) 1 950(13) 3 000(20)	
Pitch of mounting holes <i>F</i>	105	120	150	180	150	
E	52.5	60	75	90	75	
Standard range incl.	12.5	15	17	23	29	
of E (1) under	65	75	92	113	104	
Maximum length (2)	2 940 (3 990)	3 000 (3 960)	3 000 (3 900)	2 880 (³)	3 000	

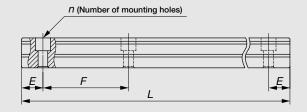
Note(1): Not applicable to the track rail with female threads for bellows (supplemental code "/J").

(2): Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult IKD for further information.

(3): For half pitch of track rail mounting holes (supplemental code "/HP"), the maximum length is 2970mm.

Remark: The above table shows representative model numbers but is applicable to all models of the same size.





unit: mm

Model num	LRXD 10···SL	LRX 12···SL	LRX 15···SL	LRX 20···SL	LRX 25···SL	LRX 30···SL
	50(2)	80(2)	180(3)	240(4)	240(4)	480(6)
	100(4)	160(4)	240(4)	480(8)	480(8)	640(8)
	150(6)	240(6)	360(6)	660(11)	660(11)	800(10)
	200(8)	320(8)	480(8)	840(14)	840(14)	1 040(13)
Standard length $L(n)$	250(10)	400(10)	660(11)			
	300(12)	480(12)				
	350(14)	560(14)				
	400(16)	640(16)				
	450(18)	720(18)				
	500(20)					
Pitch of mounting holes F	25	40	60	60	60	80
E	12.5	20	30	30	30	40
Standard range of E (1)	. 5	5.5	7	8	9	10
unc	ler 17.5	25.5	37	38	39	50
	850	1 000	1 200	1 200	1 200	1 200
Maximum length (2)	(1 000)	(1 480)	(1 980)	(1 980)	(1 980)	(2 000)

Note(1): Not applicable to the track rail with female threads for bellows (supplemental code /J).

(2): Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult IXO for further information.

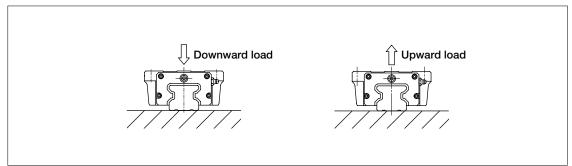
Remark: The above table shows representative model numbers and is also applicable to all stainless steel track rails in the same size.

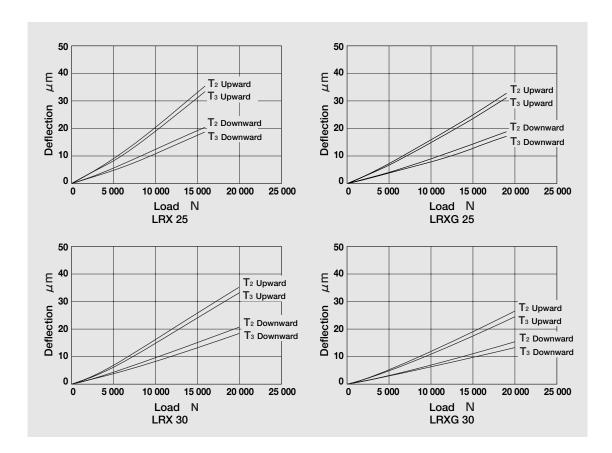


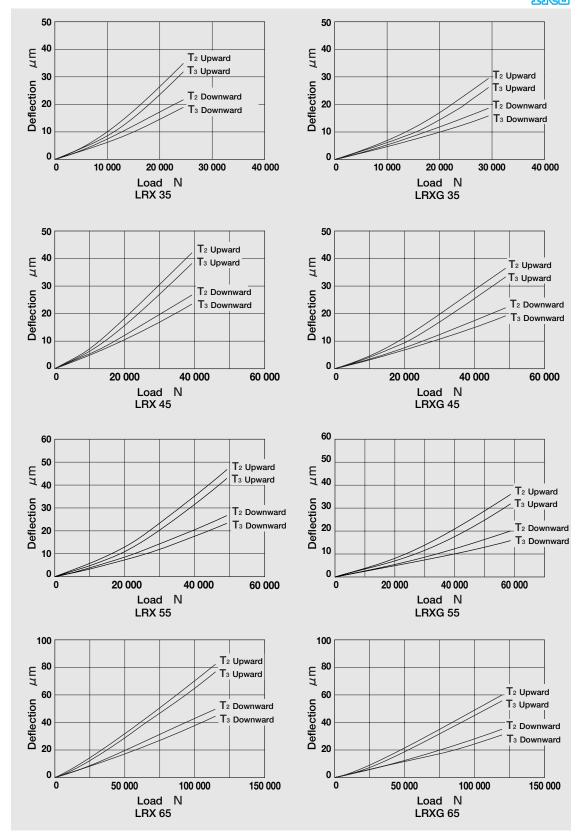
Rigidity of Linear Roller Way Super X (Reference Values)

Linear Roller Way Super X has the highest rigidity among all the Linear Way and Linear Roller Way series. Deflection due to elastic deformations at the contact area of the rolling element and in the structural members under external load is very small.

Typical experimental data on the relations between the load and the deflection for various preload amounts and load directions are shown below as reference values.





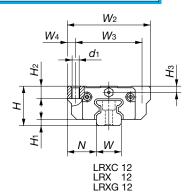


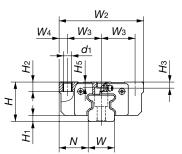
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

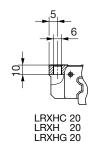
C-16

Linear Roller Way Super X : Flange type

Flange type mounted from top/bottom LRXC, LRX, LRXG





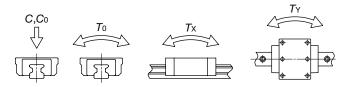


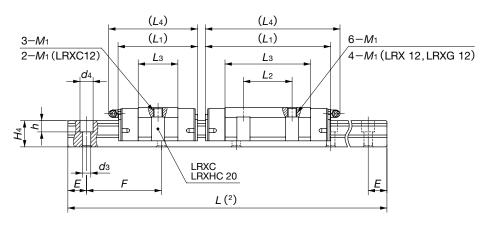
Models mounted from bottom only (1)

Model number	Interchangeable	Mass	(Ref.)		ensior ssemb mm						Di	mensio	ons of s mm	lide un	it	
Woder Humber	Intercha	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L 4	d1	<i>M</i> 1	H 2
LRXC 12	☆	0.058								37	_	14.8	40			
LRX 12	☆	0.092	0.92	19	3	14	40	32	4	47	45	25.3	50	3.4	M 4	6
LRXG 12	☆	0.13								58	15	35.8	61			
LRXC 15	☆	0.13								52	_	24	55			
LRX 15	☆	0.20	1.65	24	4	16	47	19	4.5	68	20	40	71	4.4	M 5	7
LRXG 15	☆	0.28								84	30	56	87			
LRXC 20 (1)	☆	0.29								66	_	31.6	74	(¹)	(¹)	
LRX 20 (1)	☆	0.44	2.73	30	5	21.5	63	26.5	5	86	40	51.6	94	_	M 6	10
LRXG 20 (1)	☆	0.61								106	40	71.6	114			
LRXC 25	☆	0.44								74	_	36	83			
LRX 25	☆	0.67	3.59	36	6	23.5	70	28.5	6.5	98	4-	60	107	7	M 8	10
LRXG 25	☆	0.84								113	45	75	122			
LRXC 30	☆	0.78								85		42.4	95			
LRX 30	☆	1.20	5.01	42	6.5	31	90	36	9	113	F0	70.4	123	8.5	M10	10
LRXG 30	☆	1.58								134	52	91.4	144			

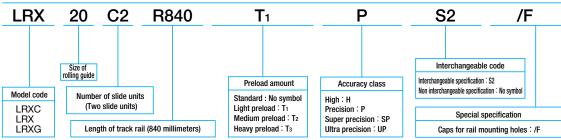
Note(1): LRXC20, LRX20 and LRXG20 can be mounted from the upper side only. For mounting from the lower side, LRXHC20, LRXH20 and LRXHG20 which have the same dimensions as those of the above models can be used.

- (2): Track rail lengths are shown in Table 10.1 on page C-14.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: The mark 💢 indicates that interchangeable specification products are available.
 - 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
 - 3 : For grease nipple specifications, see page 99.
 - 4: A grease nipple mounting thread hole is provided on the left and right end plates respectively.



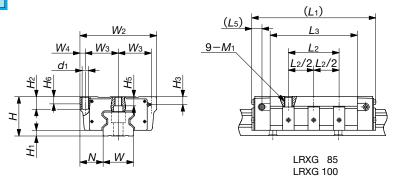


			Dii	mensio	ons of mm	track r	ail		Mounting bolt for track rail mm	Basic dynamic load rating(3)	Basic static load rating(3)	Static	moment rat	ing(³)
	١			١.	Ι.	١.	l _	l _		С	C ₀	7 0	Tx	T _Y
Нз	H 5	W	H 4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
										3 900	6 090	46.3	16.3 170	16.3 170
3	_	12	12	3.5	6	4.5	20	40	M3×12	5 890	10 400	78.7	45.2 343	45.2 343
										7 710	14 600	111	88.6 581	88.6 581
									60 M4×16	7 730	12 000	113	50.6	50.6 457
3.5	3	15	16.5	4.5	8	6	30	60	0 M4×16	11 500	20 000	188	457 136	136
									M4×16	14 900	28 000	263	942 262	942 262
										16 100	26 400	341	1 590 150	1 590 150
			0.4						MENCO			-	1 260 379	1 260 379
4	3.5	20	21	6	9.5	8.5	30	60	M5×20	23 400	42 700	550	2 520	2 520
										30 100	58 900	760	713 4 200	713 4 200
										21 600	33 800	500	213 1 810	213 1 810
5	5	23	24.5	7	11	9	30	60	M6×25	32 100	56 300	833	573 3 800	573 3 800
										38 200	70 300	1 040	885 5 380	885 5 380
) M8×28	29 200	44 600	808	329 2 740	329 2 740
6.5	5.5	28	28	9	14	12	40	80		43 400	74 400	1 350	883	883
0.0	0.0						'						5 780 1 470	5 780 1 470
										53 200	96 700	1 750	8 740	8 740



Linear Roller Way Super X : Flange type

Flange type mounted from top/bottom LRXC, LRX, LRXG

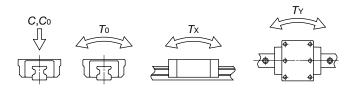


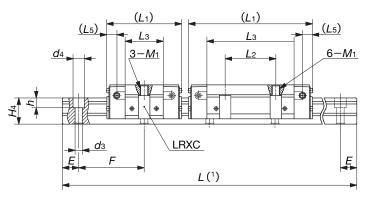
Model nu	mbor	Interchangeable	Mass	(Ref.)		nensior ssemb mm						Din	nensions n	s of slic	de unit			
wodel nu	mber	Intercha	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> ₁	L ₂	L ₃	L 5	d ₁	<i>M</i> 1	H2	Нз
LRXC	35	꺄	1.13								92	_	46.6					
LRX	35	⋫	1.76	6.88	48	6.5	33	100	41	9	124		78.6	12.5	8.5	M10	13	13
LRXG	35	☆	2.41								152	62	106.6					
LRXC	45	☆	2.11								114	_	59					
LRX	45	☆	3.26	10.8	60	8	37.5	120	50	10	154		99	17.5	10.5	M12	15	16
LRXG	45	☆	4.60								194	80	139					
LRXC	55	☆	3.49								136	_	72					
LRX	55	☆	5.42	14.1	70	9	43.5	140	58	12	184		120	20	12.5	M14	17	16
LRXG	55	☆	7.93								238	95	174					
LRXC	65	☆	7.18								181	_	95					
LRX	65	☆	11.5	22.6	90	12	53.5	170	71	14	245		159	26.6	14.5	M16	23	18
LRXG	65	☆	16.0								309	110	223					
LRX	85		25.4								323	140	232					
LRXG	LRXG 85		32.7	36.7	110	16	65	215	92.5	15	395	200	304	27.5	17.8	M20	35	22
LRXG	100		43.0	43.2	120	15	75	250	110	15	362	200	262	29.7	17.8	M20	35	30

Note(1): Track rail lengths are shown in Table 10.1 on page C-14.

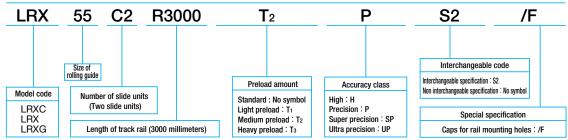
- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Ty) are shown in the sketches
- below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

 Remark 1: The mark $\frac{1}{2}$ indicates that interchangeable specification products are available.
- - 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
 - 3 : For grease nipple specifications, see page 99.
 - 4: Three grease nipple mounting thread holes are provided on the left and right end plates respectively.



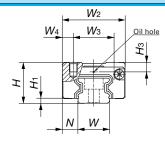


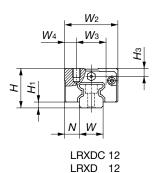
			Di	mensio	ons of mm	track	rail		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Static	moment rat	ing(²)
			l	1 1		ı	I	I		С	C ₀	T 0	Tx	<i>T</i> Y
H 5	H 6	W	H 4	d з	d4	h	E	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
										39 500	60 000	1 300	506 3 950	506 3 950
													1 360	1 360
7	_	34	32	9	14	12	40	80	M 8×35	58 700	100 000	2 170	8 470	8 470
										74.000	405.000	0.000	2 440	2 440
										74 200	135 000	2 930	13 800	13 800
									64 100	95 600	2 660	1 010	1 010	
								_	04 100	33 000	2 000	7 800	7 800	
11	_	45	38	14	20	17	52.5	.5 105 M12×40	95 400	159 000	4 430	2 700	2 700	
													16 800 5 220	16 800 5 220
										124 000	223 000	6 200	29 000	29 000
													1 880	1 880
										99 700	149 000	4 830	14 400	14 400
14	_	53	43	16	23	20	60	120	M14×45	140,000	240,000	0.040	5 040	5 040
14	_	53	43	10	23	20	60	120	IVI 14 × 45	148 000	248 000	8 040	31 100	31 100
										198 000	359 000	11 700	10 400	10 400
										100 000	000 000	11700	57 000	57 000
										174 000	249 000	9 790	4 200	4 200
													32 200 11 300	32 200 11 300
18.5	_	63	56	18	26	22	75	150	M16×60	260 000	415 000	16 300	69 300	69 300
													21 800	21 800
										337 000	581 000	22 800	120 000	120 000
										440 000	753 000	38 900	29 500	29 500
25.5	20	85	67	26.5	39	30	90	180	M24×70	440 000	753 000	30 900	163 000	163 000
25.5	20	33	0,	20.5	55	30	50	100	180 M24×70	542 000	985 000	50 800	50 000	50 000
									0.2 000	000 000		257 000	257 000	
30.5	_	100	70	33	48	36	75	150 M30×80	M30×80	498 000	821 000	49 700	35 800	35 800
													199 000	199 000



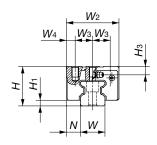
Linear Roller Way Super X: Block type

Block type mounted from top
LRXDC, LRXD, LRXDG
LRXDC···SL (Stainless steel made)
LRXD ···SL (Stainless steel made)
LRXDG···SL (Stainless steel made)





LRXDG 12



LRXD 10···SL

	-17	ال ۱۰۰۰۰ ا	-												
Model number	Interchangeable	Mass	(Ref.)		nension ssemb mm					Dime	nsions m	of slide m	e unit		
woder number	Intercha	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L4	<i>M</i> ₁×depth	Нз
LRXD 10···SL		0.028	0.48	13	1.5	5	20	13	3.5	34.5	12	21.5	_	M2.6×3	3
LRXDC 12	☆	0.045								07		440	40		
LRXDC 12···SL	☆	0.045								37	_	14.8	40		
LRXD 12	☆	0.070	0.00	20	3	7.5	0.7	15		47		25.2	50	MA VAE	_
LRXD 12···SL	☆	0.072	0.92	20	3	7.5	27	15	6	47	45	25.3	50	M4 ×4.5	4
LRXDG 12	☆	0.097								58	15	35.8	61		
LRXDG 12···SL	☆	0.097								50		33.0	01		
LRXDC 15	☆	0.13								52		24	55		
LRXDC 15···SL	☆	0.13								52	_	24	55		
LRXD 15	☆	0.19	1.65	28	4	9.5	34	13	4	68		40	71	M4 ×8	7.5
LRXD 15···SL	☆	0.19	1.05	28	4	9.5	34	13	4	08	26	40	/1	1014 88	7.5
LRXDG 15	☆	0.26								84	26	56	87		
LRXDG 15···SL	☆	0.26								04		90	07		

Note(1): Track rail lengths are shown in Table 10.1 on page C-14 and Table 10.2 on page C-15.

(2): The directions of basic dynamic load rating (C), basic static load rating (C₀) and static moment rating (T₀, Tx, Ty) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

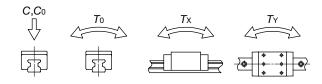
Remark 1: The mark $\frac{1}{\sqrt{2}}$ indicates that interchangeable specification products are available.

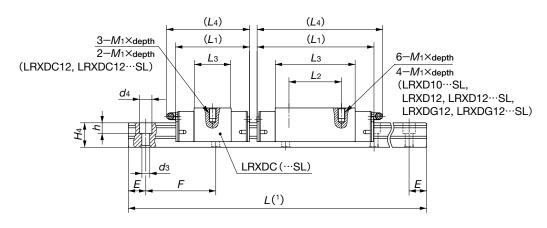
2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.

For stainless steel type Linear Roller Way Super X, stainless steel bolts are appended.

3: For grease nipple specifications, see page 99.

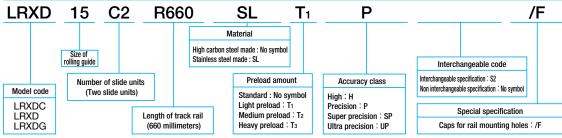
4: A grease nipple mounting thread hole is provided on the left and right end plates respectively.





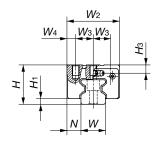
	D	imensi	ons of t	track ra	ail		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)		c moment ratir	ng(²)
			1		I _	l _		С	C ₀	T 0	T x	T _Y
W	H4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
10	8	3.5	6	3.5	12.5	25	M3×10	3 160	6 190	39.6	23.0 146	23.0 146
								3 900	6 090	46.3	16.3 170	16.3 170
12	12	3.5	6	4.5	20	40	M3×12	5 890	10 400	78.7	45.2 343	45.2 343
								7 710	14 600	111	88.6 581	88.6 581
								7 730	12 000	113	50.6 457	50.6 457
15	16.5	4.5	8	6	30	60	M4×16	11 500	20 000	188	136 942	136 942
								14 900	28 000	263	262 1 590	262 1 590

 $\textbf{Example of identification number of assembled set} \ \ \textbf{(For details, see "Identification number and specification".)} \\$



IIK Linear Roller Way Super X : Block type

Block type mounted from top
LRXDC
LRXD
LRXDG
LRXDG
LRXDC
LRXDC
LRXDC
LRXDC
LRXD
LRXD
LRXD
LRXD
LRXD
LRXDG
LR



Model number	Interchangeable		(Ref.)		nensior ssemb mm					Dime	nsions m	of slide m	unit		
	Interch	Slide unit kg	Track rail kg/m	н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L ₂	L 3	L4	<i>M</i> ₁×depth	H 3
LRXDC 20	☆	0.05										04.0			
LRXDC 20···SL	☆	0.25								66	_	31.6	74		
LRXD 20	☆	0.00	0.70		_	10		40		00	00	F4.0	0.4	MEN	
LRXD 20···SL	☆	0.38	2.73	34	5	12	44	16	6	86	36	51.6	94	M5× 8	8
LRXDG 20	☆	0.50								100	F0	74.0	444		
LRXDG 20···SL	☆	0.52								106	50	71.6	114		
LRXDC 25	☆	0.00								7.4		00			
LRXDC 25···SL	☆	0.36								74	_	36	83		
LRXD 25	☆	0.55	0.50	40		40.5	40	47.5			0.5	00	407	1402440	
LRXD 25···SL	☆	0.55	3.59	40	6	12.5	48	17.5	6.5	98	35	60	107	M6×12	9
LRXDG 25	☆	0.00								440		7-	400		
LRXDG 25···SL	☆	0.68								113	50	75	122		
LRXDC 30	☆	0.00										40.4			
LRXDC 30···SL	☆	0.60								85		42.4	95		
LRXD 30	☆	0.00	F 04	4.5	0.5	1.0			4.0	440	40	70.	400	1402446	
LRXD 30···SL	☆	0.92	5.01	45	6.5	16	60	20	10	113	40	70.4	123	M8×12	9.5
LRXDG 30	☆														
LRXDG 30···SL	☆	1.18								134	60	91.4	144		

Note(1): Track rail lengths are shown in Table 10.1 on page C-14 and Table 10.2 on page C-15.

(2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

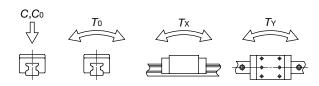
Remark 1: The mark 💢 indicates that interchangeable specification products are available.

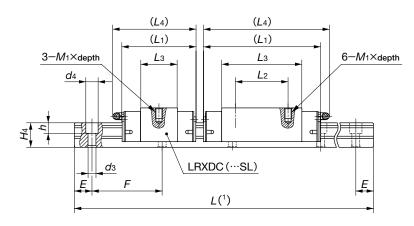
2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.

For stainless steel type Linear Roller Way Super X, stainless steel bolts are appended.

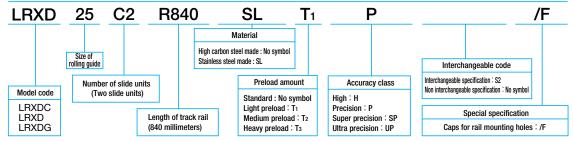
3: For grease nipple specifications, see page 99.

4: A grease nipple mounting thread hole is provided on the left and right end plates respectively.



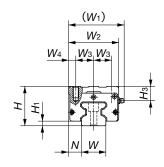


	Di	imensi	ons of t	track ra	ail		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Stat	ic moment ratir	ng(²)
	١	١.	١.	١.	l _	l _		С	C ₀	T 0	Tx	T _Y
W	H4	d 3	d4	h	Ε	F	Bolt size X length	N	N	N∙m	N∙m	N∙m
								16 100	26 400	341	150 1 260	150 1 260
20	21	6	9.5	8.5	30	60	M5×20	23 400	42 700	550	379 2 520	379 2 520
								30 100	58 900	760	713 4 200	713 4 200
								21 600	33 800	500	213 1 810	213 1 810
23	24.5	7	11	9	30	60	M6×25	32 100	56 300	833	573 3 800	573 3 800
								38 200	70 300	1 040	885 5 380	885 5 380
								29 200	44 600	808	329 2 740	329 2 740
28	28	9	14	12	40	80	M8×28	43 400	74 400	1 350	883 5 780	883 5 780
								53 200	96 700	1 750	1 470 8 740	1 470 8 740



IIK Linear Roller Way Super X : Block type

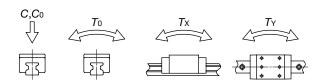
Block type mounted from the upper side LRXDC, LRXD, LRXDG

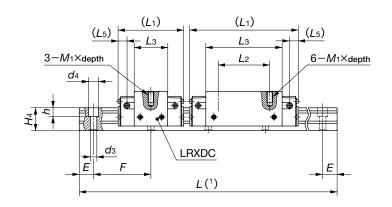


Model number	Interchangeable	Mass	(Ref.)		nension Issembl mm					E)imensi	ons of mm	slide uni	it	
Woder Humber	Intercha	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W ₁	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L 5	<i>M</i> ₁×depth
LRXDC 35	☆	0.97									92	-	46.6		
LRXD 35	☆	1.52	6.88	55	6.5	18	80	70	25	10	124	50	78.6	12.5	M 8×16
LRXDG 35	☆	2.02									152	72	106.6		
LRXDC 45	☆	2.01									114	-	59		
LRXD 45	☆	3.13	10.8	70	8	20.5	98	86	30	13	154	60	99	17.5	M10×20
LRXDG 45	☆	4.29									194	80	139		
LRXDC 55	☆	3.17									136	_	72		
LRXD 55	☆	4.97	14.1	80	9	23.5	112	100	37.5	12.5	184	75	120	20	M12×25
LRXDG 55	☆	7.06									238	95	174		
LRXDC 65	☆	5.52									181	-	95		
LRXD 65	☆	8.70	22.6	90	12	31.5	136	126	38	25	245	70	159	26.6	M16×25
LRXDG 65	☆	12.1									309	120	223		

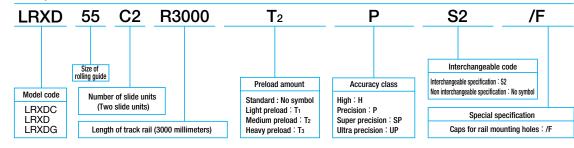
Note(1): Track rail lengths are shown in Table 10.1 on page C-14.

- (2): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are shown in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.
- Remark 1: The mark 💢 indicates that interchangeable specification products are available.
 - 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
 - 3: For grease nipple specifications, see page 99.
 - 4: Three grease nipple mounting thread holes are provided on the left and right end plates respectively.





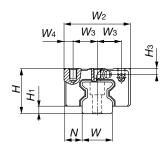
		D	imensi	ons of t	track ra	ail		Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)	Statio	moment rat	ing(²)
						1			С	C ₀	T 0	Tx	TY
Нз	W	H 4	d 3	d4	h	Ε	F	Bolt size X length	N	N	N∙m	N∙m	N∙m
									39 500	60 000	1 300	506	506
									33 300	00 000	1 300	3 950	3 950
20	34	32	9	14	12	40	80	M 8×35	58 700	100 000	2 170	1 360	1 360
20	0-1	52		'-	12	40		IVI OASS	30 700	100 000	2 170	8 470	8 470
									74 200	135 000	2 930	2 440	2 440
									71200	100 000	2 000	13 800	13 800
									64 100	95 600	2 660	1 010	1 010
												7 800	7 800
26	45	38	14	20	17	52.5	105	M12×40	95 400	159 000	4 430	2 700 16 800	2 700 16 800
												5 220	5 220
									124 000	223 000	6 200	29 000	29 000
												1 880	1 880
									99 700	149 000	4 830	14 400	14 400
												5 040	5 040
26	53	43	16	23	20	60	120	M14×45	148 000	248 000	8 040	31 100	31 100
												10 400	10 400
									198 000	359 000	11 700	57 000	57 000
												4 200	4 200
								M16×60	174 000	249 000	9 790	32 200	32 200
10	60		10	20	22	75	150		200,000	415.000	10 200	11 300	11 300
18	63	56	18	26	22	75	150		260 000	415 000	16 300	69 300	69 300
									227.000	F01 000	22.000	21 800	21 800
									337 000	581 000	22 800	120 000	120 000



LRX, LRXD, LRXS

Linear Roller Way Super X : Compact block type

Compact block type mounted from top LRXSC, LRXS, LRXSG



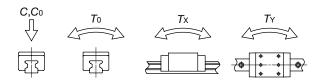
Madalassakas	Interchangeable	Mass	(Ref.)		nension ssembl mm					Din		s of slic	de unit	
Model number	Intercha	Slide unit kg	Track rail kg/m	Н	<i>H</i> 1	N	W 2	W 3	W 4	<i>L</i> 1	L2	Lз	L 4	M₁×depth(²)
LRXSC 15	☆	0.099								52	_	24	55	
LRXS 15	☆	0.15	1.65	24	4	9.5	34	13	4	68		40	71	M4× 5.5
LRXSG 15	☆	0.21								84	26	56	87	
LRXSC 20	☆	0.21								66	-	31.6	74	
LRXS 20	☆	0.31	2.73	30	5	12	44	16	6	86	36	51.6	94	M5× 6.5
LRXSG 20	☆	0.42								106	50	71.6	114	
LRXSC 25	☆	0.30								74	-	36	83	
LRXS 25	☆	0.47	3.59	36	6	12.5	48	17.5	6.5	98	35	60	107	M6× 9
LRXSG 25	☆	0.57	3.59							113	50	75	122	
LRXSC 30	☆	0.54								85	1	42.4	95	
LRXS 30	☆	0.83	5.01	42	6.5	16	60	20	10	113	40	70.4	123	M8×11
LRXSG 30	☆	1.05								134	60	91.4	144	

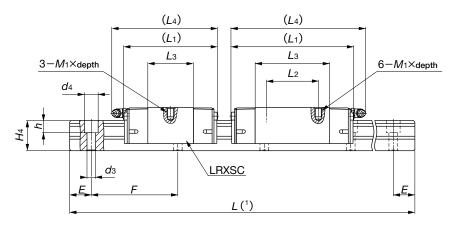
Note(1): Track rail lengths are shown in Table 10.1 on page C-14.

- (2): Recommended insertion depth for mounting slide unit are shown in Table 9 on page C-13.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co) and static moment rating (To, Tx, Tr) are show in the sketches below. The upper values in the Tx and Tr columns apply to one slide unit, and the lower values apply to two slide units in close contact.

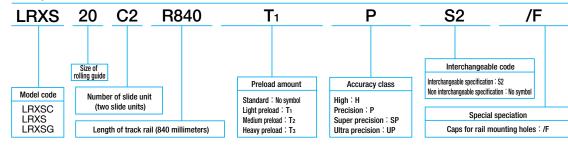
Remark 1: The mark 💢 indicates that interchangeable specification products are available.

- 2: The appended track rail mounting bolts are hexagon socket head bolts of JIS1176 or equivalent.
- 3: For grease nipple specification, see page 99.
- 4: A grease nipple mounting thread holes are provided on the left and right end plates respectively.





		D	imensi	on of tr mm	ack rai	I		Mounting bolt for track rail mm	Basic dynamic load rating(3)	Basic static load rating(3)	Statio	c rated mom	ent(3)
									С	C ₀	T 0	Tx.	T Y
Нз	W	H 4	d 3	d4	h	Ε	F	Bolt size × length	N	N	N∙m	N∙m	N∙m
									7 730	12 000	113	50.6 457	50.6 457
3.5	15	16.5	4.5	8	6	30	60	M4×16	11 500	20 000	188	136 942	136 942
								14 900	28 000	263	262 1 590	262 1 590	
								16 100	26 400	341	150 1 260	150 1 260	
4	20	21	6	9.5	8.5	30	60	M5×20	23 400	42 700	550	379 2 520	379 2 520
									30 100	58 900	760	713 4 200	713 4 200
									21 600	33 800	500	213 1 810	213 1 810
5	23	24.5	7	11	9	30	60	M6×25	32 100	56 300	833	573	573 3 800
									38 200	70 300	1 040	3 800 885 5 380	885 5 380
								0 M8×28	29 200	44 600	808	329	329
6.5	28	28	9	14	12	40	80		43 400	74 400	1 350	2 740 883	2 740 883
									53 200	96 700	1 750	5 780 1 470 8 740	5 780 1 470 8 740



Linear Ball Spline





Description of Linear Ball SplineD-2
Linear Ball Spline G·····D-28
Block type Linear Ball SplineD-46
Stroke Ball Spline LS·····D-54

Features of Linear Ball Spline

IKO Linear Ball Spline is a linear motion rolling guide which achieves endless linear motion of an external cylinder along a spline shaft. As steel balls make rolling contact with the spline grooves, radial loads as well as rotating torque can be received. This product is most suitable for mechanisms that perform linear motion while transmitting rotating torque. The spline grooves have almost the same radius of curvature as that of steel balls, and can receive a large load. This product has a large load capacity and will be useful for achieving compact design of machines and equipment.

Interchangeable

The dimensions of spline shafts and external cylinders (or slide units) of the interchangeable specification are individually controlled, so that the spline shafts and external cylinders (or slide units) can be combined, added or exchanged freely. (Linear Ball Spline G series and Block type Linear Ball Spline series)

Wide variations

Size variations range from a very small size with shaft diameter of 2 mm to larger sizes up to 50 mm. Three types of external cylinders (including one slide unit type) are also available: standard type, flange type and block type.

These products can be selected to meet the requirements for each application.

Compact design with high rigidity

Large diameter steel balls are arranged in two rows and in four point contact with the raceways, achieving compact design with high rigidity. (Linear Ball Spline G series and Block type Linear Ball Spline series)

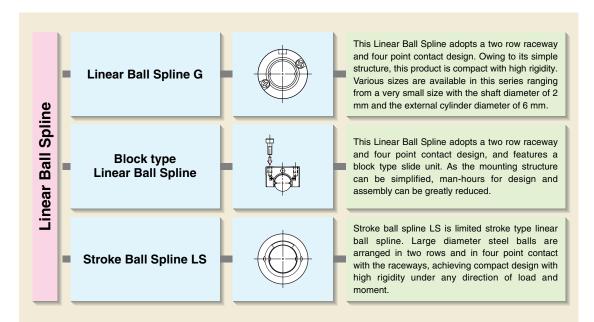
High positioning accuracy

By applying a suitable preload, clearance in the rotational direction is eliminated. So high positioning accuracy in the rotational direction can be obtained.

Smooth motion with low friction

The steel ball re-circulation was thoroughly analyzed, resulting in an optimal design of re-circulation route through end caps. High speed operation as well as smooth motion with low friction can be achieved.

Series of Linear Ball Spline



Series and size variation

Size	Linear Ball Spline G	Block type Linear Ball Spline	Stroke Ball Spline LS
2	0	-	_
3	0	1	_
4	0	-	0
5	0	_	0
6	0	0	0
8	0	0	-
10	0	0	_
12	0	1	-
13	_	0	_
15	0	_	_
16	_	0	_
20	0	0	_
25	0	0	_
30	0	_	_
40	0	_	_
50	_	_	_

Remark: For the details of applicable specifications and sizes, see the description of each series.

Interchangeable Specification

IKO Linear Ball Spline include interchangeable specification products. The spline shafts and the external cylinders (or the slide units) of this specification can be handled separately and can be assembled to make a set as required.

The interchangeable specification guides are produced with the original precision manufacturing technology, making the most of the IKO guide designs: namely, the simple two-row raceway and four-point contact ball design. The dimensional accuracy of both external cylinders (or slide units) and spline shafts is strictly controlled to achieve the interchangeability of higher standard.



Wide range of variations

The models of Linear Ball Spline G for which the interchangeable specification is applicable are indicated by an asterisk $(\)$ in the table of dimensions of each series.

All models of Block type Linear Ball Spline are interchangeable specification products.

Linear Ball Spline G

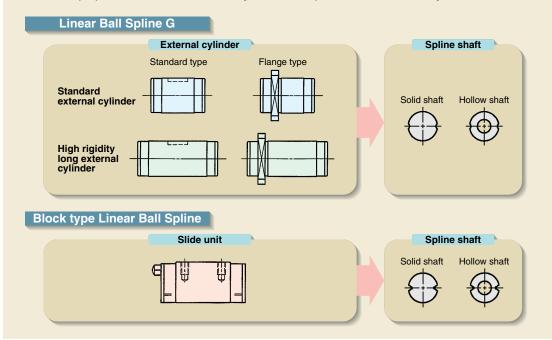
(page D-28 to page D-45) 8 types and 56 models

Block type Linear Ball Spline

(page D-46 to page D-53) 3 types and 17 models

Features of interchangeable specification products [1] Interchangeable external cylinder, Interchangeable slide unit

Various types of external cylinders with different shapes and lengths and solid shafts and hollow shafts are prepared. All of these external cylinders and spline shafts can be freely combined.



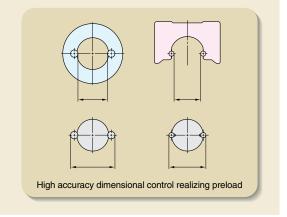
Features of interchangeable specification products [2] Interchangeable with high accuracy

Two accuracy classes, Ordinary and High are prepared for the interchangeable specification products so that these products can be used for applications requiring high running accuracy.

Features of interchangeable specification products [3] Interchangeable with preload

High accuracy dimensional control owing to a simple structure has made it possible to realize the interchangeability among preloaded external cylinders (or slide units).

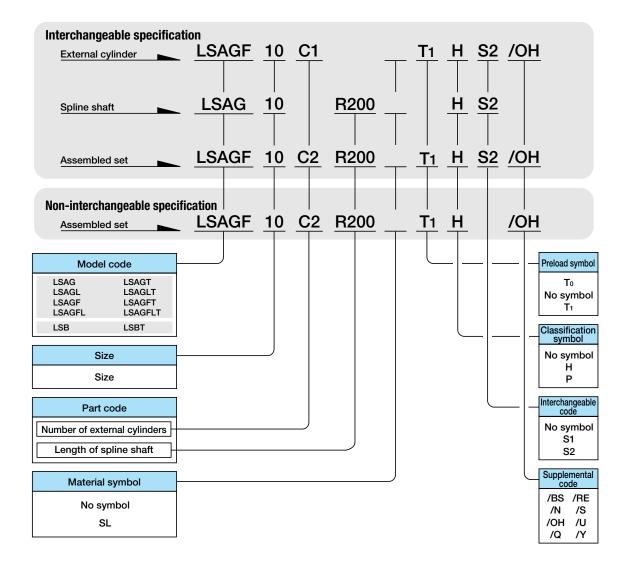
In the interchangeable specification products, light preload type is prepared so that these products can be used for applications requiring one step higher rigidity.



D-4 D-5 1mm=0.03937inch

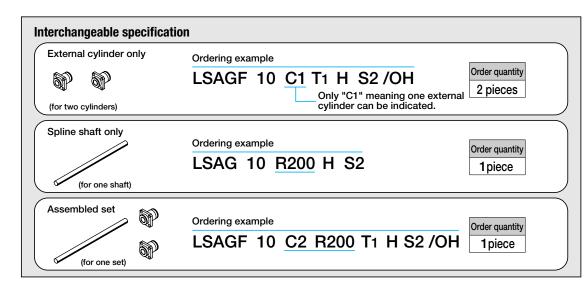
Identification Number

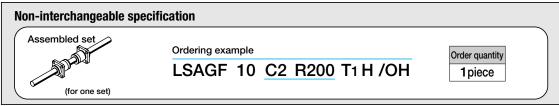
The identification number of IKO Linear Ball Spline consists of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. Examples of identification number are shown below. For details of specifications, see the description of each series.



For Ordering

When ordering assembled sets of Linear Ball Spline, indicate the number of sets which is always represented by the number of spline shafts. For ordering the external cylinders and spline shafts of interchangeable specification separately, indicate the number of external cylinders and the number of spline shafts, respectively. Examples of ordering are shown below.





D-6 **D-7** 1mm=0.03937inch

Load Rating

The load ratings of **IKD** Linear Ball Spline are defined for downward load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculation, see "General description".

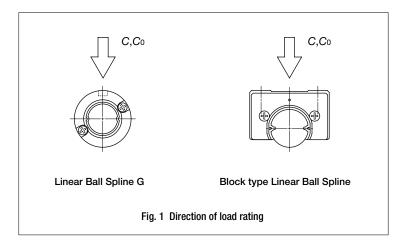
Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Linear Ball Splines are individually operated and 90% of the units in the group can travel 50 x 10³ meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

D-8

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

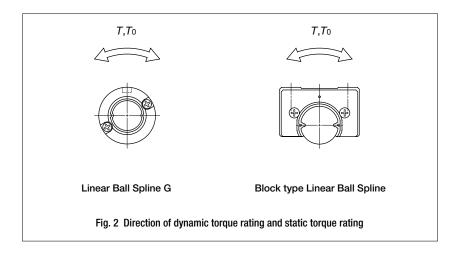


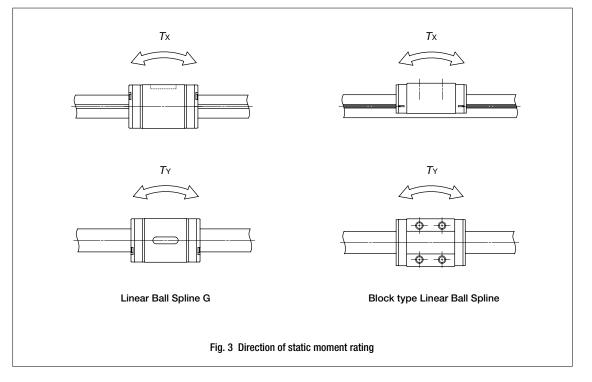
Dynamic torque rating T

The dynamic torque rating is defined as the constant torque both in direction and magnitude under which a group of identical Linear Ball Splines are individually operated and 90% of the units in the group can travel 50×10^3 meters free from material damage due to rolling contact fatigue.

lacktriangle Static torque rating T_0 and static moment rating T_X , T_Y

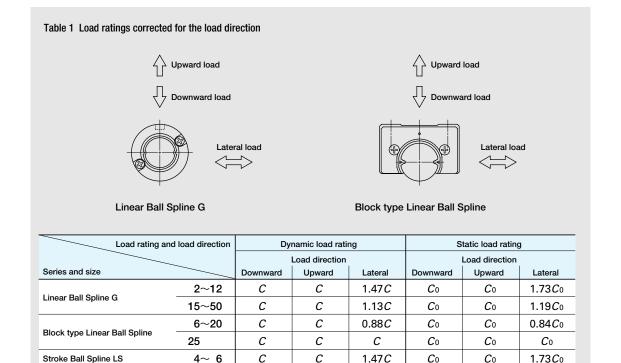
The static torque rating or the static moment rating is defined as the static torque or moment load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load when a torque or a moment is loaded.





Load direction and load rating

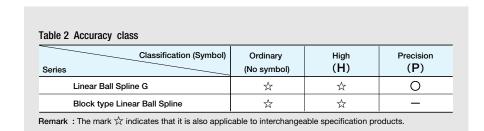
Since the load ratings of **IKD** Linear Ball Spline given in the table of dimensions are for downward load, they must be corrected for the load direction for upward or lateral load. The corrected basic dynamic load ratings and basic static load ratings are shown in Table 1.

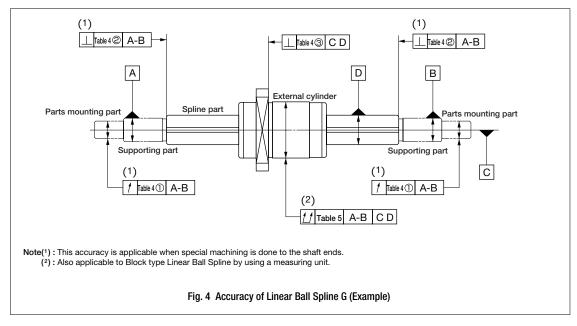


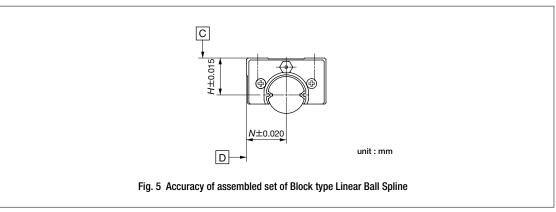
Accuracy

Three classes of accuracy, Ordinary, High, and Precision are specified for **IKO** Linear Ball Spline. Table 2 summarizes applicable classes for each series, and Tables 3 to 5 show accuracy of each series. For details of applicable classes, see the description of each series.

For the accuracy of series other than those shown in Table 2, consult **IKD** for further information.







ble 3 Twist of grooves with r	espect to effective	length of the spline	part unit : μm
Accuracy class	Ordinary (No symbol)	High (H)	Precision (P)
Allowable value	33	13	6

Remark: The values are applicable to any length of 100 mm over the effective length of the spline part.

		Relative to a	xial line of sup	porting part o	f spline shaft		3 Perpendio	cularity of moun	iting surface of
Model number	1 Radial runo	out of periphery of p	parts mounting part	Perpendicularity of spline part end face			flange relative to axial line of spline shaf		
Model Humber	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
LSAG 2	33	14	8	22	9	6	27	11	8
LSAG 3	33	14	8	22	9	6	27	11	8
LSAG 4	33	14	8	22	9	6	27	11	8
LS 4	_	_	8	_	_	6	_	_	_
LSAG 5	33	14	8	22	9	6	27	11	8
LS 5	_	_	8	_	_	6	_	_	_
LSAG 6	33	14	8	22	9	6	27	11	8
LS 6	_	_	8	_	_	6	_	_	_
LSAG 8	33	14	8	22	9	6	27	11	8
LSAG 10	41	17	10	22	9	6	33	13	9
LSAG 12	41	17	10	22	9	6	33	13	9
LSAG 15	46	19	12	27	11	8	33	13	9
LSAG 20	46	19	12	27	11	8	33	13	9
LSAG 25	53	22	13	33	13	9	39	16	11
LSAG 30	53	22	13	33	13	9	39	16	11
LSAG 40	62	25	15	39	16	11	46	19	13
LSAG 50	62	25	15	39	16	11	_	_	_

Remark: The above table shows representative model numbers, but is applicable to all models.

However, the accuracy of ① and ② is applicable when special machining is done to the shaft ends. The accuracy of ③ is applicable to LSAGF(T) and LSAGFL(T).

-	of spline shaft m	LSAG 4 LSB 6 LSAG 5 LSB 8 LSAG 6 LSAG 8		LSAG 10 LSB 10 LSAG 12 LSB 13		LSAG 15 LSB 16 LSAG 20 LSB 20				
over	incl.	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
_	200	72	46	26	59	36	20	56	34	18
200	315	133	89	57	83	54	32	71	45	25
315	400	185	126	82	103	68	41	83	53	31
400	500	236	163	108	123	82	51	95	62	38
500	630	_	_	_	151	102	65	112	75	46
630	800	_	_	_	190	130	85	137	92	58
800	1 000	_	_	_	_	_	_	170	115	75

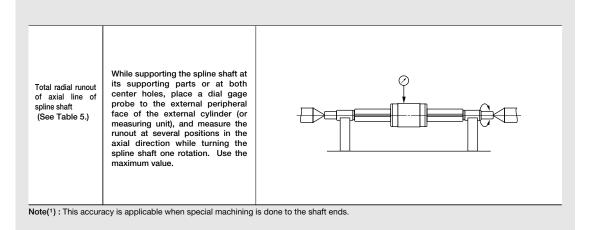
-	of spline shaft m	LSAG 25 LSAG 30			LSAG 40 LSAG 50		
over	incl.	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
_	200	53	32	18	53	32	16
200	315	58	39	21	58	36	19
315	400	70	44	25	63	39	21
400	500	78	50	29	68	43	24
500	630	88	57	34	74	47	27
630	800	103	68	42	84	54	32
800	1 000	124	83	52	97	63	38
1 000	1 250	151	102	65	114	76	47

Remark: The above table shows representative model numbers, but is applicable to all models.

-	of spline shaft	LS 4 LS 5 LS 6			
over	incl.	Ordinary (No symbol)	High (H)	Precision (P)	
_	200	_	_	26	
200	300	_	_	57	

D-12 D-13 D-13

Item	Measuring methods	Illustrations of measuring method
Twist of grooves with respect to effective length of the spline shaft (See Table 3.)	Fix and support the spline shaft. Then apply a torsional moment on the external cylinder (or the measuring unit) in a suitable direction before placing a dial gage probe in a perpendicular direction to the spline shaft and against the side face of the sunk key attached on the external cylinder. Measure the runout when the external cylinder and the gage have traveled together 100 millimeters on any effective part of the spline shaft. However, the gage should be applied as near as possible to the outer periphery of the external cylinder.	Sunk key 100 Datum block for traveling of gage
(1) Radial runout of periphery of parts mounting part relative to axial line of supporting part of spline shaft (See Table 4 ①.)	While supporting the spline shaft at its supporting parts, place dial gage probes to the outer peripheral faces of the parts mounting parts, and measure the runout from one rotation of the spline shaft.	
(1) Perpendicularity of spline end face relative to axial line of supporting part of spline shaft (See Table 4 ②.)	While supporting the spline shaft at its supporting parts and at one spline shaft end, place a dial gage probe to the spline end face and measure the runout from one rotation of the spline shaft.	
Perpendicularity of mounting surface of flange relative to axial line of spline shaft (See Table 4 ③.)	While supporting the spline shaft at both center holes and at the outer peripheral face of the spline shaft adjacent to the external cylinder, and while fixing the external cylinder to the spline shaft, place a dial gage probe to the mounting surface of the flange of the external cylinder and measure the perpendicularity from runout caused by one rotation of the spline shaft.	Jigs for fixing



Preload

The average amount of preload for **IKD** Linear Ball Spline is shown in Table 7. A summary of applicable preload types is shown in Table 8. For details, see the description of each series.

Item eload type	Symbol	Preload amount	Application
Clearance	To	0(1)	·Very smooth motion
Standard	(No symbol)	0(2)	·Smooth and precise motion
Light preload	T 1	0.02 <i>C</i> ₀	Minimum vibrationLoad is evenly balanced.Smooth and precise motion

Note(1): Zero or minimal amount of clearance
(2): Zero or minimal amount of preload

Remark: Co means the basic static load rating.

Series		Preload (Symbol)	Clearance (T ₀)	Standard (No symbol)	Light preload
	Linear Ball Spline G		0	☆	☆
	Block type Linear Ball Spline			☆	$\stackrel{\wedge}{\simeq}$
Stroke Ball Spline LS			_	-	0

D-14 D-15

Special Specifications

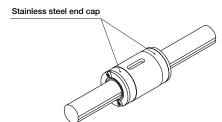
IKU Linear Ball Splines of the special specifications shown in Table 9 are available. In some cases, special specifications may not be applicable. For details, see the description of each series.

When a special specification is required, add the applicable supplemental code to the end of the identification number. When a combination of several special specifications is required, arrange their supplemental codes in alphabetical order.

Table 9 Special specifications for Linear Ball Spline Block type Linear Ball Spline G Special specification Linear Ball Spline code BS 0 Stainless steel end caps N ☆ $\stackrel{\leftrightarrow}{\sim}$ No end seal OH ☆ With an oil hole Q 샀 Capillary plates RE 0 Seals for special environment S 0 Spline shaft in stainless steel U _ 샀 With under seals 0 Specified grease

2: For details of special specifications applicable to each series and their combinations, see the description of each series.

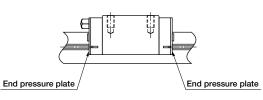
With stainless steel end caps /BS



The standard synthetic resin end caps are replaced with stainless steel end caps, keeping the total length of external cylinder unchanged.

No end seal /N

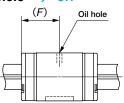
D-16

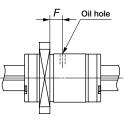


End seals at both ends of external cylinder or slide unit are replaced by end pressure plates (not in contact with the spline shaft) to reduce frictional resistance.

This specification is not effective for dust protection.

With an oil hole /OH

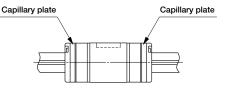




An oil hole is provided on the external cylinder of Linear Ball Spline G. For dimensions, see the description of each series.

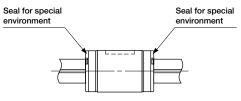
Capillary plate /Q





The capillary plate is assembled inside the end seal of the external cylinder. It is impregnated with lubricant so that relubrication interval can be made longer. For the total length of the external cylinder with capillary plate, see the description of each series.

Seal for special environment / RE



The standard end seals are changed to seals for special environment that can be used at high temperature, keeping the total length of external cylinder unchanged.

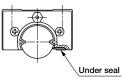
Spline shaft in stainless steel



The material of solid spline shaft of Linear Ball Spline G is changed to stainless steel. The load rating will be obtained by multiplying the load rating for the high carbon steel spline shaft by a factor of 0.8.

With under seals





To prevent foreign substances intruding from the lower side of Block type Linear Ball Spline, seals are provided on the bottom faces of slide unit.

Specified grease /YCG/YCL/YBR/YAF/YNG

The type of pre-packed grease can be changed by a supplemental code.

IKD Low Dust Generation Grease for Clean Environment CG2 is pre-packed.

IKD Low Dust Generation Grease for Clean Environment CGL is pre-packed.

MOLYCOTE BR2 Plus Grease (Dow Corning) is pre-packed.

(4) /YAF

IKD Anti-Fretting Corrosion Grease is Pre-packed.

(5) /YNG

No grease is pre-packed.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Lubrication and Dust Protection

IKO Linear Ball Spline is most generally lubricated with grease, which provides easy lubrication control. A grease nipple for grease replenishment is provided on the slide unit of Block type Linear Ball Spline. Parts such as piping joints are also available, and can be delivered if required.

IKO Linear Ball Spline is provided with special rubber seals for dust protection. But, if a large amount of fine contaminants are present, or if large particles of foreign matter may fall on the spline shaft, it is recommended to provide bellows and other protective covers.

The size 2, 3, 4 models and Stroke Ball Spline LS are not provided with seals.

When requiring the size 3 and 4 models with seals, consult **IKD** for further information.

Pre-packed grease

A high quality lithium-soap base grease shown in Table 10 is pre-packed in IKO Linear Ball Spline. For the interval and amount of grease replenishment, see "General description".

ole 10 Pre-packed grease	
Series	Pre-packed grease
Linear Ball Spline G	ALVANIA EP GREASE 2 (SHELL)
Block type Linear Ball Spline	MULTEMP PS No.2 (KYODO YUSHI)

Parts for lubrication

The slide unit of Block type Linear Ball Spline is provided with a grease nipple or oil hole for grease replenishment. Table 11 shows applicable parts for lubrication.

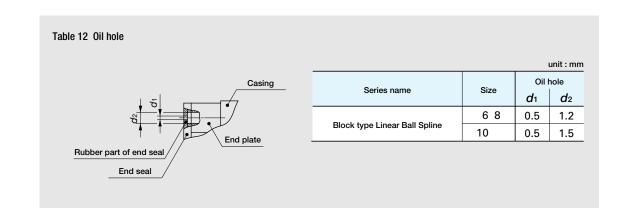
However, Linear Ball Spline G is not provided with a grease nipple or oil hole. For re-lubrication of this type, apply grease directly to the raceways of the spline shaft.

Table 11 Parts for lubrication				Grease nipple
Series	Model code	Size	Туре	Applicable supply nozzle type
		6 8 10	Oil hole	Miniature greaser
Block type Linear Ball Spline	LSB	13 16 20	A-M3	A-5120V A-5240V B-5120V B-5240V
		25	A-M4	A-5120V A-5240V B-5120V B-5240V

Remark: The above table shows representative model codes, but is applicable to all models. When "Oil hole" is described in the grease nipple column, an oil hole shown in Table 12 is provided in place of a grease nipple.

Oil hole

Some models of Block type Linear Ball Spline are provided with an oil hole as shown in Table 12. (See also Table 11.) For grease replenishment, use a syringe type dispenser. The specially prepared miniature greaser is also available. For specifications of the miniature greaser, see page 101.



D-18 D-19 1mm=0.03937inch

Grease nipple and supply nozzle

Table 13 shows the specifications of grease nipples and applicable types of supply nozzles. For the specifications of supply nozzles, see page 97.

	Grease nipple		Applicable supply nozzle
Туре	Shape and dimension	Туре	Shape
А–МЗ	Width across flats 4 M3	A–5120V A–5240V	Straight type
A-M4	Width across flats 4.5 M4	B-5120V B-5240V	Straight type with angle

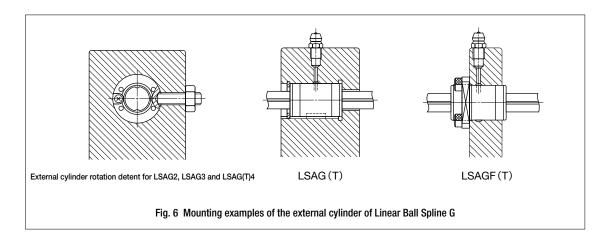
Precautions for Use

External cylinder fit

The normal fit between the external cylinder of Linear Ball Spline G and housing hole is the transition fit (J7). The clearance fit (H7) can be used, when the requirement for accuracy and rigidity is not very strict.

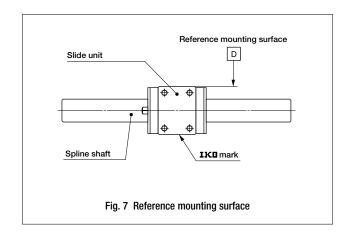
Standard mounting examples of Linear Ball Spline G

Fig. 6 shows the standard mounting examples of the external cylinder of Linear Ball Spline G. To prevent the rotation of the external cylinders of LSAG2, LSAG3 and LSAG(T)4, an M1.2 to M1.6 screw for LSAG2, an M1.6 to M2 screw for LSAG3 and an M2 to M2.5 screw for LSAG(T)4 are set to the countersink provided on each cylinder. Avoid deforming the external cylinder when tightening the



Reference mounting surface of Block type Linear Ball Spline

To mount Block type Linear Ball Spline, correctly fit the reference mounting surface of the slide unit to the reference mounting surface of the table, and then fix them tightly. The slide unit reference mounting surface of Block type Linear Ball Spline is always the side surface opposite to the **IKD** mark. (See Fig. 7.)



Standard mounting example of Block type Linear Ball Spline

The outer peripheral surface of the spline shaft, and the reference mounting surface D and mounting surface C of the slide unit of Block type Linear Ball Spline are accurately finished by grinding as shown in Fig. 8. Stable and high accuracy linear motion can be obtained by finishing the mating mounting surfaces of machines or equipment with high accuracy and correctly mounting the Linear Ball Spline on these surfaces. It is recommended to make a relieved fillet at the corner of the mating reference mounting surface as shown in Table 14. Table 14 shows the recommended shoulder height of the mating reference mounting surface.

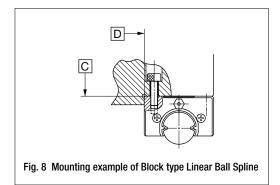
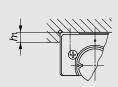


Table 14 Shoulder height of the mating reference mounting surface of Block type Linear Ball Spline



	unit : mm
Model number	Shoulder height h1
LSB 6	2
LSB 8	2.5
LSB 10	3
LSB 13	3.5
LSB 16	4
LSB 20	5
LSB 25	6

Remark: The above table shows representative model numbers, but is applicable to all models

Mounting example of Stroke Ball Spline LS

• Additional machining of spline shaft

The high carbon steel spline shaft is hardened by induction hardening. When additional machining on the shaft end is needed, make sure that the maximum diameter of the shaft end machining part does not exceed the dimension d_1 shown in the dimension tables. Spline shafts with special end shapes can be prepared upon request. Consult **IKO** for further information.

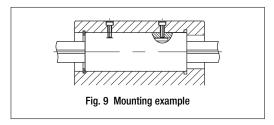
2 Operating temperature

The maximum ambient temperature 120°C. In case of continuously operation, ambient temperature should not exceed 100°C.

© Caution in the operation

Stroke length should be within effective stroke length in dimension table.

Cage creeping may occur under unsteady high-speed operation and/or moment load condition. A full length of stroking is necessary to correct cage position in periodical operation interval.



Additional machining of spline shaft end

The high carbon steel spline shaft is hardened by induction hardening. When additional machining on the shaft end is needed, make sure that the maximum diameter of the shaft end machining part does not exceed the dimension d_1 shown in the table of dimensions.

Spline shafts with special end shapes can be prepared upon request. Consult **IKD** for further information.

Multiple external cylinders or slide units in close distance

When using multiple external cylinders or slide units in close distance to each other, actual load may be greater than the calculated load depending on the accuracy of the mounting surfaces and the reference mounting surfaces of the machine. It is suggested in such cases to assume a greater load than the calculated

For Linear Ball Spline G, the key grooves of the external cylinders are aligned before delivery, when two or more external cylinders are assembled on a single spline shaft and two or more keys are used to fix the external cylinders in the rotational direction.

For Block type Linear Ball Spline, dimensional variations of H and N among a set can be specified upon request. Consult **IKD** for further information.

Arrangement of flange type external cylinders of Linear Ball Spline G (Non-interchangeable specification)

Multiple flange type external cylinders of non-interchangeable Linear Ball Spline G are arranged as shown in Table 15. Other arrangements are also available. Consult **IKD** for further information.

Number of external cylinders	Arrangement of external cylinders
1	
2	
3	
4	
5	
6	

Operating temperature

The maximum operating temperature is 120°C and a continuous operation is possible at temperatures up to 100°C. When the temperature exceeds 100°C, consult **IKD**.

In case of "With capillary plates" of special specification, operate below 80°C.

D-22 D-23 1mm=0.03937inch

Precautions for Mounting

When mounting multiple sets at the same time

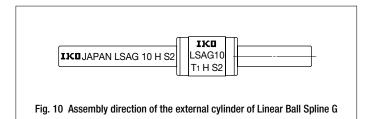
- Interchangeable specification product
- Assemble an external cylinder (or a slide unit) and a spline shaft with the same interchangeable code ("S2" and "S2").
- Non-interchangeable specification product
- Use an assembly of external cylinder and spline shaft as delivered without changing the combination.

Assembling an external cylinder (or a slide unit) and a spline shaft

Assembling Linear Ball Spline G

When assembling the external cylinder on the spline shaft, correctly fit the grooves of the external cylinder to the grooves of the spline shaft and move the external cylinder gently in parallel direction. Rough handling will result in seal damage or dropping of steel balls.

Non-interchangeable specification products are already assembled so as to provide the best accuracy when the external cylinder **IKD** mark and the spline shaft **IKD** mark face the same direction. (See Fig. 10.) So make sure not to change the assembly direction.

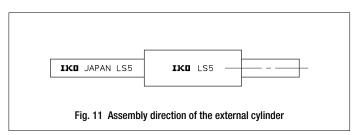


- Assembling Block type Linear Ball Spline LS
- When assembling the slide unit on the spline shaft, handle them with care to prevent steel balls from falling out.
- Assembling an external cylinder and a spline shaft
- When assembling the external cylinder on the spline shaft, correctly fit grooves of the external cylinder to the grooves of the spline shaft and move the external cylinder gentry in parallel direction. Rough handling will result in dropping steel balls.

The cage must be located in the middle position. After assemble the external cylinder to a spline shaft, push the spline shaft forward until the cage contacts to end part of external cylinder.

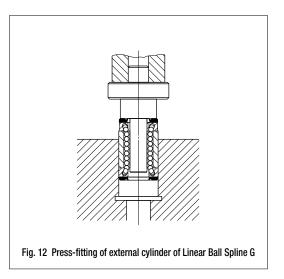
Furthermore, push the spline shaft until a half of the maximum stroke length and return it by the same length. Then the location of the cage can be located in the middle.

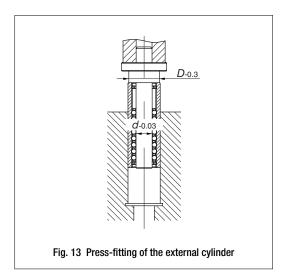
Products are assembled to provide the best accuracy when **IKO** marks of external cylinder and spline shaft face the same direction. (See Fig. 11.)



Mounting the external cylinder of Linear Ball Spline G and Stroke Ball Spline LS

When press-fitting the external cylinder of Linear Ball Spline G to the housing, assemble them correctly using a press and a suitable jig fixture, etc. (See Fig. 12, 13.)





Tightening torque of fixing bolts

The standard torque values for Block type Linear Ball Spline fixing bolts are shown in Table 16. When machines or equipment are subjected to severe vibration, shock, large fluctuating load, or moment load, the bolts should be tightened with a torque 1.2 to 1.5 times larger than the standard torque values shown. When the mating member material is cast iron or aluminum, tightening torque should be reduced in accordance with the strength characteristics of the material.

	Tightening	Tightening torque N⋅m		
Bolt size	Carbon steel bolt	Stainless steel bolt		
	(strength division 12.9)	(property division A2-70)		
$M2 \times 0.4$	0.49	0.31		
M3 × 0.5	1.7	1.1		
M4 × 0.7	4.0	_		
M5 × 0.8	7.9	_		
M6 × 1	13.3	_		



Linear Ball Splines

Description of each series and Table of dimensions



In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

Linear Ball Spline G

LSAG/LSAGF

IKO Linear Ball Spline G is a linear motion rolling guide which achieves endless linear motion of an external cylinder along a spline shaft. Two rows of steel balls are arranged in four point contact with the raceways. Stable high accuracy and rigidity are ensured in operations even under fluctuating loads with changing direction and magnitude or complex loads. Owing to its simple design, this product is very compact.

In

Interchangeable

Linear Ball Spline G includes interchangeable specification products. The dimensions of external cylinders and spline shafts of this specification are individually controlled, so that the external cylinders and spline shafts can be combined, added or exchanged freely



Solid shaft and hollow shaft

Length of external cylinder

External cylinders of both standard type and flange type

are available in two different lengths: standard and high

rigidity long. They can be selected for wide applications.

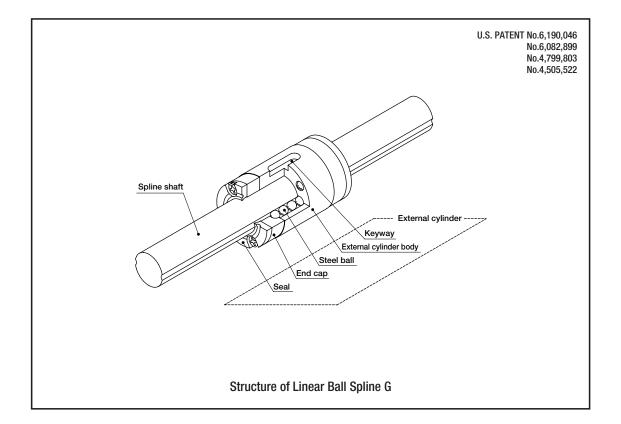
Two types of spline shaft, the solid shaft and the hollow

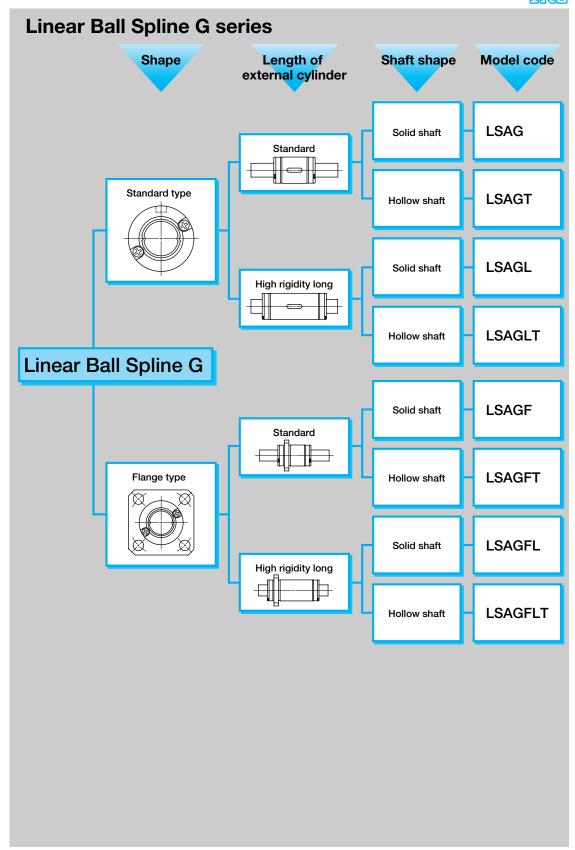
and flange type shaft are available for selection suitable for each application.

silable in two different shapes:

Standard type and flange type

External cylinders are available in two different shapes: the standard type (cylindrical shape) and the flange type.

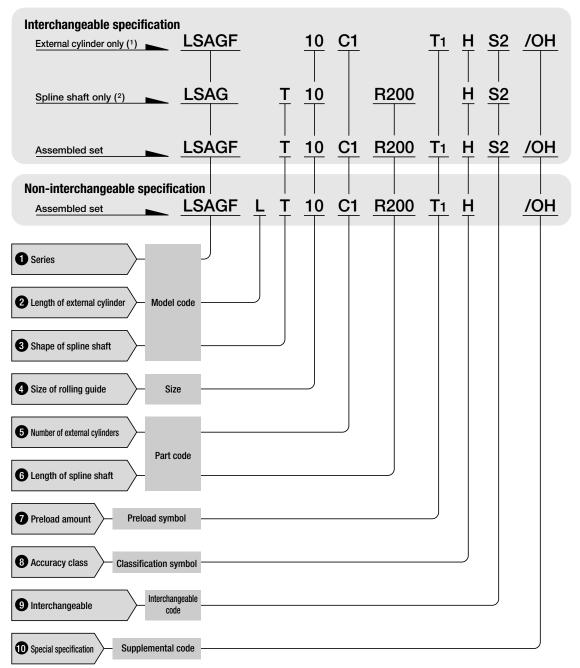




1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

The specification of Linear Ball Spline G is indicated by the identification number, consisting of a model code, a size, a part code, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page D-6.



Note(1): For the model code of a single external cylinder of interchangeable specification, indicate "LSAG" (standard type) or "LSAGF" (flange type) regardless of the spline shaft type to be combined.

(2): For the model code of a single spline shaft of interchangeable specification, indicate "LSAG" (solid shaft) or "LSAGT" (hollow shaft) regardless of the external cylinder type to be combined.

: LSAG Standard type 1 Series : LSAGF Flange type

2 Length of external cylinder

Standard : No symbol

: L High rigidity long

> For available external cylinder models, spline shaft models, and sizes, see Tables 1.1 and 1.2.

> > High rigidity long

3 Shape of spline shaft

Solid shaft : No symbol

Hollow shaft : T

4 Size of rolling guide

Table 1.1 Models and sizes of Linear Ball Spline G standard type					
Model	Standard				
	Solid shaft	Hollow shaft	Soli		

Size	Solid shaft LSAG	Hollow shaft LSAGT	Solid shaft LSAGL	Hollow shaft LSAGLT
2	0	_	_	_
3	0	_	_	_
4	0	0	_	_
5	☆	☆	☆	☆
6	☆	☆	☆	☆
8	☆	☆	☆	☆
10	☆	☆	☆	☆
12	☆	☆	☆	☆
15	☆	_	☆	_
20	☆	_	☆	_
25	☆	_	☆	_
30	☆	_	☆	_
40	0	_	_	_
50	0	_	_	_

Remark: The mark ☆ indicates that interchangeable specification products are available.

1N=0.102kgf=0.2248lbs.

D-31

Model	Star	ndard	High rigidity long		
Size	Solid shaft LSAGF	Hollow shaft LSAGFT	Solid shaft LSAGFL	Hollow shaft	
2	0	_	_	_	
3	0	_	_	_	
4	0	0	_	_	
5	☆	☆	☆	☆	
6	☆	☆	☆	☆	
8	☆	☆	☆	☆	
10	☆	☆	☆	☆	
12	☆	☆	☆	☆	
15	☆	_	☆	_	
20	☆	_	☆	_	
25	☆	_	☆	_	
30	☆	_	☆	_	
40	0	_	_	_	

5 Number of external cylinders

: **C** \bigcirc Assembled set

: C1 External cylinder

For an assembled set, indicate the number of external cylinders assembled on one spline shaft. For an external cylinder, only "C1" can be indicated.

6 Length of spline shaft

: **R**〇 Assembled set

: **R**〇 Spline shaft

Indicate the length of spline shaft in mm. For standard and maximum lengths, see the table of dimensions.

7 Preload amount

Clearance : T0

Standard : No symbol

Light preload: T1

Specify this item for an assembled set or a single external cylinder. For applicable preload amount, see Table 2. For details of preload amount, see page D-15.

Table 2 Applicable preload types

• • • • • • • • • • • • • • • • • • • •			
		Preload type (Symbol)	
Size	Clearance (To)	Standard (No symbol)	Light preload (T1)
2	0	0	1
3	0	0	1
4	0	0	ı
5	ı	☆	☆
6	_	☆	\Rightarrow
8	_	☆	☆
10	_	☆	\Rightarrow
12	ı	☆	\Rightarrow
15	_	☆	\Rightarrow
20	_	☆	☆
25	_	☆	\Rightarrow
30	_	☆	\Rightarrow
40	_	0	0
50		0	0

Remark : The mark ☆ indicates that it is also applicable to interchangeable specification products.

8 Accuracy class

Ordinary : No symbol

: H High : P

Precision

For applicable accuracy, see Table 3. In case of interchangeable specification products, assemble external cylinders and spline shafts of the same class. For details of accuracy, see page D-11.

Table 3 Applicable accuracy classes

	Accuracy class (Symbol)						
Size	Ordinary (No symbol)	High (H)	Precision (P)				
2	0	0	0				
3	0	0	0				
4	0	0	0				
5	5 ☆		0				
6	6 ☆		0				
8	8 ☆		0				
10	10 ☆		0				
12	12 ☆		0				
15	\Rightarrow	\Rightarrow	0				
20	☆	☆	0				
25	25 ☆		0				
30	30 ☆		0				
40	0	0	0				
50	0	0	0				

Remark : The mark ☆ indicates that it is also applicable to interchangeable specification products.

9 Interchangeable code

Select group 1 : S1
Select group 2 : S2

Specify this item for interchangeable specification products. Assemble external cylinders and spline shafts with the same interchangeable code.

Performance and accuracy of "S1" group and "S2" group are the same.

10 Special specification

For applicable special specifications, see Table 4. When several special specifications are combined, see Table 5. For details of special specifications, see page D-16.

Table 4 Special specifications

Special specifications	Supplemental code	Assembled set	External cylinder only	Spline shaft only	Dimension
With stainless steel end plates	BS	O(1)	_	_	
No end seal	N	☆(2)	☆	_	
Oil hole	ОН	☆(3)	☆(3)	_	See Table 6.1 and 6.2.
Capillary plates	Q	☆(4)	☆(4)	_	See Table 7.
Seal for special environment	RE	O(1)	_	_	
Spline shaft in stainless steel	S	O(5)(6)	_	_	
Specified grease	Υ	O(1)	_	_	

Note(1): Applicable to size 5, 6, 8, 10, 12 and 15 models.

- (2): Not applicable to size 2, 3 and 4 models.
- (3): Not applicable to size 2 models.
- (4): Applicable to size 5, 6, 8, 10 and 12 models.
- (5): Not applicable to size 2, 3, 4, 40 and 50 models.
- (6): Not applicable to the hollow shaft.

Remark: In the table, the mark & indicates that it is also applicable to interchangeable specification products.

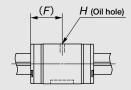
Table 5 Combination of special specifications

N	O					
ОН	0	☆				
Q	0	☆	☆			
RE	0	_	0	0		
S	0	0	0	0	0	
Υ	0	0	0		0	0
	RS	N	ОН	0	RF	9

Remark 1 : The mark \precsim indicates that it is also applicable to interchangeable specification products.

- 2: In the table, the mark indicates that this combination cannot be made.
- 3: When several special specifications are required, arrange the supplemental codes alphabetically.

Table 6.1 Location and diameter of oil hole for standard type external cylinder (Supplemental code /OH)



H (Oil hole)	H (Oil hole)
	45°
1	LSAG 40

Model number	F	н	Model number	F	н
LSAG 3	5	1.2	LSAG 15	20	2
LSAG 4	6		LSAG 20	25	
LSAG 5	1.5			30	
LSAG 6				35	3
LSAG 8	12.5		LSAG 40	50	
LSAG 10	15	2	LSAG 50	30	
LSAG 12	17.5	_	_		

unit : mm Н Н F Model number Model number **LSAGL 15** 32.5 2 **LSAGL 20** 35.5 **LSAGL 5** 13 **LSAGL 25** 42 3 **LSAGL 6** 15 1.5 LSAGL 30 49 **LSAGL 8** 18.5 _ **LSAGL 10** 23.5 _ _ **LSAGL 12** 27 _

Remark: Also applicable to assembled sets of LSAGT and LSAGLT.

Table 6.2 Location and diameter of oil hole for flange type external cylinder (Supplemental code /OH)

F

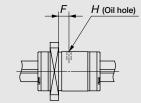
7.5

9

11

13

14



Н

1.2

2

Model number

LSAGF 12

LSAGF 15

LSAGF 20

LSAGF 25

LSAGF 30

LSAGF 40 23.4

F

2.1

2.8

2.8

3.5

3.5

Model number

LSAGF 3

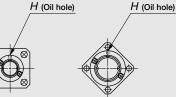
LSAGF 4

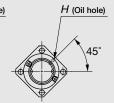
LSAGF 5

LSAGF 6

LSAGF 8

LSAGF 10 5





LSAGF(L) 30

LSAGF 40

LSAGFL 12 17

LSAGFL 15 21.4

LSAGFL 20 21.5

LSAGFL 25 25

LSAGFL 30 28

Model number

н	Model number	F	Н
2	_	_	_
2	_	_	_
	LSAGFL 5	5.8	
3	LSAGFL 6	8	1.5
J	LSAGFL 8	9.5	
	LSAGFL 10	13.3	2

Remark: Also applicable to assembled sets of LSAGFT and LSAGFLT.



unit: mm

Н

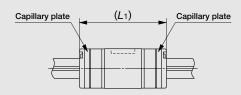
2

3

F

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Table 7 External cylinder with Capillary plates (Supplemental code /Q)



Model number	<i>L</i> ₁
LSAG 5	24
LSAGL 5	32
LSAG 6	27
LSAGL 6	36
LSAG 8	33
LASGL 8	45

Model number	<i>L</i> ₁
LSAG 10	38
LSAGL 10	55
LSAG 12	43
LASGL 12	62

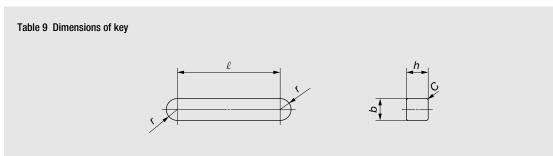
Moment of inertia of sectional area and section modulus of spline shaft

Moment of inertia of sectional area and section modulus of the spline shaft are shown in Table 8.

Size	Moment of inertia of	sectional area mm4	Section mo	odulus mm³
Size	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
2	0.60	_	0.65	_
3	3.6	_	2.5	_
4	12	12	6	6
5	29	29	12	12
6	61	61	21	21
8	190	190	49	49
10	470	460	95	12 21
12	990	960	170	160
15	1 590	_	240	_
20	5 110	_	570	_
25	12 100	_	1 080	_
30	25 400	_	1 890	_
40	91 000	_	4 930	_
50	223 000	_	9 660	_

Dimensions of key

The keys shown in Table 9 are appended to Linear Ball Spline G standard type. However, no keys are appended to LSAG2, LSAG3, LSAG4 and LSAGT4. For details of fixing, see page D-21.



unit	

Model number	b	Tolerance	h	Tolerance	l	r	С
LSAG 5	2		2		3.8	1	
LSAG 6	-				г о	1	
LSAG 8	2.5	+0.016 +0.006	2.5	0 -0.025 -	5.8	1.25	
LSAG 10	3	70.006	3		7.8	1 5	0.16~0.25
LSAG 12	3		3		11.8	1.5	
LSAG 15	3.5		3.5		16	1.75	
LSAG 20	4	+0.024 +0.012	4	0 -0.030	21.5	2	
LSAG 25	5	10.012	5	0.000	23.5	2.5	0.25~0.4
LSAG 30	7	+0.030	7		27.5	3.5	0.25 -0.4
LSAG 40	10	+0.015	8	-0.036	44.3	5	
LSAG 50	15	+0.036 +0.018	10		34.3	7.5	0.4 ~0.6

Remark: The above table shows representative model numbers but is applicable to all standard types of the same size.



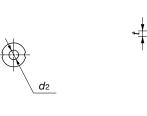
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

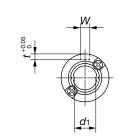
Linear Ball Spline G: Standard type

120°

LSAG • LSAGT • LSAGL • LSAGLT

Bore dia. of hollow shaft



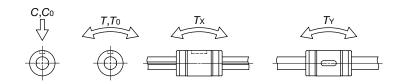


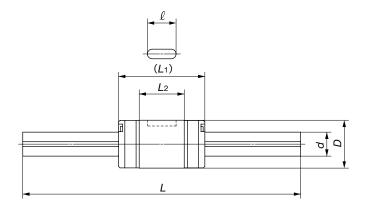
LSAG LSAG LSAG (T

Model number	nterchangeable	N	lass (Ref.) g	Dimensions and tolerances of external cylinder mm									
Model number	Intercha	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	L1	L2	W	Tolerance	t	l		
LSAG 2(1)		1.0	2.3	6	0 -0.008	8.5	4.7	_	_	0.7	_		
LSAG 3(1)		2.1	5.4	7	0 -0.009	10	5.9	_	_	0.8	_		
LSAG 4(1)		2.5	9.6	8	0	12	7.9		_	1			
LSAGT 4(1)		2.5	8.2	8	-0.009	12	7.9	_	_		_		
LSAG 5	☆	4.8	14.9			18	9.4		+0.014				
LSAGT 5	☆	7.9	12.4	10	0 -0.009	10	3.4	2		1.2	6		
LSAGL 5	☆		14.9	10		26	16.9	2	0	1.2			
LSAGLT 5	☆	7.9	12.4			20	16.9						
LSAG 6	☆	8.9	19			21	12.4						
LSAGT 6	☆	6.9	16.5	12	0		12.4	2	+0.014	1.2	8		
LSAGL 6	☆	445	19	12	-0.011	00	04.4	2	0	1.2	8		
LSAGLT 6	☆	14.5	16.5			30	21.4						
LSAG 8	☆	15.9	39			25	14.6						
LSAGT 8	☆	15.9	33	45	0	25	14.6	0.5	+0.014	4.5	0.5		
LSAGL 8	☆	20.5	39	15	-0.011		26.6	2.5	5 +0.014	1.5	8.5		
LSAGLT 8	☆	26.5	33			37							

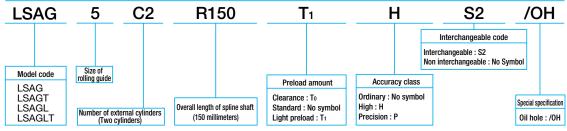
Note(1): No seals are attached.

- (2): Dimension d₁ indicates the maximum diameter when machining is done at the shaft ends.
- (3): This length is the standard length. Spline shafts in other length are also available. Simply indicate the necessary length of spline shaft in mm in the identification number.
- (4): The directions of basic dynamic load rating (C), basic static load rating (C₀), dynamic torque rating (T) and static torque/moment rating (T₀, T_x, T_y) are shown in the sketches below.
- The upper values in the Tx and Ty columns apply to one external cylinder, and the lower values apply to two external cylinders in close contact. **Remark**: The mark $\not \simeq$ indicates that interchangeable specification products are available.





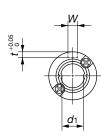
	Dimen	sions a	nd tolei mi	rance of spline shaft m		Basic dynamic load rating(4)	Basic static load rating(4)	Dynamic torque rating(4)	Static torque rating(4)	Static n	
		(0)		(0)	l., .	С	C ₀	Т	T 0	Tx	TY
d	Tolerance	d 1 ⁽²⁾	d 2	L(3)	Maximum length	N	N	N∙m	N∙m	N∙m	N∙m
2	0 -0.010	1.2	_	50 100	100	222	237	0.28	0.30	0.22 1.6	0.39 2.9
3	0 -0.010	2.2	_	100 150	150	251	285	0.45	0.51	0.31 1.9	0.53 3.3
4	0	3.2	_	100 150	200	303	380	0.70	0.87	0.52	0.90
4	-0.012	3.2	1.5	100 150	150	303	360	0.70	0.67	2.9	5.0
			_			587	641	1.8	1.9	1.0	1.8
5	0 4.2 2	100 150	200	307	041	1.0	1.5	7.9	13.6		
3	-0.012	4.2	_	100 130		879	1 180	2.6	3.5	3.2	5.5
			2			0/3	1 100	2.0	5.5	19.3	33.4
			_			711	855	2.5	3.0	1.7	3.0
6	0	5.2	2	150 200	300	/ / / /	855	2.5	3.0	11.7	20.3
O	-0.012	5.2	_	130 200	300	1 030	1 500	3.6	5.2	5.0	8.6
			2			1 030	1 300	3.0	5.2	27.6	47.8
			_		500	1 190	1 330	5.5	6.2	3.3	5.6
0	0	7	3	150 200	400	1 190	1 330	5.5	0.2	22.0	38.1
0	8 -0.015 7 - 250	500	1 000	2.470	0.4		10.3	17.8			
			3		400	1 800	2 470	8.4	11.5	56.3	97.5



Linear Ball Spline G: Standard type

LSAG • LSAGT • LSAGL • LSAGLT





Bore dia. of hollow shaft

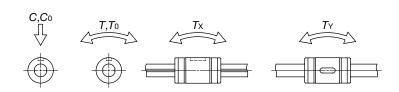
Model number	nterchangeable	N	lass (Ref.) g		Dimension	s and t	oleranc mm		external cylii	nder							
Woder Humber	Intercha	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	<i>L</i> 1	L2	w	Tolerance	t	l	d	Tolerance				
LSAG 10	☆	31.5	60.5			30	18.2										
LSAGT 10	☆	31.5	51	19	0	30	10.2	3	+0.014	1.8	11	10	0				
LSAGL 10	☆	56.5	60.5	19	-0.013	47	34.9	3	0	1.8	11	10	-0.015				
LSAGLT 10	☆	56.5	51			4/	34.9										
LSAG 12	☆	44	87.5			35	23										
LSAGT 12	☆	44	66		0	35	23		+0.014	1.0	4.5	12	0				
LSAGL 12	☆	76.8	87.5	21	-0.013	54	42	3	0	1.8	15	12	-0.018				
LSAGLT 12	☆		66			54	42										
LSAG 15	☆	59.5	444		0	40	27	0.5	+0.018			13.6	0				
LSAGL 15	☆	110	111	23	-0.013	65	52	3.5	.5 0	2	20		-0.018				
LSAG 20	☆	130	000		0	50	33	_	+0.018	۰.		40.0	0				
LSAGL 20	☆	198	202	30	-0.016	71	54	4	0	2.5	26	18.2	-0.021				
LSAG 25	☆	220	210	27	0	60	39.2	_	+0.018	2	20	22.0	0				
LSAGL 25	☆	336	310	37	-0.016	84	63.2	5	0	3	29	22.6	-0.021				
LSAG 30	☆	430	450	45	0	70	43						+0.022		0.5	07.0	0
LSAGL 30	☆	634	450	45	-0.016	98	71	7	0	4	35	27.2	-0.021				
LSAG 40		760	808	60	0 -0.019	100	70.8	10	+0.022 0	4.5	55	37.2	0 -0.025				
LSAG 50		1 140	1 320	75	0 -0.019	100	66.4	15	+0.027 0	5	50	46.6	0 -0.025				

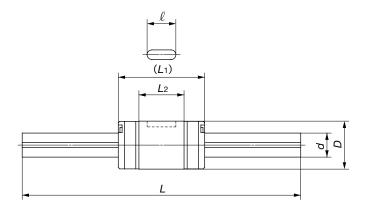
Note(1): Dimension d_1 indicates the maximum diameter when machining is done at the shaft ends.

- (2): This length is the standard length. Spline shafts in other length are also available. Simply indicate the necessary length of spline shaft in mm in the identification number.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx, Tv) are shown in the sketches below.

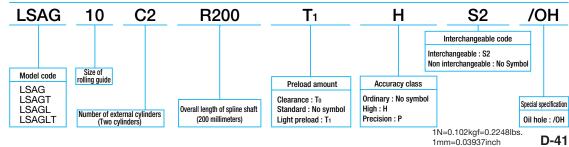
The upper values in the *Tx* and *Ty* columns apply to one external cylinder, and the lower values apply to two external cylinders in close contact.

Remark: The mark ☆ indicates that interchangeable specification products are available.



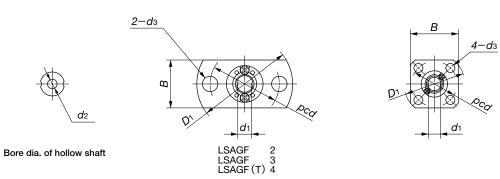


	Dime	nsions and tolerance of spline sha	aft	Basic dynamic load rating (3)	Basic static load rating(3)	Dynamic torque rating(3)	Static torque rating(3)	Static mome	ent rating(3)
			1	С	C ₀	T	T 0	T x	T Y
$d_1^{(1)}$	d 2	L (2)	Maximum length	N	N	N∙m	N∙m	N∙m	N∙m
	_							7.0	12.1
	4			1 880	2 150	10.9	12.5	41.5	71.9
8.9	_	200 300	600						
				2 850	4 040	16.6	23.4	22.7 115	39.3 200
	4							113	
	_			2 180	2 690	140	10.2	10.6	18.3
	6		800	2 100	2 030	14.8	18.3	59.1	102
10.9	_	200 300 400						20.0	
	6			3 220	4 850	21.9	33.0	32.2 157	55.7 272
				4 180	6 070	31.3	45.6	27.8	33.2
11.6	_	200 300 400	1 000					152 94.0	181 112
				6 400	11 500	48.0	86.5	449	535
		300 400 500		6 600	9 040	66.0	90.4	48.6 288	58.0 343
15.7	_	600	1 000	9 270	15 100	92.7	151	127 620	151 738
				11 200	14 300	139	178	92.8	111
19.4	_	300 400 500	1 200	11 200	14 300	133	170	551 229	656 273
		600 800		15 400	23 200	193	290	229 1 190	1 420
		400 500 600		15 400	19 400	231	292	147 874	176 1 040
23.5	_	700 1 100	1 200	21 300	31 600	320	474	364	434
		400 500 600		21300	31000	320	4/4	1 900 364	2 260
33.5	_	700 1 100	1 200	21 300	31 600	426	632	364 1 940	434 2 310
42.0	_	400 500 600 700 1 100	1 200	28 300	36 100	707	904	389 2 300	464 2 740



Linear Ball Spline G: Flange type

LSAGF • LSAGFT • LSAGFL • LSAGFLT

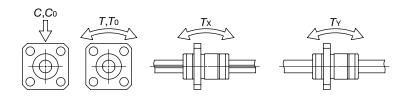


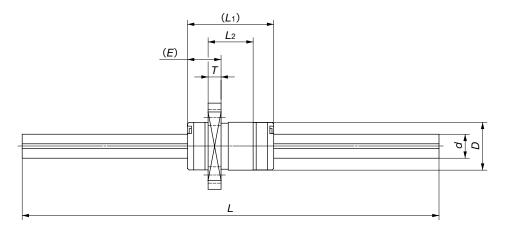
Model number	Interchangeable	N	lass (Ref.) g	Dimensions and tolerance of external cylinder mm										
	Interch	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	<i>L</i> 1	L2	D1	В	Ε	Т	pcd	d з	
LSAGF 2(1)		1.9	2.3	6	0 -0.008	8.5	4.7	15.5	8	3.4	1.5	11	2.4	
LSAGF 3(1)		3.7	5.4	7	0 -0.009	10	5.9	18	9	4	1.9	13	2.9	
LSAGF 4(1)		5.1	9.6	8	8 0 .	12	12 7.9	21	10	4.6	2.5	15	3.4	
LSAGFT 4(1)		3.1	8.2		-0.009	12	7.5	21	10	4.0			3.4	
LSAGF 5	☆	8.9	14.9		0 -0.009	18	18 9.4		18	7	2.7			
LSAGFT 5	☆	0.5	12.4	10				23				17	3.4	
LSAGFL 5	☆	12	14.9			26	16.9			,				
LSAGFLT 5	☆	_ `	12.4											
LSAGF 6	☆	13.9	19		2,	21	12.4	25						
LSAGFT 6	☆	10.0	16.5	12	0				20	7	2.7	19	3.4	
LSAGFL 6	☆	19.5	19	'-	-0.011	30	21.4	20	20	,	2.,	'	0.4	
LSAGFLT 6	☆	10.0	16.5				2							
LSAGF 8	☆	23.5	39			25	14.6							
LSAGFT 8	☆	25.5	33	15	0		14.0	28	22	9	3.8	22	3.4	
LSAGFL 8	☆	34.1	39		-0.011	37	37 26.6		~~		0.0			
LSAGFLT 8	☆	34.1	33			37	20.0							

Note(1): No seals are attached.

- (2): Dimension d_1 indicates the maximum diameter when machining is done at the shaft ends.
- (3): This length is the standard length. Spline shafts in other length are also available. Simply indicate the necessary length of spline shaft in mm in the identification number.
- (4): The directions of basic dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx, Tv) are shown in the sketches below.

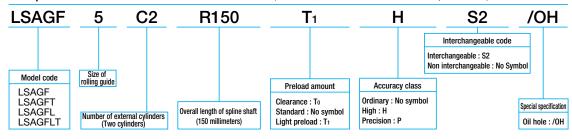
The upper values in the Tx and Ty columns apply to one external cylinder, and the lower values apply to two external cylinders in close contact. **Remark**: The mark \dot{x} indicates that interchangeable specification products are available.





	Dimen	sions a	nd tolei mi	rance of spline shaft n		Basic dynamic load rating(4)	Basic static load rating(4)	Dynamic torque rating (4)	Static torque rating(4)	Static r rating(moment
d	Tolerance	d1 ⁽²⁾	d2	L (3)	Maximum	С	C ₀	Т	T 0	Tx	TY
		u ,		=\',	length	N	N	N∙m	N∙m	N∙m	N∙m
2	0 -0.010	1.2	_	50 100	100	222	237	0.28	0.30	0.22 1.6	0.39 2.9
3	0 -0.010	2.2	_	100 150	150	251	285	0.45	0.51	0.31 1.9	0.53 3.3
4	0	3.2	_	100 150	200	303	380	0.70	0.87	0.52	0.90
4	-0.012	3.2	1.5	100 150	150	303	300	0.70	0.67	2.9	5.0
			_			587	641	1.8	1.9	1.0	1.8
5	0	4.2	2	100 150	200	587	641	1.8	1.9	7.9	13.6
5	-0.012	4.2	_	100 150	200	070	4.400		0.5	3.2	5.5
			2			879	1 180	2.6	3.5	19.3	33.4
			_			744	055	0.5	0.0	1.7	3.0
	0	F 0	2	150, 200	000	711	855	2.5	3.0	11.7	20.3
6	-0.012	5.2	_	150 200	300					5.0	8.6
			2			1 030	1 500	3.6	5.2	27.6	47.8
			_		500	4.405	4.005			3.3	5.6
0	0		3	150 200	400	1 190	1 330	5.5	6.2	22.0	38.1
8	-0.015	7	_	250	500					10.3	17.8
			3		400	1 800	2 470	8.4	11.5	56.3	97.5

Example of identification number of assembled set (For details, see "Identification number and specification".)

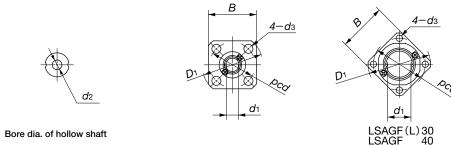




D-43

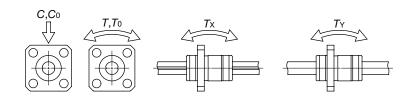
IK Linear Ball Spline G: Flange type

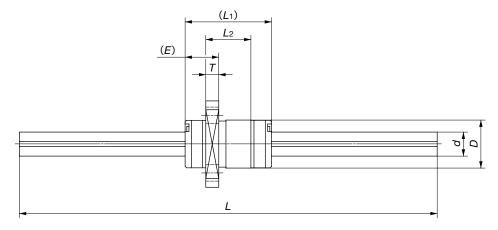
LSAGF • LSAGFT • LSAGFL • LSAGFLT



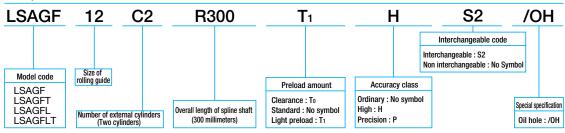
	-														
Model number	Interchangeable	М	ass (Ref.) g		Dimen	sions	and to	lerance mm	e of ex	kternal	cylind	er			
Wiodel Humber	Intercha	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	<i>L</i> 1	L ₂	D 1	В	E	Τ	pcd	d 3	d	Tolerance
LSAGF 10	☆	45	60.5			30	18.2								
LSAGFT 10	☆	45	51	19	0	30	10.2	36	28	10	4.1	28	4.5	10	0
LSAGFL 10	☆	70.1	60.5	13	-0.013	47	34.9	30	20		4.1	20	4.5	10	-0.015
LSAGFLT 10	☆	70.1	51			47	34.3								
LSAGF 12	☆	59	87.5			35	23								
LSAGFT 12	☆	55	66	21	0	35	23	38	30	10	4	30	4.5	12	0
LSAGFL 12	☆	91.8	87.5	21	-0.013	54	42	50	30		1	30	4.5	12	-0.018
LSAGFLT 12	☆	31.0	66			54	42								
LSAGF 15	☆	77	111	23	0	40	27	40	31	11	4.5	32	4.5	13.6	0
LSAGFL 15	☆	128	111	23	-0.013	65	52	40	31		4.5	32	4.5	13.0	-0.018
LSAGF 20	☆	150	202	30	0	50	33	46	35	14	5.5	38	4.5	18.2	0
LSAGFL 20	☆	218	202	30	-0.016	71	54	40	33	14	5.5	30	4.5	10.2	-0.021
LSAGF 25	☆	255	310	37	0	60	39.2	57	43	17	6.6	47	5.5	22.6	0
LSAGFL 25	☆	371	310	37	-0.016	84	63.2	57	43	17	0.0	47	5.5	22.0	-0.021
LSAGF 30	☆	476	450	45	0	70	43	65	50	21	7.5	54	6.6	27.2	0
LSAGFL 30	☆	680	450	40	-0.016	98	71	UO	50	Z 1	7.5	54	0.0	27.2	-0.021
LSAGF 40		962	808	60	0 -0.019	100	70.8	93	73	26.6	12	73	9	37.2	0 -0.025

- Note(1): Dimension d_1 indicates the maximum diameter when machining is done at the shaft ends.
 - (2): This length is the standard length. Spline shafts in other length are also available. Simply indicate the necessary length of spline shaft in mm in the identification number.
- (3): The directions of basic dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx, Ty) are shown in the sketches below.
- The upper values in the Tx and Ty columns apply to one external cylinder, and the lower values apply to two external cylinders in close contact. **Remark**: The mark \cancel{x} indicates that interchangeable specification products are available.





С	Dimensio		erance nm	e of spline s	shaft	Basic dynamic load rating(3)	Basic static load rating(3)	Dynamic torque rating(3)	Static torque rating(3)	Static mome	ent rating(3)
					l	С	C ₀	Τ	T 0	Tx	T Y
d ₁ (1)	d 2		L(2)		Maximum length	N	N	N∙m	N∙m	N∙m	N∙m
	_									7.0	12.1
0.0	4					1 880	2 150	10.9	12.5	41.5	71.9
8.9	_	200	300		600					22.7	39.3
	4					2 850	4 040	16.6	23.4	115	200
	_									10.0	10.0
	6					2 180	2 690	14.8	18.3	10.6 59.1	18.3 102
10.9	_	200	300	400	800						
	6					3 220	4 850	21.9	33.0	32.2 157	55.7 272
44.0						4 180	6 070	31.3	45.6	27.8 152	33.2 181
11.6	_	200	300	400	1 000	6 400	11 500	48.0	86.5	94.0 449	112 535
		300	400	500		6 600	9 040	66.0	90.4	48.6 288	58.0 343
15.7	_	600	400	300	1 000	9 270	15 100	92.7	151	127 620	151 738
		300	400	500		11 200	14 300	139	178	92.8 551	111 656
19.4	_		800	500	1 200	15 400	23 200	193	290	229 1 190	273 1 420
		400	F00	000		15 400	19 400	231	292	147 874	176 1 040
23.5	_	400 700 1	500 100	600	1 200	21 300	31 600	320	474	364	434
33.5	_		500	600	1 200	21 300	31 600	426	632	1 900 364	2 260 434
33.3		700 1	100		1 200	21300	31000	420	032	1 940	2 310



Block type Linear Ball Spline

LSB

IKO Block type Linear Ball Spline is a linear motion rolling guide, featuring a slide unit which performs endless linear motion along a spline shaft. Two rows of steel balls are arranged in four point contact with the raceways. This design ensures stable high accuracy and rigidity in operations even under fluctuating loads with changing direction and magnitude or complex loads.

Interchangeable

All models in this series are interchangeable specification products. The dimensions of slide units and spline shafts are individually controlled, so that the spline shafts and slide units can be combined, added or



Easy mounting

The slide unit is provided with threaded mounting holes for easy mounting on machines or equipment with bolts.

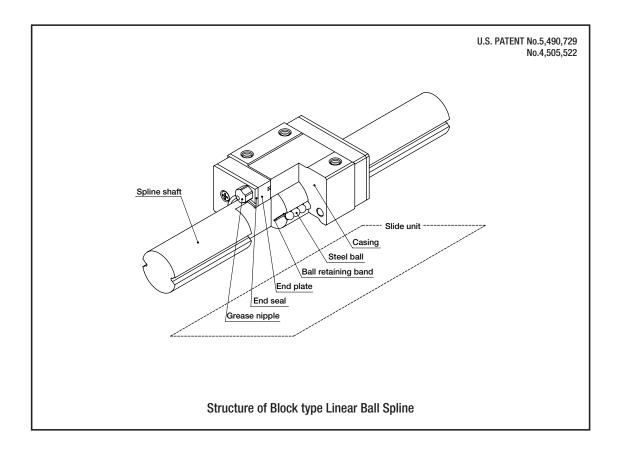


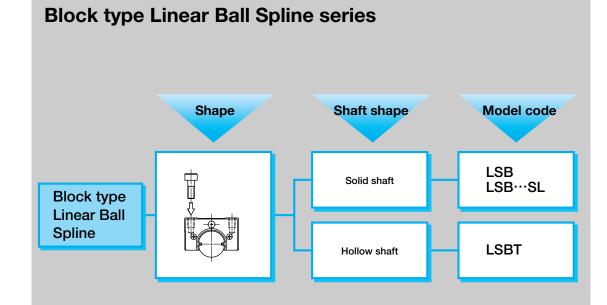
Stainless steel type

The stainless steel type has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, measuring instruments, and semiconductor manufacturing equipment.

Hollow shaft

In high carbon steel type, hollow shafts are also available in addition to solid shafts. The hollow shafts are suitable for applications in which piping, wiring or ventilation is needed.





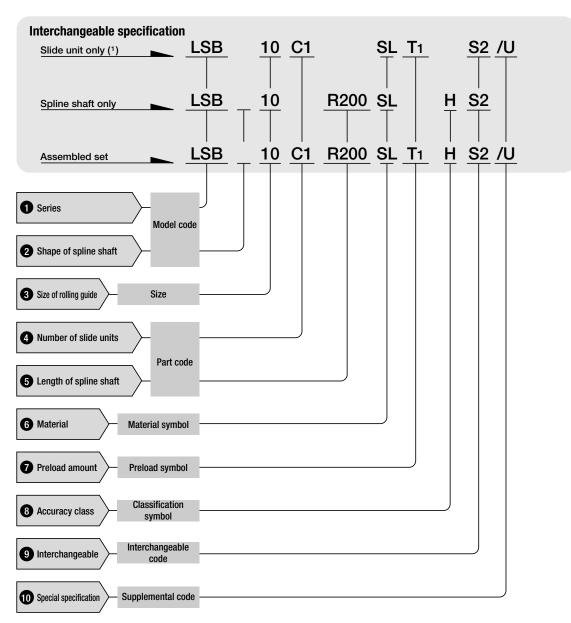


Remark: Models with "SL" are stainless steel type.

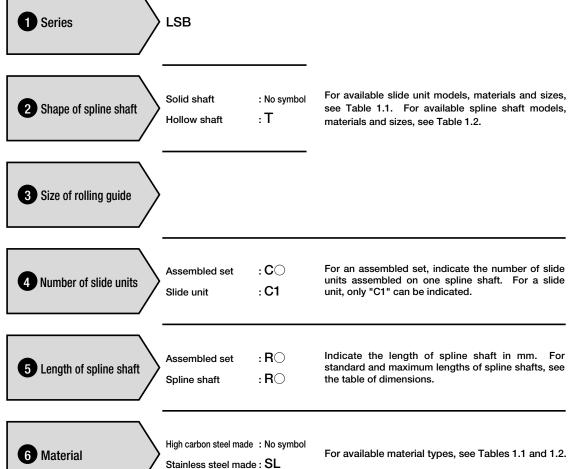
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

The specification of Block type Linear Ball Spline is indicated by the identification number, consisting of a model code, a size, a part code, a material symbol, a preload symbol, a classification symbol, an interchangeable code and any supplemental codes. For details of each specification, see page D-6.



Note(1): For the model code of a single slide unit, indicate "LSB" regardless of the spline shaft type to be combined





1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Table 1.1 Models and sizes of slide unit of Block type Linear Ball Spline

Model	High carbon steel made	Stainless steel made
Size	LSB···C1···S1 LSB···C1···S2	LSB···C1 SL···S1 LSB···C1 SL···S2
6	_	☆
8	_	☆
10	_	☆
13	\Rightarrow	_
16	\Rightarrow	_
20	\Rightarrow	_
25	☆	_

Remark: For the slide units of size 6, 8, and 10 models, only the stainless steel type is available. If high carbon steel type is specified in the identification number of assembled set, only the spline shaft will be high carbon steel type.

Table 1.2 Models and sizes of spline shaft of Block type Linear Ball Spline

Model	High carbor	n steel made	Stainless steel made
Size	Solid shaft LSB···R···S1 LSB···R···S2	Hollow shaft LSBT···R···S1 LSBT···R···S2	Solid shaft LSB···R SL···S1 LSB···R SL···S2
6	☆	☆	☆
8	☆	☆	☆
10	☆	☆	☆
13	☆	☆	_
16	☆	☆	-
20	☆	☆	_
25	☆	☆	_

7 Preload amount

Standard

: No symbol

Light preload

: **T**1

Specify this item for an assemble set or a single slide unit. For applicable preload types, see Table 2. For details of preload amount, see page D-15.

Table 2 Applicable preload types

Size	Standard (No symbol)	Light preload (T ₁)
6	☆	_
8	☆	☆
10	☆	☆
13	☆	☆
16	☆	☆
20	☆	☆
25	☆	☆

Ordinary : No symbol Specify this item for an assemble set or a single 8 Accuracy class spline shaft. For details of accuracy, see page D-11. High : H Assemble slide units and spline shafts with the Select group 1 : S1 same interchangeable code. 9 Interchangeable code Performance and accuracy of "S1" group and "S2" Select group 2 : S2 group are the same. For applicable special specifications, see Table 3. 10 Special specification For details of special specifications, see page D-16.

Supplemental code
N
U

Remark 1 : Applicable to a single slide unit and an assembled set.
2 : "No end seal" and "With under seals" cannot be combined.

Moment of inertia of sectional area and section modulus of spline shaft

Moment of inertia of sectional area and section modulus of the spline shaft are shown in Table 4.

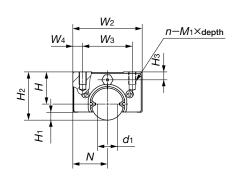
0:	Moment of inertia of	sectional area mm4	Section mo	dulus mm ³
Size	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
6	55	54	19	19
8	170	170	44	43
10	440	420	90	87
13	1 220	1 160	190	180
16	2 830	2 630	360	340
20	7 110	6 620	730	680
25	17 600	15 100	1 440	1 230

Block type Linear Ball Spline

LSB • LSBT



Bore dia. of hollow shaft



Model number	Interchangeable	Mas	s (Ref.) g	Dimer	nsions m	of asse	embly				Dime		s of s	lide u	nit	
Model Hamber	Intercha	Slide unit	Spline shaft (per 100 mm)	н	<i>H</i> 1	H 2	N	W 2	W 3	W 4	<i>L</i> 1	L2	L 3	L4	n-M₁×depth	Нз
LSB 6	☆		21.2													
LSBT 6	☆	7.6	18.8	6	1.1	9	6.5	13	8	2.5	19	_	12.5	_	2-M2× 3	1.5
LSB 6 ···SL	☆		21.2													
LSB 8	☆		37.6													
LSBT 8	☆	18	32.1	8	1.3	12	9	18	12	3	25	8	15.6	_	4-M3× 3	1.5
LSB 8 ···SL	☆		37.6													
LSB 10	☆		59.7													
LSBT 10	☆	34	49.8	10	1.9	15	10.5	21	15	3	31	10	21.2	_	4-M3× 4	2.5
LSB 10 ···SL	☆		59.7													
LSB 13	☆	00	100	40	0.0	10.5	4.4	28	00	_	0.5	4.5	00.4	40	4 1407 5	0.0
LSBT 13	☆	62	77.9	13	3.2	19.5	14	28	20	4	35	15	22.4	40	4-M3× 5	3.2
LSB 16	☆	440	152	40	4.0	0.4	40.5	00	0.5	_	40	00	00.0	40	4 144 0	_
LSBT 16	☆	112	113	16	4.2	24	16.5	33	25	4	43	20	28.8	48	4-M4× 6	4
LSB 20	☆	215	240	20	F.0	20	20	40	20	_	F2	25	27.0		4-145-40	
LSBT 20	☆	215	178	20	5.8	30	20	40	30	5	53	25	37.3	58	4-M5×10	5
LSB 25	☆	400	376	0.5	_	07.5	00		40		07	00	44.0	70	4 140740	
LSBT 25	☆	403	237	25	6	37.5	26	52	40	6	67	30	41.8	70	4-M6×12	6

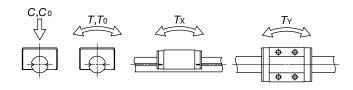
Note(1): Not applicable to the hollow shaft (LSBT).

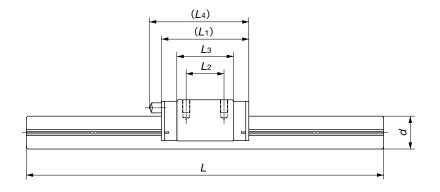
- (2): Dimension d_1 indicates the maximum diameter when machining is done at the shaft ends.
- (3): This length is the standard length. Spline shafts in other length are also available. Simply indicate the necessary length of spline shaft in mm in the identification number.
- (4): The directions of basic dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx, Ty) are shown in the sketches below.

The upper values in the Tx and Ty columns apply to one slide unit, and the lower values apply to two slide units in close contact.

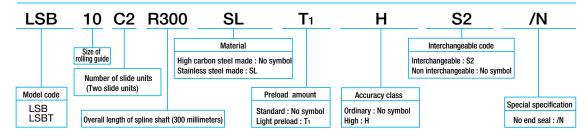
Remark 1: All Block type Linear Ball Splines are interchangeable specification products.

2: Models LSB6, LSB76, LSB6. SL, LSB8, LSB78, LSB8. LSB10, LSB10 and LSB10. SL are provided with an oil hole. For grease nipple and oil hole specifications, see page D-19.





	Dimensi	ons and	d tolera mm	nce of spline shaft		Basic dynamic load rating(4)		Dynamic torque rating(4)	Static torque rating(4)	Static rating(moment ⁴)
	ı				l	С	C ₀	T	T 0	T x	T Y
d	Tolerance(1)	d 1(2)	d ₂	L(3)	Maximum length	N	N	N∙m	N∙m	N∙m	N∙m
6	0 -0.012	3.7	2	150 200	300	612	1 130	1.8	3.4	2.4 13.3	2.0 11.2
	0.012		_			489	907	1.5	2.7	1.9 10.7	1.6 8.9
			_		500					4.9	4.1
8	0 -0.015	5	3	150 200 250	400	1 200	1 960	4.8	7.8	31.4	26.3
	0.010		_		500	963	1 570	3.9	6.3	3.9 25.1	3.3 21.1
			_			1 610	2 860	8.1	14.3	9.4	7.9
10	0 -0.015	6.9	4	200 300	600		2 000	0.1	14.0	55.0	46.2
			_			1 290	2 290	6.5	11.4	7.5 44.0	6.3 36.9
10	0		_	000 000 400	000		4.450	40.0	00.0	16.0	13.4
13	-0.018	9	6	200 300 400	800	2 960	4 450	19.2	28.9	99.9	83.8
16	0	11.4	_	200 300 400	1 000	4 390	6 730	35.1	53.9	30.8	25.9
10	-0.018	11.4	8	200 300 400	1 000	4 390	6 730	35.1	53.9	183	153
20	0	15	_	300 400 500	1 000	5 830	0.420	58.3	04.2	54.6	45.8
20	-0.021	מו	10	600	1 000	5 830	9 420	58.3	94.2	310	260
٦٢	0	10.2	_	300 400 500	1 200	0.200	12.000	100	101	99.2	99.2
25	-0.021	19.3	15	600 800	1 200	9 360	13 900	122	181	587	587



IKO Stroke Ball Spline LS is limited stroke type linear ball spline. Large diameter steel balls are arranged in two rows and in four point contact with the raceways, achieving compact design with high rigidity under any direction of load and moment.

Unprecedented smoothness

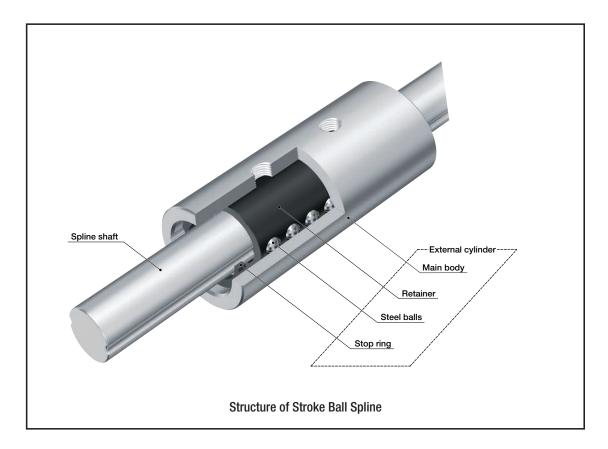
Precise ball retainer is incorporated and non-circulation structure provide superior low friction even in the vertical operation.

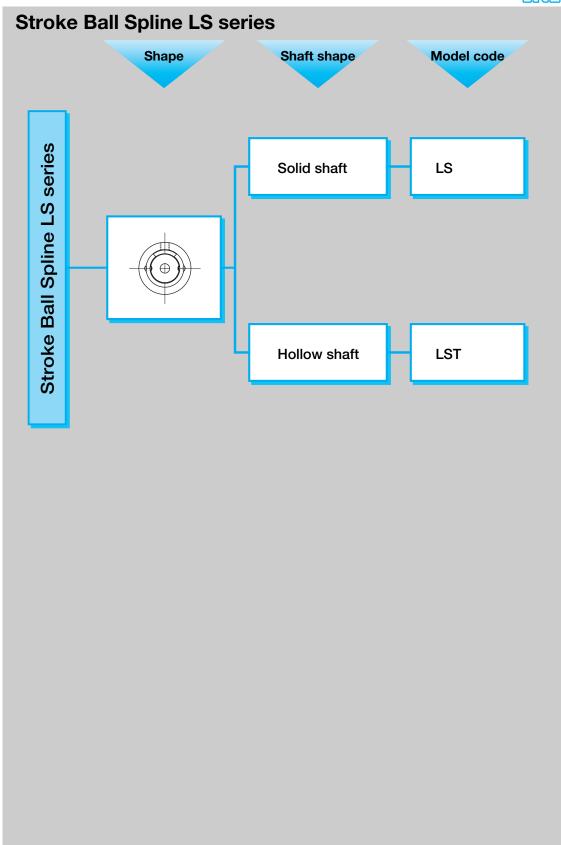
Compact design with high rigidity

Large diameter steel balls are arranged in two rows and in four point contact with the raceways, achieving compact design with high rigidity under any direction of load and moment.

Superior positioning accuracy

By applying suitable preload, clearance in the rotational direction is eliminated. So high positioning accuracy in the rotational direction has been obtained.

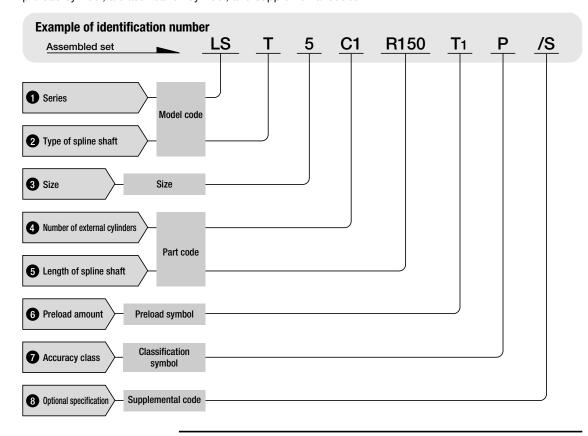




1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **D-55**

Identification Number

Identification numbers of **IKO** Stroke Ball Spline LS series consist of a model code, a size, a part code, a preload symbol, a classification symbol, and supplemental codes.



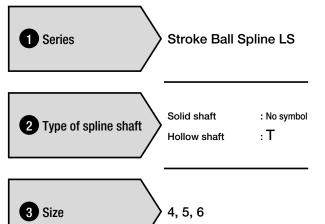
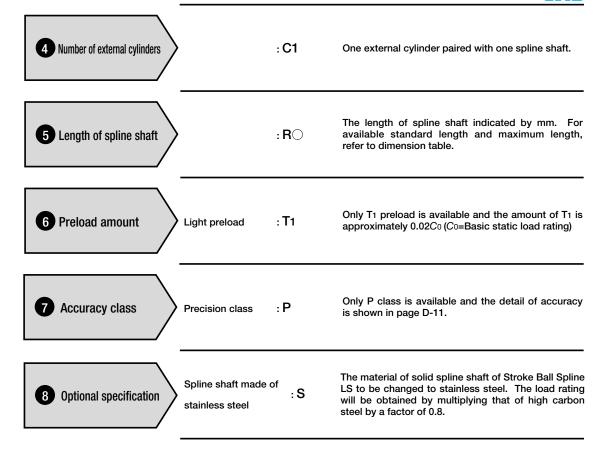


Table 1 Models a	and sizes of Stroke I	Ball Spline
Type Size	Solid shaft LS	Hollow shaft LST
4	0	0
5	0	0
6	0	0



Special specifications	Supplemental code	Assembled set
Spline shaft in stainless steel	S	O(1)

Spline Shaft

Moment of inertia of sectional area and section modulus of the spline shaft are shown in Table 3.

Table 3 Moment of inertia of sectional area and section modulus									
Model number		Moment of inertia of	sectional area mm4	Section modulus mm ³					
		Solid shaft	Hollow shaft	Solid shaft	Hollow shaft				
LS	4	12	12	6	6				
LS	5	29	29	12	12				
LS	6	61	61	21	21				

LS • LST



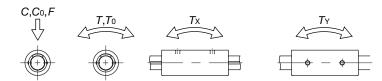


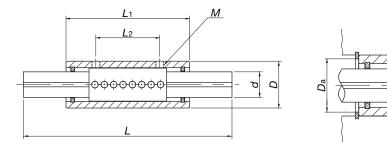
Bore dia. of hollow shaft

	Mass (Ref.) g		Dimension and tolerance of external cylinder mm						Dimension and tolerance of spline shaft mm			
Model number	External cylinder	Spline shaft (per 100 mm)	D	Tolerance	<i>L</i> 1	L ₂	М	Maximum depth of thread	d	Tolerance	d1 ⁽¹⁾	d ₂
LS 4	5.7	9.6	0	24	10	M2	1.3		0	3.2	_	
LST 4		8.6	8	-0.009	24	10	IVIZ	1.3	4	-0.012	3.2	1.5
LS 5	8.9	14.9	0	27	12	M2	1.4	5	0	4.2	_	
LST 5		12.4	10	-0.009	21	12	IVIZ	1.4	່ວ	-0.012	4.2	2
LS 6	10.9	19	11	0 -0.011	29	15	M2	1.4	6	0 -0.012	5.2	_
LST 6		16.5										2

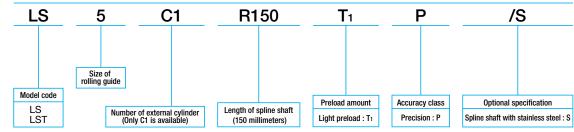
- Note(¹): Dimension d₁ indicates the maximum diameter when machining is done at the spline shaft ends.
 (²): Lengths indicated are standard lengths. Spline shafts in different lengths are also available. Simply indicate the necessary length of spline shaft (mm) in the identification number.
- (3): The directions of dynamic load rating (C), basic static load rating (Co), dynamic torque rating (T) and static torque/moment rating (To, Tx, and Tr) are shown in the sketches below.

 Remark: Grease is not pre-packed. Initial lubrication with grease or oil is necessary before the operation.





		Effective stroke length Maximum		Mounting dimension	Basic dynamic load rating(3) Basic state		Allowable load(3)	Dynamic torque rating(3)	Static torque rating(3)	Static moment rating(3)	
				Da	С	C 0	F	Т	T 0	Tx	T _Y
L(2)	Maximum length	mm	mm	mm	N	N	N	N∙m	N∙m	N∙m	N∙m
100 150	200	10	13.2	5	285	380	127	0.66	0.87	0.88	1.5
	150										
100 150	200	10	14	7	616	748	249	1.8	2.2	2.0	3.5
150 200	300	10	13.6	8	673	855	285	2.4	3.0	2.6	4.4







Crossed Roller Ways

Description of each series and Table of dimensions









In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

IKO Anti-Creep Cage Crossed Roller Way is the product with a cage creep proof function using a rack and pinion mechanism originated from IKO Crossed Roller Way, featuring smooth linear motion with super high accuracy.

Reliable running performance

Perfect solution for cage creeping problems by a built in rack and pinion mechanism as an **IKO** original design.

Freedom in mounting

This series is reliable for applications such as a vertical axis for which the existing Crossed Roller Way is not easy to use.

Applicable to high-speed operation

Any corrective operation for cage creeping is not necessary even for a long-time operation.

Interchangeable in dimensions

It has full interchangeability with the existing Crossed Roller Way in mounting dimension. Since the series has the same external dimensions to those of the existing Crossed Roller Way and can be easily replaced without any modification on the machine or equipment using the existing Crossed Roller Way.

Energy-saving in operation

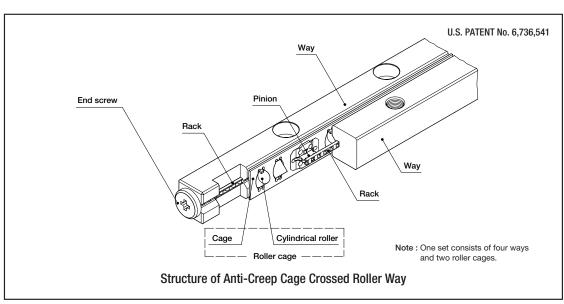
Any corrective operation for cage creeping is not necessary even for a long-time operation.

Smooth operation

Precisely finished raceways are combined with roller cages, in which the length of super precise roller is accurately controlled to avoid skewing. Very smooth linear motion with very little frictional resistance and free from stick-slip can be achieved.

Easy mounting

The mounting holes of the ways are female thread holes with a counter bore. So the mounting method is flexible, allowing the ways to be mounted either by inserted through the holes prepared on machines. Mounting structure can be designed freely.



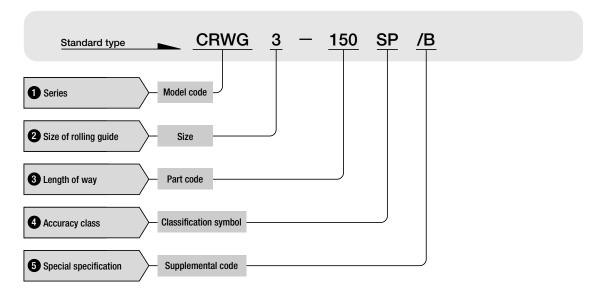
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **E-3**



CRN

Identification number and specification

The specification of Anti-Creep Cage Crossed Roller Way is indicated by the identification number. Indicate each specification by using a model code, size, part code, classification symbol, and supplemental codes. The ordering unit is a set of the combination of four ways and two roller cages.



1 Series

Standard type : CRWG

Applicable type and size are shown in Table 1.

2 Size

Table 1 Ty	Table 1 Type and size										
	Туре	Carbon steel									
Size		CRWG									
2	2	0									
3	3	0									
4	l .	0									
6	6	0									

3 Length of way

The length of way is indicated in millimeters. For applicable way lengths, please refer Table1.

Table 1 Length of w	able 1 Length of way										
Model number				Le	ngth of w	ay mm					
CRWG 2	30	45	60	75	90	105	120	135	150		
CRWG 3	50	75	100	125	150	175	200	225	250		
CRWG 4	80	120	160	200	240	280	320	_	_		
CRWG 6	100	150	200	250	300	350	_	_	_		

4 Accuracy class

Standard : No

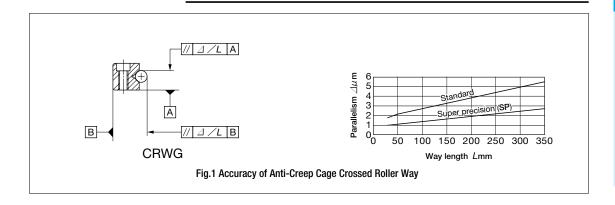
Super precision

: No symbol

: SP

For the allowable values of parallelism of the raceway to the reference mounting surface, see

Fig 1



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

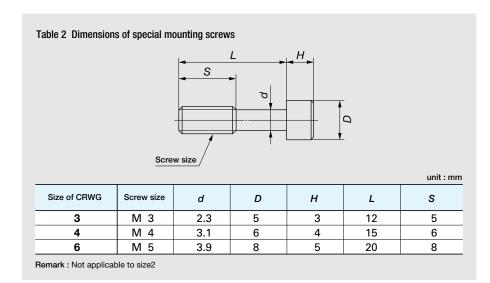
Detail of special specification of Crossed Roller Way is shown below. Indicate any specification by adding the supplemental code to the end of the identification number.

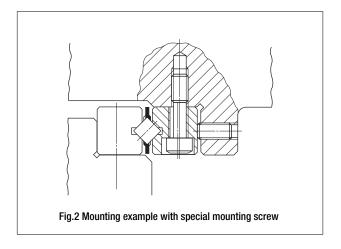
Special mounting screw /B



The way on the preload adjustment side is moved when the preload is adjusted. There should be some allowance for movement between the way fixing screw and the mounting hole. When such allowance cannnot be provided or when the fixing screw is installed from the way side as shown in Fig. 2, it is convenient to use the attached special mounting screws.

This special mounting screw is also available when the positional accuracy of the mounting holes and female thread of the machine on which the fixed side ways are mounted is not sufficient.





Load Rating and Allowable Load

For the load rating and allowable load of Anti-Creep Cage Crossed Roller Way, values for a downward load provided when a combination of four ways and two roller cages is used in parallel are indicated. An outline of them is described below.

The load ratings and allowable load of Anti-Creep Cage Crossed Roller Way are designed for equal load capacity in downward, upward, and lateral directions.

Basic dynamic load rating C

The basic dynamic load rating is defined as a constant load both in direction and magnitude under which a group of identical Crossed Roller Way are individually operated and 90% of those in the group can travel 100 x 10³ meters free from material damage due to rolling contact fatigue.

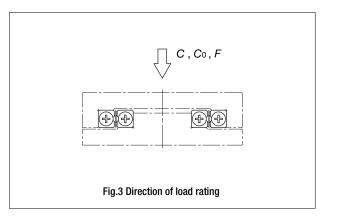
Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between a rolling element and raceways receiving the maximum load.

Allowable load F

The allowable load is a load under which the sum of elastic deformations of the rolling element and the raceways in the contact area subjected to the maximum contact stress is small enough to guarantee accuracy and smooth rolling movement.

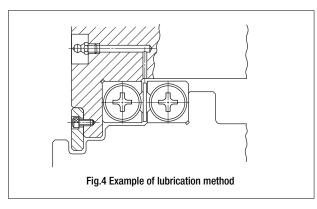
Therefore, where very smooth and highly accurate linear motion is required, make sure to use an Anti-Creep Cage Crosse Roller Way well within the allowable load values.

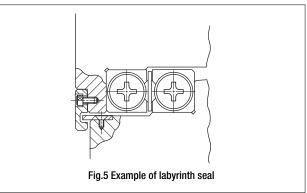


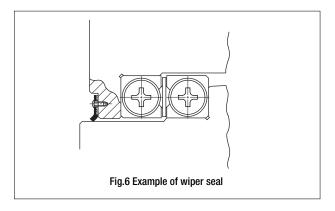
Lubrication and dust protection

Oil or grease is used as a lubricant for Anti-Creep Cage Crossed Roller Way. Oil is generally used for high speed or low friction operation. On the other hand, grease is used when operating speed is low. In case of grease lubrication, good quality lithium-soap base grease is recommended. When operation speed is low and load is light, coat the raceways with grease before use and rubricate periodically. Structure show in Fig.4 makes the lubrication easy.

Anti-Creep Cage Crossed Roller Way is finished in production very accurately. If harmful foreign materials such as dust or chips enter inside the ways, this will shorten the life or lower the accuracy. With the object of preventing external harmful foreign materials such as dust, chips and water from entering inside, it is recommended to install a non-contact-type labyrinth seal shown in Fig. 5 or a contact type wiper seal shown in Fig. 6 on both side faces.







Precautions for use

Specifications of Anti-Creep Cage Crossed Roller Way

Check whether the operating characteristics of the selected Anti-Creep Cage Crossed Roller Way are suitable for the application of the machine or equipment.

2 Handling of Anti-Creep Cage Crossed Roller Way

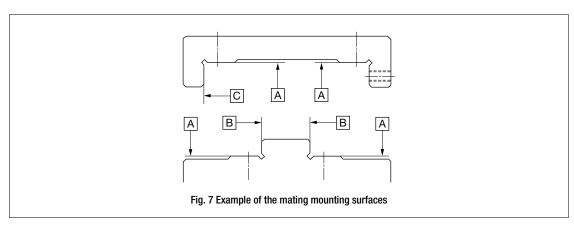
Anti-Creep Cage Crossed Roller Ways are finished in production very accurately, so handle carefully. A pinion is assembled in the roller cage. If the cage is dropped or handled roughly, the pinion may come off. As cutting off the cage may cause the pinion coming off or damage to the pinion mounting part, so please avoid cutting off the cage.

A rack is assembled in the way and fixed its position with the end screws. When assembling, the rack may come out from the way by removing the end screws.

3 Accuracy of the mounting part

The general configuration of mating mounting surfaces for Anti-Creep Cage Crossed Roller Way is shown Fig. 7.

Accuracy of the mating mounting surfaces are, in general, as shown in Table 3. The accuracy of the mating mounting surfaces directly affects the operating accuracy and performance of Anti-Creep Cage Crossed Roller Way. If very precise operating accuracy is required, higher accuracy of mating mounting surfaces than the values shown in Table 3 may be needed.

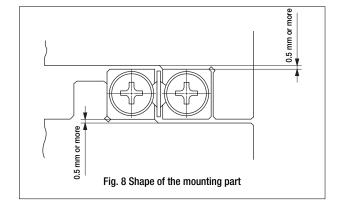


▲ surface	 This accuracy directly affects the operating accuracy. Flatness of A surface (four places) should be equal or nearly equal to the value of parallelism in Fig. 1 on page E-5.
B and C surfaces	 Flatness Flatness of these surfaces directly affects preload. The value of flatness should be equal or nearly equal to the value of parallelism in Fig. 1 on page E-51. Squareness Squareness to A surface affects the rigidity of assembled unit in the preload direction. Consequently, a high accuracy finish is necessary.

CRWG

4 Shape of the mounting part

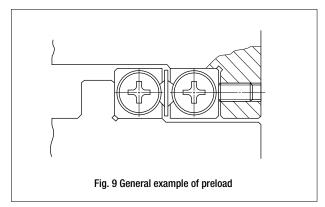
It is recommended to make a relieved fillet at the corner of the mating mounting surfaces as shown in Fig.8. Allow a clearance of 0.5 mm or more between the way and the mating material of the other side.

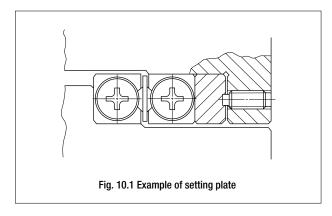


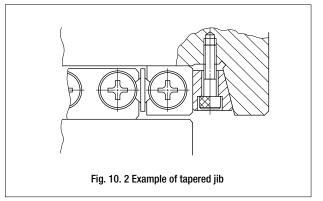
5 Preload method

Preload adjusting screws are generally used for setting preload, as shown in Fig.9. The size of the preload adjusting screws are the same as that of the mounting screws for the ways. The position of the preload adjusting screws is at the same position as the mounting screws of the ways. For centering, use half of way height H.

Preload amounts differ according to the application of machine or equipment. Excessive preloads deteriorate life and often damage the raceways. Therefore, zero or minimal preload is recommended in general. If accuracy and rigidity are important, a setting plate as shown in Fig.10.1 or a tapered jib as shown in Fig.10.2 may be used.







6 Maximum operating temperature

Anti-Creep Cage Crossed Roller Way contains synthetic resin parts. Accordingly, the maximum operating temperature is 120°C. In case of continuous operation, operating temperature should not exceed 100°C.

Maximum speed

The operating speed of Anti-Creep Cage Crossed Roller Way should not exceed 30m/min.

8 Tightening torque of mounting screws

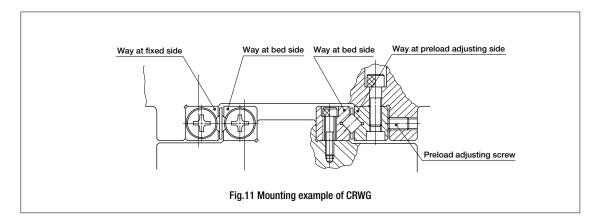
Tightening torque of mounting screws is shown in Table 4. If vibration or shock is large, or moment load is applied, it is recommended to tighten the screws to about 1.3 times the values shown in Table 5. If vibration and shock are not present and high operating accuracy is needed, a lower tightening torque than the values shown in Table 4 is suggested. In this case, adhesive or lock-screws may be used to prevent any subsequent loosening of the mounting screws.

•	Tightening torque				
Screw size	N∙m				
M2×0.4	0.23				
M3×0.5	1.4				
M4×0.7	3.2				
M5×0.8	6.3				
M6×1	10.7				

Remark: If the screw sizes on table side and bed side are different, use the tightening torque of the smaller screw size for both screws.

Mounting

A general method of Anti-Cage Creep Crossed Roller Way is shown in Fig.11. The general procedure is as follows.

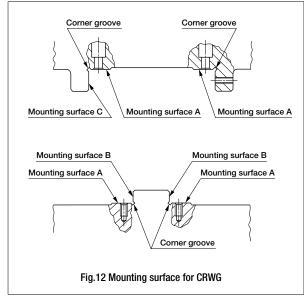


Preparation for mounting

- CRWG is delivered as an individual package containing four ways and two roller cages. The ways in each package are not interchangeable with ways in other packages, so do not mix them.
- Separate the end screws or end stoppers and wash the ways with a clean cleaning agent. After cleaning, apply rust preventing oil or lubricating oil.

Cleaning of mounting surfaces of table and bed

- Remove burrs and blemishes from mounting surfaces of table and bed with an oil-stone, etc. During this process, also pay attention to the corner grooves of the mounting surfaces.
- Wipe off dust with clean cloth and apply rust preventive oil or lubricating oil.



3 Mounting of ways at bed side (Fig.13)

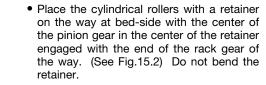
- After fitting mounting surface of ways onto the mating mounting surfaces of bed, temporally tighten the mounting screws with uniform tightening torque.
- After closely fitting the ways to B surfaces (See Fig.12), tighten mounting screws uniformly to the prescribed tightening torque.
- If high accuracy is required, tighten the mounting screws uniformly to the prescribed tightening torque while checking the parallelism of the two ways along the overall way length.
- General tightening torque of mounting screws is shown in Table 4 on page E-57.

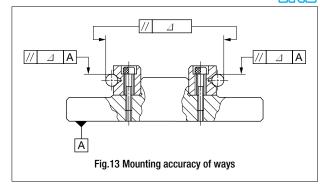
4 Mounting of ways at table side (Fig.14)

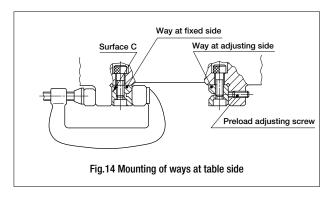
- After fitting the mounting surfaces of the way at the fixed side to the mating mounting surfaces of table, temporally tighten the mounting screws at the fixed side with uniform tightening torque.
- After closely fitting the way at the fixed side to C surface, tighten the mounting screws at the fixed side uniformly to the prescribed tightening torque.
- Loosen the preload adjusting screws and temporally tighten the mounting screws of the way at adjusting side with uniform and light tightening torque.

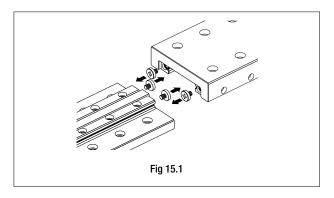
5 Assembling of table and bed

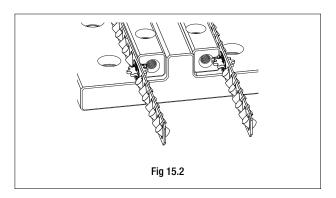
 Remove end screws from the way at table side and way at the bed-side in the side to which the cylindrical rollers with a retainer are inserted. (See Fig.15.1)



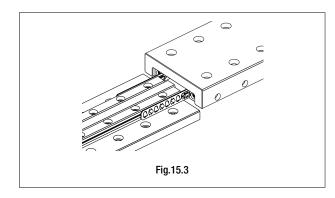




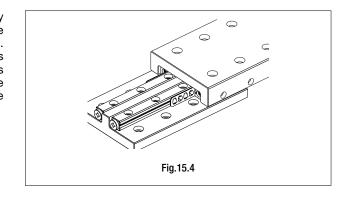




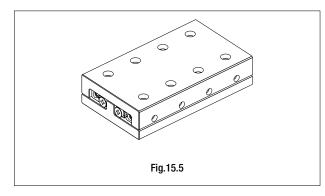
• Engage the end of the rack gear of the way at table side with the pinion gear while adjusting the longitudinal and traverse positions of the way at table-side and pushing the retainer to secure. Do not give any excessive force to the cage. (See Fig.15.3)



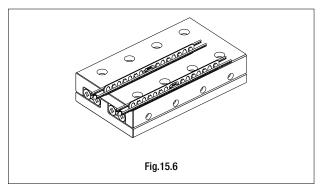
• Slide the table on the base. Do not apply any offset load to the rack gear and the pinion gear and do not deform the cage. Check and make sure the rack gear is over the end of the way. If the rack gear is over the end of the way, gently push the rack gear into the way while moving the table at a little stroke. (See Fig.15.4)



 Slide the table to the center of the stroke and tighten the end screws. (See Fig.15.5)



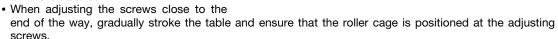
• Gently move the table at a full stroke and make sure that the cylindrical roller at each end of the retainer does not hit the end screw of the track base within the stroke. If the roller hits the retainer end, repeat the above steps from the first. (See Fig.15.6)

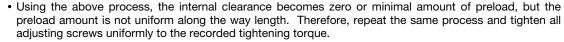


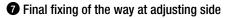
After checking the stroke movement, adjust the preload, check the slide movement of the table and check the accuracy. With this, the mounting procedure of the CRWG crossed roller way is completed.

6 Preload adjustment

- Preload adjustment is done only when mounting screws for the way at the adjusting side are temporally tightened.
- Preload adjustment is started from the adjusting screw at the center of the way length, proceeding alternately to the left and right.
- While checking the clearance (deflection) at the side surface of table, tighten each amount, then repeat the same process applying a higher tightening torque until a dial gauge indicates zero-clearance. (No more change in deflection) Record the tightening torque of the adjusting screws at zero-clearance.



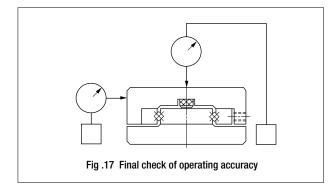


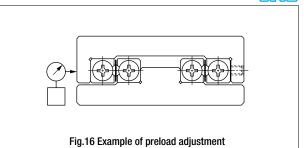


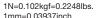
- The mounting screws have been tightened lightly to a uniform torque. Similar to the adjustment of the preload adjusting screws, temporally tighten the mounting screws at the adjusting side to a slightly lower tightening torque than the prescribed value. Start from the center screw of the way length and proceed alternately to the left and right.
- When tightening the mounting screws close to the end of the way, gradually stroke the table and ensure that the roller cage is positioned at the mounting screw.
- Finally, tighten all mounting screws at the adjusting side uniformly to the prescribed torque similar to the adjustment of the preload adjusting screws.

8 Final checking (Fig.17)

- Stroke the table gradually till its full stroke length, ensuring that the stroke is smooth and quiet.
- Check the operating accuracy by measuring the upper and side faces of table with a dial gauge.

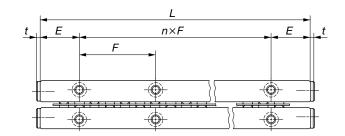


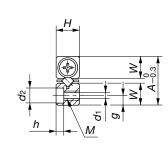




IKO Anti-Creep Cage Crossed Roller Way







	Mass	(Ref.)						Nomina	al dimen	sions	mm
		()		Pour	dary dimensions			Dimensio			
Model number	Way(1)	Roller		Bouil	luary uniterisions	I.)	ei caye 	ı
		cage(2)	A	н	L (n×F)	E	Dw	R	z	р	е
	g	g			, ,					•	
CRWG 2- 30	6.53	0.38			30 (1×15)			25.6	4		
CRWG 2- 45	9.53	0.72			45 (2×15)			41.6	8		
CRWG 2- 60	12.5	0.88			60 (3×15)			49.6	10		
CRWG 2- 75	15.5	1.22			75 (4×15)	1		65.6	14		
CRWG 2- 90	18.5	1.39	12	6	90 (5×15)	7.5	2	73.6	16	4	2.8
CRWG 2-105	21.5	1.72			105 (6×15)			89.6	20		
CRWG 2-120	24.5	1.89			120 (7×15)	1		97.6	22		
CRWG 2-135	27.5	2.22			135 (8×15)			113.6	26		
CRWG 2-150	30.5	2.39			150 (9×15)			121.6	28		
CRWG 3- 50	22.8	1.69			50 (1×25)	1		42	6		
CRWG 3- 75	33.3	2.71			75 (2×25)	1		62	10		
CRWG 3-100	43.8	3.72			100 (3×25)	1		82	14		
CRWG 3-125	54.4	4.74			125 (4×25)	1		102	18		
CRWG 3-150	64.9	5.75	18	8	150 (5×25)	12.5	3	122	22	5	3.5
CRWG 3-175	75.4	6.77			175 (6×25)			142	26		
CRWG 3-200	85.9	7.78			200 (7×25)			162	30		
CRWG 3-225	96.4	8.80			225 (8×25)			182	34		
CRWG 3-250	107	9.81			250 (9×25)			202	38		
CRWG 4- 80	59.6	9.70			80 (1×40)			73	8		
CRWG 4-120	88.0	12.0			120 (2×40)	1		101	12		
CRWG 4-160	116	14.3			160 (3×40)	1		129	16		
CRWG 4-200	145	16.7	22	11	200 (4×40)	20	4	157	20	7	5
CRWG 4-240	173	20.1			240 (5×40)			199	26		
CRWG 4-280	201	22.5			280 (6×40)			227	30		
CRWG 4-320	230	24.8			320 (7×40)	1		255	34		
CRWG 6-100	147	12.0			100 (1×50)			75	6		
CRWG 6-150	216	22.6			150 (2×50)	1		129	12		
CRWG 6-200	285	29.7	31	15	200 (3×50)	25	6	165	16	9	6
CRWG 6-250	353	36.8	ļ .		250 (4×50)			201	20		
CRWG 6-300	422	43.9			300 (5×50)	1		237	24		
CRWG 6-350	491	51.0			350 (6×50)			273	28		

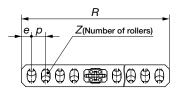
Note(1): The value shows the mass of one piece of way.

(2): The value shows the mass of one roller cage.

(3): Direction of basic dynamic load rating (C), basic static load rating (Co) and allowable load (F) is shown in below.



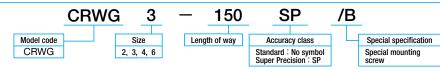
	
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		Mount	ing dime	ensions	sions		Maximum stroke length	Basic dynamic load rating(3)	Basic static load rating(3)	Allowable load(2)	Madalarashara			
W	g	М	d ₁	d ₂	h	t		C	C ₀	F	Model number			
**	g	IVI	u i	u2	"	ľ	mm	N	N	N				
							9	913	1 180	392	CRWG 2- 30			
							7	1 570	2 350	783	CRWG 2- 45			
							21	1 860	2 940	979	CRWG 2- 60			
							19	2 420	4 110	1 370	CRWG 2- 75			
5.5	2.5	М3	2.55	4.4	2	1.5	33	2 680	4 700	1 570	CRWG 2- 90			
							31	3 190	5 880	1 960	CRWG 2-105			
							45	3 440	6 460	2 150	CRWG 2-120			
							43	3 910	7 640	2 550	CRWG 2-135			
							57	4 150	8 230	2 740	CRWG 2-150			
							13	2 740	3 660	1 220	CRWG 3- 50			
							23	4 080	6 090	2 030	CRWG 3- 75			
							33	5 300	8 530	2 840	CRWG 3-100			
							43	6 440	11 000	3 660	CRWG 3-125			
8.3	3.5	M4	3.3	6	3.1	2	53	7 530	13 400	4 470	CRWG 3-150			
						-			63	8 570	15 800	5 280	CRWG 3-175	
											73	9 580	18 300	6 090
							83	10 600	20 700	6 910	CRWG 3-225			
							93	11 500	23 200	7 720	CRWG 3-250			
							14	6 690	9 400	3 130	CRWG 4- 80			
							38	9 180	14 100	4 700	CRWG 4-120			
							62	11 500	18 800	6 270	CRWG 4-160			
10	4.5	M5	4.3	7.5	4.1	2	86	13 700	23 500	7 830	CRWG 4-200			
							82	16 700	30 600	10 200	CRWG 4-240			
							106	18 700	35 300	11 800	CRWG 4-280			
							129	20 600	40 000	13 300	CRWG 4-320			
							48	11 200	13 800	4 610	CRWG 6-100			
							40	19 300	27 700	9 230	CRWG 6-150			
14	6	M6	5.3	9.5	5.2	3	68	24 100	36 900	12 300	CRWG 6-200			
14	U	IVIO	5.3	9.0	5.2	٥	96	28 700	46 100	15 400	CRWG 6-250			
							124	33 000	55 400	18 500	CRWG 6-300			
							151	37 200	64 600	21 500	CRWG 6-350			

Example of identification number



Anti-Creep Cage Crossed Roller Way Unit

IKO Anti-Creep Cage Crossed Roller Way Unit is the product with a cage creep proof function using a rack and pinion mechanism originated from IKO Crossed Roller Way, featuring smooth linear motion with super high accuracy.

Freedo

Freedom in mounting

This series is reliable for applications such as a vertical axis where Crossed Roller Way Unit may have chances of cage creep.

Interchangeable in dimensions

CRWUG are dimensionally interchangeable to **IKD** Crossed Roller Way Unit.

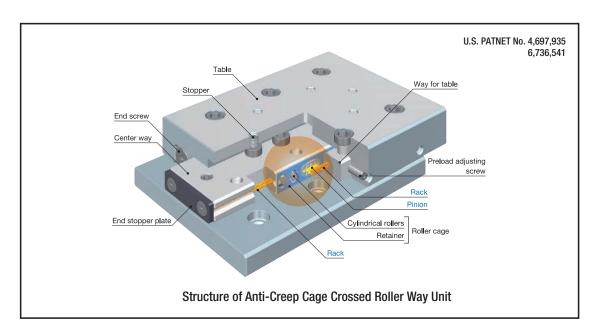
Since they have the same external dimensions to those of the existing Crossed Roller Way Unit, existing Crossed Roller Way Unit can be replaced without any modification.

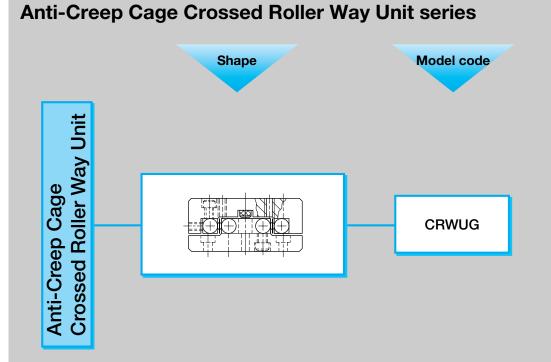
High-speed operation

Any corrective operation for cage creep is not necessary even for a longtime operation. Energy saving in the operation is possible.

Smooth and accurate operation

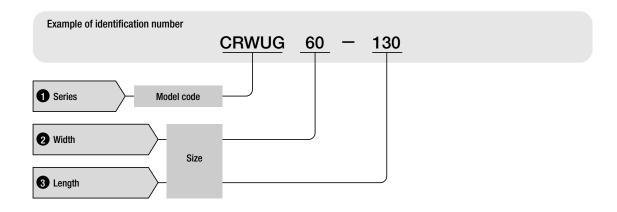
Combination of precisely finished raceways and nonrecirculating cages with super high precision rollers provides superbly smooth motion with very high accuracy.

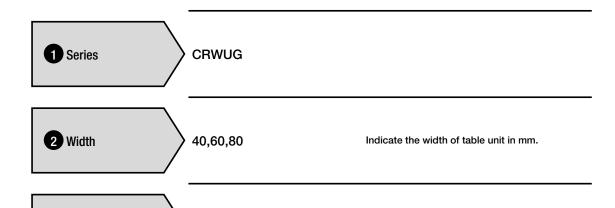




Identification Number of Anti-Creep Cage Crossed Roller Way Unit

The specification of Anti-Creep Cage Crossed Roller Way Unit is indicated by the model number. Indicate each specification by using a model code and size.





Indicate the length of table unit in mm.

For applicable lengths, please refer to Table 1.

Table 1 Length of tabl	able 1 Length of table unit												
Model number			l	_ength mn	n								
CRWUG 40	35	35 50 65 80 95 110 12											
CRWUG 60	55	80	105	130	155	_	_						
CRWUG 80	85	85 125 165 205 — — —											
	•		•	•									

Load Rating and Allowable Load

Summarized descriptions of load ratings of Anti-Creep Cage Crossed Roller Way Unit are given below. For details of load rating definitions and load calculations, see "General description".

The load ratings for upward and lateral loads of Anti-Creep Cage Crossed Roller Way Unit are the same as those for downward load.

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Anti-Creep Cage Crossed Roller Way Units are individually operated and 90% of the units in the group can travel 100 x 10³ meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

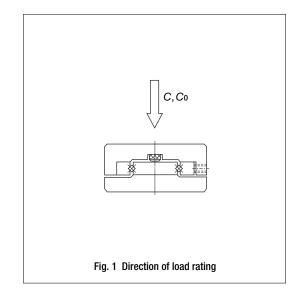
Allowable load F

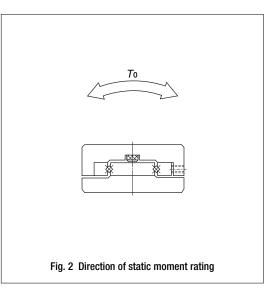
The allowable load is a load under which the sum of elastic deformations of the rolling element and the raceway in the contact area subjected to the maximum contact stress is small enough to guarantee accuracy and smooth rolling movement.

Therefore, when very smooth and highly accurate linear motion is required, make sure that the applied load on Anti-Creep Cage Crossed Roller Way Unit is well within the allowable load value.

Static moment rating To

The static moment rating is defined as the static moment load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load when a moment is loaded.





1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

E-21

3 Length

Accuracy

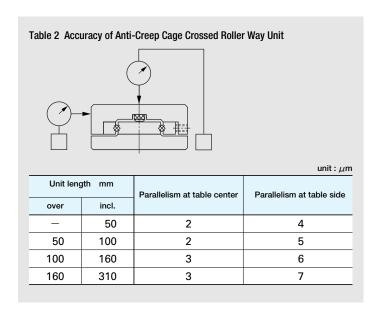
The accuracy of Anti-Creep Cage Crossed Roller Way Unit is shown in Table 2.

Parallelism at the table center shows the difference between the maximum and the minimum of table height when the table is stroked.

Parallelism at table side shows the difference between the maximum and the minimum of measured values at the table side (opposite to adjusting side) when the table is stroked.

The standard height tolerance of the unit is ± 0.1 mm. If several units are used on the same mounting surface and the height of those units require a limited height variation, units with a height variation of less than 0.01 mm among the several units to be used on the same mounting surface can be supplied on request.

If a special accuracy other than those shown in Table 2 is required, consult **IKD**.



Precautions for Mounting and Use

Specifications of product

Check if the operating characteristics of the selected Anti-Creep Cage Crossed Roller Way Unit are suitable for the application of the machine or equipment.

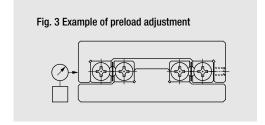
2 Handling

Anti-Creep Cage Crossed Roller Way Unit are finished in production very accurately, so handle carefully. A pinion is assembled in the roller cage. If the cage is dropped or handled rougly, the pinion may come off. As cutting off the cage may cause the pinion coming off or damage to the pinion mounting part, so please avoid cutting off the cage. A rack is assembled in the way and fixed its position with the and screws. When assembling, the rack may come out from the way by removing the and screws.

3 Preload re-adjustment

Preload of Anti-Creep Cage Crossed Roller Way Unit is adjusted to zero or minimal amount of preload in the delivery.

- · Preload adjustment is done only when mounting screws for the way at the adjusting side are temporally tightened lightly.
- · Preload adjustment is started from the adjusting screw at the center of the way length, proceeding alternately to the left and right.
- · While checking the clearance (deflection) at the side surface of table, tighten each amount, then repeat the same process applying a higher tightening torque until a dial gauge indicates zero-clearance. (No more change in deflection) Record the tightening torque of the adjusting screws at zero-clearance.
- When adjusting the screws close to the end of the way, gradually stroke the table and ensure that the roller cage is positioned at the adjusting screws.
- · Using the above process, the internal clearance becomes zero or minimal amount of preload, but the preload amount is not uniform along the way length. Therefore, repeat the same process tighten all adjusting screws uniformly to the recorded tightening torque.



4 Maximum operating temperature

Anti-Creep Cage Crossed Roller Way Unit contains synthetic resin parts. Accordingly, the maximum operating temperature is 120°C.

In case of continuous operation, operating temperature should not exceed 100°C.

Maximum speed

The operating speed of Anti-Creep Cage Crossed Roller Way Unit should not exceed 30m/min.

6 Tightening torque of mounting screws

Tightening torque of mounting screws is shown in Table 3. If vibration or shock is large, or moment load is applied, it is recommended to tighten the screws by about 1.3 times the values shown in Table 8. If vibration and shock are not present and high operating accuracy is needed, a lower tightening torque than the values shown in Table 3 is suggested. In this case, adhesive or lock-screws may be used to prevent any subsequent loosening of the mounting screws.

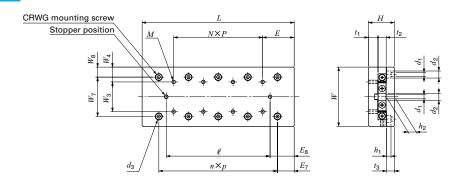
Table 3 Tightening torque of screws

Screw size	Tightening torque N·m
M2 ×0.4	0.23
M3 ×0.5	1.4
M4 ×0.7	3.2
M5 ×0.8	6.3
M6 ×1	10.7

Remark: If the screw sizes on table side and bed side are different, use the tightening torque of the smaller screw size for both screws.

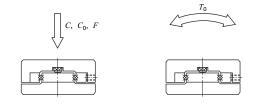
IXI Anti-Creep Cage Crossed Roller Way Unit CRWUG

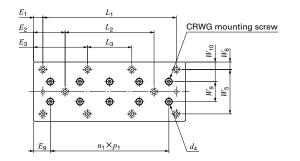
CRWUG



	Mass				Bound	ary d	limen	sior	ns m	m				Nor	nina	l di	mei	nsion	ıs m	m				
	(Ref.)												Table							Bec	i			
Model number	Kg	w	Tolerance	н	Tolerance	L	t1	t2	tз	Maximum stroke length		W 4	N×P	Ε	м	W 5	W 6	<i>L</i> 1	<i>E</i> 1	L2	E 2	Lз	E 3	d ₁
CRWUG 40- 35	0.21					35	8	6	6.5	18			_					25		_	_	_	_	
CRWUG 40- 50	0.30					50				30			1×15					40		_	_	_	_	
CRWUG 40- 65	0.36	1				65				40			2×15					55		_	_	_	_	
CRWUG 40- 80	0.47	40	±0.1	21	±0.1	80	_			50	15	12.5	3×15	17.5	МЗ	30	5	70	5.0	_	-	40	20	3.5
CRWUG 40- 95	0.53	1				95	7	8	5.5	60			4×15					85		_	-	55	20	
CRWUG 40-110	0.63					110				70			5×15					100		_	-	70	20	
CRWUG 40-125	0.70					125				80			6×15					115		_	_	85	20	
CRWUG 60- 55	0.67					55				30			_					35		-	-	_	_	
CRWUG 60- 80	0.99					80				45			1×25					60		_	_	_	_	
CRWUG 60-105	1.28	60	±0.1	28	±0.1	105	10.5	8	9	60	25	17.5	2×25	27.5	M4	40	10	85	10.0	_	-	_	_	4.5
CRWUG 60-130	1.57					130				75			3×25					110		_	_	_	_	
CRWUG 60-155	1.86					155				90			4×25					135		85	35	_	_	
CRWUG 80- 85	1.78					85				50			_					40		_	-	_	_	
CRWUG 80-125				25		125	10		40.5	75	40	20	1×40	40.5	N 4 F	00	10	80	22.5	_	-	_	_	
CRWUG 80-165		-	±0.1	35	±0.1	165	13	11	10.5	105	40	20	2×40	1	IVI5	00	10	120	22.5	_	-	_	_	5.5
CRWUG 80-205	4.12					205				135			3×40				160		_	-	80	62.5		

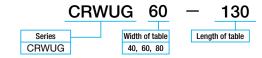
Note(1): Directions of basic dynamic load raiting (C), basic static load raiting (C₀), allowable load (F) and static moment raiting (T₀) are shown in below.





		1		Sto	pper a		RWO	3 mo	unting	g di		ion m	m		Basic dynamic load rating(1)	Basic static load rating(1)	Allowable load(1)	Static moment rating(1)	Madalassahass
d ₂	h1	h2	W 7	W 8	п×р	E 7	d 3	e	E 8	W 9	W 10	n1×p1	E 9	d4	C N	C ₀	F N	<i>T</i> ₀ N•m	Model number
	3.5	7	25	7.5	1×15	10	6	29	3			1×15	10		913	1 180	392	10.6	CRWUG 40- 35
					1×25	12.5		41	4.5			2×15	10		2 000	2 440	813	17.7	CRWUG 40- 50
					1×25	20		51	7			2×15	17.5		2 000	2 440	813	17.7	CRWUG 40- 65
6		_			2×25	15	İ	61	9.5	-	20	4×15	10	6	3 430	4 880	1 630	35.3	CRWUG 40- 80
	3.2	6	25.5		2×25	22.5	6.5	71	12			4×15	17.5		2 740	3 660	1 220	26.5	CRWUG 40- 95
					3×25	17.5		81	14.5			5×15	17.5		4 080	6 090	2 030	44.2	CRWUG 40-110
					3×25	25		91	17			5×15	25		4 080	6 090	2 030	44.2	CRWUG 40-125
-					1×25			44	5.5			1×25			2 000	2 440	813	35.3	CRWUG 60- 55
					2×25			59	10.5			2×25			3 430	4 880	1 630	70.7	CRWUG 60- 80
7.5	4.5	9.5	40	10	3×25	15	7.5	74	15.5	17	21.5	3×25	15	7.5	4 700	7 310	2 440	106	CRWUG 60-105
					4×25			89	20.5			4×25			5 300	8 530	2 840	124	CRWUG 60-130
					5×25			104	25.5			5×25			6 440	11 000	3 660	159	CRWUG 60-155
					1×40			64	10.5			1×40			5 350	7 050	2 350	145	CRWUG 80- 85
9.5	6	11	54	13	2×40	22.5	0.5	89		27	26.5	2×40	22.5	0 5	7 960	11 800	3 920	241	CRWUG 80-125
9.5	О	' '	54		3×40		9.5	119		21	20.5	3×40		9.5	9 180	14 100	4 700	289	CRWUG 80-165
					4×40			149	28			4×40			11 500	18 800	6 270	385	CRWUG 80-205

Example of identification number



CRW/CRWM

IKO Crossed Roller Way is a linear motion rolling guide in which a roller cage is incorporated between two ways with V-shaped raceways. As the cylindrical rollers are alternately crossed, Crossed Roller Way can receive loads in any direction and can achieve very smooth linear motion with very high

Wide variations in size are available for selections suitable for each application.



Standard type and module type

Two types are available: the standard type and the module type. In the standard type four ways and two roller cages are used as one set, while in the module type two inner ways are integrated into a single piece.



Very smooth operation

Precisely finished raceways are combined with roller cages, in which the length of super precise rollers is accurately controlled to avoid skewing. Very smooth linear motion with very little frictional resistance and free from stick-slip can be achieved.



High carbon chromium bearing steel type and stainless steel type

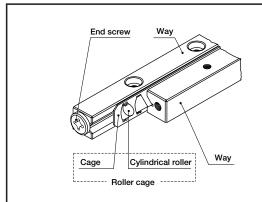
Standard types include high carbon chromium bearing steel type and stainless steel type.

Easy mounting

The mounting holes of the ways are female thread holes with a counter bore. So the mounting method is flexible, allowing the ways to be mounted either by using the female threads of the ways together with bolts inserted through the holes prepared on machines or by using the female threads prepared on machines. Mounting structure can be designed freely.

Two inner ways of module type are integrated into a single piece. The mounting structure can be made simple and, furthermore, as errors from extra machining of the mounting parts can be avoided, accuracy of linear motion can be improved.

U.S. PATNET No. 4,697,935



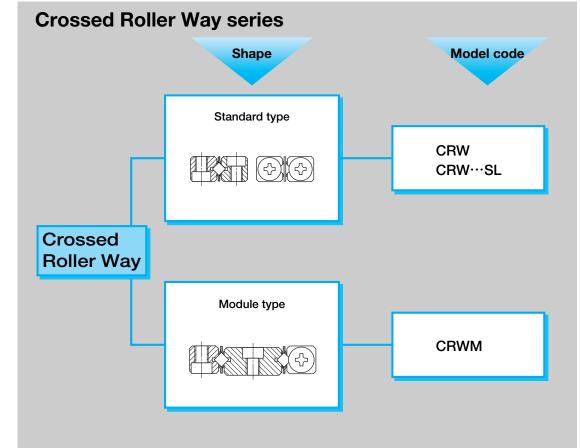
Note: One set consists of four ways and two roller cages.

CRW

Note: One set consists of one center way, two ways and two roller cages.

CRWM

Structure of Crossed Roller Way

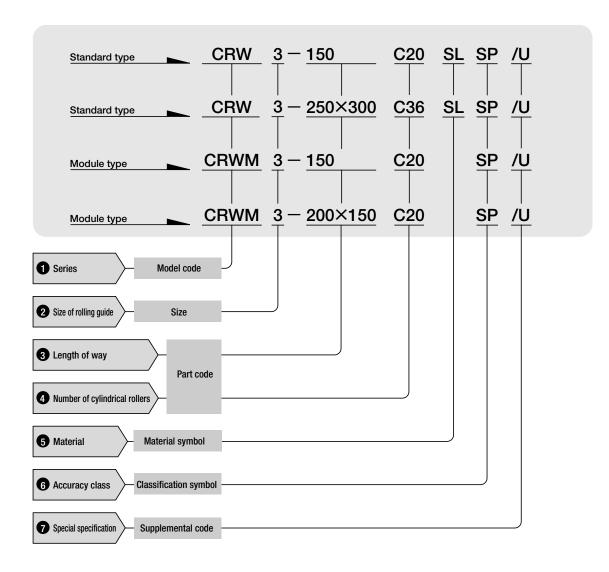


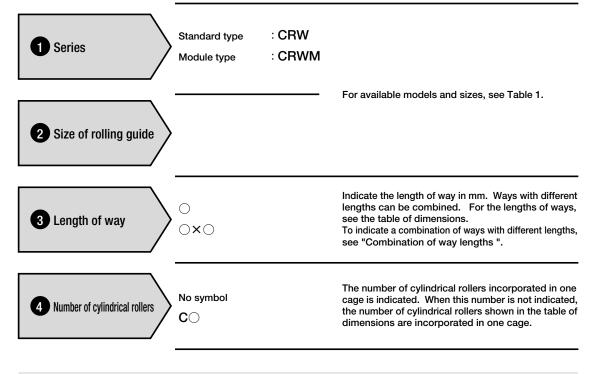
Remark: Models with "SL" are stainless steel type.

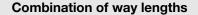
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

The specification of Crossed Roller Way is indicated by the identification number, consisting of a model code, a size, a part code, a material symbol, a classification symbol and any supplemental codes.



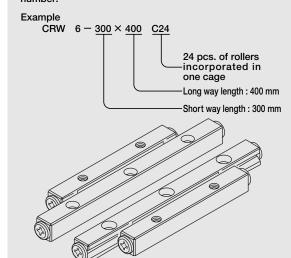




Combination for the standard type

One set consists of two short ways and two long ways together with two roller cages.

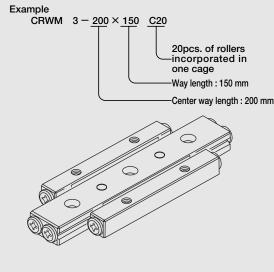
As standard, the number of rollers in one cage is the number of rollers for the shorter of the two way lengths shown in the dimension tables. If a different number of rollers is required, indicate it in the identification number.



Combination for the module type

One set consists of one center way, two ways together with two roller cages.

As standard, the number of rollers in one cage is the number of rollers for the shorter of the two way lengths shown in the dimension tables. If a different number of rollers is required, indicate it in the identification number.



1N=0.102kgf=0.2248lbs.

1mm=0.03937inch

High carbon steel made : No symbol

Stainless steel made : SL

For applicable material types, see Table 1.

Table 1 Types and sizes

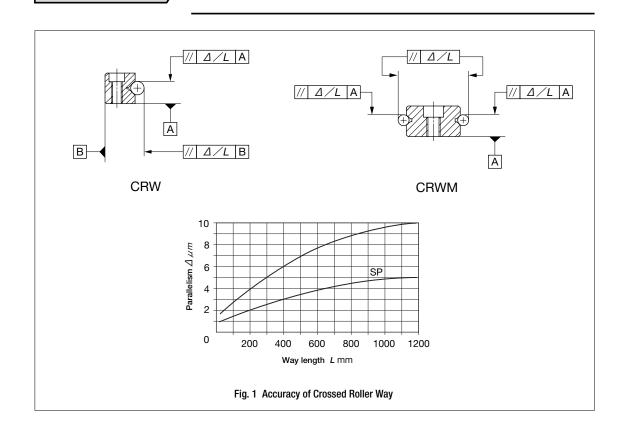
and sizes		
Standa	Module type	
High carbon steel made	Stainless steel made	High carbon steel made
0	0	0
0	0	0
0	0	0
0	0	0
0	0	_
0	_	_
0	_	_
0	_	_
0	_	_
0	_	_
	Standa	Standard type

6 Accuracy class

Standard

Super precision

: No symbol For the allowable values of parallelism of the raceway to the reference mounting surface and of parallelism :SP between two raceways of CRWM, see Fig. 1.



For applicable special specifications, see Table 2. When several special specifications are required, see Table 3.

For details of special specifications, see page E-32.

Table 2 Special specifications

Canadal appointment	Supplemental	Standa	Module type	
Special specification	code	High carbon steel made	Stainless steel made	High carbon steel made
Special mounting screws	В	O (¹)	1	O (¹)
High rigidity roller cage	M	O (2)	O (2)	_
End stopper SA	SA	O (3)	○ (³)	O (3)
End stopper SB	SB	O (3)	○ (³)	O (3)
Wiper seal	U	O (3)	O (3)	O (3)

Note(1): Not applicable to size 1 and 2 models.

(2): Not applicable to size 1, 2, 3 and 4 models.
(3): Not applicable to size 1 models.

Table 3 Combinations of special specifications



Remark 1: In the table, the mark – indicates that this combination can not be made.

2: When several special specifications are required, arrange the supplemental codes alphabetically.

CRW, CRWM

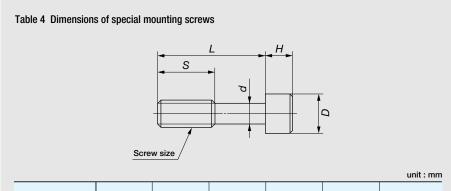
Special specifications

Details of special specifications of Crossed Roller Way are shown below. Indicate any specification by adding the supplemental code to the end of the identification number.

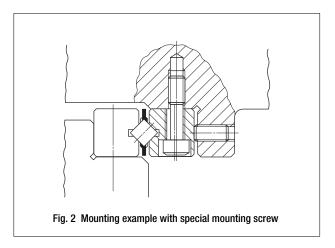
Special mounting screws /B

Since the way at the adjusting side moves when the preload is set, some clearance between the mounting screw and the mounting hole is necessary. However, if sufficient clearance can not be provided or if the mounting screw is fixed from the way side to the table as shown in Fig. 2, special mounting screws may be needed.

Further, if the positioning accuracy of mounting holes in table or bed are not good, special screws can also be used. The special mounting screws are delivered as appended parts upon request, but available in carbon steel type only.



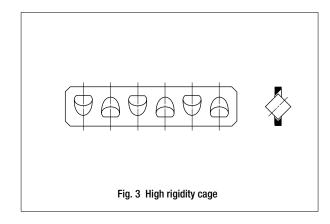
Size	Screw size	d	D	Н	L	S
3	M 3	2.3	5	3	12	5
4	M 4	3.1	6	4	15	6
6	M 5	3.9	8	5	20	8
9	M 6	4.6	8.5	6	30	12
12	M 8	6.2	11.5	8	40	17
15	M10	7.9	14	10	45	16
18	M12	9.6	16	12	50	19
24	M14	11.2	19.5	14	70	26



High rigidity roller cage ✓M

High rigidity cages made of copper alloy, which are suitable for use in vertical applications, are optionally available. This cage is designed to prevent rollers from falling out in one direction. (See Fig. 3.)

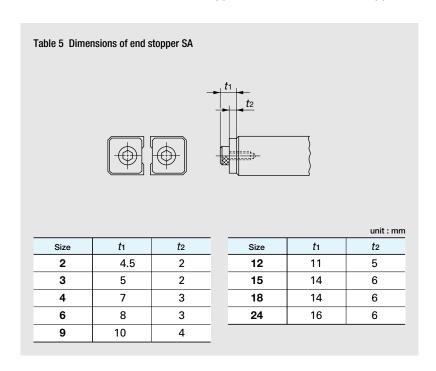
For vertical usage, it is recommended to use this cage together with the end stopper SB.



End stopper SA /SA

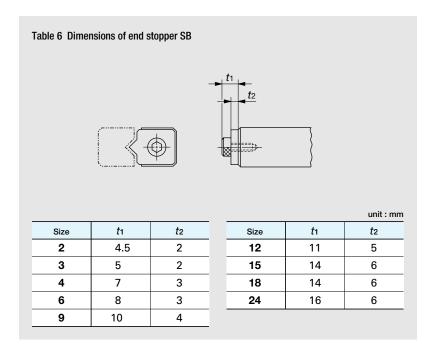
When the cage is stroked frequently or subjected to vibration or unevenly distributed load, the cage position may shift while in operation. It is recommended, in such cases, to replace the end screw with the end stopper SA.

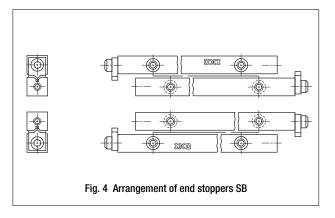
Size 1 models are assembled with stoppers similar to the SA end stopper as standard.



When the high rigidity cage is used on a vertical axis, the end screw is replaced with the end stopper SB to limit the stroking of the cage at the way end.

The end stopper SB can not be mounted on all ends of the ways in the assembly. Fig. 4 shows the standard mounting arrangement. The mounting arrangement can be changed by loosening screws and resetting the end stoppers.

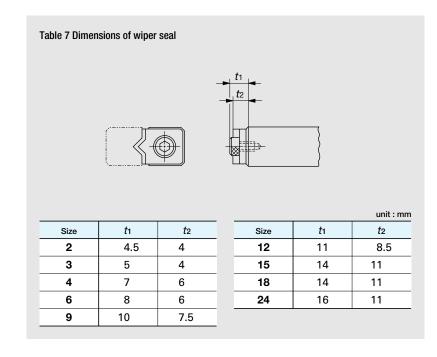


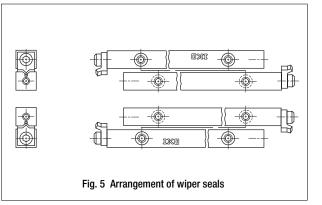


Wiper seal /u

The end screw is replaced with the wiper seal to prevent foreign particles from intruding into the raceways. The wiper seal also serves as the end stopper providing the same function as the end stopper SB.

The wiper seal cannot be mounted on every way end. Fig. 5 shows the standard mounting arrangement. The mounting arrangement can be changed by loosening screws and resetting the wiper seals.







Load Rating and Allowable Load

Summarized descriptions of load ratings of Crossed Roller Way are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Crossed Roller Ways are individually operated and 90% of the units in the group can travel 100 x 10³ meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

Allowable load F

The allowable load is a load under which the sum of elastic deformations of the rolling element and the raceway in the contact area subjected to the maximum contact stress is small enough to guarantee accuracy and smooth rolling movement.

Therefore, when very smooth and highly accurate linear motion is required, make sure that the applied load is well within the allowable load value.

Calculation of load ratings and allowable load

In Crossed Roller Way, the number of cylindrical rollers sharing a load differs according to the load direction. Therefore, it is necessary to obtain load ratings and allowable load for each direction.

The basic dynamic load rating Cu, basic static load rating Cou and allowable load Fu shown in the table of dimensions indicate values per one roller.

The basic dynamic load rating *C*, basic static load rating *C*₀ and allowable load *F* of Crossed Roller Way are obtained from the formulae shown in Tables 8.1 and 8.2.

	o for four fathings and anomable found of office	
	Upward/downward load (1)	Lateral load
Load condition	Load Load Load	Load
Basic dynamic load rating C N	$C_r = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} C_U \cdots (1)$	$C_{a} = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} 2^{7/9} C_{U} \cdots (4)$
Basic static load rating C ₀ N	$C_{0r} = \left(\frac{Z}{2}\right) C_{0U} \cdots (2)$	$C_{0a} = 2\left(\frac{Z}{2}\right)C_{0U} \cdots (5)$
Allowable load F N	$F_r = \left(\frac{Z}{2}\right) F_U \cdots (3)$	$F_a = 2\left(\frac{Z}{2}\right)F_U \cdots (6)$
Meaning of symbols	Cr: Basic dynamic load rating for upward / do Ca: Basic dynamic load rating for lateral load, Cor: Basic static load rating for upward / down Coa: Basic static load rating for lateral load, N Fr: Allowable load for upward / downward loa Fa: Allowable load rating for lateral load, N	N ward load, N

Table 8.1 Calculation formulae for load ratings and allowable loads of CRW

Note(1): When using one set of CRW type (four ways and two roller cages) in parallel in this load direction, use formulae (7), (8) and (9) in Table 8.2.

 $p: \mbox{Pitch between cylindrical rollers, mm} \\ \mbox{C} \cup: \mbox{Basic dynamic load rating per one roller, N} \\$

Cou: Basic static load rating per one roller, N

Fu : Allowable load per one roller, N

Z: Number of cylindrical rollers incorporated in one roller cage (Disregard any decimal for Z/2)

	Upward/downward load	Lateral load			
asic static load rating C ₀ N	1/2Load 1/2Load	Load			
Basic dynamic load rating C N	$C_r = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} 2^{7/9} C \cup \cdots (7)$	$C_a = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} 2^{7/9} Cu \cdot (10)$			
Basic static load rating C ₀ N	$Cor = 2\left(\frac{Z}{2}\right)Cou \cdots \qquad (8)$	$C_{0a} = 2\left(\frac{Z}{2}\right)C_{0U} \cdots (11)$			
Allowable load F N	$F_r = 2\left(\frac{Z}{2}\right)F_U \qquad (9)$	$F_a = 2\left(\frac{Z}{2}\right)F_U \cdots (12)$			
Meaning of symbols	C _r : Basic dynamic load rating for upward / dc C _a : Basic dynamic load rating for lateral load, C _{0r} : Basic static load rating for upward / down C _{0a} : Basic static load rating for lateral load, N Fr: Allowable load for upward / downward loa F _a : Allowable load for upward / downward loa F _a : Allowable load rating for lateral load, N Z: Number of cylindrical rollers incorporated p: Pitch between cylindrical rollers, or C ₀ U: Basic dynamic load rating per one roller, N F _U : Allowable load per one roller, N	N ward load, N ad, N in one roller cage (Disregard any decimal for Z/2)			

Selection of Specification

When selecting the specification of Crossed Roller Way, stroke length and number of rollers should be considered as well as the accuracy, load ratings and allowable load.

Stroke length and number of rollers

Stroke length of Crossed Roller Way is related to the way length and number of rollers in a roller cage, etc. Therefore, selection procedure is as follows while considering the operating stroke length and applied loads.

Calculation of way length

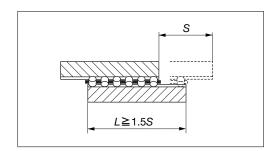
Way length is generally more than 1.5 times of operating stroke length and is obtained from the following formula.

$$L \ge 1.5S$$
 ······(10)

where,

L: Way length, mm

S: Operating stroke length, mm



2 Calculation of maximum stroke length

It is suggested that the operating stroke length is 80% or less of the maximum stroke length. The maximum stroke length is obtained from the following formula.

$$S_1 \ge \frac{1}{0.8}S$$
(11)

where, S1: Maximum stroke length, mm

S: Operating stroke length, mm

3 Calculation of cage length and number of rollers

Cage length is determined by the way length and maximum stroke length.

In calculation of cage length, the calculation method is different according to the specification of end screws, end stoppers, etc.

(1) With standard end screws or end stoppers SA (except size 1 models)

The distance between rollers at both ends in one cage is that way length minus half of maximum stroke

length as in the following formula.

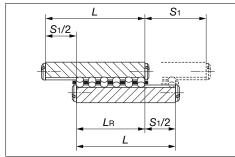
$$L_{R} = L - \frac{S_{1}}{2}$$
(12)

where.

LR: Allowable distance between rollers at both ends in one cage, mm

L: Way length, mm

S1: Maximum stroke length, mm



$$Z = \frac{L_{R} - D_{W}}{p} + 1 \cdot \cdots \cdot (13)$$

Z: Number of rollers in one cage (Disregard any decimal.)

LR: Allowable distance between rollers at both ends in one cage, mm

Dw: Roller diameter (See dimension tables.), mm

p: Roller pitch (See dimension tables.), mm

(2) In case of size 1 models

Stroke length is limited by the cage and end stoppers. The cage length is obtained from the following formula.

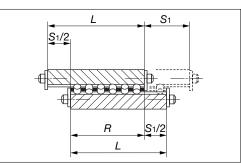
$$R = L - \frac{S_1}{2} \quad \dots \tag{14}$$

where.

R: Allowable cage length, mm

L: Way length, mm

S1: Maximum stroke length, mm



Number of rollers in one cage is obtained from the following formula.

$$Z = \frac{R-2e}{p} + 1$$
(15)

Z: Number of rollers in one cage (Disregard any decimal.)

R: Allowable cage length, mm

e: End dimension of cage (See dimension tables.), mm

p: Roller pitch (See dimension tables.), mm

(3) With end stoppers SB or wiper seals

Stroke length is limited by the cage and end stoppers or wiper seals. The cage length is obtained from the following formula.

$$R = L - t_2 - S_1$$
(16)

R: Allowable cage length, mm

L: Way length, mm

S1: Maximum stroke length, mm

t2: Thickness of end stopper SB or wiper seal, mm (See Table 6 on page E-34 or Table 7 on

The number of rollers in a roller cage is obtained from formula (15) in the same way as size 1 models.

Calculation example

For parallel use of Crossed Roller Ways under the above specified conditions (See Fig. 12 on page E-45.), select the suitable specification.

1 Calculation of way length

From formula (10), way length L is;

$$L \ge 1.5S = 1.5 \times 195 = 292.5$$

Therefore, standard way length L = 300 mm is selected from dimension tables.

2 Calculation of maximum stroke length

From formula (11), maximum stroke length S1 is;

$$S_1 \ge \frac{1}{0.8}S = \frac{1}{0.8} \times 195 = 244$$

From formula (12), allowable distance between rollers at both ends in one cage LR is;

$$L_{\rm R} = L - \frac{S_1}{2} = 300 - \frac{244}{2} = 178$$

3 Calculation of number of rollers

From formula (13), number of rollers in one cage is; (DW = 6 mm and p = 9 mm from dimension tables)

$$Z = \frac{L_R - D_W}{p} + 1 = \frac{178 - 6}{9} + 1 = 20.1$$

Therefore, number of rollers Z = 20 in one cage is obtained by disregarding any decimal.

4 Calculation of allowable load

From formula (9) in Table 8.2 on page E-13, allowable load F in parallel usage is; (allowable load per one roller FU = 764 N from dimension tables)

$$F = 2\left(\frac{Z}{2}\right)F_{U} = 2\left(\frac{20}{2}\right) \times 769 = 15380$$

In the calculation result, the allowable load F is larger than the applied load P = 7000 N. Therefore, this model can be used within the allowable load. If the applied load exceeds the calculated allowable load, it is necessary to consider increasing the way length and number of rollers, or to select a model with larger diameter rollers.

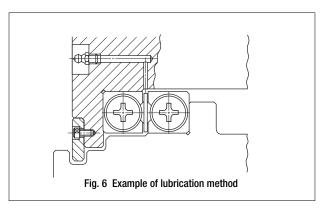
5 Determination of specification

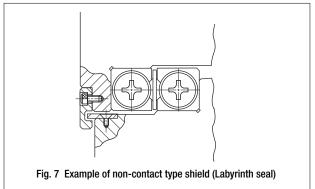
As a result of the above calculations, CRW 6-300 with 20 rollers is suitable. The selected model number is CRW 6-300 C20.

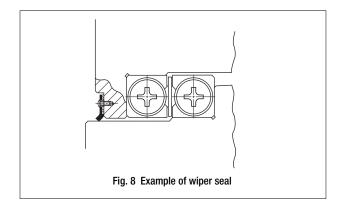
Lubrication and Dust Protection

Oil or grease is used as a lubricant for Crossed Roller Way. Oil is generally used for high speed or low friction operation. On the other hand, grease is used when operating speed is low. In case of grease lubrication, a good quality lithium-soap base grease is recommended. When operation speed is low and load is light, coat the raceways with grease before use and relubricate periodically. Structure shown in Fig. 6 makes the relubrication easy.

Crossed Roller Ways are finished very accurately. However, if dust or foreign particles intrude, life and accuracy will be adversely affected. In order to prevent the intrusion of dust, dirt, water, etc., it is recommended to use non-contact type shields (labyrinth seal) as shown in Fig. 7 or contact type wiper seals shown in Fig. 8 at the outside of installed unit.







Precautions for Use

Specification of Crossed Roller Way

Check whether the specification of selected Crossed Roller Way meets the requirements for the application of the machine or equipment.

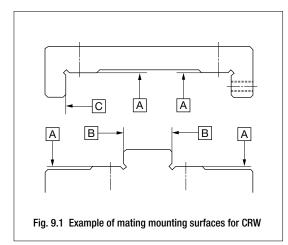
2 Handling of Crossed Roller Way

Crossed Roller Way is a high precision product, so handle it with care. The cage can be modified by cutting it to the required cage length. When cutting, do not deform the cage.

3 Accuracy of mating mounting surfaces

The general configurations of mating mounting surfaces for CRW and CRWM are shown in Figs. 9.1 and 9.2, respectively.

Accuracy of the mating mounting surfaces is, in general, as shown in Table 9. The accuracy of mating mounting surfaces directly affects the operating accuracy and performance of Crossed Roller Way. If very high operating accuracy is required, higher accuracy of mating mounting surfaces than the values shown in Table 9 may be needed.



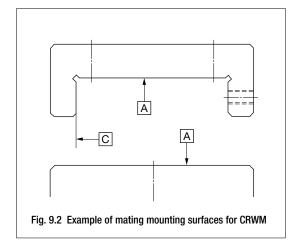
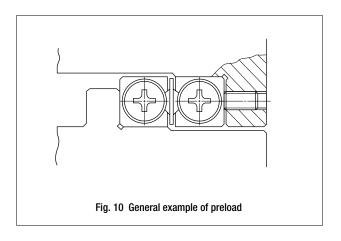


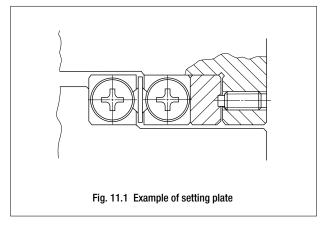
Table 9 Accuracy of mating mounting surfaces - This accuracy directly affects the operating accuracy. Flatness of A surface (four places) should be equal or nearly equal to the value of parallelism in Fig. 1 on page E-5. - Flatness Flatness of these surfaces directly affects preload. The value of flatness should be equal or nearly equal to the value of parallelism in Fig. 1 on page E-6. - Squareness Squareness to A surface affects the rigidity of assembled unit in the preload direction. Consequently, a high accuracy finish is necessary.

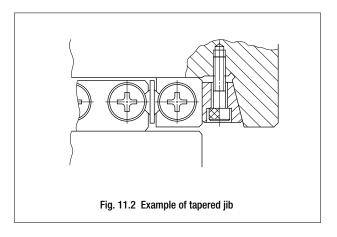
4 Preload method

Preload adjusting screws are generally used for setting preload, as shown in Fig. 10. The size of the preload adjusting screws are the same as that of the mounting screws for the ways. The position of the preload adjusting screws is at the same position as the mounting screws of the ways. For centering, use half of way height *H*.

Preload amounts differ according to the application of machine or equipment. Excessive preloads deteriorate life and often damage the raceways. Therefore, zero or minimal preload is recommended in general. If accuracy and rigidity are important, a setting plate as shown in Fig. 11.1 or a tapered jib as shown in Fig. 11.2 may be used.







5 Crossed Roller Way does not contain synthetic resin parts and can be operated at high temperatures. But, when the temperature exceeds 100°C, consult **IKO**.

6 The operating speed of Crossed Roller Way should not exceed 30 m/min.

7 Tightening torque of mounting screws

Tightening torque of mounting screws is shown in Table 10. If vibration or shock is large, or moment load is applied, it is recommended to tighten the screws to about 1.3 times the values shown in Table 10. If vibration and shock are not present and high operating accuracy is needed, a lower tightening torque than the values shown in Table 10 is suggested. In this case, adhesive or lock-screws may be used to prevent any subsequent loosening of the mounting screws.

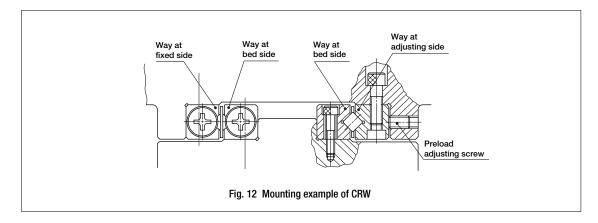
Screw size	Tightening torque N∙m
M 2×0.4	0.23
M 3×0.5	1.4
M 4×0.7	3.2
M 5×0.8	6.3
M 6×1	10.7
M 8×1.25	25.6
M10×1.5	50.1
M12×1.75	86.5
M14×2	137
M16×2	211

Remark: If the screw sizes on table side and bed side are different, use the tightening torque of the smaller screw size for both

Mounting

Mounting of CRW

A general method for mounting CRW is shown in Fig. 12. The general procedure is as follows.

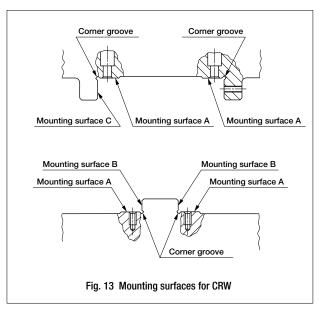


Preparation for mounting

- CRW is delivered as an individual package containing four ways and two roller cages. The ways in each package are not interchangeable with ways in other packages, so do not mix them.
- Separate the end screws or end stoppers and wash the ways with a clean cleaning agent. After cleaning, apply rust preventive oil or lubricating oil.

Cleaning of mounting surfaces of table and bed

- Remove burrs and blemishes from mounting surfaces of table and bed with an oil-stone, etc. During this process, also pay attention to the corner grooves of the mounting surfaces.
- Wipe off dust with clean cloth and apply rust preventive oil or lubricating oil.



3 Mounting of ways at bed side (Fig. 14)

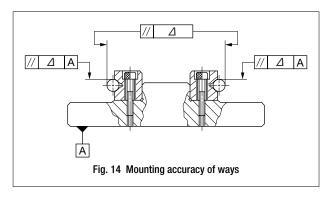
- After fitting the mounting surfaces of ways onto the mating mounting surfaces of bed, temporarily tighten the mounting screws with uniform tightening torque.
- After closely fitting the ways to B surfaces (See Fig. 13.), tighten the mounting screws uniformly to the prescribed tightening torque.
- If high accuracy is required, tighten the mounting screws uniformly to the prescribed tightening torque while checking the parallelism of the two ways along the overall way length.
- General tightening torque of mounting screws is shown in Table 10 on page E-20.

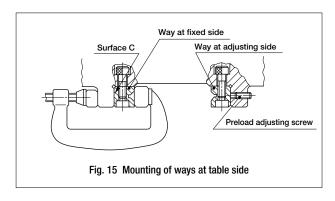
Mounting of ways at table side (Fig. 15)

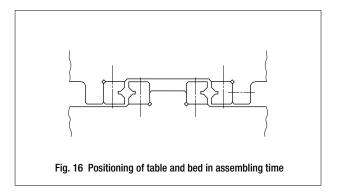
- After fitting the mounting surfaces of the way at the fixed side to the mating mounting surfaces of table, temporarily tighten the mounting screws at the fixed side with uniform tightening torque.
- After closely fitting the way at the fixed side to C surface, tighten the mounting screws at the fixed side uniformly to the prescribed tightening torque.
- Loosen the preload adjusting screws and temporarily tighten the mounting screws of the way at adjusting side with uniform and light tightening torque.

5 Assembling of table and bed (Fig. 16)

- Adjust the positions of table and bed in height and width directions in order to insert roller cages between the ways at table side and bed side.
- Insert the roller cages gradually and gently until the cages position roughly at the center of way length. In this process, do not deform the cages.
- Assemble end screws or end stoppers.
- Push the table to the preload adjusting side, and temporarily tighten the preload adjusting screws until the clearance at raceways is near zero.
- Gently stroke the table its full stroke length to position the roller cage at the center of the stroke.

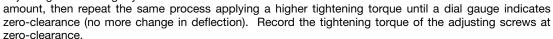


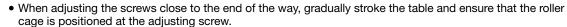




6 Preload adjustment (Fig. 17)

- Preload adjustment is done only when mounting screws for the way at the adjusting side are temporarily tightened.
- Preload adjustment is started from the adjusting screw at the center of the way length, proceeding alternately to the left and right.
- While checking the clearance (deflection) at the side face of table, tighten each adjusting screw lightly to a uniform





• Using the above process, the internal clearance becomes zero or minimal preload, but the preload amount is not uniform along the way length. Therefore, repeat the same process and tighten all adjusting screws uniformly to the recorded tightening torque.

7 Final fixing of way at adjusting side

- The mounting screws have been tightened lightly to a uniform torque. Similar to the adjustment of the preload adjusting screws, temporarily tighten the mounting screws at the adjusting side to a slightly lower tightening torque than the prescribed value. Start from the center screw of the way length and proceed alternately to the left and right.
- When tightening the mounting screws close to the end of the way, gradually stroke the table and ensure that the roller cage is positioned at the mounting screw.
- Finally, tighten all mounting screws at the adjusting side uniformly to the prescribed torque similar to the adjustment of the preload adjusting screws.

8 Final check (Fig. 18)

- Stroke the table gradually its full stroke length, ensuring that the stroke is smooth and quiet.
- Check the operating accuracy by measuring the upper and side faces of table with a dial gauge.

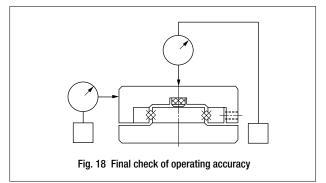
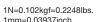
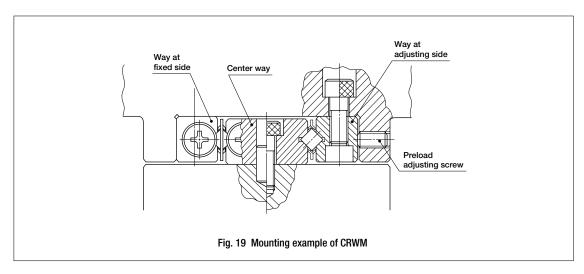


Fig. 17 Example of preload adjustment



Mounting of CRWM

A general mounting example of CRWM is shown in Fig. 19. The general mounting procedure is as follows.



Preparation for mounting

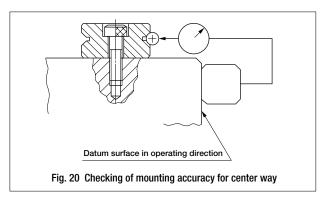
- CRWM is delivered as an individual package containing one center way, two side ways and two roller cages. The ways in each package are not interchangeable with ways in other packages, so do not mix them.
- Separate the end screws or end stoppers and wash the ways with a clean cleaning agent. After cleaning, apply rust preventive oil or lubricating oil.

2 Cleaning of mounting surfaces on table and bed

• Use the same procedure as that for CRW.

3 Mounting of center way (Fig. 20)

- Roughly position the center way to the mounting surface of bed and lightly tighten the mounting screws.
- Temporarily tighten the mounting screws with uniform tightening torque while adjusting the position of the center way by checking the parallelism between the datum surface in the operating direction and the raceways of the center way with a dial gauge.
- Finally, tighten all mounting screws uniformly to the prescribed torque.



4 Drilling for dowel pin hole (Fig. 21)

- If dowel pins are needed to fix the center way to the bed, drill holes to the bed through the dowel pin holes of the center way while assembling the center way on the bed and locating the drill tool to dowel pin holes near the way ends. The holes for dowel pins in the center way are manufactured to H7 tolerance. Therefore, the holes in bed should have the same tolerance.
- Hole diameters and their tolerances are shown in the dimension tables.
- Remove any drilling chips and, if necessary, wash again the table assembly. If the table assembly of the machine is large, first disassemble the center way. Then wash the table and the center way individually before re-assembly.
- Insert dowel pins and check the parallelism between the datum surface in the operating direction and the raceways of the center way.

5 Mounting of way at table side

Use the same procedure as that for CRW.

6 Assembling of table and bed

• Use the same procedure as that for CRW.

Preload adjustment

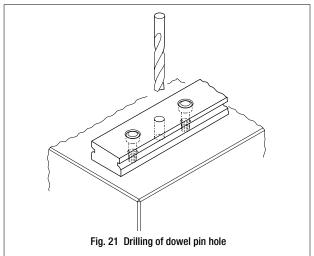
• Use the same procedure as that for CRW.

8 Final fixing of way at adjusting side

Use the same procedure as that for CRW.

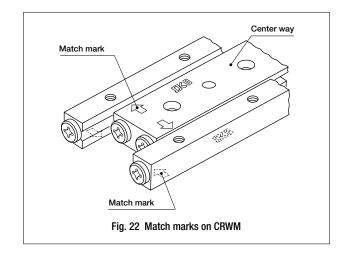
9 Final check

• Use the same procedure as that for CRW.

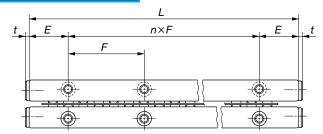


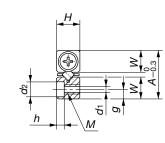
Match marks of CRWM

Ways of CRWM have match marks so that they can be assembled with the best operating results. When assembling ways, the match marks on the way end should be positioned at the same end as shown in Fig. 22.







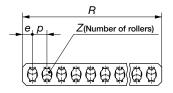


	Mass							
Model number	Way(¹) Roller cage(²)			Во	oundary dimensions	ı	Dimensions of roller cage	
	kg/m	g	Α	Н	L(n×F)	Ε	Dw	R
CRW 1- 20					20 (1×10)			16.5
CRW 1- 20 SL					20 (1×10)			10.5
CRW 1- 30			8.5		30 (2×10)			25.5
CRW 1- 30 SL		0.38						25.5
CRW 1- 40					40 (3×10) 50 (4×10)			31.5
CRW 1- 40 SL							1.5	31.5
CRW 1- 50	0.12			4		5		37.5
CRW 1- 50 SL	0.12	0.50		7	30 (47/10)			
CRW 1- 60					60 (5×10)			43.5
CRW 1- 60 SL					55 (51115)			
CRW 1- 70					70 (6×10)			52.5
CRW 1- 70 SL					70 (0×10)			
CRW 1- 80					80 (7×10)			61.5
CRW 1- 80 SL					30 (7×10)			01.5

Note(¹): This value shows mass per one meter for individual way.

(²): This value shows mass of one roller cage in which ten rollers are incorporated.

(³): This value shows load per one roller.

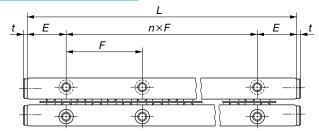


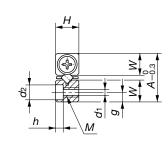


	Nomir	nal dimei mm	nsions		Basic dynamic load rating	Basic static load rating	Allowable load					
						ing dime			C∪(³)	Cou(3)	F∪(³)	
Z	р	е	W	g	М	d ₁	d ₂	h	t	N	N	N
5												
8												
10												
12	3	2.25	3.9	1.8	M2	1.65	3	1.4	1.7	125	120	39.8
14												
17												
20												









	Mass	(Ref.)							
Model number	Way(¹)	Roller cage (2)		ı	Dimension	ns of roller cage			
	kg/m g		Α	Н	L (n×F)	E	D w	R	
CRW 2- 30					30 (1×15)			29.6	
CRW 2- 30 SL					30 (1×15)			29.0	
CRW 2- 45					45 (2×15)			41.6	
CRW 2- 45 SL					43 (2 × 13)			41.0	
CRW 2- 60					60 (3×15) 75 (4×15)			53.6	
CRW 2- 60 SL						-			
CRW 2- 75		0.98	12					65.6	
CRW 2- 75 SL									
CRW 2- 90					90 (5×15)			77.6	
CRW 2- 90 SL						-			
CRW 2-105	0.24			6	105 (6×15)	7.5	2	89.6	
CRW 2-105 SL						-			
CRW 2-120					120 (7×15)			101.6	
CRW 2-120 SL						-			
CRW 2-135					135 (8×15)			113.6	
CRW 2-135 SL						-			
CRW 2-150					150 (9×15)			125.6	
CRW 2-150 SL						-			
CRW 2-165					165 (10×15)			137.6	
CRW 2-165 SL									
CRW 2-180					180 (11×15)			149.6	
CRW 2-180 SL									

			R	ì
_	e,	р	Z(Number of rollers)	
	(} {		

Nominal dimensions



Basic dynamic Basic static Allowable load

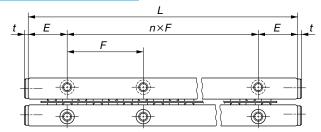
		mm								load rating	load rating	
	l	l		l	Mount	ing dime	nsions	l	l	C∪(³)	Co∪(³)	F ∪(³)
Z	р	е	W	g	М	d1	d 2	h	t	N	N	N
7												
10												
13												
16												
19												
22	4	2.8	5.5	2.5	M3	2.55	4.4	2	1.5	293	294	97.9
25												
28												
31												
34												
37												

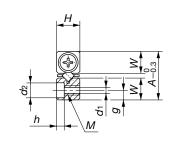
Note(¹): This value shows mass per one meter for individual way.
(²): This value shows mass of one roller cage in which ten rollers are incorporated.
(³): This value shows load per one roller.

Basic static Allowable load

IND Crossed Roller Way







	Mass	(Ref.)						
Model number				1	Boundary dimensions		Dimensio	ns of roller cage
	Way(1)	Roller cage (2)	A	Н	L(n×F)	E	D w	R
CRW 3- 50	kg/m	g						
CRW 3- 50 SL					50 (1×25)			42
CRW 3- 75						_		
CRW 3- 75 SL					75 (2×25)			62
CRW 3-100					100 (3×25)	-		
CRW 3-100 SL								82
CRW 3-125		2.96	18		125 (4×25)			102
CRW 3-125 SL					125 (4×25)			102
CRW 3-150					150 (5×25)			122
CRW 3-150 SL					100 (01120)			
CRW 3-175	0.50			8	175 (6×25)	12.5	3	142
CRW 3-175 SL	0.00	2.00	.0		200 (7×25)			
CRW 3-200								162
CRW 3-200 SL								
CRW 3-225					225 (8×25)			182
CRW 3-225 SL								
CRW 3-250					250 (9×25)			202
CRW 3-250 SL						-		
CRW 3-275					275 (10×25)			222
CRW 3-275 SL								
CRW 3-300					300 (11×25)			242
CRW 3-300 SL								

	<u> </u>		R	L
_	e	р	Z(Number of rollers)	
	(36		

Nominal dimensions

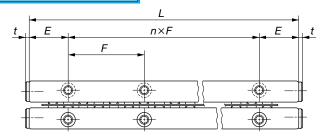


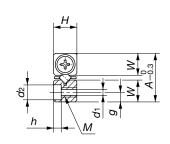
Basic dynamic

		mm								load rating	load rating	
				1		ing dime				Cu(3)	Cou(3)	<i>F</i> ∪(³)
Z	p	е	W	g	М	d1	d ₂	h	t	N	N	N
8												
12												
16												
20												
24												
28	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	638	609	203
32												
36												
40												
44												
48												

Note(¹): This value shows mass per one meter for individual way.
(²): This value shows mass of one roller cage in which ten rollers are incorporated.
(³): This value shows load per one roller.







Model number	Mass	(Ref.)							
Model number	Way(¹) kg/m	Roller cage(2)	Α	н	Boundary dimensions $L(n \times F)$	E	Dimension Dw	ns of roller cage	
CRW 4- 80					80 (1×40)			73	
CRW 4- 80 SL					30 (1/40)			/3	
CRW 4-120					120 (2×40)			101	
CRW 4-120 SL									
CRW 4-160					160 (3×40)			136	
CRW 4-160 SL									
CRW 4-200					200 (4×40)			164	
CRW 4-200 SL									
CRW 4-240		6.91			240 (5×40)			199	
CRW 4-240 SL									
CRW 4-280	0.82		22	11	280 (6×40)	20	4	227	
CRW 4-280 SL									
CRW 4-320					320 (7×40)			262	
CRW 4-320 SL									
CRW 4-360					360 (8×40)			297	
CRW 4-360 SL									
CRW 4-400					400 (9×40)			325	
CRW 4-400 SL									
CRW 4-440					440 (10×40)			360	
CRW 4-440 SL									
CRW 4-480					480 (11×40)			388	
CRW 4-480 SL									

سا				R				
е	p	_	Z	Nu	mbe	r of	rolle	ers)
			/					
()(\$\$	(4)	(‡)	(\$	(4)	(4)

Nominal dimensions

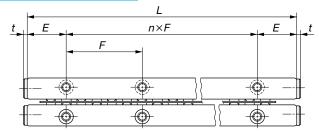


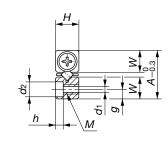
Basic dynamic Basic static Allowable load

		mm								load rating	load rating	
	l	l			Mount	ing dime	ensions	l	1	Cu(3)	Cou(3)	F ∪(³)
Z	р	е	W	g	М	d1	d ₂	h	t	N	N	N
10												
14												
19												
23												
28												
32	7	5	10	4.5	M5	4.3	7.5	4.1	2	1 230	1 180	392
37												
42												
46												
51												
55												

Note(¹): This value shows mass per one meter for individual way.
(²): This value shows mass of one roller cage in which ten rollers are incorporated.
(³): This value shows load per one roller.







	Mass	(Ref.)							
Model number	Way(1)	Roller cage (2)			Boundary dimensions		Dimension	ns of roller cage	
	kg/m	g	Α	Н	L(n×F)	Ε	Dw	R	
CRW 6-100					100 (1×50)			84	
CRW 6-100 SL					100 (17/00)				
CRW 6-150					150 (2×50)			129	
CRW 6-150 SL								120	
CRW 6-200					200 (3×50)			165	
CRW 6-200 SL					255 (57755)				
CRW 6-250					250 (4×50)			210	
CRW 6-250 SL									
CRW 6-300		20.3			300 (5×50)			246	
CRW 6-300 SL									
CRW 6-350	1.57		31	15	350 (6×50)	25	6	282	
CRW 6-350 SL									
CRW 6-400					400 (7×50)			327	
CRW 6-400 SL									
CRW 6-450					450 (8×50)			363	
CRW 6-450 SL									
CRW 6-500					500 (9×50)			408	
CRW 6-500 SL									
CRW 6-550					550 (10×50)			444	
CRW 6-550 SL									
CRW 6-600					600 (11×50)			489	
CRW 6-600 SL									

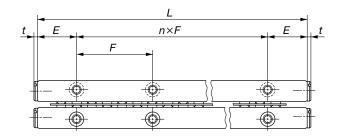
l-		R
ϵ	p ₁ p	Z(Number of rollers)
	(

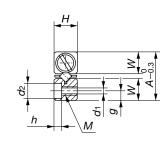


	Nomir	nal dimei mm	nsions							Basic dynamic load rating	Basic static load rating	Allowable load
						ing dime				C∪(³)	Cou(3)	F∪(³)
Z	р	е	W	g	М	d1	d ₂	h	t	N	N	N
9												
14												
18												
23												
27												
31	9	6	14	6	M6	5.3	9.5	5.2	3	2 570	2 310	769
36												
40												
45												
49												
54												

Note(¹): This value shows mass per one meter for individual way.
(²): This value shows mass of one roller cage in which ten rollers are incorporated.
(³): This value shows load per one roller.







Model number	Mass	(Ref.)						
Model number	Way(1)	Roller cage(2)		ı	Boundary dimensions	I	Dimension	ns of roller cage
	kg/m	g g	Α	н	L (n×F)	E	D w	R
CRW 9- 200	- J				200 (1×100)			173
CRW 9- 300					300 (2×100)			257
CRW 9- 400					400 (3×100)	ı		327
CRW 9- 500					500 (4×100)			411
CRW 9- 600					600 (5×100)			495
CRW 9- 700	3.3	64.8	44	22	700 (6×100)	50	9	565
CRW 9- 800					800 (7×100)			649
CRW 9- 900					900 (8×100)			733
CRW 9-1000					1 000 (9×100)			817
CRW 9-1100					1 100 (10×100)			887
CRW 9-1200					1 200 (11×100)			971
CRW 12- 200					200 (1×100)	-		168
CRW 12- 300					300 (2×100)			258
CRW 12- 400					400 (3×100)			330
CRW 12- 500					500 (4×100)			420
CRW 12- 600					600 (5×100)			492
CRW 12- 700	5.57	146	58	28	700 (6×100)	50	12	564
CRW 12- 800					800 (7×100)			654
CRW 12- 900					900 (8×100)			726
CRW 12-1000					1 000 (9×100)			816
CRW 12-1100					1 100 (10×100)			888
CRW 12-1200					1 200 (11×100)			978

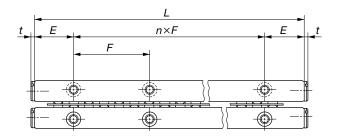
l	R
e p	Z(Number of rollers)
93	8888888

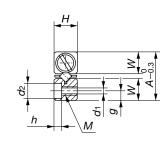


	Nomir	nal dimer mm	nsions							Basic dynamic load rating	Basic static load rating	Allowable load
						ing dime				Cu(3)	Cou(3)	F ∪(³)
Z	р	е	W	g	М	d1	d ₂	h	t	N	N	N
12												
18												
23												
29								6.2				
35										7 190	6 600	2 200
40	14	9.5	20.2	9	M 8	6.8	10.5		3			
46												
52												
58												
63												
69												
9												
14												
18												
23												
27												
31	18	12	26.9	12	M10	8.5	13.5	8.2	3	14 700	13 600	4 540
36												
40												
45												
49												
54												

Note(1): This value shows mass per one meter for individual way.
(2): This value shows mass per one roller cage in which ten rollers are incorporated.
(3): This value shows load per one roller.

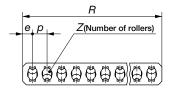






	Mass	(Ref.)						
Model number	Way(¹) kg/m	Roller cage(2)	Α	н	Boundary dimensions $L(n \times F)$	E	Dimensio Dw	ns of roller cage
CRW 15- 300					300 (2×100)			261
CRW 15- 400					400 (3×100)			330
CRW 15- 500					500 (4×100)			422
CRW 15- 600					600 (5×100)			491
CRW 15- 700	8.75	273	71	36	700 (6×100)	50	15	583
CRW 15- 800	0.75	2/3	''	36	800 (7×100)	50		652
CRW 15- 900					900 (8×100)			744
CRW 15-1000					1 000 (9×100)			813
CRW 15-1100					1 100 (10×100)			905
CRW 15-1200					1 200 (11×100)			974
CRW 18- 300					300 (2×100)	-		262
CRW 18- 400					400 (3×100)			346
CRW 18- 500					500 (4×100)			430
CRW 18- 600					600 (5×100)			514
CRW 18- 700	11.3	447	83	40	700 (6×100)	50	18	570
CRW 18- 800	11.3	44/	03	40	800 (7×100)	50	10	654
CRW 18- 900					900 (8×100)			738
CRW 18-1000					1 000 (9×100)	1		822
CRW 18-1100					1 100 (10×100)			906
CRW 18-1200					1 200 (11×100)			990

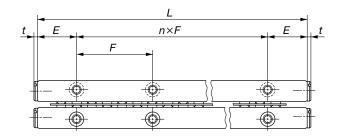
^{(2):} This value shows mass of one roller cage in which ten rollers are incorporated.
(3): This value shows load per one roller.

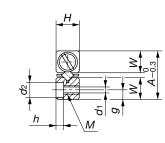




Nomi	nal dime	nsions								Basic dynamic load rating	Basic static load rating	Allowable load
	I	I		I	Mount	ing dime	nsions	1	1	C∪(³)	Cou(3)	<i>F</i> ∪(³)
Z	р	е	W	g	М	d1	d 2	h	t	N	N	N
11												
14												
18										22 800		
21	1							10.2				
25		45.5				40.5	40.5		_			7.000
28	23	15.5	33	14	M12	10.5	16.5	10.2	5	23 800	21 900	7 300
32												
35												
39												
42												
9												
12												
15												
18												
20	28	10	20.5	18	M14	10.5	10.5	12.2	_	25 000	22.700	10.000
23		19	38.5	18	IVI 14	12.5	18.5	12.2	5	35 800	32 700	10 900
26												
29												
32												
35												





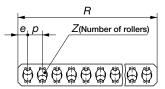


	Mass									
Model number	Way(¹) kg/m	Roller cage(²)	Α	н	Boundary dimensions $L(n\times F)$	E	Dimensio	ns of roller cage		
CRW 24- 400					400 (3×100)			336		
CRW 24- 500			110		500 (4×100)		24	408		
CRW 24- 600	20.6	1 060			600 (5×100)			516		
CRW 24- 700					700 (6×100)			588		
CRW 24- 800				55	800 (7×100)	50		660		
CRW 24- 900					900 (8×100)			732		
CRW 24-1000					1 000 (9×100)			840		
CRW 24-1100					1 100 (10×100)	1		912		
CRW 24-1200					1 200 (11×100)			984		

Note(¹): This value shows mass per one meter for individual way.

(²): This value shows mass of one roller cage in which ten rollers are incorporated.

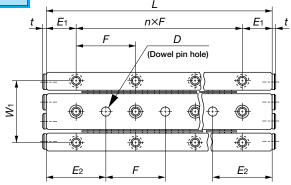
(³): This value shows load per one roller.

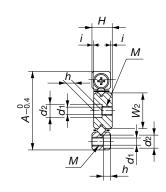




Nomir	nal dimer mm	nsions			Basic dynamic load rating	Basic static load rating	Allowable load					
Mounting dimensions										C∪(³)	Cou(3)	<i>F</i> ∪(³)
Z	р	е	w	g	М	d1	d 2	h	t	N	N	N
9												
11												
14												
16												
18	36	24	51.5	24	M16	14.5	22.5	14.2	5	69 600	63 500	21 200
20												
23												
25	1											
27												

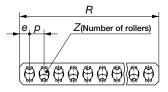






	Mass	(Ref.)							
Model number	Way(1)	Roller cage(2)		ı	Boundary dimensions	Dimensions of roller cage			
	kg/m	kg/m g		Н	L (n×F)	i	Dw	R	Z
CRWM 1- 20					20 (1×10)			16.5	5
CRWM 1- 30					30 (2×10)			25.5	8
CRWM 1- 40					40 (3×10)			31.5	10
CRWM 1- 50	0.49	0.38	17	4.5	50 (4×10)	0.5	1.5	37.5	12
CRWM 1- 60					60 (5×10)			43.5	14
CRWM 1- 70					70 (6×10)			52.5	17
CRWM 1- 80					80 (7×10)			61.5	20
CRWM 2- 30					30 (1×15)	0.5		29.6	7
CRWM 2- 45					45 (2×15)			41.6	10
CRWM 2- 60					60 (3×15)			53.6	13
CRWM 2- 75					75 (4×15)			65.6	16
CRWM 2- 90					90 (5×15)			77.6	19
CRWM 2-105	0.99	0.98	24	6.5	105 (6×15)		2	89.6	22
CRWM 2-120					120 (7×15)			101.6	25
CRWM 2-135					135 (8×15)			113.6	28
CRWM 2-150					150 (9×15)			125.6	31
CRWM 2-165					165 (10×15)			137.6	34
CRWM 2-180					180 (11×15)			149.6	37

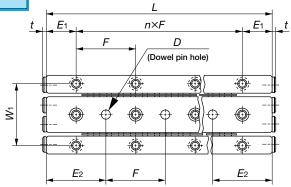
Note(1): This value shows mass per one set of ways (one center way and two side ways) per one meter.
(2): This value shows mass of one roller cage in which ten rollers are incorporated.
(3): This value shows load per one roller.

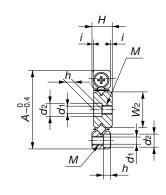




No	minal d	imensio m	Basic dynamic load rating	Basic static load rating	Allowable load										
	1		I.	ı	ı	Mount	ing dim	ensions	3	ı		l	Cu(3)	Cou(3)	F ∪(³)
р	е	W ₁	W 2	E 1	E 2	М	d1	d 2	h	D	Tolerance	t	N N	N N	N
3	2.25	13.4	7.8	5	10	M2	1.65	3	1.4	2	+0.010	1.7	125	120	39.8
4	2.8	19	11	7.5	15	МЗ	2.55	4.4	2	3	+0.010 0	1.5	293	294	97.9





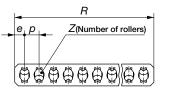


	Mass	(Ref.)							
Model number	Way(1)	Roller cage (2)		ı	Boundary dimensions	ı	Dimens	sions of rolle	r cage
	kg/m	g g	Α	н	L (n×F)	i	Dw	R	Z
CRWM 3- 50	<u> </u>				50 (1×25)			42	8
CRWM 3- 75					75 (2×25)			62	12
CRWM 3-100					100 (3×25)			82	16
CRWM 3-125					125 (4×25)			102	20
CRWM 3-150					150 (5×25)			122	24
CRWM 3-175	1.99	2.96	36	8.5	175 (6×25)	0.5	3	142	28
CRWM 3-200					200 (7×25)			162	32
CRWM 3-225					225 (8×25)			182	36
CRWM 3-250					250 (9×25)			202	40
CRWM 3-275					275 (10×25)			222	44
CRWM 3-300					300 (11×25)			242	48
CRWM 4- 80					80 (1×40)			73	10
CRWM 4-120					120 (2×40)			101	14
CRWM 4-160					160 (3×40)			136	19
CRWM 4-200					200 (4×40)			164	23
CRWM 4-240					240 (5×40)			199	28
CRWM 4-280	3.28	6.91	44	11.5	280 (6×40)	0.5	4	227	32
CRWM 4-320					320 (7×40)			262	37
CRWM 4-360					360 (8×40)			297	42
CRWM 4-400					400 (9×40)			325	46
CRWM 4-440					440 (10×40)			360	51
CRWM 4-480					480 (11×40)			388	55

Note(1):	This	value	shows	mass per	one set	of ways	(one cent	ter way	and two s	side ways) p	er one meter.

^{(2):} This value shows mass of one roller cage in which ten rollers are incorporated.

(3): This value shows load per one roller.

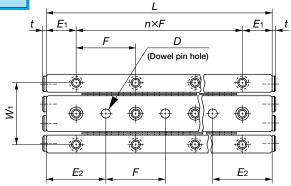


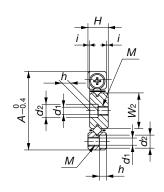


No	minal di		ns and m	toleran	ces								Basic dynamic load rating	Basic static load rating	Allowable load
								nensior			C∪(³)	Cou(3)	F ∪(³)		
р	е	<i>W</i> 1	W 2	<i>E</i> 1	E 2	М	d1	d ₂	h	D	Tolerance	t	N	N	N
5	3.5	29	16.6	12.5	25	M4	3.3	6	3.1	4	+0.012	2	638	609	203
7	5	35	20	20	40	М5	4.3	7.5	4.1	5	+0.012 0	2	1 230	1 180	392

IND Crossed Roller Way

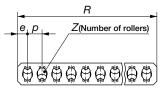






	Mass	(Ref.)							
Model number	Way(¹) kg/m	Roller cage (2)	А	н	Boundary dimensions $L(n \times F)$	i	Dimens	sions of rolle	r cage
CRWM 4- 80A					80 (1×40)			73	10
CRWM 4-120A					120 (2×40)			101	14
CRWM 4-160A					160 (3×40)			136	19
CRWM 4-200A		6.91			200 (4×40)			164	23
CRWM 4-240A					240 (5×40)			199	28
CRWM 4-280A	3.96		48	12.5	280 (6×40)	0.5	4	227	32
CRWM 4-320A					320 (7×40)			262	37
CRWM 4-360A					360 (8×40)			297	42
CRWM 4-400A					400 (9×40)			325	46
CRWM 4-440A					440 (10×40)			360	51
CRWM 4-480A					480 (11×40)			388	55

Note(1): This value shows mass per one set of ways (one center way and two side ways) per one meter.
(2): This value shows mass of one roller cage in which ten rollers are incorporated.
(3): This value shows load per one roller.





No	minal di		ns and m	toleran	ces									Basic static load rating	Allowable load
						Mounti	ng dime	ensions	l				Cu(3)	Cou(3)	F ∪(³)
р	е	<i>W</i> ₁	W 2	E 1	E 2	М	d ₁	d ₂	h	D	Tolerance	t	N	N	N
7	5	38	22	20	40	M5	4.3	8	4.1	5	+0.012 0	2	1 230	1 180	392

CRWU

IKO Crossed Roller Way Unit is a linear motion rolling guide unit for limited stroke linear motion, incorporating IKO Crossed Roller Way CRW in a table and bed of high rigidity which are finished by grinding. Elastic deformation under load is small in all directions and very smooth linear motion with high rigidity is obtained.

Wide variations in size are available for selections suitable for each application.



High accuracy

A one-piece center way is mounted on a bed of simple configuration which avoids any potential errors from machining and assembled with side ways mounted on a table, achieving linear motion of stable high accuracy.



A variety of available models and sizes

Crossed Roller Way Unit is available in three types. In addition, many different sizes in each type are provided to meet diverse dimensional requirements of machines and equipment.



High rigidity

Integrated design is applied to component parts as well as the table and bed to provide maximum rigidity. The assembled unit consequently demonstrates low elastic deformation against loads in any direction and performs with very high rigidity.



Smooth operation

A one-piece center way which avoids any potential processing and mounting errors is combined with super precise cylindrical rollers. So very smooth linear motion free from stick-slip can be obtained.

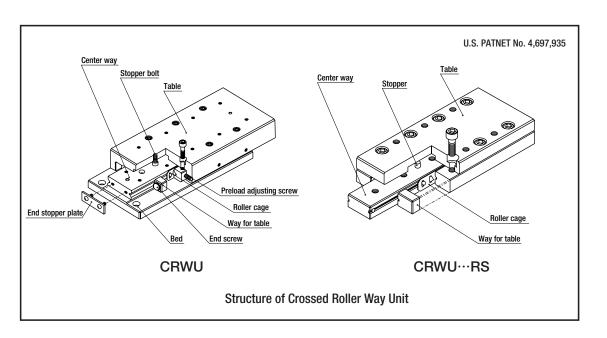


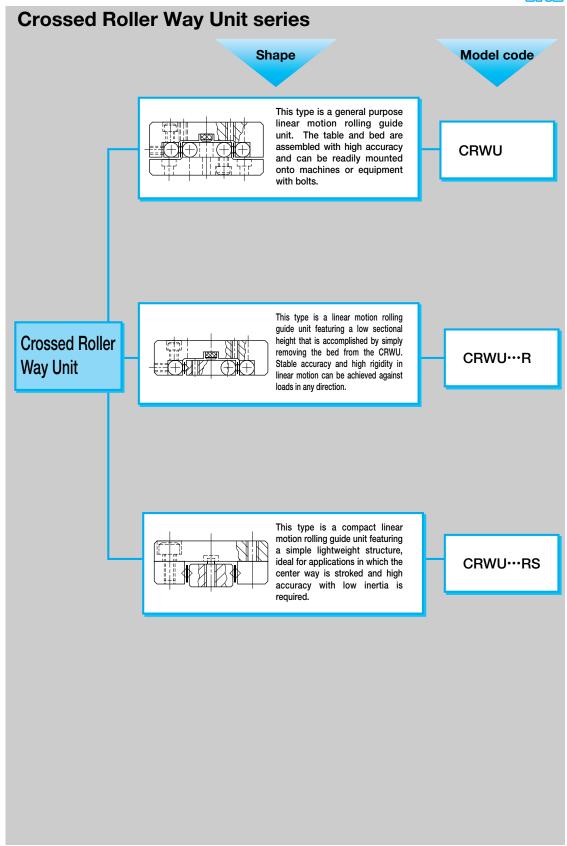
Easy mounting

Mounting surfaces of the table and bed are precisely finished by grinding. Female threads in the table and counterbored mounting holes in the bed are prepared for easy assembling.

Crossed Roller Way Unit is delivered from the factory with a finely adjusted preload in order to maintain high operating accuracy, rigidity and long life.

Therefore, by assembling Crossed Roller Way Unit into machines or equipment, a precise and durable linear motion mechanism can be easily obtained.



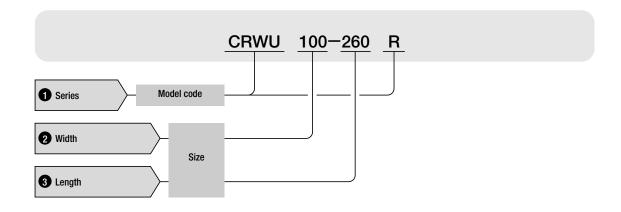


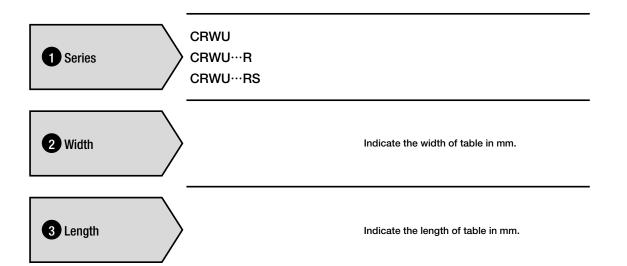
1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **E-73**

CRWU, CRWU...R, CRWU...RS

Identification number and specification

The specification of Crossed Roller Way Unit is indicated by the identification number, consisting of a model code and a size. An example is shown below.





Load Rating and Allowable Load

Summarized descriptions of load ratings of Crossed Roller Way Unit are given below. For details of load rating definitions and load calculations, see "General description".

The load ratings for upward and lateral loads of Crossed Roller Way Unit are the same as those for downward load.

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Crossed Roller Way Units are individually operated and 90% of the units in the group can travel 100×10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

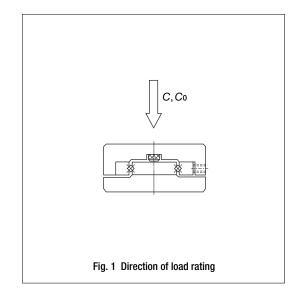
Allowable load F

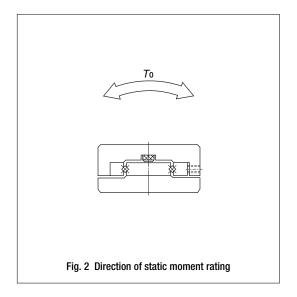
The allowable load is a load under which the sum of elastic deformations of the rolling element and the raceway in the contact area subjected to the maximum contact stress is small enough to guarantee accuracy and smooth rolling movement.

Therefore, when very smooth and highly accurate linear motion is required, make sure that the applied load on Crossed Roller Way Unit is well within the allowable load value.

Static moment rating To

The static moment rating is defined as the static moment load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load when a moment is loaded.





Accuracy

The accuracy of Crossed Roller Way Unit is shown in Table 1.

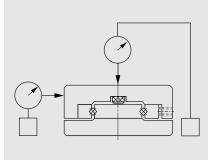
Parallelism at table center shows the difference between the maximum and the minimum of table height when the table is stroked.

Parallelism at table side shows the difference between the maximum and the minimum of measured values at the table side (opposite to adjusting side) when the table is stroked.

The standard height tolerance of the unit is ± 0.1 mm. If several units are used on the same mounting surface and the height of those units require a limited height variation, units with a height variation of less than 0.01 mm among the several units to be used on the same mounting surface can be supplied on request.

If a special accuracy other than those shown in Table 1 is required, consult **IKD**.

Table 1 Accuracy of Crossed Roller Way Unit



			unit : μm					
Unit leng	th L mm	Parallelism at table center	Parallelism at table side					
over	incl.							
_	50	2	4					
50	100	2	5					
100	160	3	6					
160	310	3	7					
310	510	4	8					
510	710	4	9					
710	_	5	10					

Precautions for Mounting and Use

Specification

Check whether the specifications of selected Crossed Roller Way Unit meet the requirements for the application of the machine or equipment.

2 Handling

Crossed Roller Way Unit is a precision product, so handle it with care.

In Crossed Roller Way Unit, the cage can be shifted from the normal position under an uneven load or irregular and high-speed motion. To correct the cage position, move the table in its full stroke after a certain operating time or reciprocating cycles.

Crossed Roller Way Unit does not contain synthetic resin parts and can be operated at high temperatures. But when the temperature exceeds 100 °C, consult **IKU**.

3 Mounting

(1) Tightening torque of mounting screws

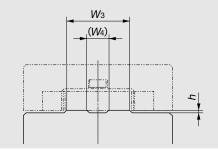
Tightening torque of mounting screws is shown in Table 2. If vibration or shock is large, or if a moment load is applied, it is recommended to further tighten the screws to 1.3 times the listed values.

(2) Mounting dimensions of CRWU···R

In order to avoid interference of the table with the mating mounting surface, carefully check H_1 and H dimensions shown in the dimension tables and design the height of the mating mounting surface accordingly. Example of the mating mounting surface of the bed is shown in Table 3.

Table 2 Tightening torque of sc	Table 2 Tightening torque of screws											
Screw size	Tightening torque N∙m											
M2 ×0.4	0.23											
M2.5×0.45	0.46											
M3 ×0.5	1.4											
M4 ×0.7	3.2											
M5 ×0.8	6.3											
M6 ×1	10.7											
M8 ×1.25	25.6											

Table 3 Example of mating mounting surface for CRWU···R



			unit : mm
Model number	h(minimum)	W 3	W 4
CRWU 30 ··· R	0.5	13	_
CRWU 40-35R	0.5	18	_
CRWU 40 ··· R	0.5	13	
CRWU 60 ··· R	0.5	26.5	_
CRWU 80 ··· R	0.5	38	16
CRWU 100 ··· R	0.5	42	14
CRWU 145 ··· R	1.0	68.5	28.5

4 Dowel pin hole

In the center way of the CRWU···R, dowel pin holes are prepared. When drilling a dowel pin hole in the bed, drill the hole in the bed through the dowel pin hole in the center way after assembling the center way on the bed. The diameters and tolerances of the center way hole are shown in the dimension tables.

5 Readjustment of preload

Preloads of Crossed Roller Way Unit are adjusted to zero clearance or minimal preload at the factory. Crossed Roller Way Unit does not usually require any further adjustment. If preload readjustment of the CRWU or CRWU···R is needed, adjust it according to "Preload adjustment" of the Crossed Roller Way shown on page E-47.

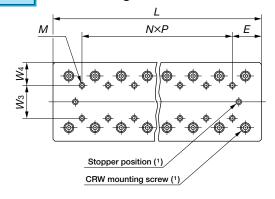
6 Operating speed

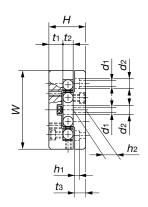
The operating speed of Crossed Roller Way Unit should not exceed 30 m/min.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

CRWU

* Mounting dimensions





	Mass (Ref.)			Bound	dary dime	nsions mm	and to	oleran	ces					
Model number			ı				1 1		ı	Maximum		Ţ	able	ı
	kg	W	Tolerance	Н	Tolerance	L	t1	t2	tз	stroke length	W 3	W 4	N×P	E
CRWU 30- 25	0.09					25				12			-	
CRWU 30- 35	0.13					35				18			1×10	
CRWU 30- 45	0.17					45				25			2×10	
CRWU 30- 55	0.20	30	±0.1	17	±0.1	55	7	4	5.5	32	10	10	3×10	12.5
CRWU 30- 65	0.24					65				40			4×10	
CRWU 30- 75	0.28					75				45			5×10	
CRWU 30- 85	0.32					85				50			6×10	
CRWU 40- 35	0.21					35	8	6	6.5	18			ı	
CRWU 40- 50	0.30					50				30			1×15	
CRWU 40- 65	0.37					65				40			2×15	
CRWU 40- 80	0.48	40	±0.1	21	±0.1	80	7	8	5.5	50	15	12.5	3×15	17.5
CRWU 40- 95	0.54					95				60			4×15	
CRWU 40-110	0.65					110				70			5×15	
CRWU 40-125	0.72					125				80			6×15	
CRWU 60- 55	0.68					55				30			-	
CRWU 60- 80	1.0					80				45			1×25	
CRWU 60-105	1.3					105				60			2×25	
CRWU 60-130	1.6	60	±0.1	28	±0.1	130	10.5	8	9	75	25	17.5	3×25	27.5
CRWU 60-155	1.9					155				90			4×25	
CRWU 60-180	2.2					180				105			5×25	
CRWU 60-205	2.5					205				130			6×25	

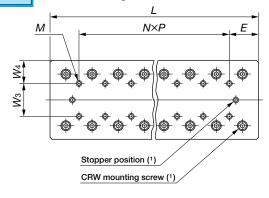
Note(1): This is the mounting position for the stopper or CRW mounting screw. For details, see page E-74.

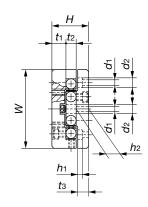
<u>E</u> 1_	L1	
<u>E2</u>	L ₂	
E 3	L3	ı
_	8	
		-
-		
		•
CRW mounting	g screw (1)	

	Mounting dimensions mm										Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating								
				l	l	Bed			l				С	C ₀	F	T 0						
М	W 5	W 6	<i>L</i> 1	E 1	L2	E 2	Lз	E 3	d1	d 2	h1	h2	N	N	N	N∙m						
			18										380	478	159	3.2						
			28				-	_					525	717	239	4.8						
			38										659	956	319	6.5						
M2	22	4	48	3.5	_	_	28	13.5	2.55	4.1	2.5	6	786	1 200	398	8.1						
			58				38	13.5					906	1 430	478	9.7						
			68				45	13.5					1 020	1 670	558	11.3						
			78				58	13.5					1 140	1 910	638	12.9						
			25								3.5	7	896	1 180	392	10.6						
			40				_	_					2 710	3 660	1 220	26.5						
			55										2 710	3 660	1 220	26.5						
МЗ	30	5	70	5	_	_	40	20	3.5	6	3.2	6	4 050	6 090	2 030	44.2						
			85				55	20					3 400	4 880	1 630	35.3						
			100				70	20					4 680	7 310	2 440	53.0						
			115				85	20					4 680	7 310	2 440	53.0						
			35										2 710	3 660	1 220	51.2						
			60										4 050	6 090	2 030	85.3						
			85		_								5 270	8 530	2 840	119						
M4	40	10	110	10			_	_	4.5	7.5	4.5	9.5	5 860	9 750	3 250	137						
			135		85	35							6 970	12 200	4 060	171						
			160		110	35													8 040	14 600	4 880	205
			185		135	35	85	60					8 550	15 800	5 280	222						

CRWU

Mounting dimensions





Model number	Mass (Ref.)		Boundary dimensions and tolerances mm										Table						
	kg	w	Tolerance	н	Tolerance	L	t1	t2	tз	Maximum stroke length	W 3	W 4	N×P	E	М	W 5			
CRWU 80- 85	1.8					85				50			_						
CRWU 80-125	2.6					125				75			1×40						
CRWU 80-165	3.4		±0.1			165				105			2×40						
CRWU 80-205	4.2	80		35	±0.1	205	13	11	10.5	135	40	20	3×40	42.5	M5	60			
CRWU 80-245	5.1					245				155			4×40						
CRWU 80-285	5.9					285				185			5×40						
CRWU 80-325	6.7					325				215			6×40						
CRWU 100-110	3.6					110				60			_						
CRWU 100-160	5.2					160				95			1×50						
CRWU 100-210	6.9					210				130			2×50						
CRWU 100-260	8.5	100	±0.15	45	±0.1	260	16	15	13	165	50	25	3×50	55	M6	60			
CRWU 100-310	10.2					310				200			4×50						
CRWU 100-360	11.8					360				235			5×50						
CRWU 100-410	13.5					410				265			6×50						
CRWU 145-210	13.2					210				130			_						
CRWU 145-310	19.6					310				180			1×100						
CRWU 145-410	25.9					410				350			2×100						
CRWU 145-510	32.2	145	±0.2	60	±0.1	510	21	22	16	450	85	30	3×100	105	M8	90			
CRWU 145-610	38.6	-				610				550			4×100						
CRWU 145-710	45.0					710				650		5×1	5×100						
CRWU 145-810	51.3					810				750			6×100						

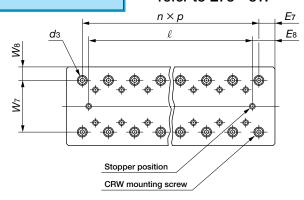
Note(1): This is the mounting position for the stopper or CRW mounting screw. For details, see page E-75.

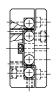
<u>E1</u>	<u>L</u> 1 →	
<u>E2</u>	L2	
<u>E</u> 3_		
E 4		
E 5_		
		We
		1
_		Ws
		S
		<u> </u>
CRW mounting so	screw (1)	

		Mounting dimensions mm Bed											Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating		
							Bed								С	C ₀	F	T 0
W 6	L ₁	<i>E</i> 1	L ₂	E 2	Lз	E 3	L ₄	E4	L 5	E 5	d1	d ₂	h1	h2	N	N	N	N∙m
	40														6 640	9 400	3 130	188
	80				_	_									9 130	14 100	4 700	282
	120														10 300	16 500	5 480	329
10	160	22.5	_	_	80	62.5	_	_	_	_	5.5	9.5	6	11	12 500	21 200	7 050	423
	200				120	62.5									14 700	25 900	8 620	517
	240				160	62.5									16 700	30 600	10 200	611
	280				200	62.5			120	102.5					18 700	35 300	11 800	705
	90														13 900	18 500	6 150	415
	140		_	_											16 600	23 100	7 690	519
	190		90	60	_	_									21 600	32 300	10 800	727
20	240	10	140	60			_	_	_	_	7	11	6.5	14	26 300	41 500	13 800	934
	290		190	60											30 800	50 700	16 900	1 140
	340		240	60	140	110									35 100	60 000	20 000	1 350
	390		290	60	190	110									37 200	64 600	21 500	1 450
	100														39 400	52 800	17 600	1 900
	200		_	_											61 200	92 300	30 800	3 320
	300		100	155	_	_									67 900	106 000	35 200	3 800
27.5	400	55	200	155			_	_	_	_	9	14	8.5	17.5	74 400	119 000	39 600	4 270
	500		300	155	100	255									87 100	145 000	48 400	5 220
	600		400	155	200	255									99 200	172 000	57 200	6 170
	700		500	155	300	255	100	355							111 000	198 000	66 000	7 120

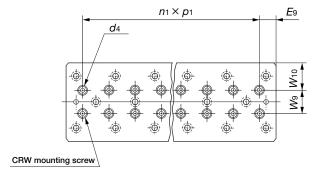
Mounting dimensions of stopper and CRW CRWU

※ For mounting dimensions, refer to E78∼81.



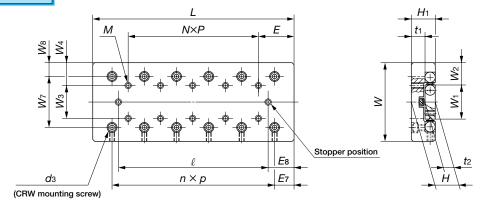


Model number			Dimen	sions of	table			Dimensions of bed mm					
	W 7	W 8	n×p	E 7	d 3	l e	E 8	W 9	W 10	nı ×pı	E 9	d4	
CRWU 30- 25			1×10			20	2.5			1×10			
CRWU 30- 35			2×10			26	4.5			2×10			
CRWU 30- 45			3×10		4.1	33	6	_	15	3×10	7.5		
CRWU 30- 55	18.4	5.8	4×10	7.5		40	7.5			4×10		4.1	
CRWU 30- 65			5×10			48	8.5			5×10			
CRWU 30- 75			6×10			53	11			6×10			
CRWU 30- 85			7×10			58	13.5			7×10			
CRWU 40- 35	25	7.5	1×15	10	6	29	3			1×15	10		
CRWU 40- 50			1×25	12.5		41	4.5			2×15	10		
CRWU 40- 65			1×25	20		51	7	_	20	2×15	17.5	6	
CRWU 40- 80	25.5	7.25	2×25	15	6.5	61	9.5			4×15	10		
CRWU 40- 95			2×25	22.5		71	12			4×15	17.5		
CRWU 40-110			3×25	17.5		81	14.5			5×15	17.5		
CRWU 40-125			3×25	25		91	17			5×15	25		
CRWU 60- 55			1×25			44	5.5			1×25			
CRWU 60- 80			2×25			59	10.5			2×25			
CRWU 60-105			3×25			74	15.5			3×25			
CRWU 60-130	39	10.5	4×25	15	7.5	89	20.5	17	21.5	4×25	15	7.5	
CRWU 60-155			5×25			104	25.5			5×25			
CRWU 60-180			6×25	_		119	30.5			6×25			
CRWU 60-205			7×25			144	30.5			7×25			

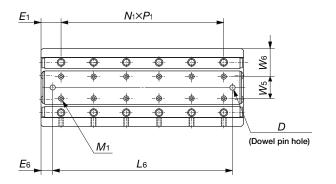


	Dimensions of table mm								Dimensions of bed mm				
Model number	W 7	W 8	n×p	E 7	d з	ℓ	E 8	W 9	W 10	n1×p1	E 9	d4	
CRWU 80- 85			1×40			64	10.5			1×40			
CRWU 80-125			2×40			89	18			2×40			
CRWU 80-165			3×40			119	23			3×40			
CRWU 80- 205	53	13.5	4×40	22.5	9.5	149	28	27	26.5	4×40	22.5	9.5	
CRWU 80- 245			5×40			169	38			5×40			
CRWU 80-285			6×40			199	43			6×40			
CRWU 80-325			7×40			229	48			7×40			
CRWU 100-110			1×50			77	16.5			1×50			
CRWU 100-160			2×50			113	23.5			2×50			
CRWU 100-210			3×50			148	31			3×50			
CRWU 100-260	64	18	4×50	30	11	183	38.5	26	37	4×50	30	11	
CRWU 100-310			5×50			218	46			5×50			
CRWU 100-360			6×50			253	53.5			6×50			
CRWU 100-410			7×50			283	63.5			7×50			
CRWU 145-210			1×100			156	27			1×100			
CRWU 145-310			2×100			206	52			2×100			
CRWU 145-410			3×100			376	17			3×100			
CRWU 145-510	98	23.5	4×100	55	14	476	17	46	49.5	4×100	55	14	
CRWU 145-610			5×100			576	17			5×100			
CRWU 145-710			6×100			676	17			6×100			
CRWU 145-810			7×100			776	17			7×100			

CRWU···R

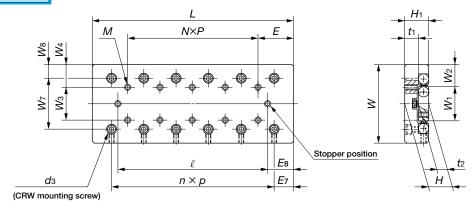


	Mass (Ref.)	Boundary dimensions and tolerances mm						mm										
Model number				I		ı	Maximum	М	ounti	ng dime	ension	ns I			I	ı	I	ı
	kg	W	Tolerance	н	Tolerance	L	stroke length	W 3	W 4	N×P	Ε	М	W 7	W 8	n×p	E 7	d з	l
CRWU 30- 25R	0.06					25	12			-					1×10			20
CRWU 30- 35R	0.08					35	18			1×10					2×10			26
CRWU 30- 45R	0.11					45	25			2×10					3×10			33
CRWU 30- 55R	0.13	30	±0.1	11	±0.1	55	32	10	10	3×10	12.5	M2	18.4	5.8	4×10	7.5	4.1	40
CRWU 30- 65R	0.16					65	40			4×10					5×10			48
CRWU 30- 75R	0.18					75	45			5×10					6×10			53
CRWU 30- 85R	0.21					85	50			6×10					7×10			58
CRWU 40- 35R	0.13			14		35	18			_			25	7.5	1×15	10	6	29
CRWU 40- 50R	0.21					50	30	0		1×15					1×25	12.5		41
CRWU 40- 65R	0.26					65	40			2×15					1×25	20		51
CRWU 40- 80R	0.34	40	±0.1	15	±0.1	80	50	15	12.5	3×15	17.5	М3	25.5	7.25	2×25	15	6.5	61
CRWU 40- 95R	0.38					95	60			4×15					2×25	22.5		71
CRWU 40-110R	0.46					110	70			5×15					3×25	17.5		81
CRWU 40-125R	0.50					125	80			6×15					3×25	25		91
CRWU 60- 55R	0.44					55	30			-					1×25			44
CRWU 60- 80R	0.66					80	45			1×25					2×25			59
CRWU 60-105R	0.85					105	60			2×25					3×25			74
CRWU 60-130R	1.1	60	±0.1	18.5	±0.1	130	75	25	17.5	3×25	27.5	M4	39	10.5	4×25	15	7.5	89
CRWU 60-155R	1.3		±0.1			155	90		.,.5	4×25	-				5×25			104
CRWU 60-180R	1.5				-	180			5×25	25				6×25			119	
CRWU 60-205R	1.7					205	130			6×25					7×25			144

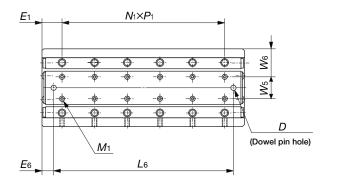


					Din	nensio	ns an		erance of o	cente	r way				Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
					Mountir	ig din	nensio	ons			I	I			С	C ₀	F	<i>T</i> 0
E 8	<i>H</i> 1	<i>t</i> 1	W 5	W 6	N ₁ ×P ₁	<i>E</i> 1	<i>M</i> 1	D	Tolerance	L ₆	E 6	W ₁	W 2	t2	N	N	N	N∙m
2.5					1×10			-	-	-	-				380	478	159	3.2
4.5					2×10			-	-	-	_				525	717	239	4.8
6					3×10			-	_	-	-				659	956	319	6.5
7.5	11	7	-	15	4×10	7.5	M2	2		30	12.5	12.8	8.6	4	786	1 200	398	8.1
8.5					5×10			2	+0.020	40	12.5				906	1 430	478	9.7
11					6×10			2	0	50	12.5				1 020	1 670	558	11.3
13.5					7×10			2		60	12.5				1 140	1 910	638	12.9
3	14	8			1×15	10		-	_	-	-	17	11.5	6	896	1 180	392	10.6
4.5					2×15	10		-	_	-	_				2 710	3 660	1 220	26.5
7					2×15	17.5		-	_	-	_				2 710	3 660	1 220	26.5
9.5	15	7	-	20	4×15	10	М3	3		45	17.5	13.1	13.45	8	4 050	6 090	2 030	44.2
12					4×15	17.5		3	+0.020	45	25				3 400	4 880	1 630	35.3
14.5					5×15	17.5		3	0	60	25				4 680	7 310	2 440	53.0
17					5×15	25		3		60	32.5				4 680	7 310	2 440	53.0
5.5					1×25					35					2 710	3 660	1 220	51.2
10.5					2×25					60					4 050	6 090	2 030	85.3
15.5					3×25					85					5 270	8 530	2 840	119
20.5	18.5	10.5	17	21.5	4×25	15	M4	4	+0.020 0	110	10	26.6	16.7	8	5 860	9 750	3 250	137
25.5					5×25					135					6 970	12 200	4 060	171
30.5					6×25					160					8 040	14 600	4 880	205
30.5					7×25					185					8 550	15 800	5 280	222

CRWU···R

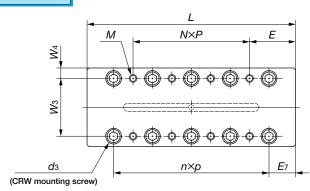


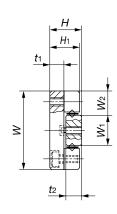
	Mass (Ref.) Boundary dimensions and tolerance mm												Dime	nsion mi	s of tabl	е		
Model number				l		l	Maximum	N	lount	ing dime	nsion	s		l	l	ı	ı	ı
	kg	W	Tolerance	Н	Tolerance	L	stroke length	W 3	W 4	N×P	Ε	М	W 7	W 8	n×p	E 7	d 3	l
CRWU 80- 85R	1.2					85	50			_					1×40			64
CRWU 80-125R	1.8					125	75			1×40					2×40			89
CRWU 80-165R	2.3					165	105			2×40					3×40			119
CRWU 80-205R	2.9	80	±0.1	24	±0.1	205	135	40	20	3×40	42.5	M5	53	13.5	4×40	22.5	9.5	149
CRWU 80-245R	3.5					245	155			4×40					5×40			169
CRWU 80-285R	4.0					285	185			5×40					6×40			199
CRWU 80-325R	4.6					325	215			6×40					7×40			229
CRWU 100-110R	2.4					110	60			_					1×50			77
CRWU 100-160R	3.6					160	95			1×50					2×50			113
CRWU 100-210R	4.7					210	130			2×50					3×50			148
CRWU 100-260R	5.9	100	±0.15	31	±0.1	260	165	50	25	3×50	55	M6	64	18	4×50	30	11	183
CRWU 100-310R	7.0					310	200			4×50					5×50			218
CRWU 100-360R	8.1					360	235			5×50					6×50			253
CRWU 100-410R	9.3					410	265			6×50					7×50			283
CRWU 145-210R	9.4					210	130			_					1×100			156
CRWU 145-310R	13.9					310	180			1×100					2×100			206
CRWU 145-410R	18.4					410	350			2×100					3×100			376
CRWU 145-510R	23.0	145	±0.2	42.5	±0.1	510	450	85	30	3×100	105	M8	98	23.5	4×100	55	14	476
CRWU 145-610R	27.5					610	550			4×100					5×100			576
CRWU 145-710R	32.0					710	650			5×100					6×100			676
CRWU 145-810R	36.6					810	750			6×100					7×100			776



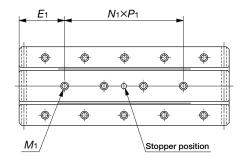
					Din	nensio	ons ar		erance of o	center	way			Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating	
					Mountin	ng din	nensio	ons				ı		l	С	C ₀	F	T 0
E 8	<i>H</i> 1	t1	W 5	W 6	N ₁ ×P ₁	<i>E</i> 1	M 1	D	Tolerance	L 6	E 6	<i>W</i> 1	W 2	t2	N	N	N	N•m
10.5					1×40					55					6 640	9 400	3 130	188
18					2×40					95					9 130	14 100	4 700	282
23					3×40					135					10 300	16 500	5 480	329
28	24	13	27	26.5	4×40	22.5	M5	5	+0.020 0	175	15	38	21	11	12 500	21 200	7 050	423
38					5×40					215					14 700	25 900	8 620	517
43					6×40					255					16 700	30 600	10 200	611
48					7×40					295					18 700	35 300	11 800	705
16.5					1×50					70					13 900	18 500	6 150	415
23.5					2×50					120					16 600	23 100	7 690	519
31					3×50					170					21 600	32 300	10 800	727
38.5	31	16	26	37	4×50	30	M6	5	+0.020 0	220	20	42	29	15	26 300	41 500	13 800	934
46					5×50					270					30 800	50 700	16 900	1 140
53.5					6×50					320					35 100	60 000	20 000	1 350
63.5					7×50					370					37 200	64 600	21 500	1 450
27					1×100					150					39 400	52 800	17 600	1 900
52					2×100					250					61 200	92 300	30 800	3 320
17					3×100					350					67 900	106 000	35 200	3 800
17	43	21	46	49.5	4×100	55	M8	5	+0.020 0	450	30	68.4	38.3	21	74 400	119 000	39 600	4 270
17					5×100					550					87 100	145 000	48 400	5 220
17					6×100					650					99 200	172 000	57 200	6 170
17					7×100					750					111 000	198 000	66 000	7 120

CRWU...RS





	Mass (Ref.)		Boundary	/ dime	nsions an mm	d toler	ances	Dimensions of table mm					table
Model number				l			Maximum		Mount	ing dime	nsions 		
	kg	W	Tolerance	Н	Tolerance	L	stroke length	W 3	W 4	N×P	E	М	n×p
CRWU 20- 25RS	0.03					25	12			1×18	3.5		1×10
CRWU 20- 35RS	0.05	20	±0.1	8	±0.1	35	18	14	3	1×28	3.5	M2.5	2×10
CRWU 20- 45RS	0.06	20	±0.1	0	±0.1	45	25	14	3	1×20	12.5		3×10
CRWU 20- 55RS	0.07					55	32			1×30	12.5		4×10
CRWU 30- 65RS	0.20					65	40			1×30			3×15
CRWU 30- 80RS	0.24	30	±0.1	12	±0.1	80	50	22	4	1×45	17.5	M3	4×15
CRWU 30- 95RS	0.29					95	60			2×30			5×15
CRWU 40-105RS	0.58					105	60			1×50			3×25
CRWU 40-130RS	0.72	40	±0.1	16	±0.1	130	75	30	5	1×75	27.5	M4	4×25
CRWU 40-155RS	0.85					155	90			2×50			5×25



						ensions of o		-		Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
	1				M	ounting dim	ension:	s 		С	C ₀	F	T 0
E 7	d 3	<i>H</i> 1	<i>t</i> 1	<i>W</i> ₁	W 2	<i>N</i> 1× <i>P</i> 1	<i>E</i> 1	M 1	t2	N	N	N	N•m
						2×7.5	5			380	478	159	1.8
7.5		7.5	0.5	_		2×10		N40 F		525	717	239	2.8
7.5	4.1	7.5	3.5	7	6.5	3×10	7.5	M2.5	4	659	956	319	3.7
						4×10				786	1 200	398	4.6
						3×15				1 850	2 940	979	19.1
10	6	11.5	5.5	12	9	4×15	10	МЗ	6	2 130	3 530	1 180	22.9
						5×15				2 410	4 110	1 370	26.7
						3×25				4 680	7 310	2 440	63.6
15	7.5	15.5	7.5	16	12	4×25	5 15	M4	8	5 860	9 750	3 250	84.8
						5×25				6 970	12 200	4 060	106

Precision Linear Slides

Description of each series and Table of dimensions





In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

High Rigidity Precision Linear Slide Unit

BWU

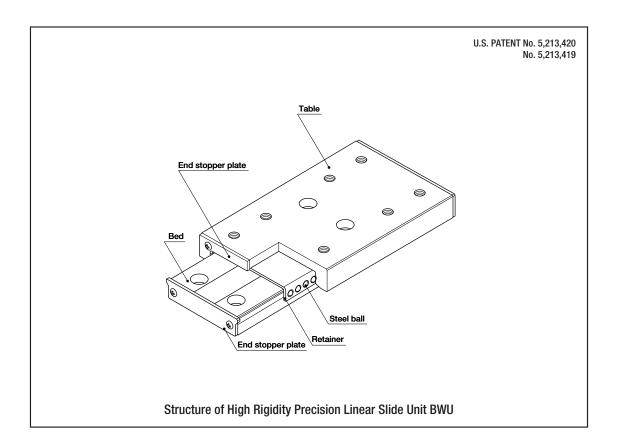
IKO High Rigidity Precision Linear Slide Unit BWU is a compact linear motion rolling guide for limited stroke length. The unit incorporates two rows of steel balls in four point contact with the raceways so that stable accuracy and high rigidity are obtained even under fluctuating and complex loads. Wide variations in size are available for selections suitable for each application.

High accuracy and smooth movement

Two raceways on the solid table and on the solid bed respectively are ground at one time to minimize processing errors and improve accuracy between the two raceways. High accuracy and smooth movement are assured.

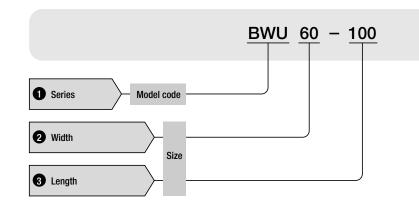
Stainless steel type

All components are made of stainless steel to give superior corrosion and heat resistance. So this series is most suitable for use in clean rooms.



Identification number and specification

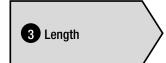
The specification of High Rigidity Precision Linear Slide Unit BWU is indicated by the identification number, consisting of a model code and a size. An example of identification number is shown below.



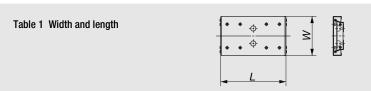




Indicate the width of the table in mm.
For available width and length, see Table 1.



Indicate the length of the table in mm. For available width and length, see Table 1.



unit	mr

Model number Item	BWU 6	BWU 8	BWU 12	BWU 17	BWU 25	BWU 30	BWU 40	BWU 60
Width W	6	8	12	17	25	30	40	60
	10	10	20	20	30	30	40	60
	20	20	30	30	45	45	60	80
Length L	30	30	45	45	60	60	80	100
					75	75	100	120
						90		

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **E-93**

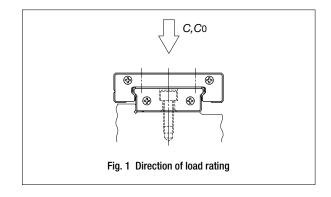


Load Rating

The load ratings of High Rigidity Precision Linear Slide Unit BWU are defined for downward load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical High Rigidity Precision Linear Slide Units BWU are individually operated and 90% of the units in the group can travel 50x10³ meters free from material damage due to rolling contact fatigue.



Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

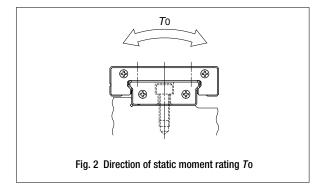
Allowable load F

Allowable load is the load under which the sum of elastic deformations of the rolling element and the raceway in the contact area subjected to the maximum contact stress is small enough to guarantee accuracy and smooth rolling movement.

Therefore, when very smooth and highly accurate linear motion is required, make sure that the applied load is well within the allowable load value.

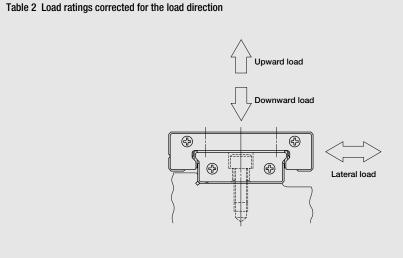
Static moment rating To

The static moment rating is defined as the static moment load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load when a moment is loaded.



Load direction and load rating

Since the load ratings of High Rigidity Precision Linear Slide Unit BWU given in the table of dimensions are for downward load, they must be corrected for the load direction for upward or lateral load. The corrected basic dynamic load ratings and basic static load ratings are shown in Table 2.



Load rating Load direction	Basic dynamic load rating	Basic static load rating
Downward	С	C ₀
Upward	С	Co
Lateral	1.19C	1.19Co



Accuracy

The accuracy of High Rigidity Precision Linear Slide Unit BWU is shown in Tables 3 and 4.

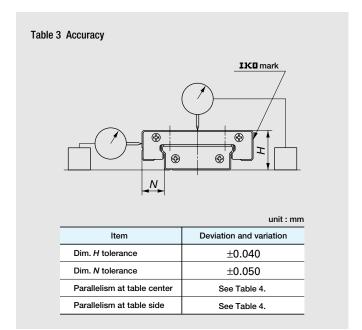


Table 4 Running a	Table 4 Running accuracy unit : μm										
Nominal le	ngth <i>L</i> mm incl.	Parallelism at table center(1)	Parallelism at table side(²)								
_	50	4	6								
50	80	5	8								
80	120	6	9								

Note(1): The value of parallelism at table center shows the difference between the maximum and the minimum of unit height measured at the table center when the table is stroked.

(²): The value of parallelism at table side shows the difference between the maximum and the minimum values measured at the table side (Opposite side of IXU mark) when the table is stroked.

Preload

Preload of High Rigidity Precision Linear Slide Unit BWU is adjusted to a proper amount at **IKD** factory.

Precautions for Use

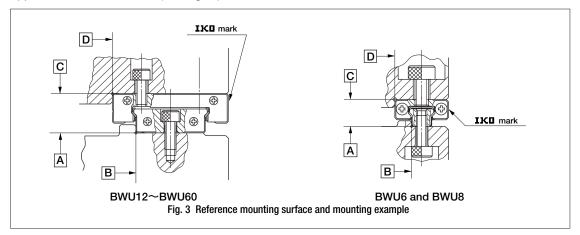
- High Rigidity Precision Linear Slide Unit BWU is coated with rust preventive oil. Wash it with clean liquid before assembling and lubricate it by coating with good quality oil or grease.
- **2** High Rigidity Precision Linear Slide Unit BWU does not incorporate a mechanical stopper. When over stroke is expected during the operation, prepare a stopper system on the adjoining equipment.
- 3 When high running accuracy is needed, the load should be applied at around the center of the table (or bed) and avoid stroking the table in full length.
- Sometimes, retainers may shift from the normal position due to unbalanced loading and/or irregular and high speed operation. To remedy for such phenomena, move High Rigidity Precision Linear Slide Unit BWU in full stroke at some intervals during operation prescribed either in time or number of strokes.
- **6** High Rigidity Precision Linear Slide Unit BWU can be used at high temperatures, because it does not have resin parts. However, if the operating temperature is over 100°C, consult **IKD**.
- 6 Use High Rigidity Precision Linear Slide Unit BWU at speeds lower than 30 m/min.
- The tightening depth of screws on the table should be less than the values shown in the dimension table. If the tightening depth is larger than these values, the screw will push the bed as the screw hole in the table is a through hole and the running accuracy and life will deteriorate.



Precautions for Mounting

1 Reference mounting surface

The reference mounting surface of High Rigidity Precision Linear Slide Unit BWU is the side surface opposite to the IKD mark. (See Fig. 3.)



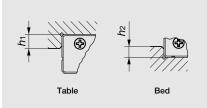
2 General mounting example

As shown in Fig. 3, the reference mounting surfaces \boxed{B} and \boxed{D} and the mounting surfaces \boxed{A} and \boxed{C} are precisely finished by grinding. Stable linear motion with high accuracy will be obtained by correctly mounting the unit on the reference mounting surfaces and the mounting surfaces of the machine which will be precisely finished.

It is recommended to make a relieved filet at the corners of the mating reference mounting surfaces as shown in the figure in Table 5. Recommended shoulder heights of the mating reference mounting surfaces are given in Table 5.

Table 5 Shoulder heights of the mating reference mounting surfaces

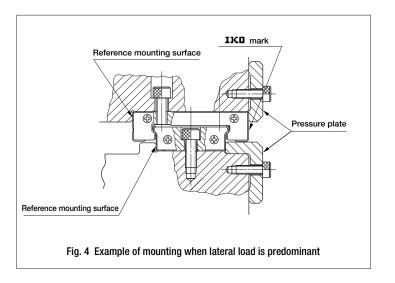
unit: mm



Model number	Table Shoulder height <i>h</i> ₁	Bed Shoulder height h 2
BWU 6- ···	1	0.5
BWU 8- ···	1.2	0.8
BWU 12- ···	1.5	0.8
BWU 17- ···	2.5	1.2
BWU 25- ···	2.5	1.5
BWU 30- ···	3	2
BWU 40- ···	3	2.5
BWU 60- ···	4	2.5

3 When lateral load is predominant

As shown in Fig. 4, fix the side surface of the table and the side surface of the bed securely onto the machine with a pressure plate, etc.



4 Mounting bolt tightening torque

Table 6 shows the mounting bolt tightening torque in general application when the mating parts are made of steel and hexagon socket head stainless steel bolts (equivalent to JIS property division A2-70) are used. According to the material of mating parts and the operating conditions, increase or decrease the amount of tightening torque.

Bolt size	Tightening torque N∙m
M1 × 0.25	0.04
$M1.4 \times 0.3$	0.10
$M1.6 \times 0.35$	0.15
$M2 \times 0.4$	0.31
M3 × 0.5	1.1
M4 × 0.7	2.5

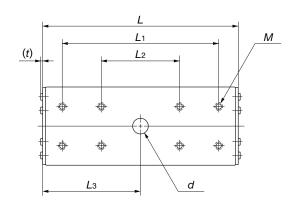
1mm=0.03937inch

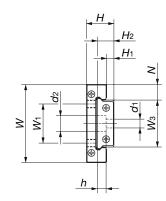
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Ε

High Rigidity Precision Linear Slide Unit







	Mass				Nomin	al dime mm	ensions	S	Dimensions of table mm				
Model number	Table	Bed	w	н	<i>H</i> 1	N	L	Maximum stroke length	W1	<i>L</i> 1	L 2	М	Maximum tightening depth
BWU 6- 10	0.72	0.23					10	3	_	4	_		
BWU 6- 20	1.6	0.50	6	3.2	0.7	2	20	11	_	10	_	M1.4	0.8
BWU 6- 30	2.4	0.78					30	16	_	18	10		
BWU 8- 10	0.96	0.42					10	4	_	5.5	_		
BWU 8- 20	2.2	0.97	8	4	1	2.5	20	16	_	10	_	M2	0.8
BWU 8- 30	3.3	1.5					30	20	_	21	10		
BWU 12- 20(1)	3.6	1.9					20	16	_	8	_		
BWU 12- 30(1)	5.7	3.2	12	4.5	1	3	30	20	_	15	_	M2	1.1
BWU 12- 45(1)	8.5	4.9					45	30	_	31	15		
BWU 17- 20	9.2	3.9					20	14		10	_		
BWU 17- 30	17.8	7.8	17	8	1.5	5	30	19	12	20	_	M2	3
BWU 17- 45	26.5	11.7					45	29		30	_		
BWU 25- 30	22.5	13.3					30	23		15	_		
BWU 25- 45	41.6	24.3	٥٥		4.0		45	28	10	25	_		0.5
BWU 25- 60	55.7	33.0	25	9	1.8	5.5	60	38	10	25	_	M3	2.5
BWU 25- 75	68.4	40.8					75	48		55	25		
BWU 30- 30	31.9	25.0					30	23		15	_		
BWU 30- 45	56.9	45.4					45	29		25	_		
BWU 30- 60	76.1	61.5	30	12	3.4	6	60	35	14	25	_	МЗ	3
BWU 30- 75	93.8	76.1					75	47		55	25	1	
BWU 30- 90	101	84.8					90	59		55	25	1	

Note(1): Special mounting bolts for mounting the bed (cross recessed head cap screws for precision equipment M2 x 4) are appended to BWU12.

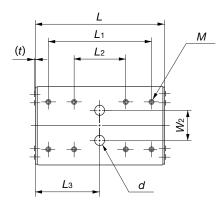
4	n×P	
#		
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 (b) 	(\$)	——(((((((((((((((
1 1	1+1	`+'
# -		
1		

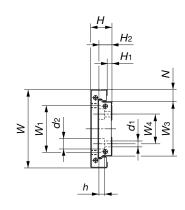
			Dimensions of bed mm							Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
						I				С	C 0	F	T 0
L 3	d	t	W 3	H ₂	n	P	d1	d ₂	h	N	N	N	N∙m
_	_				1	4		_	_	154	181	60.2	0.21
	_	0.46	2	1.9	1	8	M1.0 Thru	_	_	252	361	120	0.42
_	_				2	8	hole	_	_	355	587	196	0.68
	_				1	5	M1.6	_	_	203	212	70.6	0.36
	_	0.45	3	2.6	1	10	Thru	_	_	292	353	118	0.60
_	_				2	10	noie	_	_	442	635	212	1.1
_	-				1	7.5				292	353	118	1.1
_	-	0.45	6	2.8	1	15	2.4	4	1.5	442	635	212	2.0
22.5	4.5				2	15				603	988	329	3.2
10	4.5				1	7.5				588	635	212	2.5
	_	0.8	7	5	1	15	2.4	4.2	2.3	874	1 110	370	4.4
22.5	4.5				2	15				1 200	1 750	582	6.9
	_				1	15				783	953	318	7.1
	_	0.9	14	5.2	1	30	3.5	6	3.2	1 200	1 750	582	13.0
_	_	0.3	14	5.2	1	30	3.5	0	3.2	1 490	2 380	794	17.7
37.5	6.5				2	30				1 760	3 020	1 010	22.5
_	_				1	15				1 270	1 410	470	13.4
	_				1	30				1 920	2 540	847	24.1
_	_	1.0	18	7.5	1	30	3.5	6.5	4.5	2 490	3 670	1 220	34.9
37.5	6.5				2	30				2 880	4 520	1 510	42.9
45	6.5				2	30				3 250	5 360	1 790	50.9

IKO

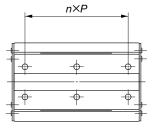
High Rigidity Precision Linear Slide Unit







	Mass (Ref.) g				Nomin	al dime	ensions	S	Dimensions of table mm				
Model number	Table	Bed	w	н	<i>H</i> 1	N	L	Maximum stroke length	<i>W</i> 1	<i>L</i> 1	L2	М	Maximum tightening depth
BWU 40- 40	68.9	52.0			3.5	8	40	31		20	_	M4	4
BWU 40- 60	125	93.0	40	14			60	39	20	40	_		
BWU 40- 80	167	125					80	47		40	_		
BWU 40-100	207	155					100	63		80	40		
BWU 60- 60	195	194					60	34		40	_		
BWU 60- 80	261	261		4.0			80	45	00	40	_	M4	4
BWU 60-100	321	325	60	16	3.6	9	100	56	36	80	40		
BWU 60-120	386	391					120	68		100	40		



Dimensions of bed mm									Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating			
	l I		l		I				l	l	I	С	C ₀	F	T 0
W 2	Lз	d	t	W 3	H 2	W 4	n	P	d1	d ₂	h	N	N	N	N∙m
_	_	_					1	20	4.5	8	4.5	2 040	2 210	735	27.8
_	_	-		24		i	1	40				3 100	3 970	1 320	50.0
_	_	_	1.0		8.5		1	40				4 010	5 730	1 910	72.2
_	50	8					2	40				4 640	7 060	2 350	88.9
_	_	_					1				4.5	4 740	5 690	1 900	124
_	_	-		40	10	20	1	40	4 -			5 930	7 820	2 610	171
23	50	8	1.1	42	10	23	2	40	4.5	8		7 020	9 960	3 320	217
23	60	8					2					8 050	12 100	4 030	264



BSP/BSPG/BSR

IKO Precision Linear Slide is a light weight and compact linear motion rolling guide, comprising a U-shaped table (or slide unit race) and bed (or track rail) made from stainless steel sheet by precision forming. The raceway grooves are accurately ground on the table (or slide unit race) and bed (or track rail). Precision Linear Slide features high performance and durability, making this series suitable for measuring equipment, disk drives, IC manufacturing and inspection devices, etc. Wide variations in performance and size are available for selections suitable for each application.

Superior corrosion resistance

The balls, table, bed and other steel components are made of stainless steel. So this series is superior in corrosion resistance and most suitable for use in clean rooms.

Quiet and smooth motion

The advanced design of ball retainers and circulators combined with precise grinding of raceways minimizes noise and gives smooth motion with low frictional resistance. So superior positioning accuracy and response can be obtained during operation even for a very small feed motion.

High safety

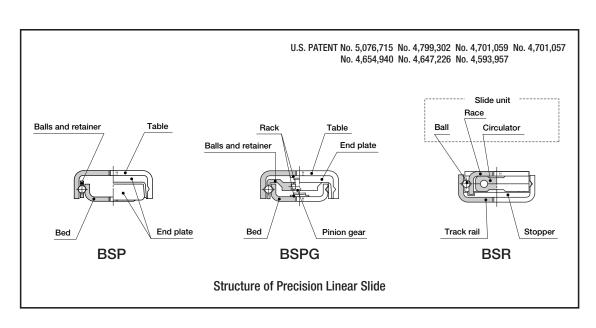
All organic components are made of nonflammable or self-extinguishing materials. So this series may be used in home appliances and office equipment.

Light weight and compact

A simple structural design minimizes the number of components, offering reduced size and weight of sliding members in machines and equipment.

Stable performance

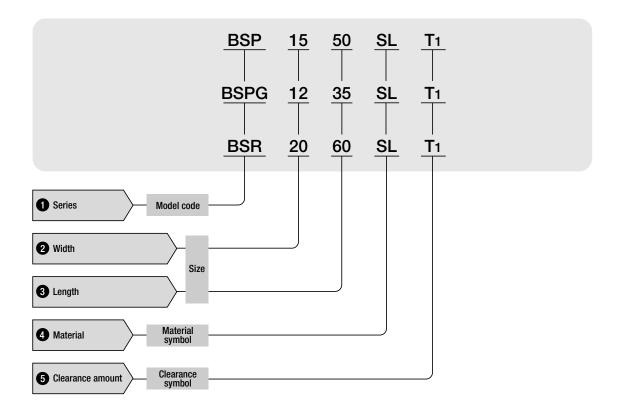
The steel balls are arranged in two rows with each ball contacting the raceways at four points. So stable load capacity is assured for loads in all directions. In addition, the simple design minimizes errors in manufacturing and assembly, ensuring high operating accuracy.



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch **E-105**

Identification number and specification

The specification of Precision Linear Slide is indicated by the identification number, consisting of a model code, a size, a material symbol and a clearance symbol.



1 Series

Limited linear motion type : BSP

Built-in rack & pinion type : BSPG For available types and widths, see Table 1.

Endless linear motion type : BSR

2 Width

Indicate the width in mm.

Table 1 Types and widths											
Type Width	BSP	BSPG	BSR								
7	0	_	_								
10	0	_	_								
12	_	0	0								
15	0	0	0								
20	0	0	0								
25	0	0	0								

3 Length

Indicate the length in mm.

4 Material

Stainless steel made : SL

Only stainless steel type "SL" is indicated.

5 Clearance amount

Standard : No symbol

T1 clearance

: T1

For details of clearance amount, see Table 2.

Clearance

Internal clearances of Precision Linear Slide are shown in Table 2. Generally, standard clearance is recommended for applications requiring low friction. T1 clearance is generally suitable for applications requiring more accurate linear movement.

Table 2 Clearance	unit : μm
Clearance type and symbol	Clearance between raceways and balls
Standard (No symbol)	0 ~ +4
T ₁	-4 ∼ 0

Load Rating

Summarized descriptions of load ratings of Precision Linear Slide are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Precision Linear Slides are individually operated and 90% of the units in the group can travel 50 x 10³ meters free from material damage due to rolling contact fatigue.

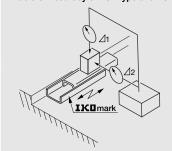
Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

Accuracy

The accuracy of Precision Linear Slide in operation is shown in Tables 3 and 4.

Table 3 Accuracy of BSP type and BSPG type

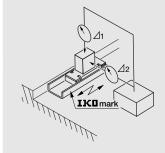


Stroke m	length m	Parallelism in operation between bed center and mounting surface of table	Parallelism in operation between bed center and reference mounting surface of table
over	incl.	⊿1	⊿2
_	18	3	6
18	30	4	8
30	50	5	10
50	80	6	12

Table 4 Accuracy of BSR type

unit : ᠘

unit: µm



over incl. ⊿1 ⊿2	
- 18 3 6	
18 30 4 8	
30 50 5 10	
50 80 6 12	

Precautions for Use

- 1 To obtain consistently high accuracy in operation, the applied load should not exceed 20% of the basic static load rating.
- 2 To maximize the accuracy of BSP or BSPG type, center the applied load over the table or bed. Allow enough additional stroke length to avoid reaching the maximum stroke length.
- ① Unevenly applied loads and high fluctuating velocities may dislocate the position of the ball retainer in the BSP type. Therefore, it is recommended that the retainer is periodically repositioned to its proper location by cycling the BSP type over its full stroke length.
- 4 BSPG or BSR type is recommended when it is difficult to readjust the position of the retainer in the BSP type.
- **6** Operating temperature

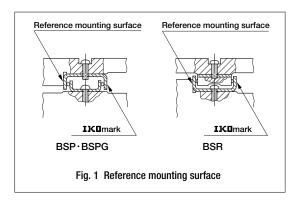
 The maximum operating temperature is 120°C, and continuous operation is possible at temperatures up to 100°C. If the operating temperature exceeds 100°C, consult **IKO** for further information.
- 6 Use Precision Linear Slide at speeds lower than 30 m/min.
- **7** Precision Linear Slide does not incorporate a mechanical stopper. When over stroke is expected during the operation, prepare a stopper mechanism on the adjoining equipment.
- In order to ensure smooth motion of BSP and BSR types, it is recommended to wash out rust preventive oil with a suitable cleaning agent, and reapply a high grade lubricating oil or grease to the raceways before running in.
- Perfluoro Polyether grease is applied on the raceways and rack and pinion of BSPG, and a product is packaged by volatile rust preventive sheet.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

BSP, BSPG, BSR

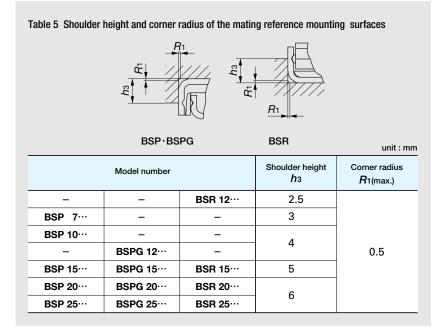
Precautions for Mounting

• The reference mounting surface of Precision Linear Slide is the side surface opposite to the **IKD** mark.



- **2** When mounting Precision Linear Slide, the mounting bolts should not be inserted deeper than the maximum insertion depth shown in the dimension table.
- When mounting the BSP and BSPG types, the female threads in the table and bed are usually used. It can also be mounted with screws that are one size smaller than the female threads by inserting the screws through the female thread holes. BSP 715 SL ∼ BSP 740 SL can not be mounted from inside of the table and bed.
- When mounting the track rail of BSR type, the female threads of the track rail are used. It can also be mounted with screws that are one size smaller than the female threads by inserting the screws through the female thread holes. BSR 1530 SL and BSR 2040 SL can not be mounted from inside of the track rail. When mounting BSR1230SL to BSR1260SL track rail with screws that are one size smaller than the female threads by inserting the screws through the female thread holes, consult IKI.
- **1** The accuracy of mating surface affects both accuracy and performance of Precision Linear Slides. Therefore, to obtain optimal accuracy during operation, the surface should be finished to as high accuracy as possible.

It is recommended to make a relieved fillet at the corner of the mating reference mounting surfaces as shown in Fig. 1. However, corner radius R_1 shown in Table 5 can also be used. Table 5 shows recommended shoulder height of the mating reference mounting surfaces.

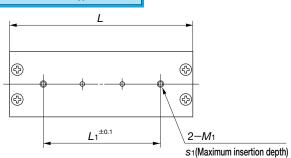


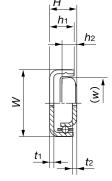
(3) Tightening torque of mounting bolts affects the performance and accuracy of Precision Linear Slides. The limit of the tightening torque depends on the material, rigidity and finish of the mating surfaces. In general, a light tightening torque is used and the recommended values are shown in Table 6. When vibration is expected to occur, it is recommended to use adhesive agent, etc. to secure the bolts.

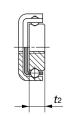
Bolt size	Tightening torque
DOIL SIZE	N·m
$M2 \times 0.4$	0.064
$M2.3 \times 0.4$	0.10
M2.6 × 0.45	0.15
M3 × 0.5	0.23

IX Precision Linear Slide





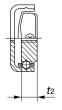


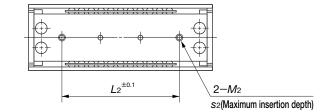


BSP 7

Model number	Mass (Ref.)		Nomin	al dimens mm	sions	M	ounting o	dimensior mm	ns of tabl	e
Model Hambel	g	w	н	L	Maximum stroke length	<i>L</i> 1	M 1	Maximum insertion depth	h1	t1
BSP 7 15 SL(1)	2.1			15	9	5				
BSP 7 20 SL(1)	2.8	_	4	20	9	10	N40		0.4	0.9
BSP 7 30 SL(1)	4.2	7	+	30	18	20	M2	1	3.4	
BSP 7 40 SL(1)	5.6			40	23	30				
BSP 10 25 SL	6.2			25	15	15				
BSP 10 35 SL	8.8	10	6	35	26	25	M2.6	1.5	5.8	1.1
BSP 10 45 SL	11.3			45	38	35				
BSP 15 30 SL	11			30	22	14				
BSP 15 40 SL	14.7			40	24	24	M3	2.5	7	1.2
BSP 15 50 SL	18.4	15	8	50	32	34	IVI3	2.5	,	1.2
BSP 15 60 SL	22.1			60	40	40				
BSP 20 40 SL	23.7		10	40	22	24	M3			1.4
BSP 20 50 SL	29.7			50	28	34				
BSP 20 60 SL	35.7	20		60	34	40		3.2	9	
BSP 20 70 SL	41.7			70	40	45				
BSP 20 80 SL	47.6			80	53	50				
BSP 25 50 SL	37.6			50	26	34				
BSP 25 60 SL	45.3			60	32	40				
BSP 25 70 SL	52.9	25	10	70	40	45	М3	3.5	9	1.6
BSP 25 80 SL	60.5			80	51	50				
BSP 25 100 SL	75.8			100	63	60				

Note(1): BSP715SL to BSP740SL can not be mounted from inside of the table and bed.



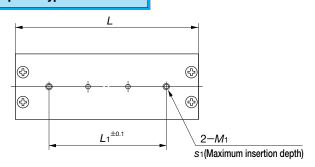


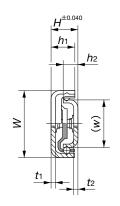
BSP 10

	Мс		ensions of	bed		Basic dynamic load rating	Basic static load rating
w	L2	M 2	Maximum insertion depth \$2	h2	t2	C N	Co N
	5		S2			93.3	42.0
	10		_			134	70.0
3.6	20	M2	2	_	2	170	98.0
	30					203	126
	15			340	156		
6.2	25	M2.6 2.7 3.7 2.7		398	194		
	35				453	233	
	14				1.2	395	194
11.2	24	M3	M3 3	4.5		550	311
11.2	34			4.5	1.2	644	389
	40					732	467
	24					726	386
	34					866	496
16	40	M3	3.5	6.2	1.4	998	606
	45					1 120	717
	50					1 180	772
	34					866	496
	40					998	606
20.5	20.5 45	M3	3	5.7	1.6	1 120	717
	50					1 180	772
	60					1 410	992

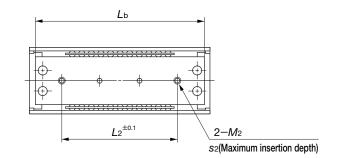
IKO Precision Linear Slide

Built-in rack & pinion type: BSPG





Model number	Mass (Ref.)		Nomin	al dimens	sions	Mounting dimensions of table mm				
Woder Humber	g	w	н	L	Maximum stroke length	L 1	M 1	Maximum insertion depth S1	h1	t1
BSPG 12 25 SL	6.5			25	14	15				
BSPG 12 35 SL	9.0	12	6	35	24	24	M2.6	2	5.2	1.2
BSPG 12 45 SL	11.6			45	34	34				
BSPG 15 40 SL	15.8			40	24	24				
BSPG 15 50 SL	19.6	15	8	50	32	34	МЗ	2.5	7	1.2
BSPG 15 60 SL	23.5			60	40	40				
BSPG 20 40 SL	25.5			40	22	24				
BSPG 20 50 SL	31.8			50	28	34				
BSPG 20 60 SL	38.1	20	10	60	34	40	МЗ	3.2	9	1.4
BSPG 20 70 SL	44.4			70	40	45				
BSPG 20 80 SL	50.5			80	47	50				
BSPG 25 50 SL	40.3			50	26	34				
BSPG 25 60 SL	48.3			60	32	40				
BSPG 25 70 SL	56.2	25	10	70	38	45	М3	3.5	9	1.6
BSPG 25 80 SL	64.1			80	44	50				
BSPG 25 100 SL	80.0			100	56	60				



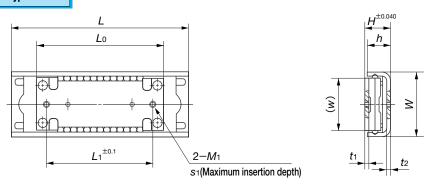
		Mounting	dimension mm	ons of bed			Basic dynamic load rating	Basic static load rating
				Maximum			С	C ₀
Lь	W	L ₂	M 2	insertion depth \$2	h2	t2	N	N
23.6		15					244	131
33.6	7.6	24	M2.6	2	3	1	299	175
43.6		34					350	219
37		24					550	311
47	9.6	34	M3	3	4.5	1.2	644	389
57		40					732	467
37		24					726	386
47		34					866	496
57	13.8	40	M3	3.5	6.2	1.4	998	606
67		45					1 120	717
77		50					1 240	827
46		34					866	496
56		40					998	606
66	18.4	45	M3	3	5.7	1.6	1 120	717
76		50					1 240	827
96		60					1 460	1 050

BSP, BSPG, BSR

IKO

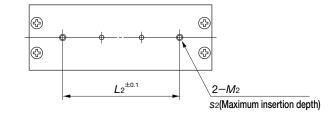
Endless linear motion type: BSR

IX Precision Linear Slide



Model number	Mass (Ref.)		Nomina	al dimen mm	sions		Mountin	_	sions of nm	slide unit	
Woder Hamber	g	W	н	L	Maximum stroke length	W	Lo	<i>L</i> 1	M 1	Maximum insertion depth S1	t1
BSR 12 30 SL(1)	5.8			30	13						
BSR 12 40 SL(1)	7.0	12	4.5	40	23	9.8	21.5	15	M2	4.0	0.9
BSR 12 50 SL(1)	8.2	12	4.5	50	33	9.8	21.5	15	IVIZ	1.3	0.9
BSR 12 60 SL(1)	9.3			60	43						
BSR 15 30 SL(2)	12.6			30	10						
BSR 15 40 SL	14.8	14.8	15 8	40	20	12.2	30	24	M3	1.8	1
BSR 15 50 SL	17.1	15		50	30			24	1410	1.0	'
BSR 15 60 SL	19.3			60	40						
BSR 20 40 SL(2)	27.6			40	12						
BSR 20 50 SL	31.1			50	22						
BSR 20 60 SL	34.6	20	10	60	32	16.8	40	32	МЗ	2.2	1.4
BSR 20 70 SL	38.1			70	42						
BSR 20 80 SL	41.6			80	52						
BSR 25 70 SL	53.8			70	33						
BSR 25 80 SL	58.4	25	10	80	43	21.4	50	42	МЗ	2.4	1.6
BSR 25 100 SL	67.4			100	63						

Note(¹): When mounting a track rail for sizes BSR1230SL to BSR1260SL by fixing bolts through the inside of M₂ mounting holes, consult **IXU**. (²): BSR1530SL and BSR2040SL can not be mounted by bolts from the inside of track rail due to stroke length limitation.



N	lounting d	imensions mm	of track ra	ail	Basic dynamic load rating	Basic static load rating
		Maximum insertion depth h t2		С	C ₀	
L2	M 2	depth \$2	h	t2	N	N
15						
20	M2	1.6	4	0.9	214	140
34	IVIZ	1.6	4	0.9	214	140
40						
14						
24	M3	3	7	1.2	543	311
34	IVIS	3	,	1.2	543	311
40						
24						
34						
40	МЗ	3.5	9	1.4	921	551
45						
50						
45						
50	М3	3.5	9	1.6	1 170	772
60						



Linear Bushings

Description of each series and Table of dimensions









In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

Linear Bushing G

LMG

IKO Linear Bushing G is a high load capacity type linear motion rolling guide which achieves endless linear motion of an external cylinder along a shaft with grooved raceways. It is a very simple and compact linear bushing with a large load capacity.

Interchangeable

The dimensional accuracy of the external cylinder and that of the shaft with grooved raceways are controlled individually to ensure interchangeability, so that they can be combined, added or exchanged freely.



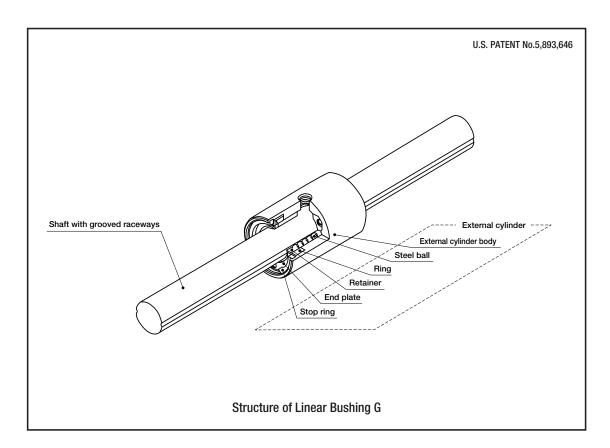
Two rows of steel balls are incorporated in the external cylinder and make contact with grooved raceways of the shaft to obtain high rigidity and high load capacity.

Solid shaft and hollow shaft

The shaft with grooved raceways can be selected from two types: the solid shaft type LMG and the hollow shaft type LMGT. The hollow shaft type is suitable for applications in which piping, wiring or ventilation is needed.

Dimensionally interchangeable with Linear Bushing LM

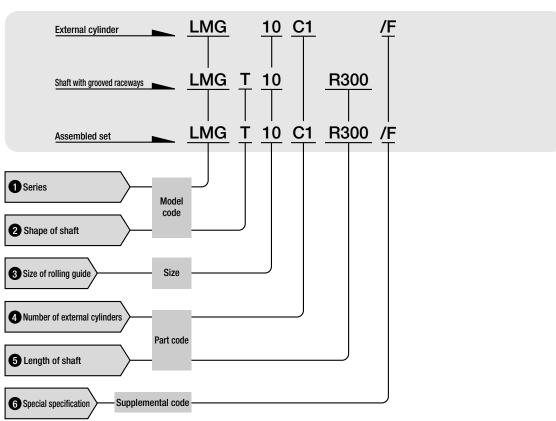
Linear Bushing G is dimensionally interchangeable with Linear Bushing LM and it is easy to change from one to



Linear Bushing G series Shaft shape Model code **LMG** Solid shaft Linear Bushing G **LMGT** Hollow shaft

Identification number and specification

The specification of Linear Bushing G is indicated by the identification number, consisting of a model code, a size, a part code and any supplemental codes.



E-121

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

2 Shape of shaft

Solid shaft : No symbol

: т Hollow shaft

3 Size of rolling guide

Indicate the shaft diameter in mm.

4 Number of external cylinders

Assembled set : CO External cylinder only : C1

For an assembled set, indicate the number of external cylinders assembled on one shaft with grooved raceways. For an external cylinder, only

"C1" can be indicated.

5 Length of shaft

Assembled set

Shaft only

: **R**O

Indicate the length of shaft with grooved raceways in mm. For standard and maximum lengths, see the

: **R**O table of dimensions. 6 Special specification

External cylinder with shell type flange : F

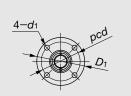
With end seals

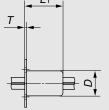
Special specification is applicable to all models and sizes. When a combination of several special specifications is required, arrange their supplemental codes in alphabetical order.

External cylinder with shell type flange /F

When a flanged external cylinder is required, this type can be used. A shell type flange is formed by precision drawing of thin steel plate.

Table 1 Dimensions of the external cylinder with shell type flange



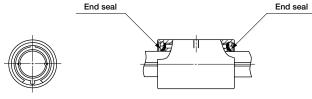


unit: mm

Model	number	D	<i>L</i> ₁	T	D 1	d ₁	pcd
LMG 6	LMGT 6	14	20.5	1.1	28	3.4	22
LMG 8	LMGT 8	17	25.5	1.1	32	3.4	26
LMG 10	LMGT 10	21	30.5	1.1	39	4.5	31
LMG 13	LMGT 13	25	33.5	1.1	43	4.5	35
LMG 16	LMGT 16	30	38.5	1.1	48	4.5	40
LMG 20	LMGT 20	34	43.5	1.1	55	5.5	45

With end seals /U

To prevent intrusion of foreign matter, end seals are mounted at both ends of the external cylinder.



Load Rating

The load ratings of Linear Bushing G are defined for downward load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Linear Bushings G are individually operated and 90% of the units in the group can travel 50 x 10³ meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

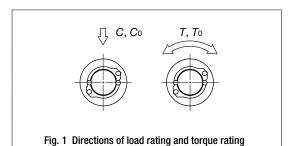
The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

Dynamic torque rating T

The dynamic torque rating is defined as the constant torque both in direction and magnitude under which a group of identical Linear Bushings G are individually operated and 90% of the units in the group can travel 50×10^3 meters free from material damage due to rolling contact fatigue.

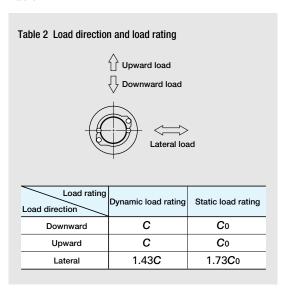
Static torque rating To

The static torque rating is defined as the static torque that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.



Load direction and load rating

Since the load ratings of Linear Bushing G given in the table of dimensions are for downward load, they must be corrected for the load direction for upward or lateral load. The corrected basic dynamic load ratings and basic static load ratings are shown in Table 2.



Accuracy

The accuracy of Linear Bushing G is shown in the dimension table. The allowable value for the total radial runout of axial line of the shaft with grooved raceways is shown in Table 3.

The allowable value for the twist of grooves with respect to effective length of shaft with grooved raceways is 33μ m for any length of 100 mm over the entire effective length of raceway. Measuring methods of accuracy are shown in Table 4.

	gth of shaft	LMG 6	LMG 8	LMG 10	LMG 13	LMG 16	LMG 20		
over	nm incl.	LMGT 6	LMGT 8	LMGT 10	LMGT 13	LMGT 16	LMGT 20		
-	200	142	142	129	129	12	26		
200	315	203	203	153	153	14	1 1		
315	400	-	255	173	173	15	53		
400	500	-	306	193	193	16	35		
500	630	-	-	221	221	18	32		
630	800	-	-	-	260	20)7		
800	1 000	_	_	_	_	24	10		

Remark: These values are applicable when the radial internal clearance is 0 μ m.

Item	Measuring method	Illustrations of measuring method
Fwist of grooves with respect to effective length of the shaft with grooved raceways	Fix and support the shaft. Then apply a uni-directional torsional moment on the external cylinder before placing a dial gage probe at right angles to the shaft against the side face of the measuring block attached on the external cylinder. Measure runout when the external cylinder and the gage have traveled together 100 millimeters on any effective part of the raceway grooves. In the measurement, the probe should be applied as near as possible to the outer surface of the external cylinder.	Measuring block 100 Datum block for traveling of gage
Fotal radial runout of axial line of shaft with grooved 'aceways See Table 3.)	While supporting the shaft at its supporting parts or at both center holes, place a dial gage probe to the outer surface of external cylinder, and measure runout at several positions in the axial direction while turning the shaft one rotation. Use the maximum value.	

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Radial Internal Clearance

The radial internal clearance of Linear Bushing G is approx. $10\,\mu$ m. In the shell flange type, radial internal clearance is slightly smaller than that of standard type.

Moment of Inertia of Sectional Area and Section Modulus of Shaft with Grooved Raceways

Moment of inertia of sectional area and section modulus of the shaft with grooved raceways are shown in Table 5.

	الماماءا	number		Moment of inertia of	f sectional area mm4	Section me	odulus mm³
ľ	viodei i	lumber		Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
LMG	6	LMGT	6	60	59	20	20
LMG	8	LMGT	8	190	190	49	48
LMG 1	10	LMGT	10	470	460	95	93
LMG 1	13	LMGT	13	1 360	1 300	210	200
LMG 1	16	LMGT	16	3 130	2 930	390	360
LMG 2	20	LMGT	20	7 720	7 230	770	720

Precautions for Use

1 Lubrication

Both grease and oil lubrication are applicable. In case of grease lubrication, use of quality lithium-soap base grease is recommended for general applications.

2 Fixing depth of mounting bolt of external cylinder

The fixing depth of mounting bolt of external cylinder should be less than the maximum depth shown in the dimension table. The fixing female thread hole in the external cylinder is a through hole. Therefore, if the fixing depth of mounting bolt is too large, the mounting bolt will contact and push the shaft, and accuracy and life will be affected adversely.

3 Multiple external cylinders in close distance

When two or more external cylinders (standard or with shell type flange) are used in close distance in the same housing, the distance between the centers of external cylinders should be over three times of the length of external cylinders. If the external cylinders are used in close distance, consult **IKD**.

4 Operation with rotational torque

In case a bi-directional and/or repeated rotational torque is applied, select IKD Linear Ball Spline G.

Precautions for Mounting

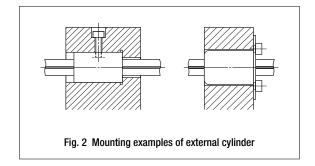
Fit

The normal fit between the external cylinder of Linear Bushing G and the housing is recommended to be a clearance fit (H7). But, in special cases, a transition fit (J7) may be used.

In case of the external cylinder with shell type flange, a clearance of over 0.2 mm based on the nominal outside diameter is required.

Mounting

To mount Linear Bushing G, the external cylinder should be press fitted carefully with proper tools using, for example, a press machine. Mounting examples are shown in Fig. 2.



Accessories

Shaft Support Block

Support blocks are prepared for supporting the ends of "shaft with grooved raceways" of Linear Bushing G. For details, consult **IKU**.



Linear Bushing G

Solid shaft : LMG Hollow shaft : LMGT

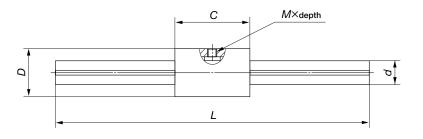






Bore dia. of hollow shaft

Model number	Interchangeable	Mass (Nominal dimensi	ions and t	tolerances
	Interch	External cylinder	Shaft(1)	D	Tolerance	С	Tolerance	M×depth(²)	d	Tolerance
LMG 6	☆	9.4	22.0	12	0	19	0	M2.5×1.9	6	0
LMGT 6	☆	5.4	19.5	12	-0.011		-0.200	(2.5)		-0.012
LMG 8	☆	15.7	39.3	15	0	24	0	M3 ×2.4	8	0
LMGT 8	☆	15.7	33.7	15	-0.011	24	-0.200	(3)	0	-0.015
LMG 10	☆	31.5	61.2	19	0	29	0	M3 ×3.1	10	0
LMGT 10	☆	31.5	51.4	13	-0.013	23	-0.200	(4)	10	-0.015
LMG 13	☆	45.4	104	23	0	32	0	M3 ×3.4	13	0
LMGT 13	☆	45.4	81.4	23	-0.013	32	-0.200	(4.5)	13	-0.018
LMG 16	☆	78.2	157	28	0	37	0	M4 ×4.1	16	0
LMGT 16	☆	70.2	118	20	-0.013		-0.200	(5.5)	10	-0.018
LMG 20	☆	110	246	32	0	42	0	M4 ×4.1	20	0
LMGT 20	☆	110	185	32	-0.016	44	-0.200	(5.5)	20	-0.021



				Basic dynamic load rating	Basic static load rating	Dynamic torque rating(4)	Static torque rating(4)
	1			С	C ₀	Т	T 0
d2(3)	K	L	Maximum length	N	N	N∙m	N∙m
5.2	-	150 200	300	587	641	2.1	2.2
5.2	2	130 200	300	307	041	2.1	2.2
7	_	150 200 250	500	769	962	3.5	4.3
	3	150 200 250	400	709		3.5	4.3
8.9	_	200 300	600	1 410	1 710	8.0	9.7
	4	200 300	000	1410	1710	0.0	J.7
11.9	_	200 300 400	800	1 880	2 150	13.7	15.7
	6	200 000 100	000	1 000	2 100	10.7	
14	_	200 300 400	1 000	2 590	2 930	23.1	26.1
	8	200 300 400	1 000	2 550	2 330	23.1	20.1
17.5	_	300 400 500 600	1 000	3 010	3 660	32.8	39.9
	10	000 400 000	1 300	3 310	3 300	32.0	

Note(1): Figures shown in this column are the mass per 100 mm of shaft.

(2): The values in parentheses indicate the max. fixing depth of mounting bolt.

(3): Dimension do indicates the maximum diameter when machining is done at the shaft ends.

(4): Figures shown in T and To columns are applicable when a uni-directional torque is applied.

In case a bi-directional and/or repeated rotational torque is applied, select IKO Linear Ball Spline G.

Remark: All Linear Bushing G series are interchangeable specification products.

Linear Bushing

LBE/LBD/LBB/LM/LME/LMB

IKO Linear Bushing is a high precision linear motion rolling guide which travels along a shaft to achieve endless linear motion. In the external cylinder, a retainer, steel balls, etc. are compactly incorporated. Wide variations in size are available for selections suitable for each application.

Low frictional linear motion

Steel balls are accurately guided by a retainer, so low frictional resistance and stable linear motion can be achieved.

Simple replacement of conventional plain bushings

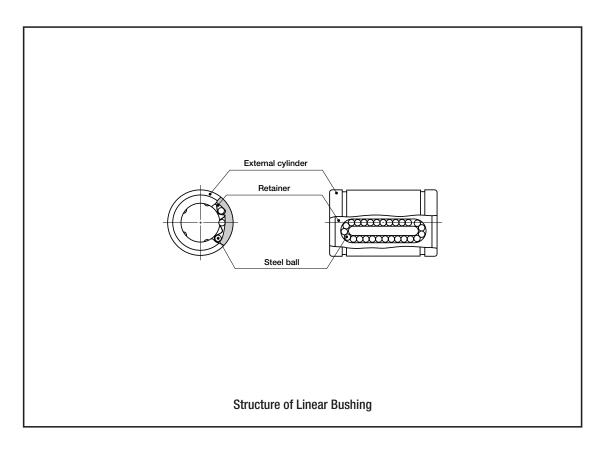
It is easy to use Linear Bushings instead of conventional plain bushings, because both types are used with a round shaft, and no major redesign is necessary.

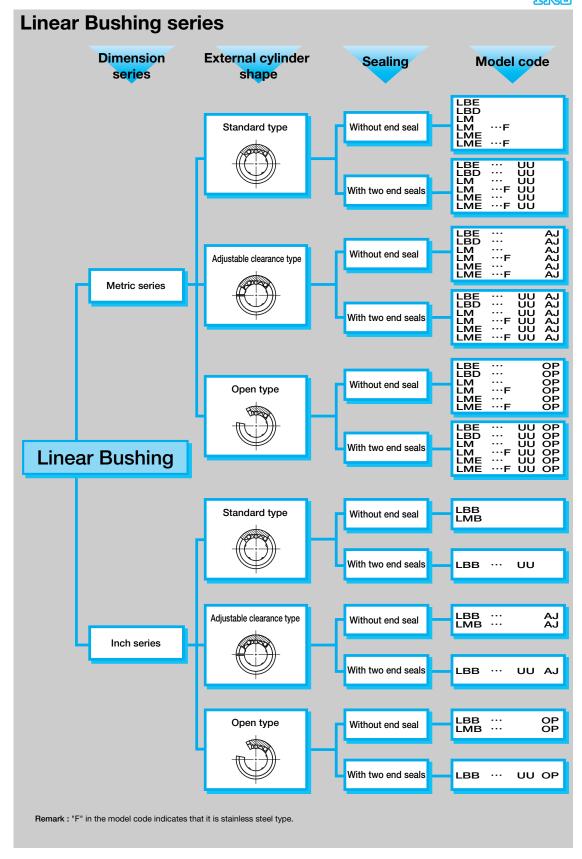
Wide variations

For each dimensional series, standard, adjustable clearance and open types are available with and without seals, so the best linear bushing for the application may be selected.

Stainless steel type

Linear Bushings made of stainless steel are also available. This type is suitable for applications where corrosion resistance is important.



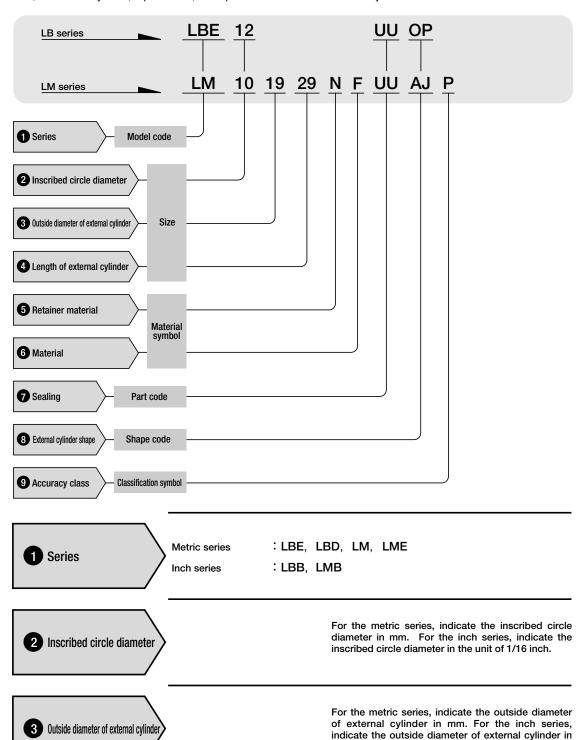


1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

E-132

The specification of Linear Bushing is indicated by the identification number, consisting of a model code, a size, a material symbol, a part code, a shape code and a classification symbol.



the unit of 1/16 inch.

4 Length of external cylinder

For the metric series, indicate the length of the external cylinder in mm. For the inch series. indicate the length of external cylinder in the unit of 1/16 inch.

5 Retainer material

Synthetic resin made : N

In case of LM series, specify the retainer material. For applicable models and sizes, see the "Model number" column in the table of dimensions on Carbon steel made : No symbol pages E-140 to E-173. The maximum operating temperature for the synthetic resin type is 100°C. Continuous operation is possible at temperatures up to 80°C.

> In all of LB series, the retainer is made of synthetic resin.

6 Material

Stainless steel made : F

High carbon steel made : No symbol Specify the component part material. For applicable models and sizes, see the "Model number" column in the table of dimensions on pages E-140 to E-173.

7 Sealing

Without end seal

: UU With two end seals

The two seal types incorporate seals with superior : No symbol dust protection performance at both ends of the external cylinder for preventing intrusion of foreign matter. The maximum allowable temperature for

seals is 120°C.

8 External cylinder shape

Standard type : No symbol

Adjustable clearance type : AJ See "External cylinder shape" shown below.

: OP Open type

External cylinder shape

Standard type

This type is widely used as a general purpose linear guide. High and precision classes are available.

Adjustable clearance type

A slot in a longitudinal direction is made on the external cylinder in order to adjust the clearance. When this type is used with a housing which can adjust the bore diameter, the radial internal clearance can be adjusted without fit selection between the linear bushing and shaft. It is possible to give a preload.

Open type

This type has one or two fewer ball circuits than the standard type, creating an open section to allow clearance for a shaft support.

The open type bushing is commonly used with long shafts when one or more support blocks are needed to reduce shaft deflection or sag. The width of the support blocks can be determined to match the (E) dimension of fan shaped open section shown in the table of dimensions. The radial internal clearance can also be adjusted.

High

For details of accuracy, see the table of dimensions on pages E-140 to E-173. High class and precision class : No symbol are available for the LBD, LBB, LM and LMB standard type series.

For the adjustable clearance type and the open type, only high class is available, and the accuracy values are applicable only before cutting the external cylinders.

9 Accuracy class

Precision

: P

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Summarized descriptions of load ratings of Linear Bushing are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Linear Bushings are individually operated and 90% of the units in the group can travel 50×10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

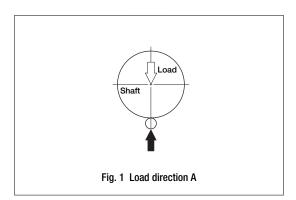
The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

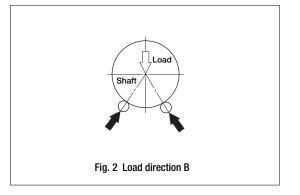
Relationships between load ratings and the position of ball circuits

Load ratings of Linear Bushing are affected by the position of the ball circuits. In the table of dimensions, two types of load ratings are shown corresponding to the load directions and steel ball circuit positions as shown in Fig. 1 and Fig. 2.

In Fig. 1 the load direction is in line with the steel ball circuit position and this direction is referred to as load direction A in the table of dimensions. In general, the load ratings for this direction are also used, when the load direction is indeterminate or the steel ball circuit position in relation to the load direction cannot be determined.

In Fig. 2, the load direction is pointed at the center of two ball circuits and this direction is referred to as load direction B in the table of dimensions. In general, a larger load can be received in this case compared with load direction A.





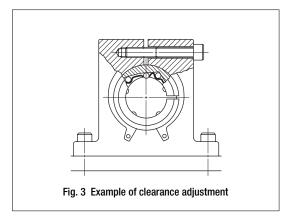
Precautions for Use

Clearance

Adjustable clearance and open type Linear Bushings can be adjusted for radial internal clearance if they are used with a housing which can adjust the bore diameter.

However, if the degree of the adjustment is excessive, deformation at the contact points between steel balls and shaft or external cylinder becomes large, resulting in short life. Therefore, it is recommended to prepare a shaft with a specified fit tolerance and adjust the radial internal clearance to zero or minimal preload by matching the individual components.

The clearance is adjusted while checking with a dial gage. The adjustment is generally completed when the shaft is rotated in an unloaded condition and light resistance is caused by the rotation of shaft. In this condition, the radial internal clearance becomes zero or minimal preload. For open type Linear Bushings having three rows of ball circuits, clearance adjustment can not be made.



2 Raceway surface

Since Linear Bushings operate with a shaft as a raceway surface, the shaft should be heat-treated and ground. Recommended surface hardness and roughness of the shaft are shown in Table 1, and also recommended minimum effective hardening depth of the raceway is shown in Table 2.

Table 1 Surf	Table 1 Surface hardness and roughness of raceway							
Item	Recommended value	Remarks						
Surface hardness	58~64HRC	When the raceway hardness is less than the necessary hardness, multiply load ratings by the hardness factor.						
Surface roughness	0.2μmRa or better (0.8μmRy or better)	When the required accuracy is not severe, a surface roughness of about $0.8\mu \text{mRa}$ ($3.2\mu \text{mRy}$) is adequate.						

Table 2 Minimum effective hardening depth unit : mm									
Shaft di	ameter incl.	Recommended minimum effective hardening depth							
over	28	0.8							
28	50	1.0 1.5 2.0							
50	100								
100	150								



1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

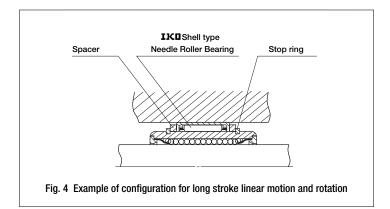
3 Lubrication

Linear Bushings can be used with oil or grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication.

4 When rotational motion is present

Linear Bushings can only be operated in linear motion and can not be rotated. When linear motion in short stroke length and rotation are both required, **IKB** Stroke Rotary Bushing (See page E-176.) is recommended. If linear motion in long stroke length and rotation are both required, a combination of Linear Bushing

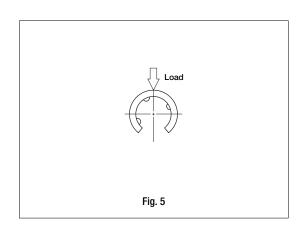
and **IKI** Needle Roller Bearing as shown in Fig. 4 is recommended.

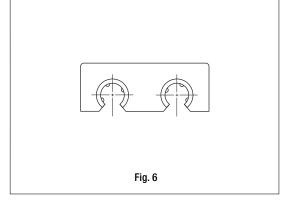


5 Precaution for use of Open type Linear Bushing having three rows of ball circuits

Open type Linear Bushings having three rows of ball circuits can be used only for the load direction shown in Fig. 5. If two Linear Bushings are used in parallel, by considering the load distribution, the arrangement shown in Fig. 6 is recommended.

This type can not be adjusted for radial internal clearance.





Precautions for Mounting



Fit

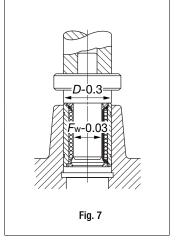
Table 3 shows the recommended fit tolerances for Linear Bushing. The fit between Linear Bushing and housing is usually clearance fit. For some special applications, an interference fit may be required. For adjustable clearance or open type Linear Bushings, the following recommendations apply. The shaft diameter is finished smaller than the lower limit of the tolerance range of the inscribed circle diameter of the Linear Bushing, while the housing diameter is finished larger than the upper limit of the tolerance range of the outside diameter of the external cylinder of the Linear Bushing.

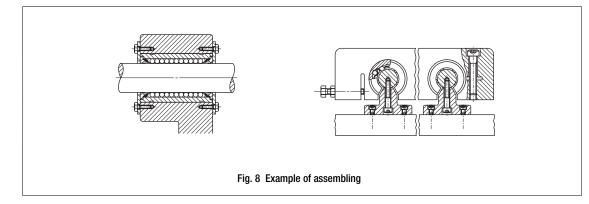
Table 3 Recommended fit tolerance Item										
Туре		Normal clearance			Interference fit					
LBD, LBB	High class	f6,g6	h6	H7	J7					
LM, LMB	Precision class	f5,g5	h5	H6	J6					
LBE, LME	_	h6	j6	H7	J7					

Mounting

When press-fitting the Linear Bushing into the housing, do not hit the end plate. The correct method is to gradually push the external cylinder with a jig for assembling. (See Fig. 7.) Then the external cylinder is fixed in the axial direction with a stop ring or a stopper plate. When inserting the shaft into the Linear Bushing assembled into a housing, gradually and gently insert a shaft avoiding to give impact on the steel balls and retainers.

If two shafts are used in parallel, fix one shaft accurately as a datum shaft and locate the second shaft to the datum shaft keeping the parallelism. Fig. 8 shows an example of general assembling.





Accessories

Steel shaft for Linear Bushing

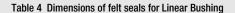
In order to achieve full performance of Linear Bushing, heat-treated and ground steel shafts with high accuracy are available. Commercial shafts can also be delivered upon request. For details, consult **IKD**.

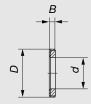
Shaft support block

Support blocks are prepared for supporting the ends of shaft for Linear Bushing. For details, consult IKD.

Felt seals for Linear Bushing

Felt seals are available for Linear Bushing without end seal. If dust protection and minimal frictional resistance in linear motion are both required, felt seals are recommended. Dimensions of felt seals are shown in Table 4.





unit : mm

Model number	d	D	В
FLM 6	6	12	2
FLM 8	8	15	2
FLM 10	10	19	3
FLM 13	13	23	3
FLM 16	16	28	4
FLM 20	20	32	4
FLM 25	25	40	5
FLM 30	30	45	5
FLM 35	35	52	5
FLM 40	40	60	5
FLM 50	50	80	10
FLM 60	60	90	10
FLM 80	80	120	10
FLM 100	100	150	10

Remark: These felt seals are used with LM or LBD models. For other models and types, consult **IKO** for details.

Linear Bushing : Metric series

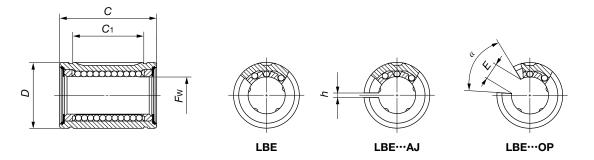
Standard type : LBE Adjustable clearance type : LBE···AJ Open type : LBE···OP







	Model number										
Shaft diameter mm	Standard type	Ball circuits	Mass (Ref.)	Adjustable clearance type		Mass (Ref.)	Open type	Ball circuits	Mass (Ref.)	Fw	Toler- ance µm
5	LBE 5	3	8.6	LBE 5 AJ	3	8.4		-	_	5	
8	LBE 8	3	16.9	LBE 8 AJ	3	16.6		_	_	8	+ 8
12	LBE 12	4	36.5	LBE 12 AJ	4	35.5	LBE 12 OP	3	29.5	12	
16	LBE 16	4	47	LBE 16 AJ	4	46.5	LBE 16 OP	3	37.5	16	+ 9
20	LBE 20	5	84.5	LBE 20 AJ	5	83	LBE 20 OP	4	72	20	– 1
25	LBE 25	5	161	LBE 25 AJ	5	159	LBE 25 OP	4	141	25	+11
30	LBE 30	6	305	LBE 30 AJ	6	300	LBE 30 OP	5	265	30	- 1
40	LBE 40	6	555	LBE 40 AJ	6	545	LBE 40 OP	5	480	40	+13
50	LBE 50	6	935	LBE 50 AJ	6	925	LBE 50 OP	5	815	50	- 2



Nominal dimensions and tolerances mm								Eccentricity	Basic dynamic load rating C		Basic static load rating Co		Preferable circlip	
D	Toler- ance µm	С	Toler- ance µm	C1	Toler- ance	h	E	α Degree	Max. μm	Load direction A N	Load direction B N	Load direction A N	Load direction B N	DIN 471
12	0	22	0	12	+270	1.5	_	_	12	90.6	73.6	213	213	12×1
16	- 8	25	-210	14	0	1.5	_	_	12	121	98.6	255	255	16×1
22	0	32		20		1.5	7.5	78°	13	284	327	575	813	22×1.2
26	- 9	36	0 -250	22	+330	1.5	10	78°	13	311	357	587	830	26×1.2
32		45		28		2.0	10	60°	14	617	734	1 150	1 680	32×1.5
40	0 -11	58		40	+390	2.0	12.5	60°	15	1 070	1 270	2 020	2 960	42×1.75
47		68	-300 0	48	0	2.0	12.5	50°	15	1 560	1 650	3 060	3 910	48×1.75
62	0	80		56	+460	2.0	16.8	50°	17	2 710	2 870	4 890	6 250	62×2
75	-13	100	-350	72	0	2.0	21	50°	17	3 940	4 180	7 130	9 120	75×2.5

Linear Bushing with Seals : Metric series

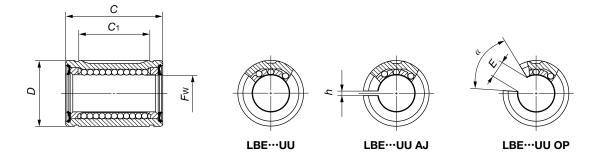
Standard type : Adjustable clearance type : Open type : LBE···UU AJ LBE···UU OP







				Model numl	oer						
Shaft diameter mm	Standard type	Ball circuits	Mass (Ref.)	Adjustable clearance type	Ball circuits	Mass (Ref.)	Open type	Ball circuits	Mass (Ref.)	Fw	Toler- ance µm
5	LBE 5 UU	3	8.6	LBE 5 UU AJ	3	8.4		-	_	5	
8	LBE 8 UU	3	17	LBE 8 UU AJ	3	16.7		_	_	8	+ 8
12	LBE 12 UU	4	36.5	LBE 12 UU AJ	4	36	LBE 12 UU OP	3	29.5	12	
16	LBE 16 UU	4	47.5	LBE 16 UU AJ	4	47	LBE 16 UU OP	3	38	16	+ 9
20	LBE 20 UU	5	85	LBE 20 UU AJ	5	83.5	LBE 20 UU OP	4	72.5	20	- 1
25	LBE 25 UU	5	162	LBE 25 UU AJ	5	160	LBE 25 UU OP	4	142	25	+11
30	LBE 30 UU	6	305	LBE 30 UU AJ	6	305	LBE 30 UU OP	5	265	30	- 1
40	LBE 40 UU	6	555	LBE 40 UU AJ	6	550	LBE 40 UU OP	5	485	40	+13
50	LBE 50 UU	6	940	LBE 50 UU AJ	6	930	LBE 50 UU OP	5	815	50	- 2



	N	lomina		sions a	and toler	ances			Eccentricity	load i	lynamic rating	load	static rating	Preferable circlip
D	Toler- ance µm	С	Toler- ance µm	C1	Toler- ance	h	E	α Degree	Max. μm	Load direction A N	Load direction B N	Load	Load direction B N	DIN 471
12	0	22	0	12	+270	1.5	_	_	12	90.6	73.6	213	213	12×1
16	- 8	25	-210	14	0	1.5	_	78°	12	121	98.6	255	255	16×1
22	0	32		20		1.5	7.5	78°	13	284	327	575	813	22×1.2
26	– 9	36	0 -250	22	+330	1.5	10	78°	13	311	357	587	830	26×1.2
32		45		28		2.0	10	60°	14	617	734	1 150	1 680	32×1.5
40	0 -11	58		40	+390	2.0	12.5	60°	15	1 070	1 270	2 020	2 960	42×1.75
47		68	-300 0	48	0	2.0	12.5	50°	15	1 560	1 650	3 060	3 910	48×1.75
62	0	80		56	+460	2.0	16.8	50°		2 710	2 870	4 890	6 250	62×2
75	-13	100	0 -350	72	0	2.0	21	50°	17	3 940	4 180	7 130	9 120	75×2.5

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Linear Bushing : Metric series

Standard type : Adjustable clearance type : Open type : LBD ...AJ LBD...OP

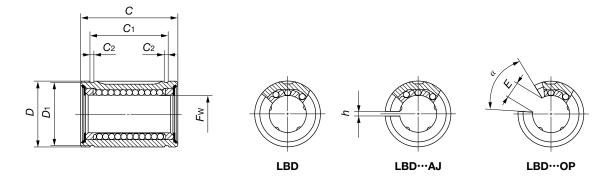






					Mode	el numb	oer						
Shaft diameter	Standard type	Ball circuits	Mass (Ref.)	Adjustable ty	e clea pe	rance	I circuits	Mass (Ref.)	Open type	Ball circuits	Mass (Ref.)	Fw	
mm		Bal	g				Ball	g		Bal	g		Pre- High
6	LBD 6	3	5.1	LBD	6	AJ	3	5.0		_	_	6	
8	LBD 8S	3	8.3	LBD	8S .	AJ	3	8.1		_	_	8	
0	LBD 8	3	11.8	LBD	8	AJ	3	11.5		_	_	8	0 0
10	LBD 10	4	25.5	LBD 1	10	AJ	4	25	LBD 10 OP	3	20.5	10	_ 6 _ 9
13	LBD 13	4	41.5	LBD 1	13	AJ	4	40.5	LBD 13 OP	3	33	13	
16	LBD 16	4	58	LBD 1	16	AJ	4	57	LBD 16 OP	3	47	16	
20	LBD 20	5	80	LBD 2	20	AJ	5	79	LBD 20 OP	4	69	20	
25	LBD 25	5	160	LBD 2	25	AJ	5	158	LBD 25 OP	4	142	25	$\begin{vmatrix} 0 & 0 \\ -7 & -10 \end{vmatrix}$
30	LBD 30	6	220	LBD 3	30	AJ	6	215	LBD 30 OP	5	196	30	
35	LBD 35	6	320	LBD 3	35	AJ	6	315	LBD 35 OP	5	280	35	
40	LBD 40	6	440	LBD 4	40	AJ	6	435	LBD 40 OP	5	390	40	$\begin{bmatrix} 0 & 0 \\ -8 & -12 \end{bmatrix}$
50	LBD 50	6	1 390	LBD 5	50	AJ	6	1 380	LBD 50 OP	5	1 220	50	

Note(1): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub. Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.



			Nomin	al dime	nsions ai mm	nd toler	ances				Eccer	,	Basic d load i	rating	Basic load	
D	Toler- ance	С	Toler- ance µm	C ₁ (¹)	Toler- ance µm	C2	<i>D</i> ₁	h	E	α Degree	Dro	ax. m High	Load direction A N	Load direction B N	Load direction A N	Load
12		19		13.5		1.1	11.5	1.5	_	_			78.0	63.4	155	155
15	0 -11	17		11.5		1.1	14.3	1.5	_	_			74.7	60.7	128	128
15		24		17.5		1.1	14.3	1.5	_	_	8	12	121	98.6	255	255
19		29	0 -200	22	0 -200	1.3	18	1.5	7	80°	0	12	197	226	405	573
23	0 -13	32		23		1.3	22	1.5	9	80°			292	336	578	818
28		37		26.5		1.6	27	1.5	11	80°			426	489	766	1 080
32		42		30.5		1.6	30.5	2.0	11	60°			617	734	1 150	1 680
40	0 -16	59		41		1.85	38	2.0	12	50°	10	15	1 070	1 270	2 020	2 960
45		64		44.5		1.85	43	2.0	15	50°			1 460	1 540	2 780	3 560
52		70	-300	49.5	-300	2.1	49	2.0	17	50°			1 610	1 710	3 080	3 940
60	0 -19	80		60.5		2.1	57	2.0	20	50°	12	20	2 710	2 870	4 890	6 250
80		100		74		2.6	76.5	2.0	25	50°			3 940	4 180	7 130	9 120



Standard type : Adjustable clearance type : Open type : LBD···UU AJ LBD···UU OP

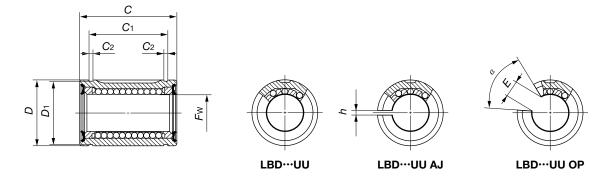






					Model numb	oer						
Shaft diameter	Standard type	I circuits	Mass (Ref.)	Adjustable typ		I circuits	Mass (Ref.)	Open type	Ball circuits	Mass (Ref.)	Fw	
mm		Ball	g			Ball	g		Ba	g		Pre- High cision
6	LBD 6 UU	3	5.2	LBD 6	UU AJ	3	5.1		-	_	6	
8	LBD 8S UU	3	8.4	LBD 85	UU AJ	3	8.2		_	_	8	
	LBD 8 UU	3	11.8	LBD 8	UU AJ	3	11.6		_	_	8	0 0
10	LBD 10 UU	4	25.5	LBD 10	UU AJ	4	25.5	LBD 10 UU OP	3	20.5	10	- 6 - 9
13	LBD 13 UU	4	41.5	LBD 13	UU AJ	4	40.5	LBD 13 UU OP	3	33.5	13	
16	LBD 16 UU	4	58	LBD 16	UU AJ	4	57	LBD 16 UU OP	3	47.5	16	
20	LBD 20 UU	5	80.5	LBD 20	UU AJ	5	79.5	LBD 20 UU OP	4	69.5	20	
25	LBD 25 UU	5	161	LBD 25	UU AJ	5	159	LBD 25 UU OP	4	143	25	$\begin{bmatrix} 0 & 0 \\ - 7 & -10 \end{bmatrix}$
30	LBD 30 UU	6	220	LBD 30	UU AJ	6	220	LBD 30 UU OP	5	197	30	
35	LBD 35 UU	6	320	LBD 35	UU AJ	6	320	LBD 35 UU OP	5	280	35	
40	LBD 40 UU	6	440	LBD 40	UU AJ	6	435	LBD 40 UU OP	5	390	40	0 0 0 -12
50	LBD 50 UU	6	1 400	LBD 50	UU AJ	6	1 380	LBD 50 UU OP	5	1 220	50	

Note(1): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub. Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.



			Nomin	al dime	nsions ai mm	nd toler	rances				Eccer	·	load	lynamic rating	load i	static rating
D	Toler- ance µm	С	Toler- ance µm	C ₁ (¹)	Toler- ance µm	C2	<i>D</i> 1	h	E	α Degree	Dro	ax. m High	Load direction A N	Load direction B N	Load direction A N	Load direction B
12		19		13.5		1.1	11.5	1.5	_	_			78.0	63.4	155	155
15	0 -11	17		11.5		1.1	14.3	1.5	_	_			74.7	60.7	128	128
15		24		17.5		1.1	14.3	1.5	_	_	8	12	121	98.6	255	255
19		29	0 -200	22	0 -200	1.3	18	1.5	7	80°	0	12	197	226	405	573
23	0 -13	32		23		1.3	22	1.5	9	80°			292	336	578	818
28		37		26.5		1.6	27	1.5	11	80°			426	489	766	1 080
32		42		30.5		1.6	30.5	2.0	11	60°			617	734	1 150	1 680
40	0 -16	59		41		1.85	38	2.0	12	50°	10	15	1 070	1 270	2 020	2 960
45		64		44.5		1.85	43	2.0	15	50°			1 460	1 540	2 780	3 560
52		70	-300	49.5	-300	2.1	49	2.0	17	50°			1 610	1 710	3 080	3 940
60	0 -19	80		60.5		2.1	57	2.0	20	50°	12	20	2 710	2 870	4 890	6 250
80		100		74		2.6	76.5	2.0	25	50°			3 940	4 180	7 130	9 120



Linear Bushing: Inch series

Standard type : LBB Adjustable clearance type : LBB···AJ Open type : LBB···OP

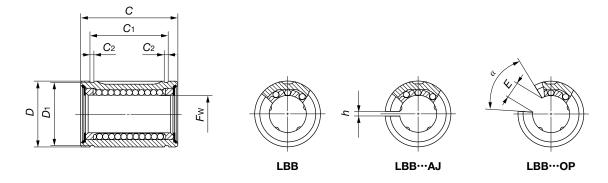






				Model num	ber						
Shaft diameter mm (inch)	Standard type	Bal circuits	Mass (Ref.)	Adjustable clearance type	Ball circuits	Mass (Ref.)	Open type	Ball circuits	Mass (Ref.)	Fw	Tolerance
6.350 (1/4)	LBB 4	3	7.1		_	_		_	_	1/ ₄ 6.350	
9.525 (3/8)	LBB 6	4	10.3		_	_		_	_	^{3/8} 9.525	
12.700 (¹/₂)	LBB 8	4	32	LBB 8 AJ	4	31.5	LBB 8 OP	3	28	1/ ₂ 12.700	0 0
15.875 (5/8)	LBB 10	4	65	LBB 10 AJ	4	64	LBB 10 OP	3	54	^{5/8} 15.875	- 8 -13
19.050 (3/ ₄)	LBB 12	5	79.5	LBB 12 AJ	5	78.5	LBB 12 OP	4	68.5	^{3/4} 19.050	
25.400 (1)	LBB 16	5	147	LBB 16 AJ	5	145	LBB 16 OP	4	127	1 25.400	
31.750 (1 ¹ / ₄)	LBB 20	6	325	LBB 20 AJ	6	320	LBB 20 OP	5	285	11/4 31.750	0
38.100 (1 ¹ / ₂)	LBB 24	6	535	LBB 24 AJ	6	530	LBB 24 OP	5	470	1 ¹ / ₂ 38.100	0 -15
50.800 (2)	LBB 32	6	1 040	LBB 32 AJ	6	1 030	LBB 32 OP	5	915	2 50.800	0 -20

Note(1): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub. Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.



		ı	Nominal	dimen	sions an mm	d toler	ances					en- city	load	lynamic rating	Basic load i	static ating
D	Toler- ance µm	С	Toler- ance µm	C ₁ (¹)	Toler- ance µm	C2	<i>D</i> 1	h	E	α Degree	Dro-	mian	Load	Load direction B N	Load direction A N	Load
1/ ₂ 12.700		³ / ₄ 19.050		12.98		0.99	12.04	_	_	-		12	80.0	64.9	156	156
^{5/8} 15.875		^{7/8} 22.225		16.15		0.99	15.16	_	_	_	8	12	117	134	227	320
^{7/8} 22.225	0	1 ¹ / ₄ 31.750	0	24.46	0	1.17	21.21	1/ ₁₆ 1.588	^{5/16} 7.938	50°	Ů	13	290	333	577	816
1 ¹ / ₈ 28.575	-10	1 ¹ / ₂ 38.100	-381	28.04	-200	1.42	27.30	^{3/₃₂} 2.381	^{3/8} 9.525	60°		13	424	488	766	1 080
1 ¹ / ₄ 31.750		1 ⁵ / ₈ 41.275		29.61		1.42	30.33	^{3/₃₂} 2.381	7/ ₁₆ 11.112	60°	9	14	608	724	1 150	1 680
19/ ₁₆ 39.688		2 ¹ / ₄ 57.150		44.53		1.73	37.85	^{3/₃₂} 2.381	9/ ₁₆ 14.288	60°	10	15	1 070	1 280	2 020	2 960
2 50.800	0	2 ⁵ / ₈ 66.675		50.92		1.73	48.51	^{3/₃₂} 2.381	^{5/8} 15.875	50°	10	15	1 920	2 030	3 570	4 570
2 ³ / ₈ 60.325	-13	3 76.200	0 -508	61.26	-300 0	2.18	57.53	^{1/8} 3.175	^{3/4} 19.050	50°	11	17	2 460	2 610	4 330	5 540
3 76.200	0 -15	4 101.600		81.07		2.62	72.64	^{1/8} 3.175	1 25.400	50°	' '	17	3 960	4 190	7 140	9 130



Linear Bushing with Seals: Inch series

Standard type : LBB…UU Adjustable clearance type : LBB…UU AJ Open type : LBB···UU OP

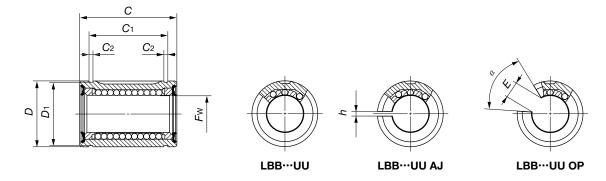






				Model num	ber					
Shaft diameter mm (inch)	Standard type	Ball circuits	Mass (Ref.)	Adjustable clearance type	Ball circuits	Mass (Ref.)	Open type	Ball circuits	Mass (Ref.)	Fw Tolerance μm Pre- High cision
6.350 (1/4)	LBB 4 UU	3	7.1		-	-			_	1/ ₄ 6.350
9.525 (3/8)	LBB 6 UU	4	10.4		-	-			_	^{3/8} 9.525
12.700 (1/ ₂)	LBB 8 UU	4	32	LBB 8 UU AJ	4	31.5	LBB 8 UU OP	3	28	1/ ₂ 12.700 0 0
15.875 (5/8)	LBB 10 UU	4	65	LBB 10 UU AJ	4	64	LBB 10 UU OP	3	54	⁵ / ₈
19.050 (3/4)	LBB 12 UU	5	80	LBB 12 UU AJ	5	79	LBB 12 UU OP	4	69	^{3/4} 19.050
25.400 (1)	LBB 16 UU	5	148	LBB 16 UU AJ	5	145	LBB 16 UU OP	4	128	1 25.400
31.750 (1 ¹ / ₄)	LBB 20 UU	6	325	LBB 20 UU AJ	6	320	LBB 20 UU OP	5	290	1 ¹ / ₄ 31.750 0
38.100 (1 ¹ / ₂)	LBB 24 UU	6	535	LBB 24 UU AJ	6	530	LBB 24 UU OP	5	475	1 ¹ / ₂ 0 -15 38.100 -10
50.800 (2)	LBB 32 UU	6	1 040	LBB 32 UU AJ	6	1 030	LBB 32 UU OP	5	920	2 50.800 0 -20

Note(¹): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub. Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.



			1	Nominal	dimen	sions an mm	d tolera	ances				Ecc tric	en- city		lynamic rating	Basic load i	
Ľ	D	Toler- ance	С	Toler- ance	C ₁ (¹)	Toler- ance	C2	<i>D</i> 1	h	E	α	μ	ax. m	Load	Load direction B		Load direction B
		μm		μm		μm					Degree	Pre- cision	riigii	N	N	N	N
1/ ₂ 12.	700		^{3/4} 19.050		12.98		0.99	12.04	_	_	_		12	80.0	64.9	156	156
^{5/8} 15.8	875		^{7/8} 22.225		16.15		0.99	15.16	_	_	_	8	12	117	134	227	320
7/ ₈ 22.:	225	0	1 ¹ / ₄ 31.750	0	24.46	0	1.17	21.21	1/ ₁₆ 1.588	^{5/16} 7.938	50°	°	13	290	333	577	816
1 ¹ / ₈ 28.	575	-10	1 ¹ / ₂ 38.100	-381	28.04	-200	1.42	27.30	^{3/₃₂} 2.381	^{3/8} 9.525	60°		13	424	488	766	1 080
1 ¹ / ₄ 31.	750		1 ⁵ / ₈ 41.275		29.61		1.42	30.33	^{3/₃₂} 2.381	7/ ₁₆ 11.112	60°	9	14	608	724	1 150	1 680
19/ ₁₆ 39.0	688		2 ¹ / ₄ 57.150		44.53		1.73	37.85	^{3/₃₂} 2.381	9/ ₁₆ 14.288	60°	10	15	1 070	1 280	2 020	2 960
2 50.8	800	0	2 ^{5/8} 66.675		50.92		1.73	48.51	^{3/₃₂} 2.381	^{5/8} 15.875	50°	10	10	1 920	2 030	3 570	4 570
2 ³ / ₈	325	-13	³ 76.200	0 -508	61.26	-300 0	2.18	57.53	^{1/8} 3.175	^{3/4} 19.050	50°	11	17	2 460	2 610	4 330	5 540
3 76.:	200	0 -15	4 101.600		81.07		2.62	72.64	1/8 3.175	1 25.400	50°	' '	17	3 960	4 190	7 140	9 130



LBE, LBD, LBB, LM, LME, LMB

Linear Bushing : Metric series

Standard type:

LM LM AJ LM OP

LM N(Synthetic resin retainer)

Adjustable clearance type:

LM OP

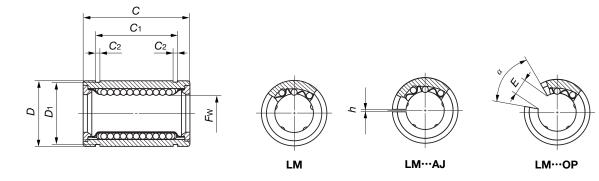






						Mo	del nui	mhor	,					
Shaft diameter mm		tandard type	Ball circuits	Mass (Ref.)	Adjusta	able clearance		Ball circuits	Mass (Ref.)		Open type		Ball circuits	Mass (Ref.)
6	LM	61219	4	8.5				-	-				_	_
	LM	61219N	4	7.6	LM	61219N	AJ	4	7.5					
	LM	81517	4	11				-	_				_	_
8	LM	81517N	4	10.4	LM	81517N	AJ	4	10					
	LM	81524	4	17				-	_				_	_
	LM	81524N	4	15	LM	81524N	AJ	4	14.7					
10	LM	101929	4	36				_	_				-	-
10	LM	101929N	4	29.5	LM	101929N	AJ	4	29	LM	101929N	OP	3	23
40	LM	122130	4	42	LM	122130	AJ	4	41	LM	122130	OP	3	32
12	LM	122130N	4	31.5	LM	122130N	AJ	4	31	LM	122130N	OP	3	25
	LM	132332	4	49	LM	132332	AJ	4	48	LM	132332	OP	3	37.5
13	LM	132332N	4	43	LM	132332N	AJ	4	42	LM	132332N	OP	3	34
10	LM	162837	4	78	LM	162837	AJ	4	77	LM	162837	OP	3	60
16	LM	162837N	4	69.5	LM	162837N	AJ	4	68	LM	162837N	OP	3	52
	LM	203242	5	100	LM	203242	AJ	5	98	LM	203242	OP	4	85
20	LM	203242N	5	98	LM	203242N	AJ	5	95	LM	203242N	OP	4	69
	LM	254059	6	260	LM	254059	AJ	6	255	LM	254059	OP	5	220
25	LM	254059N	6	220	LM	254059N	AJ	6	216	LM	254059N	OP	5	188
	LM	304564	6	290	LM	304564	AJ	6	285	LM	304564	OP	5	245
30	LM	304564N	6	250	LM	304564N	AJ	6	245	LM	304564N	OP	5	210
	LM	355270	6	425	LM	355270	AJ	6	420	LM	355270	OP	5	355
35	LM	355270N	6	390	LM	355270N	AJ	6	384	LM	355270N	OP	5	335
	LM	406080	6	675	LM	406080	AJ	6	665	LM	406080	OP	5	575
40	LM	406080N	6	585	LM	406080N	AJ	6	579	LM	406080N	OP	5	500
	LM	5080100	6	1 740	LM	5080100	AJ	6	1 720	LM	5080100	OP	5	1 480
50	LM	5080100N	6	1 580	LM	5080100N	AJ	6	1 560	LM	5080100N	OP	5	1 340

Note(1): When circlips are used for mounting, the dimension C1 minus twice the width of circlip becomes the width of hub. Remark 1: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.



				No	ominal	dimens	sions an mm	d toler	ances					Ecc trici		Basic d		Basic load r	
Fw	Toler µ Pre- cision		D	Toler- ance µm	С	Toler- ance µm	C1(1)	Toler- ance µm	C2	<i>D</i> 1	h	E	α De- gree	Μα μ Pre- cision	m	Load direction A N	Load	Load	Load direction B
6			12		19		13.5		1.1	11.5	1	_	ı			80.7	92.7	167	237
8			15	0 –11	17		11.5		1.1	14.3	1	_	-			87.4	100	160	226
8			15		24		17.5		1.1	14.3	- 1	_	_			121	139	255	361
10	0 -6	0 - 9	19		29	0	22	0	1.3	18	_ 1	- 6.8	- 80	8	12	179	206	354	501
12			21	0	30	-200	23	-200	1.3	20	1.5	8	80			259	298	503	711
13			23	-13	32		23		1.3	22	1.5	9	80			266	306	506	716
16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
25	0 - 7	0 –10	40	0 –16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
30			45		64		44.5		1.85	43	2.5	15	50			1 350	1 430	2 500	3 200
35			52		70	0 -300	49.5	0 -300	2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
40	0 – 8	0 –12	60	0 –19	80		60.5		2.1	57	3	20	50	12	20	2 030	2 150	3 620	4 640
50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120

^{2:} The end plate for the standard type and the adjustable clearance type with a shaft diameter of 40 mm or less is fixed using a stop ring

LBE, LBD, LBB, LM, LME, LMB

Linear Bushing: Metric series

Standard type : Adjustable clearance type : Open type : LM ··· AJ LM ··· OP

LM LM··· AJ LM··· OP LM···N (Synthetic resin retainer) LM···N AJ (Synthetic resin retainer) LM···N OP (Synthetic resin retainer)



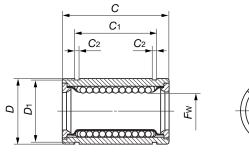


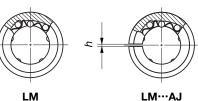


					Mode	el nur	nber						
Shaft diameter mm	Standard type	Ball circuits	Mass (Ref.) g	Adjus	stable clearance ty	ype	Ball circuits	Mass (Ref.)		Open type		Ball circuits	Mass (Ref.)
60	LM 6090110	6	2 000	LM	6090110	AJ	6	1 980	LM	6090110	ОР	5	1 700
00	LM 6090110N	6	1 860	LM	6090110N	AJ	6	1 820	LM	6090110N	OP	5	1 610
80	LM 80120140	6	4 480	LM	80120140	AJ	6	4 440	LM	80120140	ОР	5	3 810
100	LM 100150175	6	9 620	LM	100150175	AJ	6	9 540	LM	100150175	ОР	5	8 180
120	LM 120180200	8	15 000	LM	120180200	AJ	8	14 900	LM	120180200	ОР	6	11 600
150	LM 150210240	8	20 300	LM	150210240	AJ	8	20 200	LM	150210240	ОР	6	15 700

Note(1): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub.

Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.







				Ν	Iominal	dimensi	ons and	l toleran	ces					Eccer	tricity	Basic d	lynamic ting	Basic load ra	
F w	Toler µ Pre- cision		D	Toler- ance µm	С	Tolerance	C ₁ (¹)	Tolerance	C2	D 1	h	E	α De- gree	Με μ Pre- cision	m	Load direction A N	Load direction B	Load	Load direction B
60	0	0	90	0	110	0 -300	85	0 -300	3.15	86.5	3	30	50	17	25	4 760	5 040	8 150	10 400
80	-9	-15	120	-22	140		105.5		4.15	116	3	40	50	''	20	8 710	9 220	14 500	18 500
100	0	0	150	0	175	0	125.5	0	4.15	145	3	50	50	20	30	14 500	15 300	22 800	29 200
120	-10	-20	180	-25	200	-400	158.6	-400	4.15	175	4	85	80	20	30	25 800	25 500	44 300	49 400
150	0 -13	0 –25	210	0 –29	240		170.6		5.15	204	4	105	80	25	40	35 600	35 100	61 200	68 200

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Linear Bushing with Seals : Metric series

Standard type : Adjustable clearance type : Open type : LM··· UU AJ LM··· UU OP

LM···N UU(Synthetic resin retainer) LM···N UU AJ(Synthetic resin retainer) LM···N UU OP(Synthetic resin retainer)

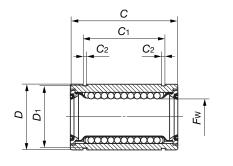


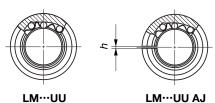




								Mod	del nur	mbei	r						
Shaft diameter mm		Standard ty	pe	Ball circuits	Mass (Ref.)	Adju	stable cleara	ance	type	Ball circuits	Mass (Ref.)		Open typ	е		Ball circuits	Mass (Ref.) g
6	LM	61219	UU	4	8.5					-	_					_	_
	LM	61219N	UU	4	7.6	LM	61219N	UU	AJ	4	7.5						
	LM	81517	UU	4	11					-	_					_	_
8	LM	81517N	UU	4	10.4	LM	81517N	UU	AJ	4	10						
	LM	81524	UU	4	17					-	_					_	_
	LM	81524N	UU	4	15	LM	81524N	UU	AJ	4	14.7						
10	LM	101929	UU	4	31					-	_		-			-	_
10	LM	101929N	UU	4	29.5	LM	101929N	UU	AJ	4	29	LM	101929N	UU	OP	3	23
12	LM	122130	UU	4	41	LM	122130	UU	AJ	4	40	LM	122130	UU	OP	3	31
12	LM	122130N	UU	4	31.5	LM	122130N	UU	AJ	4	31	LM	122130N	UU	OP	3	25
13	LM	132332	UU	4	49	LM	132332	UU	AJ	4	48	LM	132332	UU	OP	3	37.5
13	LM	132332N	UU	4	43	LM	132332N	UU	AJ	4	42	LM	132332N	UU	OP	3	34
16	LM	162837	UU	4	78	LM	162837	UU	AJ	4	77	LM	162837	UU	OP	3	60
10	LM	162837N	UU	4	69.5	LM	162837N	UU	AJ	4	68	LM	162837N	UU	OP	3	52
20	LM	203242	UU	5	100	LM	203242	UU	AJ	5	98	LM	203242	UU	OP	4	85
20	LM	203242N	UU	5	98	LM	203242N	UU	AJ	5	95	LM	203242N	UU	OP	4	69
25	LM	254059	UU	6	260	LM	254059	UU	AJ	6	255	LM	254059	UU	OP	5	220
20	LM	254059N	UU	6	220	LM	254059N	UU	AJ	6	216	LM	254059N	UU	OP	5	188
20	LM	304564	UU	6	290	LM	304564	UU	AJ	6	285	LM	304564	UU	OP	5	245
30	LM	304564N	UU	6	250	LM	304564N	UU	AJ	6	245	LM	304564N	UU	OP	5	210
35	LM	355270	UU	6	410	LM	355270	UU	AJ	6	405	LM	355270	UU	OP	5	346
<u> </u>	LM	355270N	UU	6	390	LM	355270N	UU	AJ	6	384	LM	355270N	UU	OP	5	335
40	LM	406080	UU	6	675	LM	406080	UU	AJ	6	665	LM	406080	UU	OP	5	575
70	LM	406080N	UU	6	585	LM	406080N	UU	AJ	6	579	LM	406080N	UU	OP	5	500
50	LM	5080100	UU	6	1 740	LM	5080100	UU	AJ	6	1 720	LM	5080100	UU	OP	5	1 480
30	LM	5080100N	UU	6	1 580	LM	5080100N	UU	AJ	6	1 560	LM	5080100N	UU	OP	5	1 340

Note(1): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub. Remark 1: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.







				No	minal	dimen	sions ar mm	ıd toler	ances					Ecc trici		load ra	_	Basic load ra	ating
F w	Toler ## Pre- cision	m	D	Toler- ance µm	С	Toler- ance µm	C1(1)	Toler- ance µm	C2	<i>D</i> 1	h	Ε	α De- gree	Ma µ Pre- cision	m	Load direction A N	C Load direction B N	Load direction A	Load
6			12		19		13.5		1.1	11.5	- 1	-	-			80.7	92.7	167	237
8			15	0 –11	17		11.5		1.1	14.3	- 1	-	_			87.4	100	160	226
8			15		24		17.5		1.1	14.3	- 1	_	-			121	139	255	361
10	0 - 6	0 -9	19		29	0	22	0	1.3	18	- 1	- 6.8	- 80	8	12	179	206	354	501
12			21	0	30	-200	23	-200	1.3	20	1.5	8	80			259	298	503	711
13			23	-13	32		23		1.3	22	1.5	9	80			266	306	506	716
16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
25	0 - 7	0 –10	40	0 –16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
30			45		64		44.5		1.85	43	2.5	15	50			1 350	1 430	2 500	3 200
35			52		70	0 -300	49.5	0 -300	2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
40	0 -8	0 –12	60	0 –19	80		60.5		2.1	57	3	20	50	12	20	2 030	2 150	3 620	4 640
50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120

^{2:} The end plate for the standard type and the adjustable clearance type with a shaft diameter of 40mm or less is fixed using a stop ring for

LBE, LBD, LBB, LM, LME, LMB

Linear Bushing with Seals: Metric series

Standard type:

LM··· UU LM··· UU AJ LM··· UU OP

LM···N UU(Synthetic resin retainer) LM···N UU AJ(Synthetic resin retainer) LM···N UU OP(Synthetic resin retainer)

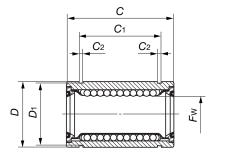


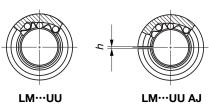




								Model ı	num	ber							
Shaft diameter mm		Standard ty	ре	Ball circuits	Mass (Ref.) g	Adju	ıstable cleara	nce typ		Ball circuits	Mass (Ref.)		Open typ	е		Ball circuits	Mass (Ref.) g
60	LM	6090110	UU	6	2 000	LM	6090110	UU A	J	6	1 980	LM	6090110	UU	OP	5	1 700
60	LM	6090110N	UU	6	1 860	LM	6090110N	UU A	J	6	1 820	LM	6090110N	UU	OP	5	1 610
80	LM	80120140	UU	6	4 480	LM	80120140	UU A	J	6	4 440	LM	80120140	UU	OP	5	3 810
100	LM	100150175	UU	6	9 620	LM	100150175	UU A	J	6	9 540	LM	100150175	UU	OP	5	8 180
120	LM	120180200	UU	8	14 700	LM	120180200	UU A	J	8	14 600	LM	120180200	UU	OP	6	11 400
150	LM	150210240	UU	8	19 900	LM	150210240	UU A	J	8	19 800	LM	150210240	UU	OP	6	15 400

Note(1): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub. Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.







				ı	Nominal	dimens	ions and	d tolera	nces					Eccer	tricity	Basic d	lynamic ting	Basic load r	static ating
Fw		ance m High	D	Toler- ance µm	С	Tolerance	C1(1)	Tolerance	C2	<i>D</i> 1	h	Ε	α De- gree	Dro.	m	Load direction A	Load direction B	Load	Load direction B
60	0	0	90	0	110	0 -300	85	0 -300	3.15	86.5	3	30	50	17	25	4 760	5 040	8 150	10 400
80	-9	-15	120	-22	140		105.5		4.15	116	3	40	50	''	23	8 710	9 220	14 500	18 500
100	0	0	150	0	175	0	125.5	0	4.15	145	3	50	50	20	30	14 500	15 300	22 800	29 200
120	-10	-20	180	-25	200	-400	158.6	-400	4.15	175	4	85	80	20	30	25 800	25 500	44 300	49 400
150	0 -13	0 –25	210	0 –29	240		170.6		5.15	204	4	105	80	25	40	35 600	35 100	61 200	68 200

ᆫ

Standard type:

LME

LME

LME

LME

AJ

Synthetic resin retainer)

Adjustable clearance type:

Den type:

LME

OP

LME

N OP

Synthetic resin retainer)

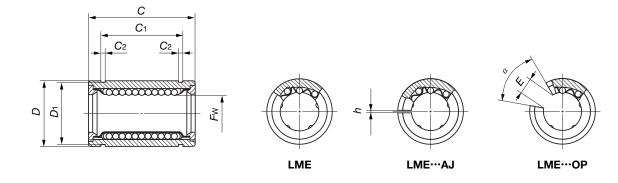






						Mo	del nui	mhei	r					
Shaft diameter mm	St	andard type	Ball circuits	Mass (Ref.)	Adjusta	able clearance		Ball circuits	Mass (Ref.)		Open type		Ball circuits	Mass (Ref.)
5	LME	51222N	4	10	LME	51222N	AJ	4	9.5				-	_
8	LME LME	81625 81625N	4	22.5 20	LME	81625N	AJ	- 4	- 19				_	-
12	LME LME	122232 122232N	4	45.5 41	LME LME	122232 122232N	AJ AJ	4	44.5 40	LME LME	122232 122232N	OP OP	3	35 32
16	LME LME	162636 162636N	4	59 56.5	LME LME	162636 162636N	AJ AJ	4	58 54.5	LME LME	162636 162636N	OP OP	3	45 44
20	LME LME	203245 203245N	5 5	105 92	LME LME	203245 203245N	AJ AJ	5 5	100 90	LME LME	203245 203245N	OP OP	4	84 75
25	LME LME	254058 254058N	6	240 220	LME LME	254058 254058N	AJ AJ	6	235 215	LME LME	254058 254058N	OP OP	5 5	200
30	LME LME	304768 304768N	6 6	360 325	LME LME	304768 304768N	AJ AJ	6	355 320	LME LME	304768 304768N	OP OP	5 5	300 272
40	LME LME	406280 406280N	6 6	800 705	LME LME	406280 406280N	AJ AJ	6	790 694	LME LME	406280 406280N	OP OP	5 5	670 600
50	LME LME	5075100 5075100N	6 6	1 260 1 130	LME LME	5075100 5075100N	AJ AJ	6	1 250 1 110	LME LME	5075100 5075100N	OP OP	5 5	1 060 970
60	LME LME	6090125 6090125N	6 6	2 270 1 860	LME LME	6090125 6090125N	AJ AJ	6	2 240 1 820	LME LME	6090125 6090125N	OP OP	5 5	1 900 1 610
80	LME	80120165	6	5 140	LME	80120165	AJ	6	5 100	LME	80120165	ОР	5	4 350

Note(1): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.



			ı	Nomina	l dimens	sions an mm	d tolera	nces					Eccen- tricity	Basic dy load rat	ing	Basic load r	ating
Fw	Tolerance <i>µ</i> m	D	Tolerance	С	Tolerance <i>µ</i> m	C ₁ (¹)	Tolerance	C2	<i>D</i> 1	h	Ε	α Degree	Max. μm	Load	Load	Load direction A N	Load
5		12	0	22		14.5		1.1	11.5	1	-	-		90.8	104	219	310
8	+ 8	16	-8	25		16.5		1.1	15.2	_ 1	_	_		121	139	255	361
12		22	0	32	0 –200	22.9	0 –200	1.3	21	1.5	7.5	78	12	259	298	503	711
16	+ 9	26	- 9	36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20	- 1	32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
25	+11	40	0 –11	58		44.1		1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
30	- 1	47		68	0	52.1	0	1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40		62	0	80	-300	60.6	-300	2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
50	+13	75	-13	100		77.6		2.65	72	3	21	50	'/	3 940	4 180	7 130	9 120
60		90	0 -15	125	0 -400	101.7	0 -400	3.15	86.5	3	27.2	54	20	4 760	5 040	8 150	10 400
80	+16 - 4	120	-15	165	-400	133.7	-400	4.15	116	3	36.3	54	20	8 710	9 220	14 500	18 500



Standard type : Adjustable clearance type : Open type : LME··· UU AJ LME··· UU OP

LME···N UU(Synthetic resin retainer) LME···N UU AJ(Synthetic resin retainer) LME···N UU OP(Synthetic resin retainer)

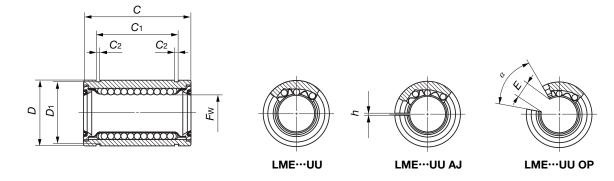






								Mod	el nur	mher							
Shaft diameter mm	s	tandard type	е	Ball circuits	Mass (Ref.) g	Adjus	table cleara			Ball circuits	Mass (Ref.)		Open type	e		Ball circuits	Mass (Ref.)
5	LME	51222N	UU	4	10	LME	51222N	UU	AJ	4	9.5					-	-
8	LME	81625	UU	4	22					-	-					_	_
	LME	81625N	UU	4	20	LME	81625N	UU	AJ	4	19						
12	LME	122232	UU	4	45.5	LME	122232	UU	AJ	4	44.5	LME	122232	UU	OP	3	35
12	LME	122232N	UU	4	41	LME	122232N	UU	AJ	4	40	LME	122232N	UU	OP	3	32
16	LME	162636	UU	4	59	LME	162636	UU	AJ	4	58	LME	162636	UU	OP	3	45
10	LME	162636N	UU	4	56.5	LME	162636N	UU	AJ	4	54.5	LME	162636N	UU	OP	3	44
20	LME	203245	UU	5	105	LME	203245	UU	AJ	5	100	LME	203245	UU	OP	4	84
20	LME	203245N	UU	5	92	LME	203245N	UU	AJ	5	90	LME	203245N	UU	OP	4	75
25	LME	254058	UU	6	240	LME	254058	UU	AJ	6	235	LME	254058	UU	OP	5	200
25	*LME	254058N	UU	6	220	*LME	254058N	UU	AJ	6	215	*LME	254058N	UU	OP	5	181
30	LME	304768	UU	6	360	LME	304768	UU	AJ	6	355	LME	304768	UU	OP	5	300
30	LME	304768N	UU	6	325	LME	304768N	UU	AJ	6	320	LME	304768N	UU	OP	5	272
40	LME	406280	UU	6	800	LME	406280	UU	AJ	6	790	LME	406280	UU	OP	5	670
40	LME	406280N	UU	6	705	LME	406280N	UU	AJ	6	694	LME	406280N	UU	OP	5	600
50	LME	5075100	UU	6	1 260	LME	5075100	UU	AJ	6	1 250	LME	5075100	UU	OP	5	1 060
50	LME	5075100N	UU	6	1 130	LME	5075100N	UU	AJ	6	1 110	LME	5075100N	UU	OP	5	970
60	LME	6090125	UU	6	2 270	LME	6090125	UU	AJ	6	2 240	LME	6090125	UU	OP	5	1 900
60	LME	6090125N	UU	6	2 050	LME	6090125N	UU	AJ	6	2 000	LME	6090125N	UU	OP	5	1 580
80	LME	80120165	UU	6	5 140	LME	80120165	UU	AJ	6	5 100	LME	80120165	UU	OP	5	4 350

Note(1): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub. Remark: Seals of the Linear Bushings marked with an asterisk (*) protrude a little from the end face of external cylinder.



			1	Nominal	dimens	ions and	d tolerar	ices					Eccen- tricity	Basic dy load rati	ing	Basic load r	ating
Fw	Tolerance	D	Tolerance <i>µ</i> m	С	Tolerance <i>µ</i> m	C ₁ (¹)	Tolerance µm	C2	D1	h	E	α Degree	Max. μm	Load	Load direction B	Load direction A N	Load
5		12	0	22		14.5		1.1	11.5	1	-	1		90.8	104	219	310
8	+ 8	16	- 8	25		16.5		1.1	15.2	- 1	_	I		121	139	255	361
12		22	0	32	0 –200	22.9	0 -200	1.3	21	1.5	7.5	78	12	259	298	503	711
16	+ 9	26	- 9	36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20	- 1	32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
25	+11	40	0 –11	58		44.1		1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
30	- 1	47		68	0	52.1	0	1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40		62	0	80	-300	60.6	-300	2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
50	+13	75	-13	100		77.6		2.65	72	3	21	50	'/	3 940	4 180	7 130	9 120
60		90	0	125	0 -400	101.7	0 -400	3.15	86.5	3	27.2	54	20	4 760	5 040	8 150	10 400
80	+16 - 4	120	–15	165	-4 00	133.7	-400	4.15	116	3	36.3	54	20	8 710	9 220	14 500	18 500



LBE, LBD, LBB, LM, LME, LMB

Linear Bushing: Inch series



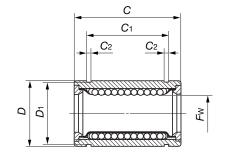


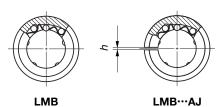


						Mc	del nur	nhe	•					
Shaft diameter mm (inch)	Sta	ndard type	Ball circuits	Mass (Ref.) g	Adjusta	ble clearance		Ball circuits	Mass (Ref.)		Open type		Ball circuits	Mass (Ref.)
6.350 (¹ /4)	LMB LMB	4812 4812N	3 4	9.1 8.5	LMB	4812N	AJ	- 4	- 8.0				-	_
9.525 (³ /8)	LMB LMB	61014 61014N	4	27.5 12.5	LMB	61014N	AJ	- 4	- 12				_	_
12.700 (¹ /2)	LMB LMB	81420 81420N	4	44 40	LMB LMB	81420 81420N	AJ AJ	4	43 38	LMB LMB	81420 81420N	OP OP	3	33.5 28
15.875 (⁵ /8)	LMB LMB	101824 101824N	4	85 76	LMB LMB	101824 101824N	AJ AJ	4	83 74	LMB LMB	101824 101824N	OP OP	3	64 57
19.050 (³ /4)	LMB LMB	122026 122026N	5 5	98 95	LMB LMB	122026 122026N	AJ AJ	5 5	96 93	LMB	122026 122026N	OP OP	4	81 76
25.400 (1)	LMB LMB	162536 162536N	6	220 200	LMB LMB	162536 162536N	AJ	6	218 198	LMB	162536 162536N	OP OP	5	190 170
31.750 (1 ¹ /4)	LMB	203242 203242N	6	490 440	LMB	203242 203242N	AJ AJ	6	485 430	LMB	203242 203242N	OP OP	5	415
38.100 (1 ¹ /2)	LMB	243848 243848N	6	730 670	LMB	243848 243848N	AJ AJ	6	720 660	LMB	243848 243848N	OP OP	5	620 570
50.800 (2)	LMB	324864 324864N	6	1 530 1 140	LMB	324864 324864N	AJ AJ	6	1 510 1 120	LMB	324864 324864N	OP OP	5	1 300
63.500 (2 ¹ /2)	LMB	406080	6	2 400	LMB	406080	AJ	6	2 380	LMB	406080	ОР	5	2 040
76.200 (3)	LMB	487296	6	4 400	LMB	487296	AJ	6	4 360	LMB	487296	ОР	5	3 740
101.600	LMB	6496128	6	11 000	LMB	6496128	AJ	6	10 900	LMB	6496128	ОР	5	9 350

Note(1): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub.
(2): The load rating for three rows of ball circuits is shown as a representative value.

Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.







				Nomi	nal dime	nsion mn	s and tol า	lerand	es					Ecc tric	en- ity	Basic o	lynamic ting	Basic load ra	
	Tolera µn Pre- cision	n	D	Toler- ance µm	С	Toler- ance µm	C1(1)	Toler- ance µm	C2	<i>D</i> 1	h	E	α De- gree		ax. m High	Load direction A N	Load	Load direction A N	Load
1/4			1/2	0	3/4		10.00		0.000	44.000	1					(2)	(2)	(2)	(2)
6.350			12.700	-11	19.050		12.98		0.992	11.906	1		_			82.6	67.0	168	168
3/8			5/8		7/8		16.15		0.992	14.935	-	_	_			94.8	109	174	246
9.525	0	0	15.875		22.225		10.15		0.552	14.550	1			8	12	54.0	103	174	240
1/2	- 6	- 9	7/8	0	1 1/4	0	24.46	0	1.168	20.853	1.5	8.7	80	Ü	12	264	303	505	714
12.700			22.225	-13	31.750	-200	24.40	-200	1.100	20.033	1.5	0.7	-			201		000	
5/8			1 ¹ /8		1 ¹ /2		28.04		1.422	26.899	1.5	9.5	80			424	488	766	1 080
15.875			28.575		38.100					20.000	1.5	0.0							
3/4			1 ¹ /4		1 ⁵ /8		29.61		1.422	29.870	1.5	10.7	60			554	659	1 000	1 470
19.050	0	0	31.750	0	41.275									10	15				
1	-7	-10	1 ⁹ /16	-16	2 ¹ /4		44.53		1.727	37.306	1.5	11.8	50			923	978	1 780	2 280
25.400			39.688		57.150														
1 ¹ /4 31.750			² 50.800		2 ⁵ /8 66.675		50.92		1.727	47.904	2.5	14.7	50			1 370	1 450	2 510	3 210
			2 ³ /8	0										12	20				
1 ¹ /2 38.100	0	0	2°/8 60.325	-19	3 76.200	-300	61.26	-300	2.184	56.870	3	17.7	50			2 010	2 130	3 610	4 620
2	-8	-12	3		4	-300		-300											
50.800			76.200		101.600		81.07		2.616	72.085	3	24.7	50			3 960	4 190	7 140	9 130
2 ¹ /2			3 ³ /4	0	5														
63.500	0	0	95.250	-22	127.000		100.99		3.048	90.220	3	29.5	50	17	25	5 190	5 490	9 090	11 600
3	-9	-15	4 ¹ /2		6														
76.200			114.300		152.400	0	120.04	0	3.048	109.474	3	39.6	50			8 620	9 120	14 500	18 500
4	0	0	6	0	8	-400	158.95	-400	3.53	145.923	3	49.5	50	20	30	17 000	10,000	20 600	26 500
101.600	-10	-20	152.400	-25	203.200		100.35		3.03	140.323	3	45.5	50	20	30	17 000	18 000	28 600	36 500

Stainless Steel Linear Bushing: Metric series

Standard type : LM··· F

Adjustable clearance type : LM··· F AJ Open type : LM··· F OP LM···N F(Synthetic resin retainer) LM···N F AJ(Synthetic resin retainer) LM···N F OP(Synthetic resin retainer)

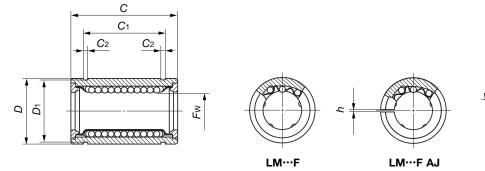






						ı	Mod	el nur	nber							
Shaft diameter mm	;	Standard type	Ball circuits	Mass (Ref.)	Adjus	stable clearar	nce t	ype	Ball circuits	Mass (Ref.) g		Open type	!		Ball circuits	Mass (Ref.) g
6	LM	61219 F	4	8.5					ı	-					-	_
	LM	61219N F	4	7.6	LM	61219N	F	AJ	4	7.5						
	LM	81517 F	4	11					_	_					_	_
8	LM	81517N F	4	10.4	LM	81517N	F	AJ	4	10						
	LM	81524 F	4	17					-	_					_	_
	LM	81524N F	4	15	LM	81524N	F	AJ	4	14.7						
10	LM	101929 F	4	36					-	_		-			-	-
10	LM	101929N F	4	29.5	LM	101929N	F	AJ	4	29	LM	101929N	F	OP	3	23
12	LM	122130 F	4	42	LM	122130	F	AJ	4	41	LM	122130	F	OP	3	32
12	LM	122130N F	4	31.5	LM	122130N	F	AJ	4	31	LM	122130N	F	OP	3	25
13	LM	132332 F	4	49	LM	132332	F	AJ	4	48	LM	132332	F	OP	3	37.5
13	LM	132332N F	4	43	LM	132332N	F	AJ	4	42	LM	132332N	F	OP	3	34
16	LM	162837 F	4	78	LM	162837	F	AJ	4	77	LM	162837	F	OP	3	60
10	LM	162837N F	4	69.5	LM	162837N	F	AJ	4	68	LM	162837N	F	OP	3	52
20	LM	203242 F	5	100	LM	203242	F	AJ	5	98	LM	203242	F	OP	4	85
	LM	203242N F	5	98	LM	203242N	F	AJ	5	95	LM	203242N	F	OP	4	69
25	LM	254059 F	6	260	LM	254059	F	AJ	6	255	LM	254059	F	OP	5	220
	LM	254059N F	6	220	LM	254059N	F	AJ	6	216	LM	254059N	F	OP	5	188
30	LM	304564 F	6	290	LM	304564	F	AJ	6	285	LM	304564	F	OP	5	245
30	LM	304564N F	6	250	LM	304564N	F	AJ	6	245	LM	304564N	F	OP	5	210
35	LM	355270 F	6	410	LM	355270	F	AJ	6	405	LM	355270	F	OP	5	346
- 33	LM	355270N F	6	390	LM	355270N	F	AJ	6	384	LM	355270N	F	OP	5	335
40	LM	406080 F	6	654	LM	406080	F	AJ	6	640	LM	406080	F	OP	5	546
	LM	406080N F	6	585	LM	406080N	F	AJ	6	579	LM	406080N	F	OP	5	500
50	LM	5080100 F	6	1 700	LM	5080100	F	AJ	6	1 680	LM	5080100	F	OP	5	1 420
30	LM	5080100N F	6	1 580	LM	5080100N	F	AJ	6	1 560	LM	5080100N	F	OP	5	1 340
60	LM	6090110 F	6	2 000	LM	6090110	F	AJ	6	1 980	LM	6090110	F	OP	5	1 650
60	LM	6090110N F	6	1 860	LM	6090110N	F	AJ	6	1 820	LM	6090110N	F	OP	5	1 610

Note(1): When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.



				No	minal d	limensio m		toleranc	es					Ecc		Basic o	dynamic ting	Basic load r	static ating
Fw	Toler µ Pre- cision	m	D	Toler- ance µm	С	Tolerance	C ₁ (¹)	Tolerance	C2	<i>D</i> 1	h	Ε	α De- gree		ax. m High	Load direction A N	Load	Load direction A	Load
6			12		19		13.5		1.1	11.5	- 1	_	_			80.7	92.7	167	237
8			15	0 –11	17		11.5		1.1	14.3	- 1	_	ı			87.4	100	160	226
8			15		24		17.5		1.1	14.3	- 1	_	-			121	139	255	361
10	0 -6	0 - 9	19		29	0	22	0	1.3	18	- 1	- 8	- 80	8	12	179	206	354	501
12			21	0	30	-200	23	-200	1.3	20	1.5	8	80			259	298	503	711
13			23	-13	32		23		1.3	22	1.5	9	80			266	306	506	716
16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
25	0 -7	0 –10	40	0 –16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
30			45		64		44.5		1.85	43	2.5	15	50			1 350	1 430	2 500	3 200
35			52		70	0	49.5	0	2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
40	0 -8	0 –12	60	0 –19	80	-300	60.5	-300	2.1	57	3	20	50	12	20	2 030	2 150	3 620	4 640
50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120
60	0 -9	0 –15	90	0 –22	110		85		3.15	86.5	3	30	50	17	25	4 760	5 040	8 150	10 400

Remark 1: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

^{2:} The end plate for the standard type and the adjustable clearance type with a shaft diameter of 40 mm or less is fixed using a stop ring for

IIK Stainless Steel Linear Bushing with Seals : Metric series

Standard type : Adjustable clearance type : Open type : LM···· F UU AJ LM···· F UU OP

LM···N F UU (Synthetic resin retainer) LM···N F UU AJ (Synthetic resin retainer) LM···N F UU OP (Synthetic resin retainer)

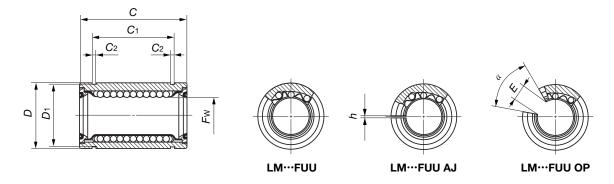






										Mod	el nur	nher								
Shaft diameter mm		Standard	typ	oe	Ball circuits	Mass (Ref.) g	Adjı	ustable clea				Ball circuits	Mass (Ref.)		Open t	ype)		Ball circuits	Mass (Ref.)
6	LM	61219		UU	4	8.5			_			_	-			_			_	_
	LM	61219N	F	UU	4	7.6	LM	61219N	F	UU	AJ	4	7.5							
	LM	81517	F	UU	4	11			_			-	_			_			_	_
8	LM	81517N	F	UU	4	10.4	LM	81517N	F	UU	AJ	4	10							
	LM	81524		UU	4	17		-	_			-	_			_			_	_
	LM	81524N	F	UU	4	15	LM	81524N	F	UU	AJ	4	14.7							
10	LM	101929	F	UU	4	31		-	_			-	_		-	_			-	-
	LM	101929N	F	UU	4	29.5	LM	101929N	F	UU	AJ	4	29	LM	101929N	F	UU	OP	3	23
12	LM	122130	F	UU	4	41	LM	122130	F	UU	AJ	4	40	LM	122130	F	UU	OP	3	32
	LM	122130N	F	UU	4	31.5	LM	122130N	F	UU	AJ	4	31	LM	122130N	F	UU	OP	3	25
13	LM	132332	F	UU	4	49	LM	132332	F	UU	AJ	4	48	LM	132332	F	UU	OP	3	37.5
	LM	132332N	F	UU	4	43	LM	132332N	F	UU	AJ	4	42	LM	132332N	F	UU	OP	3	34
16	LM	162837	F	UU	4	78	LM	162837	F	UU	AJ	4	77	LM	162837	F	UU	OP	3	60
	LM	162837N	F	UU	4	69.5	LM	162837N	F	UU	AJ	4	68	LM	162837N	F	UU	OP	3	52
20	LM	203242	F	UU	5	100	LM	203242	F	UU	AJ	5	98	LM	203242	F	UU	OP	4	85
	LM	203242N	F	UU	5	98	LM	203242N	F	UU	AJ	5	95	LM	203242N	F	UU	OP	4	69
25	LM	254059	F	UU	6	260	LM	254059	F	UU	AJ	6	255	LM	254059	F	UU	OP	5	220
	LM	254059N	F	UU	6	220	LM	254059N	F	UU	AJ	6	216	LM	254059N	F	UU	OP	5	188
20	LM	304564	F	UU	6	290	LM	304564	F	UU	AJ	6	285	LM	304564	F	UU	OP	5	245
30	LM	304564N	F	UU	6	250	LM	304564N	F	UU	AJ	6	245	LM	304564N	F	UU	OP	5	210
35	LM	355270	F	UU	6	410	LM	355270	F	UU	AJ	6	405	LM	355270	F	UU	OP	5	346
35	LM	355270N	F	UU	6	390	LM	355270N	F	UU	AJ	6	384	LM	355270N	F	UU	OP	5	335
40	LM	406080	F	UU	6	636	LM	406080	F	UU	AJ	6	622	LM	406080	F	UU	OP	5	546
40	LM	406080N	F	UU	6	585	LM	406080N	F	UU	AJ	6	579	LM	406080N	F	UU	OP	5	500
E0	LM	5080100	F	UU	6	1 670	LM	5080100	F	UU	AJ	6	1 650	LM	5080100	F	UU	OP	5	1 410
50	LM	5080100N	F	UU	6	1 580	LM	5080100N	F	UU	AJ	6	1 560	LM	5080100N	F	UU	OP	5	1 340
60	LM	6090110	F	UU	6	1 930	LM	6090110	F	UU	AJ	6	1 910	LM	6090110	F	UU	OP	5	1 580
60	LM	6090110N	F	UU	6	1 860	LM	6090110N	F	UU	AJ	6	1 820	LM	6090110N	F	UU	OP	5	1 610

Note(1): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub.



				Non	ninal di	mensio m		toleranc	es					Ecc tric	en- ity	Basic o	lynamic ting	Basic load r	static ating
Fw	Toler µ Pre- cision	m	D	Toler- ance µm	С	Tolerance	C ₁ (¹)	Tolerance	C2	D1	h	Ε	α De- gree	Με μ Pre- cision	m	Load direction A N	Load	Load direction A	Co Load direction B N
6			12		19		13.5		1.1	11.5	1	-	_			80.7	92.7	167	237
8			15	0 –11	17		11.5		1.1	14.3	1	_	_			87.4	100	160	226
8			15		24		17.5		1.1	14.3	- 1	_	_			121	139	255	361
10	0 -6	0 -9	19		29	0	22	0	1.3	18	- 1	- 8	- 80	8	12	179	206	354	501
12			21	0	30	-200	23	-200	1.3	20	1.5	8	80			259	298	503	711
13			23	-13	32		23		1.3	22	1.5	9	80			266	306	506	716
16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
25	0 -7	0 –10	40	0 –16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
30			45		64		44.5		1.85	43	2.5	15	50			1 350	1 430	2 500	3 200
35			52		70	0	49.5	0	2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
40	0 -8	0 –12	60	0 –19	80	-300	60.5	-300	2.1	57	3	20	50	12	20	2 030	2 150	3 620	4 640
50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120
60	0 - 9	0 –15	90	0 –22	110		85		3.15	86.5	3	30	50	17	25	4 760	5 040	8 150	10 400

Remark 1: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

2: The end plate for the standard type and the adjustable clearance type with a shaft diameter of 40 mm or less is fixed using a stop ring for hole.

IND Stainless Steel Linear Bushing: Metric series

Standard type:

LME··· F

LME··· F AJ

LME··· F AJ

LME··· F OP

LME··· N F (Synthetic resin retainer)

LME··· N F AJ(Synthetic resin retainer)

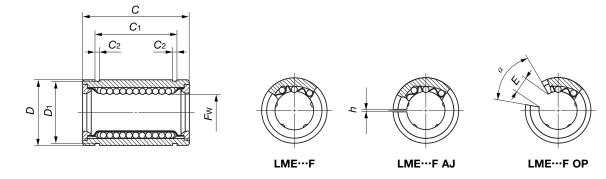






							1	lel nur	d							
Shaft diameter mm	s	tandard type	Ball circuits	Mass (Ref.)	Adjust	table clearan			Ball circuits	Mass (Ref.)		Open type			Ball circuits	Mass (Ref.)
5	LME	51222N F	4	10	LME	51222N	F	AJ	4	9.5					_	_
8	LME LME	81625 F 81625N F	4	22 20	LME	81625N	F	AJ	4	- 19					_	_
12	LME LME	122232 F 122232N F	4	45.5 41	LME LME	122232 122232N	F F	AJ AJ	4	44.5 40	LME LME	122232 122232N	F F	OP OP	3	35 32
16	LME LME	162636 F 162636N F	4	59 56.5	LME LME	162636 162636N	F F	AJ AJ	4	58 54.5	LME LME	162636 162636N	F F	OP OP	3	45 44
20	LME LME	203245 F 203245N F	5 5	105 92	LME LME	203245 203245N	F F	AJ AJ	5 5	100 90	LME LME	203245 203245N	F F	OP OP	4	84 75
25	LME LME	254058 F 254058N F	6 6	240 220	LME LME	254058 254058N	F F	AJ AJ	6 6	235 215	LME LME	254058 254058N	F F	OP OP	5 5	200 181
30	LME LME	304768 F 304768N F	6 6	360 325	LME LME	304768 304768N	F F	AJ AJ	6 6	355 320	LME LME	304768 304768N	F F	OP OP	5 5	300 272
40	LME LME	406280 F 406280N F	6 6	770 705	LME LME	406280 406280N	F F	AJ AJ	6 6	758 694	LME LME	406280 406280N	F F	OP OP	5 5	665 600
50	LME LME	5075100 F 5075100N F	6 6	1 250 1 130	LME LME	5075100 5075100N	F F	AJ AJ	6 6	1 230 1 110	LME LME	5075100 5075100N	F F	OP OP	5 5	1 080 970
60	LME LME	6090125 F 6090125N F	6 6	2 220 2 050	LME LME	6090125 6090125N	F F	AJ AJ	6 6	2 170 2 000	LME LME	6090125 6090125N	F F	OP OP	5 5	1 900 1 580

Note(1): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub.



				Nomina	l dimens	ions an mm	d tolerai	nces					Eccen- tricity	Basic dy load rat	ing	load	_
Fw	Tolerance μ m	D	Tolerance	С	Tolerance <i>µ</i> m	C ₁ (¹)	Tolerance	C2	D 1	h	E	α Degree	Max. μm	Load direction A N	Load	Load	Load direction B
5		12		22		14.5		1.1	11.5	1	-	-		90.8	104	219	310
8	+ 8	16	0 -8	25		16.5		1.1	15.2	- 1	_	_		121	139	255	361
12		22	0	32	0 –200	22.9	0 –200	1.3	21	1.5	7.5	78	12	259	298	503	711
16	+ 9	26	- 9	36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20	- 1	32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
25	+11	40	0 –11	58		44.1		1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
30	- 1	47		68	0	52.1	0	1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40		62	0	80	-300	60.6	-300	2.15	59	3	16.8	50	47	2 030	2 150	3 620	4 640
50	+13 - 2	75	-13	100		77.6		2.65	72	3	21	50	17	3 940	4 180	7 130	9 120
60		90	0 –15	125	0 -400	101.7	0 -400	3.15	86.5	3	27.2	54	20	4 760	5 040	8 150	10 400



IIK Stainless Steel Linear Bushing with Seals : Metric series

Standard type : LME··· F UU Adjustable clearance type : LME··· F UU AJ

Open type : LME··· F UU OP LME···N F UU (Synthetic resin retainer) LME···N F UU AJ (Synthetic resin retainer) LME···N F UU OP (Synthetic resin retainer)



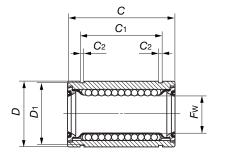


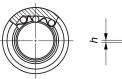


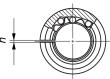
	l									Mode	el nur	nhei	•							
Shaft diameter mm		Standard ·	typ	е	Ball circuits	Mass (Ref.) g	Adjus	stable clea				Ball circuits	Mass (Ref.) g		Open ty	/pe	!		Ball circuits	Mass (Ref.)
5	LME	51222N	F	UU	4	10	LME	51222N	F	UU	AJ	4	9.5			_			-	-
8	LME LME	81625 81625N	F F	UU UU	4	22 20	LME	81625N	F	UU	AJ	- 4	- 19			_			-	_
12	LME LME	122232 122232N	F F	UU UU	4	45.5 41	LME LME	122232 122232N	F F	UU UU	AJ AJ	4	44.5 40	LME LME	122232 122232N	F F	UU UU	OP OP	3	35 32
16	LME LME	162636 162636N	F F	UU UU	4	59 56.5	LME LME	162636 162636N	F F	UU UU	AJ AJ	4 4	58 54.5	LME LME	162636 162636N	F F	UU UU	OP OP	3	45 44
20	LME LME	203245 203245N	F F	UU UU	5 5	105 92	LME LME	203245 203245N	F F	UU UU	AJ AJ	5 5	100 90	LME LME	203245 203245N	F F	UU UU	OP OP	4	84 75
25	LME *LME	254058 254058N	F F	UU UU	6 6	240 220	LME *LME	254058 254058N	F F	UU UU	AJ AJ	6 6	235 215	LME *LME	254058 254058N	F F	UU UU	OP OP	5 5	200 181
30	LME LME	304768 304768N	F F	UU UU	6 6	360 325	LME LME	304768 304768N	F F	UU UU	AJ AJ	6 6	355 320	LME LME	304768 304768N	F F	UU UU	OP OP	5 5	300 272
40	LME LME	406280 406280N	F F	UU UU	6 6	752 705	LME LME	406280 406280N	F F	UU UU	AJ AJ	6 6	740 694	LME LME	406280 406280N	F F	UU UU	OP OP	5 5	645 600
50	LME LME	5075100 5075100N	F F	UU UU	6 6	1 210 1 130	LME LME	5075100 5075100N	F F	UU UU	AJ AJ	6 6	1 190 1 110	LME LME	5075100 5075100N	F F	UU UU	OP OP	5 5	1 050 970
60	LME LME	6090125 6090125N	F F	UU UU	6 6	2 160 2 050	LME LME	6090125 6090125N	F F	UU UU	AJ AJ	6 6	2 110 2 000	LME LME	6090125 6090125N	F F	UU UU	OP OP	5 5	1 850 1 580

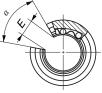
Note(¹): When circlips are used for mounting, the dimension C₁ minus twice the width of circlip becomes the width of hub.

Remark: Seals of the Linear Bushings marked with an asterisk (*) protrude a little from the end face of external cylinder.









LME…F UU LME···F UU AJ

'		
LME…F	UU	OP

				Nomina	l dimens	mm							Eccen- tricity	Basic dy load rati	ing	load r	static rating
Fw	Tolerance μ m	D	Tolerance	С	Tolerance	C1(1)	Tolerance	C2	<i>D</i> 1	h	E	α Degree	Max. μm	Load	Load	Load	Load direction B
5		12		22		14.5		1.1	11.5	1	-	_		90.8	104	219	310
8	+8	16	0 -8	25		16.5		1.1	15.2	1	_	_		121	139	255	361
12	0	22	0	32	0 –200	22.9	0 –200	1.3	21	1.5	7.5	78	12	259	298	503	711
16	+ 9	26	– 9	36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20	– 1	32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
25	+11	40	0 –11	58		44.1		1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
30	- 1	47		68	0	52.1	0	1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40		62	0	80	-300	60.6	-300	2.15	59	3	16.8	50	47	2 030	2 150	3 620	4 640
50	+13 - 2	75	-13	100		77.6		2.65	72	3	21	50	17	3 940	4 180	7 130	9 120
60		90	0 –15	125	0 -400	101.7	0 -400	3.15	86.5	3	27.2	54	20	4 760	5 040	8 150	10 400

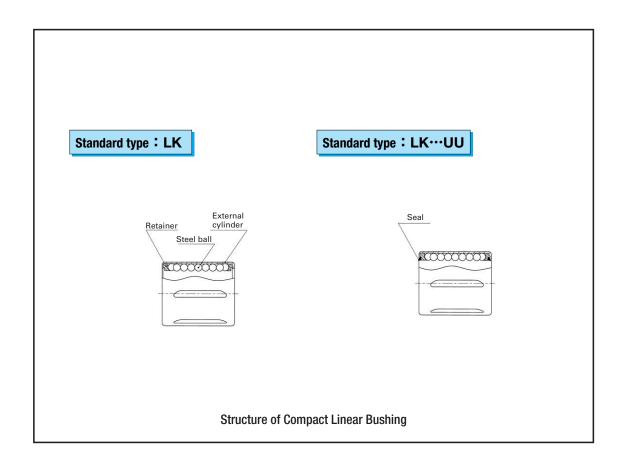


IKO Compact Linear Bushing

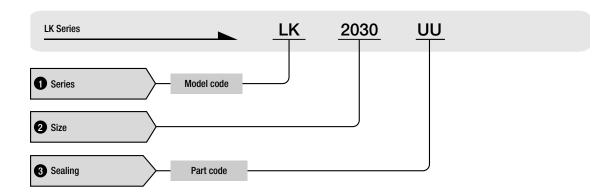
IKO Compact Linear Bushing is a linear motion rolling guide, incorporating steel balls and a retainer compactly in an external cylinder which is made from a thin special-steel plate by precision drawing, carburizing and quenching.

IKO Compact Linear Bushing can be used to greatly reduce the size and weight of linear motion part of machines, because its sectional height is as small as 4 to 5mm and it is mounted directly on the shaft which is used as the raceway. Steel balls are guided accurately by the retainer, so frictional resistance is small and a highly accurate linear motion can be obtained.

IKO Compact Linear Bushing is tightly fitted in the housing bore with an interference, so it is not necessary to fix it axially and handling is easy.



Identification Number



Raceway surface

Since the shaft surface is used as a raceway for Compact Linear Bushing, the shaft must be heat-treated and ground. Recommended surface hardness and roughness of the shaft are shown in Table 1.

Item	Recommended value
Surface hardness	HRC58~64
Surface roughness(1)	0.2μmRa or less (0.8μmRy or less)

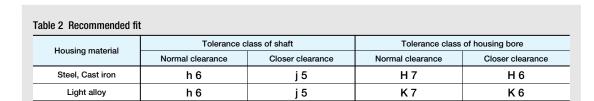




The correct dimensions and accuracy IKD Compact Linear Bushing are obtained only after it has been pressfitted into the housing bore. As the external cylinder is thin, accuracy is directly affected by the dimensions, **IKO Compact Linear Bushing**

Standard type : LK

With seals : LK···UU



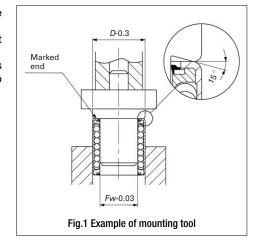
Mounting

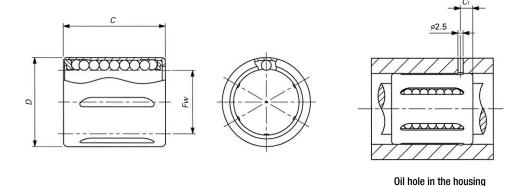
IKD Compact Linear Bushing should be press-fitted into the housing gently, using an appropriate tool as shown in Fig.1 with its marked and face up. As the external cylinder is thin, it must never be stuck directly with a hammer.

shape and rigidity of housing, so these factors must be examined carefully.

The recommended fit is shown in Table 2.

Since the external cylinder of **IKD** Compact Linear Bushing is firmly press-fitted into the housing bore, it is not necessary to fix it axially.





IKO

	Shaft dia-		Ident	ification	Number mm			Во	undary o	dimensio m	ons	Basic d load ra	lynamic ating(²)		static ating(2)
	mm	Standard type		Weight (Reference)	, ,		Weight (Reference)	F w	D	C(1)	C1	Load direction A	Load direction B	Load direction A	Load direction B
-				9			9							- ' '	
	16	LK 1630	5	24.4	LK 1630 UU	5	25.2	16	24	30	6	855	1 020	690	1 010
	20	LK 2030	6	29.5	LK 2030 UU	6	30.4	20	28	30	6	1 060	1 120	874	1 120
	25	LK 2540	6	61.4	LK 2540 UU	6	62.8	25	35	40	8	1 940	2 050	1 640	2 100
	30	LK 3050	7	88.2	LK 3050 UU	7	89.8	30	40	50	8	2 790	2 750	2 670	3 070

Note(1): The seal end of sealed type slightly protrudes from the end face of external cylinder.

(2): The load directions A and B are shown in the sketches below.



Load direction A Load direction B

Miniature Linear Bushing

LMS

IKO Miniature Linear Bushing is a miniature type linear motion rolling guide which travels along a shaft to achieve endless linear motion. The shaft diameter is 3~5 mm. In the external cylinder of Miniature Linear Bushing, a retainer, steel balls and stop rings are compactly incorporated, and precise positioning accuracy can be obtained.

Low frictional linear motion

Steel balls are accurately guided by a retainer, so low frictional resistance and stable linear motion can be achieved.



Compact design

Miniature Linear Bushing is very small in size, allowing for compact assembly in machines and equipment.



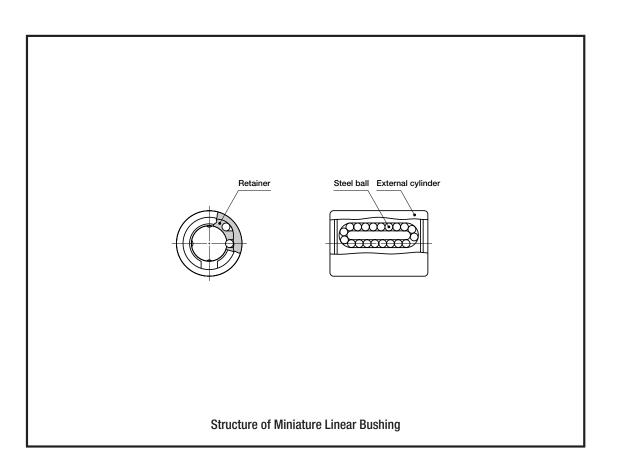
Wide variations

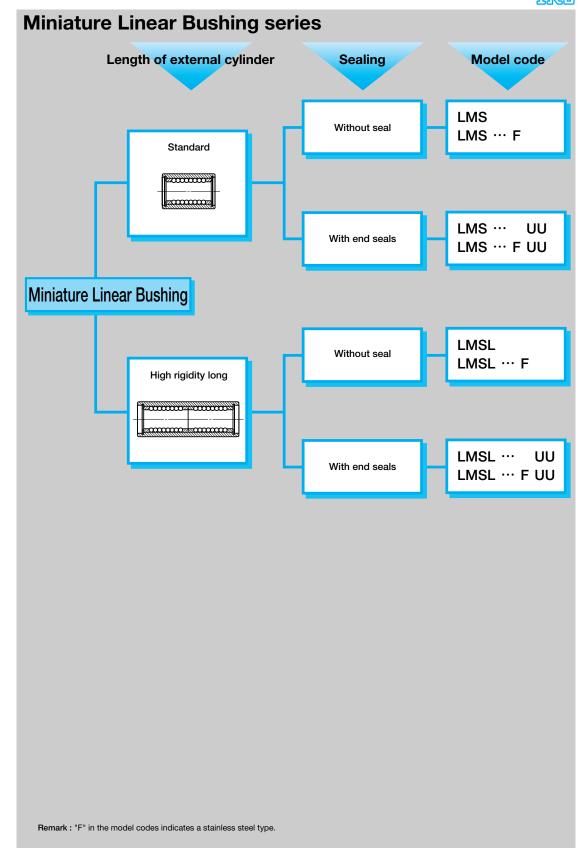
In addition to the standard type, the high-rigidity long type is available. These types can be selected to suit the requirements in applications.



Stainless steel type

Miniature Linear Bushings made of stainless steel are also available. This type is suitable for applications where corrosion resistance is important.

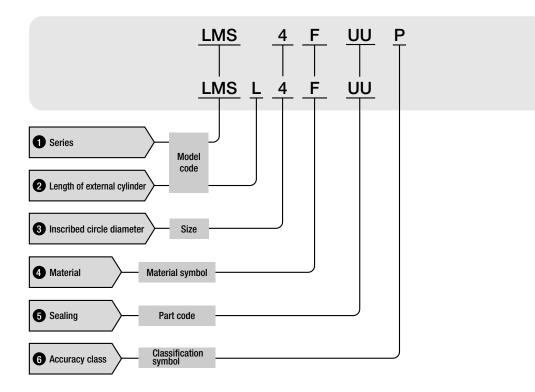


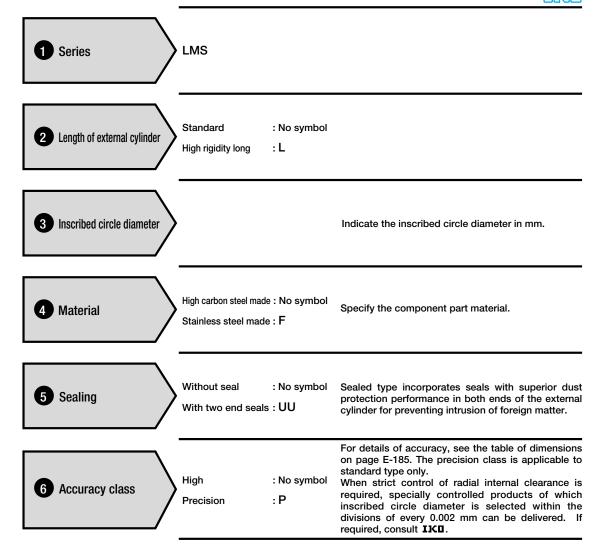


1N=0.102kgf=0.2248lbs. E-179 1mm=0.03937inch

Identification number and specification

The specification of Miniature Linear Bushing is indicated by the identification number, consisting of a model code, a size, a material symbol, a part code and a classification symbol.





1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Load Rating

Summarized descriptions of load ratings of Miniature Linear Bushing are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Miniature Linear Bushings are individually operated and 90% of the units in the group can travel 50 x 10³ meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

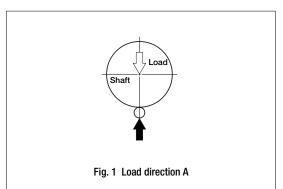
The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

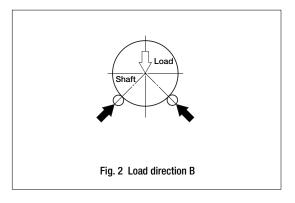
Relationships between load ratings and the position of ball circuits

Load ratings of Miniature Linear Bushing are affected by the position of the ball circuits. In the table of dimensions, two types of load ratings are shown corresponding to the load directions and steel ball circuit positions as shown in Fig. 1 and Fig. 2.

In Fig. 1 the load direction is in line with the steel ball circuit position and this direction is referred to as load direction A in the table of dimensions. In general, the load ratings for this direction are also used, when the load direction is indeterminate or the steel ball circuit position in relation to the load direction cannot be determined.

In Fig. 2, the load direction is pointed at the center of two ball circuits and this direction is referred to as load direction B in the table of dimensions. In general, a larger load can be received in this case compared with load direction A.





Precautions for Use

Raceway surface

Since Miniature Linear Bushings operate with a shaft as a raceway surface, the shaft should be heat-treated and ground. Recommended surface hardness, roughness and minimum effective hardening depth of the shaft are shown in Table 1.

Item	Recommended value	Remark
Surface hardness	58~64HRC	When the raceway hardness is less than the necessary hardness, multiply load ratings by the hardness factor.
Surface roughness	$0.2 \mu mRa$ or better (0.8 μmRy or better)	
Effective hardening depth	0.8mm or more	

2 Lubrication

Miniature Linear Bushing can be used with oil or grease lubrication. It is a common practice to apply grease lightly on the shaft surface and steel balls for grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication.

3 When rotational motion is present

Miniature Linear Bushing can only be operated in linear motion and can not be rotated. When linear motion in short stroke length and rotation are both required, **IKO** Miniature Stroke Rotary Bushing (See page E-186.) is recommended.

4 Insertion of shaft

When Miniature Linear Bushing is assembled with the shaft, do not insert the shaft with angle. It is possible that the steel balls will fall out or the retainer will be deformed and smooth operation can not be obtained.



Precautions for Mounting

F

Table 2 shows the recommended fit tolerances for Miniature Linear Bushing.

Thickness of external cylinder is very thin. Therefore, when fitting it into the housing, epoxy type adhesive is recommended for fixing the external cylinder in the housing. Do not apply press fitting.

Table 2 Recommended fit (Tolerance of shaft		unit : μ m
Class	Shaft	Housing
High class	- 6 -14	+12 0
Precision class	- 4 - 9	+ 8

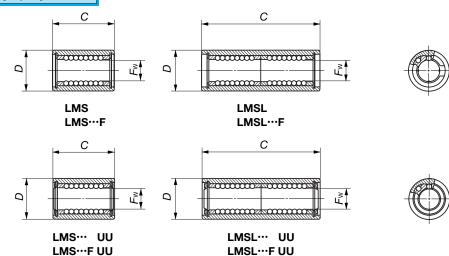
Accessories

Steel shaft for Miniature Linear Bushing

In order to achieve full performance of Miniature Linear Bushing, heat-treated and ground steel shafts with high accuracy and rigidity are available. For details, consult **IKB**.

IKO Miniature Linear Bushing

Standard : LMS
High rigidity long :LMSL



Shaft dia-		uits	Mass (Ref.)		Non	ninal c	limer	sions mm	and t	tolera	inces	Eco tric	cen-	load ra	_	load i	_
meter	Model number	Ball circuits	g	<i>F</i> w	μ	rance m High	D	Toler µ Pre- cision	m	С	Tolerance µm	Μα μ Pre- cision	m	Load	Load direction B	Load direction A	Load
3	LMS 3 LMS 3 F LMS 3 UU LMS 3 F UU	4	1.8	3	0 -5	0	7	0 -7	0 -8	10	0 -120	2	4	18.4	21.2	39.4	55.8
3	LMSL 3 LMSL 3 F LMSL 3 UU LMSL 3 F UU	4	3.0	3	_	0 -10	,	-	0 -13	19	0 -300	_	5	30.0	34.4	78.9	112
4	LMS 4 LMS 4 F LMS 4 UU LMS 4 F UU	4	2.8	4	0 -5	0 -8	8	0 -7	0 -8	12	0 -120	2	4	23.5	27.0	48.6	68.7
4	LMSL 4 LMSL 4 F LMSL 4 UU LMSL 4 F UU	4	4.3	4	_	0 -10		_	0 -13	23	0 -300	_	5	38.1	43.8	97.2	137
5	LMS 5 LMS 5 F LMS 5 UU LMS 5 F UU	4	3.8	5	0 -5	0 -8	10	0 -7	0 -8	15	0 -120	2	4	51.3	59.0	108	152
3	LMSL 5 LMSL 5 F LMSL 5 UU LMSL 5 F UU	4	6.7	5	-	0 -10	10	_	0 -13	29	0 -300	_	5	83.4	95.8	215	304

Remark: In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

IKO

S



Stroke Rotary Bushings

Description of each series and Table of dimensions



In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

Stroke Rotary Bushing

IKO Stroke Rotary Bushing is a compact linear motion rolling guide capable of rotation as well as linear motion with low frictional resistance. In the external cylinder, steel balls and a retainer are incorporated. Standard and sealed types are available. In both standard and sealed types, ordinary and heavy duty types are available. This series is used in many applications.

Rotary and linear motion

Steel balls and a retainer are incorporated in an external cylinder having a cylindrical raceway on the inside, so rotary motion can be achieved as well as linear movement.



Low frictional resistance

Very accurate steel balls are incorporated in a precisely ground external cylinder. So low rolling friction with extremely smooth rotary and reciprocating linear motions can be obtained.



Small inertia

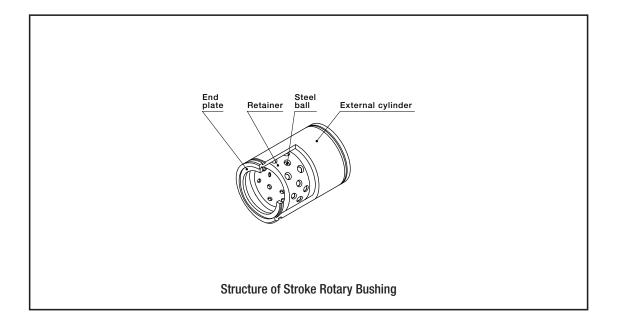
Since the retainer is highly rigid but light, this series is suitable for high speed rotation and reciprocating movement as inertia is small.

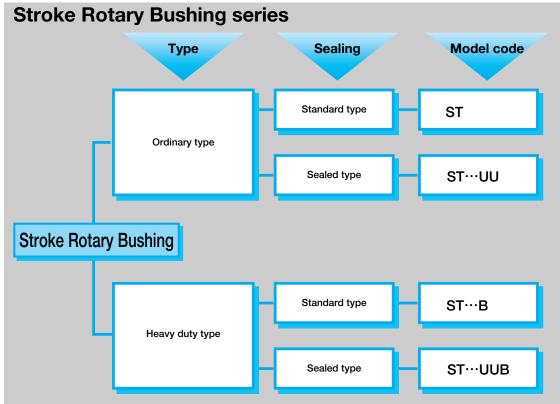
Standard type Stroke Rotary Bushing

This type is classified into ordinary and heavy duty types depending on the magnitude of load rating. The heavy duty type has a larger load rating and a higher rigidity than the ordinary type, but the stroke length is shorter compared to the ordinary type.

Sealed type Stroke Rotary Bushing

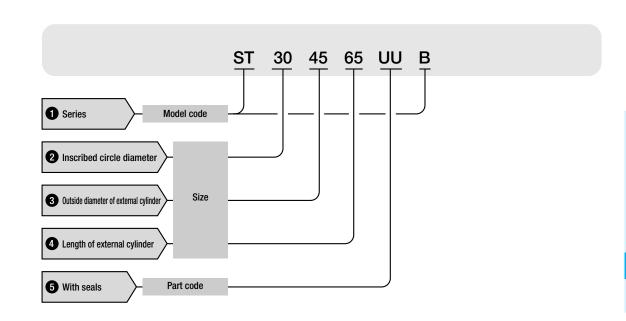
In this type, synthetic resin seals are incorporated in the external cylinder bore at both ends. These seals are used to prevent intrusion of foreign substances. This type is classified into ordinary and heavy duty types. Both types have shorter stroke lengths compared to the standard type.

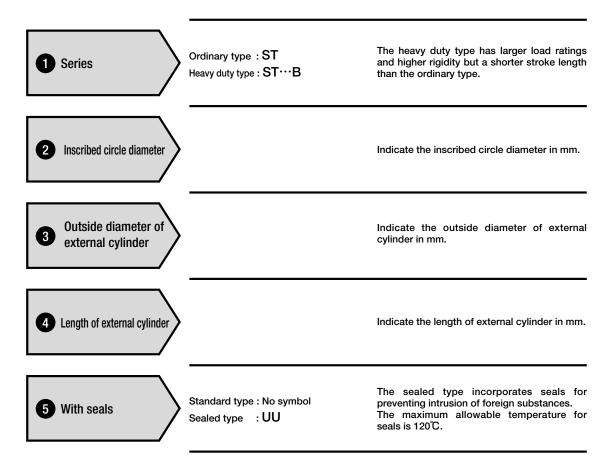




Identification number and specification

The specification of Stroke Rotary Bushing is indicated by the identification number, consisting of a model code, a size and a part code.





Load Rating

The load ratings of Stroke Rotary Bushing are defined for radial load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant radial load both in direction and magnitude under which a group of identical Stroke Rotary Bushings are individually operated and 90% of the units in the group can rotate 1,000,000 revolutions free from material damage due to rolling contact fatigue.

Basic static load rating Co

The basic static load rating is defined as the static radial load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

Accuracy

The accuracy of Stroke Rotary Bushing is shown in Tables 1.1 and 1.2.

The outside diameter of external cylinder changes by the tension of the stop ring to be set with the external cylinder. Accordingly, the measurement of the outside diameter should be made at the measuring position obtained from formula (1), and the mean diameter at that position is used.

$$W = 4 + L_1 / 8 \cdots (1)$$

where, W: Distance from the end face to measuring position P, mm (See Fig. 1.)

L₁: Length of external cylinder, mm

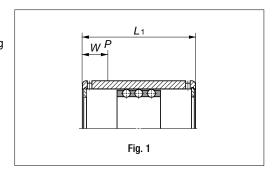


Table 1.1 Tolerance of inscribed circle diameter and outside diameter of external cylinder unit: µm

or out	side d ternal	le diameter F _w liameter D of cylinder ım	inscribe	ince of ed circle eter F _w	Tolerance of outside diameter of external cylinder $D_m(^1)$		
ove	r	incl.	high	low	high	low	
-	4	6	+18	+10	_	_	
	6	10	+22	+13	0	- 8	
10	0	18	+27	+16	0	- 8	
18	8	30	+33	+20	0	- 9	
30	0	50	+41	+25	0	-11	
50	0	80	+49	+30	0	-13	
8	0	120	+58	+36	0	-15	
120	0	150	_	-	0	-18	

Note(1): D_m is an arithmetic mean value of maximum and minimum outside diameters obtained by two-point measurement method.

Table 1.2 Tolerance of length of external cylinder unit : μ m Inscribed circle diameter Fw Tolerance of length L1 of external cylinder high incl. low over 20 0 -200 60 0 20 -300 60 100 0 -400

0)

F

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Fit

The fit of Stroke Rotary Bushing with shaft and housing bore is recommended to be as shown in Table 2. Since both rotary and linear motions may be performed at the same time, radial clearance should be held to minimum if shock load is applied or vibration is present during the operation. For use on a vertical axis or when very accurate movement is required, zero clearance or minimal preload is recommended. However, since excessive preload shortens life, radial clearance smaller than the values shown in Table 3 should not be used.

Table 2 Recommended fit tolerance							
	Tolerance range class						
Operating condition	Shaft	Housing bore					
General application	k5, m5	H6, H7					
Vertical axis or high accuracy	n5, p6	J6, J7					

Table 3 Minimu	ble 3 Minimum radial clearance unit : μ r								
	cle diameter <i>F</i> w mm	Minimum value of radial clearance							
over	incl.								
4	6	- 2							
6	10	- 3							
10	18	- 4							
18	30	- 5							
30	50	- 6							
50	80	- 8							
80	100	-10							

DN

600 000

300 000

Allowable Limit of Speed

Stroke Rotary Bushing can operate in both linear and rotary directions at the same time. The allowable limit of speed when linear motion and rotation occur at the same time can be obtained from the following formula. Limiting values in general are shown in Table 4.

Table 4 Limit of speed

Oil

Grease

Lubrication

 $DN \ge D_{pw} n + 10S n_1 \cdots (2)$

where, DN: Limit of speed (See Table 4.)

n: Number of revolutions per minute, rpm

n₁: Number of strokes per minute, cpm

S: Stroke length, mm

 D_{pw} : Pitch circle diameter of balls, mm ($D_{pw} = 1.15 F_w$)

Fw: Inscribed circle diameter, mm

This formula is applicable only when $n_1 \le 5000$ and $Sn_1 \le 50000$.

Precautions for Use

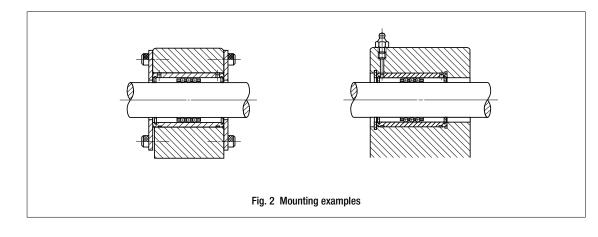
- 1 Actual stroke length should be less than 80% of the maximum stroke length shown in the dimension tables.
- 2 Since Stroke Rotary Bushings operate with a shaft as a raceway surface, the shaft should be heat-treated and ground. Recommended surface hardness and roughness of the shaft are shown in Table 5, and also recommended minimum effective hardening depth of the raceway is shown in Table 6.
- 3 This series can be used with oil or grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication. Lubrication is done through oil holes provided on the external cylinder.

Table 5 Surface hardness and roughness of raceways Recommended valu /hen the raceway hardness is less 58~64HRC than the necessary hardness, multiply Surface hardness load ratings by the hardness factor. When the required accuracy is not $0.2 \mu mRa$ or better Surface roughness severe, a surface roughness of about (0.8 µmRv or better) 0.8 μmRa (3.2 μmRy) is adequate.

able 6 Minimum effective hardening depth unit : mm										
iameter	Recommended minimum									
incl.	effective hardening depth									
28	0.8									
50	1.0									
100	1.5									
	iameter incl. 28 50									

Precautions for Mounting

First, assemble Stroke Rotary Bushing into a housing. Then gradually and gently insert a shaft into a bore. At this time, be careful not to give impact on the steel balls. After Stroke Rotary Bushing is assembled with a shaft and housing, the retainer must be located at the center of the axial direction of the external cylinder. In this process, insert the shaft into the bore, and the retainer will move together with the shaft and then stop at the end of external cylinder. Push in the shaft further for the distance of 1/2 of the maximum stroke length shown in the dimension tables while paying attention not to damage the steel balls and raceways. Pull back the shaft for the distance of 1/2 of the maximum stroke length. The retainer should then be positioned at the center of the axial direction of the external cylinder.



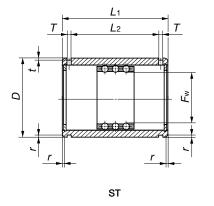
ST

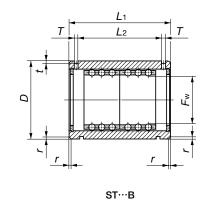
IKO Stroke Rotary Bushing

Ordinary type : ST Heavy duty type : ST···B



Shaft			Model n	umber					imensions m	
diameter mm	Ordi	inary type	Mass (Ref.)	Не	avy duty type	Mass (Ref.)	Fw	D	<i>L</i> 1	L 2
4	ST	4814	2.9	-			4	8	14	9
5	ST	51016	5.6	_			5	10	16	10.6
6	ST	61219	8.9	-			6	12	19	13.2
8	ST	81524	15.6	ST	81524B	16.8	8	15	24	17.1
10	ST	101930	28.8	ST	101930B	31.2	10	19	30	22.7
12	ST	122332	42	ST	122332B	46	12	23	32	24.5
16	ST	162837	71	ST	162837B	75	16	28	37	29.1
20	ST	203245	99	ST	203245B	106	20	32	45	35.8
25	ST	253745	117	ST	253745B	125	25	37	45	35.8
30	ST	304565	205	ST	304565B	220	30	45	65	53.5
35	ST	355270	329	ST	355270B	346	35	52	70	58.5
40	ST	406080	516	ST	406080B	540	40	60	80	68.3
45	ST	456580	563	ST	456580B	588	45	65	80	68.3
50	ST	5072100	827	ST	5072100B	862	50	72	100	86.4
55	ST	5580100	1 160	ST	5580100B	1 200	55	80	100	86.4
60	ST	6085100	1 240	ST	6085100B	1 290	60	85	100	86.4
70	ST	7095100	1 400	ST	7095100B	1 450	70	95	100	86.4
80	ST	80110100	2 050	ST	80110100B	2 110	80	110	100	86
90	ST	90120100	2 250	ST	90120100B	2 330	90	120	100	86
100	ST 1	100130100	2 440	ST	100130100B	2 520	100	130	100	86





				ST		ST···B				
τ	t		Maximum stroke length mm	Basic dynamic load rating C	Basic static load rating Co	Maximum stroke length mm	Basic dynamic load rating C	Basic static load rating Co N		
1.1	0.25	0.3	10	112	59.5					
1.1	0.25	0.3	13	121	68.3					
1.1	0.25	0.3	15	278	168					
1.5	0.5	0.5	24	315	211	8	512	422		
1.5	0.5	0.5	30	659	466	8	1 070	932		
1.5	0.5	0.5	32	1 110	822	8	1 800	1 640		
1.5	0.5	0.5	40	1 230	998	16	1 990	2 000		
2	0.5	0.5	54	1 390	1 250	28	2 250	2 500		
2	0.5	1	54	1 450	1 430	28	2 360	2 850		
2.5	0.5	1	82	3 110	3 160	44	5 060	6 320		
2.5	0.7	1.5	92	3 290	3 550	54	5 340	7 100		
2.5	0.7	1.5	108	4 340	4 810	66	7 050	9 630		
2.5	0.7	1.5	108	4 550	5 330	66	7 390	10 700		
3	1	1.5	138	5 790	6 970	88	9 400	13 900		
3	1	2	138	6 030	7 630	88	9 800	15 300		
3	1	2	138	6 260	8 300	88	10 200	16 600		
3	1	2	138	6 510	9 320	88	10 600	18 600		
3	1.5	2	132	8 230	12 200	76	13 400	24 400		
3	1.5	2	132	8 550	13 500	76	13 900	27 000		
3	1.5	2	132	8 820	14 800	76	14 300	29 500		

ST

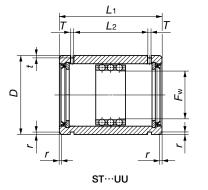
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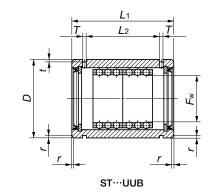
Sealed type Stroke Rotary Bushing

Ordinary type : ST…UU Heavy duty type : ST…UUB



Shaft			Model r		Nominal dimensions mm					
diameter mm		Ordinary type	Mass (Ref.)	1	Heavy duty type Mass (I		Fw	D	L 1	L ₂
8	ST	81524UU	16.5				8	15	24	12.3
10	ST	101930UU	30.7				10	19	30	15.5
12	ST	122332UU	45				12	23	32	17.1
16	ST	162837UU	74				16	28	37	21.1
20	ST	203245UU	107				20	32	45	26.8
25	ST	253745UU	121				25	37	45	26.8
30	ST	304565UU	215	ST	304565UUB	230	30	45	65	45.1
35	ST	355270UU	342	ST	355270UUB	359	35	52	70	50.1
40	ST	406080UU	529	ST	406080UUB	553	40	60	80	59.9
45	ST	456580UU	577	ST	456580UUB	602	45	65	80	59.9
50	ST	5072100UU	836	ST	5072100UUB	871	50	72	100	77.4
55	ST	5580100UU	1 190	ST	5580100UUB	1 230	55	80	100	77.4
60	ST	6085100UU	1 270	ST	6085100UUB	1 320	60	85	100	77.4
70	ST	7095100UU	1 430	ST	7095100UUB	1 480	70	95	100	77.4
80	ST	80110100UU	2 080	ST	80110100UUB	2 140	80	110	100	77
90	ST	90120100UU	2 290	ST	90120100UUB	2 370	90	120	100	77
100	ST	100130100UU	2 540	ST	100130100UUB	2 620	100	130	100	77





				ST···UU			ST…UUB	
Т	t	r	Maximum stroke length mm	Basic dynamic load rating C	Basic static load rating Co	Maximum stroke length mm	Basic dynamic load rating C	Basic static load rating Co N
1.5	0.5	0.5	14	315	211			
1.5	0.5	0.5	16	659	466			
1.5	0.5	0.5	17	1 110	822			
1.5	0.5	0.5	24	1 230	998			
2	0.5	0.5	32	1 390	1 250			
2	0.5	1	32	1 450	1 430			
2.5	0.5	1	65	3 110	3 160	27	5 060	6 320
2.5	0.7	1.5	75	3 290	3 550	37	5 340	7 100
2.5	0.7	1.5	91	4 340	4 810	49	7 050	9 630
2.5	0.7	1.5	91	4 550	5 330	49	7 390	10 700
3	1	1.5	120	5 790	6 970	70	9 400	13 900
3	1	2	120	6 030	7 630	70	9 800	15 300
3	1	2	120	6 260	8 300	70	10 200	16 600
3	1	2	120	6 510	9 320	70	10 600	18 600
3	1.5	2	114	8 230	12 200	58	13 400	24 400
3	1.5	2	114	8 550	13 500	58	13 900	27 000
3	1.5	2	114	8 820	14 800	58	14 300	29 500

Miniature Stroke Rotary Bushing

STS

IKO Miniature Stroke Rotary Bushing is a very compact linear motion rolling guide with small diameter and low sectional height. It is able to achieve both rotary and linear motion at the same time.

Since Miniature Stroke Rotary Bushing is extremely small in size and features high accuracy and low frictional resistance, it is suitable for applications which require compact size with high accuracy such as measuring instruments, IC manufacturing machines and precision equipment.

Rotary and linear motion

Steel balls held in a retainer are assembled into an outer ring having a cylindrical raceway on the inside, so linear motion as well as rotary movement can be achieved.

Extremely accurate

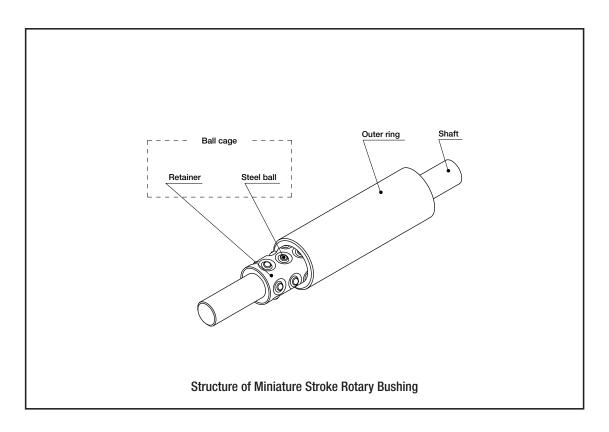
The outer ring and shaft are precisely super-finished after heat treatment. The assembled set, which consists of an outer ring, shaft and very precise steel balls held in a retainer, is set to zero or minimal preload. So extremely accurate operation can be achieved both in rotary and linear motion.

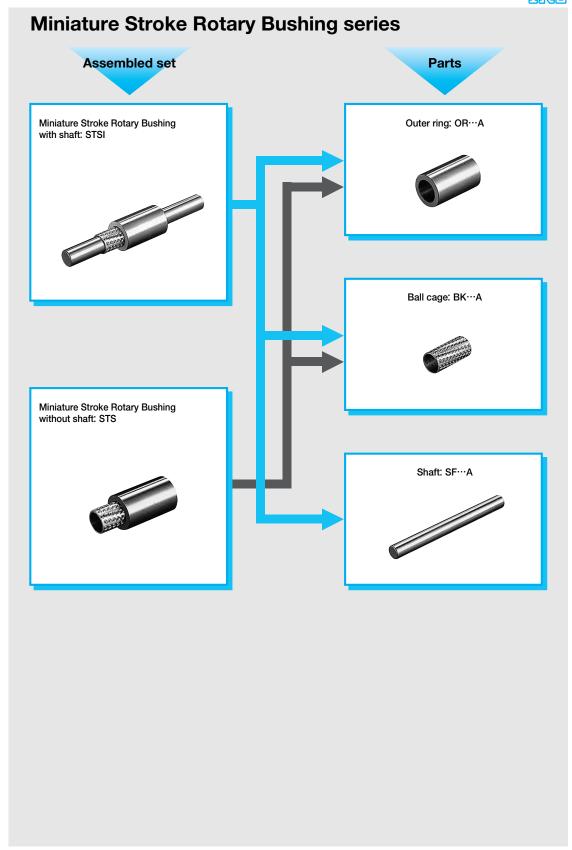
Extremely compact size

Very small diameter steel balls are assembled in a very thin walled outer ring. So the assembled set is extremely compact in sectional height.

Very smooth movement

All parts are precisely finished and assembled to obtain an optimal preload. This series offers very smooth and stable movement as well as high accuracy with low frictional resistance.

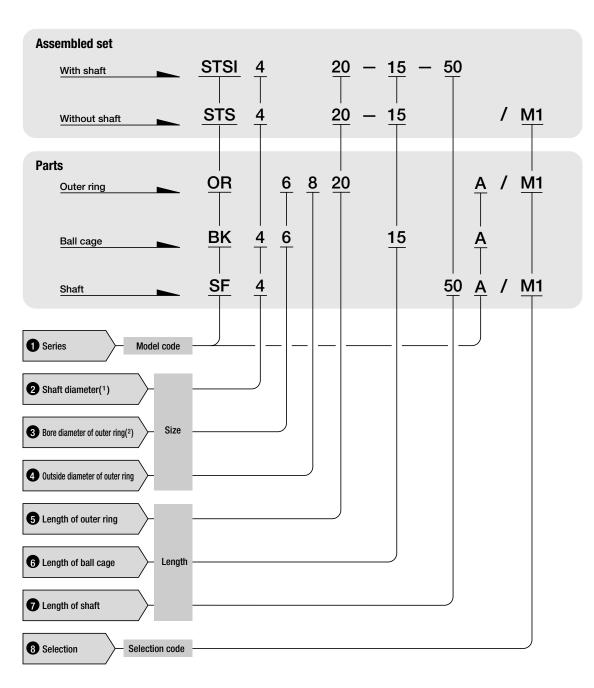




1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

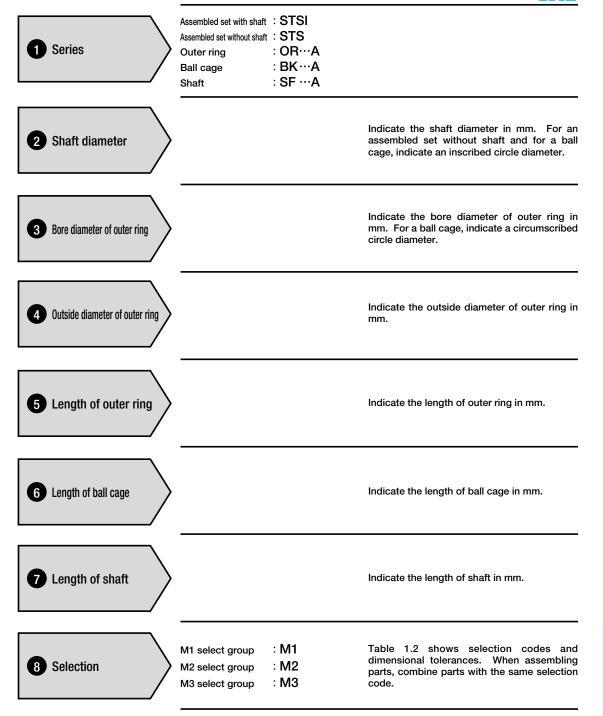
Identification number and specification

The specification of Miniature Stroke Rotary Bushing is indicated by the identification number, consisting of a model code, a size, a length and a selection code.



Note(1): For an assembled set without shaft and for a ball cage, this item indicates an inscribed circle diameter.

(2): For a ball cage, this item indicates a circumscribed circle diameter.



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1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Load Rating

The load ratings of Miniature Stroke Rotary Bushing are defined for radial load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

The load rating of Miniature Stroke Rotary Bushing is given for the case when the steel balls assembled in a retainer are positioned within the outer ring raceway without escaping from it and equally share an applied load.

Basic static load rating Co

The basic static load rating is defined as the static radial load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

Accuracy

The accuracy of Miniature Stroke Rotary Bushing is shown below.

oute	iameter of er ring nm		of outside of outer ring m	Maximum radial runout of outside diameter of	Tolerance of length of outer ring and shaft
over	incl.	high	low	outer ring μm	mm
3	6	0	-5		
6	10	0	-6	8	±0.1
10	18	0	-8		<u> </u>
18	30	0	-9	9	

able 1.2 Selection codes and dimensional tolerances unit : μ									
Selection code	Tolera outer ri	nce of ng bore							
code	high	low	high	low	high	low			
M1	- 1	-3	-1	-3	0	-1			
M2	-2	-4	-2	-4	– 1	-2			
МЗ	-3	-5	-3	-5	-2	-3			

Fit

Miniature Stroke Rotary Bushing is set to minimal preload condition to obtain high operating accuracy. For Miniature Stroke Rotary Bushing with shaft, a slight clearance fit between the outer ring and the housing is recommended to avoid any undesirable influence on the inscribed circle diameter.

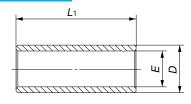
Also, when assembling the outer ring, ball cage and shaft, select the outer ring and shaft which have the same selection code and match them to a ball cage.

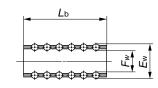
Precautions for Use

- The outer ring should have a clearance fit in the housing. When the outer ring must be positioned in the axial direction with the housing, use a stop ring, etc. at the end of the outer ring or use synthetic adhesive.
- 2 When inserting a shaft into a ball cage, the ball cage must be located at the center of the axial direction of the outer ring. A convenient way of locating the ball cage is to shift the position of the ball cage prior to assembly to the inserting direction for the distance of 1/2 of the inserting distance of the shaft.
- 3 When inserting the shaft into a ball cage, be careful not to damage the steel balls and raceways by twisting the shaft or applying a shock load.
- 4 Miniature Stroke Rotary Bushing can be used with oil or grease lubrication. When lubricating with grease, the grease is usually lightly smeared on the raceways of the shaft and outer ring. A good quality lithium-soap base grease is recommended.

IKO Miniature Stroke Rotary Bushing

Assembled set with shaft : STSI Assembled set without shaft : STS : OR···A Outer ring Ball cage : BK···A : SF ...A Shaft





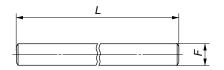
Outer ring	Ball cage

Shaft			Outer ring					Ball cag	je
diameter	Model number of the assembled set without shaft	Identification number	Mass (Ref.)	Mass (Ref.) Nominal dimension mm			Identification number	Mass (Ref.)	
mm			g	E	D	<i>L</i> 1		g	Fw
2	STS 2 L1-Lb	OR 3 510 A OR 3 515 A	0.9 1.3	3.2	5	10 15	BK 2 3 5 A BK 2 3 10 A	0.1 0.3	2
3	STS 3 L1-Lb	OR 5 7 10 A OR 5 7 20 A OR 5 7 30 A	1.5 2.9 4.4	5	7	10 20 30	BK 3 5 10 A BK 3 5 15 A BK 3 5 20 A	0.7 1.1 1.4	3
4	STS 4 L1-Lb	OR 6 8 10 A OR 6 8 20 A OR 6 8 30 A	1.7 3.4 5.2	6	8	10 20 30	BK 4 6 10 A BK 4 6 15 A BK 4 6 20 A	0.9 1.3 1.8	4
5	STS 5 L1-Lb	OR 7 10 10 A OR 7 10 20 A OR 7 10 30 A	3.1 6.3 9.4	7	10	10 20 30	BK 5 710 A BK 5 715 A BK 5 720 A	1.0 1.6 2.0	5
6	STS 6 L1-Lb	OR 8 11 20 A OR 8 11 30 A OR 8 11 40 A	7.0 10.5 14.1	8	11	20 30 40	BK 6 8 10 A BK 6 8 15 A BK 6 8 20 A	1.2 1.8 2.3	6
8	STS 8 <i>L</i> 1- <i>L</i> b	OR 10 13 20 A OR 10 13 30 A OR 10 13 40 A	8.5 12.7 17.0	10	13	20 30 40	BK 8 10 10 A BK 8 10 15 A BK 8 10 20 A	1.6 2.4 3.2	8
10	STS 10 <i>L</i> 1- <i>L</i> b	OR 12 18 20 A OR 12 18 30 A OR 12 18 43 A	22.2 33.3 47.7	12	18	20 30 43	BK 10 12 15 A BK 10 12 20 A BK 10 12 25 A	2.8 3.8 4.8	10
12	STS 12 <i>L</i> 1- <i>L</i> b	OR 14 20 25 A OR 14 20 30 A OR 14 20 35 A OR 14 20 40 A	31.4 37.7 44.0 50.3	14	20	25 30 35 40	BK 12 14 20 A BK 12 14 25 A BK 12 14 30 A	4.3 5.4 6.1	12

Note(1): This figure shows the static load rating when the steel balls assembled in a retainer do not escape from the raceway of outer ring and the

balls equally share an applied load.

Remark: "L1", "Lb" and "L" in the model number of the assembled set - either with shaft or without shaft - indicate "length of outer ring", "length of ball cage" and "shaft length" respectively.



Nom	ninal	Basic static load rating(1)		Shaft			Model number of
dimer	nsions m	C ₀	Identification number	Mass (Ref.)		limensions m	the assembled set with shaft
E _w		N N	idoninouton number	g	F	 <u>L</u>	With Share
3.2	5	10.5	SF 2 20 A	0.5	2	20	STSI 2 L1-Lb-L
0.2	10	21.0	SF 2 30 A	0.7	_	30	0.01 221 282
	10	38.4					
5	15	57.7	SF 3 50 A	2.8	3	50	STSI 3 L1-Lb-L
	20	76.9	SF 3 60 A	3.3		60	
	10	59.5	SF 4 50 A	4.9		FO	
6	15	89.3	SF 4 50 A	4.9 5.9	4	50 60	STSI 4 L1-Lb-L
	20	119	31 4 00 A	5.5		00	
	10	81	SF 5 50 A	7.7		50	
7	15	121	SF 5 80 A	12.3	5	80	STSI 5 L1-Lb-L
	20	162	G. 6 66 X	12.0			
	10	103	SF 6 50 A	11.1		50	
8	15	154	SF 6 80 A	17.7	6	80	STSI 6 L1-Lb-L
	20	206					
	10	105	SF 8 50 A	19.7		50	
10	15	157	SF 8 80 A	31.5	8	80	STSI 8 L1-Lb-L
	20	209	SF 8 90 A	35.5		90	
	15	191	SF 10 80 A	49.3		80	
12	20	254	SF 10 100 A	61.6	10	100	STSI 10 L1-Lb-L
	25	318	SF 10 120 A	74.0		120	
	20	341	SF 12 80 A	71.0		80	
14	25	427	SF 12 100 A	88.8	12	100	STSI 12 L1-Lb-L
1-7	30	512	SF 12 120 A	106.5	12	120	3101 12 11-110-1

IKO

Stroke Rotary Cage

IKO Stroke Rotary Cage is a compact linear motion rolling guide with low sectional height. Steel balls having very small size variation in diameter are held in a retainer. Thus if they are assembled with a shaft and housing which are precisely finished to function as raceways, reciprocal linear motion as well as rotation can be achieved with high accuracy corresponding to the accuracy of the shaft and housing.

Superior high speed performance

The retainers are highly rigid and light in weight with low inertia. So this series is suitable for high speed reciprocating linear motion.



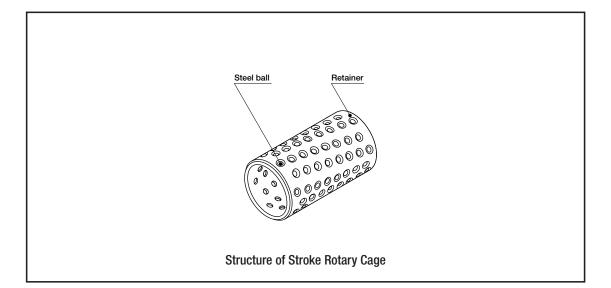
Large load rating and high rigidity

In the retainer, steel balls are incorporated as many as possible. So the load ratings are large and the rigidity is high with small elastic deformation even under fluctuating loads or localized edge loads.



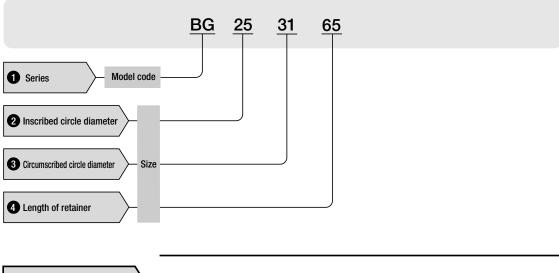
Long life

The steel balls held in the retainer are arranged in a spiral formation in order to prevent the steel balls tracing the same path. Rolling contact fatigue of the shaft and housing raceways is thereby minimized. Also, stable high accuracy can be assured for long periods of



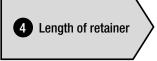
Identification number and specification

The identification number of Stroke Rotary Cage consists of a model code and a size. An example of identification number is shown below.









Indicate the length of retainer in mm.

DN

600 000

300 000

Load Rating

The load ratings of Stroke Rotary Cage are defined for radial load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant radial load both in direction and magnitude under which a group of identical Stroke Rotary Cages are individually operated and 90% of the units in the group can rotate 1,000,000 revolutions free from material damage due to rolling contact fatigue.

Basic static load rating Co

The basic static load rating is defined as the static radial load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.

Fit

Stroke Rotary Cage is generally used with a minimal radial clearance. Recommended fits are shown in Table 1.

If Stroke Rotary Cage is used on the die-set guiding posts of press machines or on machines which require accurate operation, a preload is generally given. In this case, the dimensional accuracy of the shaft and housing bore is recommended as shown in Table 2. However, since excessive preload shortens the life of Stroke Rotary Cage, it is suggested that the lower limit of radial clearance is not smaller than the value shown in Table 3.

Table 1 Fit in general		
Shaft	Housing bore	
h5, h6	H6, H7	

Э	Shaft Housing bore							
K5		Nominal diameter	5	Nominal diameter				
low	high	mm	low	high	mm			
-8	+1	25	- 9	0	19			
-8	+1	28	- 9	0	22			
-9	+2	31	- 9	0	25			
-9	+2	36	- 9	0	28			
-9	+2	40	-11	0	32			
-9	+2	48	-11	0	38			

Table 3 Lower limit of radial clearance $unit : \mu$				
Nominal shaft diameter mm	Lower limit of radial clearance			
19	-5			
22	-5			
25	-5			
28	-7			
32	-7			
38	-7			

Allowable Limit of Speed

Stroke Rotary Cages can be operated in both linear and rotary directions at the same time. The allowable limit of speed when linear motion and rotation occur at the same time can be obtained from the following formula. Limiting values in general are shown in Table 4.

Table 4 Limit of speed

Lubrication

Oil

Grease

 $DN \ge D_{pw} n + 10S n_1 \cdots (1)$

where, DN: Limit of speed (See Table 4.)

n: Number of revolutions per minute, rpm

n1: Number of strokes per minute, cpm

S: Stroke length, mm

 D_{pw} : Pitch circle diameter of balls, mm ($D_{\text{pw}} = \frac{F_{\text{w}} + E_{\text{w}}}{2}$

Fw: Inscribed circle diameter, mm

Ew: Circumscribed circle diameter, mm

This formula is applicable only when $n_1 \le 5000$ and $Sn_1 \le 50000$.

Precautions for Use

1 Stroke Rotary Cage is used with a shaft and housing bore as raceway surfaces. Recommended surface hardness and roughness of the shaft and housing are shown in Table 5, and also recommended minimum effective hardening depth of the raceway is shown in Table 6.

Table 5 Surface hardness and roughness of raceways

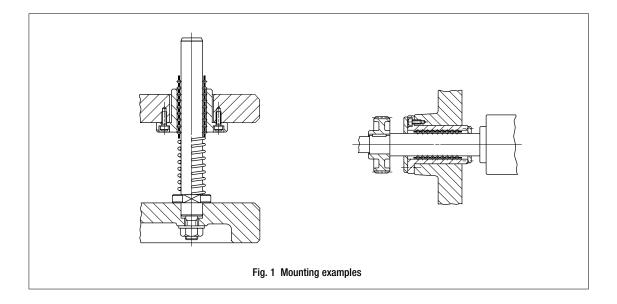
Item	Recommended value	Remarks
Surface hardness	58~64HRC	When the raceway hardness is less than the necessary hardness, multiply load ratings by the hardness factor.
Surface roughness	$0.2~\mu\mathrm{mRa}$ or better (0.8 $\mu\mathrm{mRy}$ or better)	When the required accuracy is not severe, a surface roughness of about 0.8 μ mRa (3.2 μ mRy) is adequate.

Table 6 Minimum effective hardening depth unit: mm							
Shaft or housing bore diameter Recommended minimum							
over	incl.	effective hardening depth					
	28	0.8					
28	50	1.0					

- 2 Stroke Rotary Cage can be used with oil or grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication.
- When Stroke Rotary Cage is operated in a linear direction and some of the steel balls escape the housing raceway, it is recommended that the housing bore ends should be slightly tapered so that the balls enter or exit smoothly.

Precautions for Mounting

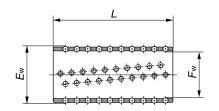
- 1 First, assemble Stroke Rotary Cage into a housing. Then gradually and gently insert a shaft into a bore. During assembly, keep the shaft parallel to the axis of Stroke Rotary Cage and avoid giving impact on the steel balls.
- 2 When Stroke Rotary Cage is used in a preloaded condition, position the ball cage at the regular position in the axial direction. A convenient way for positioning is to shift the position of the ball cage prior to the assembly to the inserting direction for the distance of 1/2 of the inserting distance of the shaft.



IK Stroke Rotary Cage







IKO

Shaft diameter	Model number	Mass (Ref.)	ass (Ref.) Nominal dimensions mm			Basic dynamic load rating C	Basic static load rating
mm		g	Fw	Ew	L	N	N
19	BG 192555	33	19	25	55	2 330	2 600
22	BG 222860	40	22	28	60	2 490	2 950
25	BG 253165	48	25	31	65	2 660	3 390
28	BG 283670	76	28	36	70	3 830	4 660
32	BG 324075	93	32	40	75	4 480	6 030
38	BG 384880	162	38	48	80	6 750	9 390

Remark: The values of basic dynamic load rating and basic static load rating are the values when the steel balls assembled in a retainer do not escape from the raceways and the applied load is equally distributed on the balls.



Roller Ways and Flat Roller Cages

Description of each series and Table of dimensions



In the table of dimensions, standard products are referred to using identification numbers marked with ______. The identification numbers marked with ______ refer to our semi-standard products.

Flat Roller Cage

FT/FTW···A

IKO Flat Roller Cage is a precision linear motion rolling guide consisting of a high accuracy cage and very precise rollers and features very low sectional height. In this series, both single row type and double row type with a 90° angle are available. The cage material is steel or synthetic resin.

Smooth operation

As the cage precisely guides the rollers, the frictional resistance is very low without stick-slip, and stable linear motion is obtained.

Large load rating

Needle rollers are assembled in a cage with a small pitch distance, so load ratings are large.

Adaptability to conventional plain guide ways

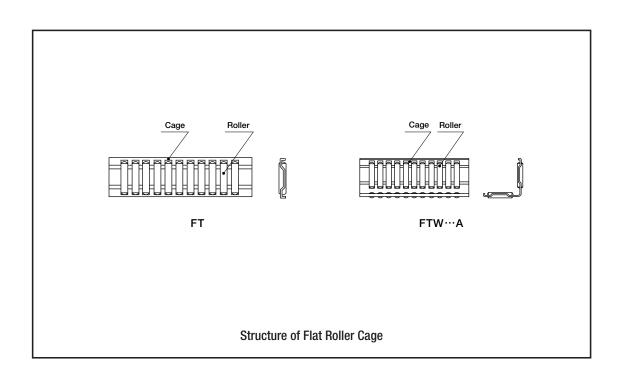
Single row and double row types are standardized and can be easily used to modify the conventional plain guide ways of machine tools, etc. into rolling guide type without large-scale redesign of the bed.

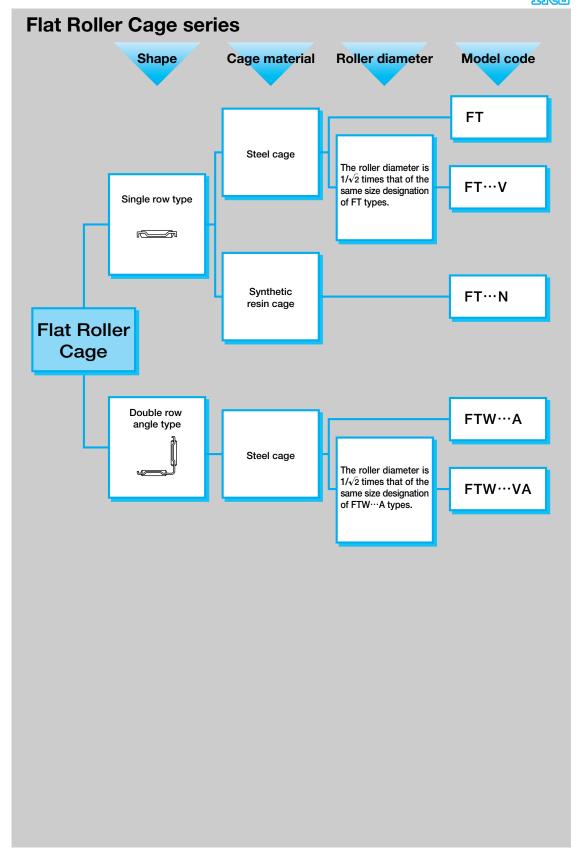
Low noise

Cages made of synthetic resin are also available. This type is most suitable for applications where low noise is required.

Easy handling

The rollers are retained in a cage securely, allowing easy handling and assembly.

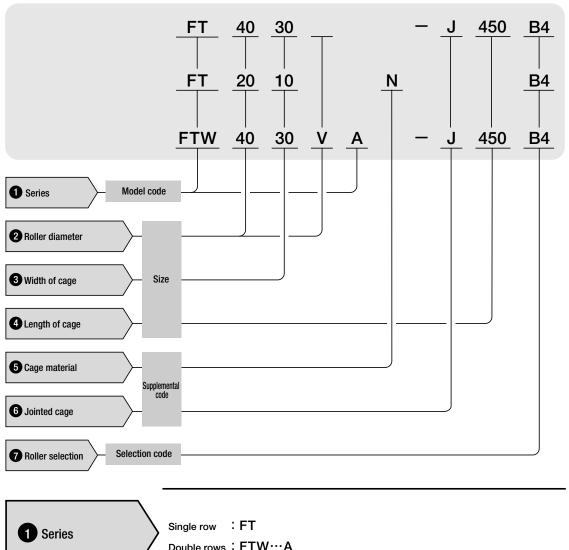




1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

Identification number and specification

The specification of Flat Roller Cage is indicated by the identification number, consisting of a model code, a size, any supplemental codes and a selection code.





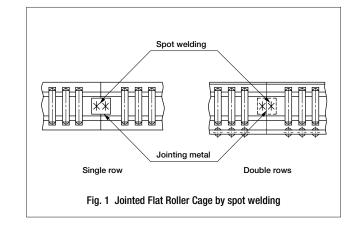




4 Length of cage Indicate the length of cage in mm. Specify the material of cage. For applicable models : No symbol and sizes, see the "model number" column in the table Steel cage 5 Cage material of dimensions on page E-224. The maximum operating Synthetic resin cage : N temperature for the synthetic resin type is 100°C. Continuous operation is possible at up to 80°C. Not jointed : No symbol The overall length of the cage is also indicated. 6 Jointed cage Specify this item when the standard length is : J Jointed exceeded.

Jointed Flat Roller Cages made from steel are available to extend the overall length of a cage. If the jointing specification is required, indicate "J" and the necessary overall length in millimeters in the identification number. Available maximum length of jointed Flat Roller Cage is shown in Table 1.

If a longer Flat Roller Cage than the maximum length shown in Table 1 is required, consult **IKD**.



		unit : mm				
Мо	del number	Maximum length of jointed cage				
FT	2010					
FT	2515	300				
FT	3020					
FT	3525	375				
FT	4030					
FT	4035	600				
FT	4026 V					
FT	5038					
FT	5043					
FT	5030 V	1 000				
FT	10080					
FT	10060 V					
FT	200120	1 500				
FT	200100 V	1 000				
FTW	4030 VA	600				
FTW	5045 A					
FTW	5050 A	1 000				
FTW	5035 VA					
FTW						
FTW		1 500				
	200150 A	1 300				
FTW	200120 VA					

Table 1 Maximum length of jointed Flat Roller Cage

1N=0.102kgf=0.2248lbs. E-217 1mm=0.03937inch

See Table 2.

Tolerances of the roller diameter of Flat Roller Cage are shown in Table 2. Any standard tolerance class rollers will be supplied unless otherwise specified.

For a uniform load distribution, Flat Roller Cages with the same range of roller tolerance (the same selection code) are recommended for assembly. When the particular tolerance ranges are required, add its selection code onto the identification number.

Selection classification	Selection code	Tolerance of mean diameter of rollers (1)
	B2	0 ~ -2
a [B4	−2 ~ −4
Standard	В6	-4 ∼ -6
	B8	−6 ~ −8
	A1	0 ~ -1
	A2	-1 ~ −2
Semi-standard	А3	−2 ~ −3
Semi-standard	A4	−3 ~ −4
	A5	-4 ∼ -5
	A6	−5 ~ −6

Note(1): The out of roundness and cylindricity conform to JIS B 1506 "Rollers for Roller Bearings".

Load Rating

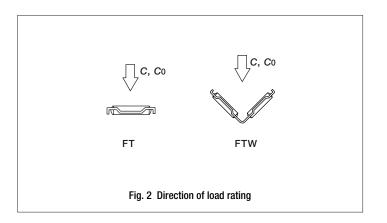
The load ratings of Flat Roller Cage are defined for downward load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculations, see "General description".

Basic dynamic load rating C

The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Flat Roller Cages are individually operated and 90% of the units in the group can travel 100×10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating Co

The basic static load rating is defined as the static load that gives a prescribed constant contact stress at the center of the contact area between the rolling element and raceway receiving the maximum load.



E-219

Precautions for Use

Mating raceways

Recommended surface hardness and roughness of mating raceways are shown in Table 3, and also recommended minimum effective hardening depth of the raceways is shown in Table 4.

Table 3 Surface hardness and roughness of mating raceways					
Item	Recommended value	Remark			
Surface hardness	58~64HRC	When the raceway hardness is less than the necessary hardness, multiply load ratings by the hardness factor.			
Surface roughness	0.2 μmRa or better (0.8 μmRy or better)	When the required accuracy is not severe, a surface roughness of about $0.8\mu\mathrm{mRa}$ (3.2 $\mu\mathrm{mRy}$) is adequate.			

Pollor	diameter	Recommended minimum
over	incl.	effective hardening depth
_	3	0.5
3	4	0.8
4	5	1.0
5	8	1.5
8	10	2.0
10	14.142	2.5
14.142	20	3.5

2 For V-Flat configuration where the flat and the 90° angle surfaces are present

Either FT and FTW···VA types or FT···V and FTW···A types are assembled after accurately lapping the raceways of bed and table on each other as shown in Fig. 3. The combinations of Flat Roller Cages are shown in Table 5.

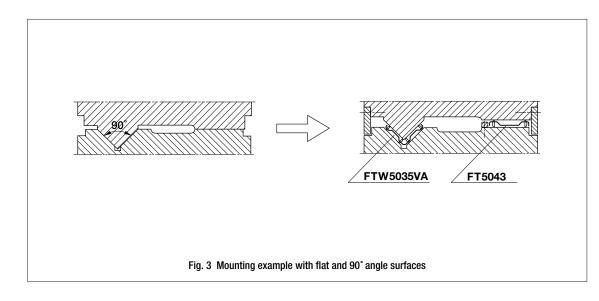


Table 5 Combination of	Flat Roller Cages			unit : m
Combination number	For flat	surface	For 90° ang	gle surface
Combination number	Model number	Roller diameter D_{w}	Model number	Roller diameter D_{W}
1	FT 4030	4	FTW 4030 VA	2.828
2	FT 4035	4	FTW 4030 VA	2.828
3	FT 5038	5	FTW 5035 VA	3.535
4	FT 5043	5	FTW 5035 VA	3.535
5	FT 10060 V	7.071	FTW 5045 A	5
6	FT 10060 V	7.071	FTW 5050 A	5
7	FT 10080	10	FTW 10070 VA	7.071
8	FT 200100 V	14.142	FTW 10095 A	10
9	FT 200120	20	FTW 200120 VA	14.142

F

E-221

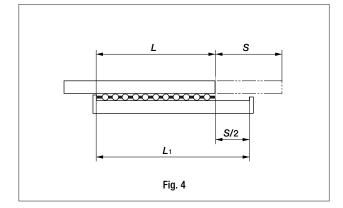
When the table or bed is stroked in linear direction, Flat Roller Cage moves 1/2 distance of the stroke length of the table or bed in the same direction as shown in Fig.4. Therefore, the relationship among the raceway length, the stroke length and the cage length is given as in the following formula.

$$L_1 = \frac{S}{2} + L \cdots (1)$$

where, L1: Raceway length, mm

S: Stroke length, mm

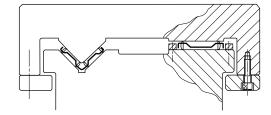
L: Cage length, mm



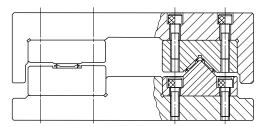
Precautions for Mounting

Flat Roller Cages are generally mounted as shown in Fig. 5. When mounting separate raceways, which are heat-treated and ground, onto the table and bed (See mounting examples 2 and 3 in Fig.5.), be careful not to cause deformation on the raceways by over tightening mounting bolts.

1 General mounting



2 With separate raceways



3 When overhung load is applied

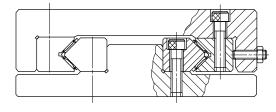


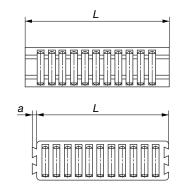
Fig. 5 Mounting examples

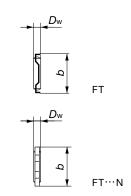


IKO

IKO Flat Roller Cage

Single row: FT

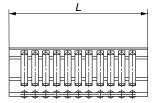


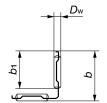


Model number		Mass (Ref.)	Nominal dimensions mm			3	Basic dynamic load rating	Basic static load rating
0				I	I		С	C ₀
Steel cage	Synthetic resin cage	g	Dw	b	L	а	N	N
_	FT 2010N	1.63	2	10	32	2	8 660	19 800
FT 2010 - 32		1.91	2	10	32	_	9 710	22 900
FT 2010 - 100		5.8	2	10	100	_	22 900	68 700
_	FT 2515N	4.3	2.5	15	45	2.5	17 300	41 100
FT 2515 - 45		5.6	2.5	15	45	_	22 000	56 200
FT 2515 - 100		11.6	2.5	15	100	_	37 900	112 000
_	FT 3020N	9.7	3	20	60	3	31 600	78 800
FT 3020 - 60		12.5	3	20	60	_	37 100	96 700
_	FT 3525N	18.6	3.5	25	75	3.5	51 400	132 000
FT 3525 - 75		23	3.5	25	75	_	58 400	155 000
FT 4030 - 150		73	4	30	150	_	127 000	382 000
FT 4035 - 150		86	4	35	150	_	143 000	446 000
FT 4026V - 150		45	2.828	26	150	_	97 300	347 000
FT 5038 - 250		195	5	38	250	_	267 000	851 000
FT 5043 - 250		200	5	43	250	_	306 000	1 020 000
FT 5030V - 250	_	103	3.535	30	250	_	180 000	652 000
FT 10080 - 500		1 610	10	80	500	_	1 390 000	4 370 000
FT 10060V - 500		870	7.071	60	500	_	838 000	2 900 000
FT 200120 - 500		4 940	20	120	500	_	3 120 000	7 670 000
FT 200100V - 500	_	2 860	14.142	100	500	_	2 090 000	5 820 000

IX Flat Roller Cage

Double row: FTW···A





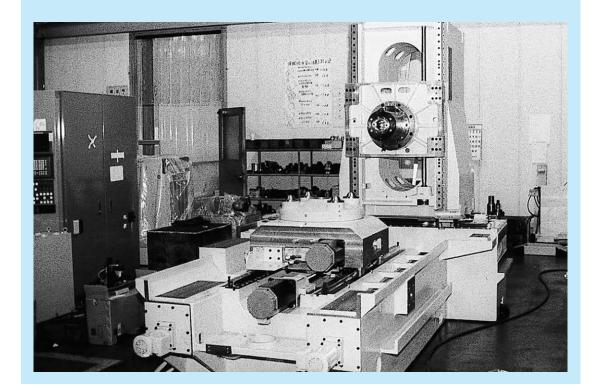
W	•	•	•	Α	
---	---	---	---	---	--

Model number	Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
	g	Dw	b	L	b 1	N	N
FTW 4030VA - 150	94	2.828	30	150	24.5	118 000	491 000
FTW 5045A - 250	410	5	45	250	35.5	332 000	1 240 000
FTW 5050A - 250	460	5	50	250	40.5	371 000	1 440 000
FTW 5035VA - 250	220	3.535	35	250	29	218 000	922 000
FTW 10095A - 500	3 360	10	95	500	77	1 680 000	6 180 000
FTW 10070VA - 500	1 790	7.071	70	500	56.5	1 020 000	4 110 000
FTW 200150A - 500	10 200	20	150	500	118	3 790 000	10 800 000
FTW 200120VA - 500	5 940	14.142	120	500	96	2 530 000	8 220 000

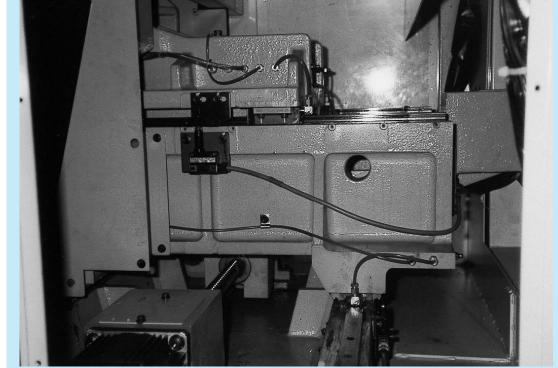


Application Examples and Miscellaneous Tables

Application Examples ·····F-	2
Miscellaneous Tables ·····F-	26
CAD Data ······ F-	40

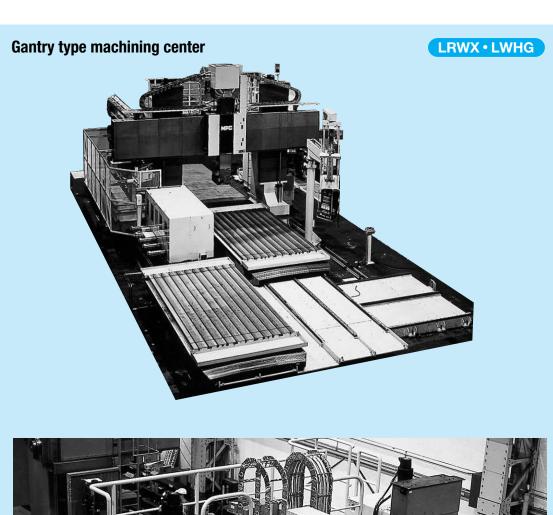




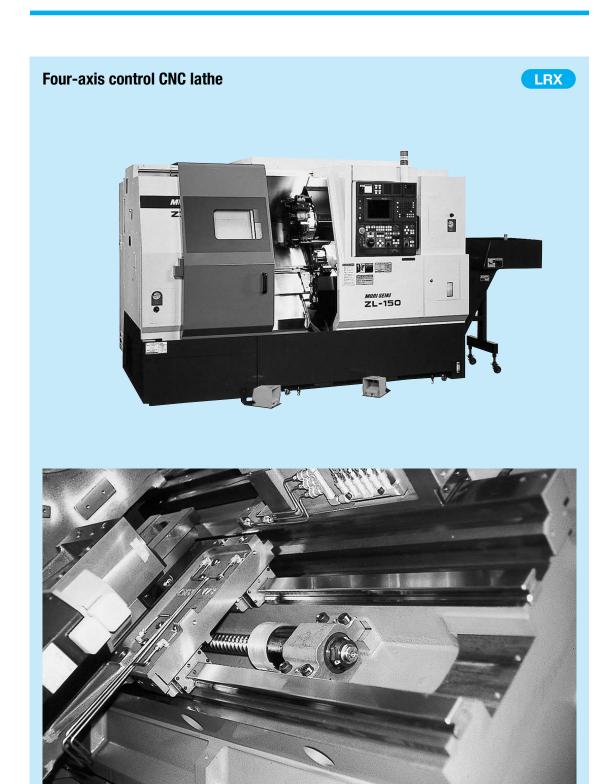


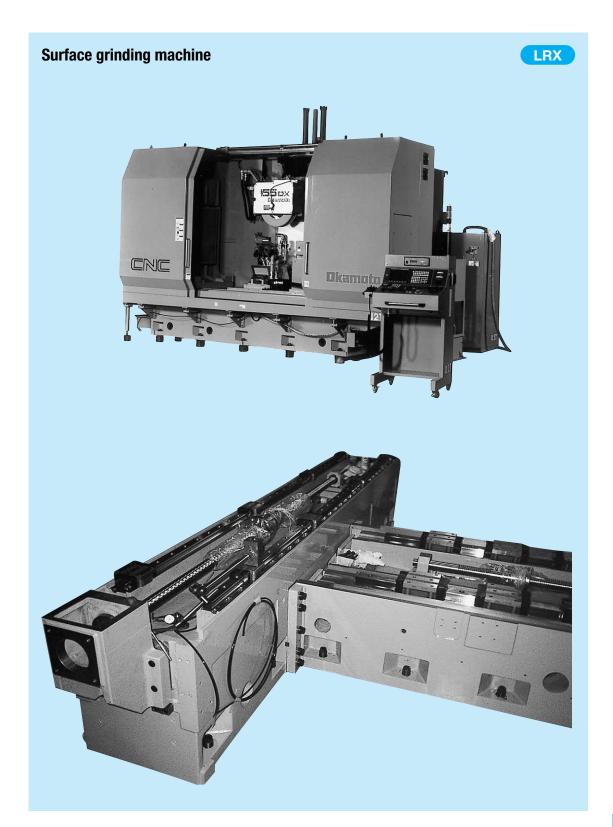


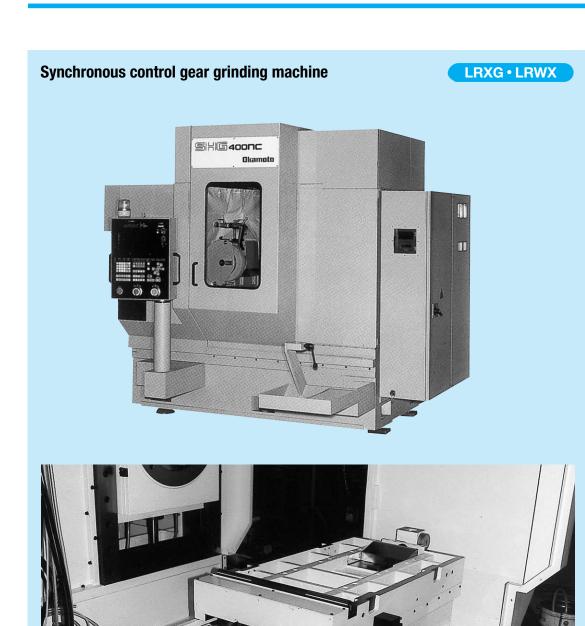












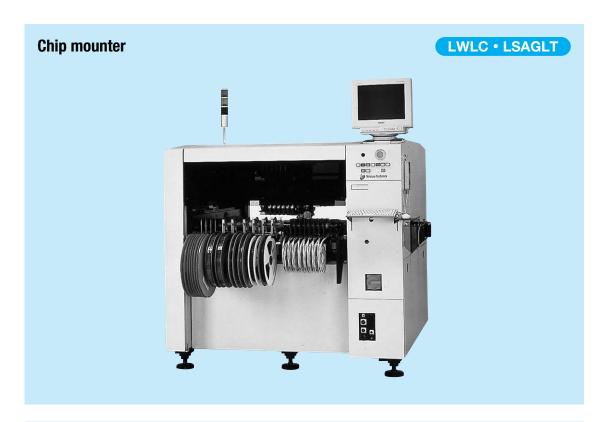




Semiconductor and liquid crystal manufacturing equipment







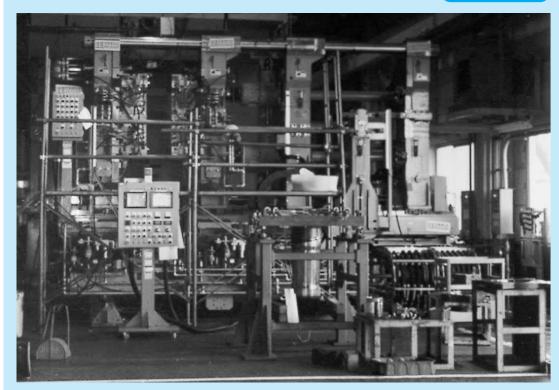


| Applications



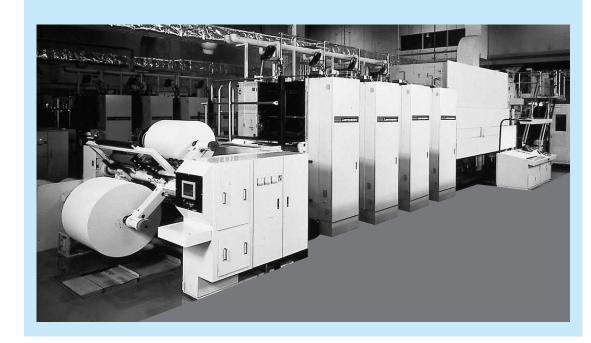






Web offset printing press



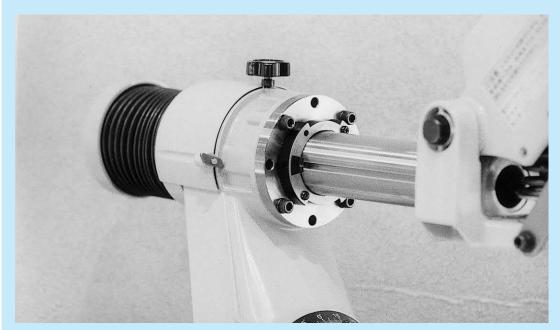


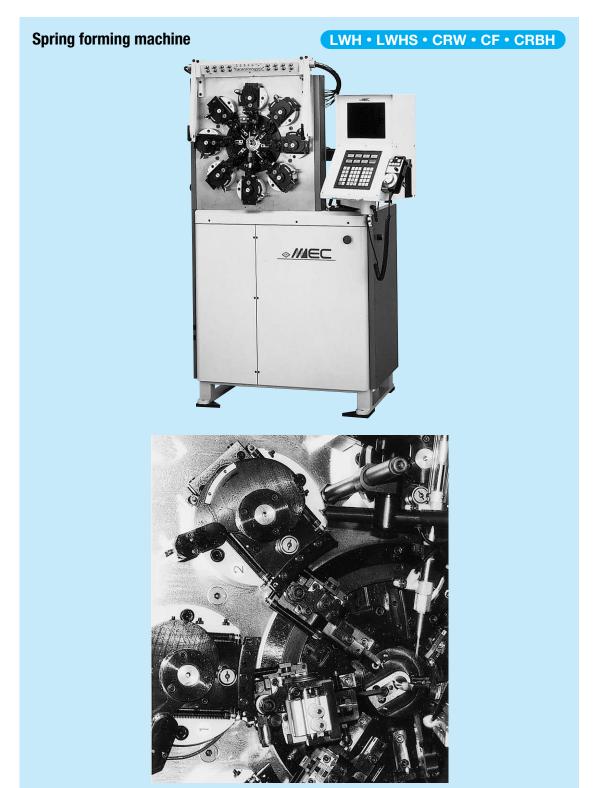
Multi-head type electronic embroidering machine



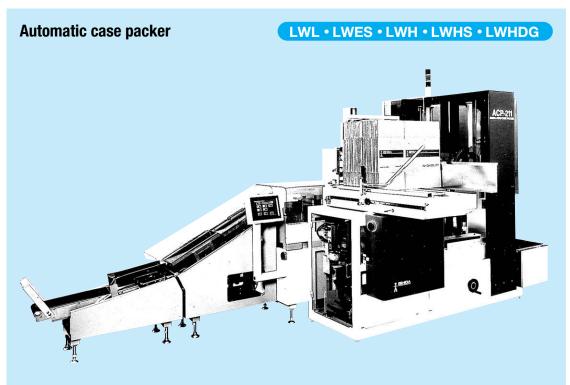




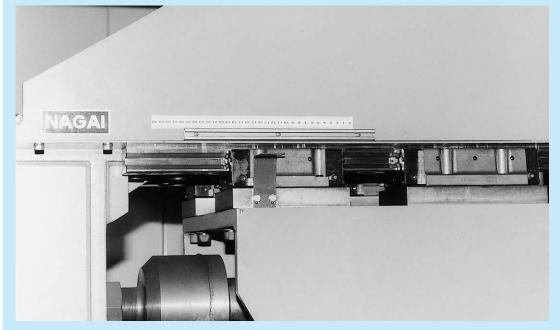






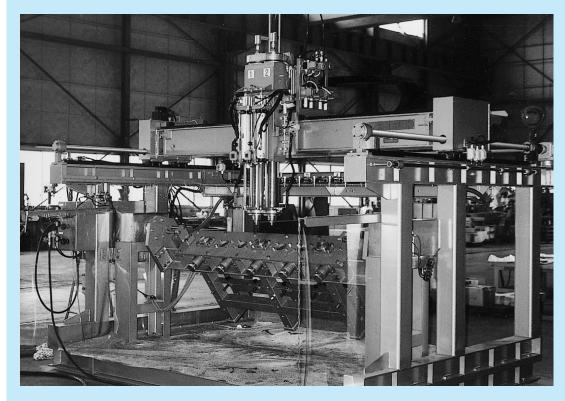








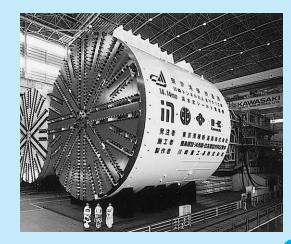




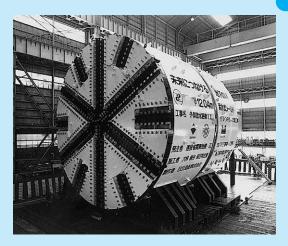


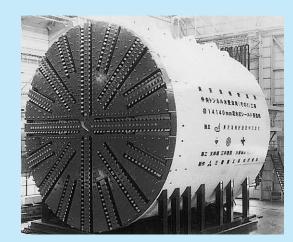
Shield type tunnel excavator





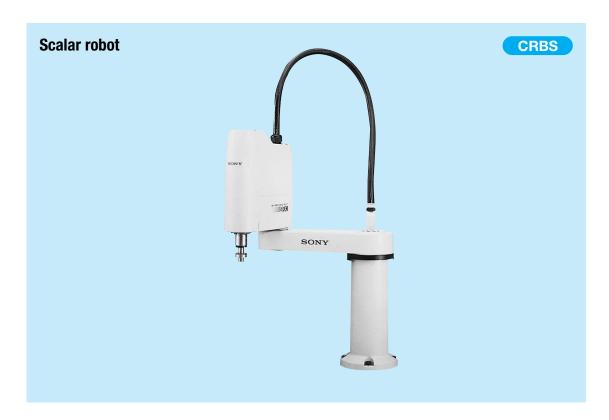
LRXDG • LWHS







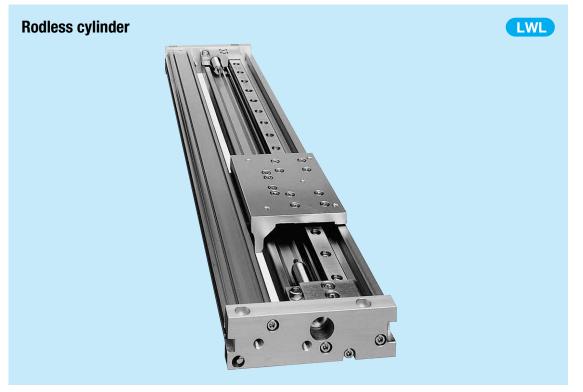












Applications





Miscellaneous Tables

Conversion Table of Units

Comparison table between SI units (system of international units), CGS units and KMS units (gravitational system of units)

Quantity System of units	Length	Mass	Time	Acceleration	Force	Stress	Pressure
SI units	m	kg	s	m/s ²	N	Pa	Pa
CGS units	cm	g	S	Gal	dyn	dyn/cm ²	dyn/cm ²
KMS units	m	kgf•s²/m	S	m/s ²	kgf	kgf/m ²	kgf/m ²

Conversion into SI units

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Quantity	Unit name	Symbol	Conversion factor into SI	SI unit name	Symbol
Angle	Degree Minute Second	° , , , , , , , , , , , , , , , , , , ,	π /180 π /10 800 π /648 000	Radian	rad
Length			10 ⁻⁶ 10 ⁻¹⁰ ≈1.002 08×10 ⁻¹³	Meter	m
Area	Square meter Are Hectare	m² a ha	1 10 ² 10 ⁴	Square meter	m ²
Volume	Cubic meter Liter	m³ I, L	1 10 ⁻³	Cubic meter	m ³
Mass	Kilogram Ton Atomic mass unit	kg t u	1 10 ³ ≈1.660 57×10 ⁻²⁷	Kilogram	kg
Time	Second Minute Hour Day	s min h d	1 60 3 600 86 400	Second	s
Velocity	Meter per second Knot	m/s kn	1 1 852/3 600	Meter per second	m/s
Frequency and number of oscillations per time	Cycle	s ⁻¹	1	Hertz	Hz
Rotation speed	Rotation per minute	rpm	1/60	Per second	s ⁻¹
Angular velocity	Radian per second	rad/s	1	Radian per second	rad/s
Acceleration	Meter per square second G	m/s² G	1 9.806 65	Meter per square second	m/s ²
Force	Kilogram force Ton force Dyne	kgf tf dyn	9.806 65 9 806.65 10 ⁻⁵	Newton	N
Moment of force	Kilogram force-meter	kgf∙m	9.806 65	Newton-meter	N∙m
Stress and pressure	Kilogram force per square meter Kilogram force per square centimeter Kilogram force per square millimeter	kgf/m² kgf/cm² kgf/mm²	9.806 65 9.806 65×10 ⁴ 9.806 65×10 ⁶	Pascal	Pa

Energy	Power	Temperature	Viscosity	Kinematic viscosity	Magnetic flux	Magnetic flux density	Magnetic field intensity
J	W	K	Pa•s	m²/s	Wb	Т	A/m
erg	erg/s	°C	Р	St	Mx	Gs	Oe
kgf∙m	kgf•m/s	°C	kgf•s/m²	m²/s	1	_	

Quantity	Unit name	Symbol	Conversion factor into SI	SI unit name	Symbol
Pressure	Hydro-column meter Mercurial column millimeter Torr Atmosphere Bar	mH2O mmHg Torr atm bar	9 806.65 101 325/760 101 325/760 101 325 10 ⁵	Pascal	Pa
Energy	Erg IT calorie Kilogram force - meter Kilowatt hour Horse power hour (French) Electron volt	erg calı⊤ kgf∙m kW∙h PS∙h eV	10 ⁻⁷ 4.186 8 9.806 65 3.600×10 ⁶ ≈2.647 79×10 ⁶ ≈1.602 19×10 ⁻¹⁹	Joule	J
Power	Watt Horse power (French) Kilogram force -meter per second	W PS kgf•m/s	1 ≈735.5 9.806 65	Watt	W
Viscosity	Poise Centipoise Kilogram force-second per square meter	P cP kgf•s/m²	10 ⁻¹ 10 ⁻³ 9.806 65	Pascal-second	Pa•s
Kinematic viscosity	Stokes Centistokes	St cSt	10 ⁻⁴ 10 ⁻⁶	Square meter per second	m²/s
Temperature	Degree	°C	+273.15	Kelvin	K
Radioactivity Exposure dose Absorbed dose Dose equivalent	Curie Roentgen Rad Rem	Ci R rad rem	3.7×10 ¹⁰ 2.58×10 ⁻⁴ 10 ⁻² 10 ⁻²	Becquerel Coulomb per kilogram Gray Sievert	Bq C/kg Gy Sv
Magnetic flux	Maxwell	Mx	10-8	Weber	Wb
Magnetic flux density	Gamma Gauss	γ Gs	10 ⁻⁹ 10 ⁻⁴	Tesla	Т
Magnetic field intensity	Oersted	Oe	$10^{3}/4 \pi$	Ampere per meter	A/m
Quantity of electricity Electric potential difference Electrostatic capacity (Electric) resistance (Electric) conductance	Coulomb Volt Farad Ohm Siemens	. o b i < o	1 1 1 1 1 1	Coulomb Volt Farad Ohm Siemens	C V F Ω S :
Inductance Current	Henry Ampere	H A	1	Henry Ampere	H A

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch ● Inch-mm Conversion Table

1 inch = 25.4 mm

1 inch = 25.4 mm

in	ch									
Fraction	Decimal	0"	1″	2″	3″	4"	5″	6"	7"	8″
	0		25.400	50.800	76.200	101.600	127.000	152.400	177.800	203,200
1 / 64"	0.015625	0.397	25.797	51.197	76.597	101.997	127.397	152.797	178.197	203.597
1 / 32"	0.031250	0.794	26.194	51.594	76.994	102.394	127.794	153.194	178.594	203.994
3 / 64"	0.046875	1.191	26.591	51.991	77.391	102.791	128.191	153.591	178.991	204.391
1 / 16"	0.062500	1.588	26.988	52.388	77.788	103.188	128.588	153.988	179.388	204.788
5 / 64"	0.078125	1.984	27.384	52.784	78.184	103.584	128.984	154.384	179.784	205.184
3 / 32"	0.093750	2.381	27.781	53.181	78.581	103.981	129.381	154.781	180.181	205.581
7 / 64"	0.109375	2.778	28.178	53.578	78.978	104.378	129.778	155.178	180.578	205.978
1 / 8"	0.125000	3.175	28.575	53.975	79.375	104.775	130.175	155.575	180.975	206.375
9 / 64"	0.140625	3.572	28.972	54.372	79.772	105.172	130.572	155.972	181.372	206.772
5 / 32"	0.156250	3.969	29.369	54.769	80.169	105.569	130.969	156.369	181.769	207.169
11 / 64"	0.171875	4.366	29.766	55.166	80.566	105.966	131.366	156.766	182.166	207.566
3 / 16"	0.187500	4.762	30.162	55.562	80.962	106.362	131.762	157.162	182.562	207.962
13 / 64"	0.203125	5.159	30.559	55.959	81.359	106.759	132.159	157.559	182.959	208.359
7 / 32"	0.218750	5.556	30.956	56.356	81.756	107.156	132.556	157.956	183.356	208.756
15 / 64"	0.234375	5.953	31.353	56.753	82.153	107.553	132.953	158.353	183.753	209.153
1 / 4"	0.250000	6.350	31.750	57.150	82.550	107.950	133.350	158.750	184.150	209.550
17 / 64"	0.265625	6.747	32.147	57.547	82.947	108.347	133.747	159.147	184.547	209.947
9 / 32"	0.281250	7.144	32.544	57.944	83.344	108.744	134.144	159.544	184.944	210.344
19 / 64"	0.296875	7.541	32.941	58.341	83.741	109.141	134.541	159.941	185.341	210.741
5 / 16"	0.312500	7.938	33.338	58.738	84.138	109.538	134.938	160.338	185.738	211.138
21 / 64"	0.328125	8.334	33.734	59.134	84.534	109.934	135.334	160.734	186.134	211.534
11 / 32"	0.343750	8.731	34.131	59.531	84.931	110.331	135.731	161.131	186.531	211.931
23 / 64"	0.359375	9.128	34.528	59.928	85.328	110.728	136.128	161.528	186.928	212.328
3/8"	0.375000	9.525	34.925	60.325	85.725	111.125	136.525	161.925	187.325	212.725
25 / 64"	0.390625	9.922	35.322	60.722	86.122	111.522	136.922	162.322	187.722	213.122
13 / 32"	0.406250	10.319	35.719	61.119	86.519	111.919	137.319	162.719	188.119	213.519
27 / 64"	0.421875	10.716	36.116	61.516	86.916	112.316	137.716	163.116	188.516	213.916
7 / 16"	0.437500	11.112	36.512	61.912	87.312	112.712	138.112	163.512	188.912	214.312
29 / 64"	0.453125	11.509	36.909	62.309	87.709	113.109	138.509	163.909	189.309	214.709
15 / 32"	0.468750	11.906	37.306	62.706	88.106	113.506	138.906	164.306	189.706	215.106
31 / 64"	0.484375	12.303	37.703	63.103	88.503	113.903	139.303	164.703	190.103	215.503
1/ 2"	0.500000	12.700	38.100	63.500	88.900	114.300	139.700	165.100	190.500	215.900

in	ch								_	
Fraction	Decimal	0"	1″	2"	3″	4"	5″	6"	7"	8"
33 / 64"	0.515625	13.097	38.497	63.897	89.297	114.697	140.097	165.497	190.897	216.297
17 / 32"	0.531250	13.494	38.894	64.294	89.694	115.094	140.494	165.894	191.294	216.694
35 / 64"	0.546875	13.891	39.291	64.691	90.091	115.491	140.891	166.291	191.691	217.091
9 / 16"	0.562500	14.288	39.688	65.088	90.488	115.888	141.288	166.688	192.088	217.488
37 / 64"	0.578125	14.684	40.084	65.484	90.884	116.284	141.684	167.084	192.484	217.884
19 / 32"	0.593750	15.081	40.481	65.881	91.281	116.681	142.081	167.481	192.881	218.281
39 / 64"	0.609375	15.478	40.878	66.278	91.678	117.078	142.478	167.878	193.278	218.678
5 / 8"	0.625000	15.875	41.275	66.675	92.075	117.475	142.875	168.275	193.675	219.075
41 / 64"	0.640625	16.272	41.672	67.072	92.472	117.872	143.272	168.672	194.072	219.472
21 / 32"	0.656250	16.669	42.069	67.469	92.869	118.269	143.669	169.069	194.469	219.869
43 / 64"	0.671875	17.066	42.466	67.866	93.266	118.666	144.066	169.466	194.866	220.266
11 / 16"	0.687500	17.462	42.862	68.262	93.662	119.062	144.462	169.862	195.262	220.662
45 / 64"	0.703125	17.859	43.259	68.659	94.059	119.459	144.859	170.259	195.659	221.059
23 / 32"	0.718750	18.256	43.656	69.056	94.456	119.856	145.256	170.656	196.056	221.456
47 / 64"	0.734375	18.653	44.053	69.453	94.853	120.253	145.653	171.053	196.453	221.853
3 / 4"	0.750000	19.050	44.450	69.850	95.250	120.650	146.050	171.450	196.850	222.250
49 / 64"	0.765625	19.447	44.847	70.247	95.647	121.047	146.447	171.847	197.247	222.647
25 / 32"	0.781250	19.844	45.244	70.644	96.044	121.444	146.844	172.244	197.644	223.044
51 / 64"	0.796875	20.241	45.641	71.041	96.441	121.841	147.241	172.641	198.041	223.441
13 / 16"	0.812500	20.638	46.038	71.438	96.838	122.238	147.638	173.038	198.438	223.838
53 / 64"	0.828125	21.034	46.434	71.834	97.234	122.634	148.034	173.434	198.834	224.234
27 / 32"	0.843750	21.431	46.831	72.231	97.631	123.031	148.431	173.831	199.231	224.631
55 / 64"	0.859375	21.828	47.228	72.628	98.028	123.428	148.828	174.228	199.628	225.028
7 / 8"	0.875000	22.225	47.625	73.025	98.425	123.825	149.225	174.625	200.025	225.425
57 / 64"	0.890625	22.622	48.022	73.422	98.822	124.222	149.622	175.022	200.422	225.822
29 / 32"	0.906250	23.019	48.419	73.819	99.219	124.619	150.019	175.419	200.819	226.219
59 / 64"	0.921875	23.416	48.816	74.216	99.616	125.016	150.416	175.816	201.216	226.616
15 / 16"	0.937500	23.812	49.212	74.612	100.012	125.412	150.812	176.212	201.612	227.012
61 / 64"	0.953125	24.209	49.609	75.009	100.409	125.809	151.209	176.609	202.009	227.409
31 / 32"	0.968750	24.606	50.006	75.406	100.806	126.206	151.606	177.006	202.406	227.806
63 / 64"	0.984375	25.003	50.403	75.803	101.203	126.603	152.003	177.403	202.803	228.203



Hardness Conversion Table (Reference)

Rockwell C scale hardness	Vickers' hardness	Brinell h	ardness	Rockwell	hardness	Shore hardness
Load 1471N				A scale	B scale	
HRC	HV	Standard ball	Tungsten carbide ball	Load 588.4N Diamond circular cone	Load 980.7N 1/16" ball	HS
68	940	_	_	85.6	_	97
67	900	_	_	85.0	_	95
66	865	_	_	84.5	_	92
65	832	_	(739)	83.9	_	91
64	800	_	(722)	83.4	_	88
63	772	_	(705)	82.8	_	87
62	746	_	(688)	82.3	_	85
61	720	_	(670)	81.8	_	83
60	697	_	(654)	81.2	_	81
59	674	_	(634)	80.7	_	80
			, ,			
58	653	_	615	80.1	_	78
57	633	_	595	79.6	_	76
56	613	_	577	79.0	_	75
55	595	_	560	78.5	_	74
54	577	_	543	78.0	_	72
53	560	_	525	77.4	_	71
52	544	(500)	512	76.8	_	69
51	528	(487)	496	76.3	_	68
50	513	(475)	481	75.9	_	67
49	498	(464)	469	75.2	_	66
		, ,				
48	484	451	455	74.7	_	64
47	471	442	443	74.1	_	63
46	458	432	432	73.6	_	62
45	446	421	421	73.1	_	60
44	434	409	409	72.5	_	58
43	423	400	400	72.0	_	57
42	412	390	390	71.5	_	56
41	402	381	381	70.9	_	55
40	392	371	371	70.4	_	54
39	382	362	362	69.9	_	52

Rockwell C scale hardness	Vickers' hardness	Brinell h	ardness	Rockwell	hardness	Shore hardness
Load 1471N HRC	HV	Standard ball	Tungsten carbide ball	A scale Load 588.4N Diamond circular cone	B scale Load 980.7N 1/16" ball	HS
38	372	353	353	69.4	_	51
37	363	344	344	68.9	_	50
36	354	336	336	68.4	(109.0)	49
35	345	327	327	67.9	(108.5)	48
34	336	319	319	67.4	(108.0)	47
					` ,	
33	327	311	311	66.8	(107.5)	46
32	318	301	301	66.3	(107.0)	44
31	310	294	294	65.8	(106.0)	43
30	302	286	286	65.3	(105.5)	42
29	294	279	279	64.7	(104.5)	41
28	286	271	271	64.3	(104.0)	41
27	279	264	264	63.8	(103.0)	40
26	272	258	258	63.3	(102.5)	38
25	266	253	253	62.8	(101.5)	38
24	260	247	247	62.4	(101.0)	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	_	96.7	33
(16)	222	212	212	_	95.5	32
(14)	213	203	203	_	93.9	31
(12)	204	194	194	_	92.3	29
(10)	196	187	187	_	90.7	28
(8)	188	179	179	_	89.5	27
(6)	180	171	171	_	87.1	26
(4)	173	165	165	_	85.5	25
(2)	166	158	158	_	83.5	24
(0)	160	152	152	_	81.7	24

F-30 F-31



Tolerance of Shaft Diameter

F-32

	Diameter nm	þ.	12	c ⁻	12	d	6	е	6	e1	12	f	5	f	6	g	5
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
	3	-140	- 240	- 60	- 160	- 20	- 26	- 14	- 20	- 14	-114	- 6	-10	- 6	- 12	- 2	– 6
3	6	-140	- 260	— 70	- 190	- 30	- 38	- 20	- 28	- 20	-140	-10	-15	-10	— 18	- 4	- 9
6	10	-150	- 300	- 80	- 230	- 40	- 49	- 25	- 34	- 25	-175	-13	-19	-13	- 22	– 5	-11
10	18	-150	- 330	- 95	- 275	- 50	- 61	- 32	- 43	- 32	-212	-16	-24	-16	- 27	- 6	-14
18	30	-160	- 370	-110	- 320	— 65	— 78	- 40	- 53	- 40	-250	-20	-29	-20	- 33	– 7	-16
30	40	-170	- 420	-120	- 370	- 80	- 96	- 50	- 66	- 50	-300	-25	-36	-25	- 41	- 9	-20
40	50	-180	- 430	-130	- 380	- 80	- 96	- 50	- 66	- 50	-300	-25	-36	-25	- 41	- 9	-20
50	65	-190	- 490	-140	- 440	-100	-119	- 60	– 79	- 60	-360	-30	-43	-30	- 49	-10	-23
65	80	-200	- 500	-150	— 450	-100	-119	- 60	- 79	- 60	-360	-30	-43	-30	- 49	-10	-23
80	100	-220	- 570	-170	- 520	-120	-142	- 72	- 94	- 72	-422	-36	-51	-36	- 58	-12	-27
100	120	-240	- 590	-180	- 530	120	142	12	54	12	422	30	31	30	36	12	21
120	140	-260	- 660	-200	- 600												
140	160	-280	- 680	-210	— 610	-145	-170	- 85	-110	— 85	-485	-43	-61	-43	— 68	-14	-32
160	180	-310	— 710	-230	— 630												
180	200	-340	- 800	-240	– 700												
200	225	-380	- 840	-260	- 720	-170	-199	-100	-129	-100	-560	-50	-70	-50	— 79	-15	-35
225	250	-420	- 880	-280	— 740												
250	280	-480	-1000	-300	- 820	-190	-222	-110	-142	-110	-630	-56	-79	-56	- 88	-17	-40
280	315	-540	-1060	-330	— 850	190	222	110	142	110	030	30	75	30	00	17	40
315	355	-600	-1170	-360	- 930	-210	-246	-125	-161	-125	-695	-62	-87	-62	- 98	-18	-43
355	400	-680	-1250	-400	- 970	210	240	123	101	123	090	02	07	02	90	10	40
400	450	-760	-1390	-440	-1070	-230	-270	-135	-175	-135	-765	-68	-95	-68	-108	-20	-47
450	500	-840	-1470	-480	-1110	230	270	133	175	133	703	00	93	00	100	20	47

	Diameter IM	h [.]	12	js	s5	j!	5	js	66	j	6	j	7	k	5	k	6
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
_	3	0	-100	+ 2	- 2	+2	- 2	+ 3	- 3	+ 4	- 2	+ 6	- 4	+ 4	0	+ 6	0
3	6	0	-120	+ 2.5	- 2.5	+3	- 2	+ 4	- 4	+ 6	- 2	+ 8	- 4	+ 6	+1	+ 9	+1
6	10	0	-150	+ 3	– 3	+4	- 2	+ 4.5	- 4.5	+ 7	- 2	+10	– 5	+ 7	+1	+10	+1
10	18	0	-180	+ 4	- 4	+5	- 3	+ 5.5	- 5.5	+ 8	— з	+12	- 6	+ 9	+1	+12	+1
18	30	0	-210	+ 4.5	- 4.5	+5	- 4	+ 6.5	— 6.5	+ 9	- 4	+13	- 8	+11	+2	+15	+2
30 40	40 50	0	-250	+ 5.5	- 5.5	+6	- 5	+ 8	- 8	+11	- 5	+15	-10	+13	+2	+18	+2
50 65	65 80	0	-300	+ 6.5	- 6.5	+6	- 7	+ 9.5	- 9.5	+12	- 7	+18	-12	+15	+2	+21	+2
80 100	100 120	0	-350	+ 7.5	- 7.5	+6	- 9	+11	-11	+13	- 9	+20	-15	+18	+3	+25	+3
120 140 160	140 160 180	0	-400	+ 9	- 9	+7	-11	+12.5	-12.5	+14	-11	+22	-18	+21	+3	+28	+3
180 200 225	200 225 250	0	-460	+10	-10	+7	-13	+14.5	-14.5	+16	-13	+25	-21	+24	+4	+33	+4
250 280	280 315	0	-520	+11.5	-11.5	+7	-16	+16	-16	+16	-16	+26	-26	+27	+4	+36	+4
315 355	355 400	0	-570	+12.5	-12.5	+7	-18	+18	-18	+18	-18	+29	-28	+29	+4	+40	+4
400 450	450 500	0	-630	+13.5	-13.5	+7	-20	+20	-20	+20	-20	+31	-32	+32	+5	+45	+5

g	6	h	5	h	6	h	7	h	8	h	9	h	10	h [.]	11	Nominal m	Diameter M
High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
– 2	- 8	0	- 4	0	- 6	0	-10	0	-14	0	- 25	0	- 40	0	- 60	_	3
- 4	-12	0	– 5	0	– 8	0	-12	0	-18	0	— 30	0	- 48	0	— 75	3	6
– 5	-14	0	- 6	0	- 9	0	-15	0	-22	0	- 36	0	- 58	0	- 90	6	10
– 6	-17	0	- 8	0	-11	0	-18	0	-27	0	- 43	0	- 70	0	-110	10	18
– 7	-20	0	- 9	0	-13	0	-21	0	-33	0	- 52	0	— 84	0	-130	18	30
- 9	-25	0	-11	0	-16	0	-25	0	-39	0	- 62	0	-100	0	-160	30 40	40 50
																50	65
-10	-29	0	-13	0	-19	0	-30	0	-46	0	- 74	0	-120	0	-190	65	80
																80	100
-12	-34	0	-15	0	-22	0	-35	0	-54	0	— 87	0	-140	0	-220	100	120
																120	140
-14	-39	0	-18	0	-25	0	-40	0	-63	0	-100	0	-160	0	-250	140	160
				-			-									160	180
																180	200
-15	-44	0	-20	0	-29	0	-46	0	-72	0	-115	0	-185	0	-290	200	225
																225	250
																250	280
-17	-49	0	-23	0	-32	0	-52	0	-81	0	-130	0	-210	0	-320	280	315
-18	-54		-25	_	-36	_	-57		-89		-140		-230		-360	315	355
-18	-54	0	-25	0	-36	0	-57	0	-89	0	-140	0	-230	30 0	-360	355	400
-20	-60	0	-27	0	-40	0	-63	0	-97	0	-155	0	-250	0	-400	400	450

-97

0

unit : μ m

 -155
 0
 -250
 0

-400

											unit : μ m
m	15	m	16	n	5	n	6	р	6		Diameter m
High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
+ 6	+ 2	+ 8	+ 2	+ 8	+ 4	+10	+ 4	+ 12	+ 6	_	3
+ 9	+ 4	+12	+ 4	+13	+ 8	+16	+ 8	+ 20	+12	3	6
+12	+ 6	+15	+ 6	+16	+10	+19	+10	+ 24	+15	6	10
+15	+ 7	+18	+ 7	+20	+12	+23	+12	+ 29	+18	10	18
+17	+ 8	+21	+ 8	+24	+15	+28	+15	+ 35	+22	18	30
+20	+ 9	+25	+ 9	+28	+17	+33	+17	+ 42	+26	30 40	40 50
+24	+11	+30	+11	+33	+20	+39	+20	+ 51	+32	50	65
		1 00	' ''	1 00	120	1 00	120	,	102	65	80
+28	+13	+35	+13	+38	+23	+45	+23	+ 59	+37	80	100
1 20	1 .0	1 00	1 .0	1 00	120	1 .0	120	1 00	10,	100	120
										120	140
+33	+15	+40	+15	+45	+27	+52	+27	+ 68	+43	140	160
										160	180
										180	200
+37	+17	+46	+17	+51	+31	+60	+31	+ 79	+50	200	225
										225	250
+43	+20	+52	+20	+57	+34	+66	+34	+ 88	+56	250	280
										280	315
+46	+21	+57	+21	+62	+37	+73	+37	+ 98	+62	315	355
										355	400
+50	+23	+63	+23	+67	+40	+80	+40	+108	+68	400	450
										450	500

-40 0

-60 O

-63 O

unit : μ m

500

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch

• Tolerance of Housing Bore Diameter

	al Diameter mm	B.	12	E	7	E.	11	E	12	F	6	F	7	G	i6	G	i 7
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
_	3	+ 240	+140	+ 24	+ 14	+ 74	+ 14	+114	+ 14	+ 12	+ 6	+ 16	+ 6	+ 8	+ 2	+12	+ 2
3	6	+ 260	+140	+ 32	+ 20	+ 95	+ 20	+140	+ 20	+ 18	+10	+ 22	+10	+12	+ 4	+16	+ 4
6	10	+ 300	+150	+ 40	+ 25	+115	+ 25	+175	+ 25	+ 22	+13	+ 28	+13	+14	+ 5	+20	+ 5
10	18	+ 330	+150	+ 50	+ 32	+142	+ 32	+212	+ 32	+ 27	+16	+ 34	+16	+17	+ 6	+24	+ 6
18	30	+ 370	+160	+ 61	+ 40	+170	+ 40	+250	+ 40	+ 33	+20	+ 41	+20	+20	+ 7	+28	+ 7
30	40	+ 420	+170	+ 75	+ 50	+210	+ 50	+300	+ 50	+ 41	+25	+ 50	+25	+25	+ 9	+34	+ 9
40	50	+ 430	+180	T /5	T 50	+210	T 50	+300	T 50	T 41	+ 25	T 50	T25	T25	+ 9	+34	+ 9
50	65	+ 490	+190	+ 90	+ 60	+250	+ 60	+360	+ 60	+ 49	+30	+ 60	+30	+29	+10	+40	+10
65	80	+ 500	+200	T 90	+ 60	+250	+ 60	+360	+ 60	T 49	+30	+ 60	+30	T29	+10	+4 0	+10
80	100	+ 570	+220	+107	+ 72	+292	+ 72	+422	+ 72	+ 58	+36	+ 71	+36	+34	+12	+47	+12
100	120	+ 590	+240	T107	T /2	T292	T /2	T422	T /2	T 36	⊤30	T /1	+30	⊤34	T12	T47	T12
120	140	+ 660	+260														
140	160	+ 680	+280	+125	+ 85	+335	+ 85	+485	+ 85	+ 68	+43	+ 83	+43	+39	+14	+54	+14
160	180	+ 710	+310														
180	200	+ 800	+340														
200	225	+ 840	+380	+146	+100	+390	+100	+560	+100	+ 79	+50	+ 96	+50	+44	+15	+61	+15
225	250	+ 880	+420														
250	280	+1000	+480	+162	+110	+430	+110	+630	+110	+ 88	+56	+108	+56	+49	+17	+69	+17
280	315	+1060	+540	1 102	1 110	1 430	1 110	1 030	1 110	1 00	1 30	1 100	1 30	143	1 17	103	1 17
315	355	+1170	+600	+182	+125	+485	+125	+695	+125	+ 98	+62	+119	+62	+54	+18	+75	+18
355	400	+1250	+680	1 102	1 123	1 400	1 125	1 095	1 125	1 90	1 02	1119	1 02	1 54	1 10	175	1.10
400	450	+1390	+760	+198	+135	+535	+135	+765	+135	+108	+68	+131	+68	+60	+20	+83	+20
450	500	+1470	+840	±198	⊤135	⊤535	⊤135	⊤/05	⊤135	+108	⊤68	+131	⊤ 68	760	⊤20	⊤83	⊤20

Nomir	nal Diameter mm	J	6 7	J	7	К	5	К	6	К	.7	N	16	N	17	N	16
Over	Incl.	High	Low	High	Low	High	Low	High	Low								
_	3	+ 5	– 5	+ 4	- 6	0	- 4	0	- 6	0	-10	- 2	- 8	-2	-12	- 4	-10
3	6	+ 6	– 6	+ 6	– 6	0	– 5	+2	- 6	+ 3	– 9	- 1	- 9	0	-12	- 5	-13
6	10	+ 7	- 7	+ 8	- 7	+1	- 5	+2	- 7	+ 5	-10	- 3	-12	0	-15	- 7	-16
10	18	+ 9	- 9	+10	- 8	+2	- 6	+2	- 9	+ 6	-12	- 4	-15	0	-18	- 9	-20
18	30	+10	-10	+12	- 9	+1	- 8	+2	-11	+ 6	-15	- 4	-17	0	-21	-11	-24
30 40	40 50	+12	-12	+14	-11	+2	- 9	+3	-13	+ 7	-18	- 4	-20	0	-25	-12	-28
50 65	65 80	+15	-15	+18	-12	+3	-10	+4	-15	+ 9	-21	- 5	-24	0	-30	-14	-33
80 100	100 120	+17	-17	+22	-13	+2	-13	+4	-18	+10	-25	- 6	-28	0	-35	-16	-38
120 140 160	140 160 180	+20	-20	+26	-14	+3	-15	+4	-21	+12	-28	- 8	-33	0	-40	-20	-45
180	200																
200 225	225 250	+23	-23	+30	-16	+2	-18	+5	-24	+13	-33	- 8	-37	0	-46	-22	-51
250	280	+26	-26	+36	-16	+3	-20	+5	-27	+16	-36	- 9	-41	0	-52	-25	-57
280	315	120		1 00						1 .0			• • • • • • • • • • • • • • • • • • • •				
315 355	355 400	+28	-28	+39	-18	+3	-22	+7	-29	+17	-40	-10	-46	0	-57	-26	-62
400 450	450 500	+31	-31	+43	-20	+2	-25	+8	-32	+18	-45	-10	-50	0	-63	-27	-67

uni	t:	μm

Н	16	Н	17	Н	18	Н	9	H [.]	10	H	11	J	S6	J	6	Nominal M	Diameter M
High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
+ 6	0	+10	0	+14	0	+ 25	0	+ 40	0	+ 60	0	+ 3	- 3	+ 2	-4	_	3
+ 8	0	+12	0	+18	0	+ 30	0	+ 48	0	+ 75	0	+ 4	- 4	+ 5	-3	3	6
+ 9	0	+15	0	+22	0	+ 36	0	+ 58	0	+ 90	0	+ 4.5	- 4.5	+ 5	-4	6	10
+11	0	+18	0	+27	0	+ 43	0	+ 70	0	+110	0	+ 5.5	- 5.5	+ 6	-5	10	18
+13	0	+21	0	+33	0	+ 52	0	+ 84	0	+130	0	+ 6.5	— 6.5	+ 8	-5	18	30
+16	0	+25	0	+39	0	+ 62	0	+100	0	+160	0	+ 8	_ 8	+10	_ ₆	30	40
110		125		1 00		1 02		1 100		1 100		' '		1 10		40	50
+19	0	+30	0	+46	0	+ 74	0	+120	0	+190	0	+ 9.5	- 9.5	+13	_ ₆	50	65
		1 00		1 40		1 /-	•	1 120		1 100	•	1 0.0	0.0	1 10	Ů	65	80
+22	0	+35	0	+54	0	+ 87	0	+140	0	+220	0	+11	-11	+16	_ ₆	80	100
				,												100	120
																120	140
+25	0	+40	0	+63	0	+100	0	+160	0	+250	0	+12.5	-12.5	+18	<u>-7</u>	140	160
																160	180
																180	200
+29	0	+46	0	+72	0	+115	0	+185	0	+290	0	+14.5	-14.5	+22	<u>-7</u>	200	225
																225	250
+32	0	+52	0	+81	0	+130	0	+210	0	+320	0	+16	-16	+25	_ ₇	250	280
- 02										, 520						280	315
+36	0	+57	0	+89	0	+140	0	+230	0	+360	0	+18	_ ₁₈	+29	_ ₇	315	355
		. 31		. 00				. 200		. 500				. 20	,	355	400
+40	0	+63	0	+97	0	+155	0	+250	0	+400	0	+20	-20	+33	_ ₇	400	450
, 40		, 30		'0'		, 100		, 200		, 100		, _0	0	, 00	,	450	500

unit : μ m

											unit: µm
N	7	Р	6	Р	7	R	17	S	7	Nominal m	Diameter M
High	Low	High	Low	High	Low	High	Low	High	Low	Over	Incl.
- 4	-14	- 6	-12	– 6	- 16	- 10	- 20	- 14	- 24	_	3
- 4	-16	- 9	-17	- 8	- 20	- 11	- 23	- 15	- 27	3	6
- 4	-19	-12	-21	– 9	- 24	- 13	- 28	— 17	- 32	6	10
– 5	-23	-15	-26	-11	- 29	- 16	- 34	- 21	- 39	10	18
– 7	-28	-18	-31	-14	- 35	- 20	- 41	- 27	- 48	18	30
– 8	-33	-21	-37	-17	- 42	– 25	– 50	- 34	– 59	30	40
- 8	-33	-21	-37	-17	- 42	- 25	- 50	- 34	- 59	40	50
– 9	-39	-26	—45	—21	– 51	- 30	- 60	- 42	- 72	50	65
	39	20	45	21	31	- 32	— 62	— 48	— 78	65	80
-10	-45	-30	-52	—24	– 59	- 38	— 73	- 58	- 93	80	100
	+3	30	32		33	— 41	- 76	— 66	— 101	100	120
						— 48	- 88	— 77	-117	120	140
-12	-52	-36	-61	-28	— 68	— 50	- 90	— 85	-125	140	160
						- 53	- 93	- 93	-133	160	180
						- 60	-106	-105	-151	180	200
-14	-60	-41	-70	-33	— 79	— 63	-109	-113	-159	200	225
						— 67	-113	-123	-169	225	250
-14	-66	-47	—79	-36	— 88	— 74	-126	-138	-190	250	280
	00	-7/	/3	- 50	- 00	- 78	-130	-150	-202	280	315
-16	-73	-51	_ ₈₇	_ ₄₁	– 98	— 87	-144	-169	-226	315	355
	,,,	01	0,	71	- 50	- 93	-150	-187	-244	355	400
-17	-80	-55	-95	—45	-108	-103	-166	-209	-272	400	450
	- 00	- 00	00	10	100	-109	-172	-229	-292	450	500

N-lbf Conversion Table

N	ועו-ועו	GUIN	rersion i	abie				1N = 0.224809	9 lbf 1lb	of = 4.44822 N
4.448 1 0.225 151.24 34 7.643 298.03 67 15.062 8.896 2 0.450 155.69 35 7.868 302.48 68 15.287 13.345 3 0.674 160.14 36 8.093 306.93 69 15.512 17.793 4 0.899 164.58 37 8.318 311.38 70 15.737 22.241 5 1.124 169.03 38 8.543 315.82 71 15.961 26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11										
8.896 2 0.450 155.69 35 7.868 302.48 68 15.287 13.345 3 0.674 160.14 36 8.093 306.93 69 15.512 17.793 4 0.899 164.58 37 8.318 311.38 70 15.797 22.241 5 1.124 169.03 38 8.543 315.82 71 15.961 26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 <t< th=""><th>N</th><th></th><th>lbf</th><th></th><th>N</th><th></th><th>lbf</th><th>N</th><th></th><th>lbf</th></t<>	N		lbf		N		lbf	N		lbf
8.896 2 0.450 155.69 35 7.868 302.48 68 15.287 13.345 3 0.674 160.14 36 8.093 306.93 69 15.512 17.793 4 0.899 164.58 37 8.318 311.38 70 15.797 22.241 5 1.124 169.03 38 8.543 315.82 71 15.961 26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>										
13.345 3 0.674 160.14 36 8.093 306.93 69 15.512 17.793 4 0.899 164.58 37 8.318 311.38 70 15.737 22.241 5 1.124 169.03 38 8.543 315.82 71 15.961 26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 40.034 9 2.023 186.83 42 9.442 333.02 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13			0.225						67	
17.793 4 0.899 164.58 37 8.318 311.38 70 15.737 22.241 5 1.124 169.03 38 8.543 315.82 71 15.961 26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 40.034 9 2.023 186.83 42 9.442 333.62 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 349.41 79 17.760 62.275 14										
22.241 5 1.124 169.03 38 8.543 315.82 71 15.961 26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 40.034 9 2.023 186.83 42 9.442 333.62 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.688 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14										
26.689 6 1.349 173.48 39 8.768 320.27 72 16.186 31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 40.034 9 2.023 186.83 42 9.442 333.62 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15										
31.138 7 1.574 177.93 40 8.992 324.72 73 16.411 35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 40.034 9 2.023 186.83 42 9.442 333.62 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 217.96 49 11.016 364.75 82 18.434 75.620 17	22.241	5	1.124		169.03	38	8.543	315.82	71	15.961
35.586 8 1.798 182.38 41 9.217 329.17 74 16.636 40.034 9 2.023 186.83 42 9.442 333.62 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047	26.689	6	1.349			39		320.27	72	16.186
40.034 9 2.023 186.83 42 9.442 333.62 75 16.861 44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 20.462 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 <td>31.138</td> <td>7</td> <td>1.574</td> <td></td> <td>177.93</td> <td>40</td> <td>8.992</td> <td>324.72</td> <td>73</td> <td>16.411</td>	31.138	7	1.574		177.93	40	8.992	324.72	73	16.411
44.482 10 2.248 191.27 43 9.667 338.06 76 17.085 48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19<		8	1.798		182.38	41		329.17	74	16.636
48.930 11 2.473 195.72 44 9.892 342.51 77 17.310 53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.94 20<	40.034	9	2.023		186.83	42		333.62	75	16.861
53.379 12 2.698 200.17 45 10.116 346.96 78 17.535 57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 2	44.482	10	2.248		191.27	43	9.667	338.06	76	17.085
57.827 13 2.923 204.62 46 10.341 351.41 79 17.760 62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 2	48.930	11	2.473		195.72	44	9.892	342.51	77	17.310
62.275 14 3.147 209.07 47 10.566 355.86 80 17.985 66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 2	53.379	12	2.698		200.17	45	10.116	346.96	78	17.535
66.723 15 3.372 213.51 48 10.791 360.31 81 18.210 71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 2	57.827	13	2.923		204.62	46	10.341	351.41	79	17.760
71.171 16 3.597 217.96 49 11.016 364.75 82 18.434 75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 115.65 2	62.275	14	3.147		209.07	47	10.566	355.86	80	17.985
75.620 17 3.822 222.41 50 11.240 369.20 83 18.659 80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 120.10 2	66.723	15	3.372		213.51	48	10.791	360.31	81	18.210
80.068 18 4.047 226.86 51 11.465 373.65 84 18.884 84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.322 129.00 29	71.171	16	3.597		217.96	49	11.016	364.75	82	18.434
84.516 19 4.271 231.31 52 11.690 378.10 85 19.109 88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132	75.620	17	3.822		222.41	50	11.240	369.20	83	18.659
88.964 20 4.496 235.76 53 11.915 382.55 86 19.334 93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31	80.068	18	4.047		226.86	51	11.465	373.65	84	18.884
93.413 21 4.721 240.20 54 12.140 386.99 87 19.558 97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582	84.516	19	4.271		231.31	52	11.690	378.10	85	19.109
97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 3	88.964	20	4.496		235.76	53	11.915	382.55	86	19.334
97.861 22 4.946 244.65 55 12.364 391.44 88 19.783 102.31 23 5.171 249.10 56 12.589 395.89 89 20.008 106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 3	93.413	21	4.721		240.20	54	12.140	386.99	87	19.558
106.76 24 5.395 253.55 57 12.814 400.34 90 20.233 111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	97.861	22	4.946		244.65	55	12.364	391.44	88	19.783
111.21 25 5.620 258.00 58 13.039 404.79 91 20.458 115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	102.31	23	5.171		249.10	56	12.589	395.89	89	20.008
115.65 26 5.845 262.44 59 13.264 409.24 92 20.682 120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	106.76	24	5.395		253.55	57	12.814	400.34	90	20.233
120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	111.21	25	5.620		258.00	58	13.039	404.79	91	20.458
120.10 27 6.070 266.89 60 13.489 413.68 93 20.907 124.55 28 6.295 271.34 61 13.713 418.13 94 21.132 129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	115.65	26	5.845		262.44	59	13.264	409.24	92	20.682
129.00 29 6.519 275.79 62 13.938 422.58 95 21.357 133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	120.10	27	6.070		266.89	60	13.489	413.68	93	20.907
133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031		28	6.295			61			94	21.132
133.45 30 6.744 280.24 63 14.163 427.03 96 21.582 137.89 31 6.969 284.69 64 14.388 431.48 97 21.806 142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	129.00	29	6.519		275.79	62	13.938	422.58	95	21.357
142.34 32 7.194 289.13 65 14.613 435.93 98 22.031		30	6.744		280.24	63	14.163	427.03	96	
142.34 32 7.194 289.13 65 14.613 435.93 98 22.031	137.89	31	6.969		284.69	64	14.388	431.48	97	21.806
22 200.00	146.79	33	7.419		293.58	66	14.837	440.37	99	22.256

How to use: For example, to convert 20 N into lbf, find the number 20 in the center of the first column. By referring to the lbf column on the right, it will be found that 20 N equals 4.496 lbf.

To convert 20 lbf into N, refer to the N column on the left and it will be found that 20 lbf equals 88.964 N.

N-kgf Conversion Table

								0
N		kgf	N		kgf	N		kgf
9.8066	1	0.1020	333.43	34	3.4670	657.05	67	6.8321
19.613	2	0.2039	343.23	35	3.5690	666.85	68	6.9341
29.420	3	0.3059	353.04	36	3.6710	676.66	69	7.0360
39.227	4	0.4079	362.85	37	3.7729	686.47	70	7.1380
49.033	5	0.5099	372.65	38	3.8749	696.27	71	7.2400
58.840	6	0.6118	382.46	39	3.9769	706.08	72	7.3420
68.647	7	0.7138	392.27	40	4.0789	715.89	73	7.4439
78.453	8	0.8158	402.07	41	4.1808	725.69	74	7.5459
88.260	9	0.9177	411.88	42	4.2828	735.50	75	7.6479
98.066	10	1.0197	421.69	43	4.3848	745.31	76	7.7498
107.87	11	1.1217	431.49	44	4.4868	755.11	77	7.8518
117.68	12	1.2237	441.30	45	4.5887	764.92	78	7.9538
127.49	13	1.3256	451.11	46	4.6907	774.73	79	8.0558
137.29	14	1.4276	460.91	47	4.7927	784.53	80	8.1577
147.10	15	1.5296	470.72	48	4.8946	794.34	81	8.2597
156.91	16	1.6315	480.53	49	4.9966	804.15	82	8.3617
166.71	17	1.7335	490.33	50	5.0986	813.95	83	8.4636
176.52	18	1.8355	500.14	51	5.2006	823.76	84	8.5656
186.33	19	1.9375	509.95	52	5.3025	833.57	85	8.6676
196.13	20	2.0394	519.75	53	5.4045	843.37	86	8.7696
205.94	21	2.1414	529.56	54	5.5065	853.18	87	8.8715
215.75	22	2.2434	539.37	55	5.6084	862.99	88	8.9735
225.55	23	2.3453	549.17	56	5.7104	872.79	89	9.0755
235.36	24	2.4473	558.98	57	5.8124	882.60	90	9.1774
245.17	25	2.5493	568.79	58	5.9144	892.41	91	9.2794
254.97	26	2.6513	578.59	59	6.0163	902.21	92	9.3814
264.78	27	2.7532	588.40	60	6.1183	912.02	93	9.4834
274.59	28	2.8552	598.21	61	6.2203	921.83	94	9.5853
284.39	29	2.9572	608.01	62	6.3222	931.63	95	9.6873
294.20	30	3.0591	617.82	63	6.4242	941.44	96	9.7893
304.01	31	3.1611	627.63	64	6.5262	951.25	97	9.8912
313.81	32	3.2631	637.43	65	6.6282	961.05	98	9.9932
323.62	33	3.3651	647.24	66	6.7301	970.86	99	10.0952

How to use: For example, to convert 20 N into kgf, find the number 20 in the center of the first column. By referring to the kgf column on the right, it will be found that 20 N equals 2.0394 kgf.

To convert 20 kgf into N, refer to the N column on the left and it will be found that 20 kgf equals 196.13 N.

1N = 0.1019716 kgf 1kgf = 9.80665 N

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch F-36

• Temperature Conversion Table

Ten	npe	rature Co	nversi	on 1	able				$C = \frac{5}{9} (F$	-32) F	$= 32 + \frac{9}{5}$ C
°C		°F	°C		°F	°C		°F	°C		°F
-73.3 -62.2 -51.1 -40.0 -28.9	-100 - 80 - 60 - 40 - 20	-148.0 -112.0 - 76.0 - 40.0 - 4.0	-2.2 -1.7 -1.1 -0.6 0	28 29 30 31 32	82.4 84.2 86.0 87.8 89.6	16.1 16.7 17.2 17.8 18.3	61 62 63 64 65	141.8 143.6 145.4 147.2 149.0	34.4 35.0 35.6 36.1 36.7	94 95 96 97 98	201.2 203.0 204.8 206.6 208.4
-17.8 -17.2 -16.7 -16.1 -15.6	0 1 2 3 4	32.0 33.8 35.6 37.4 39.2	0.6 1.1 1.7 2.2 2.8	33 34 35 36 37	91.4 93.2 95.0 96.8 98.6	18.9 19.4 20.0 20.6 21.1	66 67 68 69 70	150.8 152.6 154.4 156.2 158.0	37.2 37.8 43.3 48.9 54.4	99 100 110 120 130	210.2 212 230 248 266
-15.0 -14.4 -13.9 -13.3 -12.8	5 6 7 8 9	41.0 42.8 44.6 46.4 48.2	3.3 3.9 4.4 5.0 5.6	38 39 40 41 42	100.4 102.2 104.0 105.8 107.6	21.7 22.2 22.8 23.3 23.9	71 72 73 74 75	159.8 161.6 163.4 165.2 167.0	60.0 65.6 71.1 76.7 82.2	140 150 160 170 180	284 302 320 338 356
-12.2 -11.7 -11.1 -10.6 -10.0	10 11 12 13 14	50.0 51.8 53.6 55.4 57.2	6.1 6.7 7.2 7.8 8.3	43 44 45 46 47	109.4 111.2 113.0 114.8 116.6	24.4 25.0 25.6 26.1 26.7	76 77 78 79 80	168.8 170.6 172.4 174.2 176.0	87.8 93.3 121.1 149 177	190 200 250 300 350	374 392 482 572 662
- 9.4 - 8.9 - 8.3 - 7.8 - 7.2	15 16 17 18 19	59.0 60.8 62.6 64.4 66.2	8.9 9.4 10.0 10.6 11.1	48 49 50 51 52	118.4 120.2 122.0 123.8 125.6	27.2 27.8 28.3 28.9 29.4	81 82 83 84 85	177.8 179.6 181.4 183.2 185.0	204 232 260 288 316	400 450 500 550 600	752 842 932 1022 1112
- 6.7 - 6.1 - 5.6 - 5.0 - 4.4	20 21 22 23 24	68.0 69.8 71.6 73.4 75.2	11.7 12.2 12.8 13.3 13.9	53 54 55 56 57	127.4 129.2 131.0 132.8 134.6	30.0 30.6 31.1 31.7 32.2	86 87 88 89 90	186.8 188.6 190.4 192.2 194.0	343 371 399 427 454	650 700 750 800 850	1202 1292 1382 1472 1562
- 3.9 - 3.3 - 2.8	25 26 27	77.0 78.8 80.6	14.4 15.0 15.6	58 59 60	136.4 138.2 140.0	32.8 33.3 33.9	91 92 93	195.8 197.6 199.4	482 510 538	900 950 1000	1652 1742 1832

How to use: For example, to convert 20°C into °F, find the number 20 in the center of the first column. By referring the °F column on the right, it will be found that 20°C equals 68.0°F.

To convert 20°F into °C, refer to the °C column on the left and it will be found that 20°F equals -6.7°C.

• Grease names and the characteristics (Also see page 48)

Sort	Name	Supplier	Thickener of metallic soap	Con- sistency	Dropping point (°C)	Service range(¹) (°C)	Remarks
	ALVANIA GREASE No.1	SHELL	Li	326	180	-35~+120	General, Centralized greasing
o	ALVANIA GREASE No.2	SHELL	Li	273	182	-25~+120	General, Centralized greasing
rpos	ALVANIA GREASE No.3	SHELL	Li	232	183	-20~+135	General
al bu	DAPHNE EPONEX GREASE No.2	IDEMITSU	Li	276	195	-20~+120	General
General purpose	COSMO GREASE DYNAMAX No.2	соѕмо	Li	280	188	-20~+120	General
G	MULTINOC GREASE 2	NIPPON OIL	Li	278	212	-30~+125	General
	MOBILAX GREASE No.2	MOBIL	Li	280	196	-35~+120	General
Ф	ALVANIA GREASE RA	SHELL	Li	252	183	-40~+130	Low temperature
Low temperature	BEACON 325	ESSO	Li	280	193	(+160) -60~+120	Low temperature, Low torque
mpe	ISOFLEX LDS 18 SPECIAL A	KLÜBER	Li	280	≧185	-60~+130	Low temperature, High speed,Extreme pressure
ow te	ISOFLEX SUPER LDS 18	KLÜBER	Li	280	≧185	−60∼+130	Low temperature, High speed,Low noise
ב	LT GREASE No.2	JAPAN ENERGY	Li	275	181	-50~+150	Low temperature
nge	TEMPREX N3	ESSO	Li Complex	235	≧300	(+200) -20~+160	Wide temperature range, High temperature
ure ra	AEROSHELL GREASE 7	SHELL	Microgel	288	≧260	−73∼+149	Wide temperature range, Low temperature
oerati	MULTEMP PS No.2	KYODO YUSHI	Li	275	190	-50~+130	Wide temperature range, For low temperature & low noise
Wide temperature range	MULTEMP SRL	KYODO YUSHI	Li	242	192	−50~+150	Wide temperature range, For low temperature & low noise
Wide	MULTINOC WIDE No.2	NIPPON OIL	Li+special Na	247	203	-40~+135	Wide temperature range
ө ө	ALVANIA EP-2	SHELL	Li	276	187	-20~+110	Extreme pressure, Centralized greasing
Extreme pressure	MOLYKOTE BR2-PLUS	DOW CORNING	Li	265	185	-30~+150	With MoS ₂ , Extreme pressure
மித்	MOLUB-ALLOY #777-2	CASTROL	Li	280	182	0~+135	With MoS ₂ , Extreme pressure
	G 40M	SHIN-ETSU	Li	260	≧200	-30~+200	Wide temperatur range, Superior at high temperature with stable anti-oxidation and water proof, Chemically inert
	G 40H	SHIN-ETSU	Li	220	≧200	-30~+200	Wide temperatur range, Superior at high temperature with stable anti-oxidation and water proof, Chemically inert
	KRYTOX 240AD	DU PONT	Fluorinated	275	None	-30~+288	Stabl at high temperature, Chemically inert, Anti-solvent
Others	BARRIERTA L55/2	KLÜBER	Fluorinated	No.2	None	(+250) -35~+220	General, Low evaporation at high temperature, Chemically inert
δ	BARRIERTA IMI/V	KLÜBER	Fluorinated	No.2	None	-50~+220	For high vacuum
	DEMNUM GREASE L-200	DAIKIN	Fluorinated	280	None	-60~+300	Stabl at high temperature, Anti- solvent, Chemically inert
	DOLIUM GREASE R	SHELL	Polyurea	281	249	-30~+150	Heat resistant, Superior at high temperature with stable anti-oxidation
	STAMINA GREASE RL2	SHELL	Polyurea	268	271	-20~+180	Heat resistant, Superior at high temperature with stable anti-oxidation

Note(1): Figures in parentheses show the maximum allowable temperature in very short time operation, and they are not applicable for continuous operation.

Remark When using these products, see individual manufacturer's catalogs.

1N=0.102kgf=0.2248lbs. 1mm=0.03937inch F-38



Linear Products CAD Data

We can supply CAD data for **IKO** Linear Motion Rolling Guides including the Linear Way and Linear Roller Way series. We hope this data is useful for customer's design efficiently. If this data is required, Please visit **IKO** web site **http://www.ikont.com/resister.htm**



Types of CAD Data Formats: DXF and other formats (2D and 3D)

F-40

Products Described

Linear Motion Rolling Guide series

- C-Lube Linear Way ML and Linear Way L
- ◆C-Lube Linear Way ME and Linear Way E
- C-Lube Linear Way MH and Linear Way H
- C-Lube Linear Way MUL and Linear Way U
- C-Lube Linear Roller Way Super MX
- C-Lube Linear Ball Spline MAG
- Linear Roller Way Super X
- Linear Way F
- Linear Way Module
- Linear Ball Spline G
- Stroke Ball Spline LS
- Block type Linear Ball Spline
- High Rigidity Precision Linear Slide Unit
- Precision Linear Slide
- Linear Bushing G

Mechatronic Product series

Precision Positioning Table TU

Data Included

The data includes three drawings of front view, side view, and plane view. The scale is 1:1 (actual size) and no dimension line is shown.

Precautions

- ① When reading the graphic data of the **IKD** Linear Motion series CAD data collections by using your CAD system, first check the CAD system instruction manual.
- ② The graphic data of the IKŪ Linear Motion series CAD data collections is subject to change without notice for improvement purposes.
- 3 We shall disclaim all responsibility for any damages that may result from using this collection of data.

Product names marked with an asterisk (**) represent the trademark or registered trademark of Autodesk.

Index of Model Codes

BG E-211 Storius Rotany Cage LBD — AJ — E-144 Linear Bushring LM····OP E-152 Linear Bushring LME BK····A E-204 Ministrus Storius Rotany, Rashing LBD····OP E-144 Linear Bushring LMC							
BK···A E-204 Ministry Stoke Roay Spating LBD···AD E-144 Linear Bushing LM···UU AJ E-158 Linear Bushing LMGT BSP···SL E-114 Precision Linear Sities LBD···-UU AJ E-164 Linear Bushing LM···-UU AJ E-158 Linear Bushing LMS BSR···SL E-116 Precision Linear Sities LBD···-UU AJ E-146 Linear Bushing LMB E-164 Linear Bushing LMS··-F BWU E-106 Precision Linear Sities LBD···-UU OP E-146 Linear Bushing LMB···-NA E-164 Linear Bushing LMS··-F BWU E-150 Class of Mole Way LBE···-UU OP E-140 Linear Bushing LMB····NA J E-164 Linear Bushing LMS···- CRW E-50 Cossaed Roler Way LBE····UU OP E-142 Linear Bushing LMB····NOP E-164 Linear Bushing LMS····C CRW-W-SL E-50 Cossaed Roler Way LBE···-UU OP E-142 Linear Bushing LME····P E-160 Linear Bushing LMS			LBB···UU OP	·		ū	LME···U
BSPSL E-112 Precision Linear Sinde LBD	BG	E-211 Stroke Rotary Cage	LBD	E-144 Linear Bushing	LM···OP	E-152 Linear Bushing	LMEUU
BSPG··SL E-114 Precision Linear Side LBD···UU E-146 Lanear Bushing LMB···UU OP E-158 Linear Bushing LMS···FE	ВК…А	E-204 Miniature Stroke Rotary Bushing	LBD···AJ	E-144 Linear Bushing	LM···UU	E-158 Linear Bushing	LMG
BBR**SL E-116 Precision Linear Side LBD***UU AJ E-146 Linear Bushing LMB*** E-164 Linear Bushing LMS***FU LBB*** LBB*** LBB*** LBB*** LBB**** LBB***** LBB**** LBB**** LBB**** LBB**** LBB**** LBB**** LBB***** LBB***** LBB***** LBB***** LBB***** LBB****** LBB***** LBB****** LBB***** LBB***** LBB***** LBB***** LBB***** LBB***** LBB****** LBB****** LBB****** LBB****** LBB******** LBB******* LBB******* LBB******** LBB******** LBB******* LBB******** LBB******** LBB**********	BSP···SL	E-112 Precision Linear Slide	LBD···OP	E-144 Linear Bushing	LM···UU AJ	E-158 Linear Bushing	LMGT
BWU Fight Rightly Precision Linear Side Units LBD···UU OP E-146 Incer Bushing LMB···AU E-164 Incer Bushing LMS···F U C LMB···M E-164 Incer Bushing LMB···M AU E-164 Incer Bushing LMS···F U C LMB···M AU E-164 Incer Bushing LMB···M AU E-164 Incer Bushing LMB···M AU CRW E-50 Incessed Roller Way LBE···UU AU E-142 Incer Bushing LMB···M AU E-164 Incer Bushing LMB···M AU CRWG E-160 Incessed Roller Way LBE···UU AU E-142 Incer Bushing LME···AU E-160 Incer Bushing LMS···VU Incer Bushing CRWG E-160 Incert Bushing LME···GAU E-160 Incer Bushing LMS···VU Incer Bushing CRWW-SL E-50 Incert Bushing LME···F UI LME···F UI LME···F UI LMB···F UI	BSPG···SL	E-114 Precision Linear Slide	LBD····UU	E-146 Linear Bushing	LM···UU OP	E-158 Linear Bushing	LMS
LBE	BSR···SL		LBD····UU AJ	E-146 Linear Bushing	LMB	E-164 Linear Bushing	LMS…F
LBE	BWU	E-100 High Rigidity Precision Linear Slide Unit	LBD····UU OP	E-146 Linear Bushing	LMB···AJ	E-164 Linear Bushing	LMS…F UL
C LBE···OP E-140 Lmear Bushing LMB···N OP E-164 Linear Bushing LMSL··FE CRW E-50 Crossed Roller Way LBE····UU E-142 Linear Bushing LMB···OP E-164 Linear Bushing LMSL···FE CRWG E-16 McDaep Cago Crossed Roller Way LBE····UU AD E-142 Linear Bushing LME E-160 Linear Bushing LMSL···UU CRWW E-50 Crossed Roller Way LK E-177 Compact Linear Bushing LME···F E-170 Linear Bushing LRX CRWM E-66 Crossed Roller Way LK E-177 Compact Linear Bushing LME···F AJ E-170 Linear Bushing LRX CRWU E-78 Crossed Roller Way Unit LM····F AJ E-152 Linear Bushing LME····F AJ E-170 Linear Bushing LRX CRWU E-78 Crossed Roller Way Unit LM·····F AJ E-166 Linear Bushing LME····F AJ E-170 Linear Bushing LRX LRX LRX LRX LRX		Sildo Silik	LBE	E-140 Linear Bushing	LMB···N	E-164 Linear Bushing	LMS…UU
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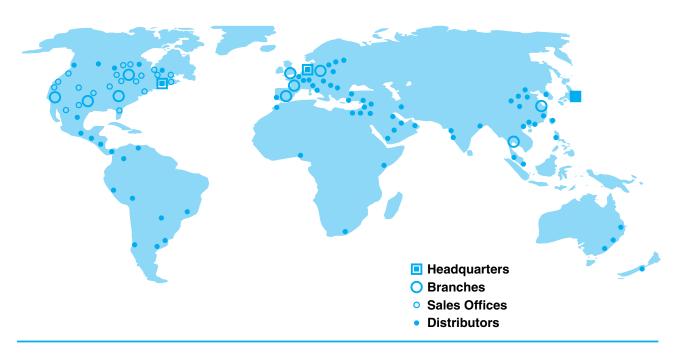
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