INDEX

GENERAL DESCRIPTON

LINEAR WAY and LINEAR ROLLER WAY

LINEAR BALL SPLINE

OTHER LINEAR MOTION ROLLING GUIDES

OTHER PRODUCT

General Description

IKO Linear Motion Rolling Guides are used 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 available.

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 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

IKO 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 IKO's standard product lines.

3 A functional simplicity in structure yields high reliability

IKO Linear Motion Rolling Guides feature functional and simple designs. Compared to more complicated designs needing extra steps in manufacturing, the simplicity of IKO 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

IKO'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 IKO 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 IKO 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.

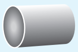
Line-up of interchangeable specification products

	Rolling element	Series name	Material	Variation	Reference page
C-Sleeve Linear Way	Ball	C-Sleeve Linear Way ML	Stainless steel	6 types, 37 sizes	A-2 ～
		C-Sleeve Linear Way ME	Carbon steel	9 types, 27 sizes	A-18 ～
		C-Sleeve Linear Way MH	Carbon steel	8 types, 18 sizes	A-34 ～
Linear Way	Ball	Linear Way L	High carbon steel	2 types, 8 sizes	B-2 ～
			Stainless steel	6 types, 37 sizes	
		Linear Way E	High carbon steel	9 types, 45 sizes	B-28 ～
			Stainless steel	9 types, 36 sizes	
		Linear Way H	High carbon steel	8 types, 52 sizes	B-72 ～
			Stainless steel	6 types, 24 sizes	
		Linear Way F	High carbon steel	3 types, 9 sizes	B-108 ～
			Stainless steel	1 type, 3 sizes	
Linear Roller Way	Roller	Linear Roller Way Super X	High carbon steel	9 types, 69 sizes	C-2 ～
			Stainless steel	3 types, 15 sizes	
Linear Ball Spline	Ball	Linear Ball Spline G	High carbon steel	8 types, 56 sizes	D-28 ～
		Block type Linear Ball Spline	High carbon steel	2 types, 14 sizes	D-46 ～
			Stainless steel	1 type, 3 sizes	

Types of IKO Linear Motion Rolling Guides

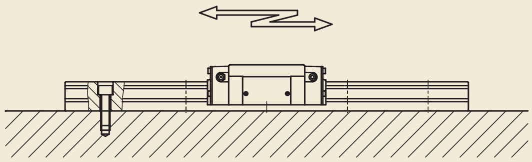
IKO Linear Motion Rolling Guides are classified according to the guide type, motion type and rolling element type. Three guide types, namely, rail guide type, shaft guide type and flat guide type are available. Each of them is divided into the endless motion type in which rolling elements are re-circulated 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.

 **Ball type**

 **Roller type**

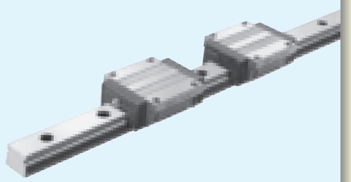
Rail guide type

The rail guide type achieves linear motion along a rail. This product can receive a complex load and features high performance, excellent total balance and easy handling.

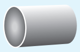


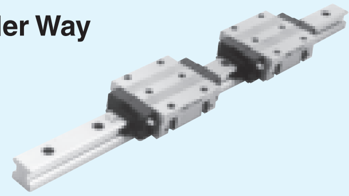
Endless linear motion

Linear Way



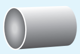
Linear Roller Way



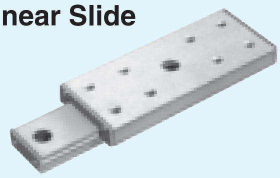


Limited linear motion

Crossed Roller Way

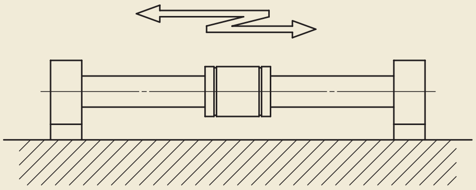


Precision Linear Slide



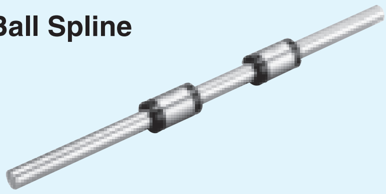
Shaft guide type

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.

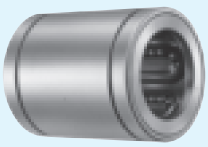


Endless linear motion

Linear Ball Spline

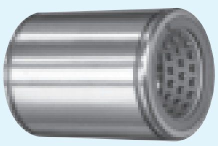


Linear Bushing



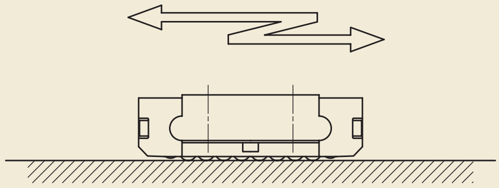
Limited linear motion and rotation

Stroke Rotary Bushing



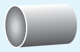
Flat guide type

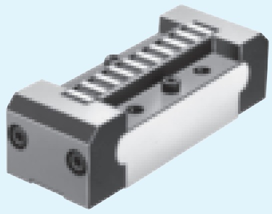
The flat guide type achieves linear motion along a flat plate. It can receive only a unidirectional load but has a large load carrying capacity.



Endless linear motion

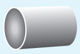
Roller Way

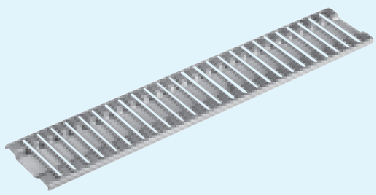




Limited linear motion

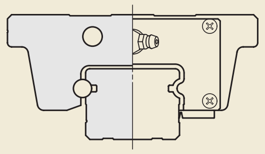
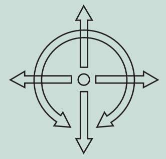
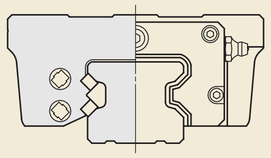
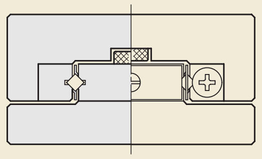
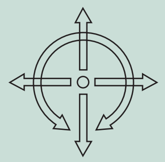
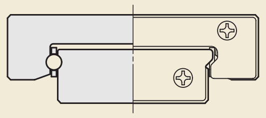
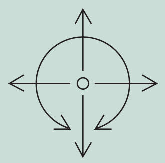
Flat Roller Cage





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.

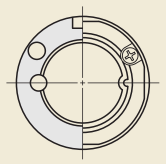
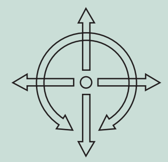
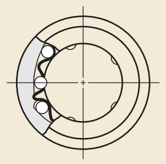
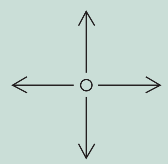
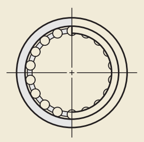
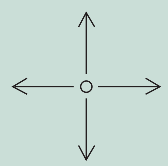
		Type of rolling element	Type of motion	Load direction and load carrying capacity	Rigidity	Frictional characteristic	Ease of mounting	General applications	
Endless linear motion	**Linear Way** 	Ball	Endless linear motion	 Complex load, medium to heavy load	○	○	◎	· NC machine tool · Precision working machine · Robot · Material transfer machine	Page A-2~ Page B-2~
	Linear Roller Way 	Roller	Endless linear motion	 Complex load, heavy to extra-heavy load	◎	○	◎	· Heavy duty machine tool · Large working machine · High-rigidity robot	Page C-2~
Limited linear motion	**Crossed Roller Way** 	Roller	Limited linear motion	 Complex load, medium load	○	◎	◎	· Precision working machine · Electronic parts assembling machine · Precision measuring instrument	Page E-2~
	Precision Linear Slide 	Ball	Limited linear motion	 Complex load, light to medium load	△	◎	◎	· Electronic parts assembling machine	Page E-84~

Remarks: ◎ Excellent, ○ Good, △ Fair

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

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.

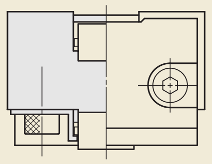
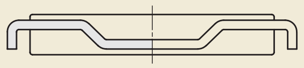
		Type of rolling element	Type of motion	Load direction and load carrying capacity	Rigidity	Frictional characteristic	Ease of mounting	General applications	
Endless linear motion	**Linear Ball Spline** 	Ball	Endless linear motion	 Complex load, medium to heavy load	◯	◯	◯	· Robot · Testing and inspection equipment · Material transfer machine	Page D-28~
Endless linear motion	**Linear Bushing** 	Ball	Endless linear motion	 Radial load, light load	△	◯	◯	· Packaging machine · Measuring instrument · Medical equipment	Page E-112~
Limited linear motion + rotation	**Stroke Rotary Bushing** 	Ball	Limited linear motion + rotation	 Radial load, light load	△	◎	◯	· Printing press · Press die set · Precision measuring instrument	Page E-176~

Remarks: ◎ Excellent, ◯ Good, △ Fair

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

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.

		Type of rolling element	Type of motion	Load direction and load carrying capacity	Rigidity	Frictional characteristic	Ease of mounting	General applications	
Endless linear motion	**Roller Way** 	Roller	Endless linear motion	One-directional load, extra-heavy load	◎	○	△	· NC machine tool · Precision working machine	Page E-202~
Limited linear motion	**Flat Roller Cage** 	Roller	Limited linear motion	One-directional load, extra-heavy load	◎	◎	○	· Precision working machine · Optical measuring instrument	Page E-218~

Remarks: ◎ Excellent, ○ Good, △ Fair

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

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.

Example of Linear Motion Rolling Guide Selection Procedure

Procedure	Details	Reference
Confirmation of requirements and operating conditions	• Identify the machine and the location where the guide is to be used. • Confirm the requirements for the guide such as required guide performance, and also confirm the operating conditions and special environment conditions.	
Selection of the rolling guide series	• Select the rolling guide series suitable for the application, by considering the type of motion, magnitude of load, rigidity, friction, mounting, etc.	See Types of Linear Motion Rolling Guides on page 10.
Selection between the interchangeable and non-interchangeable specifications	• Consider the factors such as the ease of maintenance and assembly.	See the description of Linear Way and Linear Roller Way on page 52 and the description of Linear Ball Spline on page D-2.
Selection of accuracy class	• Select the accuracy class based on the required accuracy in operation. When high operating accuracy is a primary requirement, select a more precise class.	See the description of each series.
Preliminary selection of the size and quantity of rolling guides	• Provisionally determine the guide, taking a balance between the guide size and the machine size and referring to past experiences on similar machines.	
Calculation of loads on rolling guides	• Calculate the load applied to each load carrying unit of rolling guide. • Consider loads due to acceleration and deceleration as well as fluctuating loads.	See the general description.
Calculation of static safety factor	• Calculate the static safety factor, and ensure that the calculated factor meets the operating conditions.	See the general description.
Calculation of life	• Calculate the basic rating life and compare it with the required life.	See the general description.
Consideration on preload amount and clearance	• Select a preload amount or clearance meeting the operating conditions.	See the description of each series.
Determination of the size, quantity and preload		
Selection of lubrication and dust-proof methods	• Select either oil lubrication or grease lubrication. • Select a suitable dust-proof method such as seals or bellows, depending on environmental conditions.	See the general description.
Secondary design considerations	• Examine the mounting method and the dimensions related to mounting.	See the description of Linear Way and Linear Roller Way on page 52 and the description of Linear Ball Spline on page D-2, or the description of each series.
Final determination of specifications of rolling guides and peripheral parts		

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 become 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.

Table 1 Basic rating life for basic dynamic load rating

Series	Basic rating life for basic dynamic load rating
Linear Way Linear Roller Way Linear Ball Spline Precision Linear Slide Linear Bushing	50×10^3 m
Crossed Roller Way Roller Way 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.

Table 2 Applicable life calculation formula

Series	Basic rating life calculation formula unit : 10^3m	Basic rating life calculation formula unit : hours	Symbols
Linear Way Precision Linear Slide Linear Bushing	$L=50\left(\frac{C}{P}\right)^3$	$L_h=\frac{10^6 L}{2S\,n_1\times 60}$	L : Basic rating life, 10^3m 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 L_h : Basic rating life in hours, h S : Stroke length, mm n_1 : Number of strokes per minute, cpm
Linear Ball Spline	$L=50\left(\frac{C}{P}\right)^3$ $L=50\left(\frac{T}{M}\right)^3$		
Linear Roller Way	$L=50\left(\frac{C}{P}\right)^{10/3}$		
Crossed Roller Way Roller Way Flat Roller Cage	$L=100\left(\frac{C}{P}\right)^{10/3}$		

Table 3 Life calculation formula of Stroke Rotary Bushing

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

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

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.

$$C_t = f_t C \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (1.1)$$

where, C_t : Basic dynamic load rating considering a temperature rise, N
f_t : Temperature factor (See Fig. 1.)
C : Basic dynamic load rating, N

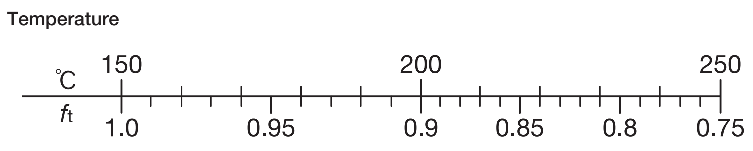


Fig. 1 Temperature factor

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.

$$C_H = f_H C \quad \cdots\cdots\cdots\cdots\cdots\cdots \quad (1.2)$$

where, C_H : Basic dynamic load rating considering hardness, N
f_H : Hardness factor (See Fig. 2.)
C : Basic dynamic load rating, N

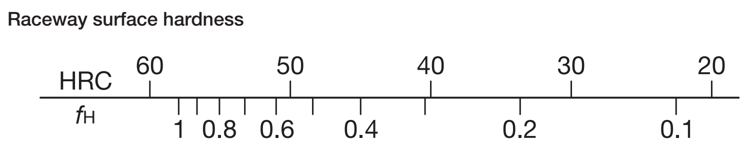


Fig. 2 Hardness factor

Basic static load rating C_0 (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.

Table 4 Maximum contact stress

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

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.

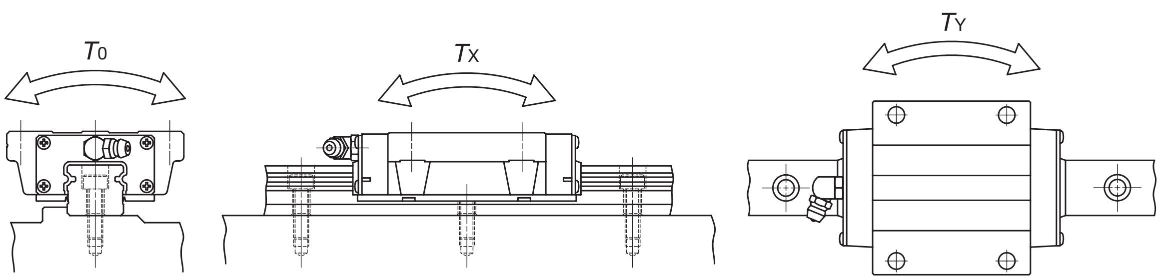


Fig. 3 Examples of static moment rating direction

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.

$$f_s = \frac{C_0}{P_0} \quad \cdots\cdots\cdots\cdots\cdots (1.3)$$

$$f_s = \frac{T_0}{M_0} \quad \cdots\cdots\cdots\cdots\cdots (1.4)$$

where, f_s : Static safety factor
C_0 : Basic static load rating, N
P_0 : 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

Operating conditions	f_s
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 5.3 Static safety factor of Linear Ball Spline

Operating conditions	f_s
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 5.2 Static safety factor of Linear Roller Way

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

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

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

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.

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

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

where, F_{re} : Downward conversion load, N
F_{ae} : Lateral conversion load, N
F_r : Downward load, N
F_a : Lateral load, N
M_0 : Moment in the T_0 direction, N・m
M_X : Moment in the T_X direction, N・m
M_Y : Moment in the T_Y direction, N・m
k_r、k_a : Conversion factors for load direction (See Table 7.)
C_0 : Basic static load rating, N
T_0 : Static moment rating in the T_0 direction, N・m
T_X : Static moment rating in the T_X direction, N・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.

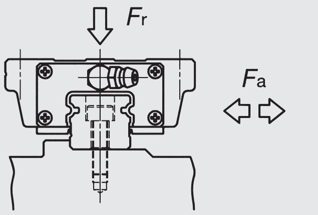
$$P = X F_{re} + Y F_{ae} \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (1.7)$$

where, P : Dynamic equivalent load, N
X、Y : Dynamic equivalent load factor (See Table 6.)
F_{re} : Downward conversion load, N
F_{ae} : Lateral conversion load, N

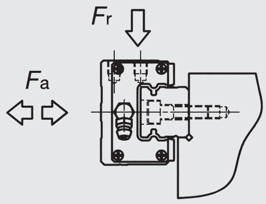
Table 6 Dynamic equivalent load factor

Condition	X	Y
$\lvert F_{re}\rvert \geqq \lvert F_{ae}\rvert$	1	0.6
$\lvert F_{re}\rvert < \lvert F_{ae}\rvert$	0.6	1

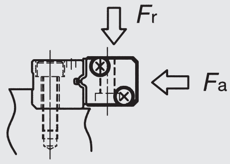
Table 7 Conversion factor for load direction



Linear Way and Linear Roller Way



Linear Way H Side Mounting type



Linear Way LM
Linear Way M
Linear Roller Way M

Series and size		Conversion factor k_r ($F_r \geqq 0$)	Conversion factor k_r ($F_r < 0$)	Conversion factor k_a
C-Sleeve Linear Way ML		1	1	1.13
C-Sleeve Linear Way ME		1	1	1
C-Sleeve Linear Way MH		1	1	1
C-Sleeve Linear Way MUL		1	1	1.19
Linear Way L	Ball retained type	1	1	1.13
	Ball non-retained type	1	1	0.88
Linear Way E	15～30	1	1	1
	35～45	1	1.13	1.19
Low Decibel Linear Way E		1	1	1
Linear Way H	8～12	1	1	1.13
	15～30	1	1	1
	35～65	1	1.13	1.19
	85	1	1.28	1.23
Linear Way H Side Mounting type	15～30	1	1	1
	35～65 (1)	1	1	0.84 0.95
Linear Way F	33～42	1	1	1
	69	1	1	1.13
Linear Way FH		1	1.13	1.19
Linear Way U	25、30	1	1	1.13
	40～130	1	1	1
Linear Roller Way Super X		1	1	1
Linear Roller Way X		1	1	1
Linear Way LM		1	1	0.70
Linear Way M	1～ 5	1	1.13	0.73
	6	1	1.28	0.76
Linear Roller Way M		1	1	0.58

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

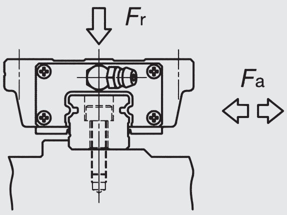
Static equivalent load P_0

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.

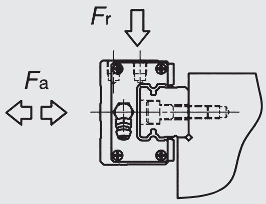
$$P_0 = k_{0r}|F_r| + k_{0a}|F_a| + \frac{C_0}{T_0}|M_0| + \frac{C_0}{T_X}|M_X| + \frac{C_0}{T_Y}|M_Y| \cdots\cdots\cdots (1.8)$$

where,
P_0 : Static equivalent load, N
F_r : Downward load, N
F_a : Lateral load, N
M_0 : Moment in the T_0 direction, N・m
M_X : Moment in the T_X direction, N・m
M_Y : Moment in the T_Y direction, N・m
k_{0r}, k_{0a} : Conversion factors for load direction (See Table 8.)
C_0 : Basic static load rating, N
T_0 : Static moment rating in the T_0 direction, N・m
T_X : Static moment rating in the T_X direction, N・m
T_Y : Static moment rating in the T_Y direction, N・m

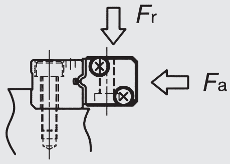
Table 8 Conversion factor for load direction



Linear Way and Linear Roller Way



Linear Way H Side Mounting type



Linear Way LM
Linear Way M
Linear Roller Way M

Series and size		Conversion factor		
		k_{0r}		k_{0a}
		$F_r \geqq 0$	$F_r < 0$	
C-Sleeve Linear Way ML		1	1	1.19
C-Sleeve Linear Way ME		1	1	1
C-Sleeve Linear Way MH		1	1	1
C-Sleeve Linear Way MUL		1	1	1.19
Linear Way L	Ball retained type	1	1	1.19
	Ball non-retained type	1	1	0.84
Linear Way E	15～30	1	1	1
	35～45	1	1.19	1.28
Low Decibel Linear Way E		1	1	1
Linear Way H	8～12	1	1	1.19
	15～30	1	1	1
	35～65	1	1.19	1.28
	85	1	1.43	1.34
Linear Way H Side Mounting type	15～30	1	1	1
	35～65 (1)	1	1	0.78 0.93
Linear Way F	33～42	1	1	1
	69	1	1	1.19
Linear Way FH		1	1.19	1.28
Linear Way U	25、30	1	1	1.19
	40～130	1	1	1
Linear Roller Way Super X		1	1	1
Linear Roller Way X		1	1	1
Linear Way LM		1	1	0.60
Linear Way M	1～ 5	1	1.19	0.64
	6	1	1.43	0.67
Linear Roller Way M		1	1	0.50

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.

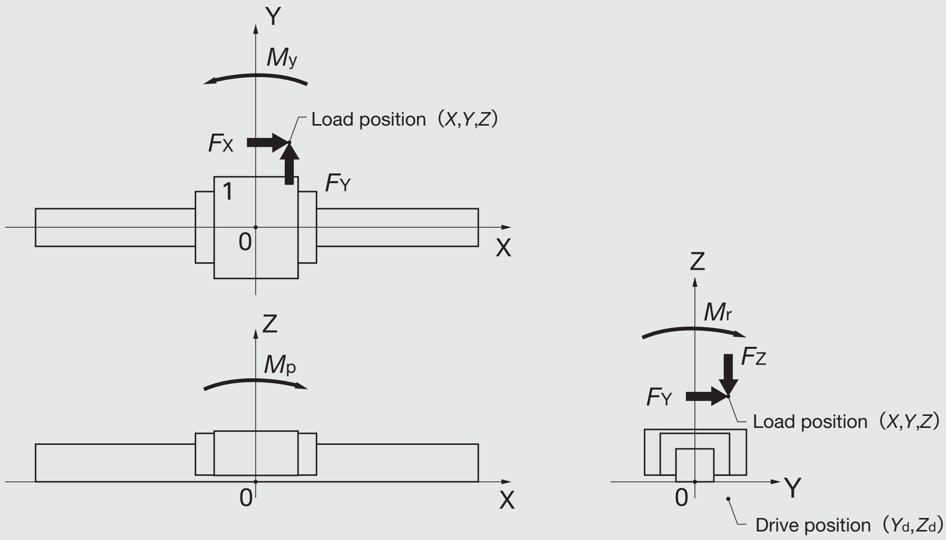
Table 9 Load factor

Operating conditions	f_W
Smooth operation free from vibration and/or shocks	1 ～1.2
Normal operation	1.2～1.5
Operation 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



Slide unit No.	Load applied on the slide unit				
	Downward load F_r	Lateral load F_a	Moment in the T_0 direction M_0	Moment in the T_X direction M_X	Moment in the T_Y direction M_Y
1	F_z	F_y	M_r	M_p	M_y

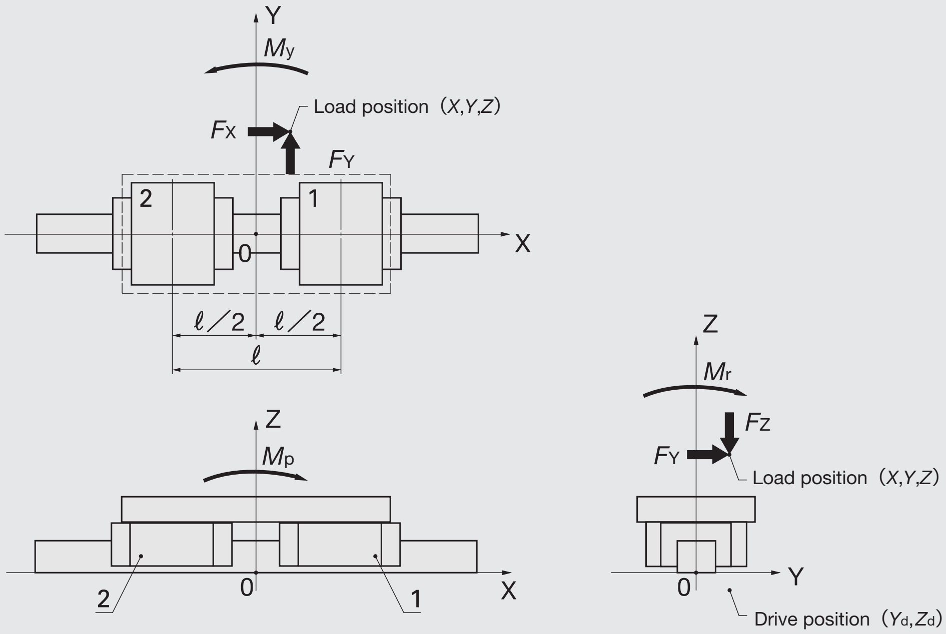
Remark : The moment loads in each direction M_r, M_p, and M_y can be obtained by the following formulae.

$$M_r = F_Y Z + F_Z Y$$

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

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

Table 10.2 One track rail and two slide units



Slide unit No.	Load applied on the slide unit		
	Downward load F_r	Lateral load F_a	Moment in the T_0 direction M_0
1	$\frac{F_Z}{2}+\frac{M_p}{\ell}$	$\frac{F_Y}{2}+\frac{M_y}{\ell}$	$\frac{M_r}{2}$
2	$\frac{F_Z}{2}-\frac{M_p}{\ell}$	$\frac{F_Y}{2}-\frac{M_y}{\ell}$	$\frac{M_r}{2}$

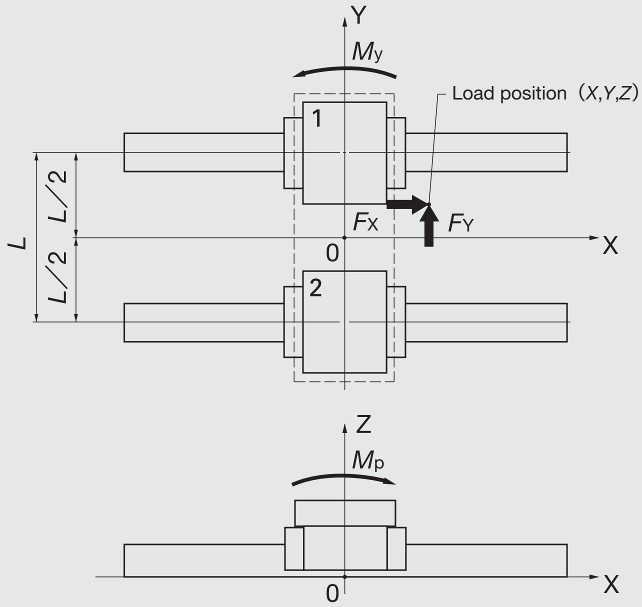
Remark：The moment loads in each direction M_r, M_p, and M_y can be obtained by the following formulae.

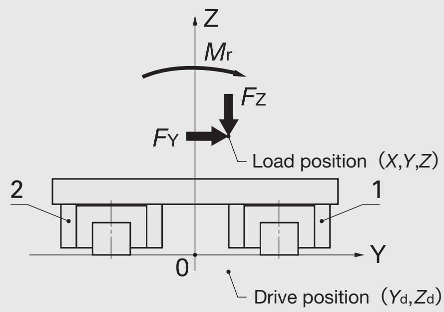
$$M_r = F_Y\, Z + F_Z\, Y$$

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

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

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





Slide unit No.	Load applied on the slide unit			
	Downward load F_r	Lateral load F_a	Moment in the T_X direction M_X	Moment in the T_Y direction M_Y
1	$\frac{F_Z}{2}+\frac{M_r}{L}$	$\frac{F_Y}{2}$	$\frac{M_p}{2}$	$\frac{M_y}{2}$
2	$\frac{F_Z}{2}-\frac{M_r}{L}$	$\frac{F_Y}{2}$	$\frac{M_p}{2}$	$\frac{M_y}{2}$

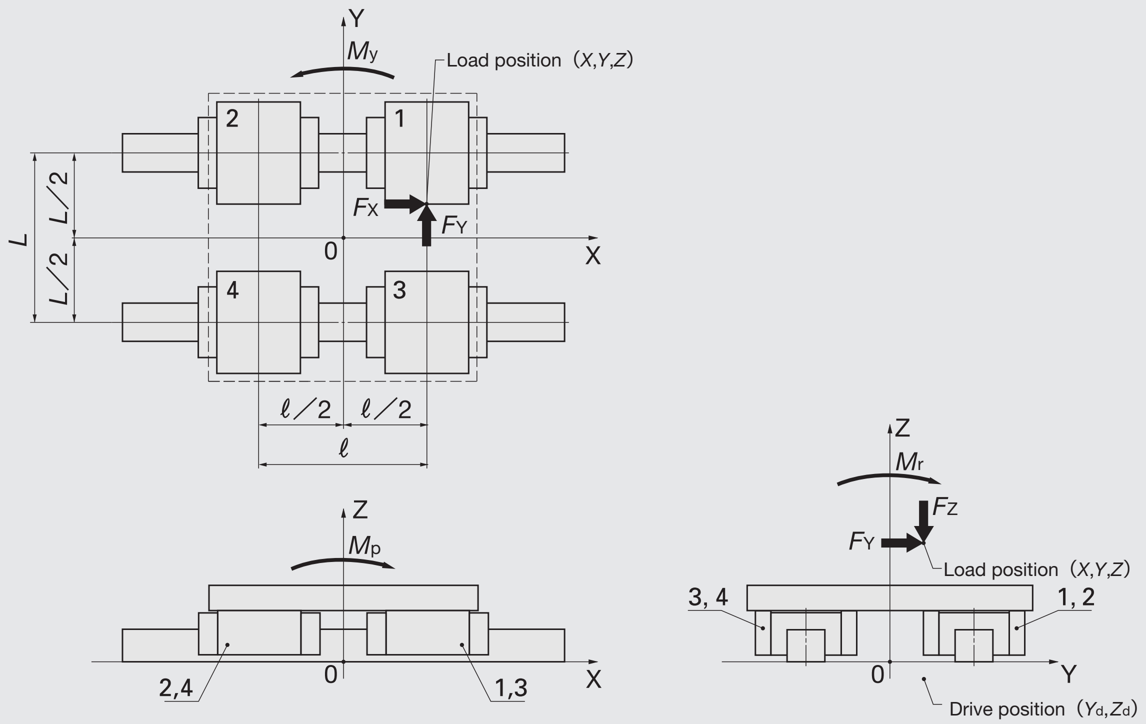
Remark: The moment loads in each direction M_r, M_p, and M_y can be obtained by the following formulae.

$$M_r = F_Y Z + F_Z Y$$

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

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

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



Slide unit No.	Load applied on the slide unit	
	Downward load F_r	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	$\frac{F_Z}{4}-\frac{M_r}{2L}-\frac{M_p}{2\ell}$	$\frac{F_Y}{4}-\frac{M_y}{2\ell}$

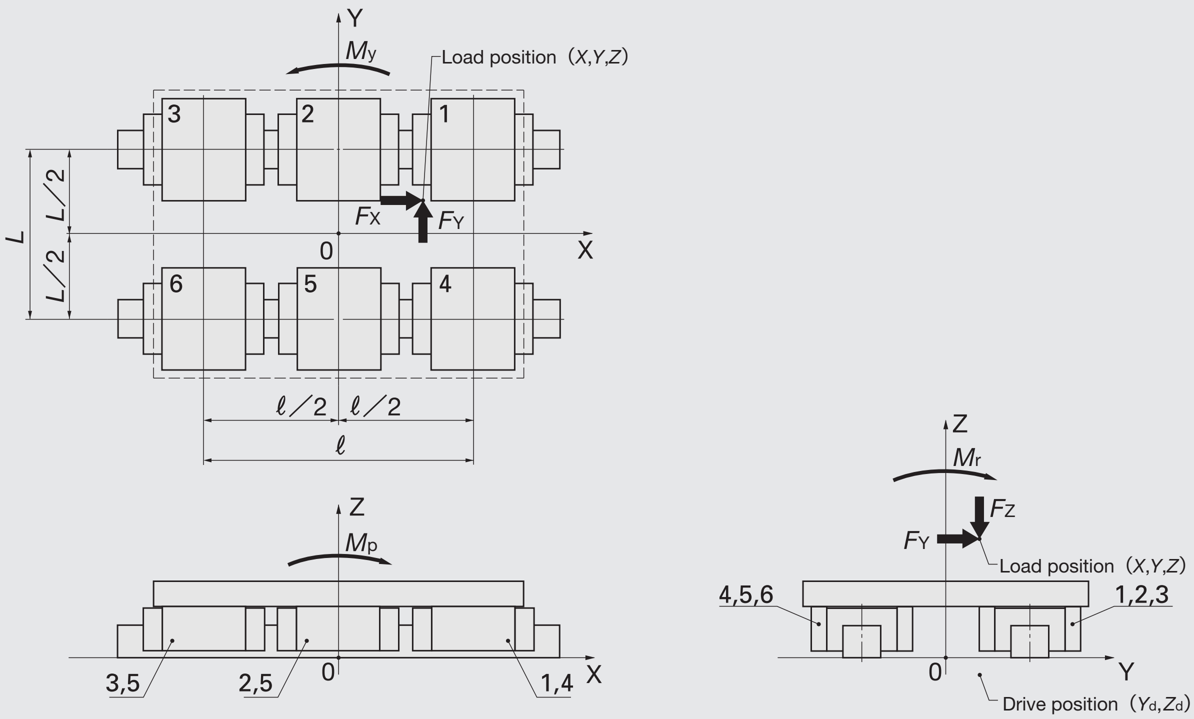
Remark: The moment loads in each direction M_r, M_p, and M_y can be obtained by the following formulae.

$$M_r = F_Y Z + F_Z Y$$

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

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

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



Slide unit No.	Load applied on the slide unit	
	Downward load F_r	Lateral load F_a
1	$\frac{F_Z}{6}+\frac{M_r}{3L}+\frac{M_p}{2\ell}$	$\frac{F_Y}{6}+\frac{M_y}{2\ell}$
2	$\frac{F_Z}{6}+\frac{M_r}{3L}$	$\frac{F_Y}{6}$
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	$\frac{F_Z}{6}-\frac{M_r}{3\ell}$	$\frac{F_Y}{6}$
6	$\frac{F_Z}{6}-\frac{M_r}{3L}-\frac{M_p}{2\ell}$	$\frac{F_Y}{6}-\frac{M_y}{2\ell}$

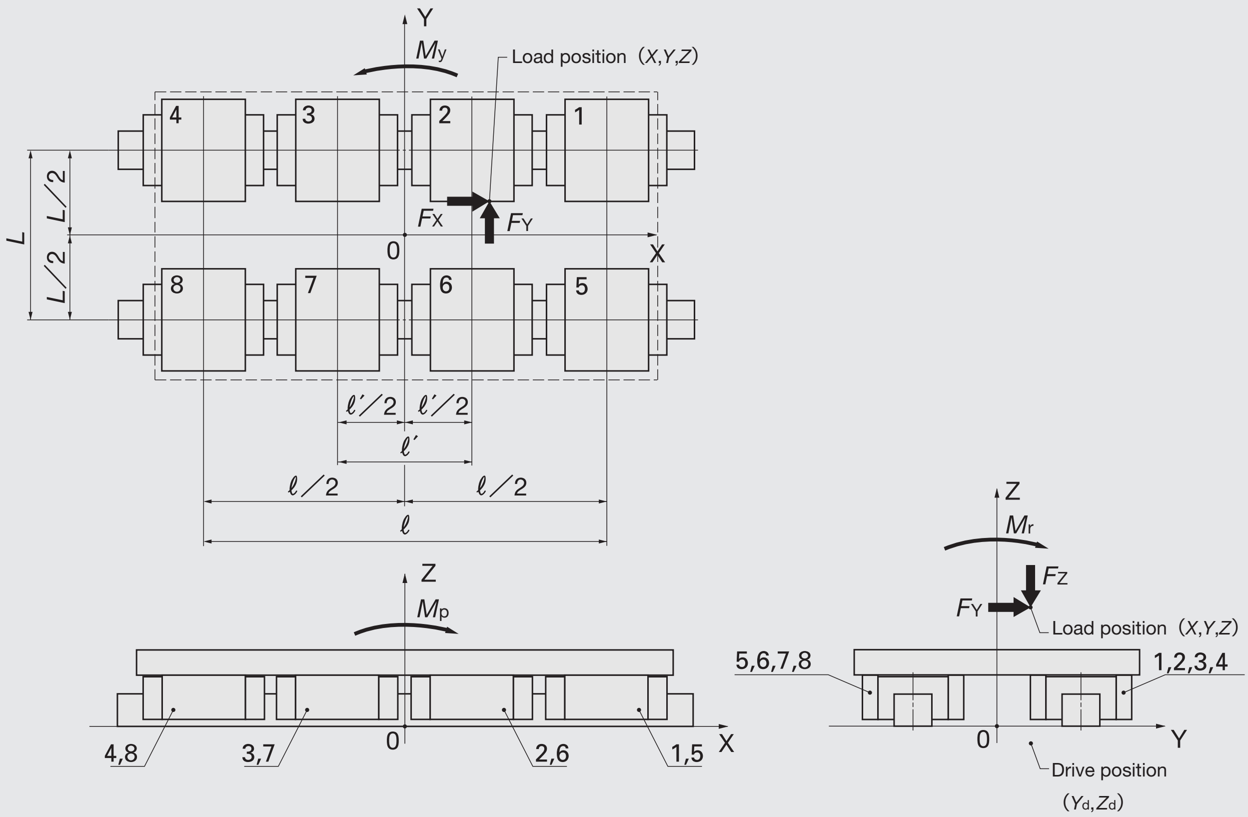
Remark：The moment loads in each direction M_r, M_p, and M_y can be obtained by the following formulae.

$$M_r = F_Y Z + F_Z Y$$

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

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

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



Slide unit No.	Load applied on the slide unit	
	Downward load F_r	Lateral load F_a
1	$\frac{F_Z}{8}+\frac{M_r}{4L}+\frac{M_p}{2}\frac{\ell}{\ell^2+\ell'^2}$	$\frac{F_Y}{8}+\frac{M_y}{2}\frac{\ell}{\ell^2+\ell'^2}$
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	$\frac{F_Z}{8}-\frac{M_r}{4L}-\frac{M_p}{2}\frac{\ell}{\ell^2+\ell'^2}$	$\frac{F_Y}{8}-\frac{M_y}{2}\frac{\ell}{\ell^2+\ell'^2}$

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

$$M_r = F_Y Z + F_Z Y$$

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

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

Mean equivalent load for fluctuating load

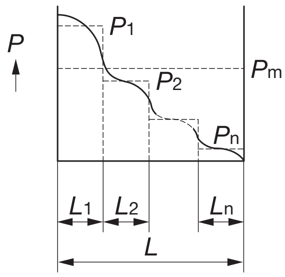
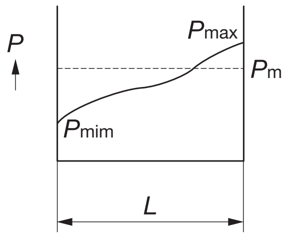
When the load on the rolling guide fluctuates, the mean equivalent load P_m is used in place of the load P in the life calculation formula.
The mean equivalent load is a constant load which gives the basic rating life equal to that for the fluctuating load. It is obtained by the following formula.

$$P_m = \sqrt[p]{\frac{1}{L}\int_0^L P_n^p \, dL} \quad \cdots\cdots\cdots\cdots (1.9)$$

where, P_m : 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.

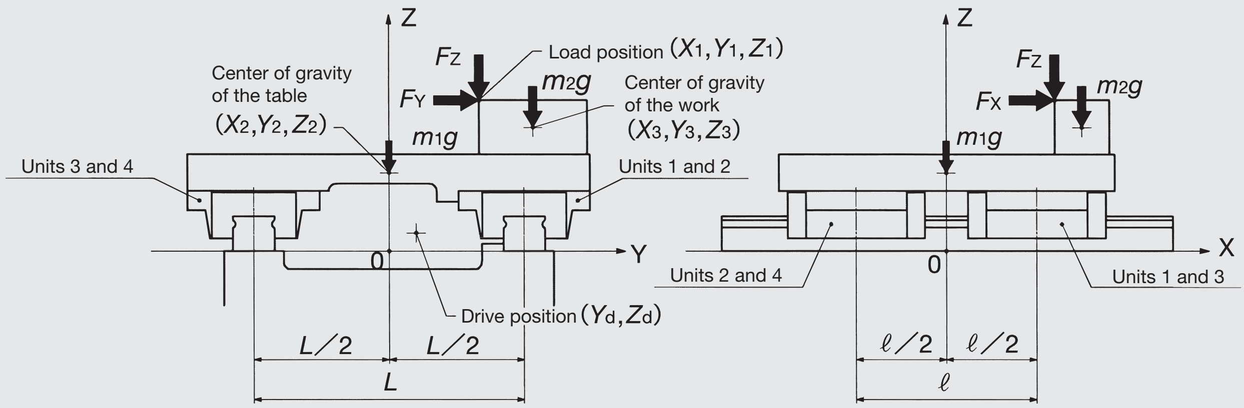
Table 11 Mean equivalent load for fluctuating load

Example		Calculation formula
① Step load		$P_m = \sqrt[p]{\frac{1}{L}(P_1^p L_1+P_2^p L_2+\cdots+P_n^p L_n)}$ where, L_1 : Total traveling distance under load P_1, m L_2 : Total traveling distance under load P_2, m L_n : Total traveling distance under load P_n, m
② Monotonously changing load		$P_m \fallingdotseq \frac{1}{3}(2P_{max}+P_{min})$ where, P_{max} : Maximum value of fluctuating load, N P_{min} : Minimum value of fluctuating load, N

Examples of Load and Life Calculation

Example 1

Model No.		LWE 25 C2 R640 H
Basic dynamic load rating	C	= 18100 N
Basic static load rating	C_0	= 21100 N
Applied load	F_{X1}	= 1000 N
	F_{Y1}	= 2000 N
	F_{Z1}	= 1000 N
Load position	X_1	= 60 mm
	Y_1	= 50 mm
	Z_1	= 83 mm
Table mass	m_1	= 10 kg
Position of the center of gravity of table	X_2	= 0 mm
	Y_2	= 0 mm
	Z_2	= 43 mm
Work mass	m_2	= 10 kg
Position of the center of gravity of work	X_3	= 75 mm
	Y_3	= 80 mm
	Z_3	= 68 mm
Number of strokes per minute	n_1	= 5 cpm
Stroke length	S	= 100 mm
Distance between the slide units	ℓ	= 100 mm
Distance between the track rails	L	= 150 mm
Drive position	Y_d	= 150 mm
	Z_d	= 10 mm



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

❶Load 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.

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

$$= 2000 \times 83 + 1000 \times 50 + 10 \times 9.8 \times 0 + 10 \times 9.8 \times 80 \fallingdotseq 224000$$

$$M_p = \Sigma \{F_X (Z - Z_d)\} + \Sigma (F_Z X) = F_{X1} (Z_1 - Z_d) + F_{Z1} X_1 + m_1 g X_2 + m_2 g X_3$$

$$= 1000 \times (83 - 10) + 1000 \times 60 + 10 \times 9.8 \times 0 + 10 \times 9.8 \times 75 \fallingdotseq 140000$$

$$M_y = -\Sigma \{F_X (Y - Y_d)\} + \Sigma (F_Y X) = -F_{X1} (Y_1 - Y_d) + F_{Y1} X_1$$

$$= -1000 \times (50 - 150) + 2000 \times 60 = 220000$$

where, M_r : Moment in the rolling direction, N・mm
M_p : Moment in the pitching direction, N・mm
M_y : Moment in the yawing direction, N・mm

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

$$F_{r1}=\frac{\Sigma F_Z}{4}+\frac{M_r}{2L}+\frac{M_p}{2\ell}=\frac{F_{Z1}+m_1g+m_2g}{4}+\frac{M_r}{2L}+\frac{M_p}{2\ell}$$

$$=\frac{1000+10\times9.8+10\times9.8}{4}+\frac{224000}{2\times150}+\frac{140000}{2\times100}\fallingdotseq1750$$

$$F_{r2}=\frac{\Sigma F_Z}{4}+\frac{M_r}{2L}-\frac{M_p}{2\ell}=\frac{F_{Z1}+m_1g+m_2g}{4}+\frac{M_r}{2L}-\frac{M_p}{2\ell}\fallingdotseq346$$

$$F_{r3}=\frac{\Sigma F_Z}{4}-\frac{M_r}{2L}+\frac{M_p}{2\ell}=\frac{F_{Z1}+m_1g+m_2g}{4}-\frac{M_r}{2L}+\frac{M_p}{2\ell}\fallingdotseq252$$

$$F_{r4}=\frac{\Sigma F_Z}{4}-\frac{M_r}{2L}-\frac{M_p}{2\ell}=\frac{F_{Z1}+m_1g+m_2g}{4}-\frac{M_r}{2L}-\frac{M_p}{2\ell}\fallingdotseq-1150$$

$$F_{a1}=F_{a3}=\frac{\Sigma F_Y}{4}+\frac{M_y}{2\ell}=\frac{F_{Y1}}{4}+\frac{M_y}{2\ell}$$

$$=\frac{2000}{4}+\frac{220000}{2\times100}=1600$$

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

❷Basic 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.

$F_{re1}=k_r|F_{r1}|=1\times1750=1750$

$F_{re2}=k_r|F_{r2}|=1\times346=346$

$F_{re3}=k_r|F_{r3}|=1\times252=252$

$F_{re4}=k_r|F_{r4}|=1\times1150=1150$

$F_{ae1}=k_a|F_{a1}|=1\times1600=1600$

$F_{ae2}=k_a|F_{a2}|=1\times600=600$

$F_{ae3}=k_a|F_{a3}|=1\times1600=1600$

$F_{ae4}=k_a|F_{a4}|=1\times600=600$

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.

$P_1=X|F_{re1}|+Y|F_{ae1}|=1\times1750+0.6\times1600=2710$

$P_2=X|F_{re2}|+Y|F_{ae2}|=0.6\times346+1\times600\fallingdotseq808$

$P_3=X|F_{re3}|+Y|F_{ae3}|=0.6\times252+1\times1600\fallingdotseq1750$

$P_4=X|F_{re4}|+Y|F_{ae4}|=1\times1150+0.6\times600=1510$

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.

$$L_1 = 50\left(\frac{C}{f_W P_1}\right)^3 = 50\times\left(\frac{18100}{1.5\times2710}\right)^3 \fallingdotseq 4410$$

$$L_{h1} = \frac{10^6 L_1}{2S n_1\times60} = \frac{10^6\times4410}{2\times100\times5\times60} \fallingdotseq 73500$$

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

❸Static safety factor

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

$$P_{01} = k_{0r}|F_{r1}| + k_{0a}|F_{a1}| = 1\times1750 + 1\times1600 = 3350$$

$$P_{02} = k_{0r}|F_{r2}| + k_{0a}|F_{a2}| = 1\times346 + 1\times600 = 946$$

$$P_{03} = k_{0r}|F_{r3}| + k_{0a}|F_{a3}| = 1\times252 + 1\times1600 = 1852$$

$$P_{04} = k_{0r}|F_{r4}| + k_{0a}|F_{a4}| = 1\times1150 + 1\times600 = 1750$$

where, k_{0r}, k_{0a} : 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.

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

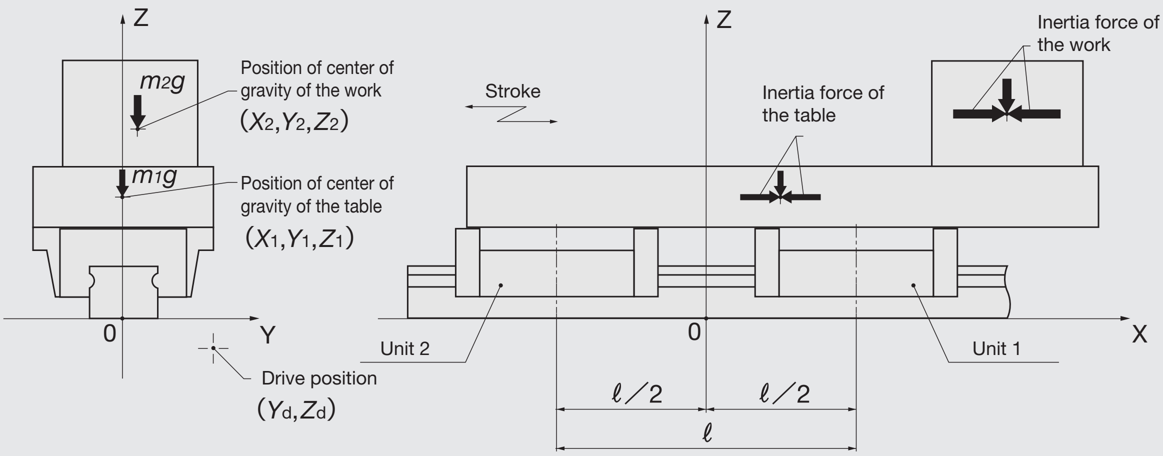
As the result of the above calculation, the static safety factor is about 6.3.

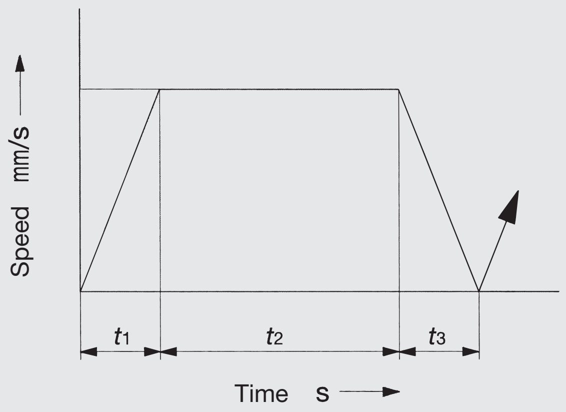
Example 2

Model No. ························ LWH 45 C2 R1050 B H

Basic dynamic load rating ······	C	= 74600 N
Basic static load rating ··········	C_0	= 80200 N
Static moment rating in the T_0 direction ··········	T_0	= 1610 N·m
Table mass ························	m_1	= 100 kg
Position of the center of gravity of table ·········	X_1	= 50 mm
·········	Y_1	= 0 mm
·········	Z_1	= 80 mm
Work mass ························	m_2	= 1000 kg
Position of the center of gravity of work ·········	X_2	= 200 mm
·········	Y_2	= 10 mm
·········	Z_2	= 130 mm

Distance between the slide units ················	ℓ	= 200 mm
Stroke length ······················	S	= 500 mm
Number of strokes per minute ···	n_1	= 6 cpm
Maximum travel speed ··········	V	= 100 mm/s
Time spent for acceleration ····	t_1	= 0.1 s
Time spent during constant speed motion ····	t_2	= 4.9 s
Time spent for deceleration ····	t_3	= 0.1 s
Drive position ······················	Y_d	= 60 mm
······················	Z_d	= −20 mm





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

❶Load 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

$$M_r = \Sigma (F_Y Z) + \Sigma (F_Z Y) = m_1 g Y_1 + m_2 g Y_2 = 100 \times 9.8 \times 0 + 1000 \times 9.8 \times 10 \fallingdotseq 98000$$

$$M_p = \Sigma \{F_X (Z - Z_d)\} + \Sigma (F_Z X)$$

$$= m_1 \frac{V}{1000 \times t_1} (Z_1 - Z_d) + m_2 \frac{V}{1000 \times t_1} (Z_2 - Z_d) + m_1 g X_1 + m_2 g X_2$$

$$= 100 \times \frac{100}{1000 \times 0.1} \times (80 + 20) + 1000 \times \frac{100}{1000 \times 0.1} \times (130 + 20)$$

$$+ 100 \times 9.8 \times 50 + 1000 \times 9.8 \times 200 \fallingdotseq 2169000$$

$$M_y = - \Sigma \{F_X (Y - Y_d)\} + \Sigma (F_Y X)$$

$$= - m_1 \frac{V_{max}}{1000 \times t_1} (Y_1 - Y_d) - m_2 \frac{V_{max}}{1000 \times t_2} (Y_2 - Y_d)$$

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

・During constant speed motion

$$M_r = m_1 g Y_1 + m_2 g Y_2 \fallingdotseq 98000$$
$$M_p = m_1 g X_1 + m_2 g X_2 \fallingdotseq 2010000$$
$$M_y = 0$$

・During deceleration at the end of motion

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

$$M_p = - m_1 \frac{V_{max}}{t_1} (Z_1 - Z_d) - m_2 \frac{V_{max}}{t_1} (Z_2 - Z_d) + m_1 g X_1 + m_2 g X_2 \fallingdotseq 1850000$$

$$M_y = m_1 \frac{V_{max}}{t_1} (Y_1 - Y_d) + m_2 \frac{V_{max}}{t_2} (Y_2 - Y_d) \fallingdotseq -56000$$

where, M_r : Moment in the rolling direction, N・mm
M_p : Moment in the pitching direction, N・mm
M_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

$$F_{r1} = \frac{\Sigma F_Z}{2} + \frac{M_p}{\ell} = \frac{m_1 g + m_2 g}{2} + \frac{M_p}{\ell} = \frac{100 \times 9.8 + 1000 \times 9.8}{2} + \frac{2169000}{200} \fallingdotseq 16200$$

$$F_{r2} = \frac{\Sigma F_Z}{2} - \frac{M_p}{\ell} = \frac{m_1 g + m_2 g}{2} - \frac{M_p}{\ell} \fallingdotseq -5460$$

$$F_{a1} = \frac{\Sigma F_Y}{2} + \frac{M_y}{\ell} = 280$$

$$F_{a2} = \frac{\Sigma F_Y}{2} - \frac{M_y}{\ell} = -280$$

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

・During constant speed motion

$$F_{r1} = \frac{100\times9.8+1000\times9.8}{2}+\frac{2010000}{200}\fallingdotseq15400$$

$$F_{r2} \fallingdotseq -4660$$

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

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

・During deceleration at the end of motion

$$F_{r1} = \frac{100\times9.8+1000\times9.8}{2}+\frac{1850000}{200}\fallingdotseq14600$$

$$F_{r2} \fallingdotseq -3860$$

$$F_{a1} \fallingdotseq -280$$

$$F_{a2} \fallingdotseq 280$$

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

❷Basic 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

$$F_{re1} = k_r\left|F_{r1}\right|+\frac{C_0}{T_0}\left|M_{01}\right|=1\times16200+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq18600$$

$$F_{re2} = 1\times5460+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq7900$$

$$F_{ae1} = k_a\left|F_{a1}\right| = 1.28\times280\fallingdotseq358$$

$$F_{ae2} = 1.28\times280\fallingdotseq358$$

$$P_1 = X\,F_{re1}+Y\,F_{ae1} = 1\times18600+0.6\times358\fallingdotseq18800$$

$$P_2 = X\,F_{re2}+Y\,F_{ae2} = 1\times7900+0.6\times358\fallingdotseq8110$$

・During constant speed motion

$$F_{re1} = 1\times15400+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq17800$$

$$F_{re2} = 1\times4660+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq7100$$

$$F_{ae1} = 0$$

$$F_{ae2} = 0$$

$$P_1 = 17800$$

$$P_2 = 7100$$

・During deceleration at the end of motion

$$F_{re1} = 1\times14600+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq17000$$

$$F_{re2} = 1\times3860+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq6300$$

$$F_{ae1} = 1.28\times280\fallingdotseq358$$

$$F_{ae2} = 1.28\times280\fallingdotseq358$$

$$P_1 = 1\times17000+0.6\times358\fallingdotseq17200$$

$$P_2 = 1\times6300+0.6\times358\fallingdotseq6510$$

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

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

$$=\left\{\frac{1}{500}\times\left(18800^3\times\frac{100\times0.1}{2}+17800^3\times100\times4.9+17200^3\times\frac{100\times0.1}{2}\right)\right\}^{1/3}\fallingdotseq17800$$

$$P_{m2}=\left\{\frac{1}{500}\times\left(8110^3\times\frac{100\times0.1}{2}+7100^3\times100\times4.9+6510^3\times\frac{100\times0.1}{2}\right)\right\}^{1/3}\fallingdotseq7110$$

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.

$$L_1=50\left(\frac{C}{f_W\,P_{m1}}\right)^3=50\left(\frac{74600}{1.5\times17800}\right)^3\fallingdotseq1090$$

$$L_{h1}=\frac{10^6\,L_1}{2S\ n_1\times60}=\frac{10^6\times1090}{2\times500\times6\times60}\fallingdotseq3030$$

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

❸Static 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

$$P_{01}=k_{0r}\left|F_{r1}\right|+k_{0a}\left|F_{a1}\right|+\frac{C_0}{T_0}\left|M_{01}\right|=1\times16200+1.28\times280+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq19000$$

$$P_{02}=k_{0r}\left|F_{r2}\right|+k_{0a}\left|F_{a2}\right|+\frac{C_0}{T_0}\left|M_{02}\right|=1.19\times5460+1.28\times280+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq9300$$

・During constant speed motion

$$P_{01}=1\times15400+1.28\times0+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq19000$$

$$P_{02}=1.19\times4660+1.28\times0+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq7990$$

・During deceleration at the end of motion

$$P_{01}=1\times14600+1.28\times280+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq17400$$

$$P_{02}=1.19\times3860+1.28\times280+\frac{80200}{1610}\times\frac{49000}{1000}\fallingdotseq7390$$

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.

$$f_s=\frac{C_0}{P_{01}}=\frac{80200}{19000}\fallingdotseq4.2$$

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

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.)

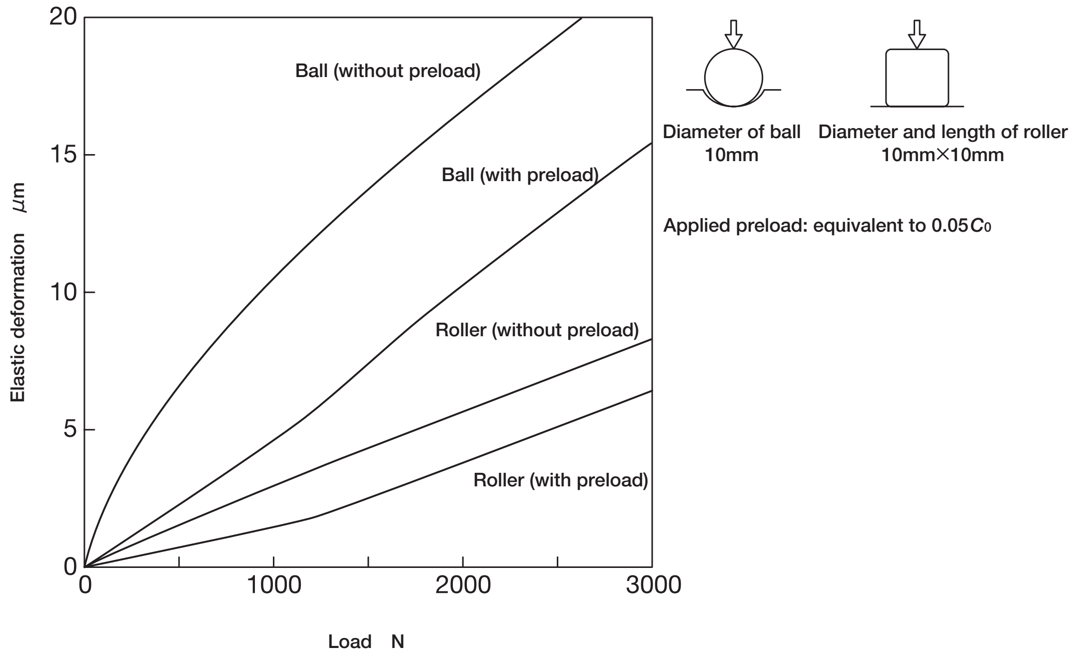


Fig. 4 Effect of preload on elastic deformation due to load

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 IKO for further information.
Linear Bushing and Stroke Rotary Bushing should never be given a large amount of preload.

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 speed.
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.

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

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.

Table 12 Friction coefficient

Series	Dynamic friction coefficient μ (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
Roller Way	0.0020～0.0040
Flat Roller Cage	0.0010～0.0030

Note(1) : These friction coefficients do not include the seal friction.

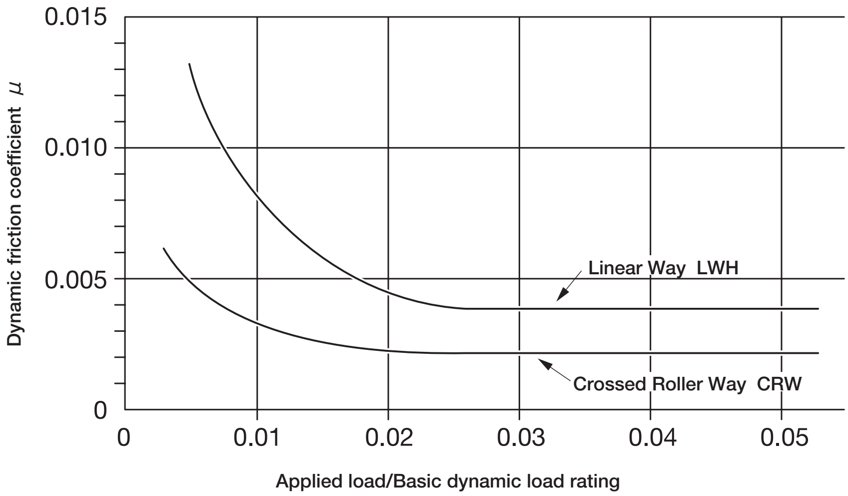


Fig. 5 Relationship between load and friction coefficient

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 for10 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.

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.

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
IKO 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
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 mm^2/s is used. For linear motion rolling guides under light loads at high speeds, lubrication oil with a viscosity of about 13 mm^2/s is used.

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. 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.

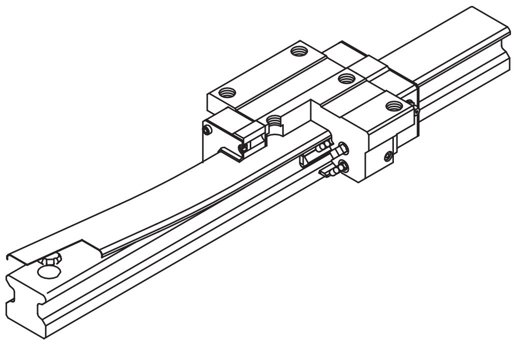


Fig. 6 Rail cover plate

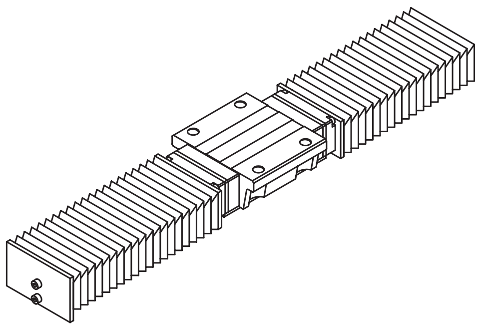


Fig. 7 Bellows

Linear Way
Linear Roller Way

LINEAR WAY
LINEAR ROLLER WAY

Features of Linear Way and Linear Roller Way

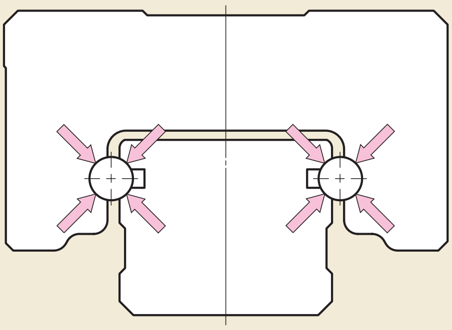
IKO Linear Way and Linear Roller Way are linear motion rolling guides which achieve endless linear motion of a slide unit along a track rail by re-circulating rolling elements inside the slide unit. Slide units and track rails are fixed on machines and equipment with mounting bolts, and a highly accurate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

1 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.

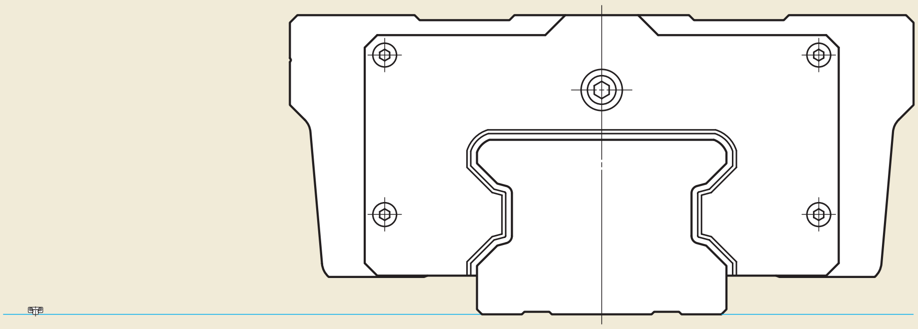
2 Large load capacity in any directions

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.



3 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 2 mm to 100 mm.



LWL2

C	211	N
C_0	381	N

LRXG100

C	498 000	N
C_0	821 000	N

4 High rigidity for achieving compact design of machines and equipment

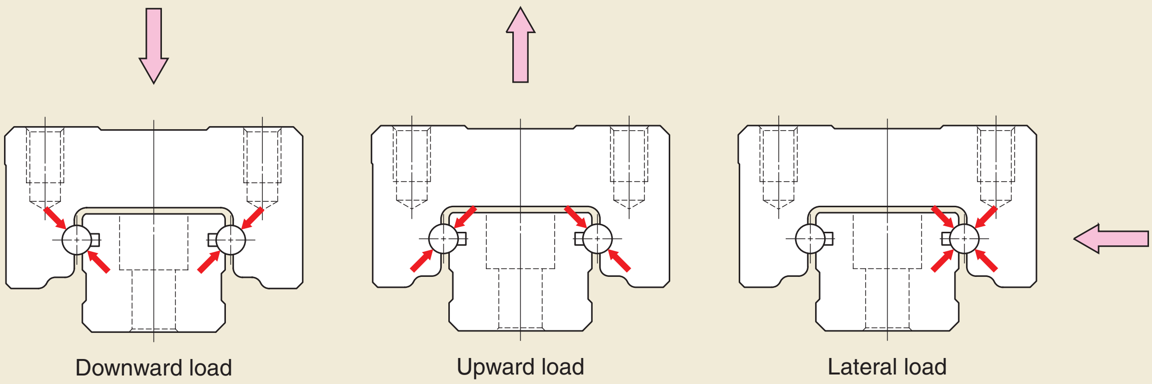
Because the track rail is firmly fixed on the mating mounting surface over its total length, high rigidity can be obtained in comparison with shaft type guides which may be affected by shaft bending.

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

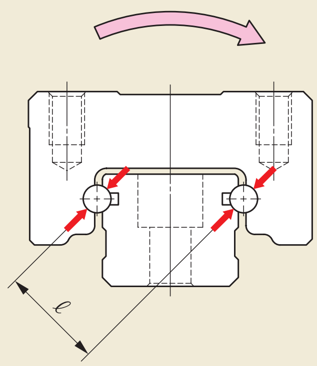
The simple two-row raceway design makes it possible to incorporate large diameter steel balls for high load ratings. Loads in any directions can almost uniformly be received.



Load acting on rolling elements in each loading direction

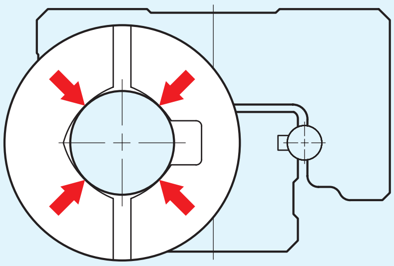
2 Excellent strength against moment load and complex load

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.



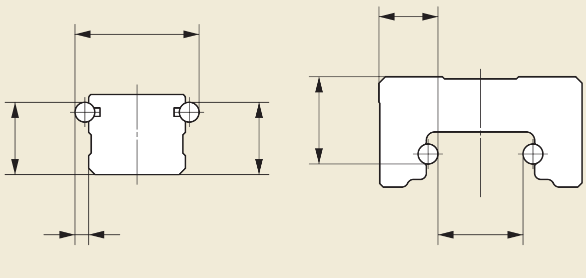
When T_0 moment is applied

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.



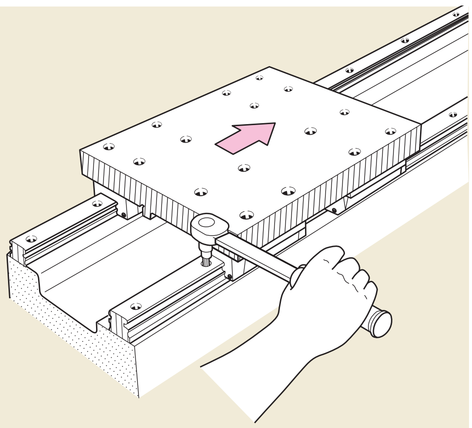
Measurement of raceway accuracy

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.

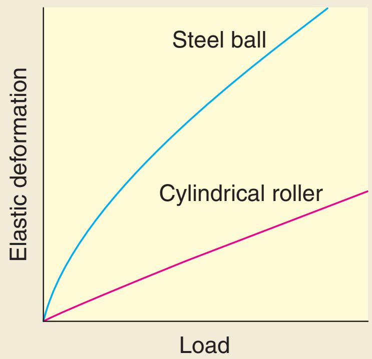


Features of Linear Roller Way

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.

1 Super high rigidity

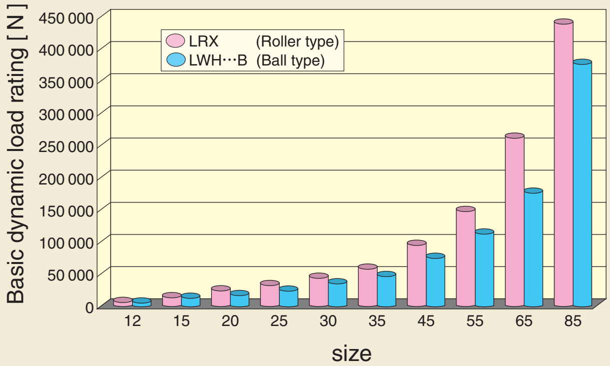
Very high rigidity is achieved owing to the excellent elastic deformation characteristics of cylindrical rollers which give smaller elastic deformation under load as compared with steel balls, and, in addition, to a large number of cylindrical rollers incorporated in the slide unit.



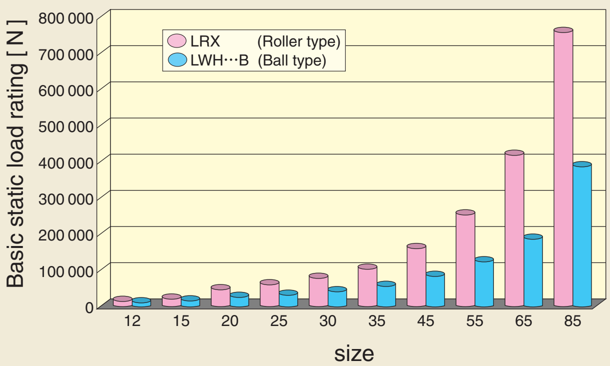
Comparison of rigidity between cylindrical roller and steel ball

2 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.



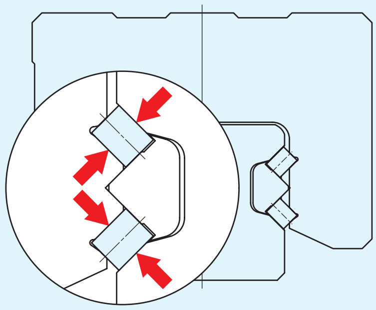
Comparison of basic dynamic load ratings



Comparison of basic static load ratings

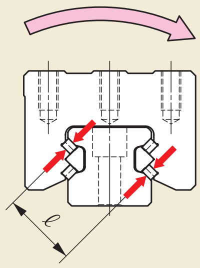
Remark : The calculation formulas of rating life are different for roller type and ball type. Generally, if the values of basic dynamic load rating are the same, the life of the roller type is longer.

Parallel arrangement



3 Excellent load balance and moment load capacity

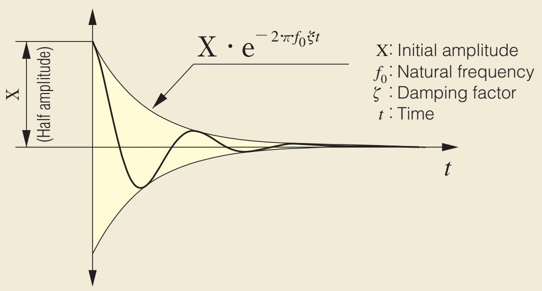
Cylindrical rollers are arranged in a well-balanced form so that they can uniformly withstand loads in all directions. In addition, rows are arranged in such a way that the moment arm distance ℓ between the loading points is large under T_0 moment. A high moment load capacity can be obtained.

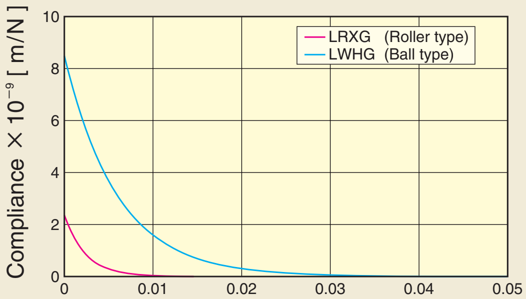


When T_0 moment is applied

4 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.





Vibration damping curve

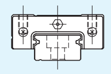
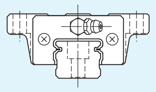
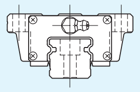
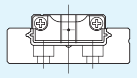
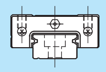
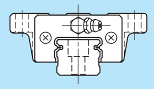
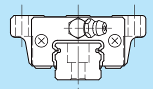
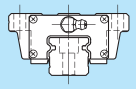
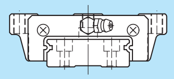
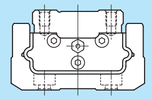
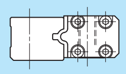
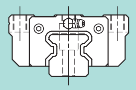
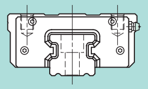
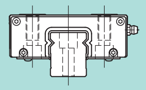
5 High running performance

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

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

Series of Linear Way and Linear Roller Way

Linear Way and Linear Roller Way

	Series			Reference page
C-Sleeve Linear Way	*Miniature Maintenance Free Linear Way* **C-Sleeve Linear Way ML**		C-Sleeve Linear Way ML is a linear motion rolling guide, incorporating the C-Sleeve 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.	A-2～
	Compact Maintenance Free Linear Way **C-Sleeve Linear Way ME**		C-Sleeve Linear Way ME is a linear motion rolling guide, incorporating the C-Sleeve 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.	A-18～
	High Rigidity Maintenance Free Linear Way **C-Sleeve Linear Way MH**		C-Sleeve Linear Way MH is a linear motion rolling guide, incorporating the C-Sleeve 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.	A-34～
	U-shaped Maintenance Free Linear Way **C-Sleeve Linear Way MUL**		C-Sleeve Linear Way MUL is a linear motion rolling guide, incorporating the C-Sleeve 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.	A-52～
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 2mm and upward are made available owing to the simple and compact design of IKO Linear Way.	B-2～
	Compact Type Linear Way **Linear Way E**		Lower, narrower and shorter. Compactness has been pursued in every dimension.	B-28～
	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.	B-54～
	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.	B-72～
	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.	B-108～
	U-shaped Track Rail Linear Way **Linear Way U**		By adopting a U-shaped track rail, rigidity against moment and torsion is greatly improved.	B-128～
Linear Way Module	**Linear Way LM** **Linear Way M** **Linear Roller Way 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.	B-140～
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.	C-2～
	Linear Roller Way X			C-34～
	Linear Roller Way H			C-46～

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

Maintenance Free Linear Motion Rolling Guide Series

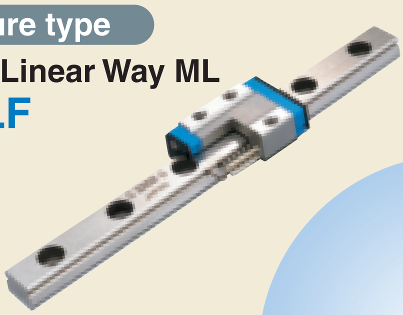
This Maintenance Free series can reduce the man-hours for troublesome lubrication control and achieve long-term maintenance free operations. In Maintenance Free series, Miniature type C-Sleeve Linear Way ML, Compact type C-Sleeve Linear Way ME, High Rigidity type C-Sleeve Linear Way MH, U-shaped track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

Wide variation of C-Sleeve Linear Way

Miniature type

C-Sleeve Linear Way ML

ML・MLF

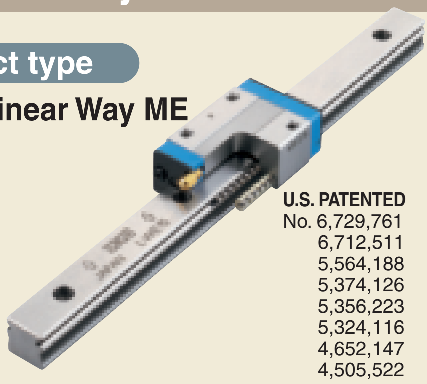


U.S. PATENTED
No. 6,729,761
6,712,511
5,435,649
5,289,779
5,250,126
4,652,147
4,505,522

Compact type

C-Sleeve Linear Way ME

ME



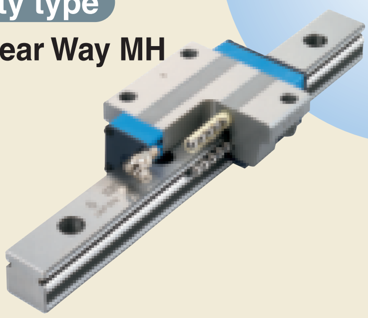
U.S. PATENTED
No. 6,729,761
6,712,511
5,564,188
5,374,126
5,356,223
5,324,116
4,652,147
4,505,522

IKO C-Sleeve®

High Rigidity type

C-Sleeve Linear Way MH

MH

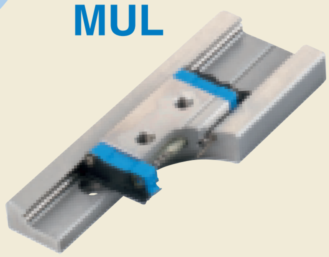


U.S. PATENTED
No. 6,729,761
6,712,511
5,622,433
5,564,188
5,374,126
4,652,147
4,610,488
4,505,522

U-shaped track rail type

C-Sleeve Linear Way MUL

MUL



U.S. PATENTED
No. 6,729,761
6,712,511
6,309,107
5,435,649
5,289,779
5,250,126
4,652,147
4,505,522

Long-term maintenance free series

Linear Way & Linear Roller Way with Capillary plates

The Capillary plate is assembled inside the end seal of the slide unit or external cylinder and makes uniform contact with the raceways of track rail or spline shaft.
When the slide unit or external cylinder is stroked, lubrication oil impregnated in the Capillary plate is continuously fed to the raceways, keeping stable lubrication for long periods of time. So, long-term maintenance free operations can be achieved.
The Capillary plate is applicable to Linear Way, Linear Roller Way and Linear Ball Spline.

IKO C-Plate
Capillary Plate

U.S. PATENTED
No. 6,190,046
No. 6,176,617
No. 6,082,899
No. 5,967,667

Feature of C-Sleeve Linear Way

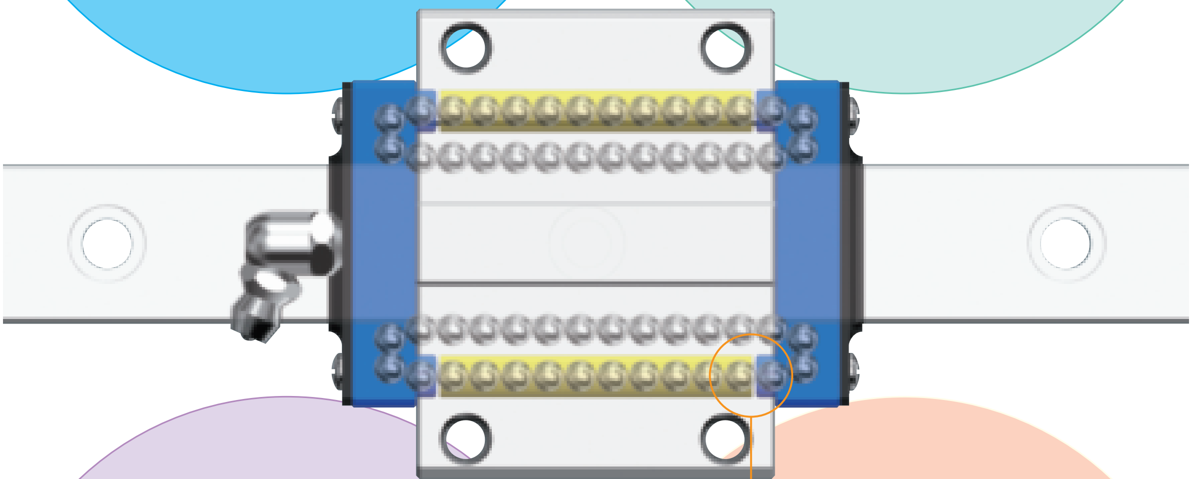
Maintenance free for 20,000km or 5 years
Interchangeable is newly available.

Maintenance Free

Ability of lubrication is maintained for long term, the cost of lubrication management and system can be reduced.

Ecology

C-Sleeve contributes to global environment protection because the amount of lubricant can be minimized.



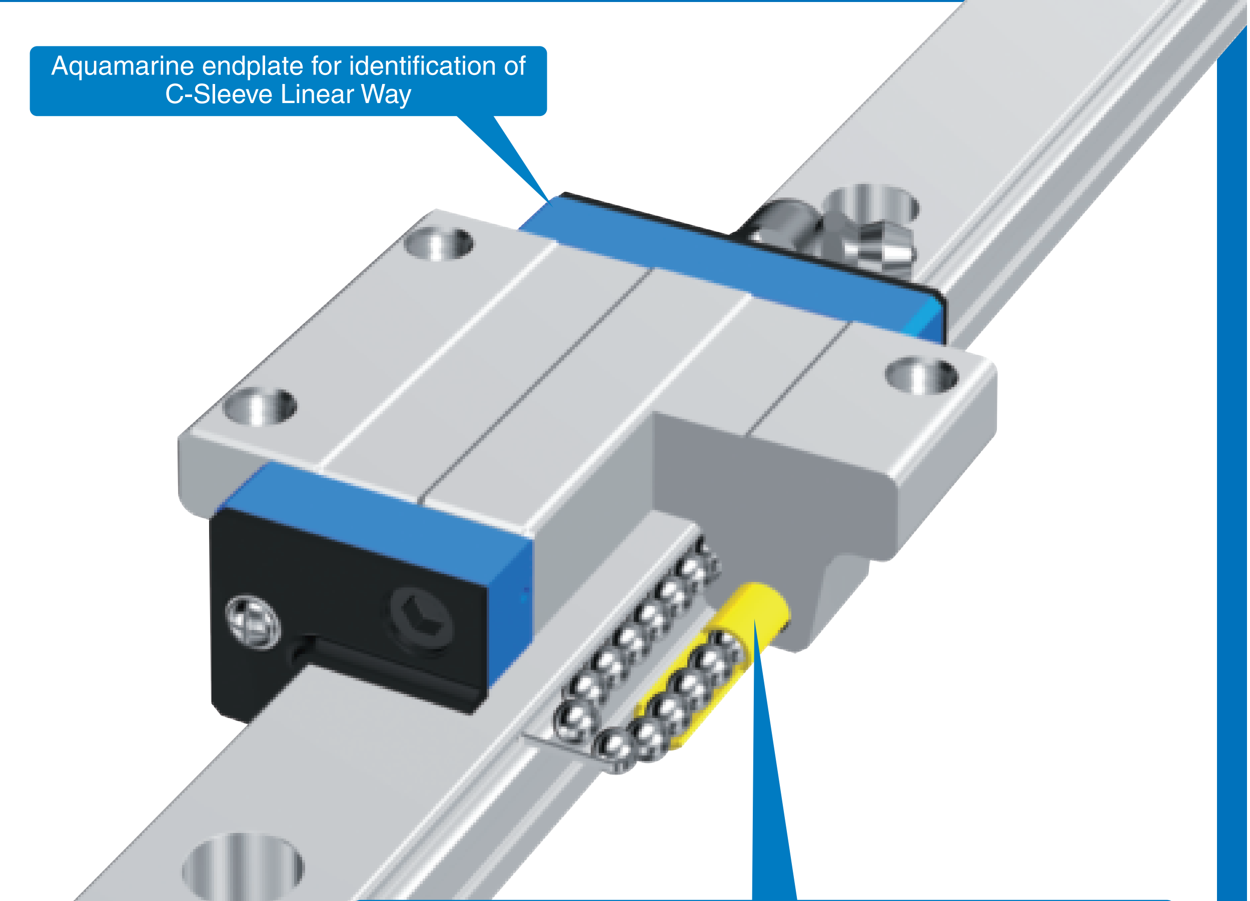
Compactness

No increase in carriage length unlike a bolt-on external lubrication parts. No loss of available stroke length when replacing standard unit.

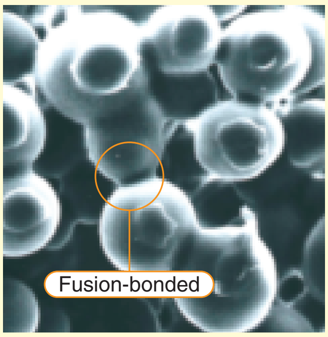
Smoothness

Light and smooth running is achieved by the improvement of design. It is designed not to have contact to track rail and this has brought a very smooth friction.

Structure of C-Sleeve Linear Way

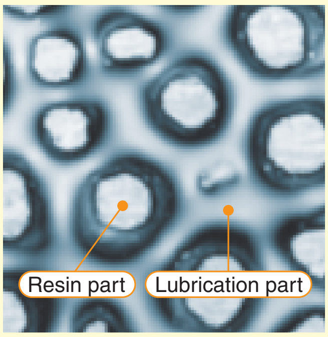


Capillary system has been developed is for new type lubrication. It is a porous resin sleeve or plate with steel backing formed by sintering fine resin powder and impregnating a large amount of lubrication oil in its open pores. Capillary system always supplies proper amount of lubrication oil to the balls and lubrication condition of the raceway can be kept well for long period of time.



Before impregnating oil

Resin particles are strongly fusion-bonded.

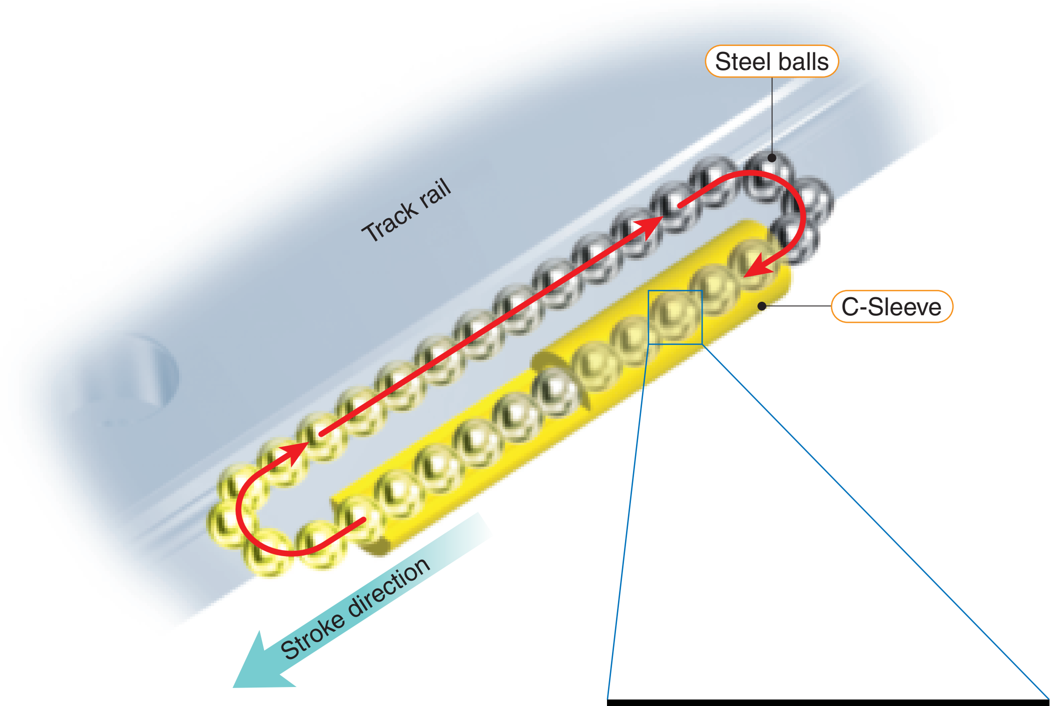


After impregnating oil

(Capillary lubrication structure)

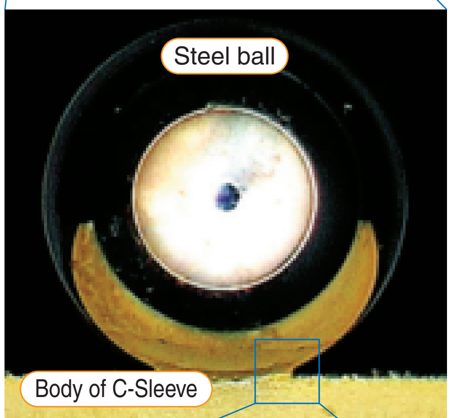
Lubricant is retained in cavities amongst resin particles.

C-Sleeve lubrication mechanism



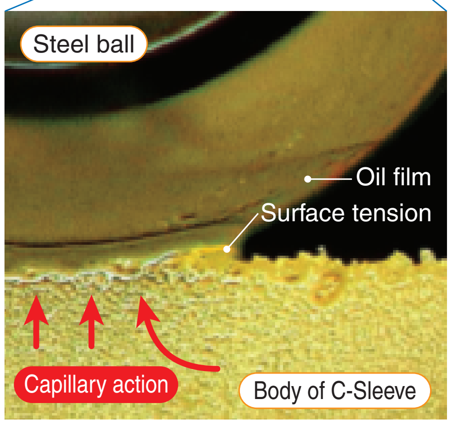
Lubricant is distributed by the circulation of the steel balls.

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.



Lubricant is deposited directly to the surface of the steel balls.

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



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 IKO 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 re-circulating 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 (☆) in the table of dimensions of each series.

C-Sleeve Linear Way ML
(page **A-2** to page **A-17**)
6 types and 37 models

C-Sleeve Linear Way ME
(page **A-18** to page **A-33**)
9 types and 27 models

C-Sleeve Linear Way MH
(page **A-34** to page **A-51**)
8 types and 18 models

Linear Way L
(page **B-2** to page **B-27**)
8 types and 45 models

Linear Way E
(page **B-28** to page **B-53**)
18 types and 81 models

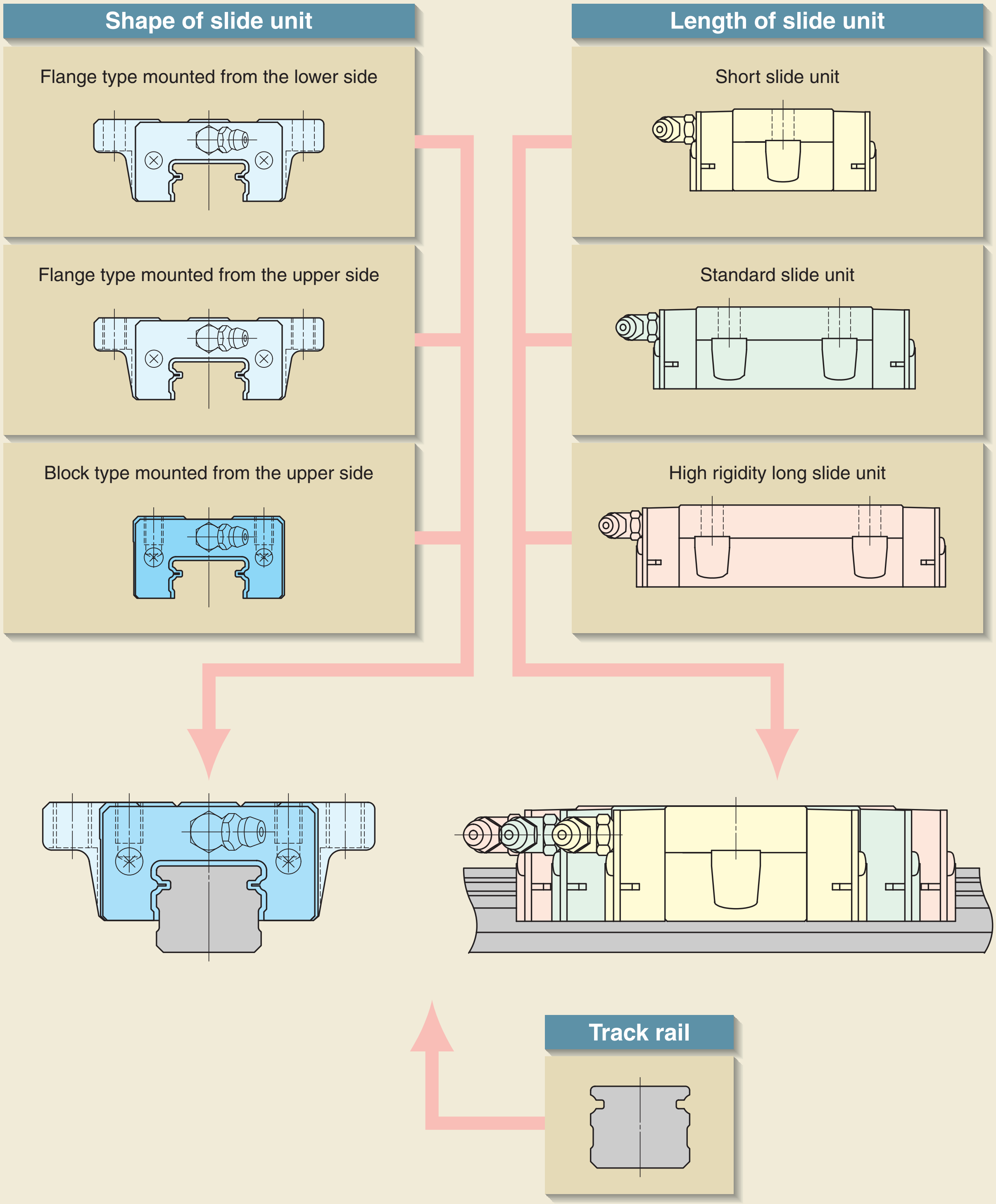
Linear Way H
(page **B-72** to page **B-107**)
14 types and 76 models

Linear Way F
(page **B-108** to page **B-127**)
4 types and 12 models

Linear Roller Way Super X
(page **C-2** to page **C-33**)
12 types and 84 models

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])



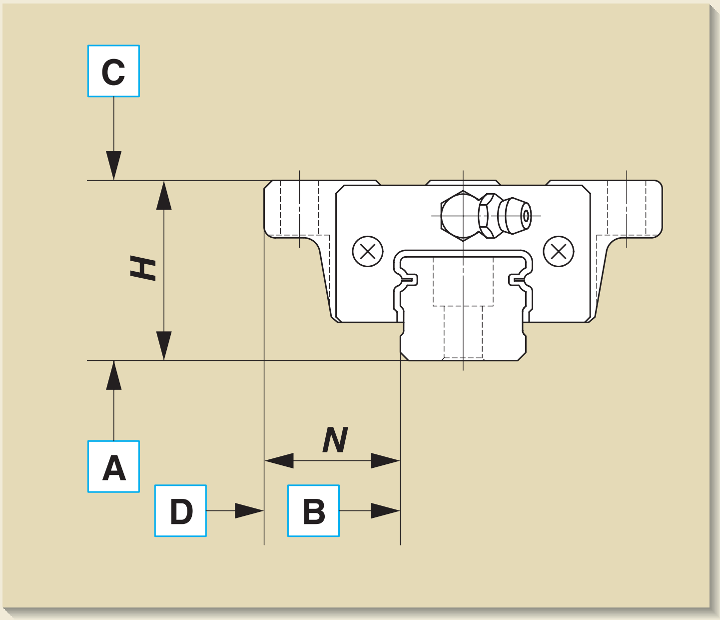
Note([1]) : When butt-jointing track rails are required, place an order specifying "butt-jointing interchangeable track rail" of special specification.

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.

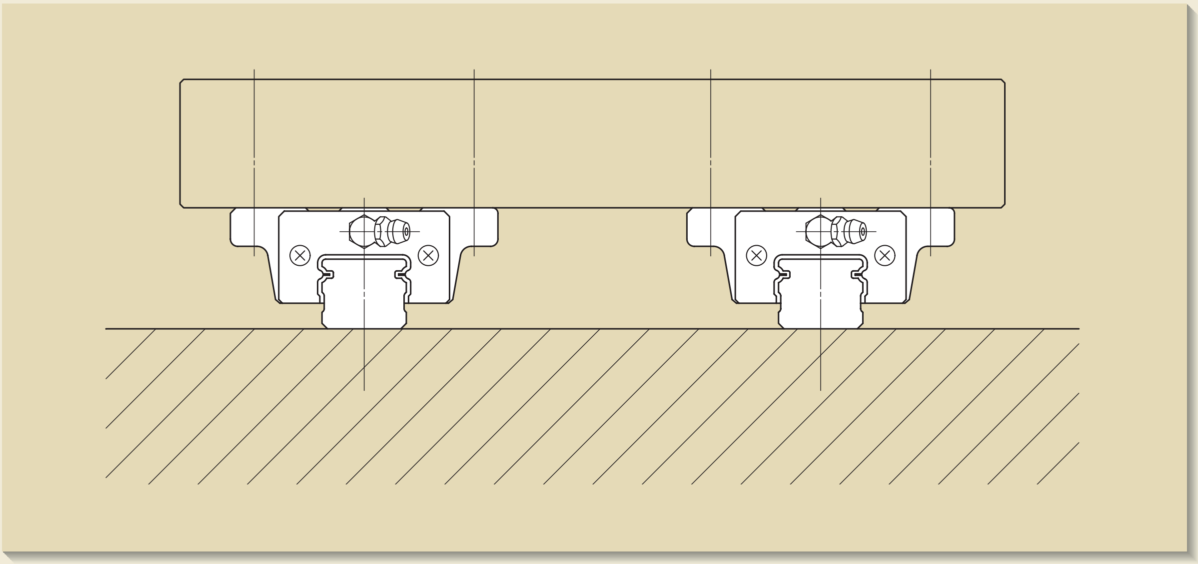
Standard accuracy specifications : up to Precision class

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

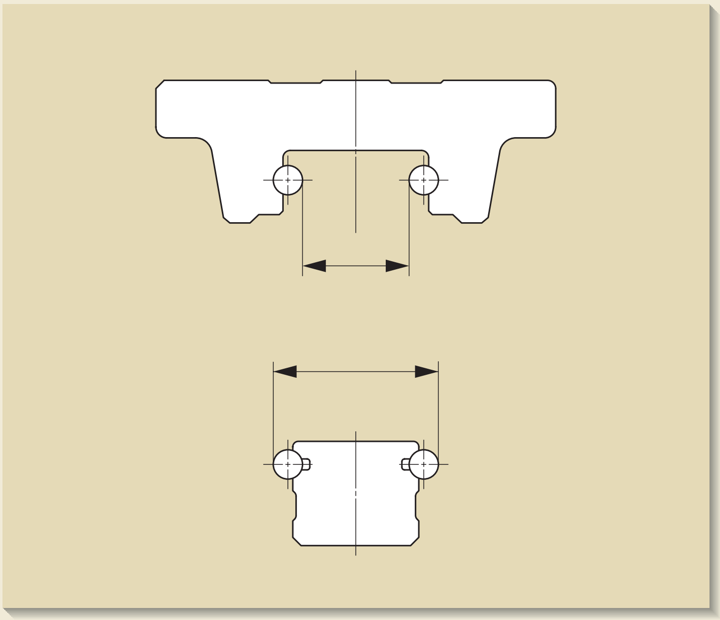
The dimensional variation of H among multiple sets is specified.



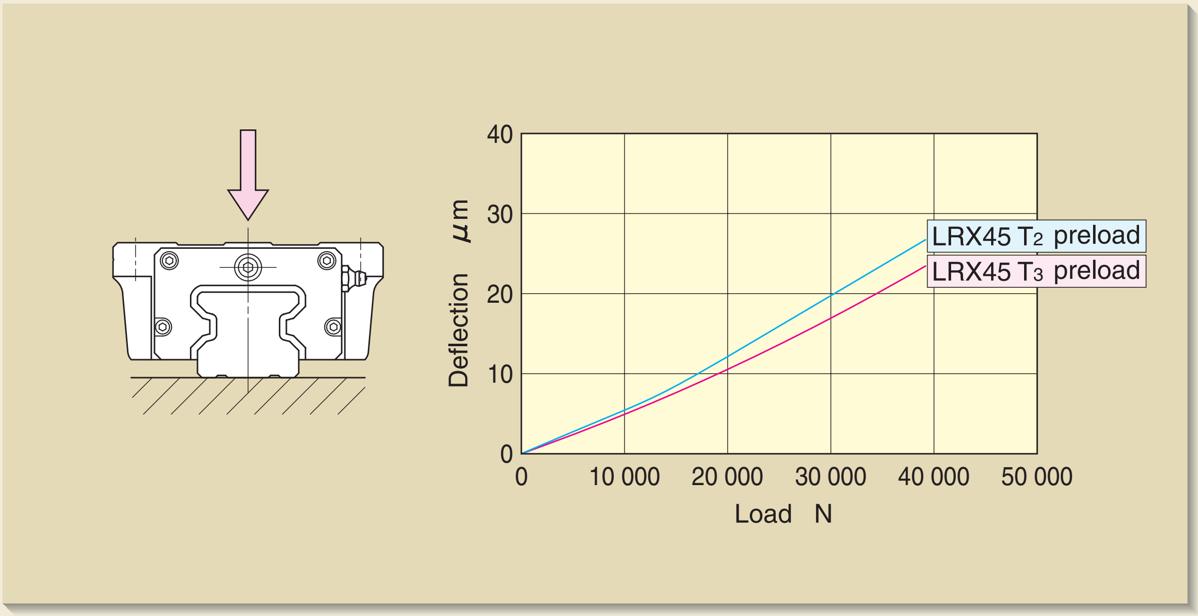
Interchangeable with preload

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

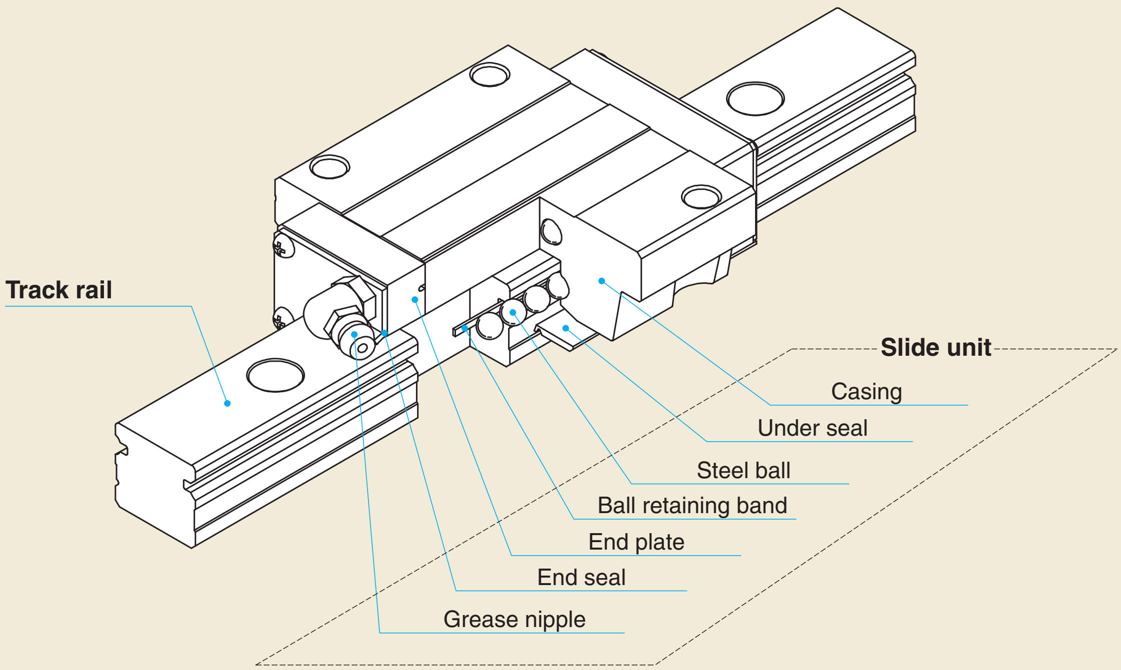


Slide units with the same preload symbol are interchangeable for achieving high rigidity



Stainless Series

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.



Material

Part	Material
Track rail	Martensitic stainless steel
Casing	Martensitic stainless steel
Steel ball	Martensitic stainless steel
Ball retaining band	Austenitic stainless steel
End plate	Functional synthetic resin
End seal	Austenitic stainless steel + Synthetic rubber
Grease nipple	Brass

	Series		Reference page
C-Sleeve Linear Way	*Miniature Maintenance Free Linear Way* **C-Sleeve Linear Way ML**	This Linear Way incorporates the C-Sleeve as a component part for lubrication in Linear Way L. The lubricant contained in the C-Sleeve achieves long-term maintenance free operations, so the man-hours for troublesome lubrication control can be reduced.	A-2～
C-Sleeve Linear Way	*U-shaped Maintenance Free Linear Way* **C-Sleeve Linear Way MUL**	This Linear Way incorporates the C-Sleeve as a component part for lubrication in Linear Way UL. The lubricant contained in the C-Sleeve achieves long-term maintenance free operations, so the man-hours for troublesome lubrication control can be reduced.	A-52～
Linear Way	*Miniature Type Linear Way* **Linear Way L**	This is the smallest in the IKO Linear Ways. This product is suitable for use in machines or equipment in clean rooms. Models with various track rail widths from as small as 2 mm are lined up.	B-2～
Linear Way	*Compact Type Linear Way* **Linear Way E**	This is a compact type in comparison with Linear Way H and can be used for general purpose applications.	B-28～
Linear Way	*High Rigidity Type Linear Way* **Linear Way H**	This type features large load ratings and high rigidity.	B-72～
Linear Way	*Wide Rail Type Linear Way* **Linear Way F**	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.	B-108～
Linear Way	*U-shaped Track Rail Linear Way* **Linear Way U**	By adopting a U-shaped track rail, rigidity against moment and torsion is greatly improved.	B-128～
Linear Roller Way	**Linear Roller Way Super X**	For its rolling elements, this product employs cylindrical rollers, which provide very high rigidity and high accuracy.	C-2～

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

IKO Low Dust Generation Grease for Clean Environment CG2 /YCG

IKO 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 wall as high lubricating and rust preventing performance.

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 necessary.
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

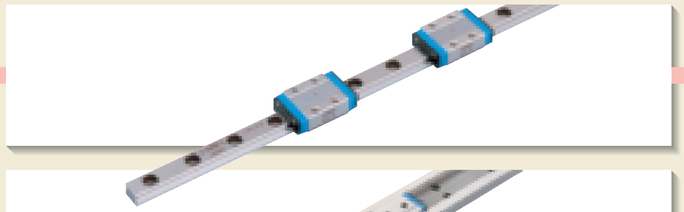
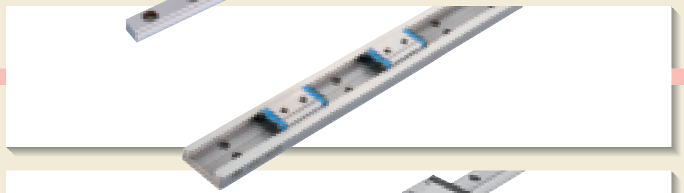
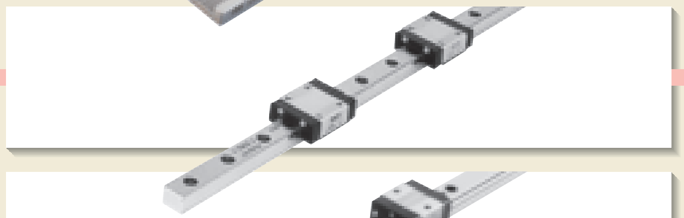
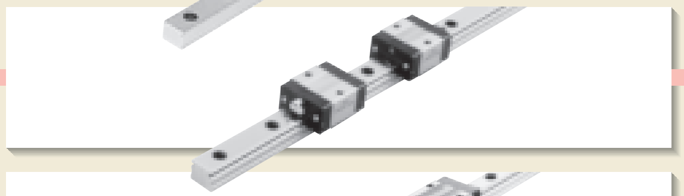
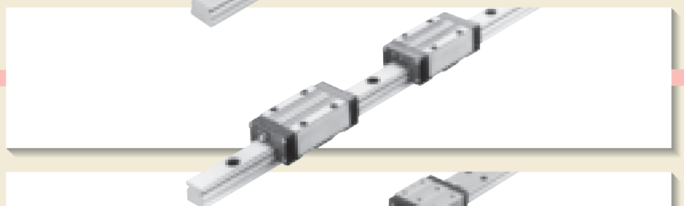
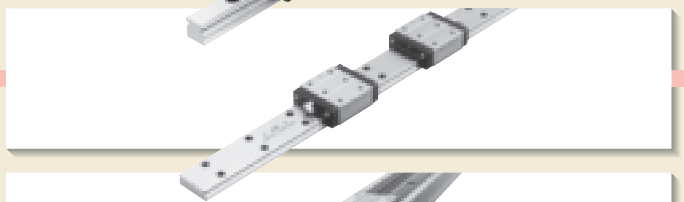
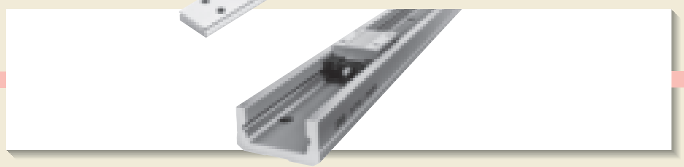
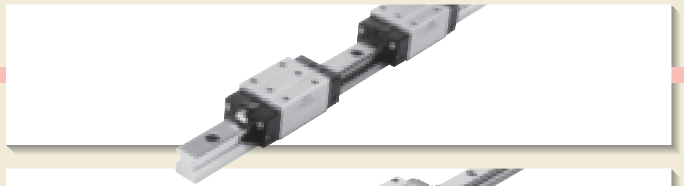
Linear Way and Linear Roller Way for Special Environment

For applications in special environments requiring high corrosion resistance and high sealing performance, IKO provides Linear Way and Linear Roller Way for special environment as follows.

Linear Way and Linear Roller Way for Special Environment

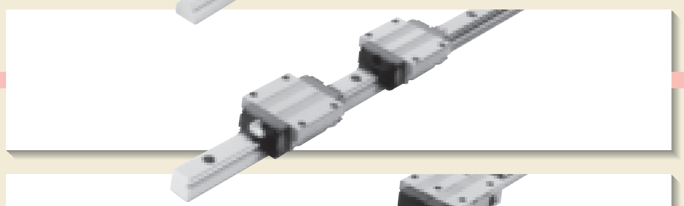
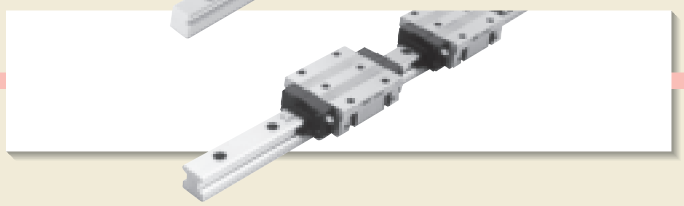
Rust prevention

Stainless steel components are used in place of common steel components for improving corrosion resistance.

Series		Reference page
Miniature Maintenance Free Linear Way **C-Sleeve Linear Way ML** Stainless standard product		A-2～
U-shaped Maintenance Free Linear Way **C-Sleeve Linear Way MUL** Stainless standard product		A-52～
Miniature Type Linear Way **Linear Way L** Stainless standard product		B-2～
Compact Type Linear Way **Linear Way E** Stainless specification product		B-28～
High Rigidity Type Linear Way **Linear Way H** Stainless specification product		B-72～
Wide Rail Type Linear Way **Linear Way F** Stainless specification product		B-108～
U-shaped Track Rail Linear Way **Linear Way U** Stainless specification product		B-128～
Linear Roller Way Super X Stainless specification product		C-2～

High sealing specification

Precision grinding is applied to the entire contour surfaces of the track rail for improving the sealing performance.

Series		Reference page
Linear Way H Ultra sealed specification product		B-72～
Linear Roller Way Super X Standard product, size 25 and upward		C-2～

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

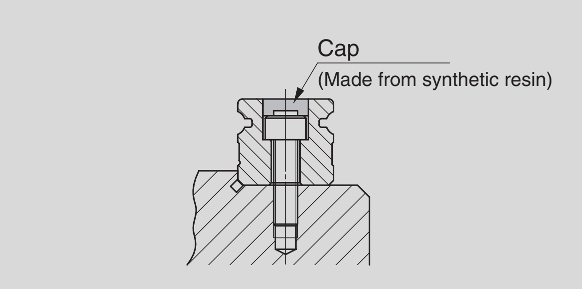
Optional Special Specifications for Special Environment

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 86 and 87.

Dust protection

With caps for rail mounting holes /F

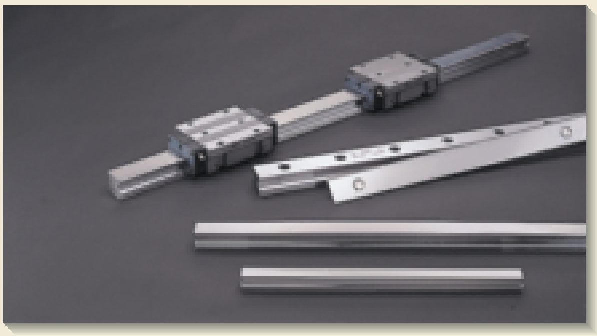
The caps prevent dust and other harmful foreign matter from accumulating in rail mounting holes and intruding into the slide unit.
Aluminum caps are also available. Consult IKO for further information.



Rail cover plate /PS

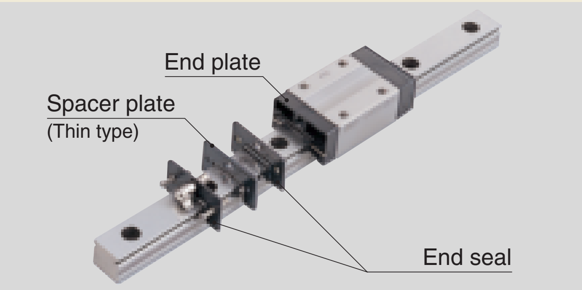
The top surface of the track rail is completely covered with a rail cover plate to prevent intrusion of foreign matter into the slide unit from track rail mounting holes.

U.S. PATENT No. 5,622,433



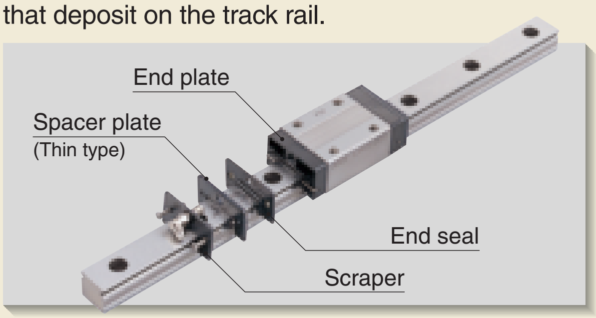
With double end seals /V

The double end seals improve the dust protection performance.



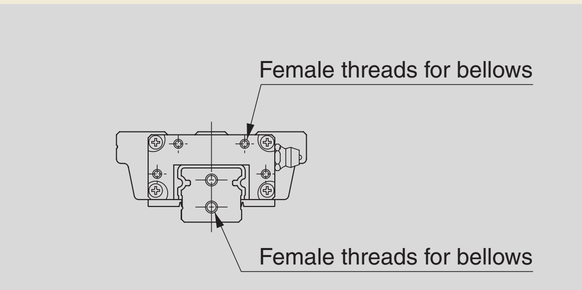
With scrapers /Z

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



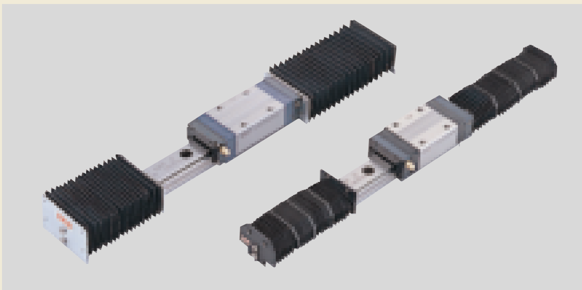
With female threads for bellows /J

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



Bellows (available product)

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

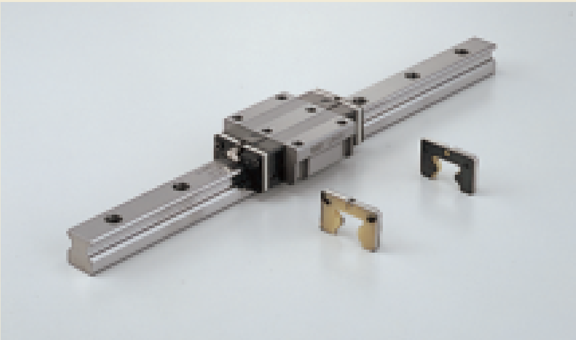


Lubrication

Capillary plate /Q

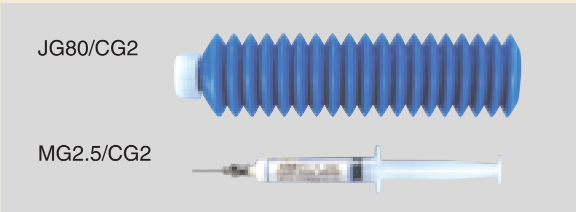
Re-lubrication interval can be made longer and maintenance time and cost can be saved by incorporating this lubrication part.

U.S. PATENT No. 6,190,046
No. 6,176,617
No. 6,082,899
No. 5,967,667



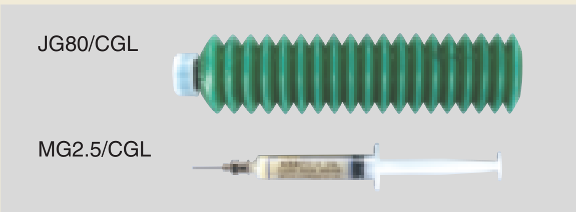
IKO Low Dust Generation Grease for Clean Environment CG2

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.



Others

When special grease is required for vacuum or high temperature, consult IKO 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

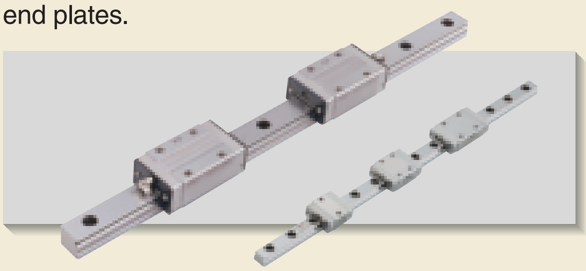
Fluorine resin coating is performed on top of the black chrome permeable film for further improvement in corrosion resistance. This treatment also effectively prevents foreign matter from adhering to the surface.

U.S. PATENT No. 5,564,188
No. 5,374,126

Others

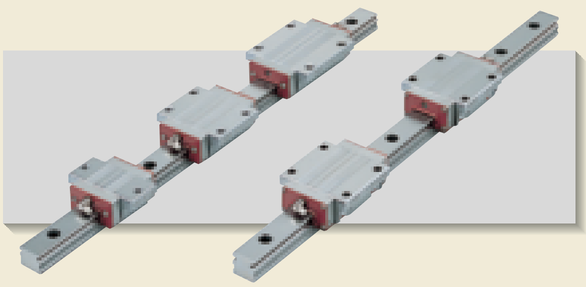
With stainless steel end plates /BS

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).

Identification Number

Identification numbers of IKO 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.

Interchangeable specification

Slide unit	LWESG	25	C1		SL	T_1	P	S2	/U
Track rail	LWE	25		R640	SL		P	S2	/F
Assembled set	LWESG	25	C2	R640	SL	T_1	P	S2	/FU

Non-interchangeable specification

Assembled set	LWESG	25	C2	R640	SL	T_1	P		/FU

Model code

MLC MLFC	ML MLF	MLG MLFG
MEC METC MESC	ME MET MES	MEG METG MESG
	MH MHT MHD MHS	MHG MHTG MHDG MHSG
	MUL	
LWLC …B LWLC …N LWLFC…B LWLFC…N LWLC LWLFC	LWL …B LWL …N LWLF…B LWLF…N LWL LWLF	LWLG …B LWLG …N LWLFG…B LWLFG…N
LWEC LWETC LWESC	LWE LWET LWES	LWEG LWETG LWESG
	LWE …Q LWET…Q LWES…Q	
LWHDC	LWH (…B) LWHT(…B) LWHD(…B) LWHS(…B) LWHY	LWHG LWHTG LWHDG LWHSG
	LWFH LWFF LWFS	
	LWUL…B LWU …B LWU	
	LWLM LWM LRWM	
LRXC LRXDC	LRX LRXD	LRXG LRXDG
	LRWX…B LRWXH	

Size

Size

Part code

- Number of slide units
- Length of track rail

Material symbol

No symbol
CS
SL

Preload symbol

T_C
T_0
No symbol
T_1
T_2
T_3

Classification symbol

No symbol
H
P
SP
UP

Interchangeable code

No symbol
S1
S2

Supplemental code

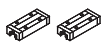
/A /BS /C /D /E /F /GE /HP /I
/J /L /LF /MA /MN /M /N /PS
/Q /RE /S /T /U /V /W /Y /Z

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.

Interchangeable specification

Slide unit



(for two units)

Ordering example

LWESG 25 C1 SL T_1 P S2 /U

Only "C1" meaning one slide unit can be indicated.

Order quantity
2 pieces

Track rail

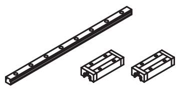
(for one rail)

Ordering example

LWE 25 R640 SL P S2 /F

Order quantity
1 piece

Assembled set



(for one set)

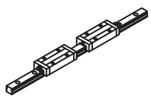
Ordering example

LWESG 25 C2 R640 SL T_1 P S2 /FU

Order quantity
1 piece

Non-interchangeable specification

Assembled set



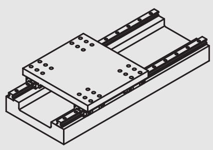
(for one set)

Ordering example

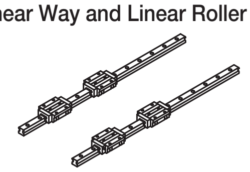
LWESG 25 C2 R640 SL T_1 P /FU

Order quantity
1 piece

Matched sets to be used as an assembled group (supplemental code/W)



Linear Way and Linear Roller Way



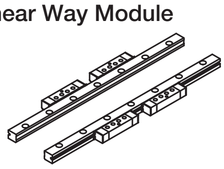
(for one group consisting of two sets)

Ordering example

LRX 45 C2 R1260 T_3 SP /W2

Order quantity
2 pieces

Linear Way Module



(for one group consisting of two sets)

Ordering example

LWM 2 M2 R480 P /W2

Order quantity
2 pieces

The load ratings of IKO 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 C_0

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.

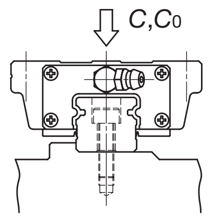


Fig. 1 Direction of load rating

Static moment rating T_0, T_X, T_Y

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.

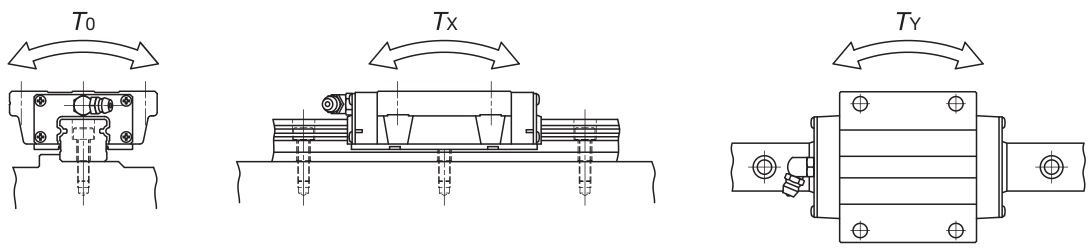


Fig. 2 Static moment rating direction

Accuracy

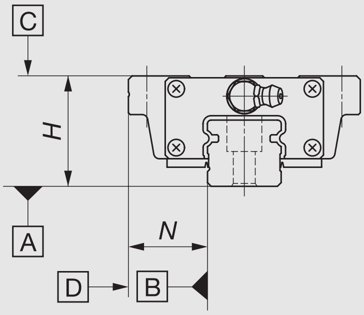
Five classes of accuracy, Ordinary, High, Precision, Super Precision, and Ultra Precision are specified for IKO Linear Way and Linear Roller Way. Table 1 summarizes applicable accuracy classes for each series, and Tables 2.1 to 2.4 show accuracy of each series. For details of applicable classes, see the description of each series.
For the accuracy of series other than those shown in Table 2, consult IKO for further information.

Table 1 Accuracy classes

Series \ Classification (symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
C-Sleeve Linear Way ML	–	☆	☆	–	–
C-Sleeve Linear Way ME	☆	☆	☆	○	–
C-Sleeve Linear Way MH	–	☆	☆	○	–
C-Sleeve Linear Way MUL	○	○	–	–	–
Linear Way L	–	☆	☆	–	–
Linear Way E	☆	☆	☆	○	–
Low Decibel Linear Way E	○	○	○	–	–
Linear Way H(1)	–	☆	☆	○	–
Linear Way F	–	☆	☆	○	–
Linear Way U	○	○	–	–	–
Linear Roller Way Super X	–	☆	☆	○	○
Linear Roller Way X	–	○	○	○	○
Linear Way Module	–	○	○	○	–

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

Item \ Classification (symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super Precision (SP)	Ultra Precision (UP)
Dim. *H* 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 *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 *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.
(2) : It applies to the interchangeable specification products.
Remark 1 : The accuracy of C-Sleeve 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-Sleeve Linear Way MUL is shown in Table 2.3.
3 : The accuracy of Linear Way Module is shown in Table 2.4.

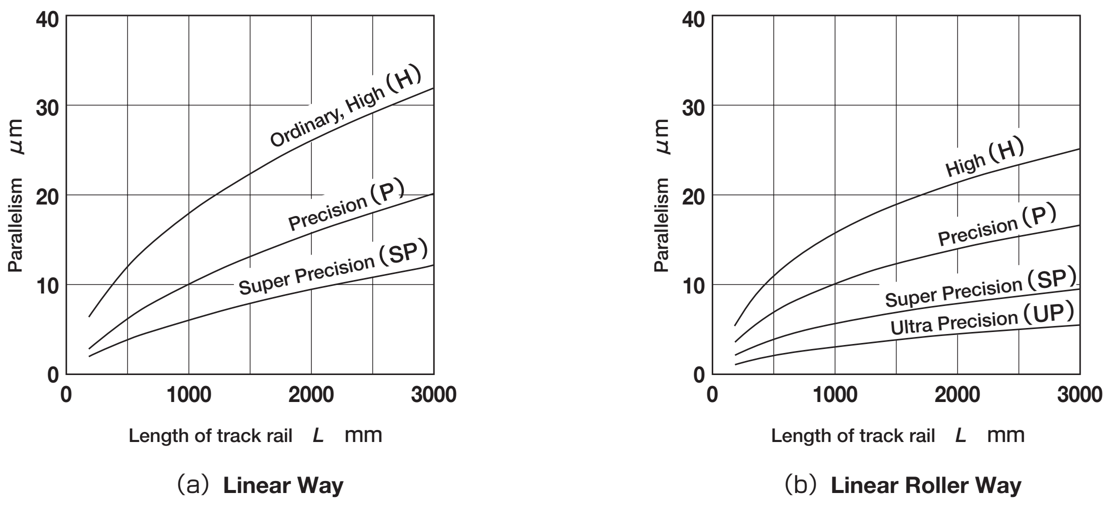
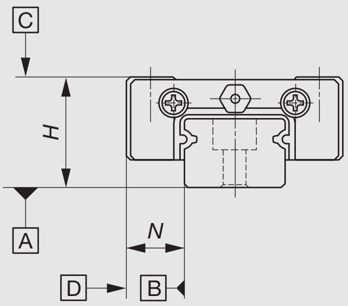


Fig. 3.1 Parallelism in operation of Linear Way and Linear Roller Way

Table 2.2 Accuracy of Linear Way L and C-sleeve Linear Way ML



unit : mm

Item \ Classification (Symbol)	High (H)	Precision (P)
Dim. *H* tolerance	±0.020	±0.010
Dim. *N* tolerance	±0.025	±0.015
Dim. variation of *H*(1)	0.015	0.007
Dim. variation of *N*(1)	0.020	0.010
Dim. variation of *H* for multiple assembled sets (2)	0.030	0.020
Parallelism in operation of C to A	See Fig. 3.2.	
Parallelism in operation of D to B	See Fig. 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-Sleeve Linear Way L and the size 8 to 12 models of Linear Way H.

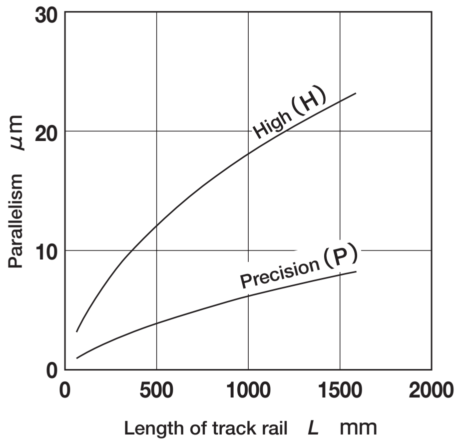
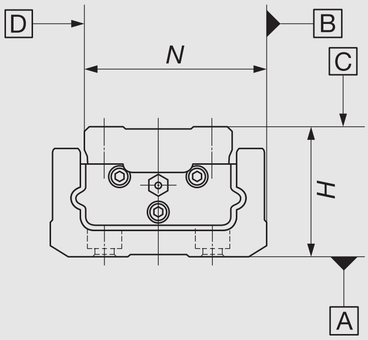


Fig. 3.2 Parallelism in operation of Linear Way L and C-Sleeve Linear Way ML

Table 2.3 Accuracy of Linear Way U



unit : mm

Item \ Classification (Symbol)	Ordinary (No symbol)	High (H)
Dim. H tolerance	±0.100	±0.050
Dim. N tolerance	±0.100	±0.050
Dim. variation of H(1)	0.050	0.040
Dim. variation of N(1)	0.050	0.040
Parallelism in operation of C to A	See Fig. 3.3.	
Parallelism in operation of D to B	See Fig. 3.3.	

Note(1) : It means the size variation between slide units mounted on the same track rail.
Remark : Also applicable to C-Sleeve Linear Way MUL.

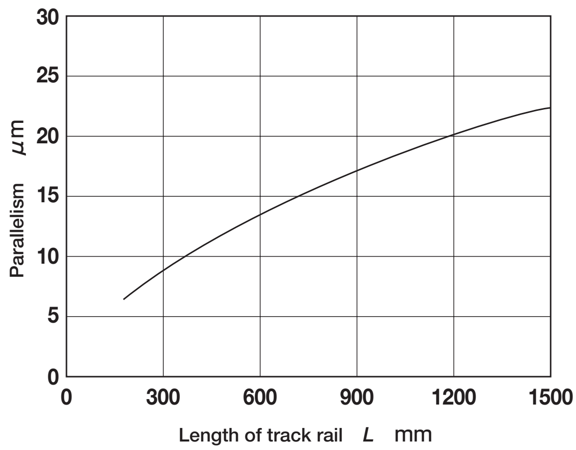
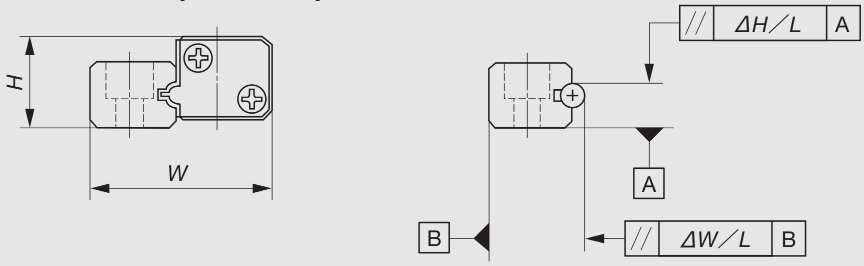


Fig. 3.3 Parallelism in operation of Linear Way U

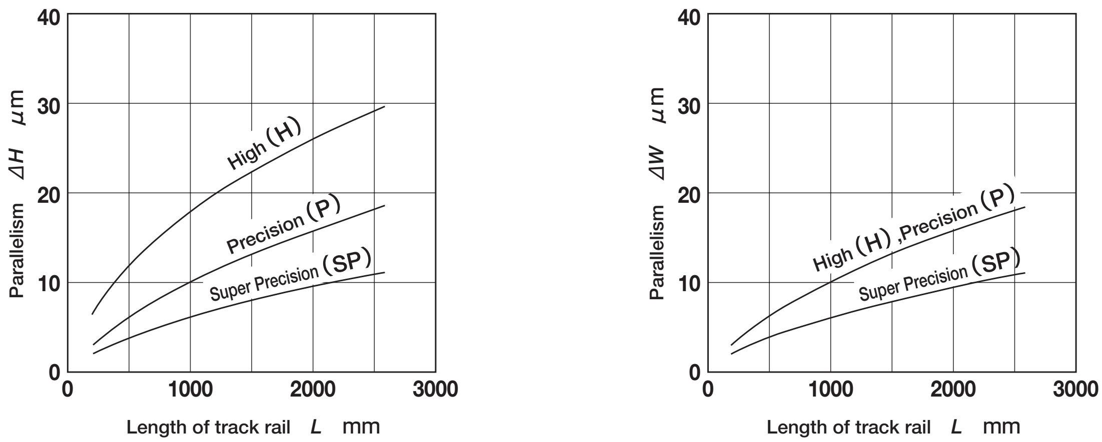
Table 2.4 Accuracy of Linear Way Module



unit : mm

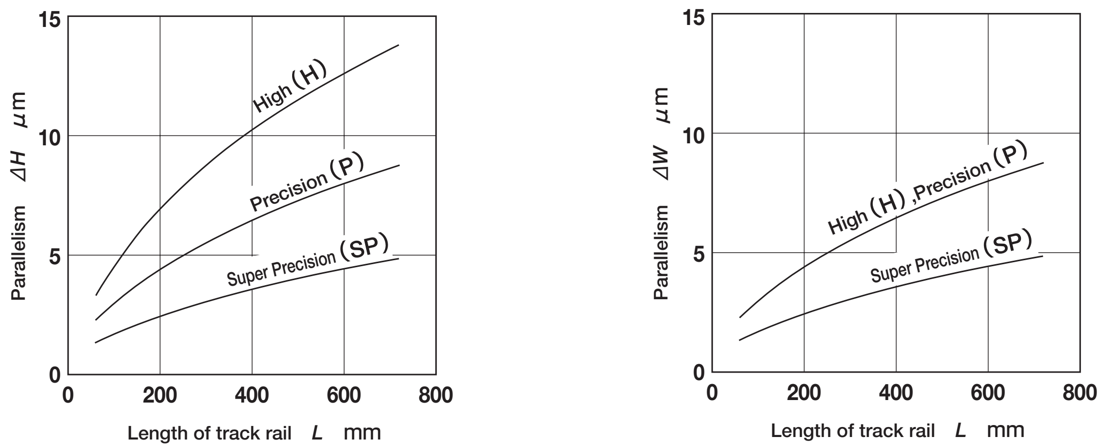
Item \ Classification (symbol)	High (H)	Precision (P)	Super Precision (SP)
Dim. *H* tolerance	±0.040	±0.020	±0.010
Dim. *W* tolerance	±0.050	±0.025	±0.015
Dim. variation of *H*(1)	0.015	0.007	0.005
Dim. variation of *W*(1)	0.020	0.010	0.007
Parallelism of track rail Δ*H*	See Figs. 3.4 and 3.5.		
Parallelism of track rail Δ*W*	See Figs. 3.4 and 3.5.		

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



(a) Parallelism Δ*H* (b) Parallelism Δ*W*

Fig. 3.4 Parallelism of Linear Way M and Linear Roller Way M



(a) Parallelism Δ*H* (b) Parallelism Δ*W*

Fig. 3.5 Parallelism of Linear Way LM

Preload

The average amount of preload for IKO 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

Preload type \ Item	Symbol	Preload amount N	Application
Clearance	T_C	0 (1)	• Very smooth motion • To absorb slight misalignment
	T_0	0 (2)	• Very smooth motion
Standard	(No symbol)	0 (3)	• Smooth and precise motion
Light preload	T_1	$0.02C_0$	• Minimum vibration • Load is evenly balanced. • Smooth and precise motion
Medium preload	T_2	$0.05C_0$	• Medium vibration • Medium overhung load
Heavy preload	T_3	$0.08C_0$	• 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 : C_0 means the basic static load rating.

Table 4 Preload type

Series \ Preload type (Symbol)	Clearance (TC)	Clearance (T0)	Standard (No symbol)	Light preload (T1)	Medium preload (T2)	Heavy preload (T3)
C-Sleeve Linear Way ML	–	☆	☆	☆	–	–
C-Sleeve Linear Way ME (2)	☆	–	☆	☆	○	–
C-Sleeve Linear Way MH	–	–	☆	☆	○	○
C-Sleeve Linear Way MUL	–	–	○	○	–	–
Linear Way L	–	☆	☆	☆	–	–
Linear Way E	☆	–	☆	☆	○	–
Low Decibel Linear Way E	–	–	○	○	–	–
Linear Way H	–	○ (1)	☆	☆	☆	☆
Linear Way F	–	–	☆	☆	○	–
Linear Way U	–	–	○	○	–	–
Linear Roller Way Super X	–	–	☆	☆	☆	☆
Linear Roller Way X	–	–	○	○	○	○

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.

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

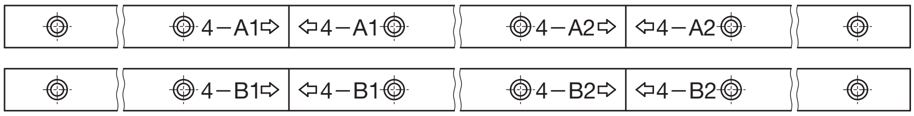
Note(1) : Including Linear Way LM and Linear Roller Way M.
Remark 1 : The mark ☆ indicates that interchangeable specification products are available.
2 : For the details of special specifications applicable to each series and combinations of special specifications, see the description of each series.

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

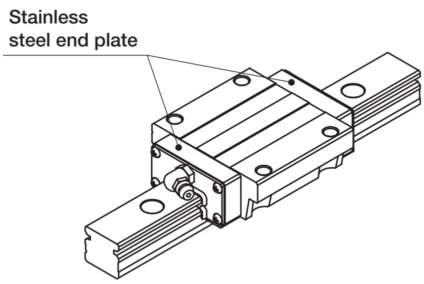
Note(1) : Including Linear Way LM and Linear Roller Way M.
Remark 1 : The mark ☆ indicates that interchangeable specification products are available.
2 : For the details of special specifications applicable to each series and combinations of special specifications, see the description of each series.

Butt-jointing track rails ／A



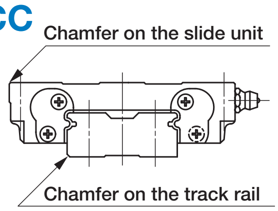
When the required length of non-interchangeable specification track rail exceeds the maximum length indicated in the description of each series, two or more track rails can be used by butt-jointing them in the direction of linear motion. For the length and the number of butt-jointing track rails, consult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

With stainless steel end plates ／BS



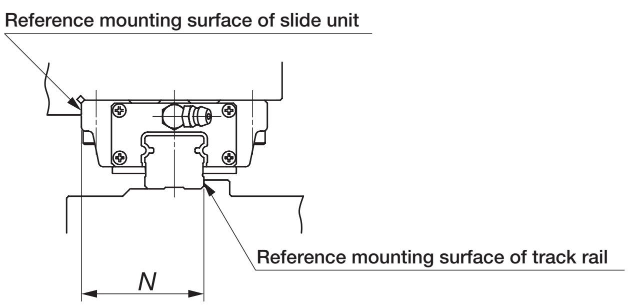
The standard synthetic resin end plates are replaced with stainless steel end plates, keeping the total length of slide unit unchanged.
When superior heat resistance is required, it is recommended to apply this specification in combination with the "with no end seal (/N)" specification.

Chamfered reference surface ／C ／CC



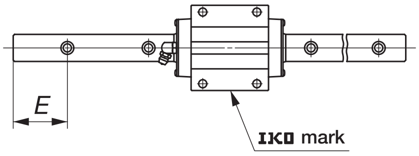
Chamfering is additionally made at the edges of reference mounting surfaces of slide unit and track rail.
For the corner radius of mating mounting parts, see Table 23.2 on page 120.
1 /C
Chamfering is additionally made at the edge of reference mounting surface of track rail.
2 /CC
Chamfering is additionally made at the edges of reference mounting surfaces of slide unit and track rail.

Opposite reference surfaces arrangement ／D



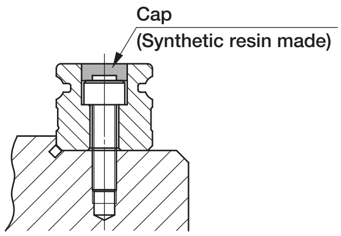
The reference mounting surface of track rail is made opposite to the standard side. The accuracy of dimension *N* including parallelism in operation is the same with that of standard specification.

Specified rail mounting hole positions ／E



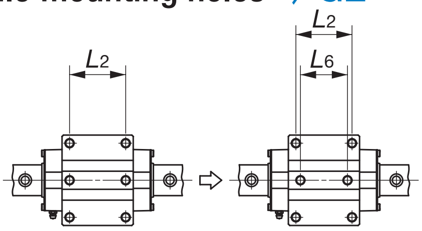
The mounting hole positions of track rail can be specified by specifying dimension *E* at the left end, which is the distance from the mounting hole nearest to the left end of the track rail to the left end face of the track rail in sight of **IKO** mark on the slide unit.
When ordering, add the dimension (in mm) after "/E".
Dimension *E* can be specified in a limited range. Consult **IKO** for further information.

With caps for rail mounting holes ／F



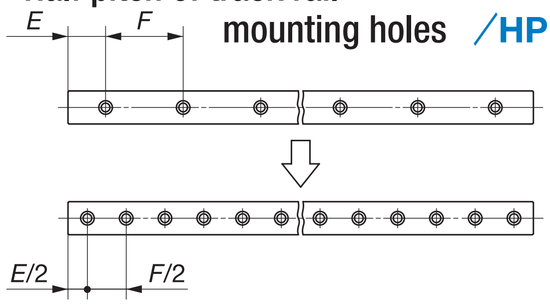
Specially prepared caps for track rail mounting holes are appended. These caps cover the track rail mounting holes to improve the sealing performance in the linear motion direction. Aluminum caps are also available. Consult **IKO** for further information.

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 mounting holes ／HP

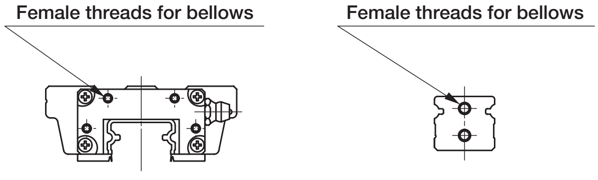


The pitch of the track rail mounting holes is changed to 1/2 of the dimension *F* of standard type. Track rail mounting bolts are appended in the same number as that of mounting holes.

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.

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

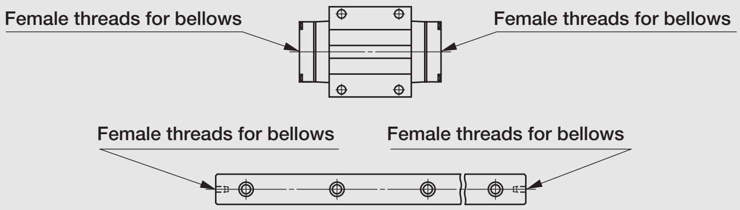


Slide unit

Track rail

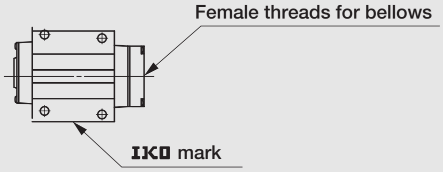
Female threads for mounting bellows are provided on the interchangeable slide unit or the interchangeable track rail. For details of related dimensions, see the description of each series.

① ／J



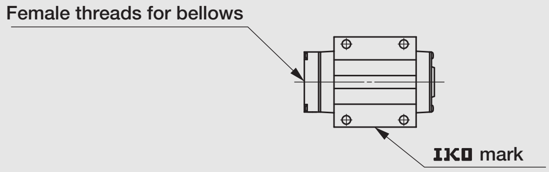
Female threads are provided at both ends of the slide unit or the track rail.

② ／JR



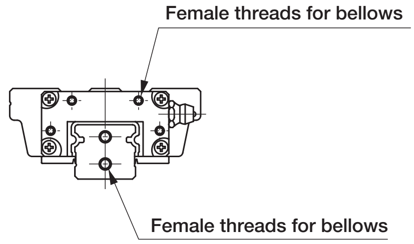
Female threads are provided at the right end of the slide unit in sight of IKO mark.

③ ／JL



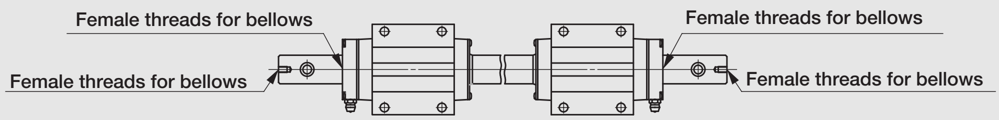
Female threads are provided at the left end of the slide unit in sight of IKO mark.

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



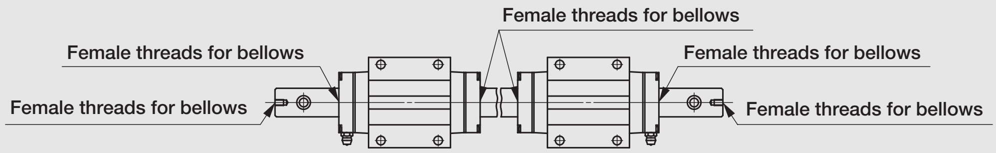
For an assembled set of interchangeable or non-interchangeable specification, female threads for mounting bellows are provided on the slide unit and the track rail. For details of related dimensions, see the description of each series.

① ／J



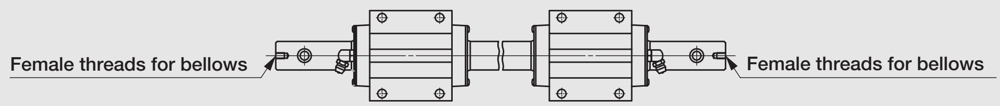
Female threads are provided at both ends of the track rail, and at the slide unit ends which are the closest to the track rail ends. (In case only one slide unit is assembled, female threads are provided at both ends.)

② ／JJ



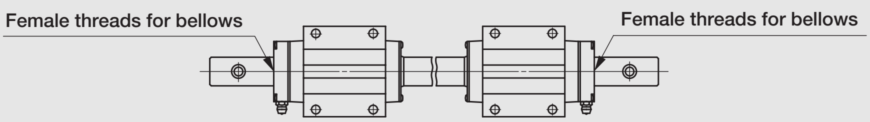
Female threads are provided at both ends of the track rail, and at all ends of all slide units. (Applicable, when the number of slide units is two or more. In case only one slide unit is assembled, indicate "/J".)

③ ／JR



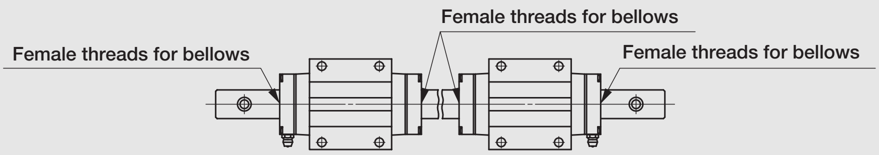
Female threads are provided at both ends of the track rail.

④ ／JS



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.

② ／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.

② ／LFR

Treatment is applied to the track rail.

③ ／LFCR

Treatment is applied to the casing and the track rail.

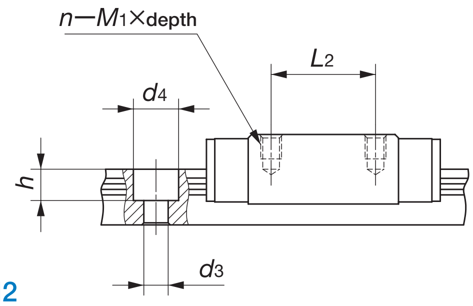
With track rail mounting bolts
／MA(1)

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 size of the female threads for mounting the slide unit or the size of the track rail mounting hole is changed. For dimensions, see the description of each series.

① ／M2

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

② ／M3

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.

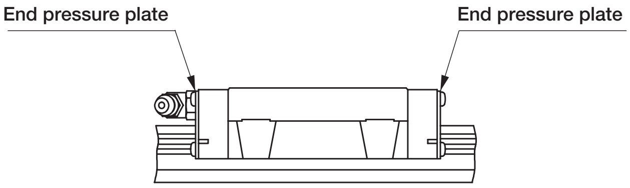
The female threads for mounting LWLF14 and LWLF18 slide units are changed to M3.

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

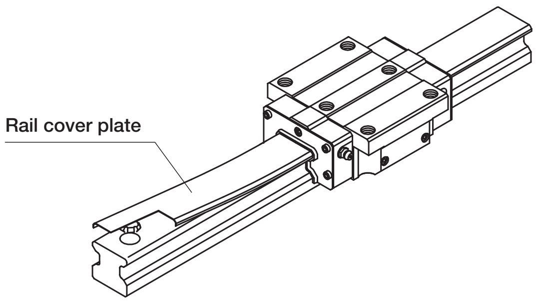
No end seal ／N



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.

Rail cover plate ／PS

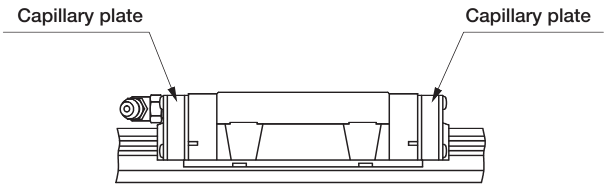
U.S. PATENT NO. 5,622,433



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.

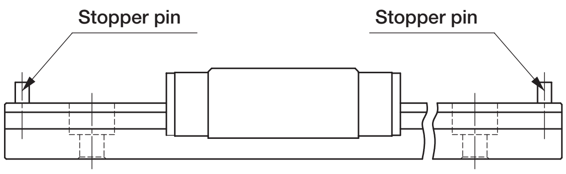
Capillary plate ／Q

U.S. PATENT NO. 6,190,046
NO. 6,176,617
NO. 6,082,899
NO. 5,967,667



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



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

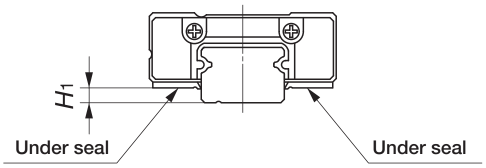
The standard end seals and under seals are changed to seals for special environment that can be used at high temperature.

Butt-jointing interchangeable track rail (for interchangeable specification) ／T

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)".

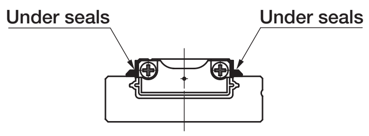
With under seals ／U

U.S. PATENT NO. 5,464,288
NO. 5,356,223
NO. 5,324,116
NO. 5,306,089
NO. 5,209,575



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.

With upper seals ／U



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.

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.

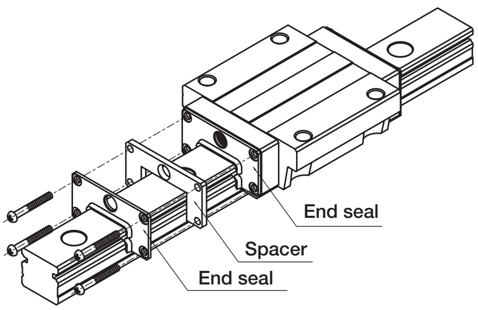
② ／VR

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

③ ／VL

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

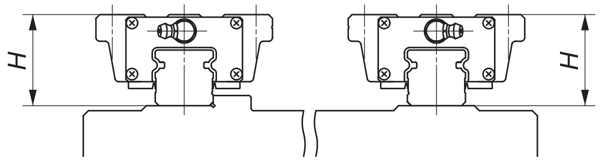


Double end seals are provided on the slide unit of assembled set of interchangeable specification or non-interchangeable specification for more effective dust protection. For the total length of the slide unit with double end seals, see the description of each series.

① ／V
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.)

② ／VV
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 ／W



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 range.
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".

Specified grease
／YCG ／YCL ／YBR ／YNG

The type of pre-packed grease in the slide unit can be changed by a supplemental code.

① ／YCG
IKO Low Dust Generation Grease for Clean Environment CG2 is pre-packed.

② ／YCL
IKO Low Dust Generation Grease for Clean environment CGL is pre-packed.

③ ／YBR
MOLYCOTE BR2 Plus Grease (Dow Corning) is pre-packed.

④ ／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 (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.

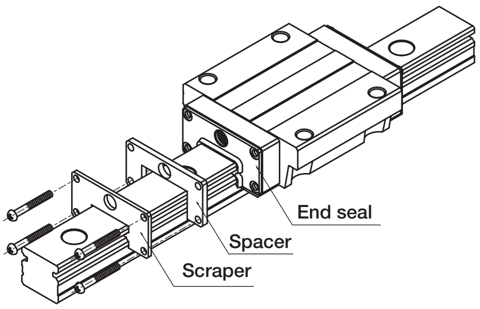
① ／Z
Scrapers are provided at both ends of the slide unit.

② ／ZR
A scraper is provided at the right end of the slide unit in sight of IKO mark.

③ ／ZL
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.



① ／Z
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 ／ZZ
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".)

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

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 95. For the interval and amount of grease replenishment, see "General description".

Table 6 Pre-packed grease list

<table>
<tr><th>Series</th><th>Pre-packed grease</th></tr>
<tr><td>C-Sleeve Linear Way ML</td><td>MULTEMP PS No.2
(KYODO YUSHI)</td></tr>
<tr><td>C-Sleeve Linear Way ME</td><td rowspan="2">ALVANIA EP GREASE 2
(SHELL)</td></tr>
<tr><td>C-Sleeve Linear Way MH</td></tr>
<tr><td>C-Sleeve Linear Way MUL</td><td rowspan="2">MULTEMP PS No.2
(KYODO YUSHI)</td></tr>
<tr><td>Linear Way L</td></tr>
<tr><td>Linear Way E</td><td rowspan="8">ALVANIA EP GREASE 2
(SHELL)</td></tr>
<tr><td>Low Decibel Linear Way E</td></tr>
<tr><td>Linear Way H(1)</td></tr>
<tr><td>Linear Way F</td></tr>
<tr><td>Linear Way U(2)</td></tr>
<tr><td>Linear Roller Way Super X</td></tr>
<tr><td>Linear Roller Way X</td></tr>
<tr><td>Linear Way Module</td></tr>
</table>

Note(1) : For size 8 to 12 models, MULTEMP PS No.2 is pre-packed.
(2) : For size 25 and 30 models, MULTEMP PS No.2 is pre-packed.

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.

Table 7.1 Parts for lubrication

Series	Model code	Size	Grease nipple		Nominal size of female threads for piping
			Type	Applicable supply nozzle type	
C-Sleeve Linear Way ML	ML	5 7 9 12	Oil hole	Mini-grease injector	–
		15 20	A–M3	A–5120V A–5240V B–5120V B–5240V	–
		25	B–M4	A–8120V B–8120V	M4
	MLF	10 14 18 24	Oil hole	Mini-grease injector	–
		30 42	A–M3	A–5120V A–5240V B–5120V B–5240V	–
C-Sleeve Linear Way ME	ME	15	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		20 25	B–M6	Grease gun available on the market	M6
C-Sleeve Linear Way MH	MH	15	A–M4	A–5120V A–5240V B–5120V B–5240V	–
		20 25	B–M6	Grease gun available on the market	M6
C-Sleeve Linear Way MUL	MUL	25 30	Oil hole	Mini-grease injector	–
Linear Way L Ball Retained type	LWL …B	5 7 9 12	Oil hole	Mini-grease injector	–
		15 20	A–M3	A–5120V A–5240V B–5120V B–5240V	–
		25	B–M4	A–8120V B–8120V	M4
	LWLF…B	10 14 18 24	Oil hole	Mini-grease injector	–
		30 42	A–M3	A–5120V A–5240V B–5120V B–5240V	–
Linear Way E	LWE	15	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		20 25 30	B–M6	Grease gun available on the market	M6
		35 45	JIS B type		PT1/8
Low Decibel Linear Way E	LWE…Q	15	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		20 25 30	B–M6	Grease gun available on the market	M6
		35	JIS B type		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.

Table 7.2 Parts for lubrication

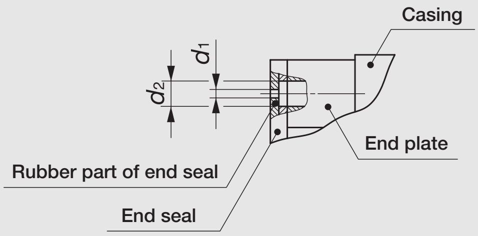
Series	Model code	Size	Grease nipple		Nominal size of female threads for piping
			Type	Applicable supply nozzle type	
Linear Way H	LWH⋯B	8 10	Oil hole	Mini-grease injector	–
		12	A–M3	A–5120V A–5240V B–5120V B–5240V	–
		15	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		20 25 30	B–M6		M6
		35 45 55 65 85	JIS B type	Grease gun available on the market	PT1/8
Linear Way F	LWFH	40 60 90	JIS A–M6F		M6
	LWFF LWFS	33	A–M3	A–5120V A–5240V B–5120V B–5240V	–
		37	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		42 69	B–M6	Grease gun available on the market	M6
Linear Way U	LWUL⋯B	25 30	Oil hole	Mini-grease injector	–
	LWU⋯B LWU	40 50	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		60 86 100 130	JIS A–M6F	Grease gun available on the market	M6
Linear Roller Way Super X	LRX	12	A–M3	A–5120V A–5240V B–5120V B–5240V	–
		15	A–M4	A–5120V A–5240V B–5120V B–5240V	M4
		20 25	B–M4	A–8120V B–8120V	M4
		30	B–M6		M6
		35	JIS A–M6F		M6
		45 55 65 85	JIS A–PT1/8	Grease gun available on the market	PT1/8
		100	JIS A–PT1/4		PT1/4
Linear Roller Way X	LRWX⋯B	25 35	JIS A–M6F		M6
		45 55 75	JIS A–PT1/8		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.

Oil hole

Some models of C-Sleeve Linear Way ML, C-Sleeve 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.

Table 8 Oil hole



unit : mm

Series	Size	Oil hole size d_1	Oil hole size d_2
C-Sleeve Linear Way ML	5 10	0.5	1.1
	7 14		1.2
	9 18		1.5
	12 24		2
C-Sleeve Linear Way MUL	25	0.5	1.2
	30		1.5
Linear Way L Ball Retained type	5 10	0.5	1.1
	7 14		1.2
	9 18		1.5
	12 24		2
Linear Way H	8 10	0.5	1.5
Linear Way U	25	0.5	1.2
	30		1.5

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.

Table 9 Specifications

Identification number	Grease name	Content	Outside diameter of injector needle
MG10/MT2	MULTEMP PS No.2 (KYODO YUSHI)	10ml	ϕ1mm
MG10/CG2	IKO Low Dust Generation Grease for Clean Environment CG2		
MG2.5/CG2	IKO Low Dust Generation Grease for Clean Environment CG2	2.5ml	
MG2.5/CGL	IKO Low Dust Generation Grease for Clean Environment CGL		

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.

Table 10.1 Grease nipples and applicable supply nozzles

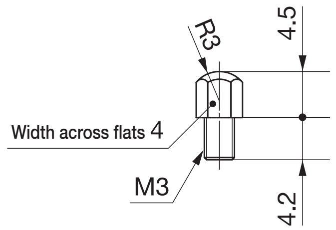
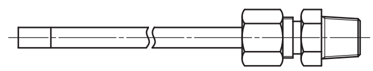
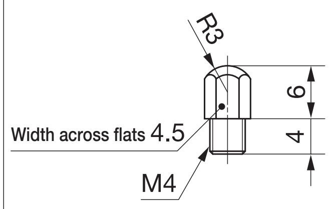
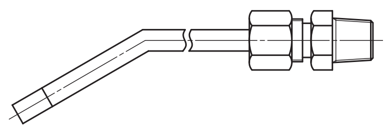
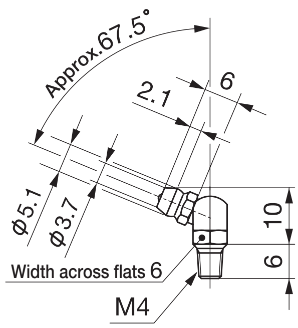
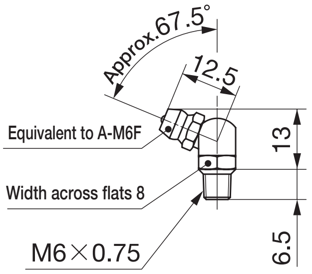
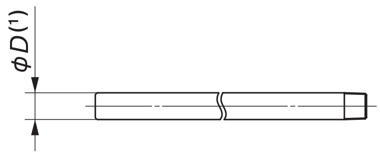
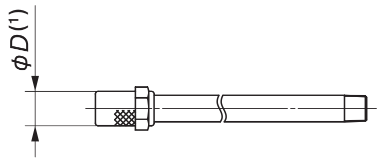
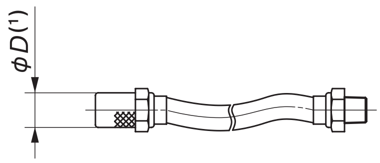
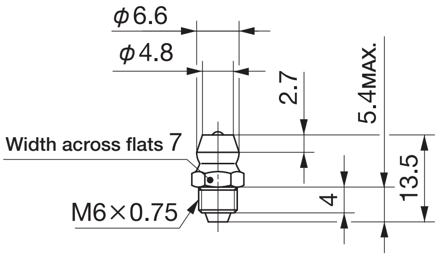
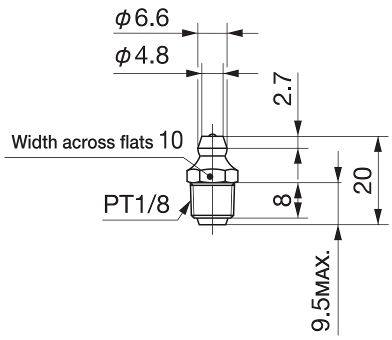
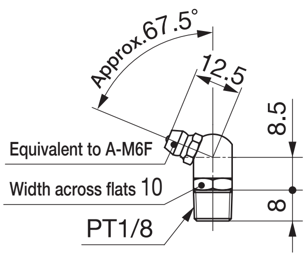
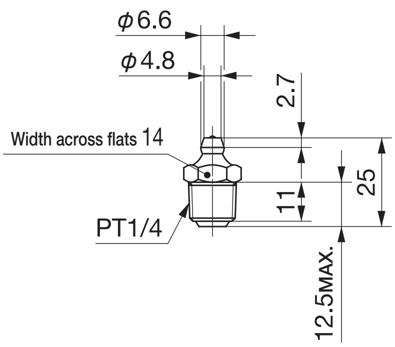
Grease nipple		Applicable supply nozzle	
Type	Shape and dimension	Type	Shape
A–M3		A–5120V A–5240V B–5120V B–5240V	Straight type 
A–M4			Straight type with angle 
B–M4		A–8120V B–8120V	

Table 10.2 Grease nipples and applicable supply nozzles

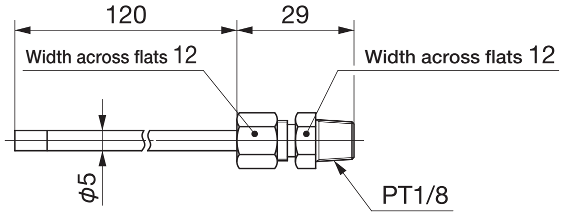
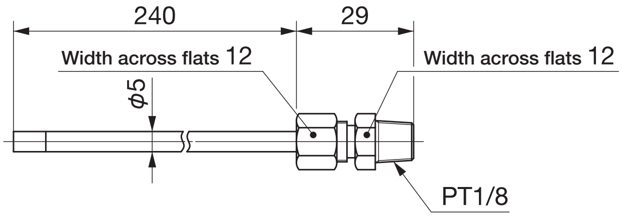
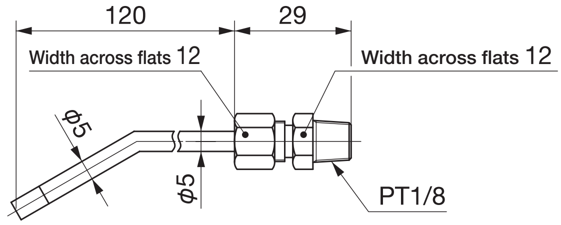
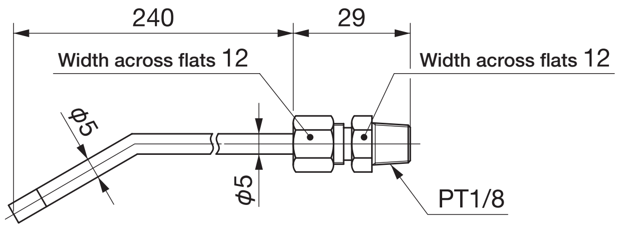
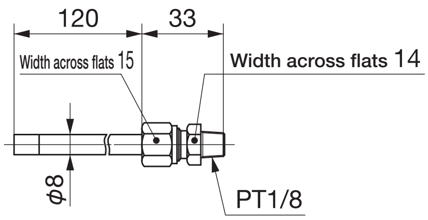
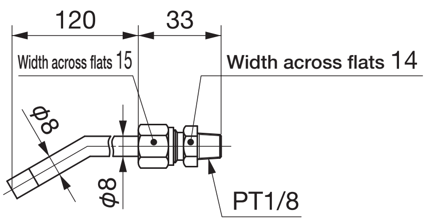
<table>
<tr><th colspan="2">Grease nipple</th><th colspan="2">Applicable supply nozzle</th></tr>
<tr><th>Type</th><th>Shape and dimension</th><th>Type</th><th>Shape</th></tr>
<tr><td>B–M6</td><td>
</td><td rowspan="5">Product available on the market</td><td rowspan="5">Straight type


Chuck type


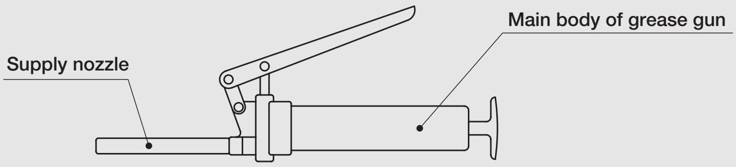
Hose type

</td></tr>
<tr><td>JIS
A–M6F</td><td>
</td></tr>
<tr><td>JIS
A–PT1/8</td><td>
</td></tr>
<tr><td>JIS
B type</td><td>
</td></tr>
<tr><td>JIS
A–PT1/4</td><td>
</td></tr>
</table>

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

Type	Shape and dimension
A–5120V	
A–5240V	
B–5120V	
B–5240V	
A–8120V	
B–8120V	

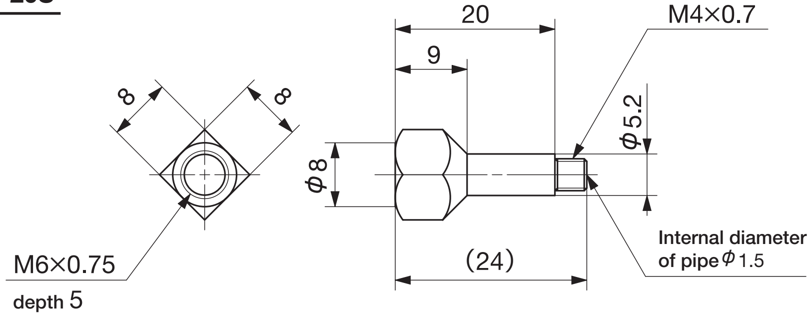
Remark : The supply nozzles shown in the table can be mounted on the main body of a common grease gun available on the market (shown below). If these supply nozzles are required, consult IKO by specifying the supply nozzle type.



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 and13.2 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 **IKO** for further information.

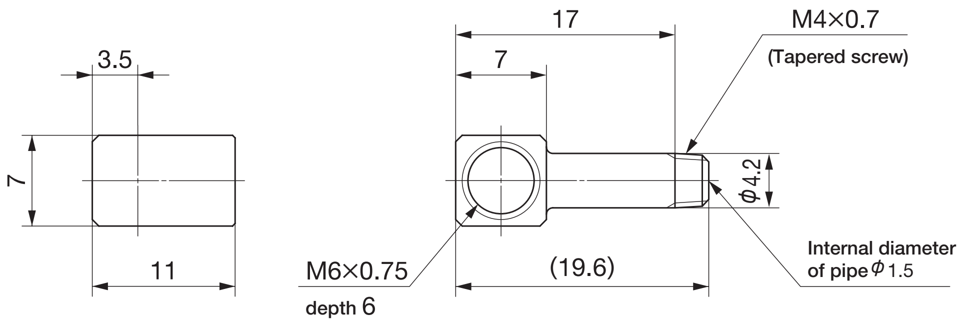
Model number	SC4–20S



Remark : Not applicable to LRX.

Fig. 4.1 Pipe joint for M4×0.7 (Straight type)

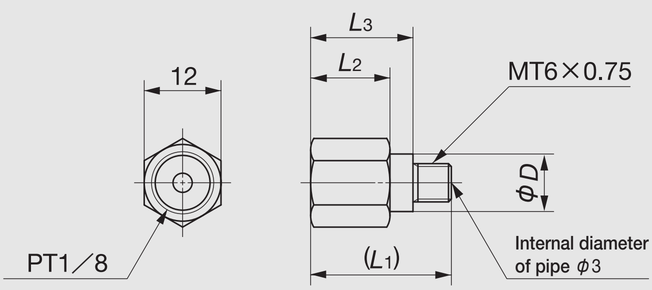
Model number	LC4–17



Remark : The straight type pipe joint shown in Table 12.1 is recommended for female threads (M6 × 0.75).

Fig. 4.2 Pipe joint for M4×0.7 (L type)

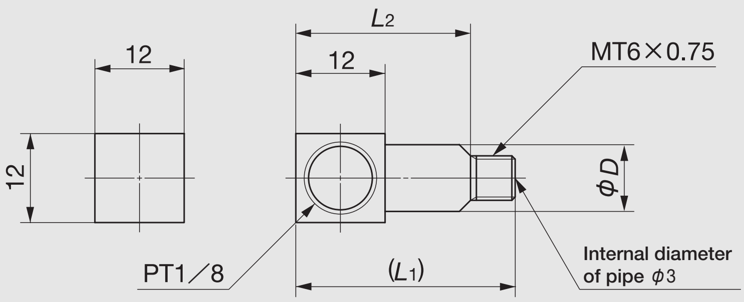
Table 12.1 Pipe joint for M6 × 0.75 (Straight type)



unit : mm

Model number	L_1	L_2	L_3	D
SC6–16	22	12.4	16	9
SC6–22S	28	12	22	6
SC6–25S	31	12	25	6

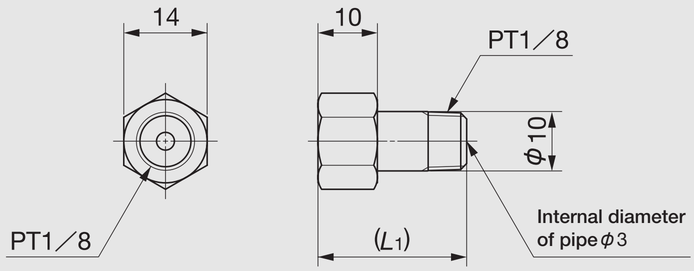
Table 12.2 Pipe joint for M6 × 0.75 (L type)



unit : mm

Model number	L_1	L_2	D
LC6–18	25	18	9
LC6–22S	28	—	6
LC6–24	30.5	23.5	9
LC6–25S	31	—	6

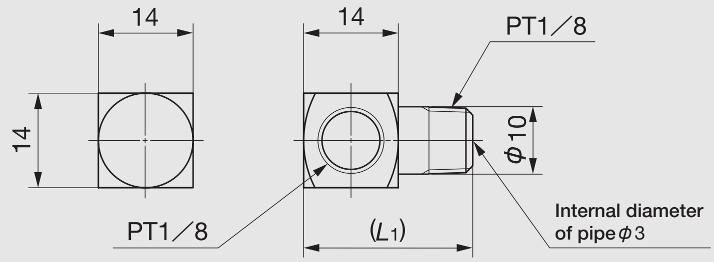
Table 13.1 Pipe joint for PT1/8 (Straight type)



unit : mm

Model number	L_1
SC1/8–19S	25
SC1/8–34S	40

Table 13.2 Pipe joint for PT1/8 (L type)



unit : mm

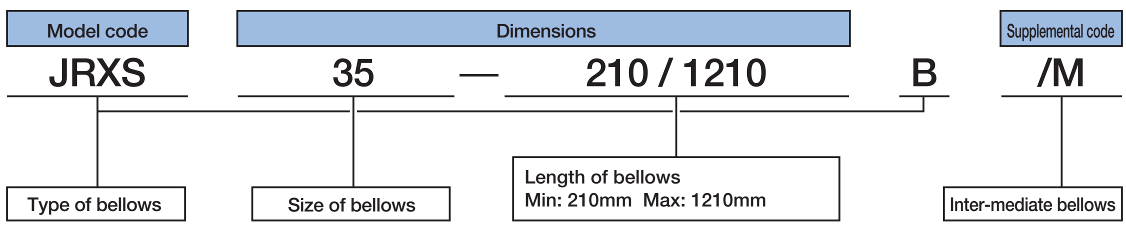
Model number	L_1
LC1/8–19S	25
LC1/8–34S	40

Bellows

Dimensions of bellows specially prepared for IKO 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 IKO 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.

$$ns = \frac{S}{\ell s_{max} - \ell s_{min}}$$

where, ns: Number of pleats (Raise decimal fractions.)
S: Length of stroke, mm
ℓs_{max}: Maximum length of one pleat (See Tables 15.1 and 15.2.)
ℓs_{min}: Minimum length of one pleat (See Tables 15.1 and 15.2.)

$$L_{min} = ns \times \ell s_{min} + m \times 5 + 10$$
$$L_{max} = S + L_{min}$$

where, L_{min}: Minimum length of bellows, mm
L_{max}: Maximum length of bellows, mm
m: Number of internal guide plates (See Table 14.)

Table 14 Number of internal guide plates

Type of bellows	Dimension P of bellows (1) mm		Number of internal guide plates, m
	over	incl.	
JEF JRES	—	35	$m = \frac{ns}{7} - 1$
JES JHS JFS JRXS…B	—	22	$m = \frac{ns}{16}$ but $m=0$, when $ns \leqq 20$
	22	25	$m = \frac{ns}{12}$ but $m=0$, when $ns \leqq 18$
	25	35	$m = \frac{ns}{8}$

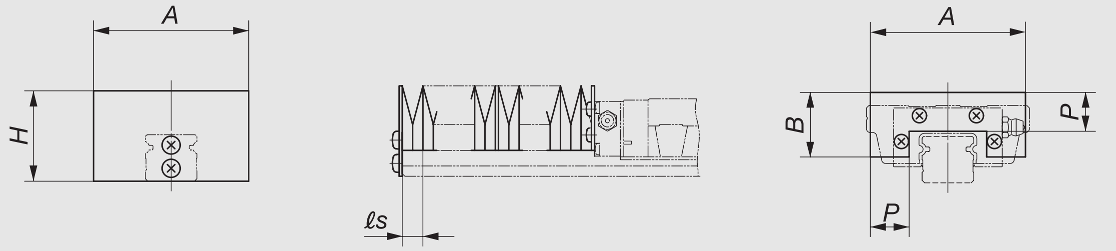
Note(1) : For dimension P, see Tables 15.1 and 15.2.
Remark : In calculating the number of internal guide plates m, raise the decimal fractions for JEF and JRES and omit the decimal fractions for others.

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 IKO.

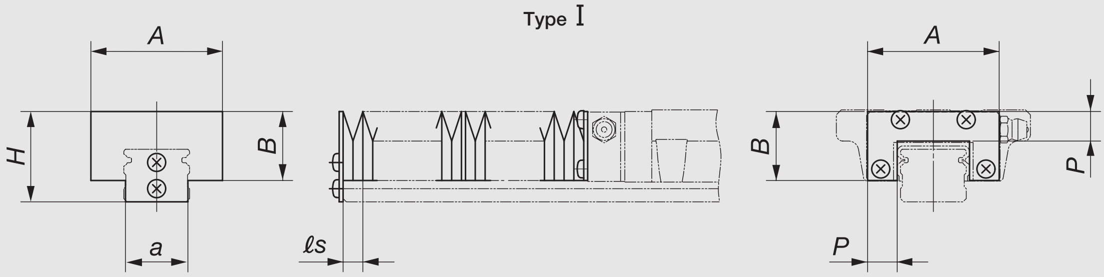
Table 15.1 Dimensions of bellows and applicable models



Track rail side

Slide unit side

Type Ⅰ



Track rail side

Slide unit side

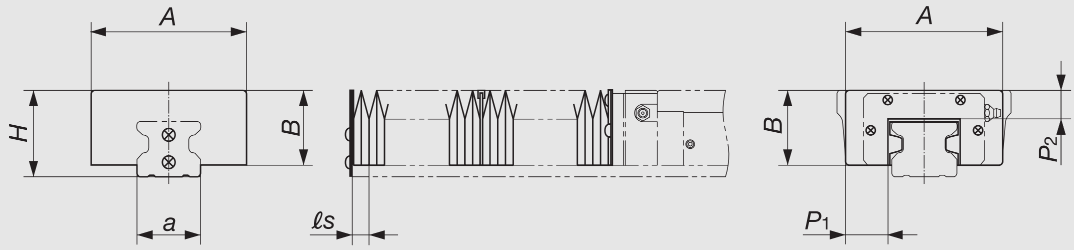
Type Ⅱ

unit : mm

Series	Size	Bellows model code	Type	*H*	*A*	*a*	*B*	*P*	ℓsmin	ℓsmax
C-Sleeve Linear Way ME	15	JEF15	Ⅱ	23.5	34	14	17	8	2	9
	20	JEF20		27.5	40	19	21	9	2	10
	25	JEF25		32	46	22	24	10	2	11
C-Sleeve Linear Way MH	15	JHS15	Ⅰ	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
Linear Way E	15	JEF15	Ⅱ	23.5	34	14	17	8	2	9
	20	JEF20		27.5	40	19	21	9	2	10
	25	JEF25		32	46	22	24	10	2	11
	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
Linear Way H(1)	15	JHS15	Ⅰ	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
	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
	55	JHS55		70	120	–	57	25	2	28
	65	JHS65		90	158	–	76	35	2	42
Linear Way F	33	JFFS33	Ⅱ	26(2)	66(3)	–	23	15	2	15
	37	JFFS37	Ⅱ	27.5(2)	70(3)	–	24	15	2	15
	40	JFS40	Ⅰ	32(2)	80	–	27	15	2	14
	42	JFFS42	Ⅱ	30.5(2)	76(3)	–	27.5	15	2	15
	60	JFS60	Ⅰ	36(2)	100	–	30	15	2	14
	69	JFFS69	Ⅱ	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.

Table 15.2 Dimensions of bellows and applicable models



Track rail side

Slide unit side

unit : mm

Series	Size	Bellows model code	*H*	*A*	*a*	*B*	P_1	P_2	ℓsmin	ℓsmax
Linear Roller Way Super X	15	JRES 15	34([1])	55	14	30	17.5	15	2	15
	20	JRES 20	39([1])	60	19	34	15	15	2	15
	25	JRES 25	42([1])	65	22	36	16.5	15	2	15
	30	JRES 30	46([1])	70	27	39.5	15	15	2	15
	35	JRES 35	48	88	33	41.5	24	15	2	15
	45	JRES 45	60	108	44	52	29	20	2	21
	55	JRES 55	70	122	52	61	31	22	2	23.5
	65	JRES 65	88	140	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
Linear Roller Way X	25	JRXS25…B	40	60	22	34	15	12	2	10
	35	JRXS35…B	48	88	34	41.5	24	15	2	14
	45	JRXS45…B	60	108	44	52	29	20	2	21
	55	JRXS55…B	70	122	54	61	31	22	2	23.5
	75	JRXS75…B	90	160	74	80	40	30	2	36

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.

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.

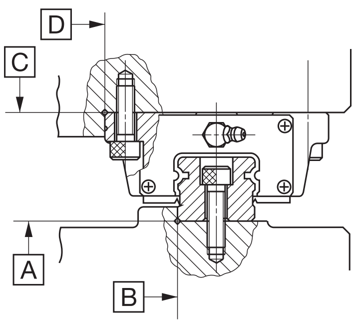


Fig. 5 Reference mounting surfaces and general mounting structure of Linear Way and Linear Roller Way

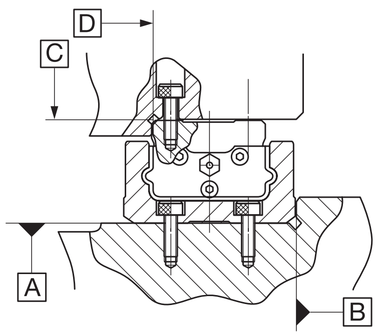


Fig. 6 Reference mounting surfaces and general mounting structure of Linear Way U

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.)

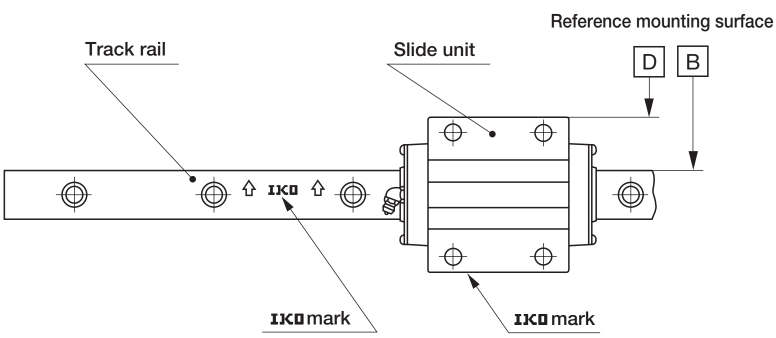


Fig. 7 Reference mounting surfaces of Linear Way and Linear Roller Way

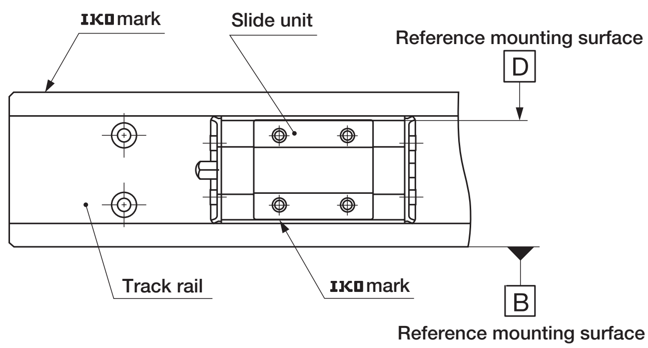


Fig. 8 Reference mounting surfaces of Linear Way U

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.

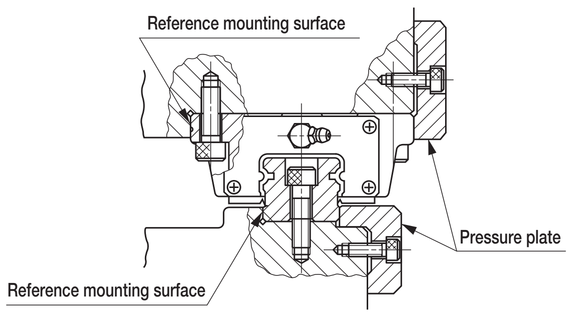


Fig. 9 Mounting example with pressure plate

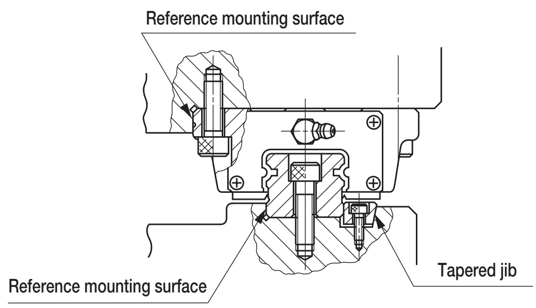


Fig. 10 Mounting example with tapered jib

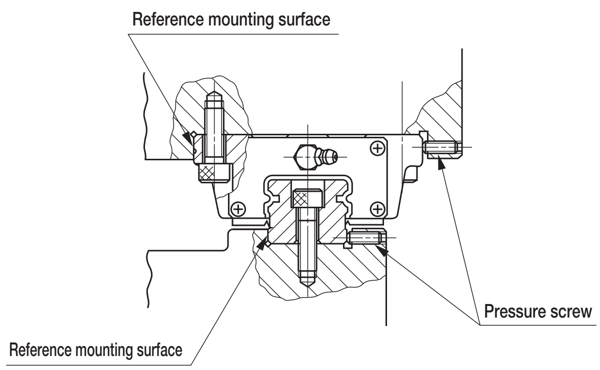


Fig. 11 Mounting example with pressure screw

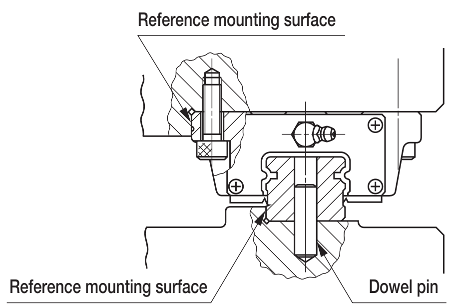


Fig. 12 Mounting example with dowel pin

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 H_4 shown in the dimension table.

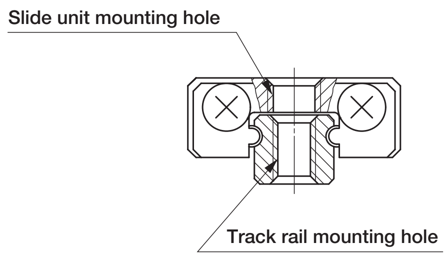


Fig. 13 Slide unit and track rail mounting holes of Linear Way L (Size 2, 3, 4 and 6 models)

Mounting of Linear Roller Way Super X and Linear Roller Way X slide unit

The general mounting structure of Linear Roller Way Super X and Linear Roller Way X slide unit 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.

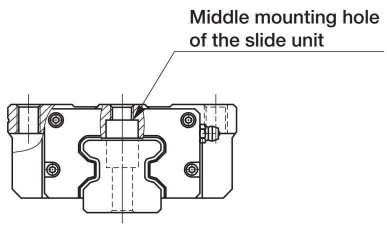


Fig. 14 Middle mounting hole of the slide unit

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 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.

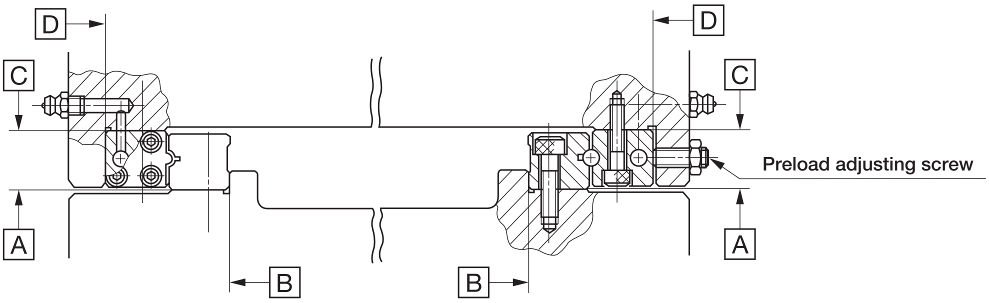


Fig. 15 Mounting of Linear Way Module

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.

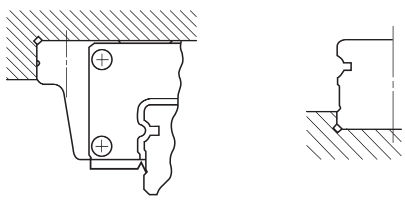


Fig. 16 Relieved fillet at the corner of the mating reference mounting surfaces

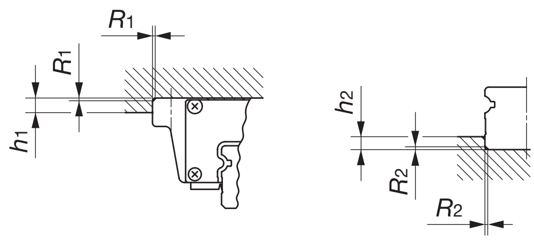
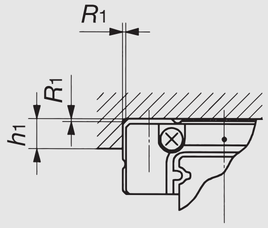
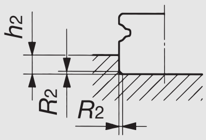


Fig. 17 Corner radii and shoulder heights of the mating reference mounting surfaces

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



Slide unit



Track rail

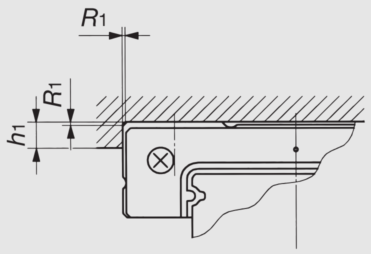
unit : mm

Model number	Slide unit		Track rail	
	Shoulder height h_1	Comer radius R_1 (max.)	Shoulder height[1] h_2	Comer radius R_2 (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

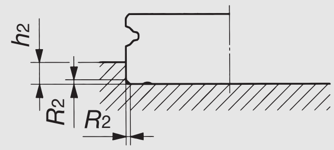
Note[1] : For models with under seals (/U), it is use h_2 values 1mm smaller than the values in the table.
However, for "with under seals" of the size 9 models, 0.8mm is recommended.

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

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



Slide unit



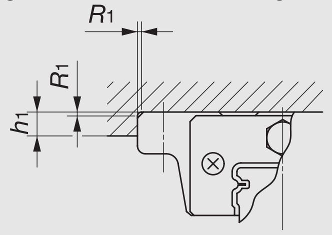
Track rail

unit : mm

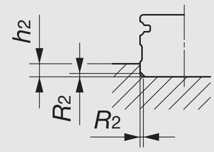
Model number	Slide unit		Track rail	
	Shoulder height h_1	Comer radius R_1 (max.)	Shoulder height(1) h_2	Comer radius R_2 (max.)
MLF 10	2	0.3	1.2	0.2
MLF 14	2.5	0.2	1.2	0.2
MLF 18	3	0.2	2.5	0.2
MLF 24	4	0.2	2.5	0.2
MLF 30	4.5	0.2	2.5	0.2
MLF 42	5	0.2	3	0.2

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-Sleeve Linear Way ME



Slide unit



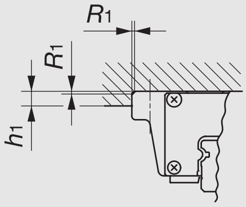
Track rail

unit : mm

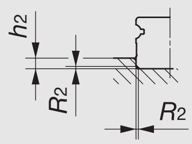
Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1 (max.)	Shoulder height h_2	Corner radius R_2 (max.)
ME(T) 15	4	1	3	0.5
MES 15		0.5		
ME(T) 20	5	1	3	0.5
MES 20		0.5		
ME(T) 25	6	1	4	1
MES 25				

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-Sleeve Linear Way MH



Slide unit



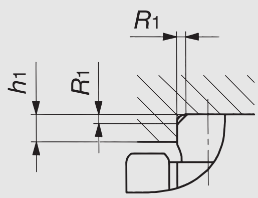
Track rail

unit : mm

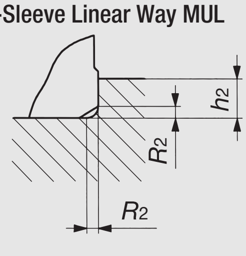
Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1 (max.)	Shoulder height h_2	Corner radius R_2 (max.)
MH 15	4	0.5	3	0.5
MH 20	5	0.5	3	0.5
MH 25	6	1	4	1

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-Sleeve Linear Way MUL



Slide unit



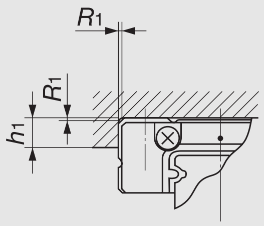
Track rail

unit : mm

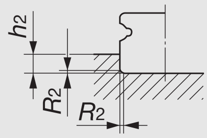
Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1 (max.)	Shoulder height h_2	Corner radius R_2 (max.) (1)
MUL 25	1.5	0.2	2.5	—
MUL 30	2.5	0.2	3	—

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

Table 20.1 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way L standard type



Slide unit



Track rail

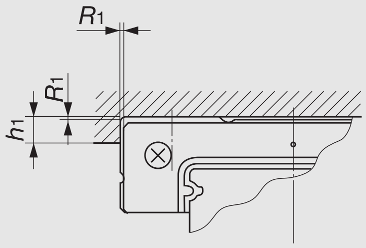
unit : mm

Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1 (max.)	Shoulder height[1] h_2	Corner radius R_2 (max.)
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				
LWL 7…B	2.5	0.2	1.2	0.2
LWL 7				
LWL 9…B	3	0.2	1.5	0.2
LWL 9…BCS		0.4		
LWL 9		0.2		
LWL 12…B	4	0.2	2.5	0.2
LWL 12…BCS		0.4		
LWL 12		0.2		
LWL 12…CS		0.4		
LWL 15…B	4.5	0.2	3	0.2
LWL 15…BCS		0.4		
LWL 15	4	0.2		
LWL 15…CS		0.4		
LWL 20…B	5	0.2	4	0.2
LWL 20…BCS		0.4		
LWL 25…B	6.5	0.7	4	0.7

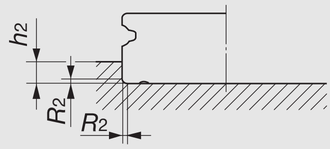
Note(1) : For models with under seals (/U), it is recommended to use h_2 values 1mm smaller than the values in the table.
However, for "with under seals" of the size 9 models, 0.8mm is recommended.

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

Table 20.2 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way L wide rail type



Slide unit



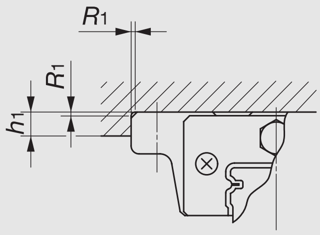
Track rail

unit : mm

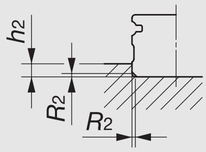
Model number	Slide unit – Shoulder height h_1	Slide unit – Corner radius R_1 (max.)	Track rail – Shoulder height[1] h_2	Track rail – Corner radius R_2 (max.)
LWLF 4	1.5	0.1	0.8	0.1
LWLF 6	2	0.1	0.8	0.1
LWLF 10 …B	2	0.3	1.2	0.2
LWLF 14 …B	2.5	0.2	1.2	0.2
LWLF 14				
LWLF 18 …B	3	0.2	2.5	0.2
LWLF 18 …BCS		0.4		
LWLF 18		0.2	1.5	
LWLF 18 …CS		0.4		
LWLF 24 …B	4	0.2	2.5	0.2
LWLF 24 …BCS		0.4		
LWLF 24	3	0.2		
LWLF 24 …CS		0.4		
LWLF 30 …B	4.5	0.2	2.5	0.2
LWLF 30 …BCS		0.4		
LWLF 42 …B	5	0.2	3	0.2
LWLF 42 …BCS		0.4		
LWLF 42	4	0.2	2.5	
LWLF 42 …CS		0.4		

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.

Table 21 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way E



Slide unit



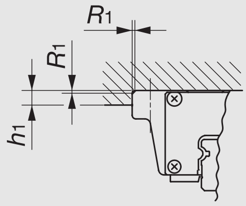
Track rail

unit : mm

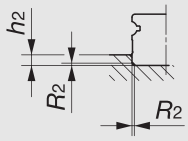
Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1(max.)	Shoulder height h_2	Corner radius R_2(max.)
LWE(T) 15	4	1	3	0.5
LWES 15		0.5		
LWE(T) 20	5	1	3	0.5
LWES 20		0.5		
LWE(T) 25	6	1	4	1
LWES 25				
LWE(T) 30	8	1	5	1
LWES 30				
LWE(T) 35	8	1	6	1
LWES 35				
LWE(T) 45	8	1.5	7	1.5
LWES 45				

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

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



Slide unit



Track rail

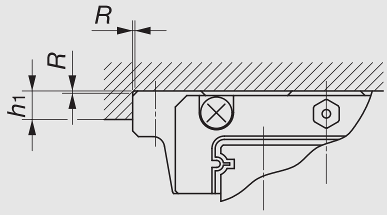
unit : mm

Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1(max.)	Shoulder height h_2	Corner radius 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 25…B	6	1	4	1
LWH 30…B	8	1	5	1
LWH 35…B	8	1	6	1
LWH 45…B	8	1.5	7	1.5
LWH 55…B	10	1.5	8	1.5
LWH 65…B	10	1.5	10	1.5

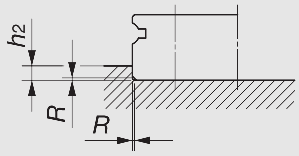
Note(1) : For models with under seals (/U), it is recommended to use h_2 values 0.6mm smaller than the values in the table.
Remark : The above table shows representative model numbers but is applicable to all models.

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

Table 23.1 Shoulder heights and corner radius of the mating reference mounting surfaces of Linear Way F



Slide unit

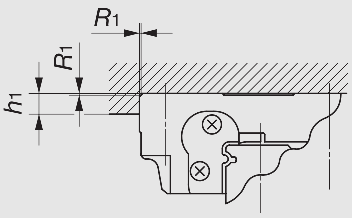


Track rail

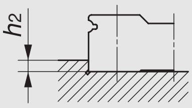
unit : mm

Model number	Slide unit Shoulder height h_1	Track rail Shoulder height h_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

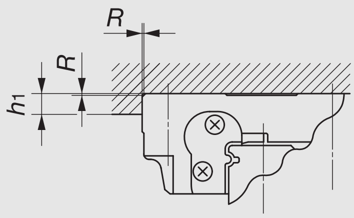
Table 23.2 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way F



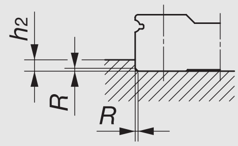
Slide unit



Track rail



Slide unit



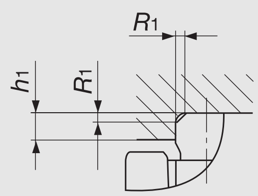
Track rail

When supplemental code "/CC" is specified

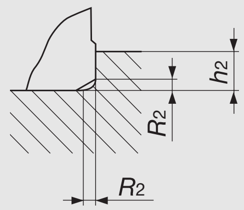
unit : mm

Model number	Slide unit Shoulder height h_1	Slide unit Corner radius R_1(max.)	Track rail Shoulder height h_2	Corner radius for "/CC" specification R(max.)
LWFH 40	4	0.3	3	1
LWFH 60	6	0.5	4	1
LWFH 90	8	0.5	6	1

Table 24 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Way U



Slide unit



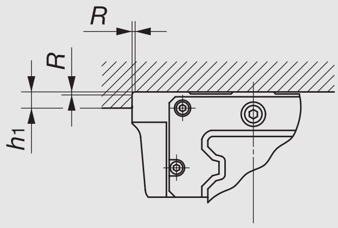
Track rail

unit : mm

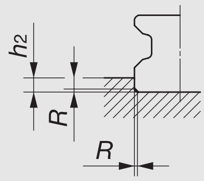
Model number	Slide unit		Track rail	
	Shoulder height h_1	Corner radius R_1 (max.)	Shoulder height h_2	Corner radius R_2 (max.) (1)
LWUL 25…B	1.5	0.2	2.5	—
LWUL 30…B	2.5	0.2	3	—
LWU 40…B	3	0.5	5	1
LWU 50…B	3	0.5	7	2
LWU 60…B	3	0.5	9	2
LWU 86…B	4	0.5	11	2
LWU 100	4	0.5	13	1
LWU 130	5	1	14	2

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

Table 25 Shoulder heights and corner radius of the mating reference mounting surfaces of Linear Roller Way Super X



Slide unit



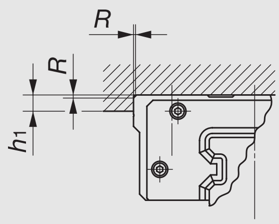
Track rail

unit : mm

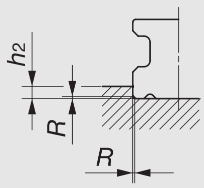
Model number	Slide unit Shoulder height h_1	Track rail Shoulder height h_2	Corner radius R(max.)
LRX 12	4	2	0.5
LRX 15	4	3	0.5
LRX 20	5	4	0.5
LRX 25	6	5	1
LRX 30	8	5.5	1
LRX 35	8	5.5	1
LRX 45	8	7	1.5
LRX 55	10	8	1.5
LRX 65	10	10	1.5
LRX 85	14	14	2.5
LRX 100	14	13	2.5

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

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



Slide unit



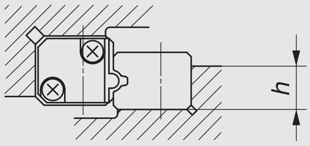
Track rail

unit : mm

Model number	Slide unit Shoulder height h_1	Ttrack rail Shoulder height h_2	Corner radius R(max.)
LRWX 25 …B	6	4	1
LRWX 35 …B **LRWXH 35**	8	5.5	1
LRWX 45 …B **LRWXH 45**	8	6	1
LRWX 55 …B **LRWXH 55**	10	8	1.5
LRWX 75 …B **LRWXH 75**	10	8	1.5

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

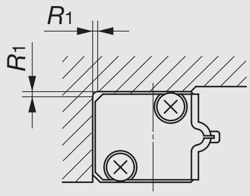
Table 27.1 Shoulder height of the mating reference mounting surface of Linear Way LM



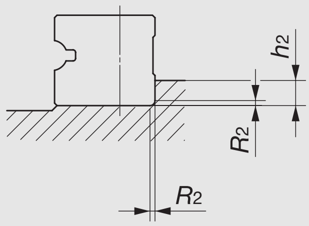
unit : mm

Model number	h
LWLM 7	4
LWLM 9	5
LWLM 11	6

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



Slide member

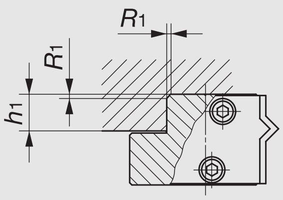


Track rail

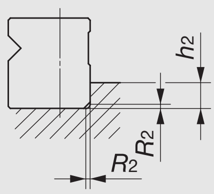
unit : mm

Model number	Slide member Corner radius R_1(max.)	Track rail 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

Table 27.3 Shoulder heights and corner radii of the mating reference mounting surfaces of Linear Roller Way M



Slide member



Track rail

unit : mm

Model number	Slide member		Track rail	
	Shoulder height h_1	Corner radius R_1(max.)	Shoulder height h_2	Corner radius R_2(max.)
LRWM 2	7	1	5	1
LRWM 3	8.5	1	6	1
LRWM 4	10.5	1.5	6	1
LRWM 5	12.5	1.5	8	1
LRWM 6	14.5	2	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 IKO.
In the case of C-Sleeve Linear Way and the models "with Capillary plates" of special specification, operate below 80°C.

Cleaning

Do not wash C-Sleeve 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 IKO 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 .

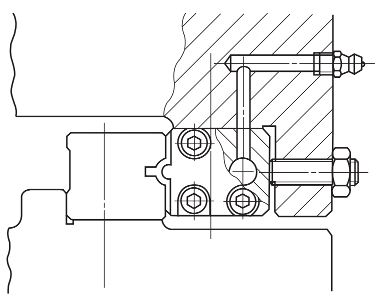


Fig.18 Example of lubrication method for Linear Way Module

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-Sleeve Linear Way ML and Linear Way L
  When assembling C-Sleeve 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-Sleeve 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 IKO for further information.

Table 29 Models to which a steel ball holder is appended

C-Sleeve Linear 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-Sleeve 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-Sleeve Linear Way ML, Linear Way L and Linear Way LM

In C-Sleeve Linear Way ML, Linear Way L Ball Retained type and Linear Way 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	30		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.

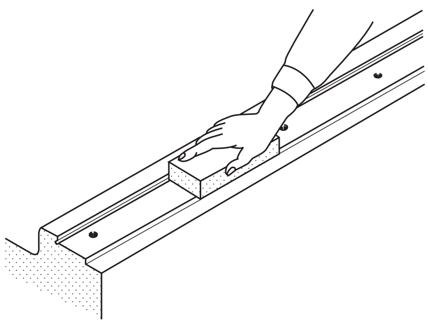


Fig. 19 Cleaning of mounting surfaces

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.

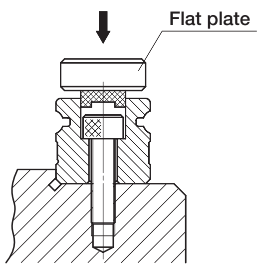


Fig. 20 Plugging-in of caps for rail mounting holes

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

Bolt size	Tightening torque N・m	
	Carbon steel bolt (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	—
M 30 × 3.5	1 750	—

Remark 1 : For C-Sleeve 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-Sleeve Linear Way ML, Linear Way L, Linear Way LM and the size 8, 10 and 12 models of Linear Way H

Bolt size	Tightening torque N・m	
	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

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

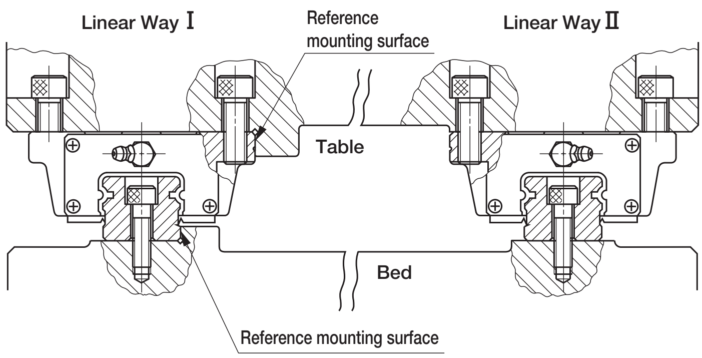


Fig. 21 Example 1

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.)

❶ 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.

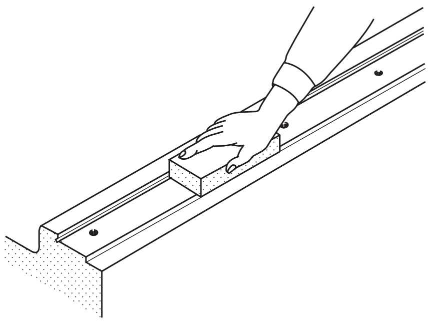


Fig. 22 Cleaning of mounting surfaces

❷ 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.

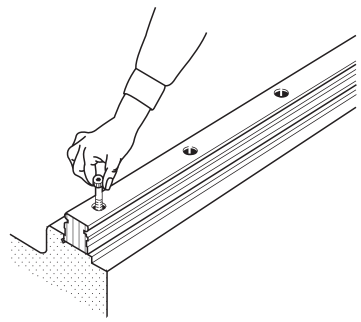


Fig. 23 Temporary fixing of track rail

❸ 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.

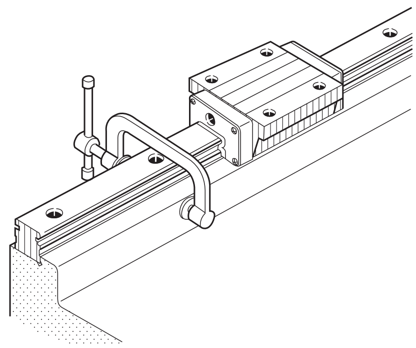


Fig. 24 Fixing of datum side track rail to the bed

❹ 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.

❺ 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.

❻ 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.)

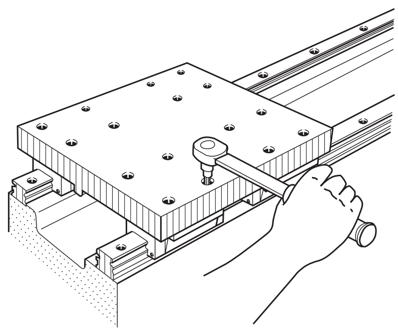


Fig. 25 Fixing of the slide units to the table

❼ Final fixing of Linear Way Ⅱ 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.)

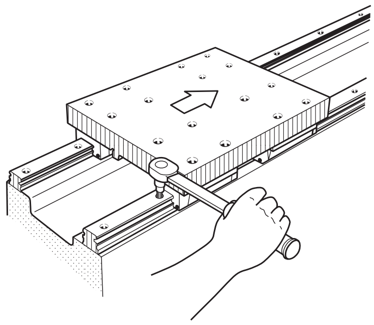


Fig. 26 Fixing of attendant side track rail

❽ 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 Operation requiring accurate movement and rigidity

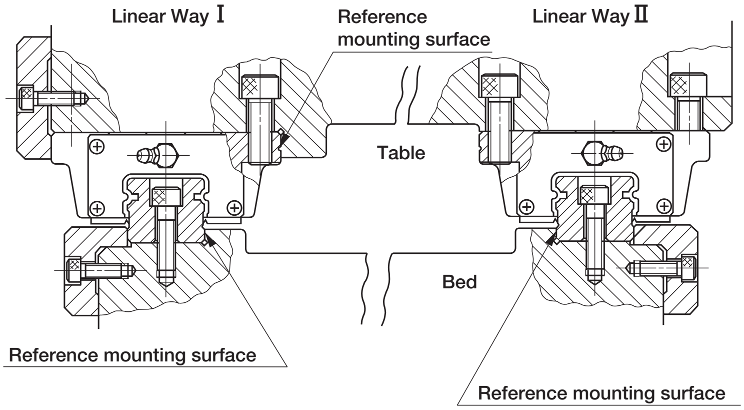


Fig. 27 Example 2

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. 27.)

❶ 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. 28.)

- Remove rust preventive oil and dirt from Linear Way reference mounting surfaces and mounting surfaces with clean cloth.

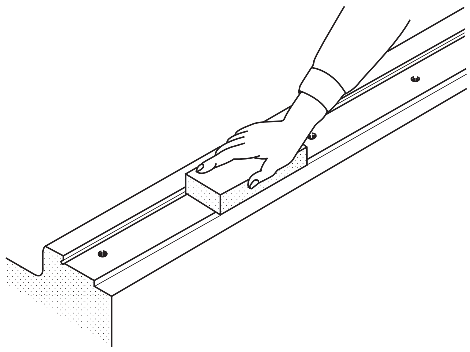


Fig. 28 Cleaning of mounting surfaces

❷ 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. 29.)

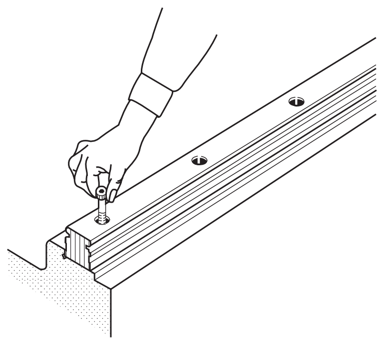


Fig. 29 Temporary fixing of track rail

❸ 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. 30.)

- Fix Linear Way Ⅱ track rail in the same way.

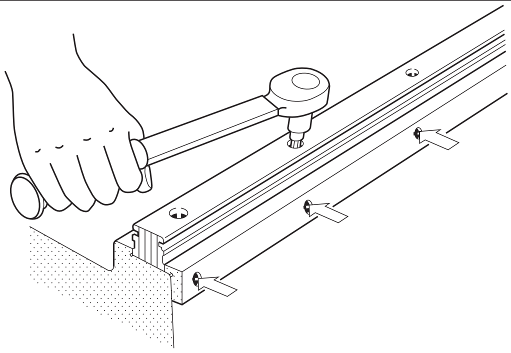


Fig. 30 Fixing of track rail using pressure plate

❹ 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.

❺ 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 screws.

❻ 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. 31.)

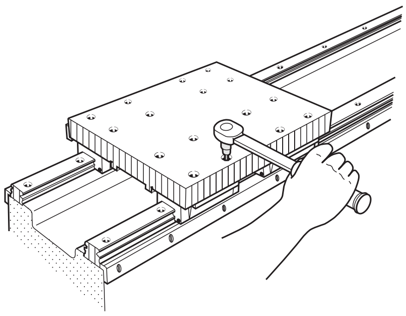


Fig.31 Fixing of slide units to the table

Example 3 Separate mounting of slide units from track rails

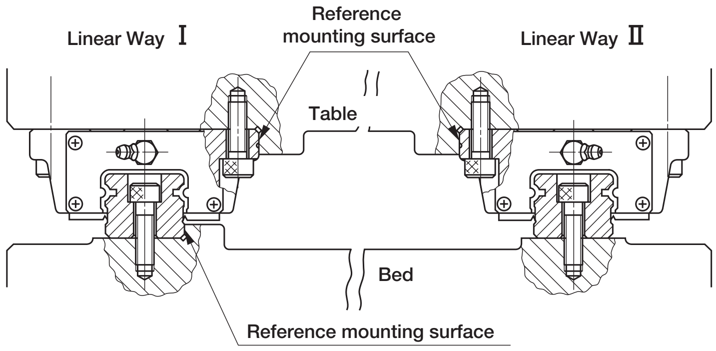


Fig. 32 Example 3

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. 32.)

❶ 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. 33.)

- Remove rust preventive oil and dirt from Linear Way reference mounting surfaces and mounting surfaces with clean cloth.

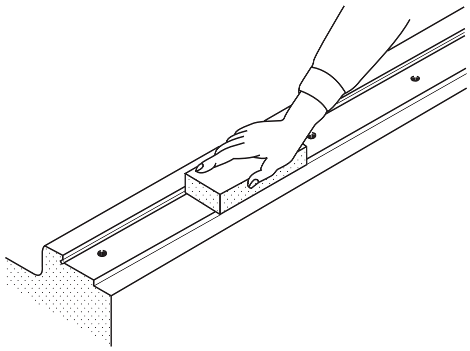


Fig. 33 Cleaning of mounting surfaces

❷ 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. 34.)
  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.

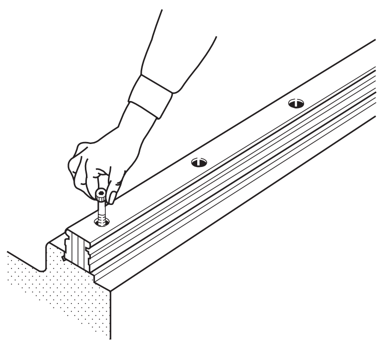


Fig. 34 Temporary fixing of track rail

❸ 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 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. 35.)

- At this stage, leave Linear Way Ⅱ track rail temporarily fixed.

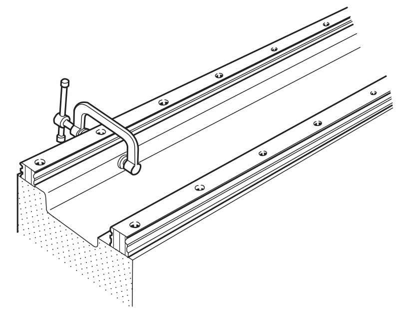


Fig. 35 Fixing of track rail

❹ 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.

❺ 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. 36.)

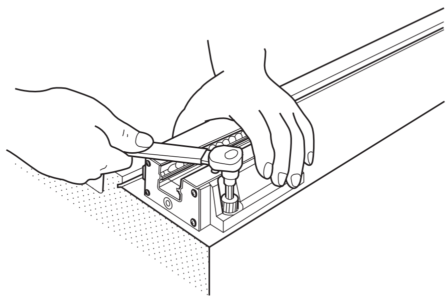


Fig. 36 Fixing of slide unit

❻ 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.

❼ Fixing of Linear Way Ⅱ track rail

- Fix the track rail of Linear Way Ⅱ 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 Ⅱ just passed. Fix the track rail by repeating this procedure from one rail end to the other.

Example 4 Assembly of Linear Way Module

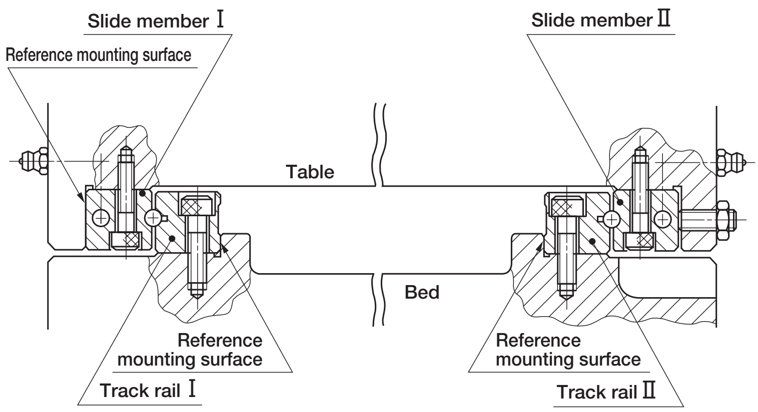


Fig. 37 Example 4

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. 37.)

❶ 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. 38.)
- Remove rust preventive oil and dirt from Linear Way Module reference mounting surfaces and mounting surfaces with clean cloth.

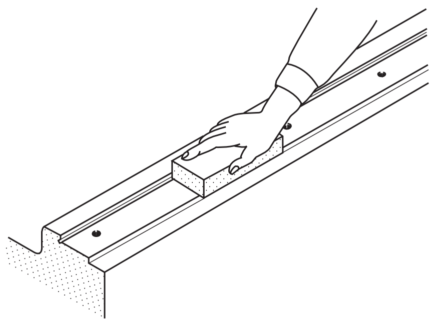


Fig. 38 Cleaning of mounting surfaces

❷ 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. 39.)

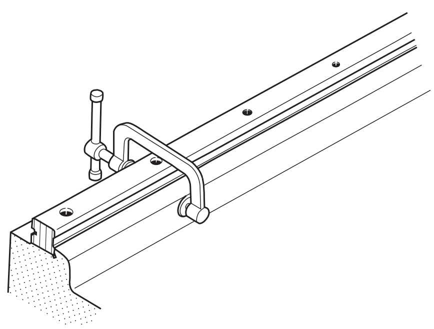


Fig. 39 Fixing of track rail

❸ 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. 40.)

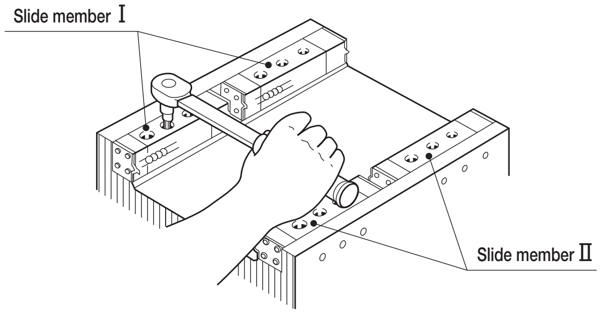


Fig. 40 Fixing of slide members

❹ 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.

❺ Final fixing of slide member Ⅱ

- While measuring the clearance with a dial gauge as shown in Fig. 41, 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.

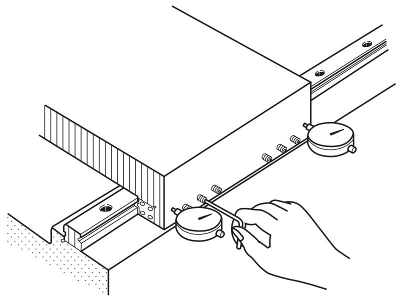


Fig. 41 Preload adjustment

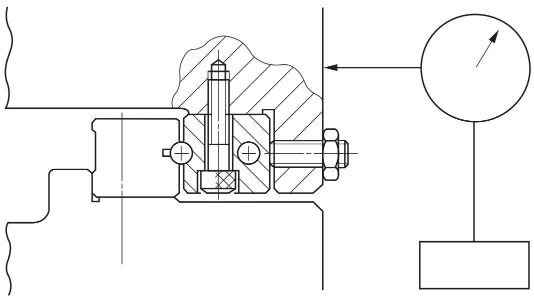


Fig. 42 Example of preload adjustment checking method

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.

❶ 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.

❷ 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. 43. 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.

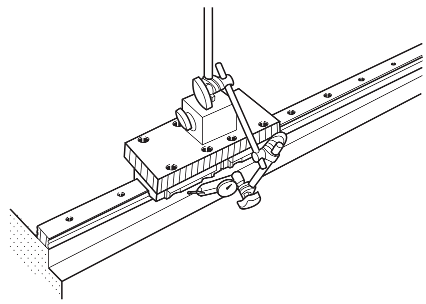


Fig. 43 Mounting by using a temporary reference surface

❸ 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. 44. 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.

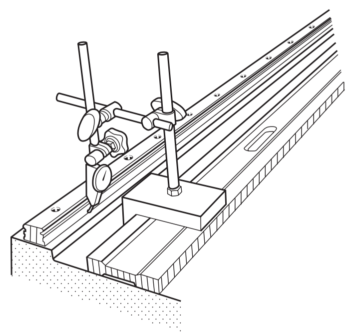


Fig. 44 Mounting by using a straight-edge

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.

❶ 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.

❷ 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.

❸ 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.

❹ Use of datum side Linear Way

As shown in Fig. 45, 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.

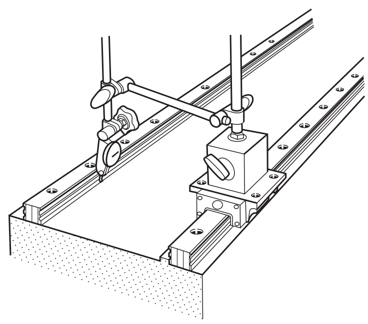


Fig. 45 Mounting by using Linear Way of datum side

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. 46 is indicated on the top face of track rail end. Procedures for mounting jointing track rails are generally as follows.

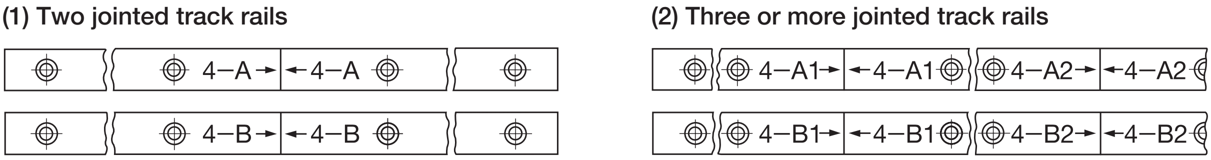


Fig. 46 Butt-jointing match marks

❶ 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.

❷ 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. 47.)

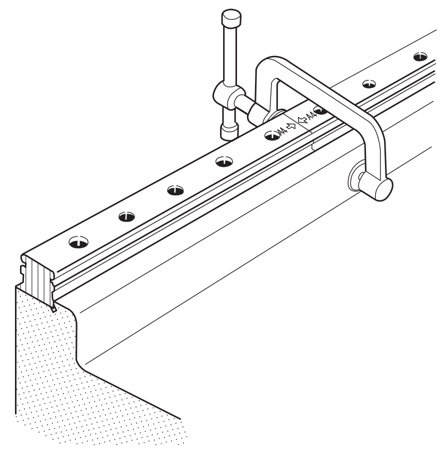
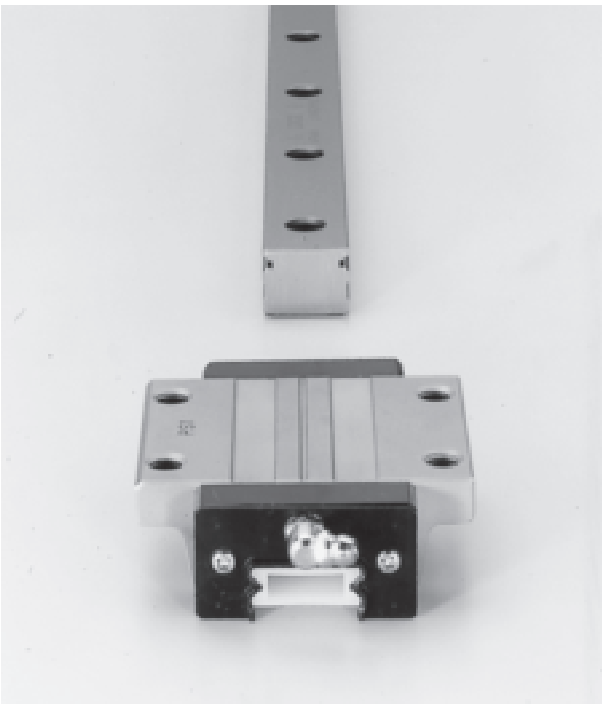


Fig. 47 Fixing of butt-jointing track rails



C-Sleeve Linear Ways

Description of each series and Table of dimensions

A

Miniature type

C-Sleeve Linear Way ML

Page A-2 to A-17

Compact type

C-Sleeve Linear Way ME

Page A-18 to A-33

High Rigidity type

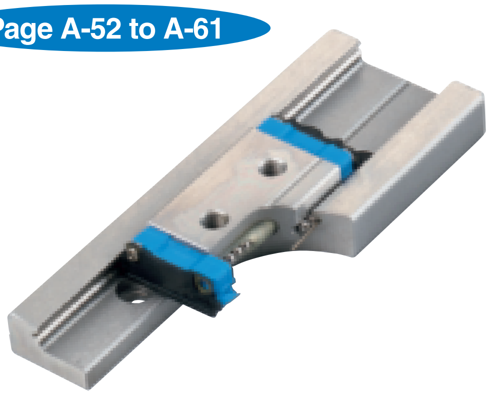
C-Sleeve Linear Way MH

Page A-34 to A-51

U-shaped track rail type

C-Sleeve Linear Way MUL

Page A-52 to A-61



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-Sleeve Linear Way ML

ML／MLF

IKO C-Sleeve Linear Way ML is a linear motion rolling guide, incorporating the C-Sleeve 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-Sleeve 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 L series without changing the external dimensions of the slide unit.

Smooth and light motion

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

Stainless steel made

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.

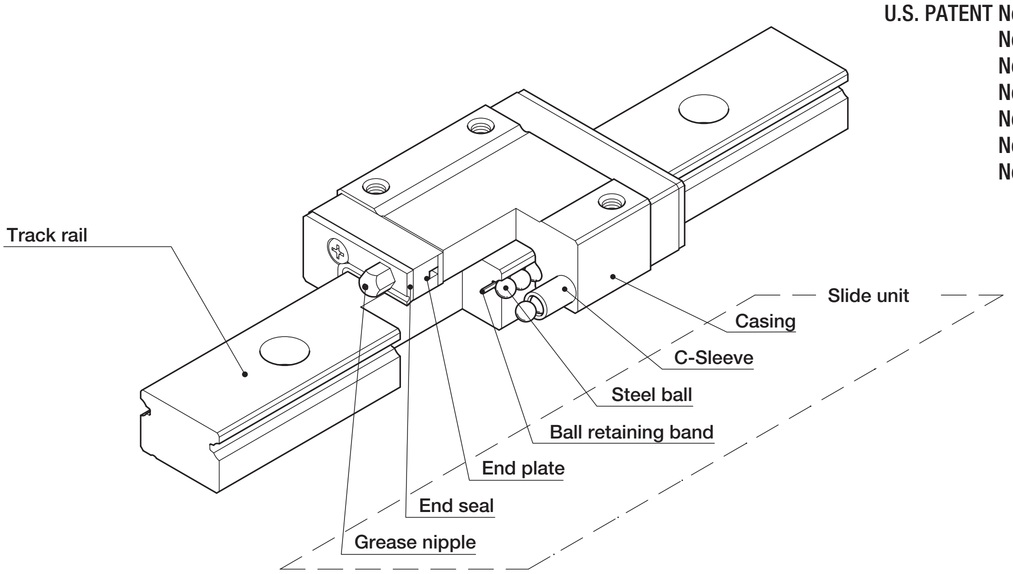
Ball retained type

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

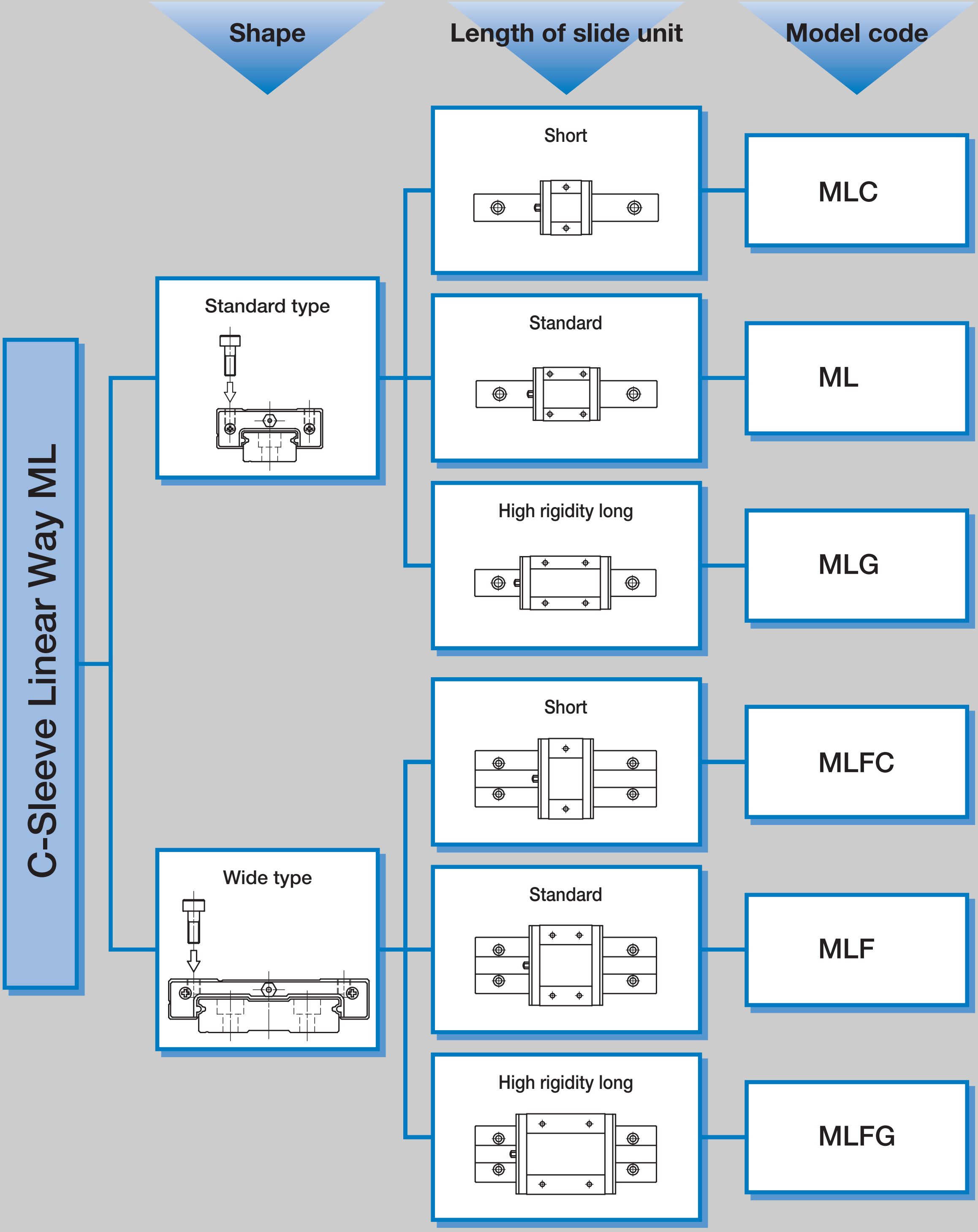
The track rails and the slide units of interchangeable specification can be handled separately and can be assembled to make a set as required. Three types of slide units with different lengths are prepared. The best type and size can be selected these entire slide units can be freely assembled on the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

U.S. PATENT No.6,729,761
No.6,712,511
No.5,435,649
No.5,289,779
No.5,250,126
No.4,652,147
No.4,505,522



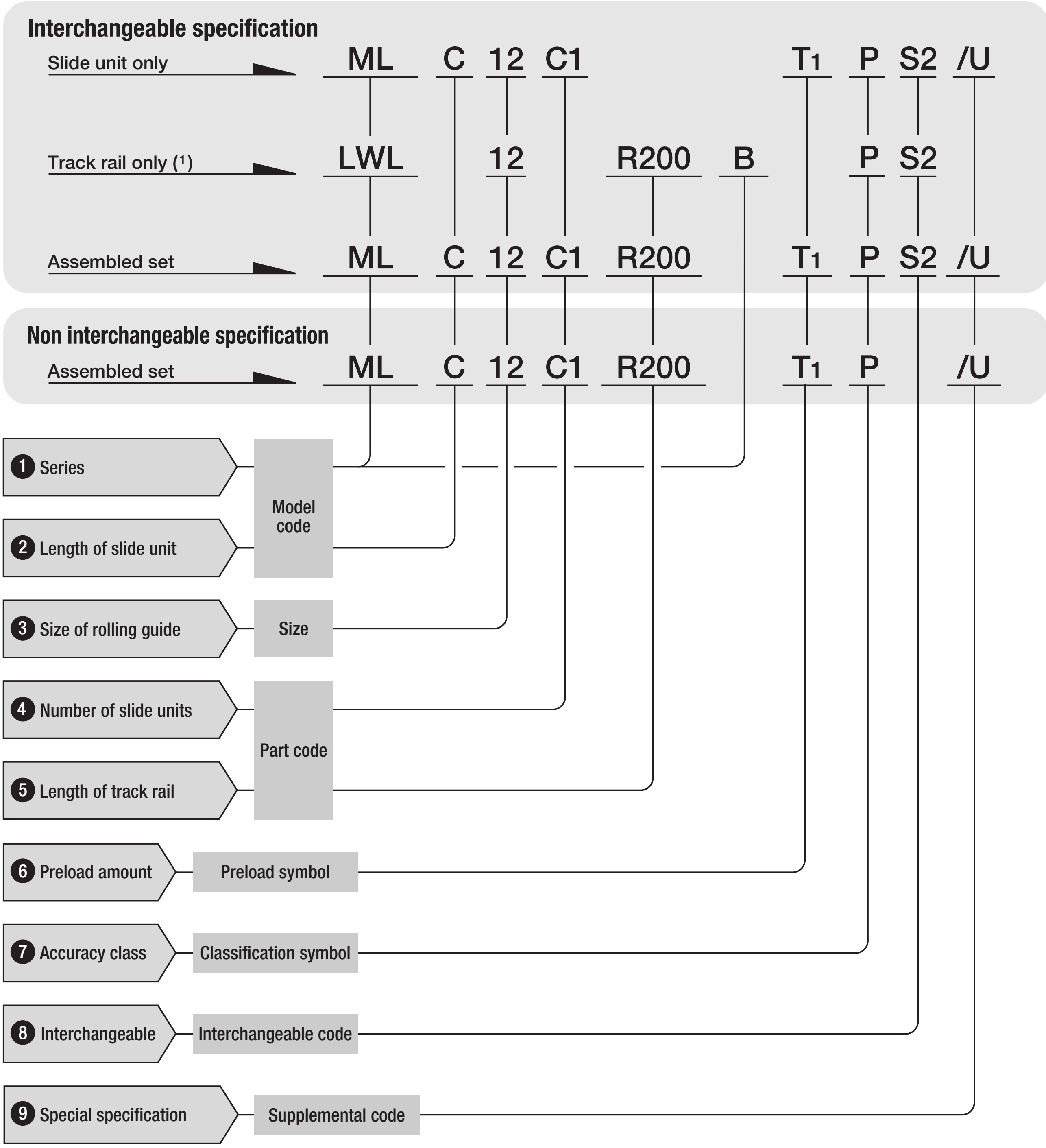
Structure of C-Sleeve Linear Way ML

Variation of IKO C-Sleeve Linear Way ML



Identification number and specification

The specification of C-Sleeve 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 76.



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-Sleeve Linear Way ML

Type / Size	Stainless steel		
	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-Sleeve Linear Way MLF

Type / Size	Stainless steel		
	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○
Slide unit only : C1

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

Assembled set : R○
Track rail only : R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page A-8.

6 Preload amount

Clearance	: T_0	
Standard	: No symbol	
Light preload	: T_1	

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 84.

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

Size		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	42	☆	☆	☆
25	–	☆	☆	☆

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

7 Accuracy class

High class	: H
Precision class	: P

In interchangeable specification, please combine same accuracy codes on both slide unit and track rail. For detail of accuracy, see page 79.

8 Inetrchangeable

Select group 1	: S1
Select group 2	: S2

Specify this item for the 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.

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 86.

Table 4 Applicable specifications

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

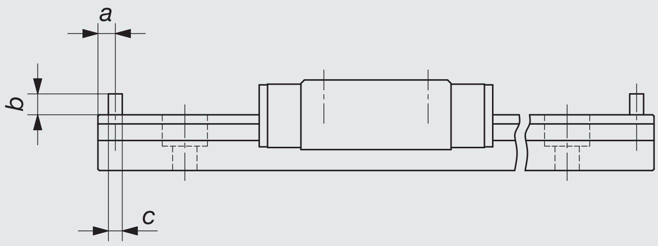
Note(1) **:** Not applicable to size 5 and 10.
(2) **:** Not applicable to size 5, 7, 10 and 14.
Remark : The mark ☆ indicates that it is also applicable to interchangeable specification.

Table 5 Combination of special specifications

	A	D	E	I	LR	MN	N	S	U
D	○								
E	–	–							
I	○	○	○						
LR	–	○	○	○					
MN	○	☆	☆	○	○				
N	○	☆	☆	○	○	☆			
S	○	○	○	○	○	○	○		
U	○	☆	☆	○	○	☆	–	○	
W	○	○	–	○	○	○	○	○	○

Remark 1 : In the table, the mark ○ 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)



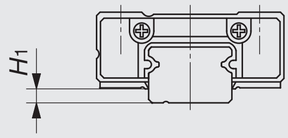
unit : mm

Model number	*a*	*b*	*c*
ML 5	2	2	1.6
ML 7	2.5	2.5	2
ML 9		3	
ML 12			
ML 15		4	
ML 20		5	
ML 25	3.5		

Model number	*a*	*b*	*c*
MLF 10	2.5	2	1.6
MLF 14		3	2
MLF 18			
MLF 24			
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 H_1 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	2
MLF 24	
MLF 30	
MLF 42	3

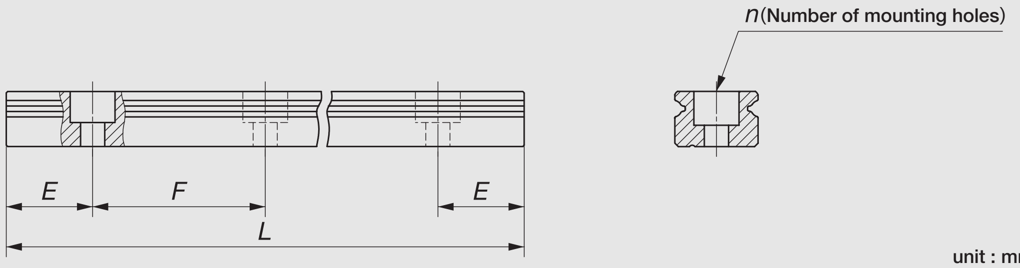
Note(1) : H_1 dimension of size 25 (ML25) is the same as the dimension without under seals.
Remark : The table shows representative model numbers but is applicable to all models of the same size of ML and MLF series.

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-Sleeve Linear Way ML (Standard type) Standard and maximum lengths of track rails



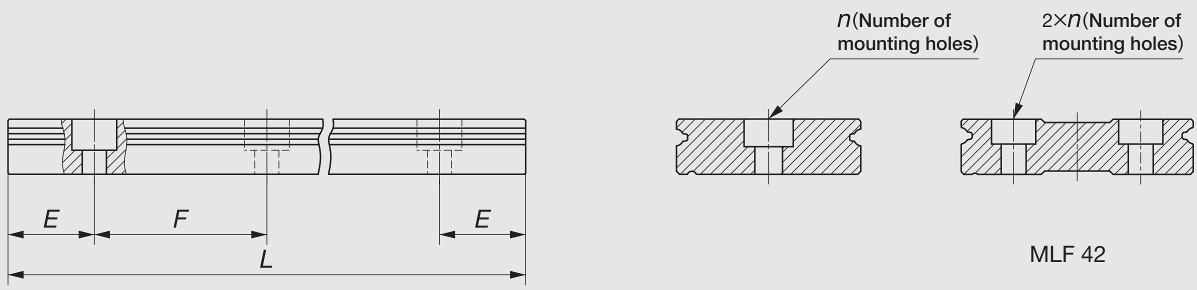
unit : mm

Model number / Item		ML 5	ML 7	ML 9	ML 12
Standard length *L* (*n*)		60(4) 90(6) 105(7) 120(8) 150(10)	60(4) 90(6) 120(8) 150(10) 180(12) 240(16)	60(3) 80(4) 120(6) 160(8) 220(11) 280(14)	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 dimension *E* [1]	Over (Incl.)	4	4.5	4.5	5
	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 / Item		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 dimension *E* [1]	Over (Incl.)	5.5	8	9
	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 IKO.
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.

Table 8.2 C-Sleeve Linear Way MLF (Wide type) Standard and maximum lengths of track rails



unit : mm

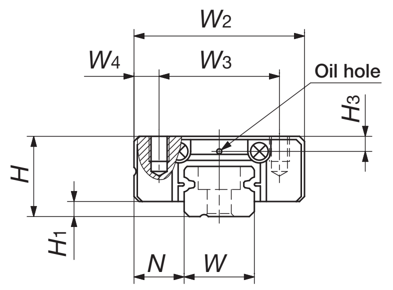
Item \ Model number		MLF 10	MLF 14	MLF 18	MLF 24
Standard length *L* (*n*)		60(3) 80(4) 120(6) 160(8) 220(11) 280(14)	90(3) 120(4) 150(5) 180(6) 240(8) 300(10)	90(3) 120(4) 150(5) 180(6) 240(8) 300(10)	120(3) 160(4) 240(6) 320(8) 400(10) 480(12)
Mounting hole pitch *F*		20	30	30	40
E		10	15	15	20
Reference dimension *E* (1)	Over (Incl.)	4.5	5.5	5.5	6.5
	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 rails for butt jointing		7	8	3	3
Maximum length of butt jointing track rails		1 840	1 950	1 920	1 840

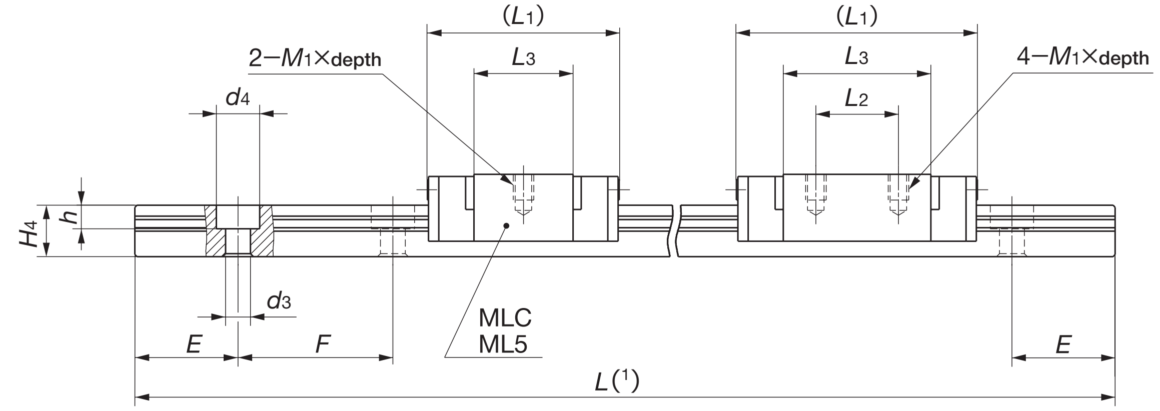
Item \ Model number		MLF 30	MLF 42
Standard length *L* (*n*)		160(4) 240(6) 320(8) 440(11) 560(14) 680(17)	160(4) 240(6) 320(8) 440(11) 560(14) 680(17)
Mounting hole pitch *F*		40	40
E		20	20
Reference dimension *E* (1)	Over (Incl.)	6.5	6.5
	Under	26.5	26.5
Maximum length(2)		680 (2 000)	680 (2 000)
Maximum number of track rails for butt jointing		3	3
Maximum length of butt jointing track rails		1 840	1 840

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 IKO.
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.

IKO C-Sleeve Linear Way ML Standard type

MLC
ML
MLG

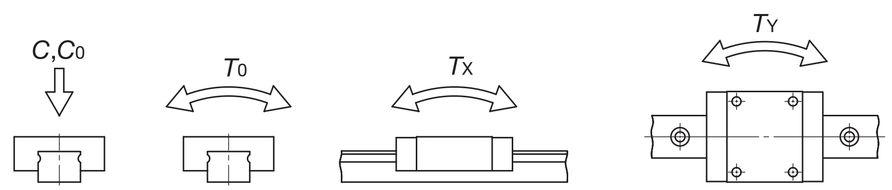




Model number	Interchangeable	Mass (Reference) g: Slide unit	Mass (Reference) g: Track rail (per 100mm)	Dimension of assembly mm: H	H_1	N	Dimension of slide unit mm: W_2	W_3	W_4	L_1	L_2	L_3	M_1×depth
MLC 5	☆	3.4	12	6	1	3.5	12	8	2	16	—	9.6	M2×1.5
ML 5	☆	4.3								19		12.6	
MLC 7	☆	6.7	22	8	1.5	5	17	12	2.5	19	—	9.6	M2×2.5
ML 7	☆	9.1								23.5	8	14.3	
MLG 7	☆	13								31	12	21.6	
MLC 9	☆	11	35	10	2	5.5	20	15	2.5	21.5	—	11.9	M3×3
ML 9	☆	18								30	10	20.8	
MLG 9	☆	26								40.5	15	30.9	
MLC 12	☆	22	65	13	3	7.5	27	20	3.5	25	—	13	M3×3.5
ML 12	☆	34								34	15	21.6	
MLG 12	☆	48								44	20	32	

Model number	H_3	Dimension of track rail mm: W	H_4	d_3	d_4	h	E	F	Appended mounting bolt for track rail mm: Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N•m	T_X N•m	T_Y N•m
MLC 5	1.2	5	3.7	2.4	3.6	0.8	7.5	15	Cross-recessed head cap screw for precision equipment M2×6	562	841	2.2	1.4 8.5	1.2 7.2
ML 5										676	1 090	2.9	2.3 12.8	1.9 10.8
MLC 7	1.5	7	5	2.4	4.2	2.3	7.5	15	Hexagon socket head bolt M2×6	937	1 140	4.1	1.8 14.9	1.5 12.5
ML 7										1 330	1 890	6.9	4.7 28.2	3.9 23.6
MLG 7										1 690	2 650	9.7	8.8 50.7	7.4 42.5
MLC 9	2.2	9	6	3.5	6	3.5	10	20	Hexagon socket head bolt M3×8	1 180	1 480	6.9	2.9 21.4	2.4 18.0
ML 9										1 810	2 760	12.8	9.1 51.1	7.6 42.9
MLG 9										2 370	4 030	18.7	18.7 98.3	15.7 82.5
MLC 12	2.7	12	8	3.5	6.5	4.5	12.5	25	Hexagon socket head bolt M3×8	2 210	2 380	14.8	5.3 41.7	4.5 35.0
ML 12										3 330	4 290	26.6	15.4 93.1	12.9 78.2
MLG 12										4 310	6 200	38.4	30.6 168	25.7 141

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 99.



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

ML 9 C2 R160 T1 P S2 /U

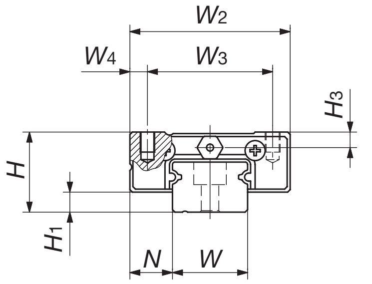
- ML — Series: MLC, ML, MLG
- 9 — Size
- C2 — Number of slide unit (two slide units)
- R160 — Length of track rail (160 mm)
- T_1 — Preload amount: Clearance : T_0; Standard : No symbol; Light preload : T_1
- P — Accuracy class: High : H; Precision : P
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /U — Special specification: With under seals : /U

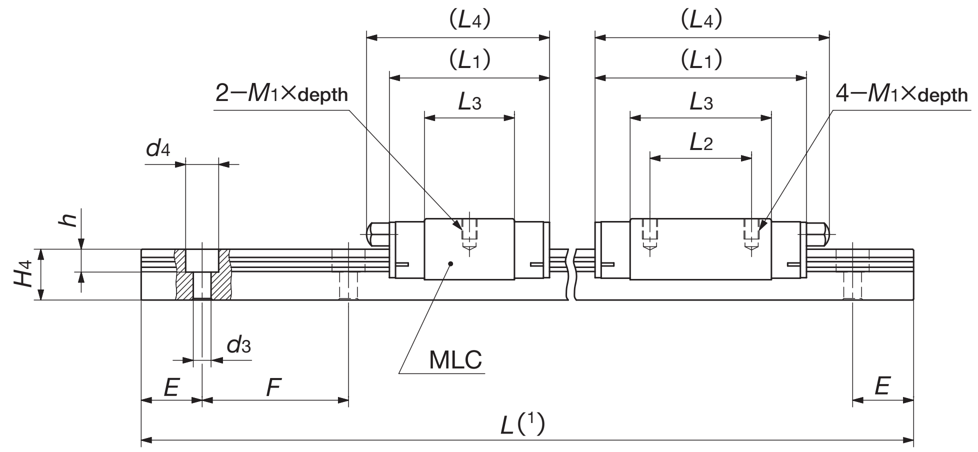
※In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable ML ➡ Model code LWL···B (Ex: LWL9R160BPS2)

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

C-Sleeve Linear Way ML Standard type

MLC
ML
MLG

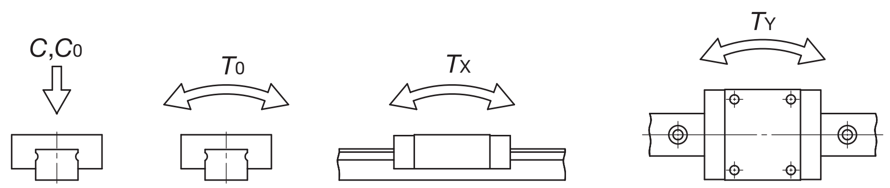




Model number	Interchangeable	Mass (Reference) g Slide unit	Mass (Reference) g Track rail (per 100mm)	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
MLC 15	☆	43								32	−	17.8	36	
ML 15	☆	63	107	16	4	8.5	32	25	3.5	42	20	27.9	47	M3×4
MLG 15	☆	93								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	

Model number	Dimension of track rail mm H_3	W	H_4	d_3	d_4	h	E	F	Appended mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
MLC 15										3 490	3 890	30.0	11.7 84.5	9.8 70.9
ML 15	3.1	15	10	3.5	6.5	4.5	20	40	Hexagon socket head bolt M3×10	4 980	6 490	50.0	29.7 172	24.9 144
MLG 15										6 620	9 740	75.0	63.9 338	53.6 284
MLC 20										4 580	5 300	54.0	19.4 134	16.3 112
ML 20	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
MLG 20										8 510	12 900	131	102 529	85.7 444
MLC 25										9 120	10 600	128	57.4 380	48.1 319
ML 25	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
MLG 25										16 700	25 200	303	293 1 480	246 1 240

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 97.



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

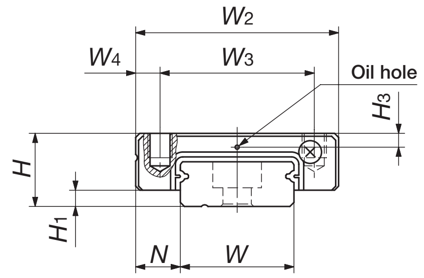
ML 20 C2 R240 T1 P S2 /U

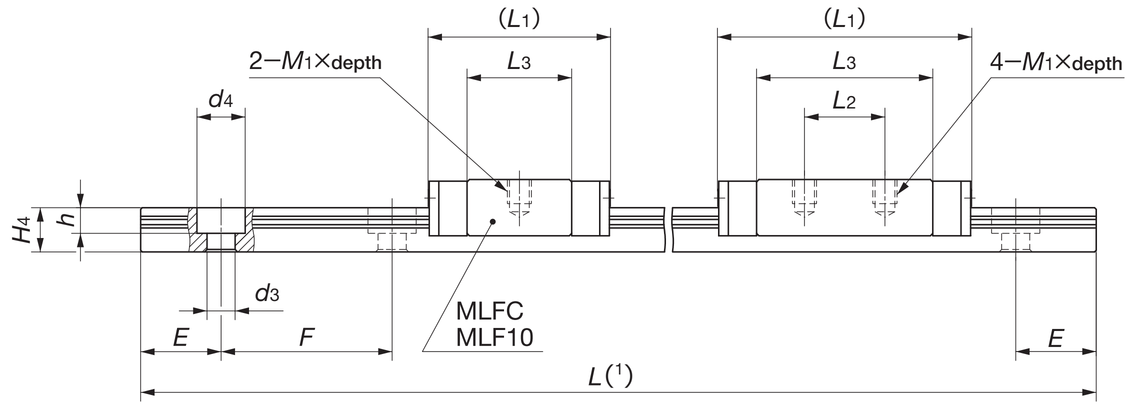
- ML — Series: MLC, ML, MLG
- 20 — Size
- C2 — Number of slide unit (two slide units)
- R240 — Length of track rail (240 mm)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- P — Accuracy class: High : H; Precision : P
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /U — Special specification: With under seals : /U

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

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

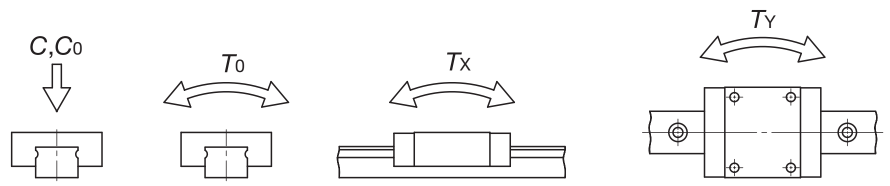
MLFC
MLF
MLFG





Model number	Interchangeable	Mass (Reference) g: Slide unit	Mass (Reference) g: Track rail (per 100mm)	Dimension of assembly mm: H	H_1	N	Dimension of slide unit mm: W_2	W_3	W_4	L_1	L_2	L_3	M_1 × depth	H_3	Dimension of track rail mm: W	H_4	d_3	d_4	h	E	F	Appended mounting bolt for track rail mm: Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
MLFC 10	☆	6.1	28	6.5	1.5	3.5	17	13	2	20.5	—	13.6	M2.5 ×1.5	1.3	10	4	2.9	4.8	1.6	10	20	Cross-recessed head cap screw for precision equipment M2.5×7	712	1 180	6.1	2.6 14.9	2.2 12.5
MLF 10	☆	7.6								24.5		17.6											849	1 510	7.8	4.2 22.4	3.5 18.8
MLFC 14	☆	13	54	9	2	5.5	25	19	3	22.5	—	13	M3 ×3	1.7	14	5.5	3.5	6	3.2	15	30	Hexagon socket head bolt M3×8	1 240	1 700	12.2	3.8 24.6	3.2 20.7
MLF 14	☆	20								31.5	10	22											1 770	2 840	20.3	10.1 54.7	8.4 45.9
MLFG 14	☆	29								42	19	32.5											2 320	4 160	29.8	21.0 104	17.6 87.6
MLFC 18	☆	26	90	12	3	6	30	21	4.5	26.5	—	16.6	M3 ×3	2.5	18	7	3.5	6.5	4.5	15	30	Hexagon socket head bolt M3×8	1 510	2 120	19.4	5.5 35.9	4.7 30.1
MLF 18	☆	42								39	12	28.6											2 280	3 810	34.9	16.9 90.1	14.2 75.6
MLFG 18	☆	59						23	3.5	50.5	24	40.4											2 870	5 300	48.5	31.9 159	26.7 134
MLFC 24	☆	46	139	14	3	8	40	28	6	30.5	—	17.7	M3 ×3.5	3.2	24	8	4.5	8	4.5	20	40	Hexagon socket head bolt M4×10	2 800	3 340	40.7	9.7 67.6	8.2 56.8
MLF 24	☆	74								44	15	31											4 310	6 200	75.6	30.6 168	25.7 141
MLFG 24	☆	108								59	28	46.3											5 620	9 060	111	63.3 321	53.1 270

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 MLF10 to MLF24 models.
4 : For specification of oil hole, see page 99.



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

MLF 14 C2 R240 T1 P S2 /U

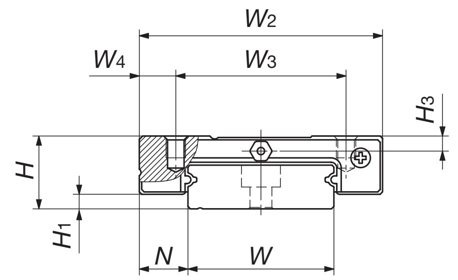
- MLF — Series: MLFC, MLF, MLFG
- 14 — Size
- C2 — Number of slide unit (two slide units)
- R240 — Length of track rail (240 mm)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- P — Accuracy class: High : H; Precision : P
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /U — Special specification: With under seals : /U

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

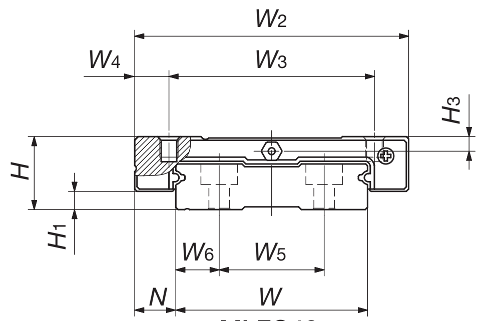
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

C-Sleeve Linear Way MLF Wide type

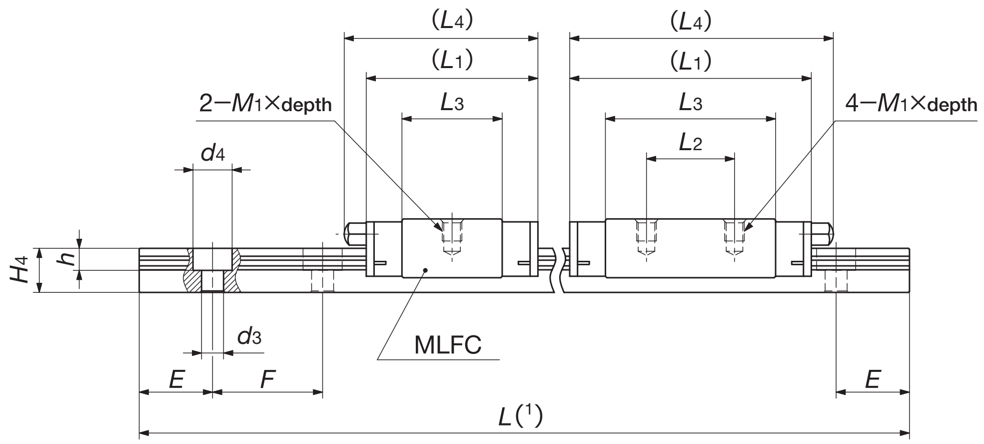
MLFC
MLF
MLFG



MLFC30
MLF 30
MLFG30



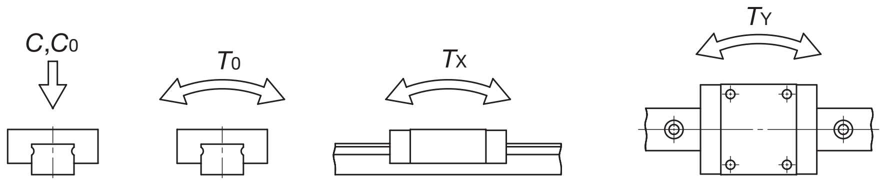
MLFC42
MLF 42
MLFG42



Model number	Interchangeable	Mass (Reference) g Slide unit	Mass (Reference) g Track rail (per 100mm)	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_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		

Dimension of track rail mm W	H_4	W_5	W_6	d_3	d_4	h	E	F	Appended mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
										3 890	4 540	69.1	15.4 107	13.0 89.9
30	9	—	—	4.5	8	4.5	20	40	Hexagon socket head bolt M4×12	5 970	8 440	128	48.7 259	40.8 217
										7 810	12 300	187	100 508	84.3 426
										5 440	6 810	144	30.8 180	25.8 151
42	10	23	9.5	4.5	8	4.5	20	40	Hexagon socket head bolt M4×12	7 050	9 840	209	61.3 333	51.4 280
										9 520	15 100	321	140 674	117 565

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 97.



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

MLF 42 C2 R320 T1 P S2 /U

- MLF — Series: MLFC, MLF, MLFG
- 42 — Size
- C2 — Number of slide unit (two slide units)
- R320 — Length of track rail (320 mm)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- P — Accuracy class: High : H; Precision : P
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /U — Special specification: With under seals : /U

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

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

C-Sleeve Linear Way ME

ME／MET／MES

IKO C-Sleeve Linear Way ME is a linear motion rolling guide, incorporating the C-Sleeve 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-Sleeve 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-Sleeve 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.

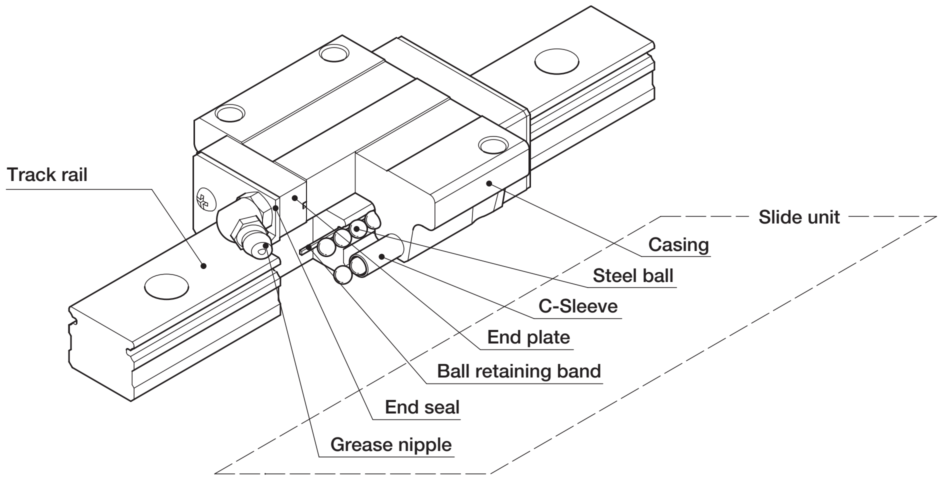
Flange type and block type

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

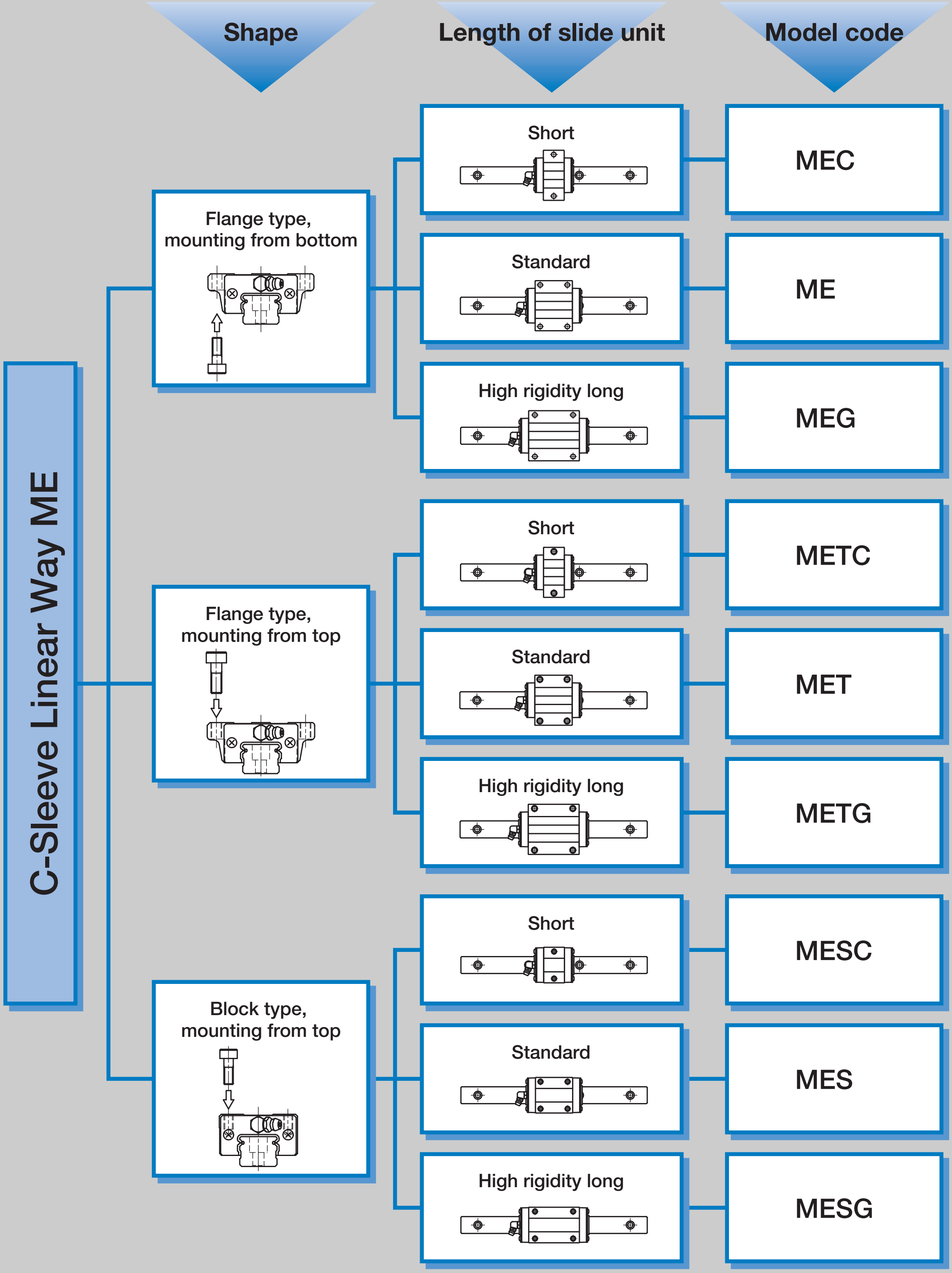
The track rails and the slide units of interchangeable specification can be handled separately and can be assembled to make a set as required. Three types of slide units with different lengths are prepared. The best type and size can be selected these entire slide units can be freely assembled on the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

U.S. PATENT No.6,729,761
No.6,712,511
No.5,564,188
No.5,374,126
No.5,356,223
No.5,324,116
No.4,652,147
No.4,505,522



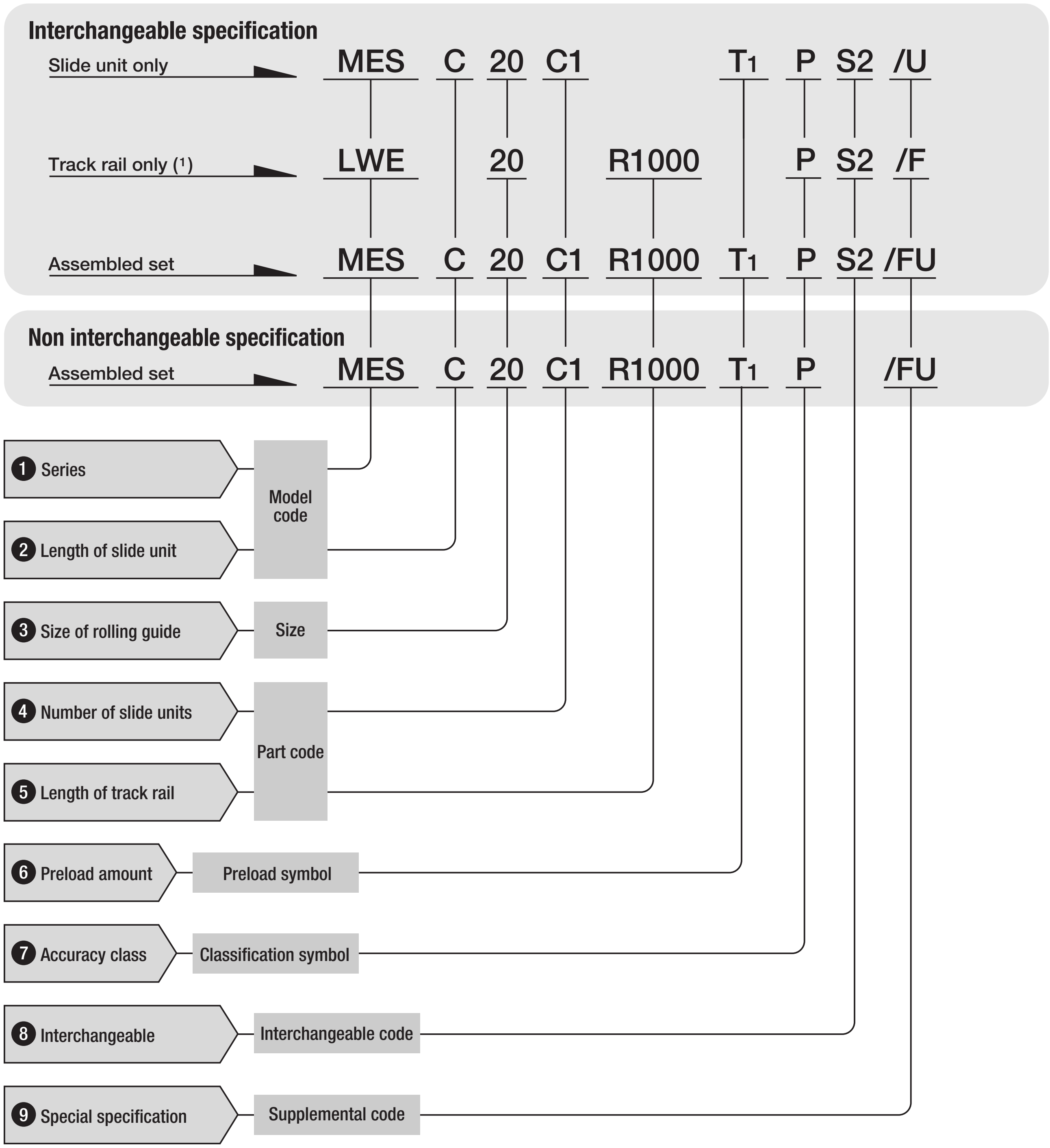
Structure of C-Sleeve Linear Way ME

Variation of IKO C-Sleeve Linear Way ME



Identification number and specification

The specification of C-Sleeve 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 76.



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 standard type C-Sleeve Linear Way ME

Table 1.1 Flange type, mounting from bottom

Size \ Type	Carbon steel		
	Short MEC	Standard ME	High rigidity long MEG
15	☆	☆	☆
20	☆	☆	☆
25	☆	☆	☆

Table 1.2 Flange type, mounting from top

Size \ Type	Carbon steel		
	Short METC	Standard MET	High rigidity long METG
15	☆	☆	☆
20	☆	☆	☆
25	☆	☆	☆

Table 1.3 Block type, mounting from top

Size \ Type	Carbon steel		
	Short MESC	Standard MES	High rigidity long MESG
15	☆	☆	☆
20	☆	☆	☆
25	☆	☆	☆

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

❹ 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	

❺ Length of track rail

Assembled set	: R○	Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page A-27.
Track rail only	: R○	

❻ Preload amount

Clearance	: T_C	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 84.
Standard	: No symbol	
Light preload	: T_1	
Medium preload	: T_2	

❼ Accuracy class

Ordinary	: No symbol	In interchangeable specification, please combine same accuracy codes on both slide unit and track rail. For combination of accuracy and preload, see Table 2. Detail of accuracy is shown in page 79.
High class	: H	
Precision class	: P	
Super precision	: SP	

Table 2 Combination of accuracy and preload

Accuracy class and symbol / Preload class and symbol	Ordinary class (No symbol)	High class (H)	Precision class (P)	Super precision class (SP)
Clearance (Tc)	☆	—	—	—
Standard (No symbol)	☆	☆	☆	○
Light preload (T_1)	—	☆	☆	○
Medium preload (T_2)	—	○	○	○

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

❽ Inetrchangeable

Select group 1	: S1	Specify this item for the 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.
Select group 2	: S2	

9 Special specifications

Applicable special specifications are shown in Table 3. 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 86.

Table 3 Applicable specifications

Specifications	Supplemental code	Set product	Track rail only	Slide unit only	Dimension
Butt jointing track rail	A	○	—	—	
Opposite reference surfaces arrangement	D	☆	—	—	
Specified rail mounting hole positions	E	☆	☆	—	
Caps for rail mounting holes	F	☆	☆	—	
Appending inspection sheet	I	○	—	—	
Female threads for bellows	J	☆	☆	☆	See table 5.1 and 5.2
Black chrome surface treatment	L	☆	—	—	
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	T	☆ (2)	☆	—	
Under seals	U	☆	—	☆	See table 8
Double end seals	V	☆	—	☆	See table 9
Matched sets to be used as an assembled group	W	○	—	—	
Scrapers	Z	☆	—	☆	See table 10

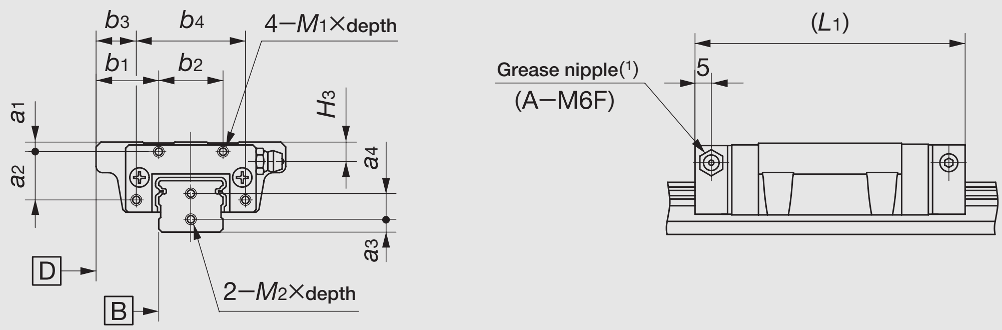
Note(1) : Applicable to size 15
(2) **:** Not applicable to non interchangeable specification
Remark : The mark ☆ indicates that it is also applicable to interchangeable specification.

Table 4 Combination of special specifications

	A	D	E	F	I	J	L	LF	MA	M4	N	T	U	V	W
D	○														
E	—	—													
F	○	☆	☆												
I	○	○	○	○											
J	○	☆	☆	☆	○										
L	○	☆	☆	☆	○	☆									
LF	○	☆	☆	☆	○	☆	—								
MA	○	☆	☆	☆	○	☆	☆	☆							
M4	○	☆	☆	☆	○	☆	☆	☆	☆						
N	○	☆	☆	—	○	—	☆	☆	☆	☆					
T	—	☆	☆	☆	—	—	☆	☆	☆	☆	☆				
U	○	☆	☆	☆	○	☆	☆	☆	☆	☆	—	☆			
V	○	☆	☆	☆	○	★	☆	☆	☆	☆	—	☆	☆		
W	○	○	—	○	○	○	○	○	○	○	○	—	○	○	
Z	○	☆	☆	☆	○	★	☆	☆	☆	☆	—	☆	☆	★	○

Remark 1 : In the table, the mark ○ indicates that this combination can be made.
2 : The mark ☆ indicates that the combination is available for also interchangeable specification.
3 : When the specification with ★ is required, please consult IKO.
4 : When a combination of several specifications is required, arrange their supplemental codes in alphabetical order.

Table 5.1 Female threads for bellows for flange type ME (Supplemental code /JJ)



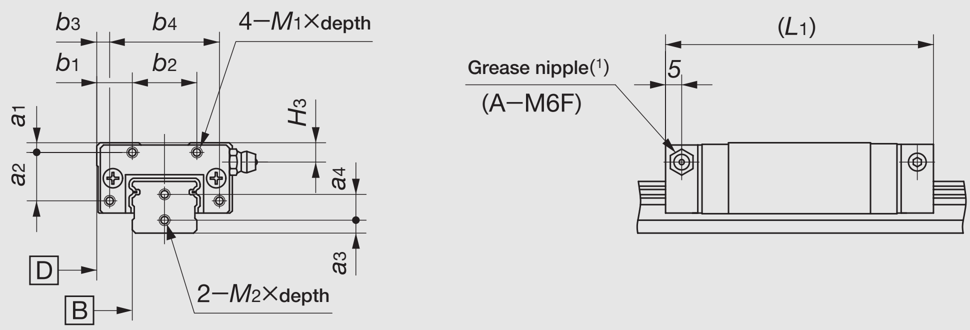
unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	$M_1\times$depth	L_1(2)	H_3	a_3	a_4	$M_2\times$depth
ME (T) C 15								58				
ME (T) 15	3	12	18	16	12	28	M3×6	74	5.7	4	7	M3×6
ME (T) G 15								87				
ME (T) C 20								64				
ME (T) 20	3	15	19.5	20	12.5	34	M3×6	83	6	4	8	M3×6
ME (T) G 20								99				
ME (T) C 25								76				
ME (T) 25	3.5	17	23.5	26	16.5	40	M3×6	100	7	5	9	M4×8
ME (T) G 25								119				

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 5.2 Female threads for bellows for block type MES (Supplemental code /JJ)



unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	$M_1\times$depth	L_1(2)	H_3	a_3	a_4	$M_2\times$depth
MESC 15								58				
MES 15	3	12	9	16	3	28	M3×6	74	5.7	4	7	M3×6
MESG 15								87				
MES 20								64				
MES 20	3	15	11	20	4	34	M3×6	83	6	4	8	M3×6
MESG 20								99				
MESC 25								76				
MES 25	3.5	17	11	26	4	40	M3×6	100	7	5	9	M4×8
MESG 25								119				

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.

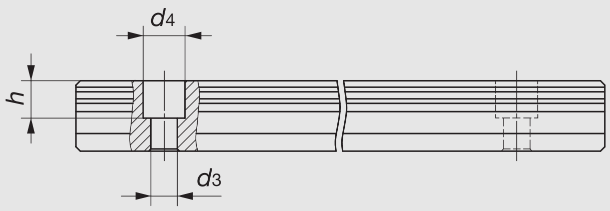
(2) : The values are for the slide unit with female threads for bellows at both ends.

Table 6 Appended bolts size for mounting track rail (Supplemental code /MA)

Model number	Bolt size
ME 15	M 3×16 M 4×16(1)
ME 20	M 5×16
ME 25	M 6×20

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

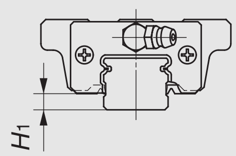


unit : mm

Model number	d_3	d_4	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 H_1 dimension of slide unit with under seals (Supplemental code /U)

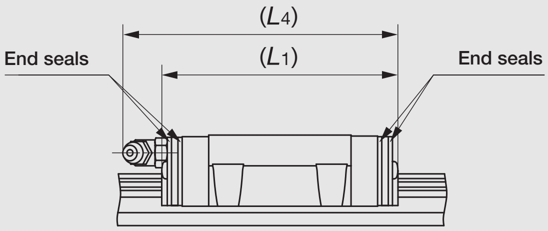


unit : mm

Model number	H_1
ME 15	5
ME 20	5
ME 25	6

Remark : 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)

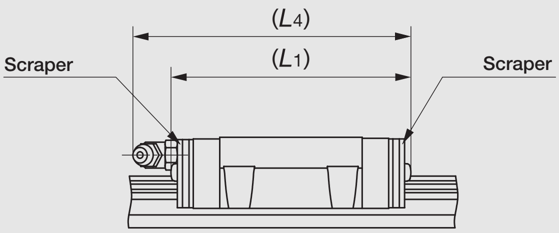


unit : mm

Model number	L_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

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)



unit : mm

Model number	L_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

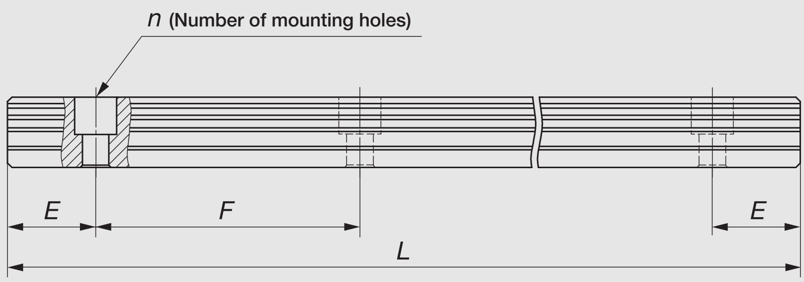
Remark 1 : The table shows representative model numbers but is applicable to all models of the same size.
2 : The total lengths of slide unit with scrapers at both ends are shown.

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 89.

Table 11 Standard and maximum lengths of high carbon track rails

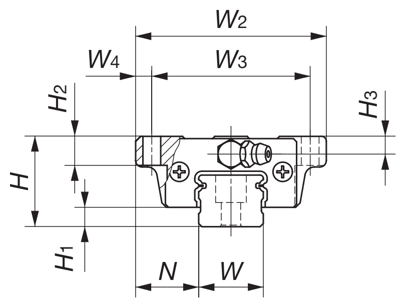


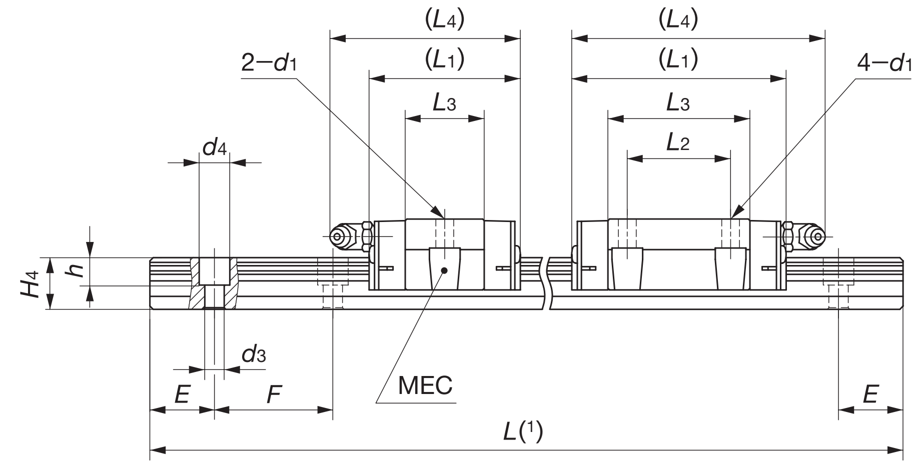
unit : mm

Item \ Model number		ME 15	ME 20	ME 25
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) 1 240 (21)	220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14) 1 000 (17) 1 240 (21) 1 600 (27)
Mounting hole pitch *F*		60	60	60
E (1)		20	20	20
Reference dimension *E* (2)	Over (Incl.)	6	8	9
	Under	36	38	39
Maximum length (3)(4)		1 600 (2 980)	2 200 (2 980)	2 980 (4 000)

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) : 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 IKO for further information.
Remark : The above table shows representative model numbers but is applicable to all models of the same size.

Flange type, mounting from bottom
MEC
ME
MEG



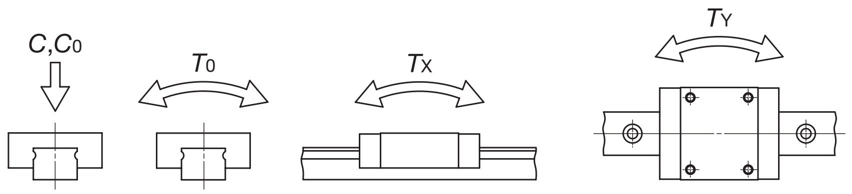


Model number	Interchangeable	Mass (Reference) Slide unit kg	Mass (Reference) Track rail kg/m	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1	H_2	H_3
MEC 15	☆	0.11								41	—	22.4	45			
ME 15	☆	0.18	1.57	24	5.8	18.5	52	41	5.5	57	26	38.4	61	4.5	7	4.5
MEG 15	☆	0.24								70	36	51.1	74			
MEC 20	☆	0.18								47	—	24.7	59			
ME 20	☆	0.30	2.28	28	6	19.5	59	49	5	66.5	32	44.2	79	5.5	9	5.5
MEG 20	☆	0.39								82	45	60.1	95			
MEC 25	☆	0.33								59	—	32	71			
ME 25	☆	0.54	3.09	33	7	25	73	60	6.5	83	35	56	95	7	10	6.5
MEG 25	☆	0.72								102	50	75	114			

Model number	Dimension of track rail mm W	H_4	d_3	d_4	h	E	F	Recommended mounting bolt for track rail(2) mm Bolt size x length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N·m	T_X N·m	T_Y N·m
MEC 15									5 240	5 480	43.8	21.3 / 149	21.3 / 149
ME 15	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
MEG 15									9 340	12 500	100	99.5 / 533	99.5 / 533
MEC 20									7 580	7 340	78.9	31.5 / 235	31.5 / 235
ME 20	20	16	6	9.5	8.5	20	60	M5×16	11 600	13 400	145	95.6 / 561	95.6 / 561
MEG 20									14 400	18 300	197	172 / 918	172 / 918
MEC 25									12 400	12 300	153	71.8 / 480	71.8 / 480
ME 25	23	19	7	11	9	20	60	M6×20	18 100	21 100	262	195 / 1 090	195 / 1 090
MEG 25									22 200	28 200	349	336 / 1 740	336 / 1 740

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 : Values in parentheses are applicable to the supplemental code "/M4" of special specification.
3 : For the shape of grease nipple, please see page 97.



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

ME 20 C2 R280 T1 P S2 /N

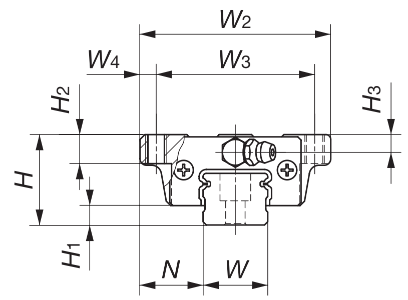
- ME — Series: MEC, ME, MEG
- 20 — Size
- C2 — Number of slide unit (two slide units)
- R280 — Length of track rail (280mm)
- T1 — Preload amount: Clearance : Tc; Standard : No symbol; Light preload : T1; Medium preload : T2
- P — Accuracy class: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /N — Special specification: No end seal : /N

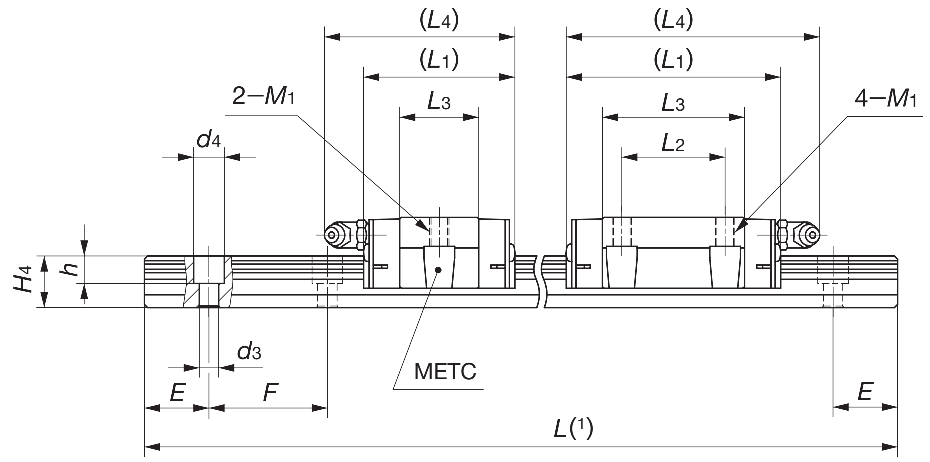
※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable ME ➡ Model code LWE (Ex:LWE20R280PS2)

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

Flange type, mounting from top

METC
MET
METG

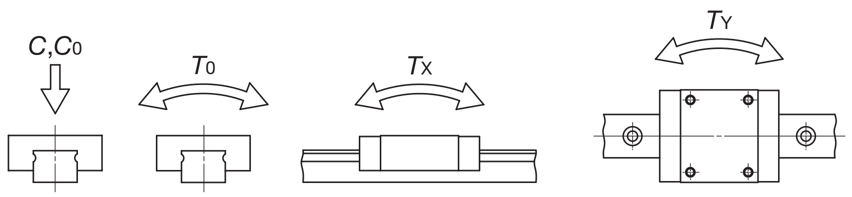




Model number	Interchangeable	Mass (Reference) Slide unit kg	Mass (Reference) Track rail kg/m	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1	H_2	H_3
METC 15	☆	0.11								41	—	22.4	45			
MET 15	☆	0.18	1.57	24	5.8	18.5	52	41	5.5	57	26	38.4	61	M 5	7	4.5
METG 15	☆	0.24								70	36	51.1	74			
METC 20	☆	0.18								47	—	24.7	59			
MET 20	☆	0.30	2.28	28	6	19.5	59	49	5	66.5	32	44.2	79	M 6	9	5.5
METG 20	☆	0.39								82	45	60.1	95			
METC 25	☆	0.33								59	—	32	71			
MET 25	☆	0.54	3.09	33	7	25	73	60	6.5	83	35	56	95	M 8	10	6.5
METG 25	☆	0.72								102	50	75	114			

Model number	Dimension of track rail mm W	H_4	d_3	d_4	h	E	F	Recommended mounting bolt for track rail(2) mm Bolt size x length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N·m	T_X N·m	T_Y N·m
METC 15									5 240	5 480	43.8	21.3 149	21.3 149
MET 15	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
METG 15									9 340	12 500	100	99.5 533	99.5 533
METC 20									7 580	7 340	78.9	31.5 235	31.5 235
MET 20	20	16	6	9.5	8.5	20	60	M5×16	11 600	13 400	145	95.6 561	95.6 561
METG 20									14 400	18 300	197	172 918	172 918
METC 25									12 400	12 300	153	71.8 480	71.8 480
MET 25	23	19	7	11	9	20	60	M6×20	18 100	21 100	262	195 1 090	195 1 090
METG 25									22 200	28 200	349	336 1 740	336 1 740

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 : Values in parentheses are applicable to the supplemental code "/M4" of special specification.
3 : For the shape of grease nipple, please see page 97.



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

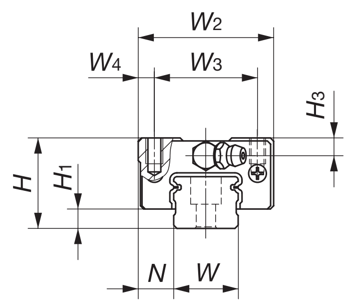
MET 20 C2 R280 T1 P S2 /N

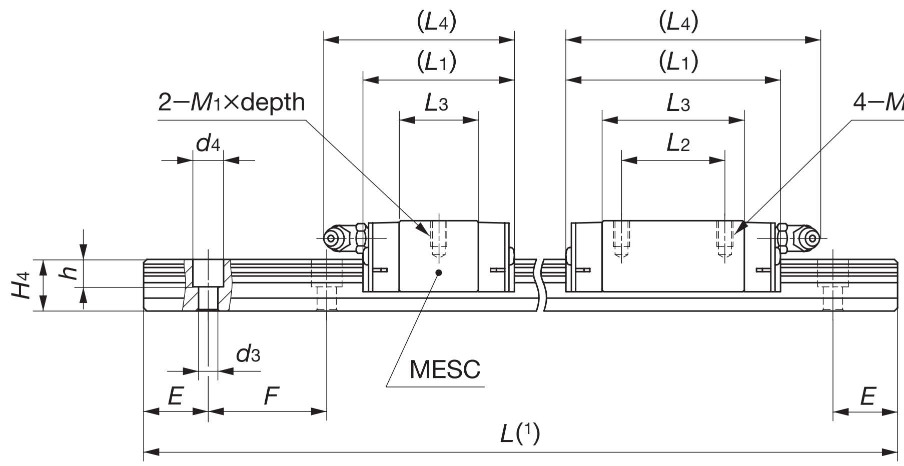
- MET — Series: METC, MET, METG
- 20 — Size
- C2 — Number of slide unit (two slide units)
- R280 — Length of track rail (280mm)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1; Medium preload : T2
- P — Accuracy class: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /N — Special specification: No end seal : /N

※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable MET ➡ Model code LWE (Ex:LWE20R280PS2)

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

Block type, mounting from top
MESC
MES
MESG

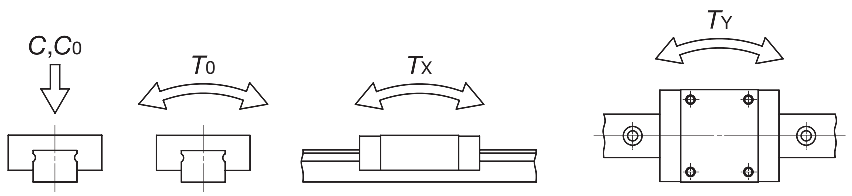




Model number	Interchangeable	Mass (Reference)		Dimension of assembly mm			Dimensions of slide unit mm							
		Slide unit kg	Track rail kg/m	H	H_1	N	W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
MESC 15	☆	0.09								41	—	22.4	45	
MES 15	☆	0.14	1.57	24	5.8	9.5	34	26	4	57	26	38.4	61	M4×7
MESG 15	☆	0.18								70	36	51.1	74	
MESC 20	☆	0.15								47	—	24.7	59	
MES 20	☆	0.25	2.28	28	6	11	42	32	5	66.5	32	44.2	79	M5×8
MESG 20	☆	0.32								82	45	60.1	95	
MESC 25	☆	0.26								59	—	32	71	
MES 25	☆	0.41	3.09	33	7	12.5	48	35	6.5	83	35	56	95	M6×9
MESG 25	☆	0.54								102	50	75	114	

Dimensions of track rail mm								Recommended mounting bolt for track rail(2) mm	Basic dynamic load rating(3)	Basic static load rating(3)	Static moment rating(3)		
H_3	W	H_4	d_3	d_4	h	E	F	Bolt size x length	C N	C_0 N	T_0 N・m	T_X N・m	T_Y 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 (8)	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

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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 : Values in parentheses are applicable to the supplemental code "/M4" of special specification.
3 : For the shape of grease nipple, please see page 97.



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

MES 20 C2 R280 T1 P S2 /N

- MES — Series: MESC, MES, MESG
- 20 — Size
- C2 — Number of slide unit (two slide units)
- R280 — Length of track rail (280mm)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1; Medium preload : T2
- P — Accuracy class: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /N — Special specification: No end seal : /N

※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable MES ➡ Model code LWE (Ex:LWE20R280PS2)

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

C-Sleeve Linear Way MH

MH／MHT／MHD／MHS

IKO C-Sleeve Linear Way MH features the largest load ratings and rigidity among all ball types and incorporating the C-Sleeve 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-Sleeve 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-Sleeve 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-Sleeve is not in contact with the track rail, frictional resistance does not increase. A smooth and light motion is ensured.

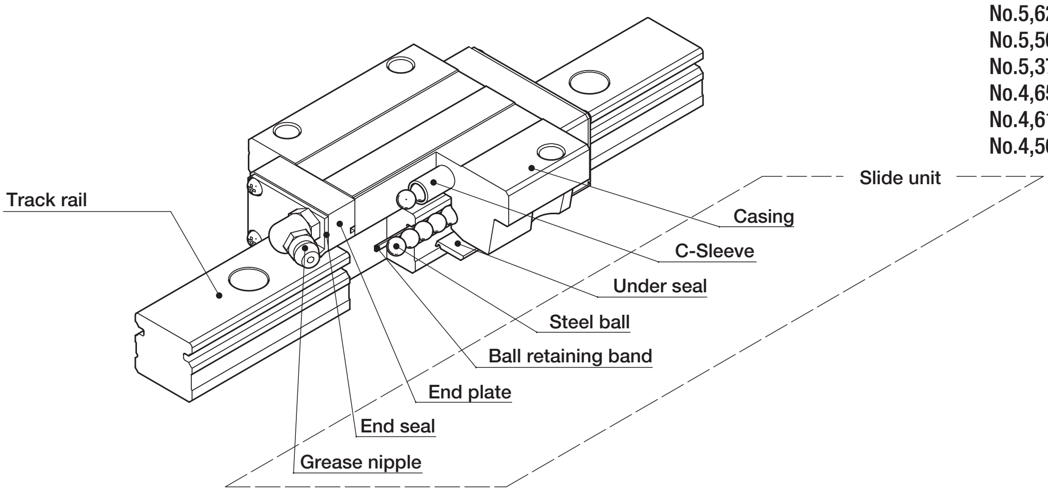
Flange type and block type

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.

U.S. PATENT No.6,729,761
No.6,712,511
No.5,622,433
No.5,564,188
No.5,374,126
No.4,652,147
No.4,610,488
No.4,505,522



Structure of C-Sleeve Linear Way MH

Variation of IKO C-Sleeve Linear Way MH

C-Sleeve Linear Way MH

Shape	Length of slide unit	Model code
Flange type, mounting from bottom	Standard	MH
	High rigidity long	MHG
Flange type, mounting from top	Standard	MHT
	High rigidity long	MHTG
Block type, mounting from top	Standard	MHD
	High rigidity long	MHDG
Compact block type, mounting from top	Standard	MHS
	High rigidity long	MHSG

Identification number and specification

The specification of C-Sleeve 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 76.

Interchangeable specification

	Model code	Model code	Size	Part code	Part code	Model code	Preload symbol	Classification symbol	Interchangeable code	Supplemental code
Slide unit only	MHT	G	20	C1			T_1	P	S2	/V
Track rail only (1)	LWH		20		R840	B		P	S2	/F
Assembled set	MHT	G	20	C1	R840		T_1	P	S2	/FV

Non interchangeable specification

	Model code	Model code	Size	Part code	Part code	Preload symbol	Classification symbol	Supplemental code
Assembled set	MHT	G	20	C1	R840	T_1	P	/FV

Item	Code
1 Series	Model code
2 Length of slide unit	Model code
3 Size of rolling guide	Size
4 Number of slide units	Part code
5 Length of track rail	Part code
6 Preload amount	Preload symbol
7 Accuracy class	Classification symbol
8 Interchangeable	Interchangeable code
9 Special specification	Supplemental code

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)

1 Series	Flange type, mounting from bottom	: MH
	Flange type, mounting from top	: MHT
	Block type, mounting from top	: MHD
	Compact block type, mounting from top	: MHS
2 Length of slide unit	Standard	: No symbol
	High rigidity long	: G
3 Size		

Applicable size and shape of slide unit are shown in Table 1.1 to 1.4.

Type and size of standard type C-Sleeve Linear Way MH

Table 1.1 Flange type, mounting from bottom

Size \ Type	Carbon steel	
	Standard MH	High rigidity long MHG
15	☆	—
20	☆	☆
25	☆	☆

Table 1.2 Flange type, mounting from top

Size \ Type	Carbon steel	
	Standard MHT	High rigidity long MHTG
15	☆	—
20	☆	☆
25	☆	☆

Table 1.3 Block type, mounting from top

Size \ Type	Carbon steel	
	Standard MHD	High rigidity long MHDG
15	☆	—
25	☆	☆

Table 1.4 Compact block type, mounting from top

Size \ Type	Carbon steel	
	Standard MHS	High rigidity long MHSG
15	☆	—
20	☆	☆
25	☆	☆

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

4 Number of slide unit

Assembled set : C○

Slide unit only : C1

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

5 Length of track rail

Assembled set : R○

Track rail only : R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page A-43.

6 Preload amount

Standard : No symbol

Light preload : T_1

Medium preload : T_2

Heavy preload : T_3

Specify this items for an assembled set or an interchangeable single slide unit.
Applicable preload and size are shown in Table 2.
For detail of preload amount, see page 84.

Table 2 Preload of C-Sleeve Linear Way MH

Size	Preload class and symbol			
	Standard (No symbol)	Light preload (T_1)	Medium preload (T_2)	Heavy preload (T_3)
15	☆	☆	○	○
20	☆	☆	○	○
25	☆	☆	○	○

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

7 Accuracy class

High class : H

Precision class : P

Super precision : SP

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 79.

Table 3 Accuracy class and size

Size	Accuracy class		
	High class (H)	Precision class (P)	Super precision (SP)
15	☆	☆	○
20	☆	☆	○
25	☆	☆	○

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

8 Inetrchangeable

Select group 1 : S1

Select group 2 : S2

Specify this item for the 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.

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 detain of specifications are shown on page 86.

Table 4 Applicable specifications

Specifications	Supplemental code	Set product	Track rail only	Slide unit only	Dimension
Butt jointing track rail	A	○	—	—	
Opposite reference surfaces arrangement	D	☆	—	—	
Specified rail mounting hole positions	E	☆	☆	—	
Caps for rail mounting holes	F	☆	☆	—	
Appending inspection sheet	I	○	—	—	
Female threads for bellows	J	☆	☆	☆	See table 6.1, 6.2 and 6.3
Black chrome surface treatment	L	☆	—	—	
Fluoric black chrome surface treatment	LF	☆	—	—	
With track rail mounting bolts (Applicable to set order)	MA	☆	—	—	See table 7
Without track rail mounting bolts (Applicable to track rail order)	MN	—	☆	—	
No rubber end seals	N	☆	—	☆	
Rail cover plate for track rail (1)	PS	○ (1)	—	—	
Butt jointing interchangeable track rail	T	☆ (2)	☆	—	
Double end seals	V	☆	—	☆	See table 8
Matched sets to be used as an assembled group	W	○	—	—	
Scrapers	Z	☆	—	☆	See table 9

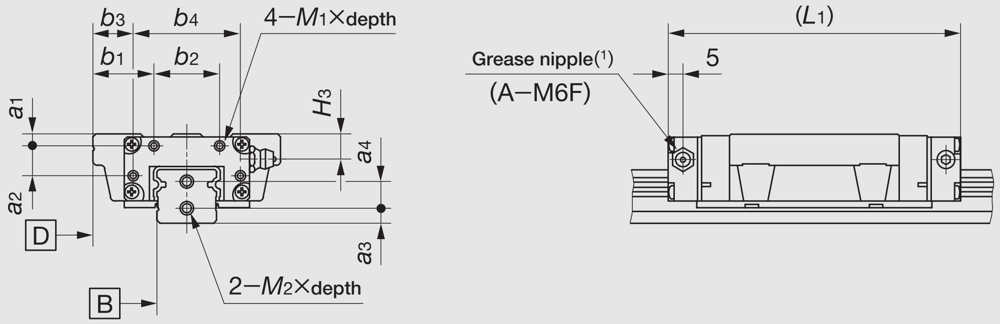
Note(1) : Applicable to size 25 only.
(2) : Not applicable to non interchangeable specification
Remark : The mark ☆ indicates that it is also applicable to interchangeable specification.

Table 5 Combination of special specifications

	A	D	E	F	I	J	L	LF	MA	MN	N	PS	T	V	W
D	○														
E	—	—													
F	○	☆	☆												
I	○	○	○	○											
J	○	☆	☆	☆	○										
L	○	☆	☆	☆	○	☆									
LF	○	☆	☆	☆	○	☆	—								
MA	○	☆	☆	☆	○	☆	☆	☆							
MN	—	—	☆	☆	—	☆	—	—	—						
N	○	☆	☆	—	○	—	☆	☆	☆	—					
PS	—	○	○	—	○	—	—	—	○	—	—				
T	—	☆	☆	☆	—	—	☆	☆	☆	☆	☆	—			
V	○	☆	☆	☆	○	★	☆	☆	☆	—	—	○	☆		
W	○	○	—	○	○	○	○	○	○	—	○	○	—	○	
Z	○	☆	☆	☆	○	★	☆	☆	☆	—	—	—	☆	★	○

Remark 1 : In the table, the mark ○ indicates that this combination can be made.
2 : The mark ☆ indicates that the combination is available for also interchangeable specification.
3 : When the specification with ★ is required, please consult IKO.
4 : When a combination of several specifications is required, arrange their supplemental codes in alphabetical order.

Table 6.1 Female threads for bellows for flange type MH (Supplemental code /JJ)

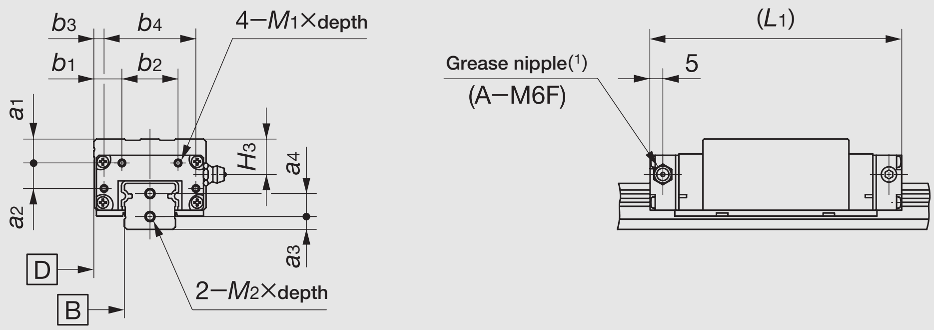


unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_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	9	M4×8
MH (T) G 20								128				
MH (T) 25	4	13	22	26	15	40	M3×6	110	8.5	5	12	M4×8
MH (T) G 25								133				

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 6.2 Female threads for bellows for block type MHD (Supplemental code /JJ)

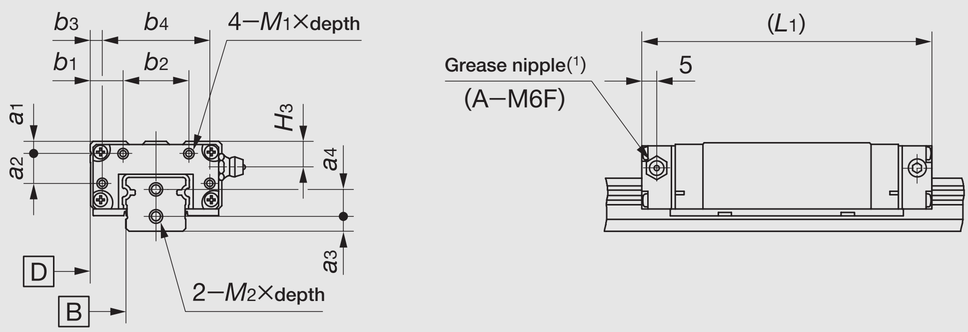


unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
MHD 15	7	7	9	16	3	28	M3×6	83	10.5	4	8	M3×6
MHD 25	8	13	11	26	4	40	M3×6	110	12.5	5	12	M4×8
MHDG 25								133				

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 : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_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	9	M4×8
MHSG 20								128				
MHS 25	4	13	11	26	4	40	M3×6	110	8.5	5	12	M4×8
MHSG 25								133				

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.

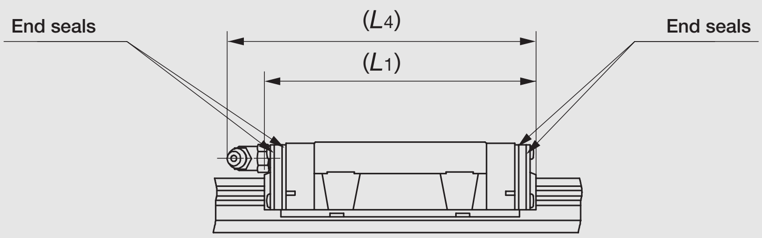
Table 7 Appended bolts size for mounting track rail of MH (Supplemental code /MA)

Model number	Bolt size
MH 15	M4×16
MH 20	M5×18
MH 25	M6×22

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 Slide unit with double end seals (Supplemental code /VV)

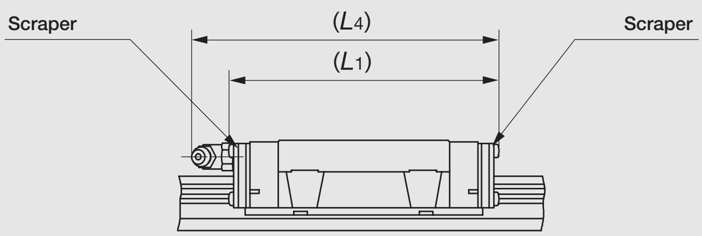


unit : mm

Model number	L_1	L_4
MH 15	72	77
MH 20	91	104
MHG 20	119	133
MH 25	104	116
MHG 25	127	139

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 9 Slide unit with scrapers (Supplemental code /ZZ)



unit : mm

Model number	L_1	L_4
MH 15	73	75
MH 20	91	104
MHG 20	119	133
MH 25	104	116
MHG 25	126	139

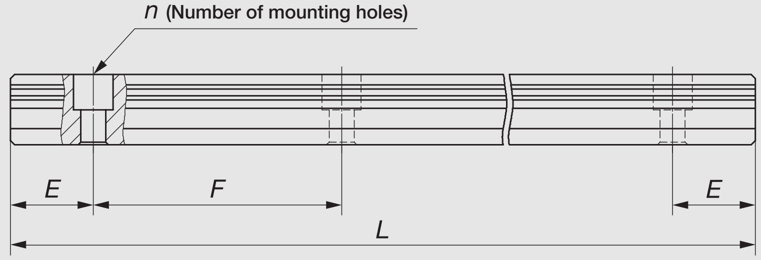
Remark 1 : The table shows representative model numbers but is applicable to all models of the same size.
2 : The total lengths of slide unit with scrapers at both ends are shown.

● Track rail length

Standard and maximum lengths of track rail are shown in Table 10.
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 10, 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 89.

Table 10 Standard and maximum lengths of MH

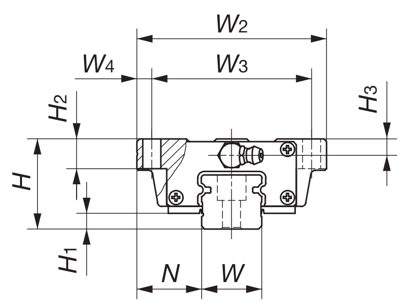


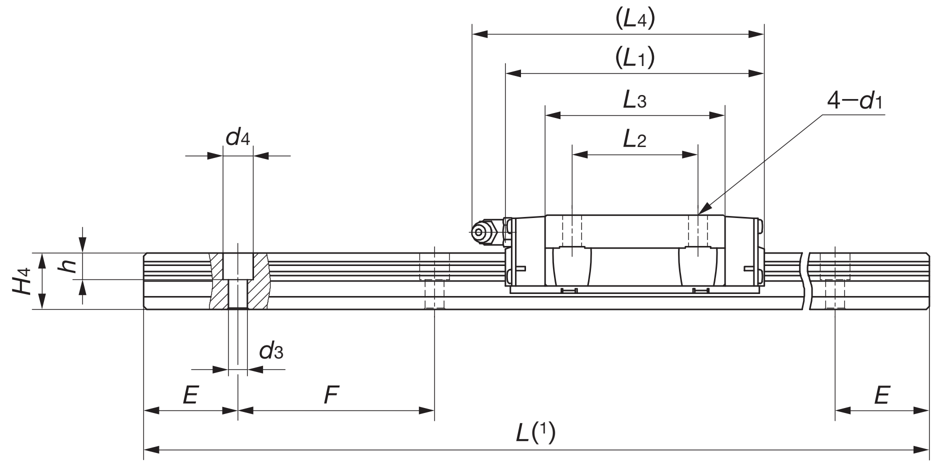
unit : mm

Item \ Model number		MH 15	MH 20	MH 25
Standard length L (n)		180(3) 240(4) 360(6) 480(8) 660(11) 900(15) 1 200(20)	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) 1 980(33)
Mounting hole pitch F		60	60	60
E		30	30	30
Reference dimension E (1)	Over (Incl.)	7	8	9
	Under	37	38	39
Maximum length (2)		1 500 (3 000)	1 980 (3 000)	3 000 (3 960)

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

Flanged shape, mounting from bottom
MH
MHG

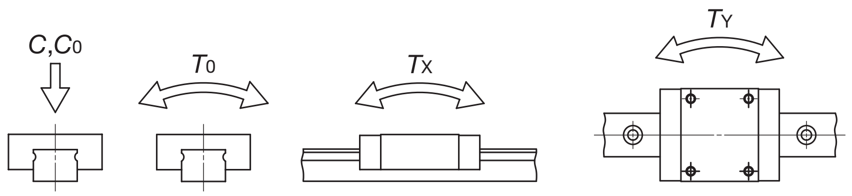




Model number	Interchangeable	Mass (Reference) Slide unit kg	Mass (Reference) Track rail kg/m	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1
MH 15	☆	0.22	1.47	24	4.5	16	47	38	4.5	66	30	44.2	69	4.5
MH 20	☆	0.47	2.56	30	5	21.5	63	53	5	83	40	56	95	6
MHG 20	☆	0.69								112		84.8	124	
MH 25	☆	0.69	3.50	36	6.5	23.5	70	57	6.5	95	45	63.9	106	7
MHG 25	☆	0.91								118		86.6	129	

Model number	Dimension of track rail mm H_2	H_3	W	H_4	d_3	d_4	h	E	F	Recommended mounting bolt for track rail(2) mm Bolt size x length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N・m	T_X N・m	T_Y N・m
MH 15	7	4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
MH 20	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
MHG 20											24 100	31 700	349	421 2 140	421 2 140
MH 25	10	6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
MHG 25											30 800	38 300	483	533 2 740	533 2 740

Note(1) : Track rail lengths L are shown in Table 10 on page A-43.
(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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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, please see page 97.



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

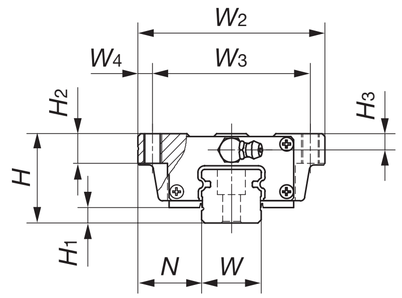
MH 15 C2 R900 T1 P S2 /V

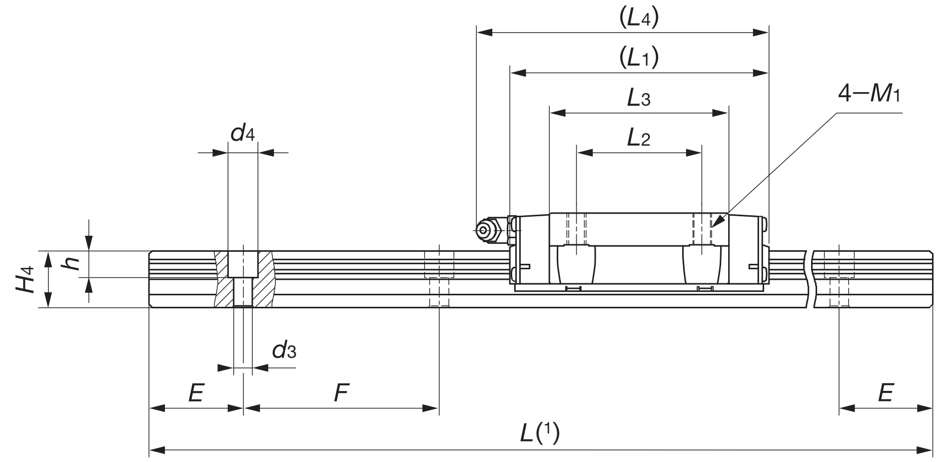
- MH — Series: MH, MHG
- 15 — Size
- C2 — Number of slide unit (two slide units)
- R900 — Length of track rail (900mm)
- T1 — Preload amount: Standard : No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- P — Accuracy class: High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /V — Special specification: With double end seals : /V

※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable MH ➡ Model code LWH (Ex: LWH15R900BPS2)

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

Flange type, mounting from top
MHT
MHTG

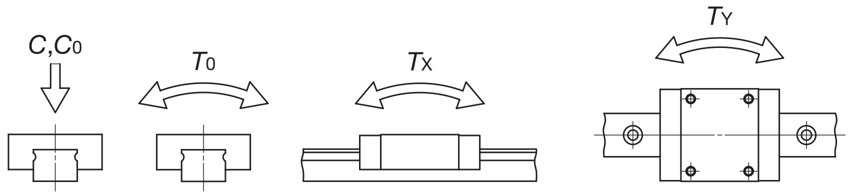




Model number	Interchangeable	Mass (Reference) Slide unit kg	Mass (Reference) Track rail kg/m	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1
MHT 15	☆	0.22	1.47	24	4.5	16	47	38	4.5	66	30	44.2	69	M5
MHT 20	☆	0.47	2.56	30	5	21.5	63	53	5	83	40	56	95	M6
MHTG 20	☆	0.69								112		84.8	124	
MHT 25	☆	0.69	3.50	36	6.5	23.5	70	57	6.5	95	45	63.9	106	M8
MHTG 25	☆	0.91								118		86.6	129	

Dimension of track rail mm H_2	H_3	W	H_4	d_3	d_4	h	E	F	Recommended mounting bolt for track rail(2) mm Bolt size x length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N·m	T_X N·m	T_Y 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

Note(1) : Track rail lengths L are shown in Table 10 on page A-43.
(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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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, please see page 97.



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

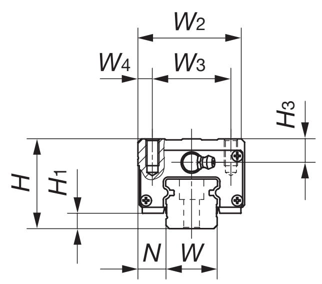
MHT 15 C2 R900 T1 P S2 /V

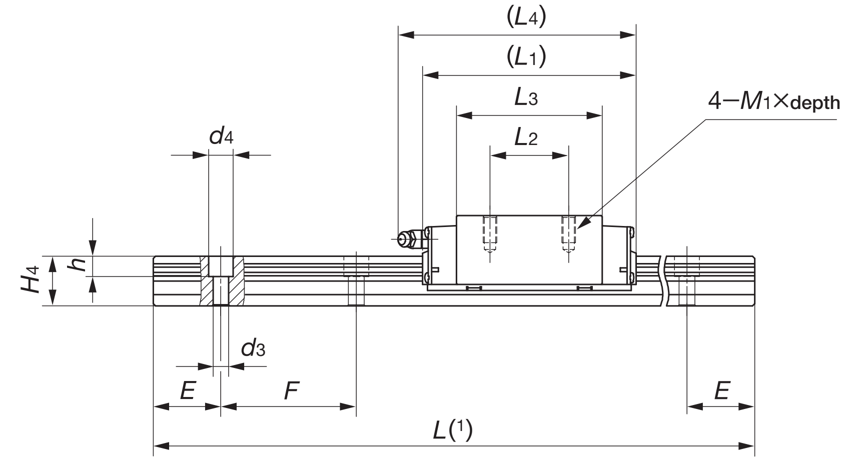
- Series: MHT, MHTG
- Size
- Number of slide unit (two slide units)
- Length of track rail (900mm)
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: With double end seals : /V

※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable MHT ➡ Model code LWH (Ex: LWH15R900BPS2)

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

Block type, mounting from top
MHD
MHDG

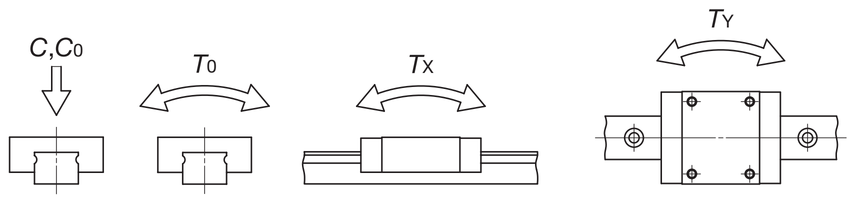




Model number	Interchangeable	Mass (Reference) Slide unit kg	Mass (Reference) Track rail kg/m	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
MHD 15	☆	0.23	1.47	28	4.5	9.5	34	26	4	66	26	44.2	69	M4×10
MHD 25	☆	0.64	3.50	40	6.5	12.5	48	35	6.5	95	35	63.9	106	M6×12
MHDG 25	☆	0.78								118	50	86.6	129	

Model number	Dimension of track rail mm H_3	W	H_4	d_3	d_4	h	E	F	Recommended mounting bolt for track rail(2) mm Bolt size x length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N・m	T_X N・m	T_Y N・m
MHD 15	8.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
MHD 25	10.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
MHDG 25										30 800	38 300	483	533 2 740	533 2 740

Note(1) : Track rail lengths L are shown in Table 10 on page A-43.
(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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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, please see page 97.



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

MHD 15 C2 R900 T_1 P S2 /V

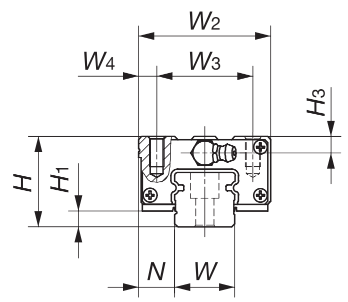
- Series: MHD / MHDG
- Size
- Number of slide unit (two slide units)
- Length of track rail (900mm)
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: With double end seals : /V

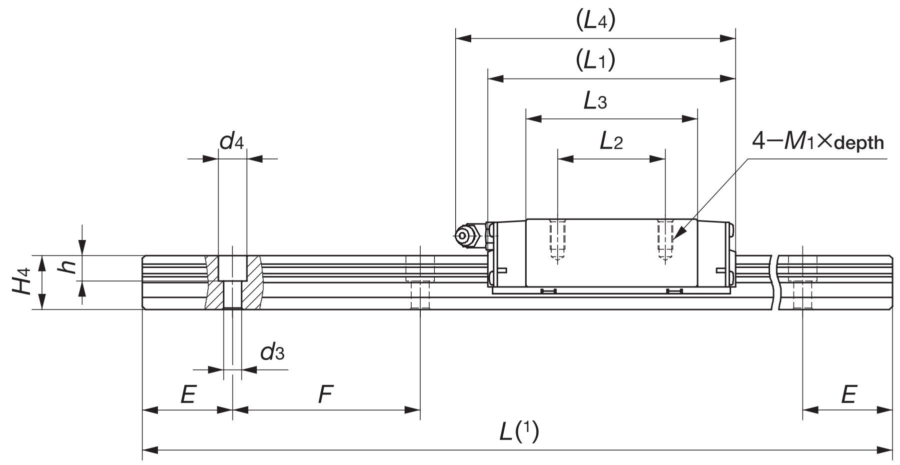
※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable MHD ➡ Model code LWH (Ex: LWH15R900PPS2)

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

C-Sleeve Linear Way MH

Compact block type, mounting from top
MHS
MHSG

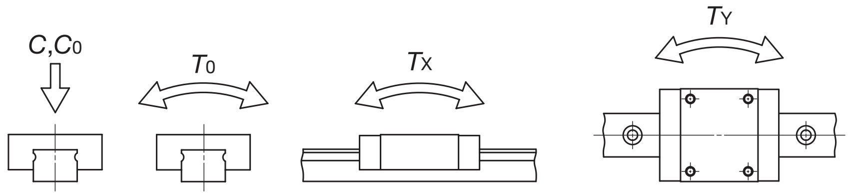




Model number	Interchangeable	Mass (Reference) Slide unit kg	Mass (Reference) Track rail kg/m	Dimension of assembly mm H	H_1	N	Dimension of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
MHS 15	☆	0.18	1.47	24	4.5	9.5	34	26	4	66	26	44.2	69	M4× 8
MHS 20	☆	0.35	2.56	30	5	12	44	32	6	83	36	56	95	M5×10
MHSG 20	☆	0.52								112	50	84.8	124	
MHS 25	☆	0.54	3.50	36	6.5	12.5	48	35	6.5	95	35	63.9	106	M6×12
MHSG 25	☆	0.66								118	50	86.6	129	

H_3	Dimension of track rail mm W	H_4	d_3	d_4	h	E	F	Recommended mounting bolt for track rail(2) mm Bolt size x length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N・m	T_X N・m	T_Y 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

Note(1) : Track rail lengths L are shown in Table 10 on page A-43.
(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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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, please see page 97.



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

MHS 15 C2 R900 T1 P S2 /V

- MHS — Series: MHS, MHSG
- 15 — Size
- C2 — Number of slide unit (two slide units)
- R900 — Length of track rail (900mm)
- T1 — Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- P — Accuracy class: HighH : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /V — Special specification: With double end seals : /V

※ In case ordering track rail only, model code is changed as shown below.
Track rail of interchangeable MHS ➡ Model code LWH (Ex: LWH15R900BPS2)

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

C-Sleeve Linear Way MUL

MUL

IKO C-Sleeve Linear Way MUL is a linear motion rolling guide, incorporating the C-Sleeve 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-Sleeve 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 LWLU series without changing the external dimensions of the slide unit.

Smooth and light motion

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

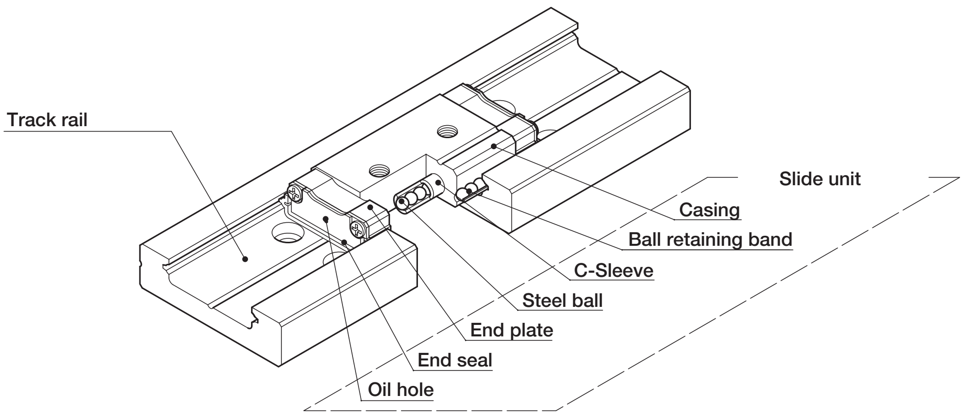
Stainless steel made

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

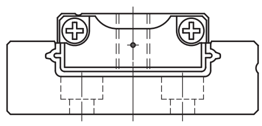
Rigidity of track rail under moment and torsion is very much increased by adopting the U-shaped design. The track rail can, therefore, be mounted on machines and equipment as structural members, either in a cantilever position or supported at both ends, so they can be combined an assembled freely.

U.S. PATENT No.6,729,761
No.6,712,511
No.6,309,107
No.5,435,649
No.5,289,779
No.5,250,126
No.4,652,147
No.4,505,522



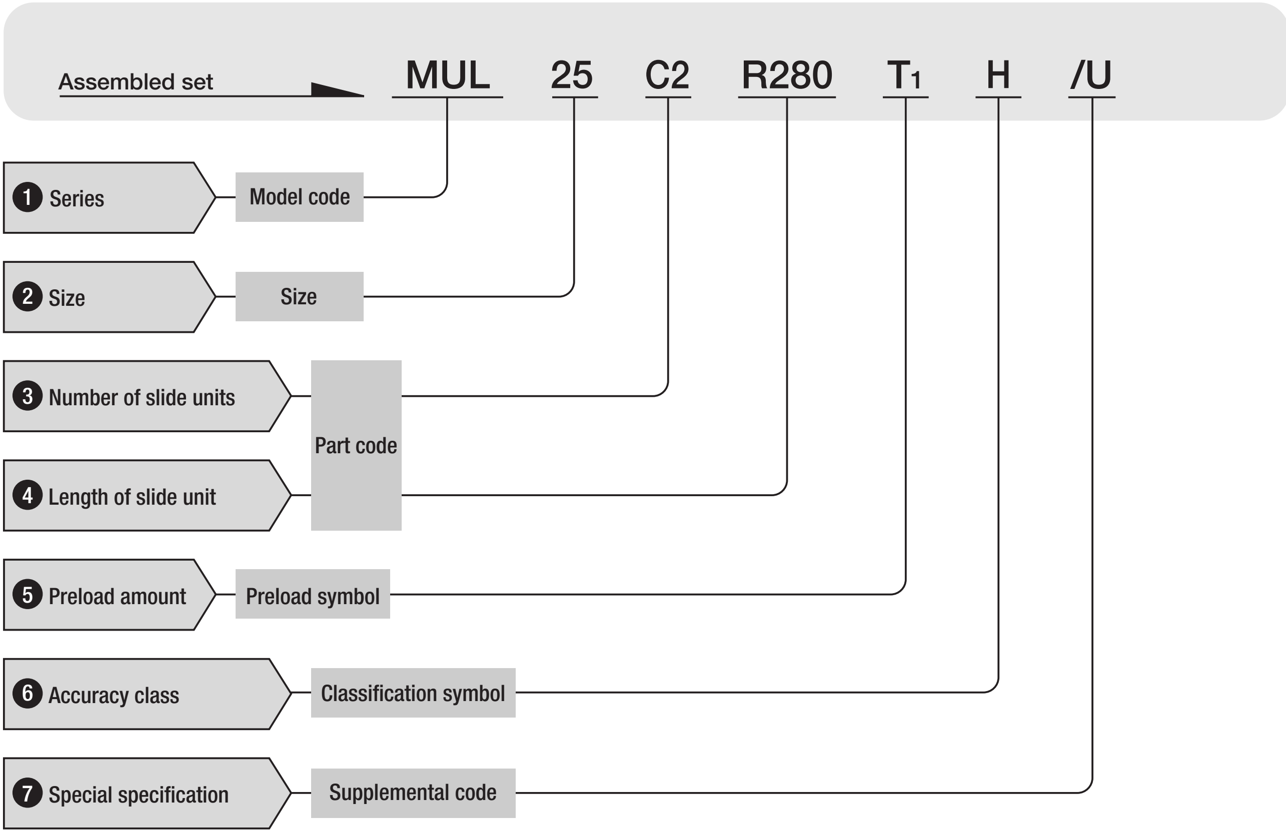
Structure of C-Sleeve Linear Way MUL

IKO C-Sleeve Linear Way MUL

C-Sleeve Linear Way MUL	Shape	Model code
	Miniature type 	MUL

Identification number and specification

The specification of C-Sleeve 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 76.



1 Series

Miniature type : MUL

2 Size

Applicable type and size of slide unit are shown in Table 1.

Table 1 Type and size of C-Sleeve Linear Way MUL

Size \ Type	Stainless steel MUL
25	○
30	○

3 Number of slide unit

: C○

For an assembled set, indicate the number of slide units assembled on one track rail.

4 Length of track rail

: R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page A-58.

5 Preload amount

Standard : No symbol
Light preload : T_1

For detail of preload amount, see page 84.

6 Accuracy class

Ordinary class : No symbol
High class : H

For detail of accuracy, see page 79.

7 Special specifications

Applicable special specifications are shown in Table 2. When a combination of several special specifications is required, please refer Table 3 and arrange their supplemental codes in alphabetical order. For detail of specifications, see page 86.

Table 2 Applicable special specifications

Specifications	Supplemental code	Dimension
Specified rail mounting hole positions	E	
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

LR	○			
MA	○	○		
U	○	○	○	
W	—	○	○	○
	E	LR	MA	U

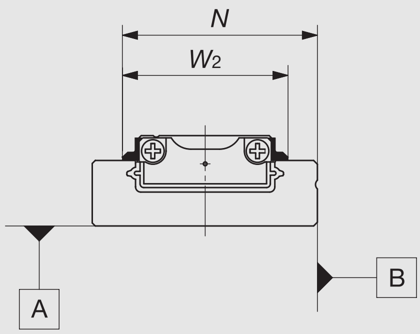
Remark : When a combination of several special specifications is required, arrange their supplemental codes in alphabetical order.

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 : mm

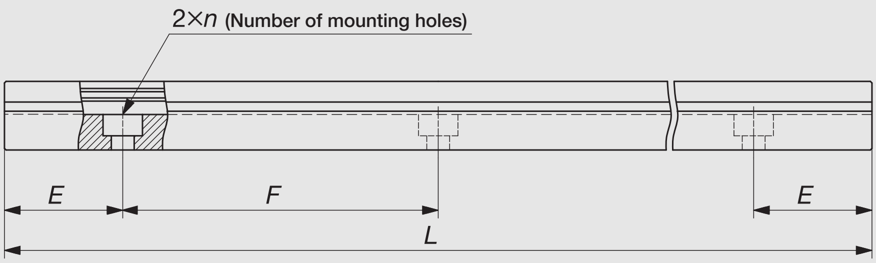
Model number	*N*	*W*2
MUL 25	21.4	18
MUL 30	25.9	22

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 **IKO** 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 89.

Table 6 Standard and maximum lengths of track rails



unit : mm

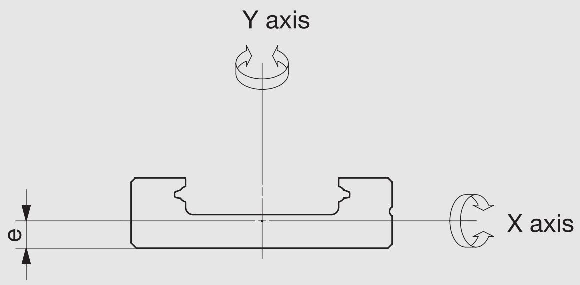
Item \ Model number		MUL 25	MUL 30
Standard length *L* (*n*)		105(3) 140(4) 175(5) 210(6) 245(7) 280(8)	120(3) 160(4) 200(5) 240(6) 280(7) 320(8)
Mounting hole pitch *F*		35	40
E		17.5	20
Reference dimension *E*	Over (Incl.)	4.5	4.5
	Under	22	24.5
Maximum length [1]		420 (840)	480 (960)

Note [1] : The track rails can be manufactured up to the maximum length shown in parentheses. If required, please consult **IKO**.

Geometrical moment of inertia

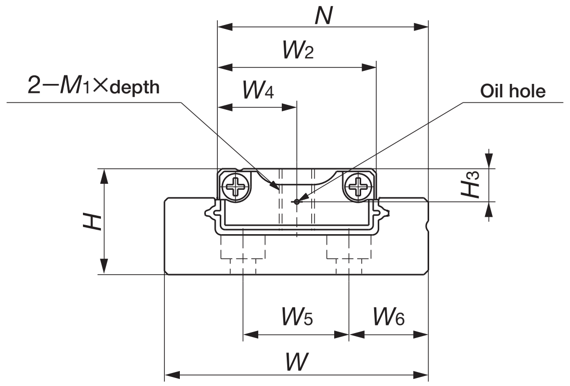
High rigidity design of C-Sleeve Linear Way MUL is achieved by adopting a U-shaped track rail. Table 7 shows the moment of inertia of sectional area of track rails.

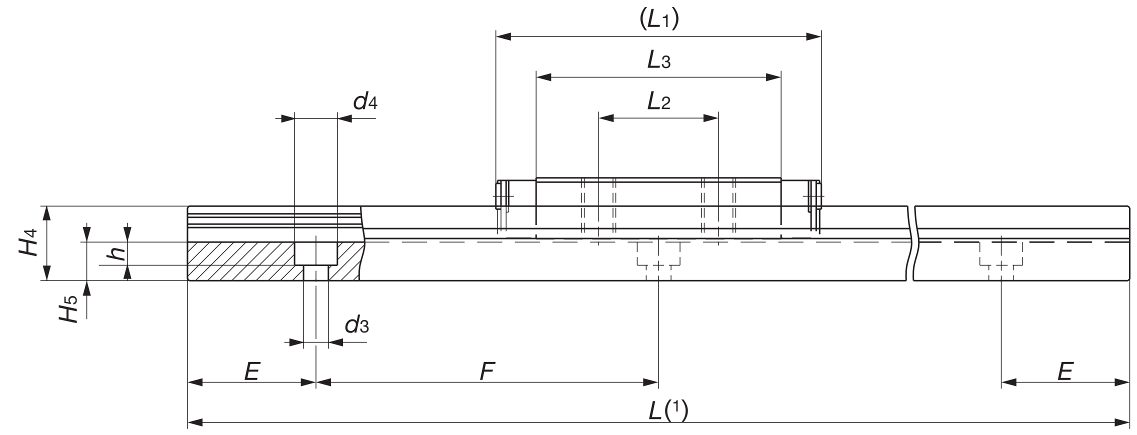
Table 7 Moment of inertia of sectional area of track rails



Model number	Moment of inertia of sectional area mm⁴		Center of gravity e mm
	I_X	I_Y	
MUL 25	3.7×10^2	7.5×10^3	2.6
MUL 30	9.3×10^2	1.7×10^4	3.3

MUL

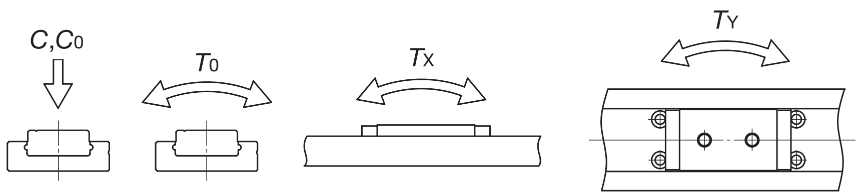




Model number	Mass (Reference) g		Dimension of assembly mm		Dimension of slide unit mm								
	Slide unit	Track rail (per 100mm)	H	N	W_2	W_4	L_1	L_2	L_3	M_1×depth	H_3	W	H_4
MUL 25	13	87	9	19.4	14	7	31	12	22	M3×5	2.9	24.9	6.7
MUL 30	28	139	12	23.9	18	9	38	14	28.6	M4×7	3.75	29.9	8.7

Dimension of track rail mm								Appended mounting bolt for track rail(2) mm	Basic dynamic load rating(3)	Basic static load rating(3)	Static moment rating(3)		
H_5	W_5	W_6	d_3	d_4	h	E	F	Bolt size x length	C N	C_0 N	T_0 N•m	T_X N•m	T_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

Note(1) : Track rail lengths L are shown in Table 5 on page A-58.
(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 (C_0) and static moment rating (T_0, T_X and T_Y) are shown in the sketches below. The upper values in the T_X and T_Y 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 97.



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

MUL 25 C2 R280 T1 H /U

- MUL — Model code: MUL
- 25 — Size
- C2 — Number of slide unit (two units)
- R280 — Length of track rail (280mm)
- T1 — Preload symbol: Standard : No symbol; Light preload : T1
- H — Accuracy class: Ordinary : No symbol; High : H
- /U — Special specification: With upper seals : /U

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

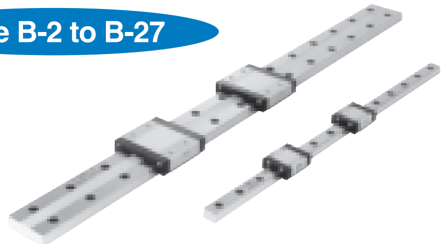
Linear Ways

Description of each series and Table of dimensions

B

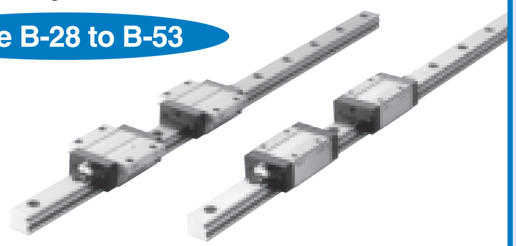
Linear Way L

Page B-2 to B-27



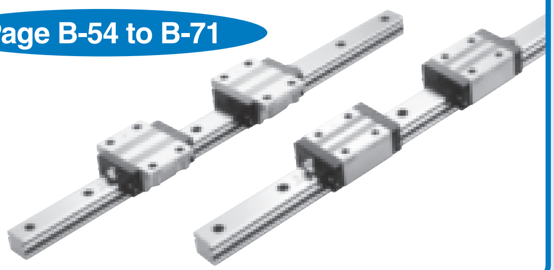
Linear Way E

Page B-28 to B-53



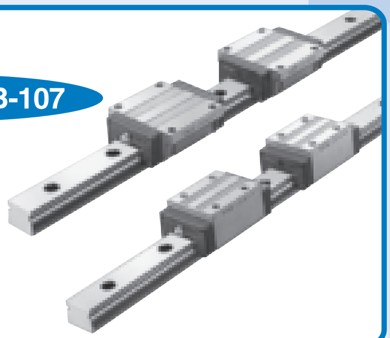
Low Decibel Linear Way E

Page B-54 to B-71



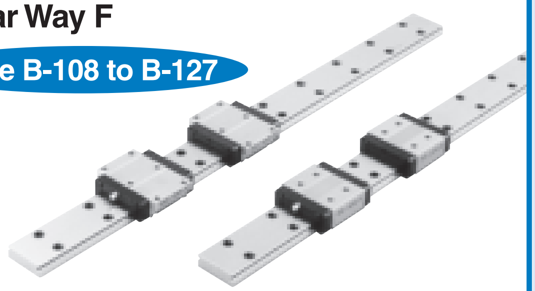
Linear Way H

Page B-72 to B-107



Linear Way F

Page B-108 to B-127

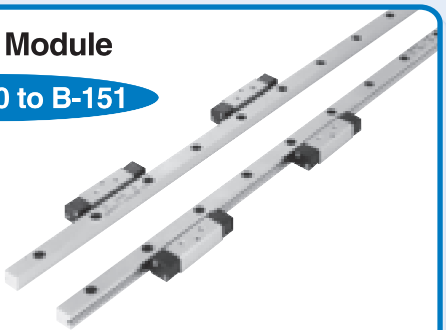


Linear Way U

Page B-128 to B-139

Linear Way Module

Page B-140 to B-151



In the table of dimensions, standard products are referred to using identification numbers marked with [shaded box]. The identification numbers marked with [white box] 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.

Stainless steel type and high carbon steel type

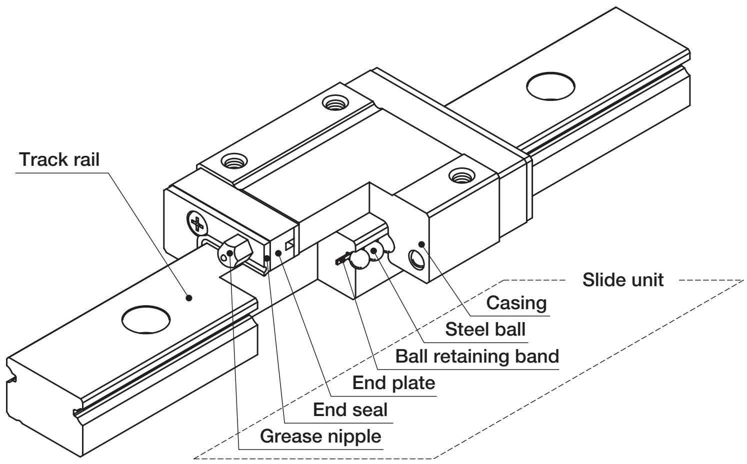
The stainless steel type has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, disk read devices, and semi-conductor manufacturing equipment.
The high carbon steel type permits additional working to track rails and 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.

Tapped rail specification

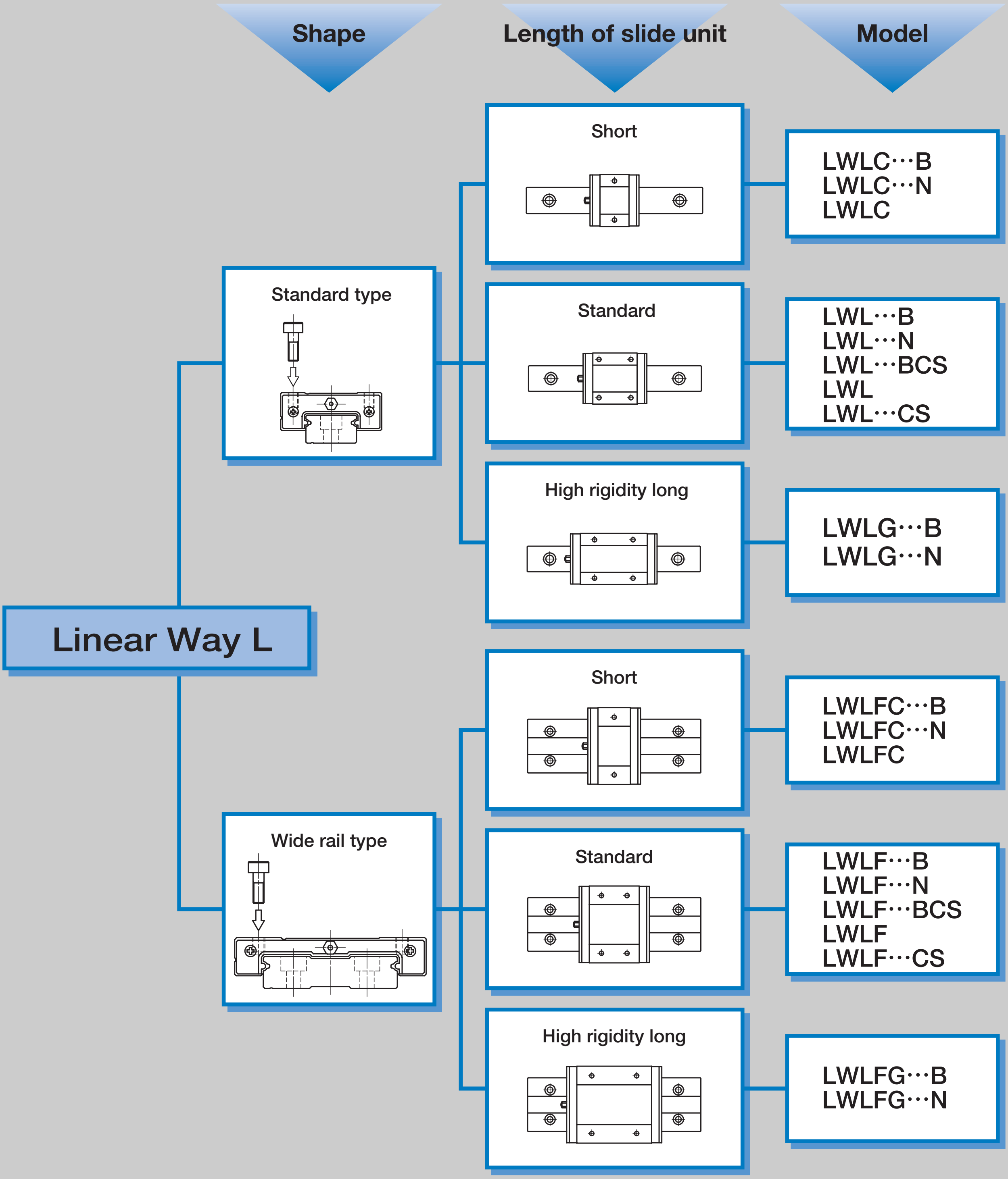
In addition to the standard specification track rail which is fixed by inserting bolts downward in the mounting holes, the tapped rail specification track rail that has tapped screw holes is available, so an optimum mounting direction can be selected, giving more freedom in machine design.



Structure of Linear Way L Ball Retained Type

U.S. PATENT No. 5,435,649
No. 5,289,779
No. 5,250,126
No. 4,652,147
No. 4,505,522

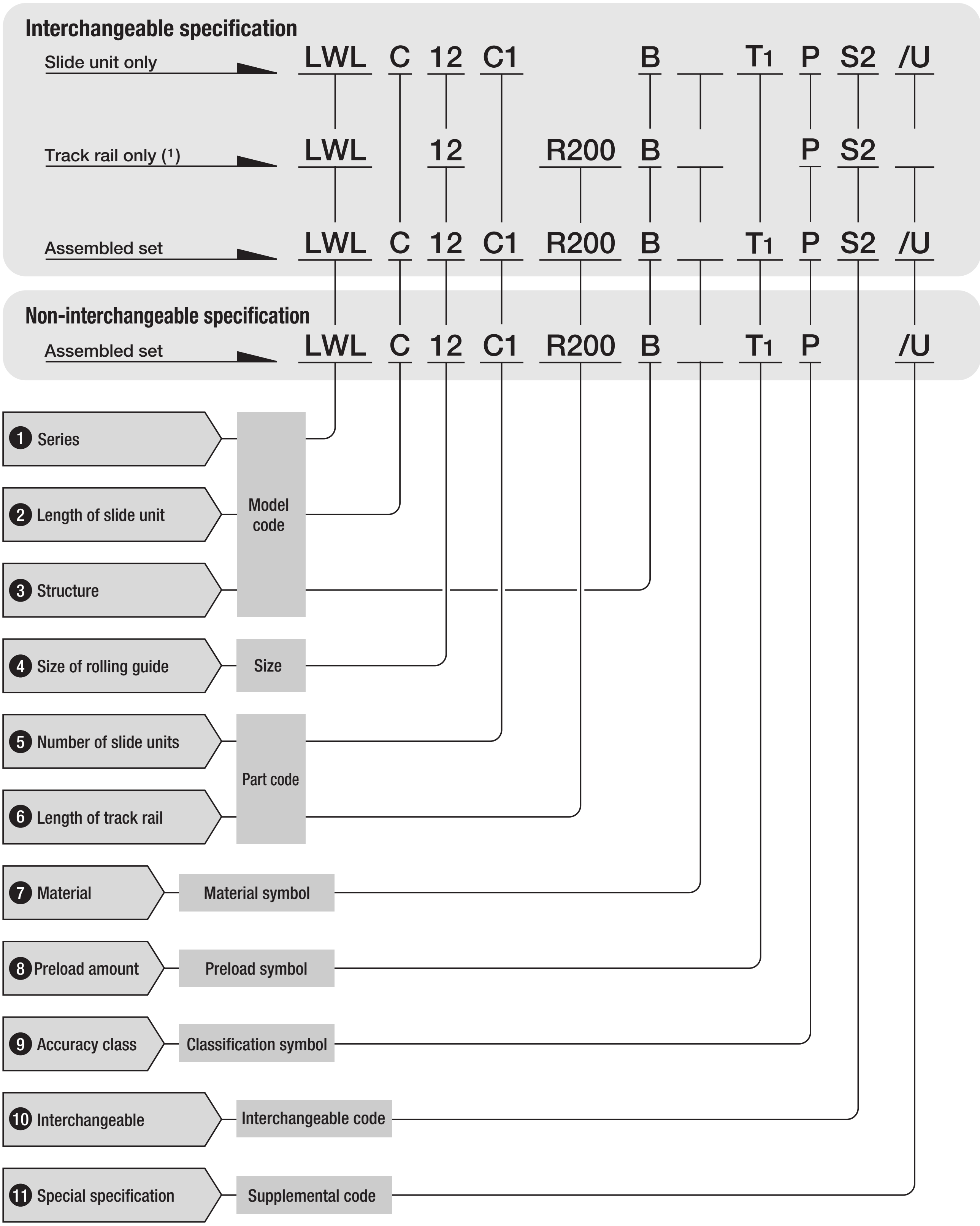
Linear Way L series



Remark 1 : Models with "B" are ball retained type and include interchangeable products.
2 : Models with "N" are tapped rail specification.
3 : Models with "CS" are high carbon steel type.

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 76.



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.

1 Series	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 2.2. 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	Ball retained type : B Ball non-retained type : No symbol Tapped rail specification : N	
4 Size of rolling guide		
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○	Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-12 to B-13.
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.

Table 1.1 Models and sizes of Linear Way L standard type (Ball retained type)

Model / Size	Standard rail specification				Tapped rail specification		
	Stainless steel made			High carbon steel made	Stainless steel made		
	Short LWLC…B	Standard LWL…B	High rigidity long LWLG…B	Standard LWL…BCS	Short LWLC…N	Standard LWL…N	High rigidity long LWLG…N
5	☆	☆	—	—	○	○	—
7	☆	☆	☆	—	○	○	○
9	☆	☆	☆	☆	○	○	○
12	☆	☆	☆	☆	—	—	—
15	☆	☆	☆	☆	—	—	—
20	☆	☆	☆	☆	—	—	—
25	☆	☆	☆	—	—	—	—

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

Table 1.2 Models and sizes of Linear Way L standard type (Ball non-retained type)

Model / Size	Standard rail specification		Tapped rail specification	
	Stainless steel made	High carbon steel made	Stainless steel made	
	Standard LWL	Standard LWL…CS	Short LWLC	Standard LWL
2	—	—	—	○
3	—	—	○	○
5	○	—	—	—
7	○	—	—	—
9	○	—	—	—
12	○	○	—	—
15	○	○	—	—

Table 2.1 Models and sizes of Linear Way L wide rail type (Ball retained type)

Model / Size	Standard rail specification				Tapped rail specification		
	Stainless steel made			High carbon steel made	Stainless steel made		
	Short LWLFC…B	Standard LWLF…B	High rigidity long LWLFG…B	Standard LWLF…BCS	Short LWLFC…N	Standard LWLF…N	High rigidity long LWLFG…N
10	☆	☆	—	—	○	○	—
14	☆	☆	☆	—	○	○	○
18	☆	☆	☆	☆	○	○	○
24	☆	☆	☆	☆	—	—	—
30	☆	☆	☆	☆	—	—	—
42	☆	☆	☆	☆	—	—	○

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)

Model / Size	Standard rail specification			Tapped rail specification	
	Stainless steel made		High carbon steel made	Stainless steel made	
	Short LWLFC	Standard LWLF	Standard LWLF…CS	Short LWLFC…N	Standard LWLF…N
4	—	○	—	—	—
6	○	○	—	○	○
14	—	○	—	—	—
18	—	○	○	—	—
24	—	○	○	—	—
42	—	○	○	—	—

8 Preload amount

Clearance : T_0

Standard : No symbol

Light preload : T_1

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 84.

Table 3 Applicable preload types

Size		Preload type		
Standard type	Wide rail type	Clearance (T_0)	Standard (No symbol)	Light preload (T_1)
2	4	○	—	—
3	6	○	—	—
5	10	☆	☆	—
7	14	☆	☆	☆
9	18	☆	☆	☆
12	24	☆	☆	☆
15	30	☆	☆	☆
20	42	☆	☆	☆
25	—	☆	☆	☆

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

9 Accuracy class

High : H

Precision : P

For the interchangeable specification, combine slide units and track rails of the same class. For details of accuracy, see page 79.

10 Interchangeable code

Select group 1 : S1

Select group 2 : S2

Specify this item for the 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.

11 Special specification

For applicable special specifications, see Table 4. When several special specifications are required, see Table 5.
For details of special specifications, see page 86.

Table 4 Special specifications

Special specification	Supplemental code	Assembled set	Track rail only	Slide unit only	Dimension
Butt-jointing track rail	A	○(1)(2)(3)	—	—	
Stainless steel end plates	BS	○(4)(5)	—	—	
Opposite reference surfaces arrangement	D	☆	—	—	
Specified rail mounting hole positions	E	☆	☆	—	
Inspection sheet	I	○	—	—	
Black chrome surface treatment (track rail)	LR	○(6)	—	—	
Supplied without track rail mounting bolt	MN	☆(2)(7)	☆	—	
Changed sizes of mounting holes and female threads	M	○(2)(8)	—	—	See Table 6 .
No end seal	N	☆	—	☆	
Capillary plates	Q	☆(4)	—	☆	See Table 7 .
Seals for special environment	RE	○(4)(9)	—	—	
Track rail with stopper pins	S	○	—	—	See Table 8 .
Under seals	U	☆(10)	—	☆(11)	See Table 9 .
Matched sets to be used as an assembled group	W	○	—	—	
Specified grease	Y	○(12)	—	—	

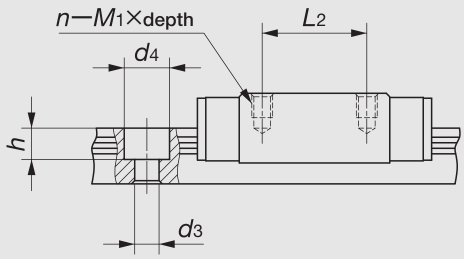
Note(1) : Not applicable to high carbon steel type.
(2) : Not applicable to tapped rail specification products.
(3) : Not applicable to size 2, 3, 4 and 6 models.
(4) : Not applicable to non ball-retrained type.
(5) : Not applicable to size 25 models.
(6) : Not applicable to size 2, 3, 4, 5, 6 and 10 models.
(7) : Not applicable to size 2 and 3 models.
(8) : Applicable to size 5, 9, 12, 14 and 18 models of stainless steel made ball non-retained type.
(9) : Not applicable to size 2, 3, 4 and 25 models.
(10) : Not applicable to size 2, 3, 4, 5, 6, 7, 10 and 14 models.
(11) : Not applicable to size 5, 7, 10 and 14 models.
(12) : Only /YNG is applicable to size 2 and 4 models.
Remark : The mark ☆ indicates that it is also applicable to interchangeable specification products.

Table 5 Combination of special specifications

BS	○													
D	○	○												
E	—	○	—											
I	○	○	○	○										
LR	—	○	○	○	○									
MN	○	○	☆	☆	○	○								
M	○	○	○	○	○	○	○							
N	○	○	☆	☆	○	○	☆	○						
Q	○	○	☆	☆	○	○	☆	○	☆					
RE	○	○	○	○	○	○	○	○	—	○				
S	○	○	○	○	○	○	○	○	○	○	○			
U	○	○	☆	☆	○	○	☆	○	—	☆	○	○		
W	○	○	○	—	○	○	○	○	○	○	○	○	○	
Y	○	○	○	○	○	○	○	○	○	—	○	○	○	○
	A	BS	D	E	I	LR	MN	M	N	Q	RE	S	U	W

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 : When several special specifications are combined, arrange the supplemental codes alphabetically.

Table 6 Changed sizes of mounting holes and female threads (Supplemental code /M)

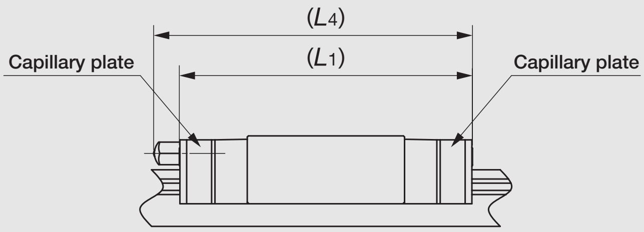


unit : mm

Model number	n—M_1× depth	L_2	d_3	d_4	h	Track rail mounting bolt
LWL 5 …/M2	2—M2×2	7*	2.4*	3.6*	1*	M2× 6*
LWL 9 …/M3	4—M3×2.5	10	3.5	6	3.5	M3× 8
LWL 12 …/M3	4—M3×3	15*	3.5	6.5	4.5	M3×10
LWLF 14 …/M3	4—M3×3	10*	3.5*	6*	3.2*	M3× 6*
LWLF 18 …/M3	4—M3×3	12*	3.5*	6.5*	4.5*	M3× 8*

Remark : The values marked with an asterisk (*) are the same as those of the standard products.

Table 7 Slide unit with Capillary plates (Supplemental code /Q)



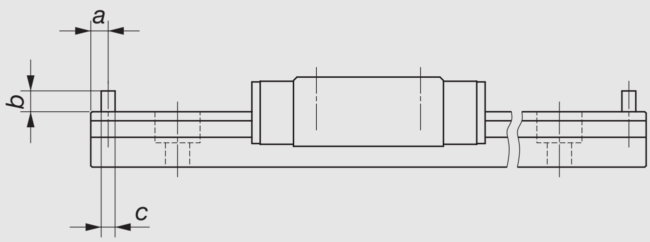
unit : mm

Model number	L_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 25…B	87.5	98
LWLG 25…B	107.5	118

Model number	L_1	L_4
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.

Table 8 Track rail with stopper pins (Supplemental code /S)



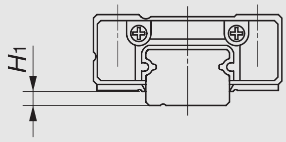
unit : mm

Model number: Ball retained type	Model number: Ball non-retained type	*a*	*b*	*c*
LWL 5…B	**LWL 5**	2	2	1.6
LWL 7…B	**LWL 7**	2.5	2.5	2
LWL 9…B	**LWL 9**		3	
LWL 12…B	**LWL 12**			
LWL 15…B	**LWL 15**		4	
LWL 20…B	—		5	
LWL 25…B	—	3.5		

Model number: Ball retained type	Model number: Ball non-retained type	*a*	*b*	*c*
LWLF 10…B	—	2.5	2	1.6
LWLF 14…B	**LWLF 14**		3	2
LWLF 18…B	**LWLF 18**			
LWLF 24…B	**LWLF 24**			
LWLF 30…B	—		4	
LWLF 42…B	**LWLF 42**		5	

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

Table 9 H_1 dimension of slide unit with under seals (Supplemental code /U)



unit : mm

Model number: Ball retained type	Model number: Ball non-retained type	H_1
LWL 9…B	**LWL 9**	1
LWL 12…B	**LWL 12**	2
LWL 15…B	**LWL 15**	3
LWL 20…B	—	4
LWL 25…B	—	5(1)

Model number: Ball retained type	Model number: Ball non-retained type	H_1
LWLF 18…B	**LWLF 18**	2
LWLF 24…B	**LWLF 24**	
LWLF 30…B	—	
—	**LWLF 42**	
LWLF 42…B	—	3

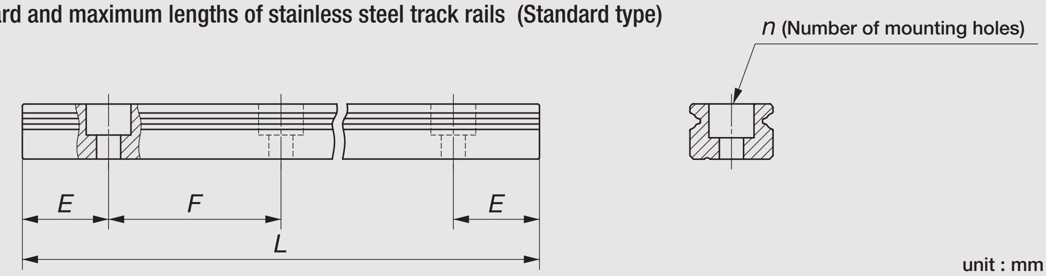
Note(1) : This dimension is the same as that without under seals.
Remark : The above table shows representative model numbers but is applicable to all models of the same size.

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 IKO 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 89.

Table 10.1 Standard and maximum lengths of stainless steel track rails (Standard type)



unit : mm

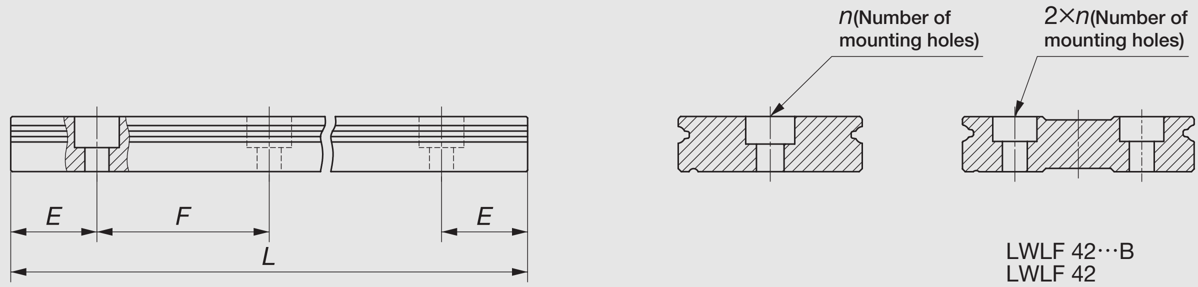
Item ＼ Model number		LWL 2	LWL 3	LWL 5…B LWL 5	LWL 7…B LWL 7	LWL 9…B LWL 9
Standard length *L*(*n*)		32(4) 40(5) 56(7) 80(10)	30(3) 40(4) 60(6) 80(8) 100(10)	60(4) 90(6) 105(7) 120(8) 150(10)	60(4) 90(6) 120(8) 150(10) 180(12) 240(16)	60(3) 80(4) 120(6) 160(8) 220(11) 280(14)
Pitch of mounting holes *F*		8	10	15	15	20
E		4	5	7.5	7.5	10
Standard range of *E* (1)	incl.	2.5	3	4	4.5	4.5
	under	6.5	8	11.5	12	14.5
Maximum length(2)		104 (200)	150 (300)	210 (510)	300 (990)	860 (1 200)
Maximum number of butt-jointing track rails		—	—	5	7	2
Maximum length of butt-jointing track rails		—	—	915	1 905	1 660

Item ＼ Model number		LWL 12…B LWL 12	LWL 15…B LWL 15	LWL 20…B	LWL 25…B
Standard length *L*(*n*)		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*		25	40	60	60
E		12.5	20	30	30
Standard range of *E* (1)	incl.	5	5.5	8	9
	under	17.5	25.5	38	39
Maximum length(2)		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
Maximum length of butt-jointing track rails		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 IKO 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.

Table 10.2 Standard and maximum lengths of stainless steel track rails (Wide rail type)



unit : mm

Item \ Model number	LWLF 4	LWLF 6	LWLF 10…B	LWLF 14…B LWLF 14
Standard length *L* (*n*)	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 holes *F*	10	15	20	30
E	5	7.5	10	15
Standard range of *E* (1) incl.	3.5	4.5	4.5	5.5
Standard range 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

Item \ Model number	LWLF 18…B LWLF 18	LWLF 24…B LWLF 24	LWLF 30…B	LWLF 42…B LWLF 42
Standard length *L* (*n*)	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 holes *F*	30	40	40	40
E	15	20	20	20
Standard range of *E* (1) incl.	5.5	6.5	6.5	6.5
Standard range 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 track rails	3	3	3	3
Maximum length of butt-jointing track rails	1 920	1 840	1 840	1 840

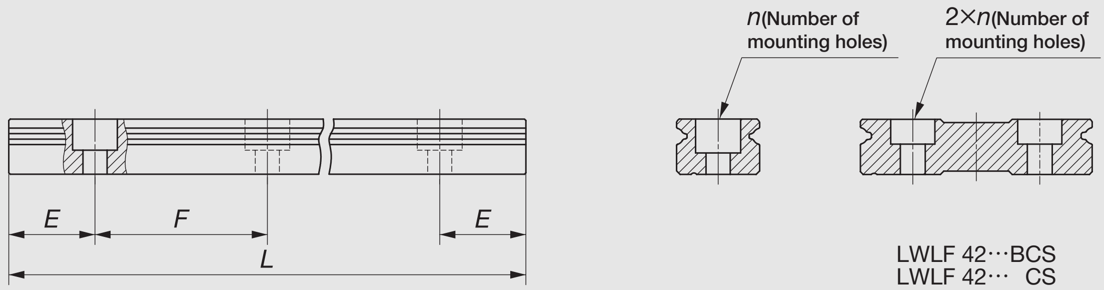
Note(1) : Not applicable to the track rail with stopper pins (/S).
(2) : The track rails of LWLF 4, LWLF 6 and LWLF…B can be manufactured up to the maximum lengths shown in parentheses. Consult IKO for further information.

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.

B

LWL, LWLF

Table 10.3 Standard and maximum lengths of high carbon steel track rails (Standard type, Wide rail type)



unit : mm

Item \ Model number		LWL 9⋯BCS	LWL 12⋯BCS LWL 12⋯ CS	LWL 15⋯BCS LWL 15⋯ CS	LWL 20⋯BCS
Standard length *L* (*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 holes *F*		20	25	40	60
E		10	12.5	20	30
Standard range of *E* (1)	incl.	4.5	5	5.5	8
	under	14.5	17.5	25.5	38
Maximum length		1 000	1 500	1 520	1 560

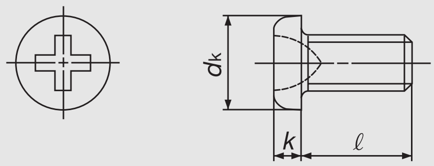
Item \ Model number		LWLF 18⋯BCS LWLF 18⋯ CS	LWLF 24⋯BCS LWLF 24⋯ CS	LWLF 30⋯BCS	LWLF 42⋯BCS LWLF 42⋯ CS
Standard length *L* (*n*)		90(3) 180(6) 240(8) 300(10) 420(14) 510(17) 600(20)	120(3) 240(6) 320(8) 400(10) 600(15) 720(18) 800(20)	160(4) 320(8) 440(11) 560(14) 680(17) 800(20) 920(23)	160(4) 320(8) 440(11) 560(14) 680(17) 800(20) 920(23)
Pitch of mounting holes *F*		30	40	40	40
E		15	20	20	20
Standard range of *E* (1)	incl.	5.5	6.5	6.5	6.5
	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 IKO for further information.

Table 11.1 Cross recessed head screw for precision equipment

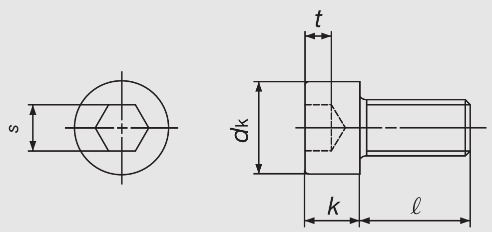


unit : mm

Bolt size (d)	Dimension			
	Pitch of screw (P)	d_k	k	ℓ
M1	0.25	1.8	0.45	3, 4, 5
M1.4 (1)	0.3	2.5	0.8	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

Bolt size (d)	Dimension					
	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

B

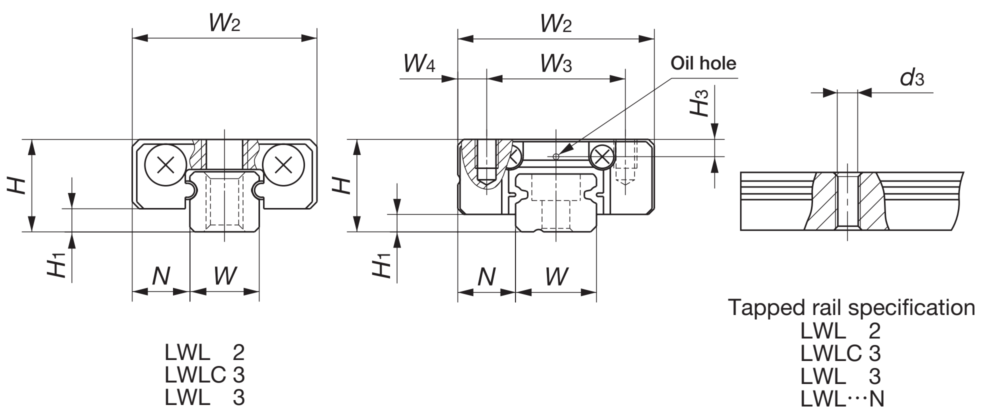
LWL, LWLF

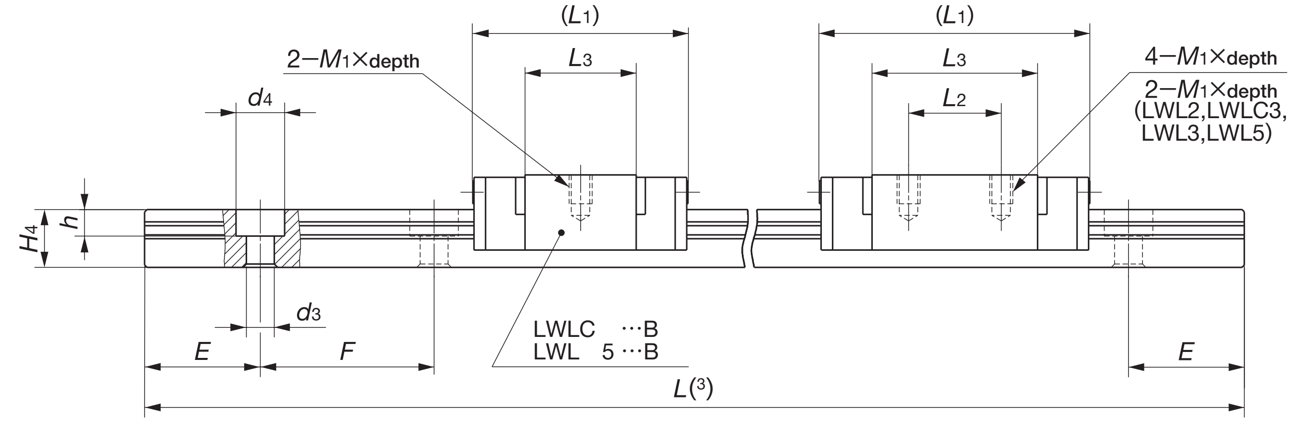
Linear Way L : Standard type

Ball retained type
- LWLC…B
- LWL …B
- LWLG…B

Tapped rail specification
- LWLC…N
- LWL …N
- LWLG…N

Ball non-retained type
- LWLC
- LWL



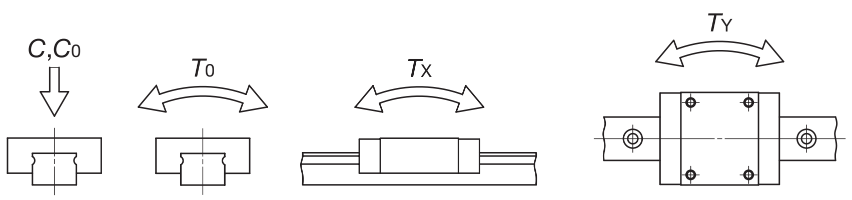


Model number	Interchangeable	Mass(Ref.) g Slide unit	Track rail (per 100 mm)	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	M_1×depth
LWL 2(1)		0.9	2.8	3.2	0.7	2	6	—	—	12.4	4	8.8	M1.4×1.1
LWLC 3(1)		1.0	5.3	4	1	2.5	8	—	—	12	3.5	6.7	M1.6×1.3
LWL 3(1)		1.6	5.3	4	1	2.5	8	—	—	16	5.5	10.7	M2 ×1.3
LWLC 5…B	☆	3.4	12	6	1	3.5	12	8	2	16	—	9.6	M2 ×1.5
LWLC 5…N		3.4	13	6	1	3.5	12	8	2	16	—	9.6	M2 ×1.5
LWL 5…B	☆	4.4	12	6	1	3.5	12	8	2	19	—	12.6	M2 ×1.5
LWL 5…N		4.4	13	6	1	3.5	12	8	2	19	—	12.6	M2 ×1.5
LWL 5		4.0	12	6	1	3.5	12	—	—	19.5	7	12.6	M2.6×2
LWLC 7…B	☆	7.1	22	8	1.5	5	17	12	2.5	19	—	9.6	M2 ×2.5
LWLC 7…N		7.1	24	8	1.5	5	17	12	2.5	19	—	9.6	M2 ×2.5
LWL 7…B	☆	10	22	8	1.5	5	17	12	2.5	23.5	8	14.3	M2 ×2.5
LWL 7…N		10	24	8	1.5	5	17	12	2.5	23.5	8	14.3	M2 ×2.5
LWLG 7…B	☆	14	22	8	1.5	5	17	12	2.5	31	12	21.6	M2 ×2.5
LWLG 7…N		14	24	8	1.5	5	17	12	2.5	31	12	21.6	M2 ×2.5
LWL 7		7.0	24	8	1.5	5	17	12	2.5	23.5	8	14.3	M2 ×2.5

Model number	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(4) C N	Basic static load rating(4) C_0 N	Static moment rating(4) T_0 N·m	T_X N·m	T_Y N·m
LWL 2(1)	—	2	2	M1 Through	—	—	4	8	M1 × ℓ (2) (not appended)	211	381	0.42	0.54 2.9	0.64 3.4
LWLC 3(1)	—	3	2.6	M1.6 Through	—	—	5	10	M1.6× ℓ (2) (not appended)	251	361	0.58	0.39 2.9	0.47 3.4
LWL 3(1)	—	3	2.6	M1.6 Through	—	—	5	10	M1.6× ℓ (2) (not appended)	353	587	0.94	0.98 5.9	1.2 7.0
LWLC 5…B	1.2	5	3.7	2.4	3.6	0.8	7.5	15	Cross recessed head screw for precision equipment M2 × 6	562	841	2.2	1.4 8.5	1.2 7.2
LWLC 5…N	1.2	5	3.7	M2.5 Through	—	—	7.5	15	M2.5× ℓ (2) (not appended)	562	841	2.2	1.4 8.5	1.2 7.2
LWL 5…B	1.2	5	3.7	2.4	3.6	0.8	7.5	15	Cross recessed head screw for precision equipment M2 × 6	676	1 090	2.9	2.3 12.8	1.9 10.8
LWL 5…N	1.2	5	3.7	M2.5 Through	—	—	7.5	15	M2.5× ℓ (2) (not appended)	676	1 090	2.9	2.3 12.8	1.9 10.8
LWL 5	—	5	3.7	2.4	3.6	1	7.5	15	Cross recessed head screw for precision equipment M2 × 6	567	917	2.4	1.9 11.1	2.3 13.2
LWLC 7…B	1.5	7	5	2.4	4.2	2.3	7.5	15	Hexagon socket head bolt M2 × 6	937	1 140	4.1	1.8 14.9	1.5 12.5
LWLC 7…N	1.5	7	5	M3 Through	—	—	7.5	15	M3 × ℓ (2) (not appended)	937	1 140	4.1	1.8 14.9	1.5 12.5
LWL 7…B	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 28.2	3.9 23.6
LWL 7…N	1.5	7	5	M3 Through	—	—	7.5	15	M3 × ℓ (2) (not appended)	1 330	1 890	6.9	4.7 28.2	3.9 23.6
LWLG 7…B	1.5	7	5	2.4	4.2	2.3	7.5	15	Hexagon socket head bolt M2 × 6	1 690	2 650	9.7	8.8 50.7	7.4 42.5
LWLG 7…N	1.5	7	5	M3 Through	—	—	7.5	15	M3 × ℓ (2) (not appended)	1 690	2 650	9.7	8.8 50.7	7.4 42.5
LWL 7	—	7	5	2.4	4.2	2.3	7.5	15	Hexagon socket head bolt M2 × 6	1 120	1 590	6.3	3.9 23.6	4.7 28.2

Note(1) : Size 2 and 3 models are not provided with end seals.
(2) : Prepare track rail mounting bolts with a fixing depth less than H_4.
(3) : Track rail lengths are shown in Table 10.1 on page B-12 and Table 10.3 on page B-14.
(4) : 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.

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 : The mounting bolts M2 or smaller are shown on page B-15. Consult IKO 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 99.



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

LWL 7 C2 R180 B P S2 /N

- LWL — Model code: LWLC…B, LWLC…N, LWL …B, LWL …N, LWLG…B, LWLG…N, LWLC, LWL
- 7 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R180 — Length of track rail (180 millimeters)
- B — Material: Stainless steel made : No symbol; High carbon steel made : CS
- Preload amount: Clearance : T_0; Standard: No symbol; Light preload : T_1
- P — Accuracy class: High : H; Precision : P
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /N — Special specification: No end seal : /N

B

LWL, LWLF

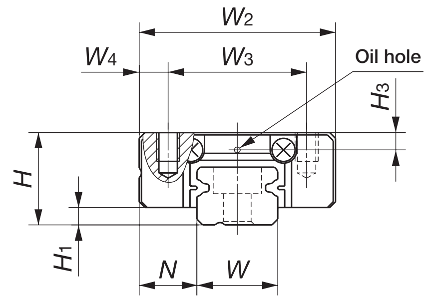
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

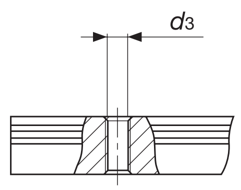
IKO Linear Way L : Standard type

Ball retained type
- LWLC…B
- LWL …B
- LWL …B CS (High carbon steel made)
- LWLG…B

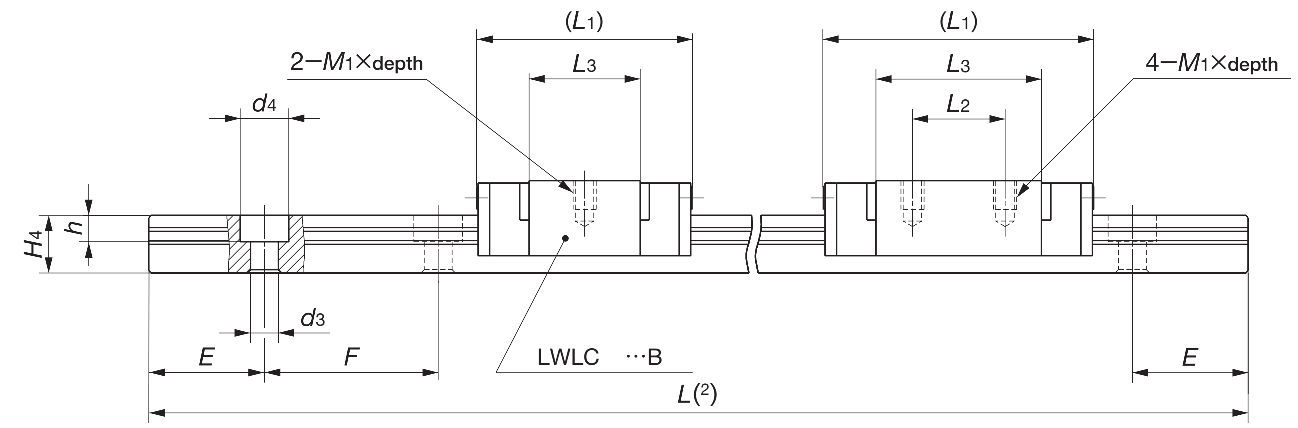
Tapped rail specification
- LWLC…N
- LWL …N
- LWLG…N

Ball non-retained type
- LWL
- LWL …CS (High carbon steel made)





Tapped rail specification
LWL…N

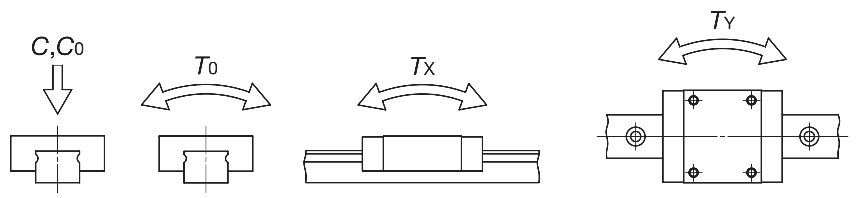


Model number	Interchangeable	Mass(Ref.) g Slide unit	Mass(Ref.) g Track rail (per 100 mm)	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	M_1×depth
LWLC 9…B	☆	11	35	10	2	5.5	20	15	2.5	21.5	–	11.9	M3 ×3
LWLC 9…N			37										
LWL 9…B	☆	19	35							30	10	20.8	
LWL 9…B CS	☆												
LWL 9…N			37										
LWLG 9…B	☆	28	35							40.5	15	30.9	
LWLG 9…N			37										
LWL 9		18	43							30	13	19.6	M2 ×2.5
LWLC 12…B	☆	22	65	13	3	7.5	27	20	3.5	25	–	13	M3 ×3.5
LWL 12…B	☆	35								34	15	21.6	
LWL 12…B CS	☆												
LWLG 12…B	☆	51								44	20	32	
LWL 12		34	75							34	15	21	M2.6×3
LWL 12…CS													M3 ×3

Model number	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N·m	T_X N·m	T_Y N·m
LWLC 9…B	2.2	9	6	3.5	6	3.5	10	20	M3 × 8	1 180	1 480	6.9	2.9 21.4	2.4 18.0
LWLC 9…N				M4 Through	–	–			M4 × ℓ (1) (not appended)					
LWL 9…B				3.5	6	3.5			M3 × 8	1 810	2 760	12.8	9.1 51.1	7.6 42.9
LWL 9…B CS														
LWL 9…N				M4 Through	–	–			M4 × ℓ (1) (not appended)					
LWLG 9…B				3.5	6	3.5			M3 × 8	2 370	4 030	18.7	18.7 98.3	15.7 82.5
LWLG 9…N				M4 Through	–	–			M4 × ℓ (1) (not appended)					
LWL 9	–		6.5	2.6	4.5	3			M2.3× 8	2 070	2 820	14.1	9.3 53.3	11.1 63.5
LWLC 12…B	2.7	12	8	3.5	6.5	4.5	12.5	25	M3 × 8	2 210	2 380	14.8	5.3 41.7	4.5 35.0
LWL 12…B										3 330	4 290	26.6	15.4 93.1	12.9 78.2
LWL 12…B CS														
LWLG 12…B										4 310	6 200	38.4	30.6 168	25.7 141
LWL 12	–		8.5	3	5.5	3.5			M2.6×10	2 860	3 530	23.3	12.0 78.0	14.3 92.9
LWL 12…CS				3.5	6.5	4.5			M3 ×10					

Note(1) : Prepare track rail mounting bolts with a fixing depth less H_4.
(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 (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.

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 (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 99.



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

LWL 9 C2 R160 B CS P S2 /N

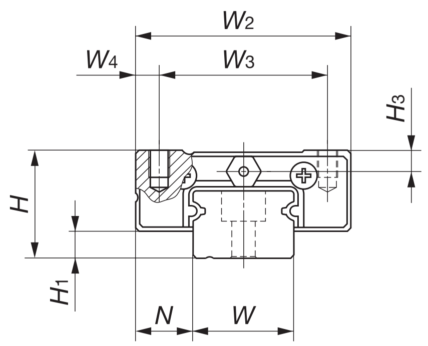
- Model code: LWLC…B, LWLC…N, LWL …B, LWL …N, LWLG…B, LWLG…N, LWL
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (160 millimeters)
- Material: Stainless steel made : No symbol; High carbon steel made : CS
- Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- Accuracy class: High : H; Precision : P
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: No end seal : /N

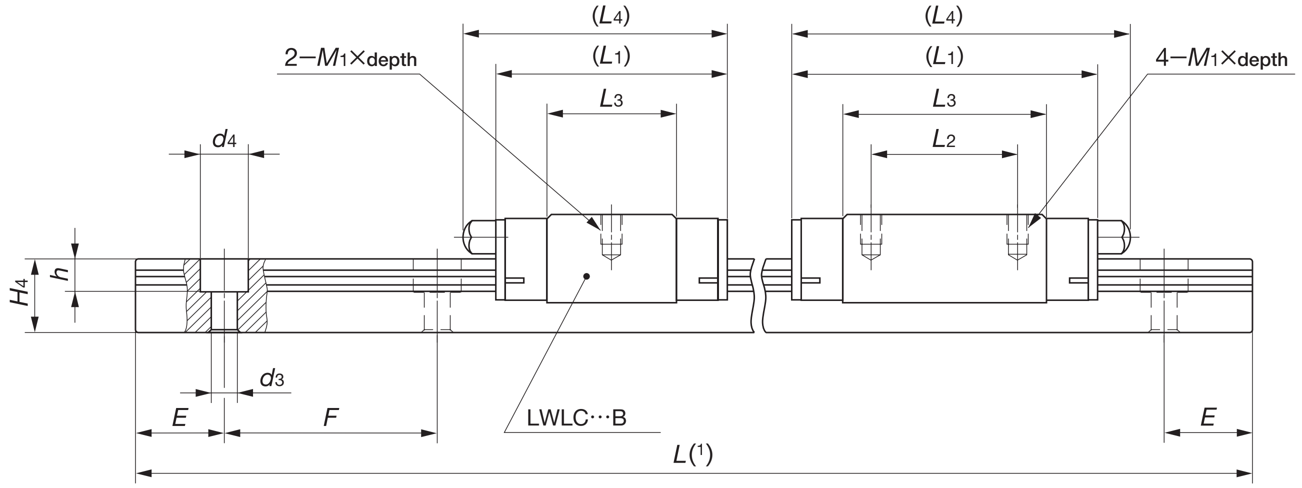
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO 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)



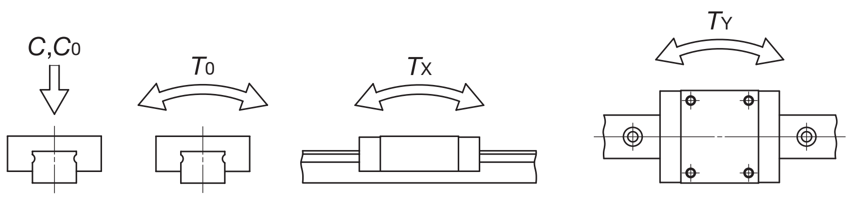


Model number	Interchangeable	Mass (Ref.) g Slide unit	Track rail (per 100 mm)	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
LWLC 15…B	☆	42	107	16	4	8.5	32	25	3.5	32	—	17.7	36	M3×4
LWL 15…B	☆	64								42	20	27.8	47	
LWL 15…B CS	☆													
LWLG 15…B	☆	95								57	25	42.7	62	
LWL 15		57	130							42	20	26.8	—	
LWL 15…CS														
LWLC 20…B	☆	89	156	20	5	10	40	30	5	38	—	22.3	42	M4×6
LWL 20…B	☆	133								50	25	34.6	55	
LWL 20…B CS	☆													
LWLG 20…B	☆	196								68	30	52.3	72	
LWLC 25…B	☆	190	243	25	5	12.5	48	35	6.5	55	—	31.9	65	M6×7
LWL 25…B	☆	310								78	35	55.7	89	
LWLG 25…B	☆	413								98	40	75.5	108	

Model number	Dimensions of track rail mm H_3	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWLC 15…B	3.1	15	10	3.5	6.5	4.5	20	40	M3×10	3 490	3 890	30.0	11.7 84.5	9.8 70.9
LWL 15…B										4 980	6 490	50.0	29.7 172	24.9 144
LWL 15…B CS														
LWLG 15…B										6 620	9 740	75.0	63.9 338	53.6 284
LWL 15	—		11						M3×12	4 760	5 690	47.2	24.6 155	29.4 184
LWL 15…CS														
LWLC 20…B	4.2	20	11	6	9.5	5.5	30	60	M5×14	4 580	5 300	54.0	19.4 134	16.3 112
LWL 20…B										6 650	9 080	92.6	52.7 280	44.2 235
LWL 20…B CS														
LWLG 20…B										8 510	12 900	131	102 529	85.7 444
LWLC 25…B	5	23	15	7	11.0	9.0	30	60	M6×16	9 120	10 600	128	57.4 380	48.1 319
LWL 25…B										13 500	18 500	223	163 887	137 744
LWLG 25…B										16 700	25 200	303	293 1 480	246 1 240

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 (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.

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 97.



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

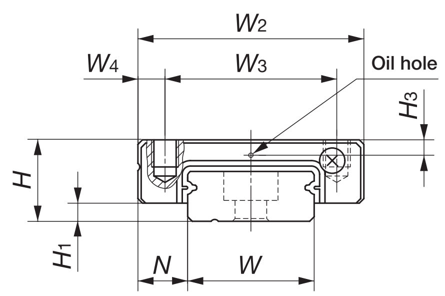
LWL 20 C2 R240 B CS P S2 /U

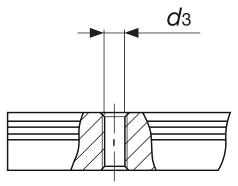
- Model code: LWLC…B, LWL …B, LWLG…B, LWL
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (240 millimeters)
- Material: Stainless steel made : No symbol; High carbon steel made : CS
- Preload amount: Clearance : T_0; Standard : No symbol; Light preload : T_1
- Accuracy class: High : H; Precision : P
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Under seals : /U

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

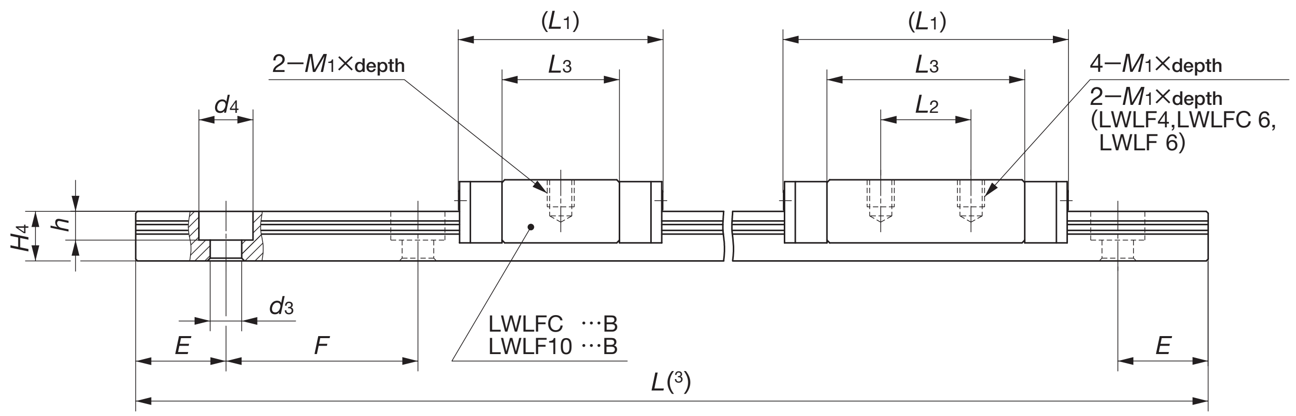
IKO Linear Way L : Wide rail type

Ball retained type
LWLFC…B
LWLF …B
LWLFG…B
Tapped rail specification
LWLFC…N
LWLF …N
LWLFG…N
Ball non-retained type
LWLFC
LWLF





Tapped rail specification
LWLF…N

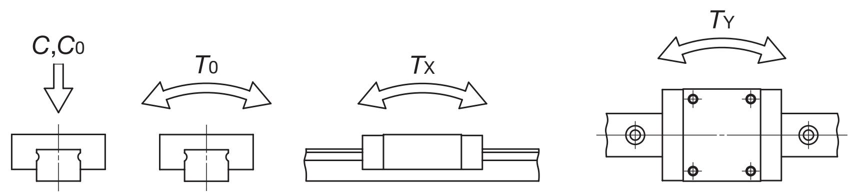


Model number	Interchangeable	Mass (Ref.) g: Slide unit	Mass (Ref.) g: Track rail (per 100 mm)	Dimensions of assembly mm: H	H_1	N	Dimensions of slide unit mm: W_2	W_3	W_4	L_1	L_2	L_3	M_1×depth
LWLF 4(1)		2.1	6.8	4	1	3	10	—	5	17	6.5	11.9	M2 ×1.3
LWLFC 6(1)		2.4	13	4.5	1	3	12	—	6	15	4.5	9.8	M2 ×1.6
LWLFC 6…N(1)		2.4	12	4.5	1	3	12	—	6	15	4.5	9.8	M2 ×1.6
LWLF 6(1)		3.4	13	4.5	1	3	12	—	6	20	8	14.6	M2 ×1.6
LWLF 6…N(1)		3.4	12	4.5	1	3	12	—	6	20	8	14.6	M2 ×1.6
LWLFC 10…B	☆	5.9	28	6.5	1.5	3.5	17	13	2	20.5	—	13.6	M2.5×1.5
LWLFC 10…N		5.9	29	6.5	1.5	3.5	17	13	2	20.5	—	13.6	M2.5×1.5
LWLF 10…B	☆	7.5	28	6.5	1.5	3.5	17	13	2	24.5	—	17.6	M2.5×1.5
LWLF 10…N		7.5	29	6.5	1.5	3.5	17	13	2	24.5	—	17.6	M2.5×1.5
LWLFC 14…B	☆	13	54	9	2	5.5	25	19	3	22.5	—	13	M3 ×3
LWLFC 14…N		13	56	9	2	5.5	25	19	3	22.5	—	13	M3 ×3
LWLF 14…B	☆	21	54	9	2	5.5	25	19	3	31.5	10	22	M3 ×3
LWLF 14…N		21	56	9	2	5.5	25	19	3	31.5	10	22	M3 ×3
LWLFG 14…B	☆	31	54	9	2	5.5	25	19	3	42	19	32.5	M3 ×3
LWLFG 14…N		31	56	9	2	5.5	25	19	3	42	19	32.5	M3 ×3
LWLF 14		23	53	9	1.7	5.5	25	19	3	31.5	10	21.9	M2.6×3

Model number	Dimensions of track rail mm: H_3	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm: Bolt size × length	Basic dynamic load rating(4) C N	Basic static load rating(4) C_0 N	Static moment rating(4): T_0 N·m	T_X N·m	T_Y N·m
LWLF 4(1)	—	4	2.6	1.8	2.8	0.75	5.0	10	Cross recessed head screw for precision equipment M1.6×5	390	677	1.4	1.3 7.1	1.5 8.4
LWLFC 6(1)	—	6	2.8	2.4	4	1.5	7.5	15	Cross recessed head screw for precision equipment M2 ×4	334	542	1.7	0.84 5.1	1.0 6.1
LWLFC 6…N(1)	—	6	2.8	M3 Through	—	—	7.5	15	M3 × ℓ (2) (not appended)	334	542	1.7	0.84 5.1	1.0 6.1
LWLF 6(1)	—	6	2.8	2.4	4	1.5	7.5	15	Cross recessed head screw for precision equipment M2 ×4	443	813	2.5	1.8 9.9	2.2 11.8
LWLF 6…N(1)	—	6	2.8	M3 Through	—	—	7.5	15	M3 × ℓ (2) (not appended)	443	813	2.5	1.8 9.9	2.2 11.8
LWLFC 10…B	1.3	10	4	2.9	4.8	1.6	10	20	Cross recessed head screw for precision equipment M2.5 ×7	712	1 180	6.1	2.6 14.9	2.2 12.5
LWLFC 10…N	1.3	10	4	M3 Through	—	—	10	20	M3 × ℓ (2) (not appended)	712	1 180	6.1	2.6 14.9	2.2 12.5
LWLF 10…B	1.3	10	4	2.9	4.8	1.6	10	20	Cross recessed head screw for precision equipment M2.5 ×7	849	1 510	7.8	4.2 22.4	3.5 18.8
LWLF 10…N	1.3	10	4	M3 Through	—	—	10	20	M3 × ℓ (2) (not appended)	849	1 510	7.8	4.2 22.4	3.5 18.8
LWLFC 14…B	1.7	14	5.5	3.5	6	3.2	15	30	Hexagon socket head bolt M3 × 8	1 240	1 700	12.2	3.8 24.6	3.2 20.7
LWLFC 14…N	1.7	14	5.5	M4 Through	—	—	15	30	M4 × ℓ (2) (not appended)	1 240	1 700	12.2	3.8 24.6	3.2 20.7
LWLF 14…B	1.7	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
LWLF 14…N	1.7	14	5.5	M4 Through	—	—	15	30	M4 × ℓ (2) (not appended)	1 770	2 840	20.3	10.1 54.7	8.4 45.9
LWLFG 14…B	1.7	14	5.5	3.5	6	3.2	15	30	Hexagon socket head bolt M3 × 8	2 320	4 160	29.8	21.0 104	17.6 87.6
LWLFG 14…N	1.7	14	5.5	M4 Through	—	—	15	30	M4 × ℓ (2) (not appended)	2 320	4 160	29.8	21.0 104	17.6 87.6
LWLF 14	—	14	5.2	3.5	6	3.2	15	30	Hexagon socket head bolt M3 × 6	1 490	2 380	17.7	8.4 45.9	10.1 54.7

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.
(3) : 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 (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.

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 : The mounting bolts M2 or smaller are shown on page B-15. Consult IKO for further information.
4 : The ball non-retained type models (LWLF4, LWLFC6, LWLF6, LWLF14) are not provided with an oil hole.
5 : The specification of oil hole is shown on page 99.



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

LWLF 14 C2 R240 B P S2 /N

- Model code: LWLFC…B, LWLFC…N, LWLF …B, LWLF …N, LWLFG…B, LWLFG…N, LWLFC, LWLF
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (240 millimeters)
- Material: Stainless steel made : No symbol; High carbon steel made : CS
- Preload amount: Clearance : T_0; Standard: No symbol; Light preload : T_1
- Accuracy class: High : H; Precision : P
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: No end seal : /N

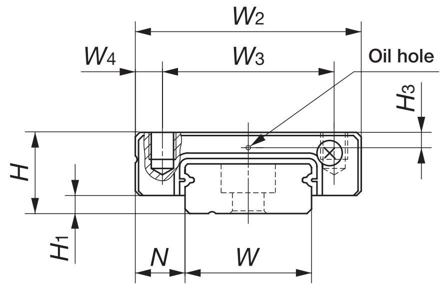
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

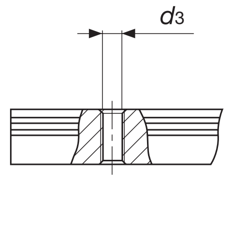
Linear Way L : Wide rail type

Ball retained type
- LWLFC…B
- LWLF …B
- LWLF …B CS (High carbon steel made)
- LWLFG…B

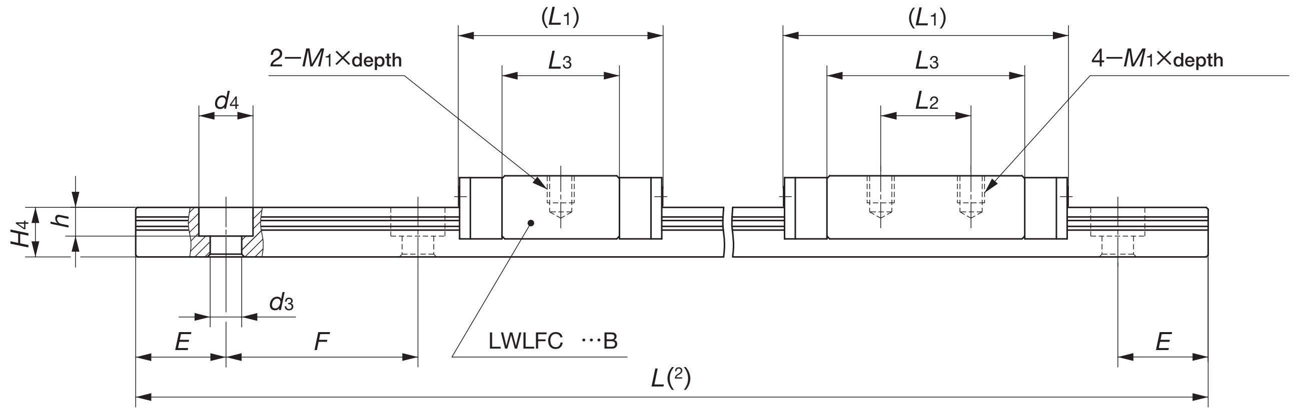
Tapped rail specification
- LWLFC…N
- LWLF …N
- LWLFG…N

Ball non-retained type
- LWLF
- LWLF …CS (High carbon steel made)





Tapped rail specification
LWLF…N

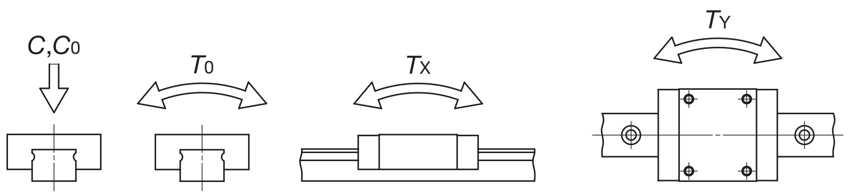


Model number	Interchangeable	Mass (Ref.) g Slide unit	Mass (Ref.) g Track rail (per 100 mm)	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	M_1×depth
LWLFC 18…B	☆	26	90	12	3	6	30	21	4.5	26.5	—	16.6	M3 ×3
LWLFC 18…N			92										
LWLF 18…B	☆	44	90							39	12	28.6	
LWLF 18…BCS	☆												
LWLF 18…N			92										
LWLFG 18…B	☆	61	90					23	3.5	50.5	24	40.4	
LWLFG 18…N			92										
LWLF 18		39	98					21	4.5	39	12	27.6	M2.6×3
LWLF 18…CS													M3 ×3
LWLFC 24…B	☆	45	139	14	3	8	40	28	6	30.5	—	17.7	M3 ×3.5
LWLF 24…B	☆	76								44	15	31	
LWLF 24…BCS	☆												
LWLFG 24…B	☆	111								59	28	46.3	
LWLF 24		74	150							44	15	31	M3 ×3
LWLF 24…CS													

Model number	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size×length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N·m	T_X N·m	T_Y N·m
LWLFC 18…B	2.5	18	7	3.5	6.5	4.5	15	30	M3× 8	1 510	2 120	19.4	5.5 35.9	4.7 30.1
LWLFC 18…N				M4 Through	—	—			M4× ℓ (1) (not appended)					
LWLF 18…B				3.5	6.5	4.5			M3× 8	2 280	3 810	34.9	16.9 90.1	14.2 75.6
LWLF 18…BCS														
LWLF 18…N				M4 Through	—	—			M4× ℓ (1) (not appended)					
LWLFG 18…B				3.5	6.5	4.5			M3× 8	2 870	5 300	48.5	31.9 159	26.7 134
LWLFG 18…N				M4 Through	—	—			M4× ℓ (1) (not appended)					
LWLF 18	—		7.5	3.5	6.5	4.5			M3× 8	2 620	3 950	37.5	17.5 94.4	20.9 113
LWLF 18…CS														
LWLFC 24…B	3.2	24	8	4.5	8	4.5	20	40	M4×10	2 800	3 340	40.7	9.7 67.6	8.2 56.8
LWLF 24…B										4 310	6 200	75.6	30.6 168	25.7 141
LWLF 24…BCS														
LWLFG 24…B										5 620	9 060	111	63.3 321	53.1 270
LWLF 24	—		8.5							3 790	5 290	66.7	25.6 145	30.5 172
LWLF 24…CS														

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_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.

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 99.



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

LWLF 18 C2 R240 B CS P S2 /U

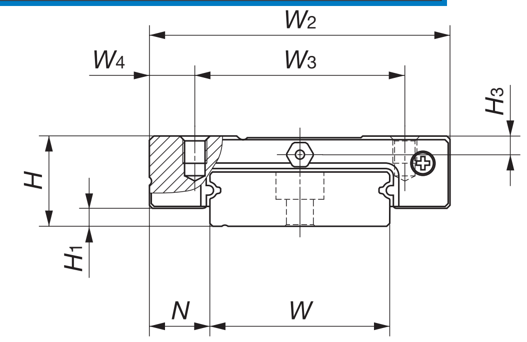
- Model code: LWLFC…B, LWLFC…N, LWLF …B, LWLF …N, LWLFG…B, LWLFG…N, LWLF
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (240 millimeters)
- Material: Stainless steel made : No symbol; High carbon steel made : CS
- Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- Accuracy class: High : H; Precision : P
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Under seals : /U

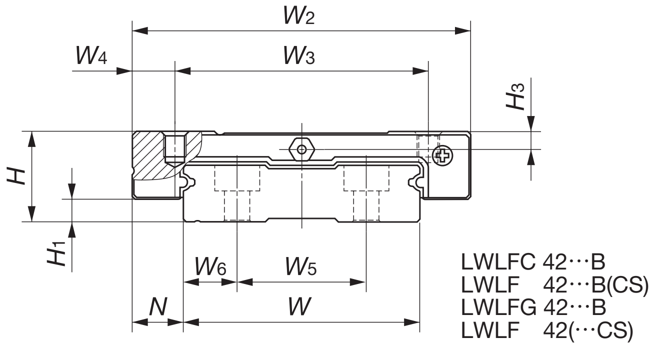
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

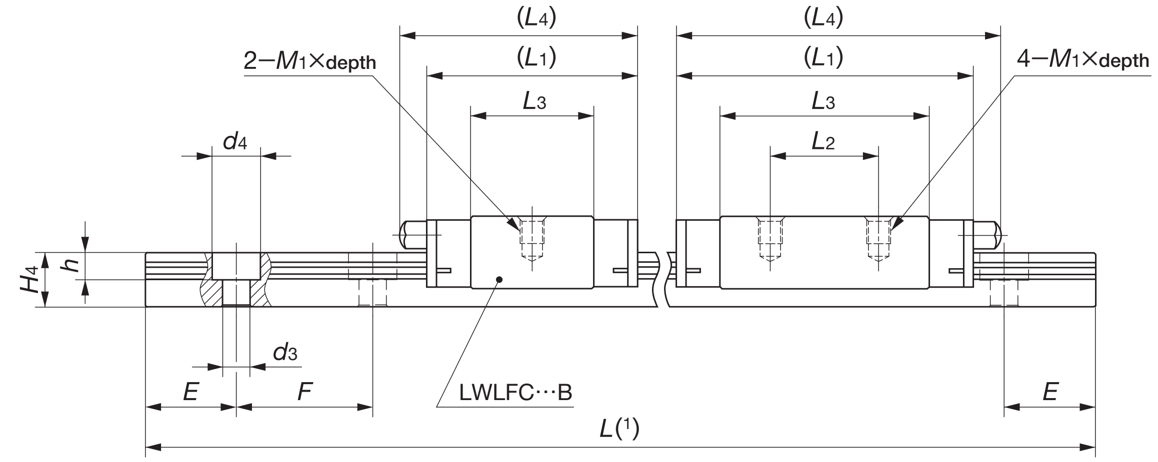
IKO Linear Way L : Wide rail type

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)



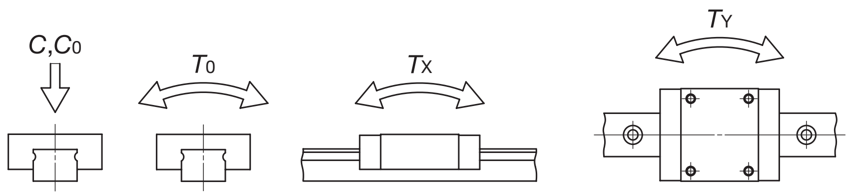




Model number	Interchangeable	Mass (Ref.) g Slide unit	Mass (Ref.) g Track rail (per 100 mm)	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
LWLFC 30…B	☆	70	198	15	3	10	50	35	7.5	35.5	—	20.5	40	M4×4.5
LWLF 30…B	☆	112								50	18	34.8	54	
LWLF 30…B CS	☆													
LWLFG 30…B	☆	170								68.5	35	53.8	73	
LWLFC 42…B	☆	95	294	16	4	9	60	45	7.5	41.5	—	25.3	46	M4×4.5
LWLF 42…B	☆	140								55	20	39	60	
LWLF 42…B CS	☆													
LWLFG 42…B	☆	204								74.5	35	58.3	79	
LWLF 42		140	300		3					55	20	39.5	—	
LWLF 42…CS														

Model number	H_3	Dimensions of track rail mm W	H_4	W_5	W_6	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LWLFC 30…B	3.1	30	9	—	—	4.5	8	4.5	20	40	M4 ×12	3 890	4 540	69.1	15.4 107	13.0 89.9
LWLF 30…B												5 970	8 440	128	48.7 259	40.8 217
LWLF 30…B CS																
LWLFG 30…B												7 810	12 300	187	100 508	84.3 426
LWLFC 42…B	3.2	42	10	23	9.5	4.5	8	4.5	20	40	M4 ×12	5 030	6 050	128	24.8 164	20.8 137
LWLF 42…B												7 050	9 840	209	61.3 333	51.4 280
LWLF 42…B CS																
LWLFG 42…B												9 200	14 400	305	126 644	106 541
LWLF 42	—											6 320	8 540	186	52.4 291	62.4 347
LWLF 42…CS																

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 (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.
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 97.



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

LWLF 42 C2 R320 B CS P S2 /U

- Model code: LWLFC…B, LWLF …B, LWLFG…B, LWLF
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (320 millimeters)
- Material: Stainless steel made : No symbol; High carbon steel made : CS
- Preload amount: Clearance : T0; Standard: No symbol; Light preload : T1
- Accuracy class: High : H; Precision : P
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Under seals : /U

B

LWL, LWLF

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

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.

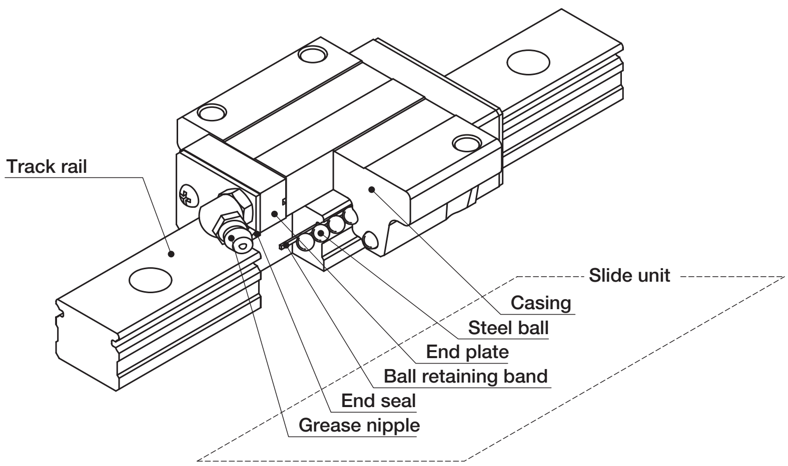
Variable lengths of slide unit

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

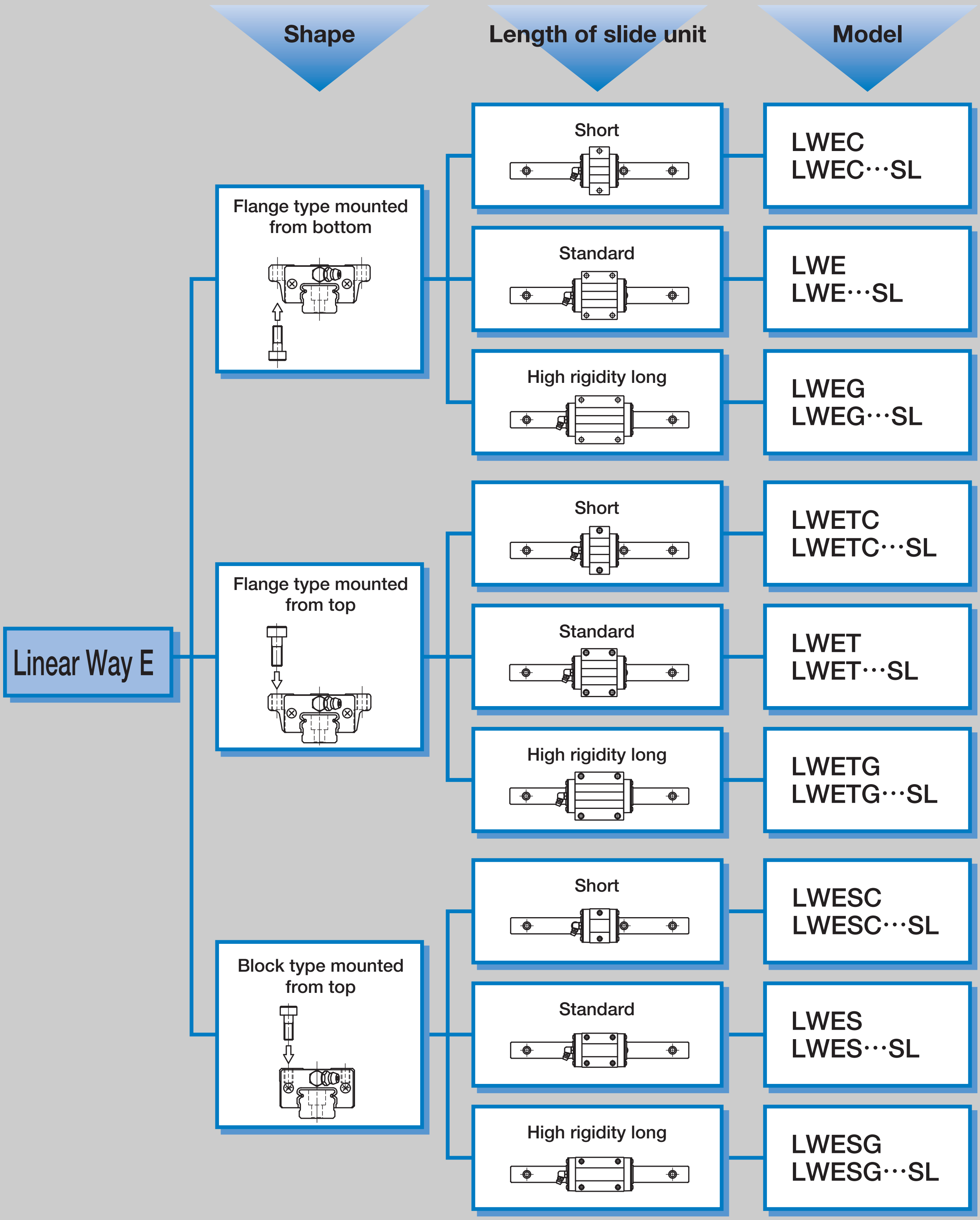
The stainless steel type has excellent corrosion resistance and is most suitable for machines and equipment used in clean environments, for example, medical equipment, disk read devices and semi-conductor manufacturing equipment.

U.S. PATENT No.6,176,617
No.5,962,667
No.4,652,147
No.4,610,488
No.4,505,522



Structure of Linear Way E

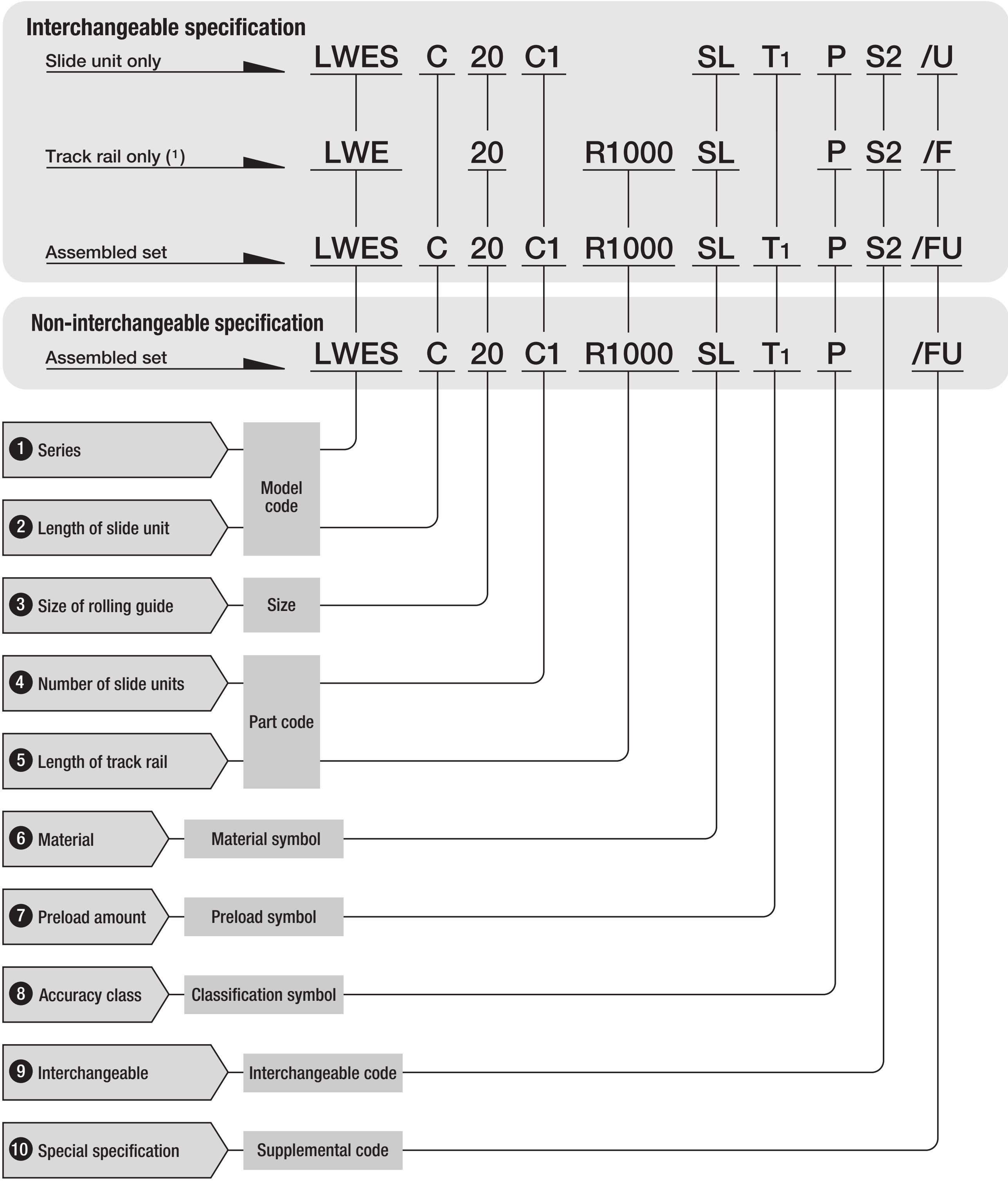
Linear Way E series



Remark : Models with "SL" are stainless steel type.

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 76.



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.

1 Series	Flange type mounted from bottom : LWE Flange type mounted from top : LWET Block type mounted from top : LWES	
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 to 1.3.
3 Size of rolling guide		
4 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.
5 Length of track rail	Assembled set : R○ Track rail only : R○	Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-40 to B-41.
6 Material	High carbon steel made : No symbol Stainless steel made : SL	For available material types, see Tables 1.1, 1.2 and 1.3 on page B-32.

Models and sizes of Linear Way E

Table 1.1 Flange type mounted from bottom

Size \ Model	High carbon steel made			Stainless steel made		
	Short LWEC	Standard LWE	High rigidity long LWEG	Short LWEC…SL	Standard LWE…SL	High rigidity long LWEG…SL
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	—	—	—	—
45	—	☆	—	—	—	—

Table 1.2 Flange type mounted from top

Size \ Model	High carbon steel made			Stainless steel made		
	Short LWETC	Standard LWET	High rigidity long LWETG	Short LWETC…SL	Standard LWET…SL	High rigidity long LWETG…SL
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	—	—	—	—
45	—	☆	—	—	—	—

Table 1.3 Block type mounted from top

Size \ Model	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
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	—	—	—	—
45	—	☆	—	—	—	—

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

7 Preload amount

Clearance : T_C
Standard : No symbol
Light preload : T_1
Medium preload : T_2

Specify this item for an assembled set or a single slide unit.
For applicable combinations of accuracy and preload amount, see Table 2. For details of preload amount, see page 84.

8 Accuracy class

Ordinary : No symbol
High : H
Precision : P
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 79.

Table 2 Accuracy class and preload

Accuracy class (Symbol) / Preload (Symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)
Clearance (T_C)	☆	—	—	—
Standard (No symbol)	☆	☆	☆	○
Light preload (T_1)	—	☆	☆	○
Medium preload (T_2)	—	○	○	○

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 86.

Table 3 Special specifications

Special specification	Supplemental code	Assembled set	Track rail only	Slide unit only	Dimension
Butt-jointing track rail	A	○	–	–	
Stainless steel end plates	BS	☆ (1)	–	–	
Opposite reference surfaces arrangement	D	☆	–	–	
Specified rail mounting hole positions	E	☆	☆	–	
Caps for rail mounting holes	F	☆	☆	–	
Inspection sheet	I	○	–	–	
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	☆	☆	–	See Table 6.
Changed size of mounting holes	M4	☆ (3)	☆ (3)	–	See Table 7.
No end seal	N	☆	–	☆	
Capillary plates	Q	☆	–	☆	See Table 8.
Seals for special environment	RE	☆ (1)	–	☆ (1)	
Butt-jointing interchangeable track rail	T	☆ (4)	☆	–	
Under seals	U	☆	–	☆	See Table 9.
Double end seals	V	☆	–	☆	See Table 10.
Matched sets to be used as an assembled group	W	○	–	–	
Specified grease	Y	☆	–	–	
Scrapers	Z	☆	–	☆	See Table 11.

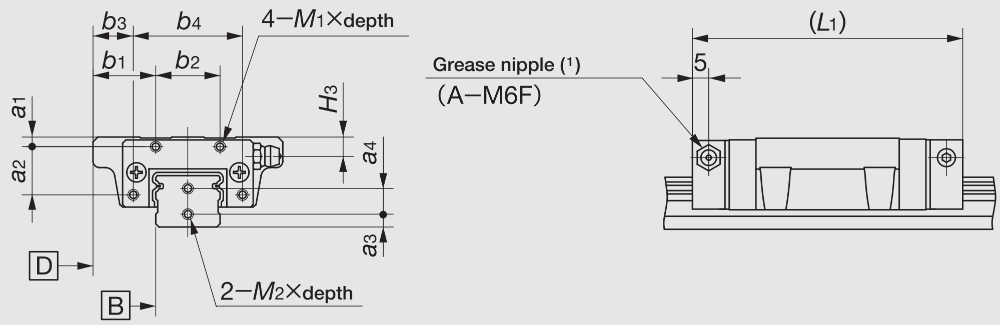
Note(1) : Not applicable to size 35 and 45 models.
(2) : Not applicable to stainless steel made interchangeable specification products.
(3) : Applicable to size 15 models.
(4) : Not applicable to non-interchangeable specification products.
Remark : In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

Table 4 Combination of special specifications

	A	BS	D	E	F	I	J	L	LF	MA	M4	N	Q	RE	T	U	V	W	Y
BS	○																		
D	○	☆																	
E	–	☆	–																
F	○	☆	☆	☆															
I	○	○	○	○	○														
J	○	☆	☆	☆	☆	○													
L	○	☆	☆	☆	☆	○	☆												
LF	○	☆	☆	☆	☆	○	☆	–											
MA	○	☆	☆	☆	☆	○	☆	☆	☆										
M4	○	☆	☆	☆	☆	○	☆	☆	☆	☆									
N	○	☆	☆	☆	–	○	–	☆	☆	☆	☆								
Q	○	☆	☆	☆	☆	○	–	☆	☆	☆	☆	☆							
RE	○	☆	☆	☆	☆	○	☆	☆	☆	☆	☆	–	☆						
T	–	☆	☆	☆	☆	–	–	☆	☆	☆	☆	☆	☆	☆					
U	○	☆	☆	☆	☆	○	☆	☆	☆	☆	☆	–	☆	☆	☆				
V	○	☆	☆	☆	☆	○	★	☆	☆	☆	☆	–	–	☆	☆	☆			
W	○	○	○	–	○	○	○	○	○	○	○	○	○	○	–	○	○		
Y	○	☆	☆	☆	☆	○	☆	☆	☆	☆	☆	☆	–	☆	☆	☆	☆	○	
Z	○	☆	☆	☆	☆	○	★	☆	☆	☆	☆	–	–	☆	☆	☆	★	○	☆

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 : For combinations marked ★, consult IKO for further information.
4 : 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)

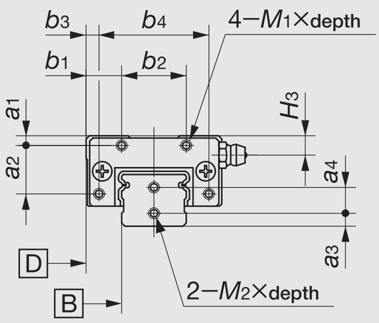


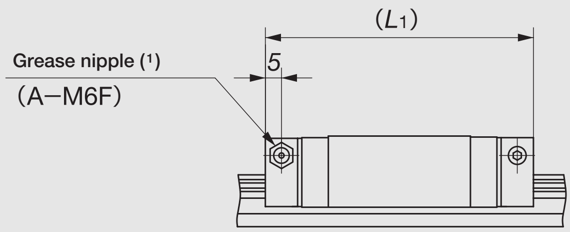
unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
LWE (T) C 15	3	12	18	16	12	28	M3×6	58	5.7	4	7	M3× 6
LWE (T) 15								74				
LWE (T) G 15								87				
LWE (T) C 20	3	15	19.5	20	12.5	34	M3×6	64	6	4	8	M3× 6
LWE (T) 20								83				
LWE (T) G 20								99				
LWE (T) C 25	3.5	17	23.5	26	16.5	40	M3×6	76	7	5	9	M4× 8
LWE (T) 25								100				
LWE (T) G 25								119				
LWE (T) C 30	5	17	28	34	20	50	M3×6	83	11	6	14	M4× 8
LWE (T) 30								112				
LWE (T) G 30								144				
LWE (T) C 35	6	20	30	40	20	60	M3×6	93	13	7	15	M4× 8
LWE (T) 35								126				
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 a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	Track rail a_3	a_4	M_2×depth
LWESC 15	3	12	9	16	3	28	M3×6	58	5.7	4	7	M3× 6
LWES 15								74				
LWESG 15								87				
LWESC 20	3	15	11	20	4	34	M3×6	64	6	4	8	M3× 6
LWES 20								83				
LWESG 20								99				
LWESC 25	3.5	17	11	26	4	40	M3×6	76	7	5	9	M4× 8
LWES 25								100				
LWESG 25								119				
LWESC 30	5	17	13	34	5	50	M3×6	83	11	6	14	M4× 8
LWES 30								112				
LWESG 30								144				
LWESC 35	6	20	15	40	5	60	M3×6	93	13	7	15	M4× 8
LWES 35								126				
LWES 45	7	26	18	50	6	74	M4×8	138	15	8	19	M5×10

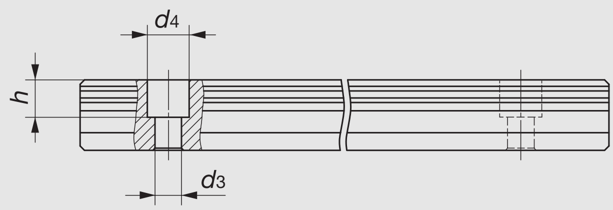
Note(1) : The specification and mounting position of grease nipple are different from those of the standard specification product.
Size 15 models are provided with a special specification grease nipple (NPB2 type).
For details of dimensions, consult IKO for further information.
(2) : The values for a 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 6 Recommended track rail mounting bolt size (Supplemental code /MA)

Model number	Recommended bolt size
LWE 15	M 3×16 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

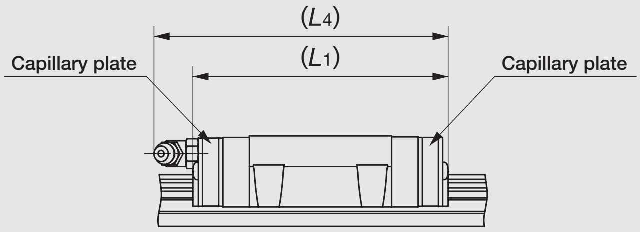
Model number	d_3	d_4	h
LWE 15	4.5	8	6

Remark : The above table shows a representive model number but is applicable to all models of size 15.

B

LWE, LWET, LWES

Table 8 Slide unit with Capillary plates (Supplemental code /Q)



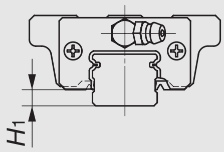
unit : mm

Model number	L_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

Model number	L_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 H_1 dimension of slide unit with under seals (Supplemental code /U)

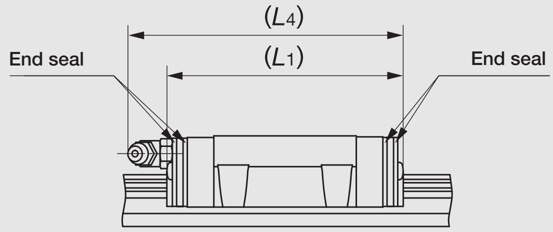


unit : mm

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)



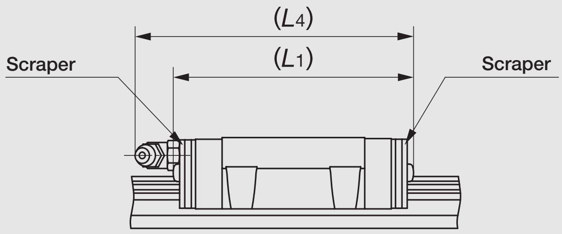
unit : mm

Model number	L_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

Model number	L_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	L_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	L_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

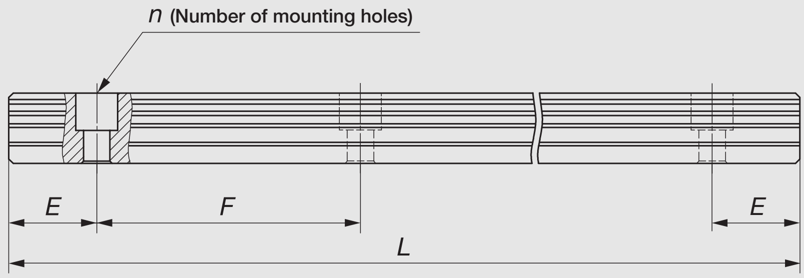
Remark 1 : The above table shows representative model numbers but is applicable to all models of the same size.
2 : The values for a slide unit with scrapers at both ends are shown.

● 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 IKO 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 89.

Table 12.1 Standard and maximum lengths of high carbon steel track rails

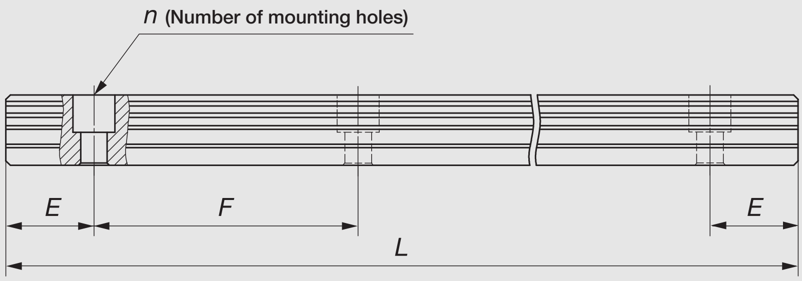


unit : mm

Item \ Model number		LWE 15	LWE 20	LWE 25	LWE 30	LWE 35	LWE 45
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) 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)	570 (6) 885 (9) 1 200 (12) 1 620 (16) 2 040 (20) 2 460 (24) 2 985 (29)
Pitch of mounting holes *F*		60	60	60	80	80	105
E (1)		20	20	20	20	20	22.5
Standard range of *E* (2)	incl.	6	8	9	9	10	12
	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 IKO for further information.
Remark : The above table shows representative model numbers but is applicable to all models of the same size.

Table 12.2 Standard and maximum lengths of stainless steel track rails

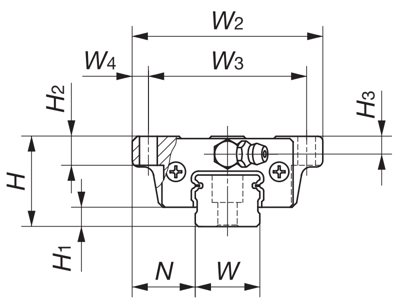


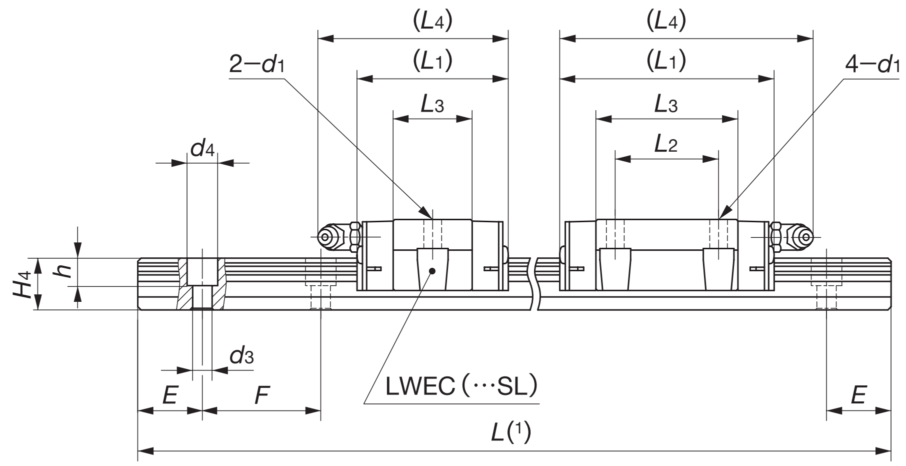
unit : mm

Item \ Model 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 holes *F*		60	60	60	80
E (1)		20	20	20	20
Standard range of *E* (2)	incl.	6	8	9	9
	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-jointing part.
(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 IKO 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)



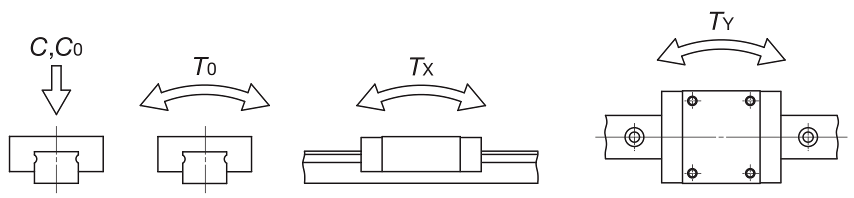


Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1
LWEC 15	☆	0.11	1.57	24	5.8	18.5	52	41	5.5	41	—	22.4	45	4.5
LWEC 15…SL	☆													
LWE 15	☆	0.18								57	26	38.4	61	
LWE 15…SL	☆													
LWEG 15	☆	0.24								70	36	51.1	74	
LWEG 15…SL	☆													
LWEC 20	☆	0.18	2.28	28	6	19.5	59	49	5	47	—	24.5	59	5.5
LWEC 20…SL	☆													
LWE 20	☆	0.30								66.5	32	44	79	
LWE 20…SL	☆													
LWEG 20	☆	0.40								82	45	59.9	95	
LWEG 20…SL	☆													

Dimensions of track rail mm H_2	H_3	W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
7	4.5	15	14.5	3.6	6.5	4.5	20	60	5 240	5 480	43.8	21.3 149	21.3 149
									7 640	9 390	75.1	57.6 333	57.6 333
									9 340	12 500	100	99.5 533	99.5 533
9	5.5	20	16	6	9.5	8.5	20	60	7 570	7 340	78.9	31.5 235	31.5 235
									11 600	13 400	145	95.6 561	95.6 561
									14 400	18 300	197	172 918	172 918

Note(1) : Track rail lengths are shown in Table 12.1 on page B-40 and Table 12.2 on page B-41.
(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.

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-37.
3 : For grease nipple specifications, see page 97.



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

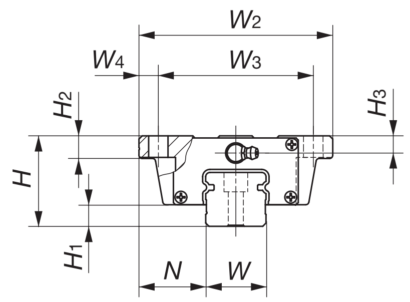
LWE 20 C2 R280 SL T1 P S2 /N

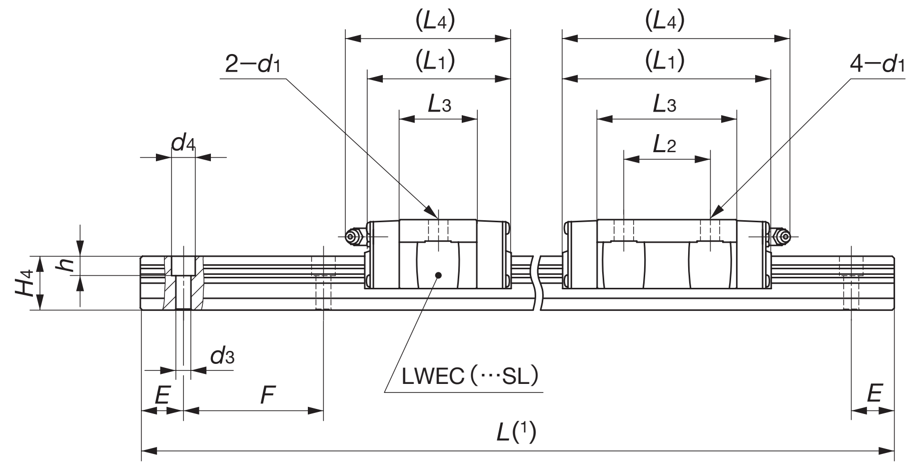
- Model code: LWEC, LWE, LWEG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (280 millimeters)
- Material: High carbon steel made : No symbol; Stainless steel made : SL
- Preload amount: Clearance : T_C; Standard : No symbol; Light preload : T_1; Medium preload : T_2
- Accuracy class: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: No end seal : /N

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

IKO Linear Way E : Flange type

Flange type mounted from bottom
- **LWEC**
- **LWE**
- **LWEG**
- **LWEC···SL** (Stainless steel made)
- **LWE ···SL** (Stainless steel made)
- **LWEG···SL** (Stainless steel made)



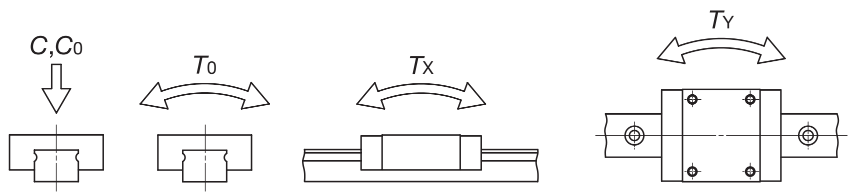


Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1
LWEC 25	☆	0.33	3.09	33	7	25	73	60	6.5	59	—	32	71	7
LWEC 25···SL	☆													
LWE 25	☆	0.55								83	35	56	95	
LWE 25···SL	☆													
LWEG 25	☆	0.73								102	50	75	114	
LWEG 25···SL	☆													
LWEC 30	☆	0.58	5.09	42	10	31	90	72	9	68	—	36	78	9
LWEC 30···SL	☆													
LWE 30	☆	0.99								97	40	64.8	107	
LWE 30···SL	☆													
LWEG 30	☆	1.50								128.5	60	96.5	139	
LWEG 30···SL	☆													
LWEC 35	☆	0.84	6.85	48	11	33	100	82	9	78	—	41.6	90	9
LWE 35	☆	1.52								111	50	74.6	123	
LWE 45	☆	2.46	11.2	60	14	37.5	120	100	10	125	60	81.4	136	11

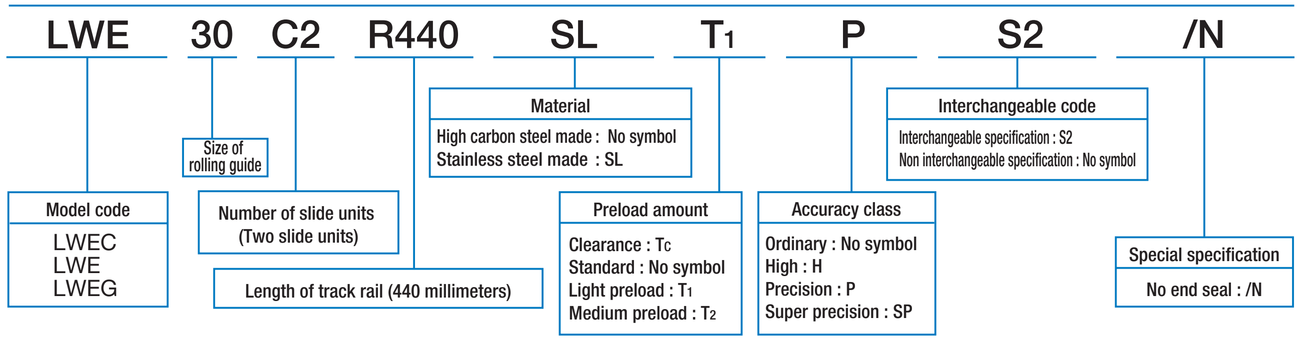
Model number	Dimensions of track rail mm H_2	H_3	W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWEC 25	10	6.5	23	19	7	11	9	20	60	12 400	12 300	153	71.8 480	71.8 480
LWEC 25···SL														
LWE 25										18 100	21 100	262	195 1 090	195 1 090
LWE 25···SL														
LWEG 25										22 200	28 200	349	336 1 740	336 1 740
LWEG 25···SL														
LWEC 30	10	8	28	25	7	11	9	20	80	20 600	18 800	287	129 855	129 855
LWEC 30···SL														
LWE 30										29 500	31 300	479	328 1 920	328 1 920
LWE 30···SL														
LWEG 30										39 200	47 000	718	704 3 670	704 3 670
LWEG 30···SL														
LWEC 35	13	10	34	28	9	14	12	20	80	29 900	26 800	412	176 1 190	162 1 100
LWE 35										42 900	44 700	686	448 2 660	412 2 450
LWE 45	15	13	45	34	11	17.5	14	22.5	105	61 100	60 200	1 210	672 4 070	618 3 750

Note(1) : Track rail lengths are shown in Table 12.1 on page B-40 and Table 12.2 on page B-41.
(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.

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-37.
3 : For grease nipple specifications, see page 97.

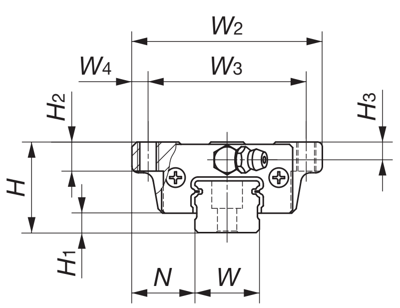


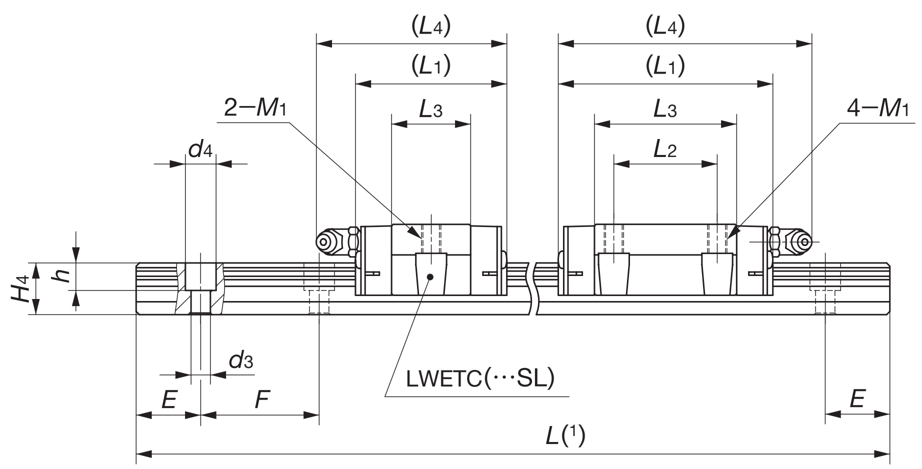
Example of identification number of assembled set (For details, see "Identification number and specification".)



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

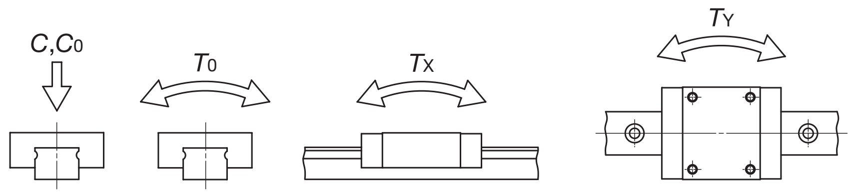
Flange type mounted from top
LWETC
LWET
LWETG
LWETC···SL (Stainless steel made)
LWET ···SL (Stainless steel made)
LWETG···SL (Stainless steel made)





Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1	H_2	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWETC 15	☆	0.11	1.57	24	5.8	18.5	52	41	5.5	41	—	22.4	45	M 5	7	4.5	15	14.5	3.6	6.5	4.5	20	60	5 240	5 480	43.8	21.3 149	21.3 149
LWETC 15···SL	☆																											
LWET 15	☆	0.18								57	26	38.4	61											7 640	9 390	75.1	57.6 333	57.6 333
LWET 15···SL	☆																											
LWETG 15	☆	0.24								70	36	51.1	74											9 340	12 500	100	99.5 533	99.5 533
LWETG 15···SL	☆																											
LWETC 20	☆	0.18	2.28	28	6	19.5	59	49	5	47	—	24.5	59	M 6	9	5.5	20	16	6	9.5	8.5	20	60	7 570	7 340	78.9	31.5 235	31.5 235
LWETC 20···SL	☆																											
LWET 20	☆	0.30								66.5	32	44	79											11 600	13 400	145	95.6 561	95.6 561
LWET 20···SL	☆																											
LWETG 20	☆	0.40								82	45	59.9	95											14 400	18 300	197	172 918	172 918
LWETG 20···SL	☆																											

Note(1) : Track rail lengths are shown in Table 12.1 on page B-40 and Table 12.2 on page B-41.
(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.
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-37.
3 : For grease nipple specifications, see page 97.



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

LWET 20 C2 R280 SL T1 P S2 /N

- LWET — Model code: LWETC, LWET, LWETG
- 20 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R280 — Length of track rail (280 millimeters)
- SL — Material: High carbon steel made : No symbol; Stainless steel made : SL
- T1 — Preload amount: Clearance : T_0; Standard : No symbol; Light preload : T_1; Medium preload : T_2
- P — Accuracy class: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /N — Special specification: No end seal : /N

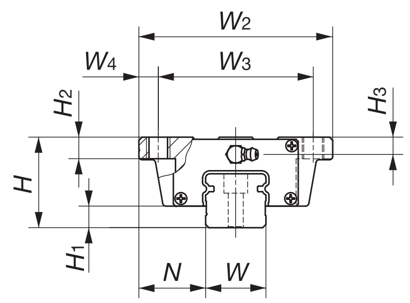
B

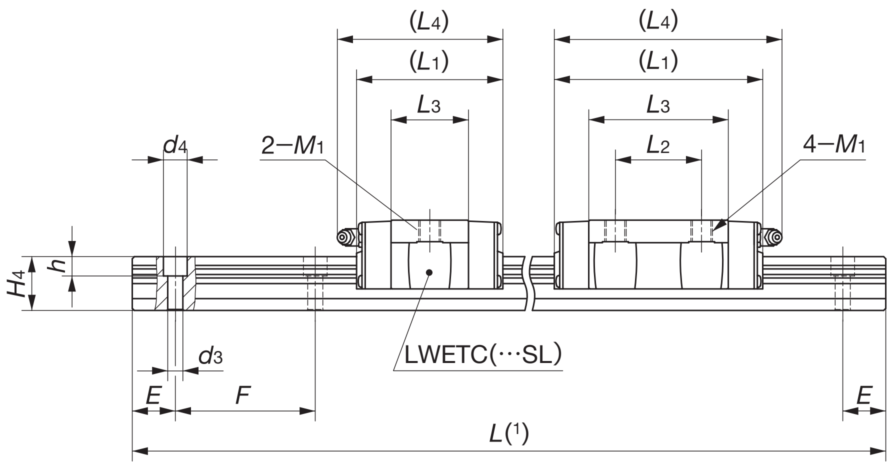
LWE, LWET, LWES

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

Linear Way E : Flange type

Flange type mounted from top
LWETC
LWET
LWETG
LWETC …SL (Stainless steel made)
LWET …SL (Stainless steel made)
LWETG …SL (Stainless steel made)

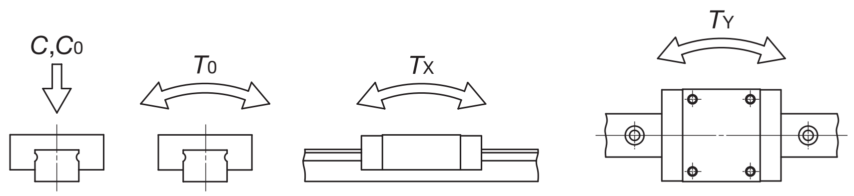




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1	H_2	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LWETC 25	☆	0.33	3.09	33	7	25	73	60	6.5	59	—	32	71	M 8	10	6.5	23	19	7	11	9	20	60	12 400	12 300	153	71.8 480	71.8 480
LWETC 25…SL	☆																											
LWET 25	☆	0.55								83	35	56	95											18 100	21 100	262	195 1 090	195 1 090
LWET 25…SL	☆																											
LWETG 25	☆	0.73								102	50	75	114											22 200	28 200	349	336 1 740	336 1 740
LWETG 25…SL	☆																											
LWETC 30	☆	0.58	5.09	42	10	31	90	72	9	68	—	36	78	M 10	10	8	28	25	7	11	9	20	80	20 600	18 800	287	129 855	129 855
LWETC 30…SL	☆																											
LWET 30	☆	0.99								97	40	64.8	107											29 500	31 300	479	328 1 920	328 1 920
LWET 30…SL	☆																											
LWETG 30	☆	1.50								128.5	60	96.5	139											39 200	47 000	718	704 3 670	704 3 670
LWETG 30…SL	☆																											
LWETC 35	☆	0.84	6.85	48	11	33	100	82	9	78	—	41.6	90	M 10	13	10	34	28	9	14	12	20	80	29 900	26 800	412	176 1 190	162 1 110
LWET 35	☆	1.52								111	50	74.6	123											42 900	44 700	686	448 2 660	412 2 450
LWET 45	☆	2.46	11.2	60	14	37.5	120	100	10	125	60	81.4	136	M 12	15	13	45	34	11	17.5	14	22.5	105	61 100	60 200	1 210	672 4 070	618 3 750

Note(1) : Track rail lengths are shown in Table 12.1 on page B-40 and Table 12.2 on page B-41.
(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.

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-37.
3 : For grease nipple specifications, see page 97.



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

LWET 30 C2 R440 SL T_1 P S2 /N

- **Model code**: LWETC, LWET, LWETG
- **Size of rolling guide**
- **Number of slide units** (Two slide units)
- **Length of track rail** (440 millimeters)
- **Material**: High carbon steel made : No symbol; Stainless steel made : SL
- **Preload amount**: Clearance : T_C; Standard : No symbol; Light preload : T_1; Medium preload : T_2
- **Accuracy class**: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- **Interchangeable code**: Interchangeable specification : S2; Non interchangeable specification : No symbol
- **Special specification**: No end seal : /N

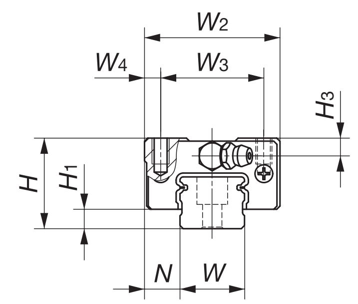
B

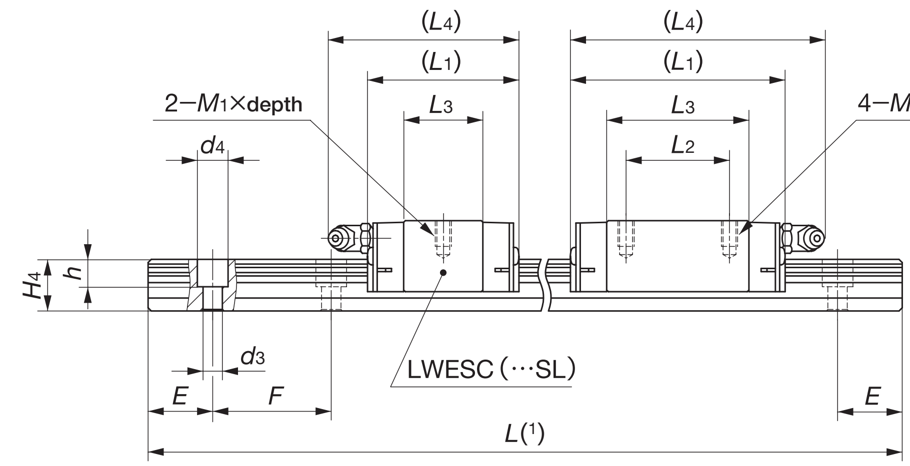
LWE, LWET, LWES

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

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)

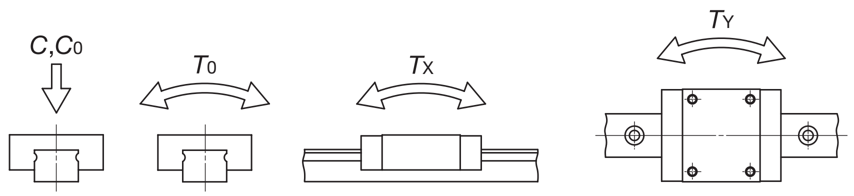




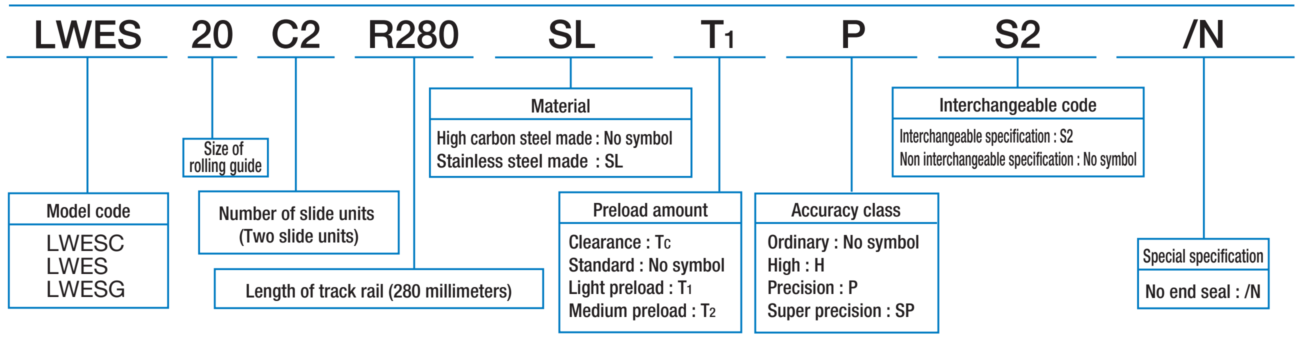
Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4
LWESC 15	☆	0.09	1.57	24	5.8	9.5	34	26	4	41	—	22.4	45
LWESC 15…SL	☆												
LWES 15	☆	0.14								57	26	38.4	61
LWES 15…SL	☆												
LWESG 15	☆	0.18								70	36	51.1	74
LWESG 15…SL	☆												
LWESC 20	☆	0.15	2.28	28	6	11	42	32	5	47	—	24.5	59
LWESC 20…SL	☆												
LWES 20	☆	0.25								66.5	32	44	79
LWES 20…SL	☆												
LWESG 20	☆	0.33								82	45	59.9	95
LWESG 20…SL	☆												

Dimensions of track rail mm M_1×depth	H_3	W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
M4×7	4.5	15	14.5	3.6	6.5	4.5	20	60	5 240	5 480	43.8	21.3 149	21.3 149
									7 640	9 390	75.1	57.6 333	57.6 333
									9 340	12 500	100	99.5 533	99.5 533
M5×8	5.5	20	16	6	9.5	8.5	20	60	7 570	7 340	78.9	31.5 235	31.5 235
									11 600	13 400	145	95.6 561	95.6 561
									14 400	18 300	197	172 918	172 918

Note(1) : Track rail lengths are shown in Table 12.1 on page B-40 and Table 12.2 on page B-41.
(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.
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-37.
3 : For grease nipple specifications, see page 97.

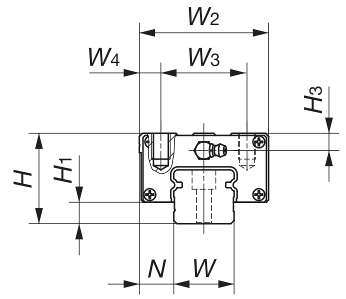


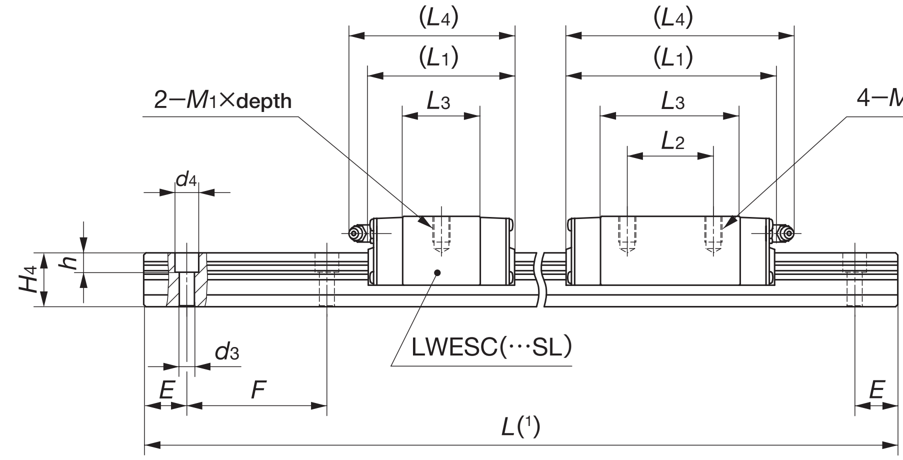
Example of identification number of assembled set (For details, see "Identification number and specification".)



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

Block type mounted from top
LWESC
LWES
LWESG
LWESC …SL (Stainless steel made)
LWES …SL (Stainless steel made)
LWESG …SL (Stainless steel made)

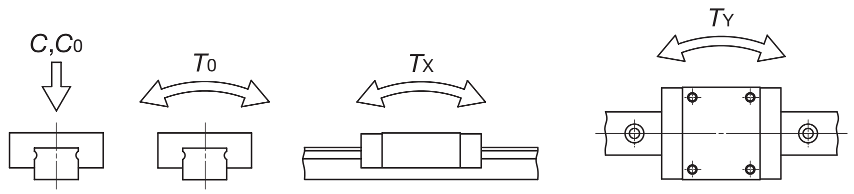




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4
LWESC 25	☆	0.26	3.09	33	7	12.5	48	35	6.5	59	—	32	71
LWESC 25…SL	☆												
LWES 25	☆	0.42								83	35	56	95
LWES 25…SL	☆												
LWESG 25	☆	0.55								102	50	75	114
LWESG 25…SL	☆												
LWESC 30	☆	0.46	5.09	42	10	16	60	40	10	68	—	36	78
LWESC 30…SL	☆												
LWES 30	☆	0.78								97	40	64.8	107
LWES 30…SL	☆												
LWESG 30	☆	1.13								128.5	60	96.5	139
LWESG 30…SL	☆												
LWESC 35	☆	0.67	6.85	48	11	18	70	50	10	78	—	41.6	90
LWES 35	☆	1.21								111	50	74.6	123
LWES 45	☆	2.05	11.2	60	14	20.5	86	60	13	125	60	81.4	136

Dimensions of track rail mm M_1×depth	H_3	W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
M 6× 9	6.5	23	19	7	11	9	20	60	12 400	12 300	153	71.8 480	71.8 480
									18 100	21 100	262	195 1 090	195 1 090
									22 200	28 200	349	336 1 740	336 1 740
M 8×12	8	28	25	7	11	9	20	80	20 600	18 800	287	129 855	129 855
									29 500	31 300	479	328 1 920	328 1 920
									39 200	47 000	718	704 3 670	704 3 670
M 8×12	10	34	28	9	14	12	20	80	29 900	26 800	412	176 1 190	162 1 100
									42 900	44 700	686	448 2 660	412 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

Note(1) : Track rail lengths are shown in Table 12.1 on page B-40 and Table 12.2 on page B-41.
(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.
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-37.
3 : For grease nipple specifications, see page 97.



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

LWES 30 C2 R440 SL T1 P S2 /N

- LWES — Model code: LWESC, LWES, LWESG
- 30 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R440 — Length of track rail (440 millimeters)
- SL — Material: High carbon steel made : No symbol; Stainless steel made : SL
- T1 — Preload amount: Clearance : T_C; Standard : No symbol; Light preload : T_1; Medium preload : T_2
- P — Accuracy class: Ordinary : No symbol; High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /N — Special specification: No end seal : /N

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

Low Decibel Linear Way E

LWE…Q／LWET…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.

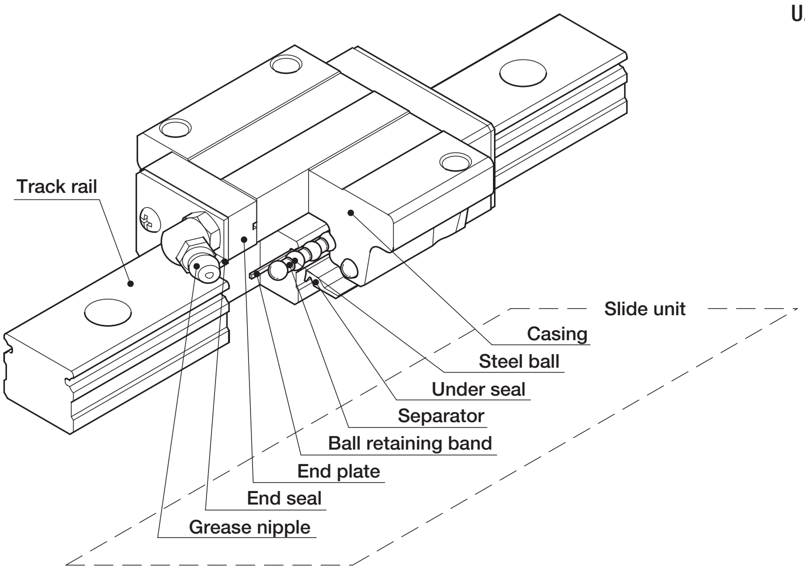
Flange type and block type

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

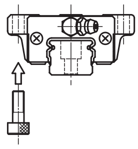
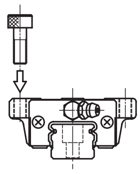
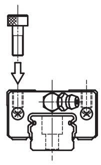
The mounting dimensions are the same as those of Linear Way E. So this guide can replace Linear Way E (LWE) with little modifications of machines or equipment.

U.S. PATENT No. 6,176,617
No. 5,967,667
No. 5,564,188
No. 5,374,126
No. 5,356,223
No. 5,324,116
No. 4,652,147



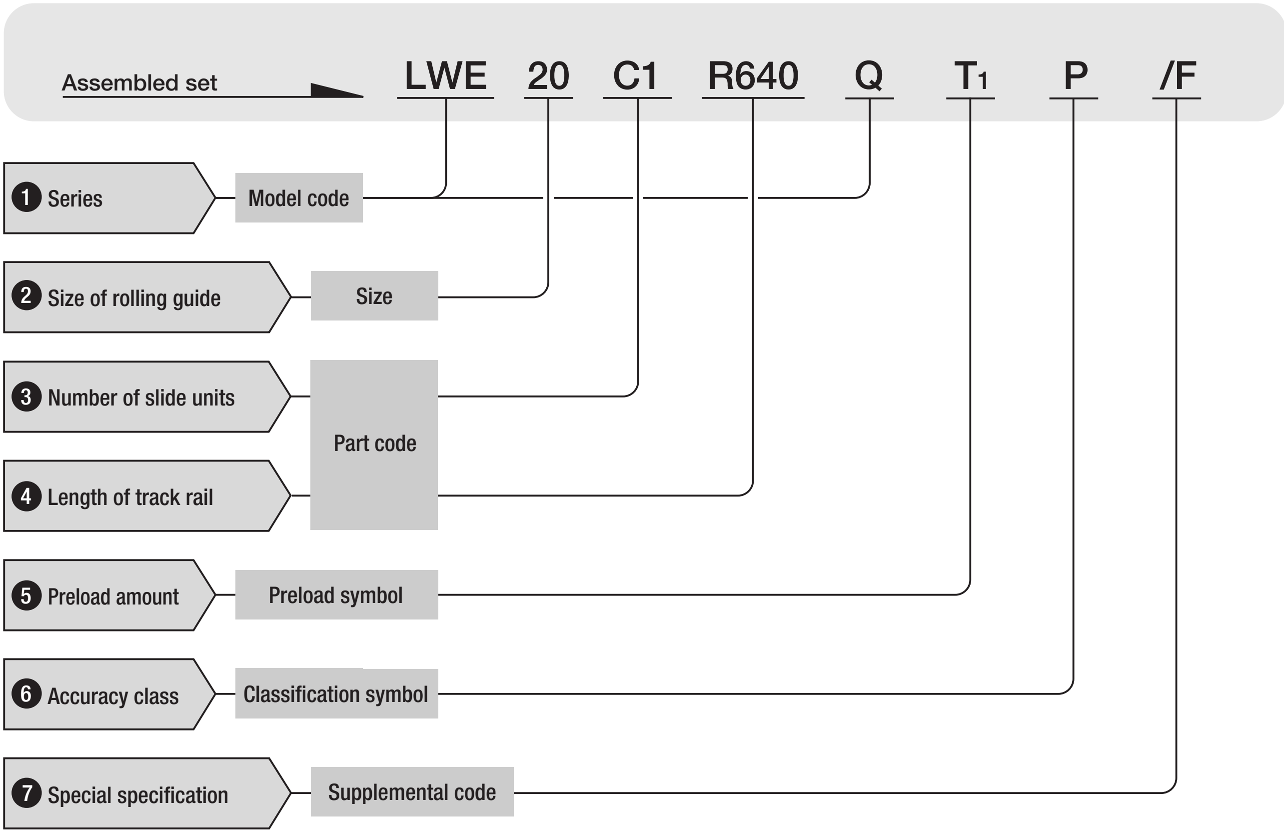
Structure of Low Decibel Linear Way E

Low Decibel Linear Way E series

Series	Shape	Model code
Low Decibel Linear Way E	Flange type mounted from bottom 	LWE…Q
	Flange type mounted from top 	LWET…Q
	Block type mounted from top 	LWES…Q

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 76.



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

Table 1 Models and sizes of Low Decibel Linear Way E

Size \ Model	High carbon steel made		
	Flange type mounted from bottom LWE···Q	Flange type mounted from top LWET···Q	Block type mounted from top LWES···Q
15	○	○	○
20	○	○	○
25	○	○	○
30	○	○	○
35	○	○	○

3 Number of slide units

: C○

Indicate the number of slide units assembled on one track rail.

4 Length of track rail

: R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-65.

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 84.

6 Accuracy class

Ordinary : No symbol
High : H
Precision : P
Super precision : SP

For applicable combinations of accuracy and preload amount, see Table 2. For details of accuracy, see page 79.

Table 2 Accuracy class and preload

Preload (Symbol) \ Accuracy class (Symbol)	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)
Standard (No symbol)	○	○	○	○
Light preload (T1)	–	○	○	○

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 86.

Table 3 Special specifications

Special specification	Supplemental code	Assembled set	Dimension
Opposite reference surfaces arrangement	D	○	
Specified rail mounting hole positions	E	○	
Caps for rail mounting holes	F	○	
Inspection sheet	I	○	
Female threads for bellows	J	○	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	○	See Table 6.
Changed size of mounting holes	M4	○ (1)	See Table 7.
Capillary plates	Q	○	See Table 8.
Double end seals	V	○	See Table 9.
Matched sets to be used as an assembled group	W	○	
Specified grease	Y	○	
Scrapers	Z	○	See Table 10.

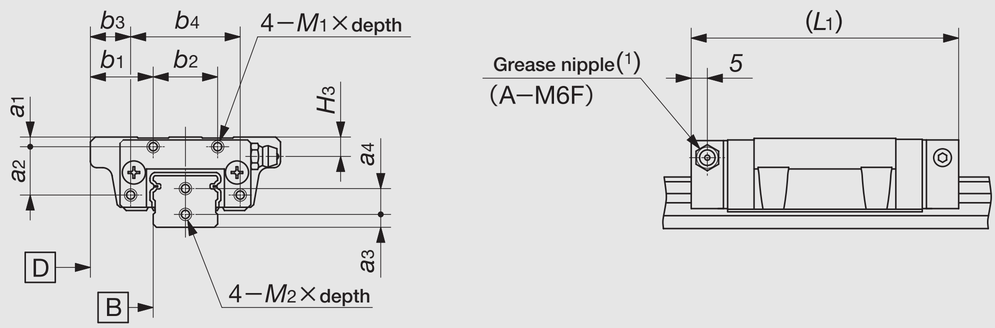
Note(1) : Applicable to size 15 models.

Table 4 Combination of special specifications

E	–												
F	○	○											
I	○	○	○										
J	○	○	○	○									
L	○	○	○	○	○								
LF	○	○	○	○	○	–							
MA	○	○	○	○	○	○	○						
M4	○	○	○	○	○	○	○	○					
Q	○	○	○	○	–	○	○	○	○				
V	○	○	○	○	○	○	○	○	○	–			
W	○	–	○	○	○	○	○	○	○	○	○		
Y	○	○	○	○	○	○	○	○	○	–	○	○	
Z	○	○	○	○	○	○	○	○	○	–	○	○	○
	D	E	F	I	J	L	LF	MA	M4	Q	V	W	Y

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)

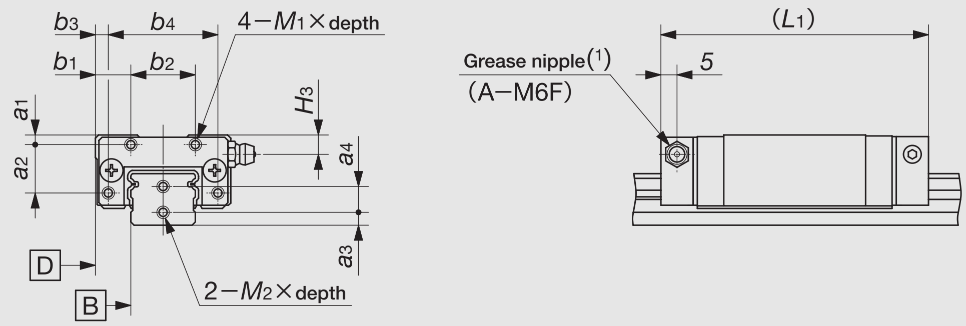


unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
LWE(T) 15…Q	3	12	18	16	12	28	M3×6	74	5.7	4	7	M3×6
LWE(T) 20…Q	3	15	19.5	20	12.5	34	M3×6	83	6	4	8	M3×6
LWE(T) 25…Q	3.5	17	23.5	26	16.5	40	M3×6	100	7	5	9	M4×8
LWE(T) 30…Q	5	20	25	40	20	50	M3×6	111	10	6	14	M4×8
LWE(T) 35…Q	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 IKO 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

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
LWES 15…Q	3	12	9	16	3	28	M3×6	74	5.7	4	7	M3×6
LWES 20…Q	3	15	11	20	4	34	M3×6	83	6	4	8	M3×6
LWES 25…Q	3.5	17	11	26	4	40	M3×6	100	7	5	9	M4×8
LWES 30…Q	5	20	10	40	5	50	M3×6	111	10	6	14	M4×8
LWES 35…Q	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 IKO 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)

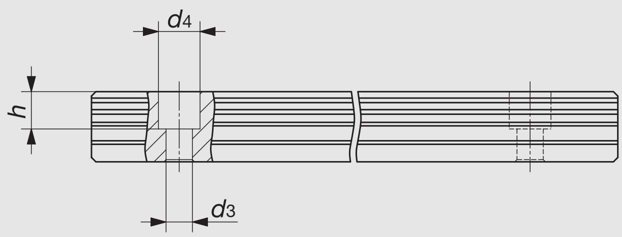
Model number	Recommended bolt size
LWE 15…Q	M3×16 M4×16(1)
LWE 20…Q	M5×16
LWE 25…Q	M6×20
LWE 30…Q	M6×25
LWE 35…Q	M8×30

Note(1) : Applicable to the track rail of supplemental code "/M4" of special 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.

Table 7 Changed size of mounting holes (Supplemental code /M4)

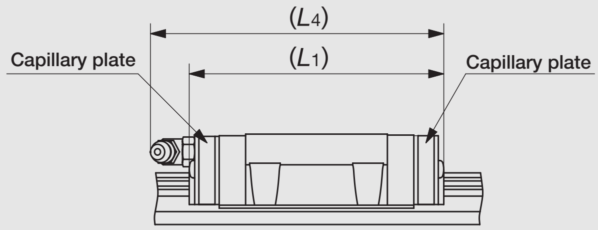


unit : mm

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)

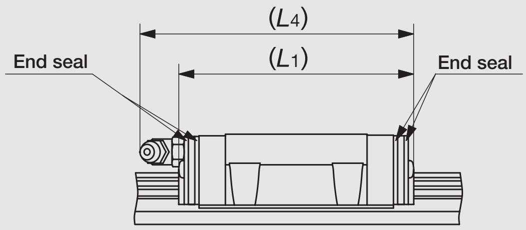


unit : mm

Model number	L_1	L_4
LWE 15…Q	68	71
LWE 20…Q	78	91
LWE 25…Q	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)

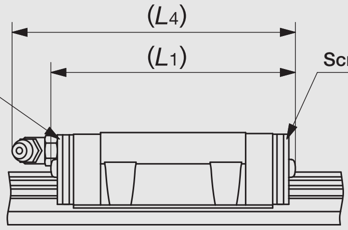


unit : mm

Model number	L_1	L_4
LWE 15…Q	64	66
LWE 20…Q	73	87
LWE 25…Q	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	L_1	L_4
LWE 15…Q	64	66
LWE 20…Q	75	88
LWE 25…Q	93	105
LWE 30…Q	109	119
LWE 35…Q	123	135

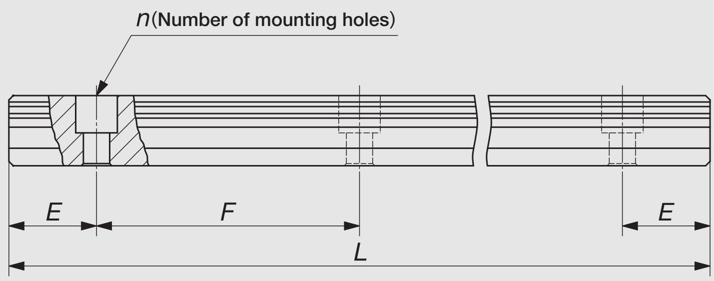
Remark : The above table shows representative model numbers but is applicable to all models of the same size.

Track rail length

Standard and maximum lengths of track rails are shown in Table 11. When requiring track rails in any other length, consult IKO for further information. For the tolerances of *E* dimension and track rail length, consult IKO 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 89.

Table 11 Standard and maximum lengths of track rails



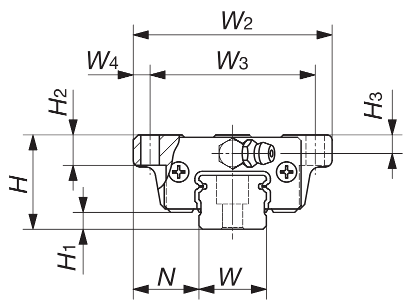
unit : mm

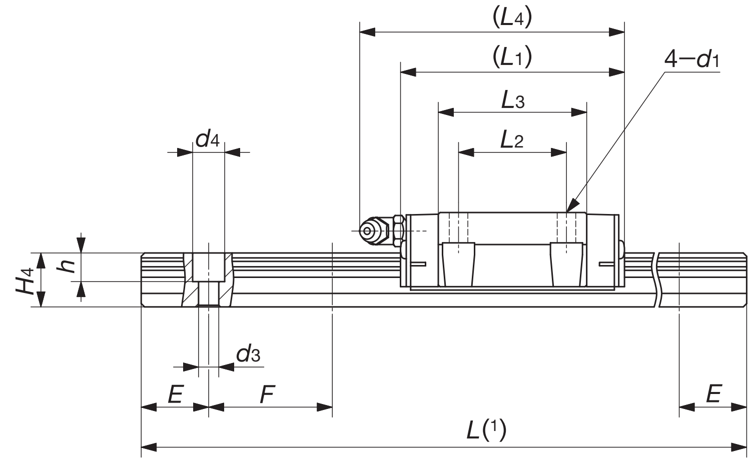
Item / Model number		LWE 15…Q	LWE 20…Q	LWE 25…Q	LWE 30…Q	LWE 35…Q
Standard length *L* (*n*)		160 (3) 220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14)	220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14) 1 000 (17) 1 240 (21)	220 (4) 280 (5) 340 (6) 460 (8) 640 (11) 820 (14) 1 000 (17) 1 240 (21) 1 600 (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 holes *F*		60	60	60	80	80
E		20	20	20	20	20
Standard range of *E* (1)	incl.	6	8	9	9	10
	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.

IKO Low Decibel Linear Way E: Flange type

Flange type mounted from bottom
LWE …Q

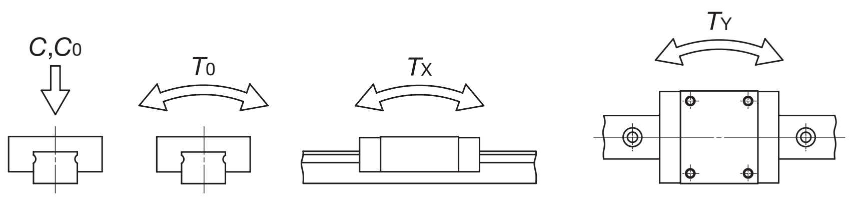




Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1
LWE 15…Q	0.18	1.57	24	5	18.5	52	41	5.5	57	26	38.4	61	4.5
LWE 20…Q	0.30	2.28	28	5	19.5	59	49	5	66.5	32	44	79	5.5
LWE 25…Q	0.56	3.09	33	6	25	73	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

Model number	H_3	H_5	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWE 15…Q	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
LWE 20…Q	9	5.5	20	16	6	9.5	8.5	20	60	10 500	13 400	145	100 557	100 557
LWE 25…Q	10	6.5	23	19	7	11	9	20	60	15 500	19 400	240	175 1 010	175 1 010
LWE 30…Q	10	8	28	25	7	11	9	20	80	21 600	26 400	398	278 1 570	278 1 570
LWE 35…Q	13	10	34	28	9	14	12	20	80	30 500	37 600	687	482 2 530	482 2 530

Note(1) : Track rail lengths are shown in Table 11 on page B-65.
(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.
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-62.
2 : For grease nipple specifications, see page 97.



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

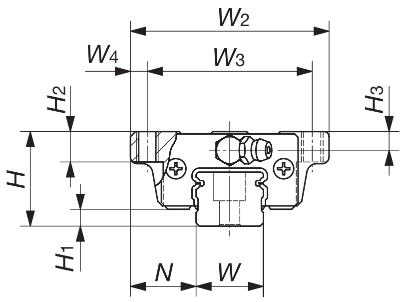
LWE 25 C2 R820 Q T1 P /Q

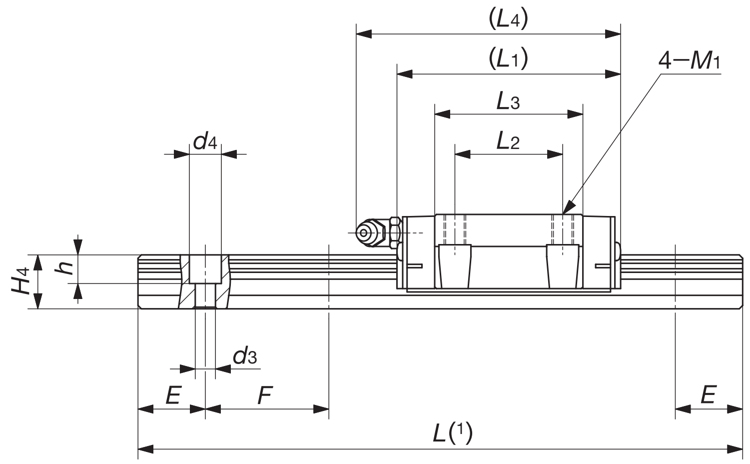
- LWE: Model code — LWE…Q
- 25: Size of rolling guide
- C2: Number of slide units (Two slide units)
- R820: Length of track rail (820 millimeters)
- Q
- T1: Preload amount — Standard : No symbol; Light preload : T1
- P: Accuracy class — Ordinary : No symbol; High : H; Precision : P
- /Q: Special specification — Capillary plates : /Q

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

IKO Low Decibel Linear Way E: Flange type

Flange type mounted from top LWET …Q

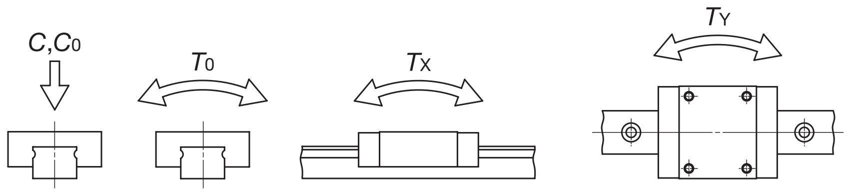




Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1
LWET 15…Q	0.18	1.57	24	5	18.5	52	41	5.5	57	26	38.4	61	M 5
LWET 20…Q	0.30	2.28	28	5	19.5	59	49	5	66.5	32	44	79	M 6
LWET 25…Q	0.56	3.09	33	6	25	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

Model number	H_2	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWET 15…Q	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
LWET 20…Q	9	5.5	20	16	6	9.5	8.5	20	60	10 500	13 400	145	100 557	100 557
LWET 25…Q	10	6.5	23	19	7	11	9	20	60	15 500	19 400	240	175 1 010	175 1 010
LWET 30…Q	10	8	28	25	7	11	9	20	80	21 600	26 400	398	278 1 570	278 1 570
LWET 35…Q	13	10	34	28	9	14	12	20	80	30 500	37 600	687	482 2 530	482 2 530

Note(1) : Track rail lengths are shown in Table 11 on page B-65.
(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.
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-62.
2 : For grease nipple specifications, see page 97.



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

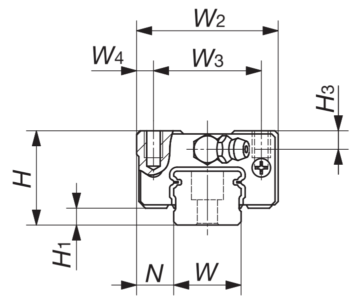
LWET 25 C2 R820 Q T1 P /Q

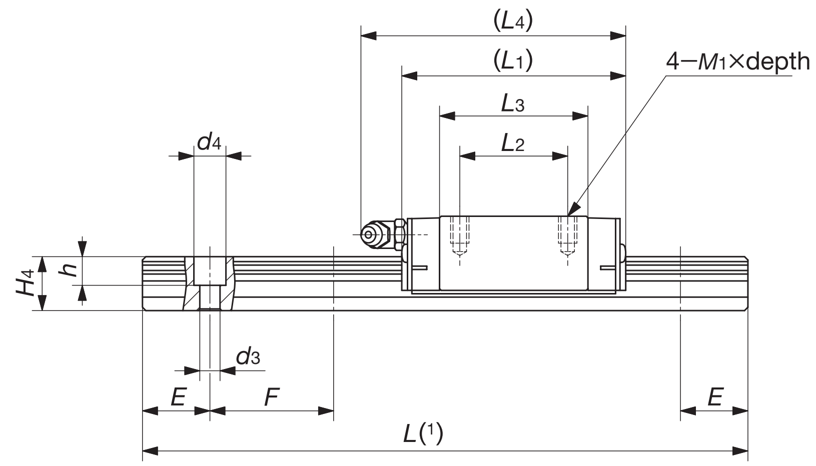
- Model code: LWET…Q
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (820 millimeters)
- Preload amount: Standard : No symbol; Light preload : T1
- Accuracy class: Ordinary : No symbol; High : H; Precision : P
- Special specification: Capillary plates : /Q

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

Low Decibel Linear Way E: Block type

Block type mounted from top
LWES ···Q

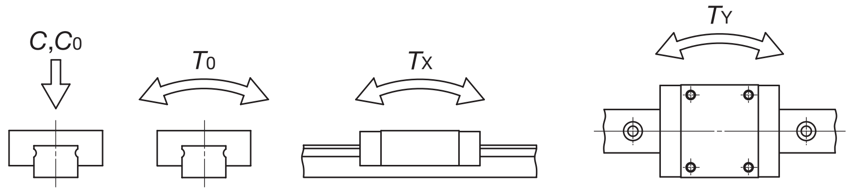




Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4
LWES 15···Q	0.14	1.57	24	5	9.5	34	26	4	57	26	38.4	61
LWES 20···Q	0.25	2.28	28	5	11	42	32	5	66.5	32	44	79
LWES 25···Q	0.43	3.09	33	6	12.5	48	35	6.5	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

Model number	Dimensions of slide unit mm M_1×depth	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LWES 15···Q	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
LWES 20···Q	M5× 8	5.5	20	16	6	9.5	8.5	20	60	10 500	13 400	145	100 557	100 557
LWES 25···Q	M6× 9	6.5	23	19	7	11	9	20	60	15 500	19 400	240	175 1 010	175 1 010
LWES 30···Q	M8×12	8	28	25	7	11	9	20	80	21 600	26 400	398	278 1 570	278 1 570
LWES 35···Q	M8×12	10	34	28	9	14	12	20	80	30 500	37 600	687	482 2 530	482 2 530

Note(1) : Track rail lengths are shown in Table 11 on page B-65.
(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.
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-62.
2 : For grease nipple specifications, see page 97.



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

LWES 25 C2 R820 Q T1 P /Q

- Model code: LWES···Q
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (820 millimeters)
- Preload amount: Standard : No symbol; Light preload : T1
- Accuracy class: Ordinary : No symbol; High : H; Precision : P
- Special specification: Capillary plates : /Q

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

B

LWE···Q, LWET···Q, LWES···Q

Linear Way H

LWH…B／LWHT…B／LWHD…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, disk read devices and semi-conductor manufacturing equipment.

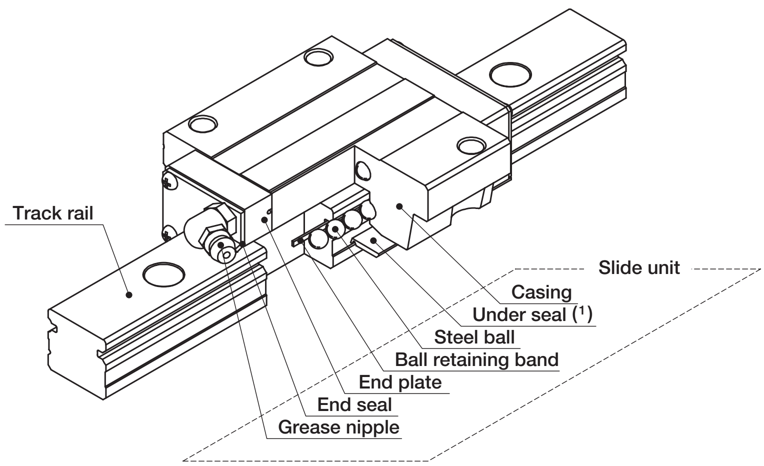
Ultra sealed specification

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.

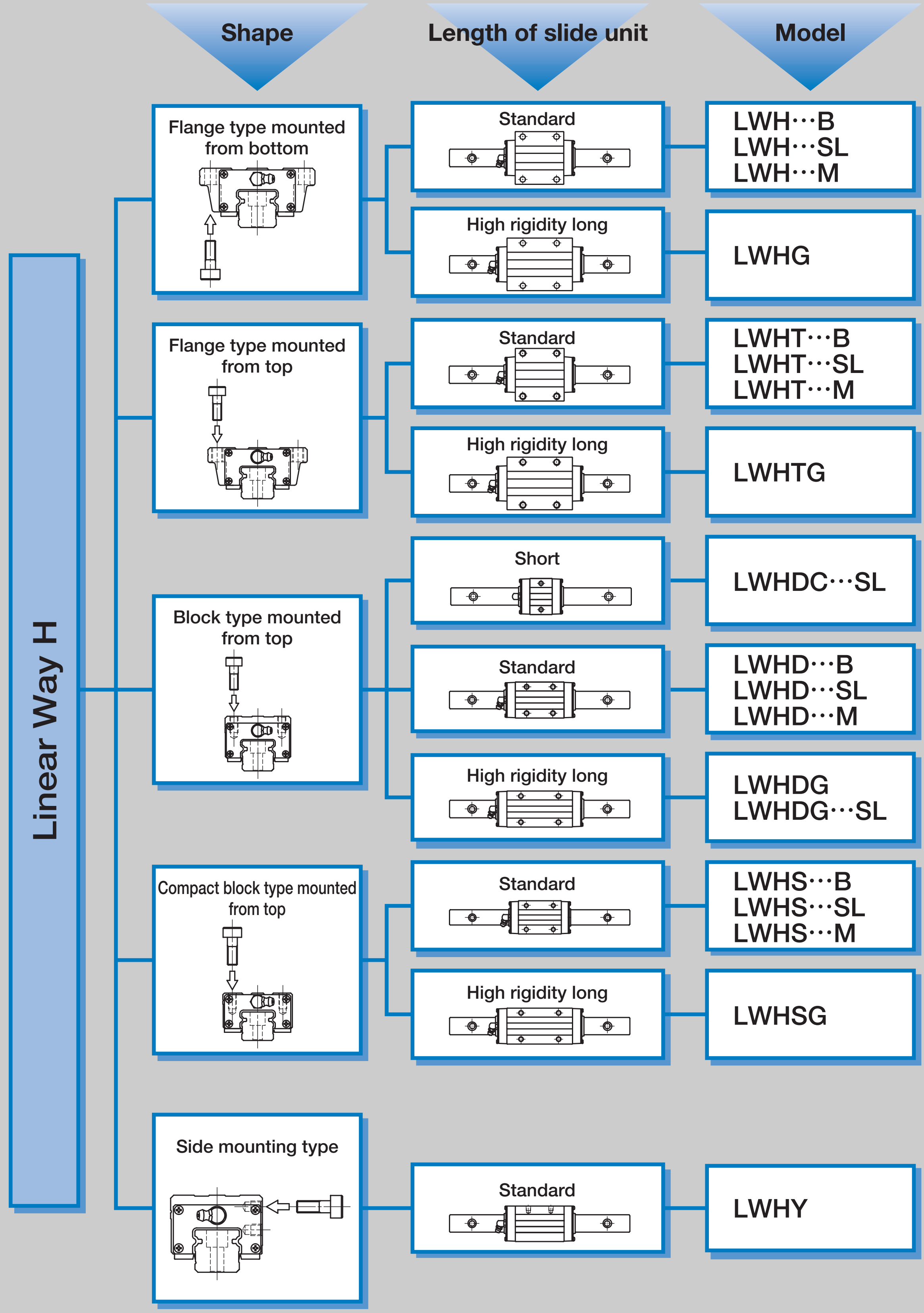
U.S. PATENT No. 6,176,617
No. 5,967,667
No. 5,289,779
No. 5,250,126
No. 4,652,147
No. 4,610,488
No. 4,505,522



Structure of Linear Way H

Note(1) : Size 8, 10 and 12 models with under seals are special specification products.

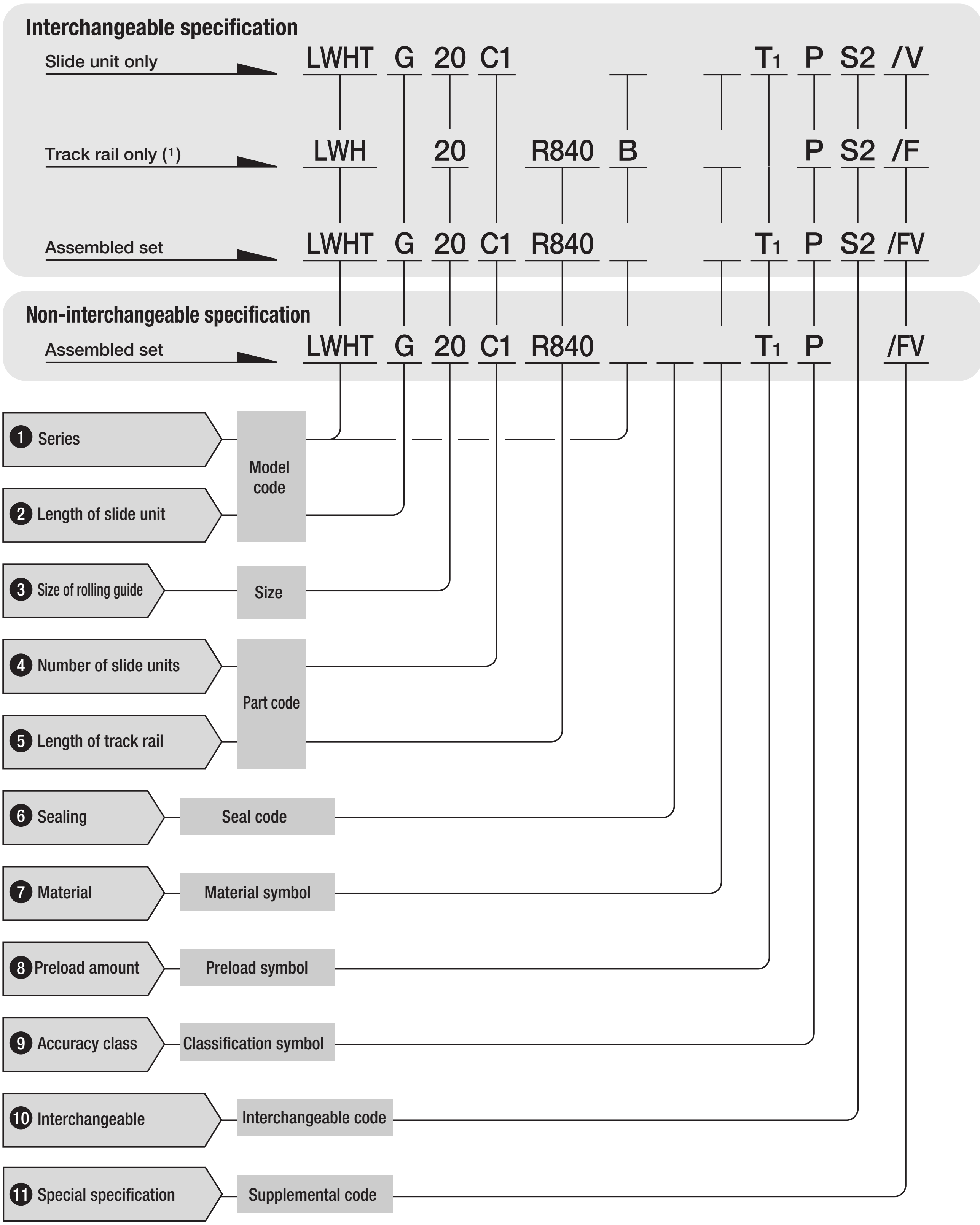
Linear Way H series



Remark 1 : Models with "SL" are stainless steel type.
2 : Models with "M" are ultra sealed specification products.

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 76.



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.

1 Series	Flange type mounted from bottom : LWH ··· (B) Flange type mounted from top : LWHT··· (B) Block type mounted from top : LWHD··· (B) Compact block type mounted from top : LWHS··· (B) Side mounting type : LWHY	
2 Length of slide unit	Short : C Standard : No symbol High rigidity long : G	For available slide unit models, sealing, materials and sizes, see Tables 1.1 to 1.5. "B" is not attached to the model codes of size 12 models, high rigidity long type models, ultra sealed specification models and stainless steel type models.
3 Size of rolling guide		
4 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.
5 Length of track rail	Assembled set : R○ Track rail only : R○	Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-88.
6 Sealing	Standard specification : No symbol Ultra sealed specification : M Ultra sealed track rail mounted from the lower side : MU	For applicable specifications, see Tables 1.1 to 1.5. For the specifications of ultra sealed track rail mounted from the lower side MU, the specifications of the ultra sealed specification M are applicable. For track rail dimensions, see Table 12 on page B-91.
7 Material	High carbon steel made : No symbol Stainless steel made : SL	For applicable material types, see Tables 1.1 to 1.5.

Table 1.1 Models and sizes of Linear Way H flange type mounted from bottom

Size \ Model	Standard specification			Ultra sealed specification
	High carbon steel made		Stainless steel made	High carbon steel made
	Standard LWH…B	High rigidity long LWHG	Standard LWH…SL	Standard LWH…M
15	☆	—	☆	○
20	☆	☆	☆	○
25	☆	☆	☆	○
30	☆	☆	☆	○
35	☆	☆	—	○
45	☆	☆	—	○
55	☆	☆	—	—
65	☆	☆	—	—
85	—	○	—	—

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

Table 1.2 Models and sizes of Linear Way H flange type mounted from top

Size \ Model	Standard specification			Ultra sealed specification
	High carbon steel made		Stainless steel made	High carbon steel made
	Standard LWHT…B	High rigidity long LWHTG	Standard LWHT…SL	Standard LWHT…M
8 (1)	—	—	☆	—
10 (1)	—	—	☆	—
12 (1)	☆ (2)	—	☆	—
15	☆	—	☆	○
20	☆	☆	☆	○
25	☆	☆	☆	○
30	☆	☆	☆	○
35	☆	☆	—	○
45	☆	☆	—	○
55	☆	☆	—	—
65	☆	☆	—	—
85	—	○	—	—

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 / Size	Standard specification					Ultra sealed specification
	High carbon steel made		Stainless steel made			High carbon steel made
	Standard LWHD…B	High rigidity long LWHDG	Short LWHDC…SL	Standard LWHD…SL	High rigidity long LWHDG…SL	Standard LWHD…M
8	—	—	☆	☆	☆	—
10	—	—	☆	☆	☆	—
12	☆ (1)	—	☆	☆	☆	—
15	☆	—	—	—	—	○
25	☆	☆	—	—	—	○
30	☆	☆	—	—	—	○
35	☆	☆	—	—	—	○
45	☆	☆	—	—	—	○
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 / Size	Standard specification			Ultra sealed specification
	High carbon steel made		Stainless steel made	High carbon steel made
	Standard LWHS…B	High rigidity long LWHSG	Standard LWHS…SL	Standard LWHS…M
15	☆	—	☆	○
20	☆	☆	☆	○
25	☆	☆	☆	○
30	☆	☆	☆	○

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

Table 1.5 Models and sizes of Linear Way H side mounting type

Model / Size	Standard specification
	High carbon steel made
	Standard LWHY
15	○
20	○
25	○
30	○
35	○
45	○
55	○
65	○

Remark : Only non-interchangeable specification products are available for this type.

8 Preload amount

Clearance : T_0
Standard : No symbol
Light preload : T_1
Medium preload : T_2
Heavy preload : T_3

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 84.

Table 2 Applicable preload types

Size	Preload type (Symbol)				
	Clearance (T_0)	Standard (No symbol)	Light preload (T_1)	Medium preload (T_2)	Heavy preload (T_3)
8	○	☆	○	—	—
10	○	☆	○	—	—
12	○	☆	○	—	—
15	—	☆	☆	☆	☆
20	—	☆	☆	☆	☆
25	—	☆	☆	☆	☆
30	—	☆	☆	☆	☆
35	—	☆	☆	☆	☆
45	—	☆	☆	☆	☆
55	—	☆	☆	☆	☆
65	—	☆	☆	☆	☆
85	—	○	○	○	○

Remark 1 : The mark ☆ indicates that it is also applicable to interchangeable specification products.
2 : For the stainless steel type, medium preload (T_2) and heavy preload (T_3) are not applicable.

9 Accuracy class

High : H
Precision : 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 79.

Table 3 Applicable accuracy class

Size	Accuracy class (Symbol)		
	High (H)	Precision (P)	Super precision (SP)
8	☆	☆	—
10	☆	☆	—
12	☆	☆	—
15	☆	☆	○
20	☆	☆	○
25	☆	☆	○
30	☆	☆	○
35	☆	☆	○
45	☆	☆	○
55	☆	☆	○
65	☆	☆	○
85	○	○	○

Remark : The mark ☆ 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.
11 Special specification		For applicable special specifications, see Table 4. When several special specifications are required, see Table 5. For details of special specifications, see page 86.

Table 4 Special specifications

Special specification	Supplemental code	Assembled set	Track rail	Slide unit	Dimension
Butt-jointing track rail	A	○ (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	○	—	—	
Female threads for bellows	J	☆ (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	N	☆ (4)	—	☆	
Rail cover plate	PS	○ (4)(9)(10)	—	—	
Capillary plates	Q	☆ (3)(4)	—	☆	See Table 7.
Seals for special environment	RE	☆ (2)(4)	—	☆ (2)	
Butt-jointing interchangeable track rail	T	☆ (6)(11)	☆ (6)	—	
Under seals(12)	U	☆ (12)	—	☆ (12)	See Table 8.
Double end seals	V	☆ (6)	—	☆ (6)	See Table 9.
Matched sets to be used as an assembled group	W	○	—	—	
Specified grease	Y	☆ (13)	—	—	
Scrapers	Z	☆ (6)	—	☆ (6)	See Table 10.

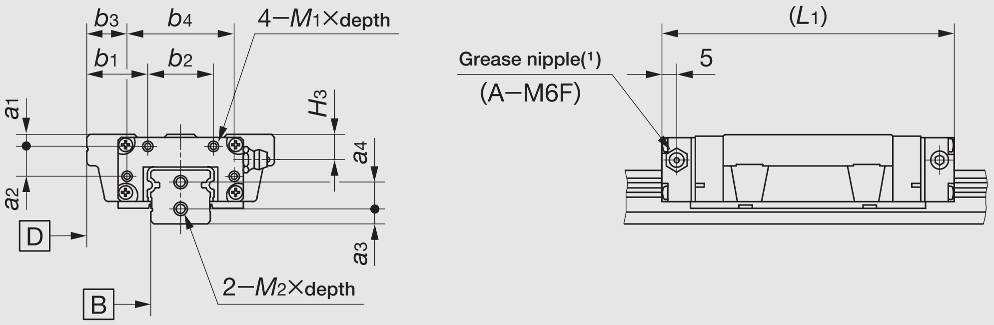
Note(1) **:** Not applicable to size 12 of high carbon steel made models.
(2) **:** Applicable to size 15, 20, 25 and 30 models.
(3) **:** Not applicable to the side mounting type (model code: LWHY).
(4) **:** Not applicable to ultra sealed specification products.
(5) **:** Not applicable to size 8 and 10 models.
(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 12, 15 and 20 models.
(10) **:** Applicable to high carbon steel type.
(11) **:** 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.
2 : For size 85 models, no special specifications are applicable.

Table 5 Combination of special specifications

	A	BS	D	E	F	I	J	L	LF	MN	N	PS	Q	RE	T	U	V	W	Y
BS	○																		
D	○	☆																	
E	–	☆	–																
F	○	☆	☆	☆															
I	○	○	○	○	○														
J	○	☆	☆	☆	☆	○													
L	○	☆	☆	☆	☆	○	☆												
LF	○	☆	☆	☆	☆	○	☆	–											
MN	○	☆	☆	☆	☆	○	☆	☆	☆										
N	○	☆	☆	☆	–	○	–	☆	☆	☆									
PS	–	○	○	○	–	○	–	–	–	○	–								
Q	○	☆	☆	☆	☆	○	–	☆	☆	☆	☆	○							
RE	○	☆	☆	☆	☆	○	☆	☆	☆	☆	–	–	☆						
T	–	☆	☆	☆	☆	–	–	☆	☆	☆	☆	–	☆	☆					
U	○	–	☆	☆	☆	○	–	☆	–	☆	–	–	○	–	–				
V	○	☆	☆	☆	☆	○	★	☆	☆	☆	–	○	–	☆	☆	–			
W	○	○	○	–	○	○	○	○	○	○	○	○	○	○	–	○	○		
Y	○	☆	☆	☆	☆	○	☆	☆	☆	☆	☆	○	–	☆	☆	☆	☆	○	
Z	○	☆	☆	☆	☆	○	★	☆	☆	☆	–	–	–	☆	☆	–	★	○	☆

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.

Table 6.1 Female threads for bellows for flange type (Supplemental code /J, /JJ)

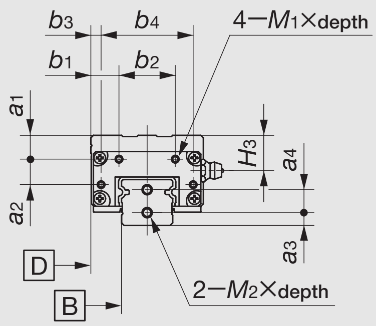


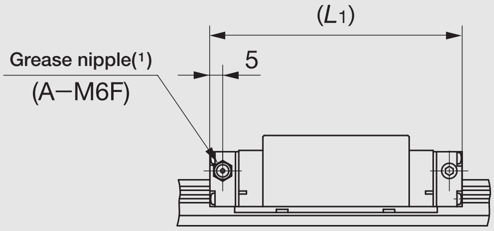
unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
LWH (T) 15…B	3	7	15.5	16	9.5	28	M3× 6	83	6.5	4	8	M3× 6
LWH (T) 15…SL												
LWH (T) 15…M								86				
LWH (T) 20…B	4	10	20.5	22	13.5	36	M3× 6	99	8.5	5	9	M4× 8
LWH (T) 20…SL												
LWH (T) 20…M								103				
LWH (T) G 20								128				
LWH (T) 25…B	4	13	22	26	15	40	M3× 6	110	8.5	5	12	M4× 8
LWH (T) 25…SL												
LWH (T) 25…M								115				
LWH (T) G 25								133				
LWH (T) 30…B	5	17	28	34	20	50	M3× 6	128	11	6	14	M4× 8
LWH (T) 30…SL												
LWH (T) 30…M								133				
LWH (T) G 30								154				
LWH (T) 35…B	6	20	30	40	20	60	M3× 6	137	13	7	15	M4× 8
LWH (T) 35…M								143				
LWH (T) G 35								165				
LWH (T) 45…B	7	26	35	50	23	74	M4× 8	160	15	8	19	M5×10
LWH (T) 45…M								167				
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								248				
LWH (T) 65…B	10	46	50	70	32	106	M5×10	240	20	10	28	M6×12
LWH (T) G 65								314				

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 are for the slide unit with female threads for bellows at both ends.

Table 6.2 Female threads for bellows for block type (Supplemental code /J, /JJ)





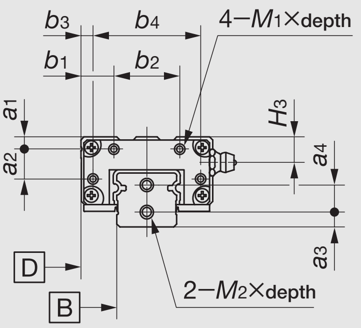
unit : mm

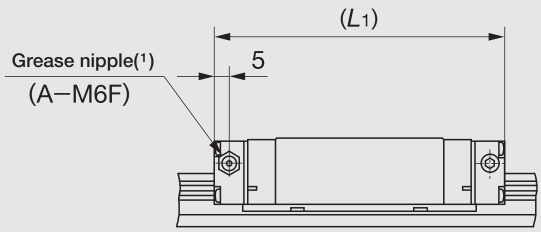
Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
LWHD 15…B	7	7	9	16	3	28	M3× 6	83	10.5	4	8	M3× 6
LWHD 15…M								86				
LWHD 25…B	8	13	11	26	4	40	M3× 6	110	12.5	5	12	M4× 8
LWHD 25…M								115				
LWHDG 25								133				
LWHD 30…B	8	17	13	34	5	50	M3× 6	128	14	6	14	M4× 8
LWHD 30…M								133				
LWHDG 30								154				
LWHD 35…B	13	20	15	40	5	60	M3× 6	137	20	7	15	M4× 8
LWHD 35…M								143				
LWHDG 35								165				
LWHD 45…B	17	26	18	50	6	74	M4× 8	160	25	8	19	M5×10
LWHD 45…M								167				
LWHDG 45								203				
LWHD 55…B	17	32	20	60	7	86	M4× 8	196	27	8	25	M5×10
LWHDG 55								248				
LWHD 65…B	10	46	28	70	10	106	M5×10	240	20	10	28	M6×12
LWHDG 65								314				

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 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)





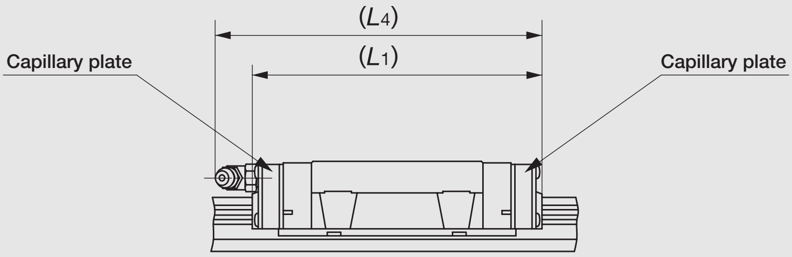
unit : mm

Model number	Slide unit									Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(2)	H_3	a_3	a_4	M_2×depth
LWHS 15…B	3	7	9	16	3	28	M3×6	83	6.5	4	8	M3×6
LWHS 15…SL												
LWHS 15…M								86				
LWHS 20…B	4	10	11	22	4	36	M3×6	99	8.5	5	9	M4×8
LWHS 20…SL												
LWHS 20…M								103				
LWHSG 20								128				
LWHS 25…B	4	13	11	26	4	40	M3×6	110	8.5	5	12	M4×8
LWHS 25…SL												
LWHS 25…M								115				
LWHSG 25								133				
LWHS 30…B	5	17	13	34	5	50	M3×6	128	11	6	14	M4×8
LWHS 30…SL												
LWHS 30…M								133				
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 IKO for further information.

(2) : The values are for the slide unit with female threads for bellows at both ends.

Table 7 Slide unit with capillary plates (Supplemental code /Q)



unit : mm

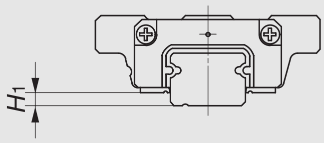
Model number	L_1	L_4
LWHDC 8···SL	26	—
LWHD 8···SL	32	—
LWHDG 8···SL	39	—
LWHDC 10···SL	34	—
LWHD 10···SL	42	—
LWHDG 10···SL	50	—
LWHDC 12···SL	44	48
LWHD 12	56	60
LWHD 12···SL		
LWHDG 12···SL	68	72
LWH 15···B	75	78
LWH 15···SL		
LWH 20···B	92	105
LWH 20···SL		
LWHG 20	121	134

Model number	L_1	L_4
LWH 25···B	105	117
LWH 25···SL		
LWHG 25	127	139
LWH 30···B	125	135
LWH 30···SL		
LWHG 30	151	161
LWH 35···B	134	146
LWHG 35	162	174
LWH 45···B	160	170
LWHG 45	203	213
LWH 55···B	196	207
LWHG 55	248	258
LWH 65···B	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_1 dimension of slide unit with under seals (Supplemental code /U)

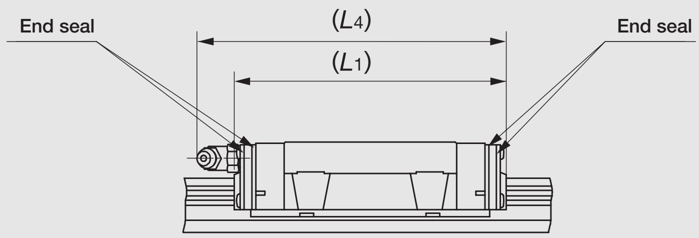
unit : mm



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 : H_1 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)



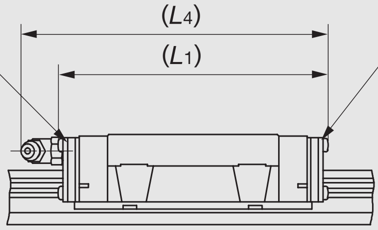
unit : mm

Model number	L_1	L_4
LWH 15…B	72	77
LWH 15…SL		
LWH 15…M	71	76
LWH 20…B	91	104
LWH 20…SL		
LWH 20…M	90	103
LWHG 20	119	133
LWH 25…B	104	116
LWH 25…SL		
LWH 25…M	103	115
LWHG 25	127	139
LWH 30…B	122	134
LWH 30…SL		
LWH 30…M	121	133
LWHG 30	148	160

Model number	L_1	L_4
LWH 35…B	133	146
LWH 35…M		
LWHG 35	161	173
LWH 45…B	159	170
LWH 45…M	158	
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 number	L_1	L_4
LWH 15…B	73	75
LWH 15…SL	73	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	116
LWH 25…M	103	113
LWHG 25	126	139

Model number	L_1	L_4
LWH 30…B	124	135
LWH 30…SL	124	135
LWH 30…M	123	131
LWHG 30	150	161
LWH 35…B	133	146
LWH 35…M	133	146
LWHG 35	161	174
LWH 45…B	160	171
LWH 45…M	159	170
LWHG 45	203	214
LWH 55…B	196	207
LWHG 55	248	258
LWH 65…B	242	252
LWHG 65	317	326

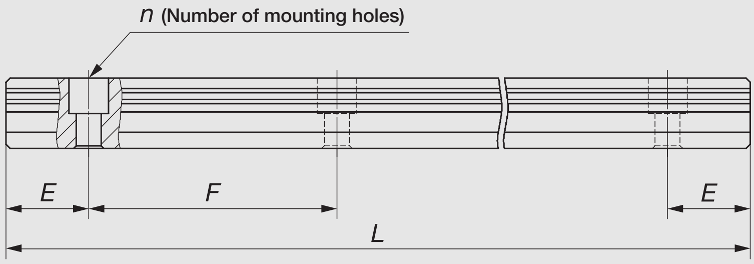
Remark 1 : The above table shows representative model numbers but is applicable to all models of the same size.
2 : The values are for the slide unit with scrapers at both ends.

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 89.

Table 11.1 Standard and maximum lengths of high carbon steel track rails



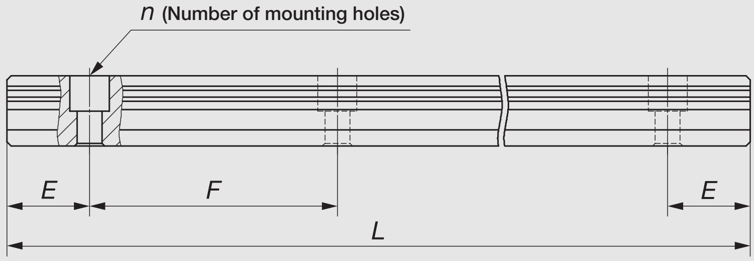
unit : mm

Item \ Model number		LWH 12	LWH 15…B	LWH 20…B	LWH 25…B	LWH 30…B
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) 900(15) 1 200(20)	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) 1 980(33)	480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19) 2 000(25)
Pitch of mounting holes *F*		40	60	60	60	80
E		20	30	30	30	40
Standard range of *E*(1)	incl.	5.5	7	8	9	10
	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)

Item \ Model number		LWH 35…B	LWH 45…B	LWH 55…B	LWH 65…B
Standard length *L* (*n*)		480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19)	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)
Pitch of mounting holes *F*		80	105	120	150
E		40	52.5	60	75
Standard range of *E*(1)	incl.	10	12.5	15	17
	under	50	65	75	92
Maximum length(2)		2 960 (4 000)	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").
(2) : Track rails with the maximum lengths in parentheses can be manufactured. Consult IKO for further information.
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-90.

Table 11.2 Standard and maximum lengths of stainless steel track rails



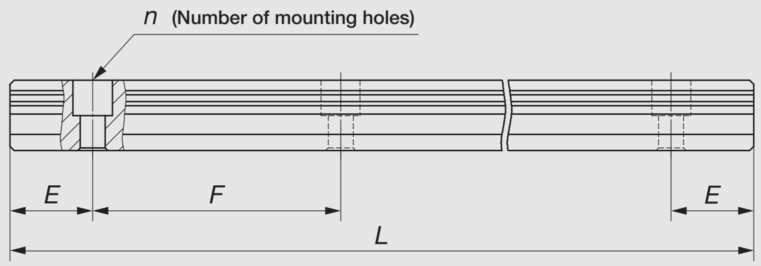
unit : mm

Item \ Model number		LWH 8…SL	LWH 10…SL	LWH 12…SL	LWH 15…SL
Standard length $L(n)$		40(2) 80(4) 120(6) 160(8) 200(10) 240(12) 280(14)	50(2) 100(4) 150(6) 200(8) 250(10) 300(12) 350(14) 400(16) 450(18) 500(20)	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)
Pitch of mounting holes F		20	25	40	60
E		10	12.5	20	30
Standard range of E(1)	incl.	4.5	5	5.5	7
	under	14.5	17.5	25.5	37
Maximum length(2)		480 (1 000)	850 (1 000)	1 000 (1 480)	1 200 (1 500)

Item \ Model number		LWH 20…SL	LWH 25…SL	LWH 30…SL
Standard length $L(n)$		240(4) 480(8) 660(11) 840(14)	240(4) 480(8) 660(11) 840(14)	480(6) 640(8) 800(10) 1 040(13)
Pitch of mounting holes F		60	60	80
E		30	30	40
Standard range of E(1)	incl.	8	9	10
	under	38	39	50
Maximum length(2)		1 200 (1 980)	1 200 (1 980)	1 200 (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 IKO for further information.
Remark : The above table shows representative model numbers but is applicable to all models of the same size.

Table 11.3 Standard and maximum lengths of ultra sealed type high carbon steel track rails



unit : mm

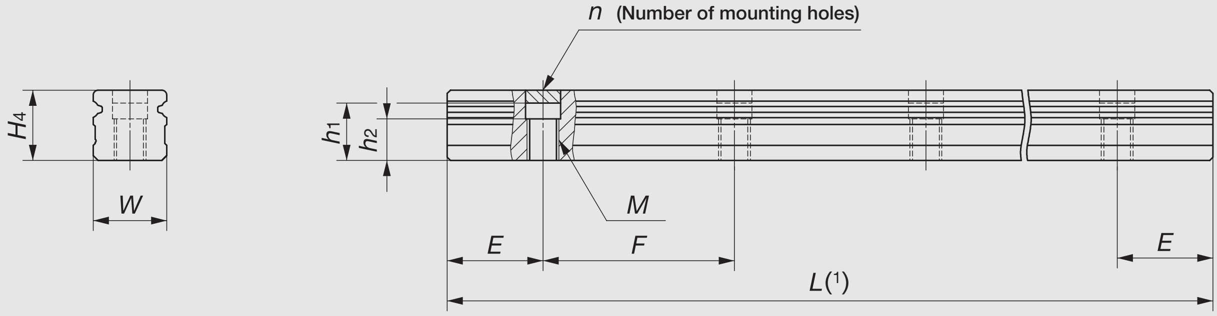
Item \ Model number		LWH 15…M	LWH 20…M	LWH 25…M	LWH 30…M	LWH 35…M	LWH 45…M
Standard length $L(n)$		180(3) 240(4) 360(6) 480(8) 660(11)	240(4) 480(8) 660(11) 840(14) 1 020(17) 1 200(20) 1 500(25)	240(4) 480(8) 660(11) 840(14) 1 020(17) 1 200(20) 1 500(25)	480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19)	480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19)	840(8) 1 050(10) 1 260(12) 1 470(14) 1 995(19)
Pitch of mounting holes F		60	60	60	80	80	105
E		30	30	30	40	40	52.5
Standard range of E(1)	incl.	7	8	9	10	10	12.5
	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-jointing rails		3	3	3	3	3	3
Maximum length of butt-jointing 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.

Table12 Dimensions of ultra sealed type track rails mounted from the lower side

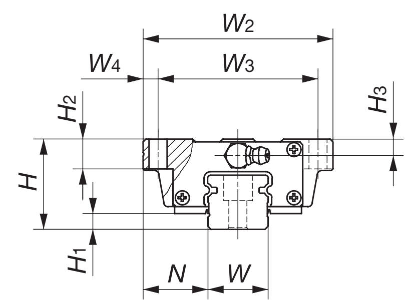


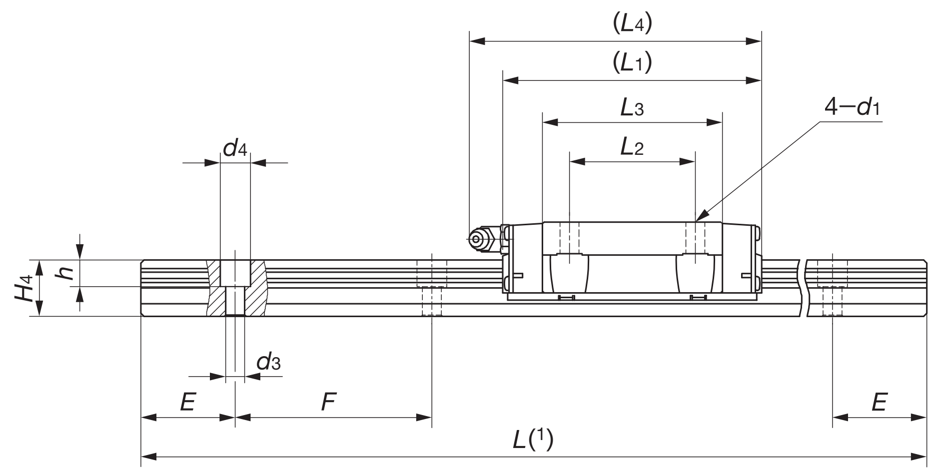
Model number	Mass (Ref.) kg/m	Dimensions mm						
		W	H_4	*E*	*F*	*M*	h_1 (2)	h_2
LWH 15…MU	1.47	15	15	30	60	M 6	12	9
LWHT 15…MU								
LWHD 15…MU								
LWHS 15…MU								
LWH 20…MU	2.56	20	18	30	60	M 8	13.5	9.5
LWHT 20…MU								
LWHS 20…MU								
LWH 25…MU	3.50	23	22	30	60	M10	18	13
LWHT 25…MU								
LWHD 25…MU								
LWHS 25…MU								
LWH 30…MU	4.82	28	25	40	80	M12	20	13
LWHT 30…MU								
LWHD 30…MU								
LWHS 30…MU								
LWH 35…MU	6.85	34	28	40	80	M12	23	16
LWHT 35…MU								
LWHD 35…MU								
LWH 45…MU	10.7	45	34	52.5	105	M16	29	17
LWHT 45…MU								
LWHD 45…MU								

Note(1) : For the track rail length, see Table 11.3 on page B-90.
(2) : The mounting bolt length should be less than the h_1 dimension.
Remark : The track rail mounting bolts are not appended.

IKO Linear Way H : Flange type

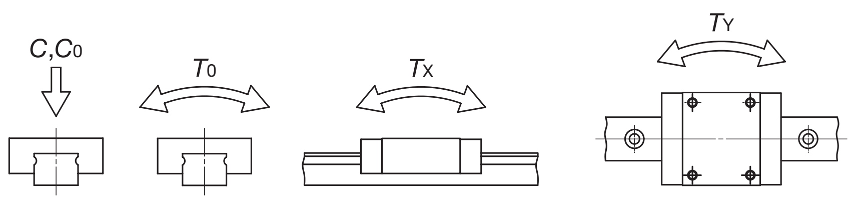
Flange type mounted from bottom
LWH …B
LWHG
LWH …SL (Stainless steel made)
LWH …M (Ultra sealed type)





Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1	H_2	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWH 15…B	☆																												
LWH 15…SL	☆	0.22	1.47	24	4.5	16	47	38	4.5	66	30	44.6	69	4.5	7	4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
LWH 15…M																													
LWH 20…B	☆																												
LWH 20…SL	☆	0.48	2.56	30	5	21.5	63	53	5	83	40	57.2	95	6	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
LWH 20…M																													
LWHG 20	☆	0.71								112		86	124												24 100	31 700	349	421 2 140	421 2 140
LWH 25…B	☆																												
LWH 25…SL	☆	0.70	3.50	36	6.5	23.5	70	57	6.5	95	45	64.7	106	7	10	6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
LWH 25…M																													
LWHG 25	☆	0.93								118		87.4	129												30 800	38 300	483	533 2 740	533 2 740

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.
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 97.



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

LWH 15 C2 R900 B T1 P S2 /V

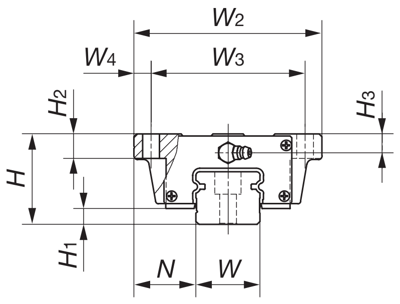
- Model code: LWH …B / LWH / LWHG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (900 millimeters)
- Sealing: Standard specification : No symbol; Ultra sealed specification : M
- Material: High carbon steel made : No symbol; Stainless steel made : SL
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Double end seals : /V

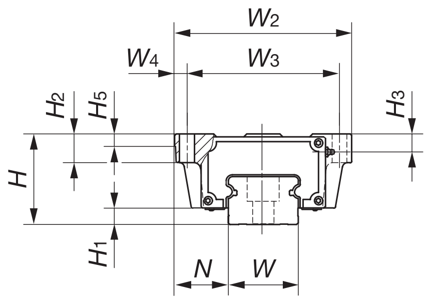
B

LWH, LWHT, LWHD, LWHS, LWHY

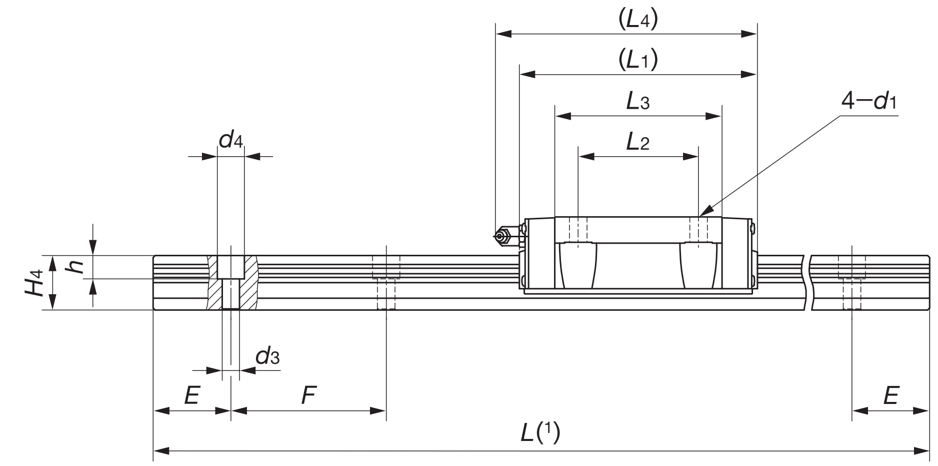
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Flange type mounted from bottom
- LWH ···B
- LWHG
- LWH ···SL(Stainless steel made)
- LWH ···M(Ultra sealed type)





LWHG85

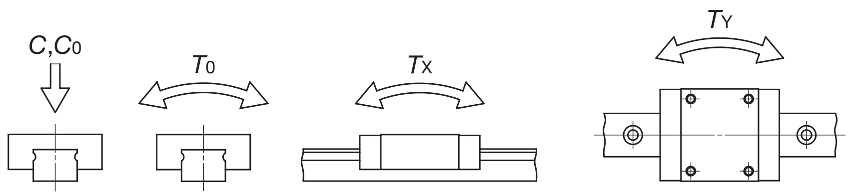


Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1
LWH 30···B	☆	1.28	4.82	42	7	31	90	72	9	113	52	80.6	124	9
LWH 30···SL	☆													
LWH 30···M														
LWHG 30	☆	1.69								139		106.6	150	
LWH 35···B	☆	1.79	6.85	48	8	33	100	82	9	123	62	86.2	135	9
LWH 35···M														
LWHG 35	☆	2.35								151		114	163	
LWH 45···B	☆	3.17	10.7	60	10	37.5	120	100	10	147	80	103.4	158	11
LWH 45···M														
LWHG 45	☆	4.34								190		146.6	201	
LWH 55···B	☆	5.30	15.5	70	13	43.5	140	116	12	183	95	132	194	14
LWHG 55	☆	7.40								235		183.6	246	
LWH 65···B	☆	12.3	22.2	90	14	53.5	170	142	14	229	110	164	239	16
LWHG 65	☆	17.6								303		238.8	313	
LWHG 85		25.9	34.6	110	16	65	215	185	15	318	140	240	—	18

Model number	Dimensions of track rail mm H_2	H_3	H_5	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWH 30···B	10	8	—	28	25	9	14	12	40	80	M 8×28	35 400	40 700	623	536 2 820	536 2 820
LWH 30···SL																
LWH 30···M																
LWHG 30												42 700	53 200	814	894 4 460	894 4 460
LWH 35···B	13	10	—	34	28	9	14	12	40	80	M 8×28	48 700	53 700	823	631 3 480	579 3 190
LWH 35···M																
LWHG 35												59 500	71 600	1 100	1 090 5 570	1 000 5 110
LWH 45···B	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
LWH 45···M																
LWHG 45												95 200	114 000	2 280	2 240 11 100	2 050 10 200
LWH 55···B	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
LWHG 55												142 000	168 000	3 970	4 120 20 200	3 780 18 500
LWH 65···B	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
LWHG 65												229 000	269 000	7 560	8 530 41 500	7 810 38 100
LWHG 85	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

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.

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 97.



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

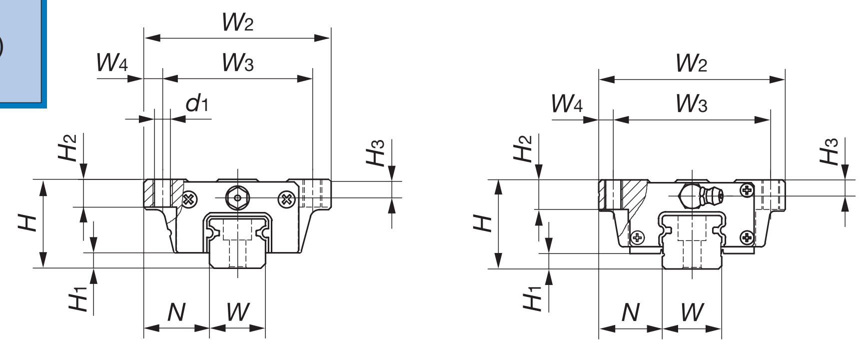
LWH 30 C2 R800 B T1 P S2 /V

- **Model code**: LWH ···B, LWH, LWHG
- **Size of rolling guide**
- **Number of slide units** (Two slide units)
- **Length of track rail** (800 millimeters)
- **Sealing**: Standard specification : No symbol; Ultra sealed specification : M
- **Material**: High carbon steel made : No symbol; Stainless steel made : SL
- **Preload amount**: Standard: No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- **Accuracy class**: High : H; Precision : P; Super precision : SP
- **Interchangeable code**: Interchangeable specification : S2; Non interchangeable specification : No symbol
- **Special specification**: Double end seals : /V

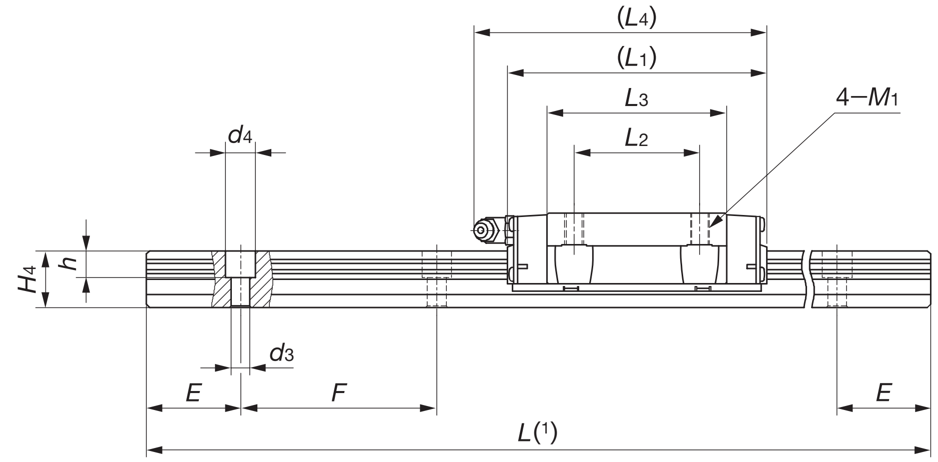
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Linear Way H : Flange type

Flange type mounted from top
LWHT …B
LWHTG
LWHT …SL(Stainless steel made)
LWHT …M(Ultra sealed type)



LWHT 8…SL
LWHT 10…SL
LWHT 12

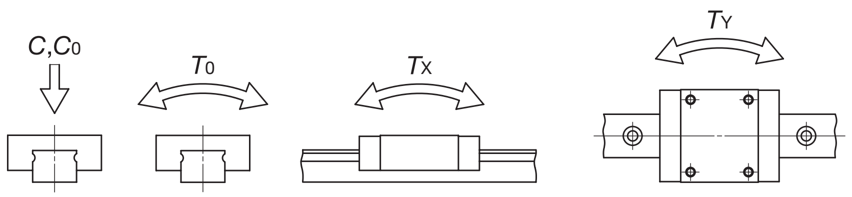


Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1(3)
LWHT 8…SL	☆	0.015	0.32	10	2.1	8	24	19	2.5	24	10	15.3	—	1.9
LWHT 10…SL	☆	0.032	0.47	12	2.4	10	30	24	3	32	12	21.4	—	2.6
LWHT 12	☆	0.11	0.86	19	3.2	14	40	32	4	46	15	31.6	50	3.4
LWHT 12…SL	☆													
LWHT 15…B	☆	0.22	1.47	24	4.5	16	47	38	4.5	66	30	44.6	69	—
LWHT 15…SL	☆													
LWHT 15…M														
LWHT 20…B	☆	0.48	2.56	30	5	21.5	63	53	5	83	40	57.2	95	—
LWHT 20…SL	☆													
LWHT 20…M														
LWHTG 20	☆	0.71								112		86	124	
LWHT 25…B	☆	0.70	3.50	36	6.5	23.5	70	57	6.5	95	45	64.7	106	—
LWHT 25…SL	☆													
LWHT 25…M														
LWHTG 25	☆	0.93								118		87.4	129	

Model number	Dimensions of track rail mm M_1	H_2	H_3	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWHT 8…SL	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
LWHT 10…SL	M3	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
LWHT 12	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
LWHT 12…SL																
LWHT 15…B	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
LWHT 15…SL																
LWHT 15…M																
LWHT 20…B	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
LWHT 20…SL																
LWHT 20…M																
LWHTG 20												24 100	31 700	349	421 2 140	421 2 140
LWHT 25…B	M8	10	6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
LWHT 25…SL																
LWHT 25…M																
LWHTG 25												30 800	38 300	483	533 2 740	533 2 740

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.
(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. For stainless steel type Linear Way H, stainless steel bolts are appended.
3 : For grease nipple and oil hole specifications, see page 97.
4 : LWHT8…SL and LWHT10…SL are provided with an oil hole.



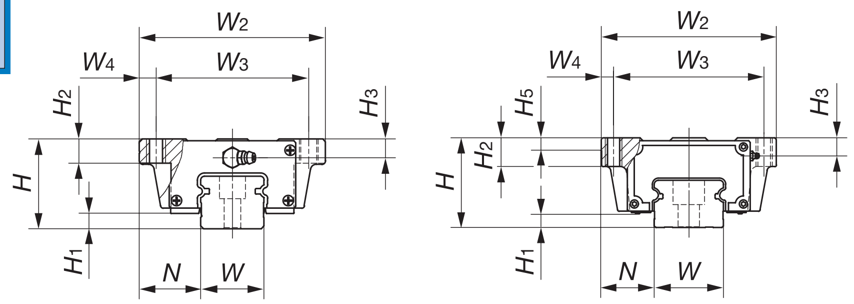
Example of identification number of assembled set (For details, see "Identification number and specification".)

LWHT 15 C2 R900 B T1 P S2 /V

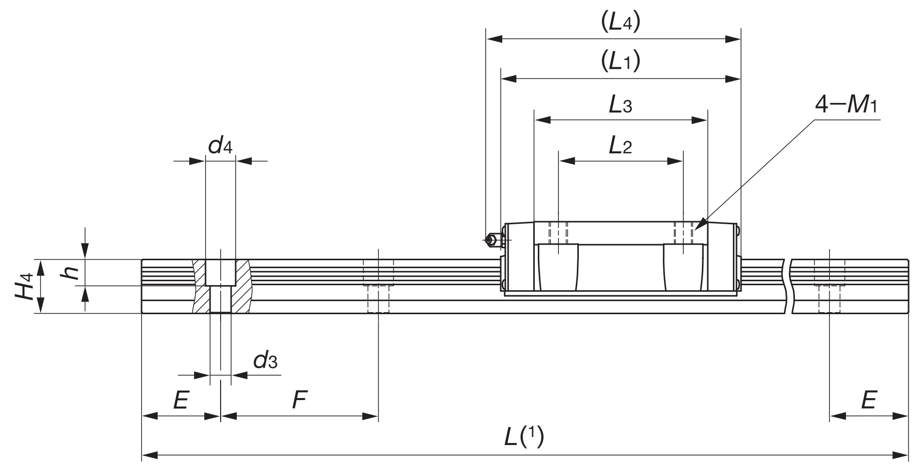
- Model code: LWHT …B / LWHT / LWHTG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (900 millimeters)
- Sealing: Standard specification : No symbol; Ultra sealed specification : M
- Material: High carbon steel made : No symbol; Stainless steel made : SL
- Preload amount: Clearance : T_0; Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Double end seals : /V

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

Flange type mounted from top
LWHT …B
LWHTG
LWHT …SL (Stainless steel made)
LWHT …M (Ultra sealed type)



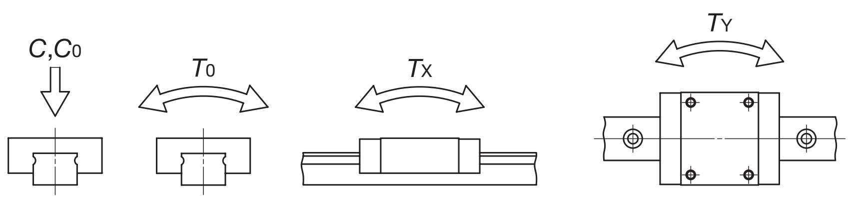
LWHTG 85



Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1
LWHT 30…B	☆	1.28	4.82	42	7	31	90	72	9	113	52	80.6	124	M 10
LWHT 30…SL	☆													
LWHT 30…M														
LWHTG 30	☆	1.69								139		106.6	150	
LWHT 35…B	☆	1.79	6.85	48	8	33	100	82	9	123	62	86.2	135	M 10
LWHT 35…M														
LWHTG 35	☆	2.35								151		114	163	
LWHT 45…B	☆	3.17	10.7	60	10	37.5	120	100	10	147	80	103.4	158	M 12
LWHT 45…M														
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								235		183.6	246	
LWHT 65…B	☆	12.3	22.2	90	14	53.5	170	142	14	229	110	164	239	M 16
LWHTG 65	☆	17.6								303		238.8	313	
LWHTG 85		25.9	34.6	110	16	65	215	185	15	318	140	240	—	M 20

Model number	H_2	H_3	H_5	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWHT 30…B	10	8	—	28	25	9	14	12	40	80	M 8×28	35 400	40 700	623	536 2 820	536 2 820
LWHT 30…SL																
LWHT 30…M																
LWHTG 30												42 700	53 200	814	894 4 460	894 4 460
LWHT 35…B	13	10	—	34	28	9	14	12	40	80	M 8×28	48 700	53 700	823	631 3 480	579 3 190
LWHT 35…M																
LWHTG 35												59 500	71 600	1 100	1 090 5 570	1 000 5 110
LWHT 45…B	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
LWHT 45…M																
LWHTG 45												95 200	114 000	2 280	2 240 11 100	2 050 10 200
LWHT 55…B	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
LWHTG 55												142 000	168 000	3 970	4 120 20 200	3 780 18 500
LWHT 65…B	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
LWHTG 65												229 000	269 000	7 560	8 530 41 500	7 810 38 100
LWHTG 85	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

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.
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 97.



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

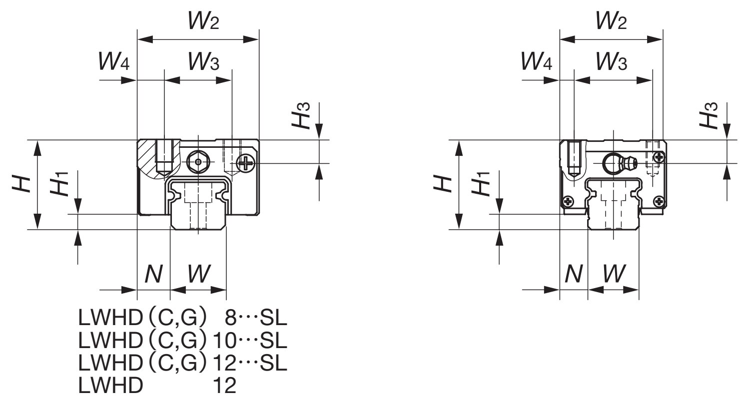
LWHT 30 C2 R800 B T1 P S2 /V

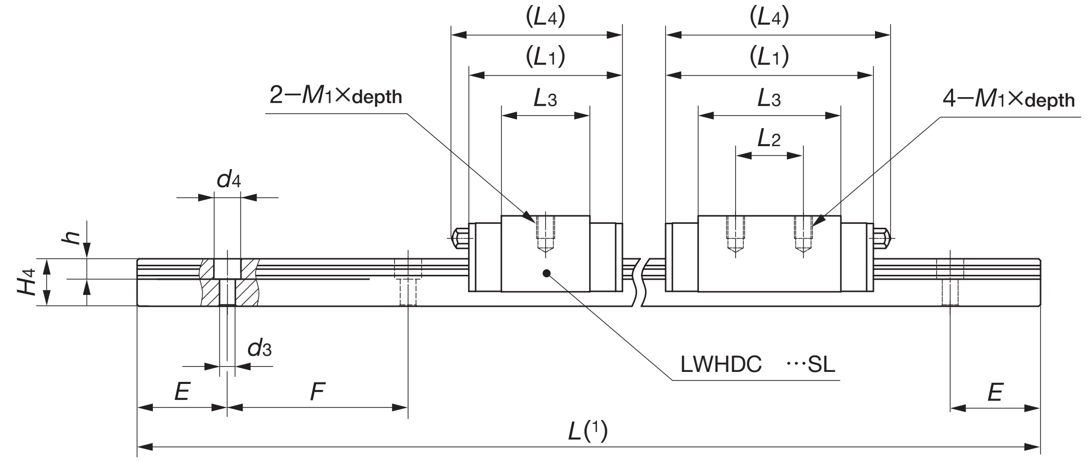
- Model code: LWHT …B, LWHT, LWHTG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (800 millimeters)
- Sealing: Standard specification : No symbol; Ultra sealed specification : M
- Material: High carbon steel made : No symbol; Stainless steel made : SL
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Double end seals : /V

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

IKO 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)

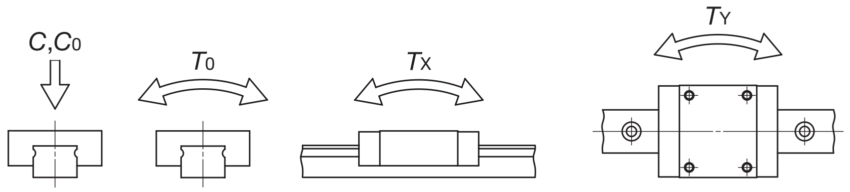




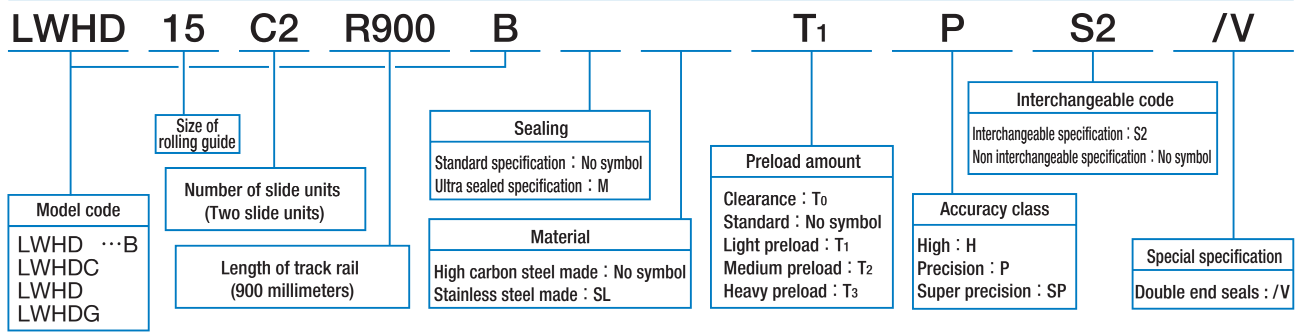
Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
LWHDC 8···SL	☆	0.008	0.32	11	2.1	4	16	10	3	18	—	9.0	—	M2 × 2.5
LWHD 8···SL	☆	0.013								24	10	15.3		
LWHDG 8···SL	☆	0.018								30.5		21.7		
LWHDC 10···SL	☆	0.018	0.47	13	2.4	5	20	13	3.5	24	—	13.4	—	M2.6× 3
LWHD 10···SL	☆	0.027								32	12	21.4		
LWHDG 10···SL	☆	0.036								40		29.4		
LWHDC 12···SL	☆	0.058	0.86	20	3.2	7.5	27	15	6	34	—	19.6	38	M4 × 5
LWHD 12	☆	0.091								46	15	31.6	50	
LWHD 12···SL	☆													
LWHDG 12···SL	☆	0.118								58		43.6	62	
LWHD 15···B	☆	0.23	1.47	28	4.5	9.5	34	26	4	66	26	44.6	69	M4 ×10
LWHD 15···M														
LWHD 25···B	☆	0.65	3.50	40	6.5	12.5	48	35	6.5	95	35	64.7	106	M6 ×12
LWHD 25···M														
LWHDG 25	☆	0.80								118	50	87.4	129	

H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
3	8	6	2.4	4.2	2.3	10	20	M2× 8	1 050	1 270	5.3	2.2 / 15.5	1.8 / 13.0
									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
3.5	10	7	3.5	6	3.5	12.5	25	M3× 8	1 920	2 350	12.2	5.8 / 37.1	4.8 / 31.2
									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
5	12	10.5	3.5	6	4.5	20	40	M3×12	4 560	5 300	32.8	19.4 / 117	16.3 / 98.5
									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

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.
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 and oil hole specifications, see page 97.
4 : LWHD8···SL and LWHD10···SL are provided with an oil hole.



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

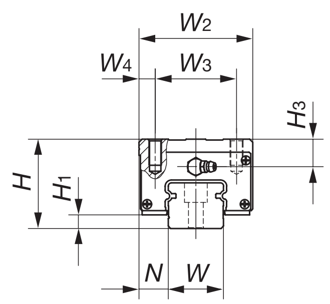


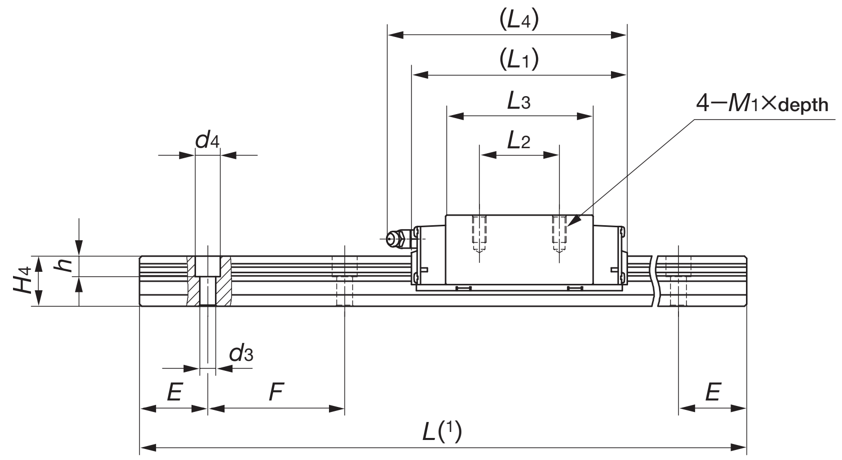
B

LWH, LWHT, LWHD, LWHS, LWHY

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

Block type mounted from top
LWHD …B
LWHDG
LWHD …M (Ultra sealed type)

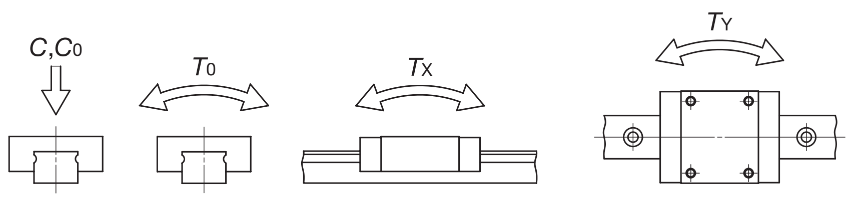




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
LWHD 30…B	☆	1.12	4.82	45	7	16	60	40	10	113	40	80.6	124	M8 ×16
LWHD 30…M														
LWHDG 30	☆	1.44								139	60	106.6	150	
LWHD 35…B	☆	1.74	6.85	55	8	18	70	50	10	123	50	86.2	135	M8 ×16
LWHD 35…M														
LWHDG 35	☆	2.26								151	72	114	163	
LWHD 45…B	☆	3.30	10.7	70	10	20.5	86	60	13	147	60	103.4	158	M10×20
LWHD 45…M														
LWHDG 45	☆	4.57								190	80	146.6	201	
LWHD 55…B	☆	5.36	15.5	80	13	23.5	100	75	12.5	183	75	132	194	M12×25
LWHDG 55	☆	7.20								235	95	183.6	246	
LWHD 65…B	☆	9.80	22.2	90	14	31.5	126	76	25	229	70	164	239	M16×30
LWHDG 65	☆	14.3								303	120	238.8	313	

Model number	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWHD 30…B / LWHD 30…M	11	28	25	9	14	12	40	80	M8 ×28	35 400	40 700	623	536 2 820	536 2 820
LWHDG 30										42 700	53 200	814	894 4 460	894 4 460
LWHD 35…B / LWHD 35…M	17	34	28	9	14	12	40	80	M8 ×28	48 700	53 700	823	631 3 480	579 3 190
LWHDG 35										59 500	71 600	1 100	1 090 5 570	1 000 5 110
LWHD 45…B / LWHD 45…M	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
LWHDG 45										95 200	114 000	2 280	2 240 11 100	2 050 10 200
LWHD 55…B	24	53	41	16	23	20	60	120	M14×45	113 000	121 000	2 870	2 210 11 600	2 030 10 600
LWHDG 55										142 000	168 000	3 970	4 120 20 200	3 780 18 500
LWHD 65…B	20	63	48	18	26	22	75	150	M16×50	176 000	184 000	5 180	4 130 22 000	3 790 20 200
LWHDG 65										229 000	269 000	7 560	8 530 41 500	7 810 38 100

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.
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 97.



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

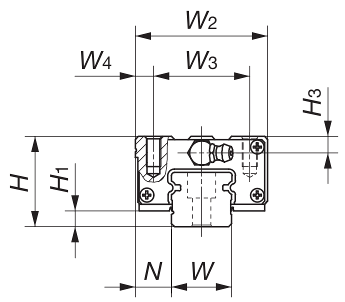
LWHD 35 C2 R800 B T1 P S2 /V

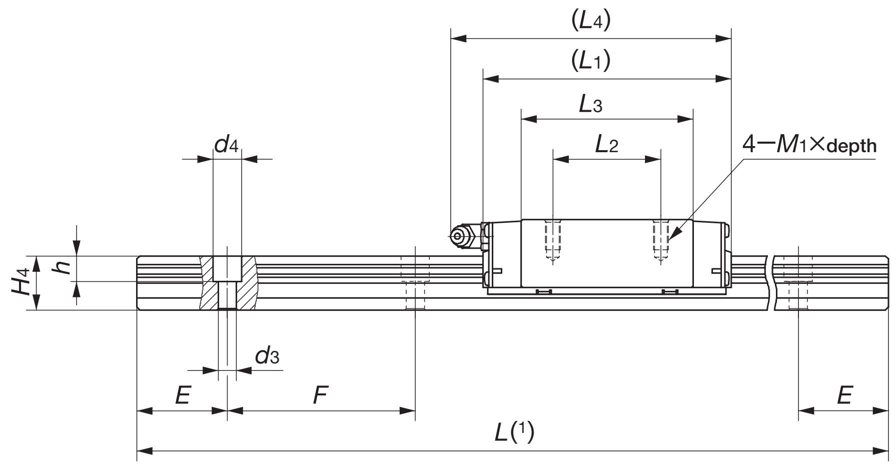
- Model code: LWHD …B / LWHD / LWHDG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (800 millimeters)
- Sealing: Standard specification : No symbol; Ultra sealed specification : M
- Material: High carbon steel made : No symbol; Stainless steel made : SL
- Preload amount: Standard : No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Double end seals : /V

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

IKO 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)

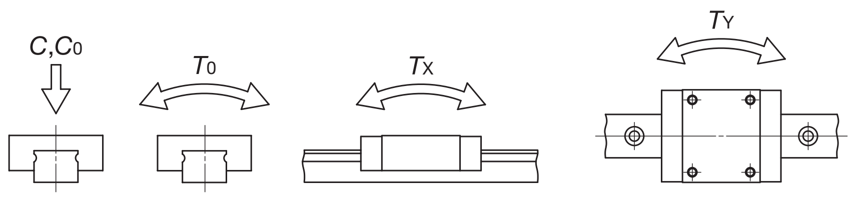




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth
LWHS 15…B	☆													
LWHS 15…SL	☆	0.18	1.47	24	4.5	9.5	34	26	4	66	26	44.6	69	M4× 8
LWHS 15…M														
LWHS 20…B	☆													
LWHS 20…SL	☆	0.36	2.56	30	5	12	44	32	6	83	36	57.2	95	M5×10
LWHS 20…M														
LWHSG 20	☆	0.53								112	50	86	124	
LWHS 25…B	☆													
LWHS 25…SL	☆	0.55	3.50	36	6.5	12.5	48	35	6.5	95	35	64.7	106	M6×12
LWHS 25…M														
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														
LWHSG 30	☆	1.29								139	60	106.6	150	

Model number	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWHS 15…B														
LWHS 15…SL	4.5	15	15	4.5	8	6	30	60	M4×16	11 600	13 400	112	95.6 556	95.6 556
LWHS 15…M														
LWHS 20…B														
LWHS 20…SL	5.5	20	18	6	9.5	8.5	30	60	M5×18	18 100	21 100	232	195 1 090	195 1 090
LWHS 20…M														
LWHSG 20										24 100	31 700	349	421 2 140	421 2 140
LWHS 25…B														
LWHS 25…SL	6.5	23	22	7	11	9	30	60	M6×22	25 200	28 800	362	309 1 690	309 1 690
LWHS 25…M														
LWHSG 25										30 800	38 300	483	533 2 740	533 2 740
LWHS 30…B														
LWHS 30…SL	8	28	25	9	14	12	40	80	M8×28	35 400	40 700	623	536 2 820	536 2 820
LWHS 30…M														
LWHSG 30										42 700	53 200	814	894 4 460	894 4 460

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88, Table 11.2 on page B-89 and Table 11.3 on page B-90.
(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.
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 97.



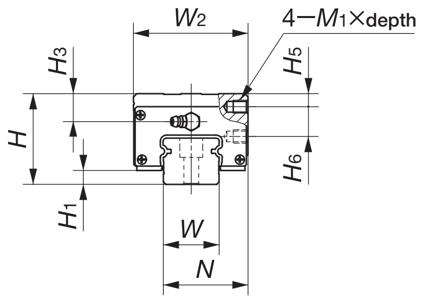
Example of identification number of assembled set (For details, see "Identification number and specification".)

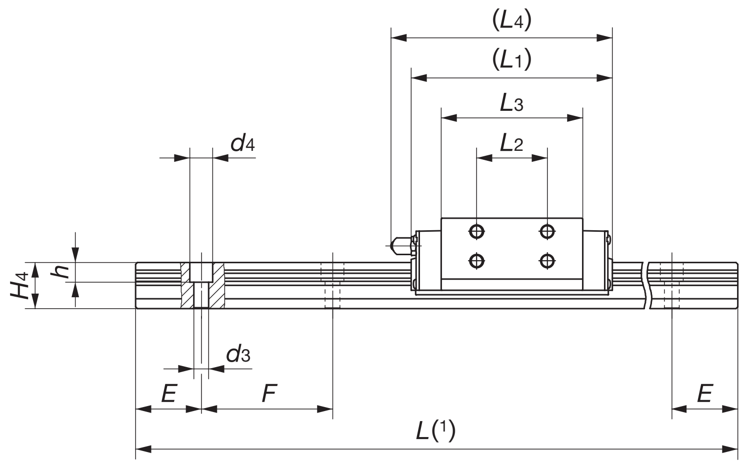
LWHS 15 C2 R900 B T1 P S2 /V

- Model code: LWHS …B / LWHS / LWHSG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (900 millimeters)
- Sealing: Standard specification : No symbol; Ultra sealed specification : M
- Material: High carbon steel made : No symbol; Stainless steel made : SL
- Preload amount: Standard: No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Double end seals : /V

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

Side mounting type
LWHY

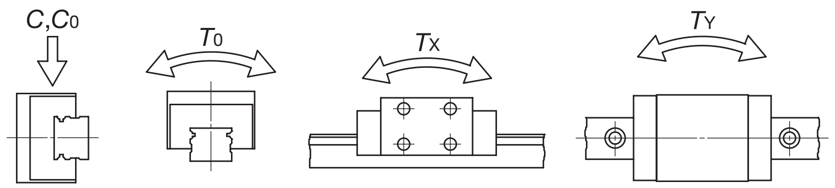




Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	L_1	L_2	L_3	L_4	M_1×depth	H_3
LWHY 15	0.23	1.47	28	4.5	24.3	34	66	18	44.6	69	M 4× 4	8.5
LWHY 20	0.36	2.56	30	5	31.5	43.7	83	25	57.2	95	M 5× 5	5.5
LWHY 25	0.65	3.50	40	6.5	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

Model number	H_5	H_6	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWHY 15	4	9	15	15	4.5	8	6	30	60	M 4×16	9 360	13 900	116	99.2 / 577	99.2 / 577
LWHY 20	4	10	20	18	6	9.5	8.5	30	60	M 5×18	14 500	21 900	241	202 / 1 130	202 / 1 130
LWHY 25	6	12	23	22	7	11	9	30	60	M 6×22	20 100	29 800	376	320 / 1 750	320 / 1 750
LWHY 30	8	14	28	25	9	14	12	40	80	M 8×28	28 100	42 200	646	556 / 2 930	556 / 2 930
LWHY 35	8	18	34	28	9	14	12	40	80	M 8×28	31 200	43 500	878	665 / 3 600	601 / 3 310
LWHY 45	10	22	45	34	14	20	17	52.5	105	M12×35	47 600	65 000	1 720	1 200 / 6 420	1 100 / 5 900
LWHY 55	12	25	53	41	16	23	20	60	120	M14×45	71 200	98 300	3 050	2 300 / 12 000	2 110 / 11 000
LWHY 65	12	30	63	48	18	26	22	75	150	M16×50	110 000	149 000	5 510	4 280 / 22 800	3 930 / 21 000

Note(1) : Track rail lengths are shown in Table 11.1 on page B-88.
(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.
Remark 1 : The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
2 : For grease nipple specifications, see page 97.



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

LWHY 15 C2 R900 T1 P /V

- Model code: LWHY
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail(900 millimeters)
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP
- Special specification: Double end seals : /V

B
LWH, LWHT, LWHD, LWHS, LWHY

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

Linear Way F

LWFH／LWFF／LWFS

IKO 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, disk read devices and semiconductor 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.

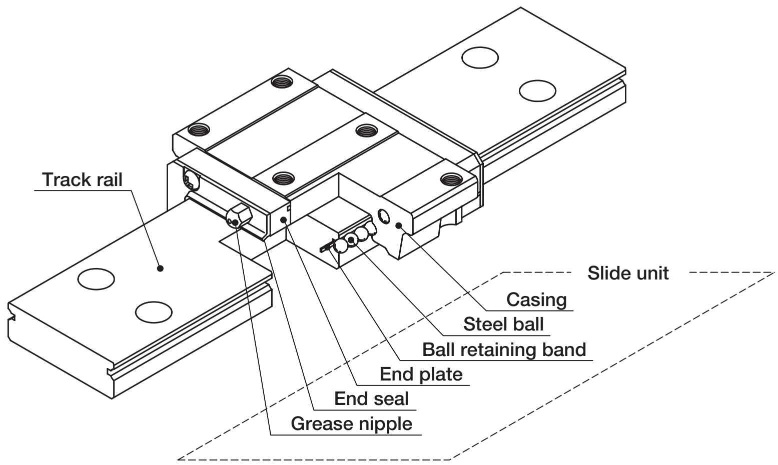
Good load balance

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.

U.S. PATENT No. 6,176,617
No. 5,967,667
No. 4,505,522



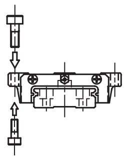
Structure of Linear Way F

Linear Way F series

Shape	Model code

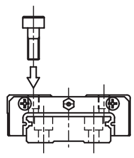
Linear Way F

- Flange type mounted from top/bottom



  - LWFH
  - LWFF

- Block type mounted from top

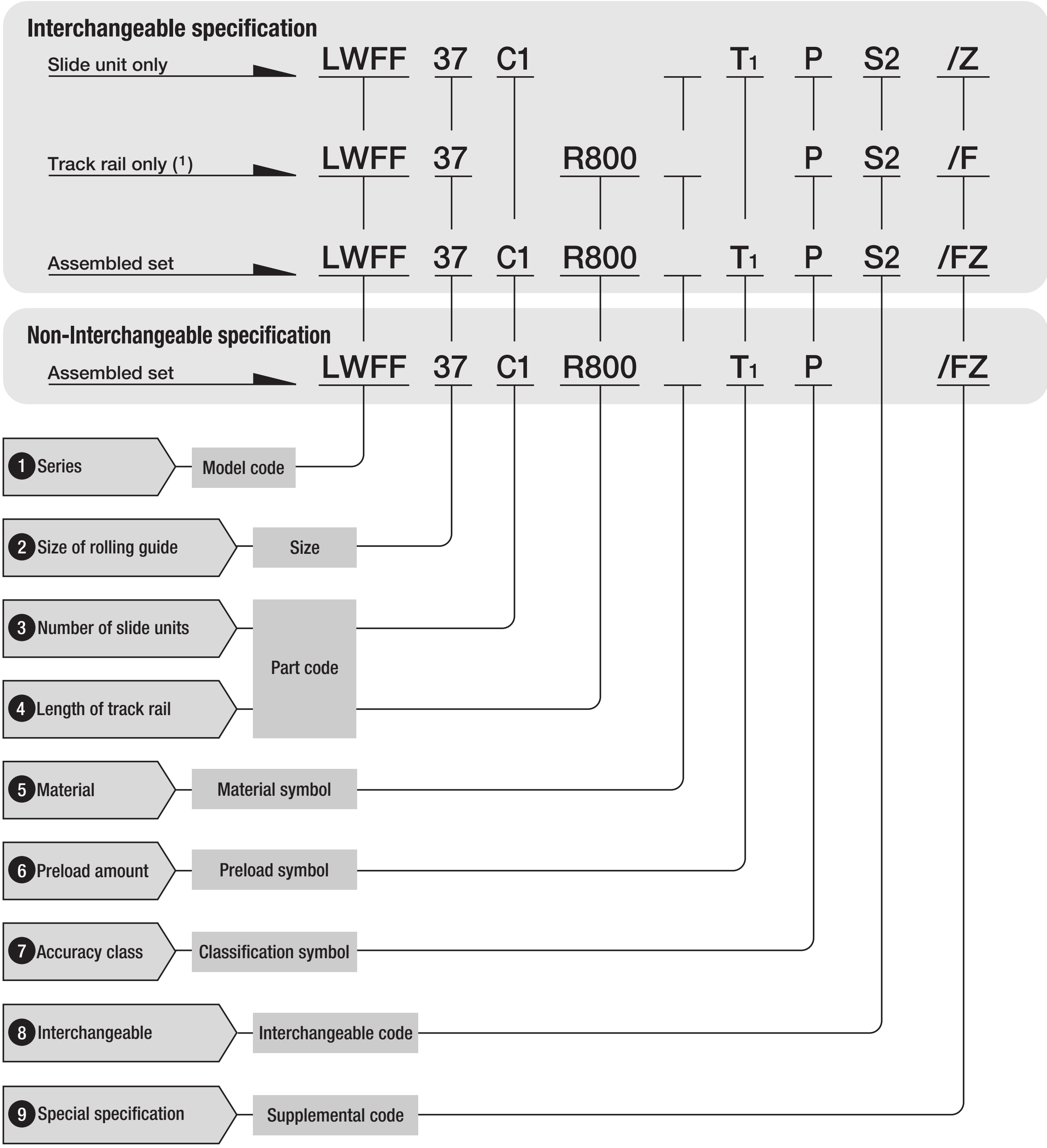


  - LWFS
  - LWFS···SL

Remark : Models with "SL" are stainless steel type.

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 76.



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

Table 1 Models and sizes of Linear Way F

Size \ Model	Flange type		Block type	
	High carbon steel made		High carbon steel made	Stainless steel made
	LWFH	LWFF	LWFS	LWFS…SL
33	—	☆	☆	☆
37	—	☆	☆	☆
40	☆	—	—	—
42	—	☆	—	☆
60	☆	—	—	—
69	—	☆	—	—
90	☆	—	—	—

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

3 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.

4 Length of track rail

Assembled set : R○
Track rail only : R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-120.

5 Material

High carbon steel made : No symbol
Stainless steel made : SL

For applicable material types, see Table 1.

6 Preload amount

Standard : No symbol

Light preload : T_1

Medium preload : T_2

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 84.

Table 2 Applicable preload types

Size	Preload type (Symbol)		
	Standard (No symbol)	Light preload (T_1)	Medium preload (T_2)
33	☆	☆	○
37	☆	☆	○
40	☆	☆	○
42	☆	☆	○
60	☆	☆	○
69	☆	☆	○
90	☆	☆	○

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

7 Accuracy class

High : H

Precision : 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 79.

Table 3 Applicable accuracy class

Size	Accuracy class (Symbol)		
	High (H)	Precision (P)	Super precision (SP)
33	☆	☆	○
37	☆	☆	○
40	☆	☆	○
42	☆	☆	○
60	☆	☆	○
69	☆	☆	○
90	☆	☆	○

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

8 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.
9 Special specification		For applicable special specifications, see Tables 4.1 and 4.2. When several special specifications are required, see Table 5. For details of special specifications, see page 86.

Table 4.1 Special specifications of LWFH

Special specification	Supplemental code	Assembled set	Track rail	Slide unit	Dimension
Butt-jointing track rail	A	○	—	—	
Chamfered reference surface	C	○ (1)	—	—	See Fig. 1.
Opposite reference surfaces arrangement	D	☆	—	—	
Specified rail mounting hole positions	E	☆	☆	—	
Caps for rail mounting holes	F	☆	☆	—	
Inspection sheet	I	○	—	—	
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	○	—	—	
Specified grease	Y	☆	—	—	
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	A	○	—	—	
Opposite reference surfaces arrangement	D	☆	—	—	
Specified rail mounting hole positions	E	☆	☆	—	
Caps for rail mounting holes	F	☆	☆	—	
Inspection sheet	I	○	—	—	
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	○	—	—	
Specified grease	Y	☆	—	—	
Scrapers	Z	☆	—	☆	See Table 10.

Note(1) **:** Not applicable to stainless steel made interchangeable specification products.
(2) **:** The H_1 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.

Table 5 Combination of special specifications

LWFH

	A	C	D	E	F	I	J	L	LF	MN	N	Q	U	W	Y
C	○														
D	○	○													
E	–	○	–												
F	○	○	☆	☆											
I	○	○	○	○	○										
J	○	○	☆	☆	☆	○									
L	○	○	☆	☆	☆	○	☆								
LF	○	○	☆	☆	☆	○	☆	–							
MN	○	○	☆	☆	☆	○	☆	☆	☆						
N	○	○	☆	☆	☆	○	–	☆	☆	☆					
Q	○	○	☆	☆	–	○	–	☆	☆	☆	☆				
U	○	○	☆	☆	☆	○	☆	☆	☆	☆	–	☆			
W	○	○	○	–	○	○	○	○	○	○	○	○	○		
Y	○	○	☆	☆	☆	○	☆	☆	☆	☆	☆	–	☆	○	
Z	○	○	☆	☆	☆	○	–	☆	☆	☆	–	–	☆	○	○

LWFF
LWFS

	A	D	E	F	I	J	L	LF	MN	N	Q	U	V	W	Y
D	○														
E	–	–													
F	○	☆	☆												
I	○	○	○	○											
J	○	☆	☆	☆	○										
L	○	☆	☆	☆	○	☆									
LF	○	☆	☆	☆	○	☆	–								
MN	○	☆	☆	☆	○	☆	☆	☆							
N	○	☆	☆	–	○	–	☆	☆	☆						
Q	○	☆	☆	☆	○	–	☆	☆	☆	☆					
U	○	☆	☆	☆	○	☆	☆	☆	☆	–	☆				
V	○	☆	☆	☆	○	★	☆	☆	☆	–	–	☆			
W	○	○	–	○	○	○	○	○	○	○	○	○	○		
Y	○	☆	☆	☆	○	☆	☆	☆	☆	☆	–	☆	☆	○	
Z	○	☆	☆	☆	○	★	☆	☆	☆	–	–	☆	★	○	☆

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.

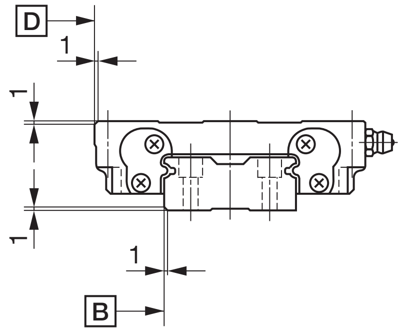
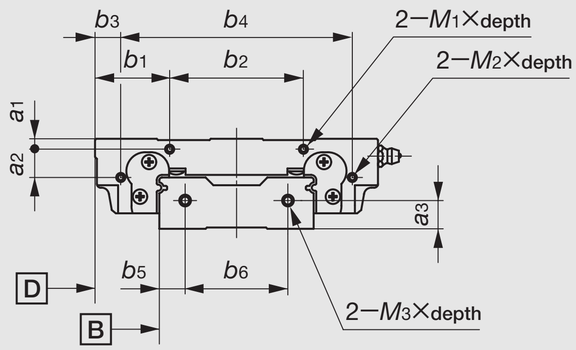


Fig. 1 Chamfers on reference surfaces (Supplemental code /CC)

Table 6.1 Female threads for bellows of LWFH (Supplemental code /J, /JJ)

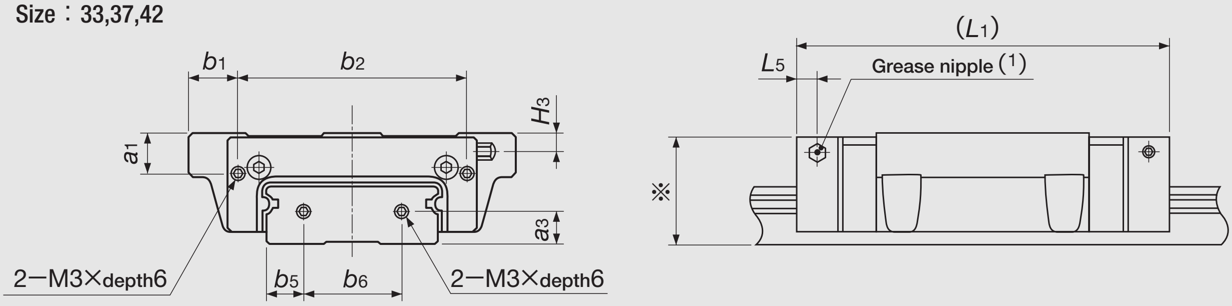


unit : mm

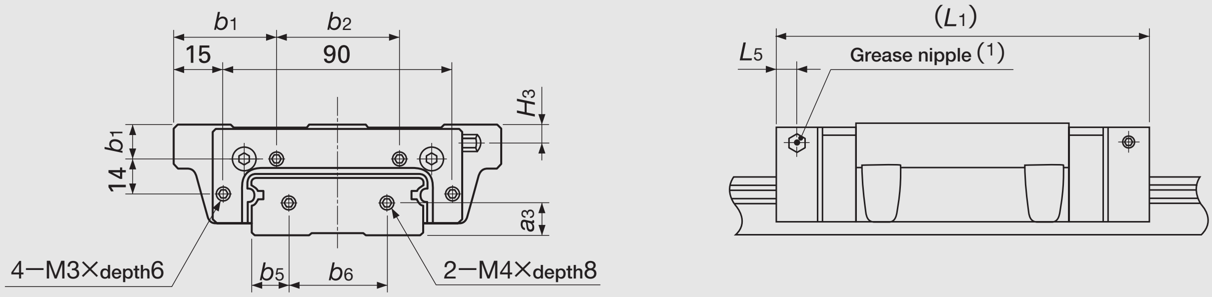
Model number	Slide unit								Track rail			
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	M_2×depth	a_3	b_5	b_6	M_3×depth
LWFH 40	3	—	23.5	35	—	—	M3×6	—	9	8	24	M3×6
LWFH 60	4	11	29	52	10	90	M3×6	M3×3	11	10	40	M4×8
LWFH 90	6	17	41	80	13	136	M3×5	M3×5	13	15	60	M4×8

Table 6.2 Female threads for bellows of LWFF, LWFS (Supplemental code /J, /JJ)

Size：33,37,42



Size：69

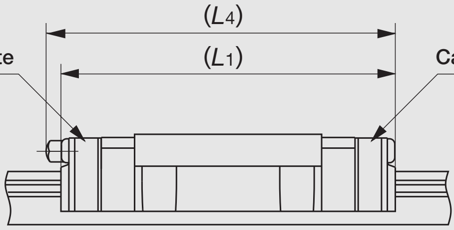


unit : mm

Model number	Slide unit						Track rail		
	a_1	b_1	b_2	L_1 (2)	L_5	H_3	a_3	b_5	b_6
LWFF 33	4	8.25	43.5	71	5	1	6	7.5	18
LWFS 33		3.25							
LWFF 37	6	10	48	78	5	1	6.5	8.5	20
LWFS 37		3							
LWFF 42	9.5	12	56	92	7	4.5	8	9	24
LWFS 42…SL		3							
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 96.
(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)

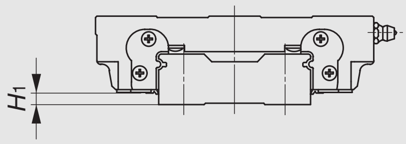


unit : mm

Model number	L_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	L_1	L_4
LWFS 33	64	67
LWFS 33…SL		
LWFS 37	73	75
LWFS 37…SL		
LWFS 42…SL	86	99

Table 8 H_1 dimension of slide unit with under seals (Supplemental code /U)

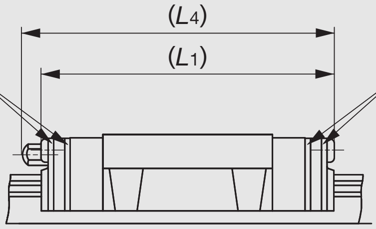


unit : mm

Model number	H_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)

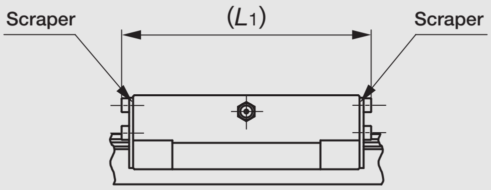


unit : mm

Model number	L_1	L_4
LWFF 33	61	64
LWFS 33		
LWFF 37	70	74
LWFS 37		
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)

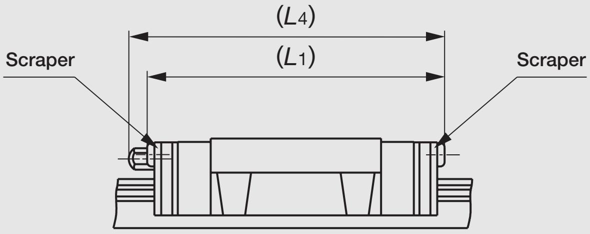


unit : mm

Model number	L_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

Model number	L_1	L_4
LWFF 33	62	64
LWFS 33		
LWFF 37	71	75
LWFS 37		
LWFF 42	84	97
LWFF 69	119	131

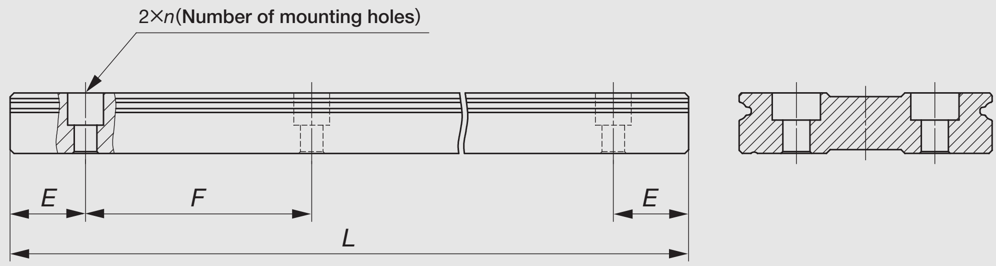
Remark : The above values are for slide units with scrapers at both ends.

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 89.

Table 11.1 Standard and maximum lengths of high carbon steel track rails



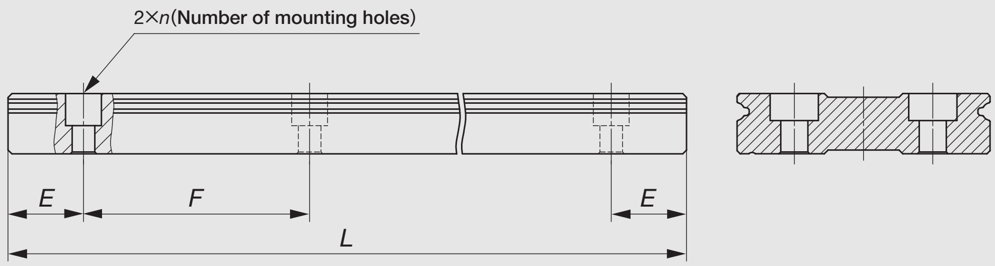
unit : mm

Item \ Model number	LWFH 40	LWFH 60	LWFH 90
Standard length *L*(*n*)	180(3) 240(4) 360(6) 480(8) 660(11) 840(14)	240(3) 480(5) 640(8) 800(10) 1 040(13)	480(6) 640(8) 800(10) 1 040(13) 1 200(15) 1 520(19)
Pitch of mounting holes *F*	60	80	80
E	30	40	40
Standard range of *E*(1) incl.	8	10	10
Standard range of *E*(1) under	38	50	50
Maximum length(2)	1 500	1 520	1 520

Item \ Model number	LWFF 33 LWFS 33	LWFF 37 LWFS 37	LWFF 42	LWFF 69
Standard length *L*(*n*)	120(3) 200(5) 320(8) 480(12) 560(14)	150(3) 250(5) 400(8) 500(10) 600(12) 800(16)	180(3) 240(4) 360(6) 480(8) 660(11) 840(14)	320(4) 480(6) 800(10) 1 040(13) 1 280(16) 1 600(20)
Pitch of mounting holes *F*	40	50	60	80
E	20	25	30	40
Standard range of *E*(1) incl.	7	7	7	9
Standard range of *E*(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 IKO for further information.

Table 11.2 Standard and maximum lengths of stainless steel track rails

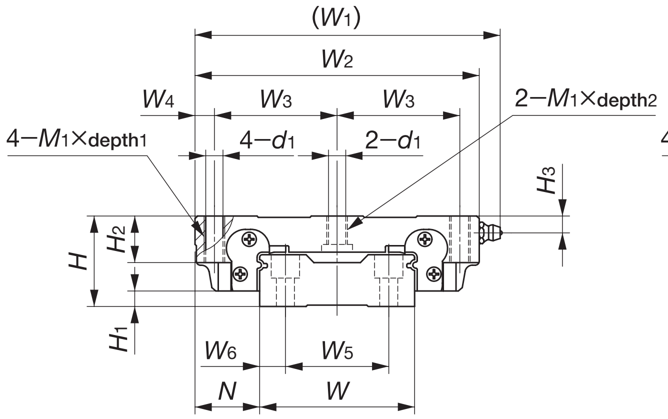


unit : mm

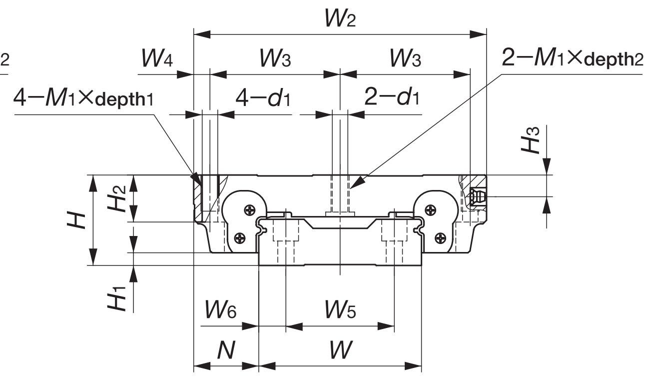
Item \ Model number		LWFS 33…SL	LWFS 37…SL	LWFS 42…SL
Standard length $L(n)$		120(3)	150(3)	180(3)
		200(5)	250(5)	240(4)
		320(8)	400(8)	360(6)
		480(12)	500(10)	480(8)
		560(14)	600(12)	660(11)
			800(16)	840(14)
Pitch of mounting holes F		40	50	60
E		20	25	30
Standard range of E(1)	incl.	7	7	7
	under	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 IKO for further information.

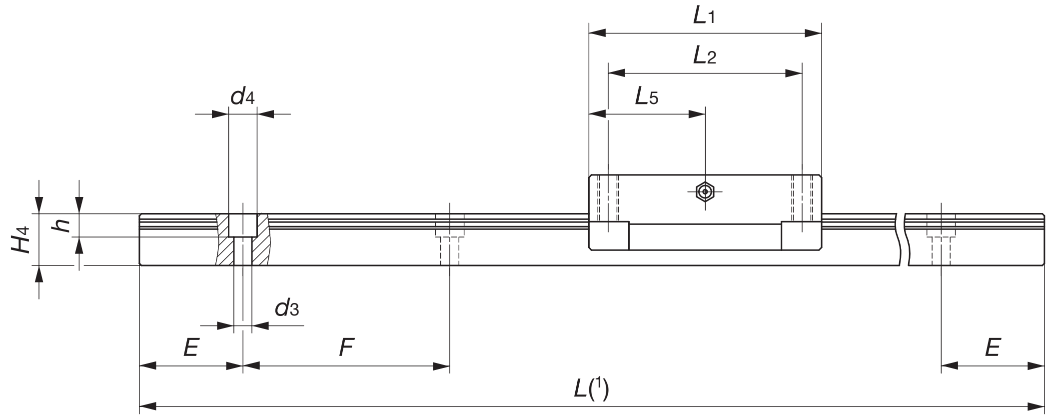
Flange type mounted from top/bottom
LWFH



LWFH40, LWFH60

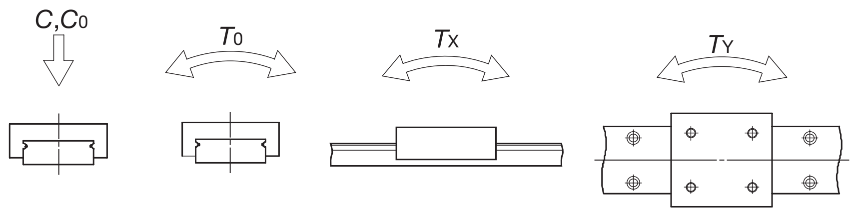


LWFH90



Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_1	W_2	W_3	W_4	L_1	L_2	L_5	d_1	M_1×depth1	depth2	H_2	Dimensions of track rail mm H_3	W	H_4	W_5	W_6	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LWFH 40	☆	0.58	4.60	27	5	21	92	82	37	4	70	60	27.5	4.3	M 5×14	8	14	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
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	6.5	60	20	40	10	7	11	9	40	80	M6×22	16 100	23 500	600	210 1 090	193 998
LWFH 90	☆	4.06	16.5	50	7	36	—	162	72	9	120	100	60	8.6	M10×20	20.5	26	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

Note(1) : Track rail lengths are shown in Table 11.1 on page B-120.
(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.
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 97.



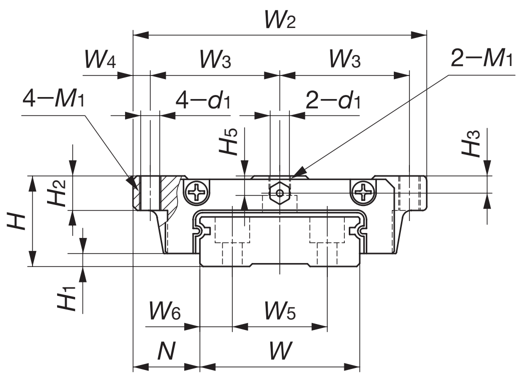
Example of identification number of assembled set (For details, see "Identification number and specification".)

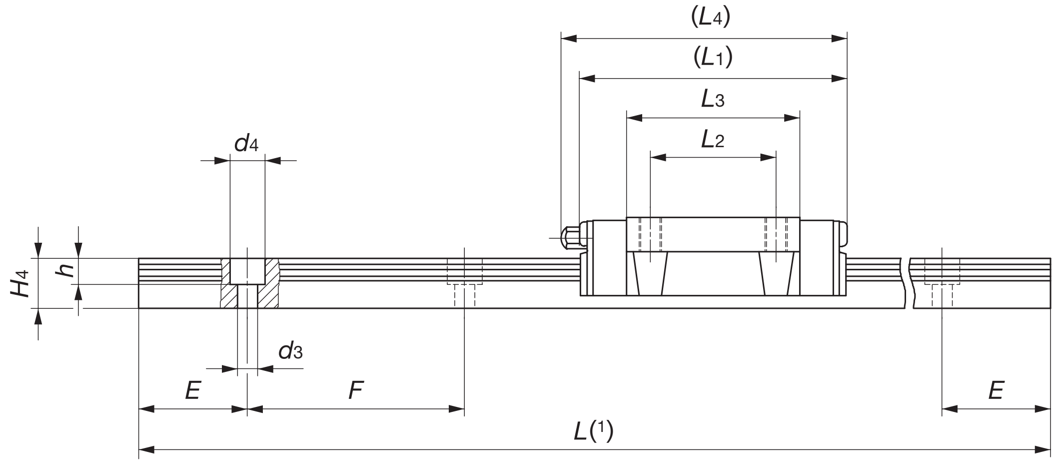
LWFH 60 C2 R800 T_1 P S2 /U

- Model code: LWFH
- Size of rolling guide: 60
- Number of slide units (Two slide units): C2
- Length of track rail (800 millimeters): R800
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2
- Accuracy class: High : H; Precision : P; Super precision : SP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Under seals : /U

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

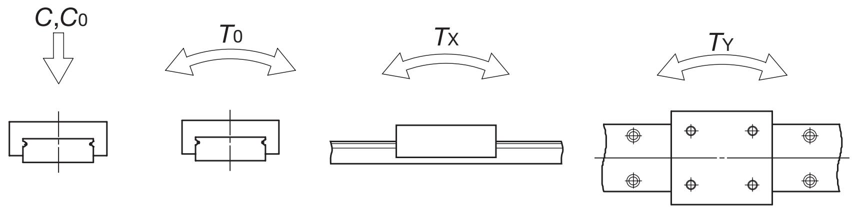
Flange type mounted from top/bottom
LWFF





Model number	Interchangeable	Mass (Ref.)		Dimensions of assembly mm			Dimensions of slide unit mm										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)		
		Slide unit kg	Track rail kg/m	H	H_1	N	W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1	M_1	H_2	H_3	H_5	W	H_4	W_5	W_6	d_3	d_4	h	E	F	Bolt size x length	C N	C_0 N	T_0 N･m	T_X N･m	T_Y N･m
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	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
LWFF 37	☆	0.23	3.05	21	3	15.5	68	30	4	62	29	40	66	4.4	M5	8	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
LWFF 42	☆	0.49	4.30	27	3	19	80	35	5	75	40	52.2	86	5.3	M6	10	6	7	42	14	24	9	4.6	8	6	30	60	M4×16	15 500	19 400	424	165 904	165 904
LWFF 69	☆	1.40	9.51	35	4	25.5	120	53.5	6.5	109	60	79.5	119	7	M8	14	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

Note(1) : Track rail lengths are shown in Table 11.1 on page B-120.
(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.
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 97.



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

LWFF 37 C2 R800 T1 P S2 /U

- LWFF — Model code: LWFF
- 37 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R800 — Length of track rail (800 millimeters)
- T1 — Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2
- P — Accuracy class: High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /U — Special specification: Under seals : /U

B

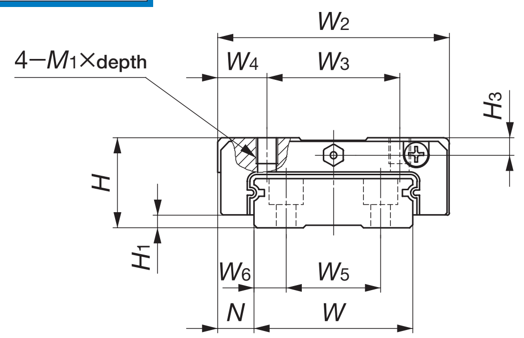
LWFH, LWFF, LWFS

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

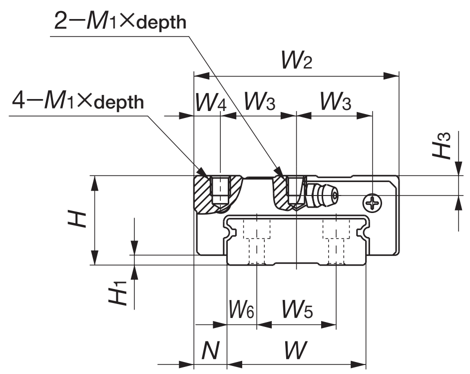
IKO Linear Way F : Block type

Block type mounted from top

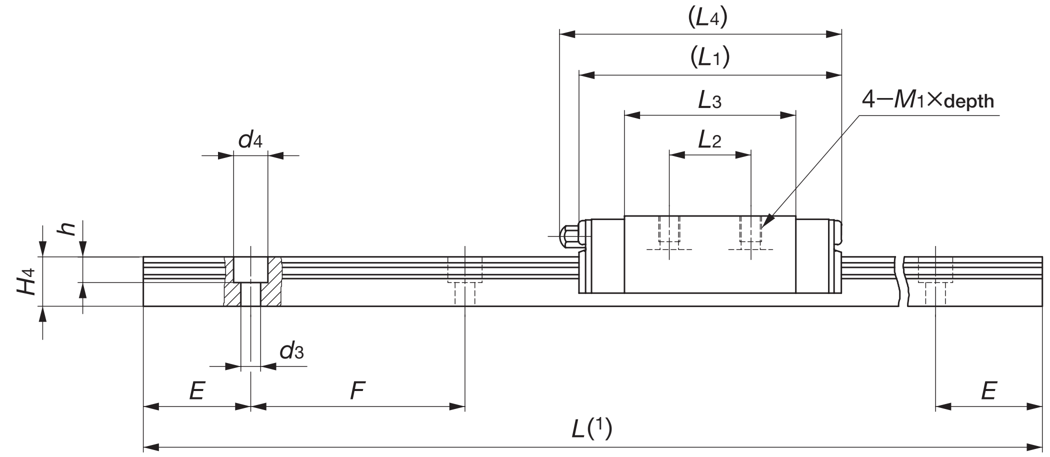
LWFS
LWFS···SL (Stainless steel made)



LWFS 33(···SL)
LWFS 37(···SL)

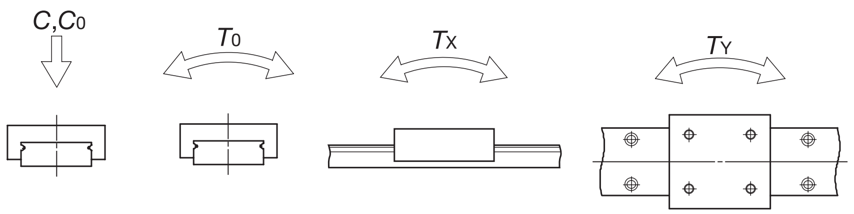


LWFS 42···SL



Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth	H_3	Dimensions of track rail mm W	H_4	W_5	W_6	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWFS 33	☆	0.13	2.41	17	2.5	8.5	50	29	10.5	53.5	15	35.3	56	M4×5	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
LWFS 33···SL	☆																													
LWFS 37	☆	0.20	3.05	21	3	8.5	54	31	11.5	62	19	40	66	M5×6	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
LWFS 37···SL	☆																													
LWFS 42···SL	☆	0.40	4.30	27	3	10	62	23	8	75	32	52.2	86	M6×6	6	42	14	24	9	4.6	8	6	30	60	M4×16	15 500	19 400	424	165 904	165 904

Note(1) : Track rail lengths are shown in Table 11.1 on page B-120 and Table 11.2 on page B-121.
(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.
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 97.



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

LWFS 37 C2 R800 SL T1 P S2 /U

- LWFS — Model code: LWFS
- 37 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R800 — Length of track rail (800 millimeters)
- SL — Material: High carbon steel made : No symbol; Stainless steel made : SL
- T1 — Preload amount: Standard : No symbol; Light preload : T1; Medium preload : T2
- P — Accuracy class: High : H; Precision : P; Super precision : SP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /U — Special specification: Under seals : /U

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

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.

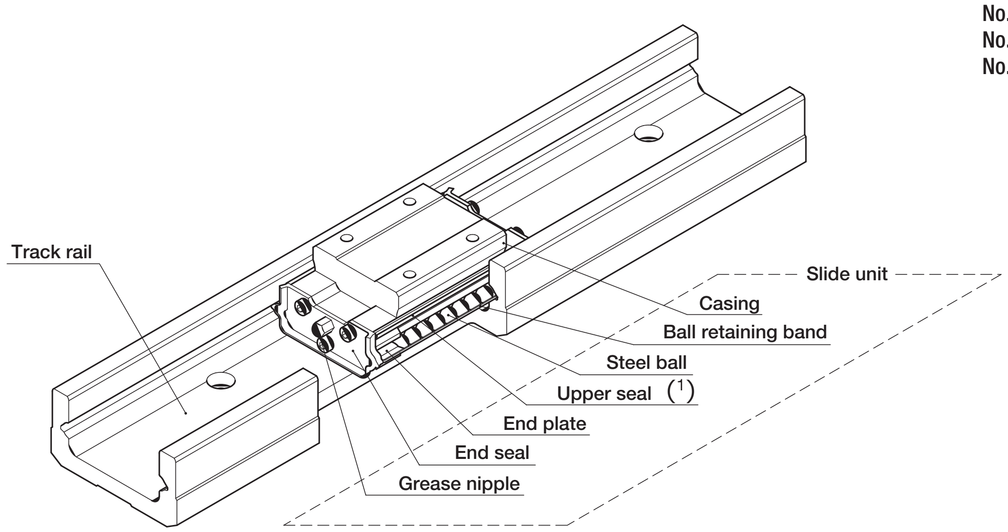
Ball retained type

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.

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.)

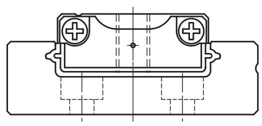
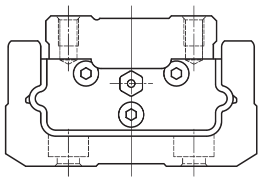
U.S. PATENT No. 6,309,107
No. 6,176,617
No. 6,082,899
No. 5,967,667



Note(1) : The miniature type with upper seals is a special specification product.

Structure of Linear Way U Ball Retained Type

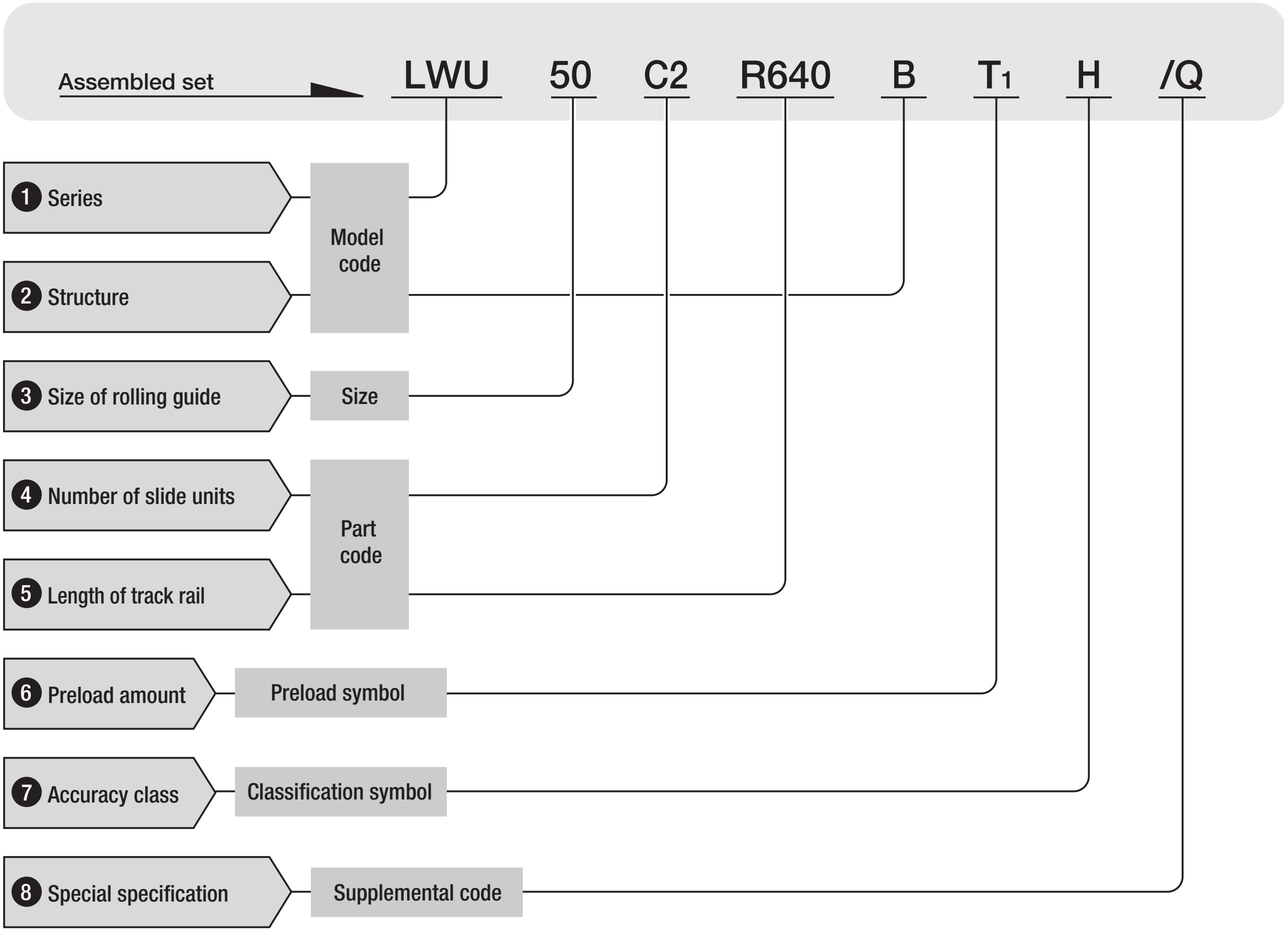
Linear Way U series

Linear Way U	Shape	Model code
	Miniature type 	LWUL···B
	Standard type 	LWU···B LWU

Remark : Models with "B" are ball retained type.

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 76.



1 Series

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

Table 1 Models and sizes of Linear Way U

Size \ Model	Miniature type	Standard type	
	Stainless steel made	High carbon steel made	
	Ball retained type LWUL…B	Ball retained type LWU…B	Ball non-retained type LWU
25	○	—	—
30	○	—	—
40	—	○	○
50	—	○	○
60	—	○	○
86	—	○	○
100	—	—	○
130	—	—	○

4 Number of slide units

: C○

Indicate the number of slide units assembled on one track rail.

5 Length of track rail

: R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-134.

6 Preload amount

Standard : No symbol
Light preload : T1

For details of preload amount, see page 84.

7 Accuracy class

Ordinary	: No symbol	For details of accuracy, see page 79.
High	: H	

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 page 86.

Table 2 Special specifications

Special specification	Supplemental code	Dimension
Specified rail mounting hole positions (1)	E	
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

	E	L	MA	MN	Q	U
L	○					
MA	○	○				
MN	○	○	—			
Q	—	○	○	○		
U	○	○	○	○	—	
W	—	○	○	○	○	○

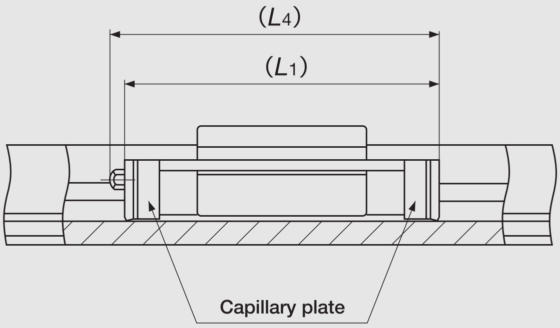
Remark : When several special specifications are required, arrange the supplemental codes alphabetically.

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)

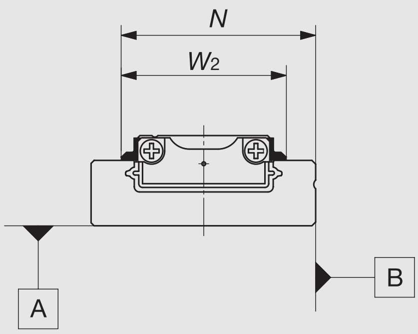


unit : mm

Model number	L_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

Track rail length

Standard and maximum lengths of track rails are shown in Table 7.

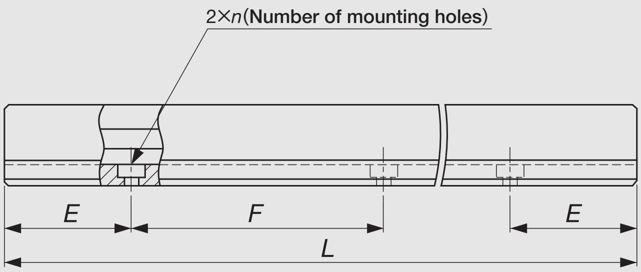
For miniature type, track rails in any length are also available. Simply indicate the necessary length of track rail in mm in the identification number. For the tolerances of *E* dimension and track rail length, consult IKO for further information.

- *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 89.

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 IKO for further information.

Table 7 Standard and maximum lengths of track rails



unit : mm

Item \ Model 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	—	—
	under	22	24.5	—	—
Maximum length[1]		420 (840)	480 (960)	720	800

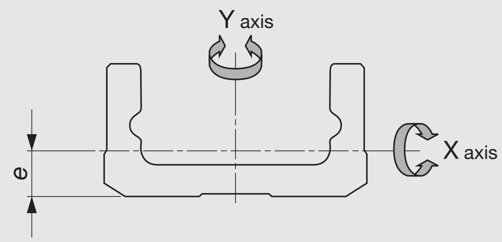
Item \ Model number	LWU 60…B LWU 60	LWU 86…B LWU 86	LWU 100	LWU 130
Standard length *L* (*n*)	300(3) 400(4) 500(5) 600(6) 700(7) 800(8)	300(3) 400(4) 500(5) 600(6) 700(7) 800(8)	450(3) 600(4) 750(5) 900(6) 1 050(7) 1 200(8)	450(3) 600(4) 750(5) 900(6) 1 050(7) 1 200(8)
Pitch of mounting holes *F*	100	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

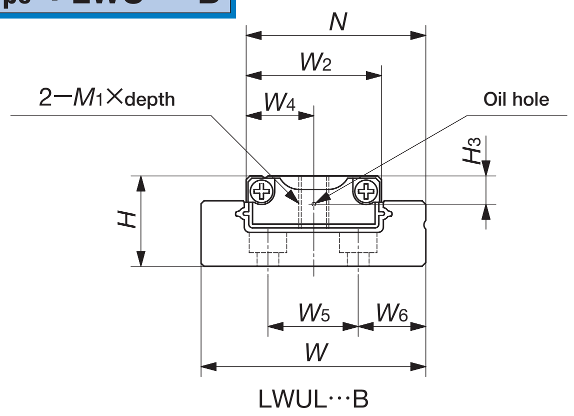
Table 8 shows the moment of inertia of sectional area of track rails.

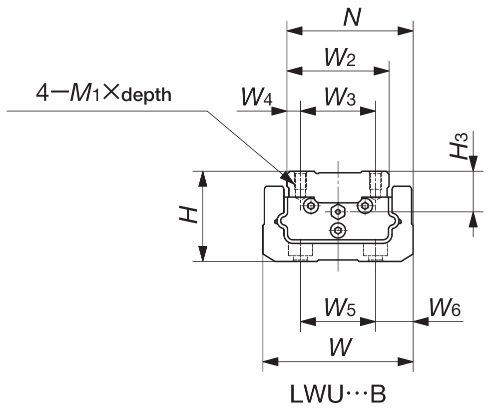
Table 8 Moment of inertia of sectional area of track rails

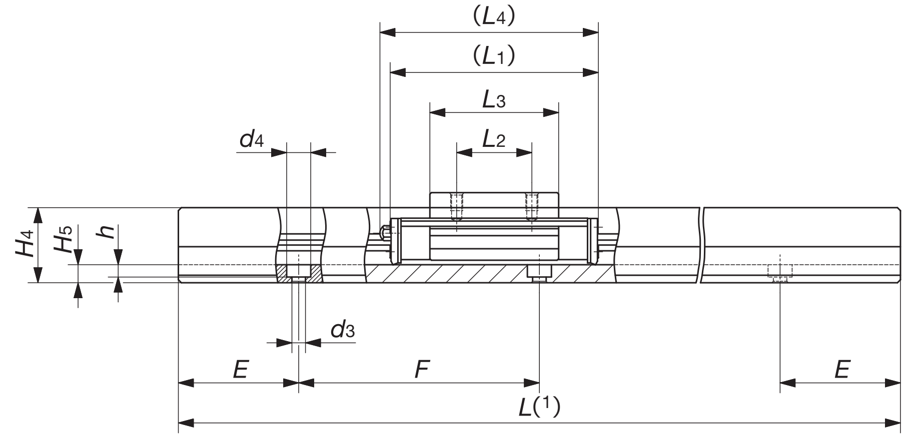


Model number	Moment of inertia of sectional area mm^4		Center of gravity *e* mm
	I_X	I_Y	
LWUL 25…B	3.7×10^2	7.5×10^3	2.6
LWUL 30…B	9.3×10^2	1.7×10^4	3.3
LWU 40…B	1.0×10^4	6.8×10^4	6.6
LWU 40		6.9×10^4	
LWU 50…B	2.8×10^4	1.7×10^5	8.7
LWU 50			
LWU 60…B	6.3×10^4	3.9×10^5	10.7
LWU 60			10.8
LWU 86…B	2.4×10^5	1.6×10^6	14.6
LWU 86			
LWU 100	5.9×10^5	3.3×10^6	18.8
LWU 130	1.4×10^6	8.8×10^6	23.0

Ball retained type
Miniature type : LWUL…B
Standard type : LWU …B

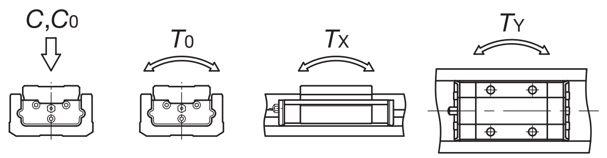






Model number	Mass (Ref.) Slide unit kg	Track rail kg/m	Dimensions of assembly mm H	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth	H_3
LWUL 25…B	0.013	0.87	9	19.4	14	—	7	31	12	22	—	M3× 5	2.9
LWUL 30…B	0.029	1.39	12	23.9	18	—	9	38	14	28.6	—	M4× 7	3.75
LWU 40…B	0.12	2.65	24	33	26	18	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-134.
(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.
Remark 1 : For grease nipple and oil hole specifications, see page 97.
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 86. Hexagon socket head cap bolts of JIS B 1176 in strength division 12.9 are recommended. Please see Table 4 on page B-132.



Dimensions of track rail mm W	H_4	H_5	W_5	W_6	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_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

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

LWU 50 C2 R640 B T1 H /Q

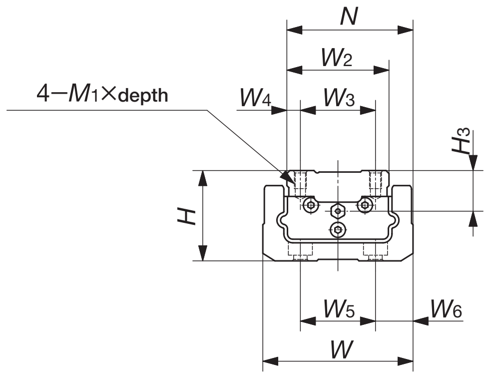
- Model code: LWUL…B, LWU …B
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (640 millimeters)
- Preload amount: Standard : No symbol; Light preload : T1
- Accuracy class: Ordinary : No symbol; High : H
- Special specification: Capillary plates : /Q

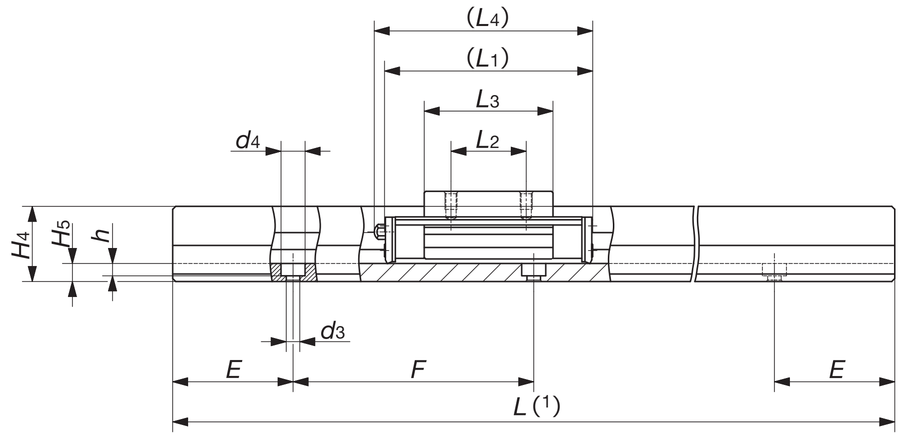
B

LWU…B, LWU

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

Ball non-retained type
Standard type : LWU

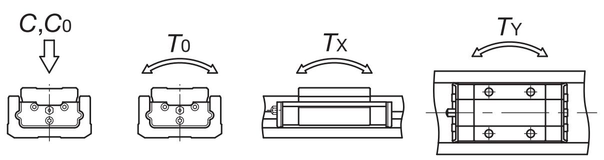




Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth	H_3	W
LWU 40	0.12	2.66	24	33	26	18	4	55	18	31.5	59	M 3× 5	10.5	40
LWU 50	0.27	4.08	30	42	34	25	4.5	70	25	42.8	73	M 4× 6	13.5	50
LWU 60	0.40	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

Model number	Dimensions of track rail mm H_4	H_5	W_5	W_6	d_3	d_4	h	E	F	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LWU 40	19	5	18	11	3.4	6.5	3.1	30	60	8 410	9 780	134	53.0 351	53.0 351
LWU 50	25	6	25	12.5	4.5	8	4.1	40	80	13 500	15 800	280	114 711	114 711
LWU 60	30	8	28	16	5.5	9.5	5.4	50	100	18 800	21 600	425	181 1 150	181 1 150
LWU 86	42	13	46	20	7	11	7	50	100	41 400	51 500	1 470	764 4 120	764 4 120
LWU 100	52	17	50	24.5	9	14	9	75	150	54 600	68 500	2 230	1 210 6 460	1 210 6 460
LWU 130	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

Note(1) : Track rail lengths are shown in Table 7 on page B-134.
(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.
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-132.
2 : For grease nipple specifications, see page 97.



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

LWU 50 C2 R640 T1 H /Q

- LWU — Model code: LWU
- 50 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R640 — Length of track rail (640 millimeters)
- T1 — Preload amount: Standard : No symbol; Light preload : T1
- H — Accuracy class: Ordinary : No symbol; High : H
- /Q — Special specification: Capillary plates : /Q

B

LWU…B, LWU

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

U.S. PATENTED

Linear Way Module

LWLM／LWM／LRWM

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 LM

As stainless steel components are used, Linear Way 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 equipment.

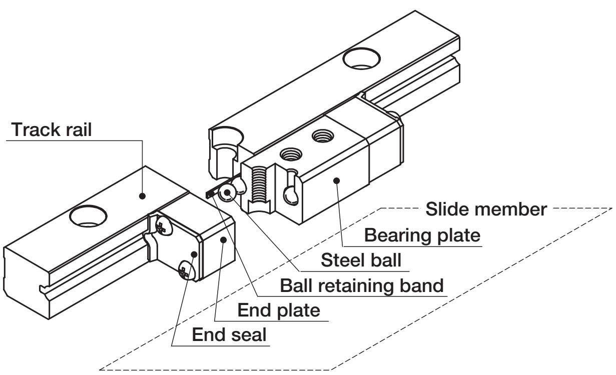
Linear Roller Way M

High rigidity cylindrical rollers are alternately crossed at right angles to each other. This product is suitable for applications with heavy loads and shock loads.

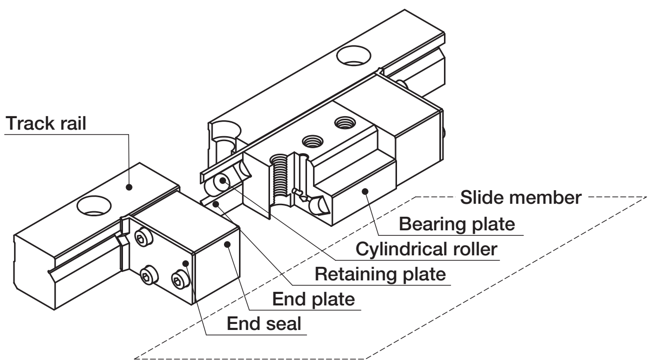
Linear Way M

Linear Way M is a standard type, incorporating steel balls as rolling elements.

U.S. PATENT No. 4,505,522
No. 4,688,950
No. 4,504,097



Structure of Linear Way M



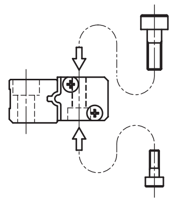
Structure of Linear Roller Way M

Linear Way Module series

Shape	Model code

Linear Way Module

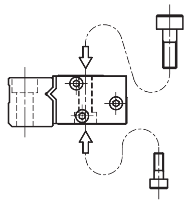
Linear Way LM
Linear Way M



LWLM

LWM

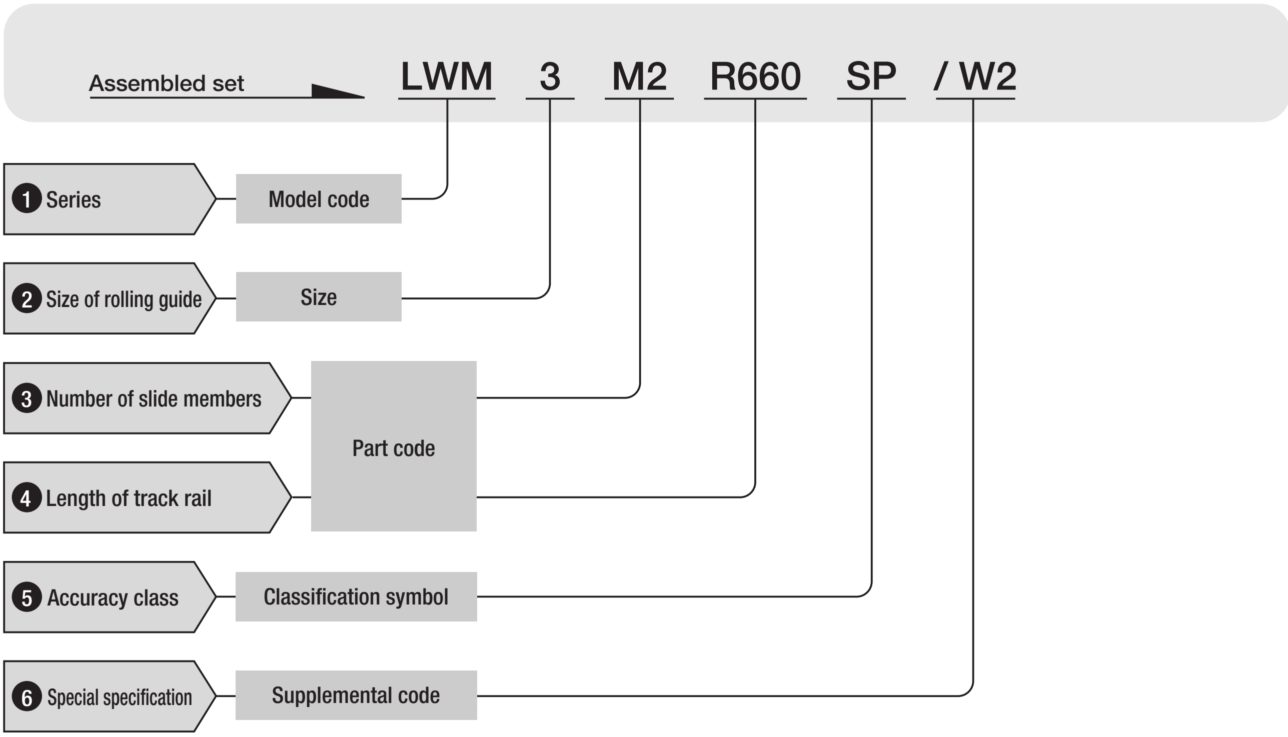
Linear Roller Way M



LRWM

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 76.



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.

1 Series	Linear Way LM : LWLM Linear Way M : LWM Linear Roller Way M : LRWM	
2 Size of rolling guide		See the table of dimensions of each series.
3 Number of slide members	: M○	Indicate the number of slide members assembled on one track rail.
4 Length of track rail	: R○	Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page B-145.
5 Accuracy class	High : H Precision : P Super precision : SP	For details of accuracy, see page 79.
6 Special specification		For applicable special specifications, see Table 1. When several special specifications are combined, see Table 2. For details of special specifications, see page 86.

Table 1 Special specifications

Special specification	Supplemental code	Linear Way LM	Linear Way M	Linear Roller Way M
Butt-jointing track rail	A	—	○	○
Specified rail mounting hole positions	E	○	○	○
Caps for rail mounting holes	F	—	○	○
Inspection sheet	I	○	○	○
Black chrome surface treatment	LR	—	○	○
Fluorine black chrome surface treatment	LFR	—	○	○
Supplied without track rail mounting bolt	MN	○	○ (1)	○ (1)
Matched sets to be used as an assembled group	W	○	○	○
Specified grease	Y	○	○	○

Table 2 Combination of special specifications

	A	E	F	I	LR	LFR	MN	W
E	—							
F	○	○						
I	○	○	○					
LR	○	○	○	○				
LFR	○	○	○	○	—			
MN	○	○	○	○	○	○		
W	○	—	○	○	○	○	○	
Y	○	○	○	○	○	○	○	○

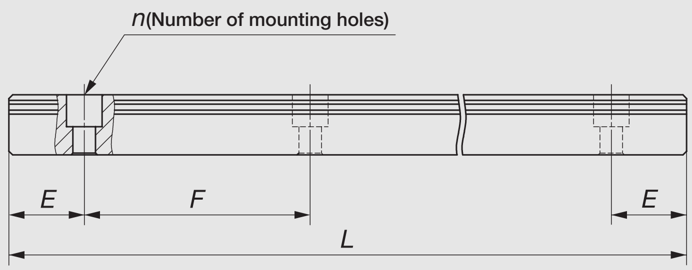
Remark 1 : In the table, the mark – indicates that this combination cannot be made.
2 : When several special specifications are required, arrange the supplemental codes alphabetically.

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 IKO for further information.

- For track rails of Linear Way M or Linear Roller Way 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 89.

Table 3 Standard and maximum lengths of track rails



unit : mm

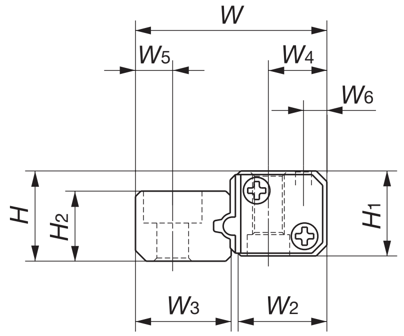
Item \ Model number	LWLM 7	LWLM 9	LWLM 11
Standard length *L* (*n*)	60(3) 80(4) 120(6) 160(8)	100(4) 150(6) 200(8) 275(11)	160(4) 240(6) 320(8) 440(11)
Pitch of mounting holes *F*	20	25	40
E	10	12.5	20
Standard range of *E* incl.	4.5	5	5.5
Standard range of *E* under	14.5	17.5	25.5
Maximum length[1]	240 (500)	350 (900)	520 (1 000)

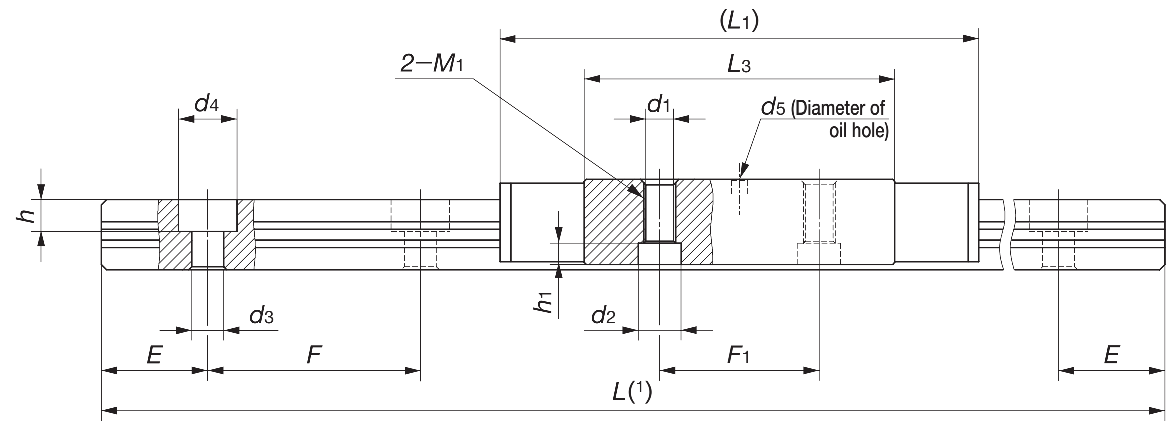
Item \ Model number	LWM 1	LWM 2	LWM 3	LWM 4	LWM 5	LWM 6
Standard length *L* (*n*)	240(6) 360(9) 480(12)	240(4) 360(6) 480(8)	480(8) 660(11) 840(14)	800(10) 1 040(13) 1 200(15)	800(8) 1 200(12) 1 500(15)	1 200(10) 1 920(16) 2 520(21)
Pitch of mounting holes *F*	40	60	60	80	100	120
E	20	30	30	40	50	60
Standard range of *E* incl.	7	8	9	10	12	13
Standard range of *E* under	27	38	39	50	62	73
Maximum length	1 240	1 260	1 260	1 520	1 500	2 520

Item \ Model number	LRWM 2	LRWM 3	LRWM 4	LRWM 5	LRWM 6
Standard length *L* (*n*)	480(8) 660(11) 840(14)	480(8) 660(11) 840(14)	800(10) 1 040(13) 1 200(15)	800(8) 1 200(12) 1 500(15)	1 200(10)
Pitch of mounting holes *F*	60	60	80	100	120
E	30	30	40	50	60
Standard range of *E* incl.	8	9	10	12	13
Standard range of *E* under	38	39	50	62	73
Maximum length	1 800	1 860	1 920	1 600	1 200

Note([1]) : Track rails with the maximum lengths shown in parentheses can also be manufactured for LWLM. Consult IKO for further information.

Linear Way LM
LWLM (Stainless steel made)

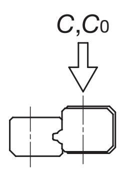




Model number	Mass (Ref.) Slide member g	Mass (Ref.) Track rail g/m	Dimensions of assembly mm H	W	Dimensions of slide member mm H_1	W_2	W_4	W_6	L_1	L_3	F_1	d_1	d_2	h_1	M_1	d_5
LWLM 7	10	210	7	15	6.6	7.8	5	2.5	38	24	12	—	—	—	M2.6	1
LWLM 9	16	390	8.5	18	8	8.6	5.5	2.2	45	29.2	15	—	—	—	M3	1.5
LWLM 11	32	590	11	23	10	11.8	7	3	52	32.8	15	2.55	5	3	M3	2

Model number	Dimensions of track rail mm H_2	W_3	W_5	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N
LWLM 7	4.8	6.8	3.3	3(3)	—(3)	—(3)	10	20	M 2.6× 8(3)	1 730	2 020
LWLM 9	6.6	9	3.5	3	5.5	3	12.5	25	M 2.6× 8	2 780	3 150
LWLM 11	8	10.8	5	3.5	6	4.5	20	40	M 3 × 8	4 080	4 240

Note(1) : Track rail lengths are shown in Table 3 on page B-145.
(2) : The directions of basic dynamic load rating (C) and basic static load rating (C_0) 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.



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

LWLM 9 M2 R200 P / W2

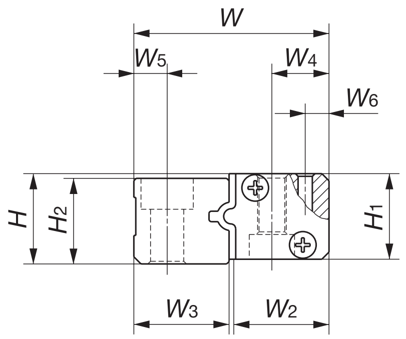
- LWLM — Model code: LWLM
- 9 — Size of rolling guide
- M2 — Number of slide members (Two slide members)
- R200 — Length of track rail (200 millimeters)
- P — Accuracy class: High : H, Precision : P, Super precision : SP
- / W2 — Special specification: Matched two sets

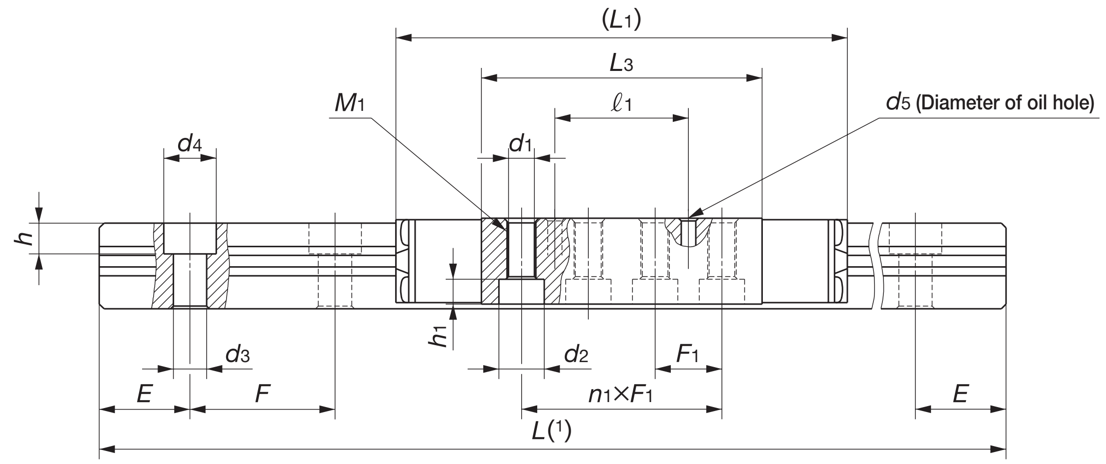
B

LWLM, LWM, LRWM

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

Linear Way M
LWM

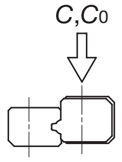




Model number	Mass (Ref.)		Dimensions of assembly mm		Dimensions of slide member mm									
	Slide member g	Track rail g/m	H	W	H_1	W_2	W_4	W_6	L_1	L_3	$n_1 \times F_1$	d_1	d_2	h_1
LWM 1	0.07	1.20	14	28	13	14.6	9	4	65	41.2	2×13	3.4	6.5	3.1
LWM 2	0.11	1.93	17	35	16	17	10	4	75	47.2	2×15	4.4	8	4.1
LWM 3	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

			Mounting bolt for slide member mm	Dimensions of track rail mm								Mounting bolt for track rail mm	Basic dynamic load rating(2)	Basic static load rating(2)
M_1	ℓ_1	d_5	Bolt size x length	H_2	W_3	W_5	d_3	d_4	h	E	F	Bolt size x length	C N	C_0 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

Note(1) : Track rail lengths are shown in Table 3 on page B-145.
(2) : The directions of basic dynamic load rating (C) and basic static load rating (C_0) 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.



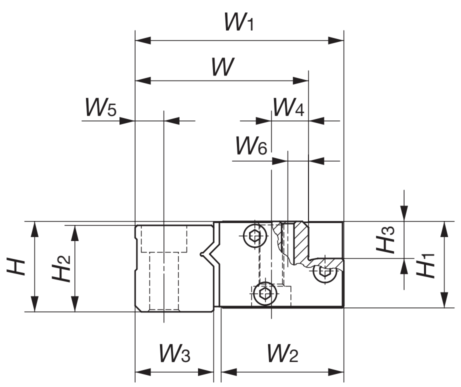
Example of identification number
(For details, see "Identification number and specification".)

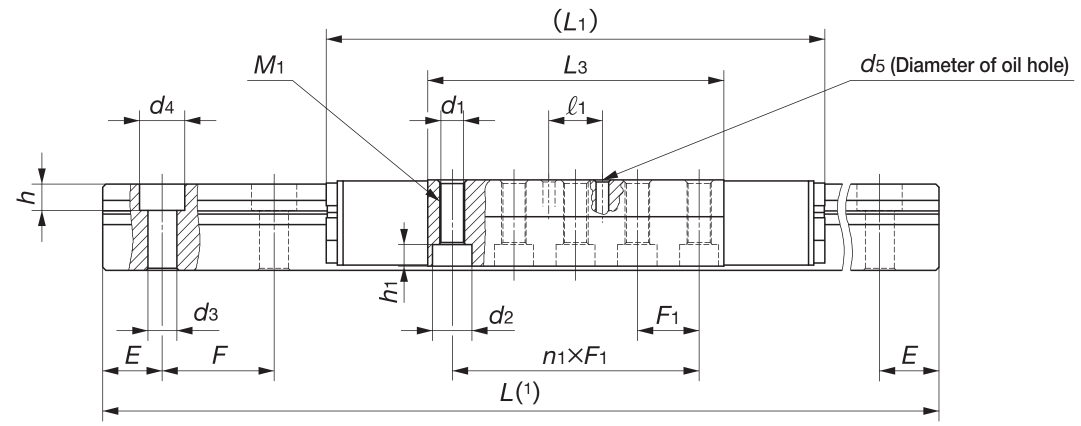
LWM 3 M2 R660 P / W2

- LWM — Model code: LWM
- 3 — Size of rolling guide
- M2 — Number of slide members (Two slide members)
- R660 — Length of track rail (660 millimeters)
- P — Accuracy class: High : H, Precision : P, Super precision : SP
- / W2 — Special specification: Matched two sets

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

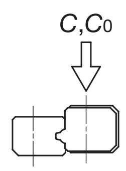
Linear Roller Way M
LRWM





Model number	Mass (Ref.) Slide member kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	W	W_1	Dimensions of slide member mm H_1	H_3	W_2	W_4	L_1	L_3	$n \times F_1$	M_1	d_1	d_2	h_1
LRWM 2	0.26	1.98	19	33	39.6	18	7.5	22.9	8	105	63	4×12	M 5	4.4	8	4.1
LRWM 3	0.46	2.92	22	42	50.6	21	9	29.8	9	122	72	4×15	M 6	5.4	9.5	5.2
LRWM 4	0.98	4.64	28	56	65.6	27	11	39.4	13	158	96	5×16	M 8	6.8	11	6.2
LRWM 5	2.03	6.85	33	70	81.6	32	13	49.1	16	212	140	5×24	M10	8.6	14	8.2
LRWM 6	3.42	9.25	38	83	96.6	37	15	58.6	21	256	168	6×25	M10	8.6	14	8.2

Note(1) **:** Track rail lengths are shown in Table 3 on page B-145.
(2) **:** The directions of basic dynamic load rating (C) and basic static load rating (C_0) 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.



W_6	ℓ_1	d_5	Mounting bolt for slide member mm Bolt size x length	Dimensions of track rail mm H_2	W_3	W_5	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N
4	10	3	M4×20	18	15	6	6	9.5	5.4	30	60	M 5×20	9 700	10 800
5	13	3	M5×25	21	19	7	7	11	6.5	30	60	M 6×25	18 500	20 300
6	—	3	M6×32	27	24	9	9	14	8.6	40	80	M 8×32	36 500	39 800
7	—	3	M8×35	32	30	12	11	17.5	10.8	50	100	M10×35	67 900	75 500
8	28	3	M8×40	37	35	14	14	20	13	60	120	M12×40	99 800	109 000

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

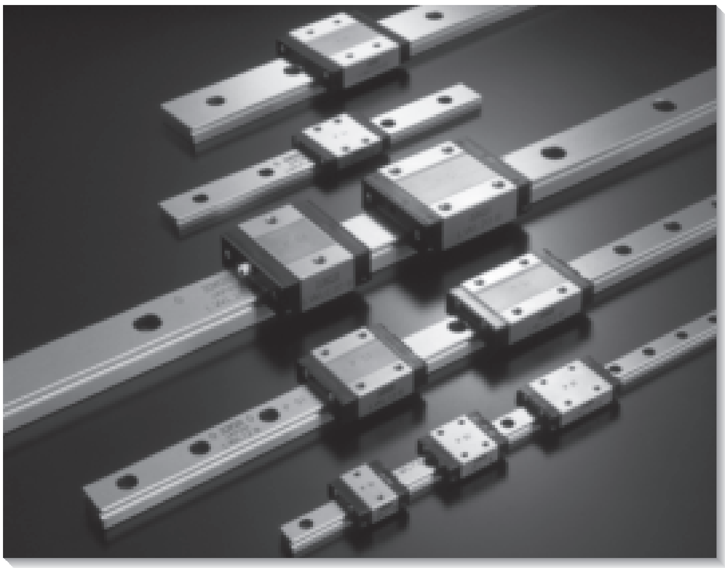
LRWM 3 M2 R660 P / W2

- LRWM — Model code: LRWM
- 3 — Size of rolling guide
- M2 — Number of slide members (Two slide members)
- R660 — Length of track rail (660 millimeters)
- P — Accuracy class: High : H, Precision : P, Super precision : SP
- / W2 — Special specification: Matched two sets

B

LWLM, LWM, LRWM

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



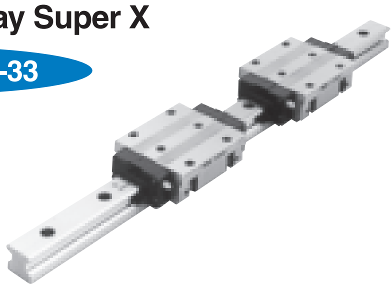
Linear Roller Ways

Description of each series and Table of dimensions

C

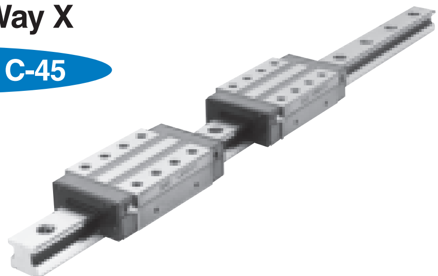
Linear Roller Way Super X

Page C-2 to C-33



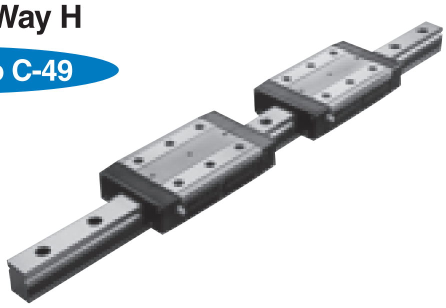
Linear Roller Way X

Page C-34 to C-45



Linear Roller Way H

Page C-46 to C-49



In the table of dimensions, standard products are referred to using identification numbers marked with [shaded box]. The identification numbers marked with [white box] 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.

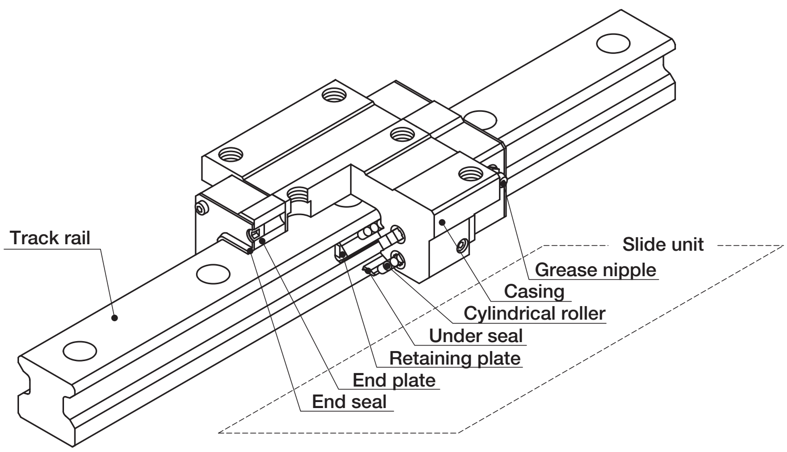
Dimensional interchangeability with the ball type

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.

U.S. PATENT No. 6,176,617
No. 5,967,667
No. 5,800,064
No. 5,193,914
No. 4,505,522



Structure of Linear Roller Way Super X

Linear roller Way Super X series

Linear Roller Way Super X

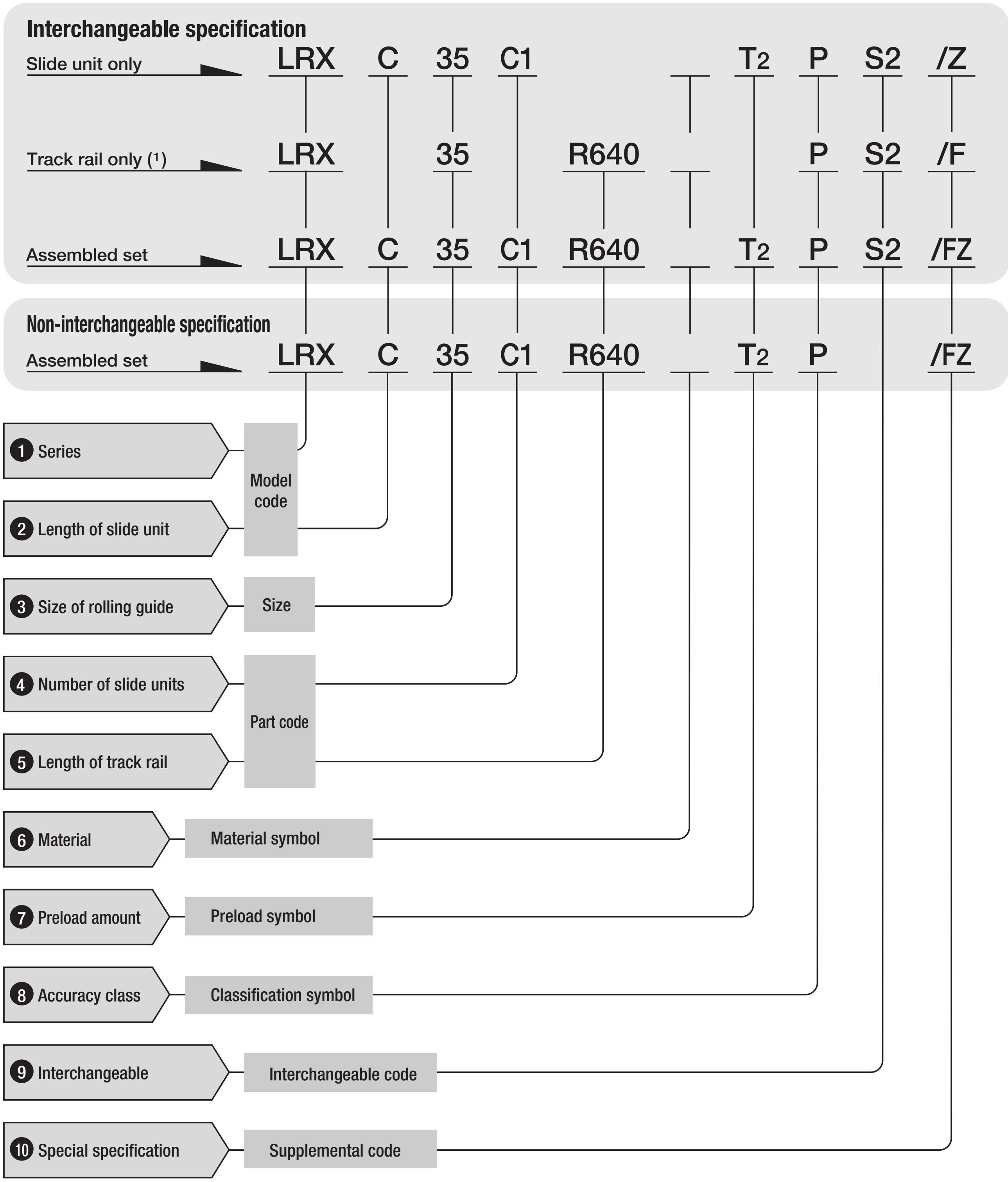
Shape	Length of slide unit	Model code
Flange type mounted from top/bottom (1)	Short	LRXC (1)
	Standard	LRX (1)
	High rigidity long	LRXG (1)
Block type mounted from top	Short	LRXDC LRXDC···SL
	Standard	LRXD LRXD···SL
	High rigidity long	LRXDG LRXDG···SL
Compact block type mounted from top	Short	LRXSC
	Standard	LRXS
	High rigidity long	LRXSG

Note(1) : LRXC20, LRX20 and LRXG20 can be mounted from upper side only. For mounting from bottom, LRXHC20, LRXH20 and LRXHG20 can be used, which have the same dimensions as those of the above models.

Remark : Models with "SL" are stainless steel type.

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 76.



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.

1 Series	Flange type mounted from top/bottom : LRX Block type mounted from top : LRXD Compact block type mounting from top : LRXS	
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 and 1.3.
3 Size of rolling guide		
4 Number of slide units	Assembled set : C○ Slide unit : 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	Assembled set : R○ Track rail : R○	Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page C-18.
6 Material	High carbon steel made : No symbol Stainless steel made : SL	For available material types, see Tables 1.1, 1.2 and 1.3.

Table 1.1 Models and sizes of Linear Roller Way Super X flange type

Model / Size	High carbon steel made		
	Short LRXC	Standard LRX	High rigidity long LRXG
12	☆	☆	☆
15	☆	☆	☆
20 (1)	☆	☆	☆
25	☆	☆	☆
30	☆	☆	☆
35	☆	☆	☆
45	☆	☆	☆
55	☆	☆	☆
65	☆	☆	☆
85	—	○	○
100	—	—	○

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 ☆ indicates that interchangeable specification products are available.

Table 1.2 Models and sizes of Linear Roller Way Super X block type

Size \ Model	High carbon steel made			Stainless steel made		
	Short LRXDC	Standard LRXD	High rigidity long LRXDG	Short LRXDC…SL	Standard LRXD…SL	High rigidity long LRXDG…SL
12	☆	☆	☆	☆	☆	☆
15	☆	☆	☆	☆	☆	☆
20	☆	☆	☆	☆	☆	☆
25	☆	☆	☆	☆	☆	☆
30	☆	☆	☆	☆	☆	☆
35	☆	☆	☆	—	—	—
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

Size \ Model	High carbon steel made		
	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 : T_1
Medium preload : T_2
Heavy preload : T_3

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 84.

Table 2 Applicable preload types

Size	Preload type (Symbol)			
	Standard (No symbol)	Light preload (T_1)	Medium preload (T_2)	Heavy preload (T_3)
12	☆	☆	○	○
15	☆	☆	☆	○
20	☆	☆	☆	○
25	○	☆	☆	○
30	○	☆	☆	○
35	○	○	☆	☆
45	○	○	☆	☆
55	○	○	☆	☆
65	○	○	☆	☆
85	○	○	○	○
100	○	○	○	○

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

8 Accuracy class

High	: H
Precision	: P
Super precision	: SP
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 79.

Table 3 Applicable accuracy class

Size	Accuracy(Symbol)			
	High (H)	Precision (P)	Super precision (SP)	Ultra precision (UP)
12	☆	☆	○	○
15	☆	☆	○	○
20	☆	☆	○	○
25	☆	☆	○	○
30	☆	☆	○	○
35	☆	☆	○	○
45	☆	☆	○	○
55	☆	☆	○	○
65	☆	☆	○	○
85	○	○	○	○
100	○	○	○	○

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 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 4. When several special specifications are combined, see Table 5. For details of special specifications, see page 86.

Table 4 Special specifications

Special specification	Supplemental code	Assembled set	Track rail only	Slide unit only	Dimension
Butt-jointing track rail	A	○	—	—	
Opposite reference surfaces arrangement	D	☆	—	—	
Specified rail mounting hole positions	E	☆	☆	—	
Caps for rail mounting holes	F	☆	☆	—	
Changed pitch of slide unit middle mounting holes	GE	☆ (1)(2)(3)	—	☆ (1)(2)	See Table 6.
Half pitch of track rail mounting holes	HP	☆ (4)	☆	—	
Inspection sheet	I	○	—	—	
Female threads for bellows	J	☆ (2)(4)(5)	☆ (2)(5)	☆ (2)(5)	See Tables 7.1, 7.2, 7.3 and 7.4.
Black chrome surface treatment	L	☆ (3)(4)	—	—	
Fluorine black chrome surface treatment	LF	☆ (3)(4)	—	—	
Supplied without track rail mounting bolt	MN	☆	☆	—	
No end seal	N	☆ (6)	—	☆ (6)	
Rail cover plate for track rail	PS	○ (7)	—	—	
Capillary plate	Q	☆ (4)	—	☆	See Table 8.1 and 8.2.
Butt-jointing interchangeable track rail	T	☆ (8)	☆	—	
Double end seals	V	☆	—	☆	See Tables 9.1 and 9.2.
Matched sets to be used as an assembled group	W	○ (3)(4)	—	—	
Specified grease	Y	☆	—	—	
Scrapers	Z	☆	—	☆	See Table 10.1 and 10.2.

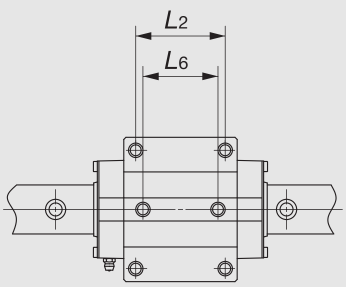
Note(1) : Applicable to flange types.(LRX, LRXG, LRXH, LRXHG)
(2) **:** Not applicable to size 12 models.
(3) **:** Not applicable to size 85 models.
(4) **:** Not applicable to size 100 models.
(5) **:** Not applicable to stainless steel made interchangeable specification products.
(6) **:** Not applicable to size 55, 65 and 100 models.
(7) **:** Applicable to size 35, 45 and 55 models.
(8) **:** Not applicable to non-interchangeable specification products.
Remark : In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

Table 5 Combination of special specifications

	A	D	E	F	GE	HP	I	J	L	LF	MN	N	PS	Q	T	V	W	Y
D	○																	
E	—	—																
F	○	☆	☆															
GE	○	☆	☆	☆														
HP	—	☆	—	☆	☆													
I	○	○	○	○	○	○												
J	○	☆	☆	☆	☆	—	○											
L	○	☆	☆	☆	☆	☆	○	☆										
LF	○	☆	☆	☆	☆	☆	○	☆	—									
MN	○	☆	☆	☆	☆	☆	○	☆	☆	☆								
N	○	☆	☆	—	☆	☆	○	—	☆	☆	☆							
PS	—	○	○	—	○	○	○	○	—	—	○	—						
Q	○	☆	☆	☆	☆	☆	○	—	☆	☆	☆	☆	○					
T	—	☆	☆	☆	☆	☆	—	—	☆	☆	☆	☆	—	☆				
V	○	☆	☆	☆	☆	☆	○	★	☆	☆	☆	—	○	—	☆			
W	○	○	—	○	○	○	○	○	○	○	○	○	○	○	—	○		
Y	○	☆	☆	☆	☆	☆	○	☆	☆	☆	☆	☆	○	—	☆	☆	○	
Z	○	☆	☆	☆	☆	☆	○	★	☆	☆	☆	—	—	—	☆	★	○	☆

Remarks 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 : For combinations marked ★, consult IKO for further information.
4 : When several special specifications are required, arrange the supplemental codes alphabetically.

Table 6 Pitch of slide unit middle mounting holes (Supplemental code /GE)

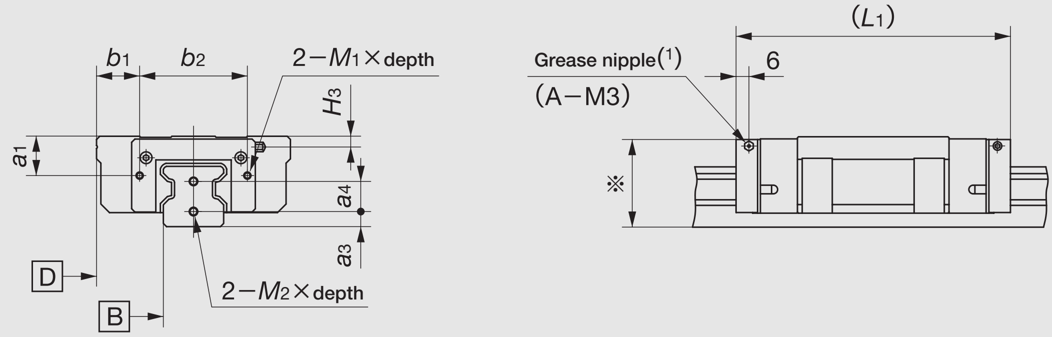


unit : mm

Model number	L_2	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 bottom.

Table 7.1 Female threads for bellows for flange type slide unit (Supplemental code /J, /JJ)
Size : 15, 20, 25, 30

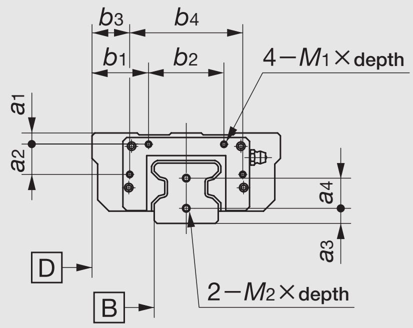


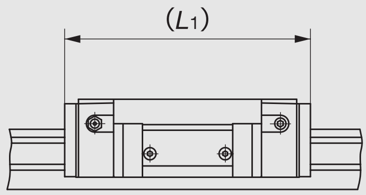
unit : mm

Model number	Slide unit						Track rail		
	a_1	b_1	b_2	M_1×depth	L_1 (2)	H_3	a_3	a_4	M_2×depth
LRXC 15					67				
LRX 15	10.5	10.5	26		83	1	4	8	M3×6
LRXG 15					99				
LRXC 20 (3)					81				
LRX 20 (3)	12	13.5	36		101	2	5	10	
LRXG 20 (3)					121				
LRXC 25				M3×6	89				
LRX 25	15.5	15	40		113	4	6	12	M4×8
LRXG 25					128				
LRXC 30					100				
LRX 30	18.5	20	50		128	4.8	7	14	
LRXG 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 page 97.
(2) : The values for a slide unit with female threads for bellows at both ends are shown.
(3) : Also applicable to LRXHC 20, LRXH 20 and LRXHG 20 that are mounted from bottom.
Remark : For the size 15 and 20 models, the dimension indicated by an asterisk (※) is higher than the *H* dimension of Linear Roller Way Super X. For details, consult IKO for further information.

Table 7.2 Female threads for bellows for flange type slide unit (Supplemental code /J, /JJ)
Size : 35, 45, 55, 65, 85



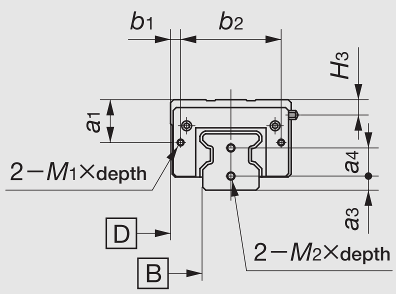


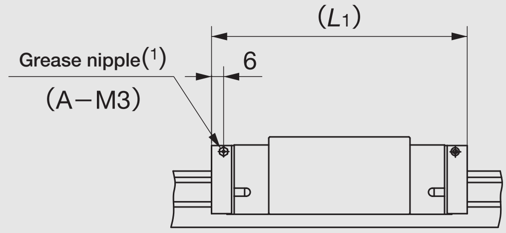
unit : mm

Model number	Slide unit								Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(1)	a_3	a_4	M_2×depth
LRXC 35								99			
LRX 35	6	16	30	40	20	60	M3× 6	131	8	16	M4× 8
LRXG 35								159			
LRXC 45								123			
LRX 45	7	21	35	50	23	74	M4× 8	163	10	19	M5×10
LRXG 45								203			
LRXC 55								145			
LRX 55	7	27	40	60	26	88		193		24	
LRXG 55								247			
LRXC 65								192			
LRX 65	8.7	37	47.5	75	31	108	M5×10	256	14	28	M6×12
LRXG 65								320			
LRX 85	15	45	62.5	90	37.5	140	M6×10	334	14.5	38	
LRXG 85								406			

Note(1) : The values for a slide unit with female threads for bellows at both ends are shown.

Table 7.3 Female threads for bellows for block type slide unit (Supplemental code /J, /JJ)
Size : 15, 20, 25, 30



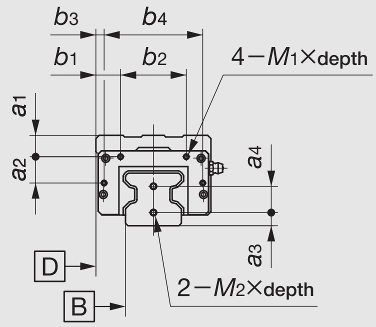


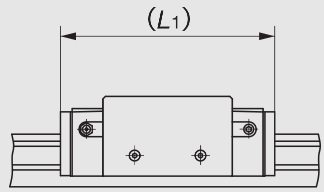
unit : mm

Model number	Slide unit						Track rail		
	a_1	b_1	b_2	M_1×depth	L_1 (2)	H_3	a_3	a_4	M_2×depth
LRXDC 15	14.5	4	26	M3×6	67	5	4	8	M3×6
LRXD 15					83				
LRXDG 15					99				
LRXDC 20	16	4	36		81	6	5	10	M4×8
LRXD 20					101				
LRXDG 20					121				
LRXDC 25	19.5	4	40		89	8	6	12	
LRXD 25					113				
LRXDG 25					128				
LRXDC 30	21.5	5	50		100	7.8	7	14	
LRXD 30					128				
LRXDG 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 page 97.
(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 7.4 Female threads for bellows for block type slide unit (Supplemental code /J, /JJ)
Size : 35, 45, 55, 65





unit : mm

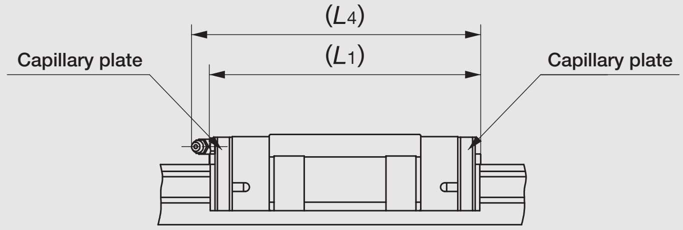
Model number	Slide unit								Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1 (1)	a_3	a_4	M_2×depth
LRXDC 35								99			
LRXD 35	13	16	15	40	5	60	M3× 6	131	8	16	M4× 8
LRXDG 35								159			
LRXDC 45								123			
LRXD 45	17	21	18	50	6	74		163		19	
LRXDG 45							M4× 8	203	10		M5×10
LRXDC 55								145			
LRXD 55	17	27	20	60	6	88		193		24	
LRXDG 55								247			
LRXDC 65								192			
LRXD 65	8.7	37	25.5	75	9	108	M5×10	256	14	28	M6×12
LRXDG 65								320			

Note(1) : The values for a slide unit with female threads for bellows at both ends are shown.

C

LRX, LRXD, LRXS

Table 8.1 Slide unit with capillary plates (Supplemental code /Q)
Size : 12, 15, 20, 25, 30



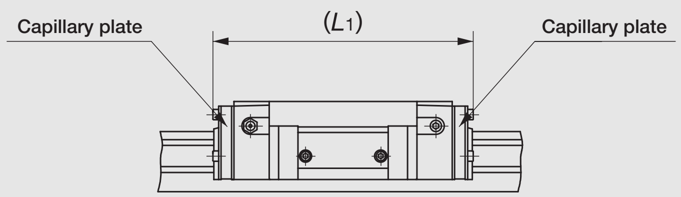
unit : mm

Model number	L_1	L_4
LRXC 12	47	50
LRX 12	57	60
LRXG 12	68	71
LRXC 15	63	64
LRX 15	79	80
LRXG 15	95	96
LRXC 20	76	85
LRX 20	96	105
LRXG 20	116	125

Model number	L_1	L_4
LRXC 25	85	94
LRX 25	109	118
LRXG 25	124	133
LRXC 30	96	108
LRX 30	124	136
LRXG 30	145	157

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

Table 8.2 Slide unit with capillary plates (Supplemental code /Q)
Size : 35, 45, 55, 65, 85



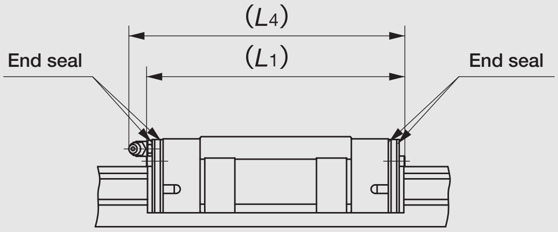
unit : mm

Model number	L_1
LRXC 35	103
LRX 35	135
LRXG 35	163
LRXC 45	127
LRX 45	167
LRXG 45	207
LRXC 55	149
LRX 55	197
LRXG 55	251

Model number	L_1
LRXC 65	198
LRX 65	262
LRXG 65	326
LRX 85	341
LRXG 85	413

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

Table 9.1 Slide unit with double end seals (Supplemental code /V, /VV)
Size : 12, 15, 20, 25, 30



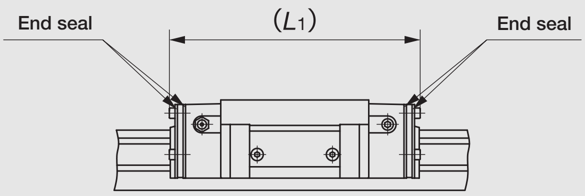
unit : mm

Model number	L_1	L_4
LRXC 12	44	46
LRX 12	54	57
LRXG 12	65	67
LRXC 15	58	60
LRX 15	74	76
LRXG 15	90	92
LRXC 20	73	83
LRX 20	93	103
LRXG 20	113	123

Model number	L_1	L_4
LRXC 25	83	92
LRX 25	107	116
LRXG 25	122	131
LRXC 30	93	106
LRX 30	121	134
LRXG 30	142	155

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 9.2 Slide unit with double end seals (Supplemental code /V, /VV)
Size : 35, 45, 55, 65, 85, 100



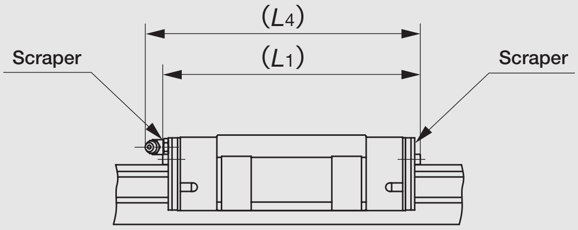
unit : mm

Model number	L_1
LRXC 35	101
LRX 35	133
LRXG 35	161
LRXC 45	127
LRX 45	167
LRXG 45	207
LRXC 55	149
LRX 55	197
LRXG 55	251

Model number	L_1
LRXC 65	193
LRX 65	257
LRXG 65	321
LRX 85	338
LRXG 85	410
LRXG 100	376

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 10.1 Slide unit with scrapers (Supplemental code /Z, / ZZ)
Size : 12, 15, 20, 25, 30



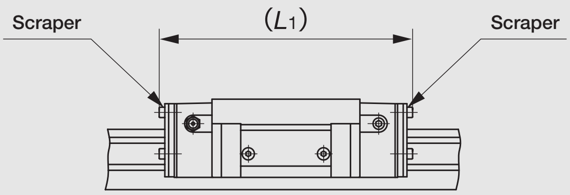
unit : mm

Model number	L_1	L_4
LRXC 12	45	48
LRX 12	56	58
LRXG 12	66	69
LRXC 15	60	61
LRX 15	76	77
LRXG 15	92	93
LRXC 20	75	84
LRX 20	95	104
LRXG 20	115	124

Model number	L_1	L_4
LRXC 25	85	93
LRX 25	109	117
LRXG 25	124	132
LRXC 30	96	107
LRX 30	124	135
LRXG 30	145	156

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.

Table 10.2 Slide unit with scrapers (Supplemental code /Z, / ZZ)
Size : 35, 45, 55, 65, 85, 100



unit : mm

Model number	L_1
LRXC 35	103
LRX 35	135
LRXG 35	163
LRXC 45	129
LRX 45	169
LRXG 45	209
LRXC 55	151
LRX 55	199
LRXG 55	253

Model number	L_1
LRXC 65	194
LRX 65	258
LRXG 65	322
LRX 85	339
LRXG 85	411
LRXG 100	378

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.

Mounting slide unit of Compact block type

For mounting slide unit of Compact block type, insertion depth shown in Table11 is recommended to keep certain fixing strength.

Table 11 Insertion depths for mounting Compact block type slide unit

unit : mm

Model number	Recommended screw-in depths
LRXS 15	4.5
LRXS 20	5.5
LRXS 25	7
LRXS 30	9

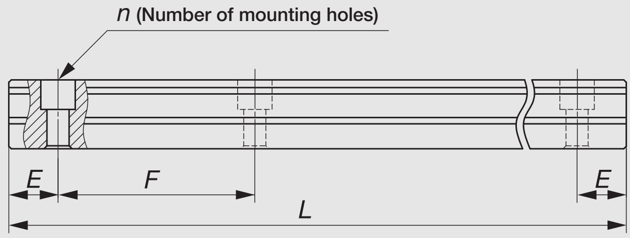
Remark : The table shows representative model number but is applicable to all models of the same size.

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 IKO 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 89.

Table 12.1 Standard and maximum lengths of high carbon steel track rails



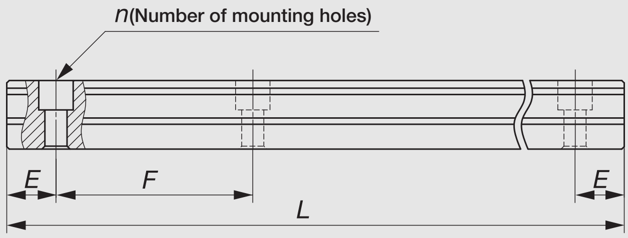
unit : mm

Item \ 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 *F*		40	60	60	60	80	80
E		20	30	30	30	40	40
Standard range of *E* (1)	incl.	5.5	7	8	9	10	10
	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)

Item \ 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 *F*		105	120	150	180	150
E		52.5	60	75	90	75
Standard range of *E* (1)	incl.	12.5	15	17	23	29
	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 IKO 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.

Table 12.2 Standard and maximum lengths of stainless steel track rails



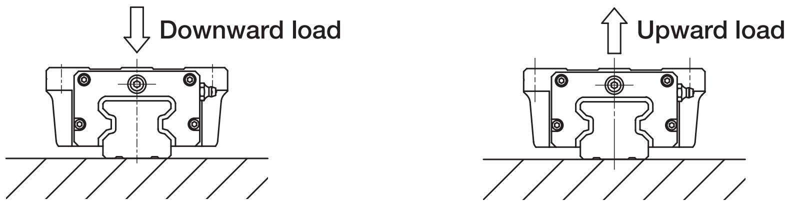
unit : mm

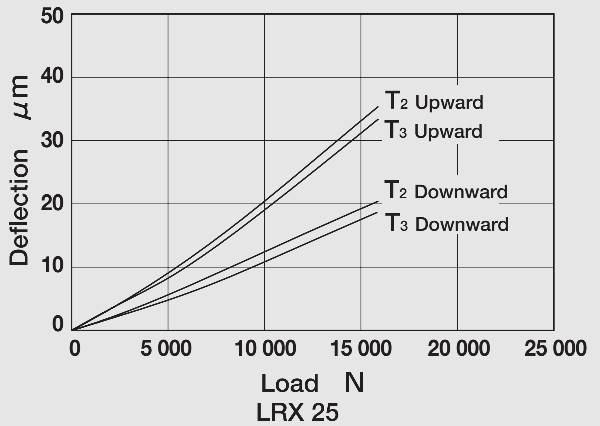
Item \ Model number		LRXD 12…SL	LRXD 15…SL	LRXD 20…SL	LRXD 25…SL	LRXD 30…SL
Standard length $L(n)$		80(2) 160(4) 240(6) 320(8) 400(10) 480(12) 560(14) 640(16) 720(18)	180(3) 240(4) 360(6) 480(8) 660(11)	240(4) 480(8) 660(11) 840(14)	240(4) 480(8) 660(11) 840(14)	480(6) 640(8) 800(10) 1 040(13)
Pitch of mounting holes F		40	60	60	60	80
E		20	30	30	30	40
Standard range of E (1)	incl.	5.5	7	8	9	10
	under	25.5	37	38	39	50
Maximum length (2)		1 000 (1 480)	1 200 (1 980)	1 200 (1 980)	1 200 (1 980)	1 200 (2 000)

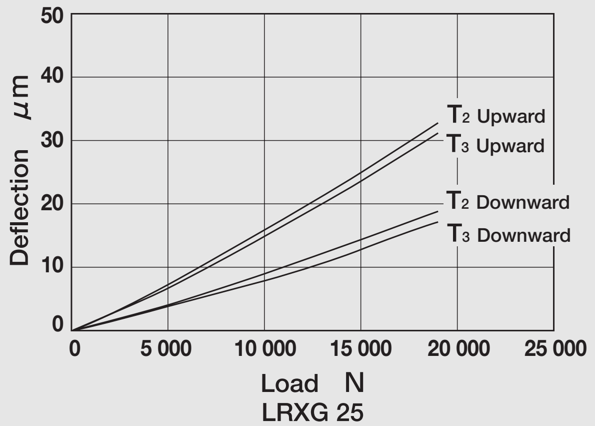
Note(1) : Not applicable to the track rail with female threads for bellows (supplemental code "/J").
(2) : Track rails with the maximum lengths shown in parentheses can also be manufactured. Consult IKO for further information.
Remark : The above table shows representative model numbers but is applicable to all models of the same size.

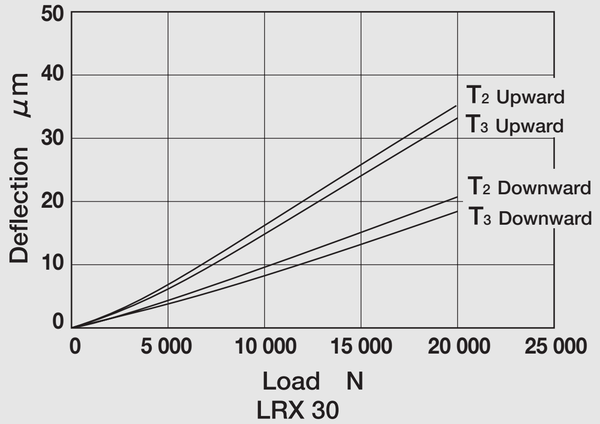
Rigidity of Linear Roller Way Super X (Reference Values)

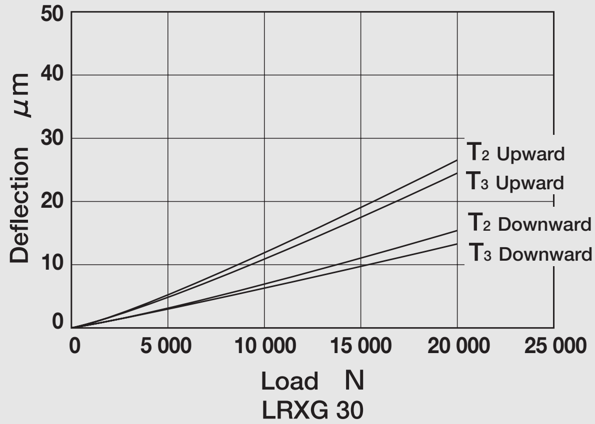
Linear Roller Way Super X has the highest rigidity among all the Linear Way and Linear Roller Way series. Deflection due to elastic deformations at the contact area of the rolling element and in the structural members under external load is very small.
Typical experimental data on the relations between the load and the deflection for various preload amounts and load directions are shown below as reference values.

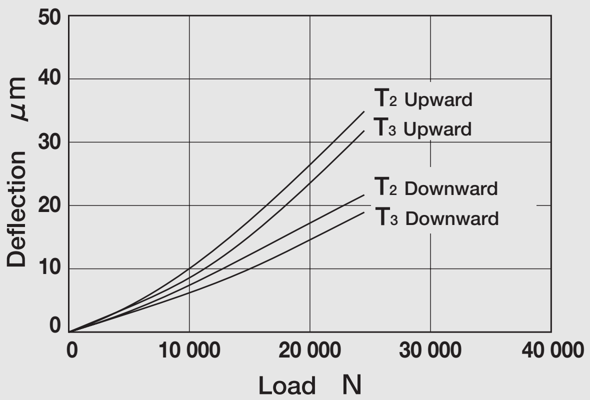




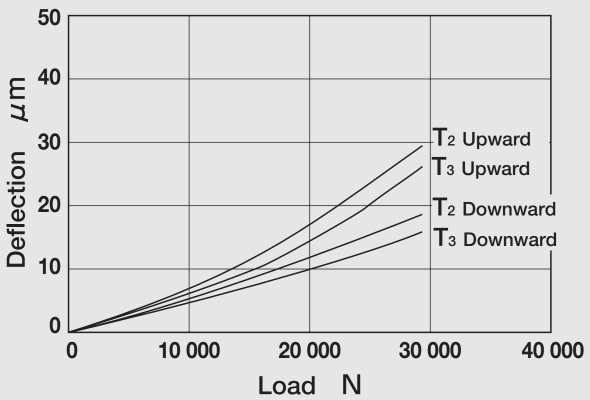




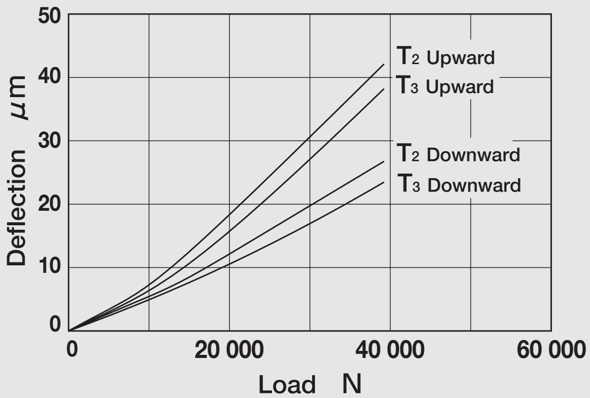




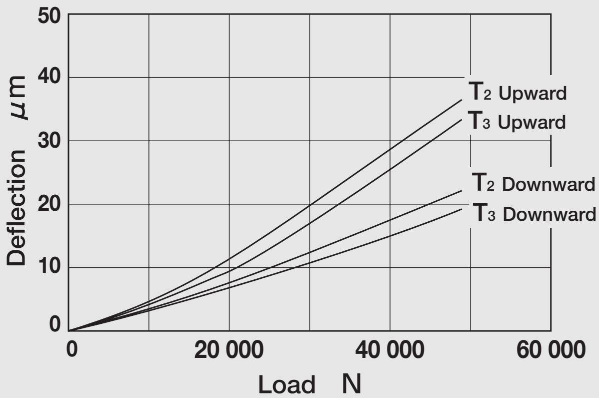
LRX 35



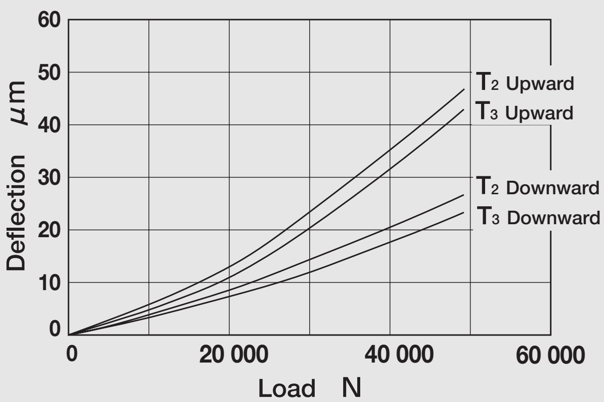
LRXG 35



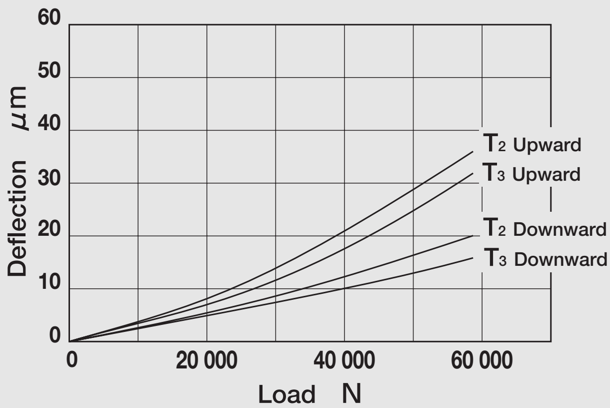
LRX 45



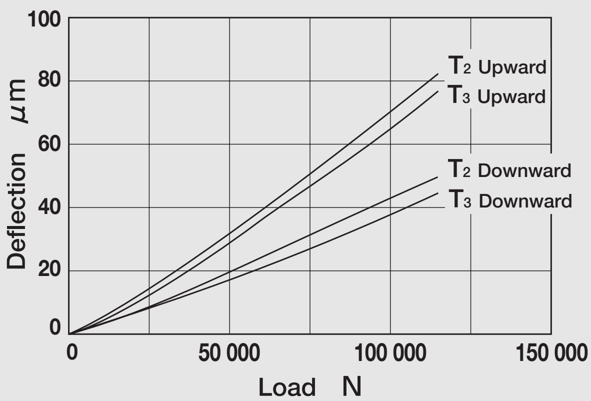
LRXG 45



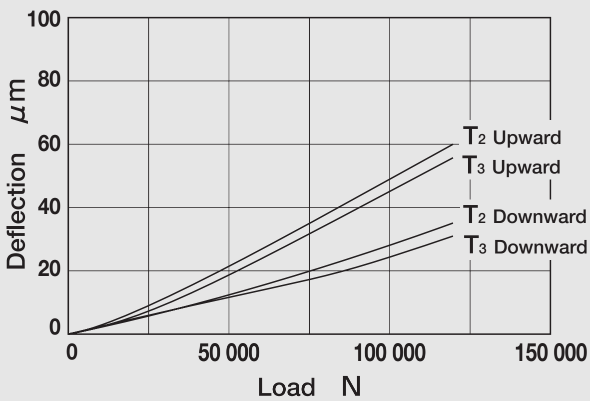
LRX 55



LRXG 55



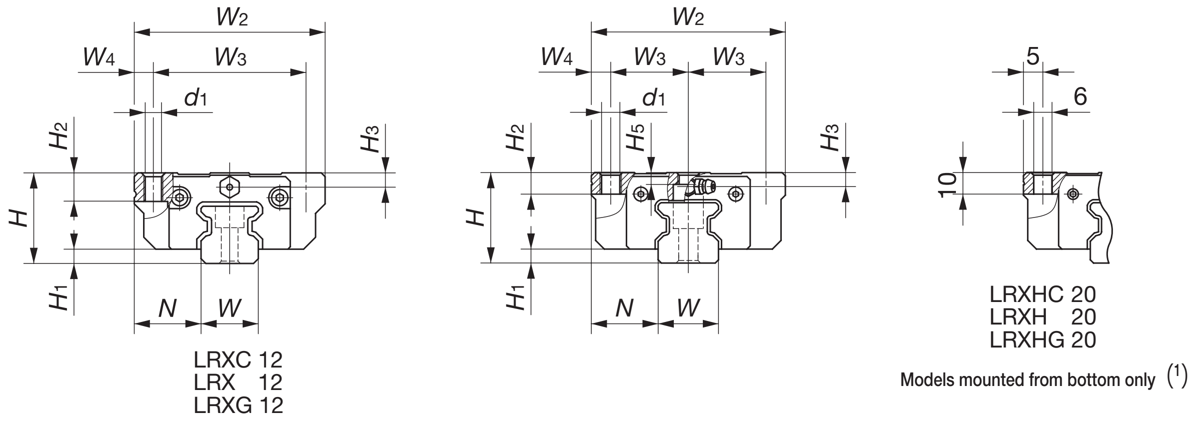
LRX 65

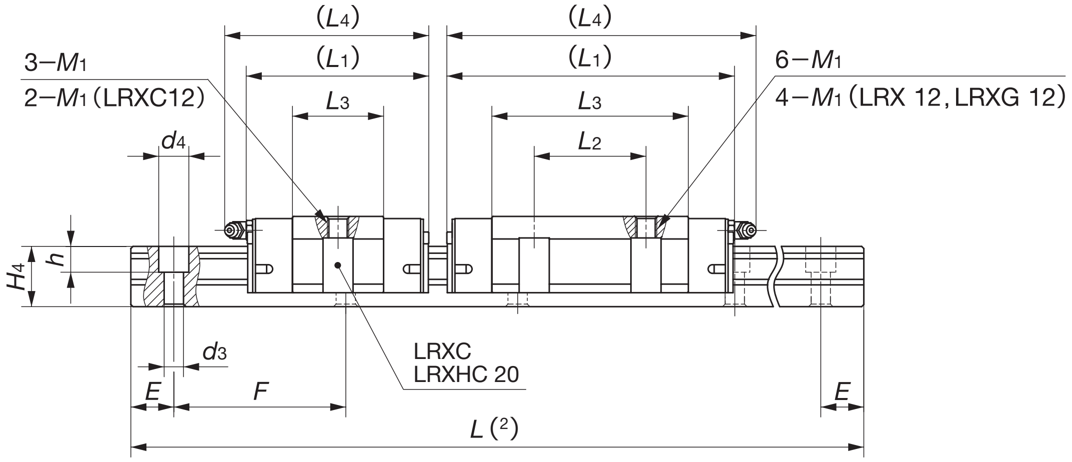


LRXG 65

Linear Roller Way Super X : Flange type

Flange type mounted from top/bottom
LRXC, LRX, LRXG

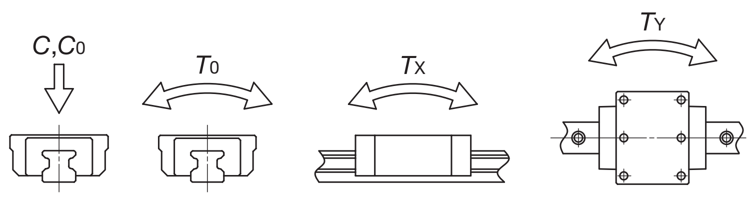




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	d_1	M_1	H_2	H_3	H_5	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static moment rating(3) T_0 N·m	T_X N·m	T_Y N·m
LRXC 12	☆	0.058	0.92	19	3	14	40	32	4	37	—	14.8	40	3.4	M 4	6	3	—	12	12	3.5	6	4.5	20	40	M3×12	3 900	6 090	46.3	16.3 170	16.3 170
LRX 12	☆	0.092								47	15	25.3	50														5 890	10 400	78.7	45.2 343	45.2 343
LRXG 12	☆	0.13								58		35.8	61														7 710	14 600	111	88.6 581	88.6 581
LRXC 15	☆	0.13	1.65	24	4	16	47	19	4.5	52	—	24	55	4.4	M 5	7	3.5	3	15	16.5	4.5	8	6	30	60	M4×16	7 730	12 000	113	50.6 457	50.6 457
LRX 15	☆	0.20								68	30	40	71														11 500	20 000	188	136 942	136 942
LRXG 15	☆	0.28								84		56	87														14 900	28 000	263	262 1 590	262 1 590
LRXC 20 (1)	☆	0.29	2.73	30	5	21.5	63	26.5	5	66	—	31.6	74	(1) —	(1) M 6	10	4	3.5	20	21	6	9.5	8.5	30	60	M5×20	16 100	26 400	341	150 1 260	150 1 260
LRX 20 (1)	☆	0.44								86	40	51.6	94														23 400	42 700	550	379 2 520	379 2 520
LRXG 20 (1)	☆	0.61								106		71.6	114														30 100	58 900	760	713 4 200	713 4 200
LRXC 25	☆	0.44	3.59	36	6	23.5	70	28.5	6.5	74	—	36	83	7	M 8	10	5	5	23	24.5	7	11	9	30	60	M6×25	21 600	33 800	500	213 1 810	213 1 810
LRX 25	☆	0.67								98	45	60	107														32 100	56 300	833	573 3 800	573 3 800
LRXG 25	☆	0.84								113		75	122														38 200	70 300	1 040	885 5 380	885 5 380
LRXC 30	☆	0.78	5.01	42	6.5	31	90	36	9	85	52	42.4	95	8.5	M10	10	6.5	5.5	28	28	9	14	12	40	80	M8×28	29 200	44 600	808	329 2 740	329 2 740
LRX 30	☆	1.20								113		70.4	123														43 400	74 400	1 350	883 5 780	883 5 780
LRXG 30	☆	1.58								134		91.4	144														53 200	96 700	1 750	1 470 8 740	1 470 8 740

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 12.1 on page C-18.
(3) : 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.

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 97.
4 : A grease nipple mounting thread hole is provided on the left and right end plates respectively.



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

LRX 20 C2 R840 T1 P S2 /F

- LRX — Model code: LRXC, LRX, LRXG
- 20 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R840 — Length of track rail (840 millimeters)
- T1 — Preload amount: Standard : No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- P — Accuracy class: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- S2 — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /F — Special specification: Caps for rail mounting holes : /F

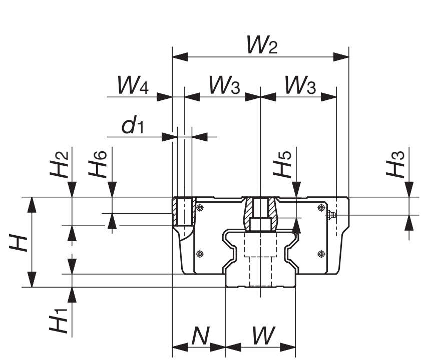
C

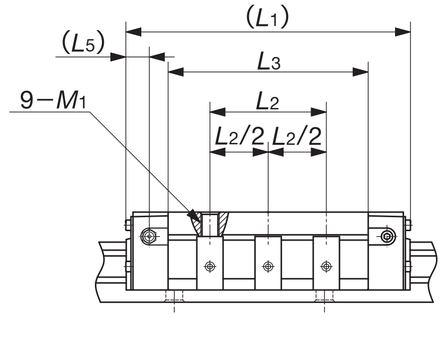
LRX, LRXD, LRXS

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

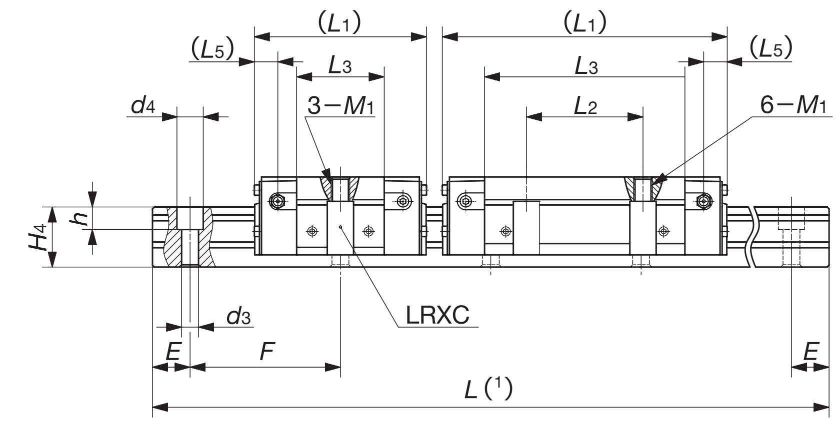
IKO Linear Roller Way Super X : Flange type

Flange type mounted from top/bottom
LRXC, LRX, LRXG





LRXG 85
LRXG 100

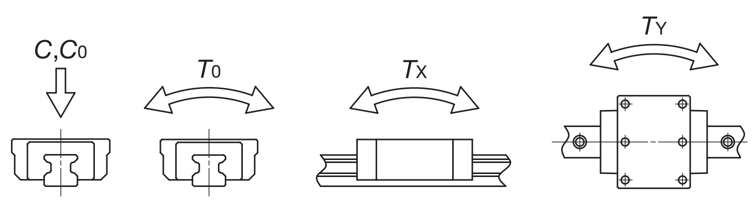


Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_5	d_1	M_1	H_2	H_3
LRXC 35	☆	1.13								92	—	46.6					
LRX 35	☆	1.76	6.88	48	6.5	33	100	41	9	124	62	78.6	12.5	8.5	M10	13	13
LRXG 35	☆	2.41								152		106.6					
LRXC 45	☆	2.11								114	—	59					
LRX 45	☆	3.26	10.8	60	8	37.5	120	50	10	154	80	99	17.5	10.5	M12	15	16
LRXG 45	☆	4.60								194		139					
LRXC 55	☆	3.49								136	—	72					
LRX 55	☆	5.42	14.1	70	9	43.5	140	58	12	184	95	120	20	12.5	M14	17	16
LRXG 55	☆	7.93								238		174					
LRXC 65	☆	7.18								181	—	95					
LRX 65	☆	11.5	22.6	90	12	53.5	170	71	14	245	110	159	26.6	14.5	M16	23	18
LRXG 65	☆	16.0								309		223					
LRX 85		25.4	36.7	110	16	65	215	92.5	15	323	140	232	27.5	17.8	M20	35	22
LRXG 85		32.7								395	200	304					
LRXG 100		43.0	43.2	120	15	75	250	110	15	362	200	262	29.7	17.8	M20	35	30

Model number	H_5	H_6	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LRXC 35											39 500	60 000	1 300	506 3 950	506 3 950
LRX 35	7	—	34	32	9	14	12	40	80	M 8×35	58 700	100 000	2 170	1 360 8 470	1 360 8 470
LRXG 35											74 200	135 000	2 930	2 440 13 800	2 440 13 800
LRXC 45											64 100	95 600	2 660	1 010 7 800	1 010 7 800
LRX 45	11	—	45	38	14	20	17	52.5	105	M12×40	95 400	159 000	4 430	2 700 16 800	2 700 16 800
LRXG 45											124 000	223 000	6 200	5 220 29 000	5 220 29 000
LRXC 55											99 700	149 000	4 830	1 880 14 400	1 880 14 400
LRX 55	14	—	53	43	16	23	20	60	120	M14×45	148 000	248 000	8 040	5 040 31 100	5 040 31 100
LRXG 55											198 000	359 000	11 700	10 400 57 000	10 400 57 000
LRXC 65											174 000	249 000	9 790	4 200 32 200	4 200 32 200
LRX 65	18.5	—	63	56	18	26	22	75	150	M16×60	260 000	415 000	16 300	11 300 69 300	11 300 69 300
LRXG 65											337 000	581 000	22 800	21 800 120 000	21 800 120 000
LRX 85	25.5	20	85	67	26.5	39	30	90	180	M24×70	440 000	753 000	38 900	29 500 163 000	29 500 163 000
LRXG 85											542 000	985 000	50 800	50 000 257 000	50 000 257 000
LRXG 100	30.5	—	100	70	33	48	36	75	150	M30×80	498 000	821 000	49 700	35 800 199 000	35 800 199 000

Note(1) : Track rail lengths are shown in Table 12.1 on page C-18.
(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.

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 97.
4 : Three grease nipple mounting thread holes are provided on the left and right end plates respectively.



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

LRX 55 C2 R3000 T_2 P S2 /F

- **Model code**: LRXC, LRX, LRXG
- **Size of rolling guide**
- **Number of slide units** (Two slide units)
- **Length of track rail (3000 millimeters)**
- **Preload amount**: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- **Accuracy class**: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- **Interchangeable code**: Interchangeable specification : S2; Non interchangeable specification : No symbol
- **Special specification**: Caps for rail mounting holes : /F

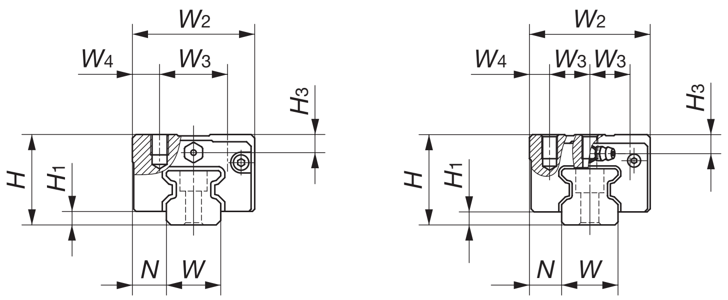
LRX, LRXD, LRXS

C

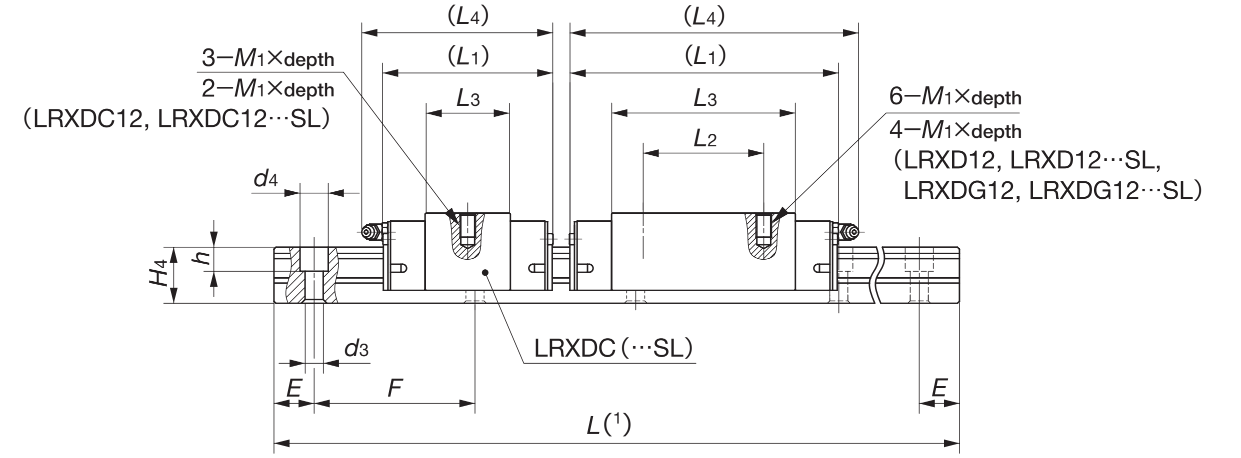
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO 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)



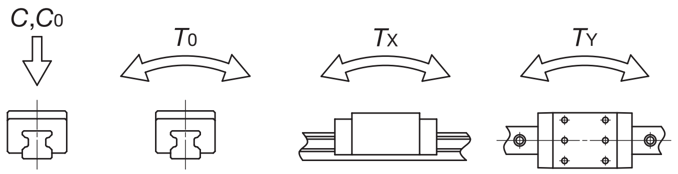
LRXDC 12
LRXD 12
LRXDG 12



Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth	H_3
LRXDC 12	☆	0.045	0.92	20	3	7.5	27	15	6	37	—	14.8	40	M4×4.5	4
LRXDC 12…SL	☆														
LRXD 12	☆	0.072								47	15	25.3	50		
LRXD 12…SL	☆														
LRXDG 12	☆	0.097								58		35.8	61		
LRXDG 12…SL	☆														
LRXDC 15	☆	0.13	1.65	28	4	9.5	34	13	4	52	—	24	55	M4×8	7.5
LRXDC 15…SL	☆														
LRXD 15	☆	0.19								68	26	40	71		
LRXD 15…SL	☆														
LRXDG 15	☆	0.26								84		56	87		
LRXDG 15…SL	☆														

Model number	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LRXDC 12	12	12	3.5	6	4.5	20	40	M3×12	3 900	6 090	46.3	16.3 170	16.3 170
LRXDC 12…SL													
LRXD 12									5 890	10 400	78.7	45.2 343	45.2 343
LRXD 12…SL													
LRXDG 12									7 710	14 600	111	88.6 581	88.6 581
LRXDG 12…SL													
LRXDC 15	15	16.5	4.5	8	6	30	60	M4×16	7 730	12 000	113	50.6 457	50.6 457
LRXDC 15…SL													
LRXD 15									11 500	20 000	188	136 942	136 942
LRXD 15…SL													
LRXDG 15									14 900	28 000	263	262 1 590	262 1 590
LRXDG 15…SL													

Note(1) : Track rail lengths are shown in Table 12.1 on page C-18 and Table 12.2 on page C-19.
(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.
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 97.
4 : A grease nipple mounting thread hole is provided on the left and right end plates respectively.



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

LRXD 15 C2 R660 SL T1 P /F

- LRXD — Model code: LRXDC, LRXD, LRXDG
- 15 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R660 — Length of track rail (660 millimeters)
- SL — Material: High carbon steel made : No symbol; Stainless steel made : SL
- T1 — Preload amount: Standard : No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- P — Accuracy class: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- /F — Special specification: Caps for rail mounting holes : /F

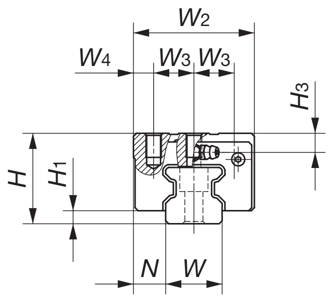
C

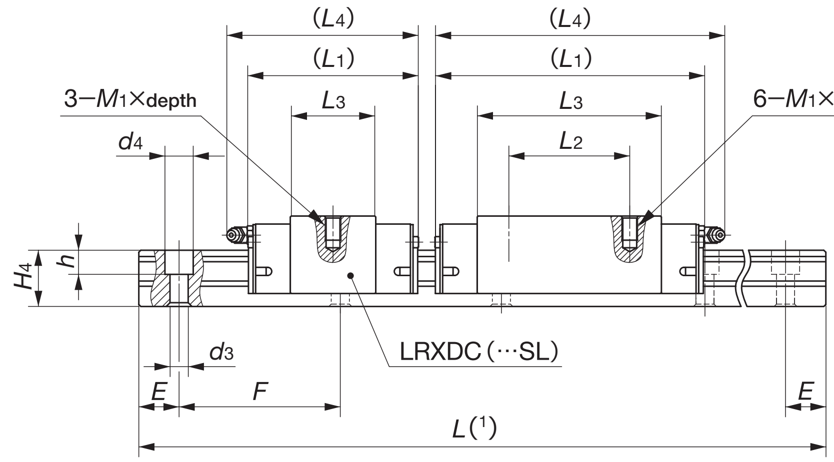
LRX, LRXD, LRXS

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

IKO 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)



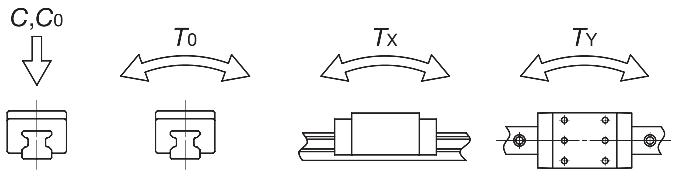


Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth	H_3
LRXDC 20	☆	0.25	2.73	34	5	12	44	16	6	66	—	31.6	74	M5× 8	8
LRXDC 20…SL	☆														
LRXD 20	☆	0.38								86	36	51.6	94		
LRXD 20…SL	☆														
LRXDG 20	☆	0.52								106	50	71.6	114		
LRXDG 20…SL	☆														
LRXDC 25	☆	0.36	3.59	40	6	12.5	48	17.5	6.5	74	—	36	83	M6×12	9
LRXDC 25…SL	☆														
LRXD 25	☆	0.55								98	35	60	107		
LRXD 25…SL	☆														
LRXDG 25	☆	0.68								113	50	75	122		
LRXDG 25…SL	☆														
LRXDC 30	☆	0.60	5.01	45	6.5	16	60	20	10	85	—	42.4	95	M8×12	9.5
LRXDC 30…SL	☆														
LRXD 30	☆	0.92								113	40	70.4	123		
LRXD 30…SL	☆														
LRXDG 30	☆	1.18								134	60	91.4	144		
LRXDG 30…SL	☆														

Model number	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LRXDC 20 / LRXDC 20…SL	20	21	6	9.5	8.5	30	60	M5×20	16 100	26 400	341	150 1 260	150 1 260
LRXD 20 / LRXD 20…SL									23 400	42 700	550	379 2 520	379 2 520
LRXDG 20 / LRXDG 20…SL									30 100	58 900	760	713 4 200	713 4 200
LRXDC 25 / LRXDC 25…SL	23	24.5	7	11	9	30	60	M6×25	21 600	33 800	500	213 1 810	213 1 810
LRXD 25 / LRXD 25…SL									32 100	56 300	833	573 3 800	573 3 800
LRXDG 25 / LRXDG 25…SL									38 200	70 300	1 040	885 5 380	885 5 380
LRXDC 30 / LRXDC 30…SL	28	28	9	14	12	40	80	M8×28	29 200	44 600	808	329 2 740	329 2 740
LRXD 30 / LRXD 30…SL									43 400	74 400	1 350	883 5 780	883 5 780
LRXDG 30 / LRXDG 30…SL									53 200	96 700	1 750	1 470 8 740	1 470 8 740

Note(1) : Track rail lengths are shown in Table 12.1 on page C-18 and Table 12.2 on page C-19.
(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.

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 97.
4 : A grease nipple mounting thread hole is provided on the left and right end plates respectively.



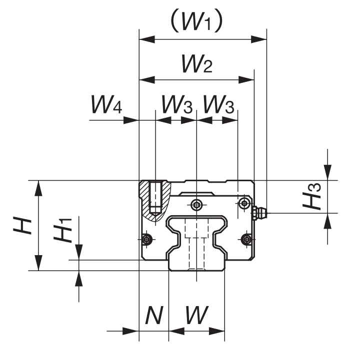
Example of identification number of assembled set (For details, see "Identification number and specification".)

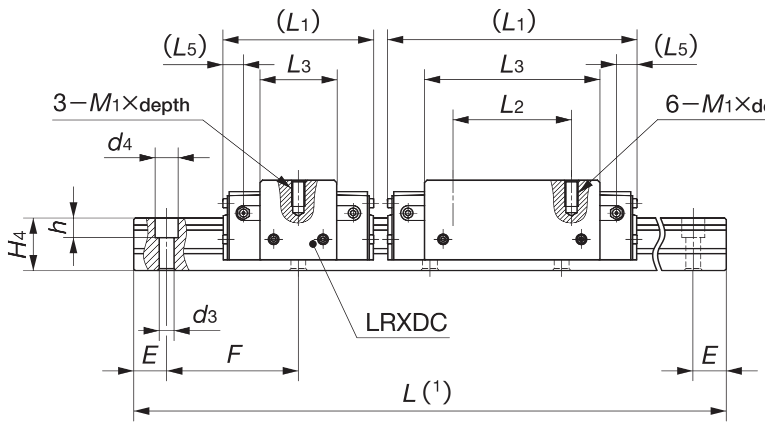
LRXD 25 C2 R840 SL T1 P /F

- **Model code**: LRXDC, LRXD, LRXDG
- **Size of rolling guide**
- **Number of slide units** (Two slide units)
- **Length of track rail** (840 millimeters)
- **Material**: High carbon steel made : No symbol; Stainless steel made : SL
- **Preload amount**: Standard : No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- **Accuracy class**: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- **Interchangeable code**: Interchangeable specification : S2; Non interchangeable specification : No symbol
- **Special specification**: Caps for rail mounting holes : /F

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

Block type mounted from the upper side
LRXDC, LRXD, LRXDG

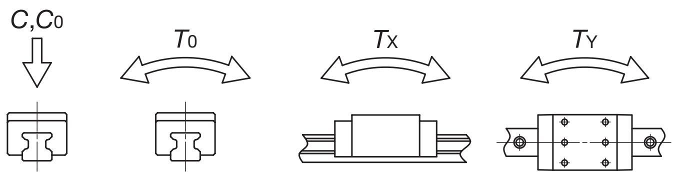




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_1	W_2	W_3	W_4	L_1	L_2	L_3	L_5	$M_1\times$depth
LRXDC 35	☆	0.97									92	—	46.6		
LRXD 35	☆	1.52	6.88	55	6.5	18	80	70	25	10	124	50	78.6	12.5	M 8×16
LRXDG 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		

Model number	Dimensions of track rail mm H_3	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LRXDC 35										39 500	60 000	1 300	506 3 950	506 3 950
LRXD 35	20	34	32	9	14	12	40	80	M 8×35	58 700	100 000	2 170	1 360 8 470	1 360 8 470
LRXDG 35										74 200	135 000	2 930	2 440 13 800	2 440 13 800
LRXDC 45										64 100	95 600	2 660	1 010 7 800	1 010 7 800
LRXD 45	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
LRXDG 45										124 000	223 000	6 200	5 220 29 000	5 220 29 000
LRXDC 55										99 700	149 000	4 830	1 880 14 400	1 880 14 400
LRXD 55	26	53	43	16	23	20	60	120	M14×45	148 000	248 000	8 040	5 040 31 100	5 040 31 100
LRXDG 55										198 000	359 000	11 700	10 400 57 000	10 400 57 000
LRXDC 65										174 000	249 000	9 790	4 200 32 200	4 200 32 200
LRXD 65	18	63	56	18	26	22	75	150	M16×60	260 000	415 000	16 300	11 300 69 300	11 300 69 300
LRXDG 65										337 000	581 000	22 800	21 800 120 000	21 800 120 000

Note(1) : Track rail lengths are shown in Table 12.1 on page C-18.
(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.
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 97.
4 : Three grease nipple mounting thread holes are provided on the left and right end plates respectively.



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

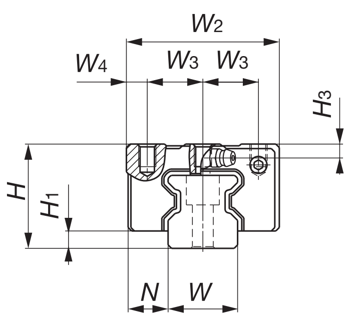
LRXD 55 C2 R3000 T_2 P S2 /F

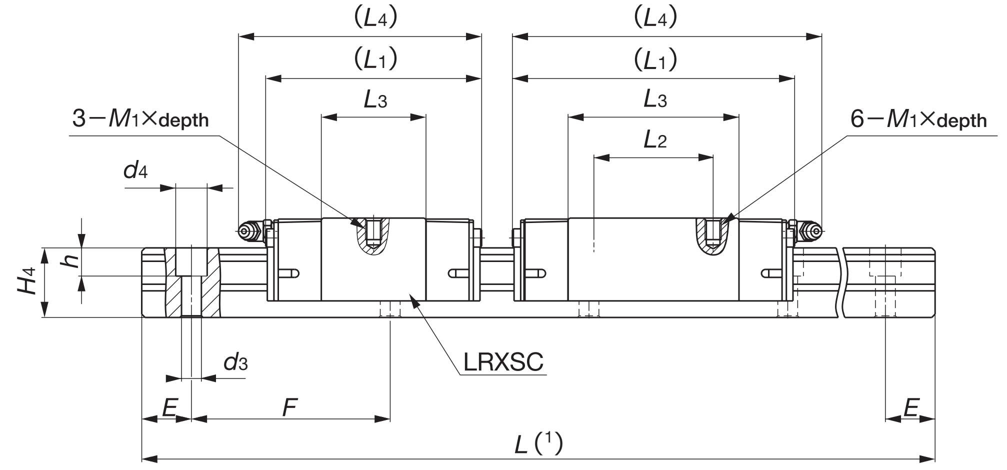
- Model code: LRXDC, LRXD, LRXDG
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (3000 millimeters)
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- Special specification: Caps for rail mounting holes : /F

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

IKO Linear Roller Way Super X : Compact block type

Compact block type mounted from top
LRXSC, LRXS, LRXSG

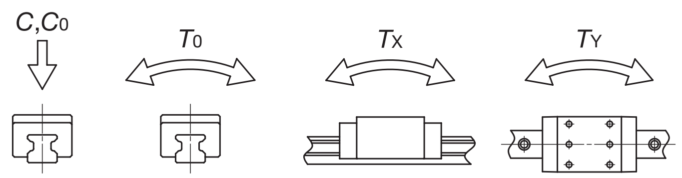




Model number	Interchangeable	Mass (Ref.) Slide unit kg	Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	M_1×depth(2)
LRXSC 15	☆	0.099								52	—	24	55	
LRXS 15	☆	0.15	1.65	24	4	9.5	34	13	4	68	26	40	71	M4× 5.5
LRXSG 15	☆	0.21								84		56	87	
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								113	50	75	122	
LRXSC 30	☆	0.54								85	—	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	

Model number	Dimension of track rail mm H_3	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size × length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Static rated moment(3) T_0 N·m	T_X N·m	T_Y N·m
LRXSC 15										7 730	12 000	113	50.6 457	50.6 457
LRXS 15	3.5	15	16.5	4.5	8	6	30	60	M4×16	11 500	20 000	188	136 942	136 942
LRXSG 15										14 900	28 000	263	262 1 590	262 1 590
LRXSC 20										16 100	26 400	341	150 1 260	150 1 260
LRXS 20	4	20	21	6	9.5	8.5	30	60	M5×20	23 400	42 700	550	379 2 520	379 2 520
LRXSG 20										30 100	58 900	760	713 4 200	713 4 200
LRXSC 25										21 600	33 800	500	213 1 810	213 1 810
LRXS 25	5	23	24.5	7	11	9	30	60	M6×25	32 100	56 300	833	573 3 800	573 3 800
LRXSG 25										38 200	70 300	1 040	885 5 380	885 5 380
LRXSC 30										29 200	44 600	808	329 2 740	329 2 740
LRXS 30	6.5	28	28	9	14	12	40	80	M8×28	43 400	74 400	1 350	883 5 780	883 5 780
LRXSG 30										53 200	96 700	1 750	1 470 8 740	1 470 8 740

Note(1) : Track rail lengths are shown in Table 12.1 on page C-18.
(2) : Recommended screw-in depths for mounting slide unit are shown in Table 11 on page C-17.
(3) : 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 show 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.
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 97.
4 : A grease nipple mounting thread holes are provided on the left and right end plates respectively.



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

LRXS 20 C2 R840 T1 P S2 /F

- **LRXS** — Model code: LRXSC, LRXS, LRXSG
- **20** — Size of rolling guide
- **C2** — Number of slide unit (two slide units)
- **R840** — Length of track rail (840 millimeters)
- **T1** — Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- **P** — Accuracy class: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- **S2** — Interchangeable code: Interchangeable specification : S2; Non interchangeable specification : No symbol
- **/F** — Special speciation: Caps for rail mounting holes : /F

C

LRX, LRXD, LRXS

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

Linear Roller Way X

LRWX…B／LRWXH

IKO Linear Roller Way X is a linear motion rolling guide which achieves smooth linear motion with high accuracy and rigidity. Four rows of cylindrical rollers are arranged in its casing with good balance, so elastic deformation is small and stable operation is ensured even under heavy or fluctuating loads. This product is suitable for applications with vibration and shocks.

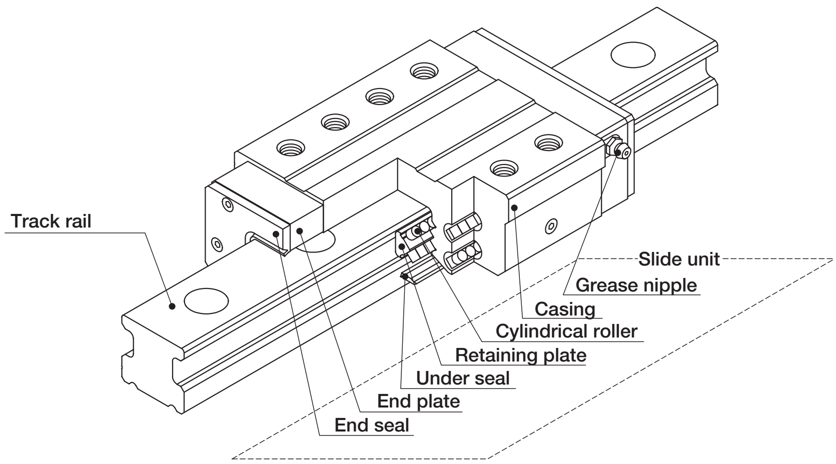
High rigidity and excellent vibration damping performance

As a large number of parallel cylindrical rollers are arranged in a highly rigid casing with good balance, high rigidity as well as excellent vibration damping performance can be obtained.

Block type and flange type

Slide units are available in two different sectional shapes: the block type and the flange type for different mounting directions.

U.S. PATENT No. 6,176,617
No. 5,967,667
No. 5,193,914
No. 4,505,522



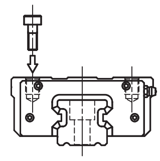
Structure of Linear Roller Way X

Linear Roller Way X series

Shape | **Model code**

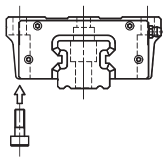
Linear Roller Way X

- Block type mounted from top



→ LRWX ···B

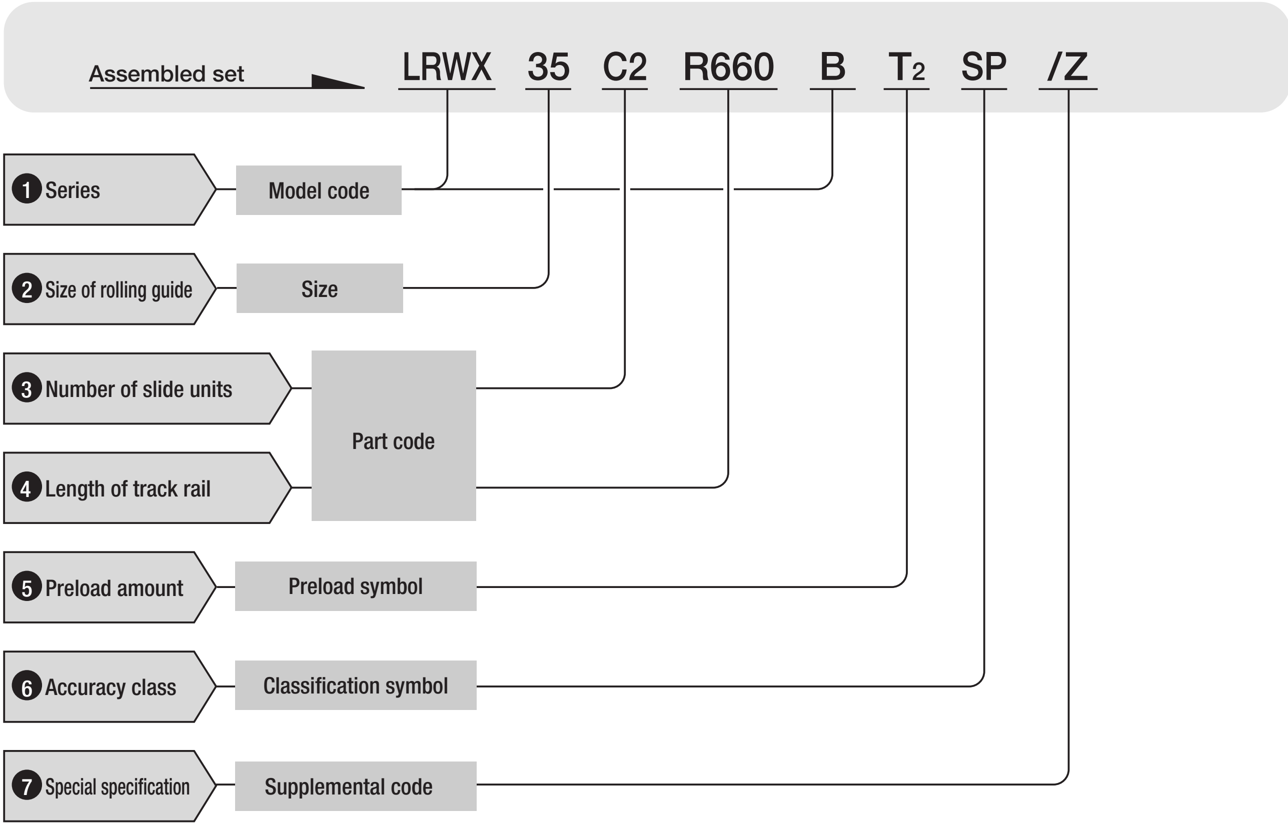
- Flange type mounted from bottom



→ LRWXH

Identification number and specification

The specification of Linear Roller Way X 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 76.



1 Series

Block type mounted from top : LRWX···B

Flange type mounted from bottom : LRWXH

2 Size of rolling guide

For available models and sizes, see Table 1.

Table 1 Models and sizes of Linear Roller Way X

Size \ Model	Block type LRWX···B	Flange type LRWXH
25	○	—
35	○	○
45	○	○
55	○	○
75	○	○

3 Number of slide units

: C○

Indicate the number of slide units assembled on one track rail.

4 Length of track rail

: R○

Indicate the length of track rail in mm. For standard and maximum lengths, see "Track rail length" on page C-41.

5 Preload amount

Standard : No symbol
Light preload : T_1
Medium preload : T_2
Heavy preload : T_3

For details of preload amount, see page 84.

6 Accuracy class

High : H
Precision : P
Super precision : SP
Ultra precision : UP

For details of accuracy, see page 79.

7 Special specification

For applicable special specifications, see Table 2. When several special specifications are combined, see Table 3.
For details of special specifications, see page 86.

Table 2 Special specifications

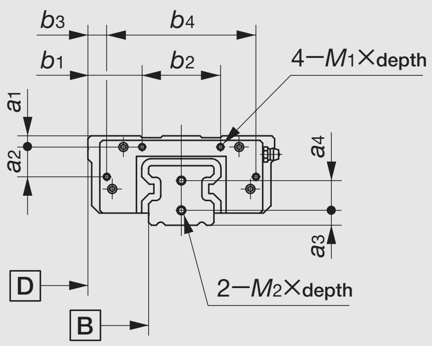
Special specification	Supplemental code	Block type	Flange type	Dimension
Butt-jointing track rail	A	○	○	
Opposite reference surfaces arrangement	D	○	○	
Specified rail mounting hole positions	E	○	○	
Caps for rail mounting holes	F	○	○	
Inspection sheet	I	○	○	
Female threads for bellows	J	○	○	See Table 4.
Black chrome surface treatment	L	○	○	
Fluorine black chrome surface treatment	LF	○	○	
Supplied without track rail mounting bolt	MN	○	○	
Capillary plates	Q	○	○	See Table 5.
Matched sets to be used as an assembled group	W	○	○	
Specified grease	Y	○	○	
Scrapers	Z	○	○	See Table 6.

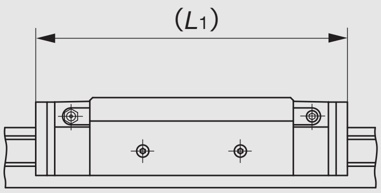
Table 3 Combination of special specifications

	A	D	E	F	I	J	L	LF	MN	Q	W	Y
D	○											
E	–	–										
F	○	○	○									
I	○	○	○	○								
J	○	○	○	○	○							
L	○	○	○	○	○	○						
LF	○	○	○	○	○	○	–					
MN	○	○	○	○	○	○	○	○				
Q	○	○	○	○	○	–	○	○	○			
W	○	○	–	○	○	○	○	○	○	○		
Y	○	○	○	○	○	○	○	○	○	–	○	
Z	○	○	○	○	○	–	○	○	○	–	○	○

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.

Table 4 Female threads for bellows (Supplemental code /J, /JJ)



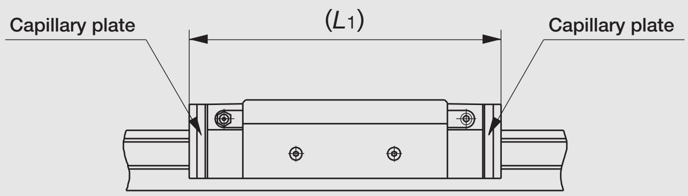


unit : mm

Model number	Slide unit								Track rail		
	a_1	a_2	b_1	b_2	b_3	b_4	M_1×depth	L_1(1)	a_3	a_4	M_2×depth
LRWX 25···B	5	12	15	33	7	49	M3× 6	116	7	12	M4× 8
LRWX 35···B	6	16	29	42	10	80	M3× 6	166	8	16	M4× 8
LRWXH 35			31		12						
LRWX 45···B	8	20	34	52	12	96	M4× 8	221	10	19	M5×10
LRWXH 45			38		16						
LRWX 55···B	9	24	36	68	15	110	M5×10	282	12	23	M6×12
LRWXH 55			43		22						
LRWX 75···B	10	35	35	110	15.5	149	M5×10	366	15	30	M6×12
LRWXH 75			42		22.5						

Note(1) : The values for a slide unit with female threads for bellows at both ends are shown.

Table 5 Slide unit with Capillary plates (Supplemental code /Q)

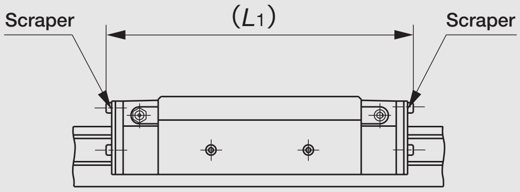


unit : mm

Model number	L_1
LRWX 25···B	120
LRWX 35···B	166
LRWXH 35	
LRWX 45···B	218
LRWXH 45	

Model number	L_1
LRWX 55···B	275
LRWXH 55	
LRWX 75···B	364
LRWXH 75	

Table 6 Slide unit with scrapers (Supplemental code /Z, /ZZ)



unit : mm

Model number	L_1
LRWX 25…B	120
LRWX 35…B	164
LRWXH 35	
LRWX 45…B	217
LRWXH 45	

Model number	L_1
LRWX 55…B	275
LRWXH 55	
LRWX 75…B	361
LRWXH 75	

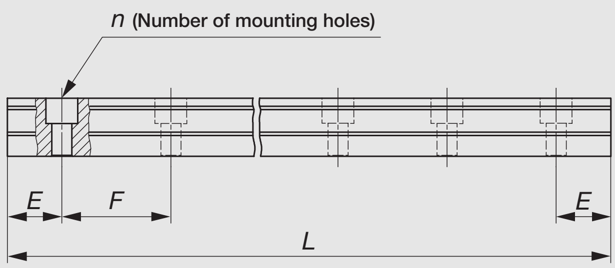
Remark : The values for a slide unit with scrapers at both ends are shown.

Track rail length

Standard and maximum lengths of track rails are shown in Table 7. 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 track rails longer than the maximum length shown in Table 7, 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 89.

Table 7 Standard and maximum lengths of track rails

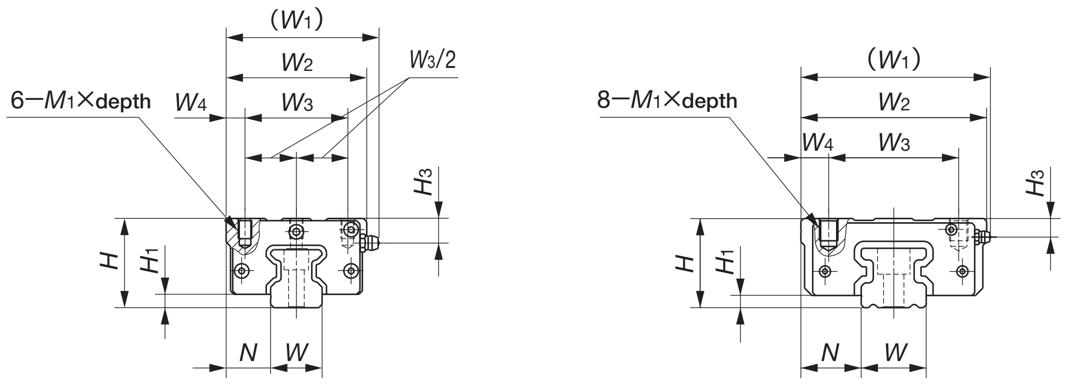


unit : mm

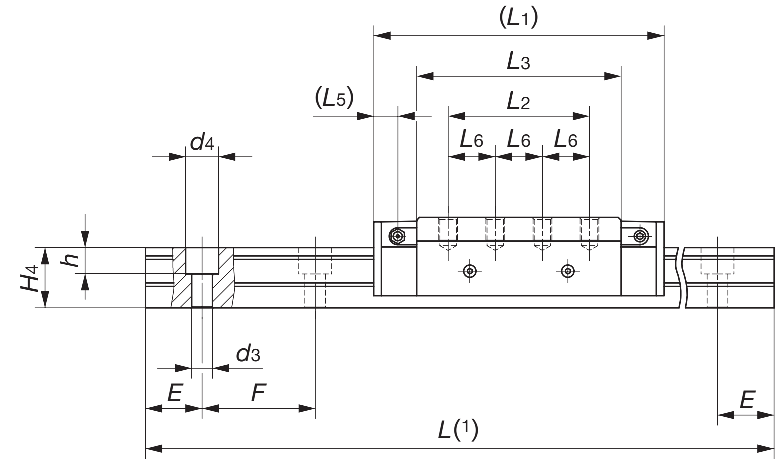
Item \ Model number		LRWX 25…B	LRWX 35…B	LRWX 45…B	LRWX 55…B	LRWX 75…B
Standard length *L* (*n*)		480 (8) 660 (11) 840 (14) 1 020 (17) 1 200 (20) 1 500 (25)	480 (8) 660 (11) 840 (14) 1 020 (17) 1 200 (20) 1 500 (25)	800 (10) 1 040 (13) 1 200 (15) 1 520 (19) 1 920 (24)	800 (8) 1 000 (10) 1 200 (12) 1 500 (15) 2 000 (20) 3 000 (30)	840 (7) 1 200 (10) 1 560 (13) 1 920 (16) 3 000 (25)
Pitch of mounting holes *F*		60	60	80	100	120
E		30	30	40	50	60
Standard range of *E* (1)	incl.	9	12	15	18	23
	under	39	42	55	68	83
Maximum length (2)		1 980 (3 000)	3 000 (3 960)	2 960 (4 000)	3 000 (4 000)	3 000 (3 960)

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

Block type mounted from top
LRWX…B



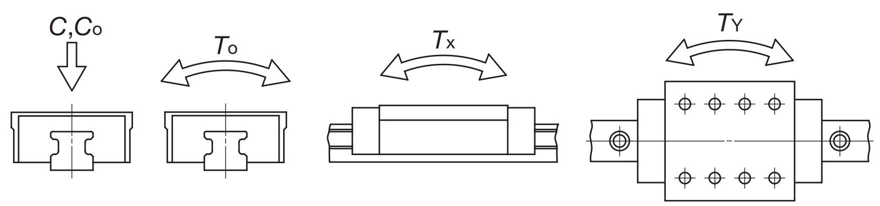
LRWX 25…B



Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_1	W_2	W_3	W_4	L_1	L_2	L_3	L_5	L_6	M_1×depth
LRWX 25…B	0.93	3.70	40	6	20	70	63	46	8.5	109	45	74.4	11	—	M 6× 9
LRWX 35…B	2.65	6.66	48	6.5	32.5	104	100	70	15	154	75	108.4	12.8	25	M10×12
LRWX 45…B	5.32	10.3	60	8	37.5	129	120	82	19	205	105	144	18.5	35	M12×16
LRWX 55…B	9.09	15.3	70	9	42.5	146	140	95	22.5	262	135	189	24.5	45	M12×18
LRWX 75…B	19.0	25.1	90	10	52.5	195	180	123	28.5	346	180	240	45	60	M16×25

Model number	Dimensions of track rail mm H_3	W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LRWX 25…B	11	23	26	7	11	9	30	60	M 6×28	32 700	70 300	1 110	885 5 220	885 5 220
LRWX 35…B	10	35	32	11	17.5	14	30	60	M10×35	49 900	91 100	2 150	1 660 9 450	1 660 9 450
LRWX 45…B	14.5	45	39	14	20	16	40	80	M12×40	93 300	167 000	5 000	4 030 23 000	4 030 23 000
LRWX 55…B	16	55	47	18	26	21	50	100	M16×50	186 000	330 000	12 200	10 700 57 900	10 700 57 900
LRWX 75…B	20	75	57	26	39	30	60	120	M24×60	298 000	518 000	25 200	20 900 121 000	20 900 121 000

Note(1) : Track rail lengths are shown in Table 7 on page C-41.
(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.
Remark 1 : The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
2 : For grease nipple specifications, see page 97.



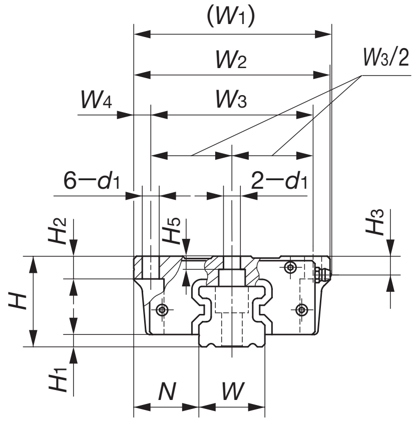
Example of identification number (For details, see "Identification number and specification".)

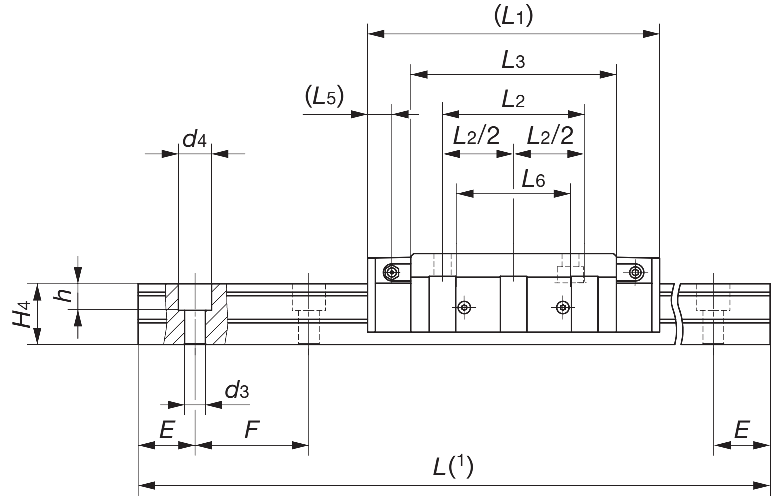
LRWX 35 C2 R840 B T1 P / W2

- LRWX: Model code LRWX…B
- 35: Size of rolling guide
- C2: Number of slide units (Two slide units)
- R840 B: Length of track rail (840 millimeters)
- T1: Preload amount — Standard : No symbol; Light preload : T1; Medium preload : T2; Heavy preload : T3
- P: Accuracy class — High : H; Precision : P; Super precision : SP; Ultra precision : UP
- / W2: Special specification — Matched two sets : /W2

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

Flange type mounted from bottom
LRWXH

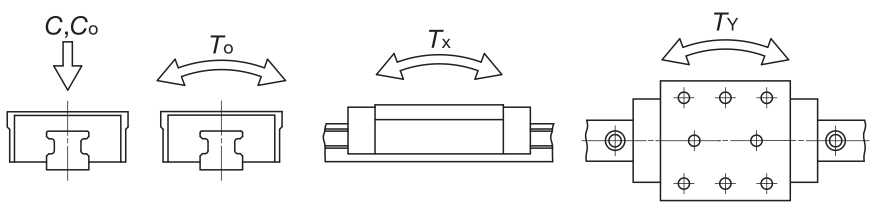




Model number	Mass (Ref.) Slide unit kg	Mass (Ref.) Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_1	W_2	W_3	W_4	L_1	L_2	L_3	L_5	L_6	d_1
LRWXH 35	2.51	6.66	48	6.5	34.5	106	104	86	9	154	75	108.4	12.8	60	9
LRWXH 45	5.18	10.3	60	8	41.5	133	128	108	10	205	105	144	18.5	80	11
LRWXH 55	9.08	15.3	70	9	49.5	—	154	130	12	262	135	189	24.5	106	14
LRWXH 75	19.7	25.1	90	10	59.5	202	194	164	15	346	180	240	45	134	18

Model number	H_2	H_3	H_5	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N・m	T_X N・m	T_Y N・m
LRWXH 35	12	10	7	35	32	11	17.5	14	30	60	M10×35	49 900	91 100	2 150	1 660 9 450	1 660 9 450
LRWXH 45	15	14.5	10	45	39	14	20	16	40	80	M12×40	93 300	167 000	5 000	4 030 23 000	4 030 23 000
LRWXH 55	18	16	10	55	47	18	26	21	50	100	M16×50	186 000	330 000	12 200	10 700 57 900	10 700 57 900
LRWXH 75	24	20	16	75	57	26	39	30	60	120	M24×60	298 000	518 000	25 200	20 900 121 000	20 900 121 000

Note(1) : Track rail lengths are shown in Table 7 on page C-41.
(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.
Remark 1 : The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
2 : For grease nipple specifications, see page 97.



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

LRWXH 35 C2 R840 T1 P / W2

- Model code: LRWXH
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (840 millimeters)
- Preload amount: Standard : No symbol; Light preload : T_1; Medium preload : T_2; Heavy preload : T_3
- Accuracy class: High : H; Precision : P; Super precision : SP; Ultra precision : UP
- Special specification: Matched two sets : /W2

C

LRWX…B, LRWXH

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

Linear Roller Way H

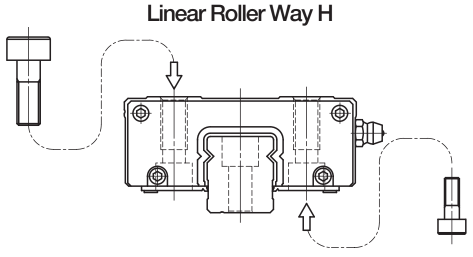
LRWH

IKO Linear Roller Way H is a roller type linear motion rolling guide which achieves endless linear motion of the slide unit along the track rail. Two rows of cylindrical rollers are incorporated in the slide unit and the rollers in each row are alternately crossed at right angles to each other.

Linear Roller Way H

The casing has a solid structure, and incorporates a large number of effective rollers with a long effective contact length. This product can be mounted from both upper and lower sides.

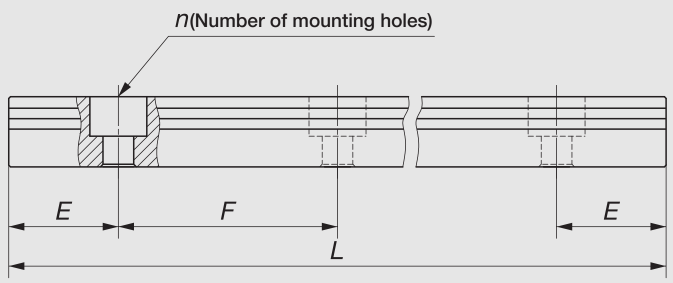
Linear Roller Way H series

Shape	Model code
Linear Roller Way H 	LRWH

U.S. PATENT No. 4,746,228
No. 4,692,036
No. 4,688,950

Track rail length

Table 1 Standard and maximum lengths of track rails



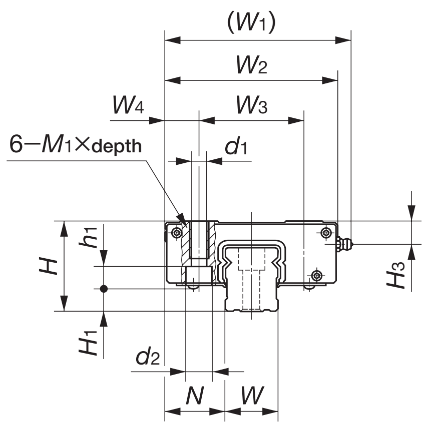
unit : mm

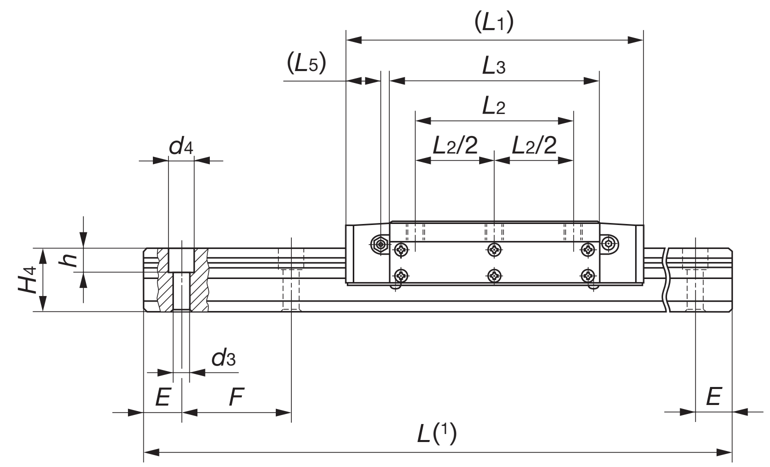
Item \ Model number	LRWH 25	LRWH 35	LRWH 45	LRWH 55	LRWH 65
Standard length *L*(*n*)	480(8) 660(11) 840(14) 1 020(17) 1 200(20) 1 500(25)	480(8) 660(11) 840(14) 1 020(17) 1 200(20) 1 500(25)	800(10) 1 040(13) 1 200(15) 1 520(19) 1 920(24)	800(8) 1 000(10) 1 200(12) 1 500(15) 2 000(20) 3 000(30)	840(7) 1 200(10) 1 560(13) 1 920(16) 3 000(25)
Pitch of mounting holes *F*	60	60	80	100	120
E	30	30	40	50	60
Maximum length	3 000	3 000	2 960	3 000	3 000

C

LRWH

LRWH

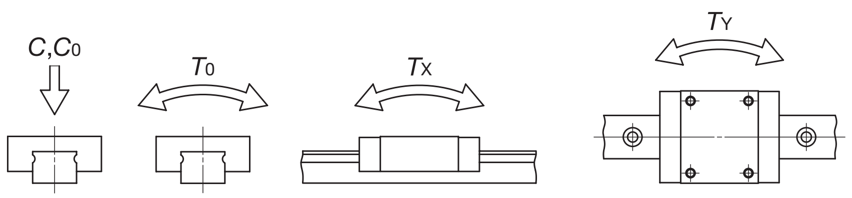




Model number	Mass (Ref.) Slide unit kg	Track rail kg/m	Dimensions of assembly mm H	H_1	N	Dimensions of slide unit mm W_1	W_2	W_3	W_4	L_1	L_2	L_3	L_5	d_1	d_2	h_1	M_1×depth
LRWH 25	0.95	3.39	35	6	25	80	70	40	15	124	60	85.5	14	6.8	11	9	M 8×16
LRWH 35	2.03	6.95	48	12	32	102	92	56	18	162	86	114	19	8.6	14	12	M10×20
LRWH 45	4.92	10.9	60	11	42	137	122	76	23	214	120	152	23	10.5	17	17	M12×24
LRWH 55	8.83	16.4	70	15	52	167	152	96	28	264	150	190	29	12.5	21	27	M14×28
LRWH 65	16.3	22.1	85	17	62	195	180	110	35	316	180	228	36	15.7	24	32	M18×36

Model number	H_3	Dimensions of track rail mm W	H_4	d_3	d_4	h	E	F	Mounting bolt for track rail mm Bolt size x length	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Static moment rating(2) T_0 N·m	T_X N·m	T_Y N·m
LRWH 25	11	20	23	7	11	9	30	60	M 6×22	21 700	30 400	340	492 2 640	466 2 700
LRWH 35	12	28	34	9	14	12	30	60	M 8×35	44 400	62 400	955	1 350 7 060	1 280 7 220
LRWH 45	17	38	40	14	20	16	40	80	M12×40	87 200	122 000	2 490	3 500 18 100	3 320 18 500
LRWH 55	18	48	47	16	23	19	50	100	M14×50	142 000	194 000	5 010	6 990 35 700	6 620 36 500
LRWH 65	20	56	54	18	26	21	60	120	M16×55	206 000	277 000	8 360	12 000 60 900	11 300 62 200

Note(1) : Track rail lengths are shown in Table 1 on page C-47.
(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.
Remark 1 : The appended track rail mounting bolts are hexagon socket head bolts of JIS B 1176 or equivalent.
2 : LRWH25 and LRWH35 are provided with an A-M6F grease nipple, while LRWH45, LRWH55 and LRWH65 are provided with an A-PT1/8 grease nipple.



Example of identification number

LRWH 25 C2 R840 T1 P

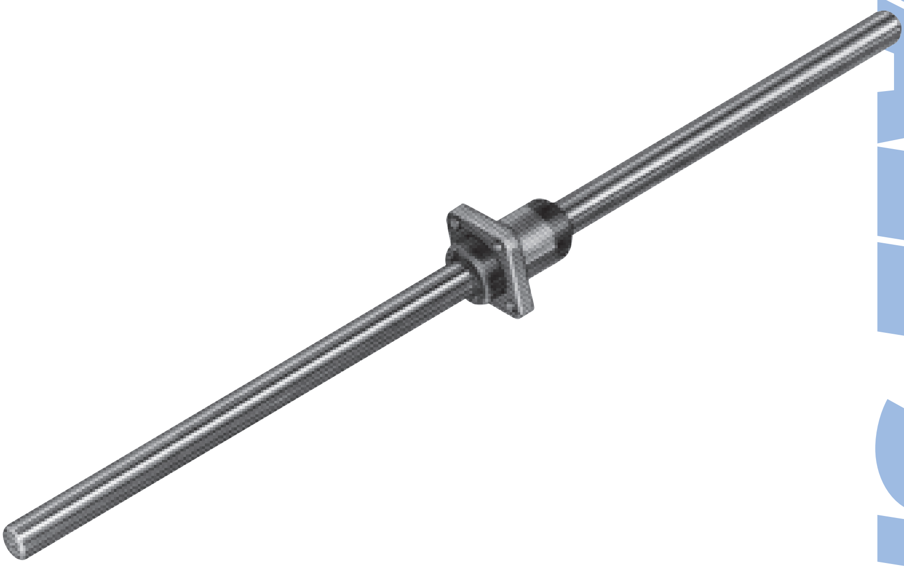
- Model code: LRWH
- Size of rolling guide
- Number of slide units (Two slide units)
- Length of track rail (840 millimeters)
- Preload amount: Standard : No symbol / Light preload : T1 / Medium preload : T2 / Heavy preload : T3
- Accuracy class: High : H / Precision : P / Super precision : SP

C
LRWH

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

Linear Ball Spline

LINEAR BALL SPLINE



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.

1 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)

2 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.

3 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)

4 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.

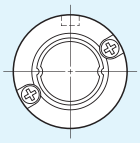
5 Smooth motion with low friction

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

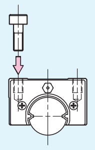
Linear Ball Spline

Linear Ball Spline G



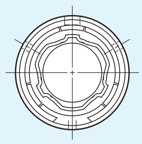
This Linear Ball Spline adopts a two row raceway and four point contact design. Owing to its simple structure, this product is compact with high rigidity. Various sizes are available in this series ranging from a very small size with the shaft diameter of 2 mm and the external cylinder diameter of 6 mm.

Block type Linear Ball Spline



This Linear Ball Spline adopts a two row raceway and four point contact design, and features a block type slide unit. As the mounting structure can be simplified, man-hours for design and assembly can be greatly reduced.

Angular type Linear Ball Spline



This Linear Ball Spline adopts a six row raceway and two point contact design, and a special structure is used for holding steel balls in place of a ball retainer. This product is compact and has large load ratings.

Series and size variation

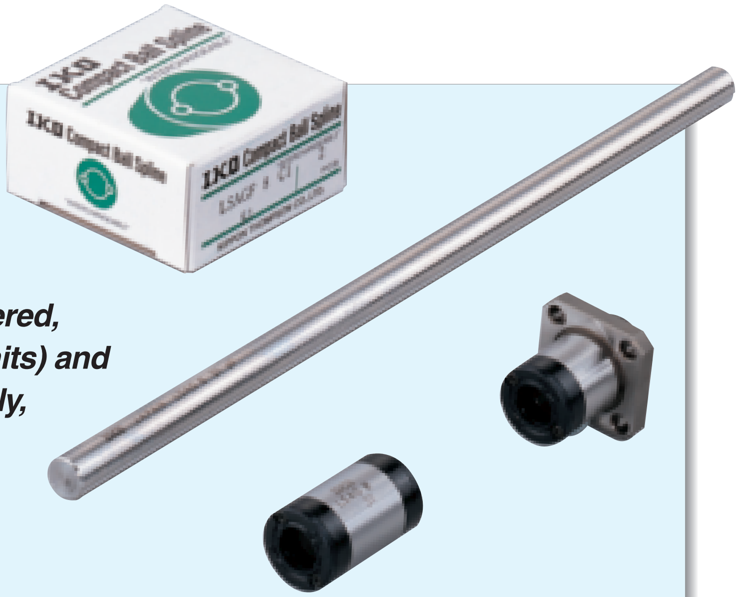
Size	Linear Ball Spline G	Block type Linear Ball Spline	Angular type Linear Ball Spline
2	○	—	—
3	○	—	—
4	○	—	—
5	○	—	—
6	○	○	—
8	○	○	—
10	○	○	—
12	○	—	—
13	—	○	—
15	○	—	○
16	—	○	—
20	○	○	○
25	○	○	○
30	○	—	○
40	○	—	○
50	—	—	○

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.

Interchangeable



A new product selection system is offered, in which external cylinders (or slide units) and spline shafts can be selected separately, as and when required !!

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.

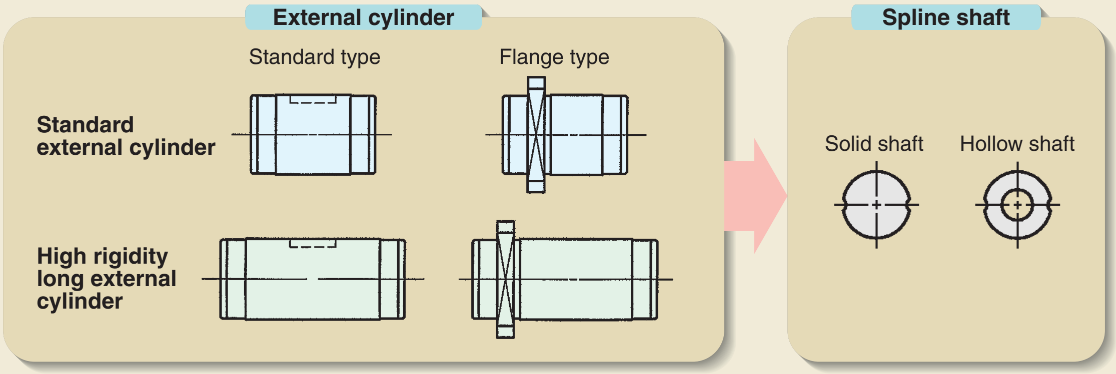
Linear Ball Spline G
(page D-28 to page D-45)
8 types and 56 models

Block type Linear Ball Spline
(page D-46 to page D-53)
3 types and 17 models

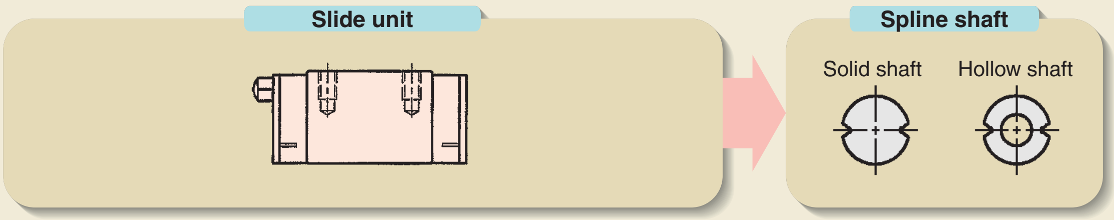
Features of interchangeable specification products [1]
Interchangeable external cylinder, Interchangeable slide unit

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.

Linear Ball Spline G



Block type Linear Ball Spline

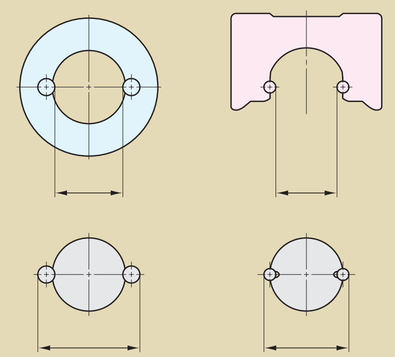


Features of interchangeable specification products [2]
Interchangeable with high accuracy

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.



High accuracy dimensional control realizing preload

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.

Interchangeable specification

External cylinder	LSAGF	10	C1			T_1	H	S2	/OH
Spline shaft	LSAG	10		R200			H	S2	
Assembled set	LSAGF	10	C2	R200		T_1	H	S2	/OH

Non-interchangeable specification

Assembled set	LSAGF	10	C2	R200		T_1	H		/OH

Model code

LSAG	LSAGT
LSAGL	LSAGLT
LSAGF	LSAGFT
LSAGFL	LSAGFLT
LSB	LSBT

Size

Size

Part code

Number of external cylinders

Length of spline shaft

Material symbol

No symbol

SL

Preload symbol

T_0

No symbol

T_1

Classification symbol

No symbol

H

P

Interchangeable code

No symbol

S1

S2

Supplemental code

/BS	/RE
/N	/S
/OH	/U
/Q	/Y

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.

Interchangeable specification

External cylinder only

(for two cylinders)

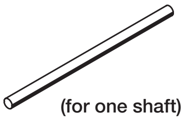
Ordering example

LSAGF 10 C1 T_1 H S2 /OH

Only "C1" meaning one external cylinder can be indicated.

Order quantity
2 pieces

Spline shaft only



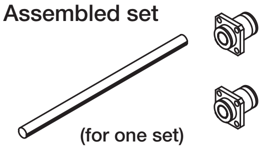
(for one shaft)

Ordering example

LSAG 10 R200 H S2

Order quantity
1 piece

Assembled set



(for one set)

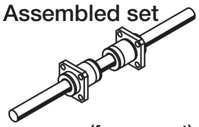
Ordering example

LSAGF 10 C2 R200 T_1 H S2 /OH

Order quantity
1 piece

Non-interchangeable specification

Assembled set



(for one set)

Ordering example

LSAGF 10 C2 R200 T_1 H /OH

Order quantity
1 piece

Load Rating

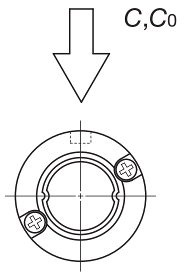
The load ratings of IKO Linear Ball Spline are defined for downward load. Summarized descriptions of load ratings are given below. For details of load rating definitions and load calculation, see "General description".

Basic dynamic load rating C

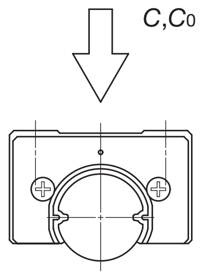
The basic dynamic load rating is defined as the constant load both in direction and magnitude under which a group of identical Linear Ball Splines are individually operated and 90% of the units in the group can travel 50 x 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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.



Linear Ball Spline G



Block type Linear Ball Spline

Fig. 1 Direction of load rating

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 x 10^3 meters free from material damage due to rolling contact fatigue.

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.

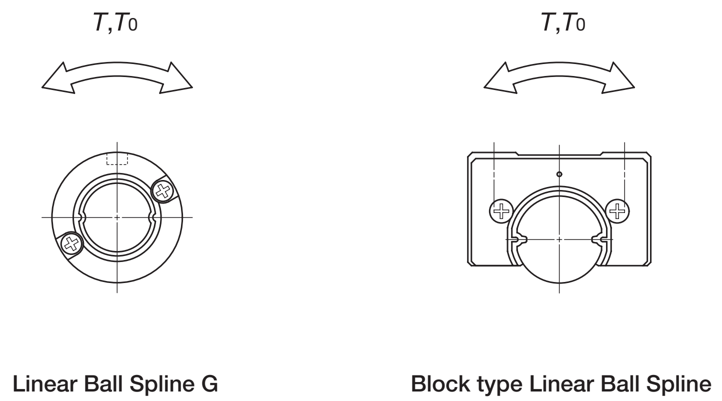


Fig. 2 Direction of dynamic torque rating and static torque rating

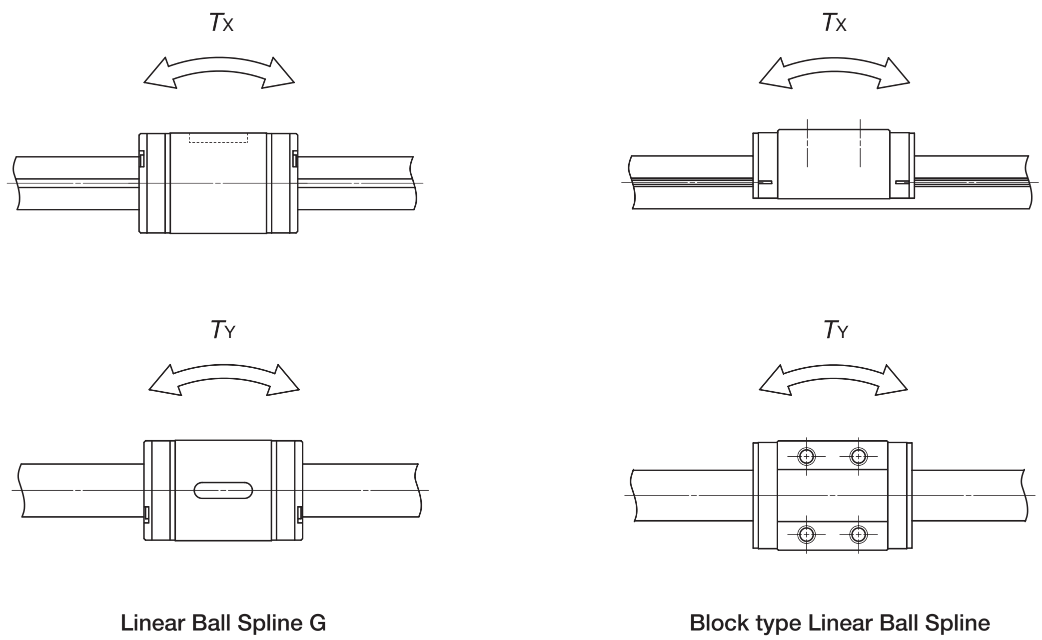
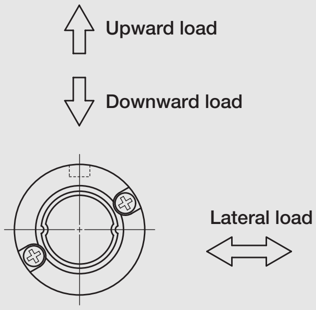


Fig. 3 Direction of static moment rating

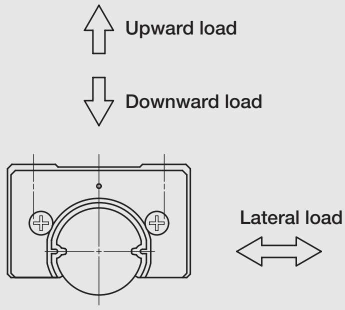
Load direction and load rating

Since the load ratings of IKO 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.

Table 1 Load ratings corrected for the load direction



Linear Ball Spline G



Block type Linear Ball Spline

Series and size \ Load rating and load direction		Dynamic load rating			Static load rating		
		Load direction			Load direction		
		Downward	Upward	Lateral	Downward	Upward	Lateral
Linear Ball Spline G	2～12	C	C	$1.47C$	C_0	C_0	$1.73C_0$
	15～50	C	C	$1.13C$	C_0	C_0	$1.19C_0$
Block type Linear Ball Spline	6～20	C	C	$0.88C$	C_0	C_0	$0.84C_0$
	25	C	C	C	C_0	C_0	C_0

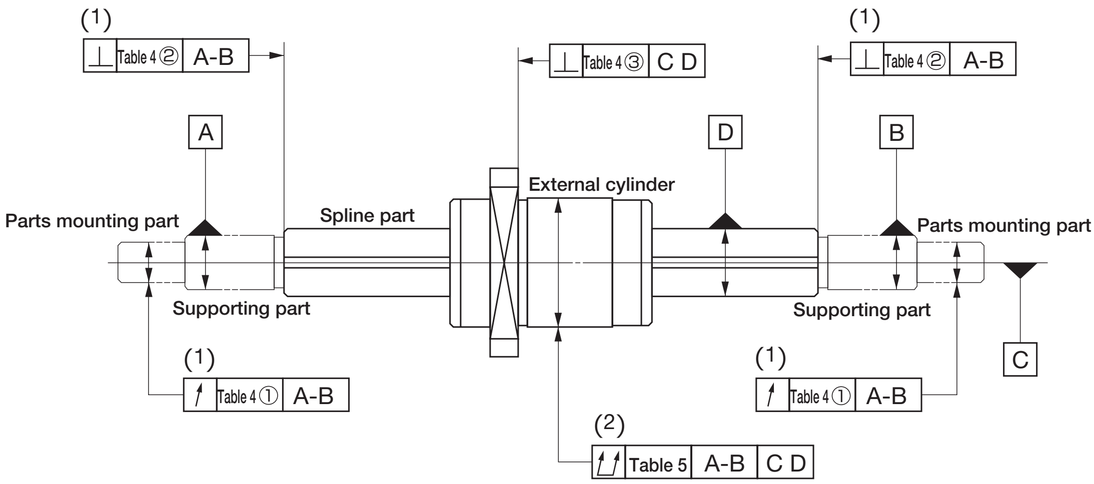
Accuracy

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 IKO for further information.

Table 2 Accuracy class

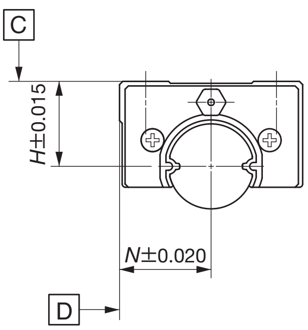
Series \ Classification (Symbol)	Ordinary (No symbol)	High (H)	Precision (P)
Linear Ball Spline G	☆	☆	○
Block type Linear Ball Spline	☆	☆	—

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



Note(1) : This accuracy is applicable when special machining is done to the shaft ends.
(2) : Also applicable to Block type Linear Ball Spline by using a measuring unit.

Fig. 4 Accuracy of Linear Ball Spline G (Example)



unit : mm

Fig. 5 Accuracy of assembled set of Block type Linear Ball Spline

Table 3 Twist of grooves with respect 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.

Table 4 Accuracy of each part of Linear Ball Spline G

unit : μm

Model number	Relative to axial line of supporting part of spline shaft						③ Perpendicularity of mounting surface of flange relative to axial line of spline shaft		
	① Radial runout of periphery of parts mounting part			② Perpendicularity of spline part end face					
	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
LSAG 5	33	14	8	22	9	6	27	11	8
LSAG 6	33	14	8	22	9	6	27	11	8
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).

Table 5 Total radial runout of axial line of spline shaft

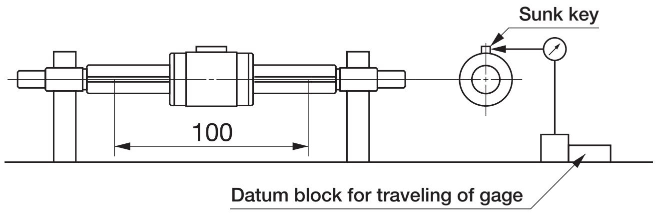
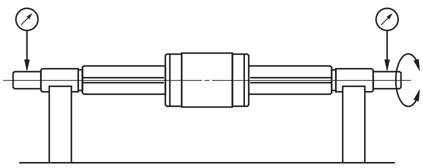
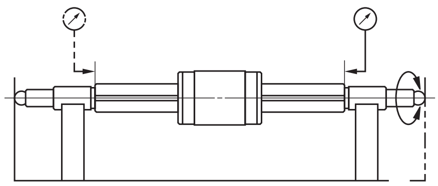
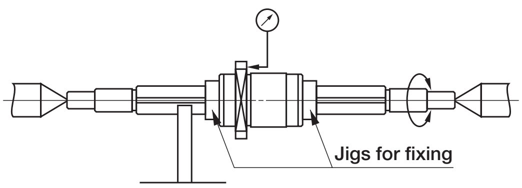
unit : μm

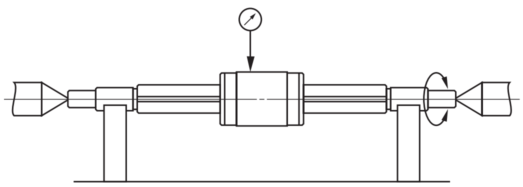
Overall length of spline shaft mm		LSAG 2 LSAG 3 LSAG 4 LSAG 5 LSAG 6 LSAG 8 LSB 6 LSB 8			LSAG 10 LSAG 12 LSB 10 LSB 13			LSAG 15 LSAG 20 LSB 16 LSB 20		
over	incl.	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
—	200	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

Overall length of spline shaft mm		LSAG 25 LSAG 30 LSB 25			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.

Table 6 Measuring methods of accuracy

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.	
(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.	

Total radial runout of axial line of spline shaft (See Table 5.)	While supporting the spline shaft at its supporting parts or at both center holes, place a dial gage probe to the external peripheral face of the external cylinder (or measuring unit), and measure the runout at several positions in the axial direction while turning the spline shaft one rotation. Use the maximum value.	

Note([1]) : This accuracy is applicable when special machining is done to the shaft ends.

Preload

The average amount of preload for IKO 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.

Table 7 Preload amount

Preload type \ Item	Symbol	Preload amount N	Application
Clearance	T_0	0 (1)	・Very smooth motion
Standard	(No symbol)	0 (2)	・Smooth and precise motion
Light preload	T_1	$0.02C_0$	・Minimum vibration ・Load is evenly balanced. ・Smooth and precise motion

Note([1]) : Zero or minimal amount of clearance
([2]) : Zero or minimal amount of preload
Remark : C_0 means the basic static load rating.

Table 8 Applicable preload typs

Series \ Preload (Symbol)	Clearance (T_0)	Standard (No symbol)	Light preload (T_1)
Linear Ball Spline G	○	☆	☆
Block type Linear Ball Spline	—	☆	☆

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

Special Specifications

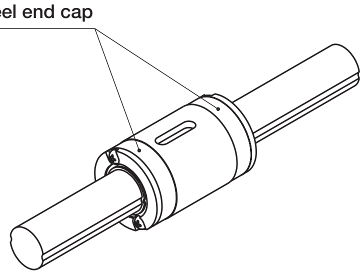
IKO Linear Ball Splines of the special specifications shown in Table 9 are available. In some cases, special specifications may not be applicable. For details, see the description of each series.
When a special specification is required, add the applicable supplemental code to the end of the identification 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

Special specification	Supplemental code	Linear Ball Spline G	Block type Linear Ball Spline
Stainless steel end caps	BS	○	—
No end seal	N	☆	☆
With an oil hole	OH	☆	—
Capillary plates	Q	☆	—
Seals for special environment	RE	○	—
Spline shaft in stainless steel	S	○	—
With under seals	U	—	☆
Specified grease	Y	○	—

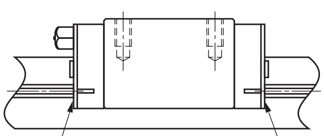
Remark 1 : The mark ☆ indicates that it is also applicable to interchangeable specification products.
2 : For details of special specifications applicable to each series and their combinations, see the description of each series.

With stainless steel end caps /BS



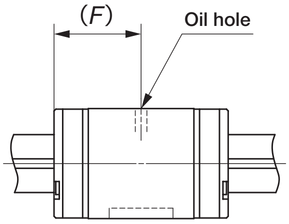
The standard synthetic resin end caps are replaced with stainless steel end caps, keeping the total length of external cylinder unchanged.

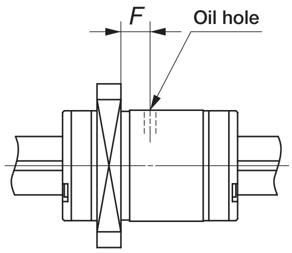
No end seal /N



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.

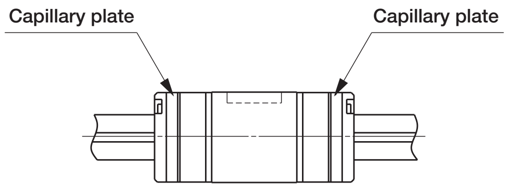
With an oil hole ／OH





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

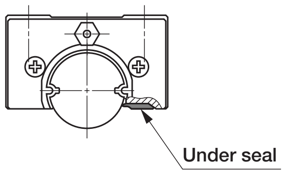


The capillary plate is assembled inside the end seal of the external cylinder. It is impregnated with lubricant so that re-lubrication interval can be made longer. For the total length of the external cylinder with capillary plate, see the description of each series.

Spline shaft in stainless steel ／S

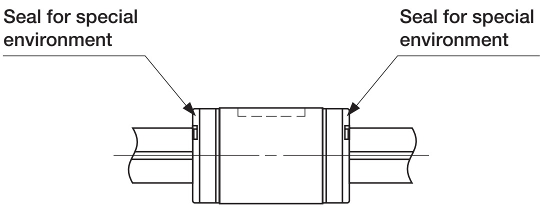
The material of solid spline shaft of Linear Ball Spline G is changed to stainless steel.
The load rating will be obtained by multiplying the load rating for the high carbon steel spline shaft by a factor of 0.8.

With under seals ／U



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.

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.

Specified grease ／YCG／YCL／YBR／YNG

The type of pre-packed grease can be changed by a supplemental code.

① ／YCG
IKO Low Dust Generation Grease for Clean Environment CG2 is pre-packed.

② ／YCL
IKO Low Dust Generation Grease for Clean Environment CGL is pre-packed.

③ ／YBR
MOLYCOTE BR2 Plus Grease (Dow Corning) is pre-packed.

④ ／YNG
No grease is pre-packed.

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 and 4 models are not provided with seals.
When requiring the size 3 and 4 models with seals, consult IKO 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".

Table 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

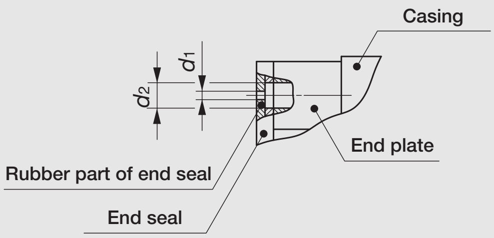
Series	Model code	Size	Grease nipple	
			Type	Applicable supply nozzle type
Block type Linear Ball Spline	LSB	6 8 10	Oil hole	Miniature greaser
		13 16 20	A–M3	A–5120V A–5240V B–5120V B–5240V
		25	A–M4	A–5120V A–5240V B–5120V B–5240V

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 99.

Table 12 Oil hole



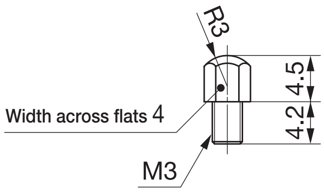
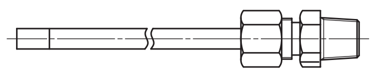
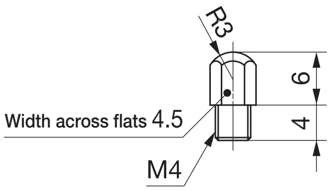
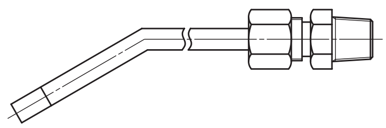
unit : mm

Series name	Size	Oil hole	
		d_1	d_2
Block type Linear Ball Spline	6 8	0.5	1.2
	10	0.5	1.5

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 95.

Table 13 Grease nipples and applicable supply nozzles

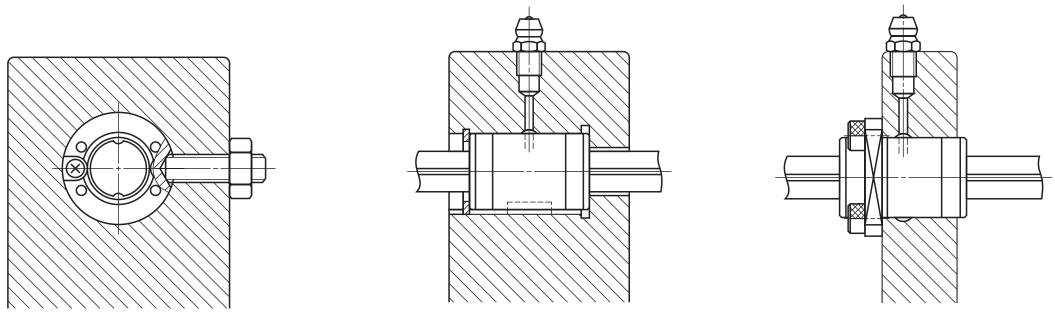
<table>
<tr><th colspan="2">Grease nipple</th><th colspan="2">Applicable supply nozzle</th></tr>
<tr><th>Type</th><th>Shape and dimension</th><th>Type</th><th>Shape</th></tr>
<tr><td>A–M3</td><td>
</td><td rowspan="2">A–5120V
A–5240V
B–5120V
B–5240V</td><td>Straight type
</td></tr>
<tr><td>A–M4</td><td>
</td><td>Straight type with angle
</td></tr>
</table>

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 screw.



External cylinder rotation detent for LSAG2, LSAG3 and LSAG(T)4 LSAG (T) LSAGF (T)

Fig. 6 Mounting examples of the external cylinder of Linear Ball Spline G

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 IKO mark. (See Fig. 7.)

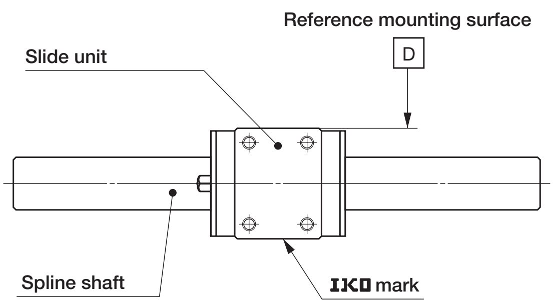


Fig. 7 Reference mounting surface

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.

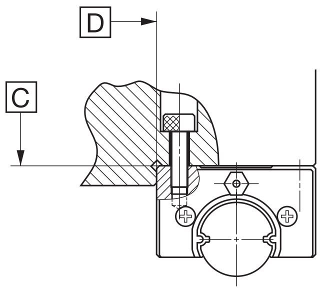
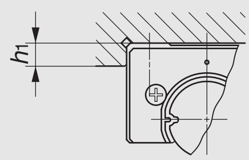


Fig. 8 Mounting example of Block type Linear Ball Spline

Table 14 Shoulder height of the mating reference mounting surface of Block type Linear Ball Spline



unit : mm

Model number	Shoulder height h_1
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.

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 IKO for further information.

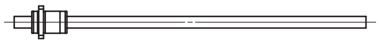
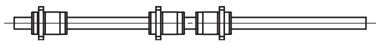
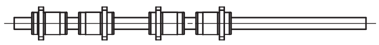
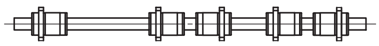
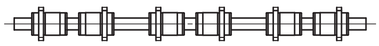
Multiple external cylinders or slide units in close distance

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 load.
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 IKO 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 IKO for further information.

Table 15 Arrangement of flange type external cylinders of Linear Ball Spline G (Non-interchangeable specification)

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 IKO.
In case of "With capillary plates" of special specification, operate below 80˚C.

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 ("S1" or "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 IKO mark and the spline shaft IKO mark face the same direction. (See Fig. 9.) So make sure not to change the assembly direction.

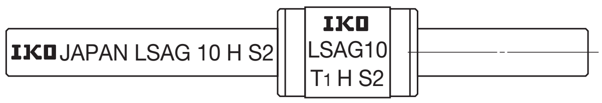


Fig. 9 Assembly direction of the external cylinder of Linear Ball Spline G

- Assembling Block type Linear Ball Spline
  When assembling the slide unit on the spline shaft, handle them with care to prevent steel balls from falling out.

Mounting the external cylinder of Linear Ball Spline G

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. 10.)

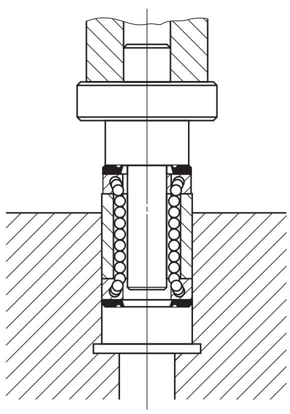


Fig. 10 Press-fitting of external cylinder of Linear Ball Spline G

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.

Table 16 Tightening torque

Bolt size	Tightening torque N・m	
	Carbon steel bolt (strength division 12.9)	Stainless steel bolt (property division A2-70)
M2 × 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	—

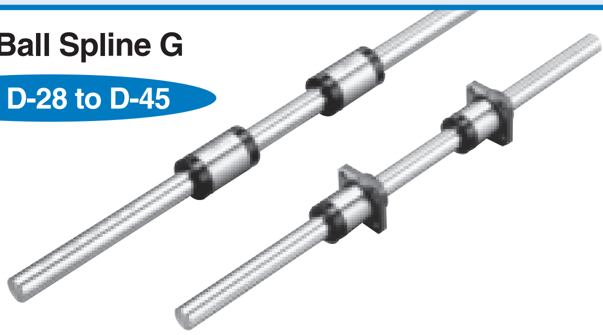
Linear Ball Splines

Description of each series and Table of dimensions

D

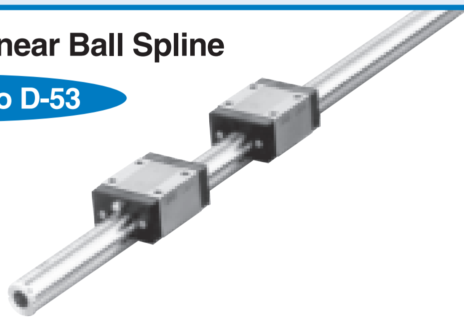
Linear Ball Spline G

Page D-28 to D-45



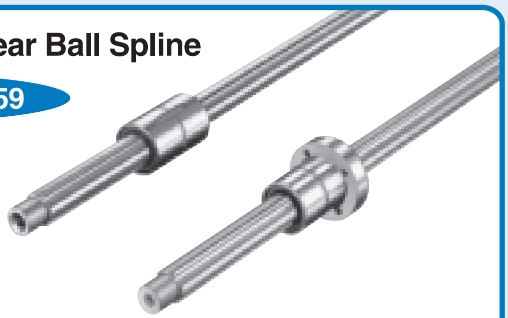
Block type Linear Ball Spline

Page D-46 to D-53



Angular type Linear Ball Spline

Page D-54 to D-59



In the table of dimensions, standard products are referred to using identification numbers marked with ▭ (shaded). 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.

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.

Standard type and flange type

External cylinders are available in two different shapes: the standard type (cylindrical shape) and the flange type.

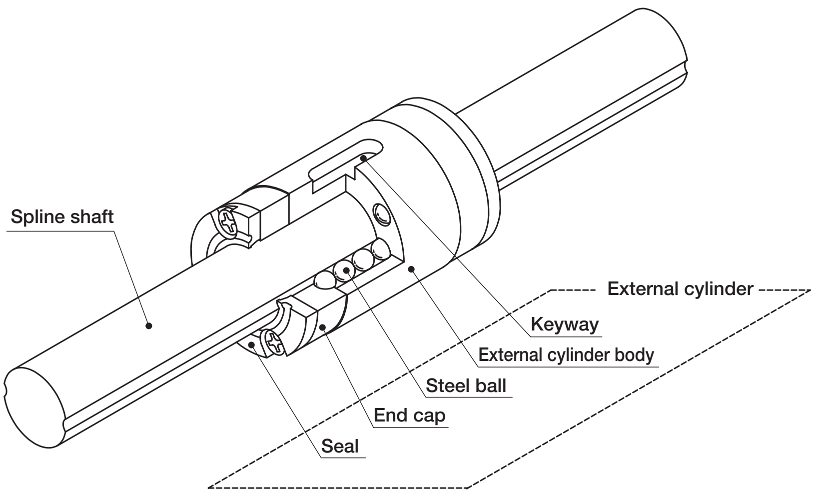
Length of external cylinder

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.

Solid shaft and hollow shaft

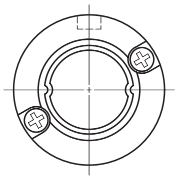
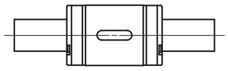
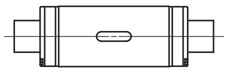
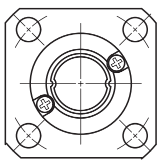
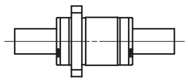
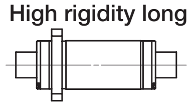
Two types of spline shaft, the solid shaft and the hollow shaft are available for selection suitable for each application.

U.S. PATENT No.6,190,046
No.6,082,899
No.4,799,803
No.4,505,522



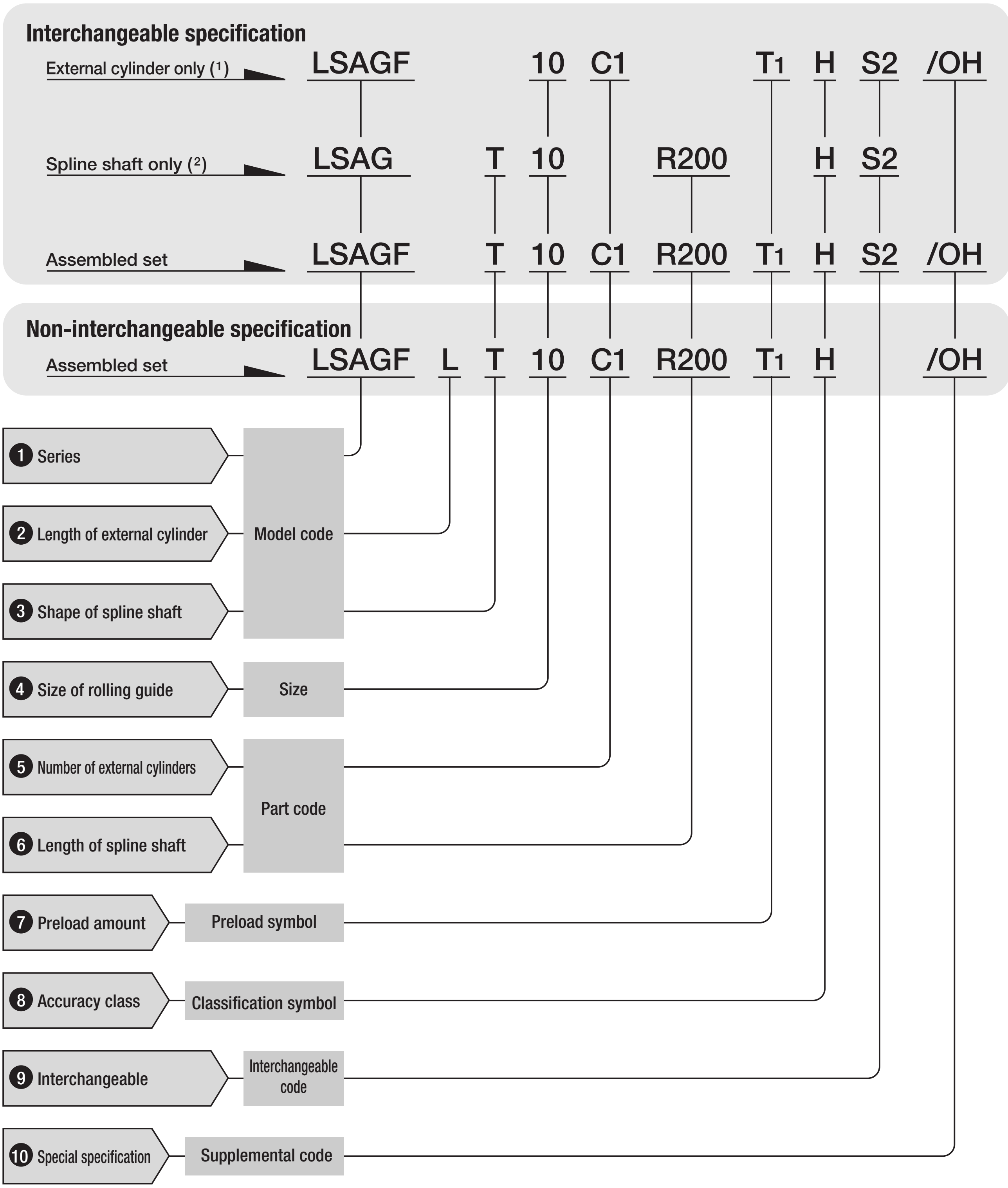
Structure of Linear Ball Spline G

Linear Ball Spline G series

Shape	Length of external cylinder	Shaft shape	Model code
Linear Ball Spline G – Standard type 	Standard 	Solid shaft	LSAG
		Hollow shaft	LSAGT
	High rigidity long 	Solid shaft	LSAGL
		Hollow shaft	LSAGLT
Linear Ball Spline G – Flange type 	Standard 	Solid shaft	LSAGF
		Hollow shaft	LSAGFT
	High rigidity long 	Solid shaft	LSAGFL
		Hollow shaft	LSAGFLT

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.

1 Series

Standard type : LSAG
Flange type : LSAGF

2 Length of external cylinder

Standard : No symbol
High rigidity long : L

3 Shape of spline shaft

Solid shaft : No symbol
Hollow shaft : T

4 Size of rolling guide

For available external cylinder models, spline shaft models, and sizes, see Tables 1.1 and 1.2.

Table 1.1 Models and sizes of Linear Ball Spline G standard type

Size \ Model	Standard		High rigidity long	
	Solid shaft LSAG	Hollow shaft LSAGT	Solid shaft LSAGL	Hollow shaft LSAGLT
2	○	—	—	—
3	○	—	—	—
4	○	○	—	—
5	☆	☆	☆	☆
6	☆	☆	☆	☆
8	☆	☆	☆	☆
10	☆	☆	☆	☆
12	☆	☆	☆	☆
15	☆	—	☆	—
20	☆	—	☆	—
25	☆	—	☆	—
30	☆	—	☆	—
40	○	—	—	—
50	○	—	—	—

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

Table 1.2 Models and sizes of Linear Ball Spline G flange type

Size \ Model	Standard		High rigidity long	
	Solid shaft LSAGF	Hollow shaft LSAGFT	Solid shaft LSAGFL	Hollow shaft LSAGFLT
2	○	—	—	—
3	○	—	—	—
4	○	○	—	—
5	☆	☆	☆	☆
6	☆	☆	☆	☆
8	☆	☆	☆	☆
10	☆	☆	☆	☆
12	☆	☆	☆	☆
15	☆	—	☆	—
20	☆	—	☆	—
25	☆	—	☆	—
30	☆	—	☆	—
40	○	—	—	—

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

5 Number of external cylinders

Assembled set : C○

External cylinder : C1

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

Assembled set : R○

Spline shaft : R○

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

Size	Preload type (Symbol) Clearance (T_0)	Standard (No symbol)	Light preload (T_1)
2	○	○	—
3	○	○	—
4	○	○	—
5	—	☆	☆
6	—	☆	☆
8	—	☆	☆
10	—	☆	☆
12	—	☆	☆
15	—	☆	☆
20	—	☆	☆
25	—	☆	☆
30	—	☆	☆
40	—	○	○
50	—	○	○

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

8 Accuracy class

Ordinary : No symbol
High : H
Precision : P

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

Size	Accuracy class (Symbol) Ordinary (No symbol)	High (H)	Precision (P)
2	○	○	○
3	○	○	○
4	○	○	○
5	☆	☆	○
6	☆	☆	○
8	☆	☆	○
10	☆	☆	○
12	☆	☆	○
15	☆	☆	○
20	☆	☆	○
25	☆	☆	○
30	☆	☆	○
40	○	○	○
50	○	○	○

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	○ (1)	—	—	
No end seal	N	☆ (2)	☆	—	
Oil hole	OH	☆ (3)	☆ (3)	—	See Table 6.1 and 6.2.
Capillary plates	Q	☆ (4)	☆ (4)	—	See Table 7.
Seal for special environment	RE	○ (1)	—	—	
Spline shaft in stainless steel	S	○ (5)(6)	—	—	
Specified grease	Y	○ (1)	—	—	

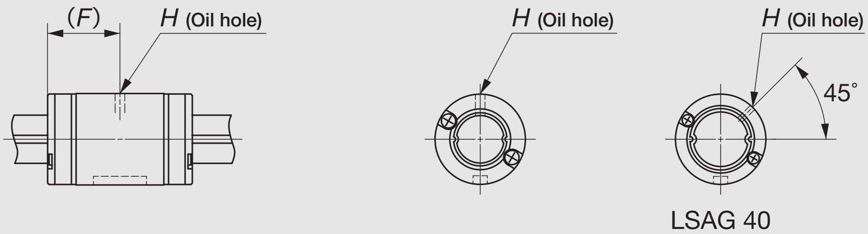
Note(1) : Applicable to size 5, 6, 8, 10, 12 and 15 models.
(2) : Not applicable to size 2, 3 and 4 models.
(3) : Not applicable to size 2 models.
(4) : Applicable to size 5, 6, 8, 10 and 12 models.
(5) : Not applicable to size 2, 3, 4, 40 and 50 models.
(6) : Not applicable to the hollow shaft.
Remark : In the table, the mark ☆ indicates that it is also applicable to interchangeable specification products.

Table 5 Combination of special specifications

N	○					
OH	○	☆				
Q	○	☆	☆			
RE	○	—	○	○		
S	○	○	○	○	○	
Y	○	○	○	—	○	○
	BS	N	OH	Q	RE	S

Remark 1 : 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 : 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)



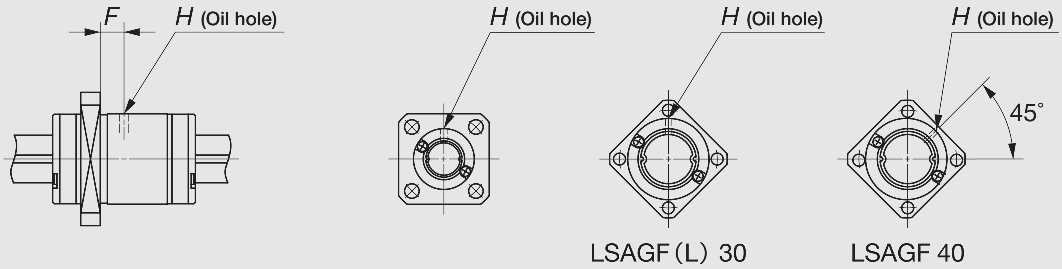
unit : mm

Model number	*F*	*H*	Model number	*F*	*H*
LSAG 3	5	1.2	**LSAG 15**	20	2
LSAG 4	6	1.5	**LSAG 20**	25	3
LSAG 5	9		**LSAG 25**	30	
LSAG 6	10.5		**LSAG 30**	35	
LSAG 8	12.5		**LSAG 40**	50	
LSAG 10	15	2	**LSAG 50**		
LSAG 12	17.5		—	—	—

Model number	*F*	*H*	Model number	*F*	*H*
—	—	—	**LSAGL 15**	32.5	2
—	—	—	**LSAGL 20**	35.5	3
LSAGL 5	13	1.5	**LSAGL 25**	42	
LSAGL 6	15		**LSAGL 30**	49	
LSAGL 8	18.5		—	—	—
LSAGL 10	23.5	2	—	—	—
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)



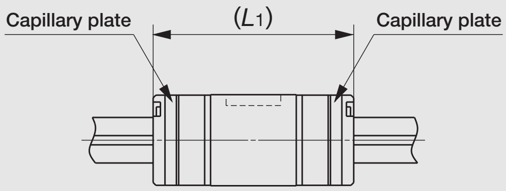
unit : mm

Model number	*F*	*H*	Model number	*F*	*H*
LSAGF 3	2.1	1.2	**LSAGF 12**	7.5	2
LSAGF 4	2.8	1.5	**LSAGF 15**	9	
LSAGF 5	2.8		**LSAGF 20**	11	3
LSAGF 6	3.5		**LSAGF 25**	13	
LSAGF 8	3.5		**LSAGF 30**	14	
LSAGF 10	5	2	**LSAGF 40**	23.4	

Model number	*F*	*H*	Model number	*F*	*H*
—	—	—	**LSAGFL 12**	17	2
—	—	—	**LSAGFL 15**	21.4	
LSAGFL 5	5.8	1.5	**LSAGFL 20**	21.5	3
LSAGFL 6	8		**LSAGFL 25**	25	
LSAGFL 8	9.5		**LSAGFL 30**	28	
LSAGFL 10	13.3	2	—	—	—

Remark : Also applicable to assembled sets of LSAGFT and LSAGFLT.

Table 7 External cylinder with Capillary plates (Supplemental code /Q)



Model number	L_1
LSAG 5	24
LSAGL 5	32
LSAG 6	27
LSAGL 6	36
LSAG 8	33
LASGL 8	45

Model number	L_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.

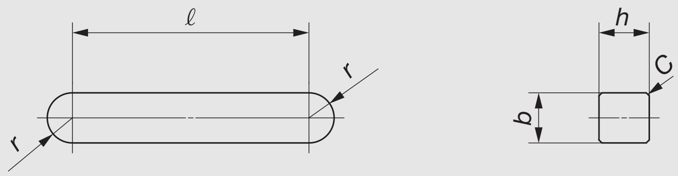
Table 8 Moment of inertia of sectional area and section modulus of spline shaft

Size	Moment of inertia of sectional area mm^4		Section modulus mm^3	
	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	94
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.

Table 9 Dimensions of key



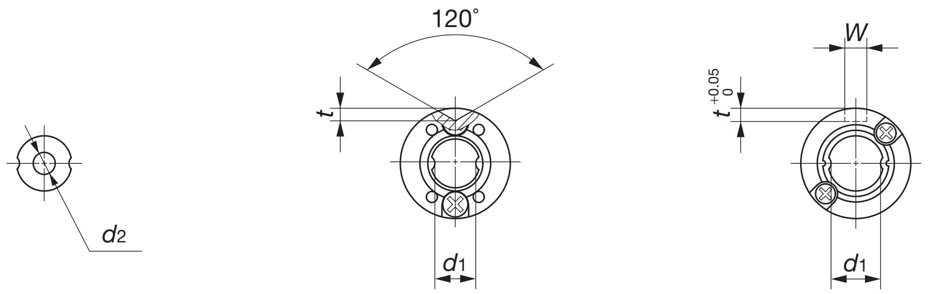
unit : mm

<table>
<tr><th>Model number</th><th>b</th><th>Tolerance</th><th>h</th><th>Tolerance</th><th>ℓ</th><th>r</th><th>C</th></tr>
<tr><td>LSAG 5</td><td rowspan="2">2</td><td rowspan="5">+0.016
+0.006</td><td rowspan="2">2</td><td rowspan="5">0
−0.025</td><td>3.8</td><td rowspan="2">1</td><td rowspan="7">0.16～0.25</td></tr>
<tr><td>LSAG 6</td><td rowspan="2">5.8</td></tr>
<tr><td>LSAG 8</td><td>2.5</td><td>2.5</td><td>1.25</td></tr>
<tr><td>LSAG 10</td><td rowspan="2">3</td><td rowspan="2">3</td><td>7.8</td><td rowspan="2">1.5</td></tr>
<tr><td>LSAG 12</td><td>11.8</td></tr>
<tr><td>LSAG 15</td><td>3.5</td><td rowspan="3">+0.024
+0.012</td><td>3.5</td><td rowspan="3">0
−0.030</td><td>16</td><td>1.75</td></tr>
<tr><td>LSAG 20</td><td>4</td><td>4</td><td>21.5</td><td>2</td></tr>
<tr><td>LSAG 25</td><td>5</td><td>5</td><td>23.5</td><td>2.5</td><td rowspan="2">0.25～0.4</td></tr>
<tr><td>LSAG 30</td><td>7</td><td rowspan="2">+0.030
+0.015</td><td>7</td><td rowspan="3">0
−0.036</td><td>27.5</td><td>3.5</td></tr>
<tr><td>LSAG 40</td><td>10</td><td>8</td><td>44.3</td><td>5</td><td rowspan="2">0.4 ～0.6</td></tr>
<tr><td>LSAG 50</td><td>15</td><td>+0.036
+0.018</td><td>10</td><td>34.3</td><td>7.5</td></tr>
</table>

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

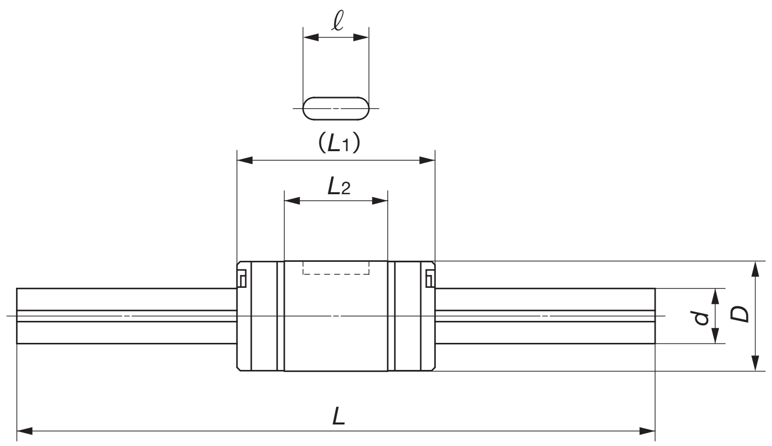
Linear Ball Spline G : Standard type

LSAG • LSAGT • LSAGL • LSAGLT



Bore dia. of hollow shaft

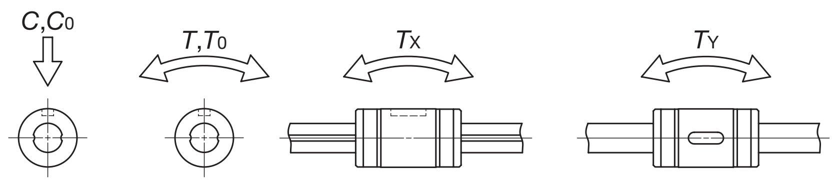
LSAG 2
LSAG 3
LSAG(T) 4



Model number	Interchangeable	Mass (Ref.) g External cylinder	Spline shaft (per 100 mm)	Dimensions and tolerances of external cylinder mm D	Tolerance	L_1	L_2	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 −0.009	12	7.9	—	—	1	—
LSAGT 4(1)			8.2								
LSAG 5	☆	4.8	14.9	10	0 −0.009	18	9.4	2	+0.014 0	1.2	6
LSAGT 5	☆		12.4								
LSAGL 5	☆	7.9	14.9			26	16.9				
LSAGLT 5	☆		12.4								
LSAG 6	☆	8.9	19	12	0 −0.011	21	12.4	2	+0.014 0	1.2	8
LSAGT 6	☆		16.5								
LSAGL 6	☆	14.5	19			30	21.4				
LSAGLT 6	☆		16.5								
LSAG 8	☆	15.9	39	15	0 −0.011	25	14.6	2.5	+0.014 0	1.5	8.5
LSAGT 8	☆		33								
LSAGL 8	☆	26.5	39			37	26.6				
LSAGLT 8	☆		33								

Dimensions and tolerance of spline shaft mm d	Tolerance	d_1(2)	d_2	L(3)	Maximum length	Basic dynamic load rating(4) C N	Basic static load rating(4) C_0 N	Dynamic torque rating(4) T N·m	Static torque rating(4) T_0 N·m	Static moment rating(4) T_X N·m	T_Y 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 −0.012	3.2	—	100 150	200	303	380	0.70	0.87	0.52 2.9	0.90 5.0
			1.5		150						
5	0 −0.012	4.2	—	100 150	200	587	641	1.8	1.9	1.0 7.9	1.8 13.6
			2								
			—			879	1 180	2.6	3.5	3.2 19.3	5.5 33.4
			2								
6	0 −0.012	5.2	—	150 200	300	711	855	2.5	3.0	1.7 11.7	3.0 20.3
			2								
			—			1 030	1 500	3.6	5.2	5.0 27.6	8.6 47.8
			2								
8	0 −0.015	7	—	150 200 250	500	1 190	1 330	5.5	6.2	3.3 22.0	5.6 38.1
			3		400						
			—		500	1 800	2 470	8.4	11.5	10.3 56.3	17.8 97.5
			3		400						

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 (C_0), dynamic torque rating (T) and static torque/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 external cylinder, and the lower values apply to two external cylinders in close contact.
Remark : The mark ☆ indicates that interchangeable specification products are available.



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

LSAG 5 C2 R150 T1 H S2 /OH

- Model code: LSAG, LSAGT, LSAGL, LSAGLT
- Size of rolling guide
- Number of external cylinders (Two cylinders)
- Overall length of spline shaft (150 millimeters)
- Preload amount: Clearance : T_0; Standard : No symbol; Light preload : T_1
- Accuracy class: Ordinary : No symbol; High : H; Precision : P
- Interchangeable code: Interchangeable : S2; Non interchangeable : No Symbol
- Special specification: Oil hole : /OH

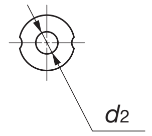
D

LSAG, LSAGF

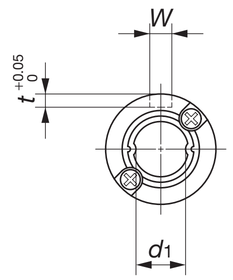
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

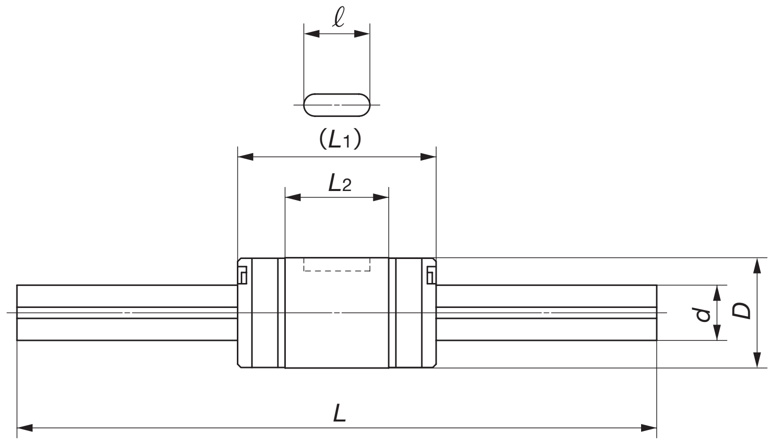
IKO Linear Ball Spline G : Standard type

LSAG • LSAGT • LSAGL • LSAGLT



Bore dia. of hollow shaft

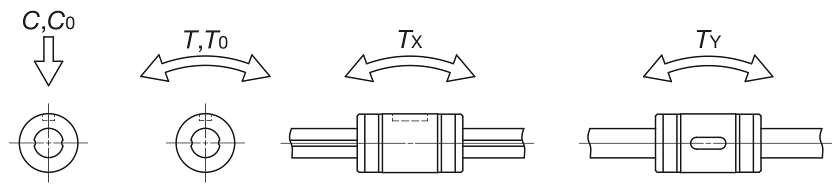




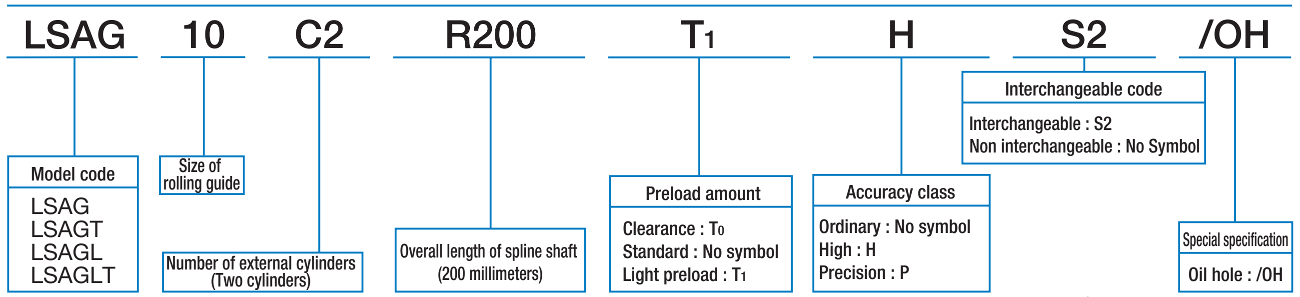
Model number	Interchangeable	Mass (Ref.) g External cylinder	Mass (Ref.) g Spline shaft (per 100 mm)	Dimensions and tolerances of external cylinder mm D	Tolerance	L_1	L_2	W	Tolerance	t	ℓ	d	Tolerance
LSAG 10	☆	31.5	60.5	19	0 −0.013	30	18.2	3	+0.014 0	1.8	11	10	0 −0.015
LSAGT 10	☆		51										
LSAGL 10	☆	56.5	60.5			47	34.9						
LSAGLT 10	☆		51										
LSAG 12	☆	44	87.5	21	0 −0.013	35	23	3	+0.014 0	1.8	15	12	0 −0.018
LSAGT 12	☆		66										
LSAGL 12	☆	76.8	87.5			54	42						
LSAGLT 12	☆		66										
LSAG 15	☆	59.5	111	23	0 −0.013	40	27	3.5	+0.018 0	2	20	13.6	0 −0.018
LSAGL 15	☆	110				65	52						
LSAG 20	☆	130	202	30	0 −0.016	50	33	4	+0.018 0	2.5	26	18.2	0 −0.021
LSAGL 20	☆	198				71	54						
LSAG 25	☆	220	310	37	0 −0.016	60	39.2	5	+0.018 0	3	29	22.6	0 −0.021
LSAGL 25	☆	336				84	63.2						
LSAG 30	☆	430	450	45	0 −0.016	70	43	7	+0.022 0	4	35	27.2	0 −0.021
LSAGL 30	☆	634				98	71						
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

Model number	Dimensions and tolerance of spline shaft mm d_1(1)	d_2	L(2)	Maximum length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Dynamic torque rating(3) T N・m	Static torque rating(3) T_0 N・m	Static moment rating(3) T_X N・m	Static moment rating(3) T_Y N・m
LSAG 10	8.9	—	200 300	600	1 880	2 150	10.9	12.5	7.0 41.5	12.1 71.9
LSAGT 10		4								
LSAGL 10		—			2 850	4 040	16.6	23.4	22.7 115	39.3 200
LSAGLT 10		4								
LSAG 12	10.9	—	200 300 400	800	2 180	2 690	14.8	18.3	10.6 59.1	18.3 102
LSAGT 12		6								
LSAGL 12		—			3 220	4 850	21.9	33.0	32.2 157	55.7 272
LSAGLT 12		6								
LSAG 15	11.6	—	200 300 400	1 000	4 180	6 070	31.3	45.6	27.8 152	33.2 181
LSAGL 15					6 400	11 500	48.0	86.5	94.0 449	112 535
LSAG 20	15.7	—	300 400 500 600	1 000	6 600	9 040	66.0	90.4	48.6 288	58.0 343
LSAGL 20					9 270	15 100	92.7	151	127 620	151 738
LSAG 25	19.4	—	300 400 500 600 800	1 200	11 200	14 300	139	178	92.8 551	111 656
LSAGL 25					15 400	23 200	193	290	229 1 190	273 1 420
LSAG 30	23.5	—	400 500 600 700 1 100	1 200	15 400	19 400	231	292	147 874	176 1 040
LSAGL 30					21 300	31 600	320	474	364 1 900	434 2 260
LSAG 40	33.5	—	400 500 600 700 1 100	1 200	21 300	31 600	426	632	364 1 940	434 2 310
LSAG 50	42.0	—	400 500 600 700 1 100	1 200	28 300	36 100	707	904	389 2 300	464 2 740

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 (C_0), dynamic torque rating (T) and static torque/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 external cylinder, and the lower values apply to two external cylinders in close contact.
Remark : The mark ☆ indicates that interchangeable specification products are available.



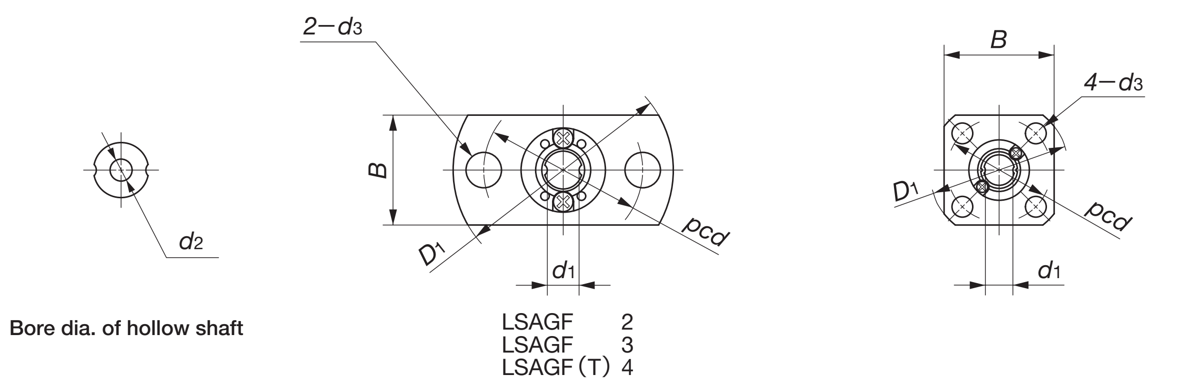
Example of identification number of assembled set (For details, see "Identification number and specification".)

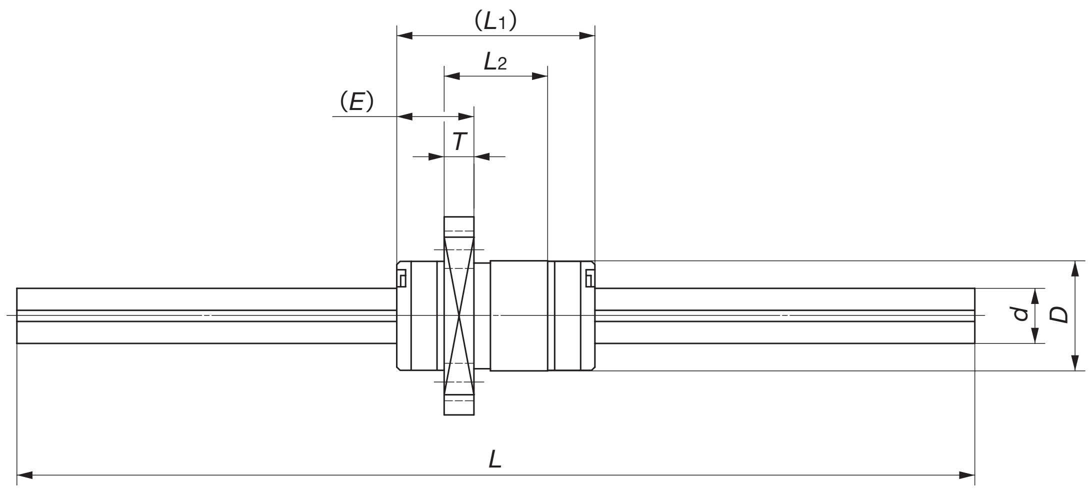


1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Linear Ball Spline G : Flange type

LSAGF • LSAGFT • LSAGFL • LSAGFLT

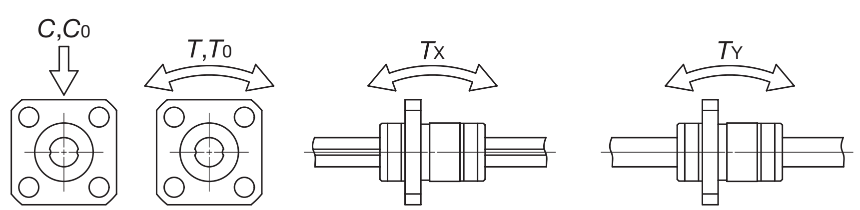




Model number	Interchangeable	Mass (Ref.) g External cylinder	Spline shaft (per 100 mm)	Dimensions and tolerance of external cylinder mm D	Tolerance	L_1	L_2	D_1	B	E	T	pcd	d_3
LSAGF 2(1)		1.9	2.3	6	0 −0.008	8.5	4.7	15.5	8	3.4	1.5	11	2.4
LSAGF 3(1)		3.7	5.4	7	0 −0.009	10	5.9	18	9	4	1.9	13	2.9
LSAGF 4(1)		5.1	9.6	8	0 −0.009	12	7.9	21	10	4.6	2.5	15	3.4
LSAGFT 4(1)			8.2										
LSAGF 5	☆	8.9	14.9	10	0 −0.009	18	9.4	23	18	7	2.7	17	3.4
LSAGFT 5	☆		12.4										
LSAGFL 5	☆	12	14.9			26	16.9						
LSAGFLT 5	☆		12.4										
LSAGF 6	☆	13.9	19	12	0 −0.011	21	12.4	25	20	7	2.7	19	3.4
LSAGFT 6	☆		16.5										
LSAGFL 6	☆	19.5	19			30	21.4						
LSAGFLT 6	☆		16.5										
LSAGF 8	☆	23.5	39	15	0 −0.011	25	14.6	28	22	9	3.8	22	3.4
LSAGFT 8	☆		33										
LSAGFL 8	☆	34.1	39			37	26.6						
LSAGFLT 8	☆		33										

Dimensions and tolerance of spline shaft mm d	Tolerance	d_1(2)	d_2	L(3)	Maximum length	Basic dynamic load rating(4) C N	Basic static load rating(4) C_0 N	Dynamic torque rating(4) T N·m	Static torque rating(4) T_0 N·m	Static moment rating(4) T_X N·m	T_Y 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 −0.012	3.2	—	100 150	200	303	380	0.70	0.87	0.52 2.9	0.90 5.0
			1.5		150						
5	0 −0.012	4.2	—	100 150	200	587	641	1.8	1.9	1.0 7.9	1.8 13.6
			2								
			—			879	1 180	2.6	3.5	3.2 19.3	5.5 33.4
			2								
6	0 −0.012	5.2	—	150 200	300	711	855	2.5	3.0	1.7 11.7	3.0 20.3
			2								
			—			1 030	1 500	3.6	5.2	5.0 27.6	8.6 47.8
			2								
8	0 −0.015	7	—	150 200 250	500	1 190	1 330	5.5	6.2	3.3 22.0	5.6 38.1
			3		400						
			—		500	1 800	2 470	8.4	11.5	10.3 56.3	17.8 97.5
			3		400						

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 (C_0), dynamic torque rating (T) and static torque/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 external cylinder, and the lower values apply to two external cylinders in close contact.
Remark : The mark ☆ indicates that interchangeable specification products are available.



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

LSAGF 5 C2 R150 T1 H S2 /OH

- LSAGF — Model code: LSAGF, LSAGFT, LSAGFL, LSAGFLT
- 5 — Size of rolling guide
- C2 — Number of external cylinders (Two cylinders)
- R150 — Overall length of spline shaft (150 millimeters)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- H — Accuracy class: Ordinary : No symbol; High : H; Precision : P
- S2 — Interchangeable code: Interchangeable : S2; Non interchangeable : No Symbol
- /OH — Special specification: Oil hole : /OH

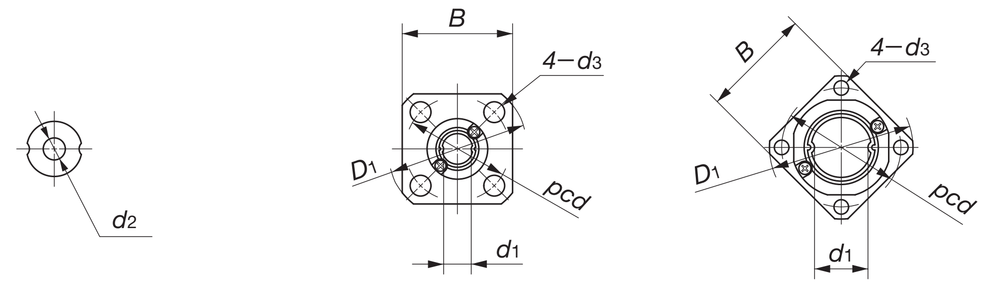
D

LSAG, LSAGF

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

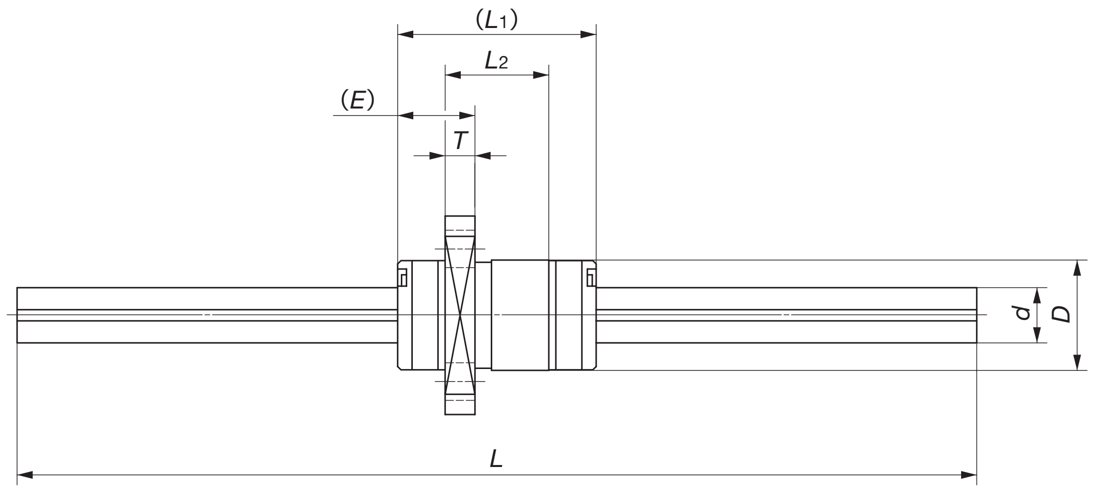
Linear Ball Spline G : Flange type

LSAGF • LSAGFT • LSAGFL • LSAGFLT



Bore dia. of hollow shaft

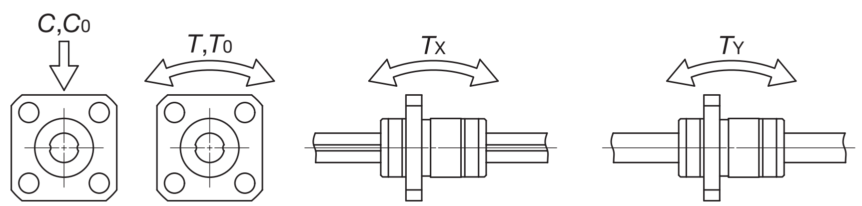
LSAGF (L) 30
LSAGF 40



Model number	Interchangeable	Mass (Ref.) g: External cylinder	Mass (Ref.) g: Spline shaft (per 100 mm)	Dimensions and tolerance of external cylinder mm: D	Tolerance	L_1	L_2	D_1	B	E	T	pcd	d_3	d	Tolerance
LSAGF 10	☆	45	60.5	19	0 −0.013	30	18.2	36	28	10	4.1	28	4.5	10	0 −0.015
LSAGFT 10	☆		51												
LSAGFL 10	☆	70.1	60.5			47	34.9								
LSAGFLT 10	☆		51												
LSAGF 12	☆	59	87.5	21	0 −0.013	35	23	38	30	10	4	30	4.5	12	0 −0.018
LSAGFT 12	☆		66												
LSAGFL 12	☆	91.8	87.5			54	42								
LSAGFLT 12	☆		66												
LSAGF 15	☆	77	111	23	0 −0.013	40	27	40	31	11	4.5	32	4.5	13.6	0 −0.018
LSAGFL 15	☆	128				65	52								
LSAGF 20	☆	150	202	30	0 −0.016	50	33	46	35	14	5.5	38	4.5	18.2	0 −0.021
LSAGFL 20	☆	218				71	54								
LSAGF 25	☆	255	310	37	0 −0.016	60	39.2	57	43	17	6.6	47	5.5	22.6	0 −0.021
LSAGFL 25	☆	371				84	63.2								
LSAGF 30	☆	476	450	45	0 −0.016	70	43	65	50	21	7.5	54	6.6	27.2	0 −0.021
LSAGFL 30	☆	680				98	71								
LSAGF 40		962	808	60	0 −0.019	100	70.8	93	73	26.6	12	73	9	37.2	0 −0.025

Model number	Dimensions and tolerance of spline shaft mm: d_1(1)	d_2	L(2)	Maximum length	Basic dynamic load rating(3) C N	Basic static load rating(3) C_0 N	Dynamic torque rating(3) T N·m	Static torque rating(3) T_0 N·m	Static moment rating(3) T_X N·m	T_Y N·m
LSAGF 10	8.9	—	200 300	600	1 880	2 150	10.9	12.5	7.0 41.5	12.1 71.9
LSAGFT 10		4								
LSAGFL 10		—			2 850	4 040	16.6	23.4	22.7 115	39.3 200
LSAGFLT 10		4								
LSAGF 12	10.9	—	200 300 400	800	2 180	2 690	14.8	18.3	10.6 59.1	18.3 102
LSAGFT 12		6								
LSAGFL 12		—			3 220	4 850	21.9	33.0	32.2 157	55.7 272
LSAGFLT 12		6								
LSAGF 15	11.6	—	200 300 400	1 000	4 180	6 070	31.3	45.6	27.8 152	33.2 181
LSAGFL 15					6 400	11 500	48.0	86.5	94.0 449	112 535
LSAGF 20	15.7	—	300 400 500 600	1 000	6 600	9 040	66.0	90.4	48.6 288	58.0 343
LSAGFL 20					9 270	15 100	92.7	151	127 620	151 738
LSAGF 25	19.4	—	300 400 500 600 800	1 200	11 200	14 300	139	178	92.8 551	111 656
LSAGFL 25					15 400	23 200	193	290	229 1 190	273 1 420
LSAGF 30	23.5	—	400 500 600 700 1 100	1 200	15 400	19 400	231	292	147 874	176 1 040
LSAGFL 30					21 300	31 600	320	474	364 1 900	434 2 260
LSAGF 40	33.5	—	400 500 600 700 1 100	1 200	21 300	31 600	426	632	364 1 940	434 2 310

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 (C_0), dynamic torque rating (T) and static torque/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 external cylinder, and the lower values apply to two external cylinders in close contact.
Remark : The mark ☆ indicates that interchangeable specification products are available.



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

LSAGF 12 C2 R300 T1 H S2 /OH

- LSAGF — Model code: LSAGF, LSAGFT, LSAGFL, LSAGFLT
- 12 — Size of rolling guide
- C2 — Number of external cylinders (Two cylinders)
- R300 — Overall length of spline shaft (300 millimeters)
- T1 — Preload amount: Clearance : T0; Standard : No symbol; Light preload : T1
- H — Accuracy class: Ordinary : No symbol; High : H; Precision : P
- S2 — Interchangeable code: Interchangeable : S2; Non interchangeable : No Symbol
- /OH — Special specification: Oil hole : /OH

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

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 exchanged freely.

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 semi-conductor manufacturing equipment.

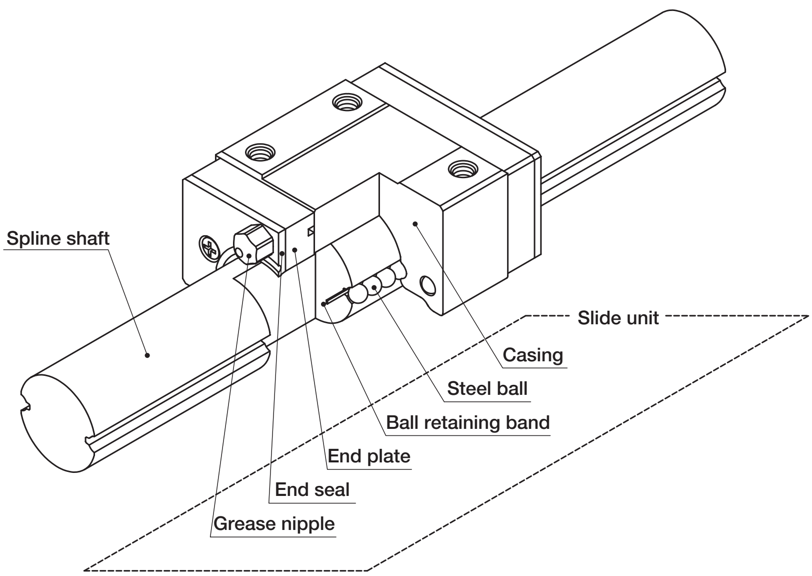
Easy mounting

The slide unit is provided with threaded mounting holes for easy mounting on machines or equipment with bolts.

Hollow shaft

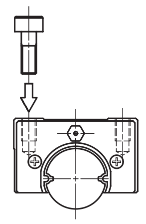
In high carbon steel type, hollow shafts are also available in addition to solid shafts. The hollow shafts are suitable for applications in which piping, wiring or ventilation is needed.

U.S. PATENT No.5,490,729
No.4,505,522



Structure of Block type Linear Ball Spline

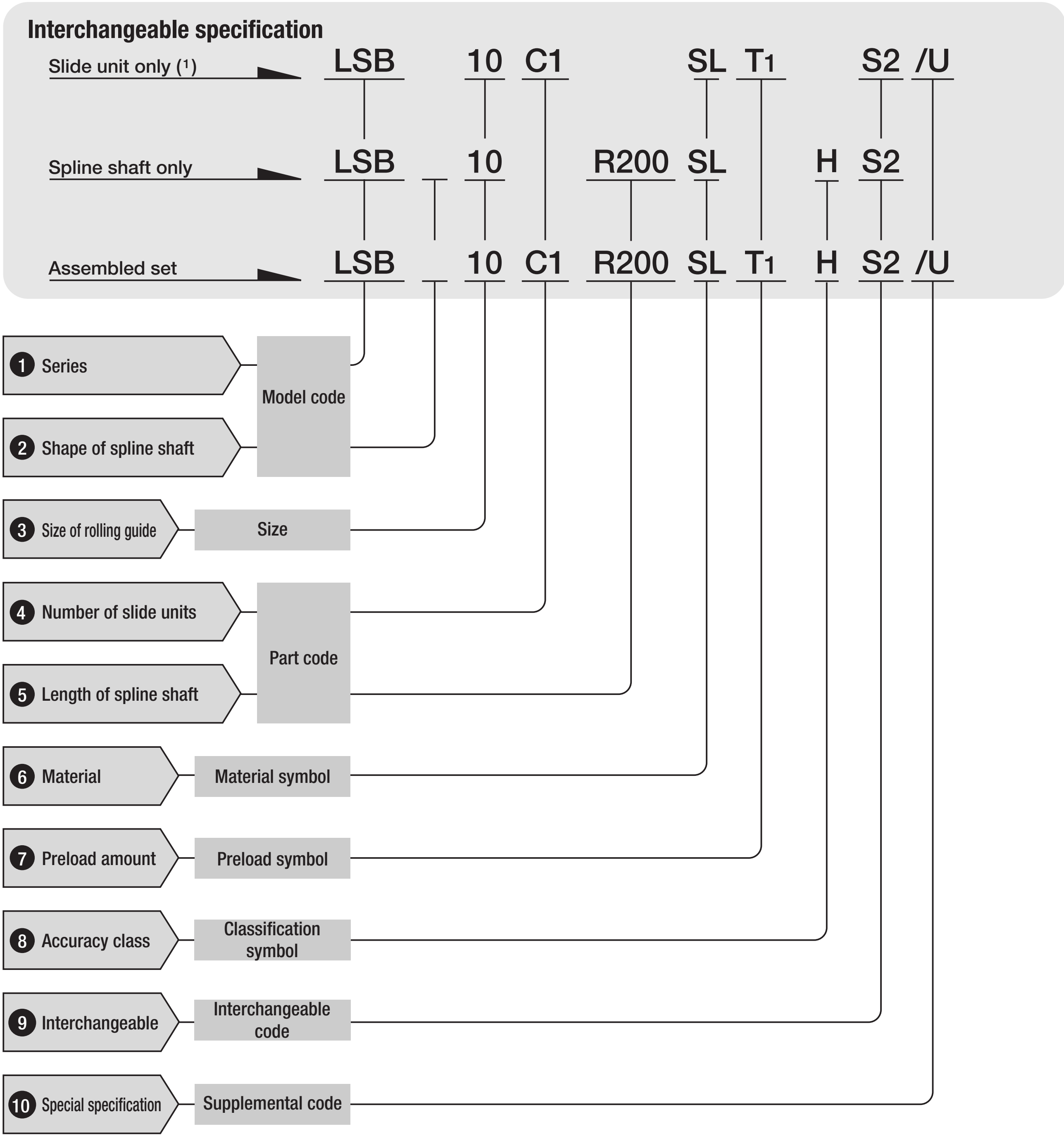
Block type Linear Ball Spline series

	Shape	Shaft shape	Model code
Block type Linear Ball Spline		Solid shaft	LSB LSB···SL
		Hollow shaft	LSBT

Remark : Models with "SL" are stainless steel type.

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.

❶ Series	LSB	
❷ Shape of spline shaft	Solid shaft : No symbol Hollow shaft : T	For available slide unit models, materials and sizes, see Table 1.1. For available spline shaft models, materials and sizes, see Table 1.2.
❸ Size of rolling guide		
❹ Number of slide units	Assembled set : C○ Slide unit : C1	For an assembled set, indicate the number of slide units assembled on one spline shaft. For a slide unit, only "C1" can be indicated.
❺ Length of spline shaft	Assembled set : R○ Spline shaft : R○	Indicate the length of spline shaft in mm. For standard and maximum lengths of spline shafts, see the table of dimensions.
❻ Material	High carbon steel made : No symbol Stainless steel made : SL	For available material types, see Tables 1.1 and 1.2.

Table 1.1 Models and sizes of slide unit of Block type Linear Ball Spline

Size \ Model	High carbon steel made LSB…C1…S1 LSB…C1…S2	Stainless steel made LSB…C1 SL…S1 LSB…C1 SL…S2
6	—	☆
8	—	☆
10	—	☆
13	☆	—
16	☆	—
20	☆	—
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

Size \ Model	High carbon steel made		Stainless steel made
	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	☆	☆

8 Accuracy class	Ordinary : No symbol High : H	Specify this item for an assemble set or a single spline shaft. For details of accuracy, see page D-11.
9 Interchangeable code	Select group 1 : S1 Select group 2 : S2	Assemble slide units 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 3. For details of special specifications, see page D-16.

Table 3 Special specifications of Block type Linear Ball Spline

Special specification	Supplemental code
No end seal	N
With under seals	U

Remark 1 : Applicable to a single slide unit and an assembled set.
2 : "No end seal" and "With under seals" cannot be combined.

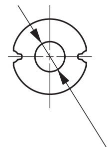
Moment of inertia of sectional area and section modulus of spline shaft

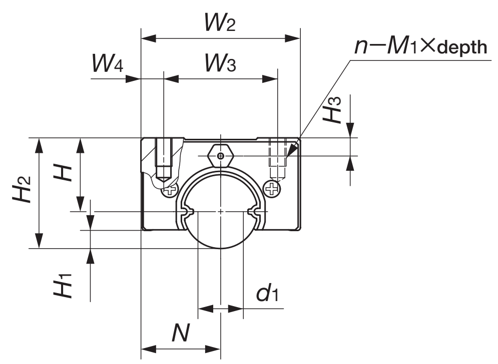
Moment of inertia of sectional area and section modulus of the spline shaft are shown in Table 4.

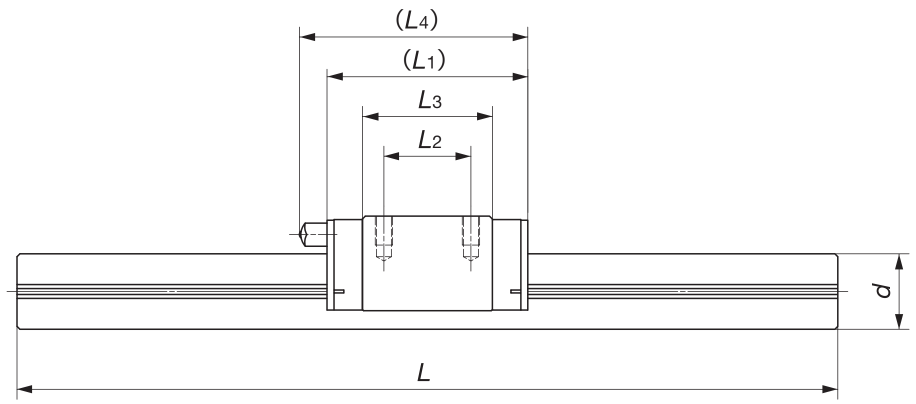
Table 4 Moment of inertia of sectional area and section modulus of spline shaft

Size	Moment of inertia of sectional area mm^4		Section modulus mm^3	
	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

LSB • LSBT





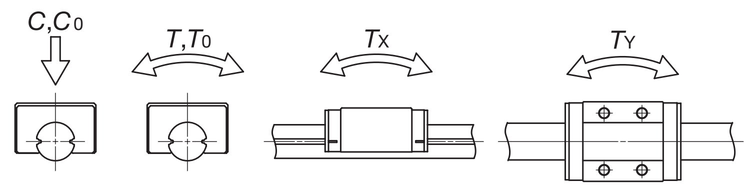


Model number	Interchangeable	Mass (Ref.) g Slide unit	Mass (Ref.) g Spline shaft (per 100 mm)	Dimensions of assembly mm H	H_1	H_2	N	Dimensions of slide unit mm W_2	W_3	W_4	L_1	L_2	L_3	L_4	n—M_1×depth	H_3
LSB 6	☆	7.6	21.2	6	1.1	9	6.5	13	8	2.5	19	—	12.5	—	2—M2× 3	1.5
LSBT 6	☆		18.8													
LSB 6 ···SL	☆		21.2													
LSB 8	☆	18	37.6	8	1.3	12	9	18	12	3	25	8	15.6	—	4—M3× 3	1.5
LSBT 8	☆		32.1													
LSB 8 ···SL	☆		37.6													
LSB 10	☆	34	59.7	10	1.9	15	10.5	21	15	3	31	10	21.2	—	4—M3× 4	2.5
LSBT 10	☆		49.8													
LSB 10 ···SL	☆		59.7													
LSB 13	☆	62	100	13	3.2	19.5	14	28	20	4	35	15	22.4	40	4—M3× 5	3.2
LSBT 13	☆		77.9													
LSB 16	☆	112	152	16	4.2	24	16.5	33	25	4	43	20	28.8	48	4—M4× 6	4
LSBT 16	☆		113													
LSB 20	☆	215	240	20	5.8	30	20	40	30	5	53	25	37.3	58	4—M5×10	5
LSBT 20	☆		178													
LSB 25	☆	403	376	25	6	37.5	26	52	40	6	67	30	41.8	70	4—M6×12	6
LSBT 25	☆		237													

Dimensions and tolerance of spline shaft mm d	Tolerance(1)	d_1(2)	d_2	L(3)	Maximum length	Basic dynamic load rating(4) C N	Basic static load rating(4) C_0 N	Dynamic torque rating(4) T N·m	Static torque rating(4) T_0 N·m	Static moment rating(4) T_X N·m	T_Y N·m
6	0 / −0.012	3.7	—	150 200	300	612	1 130	1.8	3.4	2.4 / 13.3	2.0 / 11.2
			2								
			—			489	907	1.5	2.7	1.9 / 10.7	1.6 / 8.9
8	0 / −0.015	5	—	150 200 250	500	1 200	1 960	4.8	7.8	4.9 / 31.4	4.1 / 26.3
			3		400						
			—		500	963	1 570	3.9	6.3	3.9 / 25.1	3.3 / 21.1
10	0 / −0.015	6.9	—	200 300	600	1 610	2 860	8.1	14.3	9.4 / 55.0	7.9 / 46.2
			4								
			—			1 290	2 290	6.5	11.4	7.5 / 44.0	6.3 / 36.9
13	0 / −0.018	9	—	200 300 400	800	2 960	4 450	19.2	28.9	16.0 / 99.9	13.4 / 83.8
			6								
16	0 / −0.018	11.4	—	200 300 400	1 000	4 390	6 730	35.1	53.9	30.8 / 183	25.9 / 153
			8								
20	0 / −0.021	15	—	300 400 500 600	1 000	5 830	9 420	58.3	94.2	54.6 / 310	45.8 / 260
			10								
25	0 / −0.021	19.3	—	300 400 500 600 800	1 200	9 360	13 900	122	181	99.2 / 587	99.2 / 587
			15								

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 (C_0), dynamic torque rating (T) and static torque/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.

Remark 1 : All Block type Linear Ball Splines are interchangeable specification products.
2 : Models LSB6, LSBT6, LSB6···SL, LSB8, LSBT8, LSB8···SL, LSB10, LSBT10 and LSB10···SL are provided with an oil hole.
For grease nipple and oil hole specifications, see page D-19.



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

LSB 10 C2 R300 SL T1 H S2 /N

- LSB — Model code: LSB, LSBT
- 10 — Size of rolling guide
- C2 — Number of slide units (Two slide units)
- R300 — Overall length of spline shaft (300 millimeters)
- SL — Material: High carbon steel made : No symbol; Stainless steel made : SL
- T1 — Preload amount: Standard : No symbol; Light preload : T1
- H — Accuracy class: Ordinary : No symbol; High : H
- S2 — Interchangeable code: Interchangeable : S2; Non interchangeable : No symbol
- /N — Special specification: No end seal : /N

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

Angular type Linear Ball Spline

LSA／LSAF

IKO Angular type Linear Ball Spline is a linear motion rolling guide, featuring a spline shaft with six rows of raceways along which an external cylinder performs endless linear motion by re-circulating steel balls inside the external cylinder body. The shaft sectional area is designed as large as possible to achieve high shaft rigidity.

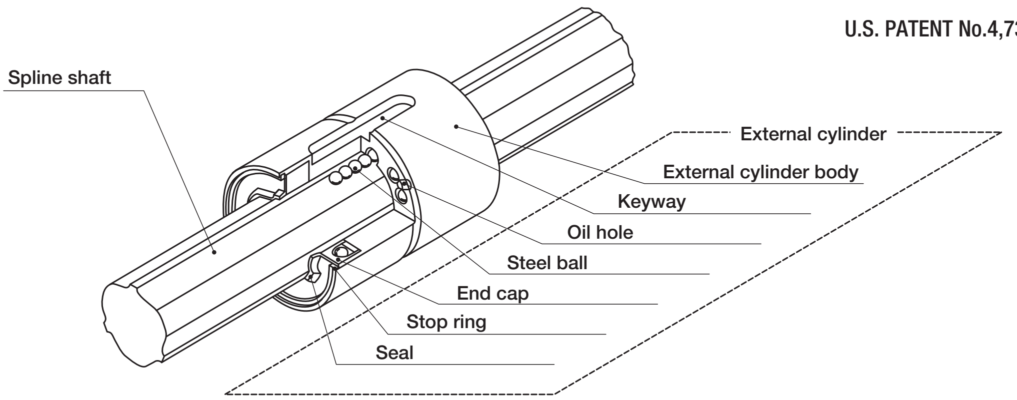
Standard type and flange type

External cylinders are available in two different shapes: the standard type (cylindrical shape) and the flange type.

Solid shaft and hollow shaft

Two types of spline shaft, the solid shaft and the hollow shaft are available for selection suitable for each application.

U.S. PATENT No.4,732,489



Structure of Angular type Linear Ball Spline

Angular type Linear Ball Spline series

	Shape	Shaft shape	Model code
Angular type Linear Ball Spline	Standard type	Solid shaft	LSA
		Hollow shaft	LSAT
	Flange type	Solid shaft	LSAF
		Hollow shaft	LSAFT

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 1.

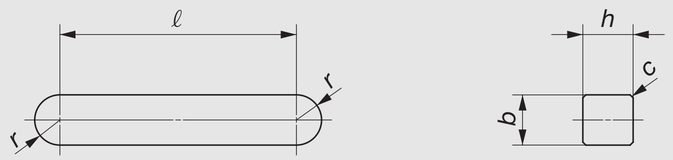
Table 1 Moment of inertia of sectional area and section modulus of spline shaft

Size	Moment of inertia of sectional area mm^4		Section modulus mm^3	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
15	1 580	—	230	—
20	4 480	4 410	500	490
25	11 500	10 900	1 010	960
30	21 500	19 700	1 600	1 470
40	76 600	70 000	4 160	3 810
50	186 000	173 000	8 110	7 540

Dimensions of key

The keys shown in Table 2 are appended to Angular type Linear Ball Spline standard type.

Table 2 Dimensions of key



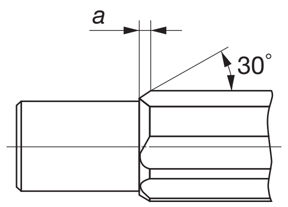
unit : mm

Model number	*b*	Tolerance	*h*	Tolerance	*ℓ*	*r*	*c*
LSA 15	3.5	+0.024 +0.012	3.5	0 −0.030	16	1.75	0.16～0.25
LSA 20	4		4		21.5	2	
LSA 25	5		5		27.5	2.5	0.25～0.4
LSA 30	7	+0.030 +0.015	7	0 −0.036	33.3	3.5	
LSA 40	10		8		44.3	5	0.4 ～0.6
LSA 50	15	+0.036 +0.018	10		44.3	7.5	

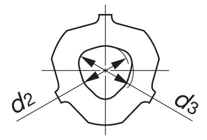
Remark : The above table shows representative model numbers but is applicable to all standard types of the same size.

IKO Angular type Linear Ball Spline : Standard type

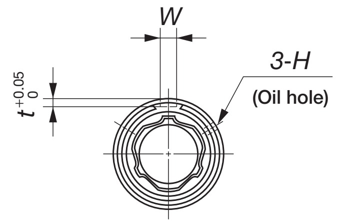
LSA • LSAT

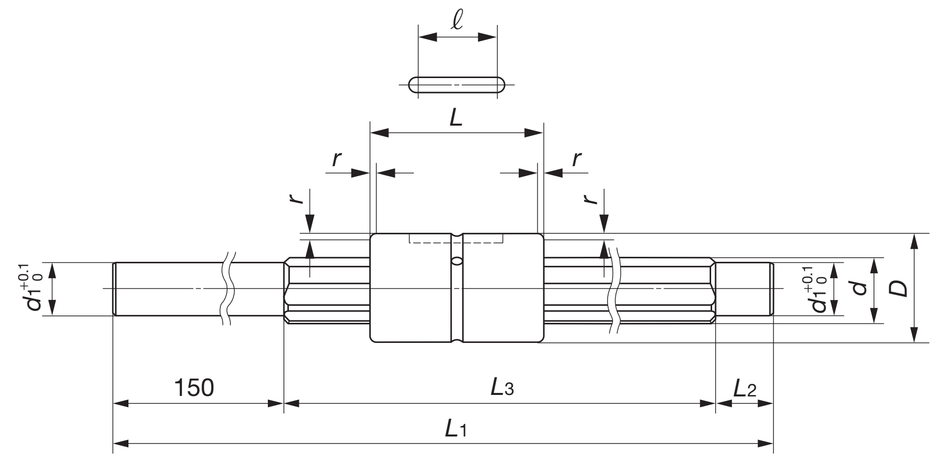


Chamfer of spline part end



Dimensions of hollow shaft of LSAT

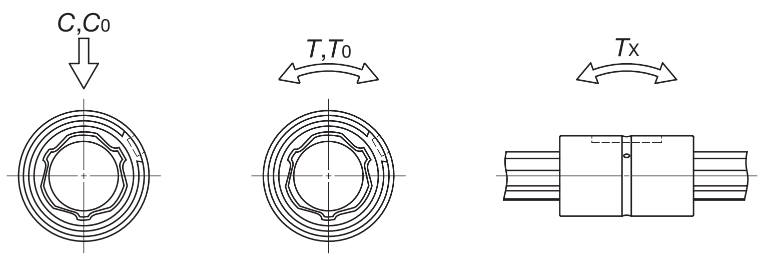




Model number	Mass (Ref.) External cylinder kg	Mass (Ref.) Spline shaft kg/m	D	Tolerance	L	Tolerance	W	Tolerance	t	ℓ	H	r	d	a	d_1
			Dimensions and tolerances of external cylinder mm												
LSA 15	0.06	1.08	23	0 / −0.013	40	0 / −0.2	3.5	+0.018 / 0	2	16.5	2	0.5	13.8	1.0	11.7
LSA 20	0.13	1.81	30	0 / −0.016	50	0 / −0.2	4	+0.018 / 0	2.5	22	2.5	0.5	18	1.0	15.2
LSAT 20		1.61													
LSA 25	0.22	2.94	37	0 / −0.016	60	0 / −0.3	5	+0.018 / 0	3	28	2.5	0.5	22.8	1.5	19.2
LSAT 25		2.37													
LSA 30	0.43	4.00	45	0 / −0.016	70	0 / −0.3	7	+0.022 / 0	4	34	3	1	26.8	2.5	22.2
LSAT 30		3.04													
LSA 40	0.89	7.55	60	0 / −0.019	90	0 / −0.3	10	+0.022 / 0	4.5	45	4	1	36.8	3.0	31.2
LSAT 40		5.58													
LSA 50	1.54	11.80	75	0 / −0.019	100	0 / −0.3	15	+0.027 / 0	5	45	4	1.5	46	3.5	39.2
LSAT 50		9.00													

Model number	L_2	d_2	d_3	L_1 (L_3) (1)	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Dynamic torque rating(2) T N・m	Static torque rating(2) T_0 N・m	Static moment rating(2) T_X N・m
	Dimensions of spline shaft mm								
LSA 15	15	—	—	265(100) 365(200) 465(300)	4 580	8 280	32.4	60.1	29.4 / 189
LSA 20	15	—	—	365(200) 465(300) 565(400) 665(500)	8 390	14 700	76.9	139	69.7 / 417
LSAT 20		5.5	6						
LSA 25	20	—	—	370(200) 470(300) 570(400) 670(500) 870(700)	13 400	23 000	155	274	136 / 779
LSAT 25		9.3	10						
LSA 30	20	—	—	470(300) 570(400) 670(500) 770(600) 1 170(1 000)	18 300	29 800	248	415	193 / 1 190
LSAT 30		11.9	14						
LSA 40	25	—	—	575(400) 775(600) 975(800) 1 175(1 000)	33 500	53 000	622	1 010	458 / 2 720
LSAT 40		17.3	19						
LSA 50	25	—	—	675(500) 1 175(1 000) 1 375(1 200) 1 775(1 600)	49 500	73 600	1 150	1 750	717 / 4 220
LSAT 50		20.5	23						

Note(1) : 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.
(2) : The directions of basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T) and static torque/moment rating (T_0, T_X) are shown in the sketches below.
The upper values in the T_X column apply to one external cylinder, and the lower values apply to two external cylinders in close contact.



Example of identification number

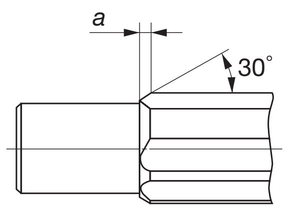
LSA 20 C2 R365 T1 P

- LSA — Model code: LSA, LSAT
- 20 — Size of rolling guide
- C2 — Number of external cylinders (Two cylinders)
- R365 — Overall length of spline shaft (365 millimeters)
- T1 — Preload amount: Standard : No symbol; Light preload : T1
- P — Accuracy class: Ordinary : No symbol; High : H; Precision : P

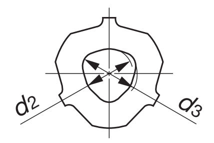
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Angular type Linear Ball Spline : Flange type

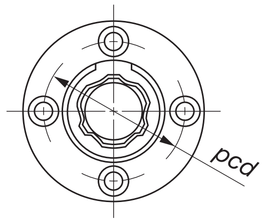
LSAF • LSAFT

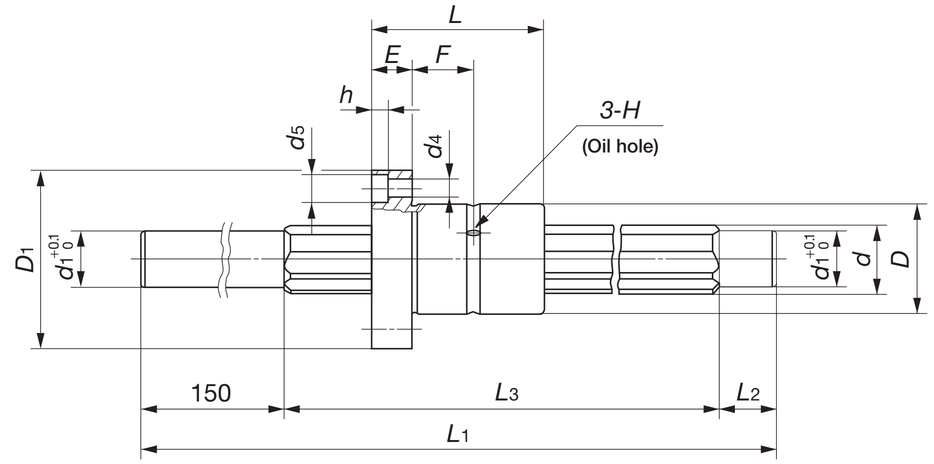


Chamfer of spline part end



Dimensions of hollow shaft of LSAFT



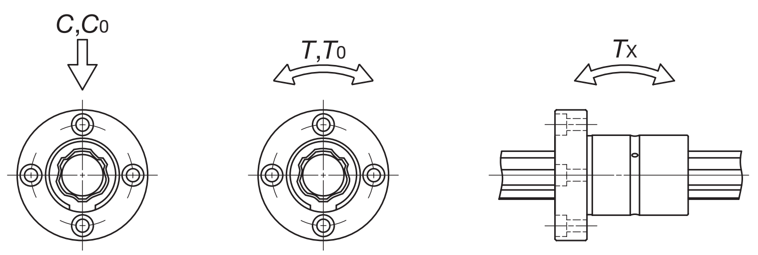


Model number	Mass (Ref.) External cylinder kg	Mass (Ref.) Spline shaft kg/m	D	Tolerance	L	Tolerance	D_1	Tolerance	E	F	pcd	d_4	d_5	h	H	d
			Dimensions and tolerances of external cylinder mm													
LSAF 15	0.13	1.08	23	0 −0.013	40	0 −0.2	43	0 −0.2	10	13	32	4.5	8	4.4	2	13.8
LSAF 20	0.23	1.81	30	0 −0.016	50	0 −0.2	49	0 −0.2	12	18	38	4.5	8	4.4	2.5	18
LSAFT 20		1.61														
LSAF 25	0.40	2.94	37	0 −0.016	60	0 −0.3	60	0 −0.2	14	21	47	5.5	9.5	5.4	2.5	22.8
LSAFT 25		2.37														
LSAF 30	0.69	4.00	45	0 −0.016	70	0 −0.3	70	0 −0.2	16	25	54	6.6	11	6.5	3	26.8
LSAFT 30		3.04														
LSAF 40	1.46	7.55	60	0 −0.019	90	0 −0.3	93	0 −0.2	20	31	73	9	14	8.6	4	36.8
LSAFT 40		5.58														
LSAF 50	2.50	11.80	75	0 −0.019	100	0 −0.3	113	0 −0.3	25	34	91	11	17.5	11	4	46
LSAFT 50		9.00														

Model number	a	d_1	L_2	d_2	d_3	L_1 (L_3) (1)	Basic dynamic load rating(2) C N	Basic static load rating(2) C_0 N	Dynamic torque rating(2) T N•m	Static torque rating(2) T_0 N•m	Static moment rating(2) T_X N•m
	Dimensions of spline shaft mm										
LSAF 15	1.0	11.7	15	—	—	265(100) 365(200) 465(300)	4 580	8 280	32.4	60.1	29.4 / 189
LSAF 20	1.0	15.2	15	—	—	365(200) 465(300) 565(400) 665(500)	8 390	14 700	76.9	139	69.7 / 417
LSAFT 20				5.5	6						
LSAF 25	1.5	19.2	20	—	—	370(200) 470(300) 570(400) 670(500) 870(700)	13 400	23 000	155	274	136 / 779
LSAFT 25				9.3	10						
LSAF 30	2.5	22.2	20	—	—	470(300) 570(400) 670(500) 770(600) 1 170(1 000)	18 300	29 800	248	415	193 / 1 190
LSAFT 30				11.9	14						
LSAF 40	3.0	31.2	25	—	—	575(400) 775(600) 975(800) 1 175(1 000)	33 500	53 000	622	1 010	458 / 2 720
LSAFT 40				17.3	19						
LSAF 50	3.5	39.2	25	—	—	675(500) 1 175(1 000) 1 375(1 200) 1 775(1 600)	49 500	73 600	1 150	1 750	717 / 4 220
LSAFT 50				20.5	23						

Note(1) : 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.

(2) : The directions of basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T) and static torque/moment rating (T_0, T_X) are shown in the sketches below.
The upper values in the T_X column apply to one external cylinder, and the lower values apply to two external cylinders in close contact.



Example of identification number

LSAF 20 C2 R365 T_1 P

- **LSAF** — Model code: LSAF, LSAFT
- **20** — Size of rolling guide
- **C2** — Number of external cylinders (Two cylinders)
- **R365** — Overall length of spline shaft (365 millimeters)
- **T_1** — Preload amount: Standard : No symbol; Light preload : T_1
- **P** — Accuracy class: Ordinary : No symbol; High : H; Precision : P

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

Crossed Roller Ways

Description of each series and Table of dimensions

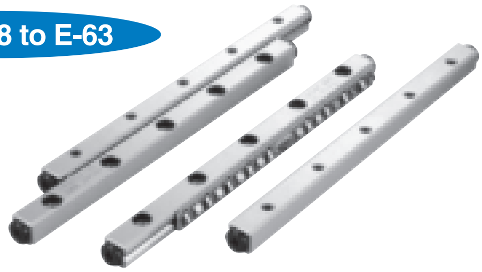
E

Crossed Roller Way

Page E-2 to E-47

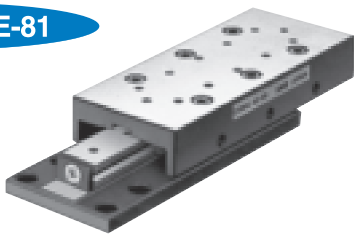
Anti-Creep Cage Crossed Roller Way

Page E-48 to E-63



Crossed Roller Way Unit

Page E-64 to E-81



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.

U.S. PATENTED

Crossed Roller Way

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 accuracy.
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

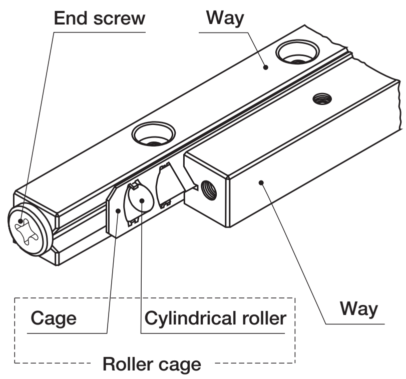
Precisely finished raceways are combined with roller cages, in which the length of super precise rollers is accurately controlled to avoid skewing. Very smooth linear motion with very little frictional resistance and free from stick-slip can be achieved.

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.



Note : One set consists of four ways and two roller cages.

CRW

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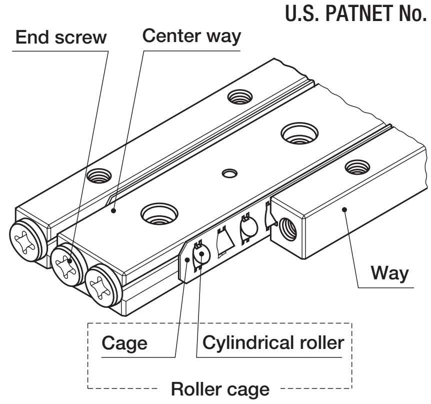


Note : One set consists of one center way, two ways and two roller cages.

CRWM

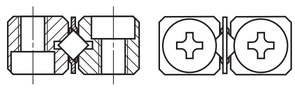
Structure of Crossed Roller Way

Crossed Roller Way series

Shape	Model code
Standard type	CRW CRW…SL
Module type	CRWM

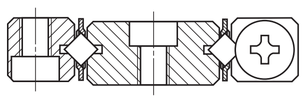
Crossed Roller Way

Standard type



CRW
CRW…SL

Module type

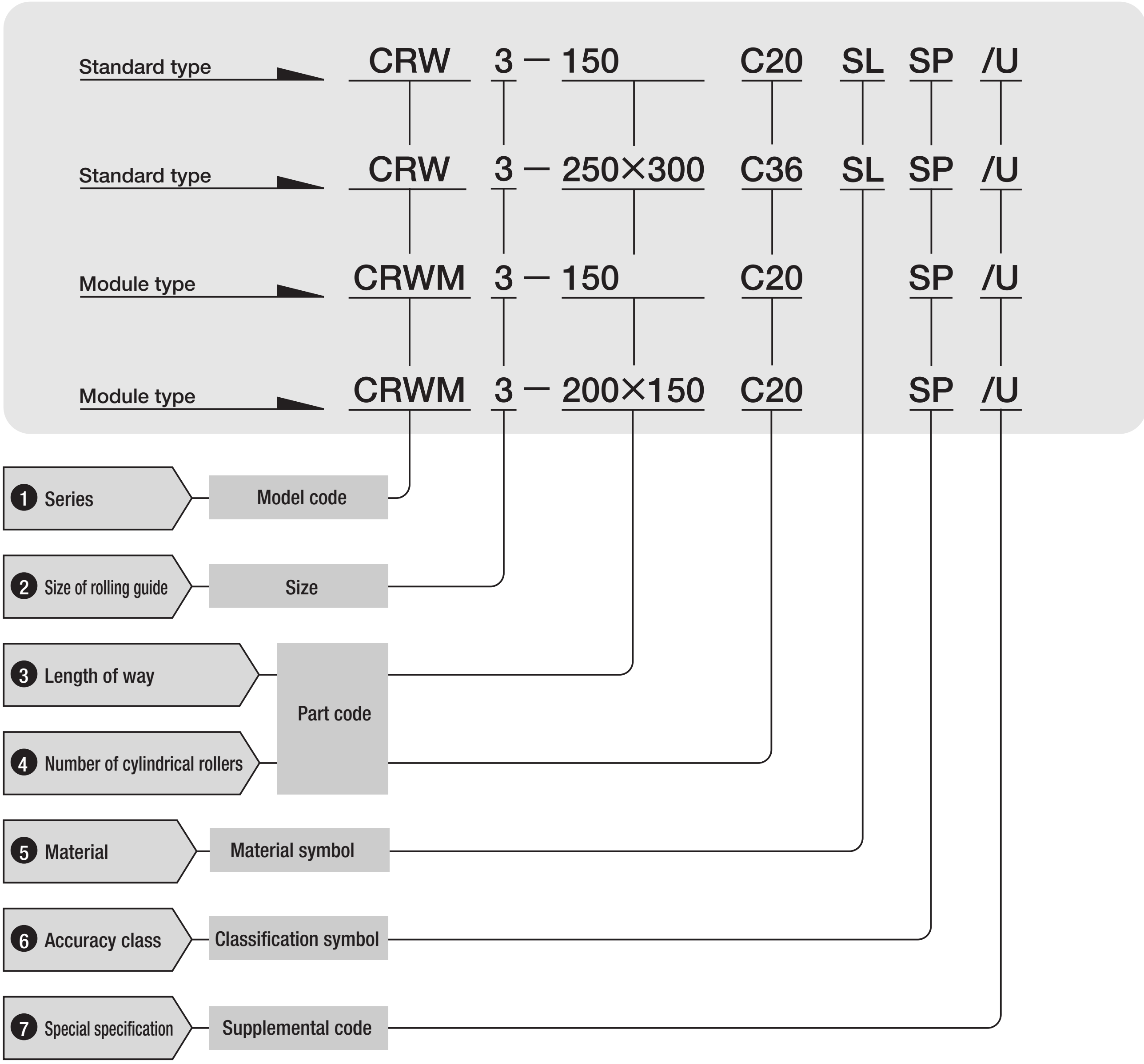


CRWM

Remark : Models with "SL" are stainless steel type.

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.



1 Series	Standard type : CRW Module type : CRWM	
2 Size of rolling guide		For available models and sizes, see Table 1.
3 Length of way	○ ○×○	Indicate the length of way in mm. Ways with different lengths can be combined. For the lengths of ways, see the table of dimensions. To indicate a combination of ways with different lengths, see "Combination of way lengths ".
4 Number of cylindrical rollers	No symbol C○	The number of cylindrical rollers incorporated in one cage is indicated. When this number is not indicated, the number of cylindrical rollers shown in the table of dimensions are incorporated in one cage.

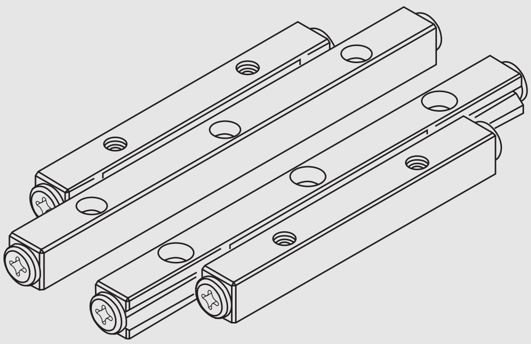
Combination of way lengths

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.

Example
CRW 6 — 300 × 400 C24

- 24 pcs. of rollers incorporated in one cage
- Long way length : 400 mm
- Short way length : 300 mm

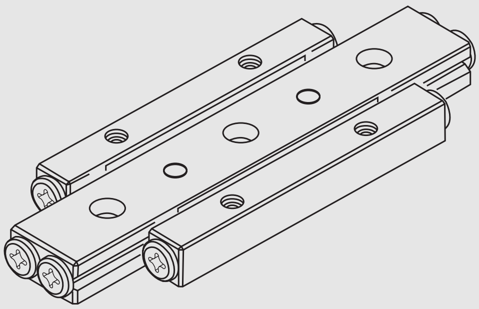


Combination for the module type

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.

Example
CRWM 3 — 200 × 150 C20

- 20pcs. of rollers incorporated in one cage
- Way length : 150 mm
- Center way length : 200 mm



CRW, CRWM
E

5 Material

High carbon steel made : No symbol

Stainless steel made : SL

For applicable material types, see Table 1.

Table 1 Types and sizes

Size \ Type	Standard type — High carbon steel made	Standard type — Stainless steel made	Module type — High carbon steel made
1	○	○	○
2	○	○	○
3	○	○	○
4	○	○	○
6	○	○	—
9	○	—	—
12	○	—	—
15	○	—	—
18	○	—	—
24	○	—	—

6 Accuracy class

Standard : No symbol

Super precision : SP

For the allowable values of parallelism of the raceway to the reference mounting surface and of parallelism between two raceways of CRWM, see Fig. 1.

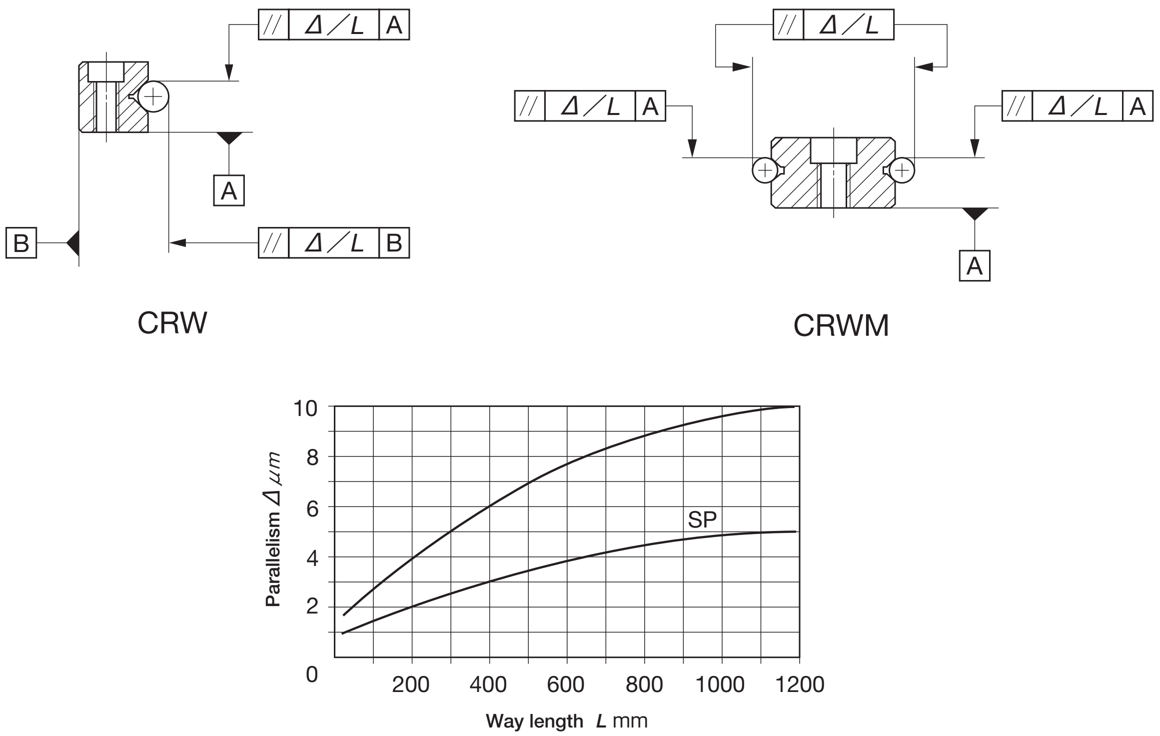


Fig. 1 Accuracy of Crossed Roller Way

7 Special specification

For applicable special specifications, see Table 2.
When several special specifications are required, see Table 3.
For details of special specifications, see page E-8.

Table 2 Special specifications

Special specification	Supplemental code	Standard type		Module type
		High carbon steel made	Stainless steel made	High carbon steel made
Special mounting screws	B	△ (1)	—	△ (1)
High rigidity roller cage	M	△ (2)	△ (2)	—
End stopper SA	SA	△ (3)	△ (3)	△ (3)
End stopper SB	SB	△ (3)	△ (3)	△ (3)
Wiper seal	U	△ (3)	△ (3)	△ (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.
Remark : In the table, the mark △ indicates that it is applicable to some sizes.

Table 3 Combinations of special specifications

	B	M	SA	SB
M	○			
SA	○	○		
SB	○	○	–	
U	○	○	–	–

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.

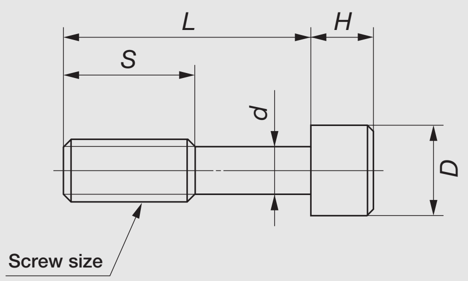
Special specifications

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.

Table 4 Dimensions of special mounting screws



unit : mm

Size	Screw size	*d*	*D*	*H*	*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

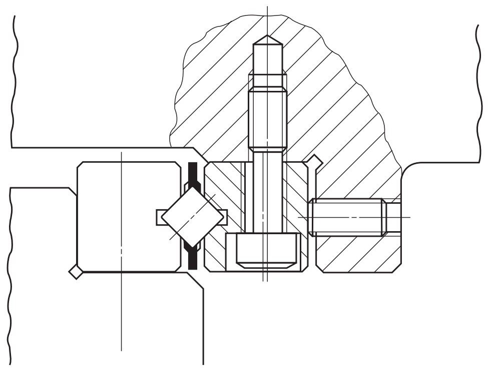


Fig. 2 Mounting example with special mounting screw

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.

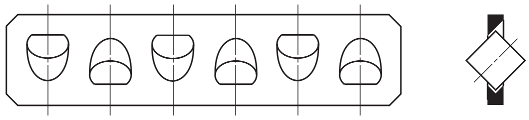
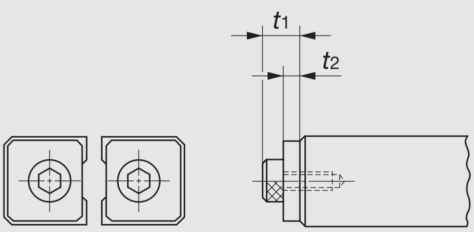


Fig. 3 High rigidity cage

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.

Table 5 Dimensions of end stopper SA



unit : mm

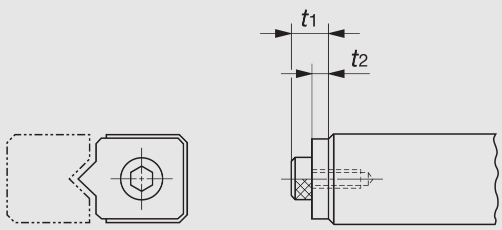
Size	t_1	t_2
2	4.5	2
3	5	2
4	7	3
6	8	3
9	10	4

Size	t_1	t_2
12	11	5
15	14	6
18	14	6
24	16	6

End stopper SB ／SB

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.

Table 6 Dimensions of end stopper SB



unit : mm

Size	t_1	t_2
2	4.5	2
3	5	2
4	7	3
6	8	3
9	10	4
12	11	5
15	14	6
18	14	6
24	16	6

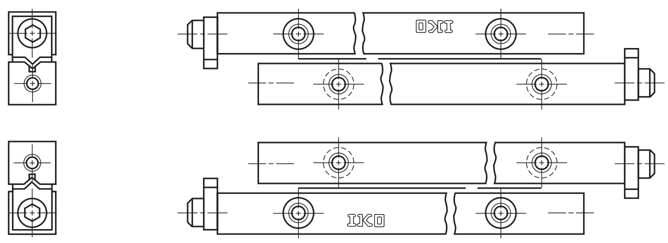
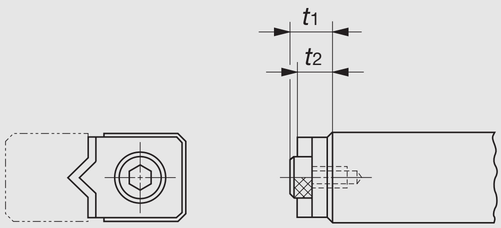


Fig. 4 Arrangement of end stoppers SB

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.

Table 7 Dimensions of wiper seal



unit : mm

Size	t_1	t_2
2	4.5	4
3	5	4
4	7	6
6	8	6
9	10	7.5
12	11	8.5
15	14	11
18	14	11
24	16	11

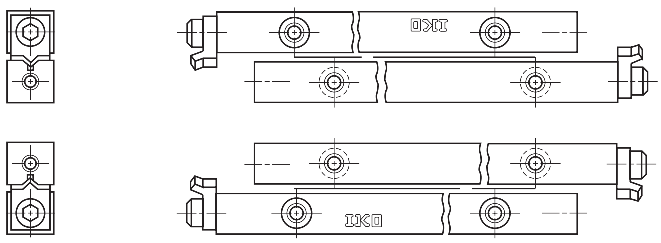


Fig. 5 Arrangement of wiper seals

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 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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.

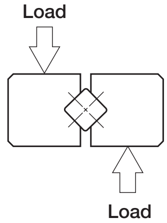
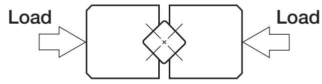
Allowable load *F*

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

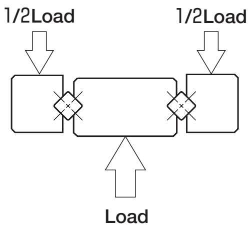
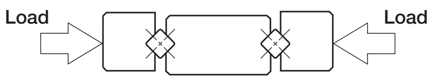
In Crossed Roller Way, the number of cylindrical rollers sharing a load differs according to the load direction. Therefore, it is necessary to obtain load ratings and allowable load for each direction.
The basic dynamic load rating C_U, basic static load rating C_{0U} and allowable load F_U shown in 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.

Table 8.1 Calculation formulae for load ratings and allowable loads of CRW

	Upward/downward load [1]	Lateral load
Load condition		
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	C_r : Basic dynamic load rating for upward / downward load, N C_a : Basic dynamic load rating for lateral load, N C_{0r} : Basic static load rating for upward / downward load, N C_{0a} : Basic static load rating for lateral load, N F_r : Allowable load for upward / downward load, N F_a : Allowable load rating for lateral load, N Z : Number of cylindrical rollers incorporated in one roller cage (Disregard any decimal for Z/2) p : Pitch between cylindrical rollers, mm C_U : Basic dynamic load rating per one roller, N C_{0U} : Basic static load rating per one roller, N F_U : Allowable load per one roller, N	

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.

Table 8.2 Calculation formulae for load ratings and allowable loads of CRWM

	Upward/downward load	Lateral load
Load condition		
Basic dynamic load rating *C* N	$C_r=\left\{\left(\frac{Z}{2}-1\right)2p\right\}^{1/36}\left(\frac{Z}{2}\right)^{3/4}2^{7/9}C_U \cdots (7)$	$C_a=\left\{\left(\frac{Z}{2}-1\right)2p\right\}^{1/36}\left(\frac{Z}{2}\right)^{3/4}2^{7/9}C_U \cdot (10)$
Basic static load rating C_0 N	$C_{0r}=2\left(\frac{Z}{2}\right)C_{0U} \cdots (8)$	$C_{0a}=2\left(\frac{Z}{2}\right)C_{0U} \cdots (11)$
Allowable load *F* N	$F_r=2\left(\frac{Z}{2}\right)F_U \cdots (9)$	$F_a=2\left(\frac{Z}{2}\right)F_U \cdots (12)$
Meaning of symbols	C_r : Basic dynamic load rating for upward / downward load, N C_a : Basic dynamic load rating for lateral load, N C_{0r} : Basic static load rating for upward / downward load, N C_{0a} : Basic static load rating for lateral load, N F_r : Allowable load for upward / downward load, N F_a : Allowable load rating for lateral load, N Z : Number of cylindrical rollers incorporated in one roller cage (Disregard any decimal for Z/2) p : Pitch between cylindrical rollers, mm C_U : Basic dynamic load rating per one roller, N C_{0U} : Basic static load rating per one roller, N F_U : Allowable load per one roller, N	

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.

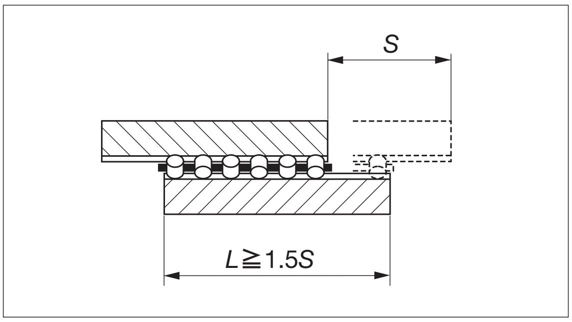
❶ Calculation of way length

Way length is generally more than 1.5 times of operating stroke length and is obtained from the following formula.

$$L \geqq 1.5S \quad \cdots\cdots\cdots\cdots\cdots\cdots (10)$$

where, L: Way length, mm

S: Operating stroke length, mm



❷ 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.

$$S_1 \geqq \frac{1}{0.8}S \quad \cdots\cdots\cdots\cdots\cdots\cdots (11)$$

where, S_1: Maximum stroke length, mm

S: Operating stroke length, mm

❸ 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.

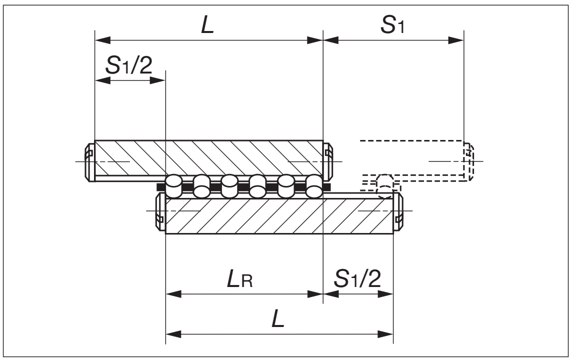
(1) With standard end screws or end stoppers SA (except size 1 models)
The distance between rollers at both ends in one cage is that way length minus half of maximum stroke length as in the following formula.

$$L_R = L - \frac{S_1}{2} \quad \cdots\cdots\cdots\cdots\cdots\cdots (12)$$

where, L_R: Allowable distance between rollers at both ends in one cage, mm

L: Way length, mm

S_1: Maximum stroke length, mm



Number of rollers in one cage is obtained from the following formula.

$$Z = \frac{L_R - D_W}{p} + 1 \cdots\cdots\cdots\cdots\cdots\cdots (13)$$

where, Z: Number of rollers in one cage (Disregard any decimal.)

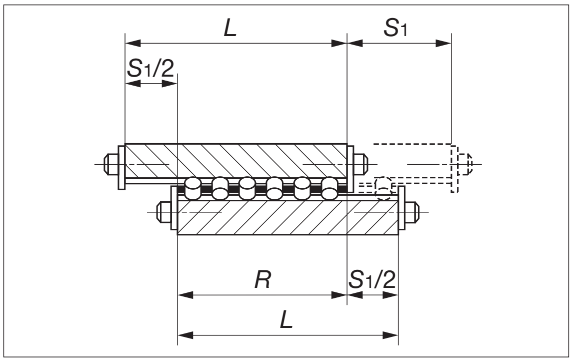
L_R: Allowable distance between rollers at both ends in one cage, mm

D_W: 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.



$$R = L - \frac{S_1}{2} \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (14)$$

where, R: Allowable cage length, mm

L: Way length, mm

S_1: Maximum stroke length, mm

Number of rollers in one cage is obtained from the following formula.

$$Z = \frac{R - 2e}{p} + 1 \cdots\cdots\cdots\cdots\cdots\cdots (15)$$

where, Z: Number of rollers in one cage (Disregard any decimal.)

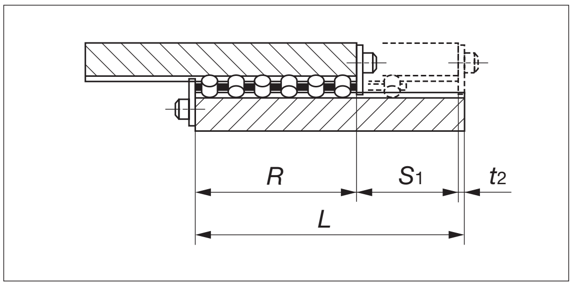
R: Allowable cage length, mm

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.



$$R = L - t_2 - S_1 \cdots\cdots\cdots\cdots\cdots\cdots (16)$$

where, R: Allowable cage length, mm

L: Way length, mm

S_1: Maximum stroke length, mm

t_2: Thickness of end stopper SB or wiper seal, mm (See Table 6 on page E-10 or Table 7 on page E-11.)

The number of rollers in a roller cage is obtained from formula (15) in the same way as size 1 models.

Calculation example

Model ·· CRW 6

Applied load ··· P = 7000 N

Stroke length ·· S = 195 mm

For parallel use of Crossed Roller Ways under the above specified conditions (See Fig. 12 on page E-21.), select the suitable specification.

❶ Calculation of way length

From formula (10), way length L is;

$$L \geqq 1.5S = 1.5\times195 = 292.5$$

Therefore, standard way length L = 300 mm is selected from dimension tables.

❷ Calculation of maximum stroke length

From formula (11), maximum stroke length S_1 is;

$$S_1 \geqq \frac{1}{0.8}S = \frac{1}{0.8}\times195 \fallingdotseq 244$$

From formula (12), allowable distance between rollers at both ends in one cage L_R is;

$$L_R = L - \frac{S_1}{2} = 300 - \frac{244}{2} = 178$$

❸ Calculation of number of rollers

From formula (13), number of rollers in one cage is;
(D_W = 6 mm and p = 9 mm from dimension tables)

$$Z = \frac{L_R - D_W}{p} + 1 = \frac{178-6}{9} + 1 \fallingdotseq 20.1$$

Therefore, number of rollers Z = 20 in one cage is obtained by disregarding any decimal.

❹ 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 F_U = 764 N from dimension tables)

$$F = 2\left(\frac{Z}{2}\right)F_U = 2\left(\frac{20}{2}\right)\times769 = 15380$$

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.

❺ 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.

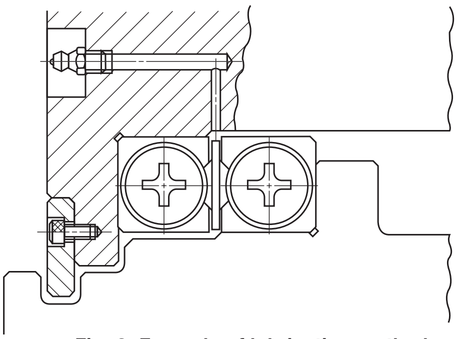


Fig. 6 Example of lubrication method

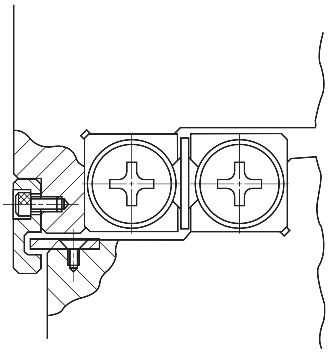


Fig. 7 Example of non-contact type shield (Labyrinth seal)

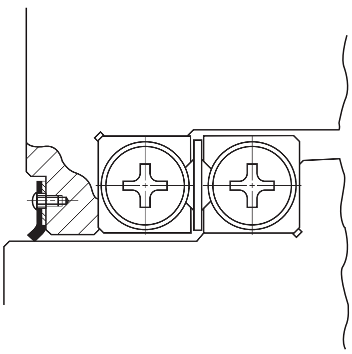


Fig. 8 Example of wiper seal

❶ 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.

❷ 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.

❸ 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.

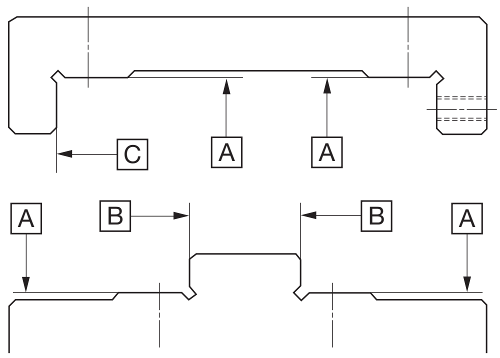


Fig. 9.1 Example of mating mounting surfaces for CRW

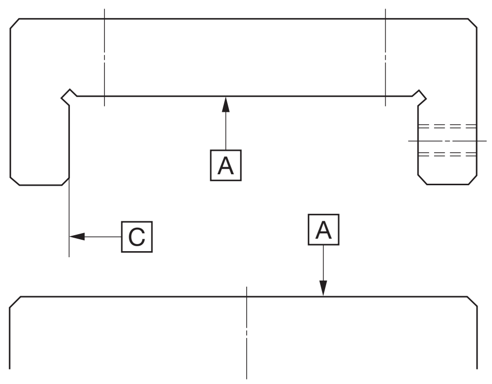


Fig. 9.2 Example of mating mounting surfaces for CRWM

Table 9 Accuracy of mating mounting surfaces

A 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-6.
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-6. • Squareness Squareness to A surface affects the rigidity of assembled unit in the preload direction. Consequently, a high accuracy finish is necessary.

❹ 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.

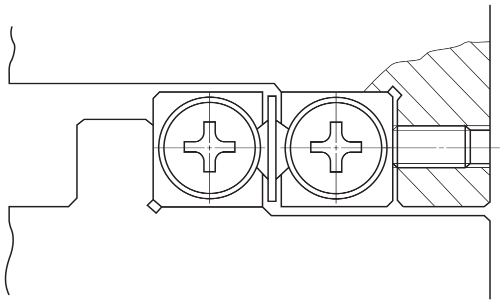


Fig. 10 General example of preload

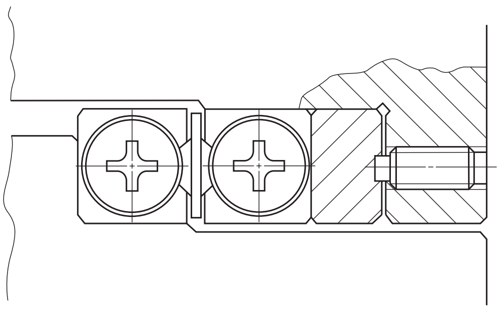


Fig. 11.1 Example of setting plate

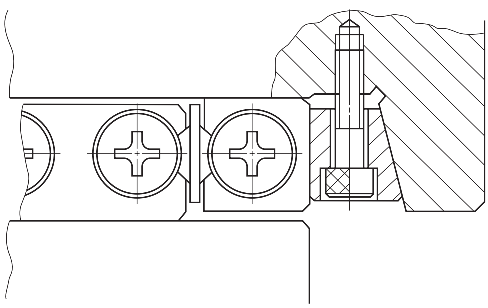


Fig. 11.2 Example of tapered jib

❺ 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.

❻ The operating speed of Crossed Roller Way should not exceed 30 m/min.

❼ 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.

Table 10 Tightening torque of 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 screws.

Mounting of CRW

A general method for mounting CRW is shown in Fig. 12. The general procedure is as follows.

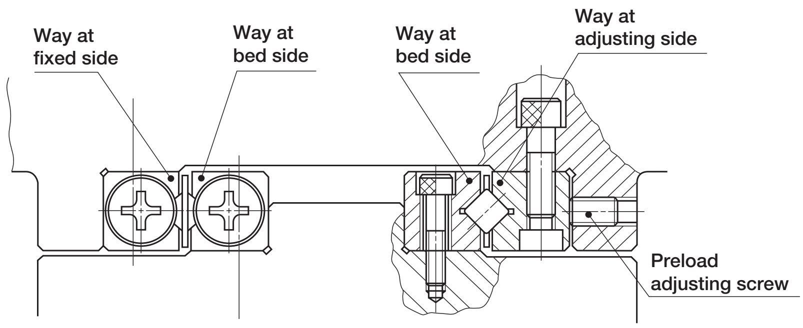


Fig. 12 Mounting example of CRW

❶ 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.

❷ 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.

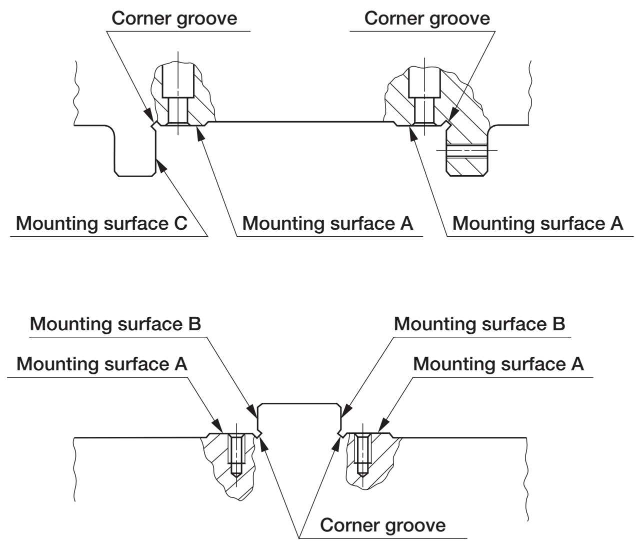


Fig. 13 Mounting surfaces for CRW

❸ 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.

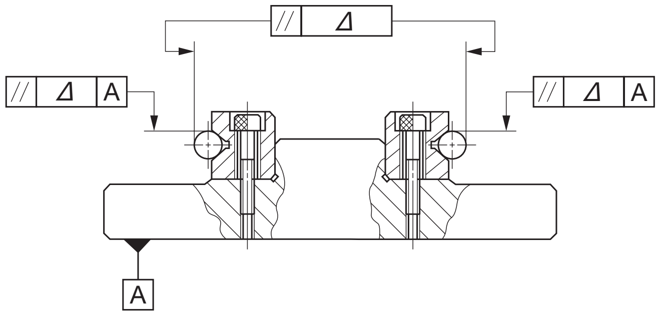


Fig. 14 Mounting accuracy of ways

❹ 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.

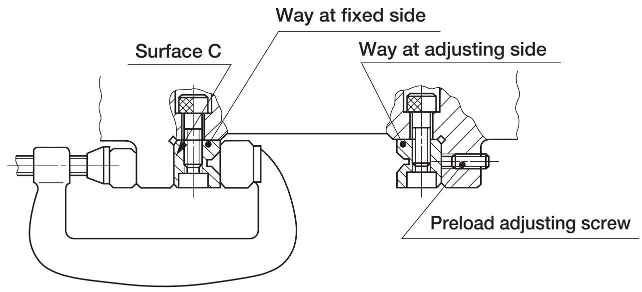


Fig. 15 Mounting of ways at table side

❺ 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.

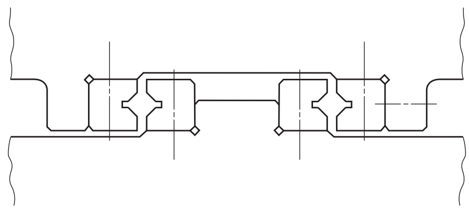


Fig. 16 Positioning of table and bed in assembling time

❻ Preload adjustment (Fig. 17)

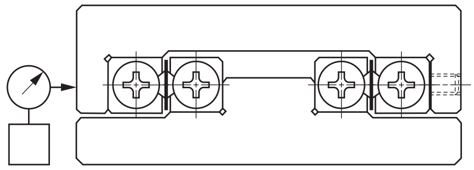


Fig. 17 Example of preload adjustment

- 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 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 screw.
- 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.

❼ 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.

❽ 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.

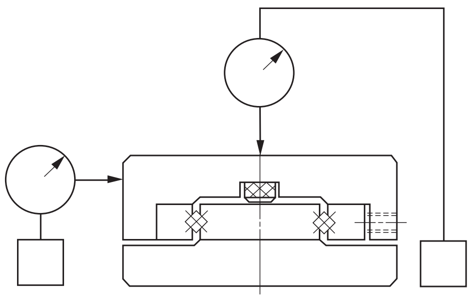


Fig. 18 Final check of operating accuracy

Mounting of CRWM

A general mounting example of CRWM is shown in Fig. 19. The general mounting procedure is as follows.

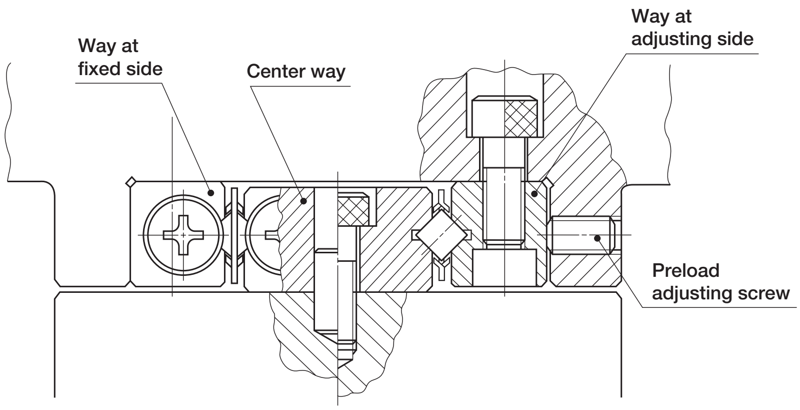


Fig. 19 Mounting example of CRWM

❶ 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.

❷ Cleaning of mounting surfaces on table and bed

- Use the same procedure as that for CRW.

❸ 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.

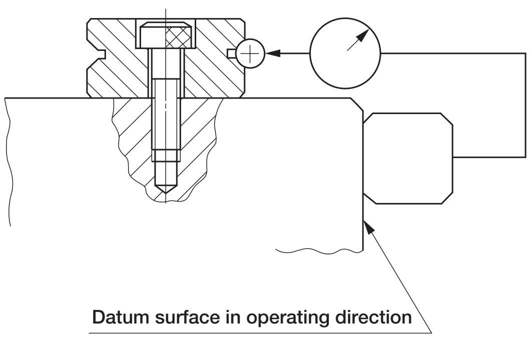


Fig. 20 Checking of mounting accuracy for center way

❹ 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.

❺ Mounting of way at table side

- Use the same procedure as that for CRW.

❻ Assembling of table and bed

- Use the same procedure as that for CRW.

❼ Preload adjustment

- Use the same procedure as that for CRW.

❽ Final fixing of way at adjusting side

- Use the same procedure as that for CRW.

❾ Final check

- Use the same procedure as that for CRW.

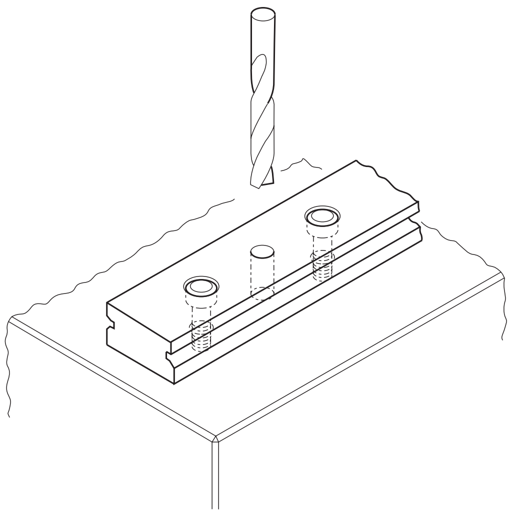


Fig. 21 Drilling of dowel pin hole

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.

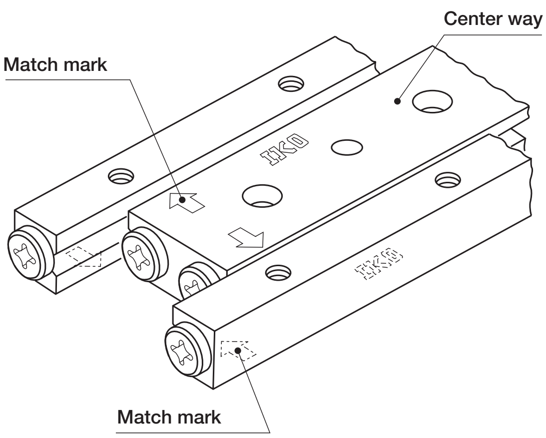
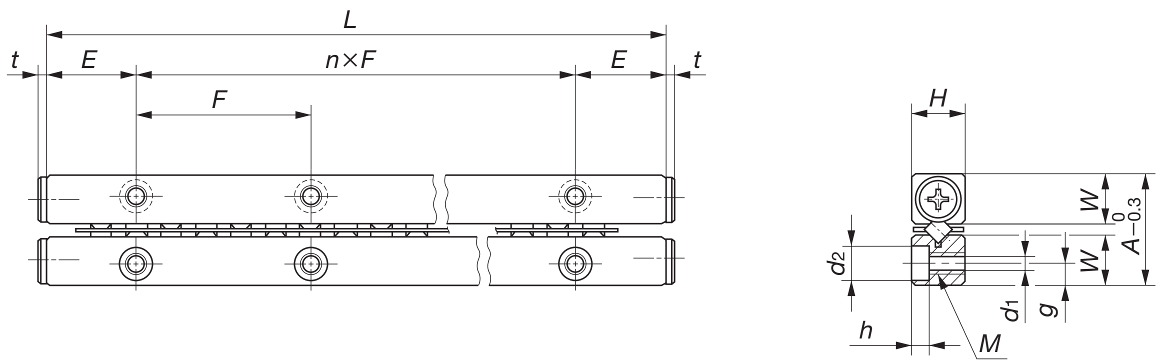
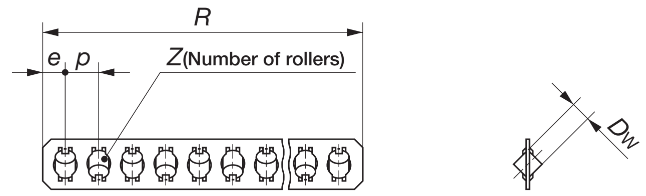


Fig. 22 Match marks on CRWM

Standard type
CRW
CRW …SL (Stainless steel made)





Model number	Mass (Ref.) Way([1]) kg/m	Mass (Ref.) Roller cage([2]) g	Boundary dimensions A	H	L (n×F)	E	Dimensions of roller cage D_W	R
CRW 1- 20	0.12	0.38	8.5	4	20 (1×10)	5	1.5	16.5
CRW 1- 20 SL								
CRW 1- 30					30 (2×10)			25.5
CRW 1- 30 SL								
CRW 1- 40					40 (3×10)			31.5
CRW 1- 40 SL								
CRW 1- 50					50 (4×10)			37.5
CRW 1- 50 SL								
CRW 1- 60					60 (5×10)			43.5
CRW 1- 60 SL								
CRW 1- 70					70 (6×10)			52.5
CRW 1- 70 SL								
CRW 1- 80					80 (7×10)			61.5
CRW 1- 80 SL								

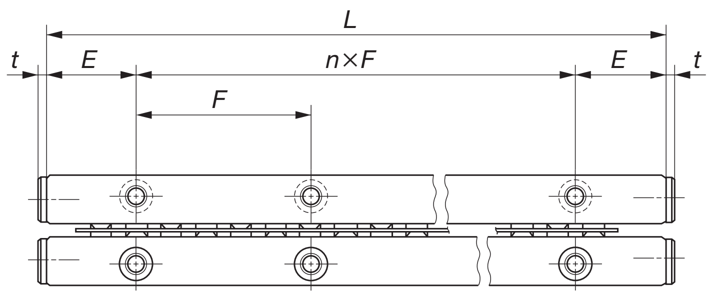
Nominal dimensions mm

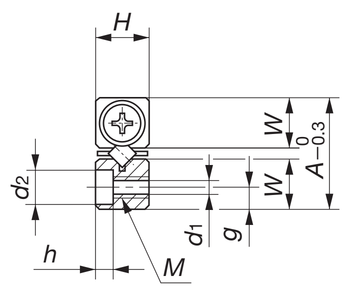
Z	Mounting dimensions p	e	W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U([3]) N	Basic static load rating C_{0U}([3]) N	Allowable load F_U([3]) N
5	3	2.25	3.9	1.8	M2	1.65	3	1.4	1.7	125	120	39.8
8												
10												
12												
14												
17												
20												

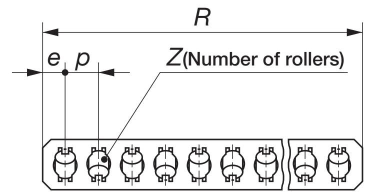
Note([1]) : This value shows mass per one meter for individual way.
([2]) : This value shows mass of one roller cage in which ten rollers are incorporated.
([3]) : This value shows load per one roller.

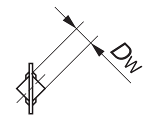
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Standard type
CRW
CRW ···SL(Stainless steel made)









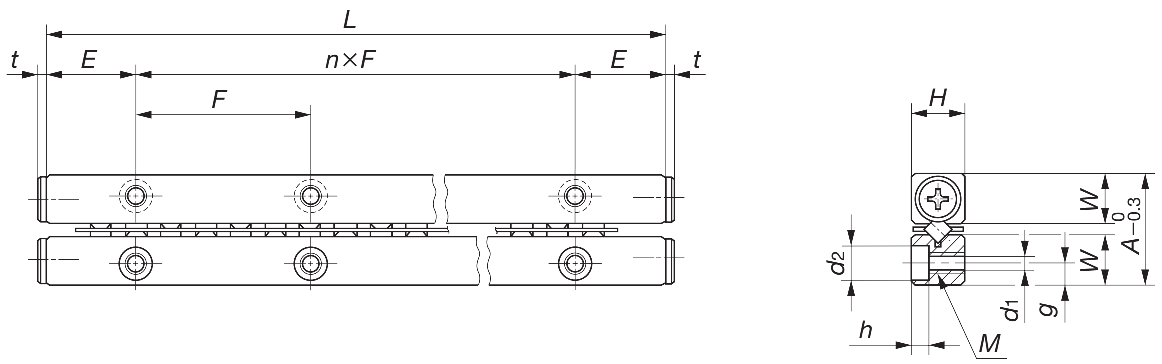
Model number	Mass (Ref.) Way(1) kg/m	Mass (Ref.) Roller cage(2) g	Boundary dimensions A	H	L (n×F)	E	Dimensions of roller cage Dw	R	Z	Nominal dimensions mm, Mounting dimensions p	e	W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u(3) N	Basic static load rating C_{0u}(3) N	Allowable load F_u(3) N
CRW 2- 30					30 (1×15)			29.6	7												
CRW 2- 30 SL																					
CRW 2- 45					45 (2×15)			41.6	10												
CRW 2- 45 SL																					
CRW 2- 60					60 (3×15)			53.6	13												
CRW 2- 60 SL																					
CRW 2- 75					75 (4×15)			65.6	16												
CRW 2- 75 SL																					
CRW 2- 90					90 (5×15)			77.6	19												
CRW 2- 90 SL																					
CRW 2-105	0.24	0.98	12	6	105 (6×15)	7.5	2	89.6	22	4	2.8	5.5	2.5	M3	2.55	4.4	2	1.5	293	294	97.9
CRW 2-105 SL																					
CRW 2-120					120 (7×15)			101.6	25												
CRW 2-120 SL																					
CRW 2-135					135 (8×15)			113.6	28												
CRW 2-135 SL																					
CRW 2-150					150 (9×15)			125.6	31												
CRW 2-150 SL																					
CRW 2-165					165 (10×15)			137.6	34												
CRW 2-165 SL																					
CRW 2-180					180 (11×15)			149.6	37												
CRW 2-180 SL																					

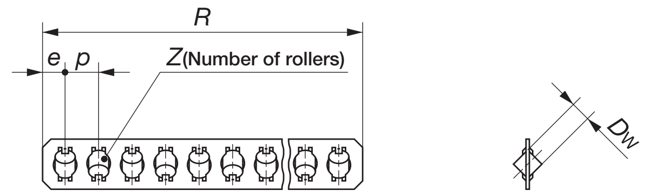
Note(1) : This value shows mass per one meter for individual way.
(2) : This value shows mass of one roller cage in which ten rollers are incorporated.
(3) : This value shows load per one roller.

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

IKO

Standard type
CRW
CRW ···SL (Stainless steel made)





Model number	Mass (Ref.) Way(1) kg/m	Mass (Ref.) Roller cage(2) g	Boundary dimensions A	H	L (n×F)	E	Dimensions of roller cage Dw	R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u(3) N	Basic static load rating C_{0u}(3) N	Allowable load F_u(3) N
CRW 3- 50	0.50	2.96	18	8	50 (1×25)	12.5	3	42	8	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	638	609	203
CRW 3- 50 SL																					
CRW 3- 75					75 (2×25)			62	12												
CRW 3- 75 SL																					
CRW 3-100					100 (3×25)			82	16												
CRW 3-100 SL																					
CRW 3-125					125 (4×25)			102	20												
CRW 3-125 SL																					
CRW 3-150					150 (5×25)			122	24												
CRW 3-150 SL																					
CRW 3-175					175 (6×25)			142	28												
CRW 3-175 SL																					
CRW 3-200					200 (7×25)			162	32												
CRW 3-200 SL																					
CRW 3-225					225 (8×25)			182	36												
CRW 3-225 SL																					
CRW 3-250					250 (9×25)			202	40												
CRW 3-250 SL																					
CRW 3-275					275 (10×25)			222	44												
CRW 3-275 SL																					
CRW 3-300					300 (11×25)			242	48												
CRW 3-300 SL																					

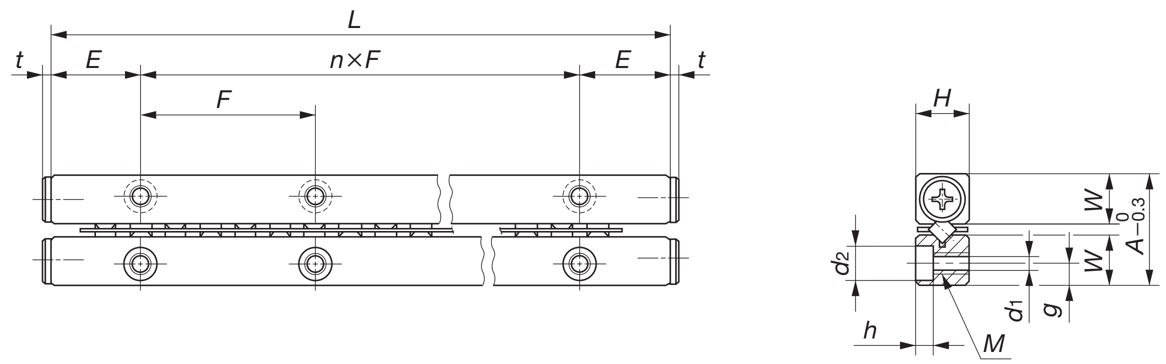
Note(1) : This value shows mass per one meter for individual way.
(2) : This value shows mass of one roller cage in which ten rollers are incorporated.
(3) : This value shows load per one roller.

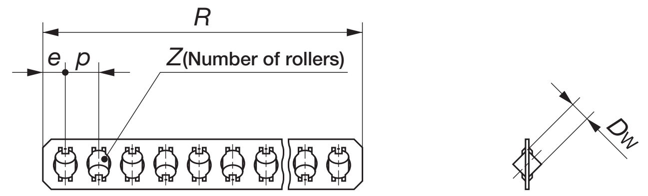
CRW, CRWM

E

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

Standard type
CRW
CRW …SL (Stainless steel made)



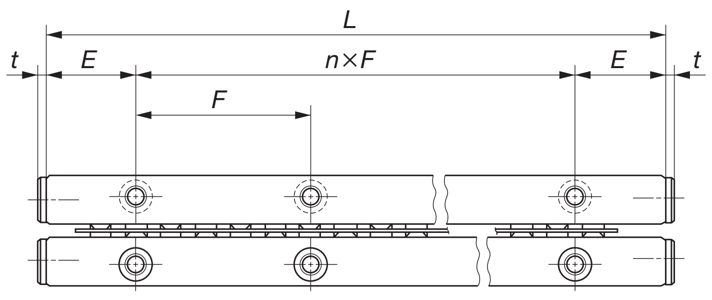


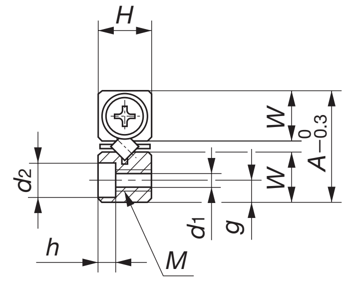
Model number	Mass (Ref.) Way([1]) kg/m	Mass (Ref.) Roller cage([2]) g	Boundary dimensions mm A	H	L (n×F)	E	Dimensions of roller cage Dw	R	Z	Mounting dimensions p	e	W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u([3]) N	Basic static load rating C_{0u}([3]) N	Allowable load F_u([3]) N
CRW 4- 80					80 (1×40)			73	10												
CRW 4- 80 SL																					
CRW 4-120					120 (2×40)			101	14												
CRW 4-120 SL																					
CRW 4-160					160 (3×40)			136	19												
CRW 4-160 SL																					
CRW 4-200					200 (4×40)			164	23												
CRW 4-200 SL																					
CRW 4-240					240 (5×40)			199	28												
CRW 4-240 SL																					
CRW 4-280	0.82	6.91	22	11	280 (6×40)	20	4	227	32	7	5	10	4.5	M5	4.3	7.5	4.1	2	1 230	1 180	392
CRW 4-280 SL																					
CRW 4-320					320 (7×40)			262	37												
CRW 4-320 SL																					
CRW 4-360					360 (8×40)			297	42												
CRW 4-360 SL																					
CRW 4-400					400 (9×40)			325	46												
CRW 4-400 SL																					
CRW 4-440					440 (10×40)			360	51												
CRW 4-440 SL																					
CRW 4-480					480 (11×40)			388	55												
CRW 4-480 SL																					

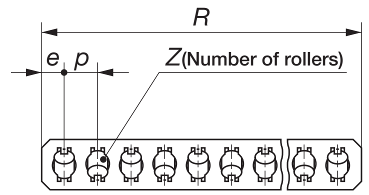
Note([1]) : This value shows mass per one meter for individual way.
([2]) : This value shows mass of one roller cage in which ten rollers are incorporated.
([3]) : This value shows load per one roller.

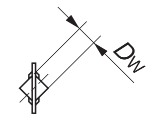
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Standard type
CRW
CRW ···SL (Stainless steel made)







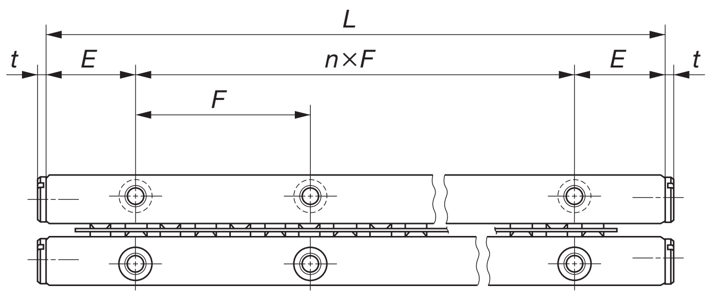


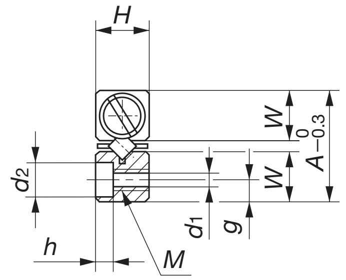
Model number	Mass (Ref.) Way([1]) kg/m	Mass (Ref.) Roller cage([2]) g	Boundary dimensions A	H	L (n×F)	E	Dimensions of roller cage Dw	R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u([3]) N	Basic static load rating C_{0u}([3]) N	Allowable load F_u([3]) N
CRW 6-100					100 (1×50)			84	9												
CRW 6-100 SL																					
CRW 6-150					150 (2×50)			129	14												
CRW 6-150 SL																					
CRW 6-200					200 (3×50)			165	18												
CRW 6-200 SL																					
CRW 6-250					250 (4×50)			210	23												
CRW 6-250 SL																					
CRW 6-300					300 (5×50)			246	27												
CRW 6-300 SL																					
CRW 6-350	1.57	20.3	31	15	350 (6×50)	25	6	282	31	9	6	14	6	M6	5.3	9.5	5.2	3	2 570	2 310	769
CRW 6-350 SL																					
CRW 6-400					400 (7×50)			327	36												
CRW 6-400 SL																					
CRW 6-450					450 (8×50)			363	40												
CRW 6-450 SL																					
CRW 6-500					500 (9×50)			408	45												
CRW 6-500 SL																					
CRW 6-550					550 (10×50)			444	49												
CRW 6-550 SL																					
CRW 6-600					600 (11×50)			489	54												
CRW 6-600 SL																					

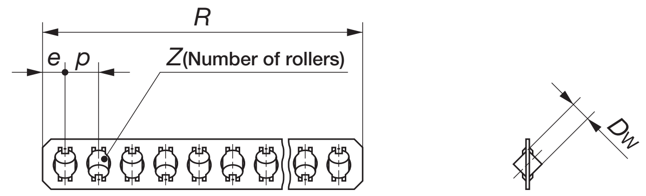
Note([1]) : This value shows mass per one meter for individual way.
([2]) : This value shows mass of one roller cage in which ten rollers are incorporated.
([3]) : This value shows load per one roller.

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

Standard type
CRW







Model number	Mass (Ref.) Way([1]) kg/m	Mass (Ref.) Roller cage([2]) g	Boundary dimensions mm A	H	$L\,(n\times F)$	E	Dimensions of roller cage D_w	R	Z	Mounting dimensions mm p	e	W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u([3]) N	Basic static load rating C_{0u}([3]) N	Allowable load F_u([3]) N
CRW 9- 200	3.3	64.8	44	22	200 (1×100)	50	9	173	12	14	9.5	20.2	9	M 8	6.8	10.5	6.2	3	7 190	6 600	2 200
CRW 9- 300					300 (2×100)			257	18												
CRW 9- 400					400 (3×100)			327	23												
CRW 9- 500					500 (4×100)			411	29												
CRW 9- 600					600 (5×100)			495	35												
CRW 9- 700					700 (6×100)			565	40												
CRW 9- 800					800 (7×100)			649	46												
CRW 9- 900					900 (8×100)			733	52												
CRW 9-1000					1 000 (9×100)			817	58												
CRW 9-1100					1 100 (10×100)			887	63												
CRW 9-1200					1 200 (11×100)			971	69												
CRW 12- 200	5.57	146	58	28	200 (1×100)	50	12	168	9	18	12	26.9	12	M10	8.5	13.5	8.2	3	14 700	13 600	4 540
CRW 12- 300					300 (2×100)			258	14												
CRW 12- 400					400 (3×100)			330	18												
CRW 12- 500					500 (4×100)			420	23												
CRW 12- 600					600 (5×100)			492	27												
CRW 12- 700					700 (6×100)			564	31												
CRW 12- 800					800 (7×100)			654	36												
CRW 12- 900					900 (8×100)			726	40												
CRW 12-1000					1 000 (9×100)			816	45												
CRW 12-1100					1 100 (10×100)			888	49												
CRW 12-1200					1 200 (11×100)			978	54												

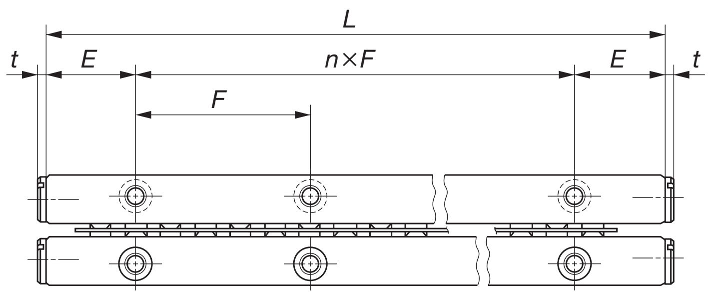
Note([1]) : This value shows mass per one meter for individual way.
([2]) : This value shows mass per one roller cage in which ten rollers are incorporated.
([3]) : This value shows load per one roller.

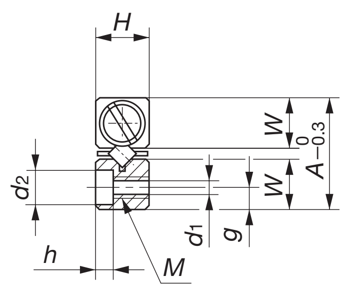
CRW, CRWM

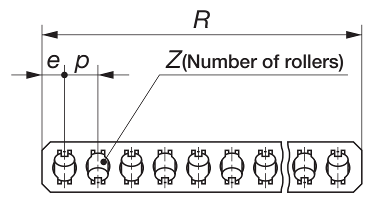
E

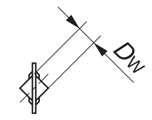
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Standard type
CRW









Model number	Mass (Ref.) Way(1) kg/m	Mass (Ref.) Roller cage(2) g	Boundary dimensions A	H	L (n×F)	E	Dimensions of roller cage D_w	R	Z	Nominal dimensions mm / Mounting dimensions p	e	W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u(3) N	Basic static load rating C_{0u}(3) N	Allowable load F_u(3) N
CRW 15- 300	8.75	273	71	36	300 (2×100)	50	15	261	11	23	15.5	33	14	M12	10.5	16.5	10.2	5	23 800	21 900	7 300
CRW 15- 400					400 (3×100)			330	14												
CRW 15- 500					500 (4×100)			422	18												
CRW 15- 600					600 (5×100)			491	21												
CRW 15- 700					700 (6×100)			583	25												
CRW 15- 800					800 (7×100)			652	28												
CRW 15- 900					900 (8×100)			744	32												
CRW 15-1000					1 000 (9×100)			813	35												
CRW 15-1100					1 100 (10×100)			905	39												
CRW 15-1200					1 200 (11×100)			974	42												
CRW 18- 300	11.3	447	83	40	300 (2×100)	50	18	262	9	28	19	38.5	18	M14	12.5	18.5	12.2	5	35 800	32 700	10 900
CRW 18- 400					400 (3×100)			346	12												
CRW 18- 500					500 (4×100)			430	15												
CRW 18- 600					600 (5×100)			514	18												
CRW 18- 700					700 (6×100)			570	20												
CRW 18- 800					800 (7×100)			654	23												
CRW 18- 900					900 (8×100)			738	26												
CRW 18-1000					1 000 (9×100)			822	29												
CRW 18-1100					1 100 (10×100)			906	32												
CRW 18-1200					1 200 (11×100)			990	35												

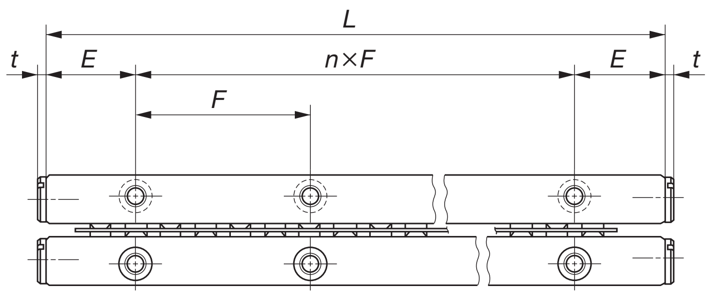
Note(1) : This value shows mass per one meter for individual way.
(2) : This value shows mass of one roller cage in which ten rollers are incorporated.
(3) : This value shows load per one roller.

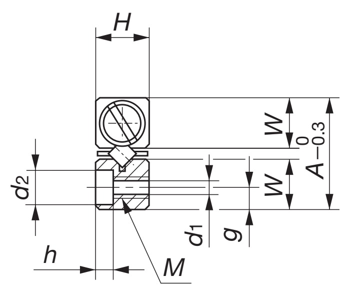
CRW, CRWM

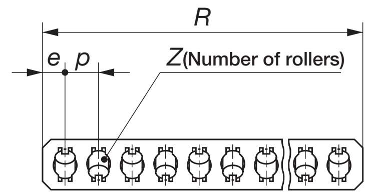
E

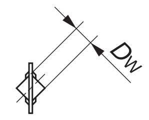
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Standard type
CRW







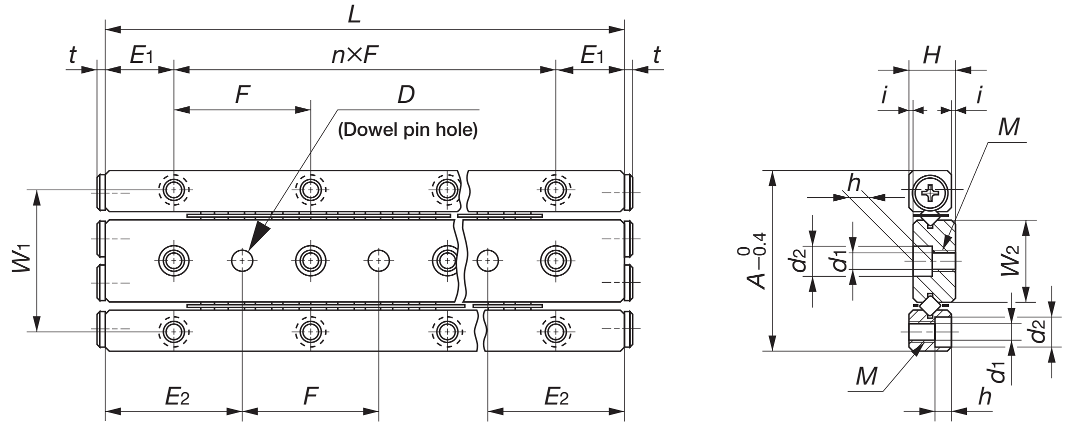


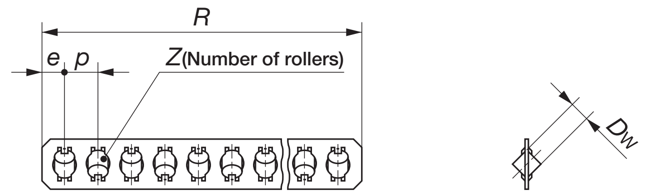
Model number	Mass (Ref.) Way[1] kg/m	Mass (Ref.) Roller cage[2] g	Boundary dimensions mm A	H	L (n×F)	E	Dimensions of roller cage D_w	R	Z	Mounting dimensions p	e	W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_u[3] N	Basic static load rating C_{0u}[3] N	Allowable load F_u[3] N
CRW 24- 400					400 (3×100)			336	9												
CRW 24- 500					500 (4×100)			408	11												
CRW 24- 600					600 (5×100)			516	14												
CRW 24- 700					700 (6×100)			588	16												
CRW 24- 800	20.6	1 060	110	55	800 (7×100)	50	24	660	18	36	24	51.5	24	M16	14.5	22.5	14.2	5	69 600	63 500	21 200
CRW 24- 900					900 (8×100)			732	20												
CRW 24-1000					1 000 (9×100)			840	23												
CRW 24-1100					1 100 (10×100)			912	25												
CRW 24-1200					1 200 (11×100)			984	27												

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.

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

Module type CRWM





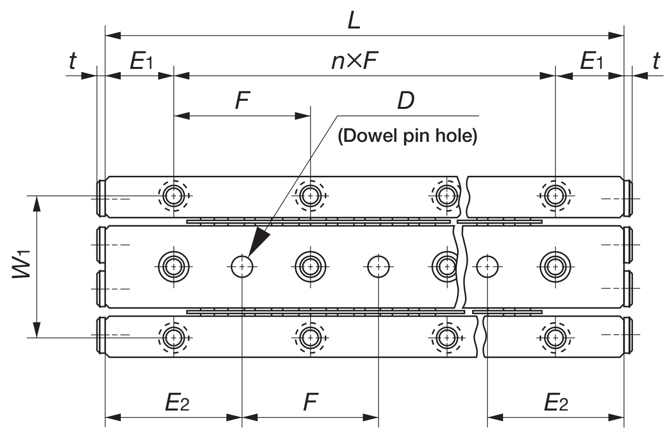
Model number	Mass (Ref.) Way([1]) kg/m	Mass (Ref.) Roller cage([2]) g	Boundary dimensions A	H	L (n×F)	i	Dimensions of roller cage D_w	R	Z	Mounting dimensions p	e	W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Tolerance	t	Basic dynamic load rating C_u([3]) N	Basic static load rating C_{0u}([3]) N	Allowable load F_u([3]) N
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	3	2.25	13.4	7.8	5	10	M2	1.65	3	1.4	2	$^{+0.010}_{0}$	1.7	125	120	39.8
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)			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)	0.5	2	89.6	22	4	2.8	19	11	7.5	15	M3	2.55	4.4	2	3	$^{+0.010}_{0}$	1.5	293	294	97.9
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																

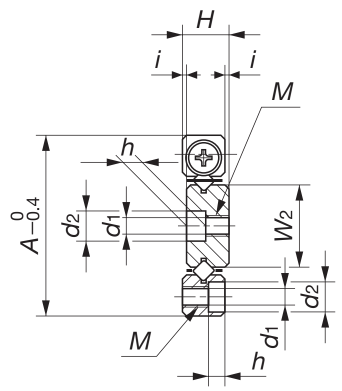
Nominal dimensions and tolerances: mm

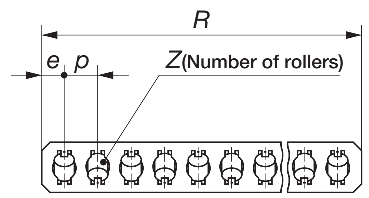
Note([1]) : This value shows mass per one set of ways (one center way and two side ways) per one meter.
([2]) : This value shows mass of one roller cage in which ten rollers are incorporated.
([3]) : This value shows load per one roller.

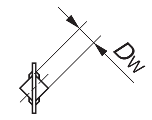
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Module type CRWM









Model number	Mass (Ref.) Way(1) kg/m	Roller cage(2) g	Boundary dimensions A	H	L (n×F)	i	Dimensions of roller cage D_w	R	Z
CRWM 3- 50					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 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.

Nominal dimensions and tolerances mm

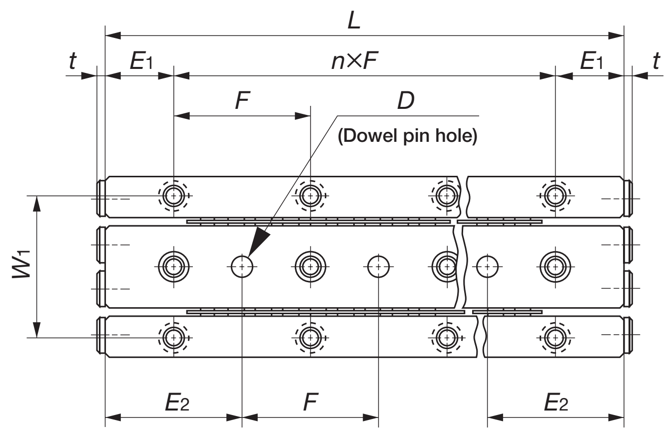
Model number	p	e	Mounting dimensions W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Tolerance	t	Basic dynamic load rating C_u(3) N	Basic static load rating C_{0u}(3) N	Allowable load F_u(3) N
CRWM 3-50 – CRWM 3-300	5	3.5	29	16.6	12.5	25	M4	3.3	6	3.1	4	$^{+0.012}_{0}$	2	638	609	203
CRWM 4-80 – CRWM 4-480	7	5	35	20	20	40	M5	4.3	7.5	4.1	5	$^{+0.012}_{0}$	2	1 230	1 180	392

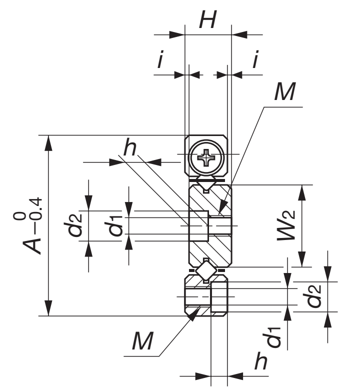
CRW, CRWM

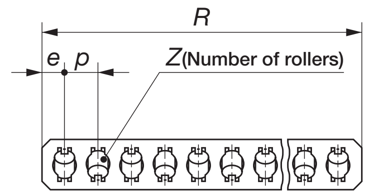
E

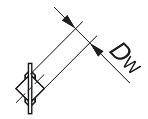
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Module type CRWM









Model number	Mass (Ref.) Way(1) kg/m	Mass (Ref.) Roller cage(2) g	Boundary dimensions A	H	L (n×F)	i	Dimensions of roller cage D_w	R	Z
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					200 (4×40)			164	23
CRWM 4-240A					240 (5×40)			199	28
CRWM 4-280A	3.96	6.91	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.

Nominal dimensions and tolerances mm

p	e	Mounting dimensions W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Tolerance	t	Basic dynamic load rating C_u(3) N	Basic static load rating C_{0u}(3) N	Allowable load F_u(3) N
7	5	38	22	20	40	M5	4.3	8	4.1	5	+0.012 0	2	1 230	1 180	392

CRW, CRWM

E

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

U.S. PATENTED

Anti-Creep Cage Crossed Roller Way

CRWG

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 and high-tact 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.

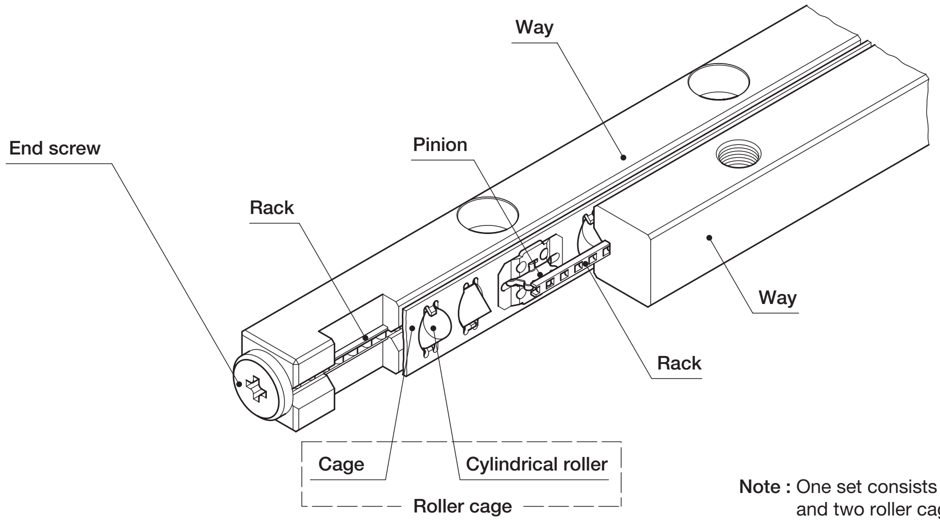
Smooth operation

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.

U.S. PATENT No. 6,736,541



Note : One set consists of four ways and two roller cages.

Structure of Anti-Creep Cage Crossed Roller Way

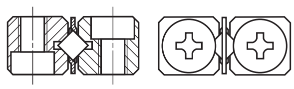
Anti-Creep Cage Crossed Roller Way series

Shape

Model code

Anti-Creep Cage Crossed Roller Way

Standard type



CRWG

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.

Standard type ► CRWG 3 — 150 SP /B

1 Series	Model code	CRWG
2 Size of rolling guide	Size	3
3 Length of way	Part code	150
4 Accuracy class	Classification symbol	SP
5 Special specification	Supplemental code	/B

1 Series

Standard type : CRWG

2 Size

Applicable type and size are shown in Table 1.

Table 1 Type and size

Size \ Type	Carbon steel CRWG
2	○
3	○
4	○

3 Length of way

○

The length of way is indicated in millimeters. For applicable way lengths, please refer to the dimension table.

4 Accuracy class

Standard : No symbol

Super precision : SP

For the allowable values of parallelism of the raceway to the reference mounting surface, see Fig.1.

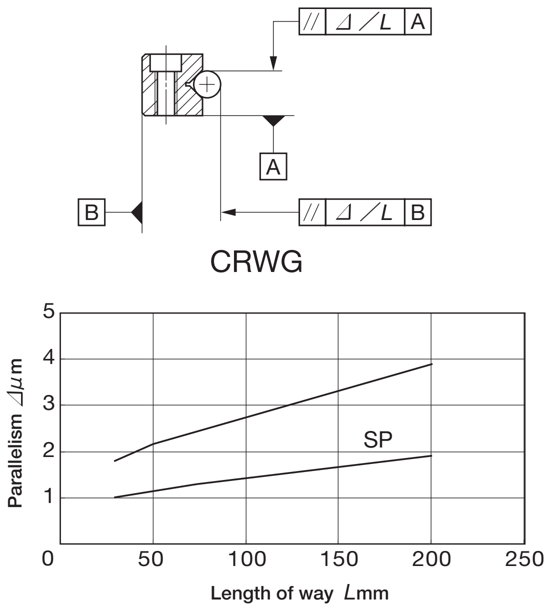


Fig.1 Accuracy of Anti-Creep Cage Crossed Roller Way

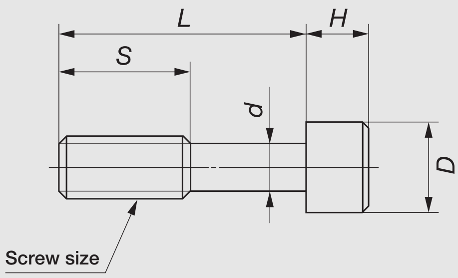
5 Special specification

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 cannot 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 positinal accuracy of the mounting holes and female screws of the machine on which the fixed side ways are mounted is not sufficient.

Table 2 Dimensions of special mounting screws



unit : mm

Size of CRWG	Screw size	*d*	*D*	*H*	*L*	*S*
3	M 3	2.3	5	3	12	5
4	M 4	3.1	6	4	15	6

Remark : Not applicable to size2

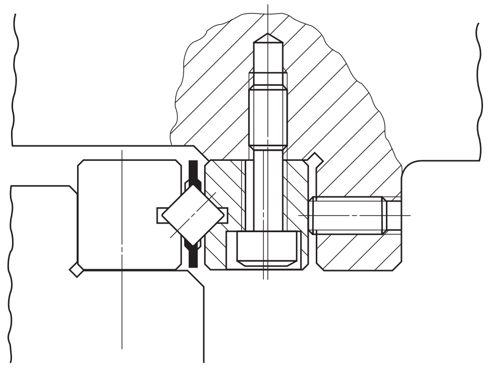


Fig.2 Mounting example with special mounting screw

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 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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.

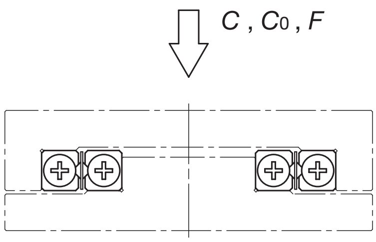


Fig.3 Direction of load rating

CRWG

E

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.

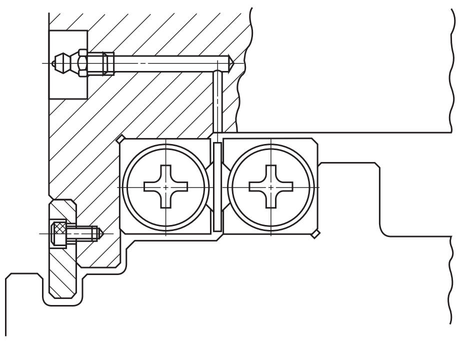


Fig.4 Example of lubrication method

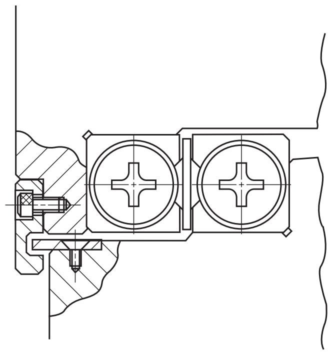


Fig.5 Example of labyrinth seal

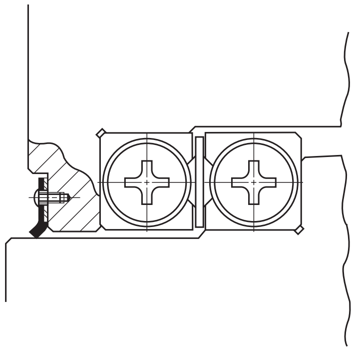


Fig.6 Example of wiper seal

Precautions for use

❶ 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.

❷ 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.

❸ 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.

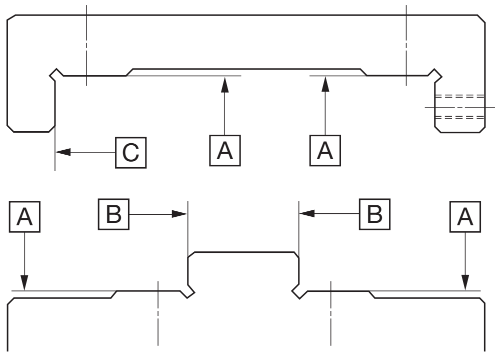


Fig. 7 Example of the mating mounting surfaces

Table 3 Accuracy of mating mounting surfaces

A 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-51.
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
E

❹ 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.

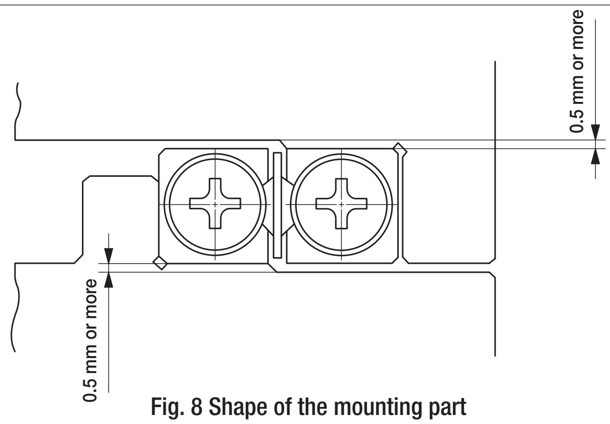


Fig. 8 Shape of the mounting part

❺ 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.

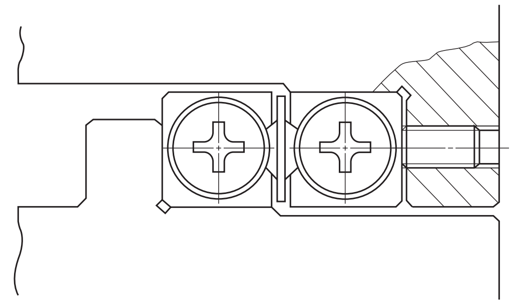


Fig. 9 General example of preload

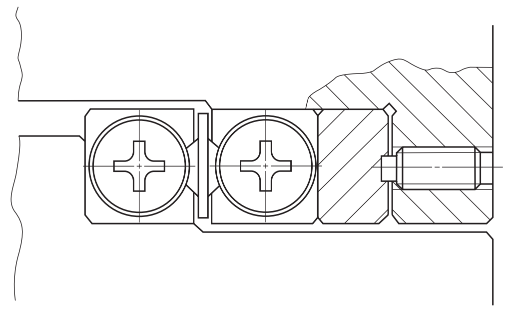


Fig. 10.1 Example of setting plate

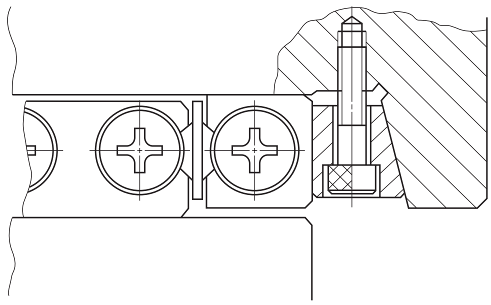


Fig. 10. 2 Example of tapered jib

❻ 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.

❼ Maximum speed

The operating speed of Crossed Roller Way should not exceed 30m/min.

❽ 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 4. 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.

Table 4 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

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.

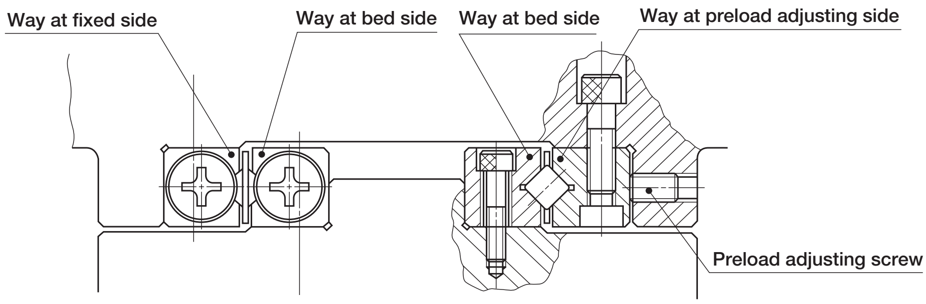


Fig.11 Mounting example of CRWG

❶ 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.

❷ 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.

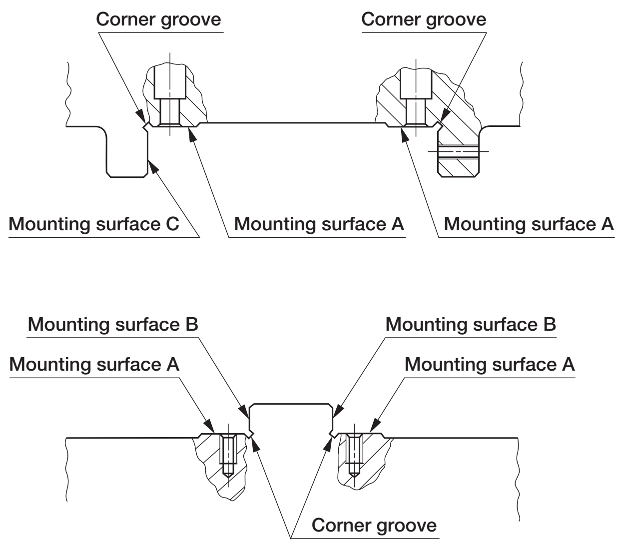


Fig.12 Mounting surface for CRWG

❸ 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.

❹ 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.

❺ 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)

- Place the cylindrical rollers with a retainer on the way at bed-side with the center of the pinion gear in the center of the retainer engaged with the end of the rack gear of the way. (See Fig.15.2) Do not bend the retainer.

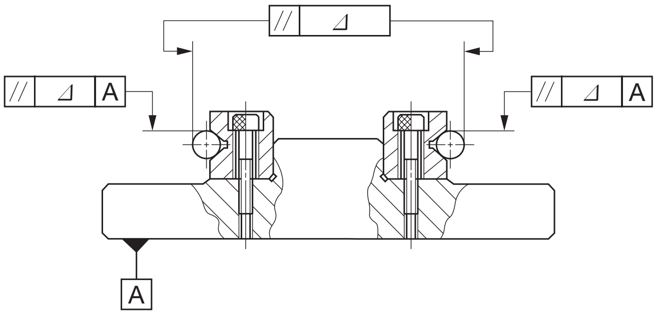


Fig.13 Mounting accuracy of ways

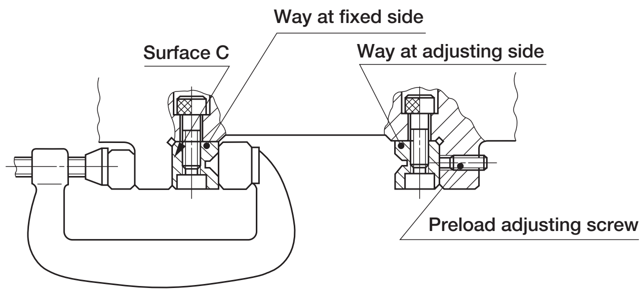


Fig.14 Mounting of ways at table side

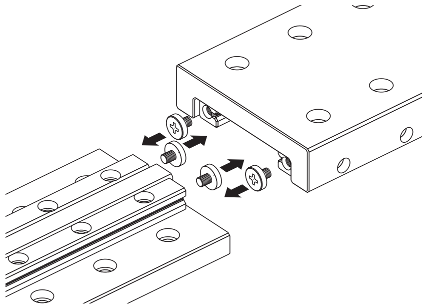


Fig 15.1

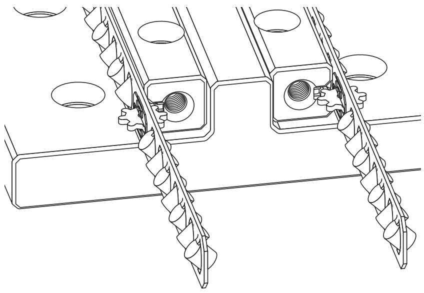


Fig 15.2

CRWG

E

- 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)

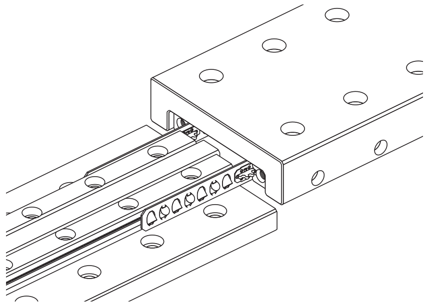


Fig.15.3

- 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)

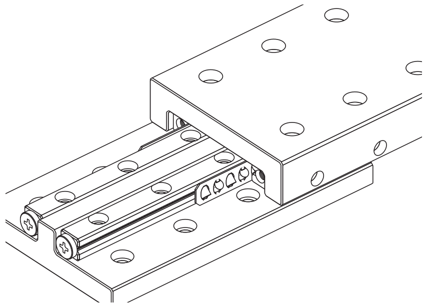


Fig.15.4

- Slide the table to the center of the stroke and tighten the end screws. (See Fig.15.5)

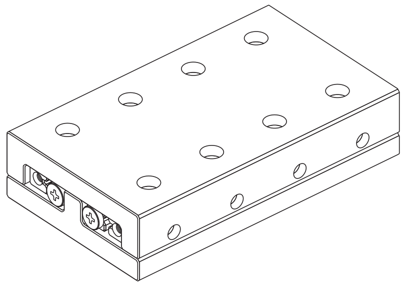


Fig.15.5

- 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)

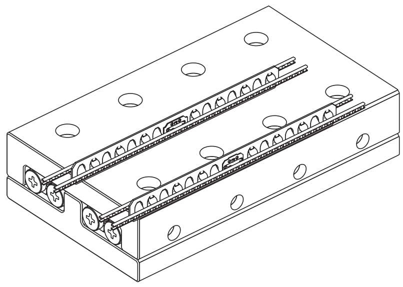


Fig.15.6

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.

❻ 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.
- 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 and tighten all adjusting screws uniformly to the recorded tightening torque.

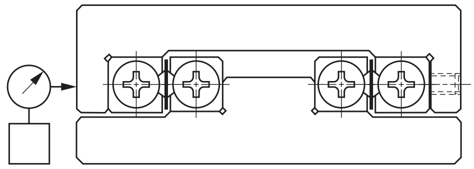


Fig.16 Example of preload adjustment

❼ Final fixing of the way at adjusting side

- 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.

❽ 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.

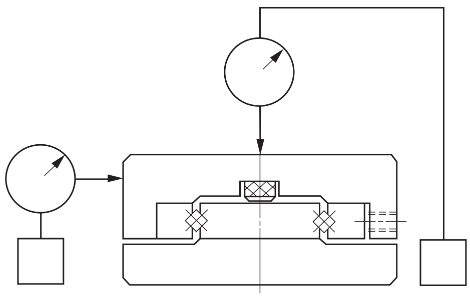
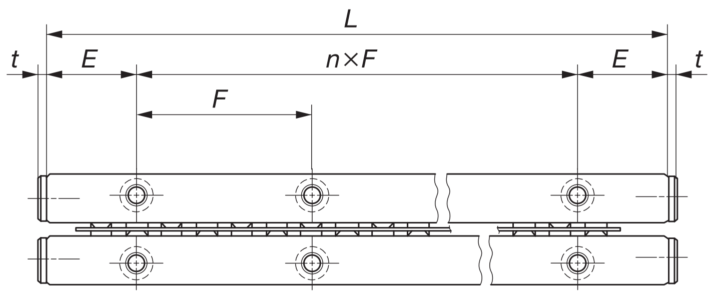
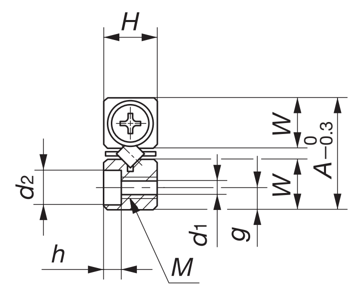


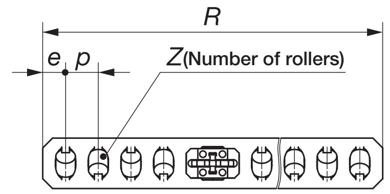
Fig .17 Final check of operating accuracy

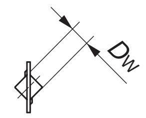
Anti-Creep Cage Crossed Roller Way

Standard type
CRWG









Model number	Mass (Ref.) Way(1) g	Mass (Ref.) Roller cage(2) g	Boundary dimensions A	H	L (n×F)	E	Dimension of roller cage Dw	R
CRWG 2- 30	6.53	0.38	12	6	30 (1×15)	7.5	2	25.6
CRWG 2- 45	9.53	0.72			45 (2×15)			41.6
CRWG 2- 60	12.5	0.88			60 (3×15)			49.6
CRWG 2- 75	15.5	1.22			75 (4×15)			65.6
CRWG 2- 90	18.5	1.39			90 (5×15)			73.6
CRWG 2-105	21.5	1.72			105 (6×15)			89.6
CRWG 3- 50	22.8	1.69	18	8	50 (1×25)	12.5	3	42
CRWG 3- 75	33.3	2.71			75 (2×25)			62
CRWG 3-100	43.8	3.72			100 (3×25)			82
CRWG 3-125	54.4	4.74			125 (4×25)			102
CRWG 3-150	64.9	5.75			150 (5×25)			122
CRWG 4- 80	59.6	9.70	22	11	80 (1×40)	20	4	73
CRWG 4-120	88.0	12.0			120 (2×40)			101
CRWG 4-160	116	14.3			160 (3×40)			129
CRWG 4-200	145	16.7			200 (4×40)			157

Note(1) : The value shows mass of one piece of way.
(2) : The value shows mass of one roller cage.

Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N
4	4	2.8	5.5	2.5	M3	2.55	4.4	2	1.5	9	912	1 180	392
8										7	1 560	2 350	783
10										21	1 860	2 940	979
14										19	2 420	4 120	1 370
16										33	2 680	4 700	1 570
20										31	3 190	5 880	1 960
6	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	13	2 740	3 650	1 220
10										23	4 080	6 090	2 030
14										33	5 300	8 530	2 840
18										43	6 440	11 000	3 650
22										53	7 530	13 400	4 470
8	7	5	10	4.5	M5	4.3	7.5	4.1	2	14	6 670	9 440	3 140
12										38	9 140	14 200	4 700
16										62	11 400	18 900	6 270
20										86	13 600	23 600	7 840

CRWG
E

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

Crossed Roller Way Unit

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.

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.

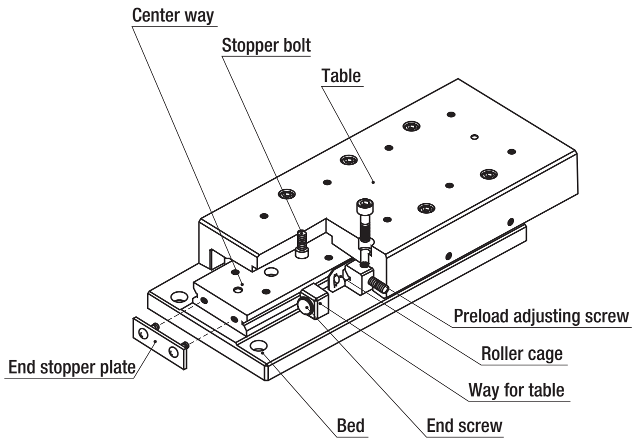
A variety of available models and sizes

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.

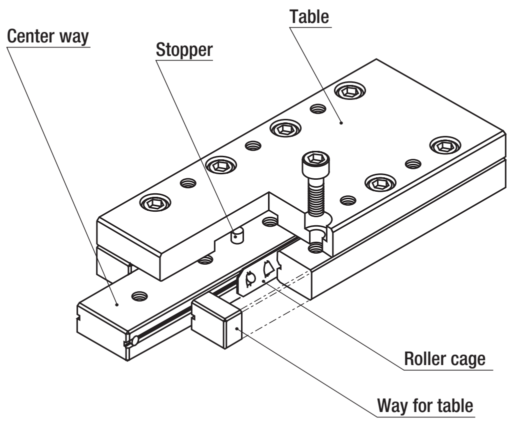
Easy mounting

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.

U.S. PATNET No. 4,697,935



CRWU



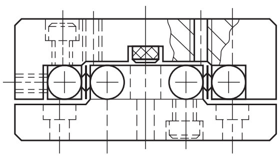
CRWU···RS

Structure of Crossed Roller Way Unit

Crossed Roller Way Unit series

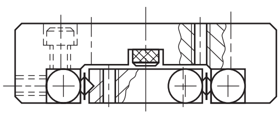
Shape | **Model code**

Crossed Roller Way Unit



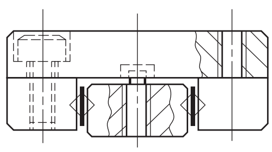
This type is a general purpose linear motion rolling guide unit. The table and bed are assembled with high accuracy and can be readily mounted onto machines or equipment with bolts.

CRWU



This type is a linear motion rolling guide unit featuring a low sectional height that is accomplished by simply removing the bed from the CRWU. Stable accuracy and high rigidity in linear motion can be achieved against loads in any direction.

CRWU···R

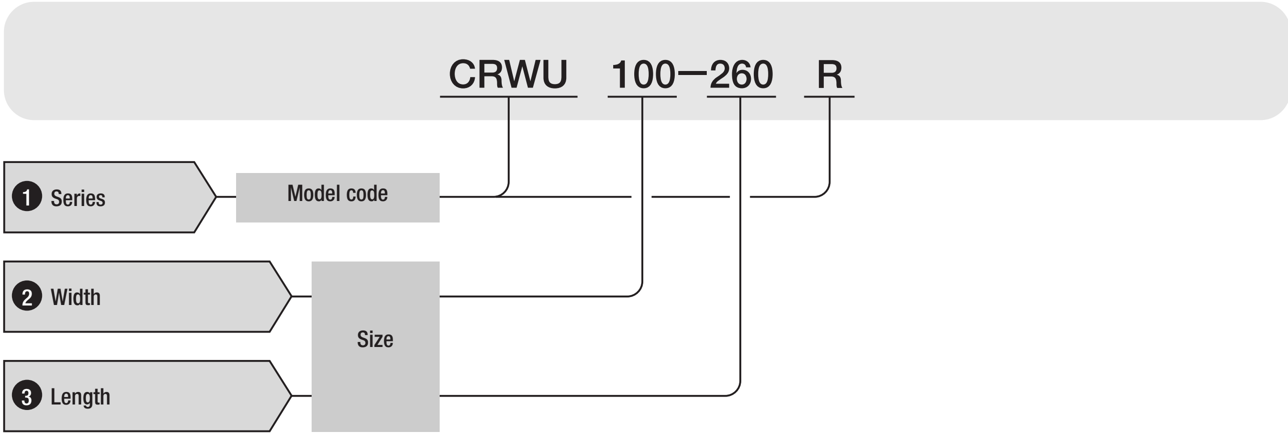


This type is a compact linear motion rolling guide unit featuring a simple lightweight structure, ideal for applications in which the center way is stroked and high accuracy with low inertia is required.

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.



1 Series	CRWU CRWU…R CRWU…RS
2 Width	Indicate the width of table in mm.
3 Length	Indicate the length of table in mm.

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 x 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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 T_0

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.

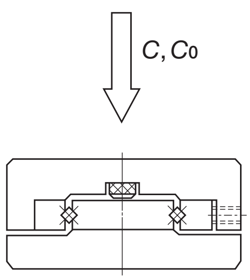


Fig. 1 Direction of load rating

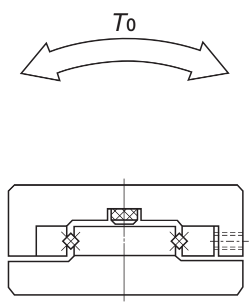


Fig. 2 Direction of static moment rating

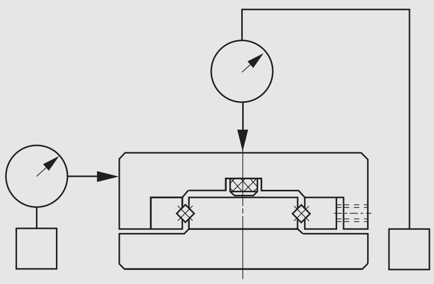
CRWU, CRWU…R, CRWU…RS

E

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 IKO.

Table 1 Accuracy of Crossed Roller Way Unit



unit : μm

Unit length L mm over	incl.	Parallelism at table center	Parallelism at table side
—	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

❶ Specification

Check whether the specifications of selected Crossed Roller Way Unit meet the requirements for the application of the machine or equipment.

❷ 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 IKO.

❸ 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.

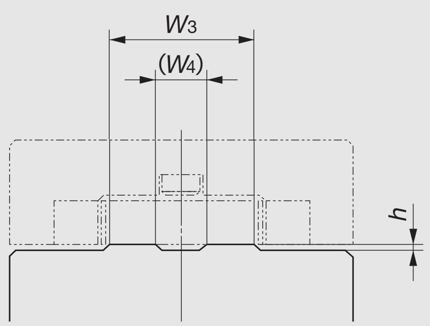
(2) Mounting dimensions of CRWU···R

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 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 CRWU 40 ··· R	0.5	18 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

❹ 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.

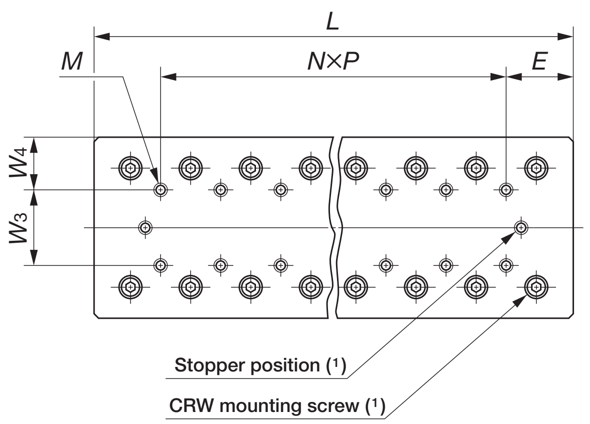
❺ Readjustment of preload

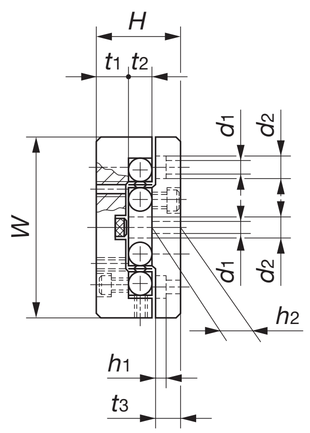
Preloads of Crossed Roller Way Unit are adjusted to zero clearance or minimal preload at the factory. Crossed Roller Way Unit does not usually require any further adjustment. If preload readjustment of the CRWU or CRWU···R is needed, adjust it according to "Preload adjustment" of the Crossed Roller Way shown on page E-23.

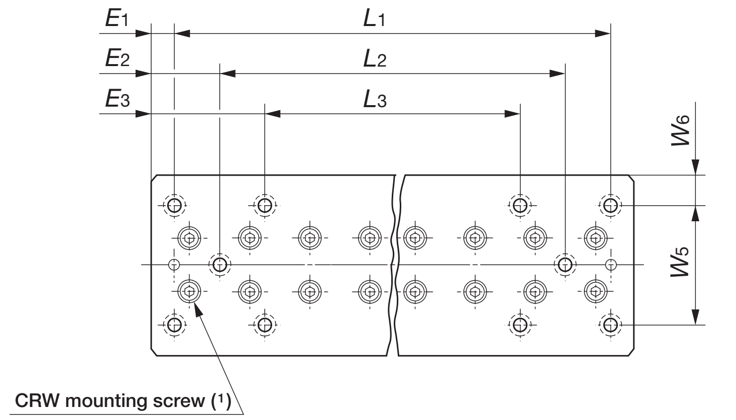
❻ Operating speed

The operating speed of Crossed Roller Way Unit should not exceed 30 m/min.

CRWU







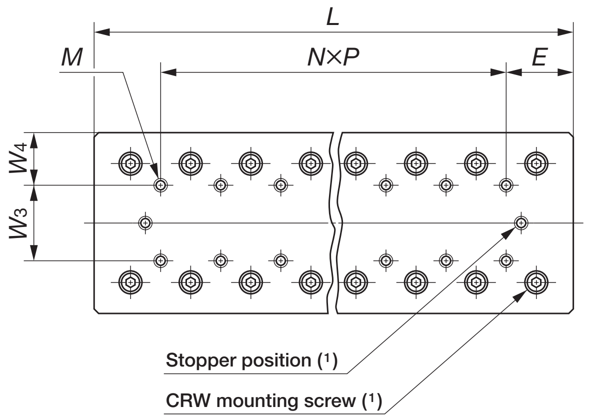
Model number	Mass (Ref.) kg	W	Tolerance	H	Tolerance	L	t_1	t_2	t_3	Maximum stroke length	W_3	W_4	N×P	E
		Boundary dimensions and tolerances mm									Table			
CRWU 30- 25	0.09					25				12			–	
CRWU 30- 35	0.13					35				18			1×10	
CRWU 30- 45	0.17					45				25			2×10	
CRWU 30- 55	0.20	30	±0.1	17	±0.1	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			–	
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	

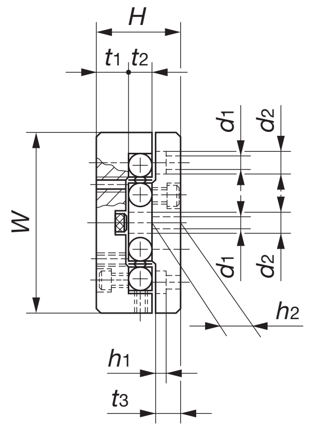
Note(1) : This is the mounting position for the stopper or CRW mounting screw.
For details, see page E-74.

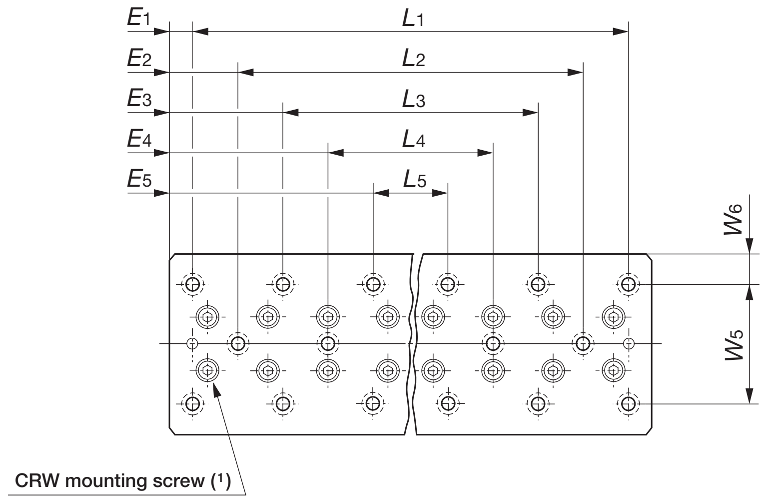
Model number	M	W_5	W_6	L_1	E_1	L_2	E_2	L_3	E_3	d_1	d_2	h_1	h_2	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N	Static moment rating T_0 N・m
	Mounting dimensions mm			Bed													
CRWU 30- 25				18										380	478	159	3.2
CRWU 30- 35				28				–	–					525	717	239	4.8
CRWU 30- 45				38										659	956	319	6.5
CRWU 30- 55	M2	22	4	48	3.5	–	–	28	13.5	2.55	4.1	2.5	6	786	1 200	398	8.1
CRWU 30- 65				58				38	13.5					906	1 430	478	9.7
CRWU 30- 75				68				45	13.5					1 020	1 670	558	11.3
CRWU 30- 85				78				58	13.5					1 140	1 910	638	12.9
CRWU 40- 35				25								3.5	7	896	1 180	392	10.6
CRWU 40- 50				40				–	–					2 710	3 660	1 220	26.5
CRWU 40- 65				55										2 710	3 660	1 220	26.5
CRWU 40- 80	M3	30	5	70	5	–	–	40	20	3.5	6	3.2	6	4 050	6 090	2 030	44.2
CRWU 40- 95				85				55	20					3 400	4 880	1 630	35.3
CRWU 40-110				100				70	20					4 680	7 310	2 440	53.0
CRWU 40-125				115				85	20					4 680	7 310	2 440	53.0
CRWU 60- 55				35										2 710	3 660	1 220	51.2
CRWU 60- 80				60										4 050	6 090	2 030	85.3
CRWU 60-105				85		–	–							5 270	8 530	2 840	119
CRWU 60-130	M4	40	10	110	10			–	–	4.5	7.5	4.5	9.5	5 860	9 750	3 250	137
CRWU 60-155				135		85	35							6 970	12 200	4 060	171
CRWU 60-180				160		110	35							8 040	14 600	4 880	205
CRWU 60-205				185		135	35	85	60					8 550	15 800	5 280	222

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

CRWU







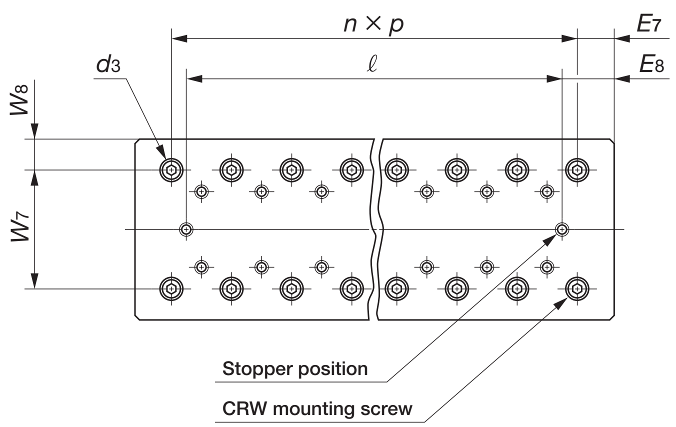
Model number	Mass (Ref.) kg	Boundary dimensions and tolerances mm W	Tolerance	H	Tolerance	L	t_1	t_2	t_3	Maximum stroke length	Table W_3	W_4	$N\times P$	E	M	W_5
CRWU 80- 85	1.8					85				50			–			
CRWU 80-125	2.6					125				75			1×40			
CRWU 80-165	3.4					165				105			2×40			
CRWU 80-205	4.2	80	±0.1	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			5×100			
CRWU 145-810	51.3					810				750			6×100			

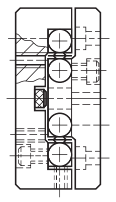
Note(1) : This is the mounting position for the stopper or CRW mounting screw.
For details, see page E-75.

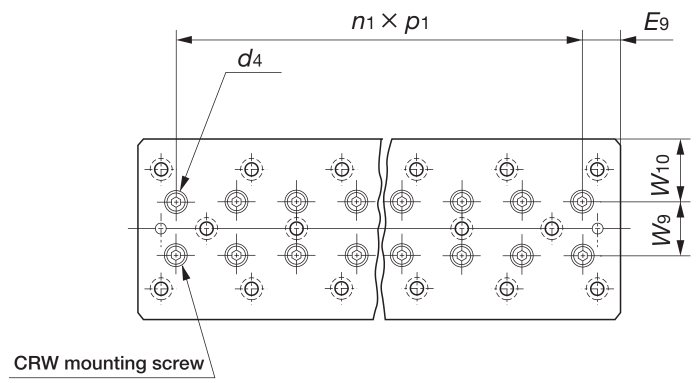
Model number	Mounting dimensions mm W_6	Bed L_1	E_1	L_2	E_2	L_3	E_3	L_4	E_4	L_5	E_5	d_1	d_2	h_1	h_2	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N	Static moment rating T_0 N·m
CRWU 80- 85		40														6 640	9 400	3 130	188
CRWU 80-125		80				–	–									9 130	14 100	4 700	282
CRWU 80-165		120														10 300	16 500	5 480	329
CRWU 80-205	10	160	22.5	–	–	80	62.5	–	–	–	–	5.5	9.5	6	11	12 500	21 200	7 050	423
CRWU 80-245		200				120	62.5									14 700	25 900	8 620	517
CRWU 80-285		240				160	62.5									16 700	30 600	10 200	611
CRWU 80-325		280				200	62.5			120	102.5					18 700	35 300	11 800	705
CRWU 100-110		90		–	–											13 900	18 500	6 150	415
CRWU 100-160		140														16 600	23 100	7 690	519
CRWU 100-210		190		90	60	–	–									21 600	32 300	10 800	727
CRWU 100-260	20	240	10	140	60			–	–	–	–	7	11	6.5	14	26 300	41 500	13 800	934
CRWU 100-310		290		190	60											30 800	50 700	16 900	1 140
CRWU 100-360		340		240	60	140	110									35 100	60 000	20 000	1 350
CRWU 100-410		390		290	60	190	110									37 200	64 600	21 500	1 450
CRWU 145-210		100		–	–											39 400	52 800	17 600	1 900
CRWU 145-310		200														61 200	92 300	30 800	3 320
CRWU 145-410		300		100	155	–	–									67 900	106 000	35 200	3 800
CRWU 145-510	27.5	400	55	200	155			–	–	–	–	9	14	8.5	17.5	74 400	119 000	39 600	4 270
CRWU 145-610		500		300	155	100	255									87 100	145 000	48 400	5 220
CRWU 145-710		600		400	155	200	255									99 200	172 000	57 200	6 170
CRWU 145-810		700		500	155	300	255	100	355							111 000	198 000	66 000	7 120

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

Mounting dimensions of stopper and CRW
CRWU





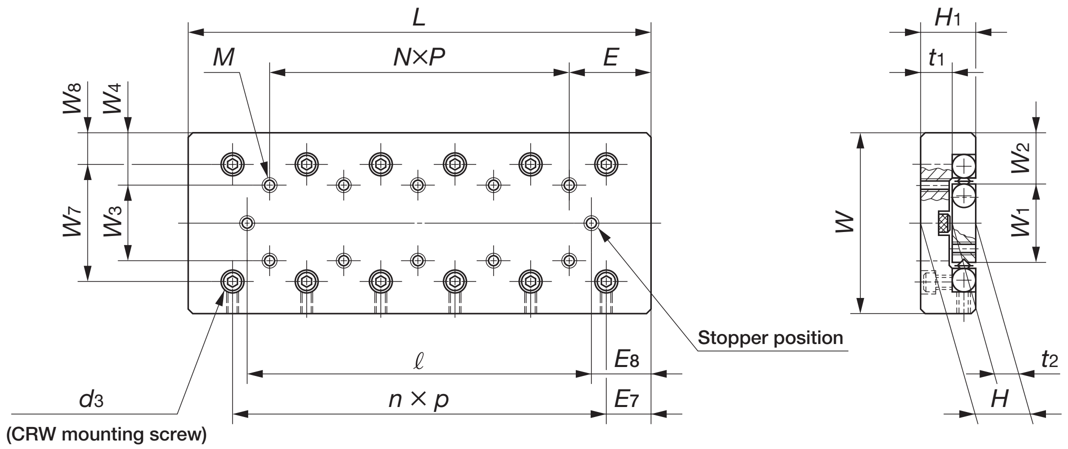


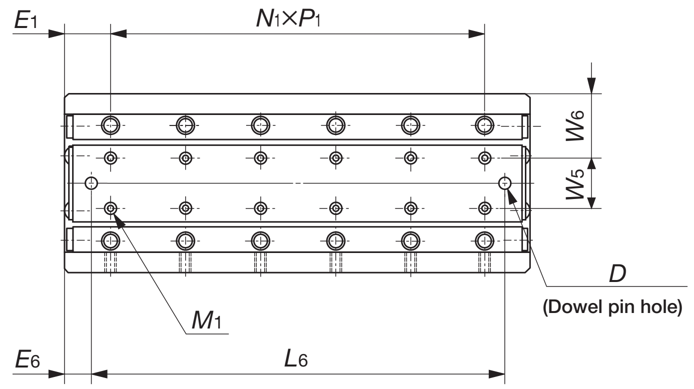
Model number	Dimensions of table mm							Dimensions of bed mm				
	W_7	W_8	$n \times p$	E_7	d_3	ℓ	E_8	W_9	W_{10}	$n_1 \times p_1$	E_9	d_4
CRWU 30- 25			1×10			20	2.5			1×10		
CRWU 30- 35			2×10			26	4.5			2×10		
CRWU 30- 45			3×10			33	6			3×10		
CRWU 30- 55	18.4	5.8	4×10	7.5	4.1	40	7.5	—	15	4×10	7.5	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			2×15	17.5	
CRWU 40- 80	25.5	7.25	2×25	15	6.5	61	9.5	—	20	4×15	10	6
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		

Model number	Dimensions of table mm							Dimensions of bed mm				
	W_7	W_8	$n \times p$	E_7	d_3	ℓ	E_8	W_9	W_{10}	$n_1 \times p_1$	E_9	d_4
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		

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

CRWU···R



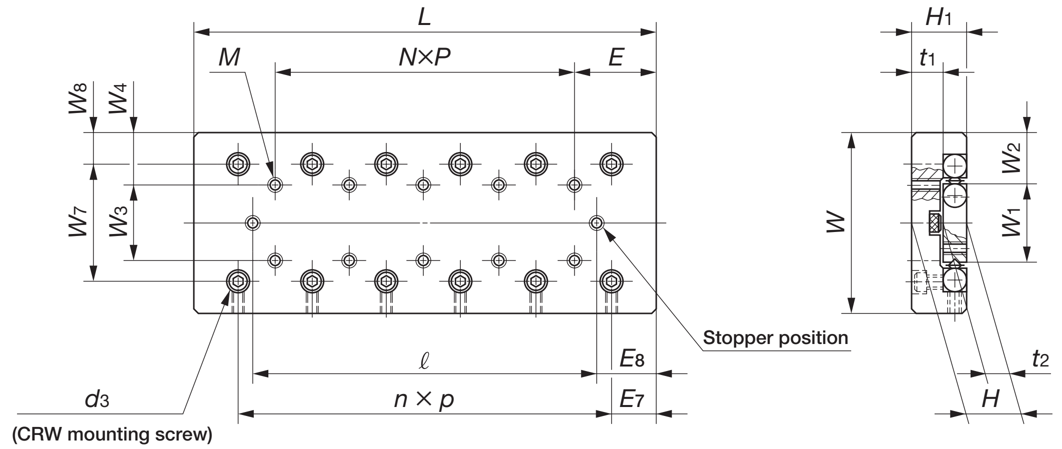


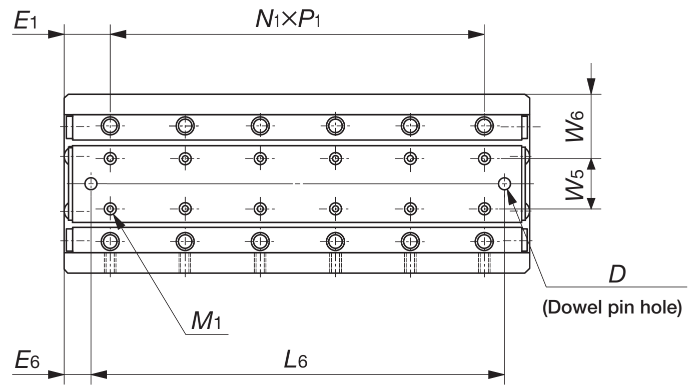
Model number	Mass (Ref.) kg	Boundary dimensions and tolerances mm: W	Tolerance	H	Tolerance	L	Maximum stroke length	Dimensions of table mm, Mounting dimensions: W_3	W_4	$N\times P$	E	M	W_7	W_8	$n\times p$	E_7	d_3	ℓ
CRWU 30- 25R	0.06					25	12			–					1×10			20
CRWU 30- 35R	0.08					35	18			1×10					2×10			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			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	M3	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					155	90			4×25					5×25			104
CRWU 60-180R	1.5					180	105			5×25					6×25			119
CRWU 60-205R	1.7					205	130			6×25					7×25			144

Model number	E_8	H_1	t_1	Dimensions and tolerance of center way mm, Mounting dimensions: W_5	W_6	$N_1\times P_1$	E_1	M_1	D	Tolerance	L_6	E_6	W_1	W_2	t_2	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N	Static moment rating T_0 N·m
CRWU 30- 25R	2.5					1×10			–	–	–	–				380	478	159	3.2
CRWU 30- 35R	4.5					2×10			–	–	–	–				525	717	239	4.8
CRWU 30- 45R	6					3×10			–	–	–	–				659	956	319	6.5
CRWU 30- 55R	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
CRWU 30- 65R	8.5					5×10			2	$^{+0.020}_{0}$	40	12.5				906	1 430	478	9.7
CRWU 30- 75R	11					6×10			2		50	12.5				1 020	1 670	558	11.3
CRWU 30- 85R	13.5					7×10			2		60	12.5				1 140	1 910	638	12.9
CRWU 40- 35R	3	14	8			1×15	10		–	–	–	–	17	11.5	6	896	1 180	392	10.6
CRWU 40- 50R	4.5					2×15	10		–	–	–	–				2 710	3 660	1 220	26.5
CRWU 40- 65R	7					2×15	17.5		–	–	–	–				2 710	3 660	1 220	26.5
CRWU 40- 80R	9.5	15	7	–	20	4×15	10	M3	3		45	17.5	13.1	13.45	8	4 050	6 090	2 030	44.2
CRWU 40- 95R	12					4×15	17.5		3	$^{+0.020}_{0}$	45	25				3 400	4 880	1 630	35.3
CRWU 40-110R	14.5					5×15	17.5		3		60	25				4 680	7 310	2 440	53.0
CRWU 40-125R	17					5×15	25		3		60	32.5				4 680	7 310	2 440	53.0
CRWU 60- 55R	5.5					1×25					35					2 710	3 660	1 220	51.2
CRWU 60- 80R	10.5					2×25					60					4 050	6 090	2 030	85.3
CRWU 60-105R	15.5					3×25					85					5 270	8 530	2 840	119
CRWU 60-130R	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
CRWU 60-155R	25.5					5×25					135					6 970	12 200	4 060	171
CRWU 60-180R	30.5					6×25					160					8 040	14 600	4 880	205
CRWU 60-205R	30.5					7×25					185					8 550	15 800	5 280	222

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

CRWU…R



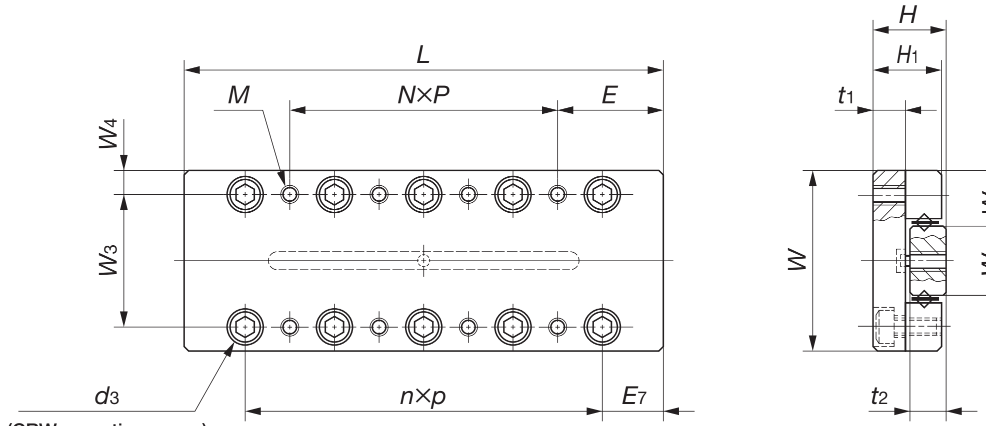


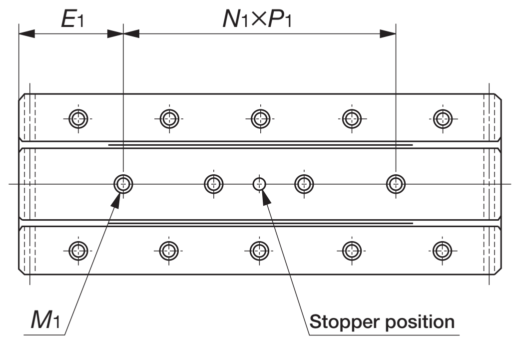
Model number	Mass (Ref.) kg	Boundary dimensions and tolerances mm W	Tolerance	H	Tolerance	L	Maximum stroke length	Dimensions of table mm — Mounting dimensions W_3	W_4	$N\times P$	E	M	W_7	W_8	$n\times p$	E_7	d_3	ℓ
CRWU 80- 85R	1.2					85	50			–					1×40			64
CRWU 80-125R	1.8					125	75			1×40					2×40			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

Model number	Dimensions and tolerance of center way mm — Mounting dimensions E_8	H_1	t_1	W_5	W_6	$N_1\times P_1$	E_1	M_1	D	Tolerance	L_6	E_6	W_1	W_2	t_2	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N	Static moment rating T_0 N・m
CRWU 80- 85R	10.5					1×40					55					6 640	9 400	3 130	188
CRWU 80-125R	18					2×40					95					9 130	14 100	4 700	282
CRWU 80-165R	23					3×40					135					10 300	16 500	5 480	329
CRWU 80-205R	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
CRWU 80-245R	38					5×40					215					14 700	25 900	8 620	517
CRWU 80-285R	43					6×40					255					16 700	30 600	10 200	611
CRWU 80-325R	48					7×40					295					18 700	35 300	11 800	705
CRWU 100-110R	16.5					1×50					70					13 900	18 500	6 150	415
CRWU 100-160R	23.5					2×50					120					16 600	23 100	7 690	519
CRWU 100-210R	31					3×50					170					21 600	32 300	10 800	727
CRWU 100-260R	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
CRWU 100-310R	46					5×50					270					30 800	50 700	16 900	1 140
CRWU 100-360R	53.5					6×50					320					35 100	60 000	20 000	1 350
CRWU 100-410R	63.5					7×50					370					37 200	64 600	21 500	1 450
CRWU 145-210R	27					1×100					150					39 400	52 800	17 600	1 900
CRWU 145-310R	52					2×100					250					61 200	92 300	30 800	3 320
CRWU 145-410R	17					3×100					350					67 900	106 000	35 200	3 800
CRWU 145-510R	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
CRWU 145-610R	17					5×100					550					87 100	145 000	48 400	5 220
CRWU 145-710R	17					6×100					650					99 200	172 000	57 200	6 170
CRWU 145-810R	17					7×100					750					111 000	198 000	66 000	7 120

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

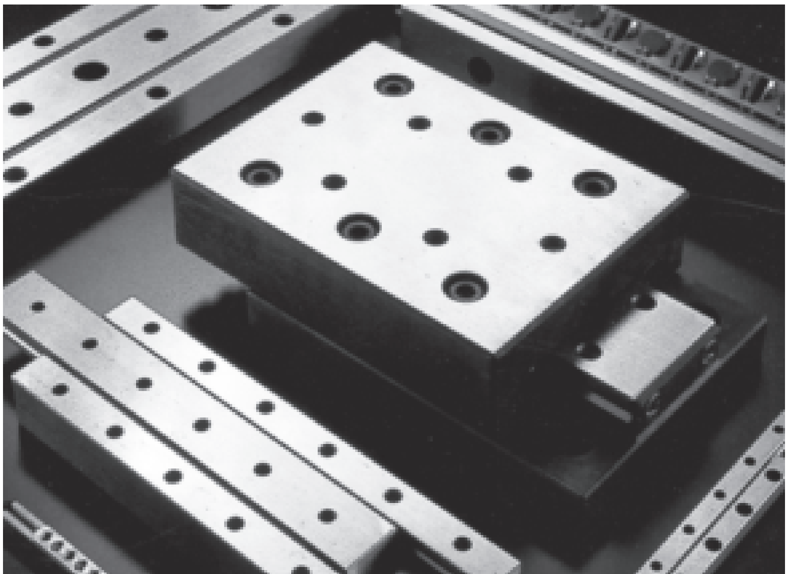
CRWU…RS





Model number	Mass (Ref.)	Boundary dimensions and tolerances mm						Dimensions of table mm Mounting dimensions										Dimensions of center way mm Mounting dimensions						Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
	kg	W	Tolerance	H	Tolerance	L	Maximum stroke length	W_3	W_4	$N \times P$	E	M	$n \times p$	E_7	d_3	H_1	t_1	W_1	W_2	$N_1 \times P_1$	E_1	M_1	t_2	C N	C_0 N	F N	T_0 N·m
CRWU 20- 25RS	0.03	20	±0.1	8	±0.1	25	12	14	3	1×18	3.5	M2.5	1×10	7.5	4.1	7.5	3.5	7	6.5	2×7.5	5	M2.5	4	380	478	159	1.8
CRWU 20- 35RS	0.05					35	18			1×28	3.5		2×10							2×10	7.5			525	717	239	2.8
CRWU 20- 45RS	0.06					45	25			1×20	12.5		3×10							3×10				659	956	319	3.7
CRWU 20- 55RS	0.07					55	32			1×30	12.5		4×10							4×10				786	1 200	398	4.6
CRWU 30- 65RS	0.20	30	±0.1	12	±0.1	65	40	22	4	1×30	17.5	M3	3×15	10	6	11.5	5.5	12	9	3×15	10	M3	6	1 850	2 940	979	19.1
CRWU 30- 80RS	0.24					80	50			1×45			4×15							4×15				2 130	3 530	1 180	22.9
CRWU 30- 95RS	0.29					95	60			2×30			5×15							5×15				2 410	4 110	1 370	26.7
CRWU 40-105RS	0.58	40	±0.1	16	±0.1	105	60	30	5	1×50	27.5	M4	3×25	15	7.5	15.5	7.5	16	12	3×25	15	M4	8	4 680	7 310	2 440	63.6
CRWU 40-130RS	0.72					130	75			1×75			4×25							4×25				5 860	9 750	3 250	84.8
CRWU 40-155RS	0.85					155	90			2×50			5×25							5×25				6 970	12 200	4 060	106

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



Precision Linear Slides

Description of each series and Table of dimensions

E

High Rigidity Precision Linear Slide Unit

Page E-84 to E-95

Precision Linear Slide

Page E-96 to E-109

In the table of dimensions, standard products are referred to using identification numbers marked with [shaded box]. The identification numbers marked with [white box] refer to our semi-standard products.

U.S. PATENTED

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.

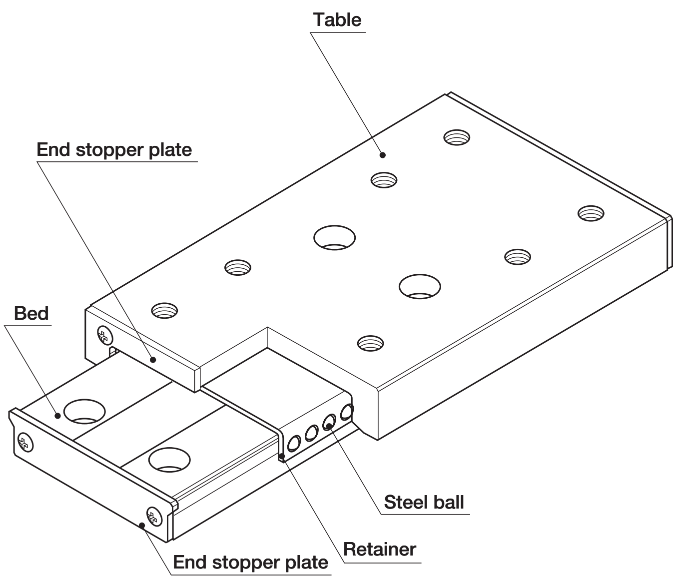
High accuracy and smooth movement

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.

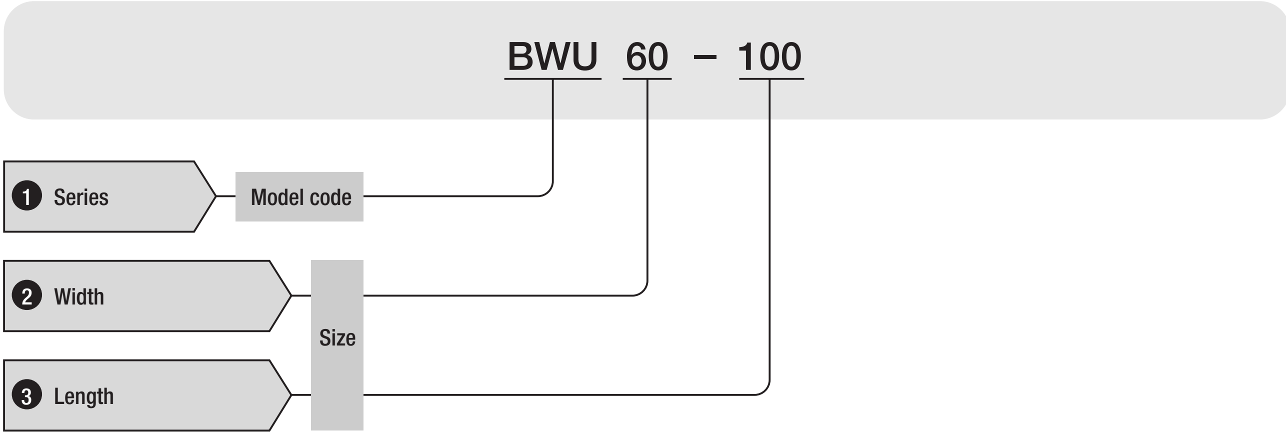
U.S. PATENT No. 5,213,420
No. 5,213,419



Structure of High Rigidity Precision Linear Slide Unit BWU

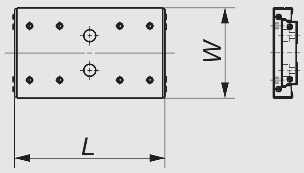
Identification number and specification

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.



1 Series	BWU
2 Width	Indicate the width of the table in mm. For available width and length, see Table 1.
3 Length	Indicate the length of the table in mm. For available width and length, see Table 1.

Table 1 Width and length



unit : mm

Item \ Model number	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
Length *L*	10 20 30	10 20 30	20 30 45	20 30 45	30 45 60 75	30 45 60 75 90	40 60 80 100	60 80 100 120

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 50x10^3 meters free from material damage due to rolling contact fatigue.

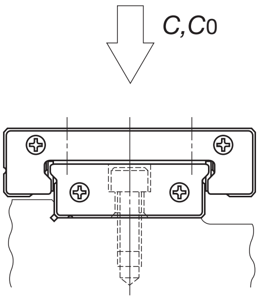


Fig. 1 Direction of load rating

Basic static load rating C_0

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 T_0

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.

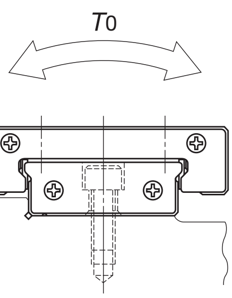
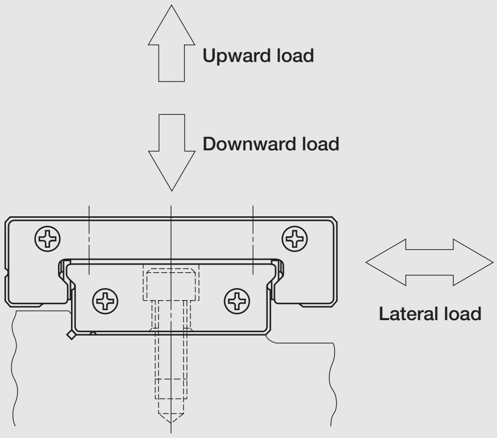


Fig. 2 Direction of static moment rating T_0

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.

Table 2 Load ratings corrected for the load direction



Load rating / Load direction	Basic dynamic load rating	Basic static load rating
Downward	C	C_0
Upward	C	C_0
Lateral	$1.19C$	$1.19C_0$

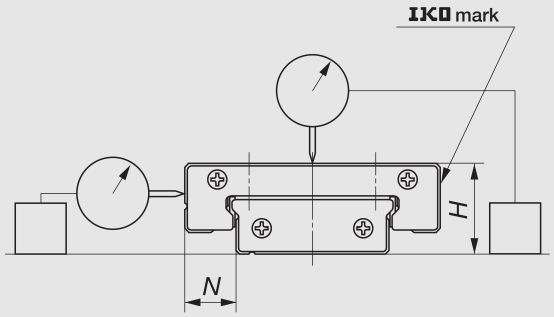
BWU

E

Accuracy

The accuracy of High Rigidity Precision Linear Slide Unit BWU is shown in Tables 3 and 4.

Table 3 Accuracy



unit : mm

Item	Deviation and variation
Dim. *H* tolerance	±0.040
Dim. *N* tolerance	±0.050
Parallelism at table center	See Table 4.
Parallelism at table side	See Table 4.

Table 4 Running accuracy

unit : μm

Nominal length *L* mm		Parallelism at table center(1)	Parallelism at table side(2)
over	incl.		
—	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 IKO mark) when the table is stroked.

Preload

Preload of High Rigidity Precision Linear Slide Unit BWU is adjusted to a proper amount at IKO factory.

Precautions for Use

❶ 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.

❷ 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.

❸ 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.

❹ 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.

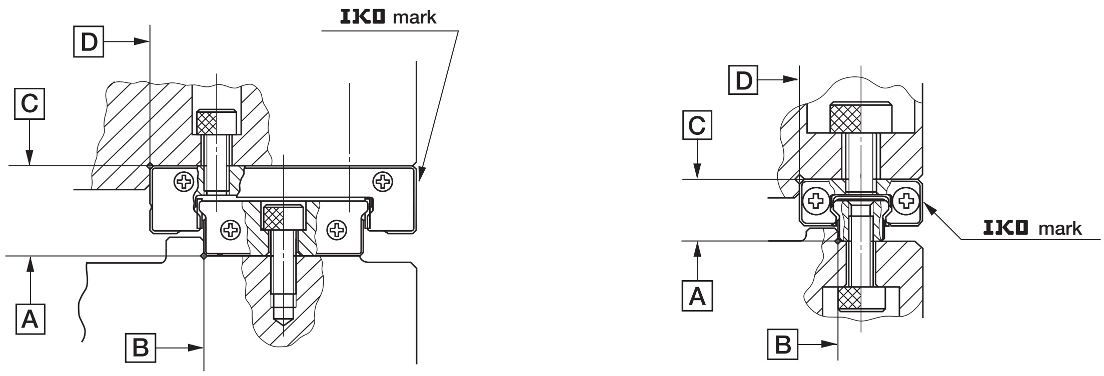
❺ High Rigidity Precision Linear Slide Unit BWU can be used at high temperatures, because it does not have resin parts. However, if the operating temperature is over 100°C, consult IKO.

❻ Use High Rigidity Precision Linear Slide Unit BWU at speeds lower than 30 m/min.

❼ 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.

❶ Reference mounting surface

The reference mounting surface of High Rigidity Precision Linear Slide Unit BWU is the side surface opposite to the IKO mark. (See Fig. 3.)



BWU12～BWU60　　BWU8

Fig. 3 Reference mounting surface and mounting example

❷ General mounting example

As shown in Fig. 3, the reference mounting surfaces B and D and the mounting surfaces A and 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

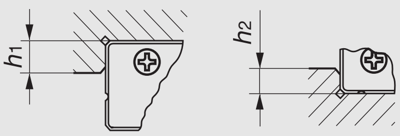


Table　　Bed

unit : mm

Model number	Table Shoulder height h_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

❸ 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.

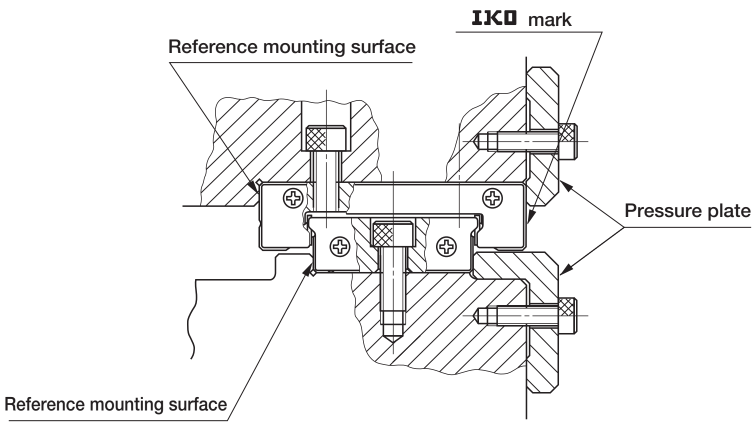


Fig. 4 Example of mounting when lateral load is predominant

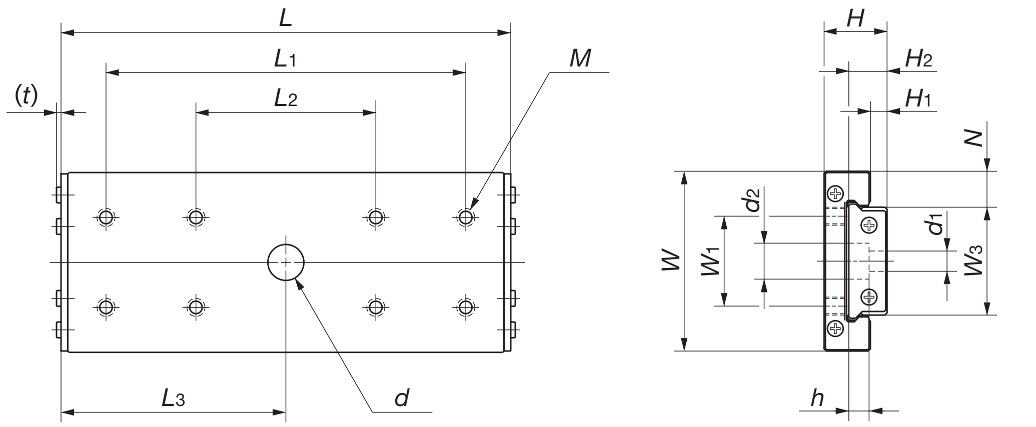
❹ Mounting bolt tightening torque

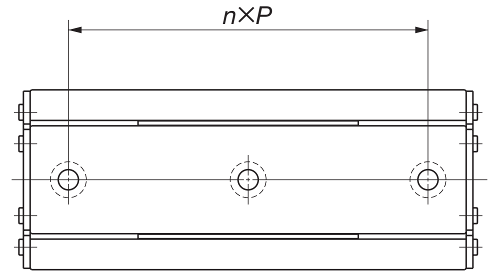
Table 6 shows the mounting bolt tightening torque in general application when the mating parts are made of steel and hexagon socket head stainless steel bolts (equivalent to JIS property division A2-70) are used. According to the material of mating parts and the operating conditions, increase or decrease the amount of tightening torque.

Table 6 Mounting bolt tightening torque

Bolt size	Tightening torque N・m
M1 × 0.25	0.04
M1.4 × 0.3	0.10
M1.6 × 0.35	0.15
M2 × 0.4	0.31
M3 × 0.5	1.1
M4 × 0.7	2.5

BWU





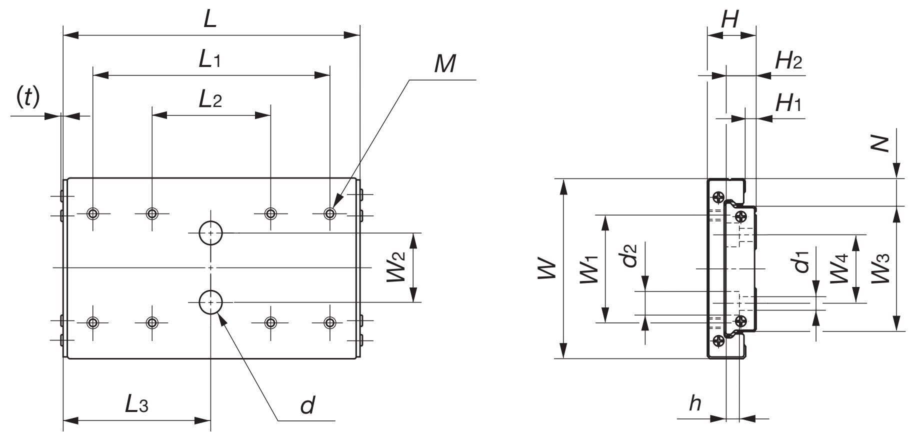
Model number	Mass (Ref.) g Table	Mass (Ref.) g Bed	Nominal dimensions mm W	H	H_1	N	L	Maximum stroke length	Dimensions of table mm W_1	L_1	L_2	M	Maximum tightening depth
BWU 6- 10	0.72	0.23	6	3.2	0.7	2	10	3	—	4	—	M1.4	0.8
BWU 6- 20	1.6	0.50					20	11	—	10	—		
BWU 6- 30	2.4	0.78					30	16	—	18	10		
BWU 8- 10	0.96	0.42	8	4	1	2.5	10	4	—	5.5	—	M2	0.8
BWU 8- 20	2.2	0.97					20	16	—	10	—		
BWU 8- 30	3.3	1.5					30	20	—	21	10		
BWU 12- 20(1)	3.6	1.9	12	4.5	1	3	20	16	—	8	—	M2	1.1
BWU 12- 30(1)	5.7	3.2					30	20	—	15	—		
BWU 12- 45(1)	8.5	4.9					45	30	—	31	15		
BWU 17- 20	9.2	3.9	17	8	1.5	5	20	14	12	10	—	M2	3
BWU 17- 30	17.8	7.8					30	19		20	—		
BWU 17- 45	26.5	11.7					45	29		30	—		
BWU 25- 30	22.5	13.3	25	9	1.8	5.5	30	23	10	15	—	M3	2.5
BWU 25- 45	41.6	24.3					45	28		25	—		
BWU 25- 60	55.7	33.0					60	38		25	—		
BWU 25- 75	68.4	40.8					75	48		55	25		
BWU 30- 30	31.9	25.0	30	12	3.4	6	30	23	14	15	—	M3	3
BWU 30- 45	56.9	45.4					45	29		25	—		
BWU 30- 60	76.1	61.5					60	35		25	—		
BWU 30- 75	93.8	76.1					75	47		55	25		
BWU 30- 90	101	84.8					90	59		55	25		

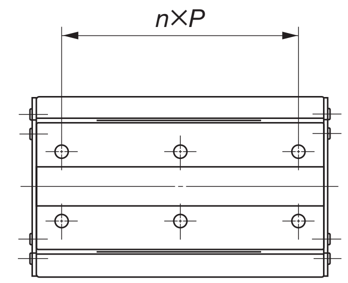
Note(1) : Special mounting bolts for mounting the bed (cross recessed head cap screws for precision equipment M2 x 4) are appended to BWU12.

Model number	L_3	d	t	Dimensions of bed mm W_3	H_2	n	P	d_1	d_2	h	Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N	Static moment rating T_0 N·m
BWU 6- 10	—	—	0.46	2	1.9	1	4	M1.0 Thru hole	—	—	154	181	60.2	0.21
BWU 6- 20	—	—				1	4		—	—	252	361	120	0.42
BWU 6- 30	—	—				2	8		—	—	355	587	196	0.68
BWU 8- 10	—	—	0.45	3	2.6	1	5	M1.6 Thru hole	—	—	203	212	70.6	0.36
BWU 8- 20	—	—				1	10		—	—	292	353	118	0.60
BWU 8- 30	—	—				2	10		—	—	442	635	212	1.1
BWU 12- 20(1)	—	—	0.45	6	2.8	1	7.5	2.4	4	1.5	292	353	118	1.1
BWU 12- 30(1)	—	—				1	15				442	635	212	2.0
BWU 12- 45(1)	22.5	4.5				2	15				603	988	329	3.2
BWU 17- 20	10	4.5	0.8	7	5	1	7.5	2.4	4.2	2.3	588	635	212	2.5
BWU 17- 30	—	—				1	15				874	1 110	370	4.4
BWU 17- 45	22.5	4.5				2	15				1 200	1 750	582	6.9
BWU 25- 30	—	—	0.9	14	5.2	1	15	3.5	6	3.2	783	953	318	7.1
BWU 25- 45	—	—				1	30				1 200	1 750	582	13.0
BWU 25- 60	—	—				1	30				1 490	2 380	794	17.7
BWU 25- 75	37.5	6.5				2	30				1 760	3 020	1 010	22.5
BWU 30- 30	—	—	1.0	18	7.5	1	15	3.5	6.5	4.5	1 270	1 410	470	13.4
BWU 30- 45	—	—				1	30				1 920	2 540	847	24.1
BWU 30- 60	—	—				1	30				2 490	3 670	1 220	34.9
BWU 30- 75	37.5	6.5				2	30				2 880	4 520	1 510	42.9
BWU 30- 90	45	6.5				2	30				3 250	5 360	1 790	50.9

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

BWU





Model number	Mass (Ref.) g		Nominal dimensions mm						Dimensions of table mm				
	Table	Bed	W	H	H_1	N	L	Maximum stroke length	W_1	L_1	L_2	M	Maximum tightening depth
BWU 40- 40	68.9	52.0	40	14	3.5	8	40	31	20	20	—	M4	4
BWU 40- 60	125	93.0					60	39		40	—		
BWU 40- 80	167	125					80	47		40	—		
BWU 40-100	207	155					100	63		80	40		
BWU 60- 60	195	194	60	16	3.6	9	60	34	36	40	—	M4	4
BWU 60- 80	261	261					80	45		40	—		
BWU 60-100	321	325					100	56		80	40		
BWU 60-120	386	391					120	68		100	40		

Model number	Dimensions of bed mm												Basic dynamic load rating C N	Basic static load rating C_0 N	Allowable load F N	Static moment rating T_0 N・m
	W_2	L_3	d	t	W_3	H_2	W_4	n	P	d_1	d_2	h				
BWU 40- 40	—	—	—	1.0	24	8.5	—	1	20	4.5	8	4.5	2 040	2 210	735	27.8
BWU 40- 60	—	—	—					1	40				3 100	3 970	1 320	50.0
BWU 40- 80	—	—	—					1	40				4 010	5 730	1 910	72.2
BWU 40-100	—	50	8					2	40				4 640	7 060	2 350	88.9
BWU 60- 60	—	—	—	1.1	42	10	23	1	40	4.5	8	4.5	4 740	5 690	1 900	124
BWU 60- 80	—	—	—					1					5 930	7 820	2 610	171
BWU 60-100	23	50	8					2					7 020	9 960	3 320	217
BWU 60-120	23	60	8					2					8 050	12 100	4 030	264

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

U.S. PATENTED

Precision Linear Slide

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.

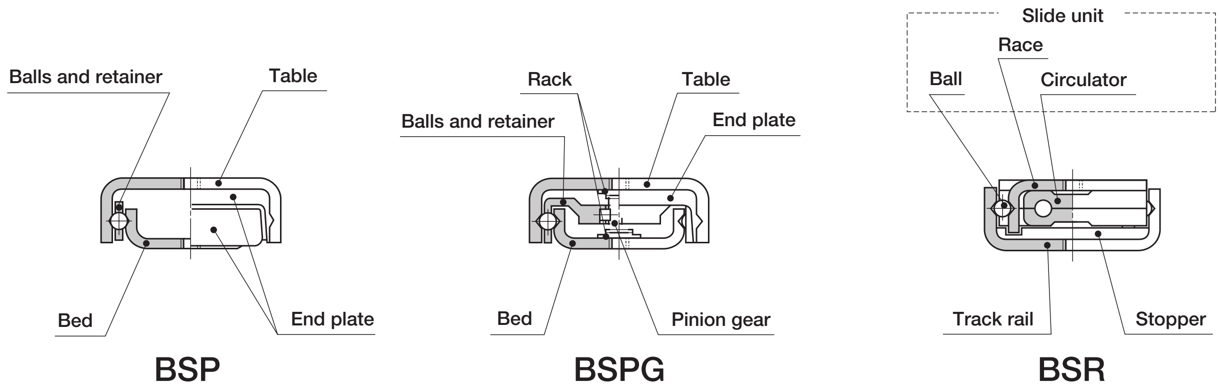
Light weight and compact

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.

U.S. PATENT No. 5,076,715 No. 4,799,302 No. 4,701,059 No. 4,701,057
No. 4,654,940 No. 4,647,226 No. 4,593,957

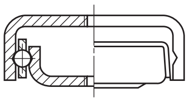


Structure of Precision Linear Slide

Precision Linear Slide series

Shape | Type | Model code

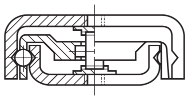
Precision Linear Slide



Limited linear motion type

A special synthetic resin retainer is used to hold the balls and eliminate ball contact noise caused by balls colliding with each other. Extremely smooth and light movement without stick slip is obtained in a limited stroke length.

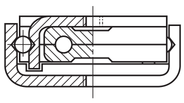
BSP



Built-in rack & pinion type

The one-piece retainer in this type holds the balls in both rows. A pinion gear assembled in the retainer engages with racks fixed on the table and bed to prevent drifting movement of the retainer in relation to the table and bed. The BSPG type has the same extremely smooth movement as the BSP type.

BSPG



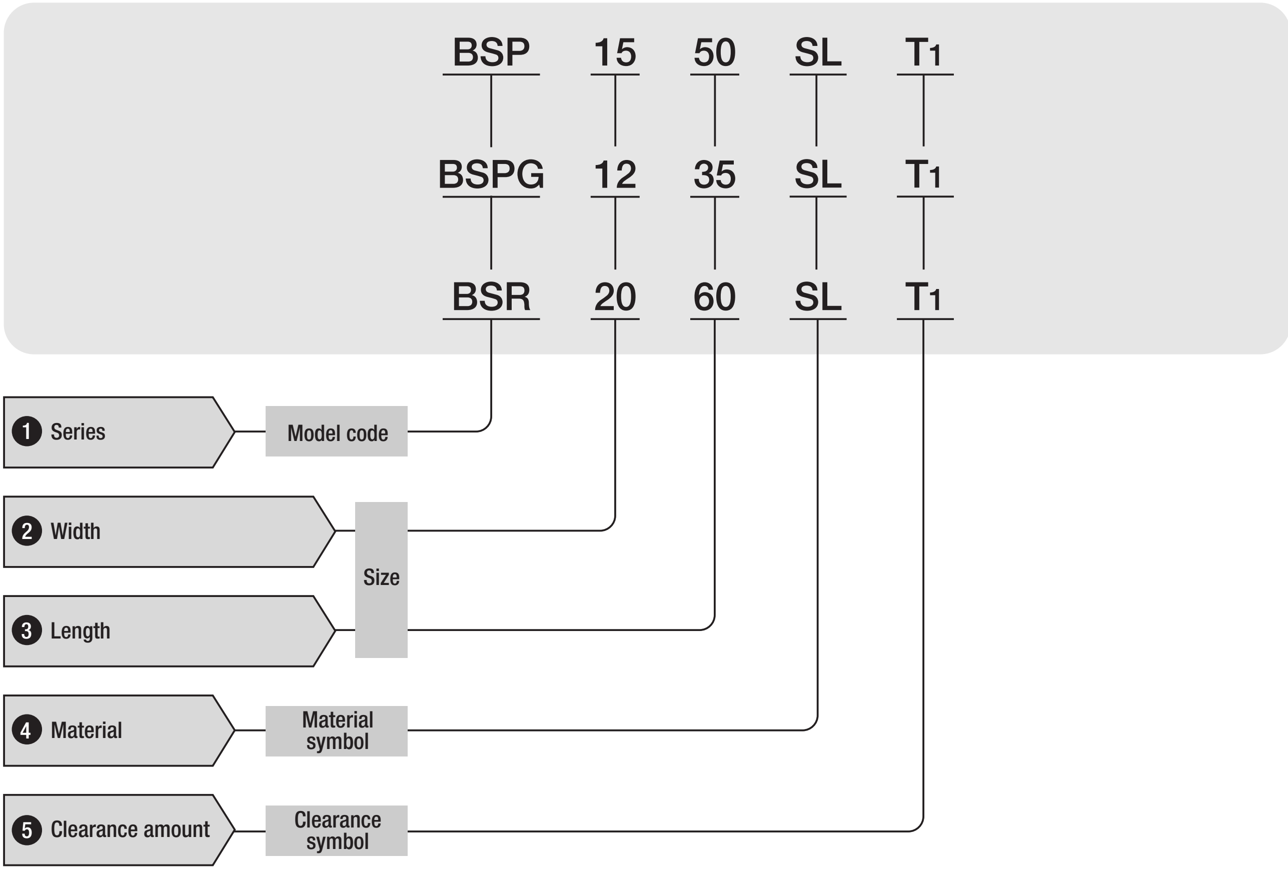
Endless linear motion type

This type features a special synthetic resin circulator to recirculate the balls, permitting longer stroke lengths with low noise.

BSR

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
Endless linear motion type : BSR

For available types and widths, see Table 1.

2 Width

Indicate the width in mm.

Table 1 Types and widths

Width \ Type	BSP	BSPG	BSR
7	○	—	—
10	○	—	—
12	—	○	○
15	○	○	○
20	○	○	○
25	○	○	○

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
T1	−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 10^3 meters free from material damage due to rolling contact fatigue.

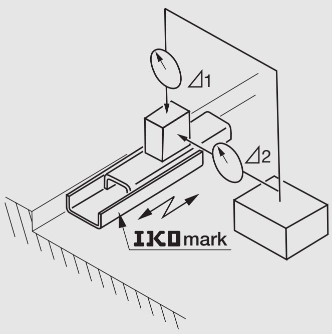
● Basic static load rating C_0

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.

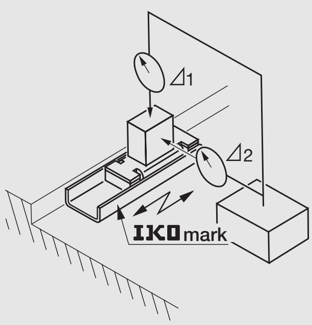
Table 3 Accuracy of BSP type and BSPG type



unit : μm

Stroke length mm		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 : μm

Stroke length mm		Parallelism in operation between slide unit center and mounting surface of track rail	Parallelism in operation between slide unit center and reference mounting surface of track rail
over	incl.	⊿1	⊿2
—	18	3	6
18	30	4	8
30	50	5	10
50	80	6	12

Precautions for Use

❶ To obtain consistently high accuracy in operation, the applied load should not exceed 20% of the basic static load rating.

❷ 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.

❸ 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.

❹ BSPG or BSR type is recommended when it is difficult to readjust the position of the retainer in the BSP type.

❺ 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.

❻ Use Precision Linear Slide at speeds lower than 30 m/min.

❼ 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.

❽ 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.

❾ The raceways and gear mechanism of BSPG type is smeared with Perfluoro Polyether grease, containing a volatile corrosion inhibiting film. In general use, the BSPG type can be used without any additional treatment if it is kept clean.

Precautions for Mounting

❶ The reference mounting surface of Precision Linear Slide is the side surface opposite to the IKO mark.

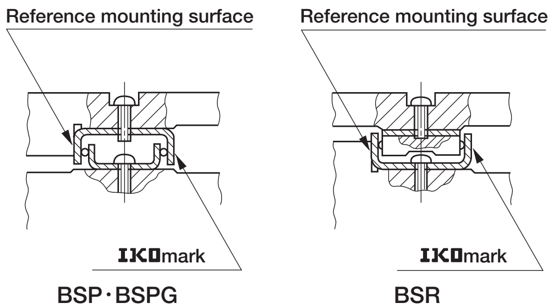


Fig. 1 Reference mounting surface

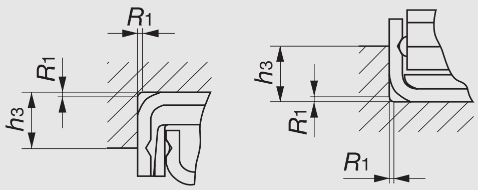
❷ When mounting Precision Linear Slide, the mounting bolts should not be inserted deeper than the maximum insertion depth shown in the dimension table.

❸ 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.

❹ 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 IKO.

❺ 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.

Table 5 Shoulder height and corner radius of the mating reference mounting surfaces



BSP·BSPG　　BSR

unit : mm

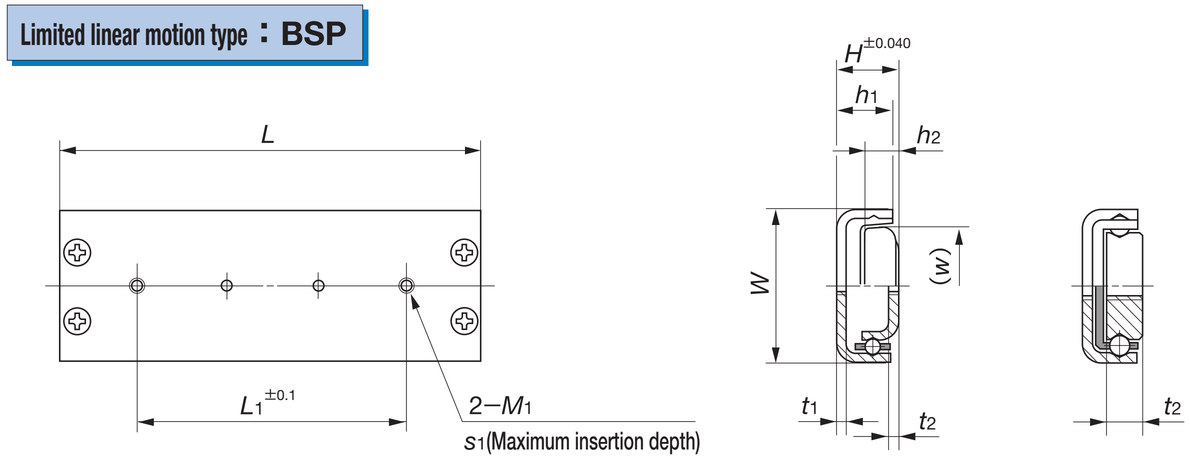
Model number			Shoulder height h_3	Corner radius R_1(max.)
–	–	**BSR 12···**	2.5	0.5
BSP 7···	–	–	3	
BSP 10···	–	–	4	
–	**BSPG 12···**	–		
BSP 15···	**BSPG 15···**	**BSR 15···**	5	
BSP 20···	**BSPG 20···**	**BSR 20···**	6	
BSP 25···	**BSPG 25···**	**BSR 25···**		

❻ 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.

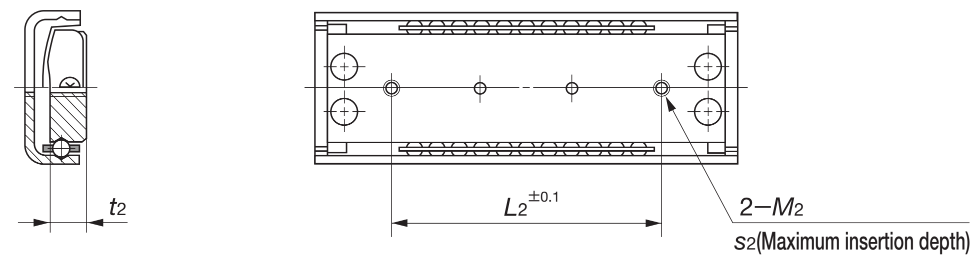
Table 6 Recommended tightening torque of bolts

Bolt size	Tightening torque N·m
M2 × 0.4	0.064
M2.3 × 0.4	0.10
M2.6 × 0.45	0.15
M3 × 0.5	0.23

Limited linear motion type : BSP



BSP 7



BSP 10

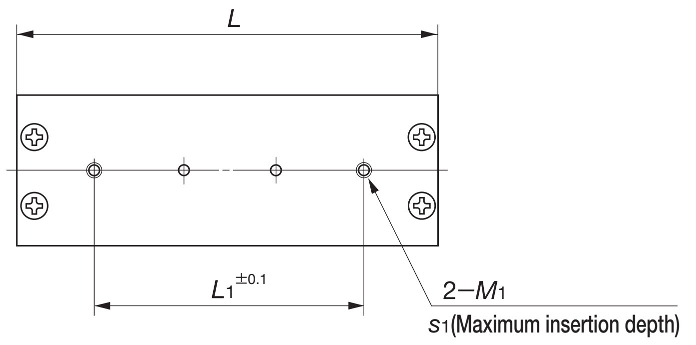
Model number	Mass (Ref.) g	Nominal dimensions mm *W*	*H*	*L*	Maximum stroke length	Mounting dimensions of table mm *L*1	*M*1	Maximum insertion depth *s*1	*h*1	*t*1
BSP 7 15 SL(1)	2.1	7	4	15	9	5	M2	1	3.4	0.9
BSP 7 20 SL(1)	2.8			20	9	10				
BSP 7 30 SL(1)	4.2			30	18	20				
BSP 7 40 SL(1)	5.6			40	23	30				
BSP 10 25 SL	6.2	10	6	25	15	15	M2.6	1.5	5.8	1.1
BSP 10 35 SL	8.8			35	26	25				
BSP 10 45 SL	11.3			45	38	35				
BSP 15 30 SL	11	15	8	30	22	14	M3	2.5	7	1.2
BSP 15 40 SL	14.7			40	24	24				
BSP 15 50 SL	18.4			50	32	34				
BSP 15 60 SL	22.1			60	40	40				
BSP 20 40 SL	23.7	20	10	40	22	24	M3	3.2	9	1.4
BSP 20 50 SL	29.7			50	28	34				
BSP 20 60 SL	35.7			60	34	40				
BSP 20 70 SL	41.7			70	40	45				
BSP 20 80 SL	47.6			80	53	50				
BSP 25 50 SL	37.6	25	10	50	26	34	M3	3.5	9	1.6
BSP 25 60 SL	45.3			60	32	40				
BSP 25 70 SL	52.9			70	40	45				
BSP 25 80 SL	60.5			80	51	50				
BSP 25 100 SL	75.8			100	63	60				

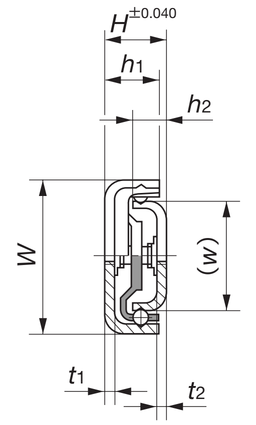
Model number	Mounting dimensions of bed mm *w*	*L*2	*M*2	Maximum insertion depth *s*2	*h*2	*t*2	Basic dynamic load rating *C* N	Basic static load rating *C*0 N
BSP 7 15 SL(1)	3.6	5	M2	2	–	2	93.3	42.0
BSP 7 20 SL(1)		10					134	70.0
BSP 7 30 SL(1)		20					170	98.0
BSP 7 40 SL(1)		30					203	126
BSP 10 25 SL	6.2	15	M2.6	2.7	3.7	2.7	340	156
BSP 10 35 SL		25					398	194
BSP 10 45 SL		35					453	233
BSP 15 30 SL	11.2	14	M3	3	4.5	1.2	395	194
BSP 15 40 SL		24					550	311
BSP 15 50 SL		34					644	389
BSP 15 60 SL		40					732	467
BSP 20 40 SL	16	24	M3	3.5	6.2	1.4	726	386
BSP 20 50 SL		34					866	496
BSP 20 60 SL		40					998	606
BSP 20 70 SL		45					1 120	717
BSP 20 80 SL		50					1 180	772
BSP 25 50 SL	20.5	34	M3	3	5.7	1.6	866	496
BSP 25 60 SL		40					998	606
BSP 25 70 SL		45					1 120	717
BSP 25 80 SL		50					1 180	772
BSP 25 100 SL		60					1 410	992

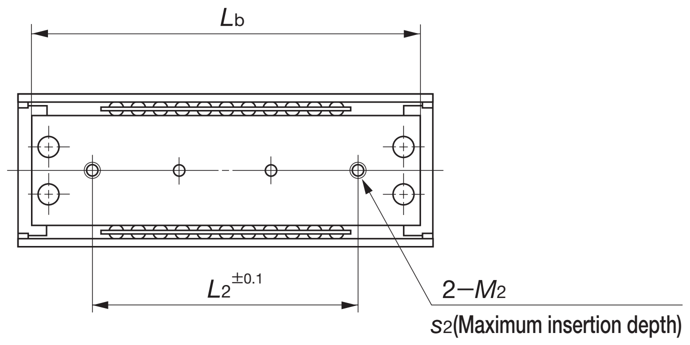
Note(1) : BSP715SL to BSP740SL can not be mounted from inside of the table and bed.

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

Built-in rack & pinion type：BSPG





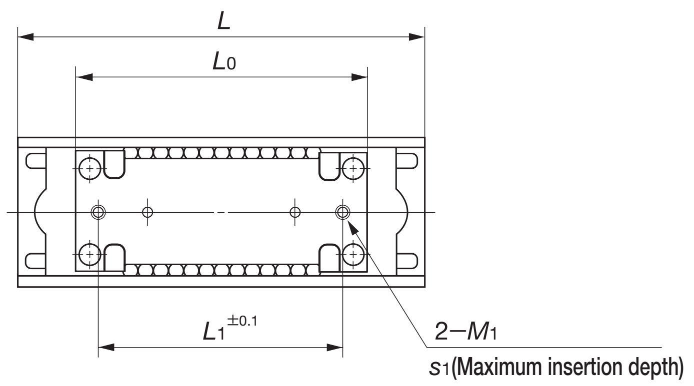


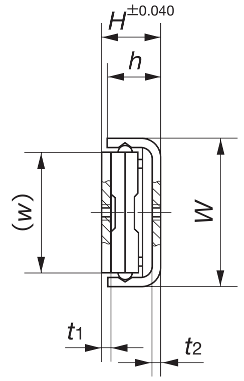
Model number	Mass (Ref.) g	Nominal dimensions mm W	H	L	Maximum stroke length	Mounting dimensions of table mm L_1	M_1	Maximum insertion depth s_1	h_1	t_1
BSPG 12 25 SL	6.5			25	14	15				
BSPG 12 35 SL	9.0	12	6	35	24	24	M2.6	2	5.2	1.2
BSPG 12 45 SL	11.6			45	34	34				
BSPG 15 40 SL	15.8			40	24	24				
BSPG 15 50 SL	19.6	15	8	50	32	34	M3	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	M3	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	M3	3.5	9	1.6
BSPG 25 80 SL	64.1			80	44	50				
BSPG 25 100 SL	80.0			100	56	60				

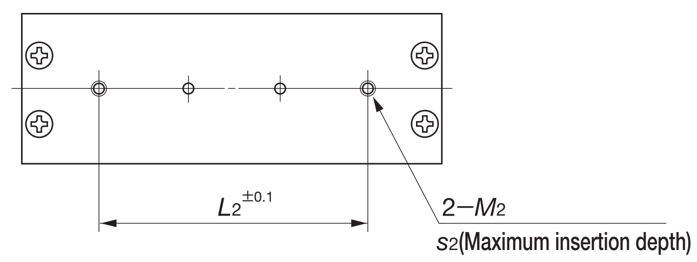
Mounting dimensions of bed mm L_b	w	L_2	M_2	Maximum insertion depth s_2	h_2	t_2	Basic dynamic load rating C N	Basic static load rating C_0 N
23.6		15					244	131
33.6	7.6	24	M2.6	2	3	1	299	175
43.6		34					350	219
37		24					550	311
47	9.6	34	M3	3	4.5	1.2	644	389
57		40					732	467
37		24					726	386
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

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

Endless linear motion type : BSR







Model number	Mass (Ref.)	Nominal dimensions mm				Mounting dimensions of slide unit mm						Mounting dimensions of track rail mm					Basic dynamic load rating	Basic static load rating
	g	W	H	L	Maximum stroke length	w	L_0	L_1	M_1	Maximum insertion depth s_1	t_1	L_2	M_2	Maximum insertion depth s_2	h	t_2	C N	C_0 N
BSR 12 30 SL(1)	5.8	12	4.5	30	13	9.8	21.5	15	M2	1.3	0.9	15	M2	1.6	4	0.9	214	140
BSR 12 40 SL(1)	7.0			40	23							20						
BSR 12 50 SL(1)	8.2			50	33							34						
BSR 12 60 SL(1)	9.3			60	43							40						
BSR 15 30 SL(2)	12.6	15	8	30	10	12.2	30	24	M3	1.8	1	14	M3	3	7	1.2	543	311
BSR 15 40 SL	14.8			40	20							24						
BSR 15 50 SL	17.1			50	30							34						
BSR 15 60 SL	19.3			60	40							40						
BSR 20 40 SL(2)	27.6	20	10	40	12	16.8	40	32	M3	2.2	1.4	24	M3	3.5	9	1.4	921	551
BSR 20 50 SL	31.1			50	22							34						
BSR 20 60 SL	34.6			60	32							40						
BSR 20 70 SL	38.1			70	42							45						
BSR 20 80 SL	41.6			80	52							50						
BSR 25 70 SL	53.8	25	10	70	33	21.4	50	42	M3	2.4	1.6	45	M3	3.5	9	1.6	1 170	772
BSR 25 80 SL	58.4			80	43							50						
BSR 25 100 SL	67.4			100	63							60						

Note(1) : 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 IKO.
(2) : BSR1530SL and BSR2040SL can not be mounted from inside of the track rail.

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

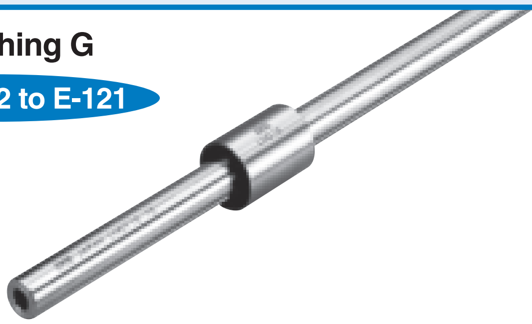
Linear Bushings

Description of each series and Table of dimensions

E

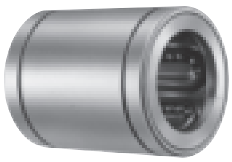
Linear Bushing G

Page E-112 to E-121



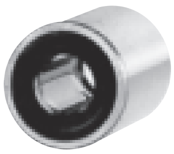
Linear Bushing

Page E-122 to E-165



Miniature Linear Bushing

Page E-166 to E-173



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.

U.S. PATENTED

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.

High load capacity

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.

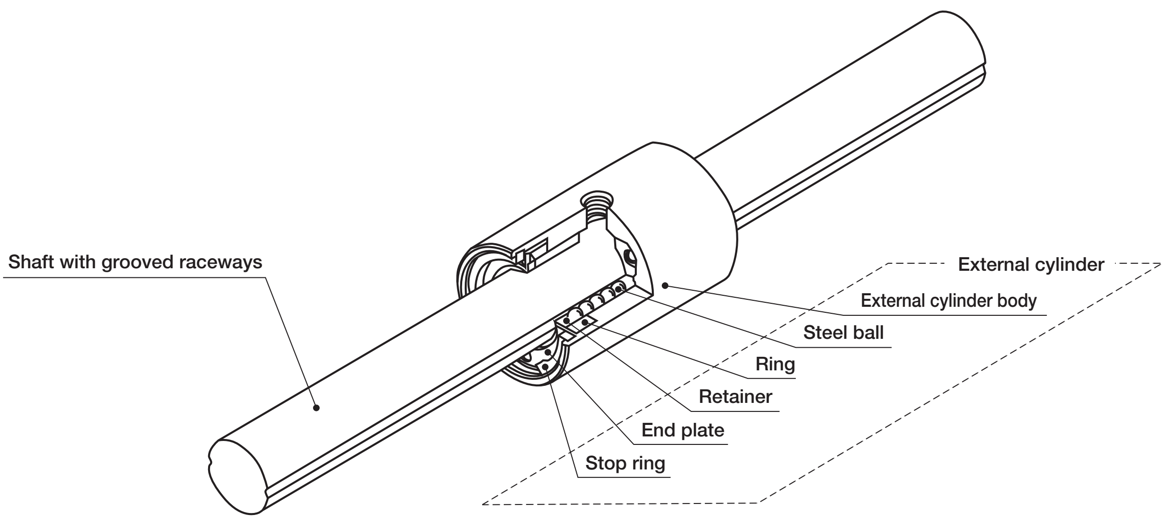
Solid shaft and hollow shaft

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.

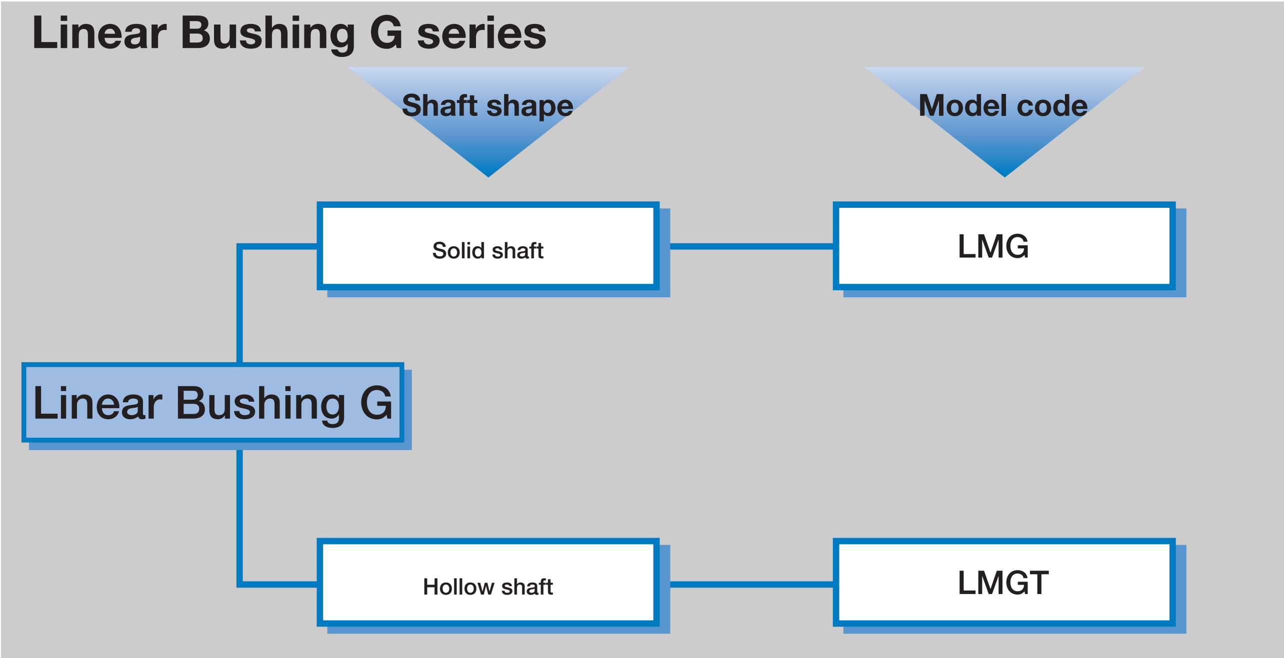
Dimensionally interchangeable with Linear Bushing LM

Linear Bushing G is dimensionally interchangeable with Linear Bushing LM and it is easy to change from one to another.

U.S. PATENT No.5,893,646

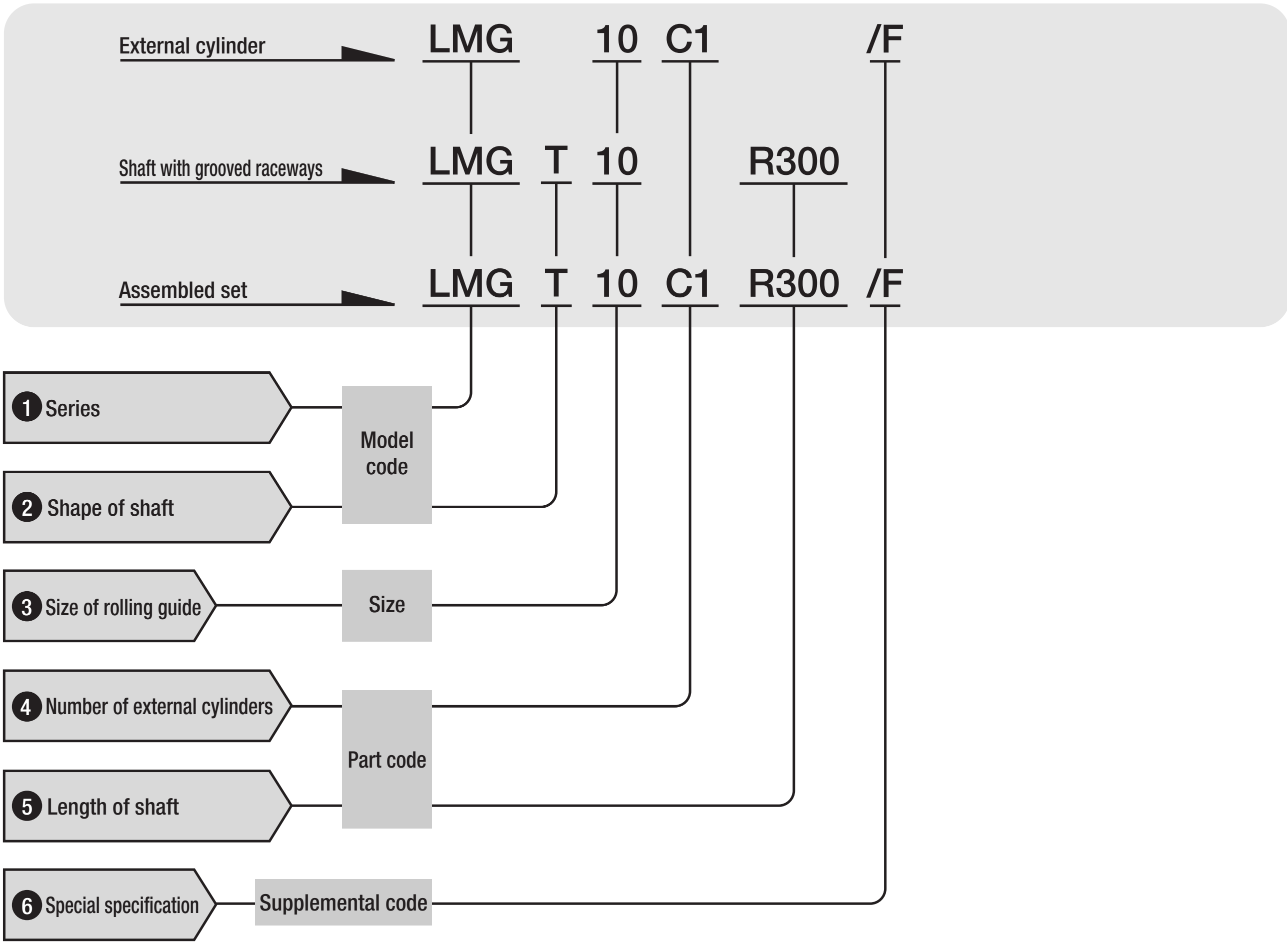


Structure of Linear Bushing G



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.



1 Series	LMG		
2 Shape of shaft	Solid shaft	: No symbol	
	Hollow shaft	: T	
3 Size of rolling guide			Indicate the shaft diameter in mm.
4 Number of external cylinders	Assembled set	: C○	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.
	External cylinder only	: C1	
5 Length of shaft	Assembled set	: R○	Indicate the length of shaft with grooved raceways in mm. For standard and maximum lengths, see the table of dimensions.
	Shaft only	: R○	

6 Special specification

External cylinder with shell type flange : F

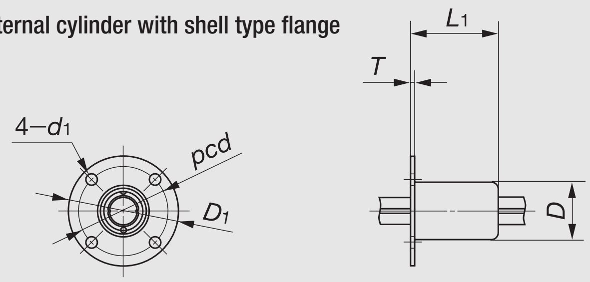
With end seals : U

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

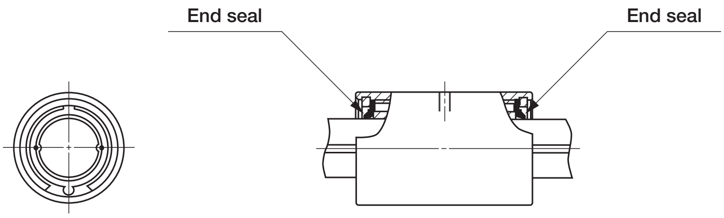


unit : mm

Model number		D	L_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.



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 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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 x 10^3 meters free from material damage due to rolling contact fatigue.

Static torque rating T_0

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.

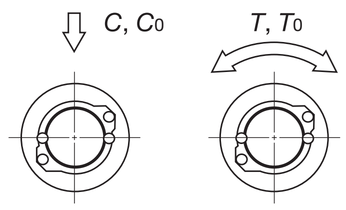
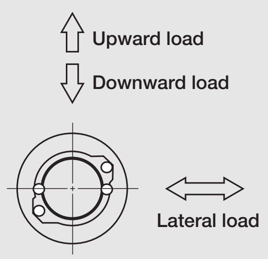


Fig. 1 Directions of load rating and torque rating

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.

Table 2 Load direction and load rating



Load direction \ Load rating	Dynamic load rating	Static load rating
Downward	C	C_0
Upward	C	C_0
Lateral	1.43C	1.73C_0

Accuracy

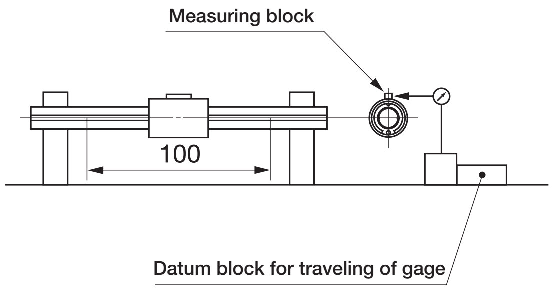
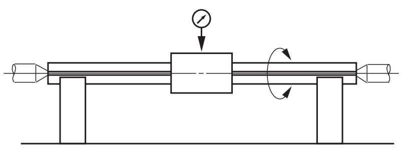
The accuracy of Linear Bushing G is shown in the dimension table. The allowable value for the total radial runout of axial line of the shaft with grooved raceways is shown in Table 3.
The allowable value for the twist of grooves with respect to effective length of shaft with grooved raceways is 33 μm for any length of 100 mm over the entire effective length of raceway. Measuring methods of accuracy are shown in Table 4.

Table 3 Total radial runout of axial line of shaft with grooved raceways unit : μm

Overall length of shaft mm over	incl.	LMG 6 LMGT 6	LMG 8 LMGT 8	LMG 10 LMGT 10	LMG 13 LMGT 13	LMG 16 LMGT 16	LMG 20 LMGT 20
–	200	142	142	129	129	126	
200	315	203	203	153	153	141	
315	400	–	255	173	173	153	
400	500	–	306	193	193	165	
500	630	–	–	221	221	182	
630	800	–	–	–	260	207	
800	1 000	–	–	–	–	240	

Remark : These values are applicable when the radial internal clearance is 0 μm.

Table 4 Measuring methods of accuracy

Item	Measuring method	Illustrations of measuring method
Twist 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.	
Total radial runout of axial line of shaft with grooved raceways (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.	

Radial Internal Clearance

The radial internal clearance of Linear Bushing G is approx. 10μm. 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.

Table 5 Moment of inertia of sectional area and section modulus

Model number		Moment of inertia of sectional area mm^4		Section modulus mm^3	
		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 10	**LMGT 10**	470	460	95	93
LMG 13	**LMGT 13**	1 360	1 300	210	200
LMG 16	**LMGT 16**	3 130	2 930	390	360
LMG 20	**LMGT 20**	7 720	7 230	770	720

Precautions for Use

❶ 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.

❷ 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.

❸ 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 IKO.

❹ Operation with rotational torque

In case a bi-directional and/or repeated rotational torque is applied, select IKO 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.

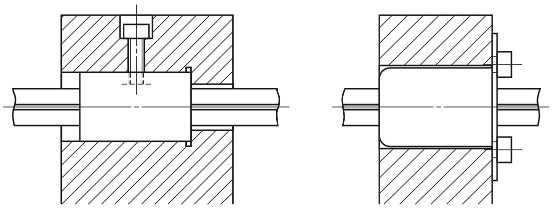


Fig. 2 Mounting examples of external cylinder

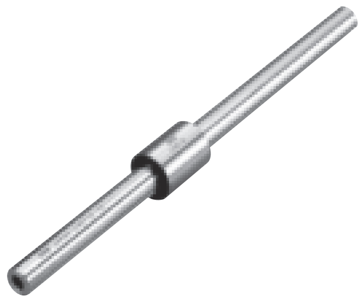
Accessories

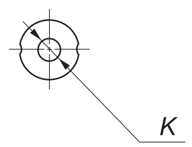
Shaft Support Block

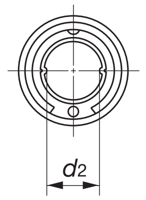
Support blocks are prepared for supporting the ends of "shaft with grooved raceways" of Linear Bushing G. For details, consult IKO.

IKO Linear Bushing G

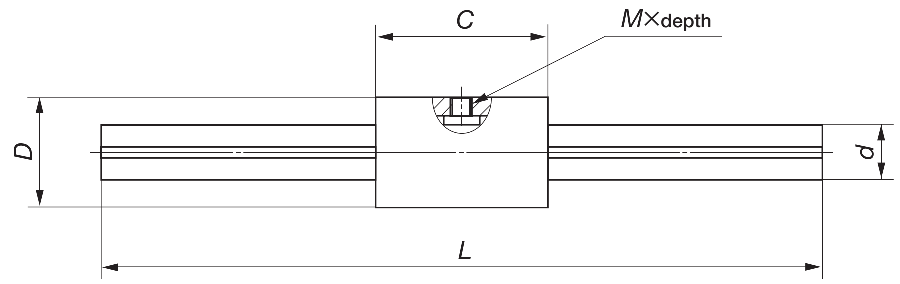
Solid shaft : LMG
Hollow shaft : LMGT







Bore dia. of hollow shaft



Model number	Interchangeable	Mass (Ref.) g External cylinder	Mass (Ref.) g Shaft(1)	Nominal dimensions and tolerances mm D	Tolerance	C	Tolerance	M×depth(2)	d	Tolerance
LMG 6	☆	9.4	22.0	12	0 −0.011	19	0 −0.200	M2.5×1.9 (2.5)	6	0 −0.012
LMGT 6	☆		19.5							
LMG 8	☆	15.7	39.3	15	0 −0.011	24	0 −0.200	M3 ×2.4 (3)	8	0 −0.015
LMGT 8	☆		33.7							
LMG 10	☆	31.5	61.2	19	0 −0.013	29	0 −0.200	M3 ×3.1 (4)	10	0 −0.015
LMGT 10	☆		51.4							
LMG 13	☆	45.4	104	23	0 −0.013	32	0 −0.200	M3 ×3.4 (4.5)	13	0 −0.018
LMGT 13	☆		81.4							
LMG 16	☆	78.2	157	28	0 −0.013	37	0 −0.200	M4 ×4.1 (5.5)	16	0 −0.018
LMGT 16	☆		118							
LMG 20	☆	110	246	32	0 −0.016	42	0 −0.200	M4 ×4.1 (5.5)	20	0 −0.021
LMGT 20	☆		185							

d_2(3)	K	L	Maximum length	Basic dynamic load rating C N	Basic static load rating C_0 N	Dynamic torque rating(4) T N・m	Static torque rating(4) T_0 N・m
5.2	−	150 200	300	587	641	2.1	2.2
	2						
7	−	150 200 250	500	769	962	3.5	4.3
	3		400				
8.9	−	200 300	600	1 410	1 710	8.0	9.7
	4						
11.9	−	200 300 400	800	1 880	2 150	13.7	15.7
	6						
14	−	200 300 400	1 000	2 590	2 930	23.1	26.1
	8						
17.5	−	300 400 500 600	1 000	3 010	3 660	32.8	39.9
	10						

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 d_2 indicates the maximum diameter when machining is done at the shaft ends.
(4) : Figures shown in T and T_0 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.

LMG

E

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

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

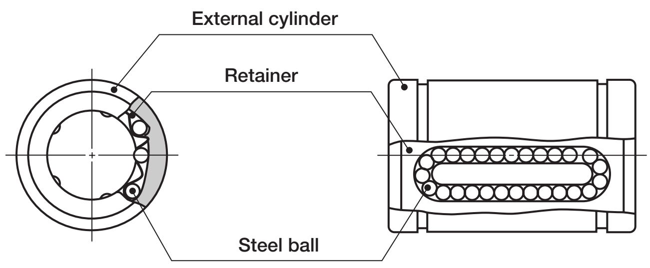
It is easy to use Linear Bushings instead of conventional plain bushings, because both types are used with a round shaft, and no major redesign is necessary.

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.



Structure of Linear Bushing

Linear Bushing series

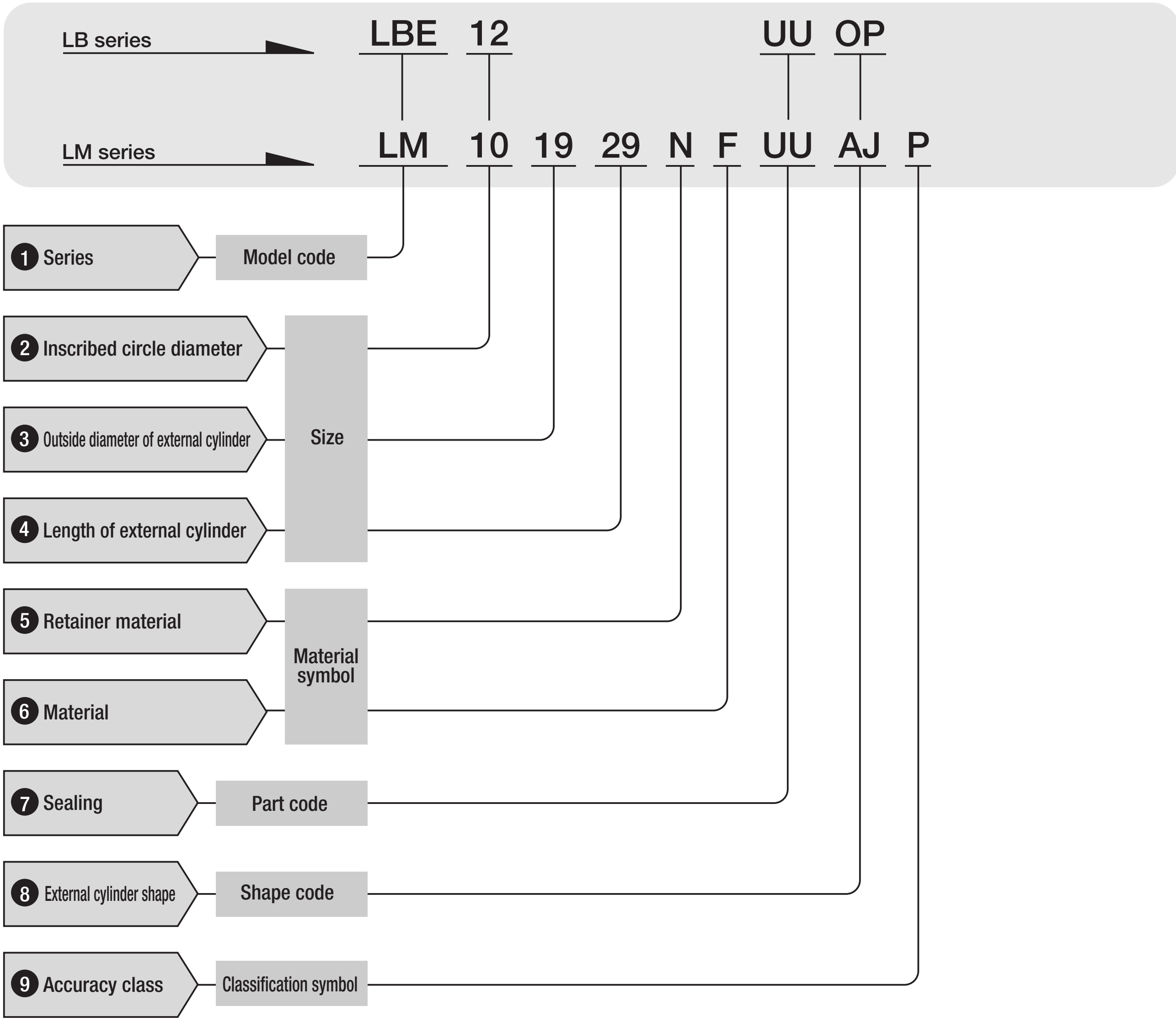
Linear Bushing

Dimension series	External cylinder shape	Sealing	Model code
Metric series	Standard type	Without end seal	LBE LBD LM LM ···F LME LME ···F
		With two end seals	LBE ··· UU LBD ··· UU LM ··· UU LM ···F UU LME ··· UU LME ···F UU
	Adjustable clearance type	Without end seal	LBE ··· AJ LBD ··· AJ LM ··· AJ LM ···F AJ LME ··· AJ LME ···F AJ
		With two end seals	LBE ··· UU AJ LBD ··· UU AJ LM ··· UU AJ LM ···F UU AJ LME ··· UU AJ LME ···F UU AJ
	Open type	Without end seal	LBE ··· OP LBD ··· OP LM ··· OP LM ···F OP LME ··· OP LME ···F OP
		With two end seals	LBE ··· UU OP LBD ··· UU OP LM ··· UU OP LM ···F UU OP LME ··· UU OP LME ···F UU OP
Inch series	Standard type	Without end seal	LBB LMB
		With two end seals	LBB ··· UU
	Adjustable clearance type	Without end seal	LBB ··· AJ LMB ··· AJ
		With two end seals	LBB ··· UU AJ
	Open type	Without end seal	LBB ··· OP LMB ··· OP
		With two end seals	LBB ··· UU OP

Remark : "F" in the model code indicates that it is stainless steel type.

Identification number and specification

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.



1 Series

Metric series : LBE, LBD, LM, LME

Inch series : LBB, LMB

2 Inscribed circle diameter

For the metric series, indicate the inscribed circle diameter in mm. For the inch series, indicate the inscribed circle diameter in the unit of 1/16 inch.

3 Outside diameter of external cylinder

For the metric series, indicate the outside diameter of external cylinder in mm. For the inch series, indicate the outside diameter of external cylinder in 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

Carbon steel made	: No symbol
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 pages E-132 to E-165. 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

High carbon steel made	: No symbol
Stainless steel made	: F

Specify the component part material. For applicable models and sizes, see the "Model number" column in the table of dimensions on pages E-132 to E-165.

7 Sealing

Without end seal	: No symbol
With two end seals	: UU

The two seal types incorporate seals with superior 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
Open type	: OP

See "External cylinder shape" shown below.

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.

9 Accuracy class

High	: No symbol
Precision	: P

For details of accuracy, see the table of dimensions on pages E-132 to E-165. High class and precision class 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.

Load Rating

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 x 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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.

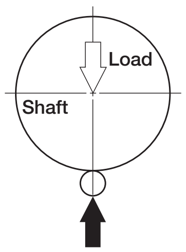


Fig. 1 Load direction A

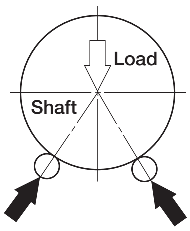


Fig. 2 Load direction B

❶ 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.

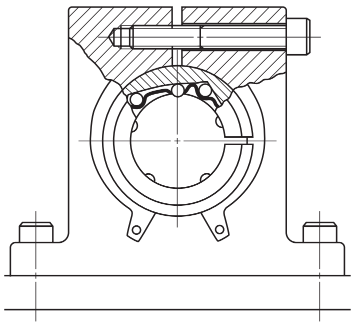


Fig. 3 Example of clearance adjustment

❷ 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 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 0.8μmRa (3.2μmRy) is adequate.

Table 2 Minimum effective hardening depth unit : mm

Shaft diameter		Recommended minimum effective hardening depth
over	incl.	
–	28	0.8
28	50	1.0
50	100	1.5
100	150	2.0

LBE, LBD, LBB, LM, LME, LMB

E

❸ Lubrication

Linear Bushings can be used with oil or grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication.

❹ 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, IKO 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 IKO Needle Roller Bearing as shown in Fig. 4 is recommended.

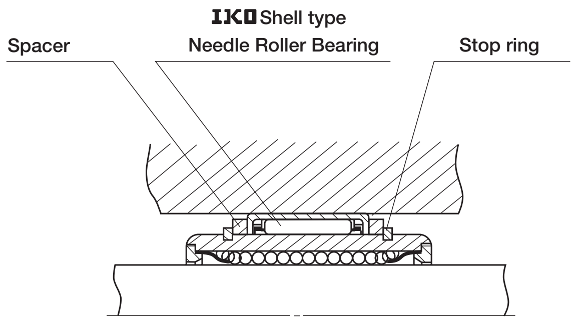


Fig. 4 Example of configuration for long stroke linear motion and rotation

❺ 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.

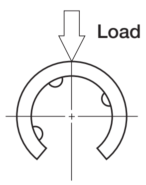


Fig. 5

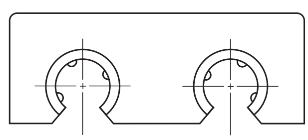


Fig. 6

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

Type \ Item		Shaft		Housing	
		Normal clearance	Closer clearance	Clearance fit	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.

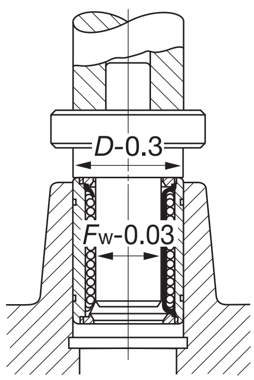


Fig. 7

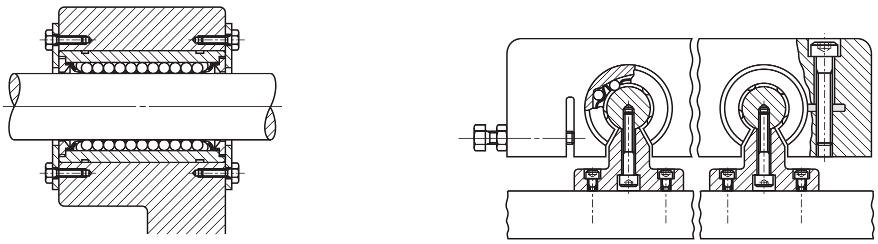


Fig. 8 Example of assembling

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 IKO.

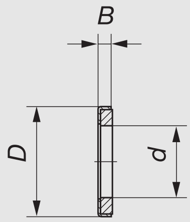
Shaft support block

Support blocks are prepared for supporting the ends of shaft for Linear Bushing. For details, consult IKO.

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.

Table 4 Dimensions of felt seals for Linear Bushing



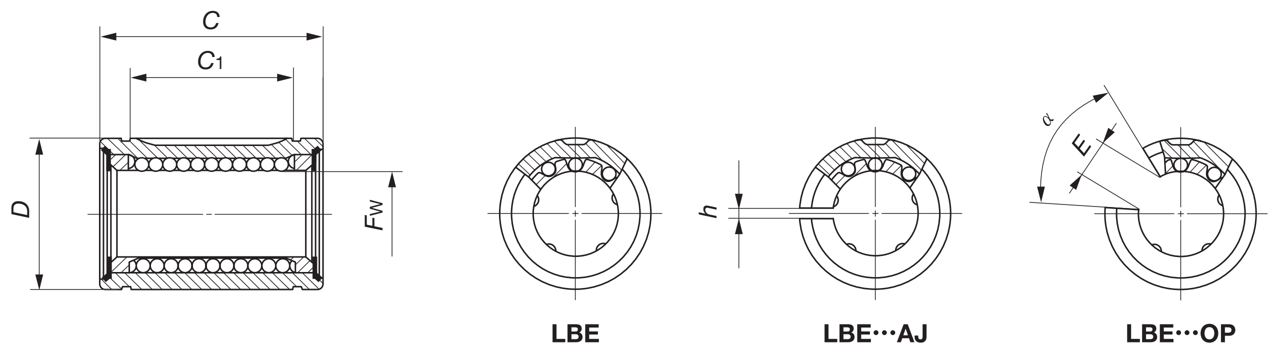
unit : mm

Model number	*d*	*D*	*B*
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.

IKO Linear Bushing : Metric series

Standard type :	Adjustable clearance type :	Open type :
LBE	**LBE···AJ**	**LBE···OP**



Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g	F_w	Tolerance µm
5	LBE 5	3	8.6	LBE 5 AJ	3	8.4	——	–	–	5	+8 / 0
8	LBE 8	3	16.9	LBE 8 AJ	3	16.6	——	–	–	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 / −1
20	LBE 20	5	84.5	LBE 20 AJ	5	83	LBE 20 OP	4	72	20	
25	LBE 25	5	161	LBE 25 AJ	5	159	LBE 25 OP	4	141	25	+11 / −1
30	LBE 30	6	305	LBE 30 AJ	6	300	LBE 30 OP	5	265	30	
40	LBE 40	6	555	LBE 40 AJ	6	545	LBE 40 OP	5	480	40	+13 / −2
50	LBE 50	6	935	LBE 50 AJ	6	925	LBE 50 OP	5	815	50	

Nominal dimensions and tolerances mm: D	Tolerance µm	C	Tolerance µm	C_1	Tolerance µm	h	E	α Degree	Eccentricity Max. µm	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N	Preferable circlip DIN 471
12	0 / −8	22	0 / −210	12	+270 / 0	1.5	–	–	12	90.6	73.6	213	213	12×1
16		25		14		1.5	–	–		121	98.6	255	255	16×1
22	0 / −9	32	0 / −250	20	+330 / 0	1.5	7.5	78°	13	284	327	575	813	22×1.2
26		36		22		1.5	10	78°		311	357	587	830	26×1.2
32	0 / −11	45		28		2.0	10	60°	14	617	734	1 150	1 680	32×1.5
40		58	0 / −300	40	+390 / 0	2.0	12.5	60°	15	1 070	1 270	2 020	2 960	42×1.75
47		68		48		2.0	12.5	50°		1 560	1 650	3 060	3 910	48×1.75
62	0 / −13	80		56	+460 / 0	2.0	16.8	50°	17	2 710	2 870	4 890	6 250	62×2
75		100	0 / −350	72		2.0	21	50°		3 940	4 180	7 130	9 120	75×2.5

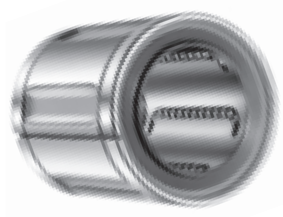
LBE, LBD, LBB, LM, LME, LMB

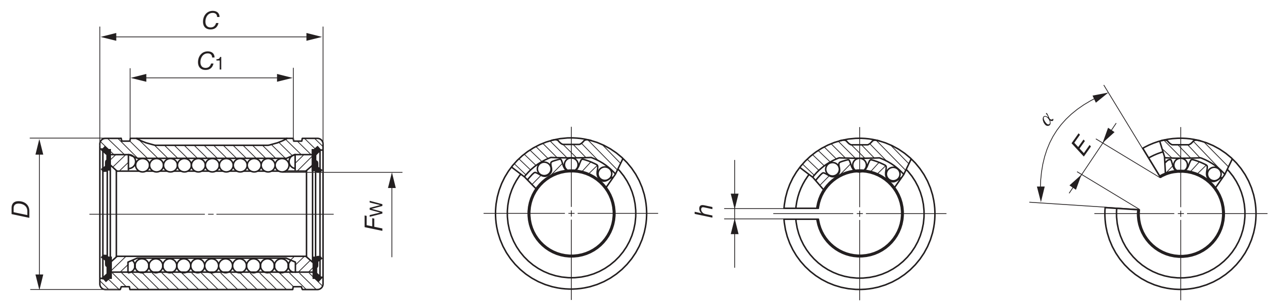
E

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

IKO Linear Bushing with Seals : Metric series

Standard type : LBE…UU **Adjustable clearance type :** LBE…UU AJ **Open type :** LBE…UU OP

LBE…UU LBE…UU AJ LBE…UU OP

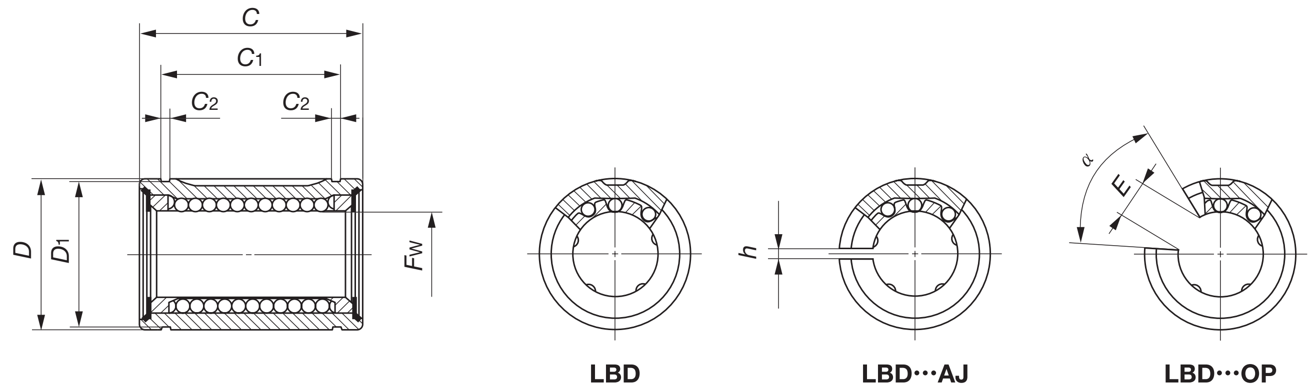
Shaft diameter mm	Model number Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g	F_w	Tolerance μm
5	**LBE 5 UU**	3	8.6	**LBE 5 UU AJ**	3	8.4	———	–	–	5	+8 0
8	**LBE 8 UU**	3	17	**LBE 8 UU AJ**	3	16.7	———	–	–	8	
12	**LBE 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 −1
20	**LBE 20 UU**	5	85	**LBE 20 UU AJ**	5	83.5	**LBE 20 UU OP**	4	72.5	20	
25	**LBE 25 UU**	5	162	**LBE 25 UU AJ**	5	160	**LBE 25 UU OP**	4	142	25	+11 −1
30	**LBE 30 UU**	6	305	**LBE 30 UU AJ**	6	305	**LBE 30 UU OP**	5	265	30	
40	**LBE 40 UU**	6	555	**LBE 40 UU AJ**	6	550	**LBE 40 UU OP**	5	485	40	+13 −2
50	**LBE 50 UU**	6	940	**LBE 50 UU AJ**	6	930	**LBE 50 UU OP**	5	815	50	

Nominal dimensions and tolerances mm D	Tolerance μm	C	Tolerance μm	C_1	Tolerance μm	h	E	α Degree	Eccentricity Max. μm	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N	Preferable circlip DIN 471
12	0 −8	22	0 −210	12	+270 0	1.5	–	–	12	90.6	73.6	213	213	12×1
16		25		14		1.5	–	–		121	98.6	255	255	16×1
22	0 −9	32	0 −250	20	+330 0	1.5	7.5	78°	13	284	327	575	813	22×1.2
26		36		22		1.5	10	78°		311	357	587	830	26×1.2
32	0 −11	45		28		2.0	10	60°	14	617	734	1 150	1 680	32×1.5
40		58	0 −300	40	+390 0	2.0	12.5	60°	15	1 070	1 270	2 020	2 960	42×1.75
47		68		48		2.0	12.5	50°		1 560	1 650	3 060	3 910	48×1.75
62	0 −13	80		56	+460 0	2.0	16.8	50°	17	2 710	2 870	4 890	6 250	62×2
75		100	0 −350	72		2.0	21	50°		3 940	4 180	7 130	9 120	75×2.5

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

IKO Linear Bushing : Metric series

Standard type :	Adjustable clearance type :	Open type :
LBD	LBD···AJ	LBD···OP



Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g	F_w	Tolerance μm Precision	Tolerance μm High
6	**LBD 6**	3	5.1	**LBD 6 AJ**	3	5.0	——	–	–	6	$^{0}_{-6}$	$^{0}_{-9}$
8	**LBD 8S**	3	8.3	**LBD 8S AJ**	3	8.1	——	–	–	8		
	LBD 8	3	11.8	**LBD 8 AJ**	3	11.5	——	–	–	8		
10	**LBD 10**	4	25.5	**LBD 10 AJ**	4	25	**LBD 10 OP**	3	20.5	10		
13	**LBD 13**	4	41.5	**LBD 13 AJ**	4	40.5	**LBD 13 OP**	3	33	13		
16	**LBD 16**	4	58	**LBD 16 AJ**	4	57	**LBD 16 OP**	3	47	16		
20	**LBD 20**	5	80	**LBD 20 AJ**	5	79	**LBD 20 OP**	4	69	20	$^{0}_{-7}$	$^{0}_{-10}$
25	**LBD 25**	5	160	**LBD 25 AJ**	5	158	**LBD 25 OP**	4	142	25		
30	**LBD 30**	6	220	**LBD 30 AJ**	6	215	**LBD 30 OP**	5	196	30		
35	**LBD 35**	6	320	**LBD 35 AJ**	6	315	**LBD 35 OP**	5	280	35	$^{0}_{-8}$	$^{0}_{-12}$
40	**LBD 40**	6	440	**LBD 40 AJ**	6	435	**LBD 40 OP**	5	390	40		
50	**LBD 50**	6	1 390	**LBD 50 AJ**	6	1 380	**LBD 50 OP**	5	1 220	50		

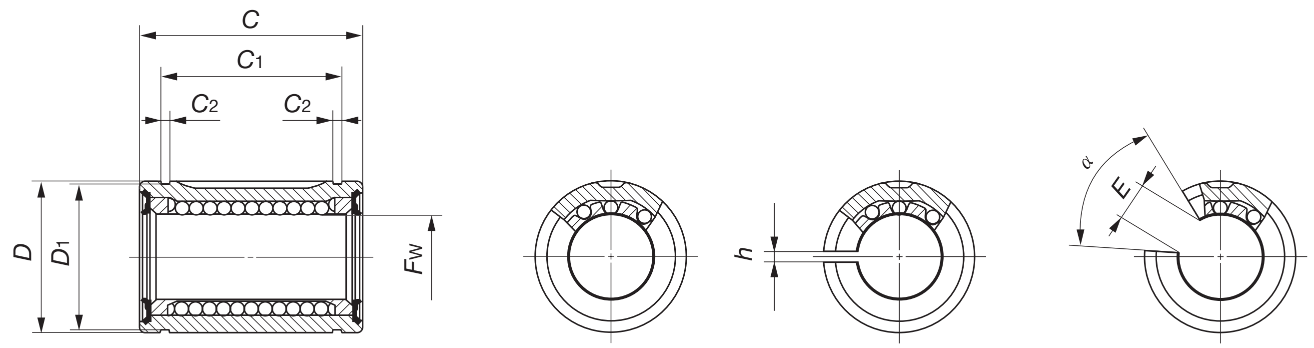
Note(1) : When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.
Remark : In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

Nominal dimensions and tolerances mm: D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm Precision	Eccentricity Max. μm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N
12	$^{0}_{-11}$	19	$^{0}_{-200}$	13.5	$^{0}_{-200}$	1.1	11.5	1.5	–	–	8	12	78.0	63.4	155	155
15		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	–	–			121	98.6	255	255
19	$^{0}_{-13}$	29		22		1.3	18	1.5	7	80°			197	226	405	573
23		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	$^{0}_{-16}$	42		30.5		1.6	30.5	2.0	11	60°	10	15	617	734	1 150	1 680
40		59	$^{0}_{-300}$	41	$^{0}_{-300}$	1.85	38	2.0	12	50°			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	$^{0}_{-19}$	70		49.5		2.1	49	2.0	17	50°	12	20	1 610	1 710	3 080	3 940
60		80		60.5		2.1	57	2.0	20	50°			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

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

IKO Linear Bushing with Seals : Metric series

Standard type : **LBD…UU** **Adjustable clearance type :** **LBD…UU AJ** **Open type :** **LBD…UU OP**



LBD…UU LBD…UU AJ LBD…UU OP

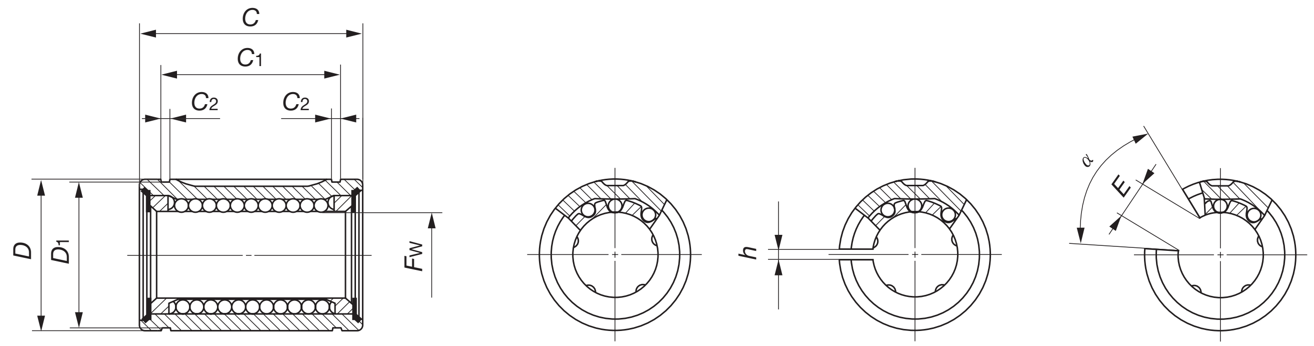
Shaft diameter mm	Model number Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g	F_w	Tolerance μm Precision	Tolerance μm High
6	LBD 6 UU	3	5.2	LBD 6 UU AJ	3	5.1	——	—	—	6		
8	LBD 8S UU	3	8.4	LBD 8S UU AJ	3	8.2	——	—	—	8		
	LBD 8 UU	3	11.8	LBD 8 UU AJ	3	11.6	——	—	—	8		
10	LBD 10 UU	4	25.5	LBD 10 UU AJ	4	25.5	LBD 10 UU OP	3	20.5	10	0 / −6	0 / −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	0 / −7	0 / −10
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 / −8	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 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.

Nominal dimensions and tolerances mm D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm Precision	Eccentricity Max. μm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N
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°			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	0 / −300	49.5	0 / −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

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

Standard type : **LBB** | **Adjustable clearance type :** **LBB…AJ** | **Open type :** **LBB…OP**



LBB | LBB…AJ | LBB…OP

Shaft diameter mm (inch)	Model number Standard type	Bal circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g	F_w	Tolerance μm Pre-cision	High
6.350 (1/4)	**LBB 4**	3	7.1	——	–	–	——	–	–	1/4 6.350	0 −8	0 −13
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		
15.875 (5/8)	**LBB 10**	4	65	**LBB 10 AJ**	4	64	**LBB 10 OP**	3	54	5/8 15.875		
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	1 1/4 31.750	0 −10	0 −15
38.100 (1 1/2)	**LBB 24**	6	535	**LBB 24 AJ**	6	530	**LBB 24 OP**	5	470	1 1/2 38.100		
50.800 (2)	**LBB 32**	6	1 040	**LBB 32 AJ**	6	1 030	**LBB 32 OP**	5	915	2 50.800		0 −20

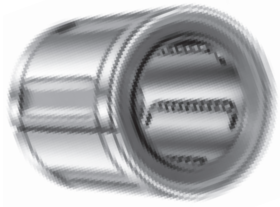
Note(1) : When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.
Remark : In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

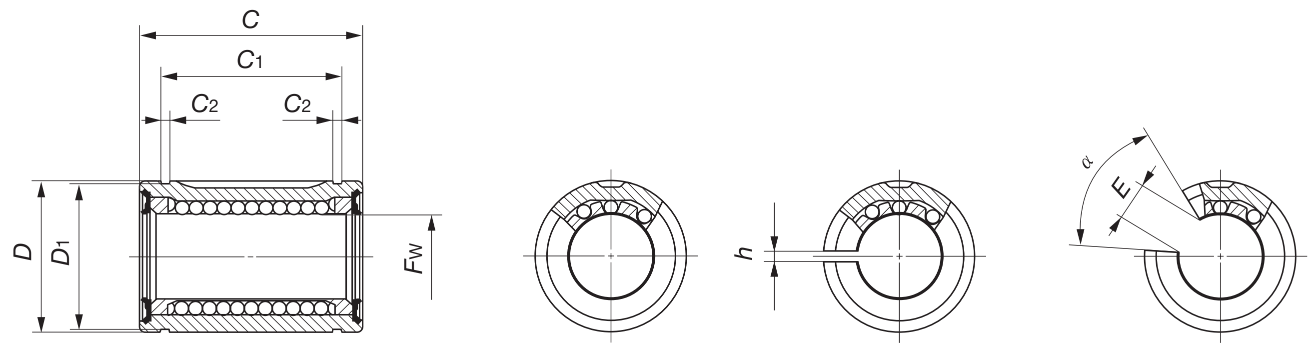
Nominal dimensions and tolerances mm D	Toler-ance μm	C	Toler-ance μm	C_1(1)	Toler-ance μm	C_2	D_1	h	E	α Degree	Eccen-tricity Max. μm Pre-cision	High	Basic dynamic load rating C Load direction A N	Load direction B N	Basic static load rating C_0 Load direction A N	Load direction B N
1/2 12.700	0 −10	3/4 19.050	0 −381	12.98	0 −200	0.99	12.04	–	–	–	8	12	80.0	64.9	156	156
5/8 15.875		7/8 22.225		16.15		0.99	15.16	–	–	–			117	134	227	320
7/8 22.225		1 1/4 31.750		24.46		1.17	21.21	1/16 1.588	5/16 7.938	50°		13	290	333	577	816
1 1/8 28.575		1 1/2 38.100		28.04		1.42	27.30	3/32 2.381	3/8 9.525	60°			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
1 9/16 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 −13	2 5/8 66.675	0 −508	50.92	0 −300	1.73	48.51	3/32 2.381	5/8 15.875	50°			1 920	2 030	3 570	4 570
2 3/8 60.325		3 76.200		61.26		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°			3 960	4 190	7 140	9 130

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

Linear Bushing with Seals : Inch series

Standard type : LBB···UU | **Adjustable clearance type : LBB···UU AJ** | **Open type : LBB···UU OP**

LBB···UU　　LBB···UU AJ　　LBB···UU OP

Shaft diameter mm (inch)	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g	F_w	Tolerance μm Precision	Tolerance μm High
6.350 (1/4)	LBB 4 UU	3	7.1	――	—	—	――	—	—	1/4 6.350	0 −8	0 −13
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		
15.875 (5/8)	LBB 10 UU	4	65	LBB 10 UU AJ	4	64	LBB 10 UU OP	3	54	5/8 15.875		
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 −10	0 −15
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 38.100		
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

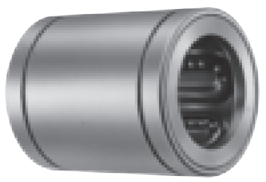
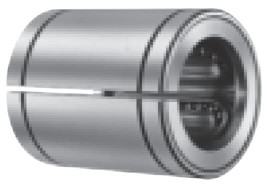
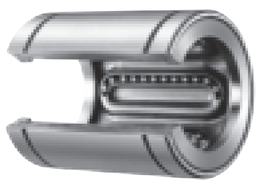
Note(1) : When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.
Remark : In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

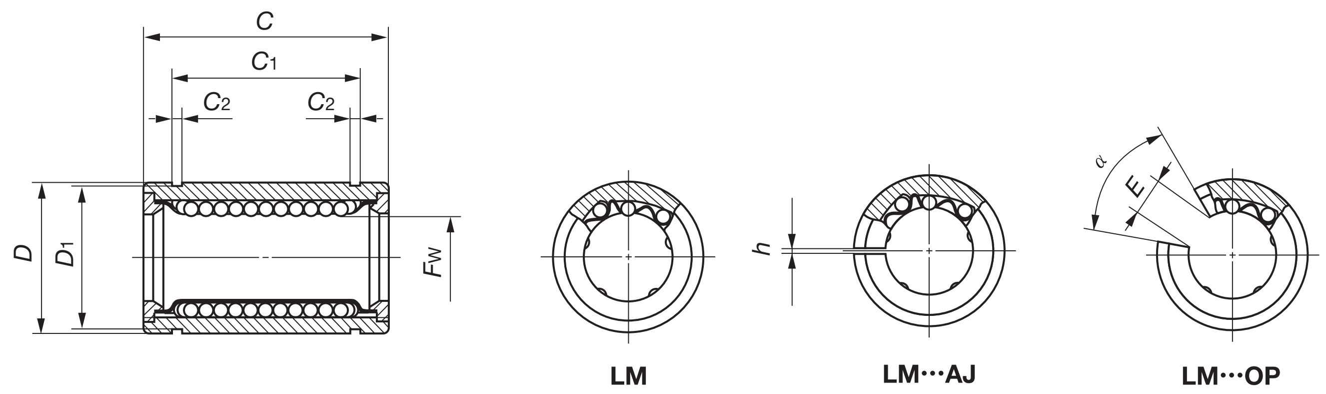
Nominal dimensions and tolerances mm: D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm Precision	Eccentricity Max. μm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N
1/2 12.700	0 −10	3/4 19.050	0 −381	12.98	0 −200	0.99	12.04	—	—	—	8	12	80.0	64.9	156	156
5/8 15.875		7/8 22.225		16.15		0.99	15.16	—	—	—			117	134	227	320
7/8 22.225		1 1/4 31.750		24.46		1.17	21.21	1/16 1.588	5/16 7.938	50°		13	290	333	577	816
1 1/8 28.575		1 1/2 38.100		28.04		1.42	27.30	3/32 2.381	3/8 9.525	60°			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
1 9/16 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 −13	2 5/8 66.675	0 −508	50.92	0 −300	1.73	48.51	3/32 2.381	5/8 15.875	50°			1 920	2 030	3 570	4 570
2 3/8 60.325		3 76.200		61.26		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°			3 960	4 190	7 140	9 130

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

IKO Linear Bushing : Metric series

Standard type :	Adjustable clearance type :	Open type :
LM	**LM··· AJ**	**LM··· OP**
LM···N (Synthetic resin retainer)	**LM···N AJ** (Synthetic resin retainer)	**LM···N OP** (Synthetic resin retainer)



Shaft diameter mm	Model number Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
6	LM 61219	4	8.5	——	–	–	——	–	–
	LM 61219N	4	7.6	LM 61219N AJ	4	7.5			
8	LM 81517	4	11	——	–	–	——	–	–
	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	——	–	–	——	–	–
	LM 101929N	4	29.5	LM 101929N AJ	4	29	LM 101929N OP	3	23
12	LM 122130	4	42	LM 122130 AJ	4	41	LM 122130 OP	3	32
	LM 122130N	4	31.5	LM 122130N AJ	4	31	LM 122130N OP	3	25
13	LM 132332	4	49	LM 132332 AJ	4	48	LM 132332 OP	3	37.5
	LM 132332N	4	43	LM 132332N AJ	4	42	LM 132332N OP	3	34
16	LM 162837	4	78	LM 162837 AJ	4	77	LM 162837 OP	3	60
	LM 162837N	4	69.5	LM 162837N AJ	4	68	LM 162837N OP	3	52
20	LM 203242	5	100	LM 203242 AJ	5	98	LM 203242 OP	4	85
	LM 203242N	5	98	LM 203242N AJ	5	95	LM 203242N OP	4	69
25	LM 254059	6	260	LM 254059 AJ	6	255	LM 254059 OP	5	220
	LM 254059N	6	220	LM 254059N AJ	6	216	LM 254059N OP	5	188
30	LM 304564	6	290	LM 304564 AJ	6	285	LM 304564 OP	5	245
	LM 304564N	6	250	LM 304564N AJ	6	245	LM 304564N OP	5	210
35	LM 355270	6	425	LM 355270 AJ	6	420	LM 355270 OP	5	355
	LM 355270N	6	390	LM 355270N AJ	6	384	LM 355270N OP	5	335
40	LM 406080	6	675	LM 406080 AJ	6	665	LM 406080 OP	5	575
	LM 406080N	6	585	LM 406080N AJ	6	579	LM 406080N OP	5	500
50	LM 5080100	6	1 740	LM 5080100 AJ	6	1 720	LM 5080100 OP	5	1 480
	LM 5080100N	6	1 580	LM 5080100N AJ	6	1 560	LM 5080100N OP	5	1 340

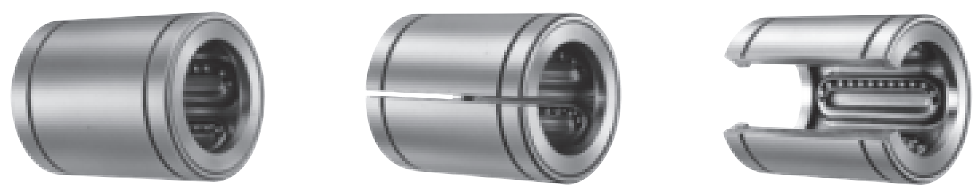
Note(1) : When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.
Remark 1 : In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.
2 : The end plate for the standard type and the adjustable clearance type with a shaft diameter of 40 mm or less is fixed using a stop ring for hole.

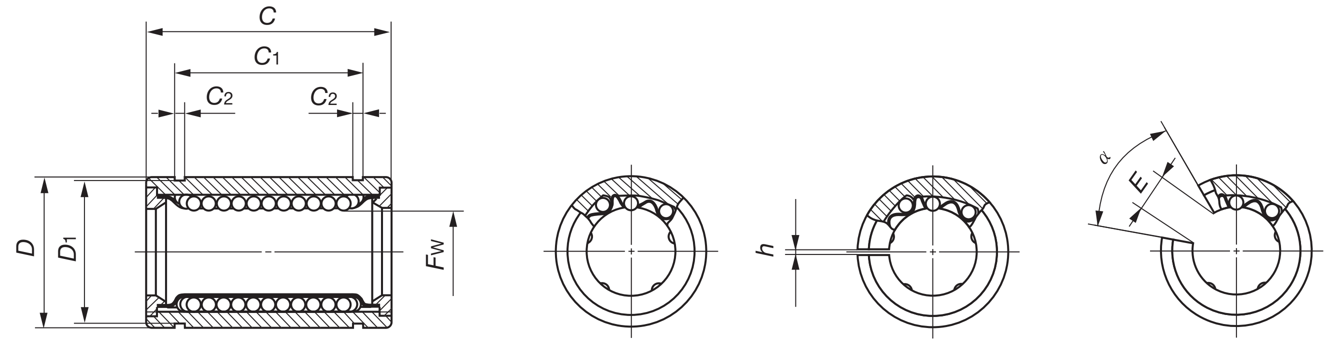
Nominal dimensions and tolerances mm F_w	Tolerance µm Precision	Tolerance µm High	D	Tolerance µm	C	Tolerance µm	C_1(1)	Tolerance µm	C_2	D_1	h	E	α Degree	Eccentricity Max. µm Precision	Eccentricity Max. µm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 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 / −200	22	0 / −200	1.3	18	– / 1	– / 6.8	– / 80	8	12	179	206	354	501
12			21	0 / −13	30		23		1.3	20	1.5	8	80			259	298	503	711
13			23		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

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

IKO Linear Bushing : Metric series

Standard type :	Adjustable clearance type :	Open type :
LM	**LM··· AJ**	**LM··· OP**
LM···N (Synthetic resin retainer)	**LM···N AJ** (Synthetic resin retainer)	**LM···N OP** (Synthetic resin retainer)





LM　　LM···AJ　　LM···OP

Shaft diameter mm	Model number Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
60	**LM 6090110**	6	2 000	**LM 6090110 AJ**	6	1 980	**LM 6090110 OP**	5	1 700
	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 OP**	5	3 810
100	**LM 100150175**	6	9 620	**LM 100150175 AJ**	6	9 540	**LM 100150175 OP**	5	8 180
120	**LM 120180200**	8	15 000	**LM 120180200 AJ**	8	14 900	**LM 120180200 OP**	6	11 600
150	**LM 150210240**	8	20 300	**LM 150210240 AJ**	8	20 200	**LM 150210240 OP**	6	15 700

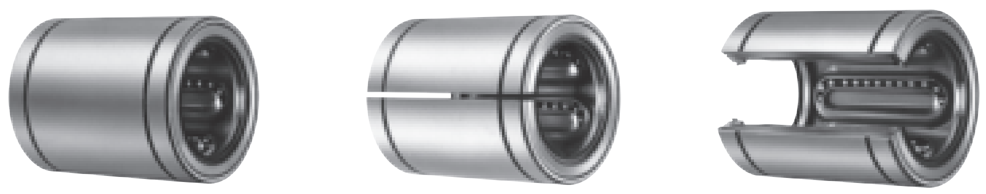
Nominal dimensions and tolerances mm															Eccentricity Max. μm		Basic dynamic load rating C		Basic static load rating C_0	
F_w	Tolerance μm Pre-cision	High	D	Toler-ance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α De-gree		Pre-cision	High	Load direction A N	Load direction B N	Load direction A N	Load direction B N
60	0 −9	0 −15	90	0 −22	110	0 −300	85	0 −300	3.15	86.5	3	30	50		17	25	4 760	5 040	8 150	10 400
80			120		140	0 −400	105.5	0 −400	4.15	116	3	40	50				8 710	9 220	14 500	18 500
100	0 −10	0 −20	150	0 −25	175		125.5		4.15	145	3	50	50		20	30	14 500	15 300	22 800	29 200
120			180		200		158.6		4.15	175	4	85	80				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

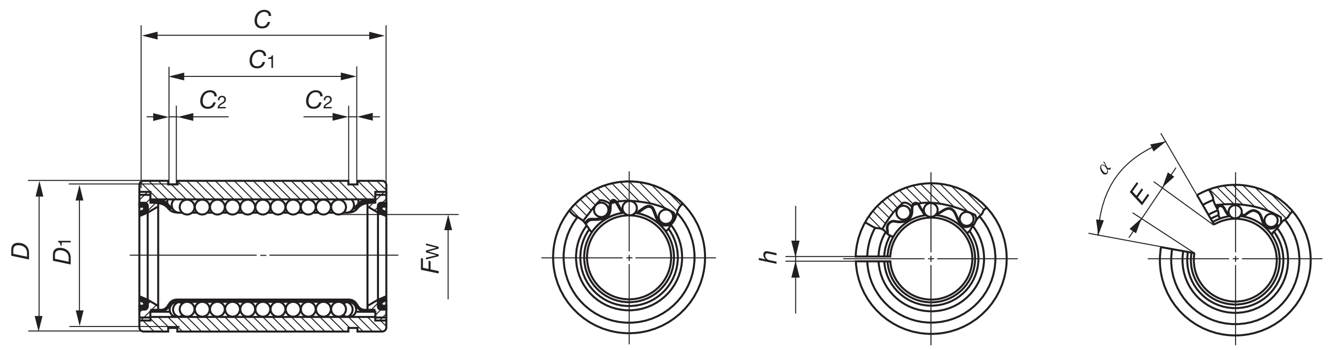
Note(1) : When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.
Remark : In the tolerance and eccentricity columns, "Precision" refers to precision class and "High" refers to high class.

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

IKO Linear Bushing with Seals : Metric series

Standard type :	Adjustable clearance type :	Open 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)





Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	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			
8	LM 81517 UU	4	11	——	–	–	——	–	–
	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	——	–	–	——	–	–
	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
	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
	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
	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
	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
	LM 254059N UU	6	220	LM 254059N UU AJ	6	216	LM 254059N UU OP	5	188
30	LM 304564 UU	6	290	LM 304564 UU AJ	6	285	LM 304564 UU OP	5	245
	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
	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
	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
	LM 5080100N UU	6	1 580	LM 5080100N UU AJ	6	1 560	LM 5080100N UU OP	5	1 340

Nominal dimensions and tolerances mm: F_w	Tolerance μm: Precision	Tolerance μm: High	D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm: Precision	Eccentricity Max. μm: High	Basic dynamic load rating C: Load direction A N	Basic dynamic load rating C: Load direction B N	Basic static load rating C_0: Load direction A N	Basic static load rating C_0: 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 −200	22	0 −200	1.3	18	– / 1	– / 6.8	– / 80	8	12	179	206	354	501
12			21	0 −13	30		23		1.3	20	1.5	8	80			259	298	503	711
13			23		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

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.
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 hole.

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

LBE, LBD, LBB, LM, LME, LMB

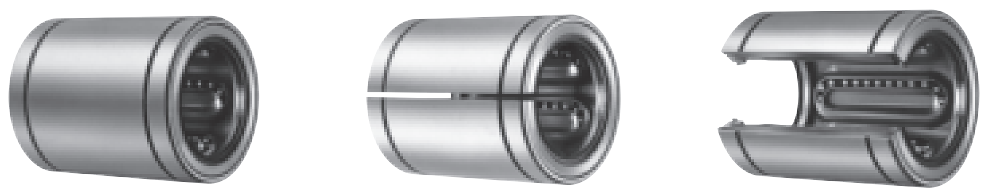
E

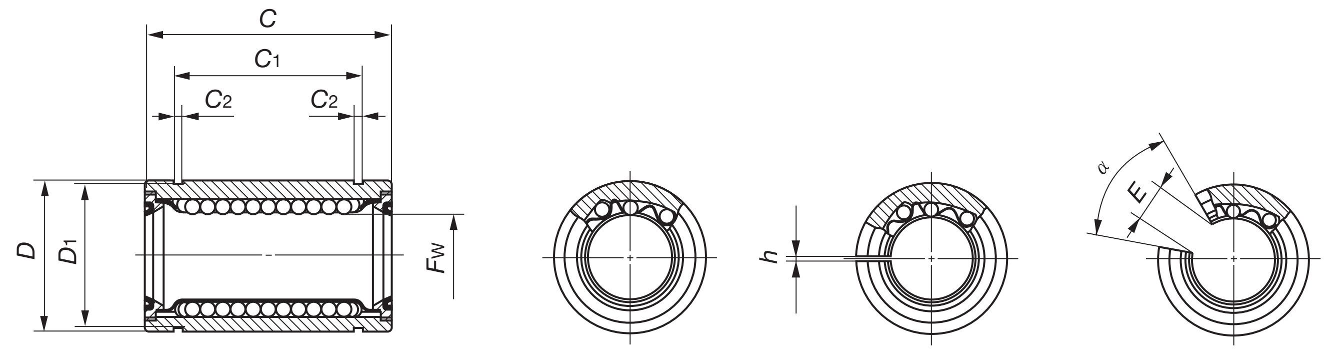
Linear Bushing with Seals : Metric series

Standard type :
LM··· UU
LM···N UU(Synthetic resin retainer)

Adjustable clearance type :
LM··· UU AJ
LM···N UU AJ(Synthetic resin retainer)

Open type :
LM··· UU OP
LM···N UU OP(Synthetic resin retainer)





LM···UU   LM···UU AJ   LM···UU OP

Shaft diameter mm	Model number Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
60	LM 6090110 UU	6	2 000	LM 6090110 UU AJ	6	1 980	LM 6090110 UU OP	5	1 700
	LM 6090110N UU	6	1 860	LM 6090110N UU AJ	6	1 820	LM 6090110N UU OP	5	1 610
80	LM 80120140 UU	6	4 480	LM 80120140 UU AJ	6	4 440	LM 80120140 UU OP	5	3 810
100	LM 100150175 UU	6	9 620	LM 100150175 UU AJ	6	9 540	LM 100150175 UU OP	5	8 180
120	LM 120180200 UU	8	14 700	LM 120180200 UU AJ	8	14 600	LM 120180200 UU OP	6	11 400
150	LM 150210240 UU	8	19 900	LM 150210240 UU AJ	8	19 800	LM 150210240 UU OP	6	15 400

Nominal dimensions and tolerances mm F_w	Tolerance μm Pre-cision	High	D	Toler-ance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α De-gree	Eccentricity Max. μm Pre-cision	High	Basic dynamic load rating C Load direction A N	Load direction B N	Basic static load rating C_0 Load direction A N	Load direction B N
60	0 −9	0 −15	90	0 −22	110	0 −300	85	0 −300	3.15	86.5	3	30	50	17	25	4 760	5 040	8 150	10 400
80			120		140	0 −400	105.5	0 −400	4.15	116	3	40	50			8 710	9 220	14 500	18 500
100	0 −10	0 −20	150	0 −25	175		125.5		4.15	145	3	50	50	20	30	14 500	15 300	22 800	29 200
120			180		200		158.6		4.15	175	4	85	80			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

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.

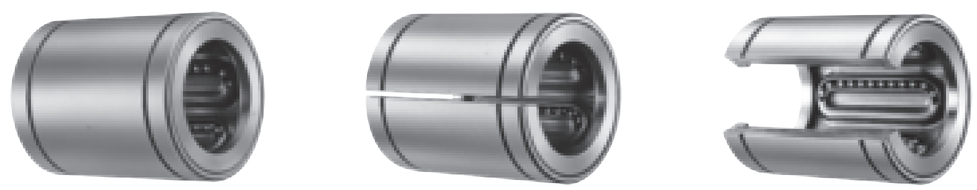
LBE, LBD, LBB, LM, LME, LMB

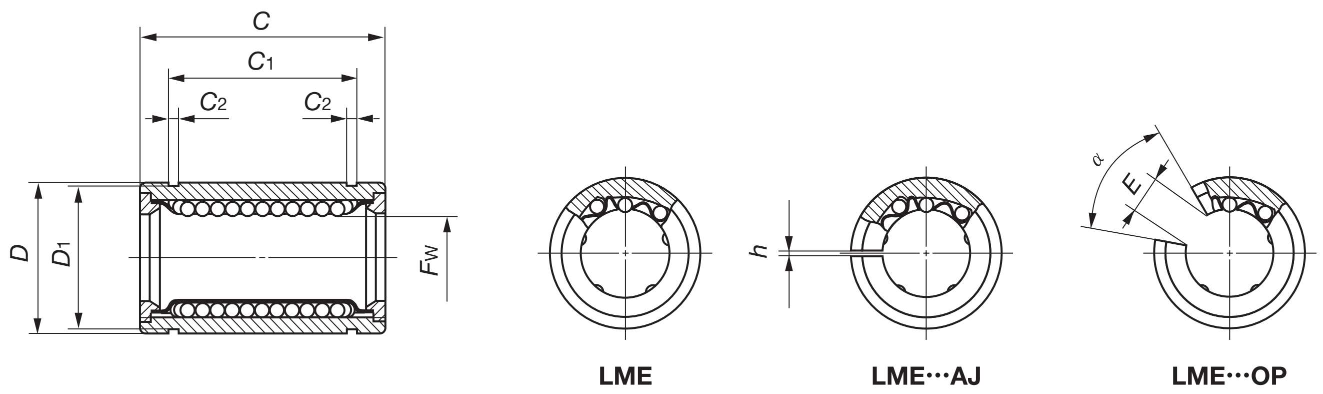
E

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

IKO Linear Bushing : Metric series

Standard type :	Adjustable clearance type :	Open type :
LME	**LME··· AJ**	**LME··· OP**
LME···N (Synthetic resin retainer)	**LME···N AJ** (Synthetic resin retainer)	**LME···N OP** (Synthetic resin retainer)





Shaft diameter mm	Model number Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
5	LME 51222N	4	10	LME 51222N AJ	4	9.5	——	–	–
8	LME 81625	4	22.5	——	–	–	——	–	–
	LME 81625N	4	20	LME 81625N AJ	4	19			
12	LME 122232	4	45.5	LME 122232 AJ	4	44.5	LME 122232 OP	3	35
	LME 122232N	4	41	LME 122232N AJ	4	40	LME 122232N OP	3	32
16	LME 162636	4	59	LME 162636 AJ	4	58	LME 162636 OP	3	45
	LME 162636N	4	56.5	LME 162636N AJ	4	54.5	LME 162636N OP	3	44
20	LME 203245	5	105	LME 203245 AJ	5	100	LME 203245 OP	4	84
	LME 203245N	5	92	LME 203245N AJ	5	90	LME 203245N OP	4	75
25	LME 254058	6	240	LME 254058 AJ	6	235	LME 254058 OP	5	200
	LME 254058N	6	220	LME 254058N AJ	6	215	LME 254058N OP	5	181
30	LME 304768	6	360	LME 304768 AJ	6	355	LME 304768 OP	5	300
	LME 304768N	6	325	LME 304768N AJ	6	320	LME 304768N OP	5	272
40	LME 406280	6	800	LME 406280 AJ	6	790	LME 406280 OP	5	670
	LME 406280N	6	705	LME 406280N AJ	6	694	LME 406280N OP	5	600
50	LME 5075100	6	1 260	LME 5075100 AJ	6	1 250	LME 5075100 OP	5	1 060
	LME 5075100N	6	1 130	LME 5075100N AJ	6	1 110	LME 5075100N OP	5	970
60	LME 6090125	6	2 270	LME 6090125 AJ	6	2 240	LME 6090125 OP	5	1 900
	LME 6090125N	6	1 860	LME 6090125N AJ	6	1 820	LME 6090125N OP	5	1 610
80	LME 80120165	6	5 140	LME 80120165 AJ	6	5 100	LME 80120165 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.

Nominal dimensions and tolerances mm F_w	Tolerance µm	D	Tolerance µm	C	Tolerance µm	C_1(1)	Tolerance µm	C_2	D_1	h	E	α Degree	Eccentricity Max. µm	Basic dynamic load rating C Load direction A N	Load direction B N	Basic static load rating C_0 Load direction A N	Load direction B N
5	+8 0	12	0 −8	22	0 −200	14.5	0 −200	1.1	11.5	1	–	–	12	90.8	104	219	310
8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
12		22	0 −9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
16	+9 −1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20		32	0 −11	45		31.5		1.6	30.3	2	10	60	15	562	668	1 010	1 470
25	+11 −1	40		58	0 −300	44.1	0 −300	1.85	37.5	2	12.5	60		920	974	1 780	2 280
30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40	+13 −2	62	0 −13	80		60.6		2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
50		75		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		165		133.7		4.15	116	3	36.3	54		8 710	9 220	14 500	18 500

LBE, LBD, LBB, LM, LME, LMB

E

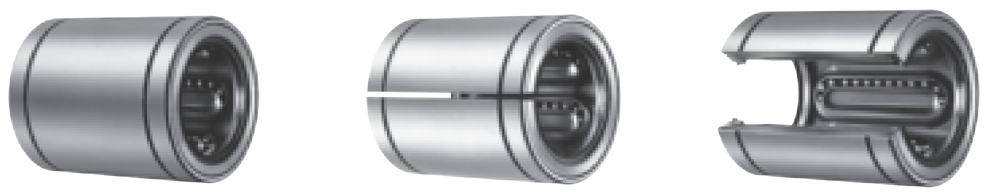
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

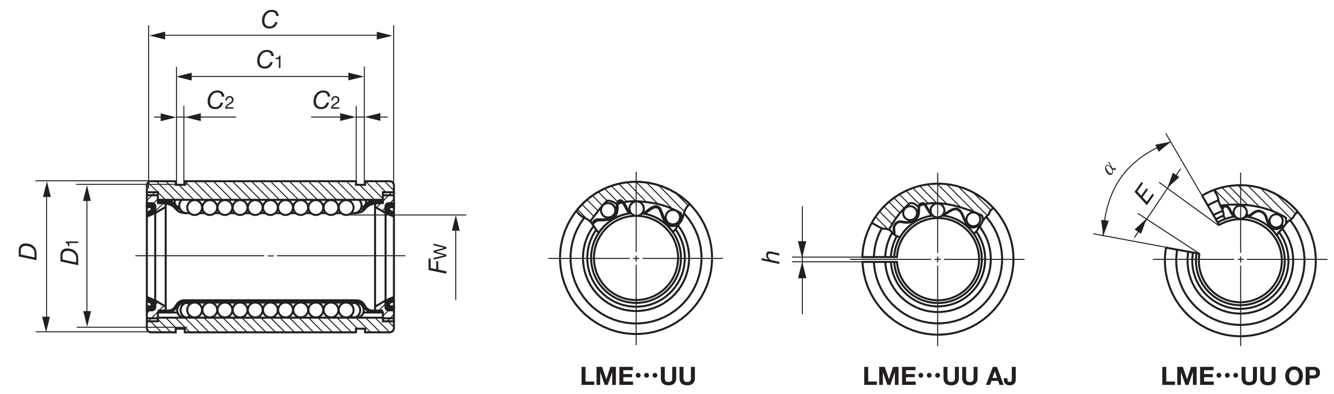
Linear Bushing with Seals : Metric series

Standard type :
LME··· UU
LME···N UU(Synthetic resin retainer)

Adjustable clearance type :
LME··· UU AJ
LME···N UU AJ(Synthetic resin retainer)

Open type :
LME··· UU OP
LME···N UU OP(Synthetic resin retainer)





Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
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
	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
	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
	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
	*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
	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
	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
	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
	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.

Nominal dimensions and tolerances mm: F_w	Tolerance μm	D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm	Basic dynamic load rating C Load direction A N	Load direction B N	Basic static load rating C_0 Load direction A N	Load direction B N
5	+8 0	12	0 −8	22	0 −200	14.5	0 −200	1.1	11.5	1	–	–	12	90.8	104	219	310
8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
12		22	0 −9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
16	+9 −1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20		32	0 −11	45		31.5		1.6	30.3	2	10	60	15	562	668	1 010	1 470
25	+11 −1	40		58	0 −300	44.1	0 −300	1.85	37.5	2	12.5	60		920	974	1 780	2 280
30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40	+13 −2	62	0 −13	80		60.6		2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
50		75		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		165		133.7		4.15	116	3	36.3	54		8 710	9 220	14 500	18 500

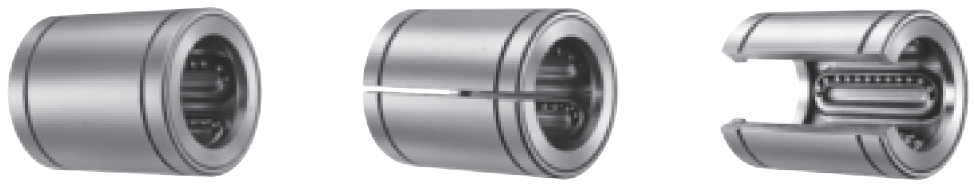
LBE, LBD, LBB, LM, LME, LMB

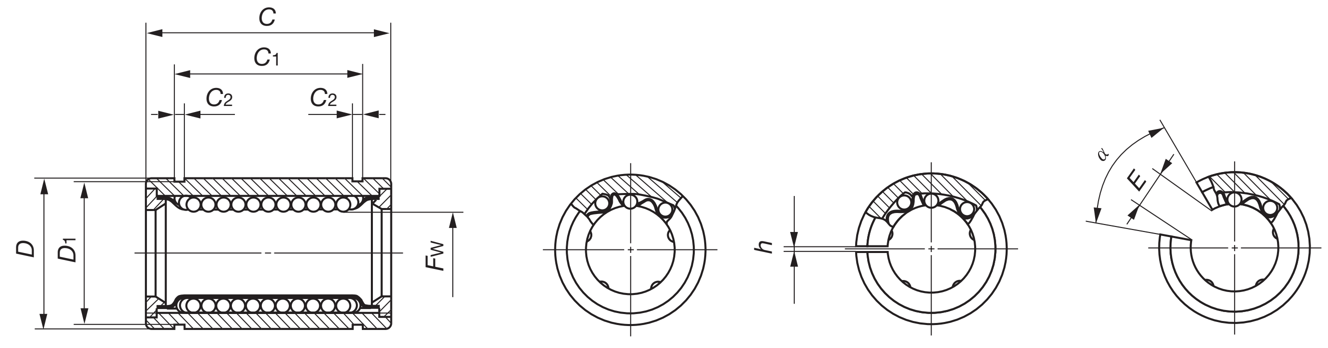
E

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

IKO Linear Bushing : Inch series

Standard type :	Adjustable clearance type :	Open type :
LMB	LMB··· AJ	LMB··· OP
LMB···N (Synthetic resin retainer)	LMB···N AJ (Synthetic resin retainer)	LMB···N OP (Synthetic resin retainer)





LMB LMB···AJ LMB···OP

Shaft diameter mm (inch)	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
6.350 (1/4)	LMB 4812	3	9.1	——	–	–	——	–	–
	LMB 4812N	4	8.5	LMB 4812N AJ	4	8.0			
9.525 (3/8)	LMB 61014	4	27.5	——	–	–	——	–	–
	LMB 61014N	4	12.5	LMB 61014N AJ	4	12			
12.700 (1/2)	LMB 81420	4	44	LMB 81420 AJ	4	43	LMB 81420 OP	3	33.5
	LMB 81420N	4	40	LMB 81420N AJ	4	38	LMB 81420N OP	3	28
15.875 (5/8)	LMB 101824	4	85	LMB 101824 AJ	4	83	LMB 101824 OP	3	64
	LMB 101824N	4	76	LMB 101824N AJ	4	74	LMB 101824N OP	3	57
19.050 (3/4)	LMB 122026	5	98	LMB 122026 AJ	5	96	LMB 122026 OP	4	81
	LMB 122026N	5	95	LMB 122026N AJ	5	93	LMB 122026N OP	4	76
25.400 (1)	LMB 162536	6	220	LMB 162536 AJ	6	218	LMB 162536 OP	5	190
	LMB 162536N	6	200	LMB 162536N AJ	6	198	LMB 162536N OP	5	170
31.750 (1 1/4)	LMB 203242	6	490	LMB 203242 AJ	6	485	LMB 203242 OP	5	415
	LMB 203242N	6	440	LMB 203242N AJ	6	430	LMB 203242N OP	5	370
38.100 (1 1/2)	LMB 243848	6	730	LMB 243848 AJ	6	720	LMB 243848 OP	5	620
	LMB 243848N	6	670	LMB 243848N AJ	6	660	LMB 243848N OP	5	570
50.800 (2)	LMB 324864	6	1 530	LMB 324864 AJ	6	1 510	LMB 324864 OP	5	1 300
	LMB 324864N	6	1 140	LMB 324864N AJ	6	1 120	LMB 324864N OP	5	980
63.500 (2 1/2)	LMB 406080	6	2 400	LMB 406080 AJ	6	2 380	LMB 406080 OP	5	2 040
76.200 (3)	LMB 487296	6	4 400	LMB 487296 AJ	6	4 360	LMB 487296 OP	5	3 740
101.600 (4)	LMB 6496128	6	11 000	LMB 6496128 AJ	6	10 900	LMB 6496128 OP	5	9 350

Note(1) : When circlips are used for mounting, the dimension C_1 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.

Nominal dimensions and tolerances mm: F_w	Tolerance µm Precision	Tolerance µm High	D	Tolerance µm	C	Tolerance µm	C_1(1)	Tolerance µm	C_2	D_1	h	E	α Degree	Eccentricity Max. µm Precision	Eccentricity Max. µm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N
1/4 6.350	0 −6	0 −9	1/2 12.700	0 −11	3/4 19.050	0 −200	12.98	0 −200	0.992	11.906	– 1	–	–	8	12	(2) 82.6	(2) 67.0	(2) 168	(2) 168
3/8 9.525			5/8 15.875	0 −13	7/8 22.225		16.15		0.992	14.935	– 1	–	–			94.8	109	174	246
1/2 12.700			7/8 22.225		1 1/4 31.750		24.46		1.168	20.853	1.5	8.7	80			264	303	505	714
5/8 15.875			1 1/8 28.575		1 1/2 38.100		28.04		1.422	26.899	1.5	9.5	80			424	488	766	1 080
3/4 19.050	0 −7	0 −10	1 1/4 31.750	0 −16	1 5/8 41.275		29.61		1.422	29.870	1.5	10.7	60	10	15	554	659	1 000	1 470
1 25.400			1 9/16 39.688		2 1/4 57.150	0 −300	44.53	0 −300	1.727	37.306	1.5	11.8	50			923	978	1 780	2 280
1 1/4 31.750	0 −8	0 −12	2 50.800	0 −19	2 5/8 66.675		50.92		1.727	47.904	2.5	14.7	50	12	20	1 370	1 450	2 510	3 210
1 1/2 38.100			2 3/8 60.325		3 76.200		61.26		2.184	56.870	3	17.7	50			2 010	2 130	3 610	4 620
2 50.800			3 76.200	0 −22	4 101.600		81.07		2.616	72.085	3	24.7	50	17	25	3 960	4 190	7 140	9 130
2 1/2 63.500	0 −9	0 −15	3 3/4 95.250		5 127.000		100.99		3.048	90.220	3	29.5	50			5 190	5 490	9 090	11 600
3 76.200			4 1/2 114.300		6 152.400	0 −400	120.04	0 −400	3.048	109.474	3	39.6	50			8 620	9 120	14 500	18 500
4 101.600	0 −10	0 −20	6 152.400	0 −25	8 203.200		158.95		3.53	145.923	3	49.5	50	20	30	17 000	18 000	28 600	36 500

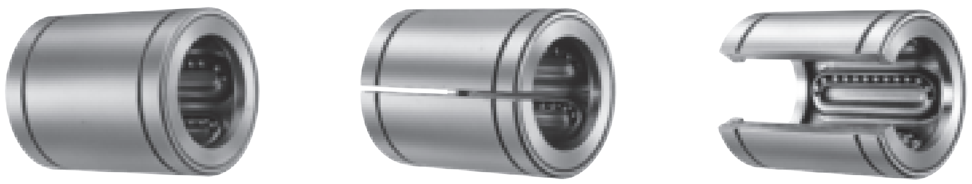
LBE, LBD, LBB, LM, LME, LMB

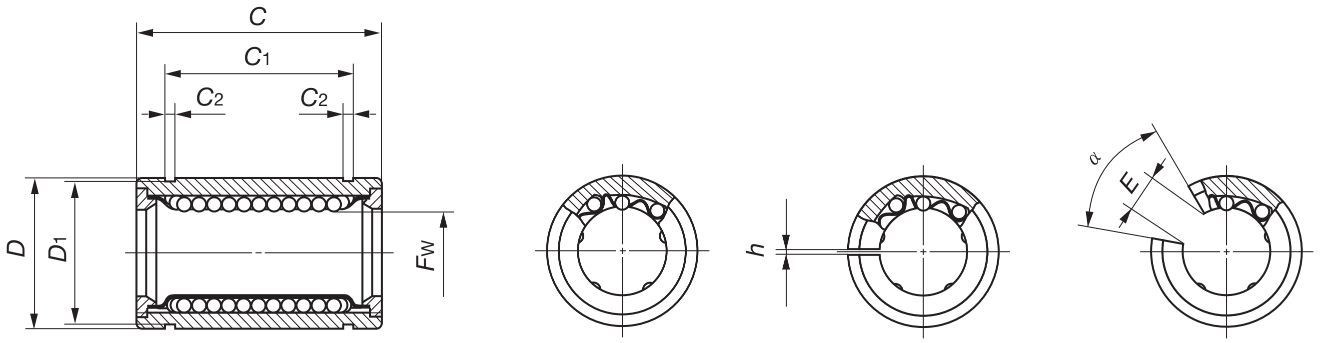
E

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

IKO Stainless Steel Linear Bushing : Metric series

Standard type :	Adjustable clearance type :	Open type :
LM··· F	LM··· F AJ	LM··· F OP
LM···N F (Synthetic resin retainer)	LM···N F AJ (Synthetic resin retainer)	LM···N F OP (Synthetic resin retainer)





LM···F LM···F AJ LM···F OP

Shaft diameter mm	Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
6	LM 61219 F	4	8.5	——	–	–	——	–	–
	LM 61219N F	4	7.6	LM 61219N F AJ	4	7.5			
8	LM 81517 F	4	11	——	–	–	——	–	–
	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	——	–	–	——	–	–
	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
	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
	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
	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
	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
	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
	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
	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.

Nominal dimensions and tolerances mm															Eccentricity		Basic dynamic load rating C		Basic static load rating C_0	
F_w	Tolerance μm Precision	Tolerance μm High	D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree		Max. μm Precision	Max. μm High	Load direction A N	Load direction B N	Load direction A N	Load direction B N
6			12	0 / −11	19		13.5		1.1	11.5	– / 1	–	–				80.7	92.7	167	237
8			15		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 / −200	22	0 / −200	1.3	18	– / 1	– / 8	– / 80		8	12	179	206	354	501
12			21	0 / −13	30		23		1.3	20	1.5	8	80				259	298	503	711
13			23		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
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.

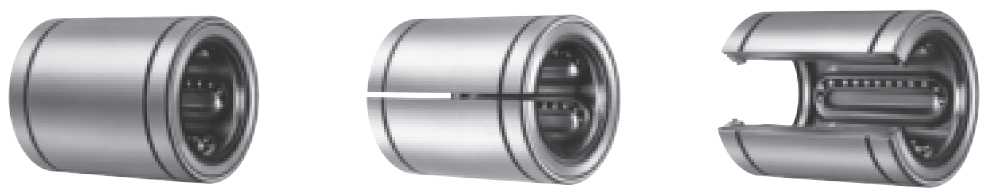
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

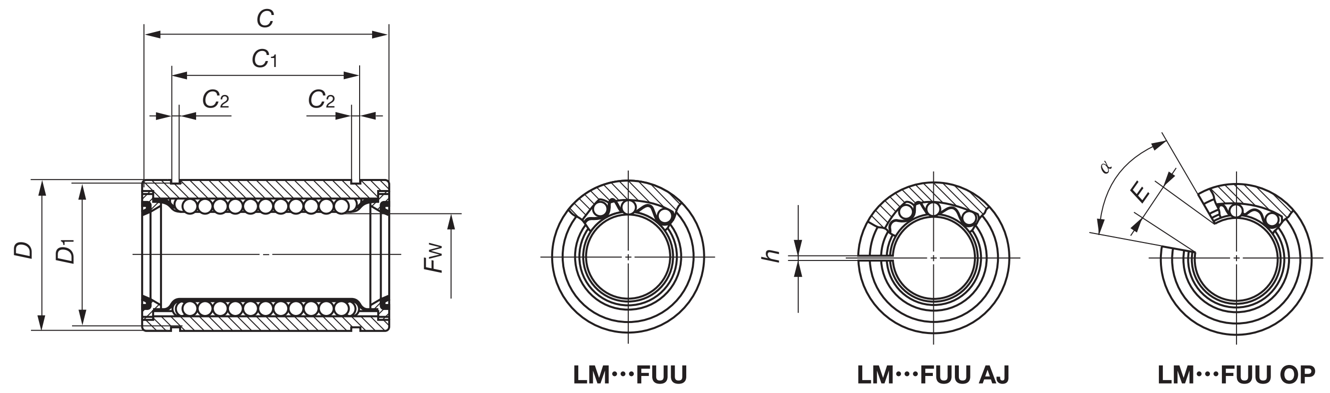
Stainless Steel Linear Bushing with Seals : Metric series

Standard type :
LM··· F UU
LM···N F UU (Synthetic resin retainer)

Adjustable clearance type :
LM··· F UU AJ
LM···N F UU AJ (Synthetic resin retainer)

Open type :
LM··· F UU OP
LM···N F UU OP (Synthetic resin retainer)





Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
6	LM 61219 F UU	4	8.5	——	–	–	——	–	–
	LM 61219N F UU	4	7.6	LM 61219N F UU AJ	4	7.5			
8	LM 81517 F UU	4	11	——	–	–	——	–	–
	LM 81517N F UU	4	10.4	LM 81517N F UU AJ	4	10			
	LM 81524 F 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
30	LM 304564 F UU	6	290	LM 304564 F UU AJ	6	285	LM 304564 F UU OP	5	245
	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
	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
	LM 406080N F UU	6	585	LM 406080N F UU AJ	6	579	LM 406080N F UU OP	5	500
50	LM 5080100 F UU	6	1 670	LM 5080100 F UU AJ	6	1 650	LM 5080100 F UU OP	5	1 410
	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
	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 C_1 minus twice the width of circlip becomes the width of hub.

Nominal dimensions and tolerances mm: F_w	Tolerance μm Precision	Tolerance μm High	D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm Precision	Eccentricity Max. μm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 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 −200	22	0 −200	1.3	18	– 1	– 8	– 80	8	12	179	206	354	501
12			21	0 −13	30		23		1.3	20	1.5	8	80			259	298	503	711
13			23		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
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.

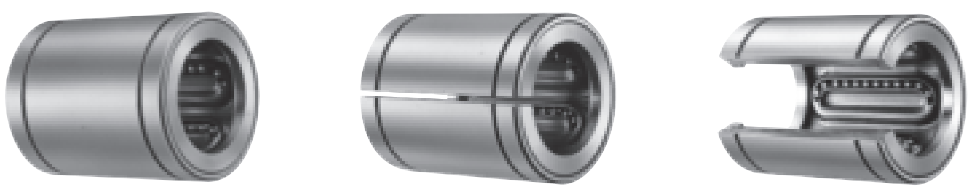
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

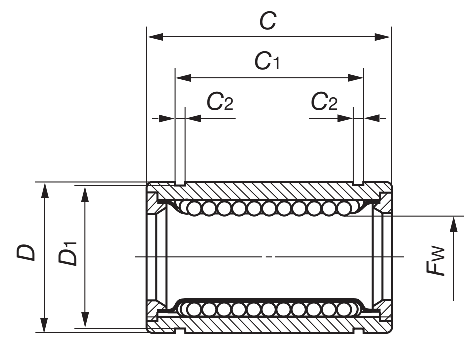
IKO Stainless Steel Linear Bushing : Metric series

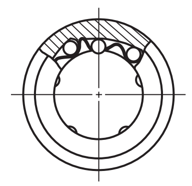
Standard type :
LME… F
LME…N F (Synthetic resin retainer)

Adjustable clearance type :
LME… F AJ
LME…N F AJ (Synthetic resin retainer)

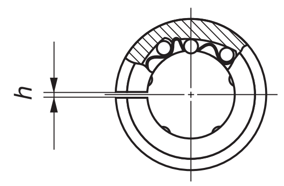
Open type :
LME… F OP
LME…N F OP (Synthetic resin retainer)



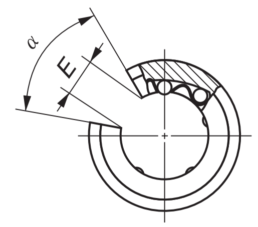




LME…F



LME…F AJ



LME…F OP

Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
5	LME 51222N F	4	10	LME 51222N F AJ	4	9.5	——	–	–
8	LME 81625 F	4	22	——	–	–	——	–	–
	LME 81625N F	4	20	LME 81625N F AJ	4	19			
12	LME 122232 F	4	45.5	LME 122232 F AJ	4	44.5	LME 122232 F OP	3	35
	LME 122232N F	4	41	LME 122232N F AJ	4	40	LME 122232N F OP	3	32
16	LME 162636 F	4	59	LME 162636 F AJ	4	58	LME 162636 F OP	3	45
	LME 162636N F	4	56.5	LME 162636N F AJ	4	54.5	LME 162636N F OP	3	44
20	LME 203245 F	5	105	LME 203245 F AJ	5	100	LME 203245 F OP	4	84
	LME 203245N F	5	92	LME 203245N F AJ	5	90	LME 203245N F OP	4	75
25	LME 254058 F	6	240	LME 254058 F AJ	6	235	LME 254058 F OP	5	200
	LME 254058N F	6	220	LME 254058N F AJ	6	215	LME 254058N F OP	5	181
30	LME 304768 F	6	360	LME 304768 F AJ	6	355	LME 304768 F OP	5	300
	LME 304768N F	6	325	LME 304768N F AJ	6	320	LME 304768N F OP	5	272
40	LME 406280 F	6	770	LME 406280 F AJ	6	758	LME 406280 F OP	5	665
	LME 406280N F	6	705	LME 406280N F AJ	6	694	LME 406280N F OP	5	600
50	LME 5075100 F	6	1 250	LME 5075100 F AJ	6	1 230	LME 5075100 F OP	5	1 080
	LME 5075100N F	6	1 130	LME 5075100N F AJ	6	1 110	LME 5075100N F OP	5	970
60	LME 6090125 F	6	2 220	LME 6090125 F AJ	6	2 170	LME 6090125 F OP	5	1 900
	LME 6090125N F	6	2 050	LME 6090125N F AJ	6	2 000	LME 6090125N F OP	5	1 580

Note(1) : When circlips are used for mounting, the dimension C_1 minus twice the width of circlip becomes the width of hub.

Nominal dimensions and tolerances mm														Eccentricity	Basic dynamic load rating C		Basic static load rating C_0	
F_w	Tolerance μm	D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Max. μm	Load direction A N	Load direction B N	Load direction A N	Load direction B N
5	+8 / 0	12	0 / −8	22	0 / −200	14.5	0 / −200	1.1	11.5	1	–	–	12	90.8	104	219	310
8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
12		22	0 / −9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
16	+9 / −1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20		32	0 / −11	45		31.5		1.6	30.3	2	10	60	15	562	668	1 010	1 470
25	+11 / −1	40		58	0 / −300	44.1	0 / −300	1.85	37.5	2	12.5	60		920	974	1 780	2 280
30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40	+13 / −2	62	0 / −13	80		60.6		2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
50		75		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

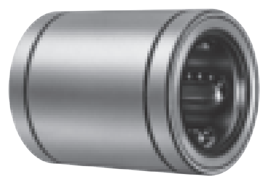
LBE, LBD, LBB, LM, LME, LMB

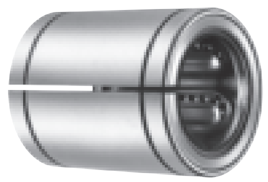
E

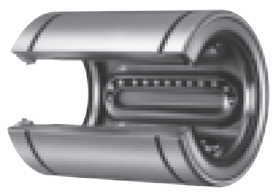
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

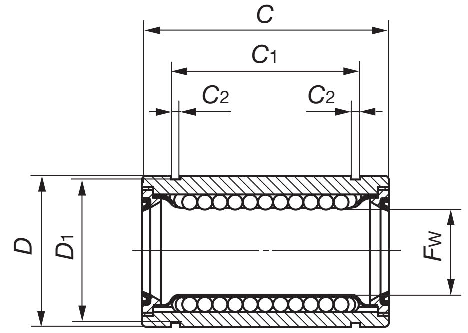
IKO Stainless Steel Linear Bushing with Seals : Metric series

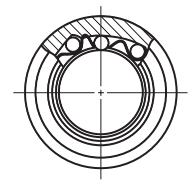
Standard type :	Adjustable clearance type :	Open type :
LME··· F UU	LME··· F UU AJ	LME··· F UU OP
LME···N F UU (Synthetic resin retainer)	LME···N F UU AJ (Synthetic resin retainer)	LME···N F UU OP (Synthetic resin retainer)



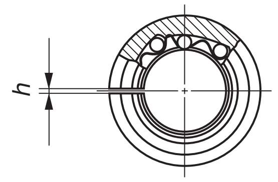




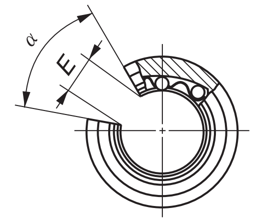




LME···F UU



LME···F UU AJ



LME···F UU OP

Shaft diameter mm	Model number: Standard type	Ball circuits	Mass (Ref.) g	Adjustable clearance type	Ball circuits	Mass (Ref.) g	Open type	Ball circuits	Mass (Ref.) g
5	LME 51222N F UU	4	10	LME 51222N F UU AJ	4	9.5	——	–	–
8	LME 81625 F UU	4	22	——	–	–	——	–	–
	LME 81625N F UU	4	20	LME 81625N F UU AJ	4	19			
12	LME 122232 F UU	4	45.5	LME 122232 F UU AJ	4	44.5	LME 122232 F UU OP	3	35
	LME 122232N F UU	4	41	LME 122232N F UU AJ	4	40	LME 122232N F UU OP	3	32
16	LME 162636 F UU	4	59	LME 162636 F UU AJ	4	58	LME 162636 F UU OP	3	45
	LME 162636N F UU	4	56.5	LME 162636N F UU AJ	4	54.5	LME 162636N F UU OP	3	44
20	LME 203245 F UU	5	105	LME 203245 F UU AJ	5	100	LME 203245 F UU OP	4	84
	LME 203245N F UU	5	92	LME 203245N F UU AJ	5	90	LME 203245N F UU OP	4	75
25	LME 254058 F UU	6	240	LME 254058 F UU AJ	6	235	LME 254058 F UU OP	5	200
	*LME 254058N F UU	6	220	*LME 254058N F UU AJ	6	215	*LME 254058N F UU OP	5	181
30	LME 304768 F UU	6	360	LME 304768 F UU AJ	6	355	LME 304768 F UU OP	5	300
	LME 304768N F UU	6	325	LME 304768N F UU AJ	6	320	LME 304768N F UU OP	5	272
40	LME 406280 F UU	6	752	LME 406280 F UU AJ	6	740	LME 406280 F UU OP	5	645
	LME 406280N F UU	6	705	LME 406280N F UU AJ	6	694	LME 406280N F UU OP	5	600
50	LME 5075100 F UU	6	1 210	LME 5075100 F UU AJ	6	1 190	LME 5075100 F UU OP	5	1 050
	LME 5075100N F UU	6	1 130	LME 5075100N F UU AJ	6	1 110	LME 5075100N F UU OP	5	970
60	LME 6090125 F UU	6	2 160	LME 6090125 F UU AJ	6	2 110	LME 6090125 F UU OP	5	1 850
	LME 6090125N F UU	6	2 050	LME 6090125N F UU AJ	6	2 000	LME 6090125N F UU OP	5	1 580

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.

Nominal dimensions and tolerances mm: F_w	Tolerance μm	D	Tolerance μm	C	Tolerance μm	C_1(1)	Tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Max. μm	Basic dynamic load rating C Load direction A N	Load direction B N	Basic static load rating C_0 Load direction A N	Load direction B N
5	+8 0	12	0 −8	22	0 −200	14.5	0 −200	1.1	11.5	1	–	–	12	90.8	104	219	310
8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
12		22	0 −9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
16	+9 −1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
20		32	0 −11	45		31.5		1.6	30.3	2	10	60	15	562	668	1 010	1 470
25	+11 −1	40		58	0 −300	44.1	0 −300	1.85	37.5	2	12.5	60		920	974	1 780	2 280
30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
40	+13 −2	62	0 −13	80		60.6		2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
50		75		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

LBE, LBD, LBB, LM, LME, LMB

E

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

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.

Wide variations

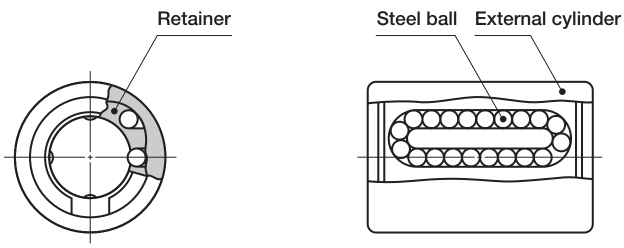
In addition to the standard type, the high-rigidity long type is available. These types can be selected to suit the requirements in applications.

Compact design

Miniature Linear Bushing is very small in size, allowing for compact assembly in machines and equipment.

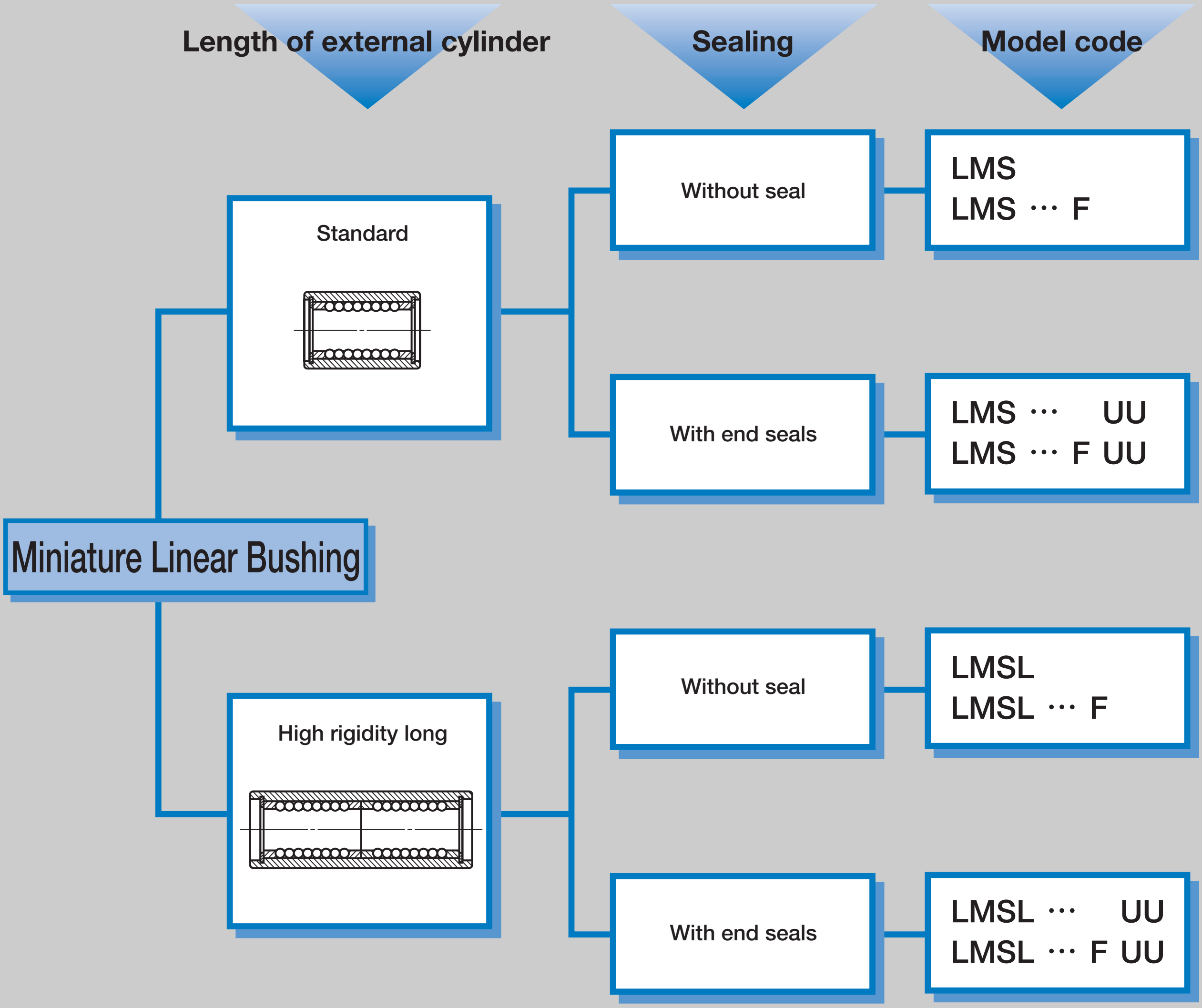
Stainless steel type

Miniature Linear Bushings made of stainless steel are also available. This type is suitable for applications where corrosion resistance is important.



Structure of Miniature Linear Bushing

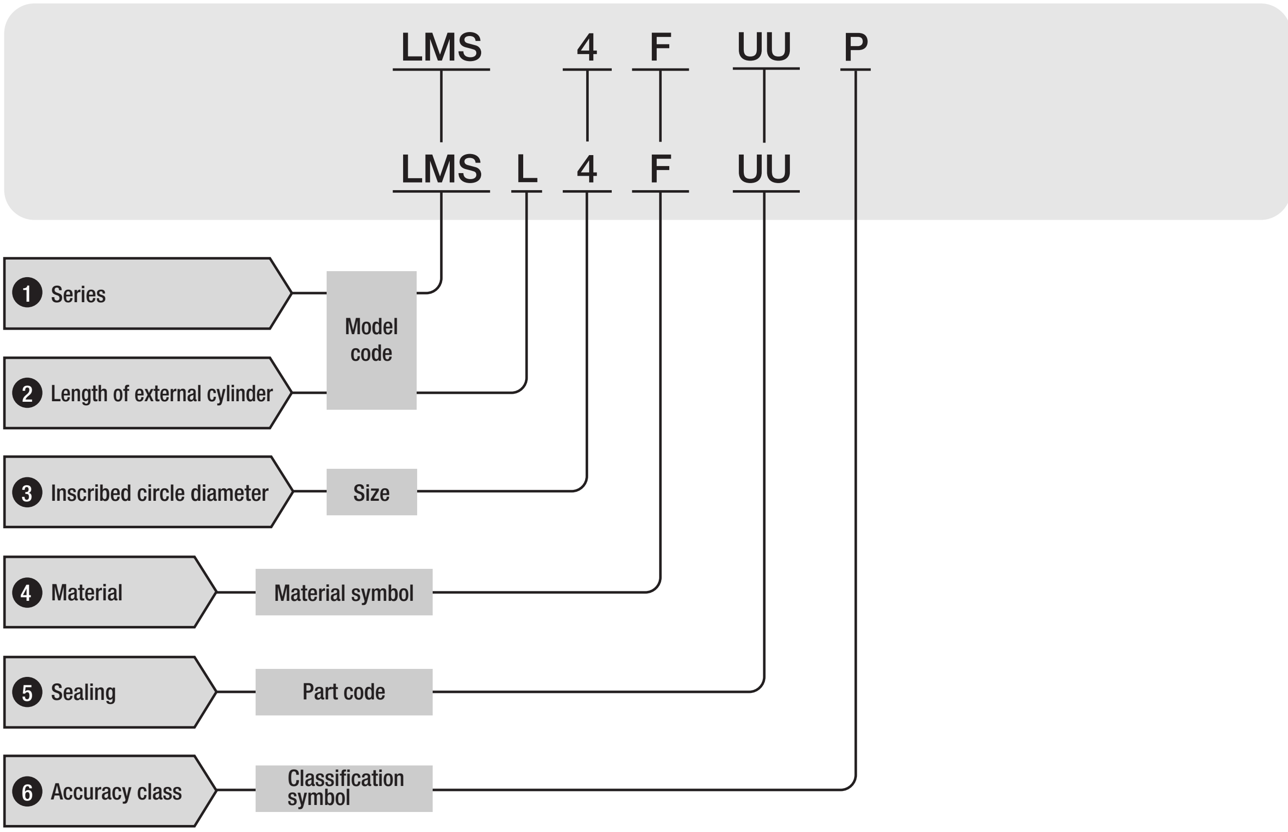
Miniature Linear Bushing series



Remark : "F" in the model codes indicates a stainless steel type.

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.



1 Series	LMS	
2 Length of external cylinder	Standard : No symbol High rigidity long : L	
3 Inscribed circle diameter		Indicate the inscribed circle diameter in mm.
4 Material	High carbon steel made : No symbol Stainless steel made : F	Specify the component part material.
5 Sealing	Without seal : No symbol With two end seals : UU	Sealed type incorporates seals with superior dust protection performance in both ends of the external cylinder for preventing intrusion of foreign matter.
6 Accuracy class	High : No symbol Precision : P	For details of accuracy, see the table of dimensions on page E-173. The precision class is applicable to standard type only. When strict control of radial internal clearance is required, specially controlled products of which inscribed circle diameter is selected within the divisions of every 0.002 mm can be delivered. If required, consult IKO.

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 10^3 meters free from material damage due to rolling contact fatigue.

● Basic static load rating C_0

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.

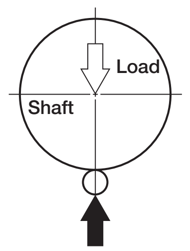


Fig. 1 Load direction A

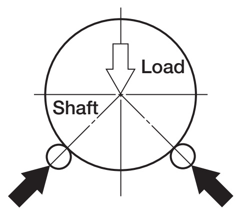


Fig. 2 Load direction B

Precautions for Use

❶ 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.

Table 1 Surface hardness, roughness and minimum effective hardening depth

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	0.2μmRa or better (0.8μmRy or better)	——
Effective hardening depth	0.8mm or more	——

❷ 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.

❸ 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.

❹ 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

Fit

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
(Tolerance of shaft and housing bore)

unit : μm

Item / Class	Shaft	Housing
High class	− 6 −14	+12 0
Precision class	− 4 − 9	+ 8 0

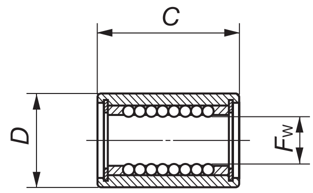
Accessories

Steel shaft for Miniature Linear Bushing

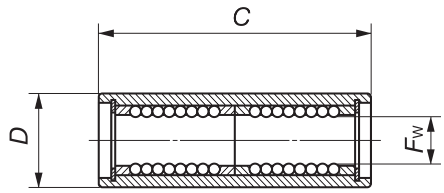
In order to achieve full performance of Miniature Linear Bushing, heat-treated and ground steel shafts with high accuracy and rigidity are available. For details, consult IKO.

IKO Miniature Linear Bushing

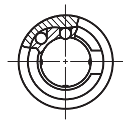
Standard : LMS
High rigidity long :LMSL

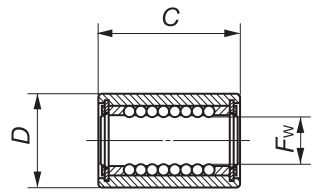


LMS
LMS…F

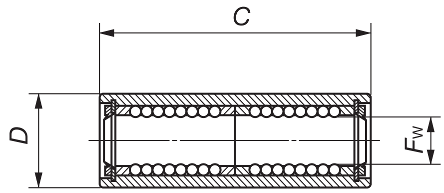


LMSL
LMSL…F

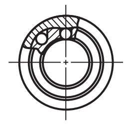




LMS… UU
LMS…F UU



LMSL… UU
LMSL…F UU



Shaft dia-meter mm	Model number	Ball circuits	Mass (Ref.) g	Nominal dimensions and tolerances mm F_w	Tolerance μm Pre-cision	Tolerance μm High	D	Tolerance μm Pre-cision	Tolerance μm High	C	Tolerance μm	Eccen-tricity Max. μm Pre-cision	Eccen-tricity Max. μm High	Basic dynamic load rating C Load direction A N	Basic dynamic load rating C Load direction B N	Basic static load rating C_0 Load direction A N	Basic static load rating C_0 Load direction B N
3	**LMS 3** **LMS 3 F** **LMS 3 UU** **LMS 3 F UU**	4	1.8	3	0 −5	0 −8	7	0 −7	0 −8	10	0 −120	2	4	18.4	21.2	39.4	55.8
	LMSL 3 **LMSL 3 F** **LMSL 3 UU** **LMSL 3 F UU**		3.0		–	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
	LMSL 4 **LMSL 4 F** **LMSL 4 UU** **LMSL 4 F UU**		4.3		–	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
	LMSL 5 **LMSL 5 F** **LMSL 5 UU** **LMSL 5 F UU**		6.7		–	0 −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
LMG

Stroke Rotary Bushings

Description of each series and Table of dimensions

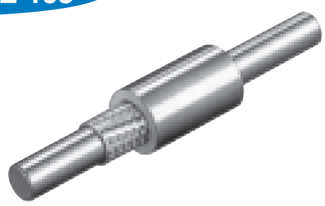
E

Stroke Rotary Bushing

Page E-176 to E-185

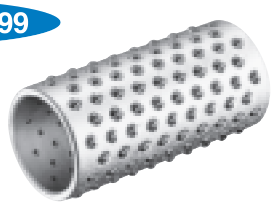
Miniature Stroke Rotary Bushing

Page E-186 to E-193



Stroke Rotary Cage

Page E-194 to E-199



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

ST

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

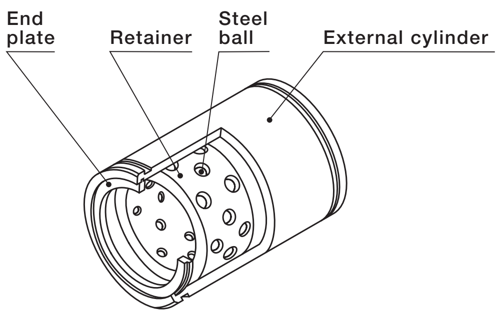
Since the retainer is highly rigid but light, this series is suitable for high speed rotation and reciprocating movement as inertia is small.

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.

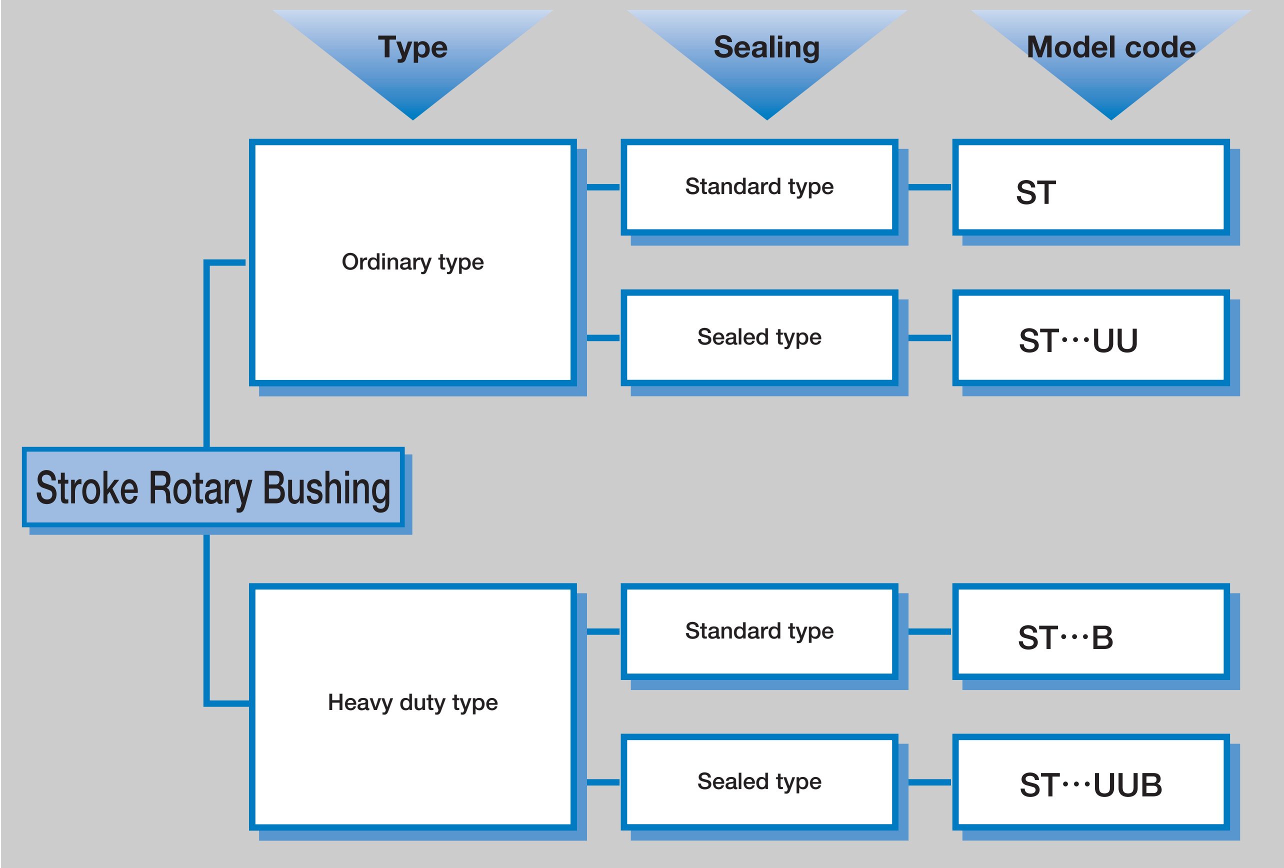
Sealed type Stroke Rotary Bushing

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.



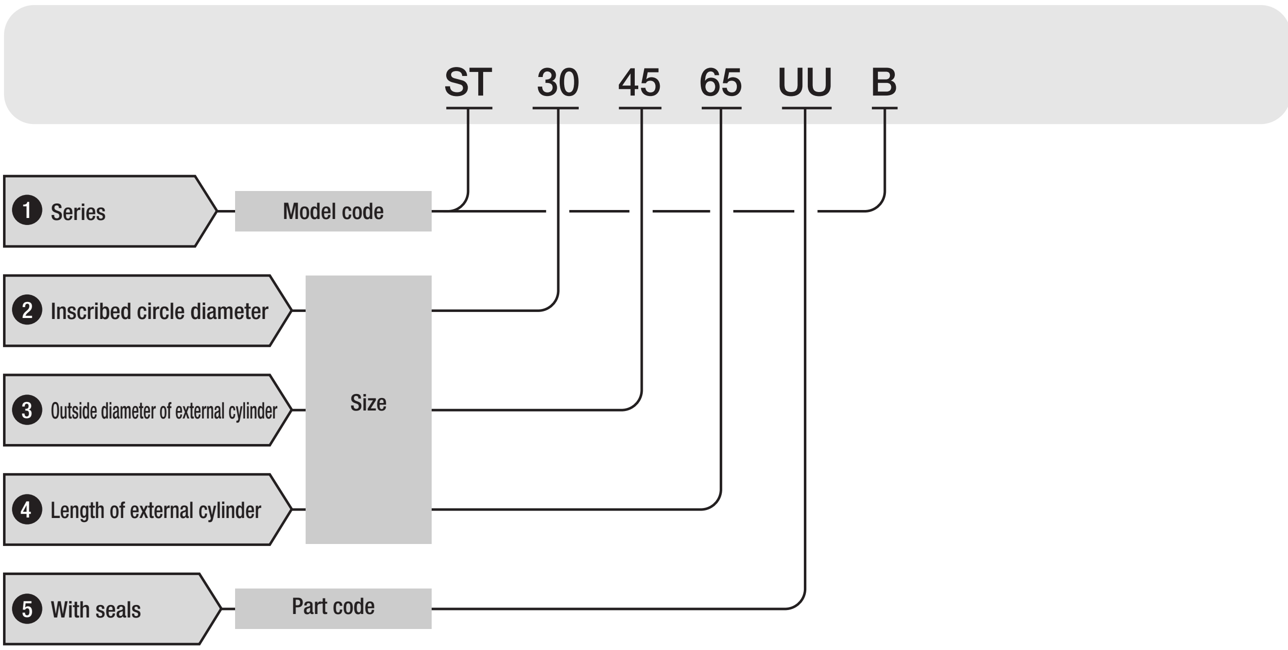
Structure of Stroke Rotary Bushing

Stroke Rotary Bushing series



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.



1 Series	Ordinary type : ST Heavy duty type : ST…B	The heavy duty type has larger load ratings and higher rigidity but a shorter stroke length than the ordinary type.
2 Inscribed circle diameter		Indicate the inscribed circle diameter in mm.
3 Outside diameter of external cylinder		Indicate the outside diameter of external cylinder in mm.
4 Length of external cylinder		Indicate the length of external cylinder in mm.
5 With seals	Standard type : No symbol Sealed type : UU	The sealed type incorporates seals for preventing intrusion of foreign substances. The maximum allowable temperature for seals is 120℃.

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 C_0

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.

$$W = 4 + L_1 / 8 \cdots\cdots\cdots\cdots (1)$$

where, W: Distance from the end face to measuring position P, mm (See Fig. 1.)
L_1: Length of external cylinder, mm

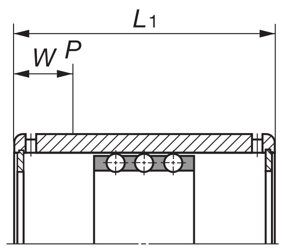


Fig. 1

Table 1.1 Tolerance of inscribed circle diameter and outside diameter of external cylinder unit : μm

Inscribed circle diameter F_w or outside diameter D of external cylinder mm		Tolerance of inscribed circle diameter F_w		Tolerance of outside diameter of external cylinder D_m(1)	
over	incl.	high	low	high	low
4	6	+18	+10	–	–
6	10	+22	+13	0	− 8
10	18	+27	+16	0	− 8
18	30	+33	+20	0	− 9
30	50	+41	+25	0	−11
50	80	+49	+30	0	−13
80	120	+58	+36	0	−15
120	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 : μm

Inscribed circle diameter F_w mm		Tolerance of length L_1 of external cylinder	
over	incl.	high	low
–	20	0	−200
20	60	0	−300
60	100	0	−400

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

Operating condition	Tolerance range class	
	Shaft	Housing bore
General application	k5, m5	H6, H7
Vertical axis or high accuracy	n5, p6	J6, J7

Table 3 Minimum radial clearance

unit : μm

Inscribed circle diameter F_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

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.

$$DN \geqq D_{pw}\, n + 10 S\, n_1 \quad \cdots\cdots (2)$$

where, DN: Limit of speed (See Table 4.)
n: Number of revolutions per minute, rpm
n_1: Number of strokes per minute, cpm
S: Stroke length, mm
D_{pw}: Pitch circle diameter of balls, mm ($D_{pw} \fallingdotseq 1.15\, F_w$)
F_w: Inscribed circle diameter, mm

This formula is applicable only when $n_1 \leqq 5000$ and $Sn_1 \leqq 50000$.

Table 4 Limit of speed

Lubrication	DN
Oil	600 000
Grease	300 000

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

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 μmRa (3.2 μmRy) is adequate.

Table 6 Minimum effective hardening depth unit : mm

Shaft diameter		Recommended minimum effective hardening depth
over	incl.	
–	28	0.8
28	50	1.0
50	100	1.5

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.

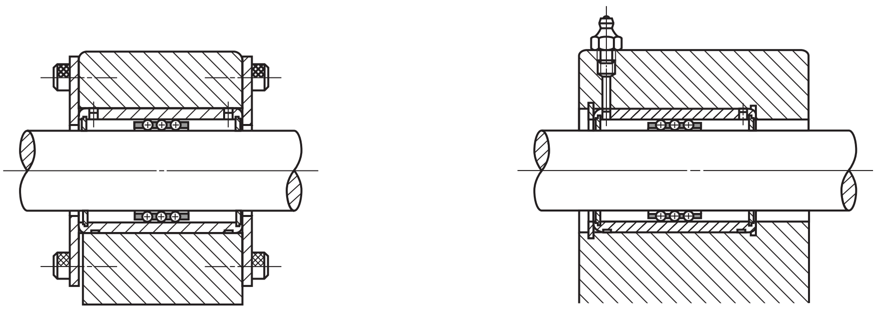


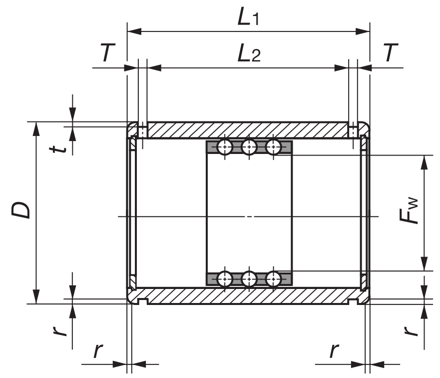
Fig. 2 Mounting examples

ST

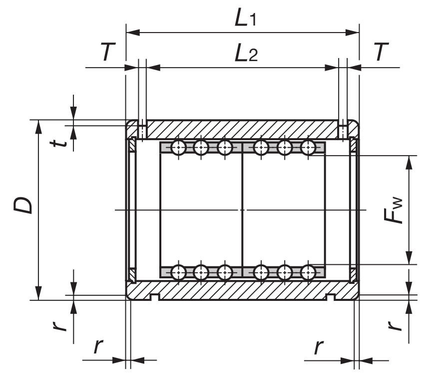
E

Stroke Rotary Bushing

Ordinary type : ST
Heavy duty type : ST···B



ST



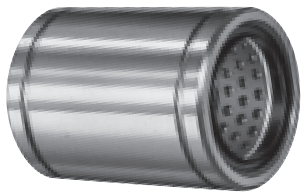
ST···B

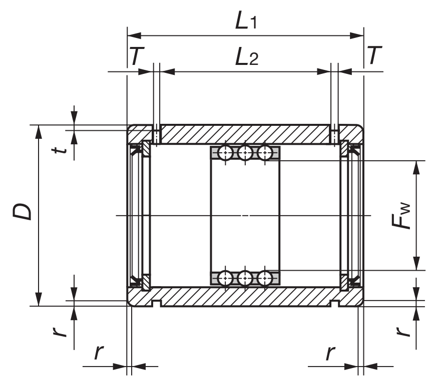
Shaft diameter mm	Model number: Ordinary type	Mass (Ref.) g	Heavy duty type	Mass (Ref.) g	Nominal dimensions mm: F_w	D	L_1	L_2	T	t	r	ST: Maximum stroke length mm	ST: Basic dynamic load rating C N	ST: Basic static load rating C_0 N	ST···B: Maximum stroke length mm	ST···B: Basic dynamic load rating C N	ST···B: Basic static load rating C_0 N
4	ST 4814	2.9	———	———	4	8	14	9	1.1	0.25	0.3	10	112	59.5	———	———	———
5	ST 51016	5.6	———	———	5	10	16	10.6	1.1	0.25	0.3	13	121	68.3	———	———	———
6	ST 61219	8.9	———	———	6	12	19	13.2	1.1	0.25	0.3	15	278	168	———	———	———
8	ST 81524	15.6	ST 81524B	16.8	8	15	24	17.1	1.5	0.5	0.5	24	315	211	8	512	422
10	ST 101930	28.8	ST 101930B	31.2	10	19	30	22.7	1.5	0.5	0.5	30	659	466	8	1 070	932
12	ST 122332	42	ST 122332B	46	12	23	32	24.5	1.5	0.5	0.5	32	1 110	822	8	1 800	1 640
16	ST 162837	71	ST 162837B	75	16	28	37	29.1	1.5	0.5	0.5	40	1 230	998	16	1 990	2 000
20	ST 203245	99	ST 203245B	106	20	32	45	35.8	2	0.5	0.5	54	1 390	1 250	28	2 250	2 500
25	ST 253745	117	ST 253745B	125	25	37	45	35.8	2	0.5	1	54	1 450	1 430	28	2 360	2 850
30	ST 304565	205	ST 304565B	220	30	45	65	53.5	2.5	0.5	1	82	3 110	3 160	44	5 060	6 320
35	ST 355270	329	ST 355270B	346	35	52	70	58.5	2.5	0.7	1.5	92	3 290	3 550	54	5 340	7 100
40	ST 406080	516	ST 406080B	540	40	60	80	68.3	2.5	0.7	1.5	108	4 340	4 810	66	7 050	9 630
45	ST 456580	563	ST 456580B	588	45	65	80	68.3	2.5	0.7	1.5	108	4 550	5 330	66	7 390	10 700
50	ST 5072100	827	ST 5072100B	862	50	72	100	86.4	3	1	1.5	138	5 790	6 970	88	9 400	13 900
55	ST 5580100	1 160	ST 5580100B	1 200	55	80	100	86.4	3	1	2	138	6 030	7 630	88	9 800	15 300
60	ST 6085100	1 240	ST 6085100B	1 290	60	85	100	86.4	3	1	2	138	6 260	8 300	88	10 200	16 600
70	ST 7095100	1 400	ST 7095100B	1 450	70	95	100	86.4	3	1	2	138	6 510	9 320	88	10 600	18 600
80	ST 80110100	2 050	ST 80110100B	2 110	80	110	100	86	3	1.5	2	132	8 230	12 200	76	13 400	24 400
90	ST 90120100	2 250	ST 90120100B	2 330	90	120	100	86	3	1.5	2	132	8 550	13 500	76	13 900	27 000
100	ST 100130100	2 440	ST 100130100B	2 520	100	130	100	86	3	1.5	2	132	8 820	14 800	76	14 300	29 500

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

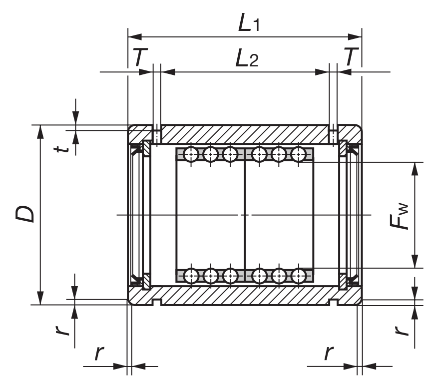
Sealed type Stroke Rotary Bushing

Ordinary type : ST···UU
Heavy duty type : ST···UUB





ST···UU



ST···UUB

Shaft diameter mm	Model number				Nominal dimensions mm							ST···UU			ST···UUB		
	Ordinary type	Mass (Ref.) g	Heavy duty type	Mass (Ref.) g	F_w	D	L_1	L_2	T	t	r	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N
8	ST 81524UU	16.5	―	―	8	15	24	12.3	1.5	0.5	0.5	14	315	211	―	―	―
10	ST 101930UU	30.7	―	―	10	19	30	15.5	1.5	0.5	0.5	16	659	466	―	―	―
12	ST 122332UU	45	―	―	12	23	32	17.1	1.5	0.5	0.5	17	1 110	822	―	―	―
16	ST 162837UU	74	―	―	16	28	37	21.1	1.5	0.5	0.5	24	1 230	998	―	―	―
20	ST 203245UU	107	―	―	20	32	45	26.8	2	0.5	0.5	32	1 390	1 250	―	―	―
25	ST 253745UU	121	―	―	25	37	45	26.8	2	0.5	1	32	1 450	1 430	―	―	―
30	ST 304565UU	215	ST 304565UUB	230	30	45	65	45.1	2.5	0.5	1	65	3 110	3 160	27	5 060	6 320
35	ST 355270UU	342	ST 355270UUB	359	35	52	70	50.1	2.5	0.7	1.5	75	3 290	3 550	37	5 340	7 100
40	ST 406080UU	529	ST 406080UUB	553	40	60	80	59.9	2.5	0.7	1.5	91	4 340	4 810	49	7 050	9 630
45	ST 456580UU	577	ST 456580UUB	602	45	65	80	59.9	2.5	0.7	1.5	91	4 550	5 330	49	7 390	10 700
50	ST 5072100UU	836	ST 5072100UUB	871	50	72	100	77.4	3	1	1.5	120	5 790	6 970	70	9 400	13 900
55	ST 5580100UU	1 190	ST 5580100UUB	1 230	55	80	100	77.4	3	1	2	120	6 030	7 630	70	9 800	15 300
60	ST 6085100UU	1 270	ST 6085100UUB	1 320	60	85	100	77.4	3	1	2	120	6 260	8 300	70	10 200	16 600
70	ST 7095100UU	1 430	ST 7095100UUB	1 480	70	95	100	77.4	3	1	2	120	6 510	9 320	70	10 600	18 600
80	ST 80110100UU	2 080	ST 80110100UUB	2 140	80	110	100	77	3	1.5	2	114	8 230	12 200	58	13 400	24 400
90	ST 90120100UU	2 290	ST 90120100UUB	2 370	90	120	100	77	3	1.5	2	114	8 550	13 500	58	13 900	27 000
100	ST 100130100UU	2 540	ST 100130100UUB	2 620	100	130	100	77	3	1.5	2	114	8 820	14 800	58	14 300	29 500

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

Miniature Stroke Rotary Bushing

STSI

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 compact size

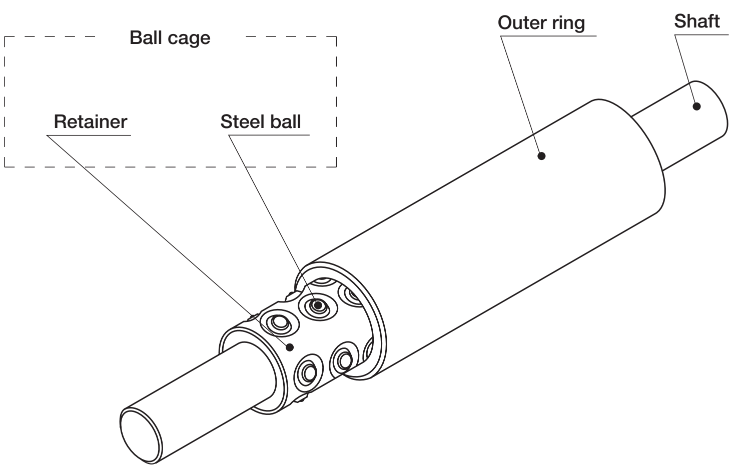
Very small diameter steel balls are assembled in a very thin walled outer ring. So the assembled set is extremely compact in sectional height.

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.

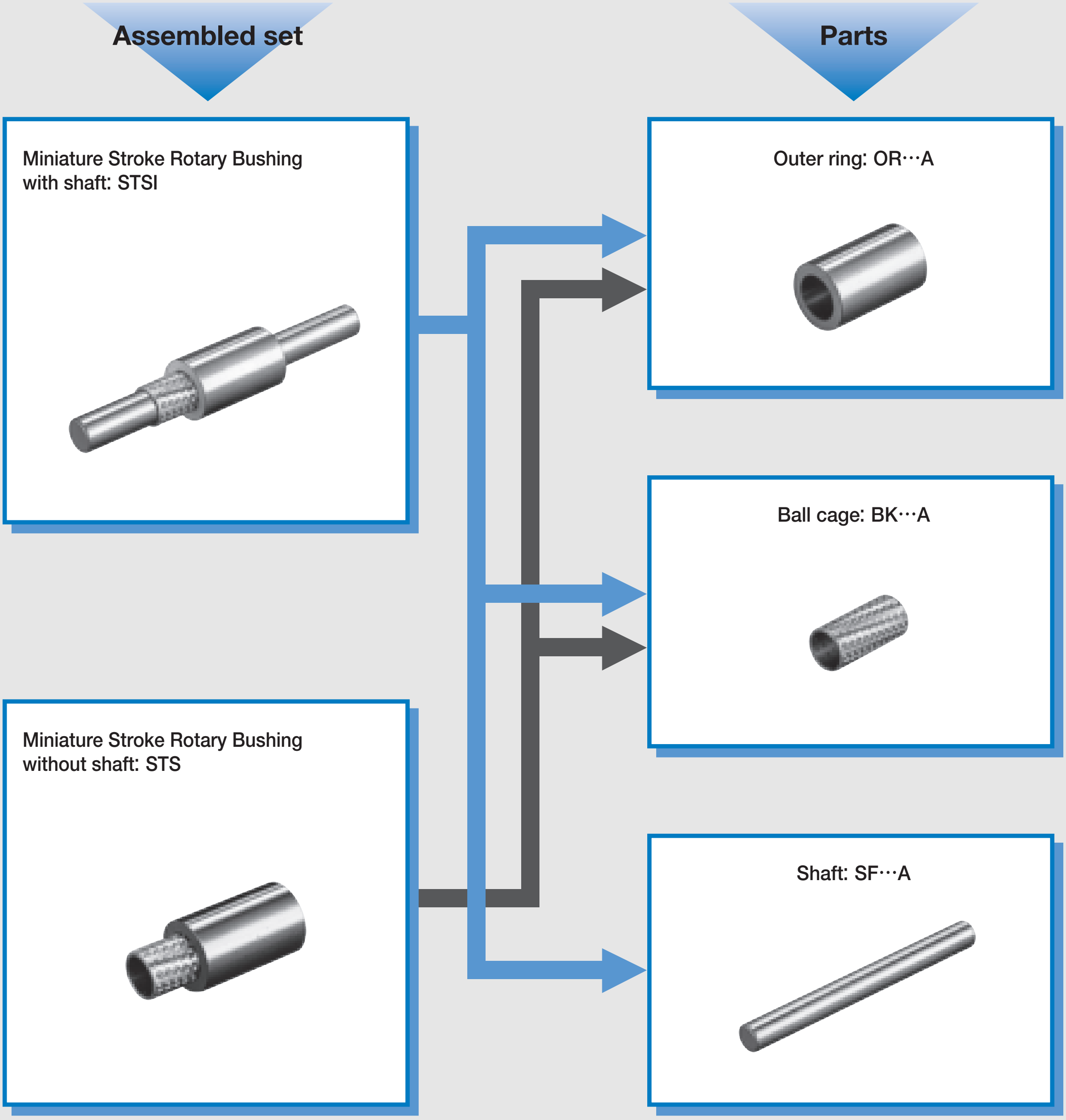
Very smooth movement

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.



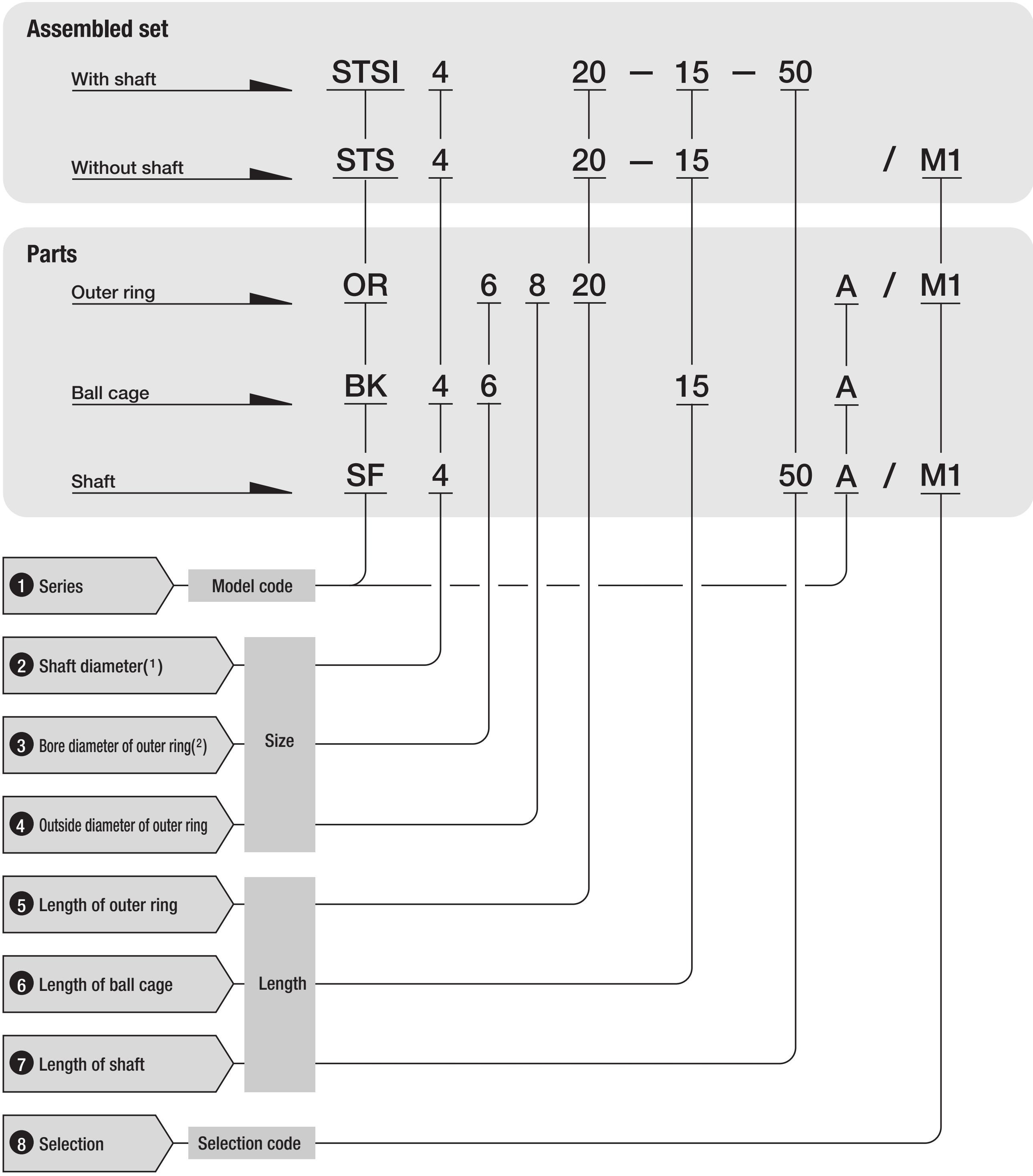
Structure of Miniature Stroke Rotary Bushing

Miniature Stroke Rotary Bushing series



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.

1 Series	Assembled set with shaft : STSI Assembled set without shaft : STS Outer ring : OR…A Ball cage : BK…A Shaft : SF …A	
2 Shaft diameter		Indicate the shaft diameter in mm. For an assembled set without shaft and for a ball cage, indicate an inscribed circle diameter.
3 Bore diameter of outer ring		Indicate the bore diameter of outer ring in mm. For a ball cage, indicate a circumscribed circle diameter.
4 Outside diameter of outer ring		Indicate the outside diameter of outer ring in mm.
5 Length of outer ring		Indicate the length of outer ring in mm.
6 Length of ball cage		Indicate the length of ball cage in mm.
7 Length of shaft		Indicate the length of shaft in mm.
8 Selection	M1 select group : M1 M2 select group : M2 M3 select group : M3	Table 1.2 shows selection codes and dimensional tolerances. When assembling parts, combine parts with the same selection code.

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 C_0

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.

Table 1.1 Accuracy

Outside diameter of outer ring mm		Tolerance of outside diameter of outer ring μm		Maximum radial runout of outside diameter of outer ring μm	Tolerance of length of outer ring and shaft mm
over	incl.	high	low		
3	6	0	−5	8	±0.1
6	10	0	−6		
10	18	0	−8		
18	30	0	−9	9	

Table 1.2 Selection codes and dimensional tolerances

unit : μm

Selection code	Tolerance of outer ring bore		Tolerance of inscribed circle diameter		Tolerance of shaft diameter	
	high	low	high	low	high	low
M1	−1	−3	−1	−3	0	−1
M2	−2	−4	−2	−4	−1	−2
M3	−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

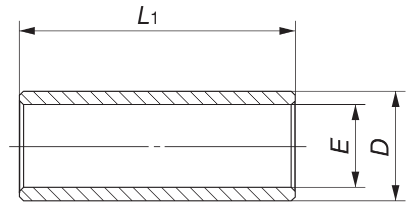
1. The outer ring should have a clearance fit in the housing. When the outer ring must be positioned in the axial direction with the housing, use a stop ring, etc. at the end of the outer ring or use synthetic adhesive.

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.

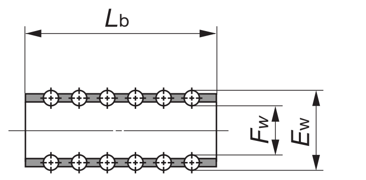
3. When inserting the shaft into a ball cage, be careful not to damage the steel balls and raceways by twisting the shaft or applying a shock load.

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.

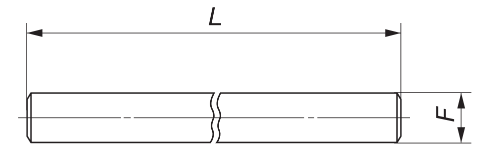
Assembled set with shaft : STSI
Assembled set without shaft : STS
Outer ring : OR…A
Ball cage : BK…A
Shaft : SF …A



Outer ring



Ball cage



Shaft

Shaft diameter mm	Model number of the assembled set without shaft	Outer ring Identification number	Outer ring Mass (Ref.) g	Nominal dimension mm E	Nominal dimension mm D	Nominal dimension mm L_1	Ball cage Identification number	Ball cage Mass (Ref.) g	F_w
2	STS 2 L_1-L_b	OR 3 5 10 A	0.9	3.2	5	10	BK 2 3 5 A	0.1	2
		OR 3 5 15 A	1.3			15	BK 2 3 10 A	0.3	
3	STS 3 L_1-L_b	OR 5 7 10 A	1.5	5	7	10	BK 3 5 10 A	0.7	3
		OR 5 7 20 A	2.9			20	BK 3 5 15 A	1.1	
		OR 5 7 30 A	4.4			30	BK 3 5 20 A	1.4	
4	STS 4 L_1-L_b	OR 6 8 10 A	1.7	6	8	10	BK 4 6 10 A	0.9	4
		OR 6 8 20 A	3.4			20	BK 4 6 15 A	1.3	
		OR 6 8 30 A	5.2			30	BK 4 6 20 A	1.8	
5	STS 5 L_1-L_b	OR 7 10 10 A	3.1	7	10	10	BK 5 7 10 A	1.0	5
		OR 7 10 20 A	6.3			20	BK 5 7 15 A	1.6	
		OR 7 10 30 A	9.4			30	BK 5 7 20 A	2.0	
6	STS 6 L_1-L_b	OR 8 11 20 A	7.0	8	11	20	BK 6 8 10 A	1.2	6
		OR 8 11 30 A	10.5			30	BK 6 8 15 A	1.8	
		OR 8 11 40 A	14.1			40	BK 6 8 20 A	2.3	
8	STS 8 L_1-L_b	OR 10 13 20 A	8.5	10	13	20	BK 8 10 10 A	1.6	8
		OR 10 13 30 A	12.7			30	BK 8 10 15 A	2.4	
		OR 10 13 40 A	17.0			40	BK 8 10 20 A	3.2	
10	STS 10 L_1-L_b	OR 12 18 20 A	22.2	12	18	20	BK 10 12 15 A	2.8	10
		OR 12 18 30 A	33.3			30	BK 10 12 20 A	3.8	
		OR 12 18 43 A	47.7			43	BK 10 12 25 A	4.8	
12	STS 12 L_1-L_b	OR 14 20 25 A	31.4	14	20	25	BK 12 14 20 A	4.3	12
		OR 14 20 30 A	37.7			30	BK 12 14 25 A	5.4	
		OR 14 20 35 A	44.0			35	BK 12 14 30 A	6.1	
		OR 14 20 40 A	50.3			40			

Nominal dimensions mm E_w	Nominal dimensions mm L_b	Basic static load rating(1) C_0 N	Shaft Identification number	Shaft Mass (Ref.) g	Nominal dimensions mm F	Nominal dimensions mm L	Model number of the assembled set with shaft
3.2	5	10.5	SF 2 20 A	0.5	2	20	STSI 2 L_1-L_b-L
	10	21.0	SF 2 30 A	0.7		30	
5	10	38.4	SF 3 50 A	2.8	3	50	STSI 3 L_1-L_b-L
	15	57.7	SF 3 60 A	3.3		60	
	20	76.9					
6	10	59.5	SF 4 50 A	4.9	4	50	STSI 4 L_1-L_b-L
	15	89.3	SF 4 60 A	5.9		60	
	20	119					
7	10	81	SF 5 50 A	7.7	5	50	STSI 5 L_1-L_b-L
	15	121	SF 5 80 A	12.3		80	
	20	162					
8	10	103	SF 6 50 A	11.1	6	50	STSI 6 L_1-L_b-L
	15	154	SF 6 80 A	17.7		80	
	20	206					
10	10	105	SF 8 50 A	19.7	8	50	STSI 8 L_1-L_b-L
	15	157	SF 8 80 A	31.5		80	
	20	209	SF 8 90 A	35.5		90	
12	15	191	SF 10 80 A	49.3	10	80	STSI 10 L_1-L_b-L
	20	254	SF 10 100 A	61.6		100	
	25	318	SF 10 120 A	74.0		120	
14	20	341	SF 12 80 A	71.0	12	80	STSI 12 L_1-L_b-L
	25	427	SF 12 100 A	88.8		100	
	30	512	SF 12 120 A	106.5		120	

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 : "L_1", "L_b" 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.

STSI

E

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

Stroke Rotary Cage

BG

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

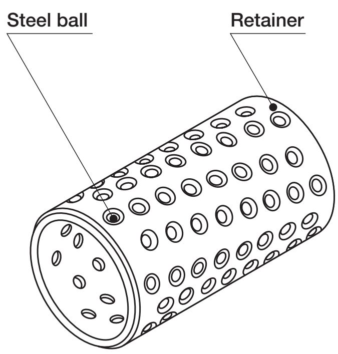
The retainers are highly rigid and light in weight with low inertia. So this series is suitable for high speed reciprocating linear motion.

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

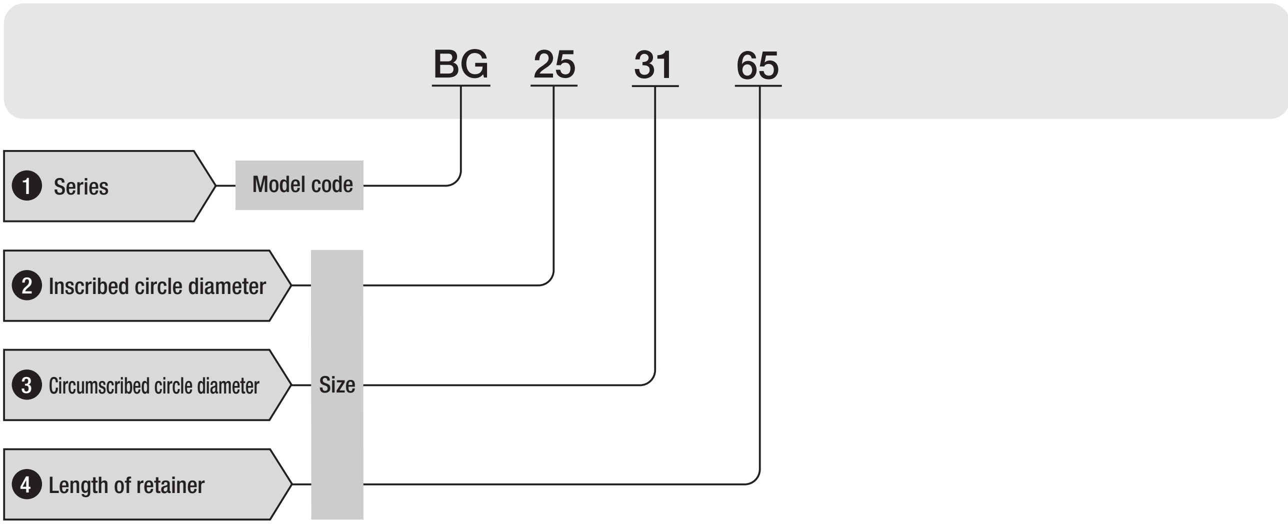
The steel balls held in the retainer are arranged in a spiral formation in order to prevent the steel balls tracing the same path. Rolling contact fatigue of the shaft and housing raceways is thereby minimized. Also, stable high accuracy can be assured for long periods of time.



Structure of Stroke Rotary Cage

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.



1 Series	BG
2 Inscribed circle diameter	Indicate the inscribed circle diameter in mm.
3 Circumscribed circle diameter	Indicate the circumscribed circle diameter in mm.
4 Length of retainer	Indicate the length of retainer in mm.

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 C_0

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

Table 2 Dimensional accuracy of shaft and housing bore

unit : μm

Shaft			Housing bore		
Nominal diameter mm	h5		Nominal diameter mm	K5	
	high	low		high	low
19	0	− 9	25	+1	−8
22	0	− 9	28	+1	−8
25	0	− 9	31	+2	−9
28	0	− 9	36	+2	−9
32	0	−11	40	+2	−9
38	0	−11	48	+2	−9

Table 3 Lower limit of radial clearance

unit : μm

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.

$$DN \geqq D_{pw}\, n + 10S\, n_1 \cdots\cdots\cdots\cdots\cdots \quad (1)$$

where, DN: Limit of speed (See Table 4.)
n: Number of revolutions per minute, rpm
n_1: Number of strokes per minute, cpm
S: Stroke length, mm
D_{pw}: Pitch circle diameter of balls, mm ($D_{pw} = \dfrac{F_w + E_w}{2}$)
F_w: Inscribed circle diameter, mm
E_w: Circumscribed circle diameter, mm

This formula is applicable only when $n_1 \leqq 5000$ and $Sn_1 \leqq 50000$.

Table 4 Limit of speed

Lubrication	DN
Oil	600 000
Grease	300 000

Precautions for Use

❶ 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 μmRa or better (0.8 μmRy or better)	When the required accuracy is not severe, a surface roughness of about 0.8 μmRa (3.2 μmRy) is adequate.

Table 6 Minimum effective hardening depth unit : mm

Shaft or housing bore diameter		Recommended minimum effective hardening depth
over	incl.	
—	28	0.8
28	50	1.0

❷ Stroke Rotary Cage can be used with oil or grease lubrication. A good quality lithium-soap base grease is recommended for grease lubrication.

❸ 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

❶ 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.

❷ 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.

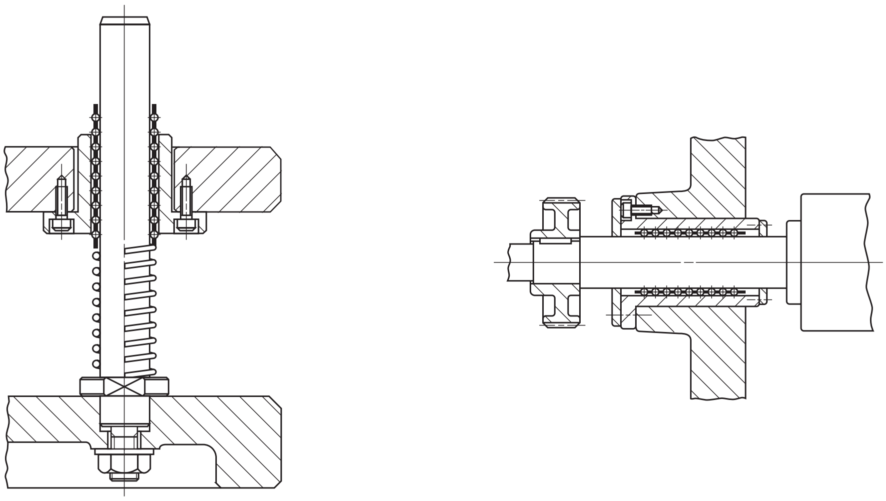
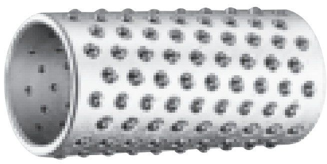
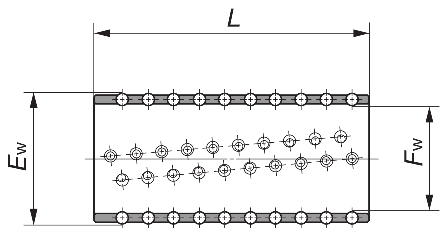


Fig. 1 Mounting examples

IKO Stroke Rotary Cage

BG





Shaft diameter mm	Model number	Mass (Ref.) g	Nominal dimensions mm			Basic dynamic load rating C N	Basic static load rating C_0 N
			F_w	E_w	L		
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.

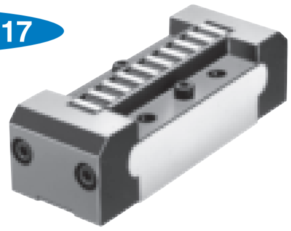
Roller Ways and Flat Roller Cages

Description of each series and Table of dimensions

E

Roller Way

Page E-202 to E-217



Flat Roller Cage

Page E-218 to E-229

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.

Roller Way

RW／SR／GSN

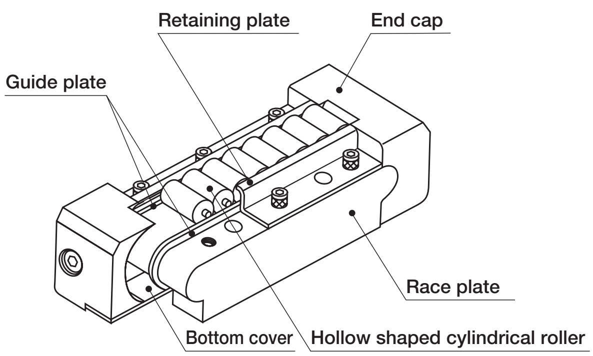
IKO Roller Way is a precision linear motion rolling guide incorporating cylindrical rollers with a precisely finished race plate. It has high load capacity and high rigidity. Elastic deformation under heavy or fluctuating load is very small and smooth linear motion can be easily obtained.

High rigidity and dimensional accuracy

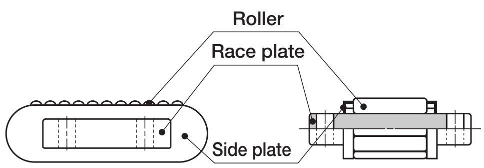
Precise cylindrical rollers are matched with a solid ground race plate finished to a high degree of flatness, achieving both high rigidity and high dimensional accuracy. As the height of Roller Way can be selected within a narrow range of 2μm in dimensional tolerance, uniform load distribution can be easily obtained among multiple Roller Ways.

Smooth operation

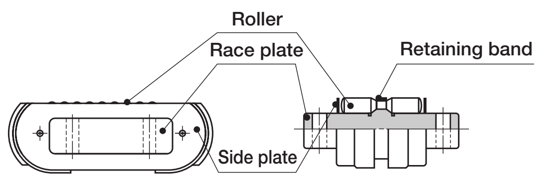
Each type has a structure for accurate roller guidance that prevents skewing. So very stable and smooth linear motion is achieved.



Roller Way RW



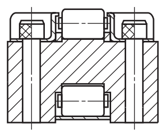
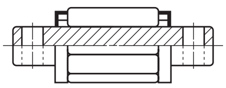
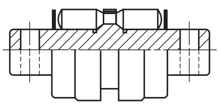
Roller Way SR



Roller Way GSN

Structure of Roller Way

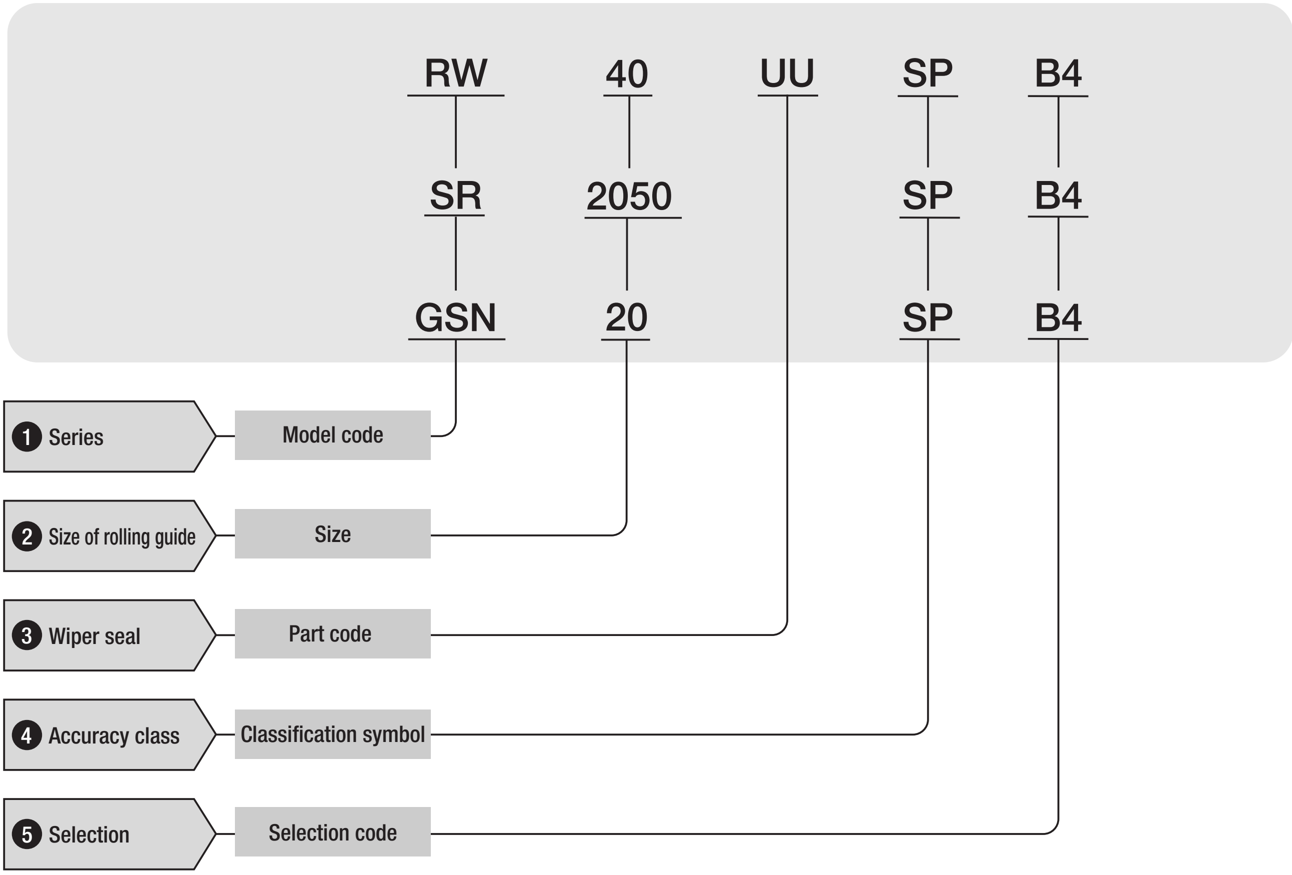
Roller Way series

Shape	Dimension series	Model code
	Metric series	RW
	Inch series	RWB
	Metric series	SR
	Metric series	GSN

Roller Way

Identification number and specification

The specification of Roller Way is indicated by the identification number, consisting of a model code, a size, a part code, a classification symbol and a selection code.



1 Series	Roller Way RW	: RW	
	Roller Way RW Inch series	: RWB	
	Roller Way SR	: SR	
	Roller Way GSN	: GSN	
2 Size of rolling guide			Indicate the representative width in mm. For the inch series, indicate the width in the unit of 1/16 inch.
3 Wiper seal	Without wiper seal	: No symbol	This item applies to Roller Way RW, and wiper seals are mounted in the direction of linear motion. These wiper seals are made of double-lip shaped special synthetic rubber for effectively wiping out foreign substances. (See Fig. 1.)
	With wiper seals	: UU	

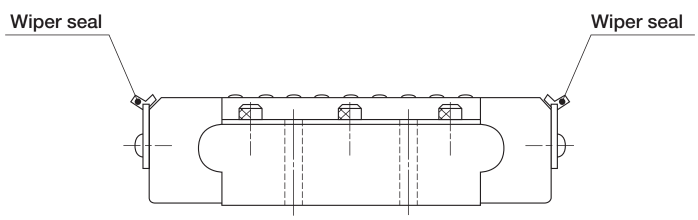
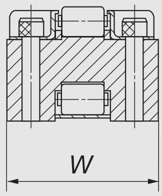


Fig. 1 Wiper seal

4 Accuracy class	Ordinary	: No symbol	For details of accuracy, see Table 3.
	High	: H	
	Precision	: P	
	Super precision	: SP	

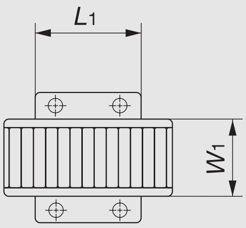
When multiple Roller Ways are assembled on the same plane, it is recommended to assemble Roller Ways with the same selection code which have the same range of dimensional tolerance of *H* as shown in Table 3 in order to achieve uniform load distribution on Roller Ways. However, when the dimensional tolerance of *H* is not specified, indicate the classification symbol only.

Table 1 Dimensional tolerance of width *W* of Roller Way RW

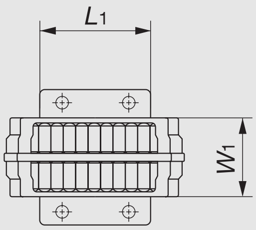


Model number		Tolerance of width *W*	
Metric series	Inch series	mm	inch
RW 26 **RW 30** **RW 40**	**RWB 14** **RWB 16** **RWB 24**	$^{0}_{-0.05}$	$^{0}_{-0.002}$
RW 50 **RW 70**	**RWB 32** **RWB 48**	$^{0}_{-0.07}$	$^{0}_{-0.003}$
RW 95	**RWB 64**	$^{0}_{-0.10}$	$^{0}_{-0.004}$

Table 2 Dimensional tolerances of width W_1 and length L_1 of Roller Ways SR and GSN



Roller Way SR

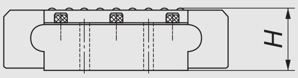


Roller Way GSN

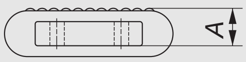
unit : mm

Model number		Tolerance of width W_1	Tolerance of length L_1
SR 1540 **SR 2050** **SR 2560** **SR 3270** **SR 4090**	**GSN 15** **GSN 20** **GSN 25** **GSN 32** **GSN 40**	$^{0}_{-0.2}$	$^{0}_{-0.2}$
SR 50125	**GSN 50**	$^{0}_{-0.3}$	$^{0}_{-0.3}$

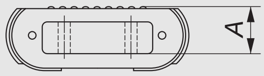
Table 3 Symbols and dimensional tolerances of height *H* and assembly height *A*



Roller Way RW



Roller Way SR



Roller Way GSN

Accuracy class \ Item	Symbol: Classification symbol	Symbol: Selection code	Dimensional tolerance of height *H* and assembly height *A*: mm	Dimensional tolerance of height *H* and assembly height *A*: inch
Ordinary (1)	—	—	0 ～ −0.010	—
High	H	E 5	0 ～ −0.005	0 ～ −0.0002
		E10	−0.005 ～ −0.010	−0.0002 ～ −0.0004
Precision	P	C 3	0 ～ −0.003	0 ～ −0.00012
		C 6	−0.003 ～ −0.006	−0.00012 ～ −0.00024
		C 9	−0.006 ～ −0.009	−0.00024 ～ −0.00036
Super precision (2)	SP	B 2	0 ～ −0.002	0 ～ −0.00008
		B 4	−0.002 ～ −0.004	−0.00008 ～ −0.00016
		B 6	−0.004 ～ −0.006	−0.00016 ～ −0.00024
		B 8	−0.006 ～ −0.008	−0.00024 ～ −0.00032
		B10	−0.008 ～ −0.010	−0.00032 ～ −0.00040

Note(1) : Applicable to Roller Ways SR and GSN.
(2) : Not applicable to RW 70, RW 95, RWB 48, RWB 64, SR 50125 and GSN 50.

Load Rating

The load ratings of 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 Roller Ways are individually operated and 90% of the units in the group can travel 100 x 10^3 meters free from material damage due to rolling contact fatigue.

Basic static load rating C_0

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.

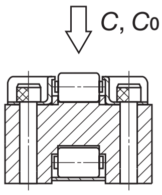


Fig. 2 Direction of load rating

❶ Mating raceways

Recommended surface hardness and roughness of mating raceways are shown in Table 4, and also recommended minimum effective hardening depth of the raceways is shown in Tables 5 and 6.

Table 4 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 μmRa (3.2 μm Ry) is adequate.

Table 5 Minimum effective hardening depth

unit : mm

Model number		Recommended minimum effective hardening depth
RW 26	**RWB 14**	0.8
RW 30	**RWB 16**	1.0
RW 40	**RWB 24**	1.5
RW 50	**RWB 32**	2.0
RW 70	**RWB 48**	2.5
RW 95	**RWB 64**	3.0

Table 6 Minimum effective hardening depth

unit : mm

Model number		Recommended minimum effective hardening depth
SR 1540	**GSN 15**	0.8
SR 2050	**GSN 20**	
SR 2560	**GSN 25**	1.0
SR 3270	**GSN 32**	
SR 4090	**GSN 40**	1.5
SR 50125	**GSN 50**	2.0

❷ Accuracy of mating surfaces

Recommended accuracy of mating surfaces is shown in Tables 7 and 8.

Table 7 Accuracy of mating surfaces of Roller Way RW

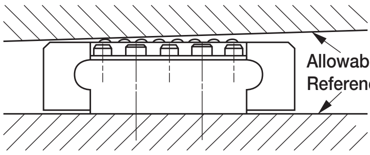
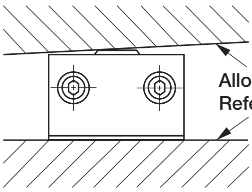
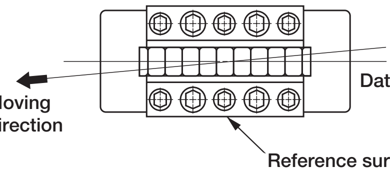
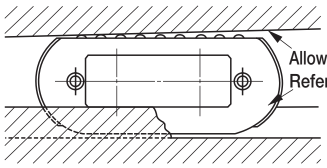
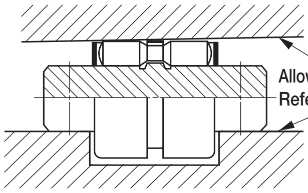
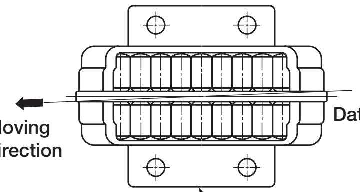
Item	Recommended value
	0.02/100 or less
	0.015/100 or less
	0.05/100 or less

Table 8 Accuracy of mating surfaces of Roller Ways SR and GSN

Item	Recommended value
	0.02/100 or less
	0.015/100 or less
	0.05/100 or less

❸ Grooving of mating mounting surface of Roller Ways SR and GSN

When Roller Way SR or GSN is mounted on a grooved mating mounting surface, the depth *E* of the groove should be deeper than the dimension from the lower surface of race plate to the bottom surface of Roller Way SR or GSN, making a room for the purpose of oil bath. (See Fig. 3.)

In addition to the above, for SR type, clearance fit or similar clearance between the groove width *W* and the width of SR type W_1 is recommended. Then, the relative positions of the groove and the reference surface should be examined so that the center of W_1 dimension should be positioned around the center of the groove.

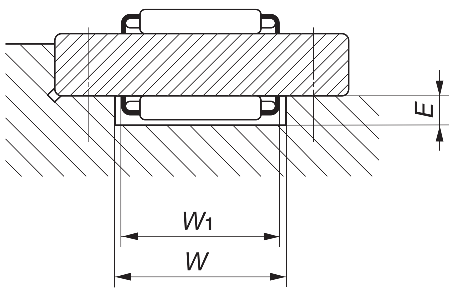


Fig. 3 Shape of mounting groove

Precautions for Mounting

❶ Reference mounting surface

To mount Roller Way correctly, use the reference mounting surface opposite to the IKO mark on the race plate. (See Fig. 4.)
The load carrying surface of Roller Way is always at the upper side in sight of IKO mark.

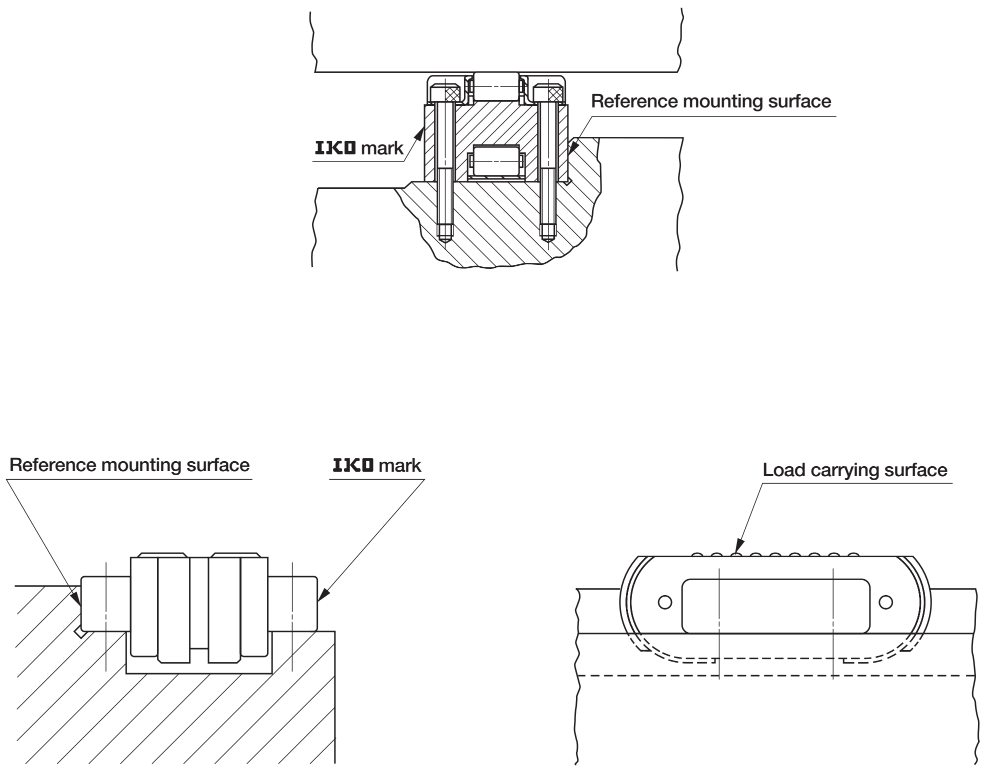


Fig. 4 Mounting examples

❷ Mounting method of Roller Ways SR and GSN

The race plate is mounted directly to the bed or table with mounting bolts, or is fixed with special fixing plates as shown in Fig.5. For mounting Roller Way SR, it is recommended to use fixing plates.

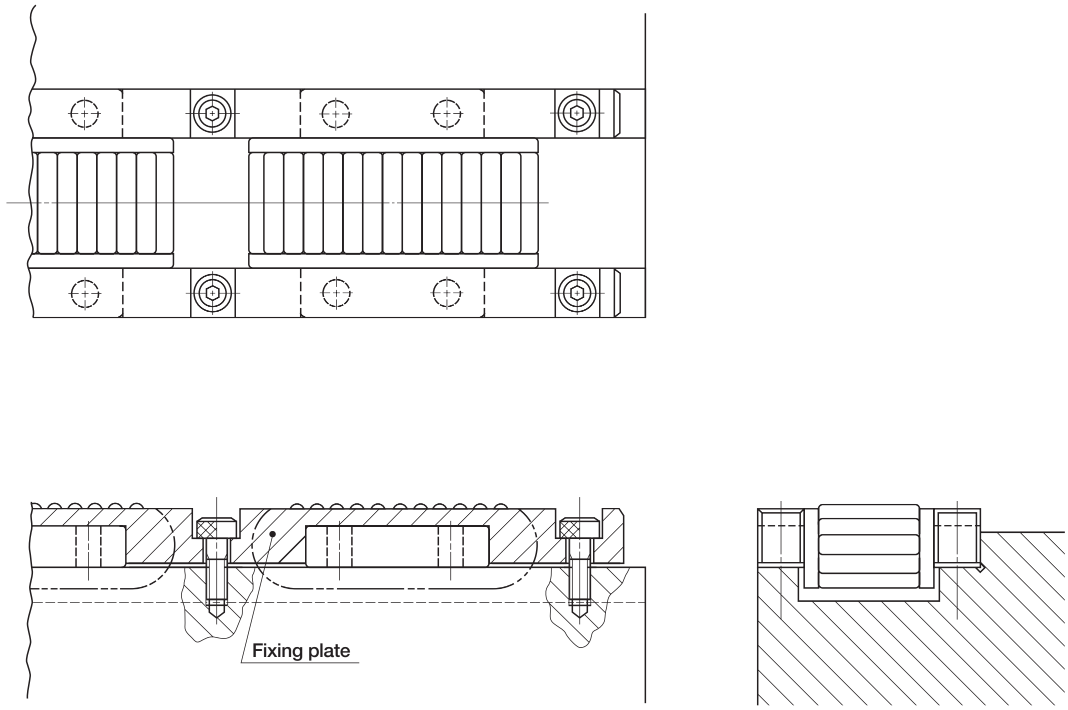


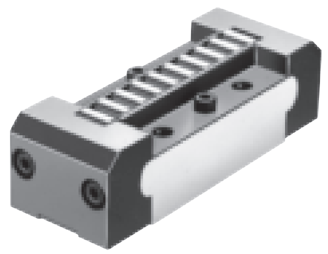
Fig. 5 Mounting example with fixing plates

RW, RWB, SR, GSN

E

IKO Roller Way

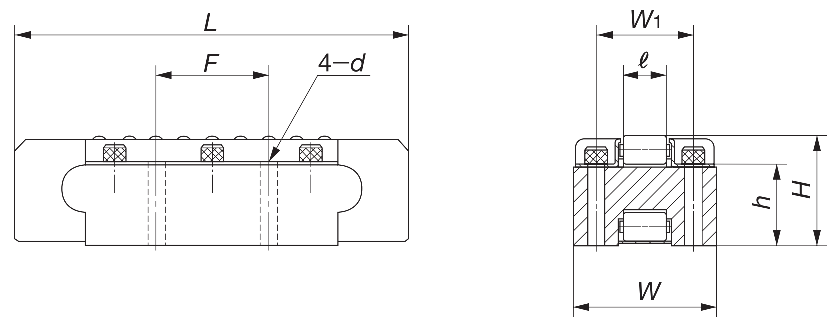
RW



Model number	Mass (Ref.) g	Nominal dimensions mm								Basic dynamic load rating C N	Basic static load rating C_0 N
		W	H	L	ℓ	F	W_1	h	d		
RW 26	74	26	14	50	6	19	16	10	3.4	25 000	40 100
RW 30	179	30	19	70	7.5	25.4	19	14	4.5	39 800	71 200
RW 40	740	40	28	100	11.3	38.1	26	21	5.5	85 700	160 000
RW 50	1 750	50	38	140	15	50.8	35	28.5	6.6	154 000	314 000
RW 70	5 260	70	57	200	22.5	76.2	48	42.5	9.0	306 000	638 000
RW 95	12 700	95	76	270	30	101.6	65	56.5	11.0	514 000	1 130 000

IKO Roller Way

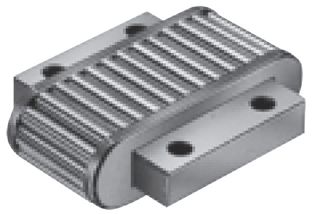
RWB (Inch series)

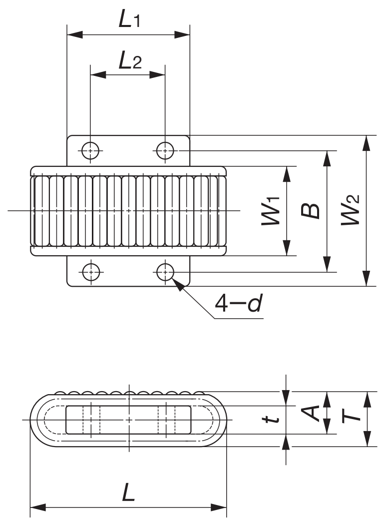


Model number	Mass (Ref.) g	Nominal dimensions inch／mm								Basic dynamic load rating C N	Basic static load rating C_0 N
		W	H	L	ℓ	F	W_1	h	d		
RWB 14	91	7/8 **22.225**	9/16 **14.288**	1.97 **50**	0.236 **6**	3/4 **19.050**	43/64 **17.066**	0.41 **10.4**	0.125 **3.2**	25 000	40 100
RWB 16	227	1 **25.400**	3/4 **19.050**	2.76 **70**	0.295 **7.5**	1 **25.400**	13/16 **20.638**	0.56 **14.2**	0.125 **3.2**	39 800	71 200
RWB 24	730	1 1/2 **38.100**	1 1/8 **28.575**	3.94 **100**	0.445 **11.3**	1 1/2 **38.100**	1 7/32 **30.956**	0.85 **21.5**	0.180 **4.6**	85 700	160 000
RWB 32	1 770	2 **50.800**	1 1/2 **38.100**	5.51 **140**	0.591 **15**	2 **50.800**	1 5/8 **41.275**	1.12 **28.5**	0.206 **5.2**	154 000	314 000
RWB 48	5 670	3 **76.200**	2 1/4 **57.150**	7.88 **200**	0.886 **22.5**	3 **76.200**	2 7/16 **61.912**	1.68 **42.8**	0.266 **6.8**	306 000	638 000
RWB 64	13 500	4 **101.600**	3 **76.200**	10.63 **270**	1.181 **30**	4 **101.600**	3 1/4 **82.550**	2.24 **57.0**	0.328 **8.3**	514 000	1 130 000

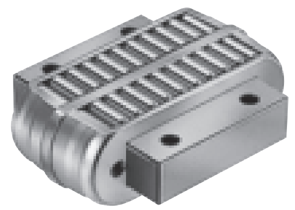
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

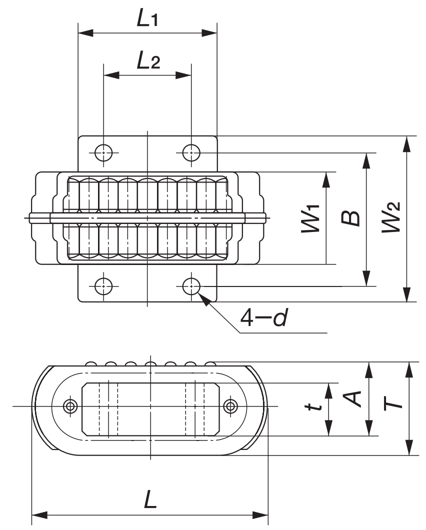
SR
GSN





Roller Way SR





Roller Way GSN

Model number		Mass (Ref.)	Nominal dimensions mm										Basic dynamic load rating	Basic static load rating
		g	W_1	W_2	L	A	T	L_1	L_2	B	d	t	C N	C_0 N
SR 1540	―	62	15	30	40	11	15	20	12	23	3.3	7	26 500	45 900
―	GSN 15	82	15	30	40	15	20	19	12	23	3.4	11	22 300	36 000
SR 2050	―	120	20	36	50	12	16	30	18	29	3.8	8	42 800	96 300
―	GSN 20	145	20	36	50	15	20	29	18	29	3.4	11	40 100	87 900
SR 2560	―	210	25	45	60	14	19	35	20	36	4.8	9	67 300	156 000
―	GSN 25	260	25	45	60	18	24.5	35	20	36	4.5	13	58 900	131 000
SR 3270	―	345	32	55	70	15	20	45	27	44	5.5	10	97 500	271 000
―	GSN 32	413	32	55	70	18	24.5	45	27	44	4.5	13	88 800	241 000
SR 4090	―	750	40	68	87	21	28	55	35	54	6.5	14	143 000	373 000
―	GSN 40	940	40	68	92	25	34	54	35	54	5.5	18	133 000	337 000
SR 50125	―	1 870	50	82	125	30	40	78	50	66	8.5	20	252 000	673 000
―	GSN 50	1 800	50	82	121	30	42	77	50	66	6.6	20	242 000	634 000

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

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.

Low noise

Cages made of synthetic resin are also available. This type is most suitable for applications where low noise is required.

Large load rating

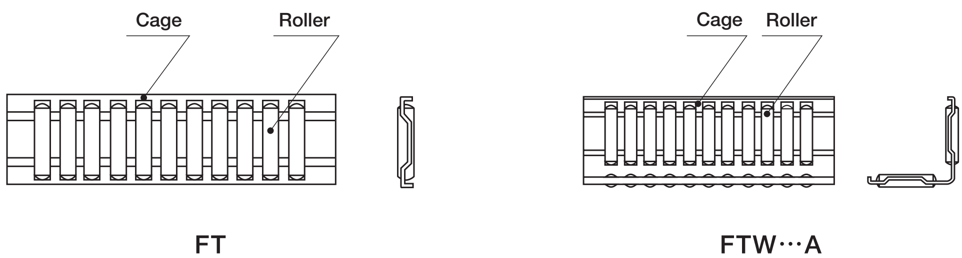
Needle rollers are assembled in a cage with a small pitch distance, so load ratings are large.

Easy handling

The rollers are retained in a cage securely, allowing easy handling and assembly.

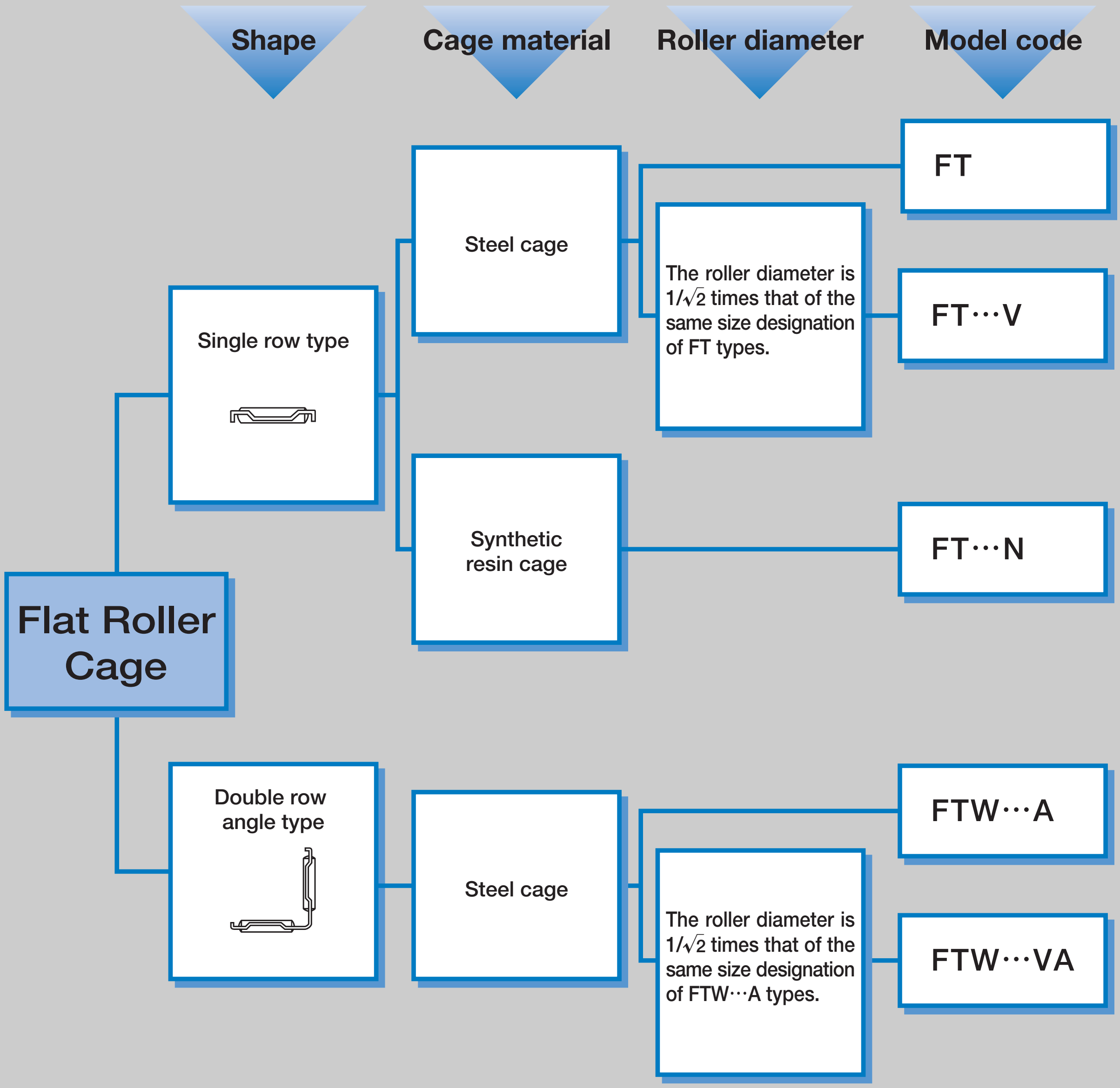
Adaptability to conventional plain guide ways

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.



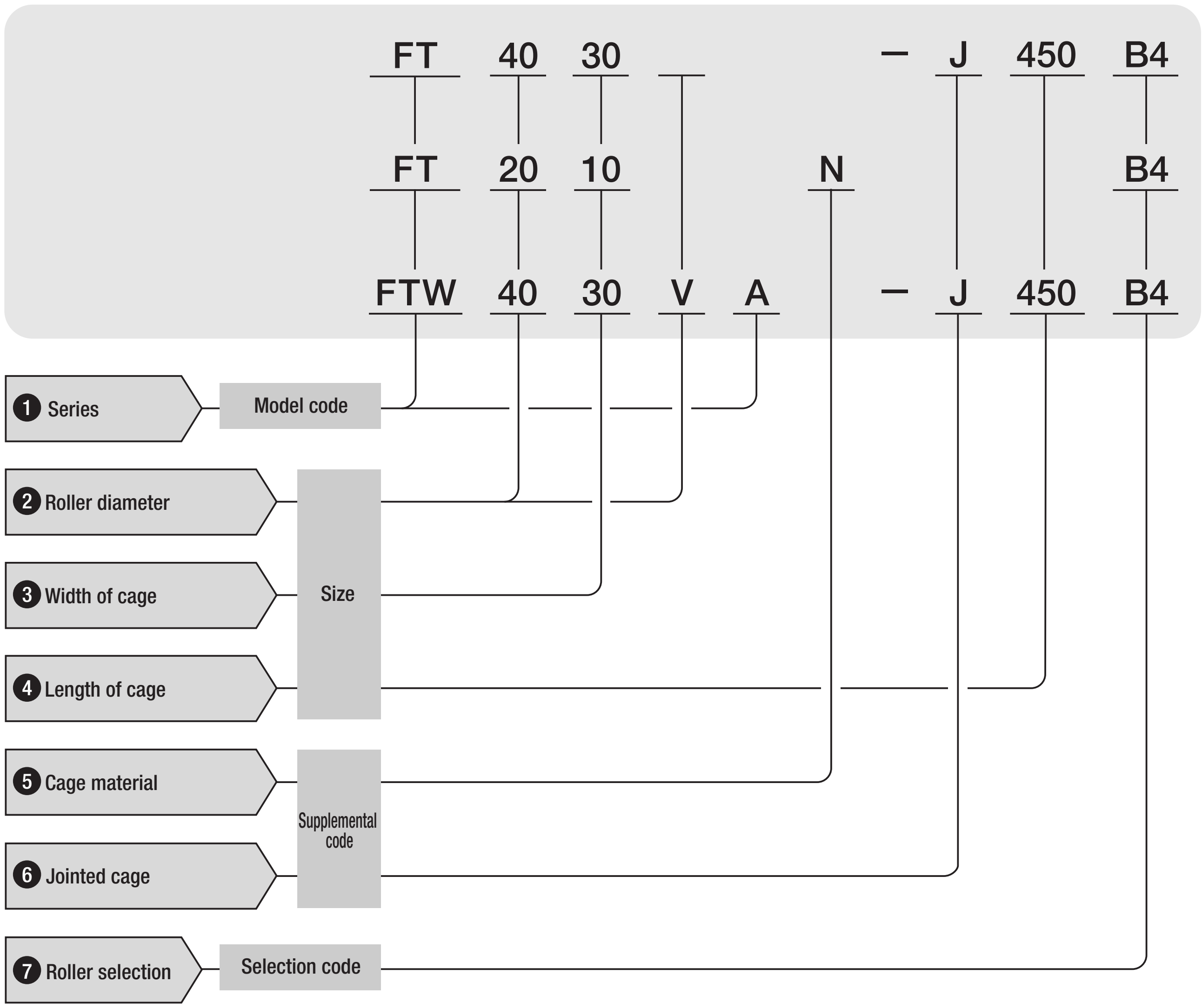
Structure of Flat Roller Cage

Flat Roller Cage series



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.



1 Series

Single row : FT

Double rows : FTW···A

2 Roller diameter

Indicate a ten-fold numeric value of the roller diameter (mm). When symbol V is attached in the model code, indicate an integer obtained by multiplying the roller diameter(mm) by $10\sqrt{2}$.

3 Width of cage

Indicate the width of cage in mm.

4 Length of cage

Indicate the length of cage in mm.

5 Cage material

Steel cage : No symbol

Synthetic resin cage : N

Specify the material of cage. For applicable models and sizes, see the "model number" column in the table of dimensions on page E-228. The maximum operating temperature for the synthetic resin type is 100℃. Continuous operation is possible at up to 80℃.

6 Jointed cage

Not jointed : No symbol

Jointed : J

The overall length of the cage is also indicated. Specify this item when the standard length is 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 IKO.

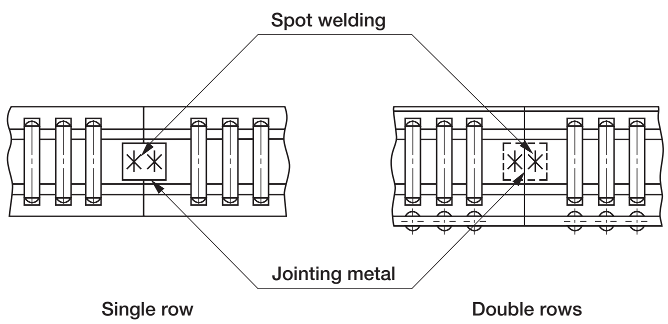


Fig. 1 Jointed Flat Roller Cage by spot welding

Table 1 Maximum length of jointed Flat Roller Cage

unit : mm

Model number	Maximum length of jointed cage
FT 2010 FT 2515 FT 3020	300
FT 3525	375
FT 4030 FT 4035 FT 4026 V	600
FT 5038 FT 5043 FT 5030 V FT 10080 FT 10060 V	1 000
FT 200120	1 500
FT 200100 V	1 000
FTW 4030 VA	600
FTW 5045 A FTW 5050 A FTW 5035 VA	1 000
FTW 10095 A FTW 10070 VA FTW 200150 A FTW 200120 VA	1 500

FT, FTW

E

7 Roller selection

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.

Table 2 Selection classification of rollers

unit : μm

Selection classification	Selection code	Tolerance of mean diameter of rollers (1)
Standard	B2	0 ～ −2
	B4	−2 ～ −4
	B6	−4 ～ −6
	B8	−6 ～ −8
Semi-standard	A1	0 ～ −1
	A2	−1 ～ −2
	A3	−2 ～ −3
	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 x 10^3 meters free from material damage due to rolling contact fatigue.

● Basic static load rating C_0

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.

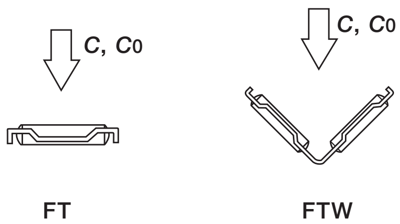


Fig. 2 Direction of load rating

FT, FTW

E

❶ 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	0.2μmRa or better (0.8μmRy or better)	When the required accuracy is not severe, a surface roughness of about 0.8μmRa (3.2μmRy) is adequate.

Table 4 Minimum effective hardening depth unit : mm

Roller diameter over	Roller diameter incl.	Recommended minimum 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

❷ 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.

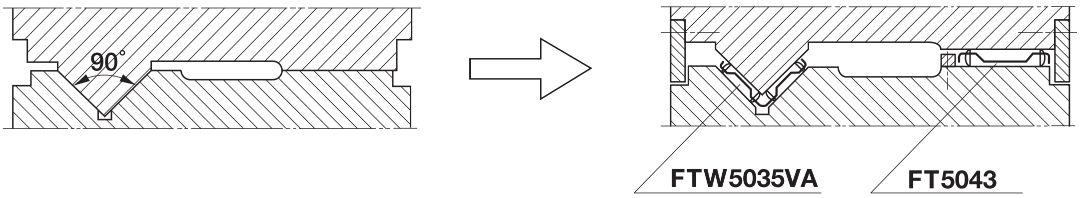


Fig. 3 Mounting example with flat and 90° angle surfaces

Table 5 Combination of Flat Roller Cages

unit : mm

Combination number	For flat surface		For 90° angle surface	
	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

❸ Stroke length and cage length

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.

$$L_1 = \frac{S}{2} + L \cdots\cdots\cdots\cdots\cdots\cdots (1)$$

where, L_1: Raceway length, mm

S: Stroke length, mm

L: Cage length, mm

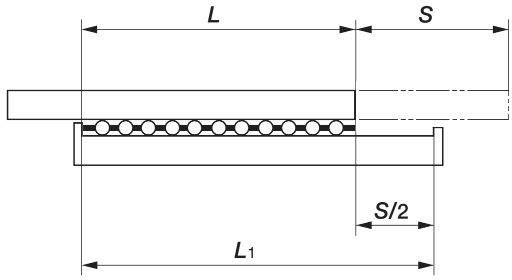
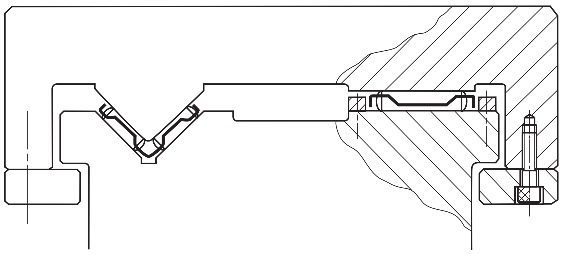


Fig. 4

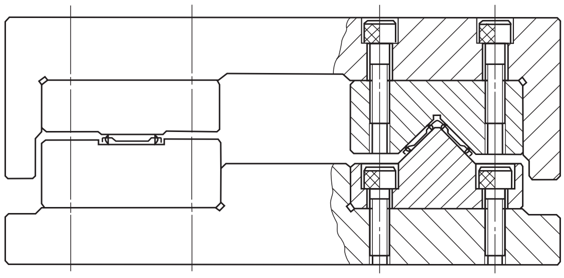
Precautions for Mounting

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.

❶ General mounting



❷ With separate raceways



❸ When overhung load is applied

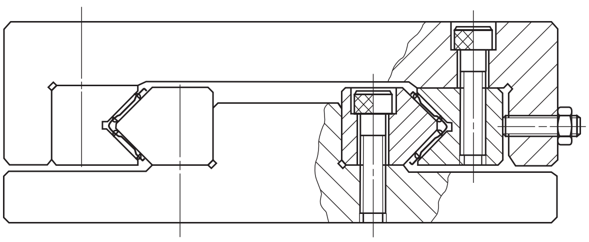


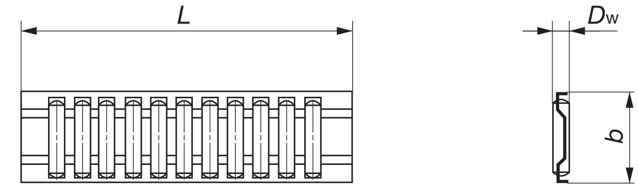
Fig. 5 Mounting examples

FT, FTW

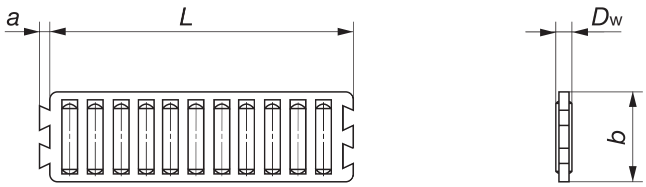
E

IKO Flat Roller Cage

Single row : FT



FT

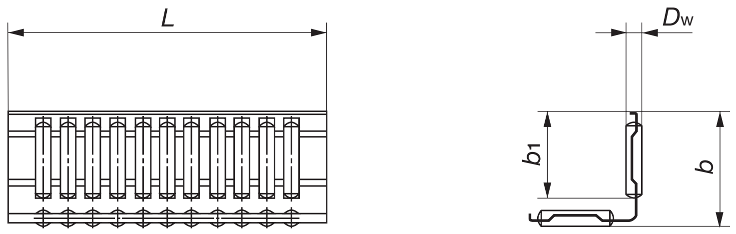


FT···N

Model number		Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
Steel cage	Synthetic resin cage	g	D_w	b	L	a	C N	C_0 N
—	**FT 2010N**	1.63	2	10	32	2	7 650	19 700
FT 2010 - 32	—	1.91	2	10	32	—	8 560	22 800
FT 2010 - 100	—	5.8	2	10	100	—	19 500	68 300
—	**FT 2515N**	4.3	2.5	15	45	2.5	15 100	40 900
FT 2515 - 45	—	5.6	2.5	15	45	—	19 200	55 900
FT 2515 - 100	—	11.6	2.5	15	100	—	32 300	112 000
—	**FT 3020N**	9.7	3	20	60	3	27 400	78 300
FT 3020 - 60	—	12.5	3	20	60	—	32 200	96 100
—	**FT 3525N**	18.6	3.5	25	75	3.5	44 300	131 000
FT 3525 - 75	—	23	3.5	25	75	—	50 300	155 000
FT 4030 -150	—	73	4	30	150	—	107 000	380 000
FT 4035 - 150		86	4	35	150	—	120 000	443 000
FT 4026V - 150	—	45	2.828	26	150	—	81 900	345 000
FT 5038 - 250	—	195	5	38	250	—	221 000	846 000
FT 5043 - 250		200	5	43	250	—	254 000	1 010 000
FT 5030V - 250	—	103	3.535	30	250	—	149 000	649 000
FT 10080 - 500	—	1 610	10	80	500	—	1 130 000	4 340 000
FT 10060V - 500	—	870	7.071	60	500	—	681 000	2 890 000
FT 200120 - 500	—	4 940	20	120	500	—	2 540 000	7 620 000
FT 200100V - 500	—	2 860	14.142	100	500	—	1 700 000	5 780 000

IKO Flat Roller Cage

Double row : FTW…A



FTW…A

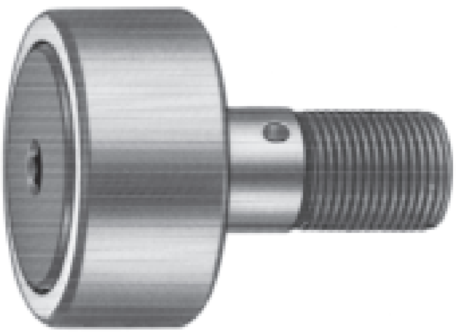
Model number	Mass (Ref.) g	Nominal dimensions mm D_w	b	L	b_1	Basic dynamic load rating C N	Basic static load rating C_0 N
FTW 4030VA - 150	94	2.828	30	150	24.5	107 000	488 000
FTW 5045A - 250	410	5	45	250	35.5	297 000	1 230 000
FTW 5050A - 250	460	5	50	250	40.5	333 000	1 430 000
FTW 5035VA - 250	220	3.535	35	250	29	195 000	917 000
FTW 10095A - 500	3 360	10	95	500	77	1 480 000	6 140 000
FTW 10070VA - 500	1 790	7.071	70	500	56.5	892 000	4 080 000
FTW 200150A - 500	10 200	20	150	500	118	3 330 000	10 800 000
FTW 200120VA - 500	5 940	14.142	120	500	96	2 230 000	8 170 000

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

Other Product

Cam Follower
Roller Follower

CAM FOLLOWER
ROLLER FOLLOWER



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.

CAM FOLLOWERS

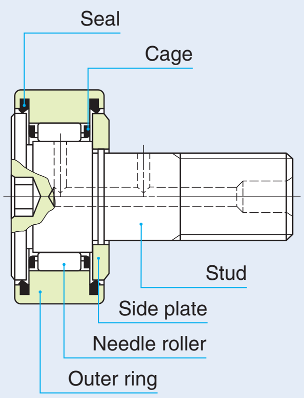
- Standard Type Cam Followers
- Solid Eccentric Stud Type Cam Followers
- Eccentric Type Cam Followers
- Thrust Disk Type Cam Followers
- Capilube Cam Followers
- Centralized Lubrication Type Cam Followers
- Easy Mounting Type Cam Followers
- Heavy Duty Type Cam Followers
- Miniature Type Cam Followers
- Thrust Disk Type Miniature Cam Followers

Structure and Features

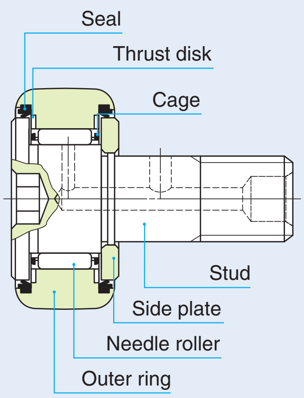
IKO Cam Followers are bearings with a stud incorporating needle rollers in a thick walled outer ring. These bearings are designed for outer ring rotation, and have superior rotational performance with a small coefficient of friction and high load capacity.
As studs already have threads or steps, they are easy to mount.
Cam Followers are follower bearings for cam mechanisms and linear motions and have high rigidity and high accuracy. They are, therefore, used widely for machine tools, industrial robots, electronic devices, and OA equipment.
Stainless steel made Cam Followers are superior in corrosion resistance and suitable for applications in environments where oil cannot be used or water splashed, and in clean rooms.

Structure of Cam Followers

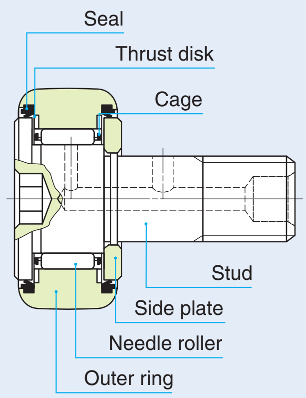
Structure of Standard Type Cam Follower
CF···BUU



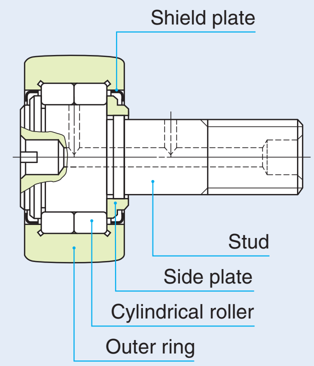
Structure of Thrust Disk Type Cam Follower
CF···WBUUR



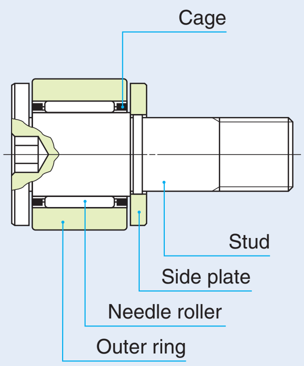
Structure of Capilube Cam Follower(1)
CF···WBUUR/SG



Structure of Heavy Duty Type Cam Follower
NUCF···R



Structure of Miniature Type Cam Follower
CFS



Note(1) For the detail of Capilube, please refer page A55.

CF, NUCF, CFS, CRH

F

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

Types

For Cam Followers, the types shown in Table 1 are available.

Table 1 Type of Cam Followers

Type					With cage		Full complement	
					Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring
Metric CF series	Standard Type Cam Follower CF	High carbon steel made	With hexagon hole	Shield type	CF ··· B R	CF ··· B	CF ···VB R	CF ···VB
				Sealed type	CF ··· BUUR	CF ··· BUU	CF ···VBUUR	CF ···VBUU
			With screwdriver slot	Shield type	CF ··· R	CF ···	CF ···V R	CF ···V
				Sealed type	CF ··· UUR	CF ··· UU	CF ···V UUR	CF ···V UU
		Stainless steel made	With hexagon hole	Shield type	CF ···FB R	CF ···FB	—	—
				Sealed type	CF ···FBUUR	CF ···FBUU	—	—
	Solid Eccentric Stud Type Cam Follower CFES	High carbon steel made	With hexagon hole	Shield type	CFES··· B R	CFES··· B	—	—
				Sealed type	CFES··· BUUR	CFES··· BUU	—	—
			With screwdriver slot	Shield type	CFES··· R	CFES	—	—
				Sealed type	CFES··· UUR	CFES··· UU	—	—
	Eccentric Type Cam Follower CFE	High carbon steel made	With hexagon hole	Shield type	CFE ··· B R	CFE ··· B	CFE ···VB R	CFE ···VB
				Sealed type	CFE ··· BUUR	CFE ··· BUU	CFE ···VBUUR	CFE ···VBUU
			With screwdriver slot	Shield type	CFE ··· R	CFE ···	CFE ···V R	CFE ···V
				Sealed type	CFE ··· UUR	CFE ··· UU	CFE ···V UUR	CFE ···V UU
	Thrust Disk Type Cam Follower CF···W	High carbon steel made	With hexagon hole	Shield type	CF ···WB R	—	—	—
				Sealed type	CF ···WBUUR	—	—	—
		Stainless steel made	With hexagon hole	Shield type	CF ···FWB R	—	—	—
				Sealed type	CF ···FWBUUR	—	—	—
	Centralized Lubrication Type Cam Follower CF-RU1, CF-FU1	High carbon steel made	With screwdriver slot	Sealed type	CF-RU1	CF-FU1	—	—
	Easy Mounting Type Cam Follower CF-SFU	High carbon steel made	With screwdriver slot	Sealed type	—	CF-SFU	—	—
Capilube Cam Follower CF···/SG		High carbon steel made	With hexagon hole	Sealed type	CF···WBUUR/SG	—	—	—
Heavy Duty Type Cam Follower NUCF		High carbon steel made	With screwdriver slot	Shield type	—	—	NUCF··· R	—
Miniature CFS series	Miniature Type Cam Follower CFS	High carbon steel made	With hexagon hole	Shield type	—	CFS	—	CFS ··· V
		Stainless steel made		Shield type	—	CFS ···F	—	CFS ···FV
	Thrust Disk Type Miniature Cam Follower CFS···W	High carbon steel made	With hexagon hole	Shield type	—	CFS ··· W	—	—
		Stainless steel made		Shield type	—	CFS ···FW	—	—
Inch series	Inch series Cam Follower CR	High carbon steel made	With hexagon hole	Shield type	CR ··· B R	CR ··· B	CR ···VB R	CR ···VB
				Sealed type	CR ··· BUUR	CR ··· BUU	CR ···VBUUR	CR ···VBUU
			With screwdriver slot	Shield type	CR ··· R	CR ···	CR ···V R	CR ···V
				Sealed type	CR ··· UUR	CR ··· UU	CR ···V UUR	CR ···V UUR
	Inch series Heavy Duty Cam Follower CRH	High carbon steel made	With hexagon hole	Shield type	—	—	CRH ···VB R	CRH ···VB
				Sealed type	—	—	CRH ···VBUUR	CRH ···VBUU
			With screwdriver slot	Shield type	—	—	CRH ···V R	CRH ···V
				Sealed type	—	—	CRH ···V UUR	CRH ···V UU

Standard Type Cam Followers

These are the basic type bearings in IKO Cam Follower series. Models with stud diameters ranging from 3 to 30 mm are prepared, and are suitable for a wide range of applications.

Solid Eccentric Stud Type Cam Followers

The stud of these bearings is eccentric to the center axis of the outer ring. Thus, the position of the outer ring in the radial direction in relation to the mating track surface can easily be adjusted by turning the stud, and the load distribution on a number of cam follower outer rings used on the same track surface can be made uniform.

These are eccentric cam followers with a one-piece stud that can be mounted in the same mounting holes as those for Standard Type Cam Followers.

Eccentricity is 0.25 mm～0.6 mm.

Eccentric Type Cam Followers

In these bearings, an eccentric collar is assembled with the Cam Follower stud, enabling the outer ring to be positioned easily in the radial direction against the mating track surface.

Eccentricity is 0.4～1.5 mm.

Thrust Disk Type Cam Followers

These bearings have special resin thrust disk washers superior in wear and heat resistance between the sliding surfaces of outer ring shoulders, stud head and side plate. These disk washers reduce friction and wear due to axial loads caused by misalignment, etc.

Centralized Lubrication Type Cam Followers

These bearings have one or two pipe-threaded holes in the stud. Thus, this series is suitable when centralized lubrication is required.

Easy Mounting Type Cam Followers

These bearings have a stepped tapered portion on the stud. When mounting the Cam Follower, it is easy to fix its location by tightening a set screw to the stepped portion. Thus, this type is suitable when a large number of Cam Followers are used in a machine such as a pallet changer.

Capilube Cam Follower

These bearings are lubricated with a newly developed thermosetting solid-type lubricant which fills the inner space of the bearing. This lubricant provides long-term maintenance free.

Heavy Duty Type Cam Followers

These bearings are full complement type bearings incorporating double rows of full complement cylindrical rollers in the outer ring, and can withstand large radial loads and some axial loads.

Miniature Type Cam Followers

These are compactly designed bearings, incorporating very thin needle rollers in an outer ring with a small outside diameter. They are used in electronic devices, OA equipment, small index devices, etc.

Inch series Cam Followers

Two types, CR and CRH, are available in the Inch series Cam Followers. Black oxide film treatment is made on CRH models.

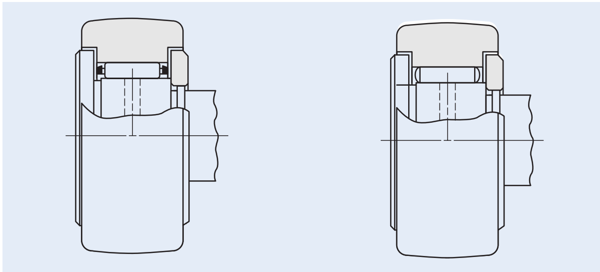
Internal Structures and Shapes

Various types are lined up in Cam Follower series, including the caged type, full complement type, shield type, sealed type, type with crowned outer ring, type with cylindrical outer ring, type with hexagonal hole, etc.

Roller guide method

Cam Followers include the caged type and the full complement type . The caged type has a small coefficient of friction and is suitable for high speed rotations, while the full complement type is suitable for heavy loads at low speed rotations.

《With cage》 《Full complement》

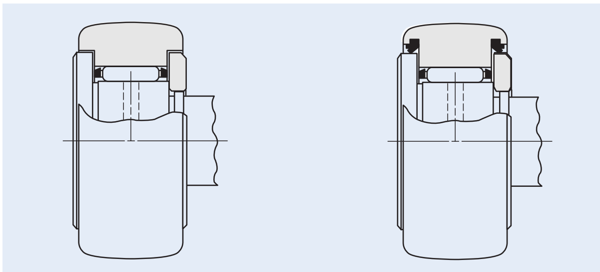


Seal structure

Cam Followers include the shield type and the sealed type. In the shield type, the narrow clearances between the outer ring and the stud flange and between the outer ring and the side plate form labyrinths .

The sealed type incorporates seals in the narrow clearances to prevent the penetration of foreign particles.

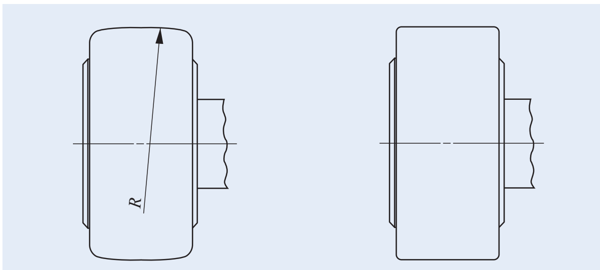
《Shield type》 《 Sealed type》



Shape of outer ring outside surface

The outside surface of the outer ring of Cam Followers, which makes direct contact with the mating track surface, is either crowned or cylindrical. The crowned outer rings are effective in moderating the edge load due to mounting errors. The cylindrical outer rings have a large contact area with the mating track surface, and are suitable for applications in which the applied load is large or the track surface hardness is low.

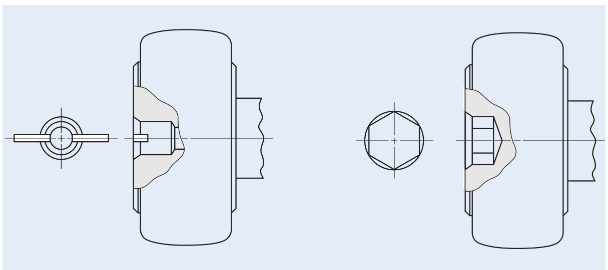
《Crowned outer ring》 《Cylindrical outer ring》



Shape of stud head

Cam Followers are available in two stud head shape types, namely, the type with screwdriver slot and the type with hexagon hole for hexagon bar wrench.

《With screwdriver slot》 《With hexagon hole》



Identification number

Some examples of the identification number of Cam Followers are shown below.

Examples of identification number

Example 1	CF	10		V		UU	R		
Example 2	CF	10	W		B		R		
Example 3	CF	8	W		B	UU	R		/SG
Example 4	CFS	3	F	V				P6	

Model code		
Metric CF series	CF	Standard Type Cam Follower
	CFES	Solid Eccentric Stud Type Cam Follower
	CFE	Eccentric Type Cam Follower
	CF···W	Thrust Disk Type Cam Follower
	CF-RU1	Centralized Lubrication Type Cam Follower (With crowned outer ring)
	CF-FU1	Centralized Lubrication Type Cam Follower (With cylindrical outer ring)
	CF-SFU	Easy Mounting Type Cam Follower
	CF···/SG	Capilube Cam Follower
	NUCF	Heavy Duty Type Cam Follower
Miniature CFS series	CFS	Miniature Type Cam Follower
	CFS···W	Thrust Disk Type Miniature Cam Follower
Inch series	CR CRH	Inch series Cam Follower

Size

The value indicates a stud diameter. (unit: mm)
In the inch series, the outside diameter in units of 1/16 inch is indicated.

Material	
No symbol	High carbon steel made
F	Stainless steel made

Roller guide method	
No symbol	With cage type
V	Full complement type

Shape of stud head	
B	With hexagon hole
No symbol	With screwdriver slot

Seal structure	
No symbol	Shield type
UU	Sealed type

Shape of outer ring outside surface	
R	With crowned outer ring
No symbol	With cylindrical outer ring

Classification symbol		
No symbol	Class 0	
P6	Class 6	Applicable to Miniature CFS series
P5	Class 5	
P4	Class 4	

Accuracy

The accuracy of Cam Followers is shown in Table 2, Table 3.1, and Table 3.2. Cam Followers with special accuracy are also available. When they are required, please contact IKO .

Table 2 Tolerances

unit: μm

Dimensions and symbols \ Series	Metric CF series (1)		Miniature CFS series	Inch series	
	Crowned outer ring	Cylindrical outer ring		Crowned outer ring	Cylindrical outer ring
Outside dia. of outer ring D	0～-50	See Table 3.1.	See Table 3.2.	0～-50	0～-25
Stud dia. d_1	h7		h6	+25～0	
Width of outer ring C	0～-120		0～-120	0～-130	

Note (1) Also applicable to Heavy Duty Type Cam Followers.

Table 3.1 Tolerances and allowable values of outer rings (Metric CF series cylindrical outer rings)

unit: μm

D Nominal outside dia. of outer ring mm		Δ_{Dmp} Single plane mean outside dia. deviation		V_{Dp} Outside dia. variation in a single radial plane (Max.)	V_{Dmp} Mean outside dia. variation (Max.)	K_{ea} Radial runout of assembled bearing outer ring (Max.)
Over	Incl.	High	Low			
6	18	0	- 8	10	6	15
18	30	0	- 9	12	7	15
30	50	0	-11	14	8	20
50	80	0	-13	16	10	25
80	120	0	-15	19	11	35

Table 3.2 Tolerances and allowable values of outer rings (Miniature CFS series)

unit: μm

Δ_{Dmp} Single plane mean outside dia. deviation								K_{ea} Radial runout of assembled bearing outer ring (Max.)			
Class 0		Class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4
High	Low	High	Low	High	Low	High	Low				
0	-8	0	-7	0	-5	0	-4	15	8	5	4

Clearance

The radial internal clearances of Cam Followers are shown in Table 4.

Table 4 Radial internal clearance

unit: μm

Identification number (1)				Radial internal clearance	
Metric CF series (2)	Heavy Duty Type Cam Followers NUCF	Miniature CFS series (3)	Inch series	Min.	Max.
CF 3～CF 5	—	CFS2～CFS5	CR 8, CR 8-1, CRH 8-1, CRH 9	3	17
CF 6	—	CFS6	CR10, CR10-1, CRH10-1, CRH11	5	20
CF 8～CF12-1	—	—	CR12～CR22, CRH12～CRH22	5	25
CF16～CF20-1	—	—	CR24～CR36, CRH24～CRH36	10	30
CF24～CF30-2	—	—	CRH40～CRH56	10	40
—	—	—	CRH64	15	50
—	NUCF10 R～NUCF24 R	—	—	20	45
—	NUCF24-1R～NUCF30-2R	—	—	25	50

Notes(1) Also applicable to the full complement type, crowned outer ring type, sealed type, and type with hexagon hole.
(2) Only representative types are shown in the table, but this table is applicable to the entire metric CF series.
(3) Only representative types are shown in the table, but this table is applicable to the entire miniature CFS series.

Fit

Tables 5 and 6 show recommended tolerances of mounting holes for Cam Follower studs. Since the Cam Follower is supported in a cantilever position, the mounting hole diameter should be prepared without play between the stud and the hole especially when heavy shock loads are applied.

Table 5 Recommended fit

Type	Tolerance class of mounting hole for stud
Metric CF series	H7
Heavy Duty Type	H7
Miniature CFS series	H6
Inch series	F7

Table 6 Dimensional tolerances of mounting hole

unit: μm

Nominal outside dia. of stud mm		F7		H6		H7	
Over	Incl.	High	Low	High	Low	High	Low
—	3	+16	+ 6	+ 6	0	+10	0
3	6	+22	+10	+ 8	0	+12	0
6	10	+28	+13	+ 9	0	+15	0
10	18	+34	+16	+11	0	+18	0
18	30	+41	+20	+13	0	+21	0
30	40	+50	+25	+16	0	+25	0
40	50						

Maximum Allowable Static Load

The applicable load on Cam Followers is, in some cases, limited by the bending strength and shear strength of the stud and the strength of the outer ring instead of the load rating of the needle roller bearing. Therefore, the maximum allowable static load that is lmited by these strengths is specified.

Track Capacity

Track capacity is defined as a load which can be continuously applied on a Cam Follower placed on a steel track surface without causing any deformation or indentation on the track surface when the outer ring of the Cam Follower makes contact with the mating track surface (plane). The track capacities shown in Tables 7.1 and 7.2 are applicable when the hardness of the mating track surface is 40HRC (Tensile strength 1250N/mm^2). When the hardness of the mating track surface differs from 40HRC, the track capacity is obtained by multiplying the value by the track capacity factor shown in Table 8.

If lubrication between the outer ring and the mating track surface is insufficient, seizure and/or wear may occur depending on the application. Therefore, attention must be paid to lubrication and surface roughness of the mating track especially for high-speed rotations such as cam mechanisms.

Table 7.1 Track capacity

unit: N

Type	Identification number With crowned outer ring	Track capacity	Identification number With cylindrical outer ring	Track capacity
Metric CF series (1)	CF 3 R	542	CF 3	1 360
	CF 4 R	712	CF 4	1 790
	CF 5 R	794	CF 5	2 210
	CF 6 R	1 040	CF 6	3 400
	CF 8 R	1 330	CF 8	4 040
	CF10 R	1 610	CF10	4 680
	CF10-1R	2 030	CF10-1	5 530
	CF12 R	2 470	CF12	7 010
	CF12-1R	2 710	CF12-1	7 480
	CF16 R	3 060	CF16	11 200
	CF18 R	3 660	CF18	14 500
	CF20 R	5 190	CF20	23 200
	CF20-1R	4 530	CF20-1	21 000
	CF24 R	6 580	CF24	34 300
	CF24-1R	8 020	CF24-1	39 800
	CF30 R	9 220	CF30	52 700
	CF30-1R	9 990	CF30-1	56 000
	CF30-2R	10 800	CF30-2	59 300
Miniature CFS series (2)	—	—	CFS2	220
	—	—	CFS2.5	298
	—	—	CFS3	485
	—	—	CFS4	799
	—	—	CFS5	1 210
	—	—	CFS6	1 680

Notes(1) Only representative types are shown in the table, but this table is applicable to the entire metric CF series, and also to Heavy Duty Type Cam Followers.

(2) Only representative types are shown in the table, but this table is applicable to the entire miniature CFS series.

Table 7.2 Track capacity

unit: N

Type	Identification number With crowned outer ring	Track capacity	Identification number With cylindrical outer ring	Track capacity	Identification number With crowned outer ring	Track capacity	Identification number With cylindrical outer ring	Track capacity
Inch series (1)	CR 8 R	770	CR 8	2 140	—	—	—	—
	CR 8-1R	770	CR 8-1	2 360	CRH 8-1R	401	CRH 8-1	2 360
	—	—	—	—	CRH 9 R	469	CRH 9	2 650
	CR10 R	1 030	CR10	3 210	—	—	—	—
	CR10-1R	1 030	CR10-1	3 480	CRH10-1R	579	CRH10-1	3 480
	—	—	—	—	CRH11 R	658	CRH11	3 830
	CR12 R	1 340	CR12	4 500	CRH12 R	853	CRH12	4 500
	CR14 R	1 630	CR14	5 250	CRH14 R	1 050	CRH14	5 250
	CR16 R	1 970	CR16	7 280	CRH16 R	1 420	CRH16	7 280
	CR18 R	2 300	CR18	7 710	CRH18 R	1 660	CRH18	7 710
	CR20 R	2 680	CR20	10 700	CRH20 R	2 160	CRH20	10 700
	CR22 R	3 050	CR22	11 800	CRH22 R	2 450	CRH22	11 800
	CR24 R	3 410	CR24	15 400	CRH24 R	3 410	CRH24	15 400
	CR26 R	3 820	CR26	16 700	CRH26 R	3 820	CRH26	16 700
	CR28 R	4 210	CR28	21 000	CRH28 R	4 210	CRH28	21 000
	CR30 R	4 610	CR30	22 500	CRH30 R	4 610	CRH30	22 500
	CR32 R	5 050	CR32	30 900	CRH32 R	5 690	CRH32	30 900
	CR36 R	5 900	CR36	34 700	CRH36 R	6 640	CRH36	34 700
	—	—	—	—	CRH40 R	8 970	CRH40	45 000
	—	—	—	—	CRH44 R	10 200	CRH44	49 500
	—	—	—	—	CRH48 R	11 400	CRH48	64 300
	—	—	—	—	CRH52 R	12 700	CRH52	69 600
	—	—	—	—	CRH56 R	14 100	CRH56	87 000
	—	—	—	—	CRH64 R	16 800	CRH64	113 000

Note(1) Only representative types are shown in the table, but this table is applicable to the entire inch series.

Table 8 Track capacity factor

Hardness HRC	Tensile strength N/mm²	Track capacity factor	
		With crowned outer ring	With cylindrical outer ring
20	760	0.22	0.37
25	840	0.31	0.46
30	950	0.45	0.58
35	1 080	0.65	0.75
38	1 180	0.85	0.89
40	1 250	1.00	1.00
42	1 340	1.23	1.15
44	1 435	1.52	1.32
46	1 530	1.85	1.51
48	1 635	2.27	1.73
50	1 760	2.80	1.99
52	1 880	3.46	2.29
54	2 015	4.21	2.61
56	2 150	5.13	2.97
58	2 290	6.26	3.39

Life and Safety Factor

Please consult IKO .

Allowable Rotational Speed

The allowable rotational speed of Cam Followers is affected by mounting and operating conditions. For reference, Table 9 shows d_1n values when only pure radial loads are applied. Cosidering that axial loads also act under actual operating conditions, the recommended d_1n value is 1/10 of the value shown in the table.

Table 9 d_1n values of Cam Followers (1)(2)

Type \ Lubricant	Grease	Oil
Caged type	84 000	140 000
Full complement type	42 000	70 000
Heavy Duty Type Cam Follower	66 000	110 000

Notes(1) d_1n value $= d_1 \times n$
where, d_1 : Stud diameter mm
n : Rotational speed rpm
(2) In case of Capilube Cam Follower, d_1n value is 10000.

Lubrication

Grease-prepacked Cam Followers are shown in Table 10. The lubricating grease prepacked in these bearings is ALVANIA GREASE S2 (SHELL).
For Cam Followers without prepacked grease, grease should be packed through the oil hole in the stud for use. If they are used without lubricant, wear of rolling contact surfaces may take place, leading to a short bearing life.

Table 10 Grease-prepacked Cam Followers

○ : With prepacked grease × : Without prepacked grease

<table>
<tr><th colspan="3" rowspan="3">Type
Series
Size of stud dia. d_1 (1) mm</th><th colspan="4">With cage</th><th rowspan="3">Full complement type</th></tr>
<tr><th colspan="2">Shield type</th><th colspan="2">Sealed type</th></tr>
<tr><th>With hexagon hole</th><th>With screwdriver slot</th><th>With hexagon hole</th><th>With screwdriver slot</th></tr>
<tr><td rowspan="4">Metric CF series</td><td rowspan="3">CF
CFES
CFE
CF…W</td><td>3～ 5</td><td rowspan="2">○</td><td>○</td><td rowspan="3">○</td><td rowspan="3">○</td><td>–</td></tr>
<tr><td>6～10</td><td rowspan="2">×</td><td rowspan="2">○</td></tr>
<tr><td>12～30</td><td>×</td></tr>
<tr><td colspan="2">CF-RU1，CF-FU1
CF-SFU</td><td>–</td><td>–</td><td>–</td><td>○</td><td>–</td></tr>
<tr><td colspan="3">Capilube Cam Followers CF…/SG (2)</td><td>–</td><td>–</td><td>×</td><td>–</td><td>–</td></tr>
<tr><td colspan="3">Heavy Duty Type Cam Followers NUCF</td><td>–</td><td>–</td><td>–</td><td>–</td><td>○</td></tr>
<tr><td>Miniature CFS series</td><td colspan="2">CFS
CFS …W</td><td>○</td><td>–</td><td>–</td><td>–</td><td>○</td></tr>
<tr><td rowspan="2">Inch series</td><td colspan="2">CR</td><td>○</td><td>○</td><td>○</td><td>○</td><td>○</td></tr>
<tr><td colspan="2">CRH</td><td>–</td><td>–</td><td>–</td><td>–</td><td>○</td></tr>
</table>

Notes(1) For Eccentric Type Cam Followers (CFE), thread diameter G shown in the table of dimensions is applicable.
(2) This Cam Follower incorporates Capilube which includes a large amount of lubricating oil.

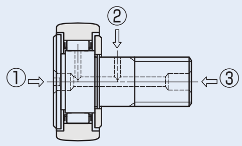
Oil Hole

The position of oil hole is shown in Table 11. Re-greasing cannot be made for models without a oil hole.
Grease should be supplied gently with a straight type grease gun as specified by JIS B 9808:1991, which is applied carefully to the nipple head from the front.

Table 11 Position of oil hole

○ : Oil hole is prepared.

Series / Size of stud dia. d_1 (1) mm			Position of oil hole	① Stud head	② Stud outside surface	③ Stud end
Metric CF series	CF CFES CFE CF…W	With hexagon hole	$d_1 \leqq 10$	△(3)	—	—
			$10 < d_1$	—	○	○
		With screwdriver slot	$d_1 < 5$	—	—	—
			$5 \leqq d_1 \leqq 10$	○	—	—
			$10 < d_1$	○	○	○
	CF-RU1, CF-FU1 (2)		$d_1 \leqq 12$	○	—	—
			$12 < d_1$	○	○	○
	CF-SFU			—	—	—
Capilube Cam Followers	CF…/SG		$d_1 \leqq 10$	—	—	—
			$10 < d_1$	—	○	—
Heavy Duty Type Cam Followers	NUCF		$d_1 \leqq 10$	○	—	—
			$10 < d_1$	○	○	○
Miniature CFS series	CFS CFS …W			—	—	—
Inch series	CR	With hexagon hole	$d_1 \leqq 6.35$	—	—	—
			$6.35 < d_1$	—	○	○
		With screwdriver slot	$d_1 \leqq 6.35$	○	—	—
			$6.35 < d_1$	○	○	○
	CRH	With hexagon hole	$d_1 \leqq 7.938$	—	—	—
			$7.938 < d_1$	—	○	○
		With screwdriver slot	$d_1 \leqq 7.938$	○	—	—
			$7.938 < d_1$	○	○	○



Notes (1) In case of Eccentric Type Cam Followers (CFE), thread diameter G shown in the table of dimensions is applicable in place of stud dia. and the oil hole on the outer surface of the stud cannot be used for lubrication.
(2) The stud head and stud end are provided with a tapped hole for piping.
(3) For the models CF5〜10-1B(UU,R), oil hole is provided in the resin made re-greasing plug which is inserted into the hexagon hole. To re-lubricate through this oil hole, a sharp grease gun nozzle is required.

Accessories

Cam Follower accessories are shown in Table 12. Grease nipple dimensions are shown in Table 13. Dimensions of plug for unused oil hole and dimensions of plug inserter are shown in Table 14.

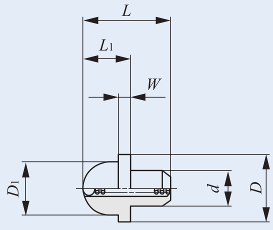
Table 12 Accessories

○ : Attached

Series / Size of stud dia. d_1 mm			Accessories	Grease nipple	Plug	Nut	Spring washer
Metric CF series	CF CFES CF···W	With hexagon hole	$d_1 \leqq 10$	–	–	○	–
			$10 < d_1$	○	○	○	–
		With screwdriver slot	$d_1 < 5$	–	–	○	–
			$5 \leqq d_1$	○	○	○	–
	CFE			○	○	○	○
	CF-RU1, CF-FU1			–	–	○	–
	CF-SFU			–	–	–	–
Capilube Cam Followers	CF···/SG			–	–	○	–
Heavy Duty Type Cam Followers	NUCF			○	○	○	–
Miniature CFS series	CFS CFS···W			–	–	○	–
Inch series	CR	With hexagon hole	$d_1 \leqq 6.35$	–	–	○	–
			$6.35 < d_1$	○	○	○	–
		With screwdriver slot	–	○	○	○	–
	CRH	With hexagon hole	$d_1 \leqq 7.938$	–	–	○	–
			$7.938 < d_1$	○	○	○	–
		With screwdriver slot	–	○	○	○	–

Table 13 Dimensions of grease nipple

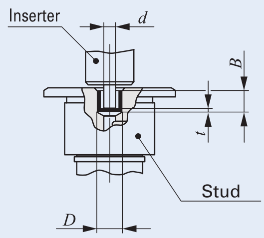
Code number	Dimensions of grease nipple mm						Applicable Cam Followers (1)
	d	D	D_1	L	L_1	W	
NPT4	4	7.5	6	10	5.5	1.5	CF 6～CF10-1
NPT6	6	8	6	11	6	2	CF12～CF18
NPT8	8	10	6	16	7	3	CF20～CF30-2
NPB2	3.18	7.5	6	9	5.5	1.5	CF5, CR8～CR10-1, CRH8-1～CRH11
NPB3	4.76	7.5	6	10	5.5	1.5	CR12～CR22, CRH12～CRH22
NPB3-1	4.76	7.5	6	12.5	5.5	1.55	CR24～CR36, CRH24～CRH44
NPB4	6.35	8.5	6	13	6	2	CRH48～CRH64



Note(1) Only representative types are shown in the table. This table is also applicable to Heavy Duty Type Cam Followers.

Table 14 Dimensions of plug

Code number	Dimensions of plug mm			Dimension of inserter mm	Applicable Cam Followers (1)
	D	t	B	$d\ _{-0.1}^{\ 0}$	
UST4F	4	0.4	3.3	3	CF 6～CF10-1
UST6F	6	0.4	4	5	CF12～CF18
UST8F	8	0.4	5.8	7	CF20～CF30-2
USB2F	3.18	0.3	3.3	2.3	CF5, CR8 ～CR10-1
USB3F	4.76	0.4	4.3	3.7	CR12～CR36, CRH12 ～CRH44
USB4F	6.35	0.5	4.8	5.2	CRH48 ～CRH64



Note(1) Only representative types are shown in the table. This table is also applicable to Heavy Duty Type Cam Followers.

Operating Temperature Range

The operating temperature range for IKO Cam Followers is -20℃～+120℃. However, the maximum allowable temperature for the following types is different.

The maximum allowable temperature for the Metric CF series with a stud diameter d_1 of 4 mm or less, Stainless steel made Cam Followers with a stud diameter 5mm or less and CFS2 is +110℃, and +100℃ when they are continuously operated.

The maximum allowable temperature for the sealed type with a stud diameter d_1 of 5 mm or less is +80℃.

The maximum allowable temperature for Capilube Cam Follower is -15℃～+80℃.

Mounting

❶Make the center axis of the mounting hole perpendicular to the moving direction of the Cam Follower and match the side shoulder accurately with the seating surface indicated by dimension f in the table of dimensions. (See Fig. 1.) Then, fix the Cam Follower with the nut. Do not hit the flange head of the Cam Follower directly with a hammer, etc. This may lead to a bearing failure such as irregular rotation or cracking.

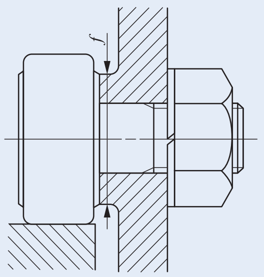


Fig. 1 Seating surface

❷The IKO mark on the flange head of the stud indicates the position of the oil hole on the raceway. Avoid locating the oil hole within the loading zone. This may lead to a short bearing life. (See Fig. 2.) The hole located in the middle part of the stud perpendicular to the stud center axis is used for greasing or locking.

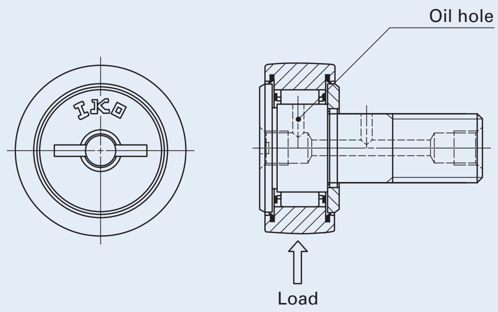


Fig. 2 Oil hole position and loading direction

❸When tightening the nut, the tightening torque should not exceed the values shown in the table of dimensions . If the tightening torque is too large, it is possible that the threaded portion of the stud will be broken. When there is a possibility of loosening, a special nut such as a lock nut, spring washer, or self-locking nut should be used.

❹In the case of Solid Eccentric Stud Type Cam Followers and Eccentric Type Cam Followers, the outer ring position can be adjusted appropriately by turning the stud with a screwdriver or hexagon bar wrench using the screwdriver slot or hexagon hole of the stud head. The stud is fixed with a nut and a spring washer, etc. The tightening torque should not exceed the values of maximum tightening torque shown in the table of dimensions.
When shock loads are applied and the adjusted eccentricity has to be ensured, it is recommended to make holes in the housing, stud and eccentric collar, and fix the stud with a dowel pin as shown in Fig. 3. However, when the stud diameter is less than 8 mm (Eccentric collar diameter 11 mm), it is difficult to make a hole in the stud because the stud is through-hardened.

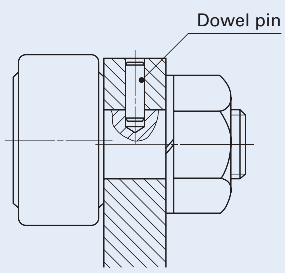


Fig. 3 Mounting example of Solid Eccentric Stud Type Cam Follower

❺In case of Eccentric Type Cam Followers (CFE), the length of the mounting hole should be more than 0.5 mm longer than the dimension B_3 (Eccentric collar width) shown in the table of dimensions. (See Fig. 4.)

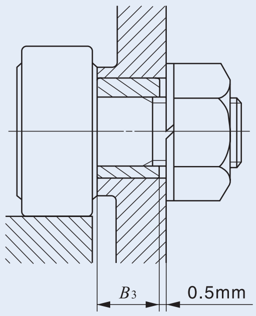


Fig. 4 Length of the mounting hole of Eccentric Type Cam Follower

❻For mounting Easy Mounting Type Cam Followers, it is recommended to fix the fixing screw from the upper side to the stepped portion of the stud. (See Fig. 5.)

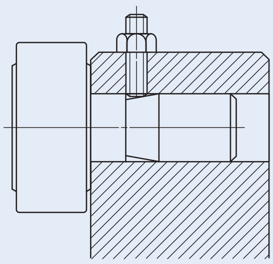


Fig. 5 Mounting example of Easy Mounting Type Cam Follower

Caution in Use

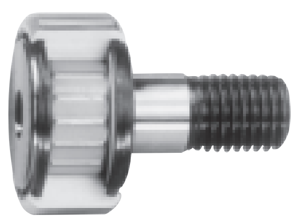
❶Never wash Capilube Bearing with organic solvent and/or white kerosene which have the ability to remove fat, or leave the bearing in contact with these agents.

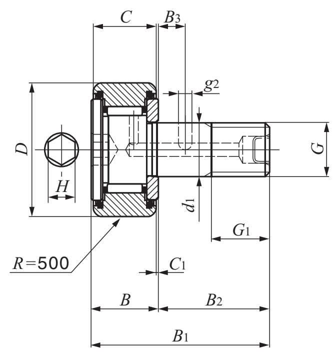
❷To ensure normal rotation of the bearing, apply a load of 1% or more of the basic dynamic load rating at use.

CAM FOLLOWERS

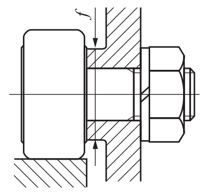
IKO

Capilube Cam Followers With Cage / With Hexagon Hole





CF…WBUUR/SG



Stud dia. 6—12mm

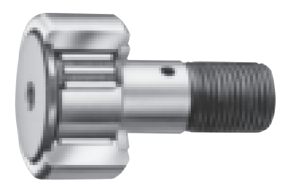
Stud dia. mm	Identification number	Mass (Ref.) g	Boundary dimensions mm D	C	d_1	G	G_1	B max	B_1 max	B_2	B_3	C_1	g_2	H	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable load N
6	**CF 6 WBUUR/SG**	18.5	16	11	6	M 6×1	8	12.2	28.2	16	—	0.6	—	3	11	2.7	3 660	3 650	1 950
8	**CF 8 WBUUR/SG**	28.5	19	11	8	M 8×1.25	10	12.2	32.2	20	—	0.6	—	4	13	6.5	4 250	4 740	4 620
10	**CF 10 WBUUR/SG**	45	22	12	10	M10×1.25	12	13.2	36.2	23	—	0.6	—	4	16	13.8	5 430	6 890	6 890
	CF 10-1 WBUUR/SG	60	26	12	10	M10×1.25	12	13.2	36.2	23	—	0.6	—	4	16	13.8	5 430	6 890	6 890
12	**CF 12 WBUUR/SG**	95	30	14	12	M12×1.5	13	15.2	40.2	25	6	0.6	3	6	21	21.9	7 910	9 790	9 790
	CF 12-1 WBUUR/SG	105	32	14	12	M12×1.5	13	15.2	40.2	25	6	0.6	3	6	21	21.9	7 910	9 790	9 790

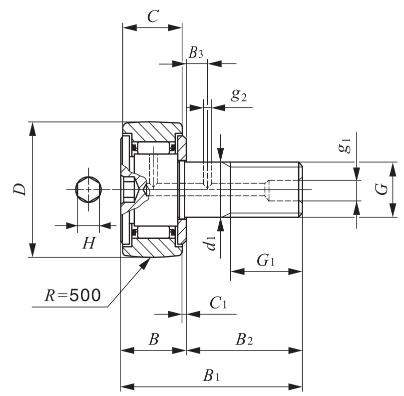
Remark Models with a stud diameter d_1 of 10 mm or less has no oil hole. The others are provided with one oil hole each on the outside surface and end surface of the stud.

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

CAM FOLLOWERS

Standard Type Cam Followers With Cage/With Hexagon Hole

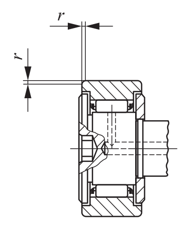




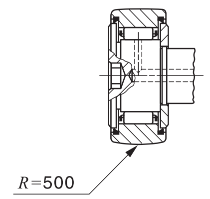
CF…BR

Stud dia. 3－30 mm

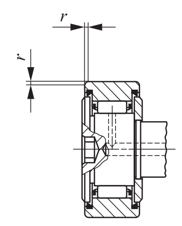
IKO



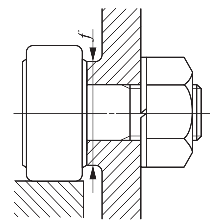
CF…B



CF…BUUR



CF…BUU



Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G	G_1	B	B_1	B_2	B_3	C_1	g_1	g_2	H	r_{smin} (1)	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
3	CF 3 BR	CF 3 B	CF 3 BUUR	CF 3 BUU	4.3	10	7	3	M 3×0.5	5	8	17	9	—	0.5	—	—	2	0.2	6.8	0.34	1 500	1 020	384
4	CF 4 BR	CF 4 B	CF 4 BUUR	CF 4 BUU	7.4	12	8	4	M 4×0.7	6	9	20	11	—	0.5	—	—	2.5	0.3	8.3	0.78	2 070	1 590	834
5	CF 5 BR	CF 5 B	CF 5 BUUR	CF 5 BUU	10.3	13	9	5	M 5×0.8	7.5	10	23	13	—	0.5	—	—	3	0.3	9.3	1.6	2 520	2 140	1 260
6	CF 6 BR	CF 6 B	CF 6 BUUR	CF 6 BUU	18.5	16	11	6	M 6×1	8	12.2max	28.2max	16	—	0.6	—	—	3	0.3	11	2.7	3 660	3 650	1 950
8	CF 8 BR	CF 8 B	CF 8 BUUR	CF 8 BUU	28.5	19	11	8	M 8×1.25	10	12.2max	32.2max	20	—	0.6	—	—	4	0.3	13	6.5	4 250	4 740	4 620
	CF 8 BRM	CF 8 BM	CF 8 BUURM	CF 8 BUUM	28.5	19	11	8	M 8×1	10	12.2max	32.2max	20	—	0.6	—	—	4	0.3	13	7.1	4 250	4 740	4 620
10	CF 10 BR	CF 10 B	CF 10 BUUR	CF 10 BUU	45	22	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	—	—	4	0.3	16	13.8	5 430	6 890	6 890
	CF 10 BRM	CF 10 BM	CF 10 BUURM	CF 10 BUUM	45	22	12	10	M10×1	12	13.2max	36.2max	23	—	0.6	—	—	4	0.3	16	14.7	5 430	6 890	6 890
	CF 10-1 BR	CF 10-1 B	CF 10-1 BUUR	CF 10-1 BUU	60	26	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	—	—	4	0.3	16	13.8	5 430	6 890	6 890
	CF 10-1 BRM	CF 10-1 BM	CF 10-1 BUURM	CF 10-1 BUUM	60	26	12	10	M10×1	12	13.2max	36.2max	23	—	0.6	—	—	4	0.3	16	14.7	5 430	6 890	6 890
12	CF 12 BR	CF 12 B	CF 12 BUUR	CF 12 BUU	95	30	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	6	3	6	0.6	21	21.9	7 910	9 790	9 790
	CF 12-1 BR	CF 12-1 B	CF 12-1 BUUR	CF 12-1 BUU	105	32	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	6	3	6	0.6	21	21.9	7 910	9 790	9 790
16	CF 16 BR	CF 16 B	CF 16 BUUR	CF 16 BUU	170	35	18	16	M16×1.5	17	19.6max	52.1max	32.5	8	0.8	6	3	6	0.6	26	58.5	12 000	18 300	18 300
18	CF 18 BR	CF 18 B	CF 18 BUUR	CF 18 BUU	250	40	20	18	M18×1.5	19	21.6max	58.1max	36.5	8	0.8	6	3	8	1	29	86.2	14 800	25 200	25 200
20	CF 20 BR	CF 20 B	CF 20 BUUR	CF 20 BUU	460	52	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	8	4	8	1	34	119	20 700	34 600	34 600
	CF 20-1 BR	CF 20-1 B	CF 20-1 BUUR	CF 20-1 BUU	385	47	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	8	4	8	1	34	119	20 700	34 600	34 600
24	CF 24 BR	CF 24 B	CF 24 BUUR	CF 24 BUU	815	62	29	24	M24×1.5	25	30.6max	80.1max	49.5	11	0.8	8	4	12	1	40	215	30 500	52 600	52 000
	CF 24-1 BR	CF 24-1 B	CF 24-1 BUUR	CF 24-1 BUU	1 140	72	29	24	M24×1.5	25	30.6max	80.1max	49.5	11	0.8	8	4	12	1	40	215	30 500	52 600	52 000
30	CF 30 BR	CF 30 B	CF 30 BUUR	CF 30 BUU	1 870	80	35	30	M30×1.5	32	37 max	100 max	63	15	1	8	4	17	1	49	438	45 400	85 100	85 100
	CF 30-1 BR	CF 30-1 B	CF 30-1 BUUR	CF 30-1 BUU	2 030	85	35	30	M30×1.5	32	37 max	100 max	63	15	1	8	4	17	1	49	438	45 400	85 100	85 100
	CF 30-2 BR	CF 30-2 B	CF 30-2 BUUR	CF 30-2 BUU	2 220	90	35	30	M30×1.5	32	37 max	100 max	63	15	1	8	4	17	1	49	438	45 400	85 100	85 100

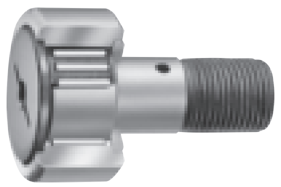
Note(1) Minimum allowable value of chamfer dimension r

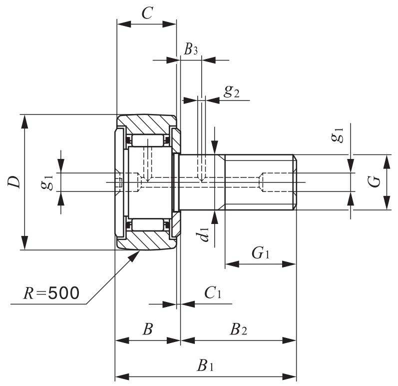
Remarks 1. Models with a stud diameter d_1 of 4 mm or less have no oil hole. For the models CF5～10-1B(UU, R, M), oil hole is provided in the resin made re-greasing plug which is inserted into hexagon hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.

2. Shield type models with a stud diameter d_1 of 10mm or less and the sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

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

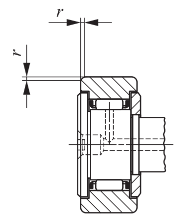
Standard Type Cam Followers With Cage/With Screwdriver Slot



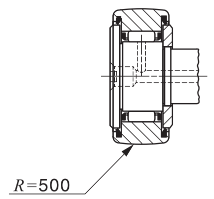


CF···R

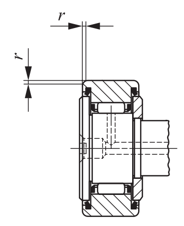
Stud dia. 3—30 mm



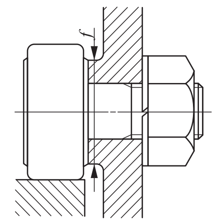
CF



CF···UUR



CF···UU



Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G	G_1	B	B_1	B_2	B_3	C_1	g_1	g_2	$r_{s\,min}$ (1)	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
3	CF 3 R	CF 3	CF 3 UUR	CF 3 UU	4.3	10	7	3	M 3×0.5	5	8	17	9	—	0.5	—	—	0.2	6.8	0.34	1 500	1 020	384
4	CF 4 R	CF 4	CF 4 UUR	CF 4 UU	7.4	12	8	4	M 4×0.7	6	9	20	11	—	0.5	—	—	0.3	8.3	0.78	2 070	1 590	834
5	CF 5 R	CF 5	CF 5 UUR	CF 5 UU	10.3	13	9	5	M 5×0.8	7.5	10	23	13	—	0.5	*3.1	—	0.3	9.3	1.6	2 520	2 140	1 260
6	CF 6 R	CF 6	CF 6 UUR	CF 6 UU	18.5	16	11	6	M 6×1	8	12.2max	28.2max	16	—	0.6	*4	—	0.3	11	2.7	3 660	3 650	1 950
8	CF 8 R	CF 8	CF 8 UUR	CF 8 UU	28.5	19	11	8	M 8×1.25	10	12.2max	32.2max	20	—	0.6	*4	—	0.3	13	6.5	4 250	4 740	4 620
	CF 8 RM	CF 8 M	CF 8 UURM	CF 8 UUM	28.5	19	11	8	M 8×1	10	12.2max	32.2max	20	—	0.6	*4	—	0.3	13	7.1	4 250	4 740	4 620
10	CF 10 R	CF 10	CF 10 UUR	CF 10 UU	45	22	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	*4	—	0.3	16	13.8	5 430	6 890	6 890
	CF 10 RM	CF 10 M	CF 10 UURM	CF 10 UUM	45	22	12	10	M10×1	12	13.2max	36.2max	23	—	0.6	*4	—	0.3	16	14.7	5 430	6 890	6 890
	CF 10-1 R	CF 10-1	CF 10-1 UUR	CF 10-1 UU	60	26	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	*4	—	0.3	16	13.8	5 430	6 890	6 890
	CF 10-1 RM	CF 10-1 M	CF 10-1 UURM	CF 10-1 UUM	60	26	12	10	M10×1	12	13.2max	36.2max	23	—	0.6	*4	—	0.3	16	14.7	5 430	6 890	6 890
12	CF 12 R	CF 12	CF 12 UUR	CF 12 UU	95	30	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	6	3	0.6	21	21.9	7 910	9 790	9 790
	CF 12-1 R	CF 12-1	CF 12-1 UUR	CF 12-1 UU	105	32	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	6	3	0.6	21	21.9	7 910	9 790	9 790
16	CF 16 R	CF 16	CF 16 UUR	CF 16 UU	170	35	18	16	M16×1.5	17	19.6max	52.1max	32.5	8	0.8	6	3	0.6	26	58.5	12 000	18 300	18 300
18	CF 18 R	CF 18	CF 18 UUR	CF 18 UU	250	40	20	18	M18×1.5	19	21.6max	58.1max	36.5	8	0.8	6	3	1	29	86.2	14 800	25 200	25 200
20	CF 20 R	CF 20	CF 20 UUR	CF 20 UU	460	52	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	8	4	1	34	119	20 700	34 600	34 600
	CF 20-1 R	CF 20-1	CF 20-1 UUR	CF 20-1 UU	385	47	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	8	4	1	34	119	20 700	34 600	34 600
24	CF 24 R	CF 24	CF 24 UUR	CF 24 UU	815	62	29	24	M24×1.5	25	30.6max	80.1max	49.5	11	0.8	8	4	1	40	215	30 500	52 600	52 000
	CF 24-1 R	CF 24-1	CF 24-1 UUR	CF 24-1 UU	1 140	72	29	24	M24×1.5	25	30.6max	80.1max	49.5	11	0.8	8	4	1	40	215	30 500	52 600	52 000
30	CF 30 R	CF 30	CF 30 UUR	CF 30 UU	1 870	80	35	30	M30×1.5	32	37 max	100 max	63	15	1	8	4	1	49	438	45 400	85 100	85 100
	CF 30-1 R	CF 30-1	CF 30-1 UUR	CF 30-1 UU	2 030	85	35	30	M30×1.5	32	37 max	100 max	63	15	1	8	4	1	49	438	45 400	85 100	85 100
	CF 30-2 R	CF 30-2	CF 30-2 UUR	CF 30-2 UU	2 220	90	35	30	M30×1.5	32	37 max	100 max	63	15	1	8	4	1	49	438	45 400	85 100	85 100

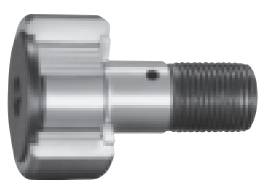
Note(1) Minimum allowable value of chamfer dimension r

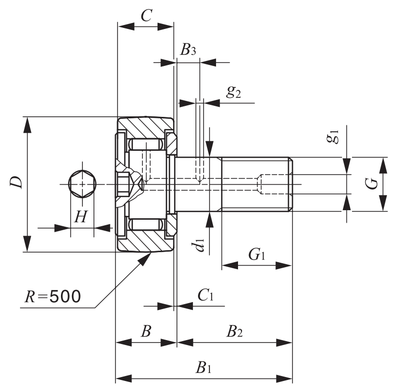
Remarks 1. Models with a stud diameter d_1 of 4 mm or less have no oil hole. Models with a stud diameter of more than 5 mm and up to 10 mm (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.

2. Shield type models with a stud diameter d_1 of 5 mm or less and the sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

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

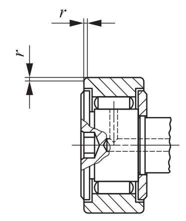
Standard Type Cam Followers Full Complement Type/With Hexagon Hole

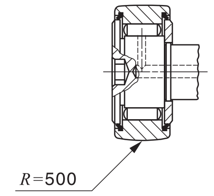


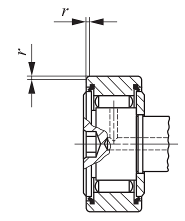


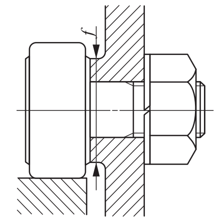
Stud dia. 6—30 mm

CF…VBR









CF…VB CF…VBUUR CF…VBUU

Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1
6	CF 6 VBR	CF 6 VB	CF 6 VBUUR	CF 6 VBUU	19	16	11	6
8	CF 8 VBR	CF 8 VB	CF 8 VBUUR	CF 8 VBUU	29	19	11	8
	CF 8 VBRM	CF 8 VBM	CF 8 VBUURM	CF 8 VBUUM	29	19	11	8
10	CF 10 VBR	CF 10 VB	CF 10 VBUUR	CF 10 VBUU	46	22	12	10
	CF 10 VBRM	CF 10 VBM	CF 10 VBUURM	CF 10 VBUUM	46	22	12	10
	CF 10-1 VBR	CF 10-1 VB	CF 10-1 VBUUR	CF 10-1 VBUU	61	26	12	10
	CF 10-1 VBRM	CF 10-1 VBM	CF 10-1 VBUURM	CF 10-1 VBUUM	61	26	12	10
12	CF 12 VBR	CF 12 VB	CF 12 VBUUR	CF 12 VBUU	97	30	14	12
	CF 12-1 VBR	CF 12-1 VB	CF 12-1 VBUUR	CF 12-1 VBUU	107	32	14	12
16	CF 16 VBR	CF 16 VB	CF 16 VBUUR	CF 16 VBUU	173	35	18	16
18	CF 18 VBR	CF 18 VB	CF 18 VBUUR	CF 18 VBUU	255	40	20	18
20	CF 20 VBR	CF 20 VB	CF 20 VBUUR	CF 20 VBUU	465	52	24	20
	CF 20-1 VBR	CF 20-1 VB	CF 20-1 VBUUR	CF 20-1 VBUU	390	47	24	20
24	CF 24 VBR	CF 24 VB	CF 24 VBUUR	CF 24 VBUU	820	62	29	24
	CF 24-1 VBR	CF 24-1 VB	CF 24-1 VBUUR	CF 24-1 VBUU	1 140	72	29	24
30	CF 30 VBR	CF 30 VB	CF 30 VBUUR	CF 30 VBUU	1 870	80	35	30
	CF 30-1 VBR	CF 30-1 VB	CF 30-1 VBUUR	CF 30-1 VBUU	2 030	85	35	30
	CF 30-2 VBR	CF 30-2 VB	CF 30-2 VBUUR	CF 30-2 VBUU	2 220	90	35	30

Boundary dimensions mm: G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	H	r_{smin} (1)	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
M 6×1	8	12.2	28.2	16	—	0.6	—	—	3	0.3	11	2.7	6 980	8 500	1 950
M 8×1.25	10	12.2	32.2	20	—	0.6	—	—	4	0.3	13	6.5	8 170	11 200	4 620
M 8×1	10	12.2	32.2	20	—	0.6	—	—	4	0.3	13	7.1	8 170	11 200	4 620
M10×1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	16	13.8	9 570	14 500	8 650
M10×1	12	13.2	36.2	23	—	0.6	—	—	4	0.3	16	14.7	9 570	14 500	8 650
M10×1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	16	13.8	9 570	14 500	8 650
M10×1	12	13.2	36.2	23	—	0.6	—	—	4	0.3	16	14.7	9 570	14 500	8 650
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	6	0.6	21	21.9	13 500	19 700	13 200
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	6	0.6	21	21.9	13 500	19 700	13 200
M16×1.5	17	19.6	52.1	32.5	8	0.8	6	3	6	0.6	26	58.5	20 700	37 600	23 200
M18×1.5	19	21.6	58.1	36.5	8	0.8	6	3	8	1	29	86.2	25 300	51 300	31 100
M20×1.5	21	25.6	66.1	40.5	9	0.8	8	4	8	1	34	119	33 200	64 500	37 500
M20×1.5	21	25.6	66.1	40.5	9	0.8	8	4	8	1	34	119	33 200	64 500	37 500
M24×1.5	25	30.6	80.1	49.5	11	0.8	8	4	12	1	40	215	46 600	92 000	52 000
M24×1.5	25	30.6	80.1	49.5	11	0.8	8	4	12	1	40	215	46 600	92 000	52 000
M30×1.5	32	37	100	63	15	1	8	4	17	1	49	438	67 700	144 000	85 900
M30×1.5	32	37	100	63	15	1	8	4	17	1	49	438	67 700	144 000	85 900
M30×1.5	32	37	100	63	15	1	8	4	17	1	49	438	67 700	144 000	85 900

Note(1) Minimum allowable value of chamfer dimension r

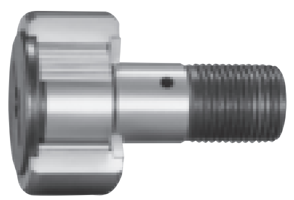
Remarks1. Models with a stud diameter d_1 of 10 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.

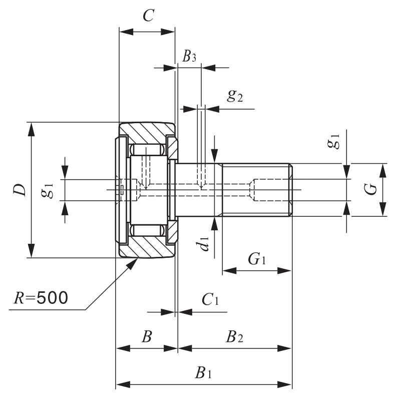
2. Provided with prepacked grease.

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

CAM FOLLOWERS

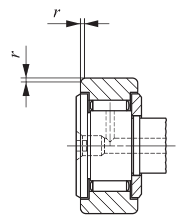
Standard Type Cam Followers **Full Complement Type/With Screwdriver Slot**



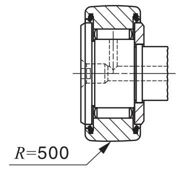


CF…VR

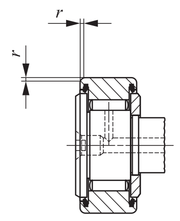
Stud dia. 6—30 mm



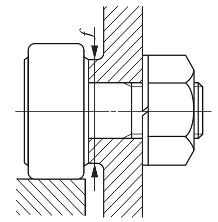
CF…V



CF…VUUR



CF…VUU



Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1
6	CF 6 VR	CF 6 V	CF 6 VUUR	CF 6 VUU	19	16	11	6
8	CF 8 VR	CF 8 V	CF 8 VUUR	CF 8 VUU	29	19	11	8
	CF 8 VRM	CF 8 VM	CF 8 VUURM	CF 8 VUUM	29	19	11	8
10	CF 10 VR	CF 10 V	CF 10 VUUR	CF 10 VUU	46	22	12	10
	CF 10 VRM	CF 10 VM	CF 10 VUURM	CF 10 VUUM	46	22	12	10
	CF 10-1 VR	CF 10-1 V	CF 10-1 VUUR	CF 10-1 VUU	61	26	12	10
	CF 10-1 VRM	CF 10-1 VM	CF 10-1 VUURM	CF 10-1 VUUM	61	26	12	10
12	CF 12 VR	CF 12 V	CF 12 VUUR	CF 12 VUU	97	30	14	12
	CF 12-1 VR	CF 12-1 V	CF 12-1 VUUR	CF 12-1 VUU	107	32	14	12
16	CF 16 VR	CF 16 V	CF 16 VUUR	CF 16 VUU	173	35	18	16
18	CF 18 VR	CF 18 V	CF 18 VUUR	CF 18 VUU	255	40	20	18
20	CF 20 VR	CF 20 V	CF 20 VUUR	CF 20 VUU	465	52	24	20
	CF 20-1 VR	CF 20-1 V	CF 20-1 VUUR	CF 20-1 VUU	390	47	24	20
24	CF 24 VR	CF 24 V	CF 24 VUUR	CF 24 VUU	820	62	29	24
	CF 24-1 VR	CF 24-1 V	CF 24-1 VUUR	CF 24-1 VUU	1 140	72	29	24
30	CF 30 VR	CF 30 V	CF 30 VUUR	CF 30 VUU	1 870	80	35	30
	CF 30-1 VR	CF 30-1 V	CF 30-1 VUUR	CF 30-1 VUU	2 030	85	35	30
	CF 30-2 VR	CF 30-2 V	CF 30-2 VUUR	CF 30-2 VUU	2 220	90	35	30

Boundary dimensions mm: G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	r_{smin} (1)	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
M 6×1	8	12.2	28.2	16	—	0.6	*4	—	0.3	11	2.7	6 980	8 500	1 950
M 8×1.25	10	12.2	32.2	20	—	0.6	*4	—	0.3	13	6.5	8 170	11 200	4 620
M 8×1	10	12.2	32.2	20	—	0.6	*4	—	0.3	13	7.1	8 170	11 200	4 620
M10×1.25	12	13.2	36.2	23	—	0.6	*4	—	0.3	16	13.8	9 570	14 500	8 650
M10×1	12	13.2	36.2	23	—	0.6	*4	—	0.3	16	14.7	9 570	14 500	8 650
M10×1.25	12	13.2	36.2	23	—	0.6	*4	—	0.3	16	13.8	9 570	14 500	8 650
M10×1	12	13.2	36.2	23	—	0.6	*4	—	0.3	16	14.7	9 570	14 500	8 650
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	0.6	21	21.9	13 500	19 700	13 200
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	0.6	21	21.9	13 500	19 700	13 200
M16×1.5	17	19.6	52.1	32.5	8	0.8	6	3	0.6	26	58.5	20 700	37 600	23 200
M18×1.5	19	21.6	58.1	36.5	8	0.8	6	3	1	29	86.2	25 300	51 300	31 100
M20×1.5	21	25.6	66.1	40.5	9	0.8	8	4	1	34	119	33 200	64 500	37 500
M20×1.5	21	25.6	66.1	40.5	9	0.8	8	4	1	34	119	33 200	64 500	37 500
M24×1.5	25	30.6	80.1	49.5	11	0.8	8	4	1	40	215	46 600	92 000	52 000
M24×1.5	25	30.6	80.1	49.5	11	0.8	8	4	1	40	215	46 600	92 000	52 000
M30×1.5	32	37	100	63	15	1	8	4	1	49	438	67 700	144 000	85 900
M30×1.5	32	37	100	63	15	1	8	4	1	49	438	67 700	144 000	85 900
M30×1.5	32	37	100	63	15	1	8	4	1	49	438	67 700	144 000	85 900

Note(1) Minimum allowable value of chamfer dimension r

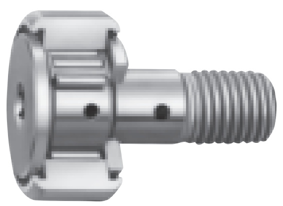
Remarks 1. Models with a stud diameter d_1 of 10 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.

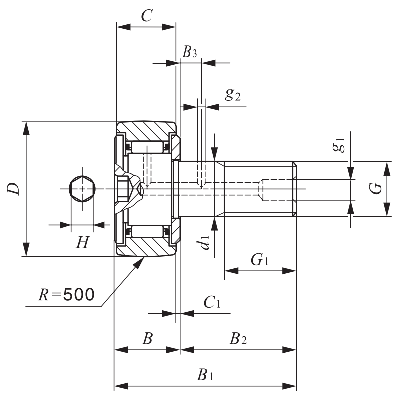
2. Provided with prepacked grease.

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

CAM FOLLOWERS

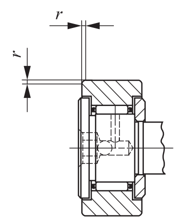
Stainless Steel Made Cam Followers With Cage/With Hexagon Hole



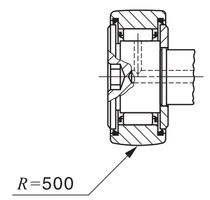


CF…FBR

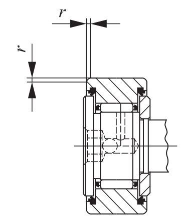
Stud dia. 3—20mm



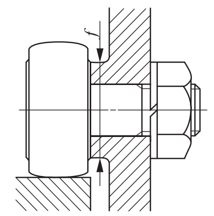
CF…FB



CF…FBUUR



CF…FBUU



Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G	G_1	Boundary dimensions mm: B	B_1	B_2	B_3	C_1	g_1	g_2	H	$r_{s\,min}$ (1)	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
3	CF 3 FBR	CF 3 FB	CF 3 FBUUR	CF 3 FBUU	4.3	10	7	3	M 3×0.5	5	8	17	9	—	0.5	—	—	2	0.2	6.8	0.34	1 200	813	384
4	CF 4 FBR	CF 4 FB	CF 4 FBUUR	CF 4 FBUU	7.4	12	8	4	M 4×0.7	6	9	20	11	—	0.5	—	—	2.5	0.3	8.3	0.78	1 650	1 270	834
5	CF 5 FBR	CF 5 FB	CF 5 FBUUR	CF 5 FBUU	10.3	13	9	5	M 5×0.8	7.5	10	23	13	—	0.5	—	—	3	0.3	9.3	1.6	1 930	1 730	1 260
6	CF 6 FBR	—	CF 6 FBUUR	—	18.5	16	11	6	M 6×1	8	12.2 max	28.2 max	16	—	0.6	—	—	3	—	11	2.7	2 930	2 920	1 950
8	CF 8 FBR	—	CF 8 FBUUR	—	28.5	19	11	8	M 8×1.25	10	12.2 max	32.2 max	20	—	0.6	—	—	4	—	13	6.5	3 400	3 790	3 790
10	CF 10 FBR	—	CF 10 FBUUR	—	45	22	12	10	M10×1.25	12	13.2 max	36.2 max	23	—	0.6	—	—	5	—	16	13.8	4 340	5 510	5 510
12	CF 12 FBR	—	CF 12 FBUUR	—	95	30	14	12	M12×1.5	13	15.2 max	40.2 max	25	6	0.6	6	3	6	—	21	21.9	6 330	7 830	7 830
16	CF 16 FBR	—	CF 16 FBUUR	—	170	35	18	16	M16×1.5	17	19.6 max	52.1 max	32.5	8	0.8	6	3	6	—	26	58.5	9 620	14 700	14 700
18	CF 18 FBR	—	CF 18 FBUUR	—	250	40	20	18	M18×1.5	19	21.6 max	58.1 max	36.5	8	0.8	6	3	8	—	29	86.2	11 800	20 200	20 200
20	CF 20 FBR	—	CF 20 FBUUR	—	460	52	24	20	M20×1.5	21	25.6 max	66.1 max	40.5	9	0.8	8	4	8	—	34	119	16 500	27 700	27 700

Note(1) Minimum allowable value of chamfer dimension r

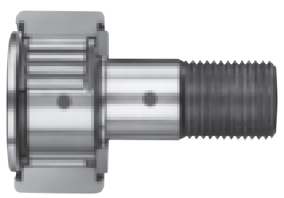
Remarks1. Models with a stud diameter d_1 of 10 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.

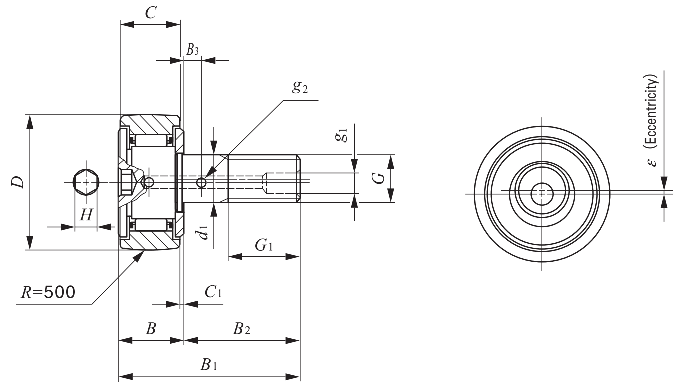
2. Shield type models with a stud diameter d_1 of 10 mm or less and the sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

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

CAM FOLLOWERS

Solid Eccentric Stud Type Cam Followers With Cage/With Hexagon Hole





Stud dia. 6—18mm

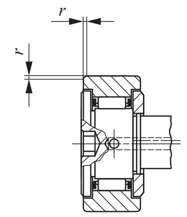
CFES…BR

Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1
6	**CFES 6 BR**	**CFES 6 B**	**CFES 6 BUUR**	**CFES 6 BUU**	18.5	16	11	6
8	**CFES 8 BR**	**CFES 8 B**	**CFES 8 BUUR**	**CFES 8 BUU**	28.5	19	11	8
10	**CFES 10 BR**	**CFES 10 B**	**CFES 10 BUUR**	**CFES 10 BUU**	45	22	12	10
	CFES 10-1 BR	**CFES 10-1 B**	**CFES 10-1 BUUR**	**CFES 10-1 BUU**	60	26	12	10
12	**CFES 12 BR**	**CFES 12 B**	**CFES 12 BUUR**	**CFES 12 BUU**	95	30	14	12
	CFES 12-1 BR	**CFES 12-1 B**	**CFES 12-1 BUUR**	**CFES 12-1 BUU**	105	32	14	12
16	**CFES 16 BR**	**CFES 16 B**	**CFES 16 BUUR**	**CFES 16 BUU**	170	35	18	16
18	**CFES 18 BR**	**CFES 18 B**	**CFES 18 BUUR**	**CFES 18 BUU**	250	40	20	18

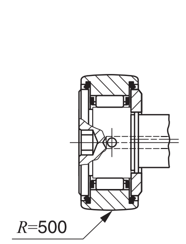
Note(1) Minimum allowable value of chamfer dimension r

Remarks 1. Models with a stud diameter d_1 of 10 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.

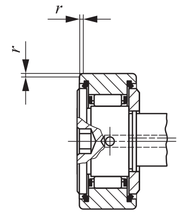
2. Shield type models with a stud diameter d_1 of 10 mm or less and the sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.



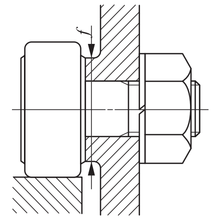
CFES…B



CFES…BUUR



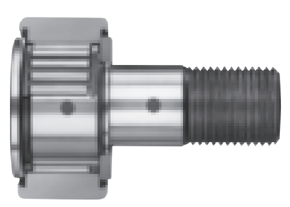
CFES…BUU

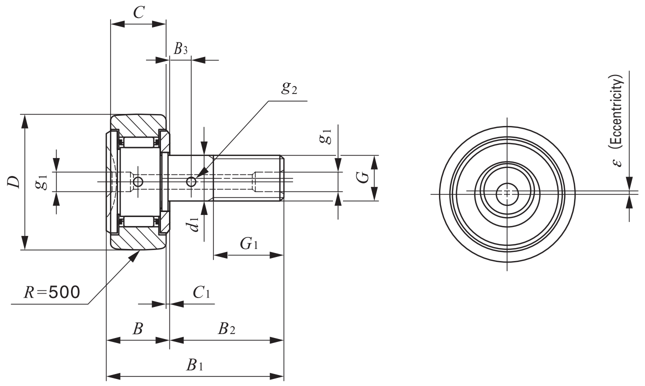


Boundary dimensions mm: G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	H	$r_{s\min}$ (1)	Eccentricity ε	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
M 6×1	8	12.2	28.2	16	—	0.6	—	—	3	0.3	0.25	11	2.7	3 660	3 650	1 980
M 8×1.25	10	12.2	32.2	20	—	0.6	—	—	4	0.3	0.25	13	6.5	4 250	4 740	4 670
M10×1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	0.3	16	13.8	5 430	6 890	6 890
M10×1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	0.3	16	13.8	5 430	6 890	6 890
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	6	0.6	0.4	21	21.9	7 910	9 790	9 790
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	6	0.6	0.4	21	21.9	7 910	9 790	9 790
M16×1.5	17	19.6	52.1	32.5	8	0.8	6	3	6	0.6	0.5	26	58.5	12 000	18 300	18 300
M18×1.5	19	21.6	58.1	36.5	8	0.8	6	3	8	1	0.6	29	86.2	14 800	25 200	25 200

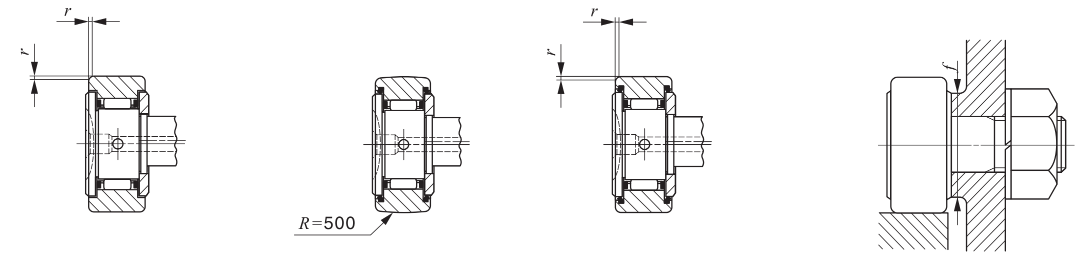
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Solid Eccentric Stud Type Cam Followers With Cage/With Screwdriver Slot





CFES···R



CFES CFES···UUR CFES···UU

Stud dia. 6—18mm

Stud dia. mm	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1
6	**CFES 6 R**	**CFES 6**	**CFES 6 UUR**	**CFES 6 UU**	18.5	16	11	6
8	**CFES 8 R**	**CFES 8**	**CFES 8 UUR**	**CFES 8 UU**	28.5	19	11	8
10	**CFES 10 R**	**CFES 10**	**CFES 10 UUR**	**CFES 10 UU**	45	22	12	10
	CFES 10-1 R	**CFES 10-1**	**CFES 10-1 UUR**	**CFES 10-1 UU**	60	26	12	10
12	**CFES 12 R**	**CFES 12**	**CFES 12 UUR**	**CFES 12 UU**	95	30	14	12
	CFES 12-1 R	**CFES 12-1**	**CFES 12-1 UUR**	**CFES 12-1 UU**	105	32	14	12
16	**CFES 16 R**	**CFES 16**	**CFES 16 UUR**	**CFES 16 UU**	170	35	18	16
18	**CFES 18 R**	**CFES 18**	**CFES 18 UUR**	**CFES 18 UU**	250	40	20	18

Boundary dimensions mm: G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	$r_{s\,min}$ (1)	Eccentricity ε	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
M 6×1	8	12.2	28.2	16	—	0.6	*4	—	0.3	0.25	11	2.7	3 660	3 650	1 980
M 8×1.25	10	12.2	32.2	20	—	0.6	*4	—	0.3	0.25	13	6.5	4 250	4 740	4 670
M10×1.25	12	13.2	36.2	23	—	0.6	*4	—	0.3	0.3	16	13.8	5 430	6 890	6 890
M10×1.25	12	13.2	36.2	23	—	0.6	*4	—	0.3	0.3	16	13.8	5 430	6 890	6 890
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	0.6	0.4	21	21.9	7 910	9 790	9 790
M12×1.5	13	15.2	40.2	25	6	0.6	6	3	0.6	0.4	21	21.9	7 910	9 790	9 790
M16×1.5	17	19.6	52.1	32.5	8	0.8	6	3	0.6	0.5	26	58.5	12 000	18 300	18 300
M18×1.5	19	21.6	58.1	36.5	8	0.8	6	3	1	0.6	29	86.2	14 800	25 200	25 200

Note(1) Minimum allowable value of chamfer dimension r

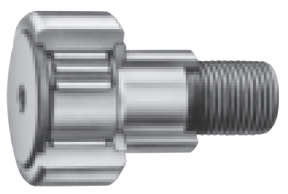
Remarks1. Models with a stud diameter d_1 of 10 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.

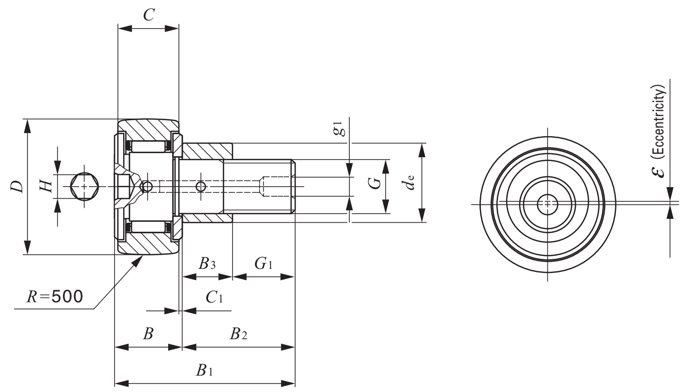
2. Sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

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

CAM FOLLOWERS

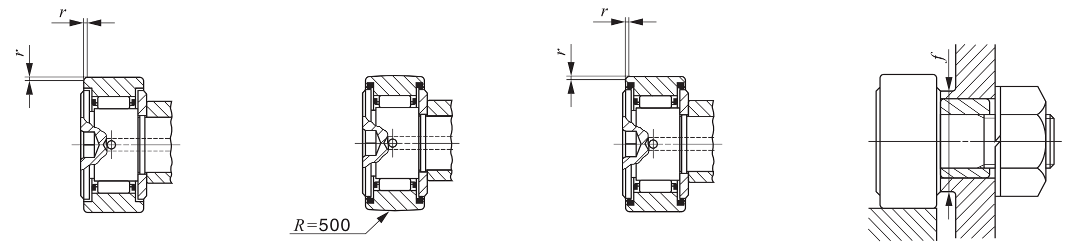
Eccentric Type Cam Followers With Cage/With Hexagon Hole





Outside diameter of eccentric collar 9—41 mm

CFE…BR



CFE…B CFE…BUUR CFE…BUU

Outside diameter of eccentric collar mm	Identification number				Mass (Ref.)				Boundary dimensions mm										Eccentricity	Mounting dimension	Maximum tightening torque	Basic dynamic load rating	Basic static load rating	Maximum allowable static load
	Shield type		Sealed type																					
	With crowned outer ring	With cylindrical outer ring	With crowned outer ring	With cylindrical outer ring	g	D	C	d_e	G	B_3	B max	B_1 max	B_2	C_1	g_1	G_1	H	$r_{s\,min}$ [1]	ε	f Min. mm	N-m	C N	C_0 N	N
9	**CFE 6 BR**	**CFE 6 B**	**CFE 6 BUUR**	**CFE 6 BUU**	20.5	16	11	9	M 6×1	7.5	12.2	28.2	16	0.6	—	8.5	3	0.3	0.4	11	2.7	3 660	3 650	1 950
11	**CFE 8 BR**	**CFE 8 B**	**CFE 8 BUUR**	**CFE 8 BUU**	32	19	11	11	M 8×1.25	9.5	12.2	32.2	20	0.6	—	10.5	4	0.3	0.4	13	6.5	4 250	4 740	4 620
13	**CFE 10 BR**	**CFE 10 B**	**CFE 10 BUUR**	**CFE 10 BUU**	49.5	22	12	13	M10×1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	5 430	6 890	6 890
	CFE 10-1 BR	**CFE 10-1 B**	**CFE 10-1 BUUR**	**CFE 10-1 BUU**	65	26	12	13	M10×1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	5 430	6 890	6 890
16	**CFE 12 BR**	**CFE 12 B**	**CFE 12 BUUR**	**CFE 12 BUU**	105	30	14	16	M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	6	0.6	0.8	21	21.9	7 910	9 790	9 790
	CFE 12-1 BR	**CFE 12-1 B**	**CFE 12-1 BUUR**	**CFE 12-1 BUU**	115	32	14	16	M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	6	0.6	0.8	21	21.9	7 910	9 790	9 790
22	**CFE 16 BR**	**CFE 16 B**	**CFE 16 BUUR**	**CFE 16 BUU**	190	35	18	22	M16×1.5	15.5	19.6	52.1	32.5	0.8	6	17	6	0.6	0.8	26	58.5	12 000	18 300	18 300
24	**CFE 18 BR**	**CFE 18 B**	**CFE 18 BUUR**	**CFE 18 BUU**	280	40	20	24	M18×1.5	17.5	21.6	58.1	36.5	0.8	6	19	8	1	0.8	29	86.2	14 800	25 200	25 200
27	**CFE 20 BR**	**CFE 20 B**	**CFE 20 BUUR**	**CFE 20 BUU**	500	52	24	27	M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	8	1	0.8	34	119	20 700	34 600	34 600
	CFE 20-1 BR	**CFE 20-1 B**	**CFE 20-1 BUUR**	**CFE 20-1 BUU**	425	47	24	27	M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	8	1	0.8	34	119	20 700	34 600	34 600
33	**CFE 24 BR**	**CFE 24 B**	**CFE 24 BUUR**	**CFE 24 BUU**	895	62	29	33	M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	12	1	0.8	40	215	30 500	52 600	52 000
	CFE 24-1 BR	**CFE 24-1 B**	**CFE 24-1 BUUR**	**CFE 24-1 BUU**	1 220	72	29	33	M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	12	1	0.8	40	215	30 500	52 600	52 000
41	**CFE 30 BR**	**CFE 30 B**	**CFE 30 BUUR**	**CFE 30 BUU**	2 030	80	35	41	M30×1.5	32.5	37	100	63	1	8	30.5	17	1	1.5	49	438	45 400	85 100	85 100
	CFE 30-1 BR	**CFE 30-1 B**	**CFE 30-1 BUUR**	**CFE 30-1 BUU**	2 190	85	35	41	M30×1.5	32.5	37	100	63	1	8	30.5	17	1	1.5	49	438	45 400	85 100	85 100
	CFE 30-2 BR	**CFE 30-2 B**	**CFE 30-2 BUUR**	**CFE 30-2 BUU**	2 380	90	35	41	M30×1.5	32.5	37	100	63	1	8	30.5	17	1	1.5	49	438	45 400	85 100	85 100

Note(1) Minimum allowable value of chamfer dimension r

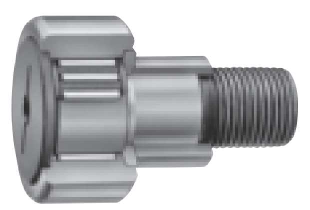
Remarks 1. Models with a stud thread diameter G of 10 mm or less have no oil hole. Other models are provided with one oil hole on the end surface of the stud.

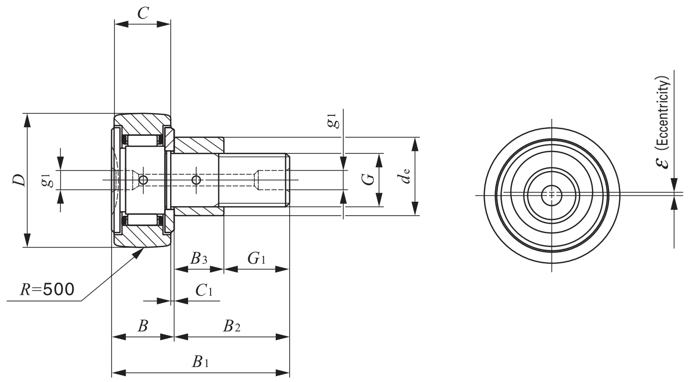
2. Shield type models with a stud thread diameter G of 10 mm or less and the sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

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

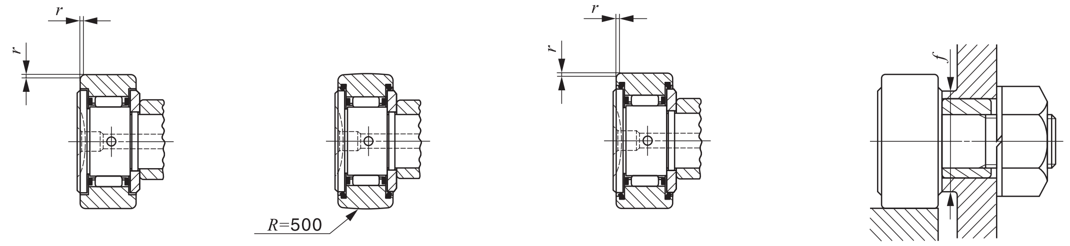
CAM FOLLOWERS

Eccentric Type Cam Followers **With Cage/With Screwdriver Slot**





CFE…R



CFE CFE…UUR CFE…UU

Outside diameter of eccentric collar 9－41 mm

Outside diameter of eccentric collar (mm)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_e
9	CFE 6 R	CFE 6	CFE 6 UUR	CFE 6 UU	20.5	16	11	9
11	CFE 8 R	CFE 8	CFE 8 UUR	CFE 8 UU	32	19	11	11
13	CFE 10 R	CFE 10	CFE 10 UUR	CFE 10 UU	49.5	22	12	13
	CFE 10-1 R	CFE 10-1	CFE 10-1 UUR	CFE 10-1 UU	65	26	12	13
16	CFE 12 R	CFE 12	CFE 12 UUR	CFE 12 UU	105	30	14	16
	CFE 12-1 R	CFE 12-1	CFE 12-1 UUR	CFE 12-1 UU	115	32	14	16
22	CFE 16 R	CFE 16	CFE 16 UUR	CFE 16 UU	190	35	18	22
24	CFE 18 R	CFE 18	CFE 18 UUR	CFE 18 UU	280	40	20	24
27	CFE 20 R	CFE 20	CFE 20 UUR	CFE 20 UU	500	52	24	27
	CFE 20-1 R	CFE 20-1	CFE 20-1 UUR	CFE 20-1 UU	425	47	24	27
33	CFE 24 R	CFE 24	CFE 24 UUR	CFE 24 UU	895	62	29	33
	CFE 24-1 R	CFE 24-1	CFE 24-1 UUR	CFE 24-1 UU	1 220	72	29	33
41	CFE 30 R	CFE 30	CFE 30 UUR	CFE 30 UU	2 030	80	35	41
	CFE 30-1 R	CFE 30-1	CFE 30-1 UUR	CFE 30-1 UU	2 190	85	35	41
	CFE 30-2 R	CFE 30-2	CFE 30-2 UUR	CFE 30-2 UU	2 380	90	35	41

Boundary dimensions mm: G	B_3	B max	B_1 max	B_2	C_1	g_1	G_1	$r_{s\,min}$ (1)	Eccentricity ε	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
M 6×1	7.5	12.2	28.2	16	0.6	*4	8.5	0.3	0.4	11	2.7	3 660	3 650	1 950
M 8×1.25	9.5	12.2	32.2	20	0.6	*4	10.5	0.3	0.4	13	6.5	4 250	4 740	4 620
M10×1.25	10.5	13.2	36.2	23	0.6	*4	12.5	0.3	0.4	16	13.8	5 430	6 890	6 890
M10×1.25	10.5	13.2	36.2	23	0.6	*4	12.5	0.3	0.4	16	13.8	5 430	6 890	6 890
M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	0.6	0.8	21	21.9	7 910	9 790	9 790
M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	0.6	0.8	21	21.9	7 910	9 790	9 790
M16×1.5	15.5	19.6	52.1	32.5	0.8	6	17	0.6	0.8	26	58.5	12 000	18 300	18 300
M18×1.5	17.5	21.6	58.1	36.5	0.8	6	19	1	0.8	29	86.2	14 800	25 200	25 200
M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	1	0.8	34	119	20 700	34 600	34 600
M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	1	0.8	34	119	20 700	34 600	34 600
M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	1	0.8	40	215	30 500	52 600	52 000
M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	1	0.8	40	215	30 500	52 600	52 000
M30×1.5	32.5	37	100	63	1	8	30.5	1	1.5	49	438	45 400	85 100	85 100
M30×1.5	32.5	37	100	63	1	8	30.5	1	1.5	49	438	45 400	85 100	85 100
M30×1.5	32.5	37	100	63	1	8	30.5	1	1.5	49	438	45 400	85 100	85 100

Note(1) Minimum allowable value of chamfer dimension r

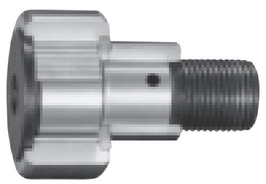
Remarks 1. Models with a stud thread diameter G of 10 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head and end surface of the stud.

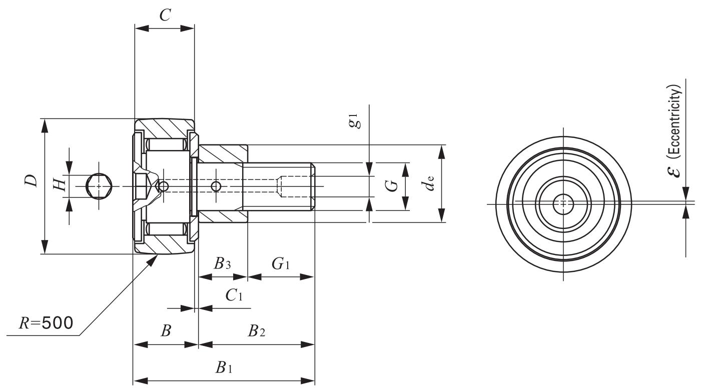
2. Sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

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

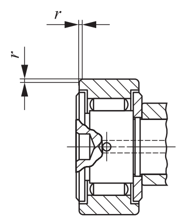
CAM FOLLOWERS

Eccentric Type Cam Followers Full Complement Type/With Hexagon Hole

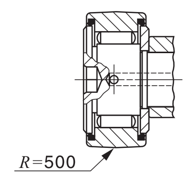




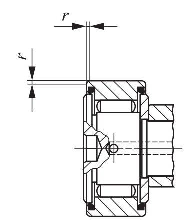
CFE···VBR



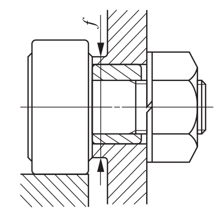
CFE···VB



CFE···VBUUR



CFE···VBUU



Outside diameter of eccentric collar 9－41 mm

Outside diameter of eccentric collar (mm)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_e
9	CFE 6 VBR	CFE 6 VB	CFE 6 VBUUR	CFE 6 VBUU	21	16	11	9
11	CFE 8 VBR	CFE 8 VB	CFE 8 VBUUR	CFE 8 VBUU	32.5	19	11	11
13	CFE 10 VBR	CFE 10 VB	CFE 10 VBUUR	CFE 10 VBUU	50.5	22	12	13
	CFE 10-1 VBR	CFE 10-1 VB	CFE 10-1 VBUUR	CFE 10-1 VBUU	66	26	12	13
16	CFE 12 VBR	CFE 12 VB	CFE 12 VBUUR	CFE 12 VBUU	107	30	14	16
	CFE 12-1 VBR	CFE 12-1 VB	CFE 12-1 VBUUR	CFE 12-1 VBUU	117	32	14	16
22	CFE 16 VBR	CFE 16 VB	CFE 16 VBUUR	CFE 16 VBUU	193	35	18	22
24	CFE 18 VBR	CFE 18 VB	CFE 18 VBUUR	CFE 18 VBUU	285	40	20	24
27	CFE 20 VBR	CFE 20 VB	CFE 20 VBUUR	CFE 20 VBUU	505	52	24	27
	CFE 20-1 VBR	CFE 20-1 VB	CFE 20-1 VBUUR	CFE 20-1 VBUU	430	47	24	27
33	CFE 24 VBR	CFE 24 VB	CFE 24 VBUUR	CFE 24 VBUU	900	62	29	33
	CFE 24-1 VBR	CFE 24-1 VB	CFE 24-1 VBUUR	CFE 24-1 VBUU	1 220	72	29	33
41	CFE 30 VBR	CFE 30 VB	CFE 30 VBUUR	CFE 30 VBUU	2 030	80	35	41
	CFE 30-1 VBR	CFE 30-1 VB	CFE 30-1 VBUUR	CFE 30-1 VBUU	2 190	85	35	41
	CFE 30-2 VBR	CFE 30-2 VB	CFE 30-2 VBUUR	CFE 30-2 VBUU	2 380	90	35	41

Identification number (With crowned outer ring, Shield type)	Boundary dimensions mm: G	B_3	B max	B_1 max	B_2	C_1	g_1	G_1	H	r_{smin} (1)	Eccentricity ε	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
CFE 6 VBR	M 6×1	7.5	12.2	28.2	16	0.6	—	8.5	3	0.3	0.4	11	2.7	6 980	8 500	1 950
CFE 8 VBR	M 8×1.25	9.5	12.2	32.2	20	0.6	—	10.5	4	0.3	0.4	13	6.5	8 170	11 200	4 620
CFE 10 VBR	M10×1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	9 570	14 500	8 650
CFE 10-1 VBR	M10×1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	9 570	14 500	8 650
CFE 12 VBR	M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	6	0.6	0.8	21	21.9	13 500	19 700	13 200
CFE 12-1 VBR	M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	6	0.6	0.8	21	21.9	13 500	19 700	13 200
CFE 16 VBR	M16×1.5	15.5	19.6	52.1	32.5	0.8	6	17	6	0.6	0.8	26	58.5	20 700	37 600	23 200
CFE 18 VBR	M18×1.5	17.5	21.6	58.1	36.5	0.8	6	19	8	1	0.8	29	86.2	25 300	51 300	31 100
CFE 20 VBR	M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	8	1	0.8	34	119	33 200	64 500	37 500
CFE 20-1 VBR	M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	8	1	0.8	34	119	33 200	64 500	37 500
CFE 24 VBR	M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	12	1	0.8	40	215	46 600	92 000	52 000
CFE 24-1 VBR	M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	12	1	0.8	40	215	46 600	92 000	52 000
CFE 30 VBR	M30×1.5	32.5	37	100	63	1	8	30.5	17	1	1.5	49	438	67 700	144 000	85 900
CFE 30-1 VBR	M30×1.5	32.5	37	100	63	1	8	30.5	17	1	1.5	49	438	67 700	144 000	85 900
CFE 30-2 VBR	M30×1.5	32.5	37	100	63	1	8	30.5	17	1	1.5	49	438	67 700	144 000	85 900

Note(1) Minimum allowable value of chamfer dimension r

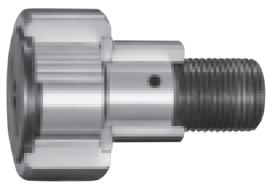
Remarks 1. Models with a stud thread diameter G of 10 mm or less have no oil hole. Other models are provided with one oil hole on the end surface of the stud.

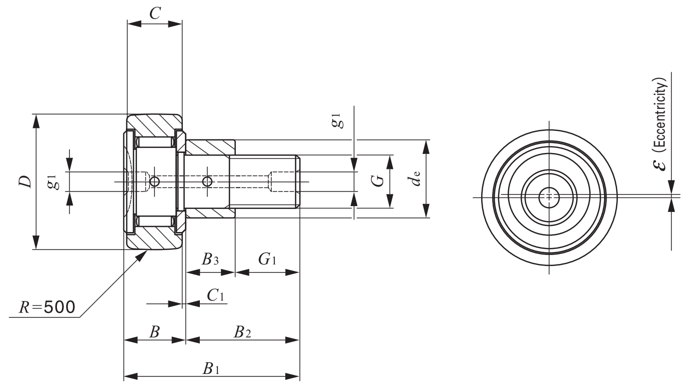
2. Provided with prepacked grease.

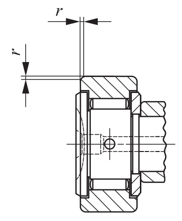
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

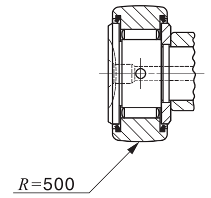
CAM FOLLOWERS

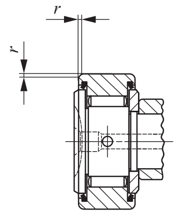
Eccentric Type Cam Followers Full Complement Type/With Screwdriver Slot

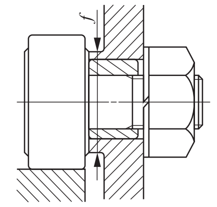












Outside diameter of eccentric collar 9—41 mm

CFE…VR CFE…V CFE…VUUR CFE…VUU

Outside diameter of eccentric collar (mm)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_e
9	CFE 6 VR	CFE 6 V	CFE 6 VUUR	CFE 6 VUU	21	16	11	9
11	CFE 8 VR	CFE 8 V	CFE 8 VUUR	CFE 8 VUU	32.5	19	11	11
13	CFE 10 VR	CFE 10 V	CFE 10 VUUR	CFE 10 VUU	50.5	22	12	13
	CFE 10-1 VR	CFE 10-1 V	CFE 10-1 VUUR	CFE 10-1 VUU	66	26	12	13
16	CFE 12 VR	CFE 12 V	CFE 12 VUUR	CFE 12 VUU	107	30	14	16
	CFE 12-1 VR	CFE 12-1 V	CFE 12-1 VUUR	CFE 12-1 VUU	117	32	14	16
22	CFE 16 VR	CFE 16 V	CFE 16 VUUR	CFE 16 VUU	193	35	18	22
24	CFE 18 VR	CFE 18 V	CFE 18 VUUR	CFE 18 VUU	285	40	20	24
27	CFE 20 VR	CFE 20 V	CFE 20 VUUR	CFE 20 VUU	505	52	24	27
	CFE 20-1 VR	CFE 20-1 V	CFE 20-1 VUUR	CFE 20-1 VUU	430	47	24	27
33	CFE 24 VR	CFE 24 V	CFE 24 VUUR	CFE 24 VUU	900	62	29	33
	CFE 24-1 VR	CFE 24-1 V	CFE 24-1 VUUR	CFE 24-1 VUU	1 220	72	29	33
41	CFE 30 VR	CFE 30 V	CFE 30 VUUR	CFE 30 VUU	2 030	80	35	41
	CFE 30-1 VR	CFE 30-1 V	CFE 30-1 VUUR	CFE 30-1 VUU	2 190	85	35	41
	CFE 30-2 VR	CFE 30-2 V	CFE 30-2 VUUR	CFE 30-2 VUU	2 380	90	35	41

Boundary dimensions mm: G	B_3	B max	B_1 max	B_2	C_1	g_1	G_1	$r_{s\,min}$ (1)	Eccentricity ε	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
M 6×1	7.5	12.2	28.2	16	0.6	*4	8.5	0.3	0.4	11	2.7	6 980	8 500	1 950
M 8×1.25	9.5	12.2	32.2	20	0.6	*4	10.5	0.3	0.4	13	6.5	8 170	11 200	4 620
M10×1.25	10.5	13.2	36.2	23	0.6	*4	12.5	0.3	0.4	16	13.8	9 570	14 500	8 650
M10×1.25	10.5	13.2	36.2	23	0.6	*4	12.5	0.3	0.4	16	13.8	9 570	14 500	8 650
M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	0.6	0.8	21	21.9	13 500	19 700	13 200
M12×1.5	11.5	15.2	40.2	25	0.6	6	13.5	0.6	0.8	21	21.9	13 500	19 700	13 200
M16×1.5	15.5	19.6	52.1	32.5	0.8	6	17	0.6	0.8	26	58.5	20 700	37 600	23 200
M18×1.5	17.5	21.6	58.1	36.5	0.8	6	19	1	0.8	29	86.2	25 300	51 300	31 100
M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	1	0.8	34	119	33 200	64 500	37 500
M20×1.5	19.5	25.6	66.1	40.5	0.8	8	21	1	0.8	34	119	33 200	64 500	37 500
M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	1	0.8	40	215	46 600	92 000	52 000
M24×1.5	25.5	30.6	80.1	49.5	0.8	8	24	1	0.8	40	215	46 600	92 000	52 000
M30×1.5	32.5	37	100	63	1	8	30.5	1	1.5	49	438	67 700	144 000	85 900
M30×1.5	32.5	37	100	63	1	8	30.5	1	1.5	49	438	67 700	144 000	85 900
M30×1.5	32.5	37	100	63	1	8	30.5	1	1.5	49	438	67 700	144 000	85 900

Note(1) Minimum allowable value of chamfer dimension r

Remarks1. Models with a stud thread diameter G of 10 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head and end surface of the stud.

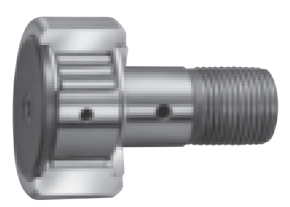
2. Provided with prepacked grease.

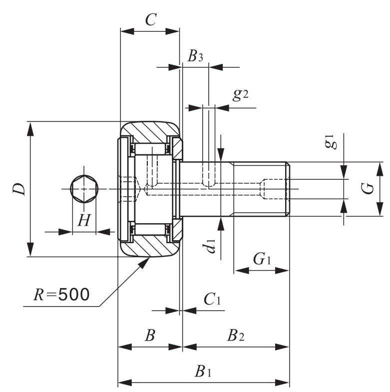
CF, NUCF, CFS, CRH

F

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

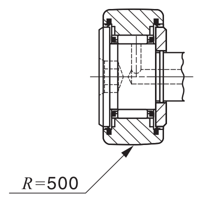
Thrust Disk Type Cam Followers With Cage/With Hexagon Hole

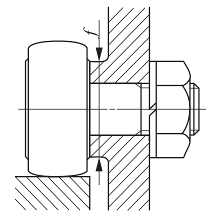




CF…WBR

Stud dia. 3—12mm





CF…WBUUR

Stud dia. mm	Identification number Shield type	Sealed type	Mass (Ref.) g	Boundary dimensions mm D	C	d_1	G	G_1	B	B_1	B_2	B_3	C_1	g_1	g_2	H	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
3	CF 3 WBR	CF 3 WBUUR	4.3	10	7	3	M 3×0.5	5	8	17	9	—	0.5	—	—	2	6.8	0.34	1 500	1 020	384
4	CF 4 WBR	CF 4 WBUUR	7.4	12	8	4	M 4×0.7	6	9	20	11	—	0.5	—	—	2.5	8.3	0.78	2 070	1 590	834
5	CF 5 WBR	CF 5 WBUUR	10.3	13	9	5	M 5×0.8	7.5	10	23	13	—	0.5	—	—	3	9.3	1.6	2 520	2 140	1 260
6	CF 6 WBR	CF 6 WBUUR	18.5	16	11	6	M 6×1	8	12.2 max	28.2 max	16	—	0.6	—	—	3	11	2.7	3 660	3 650	1 950
8	CF 8 WBR	CF 8 WBUUR	28.5	19	11	8	M 8×1.25	10	12.2 max	32.2 max	20	—	0.6	—	—	4	13	6.5	4 250	4 740	4 620
10	CF 10 WBR	CF 10 WBUUR	45	22	12	10	M10×1.25	12	13.2 max	36.2 max	23	—	0.6	—	—	4	16	13.8	5 430	6 890	6 890
	CF 10-1 WBR	CF 10-1 WBUUR	60	26	12	10	M10×1.25	12	13.2 max	36.2 max	23	—	0.6	—	—	4	16	13.8	5 430	6 890	6 890
12	CF 12 WBR	CF 12 WBUUR	95	30	14	12	M12×1.5	13	15.2 max	40.2 max	25	6	0.6	6	3	6	21	21.9	7 910	9 790	9 790
	CF 12-1 WBR	CF 12-1 WBUUR	105	32	14	12	M12×1.5	13	15.2 max	40.2 max	25	6	0.6	6	3	6	21	21.9	7 910	9 790	9 790

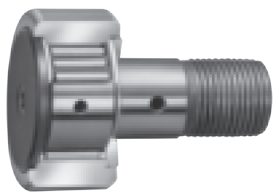
Remarks1. Models with a stud diameter d_1 of 10 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.
2. Shield type models with a stud diameter d_1 of 10 mm or less and the sealed type models are provided with prepacked grease. Other models are not provided with prepacked grease. Perform proper lubrication for use.

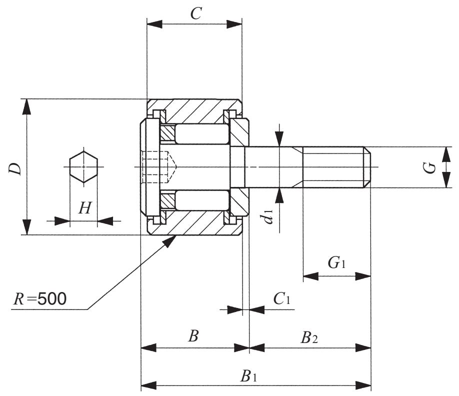
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

CAM FOLLOWERS

IKO

Thrust Disk Type Stainless Steel Made Cam Followers **With Cage/With Hexagon Hole**





CF…FWBR

CF…FWBUUR

Stud dia. 3–5mm

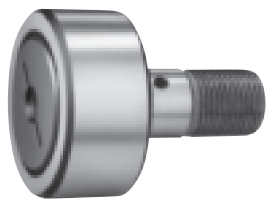
Stud dia. mm	Identification number Shield type	Identification number Sealed type	Mass (Ref.) g	D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimension f Min.	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
				Boundary dimensions mm										mm				
3	**CF 3 FWBR**	**CF 3 FWBUUR**	4.3	10	7	3	M 3×0.5	5	8	17	9	0.5	2	6.8	0.34	1 200	813	384
4	**CF 4 FWBR**	**CF 4 FWBUUR**	7.4	12	8	4	M 4×0.7	6	9	20	11	0.5	2.5	8.3	0.78	1 650	1 270	834
5	**CF 5 FWBR**	**CF 5 FWBUUR**	10.3	13	9	5	M 5×0.8	7.5	10	23	13	0.5	3	9.3	1.6	1 930	1 730	1 260

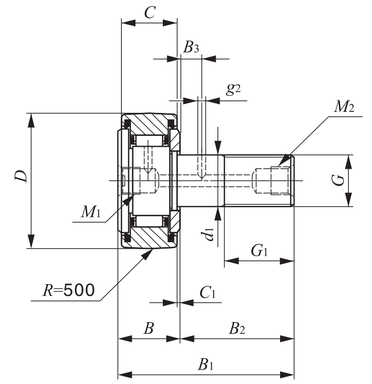
Remarks1. No oil hole is provided.
2. Provided with prepacked grease.

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

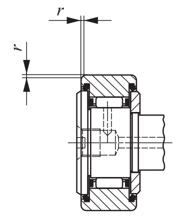
CAM FOLLOWERS

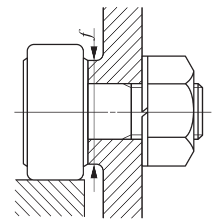
Centralized Lubrication Type Cam Followers With Cage/With Screwdriver Slot





CF···RU1





CF···FU1

Stud dia. 6—30mm

Stud dia. mm	Identification number With crowned outer ring	Identification number With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G	G_1	B max	B_1 max	B_2	B_3	C_1	g_2	M_1	M_2	$r_{s\ min}$(1)	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
6	**CF-RU1- 6**	**CF-FU1- 6**	18.5	16	11	6	M 6×1	8	12.2	28.2	16	—	0.6	—	M6×0.75	—	0.3	11	2.7	3 660	3 650	1 950
8	**CF-RU1- 8**	**CF-FU1- 8**	28.5	19	11	8	M 8×1.25	10	12.2	32.2	20	—	0.6	—			0.3	13	6.5	4 250	4 740	4 620
10	**CF-RU1-10**	**CF-FU1-10**	45	22	12	10	M10×1.25	12	13.2	36.2	23	—	0.6	—			0.3	16	13.8	5 430	6 890	6 890
	CF-RU1-10-1	**CF-FU1-10-1**	60	26	12	10	M10×1.25	12	13.2	36.2	23	—	0.6	—			0.3	16	13.8	5 430	6 890	6 890
12	**CF-RU1-12**	**CF-FU1-12**	95	30	14	12	M12×1.5	13	15.2	40.2	25	—	0.6	—			0.6	21	23.9	7 910	9 790	9 790
	CF-RU1-12-1	**CF-FU1-12-1**	105	32	14	12	M12×1.5	13	15.2	40.2	25	—	0.6	—			0.6	21	23.9	7 910	9 790	9 790
16	**CF-RU1-16**	**CF-FU1-16**	170	35	18	16	M16×1.5	17	19.6	52.1	32.5	8	0.8	3	PT 1/8	PT 1/8	0.6	26	58.5	12 000	18 300	18 300
18	**CF-RU1-18**	**CF-FU1-18**	250	40	20	18	M18×1.5	19	21.6	58.1	36.5	8	0.8	3			1	29	86.2	14 800	25 200	25 200
20	**CF-RU1-20**	**CF-FU1-20**	460	52	24	20	M20×1.5	21	25.6	66.1	40.5	9	0.8	4			1	34	119	20 700	34 600	34 600
	CF-RU1-20-1	**CF-FU1-20-1**	385	47	24	20	M20×1.5	21	25.6	66.1	40.5	9	0.8	4			1	34	119	20 700	34 600	34 600
24	**CF-RU1-24**	**CF-FU1-24**	815	62	29	24	M24×1.5	25	30.6	80.1	49.5	11	0.8	4			1	40	215	30 500	52 600	52 000
	CF-RU1-24-1	**CF-FU1-24-1**	1 140	72	29	24	M24×1.5	25	30.6	80.1	49.5	11	0.8	4			1	40	215	30 500	52 600	52 000
30	**CF-RU1-30**	**CF-FU1-30**	1 870	80	35	30	M30×1.5	32	37	100	63	15	1	4			1	49	438	45 400	85 100	85 100
	CF-RU1-30-1	**CF-FU1-30-1**	2 030	85	35	30	M30×1.5	32	37	100	63	15	1	4			1	49	438	45 400	85 100	85 100
	CF-RU1-30-2	**CF-FU1-30-2**	2 220	90	35	30	M30×1.5	32	37	100	63	15	1	4			1	49	438	45 400	85 100	85 100

Note(1) Minimum allowable value of chamfer dimension r

Remarks1. Models with a stud diameter d_1 of 12 mm or less are provided with a lubrication tapped hole on the stud head only. Other models are provided with one lubrication tapped hole each on the head and end surface of the stud.

2. Provided with prepacked grease.

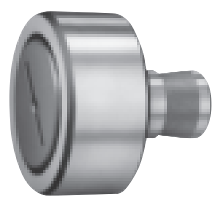
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

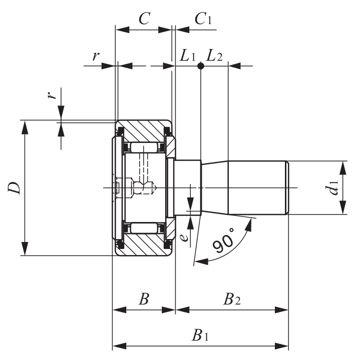
CF, NUCF, CFS, CRH

F

CAM FOLLOWERS

Easy Mounting Type Cam Followers With Cage/With Screwdriver Slot

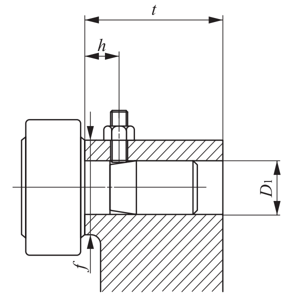




Stud dia. 6—20mm

CF···SFU

IKO



Stud dia.	Identification number	Mass (Ref.)	Boundary dimensions mm								Mounting dimensions mm									Basic dynamic load rating	Basic static load rating	Maximum allowable static load
mm		g	D	C	d_1	B max	B_1 max	B_2	C_1	L_1	L_2	e	$r_{s\,min}$ (1)	D_1	Tolerance	t Min.	f Min.	h (Ref.)	C N	C_0 N	N
6	**CF-SFU- 6**	19.5	16	11	6	12.2	32	19.8	0.6	5	10	0.3	0.3	6	+0.012 0	20	11	10	3 660	3 650	1 950
8	**CF-SFU- 8**	29	19	11	8	12.2	32	19.8	0.6	5	10	0.5	0.3	8	+0.015 0	20	13	10	4 250	4 740	4 620
10	**CF-SFU-10**	44	22	12	10	13.2	33	19.8	0.6	5	10	0.5	0.3	10		20	16	10	5 430	6 890	6 890
	CF-SFU-10-1	59	26	12	10	13.2	33	19.8	0.6	5	10	0.5	0.3	10		20	16	10	5 430	6 890	6 890
12	**CF-SFU-12**	94	30	14	12	15.2	35	19.8	0.6	5	10	1	0.6	12	+0.018 0	20	21	10	7 910	9 790	9 790
	CF-SFU-12-1	104	32	14	12	15.2	35	19.8	0.6	5	10	1	0.6	12		20	21	10	7 910	9 790	9 790
16	**CF-SFU-16**	164	35	18	16	19.6	44.5	24.9	0.8	10	10	1	0.6	16		25	26	15	12 000	18 300	18 300
18	**CF-SFU-18**	235	40	20	18	21.6	46.5	24.9	0.8	10	10	1	1	18		25	29	15	14 800	25 200	25 200
20	**CF-SFU-20**	435	52	24	20	25.6	50.5	24.9	0.8	10	10	1	1	20	+0.021 0	25	34	15	20 700	34 600	34 600
	CF-SFU-20-1	360	47	24	20	25.6	50.5	24.9	0.8	10	10	1	1	20		25	34	15	20 700	34 600	34 600

Note(1) Minimum allowable value of chamfer dimension r

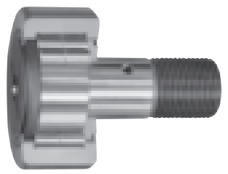
Remarks1. No oil hole is provided.

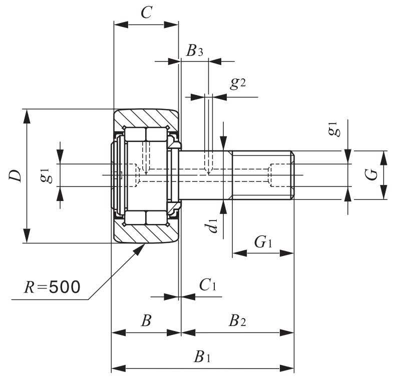
2. Provided with prepacked grease.

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

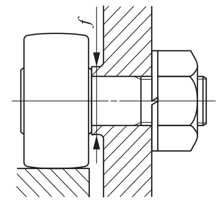
CAM FOLLOWERS

Heavy Duty Type Cam Followers Full Compliment Type/With Screwdriver Slot





NUCF…R



Stud dia. 10—30mm

Stud dia. mm	Identification number	Mass (Ref.) g	Boundary dimensions mm D	C	d_1	G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
10	**NUCF 10 R**	44	22	12	10	M10×1.25	12	13.2	36.2	23	—	0.6	*4	—	12	13.8	10 400	11 500	5 300
	NUCF 10-1 R	58	26	12	10	M10×1.25	12	13.2	36.2	23	—	0.6	*4	—	12	13.8	10 400	11 500	9 210
12	**NUCF 12 R**	86	30	14	12	M12×1.5	13	15.2	40.2	25	6	0.6	6	3	17	21.9	14 000	13 400	5 650
	NUCF 12-1 R	97	32	14	12	M12×1.5	13	15.2	40.2	25	6	0.6	6	3	17	21.9	14 000	13 400	9 040
16	**NUCF 16 R**	167	35	18	16	M16×1.5	17	19.6	52.1	32.5	8	0.8	6	3	20	58.5	23 400	27 300	11 800
18	**NUCF 18 R**	244	40	20	18	M18×1.5	19	21.6	58.1	36.5	8	0.8	6	3	22	86.2	25 200	30 900	20 300
20	**NUCF 20 R**	457	52	24	20	M20×1.5	21	25.6	66.1	40.5	9	0.8	8	4	31	119	43 100	58 100	30 000
	NUCF 20-1 R	384	47	24	20	M20×1.5	21	25.6	66.1	40.5	9	0.8	8	4	27	119	38 900	49 000	27 200
24	**NUCF 24 R**	789	62	29	24	M24×1.5	25	30.6	80.1	49.5	11	0.8	8	4	38	215	58 200	75 300	35 200
	NUCF 24-1 R	1 020	72	29	24	M24×1.5	25	30.6	80.1	49.5	11	0.8	8	4	44	215	63 900	88 800	57 000
30	**NUCF 30 R**	1 600	80	35	30	M30×1.5	32	37	100	63	15	1	8	4	45	438	90 300	121 000	98 300
	NUCF 30-2 R	1 970	90	35	30	M30×1.5	32	37	100	63	15	1	8	4	45	438	90 300	121 000	98 300

Remarks1. Models with a stud diameter d_1 of 10 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.
2. Provided with prepacked grease.

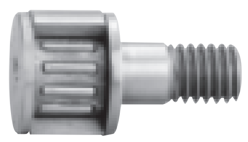
CF, NUCF, CFS, CRH

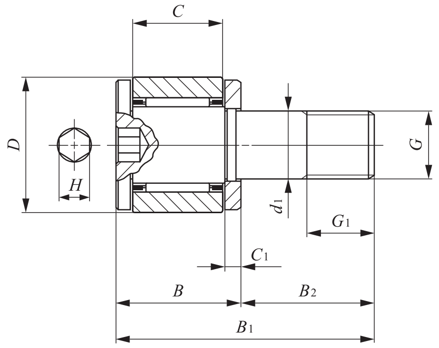
F

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

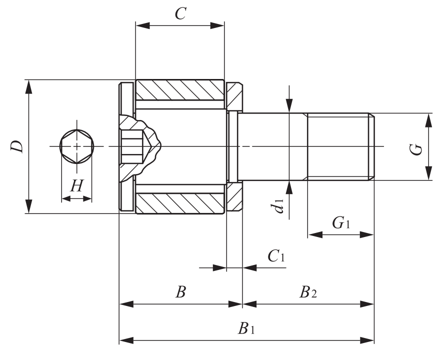
Miniature Type Cam Followers With Cage/With Hexagon Hole
Full Complement Type/With Hexagon Hole

Stud dia. 2—6mm

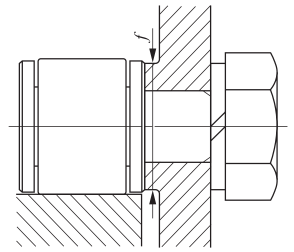




CFS



CFS…V



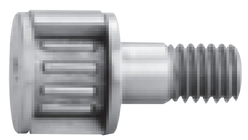
Stud dia. mm	Identification number: With cage	Identification number: Full complement	Mass (Ref.) g	D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimension f Min. mm	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
2	**CFS 2**	—	0.6	4.5	2.5	2	M2 ×0.4	2	4	8	4	0.7	0.9	4.3	9.1	288	202	202
	—	**CFS 2 V**	0.6	4.5	2.5	2	M2 ×0.4	2	4	8	4	0.7	0.9	4.3	9.1	768	734	229
2.5	**CFS 2.5**	—	1	5	3	2.5	M2.5×0.45	2.5	4.5	9.5	5	0.7	0.9	4.8	18.7	428	351	351
	—	**CFS 2.5 V**	1	5	3	2.5	M2.5×0.45	2.5	4.5	9.5	5	0.7	0.9	4.8	18.7	1 000	1 080	360
3	**CFS 3**	—	2	6	4	3	M3 ×0.5	3	5.5	11.5	6	0.7	1.3	5.8	33.5	629	611	484
	—	**CFS 3 V**	2	6	4	3	M3 ×0.5	3	5.5	11.5	6	0.7	1.3	5.8	33.5	1 420	1 790	484
4	**CFS 4**	—	4	8	5	4	M4 ×0.7	4	7	15	8	1.0	1.5	7.7	77.7	1 120	1 120	919
	—	**CFS 4 V**	4	8	5	4	M4 ×0.7	4	7	15	8	1.0	1.5	7.7	77.7	2 370	3 000	919
5	**CFS 5**	—	7	10	6	5	M5 ×0.8	5	8	18	10	1.0	2	9.6	158	1 570	1 850	1 570
	—	**CFS 5 V**	7	10	6	5	M5 ×0.8	5	8	18	10	1.0	2	9.6	158	3 180	4 700	1 570
6	**CFS 6**	—	13	12	7	6	M6 ×1	6	9.5	21.5	12	1.2	2.5	11.6	268	2 090	2 200	2 150
	—	**CFS 6 V**	13	12	7	6	M6 ×1	6	9.5	21.5	12	1.2	2.5	11.6	268	4 610	6 250	2 150

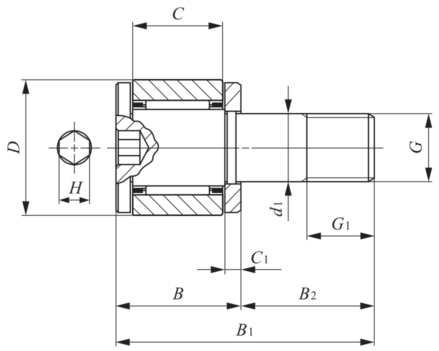
Boundary dimensions mm

Remarks1. No oil hole is provided.
2. Provided with prepacked grease.

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

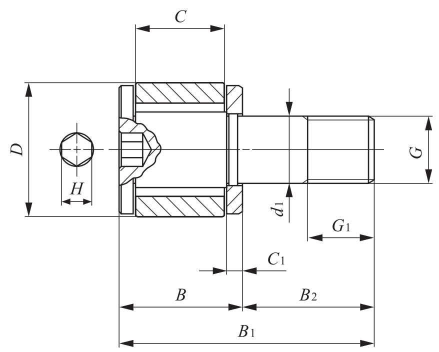
Miniature Type Cam Followers Stainless Steel Made With Cage/With Hexagon Hole
Full Complement Type/With Hexagon Hole



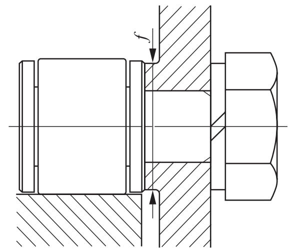


CFS…F

Stud dia. 2—6mm



CFS…FV



Stud dia. mm	Identification number: With cage	Identification number: Full complement	Mass (Ref.) g	Boundary dimensions mm: D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimension f Min. mm	Maximum tightening torque N-cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
2	CFS 2 F	—	0.6	4.5	2.5	2	M2 ×0.4	2	4	8	4	0.7	0.9	4.3	9.1	288	202	202
	—	CFS 2 FV	0.6	4.5	2.5	2	M2 ×0.4	2	4	8	4	0.7	0.9	4.3	9.1	768	734	229
2.5	CFS 2.5 F	—	1	5	3	2.5	M2.5×0.45	2.5	4.5	9.5	5	0.7	0.9	4.8	18.7	342	281	281
	—	CFS 2.5 FV	1	5	3	2.5	M2.5×0.45	2.5	4.5	9.5	5	0.7	0.9	4.8	18.7	800	862	360
3	CFS 3 F	—	2	6	4	3	M3 ×0.5	3	5.5	11.5	6	0.7	1.3	5.8	33.5	504	488	484
	—	CFS 3 FV	2	6	4	3	M3 ×0.5	3	5.5	11.5	6	0.7	1.3	5.8	33.5	1 140	1 430	484
4	CFS 4 F	—	4	8	5	4	M4 ×0.7	4	7	15	8	1.0	1.5	7.7	77.7	897	894	894
	—	CFS 4 FV	4	8	5	4	M4 ×0.7	4	7	15	8	1.0	1.5	7.7	77.7	1 900	2 400	919
5	CFS 5 F	—	7	10	6	5	M5 ×0.8	5	8	18	10	1.0	2	9.6	158	1 250	1 480	1 480
	—	CFS 5 FV	7	10	6	5	M5 ×0.8	5	8	18	10	1.0	2	9.6	158	2 540	3 760	1 570
6	CFS 6 F	—	13	12	7	6	M6 ×1	6	9.5	21.5	12	1.2	2.5	11.6	268	1 670	1 760	1 760
	—	CFS 6 FV	13	12	7	6	M6 ×1	6	9.5	21.5	12	1.2	2.5	11.6	268	3 690	5 000	2 150

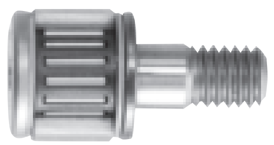
Remarks1. No oil hole is provided.
2. Provided with prepacked grease.

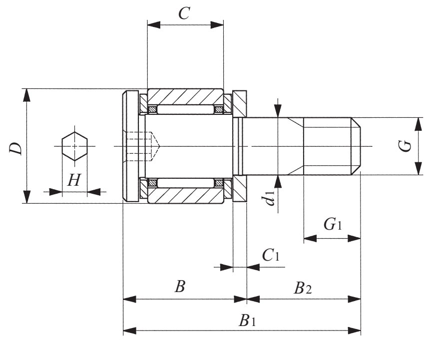
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

CAM FOLLOWERS

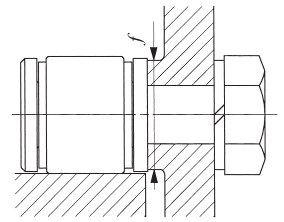
IKO

Thrust Disk Type Miniature Cam Followers With Cage/With Hexagon Hole





CFS··· W



Stud dia. 2−6 mm

Stud dia. mm	Identification number	Mass (Ref.) g	Boundary dimensions mm D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimension f Min. mm	Maximum tightening torque N-cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
2	**CFS 2 W**	0.6	4.5	2.5	2	M2 ×0.4	2	4.5	8.5	4	0.7	0.9	4.3	9.1	288	202	194
2.5	**CFS 2.5 W**	1	5	3	2.5	M2.5×0.45	2.5	5	10	5	0.7	0.9	4.8	18.7	428	351	313
3	**CFS 3 W**	2	6	4	3	M3 ×0.5	3	6.5	12.5	6	0.7	1.3	5.8	33.5	629	611	399
4	**CFS 4 W**	4	8	5	4	M4 ×0.7	4	8	16	8	1.0	1.5	7.7	77.7	1 120	1 120	785
5	**CFS 5 W**	7	10	6	5	M5 ×0.8	5	9	19	10	1.0	2	9.6	158	1 570	1 850	1 370
6	**CFS 6 W**	13	12	7	6	M6 ×1	6	10.5	22.5	12	1.2	2.5	11.6	268	2 090	2 200	1 920

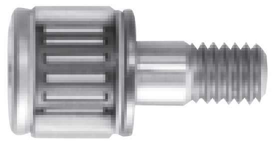
Remarks1. No oil hole is provided.
2. Provided with prepacked grease.

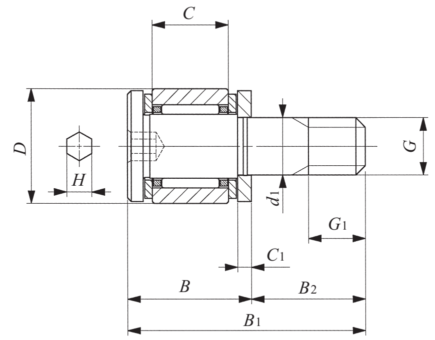
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

CAM FOLLOWERS

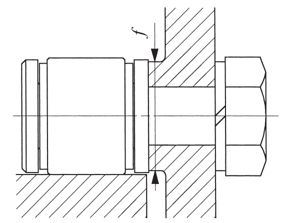
IKO

Thrust Disk Type Miniature Cam Followers·Stainless Steel Made **With Cage/With Hexagon Hole**





CFS···FW



Stud dia.2－6 mm

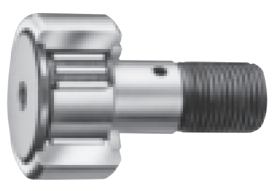
Stud dia. mm	Identification number	Mass (Ref.) g	Boundary dimensions mm D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimension f Min. mm	Maximum tightening torque N-cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
2	**CFS 2 FW**	0.6	4.5	2.5	2	M2 ×0.4	2	4.5	8.5	4	0.7	0.9	4.3	9.1	230	161	161
2.5	**CFS 2.5 FW**	1	5	3	2.5	M2.5×0.45	2.5	5	10	5	0.7	0.9	4.8	18.7	342	281	281
3	**CFS 3 FW**	2	6	4	3	M3 ×0.5	3	6.5	12.5	6	0.7	1.3	5.8	33.5	504	488	399
4	**CFS 4 FW**	4	8	5	4	M4 ×0.7	4	8	16	8	1.0	1.5	7.7	77.7	897	894	785
5	**CFS 5 FW**	7	10	6	5	M5 ×0.8	5	9	19	10	1.0	2	9.6	158	1 250	1 480	1 370
6	**CFS 6 FW**	13	12	7	6	M6 ×1	6	10.5	22.5	12	1.2	2.5	11.6	268	1 670	1 760	1 760

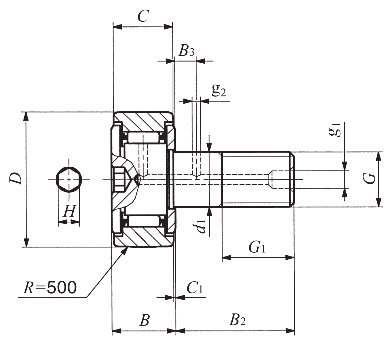
Remarks1. No oil hole is provided.
2. Provided with prepacked grease.

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

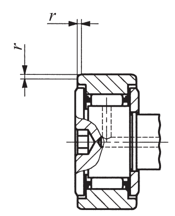
CAM FOLLOWERS

Inch Series Cam Followers **With Cage/With Hexagon Hole**

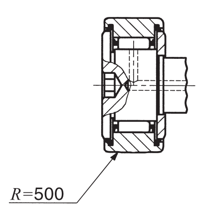




CR···BR



CR···B



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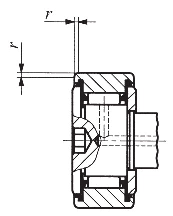
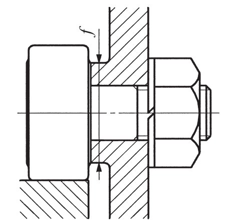


CR···BUU



Stud dia. 4.826−22.225 mm

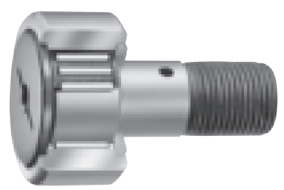
Stud dia. mm (inch)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	Boundary dimensions mm(inch): B max	B_2	B_3	C_1	g_1	g_2	H	r	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 BR	CR 8 B	CR 8 BUUR	CR 8 BUU	9	12.700 (1/2)	8.731 (11/32)	4.826	No.10-32	6.350 (1/4)	10.2(0.40)	12.700 (1/2)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	8.334 (21/64)	1.4	2 520	2 140
	CR 8-1 BR	CR 8-1 B	CR 8-1 BUUR	CR 8-1 BUU	10	12.700 (1/2)	9.525 (3/8)	4.826	No.10-32	6.350 (1/4)	10.9(0.43)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	8.334 (21/64)	1.4	2 520	2 140
6.350 (1/4)	CR 10 BR	CR 10 B	CR 10 BUUR	CR 10 BUU	19	15.875 (5/8)	10.319 (13/32)	6.350 (1/4)	1/4 - 28	7.938 (5/16)	11.8(0.46)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	11.509 (29/64)	3.4	3 650	3 670
	CR 10-1 BR	CR 10-1 B	CR 10-1 BUUR	CR 10-1 BUU	21	15.875 (5/8)	11.112 (7/16)	6.350 (1/4)	1/4 - 28	7.938 (5/16)	12.5(0.49)	19.050 (3/4)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	11.509 (29/64)	3.4	3 650	3 670
9.525 (3/8)	CR 12 BR	CR 12 B	CR 12 BUUR	CR 12 BUU	35	19.050 (3/4)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)	14.2(0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	0.794 (1/32)	13.494 (17/32)	10.8	4 420	5 110
	CR 14 BR	CR 14 B	CR 14 BUUR	CR 14 BUU	46	22.225 (7/8)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)	14.2(0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	0.794 (1/32)	15.081 (19/32)	10.8	4 790	5 810
11.112 (7/16)	CR 16 BR	CR 16 B	CR 16 BUUR	CR 16 BUU	73	25.400 (1)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)	17.3(0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.191 (3/64)	17.859 (45/64)	17.4	8 810	10 800
	CR 18 BR	CR 18 B	CR 18 BUUR	CR 18 BUU	88	28.575 (1 1/8)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)	17.3(0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.588 (1/16)	19.050 (3/4)	17.4	9 180	11 600
12.700 (1/2)	CR 20 BR	CR 20 B	CR 20 BUUR	CR 20 BUU	132	31.750 (1 1/4)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)	20.4(0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.588 (1/16)	21.828 (55/64)	27.7	14 200	16 000
	CR 22 BR	CR 22 B	CR 22 BUUR	CR 22 BUU	157	34.925 (1 3/8)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)	20.4(0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.588 (1/16)	21.828 (55/64)	27.7	14 200	16 000
15.875 (5/8)	CR 24 BR	CR 24 B	CR 24 BUUR	CR 24 BUU	225	38.100 (1 1/2)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)	23.6(0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	26.196 (1 3/64)	55.7	18 600	24 300
	CR 26 BR	CR 26 B	CR 26 BUUR	CR 26 BUU	260	41.275 (1 5/8)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)	23.6(0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	26.196 (1 3/64)	55.7	18 600	24 300
19.050 (3/4)	CR 28 BR	CR 28 B	CR 28 BUUR	CR 28 BUU	365	44.450 (1 3/4)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)	26.8(1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	32.543 (1 9/32)	100	25 100	38 200
	CR 30 BR	CR 30 B	CR 30 BUUR	CR 30 BUU	410	47.625 (1 7/8)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)	26.8(1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	32.543 (1 9/32)	100	25 100	38 200
22.225 (7/8)	CR 32 BR	CR 32 B	CR 32 BUUR	CR 32 BUU	615	50.800 (2)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)	33.5(1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	11.112 (7/16)	1.588 (1/16)	37.306 (1 15/32)	162	32 500	63 900
	CR 36 BR	CR 36 B	CR 36 BUUR	CR 36 BUU	750	57.150 (2 1/4)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)	33.5(1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	11.112 (7/16)	1.588 (1/16)	37.306 (1 15/32)	162	32 500	63 900

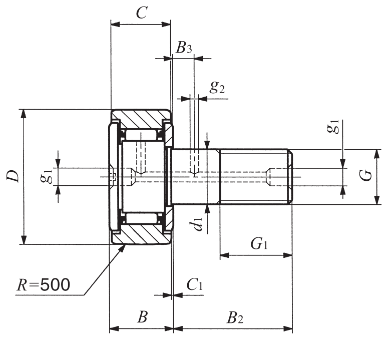
Remarks1. Models with a stud diameter d_1 of 6.35 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.
2. Provided with prepacked grease.

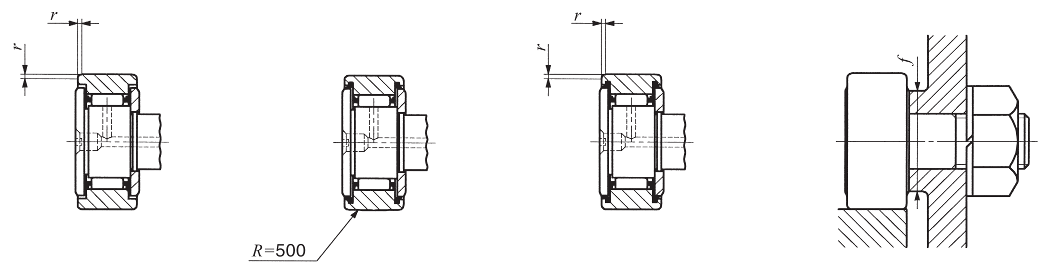
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

CAM FOLLOWERS

Inch Series Cam Followers **With Cage/With Screwdriver Slot**







Stud dia. 4.826—22.225 mm

CR···R CR CR···UUR CR···UU

Stud dia. mm (inch)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	Boundary dimensions mm(inch): B max	B_2	B_3	C_1	g_1	g_2	r	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 R	CR 8	CR 8 UUR	CR 8 UU	9	12.700 (1/2)	8.731 (11/32)	4.826	No.10-32	6.350 (1/4)	10.2 (0.40)	12.700 (1/2)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	0.397 (1/64)	8.334 (21/64)	1.4	2 520	2 140
	CR 8-1 R	CR 8-1	CR 8-1 UUR	CR 8-1 UU	10	12.700 (1/2)	9.525 (3/8)	4.826	No.10-32	6.350 (1/4)	10.9 (0.43)	15.875 (5/8)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	0.397 (1/64)	8.334 (21/64)	1.4	2 520	2 140
6.350 (1/4)	CR 10 R	CR 10	CR 10 UUR	CR 10 UU	19	15.875 (5/8)	10.319 (13/32)	6.350 (1/4)	1/4 - 28	7.938 (5/16)	11.8 (0.46)	15.875 (5/8)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	0.397 (1/64)	11.509 (29/64)	3.4	3 650	3 670
	CR 10-1 R	CR 10-1	CR 10-1 UUR	CR 10-1 UU	21	15.875 (5/8)	11.112 (7/16)	6.350 (1/4)	1/4 - 28	7.938 (5/16)	12.5 (0.49)	19.050 (3/4)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	0.397 (1/64)	11.509 (29/64)	3.4	3 650	3 670
9.525 (3/8)	CR 12 R	CR 12	CR 12 UUR	CR 12 UU	35	19.050 (3/4)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)	14.2 (0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	0.794 (1/32)	13.494 (17/32)	10.8	4 420	5 110
	CR 14 R	CR 14	CR 14 UUR	CR 14 UU	46	22.225 (7/8)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)	14.2 (0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	0.794 (1/32)	15.081 (19/32)	10.8	4 790	5 810
11.112 (7/16)	CR 16 R	CR 16	CR 16 UUR	CR 16 UU	73	25.400 (1)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)	17.3 (0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.191 (3/64)	17.859 (45/64)	17.4	8 810	10 800
	CR 18 R	CR 18	CR 18 UUR	CR 18 UU	88	28.575 (1 1/8)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)	17.3 (0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	19.050 (3/4)	17.4	9 180	11 600
12.700 (1/2)	CR 20 R	CR 20	CR 20 UUR	CR 20 UU	132	31.750 (1 1/4)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)	20.4 (0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	21.828 (55/64)	27.7	14 200	16 000
	CR 22 R	CR 22	CR 22 UUR	CR 22 UU	157	34.925 (1 3/8)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)	20.4 (0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	21.828 (55/64)	27.7	14 200	16 000
15.875 (5/8)	CR 24 R	CR 24	CR 24 UUR	CR 24 UU	225	38.100 (1 1/2)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)	23.6 (0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	26.196 (1 3/64)	55.7	18 600	24 300
	CR 26 R	CR 26	CR 26 UUR	CR 26 UU	260	41.275 (1 5/8)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)	23.6 (0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	26.196 (1 3/64)	55.7	18 600	24 300
19.050 (3/4)	CR 28 R	CR 28	CR 28 UUR	CR 28 UU	365	44.450 (1 3/4)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)	26.8 (1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	32.543 (1 9/32)	100	25 100	38 200
	CR 30 R	CR 30	CR 30 UUR	CR 30 UU	410	47.625 (1 7/8)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)	26.8 (1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	32.543 (1 9/32)	100	25 100	38 200
22.225 (7/8)	CR 32 R	CR 32	CR 32 UUR	CR 32 UU	615	50.800 (2)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)	33.5 (1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	1.588 (1/16)	37.306 (1 15/32)	162	32 500	63 900
	CR 36 R	CR 36	CR 36 UUR	CR 36 UU	750	57.150 (2 1/4)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)	33.5 (1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	1.588 (1/16)	37.306 (1 15/32)	162	32 500	63 900

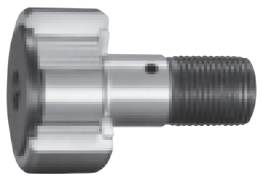
Remarks 1. Models with a stud diameter d_1 of 6.35 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.

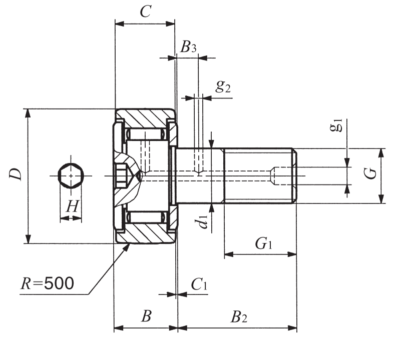
2. Provided with prepacked grease.

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

CAM FOLLOWERS

Inch Series Cam Followers **Full Complement Type/With Hexagon Hole**





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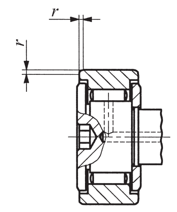
IKO



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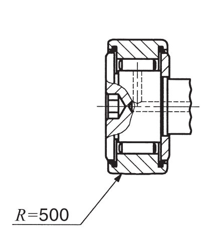

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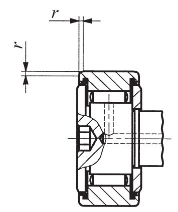

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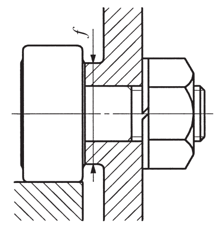


Stud dia. 4.826－22.225 mm

Stud dia. mm (inch)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1
4.826	CR 8 VBR	CR 8 VB	CR 8 VBUUR	CR 8 VBUU	9	12.700 (1/2)	8.731 (11/32)	4.826	No.10-32	6.350 (1/4)
	CR 8-1 VBR	CR 8-1VB	CR 8-1 VBUUR	CR 8-1 VBUU	10	12.700 (1/2)	9.525 (3/8)	4.826	No.10-32	6.350 (1/4)
6.350 (1/4)	CR 10 VBR	CR 10 VB	CR 10 VBUUR	CR 10 VBUU	19	15.875 (5/8)	10.319 (13/32)	6.350 (1/4)	1/4 - 28	7.938 (5/16)
	CR 10-1 VBR	CR 10-1VB	CR 10-1 VBUUR	CR 10-1 VBUU	21	15.875 (5/8)	11.112 (7/16)	6.350 (1/4)	1/4 - 28	7.938 (5/16)
9.525 (3/8)	CR 12 VBR	CR 12 VB	CR 12 VBUUR	CR 12 VBUU	36	19.050 (3/4)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)
	CR 14 VBR	CR 14 VB	CR 14 VBUUR	CR 14 VBUU	47	22.225 (7/8)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)
11.112 (7/16)	CR 16 VBR	CR 16 VB	CR 16 VBUUR	CR 16 VBUU	74	25.400 (1)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)
	CR 18 VBR	CR 18 VB	CR 18 VBUUR	CR 18 VBUU	85	28.575 (1 1/8)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)
12.700 (1/2)	CR 20 VBR	CR 20 VB	CR 20 VBUUR	CR 20 VBUU	137	31.750 (1 1/4)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)
	CR 22 VBR	CR 22 VB	CR 22 VBUUR	CR 22 VBUU	160	34.925 (1 3/8)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)
15.875 (5/8)	CR 24 VBR	CR 24 VB	CR 24 VBUUR	CR 24 VBUU	230	38.100 (1 1/2)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)
	CR 26 VBR	CR 26 VB	CR 26 VBUUR	CR 26 VBUU	265	41.275 (1 5/8)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)
19.050 (3/4)	CR 28 VBR	CR 28 VB	CR 28 VBUUR	CR 28 VBUU	372	44.450 (1 3/4)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)
	CR 30 VBR	CR 30 VB	CR 30 VBUUR	CR 30 VBUU	418	47.625 (1 7/8)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)
22.225 (7/8)	CR 32 VBR	CR 32 VB	CR 32 VBUUR	CR 32 VBUU	627	50.800 (2)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)
	CR 36 VBR	CR 36 VB	CR 36 VBUUR	CR 36 VBUU	759	57.150 (2 1/4)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)

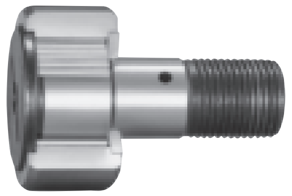
Remarks1. Models with a stud diameter d_1 of 6.35 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.
2. Provided with prepacked grease.

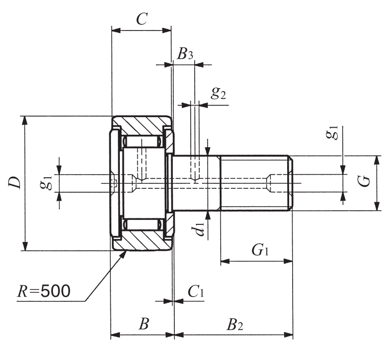
Boundary dimensions mm(inch): B max	B_2	B_3	C_1	g_1	g_2	H	r	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
10.2 (0.40)	12.700 (1/2)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	8.334 (21/64)	1.4	4 260	4 750
10.9 (0.43)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	8.334 (21/64)	1.4	4 710	5 410
11.8 (0.46)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	11.509 (29/64)	3.4	5 830	7 660
12.5 (0.49)	19.050 (3/4)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	11.509 (29/64)	3.4	6 340	8 530
14.2 (0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	0.794 (1/32)	13.494 (17/32)	10.8	8 710	12 300
14.2 (0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	0.794 (1/32)	15.081 (19/32)	10.8	8 710	12 300
17.3 (0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.191 (3/64)	17.859 (45/64)	17.4	13 100	22 700
17.3 (0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.588 (1/16)	19.050 (3/4)	17.4	13 100	22 700
20.4 (0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.588 (1/16)	21.828 (55/64)	27.7	23 600	31 700
20.4 (0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	6.350 (1/4)	1.588 (1/16)	21.828 (55/64)	27.7	23 600	31 700
23.6 (0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	26.196 (1 3/64)	55.7	28 200	40 100
23.6 (0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	26.196 (1 3/64)	55.7	28 200	40 100
26.8 (1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	32.543 (1 9/32)	100	35 300	55 600
26.8 (1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	7.938 (5/16)	1.588 (1/16)	32.543 (1 9/32)	100	35 300	55 600
33.5 (1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	11.112 (7/16)	1.588 (1/16)	37.306 (1 15/32)	162	45 700	80 600
33.5 (1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	11.112 (7/16)	1.588 (1/16)	37.306 (1 15/32)	162	45 700	80 600

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

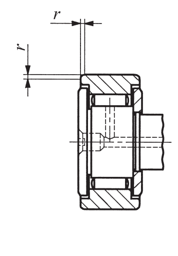
CAM FOLLOWERS

Inch Series Cam Followers Full Complement Type/With Screwdriver Slot

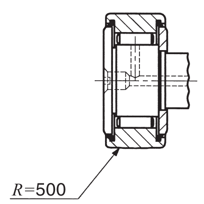




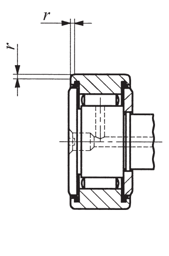
CR…VR



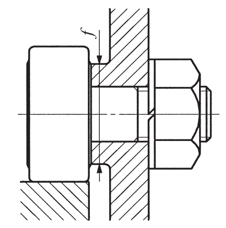
CR…V



CR…VUUR



CR…VUU



IKO

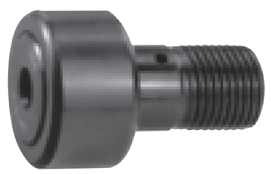
Stud dia. 4.826–31.750mm

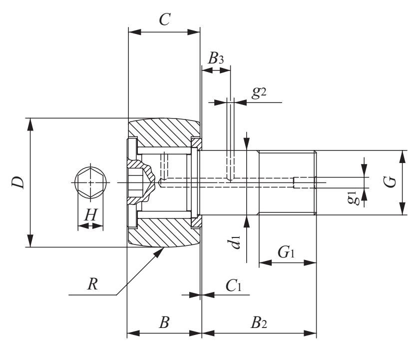
Stud dia. mm (inch)	Identification number: Shield type, With crowned outer ring	Shield type, With cylindrical outer ring	Sealed type, With crowned outer ring	Sealed type, With cylindrical outer ring	Mass (Ref.) g	Boundary dimensions mm(inch) D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	r	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 VR	CR 8 V	CR 8 VUUR	CR 8 VUU	9	12.700 (1/2)	8.731 (11/32)	4.826	No.10-32	6.350 (1/4)	10.2 (0.40)	12.700 (1/2)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	8.334 (21/64)	1.4	4 260	4 750
	CR 8-1 VR	CR 8-1 V	CR 8-1 VUUR	CR 8-1 VUU	10	12.700 (1/2)	9.525 (3/8)	4.826	No.10-32	6.350 (1/4)	10.9 (0.43)	15.875 (5/8)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	8.334 (21/64)	1.4	4 710	5 410
6.350 (1/4)	CR 10 VR	CR 10 V	CR 10 VUUR	CR 10 VUU	19	15.875 (5/8)	10.319 (13/32)	6.350 (1/4)	1/4 - 28	7.938 (5/16)	11.8 (0.46)	15.875 (5/8)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	11.509 (29/64)	3.4	5 830	7 660
	CR 10-1 VR	CR 10-1 V	CR 10-1 VUUR	CR 10-1 VUU	21	15.875 (5/8)	11.112 (7/16)	6.350 (1/4)	1/4 - 28	7.938 (5/16)	12.5 (0.49)	19.050 (3/4)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	11.509 (29/64)	3.4	6 340	8 530
9.525 (3/8)	CR 12 VR	CR 12 V	CR 12 VUUR	CR 12 VUU	36	19.050 (3/4)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)	14.2 (0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	0.794 (1/32)	13.494 (17/32)	10.8	8 710	12 300
	CR 14 VR	CR 14 V	CR 14 VUUR	CR 14 VUU	47	22.225 (7/8)	12.700 (1/2)	9.525 (3/8)	3/8 - 24	9.525 (3/8)	14.2 (0.56)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	0.794 (1/32)	15.081 (19/32)	10.8	8 710	12 300
11.112 (7/16)	CR 16 VR	CR 16 V	CR 16 VUUR	CR 16 VUU	74	25.400 (1)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)	17.3 (0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.191 (3/64)	17.859 (45/64)	17.4	13 100	22 700
	CR 18 VR	CR 18 V	CR 18 VUUR	CR 18 VUU	85	28.575 (1 1/8)	15.875 (5/8)	11.112 (7/16)	7/16 - 20	12.700 (1/2)	17.3 (0.68)	25.400 (1)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	19.050 (3/4)	17.4	13 100	22 700
12.700 (1/2)	CR 20 VR	CR 20 V	CR 20 VUUR	CR 20 VUU	137	31.750 (1 1/4)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)	20.4 (0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	21.828 (55/64)	27.7	23 600	31 700
	CR 22 VR	CR 22 V	CR 22 VUUR	CR 22 VUU	160	34.925 (1 3/8)	19.050 (3/4)	12.700 (1/2)	1/2 - 20	15.875 (5/8)	20.4 (0.80)	31.750 (1 1/4)	7.938 (5/16)	0.794 (1/32)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	21.828 (55/64)	27.7	23 600	31 700
15.875 (5/8)	CR 24 VR	CR 24 V	CR 24 VUUR	CR 24 VUU	230	38.100 (1 1/2)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)	23.6 (0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	26.196 (1 3/64)	55.7	28 200	40 100
	CR 26 VR	CR 26 V	CR 26 VUUR	CR 26 VUU	265	41.275 (1 5/8)	22.225 (7/8)	15.875 (5/8)	5/8 - 18	19.050 (3/4)	23.6 (0.93)	38.100 (1 1/2)	9.525 (3/8)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	26.196 (1 3/64)	55.7	28 200	40 100
19.050 (3/4)	CR 28 VR	CR 28 V	CR 28 VUUR	CR 28 VUU	372	44.450 (1 3/4)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)	26.8 (1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	32.543 (1 9/32)	100	35 300	55 600
	CR 30 VR	CR 30 V	CR 30 VUUR	CR 30 VUU	418	47.625 (1 7/8)	25.400 (1)	19.050 (3/4)	3/4 - 16	22.225 (7/8)	26.8 (1.06)	44.450 (1 3/4)	11.112 (7/16)	0.794 (1/32)	4.762 (3/16)	3.969 (5/32)	1.588 (1/16)	32.543 (1 9/32)	100	35 300	55 600
22.225 (7/8)	CR 32 VR	CR 32 V	CR 32 VUUR	CR 32 VUU	627	50.800 (2)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)	33.5 (1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	1.588 (1/16)	37.306 (1 15/32)	162	45 700	80 600
	CR 36 VR	CR 36 V	CR 36 VUUR	CR 36 VUU	759	57.150 (2 1/4)	31.750 (1 1/4)	22.225 (7/8)	7/8 - 14	25.400 (1)	33.5 (1.32)	50.800 (2)	12.700 (1/2)	0.794 (1/32)	4.762 (3/16)	4.762 (3/16)	1.588 (1/16)	37.306 (1 15/32)	162	45 700	80 600
31.750 (1 1/4)	—	—	—	CR 48 VUU	1 960	76.200 (3)	44.450 (1 3/4)	31.750 (1 1/4)	1 1/4 - 12	31.750 (1 1/4)	46.4 (1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/14)	4.762 (3/16)	2.381 (3/32)	51.991 (2 3/64)	500	77 600	172 000

Remarks1. Models with a stud diameter d_1 of 6.35 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.
2. Provided with prepacked grease.

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

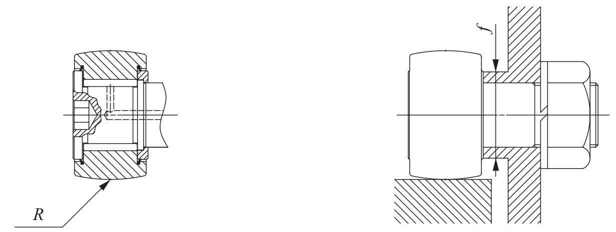
Inch Series Heavy Duty Cam Followers Full Complement Type/With Hexagon Hole





CRH…VBR

Stud dia. 6.350－50.800mm



CRH…VBUUR

Stud dia. mm (inch)	Identification number: Shield type Crowned outer ring	Identification number: Sealed type Crowned outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max
6.350 (1/4)	CRH 8-1 VBR	CRH 8-1 VBUUR	12	12.700 (1/2)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1 (0.44)
	CRH 9 VBR	CRH 9 VBUUR	15	14.228 (9/16)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1 (0.44)
7.938 (5/16)	CRH 10-1 VBR	CRH 10-1 VBUUR	23	15.875 (5/8)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8 (0.50)
	CRH 11 VBR	CRH 11 VBUUR	27	17.462 (11/16)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8 (0.50)
11.112 (7/16)	CRH 12 VBR	CRH 12 VBUUR	39	19.050 (3/4)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6 (0.57)
	CRH 14 VBR	CRH 14 VBUUR	49	22.225 (7/8)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6 (0.57)
15.875 (5/8)	CRH 16 VBR	CRH 16 VBUUR	93	25.400 (1)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9 (0.70)
	CRH 18 VBR	CRH 18 VBUUR	109	28.575 (1 1/8)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9 (0.70)
19.050 (3/4)	CRH 20 VBR	CRH 20 VBUUR	176	31.750 (1 1/4)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0 (0.83)
	CRH 22 VBR	CRH 22 VBUUR	200	34.925 (1 3/8)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0 (0.83)
22.225 (7/8)	CRH 24 VBR	CRH 24 VBUUR	296	38.100 (1 1/2)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3 (0.96)
	CRH 26 VBR	CRH 26 VBUUR	329	41.275 (1 5/8)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3 (0.96)
25.400 (1)	CRH 28 VBR	CRH 28 VBUUR	463	44.450 (1 3/4)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4 (1.08)
	CRH 30 VBR	CRH 30 VBUUR	508	47.625 (1 7/8)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4 (1.08)
28.575 (1 1/8)	CRH 32 VBR	CRH 32 VBUUR	722	50.800 (2)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2 (1.35)
	CRH 36 VBR	CRH 36 VBUUR	858	57.150 (2 1/4)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2 (1.35)
31.750 (1 1/4)	CRH 40 VBR	CRH 40 VBUUR	1 260	63.500 (2 1/2)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0 (1.57)
	CRH 44 VBR	CRH 44 VBUUR	1 460	69.850 (2 3/4)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0 (1.57)
38.100 (1 1/2)	CRH 48 VBR	CRH 48 VBUUR	2 100	76.200 (3)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4 (1.83)
	CRH 52 VBR	CRH 52 VBUUR	2 380	82.550 (3 1/4)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4 (1.83)
44.450 (1 3/4)	CRH 56 VBR	CRH 56 VBUUR	3 240	88.900 (3 1/2)	50.800 (2)	44.450 (1 3/4)	1 3/4-12UN	34.925 (1 3/8)	52.8 (2.08)
50.800 (2)	CRH 64 VBR	CRH 64 VBUUR	4 960	101.600 (4)	57.150 (2 1/4)	50.800 (2)	2-12 UN	38.100 (1 1/2)	59.4 (2.34)

Remarks1. Models with a stud diameter d_1 of 7.938 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.
2. Provided with prepacked grease.

Identification number (Shield type)	Boundary dimensions mm(inch): B_2	B_3	C_1	g_1	g_2	H	R	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
CRH 8-1 VBR	15.875 (5/8)	— (–)	0.794 (1/32)	— (–)	— (–)	3.175 (1/8)	180 (7)	8.334 (21/64)	3.4	4 710	5 410
CRH 9 VBR	15.875 (5/8)	— (–)	0.794 (1/32)	— (–)	— (–)	3.175 (1/8)	180 (7)	8.334 (21/64)	3.4	4 710	5 410
CRH 10-1 VBR	19.050 (3/4)	— (–)	0.794 (1/32)	— (–)	— (–)	3.175 (1/8)	200 (8)	11.112 (7/16)	6.8	6 340	8 530
CRH 11 VBR	19.050 (3/4)	— (–)	0.794 (1/32)	— (–)	— (–)	3.175 (1/8)	200 (8)	11.112 (7/16)	6.8	6 340	8 530
CRH 12 VBR	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	250 (10)	13.494 (17/32)	17.6	8 710	12 300
CRH 14 VBR	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	250 (10)	13.494 (17/32)	17.6	8 710	12 300
CRH 16 VBR	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	300 (12)	18.256 (23/32)	57.8	13 100	22 700
CRH 18 VBR	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	300 (12)	18.256 (23/32)	57.8	13 100	22 700
CRH 20 VBR	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	360 (14)	24.209 (61/64)	103	23 600	31 700
CRH 22 VBR	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	360 (14)	24.209 (61/64)	103	23 600	31 700
CRH 24 VBR	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500 (20)	26.988 (1 1/16)	162	28 200	40 100
CRH 26 VBR	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500 (20)	26.988 (1 1/16)	162	28 200	40 100
CRH 28 VBR	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500 (20)	32.941 (1 19/64)	258	35 300	55 600
CRH 30 VBR	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500 (20)	32.941 (1 19/64)	258	35 300	55 600
CRH 32 VBR	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	11.112 (7/16)	600 (24)	37.306 (1 15/32)	356	45 700	80 600
CRH 36 VBR	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	11.112 (7/16)	600 (24)	37.306 (1 15/32)	356	45 700	80 600
CRH 40 VBR	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	12.700 (1/2)	760 (30)	40.878 (1 39/64)	500	61 400	116 000
CRH 44 VBR	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	12.700 (1/2)	760 (30)	40.878 (1 39/64)	500	61 400	116 000
CRH 48 VBR	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760 (30)	51.991 (2 3/64)	892	77 600	172 000
CRH 52 VBR	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760 (30)	51.991 (2 3/64)	892	77 600	172 000
CRH 56 VBR	69.850 (2 3/4)	17.462 (11/16)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760 (30)	59.928 (2 23/64)	1 450	111 000	239 000
CRH 64 VBR	88.900 (3 1/2)	19.050 (3/4)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760 (30)	64.691 (2 35/64)	2 190	142 000	317 000

1N≒0.102kgf

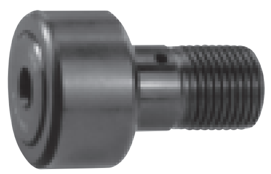
CF, NUCF, CFS, CRH

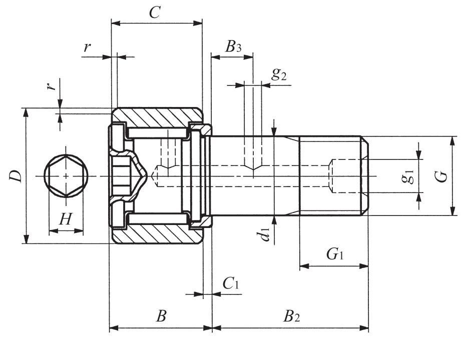
F

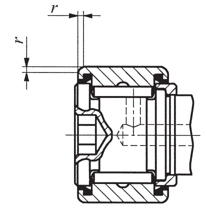
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

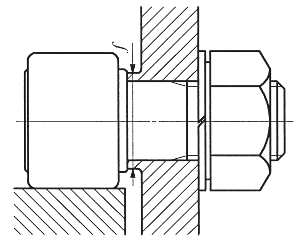
CAM FOLLOWERS

Inch Series Heavy Duty Cam Followers Full Complement Type/With Hexagon Hole









Stud dia. 6.350－50.800mm

CRH···VB

CRH···VBUU

Stud dia. mm (inch)	Identification number: Shield type	Identification number: Sealed type	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	H	r	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
				Boundary dimensions mm(inch)																
6.350 (1/4)	CRH 8-1 VB	CRH 8-1 VBUU	12	12.700 (1/2)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1(0.44)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	8.334 (21/64)	3.4	4 710	5 410
	CRH 9 VB	CRH 9 VBUU	15	14.288 (9/16)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1(0.44)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	8.334 (21/64)	3.4	4 710	5 410
7.938 (5/16)	CRH 10-1 VB	CRH 10-1 VBUU	23	15.875 (5/8)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8(0.50)	19.050 (3/4)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	11.112 (7/16)	6.8	6 340	8 530
	CRH 11 VB	CRH 11 VBUU	27	17.462 (11/16)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8(0.50)	19.050 (3/4)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	0.397 (1/64)	11.112 (7/16)	6.8	6 340	8 530
11.112 (7/16)	CRH 12 VB	CRH 12 VBUU	39	19.050 (3/4)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6(0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	0.794 (1/32)	13.494 (17/32)	17.6	8 710	12 300
	CRH 14 VB	CRH 14 VBUU	49	22.225 (7/8)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6(0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	0.794 (1/32)	13.494 (17/32)	17.6	8 710	12 300
15.875 (5/8)	CRH 16 VB	CRH 16 VBUU	93	25.400 (1)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9(0.70)	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	1.191 (3/64)	18.256 (23/32)	57.8	13 100	22 700
	CRH 18 VB	CRH 18 VBUU	109	28.575 (1 1/8)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9(0.70)	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	1.588 (1/16)	18.256 (23/32)	57.8	13 100	22 700
19.050 (3/4)	CRH 20 VB	CRH 20 VBUU	176	31.750 (1 1/4)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0(0.83)	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	1.588 (1/16)	24.209 (61/64)	103	23 600	31 700
	CRH 22 VB	CRH 22 VBUU	200	34.925 (1 3/8)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0(0.83)	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	1.588 (1/16)	24.209 (61/64)	103	23 600	31 700
22.225 (7/8)	CRH 24 VB	CRH 24 VBUU	296	38.100 (1 1/2)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3(0.96)	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	1.588 (1/16)	26.988 (1 1/16)	162	28 200	40 100
	CRH 26 VB	CRH 26 VBUU	329	41.275 (1 5/8)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3(0.96)	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	1.588 (1/16)	26.988 (1 1/16)	162	28 200	40 100
25.400 (1)	CRH 28 VB	CRH 28 VBUU	463	44.450 (1 3/4)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4(1.08)	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	1.588 (1/16)	32.941 (1 19/64)	258	35 300	55 600
	CRH 30 VB	CRH 30 VBUU	508	47.625 (1 7/8)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4(1.08)	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	1.588 (1/16)	32.941 (1 19/64)	258	35 300	55 600
28.575 (1 1/8)	CRH 32 VB	CRH 32 VBUU	722	50.800 (2)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2(1.35)	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	11.112 (7/16)	1.588 (1/16)	37.306 (1 15/32)	356	45 700	80 600
	CRH 36 VB	CRH 36 VBUU	858	57.150 (2 1/4)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2(1.35)	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	11.112 (7/16)	1.588 (1/16)	37.306 (1 15/32)	356	45 700	80 600
31.750 (1 1/4)	CRH 40 VB	CRH 40 VBUU	1 260	63.500 (2 1/2)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0(1.57)	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	12.700 (1/2)	2.381 (3/32)	40.878 (1 39/64)	500	61 400	116 000
	CRH 44 VB	CRH 44 VBUU	1 460	69.850 (2 3/4)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0(1.57)	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	12.700 (1/2)	2.381 (3/32)	40.878 (1 39/64)	500	61 400	116 000
38.100 (1 1/2)	CRH 48 VB	CRH 48 VBUU	2 100	76.200 (3)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4(1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	2.381 (3/32)	51.991 (2 3/64)	892	77 600	172 000
	CRH 52 VB	CRH 52 VBUU	2 380	82.550 (3 1/4)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4(1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	2.381 (3/32)	51.991 (2 3/64)	892	77 600	172 000
44.450 (1 3/4)	CRH 56 VB	CRH 56 VBUU	3 240	88.900 (3 1/2)	50.800 (2)	44.450 (1 3/4)	1 3/4-12UN	34.925 (1 3/8)	52.8(2.08)	69.850 (2 3/4)	17.462 (11/16)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	2.381 (3/32)	59.928 (2 23/64)	1 450	111 000	239 000
50.800 (2)	CRH 64 VB	CRH 64 VBUU	4 960	101.600 (4)	57.150 (2 1/4)	50.800 (2)	2-12 UN	38.100 (1 1/2)	59.4(2.34)	88.900 (3 1/2)	19.050 (3/4)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	2.381 (3/32)	64.691 (2 35/64)	2 190	142 000	317 000

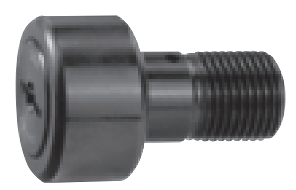
Remarks1. Models with a stud diameter d_1 of 7.938 mm or less have no oil hole. Other models are provided with one oil hole each on the outside surface and end surface of the stud.
2. Provided with prepacked grease.

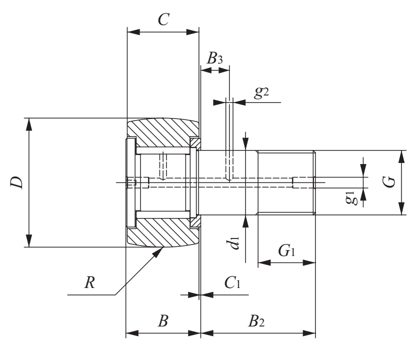
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

CF, NUCF, CFS, CRH

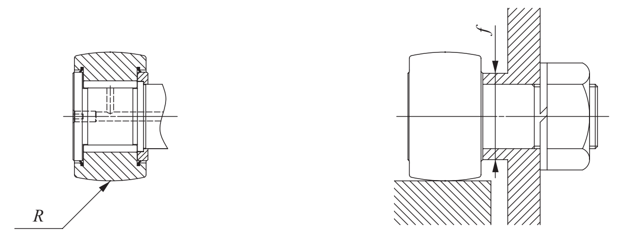
F

Inch Series Heavy Duty Cam Followers Full Complement Type/With Screwdriver Slot





CRH…VR



CRH…VUUR

Stud dia. 6.350—50.800mm

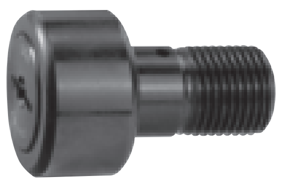
Stud dia. mm (inch)	Identification number: Shield type Crowned outer ring	Identification number: Sealed type Crowned outer ring	Mass (Ref.) g	Boundary dimensions mm(inch): D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	R	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
6.350 (1/4)	CRH 8-1 VR	CRH 8-1 VUUR	12	12.700 (1/2)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1 (0.44)	15.875 (5/8)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	180 (7)	8.334 (21/64)	3.4	4 710	5 410
	CRH 9 VR	CRH 9 VUUR	15	14.228 (9/16)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1 (0.44)	15.875 (5/8)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	180 (7)	8.334 (21/64)	3.4	4 710	5 410
7.938 (5/16)	CRH 10-1 VR	CRH 10-1 VUUR	23	15.875 (5/8)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8 (0.50)	19.050 (3/4)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	200 (8)	11.112 (7/16)	6.8	6 340	8 530
	CRH 11 VR	CRH 11 VUUR	27	17.462 (11/16)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8 (0.50)	19.050 (3/4)	— (—)	0.794 (1/32)	*3.175 (1/8)	— (—)	200 (8)	11.112 (7/16)	6.8	6 340	8 530
11.112 (7/16)	CRH 12 VR	CRH 12 VUUR	39	19.050 (3/4)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6 (0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	250 (10)	13.494 (17/32)	17.6	8 710	12 300
	CRH 14 VR	CRH 14 VUUR	49	22.225 (7/8)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6 (0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	250 (10)	13.494 (17/32)	17.6	8 710	12 300
15.875 (5/8)	CRH 16 VR	CRH 16 VUUR	93	25.400 (1)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9 (0.70)	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	300 (12)	18.256 (23/32)	57.8	13 100	22 700
	CRH 18 VR	CRH 18 VUUR	109	28.575 (1 1/8)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9 (0.70)	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	300 (12)	18.256 (23/32)	57.8	13 100	22 700
19.050 (3/4)	CRH 20 VR	CRH 20 VUUR	176	31.750 (1 1/4)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0 (0.83)	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	360 (14)	24.209 (61/64)	103	23 600	31 700
	CRH 22 VR	CRH 22 VUUR	200	34.925 (1 3/8)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0 (0.83)	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	360 (14)	24.209 (61/64)	103	23 600	31 700
22.225 (7/8)	CRH 24 VR	CRH 24 VUUR	296	38.100 (1 1/2)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3 (0.96)	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	500 (20)	26.988 (1 1/16)	162	28 200	40 100
	CRH 26 VR	CRH 26 VUUR	329	41.275 (1 5/8)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3 (0.96)	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	500 (20)	26.988 (1 1/16)	162	28 200	40 100
25.400 (1)	CRH 28 VR	CRH 28 VUUR	463	44.450 (1 3/4)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4 (1.08)	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	500 (20)	32.941 (1 19/64)	258	35 300	55 600
	CRH 30 VR	CRH 30 VUUR	508	47.625 (1 7/8)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4 (1.08)	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	500 (20)	32.941 (1 19/64)	258	35 300	55 600
28.575 (1 1/8)	CRH 32 VR	CRH 32 VUUR	722	50.800 (2)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2 (1.35)	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	600 (24)	37.306 (1 15/32)	356	45 700	80 600
	CRH 36 VR	CRH 36 VUUR	858	57.150 (2 1/4)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2 (1.35)	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	600 (24)	37.306 (1 15/32)	356	45 700	80 600
31.750 (1 1/4)	CRH 40 VR	CRH 40 VUUR	1 260	63.500 (2 1/2)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0 (1.57)	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	760 (30)	40.878 (1 39/64)	500	61 400	116 000
	CRH 44 VR	CRH 44 VUUR	1 460	69.850 (2 3/4)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0 (1.57)	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	760 (30)	40.878 (1 39/64)	500	61 400	116 000
38.100 (1 1/2)	CRH 48 VR	CRH 48 VUUR	2 100	76.200 (3)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4 (1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	760 (30)	51.991 (2 3/64)	892	77 600	172 000
	CRH 52 VR	CRH 52 VUUR	2 380	82.550 (3 1/4)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4 (1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	760 (30)	51.991 (2 3/64)	892	77 600	172 000
44.450 (1 3/4)	CRH 56 VR	CRH 56 VUUR	3 240	88.900 (3 1/2)	50.800 (2)	44.450 (1 3/4)	1 3/4-12 UN	34.925 (1 3/8)	52.8 (2.08)	69.850 (2 3/4)	17.462 (11/16)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	760 (30)	59.928 (2 23/64)	1 450	111 000	239 000
50.800 (2)	CRH 64 VR	CRH 64 VUUR	4 960	101.600 (4)	57.150 (2 1/4)	50.800 (2)	2-12 UN	38.100 (1 1/2)	59.4 (2.34)	88.900 (3 1/2)	19.050 (3/4)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	760 (30)	64.691 (2 35/64)	2 190	142 000	317 000

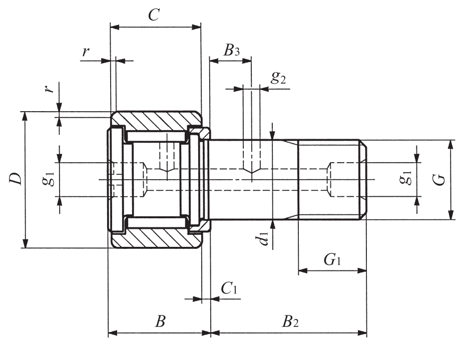
Remarks1. Models with a stud diameter d_1 of 7.938 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.
2. Provided with prepacked grease.

1N≒0.102kgf

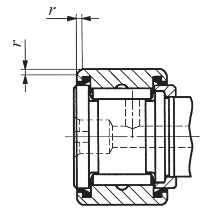
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

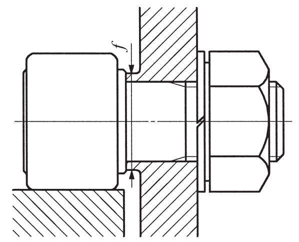
Inch Series Heavy Duty Cam Followers Full Complement Type/With Screwdriver Slot





CRH…V





CRH…VUU

Stud dia. 6.350−50.800mm

Stud dia. mm (inch)	Identification number: Shield type	Identification number: Sealed type	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	r	Mounting dimension f Min. mm(inch)	Maximum tightening torque N-m	Basic dynamic load rating C N	Basic static load rating C_0 N
6.350 (1/4)	CRH 8-1 V	CRH 8-1 VUU	12	12.700 (1/2)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1(0.44)	15.875 (5/8)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	8.334 (21/64)	3.4	4 710	5 410
	CRH 9 V	CRH 9 VUU	15	14.288 (9/16)	9.525 (3/8)	6.350 (1/4)	1/4-28	6.350 (1/4)	11.1(0.44)	15.875 (5/8)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	8.334 (21/64)	3.4	4 710	5 410
7.938 (5/16)	CRH 10-1 V	CRH 10-1 VUU	23	15.875 (5/8)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8(0.50)	19.050 (3/4)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	11.112 (7/16)	6.8	6 340	8 530
	CRH 11 V	CRH 11 VUU	27	17.462 (11/16)	11.112 (7/16)	7.938 (5/16)	5/16-24	7.938 (5/16)	12.8(0.50)	19.050 (3/4)	— (–)	0.794 (1/32)	*3.175 (1/8)	— (–)	0.397 (1/64)	11.112 (7/16)	6.8	6 340	8 530
11.112 (7/16)	CRH 12 V	CRH 12 VUU	39	19.050 (3/4)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6(0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	0.794 (1/32)	13.494 (17/32)	17.6	8 710	12 300
	CRH 14 V	CRH 14 VUU	49	22.225 (7/8)	12.700 (1/2)	11.112 (7/16)	7/16-20	9.525 (3/8)	14.6(0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	0.794 (1/32)	13.494 (17/32)	17.6	8 710	12 300
15.875 (5/8)	CRH 16 V	CRH 16 VUU	93	25.400 (1)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9(0.70)	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.191 (3/64)	18.256 (23/32)	57.8	13 100	22 700
	CRH 18 V	CRH 18 VUU	109	28.575 (1 1/8)	15.875 (5/8)	15.875 (5/8)	5/8-18	12.700 (1/2)	17.9(0.70)	25.400 (1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	18.256 (23/32)	57.8	13 100	22 700
19.050 (3/4)	CRH 20 V	CRH 20 VUU	176	31.750 (1 1/4)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0(0.83)	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	24.209 (61/64)	103	23 600	31 700
	CRH 22 V	CRH 22 VUU	200	34.925 (1 3/8)	19.050 (3/4)	19.050 (3/4)	3/4-16	15.875 (5/8)	21.0(0.83)	31.750 (1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	24.209 (61/64)	103	23 600	31 700
22.225 (7/8)	CRH 24 V	CRH 24 VUU	296	38.100 (1 1/2)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3(0.96)	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	26.988 (1 1/16)	162	28 200	40 100
	CRH 26 V	CRH 26 VUU	329	41.275 (1 5/8)	22.225 (7/8)	22.225 (7/8)	7/8-14	19.050 (3/4)	24.3(0.96)	38.100 (1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	26.988 (1 1/16)	162	28 200	40 100
25.400 (1)	CRH 28 V	CRH 28 VUU	463	44.450 (1 3/4)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4(1.08)	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	32.941 (1 19/64)	258	35 300	55 600
	CRH 30 V	CRH 30 VUU	508	47.625 (1 7/8)	25.400 (1)	25.400 (1)	1-14 UNS	22.225 (7/8)	27.4(1.08)	44.450 (1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	1.588 (1/16)	32.941 (1 19/64)	258	35 300	55 600
28.575 (1 1/8)	CRH 32 V	CRH 32 VUU	722	50.800 (2)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2(1.35)	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	37.306 (1 15/32)	356	45 700	80 600
	CRH 36 V	CRH 36 VUU	858	57.150 (2 1/4)	31.750 (1 1/4)	28.575 (1 1/8)	1 1/8-12	25.400 (1)	34.2(1.35)	50.800 (2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	1.588 (1/16)	37.306 (1 15/32)	356	45 700	80 600
31.750 (1 1/4)	CRH 40 V	CRH 40 VUU	1 260	63.500 (2 1/2)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0(1.57)	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	2.381 (3/32)	40.878 (1 39/64)	500	61 400	116 000
	CRH 44 V	CRH 44 VUU	1 460	69.850 (2 3/4)	38.100 (1 1/2)	31.750 (1 1/4)	1 1/4-12	28.575 (1 1/8)	40.0(1.57)	57.150 (2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	2.381 (3/32)	40.878 (1 39/64)	500	61 400	116 000
38.100 (1 1/2)	CRH 48 V	CRH 48 VUU	2 100	76.200 (3)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4(1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	2.381 (3/32)	51.991 (2 3/64)	892	77 600	172 000
	CRH 52 V	CRH 52 VUU	2 380	82.550 (3 1/4)	44.450 (1 3/4)	38.100 (1 1/2)	1 1/2-12	31.750 (1 1/4)	46.4(1.83)	63.500 (2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	2.381 (3/32)	51.991 (2 3/64)	892	77 600	172 000
44.450 (1 3/4)	CRH 56 V	CRH 56 VUU	3 240	88.900 (3 1/2)	50.800 (2)	44.450 (1 3/4)	1 3/4-12 UN	34.925 (1 3/8)	52.8(2.08)	69.850 (2 3/4)	17.462 (11/16)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	2.381 (3/32)	59.928 (2 23/64)	1 450	111 000	239 000
50.800 (2)	CRH 64 V	CRH 64 VUU	4 960	101.600 (4)	57.150 (2 1/4)	50.800 (2)	2-12 UN	38.100 (1 1/2)	59.4(2.34)	88.900 (3 1/2)	19.050 (3/4)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	2.381 (3/32)	64.691 (2 35/64)	2 190	142 000	317 000

Boundary dimensions mm(inch)

Remarks1. Models with a stud diameter d_1 of 7.938 mm or less (marked *) are provided with an oil hole on the stud head only. Other models are provided with one oil hole each on the head, outside surface and end surface of the stud.
2. Provided with prepacked grease.

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

ROLLER FOLLOWERS

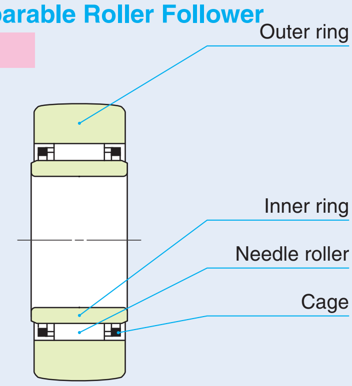
● Separable Roller Followers
● Non-separable Roller Followers
● Heavy Duty Type Roller Followers

Structure and Features

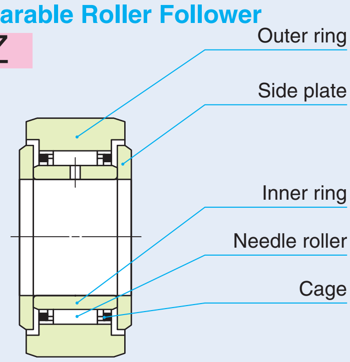
IKO Roller Followers are bearings designed for outer ring rotation, in which needle rollers are incorporated in a thick walled outer ring. Both crowned and cylindrical outer rings are available. The outer rings run directly on mating track surfaces, and the crowned outer ring is effective in relieving the edge load caused by mounting errors. The cylindrical outer ring, on the other hand, has a large contact area with the mating track surface and is suitable for applications involving large loads or low track surface hardness.
In Roller Followers, there are two types of bearings available, the caged type and the full complement type. The caged type is useful for applications at high-speed rotation. The full complement type, on the other hand, is suitable for heavy-load applications at low-speed rotation or oscillating motions.
Roller Followers include separable and non-separable types. Also, in addition to the open type, shield type and sealed type are available. The clearances between the side plates and outer ring of the shield type are narrow, and form labyrinths. In the sealed type, special synthetic rubber seals are assembled in these clearances, and they are effective in preventing penetration of dust and dirt.
These bearings are available in a variety of types to suit almost any kind of application. They are widely used for cam mechanisms and for linear motions of conveying equipment.

Structures of Roller Followers

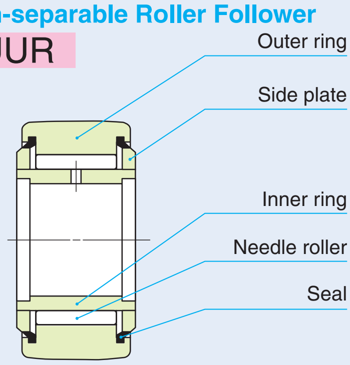
Structure of Separable Roller Follower
NAST⋯R



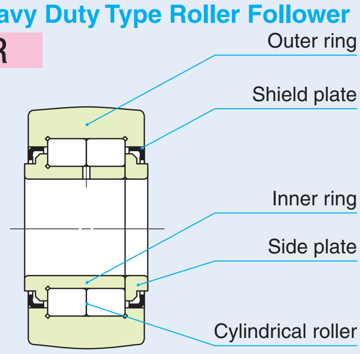
Structure of Separable Roller Follower
NAST⋯ZZ



Structure of Non-separable Roller Follower
NART⋯VUUR



Structure of Heavy Duty Type Roller Follower
NURT⋯R



Types

In Roller Followers, types shown in Table 1 are available.

Table 1 Type of Roller Followers

Type				With cage		Full complement type	
				Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring
Metric series	Separable Roller Followers RNAST, NAST	Without inner ring	Open type	RNAST⋯ R	RNAST	—	—
		With inner ring	Open type	NAST⋯ R	NAST	—	—
			Shield type	NAST⋯ZZ R	NAST⋯ZZ	—	—
			Sealed type	NAST⋯ZZUUR	NAST⋯ZZUU	—	—
	Non-separable Roller Followers NART		Shield type	NART⋯ R	—	NART⋯V R	—
			Sealed type	NART⋯ UUR	—	NART⋯VUUR	—
	Heavy Duty Type Roller Followers NURT		Shield type	—	—	NURT⋯ R	NURT
Inch series	Non-separable Roller Followers CRY		Shield type	—	—	CRY ⋯V R	CRY ⋯V
			Sealed type	—	—	CRY ⋯VUUR	CRY⋯VUU

Separable Roller Followers

These bearings are assembled by combining an outer ring, inner ring and Needle Roller Cage, which can be separated from one another. Thus, handling is easy. Oil lubrication is also easy, making them suitable for high-speed rotations.
There are two types: type without inner ring RNAST and type with inner ring NAST. The type with inner ring includes open type, shield type, and sealed type.

Non-separable Roller Followers

These non-separable type bearings have side plates fixed on both sides of the inner ring, and include the caged type and the full complement type. Both shield type and sealed type are available.
Inch series Non-separable Roller Followers are full complement type bearings and their surface is treated with black oxide surface treatment.

Heavy Duty Type Roller Followers

These full complement type bearings incorporate cylindrical rollers in the outer ring in two rows and can withstand large radial loads and some axial loads. These bearings are shield type with non-separable structure.

Identification Number

Some examples of the identification number of Roller Followers are shown below.

Examples of identification number

	Model code	Size	Roller guide method	Seal structure	Shape of outer ring outside surface
Example 1	NAST	10		ZZUU	R
Example 2	NART	10	V	UU	R
Example 3	NURT	15			R
Example 4	CRY	12	V	UU	R

Model code			
Metric series	RNAST	Separable Roller Follower	Without inner ring
	NAST		With inner ring
	NART	Non-separable Roller Follower	
	NURT	Heavy Duty Type Roller Follower	
Inch series	CRY	Non-separable Roller Follower	

Size
The size indicates the bore diameter of the inner ring. (unit: mm) In the inch series, the bore diameter is indicated in units of 1/16 inch.

Roller guide method	
No symbol	With cage
V	Full complement type

Seal structure (Separable Roller Follower)	
No symbol	Open type
ZZ	Shield type
ZZUU	Sealed type

Seal structure (Other Roller Follower)	
No symbol	Shield type
UU	Sealed type

Shape of outer ring outside surface	
R	With crowned outer ring
No symbol	With cylindrical outer ring

IKO

Accuracy

Dimensional accuracy and rotational accuracy of Roller Followers are based on Tables 2, 3 and 4. Tolerances for the smallest single roller set bore diameter of Separable Roller Followers are shown in Table 5. Roller Followers with special accuracy can also be manufactured. Please contact IKO.

Table 2 Tolerances

unit: μm

Dimensions and symbols \ Series		Metric series Crowned outer ring	Metric series Cylindrical outer ring	Inch series Crowned outer ring	Inch series Cylindrical outer ring
Bore dia. of inner ring d	$d \leqq 19.05$	See Table 3.		$+5$ -10	$+5$ -10
	$19.05 < d$			$+2$ -12	
Outside dia. of outer ring D		0 -50	See Table 4.	0 -50	0 -25
Width of outer ring C		0 -120		0 -130	
Width of inner ring B	Separable Roller Follower	0 -120		—	
Width of bearing B	Non-separable Roller Follower	h12	—	$+130$ -250	
	Heavy Duty Type Roller Follower				
Roller set bore dia. F_w	Separable Roller Follower	See Table 5.		—	

Table 3 Tolerances and allowable values of inner rings (Metric series)

unit: μm

d Nominal bore dia. mm		Δ_{dmp} Single plane mean bore dia. deviation		V_{dp} Bore dia. variation in a single radial plane	V_{dmp} Mean bore dia. variation	K_{ia} Radial runout of assembled bearing inner ring	V_{Bs} Width variation
Over	Incl.	High	Low	(Max.)	(Max.)	(Max.)	(Max.)
2.5	10	0	-8	10	6	10	15
10	18	0	-8	10	6	10	20
18	30	0	-10	13	8	13	20
30	50	0	-12	15	9	15	20

Table 4 Tolerances and allowable values of outer rings (Metric series)

unit: μm

D Nominal outside dia. of outer ring mm		Δ_{Dmp} Single plane mean outside dia. deviation		V_{Dp} (1) Outside dia. variation in a single radial plane	V_{Dmp} (1) Mean outside dia. variation	K_{ea} (1) Radial runout of assembled bearing outer ring	V_{Cs} Width variation
Over	Incl.	High	Low	(Max.)	(Max.)	(Max.)	(Max.)
6	18	0	-8	10	6	15	Same as the tolerance values of V_{Bs} for d of the inner of the same bearing
18	30	0	-9	12	7	15	
30	50	0	-11	14	8	20	
50	80	0	-13	16	10	25	
80	120	0	-15	19	11	35	

Note(1) Also applicable to the inch series.

Table 5 Tolerances of smallest single roller set bore diameter $F_{ws\ min}$

unit: μm

F_w Nominal roller set bore diameter mm		$\Delta_{Fws\ min}$ Deviation of smallest single roller set bore diameter	
Over	Incl.	High	Low
6	10	+22	+13
10	18	+27	+16
18	30	+33	+20
30	50	+41	+25
50	80	+49	+30

Clearance

Radial internal clearances of Roller Followers are based on Table 6.

Table 6 Radial internal clearance

unit: μm

Identification number (1)				Radial internal clearance	
Metric series			Inch series		
Separable Roller Followers	Non-separable Roller Followers	Heavy Duty Type Roller Followers	Non-separable Roller Followers	Min.	Max.
NAST 6R	NART 5R	–	–	5	20
NAST 8R～NAST12R	NART 6R～NART12R	–	–	5	25
NAST15R～NAST25R	NART15R～NART20R	–	–	10	30
NAST30R～NAST40R	NART25R～NART40R	–	–	10	40
NAST45R, NAST50R	NART45R, NART50R	–	–	15	50
–	–	NURT15R～NURT30-1R	–	20	45
–	–	NURT35R～NURT40-1R	–	25	50
–	–	NURT45R～NURT50-1R	–	30	60
–	–	–	CRY12R～CRY56R	35	60
–	–	–	CRY64R	45	70

Note(1) Also applicable to the full complement type, cylindrical outer ring type, shield type and sealed type.

Fit

Roller Followers are generally used under the loading conditions in which the load direction is fixed in relation to the inner ring and rotates in relation to the outer ring. The recommended fits for shafts are shown in Table 7. Those for the inch series are shown in the dimension table.

Table 7 Recommended fit (Metric series)

Type		Tolerance class of shaft
Separable Roller Followers	without inner ring	k5, k6
	with inner ring	g6, h6
Non-separable Roller Followers		
Heavy Duty Type Roller Followers		

Maximum allowable static load

The load that is applicable to Roller Followers is, in some cases, determined by the strength of the outer ring rather than by the load rating of the needle roller bearing. Therefore, the maximum allowable load that is limited by the strength of outer ring is specified.

Operating temperature

The allowaple temperature range for Roller Follower is -20˚C～+120˚C.

Life and Safety Factor

Please consult IKO .

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

Track Capacity

Track capacity is defined as the load that can be continuously applied on a Roller Follower placed on a steel track surface without causing deformation and indentation on the track surface when the outer ring of the Roller Follower makes contact with the mating track surface (plane). The track capacities shown in Tables 8.1 and 8.2 are applicable when the hardness of the mating track surface is 40HRC (Tensile strength 1250N/mm²). When the hardness of the mating track surface differs from 40HRC, the track capacity is obtained by multiplying the value by the track capacity factor shown in Table 9.

If lubrication between the outer ring and the mating track surface is insufficient, seizure and/or wear may occur depending on the application. Therefore, pay attention to lubrication and surface roughness of the mating track especially in the case of high-speed rotation such as for cam mechanisms.

Table 8.1 Track capacity (Metric series)

unit: N

Roller Followers with crowned outer ring				Roller Followers with cylindrical outer ring					
Identification number (1)			Track capacity	Identification number	Track capacity	Identification number (2)	Track capacity	Identification number	Track capacity
Separable Roller Followers	Non-separable Roller Followers	Heavy Duty Type Roller Followers							
RNAST 5R	NART 5R	—	1 040	RNAST 5	2 310	—	—	—	—
(R)NAST 6R	NART 6R	—	1 330	(R)NAST 6	3 550	NAST 6ZZ	3 550	—	—
(R)NAST 8R	NART 8R	—	1 850	(R)NAST 8	3 980	NAST 8ZZ	4 490	—	—
(R)NAST10R	NART10R	—	2 470	(R)NAST10	5 610	NAST10ZZ	6 890	—	—
(R)NAST12R	NART12R	—	2 710	(R)NAST12	5 990	NAST12ZZ	7 350	—	—
(R)NAST15R	NART15R	NURT15 R	3 060	(R)NAST15	6 550	NAST15ZZ	8 030	NURT15	11 500
—	—	NURT15-1R	3 910	—	—	—	—	NURT15-1	13 700
(R)NAST17R	NART17R	NURT17 R	3 660	(R)NAST17	10 900	NAST17ZZ	11 700	NURT17	13 600
—	—	NURT17-1R	4 530	—	—	—	—	NURT17-1	16 000
(R)NAST20R	NART20R	NURT20 R	4 530	(R)NAST20	12 800	NAST20ZZ	13 800	NURT20	20 000
—	—	NURT20-1R	5 190	—	—	—	—	NURT20-1	22 100
(R)NAST25R	NART25R	NURT25 R	5 190	(R)NAST25	14 100	NAST25ZZ	15 300	NURT25	22 100
—	—	NURT25-1R	6 580	—	—	—	—	NURT25-1	26 400
(R)NAST30R	NART30R	NURT30 R	6 580	(R)NAST30	22 100	NAST30ZZ	22 100	NURT30	31 600
—	—	NURT30-1R	8 020	—	—	—	—	NURT30-1	36 700
(R)NAST35R	NART35R	NURT35 R	8 020	(R)NAST35	25 700	NAST35ZZ	25 700	NURT35	36 700
—	—	NURT35-1R	9 220	—	—	—	—	NURT35-1	40 800
(R)NAST40R	NART40R	NURT40 R	9 220	(R)NAST40	26 900	NAST40ZZ	30 300	NURT40	44 200
—	—	NURT40-1R	10 800	—	—	—	—	NURT40-1	49 700
(R)NAST45R	NART45R	NURT45 R	9 990	(R)NAST45	28 500	NAST45ZZ	32 200	NURT45	47 000
—	—	NURT45-1R	12 400	—	—	—	—	NURT45-1	55 300
(R)NAST50R	NART50R	NURT50 R	10 800	(R)NAST50	30 200	NAST50ZZ	34 000	NURT50	49 700
—	—	NURT50-1R	14 000	—	—	—	—	NURT50-1	60 800

Notes(1) Also applicable to the full complement type, shield type, and sealed type.
(2) Also applicable to the sealed type.

Table 8.2 Track capacity (Inch series)

unit: N

Crowned outer ring		Cylindrical outer ring	
Identification number (1)	Track capacity	Identification number (1)	Track capacity
CRY12R	853	CRY12	4 490
CRY14R	1 050	CRY14	5 240
CRY16R	1 420	CRY16	7 270
CRY18R	1 660	CRY18	7 700
CRY20R	2 160	CRY20	10 700
CRY22R	2 450	CRY22	11 800
CRY24R	3 410	CRY24	15 400
CRY26R	3 820	CRY26	16 700
CRY28R	4 210	CRY28	21 000
CRY30R	4 610	CRY30	22 500
CRY32R	5 690	CRY32	30 800
CRY36R	6 640	CRY36	34 700
CRY40R	8 970	CRY40	44 900
CRY44R	10 200	CRY44	49 400
CRY48R	11 400	CRY48	64 300
CRY52R	12 700	CRY52	69 600
CRY56R	14 100	CRY56	87 000
CRY64R	16 800	CRY64	113 000

Note(1) Also applicable to the sealed type.

Table 9 Track capacity factor

Hardness HRC	Tensile strength N/mm²	Track capacity factor	
		Crowned outer ring	Cylindrical outer ring
20	760	0.22	0.37
25	840	0.31	0.46
30	950	0.45	0.58
35	1 080	0.65	0.75
38	1 180	0.85	0.89
40	1 250	1.00	1.00
42	1 340	1.23	1.15
44	1 435	1.52	1.32
46	1 530	1.85	1.51
48	1 635	2.27	1.73
50	1 760	2.80	1.99
52	1 880	3.46	2.29
54	2 015	4.21	2.61
56	2 150	5.13	2.97
58	2 290	6.26	3.39

Allowable Rotational Speed

The allowable rotational speed of Roller Followers is affected by mounting and operating conditions. For reference, Table 10 shows dn values when only pure radial loads are applied. Under actual operating conditions, the recommended dn value is 1/10 of the value shown in the table in consideration of the axial loads that may act on the bearing.

Table 10 dn values of Roller Followers[1]

Type \ Lubricant	Grease	Oil
Caged type	84 000	140 000
Full complement type	42 000	70 000
Heavy Duty Type Roller Follower	72 000	120 000

Note[1] dn value $= d \times n$
where, d : Bore diameter of bearing mm
n : Rotational speed rpm

Lubrication

In Sealed Type Roller Followers, Heavy Duty Type Roller Followers and Inch series Roller Followers, ALVANIA GREASE S2 (SHELL) is prepacked as the lubricating grease.
For Roller Followers without prepacked grease, grease or oil should be supplied through the oil hole of the inner ring for use. If they are used without lubrication, wear of rolling contact surfaces may take place, leading to a short bearing life.

Oil Hole

Open Type Separable Roller Followers have no oil hole. Inner rings of other types of Metric series Roller Followers have an oil hole. Inch series inner rings have an oil groove and an oil hole.

Mounting

❶In case of shield and sealed types, match the side surface correctly to the mating seating surface indicated by the dimension a shown in the dimension table, and fix them. (See Fig. 1.)

❷When mounting Roller Followers, pay special attention to avoid locating the oil hole of the inner ring within the loading zone. This may lead to a short bearing life. (See Fig. 2.)

❸When mounting Sealed Type Separable Roller Followers, do not cause the side plates to come off. If they come off, set them again in place taking care to avoid damaging the seal lips.

❹In case of Roller Followers without an inner ring, the shaft requires heat treatment and grinding finish. The recommended surface hardness of the shaft is 58～64HRC, and the recommended roughness of the shaft is 0.2 μmR_a or less.
Also, the outer ring and cage are guided by side surfaces of the mounting parts. Therefore, it is recommended that the side surfaces of the mounting parts be finished by grinding or at least by machining. (See Fig. 3.)

❺In Non-separable Roller Followers, the side plates are press-fitted. Therefore, when mounting the Roller Followers, do not push the side plates.

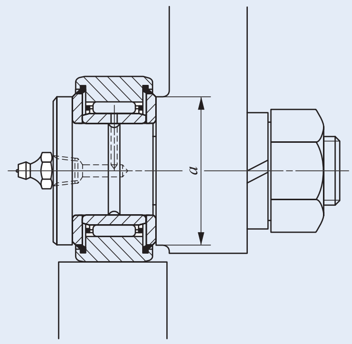


Fig. 1 Mating seating dimension "a"

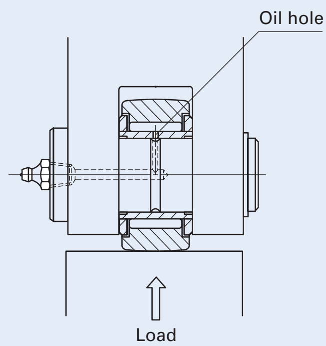


Fig. 2 Position of oil hole and load direction

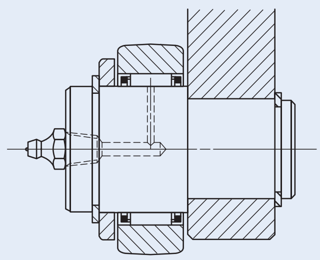
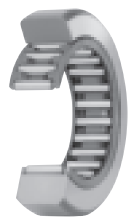
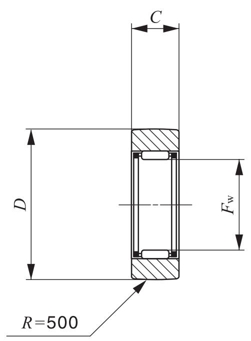


Fig. 3 Mounting example of Roller Follower without inner ring

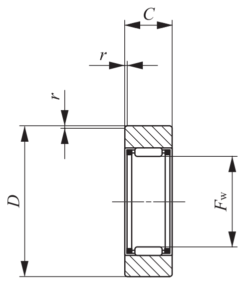
ROLLER FOLLOWERS

Separable Roller Followers, Open Type With Cage/Without Inner Ring





RNAST…R



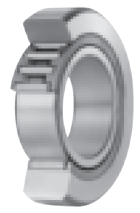
RNAST

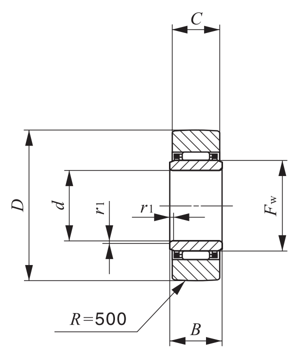
Shaft dia. 7—60mm

Shaft dia. mm	Identification number Open type Crowned outer ring	Identification number Open type Cylindrical outer ring	Mass (Ref.) g	Boundary dimensions mm F_w	D	C	$r_{s\,min}$ (1)	Basic dynamic load rating C N	Basic static load rating C_0 N
7	**RNAST 5 R**	**RNAST 5**	8.9	7	16	7.8	0.3	2 710	2 390
10	**RNAST 6 R**	**RNAST 6**	13.9	10	19	9.8	0.3	4 160	4 550
12	**RNAST 8 R**	**RNAST 8**	23.5	12	24	9.8	0.6	5 650	5 890
14	**RNAST 10 R**	**RNAST 10**	42.5	14	30	11.8	1	9 790	9 680
16	**RNAST 12 R**	**RNAST 12**	49.5	16	32	11.8	1	10 500	10 900
20	**RNAST 15 R**	**RNAST 15**	50	20	35	11.8	1	12 400	14 300
22	**RNAST 17 R**	**RNAST 17**	90	22	40	15.8	1	17 600	20 900
25	**RNAST 20 R**	**RNAST 20**	135	25	47	15.8	1	19 400	24 500
30	**RNAST 25 R**	**RNAST 25**	152	30	52	15.8	1	20 800	28 400
38	**RNAST 30 R**	**RNAST 30**	255	38	62	19.8	1	30 500	45 400
42	**RNAST 35 R**	**RNAST 35**	375	42	72	19.8	1	32 400	50 600
50	**RNAST 40 R**	**RNAST 40**	420	50	80	19.8	1.5	35 900	61 100
55	**RNAST 45 R**	**RNAST 45**	460	55	85	19.8	1.5	37 400	66 400
60	**RNAST 50 R**	**RNAST 50**	500	60	90	19.8	1.5	38 900	71 700

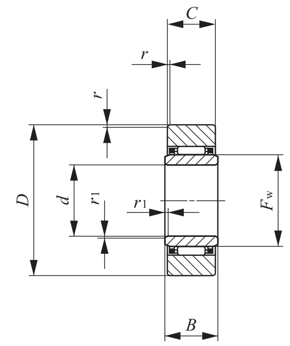
Note(1) Minimum allowable value of chamfer dimension r
Remarks 1. No oil hole is provided.
2. Not provided with prepacked grease. Perform proper lubrication for use.

Separable Roller Followers, Open Type With Cage/With Inner Ring





NAST…R



NAST

Shaft dia. 6—50mm

Shaft dia. mm	Identification number Open type Crowned outer ring	Identification number Open type Cylindrical outer ring	Mass (Ref.) g	Boundary dimensions mm d	D	B	C	$r_{s\,min}$ (1)	$r_{1s\,min}$ (1)	F_w	Basic dynamic load rating C N	Basic static load rating C_0 N	Assembled inner ring
6	**NAST 6 R**	**NAST 6**	17.8	6	19	10	9.8	0.3	0.3	10	4 160	4 550	**LRT 61010 S**
8	**NAST 8 R**	**NAST 8**	28	8	24	10	9.8	0.6	0.3	12	5 650	5 890	**LRT 81210 S**
10	**NAST 10 R**	**NAST 10**	49.5	10	30	12	11.8	1	0.3	14	9 790	9 680	**LRT 101412 S**
12	**NAST 12 R**	**NAST 12**	58	12	32	12	11.8	1	0.3	16	10 500	10 900	**LRT 121612 S**
15	**NAST 15 R**	**NAST 15**	62	15	35	12	11.8	1	0.3	20	12 400	14 300	**LRT 152012 S**
17	**NAST 17 R**	**NAST 17**	109	17	40	16	15.8	1	0.3	22	17 600	20 900	**LRT 172216 S**
20	**NAST 20 R**	**NAST 20**	157	20	47	16	15.8	1	0.3	25	19 400	24 500	**LRT 202516 S**
25	**NAST 25 R**	**NAST 25**	180	25	52	16	15.8	1	0.3	30	20 800	28 400	**LRT 253016 S**
30	**NAST 30 R**	**NAST 30**	320	30	62	20	19.8	1	0.6	38	30 500	45 400	**LRT 303820 S**
35	**NAST 35 R**	**NAST 35**	440	35	72	20	19.8	1	0.6	42	32 400	50 600	**LRT 354220 S**
40	**NAST 40 R**	**NAST 40**	530	40	80	20	19.8	1.5	1	50	35 900	61 100	**LRT 405020 S**
45	**NAST 45 R**	**NAST 45**	580	45	85	20	19.8	1.5	1	55	37 400	66 400	**LRT 455520 S**
50	**NAST 50 R**	**NAST 50**	635	50	90	20	19.8	1.5	1	60	38 900	71 700	**LRT 506020 S**

Note(1) Minimum allowable value of chamfer dimension r or r_1
Remarks 1. No oil hole is provided.
2. Not provided with prepacked grease. Perform proper lubrication for use.

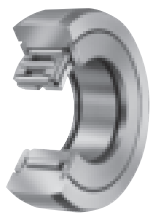
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

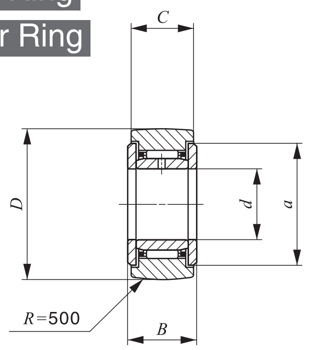
ROLLER FOLLOWERS

IKO

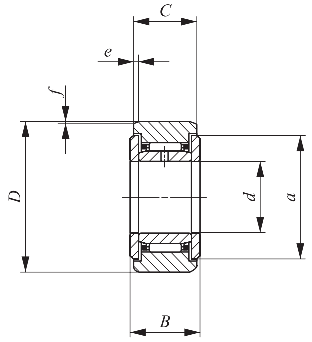
Separable Roller Followers, Shield Type **With Cage/With Inner Ring**

Separable Roller Followers, Sealed Type **With Cage/With Inner Ring**

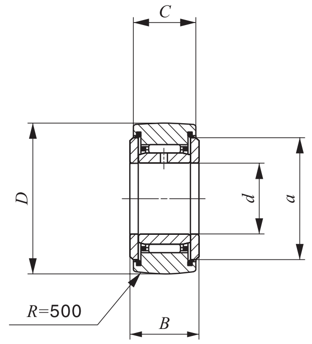




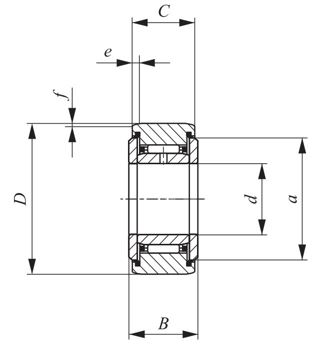
NAST···ZZR



NAST···ZZ



NAST···ZZUUR



NAST···ZZUU

Shaft dia. 6—50mm

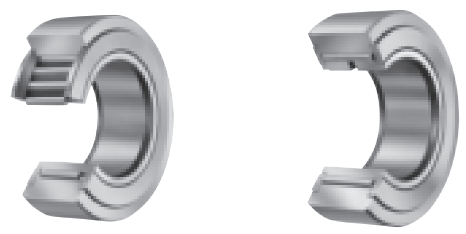
Shaft dia. mm	Identification number				Mass (Ref.) g
	Shield type		Sealed type		
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring	
6	NAST 6 ZZR	NAST 6 ZZ	NAST 6 ZZUUR	NAST 6 ZZUU	24.5
8	NAST 8 ZZR	NAST 8 ZZ	NAST 8 ZZUUR	NAST 8 ZZUU	39
10	NAST 10 ZZR	NAST 10 ZZ	NAST 10 ZZUUR	NAST 10 ZZUU	65
12	NAST 12 ZZR	NAST 12 ZZ	NAST 12 ZZUUR	NAST 12 ZZUU	75
15	NAST 15 ZZR	NAST 15 ZZ	NAST 15 ZZUUR	NAST 15 ZZUU	83
17	NAST 17 ZZR	NAST 17 ZZ	NAST 17 ZZUUR	NAST 17 ZZUU	135
20	NAST 20 ZZR	NAST 20 ZZ	NAST 20 ZZUUR	NAST 20 ZZUU	195
25	NAST 25 ZZR	NAST 25 ZZ	NAST 25 ZZUUR	NAST 25 ZZUU	225
30	NAST 30 ZZR	NAST 30 ZZ	NAST 30 ZZUUR	NAST 30 ZZUU	400
35	NAST 35 ZZR	NAST 35 ZZ	NAST 35 ZZUUR	NAST 35 ZZUU	550
40	NAST 40 ZZR	NAST 40 ZZ	NAST 40 ZZUUR	NAST 40 ZZUU	710
45	NAST 45 ZZR	NAST 45 ZZ	NAST 45 ZZUUR	NAST 45 ZZUU	760
50	NAST 50 ZZR	NAST 50 ZZ	NAST 50 ZZUUR	NAST 50 ZZUU	830

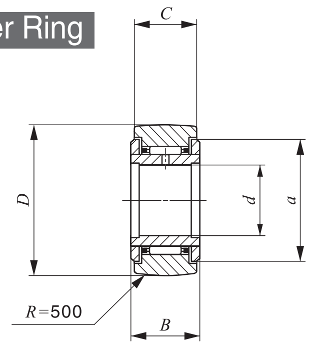
Remarks1. The inner ring has an oil hole.
2. The sealed type is provided with prepacked grease. The shield type is not provided with prepacked grease. Perform proper lubrication for use.

Boundary dimensions mm							Basic dynamic load rating C N	Basic static load rating C_0 N
d	D	B	C	a	e	f		
6	19	14	13.8	14	2.5	0.8	4 160	4 550
8	24	14	13.8	17.5	2.5	0.8	5 650	5 890
10	30	16	15.8	23.5	2.5	0.8	9 790	9 680
12	32	16	15.8	25.5	2.5	0.8	10 500	10 900
15	35	16	15.8	29	2.5	0.8	12 400	14 300
17	40	20	19.8	32.5	3	1	17 600	20 900
20	47	20	19.8	38	3	1	19 400	24 500
25	52	20	19.8	43	3	1	20 800	28 400
30	62	25	24.8	50.5	4	1.2	30 500	45 400
35	72	25	24.8	53.5	4	1.2	32 400	50 600
40	80	26	25.8	61.5	4	1.2	35 900	61 100
45	85	26	25.8	66.5	4	1.2	37 400	66 400
50	90	26	25.8	76	4	1.2	38 900	71 700

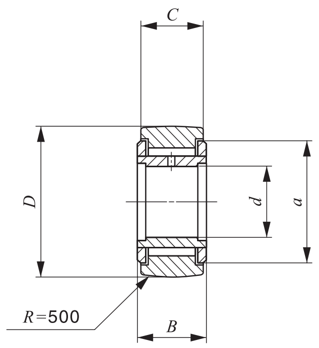
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Non-separable Roller Followers With Cage/With Inner Ring
Full Complement Type/With Inner Ring

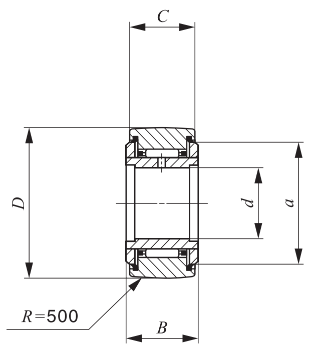




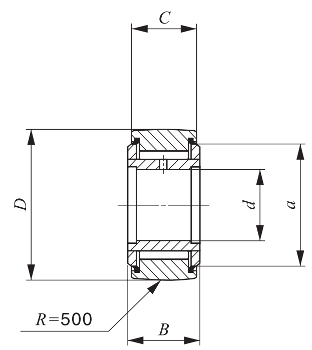
NART…R



NART…VR



NART…UUR



NART…VUUR

Shaft dia. 5—40mm

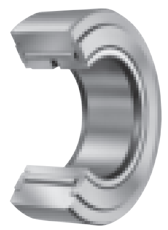
Shaft dia. mm	Identification number: Shield type, Crowned outer ring, With cage	Shield type, Crowned outer ring, Full complement	Sealed type, Crowned outer ring, With cage	Sealed type, Crowned outer ring, Full complement	Mass (Ref.) g	Boundary dimensions mm d	D	B	C	a	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
5	NART 5 R	—	NART 5 UUR	—	14.5	5	16	12	11	12	3 650	3 680	3 680
	—	NART 5 VR	—	NART 5 VUUR	15.1	5	16	12	11	12	6 810	8 370	7 310
6	NART 6 R	—	NART 6 UUR	—	20.5	6	19	12	11	14	4 250	4 740	4 740
	—	NART 6 VR	—	NART 6 VUUR	21.5	6	19	12	11	14	7 690	10 300	10 300
8	NART 8 R	—	NART 8 UUR	—	41.5	8	24	15	14	17.5	5 640	5 900	5 900
	—	NART 8 VR	—	NART 8 VUUR	42.5	8	24	15	14	17.5	11 800	15 600	15 600
10	NART 10 R	—	NART 10 UUR	—	64.5	10	30	15	14	23.5	8 030	7 540	7 540
	—	NART 10 VR	—	NART 10 VUUR	66.5	10	30	15	14	23.5	15 600	18 100	17 500
12	NART 12 R	—	NART 12 UUR	—	71	12	32	15	14	25.5	8 580	8 470	8 470
	—	NART 12 VR	—	NART 12 VUUR	73	12	32	15	14	25.5	16 800	20 500	18 600
15	NART 15 R	—	NART 15 UUR	—	102	15	35	19	18	29	13 700	16 400	16 400
	—	NART 15 VR	—	NART 15 VUUR	106	15	35	19	18	29	25 200	36 400	24 000
17	NART 17 R	—	NART 17 UUR	—	149	17	40	21	20	32.5	17 600	21 000	21 000
	—	NART 17 VR	—	NART 17 VUUR	155	17	40	21	20	32.5	32 000	46 300	33 100
20	NART 20 R	—	NART 20 UUR	—	250	20	47	25	24	38	23 000	30 700	30 700
	—	NART 20 VR	—	NART 20 VUUR	255	20	47	25	24	38	41 600	67 300	67 300
25	NART 25 R	—	NART 25 UUR	—	285	25	52	25	24	43	24 700	35 400	35 400
	—	NART 25 VR	—	NART 25 VUUR	295	25	52	25	24	43	45 500	79 100	79 100
30	NART 30 R	—	NART 30 UUR	—	470	30	62	29	28	50.5	33 600	51 400	51 400
	—	NART 30 VR	—	NART 30 VUUR	485	30	62	29	28	50.5	59 900	110 000	92 500
35	NART 35 R	—	NART 35 UUR	—	640	35	72	29	28	53.5	35 700	57 400	57 400
	—	NART 35 VR	—	NART 35 VUUR	655	35	72	29	28	53.5	63 100	121 000	121 000
40	NART 40 R	—	NART 40 UUR	—	845	40	80	32	30	61.5	44 900	81 500	81 500
	—	NART 40 VR	—	NART 40 VUUR	865	40	80	32	30	61.5	76 300	164 000	164 000

Remarks1. The inner ring has an oil hole.
2. The sealed type is provided with prepacked grease. The shield type is not provided with prepacked grease. Perform proper lubrication for use.

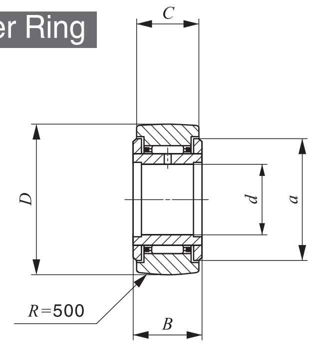
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

ROLLER FOLLOWERS

Non-separable Roller Followers **With Cage/With Inner Ring** **Full Complement Type/With Inner Ring**

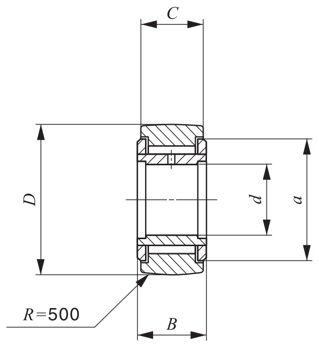


Shaft dia. 45—50mm

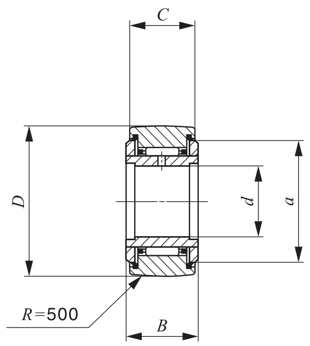


NART···R

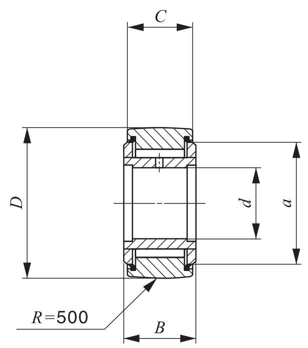
IKO



NART···VR



NART···UUR



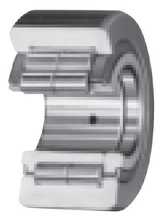
NART···VUUR

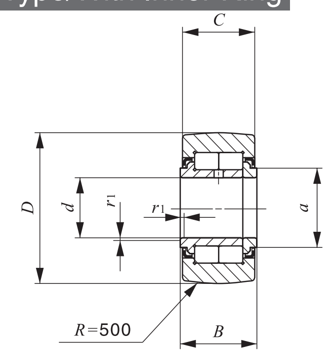
Shaft dia. mm	Identification number: Shield type, Crowned outer ring, With cage	Shield type, Crowned outer ring, Full complement	Sealed type, Crowned outer ring, With cage	Sealed type, Crowned outer ring, Full complement	Mass (Ref.) g	Boundary dimensions mm d	D	B	C	a	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
45	**NART 45 R**	—	**NART 45 UUR**	—	915	45	85	32	30	66.5	46 800	88 600	88 600
	—	**NART 45 VR**	—	**NART 45 VUUR**	935	45	85	32	30	66.5	80 300	181 000	181 000
50	**NART 50 R**	—	**NART 50 UUR**	—	980	50	90	32	30	76	48 600	95 600	95 600
	—	**NART 50 VR**	—	**NART 50 VUUR**	1 010	50	90	32	30	76	84 300	198 000	198 000

Remarks1. The inner ring has an oil hole.
2. The sealed type is provided with prepacked grease. The shield type is not provided with prepacked grease. Perform proper lubrication for use.

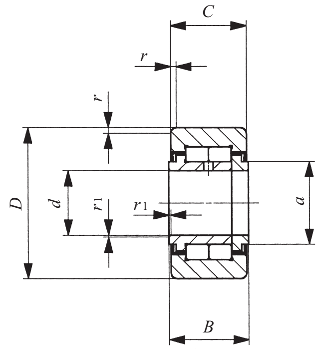
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Heavy Duty Type Roller Followers Full Complement Type/With Inner Ring





NURT···R



NURT

Shaft dia. 15—50mm

Shaft dia. mm	Identification number: Crowned outer ring	Identification number: Cylindrical outer ring	Mass (Ref.) g	Boundary dimensions mm: d	D	B	C	a	$r_{s\,min}$ (1)	$r_{1s\,min}$ (1)	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
15	**NURT 15 R**	**NURT 15**	100	15	35	19	18	20	0.6	0.3	23 400	27 300	11 800
	NURT 15-1 R	**NURT 15-1**	160	15	42	19	18	20	0.6	0.3	23 400	27 300	27 300
17	**NURT 17 R**	**NURT 17**	147	17	40	21	20	22	1	0.3	25 200	30 900	20 300
	NURT 17-1 R	**NURT 17-1**	222	17	47	21	20	22	1	0.3	25 200	30 900	30 900
20	**NURT 20 R**	**NURT 20**	245	20	47	25	24	27	1	0.3	38 900	49 000	27 200
	NURT 20-1 R	**NURT 20-1**	321	20	52	25	24	27	1	0.3	38 900	49 000	49 000
25	**NURT 25 R**	**NURT 25**	281	25	52	25	24	31	1	0.3	43 100	58 100	30 000
	NURT 25-1 R	**NURT 25-1**	450	25	62	25	24	31	1	0.3	43 100	58 100	58 100
30	**NURT 30 R**	**NURT 30**	466	30	62	29	28	38	1	0.3	58 200	75 300	35 200
	NURT 30-1 R	**NURT 30-1**	697	30	72	29	28	38	1	0.3	58 200	75 300	75 300
35	**NURT 35 R**	**NURT 35**	630	35	72	29	28	44	1	0.6	63 900	88 800	57 000
	NURT 35-1 R	**NURT 35-1**	840	35	80	29	28	44	1	0.6	63 900	88 800	88 800
40	**NURT 40 R**	**NURT 40**	817	40	80	32	30	49	1	0.6	86 500	122 000	75 300
	NURT 40-1 R	**NURT 40-1**	1 130	40	90	32	30	49	1	0.6	86 500	122 000	122 000
45	**NURT 45 R**	**NURT 45**	883	45	85	32	30	53	1	0.6	91 500	135 000	78 700
	NURT 45-1 R	**NURT 45-1**	1 400	45	100	32	30	53	1	0.6	91 500	135 000	135 000
50	**NURT 50 R**	**NURT 50**	950	50	90	32	30	58	1	0.6	96 300	148 000	82 100
	NURT 50-1 R	**NURT 50-1**	1 690	50	110	32	30	58	1	0.6	96 300	148 000	148 000

Note(1) Minimum allowable value of chamfer dimension r or r_1

Remarks 1. The inner ring has an oil hole.

2. Provided with prepacked grease.

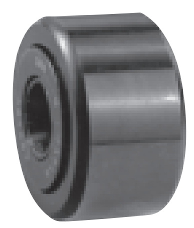
NAST, NART, NURT, CRY

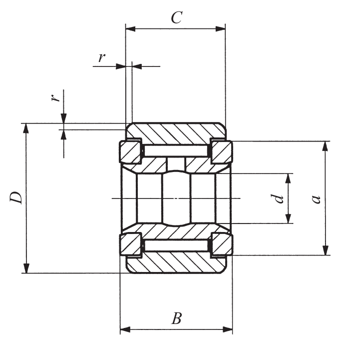
F

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

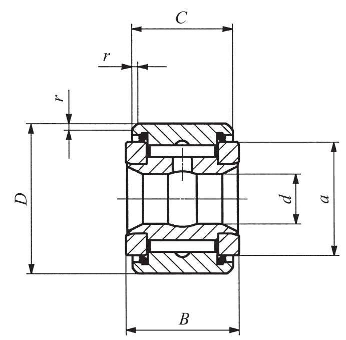
ROLLER FOLLOWERS

Non-separable Roller Followers, Inch Series **Full Complement Type /With Inner Ring**





CRY…V



CRY…VUU

Shaft dia. 6.350－31.750mm

Shaft dia. mm (inch)	Identification number: Shield type Cylindrical outer ring	Identification number: Sealed type Cylindrical outer ring	Mass (Ref.) g	Boundary dimensions mm(inch) *d*	*D*	*B*	*C*	*a*	*r*	Shaft dia. Push fit Min.	Push fit Max.	Drive fit Min.	Drive fit Max.	Press fit Min.	Press fit Max.	Basic dynamic load rating *C* N	Basic static load rating C_0 N
6.350 (1/4)	CRY 12 V	CRY 12 VUU	27	6.350(1/4)	19.050(3/4)	14.288(0.5625)	12.700(1/2)	14.4(0.567)	0.794(1/32)	6.332	6.342	6.348	6.358	6.353	6.363	8 710	12 300
	CRY 14 V	CRY 14 VUU	36	6.350(1/4)	22.225(7/8)	14.288(0.5625)	12.700(1/2)	14.4(0.567)	0.794(1/32)	6.332	6.342	6.348	6.358	6.353	6.363	8 710	12 300
7.938 (5/16)	CRY 16 V	CRY 16 VUU	68	7.938(5/16)	25.400(1)	17.463(0.6875)	15.875(5/8)	19.6(0.772)	1.191(3/64)	7.920	7.930	7.935	7.945	7.940	7.950	13 100	22 700
	CRY 18 V	CRY 18 VUU	77	7.938(5/16)	28.575(1 1/8)	17.463(0.6875)	15.875(5/8)	19.6(0.772)	1.588(1/16)	7.920	7.930	7.935	7.945	7.940	7.950	13 100	22 700
9.525 (3/8)	CRY 20 V	CRY 20 VUU	109	9.525(3/8)	31.750(1 1/4)	20.638(0.8125)	19.050(3/4)	25.0(0.984)	1.588(1/16)	9.507	9.517	9.523	9.533	9.528	9.538	23 600	31 700
	CRY 22 V	CRY 22 VUU	136	9.525(3/8)	34.925(1 3/8)	20.638(0.8125)	19.050(3/4)	25.0(0.984)	1.588(1/16)	9.507	9.517	9.523	9.533	9.528	9.538	23 600	31 700
11.112 (7/16)	CRY 24 V	CRY 24 VUU	186	11.112(7/16)	38.100(1 1/2)	23.813(0.9375)	22.225(7/8)	28.8(1.134)	1.588(1/16)	11.095	11.105	11.110	11.120	11.115	11.125	28 200	40 100
	CRY 26 V	CRY 26 VUU	227	11.112(7/16)	41.275(1 5/8)	23.813(0.9375)	22.225(7/8)	28.8(1.134)	1.588(1/16)	11.095	11.105	11.110	11.120	11.115	11.125	28 200	40 100
12.700 (1/2)	CRY 28 V	CRY 28 VUU	290	12.700(1/2)	44.450(1 3/4)	26.988(1.0625)	25.400(1)	32.7(1.287)	1.588(1/16)	12.682	12.692	12.698	12.708	12.708	12.718	35 300	55 600
	CRY 30 V	CRY 30 VUU	363	12.700(1/2)	47.625(1 7/8)	26.988(1.0625)	25.400(1)	32.7(1.287)	1.588(1/16)	12.682	12.692	12.698	12.708	12.708	12.718	35 300	55 600
15.875 (5/8)	CRY 32 V	CRY 32 VUU	476	15.875(5/8)	50.800(2)	33.338(1.3125)	31.750(1 1/4)	36.0(1.417)	1.588(1/16)	15.857	15.867	15.873	15.883	15.883	15.893	45 700	80 600
	CRY 36 V	CRY 36 VUU	599	15.875(5/8)	57.150(2 1/4)	33.338(1.3125)	31.750(1 1/4)	36.0(1.417)	1.588(1/16)	15.857	15.867	15.873	15.883	15.883	15.893	45 700	80 600
19.050 (3/4)	CRY 40 V	CRY 40 VUU	816	19.050(3/4)	63.500(2 1/2)	39.688(1.5625)	38.100(1 1/2)	43.3(1.705)	2.381(3/32)	19.032	19.042	19.048	19.058	19.058	19.068	61 400	116 000
	CRY 44 V	CRY 44 VUU	1 020	19.050(3/4)	69.850(2 3/4)	39.688(1.5625)	38.100(1 1/2)	43.3(1.705)	2.381(3/32)	19.032	19.042	19.048	19.058	19.058	19.068	61 400	116 000
25.400 (1)	CRY 48 V	CRY 48 VUU	1 410	25.400(1)	76.200(3)	46.038(1.8125)	44.450(1 3/4)	54.0(2.125)	2.381(3/32)	25.377	25.390	25.397	25.410	25.408	25.420	77 600	172 000
	CRY 52 V	CRY 52 VUU	1 640	25.400(1)	82.550(3 1/4)	46.038(1.8125)	44.450(1 3/4)	54.0(2.125)	2.381(3/32)	25.377	25.390	25.397	25.410	25.408	25.420	77 600	172 000
28.575 (1 1/8)	CRY 56 V	CRY 56 VUU	2 250	28.575(1 1/8)	88.900(3 1/2)	52.388(2.0625)	50.800(2)	61.9(2.437)	2.381(3/32)	28.522	28.565	28.572	28.585	28.583	28.595	111 000	239 000
31.750 (1 1/4)	CRY 64 V	CRY 64 VUU	3 200	31.750(1 1/4)	101.600(4)	58.738(2.3125)	57.150(2 1/4)	71.0(2.797)	2.381(3/32)	31.727	31.740	31.747	31.760	31.758	31.770	142 000	317 000

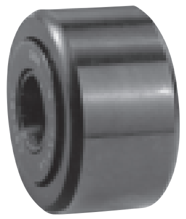
Remarks1. The inner ring has an oil groove and an oil hole.
2. Provided with prepacked grease.

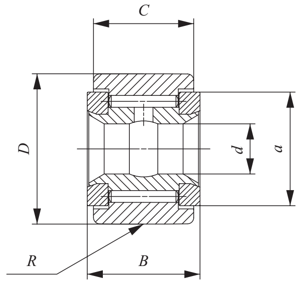
NAST, NART, NURT, CRY

F

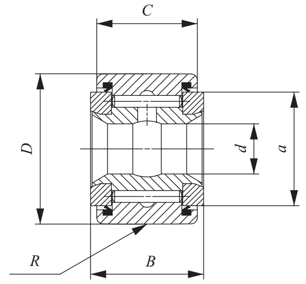
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Non-separable Roller Followers, Inch Series Full Complement Type / With Inner Ring





CRY…VR



CRY…VUUR

Shaft dia. 6.350－31.750mm

Shaft dia. mm (inch)	Identification number: Shield type Crowner outer ring	Identification number: Sealed type Crowned outer ring	Mass (Ref.) g	Boundary dimensions mm(inch) *d*	*D*	*B*	*C*	*a*	*R*	Shaft dia. Push fit Min.	Push fit Max.	Drive fit Min.	Drive fit Max.	Press fit Min.	Press fit Max.	Basic dynamic load rating *C* N	Basic static load rating C_0 N
6.350 (1/4)	CRY 12 VR	CRY 12 VUUR	27	6.350(1/4)	19.050(3/4)	14.288(0.5625)	12.700(1/2)	14.4(0.567)	250(10)	6.332	6.342	6.348	6.358	6.353	6.363	8 710	12 300
	CRY 14 VR	CRY 14 VUUR	36	6.350(1/4)	22.225(7/8)	14.288(0.5625)	12.700(1/2)	14.4(0.567)	250(10)	6.332	6.342	6.348	6.358	6.353	6.363	8 710	12 300
7.938 (5/16)	CRY 16 VR	CRY 16 VUUR	68	7.938(5/16)	25.400(1)	17.463(0.6875)	15.875(5/8)	19.6(0.772)	300(12)	7.920	7.930	7.935	7.945	7.940	7.950	13 100	22 700
	CRY 18 VR	CRY 18 VUUR	77	7.938(5/16)	28.575(1 1/8)	17.463(0.6875)	15.875(5/8)	19.6(0.772)	300(12)	7.920	7.930	7.935	7.945	7.940	7.950	13 100	22 700
9.525 (3/8)	CRY 20 VR	CRY 20 VUUR	109	9.525(3/8)	31.750(1 1/4)	20.638(0.8125)	19.050(3/4)	25.0(0.984)	360(14)	9.507	9.517	9.523	9.533	9.528	9.538	23 600	31 700
	CRY 22 VR	CRY 22 VUUR	136	9.525(3/8)	34.925(1 3/8)	20.638(0.8125)	19.050(3/4)	25.0(0.984)	360(14)	9.507	9.517	9.523	9.533	9.528	9.538	23 600	31 700
11.112 (7/16)	CRY 24 VR	CRY 24 VUUR	186	11.112(7/16)	38.100(1 1/2)	23.813(0.9375)	22.225(7/8)	28.8(1.134)	500(20)	11.095	11.105	11.110	11.120	11.115	11.125	28 200	40 100
	CRY 26 VR	CRY 26 VUUR	227	11.112(7/16)	41.275(1 5/8)	23.813(0.9375)	22.225(7/8)	28.8(1.134)	500(20)	11.095	11.105	11.110	11.120	11.115	11.125	28 200	40 100
12.700 (1/2)	CRY 28 VR	CRY 28 VUUR	290	12.700(1/2)	44.450(1 3/4)	26.988(1.0625)	25.400(1)	32.7(1.287)	500(20)	12.682	12.692	12.698	12.708	12.708	12.718	35 300	55 600
	CRY 30 VR	CRY 30 VUUR	363	12.700(1/2)	47.625(1 7/8)	26.988(1.0625)	25.400(1)	32.7(1.287)	500(20)	12.682	12.692	12.698	12.708	12.708	12.718	35 300	55 600
15.875 (5/8)	CRY 32 VR	CRY 32 VUUR	476	15.875(5/8)	50.800(2)	33.338(1.3125)	31.750(1 1/4)	36.0(1.417)	600(24)	15.857	15.867	15.873	15.883	15.883	15.893	45 700	80 600
	CRY 36 VR	CRY 36 VUUR	599	15.875(5/8)	57.150(2 1/4)	33.338(1.3125)	31.750(1 1/4)	36.0(1.417)	600(24)	15.857	15.867	15.873	15.883	15.883	15.893	45 700	80 600
19.050 (3/4)	CRY 40 VR	CRY 40 VUUR	816	19.050(3/4)	63.500(2 1/2)	39.688(1.5625)	38.100(1 1/2)	43.3(1.705)	760(30)	19.032	19.042	19.048	19.058	19.058	19.068	61 400	116 000
	CRY 44 VR	CRY 44 VUUR	1 020	19.050(3/4)	69.850(2 3/4)	39.688(1.5625)	38.100(1 1/2)	43.3(1.705)	760(30)	19.032	19.042	19.048	19.058	19.058	19.068	61 400	116 000
25.400 (1)	CRY 48 VR	CRY 48 VUUR	1 410	25.400(1)	76.200(3)	46.038(1.8125)	44.450(1 3/4)	54.0(2.125)	760(30)	25.377	25.390	25.397	25.410	25.408	25.420	77 600	172 000
	CRY 52 VR	CRY 52 VUUR	1 640	25.400(1)	82.550(3 1/4)	46.038(1.8125)	44.450(1 3/4)	54.0(2.125)	760(30)	25.377	25.390	25.397	25.410	25.408	25.420	77 600	172 000
28.575 (1 1/8)	CRY 56 VR	CRY 56 VUUR	2 250	28.575(1 1/8)	88.900(3 1/2)	52.388(2.0625)	50.800(2)	61.9(2.437)	760(30)	28.522	28.565	28.572	28.585	28.583	28.595	111 000	239 000
31.750 (1 1/4)	CRY 64 VR	CRY 64 VUUR	3 200	31.750(1 1/4)	101.600(4)	58.738(2.3125)	57.150(2 1/4)	71.0(2.797)	760(30)	31.727	31.740	31.747	31.760	31.758	31.770	142 000	317 000

Remarks1. The inner ring has an oil groove and an oil hole.
2. Provided with prepacked grease.

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

Other Product

Crossed Roller Bearing

CROSSED ROLLER BEARING

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.

CROSSED ROLLER BEARINGS

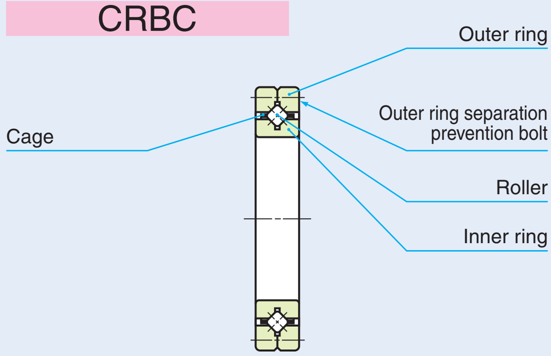
●High Rigidity Type Crossed Roller Bearings
●Standard Type Crossed Roller Bearings
●Slim Type Crossed Roller Bearings

Structure and Features

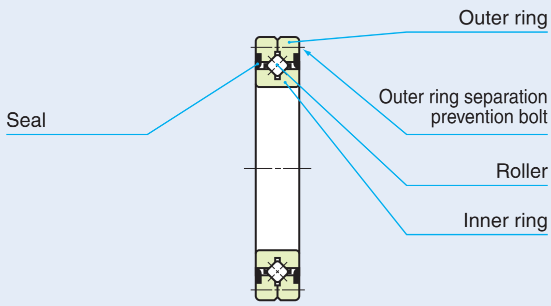
IKO Crossed Roller Bearings are compact bearings with their rollers alternately crossed at right angles to each other between inner and outer rings. They can take loads from any directions at the same time such as radial, thrust and moment loads. The rollers make line-contact with raceway surfaces, and, therefore, elastic deformation due to bearing loads is very small. These bearings are widely used in the rotating parts of industrial robots, machine tools, medical equipment, etc., which require compactness, high rigidity and high rotational accuracy.
In addition, bearings made of stainless steel or those with inner and outer rings provided with mounting holes are also available on request. Please contact IKO.

Structures of Crossed Roller Bearings

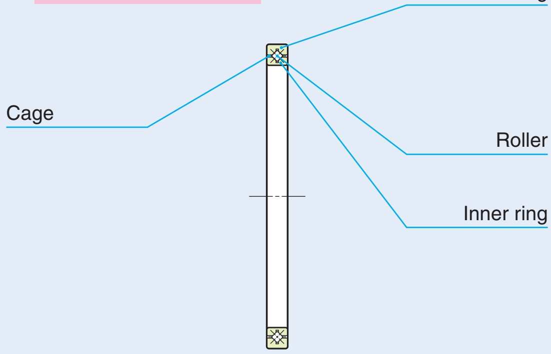
CRBC



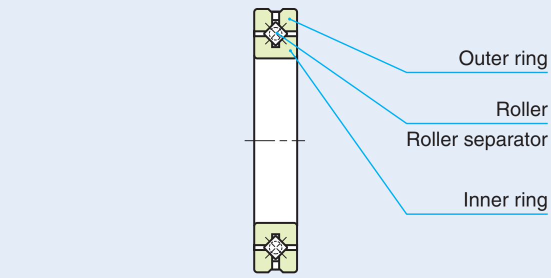
CRB···UU



CRBS



CRBH···A



Types

Crossed Roller Bearings are available in the types shown in Table 1.

Table 1 Crossed Roller Bearing Type

Type		With Cage	With Separator	Full complement
High rigidity type crossed roller bearings CRBH	Open type	—	CRBH···A	—
	Sealed type	—	CRBH···AUU	—
Standard type crossed roller bearings CRBC, CRB	Open type	CRBC	—	CRB
	Sealed type	CRBC···UU	—	CRB ··· UU
Slim type crossed roller bearings CRBS	Open type	CRBS	—	CRBS···V
	Sealed type	—	CRBS···AUU	CRBS···VUU

High Rigidity Type Crossed Roller Bearings

Both inner and outer rings have a solid one-piece construction. Therefore, high accuracy and high rigidity are achieved, and mounting errors can be minimized. As separators are incorporated between the rollers for smooth rotation, these bearings are suitable for applications where rotational speed is comparatively high.

Standard Type Crossed Roller Bearings

The outer ring is made of two split pieces, which are bolted together to prevent separation during transportation or mounting. So, handling is easy.

Slim Type Crossed Roller Bearings

These bearings are very slim bearings having a small outside diameter, in comparison with the bore diameter, and a narrow width. The type with cage and the type with separator provide smooth rotation and are suitable for applications where rotational speed is comparatively high.

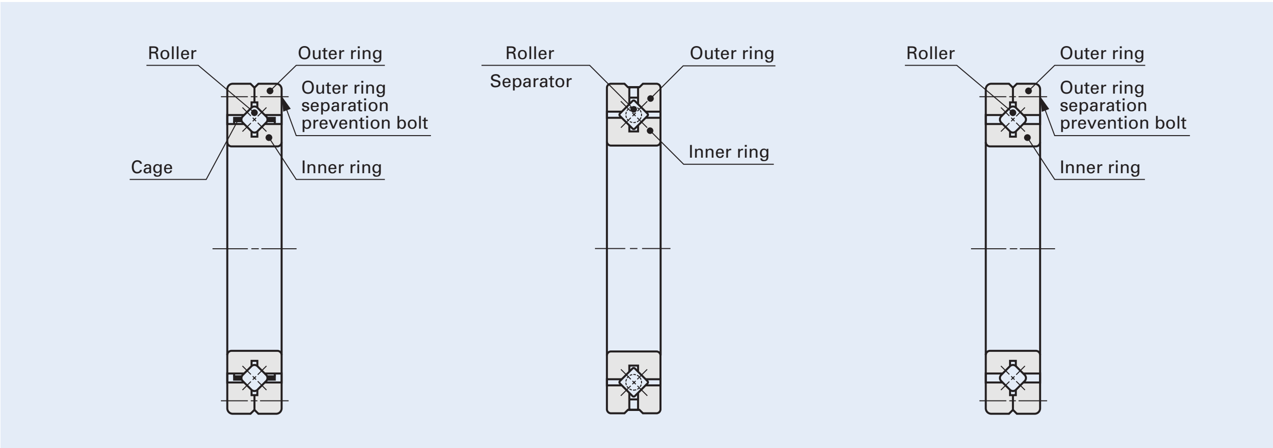
Internal Structures and Shapes

Various types are lined up in Crossed Roller Bearing series, including the type with cage, the type with separator, open type, sealed type, etc..

Roller guide method

Crossed Roller Bearings include the type with cage, type with separator and full complement type. The type with cage and the type with separator have a small coefficient of friction and are suitable for comparatively high speed rotations, while the full complement type is suitable for heavy load applications at low speed rotations.

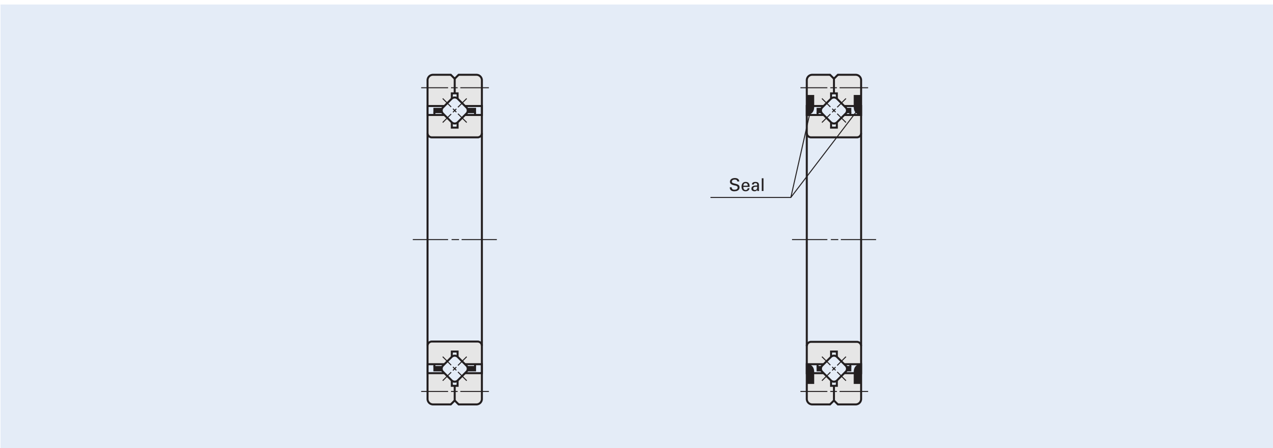
《With Cage》 《With Separator》 《Full complement》



Seal structure

Crossed Roller Bearings include the open type and sealed type. The sealed type bearing incorporates seals made of special synthetic rubber that have excellent sealing performance against dust and dirt penetration and grease leakage.

《Open type》 《Sealed type》



CRBH, CRBC, CRB, CRBS

F

Identification number

The identification number of Crossed Roller Bearings consists of a model code, dimensions, any supplemental codes and a classification symbol. Some examples are shown below.

Examples of identification number

	Model code	Dimensions			Supplemental code		Classification symbol
Example 1	CRBH	150	25	A	UU	C1	P6
Example 2	CRBC	150	25		UU	C1	P6
Example 3	CRBS	150	8	A	UU	C1	

Model code	
CRBH···A	High Rigidity Type Crossed Roller Bearing (With separator)
CRBC	Standard Type Crossed Roller Bearing (With cage)
CRB	Standard Type Crossed Roller Bearing (Full complement)
CRBS	Slim Type Crossed Roller Bearing (With cage)
CRBS···A	Slim Type Crossed Roller Bearing (With separator)
CRBS···V	Slim Type Crossed Roller Bearing (Full complement)

Dimension
The dimension indicates the bore diameter of the bearing. (unit : mm)
The dimension indicates the bearing width. (unit : mm)

Supplemental code - 1	
No symbol	Open type
UU	Sealed type(1)

Note(1) For the type with a seal on one side, "U" is attached.

Supplemental code - 2		
T1	T1 clearance	
C1	C1 clearance	
C2	C2 clearance	Not applicable to Slim Type Crossed Roller Bearings.
No symbol	Normal clearance	Applicable to Slim Type Crossed Roller Bearings.

Classification symbol		
No symbol	Accuracy class 0	
P6	Accuracy class 6	Not applicable to Slim Type Crossed Roller Bearings.
P5	Accuracy class 5	
P4	Accuracy class 4	
P2	Accuracy class 2	

Load Rating and Life

Basic dynamic road 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 Crossed Roller Bearings 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.

Life

The basic rating life of Crossed Roller Bearings is obtained from the following formula.

$$L_{10}=\left(\frac{C}{P_r}\right)^{10/3} \cdots\cdots (1)$$

where, L_{10} : Basic rating life, 10^6 rev.
C : Basic dynamic load rating, N
P_r : Dynamic equivalent radial load, N

If the number of revolutions per minute is known, the rating life in hours can be obtained from the following formula.

$$L_h=\frac{10^6 L_{10}}{60n} \cdots\cdots (2)$$

where, L_h : Basic rating life in hours, h
n : Number of revolutions per minute, rpm

Life in oscillating motion

When a bearing is used in oscillating motion, the life can be obtained from the following formula.

$$L_{OC}=\frac{90}{\theta}\left(\frac{C}{P_r}\right)^{P} \cdots\cdots (3)$$

where, L_{OC} : Basic rating life in oscillating motion, 10^6 cycles
2θ : Oscillating angle, degrees (Refer to Fig. 1)
P_r : Dynamic equivalent radial load, N

If the number of oscillations per minute n_1 cpm is given, the rating life in hours can be obtained from formula (2) by substituting n_1 for n.
When the oscillating angle 2θ is very small, an oil film may not be formed between the rolling elements and the raceways and fretting corrosion may occur. In this case, please consult IKO.

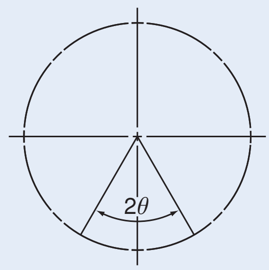


Fig. 1 Oscillating motion

Basic static load rating C_0

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.

Static safety factor

The static safety factor f_S of Crossed Roller Bearings is obtained by the formula below and Table 2 give standard values of this factor.

$$f_S = \frac{C_0}{P_{or}} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (4)$$

where, f_S : Static safety factor
C_0 : Basic static load rating, N
P_{or} : Static equivalent radial load (maximum load), N

Table 2 Static safety factor

Operating conditions	f_S
When high rotating accuracy is required	≧3
Normal operation	≧1.5
When smooth rotation is not important in normal operation When the bearing is almost not rotating	≧1

Load factor

Due to vibration and/or shocks during machine operation, the actual load on each bearing 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 3.

$$F = f_W F_C \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (5)$$

where, F : Bearing load, N
f_W : Load factor (Refer to Table 3.)
F_C : Theoretically calculated load, N

Table 3 Load factor

Operating conditions	f_W
Smooth operation free from vibration and/or shocks	1 ～1.2
Normal operation	1.2～1.5
Operation with vibration and/or shocks	1.5～3

Dynamic Equivalent Load

The dynamic equivalent radial load of Crossed Roller Bearings can be obtained from the following equation.

$$P_r = X\left(F_r + \frac{2M}{D_{pw}}\right) + YF_a \quad \cdots\cdots\cdots\cdots (6)$$

where,
P_r : Dynamic equivalent radial load, N
F_r : Radial load, N
F_a : Axial load, N
M : Moment, N-mm
D_{pw} : Pitch circle diameter of roller set, mm

$$\left(D_{pw} \fallingdotseq \frac{d+D}{2}\right)$$

X : Radial load factor (Refer to Table 4.)
Y : Axial load factor (Refer to Table 4.)

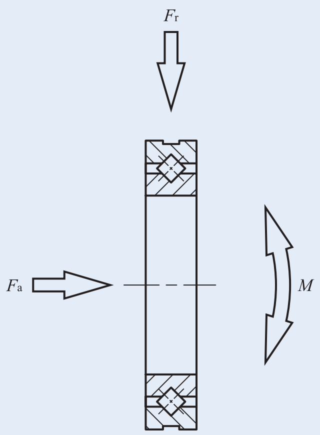


Fig. 2 Load direction

Table 4 Radial load factor and axial load factor

Conditions	X	Y
$\dfrac{F_a}{F_r + 2M/D_{pw}} \leqq 1.5$	1	0.45
$\dfrac{F_a}{F_r + 2M/D_{pw}} > 1.5$	0.67	0.67

Static Equivalent Load

The static equivalent radial load of Crossed Roller Bearings can be obtained from the following equation.

$$P_{0r} = F_r + \frac{2M}{D_{pw}} + 0.44\, F_a \quad \cdots\cdots\cdots\cdots (7)$$

where,
P_{0r} : Static equivalent radial load, N
F_r : Radial load, N
F_a : Axial load, N
M : Moment, N-mm
D_{pw} : Pitch circle diameter of roller set, mm

$$\left(D_{pw} \fallingdotseq \frac{d+D}{2}\right)$$

Accuracy

The accuracy of Crossed Roller Bearings is shown in Tables 5 and 6. However, the accuracy of Slim Type Crossed Roller Bearings is based on Table 7.

Bearings with special accuracy are also optionally available. Please consult IKO.

Table 5 Tolerances and allowable values of inner rings and tolerances of outer ring width

unit: μm

d Nominal bore diameter mm		Δ_{dmp} (1) Single plane mean bore dia. deviation								Δ_{Bs} Deviation of a single inner ring width		Δ_{Cs} (2) Deviation of a single outer ring width		K_{ia} Radial run-out of assembled bearing inner ring					S_{ia} Assembled bearing inner ring face run-out with raceway				
		Class 0		Class 6		Class 5		Class 4						Class 0	Class 6	Class 5	Class 4	Class 2	Class 0	Class 6	Class 5	Class 4	Class 2
Over	Incl.	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low										
18	30	0	−10	0	−8	0	−6	0	−5	0	−75	0	−100	13	8	4	3	2.5	13	8	4	3	2.5
30	50	0	−12	0	−10	0	−8	0	−6	0	−75	0	−100	15	10	5	4	2.5	15	10	5	4	2.5
50	80	0	−15	0	−12	0	−9	0	−7	0	−75	0	−100	20	10	5	4	2.5	20	10	5	4	2.5
80	120	0	−20	0	−15	0	−10	0	−8	0	−75	0	−100	25	13	6	5	2.5	25	13	6	5	2.5
120	150	0	−25	0	−18	0	−13	0	−10	0	−100	0	−120	30	18	8	6	2.5	30	18	8	6	2.5
150	180	0	−25	0	−18	0	−13	0	−10	0	−100	0	−120	30	18	8	6	5	30	18	8	6	5
180	250	0	−30	0	−22	0	−15	0	−12	0	−100	0	−120	40	20	10	8	5	40	20	10	8	5
250	315	0	−35	0	−25	0	−18	—	—	0	−120	0	−150	50	25	13	10	7	50	25	13	10	7
315	400	0	−40	0	−30	0	−23	—	—	0	−150	0	−200	60	30	15	12	8	60	30	15	12	8
400	500	0	−45	0	−35	—	—	—	—	0	−150	0	−200	65	35	18	14	10	65	35	18	14	10
500	630	0	−50	0	−40	—	—	—	—	0	−150	0	−200	70	40	20	16	12	70	40	20	16	12
630	800	0	−75	—	—	—	—	—	—	0	−150	0	−200	80	50	25	20	15	80	50	25	20	15

Notes(1) When values are not indicated in the table (Class 2, etc.), those for the highest class for which the values are indicated are applicable.
(2) In case of High Rigidity Type Crossed Roller Bearings, the tolerances for deviation of a single inner ring width are applicable to those of a single outer ring width.
Remark The accuracy specified in this table is not applicable to Slim Type Crossed Roller Bearings.

Table 6 Tolerances and allowable values of outer ring

unit: μm

D Nominal outside diameter mm		Δ_{Dmp} (1) Single plane mean outside dia. deviation								K_{ea} Radial run-out of assembled bearing outer ring					S_{ea} Assembled bearing outer ring face run-out with raceway				
		Class 0		Class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4(2)	Class 2(2)	Class 0	Class 6	Class 5	Class 4(2)	Class 2(2)
Over	Incl.	High	Low	High	Low	High	Low	High	Low										
30	50	0	−11	0	−9	0	−7	0	−6	20	10	7	5	2.5	20	10	7	5	2.5
50	80	0	−13	0	−11	0	−9	0	−7	25	13	8	5	4	25	13	8	5	4
80	120	0	−15	0	−13	0	−10	0	−8	35	18	10	6	5	35	18	10	6	5
120	150	0	−18	0	−15	0	−11	0	−9	40	20	11	7	5	40	20	11	7	5
150	180	0	−25	0	−18	0	−13	0	−10	45	23	13	8	5	45	23	13	8	5
180	250	0	−30	0	−20	0	−15	0	−11	50	25	15	10	7	50	25	15	10	7
250	315	0	−35	0	−25	0	−18	0	−13	60	30	18	11	7	60	30	18	11	7
315	400	0	−40	0	−28	0	−20	—	—	70	35	20	—	—	70	35	20	—	—
400	500	0	−45	0	−33	0	−23	—	—	80	40	23	—	—	80	40	23	—	—
500	630	0	−50	0	−38	0	−28	—	—	100	50	25	—	—	100	50	25	—	—
630	800	0	−75	0	−45	—	—	—	—	120	60	30	—	—	120	60	30	—	—
800	1000	0	−100	0	−60	—	—	—	—	120	75	35	—	—	120	75	35	—	—
1000	1030	0	−125	—	—	—	—	—	—	120	75	35	—	—	120	75	35	—	—

Notes(1) When values are not indicated in the table (Class 2, etc.), those for the highest class for which the values are indicated are applicable.
(2) Classes 4 and 2 apply to High Rigidity Type Crossed Roller Bearings. For Standard Type Crossed Roller Bearings, the tolerance values for Class 5 are applicable to Classes 4 and 2.
Remark The accuracy specified in this table is not applicable to Slim Type Crossed Roller Bearings.

Table 7 Tolerances and allowable values of Slim Type Crossed Roller Bearings

unit: μm

d Nominal bore diameter mm	$\Delta_{d\mathrm{mp}}$ Single plane mean bore dia. deviation High	Low	$\Delta_{D\mathrm{mp}}$ Single plane mean outside dia. deviation High	Low	$\Delta_{B\mathrm{s}}$ and $\Delta_{C\mathrm{s}}$ Deviations of a single inner ring width and outer ring width High	Low	K_{ia} and S_{ia} Radial and axial run-out of assembled bearing inner ring	K_{ea} and S_{ea} Radial and axial run-out of assembled bearing outer ring
50	0	−15	0	−13	0	−127	13	13
60	0	−15	0	−13	0	−127	13	13
70	0	−15	0	−15	0	−127	15	15
80	0	−20	0	−15	0	−127	15	15
90	0	−20	0	−15	0	−127	15	15
100	0	−20	0	−15	0	−127	15	15
110	0	−20	0	−20	0	−127	20	20
120	0	−25	0	−20	0	−127	20	20
130	0	−25	0	−25	0	−127	25	25
140	0	−25	0	−25	0	−127	25	25
150	0	−25	0	−25	0	−127	25	25
160	0	−25	0	−25	0	−127	25	25
170	0	−25	0	−30	0	−127	25	25
180	0	−30	0	−30	0	−127	30	30
190	0	−30	0	−30	0	−127	30	30
200	0	−30	0	−30	0	−127	30	30

Clearance

The radial internal clearances of Crossed Roller Bearings are shown in Table 8.1. However, the radial internal clearances of Slim Type Crossed Roller Bearings are based on Table 8.2.

Table 8.1 Radial internal clearances

unit: μm

d Nominal bore diameter mm		Radial internal clearance					
		T1		C1		C2	
Over	Incl.	Min.	Max.	Min.	Max.	Min.	Max.
–	30	−10	0	0	10	10	20
30	40	−10	0	0	10	10	20
40	50	−10	0	0	10	10	25
50	65	−10	0	0	10	10	25
65	80	−10	0	0	15	15	30
80	100	−10	0	0	15	15	35
100	120	−15	0	0	15	15	35
120	140	−15	0	0	20	20	45
140	160	−15	0	0	20	20	50
160	200	−15	0	0	20	20	50
200	250	−20	0	0	25	25	60
250	315	−20	0	0	25	25	60
315	400	−25	0	0	30	30	70
400	500	−30	0	0	40	40	85
500	630	−30	0	0	50	50	100
630	710	−30	0	0	60	60	120
710	800	−40	0	0	70	70	140

Remark This table is not applicable to Slim Type Crossed Roller Bearings.

Table 8.2 Radial internal clearances of Slim Type Crossed Roller Bearings

unit: μm

d Nominal bore diameter mm	Radial internal clearance					
	T1		C1		Normal	
	Min.	Max.	Min.	Max.	Min.	Max.
50	−8	0	0	15	30	56
60	−8	0	0	15	30	56
70	−8	0	0	15	30	56
80	−8	0	0	15	41	66
90	−8	0	0	15	41	66
100	−8	0	0	15	41	66
110	−8	0	0	15	41	66
120	−8	0	0	15	51	76
130	−8	0	0	15	51	76
140	−8	0	0	15	51	76
150	−8	0	0	15	51	76
160	−10	0	0	20	51	76
170	−10	0	0	20	51	76
180	−10	0	0	20	61	86
190	−10	0	0	20	61	86
200	−10	0	0	20	61	86

Fit

The standard fits of Crossed Roller Bearings are shown in Table 9.1. For large bearings, fit based on the actual measured dimensions of the bearings is recommended, and fit allowance should be chosen as small as possible in accordance with the tolerance class given in Table 9.1. When complex loads or shock loads are applied or when high rotational accuracy and rigidity of the bearing are required, it is recommended to use a slight interference fit adjusted to the actual measured dimensions for both inner and outer rings.

For the interference fit, the radial internal clearance after the fit decreases by approximately 70% to 90% of the interference amount. To avoid excessive preload due to fit, it is recommended to use a slight interference fit adjusted to the actual measured dimensions for both T1 and C1 clearances.

Table 9.1 Recommended fits for Crossed Roller Bearings under normal load

Radial internal clearance	Tolerance class			
	Inner ring rotating load		Outer ring rotating load	
	Shaft	Housing bore	Shaft	Housing bore
C1 clearance	h5	H7	g5	J7 (1)
C2 clearance	j5	H7	g5	J7 (1)

Note (1) It is recommended that a slight interference fit adjusted to the actual measured dimensions of the bearing is used.

Table 9.2 Recommended fits for Slim Type Crossed Roller Bearings with normal clearances

(Dimensional tolerances of shaft and housing bore)

unit: μm

d Nominal bore diameter mm	Inner ring rotating load				Outer ring rotating load			
	Shaft		Housing bore		Shaft		Housing bore	
	High	Low	High	Low	High	Low	High	Low
50	+15	0	+13	0	−15	−30	−13	−25
60	+15	0	+13	0	−15	−30	−13	−25
70	+15	0	+15	0	−15	−30	−15	−30
80	+20	0	+15	0	−20	−40	−15	−30
90	+20	0	+15	0	−20	−40	−15	−30
100	+20	0	+15	0	−20	−40	−15	−30
110	+20	0	+20	0	−20	−40	−20	−40
120	+25	0	+20	0	−25	−50	−20	−40
130	+25	0	+25	0	−25	−50	−25	−50
140	+25	0	+25	0	−25	−50	−25	−50
150	+25	0	+25	0	−25	−50	−25	−50
160	+25	0	+25	0	−25	−50	−25	−50
170	+25	0	+30	0	−25	−50	−30	−60
180	+30	0	+30	0	−30	−60	−30	−60
190	+30	0	+30	0	−30	−60	−30	−60
200	+30	0	+30	0	−30	−60	−30	−60

Allowable rotational speed

Allowable rotational speeds of Crossed Roller Bearings are affected by mounting and operating conditions. The values in general operation are shown in Table 10.

Table 10 $d_m n$ values(1) of Crossed Roller Bearings

Type		Grease	Oil
With cage or separator	Open type	75 000	150 000
	Sealed type	60 000	–
Full complement	Open type	50 000	75 000
	Sealed type	40 000	–

Note(1) · $d_m n$ value $= d_m \times n$

where, d_m : Mean value of bearing bore and outside diameters, mm

n : Number of rotations per minute, rpm

Lubrication

These bearings are generally lubricated with grease. Grease is supplied through the clearance between the inner ring and the outer ring.

In the sealed type bearings, ALVANIA EP GREASE 2 is prepacked as the lubricating grease.

For bearings without prepacked grease, supply grease or oil for use. Operating without grease or oil will increase the wear of the rolling contact surfaces and cause a short bearing life.

When using a special grease, carefully examine the grease properties and contents such as base oil viscosity and extreme pressure additives. In this case, please contact IKO.

Oil Hole

For Crossed Roller Bearings, oil holes and oil grooves can be provided on bearing rings on request. When an oil hole is required on the outer ring, attach "-OH" before the clearance symbol in the identification number. When an oil hole and an oil groove are required on the outer ring, attach "-OG" at the same place in the identification number. For an oil hole on the inner ring, attach "/OH", and for an oil hole and an oil groove on the inner ring, attach "/OG", at the same place in the identification number. High Rigidity Type Crossed Roller Bearings have an oil groove and two oil holes on the outer ring as standard. Table 11 shows availability of oil holes for each bearing type.

Table 11 Oil holes

Bearing type (1)	Oil hole code			
	/nOH	/nOG	-nOH	-nOG
CRBH	○	○	–	– (2)
CRB、CRBC	○	○	○	○
CRBS	○	–	○	–

Notes(1) Only representative types are shown in the table, but this table is applicable to all Crossed Roller Bearings.

(2) CRBH is provided with an oil groove and two oil holes on the outer ring.

Remark n denotes the number of oil holes not exceeding 4. For one oil hole, number is not indicated.

When preparing multiple oil holes, please contact IKO.

Example 1 When the inner ring has 4 oil holes

CRBC 10020 / 4OH C1

4 Oil holes

In inner ring

Example 2 When the outer ring has a single oil hole

CRBC 10020 - OH C1

1 Oil hole

In outer ring

Operating Temperature Range

The operating temperature range for Crossed Roller Bearings is $-20^\circ C \sim +120^\circ C$. However, the maximum allowable temperature for types with separator and with seal is $+110^\circ C$, and $+100^\circ C$ when they are continuously operated.

Mounting

❶When the rigidity of the mounting parts is insufficient, stress concentration will occur at the contact area between the rollers and the raceways, and the bearing performance will be deteriorated significantly . Therefore, carefully examine the rigidity of housing and the strength of fixing bolts when a large moment is applied.

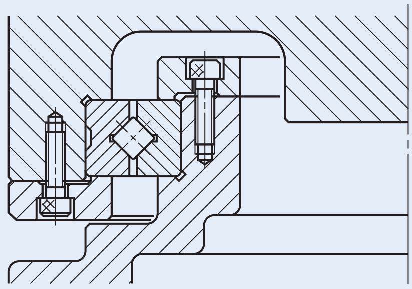


Fig. 3 Mounting example

❷In some Crossed Roller Bearings, parts made of synthetic resin or special synthetic rubber are used. When the bearing must be used at temperatures higher than 110˚C,please consult IKO.

❸The inner and outer rings should be securely fixed in the axial direction by using fixing plates, etc. Recommended thickness of the fixing plate is 1/2 or more of the bearing width B. The dimensions in the axial direction of the housing bore and the fixing plates should be determined to get a secure fixing while considering the dimension of bearing width which is given a minus tolerance.

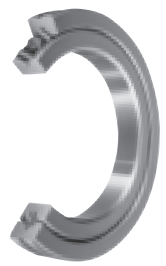
❹The shoulder height diameters (d_a and D_a) that are related to mounting should satisfy the values shown in the dimension tables. When these dimensions are incorrect, deformations of inner and outer rings will occur and the bearing performance will be remarkably impaired.

❺The depth of the housing bore is recommended to be equal to or larger than the bearing width.

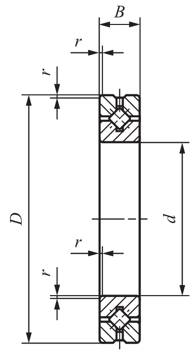
❻Separation prevention bolts for the outer ring are provided to prevent separation of two halves of the outer ring during transportation or mounting. When mounting, they should be loosened slightly.

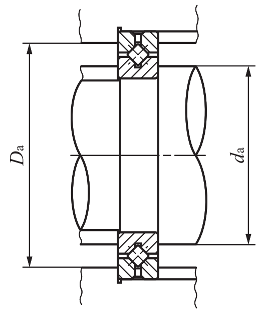
❼High Rigidity Type Crossed Roller Bearings and Slim Type Crossed Roller Bearings have a plug for hole for inserting rollers. When mounting the bearings, locate the plug at a position that is not included in the maximum loading zone. The plug is a press-fitted pin that can be found on the side face of the outer ring.

High Rigidity Type Crossed Roller Bearings Open Type/With Separator



Shaft dia. 20 ─ 250mm





CRBH···A

Shaft dia. mm	Identification number	Mass (Ref.) kg	Boundary dimensions mm d	D	B	r_{min} (1)	Mounting dimensions mm d_a	D_a	Basic dynamic load rating C N	Basic static load rating C_0 N
20	**CRBH 208 A**	0.04	20	36	8	0.3	24	31	2 910	2 430
25	**CRBH 258 A**	0.05	25	41	8	0.3	29	36	3 120	2 810
30	**CRBH 3010 A**	0.12	30	55	10	0.3	36.5	48.5	7 600	8 370
35	**CRBH 3510 A**	0.13	35	60	10	0.3	41.5	53.5	7 900	9 130
40	**CRBH 4010 A**	0.15	40	65	10	0.3	46.5	58.5	8 610	10 600
45	**CRBH 4510 A**	0.16	45	70	10	0.3	51.5	63.5	8 860	11 300
50	**CRBH 5013 A**	0.29	50	80	13	0.6	56	74	17 300	20 900
60	**CRBH 6013 A**	0.33	60	90	13	0.6	66	84	18 800	24 300
70	**CRBH 7013 A**	0.38	70	100	13	0.6	76	94	20 100	27 700
80	**CRBH 8016 A**	0.74	80	120	16	0.6	88	112	32 100	43 400
90	**CRBH 9016 A**	0.81	90	130	16	0.6	98	122	33 100	46 800
100	**CRBH 10020 A**	1.45	100	150	20	0.6	110	140	50 900	72 200
110	**CRBH 11020 A**	1.56	110	160	20	0.6	120	150	52 400	77 400
120	**CRBH 12025 A**	2.62	120	180	25	1	132	168	73 400	108 000
130	**CRBH 13025 A**	2.82	130	190	25	1	142	178	75 900	115 000
140	**CRBH 14025 A**	2.96	140	200	25	1	152	188	81 900	130 000
150	**CRBH 15025 A**	3.16	150	210	25	1	162	198	84 300	138 000
200	**CRBH 20025 A**	4.0	200	260	25	1	212	248	92 300	169 000
250	**CRBH 25025 A**	4.97	250	310	25	1.5	262	298	102 000	207 000

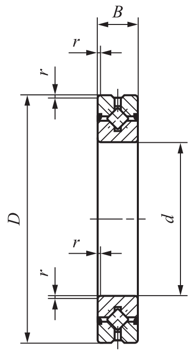
Note(1) Minimum allowable single value of chamfer dimension r

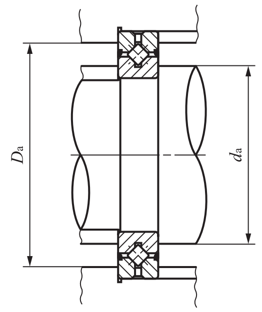
Remarks1. The outer ring has an oil groove and two oil holes.

2. Grease is not prepacked. Perform proper lubrication.

High Rigidity Type Crossed Roller Bearings Sealed Type/With Separator

Shaft dia. 20 ─ 250mm





CRBH···AUU

Shaft dia. mm	Identification number	Mass (Ref.) kg	Boundary dimensions mm d	D	B	r_{min} (1)	Mounting dimensions mm d_a	D_a	Basic dynamic load rating C N	Basic static load rating C_0 N
20	**CRBH 208 A UU**	0.04	20	36	8	0.3	24	31	2 910	2 430
25	**CRBH 258 A UU**	0.05	25	41	8	0.3	29	36	3 120	2 810
30	**CRBH 3010 A UU**	0.12	30	55	10	0.3	36.5	48.5	7 600	8 370
35	**CRBH 3510 A UU**	0.13	35	60	10	0.3	41.5	53.5	7 900	9 130
40	**CRBH 4010 A UU**	0.15	40	65	10	0.3	46.5	58.5	8 610	10 600
45	**CRBH 4510 A UU**	0.16	45	70	10	0.3	51.5	63.5	8 860	11 300
50	**CRBH 5013 A UU**	0.29	50	80	13	0.6	56	74	17 300	20 900
60	**CRBH 6013 A UU**	0.33	60	90	13	0.6	66	84	18 800	24 300
70	**CRBH 7013 A UU**	0.38	70	100	13	0.6	76	94	20 100	27 700
80	**CRBH 8016 A UU**	0.74	80	120	16	0.6	88	112	32 100	43 400
90	**CRBH 9016 A UU**	0.81	90	130	16	0.6	98	122	33 100	46 800
100	**CRBH 10020 A UU**	1.45	100	150	20	0.6	110	140	50 900	72 200
110	**CRBH 11020 A UU**	1.56	110	160	20	0.6	120	150	52 400	77 400
120	**CRBH 12025 A UU**	2.62	120	180	25	1	132	168	73 400	108 000
130	**CRBH 13025 A UU**	2.82	130	190	25	1	142	178	75 900	115 000
140	**CRBH 14025 A UU**	2.96	140	200	25	1	152	188	81 900	130 000
150	**CRBH 15025 A UU**	3.16	150	210	25	1	162	198	84 300	138 000
200	**CRBH 20025 A UU**	4.0	200	260	25	1	212	248	92 300	169 000
250	**CRBH 25025 A UU**	4.97	250	310	25	1.5	262	298	102 000	207 000

Note(1) Minimum allowable single value of chamfer dimension r

Remarks1. The outer ring has an oil groove and two oil holes.

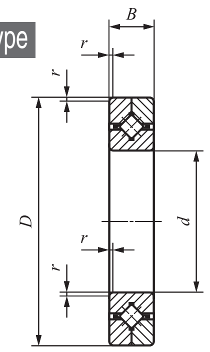
2. Provided with prepacked grease.

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

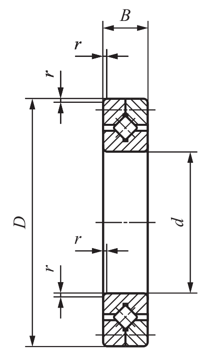
CROSSED ROLLER BEARINGS

Standard Type Crossed Roller Bearings Open Type/With Cage

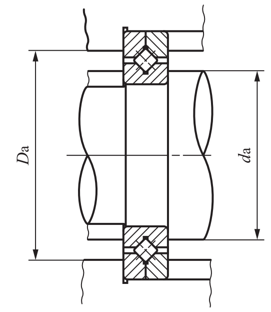
Open Type/Full Complement Type



CRBC



CRB



Shaft dia. 30 — 250mm

Shaft dia. mm	Identification number: With Cage	Identification number: Full complement	Mass (Ref.) kg	Boundary dimensions mm d	D	B	r_{min} (1)	Mounting dimensions mm d_a	D_a	CRBC Basic dynamic load rating C N	CRBC Basic static load rating C_0 N	CRB Basic dynamic load rating C N	CRB Basic static load rating C_0 N
30	CRBC 3010	CRB 3010	0.12	30	55	10	0.3	34	44	3 830	4 130	5 290	6 350
40	CRBC 4010	CRB 4010	0.15	40	65	10	0.3	44	54	4 280	5 140	5 980	8 040
50	CRBC 5013	CRB 5013	0.29	50	80	13	0.6	55	71	10 700	12 600	14 200	18 400
60	CRBC 6013	CRB 6013	0.33	60	90	13	0.6	64	81	11 600	14 600	15 400	21 500
70	CRBC 7013	CRB 7013	0.38	70	100	13	0.6	75	91	12 300	16 700	17 000	25 500
80	CRBC 8016	CRB 8016	0.74	80	120	16	0.6	86	107	18 200	25 500	24 300	37 500
90	CRBC 9016	CRB 9016	0.81	90	130	16	1	98	118	19 400	28 600	25 900	42 100
100	CRBC 10020	CRB 10020	1.45	100	150	20	1	108	134	31 500	45 100	39 400	61 100
110	CRBC 11020	CRB 11020	1.56	110	160	20	1	118	144	33 500	50 700	41 200	66 700
120	CRBC 12025	CRB 12025	2.62	120	180	25	1.5	132	164	47 700	70 500	59 900	95 400
130	CRBC 13025	CRB 13025	2.82	130	190	25	1.5	140	172	49 200	74 800	61 000	99 800
140	CRBC 14025	CRB 14025	2.96	140	200	25	1.5	151	183	50 700	79 200	64 100	108 000
150	CRBC 15025	CRB 15025	3.16	150	210	25	1.5	160	192	53 800	87 700	65 000	113 000
	CRBC 15030	CRB 15030	5.3	150	230	30	1.5	166	202	69 200	108 000	85 900	144 000
200	CRBC 20025	CRB 20025	4.0	200	260	25	2	208	239	60 200	110 000	75 300	148 000
	CRBC 20030	CRB 20030	6.7	200	280	30	2	218	262	108 000	178 000	133 000	234 000
	CRBC 20035	CRB 20035	9.58	200	295	35	2	221	274	137 000	215 000	168 000	282 000
250	CRBC 25025	CRB 25025	4.97	250	310	25	2.5	259	290	67 200	136 000	83 900	183 000
	CRBC 25030	CRB 25030	8.1	250	330	30	2.5	265	310	116 000	208 000	146 000	283 000
	CRBC 25040	CRB 25040	14.8	250	355	40	2.5	271	330	179 000	299 000	215 000	382 000

Note(1) Minimum allowable single value of chamfer dimension r

Remarks1. No oil hole is provided.

2. Grease is not prepacked. Perform proper lubrication.

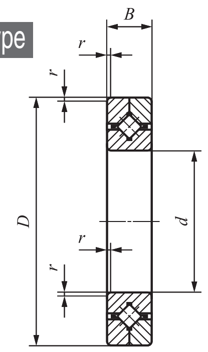
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO

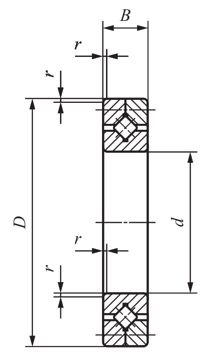
CROSSED ROLLER BEARINGS

Standard Type Crossed Roller Bearings Open Type/With Cage

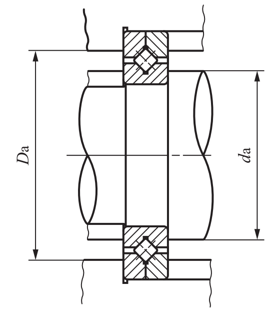
Open Type/Full Complement Type



CRBC



CRB



Shaft dia. 300 — 800mm

Shaft dia. mm	Identification number With Cage	Identification number Full complement	Mass (Ref.) kg	Boundary dimensions mm d	D	B	r_{min} (1)	Mounting dimensions mm d_a	D_a	CRBC Basic dynamic load rating C N	CRBC Basic static load rating C_0 N	CRB Basic dynamic load rating C N	CRB Basic static load rating C_0 N
300	**CRBC 30025**	**CRB 30025**	5.88	300	360	25	2.5	310	341	73 800	162 000	91 900	217 000
	CRBC 30035	**CRB 30035**	13.4	300	395	35	2.5	318	372	163 000	299 000	205 000	408 000
	CRBC 30040	**CRB 30040**	17.2	300	405	40	2.5	321	381	194 000	351 000	235 000	451 000
400	**CRBC 40035**	**CRB 40035**	14.5	400	480	35	2.5	414	457	133 000	300 000	165 000	400 000
	CRBC 40040	**CRB 40040**	23.5	400	510	40	2.5	423	483	222 000	455 000	270 000	590 000
	CRBC 40070	**CRB 40070**	72.4	400	580	70	2.5	430	532	470 000	811 000	576 000	1 060 000
500	**CRBC 50040**	**CRB 50040**	26.0	500	600	40	2.5	517	573	212 000	497 000	259 000	648 000
	CRBC 50050	**CRB 50050**	41.7	500	625	50	2.5	531	592	247 000	561 000	306 000	747 000
	CRBC 50070	**CRB 50070**	86.1	500	680	70	2.5	530	633	536 000	1 020 000	653 000	1 330 000
600	**CRBC 60040**	**CRB 60040**	30.6	600	700	40	3	621	676	231 000	581 000	287 000	774 000
	CRBC 60070	**CRB 60070**	102	600	780	70	3	630	734	591 000	1 230 000	700 000	1 540 000
	CRBC 600120	**CRB 600120**	274	600	870	120	3	643	817	1 250 000	2 210 000	1 490 000	2 800 000
700	**CRBC 70045**	**CRB 70045**	46.5	700	815	45	3	730	785	250 000	681 000	313 000	917 000
	CRBC 70070	**CRB 70070**	115	700	880	70	3	731	834	630 000	1 390 000	766 000	1 810 000
	CRBC 700150	**CRB 700150**	478	700	1 020	150	3	751	953	1 660 000	3 010 000	1 980 000	3 820 000
800	**CRBC 80070**	**CRB 80070**	109	800	950	70	4	831	907	417 000	1 090 000	513 000	1 440 000
	CRBC 800100	**CRB 800100**	247	800	1 030	100	4	840	972	936 000	2 040 000	1 140 000	2 640 000

Note(1) Minimum allowable single value of chamfer dimension r

Remarks1. No oil hole is provided.

2. Grease is not prepacked. Perform proper lubrication.

CRBH, CRBC, CRB, CRBS

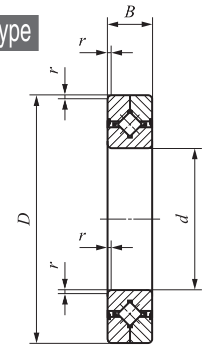
F

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

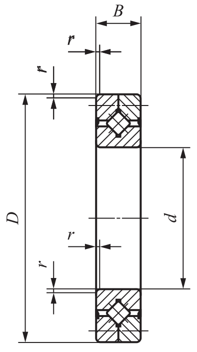
CROSSED ROLLER BEARINGS

Standard Type Crossed Roller Bearings **Sealed Type/With Cage** **Sealed Type/Full Complement Type**



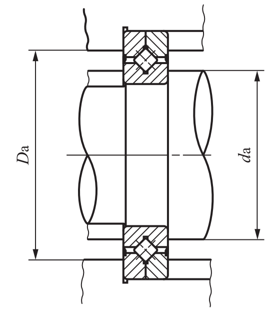


CRBC···UU



CRB···UU

Shaft dia. 30 — 300mm



Shaft dia. mm	Identification number: With Cage	Identification number: Full complement	Mass (Ref.) kg	Boundary dimensions mm: d	D	B	r_{min} [1]	Mounting dimensions mm: d_a	D_a	CRBC···UU Basic dynamic load rating C N	CRBC···UU Basic static load rating C_0 N	CRB···UU Basic dynamic load rating C N	CRB···UU Basic static load rating C_0 N
30	**CRBC 3010 UU**	**CRB 3010 UU**	0.12	30	55	10	0.3	34	44	3 830	4 130	5 290	6 350
40	**CRBC 4010 UU**	**CRB 4010 UU**	0.15	40	65	10	0.3	44	54	4 280	5 140	5 980	8 040
50	**CRBC 5013 UU**	**CRB 5013 UU**	0.29	50	80	13	0.6	55	71	10 700	12 600	14 200	18 400
60	**CRBC 6013 UU**	**CRB 6013 UU**	0.33	60	90	13	0.6	64	81	11 600	14 600	15 400	21 500
70	**CRBC 7013 UU**	**CRB 7013 UU**	0.38	70	100	13	0.6	75	91	12 300	16 700	17 000	25 500
80	**CRBC 8016 UU**	**CRB 8016 UU**	0.74	80	120	16	0.6	86	107	18 200	25 500	24 300	37 500
90	**CRBC 9016 UU**	**CRB 9016 UU**	0.81	90	130	16	1	98	118	19 400	28 600	25 900	42 100
100	**CRBC 10020 UU**	**CRB 10020 UU**	1.45	100	150	20	1	108	134	31 500	45 100	39 400	61 100
110	**CRBC 11020 UU**	**CRB 11020 UU**	1.56	110	160	20	1	118	144	33 500	50 700	41 200	66 700
120	**CRBC 12025 UU**	**CRB 12025 UU**	2.62	120	180	25	1.5	132	164	47 700	70 500	59 900	95 400
130	**CRBC 13025 UU**	**CRB 13025 UU**	2.82	130	190	25	1.5	140	172	49 200	74 800	61 000	99 800
140	**CRBC 14025 UU**	**CRB 14025 UU**	2.96	140	200	25	1.5	151	183	50 700	79 200	64 100	108 000
150	**CRBC 15025 UU**	**CRB 15025 UU**	3.16	150	210	25	1.5	160	192	53 800	87 700	65 000	113 000
	CRBC 15030 UU	**CRB 15030 UU**	5.3	150	230	30	1.5	166	202	69 200	108 000	85 900	144 000
200	**CRBC 20025 UU**	**CRB 20025 UU**	4.0	200	260	25	2	208	239	60 200	110 000	75 300	148 000
250	**CRBC 25025 UU**	**CRB 25025 UU**	4.97	250	310	25	2.5	259	290	67 200	136 000	83 900	183 000
300	**CRBC 30025 UU**	**CRB 30025 UU**	5.88	300	360	25	2.5	310	341	73 800	162 000	91 900	217 000

Note[1] Minimum allowable single value of chamfer dimension r

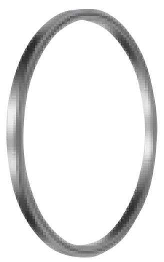
Remarks 1. No oil hole is provided.
2. Provided with prepacked grease.

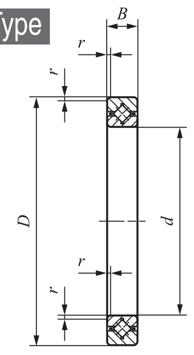
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

CROSSED ROLLER BEARINGS

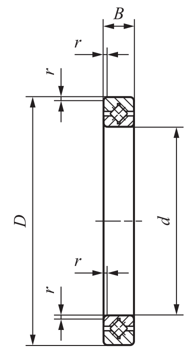
Slim Type Crossed Roller Bearings Open Type/With Cage

Open Type/Full Complement Type

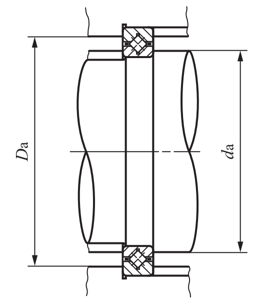




CRBS



CRBS···V



Shaft dia. 50 — 200mm

Shaft dia. mm	Identification number With Cage	Identification number Full complement	Mass (Ref.) g	Boundary dimensions mm d	D	B	r_{min} (1)	Mounting dimensions mm d_a	D_a	CRBS Basic dynamic load rating C N	CRBS Basic static load rating C_0 N	CRBS···V Basic dynamic load rating C N	CRBS···V Basic static load rating C_0 N
50	**CRBS 508**	**CRBS 508 V**	84	50	66	8	0.4	54	61	4 900	6 170	6 930	9 800
60	**CRBS 608**	**CRBS 608 V**	94	60	76	8	0.4	64	71	5 350	7 310	7 600	11 700
70	**CRBS 708**	**CRBS 708 V**	108	70	86	8	0.4	74	81	5 740	8 440	8 190	13 600
80	**CRBS 808**	**CRBS 808 V**	122	80	96	8	0.4	84	91	6 130	9 590	8 790	15 500
90	**CRBS 908**	**CRBS 908 V**	135	90	106	8	0.4	94	101	6 490	10 700	9 310	17 400
100	**CRBS 1008**	**CRBS 1008 V**	152	100	116	8	0.4	104	111	6 850	11 900	9 850	19 300
110	**CRBS 1108**	**CRBS 1108 V**	163	110	126	8	0.4	114	121	7 160	13 000	10 300	21 200
120	**CRBS 1208**	**CRBS 1208 V**	184	120	136	8	0.4	124	131	7 530	14 100	10 900	23 000
130	**CRBS 1308**	**CRBS 1308 V**	199	130	146	8	0.4	134	141	7 860	15 300	11 200	24 600
140	**CRBS 1408**	**CRBS 1408 V**	205	140	156	8	0.4	144	151	8 060	16 400	11 700	26 800
150	**CRBS 1508**	**CRBS 1508 V**	220	150	166	8	0.4	154	161	8 350	17 500	12 100	28 700
160	**CRBS 16013**	**CRBS 16013 V**	620	160	186	13	0.6	166	179	20 300	39 900	26 900	58 200
170	**CRBS 17013**	**CRBS 17013 V**	675	170	196	13	0.6	176	189	20 900	42 200	27 800	61 600
180	**CRBS 18013**	**CRBS 18013 V**	710	180	206	13	0.6	186	199	21 500	44 600	28 600	65 200
190	**CRBS 19013**	**CRBS 19013 V**	740	190	216	13	0.6	196	209	22 100	46 900	29 300	68 600
200	**CRBS 20013**	**CRBS 20013 V**	780	200	226	13	0.6	206	219	22 500	49 300	30 000	72 200

Note(1) Minimum allowable single value of chamfer dimension r

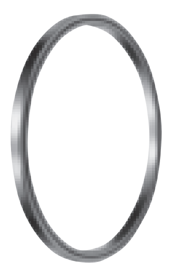
Remarks1. No oil hole is provided.

2. Grease is not prepacked. Perform proper lubrication.

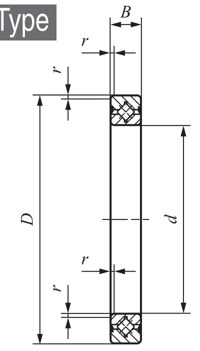
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Slim Type Crossed Roller Bearings Sealed Type/With Separator

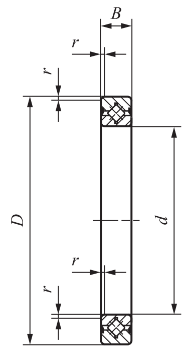
Sealed Type/Full Complement Type



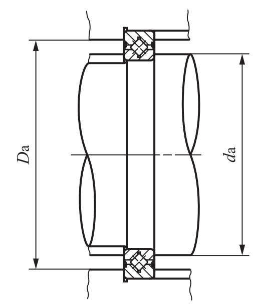
Shaft dia. 50 — 200mm



CRBS···AUU



CRBS···VUU



Shaft dia. mm	Identification number: With separator	Identification number: Full complement	Mass (Ref.) g	Boundary dimensions mm d	D	B	r_{min}[(1)]	Mounting dimensions mm d_a	D_a	CRBS···A UU Basic dynamic load rating C N	CRBS···A UU Basic static load rating C_0 N	CRBS···V UU Basic dynamic load rating C N	CRBS···V UU Basic static load rating C_0 N
50	CRBS 508 A UU	CRBS 508 V UU	84	50	66	8	0.4	54	61	4 680	5 810	6 930	9 800
60	CRBS 608 A UU	CRBS 608 V UU	94	60	76	8	0.4	64	71	5 350	7 310	7 600	11 700
70	CRBS 708 A UU	CRBS 708 V UU	108	70	86	8	0.4	74	81	5 740	8 440	8 190	13 600
80	CRBS 808 A UU	CRBS 808 V UU	122	80	96	8	0.4	84	91	6 130	9 590	8 790	15 500
90	CRBS 908 A UU	CRBS 908 V UU	135	90	106	8	0.4	94	101	6 490	10 700	9 310	17 400
100	CRBS 1008 A UU	CRBS 1008 V UU	152	100	116	8	0.4	104	111	6 530	11 100	9 850	19 300
110	CRBS 1108 A UU	CRBS 1108 V UU	163	110	126	8	0.4	114	121	6 850	12 300	10 300	21 200
120	CRBS 1208 A UU	CRBS 1208 V UU	184	120	136	8	0.4	124	131	7 070	13 000	10 900	23 000
130	CRBS 1308 A UU	CRBS 1308 V UU	199	130	146	8	0.4	134	141	7 270	13 800	11 200	24 600
140	CRBS 1408 A UU	CRBS 1408 V UU	205	140	156	8	0.4	144	151	7 510	14 900	11 700	26 800
150	CRBS 1508 A UU	CRBS 1508 V UU	220	150	166	8	0.4	154	161	7 810	16 000	12 100	28 700
160	CRBS 16013 A UU	CRBS 16013 V UU	620	160	186	13	0.6	166	179	19 400	37 700	26 900	58 200
170	CRBS 17013 A UU	CRBS 17013 V UU	675	170	196	13	0.6	176	189	20 000	39 900	27 800	61 600
180	CRBS 18013 A UU	CRBS 18013 V UU	710	180	206	13	0.6	186	199	21 900	45 700	28 600	65 200
190	CRBS 19013 A UU	CRBS 19013 V UU	740	190	216	13	0.6	196	209	22 900	49 200	29 300	68 600
200	CRBS 20013 A UU	CRBS 20013 V UU	780	200	226	13	0.6	206	219	23 300	51 600	30 000	72 200

Note(1) Minimum allowable single value of chamfer dimension r

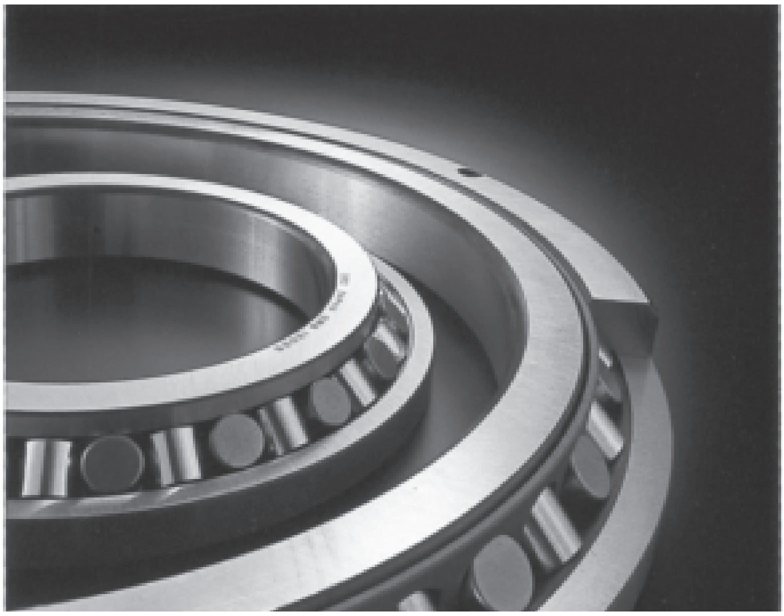
Remarks 1. No oil hole is provided.

2. Provided with prepacked grease.

CRBH, CRBC, CRB, CRBS

F

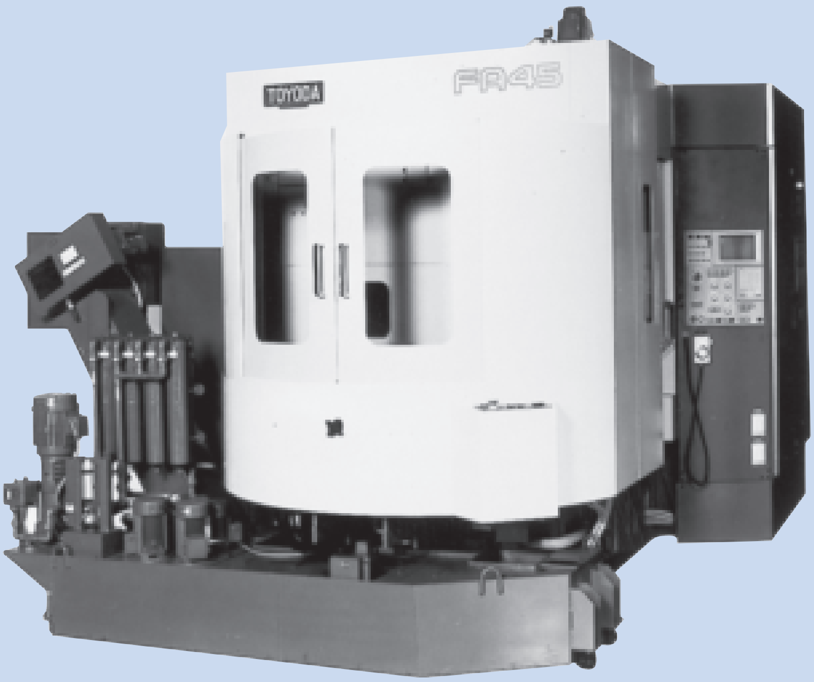
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

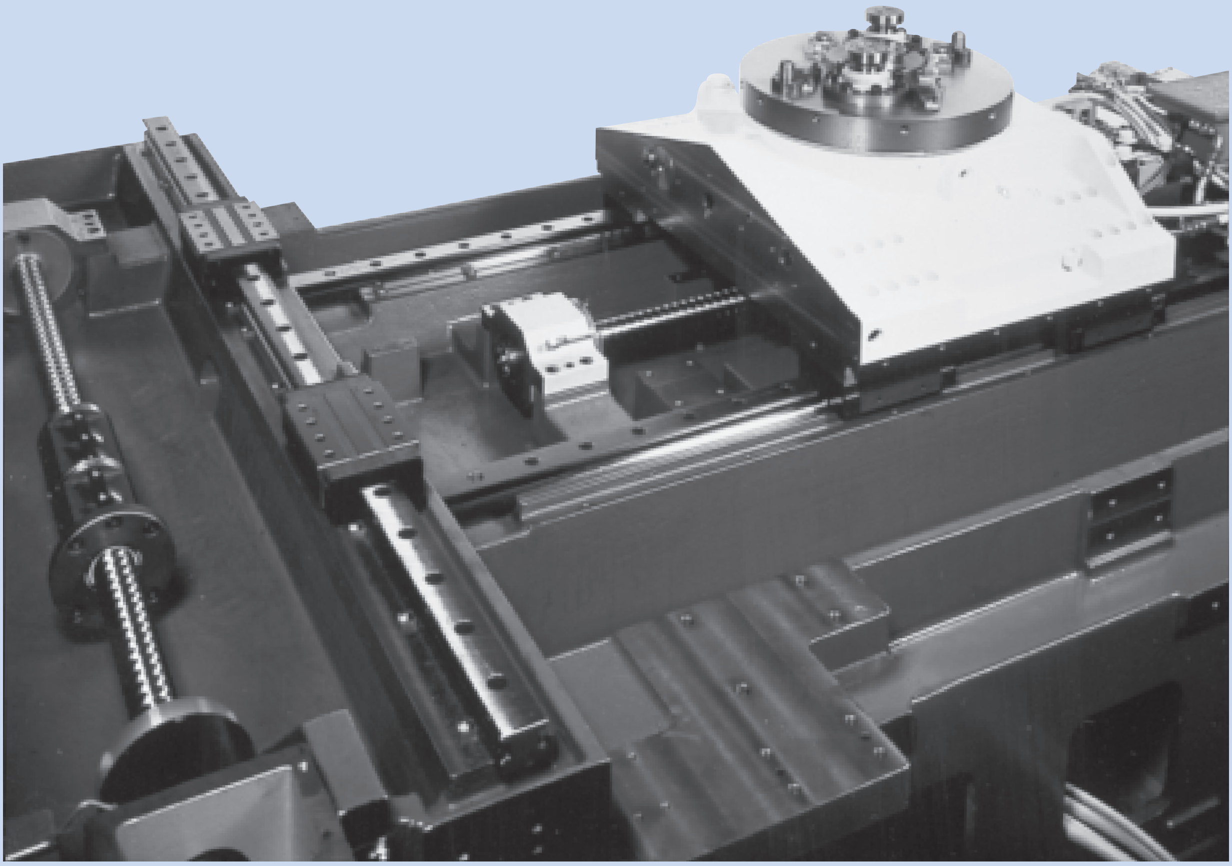


Application Examples and Miscellaneous Tables

Horizontal machining center

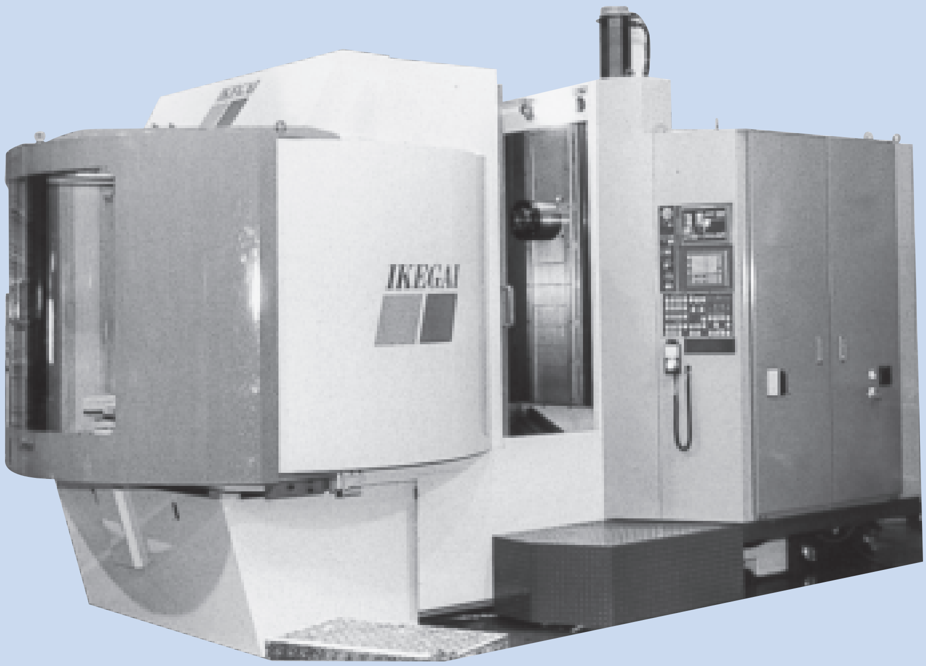
LRWX

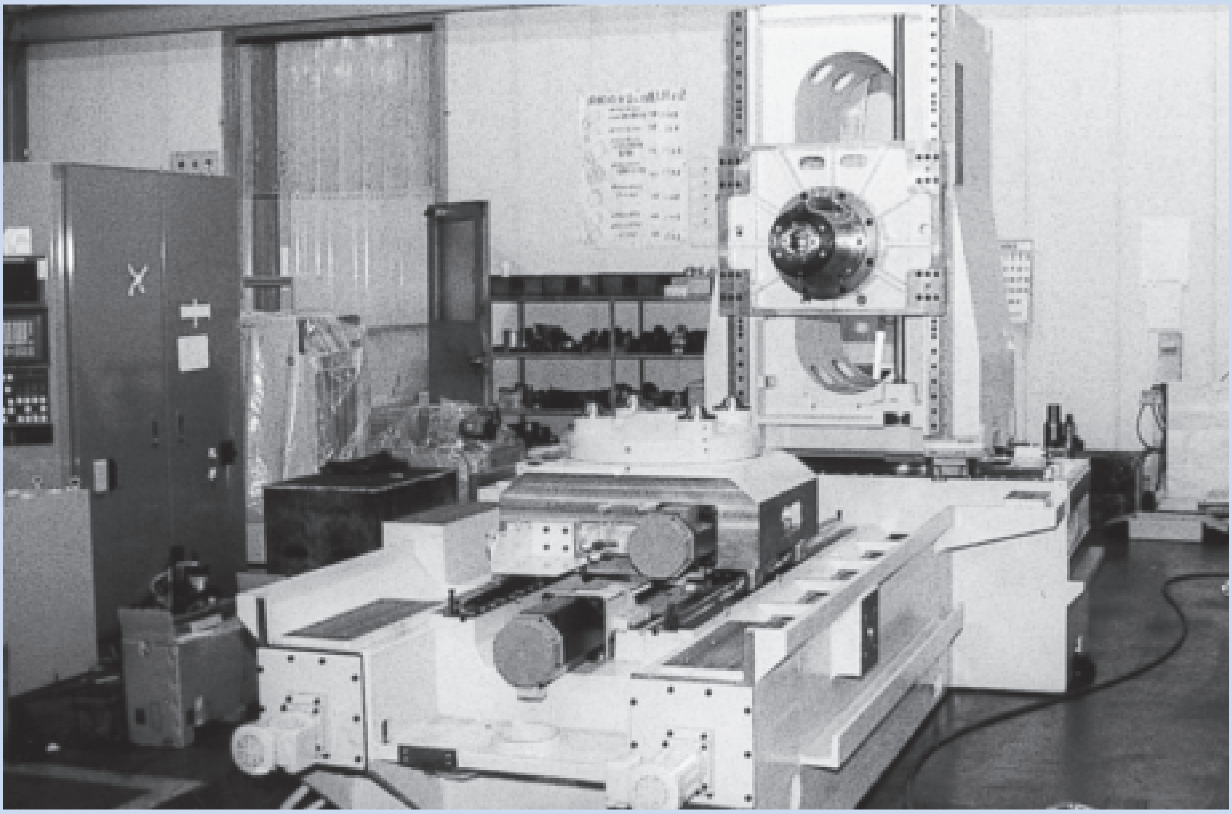




Horizontal machining center

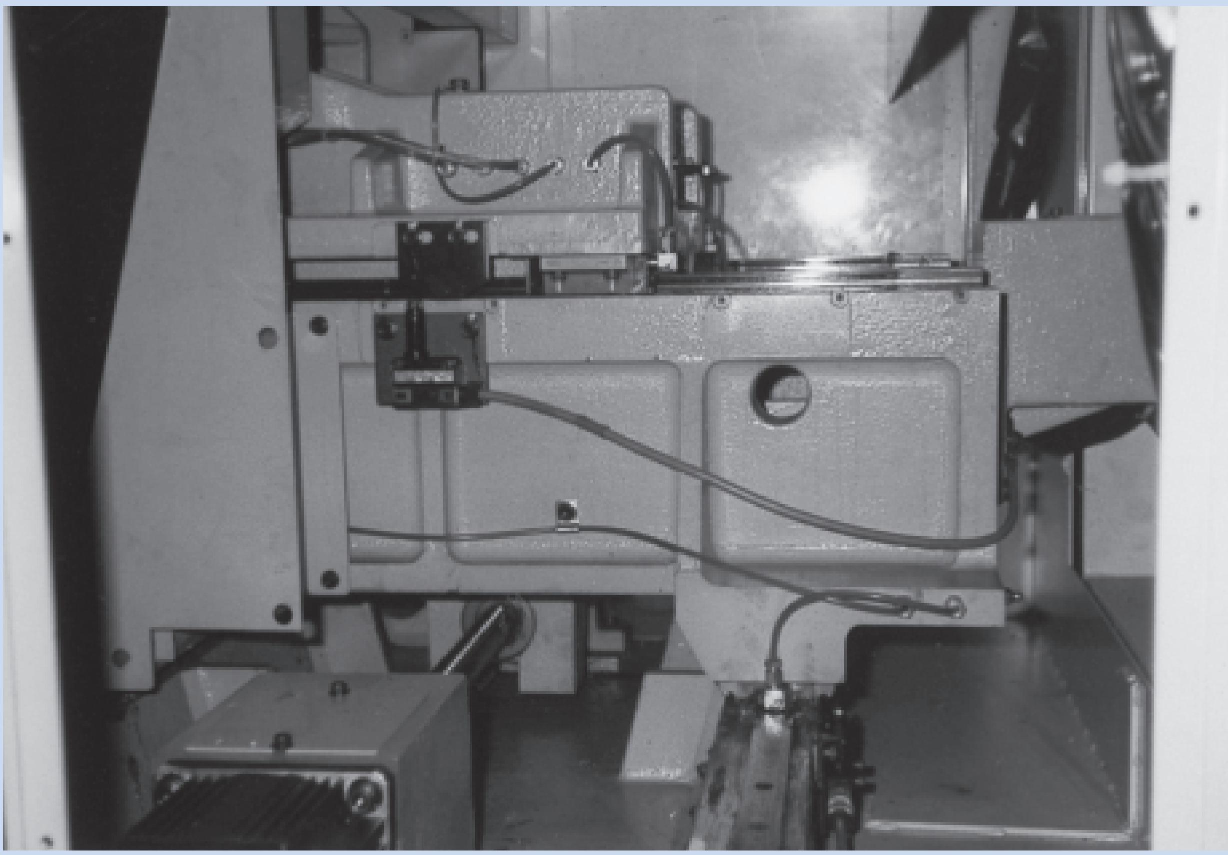
LRX • LRXDG





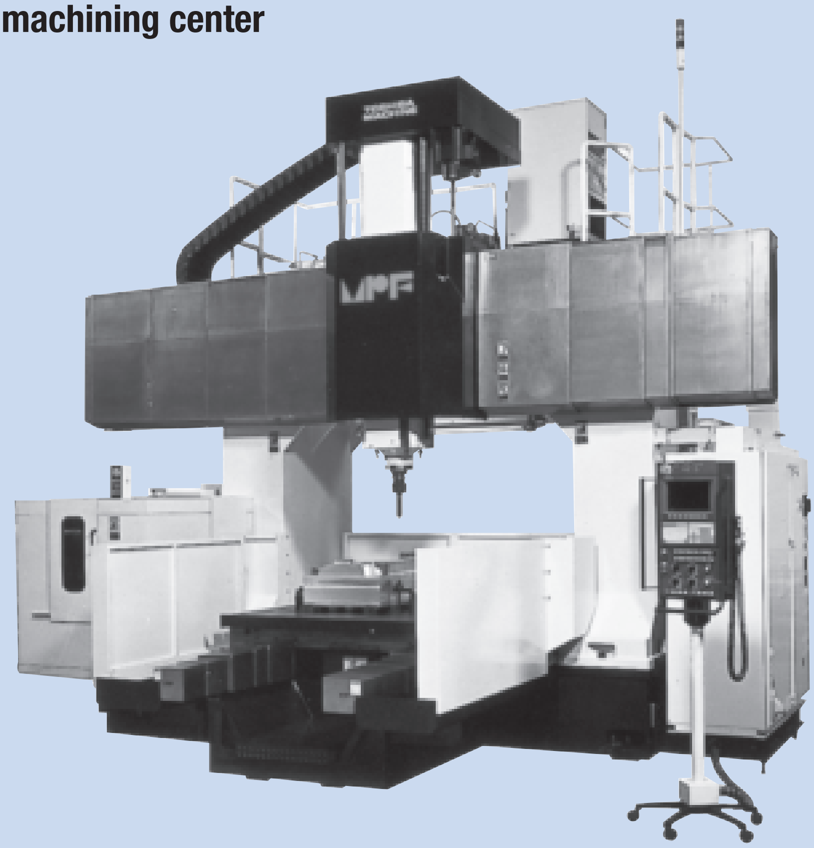
Vertical machining center

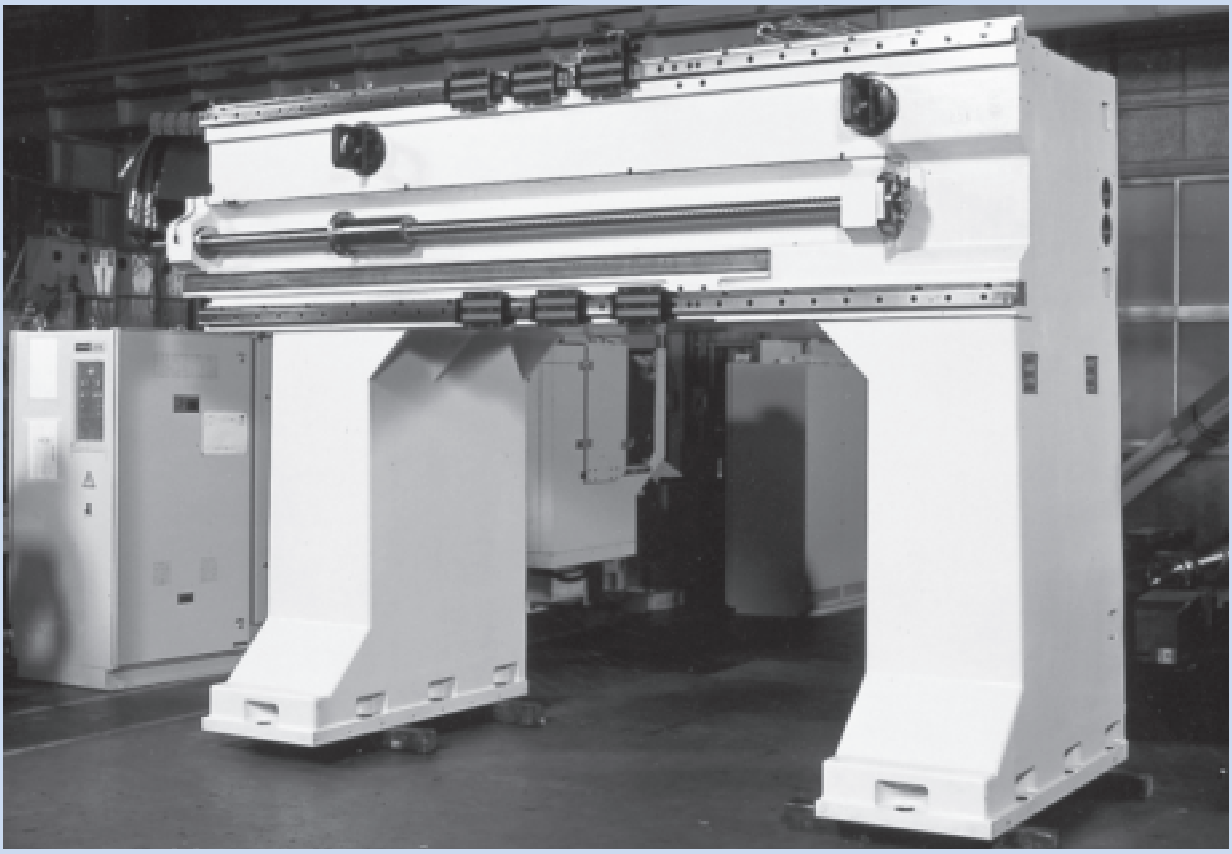
LWEC • LWE



Gantry type machining center

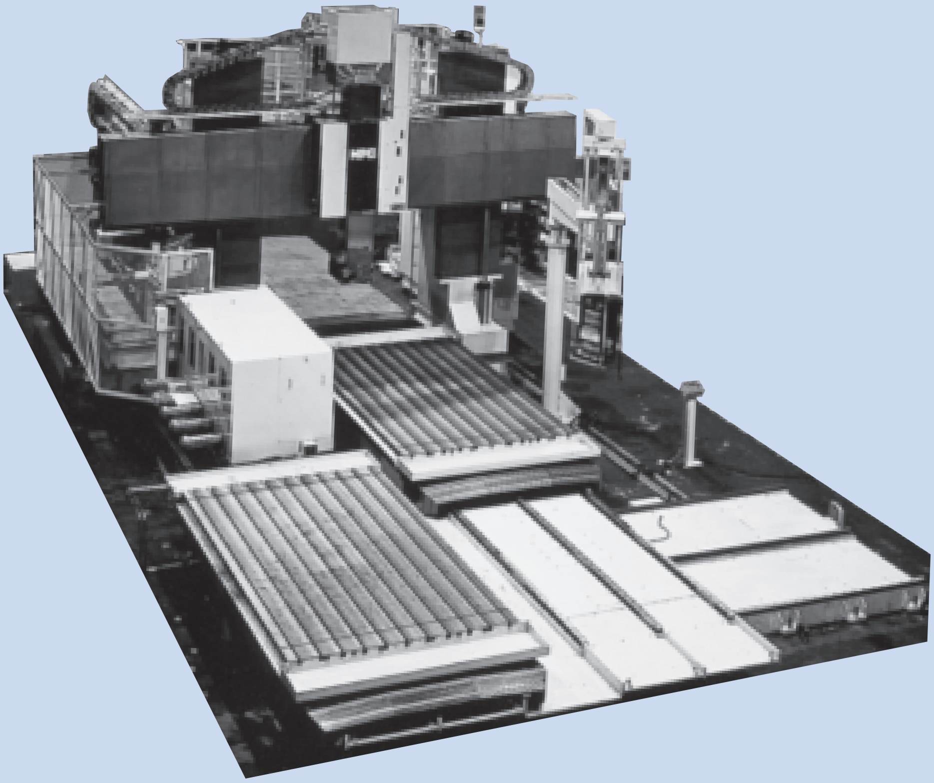
LRXG

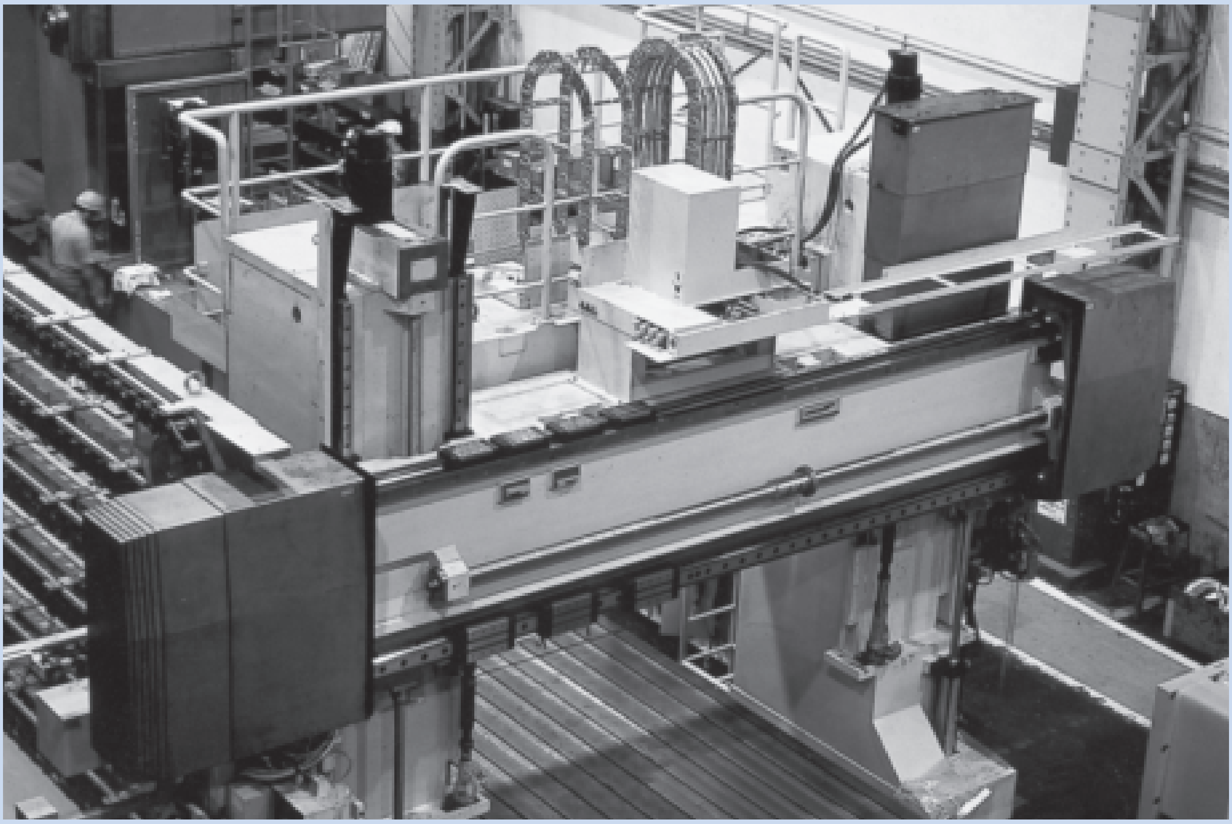




Gantry type machining center

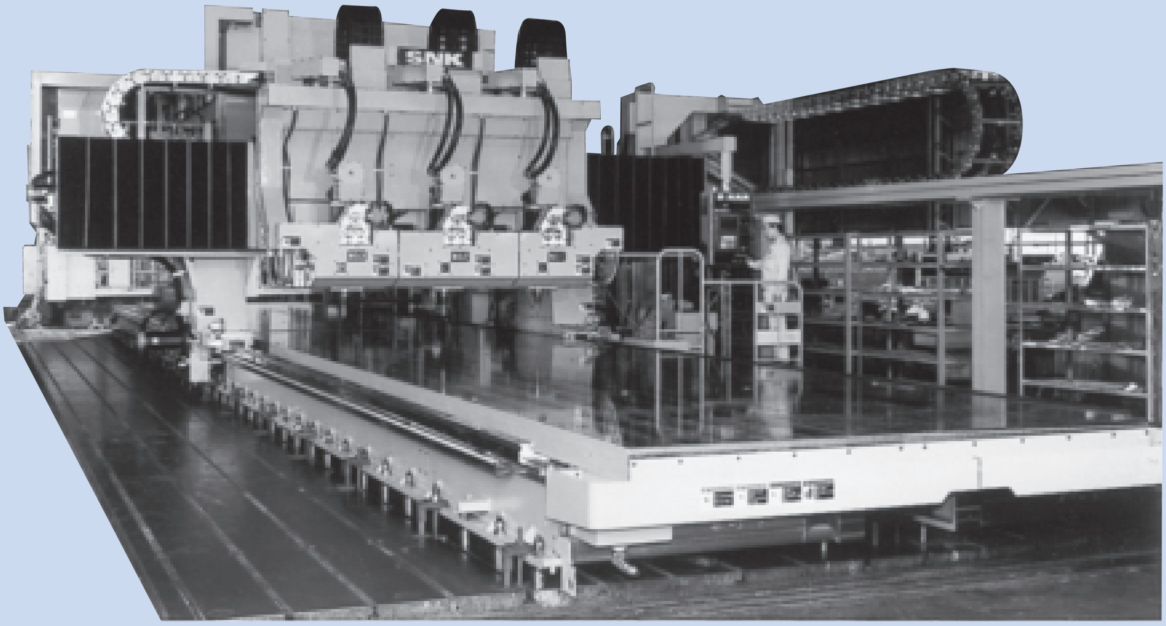
LRWX • LWHG

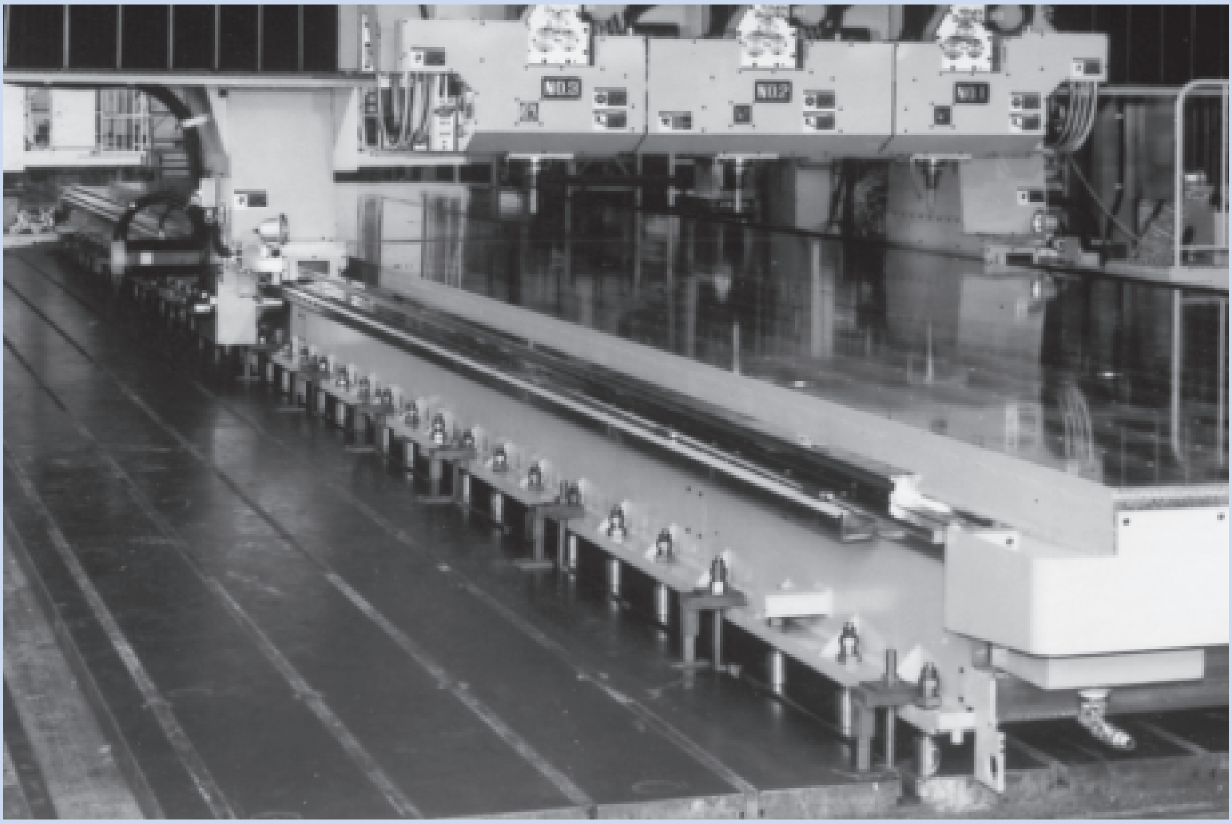




Three-spindle five-axis profiler

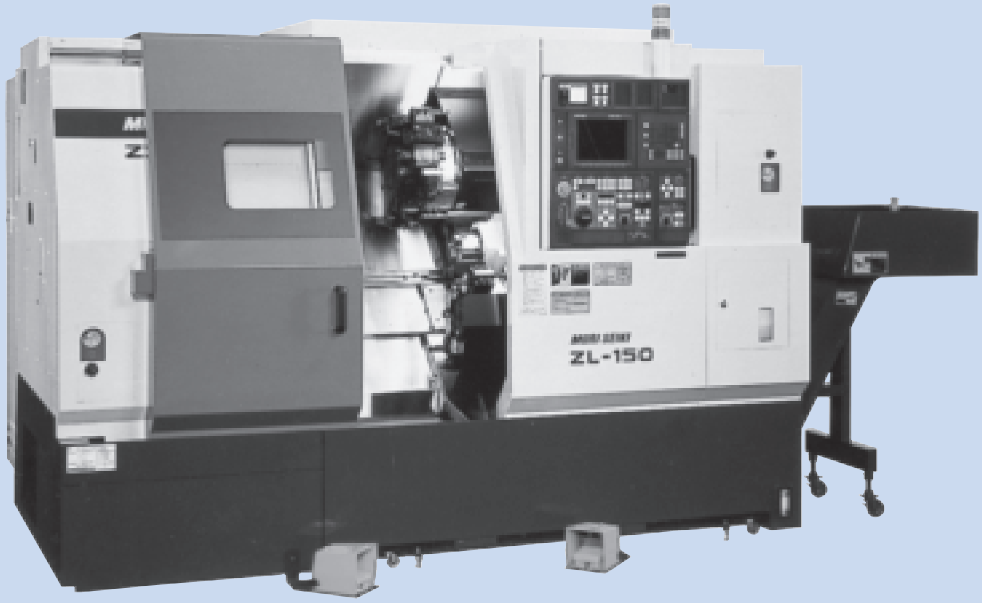
LRWX

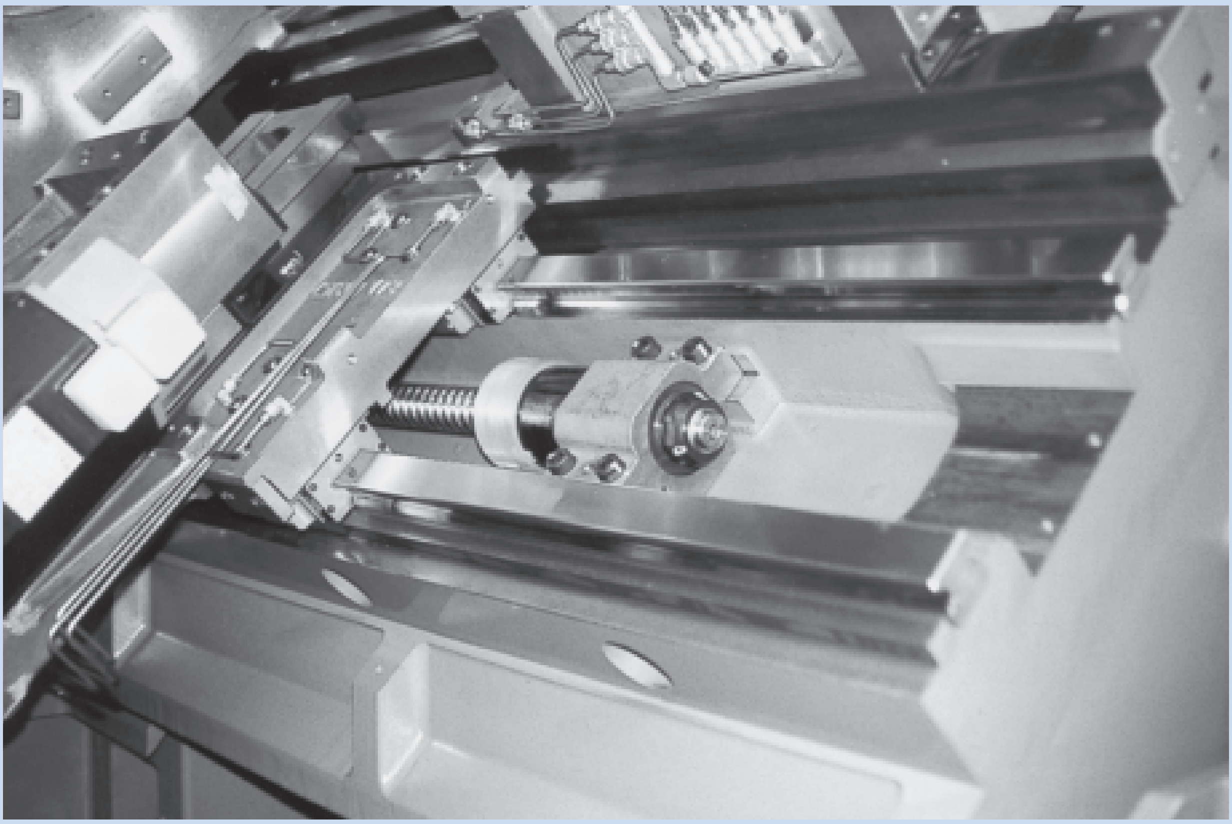




Four-axis control CNC lathe

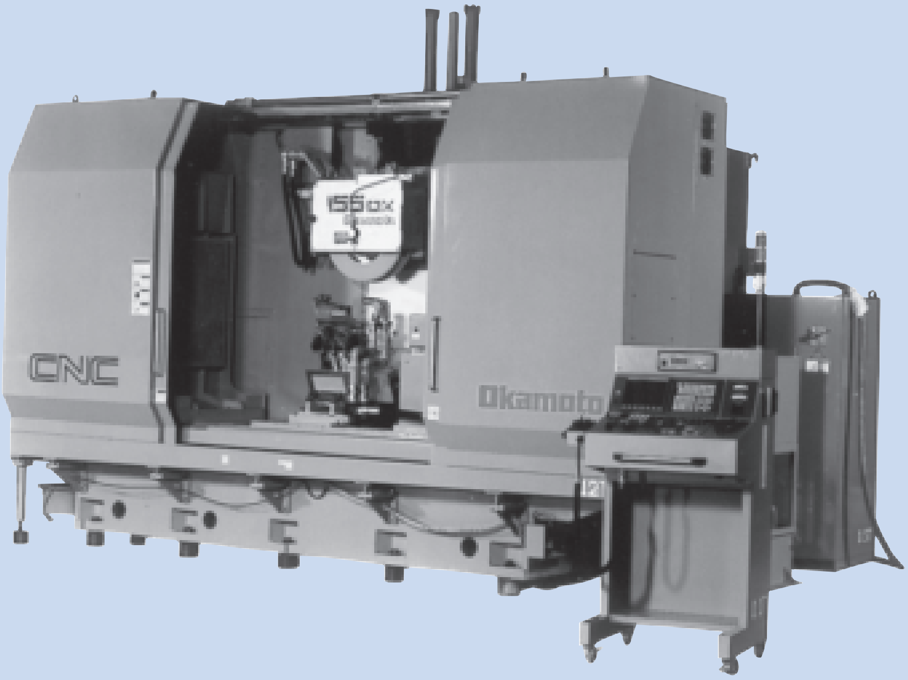
LRX

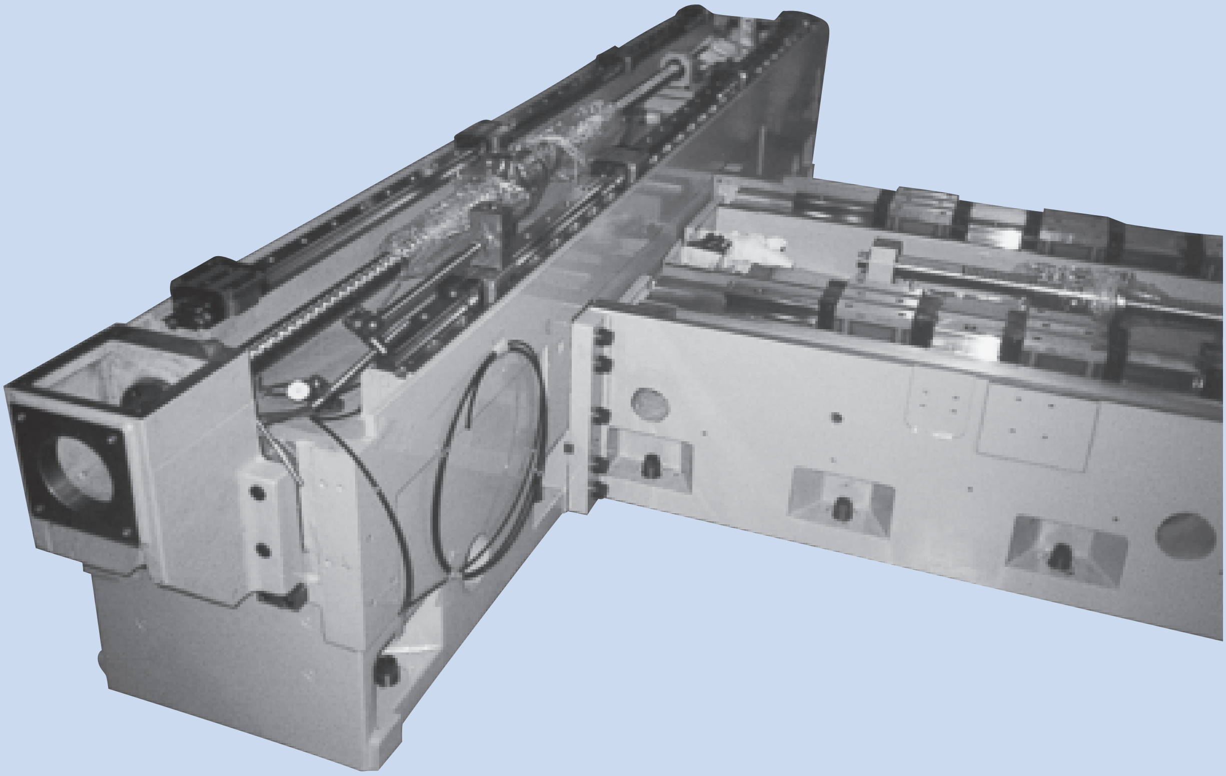




Surface grinding machine

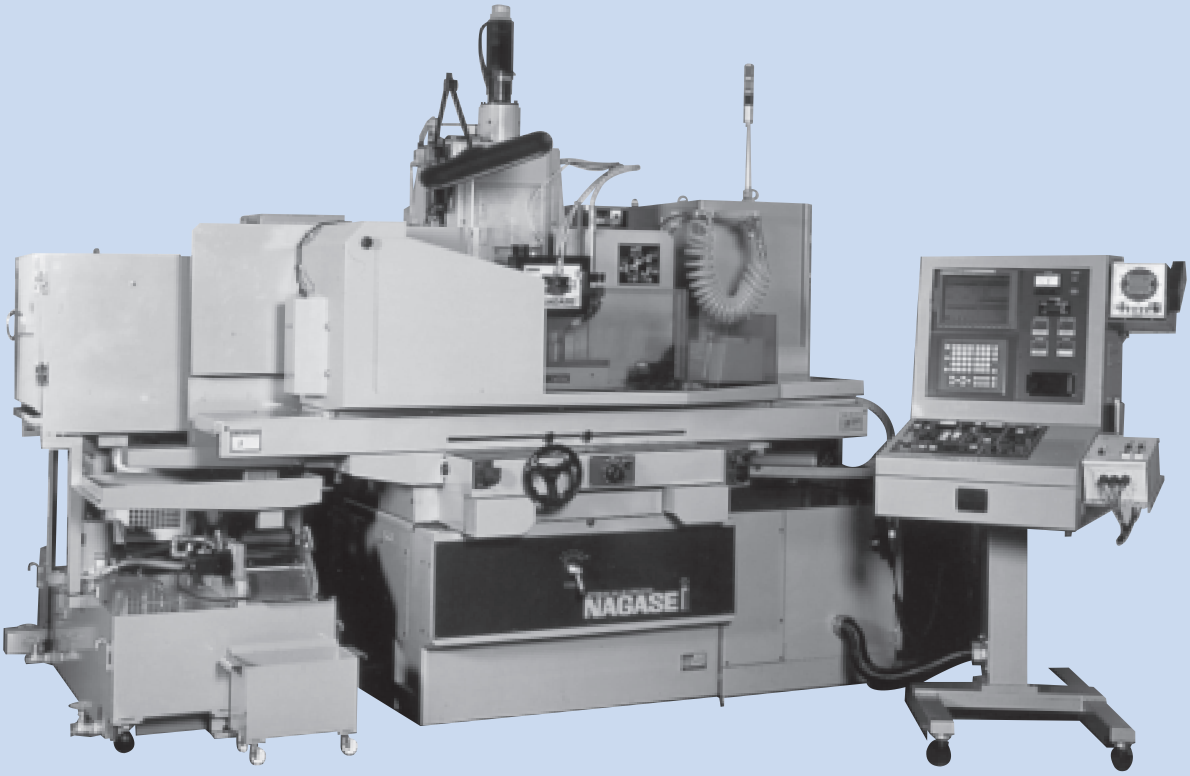
LRX

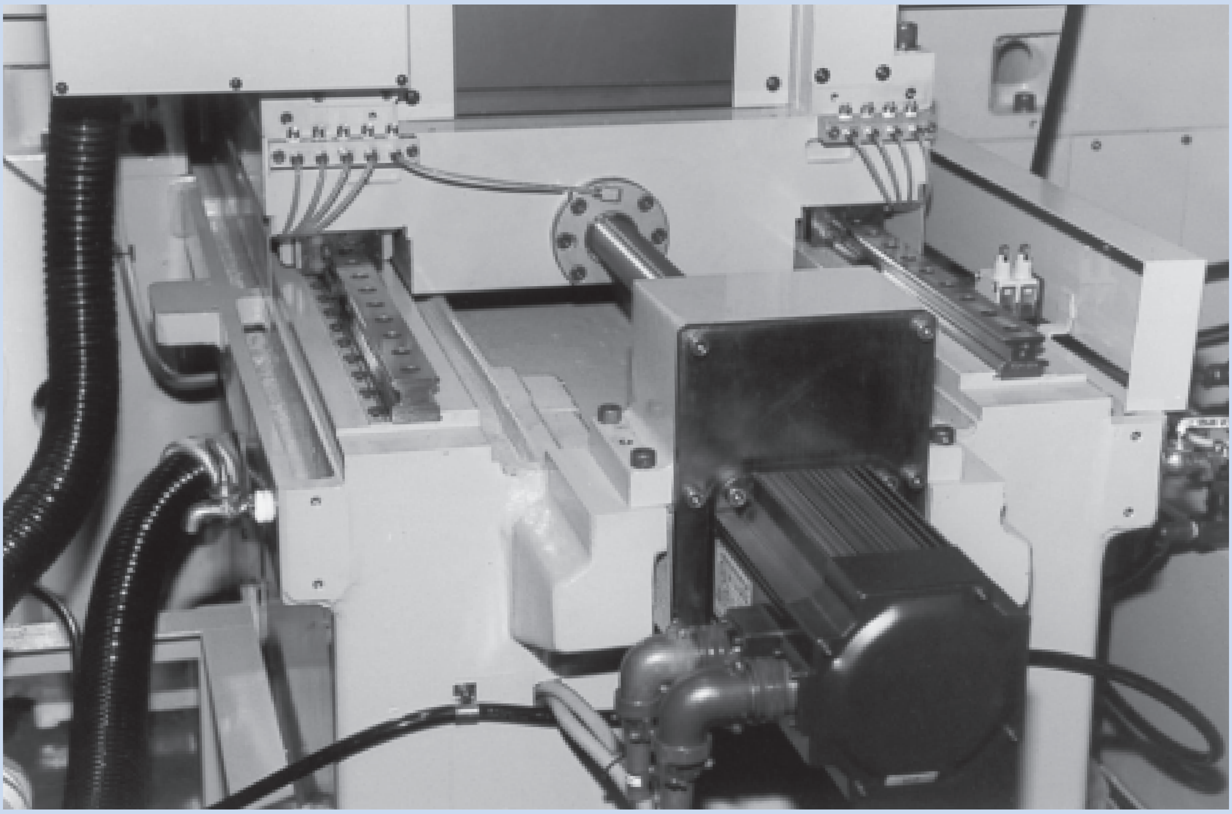




Surface grinding machine

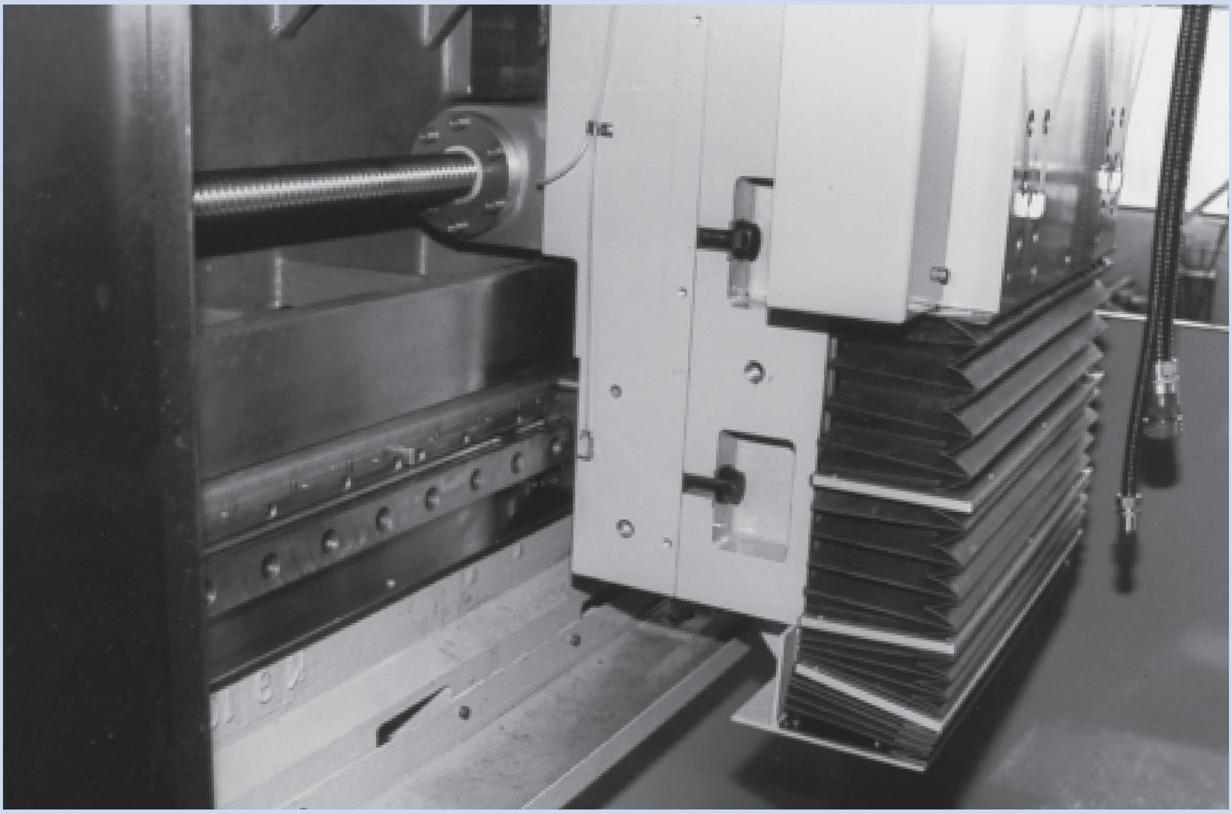
LRWX





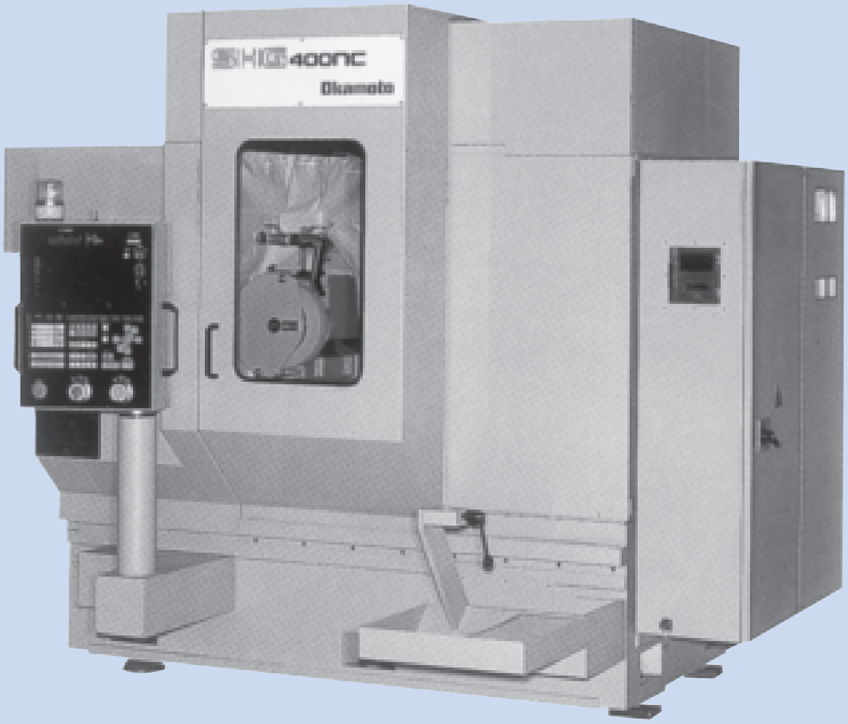
Vertical internal grinding machine

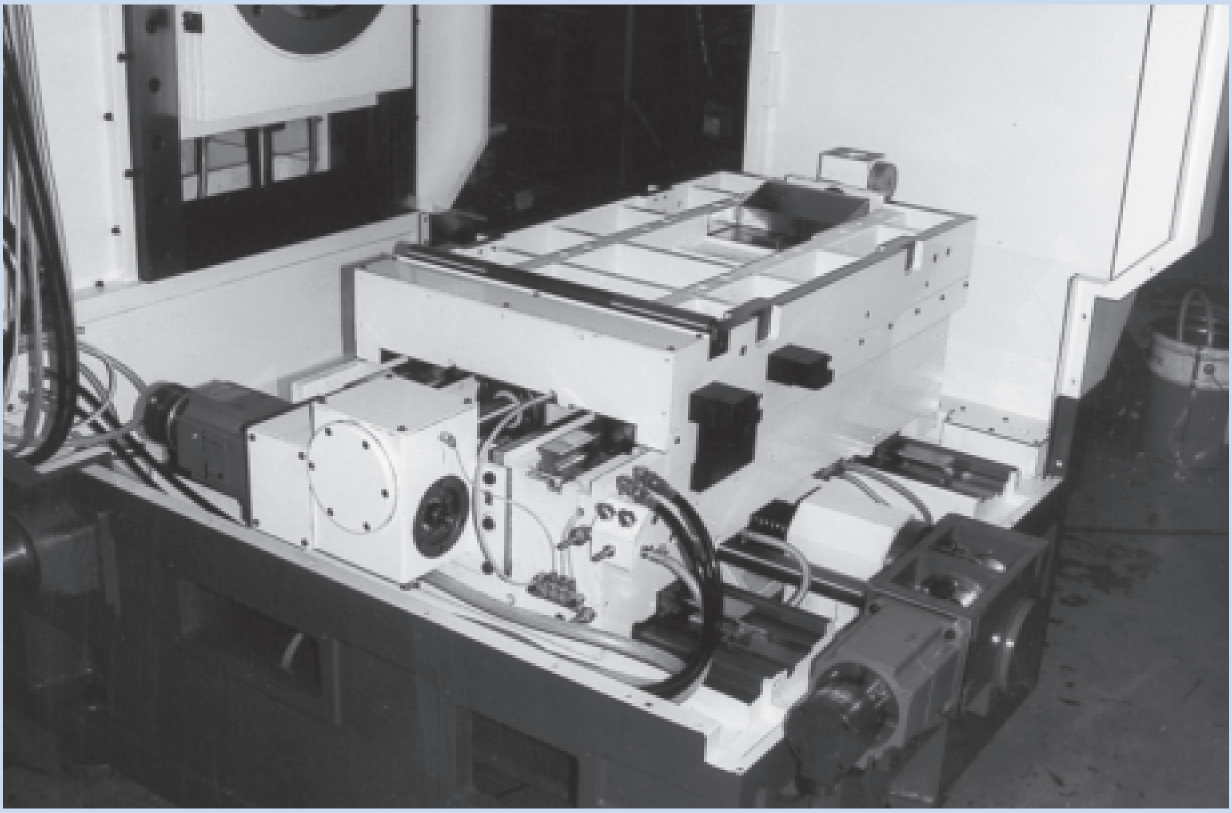
LRWX • LRWH



Synchronous control gear grinding machine

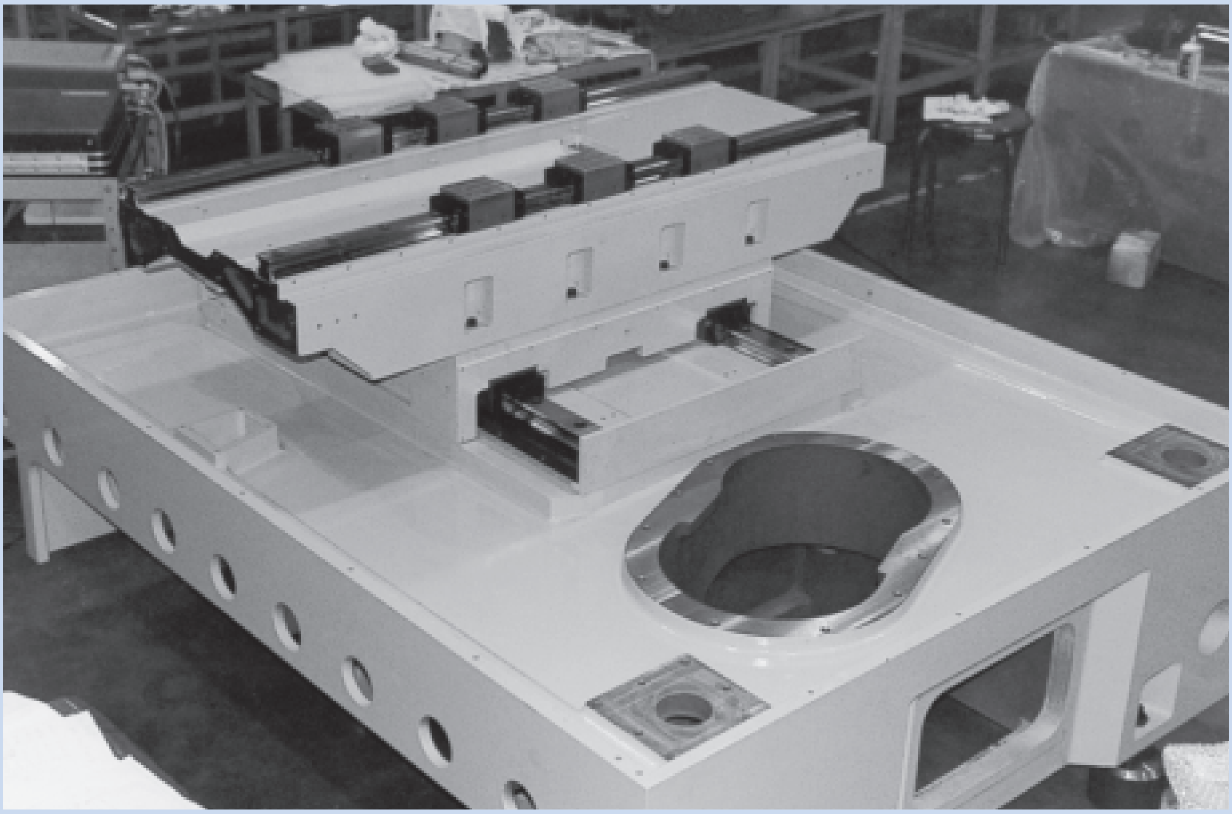
LRXG • LRWX





Tool grinding machine

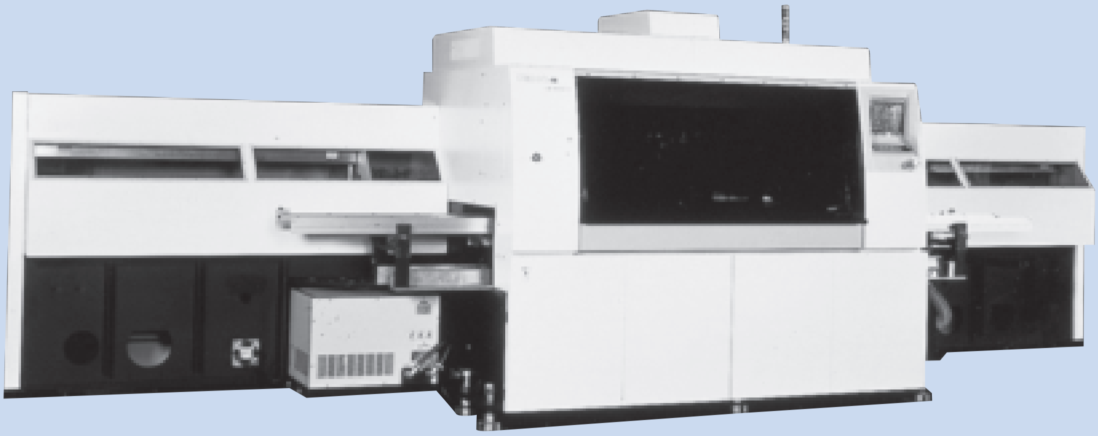
LRXD • LRXDG



Semiconductor and liquid crystal manufacturing equipment

High-speed chip mounter

LWLF • LWHS • LWHSG • LSAG

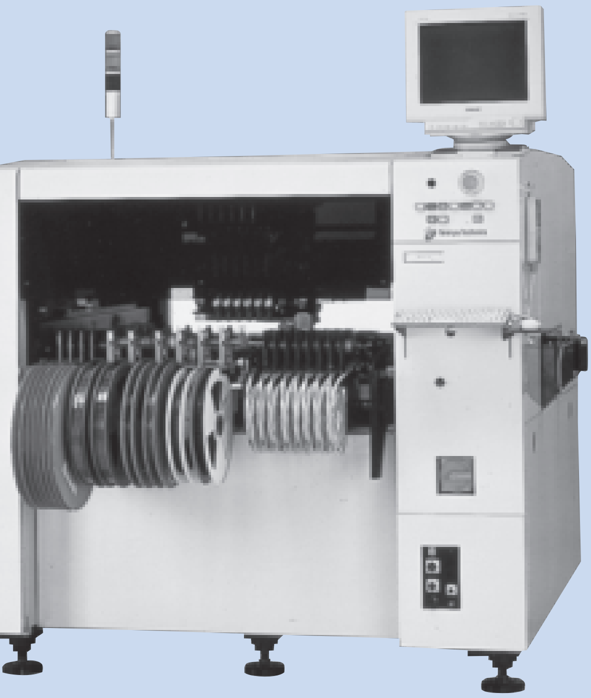


Surface mount system

LWL • LSAGT • BSR

Chip mounter

LWLC • LSAGLT

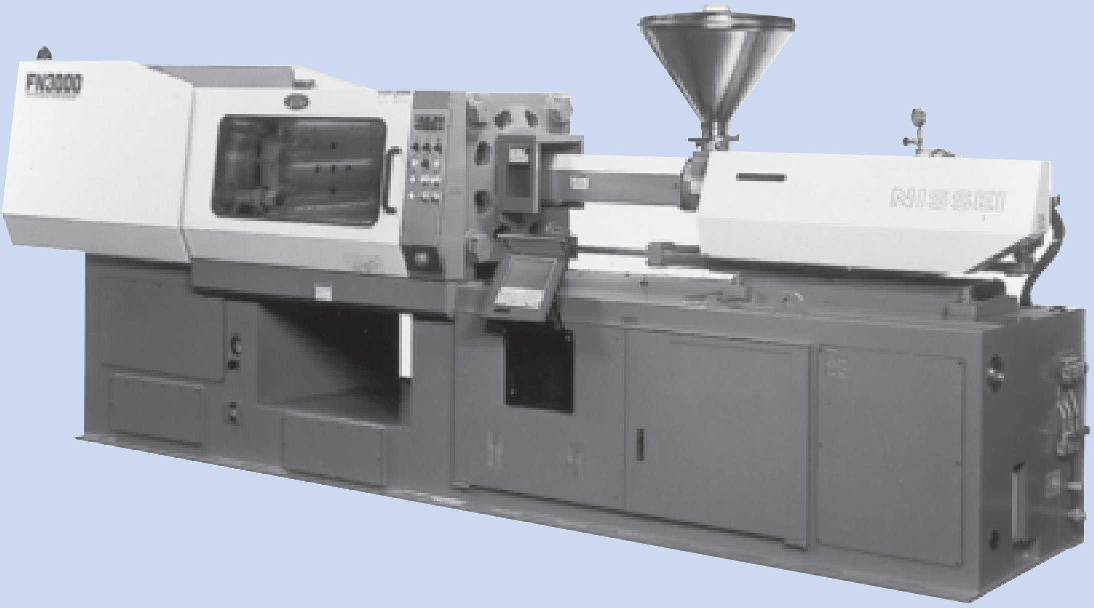


Stepper

LWL • LWLF • LWLM • LWHS • STSI

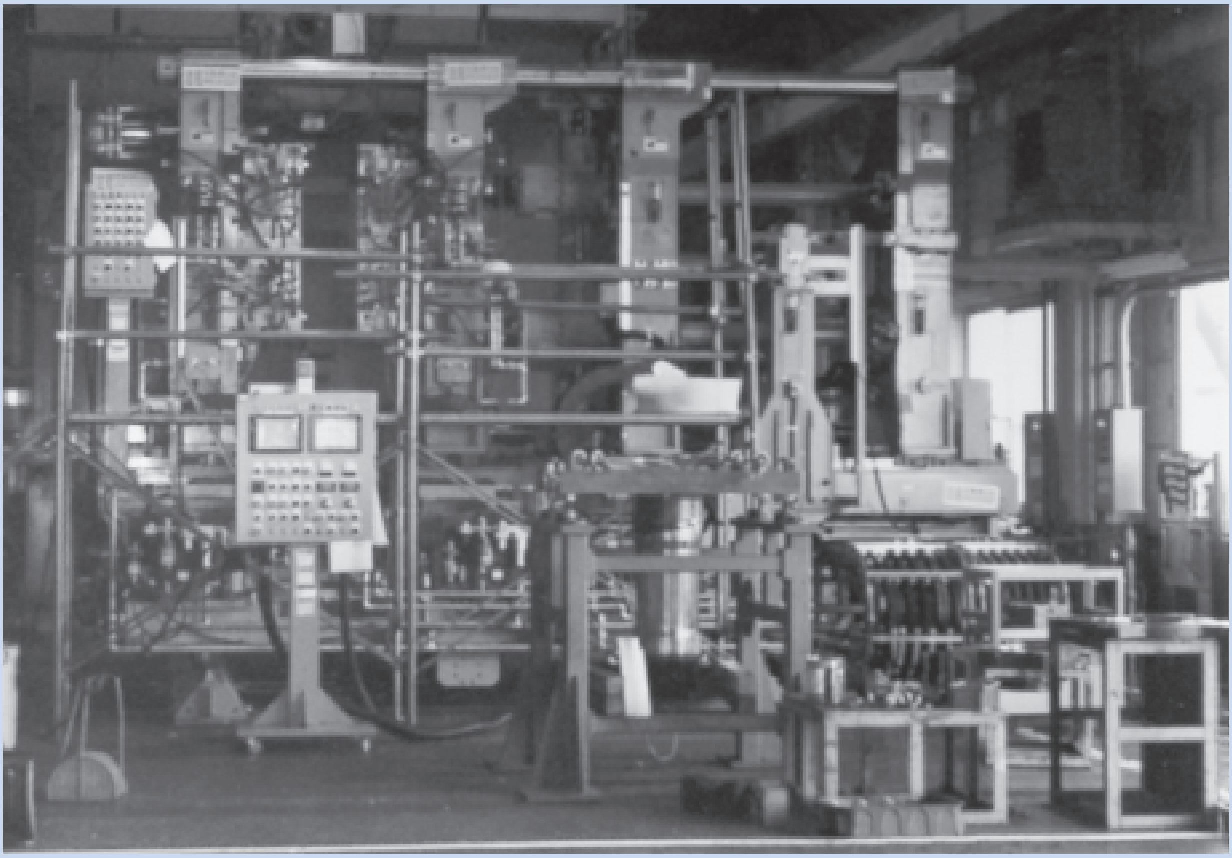
Injection molding machine

LWES



Hollow molding machine

LRXC • LRX



Web offset printing press

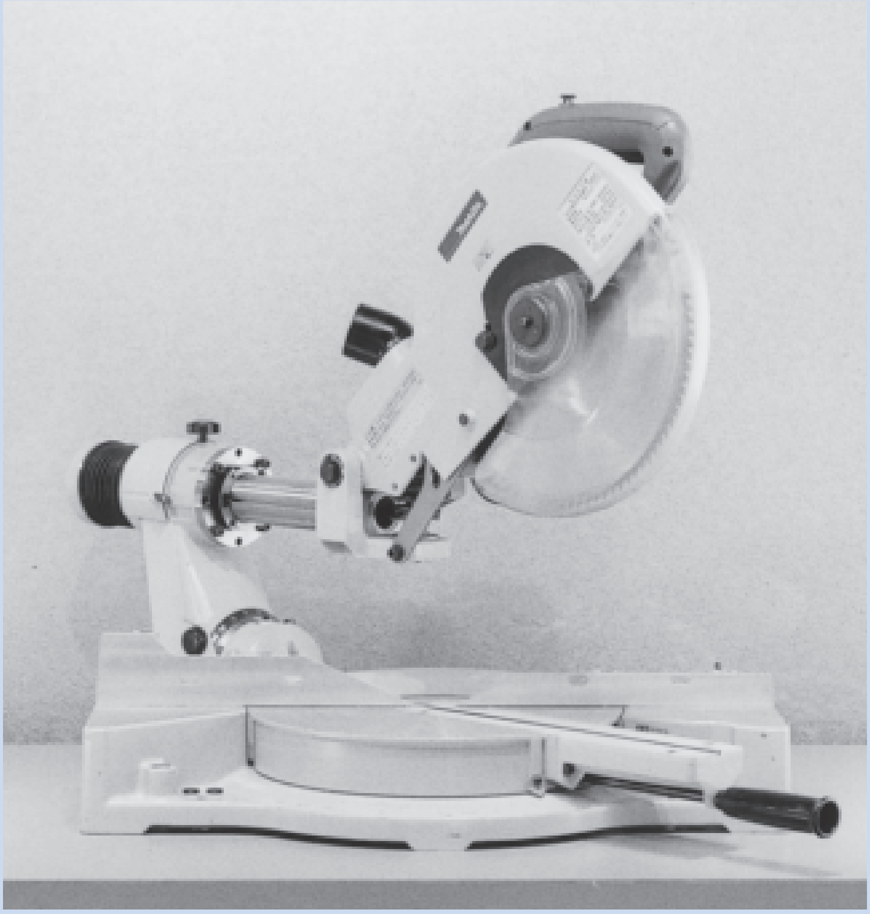
LWH • LWHDG

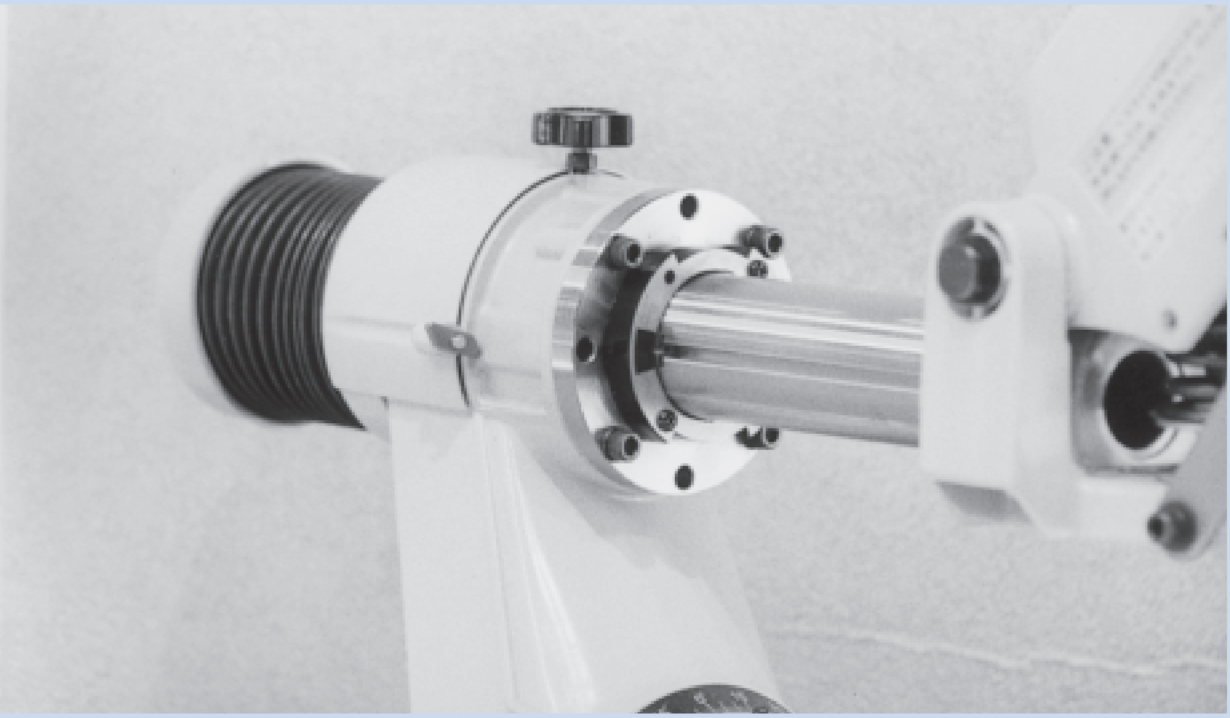
Multi-head type electronic embroidering machine

LWL

Circular saw

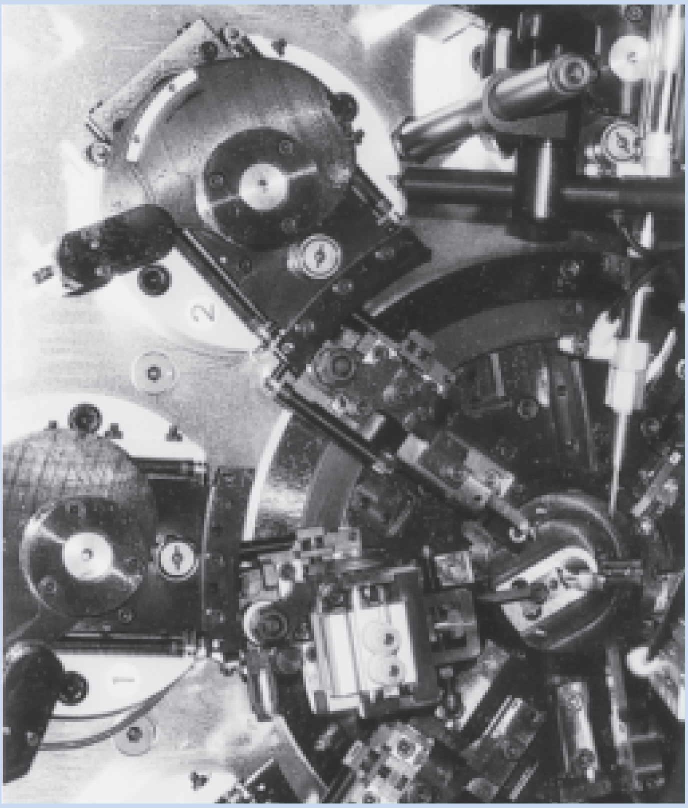
LSAG • LSAGF





Spring forming machine

LWH • LWHS • CRW • CF • CRBH

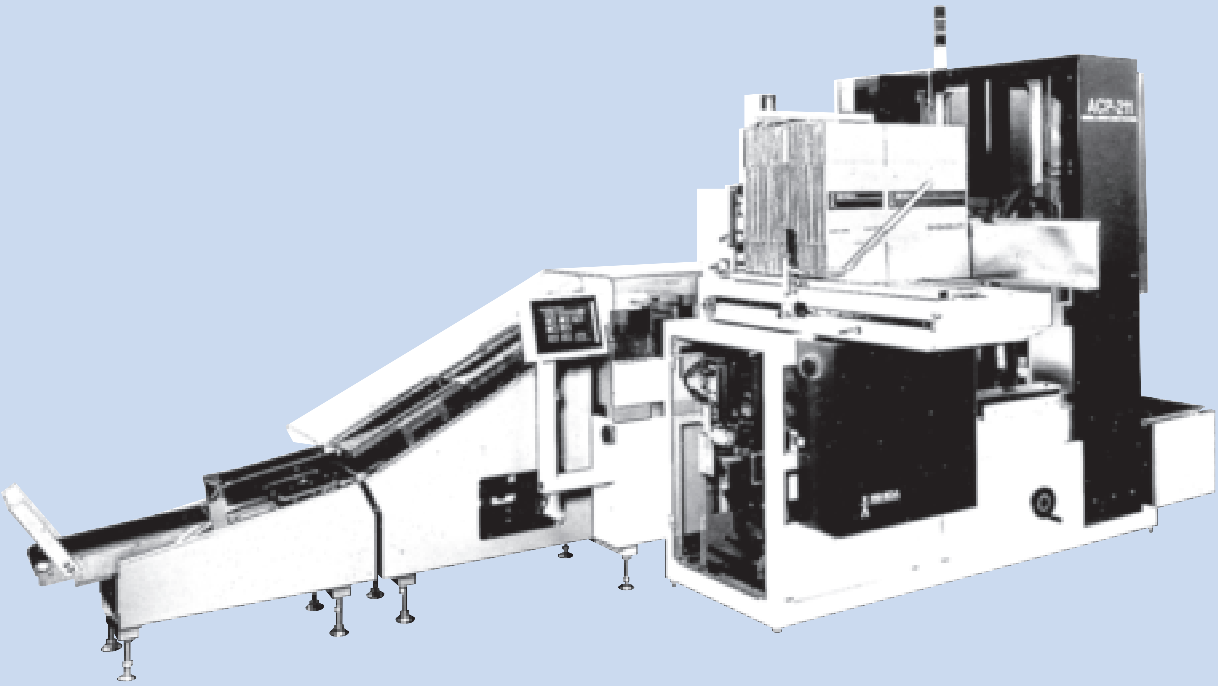


Bundling machine

LWHS

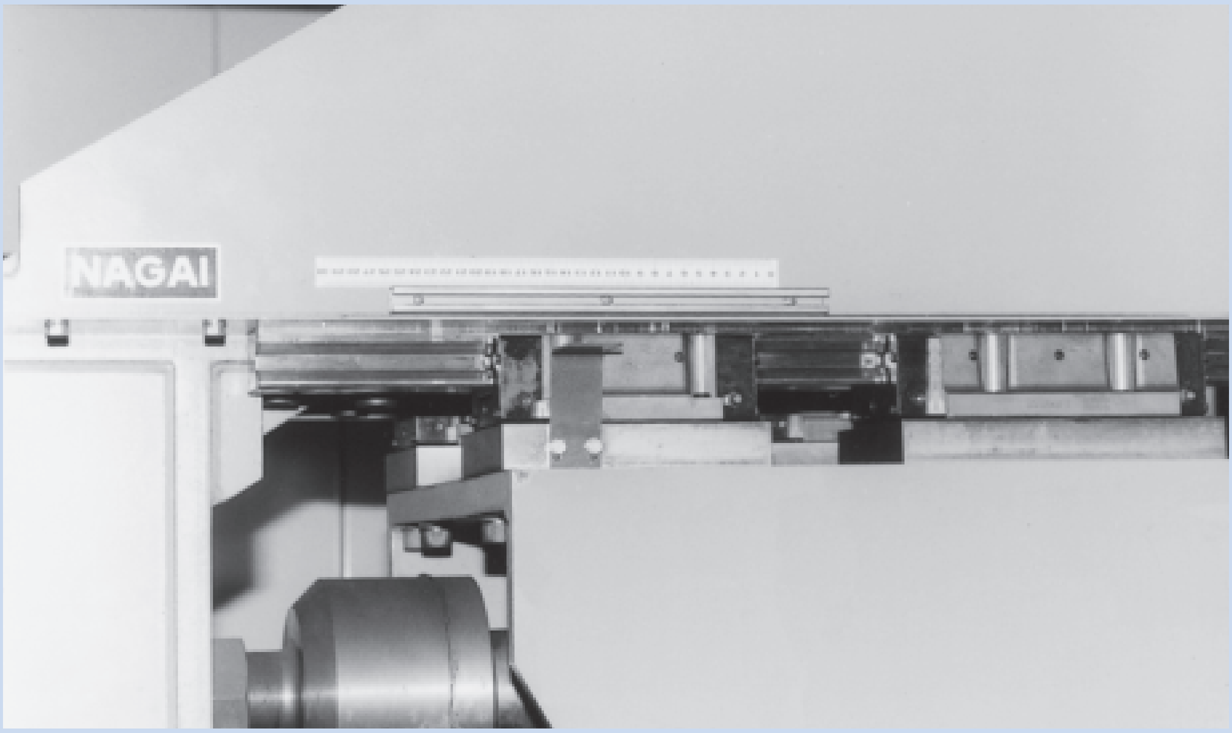
Automatic case packer

LWL • LWES • LWH • LWHS • LWHDG



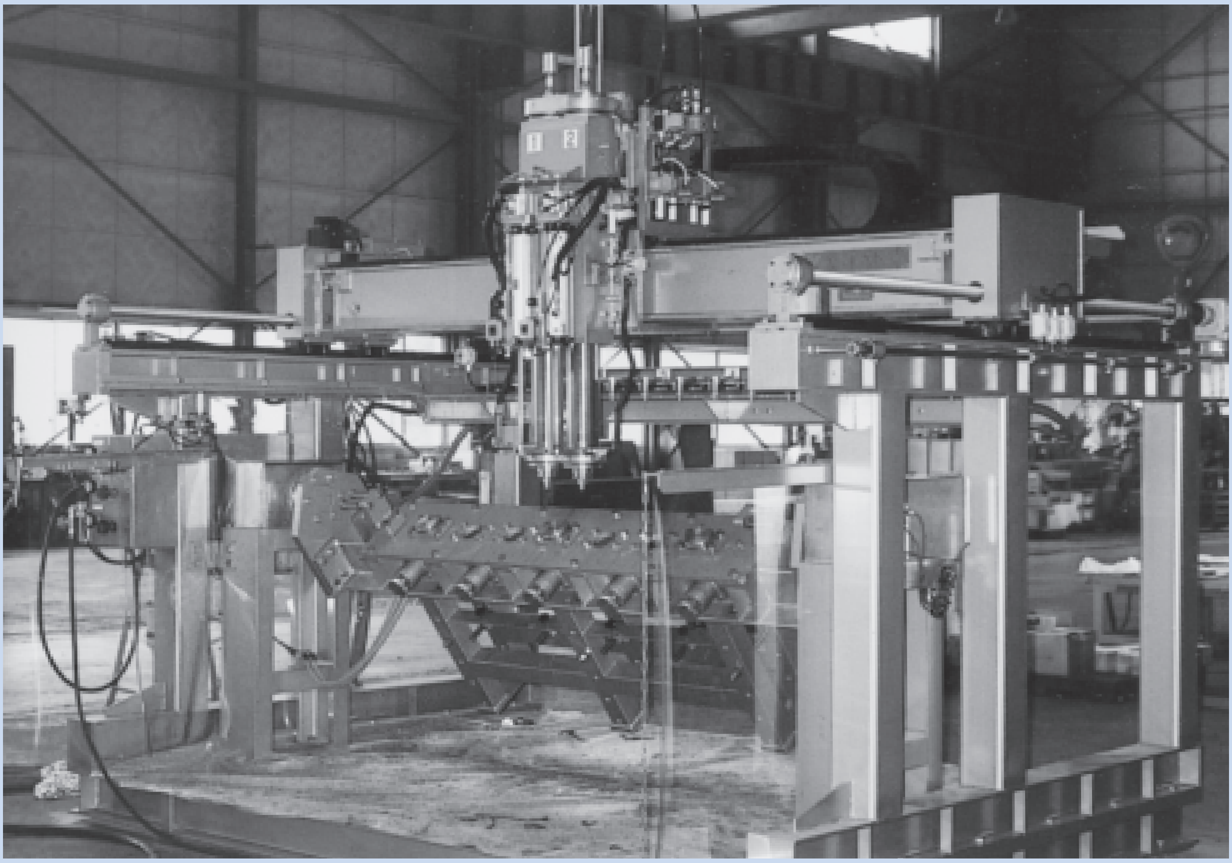
High-pressure high-density lumber compression system

LRXG



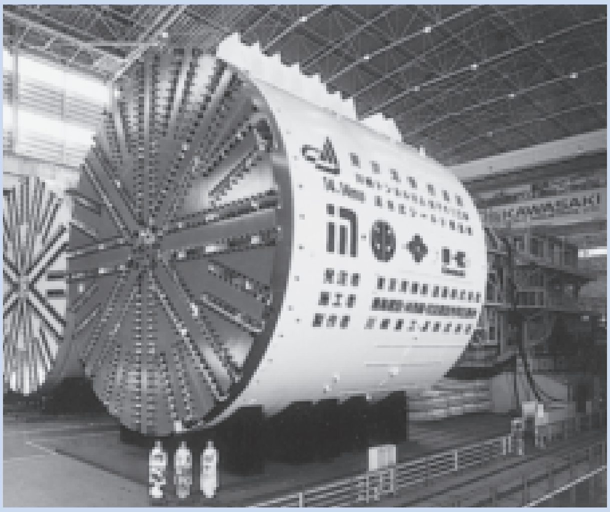
Stone polishing machine for curved surface

LWHD • LWH

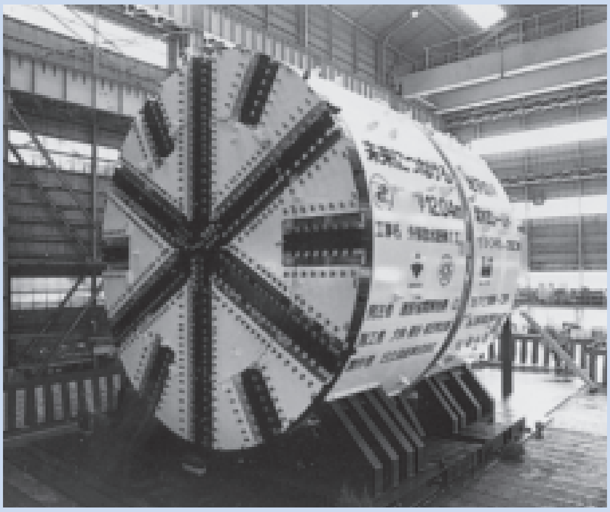


Shield type tunnel excavator

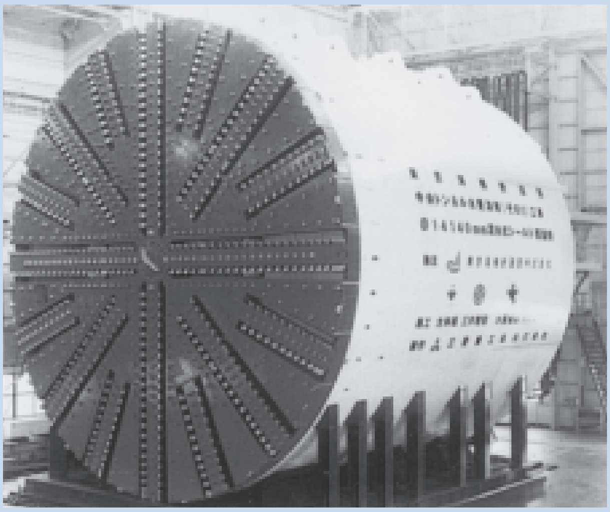
LRWX



LRXDG • LWHS



LRWX

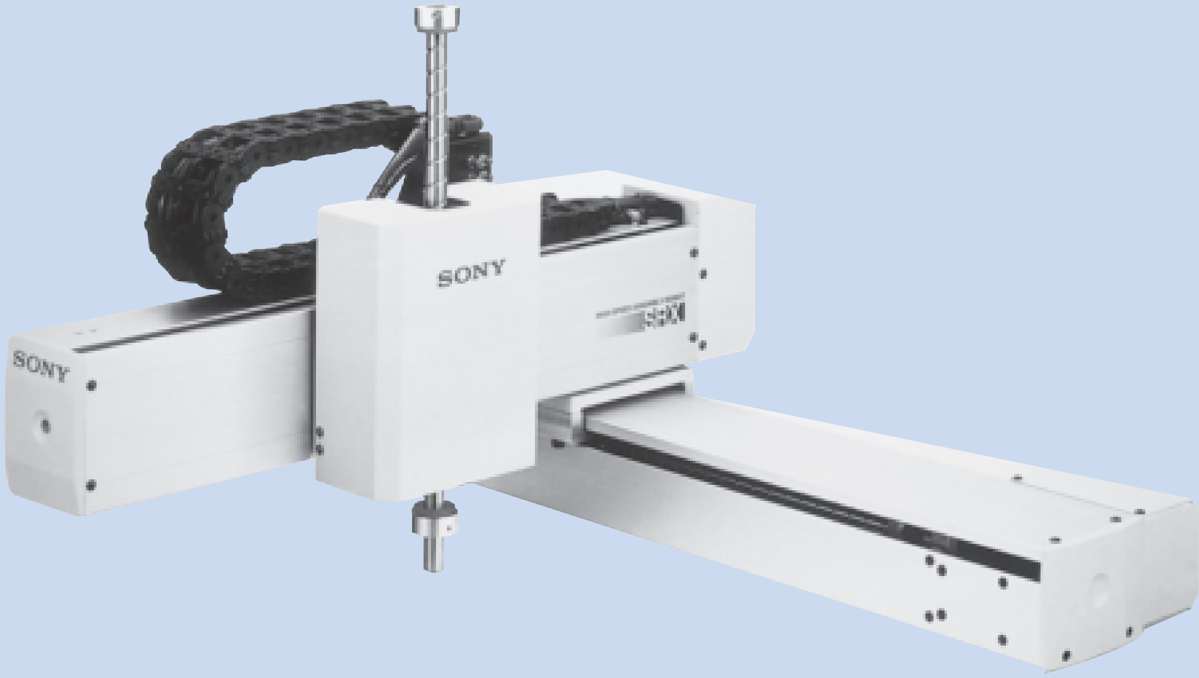


XYZ axis robot

LRW • LWHS

XYZ axis robot

LWHD



Scalar robot

CRBS

Scalar robot

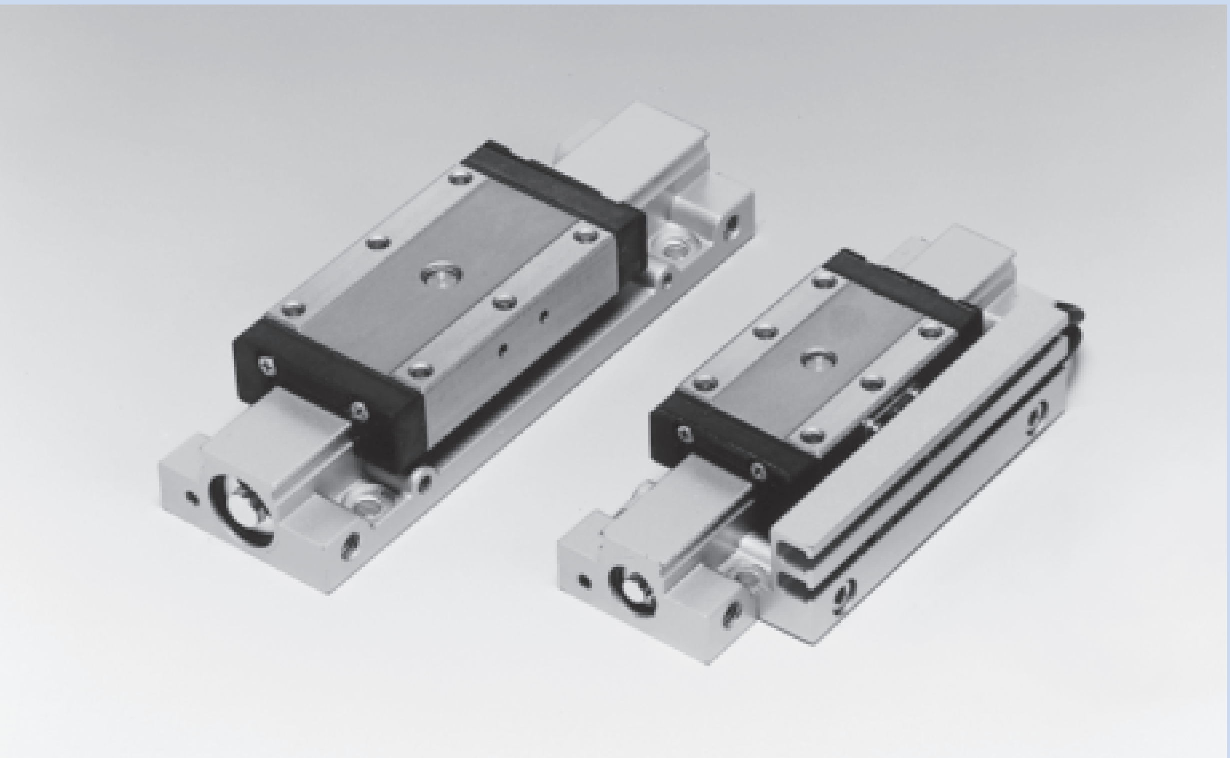
LSAG • CRBH

Applications

G

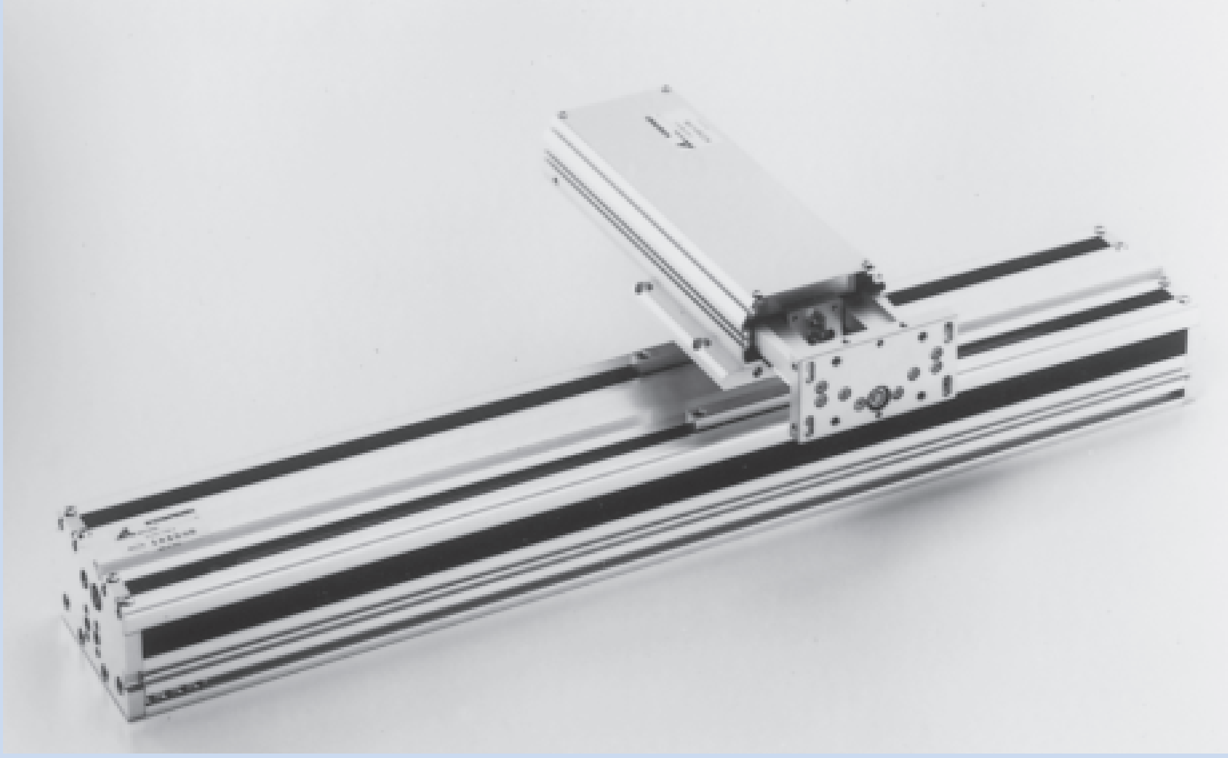
Pneumatic actuator

LWL



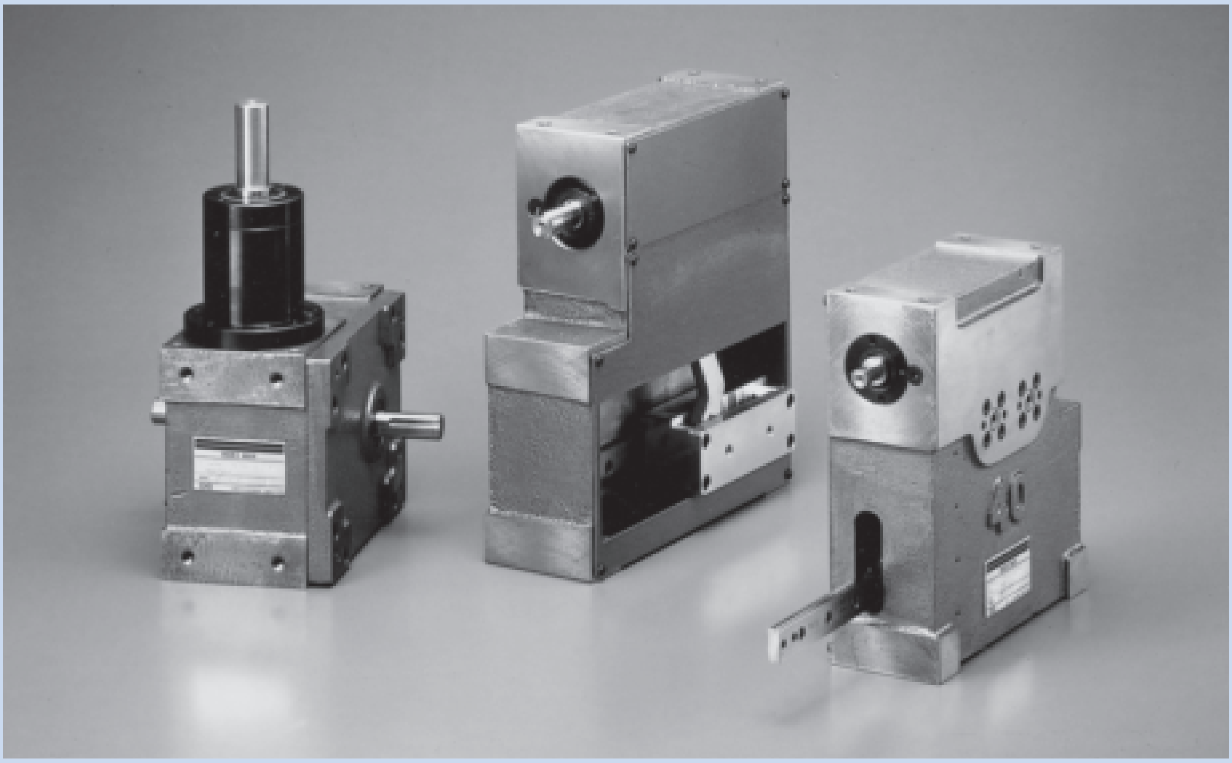
Pneumatic slide table

LWL



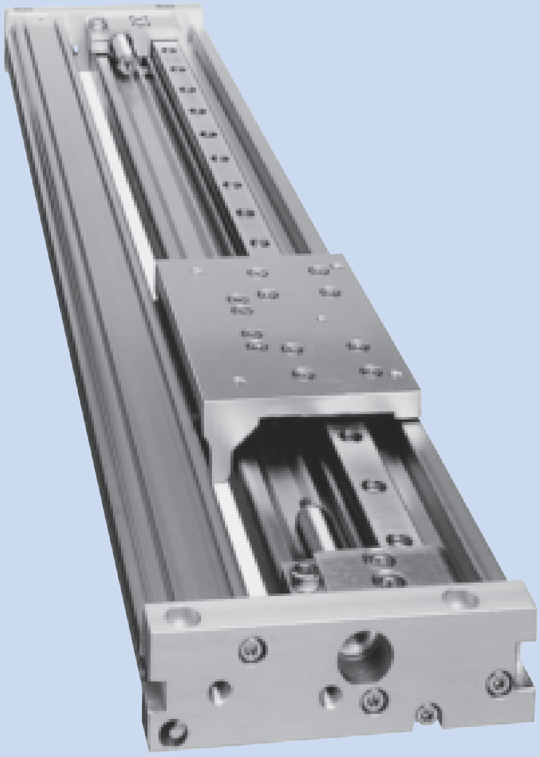
Pick and place unit

LWLF • LWHS • LSA • CFS



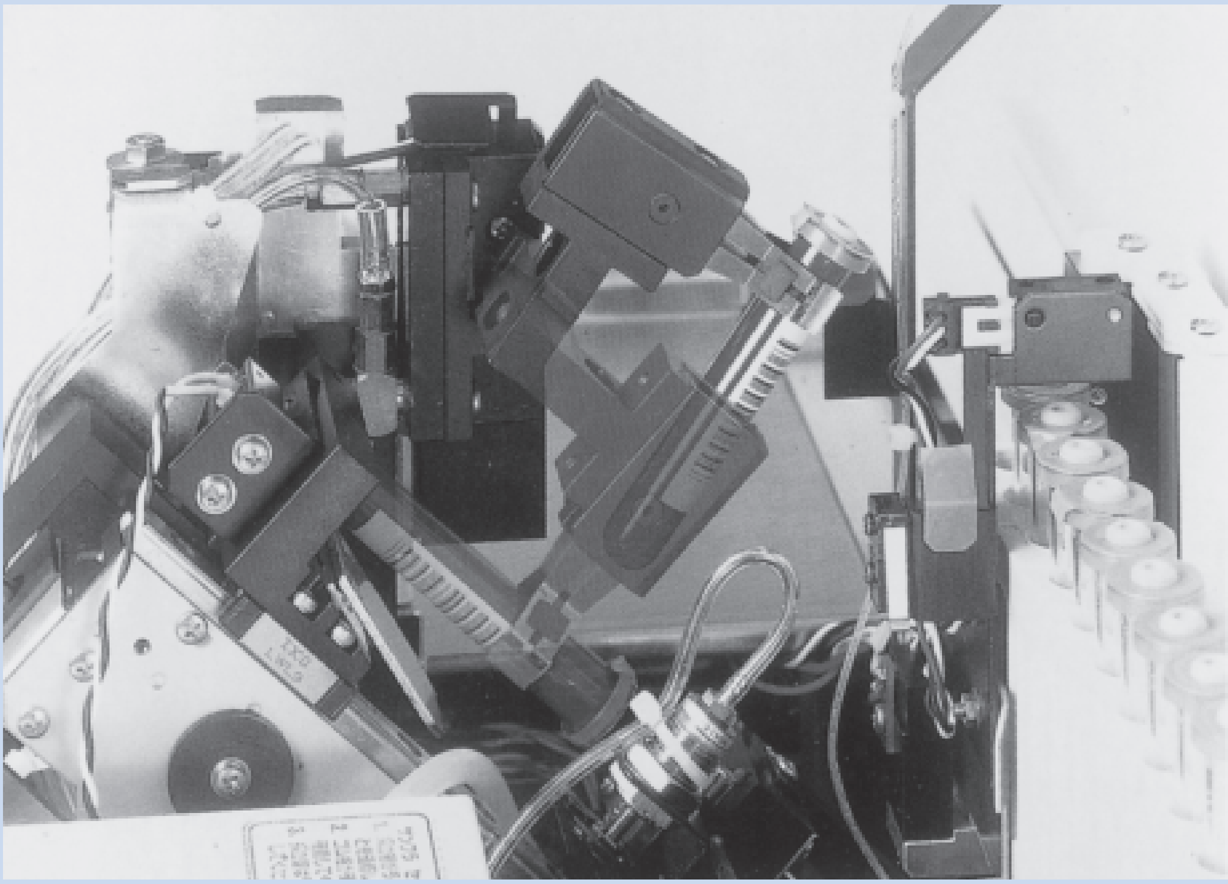
Rodless cylinder

LWL



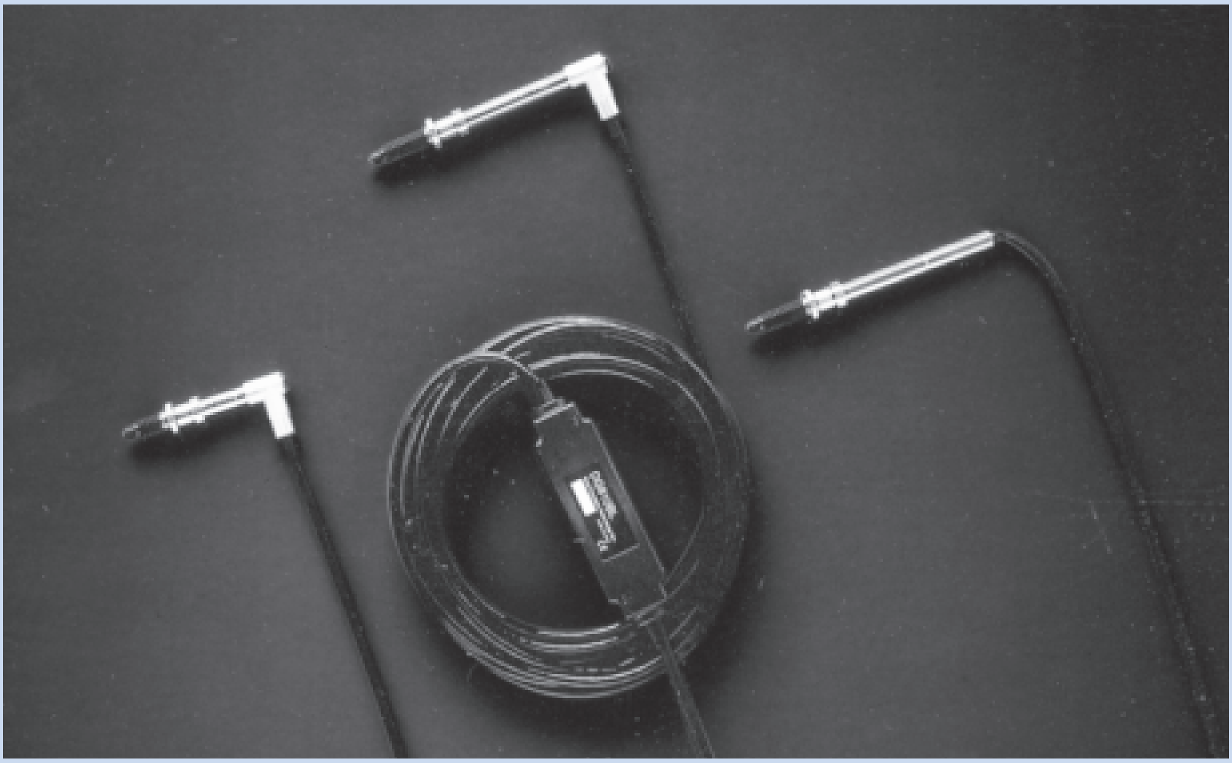
Multi-item auto hemocytometer

LWL



Digital gauge

STSI



Linear gauge sensor

LSAG

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･s^2/m	s	m/s^2	kgf	kgf/m^2	kgf/m^2

Quantity / System of units	Energy	Power	Temperature	Viscosity	Kinematic viscosity	Magnetic flux	Magnetic flux density	Magnetic field intensity
SI units	J	W	K	Pa･s	m^2/s	Wb	T	A/m
CGS units	erg	erg/s	°C	P	St	Mx	Gs	Oe
KMS units	kgf･m	kgf･m/s	°C	kgf･s/m^2	m^2/s	—	—	—

Conversion into SI units

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	Meter Micronmeter Angstrom X-ray unit Nautical mile	m µ Å n mile	1 10^{-6} 10^{-10} ≈1.002 08×10^{-13} 1852	Meter	m
Area	Square meter Are Hectare	m^2 a ha	1 10^2 10^4	Square meter	m^2
Volume	Cubic meter Liter	m^3 l, 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/s^2 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/m^2 kgf/cm^2 kgf/mm^2	9.806 65 9.806 65×10^4 9.806 65×10^6	Pascal	Pa

Quantity	Unit name	Symbol	Conversion factor into SI	SI unit name	Symbol
Pressure	Hydro-column meter Mercurial column millimeter Torr Atmosphere Bar	mH$_2$O 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 cal$_{IT}$ 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/m^2	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	m^2/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	T
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 Inductance Current	Coulomb Volt Farad Ohm Siemens Henry Ampere	C V F Ω S H A	1 1 1 1 1 1 1	Coulomb Volt Farad Ohm Siemens Henry Ampere	C V F Ω S H A

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

● Inch-mm Conversion Table

1 inch = 25.4 mm

inch Fraction	inch 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

1 inch = 25.4 mm

inch Fraction	inch 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 Load 1471N HRC	Vickers' hardness HV	Brinell hardness Standard ball	Brinell hardness Tungsten carbide ball	Rockwell hardness A scale Load 588.4N Diamond circular cone	Rockwell hardness B scale Load 980.7N 1/16" ball	Shore hardness 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 Load 1471N HRC	Vickers' hardness HV	Brinell hardness Standard ball	Brinell hardness Tungsten carbide ball	Rockwell hardness A scale Load 588.4N Diamond circular cone	Rockwell hardness B scale Load 980.7N 1/16" ball	Shore hardness 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

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

Tolerance of Shaft Diameter

unit : μm

Nominal Diameter mm Over	Incl.	b12 High	b12 Low	c12 High	c12 Low	d6 High	d6 Low	e6 High	e6 Low	e12 High	e12 Low	f5 High	f5 Low	f6 High	f6 Low	g5 High	g5 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												
50	65	−190	−490	−140	−440	−100	−119	−60	−79	−60	−360	−30	−43	−30	−49	−10	−23
65	80	−200	−500	−150	−450												
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	140	−260	−660	−200	−600	−145	−170	−85	−110	−85	−485	−43	−61	−43	−68	−14	−32
140	160	−280	−680	−210	−610												
160	180	−310	−710	−230	−630												
180	200	−340	−800	−240	−700	−170	−199	−100	−129	−100	−560	−50	−70	−50	−79	−15	−35
200	225	−380	−840	−260	−720												
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												
315	355	−600	−1170	−360	−930	−210	−246	−125	−161	−125	−695	−62	−87	−62	−98	−18	−43
355	400	−680	−1250	−400	−970												
400	450	−760	−1390	−440	−1070	−230	−270	−135	−175	−135	−765	−68	−95	−68	−108	−20	−47
450	500	−840	−1470	−480	−1110												

g6 High	g6 Low	h5 High	h5 Low	h6 High	h6 Low	h7 High	h7 Low	h8 High	h8 Low	h9 High	h9 Low	h10 High	h10 Low	h11 High	h11 Low	Nominal Diameter mm 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
−10	−29	0	−13	0	−19	0	−30	0	−46	0	−74	0	−120	0	−190	50	65
																65	80
−12	−34	0	−15	0	−22	0	−35	0	−54	0	−87	0	−140	0	−220	80	100
																100	120
−14	−39	0	−18	0	−25	0	−40	0	−63	0	−100	0	−160	0	−250	120	140
																140	160
																160	180
−15	−44	0	−20	0	−29	0	−46	0	−72	0	−115	0	−185	0	−290	180	200
																200	225
																225	250
−17	−49	0	−23	0	−32	0	−52	0	−81	0	−130	0	−210	0	−320	250	280
																280	315
−18	−54	0	−25	0	−36	0	−57	0	−89	0	−140	0	−230	0	−360	315	355
																355	400
−20	−60	0	−27	0	−40	0	−63	0	−97	0	−155	0	−250	0	−400	400	450
																450	500

Nominal Diameter mm Over	Incl.	h12 High	h12 Low	js5 High	js5 Low	j5 High	j5 Low	js6 High	js6 Low	j6 High	j6 Low	j7 High	j7 Low	k5 High	k5 Low	k6 High	k6 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	−3	+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	0	−250	+5.5	−5.5	+6	−5	+8	−8	+11	−5	+15	−10	+13	+2	+18	+2
40	50																
50	65	0	−300	+6.5	−6.5	+6	−7	+9.5	−9.5	+12	−7	+18	−12	+15	+2	+21	+2
65	80																
80	100	0	−350	+7.5	−7.5	+6	−9	+11	−11	+13	−9	+20	−15	+18	+3	+25	+3
100	120																
120	140	0	−400	+9	−9	+7	−11	+12.5	−12.5	+14	−11	+22	−18	+21	+3	+28	+3
140	160																
160	180																
180	200	0	−460	+10	−10	+7	−13	+14.5	−14.5	+16	−13	+25	−21	+24	+4	+33	+4
200	225																
225	250																
250	280	0	−520	+11.5	−11.5	+7	−16	+16	−16	+16	−16	+26	−26	+27	+4	+36	+4
280	315																
315	355	0	−570	+12.5	−12.5	+7	−18	+18	−18	+18	−18	+29	−28	+29	+4	+40	+4
355	400																
400	450	0	−630	+13.5	−13.5	+7	−20	+20	−20	+20	−20	+31	−32	+32	+5	+45	+5
450	500																

unit : μm

m5 High	m5 Low	m6 High	m6 Low	n5 High	n5 Low	n6 High	n6 Low	p6 High	p6 Low	Nominal Diameter mm 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
										65	80
+28	+13	+35	+13	+38	+23	+45	+23	+59	+37	80	100
										100	120
+33	+15	+40	+15	+45	+27	+52	+27	+68	+43	120	140
										140	160
										160	180
+37	+17	+46	+17	+51	+31	+60	+31	+79	+50	180	200
										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

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

● Tolerance of Housing Bore Diameter

unit : μm

Nominal Diameter mm		B12		E7		E11		E12		F6		F7		G6		G7	
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														
50	65	+490	+190	+90	+60	+250	+60	+360	+60	+49	+30	+60	+30	+29	+10	+40	+10
65	80	+500	+200														
80	100	+570	+220	+107	+72	+292	+72	+422	+72	+58	+36	+71	+36	+34	+12	+47	+12
100	120	+590	+240														
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														
315	355	+1170	+600	+182	+125	+485	+125	+695	+125	+98	+62	+119	+62	+54	+18	+75	+18
355	400	+1250	+680														
400	450	+1390	+760	+198	+135	+535	+135	+765	+135	+108	+68	+131	+68	+60	+20	+83	+20
450	500	+1470	+840														

H6		H7		H8		H9		H10		H11		JS6		J6		Nominal Diameter mm	
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
																40	50
+19	0	+30	0	+46	0	+74	0	+120	0	+190	0	+9.5	−9.5	+13	−6	50	65
																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	−7	140	160
																160	180
																180	200
+29	0	+46	0	+72	0	+115	0	+185	0	+290	0	+14.5	−14.5	+22	−7	200	225
																225	250
+32	0	+52	0	+81	0	+130	0	+210	0	+320	0	+16	−16	+25	−7	250	280
																280	315
+36	0	+57	0	+89	0	+140	0	+230	0	+360	0	+18	−18	+29	−7	315	355
																355	400
+40	0	+63	0	+97	0	+155	0	+250	0	+400	0	+20	−20	+33	−7	400	450
																450	500

Nominal Diameter mm		JS7		J7		K5		K6		K7		M6		M7		N6	
Over	Incl.	High	Low	High	Low	High	Low	High	Low	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	+12	−12	+14	−11	+2	−9	+3	−13	+7	−18	−4	−20	0	−25	−12	−28
40	50																
50	65	+15	−15	+18	−12	+3	−10	+4	−15	+9	−21	−5	−24	0	−30	−14	−33
65	80																
80	100	+17	−17	+22	−13	+2	−13	+4	−18	+10	−25	−6	−28	0	−35	−16	−38
100	120																
120	140																
140	160	+20	−20	+26	−14	+3	−15	+4	−21	+12	−28	−8	−33	0	−40	−20	−45
160	180																
180	200																
200	225	+23	−23	+30	−16	+2	−18	+5	−24	+13	−33	−8	−37	0	−46	−22	−51
225	250																
250	280	+26	−26	+36	−16	+3	−20	+5	−27	+16	−36	−9	−41	0	−52	−25	−57
280	315																
315	355	+28	−28	+39	−18	+3	−22	+7	−29	+17	−40	−10	−46	0	−57	−26	−62
355	400																
400	450	+31	−31	+43	−20	+2	−25	+8	−32	+18	−45	−10	−50	0	−63	−27	−67
450	500																

unit : μm

N7		P6		P7		R7		S7		Nominal Diameter mm	
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
										40	50
−9	−39	−26	−45	−21	−51	−30	−60	−42	−72	50	65
						−32	−62	−48	−78	65	80
−10	−45	−30	−52	−24	−59	−38	−73	−58	−93	80	100
						−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
						−78	−130	−150	−202	280	315
−16	−73	−51	−87	−41	−98	−87	−144	−169	−226	315	355
						−93	−150	−187	−244	355	400
−17	−80	−55	−95	−45	−108	−103	−166	−209	−272	400	450
						−109	−172	−229	−292	450	500

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

● N-lbf Conversion Table

1N = 0.224809 lbf 1lbf = 4.44822 N

N		lbf	N		lbf	N		lbf
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
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	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	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
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

1N = 0.1019716 kgf　1kgf = 9.80665 N

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.

● Temperature Conversion Table

$C = \frac{5}{9}(F-32)$ $F = 32+\frac{9}{5}C$

˚C		˚F	˚C		˚F	˚C		˚F	˚C		˚F
-73.3	-100	-148.0	-2.2	28	82.4	16.1	61	141.8	34.4	94	201.2
-62.2	- 80	-112.0	-1.7	29	84.2	16.7	62	143.6	35.0	95	203.0
-51.1	- 60	- 76.0	-1.1	30	86.0	17.2	63	145.4	35.6	96	204.8
-40.0	- 40	- 40.0	-0.6	31	87.8	17.8	64	147.2	36.1	97	206.6
-28.9	- 20	- 4.0	0	32	89.6	18.3	65	149.0	36.7	98	208.4
-17.8	0	32.0	0.6	33	91.4	18.9	66	150.8	37.2	99	210.2
-17.2	1	33.8	1.1	34	93.2	19.4	67	152.6	37.8	100	212
-16.7	2	35.6	1.7	35	95.0	20.0	68	154.4	43.3	110	230
-16.1	3	37.4	2.2	36	96.8	20.6	69	156.2	48.9	120	248
-15.6	4	39.2	2.8	37	98.6	21.1	70	158.0	54.4	130	266
-15.0	5	41.0	3.3	38	100.4	21.7	71	159.8	60.0	140	284
-14.4	6	42.8	3.9	39	102.2	22.2	72	161.6	65.6	150	302
-13.9	7	44.6	4.4	40	104.0	22.8	73	163.4	71.1	160	320
-13.3	8	46.4	5.0	41	105.8	23.3	74	165.2	76.7	170	338
-12.8	9	48.2	5.6	42	107.6	23.9	75	167.0	82.2	180	356
-12.2	10	50.0	6.1	43	109.4	24.4	76	168.8	87.8	190	374
-11.7	11	51.8	6.7	44	111.2	25.0	77	170.6	93.3	200	392
-11.1	12	53.6	7.2	45	113.0	25.6	78	172.4	121.1	250	482
-10.6	13	55.4	7.8	46	114.8	26.1	79	174.2	149	300	572
-10.0	14	57.2	8.3	47	116.6	26.7	80	176.0	177	350	662
- 9.4	15	59.0	8.9	48	118.4	27.2	81	177.8	204	400	752
- 8.9	16	60.8	9.4	49	120.2	27.8	82	179.6	232	450	842
- 8.3	17	62.6	10.0	50	122.0	28.3	83	181.4	260	500	932
- 7.8	18	64.4	10.6	51	123.8	28.9	84	183.2	288	550	1022
- 7.2	19	66.2	11.1	52	125.6	29.4	85	185.0	316	600	1112
- 6.7	20	68.0	11.7	53	127.4	30.0	86	186.8	343	650	1202
- 6.1	21	69.8	12.2	54	129.2	30.6	87	188.6	371	700	1292
- 5.6	22	71.6	12.8	55	131.0	31.1	88	190.4	399	750	1382
- 5.0	23	73.4	13.3	56	132.8	31.7	89	192.2	427	800	1472
- 4.4	24	75.2	13.9	57	134.6	32.2	90	194.0	454	850	1562
- 3.9	25	77.0	14.4	58	136.4	32.8	91	195.8	482	900	1652
- 3.3	26	78.8	15.0	59	138.2	33.3	92	197.6	510	950	1742
- 2.8	27	80.6	15.6	60	140.0	33.9	93	199.4	538	1000	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 (Reference)

Sort	Name	Supplier	Thickener of metallic soap	Con-sistency	Dropping point (℃)	Service range[1] (℃)	Remarks
General purpose	ALVANIA GREASE No.1	SHELL	Li	326	180	−35〜+120	General, Centralized greasing
	ALVANIA GREASE No.2	SHELL	Li	273	182	−25〜+120	General, Centralized greasing
	ALVANIA GREASE No.3	SHELL	Li	232	183	−20〜+135	General
	DAPHNE EPONEX GREASE No.2	IDEMITSU	Li	276	195	−20〜+120	General
	COSMO GREASE DYNAMAX No.2	COSMO	Li	280	188	−20〜+120	General
	MULTINOC GREASE 2	NIPPON OIL	Li	278	212	−30〜+125	General
	MOBILAX GREASE No.2	MOBIL	Li	280	196	−35〜+120	General
Low temperature	ALVANIA GREASE RA	SHELL	Li	252	183	−40〜+130	Low temperature
	BEACON 325	ESSO	Li	280	193	(+160) −60〜+120	Low temperature, Low torque
	ISOFLEX LDS 18 SPECIAL A	KLÜBER	Li	280	≧185	−60〜+130	Low temperature, High speed,Extreme pressure
	ISOFLEX SUPER LDS 18	KLÜBER	Li	280	≧185	−60〜+130	Low temperature, High speed,Low noise
	LT GREASE No.2	JAPAN ENERGY	Li	275	181	−50〜+150	Low temperature
Wide temperature range	TEMPREX N3	ESSO	Li Complex	235	≧300	(+200) −20〜+160	Wide temperature range, High temperature
	AEROSHELL GREASE 7	SHELL	Microgel	288	≧260	−73〜+149	Wide temperature range, Low temperature
	MULTEMP PS No.2	KYODO YUSHI	Li	275	190	−50〜+130	Wide temperature range, For low temperature & low noise
	MULTEMP SRL	KYODO YUSHI	Li	242	192	−50〜+150	Wide temperature range, For low temperature & low noise
	MULTINOC WIDE No.2	NIPPON OIL	Li+special Na	247	203	−40〜+135	Wide temperature range
Extreme pressure	ALVANIA EP-2	SHELL	Li	276	187	−20〜+110	Extreme pressure, Centralized greasing
	MOLYKOTE BR2-PLUS	DOW CORNING	Li	265	185	−30〜+150	With MoS_2, Extreme pressure
	MOLUB-ALLOY #777-2	CASTROL	Li	280	182	0〜+135	With MoS_2, Extreme pressure
Others	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
	BARRIERTA L55/2	KLÜBER	Fluorinated	No.2	None	(+250) −35〜+220	General, Low evaporation at high temperature, Chemically inert
	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.

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