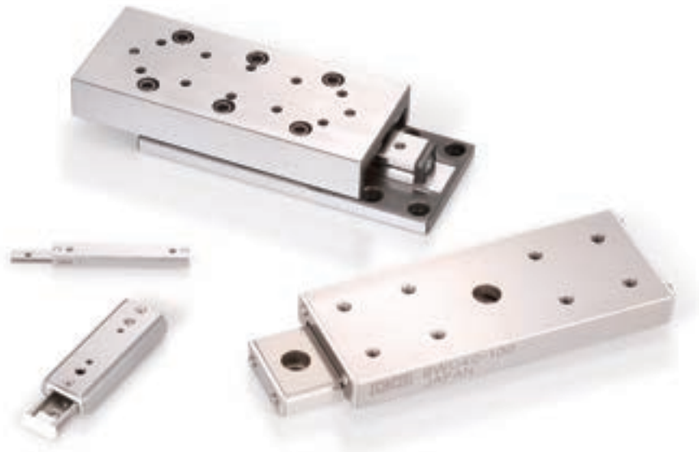

LINEAR WAYS

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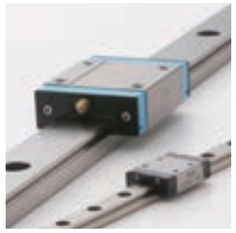
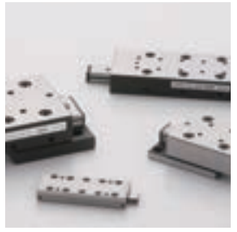
Good Environment and Good Quality





IKO Linear Motion Rolling Guides are used with satisfactory results for various applications requiring precision positioning such as semi-conductor manufacturing equipment, large sized machine tools, industrial robots, and precision equipment.
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.

LINEAR MOTION ROLLING GUIDE SERIES Full Lineup

Linear Motion Rolling Guide Series General Catalog BLUE

Recorded in CAT-1604E

Linear Way

Linear Roller Way

Linear Motion Rolling Guide Series General Catalog RED

Recorded in CAT-1605E

Crossed Roller Way

Linear Slide Unit

Linear Ball Spline

Linear Bushing

Stroke Rotary Bushing

Roller Way & Flat Roller Cage

Rail Guide Type

Ball Type Miniature Series

Super small-size linear motion rolling guide produced by original small sizing technology

C-Lube Maintenance Free Series

C-Lube Linear Way ML
ML : Standard type
MLF : Wide type

Linear Way L
LWL : Standard type
LWLF : Wide type

Ball Type Miniature Value Series

Economical linear motion rolling guides without changing the superior performance of Ball Type Miniature Series

C-Lube Linear Way MLV
MLV

Ball Type Low Profile/Light Weight Series

Super low profile and super light weight linear motion rolling guides with high load capacity

C-Lube Linear Way MV
MV

Ball Type Compact Series

Versatile linear motion rolling guides pursuing compactness in every aspect

C-Lube Linear Way ME
ME : Flange type mounting from bottom
MET : Flange type mounting from top
MES : Block type mounting from top

Linear Way E
LWE : Flange type mounting from bottom
LWET : Flange type mounting from top
LWES : Block type mounting from top

Low Decibel Linear Way E
LWE ···Q : Flange type mounting from bottom
LWET ···Q : Flange type mounting from top
LWES ···Q : Block type mounting from top

Ball Type High Rigidity Series

High rigidity linear motion rolling guides designed to evenly support high load capacity by incorporating large-diameter balls

C-Lube Linear Way MH
MH : Flange type mounting from bottom
MHT : Flange type mounting from top
MHD : Block type mounting from top
MHS : Compact block type mounting from top

Linear Way H
LWH : Flange type mounting from bottom
LWHT : Flange type mounting from top
LWHD : Block type mounting from top
LWHS : Compact block type mounting from top
LWHY : Horizontal mounting type

Ball Type Wide Rail Type Series

Linear motion rolling guide suitable to single-row use due to having resistance to across-the-width moment load by using a wide track rail

Linear Way F
LWFH : Flange type mounting from top / bottom
LWFF : Flange type mounting from top / bottom
LWFS : Block type mounting from top

Ball Type U-Shaped Track Rail Series

Linear motion rolling guide of high track rail rigidity with U-shaped track rail

C-Lube Linear Way MUL
MUL : Small type

Linear Way U
LWU ···B : Standard ball-retained type

Roller Type

Linear motion rolling guide that has achieved the highest level of performance in all characteristics utilizing the roller's superior characteristic

C-Lube Linear Roller Way Super MX
MX : Flange type mounting from top / bottom
MXD : Block type mounting from top
MXS : Compact block type mounting from top
MXN : Low profile flange type mounting from top / bottom
MXNS : Low profile block type mounting from top

Linear Roller Way Super X
LRX : Flange type mounting from top / bottom
LRXD : Block type mounting from top
LRXS : Compact block type mounting from top

Roller Type

Roller type linear motion rolling guide with cylindrical rollers in four-rows

Linear Roller Way X
LRWX : Block type mounting from top
LRWXH : Flange type mounting from bottom

Module Type

Minimum compact linear motion rolling guide with both a track rail and slide member provided

Linear Way Module
LWLM : Ball type small type
LRWM : Roller type

Shaft Guide Type

Crossed Roller Way

Linear motion rolling guide incorporating a roller cage between two ways whose two V-shaped surfaces are used as track groove

Anti-Creep Cage Crossed Roller Way
CRWG

Anti-Creep Cage Crossed Roller Way H
CRWG···H

Crossed Roller Way
CRW : Standard type
CRWM : Module type

Anti-Creep Cage Crossed Roller Way Unit
CRWUG

Crossed Roller Way Unit
CRWU / CRWU···R / CRWU···RS

Linear Slide Unit

Light weight, small, and compact linear motion rolling guide that has achieved light and smooth motion

High Rigidity Precision Linear Slide Unit
BWU

Precision Linear Slide Unit
BSP : Limited linear motion type
BSPG : Built-in rack & pinion type
BSR : Endless linear motion type

Linear Slide Unit
BSU···A

Linear Ball Spline

Linear motion rolling guide capable of performing linear motion and torque transmission using an external cylinder along the spline shaft.

C-Lube Linear Ball Spline MAG
MAG : Standard type
MAGF : Flange type

Linear Ball Spline G
LSAG : Standard type
LSAGF : Flange type

Linear Bushing

A wide variety of linear motion rolling guides facilitating the rolling motion in bush guide portion

Linear Bushing G
LMG

Linear Bushing
LM / LME / LMB

Miniature Linear Bushing
LMS

Stroke Rotary Bushing

Linear motion rolling guide enabling the rolling motion and rotary and linear motion in axial direction

Stroke Rotary Bushing
ST : Ordinary type
ST···B : For heavy load

Miniature Stroke Rotary Bushing
STSI : Assembled set with a shaft
STS : Assembled set without a shaft

Stroke Rotary Cage
BG

Flat Guide Type

Roller Way & Flat Roller Cage

High accuracy linear motion rolling guide providing high rigidity in load direction

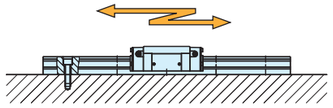
Roller Way
RW / SR / GSN

Flat Roller Cage
FT : Single row type
FTW···A : Double row angle type

Types of Linear Motion Rolling Guides

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

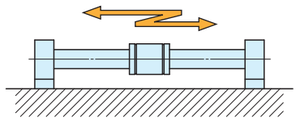
Limited linear motion

Crossed Roller Way

Linear Slide Unit

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

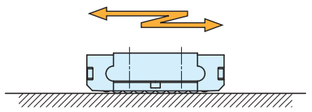
Linear Bushing

Limited linear motion + rotation

Stroke Rotary Bushing

Flat Guide Type

The Flat Guide Type achieves linear motion on a surface. This product can receive only a unidirectional load but feature high rigidity in the load direction.



Endless linear motion

Roller Way

Limited linear motion

Flat Roller Cage

Specifications of Linear Motion Rolling Guides

			Type of rolling element	Type of motion	Load direction and load carrying capacity	Rigidity	Frictional characteristic	Ease of mounting	General applications	Item-listed catalog
Rail Guide Type	Endless linear motion	Linear Way	Ball	Endless linear motion	Complex load, medium to heavy load	◯	◯	◎	• NC machine tool • Precision working machine • Robot • Transfer machine	BLUE
		Linear Roller Way	Roller	Endless linear motion	Complex load, heavy to extra-heavy load	◎	◯	◎	• Heavy duty machine tool • Large working machine • High-rigidity robot	BLUE
	Limited linear motion	Crossed Roller Way	Roller	Limited linear motion	Complex load, medium load	◯	◎	◎	• Precision working machine • Electronic parts assembling machine • Precision measuring instrument	RED
		Linear Slide Unit	Ball	Limited linear motion	Complex load, light to medium load	△	◎	◎	• Electronic parts assembling machine	RED
Shaft Guide Type	Endless linear motion	Linear Ball Spline	Ball	Endless linear motion	Complex load, medium to heavy load	◯	◯	◯	• Robot • Testing and inspection equipment • Transfer machine	RED
		Linear Bushing	Ball	Endless linear motion	Radial load, light load	△	◯	◯	• Packaging machine • Measuring instrument • Medical instrument	RED
	Limited linear motion + rotation	Stroke Rotary Bushing	Ball	Limited linear motion + rotation	Radial load, light load	△	◎	◯	• Printing press • Press die set • Precision measuring instrument	RED
Flat Guide Type	Endless linear motion	Roller Way	Roller	Endless linear motion	Unidirectional load, extra-heavy load	◎	◯	△	• NC machine tool • Precision working machine	RED
	Limited linear motion	Flat Roller Cage	Roller	Limited linear motion	Unidirectional load, extra-heavy load	◎	◎	◯	• Precision working machine • Optical measuring instrument	RED

Code description ◎Excellent ◯Good △Fair

LINEAR MOTION ROLLING GUIDE SERIES RED INDEX

Crossed Roller Way

CRWG | CRWG···H | CRW | CRWM

Linear motion rolling guide incorporating a roller cage between two ways whose two V-shaped surfaces are used as track groove

Ⅱ-7

Crossed Roller Way Unit

CRWUG | CRWU

A linear motion rolling guide with high rigidity table and bed incorporating CRWG and CRW guides for excellent load balance.

Ⅱ-55

High Rigidity Precision Linear Slide Unit

BWU

Light weight, small, and compact linear motion rolling guide that has achieved light and smooth motion

Ⅱ-75

Precision Linear Slide Unit

BSP | BSPG | BSR | BSU

Light weight, small, and compact linear motion rolling guide that has achieved light and smooth motion

Ⅱ-83

Linear Ball Spline

MAG | LSAG

Linear motion rolling guide capable of performing linear motion and torque transmission using an external cylinder along the spline shaft.

Ⅱ-107

Linear Bushing

LMG | LM | LMS

A wide variety of linear motion rolling guides facilitating the rolling motion in bush guide portion

Ⅱ-133

Stroke Rotary Bushing

ST | STSI | BG

Linear motion rolling guide enabling the rolling motion and rotary and linear motion in axial direction

Ⅱ-175

Roller Way

RW | SR | GSN

High accuracy linear motion rolling guide providing high rigidity in load direction

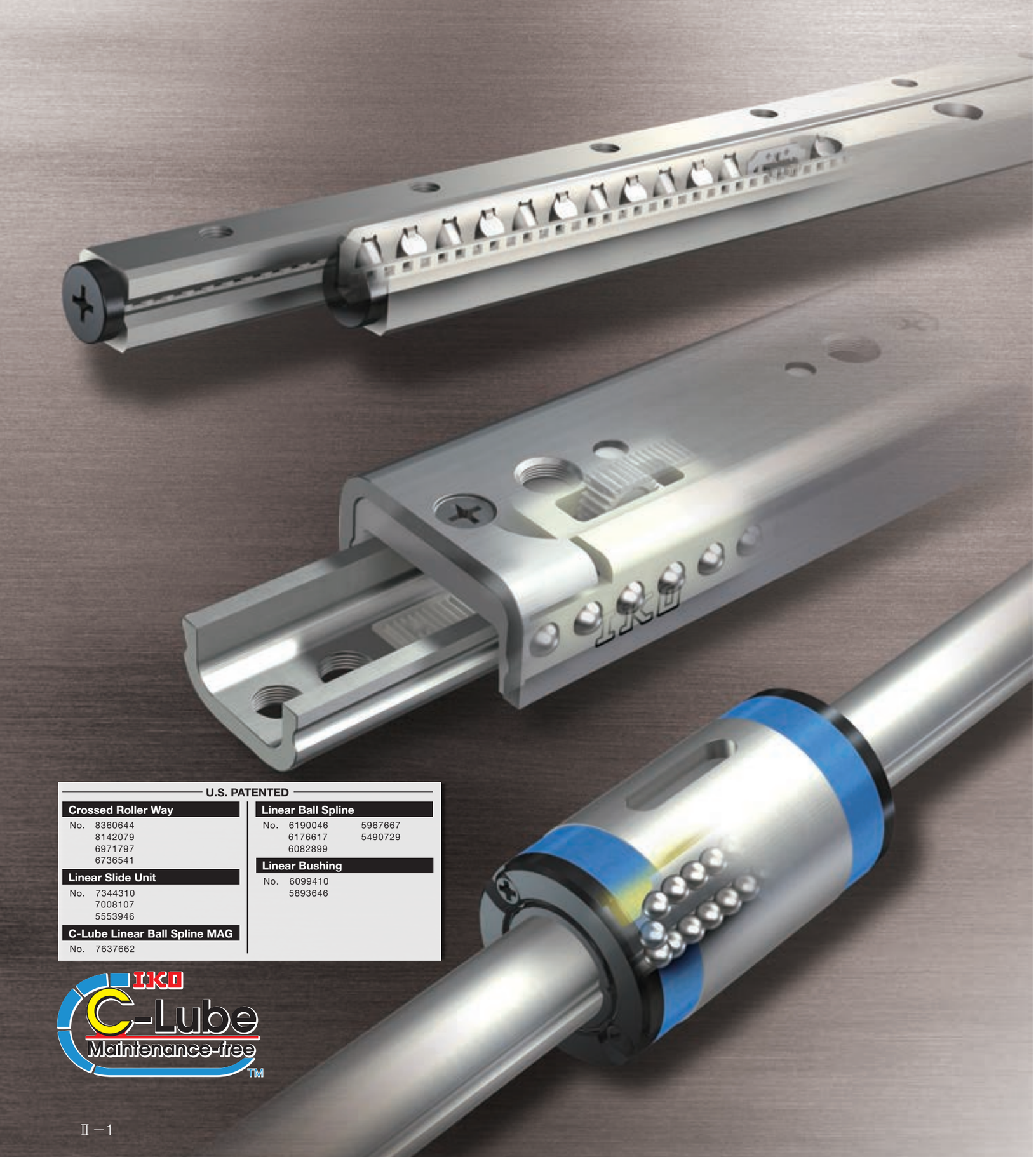
Ⅱ-195

Flat Roller Cage

FT | FTW···A

High accuracy linear motion rolling guide providing high rigidity in load direction

Ⅱ-205



U.S. PATENTED

Crossed Roller Way
No. 8360644
8142079
6971797
6736541

Linear Slide Unit
No. 7344310
7008107
5553946

C-Lube Linear Ball Spline MAG
No. 7637662

Linear Ball Spline
No. 6190046
6176617
6082899
5967667
5490729

Linear Bushing
No. 6099410
5893646

C-Lube Maintenance-free™

Explanation and Dimension Table for Respective Product Series

Rail Guide Type

Crossed Roller Way

● Anti-Creep Cage Crossed Roller Way
Anti-Creep Cage Crossed Roller Way H
Crossed Roller Way
Explanation ··· Ⅱ-7 Dimension Table ··· Ⅱ-27

● Anti-Creep Cage Crossed Roller Way Unit
Crossed Roller Way Unit
Explanation ··· Ⅱ-55 Dimension Table ··· Ⅱ-61

Linear Slide Unit

● High Rigidity Precision Linear Slide Unit
Explanation ··· Ⅱ-75 Dimension Table ··· Ⅱ-81

● Precision Linear Slide Unit
Explanation ··· Ⅱ-83 Dimension Table ··· Ⅱ-89

● Linear Slide Unit
Explanation ··· Ⅱ-95 Dimension Table ··· Ⅱ-99

Shaft Guide Type

Linear Ball Spline

● C-Lube Linear Ball Spline MAG
Linear Ball Spline G
Explanation ··· Ⅱ-107 Dimension Table ··· Ⅱ-123

Linear Bushing

● Linear Bushing G
Explanation ··· Ⅱ-133 Dimension Table ··· Ⅱ-139

● Linear Bushing
Explanation ··· Ⅱ-141 Dimension Table ··· Ⅱ-147

● Miniature Linear Bushing
Explanation ··· Ⅱ-169 Dimension Table ··· Ⅱ-172

Stroke Rotary Bushing

● Stroke Rotary Bushing
Explanation ··· Ⅱ-175 Dimension Table ··· Ⅱ-179

● Miniature Stroke Rotary Bushing
Explanation ··· Ⅱ-183 Dimension Table ··· Ⅱ-187

● Stroke Rotary Cage
Explanation ··· Ⅱ-189 Dimension Table ··· Ⅱ-192

Flat Guide Type

● Roller Way
Explanation ··· Ⅱ-195 Dimension Table ··· Ⅱ201

● Flat Roller Cage
Explanation ··· Ⅱ-205 Dimension Table ··· Ⅱ-211

General Explanation

● General Explanation ····· Ⅲ-2

Crossed Roller Way

Anti-Creep Cage Crossed Roller Way
Anti-Creep Cage Crossed Roller Way H
Crossed Roller Way
Anti-Creep Cage Crossed Roller Way Unit
Crossed Roller Way Unit

A wide variety of series products including mechanism are available! Features of cage misalignment prevention Crossed Roller Way

IKO Crossed Roller Way is a linear motion rolling guide incorporating a roller cage between two ways whose two V-shaped surfaces are used as track groove. Arrangement of cylindrical rollers by orthogonalizing them alternately allows receiving of loads in any direction and executes extremely high-accuracy and smooth linear motion.

Crossed Roller Way

CRW·CRWM

Crossed Roller Way Unit

CRWU

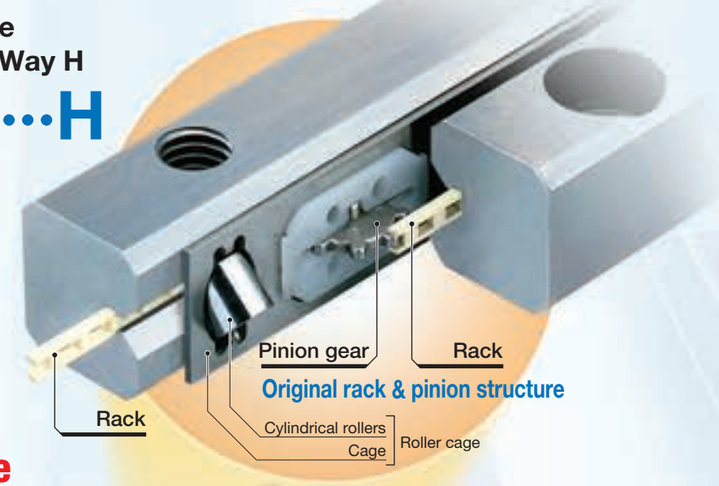
Anti-Creep Cage Crossed Roller Way

CRWG

Anti-Creep Cage Crossed Roller Way H

CRWG···H

IKO Anti-Creep Cage Crossed Roller Way CRWG is a product with a cage creep IKO proof function using a rack and pinion mechanism originated from the Crossed Roller Way CRW featuring smooth linear motion with super high accuracy.
CRWG ··· H is high load capacity type of CRWG, which has achieved greatly increased load rating by redesigning of raceway of CRWG.



Original rack & pinion structure

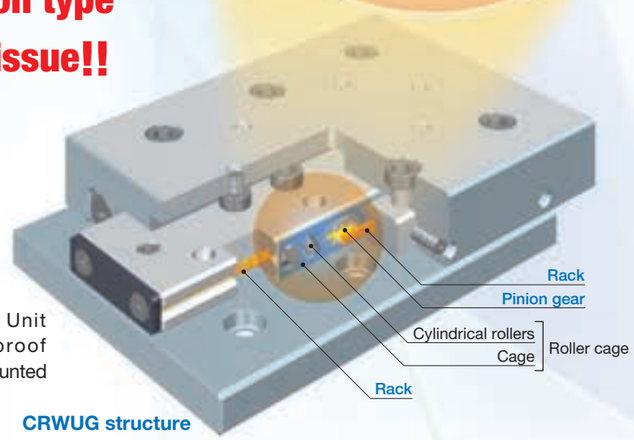
Built-in rack & pinion type

Solves cage creep issue!!

Anti-Creep Cage Crossed Roller Way Unit

CRWUG

IKO Anti-Creep Cage Crossed Roller Way Unit CRWUG is a product with a cage creep proof function-provided Crossed Roller Way CRWG mounted into a ground-finished rigid table and bed.



CRWUG structure

Features of Built-in Rack & Pinion Type

Solves Cage Creep Issue!

Perfect solution for cage creep issues by a built-in rack and pinion mechanism as an original design.

Freedom in Mounting

This series is reliable for applications such as vertical axis where Crossed Roller Way may have chances of cage creep.

High-Speed and High-Tact Operation

Any corrective operation for cage creep is not necessary even for high velocity operation.

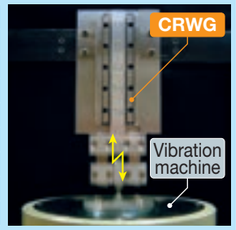
Saving Energy

No remedy motion of cage is necessary even in long term operation.

No cage creep even under high-tact operation in vertical axis!

《Durability test》 Test conditions

Model number	CRWG3	
Test method	Vibration test machine	
Condition	Posture	Vertical
	Maximum velocity	827 mm/s
	Acceleration	15 G
	Number of cycle	31 Hz
	Stroke length	8 mm
	Mass of moving part	330 g
Total cycles	100,000,000 cycles	



《Result》 No cage creep nor material damage in any component is found.

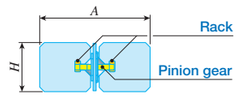
Interchangeable in Mounting Dimensions!

Adoption of original structure of arranging a rack inside the way keeps the same mounting dimensions as conventional Crossed Roller Way CRW.

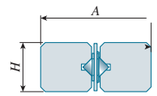
* The mounting dimensions of CRWG1··· H and CRW1 are different.

Easy Replacement

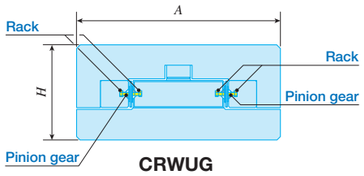
Since they have the same external dimensions to those of the existing Crossed Roller Way and Crossed Roller Way Unit, existing Crossed Roller Way and Crossed Roller Way Unit can be replaced without any mounting dimensions modification.



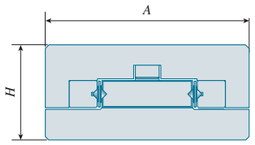
CRWG
CRWG···H



CRW



CRWUG



CRWU

Smooth and Extremely-High Accurate Operation!

Combination of precisely finished raceways and non-recirculating type linear motion rolling guide with super high precision rollers provides superbly smooth motion with very high accuracy.

Improved Running Accuracy

Extremely high running accuracy can be achieved without run deflection by recirculating type linear motion rolling guide.

Suitable for Micro-Feeding

Improvement of precision positioning accuracy and superior corresponding feature to micro-feeding command can be expected because of the linear motion without stick-slip by extremely small frictional resistance.

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

Anti-Creep Cage
Crossed Roller Way

CRWG

Anti-Creep Cage
Crossed Roller Way H

CRWG···H

Crossed Roller Way

CRW/CRWM

Points

Superior load balance

1 This unit has a roller cage with cylindrical rollers alternately orthogonalized between two ways whose two V-shaped surfaces are used as track grooves, which enables loads to be received in any direction.

Solves cage creep problem

2 CRWG and CRWG···H units, which have originally-designed rack and pinion mechanism built-in, solve the cage creep issue and support high-speed & high-tact operation and vertical axis application.

High load capacity type CRWG···H

3 CRWG···H has achieved greatly increased load rating by redesigning of raceway of CRWG, thereby downsizing the machine and equipment and prolonging their lifetime.

Standard type and module type

4 There are two types in the CRW: one is standard type of using four ways and two roller cages in combination as a set and the other is module type of integrating two internal ways in a single structure.

Easy mounting

5 The mounting holes of the way are provided with boring and female thread, so that the mounting structure is not restricted. The module type with two internal ways integrated in a single structure is simple in mounting structure, thus producing high accuracy linear motion.

Stainless steels superior in corrosion resistance are listed on lineup.

6 Products made of stainless steel are highly resistance to corrosion, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.

Identification Number and Specification

Example of an identification number

The specifications of CRWG series, CRWG···H series, and CRW series are indicated by the identification number. Indicate the identification number, consisting of a model code, a dimension, a part code, a material code, a classification symbol, and any supplemental codes for each specification to apply.

		1	2	3	1	4	5	6	7
CRWG series CRWG···H series		CRWG	3	– 150	H			SP	/B
CRW series	Standard type	CRW	3	– 150		C20	SL	SP	/U
		CRW	3	– 250×300		C36	SL	SP	/U
	Module type	CRWM	3	– 150		C20		SP	
		CRWM	3	– 250×150		C20		SP	

1 **Model** — Model code Page Ⅱ－9

2 **Size** — Dimensions Page Ⅱ－9

3 **Way length**

4 **Number of cylindrical rollers**

Part code Page Ⅱ－10

5 **Material type** — Material code Page Ⅱ－10

6 **Accuracy class** — Classification symbol Page Ⅱ－11

7 **Special specification** — Supplemental code Page Ⅱ－11

Note: One set of the CRW, CRWG, and CRWG...H series consists of a combination of four ways and two roller cages.

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

Identification Number and Specification —Model・Size—

1 Model

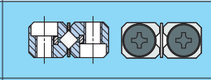
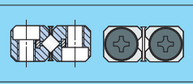
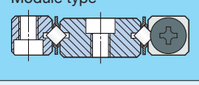
Anti-Creep Cage Crossed Roller Way (CRWG series)		: CRWG
Anti-Creep Cage Crossed Roller Way H (CRWG···H series)		: CRWG···H
Crossed Roller Way (CRW series)	Standard type	: CRW
	Module type	: CRWM

For applicable models and sizes, see Fig. 1.

2 Size

1, 2, 3, 4, 6, 9, 12, 15, 18, 24 — For applicable models and sizes, see Table 1.

Table 1 Models and Sizes of CRWG series, CRWG···H series, and CRW series

Series	Shape	Material	Model	Size									
				1	2	3	4	6	9	12	15	18	24
CRWG		High carbon steel made	CRWG	–	○	○	○	○	–	–	–	–	–
CRWG···H		High carbon steel made	CRWG···H	○	○	○	○	–	–	–	–	–	–
CRW	Standard type	High carbon steel made	CRW	○	○	○	○	○	○	○	○	○	○
		Stainless steel made	CRW···SL	○	○	○	○	○	–	–	–	–	–
	Module type 	High carbon steel made	CRWM	○	○	○	○	–	–	–	–	–	–

—Way length・Number of Cylindrical Rollers・Material Type—

3 Way length

○
○×○

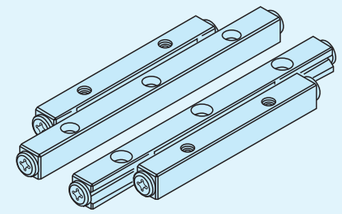
The way length is indicated in mm. The CRW series can be combined with a way of different length. For details of way length, see the dimension tables on pages Ⅱ-27 to Ⅱ-52.

Specifying the combination of different way lengths

Combination of standard type

This combination consists of two short ways, two long ways, and two roller cages, as a set.
In this case, make sure to specify the number of rollers to be incorporated in the roller cages. (For calculation of incorporated rollers, see the Selection of CRW Series on page Ⅱ-17.)

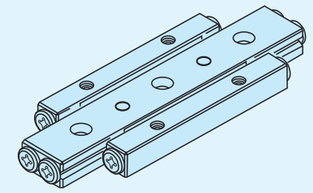
Example CRW 6 – 300 × 400 C24
- The number of cylindrical rollers to be incorporated in a unit: 24
- Length of long way: 400 mm
- Length of short way: 300 mm



Combination of module type

This combination consists of one center way, two outside ways, and two roller cages, as a set.
In this case, make sure to specify the number of rollers to be incorporated in the roller cages. (For calculation of incorporated rollers, see the Selection of CRW Series on page Ⅱ-17.)

Example CRWM 3 – 200 × 150 C20
- The number of cylindrical rollers to be incorporated in a unit: 20
- Length of outside way: 150 mm
- Length of center way: 200 mm



4 Number of cylindrical rollers

: No symbol	This represents the number of cylindrical rollers incorporated into a CRW series cage. If not directed, the number of cylindrical rollers indicated in the dimension table shall be incorporated in a roller cage.
: C○	

5 Material type

High carbon steel made	: No symbol	For applicable models and sizes, see Fig. 1.
Stainless steel made	: SL	

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

6 Accuracy class

Standard	: No symbol	For parallelism of the raceway to reference mounting surface and the tolerance of the parallelism of two raceways of CRWM, see Fig. 1.
Super precision	: SP	

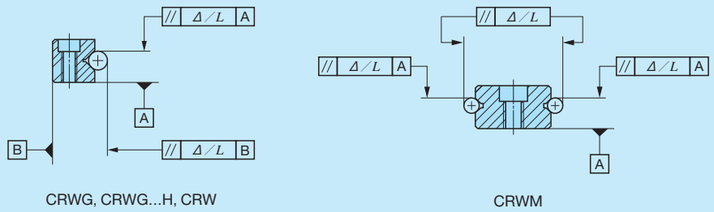


Fig. 1 Accuracy

7 Special specification

B, M, SA, SB, U

For applicable special specifications, see Table 2.
For combination of multiple special specifications, see Table 3.
For details of special specifications, see pages Ⅱ-11 to Ⅱ-14.

Table 2 Application of special specifications

Special specification	Supplemental code	Size									
		1	2	3	4	6	9	12	15	18	24
Special mounting screw	/B	—	—	○	○	○	○	○	○	○	○
High rigidity roller cage (1)	/M	—	—	—	—	○	○	○	○	○	○
End stopper SA (1)	/SA	—	○	○	○	○	○	○	○	○	○
End stopper SB (1)	/SB	—	○	○	○	○	○	○	○	○	○
Wiper seal (1)	/U	—	○	○	○	○	○	○	○	○	○

Notes (1) Applicable only to CRW series standard type. Not applicable to other series or shapes.

Table 3 Combination of special specifications

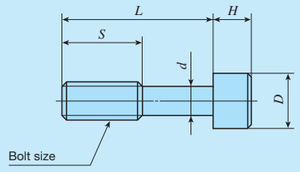
M	○			
SA	○	○		
SB	○	○	—	
U	○	○	—	—
	B	M	SA	SB

Remarks 1. The combination of "—" shown in the table is not available.
2. When using multiple types for combination, please indicate by arranging the symbols in alphabetical order.

Special mounting screw /B

Preload adjusting-side way can be moved by adjusting the preload. Allowance for movement is required between a way fixing screw and mounting hole, but special mounting screws are provided for the cases where enough allowance is not provided or a fixing screw should be mounted from the way side as shown in Fig. 2.
This special mounting screw can also be used for the case where the mounting hole for mounting the fixed-side way and positioning accuracy of female thread are not enough. This special mounting screw is high carbon steel-made only.

Table 4 Dimensions of special mounting screw



unit: mm

Size	Bolt 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

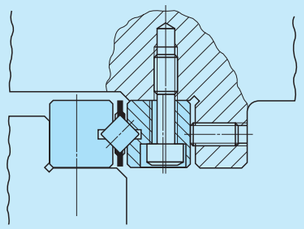
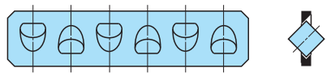


Fig. 2 Mounting by special mounting screw

High rigidity roller cage /M



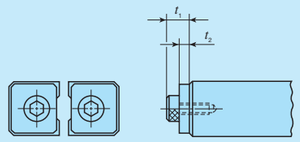
The cage is changed into a high rigidity copper alloy-made cage designed to suit vertical axis application. This cage has a structure to prevent a roller from dropping off in one-side direction.
For using a high rigidity roller cage for vertical axis application, it is recommended to use the cage in combination with end stopper SB.

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

End stopper SA /SA

When the stroke frequency is high and cage creep may be caused by the vibration and non-uniformly varying load, the end screw is changed into end stopper SA.
For the series of size 1, an end stopper SA according to end stopper SA is included as standard.

Table 5 Dimensions of end stopper SA



unit: mm

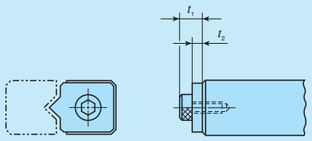
Size	t_1	t_2
2	4.5	2
3	5	2
4	7	3
6	8	3
9	10	4

Size	t_1	t_2
12	11	5
15	14	6
18	14	6
24	16	6

End stopper SB /SB

When using a high rigidity roller cage for vertical axis application, the end screw is changed into end stopper SB to regulate the cage stroke at the end.
The end stopper SB cannot be mounted on all way ends. Standard mounting positions are shown in Fig. 3. The mounting positions can be changed by loosening the screw.

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

Size	t_1	t_2
12	11	5
15	14	6
18	14	6
24	16	6

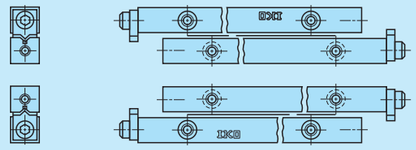
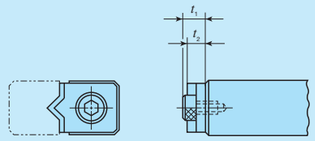


Fig. 3 Arrangement of end stopper SB

Wiper seal /U

In order to prevent foreign substances from entering into a raceway, the wiper seal is changed into the one with a function of end stopper SB.
The wiper seal cannot be mounted on all way ends. Standard mounting positions are shown in Fig. 4. The mounting positions can be changed by loosening the screw.

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

Size	t_1	t_2
12	11	8.5
15	14	11
18	14	11
24	16	11

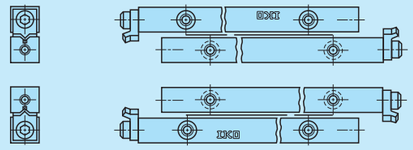


Fig. 4 Arrangement of wiper seal

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

Load Rating and Allowable Load

Basic dynamic load rating C, basic static load rating C_0, and allowable load F of the CRWG series and CRWG···H series show values for downward loads in case of parallel arrangement of four ways and two pairs of roller cages as one set. (Refer to Fig. 5) In addition, the upward and lateral load rating is the same as downward load rating.

For the CRW series, since the number of cylindrical rollers that share load of each direction varies, the load rating for each load direction and allowable load must be obtained. In addition, basic dynamic load rating C_U, basic static load rating C_{0U}, and allowable load F_U in the dimension table show values per cylindrical roller.

Basic dynamic load rating C, basic static load rating C_0, and allowable load F of the CRW series are obtained based on the equation indicated in Table 8.1 and Table 8.2.

For more information on the definition of load rating and calculated load, see page Ⅲ-3.

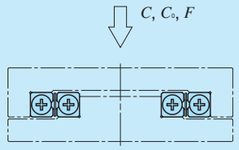


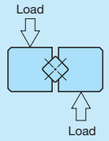
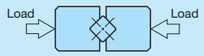
Fig. 5 Direction of load rating of the CRWG series and CRWG···H series

Allowable load

Allowable load refers to load of smooth rolling motion on contact surface to which maximum contact stress is applied and the sum of whose elastic deformation of rolling elements and raceway is small.

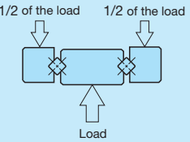
Therefore, use applied load within the allowable load range if very smooth rolling motion and high accuracy are required.

Table 8.1 Calculating formula of load rating and allowable load of standard type CRW series

	Upward and downward load (1)	Lateral load
Load direction		
Basic dynamic load rating C N	$C_r=\left\{\left(\frac{Z}{2}-1\right)2p\right\}^{1/36}\left(\frac{Z}{2}\right)^{3/4}C_U$ ·····(1)	$C_a=\left\{\left(\frac{Z}{2}-1\right)2p\right\}^{1/36}\left(\frac{Z}{2}\right)^{3/4}2^{7/9}C_U$ ·····(4)
Basic static load rating C_0 N	$C_{0r}=\left(\frac{Z}{2}\right)C_{0U}$ ·····(2)	$C_{0a}=2\left(\frac{Z}{2}\right)C_{0U}$ ·····(5)
Allowable load F N	$F_r=\left(\frac{Z}{2}\right)F_U$ ·····(3)	$F_a=2\left(\frac{Z}{2}\right)F_U$ ·····(6)
Code description	C_r : Basic dynamic load rating in case upward and downward load is applied N	
	C_a : Basic dynamic load rating in case lateral load is applied N	
	C_{0r} : Basic static load rating in case upward and downward load is applied N	
	C_{0a} : Basic static load rating in case lateral load is applied N	
	F_r : Allowable load in case upward and downward load is applied N	
	F_a : Allowable load in case lateral load is applied N	
	Z : The number of cylindrical rollers incorporated in a roller cage (omit the figures after the decimal fractions for $\frac{Z}{2}$)	
	p : Inter-pitch dimensions of cylindrical rollers mm	
	C_U : Basic dynamic load rating per cylindrical roller N	
	C_{0U} : Basic static load rating per cylindrical roller N	
	F_U : Allowable load per cylindrical roller N	

Note (1) : In case of parallel arrangement in this load direction, calculation must be performed based on the equations (7) , (8) , and (9) in Table 8.2.

Table 8.2 Calculating formula of load rating and allowable load of module type CRW series

	Upward and downward load	Lateral load
Load direction		
Basic dynamic load rating C N	$C_r=\left\{\left(\frac{Z}{2}-1\right)2p\right\}^{1/36}\left(\frac{Z}{2}\right)^{3/4}2^{7/9}C_U$ ·····(7)	$C_a=\left\{\left(\frac{Z}{2}-1\right)2p\right\}^{1/36}\left(\frac{Z}{2}\right)^{3/4}2^{7/9}C_U$ ·····(10)
Basic static load rating C_0 N	$C_{0r}=2\left(\frac{Z}{2}\right)C_{0U}$ ·····(8)	$C_{0a}=2\left(\frac{Z}{2}\right)C_{0U}$ ·····(11)
Allowable load F N	$F_r=2\left(\frac{Z}{2}\right)F_U$ ·····(9)	$F_a=2\left(\frac{Z}{2}\right)F_U$ ·····(12)
Code description	C_r : Basic dynamic load rating in case upward and downward load is applied N	
	C_a : Basic dynamic load rating in case lateral load is applied N	
	C_{0r} : Basic static load rating in case upward and downward load is applied N	
	C_{0a} : Basic static load rating in case lateral load is applied N	
	F_r : Allowable load in case upward and downward load is applied N	
	F_a : Allowable load in case lateral load is applied N	
	Z : The number of cylindrical rollers incorporated in a roller cage (omit the figures after the decimal fractions for $\frac{Z}{2}$)	
	p : Inter-pitch dimensions of cylindrical rollers mm	
	C_U : Basic dynamic load rating per cylindrical roller N	
	C_{0U} : Basic static load rating per cylindrical roller N	
	F_U : Allowable load per cylindrical roller N	

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

Selection of CRW Series

For selection of CRW series specifications, stroke length and the number of cylindrical rollers, as well as accuracy, load rating and allowable load, must be determined.

Stroke length and the number of cylindrical rollers

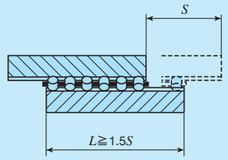
Stroke length of the CRW series affects the way length and the number of cylindrical rollers.
Therefore, select specifications by following the procedure below taking into account the stroke length used and applied load.

❶ Calculation of way length

The way length, which should be 1.5 times longer than the stroke length used, is obtained from the equation below.

$$L \geqq 1.5S \quad \cdots\cdots (13)$$

Where L: Way length mm
S: Stroke length used mm



❷ Calculation of maximum stroke length

Ideally the stroke length used should be less than 80% of the maximum stroke length, which is obtained from the equation below.

$$S_1 \geqq \frac{1}{0.8} S \quad \cdots\cdots (14)$$

Where S_1: Maximum stroke length mm
S: Stroke length used mm

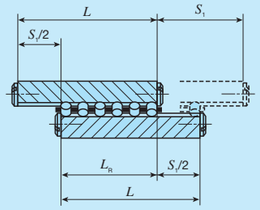
❸ Calculation of cage length and the number of rollers

With the way length and maximum stroke length determined, the allowable length for cage can be calculated.
Calculation method of the cage length varies depending on specifications of end screws and end stopper fitted to the way end.

(1) With standard end screws and end stopper SA (excluding Size 1 series)
The dimensions between rollers at both ends is obtained from the following equation by using a value obtained by subtracting a half of the maximum stroke length from the way length.

$$L_R = L - \frac{S_1}{2} \quad \cdots\cdots (15)$$

Where L_R : Allowable dimensions between rollers at both ends mm
L : Way length mm
S_1 : Maximum stroke length mm



The number of rollers to be incorporated in a roller cage is obtained by the following equation.

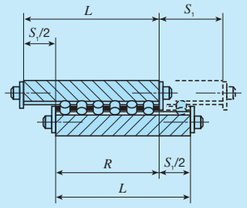
$$Z = \frac{L_R - D_W}{p} + 1 \quad \cdots\cdots (16)$$

Where Z : Number of cylindrical rollers (figures after the decimal fractions are omitted)
L_R : Allowed dimensions between rollers at both ends mm
D_W: Diameter of cylindrical rollers (refer to the dimension table) mm
p : Inter-pitch dimensions of cylindrical rollers (refer to the dimension table) mm

(2) For Size 1 series
The stroke length is regulated by cage and end stopper and the cage length is obtained by the following equation.

$$R = L - \frac{S_1}{2} \quad \cdots\cdots (17)$$

Where R: Allowable cage length mm
L: Way length mm
S_1: Maximum stroke length mm



The number of rollers to be incorporated in a roller cage is obtained by the following equation.

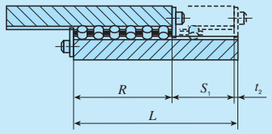
$$Z = \frac{R - 2e}{p} + 1 \quad \cdots\cdots (18)$$

Where Z : Number of cylindrical rollers (figures after the decimal fractions are omitted)
R: Allowable cage length mm
e : End dimension of cage (refer to the dimension table) mm
p: Inter-pitch dimensions of cylindrical rollers (refer to the dimension table) mm

(3) For end stopper SB and wiper seal
The stroke length is regulated by cage and end stopper or wiper seal and the cage length is obtained by the following equation.

$$R = L - t_2 - S_1 \quad \cdots\cdots (19)$$

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 in page Ⅱ-13, and Table 7 in page Ⅱ-14)



The number of rollers to be incorporated in a roller cage is obtained by the equation (18) as with the Size 1 series.

Calculation examples

Form of use ····· CRW 6
Applied load ····· P = 7000 N
Stroke length ····· S = 195 mm

Select specifications for parallel use of Crossed Roller Way under the above conditions (refer to Fig. 26 in page Ⅱ-23).

❶ Calculation of way length

The way length L is calculated from the equation (13).

$$L \geqq 1.5S = 1.5 \times 195 = 292.5$$

Therefore, select L = 300 mm based on the standard length in the dimension table.

❷ Calculation of maximum stroke length

The maximum stroke length S_1 is calculated from the equation (14).

$$S_1 \geqq \frac{1}{0.8} \quad S = \frac{1}{0.8} \times 195 \fallingdotseq 244$$

Allowable dimensions between rollers at both ends L_R is calculated from the equation (15).

$$L_R = L - \frac{S_1}{2} = 300 - \frac{244}{2} = 178$$

❸ Calculation of the number of rollers

The number of cylindrical rollers Z is calculated from the equation (16). However, D_W and p in this form are D_W = 6 mm、p = 9 mm according to the dimension table.

$$Z = \frac{L_R - D_W}{p} + 1 = \frac{178 - 6}{9} + 1 \fallingdotseq 20.1$$

Therefore, it should be Z = 20 by omitting figures after the decimal fractions.

❹ Calculation of allowable load

Allowable load in parallel arrangement F is calculated from equation (9) described in Table 8.2 in page Ⅱ-16. However, allowable load per cylindrical roller F_U is F_U = 769 N according to the dimension table.

$$F = 2\left(\frac{Z}{2}\right) F_U = 2\left(\frac{20}{2}\right) \times 769 = 15380$$

Therefore, allowable load F is larger than applied load P = 7000 N. When allowable load becomes smaller than applied load, it is necessary to increase the number of cylindrical rollers by extending way length, or increase the cylindrical roller diameter.

❺ Determination of specifications

Specifications obtained in accordance with the above is CRW6-300 and the number of cylindrical rollers is 20.

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

Lubrication

Grease is not pre-packed in the CRWG series, CRWG···H series and CRW series, so please perform adequate lubrication as needed.
Both of oil lubrication and grease lubrication are available in the CRWG series, CRWG···H series and CRW series. Generally, oil lubrication should be selected for high speed or low frictional resistance, and grease lubrication for low speed.
For grease lubrication, use of high-quality lithium-soap base grease is recommended. For light load and low speed, apply grease or oil to raceway, rack and pinion gear first and then reapply accordingly. However, the structure as indicated in the Fig. 6 allows for easy reapplication. In addition, since the clearance between ways is small for CRWG···H series, apply grease or oil directly to raceway for re-greasing.

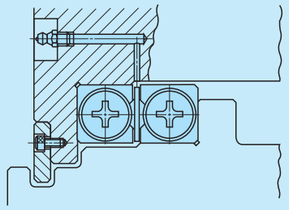


Fig. 6 Example of lubrication system

Dust Protection

Since the CRWG series, CRWG···H series and CRW series are finished with high accuracy, harmful foreign substances such as dust and particles entering into the bearing will cause low life or impaired accuracy. To prevent harmful foreign substances such as dust, particles and water from outside from entering, it is recommended to attach non-contact type labyrinth seal as indicated in Fig. 7, or contact type wiper seal as indicated in the Fig. 8 to both sides.

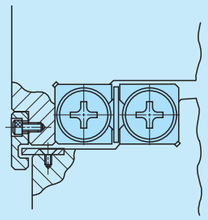


Fig. 7 Example of labyrinth seal

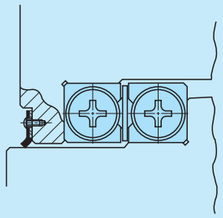


Fig. 8 Example of wiper seal

Precaution for Use

❶ Handling

As the CRWG series, CRWG···H series and CRW series are designed highly precisely, take extra care for handling.
A pinion gear and cylindrical roller are incorporated with the cage for the CRWG series and CRWG···H series. When the cage is dropped or handled roughly, the pinion gear and cylindrical roller may come off. Especially for CRWG···H, grabbing the cylindrical roller may take it off, so be sure to hold the cage body for handling. In addition, do not cut off the cage as doing so may cause pinion gear coming off and breakage of gear joint section.
A rack is incorporated with the way for the CRWG series and CRWG···H series. In operation, take note that the rack may come off when the end screw is removed.
Though the cage for the CRW series may cut off to necessary length, handle it with care not to deform it when cutting.

❷ Accuracy of mounting part

Examples of typical mounting surface processing are shown in Fig. 9.1 and Fig. 9.2.
General processing accuracy of mounting surface is according to Table 9. However, care should be exercised as mounting surface accuracy directly affects running accuracy. Especially when high running accuracy is required, the processing accuracy higher than that indicated in Table 9 is required.

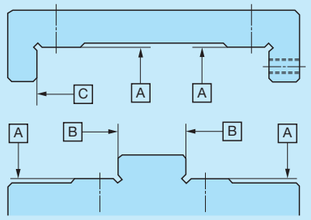


Fig. 9.1 Example of processing of CRWG, CRWG···H and CRW mounting surface

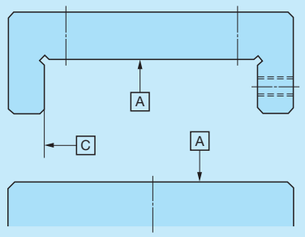


Fig. 9.2 Example of processing of CRWM mounting surface

Table 9 Accuracy of mounting part

Accuracy of A surface	· Directly affects running accuracy. For the flatness of two mounting surfaces on table and bed sides, allowable value approximate to the parallelism indicated in Fig. 1 in page Ⅱ-11 is recommended.
Accuracy of B and C surfaces	· Flatness Affects preload (refer to ❹ Preload adjustment mechanism). Allowable value approximate to the parallelism indicated in Fig. 1 in page Ⅱ-11 is recommended. · Squareness Affects rigidity in preload direction of the mounting part of the CRWG series, CRWG···H series and CRW series. Process to sufficiently high accuracy.

❸ Shape of mounting part

For the opposite corner of the mating reference mounting, it is recommended to have relieved fillet as indicated in Fig. 10.
In addition, a clearance of 0.5 mm or higher should be made between the way and the mating member material.

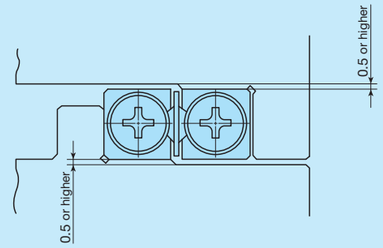


Fig. 10 Shape of mounting part

❹ Preload adjustment mechanism

For use with preload, use the preload adjusting screw as indicated in Fig. 11 as a general way. Preload adjusting screw nominal dimensions and mounting position should be in accordance with the way fixing bolt dimensions and position. Press the center of the way H dimensions.
Preload amount varies depending on operational conditions of your machine and device. However, as excessive preload may lead to short life and damage on the raceway, it is typically ideal to adjust to zero clearance or slight preload state. When accuracy and rigidity are required, use a push plate or tapered jib as indicated in Fig. 12 and Fig. 13, respectively.

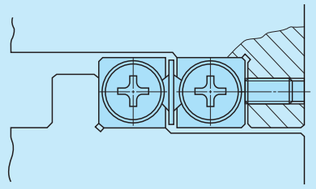


Fig. 11 Example of typical preload adjustment

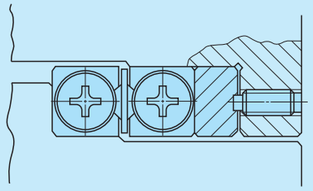


Fig. 12 Example of push plate

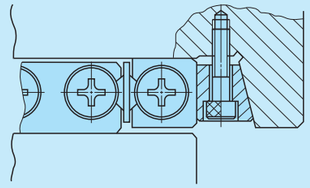


Fig. 13 Example of tapered jib

❺ Operating temperature

As synthetic resin components are used for the CRWG series and CRWG···H series, the maximum operating temperature is 120°C, while it should be lower than 100°C for continuous use. When it exceeds 100°C, contact IKO.
As synthetic resin components are not used for the CRW series, it may be used at high temperature. However, when it exceeds 100°C, contact IKO.

❻ Maximum velocity

Operating velocity should be lower than 50 m/min for the CRWG series and CRWG···H series, and lower than 30 m/min for the CRW series.

❼ Tightening torque for fixing screw

Typical tightening torque for mounting of the CRWG series, CRWG···H series and CRW series is indicated in Table 10. When vibration and shock are large or moment load is applied, it is recommended to fix by using the torque 1.3 times larger than that indicated in the table. In addition, when high running accuracy is required with no vibration and shock, it may be fixed by using torque smaller than that indicated in the table, however, it is recommended to use adhesive agent to fasten the screw, or to use stop bolts.

Table 10 Tightening torque for fixing screw

Bolt size	Tightening torque N · m	
	High carbon steel-made screw	Stainless steel-made screw
M 1.6×0.35	0.20	–
M 2 ×0.4	0.40	0.31
M 3 ×0.5	1.4	1.1
M 4 ×0.7	3.2	2.5
M 5 ×0.8	6.4	5.0
M 6 ×1	10.9	8.5
M 8 ×1.25	26.1	–
M10 ×1.5	51.1	–
M12 ×1.75	88.2	–
M14 ×2	140	–
M16 ×2	215	–

Remark:
When fixing screws used on the table side and bed side are not identical, fasten them all to the smaller tightening torque.

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

Mounting

Mounting of standard type CRW series, CRWG series, and CRWG···H series

Typical mounting structure is shown in Fig. 14. For mounting at this point, generally follow the procedure below.

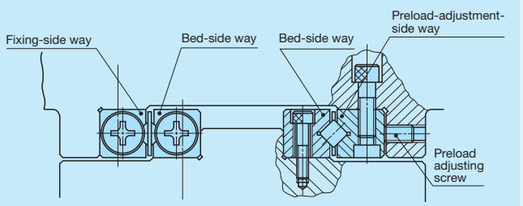


Fig. 14 Mounting example of standard type CRW series, CRWG, and CRWG···H

❶ Preparation for mounting

- Products are packed by set (4 ways and 2 pairs of roller cages). Be careful not to mix with other sets.
- Clean each part with clean wash fluid and then apply rust prevention and lubrication oil. To clean further, remove the end screw first.

❷ Cleanup of mounting surface

- Remove burrs and blemishes on the machine mounting surface with an oil-stone, etc. Be careful about corner groove on the mounting surface, too.
- Wipe off dust and dirt with clean cloth and apply rust prevention and lubrication oil lightly.

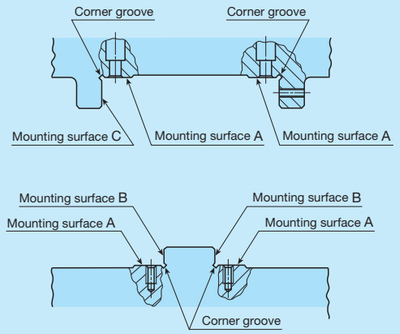


Fig. 15 Mounting surface

❸ Mounting of bed-side way

- Properly align the way with mounting surface and temporarily tighten fixing screws evenly to the tightening torque.
- While making the way sticking to B surface (refer to Fig. 15) tight, fully tighten the screws to the specified torque.
- When high running accuracy is required, fully and evenly tighten them to the specified torque while checking the parallelism of the raceway along the full length of the way.
- Typical tightening torque for fixing screw is according to Table 10 in page Ⅱ-20.

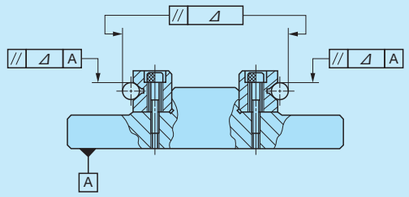


Fig. 16 Accuracy of way mounting

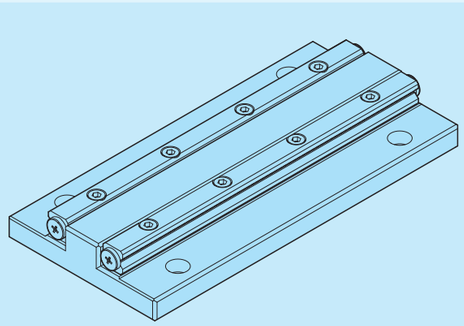


Fig. 17

❹ Operation of table and bed

- Position the roller cages at the stroke end positions of the bed-side way. (Refer to Fig. 18)
- For CRWG and CRWG···H series, mate the pinion gear at the center of the cage and the rack of the way.
- At this point, be careful not to deform the cage.

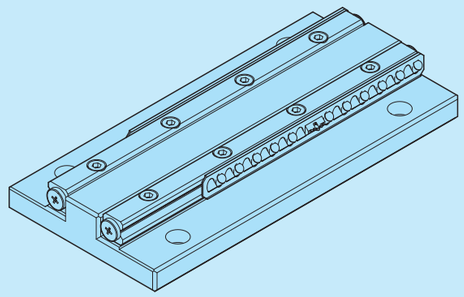


Fig. 18

- Position the table-side way in the stroke end position. (Refer to Fig. 19)
- For CRWG and CRWG···H series, mate the pinion gear at the center of the cage and the rack of the table-side way.

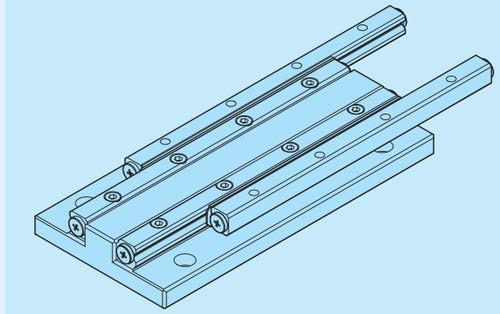


Fig. 19

- Position the table-side way approximately in the stroke center position. (Refer to Fig. 20)

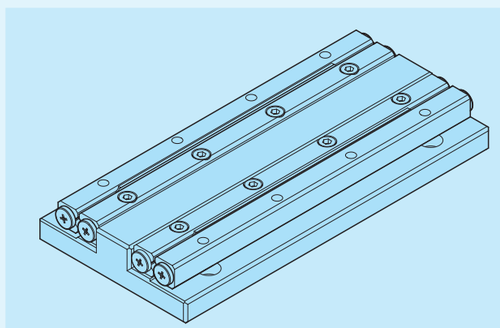


Fig. 20

- Position the table while holding the way to prevent it from moving. (Refer to Fig. 21)

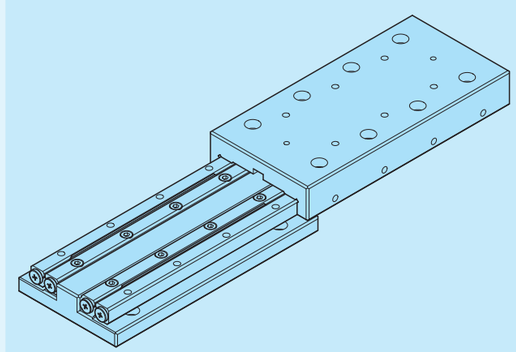


Fig. 21

- Temporarily tighten the table fixing screws. (Refer to Fig. 22)
- While tightly pressing the fixing-side way to C surface (refer to Fig. 15), fully tighten the screws to the specified torque.

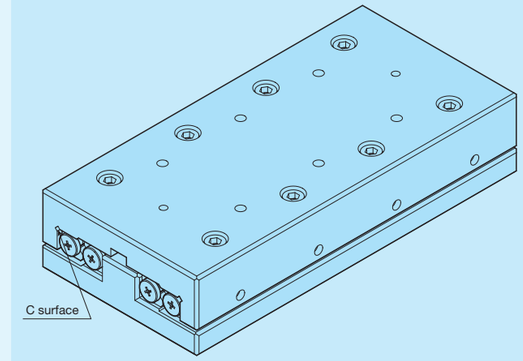


Fig. 22

- Fully stroke the table softly and check that it is within the stroke range used and cylindrical rollers on both ends of the cage do not contact with end screws of the way. If they make contact, take the procedure again. (Refer to Fig. 23)

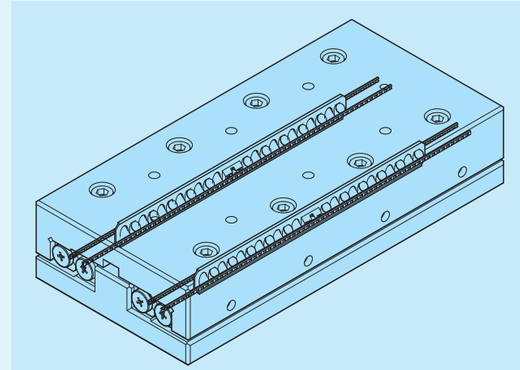


Fig. 23

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

❺ Preload adjustment

- Preload adjustment is performed with fixing screws of the table-side way tightened temporarily.
- Preload adjustment is started from the preload adjusting screw at the center of way length and then both ends in turn.
- While measuring the clearance on the table sides, tighten the preload adjusting screws subsequently until deflection of the dial gauge stops. Measure the tightening torque for preload adjusting screws at this point.
- When adjusting preload adjusting screw near either end, stroke the table softly and check that the cylindrical roller is on the preload adjusting screw section.
- After the above procedure, the clearance becomes zero or in slight preload state, but preload is still not adjusted evenly. With the same procedure again, re-adjust all the preload adjusting screws evenly to the torque previously measured.

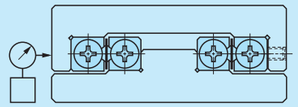


Fig. 24 Example of preload adjustment method

❻ Full tightening of preload-adjustment-side way

- Fixing screws are lightly tightened to even torque. As with preload adjusting screws, temporarily fix them to torque similar to the specified torque in turn from the way center to both ends.
- When tightening fixing screws near either end, stroke the table softly and check that the cylindrical roller is on fixing screw section.
- Finally with the same procedure, fully tighten all the fixing screws evenly to the specified torque.

❼ Check after assembly

- Fully stroke the table softly and check that running is smooth without abnormal noise.
- Measure the table upper and side surfaces with dial gauge or the like and check the running accuracy.

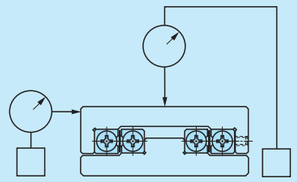


Fig. 25 Accuracy check after assembly

High-accuracy mounting of standard type CRW series

Typical mounting structure is shown in Fig. 26. For mounting at this point, generally follow the procedure below.

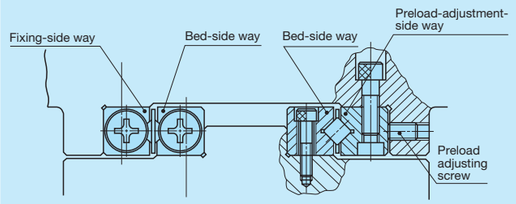


Fig. 26 Mounting example of standard type CRW series

❶ Preparation for mounting

- Products are packed by set (4 ways and 2 pairs of roller cages). Be careful not to mix with other sets.
- Clean each part with clean wash fluid and then apply rust prevention and lubrication oil. To clean further, remove the end screw first.

❷ Cleanup of mounting surface

- Remove burrs and blemishes on the machine mounting surface with an oil-stone, etc. Be careful about corner groove on the mounting surface, too.
- Wipe off dust and dirt with clean cloth and apply rust prevention and lubrication oil lightly.

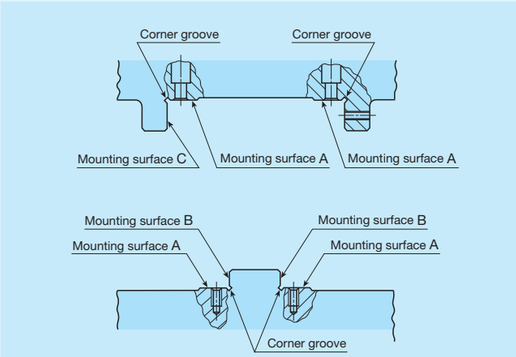


Fig. 27 Mounting surface

❸ Mounting of bed-side way

- Properly align the way with mounting surface and temporarily tighten fixing screws evenly to the tightening torque.
- While making the way sticking to B surface (refer to Fig. 27) tight, fully tighten the screws to the specified torque.
- When high running accuracy is required, fully and evenly tighten them to the specified torque while checking the parallelism of the raceway along the full length of the way.
- Typical tightening torque for fixing screw is according to Table 10 in page Ⅱ-20.

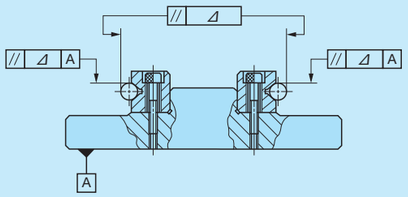


Fig. 28 Accuracy of way mounting

❹ Mounting of table-side way

- Properly align the fixing-side way with mounting surface and temporarily tighten fixing screws evenly to the tightening torque.
- While making the fixing-side way sticking to C surface tight, fully tighten the screws to the specified torque.
- Set back the preload adjusting screws in advance, make the preload-adjusting-side way sticking to the mounting surface, and then temporarily tighten fixing screws lightly to the even torque.

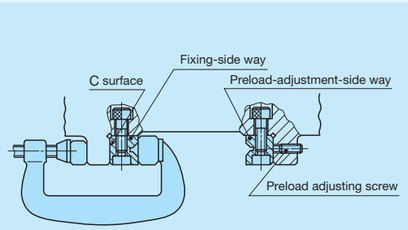


Fig. 29 Mounting of table-side way

❺ Operation of table and bed

- Make alignment of the position in height and cross direction so that the roller cage can be inserted between the table-side way and bed-side way.
- Carefully insert the roller cage and assembly it at approximate center of the way length. At this point, be careful not to deform the cage.
- Mount end screws and end stopper of each way.
- Push the entire table against the preload adjusting screws and tighten the preload adjusting screws to make temporary adjustment until the clearance between ways becomes zero.
- Fully stroke the table softly and correct the roller cage position to the center.

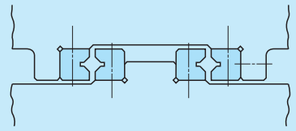


Fig. 30 Position alignment before operation

❻ Preload adjustment

- Preload adjustment is performed with fixing screws of the preload-adjusting-side way tightened temporarily.
- Preload adjustment is started from the preload adjusting screw at the center of way length and then both ends in turn.
- While measuring the clearance on the table sides, tighten the preload adjusting screws subsequently until deflection of the dial gauge stops. Measure the tightening torque for preload adjusting screws at this point.
- When adjusting preload adjusting screw near either end, stroke the table softly and check that the cylindrical roller is on the preload adjusting screw section.
- After the above procedure, the clearance becomes zero or in slight preload state, but preload is still not adjusted evenly. With the same procedure again, re-adjust all the preload adjusting screws evenly to the torque previously measured.

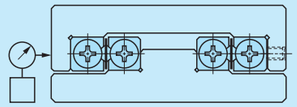


Fig. 31 Example of preload adjustment method

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

❼ Full tightening of preload-adjustment-side way
- Fixing screws are lightly tightened to even torque. As with preload adjusting screws, temporarily fix them to torque similar to the specified torque in turn from the way center to both ends.
- When tightening fixing screws near either end, stroke the table softly and check that the cylindrical roller is on fixing screw section.
- Finally with the same procedure, fully tighten all the fixing screws evenly to the specified torque.

❽ Check after assembly
- Fully stroke the table softly and check that running is smooth without abnormal noise.
- Measure the table upper and side surfaces with dial gauge or the like and check the running accuracy.

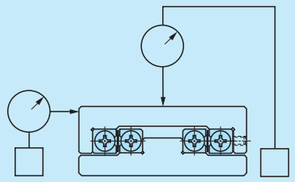


Fig. 32 Accuracy check after assembly

Mounting of module type CRW series

Typical mounting structure of CRWM is shown in Fig. 33. For mounting at this point, generally follow the procedure below.

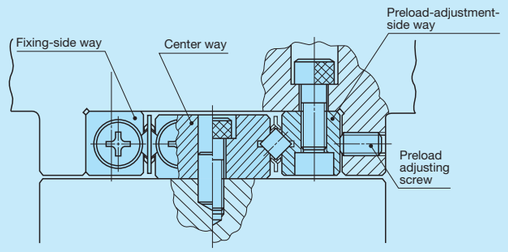


Fig. 33 Example of mounting of CRWM

❶ Preparation for mounting
- Crossed Roller Way CRWM is packed by set (1 center way, 2 ways and 2 pairs of roller cages). Be careful not to mix with other sets.
- Remove end screws and end stopper, clean up each part with clean wash fluid and then apply rust prevention and lubrication oil.

❷ Cleanup of mounting surface
- Remove burrs and blemishes on the machine mounting surface with an oil-stone, etc. Be careful about corner groove on the mounting surface, too.
- Rust prevention and lubrication oil should be applied after cleaning each part with clean wash fluid. Remove end screws and end stopper if additional cleaning is necessary.

❸ Mounting of center way
- Roughly align the center way to the mounting surface and lightly fix it with fixing screws.
- While measuring mounting parallelism of the center way and raceway to the reference surface of running parallelism for position correction, temporarily tighten the fixing screws to the even tightening torque.
- Evenly tighten all the fixing screws to the specified tightening torque.

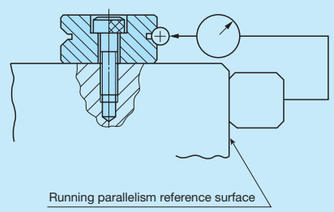


Fig. 34 Mounting accuracy check for center way

❹ Processing of dowel pin hole
- When dowel pins are used, machine holes on the bed in alignment with dowel pin holes near either end of the center way.
- Dowel pin hole of the center way is finished for H7. Finish bed holes in the same way.
- Diameter and its allowance of dowel pin hole of the center way vary depending on the dimension table.
- Eliminate cutting chips and clean up again as necessary. When machines for mounting of the center way are large, clean them up with the center way removed and then reassemble.
- Load the dowel pins and check the parallelism of the reference surface of the running parallelism and the raceway of the center way again.

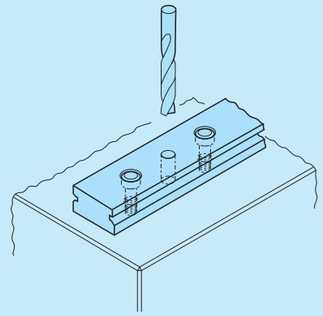


Fig. 35 Machining of dowel pin hole

❺ Operation of table and bed
- Complies with mounting of standard type CRW series, CRWG series, and CRWG···H series.

❻ Preload adjustment
- Complies with mounting of standard type CRW series, CRWG series, and CRWG···H series.

❼ Full tightening of preload-adjustment-side way
- Complies with mounting of standard type CRW series, CRWG series, and CRWG···H series.

❽ Check after assembly
- Complies with mounting of standard type CRW series, CRWG series, and CRWG···H series.

Mating marks module type CRW series

CRWM has mating marks to ensure the best running accuracy after mounting based on the parallelism measurement result of reference mounting surface and raceway. When assembling the ways, align the mating marks of ways with the same end side as indicated in Fig. 36.

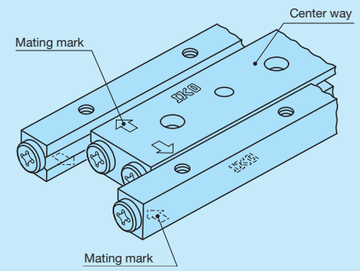
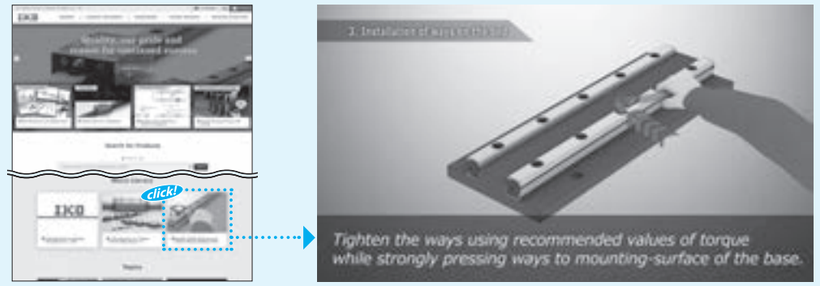


Fig. 36 Mating marks of CRWM

Instructional Mounting Videos

Instructional videos explaining the mounting methods for the Crossed Roller Way series are available on the IKO website. Please refer to them during the mounting process if needed.

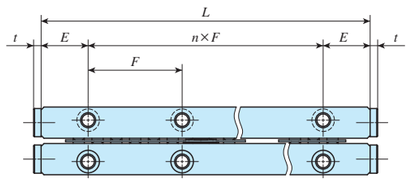
https://www.ikont.co.jp/eg/

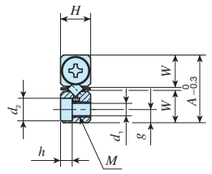


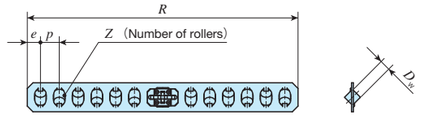
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way

Shape	CRWG			
Size	2	3	4	6







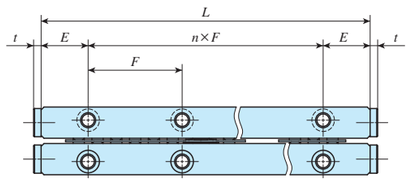
Identification number	Mass (Ref.) Way (1) g	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R		Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Maximum stroke length mm	Basic dynamic load rating C(3) N	Basic static load rating C_0(3) N	Allowable load F(3) N
CRWG 2- 30	6.53	0.38			30(1×15)			25.6		4										9	913	1 180	392
CRWG 2- 45	9.53	0.72			45(2×15)			41.6		8										7	1 570	2 350	783
CRWG 2- 60	12.5	0.88			60(3×15)			49.6		10										21	1 860	2 940	979
CRWG 2- 75	15.5	1.22			75(4×15)			65.6		14										19	2 420	4 110	1 370
CRWG 2- 90	18.5	1.39	12	6	90(5×15)	7.5	2	73.6		16	4	2.8	5.5	2.5	M3	2.55	4.4	2	1.5	33	2 680	4 700	1 570
CRWG 2-105	21.5	1.72			105(6×15)			89.6		20										31	3 190	5 880	1 960
CRWG 2-120	24.5	1.89			120(7×15)			97.6		22										45	3 440	6 460	2 150
CRWG 2-135	27.5	2.22			135(8×15)			113.6		26										43	3 910	7 640	2 550
CRWG 2-150	30.5	2.39			150(9×15)			121.6		28										57	4 150	8 230	2 740
CRWG 3- 50	22.8	1.69			50(1×25)			42		6										13	2 740	3 660	1 220
CRWG 3- 75	33.3	2.71			75(2×25)			62		10										23	4 080	6 090	2 030
CRWG 3-100	43.8	3.72			100(3×25)			82		14										33	5 300	8 530	2 840
CRWG 3-125	54.4	4.74			125(4×25)			102		18										43	6 440	11 000	3 660
CRWG 3-150	64.9	5.75	18	8	150(5×25)	12.5	3	122		22	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	53	7 530	13 400	4 470
CRWG 3-175	75.4	6.77			175(6×25)			142		26										63	8 570	15 800	5 280
CRWG 3-200	85.9	7.78			200(7×25)			162		30										73	9 580	18 300	6 090
CRWG 3-225	96.4	8.80			225(8×25)			182		34										83	10 600	20 700	6 910
CRWG 3-250	107	9.81			250(9×25)			202		38										93	11 500	23 200	7 720

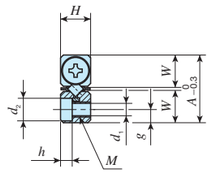
Notes (1) The value shows the mass of a piece of way.
(2) The value shows the mass of a roller cage.
(3) This is the value when a combination of four ways and two roller cages is used in parallel arrangement.

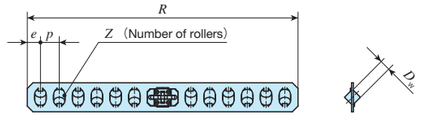
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way

Shape	CRWG			
Size	2	3	4	6







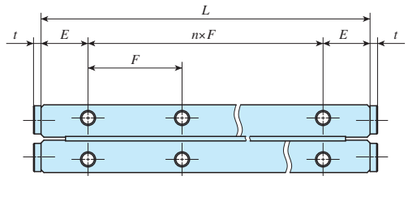
Identification number	Mass (Ref.) Way (1) g	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R		Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Maximum stroke length mm	Basic dynamic load rating C(3) N	Basic static load rating C_0(3) N	Allowable load F(3) N
CRWG 4- 80	59.6	9.70	22	11	80(1×40)	20	4	73		8	7	5	10	4.5	M5	4.3	7.5	4.1	2	14	6 690	9 400	3 130
CRWG 4-120	88.0	12.0			120(2×40)			101		12										38	9 180	14 100	4 700
CRWG 4-160	116	14.3			160(3×40)			129		16										62	11 500	18 800	6 270
CRWG 4-200	145	16.7			200(4×40)			157		20										86	13 700	23 500	7 830
CRWG 4-240	173	20.1			240(5×40)			199		26										82	16 700	30 600	10 200
CRWG 4-280	201	22.5			280(6×40)			227		30										106	18 700	35 300	11 800
CRWG 4-320	230	24.8			320(7×40)			255		34										130	20 600	40 000	13 300
CRWG 6-100	147	12.0	31	15	100(1×50)	25	6	75		6	9	6	14	6	M6	5.3	9.5	5.2	3	48	11 200	13 800	4 610
CRWG 6-150	216	22.6			150(2×50)			129		12										40	19 300	27 700	9 230
CRWG 6-200	285	29.7			200(3×50)			165		16										68	24 100	36 900	12 300
CRWG 6-250	353	36.8			250(4×50)			201		20										96	28 700	46 100	15 400
CRWG 6-300	422	43.9			300(5×50)			237		24										124	33 000	55 400	18 500
CRWG 6-350	491	51.0			350(6×50)			273		28										150	37 200	64 600	21 500

Notes (1) The value shows the mass of a piece of way.
(2) The value shows the mass of a roller cage.
(3) This is the value when a combination of four ways and two roller cages is used in parallel arrangement.

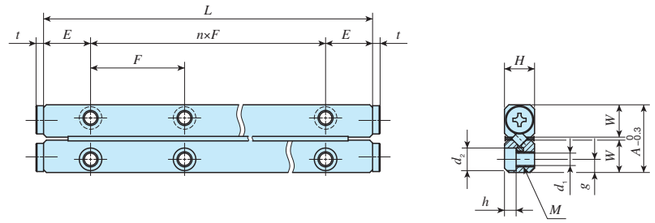
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way H

Shape	CRWG···H
Size	1 / 2 / 3 / 4



CRWG 1···H



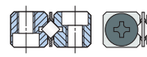
CRWG···H

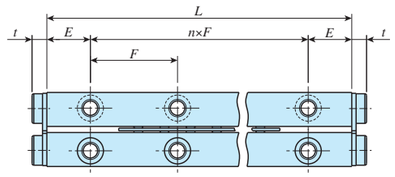
Identification number	Mass (Ref.) Way (1) g	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R	Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Maximum stroke length mm	Basic dynamic load rating C(3) N	Basic static load rating C_0(3) N	Allowable load F(3) N
CRWG 1- 20H	2.05	0.16	8.5	4	20(1×10)	5	1.5	16.5	6	2	1.25	3.9	1.7	M1.6	–	–	–	0.7	3	525	717	239
CRWG 1- 30H	3.07	0.25			30(2×10)			24.5	10										7	782	1 200	398
CRWG 1- 40H	4.10	0.30			40(3×10)			28.5	12										19	901	1 430	478
CRWG 1- 50H	5.13	0.39			50(4×10)			36.5	16										23	1 130	1 910	638
CRWG 1- 60H	6.15	0.44			60(5×10)			40.5	18										35	1 230	2 150	717
CRWG 1- 70H	7.18	0.53			70(6×10)			48.5	22										39	1 440	2 630	877
CRWG 1- 80H	8.21	0.67			80(7×10)			61.5	28		1.75								35	1 740	3 350	1 120
CRWG 2- 30H	6.53	0.40	12	6	30(1×15)	7.5	2	21.7	6	2.5	1.6	5.5	2.5	M3	2.55	4.4	2	1.5	12	1 090	1 500	500
CRWG 2- 45H	9.53	0.73			45(2×15)			36.7	12										12	1 860	3 000	1 000
CRWG 2- 60H	12.5	0.95			60(3×15)			46.7	16										22	2 330	4 000	1 330
CRWG 2- 75H	15.5	1.27			75(4×15)			61.7	22										22	2 980	5 500	1 830
CRWG 2- 90H	18.5	1.38			90(5×15)			66.7	24										42	3 190	6 000	2 000
CRWG 2-105H	21.5	1.71			105(6×15)			81.7	30										42	3 790	7 500	2 500
CRWG 2-120H	24.5	1.93			120(7×15)			91.7	34										52	4 180	8 500	2 830
CRWG 2-135H	27.5	2.26			135(8×15)			106.7	40										52	4 740	10 000	3 330
CRWG 2-150H	30.5	2.48			150(9×15)			117.5	44		2								62	5 100	11 000	3 670
CRWG 3- 50H	22.8	1.58	18	8	50(1×25)	12.5	3	41.8	8	3.8	2.5	8.6	3.5	M4	3.3	6	3.1	2	9	4 260	6 490	2 160
CRWG 3- 75H	33.7	2.28			75(2×25)			57	12										29	5 840	9 730	3 240
CRWG 3-100H	44.7	3.33			100(3×25)			79.8	18										33	8 000	14 600	4 870
CRWG 3-125H	55.7	4.02			125(4×25)			95	22										53	9 350	17 800	5 950
CRWG 3-150H	66.7	5.07			150(5×25)			117.8	28										57	11 300	22 700	7 570
CRWG 3-175H	77.6	5.69			175(6×25)			133	32										77	12 500	26 000	8 650
CRWG 3-200H	88.6	6.81			200(7×25)			155.8	38										81	14 300	30 800	10 300
CRWG 3-225H	99.6	7.85			225(8×25)			178.6	44										86	16 000	35 700	11 900
CRWG 3-250H	111	8.55			250(9×25)			193.8	48										105	17 100	38 900	13 000
CRWG 4- 80H	61.4	4.35	22	11	80(1×40)	20	4	59.4	10	4.8	3	10.6	4.5	M5	4.3	7.5	4.1	2	33	10 500	17 100	5 690
CRWG 4-120H	92.7	6.80			120(2×40)			88.2	16										55	15 200	27 300	9 100
CRWG 4-160H	124	9.25			160(3×40)			117	22										78	19 500	37 500	12 500
CRWG 4-200H	155	11.7			200(4×40)			145.8	28										100	23 500	47 800	15 900
CRWG 4-240H	186	15.0			240(5×40)			184.2	36										103	28 600	61 400	20 500
CRWG 4-280H	218	17.4			280(6×40)			213	42										126	32 200	71 700	23 900
CRWG 4-320H	249	19.9			320(7×40)			241.8	48										148	35 700	81 900	27 300

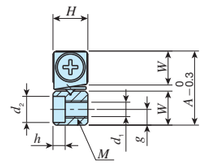
Notes (1) The value shows the mass of a piece of way.
(2) The value shows the mass of a roller cage.
(3) This is the value when a combination of four ways and two roller cages is used in parallel arrangement.

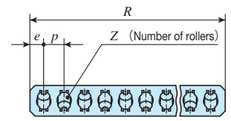
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Standard type					
Shape	CRW CRW…SL				
Size	1	2	3	4	6
	9	12	15	18	24









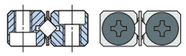
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Nominal dimensions mm Boundary dimensions A	H	$L(n\times F)$	E	Dimension of roller cage D_w	R		Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 1- 20	0.12	0.38	8.5	4	20 (1×10)	5	1.5	16.5		5	3	2.25	3.9	1.8	M2	1.65	3	1.4	1.7	125	120	39.8
CRW 1- 20 SL																						
CRW 1- 30					30 (2×10)			25.5		8												
CRW 1- 30 SL																						
CRW 1- 40					40 (3×10)			31.5		10												
CRW 1- 40 SL																						
CRW 1- 50					50 (4×10)			37.5		12												
CRW 1- 50 SL																						
CRW 1- 60					60 (5×10)			43.5		14												
CRW 1- 60 SL																						
CRW 1- 70					70 (6×10)			52.5		17												
CRW 1- 70 SL																						
CRW 1- 80					80 (7×10)			61.5		20												
CRW 1- 80 SL																						

Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

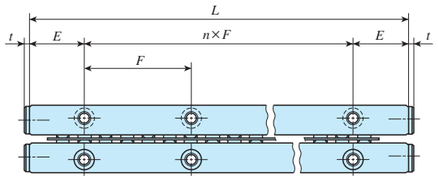
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

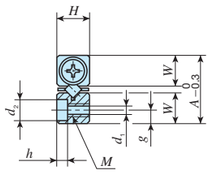
Standard type

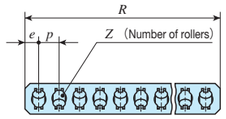
Shape: **CRW**
CRW···SL



Size	1	2	3	4	6
	9	12	15	18	24







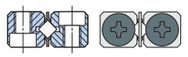
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Z	p	e	Mounting dimensions W	Mounting dimensions g	Mounting dimensions M	Mounting dimensions d_1	Mounting dimensions d_2	Mounting dimensions h	Mounting dimensions 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	0.24	0.98	12	6	30 (1×15)	7.5	2	29.6	7	4	2.8	5.5	2.5	M3	2.55	4.4	2	1.5	293	294	97.9
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					105 (6×15)			89.6	22												
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																					

Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

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

Standard type

Shape: **CRW**
CRW…SL



Size	1	2	3	4	6
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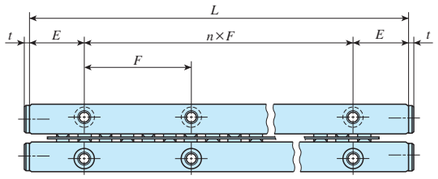
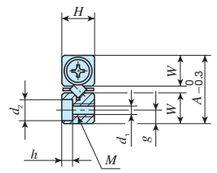
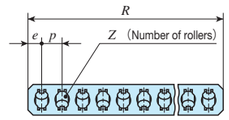






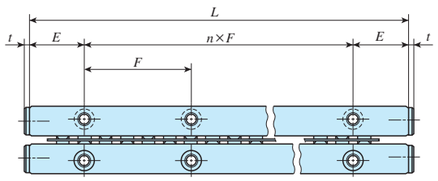
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 3- 50					50 (1×25)			42	8												
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	0.50	2.96	18	8	175 (6×25)	12.5	3	142	28	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	638	609	203
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																					

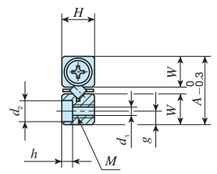
Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

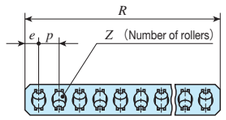
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Standard type

Shape	CRW CRW···SL
Size	1 2 3 **4** 6 9 12 15 18 24







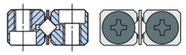
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 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																					

Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

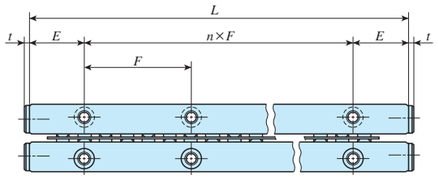
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

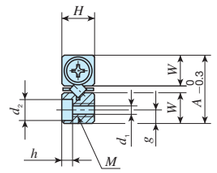
Standard type

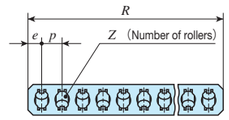
Shape: CRW, CRW···SL



Size	1	2	3	4	6
	9	12	15	18	24







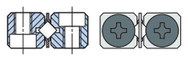
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 6-100	1.57	20.3	31	15	100 (1×50)	25	6	84	9	9	6	14	6	M6	5.3	9.5	5.2	3	2 570	2 310	769
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					350 (6×50)			282	31												
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																					

Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

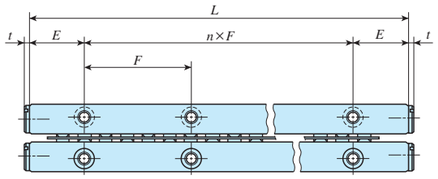
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

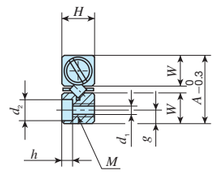
Standard type

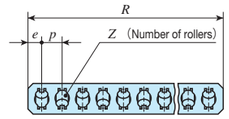
Shape: **CRW**



Size					
1	2	3	4	6
9	**12**	15	18	24







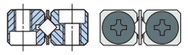
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 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												

Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

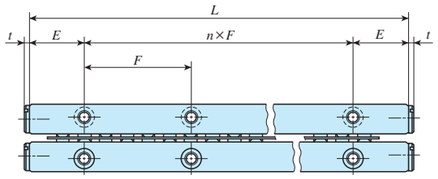
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

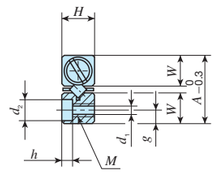
Standard type

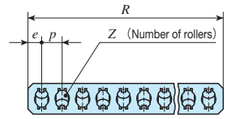
Shape: CRW



Size	1	2	3	4	6
	9	12	15	18	24



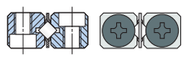


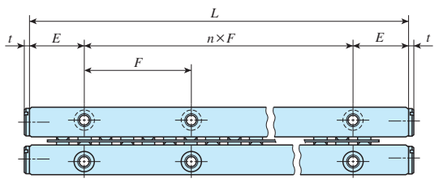


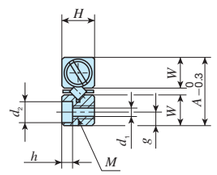
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 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												

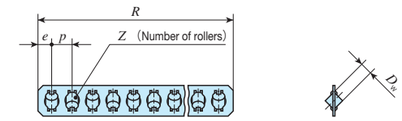
Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.
Remark: The identification numbers with * are our semi-standard items.

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

Standard type					
Shape	CRW 				
Size	1	2	3	4	6
	9	12	15	18	24





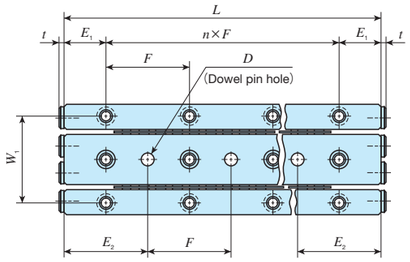


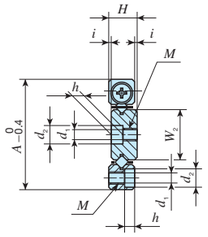
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Nominal dimensions mm Boundary dimensions A	H	$L(n\times F)$	E	Dimension of roller cage D_w	R	Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRW 24- 400*	20.6	1 060	110	55	400 (3×100)	50	24	336	9	36	24	51.5	24	M16	14.5	22.5	14.2	5	69 600	63 500	21 200
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*					800 (7×100)			660	18												
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												

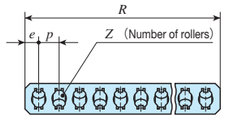
Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.
Remark: The identification numbers with * are our semi-standard items.

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

Module type				
Shape	CRWM			
Size	1	2	3	4







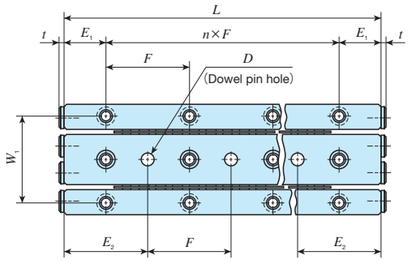
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions i	Dimension of roller cage Dw	Dimension of roller cage R	Dimension of roller cage Z	Nominal dimensions and tolerances mm p	e	Mounting dimensions W1	W2	E1	E2	M	d1	d2	h	D	Dim. D tolerance	t	Basic dynamic load rating CU(3) N	Basic static load rating C0U(3) N	Allowable load FU(3) N
CRWM 1- 20	0.49	0.38	17	4.5	20 (1×10)	0.5	1.5	16.5	5	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- 30					30 (2×10)			25.5	8																
CRWM 1- 40					40 (3×10)			31.5	10																
CRWM 1- 50					50 (4×10)			37.5	12																
CRWM 1- 60					60 (5×10)			43.5	14																
CRWM 1- 70					70 (6×10)			52.5	17																
CRWM 1- 80					80 (7×10)			61.5	20																
CRWM 2- 30	0.99	0.98	24	6.5	30 (1×15)	0.5	2	29.6	7	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- 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					105 (6×15)			89.6	22																
CRWM 2-120					120 (7×15)			101.6	25																
CRWM 2-135					135 (8×15)			113.6	28																
CRWM 2-150					150 (9×15)			125.6	31																
CRWM 2-165					165 (10×15)			137.6	34																
CRWM 2-180					180 (11×15)			149.6	37																

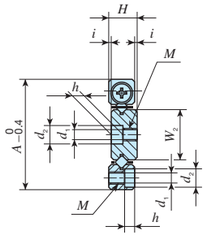
Notes (1) The value shows the total mass per meter of a set of three ways.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

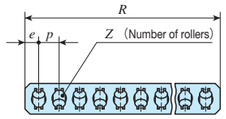
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Module type

Shape	CRWM			
Size	1	2	3	4







Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions i	Dimension of roller cage D_w	Dimension of roller cage R	Dimension of roller cage Z	Nominal dimensions and tolerances mm p	e	Mounting dimensions W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Dim. 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					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	5	3.5	29	16.6	12.5	25	M4	3.3	6	3.1	4	+0.012 0	2	638	609	203
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	7	5	35	20	20	40	M5	4.3	7.5	4.1	5	+0.012 0	2	1 230	1 180	392
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																

Notes (1) The value shows the total mass per meter of a set of three ways.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

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

Anti-Creep Cage Crossed Roller Way Unit

CRWUG

Points

● High rigidity and high accuracy

1 Since CRWG or CRW with excellent load balance is incorporated with grounded high rigidity table and bed, elastic deformation is small for load in every direction, leading to highly accurate and stable linear motion.

● Solves cage creep issue

2 As CRWG with cage creep proof function is incorporated with CRWUG, there is no risk of cage creep and it works reliable in high-speed and high-tact operation, or in vertical axis.

● Wide variation

3 Three types of CRWU with different sectional shapes are available with many size variations. You can select an optimal product for the specifications of your machine and device.

● Easy mounting

4 Mounting surface is precisely grounded. In addition, female screws and boring are used for table and bed, respectively to ensure appropriate preload state. Therefore, highly reliable linear motion can be achieved just by fitting them to the machine and device.

Identification Number and Specification

Example of an identification number

The specification of CRWUG and CRWU series is indicated by the identification number. Indicate the identification number, consisting of a model code, width, and length for each specification to apply.

	①	②		③	①
CRWUG series	CRWUG	60	–	130	
CRWU series	CRWU	60	–	130	R

① **Model** — Model code Page Ⅱ－57

② **Width**

③ **Length**

Dimensions Page Ⅱ－57

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

Identification Number and Specification

1 Model

Anti-Creep Cage Crossed Roller Way Unit (CRWUG series)	: CRWUG
Crossed Roller Way Unit (CRWU series)	: CRWU : CRWU···R : CRWU···RS

For applicable models and width, see Fig. 1.

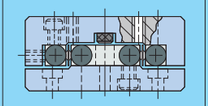
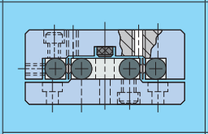
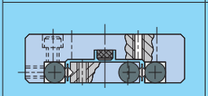
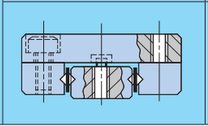
2 Width

20, 30, 40, 60, 80, 100, 145 — Indicate the table width in mm.
For applicable models and width, see Table 1.

3 Length

Indicate the table length in mm.

Table 1 Models and width of CRWUG series and CRWU series

Series	Shape	Model	Characteristics	Width 20	30	40	60	80	100	145
CRWUG		CRWUG	A unit with cage creep proof function that realizes complete compatibility with CRWU in mounting dimensions. As external dimensions are the same, this can replace machine or device using CRWU without changing mounting dimensions, as well as new applications.	–	–	○	○	○	–	–
CRWU		CRWU	An ordinary type unit to be fixed to machine or device with bolts as it is, thanks to table and bed mounted to high accuracy.	–	○	○	○	○	○	○
		CRWU···R	Low height unit without CRWU bed. Linear motion with stable accuracy and high rigidity can be achieved for load in every direction.	–	○	○	○	○	○	○
		CRWU···RS	A compact and light unit of very simple structure. This may be used as a high-accuracy unit with small motion inertia by moving the center way.	○	○	○	–	–	–	–

Load Rating and Allowable Load

Indicate values for down direction for load rating of CRWUG and CRWU series.
In addition, the upward and lateral load rating is the same as downward load rating.
For more information on the definition of load rating and calculated load, see page Ⅲ-3.

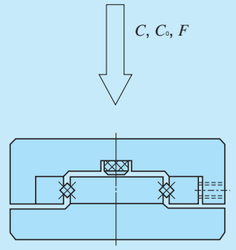


Fig. 1 Direction of load rating

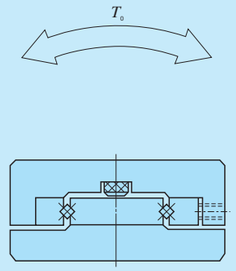


Fig. 2 Direction of static moment rating

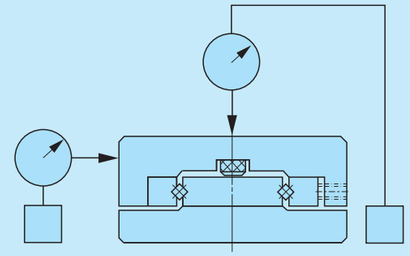
Allowable load

Allowable load refers to load of smooth rolling motion on contact surface to which maximum contact stress is applied and the sum of whose elastic deformation of rolling elements and raceway is small.
Therefore, use applied load within the allowable load range if very smooth rolling motion and high accuracy are required.

Accuracy

Accuracy of CRWUG series and CRWU series is indicated in Table 2. Parallelism at the center of the table represents parallelism of height when the table is stroked.
Parallelism at the side of the table represents parallelism of the side (preload adjusting screw side) when the table is stroked.
In addition, though allowance of unit height H is designed as ±0.1 mm, units with height variation of less than 0.01 mm among multiple units are also available. When special accuracy is needed, contact IKO.

Table 2 Running accuracy



unit: μm

Unit length L mm Over	Incl.	Parallelism at the table center	Parallelism on the 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

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

Lubrication

Grease is not pre-packed in the CRWUG series and CRWU series, so please perform adequate lubrication as needed.
Both of oil lubrication and grease lubrication are available in the CRWUG series and CRWU series. Generally, oil lubrication should be selected for high speed or low frictional resistance, and grease lubrication for low speed.
For grease lubrication, use of high-quality lithium-soap base grease is recommended.

Dust Protection

Since the CRWUG series and CRWU series are finished with high accuracy, harmful foreign substances such as dust and particles entering into the bearing will cause low life or impaired accuracy. For applications in other than clean environment, cover the entire unit with a protective case, etc. to prevent harmful foreign substances such as dust, particles and water from outside from entering.

Precaution for Use

❶ Handling

As the CRWUG series and CRWU series are designed highly precisely, take extra care for handling.
Cage of the CRWUG series has a pinion gear incorporated. When the cage is dropped or handled roughly, the pinion gear may come off. In addition, do not cut off the cage as doing so may cause pinion gear coming off and breakage of gear joint section.
Way of the CRWUG series has a rack incorporated. In operation, take note that the rack may come off when the end screw is removed.
For the CRWU series, the cage may be deviated from the right position due to offset load or irregular and high-velocity motion, etc. Fully stroke it once in certain operating time or certain number of reciprocating motion to correct the cage position.

❷ Preload re-adjustment

Preload amount of the CRWUG series and CRWU series is adjusted to zero or slight preload state, so they may be used as they are.
Preload amount of the CRWUG series, CRWU, and CRWU··· R may be re-adjusted by following the procedure below.
Preload adjustment is started from the preload adjusting screw at the center of way length and then both ends in turn, with fixing screws of the preload adjusting side way temporarily fixed.
While measuring the clearance on the table sides, tighten the preload adjusting screws subsequently until deflection of the dial gauge stops. Measure the tightening torque for preload adjusting screws at this point.
When adjusting preload adjusting screw near either end, stroke the table softly and check that the cylindrical roller is on the preload adjusting screw section.
After the above procedure, the clearance becomes zero or in slight preload state, but preload is still not adjusted evenly. With the same procedure again, re-adjust all the preload adjusting screws evenly to the torque previously measured.

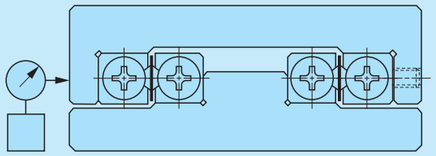


Fig. 3 Example of preload adjustment method

❸ Operating temperature

As synthetic resin components are used for the CRWUG series, the maximum operating temperature is 120°C, while it should be lower than 100°C for continuous use. When it exceeds 100°C, contact IKO.
As synthetic resin components are not used for the CRWU series, it may be used at high temperature. However, when it exceeds 100°C, contact IKO.

❹ Maximum velocity

Operating velocity should not exceed 30 m/min during operation.

❺ Tightening torque for fixing screw

Table 3 shows typical tightening torque for mounting CRWUG Series and CRWU Series. When vibration and shock are large or moment load is applied, it is recommended to fix by using the torque 1.3 times larger than that indicated in the table. In addition, when high running accuracy is required with no vibration and shock, it may be fixed by using torque smaller than that indicated in the table, however, it is recommended to use adhesive agent to fasten the screw, or to use stop bolts.

Table 3 Tightening torque for fixing screw

Bolt size	Tightening torque N · m
M 2 ×0.4	0.40
M 2.5×0.45	0.80
M 3 ×0.5	1.4
M 4 ×0.7	3.2
M 5 ×0.8	6.4
M 6 ×1	10.9
M 8 ×1.25	26.1

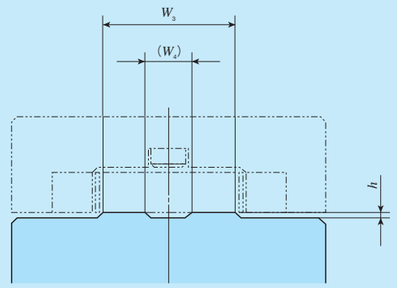
❻ Dowel pin hole of CRWU···R

A dowel pin hole is machined on the center way of the CRWU···R. When a dowel pin is used, machine a hole on the mounting surface of the machine after mounting of the center way.
Refer to the dimension table for diameter and its tolerances of dowel pin hole of the center way.

❼ Mounting part dimensions of CRWU···R

Not to allow the table to interfere with the mounting surface, it is necessary to set mounting surface height referring to the dimensions H_1 and H in the dimension table.
Example bed mounting dimensions are indicated in Table 4.

Table 4 Example of mounting dimensions of CRWU···R bed



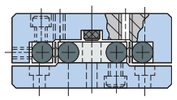
unit: μm

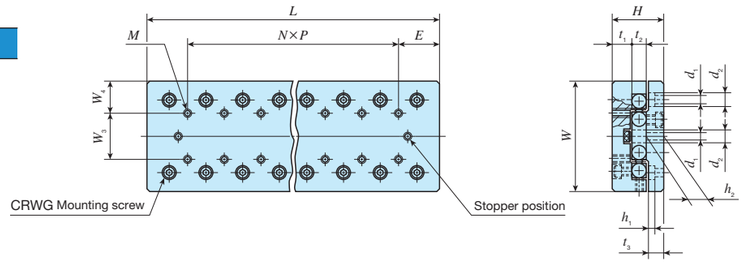
Identification number	h (minimum)	W_3	W_4
CRWU 30 ···R	0.5	13	–
CRWU 40-35R	0.5	18	–
CRWU 40 ···R		13	
CRWU 60 ···R	0.5	26.5	–
CRWU 80 ···R	0.5	38	16
CRWU100 ···R	0.5	42	14
CRWU145 ···R	1.0	68.5	28.5

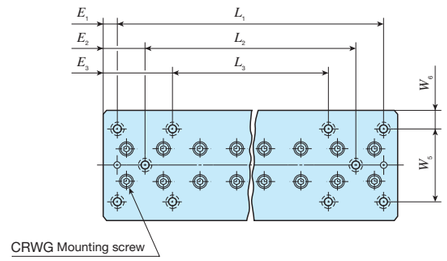
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way Unit

Shape	CRWUG
Size	40 / 60 / 80



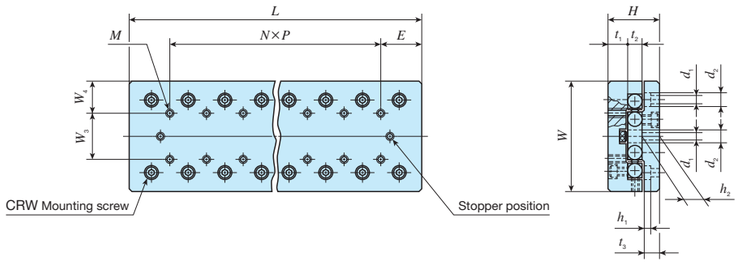


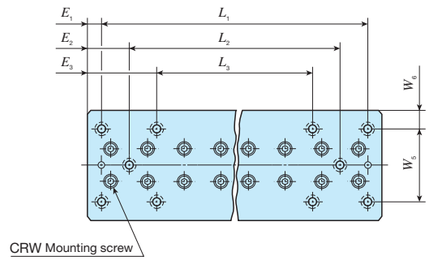


Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm									Table mounting dimensions mm						Bed mounting dimensions mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	t_1	t_2	t_3	Maximum stroke length	W_3	W_4	$N\times P$	E	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	C	C_0	F	T_0
	kg																												N	N	N	N · m
CRWUG 40- 35	0.21	40	±0.1	21	±0.1	35	8	6	6.5	18	15	12.5	–	17.5	M3		30	5	25	5.0	–	–	–	–	3.5	6	3.5	7	913	1 180	392	10.6
CRWUG 40- 50	0.30					50	7	8	5.5	30			1×15						40				–	–			3.2	6	2 000	2 440	813	17.7
CRWUG 40- 65	0.36					65				40			2×15						55										2 000	2 440	813	17.7
CRWUG 40- 80	0.47					80				50			3×15						70				40	20					3 430	4 880	1 630	35.3
CRWUG 40- 95	0.53					95				60			4×15						85				55						2 740	3 660	1 220	26.5
CRWUG 40-110	0.63					110				70			5×15						100				70						4 080	6 090	2 030	44.2
CRWUG 40-125	0.70					125				80			6×15						115				85						4 080	6 090	2 030	44.2
CRWUG 60- 55	0.67	60	±0.1	28	±0.1	55	10.5	8	9	30	25	17.5	–	27.5	M4		40	10	35	10.0	–	–	–	–	4.5	7.5	4.5	9.5	2 000	2 440	813	35.3
CRWUG 60- 80	0.99					80				45			1×25						60										3 430	4 880	1 630	70.7
CRWUG 60-105	1.28					105				60			2×25						85				–	–					4 700	7 310	2 440	106
CRWUG 60-130	1.57					130				75			3×25						110										5 300	8 530	2 840	124
CRWUG 60-155	1.86					155				90			4×25						135		85	35							6 440	11 000	3 660	159
CRWUG 80- 85	1.78	80	±0.1	35	±0.1	85	13	11	10.5	50	40	20	–	42.5	M5		60	10	65	10.0	–	–	–	–	5.5	9.5	6	11	5 350	7 050	2 350	145
CRWUG 80-125	2.56					125				75			1×40						80	22.5			–	–					7 960	11 800	3 920	241
CRWUG 80-165	3.34					165				105			2×40						120										9 180	14 100	4 700	289
CRWUG 80-205	4.12					205				135			3×40						160				80	62.5					11 500	18 800	6 270	385

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

Shape	CRWU
Size	30 40 60 80 100 145

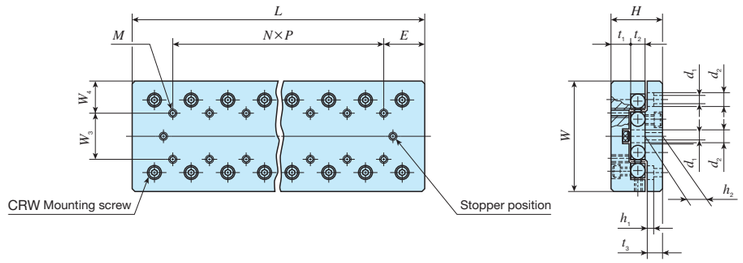


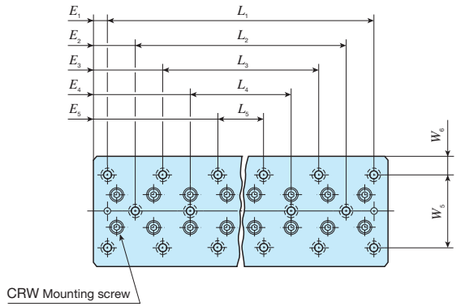


Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm									Table mounting dimensions mm						Bed mounting dimensions mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	t_1	t_2	t_3	Maximum stroke length	W_3	W_4	$N\times P$	E	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	C	C_0	F	T_0
	kg																												N	N	N	N · m
CRWU 30- 25	0.09	30	±0.1	17	±0.1	25	7	4	5.5	12	10	10	–	12.5	M2		22	4	18	3.5	–	–	–	–	2.55	4.1	2.5	6	380	478	159	3.2
CRWU 30- 35	0.13					35				18			1×10						28				–	–					525	717	239	4.8
CRWU 30- 45	0.17					45				25			2×10						38										659	956	319	6.5
CRWU 30- 55	0.20					55				32			3×10						48				28						786	1 200	398	8.1
CRWU 30- 65	0.24					65				40			4×10						58				38	13.5					906	1 430	478	9.7
CRWU 30- 75	0.28					75				45			5×10						68				45						1 020	1 670	558	11.3
CRWU 30- 85	0.32					85				50			6×10						78				58						1 140	1 910	638	12.9
CRWU 40- 35	0.21	40	±0.1	21	±0.1	35	8	6	6.5	18	15	12.5	–	17.5	M3		30	5	25	5	–	–	–	–	3.5	6	3.5	7	896	1 180	392	10.6
CRWU 40- 50	0.30					50	7	8	5.5	30			1×15						40				–	–			3.2	6	2 710	3 660	1 220	26.5
CRWU 40- 65	0.37					65				40			2×15						55										2 710	3 660	1 220	26.5
CRWU 40- 80	0.48					80				50			3×15						70				40	20					4 050	6 090	2 030	44.2
CRWU 40- 95	0.54					95				60			4×15						85				55						3 400	4 880	1 630	35.3
CRWU 40-110	0.65					110				70			5×15						100				70						4 680	7 310	2 440	53.0
CRWU 40-125	0.72					125				80			6×15						115				85						4 680	7 310	2 440	53.0
CRWU 60- 55	0.68	60	±0.1	28	±0.1	55	10.5	8	9	30	25	17.5	–	27.5	M4		40	10	35	10	–	–	–	–	4.5	7.5	4.5	9.5	2 710	3 660	1 220	51.2
CRWU 60- 80	1.0					80				45			1×25						60										4 050	6 090	2 030	85.3
CRWU 60-105	1.3					105				60			2×25						85				–	–					5 270	8 530	2 840	119
CRWU 60-130	1.6					130				75			3×25						110										5 860	9 750	3 250	137
CRWU 60-155	1.9					155				90			4×25						135		85								6 970	12 200	4 060	171
CRWU 60-180	2.2					180				105			5×25						160		110	35							8 040	14 600	4 880	205
CRWU 60-205	2.5					205				130			6×25						185		135		85	60					8 550	15 800	5 280	222

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

Shape	CRWU
Size	30 40 60 80 100 145





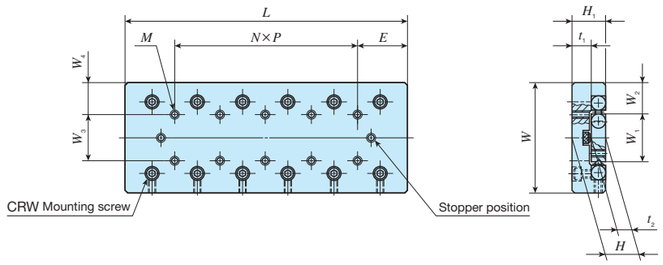
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm									Table mounting dimensions mm					Bed mounting dimensions mm																	Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	t_1	t_2	t_3	Maximum stroke length	W_3	W_4	N×P	E	M	W_5	W_6	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	C	C_0	F	T_0
	kg					mm																										N	N	N	N·m
CRWU 80- 85	1.8	80	±0.1	35	±0.1	85	13	11	10.5	50	40	20	–	42.5	M5	60	10	65	10	–	–	–	–	–	–	–	–	5.5	9.5	6	11	6 640	9 400	3 130	188
CRWU 80-125	2.6					125				75			1× 40					80	22.5			–	–	–	–	–	–					9 130	14 100	4 700	282
CRWU 80-165	3.4					165				105			2× 40					120														10 300	16 500	5 480	329
CRWU 80-205	4.2					205				135			3× 40					160		–	–	80	62.5	–	–	–	–					12 500	21 200	7 050	423
CRWU 80-245	5.1					245				155			4× 40					200				120										14 700	25 900	8 620	517
CRWU 80-285	5.9					285				185			5× 40					240				160										16 700	30 600	10 200	611
CRWU 80-325	6.7					325				215			6× 40					280				200				120	102.5					18 700	35 300	11 800	705
CRWU 100-110*	3.6	100	±0.15	45	±0.1	110	16	15	13	60	50	25	–	55	M6	60	20	90	10	–	–	–	–	–	–	–	–	7	11	6.5	14	13 900	18 500	6 150	415
CRWU 100-160*	5.2					160				95			1× 50					140														16 600	23 100	7 690	519
CRWU 100-210*	6.9					210				130			2× 50					190		90	60	–	–									21 600	32 300	10 800	727
CRWU 100-260*	8.5					260				165			3× 50					240		140				–	–	–	–					26 300	41 500	13 800	934
CRWU 100-310*	10.2					310				200			4× 50					290		190												30 800	50 700	16 900	1 140
CRWU 100-360*	11.8					360				235			5× 50					340		240		140	110									35 100	60 000	20 000	1 350
CRWU 100-410*	13.5					410				265			6× 50					390		290		190										37 200	64 600	21 500	1 450
CRWU 145-210*	13.2	145	±0.2	60	±0.1	210	21	22	16	130	85	30	–	105	M8	90	27.5	100	55	–	–	–	–	–	–	–	–	9	14	8.5	17.5	39 400	52 800	17 600	1 900
CRWU 145-310*	19.6					310				180			1×100					200		100	155	–	–									61 200	92 300	30 800	3 320
CRWU 145-410*	25.9					410				350			2×100					300		200		100	255	–	–	–	–					67 900	106 000	35 200	3 800
CRWU 145-510*	32.2					510				450			3×100					400		300		200										74 400	119 000	39 600	4 270
CRWU 145-610*	38.6					610				550			4×100					500		400		300		100	355							87 100	145 000	48 400	5 220
CRWU 145-710*	45.0					710				650			5×100					600		500		400		200								99 200	172 000	57 200	6 170
CRWU 145-810*	51.3					810				750			6×100					700		600		500		300								111 000	198 000	66 000	7 120

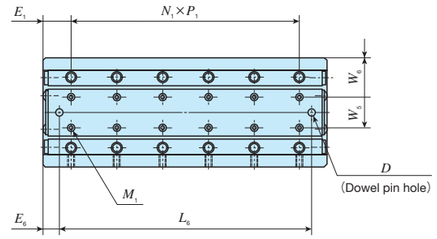
Remark: The identification numbers with * are our semi-standard items.

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

IKO Crossed Roller Way Unit

Shape	CRWU···R
Size	30 40 60 80 100 145



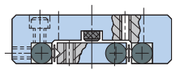


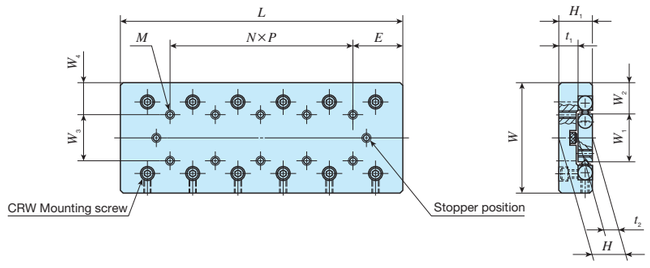
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm						Table mounting dimensions mm							Center way mounting dimensions and tolerances mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	Maximum stroke length	W_3	W_4	N×P	E	M	H_1	t_1	W_5	W_6	$N_1×P_1$	E_1	M_1	D	Dim. D tolerance	L_6	E_6	W_1	W_2	t_2	C	C_0	F	T_0
	kg																										N	N	N	N·m
CRWU 30- 25R	0.06	30	±0.1	11	±0.1	25	12	10	10	–	12.5	M2	11	7	–	15	1×10	7.5	M2	–	–	–	–	12.8	8.6	4	380	478	159	3.2
CRWU 30- 35R	0.08					35	18			1×10							2×10										525	717	239	4.8
CRWU 30- 45R	0.11					45	25			2×10							3×10										659	956	319	6.5
CRWU 30- 55R	0.13					55	32			3×10							4×10			2	+0.020 0	30	12.5				786	1 200	398	8.1
CRWU 30- 65R	0.16					65	40			4×10							5×10					40					906	1 430	478	9.7
CRWU 30- 75R	0.18					75	45			5×10							6×10					50					1 020	1 670	558	11.3
CRWU 30- 85R	0.21					85	50			6×10							7×10					60					1 140	1 910	638	12.9
CRWU 40- 35R	0.13	40	±0.1	14	±0.1	35	18	15	12.5	–	17.5	M3	14	8	–	20	1×15	10	M3	–	–	–	–	17	11.5	6	896	1 180	392	10.6
CRWU 40- 50R	0.21			15		50	30			1×15			15	7			2×15							13.1	13.45	8	2 710	3 660	1 220	26.5
CRWU 40- 65R	0.26					65	40			2×15							2×15	17.5									2 710	3 660	1 220	26.5
CRWU 40- 80R	0.34					80	50			3×15							4×15	10		3	+0.020 0	45	17.5				4 050	6 090	2 030	44.2
CRWU 40- 95R	0.38					95	60			4×15							4×15	17.5					25				3 400	4 880	1 630	35.3
CRWU 40-110R	0.46					110	70			5×15							5×15					60					4 680	7 310	2 440	53.0
CRWU 40-125R	0.50					125	80			6×15							5×15	25					32.5				4 680	7 310	2 440	53.0
CRWU 60- 55R	0.44	60	±0.1	18.5	±0.1	55	30	25	17.5	–	27.5	M4	18.5	10.5	17	21.5	1×25	15	M4	4	+0.020 0	35	10	26.6	16.7	8	2 710	3 660	1 220	51.2
CRWU 60- 80R	0.66					80	45			1×25							2×25					60					4 050	6 090	2 030	85.3
CRWU 60-105R	0.85					105	60			2×25							3×25					85					5 270	8 530	2 840	119
CRWU 60-130R	1.1					130	75			3×25							4×25					110					5 860	9 750	3 250	137
CRWU 60-155R	1.3					155	90			4×25							5×25					135					6 970	12 200	4 060	171
CRWU 60-180R	1.5					180	105			5×25							6×25					160					8 040	14 600	4 880	205
CRWU 60-205R	1.7					205	130			6×25							7×25					185					8 550	15 800	5 280	222

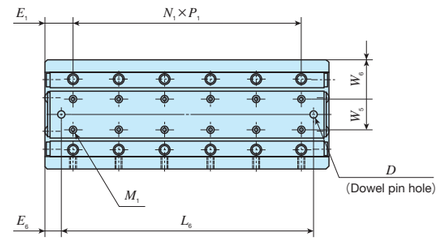
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Crossed Roller Way Unit

Shape	CRWU···R
Size	30 40 60 80 100 145







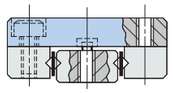
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm						Table mounting dimensions mm								Center way mounting dimensions and tolerances mm											Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	Maximum stroke length	W_3	W_4	N×P	E	M	H_1	t_1		W_5	W_6	$N_1×P_1$	E_1	M_1	D	Dim. D tolerance	L_6	E_6	W_1	W_2	t_2	C	C_0	F	T_0
	kg																										N	N	N	N·m
CRWU 80- 85R	1.2	80	±0.1	24	±0.1	85	50	40	20	–	42.5	M5	24	13		27	26.5	1×40	22.5	M5	5	+0.020 0	55	15	38	21	11	6 640	9 400	3 130	188
CRWU 80-125R	1.8					125	75			1×40								2×40					95					9 130	14 100	4 700	282
CRWU 80-165R	2.3					165	105			2×40								3×40					135					10 300	16 500	5 480	329
CRWU 80-205R	2.9					205	135			3×40								4×40					175					12 500	21 200	7 050	423
CRWU 80-245R	3.5					245	155			4×40								5×40					215					14 700	25 900	8 620	517
CRWU 80-285R	4.0					285	185			5×40								6×40					255					16 700	30 600	10 200	611
CRWU 80-325R	4.6					325	215			6×40								7×40					295					18 700	35 300	11 800	705
CRWU 100-110R*	2.4	100	±0.15	31	±0.1	110	60	50	25	–	55	M6	31	16		26	37	1×50	30	M6	5	+0.020 0	70	20	42	29	15	13 900	18 500	6 150	415
CRWU 100-160R*	3.6					160	95			1×50								2×50					120					16 600	23 100	7 690	519
CRWU 100-210R*	4.7					210	130			2×50								3×50					170					21 600	32 300	10 800	727
CRWU 100-260R*	5.9					260	165			3×50								4×50					220					26 300	41 500	13 800	934
CRWU 100-310R*	7.0					310	200			4×50								5×50					270					30 800	50 700	16 900	1 140
CRWU 100-360R*	8.1					360	235			5×50								6×50					320					35 100	60 000	20 000	1 350
CRWU 100-410R*	9.3					410	265			6×50								7×50					370					37 200	64 600	21 500	1 450
CRWU 145-210R*	9.4	145	±0.2	42.5	±0.1	210	130	85	30	–	105	M8	43	21		46	49.5	1×100	55	M8	5	+0.020 0	150	30	68.4	38.3	21	39 400	52 800	17 600	1 900
CRWU 145-310R*	13.9					310	180			1×100								2×100					250					61 200	92 300	30 800	3 320
CRWU 145-410R*	18.4					410	350			2×100								3×100					350					67 900	106 000	35 200	3 800
CRWU 145-510R*	23.0					510	450			3×100								4×100					450					74 400	119 000	39 600	4 270
CRWU 145-610R*	27.5					610	550			4×100								5×100					550					87 100	145 000	48 400	5 220
CRWU 145-710R*	32.0					710	650			5×100								6×100					650					99 200	172 000	57 200	6 170
CRWU 145-810R*	36.6					810	750			6×100								7×100					750					111 000	198 000	66 000	7 120

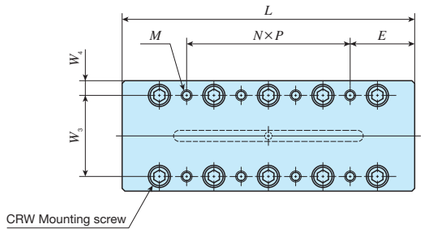
Remark: The identification numbers with * are our semi-standard items.

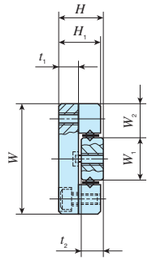
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

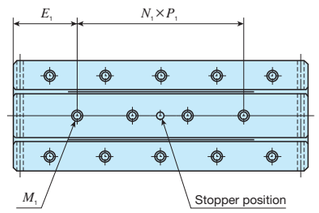
IKO Crossed Roller Way Unit

Shape	CRWU···RS
Size	20 / 30 / 40









Identification number	Mass (Ref.) kg	Nominal dimensions and tolerances mm						Table mounting dimensions mm				Center way mounting dimensions mm							Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	Maximum stroke length	W_3	W_4	$N\times P$	E	M	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	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							2×10	7.5			525	717	239	2.8
CRWU 20- 45RS	0.06					45	25			1×20	12.5						3×10				659	956	319	3.7
CRWU 20- 55RS	0.07					55	32			1×30							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	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				2 130	3 530	1 180	22.9
CRWU 30- 95RS	0.29					95	60			2×30							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	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				5 860	9 750	3 250	84.8
CRWU 40-155RS	0.85					155	90			2×50							5×25				6 970	12 200	4 060	106

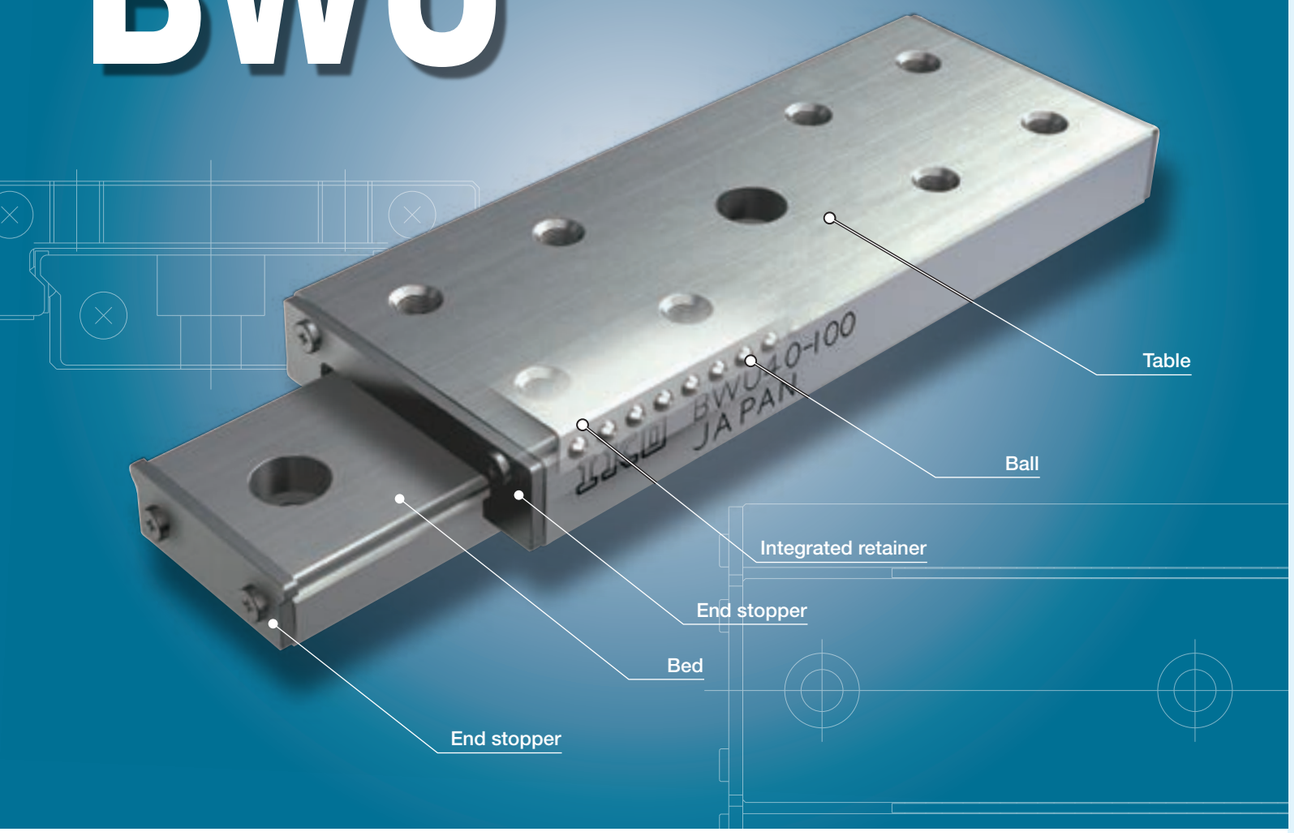
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Linear Slide Unit

High Rigidity Precision Linear Slide Unit
Precision Linear Slide Unit
Linear Slide Unit

High Rigidity Precision Linear Slide Unit

BWU



Points

1 Simple limited linear motion guide structure

Small and simple limited stroke type structure incorporated with balls and retainer between integrated table and bed. With two-row four-point contact structure, stable accuracy and rigidity can be achieved even in applications where fluctuating load and complex load are applied.

2 High accuracy

Simultaneous grinding process of two-row track grooves is applied to table and bed, which provides small processing errors and realizes linear motion of high accuracy.

3 Smooth operations

As each component is finished with accuracy without recirculation resistance of the balls, light and smooth operations are obtained.

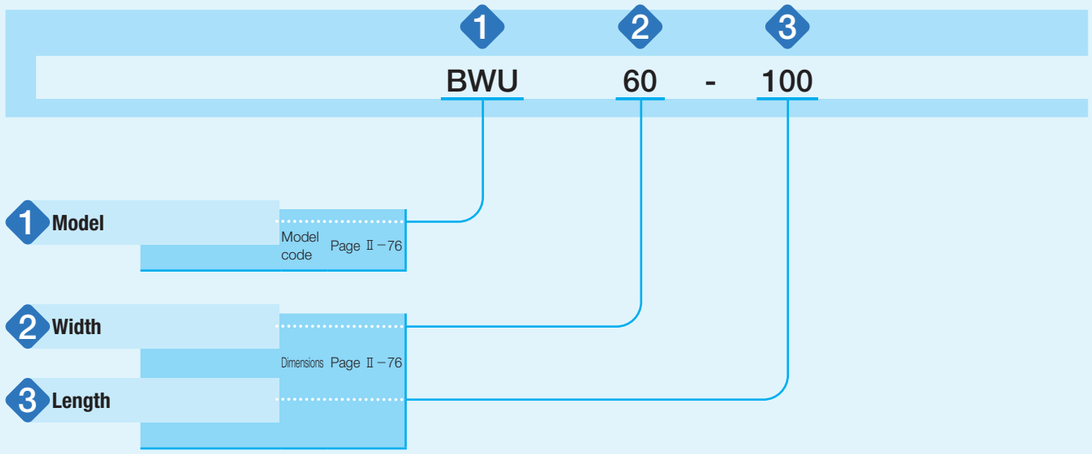
4 Stainless steel selections for excellent corrosion resistance

Stainless steel highly resistant to corrosion is used for all steel components, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.

Identification Number and Specification

Example of an identification number

The specification of BWU series is indicated by the identification number. Indicate the identification number, consisting of a model code and dimensions for each specification to apply.



Identification Number and Specification

1 Model

High Rigidity Precision Linear Slide Unit (BWU series) : BWU

For applicable models, width and length, see Table 1.

2 Width

6, 8, 10, 12, 17, 25, 30, 40, 60

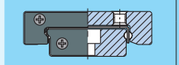
Indicate the table width in mm.
For applicable models, width and length, see Table 1.

3 Length

Indicate the table length in mm.
For applicable models, width and length, see Table 1.

Table 1 Width and length of BWU series

unit: mm

Shape	Model	Width	Length											
			10	15	20	25	30	40	45	60	75	80	90	100	120
	BWU	6	○	–	○	–	○	–	–	–	–	–	–	–	–
		8	○	–	○	–	○	–	–	–	–	–	–	–	–
		10	–	○	–	○	–	○	–	–	–	–	–	–	–
		12	–	–	○	–	○	–	○	–	–	–	–	–	–
		17	–	–	○	–	○	–	○	–	–	–	–	–	–
		25	–	–	–	–	○	–	○	○	○	–	–	–	–
		30	–	–	–	–	○	–	○	○	○	–	○	–	–
		40	–	–	–	–	–	○	–	○	–	○	–	○	–
		60	–	–	–	–	–	–	–	○	–	○	–	○	○

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

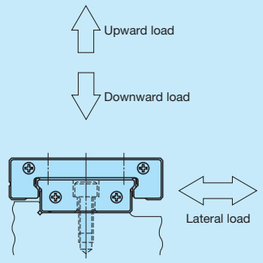
Allowable Load

Allowable load refers to load of smooth rolling motion on contact surface to which maximum contact stress is applied and the sum of whose elastic deformation of rolling elements and raceway is small.
Therefore, use applied load within the allowable load range if very smooth rolling motion and high accuracy are required.

Load Direction and Load Rating

The BWU series must be used with its load rating corrected in accordance to the load direction. The basic dynamic load rating and basic static load rating shown in the dimension table should be corrected to values in Table 2.

Table 2 Load ratings corrected for load direction

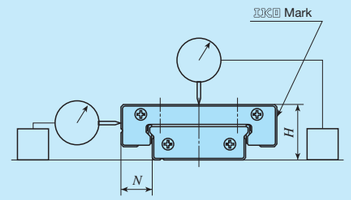


Load rating and load direction / Width	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
6～60	C	C	1.19C	C_0	C_0	1.19C_0

Accuracy

Accuracy of the BWU series is indicated in Table 3 and Table 4.

Table 3 Accuracy



unit: mm

Item	Tolerance and allowance
Dim. H tolerance	±0.040
Dim. N tolerance	±0.050
Parallelism at the table center	See Table 4
Parallelism on the table side	See Table 4

Table 4 Running accuracy unit: μm

Nominal length L mm		Parallelism at the table center (1)	Parallelism on the table side (2)
Over	Incl.		
–	50	4	6
50	80	5	8
80	120	6	9

Notes (1) Parallelism at the center of the table represents parallelism of height when the table is stroked.
(2) Parallelism at the side of the table represents parallelism of the side (the opposite side of mark) when the table is stroked.

Preload

Preload for the BWU series is adjusted to proper preload state.

Lubrication

Grease is not pre-packed in the BWU series, so please perform adequate lubrication as needed.
Upon delivery, anti-rust oil is applied. Therefore, perform cleaning with clean solution before mounting and apply high-quality lubrication oil or grease before use. For grease lubrication, use of high-quality lithium-soap base grease is recommended.
Since no grease nipple or oil hole is provided, apply grease directly to the raceway part of the bed when supplying the grease.

Dust Protection

No dust protection seal is provided for BWU series. For applications in other than clean environment, cover the entire unit with a protective case, etc. to prevent harmful foreign substances such as dust and particles from outside from entering.

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

Precaution for Use

❶ Handling

When high running accuracy is required, set the load point at the center of the table (or bed) and use with sufficient stroke length.

For the BWU series, the retainer may be deviated from the right position due to offset load or irregular and high-velocity motion, etc. Fully stroke it once in certain operating time or certain number of reciprocating motion to correct the retainer position.

Since there is no built-in mechanical stopper to regulate linear motion in the event of collision, install a stopper mechanism in proximity if risk of overstroke exists.

The fixing thread depth of mounting screws for table must not exceed the maximum fixing thread depth indicated in the table of dimensions. Since the mounting screw hole for the table is penetrated, the bed or retainer will be pushed by the screw if the fixing thread depth is too deep, and the running accuracy and life may be adversely affected.

❷ Operating temperature

As synthetic resin components are not used for the BWU series, it may be used at high temperature. However, when it exceeds 100°C, contact IKO.

❸ Maximum velocity

Operating velocity should not exceed 30 m/min during operation.

Precaution for Mounting

❶ Reference mounting surface

Reference mounting surface of the BWU series is the opposite side of the IKO mark. (See Fig. 1)

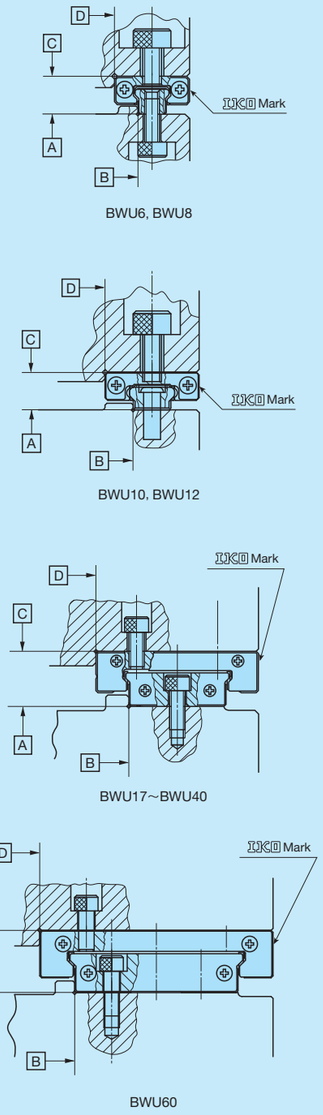


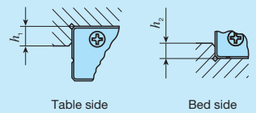
Fig. 1 Reference mounting surface and mounting examples

❷ Typical mounting structure

As indicated in Fig.1, reference mounting surfaces B and D, and mounting surfaces A and C are precisely ground. Therefore, by machining the reference mounting surface of the mating member and the mounting surface, such as machine or device, to high accuracy and mounting them properly, stable linear motion with high accuracy is realized.

For the opposite corner of the mating reference mounting, it is recommended to have relieved fillet as indicated in the illustration in Table 5. The value indicated in Table 5 is recommended for the shoulder height on the mating side.

Table 5 Shoulder height



unit: mm

Width	Shoulder height of the table side h_1	Shoulder height of the bed side h_2
6	1	0.5
8	1.2	0.8
10	1.2	0.8
12	1.5	0.8
17	2.5	1.2
25	2.5	1.5
30	3	2
40	3	2.5
60	4	2.5

❸ When lateral load is the primary load

As indicated in Fig. 2, firmly fix the sides of the table and bed with pressure plates.

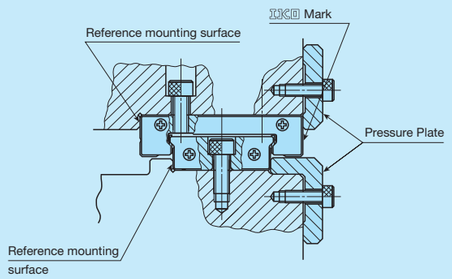


Fig. 2 Mounting example when lateral load is the primary load

❹ Tightening torque for fixing screw

Typical tightening torque for mounting of the BWU series to the steel mating member material is indicated in Table 6. If the mating member material is cast iron or aluminum alloy, reduce the tightening torque depending on the strength characteristics of the mating member material.

Table 6 Tightening torque for fixing screw

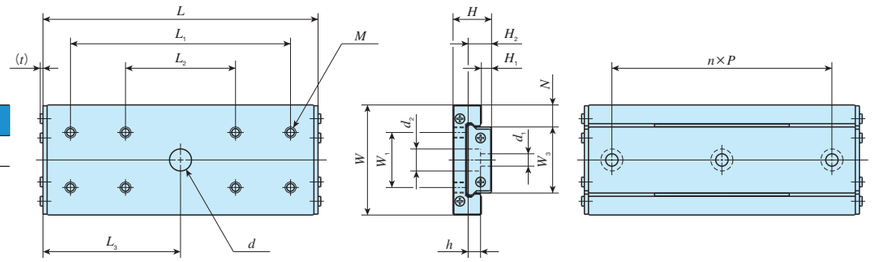
Bolt size	Tightening torque N · m
M1 ×0.25	0.04
M1.4×0.3	0.10
M1.6×0.35	0.15
M2 ×0.4	0.31
M3 ×0.5	1.1
M4 ×0.7	2.5

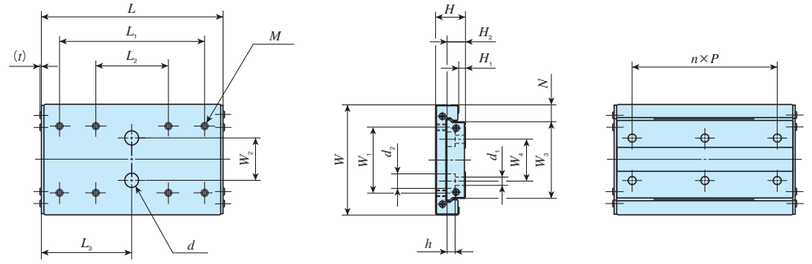
Remark: The tightening torque is calculated based on property division A2-70 of stainless steel hexagon socket head bolt.

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

High Rigidity Precision Linear Slide Unit

Shape	BWU
Size	6 · 8 · 10 · 12 · 17 · 25 · 30 · 40 · 60





BWU60-100, BWU60-120

Identification number	Mass (Ref.)	Nominal dimensions mm						Table mounting dimensions mm									Bed mounting dimensions mm								Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
	g	W	H	H_1	N	L	Maximum stroke length	W_1	L_1	L_2	M	Maximum fixing thread depth	W_2		L_3	d	t	W_3	H_2	W_4	n	P	d_1	d_2	h	C	C_0	F	T_0
																										N	N	N	N · m
BWU 6- 10	1.0	6	3.2	0.7	2	10	3	–	4	–	M1.4	0.8	–		–	–	0.46	2	1.9	–	1	4	M1.0 Through	–	–	154	181	60.2	0.21
BWU 6- 20	2.2					20	11		10													8				252	361	120	0.42
BWU 6- 30	3.3					30	16		18	10											2					355	587	196	0.68
BWU 8- 10	1.7	8	4	1	2.5	10	4	–	5.5	–	M2	0.8	–		–	–	0.45	3	2.6	–	1	5	M1.6 Through	–	–	203	212	70.6	0.36
BWU 8- 20	3.5					20	15		10													10				292	353	118	0.60
BWU 8- 30	5.2					30	19		21	10											2					442	635	212	1.1
BWU 10- 15(1)	3.2	10	4	1	3	15	8	–	6.5	–	M2	0.8	–		7.5	3	0.45	4	2.6	–	1	5	1.8	2.8	0.75	249	282	94.1	0.62
BWU 10- 25(1)	5.7					25	16		13						–	–						10				370	494	165	1.1
BWU 10- 40(1)	9.0					40	22		26	13					20	3					3					572	917	306	2.0
BWU 12- 20(2)	6.2	12	4.5	1	3	20	16	–	8	–	M2	1.1	–		–	–	0.45	6	2.8	–	1	7.5	2.4	4	1.5	292	353	118	1.1
BWU 12- 30(2)	9.5					30	20		15													15				442	635	212	2.0
BWU 12- 45(2)	14.1					45	30		31	15					22.5	4.5					2					603	988	329	3.2
BWU 17- 20	15.0	17	8	1.5	5	20	14	12	10	–	M2	3	–		10	4.5	0.8	7	5	–	1	7.5	2.4	4.2	2.3	588	635	212	2.5
BWU 17- 30	23.7					30	19		20						–	–						15				874	1 110	370	4.4
BWU 17- 45	35.4					45	29		30						22.5	4.5					2					1 200	1 750	582	6.9
BWU 25- 30	40.6	25	9	1.8	5.5	30	23	10	15	–	M3	2.5	–		–	–	0.9	14	5.2	–	1	15	3.5	6	3.2	783	953	318	7.1
BWU 25- 45	62.5					45	28		25													30				1 200	1 750	582	13.0
BWU 25- 60	84.3					60	38																			1 490	2 380	794	17.7
BWU 25- 75	104					75	48		55	25					37.5	6.5					2					1 760	3 020	1 010	22.5
BWU 30- 30	64.4	30	12	3.4	6	30	23	14	15	–	M3	3	–		–	–	1.0	18	7.5	–	1	15	3.5	6.5	4.5	1 270	1 410	470	13.4
BWU 30- 45	99.1					45	29		25													30				1 920	2 540	847	24.1
BWU 30- 60	133					60	35																			2 490	3 670	1 220	34.9
BWU 30- 75	165					75	47		55	25					37.5	6.5					2					2 880	4 520	1 510	42.9
BWU 30- 90	199					90	59								45											3 250	5 360	1 790	50.9
BWU 40- 40	136	40	14	3.5	8	40	31	20	20	–	M4	4	–		–	–	1.0	24	8.5	–	1	20	4.5	8	4.5	2 040	2 210	735	27.8
BWU 40- 60	209					60	39		40													40				3 100	3 970	1 320	50.0
BWU 40- 80	281					80	47																			4 010	5 730	1 910	72.2
BWU 40-100	346					100	63		80	40					50	8					2					4 640	7 060	2 350	88.9
BWU 60- 60	363	60	16	3.6	9	60	34	36	40	–	M4	4	–		–	–	1.1	42	10	23	1	40	4.5	8	4.5	4 740	5 690	1 900	124
BWU 60- 80	487					80	47																			5 930	7 820	2 610	171
BWU 60-100	597					100	56		80	40			23		50	8					2					7 020	9 960	3 320	217
BWU 60-120	723					120	68		100						60											8 050	12 100	4 030	264

Notes (1) Bed mounting bolts (cross-recessed pan head screw for precision equipment M1.6×5) are appended.
(2) Bed mounting bolts (cross-recessed pan head screw for precision equipment M2×4) are appended.

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

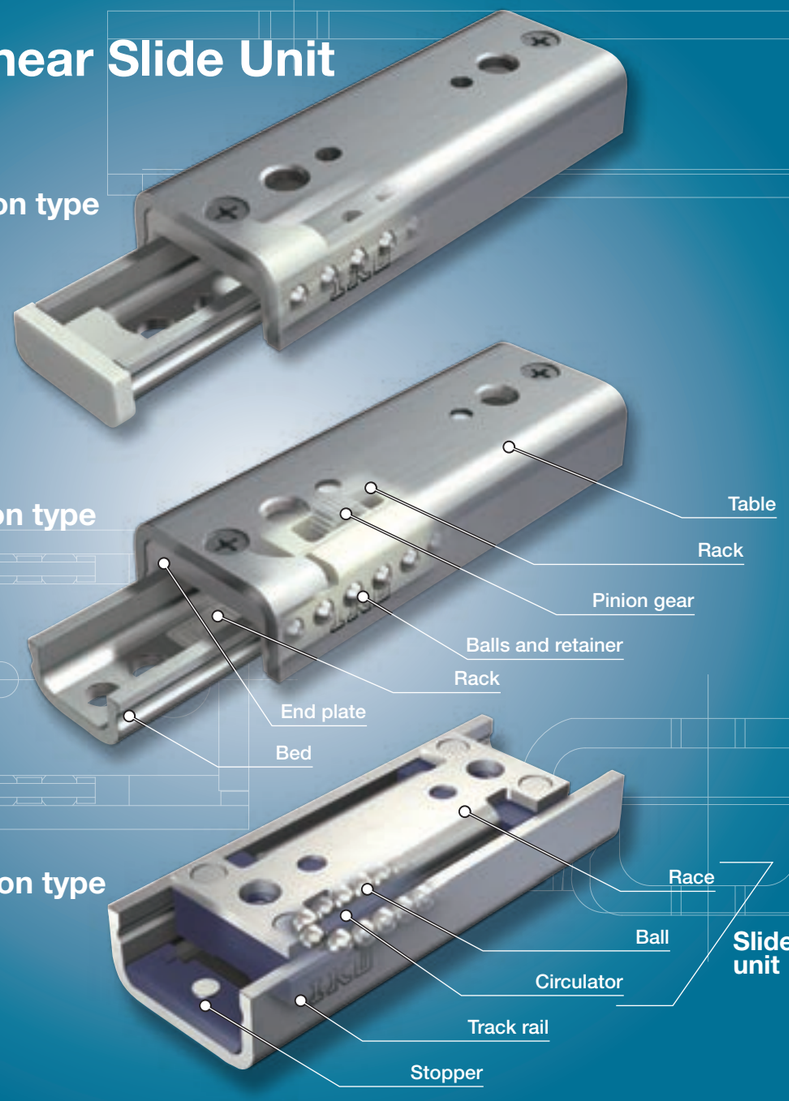
Precision Linear Slide Unit

Limited linear motion type

BSP

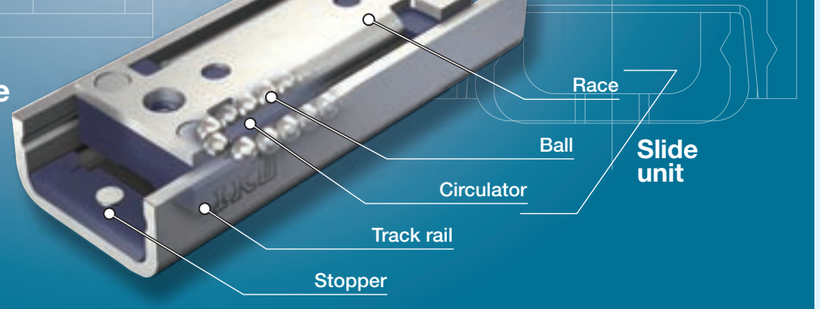
Built-in rack & pinion type

BSPG



Endless linear motion type

BSR



Points

● Light weight and compact

1 Weight is saved by precise forming of stainless steel plate to U shape and integration of the way and mounting surface, and downsizing was realized by functional allocation of parts.

● Stable performance

2 With simple two-row four-point contact structure, motion accuracy with stable load carrying capacity and high motion accuracy can be achieved for load in every direction.

● Quiet and smooth operations

3 The excellent retaining and guiding mechanism of the ball and precisely-finished raceway realizes very quiet and smooth operations. High response characteristics and positioning accuracy are obtained for micro-feeding operation as well.

● High safety

4 Since non-combustible or self-extinguishing materials are used for all synthetic resin components, they may be used for wide range of applications including household office automation equipment that requires incombustibility.

● Stainless steel selections for excellent corrosion resistance

5 Stainless steel highly resistant to corrosion is used for all steel components, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.

Identification Number and Specification

Example of an identification number

The specifications of BSP, BSPG and BSR are indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a material code, and a clearance code for each specification to apply.

1	2	3	4	5
BSP	15	50	SL	T1
BSPG	12	35	SL	T1
BSR	20	60	SL	T1

1 **Model** — Model code Page Ⅱ－85

2 **Width**

3 **Length** — Dimensions Page Ⅱ－85

4 **Material type** — Material code Page Ⅱ－85

5 **Clearance amount** — Clearance code Page Ⅱ－85

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

Identification Number and Specification

1 Model

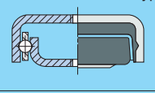
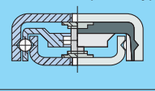
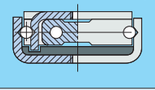
Precision Linear Slide Unit	Limited linear motion type	: BSP
	Built-in rack & pinion type	: BSPG
	Endless linear motion type	: BSR

For applicable models and width, see Table 1.

2 Width

7, 10, 12, 15, 20, 25 — Indicate the width in mm.
For applicable models and width, see Table 1.

Table 1 Models and width

Shape	Model	Characteristics	Width					
			7	10	12	15	20	25
Limited linear motion type 	BSP	Retainer made of special synthetic resin is used to prevent interference noise from contact of balls. This type performs very smooth and light limited linear motion without stick-slip.	○	○	–	○	○	○
Built-in rack & pinion type 	BSPG	A pinion gear assembled in the retainer integrated with two-row ball raceway is engaged with the racks fixed to the table and bed to prevent creeping of retainer position. Like BSP, this type also performs smooth linear motion.	–	–	○	○	○	○
Endless linear motion type 	BSR	The ball circulation structure made of special synthetic resin realizes quiet and smooth endless linear motion according to the length of a track rail.	–	–	○	○	○	○

3 Length

Indicate the length in mm.

4 Material type

Stainless steel made : SL — Stainless steel (SL) can be specified only for the material type.

5 Clearance amount

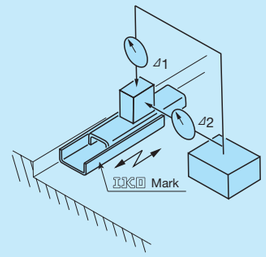
Standard	: No symbol	For details of clearance amount, see Table 2.
T_1Clearance	: T_1	Typically, apply the standard clearance for use in small frictional resistance and the clearance adjusted to the clearance code T_1 for applications requiring high linear motion accuracy.

Table 2 Clearance of raceways unit: μm

Type and code	Clearance of raceways
Standard (no symbol)	0 ~ +4
T_1	−4 ~ 0

Accuracy

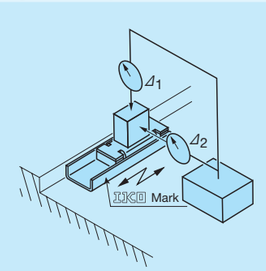
Table 3 Running accuracy for BSP and BSPG



unit: μm

Stroke length mm Over	Incl.	Parallelism at the bed center against the table mounting surface Δ_1	Parallelism at the bed center against the table reference mounting surface Δ_2
–	18	3	6
18	30	4	8
30	50	5	10
50	80	6	12

Table 4 Running accuracy for BSR



unit: μm

Stroke length mm Over	Incl.	Parallelism at the slide unit center against the track rail mounting surface Δ_1	Parallelism at the slide unit center against the track rail reference mounting surface Δ_2
–	18	3	6
18	30	4	8
30	50	5	10
50	80	6	12

Lubrication

Grease is not pre-packed in the BSP and BSR, so please perform adequate lubrication as needed.
Upon delivery, anti-rust oil is applied. Therefore, perform cleaning with clean solution before mounting, apply high-quality lubrication oil or grease to the raceway, and conduct shakedown before use.
The BSPG is packaged with special grease applied to the raceway surface and rack and pinion, using a vaporizable rust-prevention film rather than rust prevention oil. In general applications, keep cleanliness and mount it as it is.

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

Precaution for Use

❶ Applied load
For use with stable and high running accuracy, it is recommended to use applied load around 20% or lower of the basic static load rating.

❷ Handling
When high running accuracy is required for BSP and BSPG, set the load point at the center of the table (or bed) and use with sufficient stroke length.
For the BSP, the retainer may be deviated from the right position due to offset load or irregular and high-velocity motion, etc. Fully stroke it once in certain operating time or certain number of reciprocating motion to correct the retainer position. If it is difficult to correct the retainer position, use BSPG or BSR.
Since BSP, BSPG and BSR have no built-in mechanical stopper to regulate linear motion in the event of collision, install a stopper mechanism in proximity if risk of overstroke exists.

❸ Operating temperature
The maximum operating temperature is 120°C and temperature up to 100°C is allowed for continuous operation. However, when it exceeds 100°C, contact IKO.

❹ Maximum velocity
Operating velocity should not exceed 30 m/min during operation.

Precaution for Mounting

❶ Reference mounting surface
Reference mounting surface is the opposite side of the IKO mark.

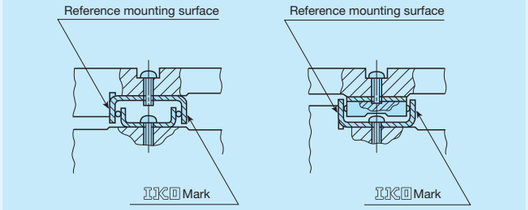
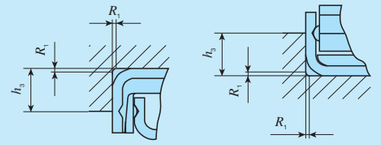


Fig. 1 Reference mounting surface

❷ Typical mounting structure
The mating surface to mount BSP, BSPG and BSR should be finished to high accuracy as much as possible so as not to affect the motion accuracy.
For the opposite corner of the mating reference mounting, it is recommended to have relieved fillet as indicated in Fig. 1, but you may also mount it based on R_1 dimension indicated in Table 5. The value indicated in Table 5 is recommended for the shoulder height on the mating side.

❸ Mounting
The fixing thread depth of fixing screws must not exceed the maximum fixing thread depth indicated in the dimension table.
When mounting BSP and BSPG, use female screws of the table and bed, or insert screws smaller by one size to the female screws. However, note that BSP 715 SL through BSP 740 SL cannot be mounted from the inside of the table and bed.
When mounting the track rail of BSR, use female screws of the track rail or insert screws smaller by one size to the female screws. However, note that BSR 1530 SL through BSR 2040 SL cannot be mounted from the inside of the track rail. In addition, when BSR 1230 SL through BSR 1260 SL are to be mounted from the inside of the track rail, contact IKO.

Table 5 Shoulder height and corner radius of the reference mounting surface



unit: mm

Identification number			Shoulder height h_3	Corner radius R_1 (maximum)
–	–	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		

❹ Tightening torque for fixing screw
If the fixing force of BSP, BSPG and BSR toward the mating surface is too strong, performance and accuracy are adversely affected. Although it depends on material, rigidity and finishing condition of the mating surface, it is generally recommended to use smaller tightening torque for fixing screws and use value comparable to Table 6. In addition, use a stopper measure such as adhesive agent if fixing screw may be loosened by vibration, etc.

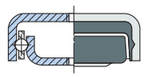
Table 6 Tightening torque for fixing screw

Bolt size	Tightening torque N · m
M2 × 0.4	0.065
M2.3 × 0.4	0.10
M2.6 × 0.45	0.15
M3 × 0.5	0.24

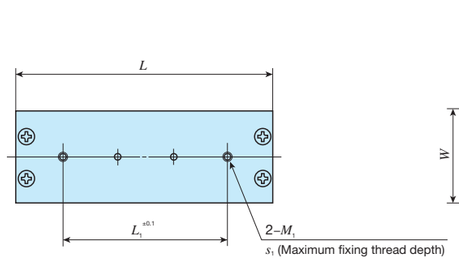
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

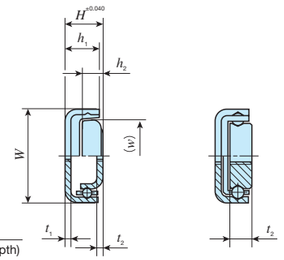
Limited linear motion type

Shape: **BSP**

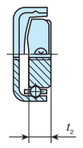


Size: 7 | 10 | 15 | 20 | 25

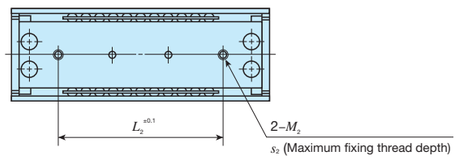




BSP 7



BSP 10



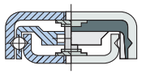
Identification number	Mass (Ref.) g	Nominal dimensions mm W	H	L	Maximum stroke length	Table mounting dimensions mm L_1	M_1	Maximum fixing thread depth s_1	h_1	t_1	Bed mounting dimensions mm w	L_2	M_2	Maximum fixing thread depth s_2	h_2	t_2	Basic dynamic load rating C N	Basic static load rating C_0 N
BSP 7 15 SL(1)	2.1	7	4	15	9	5	M2	1	3.4	0.9	3.6	5	M2	2	–	2	93.3	42.0
BSP 7 20 SL(1)	2.8			20		10						10					134	70.0
BSP 7 30 SL(1)	4.2			30	18	20						20					170	98.0
BSP 7 40 SL(1)	5.6			40	23	30						30					203	126
BSP 10 25 SL	6.2	10	6	25	15	15	M2.6	1.5	5.8	1.1	6.2	15	M2.6	2.7	3.7	2.7	340	156
BSP 10 35 SL	8.8			35	26	25						25					398	194
BSP 10 45 SL	11.3			45	38	35						35					453	233
BSP 15 30 SL	11	15	8	30	22	14	M3	2.5	7	1.2	11.2	14	M3	3	4.5	1.2	395	194
BSP 15 40 SL	14.7			40	24	24						24					550	311
BSP 15 50 SL	18.4			50	32	34						34					644	389
BSP 15 60 SL	22.1			60	40	40						40					732	467
BSP 20 40 SL	23.7	20	10	40	22	24	M3	3.2	9	1.4	16	24	M3	3.5	6.2	1.4	726	386
BSP 20 50 SL	29.7			50	28	34						34					866	496
BSP 20 60 SL	35.7			60	34	40						40					998	606
BSP 20 70 SL	41.7			70	40	45						45					1 120	717
BSP 20 80 SL	47.6			80	53	50						50					1 180	772
BSP 25 50 SL	37.6	25	10	50	26	34	M3	3.5	9	1.6	20.5	34	M3	3	5.7	1.6	866	496
BSP 25 60 SL	45.3			60	32	40						40					998	606
BSP 25 70 SL	52.9			70	40	45						45					1 120	717
BSP 25 80 SL	60.5			80	51	50						50					1 180	772
BSP 25 100 SL	75.8			100	63	60						60					1 410	992

Note (1) BSP 715 SL through BSP 740 SL cannot be mounted from the inside of the table and bed.

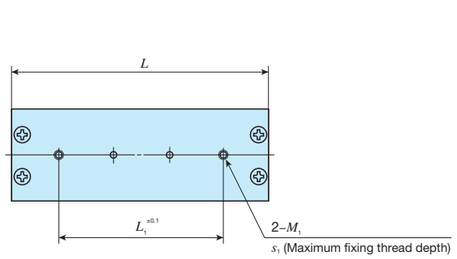
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

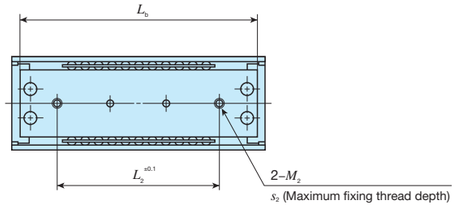
Built-in rack & pinion type

Shape: **BSPG**



Size: 12 | 15 | 20 | 25



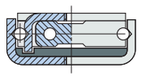


Identification number	Mass (Ref.)	Nominal dimensions mm				Table mounting dimensions mm						Bed mounting dimensions mm							Basic dynamic load rating	Basic static load rating
		W	H	L	Maximum stroke length	L_1	M_1	Maximum fixing thread depth s_1	h_1		t_1	L_b	w	L_2	M_2	Maximum fixing thread depth s_2	h_2	t_2	C	C_0
	g																		N	N
BSPG 12 25 SL	6.5	12	6	25	14	15	M2.6	2	5.2		1.2	23.6	7.6	15	M2.6	2	3	1	244	131
BSPG 12 35 SL	9.0			35	24	24						33.6		24					299	175
BSPG 12 45 SL	11.6			45	34	34						43.6		34					350	219
BSPG 15 40 SL	15.8	15	8	40	24	24	M3	2.5	7		1.2	37	9.6	24	M3	3	4.5	1.2	550	311
BSPG 15 50 SL	19.6			50	32	34						47		34					644	389
BSPG 15 60 SL	23.5			60	40	40						57		40					732	467
BSPG 20 40 SL	25.5	20	10	40	22	24	M3	3.2	9		1.4	37	13.8	24	M3	3.5	6.2	1.4	726	386
BSPG 20 50 SL	31.8			50	28	34						47		34					866	496
BSPG 20 60 SL	38.1			60	34	40						57		40					998	606
BSPG 20 70 SL	44.4			70	40	45						67		45					1 120	717
BSPG 20 80 SL	50.5			80	47	50						77		50					1 240	827
BSPG 25 50 SL	40.3	25	10	50	26	34	M3	3.5	9		1.6	46	18.4	34	M3	3	5.7	1.6	866	496
BSPG 25 60 SL	48.3			60	32	40						56		40					998	606
BSPG 25 70 SL	56.2			70	38	45						66		45					1 120	717
BSPG 25 80 SL	64.1			80	44	50						76		50					1 240	827
BSPG 25 100 SL	80.0			100	56	60						96		60					1 460	1 050

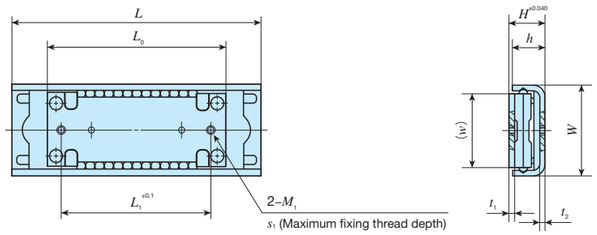
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

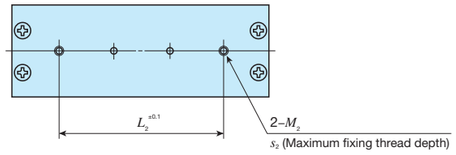
Endless linear motion type

Shape: **BSR**



Size: 12 | 15 | 20 | 25





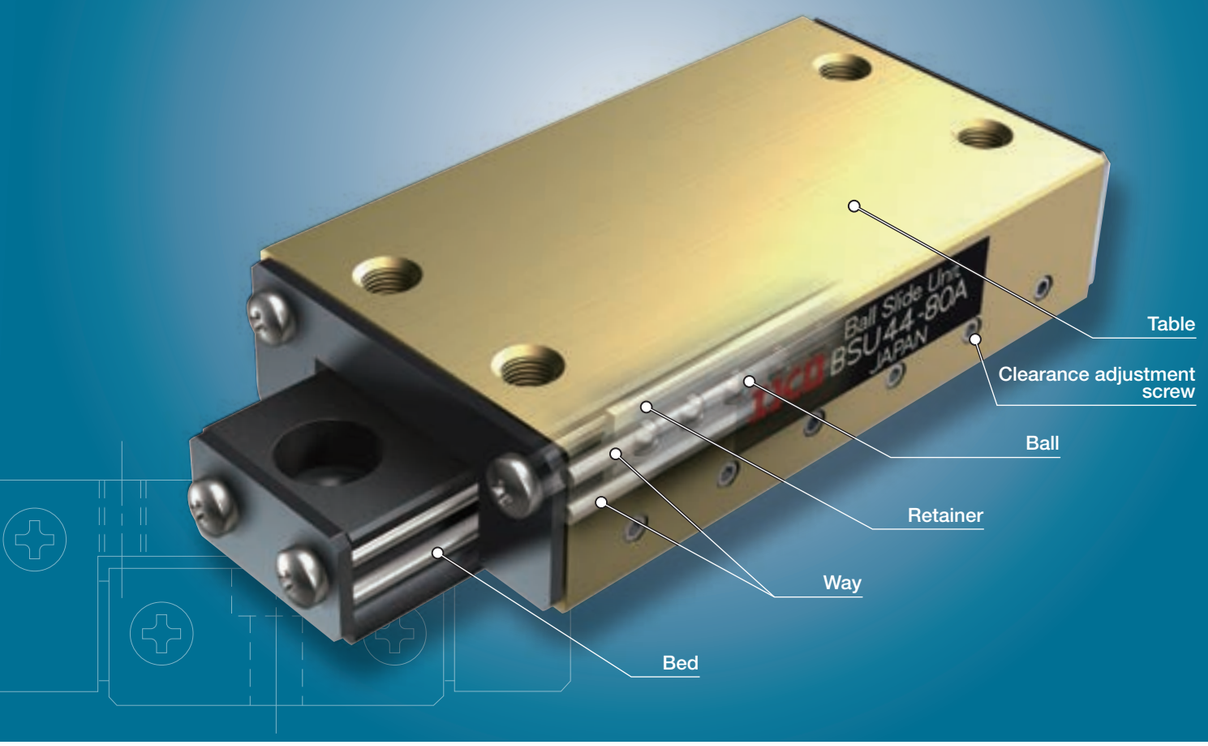
Identification number	Mass (Ref.) g	Nominal dimensions mm W	H	L	Maximum stroke length	Slide Unit mm w	L_0	L_1	Mounting dimensions M_1	Maximum fixing thread depth s_1	t_1	Track rail mounting dimensions mm L_2	M_2	Maximum fixing thread depth s_2	h	t_2	Basic dynamic load rating C N	Basic static load rating 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						

Notes (1) When BSR 1230 SL through BSR 1260 SL are to be mounted from the inside of the track rail, contact IKO.
(2) BSR 1530 SL and BSR 2040 SL cannot be mounted from the inside of the track rail.

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

Linear Slide Unit

BSU···A



Points

Light weight linear motion guide unit

1

Since the product uses aluminum alloy for table and bed, it is a light weight and compact limited linear motion guide unit.

Easy mounting

3

Since the product is properly preloaded, it can easily gain a stable linear motion only by fixing it against precisely grounded mounting surface with bolts.

Smooth operations

2

Since the ball is guided by the retainer made of synthetic resin and rotates on high accuracy round shank way, it can obtain a light and smooth motion.

Excellent corrosion resistance

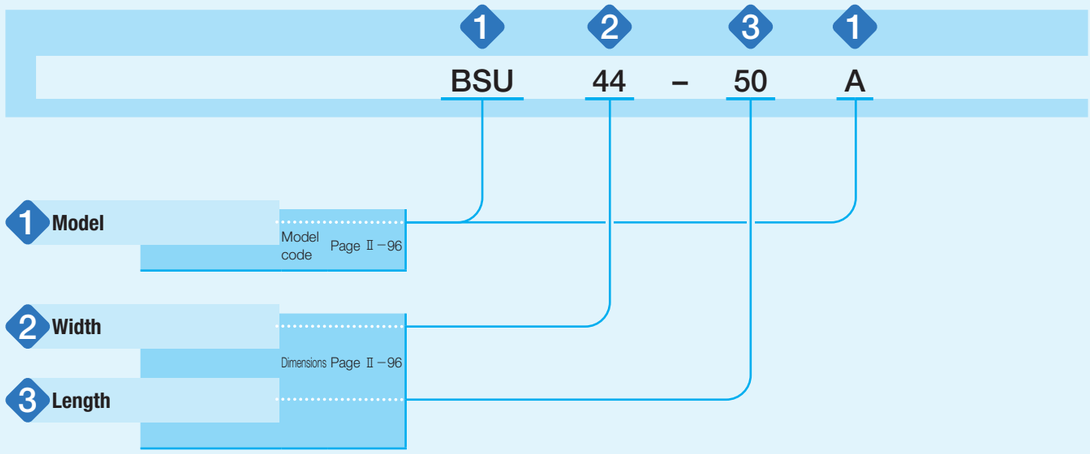
4

The ball and way are mode of stainless steel and the surface of table and bed have anodic oxidization coating, allowing high corrosion resistance.

Identification Number and Specification

Example of an identification number

The specification of BSU···A series is indicated by the identification number. Indicate the identification number, consisting of a model code and dimensions for each specification to apply.



Identification Number and Specification

1 Model

Linear Slide Unit : BSU···A

For applicable models, width and length, see Table 1.

2 Width

44, 66

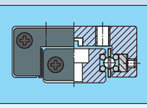
Indicate the table width in mm.
For applicable models, width and length, see Table 1.

3 Length

Indicate the length in mm.
For applicable models, width and length, see Table 1.

Table 1 Width and length of BSU···A series

unit: mm

Shape	Model	Width	Length				
			50	80	100	125	150
	BSU···A	44	○	○	○	–	–
		66	–	–	○	○	○

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

Allowable Load

Allowable load refers to load of smooth rolling motion on contact surface to which maximum contact stress is applied and the sum of whose elastic deformation of rolling elements and raceway is small.

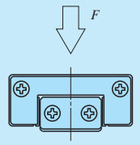


Fig.1 Direction of allowable load

Accuracy

❶ Running accuracy

Parallelism at the table center against the bed mounting surface (see Fig. 2): 10 μm / 10 mm

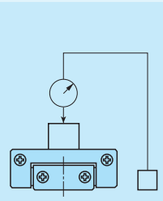


Fig.2 Parallelism at the table center

❷ Allowance of deviation at the table center

Deviation at the table center after stroking the table and returning to the same position (see Fig. 3.): 1.5 μm

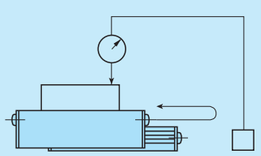


Fig.3 Deviation at the table center

Lubrication

Grease is not pre-packed in the BSU···A series, so perform adequate lubrication as needed.
Perform cleaning with clean solution before mounting and apply high-quality lubrication oil or grease to the raceway before use.

Precaution for Use

❶ Handling

When high running accuracy is required, set the load point at the center of the table (or bed) and use with sufficient stroke length.
For the BSU···A series, the retainer may be deviated from the right position due to offset load or irregular and high-velocity motion, etc. Fully stroke it once in certain operating time or certain number of reciprocating motion to correct the retainer position.
Since BSU···A series have small allowable load F, handling requires special care. Especially when clearance adjustment is performed, too much tightening of clearance adjustment screw will create impression on ball or way, which can adversely affect the friction, noise and vibration of the bearing. When performing clearance adjustment, gradually rotate the clearance adjustment screw by checking the motion status and paying special attention.

❷ Operating temperature

The table and bed of BSU···A series are made of aluminum alloy, and the clearance may change by the operating temperature. When using in the temperature outside the normal temperature, contact IKO. When using in wide operating temperature range, it is recommended to use IKO High Rigidity Precision Linear Slide Unit.

❸ Maximum velocity

Operating velocity should not exceed 30 m/min during operation.

Precaution for Mounting

❶ Mounting

The fixing thread depth of fixing screws must not exceed the maximum fixing thread depth indicated in the dimension table. Since the fixing screw hole for the table is penetrated, the bed or retainer will be pushed by the screw if the fixing thread depth is too deep, and the running accuracy and life may be adversely affected.

❷ Tightening torque for fixing screw

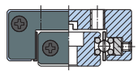
Typical tightening torque for mounting of the BSU···A series to the steel mating member material is indicated in Table 2. If the mating member material is cast iron or aluminum alloy, reduce the tightening torque depending on the strength characteristics of the mating member material.

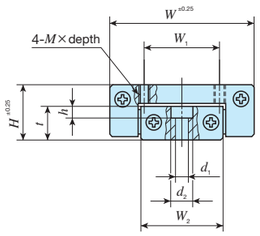
Table 2 Tightening torque for fixing screw

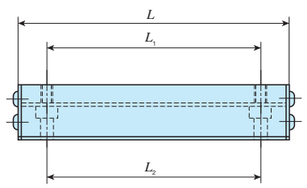
Bolt size	Tightening torque N · m
M5×0.8	5.0

Remark: The tightening torque is calculated based on property division A2-70 of stainless steel hexagon socket head bolt.

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

Shape	BSU···A	
		
Size	44	66





Identification number	Mass (Ref.)	Nominal dimensions mm				Table mounting dimensions mm			Bed mounting dimensions mm						Allowable load F
	g	H	W	L	Stroke length	W_1	L_1	M×depth	W_2	t	L_2	d_1	d_2	h	N
BSU 44- 50 A	110	20	44	50	25	20	35	M5×7	21.8	12.3	35	5.3	10	5.3	98.1
BSU 44- 80 A	175			80	50		65				65				177
BSU 44-100 A	220			100	75		85				85				235
BSU 66-100 A	420	25	66	100	50	35	75	M5×8	37	16	75	5.3	10	5.3	265
BSU 66-125 A	525			125	75		100				100				392
BSU 66-150 A	625			150	100		125				125				510

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

Linear Ball Spline

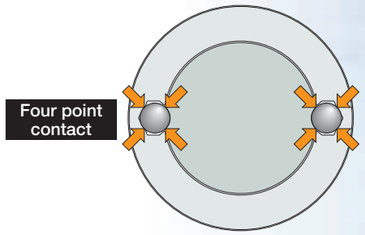
C-Lube Linear Ball Spline MAG
Linear Ball Spline G

Excellent features of compact linear structure by four-points contact in ball spline realized by a simple two-row raceways

IKO Linear Ball Spline is a linear motion rolling guide in which an external cylinder makes linear motion along the spline shaft. Since the structure lets a ball to rotate on the spline track groove, it can receive not only the radial load but also rotating torque. Therefore it best fits the structure in which torque transmission and linear motion take place in parallel.

High rigidity despite of compact size

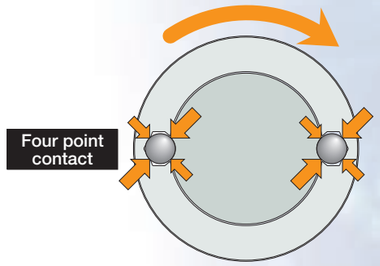
The structure places large diameter balls in two rows and has four-point contact with the track, allowing greater rigidity and compact design.



For the load from all directions it gives a good balance and high rigidity!

Allows high accuracy and accurate positioning

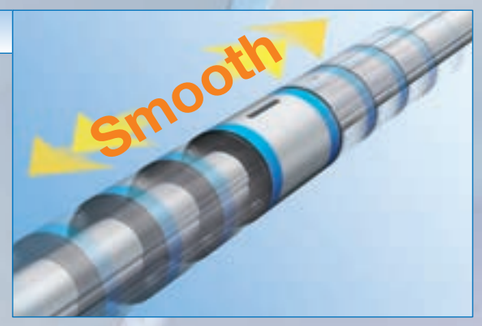
Preload removes the clearance along the rotation direction, allowing accurate positioning along the rotation direction.



No play along the rotation direction!

Low frictional resistance and smooth motion

The optimum design based on the thorough analysis of ball recirculating route realized low frictional resistance and smooth linear motion durable for high speed operations.



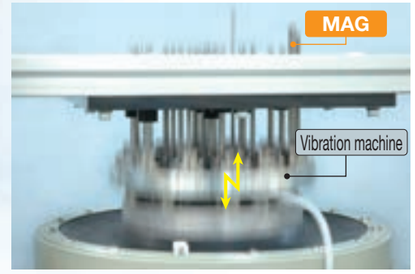
Both high speed durability performance and maintenance free performance are achieved

C-lube Linear Ball Spline MAG realizes a long term maintenance free using the built-in lubrication parts C-Lube for ball recirculation way in external cylinder. Since the lubrication oil inside C-Lube maintains the lubrication performance for a long time, it reduces the annoying lubricating management works and also allows total system cost saving by reducing the oil supply structures.

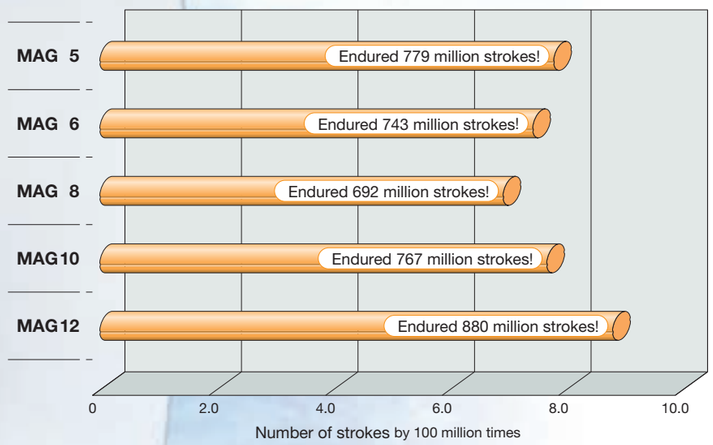
Durability test assuming the chip mounter

《Test conditions》

Lubrication conditions	Only lubrication oil inside C-lube, with no pre-packed grease	
Test method	Vibration test machine	
Operation condition	Posture	Vertical
	Maximum velocity	860 mm/s
	Acceleration	10 G
	Number of cycle	18.2 Hz
	Stroke length	15 mm



《Result》



Endured total strokes of 200 million times without a problem, only by lubrication oil inside C-Lube, for vertical shaft and super high tact operation!
Realized the maintenance free of 10 years of use equivalent to 10 years, in the test condition assuming the use for general chip mounters!!

Achieved maintenance free of more than 600 million total strokes in this severe operation conditions!!

Free combination is enabled for model/accuracy/preload!!

Extreme interchangeable system

Interchangeable specification

Interchangeable specification allows for external cylinder and spline shaft dimensions to be strictly managed based on unique advanced processing technology, resulting in an unparalleled level of interchangeability.
This allows external cylinders and spline shafts to be handled independently and selected in any combination, allowing you to order just what you need, when you need it, and in the quantity you require.

Requirements of ;

- Wish to improve the rigidity and life of machines
- Wish to improve the accuracy of machines
- Wish to replace the external cylinder immediately
- There are not enough external cylinders
- Wish to replace the spline shaft immediately
- The length of spline shaft is not sufficient
- Wish to store only the external cylinders in stock for emergency

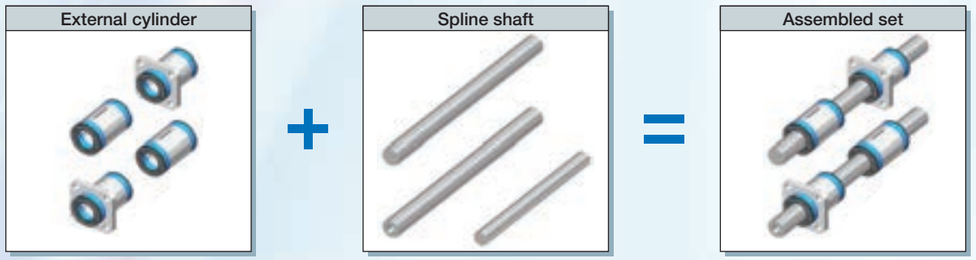
Help

Interchangeable specification realizes ;

- Wish to prepare for a sudden design change
- Wish to select freely the combination of high accuracy and preload
- Independent handling of external cylinders and spline shafts
- Free and independent combination of external cylinders and spline shafts
- Compactness - independent storing of external cylinders and spline shafts

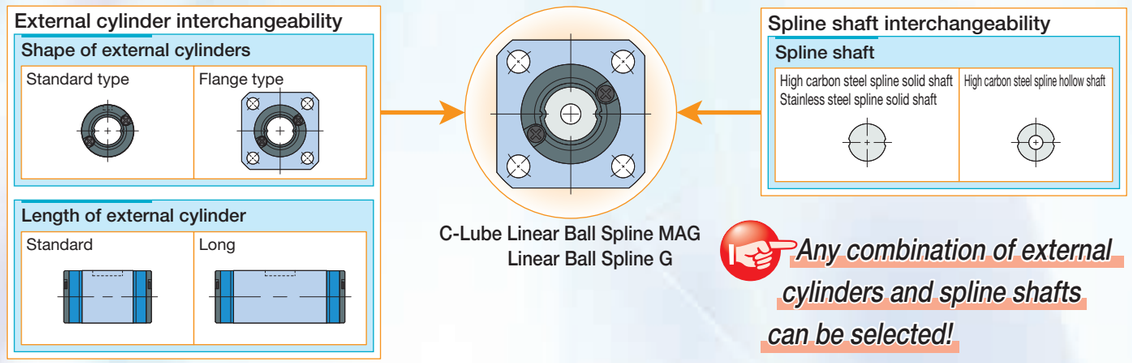
Sorted out

Select the products as many as you wish.



External cylinder interchangeability

A wide variety of models with different sectional shape and length are provided, for free replacement on the same spline shaft.



Any combination of external cylinders and spline shafts can be selected!

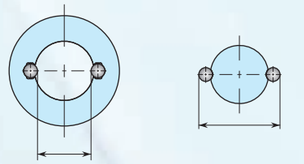
Accuracy interchangeability

The simple structure of four-contact in two-row raceway yields small manufacturing errors or accuracy measurement errors, allowing the maintenance of each raceway in the high dimensions accuracy.
Two accuracy classes of ordinary and high level are provided, to support even high traveling accuracy purposes.

It allows the accuracy improvement of units without design changes!

Preload interchangeability

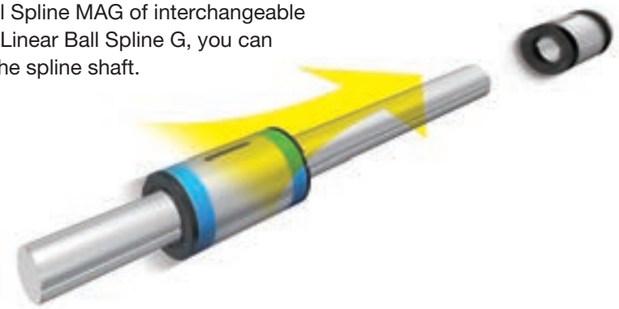
The simple structure is leveraged to allow dimensions to be managed with high accuracy, for preloaded external cylinders that are interchangeable.
It supports the applications requiring the rigidity of one higher rank.



It allows the rigidity improvement of units without design changes!

Maintenance free is achieved only by replacing the external cylinder!

By exchanging the external cylinder of Linear Ball Spline MAG of interchangeable specification with an external cylinder of C-Lube Linear Ball Spline G, you can achieve the maintenance free without changing the spline shaft.



C-Lube Linear Ball Spline MAG

MAG

C-Lube Maintenance-free™

Long term maintenance free supported!

Linear Ball Spline G

LSAG

Points

1 Compact size

Uses a unique ball retaining mechanism without using a retainer, allowing a small external cylinder outside diameter against shaft diameter.

2 Extremely small size realized by simple structure

The minimum size LSAG2 realizes an unparalleled small size of 2 mm shaft diameter and 6 mm external cylinder's outside diameter.

3 Wide range of variations for your needs

The external cylinder shape can be selected from two types, the standard (cylindrical shape) type and the flange type, and there are two types with different length of external cylinder with same section.
Also for spline shaft, the solid shaft and the hollow shaft that allows piping/wiring/air removal are prepared for your selection to meet the requirements of mechanical/unit specifications.

4 Stainless steel shaft with high corrosion resistance

The spline shafts made of stainless steel are highly corrosion-resistant. They are suitable where rust prevention oil is not preferred, such as in a cleanroom environment.

Identification Number and Specification

Example of an identification number

The specifications of MAG and LSAG series are indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a part code, a preload symbol, a classification symbol, an interchangeable code, and any supplemental codes for each specification to apply.

	1	2	3	4	5	6	7	8	9	10
Non-interchangeable specification										
Assembled set	MAG	L	T	5	C1	R150	T_1	H		/N
Interchangeable specification										
Single external cylinder	MAG	L		5	C1		T_1	H	S1	/N
Single spline shaft (1)	LSAG		T	5		R150		H	S1	
Assembled set	MAG	L	T	5	C1	R150	T_1	H	S1	/N

1 **Model**

2 **External cylinder length** — Model code Page Ⅱ－109

3 **Spline shaft shape**

4 **Size** — Dimensions Page Ⅱ－109

5 **Number of external cylinders**

6 **Spline shaft length** — Part code Page Ⅱ－109

7 **Preload amount** — Preload symbol Page Ⅱ－111

8 **Accuracy class** — Classification symbol Page Ⅱ－112

9 **Interchangeable** — Interchangeable code Page Ⅱ－115

10 **Special specification** — Supplemental code Page Ⅱ－115

Note (1) Indicate "LSAG" (solid shaft) or "LSAGT" (hollow shaft) for the model code of the single spline shaft regardless of the series and the combination of external cylinder models.

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

Identification Number and Specification —Model · External Cylinder Length ·

1 Model

C-Lube Linear Ball Spline MAG (MAG series)	Standard type	: MAG
	Flange type	: MAGF
Linear Ball Spline G (1) (LSAG series)	Standard type	: LSAG
	Flange type	: LSAGF

For applicable models and sizes, see Table 1.
Indicate "LSAG" (solid shaft) or "LSAGT" (hollow shaft) for the model code of the single spline shaft regardless of the series and the combination of external cylinder models.

Note (1) This model has no built-in C-Lube.

2 External cylinder length

Standard	: No symbol	For applicable models and sizes, see Table 1.
Long	: L	

3 Spline shaft shape

Solid shaft	: No symbol	For applicable models and sizes, see Table 1.
Hollow shaft	: T	

4 Size

2, 3, 4, 5, 6, 8, 10, 12, 15
20, 25, 30

For applicable models and sizes, see Table 1.

5 Number of external cylinders

: C○

For an assembled set, indicates the number of external cylinders assembled on a spline shaft. For a single external cylinder, only "C1" is specified.

6 Spline shaft length

: R○

The spline shaft length is indicated in mm.
For standard and maximum lengths, see the dimension table.

Spline Shaft Shape · Size · Number of External Cylinders · Spline Shaft Length—

Table 1 Models and sizes of MAG and LSAG series

Shape	External cylinder length	Model	Size 2	3	4	5	6	8	10	12	15	20	25	30
Standard type Solid shaft	Standard	MAG	–	–	○	○	○	○	○	○	–	–	–	–
		LSAG	○	○	○	○	○	○	○	○	○	○	○	○
	Long	MAGL	–	–	○	○	○	○	–	–	–	–	–	–
		LSAGL	–	–	–	○	○	○	○	○	○	○	○	○
Standard type Hollow shaft	Standard	MAGT	–	–	○	○	○	○	○	○	–	–	–	–
		LSAGT	–	–	○	○	○	○	○	○	–	–	–	–
	Long	MAGLT	–	–	○	○	○	○	–	–	–	–	–	–
		LSAGLT	–	–	–	○	○	○	○	○	–	–	–	–
Flange type Solid shaft	Standard	MAGF	–	–	–	○	○	○	○	○	–	–	–	–
		LSAGF	○	○	○	○	○	○	○	○	○	○	○	○
	Long	LSAGFL	–	–	–	○	○	○	○	○	○	○	○	○
Flange type Hollow shaft	Standard	MAGFT	–	–	–	○	○	○	○	○	–	–	–	–
		LSAGFT	–	–	○	○	○	○	○	○	–	–	–	–
	Long	LSAGFLT	–	–	–	○	○	○	○	○	–	–	–	–

Remark: For the models indicated in ▭, the interchangeable specification is available.

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

—Preload Amount—

7 Preload amount

Clearance Standard	: T_0	Specify this item for an assembled set or a single external cylinder.
Light preload	: No symbol	For details of the preload amount, see Table 2.
	: T_1	For applicable preload types, see Table 3.

Table 2 Preload amount

Item / Preload type	Preload symbol	Preload amount N	Operational conditions
Clearance	T_0	0 (1)	· Very light motion
Standard	(No symbol)	0 (2)	· Light and precise motion
Light preload	T_1	0.02 C_0	· Almost no vibrations · Load is evenly balanced · Light and precise motion

Notes (1) There is zero or subtle clearance.
(2) Indicates zero or minimal amount of preload.
Remark: C_0 indicates the basic static load rating.

Table 3 Application of preload

Size	Preload type (preload symbol)		
	Clearance (T_0)	Standard (No symbol)	Light preload (T_1)
2	○	○	–
3	○	○	–
4	○	○	–
5	–	○	○
6	–	○	○
8	–	○	○
10	–	○	○
12	–	○	○
15	–	○	○
20	–	○	○
25	–	○	○
30	–	○	○

Remark: The mark ▭ indicates that interchangeable specifications products are available.

—Accuracy Class—

8 Accuracy class

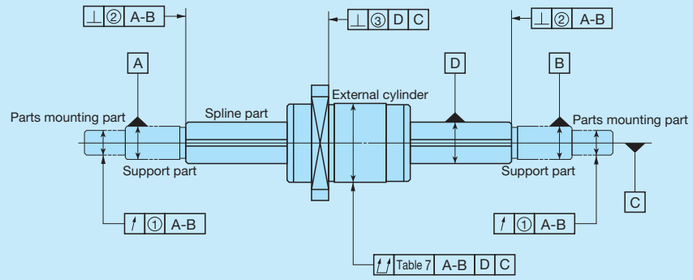
Ordinary	: No symbol	For interchangeable specification products, assemble an external cylinder and a spline shaft of the same accuracy class.
High	: H	For applicable accuracy class, see Table 4.
Precision	: P	For details of accuracy class, see Table 5, Table 6, and Table 7.

Table 4 Application of accuracy class

Size	Class (classification symbol)		
	Ordinary (No symbol)	High (H)	Precision (P)
2	○	○	○
3	○	○	○
4	○	○	○
5	○	○	○
6	○	○	○
8	○	○	○
10	○	○	○
12	○	○	○
15	○	○	○
20	○	○	○
25	○	○	○
30	○	○	○

Remark: The mark ▭ indicates that interchangeable specifications products are available.

Table 5 Tolerance of each part



unit: μm

Size	Relative to axial line of supporting part of spline shaft						③ Perpendicularity of mounting surface of flange with respect to axial line of spline shaft (2)		
	① Radial runout of periphery of parts mounting part (1)			② Perpendicularity of spline part end face (1)					
	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
2	33	14	8	22	9	6	27	11	8
3	33	14	8	22	9	6	27	11	8
4	33	14	8	22	9	6	27	11	8
5	33	14	8	22	9	6	27	11	8
6	33	14	8	22	9	6	27	11	8
8	33	14	8	22	9	6	27	11	8
10	41	17	10	22	9	6	33	13	9
12	41	17	10	22	9	6	33	13	9
15	46	19	12	27	11	8	33	13	9
20	46	19	12	27	11	8	33	13	9
25	53	22	13	33	13	9	39	16	11
30	53	22	13	33	13	9	39	16	11

Notes (1) The values are for the processed shaft ends.
(2) Applicable to the flange type.

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

Table 6 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 can be applied to 100 mm of the effective length of the spline at any position.

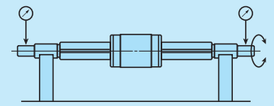
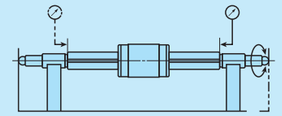
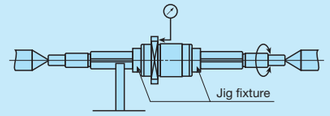
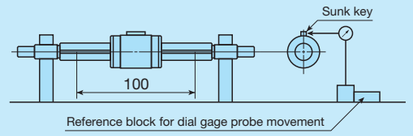
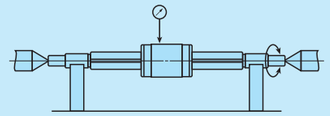
Table 7 Allowable values of total radial runout of spline shaft axial line

unit: μm

Overall length of spline shaft mm Over	Incl.	Size 2, 3, 4, 5, 6, 8 Ordinary (No symbol)	High (H)	Precision (P)	Size 10, 12 Ordinary (No symbol)	High (H)	Precision (P)	Size 15, 20 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
1 000	1 250	–	–	–	–	–	–	–	–	–

Overall length of spline shaft mm Over	Incl.	Size 25, 30 Ordinary (No symbol)	High (H)	Precision (P)
–	200	53	32	18
200	315	58	39	21
315	400	70	44	25
400	500	78	50	29
500	630	88	57	34
630	800	103	68	42
800	1 000	124	83	52
1 000	1 250	151	102	65

Table 8 Measuring methods of accuracy

Item	Measuring method	Illustration of measuring method
(1) Radial runout of periphery of parts mounting part with respect to axial line of supporting part of spline shaft (see Table 5 ①)	While supporting the spline shaft at its support part, place the dial gage probes on the outer peripheral faces of the parts mounting part and measure the deflection from one rotation of the spline shaft.	
(1) Perpendicularity of spline part end face with respect to axial line of supporting part of spline shaft (See Table 5 ②)	While supporting the spline shaft at its support part and one spline shaft end, place the dial gage probes on the spline end faces and obtain perpendicularity by measuring the deflection from one rotation of the spline shaft.	
Perpendicularity of mounting surface of flange with respect to axial line of spline shaft (see Table 5 ③)	While supporting the spline shaft at both centers and the outer peripheral faces of the spline shaft near the external cylinder and fixing the external cylinder on the spline shaft, place the dial gage probe on the flange mounting surface and obtain perpendicularity by measuring the deflection from one rotation of the spline shaft.	
Twist of grooves with respect to effective length of the spline part (see Table 6)	While supporting the spline shaft fixed, apply a unidirectional torsion moment load to the external cylinder (or measuring unit), place the dial gage probe vertically to the spline shaft on the side face of the sunk key attached on the external cylinder, and measure the deflection when the external cylinder and the dial gage probe are moved 100 mm in the axial direction at any position on the effective length of the spline shaft. However, the dial gage probe should be applied as near as possible to the outer peripheral face of the external cylinder.	
Total radial runout of axial line of spline shaft (see Table 7)	While supporting the spline shaft at its support part or at both centers, place a dial gage probe on the outer peripheral face of the external cylinder (or measuring unit) and measure the deflection from one rotation of the spline shaft at several positions in the axial direction to obtain the maximum value.	

Note (1) The accuracy are for the processed shaft ends.

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

9 Interchangeable

S1 specification	: S1	This is specified for the interchangeable specifications. Assemble a spline shaft and an external cylinder with the same interchangeable code. When using in combination with different interchangeable codes, please contact IKO. Note that the combination of interchangeable codes will not have any effect on accuracy. For applicable models and sizes, see Table 1. "No symbol" is indicated for non-interchangeable specification.
S2 specification	: S2	
Non-interchangeable specification	: No symbol	

10 Special specification

/BS, /N, /OH, /Q, /RE, /S, /Y

For applicable special specifications, see Table 9.1 and Table 9.2.
For combination of multiple special specifications, see Table 10.
For details of special specifications, see pages Ⅱ-116 and Ⅱ-117.

Table 9.1 Application of special specifications (Interchangeable specification, single external cylinder, and assembled set)

Special specification	Supplemental code	Size											
		2	3	4	5	6	8	10	12	15	20	25	30
No seal	/N	–	–	–	○	○	○	○	○	○	○	○	○
Oil hole (1)	/OH	–	–	–	○	○	○	○	○	○	○	○	○
With C-Lube plate (1)	/Q	–	–	–	○	○	○	○	○	–	–	–	–

Note (1) Applicable to LSAG series.

Table 9.2 Application of special specifications (Non-interchangeable specification)

Special specification	Supplemental code	Size											
		2	3	4	5	6	8	10	12	15	20	25	30
Stainless steel end plate (1)	/BS	–	–	–	○	○	○	○	○	○	–	–	–
No seal	/N	–	–	–	○	○	○	○	○	○	○	○	○
Oil hole (1)	/OH	–	○	○	○	○	○	○	○	○	○	○	○
With C-Lube plate (1)	/Q	–	–	–	○	○	○	○	○	–	–	–	–
Special environment seal (1)	/RE	–	–	–	○	○	○	○	○	○	–	–	–
Stainless steel spline shaft (2)	/S	–	–	–	○	○	○	○	○	○	○	○	○
Specified grease (1)	/Y	–	–	–	○	○	○	○	○	○	–	–	–

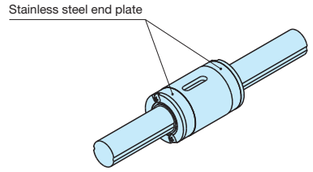
Notes (1) Applicable to LSAG series.
(2) Applicable to solid shaft.

Table 10 Combination of supplemental codes

N	●					
OH	●	○				
Q	●	○	○			
RE	●	–	●	●		
S	●	●	●	●	●	
Y	●	●	●	–	●	●
	BS	N	OH	Q	RE	S

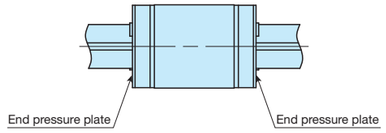
Remarks 1. The combination of "-" shown in the table is not available.
2. Contact IKO for the combination of the interchangeable specification marked with ●.
3. When using multiple types for combination, please indicate by arranging the symbols in alphabetical order.

Stainless steel end plate /BS



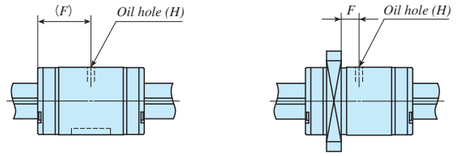
The standard synthetic resin end plates are replaced with stainless steel end plates. The total length of the external cylinder remains unchanged.

No seal /N



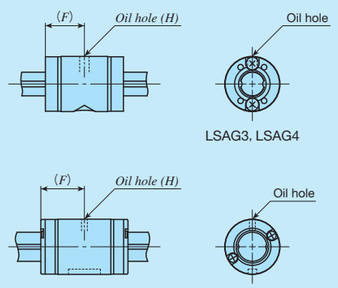
Seals at both ends of the external cylinder can be replaced with end pressure plates, which do not come in contact with the spline shaft, to reduce frictional resistance.
This specification is not effective for dust protection.

Oil hole /OH



An oil hole is created on the external cylinder. For dimensions, see Table 11.1 and Table 11.2.

Table 11.1 Location and diameter of oil hole on a standard type external cylinder (Supplemental code /OH)

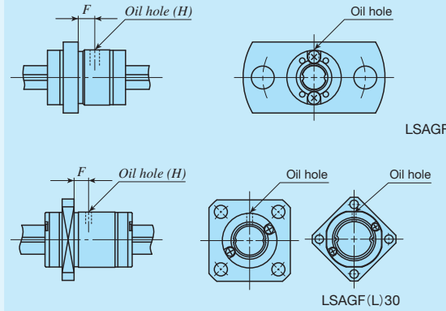


unit: mm

Identification number	F	H	Identification number	F	H
LSAG 3	5	1.2	–	–	–
LSAG 4	6	1.5	–	–	–
LSAG 5	9		LSAGL 5	13	1.5
LSAG 6	10.5		LSAGL 6	15	
LSAG 8	12.5		LSAGL 8	18.5	
LSAG10	15	2	LSAGL10	23.5	2
LSAG12	17.5		LSAGL12	27	
LSAG15	20		LSAGL15	32.5	
LSAG20	25	3	LSAGL20	35.5	3
LSAG25	30		LSAGL25	42	
LSAG30	35		LSAGL30	49	

Remark: A typical identification number is indicated, but is applied to all LSAG series standard type models of the same size.

Table 11.2 Location and diameter of oil hole on a flange type external cylinder (Supplemental code /OH)



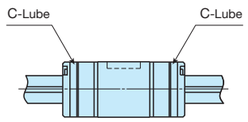
unit: mm

Identification number	F	H	Identification number	F	H
LSAGF 3	2.1	1.2	–	–	–
LSAGF 4	2.8	1.5	–	–	–
LSAGF 5			LSAGFL 5	5.8	1.5
LSAGF 6	3.5		LSAGFL 6	8	
LSAGF 8			LSAGFL 8	9.5	
LSAGF10	5	2	LSAGFL10	13.3	2
LSAGF12	7.5		LSAGFL12	17	
LSAGF15	9		LSAGFL15	21.5	
LSAGF20	11	3	LSAGFL20	21.5	3
LSAGF25	13		LSAGFL25	25	
LSAGF30	14		LSAGFL30	28	

Remark: A typical identification number is indicated, but is applied to all LSAG series flange type models of the same size.

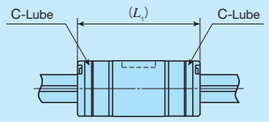
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

With C-Lube plate /Q



The C-Lube impregnated with lubrication oil is attached inside the seal of the external cylinder, so that the interval for reapplicating lubricant can be extended. For the total length of the external cylinder with C-Lube plate, see Table 12.

Table 12 Dimension of external cylinder with C-Lube plate (Supplemental code /Q)

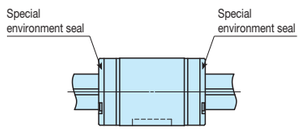


unit: mm

Identification number	L_1	Identification number	L_1
LSAG 5	24	LSAGL 5	32
LSAG 6	27	LSAGL 6	36
LSAG 8	33	LSAGL 8	45
LSAG10	38	LSAGL10	55
LSAG12	43	LSAGL12	62

Remarks 1. The dimensions of the external cylinder with C-Lube at both ends are indicated.
2. A typical identification number is indicated, but is applied to all LSAG series models of the same size.

Special environment seal /RE



The standard seals are replaced with seals for special environment that can be used at high temperatures. The total length of the external cylinder remains unchanged.

Stainless steel spline shaft /S

The material of the solid spline shaft is changed to stainless steel. The load rating will change to a value obtained by multiplying the load rating for the steel spline shaft by a factor of 0.8.

Specified grease /YCG /YCL /YAF /YBR /YNG

The type of pre-packed grease can be changed by the supplemental code.

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

Spline shaft strength

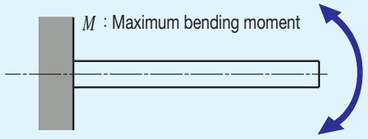
IKO Linear Ball Spline spline shafts can receive loads in all directions. Therefore, attention must be paid to spline shaft strength.

For bending load

For bending load on the spline shaft, select a shaft diameter that fulfills the conditions in formula (1).

$$M=\sigma \times Z \quad \cdots\cdots (1)$$

M : Maximum bending moment acting on spline shaft N·mm
σ : Spline shaft allowable bending stress 98 N/mm^2
Z : Section modulus of spline shaft mm^3 (See Table 13)

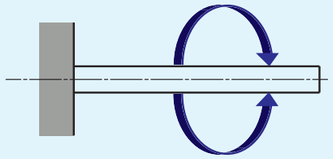


For torsion load

For torsion load on the spline shaft, select a shaft diameter that fulfills the conditions in formula (2).

$$T=\tau a \times Zp \quad \cdots\cdots (2)$$

T : Maximum torsion moment N·mm
τa : Spline shaft allowable torsion stress 49 N/mm^2
Zp : Polar section modulus of spline shaft mm^3 (See Table 13)



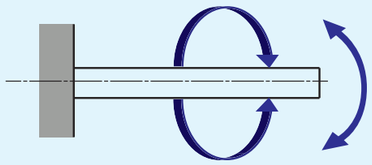
For simultaneous torsion and bending load

For simultaneous torsion and bending load on the spline shaft, calculate the shaft diameters from the equivalent bending moment formula (3) and the equivalent torsion moment formula (4) and use the larger value.

T : Maximum torsion moment

Equivalent bending moment Me

$$Me=\frac{1}{2}(M+\sqrt{M^2+T^2}) \quad \cdots\cdots (3)$$
$$Me=\sigma \times Z$$



Equivalent torsion moment Te

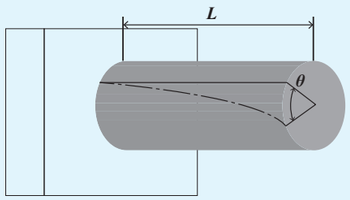
$$Te=\sqrt{M^2+T^2} \quad \cdots\cdots (4)$$
$$Te=\tau a \times Zp$$

Stiffness of spline shaft

The torsion angle of the spline shaft caused by torsion moment must not exceed 0.25° per 1 meter.

$$\theta=\frac{T \times L}{G \times Ip}\times\frac{360}{2\pi} \quad \cdots\cdots (5)$$
$$0.25^\circ \geqq \frac{1000}{L}\theta$$

θ : Torsion angle °
L : Spline shaft length mm
G : Shear Modulus 7.9×10^4 N/mm^2
Ip : Polar moment of inertia of section area of spline shaft mm^4 (See Table 13)



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

Spline shaft sectional characteristics

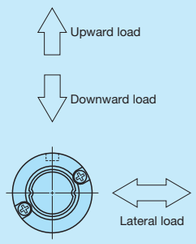
Table 13 Spline shaft sectional characteristics

Size	Moment of inertia of sectional area mm⁴		Section modulus : Z mm³		Polar moment of inertia of section area of spline shaft: I_P mm⁴		Polar section modulus : Z_P mm³	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
2	0.60	–	0.65	–	1.4	–	1.4	–
3	3.6	–	2.5	–	7.5	–	5.0	–
4	12	12	6.0	6.0	24	24	12	12
5	29	28	12	11	59	58	24	23
6	61	60	21	20	120	120	41	41
8	190	190	49	47	390	380	98	96
10	470	460	95	93	960	940	190	190
12	990	920	170	160	2 010	1 880	330	310
15	1 580	–	240	–	3 260	–	480	–
20	5 100	–	570	–	10 500	–	1 150	–
25	12 000	–	1 080	–	24 800	–	2 200	–
30	25 300	–	1 890	–	52 200	–	3 840	–

Load Direction and Load Rating

The MAG and LSAG series must be used with their load rating corrected in accordance to the load direction. The basic dynamic load rating and basic static load rating shown in the dimension table should be corrected to values in Table 14.

Table 14 Load ratings corrected for load direction



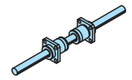
Load rating and load direction / Size	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
2~12	C	C	1.47C	C_0	C_0	1.73C_0
15~30	C	C	1.13C	C_0	C_0	1.19C_0

Identification number and quantity for ordering

To order an assembled set of MAG and LSAG series, please specify the number of sets based on the number of spline shafts. For single external cylinder or single spline shaft of the interchangeable specification, please specify the number of units.

Non-interchangeable specification

Assembled set



(When 1 set is needed)

Example of identification number indication

MAGF 10 C2 R200 T1 H /N

Order quantity: 1 set

Interchangeable specification

Single external cylinder

(When 2 pieces are needed)

Example of identification number indication

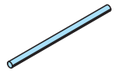
MAGF 10 C1 T1 H S○ /N

Please specify S1 or S2.

Only C1 can be specified.

Order quantity: 2 pieces

Single spline shaft



(When 1 unit is needed)

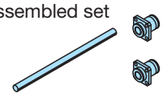
Example of identification number indication

LSAG 10 R200 H S○

Please specify S1 or S2.

Order quantity: 1 unit

Assembled set



(When 1 set is needed)

Example of identification number indication

MAGF 10 C2 R200 T1 H S○ /N

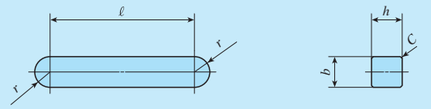
Please specify S1 or S2.

Order quantity: 1 set

Dimensions of Attached Key

The MAG and LSAG series standard types have keys shown in Table 15 attached.

Table 15 Dimensions and tolerance of attached key



unit: mm

Size	b	Dim. b tolerance	h	Dim. h tolerance	ℓ	r	C
5	2	+0.016 +0.006	2	0 −0.025	3.8	1	0.16~0.25
6					5.8		
8	2.5		2.5			1.25	
10	3		3		7.8	1.5	
12					11.8		
15	3.5	+0.024 +0.012	3.5	0 −0.030	16	1.75	
20	4		4		21.5	2	
25	5		5		23.5	2.5	0.25~0.4
30	7	+0.030 +0.015	7	0 −0.036	27.5	3.5	

Remark: No key is attached to the Size 2, 3, and 4 series. For details of how to fix the key, see page Ⅱ-121.

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

Lubrication

Lithium-soap base grease with extreme-pressure additive (Alvania EP Grease 2 [Shell Lubricants Japan K.K.]) is pre-packed in MAG and LSAG series. Additionally, MAG series has C-Lube placed in the recirculation part of balls, so that the interval for reapplicating lubricant can be extended and maintenance works such as grease job can be reduced significantly.
Perform re-greasing as below.
(1) Size 2, 3, and 4 series
Specify either direct application of grease to the spline shaft raceway surface or oil hole specification (/OH). Note that the oil hole specification (/OH) is not available for the Size 2 series.
(2) Size 5 and higher series
Apply grease directly to the spline shaft raceway surface or the rolling elements. You may also specify the oil hole specification (/OH).

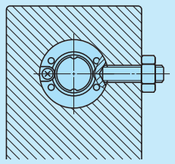
Dust Protection

The external cylinders of MAG and LSAG series are equipped with special rubber seals as standard for dust protection. However, if large amount of contaminant or dust are floating, or if large particles of foreign substances such as chips or sand may adhere to the spline shaft, it is recommended to attach a protective cover to the linear motion mechanism.
The Size 2, 3, and 4 series are not provided with seals. If the Size 3 and 4 series with seals is needed, contact IKO.

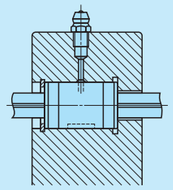
Precaution for Use

❶Fitting of external cylinder
Generally, transition fit (J7) is used for fitting between the external cylinder and the housing bore. When high accuracy and high rigidity are not required, clearance fit (H7) can also be used.

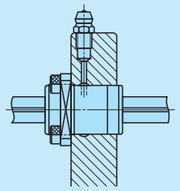
❷ Typical mounting structure
Mounting examples of the external cylinder are shown in Fig. 1.
The rotation detent for external cylinders of the Size 2, 3, and 4 series should be mounted using the countersink provided on the external cylinder. Use screws M1.2 to M1.6 for Size 2, M1.6 to M2 for Size 3, and M2 to M2.5 for Size 4. At this point, be careful not to deform the external cylinder with screws.



Rotation detent for external cylinder for size 2, 3 and 4



Mounting example for standard type
(Oil hole /OH specification)



Mounting example for flange type
(Oil hole /OH specification)

Fig. 1 Mounting examples of external cylinder

❸ Multiple external cylinders used in close proximity
When using multiple external cylinders in close proximity, greater load may be applied than the calculated value depending on the accuracy of the mounting surfaces and reference mounting surfaces of the machine or device. In such cases, allowance for greater applied load than the calculated value should be made.
If two or more external cylinders are assembled on a spline shaft and two or more keys are used to fix the rotational direction of the external cylinder, the keyway position of the external cylinders are aligned before delivery. Please contact IKO.

❹ Additional machining of spline shaft end
- When machining the outside surface of the spline shaft, make sure that the maximum diameter of the end machining part does not exceed d_1 in the dimension table. If the machined outside surface exceeds d_1, it will leave a track groove.
- Perform annealing if additional machining will be performed.
- Shaft guide shapes for spline shafts can be prepared upon request. Please contact IKO for further information.

❺ Operating temperature
MAG Series contains C-Lube. The operating temperature should not exceed 80˚C. The maximum operating temperature for LSAG series is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.
When specifying LSAG series special specification with C-Lube plate (supplemental code /Q), utilize it below 80˚C.

❻ Arrangement of flange type (non-interchangeable specification) external cylinder
Table 16 shows arrangements of multiple flange type external cylinders in non-interchangeable specification. Arrangements that are not in Table 16 can be prepared upon request. Contact IKO for further information.

Table 16 Arrangement of flange type (Non-interchangeable specification) external cylinder

Number of external cylinders	Arrangement of external cylinders
1	
2	
3	
4	
5	
6	

❼ When mounting multiple assembled sets at the same time
For interchangeable specification products, assemble an external cylinder and a spline shaft with the same interchangeable code ("S1" or "S2").
For non-interchangeable specification products, use the same combination of external cylinder and spline shaft upon delivery.

❽ Assembly of external cylinder on spline shaft
When assembling the external cylinder on the spline shaft, correctly fit the grooves of the external cylinder and the spline shaft and move the external cylinder softly in parallel direction. Rough handling may result in damaging of seals or dropping of steel balls.
The non-interchangeable specification products are already adjusted so as to provide the best accuracy when the IKO marks of the external cylinder and the spline shaft face the same direction (see Fig. 2). Be careful not to change the assembly direction.

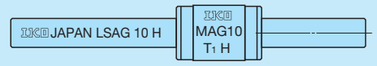


Fig. 2 Assembly direction of external cylinder

❾ Mounting of external cylinder
When press-fitting the external cylinder to the housing, assemble them correctly by using a press and a suitable jig fixture. (See Fig. 3.)

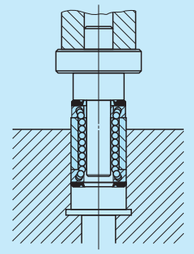


Fig. 3 Press-fitting of external cylinder

MAG・LSAG

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

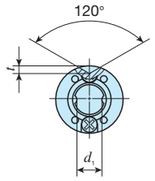
IKO C-Lube Linear Ball Spline MAG

Standard type

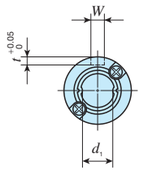
Shape: **MAG · LSAG**

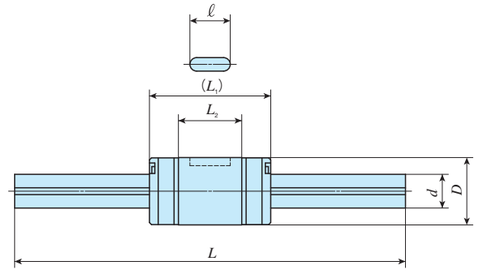
Size	2	3	4	5	6	8
	10	12	15	20	25	30

MAG(L)T
Hollow shaft dimension for LSAG(L)T



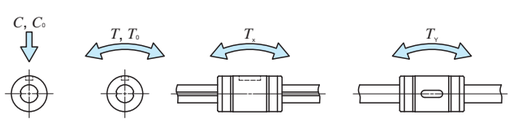
MAG(L)(T)4
LSAG 2
LSAG 3
LSAG(T) 4





Identification number: MAG series	Identification number: LSAG series (No C-Lube)	Interchangeable	Mass (Ref.) g: External cylinder	Mass (Ref.) g: Spline shaft (per 100 mm)	External cylinder dimensions and tolerances mm: D	Dim. D tolerance	L_1	L_2	W	Dim. W tolerance	t	ℓ	Spline shaft dimensions and tolerances mm: d	Dim. 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	Static moment rating (4): T_Y N · m
–	LSAG 2(1)	–	1.0	2.3	6	0 -0.008	8.5	4.7	–	–	0.7	–	2	0 -0.010	1.2	–	50 100	100	222	237	0.28	0.30	0.22 / 1.4	0.39 / 2.4
–	LSAG 3(1)	–	2.1	5.4	7	0 -0.009	10	5.9	–	–	0.8	–	3	0 -0.010	2.2	–	100 150	150	251	285	0.45	0.51	0.31 / 1.9	0.53 / 3.3
MAG 4(1)		–	2.5	9.6	8	0 -0.009	15	7.9	–	–	1	–	4	0 -0.012	3.2	–	100 150	200	303	380	0.70	0.87	0.52 / 3.80	0.90 / 6.50
	LSAG 4(1)	–					12									–							0.52 / 2.9	0.90 / 5.0
MAGT 4(1)		–		8.2			15									1.5		150					0.52 / 3.80	0.90 / 6.50
	LSAGT 4(1)	–					12																0.52 / 2.9	0.90 / 5.0
MAGL 4(1)	–	–	4.1	9.6			21	13.9								–		200	441	665	1.00	1.50	1.50 / 8.60	2.60 / 15.0
MAGLT 4(1)	–	–		8.2												1.5		150						
MAG 5	LSAG 5	○	4.8	14.9	10	0 -0.009	18	9.4	2	+0.014 0	1.2	6	5	0 -0.012	4.2	–	100 150	200	587	641	1.8	1.9	1.0 / 7.9	1.8 / 13.6
MAGT 5	LSAGT 5	○		12.4												2								
MAGL 5	LSAGL 5	○	8.1	14.9			26	16.9								–			879	1 180	2.6	3.5	3.2 / 19.3	5.5 / 33.4
MAGLT 5	LSAGLT 5	○		12.4												2								
MAG 6	LSAG 6	○	8.9	19	12	0 -0.011	21	12.4	2	+0.014 0	1.2	8	6	0 -0.012	5.2	–	150 200	300	711	855	2.5	3.0	1.7 / 11.7	3.0 / 20.3
MAGT 6	LSAGT 6	○		16.5												2								
MAGL 6	LSAGL 6	○	14.5	19			30	21.4								–			1 030	1 500	3.6	5.2	5.0 / 27.6	8.6 / 47.8
MAGLT 6	LSAGLT 6	○		16.5												2								
MAG 8	LSAG 8	○	15.9	39	15	0 -0.011	25	14.6	2.5	+0.014 0	1.5	8.5	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
MAGT 8	LSAGT 8	○		33												3		400						
MAGL 8	LSAGL 8	○	26.5	39			37	26.6								–		500	1 800	2 470	8.4	11.5	10.3 / 56.3	17.8 / 97.5
MAGLT 8	LSAGLT 8	○		33												3		400						

Notes (1) No seal is included.
(2) d_1 represents the maximum diameter for end machining. (Perform annealing if end machining will be performed.)
(3) Represents standard length. We can produce other than the standard length, please specify the length of spline shaft by indicating the length in mm with the identification number.
(4) The direction of basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T), static torque rating and static moment rating (T_0, T_X, T_Y) are shown in the sketches below.
The upper values of T_X and T_Y are for one external cylinder and the lower values are for two external cylinders inclose contact.



Example of identification number of assembled set

Model code			Dimensions	Part code		Preload symbol	Classification symbol	Interchangeable code	Supplemental code
MAG	L	T	5	C2	R150	T1	H		/N
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Model

MAG	Standard type
LSAG	

② Length of external cylinder

No symbol	Standard
L	Long

③ Spline shaft shape

No symbol	Solid shaft
T	Hollow shaft

④ Size: 2, 3, 4, 5, 6, 8

⑤ Number of external cylinders (2)

⑥ Length of spline shaft (150 mm)

⑦ Preload amount

T0	Clearance
No symbol	Standard
T1	Light preload

⑧ Accuracy class

No symbol	Ordinary
H	High
P	Precision

⑨ Interchangeable

No symbol	Non-interchangeable specification
S1	S1 specification
S2	S2 specification

⑩ Special specification: BS, N, OH, Q, RE, S, Y

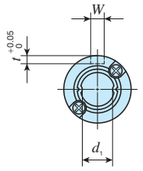
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO C-Lube Linear Ball Spline MAG

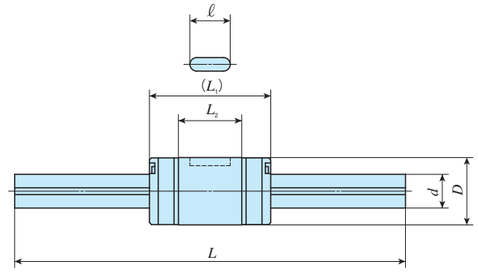
Standard type

Shape: **MAG · LSAG**

Size	2	3	4	5	6	8
	10	12	15	20	25	30

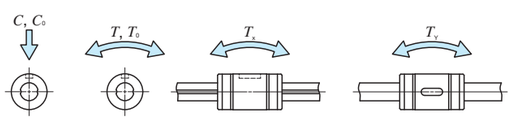


MAGT
Hollow shaft dimension for LSAG(L)T



Identification number		Interchangeable	Mass (Ref.) g		External cylinder dimensions and tolerances mm								Spline shaft dimensions and tolerances mm						Basic dynamic load rating (3)	Basic static load rating (3)	Dynamic torque rating (3)	Static torque rating (3)	Static moment rating (3)	
MAG series	LSAG series (No C-Lube)		External cylinder	Spline shaft (per 100 mm)	D	Dim. D tolerance	L_1	L_2	W	Dim. W tolerance	t	ℓ	d		Dim. d tolerance	d_1 (1)	d_2	L (2)	Maximum length	C N	C_0 N	T N · m	T_0 N · m	T_X N · m	T_Y N · m
MAG 10	LSAG 10	○	31.5	60.5	19	0 -0.013	30	18.2	3	+0.014 0	1.8	11	10		0 -0.015	8.9	–	200 300	600	1 880	2 150	10.9	12.5	7.0	12.1
MAGT 10	LSAGT 10	○		51													4						41.5	71.9
–	LSAGL 10	○	56.5	60.5			47	34.9									–			2 850	4 040	16.6	23.4	22.7	39.3
–	LSAGLT 10	○		51													4							115	200
MAG 12	LSAG 12	○	44	87.5	21	0 -0.013	35	23	3	+0.014 0	1.8	15	12		0 -0.018	10.9	–	200 300 400	800	2 180	2 690	14.8	18.3	10.6	18.3
MAGT 12	LSAGT 12	○		66													6						59.1	102
–	LSAGL 12	○	76.8	87.5			54	42									–			3 220	4 850	21.9	33.0	32.2	55.7
–	LSAGLT 12	○		66													6							157	272
–	LSAG 15	○	59.5	111	23	0 -0.013	40	27	3.5	+0.018 0	2	20	13.6		0 -0.018	11.6	–	200 300 400	1 000	4 180	6 070	31.3	45.6	27.8	33.2
–	LSAGL 15	○	110				65	52									–			6 400	11 500	48.0	86.5	152	181
–	LSAG 20	○	130	202	30	0 -0.016	50	33	4	+0.018 0	2.5	26	18.2		0 -0.021	15.7	–	300 400 500	1 000	6 600	9 040	66.0	90.4	94.0	112
–	LSAGL 20	○	198				71	54									–	600		9 270	15 100	92.7	151	449	535
–	LSAG 25	○	220	310	37	0 -0.016	60	39.2	5	+0.018 0	3	29	22.6		0 -0.021	19.4	–	300 400 500	1 200	11 200	14 300	139	178	48.6	58.0
–	LSAGL 25	○	336				84	63.2									–	600 800		15 400	23 200	193	290	288	343
–	LSAG 30	○	430	450	45	0 -0.016	70	43	7	+0.022 0	4	35	27.2		0 -0.021	23.5	–	400 500 600	1 200	15 400	19 400	231	292	127	151
–	LSAGL 30	○	634				98	71									–	700 1 100		21 300	31 600	320	474	650	774
																								92.8	111
																								551	656
																								1 229	273
																								1 190	1 420
																								147	176
																								874	1 040
																								364	434
																								1 900	2 260

Notes (1) d_1 represents the maximum diameter for end machining. (Perform annealing if end machining will be performed.)
(2) Represents standard length. We can produce other than the standard length, please specify the length of spline shaft by indicating the length in mm with the identification number.
(3) The direction of basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T), static torque rating and static moment rating (T_0, T_X, T_Y) are shown in the sketches below.
The upper values of T_X and T_Y are for one external cylinder and the lower values are for two external cylinders inclose contact.



Example of identification number of assembled set

Model code			Dimensions	Part code		Preload symbol	Classification symbol	Interchangeable code	Supplemental code
MAG		T	12	C2	R300	T1	H		/N
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Model

MAG	Standard type
LSAG	

② Length of external cylinder

No symbol	Standard
L	Long

③ Spline shaft shape

No symbol	Solid shaft
T	Hollow shaft

④ Size

10, 12, 15, 20, 25, 30

⑤ Number of external cylinders (2)

⑥ Length of spline shaft (300 mm)

⑦ Preload amount

No symbol	Standard
T1	Light preload

⑧ Accuracy class

No symbol	Ordinary
H	High
P	Precision

⑨ Interchangeable

No symbol	Non-interchangeable specification
S1	S1 specification
S2	S2 specification

⑩ Special specification

BS, N, OH, Q, RE, S, Y

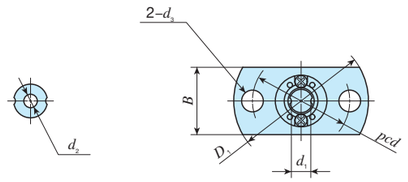
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO C-Lube Linear Ball Spline MAG

Flange type

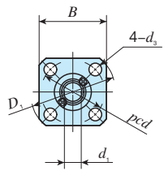
Shape: **MAGF · LSAGF**

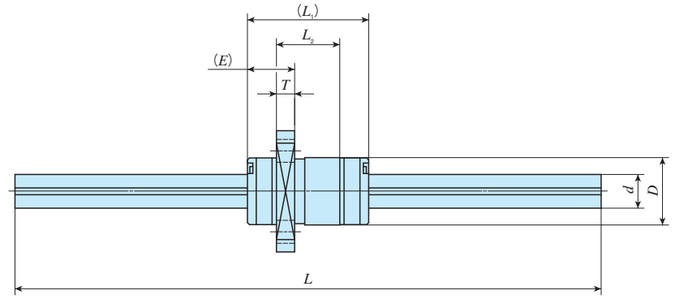
Size	2	3	4	5	6	8
	10	12	15	20	25	30



MAGFT
Hollow shaft dimension for LSAGF(L)T

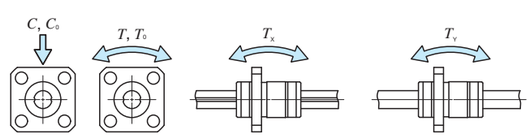
LSAGF 2
LSAGF 3
LSAGF(T) 4





Identification number: MAG series	Identification number: LSAG series (No C-Lube)	Interchangeable	Mass (Ref.) g: External cylinder	Mass (Ref.) g: Spline shaft (per 100 mm)	External cylinder dimensions and tolerances mm: D	Dim. D tolerance	L_1	L_2	D_1	B	E	T	pcd	d_3	Spline shaft dimensions and tolerances mm: d	Dim. 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	Static moment rating (4): T_Y N·m
–	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	2	0 -0.010	1.2	–	50 100	100	222	237	0.28	0.30	0.22 1.4	0.39 2.4
–	LSAGF 3(1)	–	3.7	5.4	7	0 -0.009	10	5.9	18	9	4	1.9	13	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
–	LSAGF 4(1)	–	5.1	9.6	8	0 -0.009	12	7.9	21	10	4.6	2.5	15	3.4	4	0 -0.012	3.2	–	100 150	200	303	380	0.70	0.87	0.52 2.9	0.90 5.0
–	LSAGFT 4(1)	–		8.2														1.5		150						
MAGF 5	LSAGF 5	○	8.9	14.9	10	0 -0.009	18	9.4	23	18	7	2.7	17	3.4	5	0 -0.012	4.2	–	100 150	200	587	641	1.8	1.9	1.0 7.9	1.8 13.6
MAGFT 5	LSAGFT 5	○		12.4														2								
–	LSAGFL 5	○	12	14.9			26	16.9										–			879	1 180	2.6	3.5	3.2 19.3	5.5 33.4
–	LSAGFLT 5	○		12.4														2								
MAGF 6	LSAGF 6	○	13.9	19	12	0 -0.011	21	12.4	25	20	7	2.7	19	3.4	6	0 -0.012	5.2	–	150 200	300	711	855	2.5	3.0	1.7 11.7	3.0 20.3
MAGFT 6	LSAGFT 6	○		16.5														2								
–	LSAGFL 6	○	19.5	19			30	21.4										–			1 030	1 500	3.6	5.2	5.0 27.6	8.6 47.8
–	LSAGFLT 6	○		16.5														2								
MAGF 8	LSAGF 8	○	23.5	39	15	0 -0.011	25	14.6	28	22	9	3.8	22	3.4	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
MAGFT 8	LSAGFT 8	○		33														3		400						
–	LSAGFL 8	○	34.1	39			37	26.6										–		500	1 800	2 470	8.4	11.5	10.3 56.3	17.8 97.5
–	LSAGFLT 8	○		33														3		400						

Notes (1) No seal is included.
(2) d_1 represents the maximum diameter for end machining. (Perform annealing if end machining will be performed.)
(3) Represents standard length. We can produce other than the standard length, please specify the length of spline shaft by indicating the length in mm with the identification number.
(4) The direction of basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T), static torque rating and static moment rating (T_0, T_X, T_Y) are shown in the sketches below.
The upper values of T_X and T_Y are for one external cylinder and the lower values are for two external cylinders inclose contact.



Example of identification number of assembled set

Model code			Dimensions	Part code		Preload symbol	Classification symbol	Interchangeable code	Supplemental code
MAGF	L	T	5	C2	R150	T1	H		/N
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Model
MAGF	Flange type
LSAGF	

② Length of external cylinder
No symbol	Standard
L	Long

③ Spline shaft shape
No symbol	Solid shaft
T	Hollow shaft

④ Size
2, 3, 4, 5, 6, 8

⑤ Number of external cylinders (2)

⑥ Length of spline shaft (150 mm)

⑦ Preload amount
T_0	Clearance
No symbol	Standard
T_1	Light preload

⑧ Accuracy class
No symbol	Ordinary
H	High
P	Precision

⑨ Interchangeable
No symbol	Non-interchangeable specification
S1	S1 specification
S2	S2 specification

⑩ Special specification
BS, N, OH, Q, RE, S, Y

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

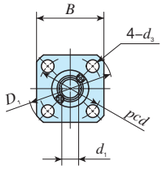
IKO C-Lube Linear Ball Spline MAG

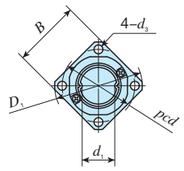
Flange type

Shape: **MAGF · LSAGF**

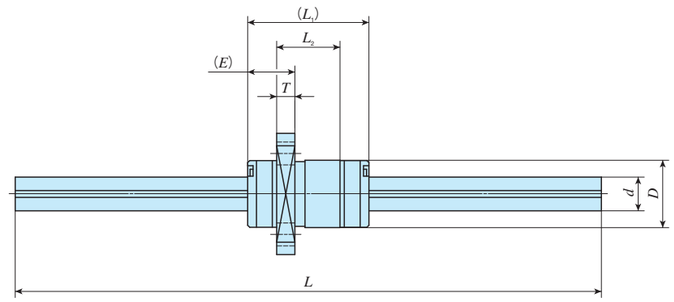
Size	2	3	4	5	6	8
	10	12	15	20	25	30

MAGFT
Hollow shaft dimension for LSAGF(L)T



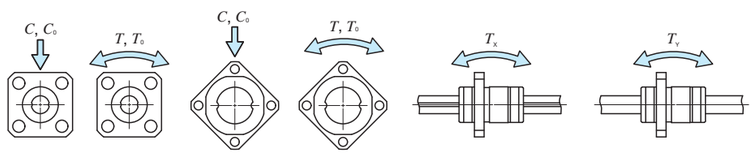


LSAGF(L) 30



Identification number		Interchangeable	Mass (Ref.) g		External cylinder dimensions and tolerances mm										Spline shaft dimensions and tolerances mm						Basic dynamic load rating (3)	Basic static load rating (3)	Dynamic torque rating (3)	Static torque rating (3)	Static moment rating (3)	
MAG series	LSAG series (No C-Lube)		External cylinder	Spline shaft (per 100 mm)	D	Dim. D tolerance	L_1	L_2	D_1	B	E	T	pcd	d_3	d	Dim. d tolerance	d_1(1)	d_2	L(2)	Maximum length	C N	C_0 N	T N · m	T_0 N · m	T_X N · m	T_Y N · m
MAGF 10	LSAGF 10	○	45	60.5	19	0 -0.013	30	18.2	36	28	10	4.1	28	4.5	10	0 -0.015	8.9	–	200 300	600	1 880	2 150	10.9	12.5	7.0 41.5	12.1 71.9
MAGFT 10	LSAGFT 10	○		51														4								
–	LSAGFL 10	○	70.1	60.5			47	34.9										–			2 850	4 040	16.6	23.4	22.7 115	39.3 200
–	LSAGFLT 10	○		51														4								
MAGF 12	LSAGF 12	○	59	87.5	21	0 -0.013	35	23	38	30	10	4	30	4.5	12	0 -0.018	10.9	–	200 300 400	800	2 180	2 690	14.8	18.3	10.6 59.1	18.3 102
MAGFT 12	LSAGFT 12	○		66														6								
–	LSAGFL 12	○	91.8	87.5			54	42										–			3 220	4 850	21.9	33.0	32.2 157	55.7 272
–	LSAGFLT 12	○		66														6								
–	LSAGF 15	○	77	111	23	0 -0.013	40	27	40	31	11	4.5	32	4.5	13.6	0 -0.018	11.6	–	200 300 400	1 000	4 180	6 070	31.3	45.6	27.8 152	33.2 181
–	LSAGFL 15	○	128				65	52										–			6 400	11 500	48.0	86.5	94.0 449	112 535
–	LSAGF 20	○	150	202	30	0 -0.016	50	33	46	35	14	5.5	38	4.5	18.2	0 -0.021	15.7	–	300 400 500 600	1 000	6 600	9 040	66.0	90.4	48.6 288	58.0 343
–	LSAGFL 20	○	218				71	54										–			9 270	15 100	92.7	151	127 650	151 774
–	LSAGF 25	○	255	310	37	0 -0.016	60	39.2	57	43	17	6.6	47	5.5	22.6	0 -0.021	19.4	–	300 400 500 600 800	1 200	11 200	14 300	139	178	92.8 551	111 656
–	LSAGFL 25	○	371				84	63.2										–			15 400	23 200	193	290	229 1 190	273 1 420
–	LSAGF 30	○	476	450	45	0 -0.016	70	43	65	50	21	7.5	54	6.6	27.2	0 -0.021	23.5	–	400 500 600 700 1 100	1 200	15 400	19 400	231	292	147 874	176 1 040
–	LSAGFL 30	○	680				98	71										–			21 300	31 600	320	474	364 1 900	434 2 260

Notes (1) d_1 represents the maximum diameter for end machining. (Perform annealing if end machining will be performed.)
(2) Represents standard length. We can produce other than the standard length, please specify the length of spline shaft by indicating the length in mm with the identification number.
(3) The direction of basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T), static torque rating and static moment rating (T_0, T_X, T_Y) are shown in the sketches below.
The upper values of T_X and T_Y are for one external cylinder and the lower values are for two external cylinders inclose contact.



LSAGF(L) 30

Example of identification number of assembled set

Model code			Dimensions	Part code		Preload symbol	Classification symbol	Interchangeable code	Supplemental code
MAGF	__	T	12	C2	R300	T1	H	__	/N
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Model

MAGF	Flange type
LSAGF	

② Length of external cylinder

No symbol	Standard
L	Long

③ Spline shaft shape

No symbol	Solid shaft
T	Hollow shaft

④ Size: 10, 12, 15, 20, 25, 30

⑤ Number of external cylinders (2)

⑥ Length of spline shaft (300 mm)

⑦ Preload amount

No symbol	Standard
T1	Light preload

⑧ Accuracy class

No symbol	Ordinary
H	High
P	Precision

⑨ Interchangeable

No symbol	Non-interchangeable specification
S1	S1 specification
S2	S2 specification

⑩ Special specification: BS, N, OH, Q, RE, S, Y

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

Linear Bushing

Linear Bushing G
Linear Bushing
Miniature Linear Bushing

Linear Bushing G

LMG

Points

● High load capacity

1 The structure that balls in two rows have contact with the track groove of the shaft allows greater rigidity and larger load capacity.

● Solid shaft and hollow shaft

2 There are two types of shafts with grooved raceway: a solid shaft and a hollow shaft. The hollow shaft is useful for piping, wiring, air removal, etc.

● Dimensionally compatible with Linear Bushing LM

3 LMG series are dimensionally compatible with Linear Bushing LM to allow easy replacement.

Identification Number and Specification

Example of an identification number

The specification of LMG series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a part code, and a supplemental code for each specification to apply.

Interchangeable specification	1	2	3	4	5	6
Single external cylinder	LMG		10	C1		/U
Single shaft with grooved raceway	LMG	T	10		R300	
Assembled set	LMG	T	10	C1	R300	/U

1 **Model** — Model code Page Ⅱ－135

2 **Shape of shaft with grooved raceway** — Model code Page Ⅱ－135

3 **Size** — Dimensions Page Ⅱ－135

4 **Number of external cylinders** — Part code Page Ⅱ－135

5 **Length of shaft with grooved raceway** — Part code Page Ⅱ－135

6 **Special specification** — Supplemental code Page Ⅱ－135

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

Identification Number and Specification –Model · Shape of Shaft · Size · Number of External Cylinders · Length of Shaft · Special Specification–

1 Model

Linear Bushing G (LMG series) : LMG

For applicable models and sizes, see Table 1.

2 Shape of shaft with grooved raceway

Solid shaft : No symbol
Hollow shaft : T

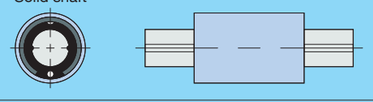
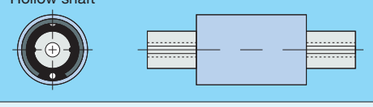
For applicable models and sizes, see Table 1.

3 Size

6, 8, 10, 13, 16, 20

Indicate the shaft diameter in mm.
For applicable models and sizes, see Table 1.

Table 1 Models and sizes of LMG series

Shape	Model	Size					
		6	8	10	13	16	20
Solid shaft 	LMG	○	○	○	○	○	○
Hollow shaft 	LMGT	○	○	○	○	○	○

Remark: LMG series are all interchangeable specification. Non-interchangeable specification is not available.

4 Number of external cylinders : C○

For an assembled set, indicates the number of external cylinders assembled on a shaft with grooved raceway.
For a single external cylinder, only "C1" is specified.

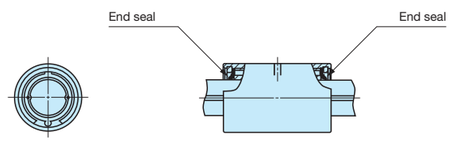
5 Length of shaft with grooved raceway : R○

Indicate the length of the shaft with grooved raceway in mm.
For standard and maximum lengths, see the dimension table.

6 Special specification With end seal /U

Applicable to all models and sizes.

With end seal /U



End seals are attached to both ends of the external cylinder to prevent foreign substances from entering.

Accuracy

Table 2 Twist of grooves with respect to effective length of track groove

unit: μm

Allowable value	33

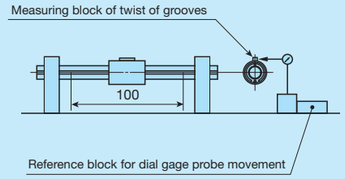
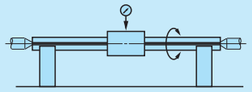
Remark: The values can be applied to 100 mm of the effective length of the track groove part at any position.

Table 3 Allowable values of total radial runout of shaft with grooved raceway axial line unit: μm

Overall length of shaft with grooved raceway mm		Size				
Over	Incl.	6	8	10	13	16, 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 are values when an internal clearance is 0 μm.

Table 4 Measuring methods of accuracy

Item	Measuring method	Illustration of measuring method
Twist of grooves with respect to effective length of track groove (See Table 2)	While supporting the shaft with grooved raceway, apply a unidirectional torsion moment load to the external cylinder, place the dial gage probe vertically to the shaft with grooved raceway on the side face of the measuring block of twist of grooves attached on the external cylinder, and measure the deflection when the external cylinder and the dial gage probe are moved 100 mm in the axial direction at any position on the effective length of track groove of the shaft with grooved raceway. However, the dial gage probe should be applied as near as possible to the outer peripheral face of the external cylinder.	
Total radial runout of axial line of shaft with grooved raceway (See Table 3)	While supporting the shaft with grooved raceway at its supporting parts or at both centers, place a dial gage probe on the outer peripheral face of the external cylinder, and measure the deflection from one rotation of the shaft with grooved raceway at several positions in the axial direction to obtain the maximum value.	

Internal Clearance

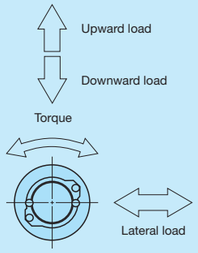
The internal clearance of LMG series is approximately 10 μm.

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

Load Direction and Load Rating

The LMG series must be used with its load rating corrected in accordance to the load direction. The basic dynamic load rating and basic static load rating shown in the dimension table should be corrected to values in Table 4.

Table 4 Load ratings corrected for load direction

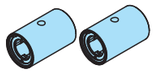


Load rating and load direction / Size	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
6~20	C	C	1.43C	C_0	C_0	1.73C_0

Identification number and quantity for ordering

To order an assembled set of LMG series, please specify the number of sets based on the number of shafts with grooved raceway. For external cylinders or single shafts with grooved raceway, please specify the number of units.

Single external cylinder



(When 2 pieces are needed)

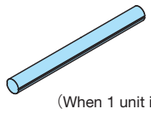
Example of identification number indication

LMG 10 C1 /U

Only C1 can be specified.

Order quantity
2 pieces

Shaft with grooved raceway



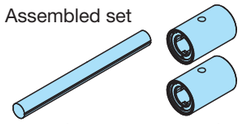
(When 1 unit is needed)

Example of identification number indication

LMG T 10 R300

Order quantity
1 unit

Assembled set



(When 1 set is needed)

Example of identification number indication

LMG T 10 C2 R300 /U

Order quantity
1 set

Moment of Inertia of Sectional Area and Section Coefficient of Shaft with Grooved Raceway

Table 5 Moment of inertia of sectional area and section coefficient of shaft with grooved raceway

Size	Moment of inertia of sectional area mm^4		Section coefficient mm^3	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
6	60	59	20	20
8	190	190	49	48
10	470	460	95	93
13	1 360	1 300	210	200
16	3 130	2 930	390	360
20	7 720	7 230	770	720

Lubrication

Grease is not pre-packed in the LMG series, so please perform adequate lubrication as needed.
Both oil lubrication and grease lubrication are available in the LMG series. For grease lubrication, use of high-quality lithium-soap base grease is recommended.

Dust Protection

No dust protection seal is provided for LMG series. For applications in other than clean environment, cover the entire unit with a protective case, etc. to prevent harmful foreign substances such as dust and particles from outside from entering.
The special specification with end seals (supplemental code / U) has a dust protection effect. However, if large amount of contaminant or dust are floating, or if large particles of foreign substances such as chips or sand may adhere to the shaft with grooved raceway, it is recommended to attach a protective cover to the linear motion mechanism.

Precaution for Use

❶ Fitting of external cylinder

Generally, clearance fit (H7) is recommended for fitting between the external cylinder and the housing bore. The transition fit (J7) may be applied for special use.

❷ Typical mounting structure

Mounting examples of the external cylinder are shown in Fig. 1. The fixing thread depth of mounting screws for the external cylinder must not exceed the maximum fixing thread depth indicated in the dimension table. Since the screw hole for the external cylinder is penetrated, the shaft with grooved raceway will be pushed by the screw if the fixing thread depth is too deep, and the running accuracy and life will be adversely affected.

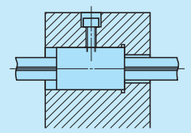


Fig. 1 Mounting examples of external cylinder

❸ Multiple external cylinders used in close proximity

When using multiple external cylinders in close distance to the same housing, it is recommended to ensure that the distance between the external cylinders is three times as long as the length of the external cylinder. When using multiple external cylinders in closer distance, contact IKO.

❹ Loaded condition with rotating torque

Use IKO Linear Ball Spline G under loaded conditions with a rotating torque bi-directionally or repeatedly.

❺ Operating temperature

The maximum operating temperature is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.

❻ Mounting of external cylinder

When press-fitting the external cylinder to the housing, assemble them correctly by using a press and a suitable jig fixture. (See Fig. 2.)

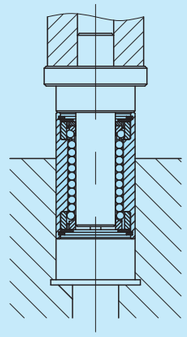
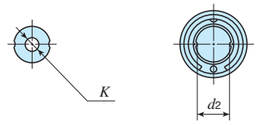


Fig. 2 Press-fitting of external cylinder

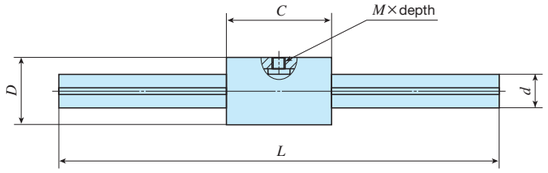
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Linear Bushing G

Shape	LMG
Size	6 8 10 13 16 20



Hollow shaft dimension for LMGT



Identification number	Interchangeable	Mass (Ref.) g		Nominal dimensions and tolerances mm											Basic dynamic load rating	Basic static load rating	Dynamic (5) torque rating	Static (5) torque rating
		External cylinder	Shaft with grooved raceway (1)	D	Dim. D tolerance	C	Dim. C tolerance	M×depth (2)	d	Dim. d tolerance		d_2 (3)	K	L (4)	Maximum length	C N	C_0 N	T N・m	T_0 N・m
LMG 6	○	9.4	22.0	12	0 −0.011	19	0 −0.200	M2.5×1.9 (2.5)	6	0 −0.012		5.2	–	150 200	300	587	641	2.1	2.2
LMGT 6	○		19.5										2						
LMG 8	○	15.7	39.3	15	0 −0.011	24	0 −0.200	M3 ×2.4 (3)	8	0 −0.015		7	–	150 200 250	500	769	962	3.5	4.3
LMGT 8	○		33.7										3		400				
LMG 10	○	31.5	61.2	19	0 −0.013	29	0 −0.200	M3 ×3.1 (4)	10	0 −0.015		8.9	–	200 300	600	1 410	1 710	8.0	9.7
LMGT 10	○		51.4										4						
LMG 13	○	45.4	104	23	0 −0.013	32	0 −0.200	M3 ×3.4 (4.5)	13	0 −0.018		11.9	–	200 300 400	800	1 880	2 150	13.7	15.7
LMGT 13	○		81.4										6						
LMG 16	○	78.2	157	28	0 −0.013	37	0 −0.200	M4 ×4.1 (5.5)	16	0 −0.018		14	–	200 300 400	1 000	2 590	2 930	23.1	26.1
LMGT 16	○		118										8						
LMG 20	○	110	246	32	0 −0.016	42	0 −0.200	M4 ×4.1 (5.5)	20	0 −0.021		17.5	–	300 400 500 600	1 000	3 010	3 660	32.8	39.9
LMGT 20	○		185										10						

Notes (1) The mass of the shaft with grooved raceway is the value per 100 mm of the track groove part.
(2) The values in ( ) are the maximum fixing thread depth.
(3) d_2 represents the maximum diameter for end machining. (Perform annealing if end machining will be performed.)
(4) Represents standard length. We can produce other than the standard length, please specify the length of the shaft with grooved raceway by indicating the length in mm with the identification number.
(5) Applicable under loaded conditions with an unidirectional torque at all times.
Use IKO Linear Ball Spline G under loaded conditions with a rotating torque bi-directionally or repeatedly.
Remark: Linear Bushing G are all interchangeable specification.

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

Linear Bushing

LM

Points

1 Simple replacement for rolling guide

Since the structure adopts the raceway to be run along the shaft, the rolling guide of conventional bushing type can be easily modified to rolling guide without major design changes.

2 Wide range of variations for your needs

For each dimensional series, standard, adjustable clearance, and open types are available with and without seals. You can select an optimal Linear Bushing for the specifications of your machine and device.

3 Stainless steel superior in corrosion resistance are listed on lineup.

Products made of stainless steel are highly resistant to corrosion, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.

Identification Number and Specification

Example of an identification number

The specification of LM series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a material code, a part code, a shape code, and a classification symbol for each specification to apply.

1	2	3	4	5	6	7	8	9
LM	10	19	29	N	F	UU	AJ	

1. **Model** — Model code Page Ⅱ－143
2. **Inscribed circle diameter**
3. **Outside diameter of external cylinder** — Dimensions Page Ⅱ－143
4. **External cylinder length**
5. **Retainer material** — Material code Page Ⅱ－143
6. **Material type**
7. **Seal structure** — Part code Page Ⅱ－143
8. **Shape of external cylinders** — Shape code Page Ⅱ－143
9. **Accuracy class** — Classification symbol Page Ⅱ－143

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

Identification Number and Specification –Model · Inscribed Circle Diameter · Outside Diameter of External Cylinder ·

1 Model

Linear Bushing (LM Series)
Metric series : LM
: LME (European specification (1))
Inch series : LMB

For applicable models and sizes, see Table 1.

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 External cylinder length

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

High carbon steel made	: No symbol	Specify the retainer material. For applicable models and sizes, see the "Identification number" column in the dimension table on pages Ⅱ-147 to Ⅱ-168.
Synthetic resin made	: N	

6 Material type

High carbon steel made	: No symbol	Specify the component part material. For applicable models and sizes, see the "Identification number" column in the dimension table on pages Ⅱ-147 to Ⅱ-168.
Stainless steel made	: F (2)	

7 Seal structure

Without seal	: No symbol	The models with one end seal and two end seals incorporate seals with superior dust protection performance for preventing intrusion of foreign substances. For the inch series, only the type without seal (no symbol) can be specified. The maximum allowable temperature for seals is 120°C.
With one end seal	: U	
With two end seals	: UU	

8 Shape of external cylinders

Standard type	: No symbol	For applicable models and sizes, see Table 1.
Adjustable clearance type	: AJ	
Open type	: OP	

9 Accuracy class

High	: No symbol	High class (no symbol) and precision class (P) are available for the accuracy class of LM and LMB standard type series. For the adjustable clearance type and the open type, only high class (no symbol) is available, and the accuracy values are applicable only before cutting the external cylinders. For details of accuracy, see the dimension table on pages Ⅱ-147 to Ⅱ-168.
Precision	: P	

Note (1) It is specification with the dimensions and tolerances generally used in Europe.
(2) The cage will be always stainless steel even when high carbon steel (no symbol) is specified.

Table. 1 Models and sizes of LM series

External cylinder shape	Dimensional series	Material type	Seal structure	Model	Size (Shaft diameter)
Standard type	Metric series	High carbon steel made	Without seal	LM LME	6 ~150 mm 5 ~ 80 mm
			With one end seal	LM ··· U LME ··· U	6 ~150 mm 5 ~ 80 mm
			With two end seals	LM ··· UU LME ··· UU	6 ~150 mm 5 ~ 80 mm
		Stainless steel made	Without seal	LM ··· F LME ··· F	6 ~ 60 mm 5 ~ 60 mm
			With one end seal	LM ··· F U LME ··· F U	6 ~ 60 mm 5 ~ 60 mm
			With two end seals	LM ··· F UU LME ··· F UU	6 ~ 60 mm 5 ~ 60 mm
	Inch series	High carbon steel made	Without seal	LMB	6.350~101.6 mm (1/4~ 4in)
Adjustable clearance type	Metric series	High carbon steel made	Without seal	LM ··· AJ LME ··· AJ	6 ~150 mm 5 ~ 80 mm
			With one end seal	LM ··· U AJ LME ··· U AJ	6 ~150 mm 5 ~ 80 mm
			With two end seals	LM ··· UU AJ LME ··· UU AJ	6 ~150 mm 5 ~ 80 mm
		Stainless steel made	Without seal	LM ··· F AJ LME ··· F AJ	6 ~ 60 mm 5 ~ 60 mm
			With one end seal	LM ··· F U AJ LME ··· F U AJ	6 ~ 60 mm 5 ~ 60 mm
			With two end seals	LM ··· F UU AJ LME ··· F UU AJ	6 ~ 60 mm 5 ~ 60 mm
	Inch series	High carbon steel made	Without seal	LMB ··· AJ	6.350~101.6 mm (1/4~ 4in)
Open type	Metric series	High carbon steel made	Without seal	LM ··· OP LME ··· OP	10 ~150 mm 12 ~ 80 mm
			With one end seal	LM ··· U OP LME ··· U OP	10 ~150 mm 12 ~ 80 mm
			With two end seals	LM ··· UU OP LME ··· UU OP	10 ~150 mm 12 ~ 80 mm
		Stainless steel made	Without seal	LM ··· F OP LME ··· F OP	10 ~ 60 mm 12 ~ 60 mm
			With one end seal	LM ··· F U OP LME ··· F U OP	10 ~ 60 mm 12 ~ 60 mm
			With two end seals	LM ··· F UU OP LME ··· F UU OP	10 ~ 60 mm 12 ~ 60 mm
	Inch series	High carbon steel made	Without seal	LMB ··· OP	12.700~101.6 mm (1/2~ 4in)

Standard type : Product with high accuracy used generally over a wide range

Adjustable clearance type : This type has a cut-away slit in an axial direction of external cylinder, which is capable of clearance adjustment. If installed in a housing whose inscribed circle diameter is adjustable, it enables radial clearance to be freely adjusted without optional fitting and also enables preloading to operate.

Open type : This type is in sectoral form with the external cylinder cut away in slit by one-row raceway or two-row raceways of ball in an axial direction. In order to avoid the occurrence of long shaft deflection, it is possible to accordingly add the shaft support block tailored to (*E*) dimension of the sectoral form shown in the dimension table, in a midway point. And, it is also capable of clearance adjustment.

Relationship between Load Rating and Ball Raceway

The load rating of LM series varies according to the loading direction and position of ball raceway. The dimension table describes two types of values shown in Fig. 1.1 and Fig. 1.2 according to the loading direction and position of ball raceway.
Fig. 1.1 shows the case where the loading direction and ball raceway position coincides with each other, representing the loading direction A in the dimension table. Generally, this is applied when the ball raceway position cannot be specified to indeterminate direction load or loading direction.
Fig. 1.2 shows the case where the loading direction is positioned between ball raceways, representing the loading direction B in the dimension table. Generally, this can be subjected to load bigger than loading direction A.

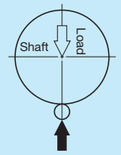


Fig. 1.1 Loading direction A

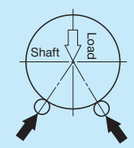


Fig. 1.2 Loading direction B

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

Lubrication

Grease is not pre-packed in the LM series, so please perform adequate lubrication as needed.
Both of oil lubrication and grease lubrication are available in the LM series. For grease lubrication, use of high-quality lithium-soap base grease is recommended.

Precaution for Use

❶Fitting

For fitting with a housing hole, clearance fit is usually used but transition fit can also be used for special usage.
For adjustable clearance type and open type, the shaft diameter shall be set as much as possible to less than the lower limit of the allowance of the inscribed circle diameter, and while the dimension of a housing hole shall be set to more than the upper limit of the allowance of the outside diameter of the external cylinder.

Table 2 Recommended fit

Models and accuracy class		Tolerance class			
		Shaft		Housing hole	
		Ordinary clearance	Interference fit	Clearance fit	Transition fit
LM, LMB	High	f6, g6	h6	H7	J7
	Precision	f5, g5	h5	H6	J6
LME	–	h6	j6	H7	J7

❷Clearance

For adjustable clearance type and open type, clearance adjustment can be easily performed if the unit is mounted into a housing with the bore diameter dimension adjustable.
However, if a large preload is produced due to the clearance adjustment, the deformation at the contact portion of the external cylinder and ball may become large, thereby deteriorating the life. Therefore, it is recommended to finish the shaft dimension within the allowance of the recommended fitting and set the clearance at zero or under a slightly-preloaded condition.
Although the clearance adjustment is performed while measuring the clearance with a dial gauge after fitting in a shaft, a method is generally taken to rotate the shaft under unloaded condition during clearance adjustment and stop the adjustment at the timing when detecting a slight resistance. At this time, the Linear Bushing clearance is at zero or under a slight preload condition. Meanwhile, the clearance adjustment for open type with three-row ball raceways cannot be performed.

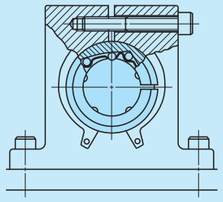


Fig. 2 Example of clearance adjustment

❸Raceway

Since LM series operates with a shaft as a raceway surface, the shaft should be heat-treated and ground. Recommended values for surface hardness and roughness of the shaft are shown in Table 3 and the recommended value for the minimum effective hardening depth is shown in Table 4.

Table 3 Surface hardness and roughness of shaft

Item	Recommended value	Remark
Surface hardness	58～64HRC	When the surface hardness is low, multiply the load rating by hardness factor (1) .
Surface roughness	0.2 μmRa or lower (0.8 μmRy or lower)	Where accuracy standard is low, around 0.8 μmRa (3.2 μmRy) is also allowed.

Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

Table 4 Minimum effective hardening depth of shaft unit : mm

Shaft diameter		Recommended value for minimum effective hardening depth
Over	Incl.	
–	28	0.8
28	50	1.0
50	100	1.5
100	150	2.0

❹When accompanied by rotational motion

LM series units support only linear motion but do not support rotational motion. When performing rotational motion and linear motion of short stroke length, IKO Stroke Rotary Bushing is recommended to be used. And, for the usage requiring rotational motion and linear motion of long stroke length, it is recommended to use in combination with IKO needle bearing as shown in Fig. 3.

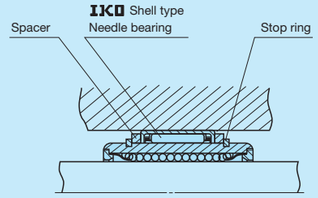


Fig. 3 Example of linear motion and rotational motion

❺Precaution for use of open type with three-row linear bushing

The open type with three-row Linear Bushing of balls may only be used with load direction indicated in Fig. 4.1. In addition, if two of them are used in parallel, mount them as indicated in 4.2, taking into account the load distribution to rolling elements. And, note that the clearance adjustment cannot be performed.

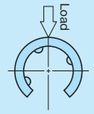


Fig. 4.1

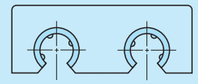


Fig. 4.2

❻Operating temperature

If the retainer is made of carbon steel, it can withstand higher temperature. However, if you use it in an environment exceeding 100˚C, please contact IKO. The maximum operating temperature of synthetic resin made products is 100˚C and temperature up to 80˚C is allowed for continuous operation.

❼Mounting

When pressing an external cylinder into the housing hole, do is softly while applying a jig to the sides of the external cylinder not to hit the end plate (see Fig. 5). After pressing-in, use a stop ring or stopper plate to fix it in an axial direction. When inserting shaft after mounting the external cylinder, be careful not to shock the ball or retainer.
In addition, when two shafts are used, mount one accurately and then the other by referring to the first one so as to ensure parallelism with it. Typical mounting example is shown in Fig. 6.

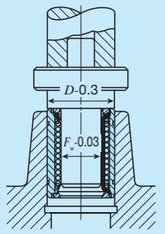


Fig. 5 Press-fitting of external cylinder

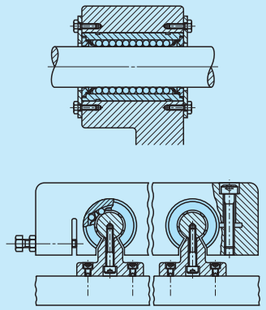


Fig. 6 Mounting example

Related Products

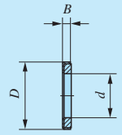
Slide shaft

To make full use of performance of the LM series, we also offer shaft with high accuracy for Linear Bushing grounded after heat treatment. If you are interested, contact IKO.
Conventional ordinary type shafts are also available.

Felt seals for Linear Bushing

Though the type with seal is standardized for the LM series, the type without seal and felt seals may be used together when emphasis is put on rolling friction resistance. Dimensions for felt seals are shown in Table 5.

Table 5 Dimensions of felt seals for Linear Bushing



unit: mm

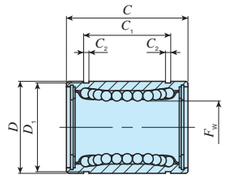
Identification number	*d*	*D*	*B*
FLM 6	6	12	2
FLM 8	8	15	2
FLM 10	10	19	3
FLM 13	13	23	3
FLM 16	16	28	4
FLM 20	20	32	4
FLM 25	25	40	5
FLM 30	30	45	5
FLM 35	35	52	5
FLM 40	40	60	5
FLM 50	50	80	10
FLM 60	60	90	10
FLM 80	80	120	10
FLM 100	100	150	10

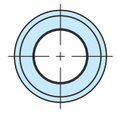
Remark: For adjustable clearance type, open type and inch series felt seals, contact IKO.

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

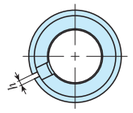
IKO Linear Bushing

	Standard type						Adjustable clearance type						Open type					
Shape	LM LM···N						LM··· AJ LM···N AJ						LM··· OP LM···N OP					
Shaft diameter	6	8	10	12	13	16	6	8	10	12	13	16	—	—	10	12	13	16
	20	25	30	35	40	50	20	25	30	35	40	50	20	25	30	35	40	50
	60	80	100	120	150		60	80	100	120	150		60	80	100	120	150	

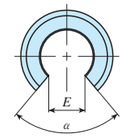




LM



LM···AJ



LM···OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g		Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm P	Dim. F_w tolerance μm H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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	LM 61219	4	8	———	–	–	———	–	–		6			12		19		13.5		1.1	11.5	– 1	–	–			80.7	92.7	167	237
	LM 61219 N	4	7.6	LM 61219 N AJ*	4	7.5																								
8	LM 81517	4	13	———	–	–	———	–	–		8			15	0 −11	17		11.5		1.1	14.3	– 1	–	–			87.4	100	160	226
	LM 81517 N	4	10.4	LM 81517 N AJ*	4	10																								
	LM 81524	4	18	———	–	–	———	–	–		8			15		24		17.5		1.1	14.3	– 1	–	–			121	139	255	361
	LM 81524 N	4	15	LM 81524 N AJ*	4	14.7																								
10	LM 101929	4	33.8	———	–	–	———	–	–		10	0 −6	0 − 9	19	0 −13	29	0 −200	22	0 −200	1.3	18	– 1	– 6.8	– 80	8	12	179	206	354	501
	LM 101929 N	4	26.8	LM 101929 N AJ*	4	26.2	LM 101929 N OP*	3	20.8																					
12	LM 122130	4	32.2	LM 122130 AJ*	4	31.5	LM 122130 OP*	3	25		12			21		30		23		1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N	4	30.4	LM 122130 N AJ*	4	29.7	LM 122130 N OP*	3	24.5																					
13	LM 132332	4	43	LM 132332 AJ*	4	42	LM 132332 OP*	3	31		13			23		32		23		1.3	22	1.5	9	80			266	306	506	716
	LM 132332 N	4	42.5	LM 132332 N AJ*	4	41.5	LM 132332 N OP*	3	31																					
16	LM 162837	4	70	LM 162837 AJ*	4	69.5	LM 162837 OP*	3	58		16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
	LM 162837 N	4	69	LM 162837 N AJ*	4	68	LM 162837 N OP*	3	52																					
20	LM 203242	5	92	LM 203242 AJ*	5	91	LM 203242 OP*	4	79		20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
	LM 203242 N	5	87	LM 203242 N AJ*	5	85	LM 203242 N OP*	4	69																					
25	LM 254059	6	226	LM 254059 AJ*	6	222	LM 254059 OP*	5	203		25	0 −7	0 −10	40	0 −16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
	LM 254059 N	6	220	LM 254059 N AJ*	6	216	LM 254059 N OP*	5	188																					
30	LM 304564	6	253	LM 304564 AJ*	6	250	LM 304564 OP*	5	228		30			45		64		44.5		1.85	43	2.5	15	50			1 460	1 540	2 780	3 560
	LM 304564 N	6	250	LM 304564 N AJ*	6	245	LM 304564 N OP*	5	210																					
35	LM 355270	6	388	LM 355270 AJ*	6	380	LM 355270 OP*	5	355		35			52		70	0 −300	49.5	0 −300	2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
	LM 355270 N	6	380	LM 355270 N AJ*	6	375	LM 355270 N OP*	5	335																					
40	LM 406080	6	596	LM 406080 AJ*	6	585	LM 406080 OP*	5	546		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
	LM 406080 N	6	585	LM 406080 N AJ*	6	579	LM 406080 N OP*	5	500																					
50	LM 5080100	6	1 615	LM 5080100 AJ*	6	1 595	LM 5080100 OP*	5	1 420		50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120
	LM 5080100 N	6	1 580	LM 5080100 N AJ*	6	1 560	LM 5080100 N OP*	5	1 340																					

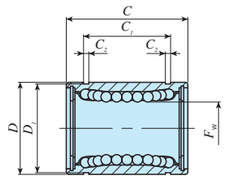
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

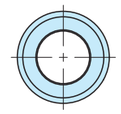
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

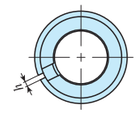
IKO Linear Bushing

	Standard type						Adjustable clearance type						Open type					
Shape	LM LM···N						LM··· AJ LM···N AJ						LM··· OP LM···N OP					
Shaft diameter	6	8	10	12	13	16	6	8	10	12	13	16	—	—	10	12	13	16
	20	25	30	35	40	50	20	25	30	35	40	50	20	25	30	35	40	50
	60	80	100	120	150		60	80	100	120	150		60	80	100	120	150	

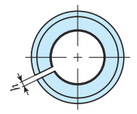




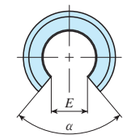
LM



LM 6090110 AJ
LM 6090110 N AJ



LM···AJ



LM···OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Adjustable clearance type	Ball raceway	Mass (Ref.) g	Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm P	H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	H	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	LM 6090110	6	1 817	LM 6090110 AJ*	6	1 788	LM 6090110 OP*	5	1 650	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
	LM 6090110 N	6	1 787	LM 6090110 N AJ*	6	1 757	LM 6090110 N OP*	5	1 610																			
80	LM 80120140*	6	4 520	LM 80120140 AJ*	6	4 400	LM 80120140 OP*	5	3 750	80			120		140		105.5		4.15	116	3	40	50			8 710	9 220	14 500	18 500
100	LM 100150175*	6	8 600	LM 100150175 AJ*	6	8 540	LM 100150175 OP*	5	7 200	100	0 −10	0 −20	150	0 −25	175	0 −400	125.5	0 −400	4.15	145	3	50	50	20	30	14 500	15 300	22 800	29 200
120	LM 120180200*	8	15 000	LM 120180200 AJ*	8	14 900	LM 120180200 OP*	6	11 600	120			180		200		158.6		4.15	175	3	85	80			25 800	25 500	44 300	49 400
150	LM 150210240*	8	20 250	LM 150210240 AJ*	8	20 150	LM 150210240 OP*	6	15 700	150	0 −13	0 −25	210	0 −29	240		170.6		5.15	204	3	105	80	25	40	35 600	35 100	61 200	68 200

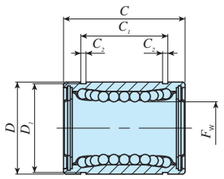
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

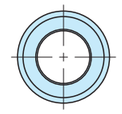
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type (shaft diameter 60 mm) end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

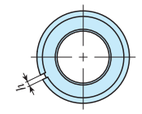
IKO Linear Bushing With Seal

	Standard type	Adjustable clearance type	Open type
Shape	LM··· UU LM···N UU	LM··· UU AJ LM···N UU AJ	LM··· UU OP LM···N UU OP
Shaft diameter	6 8 10 12 13 16 20 25 30 35 40 50 60 80 100 120 150	6 8 10 12 13 16 20 25 30 35 40 50 60 80 100 120 150	— — 10 12 13 16 20 25 30 35 40 50 60 80 100 120 150

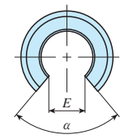




LM···UU



LM···UU AJ



LM···UU OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm P	Dim. F_w tolerance μm H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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	LM 61219 UU	4	8	———	–	–	———	–	–	6	0 −6	0 −9	12	0 −11	19	0 −200	13.5	0 −200	1.1	11.5	– 1	–	–	8	12	80.7	92.7	167	237
	LM 61219 N UU	4	7.6	LM 61219 N UU AJ*	4	7.5																							
8	LM 81517 UU	4	13	———	–	–	———	–	–	8			15		17		11.5		1.1	14.3	– 1	–	–			87.4	100	160	226
	LM 81517 N UU	4	10.4	LM 81517 N UU AJ*	4	10																							
	LM 81524 UU	4	18	———	–	–	———	–	–	8			15		24		17.5		1.1	14.3	– 1	–	–			121	139	255	361
	LM 81524 N UU	4	15	LM 81524 N UU AJ*	4	14.7																							
10	LM 101929 UU	4	33.8	———	–	–	———	–	–	10			19		29		22		1.3	18	– 1	– 6.8	– 80			179	206	354	501
	LM 101929 N UU	4	26.8	LM 101929 N UU AJ*	4	26.2	LM 101929 N UU OP*	3	20.8																				
12	LM 122130 UU	4	32.2	LM 122130 UU AJ*	4	31.5	LM 122130 UU OP*	3	25	12			21		30		23		1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N UU	4	30.4	LM 122130 N UU AJ*	4	29.7	LM 122130 N UU OP*	3	24.5																				
13	LM 132332 UU	4	43	LM 132332 UU AJ*	4	42	LM 132332 UU OP*	3	31	13			23		32		23		1.3	22	1.5	9	80			266	306	506	716
	LM 132332 N UU	4	42.5	LM 132332 N UU AJ*	4	41.5	LM 132332 N UU OP*	3	31																				
16	LM 162837 UU	4	70	LM 162837 UU AJ*	4	69.5	LM 162837 UU OP*	3	58	16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
	LM 162837 N UU	4	69	LM 162837 N UU AJ*	4	68	LM 162837 N UU OP*	3	52																				
20	LM 203242 UU	5	92	LM 203242 UU AJ*	5	91	LM 203242 UU OP*	4	79	20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
	LM 203242 N UU	5	87	LM 203242 N UU AJ*	5	85	LM 203242 N UU OP*	4	69																				
25	LM 254059 UU	6	226	LM 254059 UU AJ*	6	222	LM 254059 UU OP*	5	203	25	0 −7	0 −10	40	0 −16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
	LM 254059 N UU	6	220	LM 254059 N UU AJ*	6	216	LM 254059 N UU OP*	5	188																				
30	LM 304564 UU	6	253	LM 304564 UU AJ*	6	250	LM 304564 UU OP*	5	228	30			45		64		44.5		1.85	43	2.5	15	50			1 460	1 540	2 780	3 560
	LM 304564 N UU	6	250	LM 304564 N UU AJ*	6	245	LM 304564 N UU OP*	5	210																				
35	LM 355270 UU	6	387	LM 355270 UU AJ*	6	380	LM 355270 UU OP*	5	355	35			52		70		49.5		2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
	LM 355270 N UU	6	380	LM 355270 N UU AJ*	6	375	LM 355270 N UU OP*	5	335																				
40	LM 406080 UU	6	596	LM 406080 UU AJ*	6	585	LM 406080 UU OP*	5	546	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
	LM 406080 N UU	6	585	LM 406080 N UU AJ*	6	579	LM 406080 N UU OP*	5	500																				
50	LM 5080100 UU	6	1 615	LM 5080100 UU AJ*	6	1 595	LM 5080100 UU OP*	5	1 420	50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120
	LM 5080100 N UU	6	1 580	LM 5080100 N UU AJ*	6	1 560	LM 5080100 N UU OP*	5	1 340																				

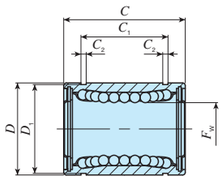
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

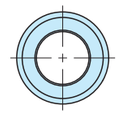
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

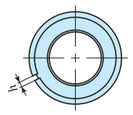
IKO Linear Bushing With Seal

	Standard type						Adjustable clearance type						Open type					
Shape	LM··· UU LM···N UU						LM··· UU AJ LM···N UU AJ						LM··· UU OP LM···N UU OP					
Shaft diameter	6	8	10	12	13	16	6	8	10	12	13	16	—	—	10	12	13	16
	20	25	30	35	40	50	20	25	30	35	40	50	20	25	30	35	40	50
	60	80	100	120	150		60	80	100	120	150		60	80	100	120	150	

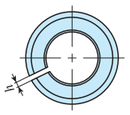




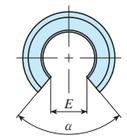
LM···UU



LM 6090110 UU AJ
LM 6090110 N UU AJ



LM···UU AJ



LM···UU OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm P	Dim. F_w tolerance μm H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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
60	LM 6090110 UU	6	1 817	LM 6090110 UU AJ*	6	1 788	LM 6090110 UU OP*	5	1 650	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
	LM 6090110 N UU	6	1 787	LM 6090110 N UU AJ*	6	1 757	LM 6090110 N UU OP*	5	1 610																			
80	LM 80120140 UU*	6	4 400	LM 80120140 UU AJ*	6	4 360	LM 80120140 UU OP*	5	3 640	80			120		140		105.5		4.15	116	3	40	50			8 710	9 220	14 500	18 500
100	LM 100150175 UU*	6	8 500	LM 100150175 UU AJ*	6	8 450	LM 100150175 UU OP*	5	7 120	100	0 −10	0 −20	150	0 −25	175	0 −400	125.5	0 −400	4.15	145	3	50	50	20	30	14 500	15 300	22 800	29 200
120	LM 120180200 UU*	8	14 700	LM 120180200 UU AJ*	8	14 600	LM 120180200 UU OP*	6	11 400	120			180		200		158.6		4.15	175	3	85	80			25 800	25 500	44 300	49 400
150	LM 150210240 UU*	8	19 900	LM 150210240 UU AJ*	8	19 800	LM 150210240 UU OP*	6	15 400	150	0 −13	0 −25	210	0 −29	240		170.6		5.15	204	3	105	80	25	40	35 600	35 100	61 200	68 200

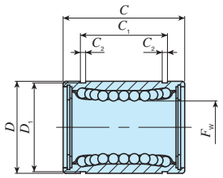
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

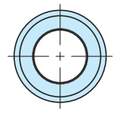
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type (shaft diameter 60 mm) end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

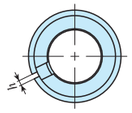
IKO Linear Bushing

	Standard type						Adjustable clearance type						Open type					
Shape	LME LME···N						LME··· AJ LME···N AJ						LME··· OP LME···N OP					
Shaft diameter	5	8	12	16	20	25	5	8	12	16	20	25	—	—	12	16	20	25
	30	40	50	60	80		30	40	50	60	80		30	40	50	60	80	

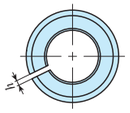




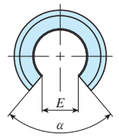
LME



LME···AJ



LME 80120165 AJ



LME···OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Adjustable clearance type	Ball raceway	Mass (Ref.) g	Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum 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	LME 51222 N*	4	11	LME 51222 N AJ*	4	9.5	———	–	–	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	LME 81625 *	4	20	———	–	–	———	–	–	8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
	LME 81625 N*	4	20	LME 81625 N AJ*	4	19.5																					
12	LME 122232 *	4	41.5	LME 122232 AJ*	4	40.5	LME 122232 OP*	3	32	12		22	0 − 9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
	LME 122232 N*	4	40	LME 122232 N AJ*	4	39	LME 122232 N OP*	3	30																		
16	LME 162636 *	4	56.5	LME 162636 AJ*	4	55.5	LME 162636 OP*	3	48	16	+ 9 − 1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
	LME 162636 N*	4	55	LME 162636 N AJ*	4	54	LME 162636 N OP*	3	46																		
20	LME 203245 *	5	97	LME 203245 AJ*	5	96	LME 203245 OP*	4	84	20		32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
	LME 203245 N*	5	91	LME 203245 N AJ*	5	90	LME 203245 N OP*	4	75																		
25	LME 254058 *	6	222	LME 254058 AJ*	6	219	LME 254058 OP*	5	195	25	+11 − 1	40	0 −11	58	0 −300	44.1	0 −300	1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
	LME 254058 N*	6	215	LME 254058 N AJ*	6	212	LME 254058 N OP*	5	181																		
30	LME 304768 *	6	338	LME 304768 AJ*	6	333	LME 304768 OP*	5	309	30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
	LME 304768 N*	6	325	LME 304768 N AJ*	6	320	LME 304768 N OP*	5	272																		
40	LME 406280 *	6	712	LME 406280 AJ*	6	701	LME 406280 OP*	5	665	40		62		80		60.6		2.15	59	3	16.8	50		2 030	2 150	3 620	4 640
	LME 406280 N*	6	705	LME 406280 N AJ*	6	694	LME 406280 N OP*	5	600																		
50	LME 5075100 *	6	1 147	LME 5075100 AJ*	6	1 127	LME 5075100 OP*	5	1 080	50	+13 − 2	75	0 −13	100		77.6		2.65	72	3	21	50	17	3 940	4 180	7 130	9 120
	LME 5075100 N*	6	1 130	LME 5075100 N AJ*	6	1 110	LME 5075100 N OP*	5	970																		
60	LME 6090125 *	6	2 051	LME 6090125 AJ*	6	2 001	LME 6090125 OP*	5	1 900	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
	LME 6090125 N*	6	2 050	LME 6090125 N AJ*	6	2 000	LME 6090125 N OP*	5	1 580																		
80	LME 80120165 *	6	5 140	LME 80120165 AJ*	6	5 000	LME 80120165 OP*	5	4 380	80	+16 − 4	120		165		133.7		4.15	116	3	36.3	54		8 710	9 220	14 500	18 500

Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

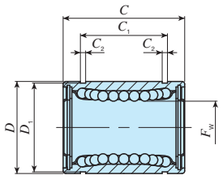
Remarks 1. High carbon steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.

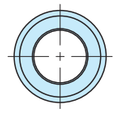
2. The identification numbers with * are our semi-standard items.

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

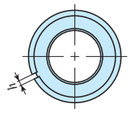
IKO Linear Bushing With Seal

	Standard type						Adjustable clearance type						Open type					
Shape	LME··· UU LME···N UU						LME··· UU AJ LME···N UU AJ						LME··· UU OP LME···N UU OP					
Shaft diameter	5	8	12	16	20	25	5	8	12	16	20	25	—	—	12	16	20	25
	30	40	50	60	80		30	40	50	60	80		30	40	50	60	80	

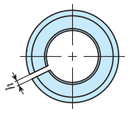




LME···UU



LME···UU AJ



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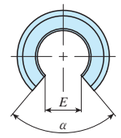


LME···UU OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1(1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum 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	LME 51222 N UU*	4	11	LME 51222 N UU AJ*	4	9.5	———	–	–	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	LME 81625 UU*	4	20	———	–	–	———	–	–	8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
	LME 81625 N UU*	4	20	LME 81625 N UU AJ*	4	19																					
12	LME 122232 UU*	4	41.5	LME 122232 UU AJ*	4	40.5	LME 122232 UU OP*	3	32	12		22	0 − 9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
	LME 122232 N UU*	4	40	LME 122232 N UU AJ*	4	39	LME 122232 N UU OP*	3	30																		
16	LME 162636 UU*	4	56.5	LME 162636 UU AJ*	4	55.5	LME 162636 UU OP*	3	48	16	+ 9 − 1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
	LME 162636 N UU*	4	55	LME 162636 N UU AJ*	4	54	LME 162636 N UU OP*	3	46																		
20	LME 203245 UU*	5	97	LME 203245 UU AJ*	5	96	LME 203245 UU OP*	4	84	20		32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
	LME 203245 N UU*	5	91	LME 203245 N UU AJ*	5	90	LME 203245 N UU OP*	4	75																		
25	LME 254058 UU*	6	222	LME 254058 UU AJ*	6	219	LME 254058 UU OP*	5	195	25	+11 − 1	40	0 −11	58		44.1		1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
	LME 254058 N UU*(2)	6	215	LME 254058 N UU AJ*(2)	6	212	LME 254058 N UU OP*(2)	5	181																		
30	LME 304768 UU*	6	338	LME 304768 UU AJ*	6	333	LME 304768 UU OP*	5	309	30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
	LME 304768 N UU*	6	325	LME 304768 N UU AJ*	6	320	LME 304768 N UU OP*	5	272																		
40	LME 406280 UU*	6	712	LME 406280 UU AJ*	6	701	LME 406280 UU OP*	5	665	40		62		80	0 −300	60.6	0 −300	2.15	59	3	16.8	50		2 030	2 150	3 620	4 640
	LME 406280 N UU*	6	705	LME 406280 N UU AJ*	6	694	LME 406280 N UU OP*	5	600																		
50	LME 5075100 UU*	6	1 147	LME 5075100 UU AJ*	6	1 127	LME 5075100 UU OP*	5	1 080	50	+13 − 2	75	0 −13	100		77.6		2.65	72	3	21	50	17	3 940	4 180	7 130	9 120
	LME 5075100 N UU*	6	1 130	LME 5075100 N UU AJ*	6	1 110	LME 5075100 N UU OP*	5	970																		
60	LME 6090125 UU*	6	2 051	LME 6090125 UU AJ*	6	2 001	LME 6090125 UU OP*	5	1 900	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
	LME 6090125 N UU*	6	2 050	LME 6090125 N UU AJ*	6	2 000	LME 6090125 N UU OP*	5	1 580																		
80	LME80120165 UU*	6	5 030	LME80120165 UU AJ*	6	4 930	LME80120165 UU OP*	5	4 210	80	+16 − 4	120		165		133.7		4.15	116	3	36.3	54		8 710	9 220	14 500	18 500

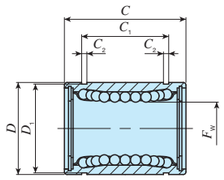
Notes (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.
(2) The seal is slightly off from the external cylinder end.

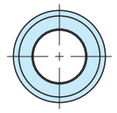
Remarks 1. High carbon steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.
2. The identification numbers with * are our semi-standard items.

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

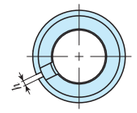
IKO Linear Bushing Inch Series

	Standard type				Adjustable clearance type				Open type			
Shape	LMB LMB···N				LMB··· AJ LMB···N AJ				LMB··· OP LMB···N OP			
Shaft diameter	6.350	9.525	12.700	15.875	6.350	9.525	12.700	15.875	–	–	12.700	15.875
	19.050	25.400	31.750	38.100	19.050	25.400	31.750	38.100	19.050	25.400	31.750	38.100
	50.800	63.500	76.200	101.600	50.800	63.500	76.200	101.600	50.800	63.500	76.200	101.600

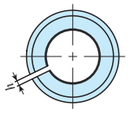




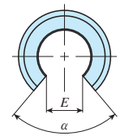
LMB



LMB···AJ



LMB 406080 AJ
LMB 487296 AJ
LMB 6496128 AJ



LMB···OP

Shaft diameter mm (inch)	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances inch/mm: F_w	Dim. F_w tolerance μm P	Dim. F_w tolerance μm H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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
6.350 (1/4)	LMB 4812 *	4	10.5	———	–	–	———	–	–	1/4 6.350	0 −6	0 −9	1/2 12.700	0 −11	3/4 19.050		12.98		0.992	11.906	– 1	–	–			82.6	94.9	168	238
	LMB 4812 N*	4	8.5	LMB 4812 N AJ*	4	8	———																					
9.525 (3/8)	LMB 61014 *	4	16.5	———	–	–	———	–	–	3/8 9.525			5/8 15.875		7/8 22.225		16.15		0.992	14.935	– 1	–	–			94.8	109	174	246
	LMB 61014 N*	4	12.5	LMB 61014 N AJ*	4	12	———																					
12.700 (1/2)	LMB 81420 *	4	37.5	LMB 81420 AJ*	4	36.5	LMB 81420 OP*	3	28	1/2 12.700			7/8 22.225	0 −13	1 1/4 31.750	0 −200	24.46	0 −200	1.168	20.853	1.5	7.9	80	8	12	264	303	505	714
	LMB 81420 N*	4	37	LMB 81420 N AJ*	4	36	LMB 81420 N OP*	3	27																			
15.875 (5/8)	LMB 101824 *	4	79.6	LMB 101824 AJ*	4	77.6	LMB 101824 OP*	3	64	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
	LMB 101824 N*	4	76	LMB 101824 N AJ*	4	74	LMB 101824 N OP*	3	57																			
19.050 (3/4)	LMB 122026 *	5	99.5	LMB 122026 AJ*	5	97.5	LMB 122026 OP*	4	86	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	11.1	60	10	15	554	659	1 000	1 470
	LMB 122026 N*	5	95	LMB 122026 N AJ*	5	93	LMB 122026 N OP*	4	76																			
25.400 (1)	LMB 162536 *	6	207	LMB 162536 AJ*	6	205	LMB 162536 OP*	5	190	1 25.400			1 9/16 39.688		2 1/4 57.150		44.57		1.727	37.306	1.5	14.3	50			923	978	1 780	2 280
	LMB 162536 N*	6	200	LMB 162536 N AJ*	6	198	LMB 162536 N OP*	5	170																			
31.750 (1 1/4)	LMB 203242 *	6	434	LMB 203242 AJ*	6	424	LMB 203242 OP*	5	390	1 1/4 31.750			2 50.800	0 −19	2 5/8 66.675		50.92		1.727	47.904	2.5	15.9	50	12	20	1 370	1 450	2 510	3 210
	LMB 203242 N*	6	421	LMB 203242 N AJ*	6	411	LMB 203242 N OP*	5	375																			
38.100 (1 1/2)	LMB 243848 *	6	662	LMB 243848 AJ*	6	652	LMB 243848 OP*	5	610	1 1/2 38.100	0 −8	0 −12	2 3/8 60.325		3 76.200	0 −300	61.26	0 −300	2.184	56.870	3	19.1	50			2 010	2 130	3 610	4 620
	LMB 243848 N*	6	646	LMB 243848 N AJ*	6	636	LMB 243848 N OP*	5	595																			
50.800 (2)	LMB 324864 *	6	1 185	LMB 324864 AJ*	6	1 165	LMB 324864 OP*	5	1 120	2 50.800			3 76.200		4 101.600		81.07		2.616	72.085	3	25.4	50			3 960	4 190	7 140	9 130
	LMB 324864 N*	6	1 140	LMB 324864 N AJ*	6	1 120	LMB 324864 N OP*	5	980																			
63.500 (2 1/2)	LMB 406080 *	6	2 600	LMB 406080 AJ*	6	2 560	LMB 406080 OP*	5	2 230	2 1/2 63.500	0 −9	0 −15	3 3/4 95.250	0 −22	5 127.000		100.99		3.048	90.220	3	31.8	50	17	25	5 190	5 490	9 090	11 600
76.200 (3)	LMB 487296 *	6	4 380	LMB 487296 AJ*	6	4 350	LMB 487296 OP*	5	3 750	3 76.200			4 1/2 114.300		6 152.400	0 −400	120.04	0 −400	3.048	109.474	3	38.1	50			8 620	9 120	14 500	18 500
101.600 (4)	LMB 6496128 *	6	10 200	LMB 6496128 AJ*	6	10 150	LMB 6496128 OP*	5	8 740	4 101.600	0 −10	0 −20	6 152.400	0 −25	8 203.200		158.95		3.53	145.923	3	50.8	50	20	30	17 000	18 000	28 600	36 500

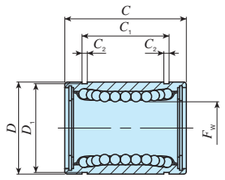
Notes (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. High carbon steel-made retainer (shaft diameter 6.350 mm and 9.525 mm), and standard type and adjustable clearance type (shaft diameter 12.700 mm to 50.800 mm) end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

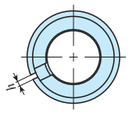
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Linear Bushing Stainless Steel Made

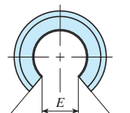
	Standard type					Adjustable clearance type					Open type				
Shape	LM··· F LM···N F					LM··· F AJ LM···N F AJ					LM··· F OP LM···N F OP				
Shaft diameter	6	8	10	12	13	6	8	10	12	13	—	—	10	12	13
	16	20	25	30	35	16	20	25	30	35	16	20	25	30	35
	40	50	60			40	50	60			40	50	60		



LM···F



LM···F AJ



LM···F OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm P	Dim. F_w tolerance μm H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1(1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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	LM 61219 F	4	8	———	–	–	———	–	–	6			12		19		13.5		1.1	11.5	– 1	–	–			80.7	92.7	167	237
	LM 61219 N F	4	7.6	LM 61219 N F AJ*	4	7.5																						
8	LM 81517 F	4	13	———	–	–	———	–	–	8			15	0 −11	17		11.5		1.1	14.3	– 1	–	–			87.4	100	160	226
	LM 81517 N F	4	10.4	LM 81517 N F AJ*	4	10																						
	LM 81524 F	4	18	———	–	–	———	–	–	8			15		24		17.5		1.1	14.3	– 1	–	–			121	139	255	361
	LM 81524 N F	4	15	LM 81524 N F AJ*	4	14.7																						
10	LM 101929 F	4	33.8	———	–	–	———	–	–	10	0 −6	0 −9	19	0 −13	29	0 −200	22	0 −200	1.3	18	– 1	– 6.8	– 80	8	12	179	206	354	501
	LM 101929 N F	4	26.8	LM 101929 N F AJ*	4	26.2	LM 101929 N F OP*	3	20.8																			
12	LM 122130 F	4	32.2	LM 122130 F AJ*	4	31.5	LM 122130 F OP*	3	25	12			21		30		23		1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N F	4	30.4	LM 122130 N F AJ*	4	29.7	LM 122130 N F OP*	3	24.5																			
13	LM 132332 F	4	43	LM 132332 F AJ*	4	42	LM 132332 F OP*	3	31	13			23		32		23		1.3	22	1.5	9	80			266	306	506	716
	LM 132332 N F	4	42.5	LM 132332 N F AJ*	4	41.5	LM 132332 N F OP*	3	31																			
16	LM 162837 F	4	70	LM 162837 F AJ*	4	69.5	LM 162837 F OP*	3	58	16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
	LM 162837 N F	4	69	LM 162837 N F AJ*	4	68	LM 162837 N F OP*	3	52																			
20	LM 203242 F	5	92	LM 203242 F AJ*	5	91	LM 203242 F OP*	4	79	20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
	LM 203242 N F	5	87	LM 203242 N F AJ*	5	85	LM 203242 N F OP*	4	69																			
25	LM 254059 F	6	226	LM 254059 F AJ*	6	222	LM 254059 F OP*	5	203	25	0 −7	0 −10	40	0 −16	59	0 −300	41	0 −300	1.85	38	2	12	50	10	15	920	974	1 780	2 280
	LM 254059 N F	6	220	LM 254059 N F AJ*	6	216	LM 254059 N F OP*	5	188																			
30	LM 304564 F	6	253	LM 304564 F AJ*	6	250	LM 304564 F OP*	5	228	30			45		64		44.5		1.85	43	2.5	15	50			1 460	1 540	2 780	3 560
	LM 304564 N F	6	250	LM 304564 N F AJ*	6	245	LM 304564 N F OP*	5	210																			
35	LM 355270 F	6	387	LM 355270 F AJ*	6	380	LM 355270 F OP*	5	355	35			52		70		49.5		2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
	LM 355270 N F	6	380	LM 355270 N F AJ*	6	375	LM 355270 N F OP*	5	335																			
40	LM 406080 F	6	596	LM 406080 F AJ*	6	585	LM 406080 F OP*	5	546	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
	LM 406080 N F	6	585	LM 406080 N F AJ*	6	579	LM 406080 N F OP*	5	500																			
50	LM 5080100 F	6	1 615	LM 5080100 F AJ*	6	1 595	LM 5080100 F OP*	5	1 420	50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120
	LM 5080100 N F	6	1 580	LM 5080100 N F AJ*	6	1 560	LM 5080100 N F OP*	5	1 340																			
60	LM 6090110 F	6	1 817	LM 6090110 F AJ*	6	1 788	LM 6090110 F OP*	5	1 650	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
	LM 6090110 N F	6	1 787	LM 6090110 N F AJ*	6	1 757	LM 6090110 N F OP*	5	1 610																			

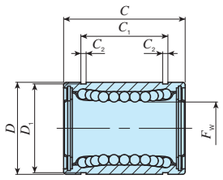
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

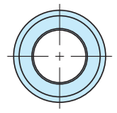
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Linear Bushing Stainless Steel Made With Seal

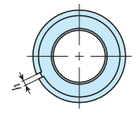
	Standard type					Adjustable clearance type					Open type				
Shape	LM··· F UU LM···N F UU					LM··· F UU AJ LM···N F UU AJ					LM··· F UU OP LM···N F UU OP				
Shaft diameter	6	8	10	12	13	6	8	10	12	13	—	—	10	12	13
	16	20	25	30	35	16	20	25	30	35	16	20	25	30	35
	40	50	60			40	50	60			40	50	60		



LM···FUU



LM···FUU AJ



LM···FUU OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm P	Dim. F_w tolerance μm H	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1(1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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	LM 61219 F UU	4	8	———	–	–	———	–	–	6			12		19		13.5		1.1	11.5	– 1	–	–			80.7	92.7	167	237
	LM 61219 N F UU	4	7.6	LM 61219 N F UU AJ*	4	7.5	———	–	–																			
8	LM 81517 F UU	4	13	———	–	–	———	–	–	8			15	0 −11	17		11.5		1.1	14.3	– 1	–	–			87.4	100	160	226
	LM 81517 N F UU	4	10.4	LM 81517 N F UU AJ*	4	10	———	–	–																			
	LM 81524 F UU	4	18	———	–	–	———	–	–	8			15		24		17.5		1.1	14.3	– 1	–	–			121	139	255	361
	LM 81524 N F UU	4	15	LM 81524 N F UU AJ*	4	14.7	———	–	–																			
10	LM 101929 F UU	4	33.8	———	–	–	———	–	–	10	0 −6	0 −9	19		29		22		1.3	18	– 1	– 6.8	– 80	8	12	179	206	354	501
	LM 101929 N F UU	4	26.8	LM 101929 N F UU AJ*	4	26.2	LM 101929 N F UU OP*	3	20.8																			
12	LM 122130 F UU	4	32.2	LM 122130 F UU AJ*	4	31.5	LM 122130 F UU OP*	3	25	12			21		30	0 −200	23	0 −200	1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N F UU	4	30.4	LM 122130 N F UU AJ*	4	29.7	LM 122130 N F UU OP*	3	24.5																			
13	LM 132332 F UU	4	43	LM 132332 F UU AJ*	4	42	LM 132332 F UU OP*	3	31	13			23	0 −13	32		23		1.3	22	1.5	9	80			266	306	506	716
	LM 132332 N F UU	4	42.5	LM 132332 N F UU AJ*	4	41.5	LM 132332 N F UU OP*	3	31																			
16	LM 162837 F UU	4	70	LM 162837 F UU AJ*	4	69.5	LM 162837 F UU OP*	3	58	16			28		37		26.5		1.6	27	1.5	11	80			426	489	766	1 080
	LM 162837 N F UU	4	69	LM 162837 N F UU AJ*	4	68	LM 162837 N F UU OP*	3	52																			
20	LM 203242 F UU	5	92	LM 203242 F UU AJ*	5	91	LM 203242 F UU OP*	4	79	20			32		42		30.5		1.6	30.5	1.5	11	60			562	668	1 010	1 470
	LM 203242 N F UU	5	87	LM 203242 N F UU AJ*	5	85	LM 203242 N F UU OP*	4	69																			
25	LM 254059 F UU	6	226	LM 254059 F UU AJ*	6	222	LM 254059 F UU OP*	5	203	25	0 −7	0 −10	40	0 −16	59		41		1.85	38	2	12	50	10	15	920	974	1 780	2 280
	LM 254059 N F UU	6	220	LM 254059 N F UU AJ*	6	216	LM 254059 N F UU OP*	5	188																			
30	LM 304564 F UU	6	253	LM 304564 F UU AJ*	6	250	LM 304564 F UU OP*	5	228	30			45		64		44.5		1.85	43	2.5	15	50			1 460	1 540	2 780	3 560
	LM 304564 N F UU	6	250	LM 304564 N F UU AJ*	6	245	LM 304564 N F UU OP*	5	210																			
35	LM 355270 F UU	6	387	LM 355270 F UU AJ*	6	380	LM 355270 F UU OP*	5	355	35			52		70	0 −300	49.5	0 −300	2.1	49	2.5	17	50			1 610	1 710	3 080	3 940
	LM 355270 N F UU	6	380	LM 355270 N F UU AJ*	6	375	LM 355270 N F UU OP*	5	335																			
40	LM 406080 F UU	6	596	LM 406080 F UU AJ*	6	585	LM 406080 F UU OP*	5	546	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
	LM 406080 N F UU	6	585	LM 406080 N F UU AJ*	6	579	LM 406080 N F UU OP*	5	500																			
50	LM 5080100 F UU	6	1 615	LM 5080100 F UU AJ*	6	1 595	LM 5080100 F UU OP*	5	1 420	50			80		100		74		2.6	76.5	3	25	50			3 940	4 180	7 130	9 120
	LM 5080100 N F UU	6	1 580	LM 5080100 N F UU AJ*	6	1 560	LM 5080100 N F UU OP*	5	1 340																			
60	LM 6090110 F UU	6	1 817	LM 6090110 F UU AJ*	6	1 788	LM 6090110 F UU OP*	5	1 650	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
	LM 6090110 N F UU	6	1 787	LM 6090110 N F UU AJ*	6	1 757	LM 6090110 N F UU OP*	5	1 610																			

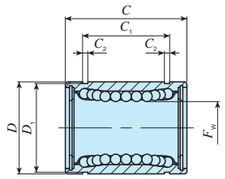
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

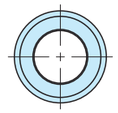
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

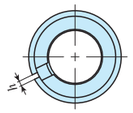
IKO Linear Bushing Stainless Steel Made

	Standard type					Adjustable clearance type					Open type				
Shape	LME··· F LME···N F					LME··· F AJ LME···N F AJ					LME··· F OP LME···N F OP				
Shaft diameter	5	8	12	16	20	5	8	12	16	20	—	—	12	16	20
	25	30	40	50	60	25	30	40	50	60	25	30	40	50	60

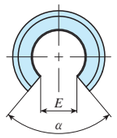




LME···F



LME···F AJ



LME···F OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. Fw tolerance μm	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1(1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum 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	LME 51222 N F*	4	11	LME 51222 N F AJ*	4	9.5	———	–	–	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	LME 81625 F*	4	20	———	–	–	———	–	–	8		16		25		16.5		1.1	15.2	− 1	–	–		121	139	255	361
	LME 81625 N F*	4	20	LME 81625 N F AJ*	4	19.5																					
12	LME 122232 F*	4	41.5	LME 122232 F AJ*	4	40.5	LME 122232 F OP*	3	32	12		22	0 − 9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
	LME 122232 N F*	4	40	LME 122232 N F AJ*	4	39	LME 122232 N F OP*	3	30																		
16	LME 162636 F*	4	56.5	LME 162636 F AJ*	4	55.5	LME 162636 F OP*	3	48	16	+ 9 − 1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
	LME 162636 N F*	4	55	LME 162636 N F AJ*	4	54	LME 162636 N F OP*	3	46																		
20	LME 203245 F*	5	97	LME 203245 F AJ*	5	96	LME 203245 F OP*	4	84	20		32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
	LME 203245 N F*	5	91	LME 203245 N F AJ*	5	90	LME 203245 N F OP*	4	75																		
25	LME 254058 F*	6	222	LME 254058 F AJ*	6	219	LME 254058 F OP*	5	195	25	+11 − 1	40	0 −11	58	0 −300	44.1	0 −300	1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
	LME 254058 N F*	6	215	LME 254058 N F AJ*	6	212	LME 254058 N F OP*	5	181																		
30	LME 304768 F*	6	338	LME 304768 F AJ*	6	333	LME 304768 F OP*	5	309	30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
	LME 304768 N F*	6	325	LME 304768 N F AJ*	6	320	LME 304768 N F OP*	5	272																		
40	LME 406280 F*	6	712	LME 406280 F AJ*	6	701	LME 406280 F OP*	5	665	40		62		80		60.6		2.15	59	3	16.8	50	17	2 030	2 150	3 620	4 640
	LME 406280 N F*	6	705	LME 406280 N F AJ*	6	694	LME 406280 N F OP*	5	600																		
50	LME 5075100 F*	6	1 147	LME 5075100 F AJ*	6	1 127	LME 5075100 F OP*	5	1 080	50	+13 − 2	75	0 −13	100		77.6		2.65	72	3	21	50		3 940	4 180	7 130	9 120
	LME 5075100 N F*	6	1 130	LME 5075100 N F AJ*	6	1 110	LME 5075100 N F OP*	5	970																		
60	LME 6090125 F*	6	2 051	LME 6090125 F AJ*	6	2 001	LME 6090125 F OP*	5	1 900	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
	LME 6090125 N F*	6	2 050	LME 6090125 N F AJ*	6	2 000	LME 6090125 N F OP*	5	1 580																		

Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

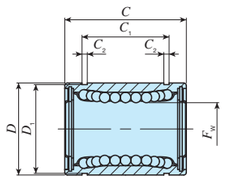
Remarks 1. Stainless steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.

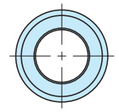
2. The identification numbers with * are our semi-standard items.

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

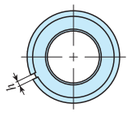
IKO Linear Bushing Stainless Steel Made With Seal

	Standard type					Adjustable clearance type					Open type				
Shape	LME··· F UU LME···N F UU					LME··· FUU AJ LME···N FUU AJ					LME··· F UU OP LME···N F UU OP				
Shaft diameter	5	8	12	16	20	5	8	12	16	20	—	—	12	16	20
	25	30	40	50	60	25	30	40	50	60	25	30	40	50	60

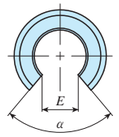




LME···FUU



LME···FUU AJ



LME···FUU OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.) g	Identification number: Open type	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: F_w	Dim. F_w tolerance μm	D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1(1)	Dim. C_1 tolerance μm	C_2	D_1	h	E	α Degree	Eccentricity Maximum 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	LME 51222 N F UU*	4	11	LME 51222 N F UU AJ*	4	9.5	———	–	–	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	LME 81625 F UU*	4	20	———	–	–	———	–	–	8		16		25		16.5		1.1	15.2	– 1	–	–		121	139	255	361
	LME 81625 N F UU*	4	20	LME 81625 N F UU AJ*	4	19.5																					
12	LME 122232 F UU*	4	41.5	LME 122232 F UU AJ*	4	40.5	LME 122232 F UU OP*	3	32	12		22	0 − 9	32		22.9		1.3	21	1.5	7.5	78		259	298	503	711
	LME 122232 N F UU*	4	40	LME 122232 N F UU AJ*	4	39	LME 122232 N F UU OP*	3	30																		
16	LME 162636 F UU*	4	56.5	LME 162636 F UU AJ*	4	55.5	LME 162636 F UU OP*	3	48	16	+ 9 − 1	26		36		24.9		1.3	24.9	1.5	10	78		283	325	514	726
	LME 162636 N F UU*	4	55	LME 162636 N F UU AJ*	4	54	LME 162636 N F UU OP*	3	46																		
20	LME 203245 F UU*	5	97	LME 203245 F UU AJ*	5	96	LME 203245 F UU OP*	4	84	20		32		45		31.5		1.6	30.3	2	10	60		562	668	1 010	1 470
	LME 203245 N F UU*	5	91	LME 203245 N F UU AJ*	5	90	LME 203245 N F UU OP*	4	75																		
25	LME 254058 F UU*	6	222	LME 254058 F UU AJ*	6	219	LME 254058 F UU OP*	5	195	25	+11 − 1	40	0 −11	58	0 −300	44.1	0 −300	1.85	37.5	2	12.5	60	15	920	974	1 780	2 280
	LME 254058 N F UU*(2)	6	215	LME 254058 N F UU AJ*(2)	6	212	LME 254058 N F UU OP*(2)	5	181																		
30	LME 304768 F UU*	6	338	LME 304768 F UU AJ*	6	333	LME 304768 F UU OP*	5	309	30		47		68		52.1		1.85	44.5	2	12.5	50		1 350	1 430	2 500	3 200
	LME 304768 N F UU*	6	325	LME 304768 N F UU AJ*	6	320	LME 304768 N F UU OP*	5	272																		
40	LME 406280 F UU*	6	712	LME 406280 F UU AJ*	6	701	LME 406280 F UU OP*	5	665	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
	LME 406280 N F UU*	6	705	LME 406280 N F UU AJ*	6	694	LME 406280 N F UU OP*	5	600																		
50	LME 5075100 F UU*	6	1 147	LME 5075100 F UU AJ*	6	1 127	LME 5075100 F UU OP*	5	1 080	50		75		100		77.6		2.65	72	3	21	50		3 940	4 180	7 130	9 120
	LME 5075100 N F UU*	6	1 130	LME 5075100 N F UU AJ*	6	1 110	LME 5075100 N F UU OP*	5	970																		
60	LME 6090125 F UU*	6	2 051	LME 6090125 F UU AJ*	6	2 001	LME 6090125 F UU OP*	5	1 900	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
	LME 6090125 N F UU*	6	2 050	LME 6090125 N F UU AJ*	6	2 000	LME 6090125 N F UU OP*	5	1 580																		

Notes (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.
(2) The seal is slightly off from the external cylinder end.

Remarks 1. Stainless steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.
2. The identification numbers with * are our semi-standard items.

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

Miniature Linear Bushing

LMS

Points

1 Compact design

The ultra-small size allows for compact machine and device design.

2 Wide variation

As the lineup of two types of external cylinder length are available, i.e. standard and long, you can select an optimal Linear Bushing for the specifications of your machine and device.

3 Stainless steel selections for excellent corrosion resistance

Products made of stainless steel are highly resistant to corrosion, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.

Identification Number and Specification

Example of an identification number

The specification of LMS series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a material code, a part code, and a classification symbol for each specification to apply.

1	2	3	4	5	6
LMS		4	F	UU	P

1 **Model** — Model code — Page Ⅱ－170

2 **External cylinder length** — Model code — Page Ⅱ－170

3 **Inscribed circle diameter** — Dimensions — Page Ⅱ－170

4 **Material type** — Material code — Page Ⅱ－170

5 **Seal structure** — Part code — Page Ⅱ－170

6 **Accuracy class** — Classification symbol — Page Ⅱ－170

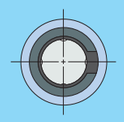
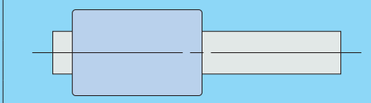
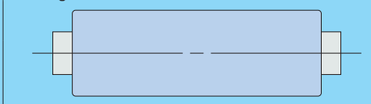
Identification Number and Specification

1 **Model**	Miniature Linear Bushing (LMS series)	: LMS	For applicable models and sizes, see Table 1.
2 **External cylinder length**	Standard Long	: No symbol : L	
3 **Inscribed circle diameter**			Indicate the inscribed circle diameter in mm.
4 **Material type**	High carbon steel made Stainless steel made	: No symbol : F	Specify the component part material. For applicable models and sizes, see Table 1.
5 **Seal structure**	Without seal With two end seals	: No symbol : UU	The models with two end seals incorporate seals with superior dust protection performance for preventing intrusion of foreign substances.
6 **Accuracy class**	High Precision	: No symbol : P	For details of accuracy, see the dimension table on page Ⅱ-172. Precision applies only to the standard type. Especially when it is necessary to control clearance with the shaft strictly, the tolerance of inscribed circle diameter can be sorted by 0.002 mm before delivery. Contact IKO for further information.

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

Identification Number and Specification

Table 1 Models and sizes of LMS series

Shape	External cylinder length	Material type	Seal structure	Model	Size 3	4	5
	Standard 	High carbon steel made	Without seal	LMS	○	○	○
			With two end seals	LMS···UU	○	○	○
		Stainless steel made	Without seal	LMS···F	○	○	○
			With two end seals	LMS···FUU	○	○	○
	Long 	High carbon steel made	Without seal	LMSL	○	○	○
			With two end seals	LMSL···UU	○	○	○
		Stainless steel made	Without seal	LMSL···F	○	○	○
			With two end seals	LMSL···FUU	○	○	○

Relationship between Load Rating and Ball Raceway

The load rating of LMS series varies according to the loading direction and position of ball raceway. The dimension table describes two types of values shown in Fig. 1.1 and Fig. 1.2 according to the loading direction and position of ball raceway.

Fig. 1.1 shows the case where the loading direction and ball raceway position coincides with each other, representing the loading direction A in the dimension table. Generally, this is applied when the ball raceway position cannot be specified to indeterminate direction load or loading direction.

Fig. 1.2 shows the case where the loading direction is positioned between ball raceways, representing the loading direction B in the dimension table. Generally, this can be subjected to load bigger than loading direction A.

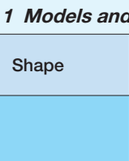


Fig. 1.1 Loading direction A

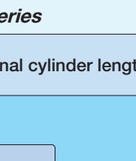


Fig. 1.2 Loading direction B

Lubrication

Grease is not pre-packed in the LMS series, so please perform adequate lubrication as needed.

Both of oil lubrication and grease lubrication are available in the LMS series. For grease lubrication, it is typically applied lightly to the shaft and each row. Use of high-quality lithium-soap base grease is recommended for the grease to use.

Related Products

Shaft for Miniature Linear Bushing

To make full use of performance of the LMS series, we also offer shaft with high accuracy for Miniature Linear Bushing grounded after heat treatment. If you are interested, contact IKO.

Precaution for Use

❶ Fitting of external cylinder

Recommended fit for the LMS series is indicated in Table 2. As the external cylinder is thin, use epoxy type adhesive agent for fixing to the housing hole, instead of press-fitting.

Table 2 Recommended fit
(Tolerances of dimensions for shaft and housing hole) unit: μm

Item / Accuracy class	Shaft	Housing hole
High	− 6 −14	+12 0
Precision	− 4 − 9	+ 8 0

❷ Raceway

LMS series operates 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 shaft are indicated in Table 3.

Table 3 Surface hardness, roughness, and effective hardening depth of shaft

Item	Recommended value	Remark
Surface hardness	58~64HRC	When the surface hardness is low, multiply the load rating by hardness factor (1).
Surface roughness	0.2 μmRa or lower (0.8 μmRy or lower)	–
Effective hardening depth	0.8 mm or higher	–

Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

❸ When accompanied by rotational motion

LMS series units support only linear motion but do not support rotational motion. When performing rotational motion and linear motion of short stroke length, IKO Miniature Stroke Rotary Bushing is recommended to be used.

❹ Insertion of shaft

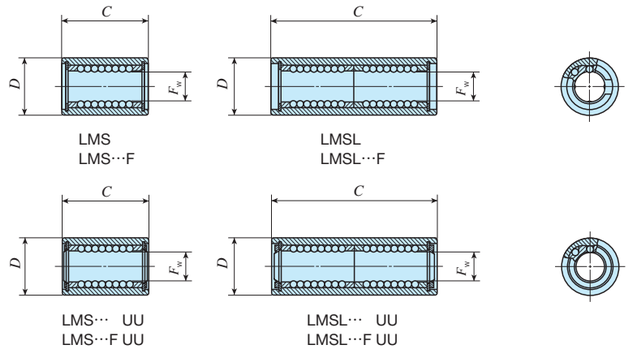
When inserting a shaft to the external cylinder, be careful not to let the shaft pried open as it may cause dropping of balls or deformation of the retainer.

❺ Operating temperature

The maximum operating temperature is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.

IKO Miniature Linear Bushing

Shape	LMS
Shaft diameter	3 / 4 / 5



LMS
LMS···F

LMSL
LMSL···F

LMS··· UU
LMS···F UU

LMSL··· UU
LMSL···F UU

Shaft diameter mm	Identification number	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: Dim. Fw tolerance F_w	Dim. Fw tolerance μm P	Dim. Fw tolerance μm H	Dim. D tolerance D	Dim. D tolerance μm P	Dim. D tolerance μm H	C	Dim. C tolerance μm	Eccentricity Maximum μm P	Eccentricity Maximum μm H	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	4	1.8	3	0 −5	0 − 8	7	0 −7	0 − 8	10	0 −120	2	4	48.9	56.1	37.4	52.9
	LMS 3 F																
	LMS 3 UU																
	LMS 3 F UU																
	LMSL 3		3.0		–	0 −10		–	0 −13	19	0 −300	–	5	79.5	91.4	74.8	106
	LMSL 3 F																
	LMSL 3 UU																
	LMSL 3 F UU																
4	LMS 4	4	2.8	4	0 −5	0 − 8	8	0 −7	0 − 8	12	0 −120	2	4	58.6	67.3	47.5	67.1
	LMS 4 F																
	LMS 4 UU																
	LMS 4 F UU																
	LMSL 4		4.3		–	0 −10		–	0 −13	23	0 −300	–	5	95.3	109	94.9	134
	LMSL 4 F																
	LMSL 4 UU																
	LMSL 4 F UU																
5	LMS 5	4	3.8	5	0 −5	0 − 8	10	0 −7	0 − 8	15	0 −120	2	4	135	155	103	146
	LMS 5 F																
	LMS 5 UU																
	LMS 5 F UU																
	LMSL 5		6.7		–	0 −10		–	0 −13	29	0 −300	–	5	219	252	206	292
	LMSL 5 F																
	LMSL 5 UU																
	LMSL 5 F UU																

Remark: "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.

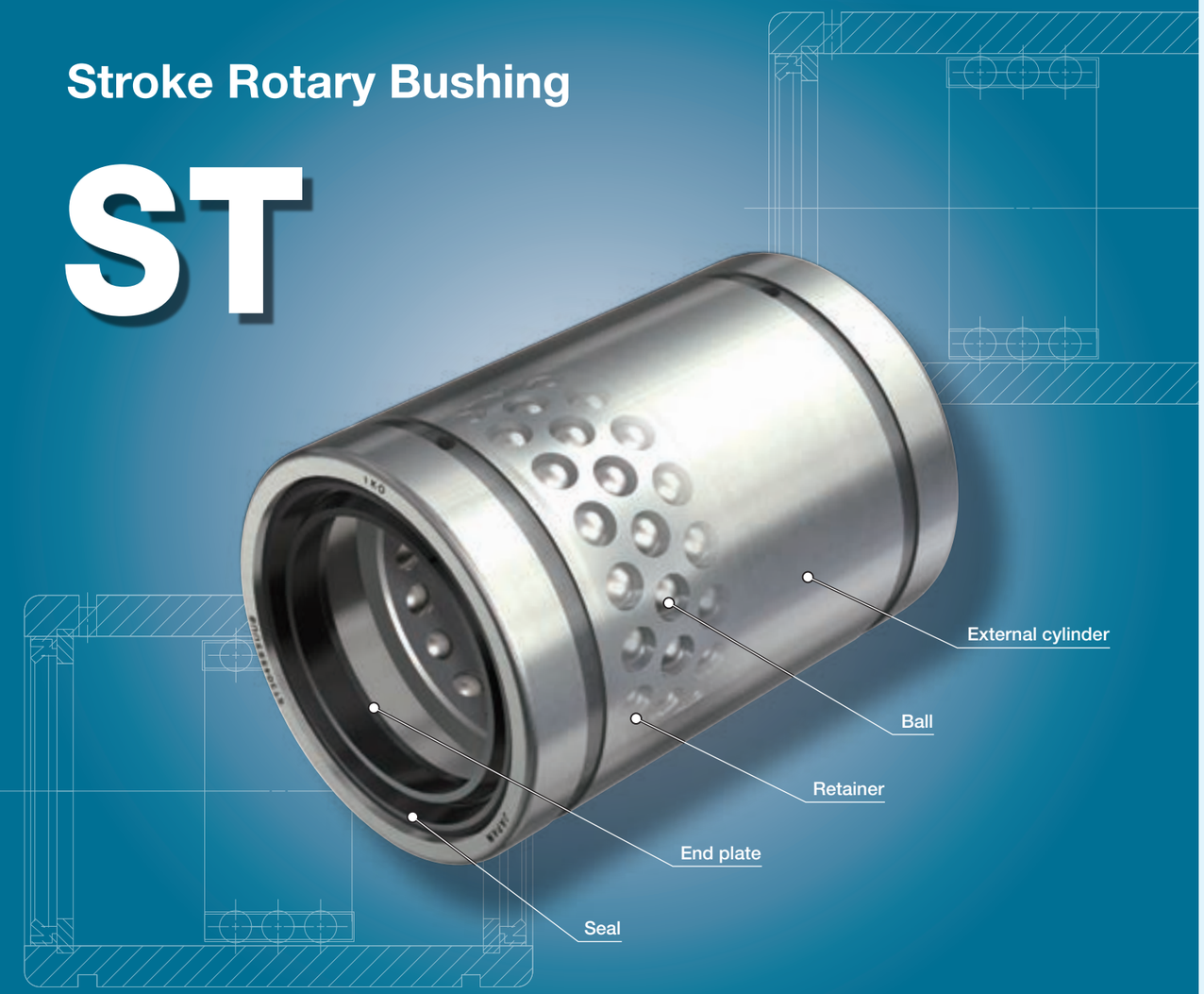
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Stroke Rotary Bushing

Stroke Rotary Bushing
Miniature Stroke Rotary Bushing
Stroke Rotary Cage

Stroke Rotary Bushing

ST



Points

Rotational and linear motions

1 With the combination of an external cylinder with cylindrical raceway and balls incorporated in the retainer, rotary and linear motion in the axial direction is possible simultaneously with rotational motion.

Small rolling frictional resistance

2 By building a ball with high accuracy into the precisely polished external cylinder, a small rolling frictional resistance and extremely smooth rolling motion together with reciprocal motion have been achieved.

Small inertia

3 The retainer has a high rigidity and light weight so that it has small motion inertia suitable for rolling motion and reciprocal motion in the high-speed operation.

Wide variation

4 Ordinary type and heavy load type with different load rating are provided, and each are available with and without seals. You can select an optimal product for the specifications of your machine and device.

Identification Number and Specification

Example of an identification number

The specification of ST series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions and a part code for each specification to apply.

1	2	3	4	5	1
ST	30	45	65	UU	B

1 Model — Model code Page Ⅱ－176

2 Inscribed circle diameter

3 Outside diameter of external cylinder

4 External cylinder length

Dimensions Page Ⅱ－176

5 Seal structure — Part code Page Ⅱ－176

Identification Number and Specification

1 Model	Stroke Rotary Bushing (ST series)	Ordinary type Heavy load type	: ST : ST···B
	For applicable models and sizes, see Table 1.		
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 External cylinder length	Indicate the external cylinder length in mm.		
5 Seal structure	Open type With seal	: No symbol : UU	The models with seal type incorporate seals with superior dust protection performance for preventing intrusion of foreign substances.

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

Identification Number and Specification

Table 1 Models and sizes of ST series

Shape	Seal structure	Model	Size																		
			4	5	6	8	10	12	16	20	25	30	35	40	45	50	55	60	70	80	90	100
Ordinary type	Open type	ST	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	With seal	ST···UU	–	–	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Heavy load type	Open type	ST···B	–	–	–	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	With seal	ST···UUB	–	–	–	–	–	–	–	–	–	○	○	○	○	○	○	○	○	○	○	○

Accuracy

Since outside diameter of external cylinder is deformed by stop ring tension, calculate the measurement point from the equation (1) and use the average diameter value at the point.

$$W = 4 + L_1 / 8 \quad \cdots\cdots(1)$$

where, W: Distance from the end to measurement point P, mm (see Fig. 1)
L_1: External cylinder length, mm

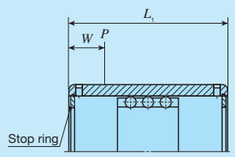


Fig. 1

Table 2 Tolerance of inscribed circle diameter and outside diameter of external cylinder unit: μm

Nominal dimensions of inscribed circle diameter F_w or outside diameter of external cylinder D mm		Tolerance of inscribed circle diameter F_w		Tolerance of outside diameter of external cylinder D_m (1)	
Over	Incl.	High	Low	High	Low
3	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 the maximum diameter and minimum diameter obtained by two-point measurement of the outside diameter of external cylinder.

Table 3 Tolerance of external cylinder length unit: μm

Nominal dimensions of inscribed circle diameter F_w mm		Dim. L_1 tolerance of external cylinder length	
Over	Incl.	High	Low
—	20	0	−200
20	60	0	−300
60	100	0	−400

Allowance of Velocity

The ST series is capable of rotation and rotary and linear motion. However, allowance of velocity for these motions performed at the same time is obtained from the equation (2). Typical values are indicated in Table 4.

$$DN \geqq D_{pw}\, n + 10\, S\, n_1 \quad \cdots\cdots(2)$$

where, DN : Allowance of velocity (see Table 4)
n : Rotational speed, min^{-1}
n_1 : Number of strokes per minute, min^{-1}
S : Stroke length, mm
D_{pw} : Pitch circle diameter of balls, mm ($D_{pw} \fallingdotseq 1.15F_w$)
F_w : Inscribed circle diameter, mm
However, applicable when $n_1 \leqq 5000$, $S\, n_1 \leqq 50000$.

Table 4 Allowance of velocity

Lubrication conditions	DN
Oil lubrication	600 000
Grease lubrication	300 000

Lubrication

Grease is not pre-packed in the ST series, so please perform adequate lubrication as needed.
Both of oil lubrication and grease lubrication are available in the ST series. For grease lubrication, use of high-quality lithium-soap base grease is recommended. Oil is fed from the oil hole on the external cylinder.

Precaution for Use

❶ Fitting

Recommended fit for the ST series is indicated in Table 5.
As the ST series performs rotation at the same time and rotary and linear motion at the same time, the radial internal clearance must be smaller when shock load or load accompanied by vibration is applied. Especially when vertical axis application or high accuracy motion is required, it is recommended to set the radial internal clearance at zero or under a slightly-preloaded condition.
Excessive preload will shorten the life, so be careful not to set lower limit value of radial internal clearance below the value stated in Table 6.

Table 5 Recommended fit

Operational conditions	Tolerance class	
	Shaft	Housing hole
Normal operational conditions	k5, m5	H6, H7
For vertical axis or high accuracy	n5, p6	J6, J7

Table 6 Lower limit of radial internal clearance unit: μm

Nominal dimensions of inscribed circle diameter F_w mm		Lower limit of radial internal clearance
Over	Incl.	
3	6	− 2
6	10	− 3
10	18	− 4
18	30	− 5
30	50	− 6
50	80	− 8
80	100	−10

❷ Raceway

Since ST series operates with a shaft as a raceway surface, the shaft should be heat-treated and ground. Recommended values for surface hardness and roughness of the shaft are shown in Table 7 and the recommended value for the minimum effective hardening depth is shown in Table 8.

Table 7 Surface hardness and roughness of raceway

Item	Recommended value	Remark
Surface hardness	58~64HRC	When the surface hardness is low, multiply the load rating by hardness factor (1).
Surface roughness	0.2 μmRa or lower (0.8 μmRy or lower)	Where accuracy standard is low, around 0.8 μmRa (3.2 μmRy) is also allowed.

Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

Table 8 Minimum effective hardening depth of shaft unit: mm

Shaft diameter		Recommended value for minimum effective hardening depth
Over	Incl.	
—	28	0.8
28	50	1.0
50	100	1.5

❸ Stroke length

For stroke length used, 80% of the maximum stroke length stated in the dimension table is recommended.

❹ Operating temperature

The maximum operating temperature is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.

❺ Assembly operation of external cylinder and shaft

When inserting a shaft, be careful not to shock the ball. After assembling, correct the position of the retainer to be in the center of the external cylinder. After assembling the external cylinder to the housing, insert the shaft softly. Move the retainer as well as the shaft until they contact one side of the surface and stop. Then push the shaft not to damage balls or raceway to the position a half of the maximum stroke length and return it by the same length (a half of the maximum stroke) so that the retainer is positioned regularly at the center of the external cylinder.

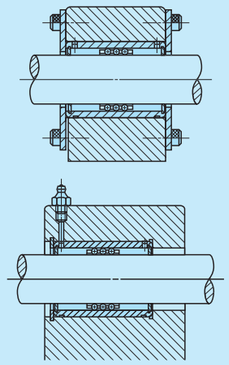
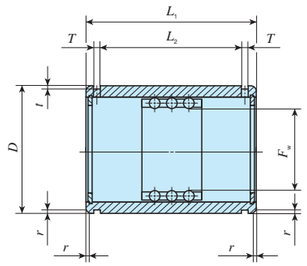


Fig. 2 Mounting examples

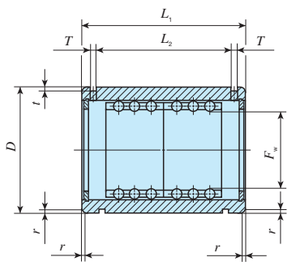
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Stroke Rotary Bushing Open Type

	Ordinary type							Heavy load type						
Shape	ST							ST···B						
Size	4	5	6	8	10	12	16	—	—	—	8	10	12	16
	20	25	30	35	40	45	50	20	25	30	35	40	45	50
	55	60	70	80	90	100		55	60	70	80	90	100	



ST



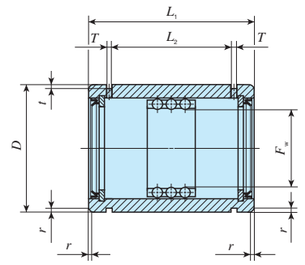
ST···B

Shaft diameter mm	Identification number: Ordinary type	Mass (Ref.) g	Identification number: Heavy load 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 81524 B	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 101930 B	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 122332 B	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 162837 B	75	16	28	37	29.1	1.5	0.5	0.5	41	1 230	998	16	1 990	2 000
20	ST 203245	99	ST 203245 B	106	20	32	45	35.8	2	0.5	0.5	55	1 390	1 250	28	2 250	2 500
25	ST 253745	117	ST 253745 B	125	25	37	45	35.8	2	0.5	1	55	1 450	1 430	28	2 360	2 850
30	ST 304565	205	ST 304565 B	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 355270 B	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 406080 B	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 456580 B	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 5072100 B	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 5580100 B	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 6085100 B	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 7095100 B	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 80110100 B	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 90120100 B	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 100130100 B	2 520	100	130	100	86	3	1.5	2	132	8 820	14 800	76	14 300	29 500

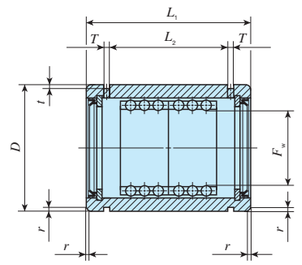
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Stroke Rotary Bushing With Seal

	Ordinary type						Heavy load type					
Shape	ST···UU						ST···UUB					
Size	8	10	12	16	20	25	—	—	—	—	—	—
	30	35	40	45	50	55	30	35	40	45	50	55
	60	70	80	90	100		60	70	80	90	100	



ST···UU



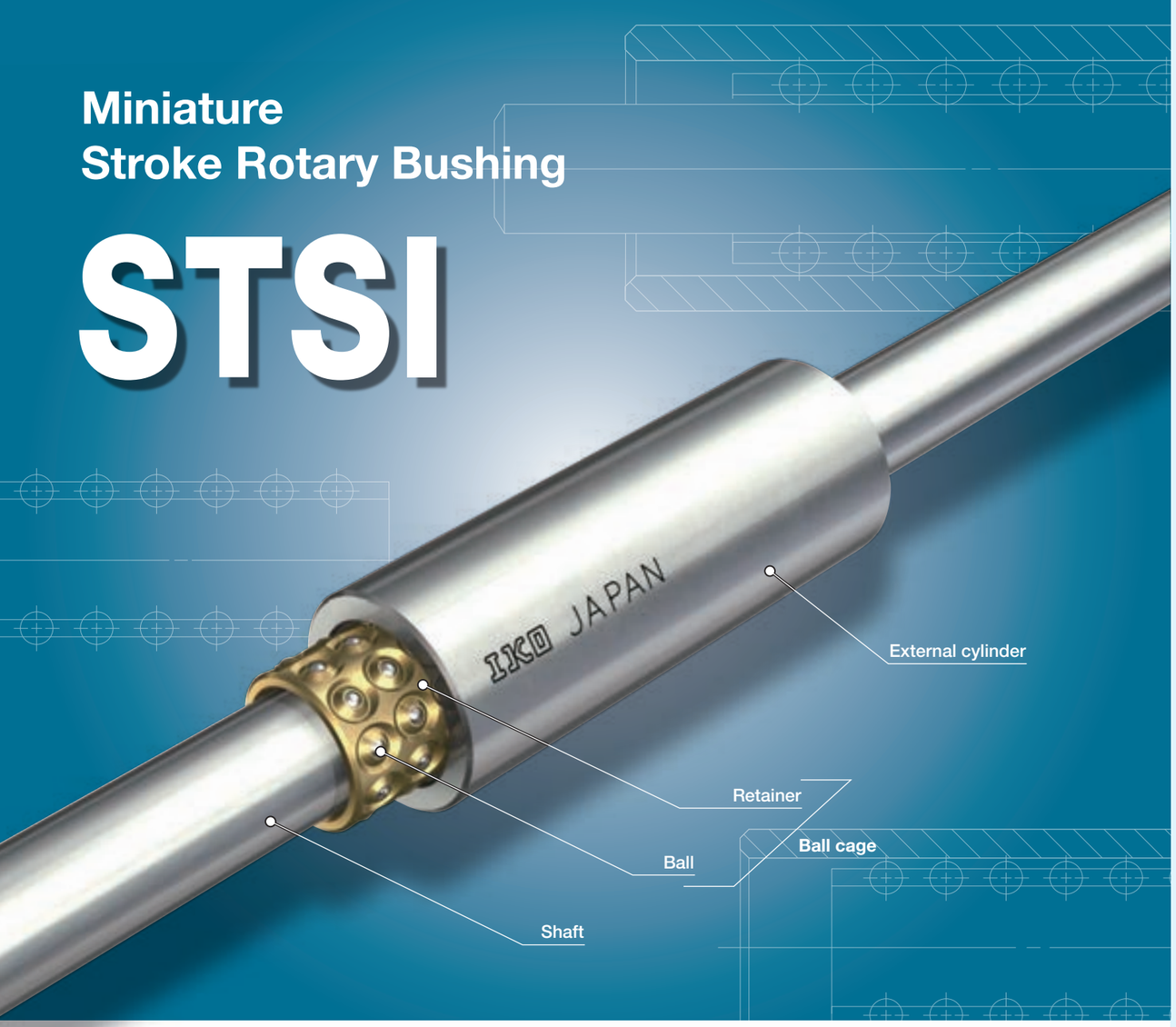
ST···UUB

Shaft diameter mm	Identification number: Ordinary type	Mass (Ref.) g	Identification number: Heavy load type	Mass (Ref.) g	Nominal dimensions mm F_w	D	L_1	L_2	T	t	r	ST···UU Maximum stroke length mm	ST···UU Basic dynamic load rating C N	ST···UU Basic static load rating C_0 N	ST···UUB Maximum stroke length mm	ST···UUB Basic dynamic load rating C N	ST···UUB Basic static load rating C_0 N
8	ST 81524 UU	16.5	———	———	8	15	24	12.3	1.5	0.5	0.5	14	315	211	———	———	———
10	ST 101930 UU	30.7	———	———	10	19	30	15.5	1.5	0.5	0.5	16	659	466	———	———	———
12	ST 122332 UU	45	———	———	12	23	32	17.1	1.5	0.5	0.5	17	1 110	822	———	———	———
16	ST 162837 UU	74	———	———	16	28	37	21.1	1.5	0.5	0.5	25	1 230	998	———	———	———
20	ST 203245 UU	107	———	———	20	32	45	26.8	2	0.5	0.5	37	1 390	1 250	———	———	———
25	ST 253745 UU	121	———	———	25	37	45	26.8	2	0.5	1	37	1 450	1 430	———	———	———
30	ST 304565 UU	215	ST 304565 UU B	230	30	45	65	45.1	2.5	0.5	1	65	3 110	3 160	27	5 060	6 320
35	ST 355270 UU	342	ST 355270 UU B	359	35	52	70	50.1	2.5	0.7	1.5	75	3 290	3 550	37	5 340	7 100
40	ST 406080 UU	529	ST 406080 UU B	553	40	60	80	59.9	2.5	0.7	1.5	91	4 340	4 810	49	7 050	9 630
45	ST 456580 UU	577	ST 456580 UU B	602	45	65	80	59.9	2.5	0.7	1.5	91	4 550	5 330	49	7 390	10 700
50	ST 5072100 UU	836	ST 5072100 UU B	871	50	72	100	77.4	3	1	1.5	120	5 790	6 970	70	9 400	13 900
55	ST 5580100 UU	1 190	ST 5580100 UU B	1 230	55	80	100	77.4	3	1	2	120	6 030	7 630	70	9 800	15 300
60	ST 6085100 UU	1 270	ST 6085100 UU B	1 320	60	85	100	77.4	3	1	2	120	6 260	8 300	70	10 200	16 600
70	ST 7095100 UU	1 430	ST 7095100 UU B	1 480	70	95	100	77.4	3	1	2	120	6 510	9 320	70	10 600	18 600
80	ST 80110100 UU	2 080	ST 80110100 UU B	2 140	80	110	100	77	3	1.5	2	114	8 230	12 200	58	13 400	24 400
90	ST 90120100 UU	2 290	ST 90120100 UU B	2 370	90	120	100	77	3	1.5	2	114	8 550	13 500	58	13 900	27 000
100	ST 100130100 UU	2 540	ST 100130100 UU B	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



Points

Rotational and linear motions

1

With the combination of an external cylinder with cylindrical raceway and balls incorporated in the retainer, rotary and linear motion in the axial direction is possible simultaneously with rotational motion.

Super small size

2

With the ultra-small sized balls incorporated in a thin external cylinder, small diameter and small sectional height are realized.

Super precision

3

Balls of high accuracy are incorporated with super-finished external cylinder and shaft to be adjusted to zero or minimal amount of preload, which realizes rotational motion and rotary and linear motion of high accuracy.

Extremely smooth operation

4

Since each component is precisely grounded and adjusted to ideal preload condition, extremely smooth and stable operation with small frictional resistance for long term can be achieved.

Identification Number and Specification

Example of an identification number

The specification of STSI series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, length, and a selection code for each specification to apply.

	1	2	3	4	5	6	7	1	8
Assembled set With a shaft	STSI	4			20	- 15	- 50		
Without a shaft	STS	4			20	- 15			/M1
Part									
External cylinder	OR		6	8	20			A	/M1
Ball cage	BK	4	6			15		A	
Shaft	SF	4					50	A	/M1

1 **Model** — Model code Page Ⅱ－185

2 **Shaft diameter** (1)

3 **Bore diameter of external cylinder** (2)

4 **Outside diameter of external cylinder**

Dimensions Page Ⅱ－185

5 **External cylinder length**

6 **Ball cage length**

7 **Shaft length**

Length Page Ⅱ－185

8 **Selection class** — Selection code Page Ⅱ－185

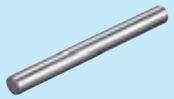
Notes (1) Indicates inscribed circle diameter for assembled set without a shaft or ball cage.
(2) Indicates circumscribed circle diameter for ball cage.

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

Identification Number and Specification

1 Model	Miniature Stroke Rotary Bushing (STSI series)	Assembled set with a shaft : STSI Assembled set without a shaft : STS External cylinder : OR···A Ball cage : BK···A Shaft : SF ···A	
2 Shaft diameter			Indicate the shaft diameter in mm. Indicates inscribed circle diameter for assembled set without a shaft or ball cage.
3 Bore diameter of external cylinder			Indicate the bore diameter of external cylinder in mm. Indicates circumscribed circle diameter for ball cage.
4 Outside diameter of external cylinder			Indicate the outside diameter of external cylinder in mm.
5 External cylinder length			Indicate the external cylinder length in mm.
6 Ball cage length			Indicate the ball cage length in mm.
7 Shaft length			Indicate the shaft length in mm.
8 Selection class	M1 class : M1 M2 class : M2 M3 class : M3		Selection code and tolerances are shown in Table 3. For combination of each part, assemble parts with the same selection code.

Table 1 Models of STSI series

Assembled set	Part
Miniature Stroke Rotary Bushing With a shaft STSI	External cylinder OR···A Ball cage BK···A Shaft SF···A 
Miniature Stroke Rotary Bushing Without a shaft STS	

Accuracy

Table 2 Tolerance and allowance

Nominal dimensions of outside diameter of external cylinder mm		Tolerance of outside diameter of external cylinder μm		Radial runout of outside diameter of external cylinder	Tolerance of length of external cylinder and shaft
Over	Incl.	High	Low	μm	mm
3	6	0	−5	8	±0.1
6	10	0	−6		
10	18	0	−8		
18	30	0	−9	9	

Table 3 Selection code and tolerance unit: μm

Selection code	Tolerance of bore diameter of external cylinder		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

Load Rating

Load rating of the STSI series represents the value obtained when load is evenly distributed without the ball incorporated in the ball cage being dropped from the external cylinder and shaft end.

Lubrication

Grease is not pre-packed in the STSI series, so please perform adequate lubrication as needed.
Both of oil lubrication and grease lubrication are available in the STSI series. For grease lubrication, it is typically applied lightly to the shaft and raceway of the external cylinder. Use of high-quality lithium-soap base grease is recommended for the grease to use.

Precaution for Use

❶ Fitting
The STSI series is assembled to slight preload state to obtain high motion accuracy. Use external cylinder and housing hole of the STSI series with clearance fit to avoid any effect of press-fitting on inscribed circle diameter. In addition, for combination of an external cylinder, a ball cage and a shaft, select an external cylinder and a shaft with the same selection code to be combined with a ball cage.

❷ Operating temperature
The maximum operating temperature is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.

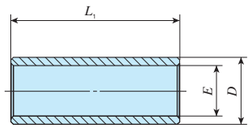
❸ Mounting
Typically, to fix the external cylinder and housing hole, the external cylinder end is fixed to the axial direction with stop ring or adhesive agent is used.
The ball cage is mounted through the shaft after the external cylinder is fixed to the housing hole. At this point, mounting becomes easier if the ball cage is shifted by one half of assembly insertion amount of the shaft in insert direction of the shaft so that the ball cage is positioned at the regular position after mounting.

❹ Insertion of shaft
When inserting a shaft into an external cylinder, be careful not to pry open or give shock to the shaft.

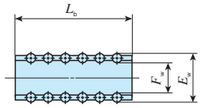
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Miniature Stroke Rotary Bushing

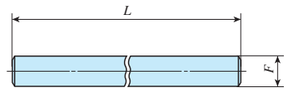
	Assembled set with a shaft	Assembled set without a shaft	External cylinder	Ball cage	Shaft
Shape	STSI	STS	OR···A	BK···A	SF···A
Size	2 3 4 5 / 6 8 10 12	2 3 4 5 / 6 8 10 12	2 3 4 5 / 6 8 10 12	2 3 4 5 / 6 8 10 12	2 3 4 5 / 6 8 10 12



External cylinder



Ball cage



Shaft

Shaft diameter mm	Identification number of assembled set without a shaft	External cylinder: Identification number	External cylinder: Mass (Ref.) g	External cylinder: Nominal dimensions mm E	External cylinder: Nominal dimensions mm D	External cylinder: Nominal dimensions mm L_1	Ball cage: Identification number	Ball cage: Mass (Ref.) g	Ball cage: Nominal dimensions mm F_w	Ball cage: Nominal dimensions mm E_w	Ball cage: Nominal dimensions mm L_b	Basic static load rating (1) C_0 N	Shaft: Identification number	Shaft: Mass (Ref.) g	Shaft: Nominal dimensions mm F	Shaft: Nominal dimensions mm L	Identification number of assembled set with a shaft
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	3.2	5	10.5	SF 2 20 A	0.5	2	20	STSI 2 L_1-L_b-L
		OR 3 5 15 A	1.3			15	BK 2 3 10 A	0.3			10	21.0	SF 2 30 A	0.7		30	
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	5	10	38.4	SF 3 50 A	2.8	3	50	STSI 3 L_1-L_b-L
		OR 5 7 20 A	2.9			20	BK 3 5 15 A	1.1			15	57.7	SF 3 60 A	3.3		60	
		OR 5 7 30 A	4.4			30	BK 3 5 20 A	1.4			20	76.9					
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	6	10	59.5	SF 4 50 A	4.9	4	50	STSI 4 L_1-L_b-L
		OR 6 8 20 A	3.4			20	BK 4 6 15 A	1.3			15	89.3	SF 4 60 A	5.9		60	
		OR 6 8 30 A	5.2			30	BK 4 6 20 A	1.8			20	119					
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	7	10	81	SF 5 50 A	7.7	5	50	STSI 5 L_1-L_b-L
		OR 7 10 20 A	6.3			20	BK 5 7 15 A	1.6			15	121	SF 5 80 A	12.3		80	
		OR 7 10 30 A	9.4			30	BK 5 7 20 A	2.0			20	162					
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	8	10	103	SF 6 50 A	11.1	6	50	STSI 6 L_1-L_b-L
		OR 8 11 30 A	10.5			30	BK 6 8 15 A	1.8			15	154	SF 6 80 A	17.7		80	
		OR 8 11 40 A	14.1			40	BK 6 8 20 A	2.3			20	206					
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	10	10	105	SF 8 50 A	19.7	8	50	STSI 8 L_1-L_b-L
		OR 10 13 30 A	12.7			30	BK 8 10 15 A	2.4			15	157	SF 8 80 A	31.5		80	
		OR 10 13 40 A	17.0			40	BK 8 10 20 A	3.2			20	209	SF 8 90 A	35.5		90	
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	12	15	191	SF 10 80 A	49.3	10	80	STSI 10 L_1-L_b-L
		OR 12 18 30 A	33.3			30	BK 10 12 20 A	3.8			20	254	SF 10 100 A	61.6		100	
		OR 12 18 43 A	47.7			43	BK 10 12 25 A	4.8			25	318	SF 10 120 A	74.0		120	
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	14	20	341	SF 12 80 A	71.0	12	80	STSI 12 L_1-L_b-L
		OR 14 20 30 A	37.7			30	BK 12 14 25 A	5.4			25	427	SF 12 100 A	88.8		100	
		OR 14 20 35 A	44.0			35	BK 12 14 30 A	6.1			30	512	SF 12 120 A	106.5		120	
		OR 14 20 40 A	50.3			40											

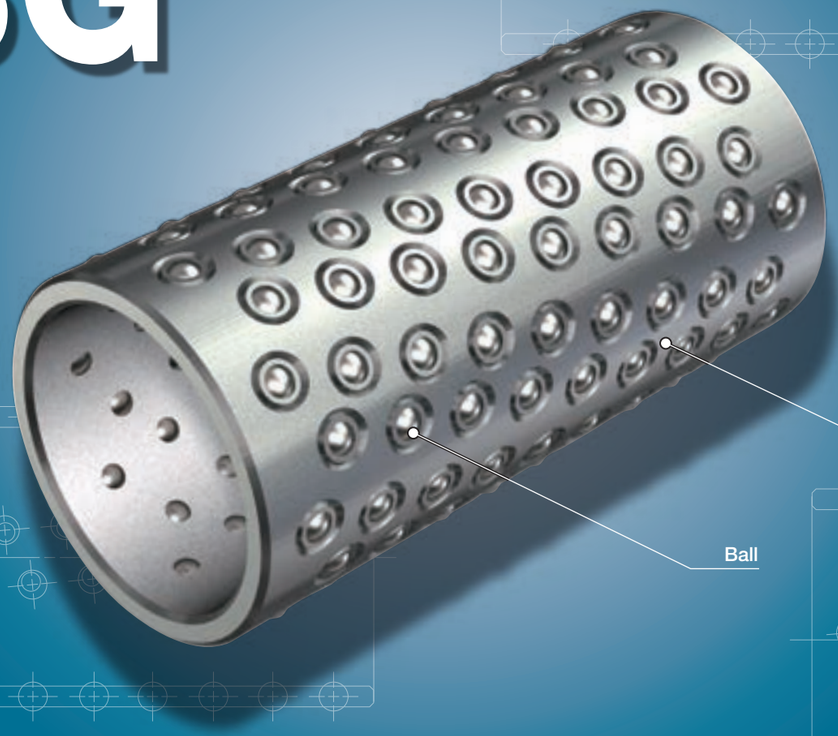
Note (1) Represents the value when load is evenly distributed without the ball incorporated in the ball cage being dropped from the external cylinder end.

Remark: L_1, L_b, and L in the identification number field of assembled set without a shaft and assembled set with a shaft represent length of the external cylinder, length of the ball cage, and length of the shaft in the dimension table.

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

Stroke Rotary Cage

BG



Points

● Rotational and linear motions

1 High-accuracy balls incorporated into the retainer make use of the raceway accuracy to allow high-accuracy rotational motion and rotary and linear motion.

● Superior high speed operation

2 As the retainers have high rigidity and light in weight with low inertia, this series is suitable for abrupt operations such as high-speed rotary and linear motion in axial direction.

● Large load rating and high rigidity

3 In the retainer, 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 load or offset load.

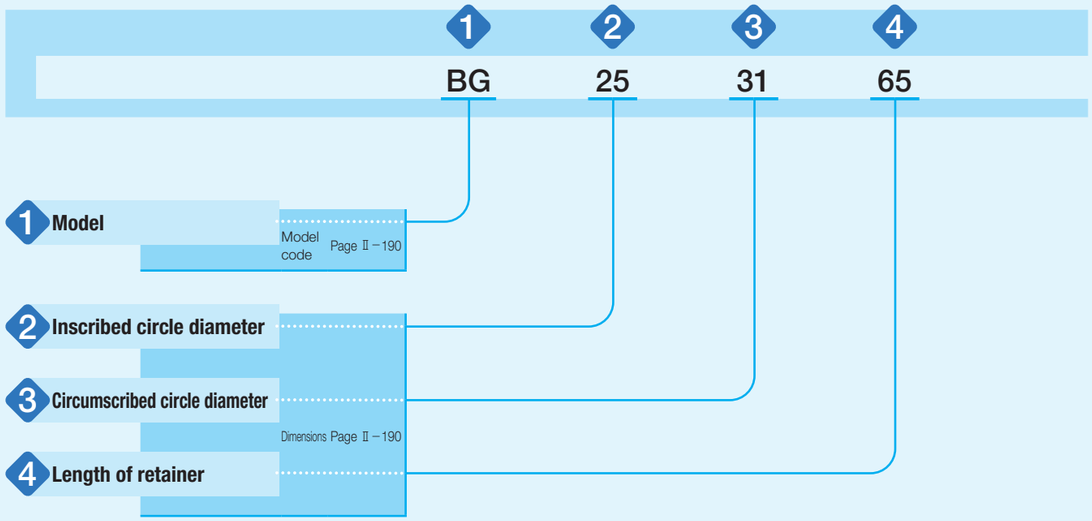
● Long life

4 Each ball held in the retainer is arranged in a spiral formation in order to prevent the balls from tracing the same path. Rolling contact fatigue of the shaft and housing raceways is thereby minimized, and stable high accuracy can be assured for long periods of time.

Identification Number and Specification

Example of an identification number

The specification of BG series is indicated by the identification number. Indicate the identification number, consisting of a model code and dimensions.



Identification Number and Specification

1 **Model**	Stroke Rotary Cage (BG 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.

Allowance of Velocity

The BG series is capable of rotation and rotary and linear motion. However, allowance of velocity for these motions performed at the same time is obtained from the equation (1). Typical values are indicated in Table 1.

$$DN \geqq D_{pw}\, n + 10\, S\, n_1 \quad \cdots\cdots (1)$$

where, DN : Allowance of velocity (see Table 1)
n : Rotational speed, min^{-1}
n_1 : Number of strokes per minute, min^{-1}
S : Stroke length, mm
D_{pw} : Pitch circle diameter of balls, mm

$$\left(D_{pw} = \frac{F_w + E_w}{2}\right)$$

F_w : Inscribed circle diameter, mm
E_w : Circumscribed circle diameter, mm

However, applicable when $n_1 \leqq 5000$, $S\, n_1 \leqq 50000$.

Table 1 Allowance of velocity

Lubrication conditions	DN
Oil lubrication	600 000
Grease lubrication	300 000

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

Precaution for Use

❶ Fitting

BG series is generally used with a slight radial internal clearance fit. Recommended fits are shown in Table 2.
When it is used for a guide post of the press die set or high operation accuracy is required, a preload is generally given. The tolerances of dimensions of the shaft and housing bore in this case are shown in Table 3. 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 4.

Table 2 General fit

Tolerance class	
Shaft	Housing hole
h5, h6	H6, H7

Table 3 Tolerances of dimensions for shaft and housing hole unit: μm

Shaft			Housing hole		
Nominal dimensions mm	h5		Nominal dimensions mm	K5	
	H	L		H	L
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 4 Lower limit of radial internal clearance unit: μm

Nominal dimensions of shaft mm	Lower limit of radial internal clearance
19	−5
22	−5
25	−5
28	−7
32	−7
38	−7

❷ Raceway

BG series is used with a shaft and housing hole as raceway surfaces. Recommended values for surface hardness and roughness of mating raceway are shown in Table 5 and the recommended values for the minimum effective hardening depth are shown in Table 6.
When some of the balls held in the retainer escape the housing raceway and operate in linear motion, it is recommended that the housing raceway ends should be slightly chamfered so that the balls enter or exit smoothly.

Table 5 Surface hardness and roughness of raceway

Item	Recommended value	Remark
Surface hardness	58～64HRC	When the surface hardness is low, multiply the load rating by hardness factor (1) .
Surface roughness	0.2 μmRa or lower (0.8 μmRy or lower)	Where accuracy standard is low, around 0.8 μmRa (3.2 μmRy) is also allowed.

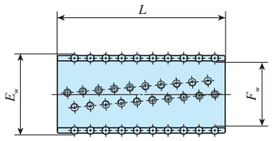
Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

Table 6 Minimum effective hardening depth of raceway unit: mm

Nominal dimensions of shaft and housing hole		Recommended value for minimum effective hardening depth
Over	Incl.	
–	28	0.8
28	50	1.0

IKO Stroke Rotary Cage

Shape	BG		
Size	19	22	25
	28	32	38



Shaft diameter mm	Identification number	Mass (Ref.) g	Nominal dimensions mm F_w	E_w	L	Basic dynamic load rating (1) C N	Basic static load rating (1) C_0 N
19	BG 192555*	33	19	25	55	2 330	2 600
22	BG 222860*	40	22	28	60	2 490	2 950
25	BG 253165*	48	25	31	65	2 660	3 390
28	BG 283670*	76	28	36	70	3 830	4 660
32	BG 324075*	93	32	40	75	4 480	6 030
38	BG 384880*	162	38	48	80	6 750	9 390

Note (1) Basic dynamic load rating and basic static load rating are values when balls incorporated into the retainer share the load evenly without escaping the raceway.
Remark: The identification numbers with * are our semi-standard items.

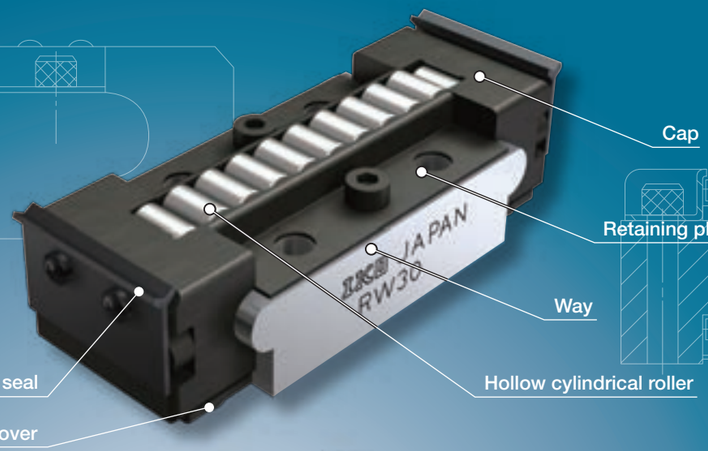
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Roller Way & Flat Roller Cage

Roller Way
Flat Roller Cage

Roller Way

RW



SR

GSN

Points

● High rigidity and accuracy

1 Since the high accuracy roller is built into the highly flat surface way finished by accurate ground, the product has a high rigidity and high accuracy. Also because the variation of operation height can be selected in the unit of 2 μm, the load can be evenly distributed even in the multiple-use environment.

● Smooth motion

2 The structure of all models lets the roller to be guided accurately without creating skew, yielding an extremely stable and smooth linear motion.

Identification Number and Specification

Example of an identification number

The specifications of RW, SR and GSN are indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a part code, a classification symbol, and a selection code for each specification to apply.

1	2	3	4	5
RW	40	UU	SP	B4
SR	2050		SP	B4
GSN	20		SP	B4

1 **Model** — Model code Page Ⅱ－196

2 **Size** — Dimensions Page Ⅱ－196

3 **Wiper seal** — Part code Page Ⅱ－197

4 **Accuracy class** — Classification symbol Page Ⅱ－197

5 **Selection class** — Selection code Page Ⅱ－197

Identification Number and Specification —Model · Size—

1 Model

Roller Way RW	: RW
Roller Way RW inch series	: RWB
Roller Way SR	: SR
Roller Way GSN	: GSN

For applicable models and sizes, see Table 1.1 and Table 1.2.

2 Size

Indicate the representative width in mm. For the inch series, indicate the width in the unit of 1/16 inch.
For applicable models and sizes, see Table 1.1 and Table 1.2.

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

Table 1.1 Models and sizes of RW, SR and GSN (Metric series)

Shape	Model	Size									
		15	20	25	26	30	32	40	50	70	95
	RW	–	–	–	○	○	–	○	○	○	○
	SR	○	○	○	–	–	○	○	○	–	–
	GSN	○	○	○	–	–	○	○	○	–	–

Table 1.2 Models and sizes of RWB (Inch series)

Shape	Model	Size					
		14	16	24	32	48	64
	RWB	○	○	○	○	○	○

3 Wiper seal

Without wiper seal	: No symbol	Applicable to Roller Way RW.
With wiper seal	: UU	Attach the wiper seal in the linear motion direction. This wiper seal is made of special synthetic rubber in double-lipped shape and has high removal performance against foreign substances.

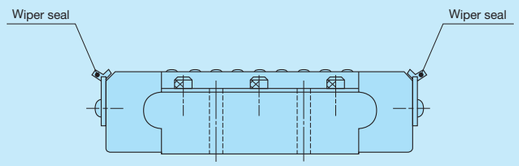


Fig. 1 Wiper seal

4 Accuracy class

Ordinary	: No symbol	For applicable accuracy class, see Table 2.1 and Table 2.2.
High	: H	
Precision	: P	For details of accuracy class, see Table 3.1, Table 3.2, and Table 4.
Super precision	: SP	

5 Selection class

When many are used on the same surface, it is required to use those with the same selection code from tolerances of dimensions in H of Table 4 to evenly distribute the load. When tolerances of dimensions of H is not specified, please specify a classification symbol only.

Table 2.1 Application of accuracy class of RW, SR and GSN (Metric series)

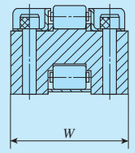
Size	Class (classification symbol)			
	Ordinary (1) (No symbol)	High (H)	Precision (P)	Super precision (SP)
15	○	○	○	○
20	○	○	○	○
25	○	○	○	○
26	–	○	○	○
30	–	○	○	○
32	○	○	○	○
40	○	○	○	○
50	○	○	○	○(2)
70	–	○	○	–
95	–	○	○	–

Notes (1) Applicable to SR and GSN.
(2) Applicable to RW.

Table 2.2 Application of accuracy class of RWB (Inch series)

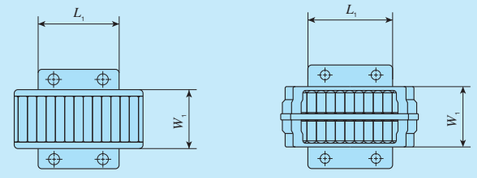
Size	Class (classification symbol)			
	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)
14	–	○	○	○
16	–	○	○	○
24	–	○	○	○
32	–	○	○	○
48	–	○	○	–
64	–	○	○	–

Table 3.1 Tolerances of RW and RWB width W



RW		RWB	
Size	Dim. W tolerance mm	Size	Dim. W tolerance inch
26 30 40	0 −0.05	14 16 24	0 −0.002
50 70	0 −0.07	32 48	0 −0.003
95	0 −0.10	64	0 −0.004

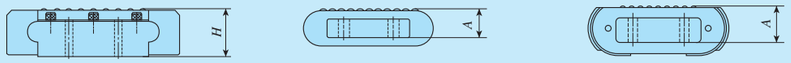
Table 3.2 Tolerances of SR and GSN width W_1, and length L_1



unit: mm

SR and GSN		
Size	Dim. W_1 tolerance	Dim. L_1 tolerance
15 20 25 32 40	0 −0.2	0 −0.2
50	0 −0.3	0 −0.3

Table 4 Selection code, and tolerance of height H and operation height A



RW SR GSN

Item / Accuracy class	Selection code	Dim. tolerance of height H and operation height A	
		Metric series mm	Inch series inch
Ordinary (no symbol)	–	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 (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

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

Precaution for Use

❶ Raceway

Recommended values for surface hardness and roughness of mating raceway are shown in Table 5 and the recommended value for the minimum effective hardening depth is shown in Table 6.1 and Table 6.2.

Table 5 Surface hardness and roughness of raceway

Item	Recommended value	Remark
Surface hardness	58～64HRC	When the surface hardness is low, multiply the load rating by hardness factor (1) .
Surface roughness	0.2 μmRa or lower (0.8 μmRy or lower)	Where accuracy standard is low, around 0.8 μmRa (3.2 μmRy) is also allowed.

Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

Table 6.1 Minimum effective hardening depth of raceway (RW and RWB) unit: mm

Identification number		Recommended value for 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 6.2 Minimum effective hardening depth of raceway (SR and GSN) unit: mm

Identification number		Recommended value for minimum effective hardening depth
SR 15	GSN 15	0.8
SR 20	GSN 20	
SR 25	GSN 25	1.0
SR 32	GSN 32	
SR 40	GSN 40	1.5
SR 50	GSN 50	2.0

❷ Accuracy of mounting surface

For accuracy of mounting surface, values in Table 7.1 and Table 7.2 are recommended.

Table 7.1 Accuracy of mounting surface (RW and RWB)

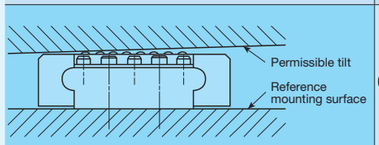
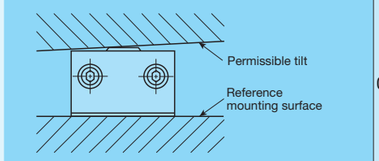
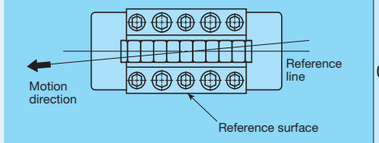
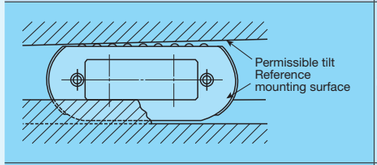
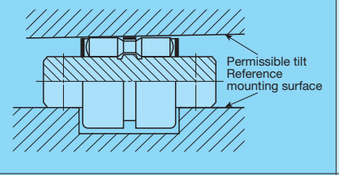
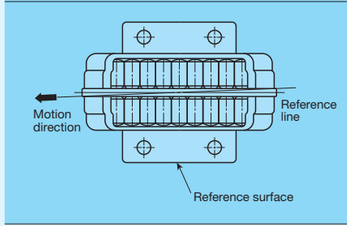
Item	Recommended value
	0.02/100 or lower
	0.015/100 or lower
	0.05/100 or lower

Table 7.2 Accuracy of mounting surface (SR and GSN)

Item	Recommended value
	0.02/100 or lower
	0.015/100 or lower
	0.05/100 or lower

❸ Groove machining on SR and GSN mounting surface

When mounting SR and GSN to the groove-machined mounting surface, the groove depth E should be deeper than the height from the bottom surface of the way to the bottom of the SR and GSN to provide clearance for oil pool. (See Fig. 2.)

Other than the above, groove width W corresponding to the width W_1 for SR should be as wide as clearance fit and the relation between the clearance and the groove position on the reference surface side must be considered.

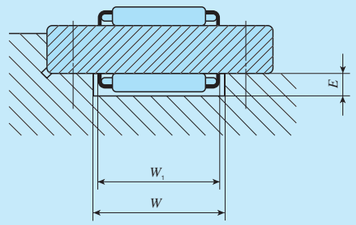


Fig. 2 Shape of groove on the mounting surface

❹ Operating temperature

The maximum operating temperature is 120˚C and temperature up to 100˚C is allowed for continuous operation. When the temperature exceeds 100˚C, contact IKO.

Precaution for Mounting

❶ Reference mounting surface

To mount RW, RWB, SR, and GSN in the linear motion direction, mount them by referring the opposite side of the IKO mark on the way end as reference surface. (See Fig. 3.) In addition, the surface under load is the upside of the IKO mark on the way end seen as the normal position.

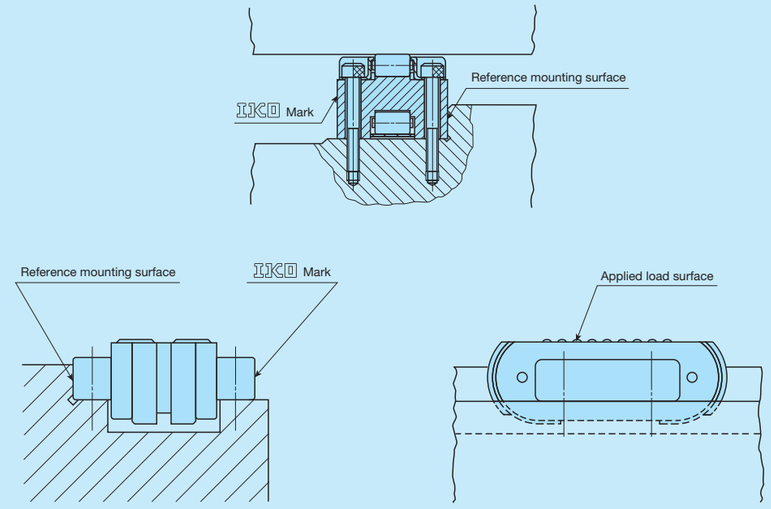


Fig. 3 Mounting examples

❷ How to mount SR and GSN

To mount it, fix the way directly to a table or a bed with bolts, or fix it with pressure plate as indicated in Fig. 4. For SR, mounting with pressure plate is recommended.

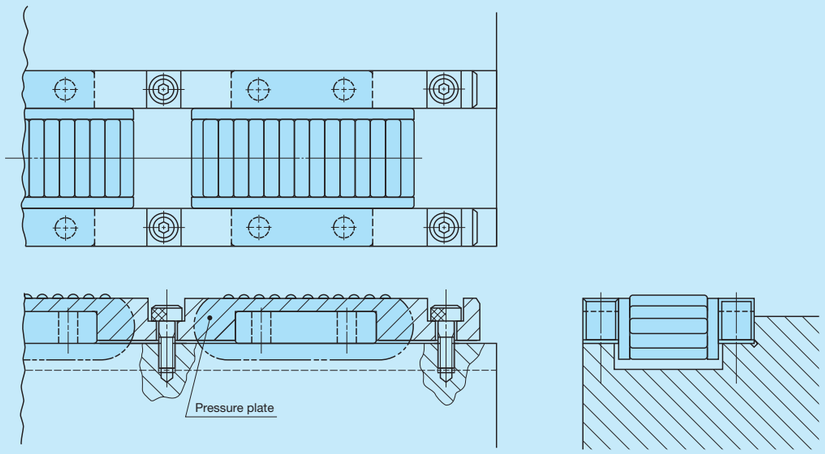
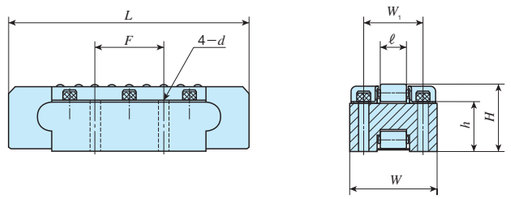


Fig. 4 Mounting with pressure plate

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

IKO Roller Way

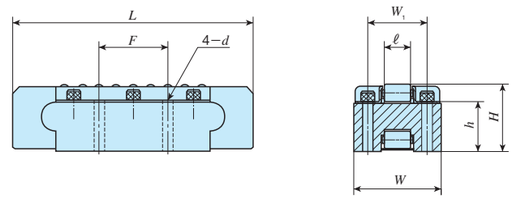
Shape	RW		
Size	26	30	40
	50	70	95



Identification number	Mass (Ref.)	Nominal dimensions mm								Basic dynamic load rating	Basic static load rating
		W	H	L	ℓ	F	W_1	h	d	C	C_0
	g									N	N
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 Inch Series

Shape	RWB		
Size	14	16	24
	32	48	64

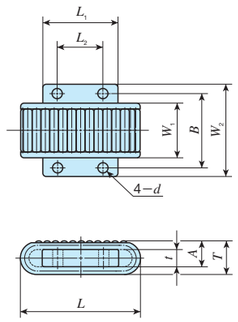


Identification number	Mass (Ref.)	Nominal dimensions inch / mm								Basic dynamic load rating	Basic static load rating
		W	H	L	ℓ	F	W_1	h	d	C	C_0
	g									N	N
RWB 14*	91	7/8 22.225	9/16 14.288	1.97 50	0.236 6	3/4 19.050	43/64 17.066	0.41 10.4	0.125 3.2	25 000	40 100
RWB 16*	227	1 25.400	3/4 19.050	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

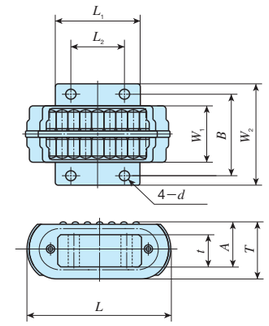
Remark: The identification numbers with * are our semi-standard items.

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

Shape	SR		
Size	15	20	25
	32	40	50



Shape	GSN		
Size	15	20	25
	32	40	50

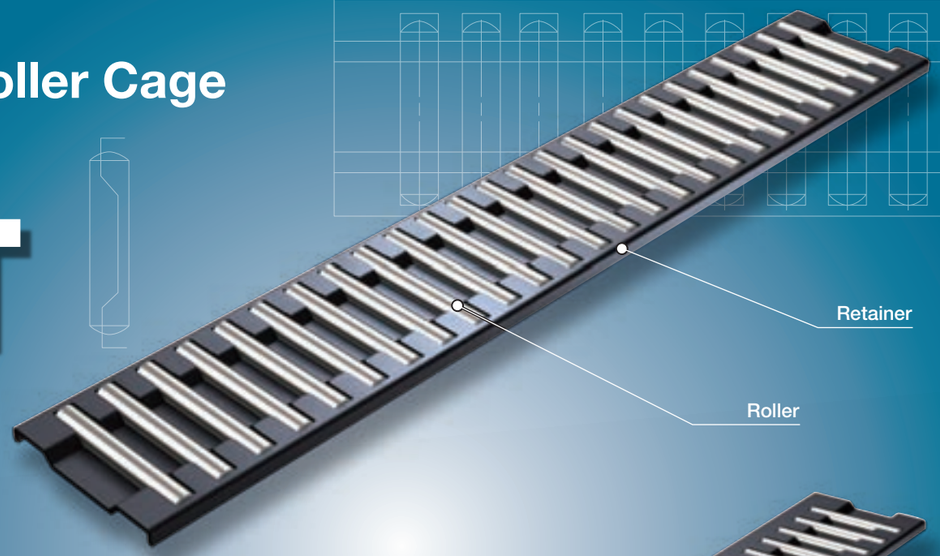


Identification number		Mass (Ref.)	Nominal dimensions mm											Basic dynamic load rating	Basic static load rating
			W_1	W_2	L	A		T	L_1	L_2	B	d	t	C	C_0
		g												N	N
SR 1540	——	62	15	30	40	11		15	20	12	23	3.3	7	26 500	45 900
———	GSN 15	82	15	30	40	15		20	19	12	23	3.4	11	22 300	36 000
SR 2050	——	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

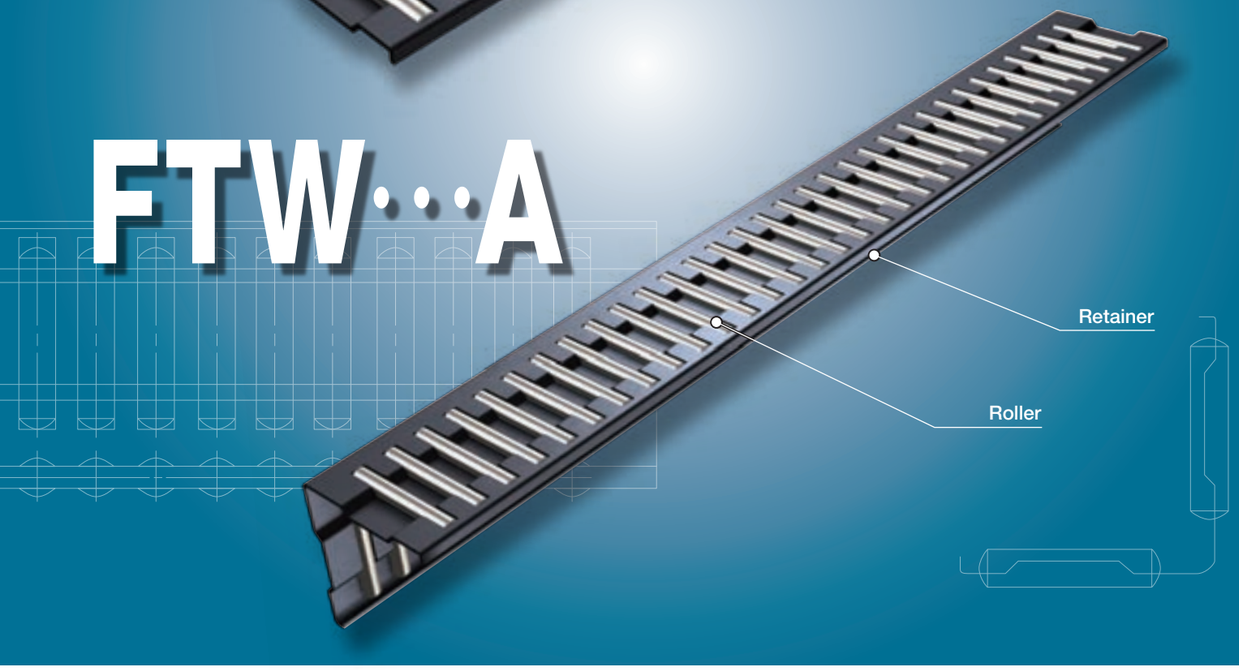
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Flat Roller Cage

FT



FTW···A



Points

● Low section

1 Flat Roller Cage is a limited linear motion guide consisting of high accuracy rollers and a very precise retainers and features low cross sectional height which is as high as the roller diameter.

● Large load rating

2 Rollers are assembled in a cage with a small pitch distance, so load ratings are large and the rigidity is high.

● Simple replacement for rolling guide

3 A single row model and a double row model with a 90° are standardized and can be easily used to modify the conventional plain guide ways of machine tools, etc. into a rolling guide type without a large-scale redesign of the bed.

● Smooth operations and low noise

4 As a retainer processed with high accuracy guides the rollers, the frictional resistance is very low without stick-slip, and stable linear motion is obtained. Retainers made of synthetic resin are most suitable for applications where low noise is required.

● Easy handling

5 The rollers are caged in a retainer securely, allowing easy handling.

Identification Number and Specification

Example of an identification number

The specification of FT and FTW···A are indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a supplemental code, and a selection code for each specification to apply.

1	2	3	2	1	5		6	4	7
FT	40	30				—	J	450	B4
FT	20	10			N				B4
FTW	40	30	V	A		—	J	450	B4

1 Model — Model code Page Ⅱ－207

2 Roller size

3 Width of retainer

Dimensions Page Ⅱ－207

4 Length of retainer

5 Retainer material — Supplemental code Page Ⅱ－207 Page Ⅱ－208

6 Jointed flat roller cage

7 Roller selection class — Selection code Page Ⅱ－208

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

Identification Number and Specification –Model · Roller Size · Width of Retainer · Length of Retainer · Retainer Material –

1 Model

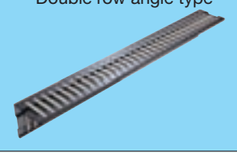
Flat Roller Cage
Single row type : FT
Double row angle type : FTW···A

For applicable models and roller sizes, see Table 1.

2 Roller size

Indicate 10 times as large value as the roller diameter (mm).
Indicate $10\sqrt{2}$ times as large integer value as roller diameter (mm) for those with code V.

Table 1 Models and sizes of FT and FTW···A

Shape	Retainer material	Model	Roller size							
			20	25	30	35	40	50	100	200
Single row type	Steel made	FT	○	○	○	○	○	○	○	○
	Synthetic resin made	FT···N	○	○	○	○	–	–	–	–
Double row angle type 	Steel made	FTW···A	–	–	–	–	○	○	○	○

3 Width of retainer

Indicate the width of retainer in mm.

4 Length of retainer

Indicate the length of retainer in mm.
Length other than the standard length stated in the dimension table can be prepared upon request.
Contact IKO for further information.

5 Retainer material

Steel made : No symbol
Synthetic resin made : N
Specify the retainer material.
For applicable models and roller sizes, see Table 1.

- Jointed Flat Roller Cage · Roller Selection Class -

6 Jointed flat roller cage

Standard length retainer : No symbol
Jointed flat roller cage : J
Indicate full length of the retainer as well and specify ones longer than the standard length.

Flat Roller Cage with extended full length can be produced by connecting steel made retainers each other. If needed, please specify a retainer full length in mm after the supplemental code "J" following the way indicated in the example of an identification number. Maximum length of a jointed flat roller cage is indicated in Table 2.
Length longer than the maximum stated in Table 2 can be prepared upon request. Contact IKO for further information.

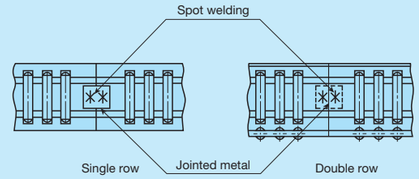


Fig. 1 Connection by spot welding

Table 2 Maximum length of jointed flat roller cage unit: mm

Identification number	Maximum length of retainer
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

7 Roller selection class

For roller selection classes and tolerances of dimensions for roller diameters, see Table 3.

Tolerances of dimensions for roller diameters are indicated in Table 3. Normally, one of the standard selection classes is delivered.
To achieve accurate load distribution, it is necessary to combine products with the same selection code. If needed, please specify it following the way indicated in the example of an identification number.

Table 3 Roller selection class unit: μm

Selection class	Selection code	Average tolerances of dimensions for roller diameters (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 dimensional accuracy of rollers conforms to JIS B 1506 "Rolling bearings-Rollers." For detailed information on accuracy, please contact IKO.

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

Precaution for Use

❶ Raceway

Recommended values for surface hardness and roughness of mating raceway are shown in Table 4 and the recommended value for the minimum effective hardening depth is shown in Table 5.

Table 4 Surface hardness and roughness of raceway

Item	Recommended value	Remark
Surface hardness	58～64HRC	When the surface hardness is low, multiply the load rating by hardness factor (1).
Surface roughness	0.2 μmRa or lower (0.8 μmRy or lower)	Where accuracy standard is low, around 0.8 μmRa (3.2 μmRy) is also allowed.

Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

Table 5 Minimum effective hardening depth of raceway

unit: mm

Roller diameter		Recommended value for minimum effective hardening depth
Over	Incl.	
–	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 When used for bed surface and 90° V surface

After complete lapping as indicated in Fig. 2, mount FT to FTW···VA, or FT···V to FTW···A. Combination of Flat Roller Cage at this point is indicated in Table 6.

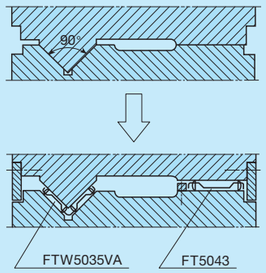


Fig. 2 Example of use on flat surface and 90° V surface

❸ Stroke length and retainer length

Movement in a linear direction as in Fig. 3 will move the Flat Roller Cage in the same direction by one half of the movement amount. Therefore, way length, stroke length and retainer length are correlated as follows:

$$L_1 = \frac{S}{2} + L \quad \cdots\cdots (1)$$

where, L_1 : Way length, mm
S : Stroke length, mm
L : Retainer length, mm

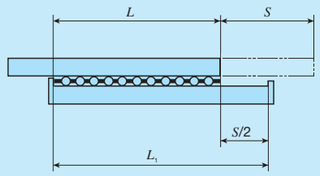


Fig. 3

❹ Operating temperature

If the retainer is made of steel, it can withstand higher temperature. However, if you use it in an environment exceeding 100℃, please contact IKO.
The retainer made of synthetic resin can withstand up to 100℃. For continuous operation, please keep it under 80℃.

Table 6 Combination of Flat Roller Cage

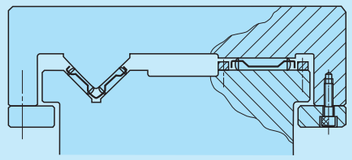
unit: mm

Combination Number	For flat surface		For 90° V surface	
	Identification number	Roller diameter D_w	Identification 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

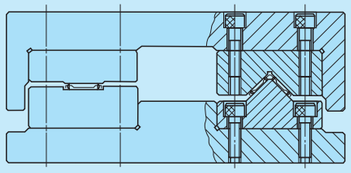
Precaution for Mounting

FT and FTW···A are typically mounted as indicated in Fig. 4. When the heat-treated and polished way is mounted to the device body, you must be careful not to make deformation by tightening.

① General case



② When a way is used



③ When overhanging load is applied

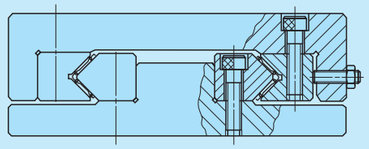
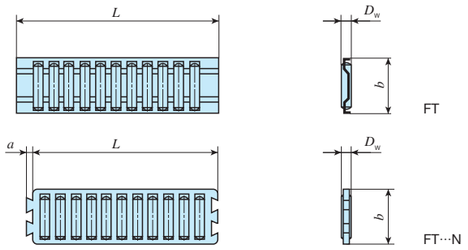


Fig. 4 Mounting examples

IKO Flat Roller Cage

Single row type Flat Roller Cage

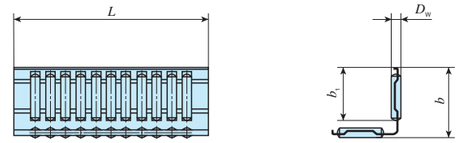
Shape	FT			
Size	20	25	30	35
	40	50	100	200



Identification number		Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
Steel retainer	Synthetic resin retainer	g	D_w	b	L	a	C N	C_0 N
———	FT 2010 N	1.63	2	10	32	2	8 660	19 800
FT 2010 - 32	——	1.91				–	9 710	22 900
FT 2010 - 100	——	5.8			100		22 900	68 700
———	FT 2515 N	4.3	2.5	15	45	2.5	17 300	41 100
FT 2515 - 45	——	5.6				–	22 000	56 200
FT 2515 - 100	——	11.6			100		37 900	112 000
———	FT 3020 N	9.7	3	20	60	3	31 600	78 800
FT 3020 - 60	——	12.5				–	37 100	96 700
———	FT 3525 N	18.6	3.5	25	75	3.5	51 400	132 000
FT 3525 - 75	——	23				–	58 400	155 000
FT 4030 - 150	——	73	4	30	150	–	127 000	382 000
FT 4035 - 150	——	86		35			143 000	446 000
FT 4026V - 150	——	45	2.828	26	150	–	97 300	347 000
FT 5038 - 250	——	195	5	38	250	–	267 000	851 000
FT 5043 - 250	——	200		43			306 000	1 020 000
FT 5030V - 250	——	103	3.535	30	250	–	180 000	652 000
FT 10080 - 500	——	1 610	10	80	500	–	1 390 000	4 370 000
FT 10060V - 500	——	870	7.071	60	500	–	838 000	2 900 000
FT 200120 - 500	——	4 940	20	120	500	–	3 120 000	7 670 000
FT 200100V - 500	——	2 860	14.142	100	500	–	2 090 000	5 820 000

Double row angle type Flat Roller Cage

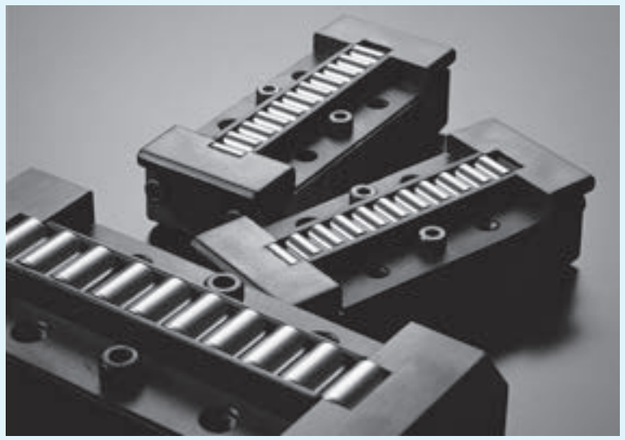
Shape	FTW···A			
Size	—	—	—	—
	40	50	100	200



Identification number	Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
	g	D_w	b	L	b_1	C N	C_0 N
FTW 4030 VA - 150	94	2.828	30	150	24.5	118 000	491 000
FTW 5045 A - 250	410	5	45	250	35.5	332 000	1 240 000
FTW 5050 A - 250	460		50		40.5	371 000	1 440 000
FTW 5035 VA - 250	220	3.535	35	250	29	218 000	922 000
FTW 10095 A - 500	3 360	10	95	500	77	1 680 000	6 180 000
FTW 10070 VA - 500	1 790	7.071	70	500	56.5	1 020 000	4 110 000
FTW 200150 A - 500	10 200	20	150	500	118	3 790 000	10 800 000
FTW 200120 VA - 500	5 940	14.142	120	500	96	2 530 000	8 220 000

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

General Explanation



Load Rating and Life

Life of linear motion rolling guides

Even in normal operational status, a linear motion rolling guide will reach the end of its life after a certain period of operations. As repeated load is constantly applied onto a raceway and rolling elements of the linear motion rolling guide, this leads to leprous damage (scale-like wear fragments) called fatigue flaking due to rolling contact fatigue of materials, it will be unusable at the end. Total traveling distance before occurrence of this fatigue flaking on a raceway or rolling elements is called the life of linear motion rolling guide.
As the life of linear motion rolling guide may vary depending on material fatigue phenomenon, rating life based on statistic calculation is used.

Rating life

Rating life of linear motion rolling guide refers to the total traveling distance (1) 90% of a group of the same linear motion rolling guide can operate without linear motion rolling guide material damages due to rolling contact fatigue when they are operated individually under the same conditions.

Note (1) Stroke Rotary Bushing is represented as total number of rotations.

Basic dynamic load rating C

Basic dynamic load rating refers to load with certain direction and size that is logically endurable for rating life indicated in Table 1 when a group of the same linear motion rolling guides is operated individually under the same conditions.

Table 1 Rating life

Series	Rating life
Crossed Roller Way Roller Way & Flat Roller Cage	100×10^3m
Linear Slide Unit Linear Ball Spline Linear Bushing	50×10^3m
Stroke Rotary Bushing	10^6 rotations

Basic static load rating C_0

Basic static load rating refers to static load generating a certain contact stress at the center of contact parts of the rolling elements and a raceway under maximum load, which is the load at the allowable limit for normal rolling motion. Generally, it is used considering static safety factor.

Allowable load F

Allowable load refers to load of smooth rolling motion on contact surface to which maximum contact stress is applied and the sum of whose elastic deformation of rolling elements and raceway is small.
Therefore, use applied load within the allowable load range if very smooth rolling motion and high accuracy are required.

Dynamic torque rating T

Dynamic torque rating refers to a torque with a certain direction and size with which 90% of a group of the same linear ball splines can run 50 x 10^3m without material damages due to rolling contact fatigue when they are operated individually.

Static torque rating T_0
Static moment rating T_0, T_X, T_Y

Static torque rating and static moment rating refer to static torque or moment load generating a certain level of contact stress at the center of contact parts of rolling elements and a raceway under the maximum load when the torque or moment load (see Fig. 1) are loaded, which is the torque or moment load at the allowable limit for normal rolling motion. Generally, it is used considering static safety factor.

Load direction and load rating

Linear motion rolling guide is used with its load rating corrected in accordance to the load direction. Basic dynamic load rating and basic static load rating indicated in the dimension table should be corrected before use. As the values to be corrected vary depending on series, please see an explanation for each series.

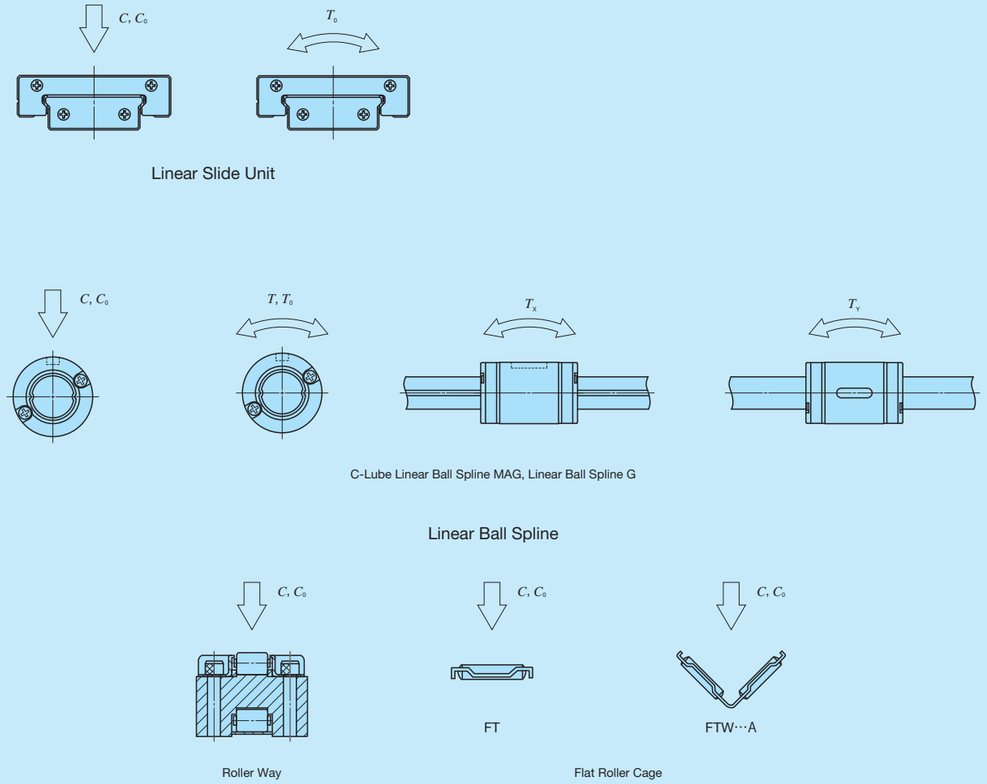


Fig. 1 Direction of load rating, torque rating, and moment load

Remark: For the cases of Crossed Roller Way and Linear Bushing, see an explanation of each series.

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

Calculating formula of life

Rating life and basic dynamic load rating of a linear motion rolling guide are correlated as indicated in Table 2.1 and Table 2.2.

Table 2.1 Calculating formula of life for each series

Series	Calculating formula of rating life: Total traveling distance 10^3 m	Calculating formula of rating life: Life length h	Code description
Crossed Roller Way Roller Way & Flat Roller Cage	$L=100\left(\frac{C}{P}\right)^{\frac{10}{3}}$	$L_h=\frac{10^6 L}{2Sn_1\times 60}$	L : Rating life, 10^3 m 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 : Rating life in hours h S : Stroke length mm n_1 : Number of strokes per minute min^{-1}
Linear Slide Unit Linear Bushing	$L=50\left(\frac{C}{P}\right)^3$		
Linear Ball Spline	$L=50\left(\frac{C}{P}\right)^3$ $L=50\left(\frac{T}{M}\right)^3$		

Table 2.2 Calculating formula of life for Stroke Rotary Bushing

Series	Calculating formula of rating life: Total number of rotation 10^6 rotations	Calculating formula of rating life: Life length h	Code description
Rotational motion	$L=\left(\frac{C}{P}\right)^3$	$L_h=\frac{10^6 L}{60\sqrt{(D_{PW}n)^2+(10Sn_1)^2}/D_{PW}}$	L : Rating life, 10^6 rotations C : Basic dynamic load rating, N P : Applied load N L_h : Rating life in hours h n : Rotational speed min^{-1} n_1 : Number of strokes per minute min^{-1} S : Stroke length mm D_{PW} : Pitch circle diameter of balls mm ($D_{PW}\fallingdotseq 1.15F_W$) F_W : Inscribed circle diameter mm
Rotational and rotary compound motion			
Rotary and linear motion		$L_h=\frac{10^6 L}{600Sn_1/(\pi D_{PW})}$	

Temperature factor

As the allowable contact stress is decreased at operating temperature above 150°C, the basic dynamic load rating should be corrected by the following equation:

$$C_t=f_t C \quad \cdots\cdots(1)$$

where, C_t : Basic dynamic load rating taking into account temperature increase, N
f_t : Temperature factor (see Fig. 2)
C : Basic dynamic load rating, N

Hardness factor

Hardness of a raceway must be 58 to 64 HRC. When it is lower than 58 HRC, correct basic dynamic load rating by the following equation:

$$C_H=f_H C \quad \cdots\cdots(2)$$

where, C_H : Basic dynamic load rating taking into account the hardness, N
f_H : Hardness factor (see Fig. 3)
C : Basic dynamic load rating, N

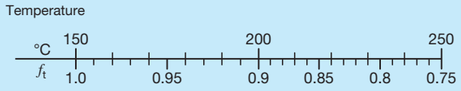


Fig. 2 Temperature factor

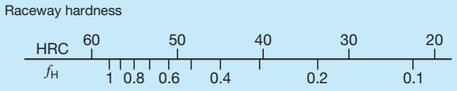


Fig. 3 Hardness factor

Load factor

Load applied to a linear motion rolling guide can be larger than theoretical load due to machine vibration or shock. Generally, the applied load is obtained by multiplying it by the load factor indicated in Table 3.

Table 3 Load factor

Operating conditions	f_w
Smooth operation free from shock	1 ～1.2
Normal operation	1.2～1.5
Operation with shock load	1.5～3

Static safety factor

Generally, basic static load rating and static moment rating (or static torque rating) is considered as load at the allowable limit for normal rolling motion. However, static safety factor must be considered according to operating conditions and required performance of the linear motion rolling guide.
Static safety factor can be obtained by the following equation and typical values are indicated in Table 4.
Equation (4) is a representative equation for moment load or torque. Static moment rating and maximum moment load in each direction is applied for the calculation.

$$f_S=\frac{C_0}{P_0} \quad \cdots\cdots(3)$$

$$f_S=\frac{T_0}{M_0} \quad \cdots\cdots(4)$$

where, f_S : Static safety factor
C_0 : Basic static load rating, N
P_0 : Static equivalent load, N
(Or applied load (maximum load))
T_0 : Static moment rating, N·m
(Or static torque rating)
M_0 : Moment load or torque in each direction, N·m
(Maximum moment load or maximum torque)

Table 4 Static safety factor

Series	Operational condition and static safety factor: Operation with vibration and/or shock	High operating performance	Normal operating conditions
Crossed Roller Way	4 ～6	3～5	2.5～3
Linear Slide Unit	3 ～5	2～4	1 ～3
Linear Ball Spline	5 ～7	4～6	3 ～5
Linear Bushing	2.5	2	1.5
Stroke Rotary Bushing	2.5	2	1.5
Roller Way & Flat Roller Cage	4 ～6	3～5	2.5～3

Preload

Objectives of preload

In some cases, the linear motion rolling guide is used with clearance given to the linear motion rolling guide when light motion with small load is required. However, for some applications it may be used with play in the guiding mechanism removed or with preload to increase rigidity.
Preload is applied to the contact parts of a raceway and rolling elements with internal stress generated in advance. When a external load is applied on the preloaded linear motion rolling guide, shock absorbing with this internal stress makes elastic deformation smaller, and its rigidity is increased. (See Fig.4)

Preload setting

Preload amount is determined by considering the characteristics of the machines or equipments on which the linear motion rolling guide is mounted and the nature of load acting on the linear motion 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 linear motion rolling guides are required to have very high rigidity to withstand vibration or fluctuating load, a larger preload may be applied.

Precaution for preload selection

Even when high rigidity must be required, excessive preload should be avoided, because it will produce an excessive stress between rolling elements and raceways, and eventually result in short life of linear motion rolling guides. It is important to apply a proper amount of preload, considering the operational conditions. When using with a large preload, contact IKO.
Linear Bushing and Stroke Rotary Bushing should never be given a large amount of preload.

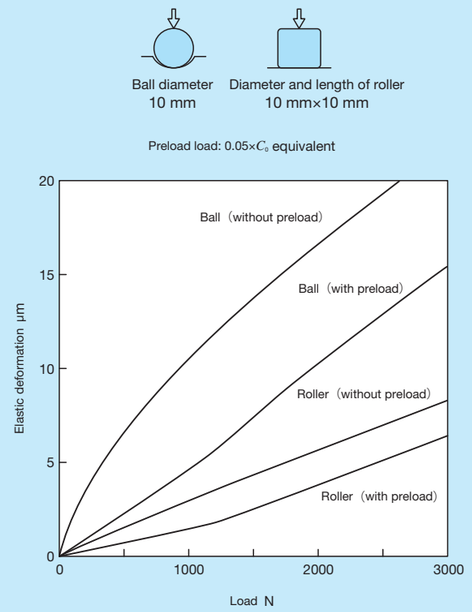


Figure 4 Preload and elastic deformation behavior

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

Friction

Friction of linear motion rolling guide

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 frictional resistance 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 characteristics to motion commands and high accuracy positioning can be achieved.

Friction coefficient

The frictional resistance of linear motion rolling guides varies with their model, applied load, velocity and characteristics of lubricant. Generally, lubricant or seals are major factors in determining the frictional resistance in light load or high speed operation, while the amount of load is the major factor in heavy load or low speed operation. The frictional resistance of linear motion rolling guides depends on various factors, but generally the following formula is used.

$$F = \mu P \quad \cdots\cdots(3)$$

where, F : Frictional resistance, N
μ : Dynamic friction coefficient
P : Applied load, N

For sealed guides, seal resistance is added to the above value, but this resistance varies greatly depending on the interference amount of seal lip and lubrication conditions.
Where the lubrication and mounting condition are correct and the load is moderate, the friction coefficients of linear motion rolling guide in operation are within the range shown in Table 5. Generally, friction coefficient is large under small load.

Table 5 Friction coefficient

Series name	Dynamic friction coefficient μ (1)
Crossed Roller Way	0.0010～0.0030
Linear Slide Unit	0.0010～0.0020
Linear Ball Spline	0.0020～0.0040
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 seal.

Lubrication

Objectives of lubrication

The objectives of applying lubricant for linear motion rolling guides is to keep raceways, rolling elements, etc. in a linear motion rolling guide from metal contact, and thereby reduce friction and wear preventing heat generation and seizure. When an adequate oil film is formed at the rolling contact area between the raceways and rolling elements, the contact stress due to load can be reduced. To manage the formation of adequate oil film is important for ensuring the reliability of linear motion rolling mechanism.

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 model, load and velocity 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 lubrication oil is needed and replenishment interval is longer, so maintenance can be greatly reduced. Grease and oil are the two most commonly used lubricants for linear motion rolling guides.

Grease lubrication

For 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 generating 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 that is suitable for the operating conditions of linear motion rolling guide and achieves satisfactory lubrication performance at the same time.

Table 6 Pre-packed grease list

Series name	Pre-packed grease
C-Lube Linear Ball Spline MAG Linear Ball Spline G	Alvania EP Grease 2 [Shell Lubricants Japan K.K.]

Grease replenishment interval

The quality of any grease will gradually deteriorate as operating time passes. Therefore, periodic replenishment is necessary. Grease replenishment interval varies depending on the operating conditions. A six month interval is generally recommended, and if the machine operation consists of reciprocating motions with many cycles and long strokes, replenishment every three month is recommended.
In addition, linear motion rolling guides in which the lubrication part "C-Lube" is built deliver long-term maintenance free performance. This eliminates the need for lubrication mechanism and workload which used to be necessary for linear motion rolling guides and significantly reduces maintenance cost.

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 to outside of the linear motion 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 additional 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 type of grease

Mixing different types of grease 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 trouble due to chemical changes of additives. Old grease should therefore be removed thoroughly before filling with new grease.

Oil lubrication

For oil lubrication, heavy load requires high oil viscosity and high velocity requires low oil viscosity. Generally, for linear motion rolling guides operating under heavy load, lubrication oil with a viscosity of about 68 mm^2/s is used. For linear motion rolling guides under light load at high speed operation, lubrication oil with a viscosity of about 13 mm^2/s is used.

Lubrication part "C-Lube"

C-Lube Linear Ball Spline MAG has built-in lubrication part, "C-Lube".
C-Lube is a porous resin with molding formed fine resin powder. It is a lubrication part impregnated with a large amount of lubrication oil in its open pores by capillary inside. Lubrication oil is supplied directly to balls (steel balls), not to the spline shaft. When the balls have contact with C-Lube built in the external cylinder, lubrication oil is supplied to the surface of the balls. As the steel balls circulate, the lubricant is distributed to the loading area along the track rail. This results in adequate lubrication oil being properly maintained in the loading area and lubrication performance will last for a long time.
The surface of C-Lube is always covered with the lubrication oil. Lubrication oil is continuously supplied to the surface of steel balls by surface tension in the contact of C-Lube surface and steel balls.

Table 7 Grease brands used in linear motion rolling guide

Brand		Base oil	Thickener	Consistency	Range of operating temperature (2) ℃	Usage
Alvania EP Grease 2	[Shell Lubricants Japan K.K.]	Mineral oil	Lithium	284	−20～110	General application with extreme-pressure additive
Alvania Grease S2	[Shell Lubricants Japan K.K.]	Mineral oil	Lithium	283	−25～120	General application
Multemp PS No.2	[KYODO YUSHI CO., LTD.]	Synthetic oil, Mineral oil	Lithium	275	−50～130	General application
IKO Low Dust-Generation Grease for Clean Environment CG2	[NIPPON THOMPSON CO., LTD.]	Synthetic oil	Urea	280	−40～200	For clean environment Long life
IKO Low Dust-Generation Grease for Clean Environment CGL	[NIPPON THOMPSON CO., LTD.]	Synthetic oil, Mineral oil	Lithium / Calcium	225	−30～120	For clean environment Low sliding
Klüberalfa GR Y-VAC3 (1)	[NOK KLUEBER]	Synthetic oil	Ethylene tetra-fluoride	No.3	−20～250	For vacuum
IKO Anti-Fretting Grease AF2	[NIPPON THOMPSON CO., LTD.]	Synthetic oil	Urea	285	−50～170	Fretting-proof
6459 Grease N	[Shell Lubricants Japan K.K.]	Mineral oil	Poly-urea	305	–	Fretting-proof

Notes (1) Set replenishment intervals to short.
(2) The Ranges of operating temperature are quoted from the grease manufacturer's cataloged values, but do not guarantee regular use under high temperature environment.
Remarks Check with the chosen grease manufacturer's catalog before use.
For grease for applications other than those listed, please contact IKO.

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

Precaution for Use

Cleaning and removing fat

Never clean a linear motion rolling guide that has integrated C-lube with organic solvents or white kerosene with fat removing properties.

Precautions regarding oil components

Rust prevention oil or grease is used for the linear motion rolling guide. Therefore, oil may drip or spatter depending on the operating conditions. Consider installing a shielding plate if necessary.

Storage

Store the linear motion rolling guide horizontally indoors in the IKO packing and packaging provided. Avoid high temperature, low temperature and high humidity. In products pre-packed with lubricant, the lubricant will deteriorate over time if products are stored for a long time. Be sure to reapply lubricant before use.

Handling

Do not disassemble the linear motion rolling guide. Also, do not apply excessive force or impact beyond intended use. It may lead to intrusion of foreign substances, or deterioration of accuracy and performance.

Statements

● Unit Conversion Rate Table

SI, CGS series and gravity system unit cross-reference table

Amount / Unit system	Length	Mass	Time	Acceleration	Force	Stress and pressure
SI	m	kg	s	m/s^2	N	Pa
CGS series	cm	g	s	Gal	dyn	dyn/cm^2
Gravity system	m	$kgf·s^2/m$	s	m/s^2	kgf	kgf/m^2

Energy	Power	Temperature	Viscosity	Kinetic viscosity	Flux	Flux density	Magnetic field intensity
J	W	K	Pa·s	m^2/s	Wb	T	A/m
erg	erg/s	℃	P	St	Mx	Gs	Oe
kgf·m	kgf·m/s	℃	$kgf·s/m^2$	m^2/s	—	—	—

SI unit conversion

Amount	Unit name	Code	SI conversion rate	SI unit name	Code
Angle	D	°	$\pi/180$	Radian	rad
	Min	′	$\pi/10\ 800$		
	Sec	″	$\pi/648\ 000$		
Length	Meter	m	1	Meter	m
	Micron	μ	10^{-6}		
	Angstrom	Å	10^{-10}		
	X ray unit		$\approx 1.002\ 08\times10^{-13}$		
	Nautical mile	n mile	1852		
Area	Square meter	m^2	1	Square meter	m^2
	Are	a	10^2		
	Hectare	ha	10^4		
Volume	Cubic meter	m^3	1	Cubic meter	m^3
	Liter	l, L	10^{-3}		
Mass	Kilogram	kg	1	Kilogram	kg
	Ton	t	10^3		
	Atomic mass unit	u	$\approx 1.660\ 57\times10^{-27}$		
Time	Sec	s	1	Sec	s
	Min	min	60		
	Hr	h	3 600		
	Day	d	86 400		
Velocity	Meter per second	m/s	1	Meter per second	m/s
	Knot	kn	1 852/3 600		
Frequency and vibration	Number of cycle	s^{-1}	1	Hertz	Hz
Number of rotations	Rotation per minute	min^{-1}	1/60	Per second	s^{-1}
Angular velocity	Radian per second	rad/s	1	Radian per second	rad/s
Acceleration	Meter per second	m/s^2	1	Meter per second	m/s^2
	G	G	9.806 65		
Force	Weight in kg	kgf	9.806 65	Newton	N
	Weight in ton	tf	9 806.65		
	Dyne	dyn	10^{-5}		
Force moment load	Weight in kg meter	kgf·m	9.806 65	Newton meter	N · m
Stress and pressure	Weight in kg per square meter	kgf/m^2	9.806 65	Pascal	Pa
	Weight in kg per square cm	kgf/cm^2	$9.806\ 65\times10^4$		
	Weight in kg per square mm	kgf/mm^2	$9.806\ 65\times10^6$		
Pressure	Meter water column	mH_2O	9 806.65	Pascal	Pa
	millimeter of mercury column	mmHg	101 325/760		
	Torr	Torr	101 325/760		
	Air pressure	atm	101 325		
	Bar	bar	10^5		
Energy	Erg	erg	10^{-7}	Joule	J
	IT calorie	cal_{IT}	4.186 8		
	Weight in kg meter	kgf·m	9.806 65		
	Kilowatt per hour	kW·h	3.600×10^6		
	French horse-power per hour	PS·h	$\approx 2.647\ 79\times10^6$		
	Electron volt	eV	$\approx 1.602\ 19\times10^{-19}$		
Power and motivity	Watt	W	1	Watt	W
	French horse-power	PS	≈735.5		
	Weight in kg meter per second	kgf·m/s	9.806 65		
Viscosity	Poise	P	10^{-1}	Pascal second	Pa·s
	Centipoise	cP	10^{-3}		
	Weight in kg second per square meter	$kgf·s/m^2$	9.806 65		
Kinetic viscosity	Stokes	St	10^{-4}	Square meter per second	m^2/s
	Centistokes	cSt	10^{-6}		
Temperature	D	℃	+273.15	Kelvin	K
Radioactivity	Curie	Ci	3.7×10^{10}	Becquerel	Bq
Exposure radiation dose	Roentgen	R	2.58×10^{-4}	Coulomb per kg	C/kg
Absorbed dose	Rad	rad	10^{-2}	Gray	Gy
Dose equivalent	Rem	rem	10^{-2}	Sievert	Sv
Flux	Maxwell	Mx	10^{-8}	Weber	Wb
Flux density	Gamma	γ	10^{-9}	Tesla	T
	Gauss	Gs	10^{-4}		
Magnetic field intensity	Oersted	Oe	$10^3/4\pi$	Ampere per meter	A/m
Electric charge	Coulomb	C	1	Coulomb	C
Electric potential difference	Volt	V	1	Volt	V
Capacitance	Farad	F	1	Farad	F
(Electric) Resistance	Ohm	Ω	1	Ohm	Ω
(Electric) Conductance	Siemens	S	1	Siemens	S
Inductance	Henry	H	1	Henry	H
Current	Ampere	A	1	Ampere	A

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

● Inch-mm Conversion Table

1 inch=25.4mm

inch		0″	1″	2″	3″	4″	5″	6″	7″	8″
Fractional number	Decimal number									
	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=25.4mm

inch		0″	1″	2″	3″	4″	5″	6″	7″	8″
Fractional number	Decimal number									
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

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

● 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 Diameter 1/16in 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 Diameter 1/16in 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

● Tolerances of Shaft Dimensions

unit: μm

Classification of diameter mm		b12		c12		d6		e6		e12		f5		f6		g5	
Above	Below	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
—	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		h5		h6		h7		h8		h9		h10		h11		Classification of diameter mm	
H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	Above	Below
− 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

unit: μm

Classification of diameter mm		h12		js5		j5		js6		j6		j7		k5		k6	
Above	Below	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
—	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																

m5		m6		n5		n6		p6		Classification of diameter mm	
H	L	H	L	H	L	H	L	H	L	Above	Below
+ 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

● Tolerances of Housing Hole Dimensions

unit: μm

Classification of diameter mm		B12		E7		E11		E12		F6		F7		G6		G7	
Above	Below	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
—	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	+125	+ 85	+335	+ 85	+485	+ 85	+ 68	+43	+ 83	+43	+39	+14	+54	+14
140	160	+ 680	+280														
160	180	+ 710	+310														
180	200	+ 800	+340	+146	+100	+390	+100	+560	+100	+ 79	+50	+ 96	+50	+44	+15	+61	+15
200	225	+ 840	+380														
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		Classification of diameter mm	
H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L	Above	Below
+ 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
+25	0	+40	0	+63	0	+100	0	+160	0	+250	0	+12.5	−12.5	+18	−7	120	140
																140	160
																160	180
+29	0	+46	0	+72	0	+115	0	+185	0	+290	0	+14.5	−14.5	+22	−7	180	200
																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

unit: μm

Classification of diameter mm		JS7		J7		K5		K6		K7		M6		M7		N6	
Above	Below	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
—	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	+20	−20	+26	−14	+3	−15	+4	−21	+12	−28	− 8	−33	0	−40	−20	−45
140	160																
160	180																
180	200	+23	−23	+30	−16	+2	−18	+5	−24	+13	−33	− 8	−37	0	−46	−22	−51
200	225																
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																

N7		P6		P7		R7		S7		Classification of diameter mm	
H	L	H	L	H	L	H	L	H	L	Above	Below
− 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
−12	−52	−36	−61	−28	− 68	− 48	− 88	− 77	−117	120	140
						− 50	− 90	− 85	−125	140	160
						− 53	− 93	− 93	−133	160	180
−14	−60	−41	−70	−33	− 79	− 60	−106	−105	−151	180	200
						− 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

Model code	Series name	Catalog name	Page
B			
BG	Stroke Rotary Cage	RED	Ⅱ-192
BK···A	Miniature Stroke Rotary Bushing	RED	Ⅱ-187
BSP···SL	Precision Linear Slide Unit	RED	Ⅱ- 89
BSPG···SL	Precision Linear Slide Unit	RED	Ⅱ- 91
BSR···SL	Precision Linear Slide Unit	RED	Ⅱ- 93
BSU···A	Linear Slide Unit	RED	Ⅱ- 99
BWU	High Rigidity Precision Linear Slide Unit	RED	Ⅱ- 81
C			
CRW	Crossed Roller Way	RED	Ⅱ- 33
CRW···SL	Crossed Roller Way	RED	Ⅱ- 33
CRWG	Anti-Creep Cage Crossed Roller Way	RED	Ⅱ- 27
CRWG···H	Anti-Creep Cage Crossed Roller Way H	RED	Ⅱ- 31
CRWM	Crossed Roller Way	RED	Ⅱ- 49
CRWU	Crossed Roller Way Unit	RED	Ⅱ- 63
CRWU···R	Crossed Roller Way Unit	RED	Ⅱ- 67
CRWU···RS	Crossed Roller Way Unit	RED	Ⅱ- 71
CRWUG	Anti-Creep Cage Crossed Roller Way Unit	RED	Ⅱ- 61
F			
FT	Flat Roller Cage	RED	Ⅱ-211
FT···N	Flat Roller Cage	RED	Ⅱ-211
FT···V	Flat Roller Cage	RED	Ⅱ-211
FTW···A	Flat Roller Cage	RED	Ⅱ-212
FTW···VA	Flat Roller Cage	RED	Ⅱ-212
G			
GSN	Roller Way	RED	Ⅱ-204
L			
LM	Linear Bushing	RED	Ⅱ-147
LM···AJ	Linear Bushing	RED	Ⅱ-147
LM···F	Linear Bushing	RED	Ⅱ-161
LM···F AJ	Linear Bushing	RED	Ⅱ-161
LM···F OP	Linear Bushing	RED	Ⅱ-161
LM···F UU	Linear Bushing	RED	Ⅱ-163
LM···F UU AJ	Linear Bushing	RED	Ⅱ-163
LM···F UU OP	Linear Bushing	RED	Ⅱ-163
LM···N	Linear Bushing	RED	Ⅱ-147
LM···N AJ	Linear Bushing	RED	Ⅱ-147
LM···N F	Linear Bushing	RED	Ⅱ-161
LM···N F AJ	Linear Bushing	RED	Ⅱ-161
LM···N F OP	Linear Bushing	RED	Ⅱ-161
LM···N F UU	Linear Bushing	RED	Ⅱ-163
LM···N F UU AJ	Linear Bushing	RED	Ⅱ-163
LM···N F UU OP	Linear Bushing	RED	Ⅱ-163
LM···N OP	Linear Bushing	RED	Ⅱ-147
LM···N UU	Linear Bushing	RED	Ⅱ-151
LM···N UU AJ	Linear Bushing	RED	Ⅱ-151
LM···N UU OP	Linear Bushing	RED	Ⅱ-151
LM···OP	Linear Bushing	RED	Ⅱ-147
LM···UU	Linear Bushing	RED	Ⅱ-151
LM···UU AJ	Linear Bushing	RED	Ⅱ-151
LM···UU OP	Linear Bushing	RED	Ⅱ-151
LMB	Linear Bushing	RED	Ⅱ-159
LMB···AJ	Linear Bushing	RED	Ⅱ-159
LMB···N	Linear Bushing	RED	Ⅱ-159
LMB···N AJ	Linear Bushing	RED	Ⅱ-159
LMB···N OP	Linear Bushing	RED	Ⅱ-159
LMB···OP	Linear Bushing	RED	Ⅱ-159
LME	Linear Bushing	RED	Ⅱ-155
LME···AJ	Linear Bushing	RED	Ⅱ-155
LME···F	Linear Bushing	RED	Ⅱ-165
LME···F AJ	Linear Bushing	RED	Ⅱ-165
LME···F OP	Linear Bushing	RED	Ⅱ-165
LME···F UU	Linear Bushing	RED	Ⅱ-167
LME···F UU AJ	Linear Bushing	RED	Ⅱ-167
LME···F UU OP	Linear Bushing	RED	Ⅱ-167
LME···N	Linear Bushing	RED	Ⅱ-155
LME···N AJ	Linear Bushing	RED	Ⅱ-155
LME···N F	Linear Bushing	RED	Ⅱ-165
LME···N F AJ	Linear Bushing	RED	Ⅱ-165
LME···N F OP	Linear Bushing	RED	Ⅱ-165
LME···N F UU	Linear Bushing	RED	Ⅱ-167
LME···N F UU OP	Linear Bushing	RED	Ⅱ-167
LME···N OP	Linear Bushing	RED	Ⅱ-155
LME···N UU	Linear Bushing	RED	Ⅱ-157
LME···N UU AJ	Linear Bushing	RED	Ⅱ-157
LME···N UU OP	Linear Bushing	RED	Ⅱ-157
LME···OP	Linear Bushing	RED	Ⅱ-155
LME···UU	Linear Bushing	RED	Ⅱ-157
LME···UU AJ	Linear Bushing	RED	Ⅱ-157
LME···UU OP	Linear Bushing	RED	Ⅱ-157
LMG	Linear Bushing G	RED	Ⅱ-139
LMGT	Linear Bushing G	RED	Ⅱ-139
LMS	Miniature Linear Bushing	RED	Ⅱ-172
LMS···F	Miniature Linear Bushing	RED	Ⅱ-172
LMS···F UU	Miniature Linear Bushing	RED	Ⅱ-172
LMS···UU	Miniature Linear Bushing	RED	Ⅱ-172
LMSL	Miniature Linear Bushing	RED	Ⅱ-172
LMSL···F	Miniature Linear Bushing	RED	Ⅱ-172
LMSL···F UU	Miniature Linear Bushing	RED	Ⅱ-172
LMSL···UU	Miniature Linear Bushing	RED	Ⅱ-172
LRWM	Linear Way Module	BLUE	Ⅱ-243
LRWX···B	Linear Roller Way X	BLUE	Ⅱ-227
LRWXH	Linear Roller Way X	BLUE	Ⅱ-229
LRX	Linear Roller Way Super X	BLUE	Ⅱ-191
LRXC	Linear Roller Way Super X	BLUE	Ⅱ-191
LRXD	Linear Roller Way Super X	BLUE	Ⅱ-199
LRXD···SL	Linear Roller Way Super X	BLUE	Ⅱ-199
LRXDC	Linear Roller Way Super X	BLUE	Ⅱ-199
LRXDC···SL	Linear Roller Way Super X	BLUE	Ⅱ-199
LRXDG	Linear Roller Way Super X	BLUE	Ⅱ-199
LRXDG···SL	Linear Roller Way Super X	BLUE	Ⅱ-199
LRXDL	Linear Roller Way Super X	BLUE	Ⅱ-207
LRXG	Linear Roller Way Super X	BLUE	Ⅱ-191
LRXH	Linear Roller Way Super X	BLUE	Ⅱ-191
LRXHC	Linear Roller Way Super X	BLUE	Ⅱ-191
LRXHG	Linear Roller Way Super X	BLUE	Ⅱ-191
LRXL	Linear Roller Way Super X	BLUE	Ⅱ-197
LRXS	Linear Roller Way Super X	BLUE	Ⅱ-209
LRXSC	Linear Roller Way Super X	BLUE	Ⅱ-209
LRXSG	Linear Roller Way Super X	BLUE	Ⅱ-209
LSAG	Linear Ball Spline G	RED	Ⅱ-123
LSAGF	Linear Ball Spline G	RED	Ⅱ-127
LSAGFL	Linear Ball Spline G	RED	Ⅱ-127
LSAGFLT	Linear Ball Spline G	RED	Ⅱ-127
LSAGFT	Linear Ball Spline G	RED	Ⅱ-127
LSAGL	Linear Ball Spline G	RED	Ⅱ-123
LSAGLT	Linear Ball Spline G	RED	Ⅱ-123
LSAGT	Linear Ball Spline G	RED	Ⅱ-123
LWE	Linear Way E	BLUE	Ⅱ- 75
LWE···Q	Low Decibel Linear Way E	BLUE	Ⅱ- 75
LWE···SL	Linear Way E	BLUE	Ⅱ- 75
LWEC	Linear Way E	BLUE	Ⅱ- 75
LWEC···SL	Linear Way E	BLUE	Ⅱ- 75
LWEG	Linear Way E	BLUE	Ⅱ- 75
LWEG···SL	Linear Way E	BLUE	Ⅱ- 75
LWES	Linear Way E	BLUE	Ⅱ- 83
LWES···Q	Low Decibel Linear Way E	BLUE	Ⅱ- 83
LWES···SL	Linear Way E	BLUE	Ⅱ- 83
LWESC	Linear Way E	BLUE	Ⅱ- 83
LWESC···SL	Linear Way E	BLUE	Ⅱ- 83
LWESG	Linear Way E	BLUE	Ⅱ- 83
LWESG···SL	Linear Way E	BLUE	Ⅱ- 83
LWET	Linear Way E	BLUE	Ⅱ- 79
LWET···Q	Low Decibel Linear Way E	BLUE	Ⅱ- 79
LWET···SL	Linear Way E	BLUE	Ⅱ- 79
LWETC	Linear Way E	BLUE	Ⅱ- 79
LWETC···SL	Linear Way E	BLUE	Ⅱ- 79
LWETG	Linear Way E	BLUE	Ⅱ- 79
LWETG···SL	Linear Way E	BLUE	Ⅱ- 79
LWFF	Linear Way F	BLUE	Ⅱ-151
LWFH	Linear Way F	BLUE	Ⅱ-149
LWFS	Linear Way F	BLUE	Ⅱ-153
LWFS···SL	Linear Way F	BLUE	Ⅱ-153
LWH···B	Linear Way H	BLUE	Ⅱ-107
LWH···M	Linear Way H	BLUE	Ⅱ-107
LWH···MU	Linear Way H	BLUE	Ⅱ-107

Note: BLUE denotes CAT-1604E, while RED denotes CAT-1605E.

Model Code Index

Note: BLUE denotes CAT-1604E, while RED denotes CAT-1605E.

Model code	Series name	Catalog name	Page
L			
LWH···SL	Linear Way H	BLUE	Ⅱ-107
LWHD	Linear Way H	BLUE	Ⅱ-121
LWHD···B	Linear Way H	BLUE	Ⅱ-123
LWHD···M	Linear Way H	BLUE	Ⅱ-123
LWHD···MU	Linear Way H	BLUE	Ⅱ-123
LWHD···SL	Linear Way H	BLUE	Ⅱ-121
LWHDC···SL	Linear Way H	BLUE	Ⅱ-121
LWHDG	Linear Way H	BLUE	Ⅱ-123
LWHDG···SL	Linear Way H	BLUE	Ⅱ-121
LWHG	Linear Way H	BLUE	Ⅱ-107
LWHS···B	Linear Way H	BLUE	Ⅱ-127
LWHS···M	Linear Way H	BLUE	Ⅱ-127
LWHS···MU	Linear Way H	BLUE	Ⅱ-127
LWHS···SL	Linear Way H	BLUE	Ⅱ-127
LWHSG	Linear Way H	BLUE	Ⅱ-127
LWHT	Linear Way H	BLUE	Ⅱ-113
LWHT···B	Linear Way H	BLUE	Ⅱ-113
LWHT···M	Linear Way H	BLUE	Ⅱ-113
LWHT···MU	Linear Way H	BLUE	Ⅱ-113
LWHT···SL	Linear Way H	BLUE	Ⅱ-113
LWHTG	Linear Way H	BLUE	Ⅱ-115
LWHY	Linear Way H	BLUE	Ⅱ-131
LWL	Linear Way L	BLUE	Ⅱ- 23
LWL···B	Linear Way L	BLUE	Ⅱ- 25
LWL···B CS	Linear Way L	BLUE	Ⅱ- 27
LWL···N	Linear Way L	BLUE	Ⅱ- 25
LWL···Y	Linear Way L	BLUE	Ⅱ- 23
LWLC	Linear Way L	BLUE	Ⅱ- 23
LWLC···B	Linear Way L	BLUE	Ⅱ- 25
LWLC···N	Linear Way L	BLUE	Ⅱ- 25
LWLF	Linear Way L	BLUE	Ⅱ- 31
LWLF···B	Linear Way L	BLUE	Ⅱ- 31
LWLF···BCS	Linear Way L	BLUE	Ⅱ- 35
LWLF···N	Linear Way L	BLUE	Ⅱ- 31
LWLFC	Linear Way L	BLUE	Ⅱ- 31
LWLFC···B	Linear Way L	BLUE	Ⅱ- 31
LWLFC···N	Linear Way L	BLUE	Ⅱ- 31
LWLFG···B	Linear Way L	BLUE	Ⅱ- 33
LWLFG···N	Linear Way L	BLUE	Ⅱ- 33
LWLG···B	Linear Way L	BLUE	Ⅱ- 25
LWLG···N	Linear Way L	BLUE	Ⅱ- 25
LWLM	Linear Way Module	BLUE	Ⅱ-241
LWU···B	Linear Way U	BLUE	Ⅱ-167
M			
MAG	C-Lube Linear Ball Spline MAG	RED	Ⅱ-123
MAGF	C-Lube Linear Ball Spline MAG	RED	Ⅱ-127
MAGFT	C-Lube Linear Ball Spline MAG	RED	Ⅱ-127
MAGL	C-Lube Linear Ball Spline MAG	RED	Ⅱ-123
MAGLT	C-Lube Linear Ball Spline MAG	RED	Ⅱ-123
MAGT	C-Lube Linear Ball Spline MAG	RED	Ⅱ-123
ME	C-Lube Linear Way ME	BLUE	Ⅱ- 75
ME···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 75
MEC	C-Lube Linear Way ME	BLUE	Ⅱ- 75
MEC···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 75
MEG	C-Lube Linear Way ME	BLUE	Ⅱ- 75
MEG···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 75
MES	C-Lube Linear Way ME	BLUE	Ⅱ- 83
MES···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 83
MESC	C-Lube Linear Way ME	BLUE	Ⅱ- 83
MESC···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 83
MESG	C-Lube Linear Way ME	BLUE	Ⅱ- 83
MESG···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 83
MET	C-Lube Linear Way ME	BLUE	Ⅱ- 79
MET···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 79
METC	C-Lube Linear Way ME	BLUE	Ⅱ- 79
METC···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 79
METG	C-Lube Linear Way ME	BLUE	Ⅱ- 79
METG···SL	C-Lube Linear Way ME	BLUE	Ⅱ- 79
MH	C-Lube Linear Way MH	BLUE	Ⅱ-107
MH···M	C-Lube Linear Way MH	BLUE	Ⅱ-107
MH···MU	C-Lube Linear Way MH	BLUE	Ⅱ-107
MHD	C-Lube Linear Way MH	BLUE	Ⅱ-121
MHD···M	C-Lube Linear Way MH	BLUE	Ⅱ-123
MHD···MU	C-Lube Linear Way MH	BLUE	Ⅱ-123
MHD···SL	C-Lube Linear Way MH	BLUE	Ⅱ-121
MHDC···SL	C-Lube Linear Way MH	BLUE	Ⅱ-121
MHDG	C-Lube Linear Way MH	BLUE	Ⅱ-123
MHDG···SL	C-Lube Linear Way MH	BLUE	Ⅱ-121
MHG	C-Lube Linear Way MH	BLUE	Ⅱ-107
MHS	C-Lube Linear Way MH	BLUE	Ⅱ-127
MHS···M	C-Lube Linear Way MH	BLUE	Ⅱ-129
MHS···MU	C-Lube Linear Way MH	BLUE	Ⅱ-129
MHS···SL	C-Lube Linear Way MH	BLUE	Ⅱ-127
MHSG	C-Lube Linear Way MH	BLUE	Ⅱ-127
MHT	C-Lube Linear Way MH	BLUE	Ⅱ-113
MHT···M	C-Lube Linear Way MH	BLUE	Ⅱ-115
MHT···MU	C-Lube Linear Way MH	BLUE	Ⅱ-115
MHT···SL	C-Lube Linear Way MH	BLUE	Ⅱ-113
MHTG	C-Lube Linear Way MH	BLUE	Ⅱ-113
ML	C-Lube Linear Way ML	BLUE	Ⅱ- 23
MLC	C-Lube Linear Way ML	BLUE	Ⅱ- 23
MLF	C-Lube Linear Way ML	BLUE	Ⅱ- 31
MLFC	C-Lube Linear Way ML	BLUE	Ⅱ- 31
MLFG	C-Lube Linear Way ML	BLUE	Ⅱ- 33
MLG	C-Lube Linear Way ML	BLUE	Ⅱ- 25
MLL	C-Lube Linear Way ML	BLUE	Ⅱ- 27
MLV	C-Lube Linear Way MLV	BLUE	Ⅱ- 47
MUL	C-Lube Linear Way MUL	BLUE	Ⅱ-167
MV	C-Lube Linear Way MV	BLUE	Ⅱ- 59
MX	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXC	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXD	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-199
MXD···SL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-199
MXDC	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-199
MXDG	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-199
MXDL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-201
MXG	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXH	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXHC	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXHG	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXHL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-191
MXN	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-213
MXNG	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-213
MXNL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-213
MXNS	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-215
MXNSG	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-215
MXNSL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-215
MXS	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-209
MXSC	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-209
MXSG	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-209
MXSL	C-Lube Linear Roller Way Super MX	BLUE	Ⅱ-209
O			
OR···A	Miniature Stroke Rotary Bushing	RED	Ⅱ-187
R			
RW	Roller Way	RED	Ⅱ-201
RWB	Roller Way	RED	Ⅱ-202
S			
SF···A	Miniature Stroke Rotary Bushing	RED	Ⅱ-187
SR	Roller Way	RED	Ⅱ-203
ST	Stroke Rotary Bushing	RED	Ⅱ-179
ST···B	Stroke Rotary Bushing	RED	Ⅱ-179
ST···UU	Stroke Rotary Bushing	RED	Ⅱ-181
ST···UU B	Stroke Rotary Bushing	RED	Ⅱ-181
STS	Miniature Stroke Rotary Bushing	RED	Ⅱ-187
STSI	Miniature Stroke Rotary Bushing	RED	Ⅱ-187

Note: BLUE denotes CAT-1604E, while RED denotes CAT-1605E.

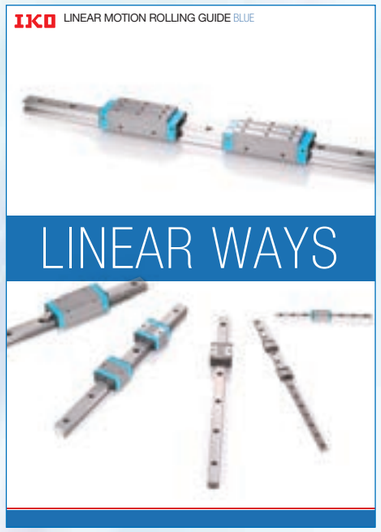
Model Code Index

Note: BLUE denotes CAT-1604E, while RED denotes CAT-1605E.

IKO Linear Motion Rolling Guide Series,

IKO Linear Motion Rolling Guide Series General Catalog Consists of **BLUE** (CAT-1604E) and **RED** (CAT-1605E), the two volumes.

BLUE



CAT-1604E

【Models】

- Rail Guide Type
  - Endless Linear Motion Type

RED

CAT-1605E

【Models】

- Rail Guide Type
  - Limited Linear Motion Type
- Shaft Guide Type
  - Endless Linear Motion Type
  - Limited Linear Motion Type + Rolling Motion Type
- Flat Guide Type
  - Endless Linear Motion Type
  - Limited Linear Motion Type

C-Lube Linear Way ML
Linear Way L
ML・LWL

C-Lube Linear Way MLV
MLV

C-Lube Linear Way MV
MV

C-Lube Linear Way ME
Linear Way E
ME・LWE

C-Lube Linear Way MH
Linear Way H
MH・LWH

Linear Way F
LWF

C-Lube Linear Way MUL
Linear Way U
MUL・LWU

C-Lube
Linear Roller Way Super MX
Linear Roller Way Super X
MX・LRX

Linear Roller Way X
LRWX

Linear Way Module
LWLM・LRWM

Rail Guide Type
Crossed Roller Way
CRW(G)(…H)
CRWU(G)

Rail Guide Type
Linear Slide Unit
BWU・BSP(G)
BSU…A

Shaft Guide Type
Linear Ball Spline
MAG・LSAG

Shaft Guide Type
Linear Bushing
LMG・LM・LMS

Shaft Guide Type
Stroke Rotary Bushing
ST・STSI・BG

Flat Guide Type
Roller Way & Flat Roller Cage
RW・SR・GSN
FT・FTW…A

Configuration of General Catalog

IKO Introduction of Technical Service Site

"IKO Technical Service Site" can be accessed from our home page. The site provides various tools for selecting Linear Ways and Linear Roller Ways. Please utilize these tools for assistance when selecting products. Additionally the site also provides CAD data and product catalogs for the Needle Series, Linear Motion Rolling Guide Series, and Mechatronics Series for download. Please utilize them to improve your design efficiency.

https://www.ikont.co.jp/eg/

1. Technical calculations

For Linear Way/Linear Roller Way load and life calculation, you can obtain the calculated load and the rating life by entering the operating conditions. Also you can derive the motor torque required for operation and the effective thrust force during operation in the sections of motor torque calculation and calculation of effective thrust force of linear motor tables respectively, and output the calculation results in PDF format, as well as save the histories.

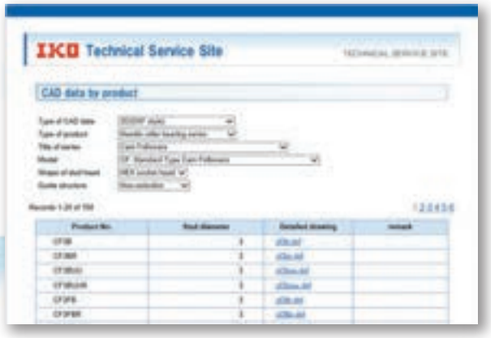
2. Selection of Identification Number

By selecting such specification as model code, dimensions, part code, material code, preload symbol, classification symbol, interchangeable code and supplemental code of Linear ways/Linear roller ways, you can easily specify the identification number used for ordering.
Also you can browse the CAD data of the selected products, calculate the load, and output the selection results in PDF format, as well as save the histories.

3. Downloading CAD data

2-dimensional CAD data (DXF file)

There are two types of figures, brief figure and detailed figure. The brief figure shows only the external view lines, and the detailed figure shows the detailed lines. The drawing consists of three drawings: front view, side view and plain view. The scale shows only the original size (1:1), and it does not show dimension lines.



3-dimensional CAD data

It is linked to the mechanical parts CAD library "PART community". Entering the rail dimension and option contents to the detail, you can view the 2D/3D CAD data suitable for the specification for free of charge.

4. Downloading Catalog and Operation Manual

You can download product catalogs of needle series, linear motion rolling guide series and mechatronics series, operation manuals of precision positioning tables and various electrical components in PDF format, as well as support software for precision positioning tables. If you would like a copy of our catalog, please visit the IKO official website and apply for the catalog, or contact our regional office or sales office nearby.

Oil Minimum

IKO Gentle to The Earth

Nippon Thompson Co., Ltd. is working to develop global environment-friendly products.
It is committed to developing products that make its customers' machinery and equipment more reliable, thereby contributing to preserving the global environment.
This development stance manifests well in the keyword "**Oil Minimum**."
Our pursuit of Oil Minimum has led to the creation of IKO's proprietary family of lubricating parts as "C-Lube."

- IKO Linear Motion Rolling Guides are manufactured through a control system that alleviates their impact on the global environment to meet the quality requirements of ISO 14001 in compliance with the quality requirements level of ISO 9001 for quality improvement.
- The standard products listed in this catalog comply with the specifications of the ten hazardous materials cited in the European RoHS Directive.

NIPPON THOMPSON CO., LTD. (JAPAN)

Head Office : 19-19, Takanawa 2-chome, Minato-ku, Tokyo, 108-8586, Japan
Phone : +81 (0)3-3448-5850
Fax : +81 (0)3-3447-7637
E-mail : ntt@ikonet.co.jp
URL : https://www.ikont.co.jp/eg/
Plant : Gifu, Kamakura

IKO INTERNATIONAL, INC. (U.S.A.)

East Coast Operation (Sales Head Office)
91 Walsh Drive,
Parsippany, NJ, 07054,
U.S.A.
Phone : +1-973-402-0254
Toll Free : +1-800-922-0337
Fax : +1-973-402-0441
E-mail : eco@ikonet.co.jp

Midwest Operation
101 Mark Street, Unit-G,
Wood Dale, IL, 60191,
U.S.A.
Phone : +1-630-766-6464
Toll Free : +1-800-323-6694
Fax : +1-630-766-6869
E-mail : mwo@ikonet.co.jp

West Coast Operation
9830 Norwalk Boulevard, Suite 198,
Santa Fe Springs, CA, 90670,
U.S.A.
Phone : +1-562-941-1019
Toll Free : +1-800-252-3665
Fax : +1-562-941-4027
E-mail : wco@ikonet.co.jp

Silicon Valley Sales Office
1500 Wyatt Drive, Suite 10,
Santa Clara, CA, 95054,
U.S.A.
Phone : +1-408-492-0240
Toll Free : +1-800-252-3665
Fax : +1-408-492-0245
E-mail : wco@ikonet.co.jp

Southeast Operation
3235 Satellite Boulevard Building 400, Suite 230,
Duluth, GA, 30096,
U.S.A.
Phone : +1-770-418-1904
Toll Free : +1-800-874-6445
Fax : +1-770-418-9403
E-mail : seo@ikonet.co.jp

Southwest Operation
6191 N STATE HIGHWAY 161, STE 440,
IRVING, TX 75038-2264,
U.S.A.
Phone : +1-972-925-0444
Toll Free : +1-800-295-7886
Fax : +1-972-707-0385
E-mail : swo@ikonet.co.jp

IKO THOMPSON BEARINGS CANADA, INC.(CANADA)

Suite 700 - 6733 Mississauga Road, Mississauga,
Ontario, L5N 6J5, Canada
Phone : +1-647-931-3933
E-mail : itc@ikonet.co.jp

IKO BRASIL SERVIÇOS EMPRESARIAIS LTDA. (BRAZIL)

Rua Frei Caneca 1407,
Condominio Edificio Barão de Monte Cedro,
Cjs. 801/802, Consolação, São Paulo- SP
Cep: 01307-909
Phone : +55 (0)11-2366-3033
E-mail : itb@ikonet.co.jp

NIPPON THOMPSON EUROPE B.V. (EUROPE)

The Netherlands (Sales Head Office)
Keersopstraat 35,
3044 EX, Rotterdam,
The Netherlands
Phone : +31 (0)10-462 68 68
E-mail : nte@ikonet.co.jp

Germany Branch
Mündelheimer Weg 54,
40472 Düsseldorf,
Germany
Phone : +49 (0)211-41 40 61
Fax : +49 (0)211-42 76 93
E-mail : ntd@ikonet.co.jp

Regensburg Sales Office
Im Gewerbepark D 04,
93059 Regensburg,
Germany
Phone : +49 (0)941-20 60 70
Fax : +49 (0)941-20 60 719
E-mail : ntdr@iko-nt.de

U.K. Branch
2 Vincent Avenue, Crownhill,
Milton Keynes, Bucks, MK8 0AB,
United Kingdom
Phone : +44 (0)1908-566144
E-mail : sales@iko.co.uk

Spain Branch
Autovia Madrid-Barcelona, Km. 43,700
Polig. Ind. AIDA - Nove A-8, Ofic. 2-1ª
19200-Azuqueca de Henares,
(Guadalajara) Spain
Phone : +34 949-26 33 90
Fax : +34 949-26 31 13
E-mail : nts@ikonet.co.jp

France Branch
Bâtiment le Raphaël-Paris, Nord 2,
22 avenue des Nations
BP54394 Villepinte
95943 ROISSY C.D.G Cedex
France
Phone : +33 (0)1-48 16 57 39
Fax : +33 (0)1-48 16 57 46
E-mail : ntf@ikont.eu

IKO THOMPSON ASIA CO., LTD. (THAILAND)

Unit 305,3rd Fl., Zuellig house, 1-7 Silom Rd.,
Silom Bangrak, Bangkok 10500, Thailand
Phone : +66 (0)2637-5115
Fax : +66 (0)2637-5116
E-mail : ita@ikonet.co.jp

See you again at
IKO Website
https://www.ikont.co.jp/eg/

IKO THOMPSON KOREA CO.,LTD. (KOREA)

201, Worldvision Bldg., 77-1, Yeouinaru-ro,
Yeongdeungpo-gu, Seoul, Korea
Phone : +82 (0)2-6337-5851
Fax : +82 (0)2-6337-5852
E-mail : itk@ikonet.co.jp

IKO-THOMPSON (SHANGHAI) LTD. (CHINA)

Shanghai (Sales Head Office)
2301-02, 2310, MetroPlaza No.555,
LouShanGuan Road, ChangNing District,
Shanghai, People's Republic of China, 200051
Phone : +86 (0)21-3250-5525
Fax : +86 (0)21-3250-5526
E-mail : ntc@ikonet.co.jp

Beijing Branch
Room 1909, Tower C Oriental Media Center,
Guanghua Road No. 4 Chaoyang District, Beijing,
People's Republic of China, 100026
Phone : +86 (0)10-6515-7681
Fax : +86 (0)10-6515-7689
E-mail : ntc@ikonet.co.jp

Guangzhou Branch
Room 834, Garden Tower, Garden Hotel
368 Huanshi East Road, Yuexiu District, Guangzhou,
Guangdong
People's Republic of China, 510064
Phone : +86 (0)20-8384-0797
Fax : +86 (0)20-8381-2863
E-mail : ntc@ikonet.co.jp

Wuhan Branch
Room 2300, Truroll Plaza No.72, Wusheng Road,
Qiao kou District, Wuhan, Hubei,
People's Republic of China, 430033
Phone : +86 (0)27-8556-1610
Fax : +86 (0)27-8556-1630
E-mail : ntc@ikonet.co.jp

Shenzhen Branch
Room1808, KEENSTAR Building 18,
Chuangye 2nd Rd 248, Bao'an, Shenzhen, Guangdong,
People's Republic of China, 518081
Phone : +86 (0)755-2265-0553
Fax : +86 (0)755-2298-0665
E-mail : ntc@ikonet.co.jp

Xian Branch
Room 2010, Block B, Chaoyang International Plaza,
No. 166,
Changle West Road, Xincheng District Xi'an, Shanxi,
People's Republic of China, 710032
Phone : +86 (0)29-8323-5915
E-mail : ntc@ikonet.co.jp

Qingdao Branch
Room 608, Building 47, Huarun City,
No. 101 Shenzhen Road, Laoshan District,
Qingdao City, Shandong
People's Republic of China, 266100
Phone : +86 (0)532-8670-2246
Fax : +86 (0)532-8670-2242
E-mail : ntc@ikonet.co.jp

Shenyang Branch
2-1203 Tower I. City Plaza Shenyang NO.206,
Nanjing North Street, Heping District,
Shenyang, Liaoning
People's Republic of China, 110001
Phone : +86 (0)24-2334-2662
Fax : +86 (0)24-2334-2442
E-mail : ntc@ikonet.co.jp

Ningbo Office
Room 3406, Zhongnongxin Building, No.181,
Zhongshan East Road, Haishu District,
Ningbo, Zhejiang
People's Republic of China, 315000
Phone : +86 (0)574-8718-9535
Fax : +86 (0)574-8718-9533
E-mail : ntc@ikonet.co.jp