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Fax : +33 (0)1-48 16 57 46
E-mail : contact@iko-france.com

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IKO Linear Motion Rolling Guide Series General Catalog RED

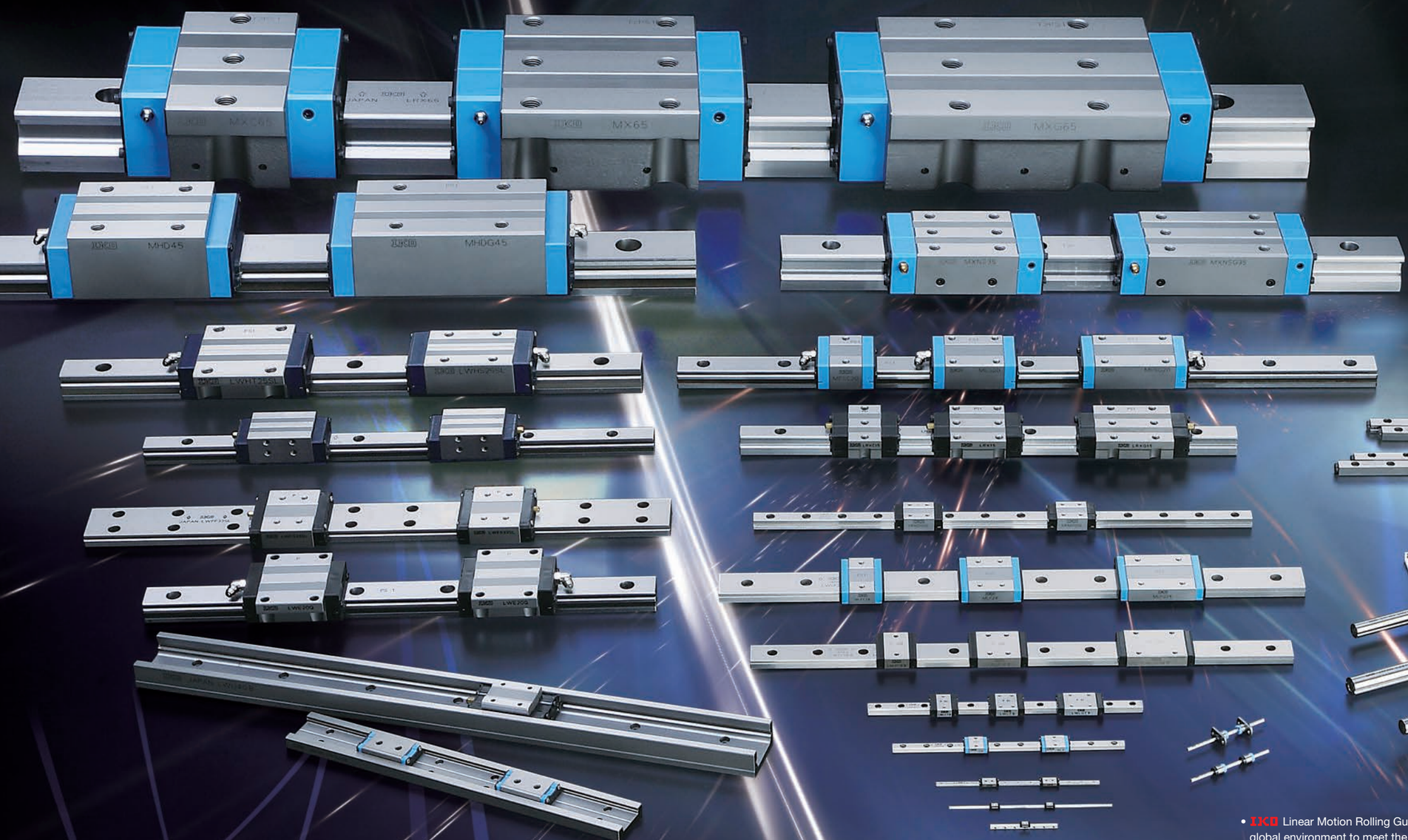
IKO Linear Motion Rolling Guide Series
General Catalog
RED



CAT-1555.3E

Eco-friendly and Excellent 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.





- 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 six hazardous materials mentioned cited in the European RoHS Directive.

IKO Linear Motion Rolling Guide Series Full Lineup

Linear Motion Rolling Guide Series General Catalog BLUE

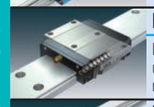


Recorded in CAT-1559E

Linear Way

Linear Roller Way

Rail Guide Type

		C-Lube Maintenance Free Series		
	**Ball Type Miniature Series** Super small-size linear motion rolling guide produced by original small sizing technology	**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** LWUL ···B : Small type LWU ···B : Standard ball-retained type LWU : Standard ball non-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 LWM : Ball type standard type LRWM : Roller type	

Linear Motion Rolling Guide Series General Catalog RED



Recorded in CAT-1555.3E

Crossed Roller Way

Linear Slide Unit

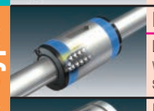
Linear Ball Spline

Linear Bushing

Stroke Rotary Bushing

Roller Way & Flat Roller Cage

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 Unit** CRWUG	**Anti-Creep Cage Crossed Roller Way H** CRWG···H **Crossed Roller Way Unit** CRWU / CRWU···R / CRWU···RS	**Crossed Roller Way** CRW : Standard type CRWM : Module type
	**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 performing linear motion while performing torque transmission along the spline shaft by external cylinder or slide unit	**C-Lube Linear Ball Spline MAG** MAG : Standard type MAGF : Flange type	**Linear Ball Spline G** LSAG : Standard type LSAGF : Flange type	**Block Type Linear Ball Spline** LSB	**Stroke Ball Spline** LS
	**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

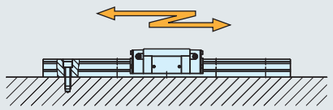
	**Roller Way & Flat Roller Cage** High accuracy linear motion rolling guide providing high rigidity in load direction		**Roller Way** RW / SR / GSN	**Flat Roller Cage** FT : Single row type FTW···A : Double row angle type

IKO Types and Specifications of Linear Motion Rolling Guide Series

Types of Linear Motion Rolling Guides

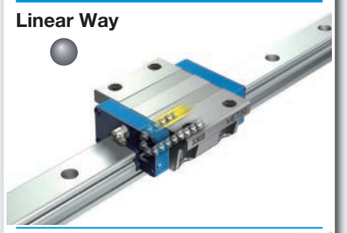
Rail Guide Type

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.

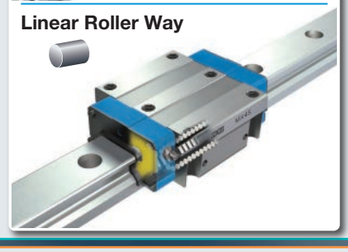


Endless linear motion

Linear Way



Linear Roller Way



Limited linear motion

Crossed Roller Way

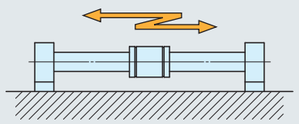


Linear Slide Unit



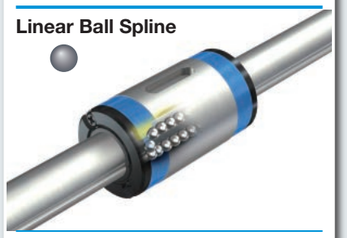
Shaft Guide Type

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

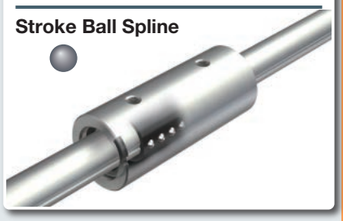


Linear Bushing



Limited linear motion

Stroke Ball Spline



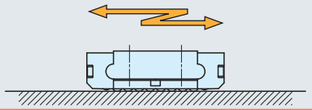
Limited linear motion + rotation

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.



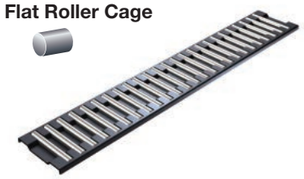
Endless linear motion

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	Stroke Ball Spline	Ball	Limited linear motion	Complex load, medium to heavy load	○	◎	○	• Robot • Testing and inspection equipment	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　General Catalog RED　INDEX



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　Anti-Creep Cage Crossed Roller Way H



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



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



Precision Linear Slide Unit



Linear Slide Unit



Linear Ball Spline

Linear motion rolling guide performing linear motion while performing torque transmission along the spline shaft by external cylinder or slide unit



C-Lube Linear Ball Spline MAG



Linear Ball Spline G



Block Type Linear Ball Spline



Stroke Ball Spline



Linear Bushing

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



Linear Bushing G



Linear Bushing



Miniature Linear Bushing



Stroke Rotary Bushing

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



Stroke Rotary Bushing



Miniature Stroke Rotary Bushing



Stroke Rotary Cage



Roller Way & Flat Roller Cage

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



Roller Way





Flat Roller Cage



Cam Follower and Roller Follower

Well-chosen related products widening the application range of IKO's linear motion rolling guide series



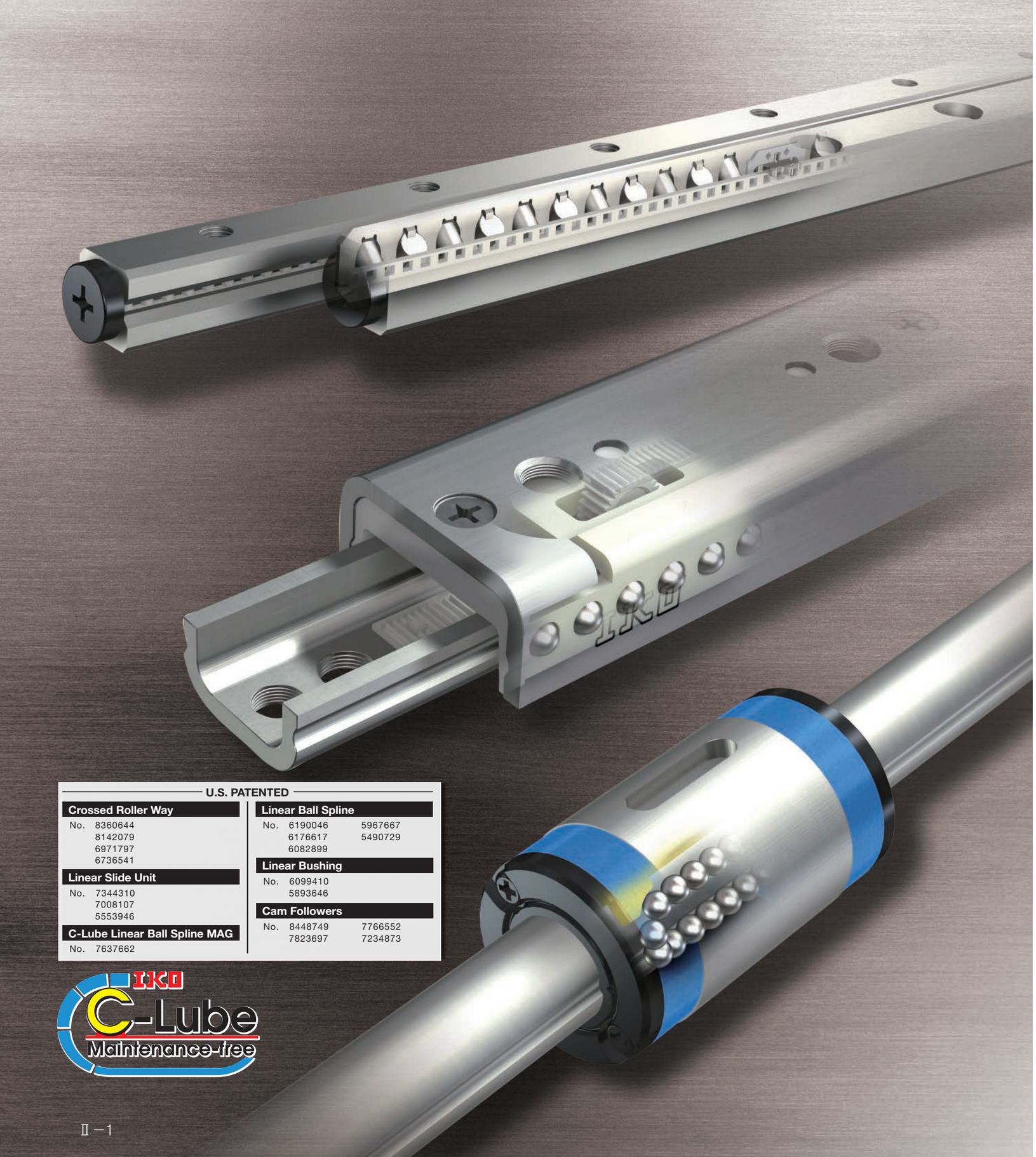
Cam Follower



C-Lube Unit For Cam Followers



Roller Follower



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 5967667
6176617 5490729
6082899

Linear Bushing
No. 6099410
5893646

Cam Followers
No. 8448749 7766552
7823697 7234873

IKO 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
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● 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

Round Shaft Guide Type

Linear Ball Spline

● C-Lube Linear Ball Spline MAG
Linear Ball Spline G
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● Block Type Linear Ball Spline
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● Flat Roller Cage
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● General Explanation ····· Ⅲ-2

Introduction of Application Examples

● Introduction of Application Examples ····· Ⅳ-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.



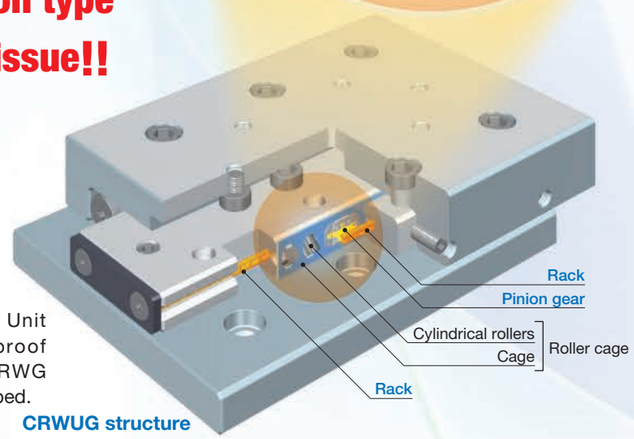
Built-in rack & pinion type

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.

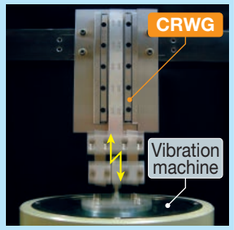
Saving Energy

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	



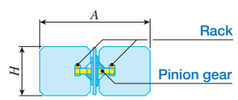
《Result》 No cage creep nor material damage in any component is found.

Interchangeable in Mounting Dimensions!

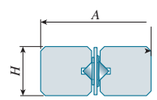
Adoption of original structure of arranging a rack inside the way keeps the same mounting dimensions as conventional Crossed Roller Way CRW.

Easy Replacement

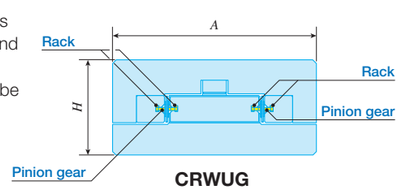
Since they have the same external dimensions to those of the existing Crossed Roller Way and Crossed Roller Way Unit, existing Crossed Roller Way and Crossed Roller Way Unit can be replaced without any mounting dimensions modification.



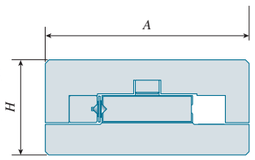
CRWG
CRWG···H



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 groove, which allows receiving of loads 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	/U
		CRWM	3	– 250×150		C20		SP	/U

1 **Model** — Model code Page Ⅱ－9

2 **Size** — Dimensions Page Ⅱ－9

3 **Way length** — Part code Page Ⅱ－10

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

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

Identification Number and Specification —Model・Size—

1 Model

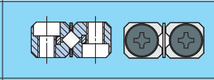
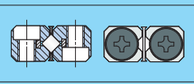
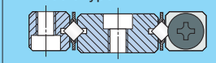
Anti-Creep Cage Crossed Roller Way (CRWG series)		: CRWG
Anti-Creep Cage Crossed Roller Way H (CRWG···H series)		: CRWG···H
Crossed Roller Way (CRW series)	Standard type	: CRW
	Module type	: CRWM

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 Fig. 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

○
○×○

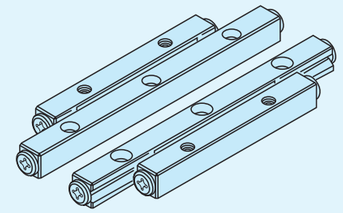
The way length is indicated in mm. The CRW series can be combined with a way of different length. For details of way length, see the dimension tables on pages Ⅱ-27 to Ⅱ-54.

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.
The number of rollers incorporated into a roller cage shall be standard number of short ways (number described in the dimension table) but the number of rollers may be specified.

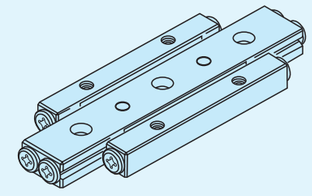
Example CRW 6 – 300 × 400 C24
- The number of cylindrical rollers to be incorporated in a unit: 24
- Length of long way: 400 mm
- Length of short way: 300 mm



Combination of module type

This combination consists of one center way, two ways, and two roller cages, as a set.
The number of rollers incorporated into a roller cage shall be standard number of short ways (number described in the dimension table) but the number of rollers may be specified.

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○	

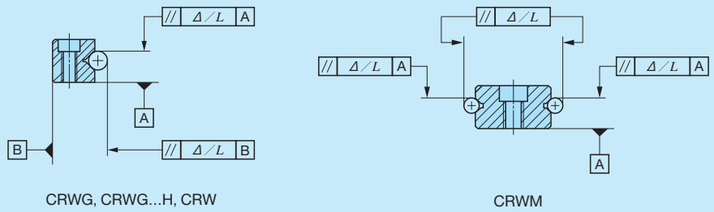
5 Material type

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	



CRWG, CRWG...H, CRW

CRWM

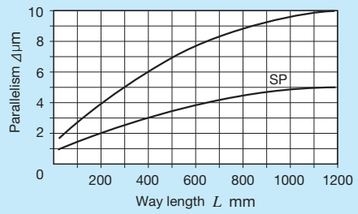


Fig. 1 Accuracy

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-12 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) (2)	/M	–	–	–	–	○	○	○	○	○	○
End stopper SA (2)	/SA	–	○	○	○	○	○	○	○	○	○
End stopper SB (2)	/SB	–	○	○	○	○	○	○	○	○	○
Wiper seal (2)	/U	–	○	○	○	○	○	○	○	○	○

Notes (1) Not applicable to module type.
(2) Not applicable to CRWG series and CRWG···H series.

Table 3 Combination of special specifications

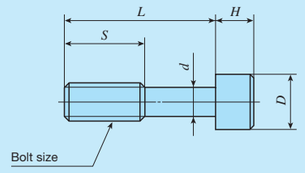
M	○			
SA	○	○		
SB	○	○	–	
U	○	○	–	–
	B	M	SA	SB

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

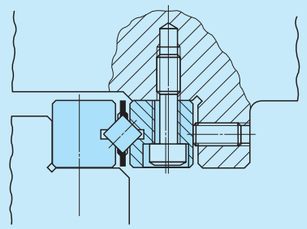
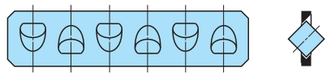


Fig. 2 Mounting by special mounting screw

High rigidity roller cage /M



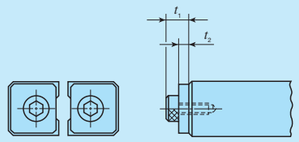
The cage is changed into a high rigidity copper alloy-made cage designed to suit vertical axis application. This cage has a structure to prevent a roller from dropping off in one-side direction.
For using a high rigidity roller cage for vertical axis application, it is recommended to use the cage in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

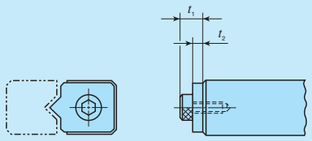
Size	t_1	t_2
2	4.5	2
3	5	2
4	7	3
6	8	3
9	10	4

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

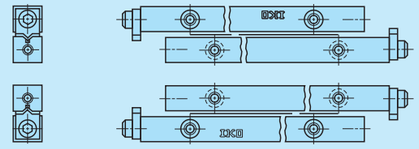
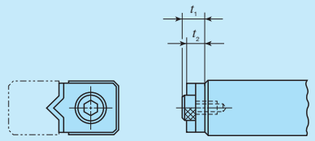


Fig. 3 Arrangement of end stopper SB

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

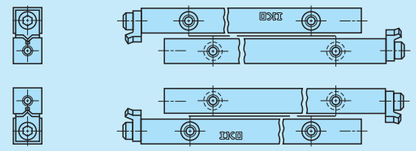


Fig. 4 Arrangement of wiper seal

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.

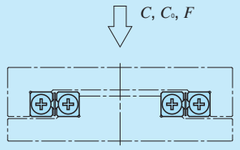


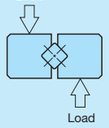
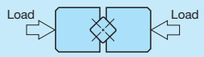
Fig. 5 Direction of load rating of the CRWG series and CRWG···H series

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.

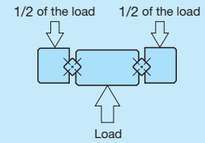
Therefore, use applied load within the allowable load range if very smooth rolling motion and high accuracy are required.

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

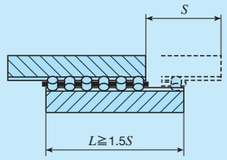
Stroke length of the CRW series affects the way length and the number of cylindrical rollers.
Therefore, select specifications by following the procedure below taking into account the stroke length used and applied load.

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

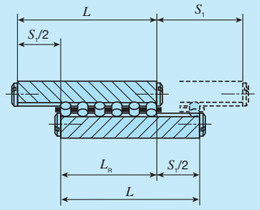
❸ Calculation of cage length and the number of rollers

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.

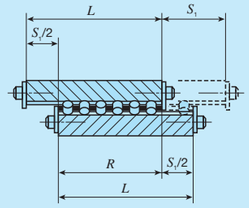
$$Z = \frac{L_R - D_W}{p} + 1 \quad \cdots\cdots (16)$$

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.

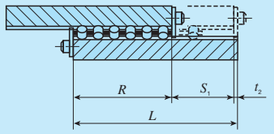
$$Z = \frac{R - 2e}{p} + 1 \quad \cdots\cdots (18)$$

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).

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

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.

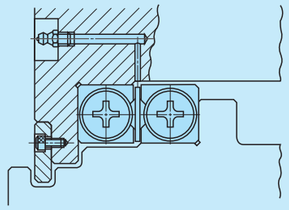


Fig. 6 Example of lubrication system

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.

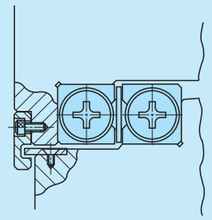


Fig. 7 Example of labyrinth seal

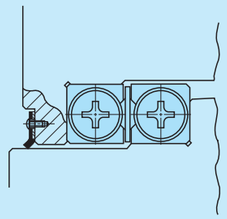


Fig. 8 Example of wiper seal

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.

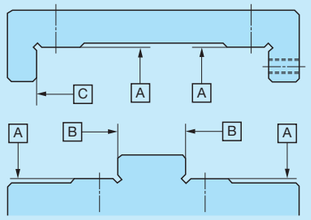


Fig. 9.1 Example of processing of CRWG, CRWG···H and CRW mounting surface

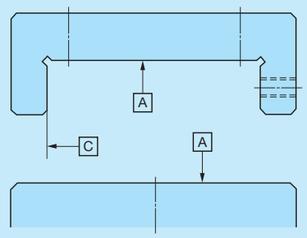


Fig. 9.2 Example of processing of CRWM mounting surface

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). Ⅱ−11Allowable 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.

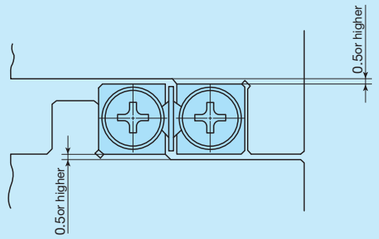


Fig. 10 Shape of mounting part

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.

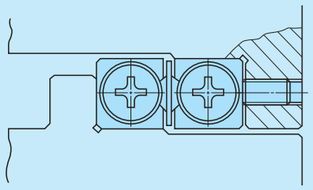


Fig. 11 Example of typical preload adjustment

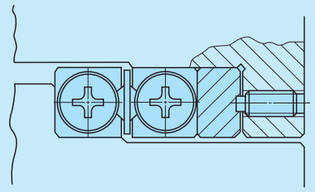


Fig. 12 Example of push plate

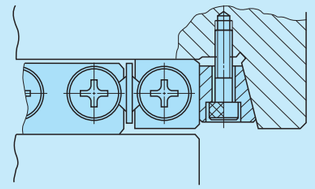


Fig. 13 Example of tapered jib

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
M 2×0.4	0.40
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
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 CRWG series and CRWG···H series

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

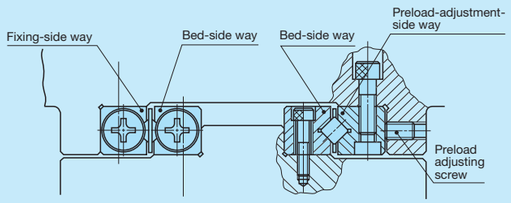


Fig. 14 Mounting example of CRWG and CRWG···H

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.
- 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.
- Wipe off dust and dirt with clean cloth and apply rust prevention and lubrication oil lightly.

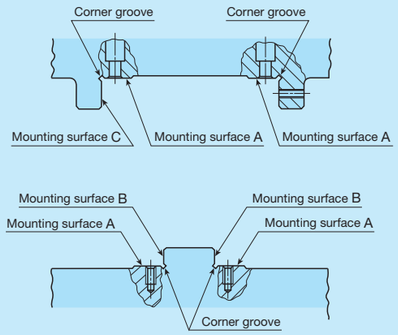


Fig. 15 Mounting surface

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.

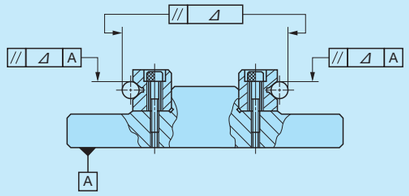


Fig. 16 Accuracy of way mounting

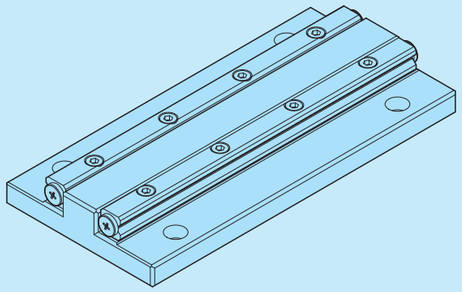


Fig. 17

❹ Operation of table and bed

- Position the roller cages at the stroke end positions of the bed-side way. (Refer to Fig. 18)
- 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.

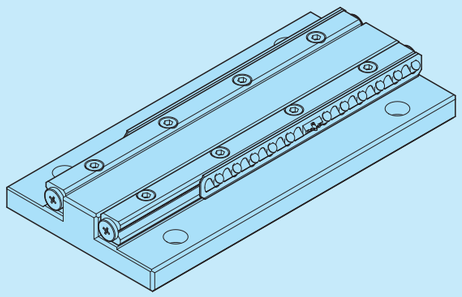


Fig. 18

- Position the table-side way in the stroke end position. (Refer to Fig. 19)
- Mate the pinion gear at the center of the cage and the rack of the table-side way.

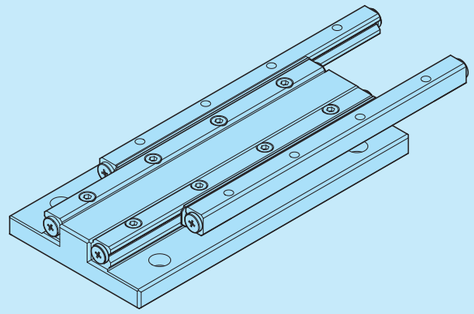


Fig. 19

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

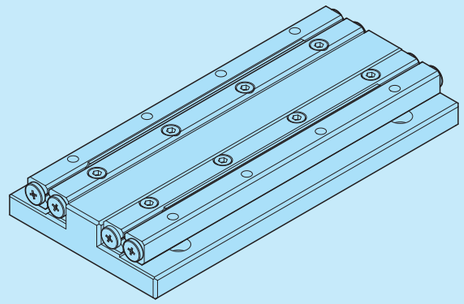


Fig. 20

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

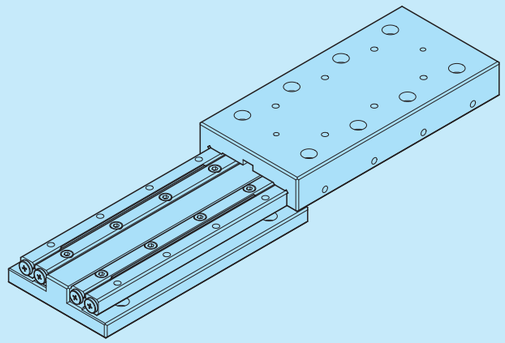


Fig. 21

- Temporarily tighten the table fixing screws. (Refer to Fig. 22)

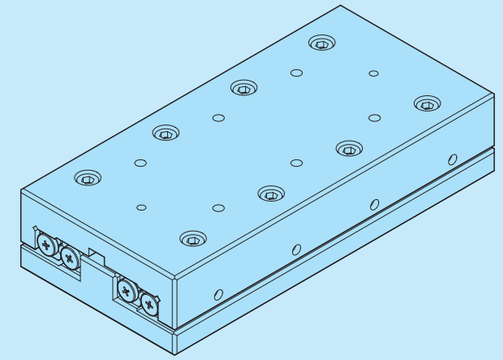


Fig. 22

- 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)

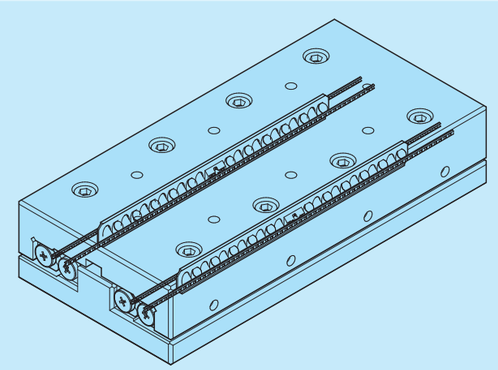


Fig. 23

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.

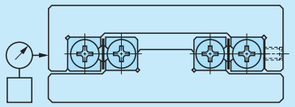


Fig. 24 Example of preload adjustment method

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.

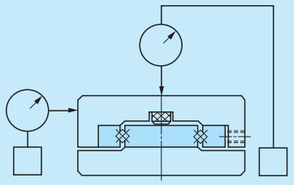


Fig. 25 Accuracy check after assembly

Mounting of standard type CRW series

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

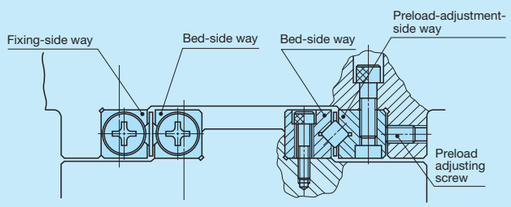


Fig. 26 Mounting example of standard type CRW series

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.
- 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.
- Wipe off dust and dirt with clean cloth and apply rust prevention and lubrication oil lightly.

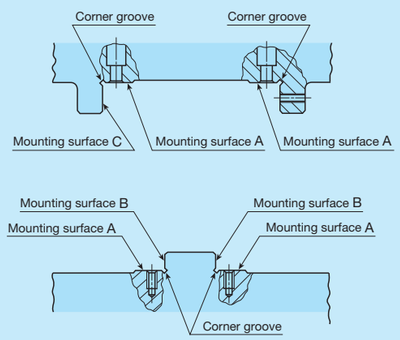


Fig. 27 Mounting surface

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.

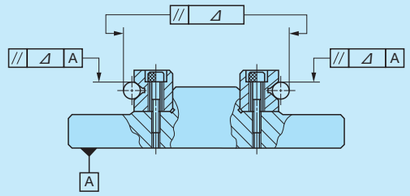


Fig. 28 Accuracy of way mounting

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.

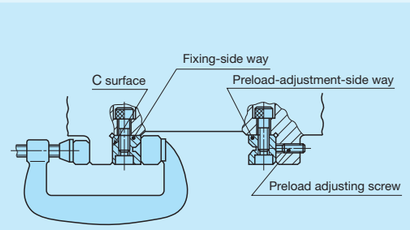


Fig. 29 Mounting of table-side way

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.

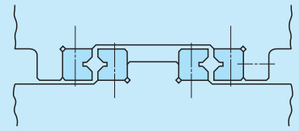


Fig. 30 Position alignment before operation

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.

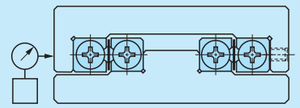


Fig. 31 Example of preload adjustment method

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.

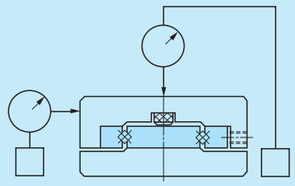


Fig. 32 Accuracy check after assembly

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.

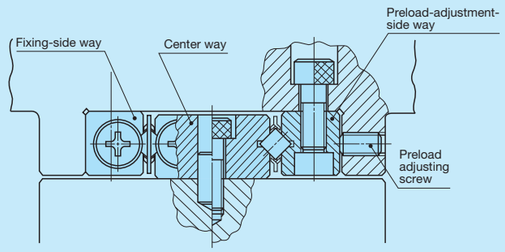


Fig. 33 Example of mounting of CRWM

❶ Preparation for mounting

- Crossed Roller Way 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.
- Wipe off dust and dirt with clean cloth and apply rust prevention and lubrication oil lightly.

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.

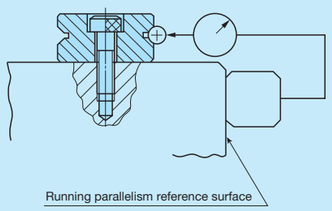


Fig. 34 Mounting accuracy check for center way

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.

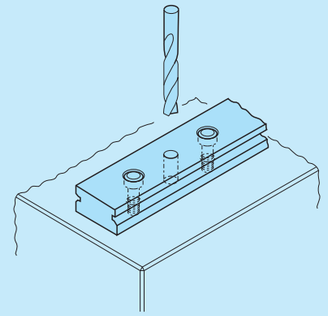


Fig. 35 Machining of dowel pin hole

❺ Mounting of table-side way

- Follow the mounting of standard type CRW series.

❻ Operation of table and bed

- Follow the mounting of standard type CRW series.

❼ Preload adjustment

- Follow the mounting of standard type CRW series.

❽ Full tightening of preload-adjustment-side way

- Follow the mounting of standard type CRW series.

❾ Check after assembly

- Follow the mounting of standard type CRW 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.

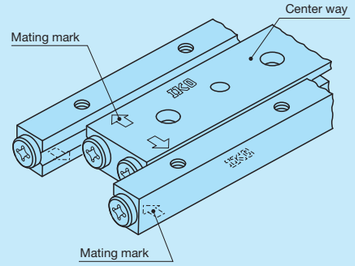
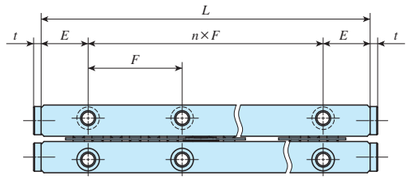


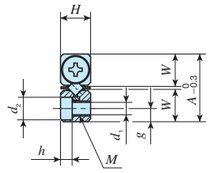
Fig. 36 Mating marks of CRWM

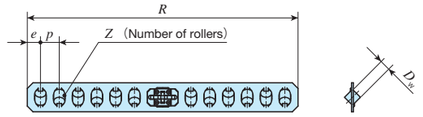
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way

Shape	CRWG			
Size	2	3	4	6







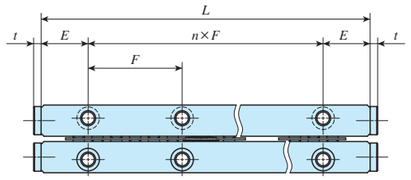
Identification number	Mass (Ref.) Way (1) g	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R		Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Maximum stroke length mm	Basic dynamic load rating C(3) N	Basic static load rating C_0(3) N	Allowable 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

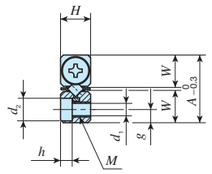
Notes (1) The value shows the mass of a piece of way.
(2) The value shows the mass of a roller cage.
(3) This is the value when a combination of four ways and two roller cages is used in parallel arrangement.

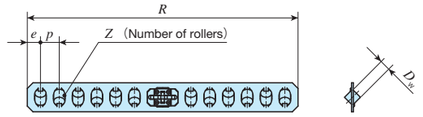
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way

Shape	CRWG			
Size	2	3	4	6







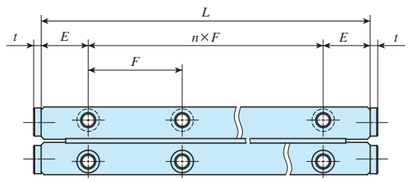
Identification number	Mass (Ref.) Way (1) g	Mass (Ref.) Roller cage (2) g	Nominal dimensions mm: Boundary dimensions A	H	$L(n\times F)$	E	Dimension of roller cage D_w	R	Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Maximum stroke length mm	Basic dynamic load rating C(3) N	Basic static load rating C_0(3) 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										129	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										151	37 200	64 600	21 500

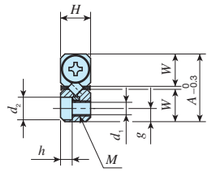
Notes (1) The value shows the mass of a piece of way.
(2) The value shows the mass of a roller cage.
(3) This is the value when a combination of four ways and two roller cages is used in parallel arrangement.

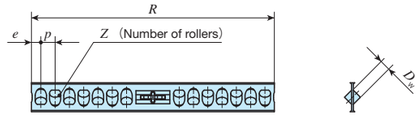
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way H

Shape	CRWG···H		
Size	2	3	4







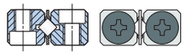
Identification number	Mass (Ref.)		Nominal dimensions mm																		Maximum stroke length	Basic dynamic load rating	Basic static load rating	Allowable load
	Way (1)	Roller cage (2)	Boundary dimensions				Dimension of roller cage			Mounting dimensions												C(3)	C_0(3)	F(3)
	g	g	A	H	$L(n\times F)$	E	D_w	R		Z	p	e	W	g	M	d_1	d_2	h	t	mm	N	N	N
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	13	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	23	10 500	17 100	5 690
CRWG 4-120H	92.7	6.80			120(2×40)			88.2		16										45	15 200	27 300	9 100
CRWG 4-160H	124	9.25			160(3×40)			117		22										68	19 500	37 500	12 500
CRWG 4-200H	155	11.7			200(4×40)			145.8		28										90	23 500	47 800	15 900
CRWG 4-240H	186	15.0			240(5×40)			184.2		36										93	28 600	61 400	20 500
CRWG 4-280H	218	17.4			280(6×40)			213		42										116	32 200	71 700	23 900
CRWG 4-320H	249	19.9			320(7×40)			241.8		48										138	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.

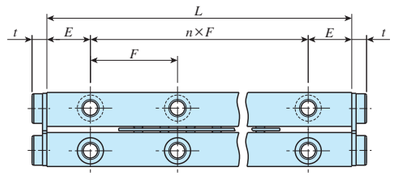
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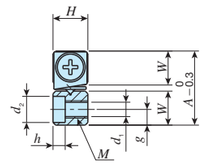
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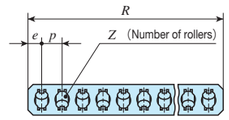
Shape: **CRW**, **CRW···SL**



Size	1	2	3	4	6
	9	12	15	18	24









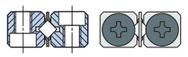
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	E	Dimension of roller cage D_w	R		Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U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

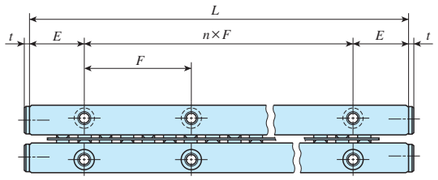
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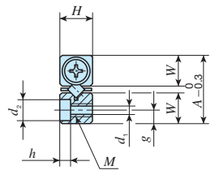
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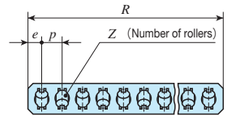
Shape: **CRW**, **CRW…SL**



Size	1	2	3	4	6
	9	12	15	18	24









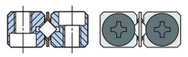
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Z	p	e	Mounting dimensions W	Mounting dimensions g	Mounting dimensions M	Mounting 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.

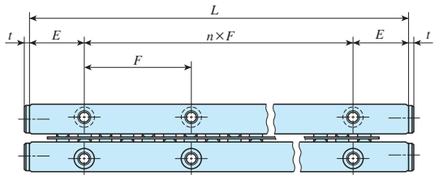
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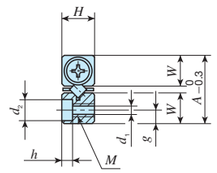
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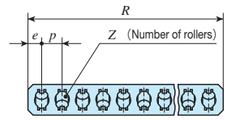
Shape: **CRW**
CRW···SL



Size	1	2	3	4	6
	9	12	15	18	24









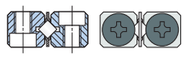
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic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

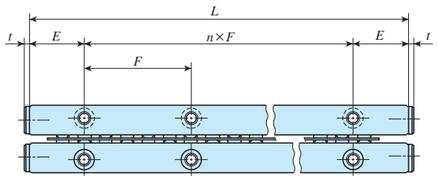
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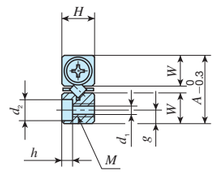
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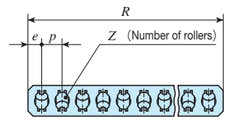
Shape: CRW, CRW···SL



Size	1	2	3	4	6
	9	12	15	18	24









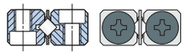
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic 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.

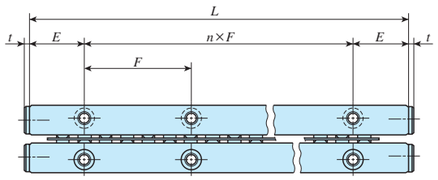
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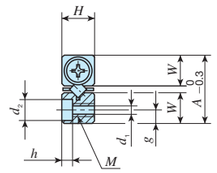
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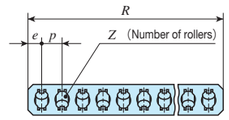
Shape: CRW
CRW···SL



Size: 1 2 3 4 6 / 9 12 15 18 24









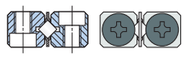
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Z	p	e	Mounting dimensions W	Mounting dimensions g	Mounting dimensions M	Mounting 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 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.

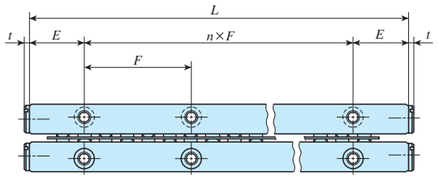
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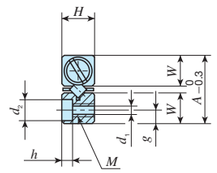
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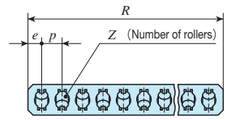
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Size: 1 | 2 | 3 | 4 | 6 | **9** | **12** | 15 | 18 | 24









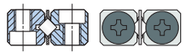
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic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

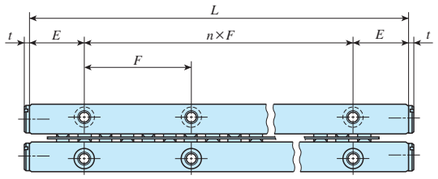
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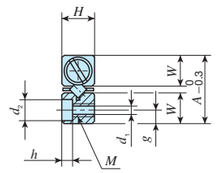
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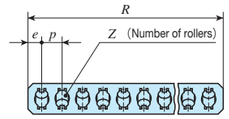
Shape: CRW



Size	1	2	3	4	6
	9	12	15	18	24









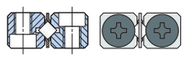
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions E	Dimension of roller cage D_w	Dimension of roller cage R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic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

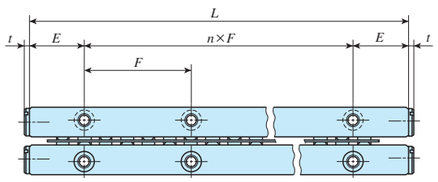
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

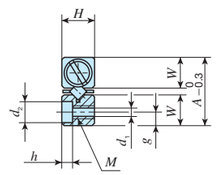
Standard type

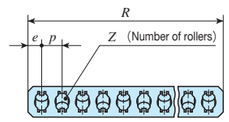
Shape: CRW



Size	1	2	3	4	6
	9	12	15	18	24







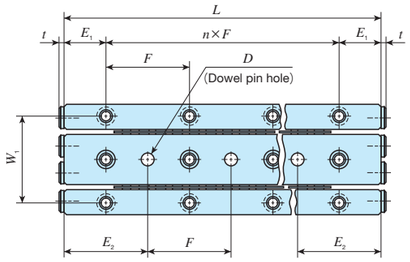


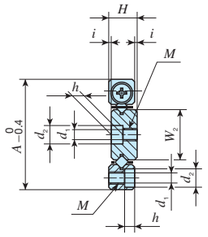
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	$L(n\times F)$	E	Dimension of roller cage D_w	R	Nominal dimensions mm Z	p	e	Mounting dimensions W	g	M	d_1	d_2	h	t	Basic dynamic load rating C_U(3) N	Basic static load rating C_{0U}(3) N	Allowable load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

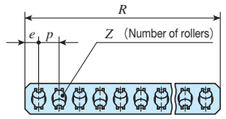
Notes (1) The value shows the mass per meter of a way.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.
Remark: The identification numbers with * are our semi-standard items.

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

Module type				
Shape	CRWM			
Size	1	2	3	4









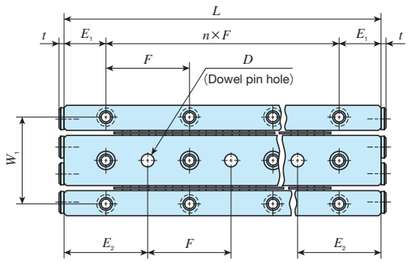
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	H	L(n×F)	i	Dimension of roller cage D_w	R	Z	p	e	Mounting dimensions W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Dim. D tolerance	t	Basic dynamic load rating C_U (3) N	Basic static load rating C_{0U} (3) N	Allowable load F_U (3) N
CRWM 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																

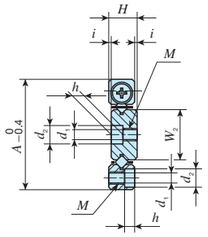
Notes (1) The value shows the total mass per meter of a set of three ways.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

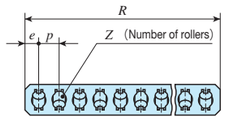
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Module type

Shape	CRWM			
Size	1	2	3	4





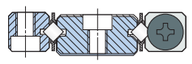


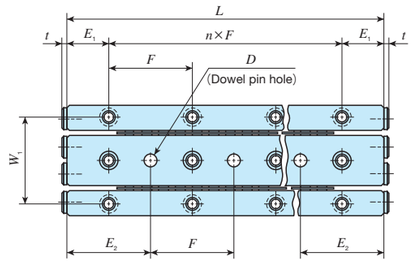


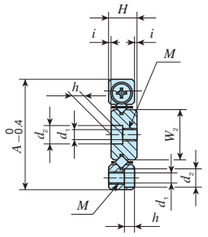
Identification number	Mass (Ref.) Way (1) kg/m	Mass (Ref.) Roller cage (2) g	Boundary dimensions A	Boundary dimensions H	Boundary dimensions L(n×F)	Boundary dimensions i	Dimension of roller cage Dw	Dimension of roller cage R	Dimension of roller cage Z	Nominal dimensions and tolerances mm p	e	Mounting 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 3- 50	1.99	2.96	36	8.5	50 (1×25)	0.5	3	42	8	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- 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					175 (6×25)			142	28																
CRWM 3-200					200 (7×25)			162	32																
CRWM 3-225					225 (8×25)			182	36																
CRWM 3-250					250 (9×25)			202	40																
CRWM 3-275					275 (10×25)			222	44																
CRWM 3-300					300 (11×25)			242	48																
CRWM 4- 80	3.28	6.91	44	11.5	80 (1×40)	0.5	4	73	10	7	5	35	20	20	40	M5	4.3	7.5	4.1	5	+0.012 0	2	1 230	1 180	392
CRWM 4-120					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					280 (6×40)			227	32																
CRWM 4-320					320 (7×40)			262	37																
CRWM 4-360					360 (8×40)			297	42																
CRWM 4-400					400 (9×40)			325	46																
CRWM 4-440					440 (10×40)			360	51																
CRWM 4-480					480 (11×40)			388	55																

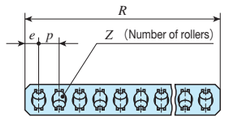
Notes (1) The value shows the total mass per meter of a set of three ways.
(2) The value shows the mass of a roller cage with ten cylindrical rollers.
(3) The value shows the load of a cylindrical roller.

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

Module type	
Shape	CRWM···A 
Size	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 4- 80A*					80 (1×40)			73	10																
CRWM 4-120A*					120 (2×40)			101	14																
CRWM 4-160A*					160 (3×40)			136	19																
CRWM 4-200A*					200 (4×40)			164	23																
CRWM 4-240A*					240 (5×40)			199	28																
CRWM 4-280A*	3.96	6.91	48	12.5	280 (6×40)	0.5	4	227	32	7	5	38	22	20	40	M5	4.3	8	4.1	5	+0.012 0	2	1 230	1 180	392
CRWM 4-320A*					320 (7×40)			262	37																
CRWM 4-360A*					360 (8×40)			297	42																
CRWM 4-400A*					400 (9×40)			325	46																
CRWM 4-440A*					440 (10×40)			360	51																
CRWM 4-480A*					480 (11×40)			388	55																

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

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 linear bushing 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, dimensions 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.

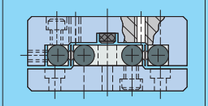
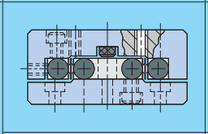
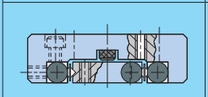
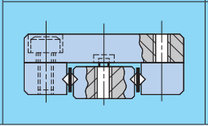
2 Width

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

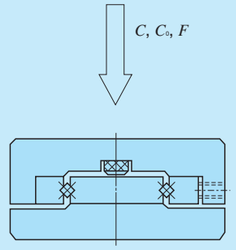


Fig. 1 Direction of load rating

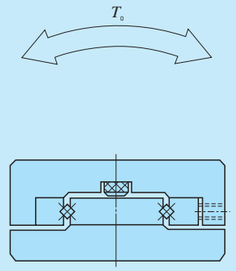


Fig. 2 Direction of static moment rating

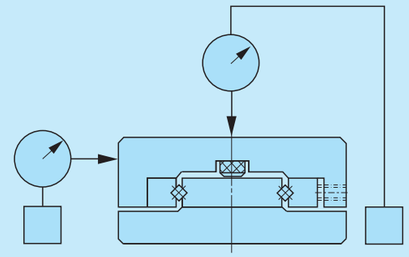
Allowable load

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.

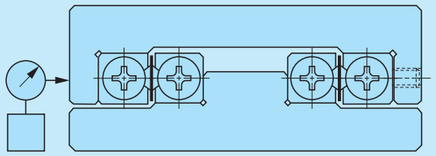


Fig. 3 Example of preload adjustment method

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

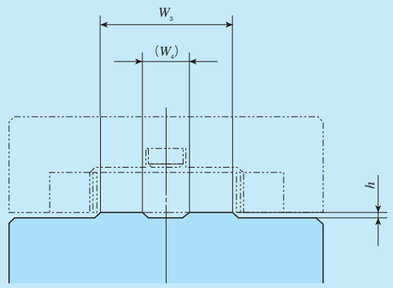
❻ Dowel pin hole of CRWU···R

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



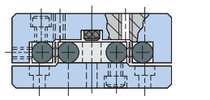
unit: μm

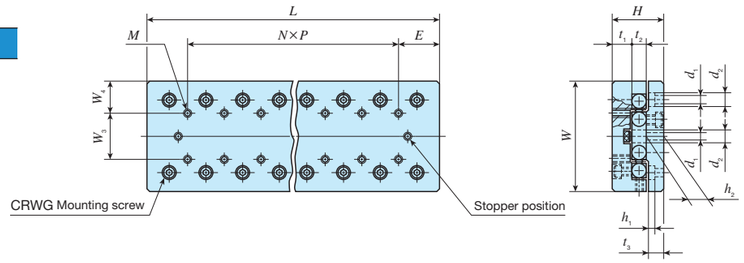
Identification number	h (minimum)	W_3	W_4
CRWU 30 ···R	0.5	13	–
CRWU 40-35R	0.5	18	–
CRWU 40 ···R		13	
CRWU 60 ···R	0.5	26.5	–
CRWU 80 ···R	0.5	38	16
CRWU100 ···R	0.5	42	14
CRWU145 ···R	1.0	68.5	28.5

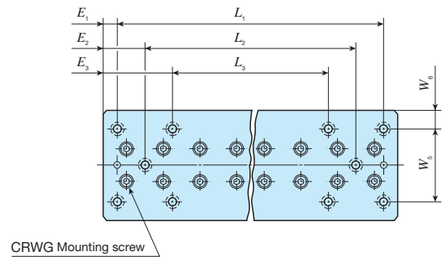
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Anti-Creep Cage Crossed Roller Way Unit

Shape	CRWUG
Size	40 / 60 / 80





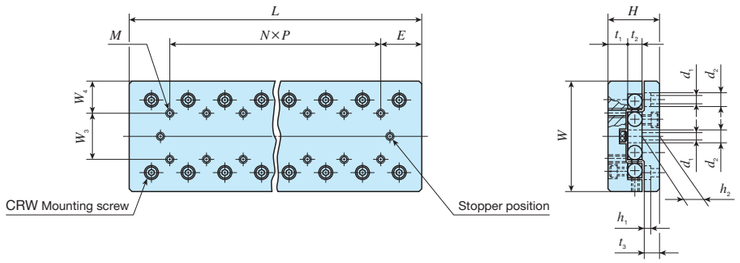


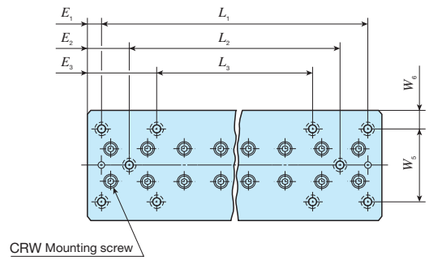
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm									Table mounting dimensions mm					Bed mounting dimensions mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	t_1	t_2	t_3	Maximum stroke 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

IKO Crossed Roller Way Unit

Shape	CRWU
Size	30 40 60 80 100 145



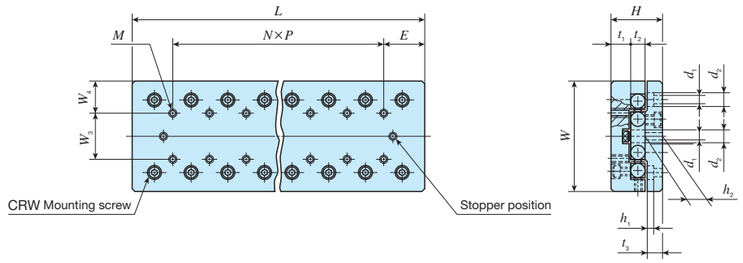


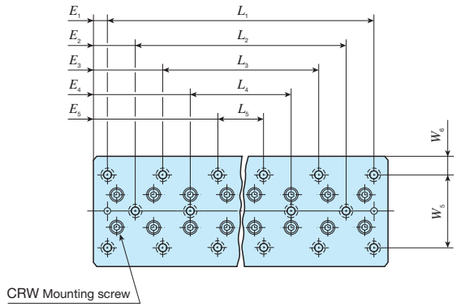
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm									Table mounting dimensions mm						Bed mounting dimensions mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	t_1	t_2	t_3	Maximum stroke 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

IKO Crossed Roller Way Unit

Shape	CRWU
Size	30 40 60 80 100 145



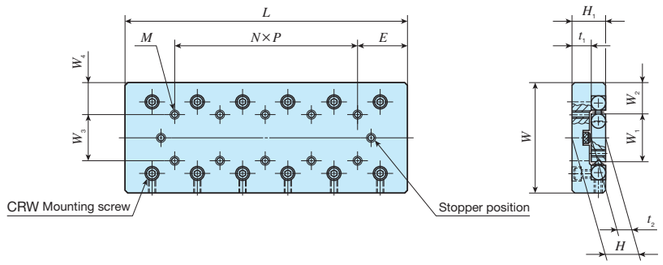


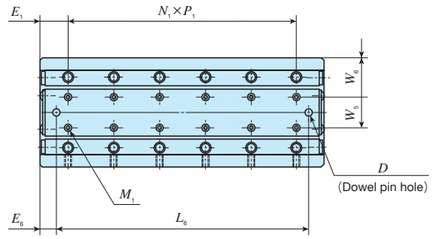
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm									Table mounting dimensions mm					Bed mounting dimensions mm																Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	t_1	t_2	t_3	Maximum 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	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										87 100	145 000	48 400	5 220
CRWU 145-710*	45.0					710				650			5×100					600		500		400										99 200	172 000	57 200	6 170
CRWU 145-810*	51.3					810				750			6×100					700		600		500										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

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

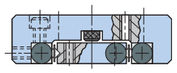


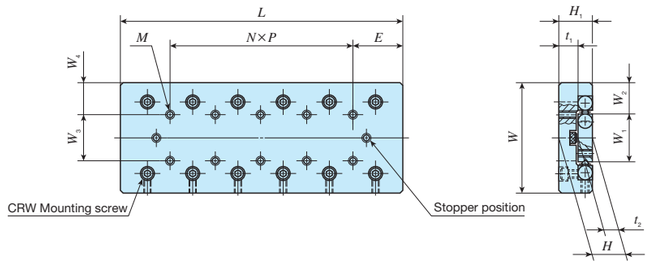


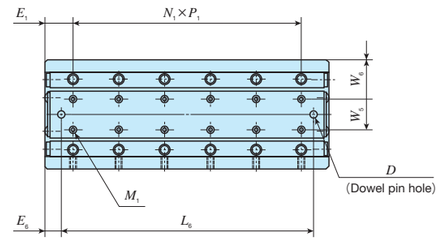
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm						Table mounting dimensions mm							Center way mounting dimensions and tolerances mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	Maximum 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

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







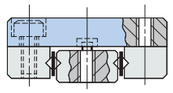
Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm						Table mounting dimensions mm								Center way mounting dimensions and tolerances mm											Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance	L	Maximum 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

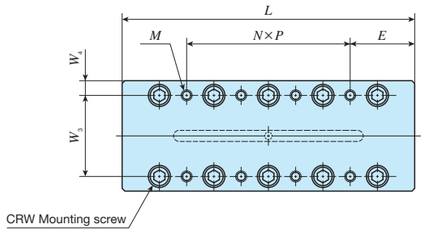
Remark: The identification numbers with * are our semi-standard items.

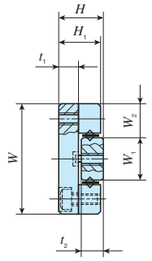
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

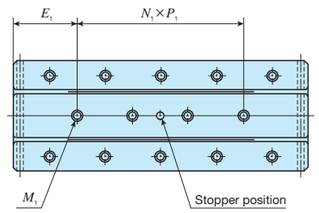
IKO Crossed Roller Way Unit

Shape	CRWU···RS
Size	20 / 30 / 40







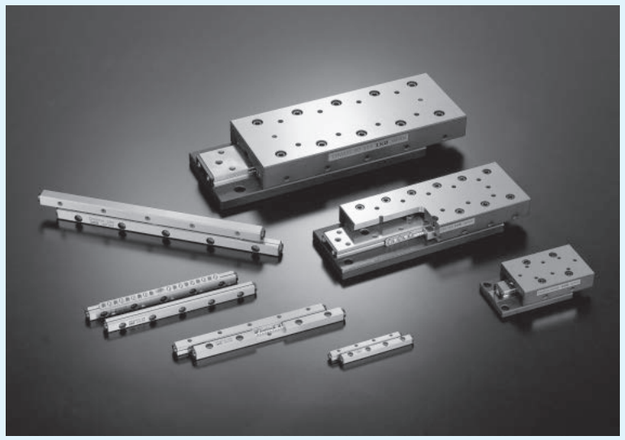


Identification number	Mass (Ref.)	Nominal dimensions and tolerances mm						Table mounting dimensions mm				Center way mounting dimensions mm							Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
	kg	W	Dim. W tolerance	H	Dim. H tolerance	L	Maximum stroke length	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

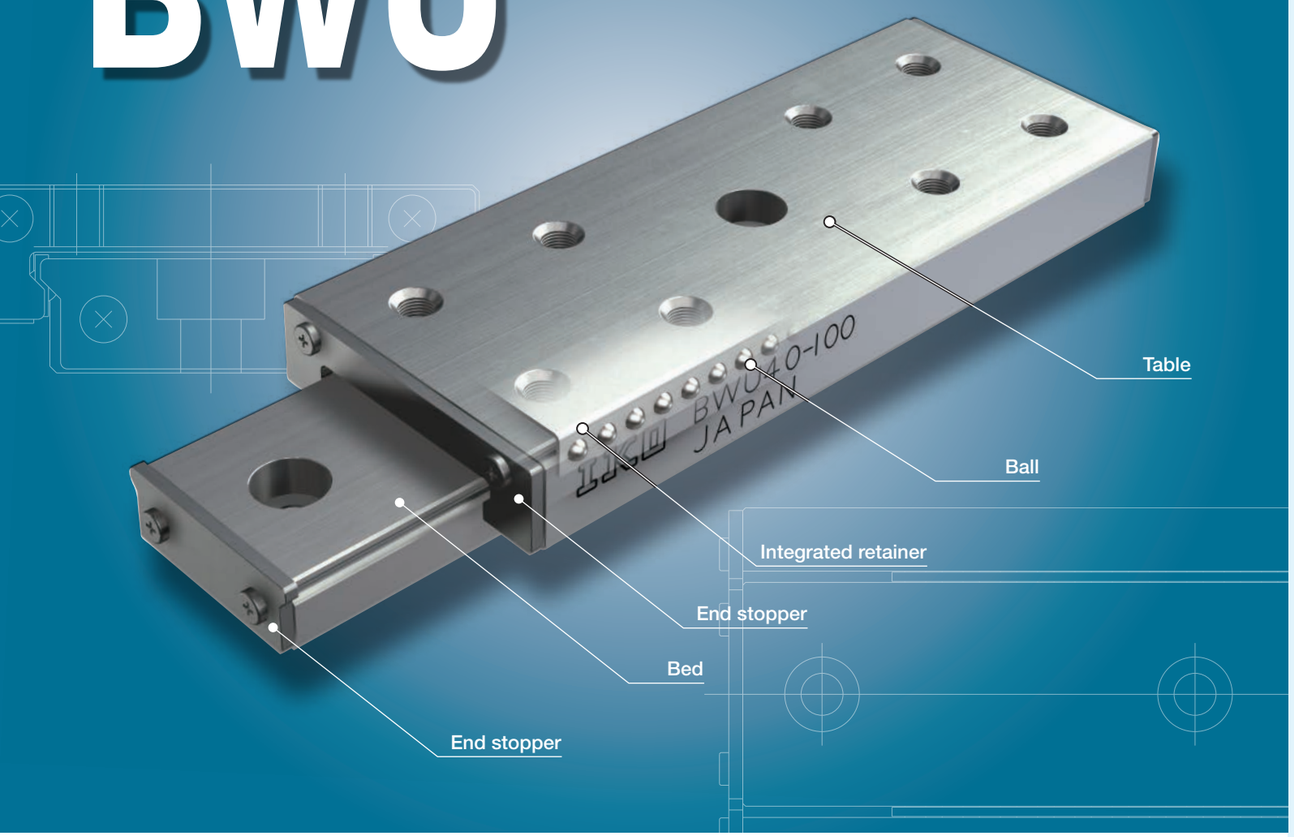
Linear Slide Unit

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.

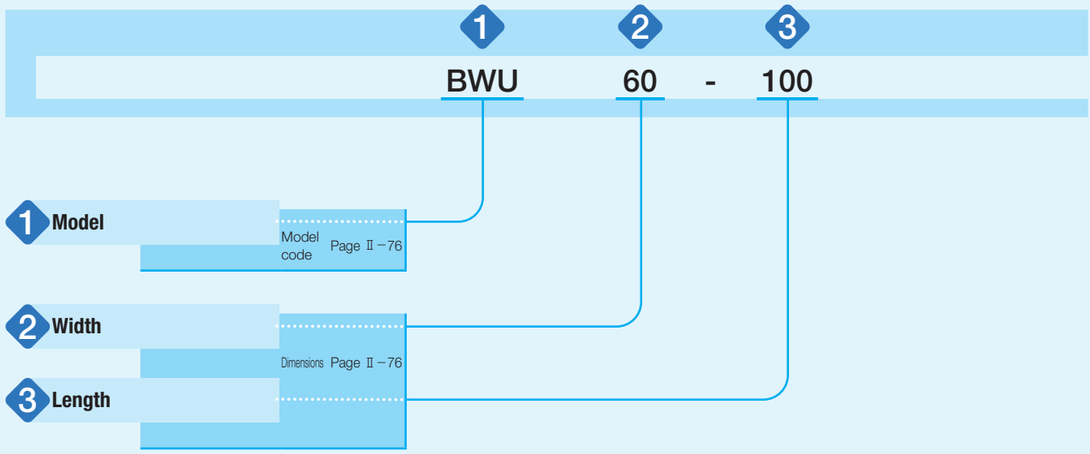
4 Stainless steel selections for excellent corrosion resistance

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

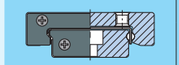
Indicate the table width in mm.
For applicable models, width and length, see Table 1.

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

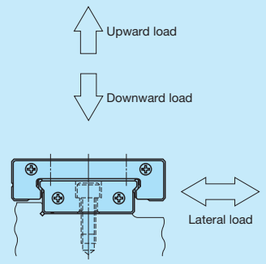
Allowable Load

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

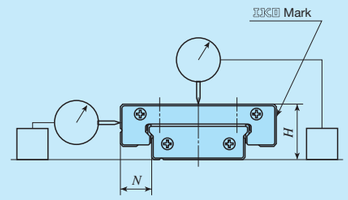


Load rating and load direction / Width	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
6~60	C	C	1.19C	C_0	C_0	1.19C_0

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 to regulate linear motion, 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.

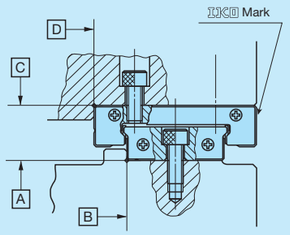
❸ Maximum velocity

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

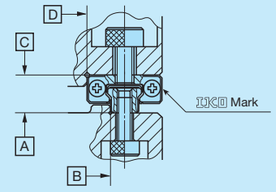
Precaution for Mounting

❶ Reference mounting surface

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



BWU10～BWU60



BWU6, BWU8

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

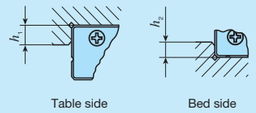


Table side　　Bed side

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.

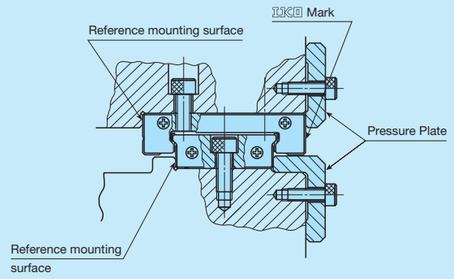


Fig. 2 Mounting example when lateral load is the primary load

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 characteristic of the mating member material.

Table 6 Tightening torque for fixing screw

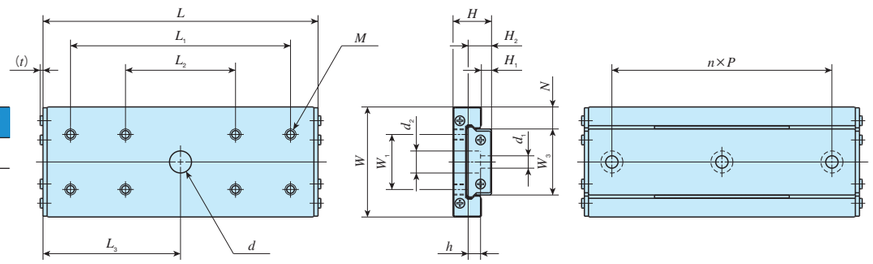
Bolt size	Tightening torque N · m
M1 ×0.25	0.04
M1.4×0.3	0.10
M1.6×0.35	0.15
M2 ×0.4	0.31
M3 ×0.5	1.1
M4 ×0.7	2.5

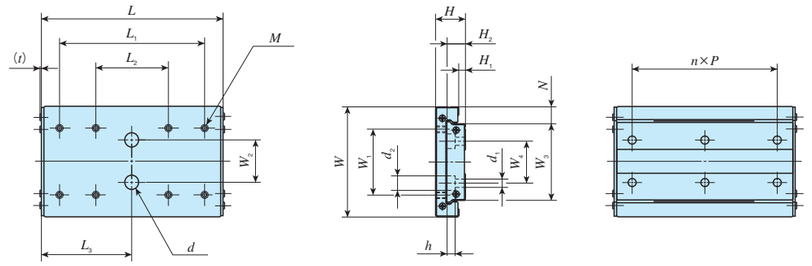
Remark: The tightening torque is calculated based on property division A2-70 of stainless steel hexagon socket head bolt.

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

IKO 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	16		10													10				292	353	118	0.60
BWU 8- 30	5.2					30	20		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	45																			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

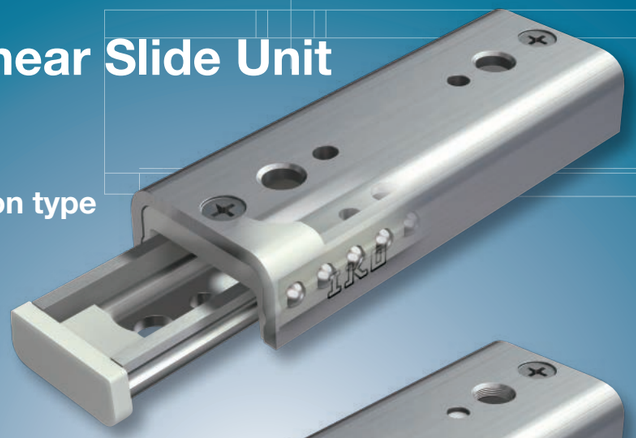
Notes (1) Bed mounting bolts (cross-recessed pan head screw for precision equipment M1.6×5) are appended.
(2) Bed mounting bolts (cross-recessed pan head screw for precision equipment M2×4) are appended.

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

Precision Linear Slide Unit

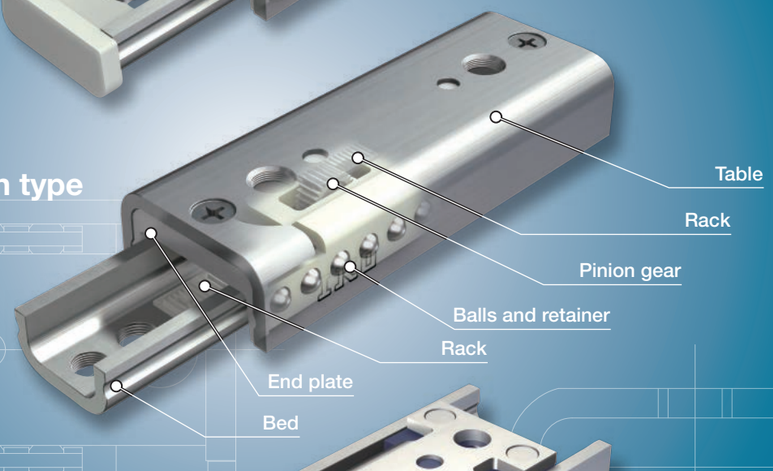
Limited linear motion type

BSP



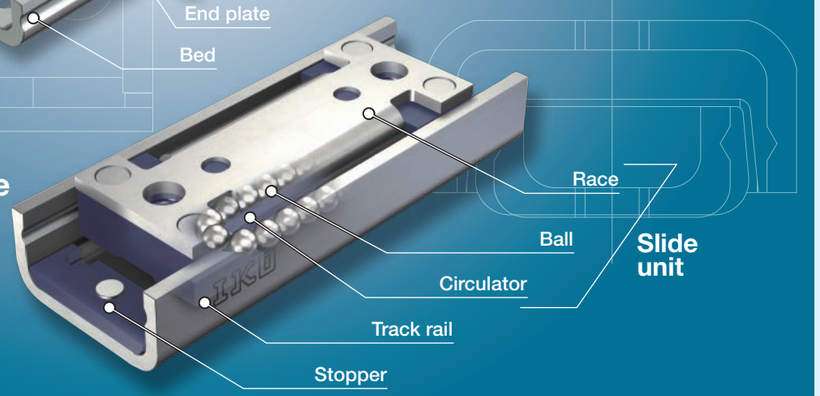
Built-in rack & pinion type

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** — Dimensions Page Ⅱ－85
- 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

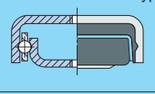
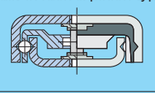
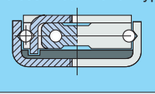
For applicable models and width, see Table 1.

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

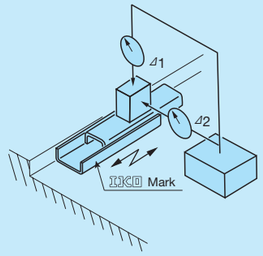
Standard	: No symbol	For details of clearance amount, see Table 2. Typically, apply the standard clearance for use in small frictional resistance and the clearance adjusted to the clearance code T_1 for applications requiring high linear motion accuracy.
T_1Clearance	: T_1	

Table 2 Clearance of raceways unit: μm

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

Accuracy

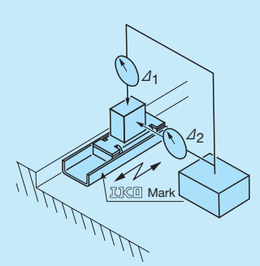
Table 3 Running accuracy for BSP and BSPG



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 packed with special grease applied to the raceway and rack and pinion. 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, 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.

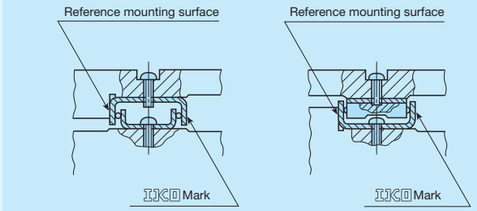
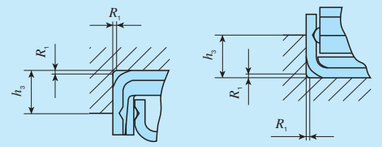


Fig. 1 Reference mounting surface

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.

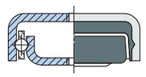
Table 6 Tightening torque for fixing screw

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

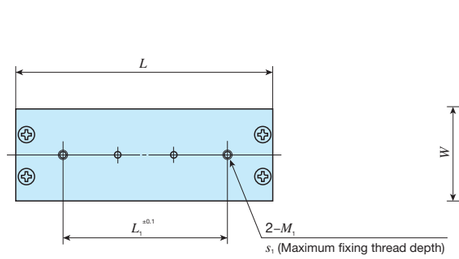
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

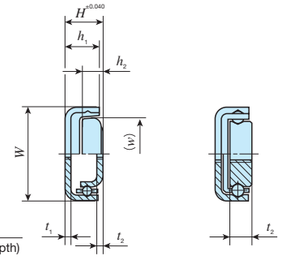
Limited linear motion type

Shape: **BSP**

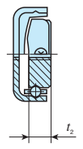


Size: 7 | 10 | 15 | 20 | 25

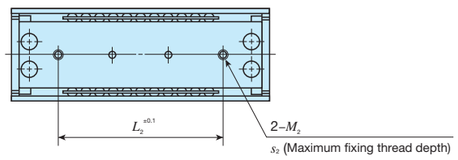




BSP 7



BSP 10



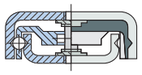
Identification number	Mass (Ref.) g	Nominal dimensions mm W	H	L	Maximum stroke length	Table mounting dimensions mm L_1	M_1	Maximum fixing thread depth s_1	h_1	t_1	Bed mounting dimensions mm w	L_2	M_2	Maximum fixing thread depth s_2	h_2	t_2	Basic dynamic load rating C N	Basic static load rating C_0 N
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.

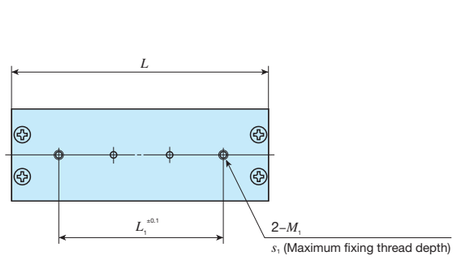
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1mm=0.03937inch

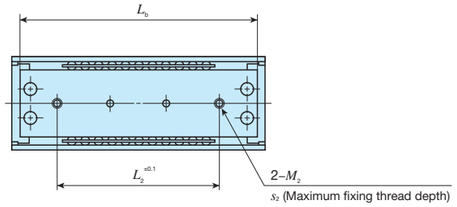
Built-in rack & pinion type

Shape: **BSPG**



Size: 12 | 15 | 20 | 25



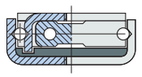


Identification number	Mass (Ref.)	Nominal dimensions mm				Table mounting dimensions mm						Bed mounting dimensions mm							Basic dynamic load rating	Basic static load rating
		W	H	L	Maximum stroke length	L_1	M_1	Maximum fixing thread depth s_1	h_1		t_1	L_b	w	L_2	M_2	Maximum fixing thread depth s_2	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

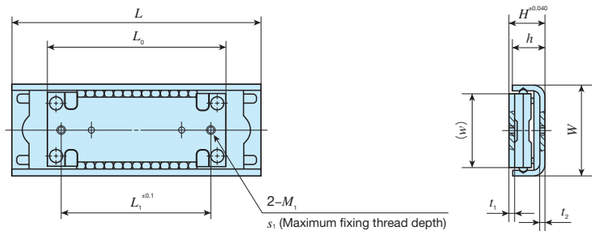
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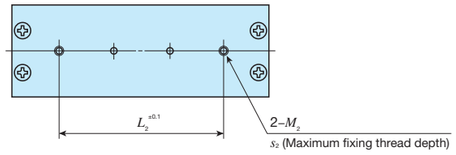
Endless linear motion type

Shape: **BSR**



Size: 12 | 15 | 20 | 25





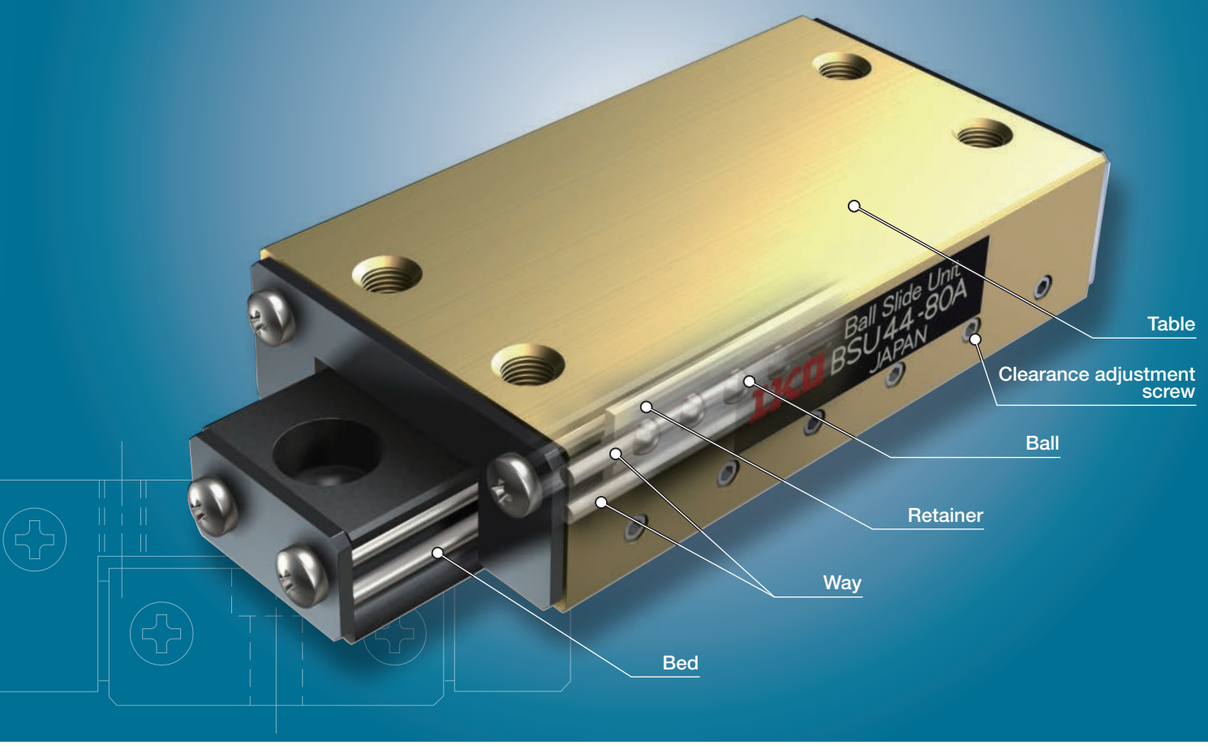
Identification number	Mass (Ref.) g	Nominal dimensions mm W	H	L	Maximum stroke length	Slide Unit mm w	L_0	L_1	Mounting dimensions M_1	Maximum fixing thread depth s_1	t_1	Track rail mounting dimensions mm L_2	M_2	Maximum fixing thread depth s_2	h	t_2	Basic dynamic load rating C N	Basic static load rating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

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.

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.

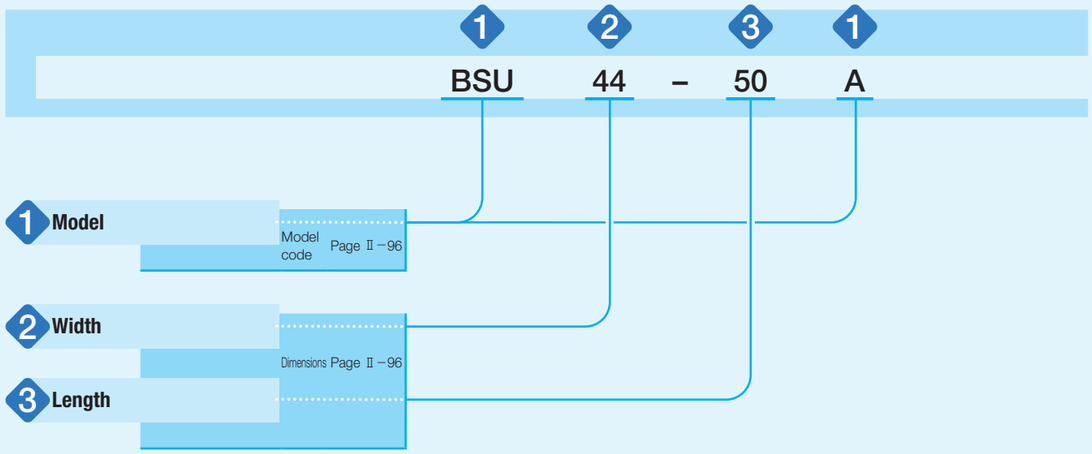
Excellent corrosion resistance

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

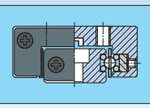
Indicate the table width in mm.
For applicable models, width and length, see Table 1.

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.

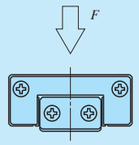


Fig.1 Direction of allowable load

Accuracy

❶ Running accuracy

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

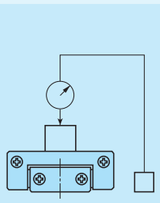


Fig.2 Parallelism at the table center

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

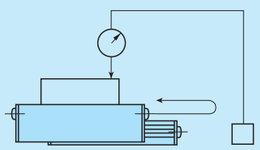


Fig.3 Deviation at the table center

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

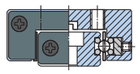
Typical tightening torque for mounting of the BSU···A series to the steel mating member material is indicated in Table 2. If the mating member material is cast iron or aluminum alloy, reduce the tightening torque depending on the strength characteristic of the mating member material.

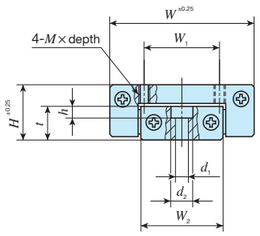
Table 2 Tightening torque for fixing screw

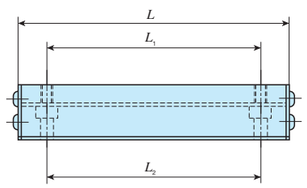
Bolt size	Tightening torque N · m
M5×0.8	5.0

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



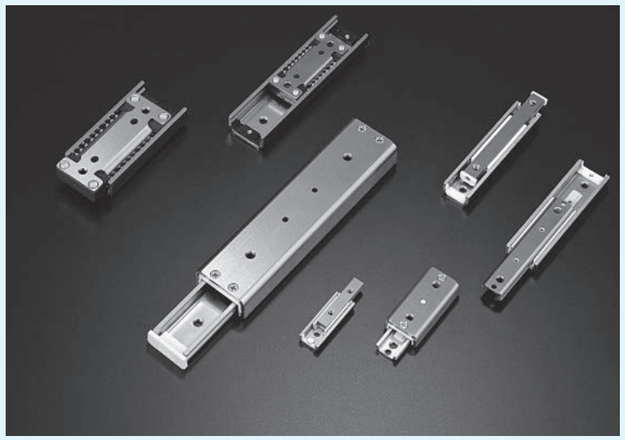


Identification number	Mass (Ref.)	Nominal dimensions mm				Table mounting dimensions mm			Bed mounting dimensions mm						Allowable load F
	g	H	W	L	Stroke length	W_1	L_1	M×depth	W_2	t	L_2	d_1	d_2	h	N
BSU 44- 50 A	110	20	44	50	25	20	35	M5×7	21.8	12.3	35	5.3	10	5.3	98.1
BSU 44- 80 A	175			80	50		65				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
Block Type Linear Ball Spline
Stroke Ball Spline



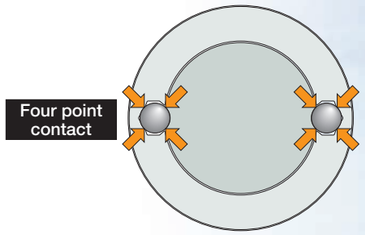
Excellent features of compact linear structure by four-points contact in ball spline realized by a simple two-row raceways

IKO Linear Ball Spline is a linear motion rolling guide in which an external cylinder or slide unit 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 in a 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.

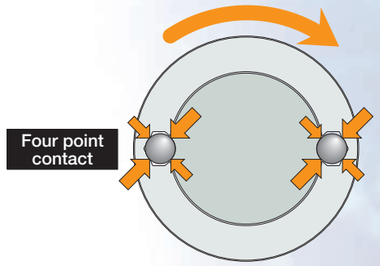


For the load from all directions it gives a good balance and high rigidity!



Allows high accuracy and accurate positioning

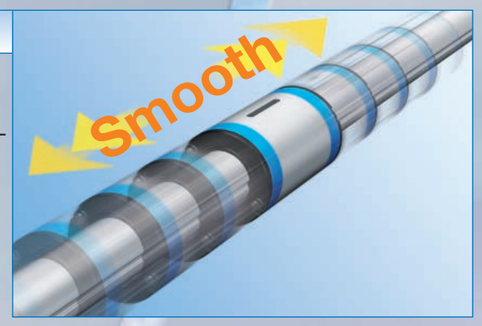
Preload removes the clearance along the rotation direction, allowing accurate positioning along the rotation direction.



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.



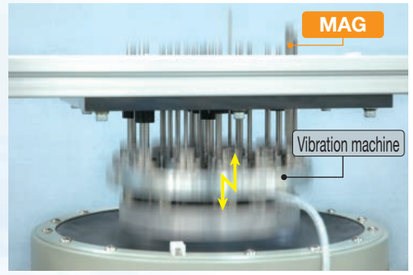
Both high speed durability performance and maintenance free performance are achieved

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.

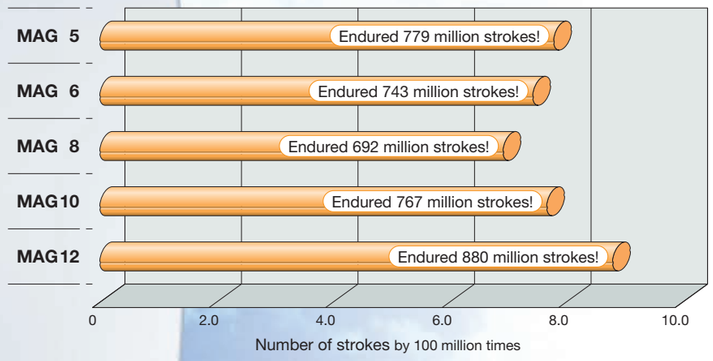
Durability test assuming the chip mounter

《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!!

Wide variation

A wide variety of models and sizes, such as super miniature size of 2 mm spline shaft diameter, block types and limited stroke types, is provided for your selection to meet each requirement.

Series		Model	Size	Spline shaft diameter Min ～ Max
C-Lube Linear Ball Spline MAG	MAG	6 models	6 sizes	4 ～ 12 mm
Linear Ball Spline G	LSAG	8 models	14 sizes	2 ～ 50 mm
Block Type Linear Ball Spline	LSB	3 models	7 sizes	6 ～ 25 mm
Stroke Ball Spline	LS	2 models	3 sizes	4 ～ 6 mm

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

Extreme interchangeable system

Interchangeable specification

Interchangeable specification has realized the unparalleled high interchangeability in the background of unique high processing technology, by severely managing the dimensions of external cylinder, slide unit and spline shaft. This feature allows independent handling of external cylinder or slide unit and spline shaft, thus allowing you to select the free combination and to order any products, for any volume and at any necessary time.

Requirements of ;

- Wish to improve the rigidity and life of machines
- Wish to improve the accuracy of machines
- Wish to replace the external cylinders or slide units immediately
- The number of external cylinders or slide units is in short
- Wish to replace the spline shaft immediately
- The length of spline shaft is not sufficient
- Wish to store only the external cylinders or slide units in stock for emergency

Help

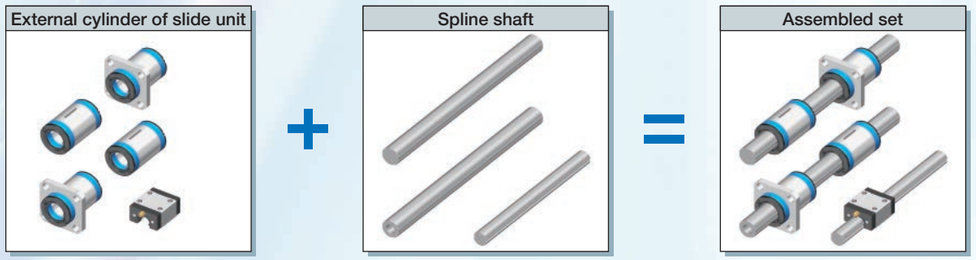
Interchangeable specification realizes ;

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

Sorted out

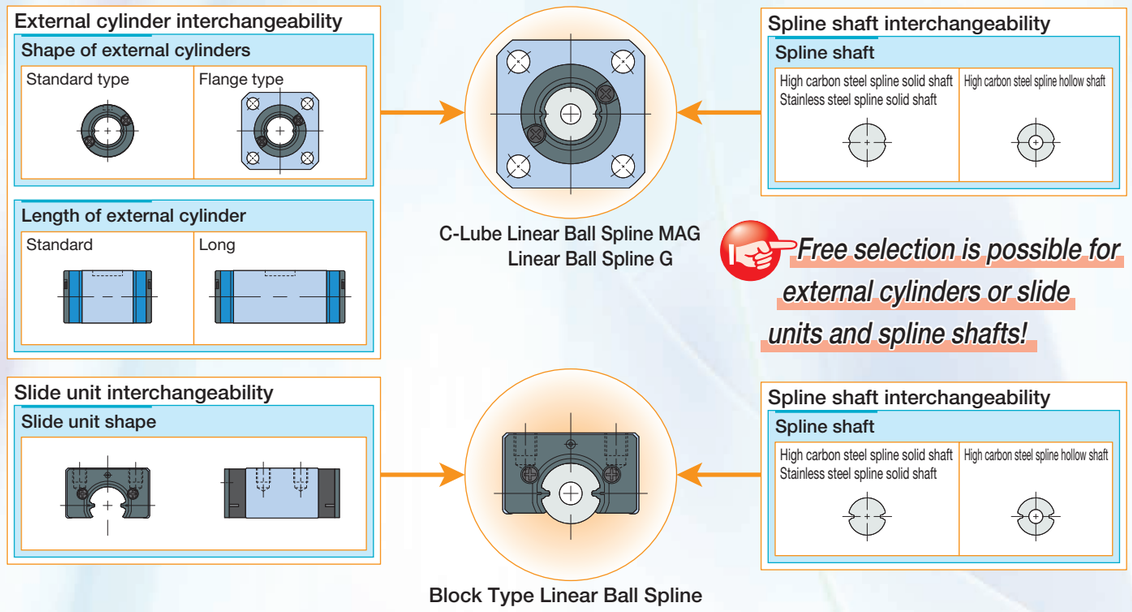
Select the products as many as you wish.

External cylinder of slide unit + Spline shaft = Assembled set



External cylinder interchangeability / unit interchangeability

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



Free selection is possible for external cylinders or slide units and spline shafts!

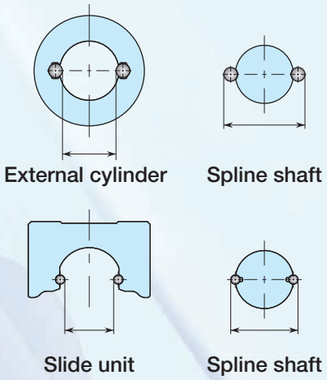
Accuracy interchangeability

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 high accuracy dimensions management utilizing the simple structure achieved the interchangeability of preloaded external cylinders and slide units.
It supports the applications requiring the rigidity of one higher rank.

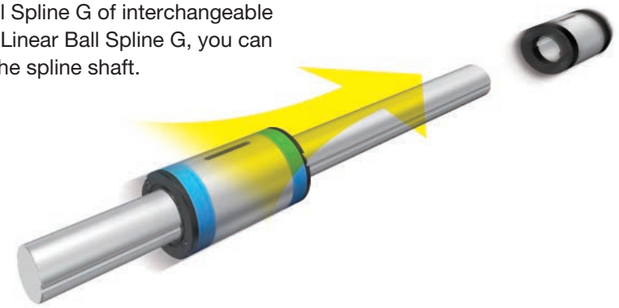




It allows the rigidity improvement of units without design changes!

Maintenance free is achieved only by replacing the external cylinder!

By exchanging the external cylinder of Linear Ball Spline G 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



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** — Model code Page Ⅱ－109

4 **Size** — Dimensions Page Ⅱ－109

5 **Number of external cylinders** — Part code Page Ⅱ－109

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, 40, 50

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	40	50
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	–	○	○
40	–	○	○
50	–	○	○

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

—Accuracy Class—

8 Accuracy class

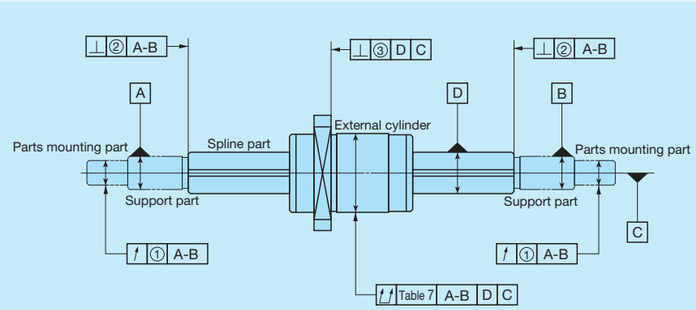
Ordinary	: No symbol	For interchangeable specification products, assemble an external cylinder and a spline shaft of the same accuracy class.
High	: H	For applicable accuracy class, see Table 4.
Precision	: P	For details of accuracy class, see Table 5, Table 6, and Table 7.

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	○	○	○
40	○	○	○
50	○	○	○

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
40	62	15	15	39	16	11	46	19	13
50	62	15	15	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.

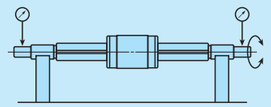
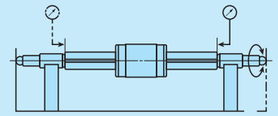
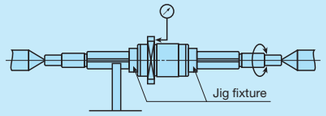
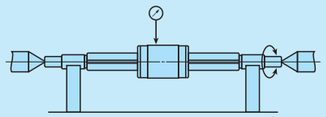
***Table 7** Allowable values of total radial runout of spline shaft axial line*

unit: μm

Overall length of spline shaft mm		Size and accuracy class								
		Size								
		2, 3, 4, 5, 6, 8			10, 12			15, 20		
		Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
–	200	72	46	26	59	36	20	56	34	18
200	315	133	89	57	83	54	32	71	45	25
315	400	185	126	82	103	68	41	83	53	31
400	500	236	163	108	123	82	51	95	62	38
500	630	–	–	–	151	102	65	112	75	46
630	800	–	–	–	190	130	85	137	92	58
800	1 000	–	–	–	–	–	–	170	115	75
1 000	1 250	–	–	–	–	–	–	–	–	–

Overall length of spline shaft mm		Size and accuracy class					
		Size					
		25, 30			40, 50		
		Ordinary (No symbol)	High (H)	Precision (P)	Ordinary (No symbol)	High (H)	Precision (P)
–	200	53	32	18	53	32	16
200	315	58	39	21	58	36	19
315	400	70	44	25	63	39	21
400	500	78	50	29	68	43	24
500	630	88	57	34	74	47	27
630	800	103	68	42	84	54	32
800	1 000	124	83	52	97	63	38
1 000	1 250	151	102	65	114	76	47

***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. Performance and accuracy of "S1" and "S2" are the same. 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	40	50
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	40	50
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	–	–	–	○	○	○	○	○	○	–	–	–	–	–

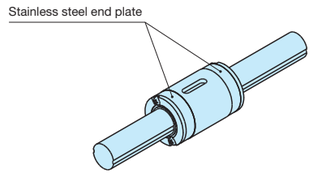
Notes (1) Applicable to LSAG series.
(2) Applicable to solid shaft.

Table 10 Combination of supplemental codes

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

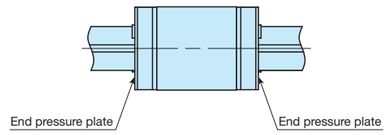
Remarks 1. The combination of "-" shown in the table is not available.
2. Contact IKO for the combination of the interchangeable specification marked with ●.
3. When using multiple types for combination, please indicate by arranging the symbols in alphabetical order.

Stainless steel end plate /BS



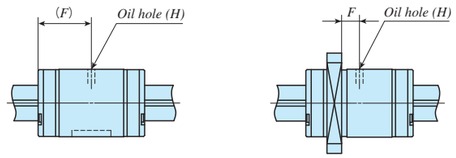
The standard synthetic resin end plates are replaced with stainless steel end plates. The total length of the external cylinder remains unchanged.

No seal /N



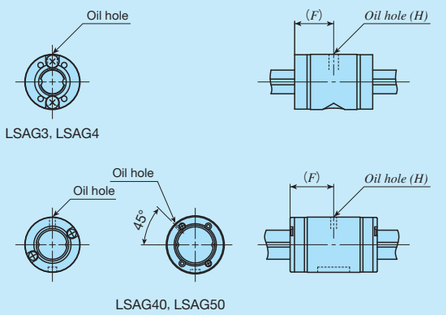
Seals at both ends of the external cylinder can be replaced with end pressure plates, which do not come in contact with the spline shaft, to reduce frictional resistance.
This specification is not effective for dust protection.

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)

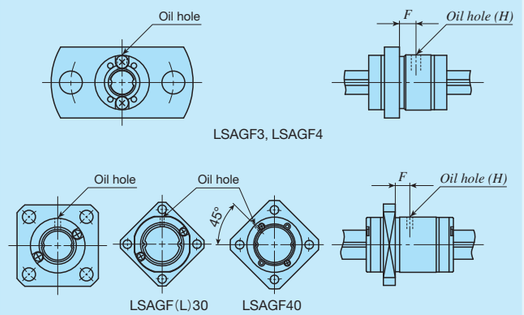


unit: mm

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	
LSAG40	50		–	–	–
LSAG50			–	–	–

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)



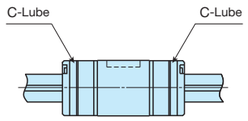
unit: mm

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	
LSAGF40	23.4		–	–	–

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

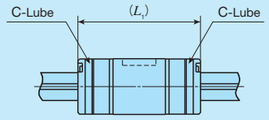
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

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)

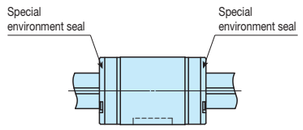


unit: mm

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

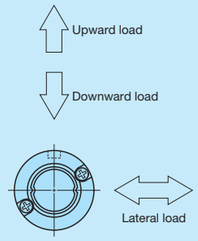
The type of pre-packed grease can be changed by the supplemental code.

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.

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 13.

Table 13 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
15~50	C	C	1.13C	C_0	C_0	1.19C_0

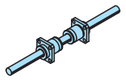
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

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)

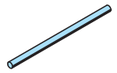
Example of identification number indication

MAGF 10 C1 T1 H S○ /N

- C1 → Only C1 can be specified.
- S○ → Please specify S1 or S2.

Order quantity
2 pieces

Single spline shaft



(When 1 unit is needed)

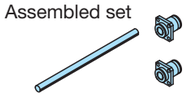
Example of identification number indication

LSAG 10 R200 H S○

- 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

- S○ → Please specify S1 or S2.

Order quantity
1 set

Moment of Inertia of Sectional Area and Section Coefficient of Spline Shaft

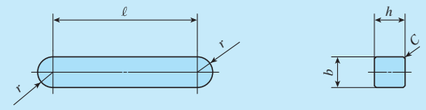
Table 14 Moment of inertia of sectional area and section coefficient of spline shaft

Size	Moment of inertia of sectional area mm⁴		Section coefficient mm³	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
2	0.60	–	0.65	–
3	3.6	–	2.5	–
4	12	12	6	6
5	29	29	12	12
6	61	61	21	21
8	190	190	49	49
10	470	460	95	94
12	990	960	170	160
15	1 590	–	240	–
20	5 110	–	570	–
25	12 100	–	1 080	–
30	25 400	–	1 890	–
40	91 000	–	4 930	–
50	223 000	–	9 660	–

Dimensions of 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	
40	10		8		44.3	5	0.4 ~0.6
50	15	+0.036 +0.018	10		34.3	7.5	

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 [SHOWA SHELL SEKIYU 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.
Since the Size 2 series do not have an oil hole, apply grease directly to the raceway part of the spline shaft for re-greasing.

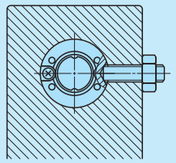
Dust Protection

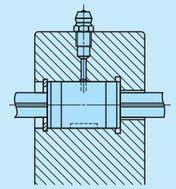
The external cylinders of MAG and LSAG series are equipped with special rubber seals as standard for dust protection. However, if large amount of contaminant or dust are floating, or if large particles of foreign substances such as chips or sand may adhere to the spline shaft, it is recommended to attach 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.


External stop ring for size 2, 3 and 4


Mounting example for standard type

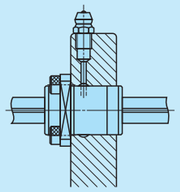

Mounting example for flange type

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
The spline shaft is hardened by induction hardening. When additional machining on the shaft end is needed, make sure that the maximum diameter of the shaft end machining part does not exceed the dimension d_1 in the dimension table.
Spline shafts with special shaft end shapes can be prepared upon request. 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.)

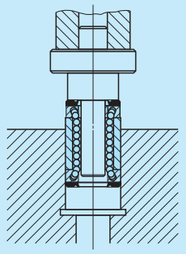


Fig. 3 Press-fitting of external cylinder

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

IKO C-Lube Linear Ball Spline MAG

Standard type

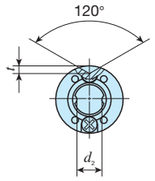
Shape: **MAG · LSAG**



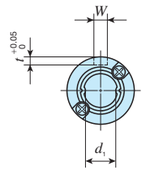
Size: 2 3 4 5 6 8 10 / 12 15 20 25 30 40 50

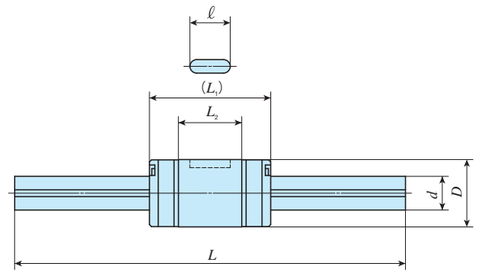


MAG(L)T
Hollow shaft dimension for LSAG(L)T



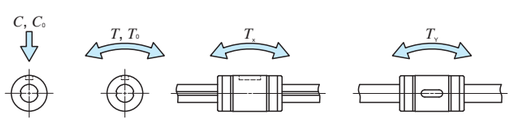
MAG(L)(T)4
LSAG 2
LSAG 3
LSAG(T) 4





Identification number		Interchangeable	Mass (Ref.) g		External cylinder dimensions and tolerances mm								Spline shaft dimensions and tolerances mm					Basic dynamic load rating (4)	Basic static load rating (4)	Dynamic torque rating (4)	Static torque rating (4)	Static moment rating (4)	
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(2)	d_2	L(3)	Maximum length	C N	C_0 N	T N · m	T_0 N · m	T_x N · m	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.
(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

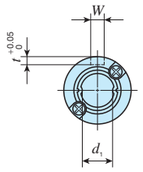
Standard type

Shape: **MAG · LSAG**

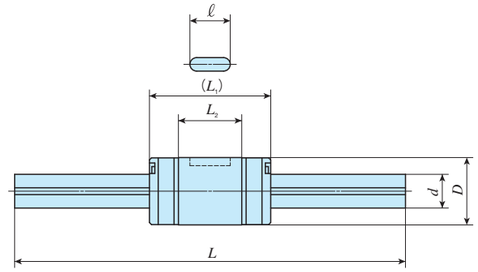


Size: 2 3 4 5 6 8 10 / 12 15 20 25 30 40 50



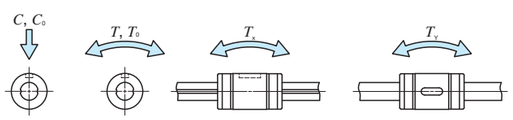


MAGT
Hollow shaft dimension for LSAG(L)T



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
–	LSAGT 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	–	300 400 500 600	1 000	6 600	9 040	66.0	90.4	94.0	112
–	LSAGL 20	○	198				71	54									–			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	–	300 400 500 600 800	1 200	11 200	14 300	139	178	48.6	58.0
–	LSAGL 25	○	336				84	63.2									–			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	–	400 500 600 700 1 100	1 200	15 400	19 400	231	292	127	151
–	LSAGL 30	○	634				98	71									–			21 300	31 600	320	474	650	774
–	LSAG 40	–	760	808	60	0 -0.019	100	70.8	10	+0.022 0	4.5	55	37.2		0 -0.025	33.5	–	400 500 600 700 1 100	1 200	21 300	31 600	426	632	92.8	111
–	LSAG 50	–	1 140	1 320	75	0 -0.019	100	66.4	15	+0.027 0	5	50	46.6		0 -0.025	42.0	–	400 500 600 700 1 100	1 200	28 300	36 100	707	904	551	656
																								1 229	273
																								1 190	1 420
																								147	176
																								874	1 040
																								364	434
																								1 900	2 260
																								364	434
																								1 940	2 310
																								389	464
																								2 300	2 740

Notes (1) d_1 represents the maximum diameter for end machining.
(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, 40, 50

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

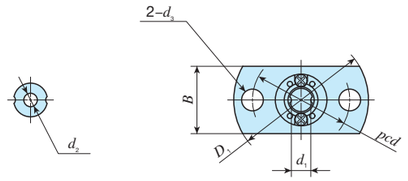
IKO C-Lube Linear Ball Spline MAG

Flange type

Shape: **MAGF · LSAGF**

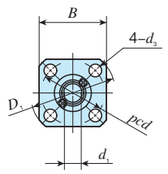


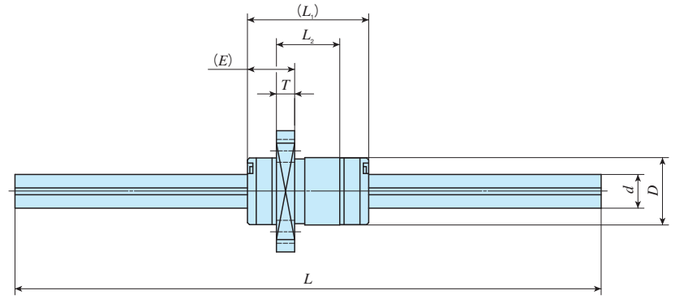
Size: 2 3 4 5 6 8 10 / 12 15 20 25 30 40



MAGFT
Hollow shaft dimension for LSAGF(L)T

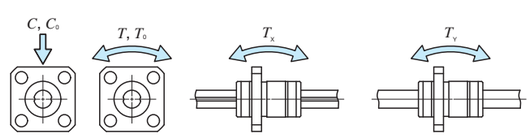
LSAGF 2
LSAGF 3
LSAGF(T) 4





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.
(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

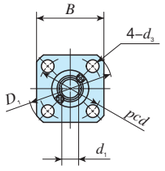
Shape: **MAGF · LSAGF**

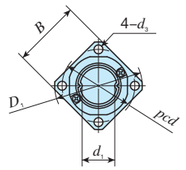


Size: 2 3 4 5 6 8 10 / 12 15 20 25 30 40

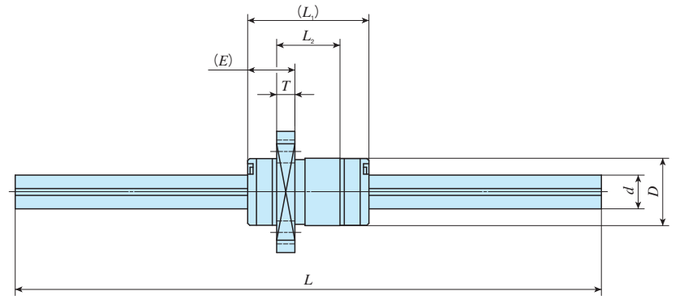


MAGFT
Hollow shaft dimension for LSAGF(L)T



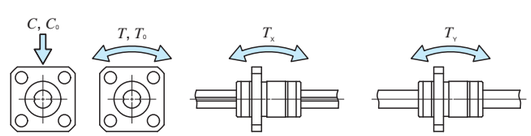


LSAGF(L) 30
LSAGF 40



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
–	LSAGF 40	–	962	808	60	0 -0.019	100	70.8	93	73	26.6	12	73	9	37.2	0 -0.025	33.5	–	400 500 600 700 1 100	1 200	21 300	31 600	426	632	364 / 1 940	434 / 2 310

Notes (1) d_1 represents the maximum diameter for end machining.
(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
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, 40

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

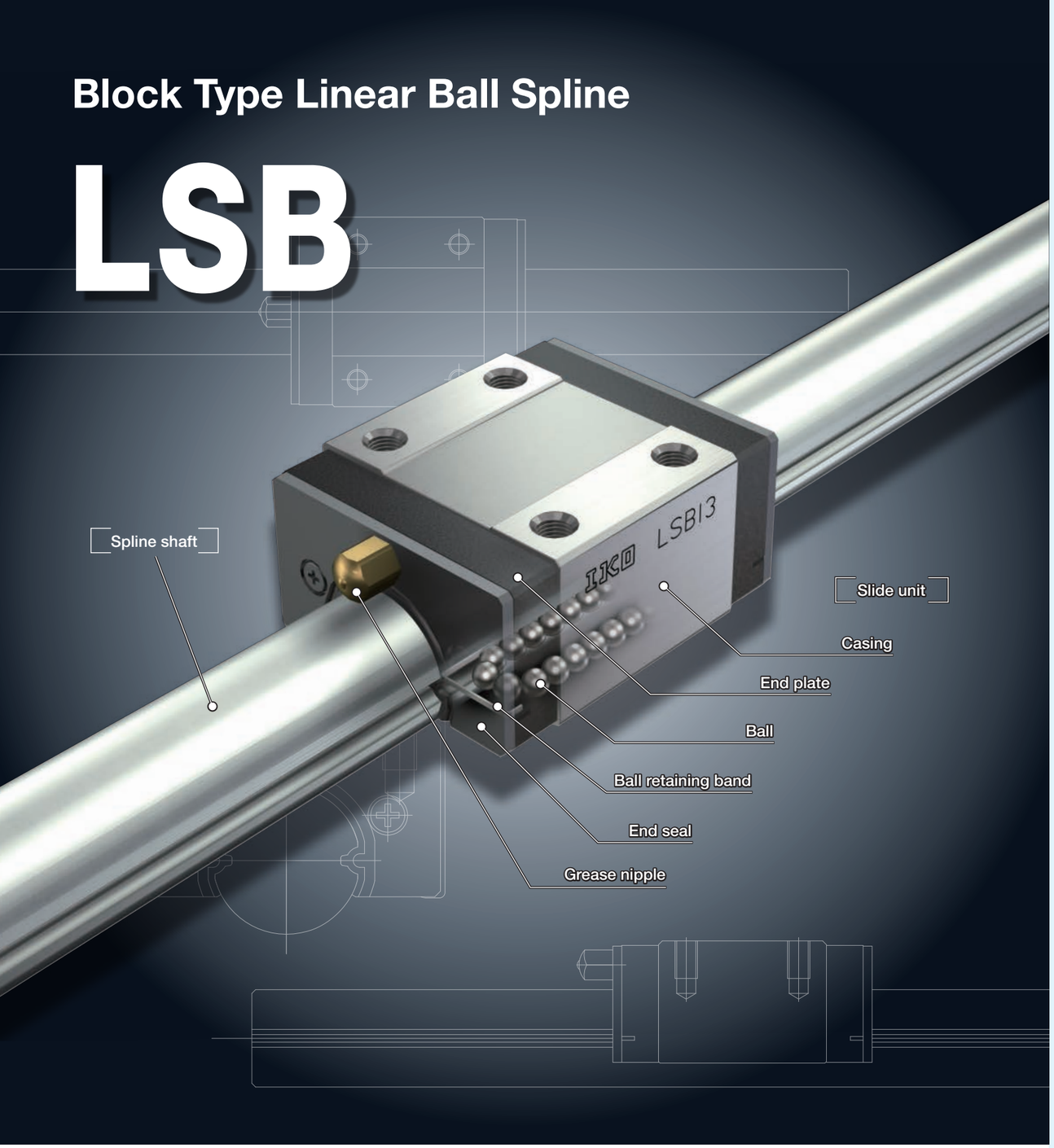
No symbol	Non-interchangeable specification
S1	S1 specification
S2	S2 specification

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

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

Block Type Linear Ball Spline

LSB



Points

● Block type for easy mounting

1 The screw holes for mounting are provided on the slide unit, so that it can be easily mounted to the machine or device using bolts.

● Stainless steel selections for excellent corrosion resistance

2 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 specification of LSB series is indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a part code, a material code, a preload symbol, a classification symbol, an interchangeable code, and a supplemental code for each specification to apply.

Interchangeable specification	1	2	3	4	5	6	7	8	9	10
Single slide unit	LSB		10	C1		SL	T_1		S1	/U
Single spline shaft	LSB		10		R200	SL		H	S1	
Assembled set	LSB		10	C1	R200	SL	T_1	H	S1	/U

1 **Model** — Model code Page Ⅱ－133

2 **Spline shaft shape** — Model code Page Ⅱ－133

3 **Size** — Dimensions Page Ⅱ－133

4 **Number of slide units** — Part code Page Ⅱ－133

5 **Spline shaft length** — Part code Page Ⅱ－133

6 **Material type** — Material code Page Ⅱ－133

7 **Preload amount** — Preload symbol Page Ⅱ－134

8 **Accuracy class** — Classification symbol Page Ⅱ－134

9 **Interchangeable** — Interchangeable code Page Ⅱ－136

10 **Special specification** — Supplemental code Page Ⅱ－136

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

Identification Number and Specification –Model · Spline Shaft Shape · Size · Slide Unit · Number of Slide Unit · Spline Shaft Length · Material Type · Preload Amount · Accuracy Class–

1 Model

Block Type Linear Ball Spline (LSB series) : LSB

For applicable models and sizes, see Table 1.

2 Spline shaft shape

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

3 Size

6, 8, 10, 13, 16, 20, 25 — For applicable models and sizes, see Table 1.

4 Number of slide units

: C○

For an assembled set, indicates the number of slide units assembled on a spline shaft. For a single slide unit, only "C1" is specified.

5 Spline shaft length

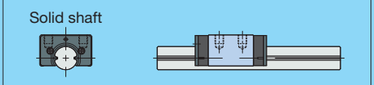
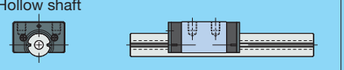
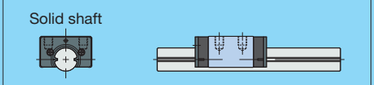
: R○

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

6 Material type

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

Table 1 Models and sizes of LSB series

Material	Shape	Model	Size 6	8	10	13	16	20	25
High carbon steel made	Solid shaft 	LSB	○(1)	○(1)	○(1)	○	○	○	○
	Hollow shaft 	LSBT	○(1)	○(1)	○(1)	○	○	○	○
Stainless steel made	Solid shaft 	LSB···SL	○	○	○	–	–	–	–

Note (1) Slide units of size 6, 8, and 10 series are stainless steel-made only. When high carbon steel-made is specified for an assembled set, only the spline shaft will be high carbon steel-made.
Remark: The LSB series are all interchangeable specification. Non-interchangeable specification is not available.

7 Preload amount

Standard	: No symbol	Specify this item for an assembled set or a single slide unit.
Light preload	: T1	For details of the preload amount, see Table 2. For applicable preload types, see Table 3.

Table 2 Preload amount

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

Note (1) 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) Standard (No symbol)	Light preload (T_1)
6	○	–
8	○	○
10	○	○
13	○	○
16	○	○
20	○	○
25	○	○

8 Accuracy class

Ordinary	: No symbol	Specify this item for an assembled set or a single spline shaft.
High	: H	For details of accuracy class, see Fig. 1, Table 4 and Table 5.

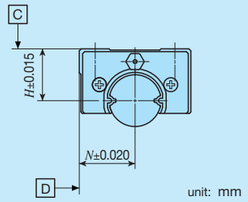


Fig. 1 Accuracy

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

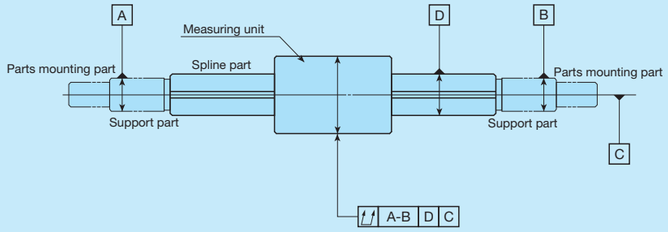
Table 4 Twist of grooves with respect to effective length of the spline part

unit: μm

Accuracy class	Ordinary (No symbol)	High (H)
Allowable value	33	13

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

Table 5 Allowable values of total radial runout of spline shaft axial line

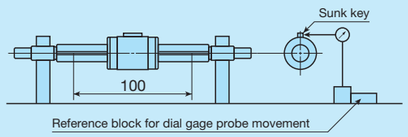
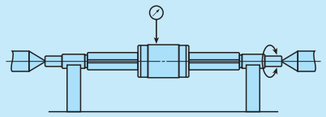


unit: μm

Overall length of spline shaft mm		Size 6, 8 Ordinary (No symbol)	6, 8 High (H)	10, 13 Ordinary (No symbol)	10, 13 High (H)	16, 20 Ordinary (No symbol)	16, 20 High (H)	25 Ordinary (No symbol)	25 High (H)
–	200	72	46	59	36	56	34	53	32
200	315	133	89	83	54	71	45	58	39
315	400	185	126	103	68	83	53	70	44
400	500	236	163	123	82	95	62	78	50
500	630	–	–	151	102	112	75	88	57
630	800	–	–	190	130	137	92	103	68
800	1 000	–	–	–	–	170	115	124	83
1 000	1 250	–	–	–	–	–	–	151	102

Remark: Applied to all models of the same size.

Table 6 Measuring methods of accuracy

Item	Measuring method	Illustration of measuring method
Twist of grooves with respect to effective length of the spline part (see Table 4)	While supporting the spline shaft fixed, apply a unidirectional torsion moment load to the 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 5)	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 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.	

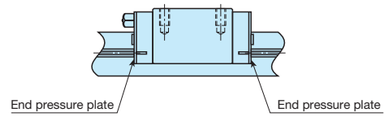
9 Interchangeable	S1 specification S2 specification	: S1 : S2	Assemble a spline shaft and a slide unit with the same interchangeable code. Performance and accuracy of "S1" and "S2" are the same.
10 Special specification	/N, /U		For applicable special specifications, see Table 7.

Table 7 Application of special specifications (Single slide unit and assembled set)

Special specification	Supplemental code	Size 6	8	10	13	16	20	25
No seal	/N	○	○	○	○	○	○	○
Under seal	/U	○	○	○	○	○	○	○

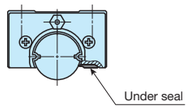
Remark: The combination of no seal (supplemental code/N) and under seal (supplemental code/U) is not available.

No seal /N



End seals at both ends of the slide unit 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.

Under seal /U



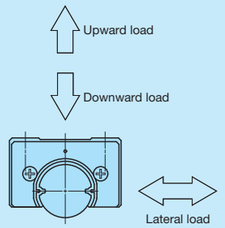
The seal is attached to the bottom of the slide unit to prevent foreign substances from entering from underneath.

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

Load Direction and Load Rating

The LSB 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 8.

Table 8 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	$0.84C$	C_0	C_0	$0.84C_0$
25	C	C	C	C_0	C_0	C_0

Identification number and quantity for ordering

To order LSB series, please specify the number of sets based on the number of spline shafts. For slide unit or single spline shafts, please specify the number of units.

Single external cylinder



(When 2 units are needed)

Example of identification number indication

LSB 10 C1 T1 S○ /U

Please specify S1 or S2.

Only C1 can be specified.

Order quantity: 2units

Single spline shaft



(When 1 unit is needed)

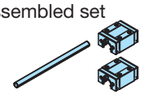
Example of identification number indication

LSB 10 R200 H S○

Please specify S1 or S2.

Order quantity: 1unit

Assembled set



(When 1 set is needed)

Example of identification number indication

LSB 10 C2 R200 T1 H S○ /U

Please specify S1 or S2.

Order quantity: 1set

Moment of Inertia of Sectional Area and Section Coefficient of Spline Shaft

Table 9 Moment of inertia of sectional area and section coefficient of spline shaft

Identification number	Moment of inertia of sectional area mm⁴		Section coefficient mm³	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
6	55	54	19	19
8	170	170	44	43
10	440	420	90	87
13	1 220	1 160	190	180
16	2 830	2 630	360	340
20	7 110	6 620	730	680
25	17 600	15 100	1 440	1 230

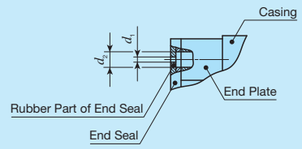
Lubrication

Lithium-soap base grease (MULTEMP PS No.2 [KYODO YUSHI CO., LTD.]) is pre-packed in LSB series.
The LSB series has grease nipple or oil hole as indicated in Table 10 and Table 11. For supply nozzle applicable to each grease nipple and dedicated supplying equipment (miniature greaser) applicable to oil holes, see Table 13 and Table 14.

Table 10 Parts for lubrication

Size	Grease nipple type	Applicable supply nozzle type
6, 8, 10	Oil hole	Miniature greaser
13, 16, 20	A-M3	A-5120V A-5240V B-5120V B-5240V
25	A-M4	

Table 11 Oil hole specifications



Size	d_1	d_2
6, 8	0.5	1.2
10		1.5

Table 12 Dimensions and shape of grease nipple

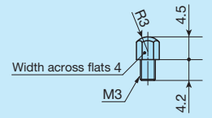
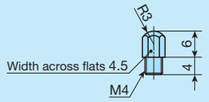
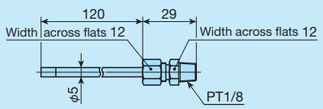
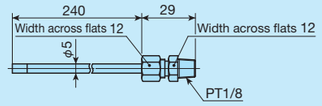
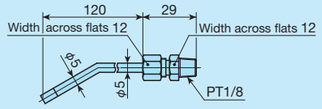
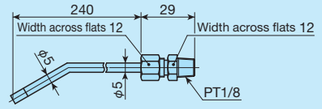
Model	Dimensions and shape
A-M3	
A-M4	

Table 13 Miniature greaser



Identification number	Grease name	Amount	Outside diameter of grease feed needle
MG10/MT2	MULTEMP PS No.2 [KYODO YUSHI CO., LTD.]	10ml	φ1mm
MG10/CG2	IKO Low Dust-Generation Grease for Clean Environment CG2		
MG2.5/EP2	Alvania EP Grease 2 [SHOWA SHELL SEKIYU K. K.]	2.5ml	
MG2.5/CG2	IKO Low Dust-Generation Grease for Clean Environment CG2		
MG2.5/CGL	IKO Low Dust-Generation Grease for Clean Environment CGL		
MG2.5/AF2	IKO Anti-Fretting Corrosion Grease AF2		

Table 14 Types and dimensions of supply nozzle

Model	Dimensions and shape
A-5120V	
A-5240V	
B-5120V	
B-5240V	

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

Dust Protection

The slide units of LSB series are equipped with end 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.

Precaution for Use

❶ Mounting surface, reference mounting surface and typical mounting structure

When mounting the LSB, properly align the reference mounting surface D of the slide unit with the reference mounting surface of the table and fix it. (See Fig. 2)
Outside diameter surface of the spline shaft, reference mounting surface D and mounting surface C are precisely ground. Machining the mounting surface of the table and bed, such as machine or device, to high accuracy and mounting them properly will ensure stable linear motion with high accuracy.
Reference mounting surface of the slide unit is the opposite side of the IKO mark. (See Fig. 3)

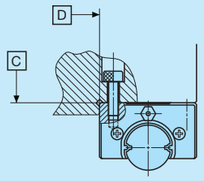


Fig. 2 Reference mounting surface and typical mounting structure

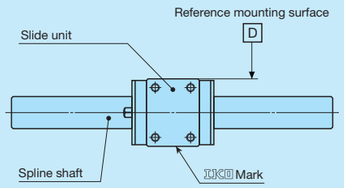


Fig. 3 Reference mounting surface

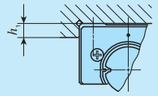
❷ Shoulder height of reference mounting surface

For the opposite corner of the mating reference mounting, it is recommended to have relieved fillet as indicated in Fig. 4. Recommended value for the shoulder height on the mating side is indicated in Table 15.



Fig. 4 Corner of the mating reference mounting

Table 15 Shoulder height



unit: mm

Size	Shoulder height
6	2
8	2.5
10	3
13	3.5
16	4
20	5
25	6

❸ Additional machining of spline shaft end

The spline shaft is hardened by induction hardening. When additional machining on the shaft end is needed, make sure that the maximum diameter of the shaft end machining part does not exceed the dimension d_1 in the dimension table.
Spline shafts with special shaft end shapes can be prepared upon request. Contact IKO for further information.

❹ Multiple slide units used in close proximity

When using multiple slide units 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.
In addition, special products with variation between H and N dimensions aligned can be prepared upon request. Contact IKO for further information.

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 When mounting multiple assembled sets at the same time

Assemble a slide unit and a spline shaft with the same interchangeable code ("S1" or "S2").

❼ Assembly of slide unit on spline shaft

When inserting a slide unit to the spline shaft, handle with care not to pry open the shaft and drop the balls.

❽ Tightening torque for fixing screw

Typical tightening torque for mounting of the LSB series to the steel mating member material is indicated in Table 16. When vibration and shock of the machine or device are large, fluctuating load is large, or moment load is applied, fix it by using the torque 1.2 to 1.5 times larger than the value indicated in the table as necessary. If the mating member material is cast iron or aluminum alloy, reduce the tightening torque depending on the strength characteristic of the mating member material.

Table 16 Tightening torque for fixing screw

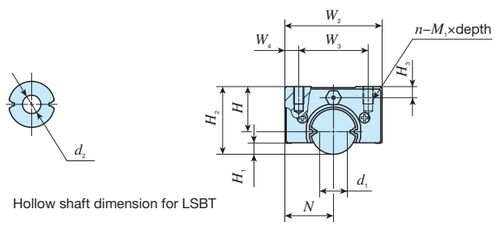
Bolt size	Tightening torque N・m	
	High carbon steel-made screw	Stainless steel-made screw
M2×0.4	0.50	0.31
M3×0.5	1.8	1.1
M4×0.7	4.1	–
M5×0.8	8.0	–
M6×1	13.6	–

Note (1) The tightening torque is calculated based on strength division 12.9 and property division A2-70.

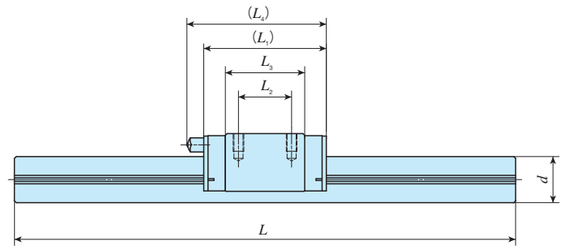
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Block Type Linear Ball Spline

Shape	LSB
Size	6 8 10 13 16 20 25



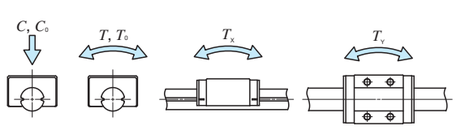
Hollow shaft dimension for LSBT



Identification number	Interchangeable	Mass (Ref.) g: Slide unit	Mass (Ref.) g: Spline shaft (per 100 mm)	Dimensions of assembly mm: H	H_1	H_2	N	Dimensions of slide unit mm: W_2	W_3	W_4	L_1	L_2	L_3	L_4	n—M_1× depth	H_3	Spline shaft dimensions and tolerances mm: d	Dim. d tolerance (1)	d_1 (2)	d_2	L (3)	Maximum length	Basic dynamic (4) load rating C N	Basic static (4) load rating C_0 N	Dynamic (4) torque rating T N · m	Static (4) torque rating T_0 N · m	Static moment rating (4): T_X N · m	T_Y N · m
LSB 6	○	7.6	21.2	6	1.1	9	6.5	13	8	2.5	20	—	12.5	—	2—M2× 3	1.5	6	$^{0}_{-0.012}$	3.7	—	150 200	300	675	1 090	2.0	3.3	2.3 13.6	1.9 11.4
LSBT 6	○		18.8																	2							
LSB 6 ···SL	○		21.2																	—			540	875	1.6	2.6	1.8 10.9	1.5 9.1
LSB 8	○	18	37.6	8	1.3	12	9	18	12	3	25	8	15.6	—	4—M3× 3	1.5	8	$^{0}_{-0.015}$	5	—	150 200 250	500	1 340	1 890	5.4	7.6	4.7 30.2	3.9 25.4
LSBT 8	○		32.1																	3		400					
LSB 8 ···SL	○		37.6																	—		500	1 070	1 510	4.3	6.1	3.7 24.2	3.1 20.3
LSB 10	○	34	59.7	10	1.9	15	10.5	21	15	3	31	10	21.2	—	4—M3× 4	2.5	10	$^{0}_{-0.015}$	6.9	—	200 300	600	1 810	2 760	9.1	13.8	9.1 53.0	7.6 44.5
LSBT 10	○		49.8																	4							
LSB 10 ···SL	○		59.7																	—			1 450	2 200	7.3	11.0	7.3 42.4	6.1 35.6
LSB 13	○	62	100	13	3.2	19.5	14	28	20	4	35	15	22.4	40	4—M3× 5	3.2	13	$^{0}_{-0.018}$	9	—	200 300 400	800	3 330	4 290	21.7	27.9	15.4 96.3	12.9 80.8
LSBT 13	○		77.9																	6							
LSB 16	○	112	152	16	4.2	24	16.5	33	25	4	43	20	28.8	48	4—M4× 6	4	16	$^{0}_{-0.018}$	11.4	—	200 300 400	1 000	4 980	6 490	39.9	51.9	29.7 176	24.9 148
LSBT 16	○		113																	8							
LSB 20	○	215	240	20	5.8	30	20	40	30	5	53	25	37.3	58	4—M5×10	5	20	$^{0}_{-0.021}$	15	—	300 400 500 600	1 000	6 670	9 080	66.7	90.8	52.7 299	44.2 251
LSBT 20	○		178																	10							
LSB 25	○	403	376	25	6	37.5	26	52	40	6	67	30	41.8	70	4—M6×12	6	25	$^{0}_{-0.021}$	19.3	—	300 400 500 600 800	1 200	10 500	13 400	136	175	95.6 566	95.6 566
LSBT 25	○		237																	15							

Notes (1) This does not apply to hollow shaft (LSBT).
(2) d_1 represents the maximum diameter for end machining.
(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 slide unit and the lower values are for two slide units in close contact.

Remarks 1. Block type Linear Ball Spline are all interchangeable specification.
2. LSB 6, LSBT 6, LSB 6···SL, LSB 8, LSBT 8, LSB 8···SL, LSB 10, LSBT 10, and LSB 10···SL are provided with oil holes.
The specifications of grease nipple and oil hole are shown in Table 11 and Table 12 on page Ⅱ-138.



Example of identification number of assembled set

Model code		Dimensions	Part code	Material code	Preload symbol	Classification symbol	Interchangeable code	Supplemental code
LSB		10	C2	R300	SL	T1	H	S1	/N
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① Model: LSB

② Spline shaft shape

No symbol	Solid shaft
T	Hollow shaft

③ Size: 6, 8, 10, 13, 16, 20, 25

④ Number of external cylinders (2)

⑤ Length of spline shaft (300 mm)

⑥ Material type

No symbol	High carbon steel made
SL	Stainless steel made

⑦ Preload amount

No symbol	Standard
T1	Light preload

⑧ Accuracy class

No symbol	Ordinary
H	High

⑨ Interchangeable

S1	S1 specification
S2	S2 specification

⑩ Special specification: N, U

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

Stroke Ball Spline

LS



Points

● Achieved extremely smooth motion

1 By building the high accuracy retainer into the limited stroke type with small recirculation resistance of the balls, a light and smooth motion with extremely small fluctuation of frictional resistance even in vertical shaft use has been achieved.

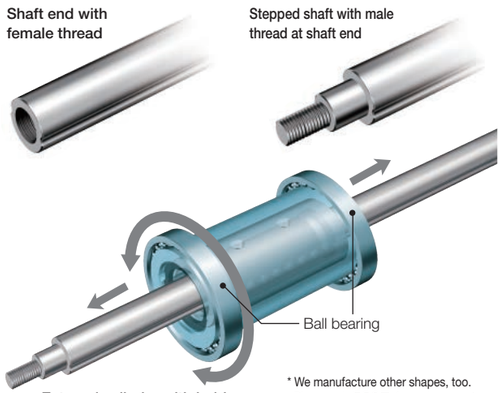
● Best for nozzle part for chip mounter

2 Since it exhibits a stable and high positioning accuracy for stroke direction, it is best for the uses of vertical shaft and high-tact operations such as chip mounter.

● Supports special shapes

3 We manufacture special shapes to meet the customer's uses such as end machining and external cylinder with holders. Please ask IKO for your needs.

End machining, holder specification (example)



* We manufacture other shapes, too. Please ask IKO for your request.

Identification Number and Specification

Example of an identification number

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

	1	2	3	4	5	6	7	8
Assembled set	LS		5	C1	R150	T_1	P	/S

1 **Model** — Model code — Page Ⅱ－145

2 **Spline shaft shape** — Model code — Page Ⅱ－145

3 **Size** — Dimensions — Page Ⅱ－145

4 **Number of external cylinders** — Part code — Page Ⅱ－145

5 **Spline shaft length** — Part code — Page Ⅱ－145

6 **Preload amount** — Preload symbol — Page Ⅱ－145

7 **Accuracy class** — Classification symbol — Page Ⅱ－146

8 **Special specification** — Supplemental code — Page Ⅱ－147

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

Identification Number and Specification —Model · Spline Shaft Shape · Size · Number of External Cylinders · Spline Shaft Length · Preload Amount · Accuracy Class—

1 Model

Stroke Ball Spline (LS series) : LS

For applicable models and sizes, see Table 1.

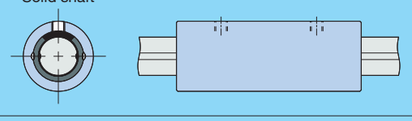
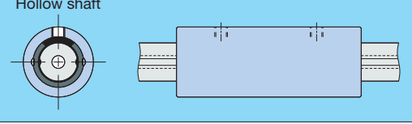
2 Spline shaft shape

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

3 Size

4, 5, 6 — For applicable models and sizes, see Table 1.

Table 1 Models and sizes of LS series

Shape	Model	Size		
		4	5	6
Solid shaft 	LS	○	○	○
Hollow shaft 	LST	○	○	○

4 Number of external cylinders

: C1 — For the number of external cylinders assembled on a spline shaft, only one unit (C1) can be specified.

5 Spline shaft length

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

6 Preload amount

Light preload : T1 — For preload amount, only light preload (T_1) can be specified.
For details of the preload amount, see Table 2.

Table 2 Preload amount

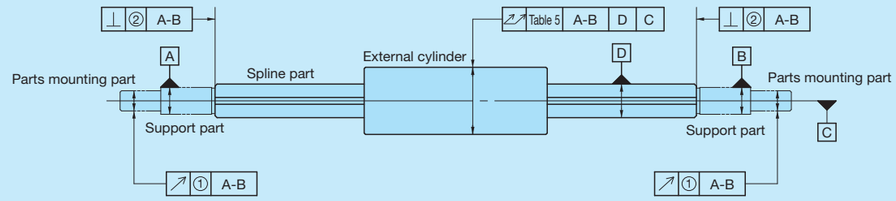
Item / Preload type	Preload symbol	Preload amount N	Operational conditions
Light preload	T1	$0.02C_0$	· Almost no vibrations · Load is evenly balanced · Light and precise motion

Remark: C_0 indicates the basic static load rating.

7 Accuracy class

Precision : P — For accuracy class, only precision (P) can be specified.
For details of accuracy class, see Table 3, Table 4 and Table 5.

Table 3 Allowable value of each part



unit: μm

Size	Relative to axial line of supporting part of spline shaft	
	① Radial runout of periphery of parts mounting part (1)	② Perpendicularity of spline part end face (1)
	Precision (P)	Precision (P)
4	8	6
5		
6		

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

Table 4 Twist of grooves with respect to effective length of the spline part unit: μm

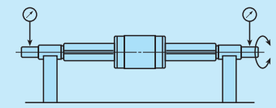
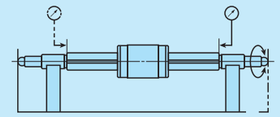
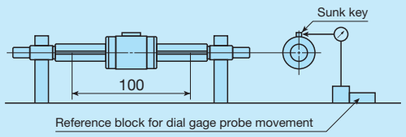
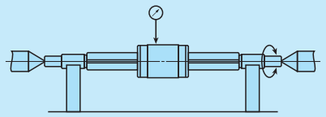
Accuracy class	Precision (P)
Allowable value	6

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

Table 5 Allowable values of total radial runout of spline shaft axial line unit: μm

Total spline shaft length mm		Precision (P)
Over	Incl.	
—	200	26
200	300	57

Table 6 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 3①)	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 3②)	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.	
Twist of grooves with respect to effective length of the spline part (See Table 4)	While supporting the spline shaft fixed, apply a unidirectional torsion moment load to the 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 5)	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 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

8 Special specification	Stainless steel spline shaft /S	Applicable to the solid shaft of size 5 and 6.

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.

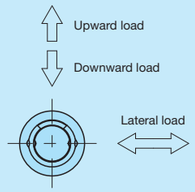
Allowable Load

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 LS 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 7.

Table 7 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
4, 5, 6	C	C	1.47C	C_0	C_0	1.73C_0

Moment of Inertia of Sectional Area and Section Coefficient of Spline Shaft

Table 8 Moment of inertia of sectional area and section coefficient of spline shaft

Size	Moment of inertia of sectional area mm^4		Section coefficient mm^3	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
4	12	12	6	6
5	29	29	12	12
6	61	61	21	21

Lubrication

Grease is not pre-packed in the LS 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 spline shaft when supplying the grease.

Dust Protection

No dust protection seal is provided for LS 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.

Precaution for Use

❶ Fitting 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 ring should be mounted using the screw hole provided on the external cylinder. The fixing thread depth must not exceed the maximum fixing thread depth indicated in the dimension table. Since the screw hole for the external cylinder is penetrated, the spline shaft or retainer will be pushed by the screw if the fixing thread depth is too deep, and the running accuracy and life will be adversely affected.
Since there is no built-in mechanical stopper to regulate linear motion, install a stopper mechanism in proximity if risk of overstroke exists.

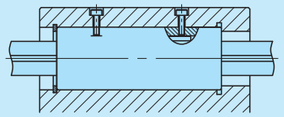


Fig. 1 Mounting example

❸ Handling upon operation
Stroke should be used within the effective stroke range shown in the dimension table.
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.

❹ Additional machining of spline shaft end
The spline shaft is hardened by induction hardening. When additional machining on the shaft end is needed, make sure that the maximum diameter of the shaft end machining part does not exceed the dimension d_1 in the dimension table.
Spline shafts with special shaft end shapes can be prepared upon request. Contact IKO for further information.

❺ Operating temperature
The maximum operating temperature for LS series is 120°C and temperature up to 100°C is allowed for continuous operation. When the temperature exceeds 100°C, contact IKO.

❻ 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 dropping of steel balls. 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 softly 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.
The 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. Be careful not to change the assembly direction. (See Fig. 2)



Fig. 2 Mounting direction of external cylinder

❼ 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)

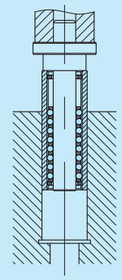
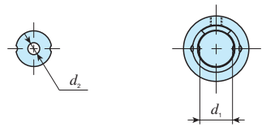


Fig. 3 Press-fitting of external cylinder

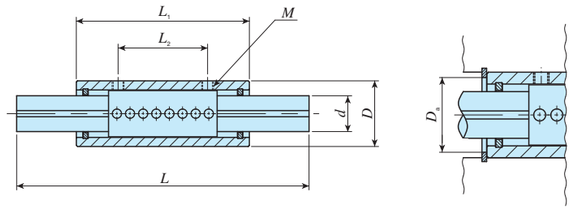
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Stroke Ball Spline

Shape	LS		
			
Size	4	5	6

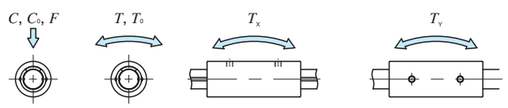


Hollow shaft dimension for LST



Identification number	Interchangeable	Mass (Ref.) g		External cylinder dimensions and tolerances mm						Spline shaft dimensions and tolerances mm						Effective stroke length	Maximum stroke length	Mounting Maximum dimensions	Basic dynamic load rating (3)	Basic static load rating (3)	Allowable load (3)	Dynamic torque rating (3)	Static torque rating (3)	Static moment rating (3)	
		External cylinder	Spline shaft (per 100 mm)	D	Dim. D tolerance	L_1	L_2	M	Maximum fixing thread depth	d	Dim. d tolerance	d_1 (1)	d_2		L (2)	Maximum length										
																		D_a	C	C_0	F	T	T_0	T_X	T_Y
																		mm	N	N	N	N · m	N · m	N · m	N · m
LS 4	–	5.7	9.6	8	0 −0.009	24	10	M2	1.3	4	0 −0.012	3.2	–		100 150	200	10	13.2	5	285	380	127	0.66	0.87	0.88	1.5
LST 4	–		8.6										1.5			150										
LS 5	–	8.9	14.9	10	0 −0.009	27	12	M2	1.4	5	0 −0.012	4.2	–		100 150	200	10	14	7	616	748	249	1.8	2.2	2.0	3.5
LST 5	–		12.4										2													
LS 6	–	10.9	19	11	0 −0.011	29	15	M2	1.4	6	0 −0.012	5.2	–		150 200	300	10	13.6	8	673	855	285	2.4	3.0	2.6	4.4
LST 6	–		16.5										2													

Notes (1) d_1 represents the maximum diameter for end machining.
(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), allowable load (F), dynamic torque rating (T), static torque rating and static moment rating (T_0, T_X, T_Y) are shown in the sketches below.
Remark: Grease is not pre-packed, so please perform adequate lubrication as needed.



Example of identification number of assembled set

Model code		Dimensions	Part code		Preload symbol	Classification symbol	Supplemental code
LS		5	C1	R150	T1	P	/S
①	②	③	④	⑤	⑥	⑦	⑧

① Model
LS

② Spline shaft shape

No symbol	Solid shaft
T	Hollow shaft

③ Size
4, 5, 6

④ Number of external cylinders (1)

⑤ Length of spline shaft (150 mm)

⑥ Preload amount

T1	Light preload

⑦ Accuracy class

P	Precision

⑧ Special specification
S

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－155

2 Shape of shaft with grooved raceway — Model code Page Ⅱ－155

3 Size — Dimensions Page Ⅱ－155

4 Number of external cylinders — Part code Page Ⅱ－155

5 Length of shaft with grooved raceway — Part code Page Ⅱ－155

6 Special specification — Supplemental code Page Ⅱ－155

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

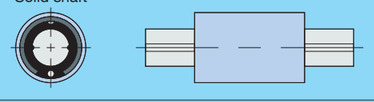
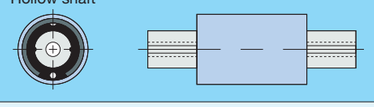
For applicable models and sizes, see Table 1.

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.

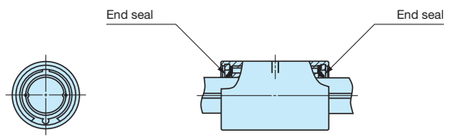
5 Length of shaft with grooved raceway : R○

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

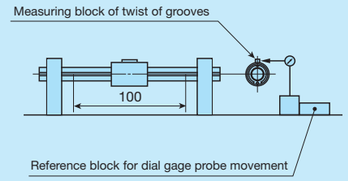
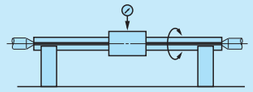
Remark: The values can be applied to 100 mm of the effective length of the track groove part at any position.

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

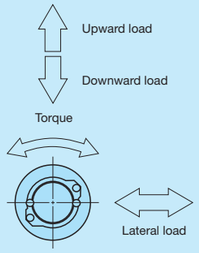
The internal clearance of LMG series is approximately 10 μm.

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

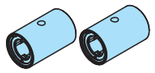


Size \ Load rating and load direction	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
6~20	C	C	1.43C	C_0	C_0	1.73C_0

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)

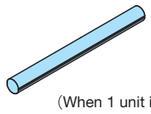
Example of identification number indication

LMG 10 C1 /U

Only C1 can be specified.

Order quantity
2 pieces

Shaft with grooved raceway



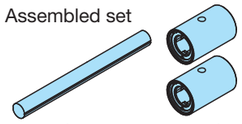
(When 1 unit is needed)

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.

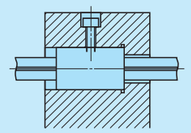


Fig. 1 Mounting examples of external cylinder

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.)

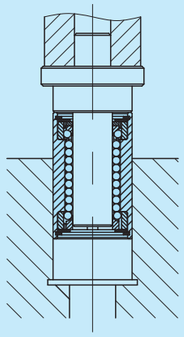


Fig. 2 Press-fitting of external cylinder

Related Products

Shaft Support Block

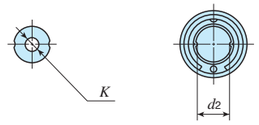
Support blocks to fix and hold both ends of the shaft with grooved raceway are also available. For more information, contact IKO.

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

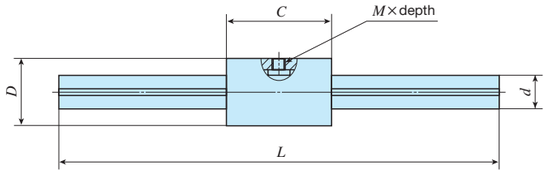
IKO Linear Bushing G

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.
(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	P

1. **Model** — Model code Page Ⅱ－163
2. **Inscribed circle diameter**
3. **Outside diameter of external cylinder**
4. **External cylinder length**

   Dimensions Page Ⅱ－163
5. **Retainer material**
6. **Material type**

   Material code Page Ⅱ－163
7. **Seal structure** — Part code Page Ⅱ－163
8. **Shape of external cylinders** — Shape code Page Ⅱ－163
9. **Accuracy class** — Classification symbol Page Ⅱ－163

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
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
Synthetic resin made : N

Specify the retainer material. For applicable models and sizes, see the "Identification number" column in the dimension table on pages Ⅱ-167 to Ⅱ-188.

6 Material type

High carbon steel made : No symbol
Stainless steel made : F

Specify the component part material. For applicable models and sizes, see the "Identification number" column in the dimension table on pages Ⅱ-167 to Ⅱ-188.

7 Seal structure

Without seal : No symbol
With one end seal : U
With two end seals : UU

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.

8 Shape of external cylinders

Standard type : No symbol
Adjustable clearance type : AJ
Open type : OP

For applicable models and sizes, see Table 1.

9 Accuracy class

High : No symbol
Precision : P

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-167 to Ⅱ-188.

External Cylinder Length · Retainer Material · Material Type · Seal Structure · Shape of External Cylinder · Accuracy Class–

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.

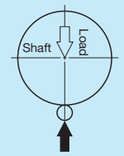


Fig. 1.1 Loading direction A

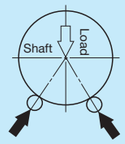


Fig. 1.2 Loading direction B

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.

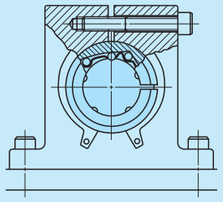


Fig. 2 Example of clearance adjustment

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.

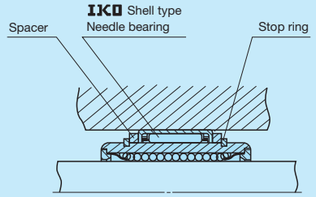


Fig. 3 Example of linear motion and rotational motion

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.

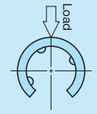


Fig. 4.1

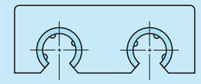


Fig. 4.2

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℃, please contact IKO. The maximum operating temperature of synthetic resin made products is 100℃ and temperature up to 80℃ 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.

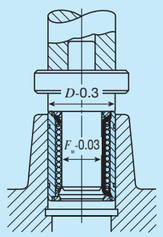


Fig. 5 Press-fitting of external cylinder

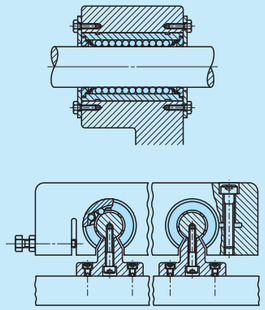


Fig. 6 Mounting example

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.

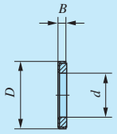
Shaft support block

Support blocks to fix and retain both ends of the slide shaft are also available. For more infromation, contact IKO.

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

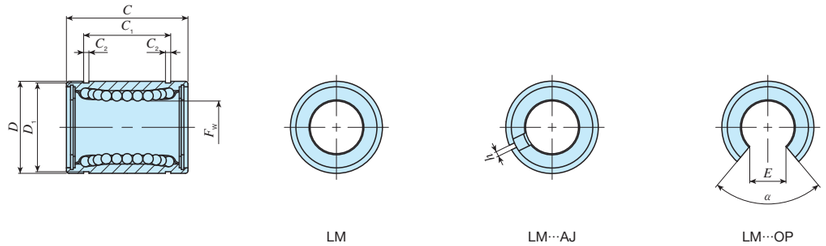
Identification number	*d*	*D*	*B*
FLM 6	6	12	2
FLM 8	8	15	2
FLM 10	10	19	3
FLM 13	13	23	3
FLM 16	16	28	4
FLM 20	20	32	4
FLM 25	25	40	5
FLM 30	30	45	5
FLM 35	35	52	5
FLM 40	40	60	5
FLM 50	50	80	10
FLM 60	60	90	10
FLM 80	80	120	10
FLM 100	100	150	10

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	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	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	30	———	–	–	———	–	–		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	27.5	LM 101929 N AJ*	4	26.5	LM 101929 N OP*	3	18																					
12	LM 122130	4	29	LM 122130 AJ*	4	28	LM 122130 OP*	3	19		12			21		30		23		1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N	4	31.5	LM 122130 N AJ*	4	30.5	LM 122130 N OP*	3	22																					
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	0 −300	41	0 −300	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			1 350	1 430	2 500	3 200
	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		49.5		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																					

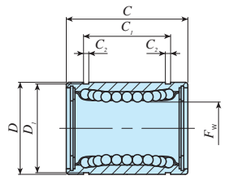
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

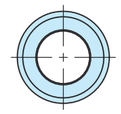
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

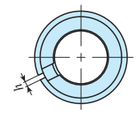
IKO Linear Bushing

	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	

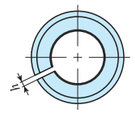




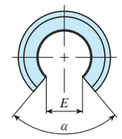
LM



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

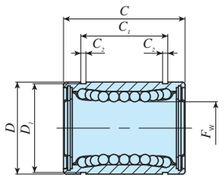
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

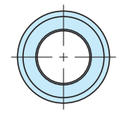
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type (shaft diameter 60 mm) end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

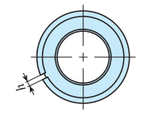
IKO Linear Bushing With Seal

	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

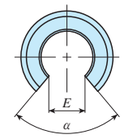




LM···UU



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	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
6	LM 61219 UU	4	8	———	–	–	———	–	–	6			12		19		13.5		1.1	11.5	– 1	–	–			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	0 −11	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	30	———	–	–	———	–	–	10	0 −6	0 −9	19		29		22		1.3	18	– 1	– 6.8	– 80	8	12	179	206	354	501
	LM 101929 N UU	4	27.5	LM 101929 N UU AJ*	4	26.5	LM 101929 N UU OP*	3	18																			
12	LM 122130 UU	4	29	LM 122130 UU AJ*	4	28	LM 122130 UU OP*	3	19	12			21		30	0 −200	23	0 −200	1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N UU	4	31.5	LM 122130 N UU AJ*	4	30.5	LM 122130 N UU OP*	3	22																			
13	LM 132332 UU	4	43	LM 132332 UU AJ*	4	42	LM 132332 UU OP*	3	31	13			23	0 −13	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			1 350	1 430	2 500	3 200
	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	0 −300	49.5	0 −300	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																			

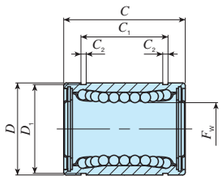
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

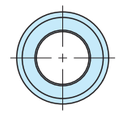
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

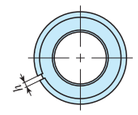
IKO Linear Bushing With Seal

	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	

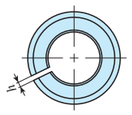




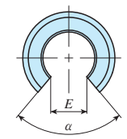
LM···UU



LM 6090110 UU AJ
LM 6090110 N UU AJ



LM···UU AJ



LM···UU OP

Shaft diameter	Identification number: Standard type	Ball raceway	Mass (Ref.)	Identification number: Adjustable clearance type	Ball raceway	Mass (Ref.)	Identification number: Open type	Ball raceway	Mass (Ref.)	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
mm			g			g			g																			
60	LM 6090110 UU	6	1 817	LM 6090110 UU AJ*	6	1 788	LM 6090110 UU OP*	5	1 650	60	0	0	90	0	110	0	85	0	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		−9	−15		−22		−300		−300										
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	0	150	0	175	0	125.5	0	4.15	145	3	50	50	20	30	14 500	15 300	22 800	29 200
120	LM 120180200 UU*	8	14 700	LM 120180200 UU AJ*	8	14 600	LM 120180200 UU OP*	6	11 400	120	−10	−20	180	−25	200	−400	158.6	−400	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	0	210	0	240		170.6		5.15	204	3	105	80	25	40	35 600	35 100	61 200	68 200
											−13	−25		−29														

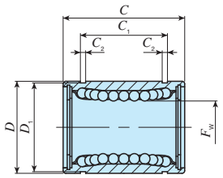
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

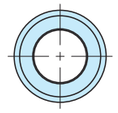
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type (shaft diameter 60 mm) end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

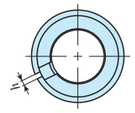
IKO Linear Bushing

	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	

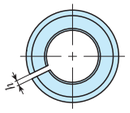




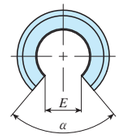
LME



LME···AJ



LME 80120165 AJ



LME···OP

Shaft diameter mm	Identification number: Standard type	Ball raceway	Mass (Ref.) g	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*	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		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	0 − 9	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	17	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		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.

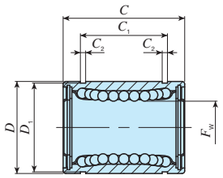
Remarks 1. High carbon steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.

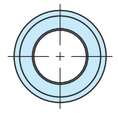
2. The identification numbers with * are our semi-standard items.

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

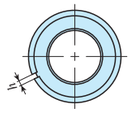
IKO Linear Bushing With Seal

	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	

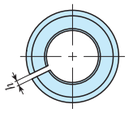




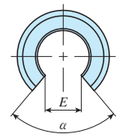
LME···UU



LME···UU AJ



LME 80120165 UU AJ



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		12		22		14.5		1.1	11.5	1	–	–		90.8	104	219	310
8	LME 81625 UU*	4	20	———	–	–	———	–	–	8	+ 8 0	16	0 − 8	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		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	0 − 9	36	0 −200	24.9	0 −200	1.3	24.9	1.5	10	78	12	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

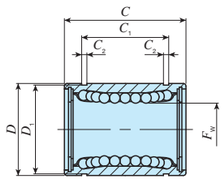
Notes (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.
(2) The seal is slightly off from the external cylinder end.

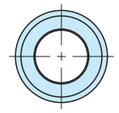
Remarks 1. High carbon steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.
2. The identification numbers with * are our semi-standard items.

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

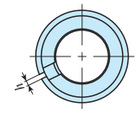
IKO Linear Bushing Inch Series

	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

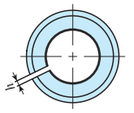




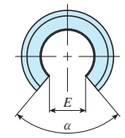
LMB



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			1 1/4 31.750		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	0 −7	0 −10	1 9/16 39.688	0 −16	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

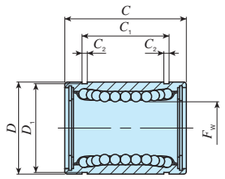
Notes (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

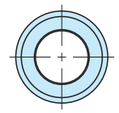
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. High carbon steel-made retainer (shaft diameter 6.350 mm and 9.525 mm), and standard type and adjustable clearance type (shaft diameter 12.700 mm to 50.800 mm) end plates are fixed with stop ring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

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

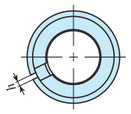
IKO Linear Bushing Stainless Steel Made

	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		

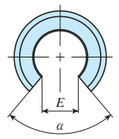




LM···F



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	30	———	–	–	———	–	–	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	27.5	LM 101929 N F AJ*	4	26.5	LM 101929 N F OP*	3	18																			
12	LM 122130 F	4	29	LM 122130 F AJ*	4	28	LM 122130 F OP*	3	19	12			21		30		23		1.3	20	1.5	8	80			259	298	503	711
	LM 122130 N F	4	31.5	LM 122130 N F AJ*	4	30.5	LM 122130 N F OP*	3	22																			
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			1 350	1 430	2 500	3 200
	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																			

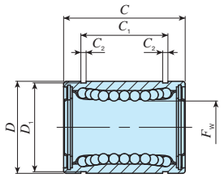
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

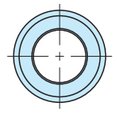
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

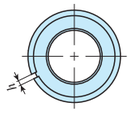
IKO Linear Bushing Stainless Steel Made With Seal

	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		

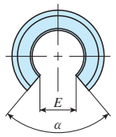




LM···FUU



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	30	———	–	–	———	–	–		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	27.5	LM 101929 N F UU AJ*	4	26.5	LM 101929 N F UU OP*	3	18																				
12	LM 122130 F UU	4	29	LM 122130 F UU AJ*	4	28	LM 122130 F UU OP*	3	19		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	31.5	LM 122130 N F UU AJ*	4	30.5	LM 122130 N F UU OP*	3	22																				
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			1 350	1 430	2 500	3 200
	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																				

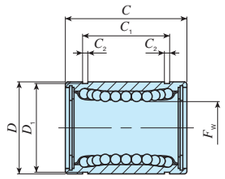
Note (1) The width of hub for fixing with circlip should be the value obtained by subtracting a circlip width value times two from the C_1 dimension.

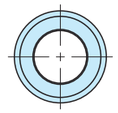
Remarks 1. "P" and "H" in Dim. F_w tolerance and Eccentricity represent precision and high, respectively.
2. Standard type and adjustable clearance type end plates are fixed with stop ring for holes.
3. The identification numbers with * are our semi-standard items.

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

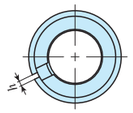
IKO Linear Bushing Stainless Steel Made

	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

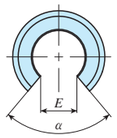




LME···F



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		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	17	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.

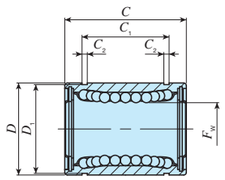
Remarks 1. Stainless steel-made retainer (shaft diameter 8 mm), and standard type and adjustable clearance type (shaft diameter 12 mm to 60 mm) end plates are fixed with stop ring for holes.

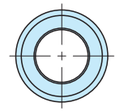
2. The identification numbers with * are our semi-standard items.

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

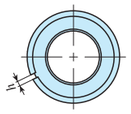
IKO Linear Bushing Stainless Steel Made With Seal

	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

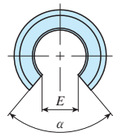




LME···FUU



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		62		80		60.6		2.15	59	3	16.8	50		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	+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 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－190

2 **External cylinder length** — Model code Page Ⅱ－190

3 **Inscribed circle diameter** — Dimensions Page Ⅱ－190

4 **Material type** — Material code Page Ⅱ－190

5 **Seal structure** — Part code Page Ⅱ－190

6 **Accuracy class** — Classification symbol Page Ⅱ－190

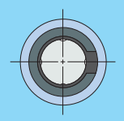
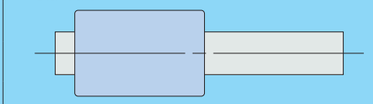
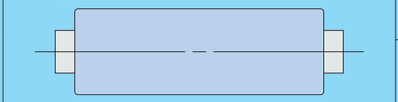
Identification Number and Specification

1 Model	Miniature Linear Bushing (LMS series)	: LMS	For applicable models and sizes, see Table 1.
2 External cylinder length	Standard	: No symbol	
	Long	: L	
3 Inscribed circle diameter			Indicate the inscribed circle diameter in mm.
4 Material type	High carbon steel made	: No symbol	Specify the component part material. For applicable models and sizes, see Table 1.
	Stainless steel made	: F	
5 Seal structure	Without seal	: No symbol	The models with two end seals incorporate seals with superior dust protection performance for preventing intrusion of foreign substances.
	With two end seals	: UU	
6 Accuracy class	High	: No symbol	For details of accuracy, see the dimension table on page Ⅱ-192. 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.
	Precision	: P	

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.

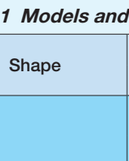


Fig. 1.1 Loading direction A

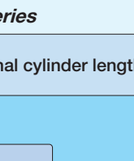


Fig. 1.2 Loading direction B

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

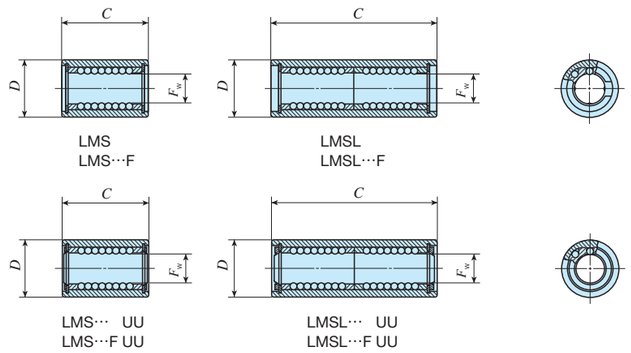
When inserting a shaft to the external cylinder, be careful not to let the shaft pried open as it may cause dropping of balls or deformation of the retainer.

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



Shaft diameter mm	Identification number	Ball raceway	Mass (Ref.) g	Nominal dimensions and tolerances mm: Dim. F_w tolerance μm P	H	Dim. D tolerance μm P	H	C	Dim. C tolerance μm	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
3	LMS 3	4	1.8	3	0 −5	0 − 8	7	0 −7	0 − 8	10	0 −120	2	4	18.4	21.2	39.4	55.8
	LMS 3 F																
	LMS 3 UU																
	LMS 3 F UU																
	LMSL 3		3.0		–	0 −10		–	0 −13	19	0 −300	–	5	30.0	34.4	78.9	112
	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	23.5	27.0	48.6	68.7
	LMS 4 F																
	LMS 4 UU																
	LMS 4 F UU																
	LMSL 4		4.3		–	0 −10		–	0 −13	23	0 −300	–	5	38.1	43.8	97.2	137
	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	51.3	59.0	108	152
	LMS 5 F																
	LMS 5 UU																
	LMS 5 F UU																
	LMSL 5		6.7		–	0 −10		–	0 −13	29	0 −300	–	5	83.4	95.8	215	304
	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

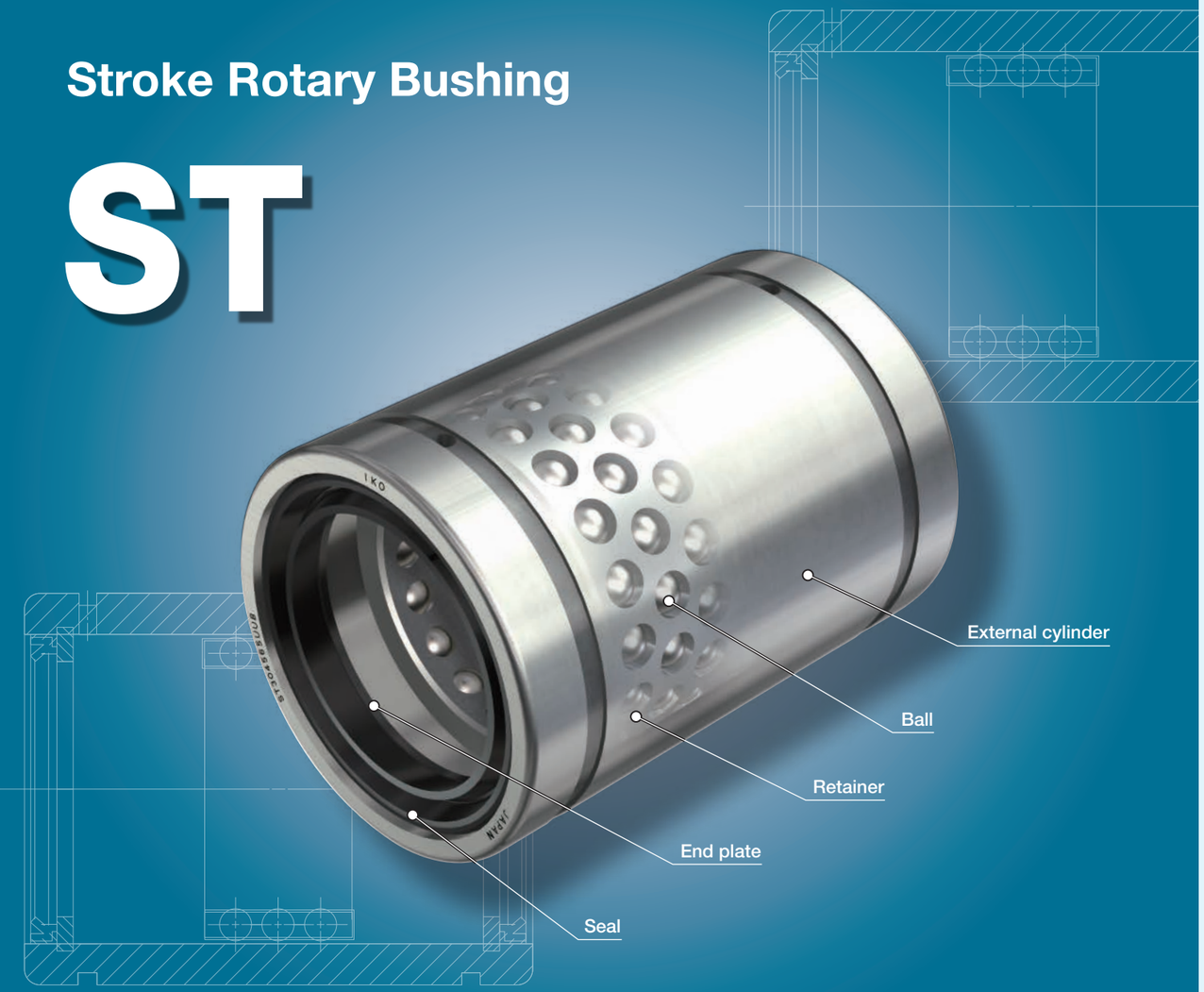
Stroke Rotary Bushing

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 linear bushing 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－196

2 **Inscribed circle diameter**

3 **Outside diameter of external cylinder**

4 **External cylinder length**

Dimensions Page Ⅱ－196

5 **Seal structure** — Part code Page Ⅱ－196

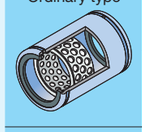
Identification Number and Specification

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

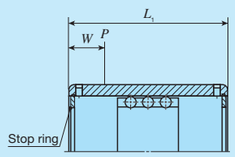


Fig. 1

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
4	6	+18	+10	—	—
6	10	+22	+13	0	− 8
10	18	+27	+16	0	− 8
18	30	+33	+20	0	− 9
30	50	+41	+25	0	−11
50	80	+49	+30	0	−13
80	120	+58	+36	0	−15
120	150	—	—	0	−18

Note (1) D_m is an arithmetic mean value of 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, rpm
n_1 : Number of strokes per minute, cpm
S : Stroke length, mm
D_{pw} : Pitch circle diameter of balls, mm ($D_{pw} \fallingdotseq 1.15F_w$)
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 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.	
4	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.

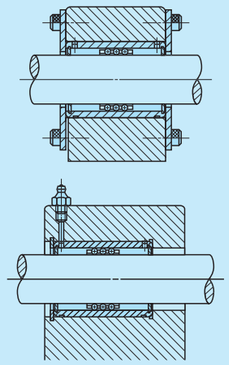
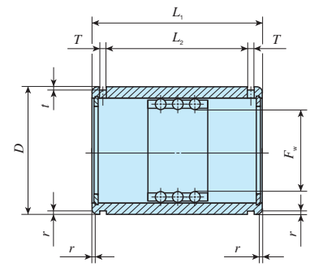


Fig. 2 Mounting examples

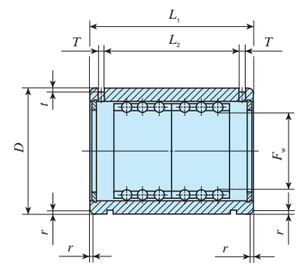
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

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



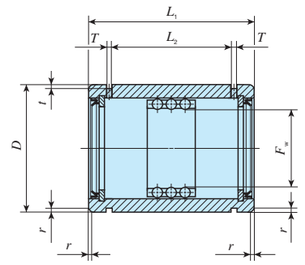
ST···B

Shaft diameter mm	Identification number				Mass (Ref.) g	Nominal dimensions mm								ST			ST···B		
	Ordinary type		Heavy load type			F_w	D	L_1	L_2		T	t	r	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N
4	ST	4814	———		———	4	8	14	9		1.1	0.25	0.3	10	112	59.5	———	———	———
5	ST	51016	———		———	5	10	16	10.6		1.1	0.25	0.3	13	121	68.3	———	———	———
6	ST	61219	———		———	6	12	19	13.2		1.1	0.25	0.3	15	278	168	———	———	———
8	ST	81524	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	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	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	ST	162837 B	75	16	28	37	29.1		1.5	0.5	0.5	40	1 230	998	16	1 990	2 000
20	ST	203245	ST	203245 B	106	20	32	45	35.8		2	0.5	0.5	54	1 390	1 250	28	2 250	2 500
25	ST	253745	ST	253745 B	125	25	37	45	35.8		2	0.5	1	54	1 450	1 430	28	2 360	2 850
30	ST	304565	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	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	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	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	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	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	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	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	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	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	ST	100130100 B	2 520	100	130	100	86		3	1.5	2	132	8 820	14 800	76	14 300	29 500

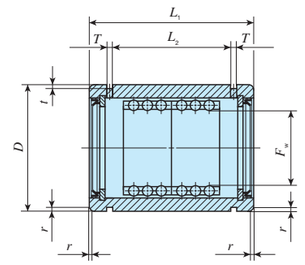
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

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



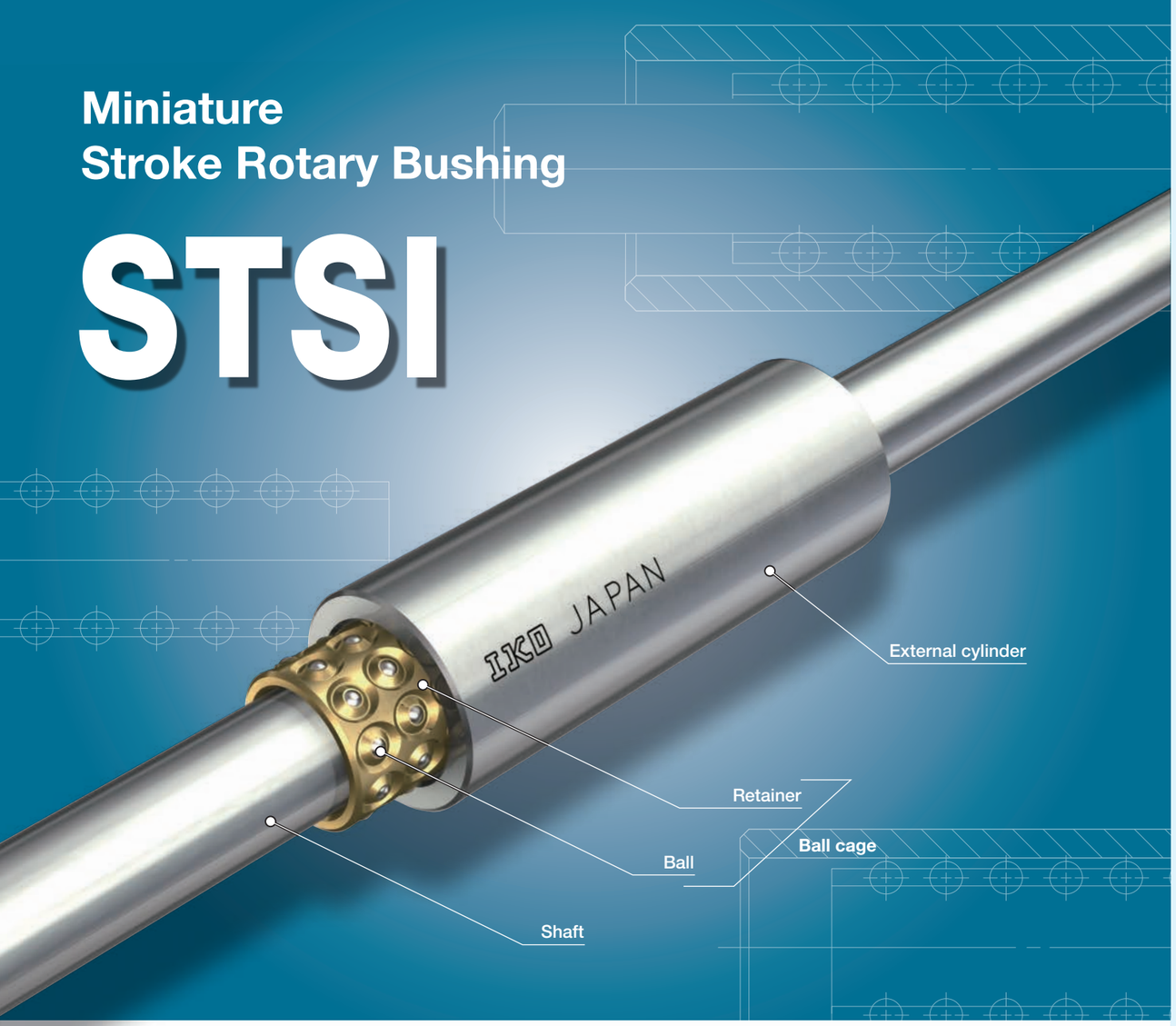
ST···UUB

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	24	1 230	998	———	———	———
20	ST 203245 UU	107	———	———	20	32	45	26.8	2	0.5	0.5	32	1 390	1 250	———	———	———
25	ST 253745 UU	121	———	———	25	37	45	26.8	2	0.5	1	32	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

1 Rotational and linear motions

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.

2 Super small size

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

3 Super precision

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.

4 Extremely smooth operation

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－205

2 **Shaft diameter** (1)

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

4 **Outside diameter of external cylinder**

Dimensions Page Ⅱ－205

5 **External cylinder length**

6 **Ball cage length**

7 **Shaft length**

Length Page Ⅱ－205

8 **Selection class** — Selection code Page Ⅱ－205

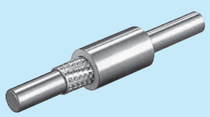
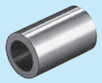
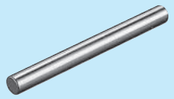
Notes (1) Indicates inscribed circle diameter for assembled set without a shaft or ball cage.
(2) Indicates circumscribed circle diameter for ball cage.

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 
Miniature Stroke Rotary Bushing Without a shaft STS 	Ball cage BK···A 
	Shaft SF···A 

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.

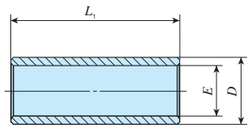
❸ Mounting
Typically, to fix the external cylinder and housing hole, the external cylinder end is fixed to the axial direction with stop ring or adhesive agent is used.
The ball cage is mounted through the shaft after the external cylinder is fixed to the housing hole. At this point, mounting becomes 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.

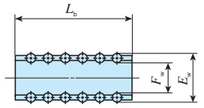
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Miniature Stroke Rotary Bushing

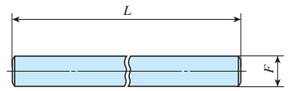
	Assembled set with a shaft	Assembled set without a shaft	External cylinder	Ball cage	Shaft
Shape	STSI	STS	OR···A	BK···A	SF···A
Size	2 3 4 5 6 8 10 12	2 3 4 5 6 8 10 12	2 3 4 5 6 8 10 12	2 3 4 5 6 8 10 12	2 3 4 5 6 8 10 12



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

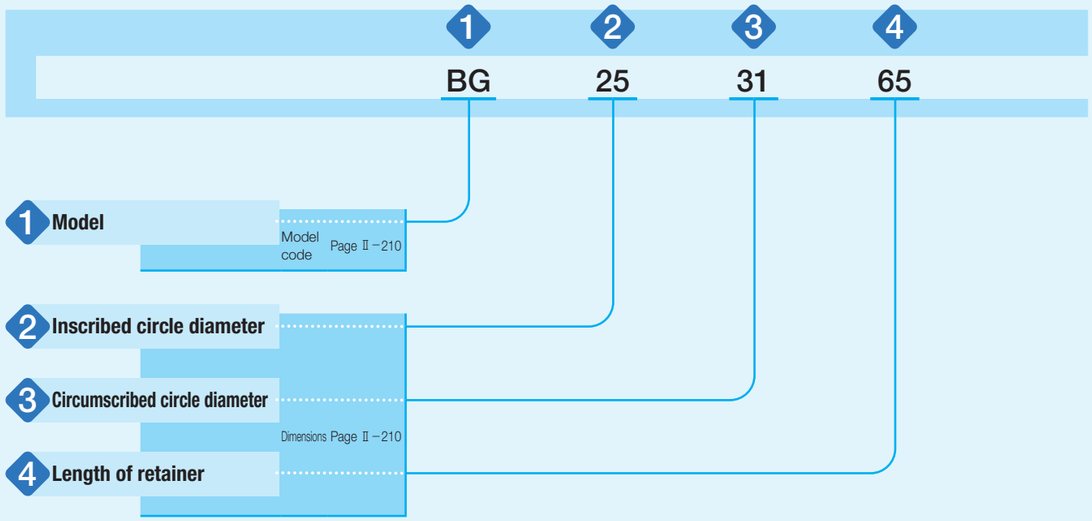
4

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, rpm
n_1 : Number of strokes per minute, cpm
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.

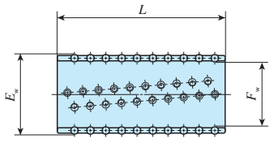
Note (1) For hardness factor, refer to Fig. 3 in page Ⅲ-5.

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

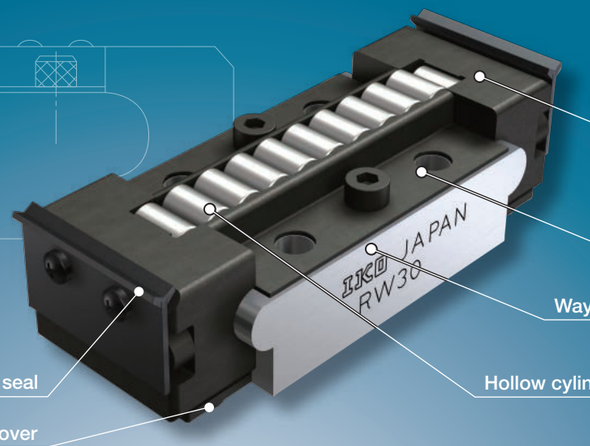
Roller Way & Flat Roller Cage

Roller Way
Flat Roller Cage



Roller Way

RW



Cap
Retaining plate
Way
Wiper seal
Hollow cylindrical roller
Cover

SR



GSN

Way
Roller
Retaining band
End plate

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－216

2 **Size** — Dimensions Page Ⅱ－216

3 **Wiper seal** — Part code Page Ⅱ－217

4 **Accuracy class** — Classification symbol Page Ⅱ－217

5 **Selection class** — Selection code Page Ⅱ－217

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)

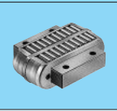
Shape	Model	Size									
		15	20	25	26	30	32	40	50	70	95
	RW	–	–	–	○	○	–	○	○	○	○
	SR	○	○	○	–	–	○	○	○	–	–
	GSN	○	○	○	–	–	○	○	○	–	–

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.

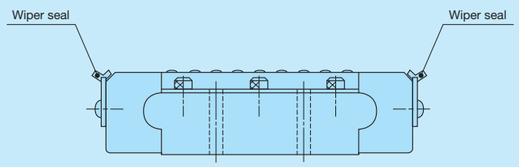


Fig. 1 Wiper seal

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)

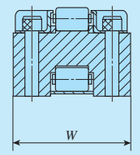
Size	Class (classification symbol)			
	Ordinary (1) (No symbol)	High (H)	Precision (P)	Super precision (SP)
15	○	○	○	○
20	○	○	○	○
25	○	○	○	○
26	–	○	○	○
30	–	○	○	○
32	○	○	○	○
40	○	○	○	○
50	○	○	○	○(2)
70	–	○	○	–
95	–	○	○	–

Notes (1) Applicable to SR and GSN.
(2) Applicable to RW.

Table 2.2 Application of accuracy class of RWB (Inch series)

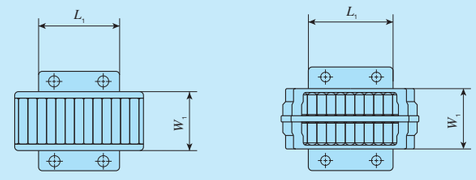
Size	Class (classification symbol)			
	Ordinary (No symbol)	High (H)	Precision (P)	Super precision (SP)
14	–	○	○	○
20	–	○	○	○
24	–	○	○	○
32	–	○	○	○
48	–	○	○	–
64	–	○	○	–

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

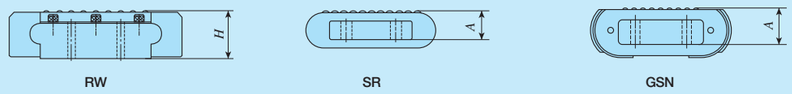
Table 3.2 Tolerances of SR and GSN width W_1, and length L_1



unit: mm

Size	SR Dim. W tolerance$_1$	GSN Dim. L tolerance$_1$
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



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)

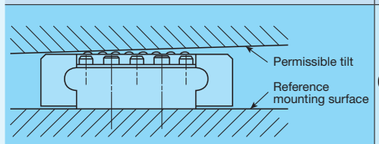
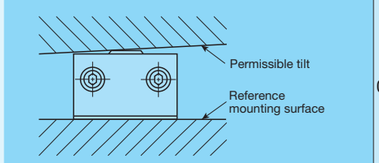
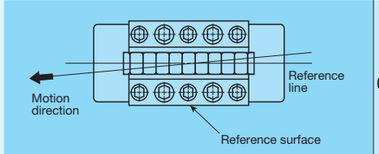
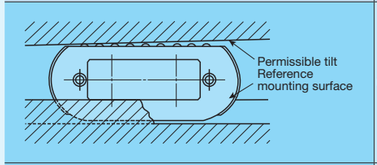
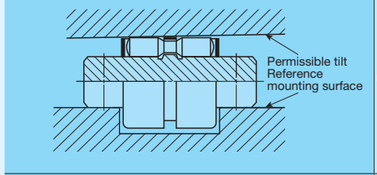
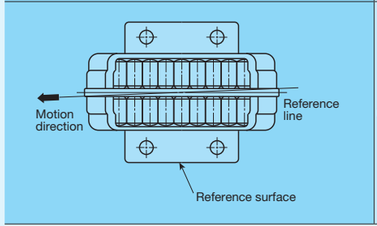
Item	Recommended value
	0.02/100 or lower
	0.015/100 or lower
	0.05/100 or lower

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.

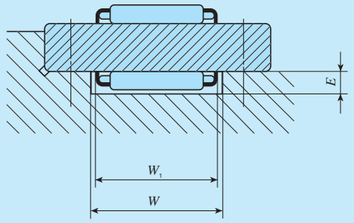


Fig. 2 Shape of groove on the mounting surface

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.

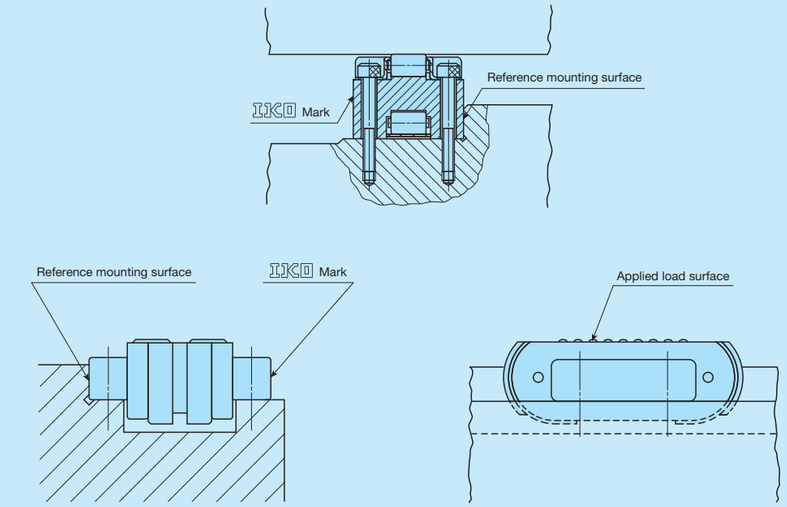


Fig. 3 Mounting examples

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.

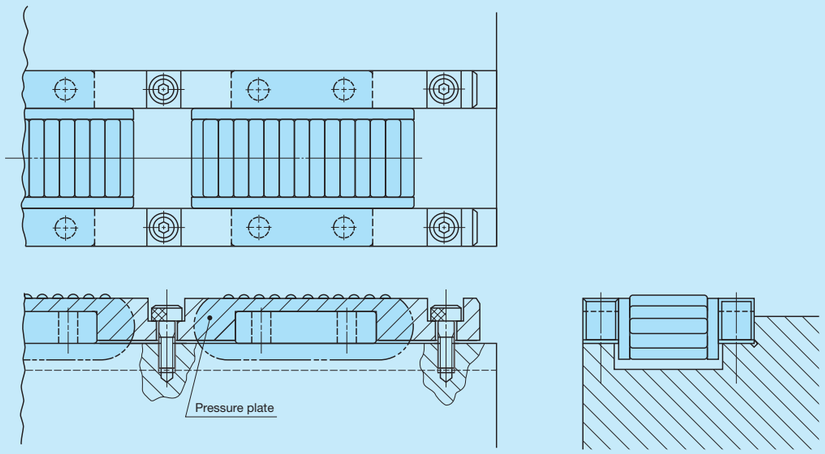
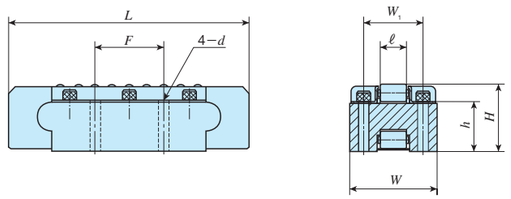


Fig. 4 Mounting with pressure plate

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

IKO Roller Way

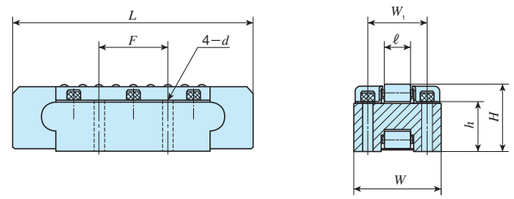
Shape	RW		
			
Size	26	30	40
	50	70	95



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

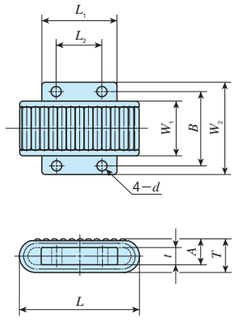


Identification number	Mass (Ref.)	Nominal dimensions inch / mm								Basic dynamic load rating	Basic static load rating
		W	H	L	ℓ	F	W_1	h	d	C	C_0
	g									N	N
RWB 14*	91	7/8 22.225	9/16 14.288	1.97 50	0.236 6	3/4 19.050	43/64 17.066	0.41 10.4	0.125 3.2	25 000	40 100
RWB 16*	227	1 25.400	3/4 19.050	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

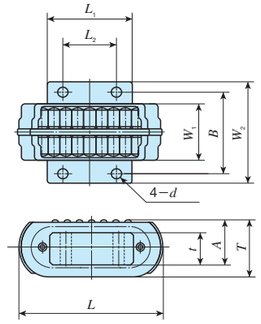
Remark: The identification numbers with * are our semi-standard items.

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

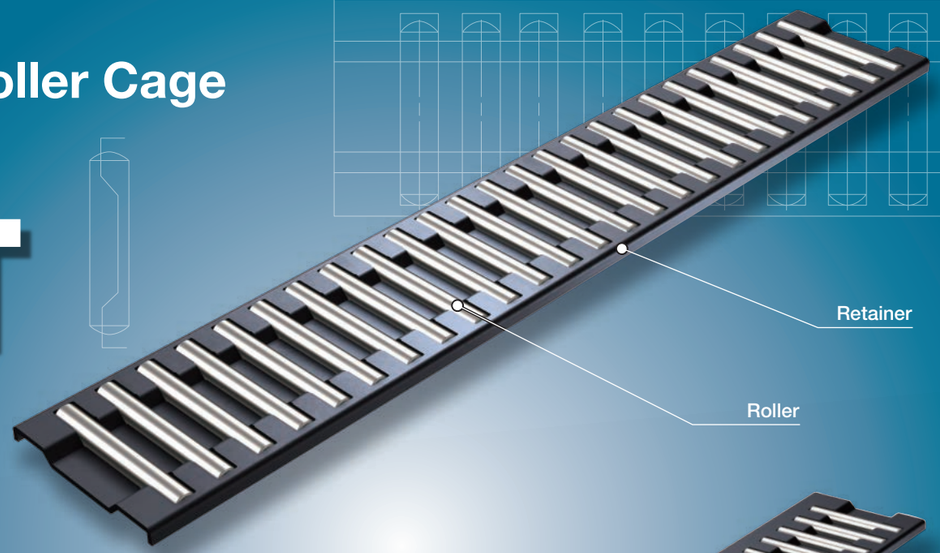


Identification number		Mass (Ref.)	Nominal dimensions mm											Basic dynamic load rating	Basic static load rating
			W_1	W_2	L	A		T	L_1	L_2	B	d	t	C	C_0
		g												N	N
SR 1540	——	62	15	30	40	11		15	20	12	23	3.3	7	26 500	45 900
———	GSN 15	82	15	30	40	15		20	19	12	23	3.4	11	22 300	36 000
SR 2050	——	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

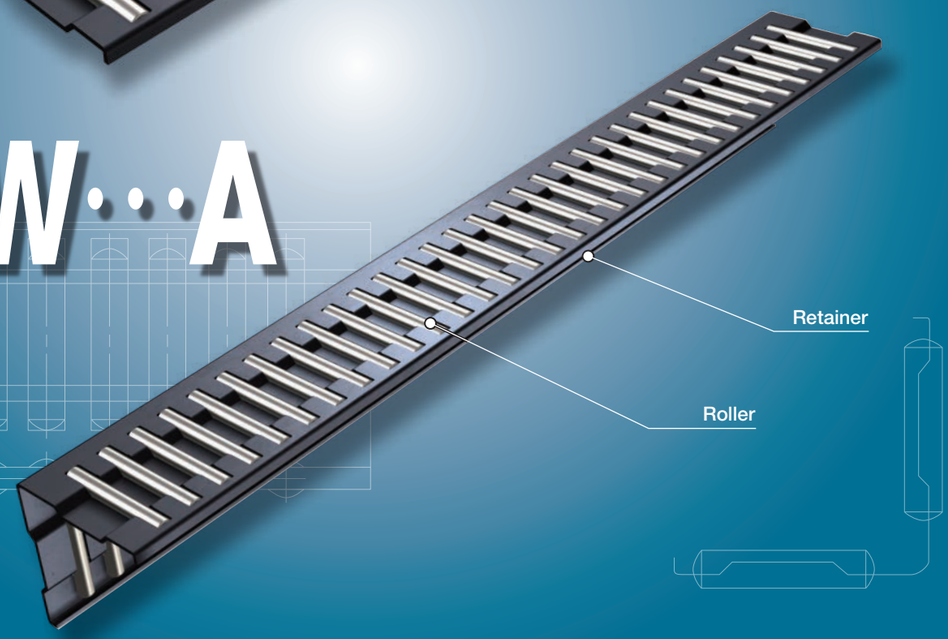
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

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－227

2 Roller size

3 Width of retainer

Dimensions Page Ⅱ－227

4 Length of retainer

5 Retainer material — Supplemental code Page Ⅱ－227

6 Jointed flat roller cage Page Ⅱ－228

7 Roller selection class — Selection code Page Ⅱ－228

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

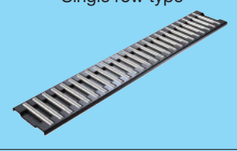
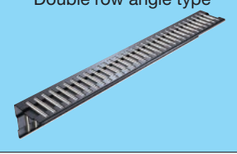
Flat Roller Cage
Single row type : FT
Double row angle type : FTW···A

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.

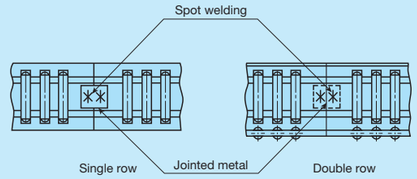


Fig. 1 Connection by spot welding

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) Allowance of roundness and cylindricity follows JIS B 1506:2005 roller bearing - roller.

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.

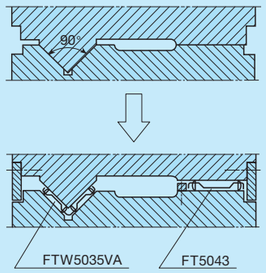


Fig. 2 Example of use on flat surface and 90° V surface

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

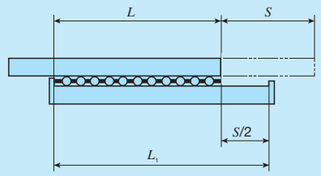


Fig. 3

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

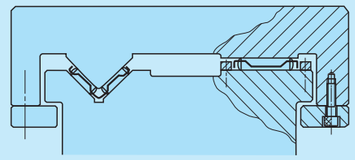
unit: mm

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

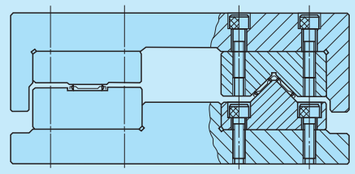
Precaution for Mounting

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

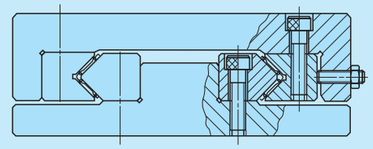


Fig. 4 Mounting examples

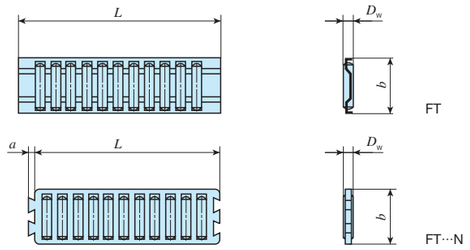
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Flat Roller Cage

Single row type Flat Roller Cage

Shape	FT			
Size	20	25	30	35
	40	50	100	200

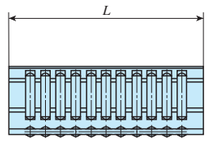


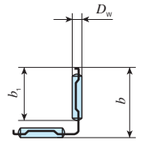


Identification number		Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
Steel retainer	Synthetic resin retainer	g	D_w	b	L	a	C N	C_0 N
———	FT 2010 N	1.63	2	10	32	2	8 660	19 800
FT 2010 - 32	——	1.91				–	9 710	22 900
FT 2010 - 100	——	5.8			100		22 900	68 700
———	FT 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





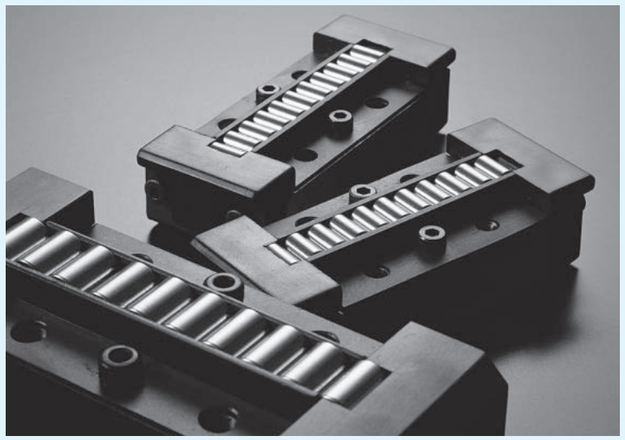
Identification number	Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
	g	D_w	b	L	b_1	C N	C_0 N
FTW 4030 VA - 150	94	2.828	30	150	24.5	118 000	491 000
FTW 5045 A - 250	410	5	45	250	35.5	332 000	1 240 000
FTW 5050 A - 250	460		50		40.5	371 000	1 440 000
FTW 5035 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

Related Products

Cam Followers

Roller Followers



Performance and Quality Assured by Proven Track Record

Reliable IKO Cam Followers and Roller Followers

Cam Followers and Roller Followers have structures of needle rollers embedded in thick outer rings. These bearings are designed for rotation of the outer ring, with small friction coefficient and excellent rotation performance.
Because radial clearance for these bearings are designed to be small to effectively enlarge the loading area, they mitigate the shock load when the outer ring outside surface guides in direct contact with the mating cam guide surface, and ensure stable and long life.
Providing wide variety of models as series for both Cam Followers with studs and Roller Followers with inner rings, suitable bearings can be selected for various use conditions. They are hence widely used for cam mechanisms and linear motion of transfer machines.



Cam Follower Series



Even the mating guide surfaces are maintenance free!!
"C-Lube Unit", external lubrication parts for Cam Followers

C-Lube Unit For Cam Followers





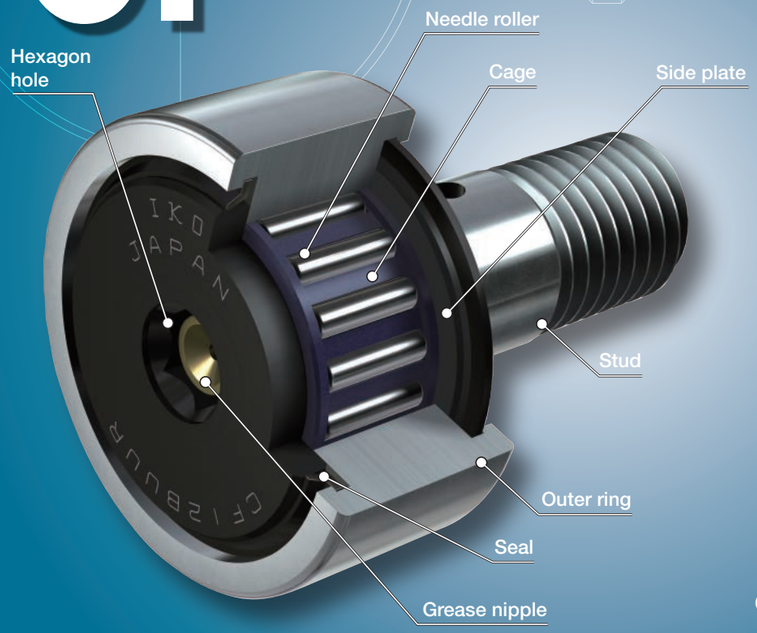
Roller Follower Series

Related Products

Cam Followers

CF

Cam Followers are studded bearings with needle rollers in the thick outer ring. The friction coefficient designed for rotation of the outer ring is small and the bearing offers excellent rotation performance.
Cam Followers have high rigidity and accuracy as follower bearings of various cam mechanisms and guide rollers for linear motion and are used for a wide range of uses such as machine tools, industrial robots, electronic parts, and office automation equipment.





C-Lube Unit For Cam Followers

CL

C-Lube Unit for Cam Followers is a lubrication part to mount into Cam Followers. This supplies necessary lubrication oil to the outer ring outside surface and the cam guide surface of Cam Followers and eliminates the need for routine grease feed.

Points

● Substantial product lineup

1 Our substantial product lineup offers an extremely-small-sized miniature type, a good type for installation errors with a built-in thrust washer, a maintenance free type with pre-packed solid lubricant, and other types.

● Wide selection of product specifications for your use

2 The material type, the roller guide type, the seal structure, and the shape of outer ring outside surface are selectable for an optimal product specification according to your use.

● The socket with hexagon hole for easy mounting

3 The socket with hexagon hole on the stud head allows easy mounting with a hexagon wrench.

● IKO's original structure allowing grease feed from stud head

4 The socket with hexagon hole does not limit grease feed directions and even allows grease up from the stud head.

● New concept of C-Lube Unit For Cam Followers

5 The C-Lube unit supplies lubrication oil to the outer ring outside surface and the cam guide surface of Cam Followers. Combining Cam Followers eliminates the need for routine grease feed to the cam guide surface and reduces friction and wear.

Identification Number and Specification

Example of an Identification Number

The specification of Cam Followers series is indicated by the identification number. In addition, for application of material type, roller guide type, seal structure and shape of outer ring outside surface to each models, refer to the dimension table.

	1	2	3	1	4	1	5	6	7	1
Arrangement example 1	CFS	3	F		V				P6	
Arrangement example 2	CF	10			V	B	UU	R		
Arrangement example 3	CF	5	F	W		B	UU	R		
Arrangement example 4	CF	8		W		B	UU	R		/SG

1 **Model** Page Ⅱ－239

2 **Dimensions** Page Ⅱ－239

3 **Material type** Page Ⅱ－241

4 **Roller guide type** Page Ⅱ－241

5 **Seal structure** Page Ⅱ－241

6 **Shape of outer ring outside surface** Page Ⅱ－241

7 **Accuracy class** Page Ⅱ－242

Identification Number and Specification —Model · Dimensions—

1 Model

Miniature Type Cam Followers : CFS
Thrust Disk Type Miniature Cam Followers : CFS···W
Standard Type Cam Followers : CF···B
Cam Followers G : CF···G
Thrust Disk Type Cam Followers : CF···WB
C-Lube Cam Followers : CF···WB···/SG
Solid Eccentric Stud Type Cam Followers : CFES···B
Eccentric Type Cam Followers : CFE···B
Centralized Lubrication Type Cam Followers (crowned outer ring) : CF-RU1
Centralized Lubrication Type Cam Followers (cylindrical outer ring) : CF-FU1
Easy Mounting Type Cam Followers : CF-SFU···B
Cylindrical Roller Cam Followers : NUCF···B
Inch series Cam Followers (With hexagon hole) : CR···B
Inch series Cam Followers (With driver slot) : CR
Inch series Cam Followers (With hexagon hole) : CRH···B
Inch series Cam Followers (With driver slot) : CRH

For applicable models and dimensions, see Table 1.1 and Table 1.2.

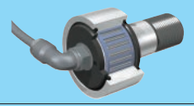
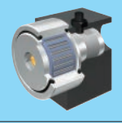
2 Dimensions

Represents stud diameter. (unit: mm)
For inch series Cam Followers, outer ring outside diameter dimensions are indicated in 1/16 inch.

Table 1.1 Models and dimensions

Shape	Model	Characteristics	Stud diameter
Miniature Type Cam Followers 	CFS	Ultrafine needle roller is incorporated to the outer ring of bearing so the compact design is realized with outer ring outside diameter which is small relative to the stud diameter. This is used for electronic parts device, office automation equipment and small type index device.	2 to 6 mm
Thrust Disk Type Miniature Cam Followers 	CFS···W	Miniature Type Cam Followers incorporated with special synthetic resin thrust washers excellent in abrasion and heat resistance. It receives axial load of outer ring generated due to installation errors to prevent friction and wear on the sliding contact.	1.4 to 6 mm
Standard Type Cam Followers 	CF	This is a basic Cam Followers model. Size variations from 3 to 30 mm in stud diameter are available.	3 to 30 mm
Cam Followers G 	CF···G	Cam Followers with pre-packed grease at reasonable price.	6 to 20 mm
Thrust Disk Type Cam Followers 	CF···WB	As it is incorporated with special synthetic resin thrust washers excellent in abrasion and heat resistance, it receives axial load of outer ring generated due to installation errors to prevent friction and wear on the sliding contact.	3 to 20 mm
C-Lube Cam Followers 	CF···WB···/SG	Maintenance free product with thermoset solid lubricant "C-Lube" pre-packed in the bearing space. "C-Lube" is heat-treated and solidified lubricant composed of an amount of lubrication oil and particulate ultra-high molecular polyethylene resin. Rotation of the bearing allows a moderate amount of lubricant to always exude from "C-Lube" onto the raceway to maintain lubrication performance of the bearing for long time.	5 to 20 mm

Table 1.2 Models and dimensions

Shape	Model	Characteristics	Stud diameter
Solid Eccentric Stud Type Cam Followers 	CFES···B	Rotation of eccentric stud can align height of outer ring outside diameter when multiple rings are used. Eccentricity is from 0.25 to 0.6 mm and it can be mounted to the same mounting hole as the standard Cam Followers.	6 to 18 mm
Eccentric Type Cam Followers 	CFE···B	As the eccentric collar is fixed to the stud, positioning in the radial direction relative to the mating cam guide surface is easy. Eccentricity is from 0.4 to 1.5 mm.	6 to 30 mm
Centralized Lubrication Type Cam Followers 	CF-RU1 CF-FU1	As a tap hole is prepared for the centralized piping on the stud head, this is optimal for applications where centralized oil piping is necessary.	6 to 30 mm
Easy Mounting Type Cam Followers 	CF-SFU···B	As the stud is stepped so that fixing of the stepped section from the upper face with set screw becomes easy, this is optimal for applications such as pallet changer.	6 to 20 mm
Cylindrical Roller Cam Followers 	NUCF···B	The full complement type bearing with double row cylindrical rollers incorporated in the outer ring can receive large radial load and some axial load.	10 to 30 mm
Inch series Cam Followers 	CR···B CR CRH···B CRH	2 types of inch series Cam Followers are available: CR and CRH. CRH is a heavy load type for large load rating with black oxide film treatment.	4.826 to 50.800 mm

—Material Type · Roller Guide Type · Seal Structure · Shape of Outer Ring Outside Surface—

3 Material type

High carbon steel made	: No symbol	Specify the component part material. For applicable models and dimensions, see dimension table.
Stainless steel made	: F	

In addition to high carbon steel products, stainless steel products are also available.
Stainless steel products are suited for applications where oil should be avoided, water is spattering, or it is used in a clean room.

<High carbon steel made>

For general use...

<Stainless steel made>

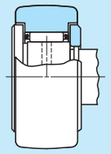
For sections where oil should be avoided and environment where water is spattering...

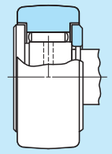
4 Roller guide type (1)

Caged type	: No symbol	Specify the roller guide type. For applicable models and dimensions, see dimension table.
Full complement type	: V	

Note (1) Cylindrical Roller Cam Followers are full complement type with no symbol.

As roller cage has smaller friction coefficient, it is suited for high-speed rotation.
Full complement type is suited for sections where low-speed rotation, oscillatory movement or heavy load exists.

For sections with high-speed rotations...

<Caged type>

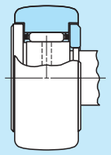
For sections with low-speed rotation or heavy load...

<Full complement type>

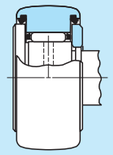
5 Seal structure (1)

Shield type	: No symbol	Specify the seal structure. For applicable models and dimensions, see dimension table.
Sealed type	: UU	

Note (1) Centralized Lubrication Type and Easy mounting Type Cam Followers are sealed type with no symbol.

Shield is shaped so that clearance between the outer ring and stud flange and between the outer ring and side plate become smaller and labyrinth is formed.
The sealed type incorporates the seal structure, which can prevent foreign substances from entering.

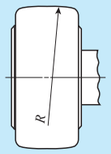
For general use...

<Shield type>

For dust protection and grease leak prevention...

<Sealed type>

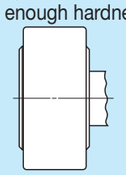
6 Shape of outer ring outside surface

Cylindrical outer ring	: No symbol	Specify the shape of outer ring outside surface. For applicable models and dimensions, see dimension table.
Crowned outer ring	: R	

Crowned outer ring is effective for mitigation of end load generated due to installation errors.
Cylindrical outer ring is suited if the applied load is large or hardness of cam guide surface is low.

For reducing installation errors...


<Crowned outer ring>

For sections with high applied load...
For cam guide surfaces without enough hardness...

<Cylindrical outer ring>

—Accuracy Class—

7 Accuracy class

Accuracy class 0	: No symbol	For details of accuracy, see Table 2, Table 3.1, Table 3.2, and 3.3.
Accuracy class 6 (1)	: P6	We also provide special accuracy class product. For details, please contact IKO.
Accuracy class 5 (1)	: P5	
Accuracy class 4 (1)	: P4	

Note (1) Applicable to miniature Cam Followers CFS and CFS···W.

Table 2 Tolerance unit: μm

Name \ Series	Miniature Cam Followers CFS, CFS···W	Standard Cam Followers (1)		Inch series Cam Followers	
		Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring
Outside diameter of outer ring D	See Table 3.1	0 −50	See Table 3.2	0 −50	See Table 3.3
Stud diameter d_1	h6	h7		+ 25 0	
Width of outer ring C	0 −120	0 −120		0 −130	

Note (1) Applicable to Cam Followers other than miniature Cam Followers and inch series Cam Followers.

Table 3.1 Tolerance and allowance of outer ring (Miniature Cam Followers CFS and CFS···W) unit: μm

ΔD_{mp} Single plane mean outside dia. deviation								K_{ea} Radial runout (Maximum)			
Class 0		Class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4
High	Low	High	Low	High	Low	High	Low				
0	−8	0	−7	0	−5	0	−4	15	8	5	4

Table 3.2 Tolerance and allowance of outer ring (Standard Cam Followers cylindrical outer ring) unit: μm

D Nominal outside dia. of outer ring mm		ΔD_{mp} Single plane mean outside dia. deviation		V_{Dsp} Outside dia. variation in a single radial plane (Maximum)	V_{Dmp} Mean outside dia. variation (Maximum)	K_{ea} Radial runout (Maximum)
Over	Incl.	High	Low			
6	18	0	− 8	10	6	15
18	30	0	− 9	12	7	15
30	50	0	−11	14	8	20
50	80	0	−13	16	10	25
80	120	0	−15	19	11	35

Table 3.3 Tolerance and allowance of outer ring (Inch series Cam Followers cylindrical outer ring) unit: μm

D Nominal outside dia. of outer ring mm		ΔD_{mp} Single plane mean outside dia. deviation		V_{Dsp} Outside dia. variation in a single radial plane (Maximum)	V_{Dmp} Mean outside dia. variation (Maximum)	K_{ea} Radial runout (Maximum)
Over	Incl.	High	Low			
6	18	0	−25	10	6	15
18	30			12	7	15
30	50			14	8	20
50	80			16	10	25
80	120			19	11	35

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

Load Rating and Life

Basic dynamic load rating C

Basic dynamic load rating refers to a static radial load with a certain direction and size with which 90% of a group of the same Cam Followers can run one million rotations without material damages due to rolling contact fatigue when they are operated in the same conditions.

Basic static load rating C_0

Basic static load rating refers to a static radial load with a certain direction and size with a certain contact stress at the center of contact parts of the rolling elements and a raceway under maximum load.

Life

The basic rating life calculation formulas are shown below.

$$L_{10} = \left(\frac{C}{P_r}\right)^{10/3} \quad \cdots\cdots(1)$$

where, L_{10} : Basic rating life, 10^6rev.
C : Basic dynamic load rating, N
P_r : Dynamic equivalent radial load, N

Therefore, life time can be calculated by applying the rotational speed to the formula below.

$$L_h = \frac{10^6 L_{10}}{60n} \quad \cdots\cdots(2)$$

where, L_h : Basic rating life represented as time h
n : Rotational speed min^{-1}

Static safety factor

Static safety factor can be obtained by the following equation and typical values are indicated in Table 4.

$$f_s = \frac{C_0}{P_{0r}} \quad \cdots\cdots(3)$$

where, f_s : Static safety factor
C_0 : Basic static load rating N
P_{0r} : Static equivalent radial load (maximum load) N

Table 4 Static safety factor

Bearing use conditions	f_s
When high rotation accuracy is required	≧3
Normal operating conditions	≧1.5
When smooth operations are not required with a high priority under normal operating conditions When it is rarely rotated	≧1

Load factor

Load actually applied on the Cam Followers becomes larger than load theoretically calculated from vibration and shock. Therefore, multiply the load by the load factor indicated in the Table 5.

Table 5 Load factor

Operating condition	f_w
Smooth operation free from shock	1 ～1.2
Normal operation	1.2～1.5
Operation with shock load	1.5～3

Maximum Allowable Static Load

Load that can be applied to the Cam Followers may in some cases be defined based on flexural and shearing strength of the stud and outer ring strength, instead of load rating as needle roller bearing. For this reason, the maximum allowable static load is defined.

Radial Internal Clearance

Radial internal clearance of Cam Followers is indicated in the Table 6.

Table 6 Radial internal clearance value

unit: μm

Identification number				Radial internal clearance	
Miniature Cam Followers CFS, CFS…W	Standard Cam Followers (1)	Cylindrical Roller Cam Followers	Inch series Cam Followers	Minimum	Maximum
CFS1.4 to CFS5	CF 3B to CF 5B	–	CR 8, CR 8-1, CRH 8-1, CRH 9	3	17
CFS6	CF 6B	–	CR10, CR10-1, CRH10-1, CRH11	5	20
–	CF 8B to CF12-1B	–	CR12 to CR22, CRH12 to CRH22	5	25
–	CF16B to CF20-1B	–	CR24 to CR36, CRH24 to CRH36	10	30
–	CF24B to CF30-2B	–	CR48, CRH40 to CRH56	10	40
–	–	–	CRH64	15	50
–	–	NUCF10 B to NUCF24 B	–	20	45
–	–	NUCF24-1B to NUCF30-2B	–	25	50

Note (1) Applicable to all Cam Followers other than Miniature Cam Followers, Cylindrical Roller Cam Followers and Inch series Cam Followers.

Fit

Recommended fit of the Cam Followers stud and mounting hole and tolerances of dimensions of mounting hole are indicated in the Table 7 and Table 8, respectively. As it is used as mounted by a cantilever, process the mounting hole not to let any play in the fitting section where a large shock load is applied especially.

Table 7 Recommended fit

Model of bearing	Tolerance class of mounting hole
Miniature Cam Followers CFS, CFS…W	H6
Standard Cam Followers (1)	H7
Inch series Cam Followers	F7

Note (1) Applicable to Cam Followers other than Miniature Cam Followers and Inch series Cam Followers.

Table 8 Dimensional tolerances of mounting hole

unit: μm

Classification of diameter mm		F7		H6		H7	
Over	Incl.	High	Low	High	Low	High	Low
–	3	+16	+ 6	+ 6	0	+10	0
3	6	+22	+10	+ 8	0	+12	0
6	10	+28	+13	+ 9	0	+15	0
10	18	+34	+16	+11	0	+18	0
18	30	+41	+20	+13	0	+21	0
30 40	40 50	+50	+25	+16	0	+25	0

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

Track Capacity

Track capacity refers to allowable load with which the mating member material can continuously endure the contact between Cam Followers outer ring and steel mating cam guide surface (plane) without generating deformation or indentation. Track capacities indicated in the Table 9.1, Table 9.2 and Table 9.3 are values on the assumption that hardness of the mating member material is 40HRC (tensile strength: 1250 N/mm^2) and if hardness is not 40HRC, these values must be multiplied by track capacity factors indicated in the Table 10.

If the lubrication between outer ring and mating cam guide surface is not sufficient, seizure and wear may be generated depending on use conditions. Special care is required for lubrication and surface roughness at high rotational speed of the cam mechanism, etc.

Table 9.1 Track capacity for Miniature Cam Followers CFS, CFS···W

unit: N

Identification number (Cylindrical outer ring)	Track capacity
CFS1.4	128
CFS2	220
CFS2.5	298
CFS3	485
CFS4	799
CFS5	1 210
CFS6	1 680

Table 9.2 Track capacity for Standard Cam Followers (1)

unit: N

Identification number (Crowned outer ring)	Track capacity	Identification number (Cylindrical outer ring)	Track capacity
CF 3 BR	542	CF 3 B	1 360
CF 4 BR	712	CF 4 B	1 790
CF 5 BR	794	CF 5 B	2 210
CF 6 BR	1 040	CF 6 B	3 400
CF 8 BR	1 330	CF 8 B	4 040
CF10 BR	1 610	CF10 B	4 680
CF10-1BR	2 030	CF10-1B	5 530
CF12 BR	2 470	CF12 B	7 010
CF12-1BR	2 710	CF12-1B	7 480
CF16 BR	3 060	CF16 B	11 200
CF18 BR	3 660	CF18 B	14 500
CF20 BR	5 190	CF20 B	23 200
CF20-1BR	4 530	CF20-1B	21 000
CF24 BR	6 580	CF24 B	34 300
CF24-1BR	8 020	CF24-1B	39 800
CF30 BR	9 220	CF30 B	52 700
CF30-1BR	9 990	CF30-1B	56 000
CF30-2BR	10 800	CF30-2B	59 300

Note (1) Applicable to Cam Followers other than miniature Cam Followers and inch series Cam Followers.

Table 9.3 Track capacity for Inch series Cam Followers

unit: N

Identification number (Crowned outer ring)	Track capacity	Identification number (Cylindrical outer ring)	Track capacity	Identification number (Crowned outer ring)	Track capacity	Identification number (Cylindrical outer ring)	Track capacity
CR 8 R	770	CR 8	2 140	–	–	–	–
CR 8-1R	770	CR 8-1	2 360	CRH 8-1R	401	CRH 8-1	2 360
–	–	–	–	CRH 9 R	469	CRH 9	2 650
CR10 R	1 030	CR10	3 210	–	–	–	–
CR10-1R	1 030	CR10-1	3 480	CRH10-1R	579	CRH10-1	3 480
–	–	–	–	CRH11- R	658	CRH11	3 830
CR12 R	1 340	CR12	4 500	CRH12- R	853	CRH12	4 500
CR14 R	1 630	CR14	5 250	CRH14- R	1 050	CRH14	5 250
CR16 R	1 970	CR16	7 280	CRH16- R	1 420	CRH16	7 280
CR18 R	2 300	CR18	7 710	CRH18- R	1 660	CRH18	7 710
CR20 R	2 680	CR20	10 700	CRH20- R	2 160	CRH20	10 700
CR22 R	3 050	CR22	11 800	CRH22- R	2 450	CRH22	11 800
CR24 R	3 410	CR24	15 400	CRH24- R	3 410	CRH24	15 400
CR26 R	3 820	CR26	16 700	CRH26- R	3 820	CRH26	16 700
CR28 R	4 210	CR28	21 000	CRH28- R	4 210	CRH28	21 000
CR30 R	4 610	CR30	22 500	CRH30- R	4 610	CRH30	22 500
CR32 R	5 050	CR32	30 900	CRH32- R	5 690	CRH32	30 900
CR36 R	5 900	CR36	34 700	CRH36- R	6 640	CRH36	34 700
–	–	–	–	CRH40- R	8 970	CRH40	45 000
–	–	–	–	CRH44- R	10 200	CRH44	49 500
–	–	CR48	64 300	CRH48- R	11 400	CRH48	64 300
–	–	–	–	CRH52- R	12 700	CRH52	69 600
–	–	–	–	CRH56- R	14 100	CRH56	87 000
–	–	–	–	CRH64- R	16 800	CRH64	113 000

Table 10 Track capacity factor

Hardness HRC	Tensile strength N/mm^2	Track capacity factor	
		Crowned outer ring	Cylindrical outer ring
20	760	0.22	0.37
25	840	0.31	0.46
30	950	0.45	0.58
35	1 080	0.65	0.75
38	1 180	0.85	0.89
40	1 250	1.00	1.00
42	1 340	1.23	1.15
44	1 435	1.52	1.32
46	1 530	1.85	1.51
48	1 635	2.27	1.73
50	1 760	2.80	1.99
52	1 880	3.46	2.29
54	2 015	4.21	2.61
56	2 150	5.13	2.97
58	2 290	6.26	3.39

Allowable Rotational Speed

The allowable rotational speed for Cam Followers is affected by mounting and use conditions. For d_1n value with only pure radial load applied, use values in Table 11 or lower as references. Under actual use conditions, it is recommended to use d_1n, one tenth of indicated values, taking into account the effect of axial load.

C-Lube Cam Followers and Cam Followers with C-Lube unit mounted, use 10,000 or lower as reference for the d_1n value.

d_1n value = $d_1 \times n$

where, d_1 : Cam Followers stud diameter mm

n : Rotational speed min^{-1}

Table 11 d_1n value of Cam Followers

Model of bearing \ Lubricant	Grease	Oil
Caged type	84 000	140 000
Full complement type	42 000	70 000
Cylindrical Roller Cam Followers	66 000	110 000

Lubrication

For bearing with pre-packed grease, refer to the Table 12. Alvania Grease S2 [SHOWA SHELL SEKIYU K. K.] is pre-packed as lubrication grease.

Fill grease from the stud oil hole before using any bearing without pre-packed grease. Otherwise, increased wear on the rolling contact surface and/or short life time may be resulted.

Table 12 Cam Followers with pre-packed grease

○: With grease ×: Without grease

Model of bearing / Stud diameter d_1 (1) mm \ Class			Caged type		Full complement type
			Shield type	Sealed type	
Miniature Type Cam Followers CFS Thrust Disk Type Miniature Cam Followers CFS···W			○	–	○
Standard Type Cam Followers	CF···B	$d_1 \leqq 5$	○	○	–
Thrust Disk Type Cam Followers	CF···WB	$6 \leqq d_1 \leqq 10$			○
Solid Eccentric Stud Type Cam Followers	CFES···B				
Eccentric Type Cam Followers	CFE···B	$12 \leqq d_1$	×		
Cam Followers G	CF···G		○	–	–
C-Lube Cam Followers CF···WB···/SG(2)			–	×	–
Centralized Lubrication Type Cam Followers	CF−RU1 CF−FU1		–	○	–
Easy Mounting Type Cam Followers	CF-SFU···B		–	○	–
Cylindrical Roller Cam Followers	NUCF···B		–	–	○
Inch series Cam Followers	CR···B (With hexagon hole) CR (With driver groove)		○	○	○
Inch series Cam Followers	CRH···B (With hexagon hole) CRH (With driver groove)		–	–	○

Note (1) For Eccentric Type Cam Followers (CFE), thread diameter G specified in the dimension table.

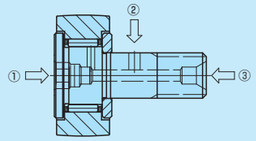
(2) Thermoset solid lubricant C-Lube is pre-packed in the bearing space.

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

Oil Hole

Oil hole position for the Cam Followers is according to the Table 13.
Fill grease by installing a supply nozzle indicated in the Table 14 to the JIS B 9808:1991 straight type grease gun and pressing the supply nozzle onto the grease nipple and grease feed plug softly.
When the NPT type grease nipple of the special specifications indicated in the Table 19 and NPB type grease nipple indicated in the Table 17 are mounted, you may also fill grease by pressing the grease gun without using a supply nozzle specified in the Table 14.
In addition, oil cannot be fed for those without oil hole described in the Table 13.

Table 13 Location of oil hole

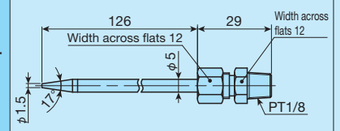
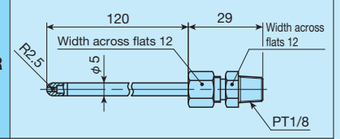
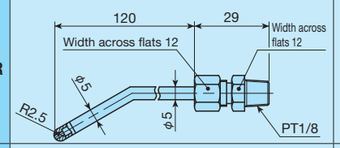
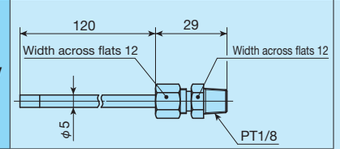
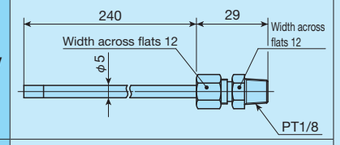
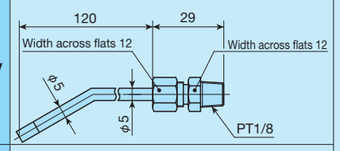
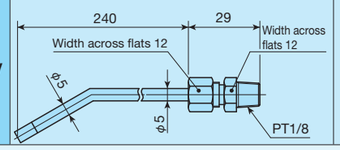


○: With oil hole

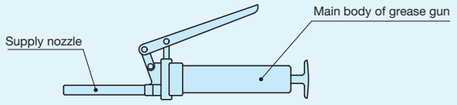
Model of bearing / Stud diameter d_1(1) mm	Class		① Head	② Stud outside surface	③ Stud end
Miniature Type Cam Followers Thrust Disk Type Miniature Cam Followers	CFS CFS···W		–	–	–
Standard Type Cam Followers Thrust Disk Type Cam Followers	CF···B CF···WB	$d_1 \leqq 4$	–	–	–
Solid Eccentric Stud Type Cam Followers	CFES···B	$5 \leqq d_1 \leqq 10$	○(2)	–	–
Eccentric Type Cam Followers	CFE···B	$10 < d_1$	○(3)	○	○
Cylindrical Roller Cam Followers	NUCF···B				
Cam Followers G	CF···G		–	–	–
C-Lube Cam Followers	CF···WB···/SG		–	–	–
Centralized Lubrication Type Cam Followers CF-RU1, CF-FU1(4)		$d_1 \leqq 12$	○	–	–
		$12 < d_1$	○	○	○
Easy Mounting Type Cam Followers CF-SFU···B		$d_1 \leqq 10$	○(2)	–	–
		$10 < d_1$	○(5)	–	–
Inch series Cam Followers CR···B (With hexagon hole)		$d_1 \leqq 6.35$	–	–	–
		$6.35 < d_1$	–	○	○
Inch series Cam Followers CR (With driver slot)		$d_1 \leqq 6.35$	○	–	–
		$6.35 < d_1$	○	○	○
Inch series Cam Followers CRH···B (With hexagon hole)		$d_1 \leqq 7.938$	–	–	–
		$7.938 < d_1$	–	○	○
Inch series Cam Followers CRH (With driver slot)		$d_1 \leqq 7.938$	○	–	–
		$7.938 < d_1$	○	○	○

Note (1) For Eccentric Type Cam Followers (CFE), thread diameter G specified in the dimension table. However, oil hole on the stud outside surface cannot be used.
(2) Grease can be fed from the Re-grease fitting located inside the hexagon hole on the head.
(3) The grease nipple is integrated in the hexagon hole on the head. Grease can be fed from the head and stud end by spiking the supplied grease nipple into the oil hole on the stud end.
(4) Head and stud end have a tap hole for piping.
(5) Grease can be fed from the grease nipple located inside the hexagon hole on the head.

Table 14 Models and dimensions of supply nozzle

Model	Dimensions and shape	Compatible grease nipple and Regreese fitting
A-5126T		NPF4-1(1) NPF6-1(1) Re-grease fitting
A-5120R		NPF4-1(1) NPF6-1(1)
B-5120R		
A-5120V		
A-5240V		NPT4-1 NPT6-1 NPB2 NPB3 NPB3-1 NPB4
B-5120V		
B-5240V		

Note (1) HSP-3 of YAMADA CORPORATION can also be used.
Remark: The supply nozzles shown in the table can be mounted on the main body of a common grease gun available on the market shown below.
If needed, specify the supply nozzle model and contact IKO.



Accessory

Accessories for Cam Followers are shown in Table 15. Grease nipple dimensions are shown in Table 16 and Table 17. Dimensions of plug for unused oil hole and dimensions of plug inserter are shown in Table 18.

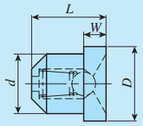
Table 15 Accessories

○: Attached

Model of bearing / Stud diameter d_1(1) mm	Class		Grease nipple	Plug	Nut	Spring washer
Miniature Type Cam Followers Thrust Disk Type Miniature Cam Followers	CFS CFS···W		–	–	○	–
Standard Type Cam Followers Thrust Disk Type Cam Followers	CF···B CF···WB	$d_1 \leqq 10$	–	–	○	–
Solid Eccentric Stud Type Cam Followers Cylindrical Roller Cam Followers	CFES···B NUCF···B	$12 \leqq d_1$	○	–	○	–
Cam Followers G	CF···G		–	–	○	–
C-Lube Cam Followers	CF···WB···/SG		–	–	○	–
Eccentric Type Cam Followers CFE···B		$d_1 \leqq 10$	–	–	○	○
		$12 \leqq d_1$	○	–	○	○
Centralized Lubrication Type Cam Followers (cylindrical outer ring)	CF-RU1, CF-FU1		–	–	○	–
Easy Mounting Type Cam Followers	CF-SFU···B		–	–	–	–
Inch series Cam Followers (With hexagon hole)	CR···B	$d_1 \leqq 6.35$	–	–	○	–
		$9.525 \leqq d_1$	○	○	○	–
Inch series Cam Followers	CR (With driver groove)		○	○	○	–
Inch series Cam Followers (With hexagon hole)	CRH···B	$d_1 \leqq 7.938$	–	–	○	–
		$11.112 \leqq d_1$	○	○	○	–
Inch series Cam Followers	CRH (With driver groove)		○	○	○	–

Note (1) For Eccentric Type Cam Followers (CFE), thread diameter G specified in the dimension table.
Remark: The standard grease nipple (brass) is included in the stainless steel cam follower.
We also have the stainless steel grease nipple. Please contact IKO and request the product.

Table 16 Dimensions of grease nipple for Standard Cam Followers (1)



Identification number	Dimensions of grease nipple mm				Stud diameter d_1(2)
	d	D	L	W	mm
NPF4-1	4	5	5	1.5	12～16
NPF6-1	6	7	8	2	18～30

Note (1) Appliable to Cam Followers other than Inch series Cam Followers.
(2) For Eccentric Type Cam Followers, thread diameter G specified in the dimension table.
Remark The same grease nipple as the accessory is integrated in the hexagon socket on the head.

Table 17 Dimensions of grease nipple for Inch series Cam Followers

Identification number	Dimensions of grease nipple mm						Applicable bearing
	d	D	D_1	L	L_1	W	
NPB2	3.18	7.5	6	9	5.5	1.5	CR8 to CR10-1, CRH8-1 to CRH11
NPB3	4.76	7.5	6	10	5.5	1.5	CR12 to CR22, CRH12 to CRH22
NPB3-1	4.76	7.5	6	12.5	5.5	1.55	CR24 to CR36, CRH24 to CRH44
NPB4	6.35	8	6	13	6	2	CR48, CRH48 to CRH64

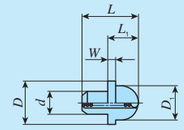
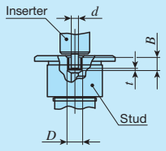


Table 18 Dimensions of plug for Inch series Cam Followers

Identification number	Dimensions of plug mm			Dimension of inserter mm	Applicable bearing
	D	t	B	$d\,^{0}_{-0.1}$	
USB2F	3.18	0.3	3.3	2.3	CR 8 to CR10-1
USB3F	4.76	0.4	4.3	3.7	CR12 to CR36, CRH12 to CRH44
USB4F	6.35	0.5	4.8	5.2	CR48, CRH48 to CRH64



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

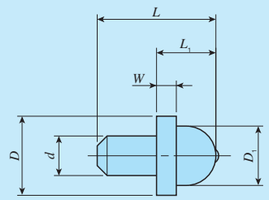
Special Specification

Grease nipple supplied as an accessory can be replaced with the grease nipple indicated in the Table 19 upon request. With this grease nipple, you may fill grease by pressing the JIS B 9808:1991 straight type grease gun directly onto it without using the the supply nozzle in the Table 14. When you request it, indicate the identification number with "/NP" at the end.

Example of an Identification Number

CF 12 BUUR / NP

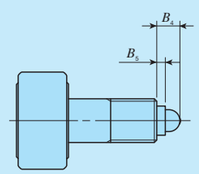
Table 19 Dimensions of NPT type grease nipple



Identification number	Dimensions of grease nipple mm						Stud diameter d_1 (1)
	d	D	D_1	L	L_1	W	mm
NPT4-1	4	8	6	12	6	2	12～16
NPT6-1	6	8	6	14	8	4	18～30

Note (1) For Eccentric Type Cam Followers, thread diameter G specified in the dimension table.

Table 20 Dimensions with NPT type grease nipple mounted



Identification number	Dimensions mm		Stud diameter d_1 (1)
	B_4	B_5	mm
NPT4-1	6	2	12～16
NPT6-1	8	4	18～30

Note (1) For Eccentric Type Cam Followers, thread diameter G specified in the dimension table.

Operating Temperature Range

Operating temperature range of Cam Followers is -20° C to 120° C. However, note that the maximum allowable temperature varies in models indicated in the Table 21.

Table 21 Limitation of operating temperature range

Model / Stud diameter d_1 mm	Class	Cage type: Shield type	Cage type: Sealed type
Miniature Type Cam Followers CFS Thrust Disk Type Miniature Cam Followers CFS…W	d_1=2	−20°C～110°C (1)	–
Standard Type Cam Followers CF…B Thrust Disk Type Cam Followers CF…WB	d_1=3, 4	−20°C～110°C (1)	−20°C～80°C
	d_1=5	−20°C～120°C	−20°C～80°C
Standard Type Cam Followers made of stainless steel CF…FB Thrust Disk Type Cam Followers made of stainless steel CF…FWB	3≦d_1≦5	−20°C～110°C (1)	−20°C～80°C
C-Lube Cam Followers CF…WB…/SG	5≦d_1≦20	–	−15°C～80°C (2)

Note (1) 100° C when used continuously.
(2) Below 60° C is recommended for long use.

Mounting

❶ Make the center line of the mounting hole perpendicular to the Cam Followers movement direction and accurately position and fix it on the side face of the mounting hole with a nut in accordance with the f dimensions in the dimension table. (See Fig. 1) At this point, do not strike the flange head of the Cam Followers directly with a hammer or the like. It may lead to rotation failure or crack.

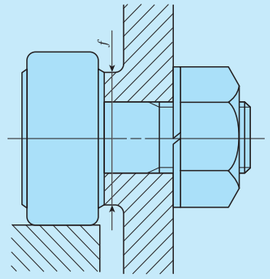


Fig. 1 Seating surface

❷ The IKO mark on the flange head indicates the oil hole location on the raceway. You need to pay attention to this mark so that this oil hole never gets into the loading area when mounting it. Otherwise, product life may become shorter. (See Fig. 2) The hole located in the middle part of the stud perpendicular to the stud center axis is used for greasing or locking.

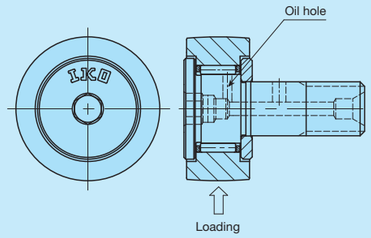


Fig. 2 Oil hole location and loading direction

❸ Tighten the nut to the extent not to exceed the maximum tightening torque specified in the dimension table. With excessive tightening torque, the stud threaded portion may be broken. In addition, use a lock nut, spring washer or self-locking nut as necessary to prevent looseness depending on use conditions.

❹ For Solid Eccentric Stud Type Cam Followers and Eccentric Type Cam Followers, a reference position for adjustment is defined as the IKO mark on the head of stud located in the position specified in the Fig. 3. Use this as a reference. Adjust the outer ring position by rotating it using the hexagon hole on the stud head.Use a nut and a spring washer or the like for fixing of the stud. Be sure to tighten the nut to the extent not to exceed the maximum tightening torque specified in the dimension table.

If it is necessary to maintain exact eccentric adjustment quantity when shock load is applied, it is recommended to make a hole on each stud and eccentric collar through the housing to fix it with a dowel pin as indicated in the Fig. 4. However, the stud with diameter 8 mm (eccentric collar diameter: 11 mm) or less is through-hardened.

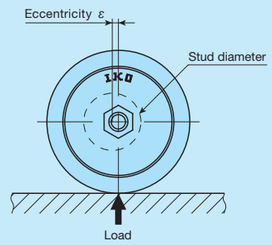


Fig. 3 Reference position for adjustment of Solid Eccentric Stud Type Cam Followers and Eccentric Type Cam Followers

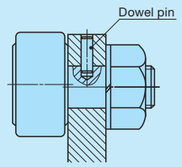


Fig. 4 Mounting example of Solid Eccentric Stud Type Cam Followers

❺ The length of a mounting hole for Eccentric Type Cam Followers must be 0.5 mm or more longer than the B_3 dimensions (eccentric collar width) specified in the dimension table. (See Fig. 5)

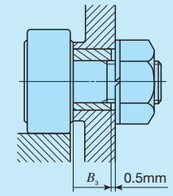


Fig. 5 Length of a mounting hole for Eccentric Type Cam Followers

❻ Eccentric callor is available for Inch series Cam Followers. Eccentric Type Cam Followers, CRE are also available. If required, please contact IKO.

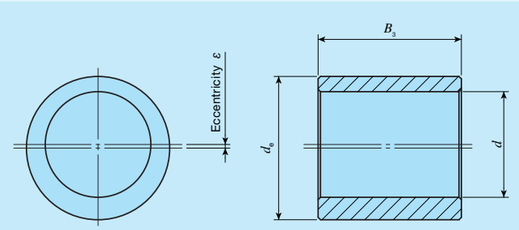


Table 22 Eccentric collars for Inch series Cam Followers

unit: mm

Identifical number of collar	Outside diameter of collar de	Length of collar B_3	Eccentricity ε	Stud dia. d	Applicable Cam Followers
EB 8	6.350(1/4)	6.350(1/4)	0.250	4.826	CR 8 CR 8-1 (V)(B)(UU)(R)
EB10	9.525(3/8)	9.525(3/8)	0.380	6.350(1/4)	CR10 CR10-1 (V)(B)(UU)(R)
EB12	12.700(1/2)	12.700(1/2)	0.380	9.525(3/8)	CR12 CR14 (V)(B)(UU)(R)
EB16	15.875(5/8)	15.875(5/8)	0.760	11.112(7/16)	CR16 CR18 (V)(B)(UU)(R)
EB20	17.450	17.450	0.760	12.700(1/2)	CR20 CR22 (V)(B)(UU)(R)
EB24	22.225(7/8)	22.225(7/8)	0.760	15.875(5/8)	CR24 CR26 (V)(B)(UU)(R)
EB28	25.400(1)	25.400(1)	0.760	19.050(1 3/4)	CR28 CR30 (V)(B)(UU)(R)
EB32	30.150	30.150	0.760	22.225(7/8)	CR32 CR36 (V)(B)(UU)(R)
EB48	44.450(1 3/4)	44.450(1 3/4)	1.520	31.750(1 1/4)	CR48 VUU

❼ Fixing by screw from the upper side is recommended for mounting of Easy Mounting Type Cam Followers.(See Fig. 6)

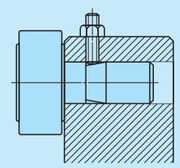


Fig. 6 Mounting example of Easy Mounting Type Cam Followers

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

Precaution for Use

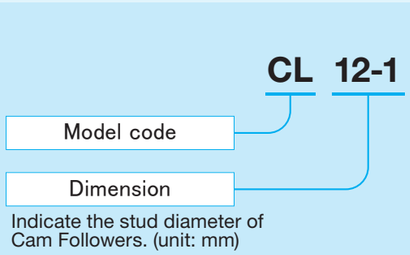
❶ Never clean up a C-Lube Cam Followers with organic solvent or white kerosene with property of removing fat.

❷ To rotate the C-Lube Cam Followers normally, apply load of 1% or more of the basic dynamic load rating.

C-Lube Unit For Cam Followers

❶ Identification number

Described below is an example of an identification number of C-Lube Unit For Cam Followers.



❷ Allowable rotational speed

Cam Followers with C-Lube unit mounted, use 10,000 or lower as reference for the d_1n value.

d_1n value = $d_1 \times n$

where, d_1 : Cam Followers stud diameter mm
n : Rotational speed min^{-1}

❸ Minimum rotational angle

To supply lubrication oil to whole surface of the outer ring outside diameter of Cam Followers, use it under a condition where the Cam Followers outer ring is rotated at least by a turn when the C-Lube unit is mounted.

❹ Operating temperature range

Use the C-Lube unit within the temperature range between -15° C and 80° C.

❺ Mounting

· Set the C-Lube unit perpendicularly to a center line of the Cam Followers stud and fix it along with the Cam Followers with a nut. (See Fig. 7)

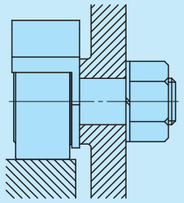


Fig. 7 Mounting of C-Lube unit

· Mount the C-Lube unit in direction other than the direction of loading to the Cam Followers.
In addition, the C-Lube unit has no baffle, so fix it while adjusting the C-Lube unit position in mounting. (See Fig. 8)

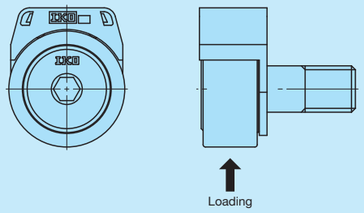


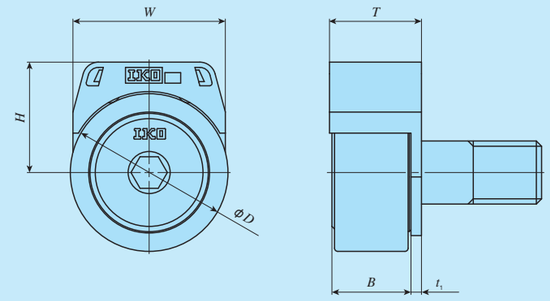
Fig. 8 Loading direction of Cam Followers

· Tighten the nut to fix the C-Lube unit and Cam Followers together to the extent not to exceed the maximum tightening torque specified in the Cam Followers dimension table.
· Use a lock nut, spring washer or special locking nut as necessary to prevent looseness depending on use conditions.

❻ Precaution for use

· Never clean up a C-Lube unit with organic solvent or white kerosene with property of removing fat.
· To avoid damage and lubrication function failure, do not directly apply load onto the C-Lube unit.
· To rotate the Cam Followers normally with the C-Lube unit mounted, apply load of 1% or more of the basic dynamic load rating to the Cam Followers.
· Load applied to the Cam Followers when the C-Lube unit is mounted must be 80% or lower of the maximum allowable static load of the Cam Followers used. Excessive load will deform the C-Lube unit mounting washer, which will loose the Cam Followers fixing nut and shift the C-Lube unit, preventing normal operations.
· Before operations, ensure that lubrication oil is supplied between the Cam Followers outer ring outside surface and the cam guide surface. Lubrication performance of the C-Lube unit is largely affected by conditions of the cam guide surface.
· Avoid operating the C-Lube unit in any environment where capillary lubricating element may be damaged or foreign substances or liquid substance may enter into it.
· As additional oil feeding to the C-Lube unit is not allowed, replace it with new one when lubrication effect is lost.

❼ Dimension table



Identification number	Nominal dimensions mm				Applicable C-Lube Cam Followers		
	W	H	T	t_1	Identification number	Nominal dimensions mm	
						D	B
CL 5	12.4	10.7	12.1	1.5	CF 5 B	13	10
CL 6	15.4	12.6	14	1.5	CF 6 B	16	12.2 max
CL 8	18.4	14.2	14	1.5	CF 8 B	19	12.2 max
CL 10	21	17	15.5	2	CF 10 B	22	13.2 max
CL 10-1	21	19.2	15.5	2	CF 10-1 B	26	13.2 max
CL 12	29	21	17.5	2	CF 12 B	30	15.2 max
CL 12-1	29	22	17.5	2	CF 12-1 B	32	15.2 max
CL 16	33.8	27.4	23.4	2.5	CF 16 B	35	19.6 max
CL 18	38.8	30.4	25.4	2.5	CF 18 B	40	21.6 max
CL 20	45.8	38.4	29.9	3	CF 20 B	52	25.6 max
CL 20-1	45.8	35.4	29.9	3	CF 20-1 B	47	25.6 max

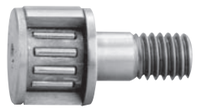
Note (1) A typical identification number is indicated, but is applied to all Standard Type Cam Followers, Thrust Disk Type Cam Followers, C-Lube Cam Followers, Centralized Lubrication Type Cam Followers, and Cylindrical Roller Cam Followers of the same size.
To bring out the maintenance free effect more efficiently, it is recommended to use it combined with the C-Lube Cam Followers.

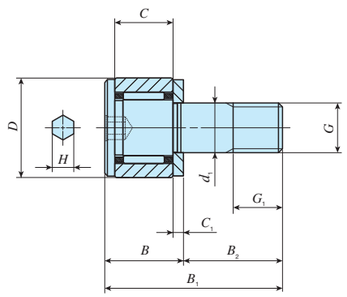
Remark: Load applied to the Cam Followers when the C-Lube unit is mounted must be 80% or lower of the maximum allowable static load of the Cam Followers used. For the maximum allowable static load of each Cam Followers, see the dimension table for each model.

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

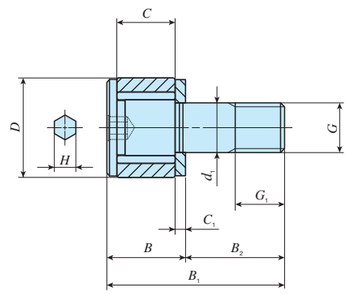
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

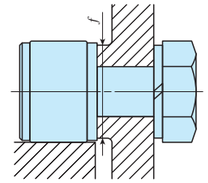




CFS
CFS···F



CFS···V
CFS···FV



Stud diameter mm	Identification number: Caged type	Identification number: Full complement type	Mass (Ref.) g	D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimensions f Minimum mm	Maximum tightening torque N·cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
2	CFS 2	—	0.6	4.5	2.5	2	M2 × 0.4	2	4	8	4	0.7	0.9	4.3	9.1	288	202	202
	—	CFS 2 V														768	734	229
	CFS 2 F	—														230	161	161
	—	CFS 2 FV														614	587	229
2.5	CFS 2.5	—	1	5	3	2.5	M2.5 × 0.45	2.5	4.5	9.5	5	0.7	0.9	4.8	18.7	428	351	351
	—	CFS 2.5 V														1 000	1 080	360
	CFS 2.5 F	—														342	281	281
	—	CFS 2.5 FV														800	862	360
3	CFS 3	—	2	6	4	3	M3 × 0.5	3	5.5	11.5	6	0.7	1.3	5.8	33.5	629	611	484
	—	CFS 3 V														1 420	1 790	484
	CFS 3 F	—														504	488	484
	—	CFS 3 FV														1 140	1 430	484
4	CFS 4	—	4	8	5	4	M4 × 0.7	4	7	15	8	1.0	1.5	7.7	77.7	1 120	1 120	919
	—	CFS 4 V														2 370	3 000	919
	CFS 4 F	—														897	894	894
	—	CFS 4 FV														1 900	2 400	919
5	CFS 5	—	7	10	6	5	M5 × 0.8	5	8	18	10	1.0	2	9.6	158	1 570	1 850	1 570
	—	CFS 5 V														3 180	4 700	1 570
	CFS 5 F	—														1 250	1 480	1 480
	—	CFS 5 FV														2 540	3 760	1 570
6	CFS 6	—	13	12	7	6	M6 × 1	6	9.5	21.5	12	1.2	2.5	11.6	268	2 090	2 200	2 150
	—	CFS 6 V														4 610	6 250	2 150
	CFS 6 F	—														1 670	1 760	1 760
	—	CFS 6 FV														3 690	5 000	2 150

Remarks 1. No oil hole is provided.
2. Grease is pre-packed.
3. A nut is supplied with the stud.

Related Products (Cam Follower)

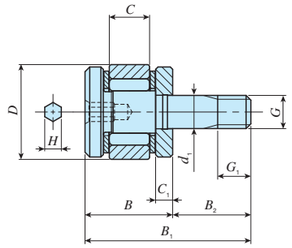
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Thrust Disk Type Miniature Cam Followers

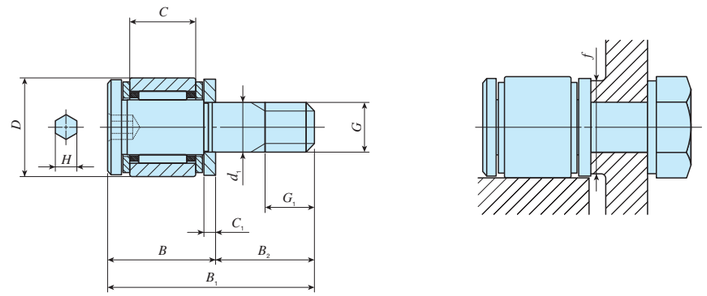
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





CFS1.4 WV



CFS··· W
CFS···FW

Stud diameter mm	Identification number: Caged type	Identification number: Full complement type	Mass (Ref.) g	Nominal dimensions mm: D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimensions f Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
1.4	—	CFS 1.4 WV	0.35	4	1.7	1.4	M1.4 × 0.3	1.4	3.7	7	3.3	0.7	0.9	3.8	3.0	481	385	105
2	CFS 2 W	—	0.6	4.5	2.5	2	M2 × 0.4	2	4.5	8.5	4	0.7	0.9	4.3	9.1	288	202	194
	CFS 2 FW	—														230	161	161
2.5	CFS 2.5 W	—	1	5	3	2.5	M2.5 × 0.45	2.5	5	10	5	0.7	0.9	4.8	18.7	428	351	313
	CFS 2.5 FW	—														342	281	281
3	CFS 3 W	—	2	6	4	3	M3 × 0.5	3	6.5	12.5	6	0.7	1.3	5.8	33.5	629	611	399
	CFS 3 FW	—														504	488	399
4	CFS 4 W	—	4	8	5	4	M4 × 0.7	4	8	16	8	1.0	1.5	7.7	77.7	1 120	1 120	785
	CFS 4 FW	—														897	894	785
5	CFS 5 W	—	7	10	6	5	M5 × 0.8	5	9	19	10	1.0	2	9.6	158	1 570	1 850	1 370
	CFS 5 FW	—														1 250	1 480	1 370
6	CFS 6 W	—	13	12	7	6	M6 × 1	6	10.5	22.5	12	1.2	2.5	11.6	268	2 090	2 200	1 920
	CFS 6 FW	—														1 670	1 760	1 760

Remarks 1. No oil hole is provided.
2. Grease is pre-packed.
3. A nut is supplied with the stud.

Related Products (Cam Follower)

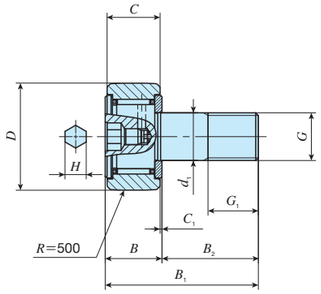
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Standard Type Cam Followers • Caged Type

Selectable product specifications

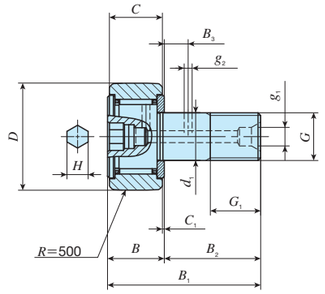
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



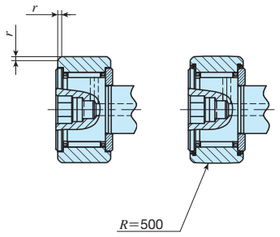


CF··· (F) BR

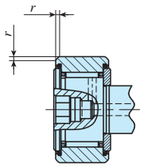
Stud diameter d_1 3-10mm (1)



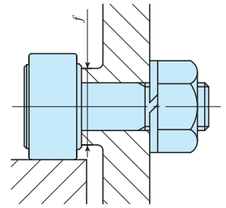
CF··· (F) BR



CF··· (F) B



CF··· (F) BUUR



CF··· (F) BUU

Stud diameter d_1 12-30mm (2)

Stud diameter mm	Identification number: Shield type, Crowned outer ring	Identification number: Shield type, Cylindrical outer ring	Identification number: Sealed type, Crowned outer ring	Identification number: Sealed type, Cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G	G_1	B	B_1	B_2	B_3	C_1	g_1	g_2	H	$r_{s\,min}$ (3)	Mounting dimensions f Minimum mm	Maximum tightening torque N·m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
3	CF 3 BR	CF 3 B	CF 3 BUUR	CF 3 BUU	4.3	10	7	3	M 3×0.5	5	8	17	9	—	0.5	—	—	2	0.2	6.8	0.34	1 500	1 020	384
	CF 3 FBR	CF 3 FB	CF 3 FBUUR	CF 3 FBUU	4.3	10	7	3	M 3×0.5	5	8	17	9	—	0.5	—	—	2	0.2	6.8	0.34	1 200	813	384
4	CF 4 BR	CF 4 B	CF 4 BUUR	CF 4 BUU	7.4	12	8	4	M 4×0.7	6	9	20	11	—	0.5	—	—	2.5	0.3	8.3	0.78	2 070	1 590	834
	CF 4 FBR	CF 4 FB	CF 4 FBUUR	CF 4 FBUU	7.4	12	8	4	M 4×0.7	6	9	20	11	—	0.5	—	—	2.5	0.3	8.3	0.78	1 650	1 270	834
5	CF 5 BR	CF 5 B	CF 5 BUUR	CF 5 BUU	10.3	13	9	5	M 5×0.8	7.5	10	23	13	—	0.5	—	—	3	0.3	9.3	1.6	2 520	2 140	1 260
	CF 5 FBR	CF 5 FB	CF 5 FBUUR	CF 5 FBUU	10.3	13	9	5	M 5×0.8	7.5	10	23	13	—	0.5	—	—	3	0.3	9.3	1.6	1 930	1 730	1 260
6	CF 6 BR	CF 6 B	CF 6 BUUR	CF 6 BUU	18.5	16	11	6	M 6×1	8	12.2max	28.2max	16	—	0.6	—	—	3	0.3	11	2.7	3 660	3 650	1 950
	CF 6 FBR	CF 6 FB	CF 6 FBUUR	CF 6 FBUU	18.5	16	11	6	M 6×1	8	12.2max	28.2max	16	—	0.6	—	—	3	0.3	11	2.7	2 930	2 920	1 950
8	CF 8 BR	CF 8 B	CF 8 BUUR	CF 8 BUU	28.5	19	11	8	M 8×1.25	10	12.2max	32.2max	20	—	0.6	—	—	4	0.3	13	6.5	4 250	4 740	4 620
	CF 8 FBR	CF 8 FB	CF 8 FBUUR	CF 8 FBUU	28.5	19	11	8	M 8×1.25	10	12.2max	32.2max	20	—	0.6	—	—	4	0.3	13	6.5	3 400	3 790	3 790
10	CF 10 BR	CF 10 B	CF 10 BUUR	CF 10 BUU	45	22	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	—	—	4	0.3	16	13.8	5 430	6 890	6 890
	CF 10 FBR	CF 10 FB	CF 10 FBUUR	CF 10 FBUU	45	22	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	—	—	5	0.3	16	13.8	4 340	5 510	5 510
	CF 10-1 BR	CF 10-1 B	CF 10-1 BUUR	CF 10-1 BUU	60	26	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	—	—	4	0.3	16	13.8	5 430	6 890	6 890
	CF 10-1FBR	CF 10-1FB	CF 10-1FBUUR	CF 10-1FBUU	60	26	12	10	M10×1.25	12	13.2max	36.2max	23	—	0.6	—	—	5	0.3	16	13.8	4 340	5 510	5 510
12	CF 12 BR	CF 12 B	CF 12 BUUR	CF 12 BUU	95	30	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	4	3	6	0.6	21	21.9	7 910	9 790	9 790
	CF 12 FBR	CF 12 FB	CF 12 FBUUR	CF 12 FBUU	95	30	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	4	3	6	0.6	21	21.9	6 330	7 830	7 830
	CF 12-1 BR	CF 12-1 B	CF 12-1 BUUR	CF 12-1 BUU	105	32	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	4	3	6	0.6	21	21.9	7 910	9 790	9 790
	CF 12-1FBR	CF 12-1FB	CF 12-1FBUUR	CF 12-1FBUU	105	32	14	12	M12×1.5	13	15.2max	40.2max	25	6	0.6	4	3	6	0.6	21	21.9	6 330	7 830	7 830
16	CF 16 BR	CF 16 B	CF 16 BUUR	CF 16 BUU	170	35	18	16	M16×1.5	17	19.6max	52.1max	32.5	8	0.8	4	3	6	0.6	26	58.5	12 000	18 300	18 300
	CF 16 FBR	CF 16 FB	CF 16 FBUUR	CF 16 FBUU	170	35	18	16	M16×1.5	17	19.6max	52.1max	32.5	8	0.8	4	3	6	0.6	26	58.5	9 620	14 700	14 700
18	CF 18 BR	CF 18 B	CF 18 BUUR	CF 18 BUU	250	40	20	18	M18×1.5	19	21.6max	58.1max	36.5	8	0.8	6	3	8	1	29	86.2	14 800	25 200	25 200
	CF 18 FBR	CF 18 FB	CF 18 FBUUR	CF 18 FBUU	250	40	20	18	M18×1.5	19	21.6max	58.1max	36.5	8	0.8	6	3	8	1	29	86.2	11 800	20 200	20 200
20	CF 20 BR	CF 20 B	CF 20 BUUR	CF 20 BUU	460	52	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	6	4	8	1	34	119	20 700	34 600	34 600
	CF 20 FBR	CF 20 FB	CF 20 FBUUR	CF 20 FBUU	460	52	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	6	4	8	1	34	119	16 500	27 700	27 700
	CF 20-1 BR	CF 20-1 B	CF 20-1 BUUR	CF 20-1 BUU	385	47	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	6	4	8	1	34	119	20 700	34 600	34 600
	CF 20-1FBR	CF 20-1FB	CF 20-1FBUUR	CF 20-1FBUU	385	47	24	20	M20×1.5	21	25.6max	66.1max	40.5	9	0.8	6	4	8	1	34	119	16 500	27 700	27 700
24	CF 24 BR	CF 24 B	CF 24 BUUR	CF 24 BUU	815	62	29	24	M24×1.5	25	30.6max	80.1max	49.5	11	0.8	6	4	12	1	40	215	30 500	52 600	52 000
	CF 24-1 BR	CF 24-1 B	CF 24-1 BUUR	CF 24-1 BUU	1 140	72	29	24	M24×1.5	25	30.6max	80.1max	49.5	11	0.8	6	4	12	1	40	215	30 500	52 600	52 000
30	CF 30 BR	CF 30 B	CF 30 BUUR	CF 30 BUU	1 870	80	35	30	M30×1.5	32	37 max	100 max	63	15	1	6	4	17	1	49	438	45 400	85 100	85 100
	CF 30-1 BR	CF 30-1 B	CF 30-1 BUUR	CF 30-1 BUU	2 030	85	35	30	M30×1.5	32	37 max	100 max	63	15	1	6	4	17	1	49	438	45 400	85 100	85 100
	CF 30-2 BR	CF 30-2 B	CF 30-2 BUUR	CF 30-2 BUU	2 220	90	35	30	M30×1.5	32	37 max	100 max	63	15	1	6	4	17	1	49	438	45 400	85 100	85 100

Note (1) No oil hole is provided if the stud diameter d_1 is 4 mm or less. An oil hole (grease feed plug) is provided for the head if the stud diameter d_1 is between 5 and 10 mm.

(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outside surface and the end surface of the stud.

(3) This represents the minimum tolerance dimensions of the chamfer dimensions r.

Remark: 1. Grease is pre-packed if the stud diameter d_1 of the shield type is 10 mm or less or if the seal structure is the sealed type. As for the others, grease is not pre-packed. Use the product with appropriate lubrication.

2. A nut is supplied with the stud.

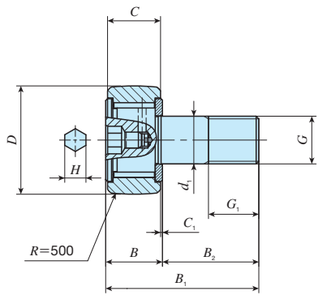
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1mm=0.03937inch

IKO Standard Type Cam Followers • Full Complement Type

Selectable product specifications

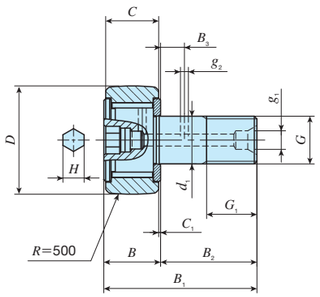
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





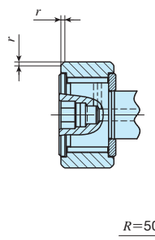
CF···VBR

Stud diameter d_1 6-10mm (1)

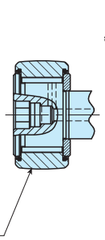


CF···VBR

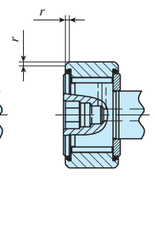
Stud diameter d_1 12-30mm (2)



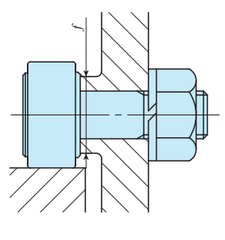
CF···VB



CF···VBUUR



CF···VBUU



Stud diameter mm	Identification number: Shield type, Crowned outer ring	Identification number: Shield type, Cylindrical outer ring	Identification number: Sealed type, Crowned outer ring	Identification number: Sealed type, Cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	H	$r_{s\,min}$ (3)	Mounting dimensions f Minimum mm	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
6	CF 6 VBR	CF 6 VB	CF 6 VBUUR	CF 6 VBUU	19	16	11	6	M 6 × 1	8	12.2	28.2	16	—	0.6	—	—	3	0.3	11	2.7	6 980	8 500	1 950
8	CF 8 VBR	CF 8 VB	CF 8 VBUUR	CF 8 VBUU	29	19	11	8	M 8 × 1.25	10	12.2	32.2	20	—	0.6	—	—	4	0.3	13	6.5	8 170	11 200	4 620
10	CF 10 VBR	CF 10 VB	CF 10 VBUUR	CF 10 VBUU	46	22	12	10	M10 × 1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	16	13.8	9 570	14 500	8 650
	CF 10-1 VBR	CF 10-1 VB	CF 10-1 VBUUR	CF 10-1 VBUU	61	26	12	10	M10 × 1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	16	13.8	9 570	14 500	8 650
12	CF 12 VBR	CF 12 VB	CF 12 VBUUR	CF 12 VBUU	97	30	14	12	M12 × 1.5	13	15.2	40.2	25	6	0.6	4	3	6	0.6	21	21.9	13 500	19 700	13 200
	CF 12-1 VBR	CF 12-1 VB	CF 12-1 VBUUR	CF 12-1 VBUU	107	32	14	12	M12 × 1.5	13	15.2	40.2	25	6	0.6	4	3	6	0.6	21	21.9	13 500	19 700	13 200
16	CF 16 VBR	CF 16 VB	CF 16 VBUUR	CF 16 VBUU	173	35	18	16	M16 × 1.5	17	19.6	52.1	32.5	8	0.8	4	3	6	0.6	26	58.5	20 700	37 600	23 200
18	CF 18 VBR	CF 18 VB	CF 18 VBUUR	CF 18 VBUU	255	40	20	18	M18 × 1.5	19	21.6	58.1	36.5	8	0.8	6	3	8	1	29	86.2	25 300	51 300	31 100
20	CF 20 VBR	CF 20 VB	CF 20 VBUUR	CF 20 VBUU	465	52	24	20	M20 × 1.5	21	25.6	66.1	40.5	9	0.8	6	4	8	1	34	119	33 200	64 500	37 500
	CF 20-1 VBR	CF 20-1 VB	CF 20-1 VBUUR	CF 20-1 VBUU	390	47	24	20	M20 × 1.5	21	25.6	66.1	40.5	9	0.8	6	4	8	1	34	119	33 200	64 500	37 500
24	CF 24 VBR	CF 24 VB	CF 24 VBUUR	CF 24 VBUU	820	62	29	24	M24 × 1.5	25	30.6	80.1	49.5	11	0.8	6	4	12	1	40	215	46 600	92 000	52 000
	CF 24-1 VBR	CF 24-1 VB	CF 24-1 VBUUR	CF 24-1 VBUU	1 140	72	29	24	M24 × 1.5	25	30.6	80.1	49.5	11	0.8	6	4	12	1	40	215	46 600	92 000	52 000
30	CF 30 VBR	CF 30 VB	CF 30 VBUUR	CF 30 VBUU	1 870	80	35	30	M30 × 1.5	32	37	100	63	15	1	6	4	17	1	49	438	67 700	144 000	85 900
	CF 30-1 VBR	CF 30-1 VB	CF 30-1 VBUUR	CF 30-1 VBUU	2 030	85	35	30	M30 × 1.5	32	37	100	63	15	1	6	4	17	1	49	438	67 700	144 000	85 900
	CF 30-2 VBR	CF 30-2 VB	CF 30-2 VBUUR	CF 30-2 VBUU	2 220	90	35	30	M30 × 1.5	32	37	100	63	15	1	6	4	17	1	49	438	67 700	144 000	85 900

Note (1) An oil hole (grease feed plug) is provided for the stud head.
(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outside surface and the end surface of the stud.
(3) This represents the minimum tolerance dimensions of the chamfer dimensions r.

Remark: 1. Grease is pre-packed.
2. A nut is supplied with the stud.

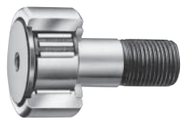
Related Products (Cam Follower)

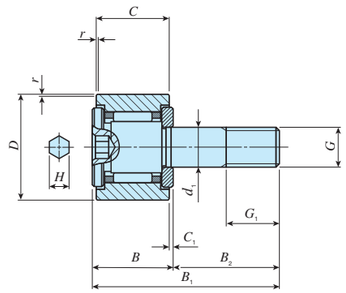
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Cam Followers G

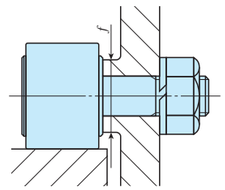
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





CF···G



Stud diameter mm	Identification number Caged type	Mass (Ref.) g	Nominal dimensions mm D	C	d_1	G	G_1	B max	B_1 max	B_2	C_1	H	$r_{s\,min}$ (1)	Mounting related dimensions f Minimum mm	Radial internal clearance μm Minimum	Maximum	Maximum tightening torque N·m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static Load N
6	CF 6 G	19.5	16	11	6	M 6 ×1	8	12.2	28.2	16	0.6	3	0.3	11	5	20	2.7	3 660	3 650	1 950
8	CF 8 G	29.5	19	11	8	M 8 ×1.25	10	12.2	32.2	20	0.6	4	0.3	13	5	25	6.5	4 250	4 740	4 620
10	CF 10 G	47.5	22	12	10	M10 ×1.25	12	13.2	36.2	23	0.6	4	0.3	16	5	25	13.8	5 430	6 890	6 890
	CF 10-1 G	61.5	26	12	10	M10 ×1.25	12	13.2	36.2	23	0.6	4	0.3	16	5	25	13.8	5 430	6 890	6 890
12	CF 12 G	95.0	30	14	12	M12 ×1.5	13	15.2	40.2	25	0.6	6	0.6	21	5	25	23.9	7 910	9 790	9 790
	CF 12-1 G	105	32	14	12	M12 ×1.5	13	15.2	40.2	25	0.6	6	0.6	21	5	25	23.9	7 910	9 790	9 790
16	CF 16 G	175	35	18	16	M16 ×1.5	17	19.6	52.1	32.5	0.8	6	0.6	26	10	30	61.1	12 000	18 300	18 300
18	CF 18 G	255	40	20	18	M18 ×1.5	19	21.6	58.1	36.5	0.8	8	1	29	10	30	89.2	14 800	25 200	25 200
20	CF 20 G	470	52	24	20	M20 ×1.5	21	25.6	66.1	40.5	0.8	8	1	34	10	30	125	20 700	34 600	34 600
	CF 20-1 G	400	47	24	20	M20 ×1.5	21	25.6	66.1	40.5	0.8	8	1	34	10	30	125	20 700	34 600	34 600

Note (1) This represents the minimum tolerance dimensions of the chamfer dimensions r.

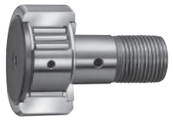
1N≒0.102kgf

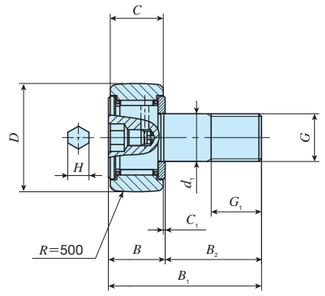
Remark: 1. Oil can not be re-fed to this bearing for structural reasons. When oil re-feeding is necessary, use IKO Standard Type Cam Followers.
2. Grease is pre-packed.

IKO Thrust Disk Type Cam Followers

Selectable product specifications

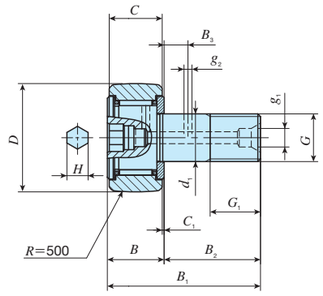
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





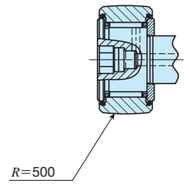
CF··· (F) WBR

Stud diameter d_1 3-10mm (1)

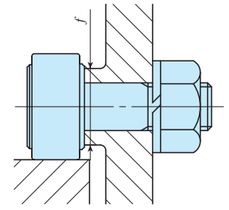


CF···WBR

Stud diameter d_1 12-20mm (2)



CF··· (F) WBUUR



Stud diameter mm	Identification number Shield type	Identification number Sealed type	Mass (Ref.) g	Nominal dimensions mm D	C	d_1	G	G_1	B	B_1	B_2	B_3	C_1	g_1	g_2	H	Mounting dimensions f Minimum mm	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
3	CF 3 WBR	CF 3 WBUUR	4.3	10	7	3	M 3 × 0.5	5	8	17	9	—	0.5	—	—	2	6.8	0.34	1 500	1 020	384
	CF 3 FWBR	CF 3 FWBUUR	4.3	10	7	3	M 3 × 0.5	5	8	17	9	—	0.5	—	—	2	6.8	0.34	1 200	813	384
4	CF 4 WBR	CF 3 WBUUR	7.4	12	8	4	M 4 × 0.7	6	9	20	11	—	0.5	—	—	2.5	8.3	0.78	2 070	1 590	834
	CF 4 FWBR	CF 3 FWBUUR	7.4	12	8	4	M 4 × 0.7	6	9	20	11	—	0.5	—	—	2.5	8.3	0.78	1 650	1 270	834
5	CF 5 WBR	CF 5 WBUUR	10.3	13	9	5	M 5 × 0.8	7.5	10	23	13	—	0.5	—	—	3	9.3	1.6	2 520	2 140	1 260
	CF 5 FWBR	CF 5 FWBUUR	10.3	13	9	5	M 5 × 0.8	7.5	10	23	13	—	0.5	—	—	3	9.3	1.6	1 930	1 730	1 260
6	CF 6 WBR	CF 6 WBUUR	18.5	16	11	6	M 6 × 1	8	12.2 max	28.2 max	16	—	0.6	—	—	3	11	2.7	3 660	3 650	1 950
8	CF 8 WBR	CF 8 WBUUR	28.5	19	11	8	M 8 × 1.25	10	12.2 max	32.2 max	20	—	0.6	—	—	4	13	6.5	4 250	4 740	4 620
10	CF 10 WBR	CF 10 WBUUR	45	22	12	10	M10 × 1.25	12	13.2 max	36.2 max	23	—	0.6	—	—	4	16	13.8	5 430	6 890	6 890
	CF 10-1 WBR	CF 10-1 WBUUR	60	26	12	10	M10 × 1.25	12	13.2 max	36.2 max	23	—	0.6	—	—	4	16	13.8	5 430	6 890	6 890
12	CF 12 WBR	CF 12 WBUUR	95	30	14	12	M12 × 1.5	13	15.2 max	40.2 max	25	6	0.6	4	3	6	21	21.9	7 910	9 790	9 790
	CF 12-1 WBR	CF 12-1 WBUUR	105	32	14	12	M12 × 1.5	13	15.2 max	40.2 max	25	6	0.6	4	3	6	21	21.9	7 910	9 790	9 790
16	CF 16 WBR	CF 16 WBUUR	170	35	18	16	M16 × 1.5	17	19.6 max	52.1 max	32.5	8	0.8	4	3	6	26	58.5	12 000	18 300	18 300
18	CF 18 WBR	CF 18 WBUUR	250	40	20	18	M18 × 1.5	19	21.6 max	58.1 max	36.5	8	0.8	6	3	8	29	86.2	14 800	25 200	25 200
20	CF 20 WBR	CF 20 WBUUR	460	52	24	20	M20 × 1.5	21	25.6 max	66.1 max	40.5	9	0.8	6	4	8	34	119	20 700	34 600	34 600
	CF 20-1 WBR	CF 20-1 WBUUR	385	47	24	20	M20 × 1.5	21	25.6 max	66.1 max	40.5	9	0.8	6	4	8	34	119	20 700	34 600	34 600

Note (1) No oil hole is provided if the stud diameter d_1 is 4 mm or less. An oil hole (grease feed plug) is provided for the head if the stud diameter d_1 is between 5 and 10 mm.

(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outside surface and the end surface of the stud.

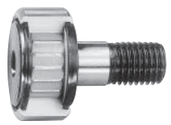
Remark: 1. Grease is pre-packed if the stud diameter d_1 of the shield type is 10 mm or less or if the seal structure is the sealed type. As for the others, grease is not pre-packed. Use the product with appropriate lubrication.

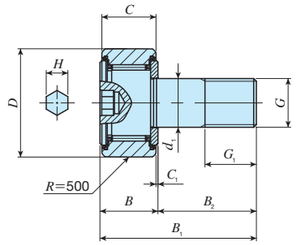
2. A nut is supplied with the stud.

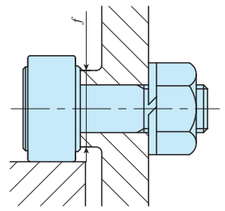
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring







Stud diameter mm	Identification number	Mass (Ref.) g	Nominal dimensions mm D	C	d_1	G	G_1	B	B_1	B_2	C_1	H	Mounting dimensions f Minimum mm	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
5	CF 5 WBUUR/SG	10.3	13	9	5	M 5 × 0.8	7.5	10	23	13	0.5	3	9.3	1.6	2 520	2 140	1 260
6	CF 6 WBUUR/SG	18.5	16	11	6	M 6 × 1	8	12.2 max	28.2 max	16	0.6	3	11	2.7	3 660	3 650	1 950
8	CF 8 WBUUR/SG	28.5	19	11	8	M 8 × 1.25	10	12.2 max	32.2 max	20	0.6	4	13	6.5	4 250	4 740	4 620
10	CF 10 WBUUR/SG	45	22	12	10	M10 × 1.25	12	13.2 max	36.2 max	23	0.6	4	16	13.8	5 430	6 890	6 890
	CF 10-1 WBUUR/SG	60	26	12	10	M10 × 1.25	12	13.2 max	36.2 max	23	0.6	4	16	13.8	5 430	6 890	6 890
12	CF 12 WBUUR/SG	95	30	14	12	M12 × 1.5	13	15.2 max	40.2 max	25	0.6	6	21	21.9	7 910	9 790	9 790
	CF 12-1 WBUUR/SG	105	32	14	12	M12 × 1.5	13	15.2 max	40.2 max	25	0.6	6	21	21.9	7 910	9 790	9 790
16	CF 16 WBUUR/SG	170	35	18	16	M16 × 1.5	17	19.6 max	52.1 max	32.5	0.8	6	26	58.5	12 000	18 300	18 300
18	CF 18 WBUUR/SG	250	40	20	18	M18 × 1.5	19	21.6 max	58.1 max	36.5	0.8	8	29	86.2	14 800	25 200	25 200
20	CF 20 WBUUR/SG	460	52	24	20	M20 × 1.5	21	25.6 max	66.1 max	40.5	0.8	8	34	119	20 700	34 600	34 600
	CF 20-1 WBUUR/SG	385	47	24	20	M20 × 1.5	21	25.6 max	66.1 max	40.5	0.8	8	34	119	20 700	34 600	34 600

Remark: 1. No oil hole is provided.
2. A nut is supplied with the stud.

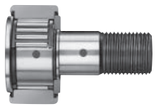
Related Products (Cam Follower)

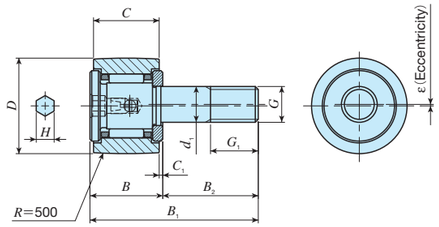
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Solid Eccentric Stud Type Cam Followers

Selectable product specifications

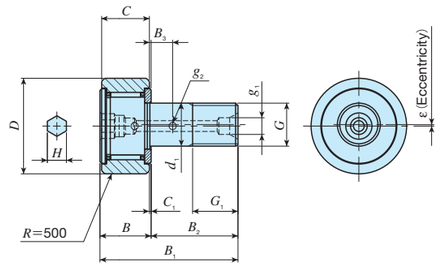
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





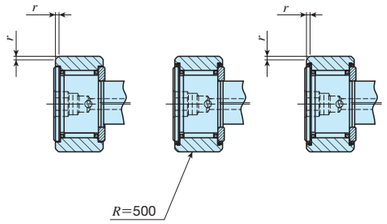
CFES···BR

Stud diameter d_1 6-10mm (1)



CFES···BR

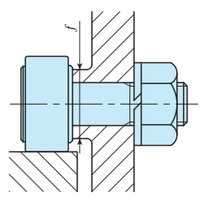
Stud diameter d_1 12-18mm (2)



CFES···B

CFES···BUUR

CFES···BUU



Stud diameter mm	Identification number: Shield type, Crowned outer ring	Identification number: Shield type, Cylindrical outer ring	Identification number: Sealed type, Crowned outer ring	Identification number: Sealed type, Cylindrical outer ring	Mass (Ref.) g	Nominal dimensions mm: D	C	d_1	G	G_1	B max	B_1 max	B_2	B_3	C_1	g_1	g_2	H	$r_{s\,min}$ (3)	Eccentricity ε	Mounting dimensions f Minimum mm	Maximum tightening torque N·m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
6	CFES 6 BR	CFES 6 B	CFES 6 BUUR	CFES 6 BUU	18.5	16	11	6	M 6 × 1	8	12.2	28.2	16	—	0.6	—	—	3	0.3	0.25	11	2.7	3 660	3 650	1 980
8	CFES 8 BR	CFES 8 B	CFES 8 BUUR	CFES 8 BUU	28.5	19	11	8	M 8 × 1.25	10	12.2	32.2	20	—	0.6	—	—	4	0.3	0.25	13	6.5	4 250	4 740	4 670
10	CFES 10 BR	CFES 10 B	CFES 10 BUUR	CFES 10 BUU	45	22	12	10	M10 × 1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	0.3	16	13.8	5 430	6 890	6 890
	CFES 10-1 BR	CFES 10-1 B	CFES 10-1 BUUR	CFES 10-1 BUU	60	26	12	10	M10 × 1.25	12	13.2	36.2	23	—	0.6	—	—	4	0.3	0.3	16	13.8	5 430	6 890	6 890
12	CFES 12 BR	CFES 12 B	CFES 12 BUUR	CFES 12 BUU	95	30	14	12	M12 × 1.5	13	15.2	40.2	25	6	0.6	4	3	6	0.6	0.4	21	21.9	7 910	9 790	9 790
	CFES 12-1 BR	CFES 12-1 B	CFES 12-1 BUUR	CFES 12-1 BUU	105	32	14	12	M12 × 1.5	13	15.2	40.2	25	6	0.6	4	3	6	0.6	0.4	21	21.9	7 910	9 790	9 790
16	CFES 16 BR	CFES 16 B	CFES 16 BUUR	CFES 16 BUU	170	35	18	16	M16 × 1.5	17	19.6	52.1	32.5	8	0.8	4	3	6	0.6	0.5	26	58.5	12 000	18 300	18 300
18	CFES 18 BR	CFES 18 B	CFES 18 BUUR	CFES 18 BUU	250	40	20	18	M18 × 1.5	19	21.6	58.1	36.5	8	0.8	6	3	8	1	0.6	29	86.2	14 800	25 200	25 200

Note (1) An oil hole (grease feed plug) is provided for the stud head.
(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outside surface and the end surface of the stud.
(3) This represents the minimum tolerance dimensions of the chamfer dimensions r.

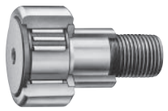
Remark: 1. Grease is pre-packed if the stud diameter d_1 of the shield type is 10 mm or less or if the seal structure is the sealed type. As for the others, grease is not pre-packed. Use the product with appropriate lubrication.
2. A nut is supplied with the stud.

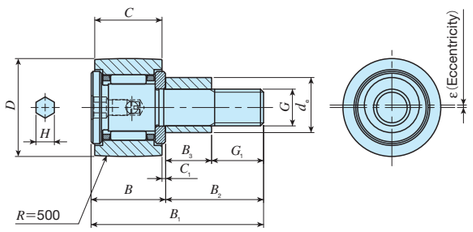
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Eccentric Type Cam Followers • Caged Type

Selectable product specifications

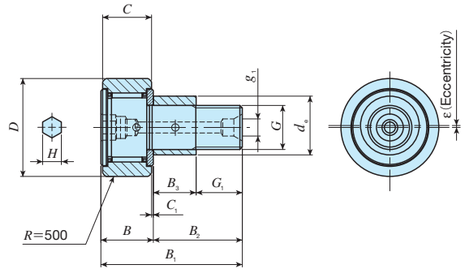
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	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





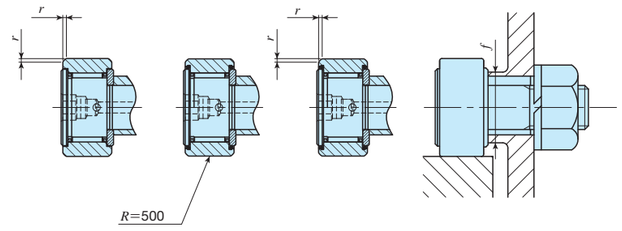
CFE···BR

Eccentric collar diameter d_e 9-13mm (1)



CFE···BR

Eccentric collar diameter d_e 16-41mm (2)



CFE···B CFE···BUUR CFE···BUU

Eccentric collar outside diameter	Identification number: Shield type		Identification number: Sealed type		Mass (Ref.)	Nominal dimensions mm												Eccentricity	Mounting dimensions	Maximum tightening torque	Basic dynamic load rating	Basic static load rating	Maximum allowable static load
						D	C	d_e		G	B_3	B max	B_1 max	B_2	C_1	g_1	G_1	H	$r_{s\,min}$ (3)	ε	f Minimum	C	C_0	
mm	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring	g																N · m	N	N	N
9	CFE 6 BR	CFE 6 B	CFE 6 BUUR	CFE 6 BUU	20.5	16	11	9		M 6 × 1	7.5	12.2	28.2	16	0.6	—	8.5	3	0.3	0.4	11	2.7	3 660	3 650	1 950
11	CFE 8 BR	CFE 8 B	CFE 8 BUUR	CFE 8 BUU	32	19	11	11		M 8 × 1.25	9.5	12.2	32.2	20	0.6	—	10.5	4	0.3	0.4	13	6.5	4 250	4 740	4 620
13	CFE 10 BR	CFE 10 B	CFE 10 BUUR	CFE 10 BUU	49.5	22	12	13		M10 × 1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	5 430	6 890	6 890
	CFE 10-1 BR	CFE 10-1 B	CFE 10-1 BUUR	CFE 10-1 BUU	65	26	12	13		M10 × 1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	5 430	6 890	6 890
16	CFE 12 BR	CFE 12 B	CFE 12 BUUR	CFE 12 BUU	105	30	14	16		M12 × 1.5	11.5	15.2	40.2	25	0.6	4	13.5	6	0.6	0.8	21	21.9	7 910	9 790	9 790
	CFE 12-1 BR	CFE 12-1 B	CFE 12-1 BUUR	CFE 12-1 BUU	115	32	14	16		M12 × 1.5	11.5	15.2	40.2	25	0.6	4	13.5	6	0.6	0.8	21	21.9	7 910	9 790	9 790
22	CFE 16 BR	CFE 16 B	CFE 16 BUUR	CFE 16 BUU	190	35	18	22		M16 × 1.5	15.5	19.6	52.1	32.5	0.8	4	17	6	0.6	0.8	26	58.5	12 000	18 300	18 300
24	CFE 18 BR	CFE 18 B	CFE 18 BUUR	CFE 18 BUU	280	40	20	24		M18 × 1.5	17.5	21.6	58.1	36.5	0.8	6	19	8	1	0.8	29	86.2	14 800	25 200	25 200
27	CFE 20 BR	CFE 20 B	CFE 20 BUUR	CFE 20 BUU	500	52	24	27		M20 × 1.5	19.5	25.6	66.1	40.5	0.8	6	21	8	1	0.8	34	119	20 700	34 600	34 600
	CFE 20-1 BR	CFE 20-1 B	CFE 20-1 BUUR	CFE 20-1 BUU	425	47	24	27		M20 × 1.5	19.5	25.6	66.1	40.5	0.8	6	21	8	1	0.8	34	119	20 700	34 600	34 600
33	CFE 24 BR	CFE 24 B	CFE 24 BUUR	CFE 24 BUU	895	62	29	33		M24 × 1.5	25.5	30.6	80.1	49.5	0.8	6	24	12	1	0.8	40	215	30 500	52 600	52 000
	CFE 24-1 BR	CFE 24-1 B	CFE 24-1 BUUR	CFE 24-1 BUU	1 220	72	29	33		M24 × 1.5	25.5	30.6	80.1	49.5	0.8	6	24	12	1	0.8	40	215	30 500	52 600	52 000
41	CFE 30 BR	CFE 30 B	CFE 30 BUUR	CFE 30 BUU	2 030	80	35	41		M30 × 1.5	32.5	37	100	63	1	6	30.5	17	1	1.5	49	438	45 400	85 100	85 100
	CFE 30-1 BR	CFE 30-1 B	CFE 30-1 BUUR	CFE 30-1 BUU	2 190	85	35	41		M30 × 1.5	32.5	37	100	63	1	6	30.5	17	1	1.5	49	438	45 400	85 100	85 100
	CFE 30-2 BR	CFE 30-2 B	CFE 30-2 BUUR	CFE 30-2 BUU	2 380	90	35	41		M30 × 1.5	32.5	37	100	63	1	6	30.5	17	1	1.5	49	438	45 400	85 100	85 100

Note (1) An oil hole (grease feed plug) is provided for the stud head.
(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outer diameter and the end.
(3) This represents the minimum tolerance dimensions of the chamfer dimensions r.

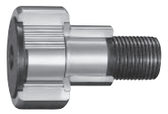
Remark: 1. Grease is pre-packed if the stud thread diameter G of the shield type is 10 mm or less or if the seal structure is the sealed type. As for the others, grease is not pre-packed. Use the product with appropriate lubrication.
2. A nut is supplied with the stud.

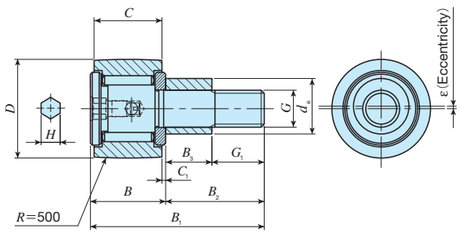
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Eccentric Type Cam Followers • Full Complement Type

Selectable product specifications

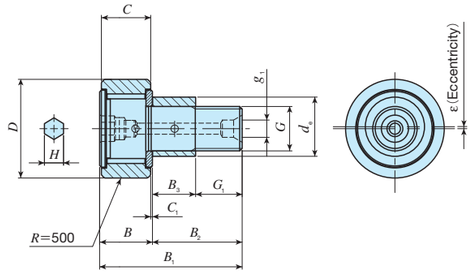
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	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





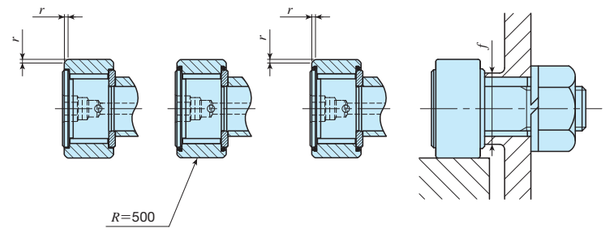
CFE···VBR

Eccentric collar diameter d_e 9-13mm (1)



CFE···VBR

Eccentric collar diameter d_e 16-41mm (2)



CFE···VB

CFE···VBUUR

CFE···VBUU

Eccentric collar outside diameter mm	Identification number: Shield type, Crowned outer ring	Identification number: Shield type, Cylindrical outer ring	Identification number: Sealed type, Crowned outer ring	Identification number: Sealed type, Cylindrical outer ring	Mass (Ref.) g	D	C	d_e	G	B_3	B max	B_1 max	B_2	C_1	g_1	G_1	H	$r_{s\,min}$ (3)	Eccentricity ε	Mounting dimensions f Minimum mm	Maximum tightening torque N·m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
9	CFE 6 VBR	CFE 6 VB	CFE 6 VBUUR	CFE 6 VBUU	21	16	11	9	M 6 × 1	7.5	12.2	28.2	16	0.6	—	8.5	3	0.3	0.4	11	2.7	6 980	8 500	1 950
11	CFE 8 VBR	CFE 8 VB	CFE 8 VBUUR	CFE 8 VBUU	32.5	19	11	11	M 8 × 1.25	9.5	12.2	32.2	20	0.6	—	10.5	4	0.3	0.4	13	6.5	8 170	11 200	4 620
13	CFE 10 VBR	CFE 10 VB	CFE 10 VBUUR	CFE 10 VBUU	50.5	22	12	13	M10 × 1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	9 570	14 500	8 650
	CFE 10-1 VBR	CFE 10-1 VB	CFE 10-1 VBUUR	CFE 10-1 VBUU	66	26	12	13	M10 × 1.25	10.5	13.2	36.2	23	0.6	—	12.5	4	0.3	0.4	16	13.8	9 570	14 500	8 650
16	CFE 12 VBR	CFE 12 VB	CFE 12 VBUUR	CFE 12 VBUU	107	30	14	16	M12 × 1.5	11.5	15.2	40.2	25	0.6	4	13.5	6	0.6	0.4	21	21.9	13 500	19 700	13 200
	CFE 12-1 VBR	CFE 12-1 VB	CFE 12-1 VBUUR	CFE 12-1 VBUU	117	32	14	16	M12 × 1.5	11.5	15.2	40.2	25	0.6	4	13.5	6	0.6	0.4	21	21.9	13 500	19 700	13 200
22	CFE 16 VBR	CFE 16 VB	CFE 16 VBUUR	CFE 16 VBUU	193	35	18	22	M16 × 1.5	15.5	19.6	52.1	32.5	0.8	4	17	6	0.6	0.8	26	58.5	20 700	37 600	23 200
24	CFE 18 VBR	CFE 18 VB	CFE 18 VBUUR	CFE 18 VBUU	285	40	20	24	M18 × 1.5	17.5	21.6	58.1	36.5	0.8	6	19	8	1	0.8	29	86.2	25 300	51 300	31 100
27	CFE 20 VBR	CFE 20 VB	CFE 20 VBUUR	CFE 20 VBUU	505	52	24	27	M20 × 1.5	19.5	25.6	66.1	40.5	0.8	6	21	8	1	0.8	34	119	33 200	64 500	37 500
	CFE 20-1 VBR	CFE 20-1 VB	CFE 20-1 VBUUR	CFE 20-1 VBUU	430	47	24	27	M20 × 1.5	19.5	25.6	66.1	40.5	0.8	6	21	8	1	0.8	34	119	33 200	64 500	37 500
33	CFE 24 VBR	CFE 24 VB	CFE 24 VBUUR	CFE 24 VBUU	900	62	29	33	M24 × 1.5	25.5	30.6	80.1	49.5	0.8	6	24	12	1	0.8	40	215	46 600	92 000	52 000
	CFE 24-1 VBR	CFE 24-1 VB	CFE 24-1 VBUUR	CFE 24-1 VBUU	1 220	72	29	33	M24 × 1.5	25.5	30.6	80.1	49.5	0.8	6	24	12	1	0.8	40	215	46 600	92 000	52 000
41	CFE 30 VBR	CFE 30 VB	CFE 30 VBUUR	CFE 30 VBUU	2 030	80	35	41	M30 × 1.5	32.5	37	100	63	1	6	30.5	17	1	1.5	49	438	67 700	144 000	85 900
	CFE 30-1 VBR	CFE 30-1 VB	CFE 30-1 VBUUR	CFE 30-1 VBUU	2 190	85	35	41	M30 × 1.5	32.5	37	100	63	1	6	30.5	17	1	1.5	49	438	67 700	144 000	85 900
	CFE 30-2 VBR	CFE 30-2 VB	CFE 30-2 VBUUR	CFE 30-2 VBUU	2 380	90	35	41	M30 × 1.5	32.5	37	100	63	1	6	30.5	17	1	1.5	49	438	67 700	144 000	85 900

Note (1) An oil hole (grease feed plug) is provided for the stud head.

(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outside surface and the end surface of the stud.

(3) This represents the minimum tolerance dimensions of the chamfer dimensions r.

Remark: 1. Grease is pre-packed.

2. A nut is supplied with the stud.

Related Products (Cam Follower)

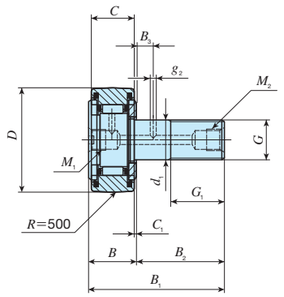
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Centralized Lubrication Type Cam Followers

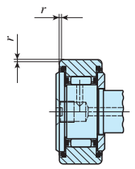
Selectable product specifications

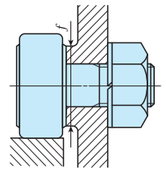
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Sealed type
Shape of outer ring outside surface	FU1	Cylindrical outer ring
	RU1	Crowned outer ring





CF-RU1





CF-FU1

Stud diameter mm	Identification number: Crowned outer ring	Identification number: Cylindrical outer ring	Mass (Ref.) g	Nominal dimensions mm: D	C	d_1	G	G_1	B max	B_1 max	B_2	B_3	C_1	g_2	M_1	M_2	$r_{s\,min}$ (1)	Mounting dimensions f Minimum mm	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
6	CF-RU1- 6	CF-FU1- 6	18.5	16	11	6	M 6 × 1	8	12.2	28.2	16	—	0.6	—	M6 × 0.75	—	0.3	11	2.7	3 660	3 650	1 950
8	CF-RU1- 8	CF-FU1- 8	28.5	19	11	8	M 8 × 1.25	10	12.2	32.2	20	—	0.6	—			0.3	13	6.5	4 250	4 740	4 620
10	CF-RU1-10	CF-FU1-10	45	22	12	10	M10 × 1.25	12	13.2	36.2	23	—	0.6	—			0.3	16	13.8	5 430	6 890	6 890
	CF-RU1-10-1	CF-FU1-10-1	60	26	12	10	M10 × 1.25	12	13.2	36.2	23	—	0.6	—			0.3	16	13.8	5 430	6 890	6 890
12	CF-RU1-12	CF-FU1-12	95	30	14	12	M12 × 1.5	13	15.2	40.2	25	—	0.6	—			0.6	21	23.9	7 910	9 790	9 790
	CF-RU1-12-1	CF-FU1-12-1	105	32	14	12	M12 × 1.5	13	15.2	40.2	25	—	0.6	—			0.6	21	23.9	7 910	9 790	9 790
16	CF-RU1-16	CF-FU1-16	170	35	18	16	M16 × 1.5	17	19.6	52.1	32.5	8	0.8	3			0.6	26	58.5	12 000	18 300	18 300
18	CF-RU1-18	CF-FU1-18	250	40	20	18	M18 × 1.5	19	21.6	58.1	36.5	8	0.8	3			1	29	86.2	14 800	25 200	25 200
20	CF-RU1-20	CF-FU1-20	460	52	24	20	M20 × 1.5	21	25.6	66.1	40.5	9	0.8	4			1	34	119.0	20 700	34 600	34 600
	CF-RU1-20-1	CF-FU1-20-1	385	47	24	20	M20 × 1.5	21	25.6	66.1	40.5	9	0.8	4			1	34	119	20 700	34 600	34 600
24	CF-RU1-24	CF-FU1-24	815	62	29	24	M24 × 1.5	25	30.6	80.1	49.5	11	0.8	4	PT 1/8	PT 1/8	1	40	215	30 500	52 600	52 000
	CF-RU1-24-1	CF-FU1-24-1	1 140	72	29	24	M24 × 1.5	25	30.6	80.1	49.5	11	0.8	4			1	40	215	30 500	52 600	52 000
30	CF-RU1-30	CF-FU1-30	1 870	80	35	30	M30 × 1.5	32	37	100	63	15	1	4			1	49	438	45 400	85 100	85 100
	CF-RU1-30-1	CF-FU1-30-1	2 030	85	35	30	M30 × 1.5	32	37	100	63	15	1	4			1	49	438	45 400	85 100	85 100
	CF-RU1-30-2	CF-FU1-30-2	2 220	90	35	30	M30 × 1.5	32	37	100	63	15	1	4			1	49	438	45 400	85 100	85 100

Note (1) This represents the minimum tolerance dimensions of the chamfer dimensions r.

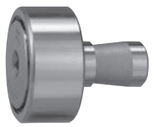
Remarks 1. A tap hole for piping is provided only for the stud head if the stud diameter d_1 is 12 mm or less. As for the others, a tap hole for piping is provided for the stud head and the end.
2. Grease is pre-packed.
3. A nut is supplied with the stud.

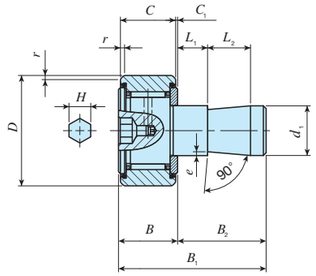
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1mm=0.03937inch

IKO Easy Mounting Type Cam Followers

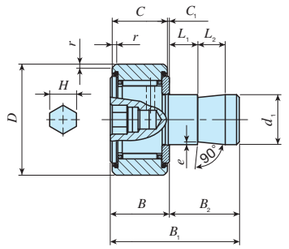
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring

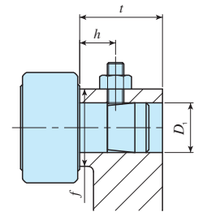




Stud diameter d_1 6-10mm (1)



Stud diameter d_1 12-20mm (2)



Stud diameter mm	Identification number Caged type	Mass (Ref.) g	Nominal dimensions mm D	C	d_1	B max	B_1 max	B_2	C_1	L_1	L_2	H	e	$r_{s\,min}$ (3)	Mounting dimensions mm D_2	Tolerance	t Minimum	f Minimum	h (Ref.)	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
6	CF-SFU- 6 B	19.5	16	11	6	12.2	32	19.8	0.6	5	10	3	0.3	0.3	6	+0.012 0	20	11	10	3 660	3 650	1 950
8	CF-SFU- 8 B	29	19	11	8	12.2	32	19.8	0.6	5	10	4	0.5	0.3	8	+0.015 0	20	13	10	4 250	4 740	4 620
10	CF-SFU- 10 B	44	22	12	10	13.2	33	19.8	0.6	5	10	4	0.5	0.3	10		20	16	10	5 430	6 890	6 890
	CF-SFU- 10-1 B	59	26	12	10	13.2	33	19.8	0.6	5	10	4	0.5	0.3	10		20	16	10	5 430	6 890	6 890
12	CF-SFU- 12 B	94	30	14	12	15.2	35	19.8	0.6	5	10	6	1	0.6	12		20	21	10	7 910	9 790	9 790
	CF-SFU- 12-1 B	104	32	14	12	15.2	35	19.8	0.6	5	10	6	1	0.6	12	+0.018 0	20	21	10	7 910	9 790	9 790
16	CF-SFU- 16 B	164	35	18	16	19.6	44.5	24.9	0.8	10	10	6	1	0.6	16		25	26	15	12 000	18 300	18 300
18	CF-SFU- 18 B	235	40	20	18	21.6	46.5	24.9	0.8	10	10	8	1	1	18		25	29	15	14 800	25 200	25 200
20	CF-SFU- 20 B	435	52	24	20	25.6	50.5	24.9	0.8	10	10	8	1	1	20	+0.021 0	25	34	15	20 700	34 600	34 600
	CF-SFU- 20-1 B	360	47	24	20	25.6	50.5	24.9	0.8	10	10	8	1	1	20		25	34	15	20 700	34 600	34 600

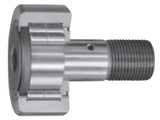
Note (1) An oil hole (grease feed plug) is provided for the stud head.
(2) An oil hole (grease nipple) is provided for the stud head.
(3) This represents the minimum tolerance dimensions of the chamfer dimensions r.
Remark: Grease is pre-packed.

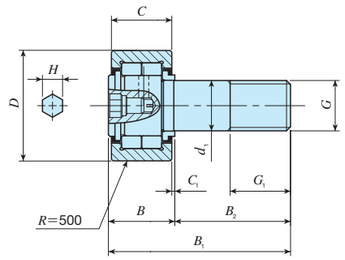
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Cylindrical Roller Cam Followers

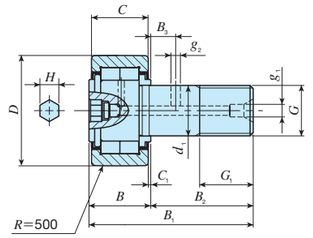
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

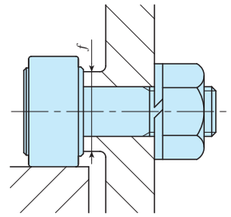




Stud diameter d_1 10mm (1)



Stud diameter d_1 12-30mm (2)



Stud diameter mm	Identification number	Mass (Ref.) g	Nominal dimensions mm D	C	d_1	G	G_1	B max	B_3 max	B_2		B_3	C_1	g_1	g_2	H	Mounting dimensions f Minimum mm	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
10	NUCF 10 BR	44	22	12	10	M10 × 1.25	12	13.2	36.2	23		—	0.6	—	—	4	12	13.8	10 400	11 500	5 300
	NUCF 10-1 BR	58	26	12	10	M10 × 1.25	12	13.2	36.2	23		—	0.6	—	—	4	12	13.8	10 400	11 500	9 210
12	NUCF 12 BR	86	30	14	12	M12 × 1.5	13	15.2	40.2	25		6	0.6	4	3	6	17	21.9	14 000	13 400	5 650
	NUCF 12-1 BR	97	32	14	12	M12 × 1.5	13	15.2	40.2	25		6	0.6	4	3	6	17	21.9	14 000	13 400	9 040
16	NUCF 16 BR	167	35	18	16	M16 × 1.5	17	19.6	52.1	32.5		8	0.8	4	3	6	20	58.5	23 400	27 300	11 800
18	NUCF 18 BR	244	40	20	18	M18 × 1.5	19	21.6	58.1	36.5		8	0.8	6	3	8	22	86.2	25 200	30 900	20 300
20	NUCF 20 BR	457	52	24	20	M20 × 1.5	21	25.6	66.1	40.5		9	0.8	6	4	8	31	119	43 100	58 100	30 000
	NUCF 20-1 BR	384	47	24	20	M20 × 1.5	21	25.6	66.1	40.5		9	0.8	6	4	8	27	119	38 900	49 000	27 200
24	NUCF 24 BR	789	62	29	24	M24 × 1.5	25	30.6	80.1	49.5		11	0.8	6	4	12	38	215	58 200	75 300	35 200
	NUCF 24-1 BR	1 020	72	29	24	M24 × 1.5	25	30.6	80.1	49.5		11	0.8	6	4	12	44	215	63 900	88 800	57 000
30	NUCF 30 BR	1 600	80	35	30	M30 × 1.5	32	37	100	63		15	1	6	4	17	45	438	90 300	121 000	98 300
	NUCF 30-2 BR	1 970	90	35	30	M30 × 1.5	32	37	100	63		15	1	6	4	17	45	438	90 300	121 000	98 300

Note (1) An oil hole (grease feed plug) is provided for the stud head.
(2) An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outside surface and the end surface of the stud.

Remark: 1. Grease is pre-packed.
2. A nut is supplied with the stud.

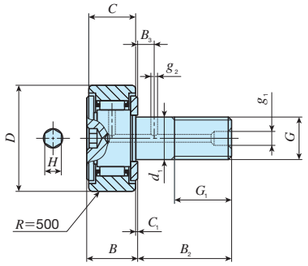
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Inch Series Cam Followers CR • Caged Type • With Hexagon Hole

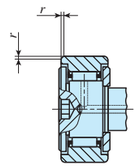
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

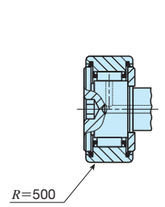




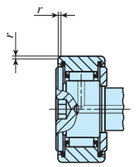
CR···BR



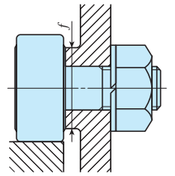
CR···B



CR···BUUR



CR···BUU



Stud diameter mm (inch)	Identification number Shield type Crowned outer ring	Shield type Cylindrical outer ring	Sealed type Crowned outer ring	Sealed type Cylindrica outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	H	r	Mounting dimensions f Minimum mm (inch)	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 BR	CR 8 B	CR 8 BUUR	CR 8 BUU	9	12.700(1/2)	8.731(11/32)	4.826	No.10-32	6.350(1/4)	10.2(0.40)	12.700(1/2)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	8.334(21/64)	1.4	2 520	2 140
	CR 8-1 BR	CR 8-1 B	CR 8-1 BUUR	CR 8-1 BUU	10	12.700(1/2)	8.525(3/8)	4.826	No.10-32	6.350(1/4)	10.9(0.43)	15.875(5/8)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	8.334(21/64)	1.4	2 520	2 140
6.350 (1/4)	CR 10 BR	CR 10 B	CR 10 BUUR	CR 10 BUU	19	15.875(5/8)	10.319(13/32)	6.350(1/4)	1/4 - 28	7.938(5/16)	11.8(0.46)	15.875(5/8)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	11.509(29/64)	3.4	3 650	3 670
	CR 10-1 BR	CR 10-1 B	CR 10-1 BUUR	CR 10-1 BUU	21	15.875(5/8)	11.112(7/16)	6.350(1/4)	1/4 - 28	7.938(5/16)	12.5(0.49)	19.050(3/4)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	11.509(29/64)	3.4	3 650	3 670
9.525 (3/8)	CR 12 BR	CR 12 B	CR 12 BUUR	CR 12 BUU	35	19.050(3/4)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2(0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	4.762(3/16)	0.794(1/32)	13.494(17/32)	10.8	4 420	5 110
	CR 14 BR	CR 14 B	CR 14 BUUR	CR 14 BUU	46	22.225(7/8)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2(0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	4.762(3/16)	0.794(1/32)	15.081(19/32)	10.8	4 790	5 810
11.112	CR 16 BR	CR 16 B	CR 16 BUUR	CR 16 BUU	73	25.400(1)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3(0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.191(3/64)	17.859(45/64)	17.4	8 810	10 800
(7/16)	CR 18 BR	CR 18 B	CR 18 BUUR	CR 18 BUU	88	28.575(1 1/8)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3(0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.588(1/16)	19.050(3/4)	17.4	9 180	11 600
12.700 (1/2)	CR 20 BR	CR 20 B	CR 20 BUUR	CR 20 BUU	132	31.750(1 1/4)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4(0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.588(1/16)	21.828(55/64)	27.7	14 200	16 000
	CR 22 BR	CR 22 B	CR 22 BUUR	CR 22 BUU	157	34.925(1 3/8)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4(0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.588(1/16)	21.828(55/64)	27.7	14 200	16 000
15.875 (5/8)	CR 24 BR	CR 24 B	CR 24 BUUR	CR 24 BUU	225	38.100(1 1/2)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6(0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	26.196(1 3/64)	55.7	18 600	24 300
	CR 26 BR	CR 26 B	CR 26 BUUR	CR 26 BUU	260	41.275(1 5/8)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6(0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	26.196(1 3/64)	55.7	18 900	24 300
19.050 (3/4)	CR 28 BR	CR 28 B	CR 28 BUUR	CR 28 BUU	365	44.450(1 3/4)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8(1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	32.543(1 9/32)	100	25 100	38 200
	CR 30 BR	CR 30 B	CR 30 BUUR	CR 30 BUU	410	47.625(1 7/8)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8(1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	32.543(1 9/32)	100	25 100	38 200
22.225 (7/8)	CR 32 BR	CR 32 B	CR 32 BUUR	CR 32 BUU	615	50.800(2)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5(1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	11.112(7/16)	1.588(1/16)	37.306(1 15/32)	162	32 500	63 900
	CR 36 BR	CR 36 B	CR 36 BUUR	CR 36 BUU	750	57.150(2 1/4)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5(1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	11.112(7/16)	1.588(1/16)	37.306(1 15/32)	162	32 500	63 900

Remarks 1. No oil hole is provided if the stud diameter d_1 is 6.35 mm or less. As for the others, an oil hole is provided for the outside surface and the end surface of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum allowable static load.
4. A nut is supplied with the stud.

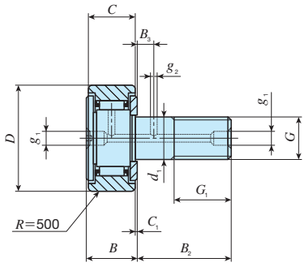
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IKO Inch Series Cam Followers CR • Caged Type • With Driver Slot

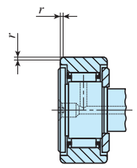
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

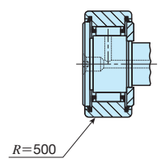




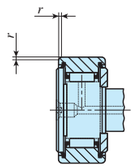
CR···R



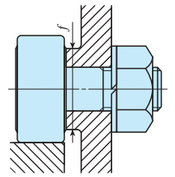
CR



CR···UUR



CR···UU



Stud diameter mm (inch)	Identification number: Shield type, Crowned outer ring	Shield type, Cylindrical outer ring	Sealed type, Crowned outer ring	Sealed type, Cylindrical outer ring	Mass (Ref.) g	Nominal dimensions mm (inch): D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	r	Mounting dimensions f Minimum mm (inch)	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 R	CR 8	CR 8 UUR	CR 8 UU	9	12.700(1/2)	8.731(11/32)	4.826	No.10-32	6.350(1/4)	10.2 (0.40)	12.700(1/2)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	8.334(21/64)	1.4	2 520	2 140
	CR 8-1 R	CR 8-1	CR 8-1 UUR	CR 8-1 UU	10	12.700(1/2)	9.525(3/8)	4.826	No.10-32	6.350(1/4)	10.9 (0.43)	15.875(5/8)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	8.334(21/64)	1.4	2 520	2 140
6.350 (1/4)	CR 10 R	CR 10	CR 10 UUR	CR 10 UU	19	15.875(5/8)	10.319(13/32)	6.350(1/4)	1/4 - 28	7.938(5/16)	11.8 (0.46)	15.875(5/8)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	11.509(29/64)	3.4	3 650	3 670
	CR 10-1 R	CR 10-1	CR 10-1 UUR	CR 10-1 UU	21	15.875(5/8)	11.112(7/16)	6.350(1/4)	1/4 - 28	7.938(5/16)	12.5 (0.49)	19.050(3/4)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	11.509(29/64)	3.4	3 650	3 670
9.525 (3/8)	CR 12 R	CR 12	CR 12 UUR	CR 12 UU	35	19.050(3/4)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2 (0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	0.794(1/32)	13.494(17/32)	10.8	4 420	5 110
	CR 14 R	CR 14	CR 14 UUR	CR 14 UU	46	22.225(7/8)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2 (0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	0.794(1/32)	15.081(19/32)	10.8	4 420	5 810
11.112 (7/16)	CR 16 R	CR 16	CR 16 UUR	CR 16 UU	73	25.400(1)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3 (0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.191(3/64)	17.859(45/64)	17.4	8 810	10 800
	CR 18 R	CR 18	CR 18 UUR	CR 18 UU	88	28.575(1 1/8)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3 (0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.588(1/16)	19.050(3/4)	17.4	9 180	11 600
12.700 (1/2)	CR 20 R	CR 20	CR 20 UUR	CR 20 UU	132	31.750(1 1/4)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4 (0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.588(1/16)	21.828(55/64)	27.7	14 200	16 000
	CR 22 R	CR 22	CR 22 UUR	CR 22 UU	157	34.925(1 3/8)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4 (0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.588(1/16)	21.828(55/64)	27.7	14 200	16 000
15.875 (5/8)	CR 24 R	CR 24	CR 24 UUR	CR 24 UU	225	38.100(1 1/2)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6 (0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	26.196(1 3/64)	55.7	18 600	24 300
	CR 26 R	CR 26	CR 26 UUR	CR 26 UU	260	41.275(1 5/8)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6 (0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	26.196(1 3/64)	55.7	18 900	24 300
19.050 (3/4)	CR 28 R	CR 28	CR 28 UUR	CR 28 UU	365	44.450(1 3/4)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8 (1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	32.543(1 9/32)	100	25 100	38 200
	CR 30 R	CR 30	CR 30 UUR	CR 30 UU	410	47.625(1 7/8)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8 (1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	32.543(1 9/32)	100	25 100	38 200
22.225 (7/8)	CR 32 R	CR 32	CR 32 UUR	CR 32 UU	615	50.800(2)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5 (1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	1.588(1/16)	37.306(1 15/32)	162	32 500	63 900
	CR 36 R	CR 36	CR 36 UUR	CR 36 UU	750	57.150(2 1/4)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5 (1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	1.588(1/16)	37.306(1 15/32)	162	32 500	63 900

Remarks 1. An oil hole is provided only for the stud head if the stud diameter d_1 is 6.35 mm or less (marked with *). As for the others, an oil hole is provided for the head, the outside surface and the end surface of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum allowable static load.
4. A nut is supplied with the stud.

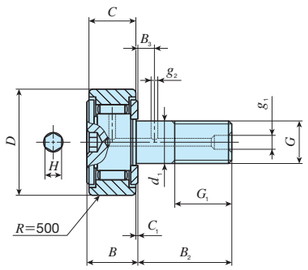
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1mm=0.03937inch

IKO Inch Series Cam Followers CR • Full Complement Type • With Hexagon Hole

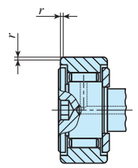
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

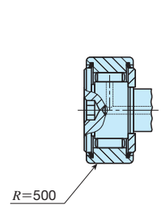




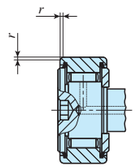
CR···VBR



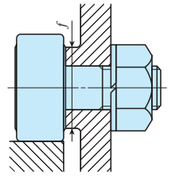
CR···VB



CR···VBUUR



CR···VBUU



Stud diameter mm (inch)	Identification number Shield type Crowned outer ring	Shield type Cylindrical outer ring	Sealed type Crowned outer ring	Sealed type Cylindrical outer ring	Mass (Ref.) g	Nominal dimensions mm (inch) D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	H	r	Mounting dimensions f Minimum mm (inch)	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 VBR	CR 8 VB	CR 8 VBUUR	CR 8 VBUU	9	12.700(1/2)	8.731(11/32)	4.826	No.10-32	6.350(1/4)	10.2(0.40)	12.700(1/2)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	8.334(21/64)	1.4	4 260	4 750
	CR 8-1 VBR	CR 8-1 VB	CR 8-1 VBUUR	CR 8-1 VBUU	10	12.700(1/2)	8.525(3/8)	4.826	No.10-32	6.350(1/4)	10.9(0.43)	15.875(5/8)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	8.334(21/64)	1.4	4 710	5 410
6.350 (1/4)	CR 10 VBR	CR 10 VB	CR 10 VBUUR	CR 10 VBUU	19	15.875(5/8)	10.319(13/32)	6.350(1/4)	1/4 - 28	7.938(5/16)	11.8(0.46)	15.875(5/8)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	11.509(29/64)	3.4	5 830	7 660
	CR 10-1 VBR	CR 10-1 VB	CR 10-1 VBUUR	CR 10-1 VBUU	21	15.875(5/8)	11.112(7/16)	6.350(1/4)	1/4 - 28	7.938(5/16)	12.5(0.49)	19.050(3/4)	— (—)	0.794(1/32)	— (—)	— (—)	3.175(1/8)	0.397(1/64)	11.509(29/64)	3.4	6 340	8 530
9.525 (3/8)	CR 12 VBR	CR 12 VB	CR 12 VBUUR	CR 12 VBUU	36	19.050(3/4)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2(0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	4.762(3/16)	0.794(1/32)	13.494(17/32)	10.8	8 710	12 300
	CR 14 VBR	CR 14 VB	CR 14 VBUUR	CR 14 VBUU	47	22.225(7/8)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2(0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	4.762(3/16)	0.794(1/32)	15.081(19/32)	10.8	8 710	12 300
11.112 (7/16)	CR 16 VBR	CR 16 VB	CR 16 VBUUR	CR 16 VBUU	74	25.400(1)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3(0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.191(3/64)	17.859(45/64)	17.4	13 100	22 700
	CR 18 VBR	CR 18 VB	CR 18 VBUUR	CR 18 VBUU	85	28.575(1 1/8)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3(0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.588(1/16)	19.050(3/4)	17.4	13 100	22 700
12.700 (1/2)	CR 20 VBR	CR 20 VB	CR 20 VBUUR	CR 20 VBUU	137	31.750(1 1/4)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4(0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.588(1/16)	21.828(55/64)	27.7	23 600	31 700
	CR 22 VBR	CR 22 VB	CR 22 VBUUR	CR 22 VBUU	160	34.925(1 3/8)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4(0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	6.350(1/4)	1.588(1/16)	21.828(55/64)	27.7	23 600	31 700
15.875 (5/8)	CR 24 VBR	CR 24 VB	CR 24 VBUUR	CR 24 VBUU	230	38.100(1 1/2)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6(0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	26.196(1 3/64)	55.7	28 200	40 100
	CR 26 VBR	CR 26 VB	CR 26 VBUUR	CR 26 VBUU	265	41.275(1 5/8)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6(0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	26.196(1 3/64)	55.7	28 200	40 100
19.050 (3/4)	CR 28 VBR	CR 28 VB	CR 28 VBUUR	CR 28 VBUU	372	44.450(1 3/4)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8(1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	32.543(1 9/32)	100	35 300	55 600
	CR 30 VBR	CR 30 VB	CR 30 VBUUR	CR 30 VBUU	418	47.625(1 7/8)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8(1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	7.938(5/16)	1.588(1/16)	32.543(1 9/32)	100	35 300	55 600
22.225 (7/8)	CR 32 VBR	CR 32 VB	CR 32 VBUUR	CR 32 VBUU	627	50.800(2)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5(1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	11.112(7/16)	1.588(1/16)	37.306(1 15/32)	162	45 700	80 600
	CR 36 VBR	CR 36 VB	CR 36 VBUUR	CR 36 VBUU	759	57.150(2 1/4)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5(1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	11.112(7/16)	1.588(1/16)	37.306(1 15/32)	162	45 700	80 600

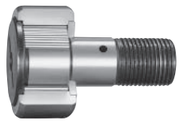
Remarks 1. No oil hole is provided if the stud diameter d_1 is 6.35 mm or less. As for the others, an oil hole is provided for the outside surface and the end surface of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum allowable static load.
4. A nut is supplied with the stud.

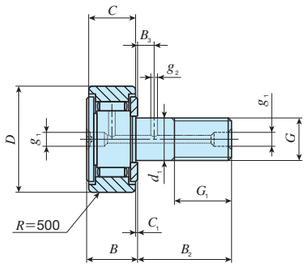
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1mm=0.03937inch

IKO Inch Series Cam Followers CR • Full Complement Type • With Driver Slot

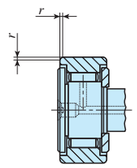
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

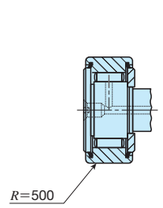




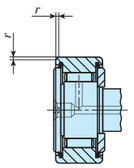
CR···VR



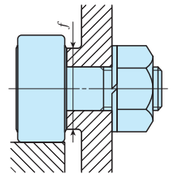
CR···V



CR···VUUR



CR···VUU



Stud diameter mm (inch)	Identification number: Shield type, Crowned outer ring	Shield type, Cylindrical outer ring	Sealed type, Crowned outer ring	Sealed type, Cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	r	Mounting dimensions f Minimum mm (inch)	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N
4.826	CR 8 VR	CR 8 V	CR 8 VUUR	CR 8 VUU	9	12.700(1/2)	8.731(11/32)	4.826	No.10-32	6.350(1/4)	10.2(0.40)	12.700(1/2)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	8.334(21/64)	1.4	4 260	4 750
	CR 8-1 VR	CR 8-1 V	CR 8-1 VUUR	CR 8-1 VUU	10	12.700(1/2)	9.525(3/8)	4.826	No.10-32	6.350(1/4)	10.9(0.43)	15.875(5/8)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	8.334(21/64)	1.4	4 710	5 410
6.350 (1/4)	CR 10 VR	CR 10 V	CR 10 VUUR	CR 10 VUU	19	15.875(5/8)	10.319(13/32)	6.350(1/4)	1/4 - 28	7.938(5/16)	11.8(0.46)	15.875(5/8)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	11.509(29/64)	3.4	5 830	7 660
	CR 10-1 VR	CR 10-1 V	CR 10-1 VUUR	CR 10-1 VUU	21	15.875(5/8)	11.112(7/16)	6.350(1/4)	1/4 - 28	7.938(5/16)	12.5(0.49)	19.050(3/4)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	0.397(1/64)	11.509(29/64)	3.4	6 340	8 530
9.525 (3/8)	CR 12 VR	CR 12 V	CR 12 VUUR	CR 12 VUU	36	19.050(3/4)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2(0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	0.794(1/32)	13.494(17/32)	10.8	8 710	12 300
	CR 14 VR	CR 14 V	CR 14 VUUR	CR 14 VUU	47	22.225(7/8)	12.700(1/2)	9.525(3/8)	3/8 - 24	9.525(3/8)	14.2(0.56)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	0.794(1/32)	15.081(19/32)	10.8	8 710	12 300
11.112 (7/16)	CR 16 VR	CR 16 V	CR 16 VUUR	CR 16 VUU	74	25.400(1)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3(0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.191(3/64)	17.859(45/64)	17.4	13 100	22 700
	CR 18 VR	CR 18 V	CR 18 VUUR	CR 18 VUU	85	28.575(1 1/8)	15.875(5/8)	11.112(7/16)	7/16 - 20	12.700(1/2)	17.3(0.68)	25.400(1)	6.350(1/4)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.588(1/16)	19.050(3/4)	17.4	13 100	22 700
12.700 (1/2)	CR 20 VR	CR 20 V	CR 20 VUUR	CR 20 VUU	137	31.750(1 1/4)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4(0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.588(1/16)	21.828(55/64)	27.7	23 600	31 700
	CR 22 VR	CR 22 V	CR 22 VUUR	CR 22 VUU	160	34.925(1 3/8)	19.050(3/4)	12.700(1/2)	1/2 - 20	15.875(5/8)	20.4(0.80)	31.750(1 1/4)	7.938(5/16)	0.794(1/32)	4.762(3/16)	3.175(1/8)	1.588(1/16)	21.828(55/64)	27.7	23 600	31 700
15.875 (5/8)	CR 24 VR	CR 24 V	CR 24 VUUR	CR 24 VUU	230	38.100(1 1/2)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6(0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	26.196(1 3/64)	55.7	28 200	40 100
	CR 26 VR	CR 26 V	CR 26 VUUR	CR 26 VUU	265	41.275(1 5/8)	22.225(7/8)	15.875(5/8)	5/8 - 18	19.050(3/4)	23.6(0.93)	38.100(1 1/2)	9.525(3/8)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	26.196(1 3/64)	55.7	28 200	40 100
19.050 (3/4)	CR 28 VR	CR 28 V	CR 28 VUUR	CR 28 VUU	372	44.450(1 3/4)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8(1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	32.543(1 9/32)	100	35 300	55 600
	CR 30 VR	CR 30 V	CR 30 VUUR	CR 30 VUU	418	47.625(1 7/8)	25.400(1)	19.050(3/4)	3/4 - 16	22.225(7/8)	26.8(1.06)	44.450(1 3/4)	11.112(7/16)	0.794(1/32)	4.762(3/16)	3.969(5/32)	1.588(1/16)	32.543(1 9/32)	100	35 300	55 600
22.225 (7/8)	CR 32 VR	CR 32 V	CR 32 VUUR	CR 32 VUU	627	50.800(2)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5(1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	1.588(1/16)	37.306(1 15/32)	162	45 700	80 600
	CR 36 VR	CR 36 V	CR 36 VUUR	CR 36 VUU	759	57.150(2 1/4)	31.750(1 1/4)	22.225(7/8)	7/8 - 14	25.400(1)	33.5(1.32)	50.800(2)	12.700(1/2)	0.794(1/32)	4.762(3/16)	4.762(3/16)	1.588(1/16)	37.306(1 15/32)	162	45 700	80 600
31.750 (1 1/4)	—	—	—	CR 48 VUU	1 960	76.200(3)	44.450(1 3/4)	31.750(1 1/4)	1 3/4 - 12	31.750(1 1/4)	46.4(1.83)	63.500(2 1/2)	15.875(5/8)	1.588(1/16)	6.350(1/4)	4.762(3/16)	2.381(3/32)	51.991(2 3/64)	500	77 600	172 000

Remarks 1. An oil hole is provided only for the stud head if the stud diameter d_1 is 6.35 mm or less (marked with *). As for the others, an oil hole is provided for the head, the outside surface and the end surface of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum allowable static load.
4. A nut is supplied with the stud.

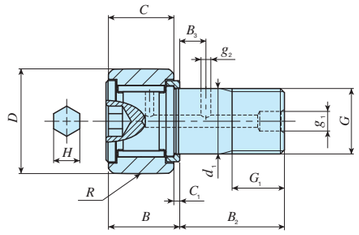
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IKO Inch Series Cam Followers CRH • Full Complement Type • With Hexagon Hole

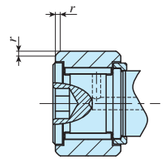
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

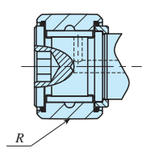




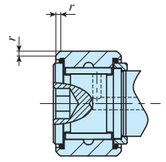
CRH···VBR



CRH···VB



CRH···VBUUR



CRH···VBUU

Stud diameter mm (inch)	Identification number Shield type Crowned outer ring	Shield type Cylindrical outer ring	Sealed type Crowned outer ring	Sealed type Cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	H	R	r	Mounting dimensions f Minimum mm (inch)	Maximum tightening torque N·m	Basic dynamic load rating C N	Basic static load rating C_0 N
6.350 (1/4)	CRH 8-1 VBR	CRH 8-1 VB	CRH 8-1 VBUUR	CRH 8-1 VBUU	12	12.700 (1/2)	9.525 (3/8)	6.350 (1/4)	1/4 - 28	6.350 (1/4)	11.0(0.44)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	180 (7)	0.397 (1/64)	8.334 (21/64)	3.4	4 710	5 410
	CRH 9 VBR	CRH 9 VB	CRH 9 VBUUR	CRH 9 VBUU	15	14.288 (9/16)	9.525 (3/8)	6.350 (1/4)	1/4 - 28	6.350 (1/4)	11.1(0.44)	15.875 (5/8)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	180 (7)	0.397 (1/64)	8.334 (21/64)	3.4	4 710	5 410
7.938 (5/16)	CRH 10-1 VBR	CRH 10-1 VB	CRH 10-1 VBUUR	CRH 10-1 VBUU	23	15.875 (5/8)	11.112 (7/16)	7.938 (5/16)	5/16 - 24	7.938 (5/16)	12.8(0.50)	19.050 (3/4)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	200 (8)	0.397 (1/64)	11.112 (7/16)	6.8	6 340	8 530
	CRH 11 VBR	CRH 11 VB	CRH 11 VBUUR	CRH 11 VBUU	27	17.462 (11/16)	11.112 (7/16)	7.938 (5/16)	5/16 - 24	7.938 (5/16)	12.8(0.50)	19.050 (3/4)	— (—)	0.794 (1/32)	— (—)	— (—)	3.175 (1/8)	200 (8)	0.397 (1/64)	11.112 (7/16)	6.8	6 340	8 530
11.112 (7/16)	CRH 12 VBR	CRH 12 VB	CRH 12 VBUUR	CRH 12 VBUU	39	19.050 (3/4)	12.700 (1/2)	11.112 (7/16)	7/16 - 20	9.525 (3/8)	14.6(0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	250(10)	0.794 (1/32)	13.494 (17/32)	17.6	8 710	12 300
	CRH 14 VBR	CRH 14 VB	CRH 14 VBUUR	CRH 14 VBUU	49	22.225 (7/8)	12.700 (1/2)	11.112 (7/16)	7/16 - 20	9.525 (3/8)	14.6(0.57)	22.225 (7/8)	6.350 (1/4)	0.794 (1/32)	4.762 (3/16)	2.381 (3/32)	4.762 (3/16)	250(10)	0.794 (1/32)	13.494 (17/32)	17.6	8 710	12 300
15.875 (5/8)	CRH 16 VBR	CRH 16 VB	CRH 16 VBUUR	CRH 16 VBUU	93	25.400(1)	15.875 (5/8)	15.875 (5/8)	5/8 - 18	12.700 (1/2)	17.9(0.70)	25.400(1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	300(12)	1.191 (3/64)	18.256 (23/32)	57.8	13 100	22 700
	CRH 18 VBR	CRH 18 VB	CRH 18 VBUUR	CRH 18 VBUU	109	28.575(1 1/8)	15.875 (5/8)	15.875 (5/8)	5/8 - 18	12.700 (1/2)	17.9(0.70)	25.400(1)	6.350 (1/4)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	300(12)	1.588 (1/16)	18.256 (23/32)	57.8	13 100	22 700
19.050 (3/4)	CRH 20 VBR	CRH 20 VB	CRH 20 VBUUR	CRH 20 VBUU	176	31.750(1 1/4)	19.050 (3/4)	19.050 (3/4)	3/4 - 16	15.875 (5/8)	21.0(0.83)	31.750(1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	360(14)	1.588 (1/16)	24.209 (61/64)	103	23 600	31 700
	CRH 22 VBR	CRH 22 VB	CRH 22 VBUUR	CRH 22 VBUU	200	34.925(1 3/8)	19.050 (3/4)	19.050 (3/4)	3/4 - 16	15.875 (5/8)	21.0(0.83)	31.750(1 1/4)	7.938 (5/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	6.350 (1/4)	360(14)	1.588 (1/16)	24.209 (61/64)	103	23 600	31 700
22.225 (7/8)	CRH 24 VBR	CRH 24 VB	CRH 24 VBUUR	CRH 24 VBUU	296	38.100(1 1/2)	22.225 (7/8)	22.225 (7/8)	7/8 - 14	19.050 (3/4)	24.3(0.96)	38.100(1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500(20)	1.588 (1/16)	26.988(1 1/16)	162	28 200	40 100
	CRH 26 VBR	CRH 26 VB	CRH 26 VBUUR	CRH 26 VBUU	329	41.275(1 5/8)	22.225 (7/8)	22.225 (7/8)	7/8 - 14	19.050 (3/4)	24.3(0.96)	38.100(1 1/2)	9.525 (3/8)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500(20)	1.588 (1/16)	26.988(1 1/16)	162	28 200	40 100
25.400 (1)	CRH 28 VBR	CRH 28 VB	CRH 28 VBUUR	CRH 28 VBUU	463	44.450(1 3/4)	25.400(1)	25.400(1)	1 - 14UNS	22.225 (7/8)	27.4(1.08)	44.450(1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500(20)	1.588 (1/16)	32.941(1 19/64)	258	35 300	55 600
	CRH 30 VBR	CRH 30 VB	CRH 30 VBUUR	CRH 30 VBUU	508	47.625(1 7/8)	25.400(1)	25.400(1)	1 - 14UNS	22.225 (7/8)	27.4(1.08)	44.450(1 3/4)	11.112 (7/16)	1.588 (1/16)	4.762 (3/16)	2.381 (3/32)	7.938 (5/16)	500(20)	1.588 (1/16)	32.941(1 19/64)	258	35 300	55 600
28.575 (1 1/8)	CRH 32 VBR	CRH 32 VB	CRH 32 VBUUR	CRH 32 VBUU	722	50.800(2)	31.750(1 1/4)	28.575(1 1/8)	1 1/8 - 12	25.400(1)	34.2(1.35)	50.800(2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	11.112 (7/16)	600(24)	1.588 (1/16)	37.306(1 15/32)	356	45 700	80 600
	CRH 36 VBR	CRH 36 VB	CRH 36 VBUUR	CRH 36 VBUU	858	57.150(2 1/4)	31.750(1 1/4)	28.575(1 1/8)	1 1/8 - 12	25.400(1)	34.2(1.35)	50.800(2)	12.700 (1/2)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	11.112 (7/16)	600(24)	1.588 (1/16)	37.306(1 15/32)	356	45 700	80 600
31.750 (1 1/4)	CRH 40 VBR	CRH 40 VB	CRH 40 VBUUR	CRH 40 VBUU	1 260	63.500(2 1/2)	38.100(1 1/2)	31.750(1 1/4)	1 1/4 - 12	28.575(1 1/8)	40.0(1.57)	57.150(2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	12.700 (1/2)	760(30)	2.381 (3/32)	40.878(1 39/64)	500	61 400	116 000
	CRH 44 VBR	CRH 44 VB	CRH 44 VBUUR	CRH 44 VBUU	1 460	69.850(2 3/4)	38.100(1 1/2)	31.750(1 1/4)	1 1/4 - 12	28.575(1 1/8)	40.0(1.57)	57.150(2 1/4)	14.288 (9/16)	1.588 (1/16)	4.762 (3/16)	3.175 (1/8)	12.700 (1/2)	760(30)	2.381 (3/32)	40.878(1 39/64)	500	61 400	116 000
38.100 (1 1/2)	CRH 48 VBR	CRH 48 VB	CRH 48 VBUUR	CRH 48 VBUU	2 100	76.200(3)	44.450(1 3/4)	38.100(1 1/2)	1 1/2 - 12	31.750(1 1/4)	46.4(1.83)	63.500(2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760(30)	2.381 (3/32)	51.991(2 3/64)	892	77 600	172 000
	CRH 52 VBR	CRH 52 VB	CRH 52 VBUUR	CRH 52 VBUU	2 380	82.500(3 1/4)	44.450(1 3/4)	38.100(1 1/2)	1 1/2 - 12	31.750(1 1/4)	46.4(1.83)	63.500(2 1/2)	15.875 (5/8)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760(30)	2.381 (3/32)	51.991(2 3/64)	892	77 600	172 000
44.450 (1 3/4)	CRH 56 VBR	CRH 56 VB	CRH 56 VBUUR	CRH 56 VBUU	3 240	88.900(3 1/2)	50.800(2)	44.450(1 3/4)	1 3/4 - 12UN	34.925(1 3/8)	52.8(2.08)	69.850(2 3/4)	17.462 (11/16)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760(30)	2.381 (3/32)	59.928(2 23/64)	1 450	111 000	239 000
50.800 (2)	CRH 64 VBR	CRH 64 VB	CRH 64 VBUUR	CRH 64 VBUU	4 960	101.600(4)	57.150(2 1/4)	50.800(2)	2 - 12UN	38.100(1 1/2)	59.4(2.34)	88.900(3 1/2)	19.050 (3/4)	1.588 (1/16)	6.350 (1/4)	3.175 (1/8)	19.050 (3/4)	760(30)	2.381 (3/32)	64.691(2 35/64)	2 190	142 000	317 000

Remarks 1. No oil hole is provided if the stud diameter d_1 is 7.938 mm or less. As for the others, an oil hole is provided for the outside surface and the end surface of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum allowable static load.
4. A nut is supplied with the stud.

Related Products (Cam Follower)

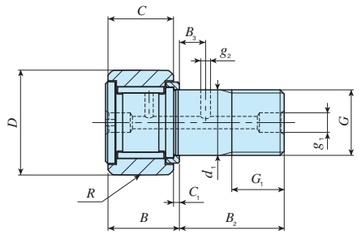
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1mm=0.03937inch

IKO Inch Series Cam Followers CRH • Full Complement Type • With Driver Slot

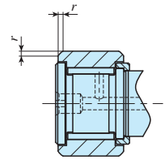
Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

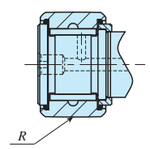




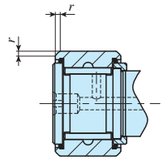
CRH···VR



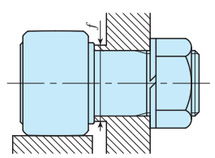
CRH···V



CRH···VUUR



CRH···VUU



Stud diameter mm (inch)	Identification number Shield type Crowned outer ring	Shield type Cylindrical outer ring	Sealed type Crowned outer ring	Sealed type Cylindrical outer ring	Mass (Ref.) g	D	C	d_1	G UNF	G_1	B max	B_2	B_3	C_1	g_1	g_2	R	r	Mounting dimensions f Minimum mm (inch)	Maximum tightening torque N · m	Basic dynamic load rating C N	Basic static load rating C_0 N
6.350 (1/4)	CRH 8-1 VR	CRH 8-1 V	CRH 8-1 VUUR	CRH 8-1 VUU	12	12.700(1/2)	9.525(3/8)	6.350(1/4)	1/4 - 28	6.350(1/4)	11.0(0.44)	15.875(5/8)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	180(7)	0.397(1/64)	8.334(21/64)	3.4	4 710	5 410
	CRH 9 VR	CRH 9 V	CRH 9 VUUR	CRH 9 VUU	15	14.288(9/16)	9.525(3/8)	6.350(1/4)	1/4 - 28	6.350(1/4)	11.1(0.44)	15.875(5/8)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	180(7)	0.397(1/64)	8.334(21/64)	3.4	4 710	5 410
7.938 (5/16)	CRH 10-1 VR	CRH 10-1 V	CRH 10-1 VUUR	CRH 10-1 VUU	23	15.875(5/8)	11.112(7/16)	7.938(5/16)	5/16 - 24	7.938(5/16)	12.8(0.50)	19.050(3/4)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	200(8)	0.397(1/64)	11.112(7/16)	6.8	6 340	8 530
	CRH 11 VR	CRH 11 V	CRH 11 VUUR	CRH 11 VUU	27	17.462(11/16)	11.112(7/16)	7.938(5/16)	5/16 - 24	7.938(5/16)	12.8(0.50)	19.050(3/4)	— (—)	0.794(1/32)	*3.175(1/8)	— (—)	200(8)	0.397(1/64)	11.112(7/16)	6.8	6 340	8 530
11.112 (7/16)	CRH 12 VR	CRH 12 V	CRH 12 VUUR	CRH 12 VUU	39	19.050(3/4)	12.700(1/2)	11.112(7/16)	7/16 - 20	9.525(3/8)	14.6(0.57)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	250(10)	0.794(1/32)	13.494(17/32)	17.6	8 710	12 300
	CRH 14 VR	CRH 14 V	CRH 14 VUUR	CRH 14 VUU	49	22.225(7/8)	12.700(1/2)	11.112(7/16)	7/16 - 20	9.525(3/8)	14.6(0.57)	22.225(7/8)	6.350(1/4)	0.794(1/32)	4.762(3/16)	2.381(3/32)	250(10)	0.794(1/32)	13.494(17/32)	17.6	8 710	12 300
15.875 (5/8)	CRH 16 VR	CRH 16 V	CRH 16 VUUR	CRH 16 VUU	93	25.400(1)	15.875(5/8)	15.875(5/8)	5/8 - 18	12.700(1/2)	17.9(0.70)	25.400(1)	6.350(1/4)	1.588(1/16)	4.762(3/16)	2.381(3/32)	300(12)	1.191(3/64)	18.256(23/32)	57.8	13 100	22 700
	CRH 18 VR	CRH 18 V	CRH 18 VUUR	CRH 18 VUU	109	28.575(1 1/8)	15.875(5/8)	15.875(5/8)	5/8 - 18	12.700(1/2)	17.9(0.70)	25.400(1)	6.350(1/4)	1.588(1/16)	4.762(3/16)	2.381(3/32)	300(12)	1.588(1/16)	18.256(23/32)	57.8	13 100	22 700
19.050 (3/4)	CRH 20 VR	CRH 20 V	CRH 20 VUUR	CRH 20 VUU	176	31.750(1 1/4)	19.050(3/4)	19.050(3/4)	3/4 - 16	15.875(5/8)	21.0(0.83)	31.750(1 1/4)	7.938(5/16)	1.588(1/16)	4.762(3/16)	2.381(3/32)	360(14)	1.588(1/16)	24.209(61/64)	103	23 600	31 700
	CRH 22 VR	CRH 22 V	CRH 22 VUUR	CRH 22 VUU	200	34.925(1 3/8)	19.050(3/4)	19.050(3/4)	3/4 - 16	15.875(5/8)	21.0(0.83)	31.750(1 1/4)	7.938(5/16)	1.588(1/16)	4.762(3/16)	2.381(3/32)	360(14)	1.588(1/16)	24.209(61/64)	103	23 600	31 700
22.225 (7/8)	CRH 24 VR	CRH 24 V	CRH 24 VUUR	CRH 24 VUU	296	38.100(1 1/2)	22.225(7/8)	22.225(7/8)	7/8 - 14	19.050(3/4)	24.3(0.96)	38.100(1 1/2)	9.525(3/8)	1.588(1/16)	4.762(3/16)	2.381(3/32)	500(20)	1.588(1/16)	26.988(1 1/16)	162	28 200	40 100
	CRH 26 VR	CRH 26 V	CRH 26 VUUR	CRH 26 VUU	329	41.275(1 5/8)	22.225(7/8)	22.225(7/8)	7/8 - 14	19.050(3/4)	24.3(0.96)	38.100(1 1/2)	9.525(3/8)	1.588(1/16)	4.762(3/16)	2.381(3/32)	500(20)	1.588(1/16)	26.988(1 1/16)	162	28 200	40 100
25.400 (1)	CRH 28 VR	CRH 28 V	CRH 28 VUUR	CRH 28 VUU	463	44.450(1 3/4)	25.400(1)	25.400(1)	1 - 14UNS	22.225(7/8)	27.4(1.08)	44.450(1 3/4)	11.112(7/16)	1.588(1/16)	4.762(3/16)	2.381(3/32)	500(20)	1.588(1/16)	32.941(1 19/64)	258	35 300	55 600
	CRH 30 VR	CRH 30 V	CRH 30 VUUR	CRH 30 VUU	508	47.625(1 7/8)	25.400(1)	25.400(1)	1 - 14UNS	22.225(7/8)	27.4(1.08)	44.450(1 3/4)	11.112(7/16)	1.588(1/16)	4.762(3/16)	2.381(3/32)	500(20)	1.588(1/16)	32.941(1 19/64)	258	35 300	55 600
28.575 (1 1/8)	CRH 32 VR	CRH 32 V	CRH 32 VUUR	CRH 32 VUU	722	50.800(2)	31.750(1 1/4)	28.575(1 1/8)	1 1/8 - 12	25.400(1)	34.2(1.35)	50.800(2)	12.700(1/2)	1.588(1/16)	4.762(3/16)	3.175(1/8)	600(24)	1.588(1/16)	37.306(1 15/32)	356	45 700	80 600
	CRH 36 VR	CRH 36 V	CRH 36 VUUR	CRH 36 VUU	858	57.150(2 1/4)	31.750(1 1/4)	28.575(1 1/8)	1 1/8 - 12	25.400(1)	34.2(1.35)	50.800(2)	12.700(1/2)	1.588(1/16)	4.762(3/16)	3.175(1/8)	600(24)	1.588(1/16)	37.306(1 15/32)	356	45 700	80 600
31.750 (1 1/4)	CRH 40 VR	CRH 40 V	CRH 40 VUUR	CRH 40 VUU	1 260	63.500(2 1/2)	38.100(1 1/2)	31.750(1 1/4)	1 1/4 - 12	28.575(1 1/8)	40.0(1.57)	57.150(2 1/4)	14.288(9/16)	1.588(1/16)	4.762(3/16)	3.175(1/8)	760(30)	2.381(3/32)	40.878(1 39/64)	500	61 400	116 000
	CRH 44 VR	CRH 44 V	CRH 44 VUUR	CRH 44 VUU	1 460	69.850(2 3/4)	38.100(1 1/2)	31.750(1 1/4)	1 1/4 - 12	28.575(1 1/8)	40.0(1.57)	57.150(2 1/4)	14.288(9/16)	1.588(1/16)	4.762(3/16)	3.175(1/8)	760(30)	2.381(3/32)	40.878(1 39/64)	500	61 400	116 000
38.100 (1 1/2)	CRH 48 VR	CRH 48 V	CRH 48 VUUR	CRH 48 VUU	2 100	76.200(3)	44.450(1 3/4)	38.100(1 1/2)	1 1/2 - 12	31.750(1 1/8)	46.4(1.83)	63.500(2 1/2)	15.875(5/8)	1.588(1/16)	6.350(1/4)	3.175(1/8)	760(30)	2.381(3/32)	51.991(2 3/64)	892	77 600	172 000
	CRH 52 VR	CRH 52 V	CRH 52 VUUR	CRH 52 VUU	2 380	82.500(3 1/4)	44.450(1 3/4)	38.100(1 1/2)	1 1/2 - 12	31.750(1 1/8)	46.4(1.83)	63.500(2 1/2)	15.875(5/8)	1.588(1/16)	6.350(1/4)	3.175(1/8)	760(30)	2.381(3/32)	51.991(2 3/64)	892	77 600	172 000
44.450 (1 3/4)	CRH 56 VR	CRH 56 V	CRH 56 VUUR	CRH 56 VUU	3 240	88.900(3 1/2)	50.800(2)	44.450(1 3/4)	1 3/4 - 12UN	34.925(1 3/8)	52.8(2.08)	69.850(2 3/4)	17.462(11/16)	1.588(1/16)	6.350(1/4)	3.175(1/8)	760(30)	2.381(3/32)	59.928(2 23/64)	1 450	111 000	239 000
50.800 (2)	CRH 64 VR	CRH 64 V	CRH 64 VUUR	CRH 64 VUU	4 960	101.600(4)	57.150(2 1/4)	50.800(2)	2 - 12UN	38.100(1 1/2)	59.4(2.34)	88.900(3 1/2)	19.050(3/4)	1.588(1/16)	6.350(1/4)	3.175(1/8)	760(30)	2.381(3/32)	64.691(2 35/64)	2 190	142 000	317 000

Remarks 1. An oil hole is provided only for the stud head if the stud diameter d_1 is 7.938 mm or less (marked with *). As for the others, an oil hole is provided for the head, the outside surface and the end surface of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum allowable static load.
4. A nut is supplied with the stud.

Related Products (Cam Follower)

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

Roller Followers



Reliable and proven Roller Followers series!

Roller Followers are bearings with needle rollers in the thick outer ring and designed for rotation of the outer ring.
There are separable/non-separable model, Cylindrical Roller Followers, and other models. Roller Followers are widely used as follower bearings of various cam mechanisms and guide rollers for linear motion of transfer machine.

Identification Number and Specification

Example of an Identification Number

The specification of Roller Followers series is indicated by the identification number. In addition, for application of roller guide type, seal structure and shape of outer ring outside surface to each models, refer to the dimension table.

	1	2	3	4	5
Arrangement example 1	NAST	10		ZZUU	R
Arrangement example 2	NART	10	V	UU	R
Arrangement example 3	NURT	15			R
Arrangement example 4	CRY	12	V	UU	R

1 **Model** Page Ⅱ－293

2 **Dimensions** Page Ⅱ－293

3 **Roller guide type** Page Ⅱ－294

4 **Seal structure** Page Ⅱ－294

5 **Shape of outer ring outside surface** Page Ⅱ－294

Identification Number and Specification —Model · Dimensions—

1 Model

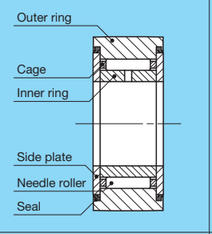
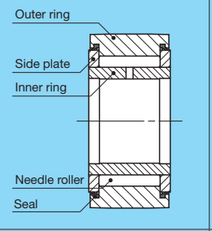
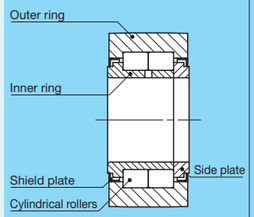
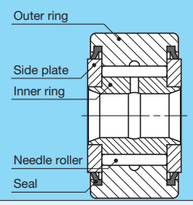
Separable Roller Followers	Without inner ring	: RNAST
	With inner ring	: NAST
Non-separable Roller Followers		: NART
Cylindrical Roller Followers		: NURT
Inch series Non-separable Roller Followers		: CRY

For applicable models and dimensions, see Table 1.

2 Dimensions

Indicates the inner ring bore diameter.(unit: mm)
For inch series, outer ring outside diameter are indicated in 1/16 inch.

Table 1 Models and dimensions

Shape	Model	Characteristics	Inner ring bore diameter
Separable Roller Followers 	**RNAST** **NAST**	This type has a structure combining the outer ring, the inner ring, and the needle cage and offers excellent high-speed rotation performance. In addition, each part is separable and has handleability. The inner ring is not provided for RNAST. The inner ring is provided for NAST.	7 to 60 mm
Non-separable Roller Followers 	**NART**	This non-separable bearing has a press-fitted side plate at both sides of the inner ring. Caged type and full complement type are available for your use.	5 to 50 mm
Cylindrical Roller Followers 	**NURT**	The full complement type bearing with double row cylindrical rollers incorporated in the outer ring can receive large radial load and some axial load.	15 to 50 mm
Inch series Non-separable Roller Followers 	**CRY**	This is inch series Roller Followers of NART with black oxide film treatment.	6.350 to 31.750 mm

—Roller Guide Type · Seal Structure · Shape of Outer Ring Outside Surface—

3 Roller guide type (1)

Caged type	: No symbol	As caged type has smaller friction coefficient, it is suited for high-speed rotation. Full complement type is suited for sections where low-speed rotation, oscillatory movement or heavy load exists.
Full complement type	: V	

Note (1) Cylindrical Roller Followers are full complement type with no symbol.

4 Seal structure

Separable Roller Followers		Shield is shaped so that clearance between the outer ring and stud flange and between the outer ring and side plate become smaller and labyrinth is formed. The sealed type incorporates the seal structure, which can prevent foreign substances from entering.
Open type	: No symbol	
Shield type	: ZZ	
Sealed type	: ZZUU	
Other than Separable Roller Followers		
Shield type	: No symbol	
Sealed type	: UU	

5 Shape of outer ring outside surface

Cylindrical outer ring	: No symbol	Crowned outer ring is effective for mitigation of end load generated due to installation errors. Cylindrical outer ring is suited if the applied load is large or hardness of cam guide surface is low.
Crowned outer ring	: R	

Load Rating and Life

Basic dynamic load rating C

Basic dynamic load rating refers to a static radial load with a certain direction and size with which 90% of a group of the same Roller Followers can run one million rotations without material damages due to rolling contact fatigue when they are operated in the same conditions.

Basic static load rating C_0

Basic static load rating refers to a static radial load with a certain direction and size with a certain contact stress at the center of contact parts of the rolling elements and a raceway under maximum load.

Life

The basic rating life calculation formulas are shown below.

$$L_{10} = \left(\frac{C}{P_r}\right)^{10/3} \quad \cdots\cdots (1)$$

where, L_{10} : Basic rating life 10^6rev.
C : Basic dynamic load rating N
P_r : Dynamic equivalent radial load N

Therefore, life time can be calculated by applying the rotational speed to the formula below.

$$L_h = \frac{10^6 L_{10}}{60n} \quad \cdots\cdots (2)$$

where, L_h : Basic rating life represented as time h
n : Rotational speed min^{-1}

Static safety factor

Static safety factor can be obtained by the following equation and typical values are indicated in Table 2.

$$f_s = \frac{C_0}{P_{0r}} \quad \cdots\cdots (3)$$

where, f_s : Static safety factor
C_0 : Basic static load rating N
P_{0r} : Static equivalent radial load (maximum load) N

Table 2 Static safety factor

Bearing use conditions	f_s
When high rotation accuracy is required	≧3
Normal operating conditions	≧1.5
When smooth operations are not required with a high priority under normal operating conditions When it is rarely rotated	≧1

Load factor

Load actually applied on the Roller Followers becomes larger than load theoretically calculated from vibration and shock. Therefore, multiply the load by the load factor indicated in the Table 3.

Table 3 Load factor

Operating condition	f_w
Smooth operation free from shock	1 ~1.2
Normal operation	1.2~1.5
Operation with shock load	1.5~3

Maximum Allowable Static Load

A load that Roller Followers can handle may depend on the strength of the outer ring rather than the load rating as a needle roller bearing. For this reason the maximum allowable static load is defined.

Accuracy

Accuracy of Roller Followers is shown in Tables 4, 5.1, 5.2, and 5.3.The tolerance of the smallest single roller set bore diameter of separable Roller Followers is shown in Table 6.We also provide special accuracy class product. For details, please contact **IKO**.

Table 4 Tolerance unit: μm

Name	Series	Metric series		Inch series	
		Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring
Bore diameter of inner ring d	d≦19.05	See Table 5.1		+ 5 −10	+ 5 −10
	19.05<d			+ 2 −12	
Outside diameter of outer ring D		0 −50	See Table 5.2	0 −50	See Table 5.3
Width of outer ring C		0 −120		0 −130	
Width of inner ring B	Separable Roller Followers	0 −120		–	
Width of bearing B	Non-separable Roller Followers	h12	–	+130 −250	
	Cylindrical Roller Followers		h12		
Roller set bore diameter F_w	Separable Roller Followers	See Table 6		–	

Table 5.1 Tolerance and allowance of inner ring (metric series) unit: μm

d Nominal bore dia. mm		Δd_{mp} Single plane mean bore dia. deviation		V_{dsp} Bore dia. variation in a single radial plane (Maximum)	V_{dmp} Mean bore dia. variation (Maximum)	K_{ia} Radial runout (Maximum)	V_{Bs} Width variation (Maximum)
Over	Incl.	High	Low				
2.5	10	0	− 8	10	6	10	15
10	18	0	− 8	10	6	10	20
18	30	0	−10	13	8	13	20
30	50	0	−12	15	9	15	20

Table 5.2 Tolerance and allowance of outer ring (metric series cylindrical outer ring) unit: μm

D Nominal outside dia. of outer ring mm		ΔD_{mp} Single plane mean outside dia. deviation		V_{Dsp} Outside dia. variation in a single radial plane (Maximum)	V_{Dmp} Mean outside dia. variation (Maximum)	K_{ea} Radial runout (Maximum)	V_{Cs} Width variation (Maximum)
Over	Incl.	High	Low				
6	18	0	− 8	10	6	15	See the allowance of V_{Bs} for the same bearing d.
18	30	0	− 9	12	7	15	
30	50	0	−11	14	8	20	
50	80	0	−13	16	10	25	
80	120	0	−15	19	11	35	

Accuracy

Table 5.3 Tolerance and allowance of outer ring (inch series and cylindrical outer ring) unit: μm

D Nominal outside dia. of outer ring mm		ΔD_{mp} Single plane mean outside dia. deviation		V_{Dsp} Outside dia. variation in a single radial plane (Maximum)	V_{Dmp} Mean outside dia. variation (Maximum)	K_{ea} Radial runout (Maximum)
Over	Incl.	High	Low			
6	18	0	−25	10	6	15
18	30			12	7	15
30	50			14	8	20
50	80			16	10	25
80	120			19	11	35

Table 6 Tolerance of smallest single roller set bore diameter $F_{ws\,min}$ unit: μm

F_w Nominal roller set bore diameter mm		$\Delta_{Fws\,min}$ Deviation of smallest single roller set bore diameter	
Over	Incl.	High	Low
6	10	+22	+13
10	18	+27	+16
18	30	+33	+20
30	50	+41	+25
50	80	+49	+30

Radial Internal Clearance

Radial internal clearance of Roller Followers is indicated in the Table 7.

Table 7 Radial internal clearance value unit: μm

Identification number (1)				Radial internal clearance	
Metric series			Inch series		
Separable Roller Followers	Non-separable Roller Followers	Cylindrical Roller Followers	Non-separable Roller Followers	Minimum	Maximum
NAST 6R	NART 5R	–	–	5	20
NAST 8R to NAST12R	NART 6R to NART12R	–	–	5	25
NAST15R to NAST25R	NART15R to NART20R	–	–	10	30
NAST30R to NAST40R	NART25R to NART40R	–	–	10	40
NAST45R, NAST50R	NART45R, NART50R	–	–	15	50
–	–	NURT15R to NURT30-1R	–	20	45
–	–	NURT35R to NURT40-1R	–	25	50
–	–	NURT45R to NURT50-1R	–	30	60
–	–	–	CRY12R to CRY56R	35	60
–	–	–	CRY64R	45	70

Note (1) Also applicable to the full complement type, the shield and sealed types, and the cylindrical outer ring type.

Fit

Roller Followers are generally used for outer ring rotation load. A recommended fit with a shaft is shown in Table 8. Inch series is described in the dimension table.

Table 8 Recommended fit (metric series)

Model of bearing		Tolerance class of shaft
Separable Roller Followers	Without inner ring	k5, k6
	With inner ring	g6, h6
Non-separable Roller Followers		
Cylindrical Roller Followers		

Track Capacity

Track capacity refers to allowable load with which the mating member material can continuously endure the contact between Roller Followers outer ring and steel mating cam guide surface (plane) without generating deformation or indentation. Track capacities indicated in the Table 9.1 and Table 9.2 are values on the assumption that hardness of the mating member material is 40HRC (tensile strength: 1250 N/mm^2) and if hardness is not 40HRC, these values must be multiplied by track capacity factors indicated in the Table 10.

If the lubrication between outer ring and mating cam guide surface is not sufficient, seizure and wear may be generated depending on use conditions. Special care is required for lubrication and surface roughness at high rotational speed of the cam mechanism, etc.

Table 9.1 Track capacity (metric series) unit: N

Crowned outer ring				Cylindrical outer ring					
Identification number(1)			Track capacity	Identification number	Track capacity	Identification number (2)	Track capacity	Identification number	Track capacity
Separable Roller Followers	Non-separable Roller Followers	Cylindrical Roller Followers							
RNAST 5R	NART 5R	–	1 040	RNAST 5	2 310	–	–	–	–
(R) NAST 6R	NART 6R	–	1 330	(R) NAST 6	3 550	NAST 6ZZ	3 550	–	–
(R) NAST 8R	NART 8R	–	1 850	(R) NAST 8	3 980	NAST 8ZZ	4 490	–	–
(R) NAST10R	NART10R	–	2 470	(R) NAST10	5 610	NAST10ZZ	6 890	–	–
(R) NAST12R	NART12R	–	2 710	(R) NAST12	5 990	NAST12ZZ	7 350	–	–
(R) NAST15R	NART15R	NURT15 R	3 060	(R) NAST15	6 550	NAST15ZZ	8 030	NURT 15	11 500
–	–	NURT15-1R	3 910	–	–	–	–	NURT 15-1	13 700
(R) NAST17R	NART17R	NURT17 R	3 660	(R) NAST17	10 900	NAST17ZZ	11 700	NURT 17	13 600
–	–	NURT17-1R	4 530	–	–	–	–	NURT 17-1	16 000
(R) NAST20R	NART20R	NURT20 R	4 530	(R) NAST20	12 800	NAST20ZZ	13 800	NURT 20	20 000
–	–	NURT20-1R	5 190	–	–	–	–	NURT 20-1	22 100
(R) NAST25R	NART25R	NURT25 R	5 190	(R) NAST25	14 100	NAST25ZZ	15 300	NURT 25	22 100
–	–	NURT25-1R	6 580	–	–	–	–	NURT 25-1	26 400
(R) NAST30R	NART30R	NURT30 R	6 580	(R) NAST30	22 100	NAST30ZZ	22 100	NURT 30	31 600
–	–	NURT30-1R	8 020	–	–	–	–	NURT 30-1	36 700
(R) NAST35R	NART35R	NURT35 R	8 020	(R) NAST35	25 700	NAST35ZZ	25 700	NURT 35	36 700
–	–	NURT35-1R	9 220	–	–	–	–	NURT 35-1	40 800
(R) NAST40R	NART40R	NURT40 R	9 220	(R) NAST40	26 900	NAST40ZZ	30 300	NURT 40	44 200
–	–	NURT40-1R	10 800	–	–	–	–	NURT 40-1	49 700
(R) NAST45R	NART45R	NURT45 R	9 990	(R) NAST45	28 500	NAST45ZZ	32 200	NURT 45	47 000
–	–	NURT45-1R	12 400	–	–	–	–	NURT 45-1	55 300
(R) NAST50R	NART50R	NURT50 R	10 800	(R) NAST50	30 200	NAST50ZZ	34 000	NURT 50	49 700
–	–	NURT50-1R	14 000	–	–	–	–	NURT 50-1	60 800

Note (1) Also applicable to the full complement type and the shield and sealed type.
(2) Also applicable to the sealed type.

Table 9.2 Track capacity (inch series) unit: N

Crowned outer ring		Cylindrical outer ring	
Identification number(1)	Track capacity	Identification number(1)	Track capacity
CRY12 R	853	CRY12	4 490
CRY14 R	1 050	CRY14	5 240
CRY16 R	1 420	CRY16	7 270
CRY18 R	1 660	CRY18	7 700
CRY20 R	2 160	CRY20	10 700
CRY22 R	2 450	CRY22	11 800
CRY24 R	3 410	CRY24	15 400
CRY26 R	3 820	CRY26	16 700
CRY28 R	4 210	CRY28	21 000
CRY30 R	4 610	CRY30	22 500
CRY32 R	5 690	CRY32	30 800
CRY36 R	6 640	CRY36	34 700
CRY40 R	8 970	CRY40	44 900
CRY44 R	10 200	CRY44	49 400
CRY48 R	11 400	CRY48	64 300
CRY52 R	12 700	CRY52	69 600
CRY56 R	14 100	CRY56	87 000
CRY64 R	16 800	CRY64	113 000

Note (1) Also applicable to the sealed type.

Table 10 Track capacity factor

Hardness HRC	Tensile strength N/mm^2	Track capacity factor	
		Crowned outer ring	Cylindrical outer ring
20	760	0.22	0.37
25	840	0.31	0.46
30	950	0.45	0.58
35	1 080	0.65	0.75
38	1 180	0.85	0.89
40	1 250	1.00	1.00
42	1 340	1.23	1.15
44	1 435	1.52	1.32
46	1 530	1.85	1.51
48	1 635	2.27	1.73
50	1 760	2.80	1.99
52	1 880	3.46	2.29
54	2 015	4.21	2.61
56	2 150	5.13	2.97
58	2 290	6.26	3.39

Allowable Rotational Speed

The allowable rotational speed for Roller Followers is affected by mounting and use conditions. For dn value with only pure radial load applied, use values in Table 11 or lower as references. Under actual use conditions, it is recommended to use dn, one tenth of indicated values, taking into account the effect of axial load.

Table 11 dn value (1) of Roller Followers

Lubrication / Model of bearing	Grease lubrication	Oil lubrication
Caged type	84 000	140 000
Full complement type	42 000	70 000
Cylindrical Roller Followers	72 000	120 000

Note (1) dn value = d x n
where, d: Bearing bore diameter mm
n: Rotational speed min^{-1}

Lubrication

Alvania Grease S2 [SHOWA SHELL SEKIYU K. K.] is pre-packed as lubrication grease in the sealed type of Roller Followers, Cylindrical Roller Followers, and Inch series Roller Followers.

Feed grease or oil from the oil hole on the inner ring to use the bearing without pre-packed grease. Otherwise, increased wear on the rolling contact surface and/or short life time may be resulted.

Oil hole

An oil hole is not provided for the open type of Separable Roller Followers. As for the other metric series Roller Followers, one oil hole is provided. An oil groove and one oil hole are provided for the inner ring of the inch series.

Operating Temperature Range

Roller Followers can be used in an environment between -20 and 120˚C. For usage exceeding 100˚C, please contact **IKO**.

The sealed type can withstand up to 100˚C. For continuous usage, please keep it under 80˚C.

Mounting

1. Mount the mounting part of the shield/sealed type according to the a dimensions in the dimension table.(See Fig. 1)
2. When mounting Roller Followers, make sure that the oil hole on the inner ring does not enter the loading area. Otherwise, product life may become shorter.(See Fig. 2)
3. When mounting the sealed type of Separable Roller Followers, make sure that the side plate does not come off. If the side plate comes off, make sure not to have the seal lip bitten when mounting it.
4. If using a bearing without the inner ring, it is necessary to have the bearing heat-treated and ground. At this time, the shaft surface hardness of 58 to 64 HRC and the shaft surface roughness of 0.2 μmR_a or less is recommended. In addition, it is ideal to have the side surface of the mounting part ground because the outer ring and the cage are guided in the axial direction by the side surface. At a minimum, make the surface turned or processed similarly.(See Fig. 3)
5. When mounting Non-separable Roller Followers, make sure not to push the side plate because it is press-fitted.

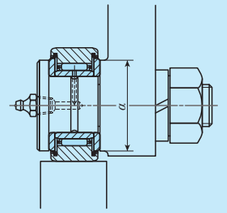


Fig. 1 Mating seating dimension "a"

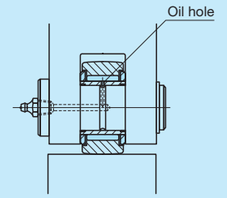


Fig. 2 Oil hole location and loading direction

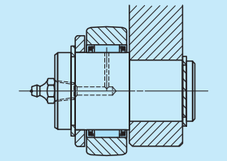


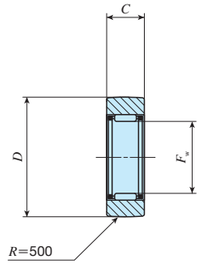
Fig. 3 Mounting example of bearing without inner ring

IKO Separable Roller Followers · Open Type · Without Inner Ring

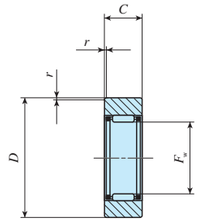
Selectable product specifications

Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Open Type
	ZZ	Shield type
	ZZUU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





RNAST···R



RNAST

Shaft diameter	Identification number Open Type		Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
	Crowned outer ring	Cylindrical outer ring		F_w	D	C	$r_{s\,min}$ (1)	C	C_0
mm			g					N	N
7	RNAST 5 R	RNAST 5	8.9	7	16	7.8	0.3	2 710	2 390
10	RNAST 6 R	RNAST 6	13.9	10	19	9.8	0.3	4 160	4 550
12	RNAST 8 R	RNAST 8	23.5	12	24	9.8	0.6	5 650	5 890
14	RNAST 10 R	RNAST 10	42.5	14	30	11.8	1	9 790	9 680
16	RNAST 12 R	RNAST 12	49.5	16	32	11.8	1	10 500	10 900
20	RNAST 15 R	RNAST 15	50	20	35	11.8	1	12 400	14 300
22	RNAST 17 R	RNAST 17	90	22	40	15.8	1	17 600	20 900
25	RNAST 20 R	RNAST 20	135	25	47	15.8	1	19 400	24 500
30	RNAST 25 R	RNAST 25	152	30	52	15.8	1	20 800	28 400
38	RNAST 30 R	RNAST 30	255	38	62	19.8	1	30 500	45 400
42	RNAST 35 R	RNAST 35	375	42	72	19.8	1	32 400	50 600
50	RNAST 40 R	RNAST 40	420	50	80	19.8	1.5	35 900	61 100
55	RNAST 45 R	RNAST 45	460	55	85	19.8	1.5	37 400	66 400
60	RNAST 50 R	RNAST 50	500	60	90	19.8	1.5	38 900	71 700

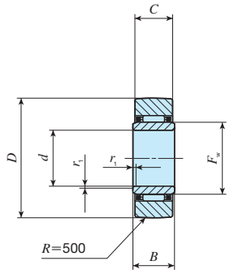
Note (1) This represents the minimum tolerance dimensions of the chamfer dimensions r.
Remarks 1. No oil hole is provided.
2. Grease is not pre-packed. Use the product with appropriate lubrication.

IKO Separable Roller Followers · Open Type · With Inner Ring

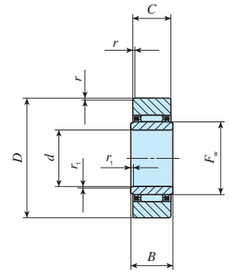
Selectable product specifications

Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Open Type
	ZZ	Shield type
	ZZUU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





NAST···R



NAST

Shaft diameter	Identification number Open Type		Mass (Ref.)	Nominal dimensions mm							Basic dynamic load rating	Basic static load rating	Assembled inner ring
	Crowned outer ring	Cylindrical outer ring		d	D	B	C	$r_{s\,min}$ (1)	$r_{1\,s\,min}$ (1)	F_w	C	C_0	
mm			g								N	N	
6	NAST 6R	NAST 6	17.8	6	19	10	9.8	0.3	0.3	10	4 160	4 550	LRT 61010 S
8	NAST 8 R	NAST 8	28	8	24	10	9.8	0.6	0.3	12	5 650	5 890	LRT 81210 S
10	NAST 10 R	NAST 10	49.5	10	30	12	11.8	1	0.3	14	9 790	9 680	LRT 101412 S
12	NAST 12 R	NAST 12	58	12	32	12	11.8	1	0.3	16	10 500	10 900	LRT 121612 S
15	NAST 15 R	NAST 15	62	15	35	12	11.8	1	0.3	20	12 400	14 300	LRT 152012 S
17	NAST 17 R	NAST 17	109	17	40	16	15.8	1	0.3	22	17 600	20 900	LRT 172216 S
20	NAST 20 R	NAST 20	157	20	47	16	15.8	1	0.3	25	19 400	24 500	LRT 202516 S
25	NAST 25 R	NAST 25	180	25	52	16	15.8	1	0.3	30	20 800	28 400	LRT 253016 S
30	NAST 30 R	NAST 30	320	30	62	20	19.8	1	0.6	38	30 500	45 400	LRT 303820 S
35	NAST 35 R	NAST 35	440	35	72	20	19.8	1	0.6	42	32 400	50 600	LRT 354220 S
40	NAST 40 R	NAST 40	530	40	80	20	19.8	1.5	1	50	35 900	61 100	LRT 405020 S
45	NAST 45 R	NAST 45	580	45	85	20	19.8	1.5	1	55	37 400	66 400	LRT 455520 S
50	NAST 50 R	NAST 50	635	50	90	20	19.8	1.5	1	60	38 900	71 700	LRT 506020 S

Note (1) This represents the minimum tolerance dimensions of the chamfer dimensions r and r_1.
Remarks 1. No oil hole is provided.
2.Grease is not pre-packed. Use the product with appropriate lubrication.

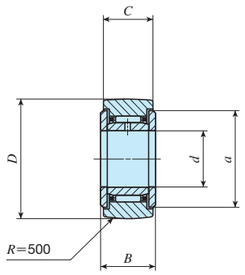
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1mm=0.03937inch

IKO Separable Roller Followers · Shield Type · With Inner Ring
IKO Separable Roller Followers · Sealed Type · With Inner Ring

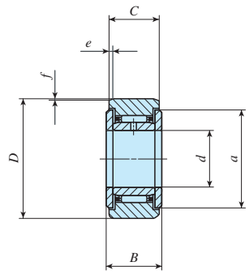
Selectable product specifications

Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Open Type
	ZZ	Shield type
	ZZUU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

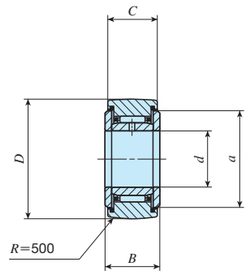




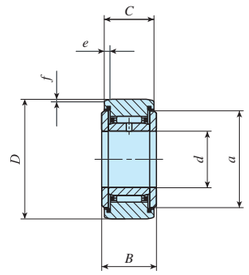
NAST···ZZR



NAST···ZZ



NAST···ZZUUR



NAST···ZZUU

Shaft diameter	Identification number				Mass (Ref.)		Nominal dimensions mm							Basic dynamic load rating	Basic static load rating
	Shield type		Sealed Type												
mm	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring	g		*d*	*D*	*B*	*C*	*a*	*e*	*f*	*C* N	C_0 N
6	NAST 6 ZZR	NAST 6ZZ	NAST 6 ZZUUR	NAST 6 ZZUU	24.5		**6**	19	14	13.8	14	2.5	0.8	**4 160**	**4 550**
8	NAST 8 ZZR	NAST 8ZZ	NAST 8 ZZUUR	NAST 8 ZZUU	39		**8**	24	14	13.8	17.5	2.5	0.8	**5 650**	**5 890**
10	NAST 10 ZZR	NAST 10 ZZ	NAST 10 ZZUUR	NAST 10 ZZUU	65		10	30	16	15.8	23.5	2.5	0.8	**9 790**	**9 680**
12	NAST 12 ZZR	NAST 12 ZZ	NAST 12 ZZUUR	NAST 12 ZZUU	75		12	32	16	15.8	25.5	2.5	0.8	10 500	10 900
15	NAST 15 ZZR	NAST 15 ZZ	NAST 15 ZZUUR	NAST 15 ZZUU	83		15	35	16	15.8	29	2.5	0.8	12 400	14 300
17	NAST 17 ZZR	NAST 17 ZZ	NAST 17 ZZUUR	NAST 17 ZZUU	135		17	40	20	19.8	32.5	3	1	17 600	20 900
20	NAST 20 ZZR	NAST 20 ZZ	NAST 20 ZZUUR	NAST 20 ZZUU	195		20	47	20	19.8	38	3	1	19 400	24 500
25	NAST 25 ZZR	NAST 25 ZZ	NAST 25 ZZUUR	NAST 25 ZZUU	225		25	52	20	19.8	43	3	1	20 800	28 400
30	NAST 30 ZZR	NAST 30 ZZ	NAST 30 ZZUUR	NAST 30 ZZUU	400		30	62	25	24.8	50.5	4	1.2	30 500	45 400
35	NAST 35 ZZR	NAST 35 ZZ	NAST 35 ZZUUR	NAST 35 ZZUU	550		35	72	25	24.8	53.5	4	1.2	32 400	50 600
40	NAST 40 ZZR	NAST 40 ZZ	NAST 40 ZZUUR	NAST 40 ZZUU	710		40	80	26	25.8	61.5	4	1.2	35 900	61 100
45	NAST 45 ZZR	NAST 45 ZZ	NAST 45 ZZUUR	NAST 45 ZZUU	760		45	85	26	25.8	66.5	4	1.2	37 400	66 400
50	NAST 50 ZZR	NAST 50 ZZ	NAST 50 ZZUUR	NAST 50 ZZUU	830		50	90	26	25.8	76	4	1.2	38 900	71 700

Remarks 1. One oil hole is provided for the inner ring.
2. Grease is pre-packed for the sealed type. Grease is not pre-packed for the shield type. Use the product with appropriate lubrication.

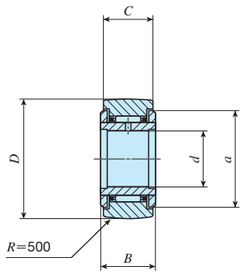
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1mm=0.03937inch

IKO Non-separable Roller Followers

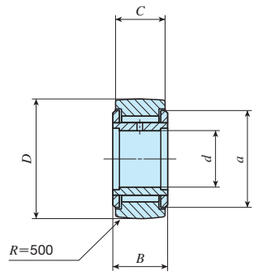
Selectable product specifications

Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

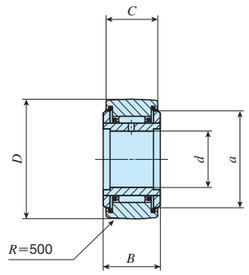




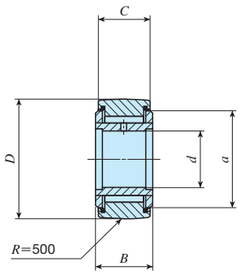
NART···R



NART···VR



NART···UUR



NART···VUUR

Shaft diameter mm	Identification number: Shield type Crowned outer ring Caged type	Shield type Crowned outer ring Full complement type	Sealed Type Crowned outer ring Caged type	Sealed Type Crowned outer ring Full complement type	Mass (Ref.) g		Nominal dimensions mm d	D	B	C	a	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
5	NART 5 R	–	NART 5 UUR	–	14.5		**5**	16	12	11	12	**3 650**	3 680	3 680
	–	NART 5 VR	–	NART 5 VUUR	15.1		**5**	16	12	11	12	**6 810**	8 370	7 310
6	NART 6 R	–	NART 6 UUR	–	20.5		**6**	19	12	11	14	**4 250**	4 740	4 740
	–	NART 6 VR	–	NART 6 VUUR	21.5		**6**	19	12	11	14	**7 690**	10 300	10 300
8	NART 8 R	–	NART 8 UUR	–	41.5		**8**	24	15	14	17.5	**5 640**	5 900	5 900
	–	NART 8 VR	–	NART 8 VUUR	42.5		**8**	24	15	14	17.5	11 800	15 600	15 600
10	NART 10 R	–	NART 10 UUR	–	64.5		10	30	15	14	23.5	**8 030**	7 540	7 540
	–	NART 10 VR	–	NART 10 VUUR	66.5		10	30	15	14	23.5	15 600	18 100	17 500
12	NART 12 R	–	NART 12 UUR	–	71		12	32	15	14	25.5	**8 580**	8 470	8 470
	–	NART 12 VR	–	NART 12 VUUR	73		12	32	15	14	25.5	16 800	20 500	18 600
15	NART 15 R	–	NART 15 UUR	–	102		15	35	19	18	29	13 700	16 400	16 400
	–	NART 15 VR	–	NART 15 VUUR	106		15	35	19	18	29	25 200	36 400	24 000
17	NART 17 R	–	NART 17 UUR	–	149		17	40	21	20	32.5	17 600	21 000	21 000
	–	NART 17 VR	–	NART 17 VUUR	155		17	40	21	20	32.5	32 000	46 300	33 100
20	NART 20 R	–	NART 20 UUR	–	250		20	47	25	24	38	23 000	30 700	30 700
	–	NART 20 VR	–	NART 20 VUUR	255		20	47	25	24	38	41 600	67 300	67 300
25	NART 25 R	–	NART 25 UUR	–	285		25	52	25	24	43	24 700	35 400	35 400
	–	NART 25 VR	–	NART 25 VUUR	295		25	52	25	24	43	45 500	79 100	79 100
30	NART 30 R	–	NART 30 UUR	–	470		30	62	29	28	50.5	33 600	51 400	51 400
	–	NART 30 VR	–	NART 30 VUUR	485		30	62	29	28	50.5	59 900	110 000	92 500
35	NART 35 R	–	NART 35 UUR	–	640		35	72	29	28	53.5	35 700	57 400	57 400
	–	NART 35 VR	–	NART 35 VUUR	655		35	72	29	28	53.5	63 100	121 000	121 000
40	NART 40 R	–	NART 40 UUR	–	845		40	80	32	30	61.5	44 900	81 500	81 500
	–	NART 40 VR	–	NART 40 VUUR	865		40	80	32	30	61.5	76 300	164 000	164 000
45	NART 45 R	–	NART 45 UUR	–	915		45	85	32	30	66.5	46 800	88 600	88 600
	–	NART 45 VR	–	NART 45 VUUR	935		45	85	32	30	66.5	80 300	181 000	181 000
50	NART 50 R	–	NART 50 UUR	–	980		50	90	32	30	76	48 600	95 600	95 600
	–	NART 50 VR	–	NART 50 VUUR	1 010		50	90	32	30	76	84 300	198 000	198 000

Remarks 1. One oil hole is provided for the inner ring.
2. Grease is pre-packed for the sealed type. Grease is not pre-packed for the shield type. Use the product with appropriate lubrication.

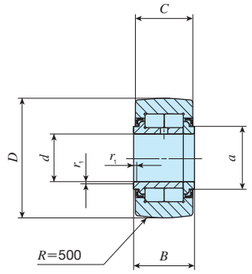
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Cylindrical Roller Followers

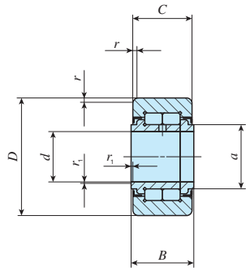
Selectable product specifications

Roller guide type	No symbol	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring





NURT···R



NURT

Shaft diameter mm	Identification number: Crowned outer ring	Identification number: Cylindrical outer ring	Mass (Ref.) g	Nominal dimensions mm: d	D	B	C	a		$r_{s\,min}$ (1)	$r_{1s\,min}$ (1)	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum allowable static load N
15	NURT 15 R	NURT 15	100	15	35	19	18	20		0.6	0.3	23 400	27 300	11 800
	NURT 15-1 R	NURT 15-1	160	15	42	19	18	20		0.6	0.3	23 400	27 300	27 300
17	NURT 17 R	NURT 17	147	17	40	21	20	22		1	0.3	25 200	30 900	20 300
	NURT 17-1 R	NURT 17-1	222	17	47	21	20	22		1	0.3	25 200	30 900	30 900
20	NURT 20 R	NURT 20	245	20	47	25	24	27		1	0.3	38 900	49 000	27 200
	NURT 20-1 R	NURT 20-1	321	20	52	25	24	27		1	0.3	38 900	49 000	49 000
25	NURT 25 R	NURT 25	281	25	52	25	24	31		1	0.3	43 100	58 100	30 000
	NURT 25-1 R	NURT 25-1	450	25	62	25	24	31		1	0.3	43 100	58 100	58 100
30	NURT 30 R	NURT 30	466	30	62	29	28	38		1	0.3	58 200	75 300	35 200
	NURT 30-1 R	NURT 30-1	697	30	72	29	28	38		1	0.3	58 200	75 300	75 300
35	NURT 35 R	NURT 35	630	35	72	29	28	44		1	0.6	63 900	88 800	57 000
	NURT 35-1 R	NURT 35-1	840	35	80	29	28	44		1	0.6	63 900	88 800	88 800
40	NURT 40 R	NURT 40	817	40	80	32	30	49		1	0.6	86 500	122 000	75 300
	NURT 40-1 R	NURT 40-1	1 130	40	90	32	30	49		1	0.6	86 500	122 000	122 000
45	NURT 45 R	NURT 45	883	45	85	32	30	53		1	0.6	91 500	135 000	78 700
	NURT 45-1 R	NURT 45-1	1 400	45	100	32	30	53		1	0.6	91 500	135 000	135 000
50	NURT 50 R	NURT 50	950	50	90	32	30	58		1	0.6	96 300	148 000	82 100
	NURT 50-1 R	NURT 50-1	1 690	50	110	32	30	58		1	0.6	96 300	148 000	148 000

Note (1) This represents the minimum tolerance dimensions of the chamfer dimensions r and r_1.
Remarks 1. One oil hole is provided for the inner ring.
2. Grease is pre-packed.

Related Products

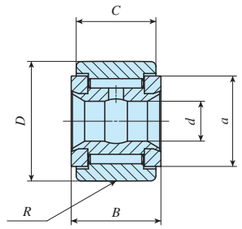
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Inch Series Non-separable Roller Followers

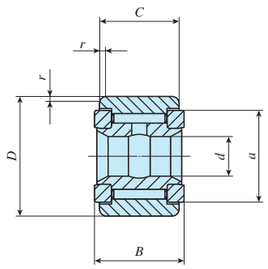
Selectable product specifications

Roller guide type	No symbol	Caged type
	V	Full complement type
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outside surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring

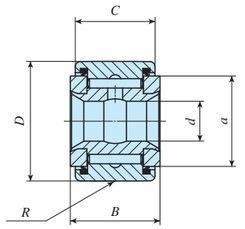




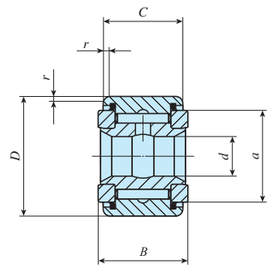
CRY···VR



CRY···V



CRY···VUUR



CRY···VUU

Shaft diameter mm (inch)	Identification number: Shield type Crowned outer ring	Shield type Cylindrical outer ring	Sealed Type Crowned outer ring	Sealed Type Cylindrical outer ring	Mass (Ref.) g	Nominal dimensions mm (inch) d	D	B	C	a	R	r	Shaft diameter mm: Clearance fit Minimum	Clearance fit Maximum	Transition fit Minimum	Transition fit Maximum	Interference fit Minimum	Interference fit Maximum	Basic dynamic load rating C N	Basic static load rating C_0 N
6.350 (1/4)	CRY 12 VR	CRY 12 V	CRY 12 VUUR	CRY 12 VUU	27	6.350(1/4)	19.050(3/4)	14.288(0.5625)	12.700(1/2)	14.4(0.567)	250(10)	0.794(1/32)	6.332	6.342	6.348	6.358	6.353	6.363	8 710	12 300
	CRY 14 VR	CRY 14 V	CRY 14 VUUR	CRY 14 VUU	36	6.350(1/4)	22.225(7/8)	14.288(0.5625)	12.700(1/2)	14.4(0.567)	250(10)	0.794(1/32)	6.332	6.342	6.348	6.358	6.353	6.363	8 710	12 300
7.938 (5/16)	CRY 16 VR	CRY 16 V	CRY 16 VUUR	CRY 16 VUU	68	7.938(5/16)	25.400(1)	17.463(0.6875)	15.875(5/8)	19.6(0.772)	300(12)	1.191(3/64)	7.920	7.930	7.935	7.945	7.940	7.950	13 100	22 700
	CRY 18 VR	CRY 18 V	CRY 18 VUUR	CRY 18 VUU	77	7.938(5/16)	28.575(1 1/8)	17.463(0.6875)	15.875(5/8)	19.6(0.772)	300(12)	1.588(1/16)	7.920	7.930	7.935	7.945	7.940	7.950	13 100	22 700
9.525 (3/8)	CRY 20 VR	CRY 20 V	CRY 20 VUUR	CRY 20 VUU	109	9.525(3/8)	31.750(1 1/4)	20.638(0.8125)	19.050(3/4)	25.0(0.984)	360(14)	1.588(1/16)	9.507	9.517	9.523	9.533	9.528	9.538	23 600	31 700
	CRY 22 VR	CRY 22 V	CRY 22 VUUR	CRY 22 VUU	136	9.525(3/8)	34.925(1 3/8)	20.638(0.8125)	19.050(3/4)	25.0(0.984)	360(14)	1.588(1/16)	9.507	9.517	9.523	9.533	9.528	9.538	23 600	31 700
11.112 (7/16)	CRY 24 VR	CRY 24 V	CRY 24 VUUR	CRY 24 VUU	186	11.112(7/16)	38.100(1 1/2)	23.813(0.9375)	22.225(7/8)	28.8(1.134)	500(20)	1.588(1/16)	11.095	11.105	11.110	11.120	11.115	11.125	28 200	40 100
	CRY 26 VR	CRY 26 V	CRY 26 VUUR	CRY 26 VUU	227	11.112(7/16)	41.275(1 5/8)	23.813(0.9375)	22.225(7/8)	28.8(1.134)	500(20)	1.588(1/16)	11.095	11.105	11.110	11.120	11.115	11.125	28 200	40 100
12.700 (1/2)	CRY 28 VR	CRY 28 V	CRY 28 VUUR	CRY 28 VUU	290	12.700(1/2)	44.450(1 3/4)	26.988(1.0625)	25.400(1)	32.7(1.287)	500(20)	1.588(1/16)	12.682	12.692	12.698	12.708	12.708	12.718	35 300	55 600
	CRY 30 VR	CRY 30 V	CRY 30 VUUR	CRY 30 VUU	363	12.700(1/2)	47.625(1 7/8)	26.988(1.0625)	25.400(1)	32.7(1.287)	500(20)	1.588(1/16)	12.682	12.692	12.698	12.708	12.708	12.718	35 300	55 600
15.875 (5/8)	CRY 32 VR	CRY 32 V	CRY 32 VUUR	CRY 32 VUU	476	15.875(5/8)	50.800(2)	33.338(1.3125)	31.750(1 1/4)	36.0(1.417)	600(24)	1.588(1/16)	15.857	15.867	15.873	15.883	15.883	15.893	45 700	80 600
	CRY 36 VR	CRY 36 V	CRY 36 VUUR	CRY 36 VUU	599	15.875(5/8)	57.150(2 1/4)	33.338(1.3125)	31.750(1 1/4)	36.0(1.417)	600(24)	1.588(1/16)	15.857	15.867	15.873	15.883	15.883	15.893	45 700	80 600
19.050 (3/4)	CRY 40 VR	CRY 40 V	CRY 40 VUUR	CRY 40 VUU	816	19.050(3/4)	63.500(2 1/2)	39.688(1.5625)	38.100(1 1/2)	43.3(1.705)	760(30)	2.381(3/32)	19.032	19.042	19.048	19.058	19.058	19.068	61 400	116 000
	CRY 44 VR	CRY 44 V	CRY 44 VUUR	CRY 44 VUU	1 020	19.050(3/4)	69.850(2 3/4)	39.688(1.5625)	38.100(1 1/2)	43.3(1.705)	760(30)	2.381(3/32)	19.032	19.042	19.048	19.058	19.058	19.068	61 400	116 000
25.400 (1)	CRY 48 VR	CRY 48 V	CRY 48 VUUR	CRY 48 VUU	1 410	25.400(1)	76.200(3)	46.038(1.8125)	44.450(1 3/4)	54.0(2.125)	760(30)	2.381(3/32)	25.377	25.390	25.397	25.410	25.408	25.420	77 600	172 000
	CRY 52 VR	CRY 52 V	CRY 52 VUUR	CRY 52 VUU	1 640	25.400(1)	82.550(3 1/4)	46.038(1.8125)	44.450(1 3/4)	54.0(2.125)	760(30)	2.381(3/32)	25.377	25.390	25.397	25.410	25.408	25.420	77 600	172 000
28.575 (1 1/8)	CRY 56 VR	CRY 56 V	CRY 56 VUUR	CRY 56 VUU	2 250	28.575(1 1/8)	88.900(3 1/2)	52.388(2.0625)	50.800(2)	61.9(2.437)	760(30)	2.381(3/32)	28.522	28.565	28.572	28.585	28.583	28.595	111 000	239 000
31.750 (1 1/4)	CRY 64 VR	CRY 64 V	CRY 64 VUUR	CRY 64 VUU	3 200	31.750(1 1/4)	101.600(4)	58.738(2.3125)	57.150(2 1/4)	71.0(2.797)	760(30)	2.381(3/32)	31.727	31.740	31.747	31.760	31.758	31.770	142 000	317 000

Remarks 1. An oil groove and one oil hole are provided for the inner ring.
2. Grease is pre-packed.

Related Products

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 Load rating

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.

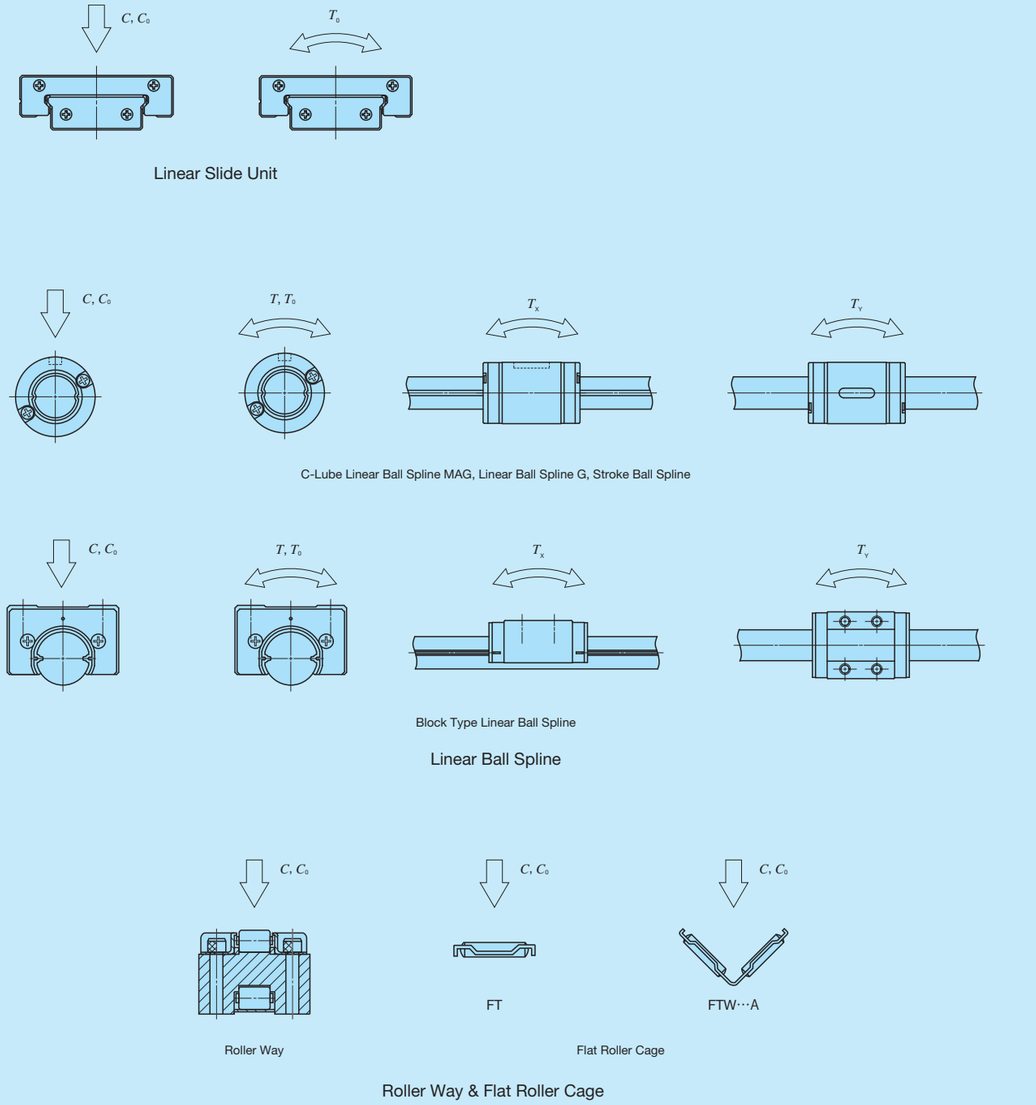


Fig. 1 Direction of load rating, torque rating, and moment load

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 cpm
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 rpm n_1 : Number of strokes per minute cpm S : Stroke length mm D_{PW} : Pitch circle diameter of balls mm ($D_{PW}\fallingdotseq 1.15F_W$) 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

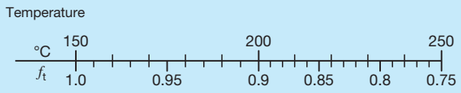


Fig. 2 Temperature factor

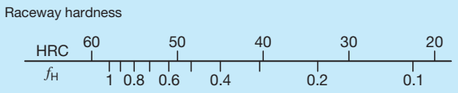


Fig. 3 Hardness factor

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.

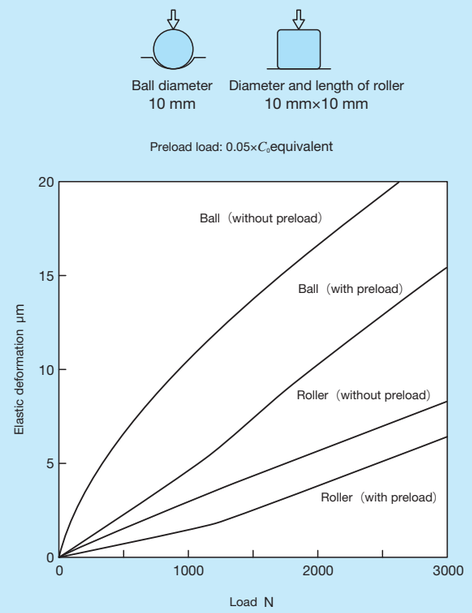


Figure 4 Preload and elastic deformation behavior

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 [SHOWA SHELL SEKIYU K. K.]
Block Type Linear Ball Spline	MULTEMP PS No.2 [KYODO YUSHI CO., LTD.]

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	Range of operating temperature (2) ℃	Usage
Alvania EP Grease 2	[SHOWA SHELL SEKIYU K. K.]	Mineral oil	Lithium	−20～110	General application with extreme-pressure additive
Alvania Grease S2	[SHOWA SHELL SEKIYU K. K.]	Mineral oil	Lithium	−25～120	General application
Multemp PS No.2	[KYODO YUSHI CO., LTD.]	Synthetic oil, Mineral oil	Lithium	−50～130	General application
IKO Low Dust-Generation Grease for Clean Environment CG2	[NIPPON THOMPSON CO., LTD.]	Synthetic oil	Urea	−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	−30～120	For clean environment Low sliding
DEMNUM™ Grease L-200 (1)	[DAIKIN INDUSTRIES, LTD.]	Synthetic oil	Ethylene tetra-fluoride	−60～300	For clean environment
FOMBLIN® Y-VAC3 (1)	[SOLVAY SOLEXIS]	Synthetic oil	Ethylene tetra-fluoride	−20～250	For vacuum
IKO Anti-Fretting Grease AF2	[NIPPON THOMPSON CO., LTD.]	Synthetic oil	Urea	−50～170	Fretting-proof
6459 Grease N	[SHOWA SHELL SEKIYU K. K.]	Mineral oil	Poly-urea	–	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 1. FOMBLIN® is a registered trademark of SOLVAY SOLEXIS.
2. Check with the chosen grease manufacturer's catalog before use.
For grease for use other than listed, contact IKO.

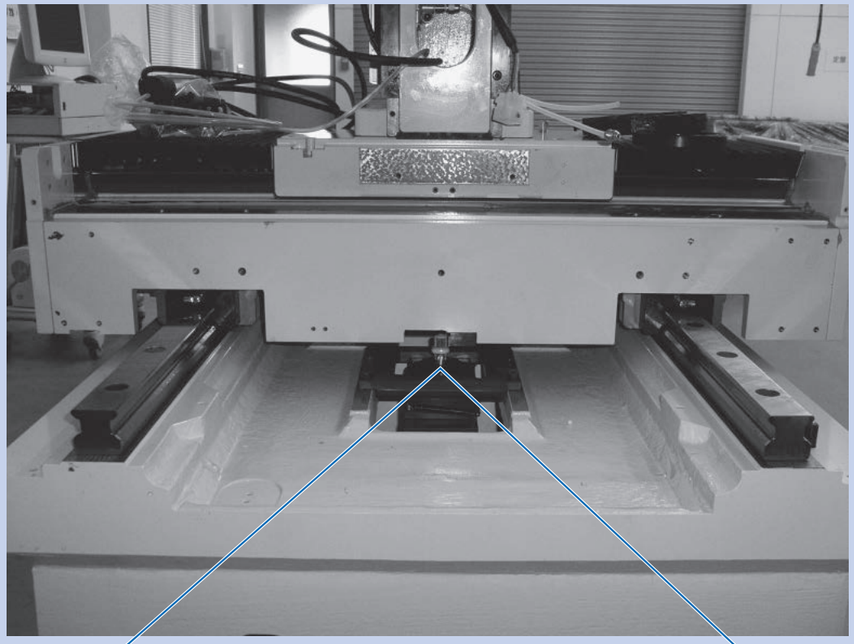
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1mm=0.03937inch

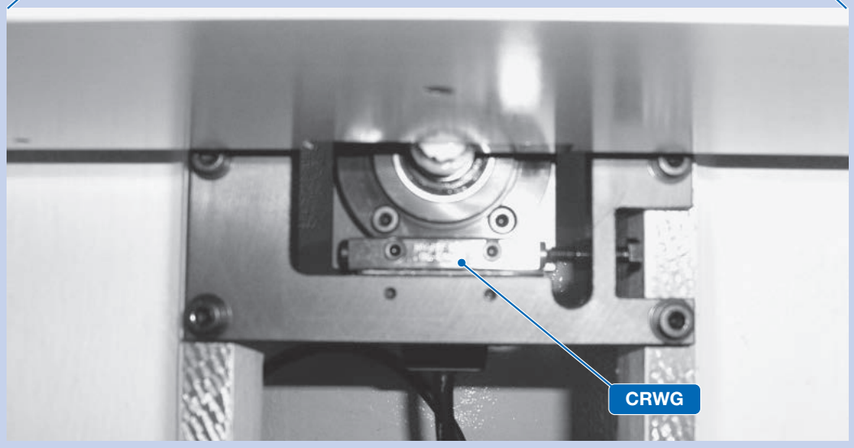
Introduction of Application Examples

Introduction of Application Examples

Gear testing and inspection equipment

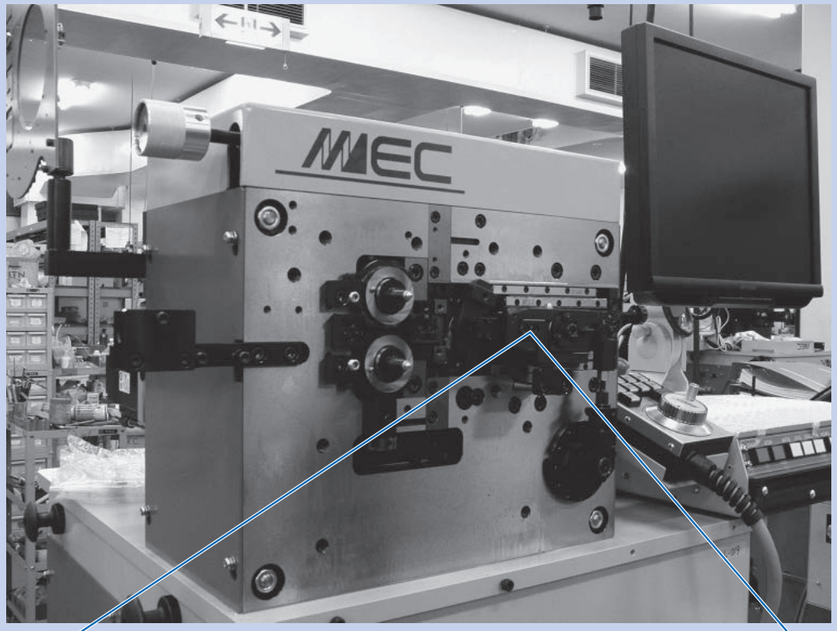
CRWG





Spring forming machine

CRWG





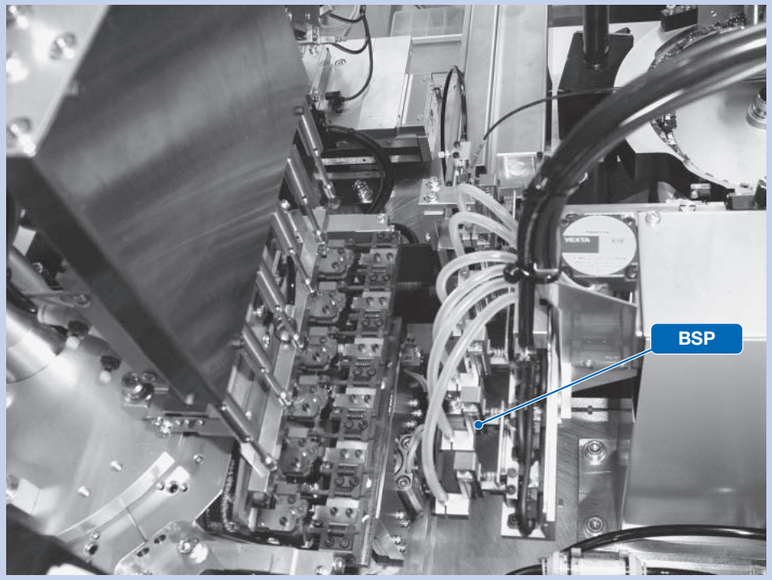
Lithium-ion battery wiring machine

LSAG



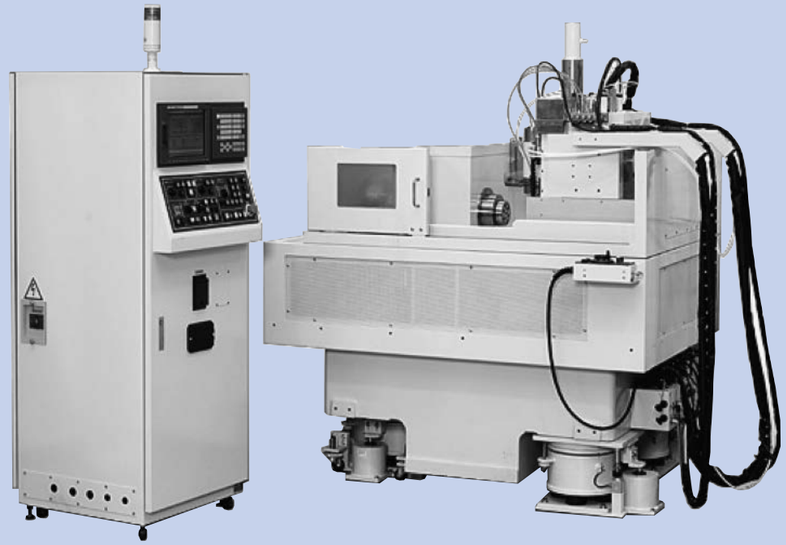
Wire coiling machine

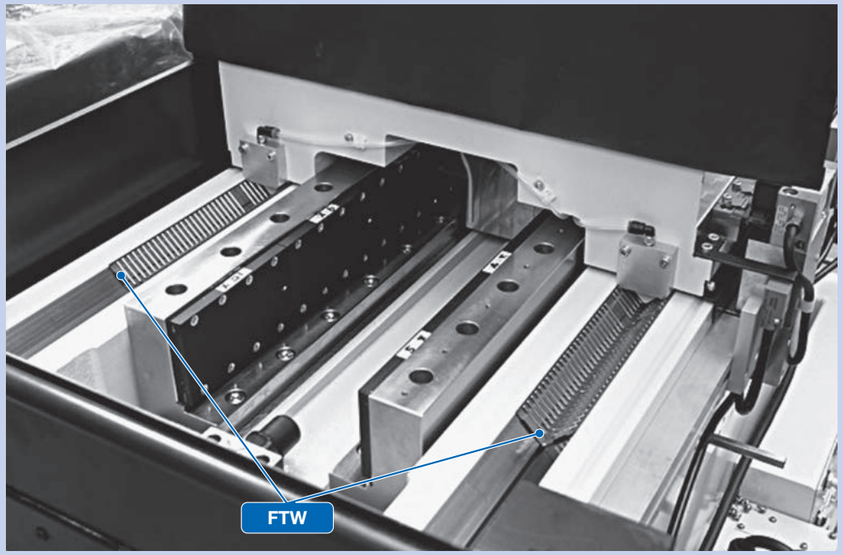
BSP



Precision processing machine

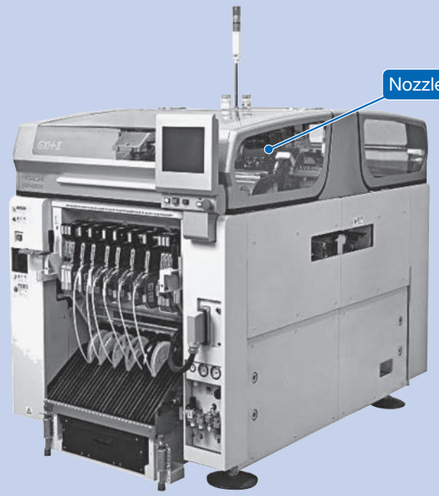
FTW





High-speed modular mounter

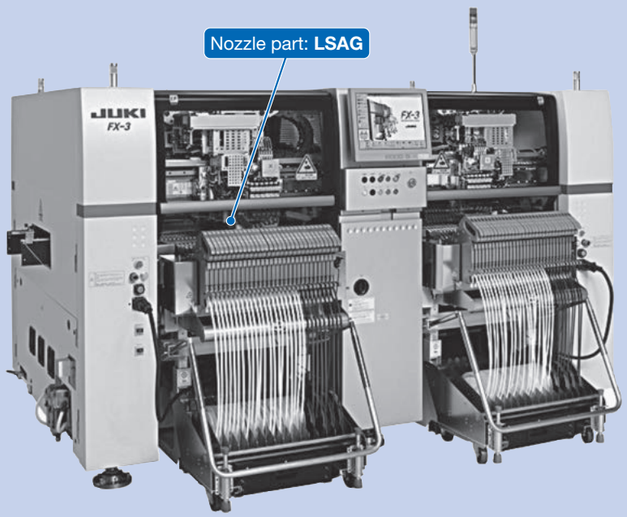
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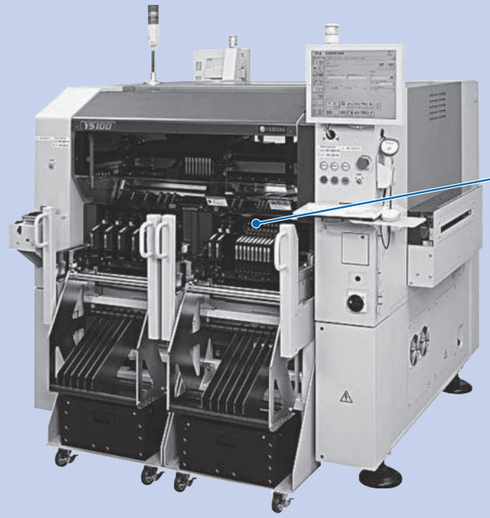
Chip mounter

LSAG



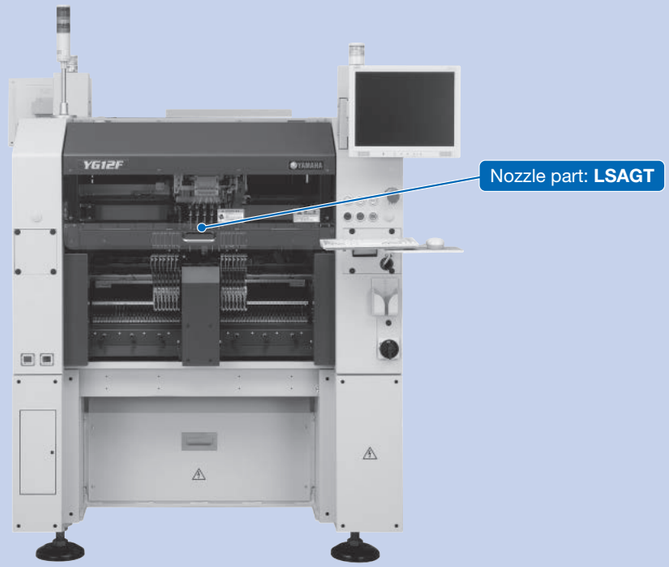
Chip mounter

LSAGT･BK



Chip mounter

LSAGT



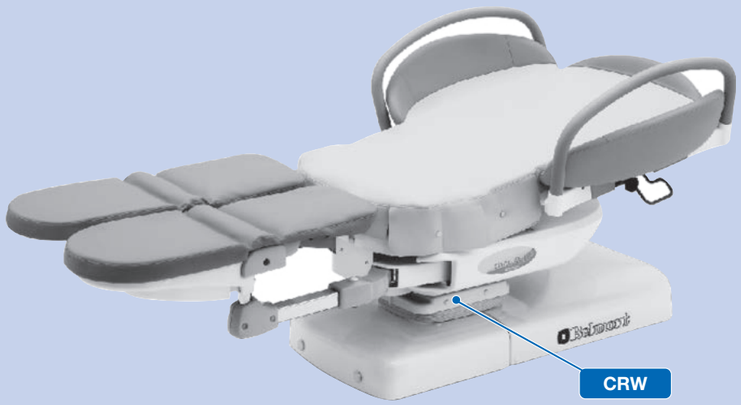
Die bonder

CRW



Delivery table

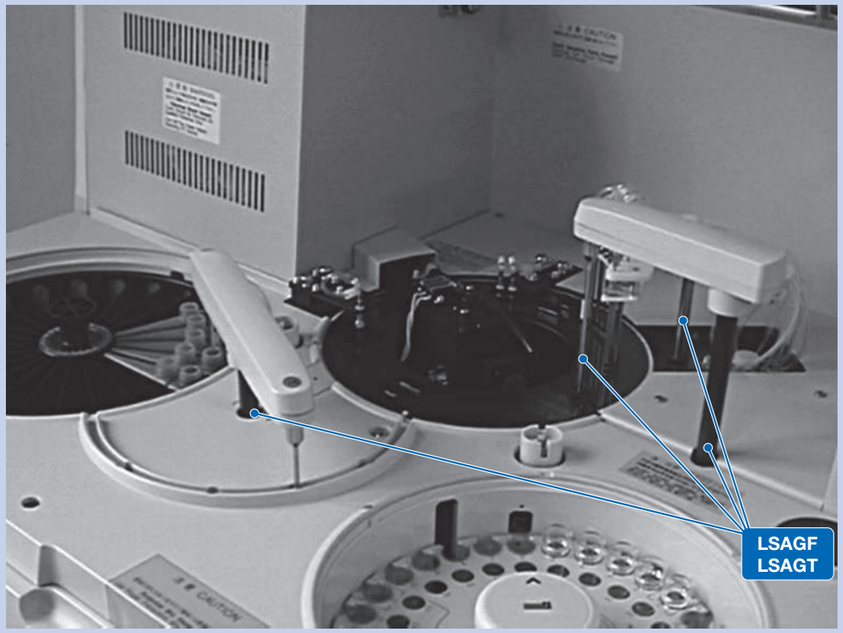
CRW



Multi-functional small-size automatic analysis equipment

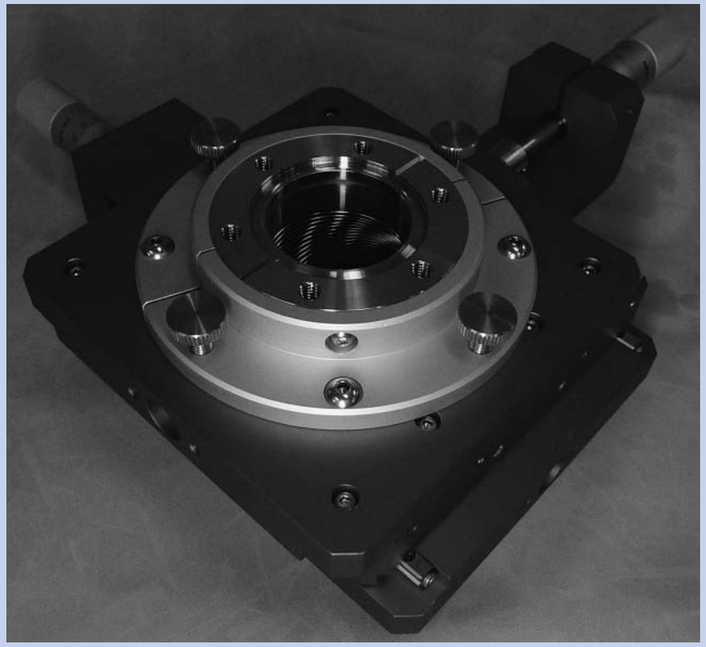
LSAGF･LSAGT

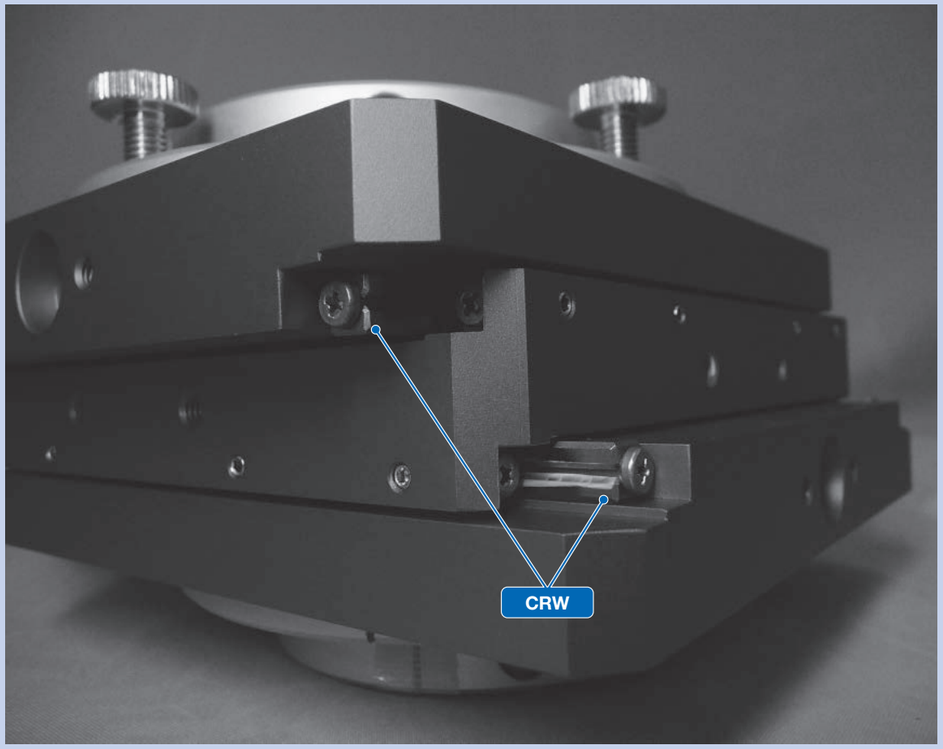




Manipulator

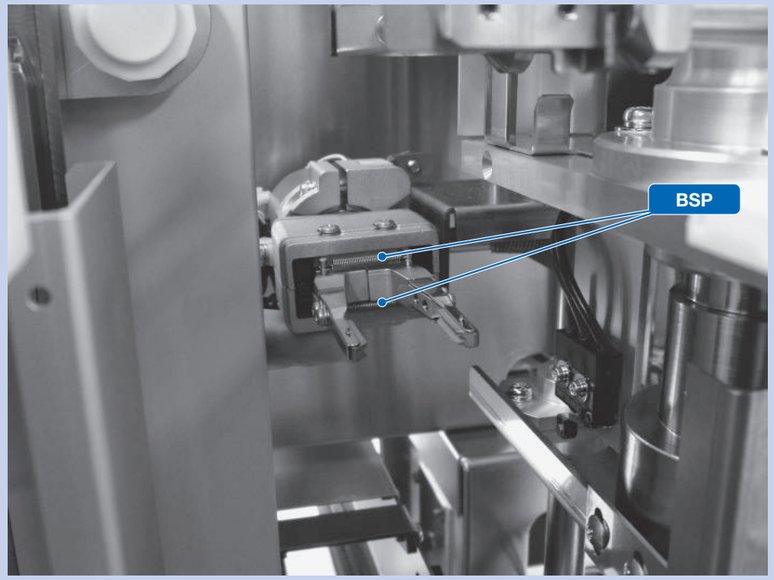
CRW





Prepared slide automatic sealing machine

BSP



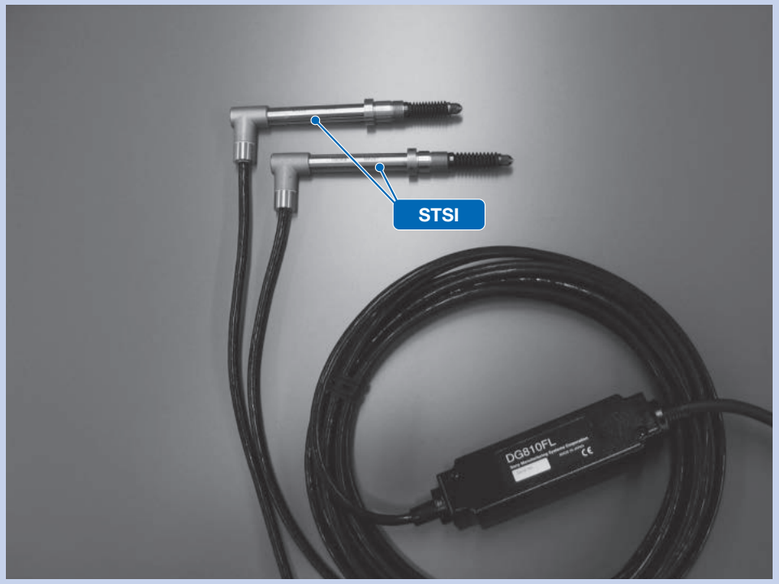
Scalar robot

LSAGFL



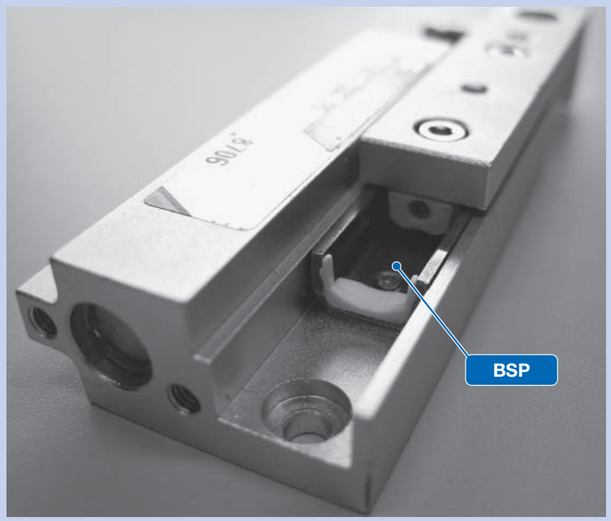
Digital gauge

STSI



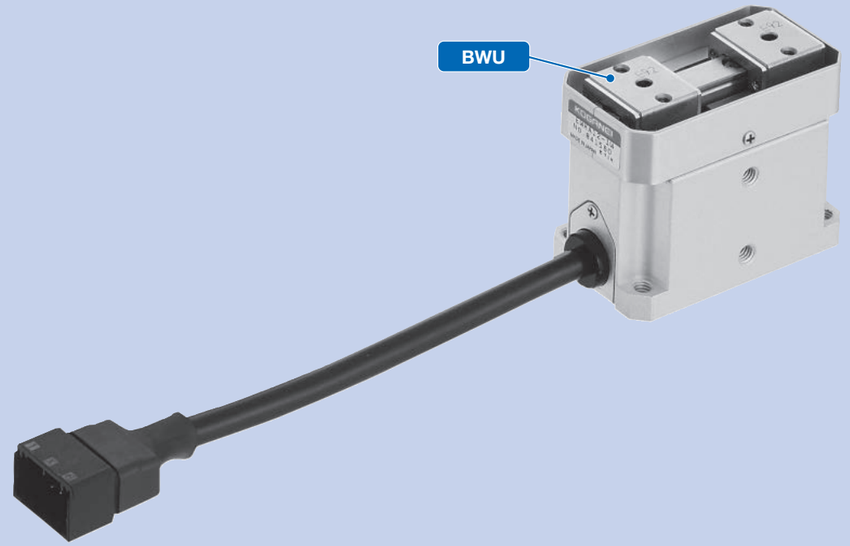
Micro table

BSP



Electric power chuck system

BWU



Direct drive electric power cylinder

MAGL



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	rpm	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-212
BK···A	Miniature Stroke Rotary Bushing	RED	Ⅱ-207
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
CRWM···A	Crossed Roller Way	RED	Ⅱ- 53
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-231
FT···N	Flat Roller Cage	RED	Ⅱ-231
FT···V	Flat Roller Cage	RED	Ⅱ-231
FTW···A	Flat Roller Cage	RED	Ⅱ-232
FTW···VA	Flat Roller Cage	RED	Ⅱ-232
G			
GSN	Roller Way	RED	Ⅱ-223
L			
LM	Linear Bushing	RED	Ⅱ-167
LM···AJ	Linear Bushing	RED	Ⅱ-167
LM···F	Linear Bushing	RED	Ⅱ-181
LM···F AJ	Linear Bushing	RED	Ⅱ-181
LM···F OP	Linear Bushing	RED	Ⅱ-181
LM···F UU	Linear Bushing	RED	Ⅱ-183
LM···F UU AJ	Linear Bushing	RED	Ⅱ-183
LM···F UU OP	Linear Bushing	RED	Ⅱ-183
LM···N	Linear Bushing	RED	Ⅱ-167
LM···N AJ	Linear Bushing	RED	Ⅱ-167
LM···N F	Linear Bushing	RED	Ⅱ-181
LM···N F AJ	Linear Bushing	RED	Ⅱ-181
LM···N F OP	Linear Bushing	RED	Ⅱ-181
LM···N F UU	Linear Bushing	RED	Ⅱ-183
LM···N F UU AJ	Linear Bushing	RED	Ⅱ-183
LM···N F UU OP	Linear Bushing	RED	Ⅱ-183
LM···N OP	Linear Bushing	RED	Ⅱ-167
LM···N UU	Linear Bushing	RED	Ⅱ-171
LM···N UU AJ	Linear Bushing	RED	Ⅱ-171
LM···N UU OP	Linear Bushing	RED	Ⅱ-171
LM···OP	Linear Bushing	RED	Ⅱ-167
LM···UU	Linear Bushing	RED	Ⅱ-171
LM···UU AJ	Linear Bushing	RED	Ⅱ-171
LM···UU OP	Linear Bushing	RED	Ⅱ-171
LMB	Linear Bushing	RED	Ⅱ-179
LMB···AJ	Linear Bushing	RED	Ⅱ-179
LMB···N	Linear Bushing	RED	Ⅱ-179
LMB···N AJ	Linear Bushing	RED	Ⅱ-179
LMB···N OP	Linear Bushing	RED	Ⅱ-179
LMB···OP	Linear Bushing	RED	Ⅱ-179
LME	Linear Bushing	RED	Ⅱ-175
LME···AJ	Linear Bushing	RED	Ⅱ-175
LME···F	Linear Bushing	RED	Ⅱ-185
LME···F AJ	Linear Bushing	RED	Ⅱ-185
LME···F OP	Linear Bushing	RED	Ⅱ-185
LME···F UU	Linear Bushing	RED	Ⅱ-187
LME···F UU AJ	Linear Bushing	RED	Ⅱ-187
LME···F UU OP	Linear Bushing	RED	Ⅱ-187
LME···N	Linear Bushing	RED	Ⅱ-175
LME···N AJ	Linear Bushing	RED	Ⅱ-175
LME···N F	Linear Bushing	RED	Ⅱ-185
LME···N F AJ	Linear Bushing	RED	Ⅱ-185
LME···N F OP	Linear Bushing	RED	Ⅱ-185
LME···N F UU	Linear Bushing	RED	Ⅱ-187
LME···N F UU AJ	Linear Bushing	RED	Ⅱ-187
LME···N F UU OP	Linear Bushing	RED	Ⅱ-187
LME···N OP	Linear Bushing	RED	Ⅱ-175
LME···N UU	Linear Bushing	RED	Ⅱ-177
LME···N UU AJ	Linear Bushing	RED	Ⅱ-177
LME···N UU OP	Linear Bushing	RED	Ⅱ-177
LME···OP	Linear Bushing	RED	Ⅱ-175
LME···UU	Linear Bushing	RED	Ⅱ-177
LME···UU AJ	Linear Bushing	RED	Ⅱ-177
LME···UU OP	Linear Bushing	RED	Ⅱ-177
LMG	Linear Bushing G	RED	Ⅱ-159
LMGT	Linear Bushing G	RED	Ⅱ-159
LMS	Miniature Linear Bushing	RED	Ⅱ-192
LMS···F	Miniature Linear Bushing	RED	Ⅱ-192
LMS···F UU	Miniature Linear Bushing	RED	Ⅱ-192
LMS···UU	Miniature Linear Bushing	RED	Ⅱ-192
LMSL	Miniature Linear Bushing	RED	Ⅱ-192
LMSL···F	Miniature Linear Bushing	RED	Ⅱ-192
LMSL···F UU	Miniature Linear Bushing	RED	Ⅱ-192
LMSL···UU	Miniature Linear Bushing	RED	Ⅱ-192
LRWM	Linear Way Module	BLUE	Ⅱ-245
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
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
LS	Stroke Ball Spline	RED	Ⅱ-149
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
LSB	Block Type Linear Ball Spline	RED	Ⅱ-141
LSB···SL	Block Type Linear Ball Spline	RED	Ⅱ-141
LSBT	Block Type Linear Ball Spline	RED	Ⅱ-141
LST	Stroke Ball Spline	RED	Ⅱ-149
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

Note: BLUE denotes CAT-1559E, while RED denotes CAT-1555.3E.

Model Code Index

Note: BLUE denotes CAT-1559E, while RED denotes CAT-1555.3E.

Model code	Series name	Catalog name	Page
L			
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
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
LWM	Linear Way Module	BLUE	Ⅱ-243
LWU	Linear Way U	BLUE	Ⅱ-167
LWU···B	Linear Way U	BLUE	Ⅱ-167
LWUL···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
MHDL	C-Lube Linear Way MH	BLUE	Ⅱ-123
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
MHTL	C-Lube Linear Way MH	BLUE	Ⅱ-117
ML	C-Lube Linear Way ML	BLUE	Ⅱ- 25
MLC	C-Lube Linear Way ML	BLUE	Ⅱ- 25
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-207
R			
RW	Roller Way	RED	Ⅱ-221
RWB	Roller Way	RED	Ⅱ-222
S			
SF···A	Miniature Stroke Rotary Bushing	RED	Ⅱ-207
SR	Roller Way	RED	Ⅱ-223
ST	Stroke Rotary Bushing	RED	Ⅱ-199
ST···B	Stroke Rotary Bushing	RED	Ⅱ-199
ST···UU	Stroke Rotary Bushing	RED	Ⅱ-201
ST···UU B	Stroke Rotary Bushing	RED	Ⅱ-201
STS	Miniature Stroke Rotary Bushing	RED	Ⅱ-207
STSI	Miniature Stroke Rotary Bushing	RED	Ⅱ-207

Note: BLUE denotes CAT-1559E, while RED denotes CAT-1555.3E.

Model Code Index

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IKO Linear Motion Rolling Guide Series,

IKO Linear Motion Rolling Guide Series General Catalog Consists of **BLUE** (CAT-1559E) and **RED** (CAT-1555.3E), the two volumes.

BLUE



CAT-1559E

【Models】

- Rail Guide Type
  - Endless 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・LWM
LRWM



RED



CAT-1555.3E

【Models】

- Rail Guide Type
  - Limited Linear Motion Type
- Shaft Guide Type
  - Endless Linear Motion Type
  - Limited Linear Motion Type
  - Limited Linear Motion Type + Rolling Motion Type
- Flat Guide Type
  - Endless Linear Motion Type
  - Limited Linear Motion Type

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
LSB・LS



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



Cam Follower
Roller Follower



IKO Introduction of Technical Service Site

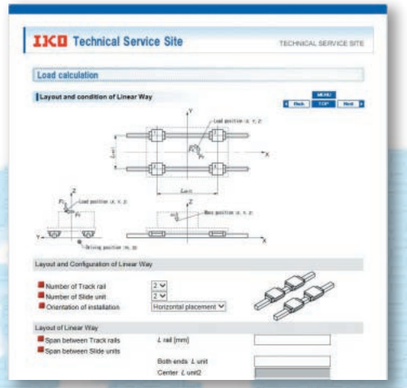
"IKO Technical Service Site" can be accessed from our home page IKO. The site also distributes various tools, etc., to select linear ways/linear roller ways, and please utilize the site for the assistance to select products. Additionally the site also provides CAD data and product catalog of needle series, linear motion rolling guide series and mechatronics series for you to download. Please consider to use for enhancing your design efficiency.

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



1. Technical calculations

In the section of linear way/linear roller way load and life calculation, you can have the calculated load and the rating life by entering the use conditions.
Also you can derive the motor torque required for operation and the effective propulsion force during operation in the sections of motor torque calculation and calculation of effective propulsion 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

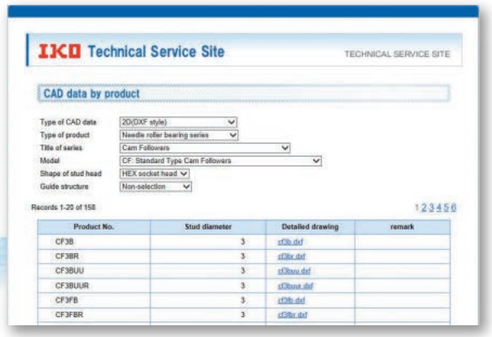
By selecting such specification as model code, dimensions, part code, material code, preload symbol, classification symbol, interchangeable code and supplemental code of linear ways/linear roller ways, you can easily specify the identification number used for ordering.
Also you can browse the CAD data 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

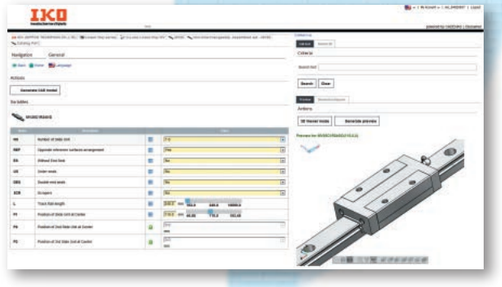
2-dimensional CAD data (DXF file)

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 six hazardous materials mentioned cited in the European RoHS Directive.

IKO Products Underpin Sustain Technology Leaps

Nippon Thompson Co., Ltd. was the first Japanese manufacturer to develop needle bearings on its own and has since expanded into the arena of linear motion rolling guides (Linear Motion Series and Mechatro Series) on the support of its advanced expertise. The company now offers a vast assortment of ingenious products, including the world's first C-Lube maintenance-free series, to address increasingly diversified customer needs and thus sustain technology leaps.

C-Lube Maintenance-Free Series Products Evolving from the "Oil Minimum" Concept

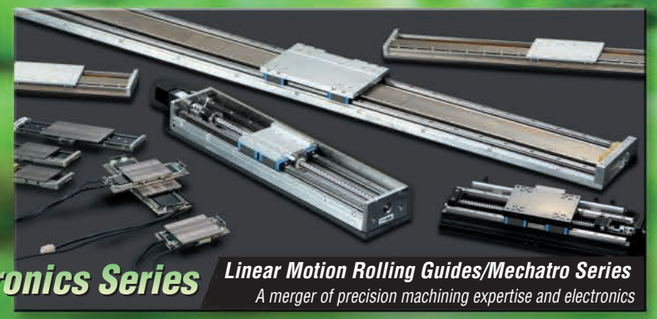
We have developed lubricating parts impregnated with a large amount of lubricant as C-Lube Series to save the customer's oiling management workload and built them into bearings and linear motion rolling guides.
The C-Lube Series not only keeps products maintenance-free for long by giving them an optimal and minimal amount of a lubricant for an extended period of time but also contributes greatly to preserving the global environment.



Needle Roller Bearings
Needle Bearings
Machine elements essential to any industry



Linear Motion Rolling Guide Series
Linear Motion Rolling Guides/Linear Motion Series
Available in broad sizes, from minimum to extra-large



Mechatronics Series
Linear Motion Rolling Guides/Mechatro Series
A merger of precision machining expertise and electronics