

NIPPON THOMPSON CO., LTD. (JAPAN)

Head office : 19-19 Takanawa 2-chome Minato-ku
Tokyo 108-8586, Japan
Phone : +81 (0)3-3448-5850
Fax : +81 (0)3-3447-7637
E-mail : ntt@ikonet.co.jp
URL : http://www.ikont.co.jp/eg
Plant : Gifu, Kamakura

IKO-THOMPSON (SHANGHAI) LTD. (CHINA)

Shanghai Sales Head Office
1608-10 MetroPlaza No.555 LouShanGuan Road
ChangNing District Shanghai
People's Republic of China 200051
Phone : +86 (0)21-3250-5525
Fax : +86 (0)21-3250-5526
E-mail : ntc@ikonet.co.jp

Beijing Branch
Room 609 Scitech Tower
No.22 Jianguomenwai Avenue, Chaoyang District, Beijing
People's Republic of China 100004
Phone : +86 (0)10-6515-7681
Fax : +86 (0)10-6515-7681*106
E-mail : ntc@ikonet.co.jp

Guangzhou Branch
Room 834, Garden Tower, Garden Hotel
368 Huanshi East Road, Yuexiu District, Guangzhou, Guangdong
People's Republic of China 510064
Phone : +86 (0)20-8384-0797
Fax : +86 (0)20-8381-2863
E-mail : ntc@ikonet.co.jp

Wuhan Branch
Room 2300, Truroll Plaza No.72 Wusheng Road,
Qiao kou District, Wuhan, Hubei
People's Republic of China 430033
Phone : +86 (0)27-8556-1610
Fax : +86 (0)27-8556-1630
E-mail : ntc@ikonet.co.jp

Xi'an Office
Room 1613, Building B, Jinqiao International Plaza
No.50 Keji Road, Gaoxin District, Xi'an, Shanxi
People's Republic of China 710075
Phone : +86 (0)29-8882-3225
Fax : +86 (0)29-8882-3215
E-mail : ntc@ikonet.co.jp

Shenzhen Office
Room 507, Oriental Plaza,
1072 Jianshe Road, Luohu District, Shenzhen, Guangdong
People's Republic of China 518001
Phone : +86 (0)20-8384-0797
Fax : +86 (0)20-8381-2863
E-mail : ntc@ikonet.co.jp

Chengdu Office
Room 01-A, 12F of Tower 1, Central Plaza
8 Shuncheng Avenue, Jinjiang District ,Chengdu, Sichuan
People's Republic of China 610016
Phone : +86 (0)28-6250-5159
Fax : +86 (0)28-6250-5259
E-mail : ntc@ikonet.co.jp

Ningbo Office
Room 3406, Zhongnongxin Building, No.181
Zhongshan East Road, Haishu Ward, Ningbo, Zhejiang
People's Republic of China 315000
Phone : +86 (0)574-8718-9535
Fax : +86 (0)574-8718-9533
E-mail : ntc@ikonet.co.jp

Qingdao Office
2107 Block A, World Trade Center Building, No.230
Changjiang Middle Road, Development Zone Qingdao
People's Republic of China 266555
Phone : +86 (0)532-8670-2246
FAX : +86 (0)532-8670-2242
E-mail : ntc@ikonet.co.jp

Shenyang Office
2-1203 Tower I.City Plaza Shenyang, No.206
Nanjing North Street Heping District, Shenyang
People's Republic of China 110001
Phone : +86 (0)24-2334-2662
FAX : +86 (0)24-2334-2442
E-mail : ntc@ikonet.co.jp

Recognizing that conservation of the global environment is the top-priority challenge for the world's population, Nippon Thompson will conduct its activities with consideration of the environment as a corporate social responsibility, reduce its negative impact on the environment, and help foster a rich global environment.

ISO 9001 & 14001 Quality system
registration certificate



NIPPON THOMPSON CO., LTD. (THAILAND)
ASEAN REPRESENTATIVE OFFICE (BANGKOK)

1-7 Zuellig House, 5th Floor
Silom Road, Silom, Bangrak
Bangkok 10500, Thailand
Phone : +66 (0)2-637-5115
FAX : +66 (0)2-637-5116
E-mail : ntar@ikonet.co.jp

IKO INTERNATIONAL, INC. (U.S.A.)

East Coast Operation (Sales Head Office)
91 Walsh Drive
Parsippany, NJ 07054
U.S.A.
Phone : +1 973-402-0254
Toll Free : 1-800-922-0337
Fax : +1 973-402-0441
E-mail : eco@ikonet.co.jp

Midwest Operation
500 East Thorndale Avenue, Suite K
Wood Dale, IL 60191
U.S.A.
Phone : +1 630-766-6464
Toll Free : 1-800-323-6694
Fax : +1 630-766-6869
E-mail : mwo@ikonet.co.jp

West Coast Operation
9830 Norwalk Boulevard, Suite 198
Santa Fe Springs, CA 90670
U.S.A.
Phone : +1 310-609-3988
Toll Free : 1-800-252-3665
Fax : +1 310-609-3916
E-mail : wco@ikonet.co.jp

Silicon Valley Sales Office
3333 Bowers Avenue, Suite 155
Santa Clara, CA 95054
U.S.A.
Phone : +1 408-492-0240
Toll Free : 1-800-252-3665
Fax : +1 408-492-0245
E-mail : wco@ikonet.co.jp

Southeast Operation
2150 Boggs Road, Suite 100
Duluth, GA 30096
U.S.A.
Phone : +1 770-418-1904
Toll Free : 1-800-874-6445
Fax : +1 770-418-9403
E-mail : seo@ikonet.co.jp

Southwest Operation
8105 N. Beltline Road, Suite 130
Irving, TX 75063
U.S.A.
Phone : +1 972-929-1515
Toll Free : 1-800-295-7886
Fax : +1 972-915-0060
E-mail : swo@ikonet.co.jp

See you again at
IKO Website
<http://www.ikont.co.jp/eg/>

NIPPON THOMPSON EUROPE B.V. (EUROPE)

The Netherlands Sales Head Office
Sheffieldstraat 35-39
3047 AN Rotterdam
The Netherlands
Phone : +31 (0)10-462 68 68
Fax : +31 (0)10-462 60 99
E-mail : nte@ikonet.co.jp

Germany Branch
Mündelheimer Weg 56
40472 Düsseldorf
Germany
Phone : +49 (0)211-41 40 61
Fax : +49 (0)211-42 76 93
E-mail : ntd@ikonet.co.jp

Regensburg Sales Office
Im Gewerbepark D 30
93059 Regensburg
Germany
Phone : +49 (0)941-20 60 70
Fax : +49 (0)941-20 60 719
E-mail : ntdr@iko-nt.de

Neunkirchen Sales Office
Gruben Str.95c
66540 Neunkirchen
Germany
Phone : +49 (0)6821-99 98 60
Fax : +49 (0)6821-99 98 626
E-mail : ntdn@iko-nt.de

U.K. Branch
2 Vincent Avenue, Crownhill
Milton Keynes, Bucks, MK8 0AB
United Kingdom
Phone : +44 (0)1908-566144
Fax : +44 (0)1908-565458
E-mail : sales@iko.co.uk

Spain Branch
Autovia Madrid-Barcelona, Km. 43,700
Polig. Ind. AIDA - Nove A-8, Ofic. 2-1ª
19200 Azuqueca de Henares
(Guadalajara) Spain
Phone : +34 949-26 33 90
Fax : +34 949-26 31 13
E-mail : nts@ikonet.co.jp

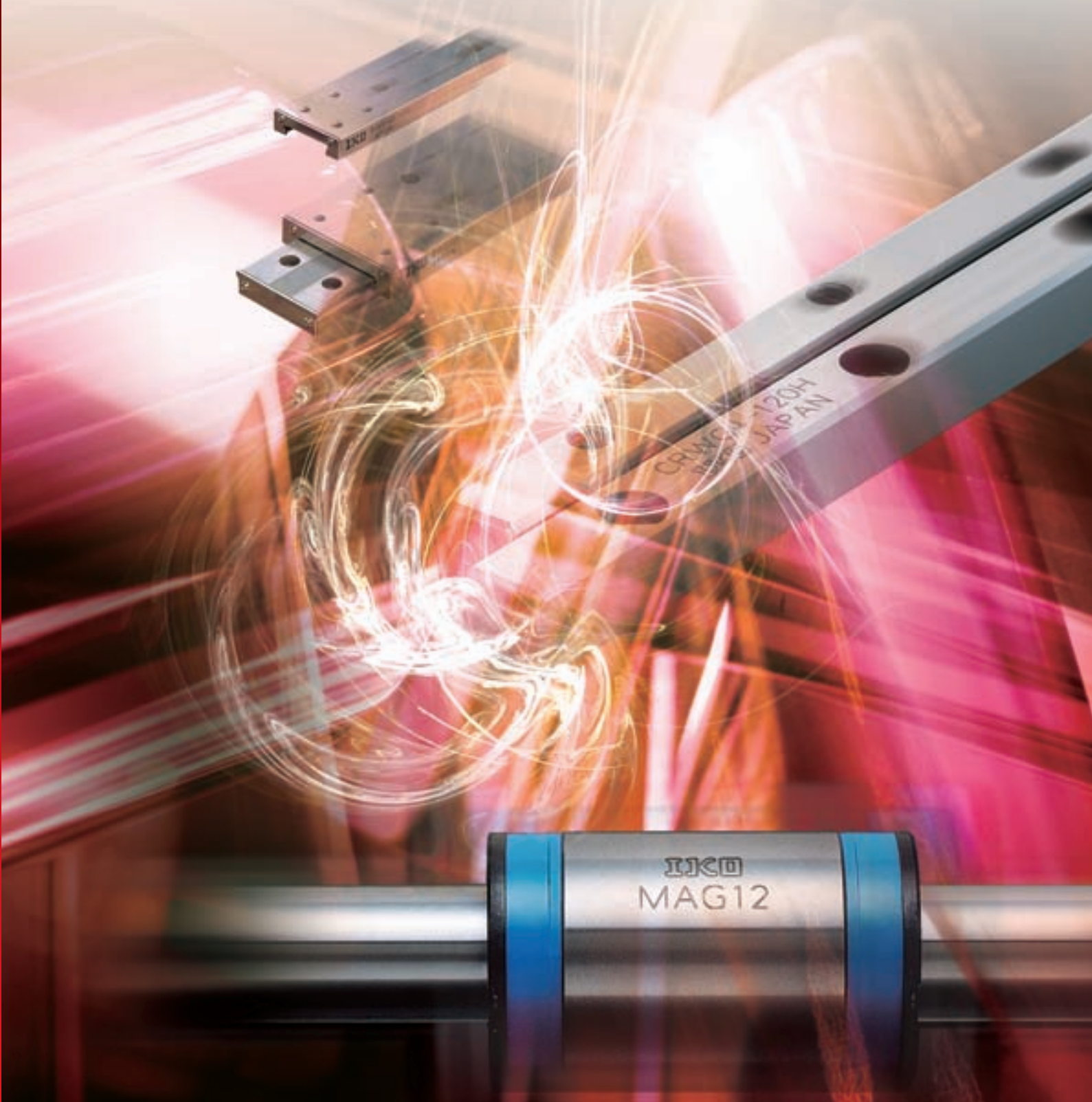
France Branch
Roissypole Le Dôme
2 rue de La Haye
BP 15950 Tremblay en France
95733 Roissy C. D. G. Cedex
France
Phone : +33 (0)1-48 16 57 39
Fax : +33 (0)1-48 16 57 46
E-mail : contact@iko-france.com

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IKO Linear Motion Rolling Guide Series General Catalog RED

IKO Linear Motion Rolling Guide Series
General Catalog

RED

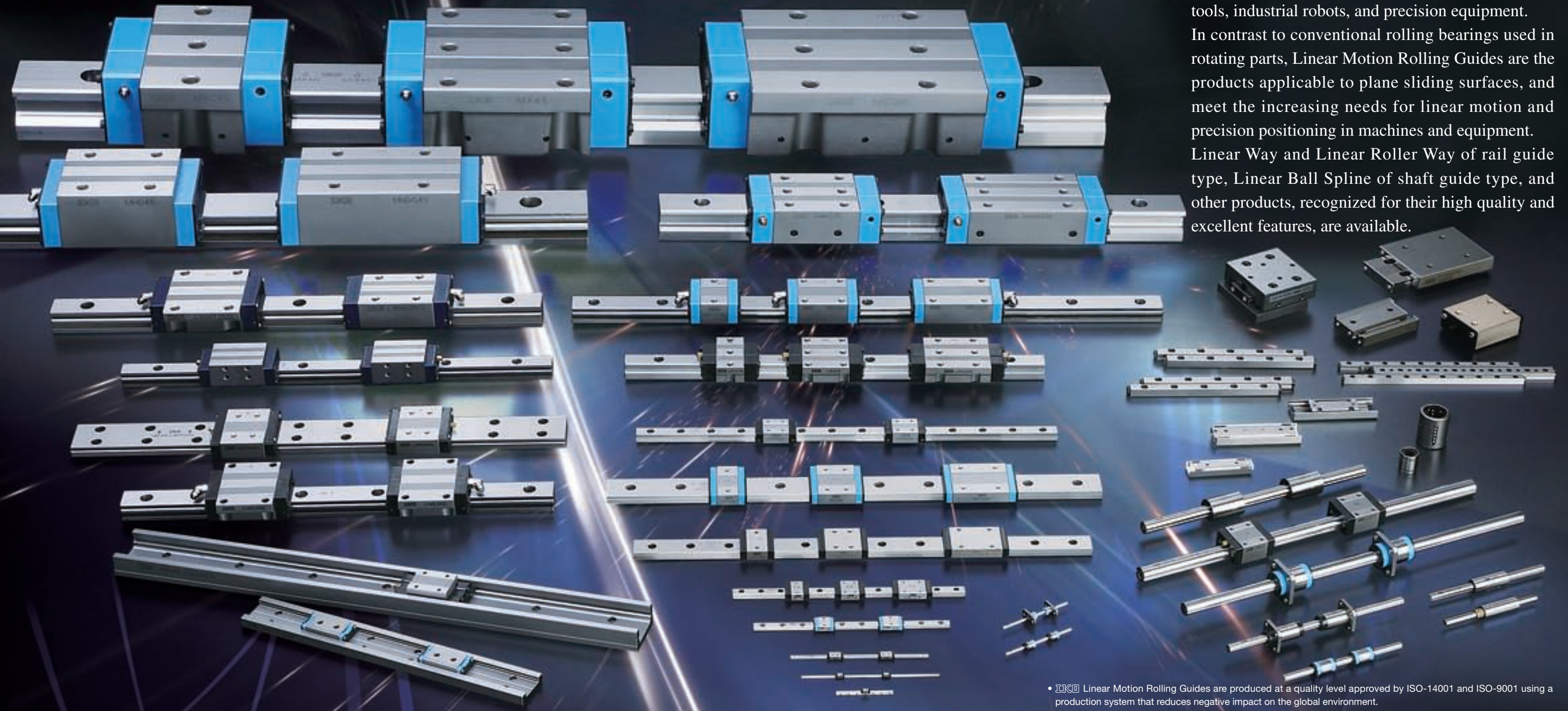


Eco-friendly and Excellent Quality

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 produced at a quality level approved by ISO-14001 and ISO-9001 using a production system that reduces negative impact on the global environment.
- The standard products listed in this catalog comply with the specifications of the six hazardous materials mentioned cited in the European RoHS Directive. For information on all other products, please check with IKO.
- This catalog adopts the SI system (system of international units) in conformance with ISO (International Organization for Standardization) Standard 1000.



Recorded in CAT-1552④E

Linear Way Linear Roller Way

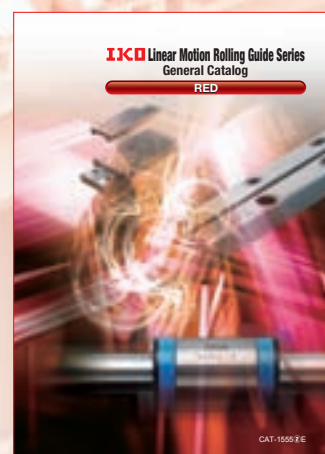
Rail Guide Type

	Ball Type Miniature Series Super small-size linear motion rolling guide produced by original small sizing technology
	Ball Type Compact Series Versatile linear motion rolling guide pursuing compactness in every aspect just like lower, narrower, and shorter
	Ball Type High Rigidity Series High rigidity linear motion rolling guide having a maximum load rating among ball-type units by incorporating a large-diameter ball
	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
	Ball Type U-Shaped Track Rail Series Linear motion rolling guide of high track rail rigidity with U-shaped track rail
	Roller Type Linear motion rolling guide that has achieved the highest level of performance in all characteristics utilizing the roller's superior characteristic
	Roller Type Roller type linear motion rolling guide with cylindrical rollers in four-rows
	Module Type Minimum compact linear motion rolling guide with both a track rail and slide member provided

C-Lube Maintenance Free Series

C-Lube Linear Way ML ML : Standard type MLF : Wide type	C-Lube Linear Way ME ME : Flange type mounting from bottom MET : Flange type mounting from top MES : Block type mounting from top	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
C-Lube Linear Way MUL MUL : Small type	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 section flange type mounting from top / bottom MXNS : Low section block type mounting from top	

Linear Way L LWL : Standard type LWLF : Wide type	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
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	Linear Way F LWFH : Flange type mounting from top / bottom LWFF : Flange type mounting from top / bottom LWFS : Block type mounting from top	
Linear Way U LWUL...B : Small type LWU...B : Standard ball-retained type LWU : Standard ball non-retained type	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	
Linear Roller Way X LRWX : Block type mounting from top LRWXH : Flange type mounting from bottom	Linear Way Module LWLM : Ball type small type LWM : Ball type standard type LRWM : Roller type	



Recorded in CAT-1555②E

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
	Linear Slide Unit Light weight, small, and compact linear motion rolling guide that has achieved light and smooth motion
	Linear Ball Spline Linear motion rolling guide performing linear motion while performing torque transmission along the spline shaft by external cylinder or slide unit
	Linear Bushing A wide variety of linear motion rolling guides facilitating the rolling motion in bush guide portion
	Stroke Rotary Bushing Linear motion rolling guide enabling the rolling motion and rotary and linear motion in axial direction
	Roller Way & Flat Roller Cage High accuracy linear motion rolling guide providing high rigidity in load direction

C-Lube Linear Ball Spline MAG

MAG : Standard type
MAGF : Flange type

Anti-Creep Cage Crossed Roller Way CRWG	Anti-Creep Cage Crossed Roller Way H CRWG...H	Crossed Roller Way CRW : Standard type CRWM : Module type
Anti-Creep Cage Crossed Roller Way Unit CRWUG	Crossed Roller Way Unit CRWU / CRWU...R / CRWU...RS	
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 G LSAG : Standard type LSAGF : Flange type	Block Type Linear Ball Spline LSB	Stroke Ball Spline LS
Linear Bushing G LMG	Linear Bushing LM / LME / LMB	Miniature Linear Bushing LMS
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
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

Specifications of Linear Motion Rolling Guides

Rail Guide Type	Endless linear motion		Limited linear motion	
	Linear Way	Linear Roller Way	Crossed Roller Way	Linear Slide Unit
Shaft Guide Type	Endless linear motion		Limited linear motion	
	Linear Ball Spline	Linear Bushing	Stroke Ball Spline	Limited linear motion + rotation Stroke Rotary Bushing
Flat Guide Type	Endless linear motion		Limited linear motion	
	Roller Way	Flat Roller Cage		

		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	Ball	↔ ∞ ↔ Endless linear motion	 Complex load, medium to heavy load	○	○	◎	• NC machine tool • Precision working machine • Robot • Transfer machine	BLUE
		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	Roller	↔ Limited linear motion	 Complex load, medium load	○	◎	◎	• Precision working machine • Electronic parts assembling machine • Precision measuring instrument	RED
		Ball	↔ Limited linear motion	 Complex load, light to medium load	△	◎	◎	• Electronic parts assembling machine	RED
Shaft Guide Type	Endless linear motion	Ball	↔ ∞ ↔ Endless linear motion	 Complex load, medium to heavy load	○	○	○	• Robot • Testing and inspection equipment • Transfer machine	RED
		Ball	↔ ∞ ↔ Endless linear motion	 Radial load, light load	△	○	○	• Packaging machine • Measuring instrument • Medical instrument	RED
	Limited linear motion	Ball	↔ Limited linear motion	 Complex load, medium to heavy load	○	◎	○	• Robot • Testing and inspection equipment	RED
	Limited linear motion + rotation	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	↔ ∞ ↔ Endless linear motion	 Unidirectional load, extra-heavy load	◎	○	△	• NC machine tool • Precision working machine	RED
	Limited linear motion	Roller	↔ Limited linear motion	 Unidirectional load, extra-heavy load	◎	◎	○	• Precision working machine • Optical measuring instrument	RED

Code description ◎Excellent ○Good △Fair



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

CRW(G)(...H)
CRW(G)

BWU · BSP(G)
BSU...A

MAG · LSAG
LSB · LS

LMG · LM · LMS

ST · STSI · BG

RW · SR · GSN
FT · FTW...A

Related Products



U.S. PATENTED	
Crossed Roller Way	Linear Ball Spline
No. 8142079	No. 6190046
6971797	6176617
6736541	6082899
Linear Slide Unit	5967667
No. 7344310	5490729
7008107	5356223
5553946	Linear Bushing
C-Lube Linear Ball Spline MAG	No. 6099410
No. 7637662	5893646



Explanation and Dimension Table for Respective Product Series

Rail Guide Type

Crossed Roller Way

- Anti-Creep Cage
Crossed Roller Way
Anti-Creep Cage
Crossed Roller Way H
Crossed Roller Way
Explanation ... II -7 Dimension Table ... II -27
- Anti-Creep Cage
Crossed Roller Way Unit
Crossed Roller Way Unit
Explanation ... II -55 Dimension Table ... II -61

Linear Slide Unit

- High Rigidity Precision Linear Slide Unit
Explanation ... II -75 Dimension Table ... II -81
- Precision Linear Slide Unit
Explanation ... II -83 Dimension Table ... II -89
- Linear Slide Unit
Explanation ... II -95 Dimension Table ... II -99

Round Shaft Guide Type

Linear Ball Spline

- C-Lube Linear Ball Spline MAG
Linear Ball Spline G
Explanation ... II -107 Dimension Table ... II -123
- Block Type Linear Ball Spline
Explanation ... II -131 Dimension Table ... II -141
- Stroke Ball Spline
Explanation ... II -143 Dimension Table ... II -149

General Explanation

- General Explanation III -2

Introduction of Application Examples

- Introduction of Application Examples IV -2

Linear Bushing

- Linear Bushing G
Explanation ... II -153 Dimension Table ... II -159
- Linear Bushing
Explanation ... II -161 Dimension Table ... II -167
- Miniature Linear Bushing
Explanation ... II -189 Dimension Table ... II -192

Stroke Rotary Bushing

- Stroke Rotary Bushing
Explanation ... II -195 Dimension Table ... II -199
- Miniature Stroke Rotary Bushing
Explanation ... II -203 Dimension Table ... II -207
- Stroke Rotary Cage
Explanation ... II -209 Dimension Table ... II -212

Flat Guide Type

- Roller Way
Explanation ... II -215 Dimension Table ... II -221
- Flat Roller Cage
Explanation ... II -225 Dimension Table ... II -231

[Related Products]

- Cam Follower II -235
- Roller Follower II -291

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

CRW(G)(...H)
CRWU(G)

A wide variety of series products including mechanism are available! Features of

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



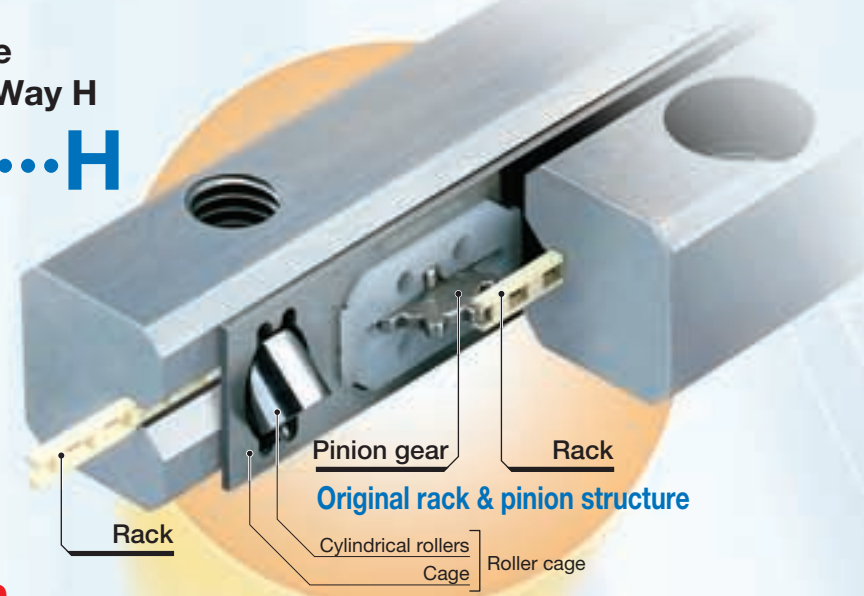
Crossed Roller Way Unit CRWU



Anti-Creep Cage Crossed Roller Way CRWG

IKO Anti-Creep Cage Crossed Roller Way CRWG is a product with a cage creep 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.

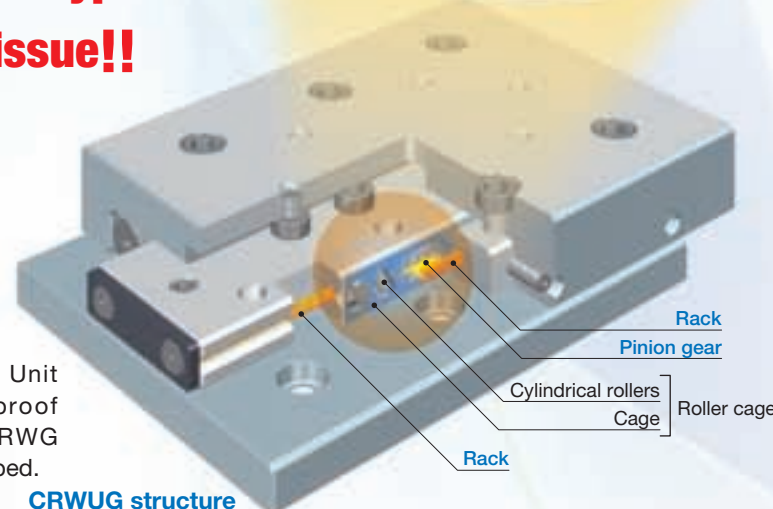
Anti-Creep Cage Crossed Roller Way H CRWG...H



**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

cage misalignment prevention Crossed Roller Way

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

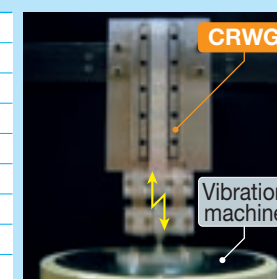
Any corrective operation for cage creep is not necessary even for high velocity operation.

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!

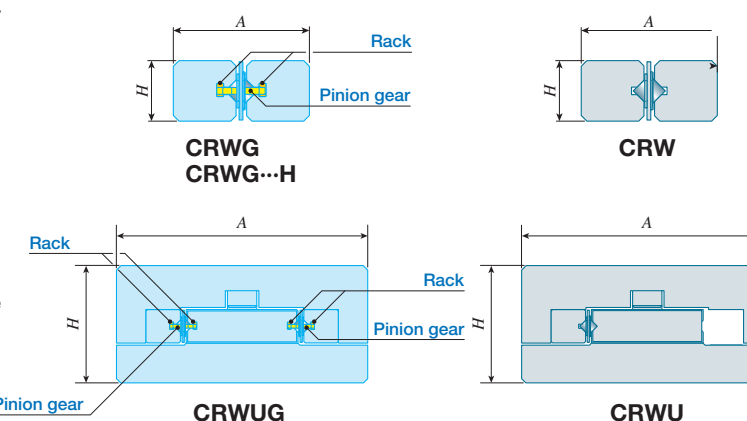
Test conditions		
Model number	CRWG3	
Test method	Vibration test machine	
Condition	Posture	Vertical
	Maximum velocity	827 mm/s
	Acceleration	15 G
	Number of cycle	31 Hz
	Stroke length	8 mm
Total cycles	Mass of moving part	330 g
	100,000,000 cycles	



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.

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.

Anti-Creep Cage
Crossed Roller Way

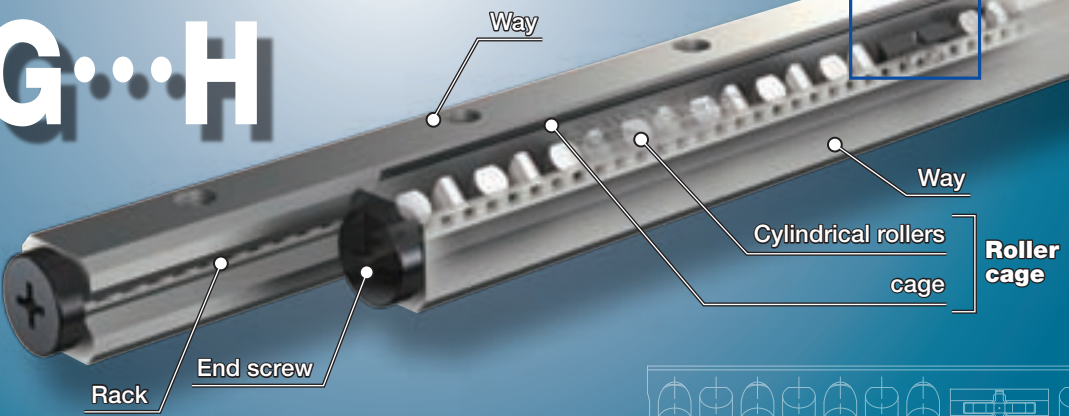
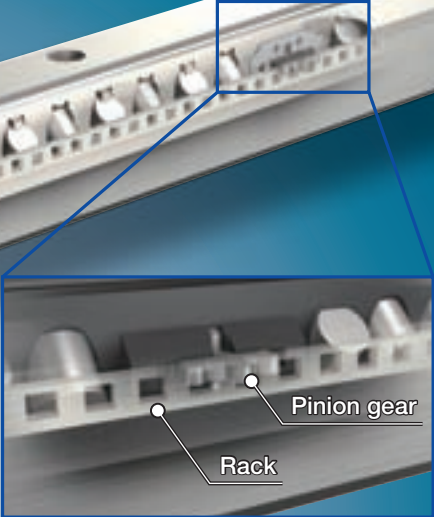
CRWG

Anti-Creep Cage
Crossed Roller Way H

CRWG···H

Crossed Roller Way

CRW/CRWM



Points

1 Superior load balance

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.

2 Solves cage creep problem

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.

3 High load capacity type CRWG···H

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

4 Standard type and module type

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.

5 Easy mounting

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.

6 Stainless steels superior in corrosion resistance are listed on lineup.

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 a supplemental code for each specification to apply.

	1	2	3	1	4	5	6	7
CRWG series	CRWG	3	- 150	H			SP	/B
CRWG···H series								
CRW series	CRW	3	- 150		C20	SL	SP	/U
Standard type								
	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

5 Material type
Material code Page II - 10

6 Accuracy class
Classification symbol Page II - 11

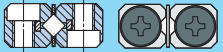
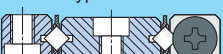
7 Special specification
Supplemental code Page II - 11

CRW(G)(···H)
CRW(G)

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	○	○	○	○	—	—	—	—	—	—

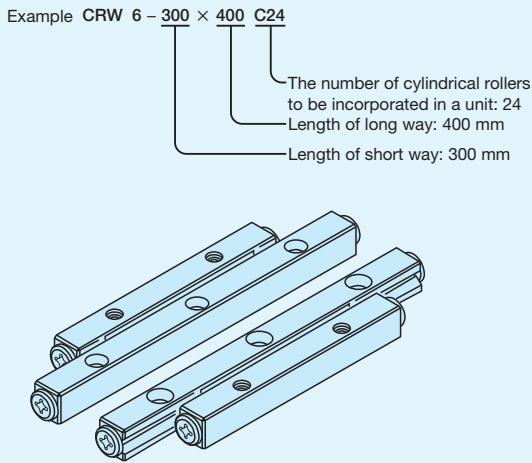
—Way length · Number of Cylindrical Rollers · Material Type—

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

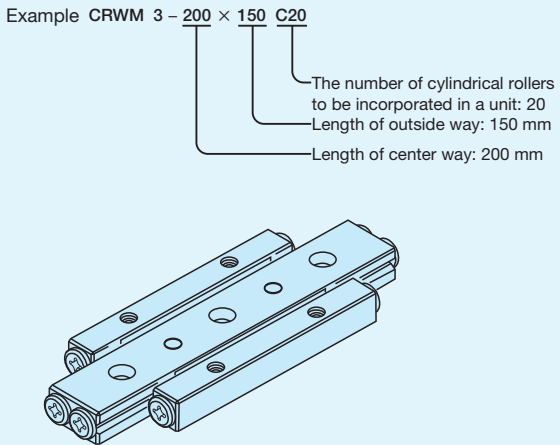
Combination of standard type

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.



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.



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	

CRW(G)(···H)
CRW(G)

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

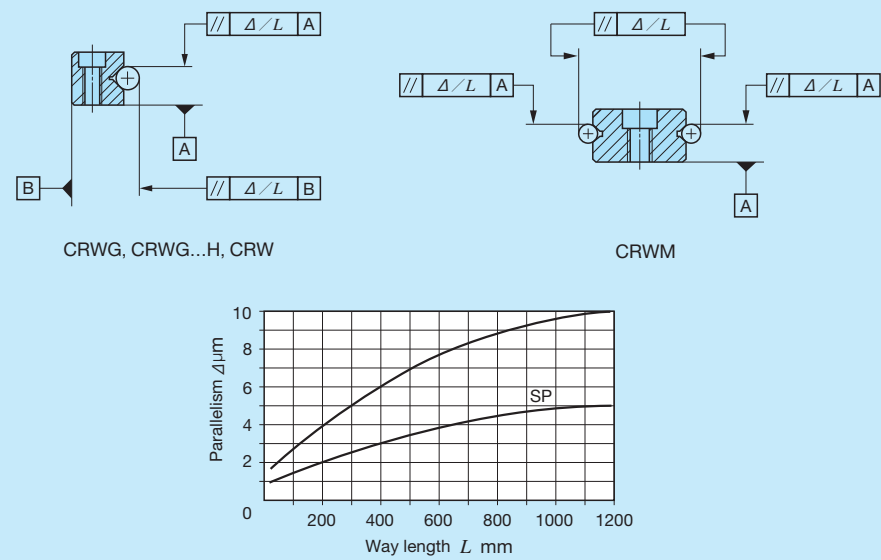


Fig. 1 Accuracy

7	Special specification	B, M, SA, SB, U	For applicable special specifications, see Table 2. For combination of multiple special specifications, see Table 3. For details of special specifications, see pages II-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

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

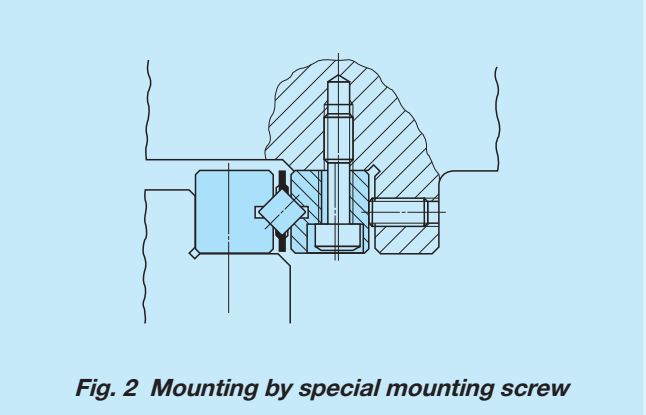
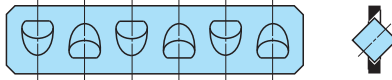


Fig. 2 Mounting by special mounting screw

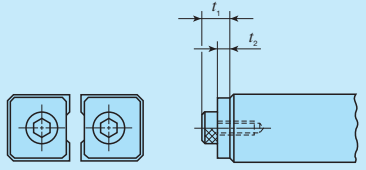
High rigidity roller cage /M	
	The cage is changed into a high rigidity copper alloy-made cage designed to suit vertical axis application. This cage has a structure to prevent a roller from dropping off in one-side direction. For using a high rigidity roller cage for vertical axis application, it is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

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 end stopper SA is included as standard.

Table 5 Dimensions of end stopper SA

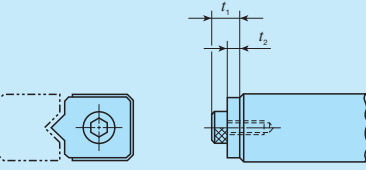
			unit: mm		
Size	t ₁	t ₂	Size	t ₁	t ₂
2	4.5	2	12	11	5
3	5	2	15	14	6
4	7	3	18	14	6
6	8	3	24	16	6
9	10	4			

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	Size	t ₁	t ₂
2	4.5	2	12	11	5
3	5	2	15	14	6
4	7	3	18	14	6
6	8	3	24	16	6
9	10	4			

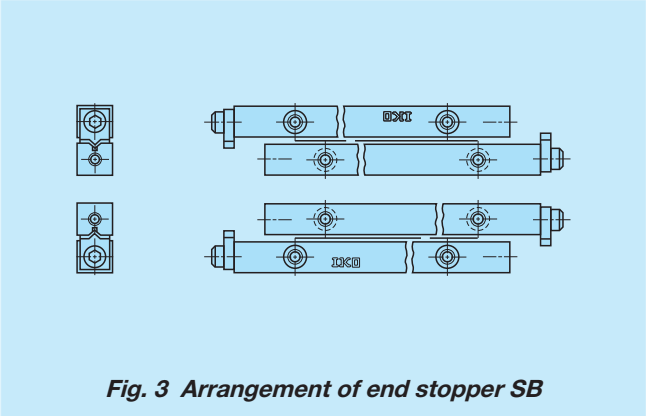


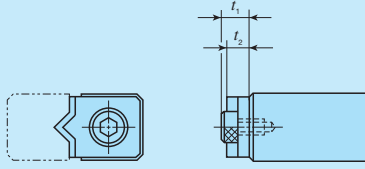
Fig. 3 Arrangement of end stopper SB

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	Size	t ₁	t ₂
2	4.5	4	12	11	8.5
3	5	4	15	14	11
4	7	6	18	14	11
6	8	6	24	16	11
9	10	7.5			

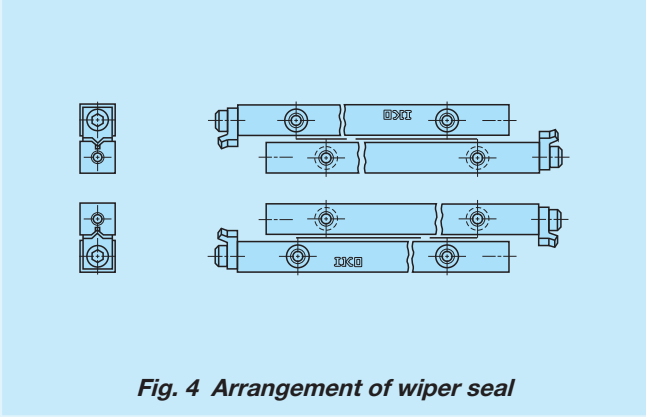


Fig. 4 Arrangement of wiper seal

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.

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.

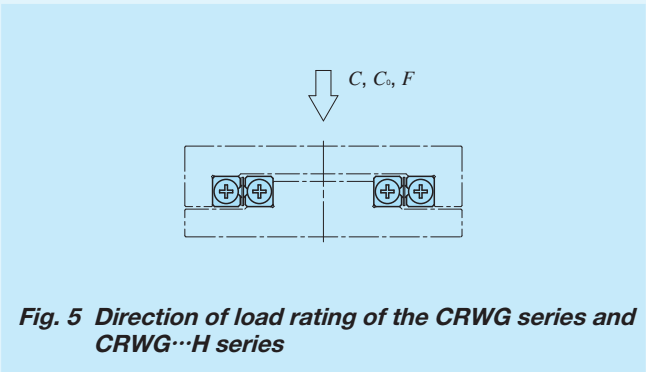


Fig. 5 Direction of load rating of the CRWG series and CRWG...H series

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

Load direction	Upward and downward load ⁽¹⁾		Lateral load	
Basic dynamic load rating C	N	$C_r = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} C_u \dots\dots\dots (1)$	$C_a = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} 2^{7/9} C_u \dots\dots\dots (4)$	
Basic static load rating C_0	N	$C_{0r} = \left(\frac{Z}{2} \right) C_{0u} \dots\dots\dots (2)$	$C_{0a} = 2 \left(\frac{Z}{2} \right) C_{0u} \dots\dots\dots (5)$	
Allowable load F	N	$F_r = \left(\frac{Z}{2} \right) F_u \dots\dots\dots (3)$	$F_a = 2 \left(\frac{Z}{2} \right) F_u \dots\dots\dots (6)$	
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

Load direction	Upward and downward load		Lateral load	
Basic dynamic load rating C	N	$C_r = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} 2^{7/9} C_u \dots\dots\dots (7)$	$C_a = \left\{ \left(\frac{Z}{2} - 1 \right) 2p \right\}^{1/36} \left(\frac{Z}{2} \right)^{3/4} 2^{7/9} C_u \dots\dots\dots (10)$	
Basic static load rating C_0	N	$C_{0r} = 2 \left(\frac{Z}{2} \right) C_{0u} \dots\dots\dots (8)$	$C_{0a} = 2 \left(\frac{Z}{2} \right) C_{0u} \dots\dots\dots (11)$	
Allowable load F	N	$F_r = 2 \left(\frac{Z}{2} \right) F_u \dots\dots\dots (9)$	$F_a = 2 \left(\frac{Z}{2} \right) F_u \dots\dots\dots (12)$	
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			

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

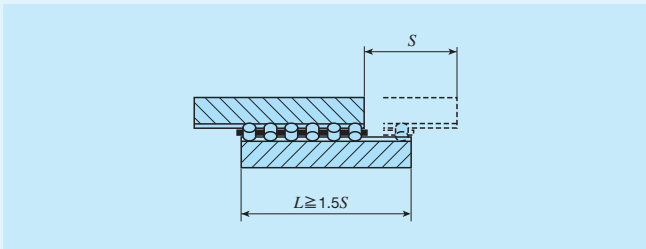
Stroke length of the CRW series affects the way length and the number of cylindrical rollers. Therefore, select specifications by following the procedure below taking into account the stroke length used and applied load.

1 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.

$$L \geq 1.5S \quad \text{..... (13)}$$

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



2 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.

$$S_1 \geq \frac{1}{0.8} S \quad \text{..... (14)}$$

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

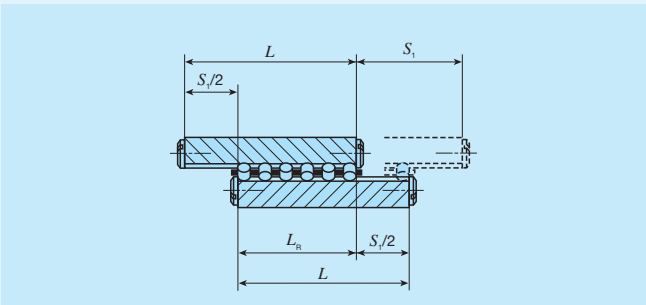
3 Calculation of cage length and the number of rollers

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.

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

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.

$$Z = \frac{L_R - D_w}{p} + 1 \quad \text{..... (16)}$$

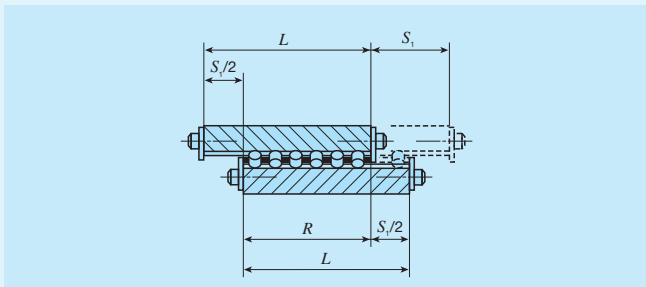
Where Z : Number of cylindrical rollers (figures after the decimal fractions are omitted)
 L_R : Allowed dimensions between rollers at both ends mm
 D_w : Diameter of cylindrical rollers (refer to the dimension table) mm
 p : Inter-pitch dimensions of cylindrical rollers (refer to the dimension table)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

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

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.

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

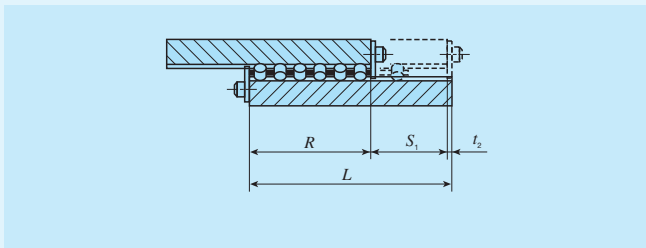
Where Z : Number of cylindrical rollers (figures after the decimal fractions are omitted)
 R : Allowable cage length mm
 e : End dimension of cage (refer to the dimension table) mm
 p : Inter-pitch dimensions of cylindrical rollers (refer to the dimension table) mm

(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.

$$R = L - t_2 - S_1 \quad \text{..... (19)}$$

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 $P = 7000 \text{ N}$
 Stroke length $S = 195 \text{ mm}$

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

1 Calculation of way length

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

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

Therefore, select $L = 300 \text{ mm}$ based on the standard length in the dimension table.

2 Calculation of maximum stroke length

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

$$S_1 \geq \frac{1}{0.8} S = \frac{1}{0.8} \times 195 \div 244$$

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

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

3 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 $D_w = 6 \text{ mm}$, $p = 9 \text{ mm}$ according to the dimension table.

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

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

4 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 $F_U = 769 \text{ N}$ 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 $P = 7000 \text{ N}$. 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.

5 Determination of specifications

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

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.

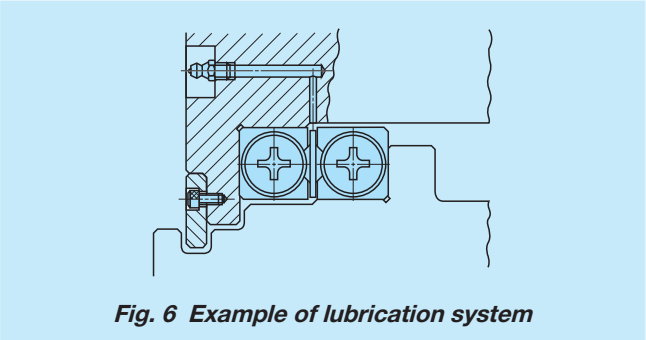


Fig. 6 Example of lubrication system

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.

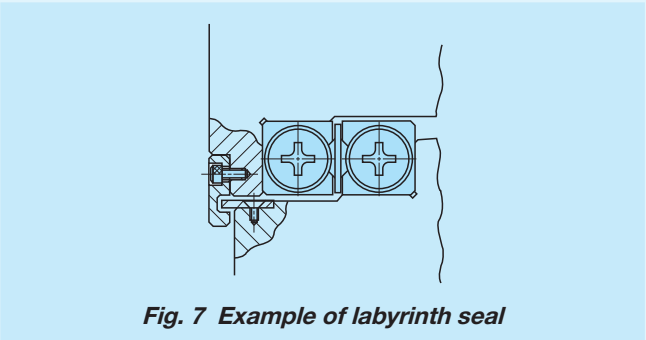


Fig. 7 Example of labyrinth seal

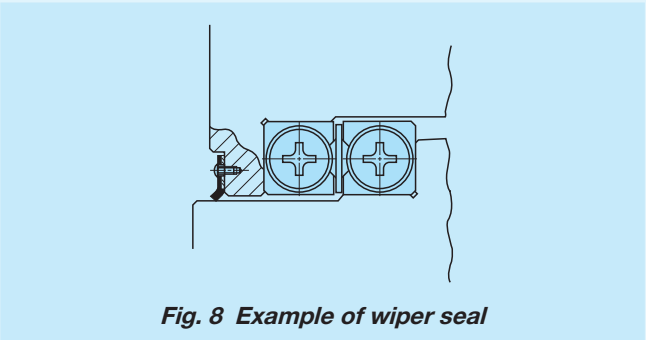


Fig. 8 Example of wiper seal

Precaution for Use

① 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.

② 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.

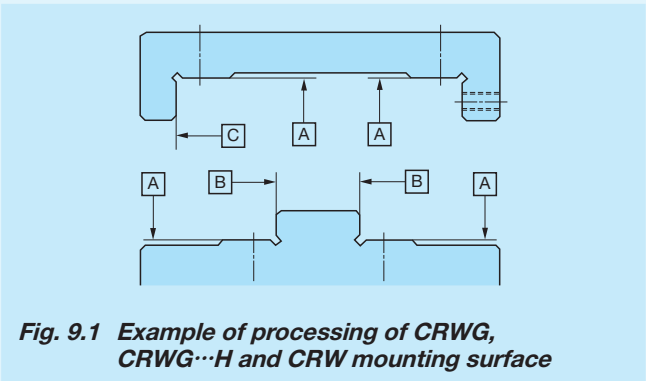


Fig. 9.1 Example of processing of CRWG, CRWG...H and CRW mounting surface

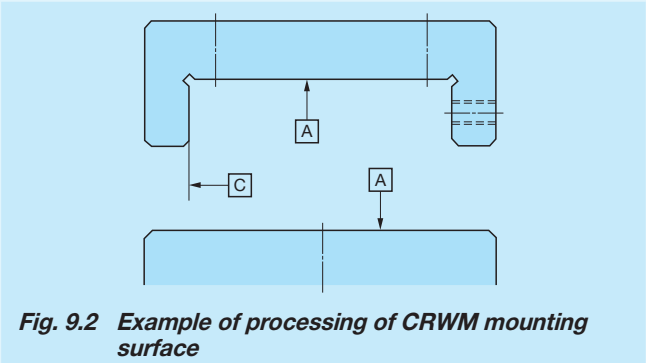


Fig. 9.2 Example of processing of CRWM mounting surface

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 ④ Preload adjustment mechanism). II-11 Allowable value approximate to the parallelism indicated in Fig. 1 in page II-11 is recommended. · Squareness Affects rigidity in preload direction of the mounting part of the CRWG series, CRWG...H series and CRW series. Process to sufficiently high accuracy.

③ 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.

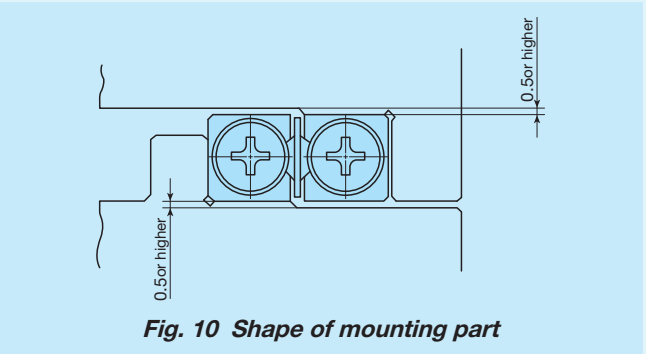


Fig. 10 Shape of mounting part

④ 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.

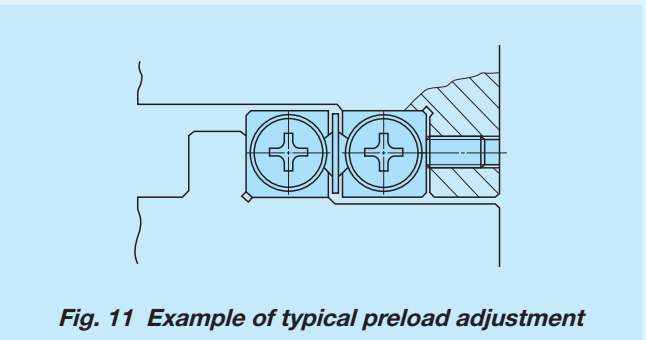


Fig. 11 Example of typical preload adjustment

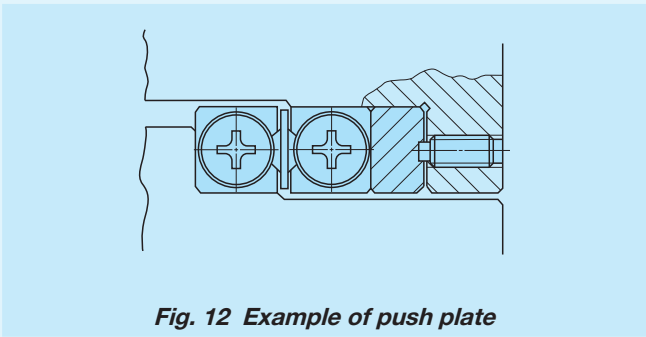


Fig. 12 Example of push plate

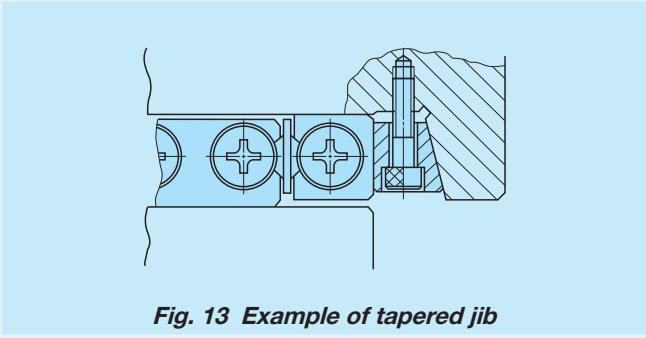


Fig. 13 Example of tapered jib

⑤ Maximum 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**.

⑥ 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.

⑦ 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	Remark
M 2×0.4	0.23	When fixing screws used on the table side and bed side are not identical, fasten them all to the smaller tightening torque.
M 3×0.5	1.4	
M 4×0.7	3.2	
M 5×0.8	6.3	
M 6×1	10.7	
M 8×1.25	25.6	
M10×1.5	50.1	
M12×1.75	86.5	
M14×2	137	
M16×2	211	

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.

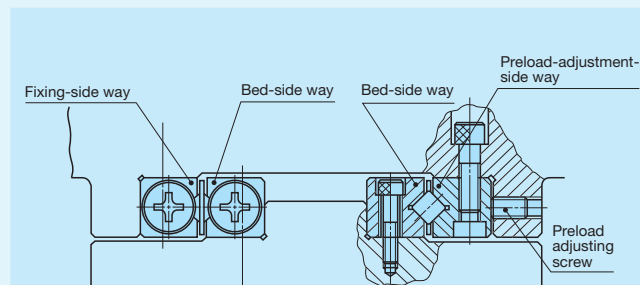


Fig. 14 Mounting example of CRWG and CRWG...H

1 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.

2 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.

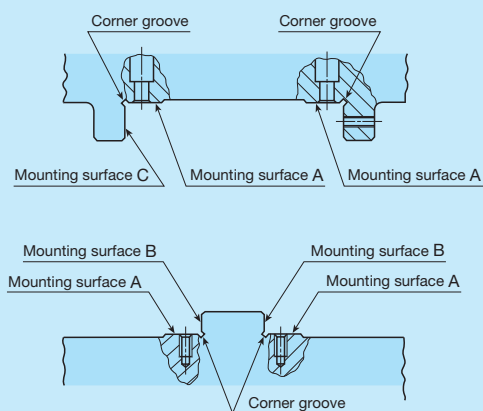


Fig. 15 Mounting surface

3 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.

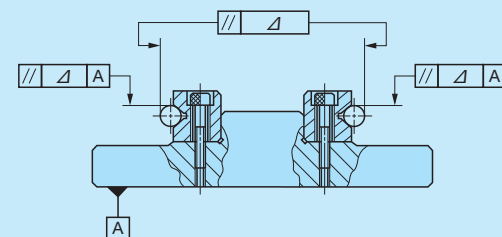


Fig. 16 Accuracy of way mounting

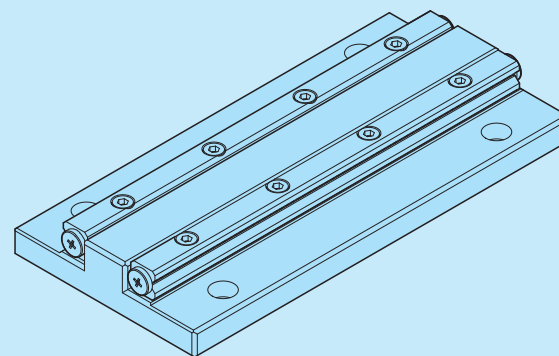


Fig. 17

4 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.

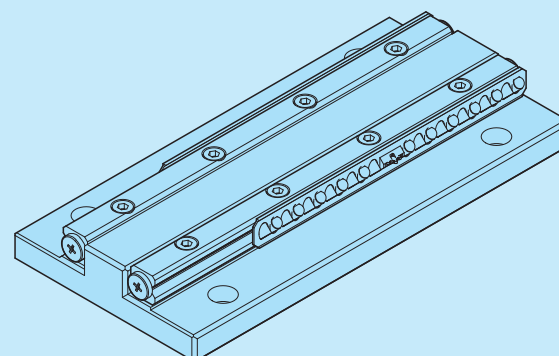


Fig. 18

- 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.

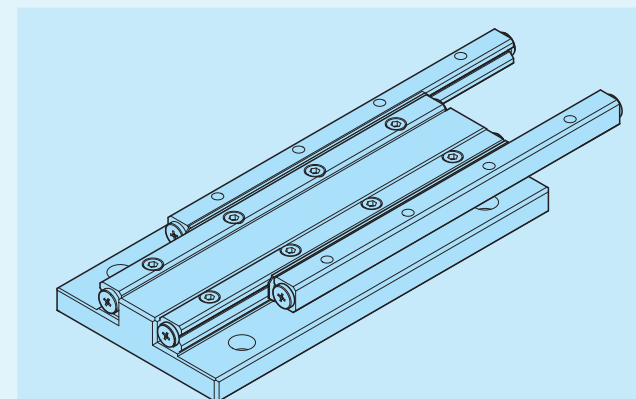


Fig. 19

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

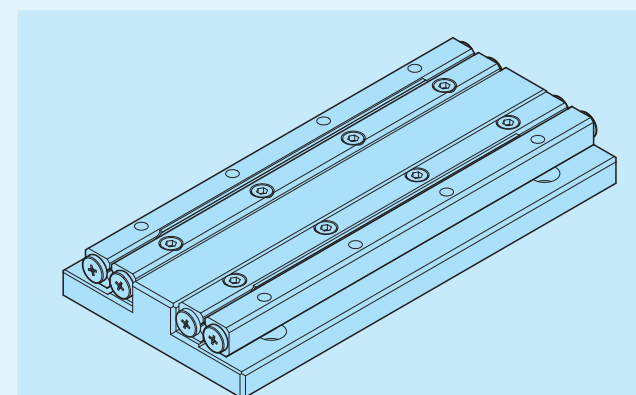


Fig. 20

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

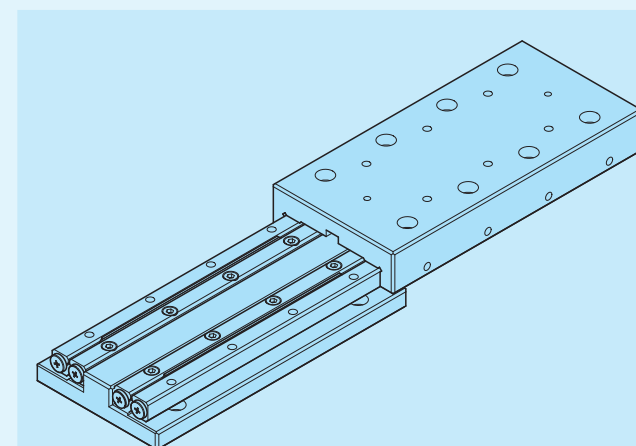


Fig. 21

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

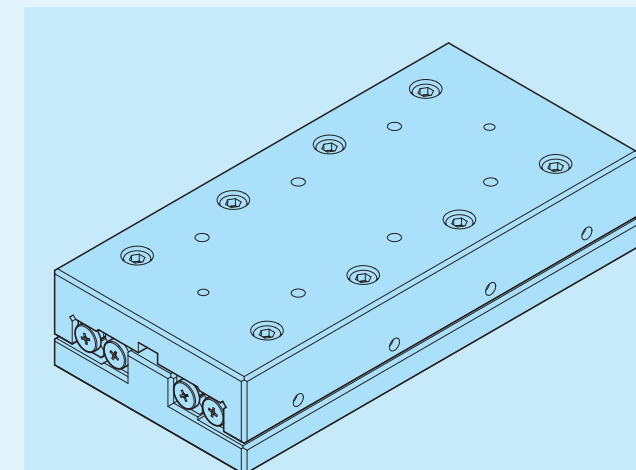


Fig. 22

- 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)

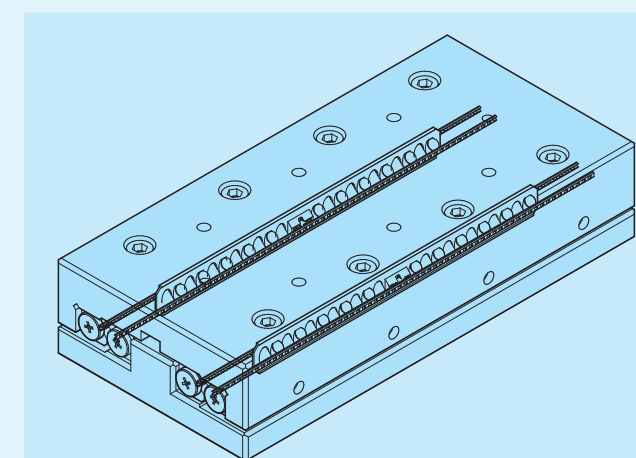


Fig. 23

5 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.

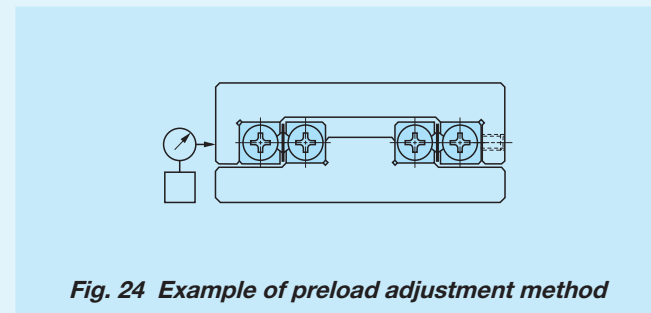


Fig. 24 Example of preload adjustment method

6 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.

7 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.

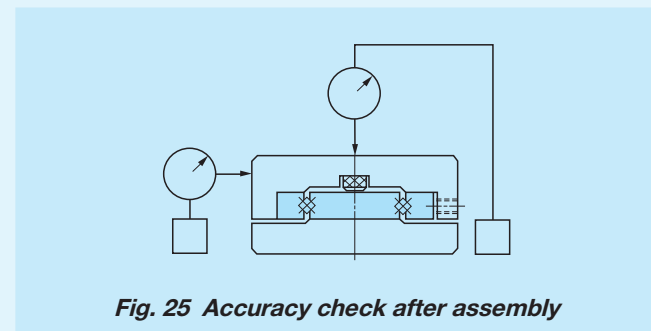


Fig. 25 Accuracy check after assembly

Mounting of standard type CRW series

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

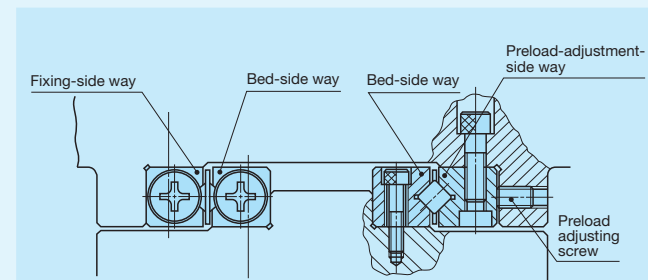


Fig. 26 Mounting example of standard type CRW series

1 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.

2 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.

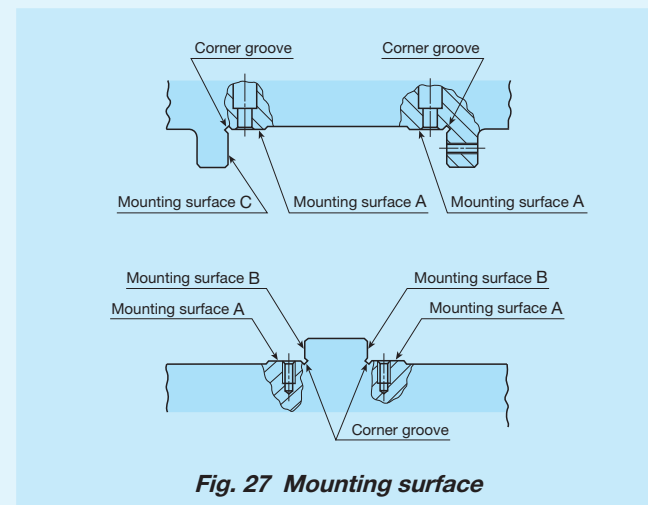


Fig. 27 Mounting surface

3 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.

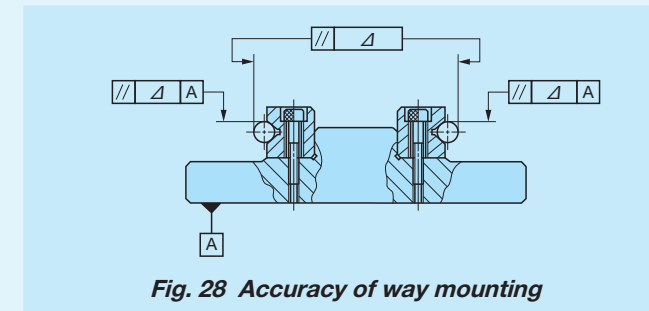


Fig. 28 Accuracy of way mounting

4 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.

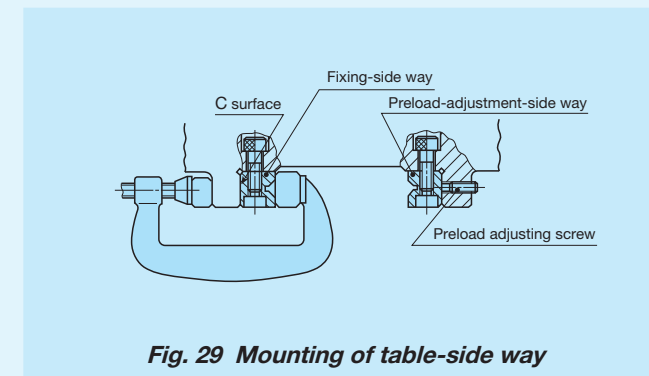


Fig. 29 Mounting of table-side way

5 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.

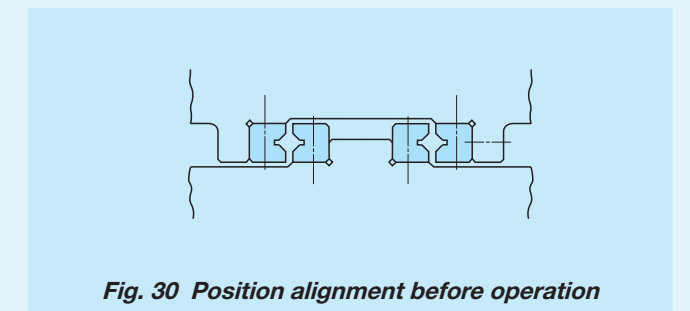


Fig. 30 Position alignment before operation

6 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.

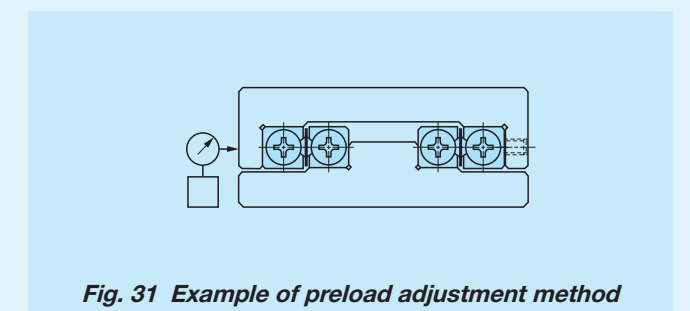


Fig. 31 Example of preload adjustment method

7 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.

8 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.

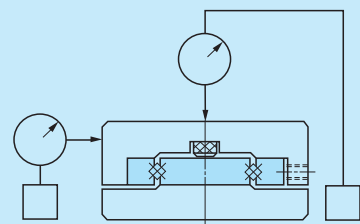


Fig. 32 Accuracy check after assembly

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.

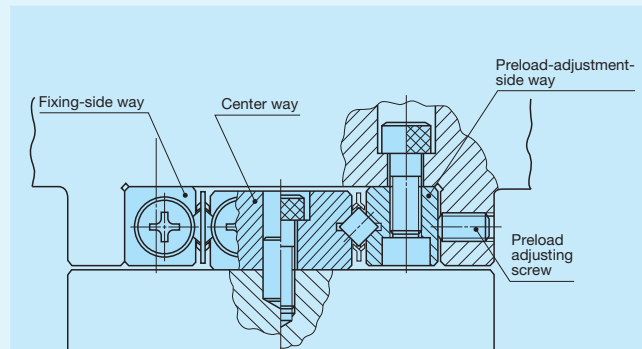


Fig. 33 Example of mounting of CRWM

1 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.

2 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.

3 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.

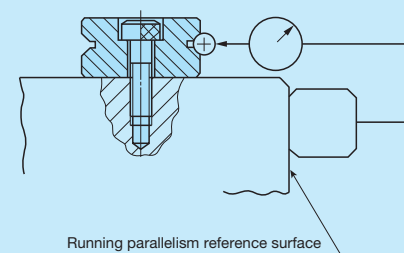


Fig. 34 Mounting accuracy check for center way

4 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.

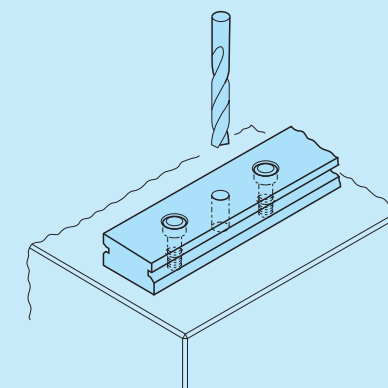


Fig. 35 Machining of dowel pin hole

5 Mounting of table-side way

- Follow the mounting of standard type CRW series.

6 Operation of table and bed

- Follow the mounting of standard type CRW series.

7 Preload adjustment

- Follow the mounting of standard type CRW series.

8 Full tightening of preload-adjustment-side way

- Follow the mounting of standard type CRW series.

9 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.

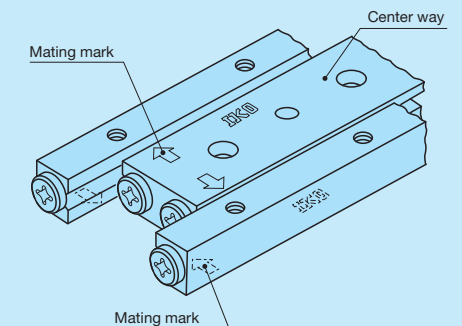
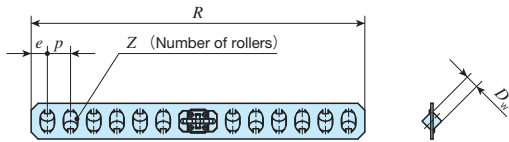
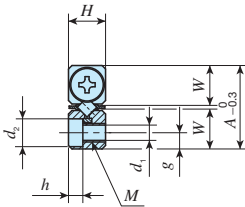
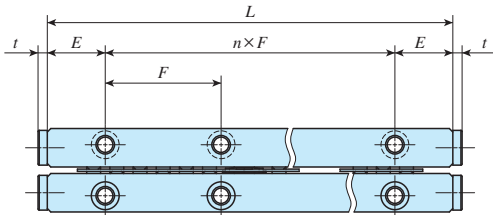


Fig. 36 Mating marks of CRWM

IK Anti-Creep Cage Crossed Roller Way

Shape	CRWG			
Size	2	3	4	6



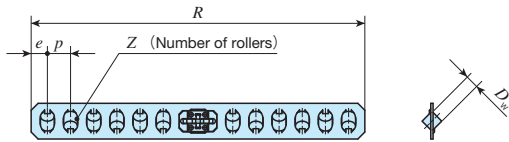
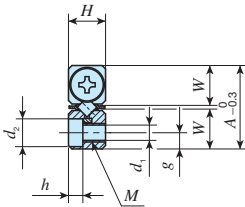
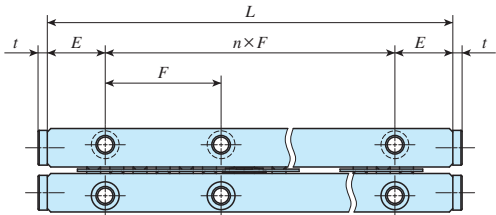
Identification number	Mass (Ref.)		Nominal dimensions mm																	Maximum stroke length	Basic dynamic load rating	Basic static load rating	Allowable load
	Way ⁽¹⁾	Roller cage ⁽²⁾	Boundary dimensions				Dimension of roller cage			Mounting dimensions													
			A	H	L(n×F)	E	D _w	R	Z	p	e	W	g	M	d ₁	d ₂	h	t					
	g	g																		mm	N	N	N
CRWG 2- 30	6.53	0.38	12	6	30(1×15)	7.5	2	25.6		4	4	2.8	5.5	2.5	M3	2.55	4.4	2	1.5	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			90(5×15)			73.6		16										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	18	8	50(1×25)	12.5	3	42		6	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	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			150(5×25)			122		22										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.

CRW(G)(...H)
CRWU(G)

IK Anti-Creep Cage Crossed Roller Way

Shape	CRWG			
				
Size	2	3	4	6

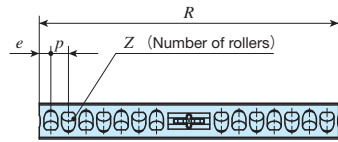
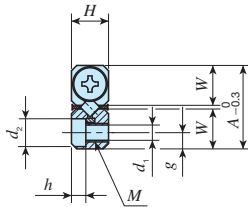
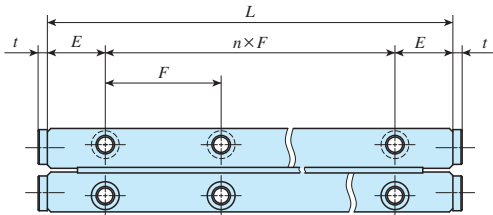


Identification number	Mass (Ref.)		Nominal dimensions mm																	Maximum stroke length	Basic dynamic load rating	Basic static load rating	Allowable load
	Way ⁽¹⁾	Roller cage ⁽²⁾	Boundary dimensions				Dimension of roller cage			Mounting dimensions													
			A	H	L(n×F)	E	D _w	R		Z	p	e	W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

IK Anti-Creep Cage Crossed Roller Way H

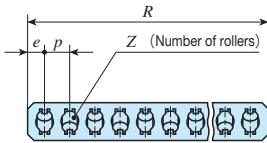
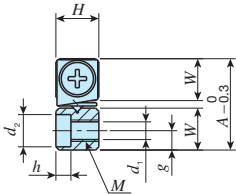
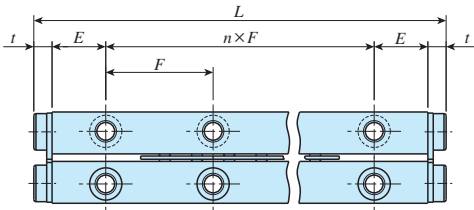
Shape	CRWG···H			
Size	2	3	4	



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

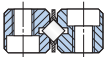
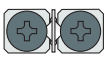
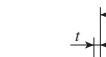
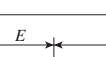
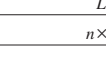
Notes ⁽¹⁾ The value shows the mass of a piece of way.
⁽²⁾ The value shows the mass of a roller cage.
⁽³⁾ This is the value when a combination of four ways and two roller cages is used in parallel arrangement.

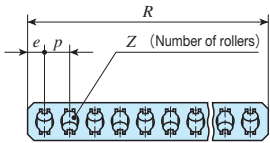
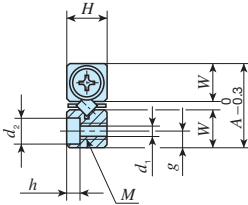
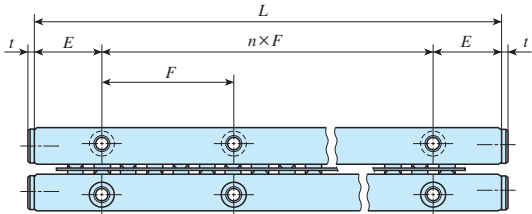
Standard type						
Shape	CRW CRW...SL					
Size	1	2	3	4	6	
	9	12	15	18	24	



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

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

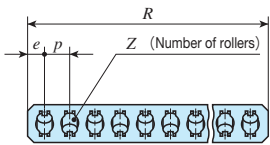
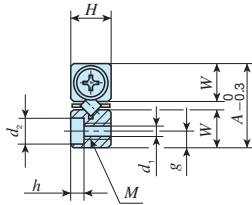
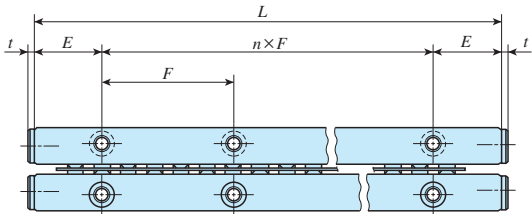
Standard type					
Shape	CRW CRW···SL				
					
Size	1	2	3	4	6
	9	12	15	18	24



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

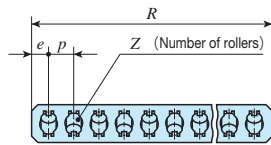
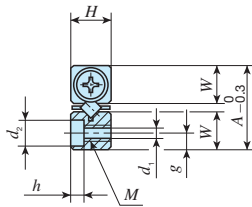
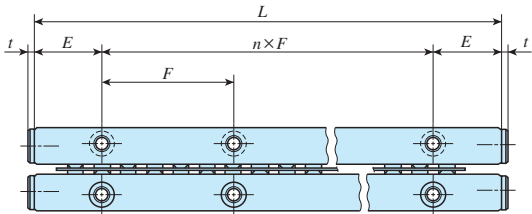
Standard type					
Shape	CRW CRW...SL				
					
Size	1	2	3	4	6
	9	12	15	18	24



Identification number	Mass (Ref.)		Nominal dimensions mm																	Basic dynamic load rating $C_U^{(3)}$ N	Basic static load rating $C_{0U}^{(3)}$ N	Allowable load $F_U^{(3)}$ N	
	Way ⁽¹⁾ kg/m	Roller cage ⁽²⁾ g	Boundary dimensions				Dimension of roller cage						Mounting dimensions										
			A	H	$L(n \times F)$	E	D_w	R		Z	p	e	W	g	M	d_1	d_2	h	t				
CRW 3- 50	0.50	2.96	18	8	50 (1×25)	12.5	3	42		8	5	3.5	8.3	3.5	M4	3.3	6	3.1	2	638	609	203	
CRW 3- 50 SL																							
CRW 3- 75					75 (2×25)			62		12													
CRW 3- 75 SL																							
CRW 3-100					100 (3×25)			82		16													
CRW 3-100 SL																							
CRW 3-125					125 (4×25)			102		20													
CRW 3-125 SL																							
CRW 3-150					150 (5×25)			122		24													
CRW 3-150 SL																							
CRW 3-175					175 (6×25)			142		28													
CRW 3-175 SL																							
CRW 3-200					200 (7×25)			162		32													
CRW 3-200 SL																							
CRW 3-225					225 (8×25)			182		36													
CRW 3-225 SL																							
CRW 3-250					250 (9×25)			202		40													
CRW 3-250 SL																							
CRW 3-275					275 (10×25)			222		44													
CRW 3-275 SL																							
CRW 3-300					300 (11×25)			242		48													
CRW 3-300 SL																							

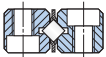
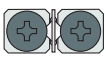
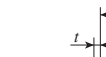
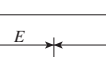
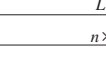
Notes ⁽¹⁾ The value shows the mass per meter of a way.
⁽²⁾ The value shows the mass of a roller cage with ten cylindrical rollers.
⁽³⁾ The value shows the load of a cylindrical roller.

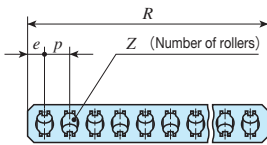
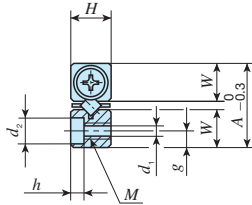
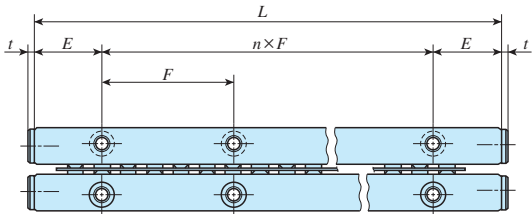
Standard type					
Shape	CRW CRW...SL				
					
Size	1	2	3	4	6
	9	12	15	18	24



Identification number	Mass (Ref.)		Nominal dimensions mm																	Basic dynamic load rating $C_U^{(3)}$ N	Basic static load rating $C_{0U}^{(3)}$ N	Allowable load $F_U^{(3)}$ N	
	Way ⁽¹⁾ kg/m	Roller cage ⁽²⁾ g	Boundary dimensions				Dimension of roller cage						Mounting dimensions										
			A	H	$L(n \times F)$	E	D_w	R		Z	p	e	W	g	M	d_1	d_2	h	t				
CRW 4- 80	0.82	6.91	22	11	80 (1×40)	20	4	73		10	7	5	10	4.5	M5	4.3	7.5	4.1	2	1 230	1 180	392	
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					280 (6×40)			227		32													
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.

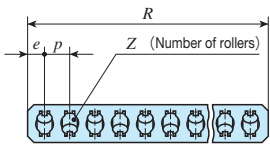
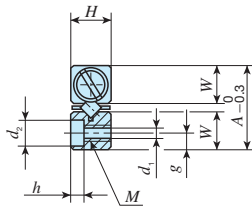
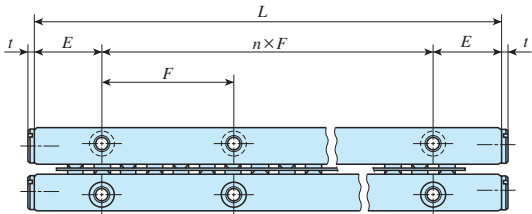
Standard type					
Shape	CRW CRW...SL				
					
Size	1	2	3	4	6
	9	12	15	18	24



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

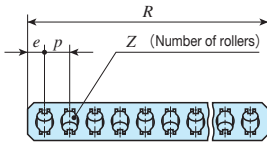
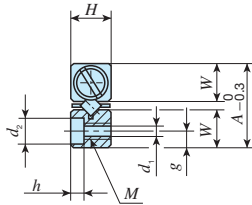
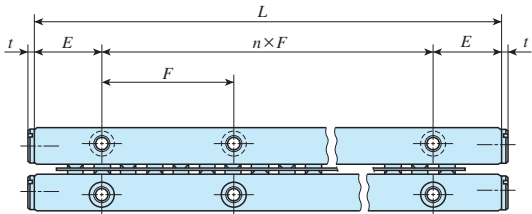
Standard type					
Shape	CRW				
					
Size	1	2	3	4	6
	9	12	15	18	24



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

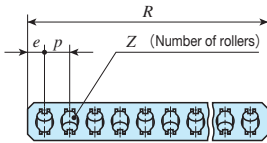
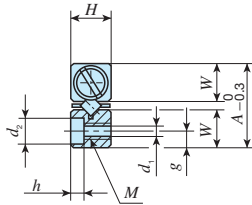
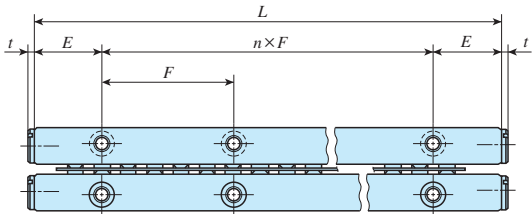
Standard type					
Shape	CRW				
					
Size	1	2	3	4	6
	9	12	15	18	24



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

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



Identification number	Mass (Ref.)		Nominal dimensions mm																	Basic dynamic load rating $C_U^{(3)}$ N	Basic static load rating $C_{ou}^{(3)}$ N	Allowable load $F_U^{(3)}$ N
	Way ⁽¹⁾ kg/m	Roller cage ⁽²⁾ g	Boundary dimensions				Dimension of roller cage						Mounting dimensions									
			A	H	$L(n \times F)$	E	D_w	R		Z	p	e	W	g	M	d_1	d_2	h	t			
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)				11													
CRW 24- 600*					600 (5×100)				14													
CRW 24- 700*					700 (6×100)				16													
CRW 24- 800*					800 (7×100)				18													
CRW 24- 900*					900 (8×100)				20													
CRW 24-1000*					1 000 (9×100)				23													
CRW 24-1100*					1 100 (10×100)				25													
CRW 24-1200*					1 200 (11×100)				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.

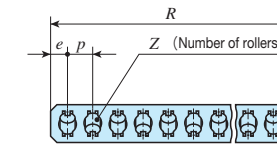
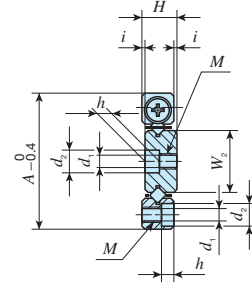
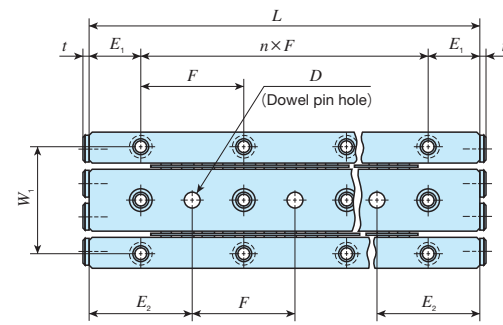
Module type				
Shape	CRWM			
Size	1	2	3	4



Identification number	Mass (Ref.)		Nominal dimensions and tolerances mm																			Basic dynamic load rating $C_u^{(3)}$ N	Basic static load rating $C_{0u}^{(3)}$ N	Allowable load $F_u^{(3)}$ N	
	Way ⁽¹⁾ kg/m	Roller cage ⁽²⁾ g	Boundary dimensions				Dimension of roller cage				Mounting dimensions														
			A	H	$L(n \times F)$	i	D_w	R	Z	p	e	W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Dim. D tolerance	t			
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.

Module type				
Shape	CRWM 			
	1	2	3	4
Size	1	2	3	4



Identification number	Mass (Ref.)		Nominal dimensions and tolerances mm																				Basic dynamic load rating $C_U^{(3)}$ N	Basic static load rating $C_{ou}^{(3)}$ N	Allowable load $F_U^{(3)}$ N		
	Way ⁽¹⁾ kg/m	Roller cage ⁽²⁾ g	Boundary dimensions				Dimension of roller cage						Mounting dimensions														
			A	H	$L(n \times F)$	i	D_w	R	Z	p	e	W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Dim. D tolerance	t					
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									62	12																	
CRWM 3-100									82	16																	
CRWM 3-125									102	20																	
CRWM 3-150									122	24																	
CRWM 3-175									142	28																	
CRWM 3-200									162	32																	
CRWM 3-225									182	36																	
CRWM 3-250									202	40																	
CRWM 3-275									222	44																	
CRWM 3-300									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									101	14																	
CRWM 4-160									136	19																	
CRWM 4-200									164	23																	
CRWM 4-240									199	28																	
CRWM 4-280									227	32																	
CRWM 4-320									262	37																	
CRWM 4-360									297	42																	
CRWM 4-400									325	46																	
CRWM 4-440									360	51																	
CRWM 4-480									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.

Module type	
Shape	CRWM...A
Size	4



Identification number	Mass (Ref.)		Nominal dimensions and tolerances mm																				Basic dynamic load rating $C_u^{(3)}$ N	Basic static load rating $C_{0u}^{(3)}$ N	Allowable load $F_u^{(3)}$ N	
	Way ⁽¹⁾ kg/m	Roller cage ⁽²⁾ g	Boundary dimensions				Dimension of roller cage				Mounting dimensions															
			A	H	$L(n \times F)$	i	D_w	R	Z		p	e	W_1	W_2	E_1	E_2	M	d_1	d_2	h	D	Dim. D tolerance				t
CRWM 4- 80A*	3.96	6.91	48	12.5	80 (1×40)	0.5	4	73	10		7	5	38	22	20	40	M5	4.3	8	4.1	5	+0.012 0	2	1 230	1 180	392
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*					280 (6×40)			227	32																	
CRWM 4-320A*					320 (7×40)			262	37																	
CRWM 4-360A*					360 (8×40)			297	42																	
CRWM 4-400A*					400 (9×40)			325	46																	
CRWM 4-440A*					440 (10×40)			360	51																	
CRWM 4-480A*	480 (11×40)	388	55																							

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.

Anti-Creep Cage
Crossed Roller Way Unit

CRWUG



Points

High rigidity and high accuracy

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

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

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

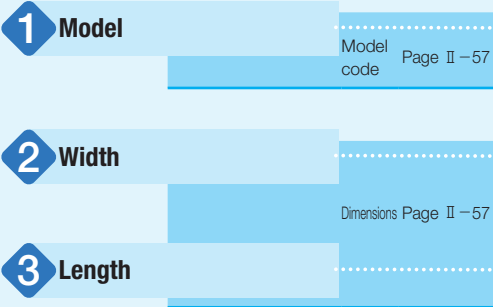
Mounting surface is precisely grounded. In addition, female screws and boring are used for table and bed, respectively to ensure appropriate preload state. Therefore, highly reliable linear motion can be achieved just by fitting them to the machine and device.

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, a part code, a material code, a classification symbol, and a supplemental code for each specification to apply.

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



CRW(G)(-...H)
CRW(G)

Identification Number and Specification

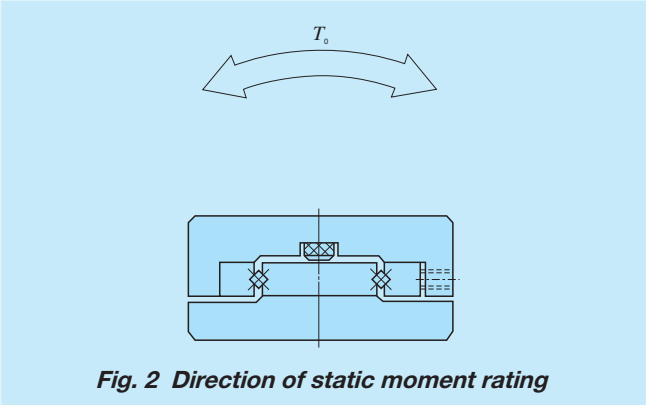
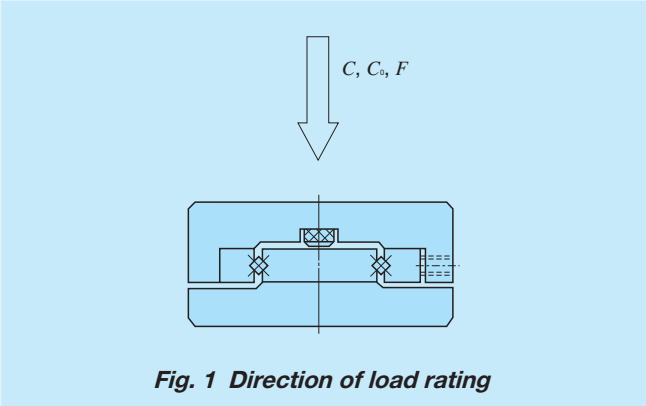
1	Model	Anti-Creep Cage Crossed Roller Way Unit (CRWUG series) : CRWUG	
		Crossed Roller Way Unit (CRWU series) : CRWU	: CRWU...R
			: CRWU...RS
		For applicable models and width, see Fig. 1.	
2	Width	20, 30, 40, 60, 80, 100, 145	Indicate the table width in mm. For applicable models and width, see Fig. 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	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		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.



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 <i>L</i> mm		Parallelism at the table center	Parallelism on the table side		
Above	Below				
—	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		

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.

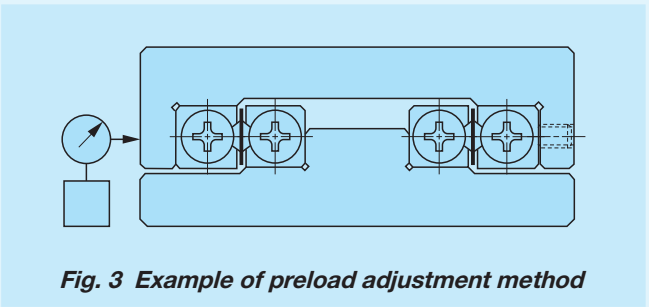
Precaution for Use

① 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.

② 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.



③ Maximum 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**.

④ Maximum velocity

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

⑤ Tightening torque for fixing screw

Typical tightening torque for mounting of the CRWUG series and CRWU series is indicated in Table 3. 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	0.23
M 3×0.5	1.4
M 4×0.7	3.2
M 5×0.8	6.3
M 6×1	10.7
M 8×1.25	25.6

⑥ 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.

⑦ Mounting part dimensions of CRWU...R

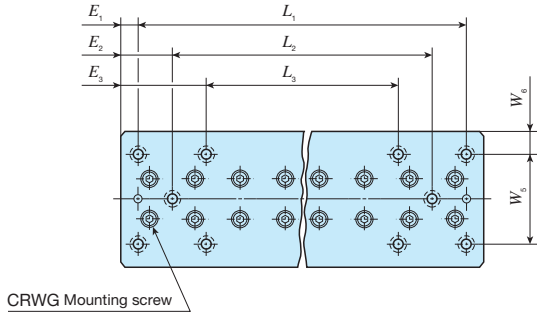
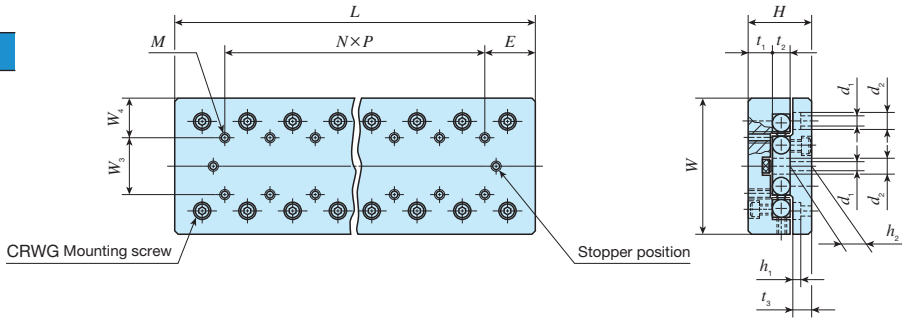
Not to allow the table to interfere with the mounting surface, it is necessary to set mounting surface height referring to the dimensions H_1 and H in the dimension table. Example bed mounting dimensions are indicated in Table 4.

Table 4 Example 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

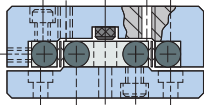
IK Anti-Creep Cage Crossed Roller Way Unit

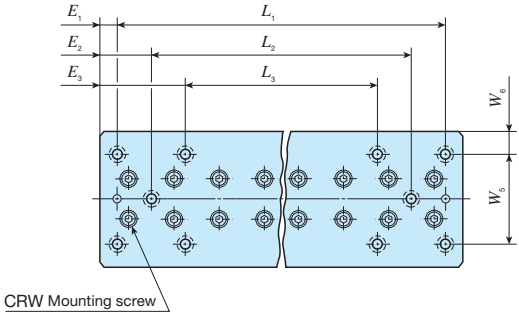
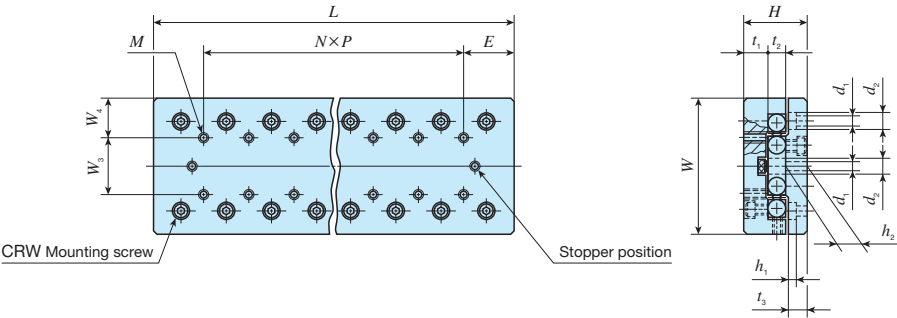
Shape	CRWUG		
Size	40	60	80



Identification number	Mass (Ref.) kg	Nominal dimensions and tolerances mm								Table mounting dimensions mm						Bed mounting dimensions mm												Basic dynamic load rating C N	Basic static load rating C ₀ N	Allowable load F N	Static moment rating T ₀ N · m		
		W	Dim. W tolerance	H	Dim. H tolerance	L	t ₁	t ₂	t ₃	Maximum stroke length	W ₃	W ₄	N×P	E		M	W ₅	W ₆	L ₁	E ₁	L ₂	E ₂	L ₃	E ₃	d ₁	d ₂	h ₁					h ₂	
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	3.2	6	913	1 180	392	10.6	
CRWUG 40- 50	0.30					50	7	8	5.5	30			1×15						40										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										3 430	4 880	1 630	35.3	
CRWUG 40- 95	0.53					95				60			4×15						85										20	2 740	3 660	1 220	26.5
CRWUG 40-110	0.63					110				70			5×15						100											4 080	6 090	2 030	44.2
CRWUG 40-125	0.70					125				80			6×15						115											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										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

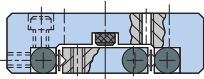
CRW(G)(...H)
CRWU(G)

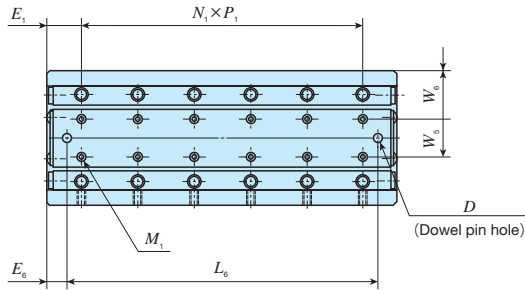
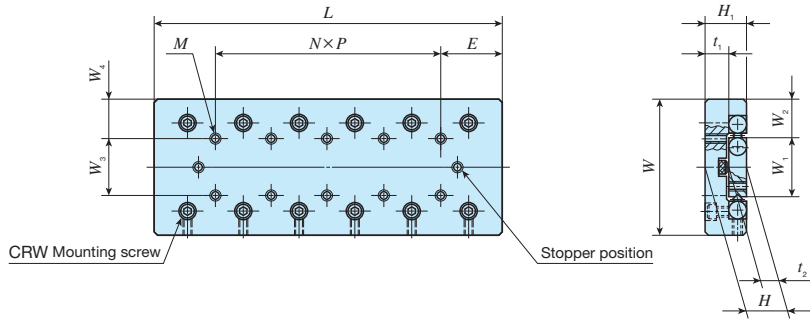
Shape	CRWU					
						
Size	30	40	60	80	100	145



Identification number	Mass (Ref.) kg	Nominal dimensions and tolerances mm								Table mounting dimensions mm						Bed mounting dimensions mm												Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating					
		W	Dim. W tolerance	H	Dim. H tolerance	L	t ₁	t ₂	t ₃	Maximum stroke length	W ₃	W ₄	N×P	E		M	W ₅	W ₆	L ₁	E ₁	L ₂	E ₂	L ₃	E ₃	d ₁	d ₂	h ₁	h ₂	C	C ₀	F	T ₀				
																													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					13.5	786	1 200	398	8.1				
CRWU 30- 65	0.24					65				40			4×10						58														906	1 430	478	9.7
CRWU 30- 75	0.28					75				45			5×10						68														1 020	1 670	558	11.3
CRWU 30- 85	0.32					85				50			6×10						78														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	3.2	6	896	1 180	392	10.6					
CRWU 40- 50	0.30					50	7	8	5.5	30			1×15						40									—	—	2 710	3 660	1 220	26.5			
CRWU 40- 65	0.37					65				2×15			55						2 710									3 660	1 220	26.5						
CRWU 40- 80	0.48					80				3×15			70						40				4 050					6 090	2 030	44.2						
CRWU 40- 95	0.54					95				4×15			85						55				3 400					4 880	1 630	35.3						
CRWU 40-110	0.65					110				5×15			100						70				4 680					7 310	2 440	53.0						
CRWU 40-125	0.72					125				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		85	35	85	60					5 860	9 750	3 250	137				
CRWU 60-155	1.9					155				90			4×25						135										6 970	12 200	4 060	171				
CRWU 60-180	2.2					180				105			5×25						160										8 040	14 600	4 880	205				
CRWU 60-205	2.5					205				130			6×25						185										8 550	15 800	5 280	222				

IK Crossed Roller Way Unit

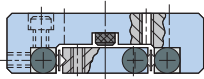
Shape	CRWU...R					
						
Size	30	40	60	80	100	145

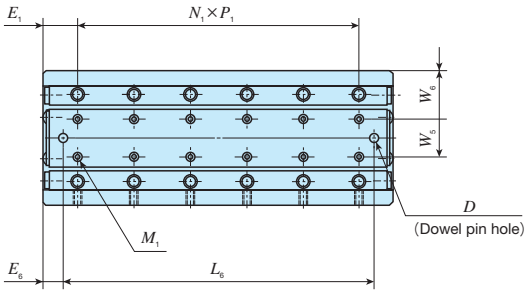
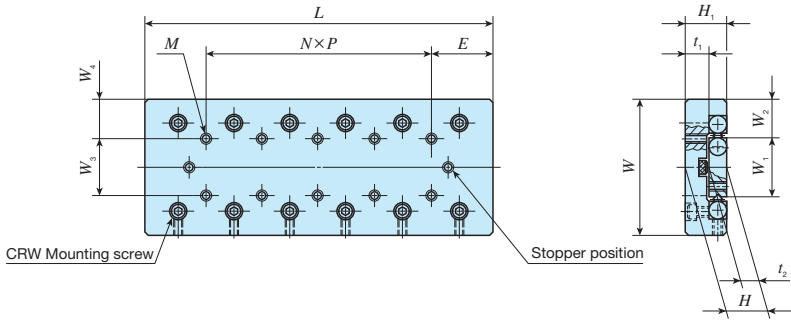


Identification number	Mass (Ref.) kg	Nominal dimensions and tolerances mm						Table mounting dimensions mm								Center way mounting dimensions and tolerances mm													Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating	
		W	Dim. W tolerance	H	Dim. H tolerance	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		
																												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								30										12.5	786	1 200	398	8.1	
CRWU 30- 65R	0.16					65	40			4×10																			40	906	1 430	478	9.7
CRWU 30- 75R	0.18					75	45			5×10																			50	1 020	1 670	558	11.3
CRWU 30- 85R	0.21					85	50			6×10																			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			50		30	1×15			2×15								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			45								17.5	4 050						6 090	2 030		44.2					
CRWU 40- 95R	0.38			95		60	4×15												4×15						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			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								110					5 860					9 750	3 250	137			
CRWU 60-155R	1.3					155	90			4×25													5×25					6 970	12 200	4 060	171		
CRWU 60-180R	1.5					180	105			5×25													6×25					8 040	14 600	4 880	205		
CRWU 60-205R	1.7					205	130			6×25													7×25					8 550	15 800	5 280	222		

CRW(G)(...H)
CRWU(G)

IK Crossed Roller Way Unit

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



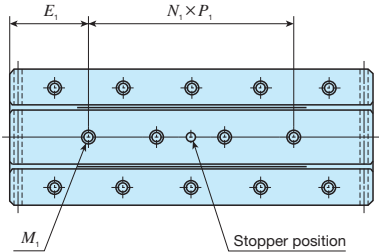
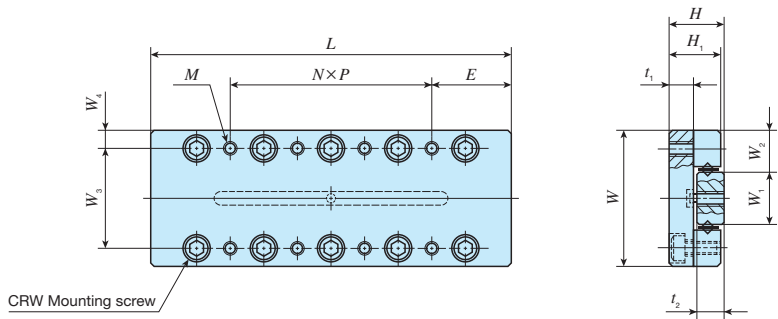
Identification number	Mass (Ref.) kg	Nominal dimensions and tolerances mm						Table mounting dimensions mm								Center way mounting dimensions and tolerances mm													Basic dynamic load rating	Basic static load rating	Allowable load	Static moment rating
		W	Dim. W tolerance	H	Dim. H tolerance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

CRW(G)(...H)
CRW(G)

IK 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 <i>C</i> N	Basic static load rating <i>C</i> ₀ N	Allowable load <i>F</i> N	Static moment rating <i>T</i> ₀ N · m	
		<i>W</i>	Dim. <i>W</i> tolerance	<i>H</i>	Dim. <i>H</i> tolerance	<i>L</i>	Maximum stroke length	<i>W</i> ₃	<i>W</i> ₄	<i>N</i> × <i>P</i>	<i>E</i>		<i>M</i>	<i>H</i> ₁	<i>t</i> ₁	<i>W</i> ₁	<i>W</i> ₂	<i>N</i> ₁ × <i>P</i> ₁	<i>E</i> ₁	<i>M</i> ₁	<i>t</i> ₂					
	kg																									
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			M2.5	4	525	717	239
CRWU 20- 45RS	0.06					45	25			1×20	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	

CRW(G)(...H)
CRWU(G)

Linear Slide Unit

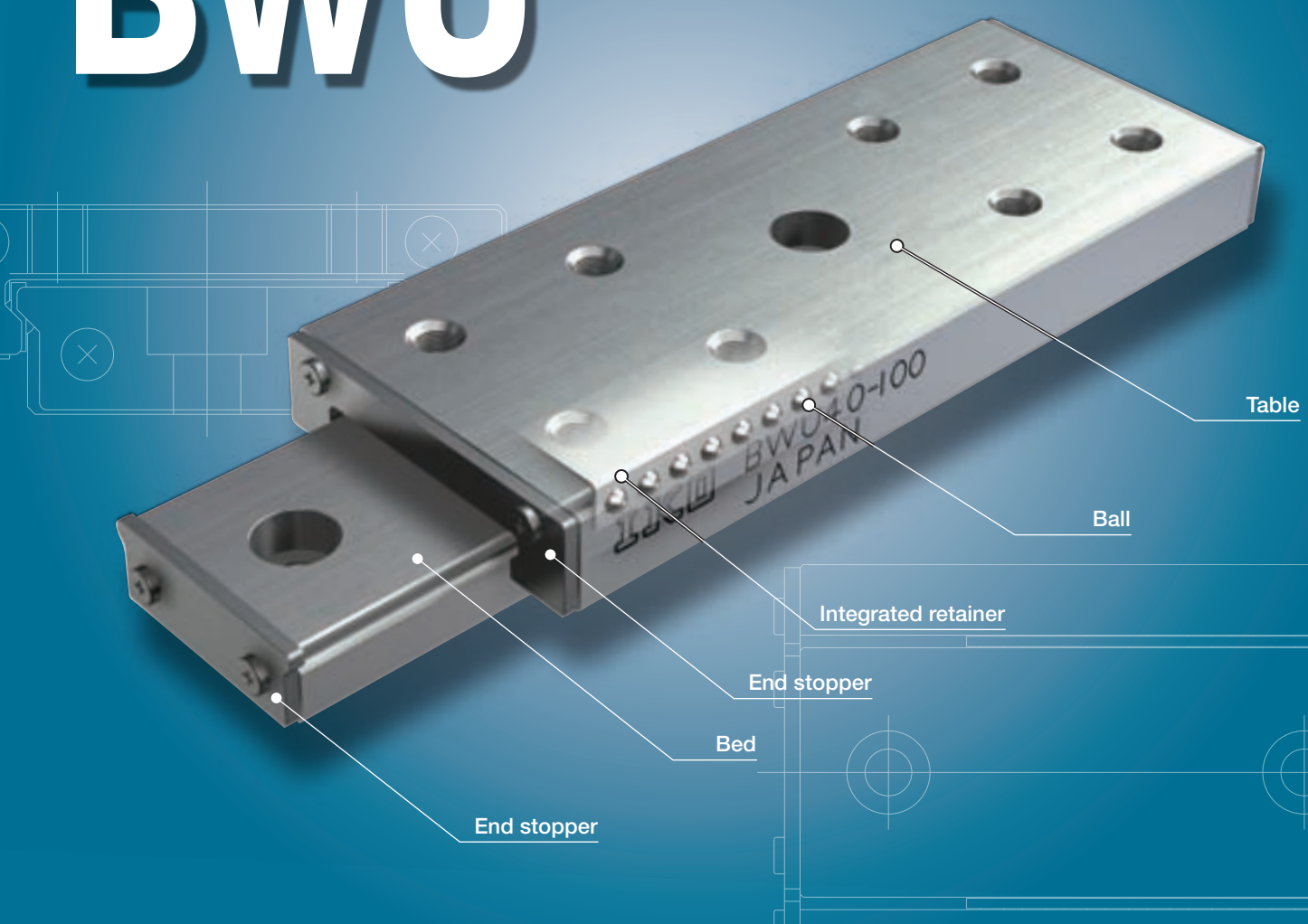
High Rigidity Precision Linear Slide Unit
Precision Linear Slide Unit
Linear Slide Unit

BWU • BSP(G)
BSU...A



High Rigidity Precision Linear Slide Unit

BWU



Points

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.

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.

Smooth operations

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

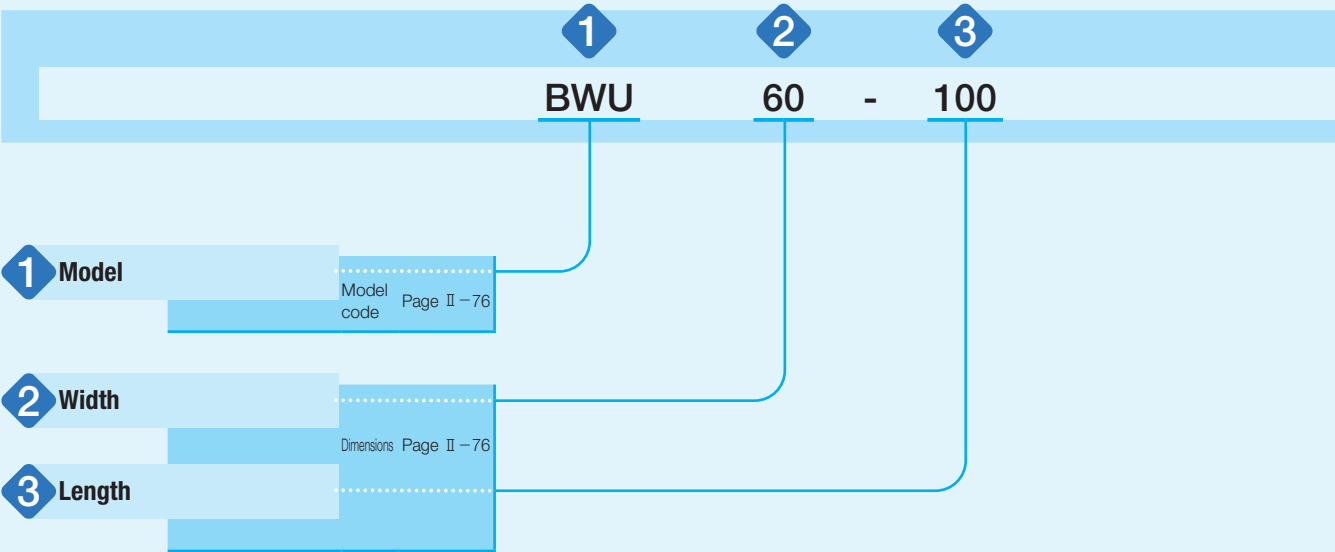
Stainless steel selections for excellent corrosion resistance

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

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	—	—	—	—	—	—	—	○	—	○	—	○	○

BWU・BSP(G)
BSU...A

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

Upward load

Downward load

Lateral load

Load rating and load direction	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
Width 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⁾
Above	Below		
—	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 I KO 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.

BWU・BSP(G)
BSU...A

Precaution for Use

Precaution for Mounting

- ① Handling

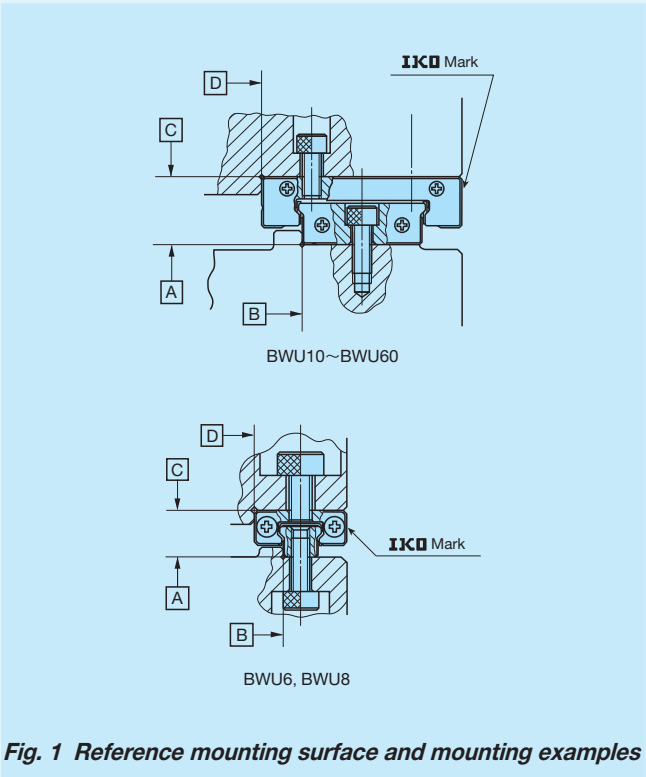
When high running accuracy is required, set the load point at the center of the table (or bed) and use with sufficient stroke length.
For the BWU series, the retainer may be deviated from the right position due to offset load or irregular and high-velocity motion, etc. Fully stroke it once in certain 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.
- ② Maximum 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**.
- ③ Maximum velocity

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

- ① Reference mounting surface

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



- ② Typical mounting structure

As indicated in Fig.1, reference mounting surfaces B and D, and mounting surfaces A and C are precisely ground. Therefore, by machining the reference mounting surface of the mating member and the mounting surface, such as machine or device, to high accuracy and mounting them properly, stable linear motion with high accuracy is realized. For the opposite corner of the mating reference mounting, it is recommended to have relieved fillet as indicated in the illustration in Table 5. The value indicated in Table 5 is recommended for the shoulder height on the mating side.

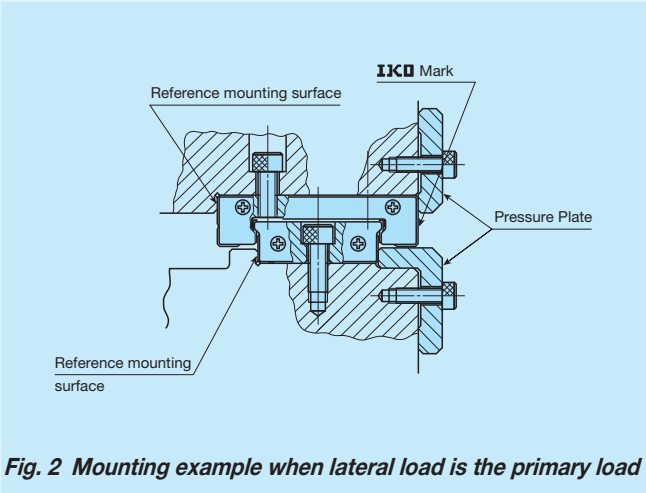
Table 5 Shoulder height

unit: mm

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

- ③ When lateral load is the primary load

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



- ④ 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, 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 calculation is based on the tightening torque of stainless steel hexagon socket head bolt, property division A2-70.

Precision Linear Slide Unit

Limited linear motion type

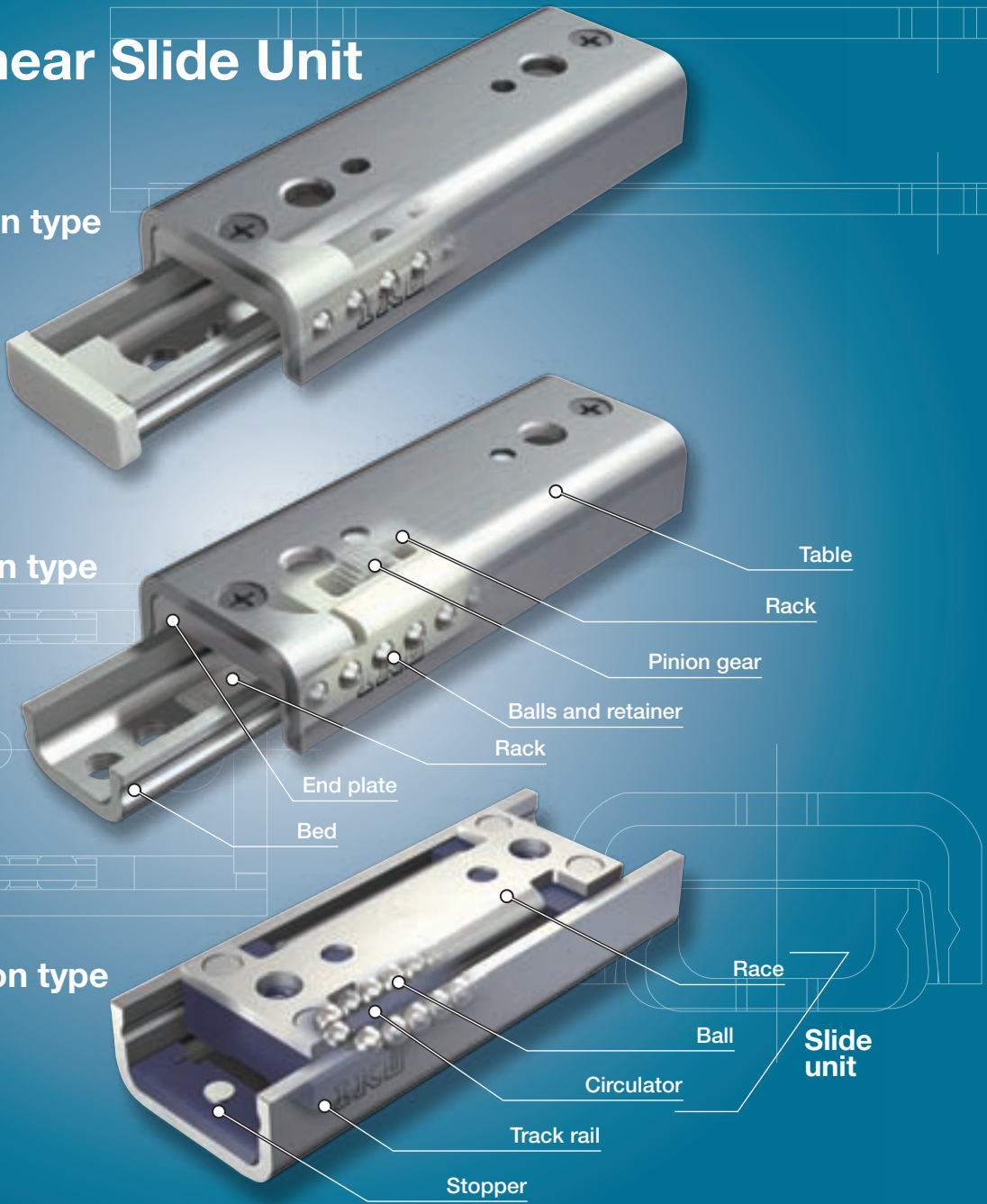
BSP

Built-in rack & pinion type

BSPG

Endless linear motion type

BSR



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	T ₁
	BSPG	12	35	SL	T ₁
	BSR	20	60	SL	T ₁

1 Model

Model code

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2 Width

Dimensions

Page II - 85

3 Length

4 Material type

Material code

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5 Clearance amount

Clearance code

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BWU • BSP(G)
BSU...A

Points

Light weight and compact

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

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

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

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.

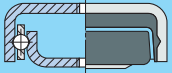
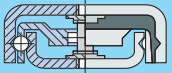
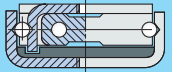
Stainless steel selections for excellent corrosion resistance

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

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.	—	—	○	○	○	○

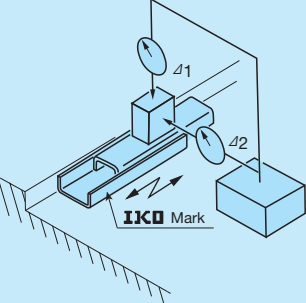
3	Length		Indicate the length in mm.	
4	Material type	Stainless steel made : SL	Stainless steel (SL) can be specified only for the material type.	
5	Clearance amount	Standard : No symbol T ₁ Clearance : T ₁	For details of clearance amount, see Table 2. Typically, apply the standard clearance for use in small frictional resistance and the clearance adjusted to the clearance code T ₁ for applications requiring high linear motion accuracy.	

Table 2 Clearance of raceways unit: μm

Type and code	Clearance of raceways
Standard (no symbol)	0 ~ +4
T ₁	−4 ~ 0

Accuracy

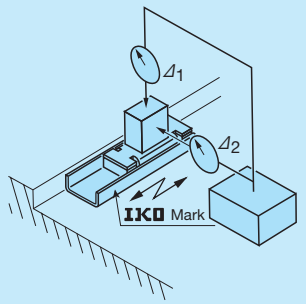
Table 3 Running accuracy for BSP and BSPG



unit: μm

Stroke length mm		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
Above	Below		
—	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		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
Above	Below		
—	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.

Precaution for Use

Precaution for Mounting

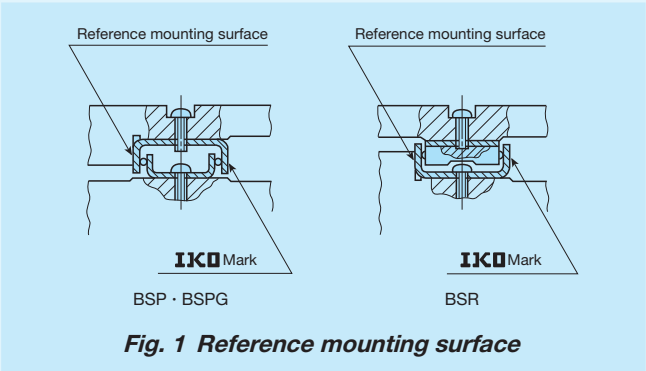
① Applied load
For use with stable and high running accuracy, it is recommended to use applied load around 20% or lower of the basic static load rating.

② 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.

③ Maximum 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**.

④ Maximum velocity
Operating velocity should not exceed 30 m/min during operation.

① Reference mounting surface
Reference mounting surface is the opposite side of the **IKO** mark.



② 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.

③ 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

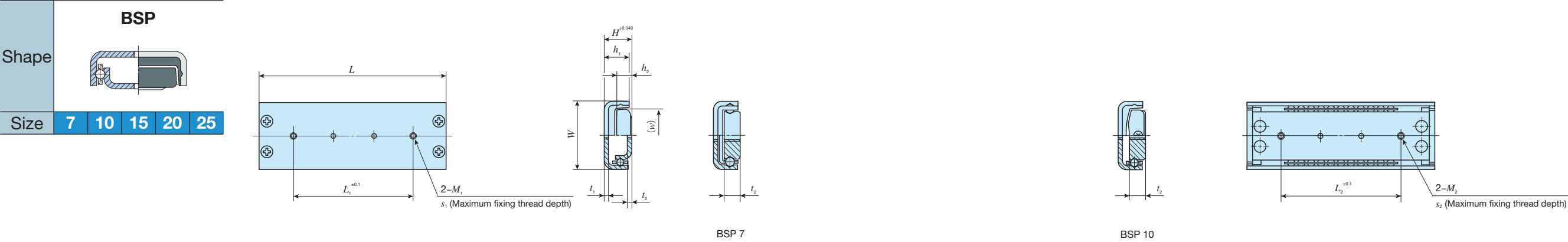
			unit: mm	
Identification number			Shoulder height h_3	Corner radius R_1 (maximum)
—	—	BSR 12	2.5	0.5
BSP 7	—	—	3	
BSP 10	—	—	4	
—	BSPG 12	—	5	
BSP 15	BSPG 15	BSR 15	6	
BSP 20	BSPG 20	BSR 20		
BSP 25	BSPG 25	BSR 25		

④ 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	0.064
M2.3 × 0.4	0.10
M2.6 × 0.45	0.15
M3 × 0.5	0.23

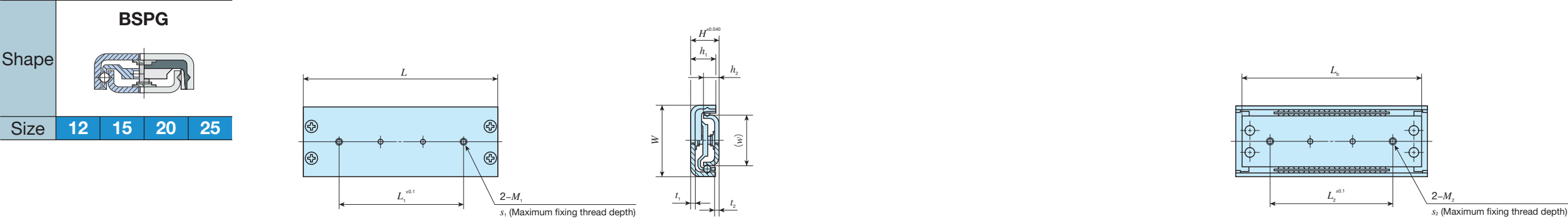
Limited linear motion type



Identification number	Mass (Ref.) g	Nominal dimensions mm				Table mounting dimensions mm						Bed mounting dimensions mm						Basic dynamic load rating C N	Basic static load rating C ₀ N
		W	H	L	Maximum stroke length	L ₁	M ₁	Maximum fixing thread depth s ₁		h ₁	t ₁	w	L ₂	M ₂	Maximum fixing thread depth s ₂	h ₂	t ₂		
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		20							20					170	98.0
BSP 7 40 SL ⁽¹⁾	5.6			40		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.

Built-in rack & pinion type

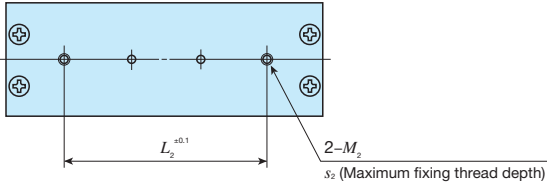
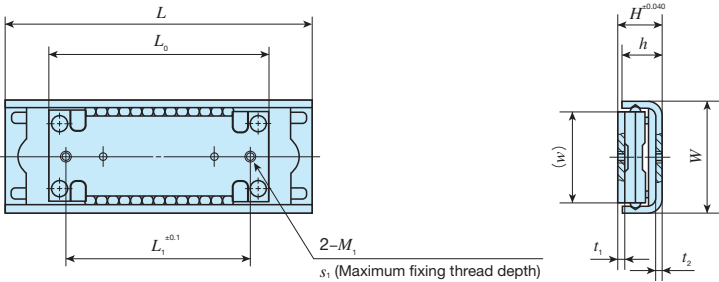


Identification number	Mass (Ref.)	Nominal dimensions mm				Table mounting dimensions mm						Bed mounting dimensions mm							Basic dynamic load rating	Basic static load rating
		<i>W</i>	<i>H</i>	<i>L</i>	Maximum stroke length	<i>L</i> ₁	<i>M</i> ₁	Maximum fixing thread depth <i>s</i> ₁	<i>h</i> ₁	<i>t</i> ₁	<i>L</i> _b	<i>w</i>	<i>L</i> ₂	<i>M</i> ₂	Maximum fixing thread depth <i>s</i> ₂	<i>h</i> ₂	<i>t</i> ₂	<i>C</i>	<i>C</i> 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

BWU • BSP(G)
BSU...A

Endless linear motion type

Shape	BSR			
Size	12	15	20	25

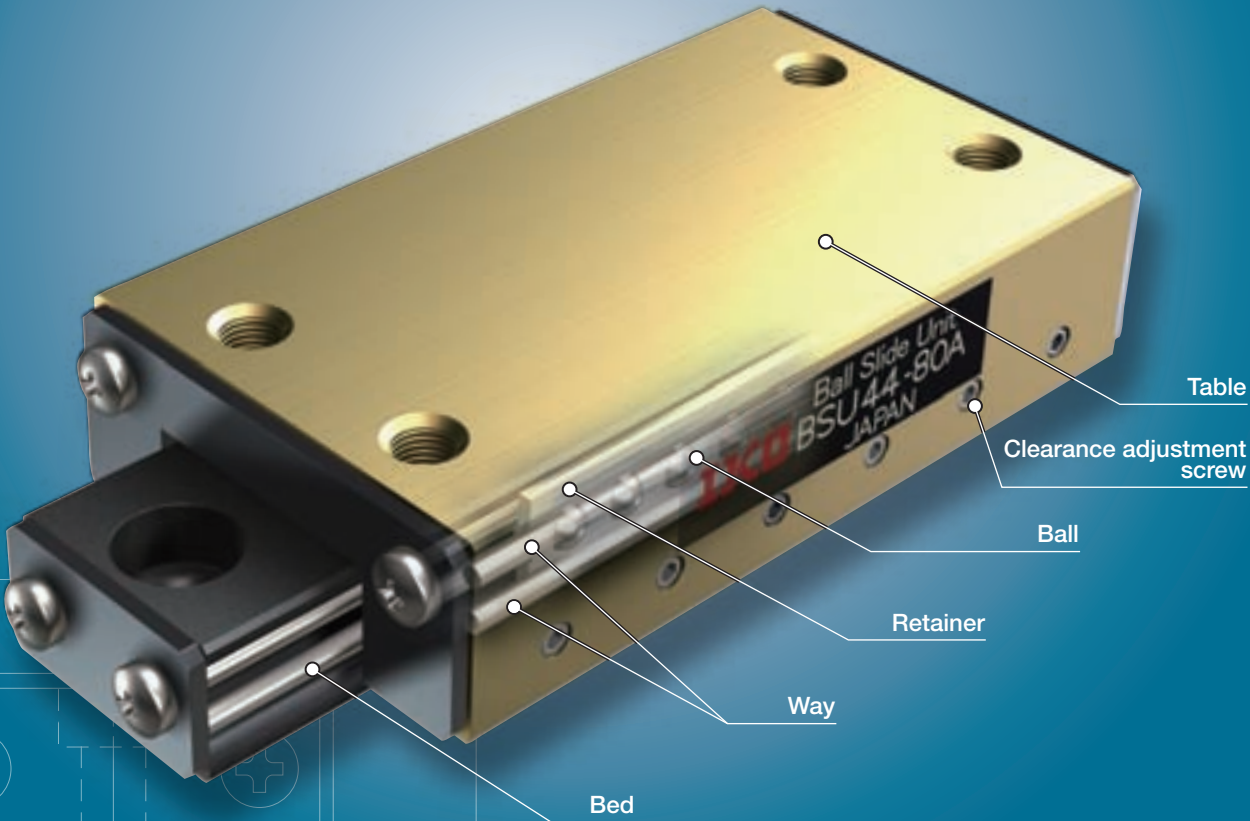


Identification number	Mass (Ref.) g	Nominal dimensions mm				Slide Unit mm				Mounting dimensions				Track rail mounting dimensions mm					Basic dynamic load rating C N	Basic static load rating C ₀ N
		W	H	L	Maximum stroke length	w	L ₀	L ₁		M ₁	Maximum fixing thread depth s ₁	t ₁		L ₂	M ₂	Maximum fixing thread depth s ₂	h	t ₂		
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	25	10	80	52	21.4	50	42		M3	2.4	1.6		50	M3	3.5	9	1.6	1 170	772
BSR 25 70 SL	53.8			70	33									45						
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.

Linear Slide Unit

BSU...A



Points

1 Light weight linear motion guide unit

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

2 Smooth operations

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.

3 Easy mounting

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.

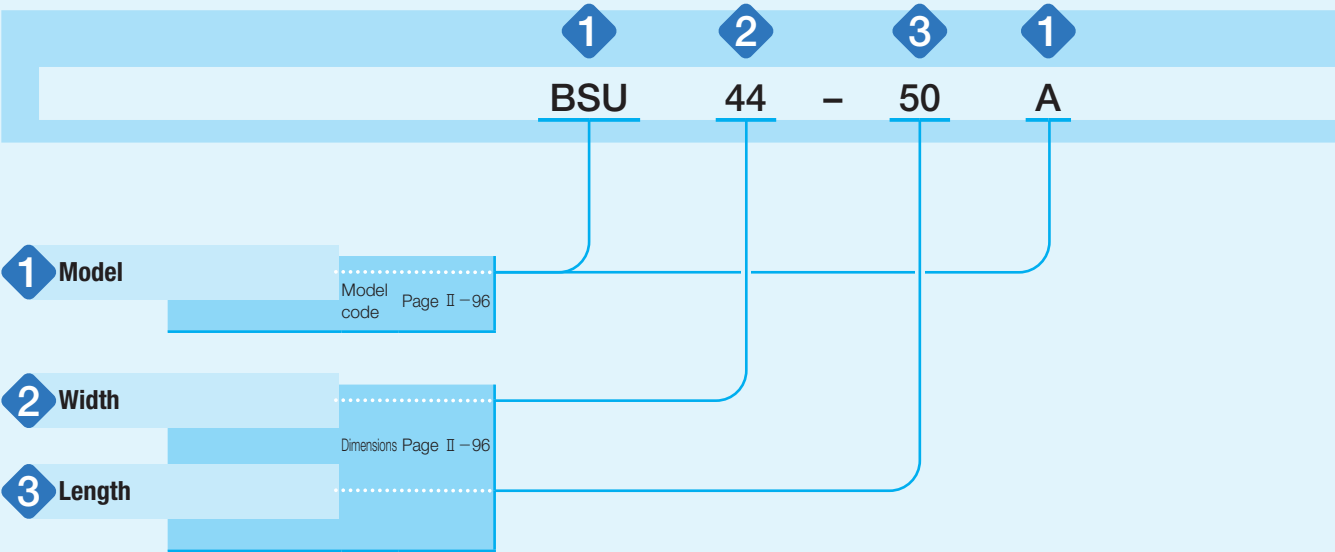
4 Excellent corrosion resistance

The ball and way are made of stainless steel and the surface of table and bed have anodic oxidation 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

Shape	Model	Width	Length				
			50	80	100	125	150
	BSU...A	44	○	○	○	—	—
		66	—	—	○	○	○

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.

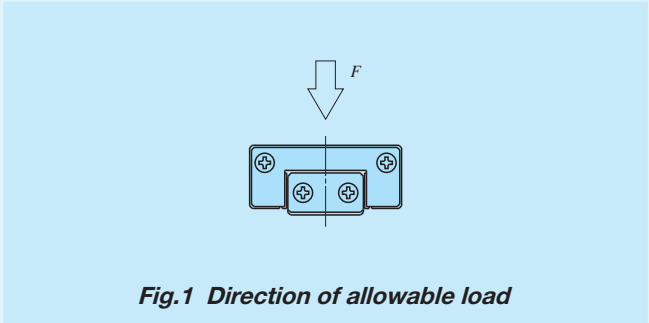


Fig.1 Direction of allowable load

Accuracy

1 Running accuracy

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

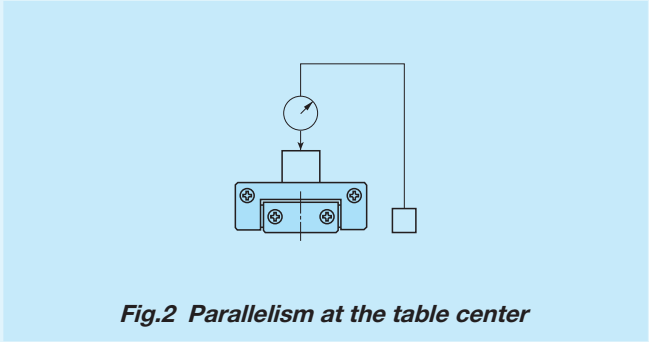


Fig.2 Parallelism at the table center

2 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

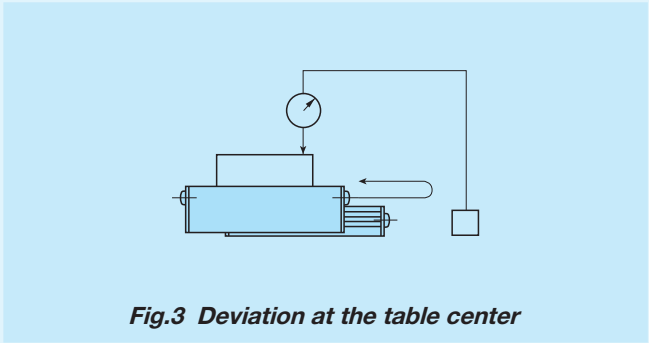


Fig.3 Deviation at the table center

Lubrication

Grease is not pre-packed in the BSU 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

1 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 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 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.

2 Operating temperature

The table and bed of BSU 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.

3 Maximum velocity

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

Precaution for Mounting

1 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.

2 Tightening torque for fixing screw

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

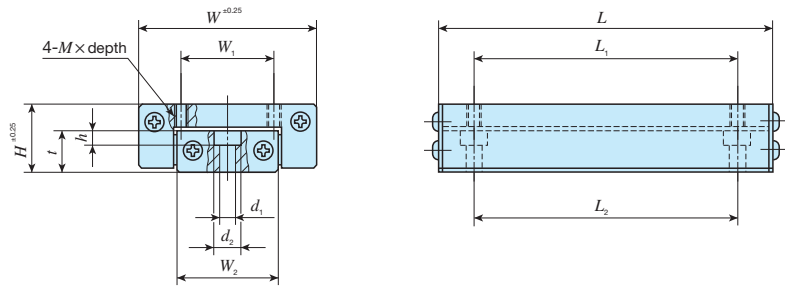
Table 2 Tightening torque for fixing screw

Bolt size	Tightening torque N · m
M5×0.8	5.0

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

BWU · BSP(G)
BSU series

Shape	BSU...A	
		
Size	44	66



Identification number	Mass (Ref.) g	Nominal dimensions mm				Table mounting dimensions mm				Bed mounting dimensions mm						Allowable load <i>F</i> N
		<i>H</i>	<i>W</i>	<i>L</i>	Stroke length	<i>W</i> ₁	<i>L</i> ₁		<i>M</i> ×depth	<i>W</i> ₂	<i>t</i>	<i>L</i> ₂	<i>d</i> ₁	<i>d</i> ₂	<i>h</i>	
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

Linear Ball Spline

C-Lube Linear Ball Spline MAG

Linear Ball Spline G

Block Type Linear Ball Spline

Stroke Ball Spline

MAG · LSAG
LSB · LS

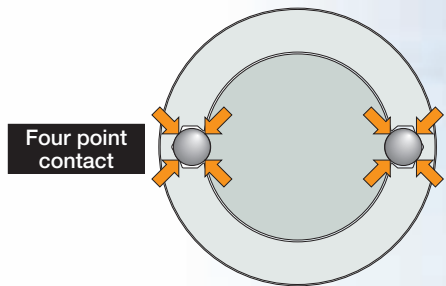


Excellent features of compact linear structure by **four-points contact** in

IKE 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

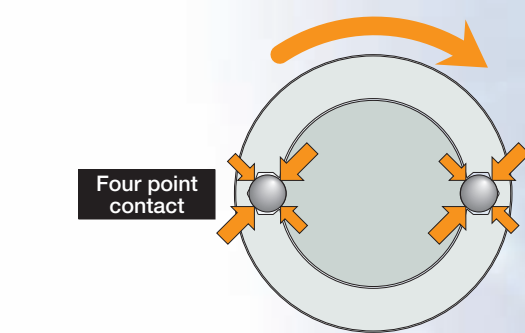
The structure places large diameter balls in two rows and has four-point contact with the track, allowing greater rigidity and compact design.



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.



ball spline realized by a simple **two-row raceways**

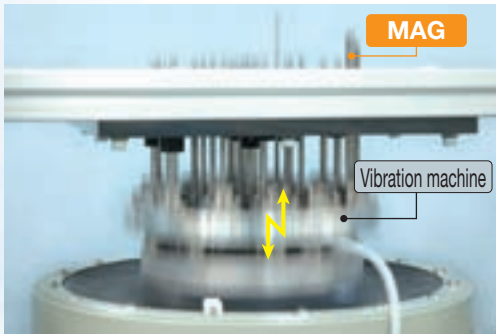
Both high speed durability performance and maintenance free performance are achieved

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.

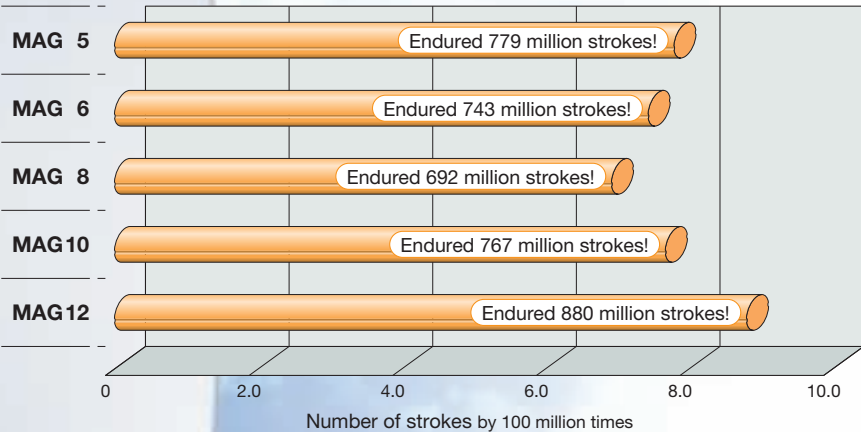
Durability test assuming the chip mounter

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	
	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

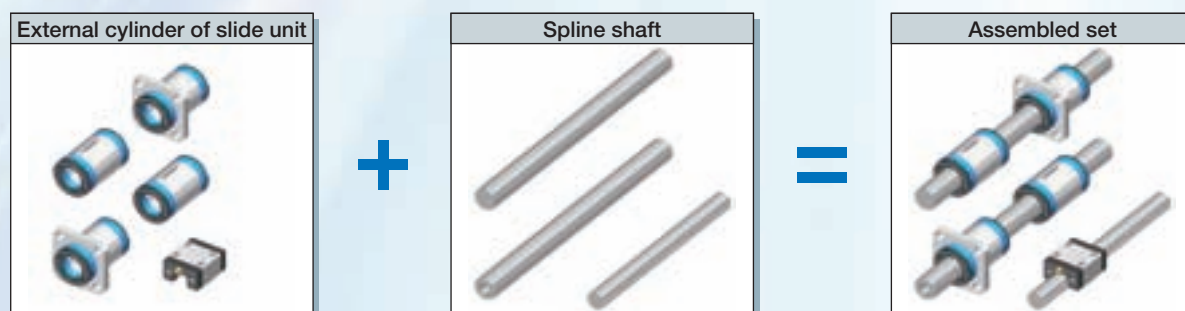
Requirements of ;

- 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

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

Select the products as many as you wish.

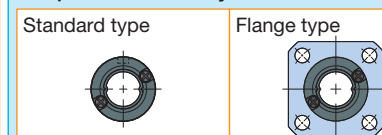


External cylinder interchangeability / unit interchangeability

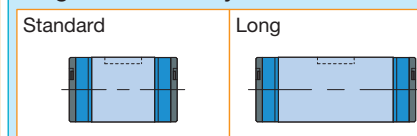
A wide variety of models with different sectional shape and length are provided, for free replacement on the same spline shaft.

External cylinder interchangeability

Shape of external cylinders

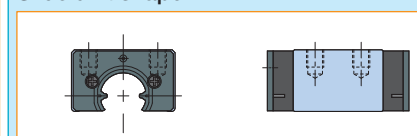


Length of external cylinder



Slide unit interchangeability

Slide unit shape



Spline shaft interchangeability

Spline shaft

- High carbon steel spline solid shaft
- High carbon steel spline hollow shaft
- Stainless steel spline solid shaft



C-Lube Linear Ball Spline MAG
Linear Ball Spline G

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

Block Type Linear Ball Spline

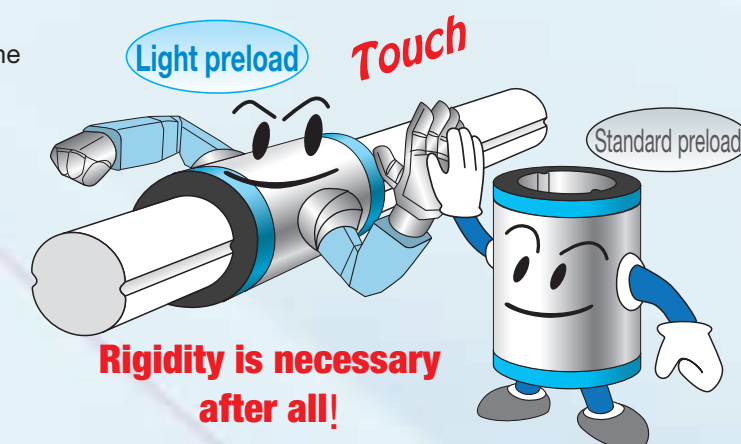
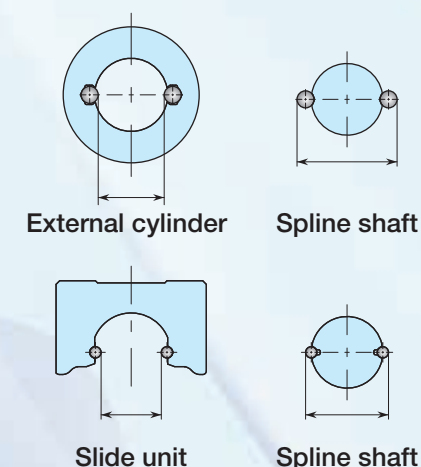
Accuracy interchangeability

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.

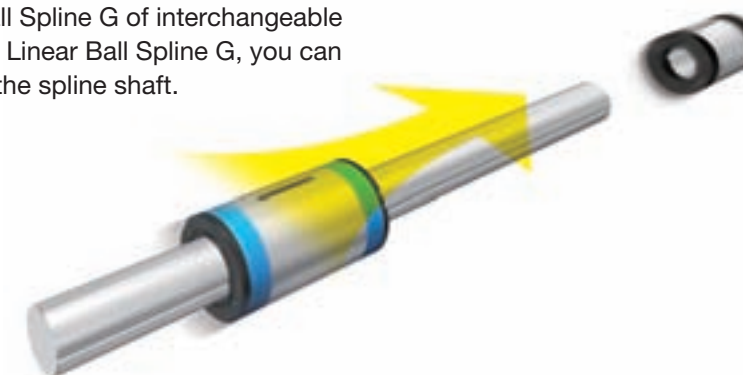


Rigidity is necessary after all!

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

MAG



Long term maintenance free supported!

The aquamarine end plate is the symbol of maintenance free.

Spline shaft

External cylinder

Keyway

External cylinder body

Ball

C-Lube

End Plate

Seal

Linear Ball Spline G

LSAG

Points

1 Compact size

Uses a unique ball retaining mechanism without using a retainer, allowing a small external cylinder outer 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 outer 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 a supplemental code for each specification to apply.

Interchangeable specification	1	2	3	4	5	6	7	8	9	10
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
Non-interchangeable specification										
Assembled set	MAG	L	T	5	C1	R150	T ₁	H		/N

1 Model

2 External cylinder length

3 Spline shaft shape

4 Size

5 Number of external cylinders

6 Spline shaft length

7 Preload amount

8 Accuracy class

9 Interchangeable

10 Special specification

Model code Page II - 109

Dimensions Page II - 109

Part code Page II - 109

Preload symbol Page II - 111

Classification symbol Page II - 112

Interchangeable code Page II - 115

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.

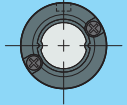
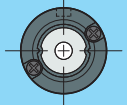
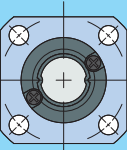
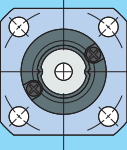
MAG・LSAG
LSB・LS

Identification Number and Specification — Model · External Cylinder Length ·

1	Model	C-Lube Linear Ball Spline MAG (MAG series) Linear Ball Spline G ⁽¹⁾ (LSAG series) 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.	Standard type : MAG Flange type : MAGF Standard type : LSAG Flange type : LSAGF
2	External cylinder length	Standard : No symbol Long : L	For applicable models and sizes, see Table 1.
3	Spline shaft shape	Solid shaft : No symbol Hollow shaft : T	For applicable models and sizes, see Table 1.
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 	MAG	—	—	○	○	○	○	○	○	—	—	—	—	—	—
		LSAG	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Long 	MAGL	—	—	○	○	○	○	—	—	—	—	—	—	—	—
		LSAGL	—	—	—	○	○	○	○	○	○	○	○	○	—	—
	Standard 	MAGT	—	—	○	○	○	○	○	○	—	—	—	—	—	—
		LSAGT	—	—	○	○	○	○	○	○	—	—	—	—	—	—
	Long 	MAGLT	—	—	○	○	○	○	—	—	—	—	—	—	—	—
		LSAGLT	—	—	—	○	○	○	○	○	—	—	—	—	—	—
	Standard 	MAGF	—	—	—	○	○	○	○	○	—	—	—	—	—	—
		LSAGF	○	○	○	○	○	○	○	○	○	○	○	○	○	—
	Long 	LSAGFL	—	—	—	○	○	○	○	○	○	○	○	○	—	—
	Standard 	MAGFT	—	—	—	○	○	○	○	○	—	—	—	—	—	—
		LSAGFT	—	—	○	○	○	○	○	○	—	—	—	—	—	—
	Long 	LSAGFLT	—	—	—	○	○	○	○	○	—	—	—	—	—	—

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

MAG · LSAG
LSB · LS

7	Preload amount	Clearance Standard	: T ₀	Specify this item for an assembled set or a single external cylinder. For details of the preload amount, see Table 2. For applicable preload types, see Table 3.
		Light preload	: No symbol	
			: T ₁	

Table 2 Preload amount

Preload type	Item	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: C₀ 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 values indicated in are also applicable to the interchangeable specifications.

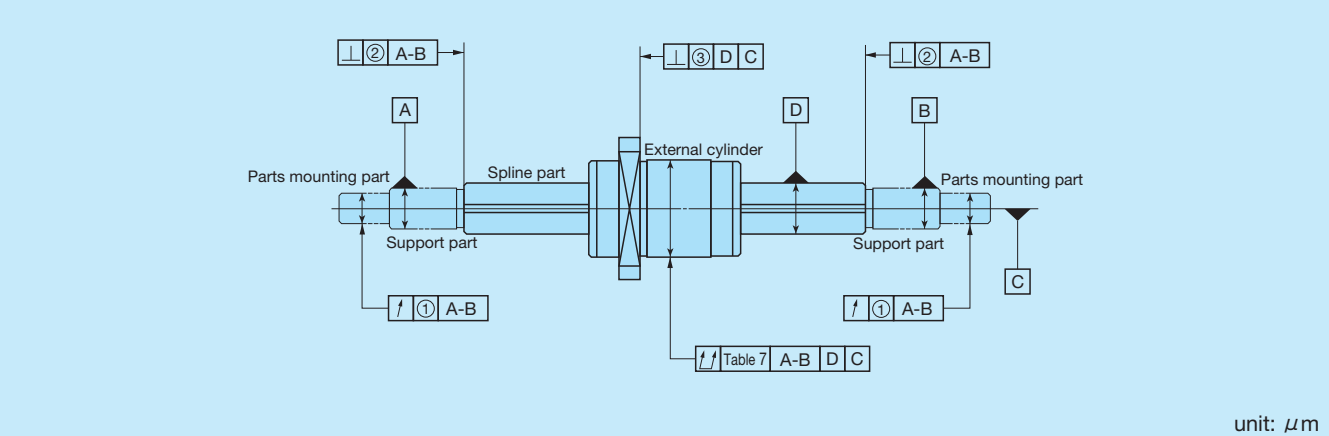
8	Accuracy class	Ordinary	: No symbol	For interchangeable specification products, assemble an external cylinder and a spline shaft of the same accuracy class. For applicable accuracy class, see Table 4. For details of accuracy class, see Table 5, Table 6, and Table 7.
		High	: H	
		Precision	: P	

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 values indicated in are also applicable to the interchangeable specifications.

Table 5 Tolerance of each part



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⁾ Applied for the flange type.

Table 6 Twist of grooves with respect to effective length of the spline part
unit: μm

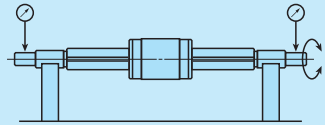
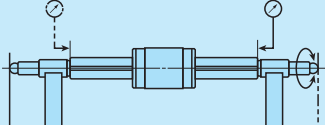
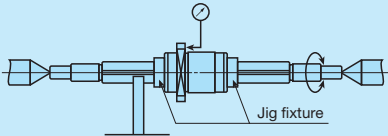
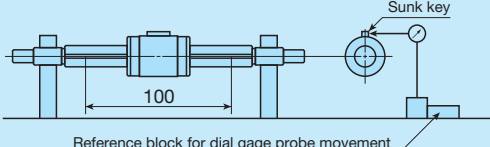
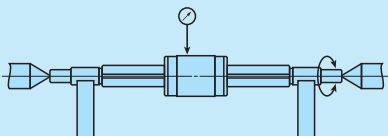
Accuracy class	Ordinary (No symbol)	High (H)	Precision (P)
Allowable value	33	13	6

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.

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

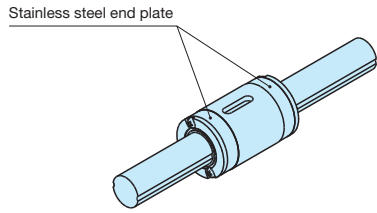
N	●					
OH	●	○				
Q	●	○	○			
RE	●	—	●	●		
S	●	●	●	●	●	
Y	●	●	●	—	●	●
	BS	N	OH	Q	RE	S

Remarks 1. The combination of "—" shown in the table is not available.

2. Contact **IKO** for the combination of the interchangeable specification marked with ●.

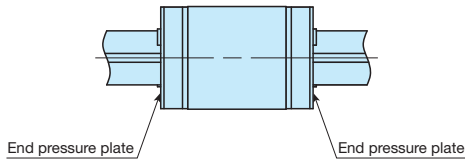
3. When using multiple types for combination, please indicate by arranging the symbols in alphabetical order.

Stainless steel end plate /BS



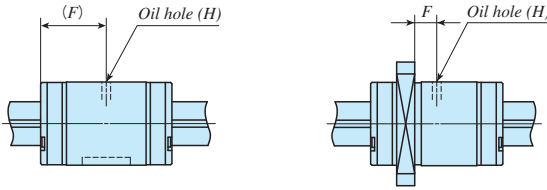
The standard synthetic resin end plates are replaced with stainless steel end plates. The total length of the external cylinder remains unchanged.

No seal /N



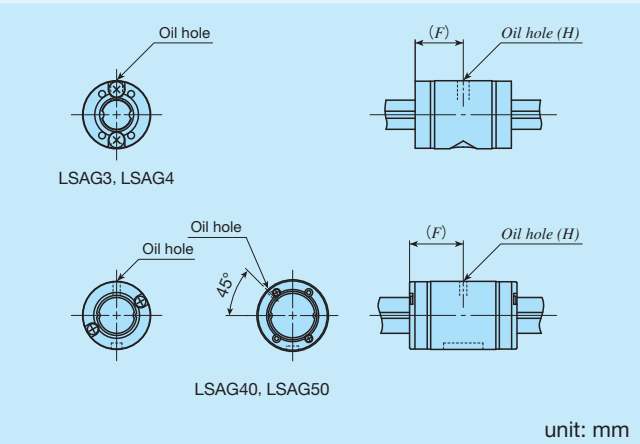
Seals at both ends of the external cylinder can be replaced with end pressure plates, which do not come in contact with the spline shaft, to reduce frictional resistance. This specification is not effective for dust protection.

Oil hole /OH



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

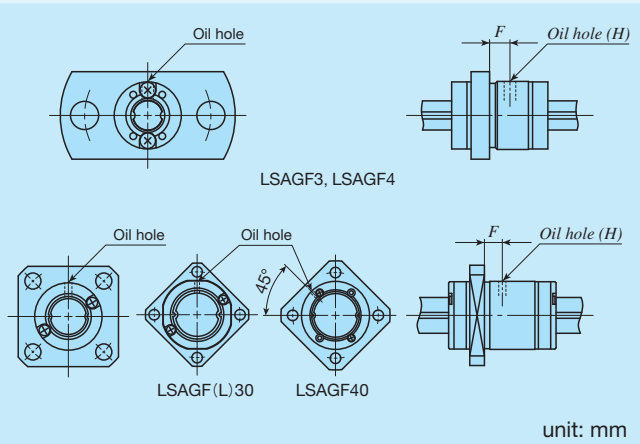
Table 11.1 Location and diameter of oil hole on a standard type external cylinder (Supplemental code /OH)



Identification number	F	H	Identification number	F	H
LSAG 3	5	1.2	—	—	—
LSAG 4	6	—	—	—	—
LSAG 5	9	1.5	LSAGL 5	13	—
LSAG 6	10.5	—	LSAGL 6	15	1.5
LSAG 8	12.5	—	LSAGL 8	18.5	—
LSAG10	15	—	LSAGL10	23.5	—
LSAG12	17.5	2	LSAGL12	27	2
LSAG15	20	—	LSAGL15	32.5	—
LSAG20	25	—	LSAGL20	35.5	—
LSAG25	30	3	LSAGL25	42	3
LSAG30	35	—	LSAGL30	49	—
LSAG40	—	—	—	—	—
LSAG50	50	—	—	—	—

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

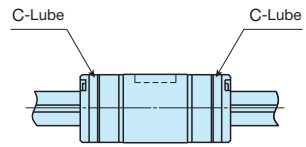
Table 11.2 Location and diameter of oil hole on a flange type external cylinder (Supplemental code /OH)



Identification number	F	H	Identification number	F	H
LSAGF 3	2.1	1.2	—	—	—
LSAGF 4	—	—	—	—	—
LSAGF 5	2.8	1.5	LSAGFL 5	5.8	—
LSAGF 6	—	—	LSAGFL 6	8	1.5
LSAGF 8	3.5	—	LSAGFL 8	9.5	—
LSAGF10	5	—	LSAGFL10	13.3	—
LSAGF12	7.5	2	LSAGFL12	17	2
LSAGF15	9	—	LSAGFL15	21.5	—
LSAGF20	11	—	LSAGFL20	21.5	—
LSAGF25	13	3	LSAGFL25	25	3
LSAGF30	14	—	LSAGFL30	28	—
LSAGF40	23.4	—	—	—	—

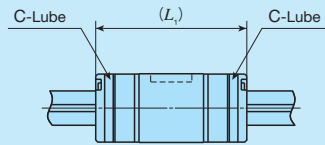
Remark: A typical identification number is indicated, but is applied to all LSAG series flange type models of the same size.

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 reapplying 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)

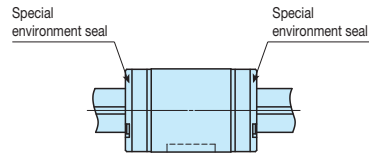


unit: mm

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.

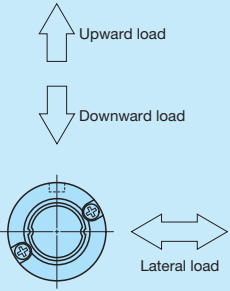
- ① /YCG Low Dust-Generation Grease for Clean Environment CG2 is pre-packed.
- ② /YCL Low Dust-Generation Grease for Clean Environment CGL is pre-packed.
- ③ /YAF Anti-Fretting Corrosion Grease AF2 is pre-packed.
- ④ /YBR MOLYCOTE BR2 Plus Grease [Dow Corning] is pre-packed.
- ⑤ /YNG No grease is pre-packed.

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	Basic dynamic load rating			Basic static load rating		
	Load direction			Load direction		
	Downward	Upward	Lateral	Downward	Upward	Lateral
Size						
2~12	C	C	1.47C	C_0	C_0	$1.73C_0$
15~50	C	C	1.13C	C_0	C_0	$1.19C_0$



Order Quantity

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

Interchangeable specification

Single external cylinder


(2 units)

Example of identification number indication

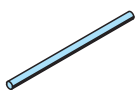
MAGF 10 C1 T1 H S1 /N

Display is C1 only.

Order quantity

2units

Single spline shaft


(1 unit)

Example of identification number indication

LSAG 10 R200 H S1

Order quantity

1unit

Assembled set


(1 set)

Example of identification number indication

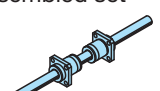
MAGF 10 C2 R200 T1 H S1 /N

Order quantity

1set

Non-interchangeable specification

Assembled set


(1 set)

Example of identification number indication

MAGF 10 C2 R200 T1 H /N

Order quantity

1set

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

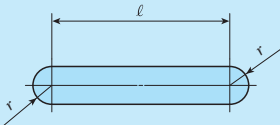
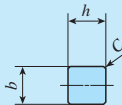
Table 14 Moment of inertia of sectional area and section coefficient of spline shaft

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

Dimensions of 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	<i>b</i>	Dim. <i>b</i> tolerance	<i>h</i>	Dim. <i>h</i> tolerance	<i>ℓ</i>	<i>r</i>	<i>C</i>
5	2	+0.016 +0.006	2	0 −0.025	3.8	1	0.16~0.25
6			2.5		5.8		
8	2.5				7.8	1.25	
10	3	+0.024 +0.012	3	0 −0.030	11.8	1.5	
12			3.5		16	1.75	
15	3.5				21.5	2	0.25~0.4
20	4		4		23.5	2.5	
25	5		5		27.5	3.5	0.4 ~0.6
30	7	+0.030	7	0 −0.036	44.3	5	
40	10	+0.015	8		34.3	7.5	
50	15	+0.036 +0.018	10				

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.

MAG・LSAG
LSB・LS

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 reapplying 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 dust protected by special rubber seals included as standard. 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

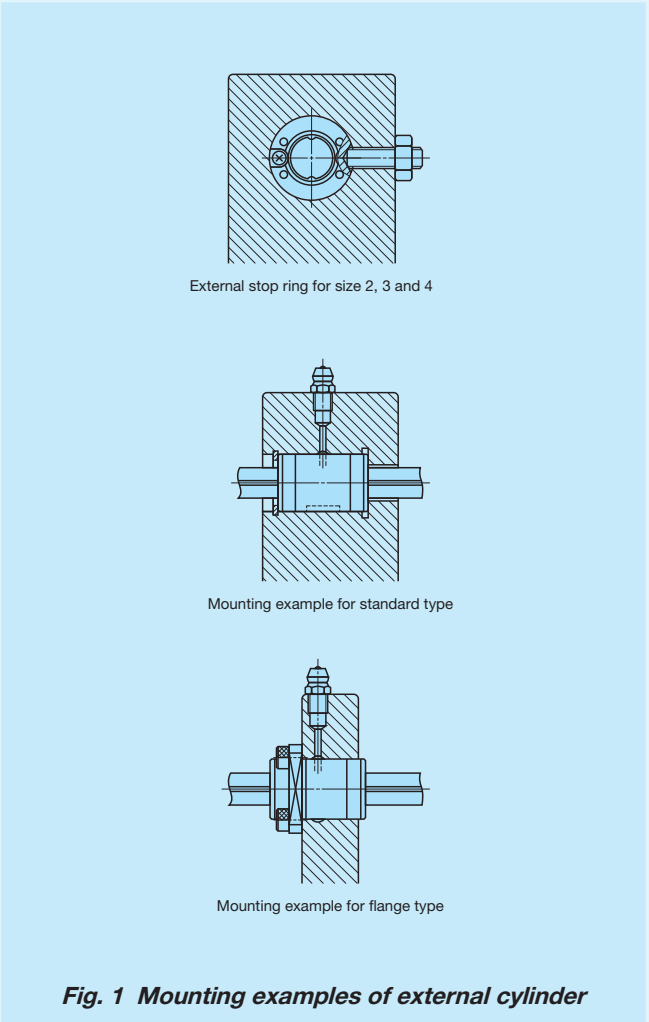
① Fitting of external cylinder

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.

② 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.



③ 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**.

④ 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.

⑤ Operating temperature

The maximum operating temperature for MAG series is 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.

⑥ 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	

⑦ When mounting multiple assembled sets at the same time

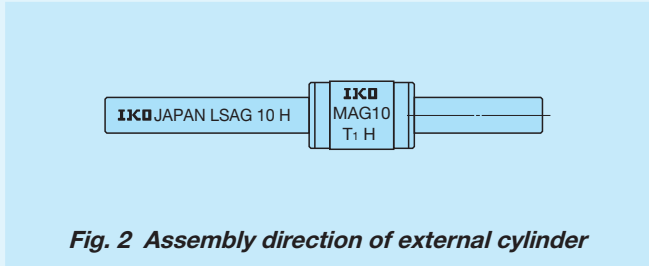
For interchangeable specification products, assemble an external cylinder and a spline shaft with the same interchangeable code ("S1" or "S2").

For non-interchangeable specification products, use the same combination of external cylinder and spline shaft upon delivery.

⑧ Assembly operation of external cylinder and spline shaft

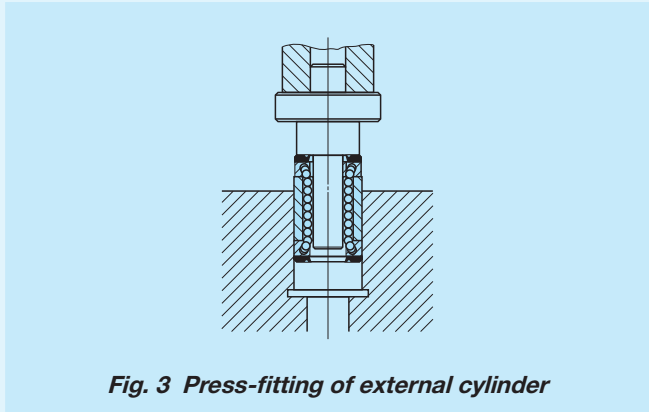
When assembling the external cylinder on the spline shaft, correctly fit the grooves of the external cylinder and the spline shaft and move the external cylinder softly in parallel direction. Rough handling may result in damaging of seals or dropping of steel balls.

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.



⑨ 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.)



MAG · LSAG
LSB · LS

IKO C-Lube Linear Ball Spline MAG

Standard type

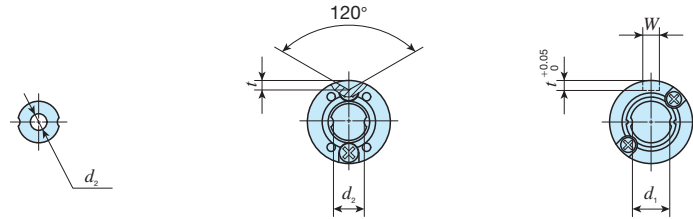
MAG • LSAG

Shape



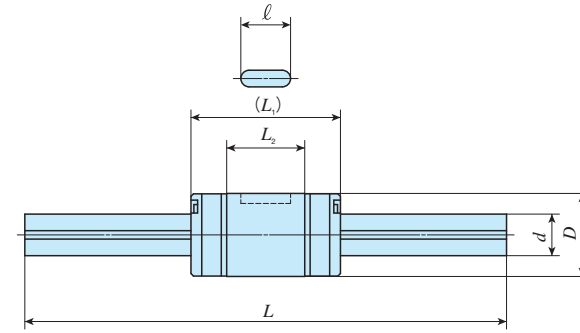
Size

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	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	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	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	22.0
MAGL 8	LSAGL 8	○	26.5	39			37	26.6									—		1 800	2 470	8.4	11.5	10.3 56.3	17.8 97.5	
MAGLT 8	LSAGLT 8	○		33																					3

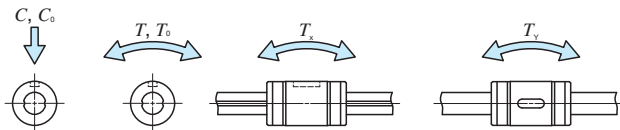
Notes (1) No seal is included.

(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⁾ Basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T), static torque rating (T_0 , T_x , T_y) are values for the direction indicated in the following figure.

The upper values of T_x and T_y are for one external cylinder and the lower values are for two external cylinders sticking.



Example of identification number of assembled set

Model code			Dimensions	Part code		Preload symbol	Classification symbol	Interchangeable code	Special specification
<u>MAG</u>	<u>L</u>	<u>T</u>	<u>5</u>	<u>C2</u>	<u>R150</u>	<u>T₁</u>	<u>H</u>	<u>S1</u>	<u>/N</u>
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	
T ₀	Clearance
No symbol	Standard
T ₁	Light preload

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

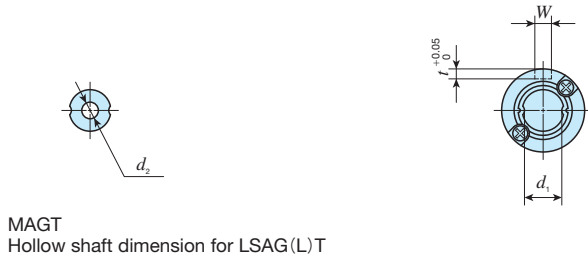
⑧ Accuracy class	
No symbol	Ordinary
H	High
P	Precision

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

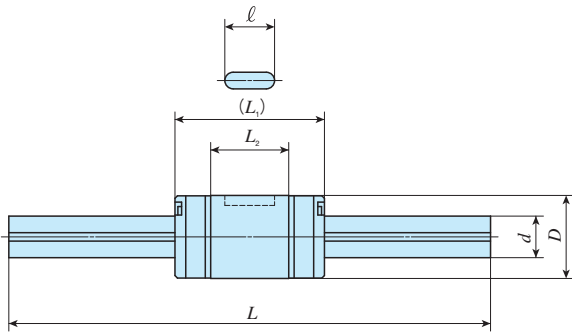
**MAG • LSAG
LSB • LS**

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

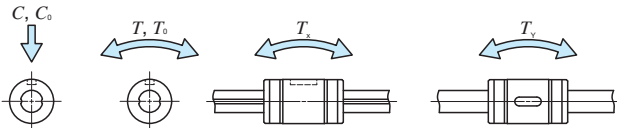


MAGT
Hollow shaft dimension for LSAG(L)T



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 41.5	12.1 71.9	
MAGT 10	LSAGT 10	○		51			4	2 850								4 040			16.6	23.4	22.7 115	39.3 200			
—	LSAGL 10	○	60.5	—			2 850	4 040								16.6			23.4	22.7 115	39.3 200				
—	LSAGLT 10	○	51	4																					
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 59.1	18.3 102	
MAGT 12	LSAGT 12	○		66			6	2 220								4 850			21.9	33.0	32.2 157	55.7 272			
—	LSAGL 12	○	87.5	—																					
—	LSAGLT 12	○	66	6																					
—	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	27.8 152	33.2 181	
—	LSAGL 15	○	110				65	52								6 400			11 500	48.0	86.5	94.0 449	112 535		
—	LSAG 20	○	130	202	30	0 -0.016	50	33	4	+0.018 0	2.5	26	18.2	0 -0.021	15.7	—	300 600 400 500	1 000	6 600	9 040	66.0	90.4	48.6 288	58.0 343	
—	LSAGL 20	○	198				71	54								9 270			15 100	92.7	151	127 650	151 774		
—	LSAG 25	○	220	310	37	0 -0.016	60	39.2	5	+0.018 0	3	29	22.6	0 -0.021	19.4	—	300 600 400 500 800	1 200	11 200	14 300	139	178	92.8 551	111 656	
—	LSAGL 25	○	336				84	63.2								15 400			23 200	193	290	229 1 190	273 1 420		
—	LSAG 30	○	430	450	45	0 -0.016	70	43	7	+0.022 0	4	35	27.2	0 -0.021	23.5	—	400 700 500 1 100 600	1 200	15 400	19 400	231	292	147 874	176 1 040	
—	LSAGL 30	○	634				98	71								21 300			31 600	320	474	364 1 900	434 2 260		
—	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	—	400 700 500 1 100 600	1 200	21 300	31 600	426	632	364 1 940	434 2 310	
—	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	—	400 700 500 1 100 600	1 200	28 300	36 100	707	904	389 2 300	464 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⁾ Basic dynamic load rating (C), basic static load rating (C₀), dynamic torque rating (T), static torque rating (T₀, T_x, T_y) are values for the direction indicated in the following figure.
The upper values of T_x and T_y are for one external cylinder and the lower values are for two external cylinders sticking.

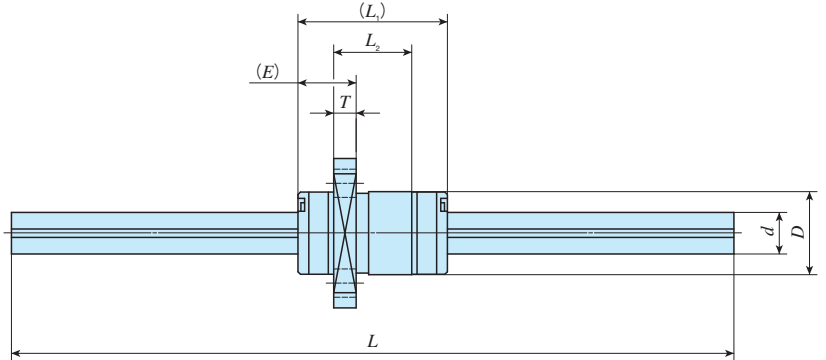
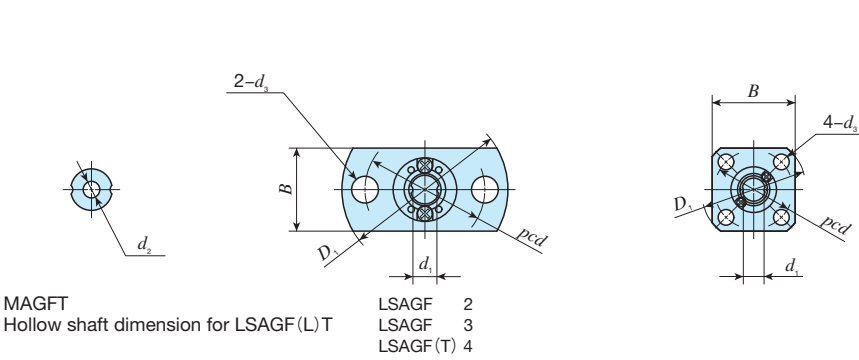


Example of identification number of assembled set

Model code		Dimensions		Part code		Preload symbol		Classification symbol		Interchangeable code		Special specification	
<u>MAG</u>		<u> </u>	<u>T</u>	<u>12</u>	<u>C2</u>	<u>R300</u>	<u>T₁</u>	<u>H</u>	<u>S1</u>	<u>/N</u>			
①		②	③	④	⑤	⑥	⑦	⑧	⑨	⑩			
① Model				④ Size				⑦ Preload amount					
MAG		Standard type		10, 12, 15, 20, 25, 30, 40, 50		No symbol Standard		T ₁ Light preload		⑨ Interchangeable			
LSAG													
② Length of external cylinder				⑤ Number of external cylinders (2)									
No symbol Standard										S1 S1 specification			
L Long										S2 S2 specification			
										No symbol Non-interchangeable specification			
③ Spline shaft shape				⑥ Length of spline shaft (300 mm)				⑧ Accuracy class		⑩ Special specification			
No symbol Solid shaft								No symbol Ordinary		BS, N, OH, Q, RE, S, Y			
T Hollow shaft								H High					
								P Precision					

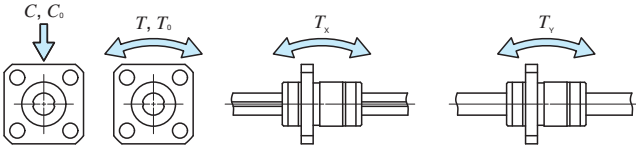
IKO C-Lube Linear Ball Spline MAG

Flange type							
Shape	MAGF · LSAGF						
							
Size	2	3	4	5	6	8	10
	12	15	20	25	30	40	



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	D ₁	B	E	T	pcd	d ₃	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
—	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								

Notes ⁽¹⁾ No seal is included.
⁽²⁾ d₁ 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⁾ Basic dynamic load rating (C), basic static load rating (C₀), dynamic torque rating (T), static torque rating (T₀, T_x, T_y) are values for the direction indicated in the following figure.
The upper values of T_x and T_y are for one external cylinder and the lower values are for two external cylinders sticking.



Example of identification number of assembled set

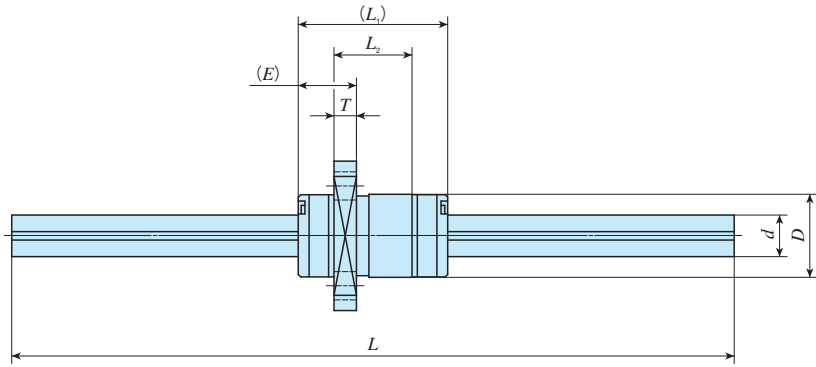
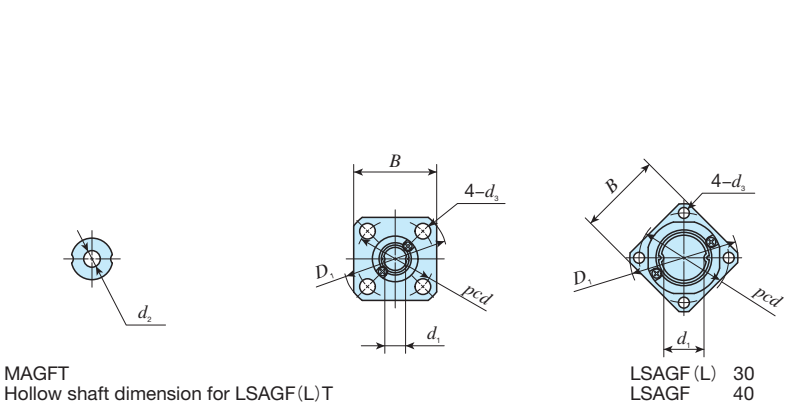
Model code			Dimensions	Part code		Preload symbol	Classification symbol	Interchangeable code	Special specification
<u>MAGF</u>	<u>L</u>	<u>T</u>	<u>5</u>	<u>C2</u>	<u>R150</u>	<u>T₁</u>	<u>H</u>	<u>S1</u>	<u>/N</u>
1	2	3	4	5	6	7	8	9	10

① Model MAGF Flange type LSAGF	④ Size 2, 3, 4, 5, 6, 8	⑦ Preload amount To Clearance No symbol Standard T1 Light preload	⑨ Interchangeable S1 S1 specification S2 S2 specification No symbol Non-interchangeable specification
② Length of external cylinder No symbol Standard L Long	⑤ Number of external cylinders (2)	⑧ Accuracy class No symbol Ordinary H High P Precision	⑩ Special specification BS, N, OH, Q, RE, S, Y
③ Spline shaft shape No symbol Solid shaft T Hollow shaft	⑥ Length of spline shaft (150 mm)		

MAG · LSAG
LSB · LS

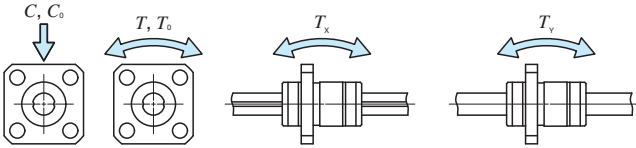
IKO C-Lube Linear Ball Spline MAG

Flange type							
Shape	MAGF · LSAGF						
							
Size	2	3	4	5	6	8	10
	12	15	20	25	30	40	



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
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 ³
—	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 ³
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	—	300 600 400 500	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	—	300 600 400 500	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	—	400 700 1 500 600	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	—	400 700 1 500 600	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⁾ Basic dynamic load rating (C), basic static load rating (C_0), dynamic torque rating (T), static torque rating (T_0 , T_x , T_y) are values for the direction indicated in the following figure.
The upper values of T_x and T_y are for one external cylinder and the lower values are for two external cylinders sticking.



Example of identification number of assembled set

Model code	Dimensions	Part code	Preload symbol	Classification symbol	Interchangeable code	Special specification
MAGF	12	C2	R300	T1	H	S1
1	2	3	4	5	6	7

① Model MAGF Flange type LSAGF	④ Size 10, 12, 15, 20, 25, 30, 40	⑦ Preload amount No symbol Standard T1 Light preload	⑨ Interchangeable S1 S1 specification S2 S2 specification No symbol Non-interchangeable specification
② Length of external cylinder No symbol Standard L Long	⑤ Number of external cylinders ⁽²⁾	⑧ Accuracy class No symbol Ordinary H High P Precision	⑩ Special specification BS, N, OH, Q, RE, S, Y
③ Spline shaft shape No symbol Solid shaft T Hollow shaft	⑥ Length of spline shaft (300 mm)		

MAG · LSAG
LSB · LS

Block Type Linear Ball Spline

LSB



Points

● Block type for easy mounting

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

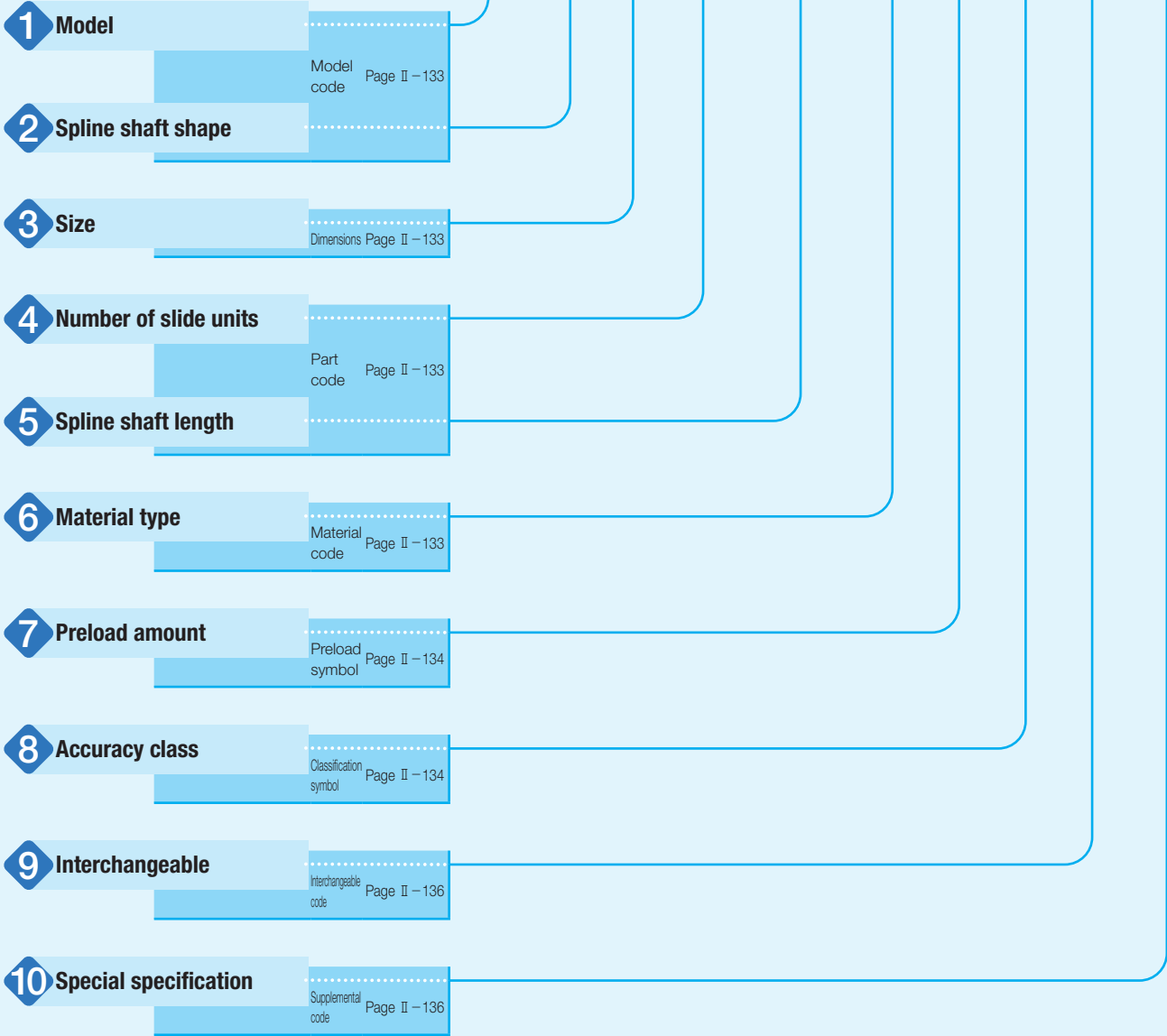
Products made of stainless steel are highly resistance to corrosion, so that they are suitable for applications where rust prevention oil is not preferred, such as in a cleanroom environment.

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



MAG · LSAG
LSB · LS

Identification Number and Specification – Model · Spline Shaft Shape · Size · Slide Unit ·

1	Model	Block Type Linear Ball Spline (LSB series)	: LSB	For applicable models and sizes, see Table 1.
2	Spline shaft shape	Solid shaft Hollow shaft	: No symbol : T	For applicable models and sizes, see Table 1.
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 Stainless steel made	: No symbol : SL	For applicable models and sizes, see Table 1.

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.

Number of Slide Unit · Spline Shaft Length · Material Type · Preload Amount · Accuracy Class —

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

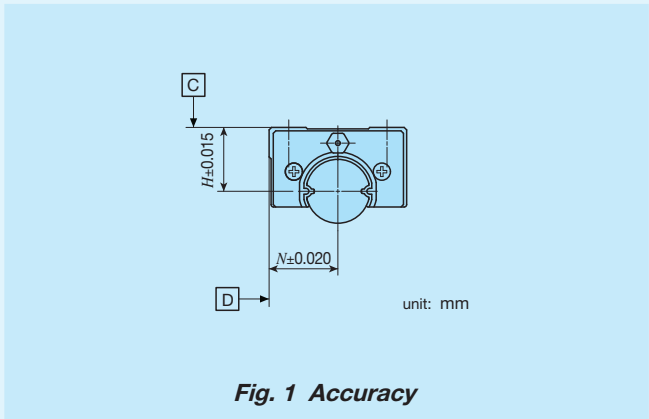
Preload type	Item	Preload symbol	Preload amount N	Operational conditions
Standard	(No symbol)		0 ⁽¹⁾	· Light and precise motion
Light preload	T1		0.02 C ₀	· Almost no vibrations · Load is evenly balanced · Light and precise motion

Note ⁽¹⁾ Indicates zero or minimal amount of preload.
Remark: C₀ indicates the basic static load rating.

Table 3 Application of preload

Size	Preload type (preload symbol)	
	Standard (No symbol)	Light preload (T1)
6	○	—
8	○	○
10	○	○
13	○	○
16	○	○
20	○	○
25	○	○

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

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

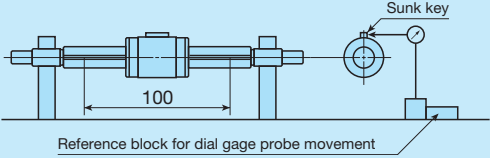
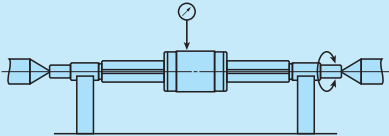
The diagram illustrates a spline shaft assembly. It consists of a central 'Spline part' (a square) flanked by two 'Support part' (cylinders). The entire assembly is mounted on 'Parts mounting part' (dashed lines). A 'Measuring unit' is shown as a square with a double-headed arrow indicating its width. Labels A, B, C, and D are placed around the assembly: A is above the left support part, B is above the right support part, C is below the right support part, and D is above the spline part. A dimension line with arrows at both ends is shown below the spline part, labeled 'A-B D C'.

unit: μm

Size and accuracy class		Size								
		6, 8		10, 13		16, 20		25		
		Ordinary (No symbol)	High (H)	Ordinary (No symbol)	High (H)	Ordinary (No symbol)	High (H)	Ordinary (No symbol)	High (H)	
Overall length of spline shaft mm	—	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.	

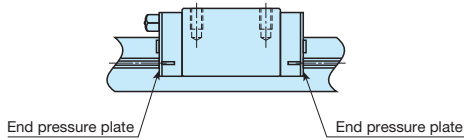
9 Interchangeable	S1 specification	: S1	Assemble a spline shaft and a slide unit with the same interchangeable code. Performance and accuracy of "S1" and "S2" are the same.
	S2 specification	: S2	
10 Special specification	/N, /U		For applicable special specifications, see Table 7.

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	○	○	○	○	○	○	○

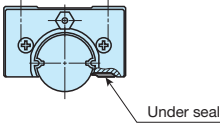
Remark: The combination of no seal (supplemental code/N) and under seal (supplemental code/U) is not available.

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.

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

Upward load

Downward load

Lateral load

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	0.84C	C ₀	C ₀	0.84C ₀
25	C	C	C	C ₀	C ₀	C ₀

Order Quantity

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 (2 units)	Example of identification number indication LSB 10 C1 T1 S1 /U Only C1 is indicated.	Order quantity 2units
Single spline shaft (1 unit)	Example of identification number indication LSB 10 R200 H S1	Order quantity 1unit
Assembled set (1 set)	Example of identification number indication LSB 10 C2 R200 T1 H S1 /U	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 mm ⁴		Section coefficient mm ³	
	Solid shaft	Hollow shaft	Solid shaft	Hollow shaft
6	55	54	19	19
8	170	170	44	43
10	440	420	90	87
13	1 220	1 160	190	180
16	2 830	2 630	360	340
20	7 110	6 620	730	680
25	17 600	15 100	1 440	1 230

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 12 and Table 13.

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
25	A-M4	B-5120V B-5240V

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	Outer diameter of grease feed needle
MG10/MT2	MULTEMP PS No.2 [KYODO YUSHI CO., LTD.]	10ml	φ 1mm
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 unit of LSB series is dust protected by end seals included as standard. 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

1 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)
Outer 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)

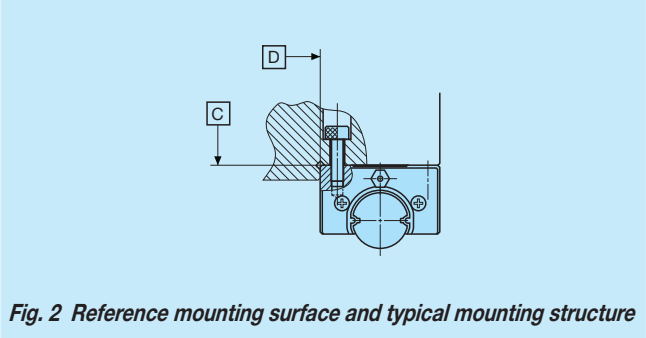


Fig. 2 Reference mounting surface and typical mounting structure

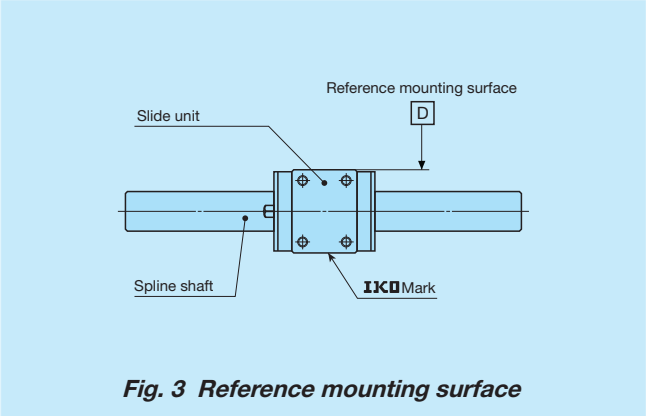


Fig. 3 Reference mounting surface

2 Shoulder height

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.

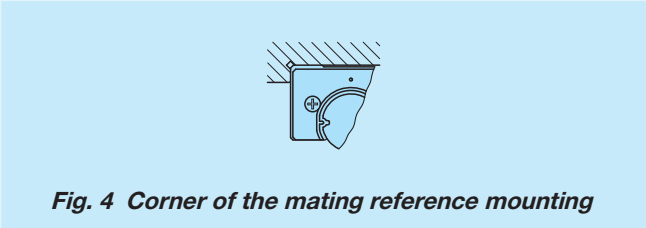


Table 15 Shoulder height

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

3 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.

4 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.

5 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**.

6 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").

7 Assembly operation of slide unit and spline shaft

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

8 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, reduce the tightening torque depending on the strength characteristic of the mating member material.

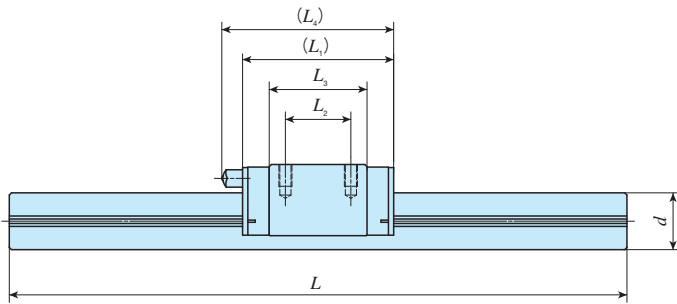
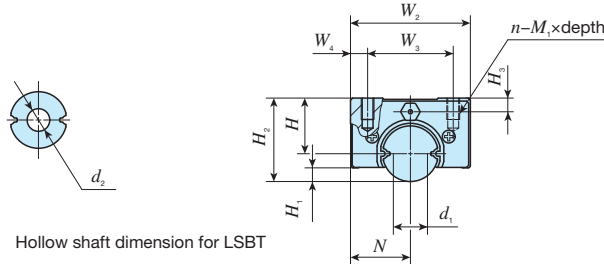
Table 16 Tightening torque for fixing screw

Bolt size	Tightening torque N · m	
	High carbon steel-made screw	Stainless steel-made screw
M2×0.4	0.49	0.31
M3×0.5	1.7	1.1
M4×0.7	4.0	—
M5×0.8	7.9	—
M6×1	13.3	—

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

IKO Block Type Linear Ball Spline

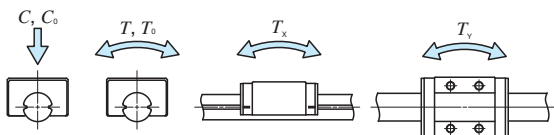
Shape	LSB						
Size	6	8	10	13	16	20	25



Identification number	Interchangeable	Mass (Ref.) g		Dimensions of assembly mm				Dimensions of slide unit mm								Spline shaft dimensions and tolerances mm						Basic dynamic ⁽⁴⁾ load rating	Basic static ⁽⁴⁾ load rating	Dynamic ⁽⁴⁾ torque rating	Static ⁽⁴⁾ torque rating	Static moment rating ⁽⁴⁾			
		Slide unit	Spline shaft (per 100 mm)	H	H ₁	H ₂	N	W ₂	W ₃	W ₄	L ₁	L ₂	L ₃	L ₄	n—M ₁ × depth	H ₃	d	Dim. d tolerance ⁽¹⁾	d ₁ ⁽²⁾	d ₂	L ⁽³⁾	Maximum length	C	C ₀	T	T ₀	T _x	T _y	
																							N	N	N · m	N · m	N · m	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																				—						
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
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																				—						
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) d₁ 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) Basic dynamic load rating (C), basic static load rating (C₀), dynamic torque rating (T), static torque rating and static moment rating (T₀, T_x, T_y) are values for the direction indicated in the following figure.
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.
For grease nipple and oil hole specifications, refer to Table 11 and Table 12 on page II-138.

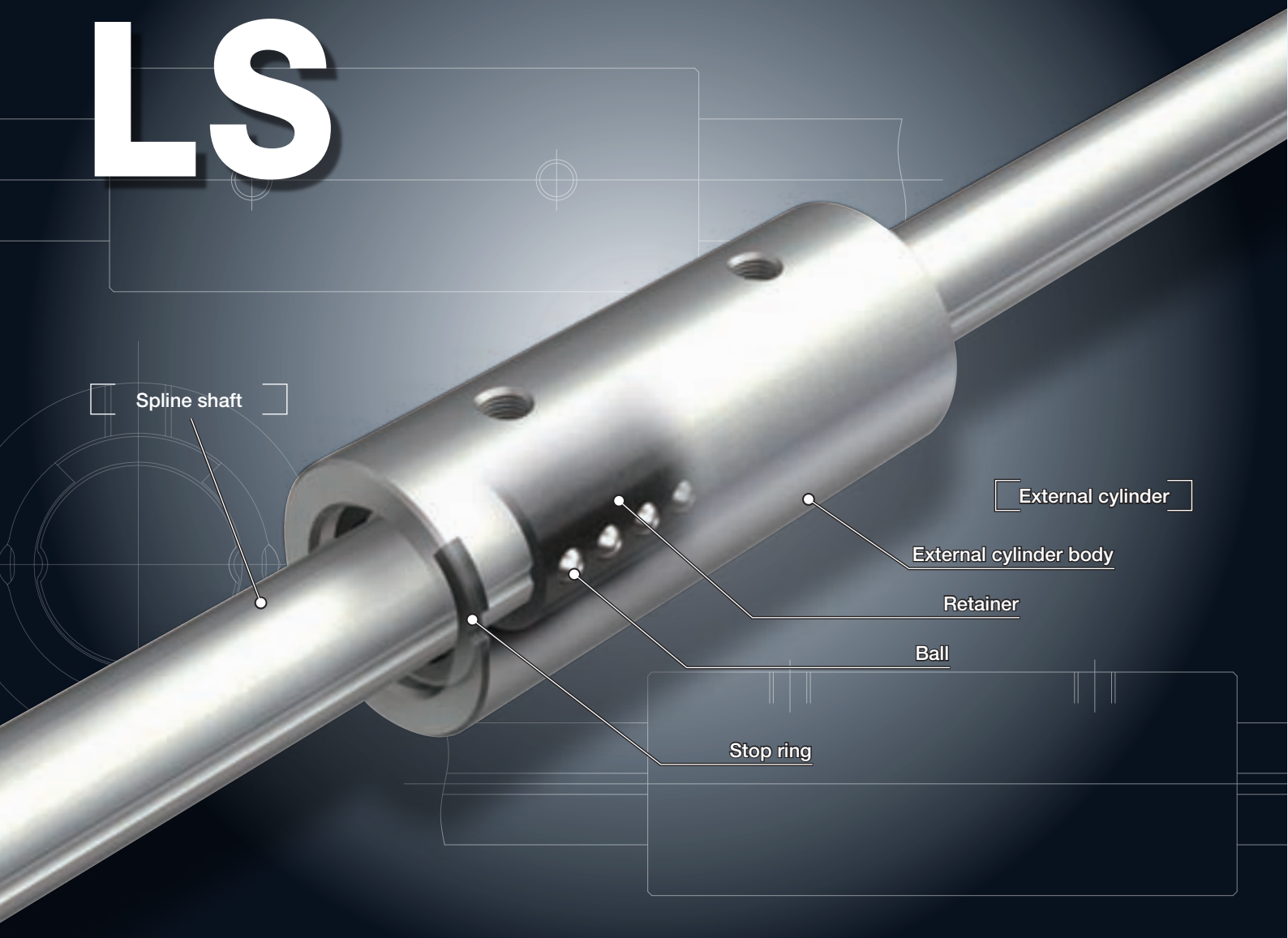


Example of identification number of assembled set

Model code	Dimensions	Part code	Material code	Preload symbol	Classification symbol	Interchangeable code	Special specification		
<u>LSB</u>	<u>10</u>	<u>C2</u>	<u>R300</u>	<u>SL</u>	<u>T₁</u>	<u>H</u>	<u>S1</u>	<u>/N</u>	
1	2	3	4	5	6	7	8	9	10
① Model		④ Number of external cylinders (2)			⑦ Preload amount		⑨ Interchangeable		
LSB					No symbol	Standard	S1	S1 specification	
					T ₁	Light preload	S2	S2 specification	
② Spline shaft shape		⑤ Length of spline shaft (300 mm)							
No symbol									
Solid shaft									
T									
Hollow shaft									
③ Size		⑥ Material type			⑧ Accuracy class		⑩ Special specification		
6, 8, 10, 13, 16, 20, 25		No symbol	High carbon steel made		No symbol	Ordinary	N, U		
		SL	Stainless steel made		H	High			

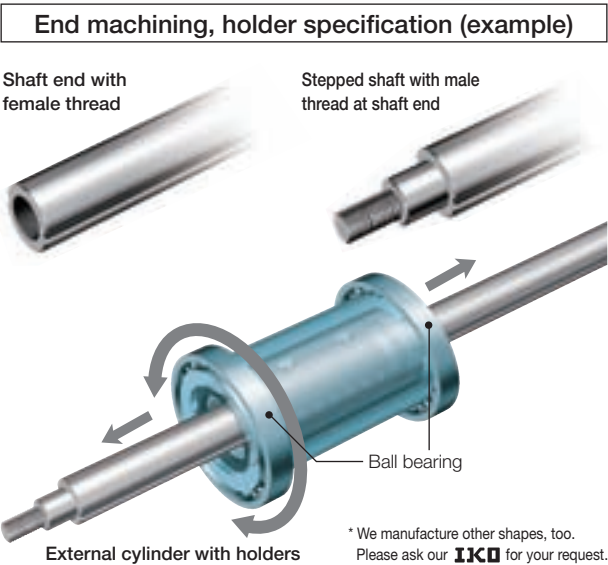
Stroke Ball Spline

LS



Points

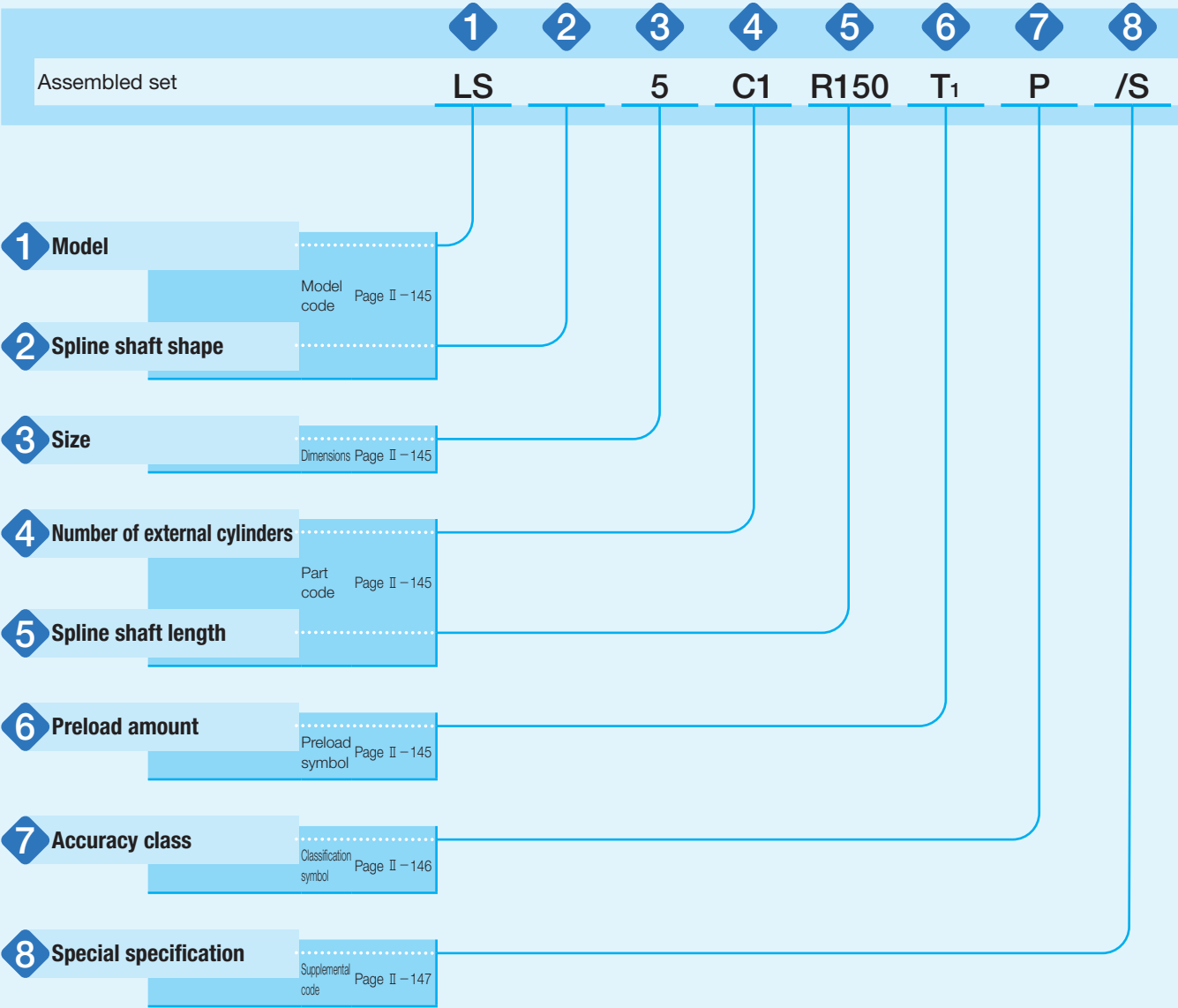
- **Achieved extremely smooth sliding**
By building the high accuracy retainer into the limited stroke type with small recirculation resistance of the balls, a light and smooth sliding with extremely small fluctuation of sliding resistance even in vertical shaft use has been achieved.
- **Best for nozzle part for chip mounter**
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**
We manufacture special shapes to meet the customer's uses such as end machining and external cylinder with holders. Please ask our **IKO** for your needs.



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.



MAG · LSAG
LSB · LS

Identification Number and Specification — Model · Spline Shaft Shape ·

1 Model	Stroke Ball Spline (LS series)	: LS	For applicable models and sizes, see Table 1.
2 Spline shaft shape	Solid shaft Hollow shaft	: No symbol : T	For applicable models and sizes, see Table 1.
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	: T ₁	For preload amount, only light preload (T ₁) can be specified. For details of the preload amount, see Table 2.

Table 2 Preload amount

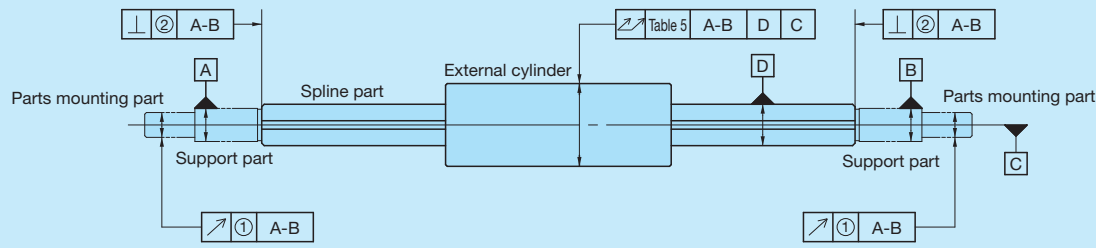
Item	Preload symbol	Preload amount N	Operational conditions
Preload type			
Light preload	T ₁	0.02C ₀	· Almost no vibrations · Load is evenly balanced · Light and precise motion

Remark: C₀ indicates the basic static load rating.

Size · Number of External Cylinders · Spline Shaft Length · Preload Amount · Accuracy Class—

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.
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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

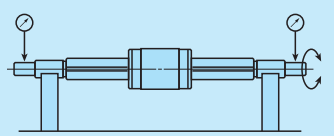
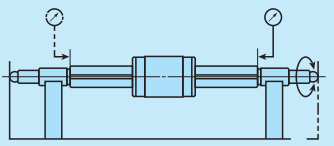
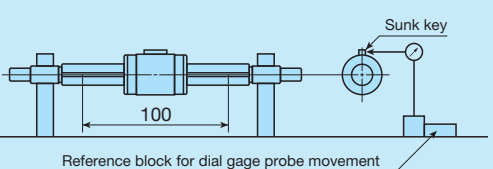
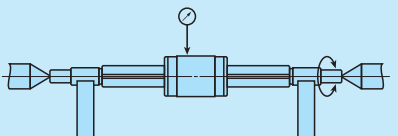
Accuracy class	Precision (P)
Allowable value	6

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

Total spline shaft length mm		Precision (P)
Above	Below	
—	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.

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

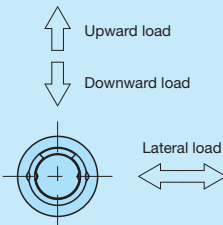
Allowable Load

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



Size	Load rating and load direction	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.

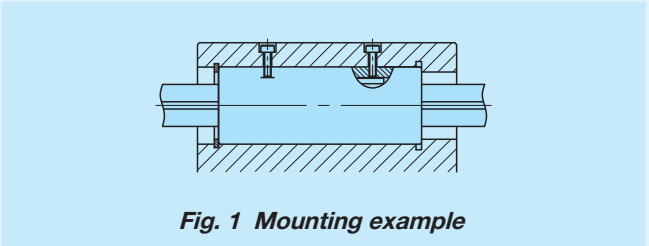
Precaution for Use

① 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.

② 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.



③ 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.

④ 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.

⑤ Operating temperature

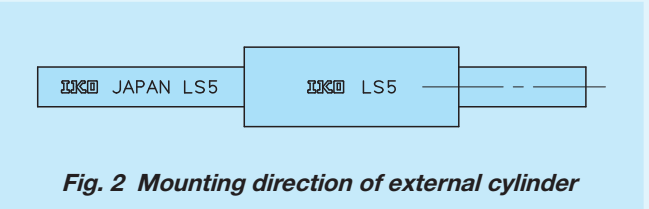
The maximum operating temperature for LS series is 120°C and temperature up to 100°C is allowed for continuous operation. When the temperature exceeds 100°C, contact **IKO**.

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.

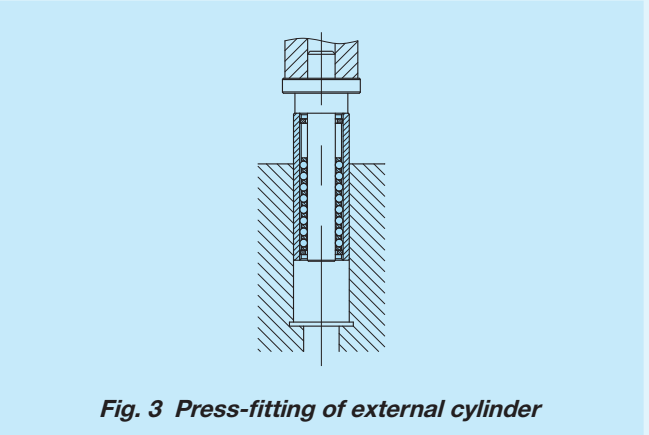
⑥ Assembly operation of external cylinder and spline shaft

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)



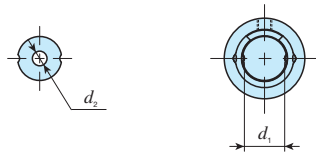
⑦ Mounting of external cylinder

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

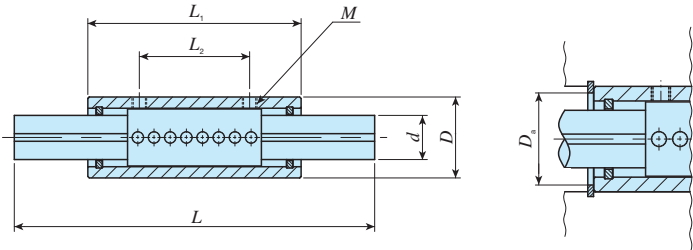


IK Stroke Ball Spline

Shape	LS		
Size	4	5	6

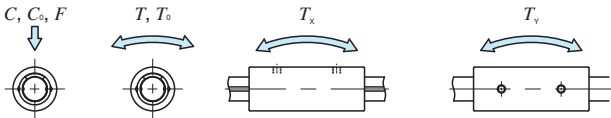


Hollow shaft dimension for LST



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	mm
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												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⁾ d₁ 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⁾ Basic dynamic load rating (C), basic static load rating (C₀), allowable load (F), dynamic torque rating (T), static torque rating and static moment rating (T₀, T_x, T_y) are values for the direction indicated in the following figure.
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	Special specification
LS	5	C1 R150	T1	P	/S
①	②	③	④	⑤	⑥
① Model	② Spline shaft shape	③ Size	④ Number of external cylinders (1)	⑤ Length of spline shaft (150 mm)	⑥ Preload amount
LS	No symbol Solid shaft T Hollow shaft	4, 5, 6			T1 Light preload
				⑦ Accuracy class	
				P Precision	
				⑧ Special specification	
				S	

Linear Bushing

Linear Bushing G

Linear Bushing

Miniature Linear Bushing



Linear Bushing G

LMG



Points

1 High load capacity

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

2 Solid shaft and hollow shaft

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.

3 Dimensionally compatible with Linear Bushing LM

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.

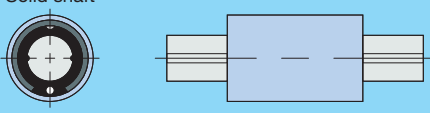
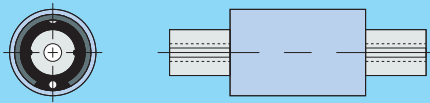
Interchangeable specification	1	2	3	4	5	6
Single external cylinder	LMG		10	C1		/U
Single shaft with grooved raceway	LMG	T	10		R300	
Assembled set	LMG	T	10	C1	R300	/U

1 Model	Model code	Page II - 155
2 Shape of shaft with grooved raceway		
3 Size	Dimensions	Page II - 155
4 Number of external cylinders	Part code	Page II - 155
5 Length of shaft with grooved raceway		
6 Special specification	Supplemental code	Page II - 155

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

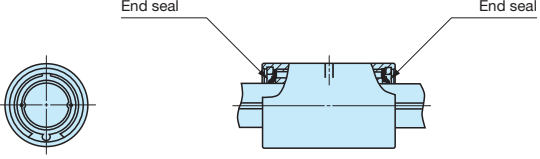
1	Model	Linear Bushing G (LMG series) : LMG		For applicable models and sizes, see Table 1.
2	Shape of shaft with grooved raceway	Solid shaft : No symbol Hollow shaft : T	For applicable models and sizes, see Table 1.	
3	Size	6, 8, 10, 13, 16, 20	Indicate the shaft diameter in mm. For applicable models 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

Allowable value	33
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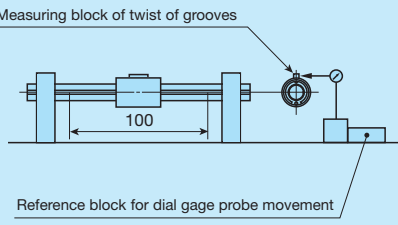
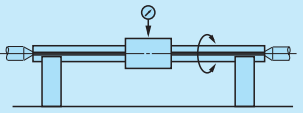
Remark: The values can be applied to 100 mm of the effective length of the track groove part at any position.

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

Overall length of shaft with grooved raceway mm		Size				
		6	8	10	13	16, 20
Above	Below					
—	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

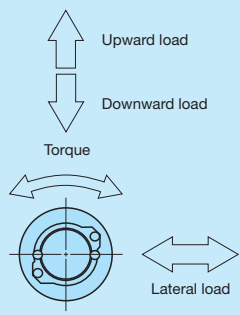
The internal clearance of LMG series is approximately 10 μm.

LMG · LM · LMS

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.

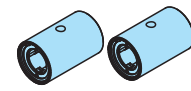
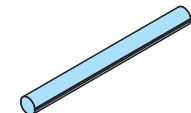
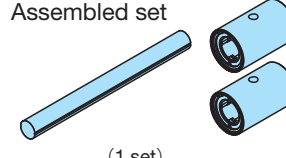
Table 4 Load ratings corrected for load direction



Size	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

Order Quantity

To order 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  (2 units)	Example of identification number indication LMG 10 C1 /U Only C1 is indicated.	Order quantity 2 pieces
Shaft with grooved raceway  (1 unit)	Example of identification number indication LMG T 10 R300	Order quantity 1 unit
Assembled set  (1 set)	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		Section coefficient	
	mm ⁴		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

1 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.

2 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.

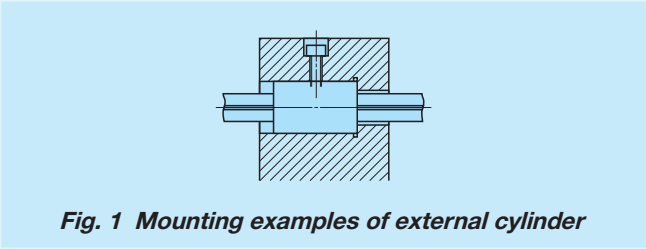


Fig. 1 Mounting examples of external cylinder

4 Loaded condition with rotating torque

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

5 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.)

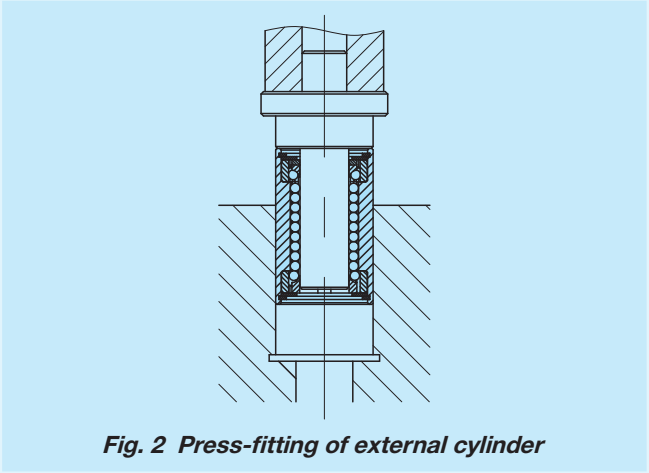


Fig. 2 Press-fitting of external cylinder

3 Multiple external cylinders used in close proximity

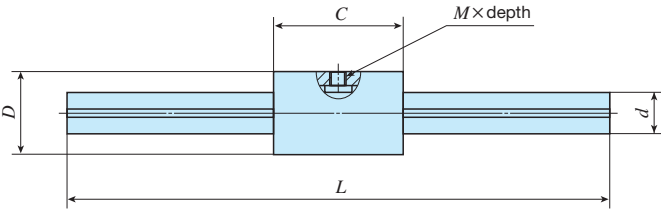
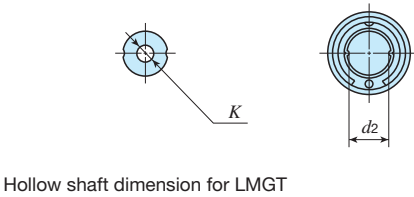
When using multiple external cylinders in close distance to the same housing, it is recommended to ensure that the distance between the external cylinders is three times as long as the length of the external cylinder. When using multiple external cylinders in closer distance, contact IKO.

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, see page II-278.

Shape	LMG					
						
Size	6	8	10	13	16	20



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⁾	<i>D</i>	Dim. <i>D</i> tolerance	<i>C</i>	Dim. <i>C</i> tolerance	<i>M</i> ×depth ⁽²⁾	<i>d</i>	Dim. <i>d</i> tolerance		<i>d</i> _s ⁽³⁾	<i>K</i>	<i>L</i> ⁽⁴⁾	Maximum length	<i>C</i> N	<i>C</i> ₀ N	<i>T</i> N · m	<i>T</i> 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⁾ d₂ 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.

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Linear Bushing

LM



Points

● **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.

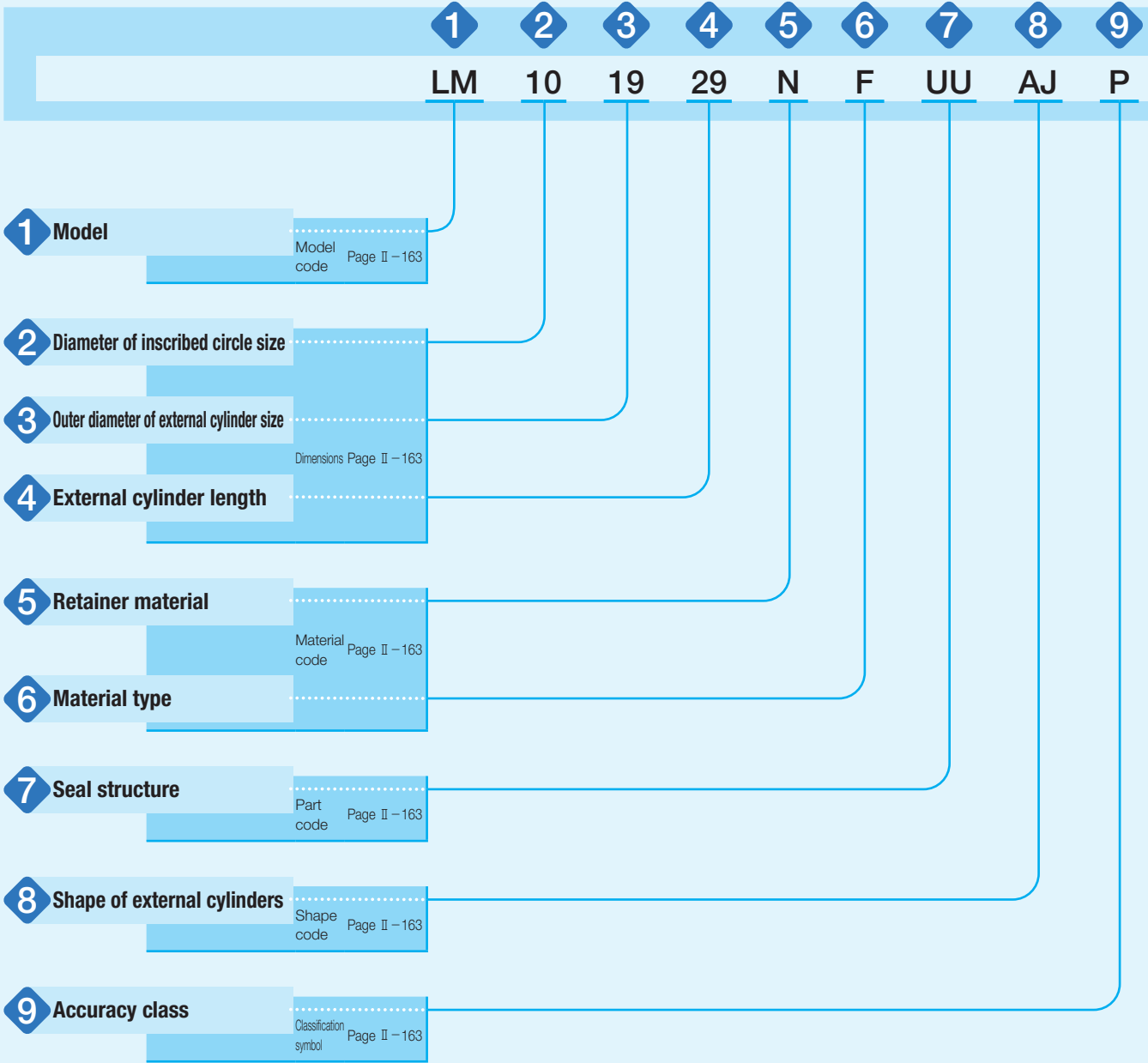
● **Wide range of variations for your needs**
For each dimensional series, standard, adjustable clearance, and open types are available with and without seals. You can select an optimal linear bushing for the specifications of your machine and device.

● **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.



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1	Model	Linear Bushing (LM series)	Metric series : LM, LME Inch series : LMB	For applicable models and sizes, see Table 1.
2	Diameter of inscribed circle size			For the metric series, indicate the diameter of inscribed circle in mm. For the inch series, indicate the diameter of inscribed circle in the unit of 1/16 inch.
3	Outer diameter of external cylinder size			For the metric series, indicate the outer diameter of external cylinder in mm. For the inch series, indicate the outer 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. The maximum operating temperature for the synthetic resin type is 100°C. Continuous operation is possible at temperatures up to 80°C.
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.

Table. 1 Models and sizes of LM series

External cylinder shape	Dimensional series	Material type	Seal structure	Model	Size (Shaft diameter)
	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	Without seal	LMB	6.350~101.6 mm (1/4~ 4in)
		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
	Metric series	High carbon 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
		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	Without seal	LMB ... AJ	6.350~101.6 mm (1/4~ 4in)
		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
	Metric series	High carbon 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
		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	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 diameter of inscribed circle 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.

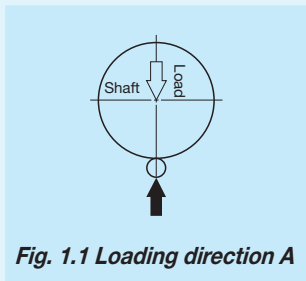


Fig. 1.1 Loading direction A

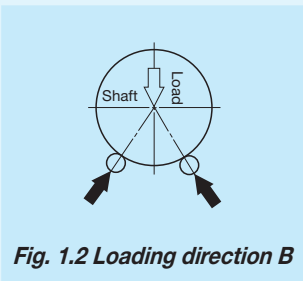


Fig. 1.2 Loading direction B

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 diameter of inscribed circle, and while the dimension of a housing hole shall be set to more than the upper limit of the allowance of the outer 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 inner 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.

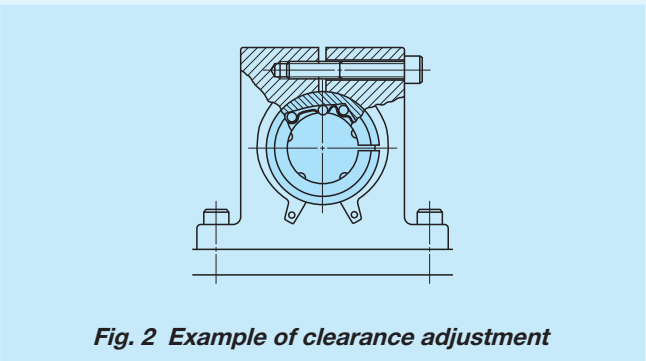


Fig. 2 Example of clearance adjustment

❸Raceway

LM series units needs heat treatment and ground finish because their shafts are used as opposite raceway. 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
Above	Below	
—	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.

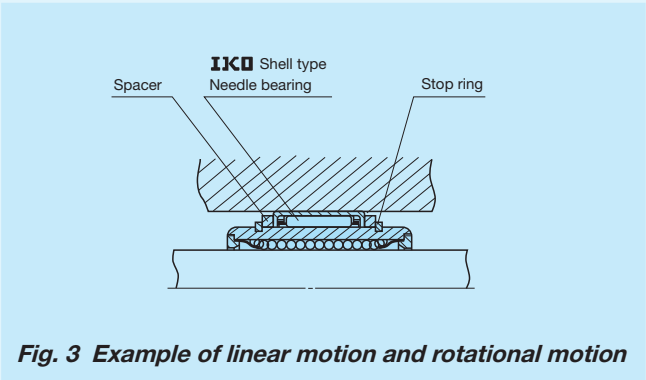


Fig. 3 Example of linear motion and rotational motion

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.

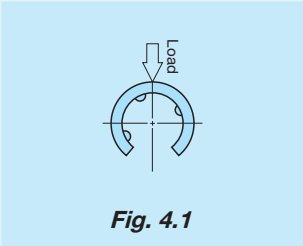


Fig. 4.1

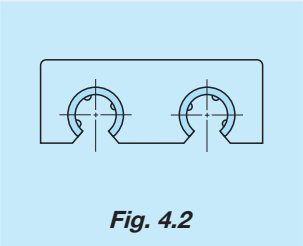


Fig. 4.2

❻Mounting

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.

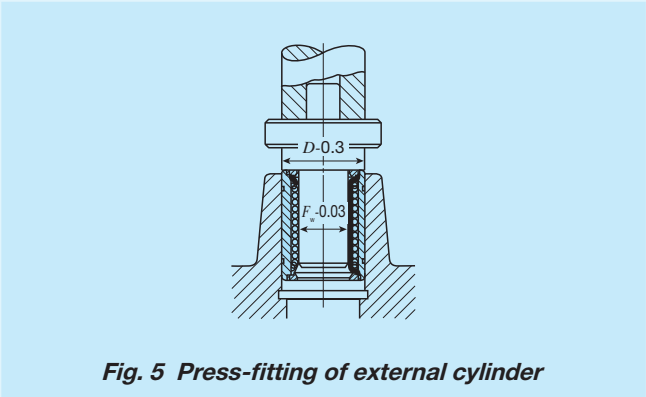


Fig. 5 Press-fitting of external cylinder

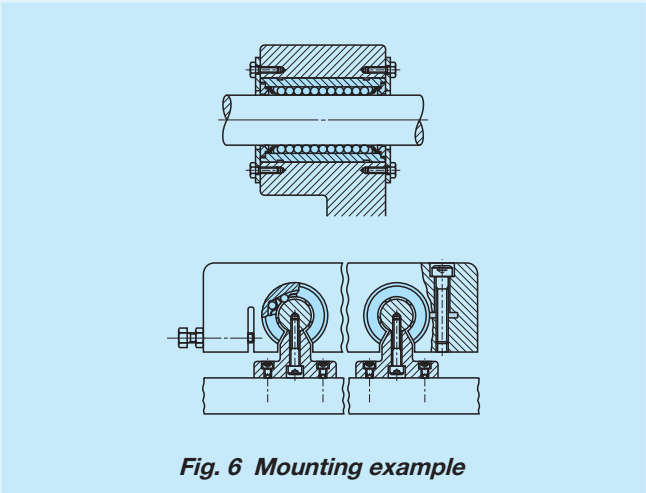


Fig. 6 Mounting example

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.

Felt seals for Linear Bushing

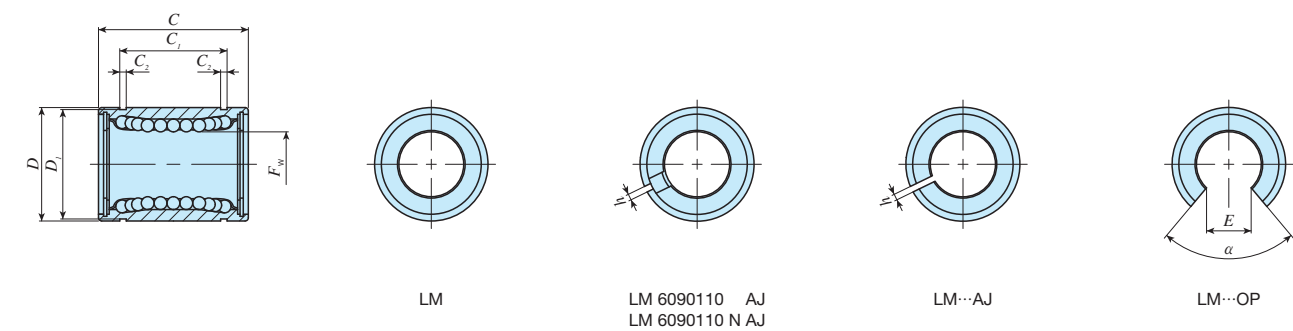
Though the type with seal is standardized for the LM series, the type without seal and felt seals may be used together when emphasis is put on rolling friction resistance. Dimensions for felt seals are shown in Table 5.

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.

	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	



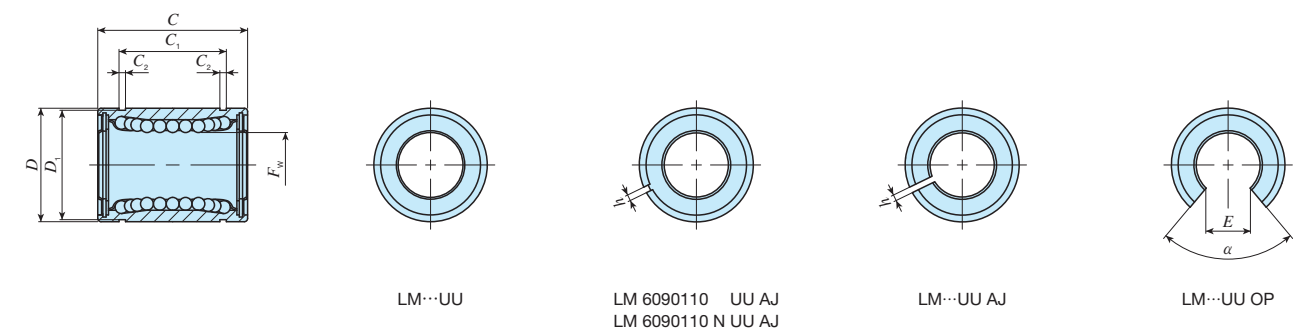
Shaft diameter mm	Identification number											Nominal dimensions and tolerances mm														Eccentricity		Basic dynamic load rating		Basic static load rating			
	Standard type		Ball raceway	Mass (Ref.) g	Adjustable clearance type		Ball raceway	Mass (Ref.) g	Open type			Ball raceway	Mass (Ref.) g	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
															P	H										P	H	P	H	P	H		
60	LM 6090110	6	1 817	LM 6090110 AJ*	6	1 788	LM 6090110 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	6	1 787	LM 6090110 N AJ*	6	1 757	LM 6090110 N OP*	5	1 610			-9	-15	120	-22	140		-300	-300														
80	LM 80120140*	6	4 520	LM 80120140 AJ*	6	4 400	LM 80120140 OP*	5	3 750		80			120				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	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*	8	15 000	LM 120180200 AJ*	8	14 900	LM 120180200 OP*	6	11 600		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*	8	20 250	LM 150210240 AJ*	8	20 150	LM 150210240 OP*	6	15 700		150	0	0	210	0	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 C₁ dimension.

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

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	

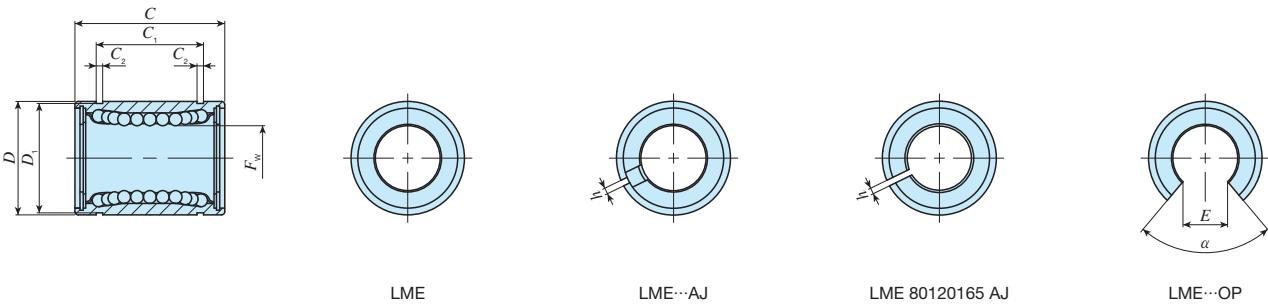


Shaft diameter mm	Identification number											Nominal dimensions and tolerances mm															Eccentricity		Basic dynamic load rating		Basic static load rating	
	Standard type	Ball raceway	Mass (Ref.) g	Adjustable clearance type		Ball raceway	Mass (Ref.) g	Open type		Ball raceway		Mass (Ref.) g	F_w	Dim. Fw tolerance μm		D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C1 tolerance μm	C_2	D_1	h	E	α	Maximum μm		C		C_0	
														P	H												P	H	Load direction A N	Load direction B N	Load direction A N	Load direction B N
60	LM 6090110 UU	6	1 817	LM 6090110 UU AJ*	6	1 788	LM 6090110 UU OP*	5	1 650		60	0	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							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		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	

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 C₁ dimension.

Remarks 1. "P" and "H" in dim. xx 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.

	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	



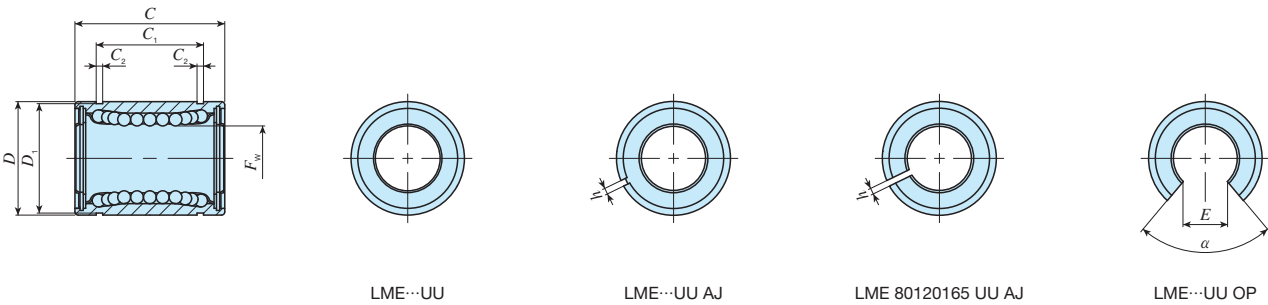
Shaft diameter mm	Identification number											Nominal dimensions and tolerances mm															Eccentricity Maximum μm	Basic dynamic load rating		Basic static load rating																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	Standard type	Ball raceway	Mass (Ref.) g	Adjustable clearance type		Ball raceway	Mass (Ref.) g	Open type				F_w	Dim. Fw tolerance μm	D	Dim. D tolerance μm	C	Dim. C tolerance μm	$C_1^{(1)}$	Dim. C1 tolerance μm	C_2	D_1	h	E	α D	Load direction A N	Load direction B N		Load direction A N	Load direction B N																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

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.

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	



Shaft diameter mm	Identification number										Nominal dimensions and tolerances mm																Eccentricity Maximum μm	Basic dynamic load rating		Basic static load rating	
	Standard type		Ball raceway	Mass (Ref.) g	Adjustable clearance type		Ball raceway	Mass (Ref.) g	Open type		F_w	Dim. Fw tolerance μm	D	Dim. D tolerance μm	C	Dim. C tolerance μm	$C_1^{(1)}$	Dim. C1 tolerance μm	C_2	D_1	h	E	α D	Maximum μm	Load direction A N	Load direction B N	Load direction A N	Load direction B N			
5	LME	51222 N UU*	4	11	LME	51222 N UU AJ*	4	9.5	—	—	5	+ 8 0	12	0	22	0	14.5	0	1.1	11.5	1	—	—	12	90.8	104	219	310			
8	LME	81625 UU*	4	20	—	—	—	—	—	—	8		16	— 8	25		16.5		1.1	15.2	— 1	—	—		121	139	255	361			
12	LME	122232 UU*	4	41.5	LME	122232 UU AJ*	4	40.5	LME	122232 UU OP*	3	+ 9 — 1	22	0	32	— 200	22.9	— 200	1.3	21	1.5	7.5	78	15	259	298	503	711			
16	LME	162636 UU*	4	56.5	LME	162636 UU AJ*	4	55.5	LME	162636 UU OP*	3		26	— 9	36		24.9		1.3	24.9	1.5	10	78		283	325	514	726			
20	LME	203245 UU*	5	97	LME	203245 UU AJ*	5	96	LME	203245 UU OP*	4	+ 11 — 1	32	0	45	0	31.5	0	1.6	30.3	2	10	60	17	562	668	1 010	1 470			
25	LME	254058 UU*	6	222	LME	254058 UU AJ*	6	219	LME	254058 UU OP*	5		40	— 11	58		44.1		1.85	37.5	2	12.5	60		920	974	1 780	2 280			
30	LME	304768 UU*	6	338	LME	304768 UU AJ*	6	333	LME	304768 UU OP*	5	+ 13 — 2	47	0	68	— 300	52.1	— 300	1.85	44.5	2	12.5	50	20	1 350	1 430	2 500	3 200			
40	LME	406280 UU*	6	712	LME	406280 UU AJ*	6	701	LME	406280 UU OP*	5		62	0	80		60.6		2.15	59	3	16.8	50		2 030	2 150	3 620	4 640			
50	LME	5075100 UU*	6	1 147	LME	5075100 UU AJ*	6	1 127	LME	5075100 UU OP*	5	+ 16 — 4	75	— 13	100	0	77.6	— 400	2.65	72	3	21	50	20	3 940	4 180	7 130	9 120			
60	LME	6090125 UU*	6	2 051	LME	6090125 UU AJ*	6	2 001	LME	6090125 UU OP*	5		90	0	125		101.7		3.15	86.5	3	27.2	54		4 760	5 040	8 150	10 400			
80	LME80120165	UU*	6	5 030	LME80120165	UU AJ*	6	4 930	LME80120165	UU OP*	5		120	— 15	165	— 400	133.7	— 400	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.

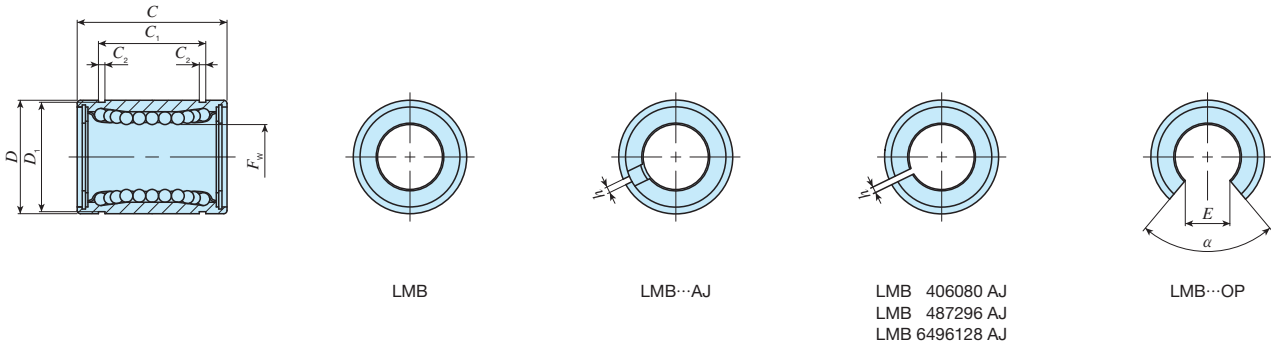
(2) The seal is slightly off from the external cylinder end.

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.

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



Shaft diameter mm (inch)	Identification number										Nominal dimensions and tolerances inch/mm																		Eccentricity		Basic dynamic load rating		Basic static load rating	
	Standard type		Ball raceway	Mass (Ref.) g	Adjustable clearance type		Ball raceway	Mass (Ref.) g	Open type		Ball raceway	Mass (Ref.) g		F_w	Dim. Fw tolerance μm		D	Dim. D tolerance μm	C	Dim. C tolerance μm	C_1 (1)	Dim. C1 tolerance μm	C_2	D_1	h	E	α	Maximum μm	C		C_0			
															P	H													Load direction A N	Load direction B N	Load direction A N	Load direction B N		
6.350 (1/4)	LMB 4812 *	4	10.5		—	—			—	—					1/4															1/2	0	3/4		12.98
	LMB 4812 N*	4	8.5	LMB 4812 N	AJ*	4	8						6.350			12.700	—11	19.050					1	—	—									
9.525 (3/8)	LMB 61014 *	4	16.5		—	—			—	—			3/8			5/8		7/8		16.15		0.992	14.935	—	—	—			94.8	109	174	246		
	LMB 61014 N*	4	12.5	LMB 61014 N	AJ*	4	12						9.525	0	0	15.875		22.225					1	—	—									
12.700 (1/2)	LMB 81420 *	4	37.5	LMB 81420	AJ*	4	36.5	LMB 81420	OP*	3	28		1/2	—	6	9	7/8	0	1 1/4		24.46	0	1.168	20.853	1.5	7.9	80			264	303	505	714	
	LMB 81420 N*	4	37	LMB 81420 N	AJ*	4	36	LMB 81420 N	OP*	3	27		12.700			22.225	—13	31.750	—200		—200													
15.875 (5/8)	LMB 101824 *	4	79.6	LMB 101824	AJ*	4	77.6	LMB 101824	OP*	3	64		5/8			1 1/8		1 1/2		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		15.875			28.575		38.100																
19.050 (3/4)	LMB 122026 *	5	99.5	LMB 122026	AJ*	5	97.5	LMB 122026	OP*	4	86		3/4			1 1/4		1 5/8		29.61		1.422	29.870	1.5	11.1	60			554	659	1 000	1 470		
	LMB 122026 N*	5	95	LMB 122026 N	AJ*	5	93	LMB 122026 N	OP*	4	76		19.050	0	0	31.750	0	41.275																
25.400 (1)	LMB 162536 *	6	207	LMB 162536	AJ*	6	205	LMB 162536	OP*	5	190		1	—	7	—10	1 9/16	—16	2 1/4		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		25.400			39.688		57.150																
31.750 (1 1/4)	LMB 203242 *	6	434	LMB 203242	AJ*	6	424	LMB 203242	OP*	5	390		1 1/4			2		2 5/8		50.92		1.727	47.904	2.5	15.9	50			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		31.750			50.800	0	66.675																
38.100 (1 1/2)	LMB 243848 *	6	662	LMB 243848	AJ*	6	652	LMB 243848	OP*	5	610		1 1/2	0	0	2 3/8	—19	3		61.26	0	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		38.100	—	8	—12	60.325		76.200	—300														
50.800 (2)	LMB 324864 *	6	1 185	LMB 324864	AJ*	6	1 165	LMB 324864	OP*	5	1 120		2			3		4		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		50.800			76.200		101.600																
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	0	0	3 3/4	0	5		100.99		3.048	90.220	3	31.8	50			5 190	5 490	9 090	11 600		
													63.500	—	9	—15	95.250	—22	127.000															
76.200 (3)	LMB 487296 *	6	4 380	LMB 487296	AJ*	6	4 350	LMB 487296	OP*	5	3 750		3			4 1/2		6		120.04	0	3.048	109.474	3	38.1	50			8 620	9 120	14 500	18 500		
													76.200	—		114.300		152.400																
101.600 (4)	LMB 6496128 *	6	10 200	LMB 6496128	AJ*	6	10 150	LMB 6496128	OP*	5	8 740		4	0	0	6	0	8	—400	158.95	—400	3.53	145.923	3	50.8	50	20	30	17 000	18 000	28 600	36 500		
													101.600	—10	—20	152.400	—25	203.200																

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.

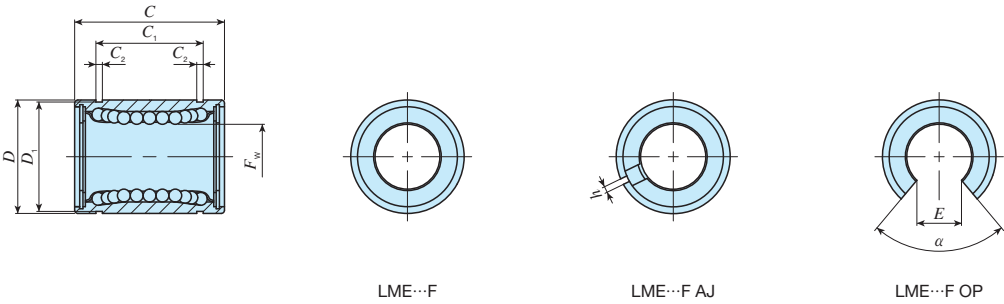
Remarks 1. "P" and "H" in dim. xx tolerance and eccentricity represent precision and high, respectively.

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.

LMB • LM • LMS

	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



Shaft diameter mm	Identification number											Nominal dimensions and tolerances mm															Eccentricity Maximum μm	Basic dynamic load rating		Basic static load rating	
	Standard type		Ball raceway	Mass (Ref.) g	Adjustable clearance type		Ball raceway	Mass (Ref.) g	Open type			Ball raceway	Mass (Ref.) g	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 D		C		C_0	
																												Load direction A N	Load direction B N	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	— 8		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	+ 9 — 1	22	0 — 9	32	—200	22.9	—200	1.3	21	1.5	7.5	78	15	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		0 —200	24.9	—200	1.3	24.9		1.5	10	78	17	283	325
	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	+11 — 1		32		45	0 —11	31.5		0 —300		1.6	30.3	2	10	60	20		562	668
	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
	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	+13 — 2		47		68	0 —13		52.1	0 —300		1.85	44.5	2	12.5	50	17		1 350	1 430
	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		+13 — 2	62	0 —13	80		—300	60.6		—300	2.15	59	3	16.8	50		20	2 030	2 150
	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		100	0 —15		77.6	0 —400		2.65	72	3	21	50	20		3 940	4 180
	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		+13 — 2	90	0 —15	125		0 —400	101.7		0 —400	3.15	86.5	3	27.2	54		20	4 760	5 040
	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.

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.

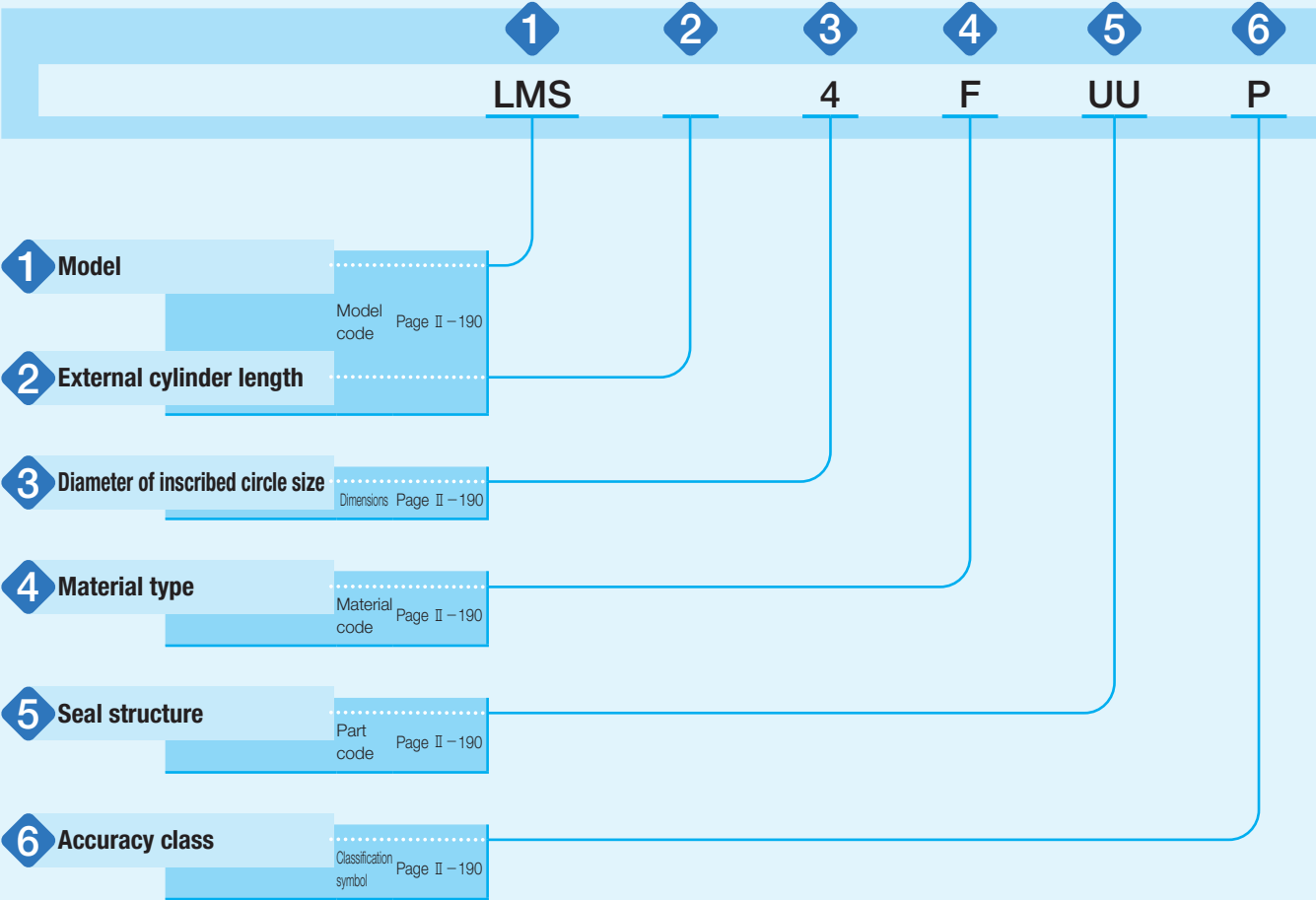
3 Stainless steel selections for excellent corrosion resistance

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.



Identification Number and Specification

1	Model	Miniature Linear Bushing (LMS series)	: LMS	For applicable models and sizes, see Table 1.
2	External cylinder length	Standard Long	: No symbol : L	
3	Diameter of inscribed circle size			Indicate the diameter of inscribed circle in mm.
4	Material type	High carbon steel made Stainless steel made	: No symbol : F	Specify the component part material. For applicable models and sizes, see Table 1.
5	Seal structure	Without seal With two end seals	: No symbol : UU	The models with two end seals incorporate seals with superior dust protection performance for preventing intrusion of foreign substances.
6	Accuracy class	High Precision	: No symbol : P	For details of accuracy, see the dimension table on page II-192. Precision applies only to the standard type. Especially when it is necessary to control clearance with the shaft strictly, the tolerance of diameter of inscribed circle can be sorted by 0.002 mm before delivery. Contact IKD for further information.

Table 1 Models and sizes of LMS series

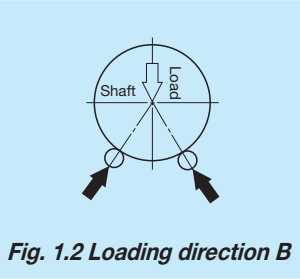
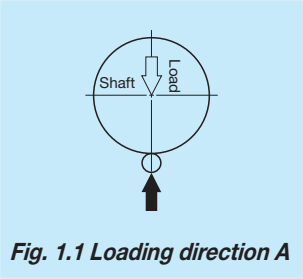
Shape	External cylinder length	Material type	Seal structure	Model	Size		
					3	4	5
	Standard	High carbon steel made	Without seal	LMS	○	○	○
			With two end seals	LMS...UU	○	○	○
		Stainless steel made	Without seal	LMS...F	○	○	○
			With two end seals	LMS...FUU	○	○	○
	Long	High carbon steel made	Without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



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

① 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	Shaft	Housing hole
Accuracy class		
High	- 6 -14	+12 0
Precision	- 4 - 9	+ 8 0

② Raceway

LMS series units needs heat treatment and ground finish because their shafts are used as opposite raceway. 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.

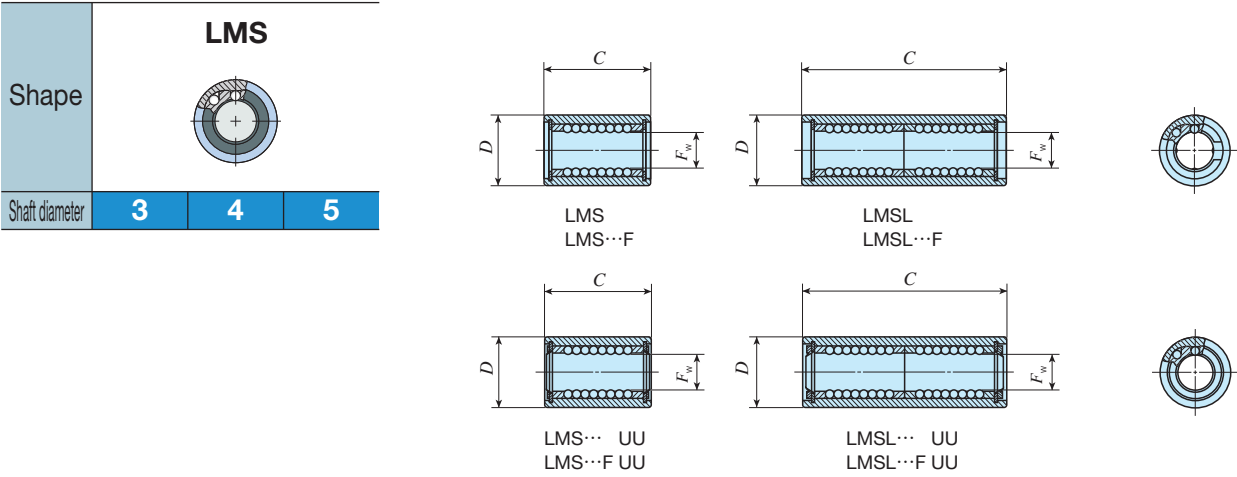
③ When accompanied by rotational motion

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.

④ 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.

IKO Miniature Linear Bushing



Shaft diameter mm	Identification number	Ball raceway	Nominal dimensions and tolerances mm									Eccentricity		Basic dynamic load rating		Basic static load rating		
			Mass (Ref.) g	Dim. Fw tolerance		Dim. D tolerance		C	Dim. C tolerance	Maximum	C		C ₀					
				<i>F_w</i> μm	 P H	<i>D</i> μm	 P H				 μm	Load direction A N	Load direction B N	Load direction A N	Load direction B N			
3	LMS 3 LMS 3 F LMS 3 UU LMS 3 F UU	4	1.8	3	0 -5	0 - 8	7	0 -7	0 - 8	10	0 -120	2	4	18.4	21.2	39.4	55.8	
	LMSL 3 LMSL 3 F LMSL 3 UU LMSL 3 F UU																	
	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	
																		LMSL 4 LMSL 4 F LMSL 4 UU LMSL 4 F UU
		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

Remark: "P" and "H" in dim. xx tolerance and eccentricity represent precision and high, respectively.

Stroke Rotary Bushing

Stroke Rotary Bushing

Miniature Stroke Rotary Bushing

Stroke Rotary Cage



Stroke Rotary Bushing

ST



Points

● 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.

● Small rolling frictional resistance

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

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.

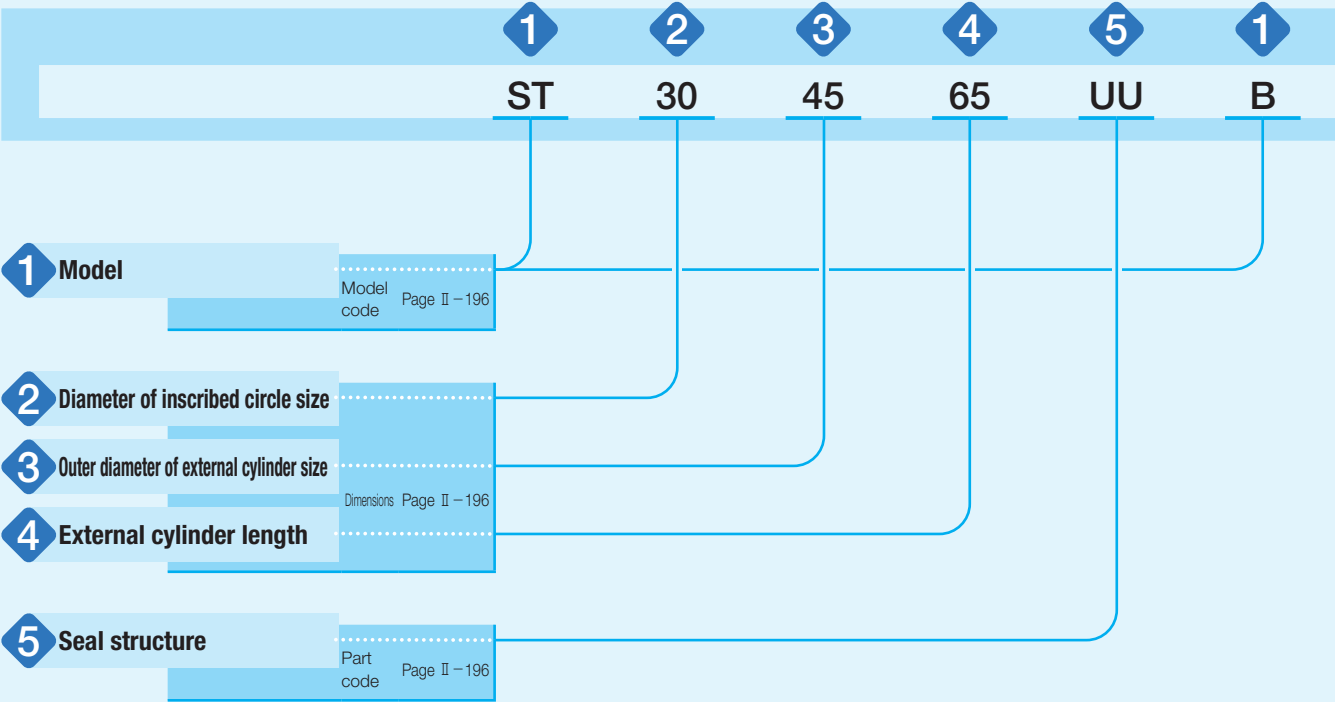
● Many variations

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.

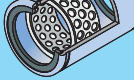


Identification Number and Specification

1 Model	Stroke Rotary Bushing (ST series)	Ordinary type : ST Heavy load type : ST...B	For applicable models and sizes, see Table 1.
2 Diameter of inscribed circle size		Indicate the diameter of inscribed circle in mm.	
3 Outer diameter of external cylinder size		Indicate the outer diameter of external cylinder in mm.	
4 External cylinder length		Indicate the external cylinder length in mm.	
5 Seal structure	Open type : No symbol With seal : UU	The with seal type incorporates seals with superior dust protection performance for preventing intrusion of foreign substances. The maximum allowable temperature for seals is 120°C.	

ST • STSI • BG

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
	Open type	ST	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	With seal	ST…UU	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Open type	ST…B	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	With seal	ST…UUB	—	—	—	—	—	—	—	—	○	○	○	○	○	○	○	○	○	○	○	○

Accuracy

Since outer 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 + L₁ / 8(1)

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

L₁: External cylinder length, mm

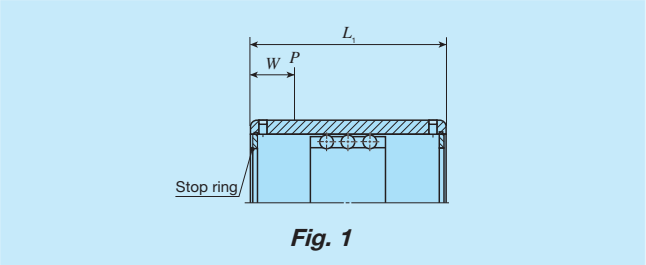


Table 2 Tolerance of diameter of inscribed circle and outer diameter of external cylinder unit: μm

Nominal dimensions of diameter of inscribed circle F _w or outer diameter of external cylinder D mm		Dim. F _w tolerance of diameter of inscribed circle		Dim. D _m tolerance of external cylinder diameter (1)	
Above	Below	H	L	H	L
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 outer diameter of external cylinder.

Table 3 Tolerance of external cylinder length unit: μm

Nominal dimensions of diameter of inscribed circle F _w mm		Dim. L ₁ tolerance of external cylinder length	
Above	Below	H	L
—	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 ≥ D_{pw} n + 10 S n₁(2)

where, DN : Allowance of velocity (see Table 4)

n : Rotation speed, rpm

n₁ : Number of strokes per minute, cpm

S : Stroke length, mm

D_{pw} : Pitch circle diameter of balls, mm (D_{pw} ≐ 1.15F_w)

F_w : Diameter of inscribed circle, mm

However, applicable when n₁ ≤ 5000, S n₁ ≤ 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

1 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 internal radial 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 internal radial 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 internal radial 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 internal radial clearance unit: μm

Nominal dimensions of diameter of inscribed circle F _w mm		Lower limit of internal radial clearance
Above	Below	
4	6	— 2
6	10	— 3
10	18	— 4
18	30	— 5
30	50	— 6
50	80	— 8
80	100	—10

2 Raceway

A shaft for ST series needs heat treatment and ground finish because the surface of shaft is used as raceways. 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
Above	Below	
—	28	0.8
28	50	1.0
50	100	1.5

3 Stroke length

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

4 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.

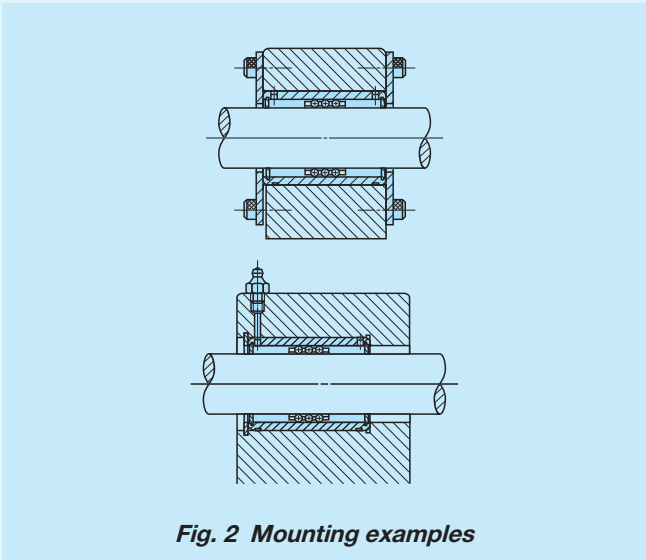
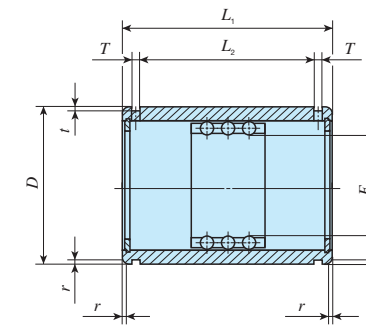


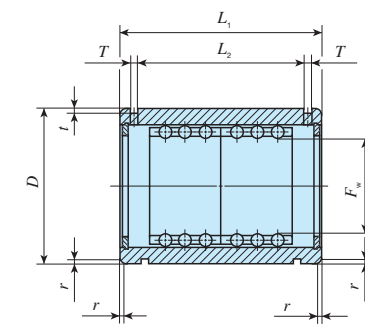
Fig. 2 Mounting examples

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
	20	25	30	35	40	45	50	20	25	30	35	40	45	50	55	60
	55	60	70	80	90	100		55	60	70	80	90	100			



ST

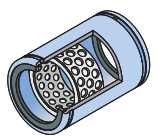
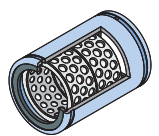


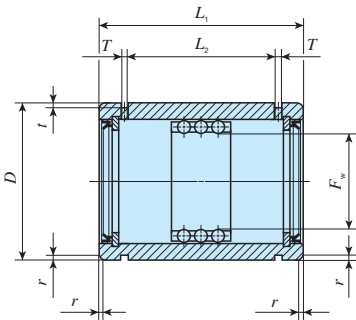
ST...B

Shaft diameter mm	Identification number				Nominal dimensions									ST			ST...B		
	Ordinary type	Mass (Ref.)	Heavy load type	Mass (Ref.)	mm									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
		g		g	F_w	D	L_1	L_2	T	t	r								
4	ST 4814	2.9	————	———	4	8	14	9		1.1	0.25	0.3	10	112	59.5	————	———	———	
5	ST 51016	5.6	————	———	5	10	16	10.6		1.1	0.25	0.3	13	121	68.3	————	———	———	
6	ST 61219	8.9	————	———	6	12	19	13.2		1.1	0.25	0.3	15	278	168	————	———	———	
8	ST 81524	15.6	ST 81524 B	16.8	8	15	24	17.1		1.5	0.5	0.5	24	315	211	8	512	422	
10	ST 101930	28.8	ST 101930 B	31.2	10	19	30	22.7		1.5	0.5	0.5	30	659	466	8	1 070	932	
12	ST 122332	42	ST 122332 B	46	12	23	32	24.5		1.5	0.5	0.5	32	1 110	822	8	1 800	1 640	
16	ST 162837	71	ST 162837 B	75	16	28	37	29.1		1.5	0.5	0.5	40	1 230	998	16	1 990	2 000	
20	ST 203245	99	ST 203245 B	106	20	32	45	35.8		2	0.5	0.5	54	1 390	1 250	28	2 250	2 500	
25	ST 253745	117	ST 253745 B	125	25	37	45	35.8		2	0.5	1	54	1 450	1 430	28	2 360	2 850	
30	ST 304565	205	ST 304565 B	220	30	45	65	53.5		2.5	0.5	1	82	3 110	3 160	44	5 060	6 320	
35	ST 355270	329	ST 355270 B	346	35	52	70	58.5		2.5	0.7	1.5	92	3 290	3 550	54	5 340	7 100	
40	ST 406080	516	ST 406080 B	540	40	60	80	68.3		2.5	0.7	1.5	108	4 340	4 810	66	7 050	9 630	
45	ST 456580	563	ST 456580 B	588	45	65	80	68.3		2.5	0.7	1.5	108	4 550	5 330	66	7 390	10 700	
50	ST 5072100	827	ST 5072100 B	862	50	72	100	86.4		3	1	1.5	138	5 790	6 970	88	9 400	13 900	
55	ST 5580100	1 160	ST 5580100 B	1 200	55	80	100	86.4		3	1	2	138	6 030	7 630	88	9 800	15 300	
60	ST 6085100	1 240	ST 6085100 B	1 290	60	85	100	86.4		3	1	2	138	6 260	8 300	88	10 200	16 600	
70	ST 7095100	1 400	ST 7095100 B	1 450	70	95	100	86.4		3	1	2	138	6 510	9 320	88	10 600	18 600	
80	ST 80110100	2 050	ST 80110100 B	2 110	80	110	100	86		3	1.5	2	132	8 230	12 200	76	13 400	24 400	
90	ST 90120100	2 250	ST 90120100 B	2 330	90	120	100	86		3	1.5	2	132	8 550	13 500	76	13 900	27 000	
100	ST 100130100	2 440	ST 100130100 B	2 520	100	130	100	86		3	1.5	2	132	8 820	14 800	76	14 300	29 500	

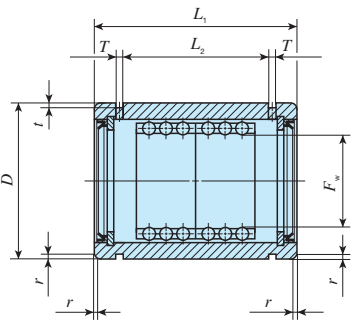
ST • STSI • BG

IK 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					Nominal dimensions mm								ST...UU			ST...UUB		
	Ordinary type	Mass (Ref.) g	Heavy load type	Mass (Ref.) g	F_w	D	L_1	L_2	T	t	r	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum stroke length mm	Basic dynamic load rating C N	Basic static load rating C_0 N		
8	ST 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		

ST • STSI • BG

Miniature
Stroke Rotary Bushing

STSI



Points

● 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.

● Super small size

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

● 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.

● Extremely smooth operation

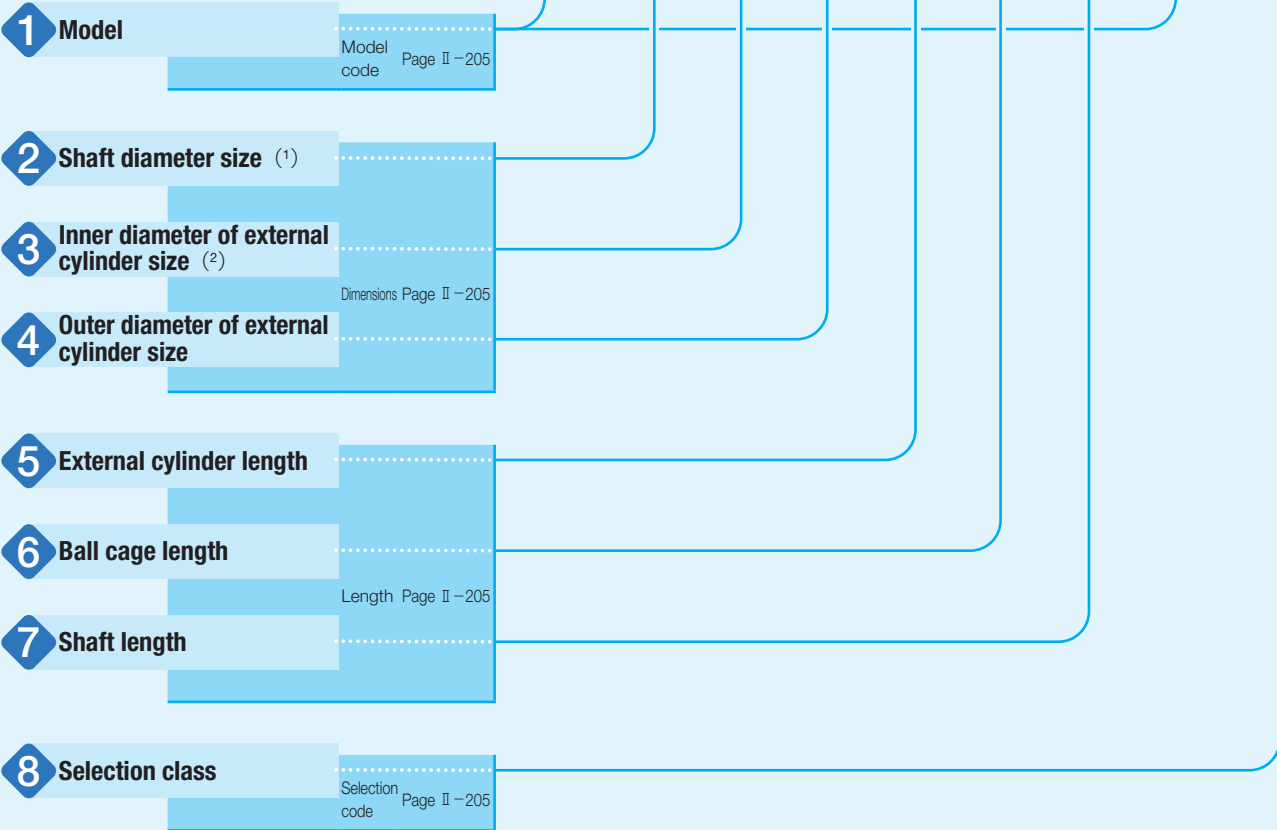
Since each component is precisely grounded and adjusted to ideal preload condition, extremely smooth and stable operation with small frictional resistance for long term can be achieved.

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

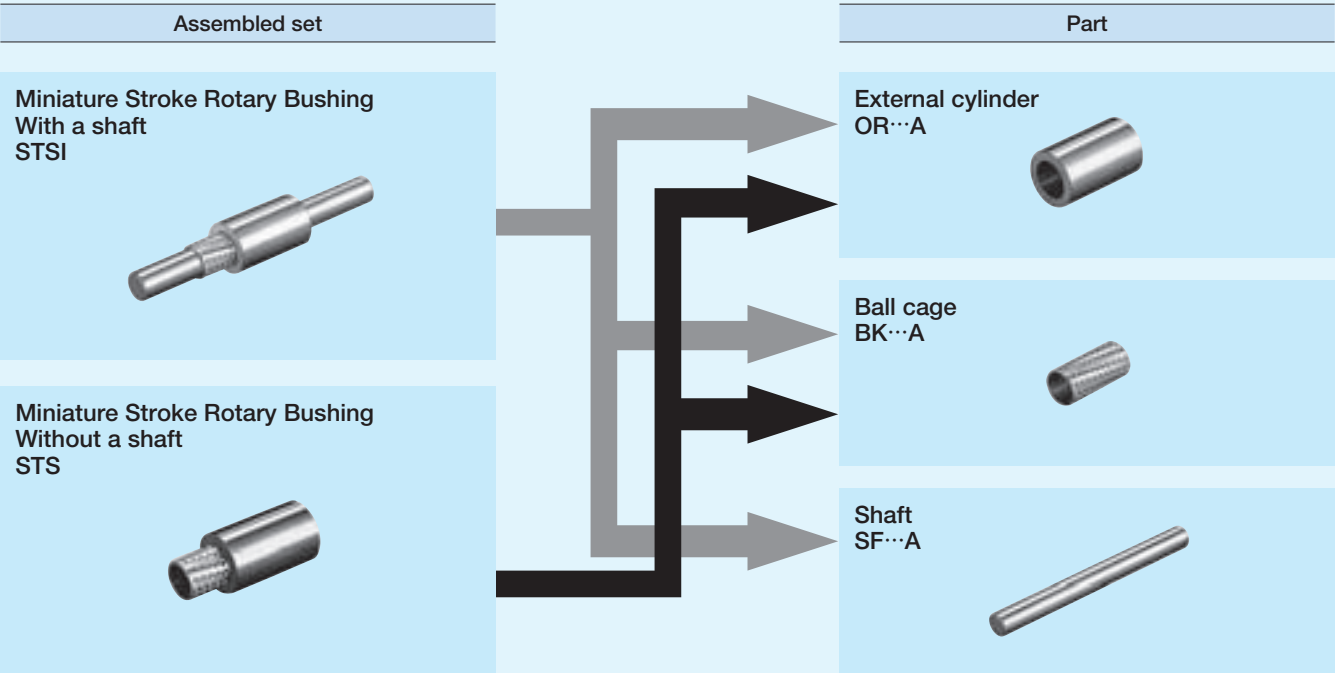


Notes (1) Indicates diameter of inscribed circle for assembled set without a shaft or ball cage.
(2) Indicates diameter of circumscribed circle for ball cage.

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 size		Indicate the shaft diameter in mm. Indicates diameter of inscribed circle for assembled set without a shaft or ball cage.
3	Inner diameter of external cylinder size		Indicate the inner diameter of external cylinder in mm. Indicates diameter of circumscribed circle for ball cage.
4	Outer diameter of external cylinder size		Indicate the outer 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



Accuracy

Table 2 Tolerance and allowance

Nominal dimensions of outer diameter of external cylinder mm		Dim. D tolerance of outer diameter of external cylinder μm		Radial deflection of outer diameter of external cylinder μm	Dim. H tolerance of external cylinder and shaft length mm
Above	Below	H	L		
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	Dim. D tolerance of inner diameter of external cylinder		Dim. D tolerance of diameter of inscribed circle		Dim. D tolerance of shaft diameter	
	H	L	H	L	H	L
M1	−1	−3	−1	−3	0	−1
M2	−2	−4	−2	−4	−1	−2
M3	−3	−5	−3	−5	−2	−3

Precaution for Use

- 1 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 diameter of inscribed circle. 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.
- 2 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.
- 3 Insertion of shaft**

When inserting a shaft into an external cylinder, be careful not to pry open or give shock to the shaft.

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.

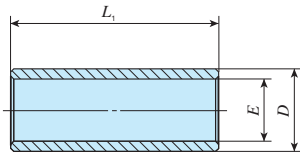
Lubrication

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

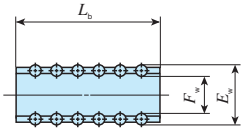
Both of oil lubrication and grease lubrication are available in the STSI series. For grease lubrication, it is typically applied lightly to the shaft and raceway of the external cylinder. Use of high-quality lithium-soap base grease is recommended for the grease to use.

IK Miniature Stroke Rotary Bushing

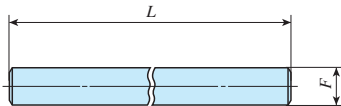
	Assembled set with a shaft				Assembled set without a shaft				External cylinder				Ball cage				Shaft			
Shape	STSI				STS				OR...A				BK...A				SF...A			
Size	2	3	4	5	2	3	4	5	2	3	4	5	2	3	4	5	2	3	4	5
	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12



External cylinder



Ball cage



Shaft

Shaft diameter mm	Identification number of assembled set without a shaft	External cylinder					Ball cage						Basic static load rating ⁽¹⁾ C ₀ N	Shaft				Identification number of assembled set with a shaft
		Identification number	Mass (Ref.) g	Nominal dimensions mm			Identification number	Mass (Ref.) g	F _w		Nominal dimensions mm			Identification number	Mass (Ref.) g	Nominal dimensions mm		
				E	D	L ₁					E _w	L _b				F	L	
2	STS 2 L ₁ -L _b	OR 3 5 10 A OR 3 5 15 A	0.9 1.3	3.2	5	10 15	BK 2 3 5 A BK 2 3 10 A	0.1 0.3	2		3.2	5 10	10.5 21.0	SF 2 20 A SF 2 30 A	0.5 0.7	2	20 30	STSI 2 L ₁ -L _b -L
3	STS 3 L ₁ -L _b	OR 5 7 10 A OR 5 7 20 A OR 5 7 30 A	1.5 2.9 4.4	5	7	10 20 30	BK 3 5 10 A BK 3 5 15 A BK 3 5 20 A	0.7 1.1 1.4	3		5	10 15 20	38.4 57.7 76.9	SF 3 50 A SF 3 60 A	2.8 3.3	3	50 60	STSI 3 L ₁ -L _b -L
4	STS 4 L ₁ -L _b	OR 6 8 10 A OR 6 8 20 A OR 6 8 30 A	1.7 3.4 5.2	6	8	10 20 30	BK 4 6 10 A BK 4 6 15 A BK 4 6 20 A	0.9 1.3 1.8	4		6	10 15 20	59.5 89.3 119	SF 4 50 A SF 4 60 A	4.9 5.9	4	50 60	STSI 4 L ₁ -L _b -L
5	STS 5 L ₁ -L _b	OR 7 10 10 A OR 7 10 20 A OR 7 10 30 A	3.1 6.3 9.4	7	10	10 20 30	BK 5 7 10 A BK 5 7 15 A BK 5 7 20 A	1.0 1.6 2.0	5		7	10 15 20	81 121 162	SF 5 50 A SF 5 80 A	7.7 12.3	5	50 80	STSI 5 L ₁ -L _b -L
6	STS 6 L ₁ -L _b	OR 8 11 20 A OR 8 11 30 A OR 8 11 40 A	7.0 10.5 14.1	8	11	20 30 40	BK 6 8 10 A BK 6 8 15 A BK 6 8 20 A	1.2 1.8 2.3	6		8	10 15 20	103 154 206	SF 6 50 A SF 6 80 A	11.1 17.7	6	50 80	STSI 6 L ₁ -L _b -L
8	STS 8 L ₁ -L _b	OR 10 13 20 A OR 10 13 30 A OR 10 13 40 A	8.5 12.7 17.0	10	13	20 30 40	BK 8 10 10 A BK 8 10 15 A BK 8 10 20 A	1.6 2.4 3.2	8		10	10 15 20	105 157 209	SF 8 50 A SF 8 80 A SF 8 90 A	19.7 31.5 35.5	8	50 80 90	STSI 8 L ₁ -L _b -L
10	STS 10 L ₁ -L _b	OR 12 18 20 A OR 12 18 30 A OR 12 18 43 A	22.2 33.3 47.7	12	18	20 30 43	BK 10 12 15 A BK 10 12 20 A BK 10 12 25 A	2.8 3.8 4.8	10		12	15 20 25	191 254 318	SF 10 80 A SF 10 100 A SF 10 120 A	49.3 61.6 74.0	10	80 100 120	STSI 10 L ₁ -L _b -L
12	STS 12 L ₁ -L _b	OR 14 20 25 A OR 14 20 30 A OR 14 20 35 A OR 14 20 40 A	31.4 37.7 44.0 50.3	14	20	25 30 35 40	BK 12 14 20 A BK 12 14 25 A BK 12 14 30 A	4.3 5.4 6.1	12		14	20 25 30	341 427 512	SF 12 80 A SF 12 100 A SF 12 120 A	71.0 88.8 106.5	12	80 100 120	STSI 12 L ₁ -L _b -L

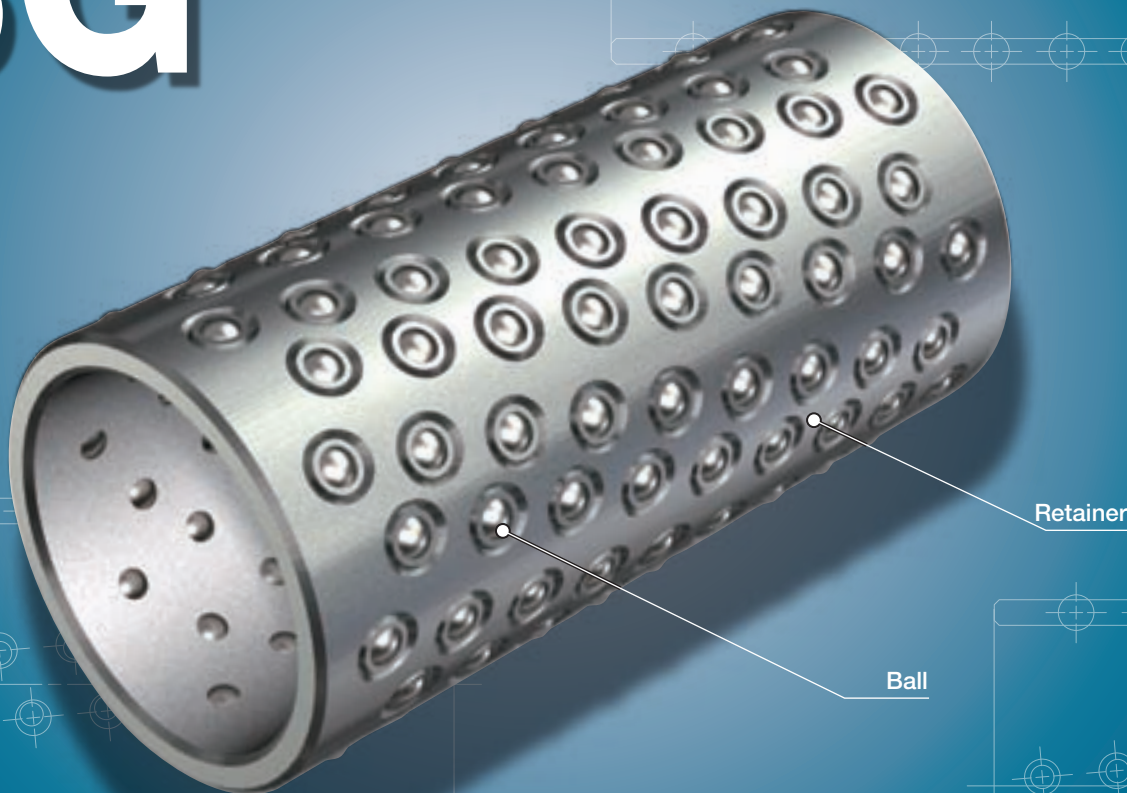
Note ⁽¹⁾ Represents the value when load is evenly distributed without the ball incorporated in the ball cage being dropped from the external cylinder end.

Remark: L₁, 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.

ST • STSI • BG

Stroke Rotary Cage

BG



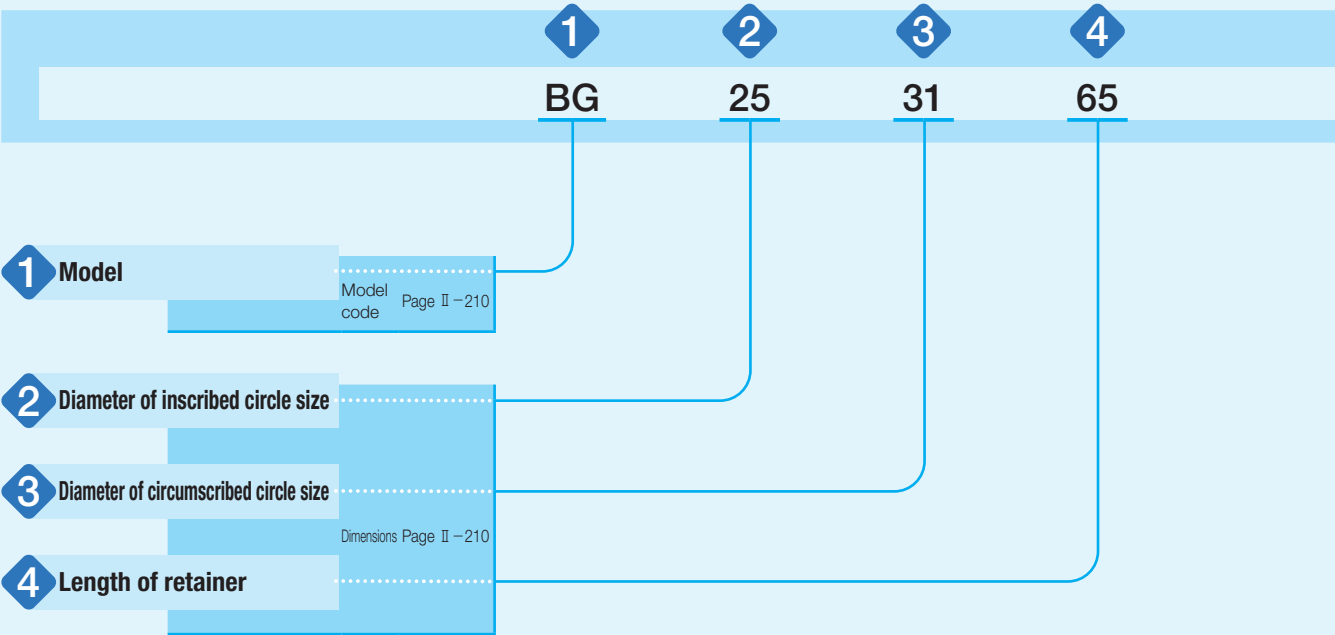
Points

- **Rotational and linear motions**
High-accuracy balls incorporated into the retainer make use of the raceway accuracy to allow high-accuracy rotational motion and rotary and linear motion.
- **Large load rating and high rigidity**
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.
- **Superior high speed operation**
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.
- **Long life**
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 Diameter of inscribed circle size		Indicate the diameter of inscribed circle in mm.
3 Diameter of circumscribed circle size		Indicate the diameter of circumscribed circle 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.

$DN \geq D_{pw} n + 10 S n_1 \dots \dots \dots (1)$

- where, DN : Allowance of velocity (see Table 1)
 n : Rotation speed, rpm
 n_1 : Number of strokes per minute, cpm
 S : Stroke length, mm
 D_{pw} : Pitch circle diameter of balls, mm
 $(D_{pw} = \frac{F_w + E_w}{2})$
 F_w : Diameter of inscribed circle, mm
 E_w : Diameter of circumscribed circle, mm

However, applicable when $n_1 \leq 5000, S n_1 \leq 50000$.

Table 1 Allowance of velocity

Lubrication conditions	DN
Oil lubrication	600 000
Grease lubrication	300 000

Precaution for Use

① 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 internal radial clearance unit: μm

Nominal dimensions of shaft mm	Lower limit of internal radial clearance
19	−5
22	−5
25	−5
28	−7
32	−7
38	−7

② 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.

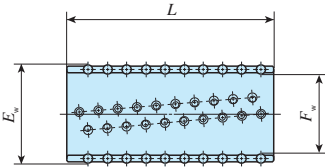
Note ⁽¹⁾ For hardness factor, refer to Fig. 3 in page III-5.

Table 6 Minimum effective hardening depth of raceway unit: mm

Nominal dimensions of shaft and housing hole		Recommended value for minimum effective hardening depth
Above	Below	
—	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			Basic dynamic load rating ⁽¹⁾ C N	Basic static load rating ⁽¹⁾ C ₀ N
			F _w	E _w	L		
19	BG 192555*	33	19	25	55	2 330	2 600
22	BG 222860*	40	22	28	60	2 490	2 950
25	BG 253165*	48	25	31	65	2 660	3 390
28	BG 283670*	76	28	36	70	3 830	4 660
32	BG 324075*	93	32	40	75	4 480	6 030
38	BG 384880*	162	38	48	80	6 750	9 390

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.

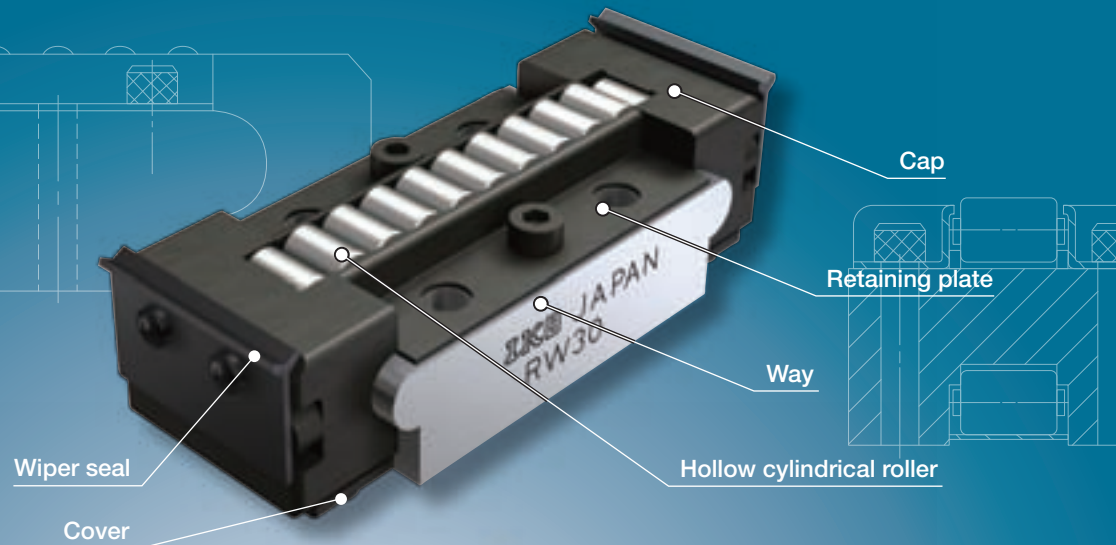
Roller Way & Flat Roller Cage

Roller Way
Flat Roller Cage

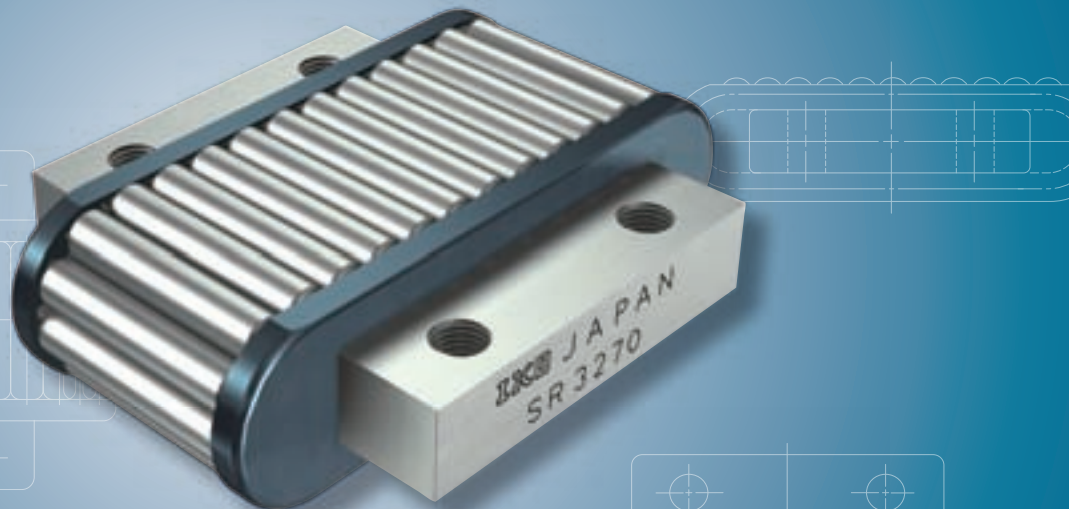


Roller Way

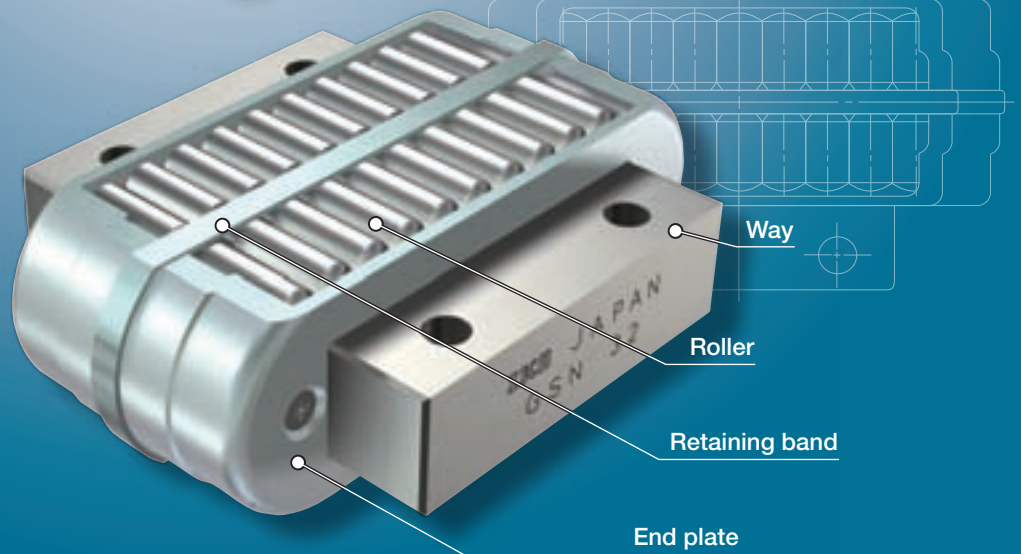
RW



SR



GSN



Points

1 High rigidity and accuracy

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.

2 Smooth motion

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.

RW · SR · GSN
FT · FTW...A

Table 1.1 Models and sizes of RW, SR and GSN (Metric series)

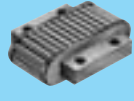
Shape	Model	Size									
		15	20	25	26	30	32	40	50	70	95
	RW	—	—	—	○	○	—	○	○	○	○
	SR	○	○	○	—	—	○	○	○	—	—
	GSN	○	○	○	—	—	○	○	○	—	—

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.

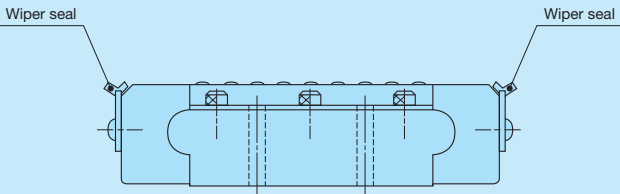


Fig. 1 Wiper seal

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 <i>H</i> 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⁾ Applied for SR and GSN.
⁽²⁾ Applied for 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*

Size	RW		Size	RWB	
	Dim.	<i>W</i> tolerance mm		Dim.	<i>W</i> tolerance inch
26	0		14	0	
30	−0.05		16	−0.002	
40			24		
50	0		32	0	
70	−0.07		48	−0.003	
95	0		64	0	
	−0.10			−0.004	

Table 3.2 Tolerances of SR and GSN width *W₁*, and length *L₁*

Size	SR		Size	GSN	
	Dim.	<i>W</i> tolerance, mm		Dim.	<i>L</i> tolerance, mm
15			14		
20	0		16	−0.2	0
25	−0.2		24		−0.2
32			32		
40			48	0	
50	0		64	−0.3	0
	−0.3				−0.3

Table 4 Display code, and tolerance of height *H* and operation height *A*

Item	Selection code	Dim. tolerance of height <i>H</i> and operation height <i>A</i>	
		Metric series mm	Inch series inch
Accuracy class			
Ordinary (no symbol)	—	0 ~ −0.010	—
High (H)	E 5 E10	0 ~ −0.005 −0.005 ~ −0.010	0 ~ −0.0002 −0.0002 ~ −0.0004
Precision (P)	C 3 C 6 C 9	0 ~ −0.003 −0.003 ~ −0.006 −0.006 ~ −0.009	0 ~ −0.00012 −0.00012 ~ −0.00024 −0.00024 ~ −0.00036
Super precision (SP)	B 2 B 4 B 6 B 8 B10	0 ~ −0.002 −0.002 ~ −0.004 −0.004 ~ −0.006 −0.006 ~ −0.008 −0.008 ~ −0.010	0 ~ −0.00008 −0.00008 ~ −0.00016 −0.00016 ~ −0.00024 −0.00024 ~ −0.00032 −0.00032 ~ −0.00040

Precaution for Use

① 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	
SR 32	GSN 32	1.0
SR 40	GSN 40	1.5
SR 50	GSN 50	2.0

② 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)

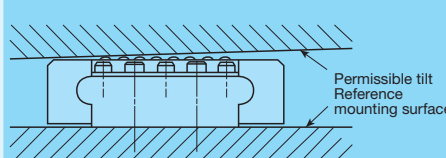
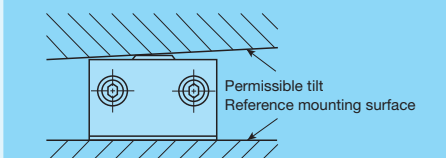
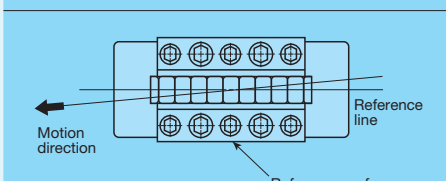
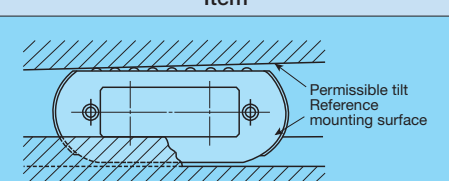
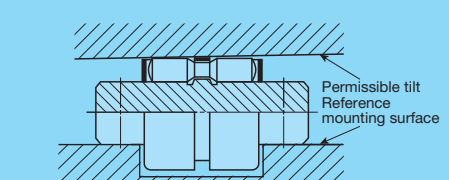
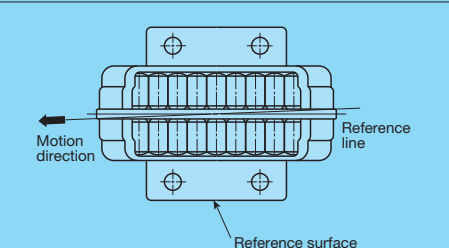
Item	Recommended value
	0.02/100 or lower
	0.015/100 or lower
	0.05/100 or lower

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

③ 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.

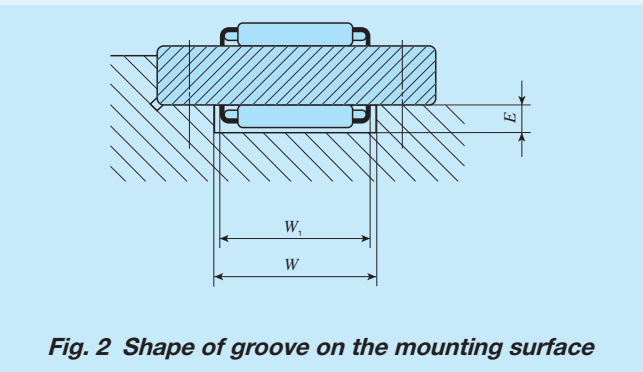


Fig. 2 Shape of groove on the mounting surface

Precaution for Mounting

① 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.

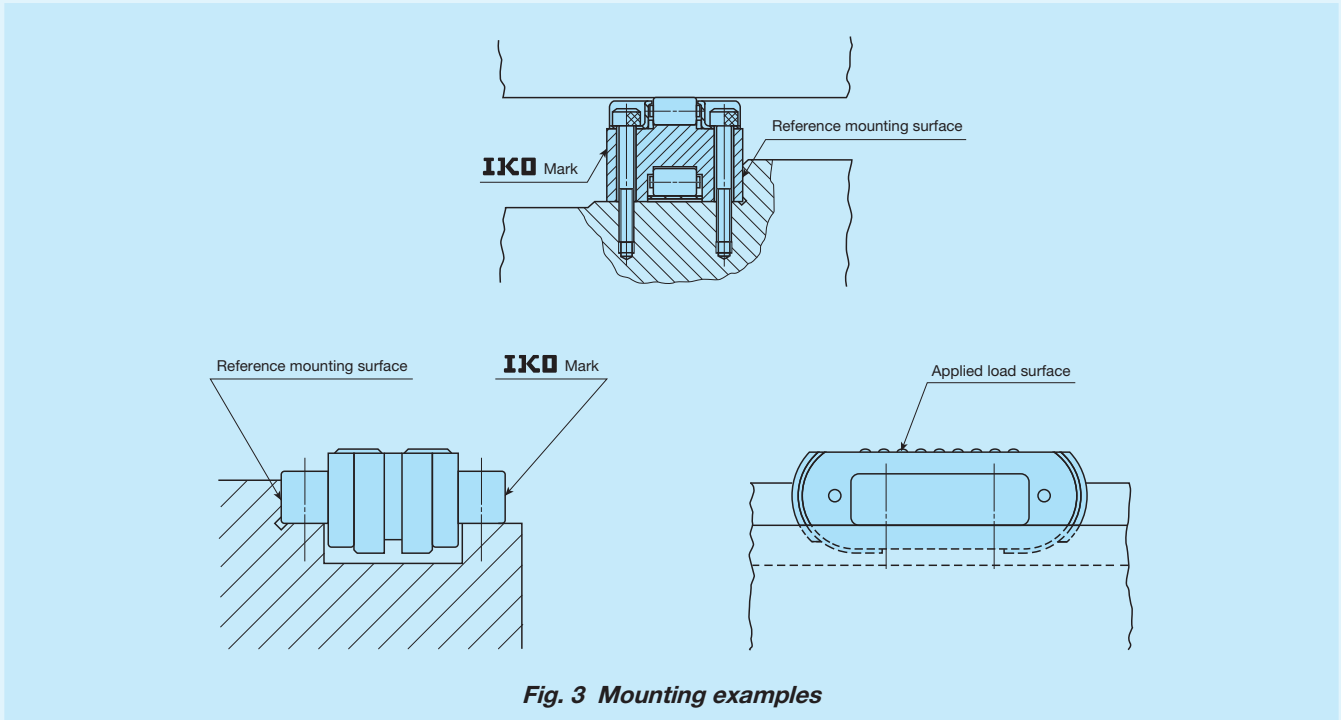


Fig. 3 Mounting examples

② 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.

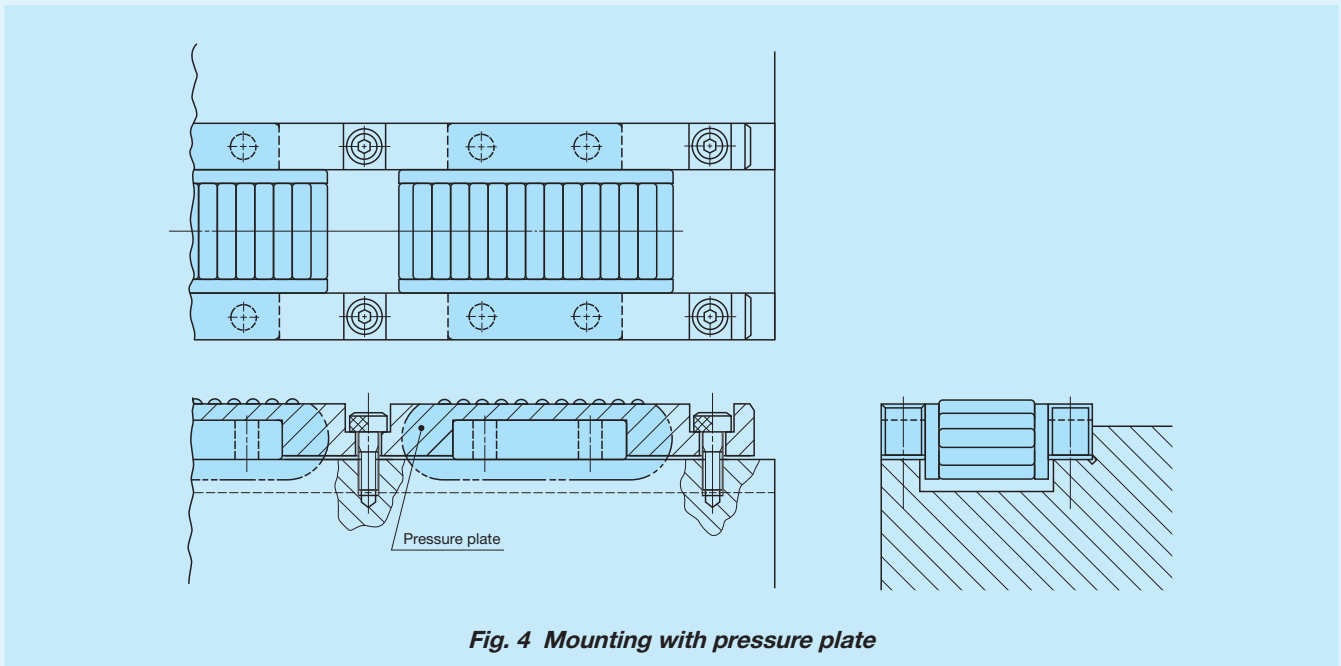
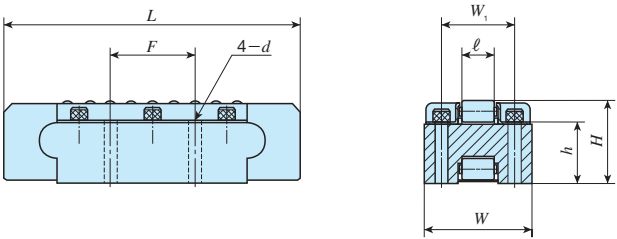


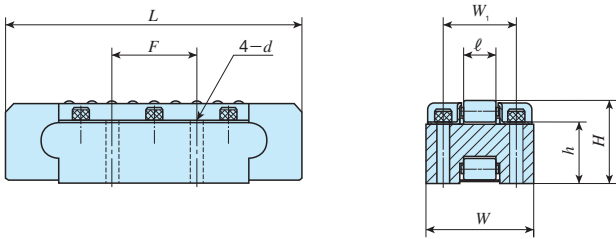
Fig. 4 Mounting with pressure plate

Shape	RW		
			
Size	26	30	40
	50	70	95



Identification number	Mass (Ref.) g	Nominal dimensions mm								Basic dynamic load rating C N	Basic static load rating C ₀ N
		W	H	L	ℓ	F	W ₁	h	d		
RW 26	74	26	14	50	6	19	16	10	3.4	25 000	40 100
RW 30	179	30	19	70	7.5	25.4	19	14	4.5	39 800	71 200
RW 40	740	40	28	100	11.3	38.1	26	21	5.5	85 700	160 000
RW 50	1 750	50	38	140	15	50.8	35	28.5	6.6	154 000	314 000
RW 70	5 260	70	57	200	22.5	76.2	48	42.5	9.0	306 000	638 000
RW 95	12 700	95	76	270	30	101.6	65	56.5	11.0	514 000	1 130 000

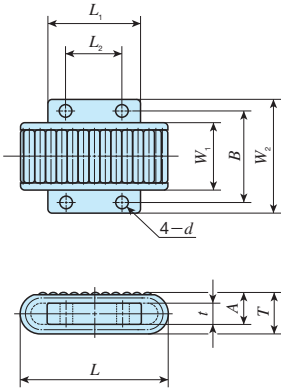
Shape	RWB		
			
Size	14	16	24
	32	48	64



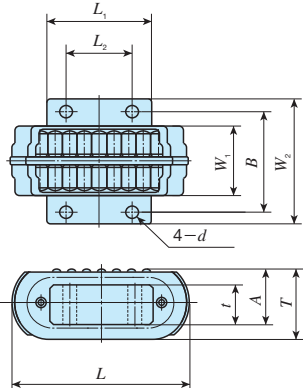
Identification number	Mass (Ref.) g	Nominal dimensions inch / mm								Basic dynamic load rating C N	Basic static load rating C ₀ N
		W	H	L	ℓ	F	W ₁	h	d		
RWB 14*	91	⁷ / ₈ 22.225	⁹ / ₁₆ 14.288	¹ / ₂ 1.97 50	0.236 6	³ / ₄ 19.050	⁴³ / ₆₄ 17.066	0.41 10.4	0.125 3.2	25 000	40 100
RWB 16*	227	¹ / ₂ 25.400	³ / ₄ 19.050	² / ₇ 2.76 70	0.295 7.5	¹ / ₂ 25.400	¹³ / ₁₆ 20.638	0.56 14.2	0.125 3.2	39 800	71 200
RWB 24*	730	¹ / ₂ 38.100	¹ / ₈ 28.575	³ / ₄ 3.94 100	0.445 11.3	¹ / ₂ 38.100	¹ / ₃₂ 30.956	0.85 21.5	0.180 4.6	85 700	160 000
RWB 32*	1 770	² / ₅ 50.800	¹ / ₂ 38.100	⁵ / ₁₆ 5.51 140	0.591 15	² / ₅ 50.800	¹ / ₈ 41.275	1.12 28.5	0.206 5.2	154 000	314 000
RWB 48*	5 670	³ / ₄ 76.200	² / ₄ 57.150	⁷ / ₈ 7.88 200	0.886 22.5	³ / ₄ 76.200	² / ₁₆ 61.912	1.68 42.8	0.266 6.8	306 000	638 000
RWB 64*	13 500	⁴ / ₁₀ 101.600	³ / ₄ 76.200	¹⁰ / ₁₆ 10.63 270	1.181 30	⁴ / ₁₀ 101.600	³ / 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.

Shape	SR		
			
Size	15	20	25
	32	40	50



Shape	GSN		
			
Size	15	20	25
	32	40	50

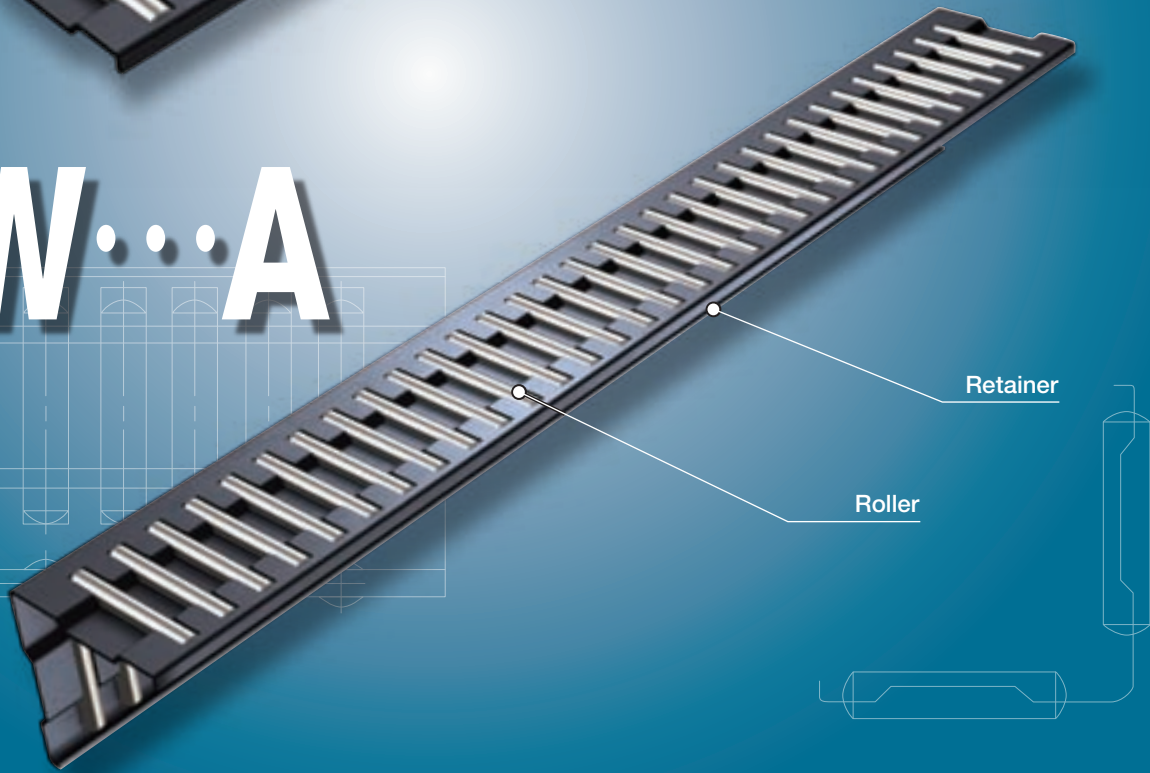
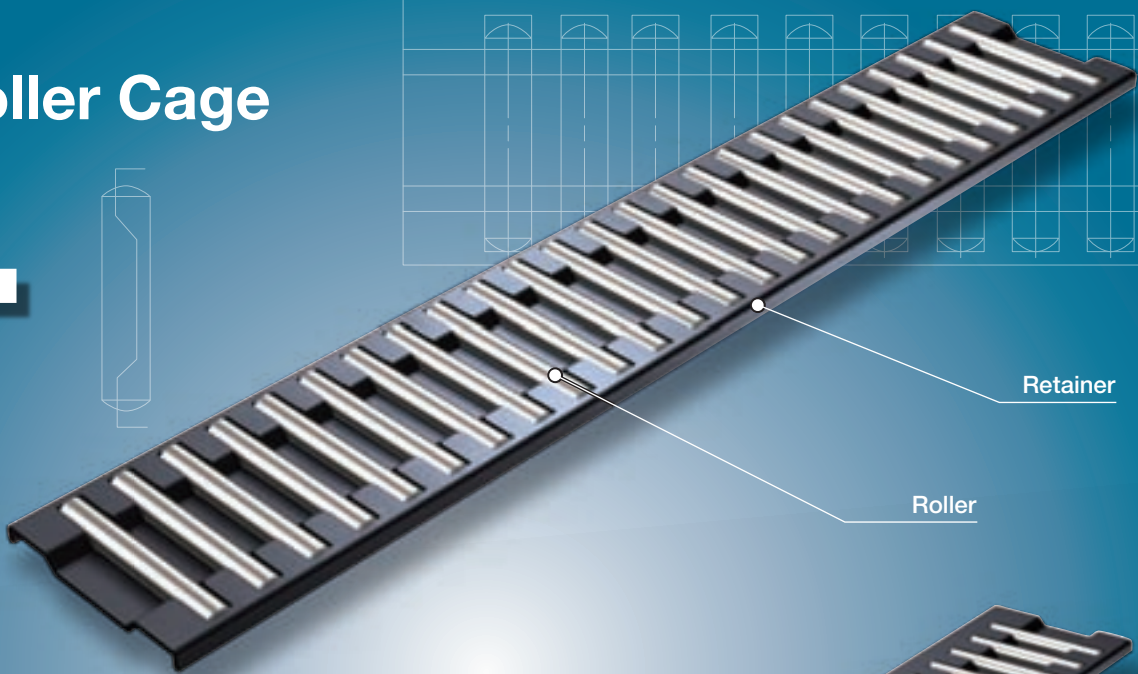


Identification number		Mass (Ref.)	Nominal dimensions mm											Basic dynamic load rating	Basic static load rating
			W_1	W_2	L	A		T	L_1	L_2	B	d	t	C N	C_0 N
SR 1540 ————	——	62	15	30	40	11		15	20	12	23	3.3	7	26 500	45 900
	GSN 15	82	15	30	40	15		20	19	12	23	3.4	11	22 300	36 000
SR 2050 ————	——	120	20	36	50	12		16	30	18	29	3.8	8	42 800	96 300
	GSN 20	145	20	36	50	15		20	29	18	29	3.4	11	40 100	87 900
SR 2560 ————	——	210	25	45	60	14		19	35	20	36	4.8	9	67 300	156 000
	GSN 25	260	25	45	60	18		24.5	35	20	36	4.5	13	58 900	131 000
SR 3270 ————	——	345	32	55	70	15		20	45	27	44	5.5	10	97 500	271 000
	GSN 32	413	32	55	70	18		24.5	45	27	44	4.5	13	88 800	241 000
SR 4090 ————	——	750	40	68	87	21		28	55	35	54	6.5	14	143 000	373 000
	GSN 40	940	40	68	92	25		34	54	35	54	5.5	18	133 000	337 000
SR 50125 ————	——	1 870	50	82	125	30		40	78	50	66	8.5	20	252 000	673 000
	GSN 50	1 800	50	82	121	30		42	77	50	66	6.6	20	242 000	634 000

Flat Roller Cage

FT

FTW...A



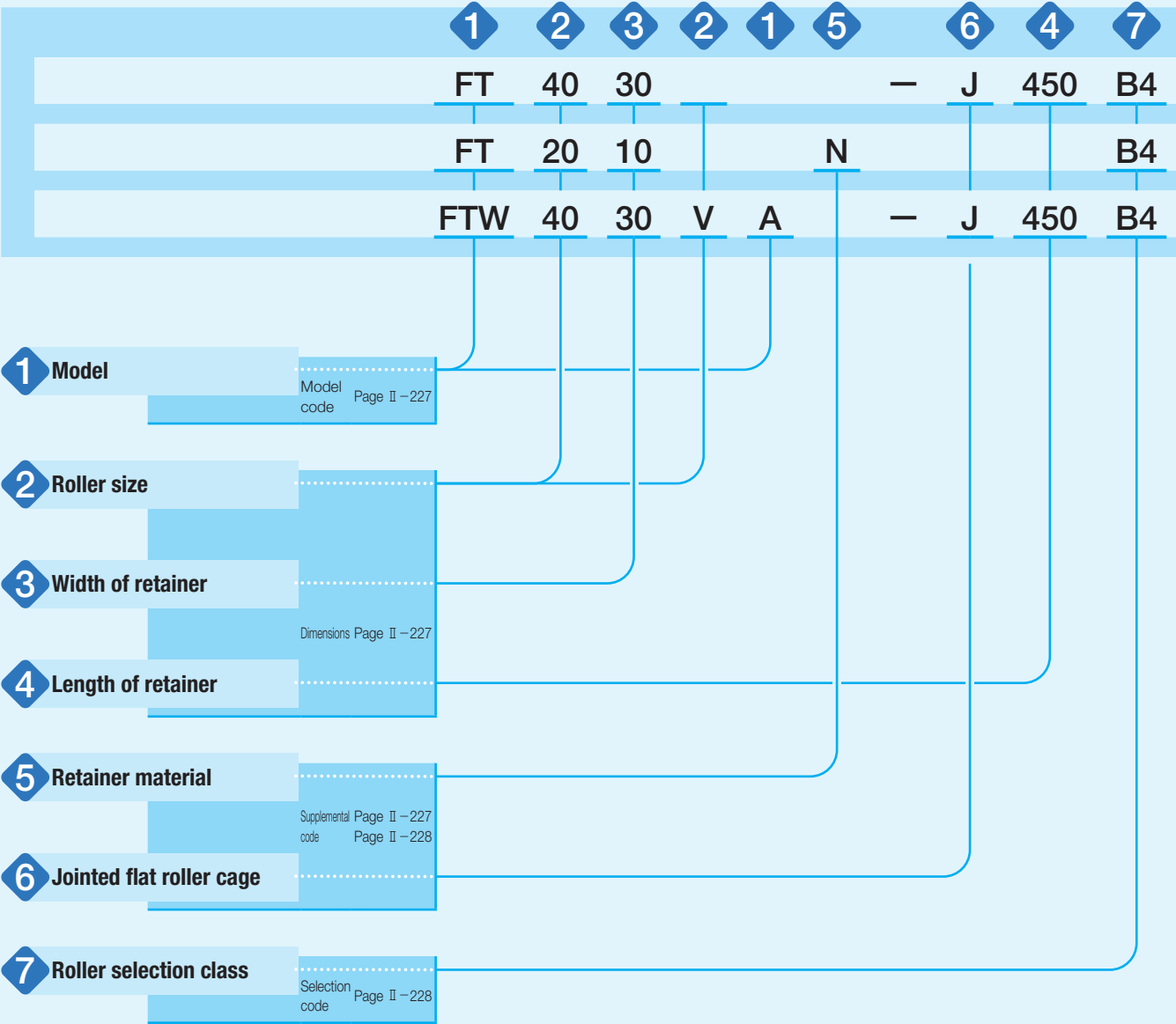
Points

- 1 Low section
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.
- 2 Large load rating
Rollers are assembled in a cage with a small pitch distance, so load ratings are large and the rigidity is high.
- 3 Simple replacement for rolling guide
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.
- 4 Smooth operations and low noise
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.
- 5 Easy handling
The rollers are caged in a retainer securely, allowing easy handling.

Identification Number and Specification

Example of an identification number

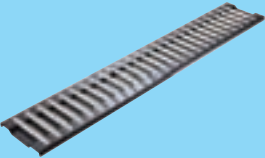
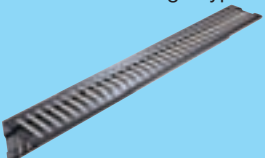
The specification of FT and FTW...A are indicated by the identification number. Indicate the identification number, consisting of a model code, dimensions, a supplemental code, and a selection code for each specification to apply.



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
2	Roller size	Indicate 10 times as large value as the roller diameter (mm). Indicate 10√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. Steel made products may be used at high temperature. However, when it exceeds 100°C, contact IKO . The maximum operating temperature of synthetic resin made products is 100°C and temperature up to 80°C is allowed for continuous operation.

- 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.

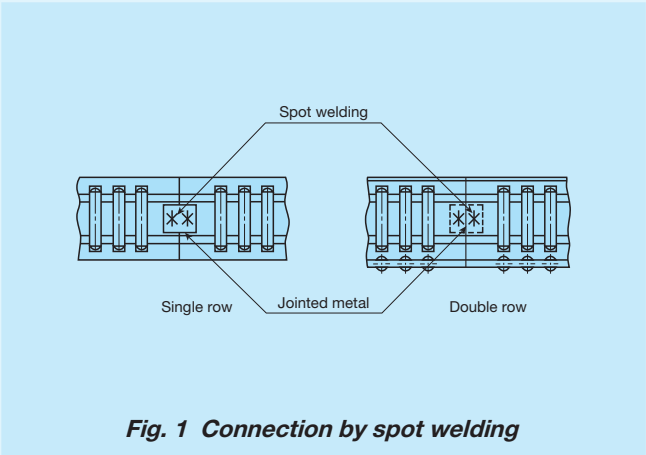


Fig. 1 Connection by spot welding

Table 2 Maximum length of jointed flat roller cage unit: mm

Identification number	Maximum length of retainer
FT 2010	300
FT 2515	
FT 3020	
FT 3525	375
FT 4030	
FT 4035	
FT 4026 V	600
FT 5038	
FT 5043	
FT 5030 V	1 000
FT 10080	
FT 10060 V	
FT 200120	1 500
FT 200100 V	
FTW 4030 VA	
FTW 5045 A	1 000
FTW 5050 A	
FTW 5035 VA	
FTW 10095 A	1 500
FTW 10070 VA	
FTW 200150 A	
FTW 200120 VA	

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.

RW · SR · GSN
FT · FTW...A

Precaution for Use

① 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
Above	Below	
—	3	0.5
3	4	0.8
4	5	1.0
5	8	1.5
8	10	2.0
10	14.142	2.5
14.142	20	3.5

② 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.

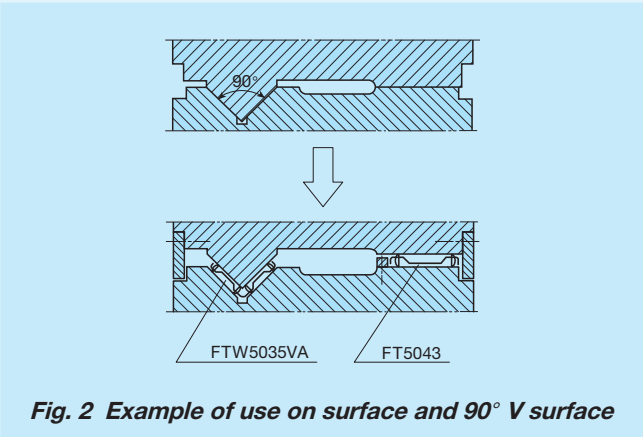


Table 6 Combination of Flat Roller Cage

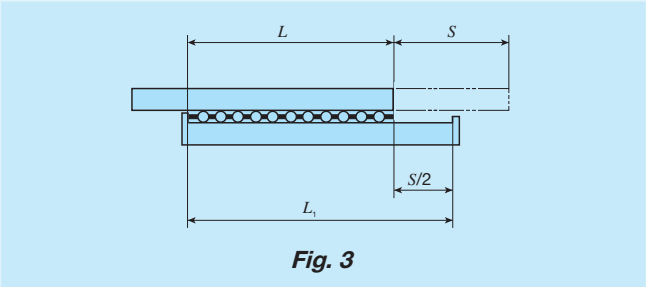
Combination Number	For surface		For 90° V surface	
	Identification number	Roller diameter D_w	Identification number	Roller diameter D_w
1	FT 4030	4	FTW 4030 VA	2.828
2	FT 4035	4	FTW 4030 VA	2.828
3	FT 5038	5	FTW 5035 VA	3.535
4	FT 5043	5	FTW 5035 VA	3.535
5	FT 10060 V	7.071	FTW 5045 A	5
6	FT 10060 V	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

③ 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:

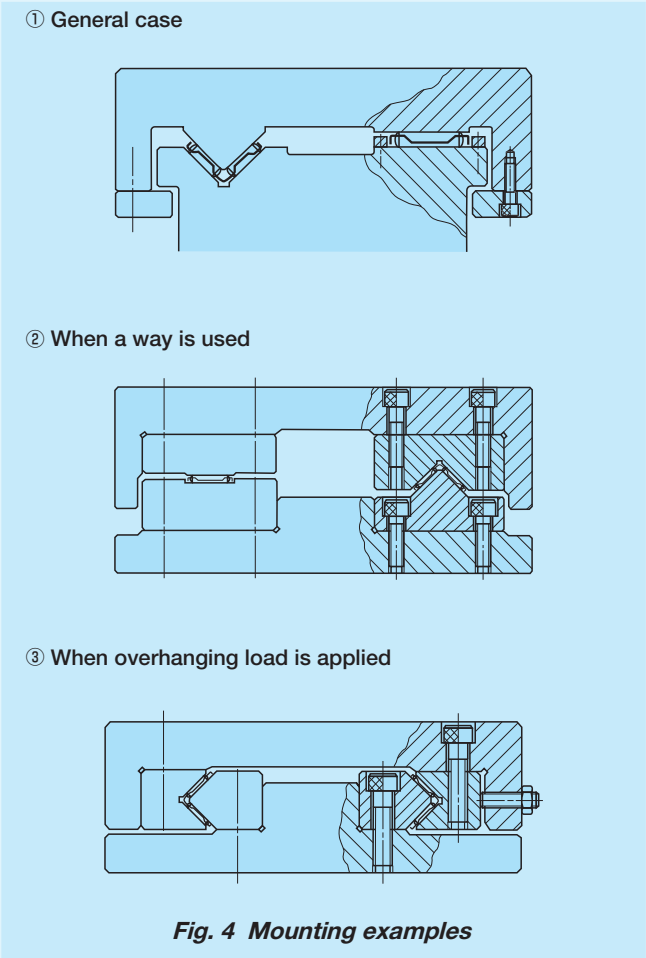
$$L_1 = \frac{S}{2} + L \dots\dots\dots (1)$$

where, L_1 : Way length, mm
 S : Stroke length, mm
 L : Retainer length, mm



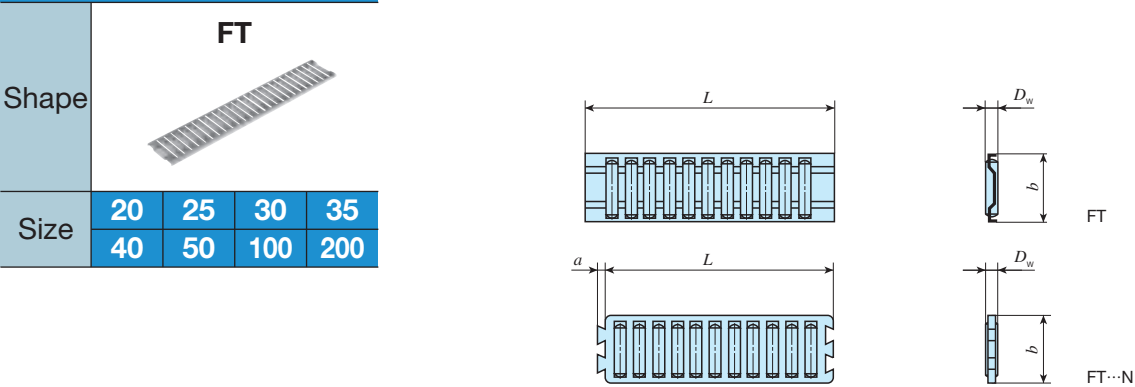
Precaution for Mounting

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.

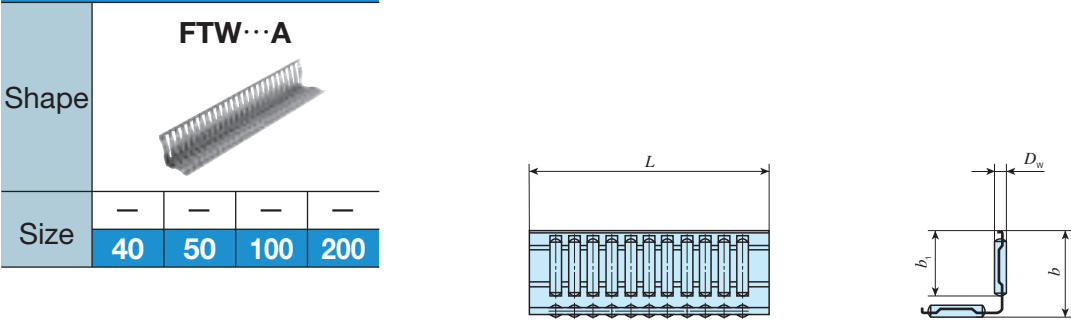


IK Flat Roller Cage

Single row type Flat Roller Cage



Double row angle type Flat Roller Cage



Identification number		Mass (Ref.) g	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
Steel retainer	Synthetic resin retainer		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			100	—	9 710	22 900
FT 2010 - 100	——	5.8					22 900	68 700
————	FT 2515 N	4.3	2.5	15	45	2.5	17 300	41 100
FT 2515 - 45	——	5.6			100	—	22 000	56 200
FT 2515 - 100	——	11.6					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

Identification number		Mass (Ref.) g	Nominal dimensions mm				Basic dynamic load rating C N	Basic static load rating C ₀ N
Steel retainer	Synthetic resin retainer		D _w	b	L	b ₁		
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



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 outer diameter 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



Roller Follower Series

Even the mating guide surfaces are maintenance free!!

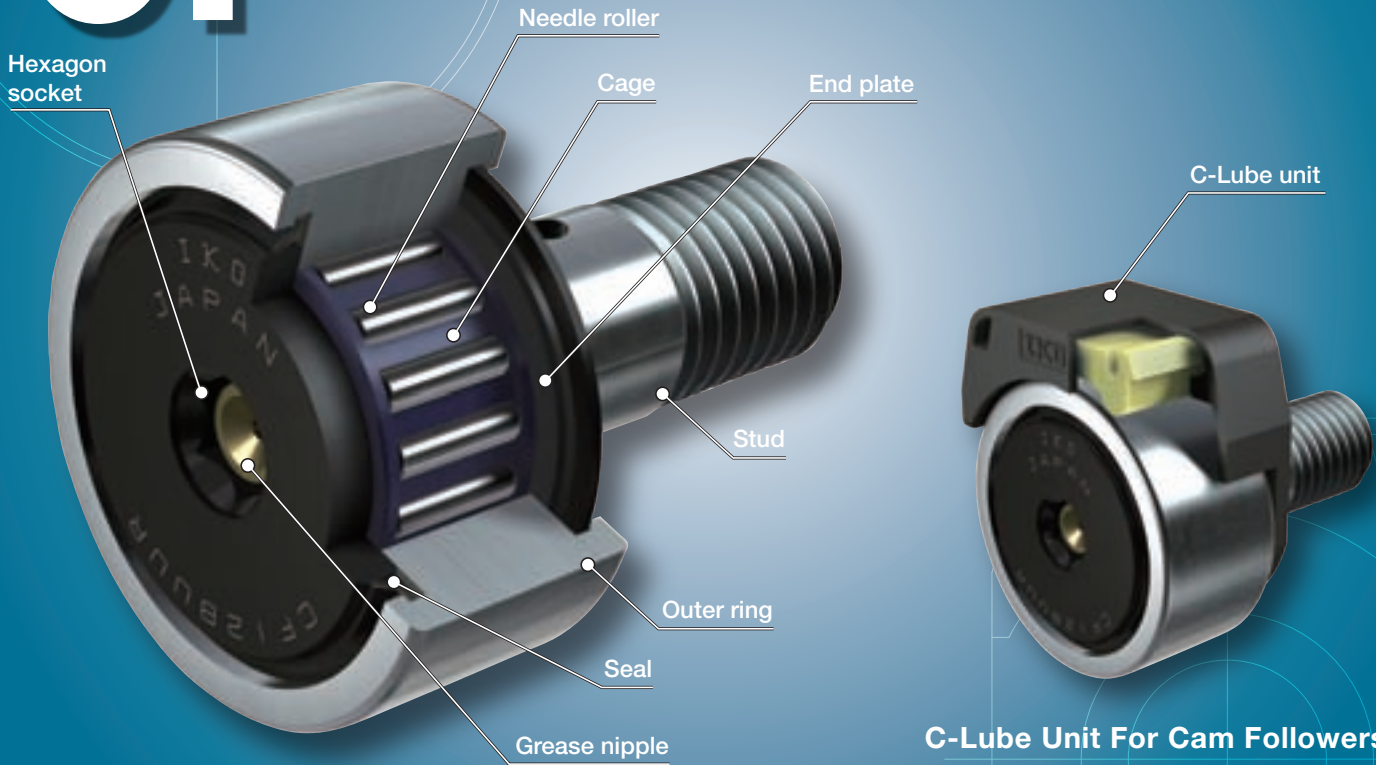
"C-Lube Unit", external lubrication parts for Cam Followers



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 outer diameter surface and the cam guide surface of Cam Followers and eliminates the need for routine grease feed.

Points

Substantial product lineup

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

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

The socket with hexagon hole for easy mounting

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

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

The C-Lube unit supplies lubrication oil to the outer ring outer diameter 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 outer diameter 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 outer diameter 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 (cylindrical 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 outer diameter dimensions are indicated in 1/16 inch.	

Table 1.1 Models and dimensions

Shape	Model	Characteristics	Stud diameter
	CFS	Ultrafine needle roller is incorporated to the outer ring of bearing so the compact design is realized with outer ring outer 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
	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 surface.	1.4 to 6 mm
	CF	This is a basic Cam Followers model. Size variations from 3 to 30 mm in stud diameter are available.	3 to 30 mm
	CF···G	Cam Followers with pre-packed grease at reasonable price.	6 to 20 mm
	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 surface.	3 to 20 mm
	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
	CFES···B	Rotation of eccentric stud can align height of outer ring outer 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
	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
	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
	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
	NUCF···B	The full complement roller bearing with double row cylindrical rollers incorporated in the outer ring can receive large radial load and some axial load.	10 to 30 mm
	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

3 Material type

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

Specify the component part material. For applicable models and dimensions, see dimension table.

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.



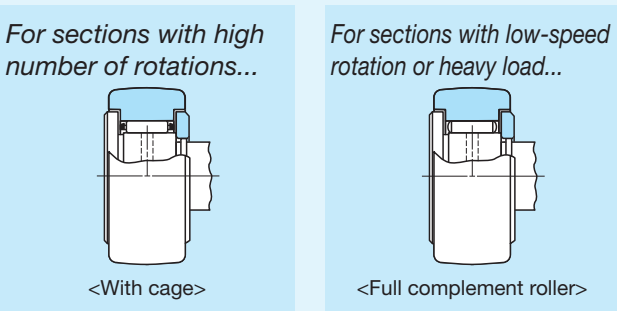
4 Roller guide type (1)

With cage : No symbol
Full complement roller : V

Specify the roller guide type. For applicable models and dimensions, see dimension table.

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

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



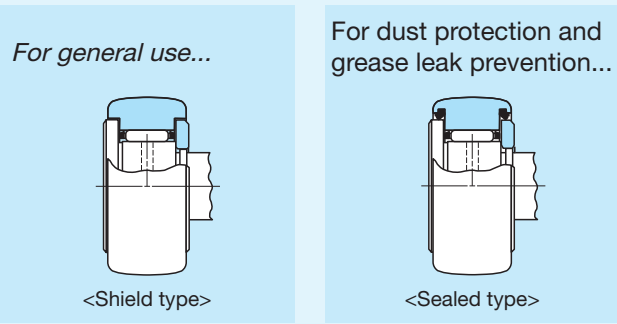
5 Seal structure (1)

Shield type : No symbol
Sealed type : UU

Specify the seal structure. For applicable models and dimensions, see dimension table.

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 collar element and between the outer ring and end plate become smaller and labyrinth is formed.
The sealed type incorporates the seal structure, which can prevent foreign substances from entering.

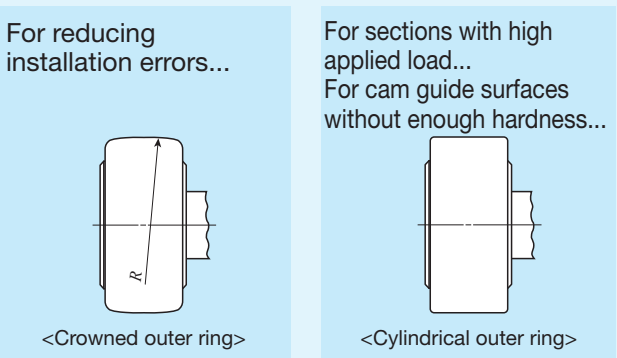


6 Shape of outer ring outer diameter surface

Cylindrical outer ring : No symbol
Crowned outer ring : R

Specify the shape of outer ring outer diameter surface. For applicable models and dimensions, see dimension table.

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.



7 Accuracy class

Accuracy class 0 : No symbol
Accuracy class 6 (1) : P6
Accuracy class 5 (1) : P5
Accuracy class 4 (1) : P4

For details of accuracy, see Table 2, Table 3.1, Table 3.2, and 3.3.
We also provide special accuracy class product. For details, please contact **IKO**.

Note (1) Applied for miniature Cam Followers CFS and CFS··W.

Table 2 Tolerance

unit: μm

Name	Class	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
Dim. D tolerance of outer ring outer diameter		See Table 3.1	0 -50	See Table 3.2	0 -50	See Table 3.3
Dim. d_1 tolerance of stud diameter		h6	h7		+ 25 0	
Dim. C tolerance of outer ring width		0 -120	0 -120		0 -130	

Note (1) Applied for 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} Dim. tolerance of mean outer diameter within a single surface								K_{ea} Radial deflection (Maximum)			
Class 0		Class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4
H	L	H	L	H	L	H	L				
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)

D Nominal outer ring outer diameter		ΔD_{mp} Dim. tolerance of mean outer diameter within a single surface		V_{Dsp} Outer diameter variation within the surface (Maximum)	V_{Dmp} Mean outer diameter variation within a single surface (Maximum)	K_{ea} Radial runout (Maximum)
mm						
Above	Below	H	L			
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)

D Nominal outer ring outer diameter		ΔD_{mp} Dim. tolerance of mean outer diameter within a single surface		V_{Dsp} Outer diameter variation within the surface (Maximum)	V_{Dmp} Mean outer diameter variation within a single surface (Maximum)	K_{ea} Radial runout (Maximum)
mm						
Above	Below	H	L			
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

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 C0

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.

L10 = (C / Pr)^10/3

where, L10 : Basic rating life, 10^6rev.

C : Basic dynamic load rating, N

Pr : Dynamic equivalent radial load, N

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

Lh = 10^6 L10 / 60n

where, Lh : Basic rating life represented as time h

n : Rotation speed min^-1

Static safety factor

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

fs = C0 / Por

where, fs : Static safety factor

C0 : Basic static load rating N

Por : Static equivalent radial load (maximum load) N

Table 4 Static safety factor

Bearing use conditions	fs
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	fw
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.

Internal Radial Clearance

Internal radial clearance of Cam Followers is indicated in the Table 6.

Table 6 Internal radial clearance value

Identification number				Internal radial 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) Applied for 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) Applied for Cam Followers other than miniature Cam Followers and inch series Cam Followers.

Table 8 Tolerances of dimensions of mounting hole

Classification of diameter mm		F7		H6		H7	
Above	Below	H	L	H	L	H	L
—	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

Track Load Capacity

Track load 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 load 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/mm²) and if hardness is not 40HRC, these values must be multiplied by track load 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 rotation speed of the cam mechanism, etc.

Table 9.1 Track load capacity for miniature Cam Followers CFS, CFS...W

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

Table 9.3 Track load capacity for inch series Cam Followers

Identification number (Crowned outer ring)	Track load capacity	Identification number (Cylindrical outer ring)	Track load capacity	Identification number (Crowned outer ring)	Track load capacity	Identification number (Cylindrical outer ring)	Track load 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 9.2 Track load capacity for standard Cam Followers (1)

Identification number (Crowned outer ring)	Track load capacity	Identification number (Cylindrical outer ring)	Track load 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) Applied for Cam Followers other than miniature Cam Followers and inch series Cam Followers.

Table 10 Track load capacity factor

Hardness HRC	Tensile strength N/mm ²	Track load 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 Number of Rotations

The allowable number of rotation 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.

$d_1n \text{ value} = d_1 \times n$

where, d_1 : Cam Followers stud diameter mm
 n : Rotation speed min⁻¹

Table 11 d_1n value of Cam Followers

Model of bearing	Lubrication	Grease lubrication	Oil lubrication
With cage		84 000	140 000
Full complement roller		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 of 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

Model of bearing Stud diameter d_1 (1) mm	Class	With cage		Full complement roller
		Shield type	Sealed type	
Miniature Type Cam Followers CFS		○	—	○
Thrust Disk Type Miniature Cam Followers CFS...W		○	—	○
Standard Type Cam Followers CF...B	$d_1 \leq 5$	○	○	—
Thrust Disk Type Cam Followers CF...WB	$6 \leq d_1 \leq 10$	○	○	○
Solid Eccentric Stud Type Cam Followers CFES...B	$12 \leq d_1$	×	×	○
Eccentric Type Cam Followers CFE...B		×	×	○
Cam Followers G CF...G		○	—	—
C-Lube Cam Followers CF...WB.../SG(2)		—	×	—
Centralized Lubrication Type Cam Followers (cylindrical outer ring) 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) , screw diameter G specified in the dimension table.
(2) Thermoset solid lubricant C-Lube is pre-packed in the bearing space.

Oil Hole

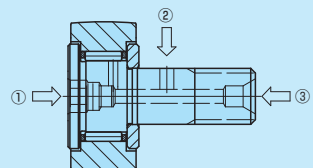
Oil hole position for the Cam Followers is according to the Table 13.

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



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

Note (1) For Eccentric Type Cam Followers (CFE) , screw diameter G specified in the dimension table. However, oil hole on the stud outer diameter surface cannot be used.

(2) Grease can be fed from the Re-grease fitting located inside the hexagon socket on the head.

(3) The grease nipple is integrated in the hexagon socket 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 socket on the head.

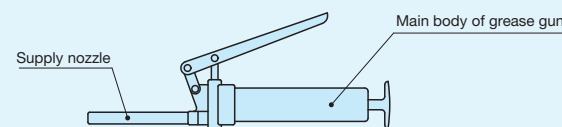
Table 14 Models and dimensions of supply nozzle

Model	Dimensions and shape	Compatible grease nipple and Regrease fitting
A-5126T		NPF4-1 (1) NPF6-1 (1) Re-grease fitting
A-5120R		NPF4-1 (1) NPF6-1 (1)
B-5120R		NPF4-1 (1) NPF6-1 (1)
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 indicated in Fig. 15. Dimensions of grease nipple supplied as a standard accessory and dimensions of caps for rail mounting holes and jigs for oil hole on the no-feeding side are specified in the Table 16, Table 17, and Table 18, respectively.

Table 15 Accessories

Model of bearing Stud diameter d_1 (') mm		Class	Grease nipple	Caps for rail mounting holes	Nut	Spring washer
Miniature Type Cam Followers	CFS					
Thrust Disk Type Miniature Cam Followers	CFS...W		—	—	○	—
Standard Type Cam Followers	CF...B	$d_1 \leq 10$	—	—	○	—
Thrust Disk Type Cam Followers	CF...WB					
Solid Eccentric Stud Type Cam Followers	CFES...B	$12 \leq d_1$	○	—	○	—
Cylindrical Roller Cam Followers	NUCF...B					
Cam Followers G	CF...G		—	—	○	—
C-Lube Cam Followers	CF...WB.../SG		—	—	○	—
Eccentric Type Cam Followers		$d_1 \leq 10$	—	—	○	○
CFE...B		$12 \leq d_1$	○	—	○	○
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	$d_1 \leq 6.35$	—	—	○	—
		$9.525 \leq d_1$	○	○	○	—
Inch series Cam Followers	CR (With driver groove)		○	○	○	—
Inch series Cam Followers (With hexagon hole)	CRH...B	$d_1 \leq 7.938$	—	—	○	—
		$11.112 \leq d_1$	○	○	○	—
Inch series Cam Followers	CRH (With driver groove)		○	○	○	—

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

Table 17 Dimensions of grease nipple for Inch series Cam Followers

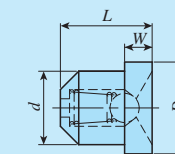
Identification number	Dimensions of grease nipple mm						Applicable bearing
	d	D	D_1	L	L_1	W	
NPB2	3.18	7.5	6	9	5.5	1.5	CR8 to CR10-1, CRH8-1 to CRH11
NPB3	4.76	7.5	6	10	5.5	1.5	CR12 to CR22, CRH12 to CRH22
NPB3-1	4.76	7.5	6	12.5	5.5	1.55	CR24 to CR36, CRH24 to CRH44
NPB4	6.35	8	6	13	6	2	CR48, CRH48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

The technical drawing shows a side view of a grease nipple. It is a cylindrical component with a wider base. The dimensions are labeled as follows: d is the inner diameter of the base, D is the outer diameter of the base, D_1 is the outer diameter of the main body, L is the total length, L_1 is the length of the main body, and W is the thickness of the base flange.

Table 18 Dimensions of caps for rail mounting holes on Inch series Cam Followers

Identification number	Dimensions of caps for rail mounting holes mm			Jig dimensions mm	Applicable bearing
	D	t	B	$d_{-0.1}^0$	
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

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



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

Note (1) Applied for Cam Followers other than Inch series Cam Followers.

(2) For Eccentric Type Cam Followers, screw diameter G specified in the dimension table.

Remark The same grease nipple as the accessory is integrated in the hexagon socket on the head.

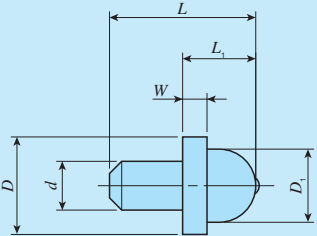
Special Specification

Operating Temperature Range

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.

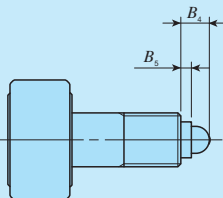
Example of an Identification Number
CF 12 BUUR / NP

Table 19 Dimensions of NPT type grease nipple

	Dimensions of grease nipple mm						Stud diameter d_1 (1) mm
	d	D	D_1	L	L_1	W	
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, screw diameter G specified in the dimension table.

Table 20 Dimensions with NPT type grease nipple mounted

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

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

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	With cage	
		Shield 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	$3 \leq d_1 \leq 5$	-20°C~110°C (1)	-20°C~80°C
C-Lube Cam Followers CF...WB.../SG	$5 \leq d_1 \leq 20$	—	-15°C~80°C (2)

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

Mounting

1 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 collar element of the Cam Followers directly with a hammer or the like. It may lead to rotation failure or crack.

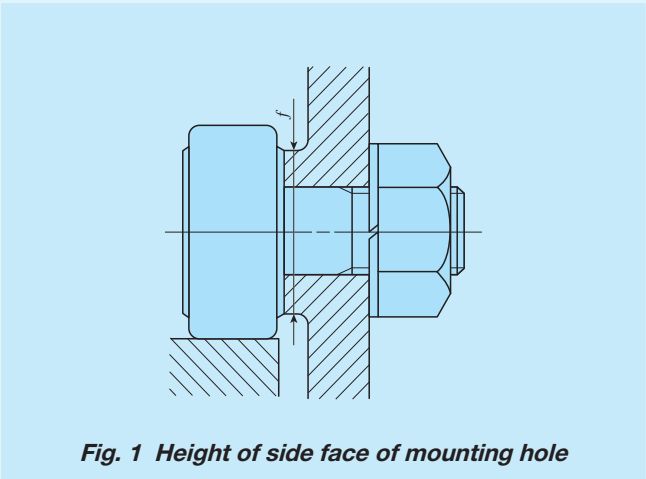


Fig. 1 Height of side face of mounting hole

2 The **IKO** mark at the side face of stud collar 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 vertical hole at the stud center is used for oil feeding or as a baffle.

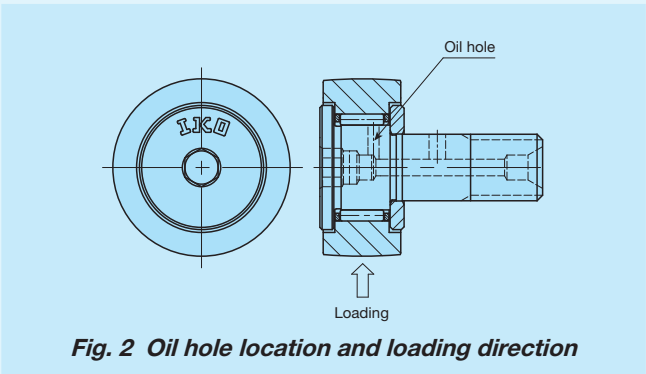


Fig. 2 Oil hole location and loading direction

3 Tighten the nut to the extent not to exceed the maximum tightening torque specified in the dimension table. With excessive tightening torque, the stud screw may be broken. In addition, use a lock nut, spring washer or special stop nut as necessary to prevent looseness depending on use conditions.

4 For Solid Eccentric Stud Type Cam Followers and Eccentric Type Cam Followers, a reference position for adjustment is defined as the **IKO** mark at the side face of stud collar 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 socket 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 or less (eccentric collar diameter: 11 mm) is quench-hardened.

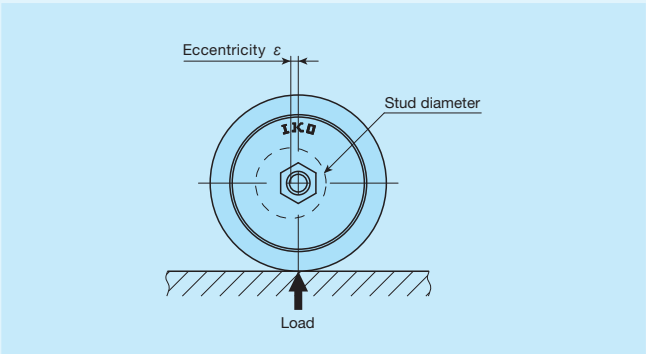


Fig. 3 Reference position for adjustment of Solid Eccentric Stud Type Cam Followers and Eccentric Type Cam Followers

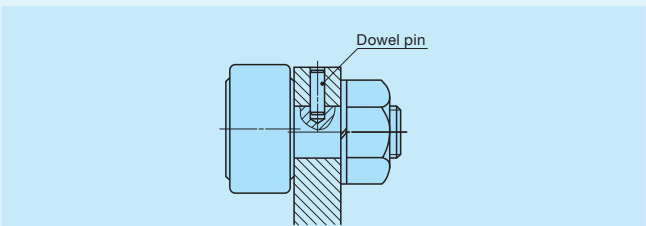


Fig. 4 Mounting examples of Solid Eccentric Stud Type Cam Followers

5 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)

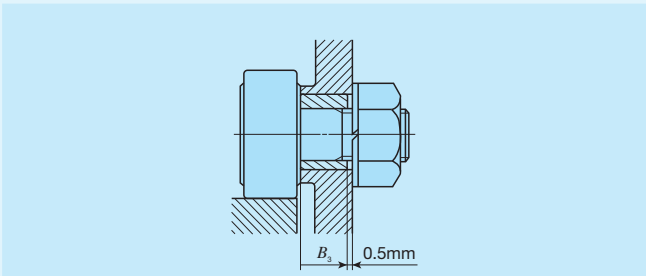


Fig. 5 Length of a mounting hole for Eccentric Type Cam Followers

6 Eccentric collar is available for Inch series Cam Followers. Eccentric Type Cam Followers, CRE are also available. If required, please consult with **IKO**.

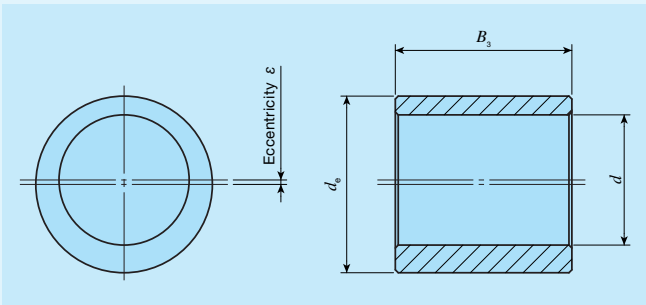


Table 21 Eccentric collars for Inch series Cam Followers

Identical number of collar	Outer diameter of collar d_e	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 (M)(B)(R)(UU)
EB10	9.525 (3/8)	9.525 (3/8)	0.380	6.350 (1/4)	CR10 CR10-1 (M)(B)(R)(UU)
EB12	12.700 (1/2)	12.700 (1/2)	0.380	9.525 (3/8)	CR12 CR14 (M)(B)(R)(UU)
EB16	15.875 (5/8)	15.875 (5/8)	0.760	11.112 (7/16)	CR16 CR18 (M)(B)(R)(UU)
EB20	17.450	17.450	0.760	12.700 (1/2)	CR20 CR22 (M)(B)(R)(UU)
EB24	22.225 (7/8)	22.225 (7/8)	0.760	15.875 (5/8)	CR24 CR26 (M)(B)(R)(UU)
EB28	25.400 (1)	25.400 (1)	0.760	19.050 (3/4)	CR28 CR30 (M)(B)(R)(UU)
EB32	30.150	30.150	0.760	22.225 (7/8)	CR32 CR36 (M)(B)(R)(UU)
EB48	44.450 (1 3/4)	44.450 (1 3/4)	1.520	31.750 (1 1/4)	CR48 VUU

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

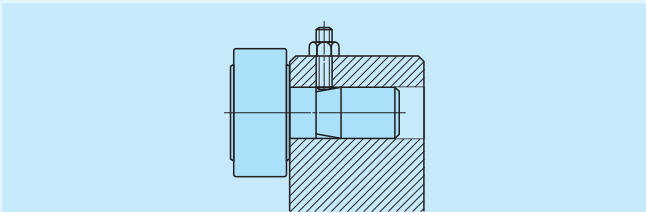


Fig. 6 Mounting examples of Easy Mounting Type Cam Followers

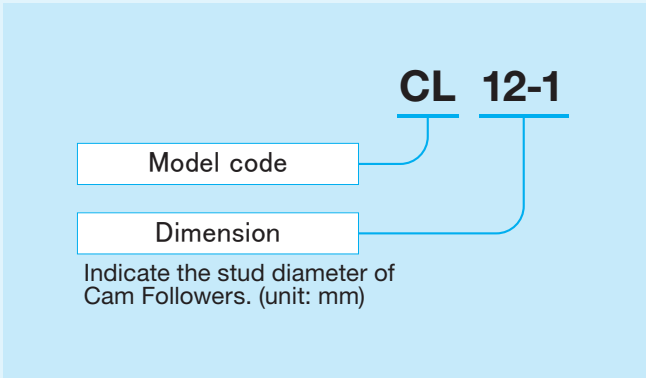
Precaution for Use

- 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 number of rotations

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

$d_1n \text{ value} = d_1 \times n$

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

❸ Minimum rotation angle

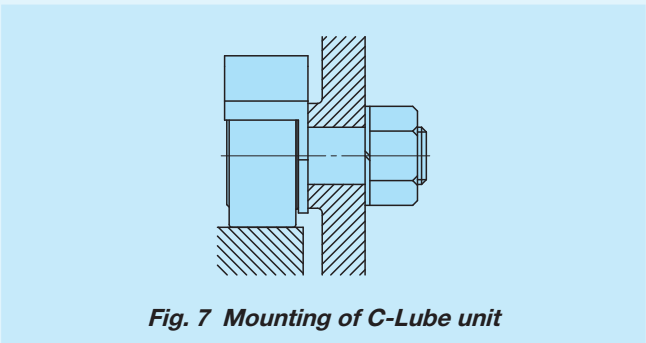
To supply lubrication oil to whole surface of the outer ring outer diameter of Cam Followers, use it under a condition where the Cam Followers outer ring is rotated at least by a turn when the C-Lube unit is mounted.

❹ Operating temperature range

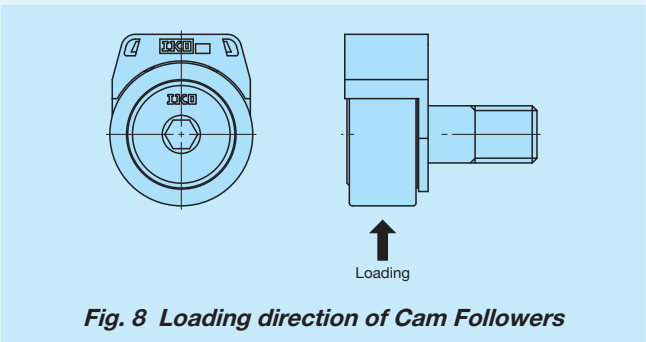
Use the C-Lube unit within the temperature range between -15°C and 80°C .

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)



- 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)



- 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 stop nut as necessary to prevent looseness depending on use conditions.

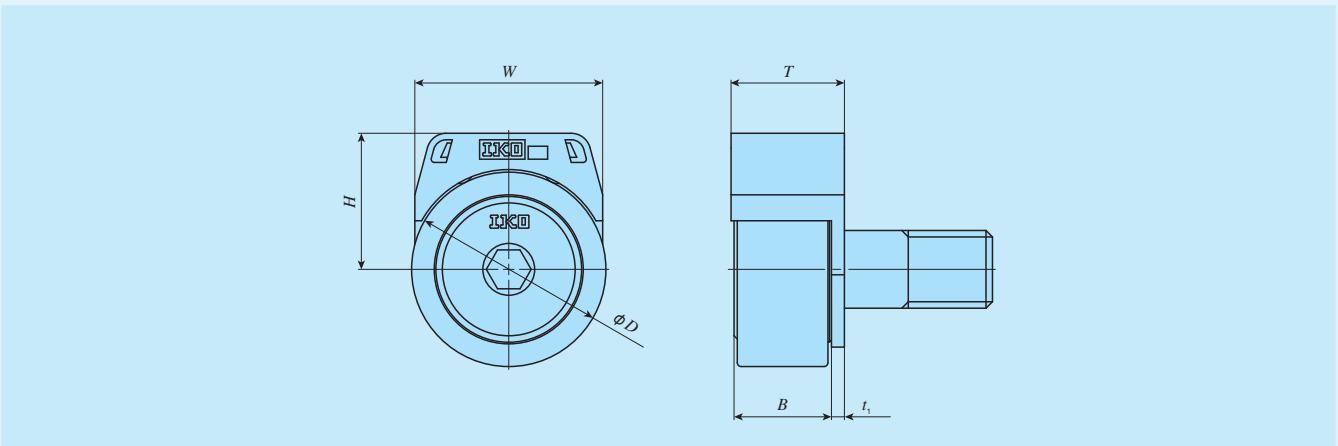
❻ Precaution for use

- 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 outer diameter 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

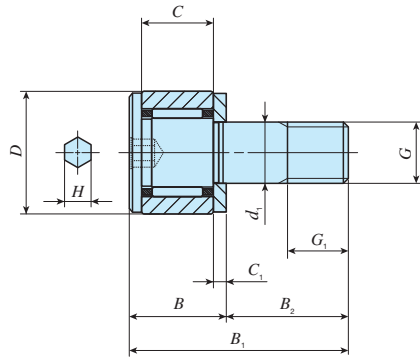
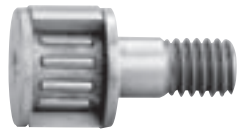
Note (1) A typical identification number is indicated, but is applied to all Standard Type Cam Followers, Thrust Disk Type Cam Followers, C-Lube Cam Followers, Centralized Lubrication Type Cam Followers, and Cylindrical Roller Cam Followers of the same size. To bring out the maintenance free effect more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

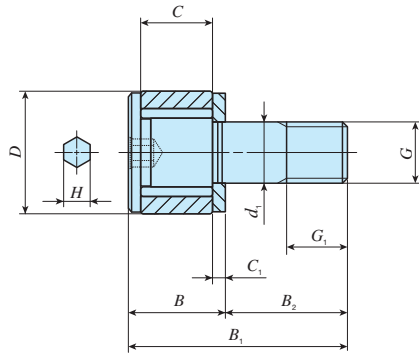
IKO Miniature Type Cam Followers

Selectable product specifications

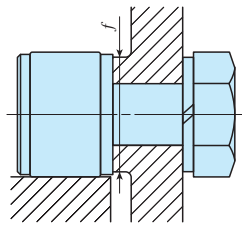
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



CFS
CFS...F



CFS...V
CFS...FV



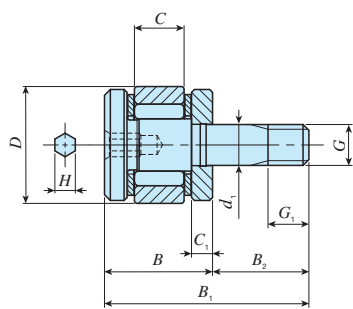
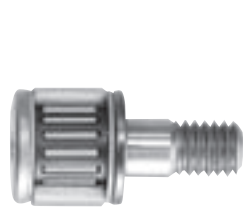
Stud diameter mm	Identification number		Mass (Ref.) g	Nominal dimensions mm											Mounting dimensions <i>f</i> Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N	Maximum static allowable load N
	With cage	Full complement roller		<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁	<i>B</i>		<i>B</i> ₁	<i>B</i> ₂	<i>C</i> ₁	<i>H</i>					
2	CFS 2 —	— CFS 2 V	0.6	4.5	2.5	2	M2 × 0.4	2	4		8	4	0.7	0.9	4.3	9.1	288 768	202 734	202 229
	CFS 2 F —	— CFS 2 FV															230 614	161 587	161 229
2.5	CFS 2.5 —	— CFS 2.5 V	1	5	3	2.5	M2.5 × 0.45	2.5	4.5		9.5	5	0.7	0.9	4.8	18.7	428 1 000	351 1 080	351 360
	CFS 2.5 F —	— CFS 2.5 FV															342 800	281 862	281 360
3	CFS 3 —	— CFS 3 V	2	6	4	3	M3 × 0.5	3	5.5		11.5	6	0.7	1.3	5.8	33.5	629 1 420	611 1 790	484 484
	CFS 3 F —	— CFS 3 FV															504 1 140	488 1 430	484 484
4	CFS 4 —	— CFS 4 V	4	8	5	4	M4 × 0.7	4	7		15	8	1.0	1.5	7.7	77.7	1 120 2 370	1 120 3 000	919 919
	CFS 4 F —	— CFS 4 FV															897 1 900	894 2 400	894 919
5	CFS 5 —	— CFS 5 V	7	10	6	5	M5 × 0.8	5	8		18	10	1.0	2	9.6	158	1 570 3 180	1 850 4 700	1 570 1 570
	CFS 5 F —	— CFS 5 FV															1 250 2 540	1 480 3 760	1 480 1 570
6	CFS 6 —	— CFS 6 V	13	12	7	6	M6 × 1	6	9.5		21.5	12	1.2	2.5	11.6	268	2 090 4 610	2 200 6 250	2 150 2 150
	CFS 6 F —	— CFS 6 FV															1 670 3 690	1 760 5 000	1 760 2 150

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

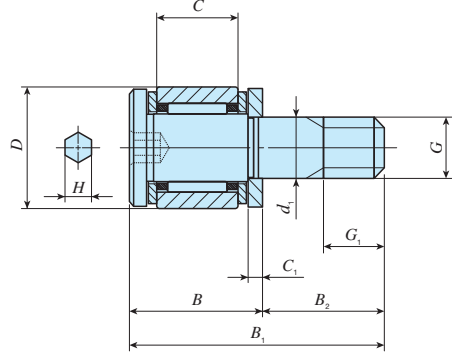
IKO Thrust Disk Type Miniature Cam Followers

Selectable product specifications

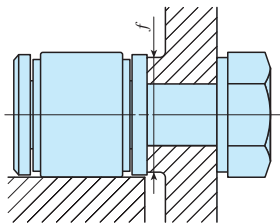
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	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



CFS1.4 WV



CFS... W
CFS...FW



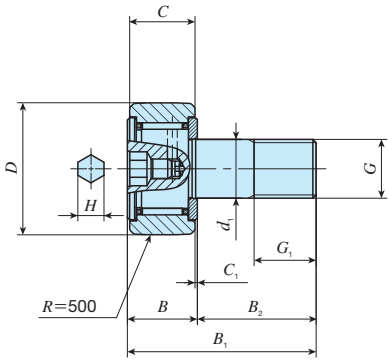
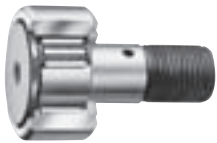
Stud diameter mm	Identification number		Mass (Ref.) g	Nominal dimensions mm											Mounting dimensions <i>f</i> Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N	Maximum static allowable load N
	With cage	Full complement roller		<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁	<i>B</i>		<i>B</i> ₁	<i>B</i> ₂	<i>C</i> ₁	<i>H</i>					
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.

IKO Standard Type Cam Followers • With Cage

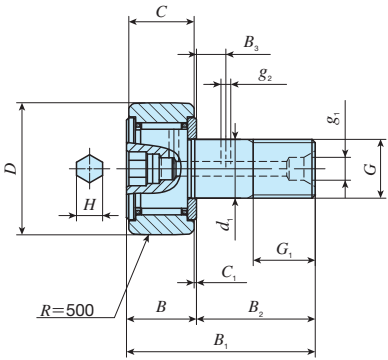
Selectable product specifications

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



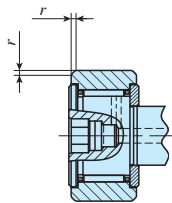
CF... (F) BR

Stud diameter d_1 3-10mm⁽¹⁾

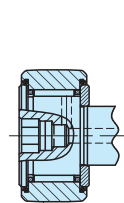


CF... (F) BR

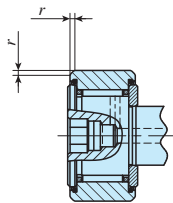
Stud diameter d_1 12-30mm⁽²⁾



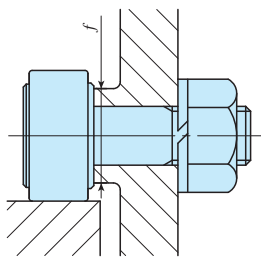
CF... (F) B



CF... (F) BUUR



CF... (F) BUU



Stud diameter mm	Identification number				Mass (Ref.) g	Nominal dimensions mm																	Mounting dimensions <i>f</i> Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N	Maximum static allowable load N
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁		<i>B</i>	<i>B</i> ₁	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>H</i>	<i>r</i> _{s min} ⁽³⁾							
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																							
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 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 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.

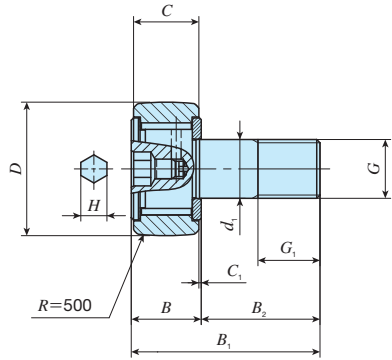
2. A nut is supplied with the stud.

Related Products
(Cam Follower)

IK Standard Type Cam Followers • Full Complement Roller

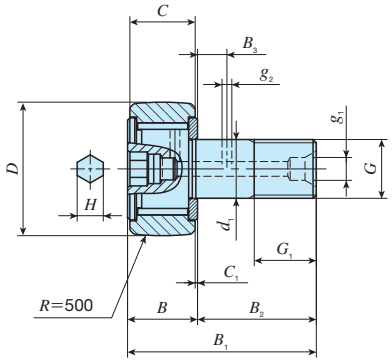
Selectable product specifications

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



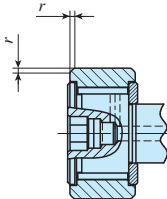
CF...VBR

Stud diameter d_1 6-10mm⁽¹⁾

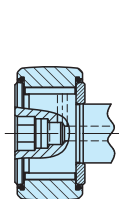


CF...VBR

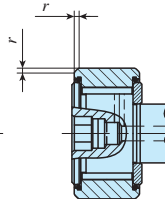
Stud diameter d_1 12-30mm⁽²⁾



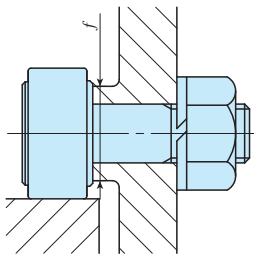
CF...VB



CF...VBUUR



CF...VBUU



Stud diameter mm	Identification number				Mass (Ref.) g	Nominal dimensions mm																	Mounting dimensions f Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum static allowable load N
	Shield type		Sealed type			D	C	d_1		G	G_1	$B_{\max}$	$B_{\max}$	B_2	B_3	C_1	g_1	g_2	H	$r_{s\min}^{(3)}$							
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																							
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 outer diameter and the end.
⁽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.

IKO Cam Followers G

Selectable product specifications

Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of external ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



Stud diameter	Identification number	Mass (Ref.)	Nominal dimensions mm												Mounting related dimensions <i>f</i>	Internal radial clearance		Maximum tightening torque	Basic dynamic load rating <i>C</i>	Basic static load rating <i>C</i> ₀	Maximum Static allowable Load
			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁	<i>B</i> _{max}	<i>B</i> _{1max}		<i>B</i> ₂	<i>C</i> ₁	<i>H</i>	<i>r</i> _{s min} ⁽¹⁾		Minimum	Maximum				
mm	With cage	g	<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁	<i>B</i> _{max}	<i>B</i> _{1max}		<i>B</i> ₂	<i>C</i> ₁	<i>H</i>	<i>r</i> _{s min} ⁽¹⁾	Minimum mm	Minimum	Maximum	N · cm	N	N	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.

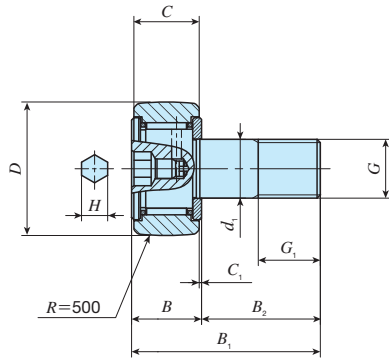
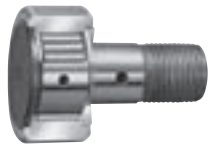
Remark: 1. Oil can not be re-fed to this bearing for structural reasons. When oil re-feeding is necessary, use IKO Standard Cam Followers.
2. Grease is pre-packed.

1N≒0.102kgf

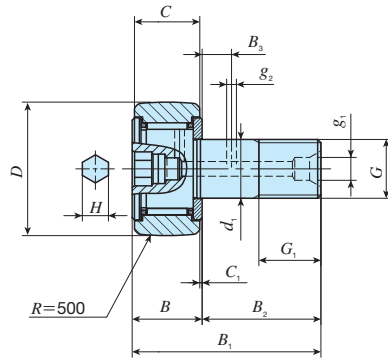
IKO Thrust Disk Type Cam Followers

Selectable product specifications

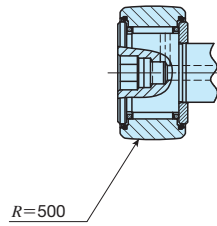
Material type	No symbol	 High carbon steel
	F	 Stainless steel
Roller guide type	No symbol	 With cage
	V	 Full complement roller
Seal structure	No symbol	 Shield type
	UU	 Sealed type
Shape of outer ring outer diameter surface	No symbol	 Cylindrical outer ring
	R	 Crowned outer ring



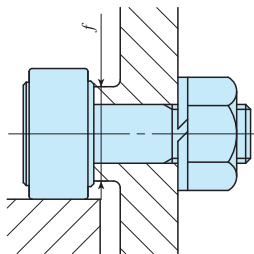
CF... (F) WBR
Stud diameter d_1 3-10mm⁽¹⁾



CF... WBR
Stud diameter d_1 12-20mm⁽²⁾



CF... (F) WBUUR



Stud diameter	Identification number		Mass (Ref.)	Nominal dimensions mm																Mounting dimensions <i>f</i>	Maximum tightening torque	Basic dynamic load rating <i>C</i>	Basic static load rating <i>C</i> ₀	Maximum static allowable load
	Shield type	Sealed type		<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁		<i>B</i>	<i>B</i> ₁	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>H</i>	Minimum mm	N · cm					
mm			g																					
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 outer diameter and the end.

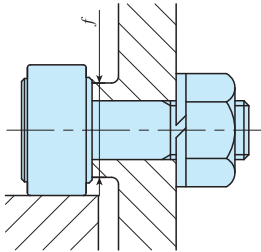
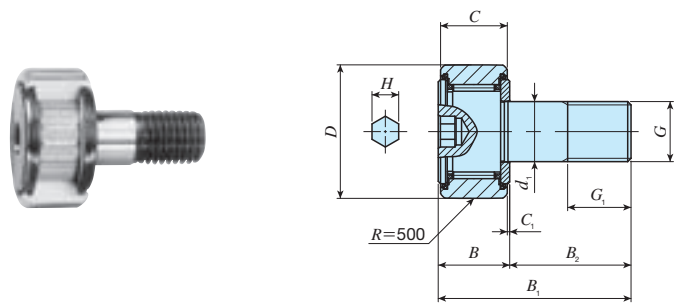
Remark: 1. Grease is pre-packed if the stud diameter d_1 of the shield type is 10 mm or less or if the seal structure is the sealed type. As for the others, grease is not pre-packed. Use the product with appropriate lubrication.

2. A nut is supplied with the stud.

IKO C-Lube Cam Followers

Selectable product specifications

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



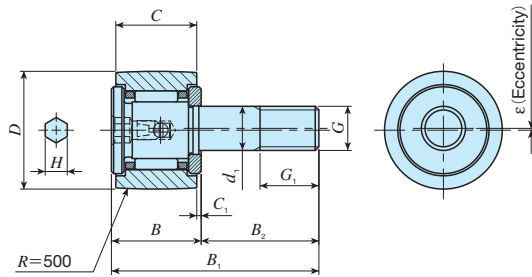
Stud diameter mm	Identification number	Mass (Ref.) g	Nominal dimensions mm											Mounting dimensions <i>f</i> Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C₀</i> N	Maximum static allowable load N
			<i>D</i>	<i>C</i>	<i>d₁</i>	<i>G</i>	<i>G₁</i>	<i>B</i>	<i>B₁</i>									
											<i>B₂</i>	<i>C₁</i>	<i>H</i>					
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.

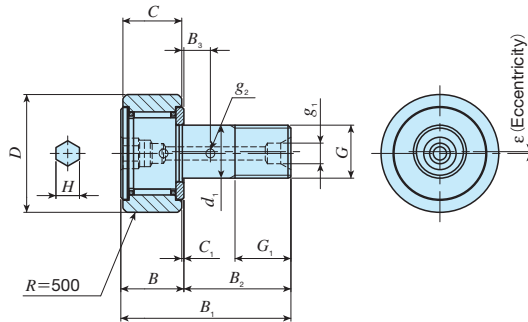
IKO Solid Eccentric Stud Type Cam Followers

Selectable product specifications

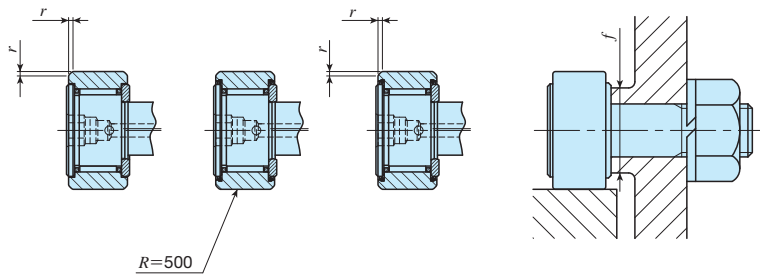
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



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	Identification number				Mass (Ref.)	Nominal dimensions mm																	Mounting dimensions <i>f</i>	Maximum tightening torque	Basic dynamic load rating <i>C</i>	Basic static load rating <i>C</i> ₀	Maximum static allowable load
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁		<i>G</i>	<i>G</i> ₁	<i>B</i> max	<i>B</i> ₁ max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>H</i>	<i>r</i> _{s min} ⁽³⁾	Eccentricity <i>ε</i>						
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																		Minimum mm					
mm					g																						
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	

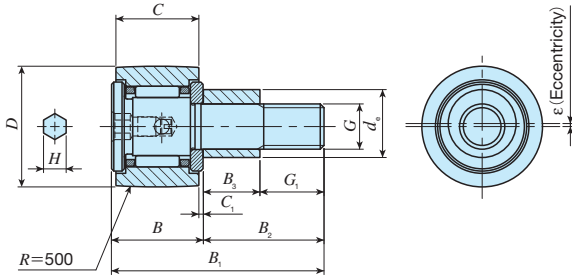
Note ⁽¹⁾ An oil hole (grease feed plug) is provided for the stud head.
⁽²⁾ An oil hole (grease nipple) is provided for the stud head and an oil hole is provided for the outer diameter and the end.
⁽³⁾ This represents the minimum tolerance dimensions of the chamfer dimensions r .

Remark: 1. Grease is pre-packed if the stud 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.

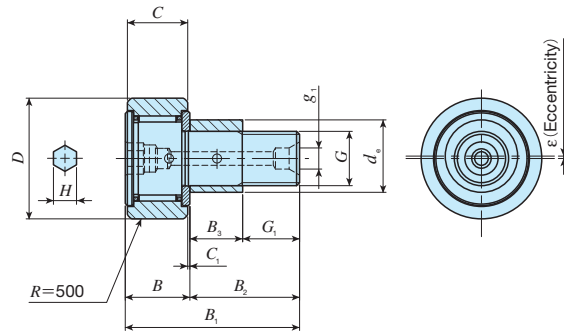
IKO Eccentric Type Cam Followers • With Cage

Selectable product specifications

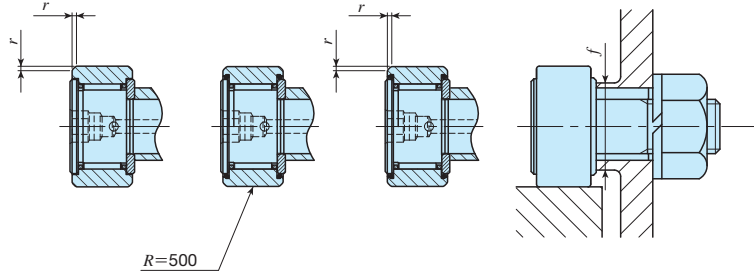
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



CFE...BR
Eccentric collar diameter d_s 9-13mm⁽¹⁾



CFE...BR
Eccentric collar diameter d_s 16-41mm⁽²⁾



CFE...B CFE...BUUR CFE...BUU

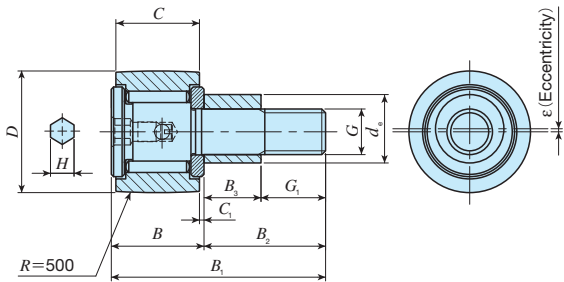
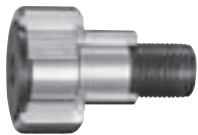
Eccentric collar outer diameter mm	Identification number				Mass (Ref.) g	Nominal dimensions mm																Eccentricity ε	Mounting dimensions f Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum static allowable load N
	Shield type		Sealed type			D	C	d_e		G	B_3	B_{max}	B_{1max}	B_2	C_1	g_1	G_1	H	$r_{smin}^{(3)}$								
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																							
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 screw 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.

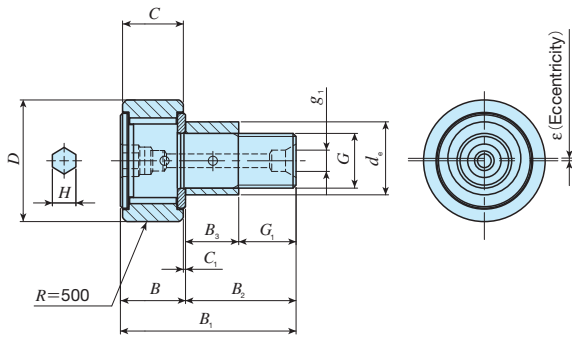
IK Eccentric Type Cam Followers • Full Complement Roller

Selectable product specifications

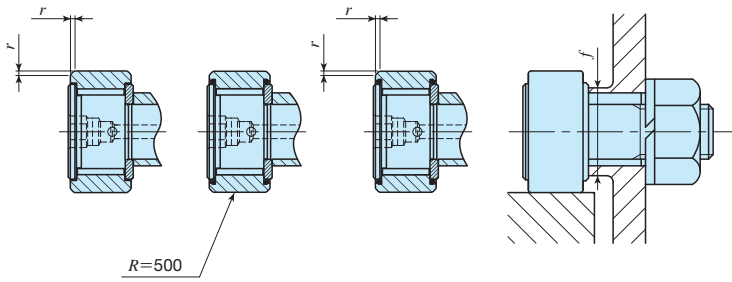
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



CFE...VBR
Eccentric collar diameter d_o 9-13mm⁽¹⁾



CFE...VBR
Eccentric collar diameter d_o 16-41mm⁽²⁾



CFE...VB CFE...VBUUR CFE...VBUU

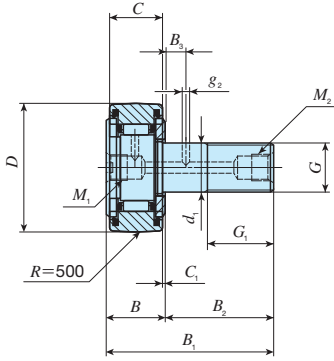
Eccentric collar outer diameter mm	Identification number				Mass (Ref.) g	Nominal dimensions mm															Eccentricity ε	Mounting dimensions f Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum static allowable load N
	Shield type		Sealed type			D	C	d_e		G	B_3	$B_{\max}$	$B_{1\max}$	B_2	C_1	g_1	G_1	H	$r_{s\min}^{(3)}$							
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																						
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 outer diameter and the end.
⁽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.

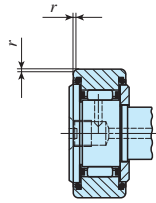
IKO Centralized Lubrication Type Cam Followers

Selectable product specifications

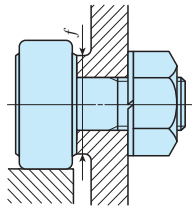
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Sealed type
Shape of outer ring outer diameter surface	FU1	Cylindrical outer ring
	RU1	Crowned outer ring



CF-RU1



CF-FU1



Stud diameter mm	Identification number		Mass (Ref.) g	Nominal dimensions mm																Mounting dimensions <i>f</i> Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N	Maximum static allowable load N
	Crowned outer ring	Cylindrical outer ring		<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i>	<i>G</i> ₁		<i>B</i> max	<i>B</i> ₁ max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₂	<i>M</i> ₁	<i>M</i> ₂	<i>r</i> _{s min} ⁽¹⁾						
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-RU1-10-1	CF-FU1-10 CF-FU1-10-1	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	
			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-RU1-12-1	CF-FU1-12 CF-FU1-12-1	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			
			105	32	14	12	M12 × 1.5	13		15.2	40.2	25	—	0.6	—	0.6	21	23.9	7 910	9 790	9 790			
16	CF-RU1-16	CF-FU1-16	170	35	18	16	M16 × 1.5	17		19.6	52.1	32.5	8	0.8	3	PT 1/8	PT 1/8	0.6	26	58.5	12 000	18 300	18 300	
18	CF-RU1-18	CF-FU1-18	250	40	20	18	M18 × 1.5	19		21.6	58.1	36.5	8	0.8	3			1	29	86.2	14 800	25 200	25 200	
20	CF-RU1-20 CF-RU1-20-1	CF-FU1-20 CF-FU1-20-1	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	
			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-RU1-24-1	CF-FU1-24 CF-FU1-24-1	815	62	29	24	M24 × 1.5	25		30.6	80.1	49.5	11	0.8	4			1	40	215	30 500	52 600	52 000	
			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-RU1-30-1 CF-RU1-30-2	CF-FU1-30 CF-FU1-30-1 CF-FU1-30-2	1 870	80	35	30	M30 × 1.5	32		37	100	63	15	1	4	1	49	438	45 400	85 100	85 100			
			2 030	85	35	30	M30 × 1.5	32		37	100	63	15	1	4	1	49	438	45 400	85 100	85 100			
			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.

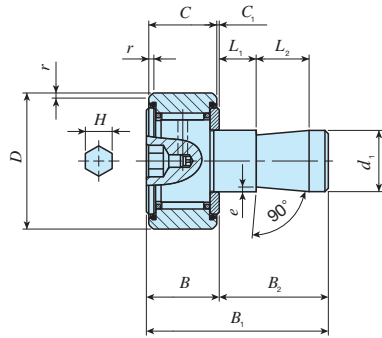
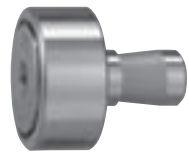
2. Grease is pre-packed.

3. A nut is supplied with the stud.

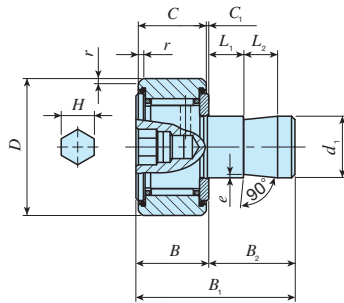
IKO Easy Mounting Type Cam Followers

Selectable product specifications

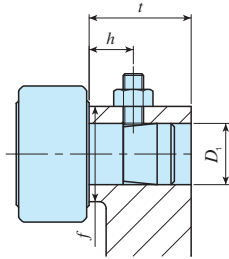
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring



Stud diameter d_1 6-10mm⁽¹⁾



Stud diameter d_1 12-20mm⁽²⁾



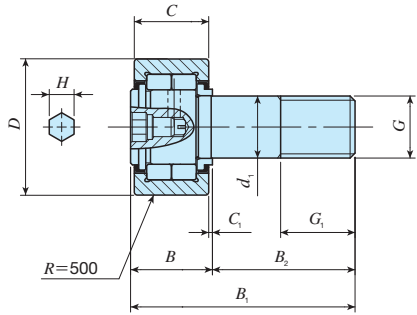
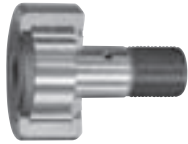
Stud diameter	Identification number	Mass (Ref.)	Nominal dimensions mm													Mounting dimensions mm				Basic dynamic load rating C	Basic static load rating C_0	Maximum static allowable load	
			D	C	d_1	$B_{\max}$	$B_{1\max}$	B_2	C_1	L_1		L_2	H	e	$r_{s\min}^{(3)}$	D_2	Tolerance	t Minimum	f Minimum				h (Ref.)
mm	With cage	g																		N	N	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 CF-SFU- 10-1 B	44 59	22 26	12 12	10 10	13.2 13.2	33 33	19.8 19.8	0.6 0.6	5 5		10 10	4 4	0.5 0.5	0.3 0.3	10 10		20 20	16 16	10 10	5 430 5 430	6 890 6 890	6 890 6 890
12	CF-SFU- 12 B CF-SFU- 12-1 B	94 104	30 32	14 14	12 12	15.2 15.2	35 35	19.8 19.8	0.6 0.6	5 5		10 10	6 6	1 1	0.6 0.6	12 12	+0.018 0	20 20	21 21	10 10	7 910 7 910	9 790 9 790	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 CF-SFU- 20-1 B	435 360	52 47	24 24	20 20	25.6 25.6	50.5 50.5	24.9 24.9	0.8 0.8	10 10		10 10	8 8	1 1	1 1	20 20	+0.021 0	25 25	34 34	15 15	20 700 20 700	34 600 34 600	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.

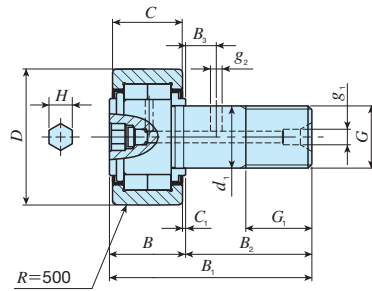
IKO Cylindrical Roller Cam Followers

Selectable product specifications

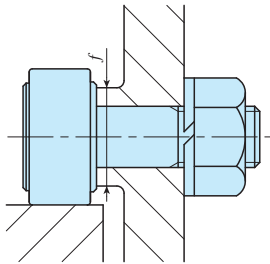
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



Stud diameter d_1 10mm⁽¹⁾



Stud diameter d_1 12-30mm⁽²⁾



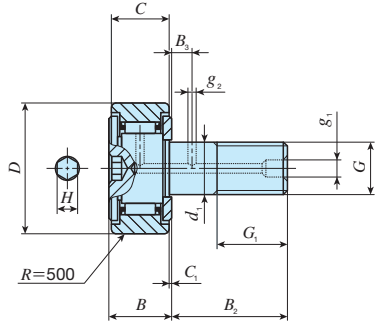
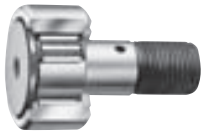
Stud diameter mm	Identification number	Mass (Ref.) g	Nominal dimensions mm														Mounting dimensions f Minimum mm	Maximum tightening torque N · cm	Basic dynamic load rating C N	Basic static load rating C_0 N	Maximum static allowable load N
			D	C	d_1	G	G_1	B_{max}	B_{max}	B_2		B_3	C_1	g_1	g_2	H					
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 outer diameter and the end.
Remark: 1. Grease is pre-packed.
2. A nut is supplied with the stud.

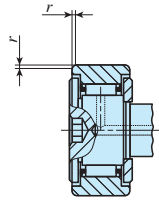
IK Inch Series Cam Followers CR • With Cage • With Hexagon Hole

Selectable product specifications

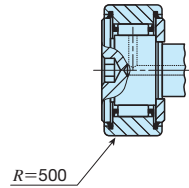
Material type	No symbol		High carbon steel
	F		Stainless steel
Roller guide type	No symbol		With cage
	V		Full complement roller
Seal structure	No symbol		Shield type
	UU		Sealed type
Shape of outer ring outer diameter surface	No symbol		Cylindrical outer ring
	R		Crowned outer ring



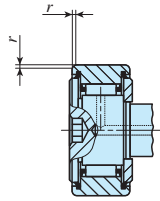
CR...BR



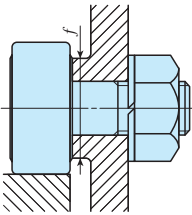
CR...B



CR...BUUR



CR...BUU

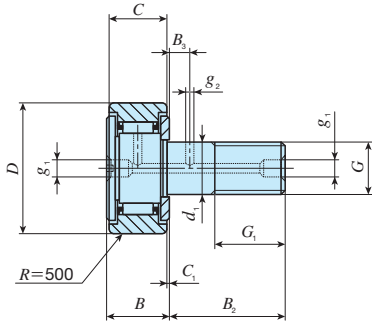


Stud diameter mm (inch)	Identification number				Mass (Ref.) g	Nominal dimensions mm (inch)													Mounting dimensions <i>f</i> Minimum mm (inch)	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N	
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i> UNF	<i>G</i> ₁	<i>B</i> max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>H</i>	<i>r</i>					
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrica outer ring																			
4.826	CR 8 BR	CR 8 B	CR 8 BUUR	CR 8 BUU	9	12.700($\frac{1}{2}$)	8.731($\frac{1}{32}$)	4.826	No.10-32	6.350($\frac{1}{4}$)		10.2(0.40)	12.700($\frac{1}{2}$)	— (—)	0.794($\frac{1}{32}$)	— (—)	— (—)	3.175($\frac{1}{8}$)	0.397($\frac{1}{64}$)	8.334($\frac{2}{64}$)	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($\frac{1}{2}$)	8.525($\frac{3}{8}$)	4.826	No.10-32	6.350($\frac{1}{4}$)		10.9(0.43)	15.875($\frac{5}{8}$)	— (—)	0.794($\frac{1}{32}$)	— (—)	— (—)	3.175($\frac{1}{8}$)	0.397($\frac{1}{64}$)	8.334($\frac{2}{64}$)	1.4	2 520	2 140
6.350 ($\frac{1}{4}$)	CR 10 BR	CR 10 B	CR 10 BUUR	CR 10 BUU	19	15.875($\frac{5}{8}$)	10.319($\frac{1}{32}$)	6.350($\frac{1}{4}$)	$\frac{1}{4}$ - 28	7.938($\frac{5}{16}$)		11.8(0.46)	15.875($\frac{5}{8}$)	— (—)	0.794($\frac{1}{32}$)	— (—)	— (—)	3.175($\frac{1}{8}$)	0.397($\frac{1}{64}$)	11.509($\frac{29}{64}$)	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($\frac{5}{8}$)	11.112($\frac{7}{16}$)	6.350($\frac{1}{4}$)	$\frac{1}{4}$ - 28	7.938($\frac{5}{16}$)		12.5(0.49)	19.050($\frac{3}{4}$)	— (—)	0.794($\frac{1}{32}$)	— (—)	— (—)	3.175($\frac{1}{8}$)	0.397($\frac{1}{64}$)	11.509($\frac{29}{64}$)	3.4	3 650	3 670
9.525 ($\frac{3}{8}$)	CR 12 BR	CR 12 B	CR 12 BUUR	CR 12 BUU	35	19.050($\frac{3}{4}$)	12.700($\frac{1}{2}$)	9.525($\frac{3}{8}$)	$\frac{3}{8}$ - 24	9.525($\frac{3}{8}$)		14.2(0.56)	22.225($\frac{7}{8}$)	6.350($\frac{1}{4}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	2.381($\frac{3}{32}$)	4.762($\frac{3}{16}$)	0.794($\frac{1}{32}$)	13.494($\frac{1}{32}$)	10.8	4 420	5 110
	CR 14 BR	CR 14 B	CR 14 BUUR	CR 14 BUU	46	22.225($\frac{7}{8}$)	12.700($\frac{1}{2}$)	9.525($\frac{3}{8}$)	$\frac{3}{8}$ - 24	9.525($\frac{3}{8}$)		14.2(0.56)	22.225($\frac{7}{8}$)	6.350($\frac{1}{4}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	2.381($\frac{3}{32}$)	4.762($\frac{3}{16}$)	0.794($\frac{1}{32}$)	15.081($\frac{1}{32}$)	10.8	4 790	5 810
11.112 ($\frac{7}{16}$)	CR 16 BR	CR 16 B	CR 16 BUUR	CR 16 BUU	73	25.400(1)	15.875($\frac{5}{8}$)	11.112($\frac{7}{16}$)	$\frac{7}{16}$ - 20	12.700($\frac{1}{2}$)		17.3(0.68)	25.400(1)	6.350($\frac{1}{4}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.175($\frac{1}{8}$)	6.350($\frac{1}{4}$)	1.191($\frac{3}{64}$)	17.859($\frac{45}{64}$)	17.4	8 810	10 800
	CR 18 BR	CR 18 B	CR 18 BUUR	CR 18 BUU	88	28.575(1 $\frac{1}{8}$)	15.875($\frac{5}{8}$)	11.112($\frac{7}{16}$)	$\frac{7}{16}$ - 20	12.700($\frac{1}{2}$)		17.3(0.68)	25.400(1)	6.350($\frac{1}{4}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.175($\frac{1}{8}$)	6.350($\frac{1}{4}$)	1.588($\frac{1}{16}$)	19.050($\frac{3}{4}$)	17.4	9 180	11 600
12.700 ($\frac{1}{2}$)	CR 20 BR	CR 20 B	CR 20 BUUR	CR 20 BUU	132	31.750(1 $\frac{1}{4}$)	19.050($\frac{3}{4}$)	12.700($\frac{1}{2}$)	$\frac{1}{2}$ - 20	15.875($\frac{5}{8}$)		20.4(0.80)	31.750(1 $\frac{1}{4}$)	7.938($\frac{5}{16}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.175($\frac{1}{8}$)	6.350($\frac{1}{4}$)	1.588($\frac{1}{16}$)	21.828($\frac{55}{64}$)	27.7	14 200	16 000
	CR 22 BR	CR 22 B	CR 22 BUUR	CR 22 BUU	157	34.925(1 $\frac{3}{8}$)	19.050($\frac{3}{4}$)	12.700($\frac{1}{2}$)	$\frac{1}{2}$ - 20	15.875($\frac{5}{8}$)		20.4(0.80)	31.750(1 $\frac{1}{4}$)	7.938($\frac{5}{16}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.175($\frac{1}{8}$)	6.350($\frac{1}{4}$)	1.588($\frac{1}{16}$)	21.828($\frac{55}{64}$)	27.7	14 200	16 000
15.875 ($\frac{5}{8}$)	CR 24 BR	CR 24 B	CR 24 BUUR	CR 24 BUU	225	38.100(1 $\frac{1}{2}$)	22.225($\frac{7}{8}$)	15.875($\frac{5}{8}$)	$\frac{5}{8}$ - 18	19.050($\frac{3}{4}$)		23.6(0.93)	38.100(1 $\frac{1}{2}$)	9.525($\frac{3}{8}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.969($\frac{5}{32}$)	7.938($\frac{5}{16}$)	1.588($\frac{1}{16}$)	26.196(1 $\frac{3}{64}$)	55.7	18 600	24 300
	CR 26 BR	CR 26 B	CR 26 BUUR	CR 26 BUU	260	41.275(1 $\frac{3}{8}$)	22.225($\frac{7}{8}$)	15.875($\frac{5}{8}$)	$\frac{5}{8}$ - 18	19.050($\frac{3}{4}$)		23.6(0.93)	38.100(1 $\frac{1}{2}$)	9.525($\frac{3}{8}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.969($\frac{5}{32}$)	7.938($\frac{5}{16}$)	1.588($\frac{1}{16}$)	26.196(1 $\frac{3}{64}$)	55.7	18 900	24 300
19.050 ($\frac{3}{4}$)	CR 28 BR	CR 28 B	CR 28 BUUR	CR 28 BUU	365	44.450(1 $\frac{3}{4}$)	25.400(1)	19.050($\frac{3}{4}$)	$\frac{3}{4}$ - 16	22.225($\frac{7}{8}$)		26.8(1.06)	44.450(1 $\frac{3}{4}$)	11.112($\frac{7}{16}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.969($\frac{5}{32}$)	7.938($\frac{5}{16}$)	1.588($\frac{1}{16}$)	32.543(1 $\frac{1}{32}$)	100	25 100	38 200
	CR 30 BR	CR 30 B	CR 30 BUUR	CR 30 BUU	410	47.625(1 $\frac{1}{8}$)	25.400(1)	19.050($\frac{3}{4}$)	$\frac{3}{4}$ - 16	22.225($\frac{7}{8}$)		26.8(1.06)	44.450(1 $\frac{3}{4}$)	11.112($\frac{7}{16}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	3.969($\frac{5}{32}$)	7.938($\frac{5}{16}$)	1.588($\frac{1}{16}$)	32.543(1 $\frac{1}{32}$)	100	25 100	38 200
22.225 ($\frac{7}{8}$)	CR 32 BR	CR 32 B	CR 32 BUUR	CR 32 BUU	615	50.800(2)	31.750(1 $\frac{1}{4}$)	22.225($\frac{7}{8}$)	$\frac{7}{8}$ - 14	25.400(1)		33.5(1.32)	50.800(2)	12.700($\frac{1}{2}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	4.762($\frac{3}{16}$)	11.112($\frac{7}{16}$)	1.588($\frac{1}{16}$)	37.306(1 $\frac{1}{32}$)	162	32 500	63 900
	CR 36 BR	CR 36 B	CR 36 BUUR	CR 36 BUU	750	57.150(2 $\frac{1}{4}$)	31.750(1 $\frac{1}{4}$)	22.225($\frac{7}{8}$)	$\frac{7}{8}$ - 14	25.400(1)		33.5(1.32)	50.800(2)	12.700($\frac{1}{2}$)	0.794($\frac{1}{32}$)	4.762($\frac{3}{16}$)	4.762($\frac{3}{16}$)	11.112($\frac{7}{16}$)	1.588($\frac{1}{16}$)	37.306(1 $\frac{1}{32}$)	162	32 500	63 900

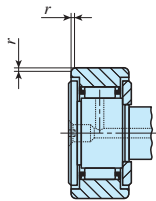
- Remarks 1. No oil hole is provided if the stud diameter d_1 is 6.35 mm or less. As for the others, an oil hole is provided for the outer diameter and the end of the stud.
2. Grease is pre-packed.
3. Contact **IKO** for the information on the maximum static allowable load.
4. A nut is supplied with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

Selectable product specifications

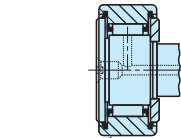
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring, outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



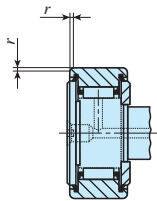
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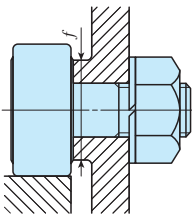
CR



CR...UUR



CR...UU



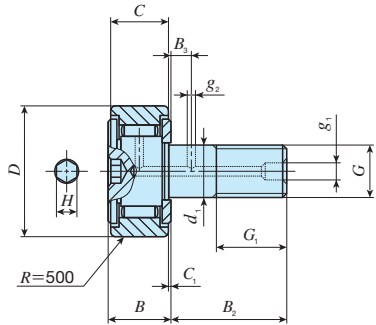
Stud diameter mm (inch)	Identification number				Mass (Ref.) g	Nominal dimensions mm (inch)														Mounting dimensions <i>f</i> Minimum mm (inch)	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i> UNF	<i>G</i> ₁		<i>B</i> max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>r</i>					
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																			
4.826	CR 8 R	CR 8	CR 8 UUR	CR 8 UU	9	12.700(¹ / ₂)	8.731(¹ / 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(² / 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(² / 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(¹ / ₃₂)	6.350(¹ / ₄)	¹ / ₄ - 28	7.938(⁵ / ₈)		11.8 (0.46)	15.875(⁵ / ₈)	— (—)	0.794(¹ / ₃₂)	*3.175(¹ / ₈)	— (—)	0.397(¹ / ₆₄)	11.509(² / 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 / ₆₄)	6.350(¹ / ₄)	¹ / ₄ - 28	7.938(⁵ / ₈)		12.5 (0.49)	19.050(³ / ₄)	— (—)	0.794(¹ / ₃₂)	*3.175(¹ / ₈)	— (—)	0.397(¹ / ₆₄)	11.509(² / 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 / ₈)	2.381(³ / ₃₂)	0.794(¹ / ₃₂)	13.494(¹ / 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 / ₈)	2.381(³ / ₃₂)	0.794(¹ / ₃₂)	15.081(¹ / 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 / ₈)	3.175(¹ / ₈)	1.191(¹ / ₆₄)	17.859(⁴ / 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 / ₈)	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 / ₈)	0.794(¹ / ₃₂)	4.762(³ / ₈)	3.175(¹ / ₈)	1.588(¹ / ₁₆)	21.828(⁵ / 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 / ₈)	0.794(¹ / ₃₂)	4.762(³ / ₈)	3.175(¹ / ₈)	1.588(¹ / ₁₆)	21.828(⁵ / 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 / ₈)	3.969(⁵ / ₃₂)	1.588(¹ / ₁₆)	26.196(1 ¹ / 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 / ₈)	3.969(⁵ / ₃₂)	1.588(¹ / ₁₆)	26.196(1 ¹ / 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 / ₈)	3.969(⁵ / ₃₂)	1.588(¹ / ₁₆)	32.543(1 ¹ / 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 / ₈)	3.969(⁵ / ₃₂)	1.588(¹ / ₁₆)	32.543(1 ¹ / 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 / ₈)	4.762(³ / ₈)	1.588(¹ / ₁₆)	37.306(1 ¹ / 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 / ₈)	4.762(³ / ₈)	1.588(¹ / ₁₆)	37.306(1 ¹ / 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 outer diameter, and the end of the stud.
2. Grease is pre-packed.
3. Contact **IKO** for the information on the maximum static allowable load.
4. A nut is supplied with the stud.

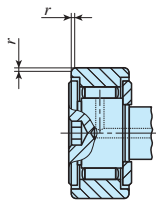
IKO Inch Series Cam Followers CR • Full Complement Roller • With Hexagon Hole

Selectable product specifications

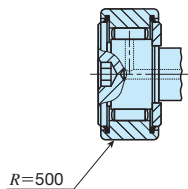
Material type	No symbol		High carbon steel
	F		Stainless steel
Roller guide type	No symbol		With cage
	V		Full complement roller
Seal structure	No symbol		Shield type
	UU		Sealed type
Shape of outer ring outer diameter surface	No symbol		Cylindrical outer ring
	R		Crowned outer ring



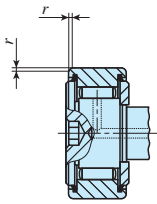
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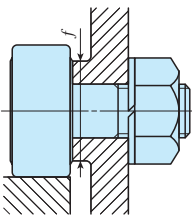
CR...VB



CR...VBUUR



CR...VBUU



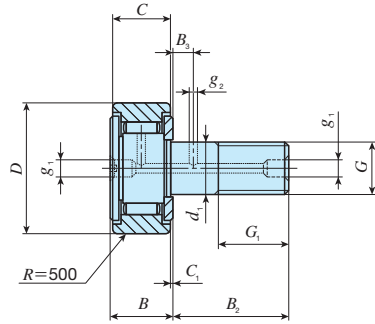
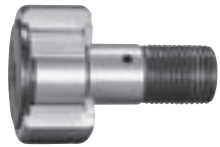
Stud diameter mm (inch)	Identification number				Mass (Ref.) g	Nominal dimensions mm (inch)															Mounting dimensions <i>f</i> Minimum mm (inch)	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i> UNF	<i>G</i> ₁		<i>B</i> max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>H</i>	<i>r</i>					
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																				
4.826	CR 8 VBR	CR 8 VB	CR 8 VBUUR	CR 8 VBUU	9	12.700(¹ / ₂)	8.731(¹ / 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(² / 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(² / 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(¹ / 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(² / 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(² / 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(¹ / 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(¹ / 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 / ₁₆)	17.859(⁴ / 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(⁵ / 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(⁵ / 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 ³ / 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 ³ / 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 ¹ / 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 ¹ / 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 outer diameter and the end of the stud.
2. Grease is pre-packed.
3. Contact **IKO** for the information on the maximum static allowable load.
4. A nut is supplied with the stud.

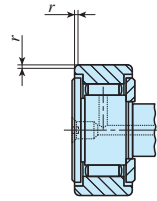
IKO Inch Series Cam Followers CR • Full Complement Roller • With Driver Slot

Selectable product specifications

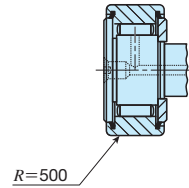
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



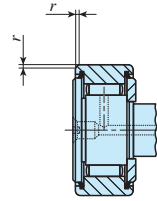
CR...VR



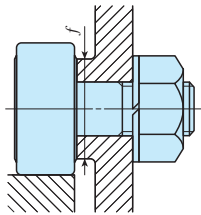
CR...V



CR...VUUR



CR...VUU



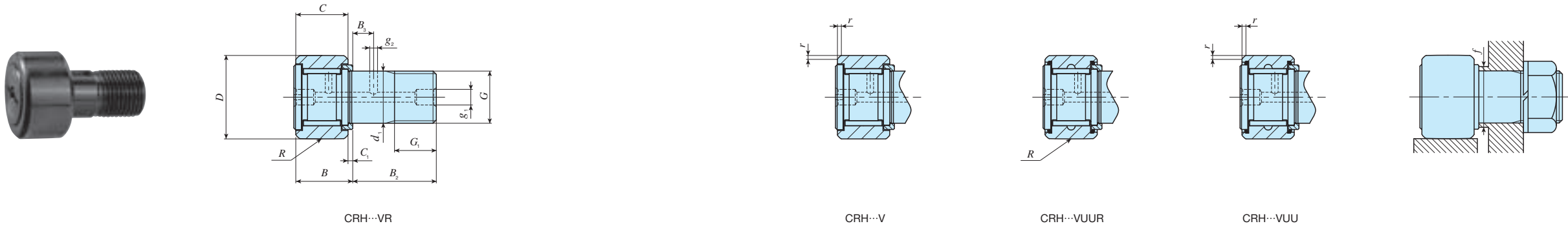
Stud diameter mm (inch)	Identification number				Mass (Ref.) g	Nominal dimensions mm (inch)													Mounting dimensions <i>f</i> Minimum mm (inch)	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i> UNF	<i>G</i> ₁		<i>B</i> max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>r</i>				
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																		
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(23/64)	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(23/64)	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(17/32)	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 1/32)	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 1/32)	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 outer diameter, and the end of the stud.
2. Grease is pre-packed.
3. Contact IKO for the information on the maximum static allowable load.
4. A nut is supplied with the stud.

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

Selectable product specifications

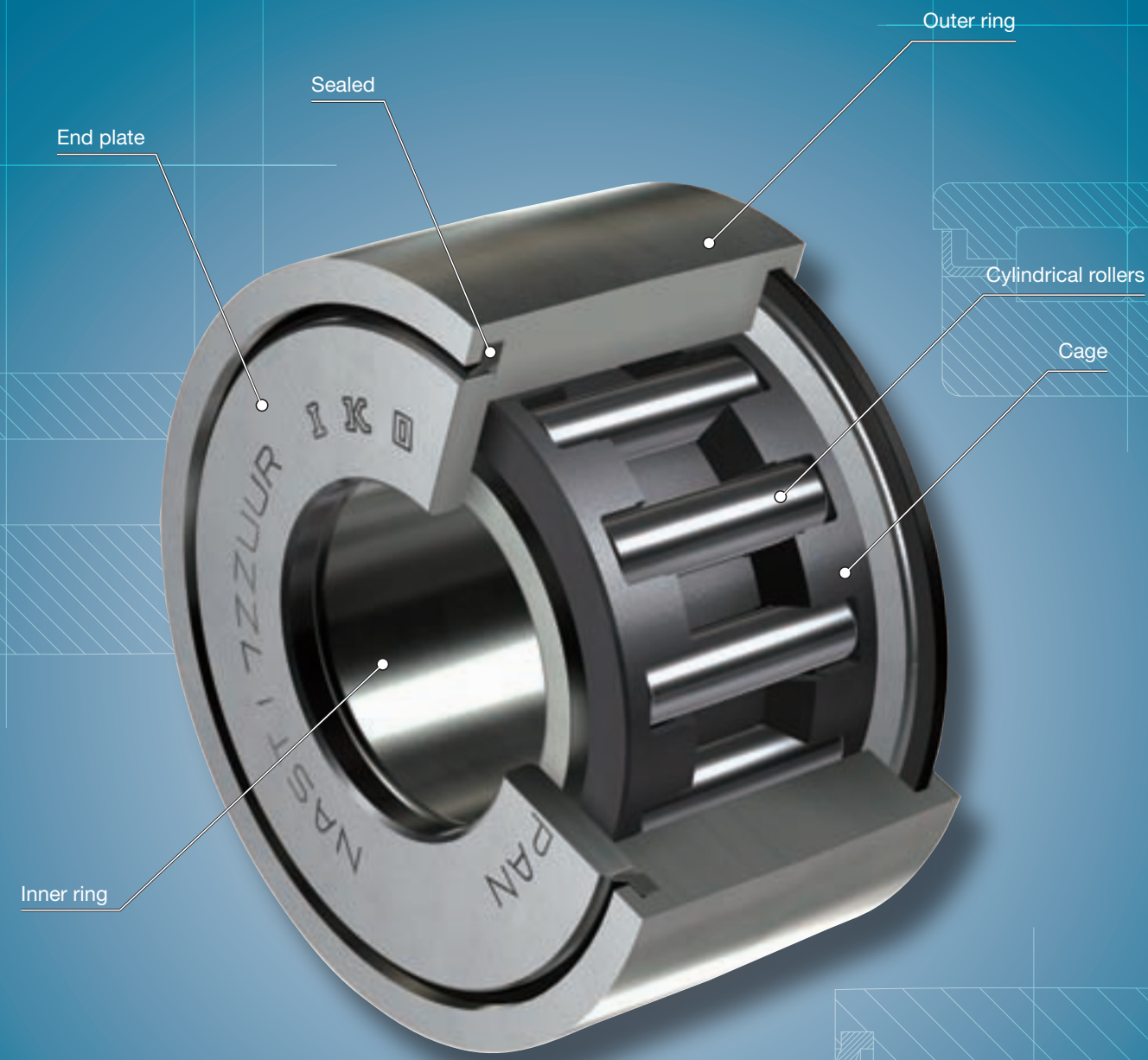
Material type	No symbol	High carbon steel
	F	Stainless steel
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



Stud diameter mm (inch)	Identification number				Mass (Ref.) g	Nominal dimensions mm (inch)														Mounting dimensions <i>f</i> Minimum mm (inch)	Maximum tightening torque N · cm	Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N
	Shield type		Sealed type			<i>D</i>	<i>C</i>	<i>d</i> ₁	<i>G</i> UNF	<i>G</i> ₁		<i>B</i> max	<i>B</i> ₂	<i>B</i> ₃	<i>C</i> ₁	<i>g</i> ₁	<i>g</i> ₂	<i>R</i>	<i>r</i>				
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring																			
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(² / 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(² / 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(¹ / ₈)	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(¹ / ₈)	6.8	6 340	8 530
	CRH 11 VR	CRH 11 V	CRH 11 VUUR	CRH 11 VUU	27	17.462(¹ / ₂)	11.112(¹ / ₈)	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(¹ / ₈)	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(¹ / ₈)	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(¹ / 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(¹ / ₈)	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(¹ / 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(² / 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(² / 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(⁶ / 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(⁶ / 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(¹ / ₈)	1.588(¹ / ₁₆)	4.762(³ / ₁₆)	2.381(³ / ₃₂)	500(20)	1.588(¹ / ₁₆)	32.941(1 ¹ / 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(¹ / ₈)	1.588(¹ / ₁₆)	4.762(³ / ₁₆)	2.381(³ / ₃₂)	500(20)	1.588(¹ / ₁₆)	32.941(1 ¹ / 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 ⁷ / ₈)	1 ⁷ / 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 ¹ / 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 ⁷ / ₈)	1 ⁷ / 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 ¹ / 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 ⁷ / 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 ³ / 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 ⁷ / 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 ³ / 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 ⁷ / 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 ⁷ / 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(1 ¹ / ₈)	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 outer diameter, and the end of the stud.
2. Grease is pre-packed.
3. Contact **IKO** for the information on the maximum static allowable load.
4. A nut is supplied with the stud.

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/inseparable 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 outer diameter 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

2 Dimensions

3 Material type

4 Roller guide type

5 Seal structure

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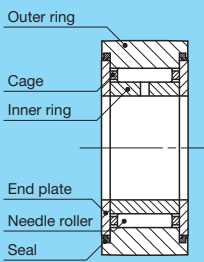
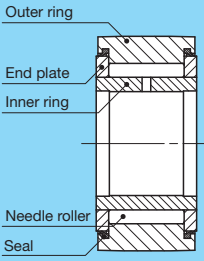
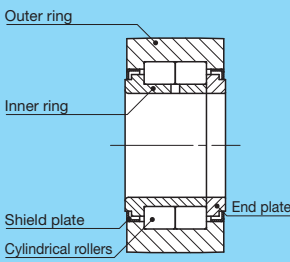
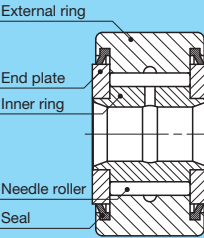
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1	Model	Separable Roller Followers	Without inner ring	: RNAS
			With inner ring	: NAS
		Inseparable Roller Followers		: NART
		Cylindrical Roller Followers		: NURT
		Inch series Inseparable Roller Followers		: CRY
		For applicable models and dimensions, see Table 1.		

2	Dimensions	Indicates the inner ring inner diameter.(unit: mm) For inch series, outer ring outer diameter dimensions are indicated in 1/16 inch.
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Table 1 Models and dimensions

Shape	Model	Characteristics	Inner ring inner diameter
Separable Roller Followers 	RNAS NAS	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 RNAS. The inner ring is provided for NAS.	7 to 60 mm
Inseparable Roller Followers 	NART	This inseparable bearing has a press-fitted end plate at both sides of the inner ring. Types with a cage and with full complement roller are available for your use.	5 to 50 mm
Cylindrical Roller Followers 	NURT	The full complement roller 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 Inseparable Roller Followers 	CRY	This is inch series Roller Followers of NART with black oxide film treatment.	6.350 to 31.750 mm

3	Roller guide type⁽¹⁾	With cage	: No symbol	As roller with cage has smaller friction coefficient, it is suited for high-speed rotation. Full complement roller is suited for sections where low-speed rotation, oscillatory movement or heavy load exists.
		Full complement roller	: V	
Note ⁽¹⁾ Cylindrical Roller Followers are full complement rollers with no symbol.				

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

5	Shape of outer ring outer diameter 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 C0

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.

L10 = (C / Pr)^10/3

where, L10 : Basic rating life 10^6rev.
C : Basic dynamic load rating N
Pr : Dynamic equivalent radial load N

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

Lh = (10^6 L10) / (60n)

where, Lh : Basic rating life represented as time h
n : Rotation speed min^-1

Static safety factor

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

fs = C0 / Por

where, fs : Static safety factor
C0 : Basic static load rating N
Por : Static equivalent radial load (maximum load) N

Table 2 Static safety factor

Bearing use conditions	fs
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	fw
Smooth operation free from shock	1 ~1.2
Normal operation	1.2~1.5
Operation with shock load	1.5~3

Maximum Static Allowable 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 static allowable 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 measured diameter of inscribed circle of separable Roller Followers is shown in Table 6.We also provide special accuracy class product. For details, please contact IKO.

Table 4 Tolerance

Name		Metric series		Inch series	
		Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring
Dim. d tolerance of inner ring inner diameter	d ≤19.05	Obtain from Table 5.1		+ 5 - 10	+ 5 - 10
	19.05 < d			+ 2 - 12	
Dim. D tolerance of outer ring outer diameter		0 - 50	Obtain from Table 5.2	0 - 50	Obtain from Table 5.3
Dim. C tolerance of outer ring width		0 - 120		0 - 130	
Dim. B tolerance of inner ring width	Separable Roller Followers	0 - 120		-	
Dim. B tolerance of bearing width	Inseparable Roller Followers	h12	-	+ 130 - 250	
	Cylindrical Roller Followers		h12		
Dim. Fw tolerance of diameter of inscribed circle		Obtain from Table 6		-	

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

d		Δdmp		Vdsp	Vdmp	Kia	VBs
Nominal inner diameter mm		Dim. tolerance of mean inner diameter in a single surface		Inner diameter variation within the surface (Maximum)	Mean inner diameter variation within a single surface (Maximum)	Radial runout (Maximum)	Width variation (Maximum)
Above	Below	H	L				
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)

D		ΔDmp		VDsp	VDmp	Kca	Vcs
Nominal outer ring outer diameter mm		Dim. tolerance of mean outer diameter within a single surface		Outer diameter variation within the surface (Maximum)	Mean outer diameter variation within a single surface (Maximum)	Radial runout (Maximum)	Width variation (Maximum)
Above	Below	H	L				
6	18	0	- 8	10	6	15	See the allowance of VBs 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	

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

D Nominal outer ring outer diameter mm		ΔD_{mp} Dim. tolerance of mean outer diameter within a single surface		V_{Dop} Outer diameter variation within the surface (Maximum)	V_{Dmp} Mean outer diameter variation within a single surface (Maximum)	K_{ca} Radial runout (Maximum)
Above	Below	H	L			
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 the smallest measured diameter of inscribed circle $F_{ws\ min}$ unit: μm

F_w Nominal inscribed inner diameter mm		$\Delta F_{ws\ min}$ Dim. tolerance of the smallest measured diameter of inscribed circle	
Above	Below	H	L
6	10	+22	+13
10	18	+27	+16
18	30	+33	+20
30	50	+41	+25
50	80	+49	+30

Internal Radial Clearance

Internal radial clearance of Roller Followers is indicated in the Table 7.

Table 7 Internal radial clearance value unit: μm

Identification number ⁽¹⁾				Internal radial clearance	
Metric series			Inch series	Minimum	Maximum
Separable Roller Followers	Inseparable Roller Followers	Cylindrical Roller Followers	Inseparable Roller Followers		
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⁾ Applied to the type with full complement roller, the shield and sealed types, and the cylindrical outer ring.

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
Inseparable Roller Followers		
Cylindrical Roller Followers		

Track Load Capacity

Track load 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 load 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/mm²) and if hardness is not 40HRC, these values must be multiplied by track load 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 rotation speed of the cam mechanism, etc.

Table 9.1 Track load capacity (metric series)

unit: N

Crowned outer ring				Cylindrical outer ring					
Identification number ⁽¹⁾			Track load capacity	Identification number	Track load capacity	Identification number ⁽²⁾	Track load capacity	Identification number	Track load capacity
Separable Roller Followers	Inseparable 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⁾ Applied to the type with full complement roller and the shield and sealed type.
⁽²⁾ Applied to the sealed type.

Table 9.2 Track load capacity (inch series)

unit: N

Crowned outer ring		Cylindrical outer ring	
Identification number ⁽¹⁾	Track load capacity	Identification number ⁽¹⁾	Track load 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⁾ Applied to the sealed type.

Table 10 Track load capacity factor

Hardness HRC	Tensile strength N/mm ²	Track load 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 Number of Rotations

The allowable number of rotation 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	Grease lubrication	Oil lubrication
Model of bearing		
With cage	84 000	140 000
Full complement roller	42 000	70 000
Cylindrical Roller Followers	72 000	120 000

Note ⁽¹⁾ dn value = $d \times n$
where, d : Bearing inner diameter mm
 n : Rotation 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.

Mounting

- Mount the mounting part of the shield/sealed type according to the a dimensions in the dimension table.(See Fig. 1)
- 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)
- When mounting the sealed type of Separable Roller Followers, make sure that the end plate does not come off. If the end plate comes off, make sure not to have the seal lip bitten when mounting it.
- 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 $0.2 \mu m R_a$ 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)
- When mounting Inseparable Roller Followers, make sure not to push the end plate because it is press-fitted.

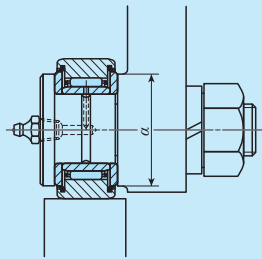


Fig. 1 Height of side surface of mounting part

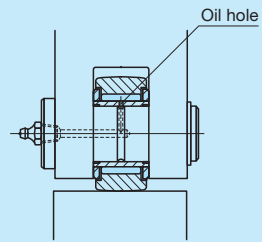


Fig. 2 Oil hole location and loading direction

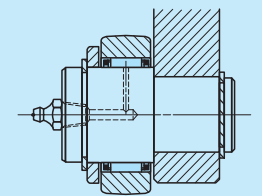
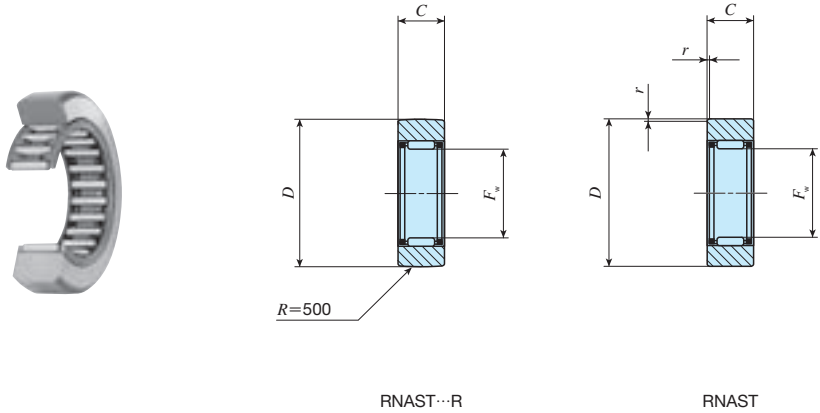


Fig. 3 Mounting examples of bearing without inner ring

IKO Separable Roller Followers · Open Type · Without Inner Ring

Selectable product specifications

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



Shaft diameter	Identification number		Mass (Ref.)	Nominal dimensions mm				Basic dynamic load rating	Basic static load rating
	Open Type			F_w	D	C	$r_{s\min}^{(1)}$		
	Crowned outer ring	Cylindrical outer ring							
mm									
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.

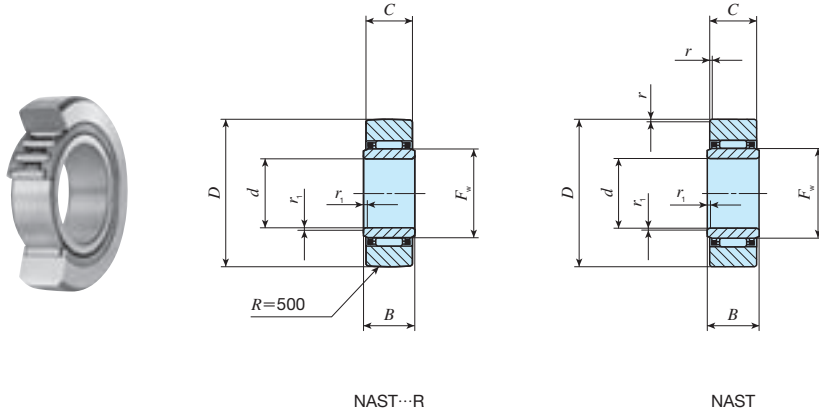
2. Grease is not pre-packed. Use the product with appropriate lubrication.

1N = 0.102 kgf

IKO Separable Roller Followers · Open Type · With Inner Ring

Selectable product specifications

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



Shaft diameter	Identification number		Mass (Ref.)	Nominal dimensions mm							Basic dynamic load rating	Basic static load rating	Built-in inner ring
	Open Type			<i>d</i>	<i>D</i>	<i>B</i>	<i>C</i>	<i>r</i> _{s min} ⁽¹⁾	<i>r</i> _{s min} ⁽¹⁾	<i>F_w</i>			
	Crowned outer ring	Cylindrical outer ring											
mm			g								<i>C</i> N	<i>C</i> ₀ 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.

IKO

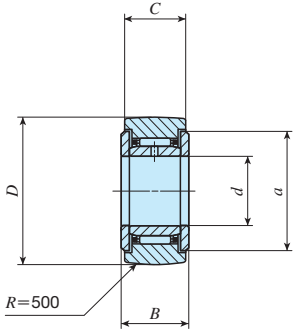
Separable Roller Followers · Shield Type · With Inner Ring

IKO

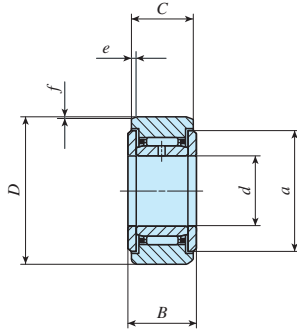
Separable Roller Followers · Sealed Type · With Inner Ring

Selectable product specifications

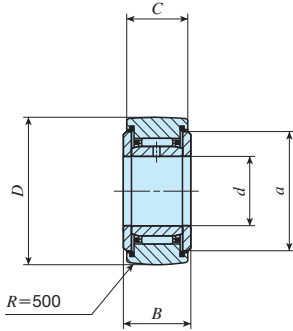
Roller guide type	No symbol	 With cage
	V	 Full complement roller
Seal structure	No symbol	 Open Type
	ZZ	 Shield type
	ZZUU	 Sealed type
Shape of outer ring outer diameter surface	No symbol	 Cylindrical outer ring
	R	 Crowned outer ring



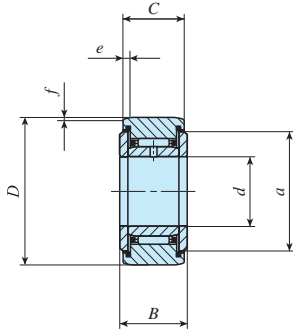
NAST...ZZR



NAST...ZZ



NAST...ZZUUR



NAST...ZZUU

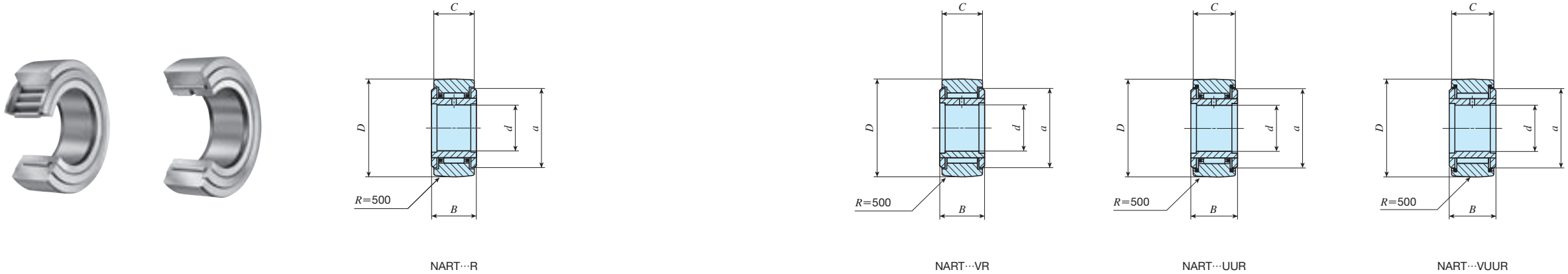
Shaft diameter	Identification number				Mass (Ref.)		Nominal dimensions mm							Basic dynamic load rating C N	Basic static load rating C_0 N
	Shield type		Sealed Type				d	D	B	C	a	e	f		
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring											
6	NAST 6 ZZR	NAST 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.

IKO Inseparable Roller Followers

Selectable product specifications

Roller guide type	No symbol	 With cage
	V	 Full complement roller
Seal structure	No symbol	 Shield type
	UU	 Sealed type
Shape of outer ring outer diameter surface	No symbol	 Cylindrical outer ring
	R	 Crowned outer ring



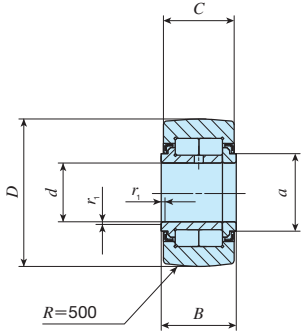
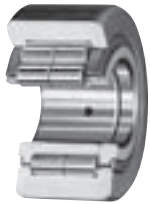
Shaft diameter	Identification number				Mass (Ref.)		Nominal dimensions mm					Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N	Maximum static allowable load N
	Shield type Crowned outer ring		Sealed Type Crowned outer ring				<i>d</i>	<i>D</i>	<i>B</i>	<i>C</i>	<i>a</i>			
	With cage	Full complement roller	With cage	Full complement roller										
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.

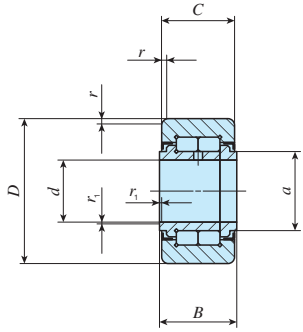
IKO Cylindrical Roller Followers

Selectable product specifications

Roller guide type	No symbol	With cage
Seal structure	No symbol	Full complement roller
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



NURT...R



NURT

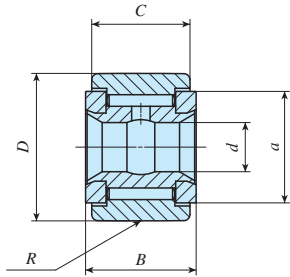
Shaft diameter mm	Identification number		Mass (Ref.) g	Nominal dimensions mm								Basic dynamic load rating C N	Basic static load rating C ₀ N	Maximum static allowable load N
	Crowned outer ring	Cylindrical outer ring		d	D	B	C	a		r _{s min} ⁽¹⁾	r _{1s min} ⁽¹⁾			
15	NURT 15 R	NURT 15	100	15	35	19	18	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.

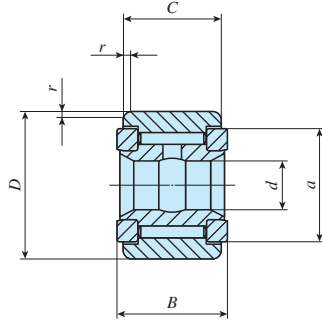
IKO Inch Series Inseparable Roller Followers

Selectable product specifications

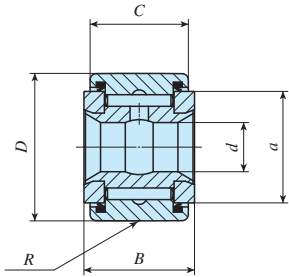
Roller guide type	No symbol	With cage
	V	Full complement roller
Seal structure	No symbol	Shield type
	UU	Sealed type
Shape of outer ring outer diameter surface	No symbol	Cylindrical outer ring
	R	Crowned outer ring



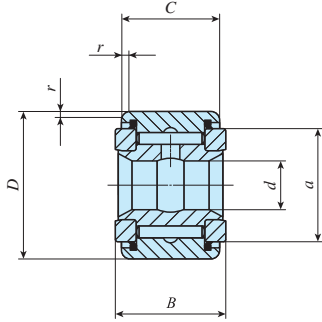
CRY...VR



CRY...V



CRY...VUUR



CRY...VUU

Shaft diameter	Identification number				Mass (Ref.)	Nominal dimensions mm (inch)									Shaft diameter mm						Basic dynamic load rating <i>C</i> N	Basic static load rating <i>C</i> ₀ N
	Shield type		Sealed Type			<i>d</i>	<i>D</i>	<i>B</i>	<i>C</i>		<i>a</i>	<i>R</i>	<i>r</i>	Clearance fit		Transition fit		Interference fit				
	Crowned outer ring	Cylindrical outer ring	Crowned outer ring	Cylindrical outer ring										Minimum	Maximum	Minimum	Maximum	Minimum	Maximum			
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 / ₁₆)	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.

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	100×10³m
Linear Slide Unit Linear Ball Spline Linear Bushing	50×10³m
Stroke Rotary Bushing	10⁶ 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

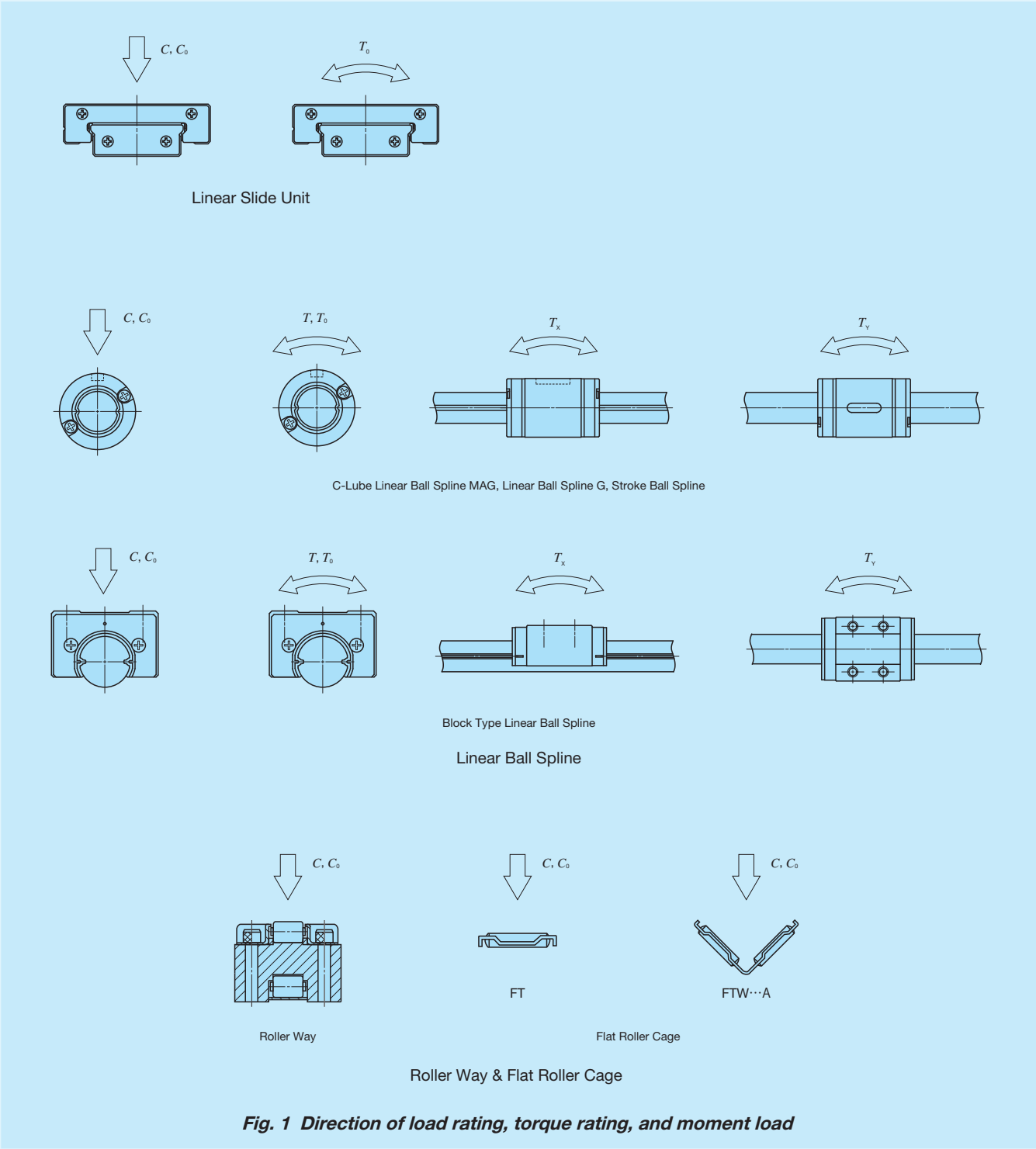
Dynamic torque rating refers to a torque with a certain direction and size with which 90% of a group of the same linear ball splines can run 50 x 10³m without material damages due to rolling contact fatigue when they are operated individually.

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.



Remark: For the cases of Crossed Roller Way and Linear Bushing, see an explanation of each series.

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		Code description
	Total traveling distance 10 ³ m	Life length h	
Crossed Roller Way Roller Way & Flat Roller Cage	$L=100\left(\frac{C}{P}\right)^{\frac{10}{3}}$	$L_h=\frac{10^6L}{2Sn_1-60}$	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

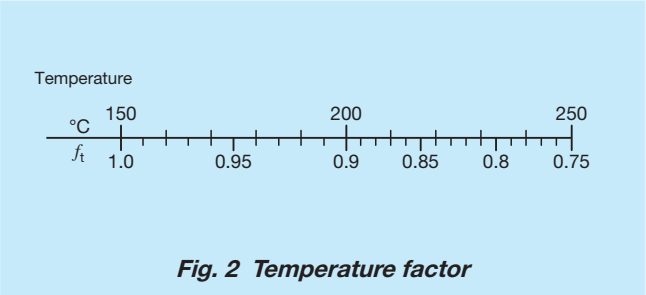
Series	Calculating formula of rating life		Code description
	Total number of rotation 10 ⁶ rotations	Life length h	
Rotational motion	$L=\left(\frac{C}{P}\right)^3$	$L_h=\frac{10^6L}{60\sqrt{(D_{PW}n)^2+(10Sn_1)^2}/D_{PW}}$	L : Rating life, 10 ⁶ rotations C : Basic dynamic load rating, N P : Applied load N L_h : Rating life in hours h n : Rotation speed rpm n_1 : Number of strokes per minute cpm S : Stroke length mm D_{PW} : Pitch circle diameter of balls mm ($D_{PW}\approx 1.15F_w$) F_w : Diameter of inscribed circle mm
Rotational and rotary compound motion			
Rotary and linear motion		$L_h=\frac{10^6L}{600Sn_1/(\pi D_{PW})}$	

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:

$C_t=f_t C$(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

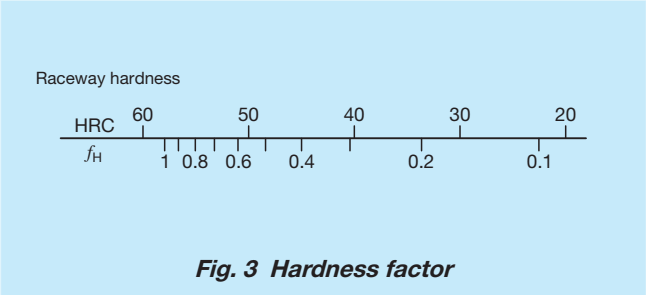


Hardness factor

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:

$C_H=f_H C$(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



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.

$f_s=\frac{C_0}{P_0}$(3)

$f_s=\frac{T_0}{M_0}$(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.

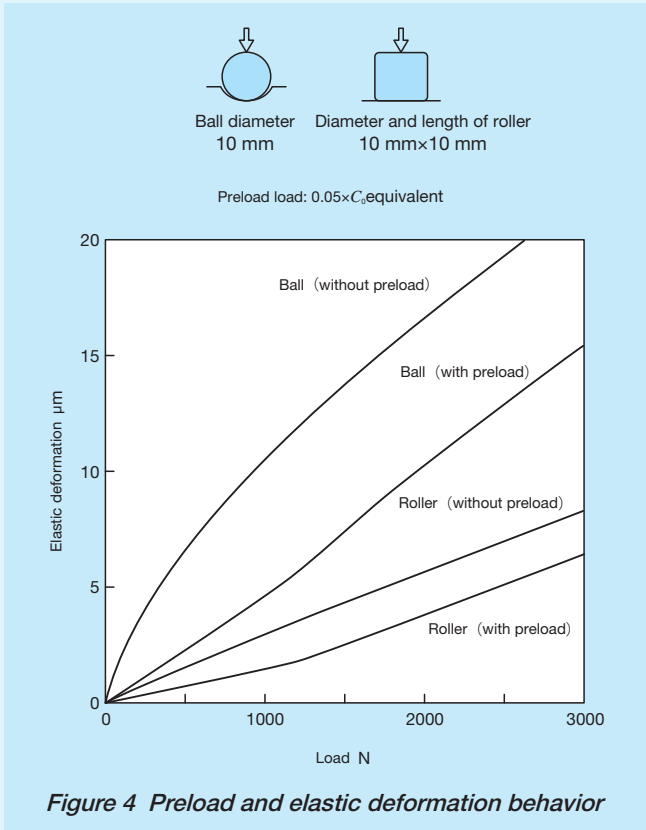
Preload is applied to the contact parts of a raceway and rolling elements with internal stress generated in advance. When a external load is applied on the preloaded linear motion rolling guide, shock absorbing with this internal stress makes elastic deformation smaller, and its rigidity is increased. (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.



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.

$$F = \mu P \cdots \cdots \cdots (3)$$

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 for 10 to 20 reciprocating cycles after excess grease is discharged, frictional resistance becomes small and stable. For applications where low frictional resistance is required, the replenishment amount of grease may be reduced, but it must be kept to an appropriate level so as not to give a bad influence on the lubrication performance.

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.

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® 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**.

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 mm²/s is used. For linear motion rolling guides under light load at high speed operation, lubrication oil with a viscosity of about 13 mm²/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.

Model Code Index

Model code	Series name	Catalog name	Page	Model code	Series name	Catalog name	Page
B				LM…AJ	Linear Bushing	RED	II-167
				LM…F	Linear Bushing	RED	II-181
BG	Stroke Rotary Cage	RED	II-212	LM…F AJ	Linear Bushing	RED	II-181
BK…A	Miniature Stroke Rotary Bushing	RED	II-207	LM…F OP	Linear Bushing	RED	II-181
BSP…SL	Precision Linear Slide Unit	RED	II- 89	LM…F UU	Linear Bushing	RED	II-183
BSPG…SL	Precision Linear Slide Unit	RED	II- 91	LM…F UU AJ	Linear Bushing	RED	II-183
BSR…SL	Precision Linear Slide Unit	RED	II- 93	LM…F UU OP	Linear Bushing	RED	II-183
BSU…A	Linear Slide Unit	RED	II- 99	LM…N	Linear Bushing	RED	II-167
BWU	High Rigidity Precision Linear Slide Unit	RED	II- 81	LM…N AJ	Linear Bushing	RED	II-167
				LM…N F	Linear Bushing	RED	II-181
C				LM…N F AJ	Linear Bushing	RED	II-181
				LM…N F OP	Linear Bushing	RED	II-181
CRW	Crossed Roller Way	RED	II- 33	LM…N F UU	Linear Bushing	RED	II-183
CRW…SL	Crossed Roller Way	RED	II- 33	LM…N F UU AJ	Linear Bushing	RED	II-183
CRWG	Anti-Creep Cage Crossed Roller Way	RED	II- 27	LM…N F UU OP	Linear Bushing	RED	II-183
CRWG…H	Anti-Creep Cage Crossed Roller Way H	RED	II- 31	LM…N OP	Linear Bushing	RED	II-167
CRWM	Crossed Roller Way	RED	II- 49	LM…N UU	Linear Bushing	RED	II-171
CRWM…A	Crossed Roller Way	RED	II- 53	LM…N UU AJ	Linear Bushing	RED	II-171
CRWU	Crossed Roller Way Unit	RED	II- 63	LM…N UU OP	Linear Bushing	RED	II-171
CRWU…R	Crossed Roller Way Unit	RED	II- 67	LM…OP	Linear Bushing	RED	II-167
CRWU…RS	Crossed Roller Way Unit	RED	II- 71	LM…UU	Linear Bushing	RED	II-171
CRWUG	Anti-Creep Cage Crossed Roller Way Unit	RED	II- 61	LM…UU AJ	Linear Bushing	RED	II-171
				LM…UU OP	Linear Bushing	RED	II-171
F				LMB	Linear Bushing	RED	II-179
				LMB…AJ	Linear Bushing	RED	II-179
FT	Flat Roller Cage	RED	II-231	LMB…N	Linear Bushing	RED	II-179
FT…N	Flat Roller Cage	RED	II-231	LMB…N AJ	Linear Bushing	RED	II-179
FT…V	Flat Roller Cage	RED	II-231	LMB…N OP	Linear Bushing	RED	II-179
FTW…A	Flat Roller Cage	RED	II-232	LMB…OP	Linear Bushing	RED	II-179
FTW…VA	Flat Roller Cage	RED	II-232	LME	Linear Bushing	RED	II-175
				LME…AJ	Linear Bushing	RED	II-175
G				LME…F	Linear Bushing	RED	II-185
				LME…F AJ	Linear Bushing	RED	II-185
GSN	Roller Way	RED	II-223	LME…F OP	Linear Bushing	RED	II-185
L				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
LM	Linear Bushing	RED	II-167	LME…N	Linear Bushing	RED	II-175
				LME…N AJ	Linear Bushing	RED	II-175

Note: BLUE denotes CAT-1552④E, while RED denotes CAT-1555②E.

Model Code Index

Model code	Series name	Catalog name	Page	Model code	Series name	Catalog name	Page
LME…N F	Linear Bushing	RED	II-185	LRXL	Linear Roller Way Super X	BLUE	II-175
LME…N F AJ	Linear Bushing	RED	II-185	LRXS	Linear Roller Way Super X	BLUE	II-187
LME…N F OP	Linear Bushing	RED	II-185	LRXSC	Linear Roller Way Super X	BLUE	II-187
LME…N F UU	Linear Bushing	RED	II-187	LRXSG	Linear Roller Way Super X	BLUE	II-187
LME…N F UU AJ	Linear Bushing	RED	II-187	LS	Stroke Ball Spline	RED	II-149
LME…N F UU OP	Linear Bushing	RED	II-187	LSAG	Linear Ball Spline G	RED	II-123
LME…N OP	Linear Bushing	RED	II-175	LSAGF	Linear Ball Spline G	RED	II-127
LME…N UU	Linear Bushing	RED	II-177	LSAGFL	Linear Ball Spline G	RED	II-127
LME…N UU AJ	Linear Bushing	RED	II-177	LSAGFLT	Linear Ball Spline G	RED	II-127
LME…N UU OP	Linear Bushing	RED	II-177	LSAGFT	Linear Ball Spline G	RED	II-127
LME…OP	Linear Bushing	RED	II-175	LSAGL	Linear Ball Spline G	RED	II-123
LME…UU	Linear Bushing	RED	II-177	LSAGLT	Linear Ball Spline G	RED	II-123
LME…UU AJ	Linear Bushing	RED	II-177	LSAGT	Linear Ball Spline G	RED	II-123
LME…UU OP	Linear Bushing	RED	II-177	LSB	Block Type Linear Ball Spline	RED	II-141
LMG	Linear Bushing G	RED	II-159	LSB…SL	Block Type Linear Ball Spline	RED	II-141
LMGT	Linear Bushing G	RED	II-159	LSBT	Block Type Linear Ball Spline	RED	II-141
LMS	Miniature Linear Bushing	RED	II-192	LST	Stroke Ball Spline	RED	II-149
LMS…F	Miniature Linear Bushing	RED	II-192	LWE	Linear Way E	BLUE	II- 53
LMS…F UU	Miniature Linear Bushing	RED	II-192	LWE…Q	Low Decibel Linear Way E	BLUE	II- 53
LMS…UU	Miniature Linear Bushing	RED	II-192	LWE…SL	Linear Way E	BLUE	II- 53
LMSL	Miniature Linear Bushing	RED	II-192	LWEC	Linear Way E	BLUE	II- 53
LMSL…F	Miniature Linear Bushing	RED	II-192	LWEC…SL	Linear Way E	BLUE	II- 53
LMSL…F UU	Miniature Linear Bushing	RED	II-192	LWEG	Linear Way E	BLUE	II- 53
LMSL…UU	Miniature Linear Bushing	RED	II-192	LWEG…SL	Linear Way E	BLUE	II- 53
LRWM	Linear Way Module	BLUE	II-223	LWES	Linear Way E	BLUE	II- 61
LRWX…B	Linear Roller Way X	BLUE	II-205	LWES…Q	Low Decibel Linear Way E	BLUE	II- 61
LRWXH	Linear Roller Way X	BLUE	II-207	LWES…SL	Linear Way E	BLUE	II- 61
LRX	Linear Roller Way Super X	BLUE	II-169	LWESC	Linear Way E	BLUE	II- 61
LRXC	Linear Roller Way Super X	BLUE	II-169	LWESC…SL	Linear Way E	BLUE	II- 61
LRXD	Linear Roller Way Super X	BLUE	II-177	LWESG	Linear Way E	BLUE	II- 61
LRXD…SL	Linear Roller Way Super X	BLUE	II-177	LWESG…SL	Linear Way E	BLUE	II- 61
LRXDC	Linear Roller Way Super X	BLUE	II-177	LWET	Linear Way E	BLUE	II- 57
LRXDG	Linear Roller Way Super X	BLUE	II-177	LWET…Q	Low Decibel Linear Way E	BLUE	II- 57
LRXDG…SL	Linear Roller Way Super X	BLUE	II-177	LWET…SL	Linear Way E	BLUE	II- 57
LRXG	Linear Roller Way Super X	BLUE	II-169	LWETC	Linear Way E	BLUE	II- 57
LRXH	Linear Roller Way Super X	BLUE	II-169	LWETC…SL	Linear Way E	BLUE	II- 57
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Note: BLUE denotes CAT-1552④E, while RED denotes CAT-1555②E.

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LWH…M	Linear Way H	BLUE	II - 85	LWLFG…B	Linear Way L	BLUE	II - 33
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LWHDG…SL	Linear Way H	BLUE	II - 99	MAG	C-Lube Linear Ball Spline MAG	RED	II -123
LWHG	Linear Way H	BLUE	II - 85	MAGF	C-Lube Linear Ball Spline MAG	RED	II -127
LWHS…B	Linear Way H	BLUE	II -105	MAGFT	C-Lube Linear Ball Spline MAG	RED	II -127
LWHS…M	Linear Way H	BLUE	II -105	MAGL	C-Lube Linear Ball Spline MAG	RED	II -123
LWHS…MU	Linear Way H	BLUE	II -105	MAGLT	C-Lube Linear Ball Spline MAG	RED	II -123
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MH…MU	C-Lube Linear Way MH	BLUE	II - 85	MXHG	C-Lube Linear Roller Way Super MX	BLUE	II -169
MHD	C-Lube Linear Way MH	BLUE	II - 99	MXHL	C-Lube Linear Roller Way Super MX	BLUE	II -169
MHD…M	C-Lube Linear Way MH	BLUE	II -101	MXL	C-Lube Linear Roller Way Super MX	BLUE	II -169
MHD…MU	C-Lube Linear Way MH	BLUE	II -101	MXN	C-Lube Linear Roller Way Super MX	BLUE	II -191
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MHDC…SL	C-Lube Linear Way MH	BLUE	II - 99	MXNL	C-Lube Linear Roller Way Super MX	BLUE	II -191
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MHDG…SL	C-Lube Linear Way MH	BLUE	II - 99	MXNSG	C-Lube Linear Roller Way Super MX	BLUE	II -193
MHDL	C-Lube Linear Way MH	BLUE	II -101	MXNSL	C-Lube Linear Roller Way Super MX	BLUE	II -193
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MHSG	C-Lube Linear Way MH	BLUE	II -105	OR…A	Miniature Stroke Rotary Bushing	RED	II -207
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MHT…M	C-Lube Linear Way MH	BLUE	II - 93	RW	Roller Way	RED	II -221
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MHTG	C-Lube Linear Way MH	BLUE	II - 91	SF…A	Miniature Stroke Rotary Bushing	RED	II -207
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MLF	C-Lube Linear Way ML	BLUE	II - 31	ST…UU	Stroke Rotary Bushing	RED	II -201
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MLFG	C-Lube Linear Way ML	BLUE	II - 33	STS	Miniature Stroke Rotary Bushing	RED	II -207
MLG	C-Lube Linear Way ML	BLUE	II - 25	STSI	Miniature Stroke Rotary Bushing	RED	II -207
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IKO Linear Motion Rolling Guide Series,

Configuration of General Catalog

IKO Linear Motion Rolling Guide Series General Catalog Consists of **BLUE** and **RED**, the two volumes.
(CAT-1552④E) (CAT-1555②E)



CAT-1552④E

【Models】

- Rail Guide Type
Endless Linear Motion Type

C-Lube Linear Way ML
Linear Way L



C-Lube Linear Way ME
Linear Way E



C-Lube Linear Way MH
Linear Way H



Linear Way F



C-Lube Linear Way MUL
Linear Way U



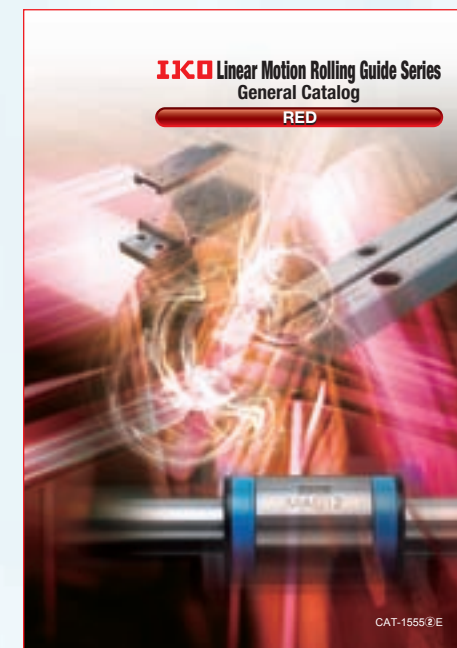
C-Lube Linear Roller Way Super MX
Linear Roller Way Super X Linear Roller Way X



Linear Way Module



RED



CAT-1555②E

【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



Rail Guide Type
Linear Slide Unit



Shaft Guide Type
Linear Ball Spline



Shaft Guide Type
Linear Bushing



Shaft Guide Type
Stroke Rotary Bushing



Flat Guide Type
Roller Way & Flat Roller Cage



Cam Follower
Roller Follower



IKO Introduction of Technical Service Site

"IKO Technical Service Site" can be accessed from our home page www.iko.co.jp. 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

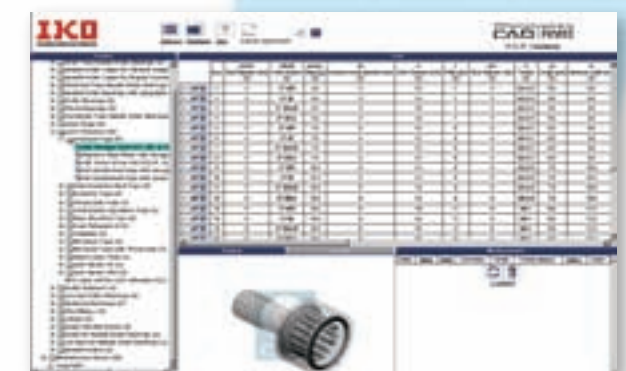
2-dimensional CAD data (DXF file)

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.

For a brochure version of the catalogs, please ask from www.iko.co.jp home page, or contact the nearest branch or sales office.

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 and ISO 9001.
- The standard products listed in this catalog comply with the specifications of the six hazardous materials mentioned cited in the European RoHS Directive. For information on all other products, please check with **IKO**.

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.

