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 customer's machinery and equipment more reliable, thereby contributing to preserving the global environment.
This development stance manifests well in the keyword **"Oil Minimum"**.

Oil Minimum
IKO Gentle to The Earth

Our pursuit of Oil Minimum has led to the creation of IKO's proprietary family of lubricating parts as "C-Lube".

"C-Lube" minimizes usage of lubrication oil and supplies the optimal amount of lubrication oil for long period of time. So it realizes long term maintenance free and contributes to the global environment preservation.

IKO C-Lube Maintenance-free

The "Interchangeable" is a result of our consideration to the environment and radical pursuit of elimination of material and inventory waste.

Interchangeable is a collective name of **"systems of products selection from users' perspective"** which allows free interchange and replacement totally retaining the accuracy and preload of slide units and track rails.

The integration of maintenance free and advanced interchangeable system with C-Lube is the "Free & Interchangeable".

Oil Minimum
IKO Gentle to The Earth

Eco-friendly specification

U.S. PATENTED

C-Lube Linear Way ML
No. 7677804 7252435 6729761 6712511

C-Lube Linear Way MLV
No. 8465206

C-Lube Linear Way MV
No. 6712511 6729761

C-Lube Linear Way ME
No. 7748905 7677804 6729761 6712511

C-Lube Linear Way MH
No. 7832929 6712511 7762723 7748905 7677804 6729761

C-Lube Linear Way MUL
No. 5435649

Linear Way L
No. 7258486 6517244 6176617 6082899 5967667

Linear Way E
No. 7677804 6176617 5967667

Linear Way H
No. 7677804 6082899 6517244 5967667 6461045 5622433 6250805 6176617

Linear Way F
No. 6176617 5967667

Linear Way U
No. 6880975 6176617 6851857 6082899 6517244 5967667 6461045 6309107

C-Lube Linear Roller Way Super MX
No. 8403563 7950852 8403562 7927016 8123408 7862234 8113714 7832930 8033730 7997800
No. 8585288 7458721 8506166 7458720 8206036 5800064 8113714 7780356 7534042

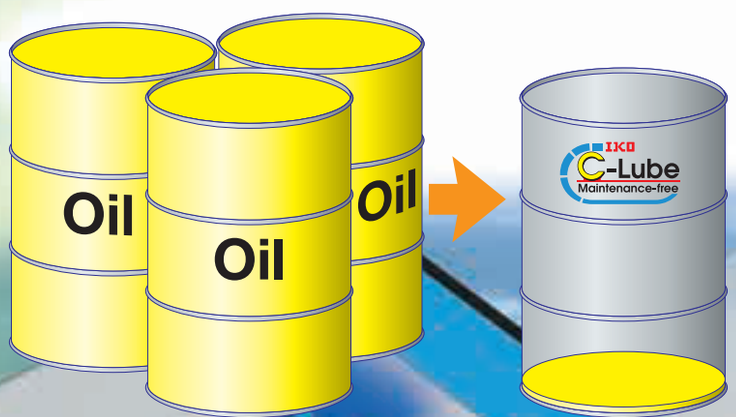
Linear Roller Way Super X
No. 7832930 6766897 7458721 6461045 7458720 6176617
No. 7341378 5622433 5967667 5464288 5800064

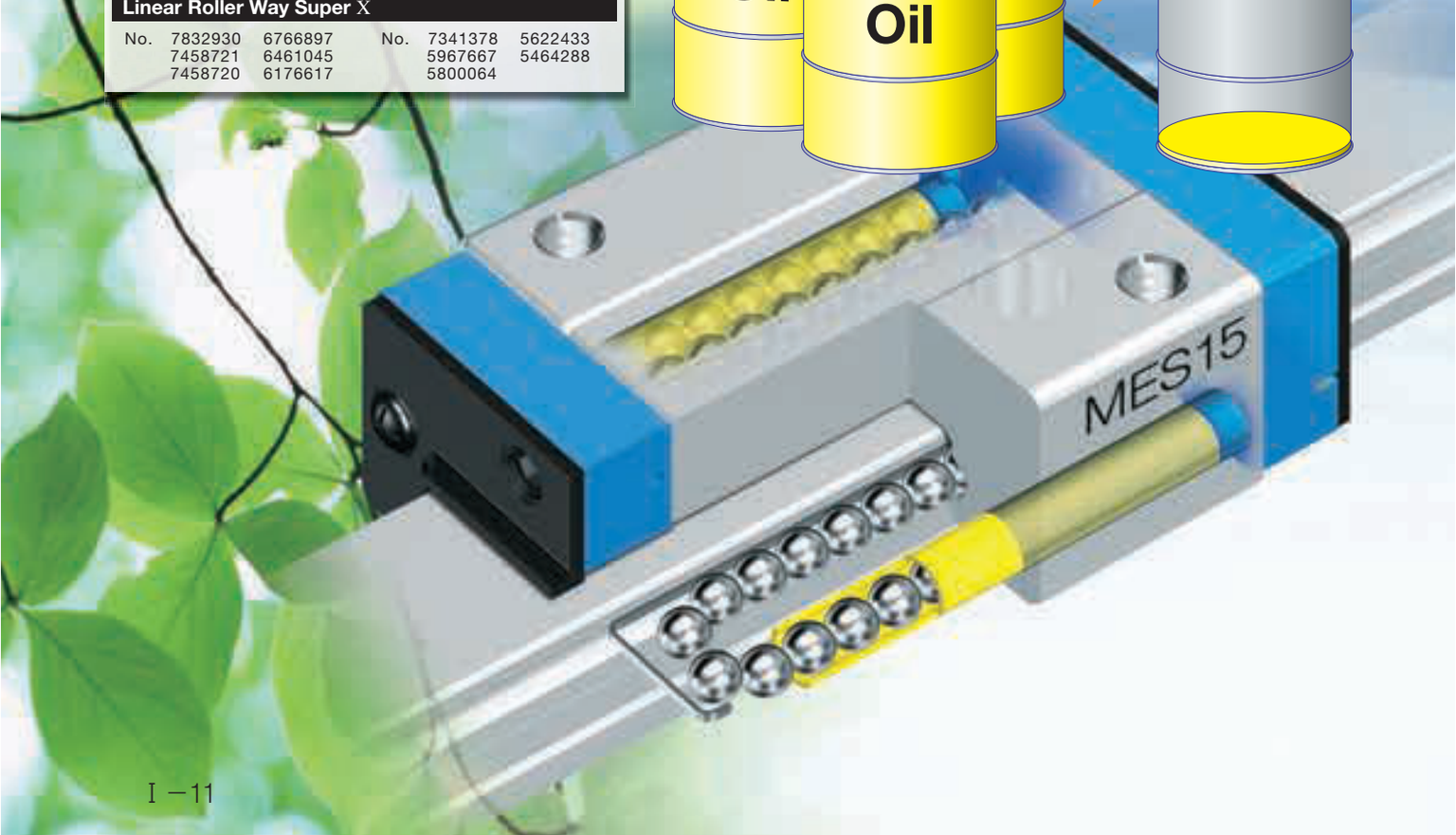
Eco-friendly

Consumption of precious oil resource is minimized! And elimination of oil feeder and its piping reduces the initial cost!

Contributes to reduction of total cost and environmental loads!!

Oil usage reduction effect





Reducing usage of lubrication oil

IKO C-Lube Maintenance-free

Maintenance free

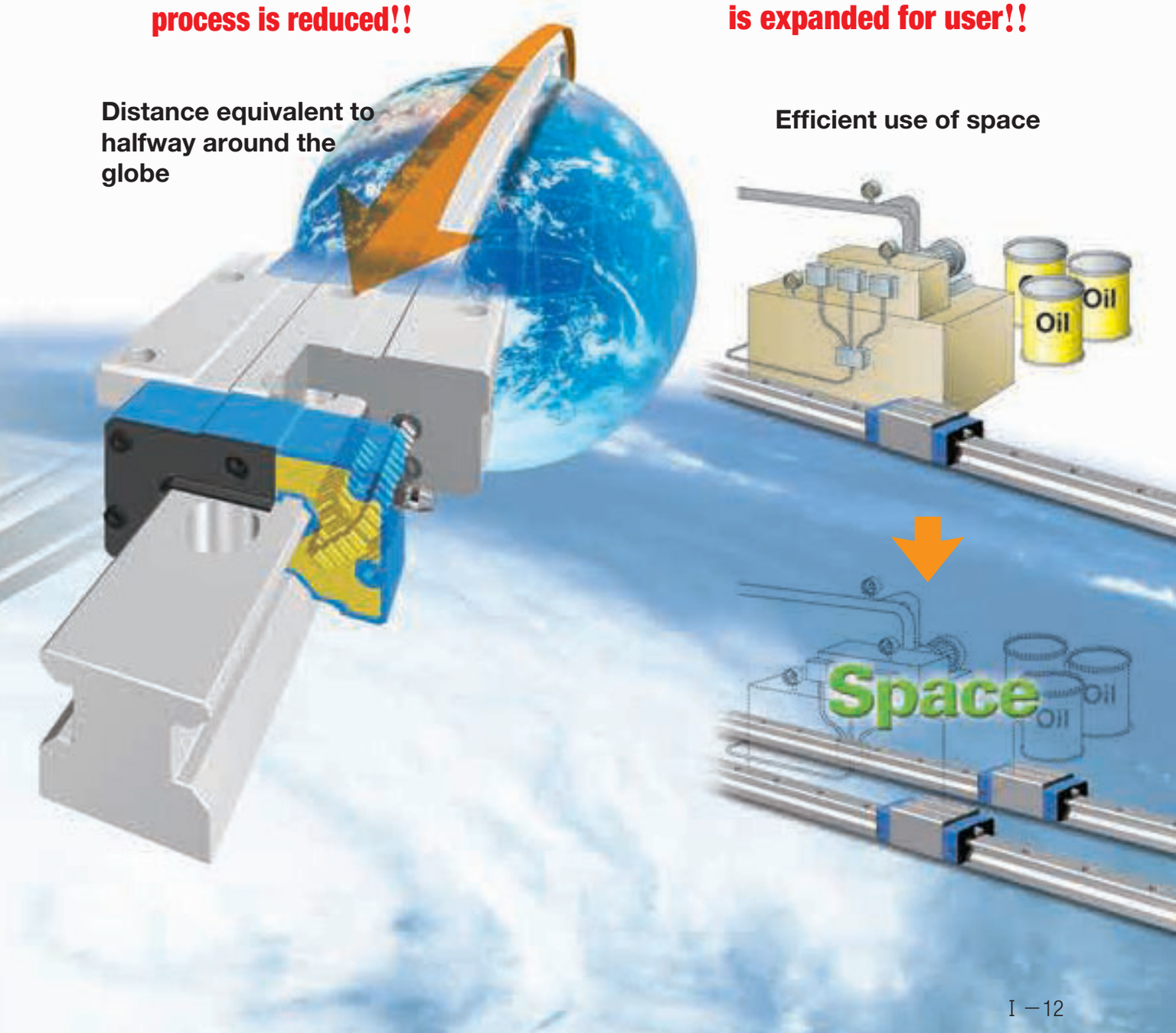
Endures running over 20,000 km without oil feeding!

Troublesome lubrication maintenance process is reduced!!

Compactness

The space consuming oil feeder is eliminated to save the space!

Freedom of machine designing is expanded for user!!



IKO Features of Maintenance Free Series ②

Oil Minimum
IKO Gentle to The Earth

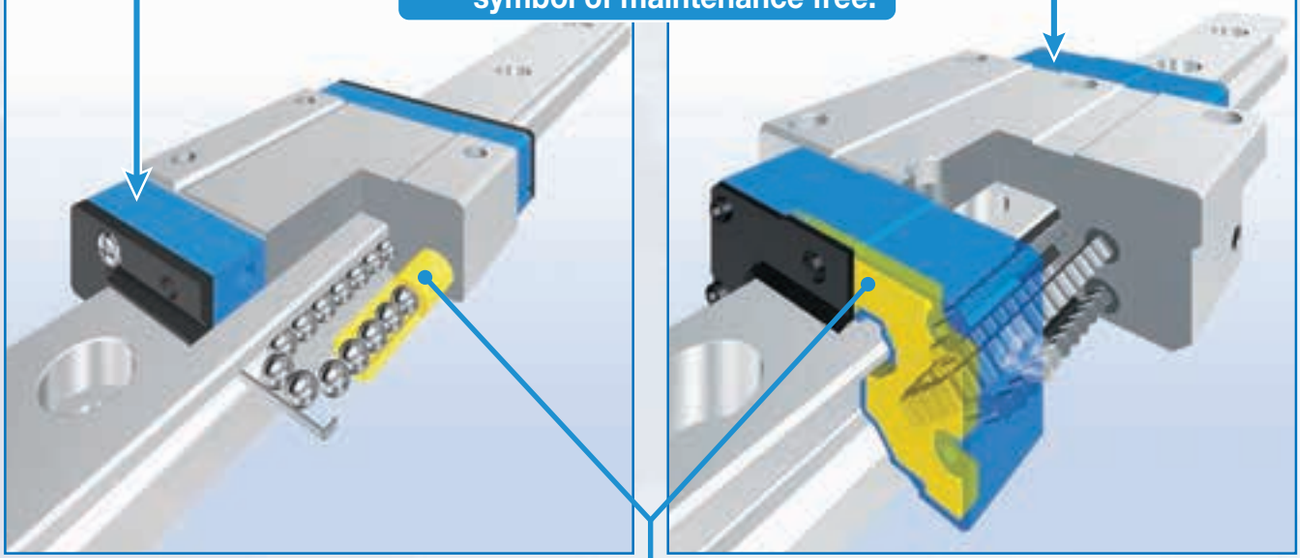
Features of C-Lube Linear Way and C-Lube Linear Roller Way

Original and world's first structure with [C-Lube]

C-Lube Linear Way

C-Lube Linear Roller Way

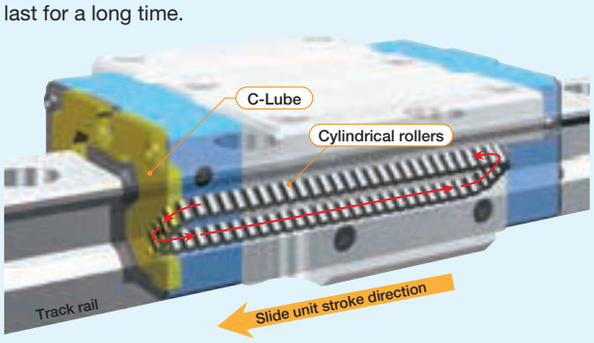
The aquamarine end plate is the symbol of maintenance free.



C-Lube integrated

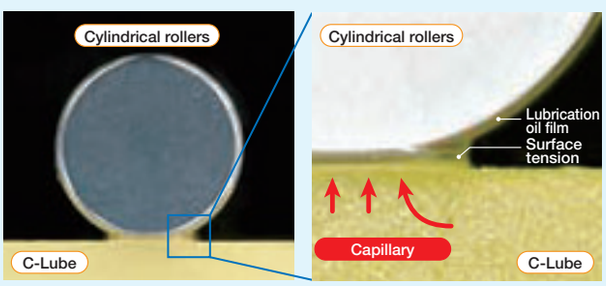
Lubrication oil is carried through circulation of rolling elements

The lubrication oil is supplied directly to the rolling elements, not to the track rail.
When rolling elements make contact with the capillary lubricating element integrated with the circulation path of slide unit rolling elements, the lubrication oil is supplied to surfaces of rolling elements and carried to the loading area through circulation of rolling elements.
This results in adequate lubrication oil being properly maintained in the loading area and lubrication performance will last for a long time.



Lubrication oil is directly supplied to surfaces of the rolling elements

The surface of capillary lubricating element is always covered with the lubrication oil.
Lubrication oil is continuously supplied to the surface of rolling elements by surface tension in the contact of capillary lubricating element surface and rolling elements.
On the surface of capillary lubricating element with which the rolling elements make contact, new lubrication oil is always supplied from the other sections.



Long term maintenance free is realized with oil impregnated with C-Lube only !!

IKO C-Lube Maintenance-free

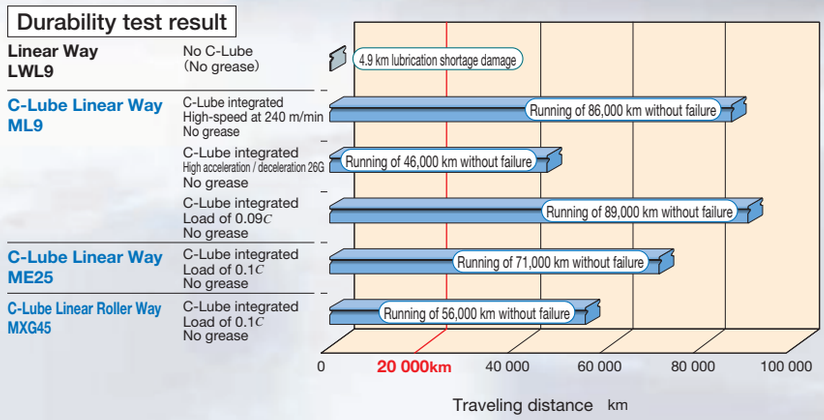
Maintenance free

This endures running over 20,000 km without oil feeding with lubrication oil in the C-Lube only.
Furthermore, grease is pre-packed in the slide unit so long term maintenance free can be realized.

Maintenance free is achieved until the end of device life*1!

*1. Typical device life is assumed. Re-greasing may be necessary depending on use conditions.

Durability test result

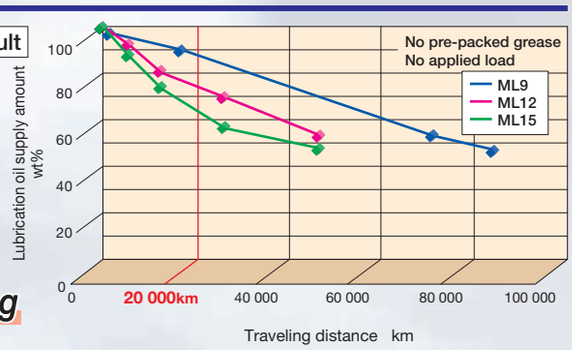


Eco-friendly

As lubrication oil in C-Lube is supplied by the amount necessary to maintain lubrication performance of the rolling guide, the consumption of lubrication oil is reduced and lubrication performance is maintained even when it run for a long period.

Eco-friendly specification reducing usage of lubrication oil!

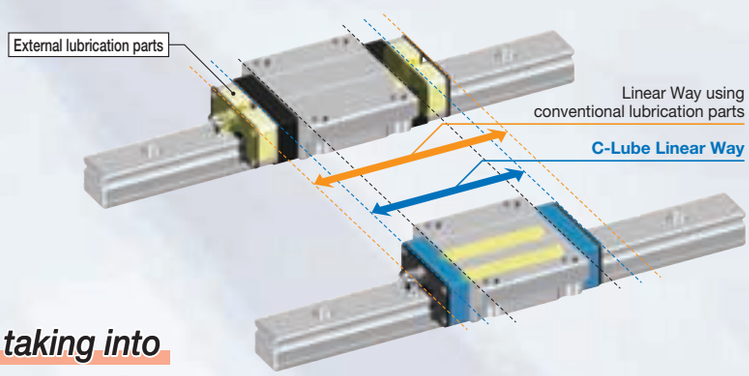
Oil supply test result



Compact

As C-Lube Linear Way and C-Lube Linear Roller Way are integrated with lubrication part C-Lube, their slide units are not long unlike types with external lubrication parts.
Replacement of conventional parts is easy free from constraints of mounting space and stroke length.

Compact design taking into account compactness!

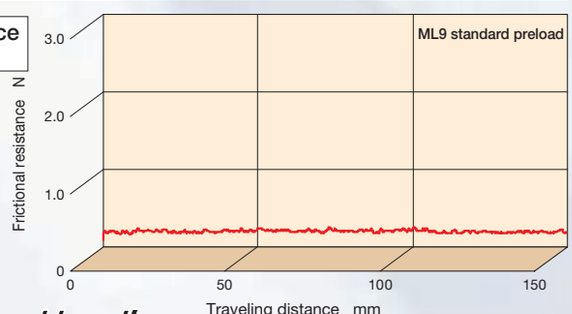


Smooth

C-Lube Linear Way and C-Lube Linear Roller Way do not generate slide resistance unlike lubrication parts external to the slide unit that make contact with the track rail.
Driving force follow-up property is superior and energy is saved by improvement of accuracy and reduction of friction loss.

Light and smooth motion is achieved!

Frictional resistance test result



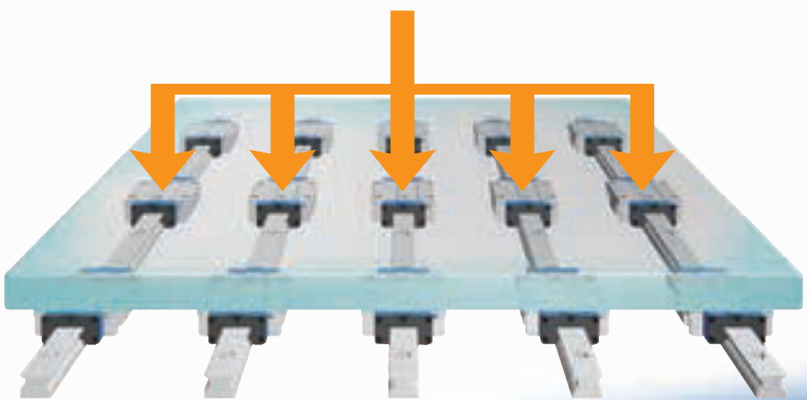
IKO Features of Interchangeable Specification ①

Ultimate Interchangeable pursuit of elimination

Accuracy interchangeability

Three accuracy classes are available!
Height variation can be controlled with multiple assembled sets!

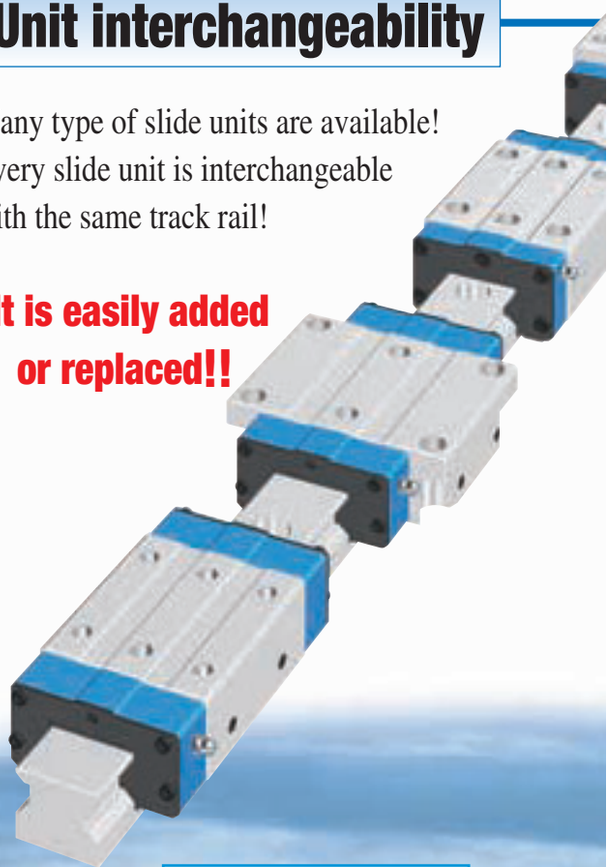
High accuracy of the device can be maintained in the multiple-use environment!!



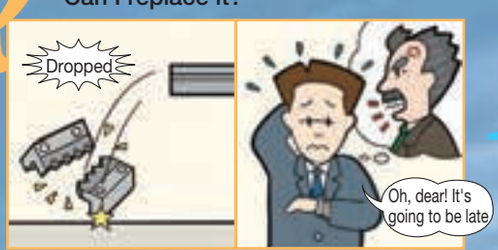
Unit interchangeability

Many type of slide units are available!
Every slide unit is interchangeable with the same track rail!

It is easily added or replaced!!

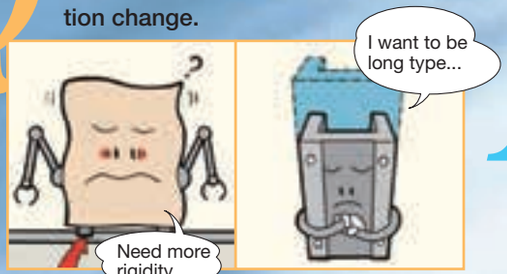


Q I dropped the Linear Way unit by mistake, and the unit is damaged. Can I replace it?

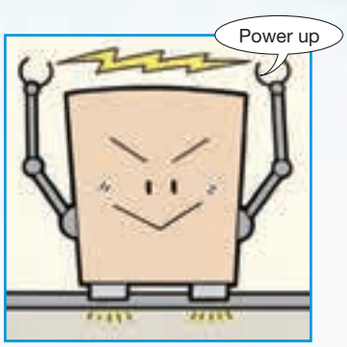


A **Unit interchangeability**
If you use Linear Way of Interchangeable specification, you may need to replace only slide unit.

Q I need to increase the rigidity of the unit because of sudden specification change.



A **Unit interchangeability**
The rigidity can be improved easily by increasing the unit length.



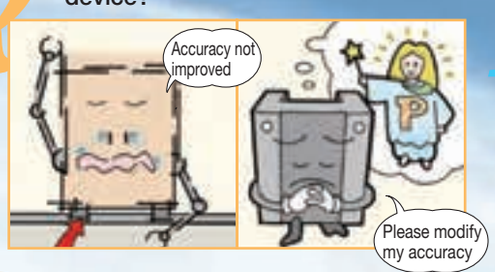
system by radical of any waste

Short delivery products

Separate delivery of slide unit and track rail!

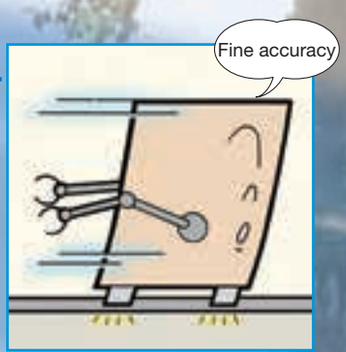
You may order what you need by any quantity at any time!!

Q Calculated accuracy cannot be achieved after assembly of the device?



A **Accuracy interchangeability, preload interchangeability**

How do you like to use accuracy higher by one class or higher preload type?
As accuracy of the interchangeable products is controlled strictly by parts, setting can be modified.



Q I carelessly forgot to arrange some parts, but I need them urgently. Can it be delivered soon?

A **Short delivery available**

Interchangeable parts are available for short delivery, they can be delivered quickly with our perfect inventory system.
Slide unit and track rail can be ordered individually.

IKO Features of Interchangeable Specification ②

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

Ultimate 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 slide unit immediately
- The number of slide units is in short
- Wish to replace the track rail immediately
- The length of track rail is not sufficient
- Wish to store only the slide units in stock for emergency

Help

Interchangeable specification realizes ;

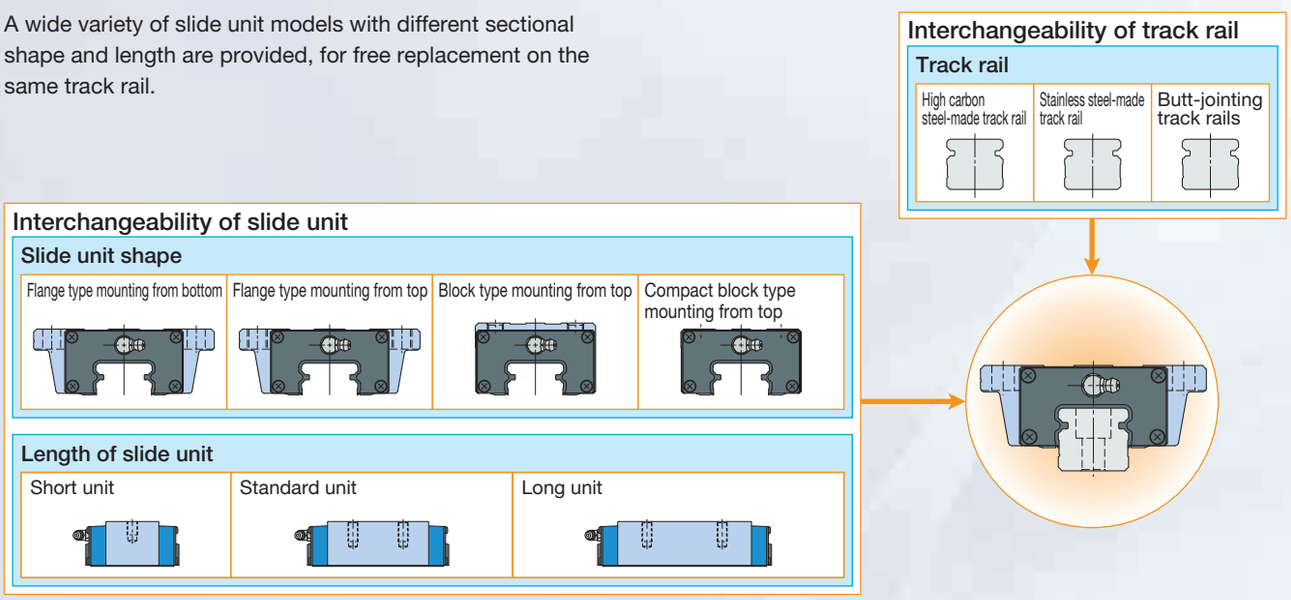
- Wish to prepare for a sudden design change
- Wish to select freely the combination of high accuracy and preload
- Slide unit and track rail are separately handled
- Free combination of slide unit and track rail can be selected
- Compactness-independent storing of slide units and track rails

Sorted out

Select the products as many as you wish.

Unit interchangeability

A wide variety of slide unit models with different sectional shape and length are provided, for free replacement on the same track rail.



Free selection is possible for slide units and track rails!

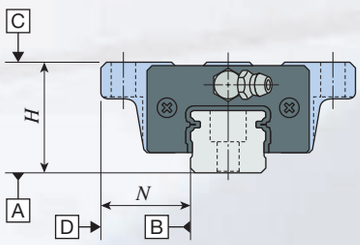
Interchangeable specification has realized the incomparable high interchangeability by severely managing the dimensions of slide unit and track rail with the background of unique high processing technology.
This feature allows independent handling of slide unit and track rail, thus allowing you to select free combination and to order any products for any volume at any necessary time.

Accuracy interchangeability

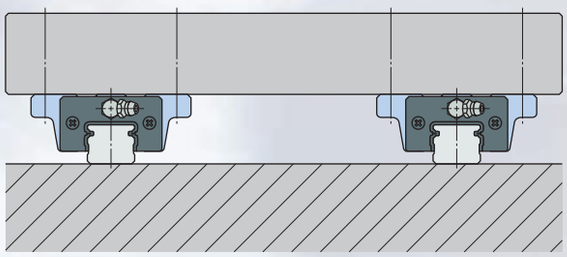
Three accuracy classes of Ordinary, High and Precision class are provided, to support even high traveling accuracy purposes. In addition, as height variation of multiple assembled sets is managed with high accuracy, you may use parallel track rails at ease.

Standard setting up to precision

- Tolerances of dimensions H and N
- Variation of dimensions H and N in 1 set
- Parallelism in operation of the C surface to A surface
- Parallelism in operation of the D surface to B surface



It allows the accuracy improvement of units without design changes!



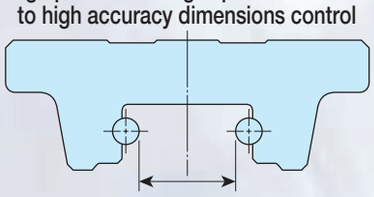
Corresponding to parallel arrangement of multiple assembled sets as standard

- Variation of dimensions H of multiple assembled sets is specified

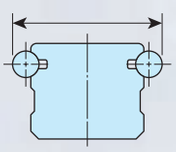
Preload interchangeability

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

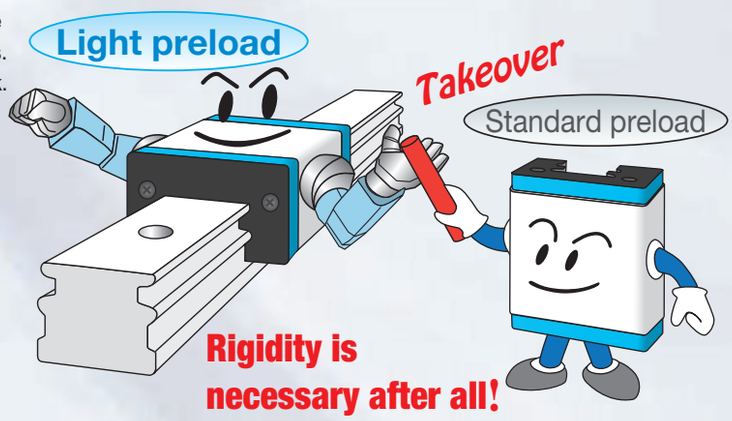
High preload setting is possible thanks to high accuracy dimensions control



Slide unit



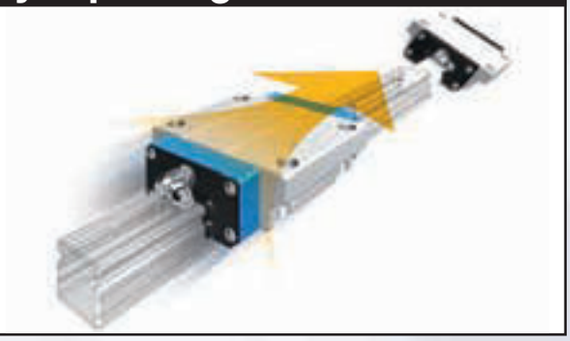
Track rail



It allows the rigidity improvement of units without design changes!

Maintenance free is achieved only by replacing the slide unit!

By replacing the interchangeable Linear Way or Linear Roller Way slide unit with C-Lube Linear Way or C-Lube Linear Roller Way slide unit, maintenance free is achieved while using the same track rail.

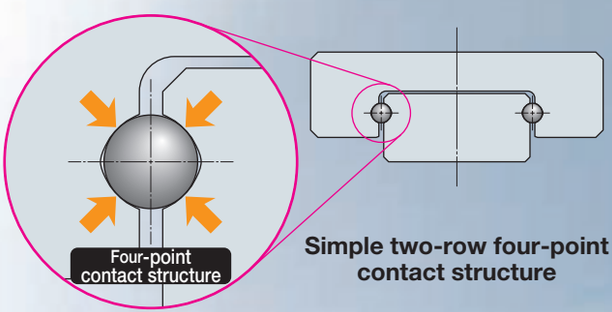


IKO Features of Linear Way Series

IKO's excellent features realized by contact in two-row raceways

Two-row four-point contact type simple structure

IKO adopts two-row four-point contact type for every Linear Way series. Thanks to our design know how and production technologies having been fostered for long time, high accuracy and smooth motion are realized in the micro series.
In addition, load in every direction can be received evenly and therefore stable high accuracy and rigidity can be achieved even in applications where load has variable direction and size or complex load is applied.



Simple two-row four-point contact structure

Essential for micro sizing!

Micro Linear Way L realized by simple structure

Micro Linear Way L for further needs of miniaturization produced by original small sizing technology.
Wide variety of track rail width from 1 mm to 6 mm is available and high accuracy of micro positioning mechanism is realized.

IKO Micro Linear Way L

LWL1

World's smallest size!

- **High accuracy even with the smallest size of 1 mm*!**
  *Track rail width of 1 mm
- **Even the smallest size of 1 mm can be securely mounted and fixed**!**
  **Tapped rail specification
- **Even the smallest size of 1 mm can ensure stable operation!**

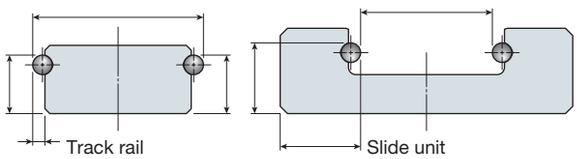
LWL1 can be used for further super miniaturization of machines and devices with free-minded thinking.

a simple structure by four-points

Interchangeable

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.

This technology realizes interchangeable specification and high interchangeable system in every series!



Measurement of way accuracy

As the ball is stabilized during track groove measurement, measurement of high accuracy and precise preload management are possible.

Variety of models and size variations

A wide variety of models and sizes, such as super miniature size of only 1 mm track rail width, is provided for your selection to meet each requirement.

Series		Model	Size	Track rail width Min	Max
C-Lube Linear Way ML	ML	20 models	15 sizes	3 ~	42 mm
Linear Way L	LWL	22 models	18 sizes	1 ~	42 mm
C-Lube Linear Way MLV	MLV	1 model	3 sizes	7 ~	12 mm
C-Lube Linear Way MV	MV	1 model	3 sizes	20 ~	30 mm
C-Lube Linear Way ME	ME	18 models	6 sizes	15 ~	45 mm
Linear Way E	LWE	21 models	6 sizes	15 ~	45 mm
C-Lube Linear Way MH	MH	17 models	9 sizes	8 ~	45 mm
Linear Way H	LWH	19 models	11 sizes	8 ~	65 mm
Linear Way F	LWF	4 models	7 sizes	33 ~	90 mm
C-Lube Linear Way MUL	MUL	1 model	2 sizes	25 ~	30 mm
Linear Way U	LWU	1 model	4 sizes	40 ~	86 mm

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

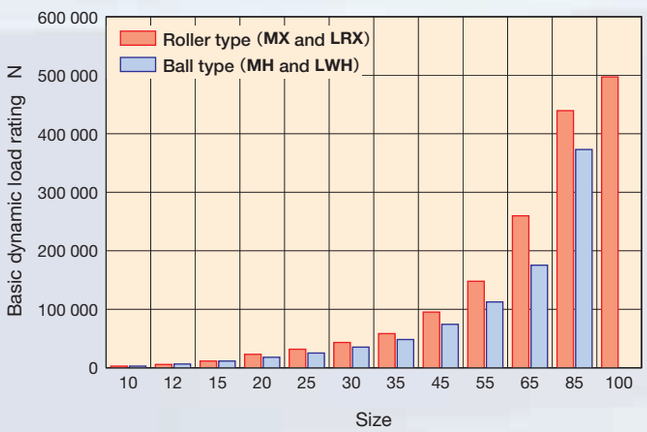
IKO Features of Linear Roller Way Series ①

Ultimate high performance produced by world's

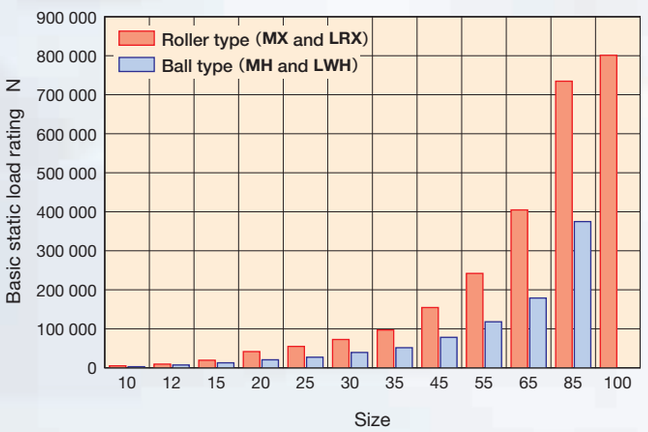
Super high load capacity

The Linear Roller Way Super X has a large contact area with the way and a number of cylindrical rollers with excellent load capacity, which allows to achieve larger load rating.

Comparison of basic dynamic load rating



Comparison of basic static load rating



Size smaller by one size than the ball type can be used!

Long life

《Roller Type》 **MXG45**

《Ball Type》 **MHG45**

C = 124 000 N
C_0 = 223 000 N

C = 95 200 N
C_0 = 114 000 N

C : Basic dynamic load rating N
C_0 : Basic static load rating N
L : Life km
P : Applied load N

Roller type has large basic dynamic load rating C and long life due to the different "index"!

【Life calculation example】

Applied load
In case of 10000 N

Roller Type

$$L=50\left(\frac{C}{P}\right)^{10/3}$$

$L \fallingdotseq 220\,000$ km

Ball Type

$$L=50\left(\frac{C}{P}\right)^{3}$$

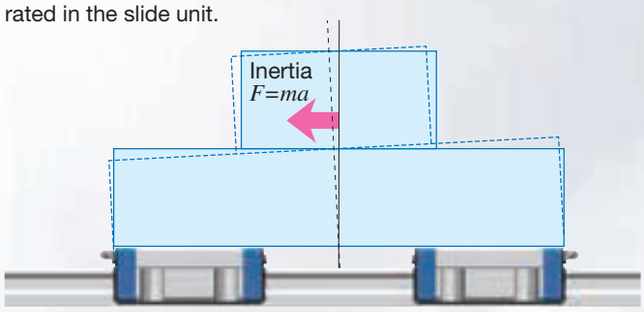
$L \fallingdotseq 43\,000$ km

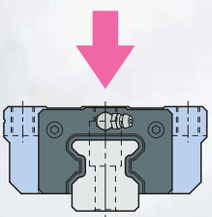
Significant increase!

first roller guide structure of IKO

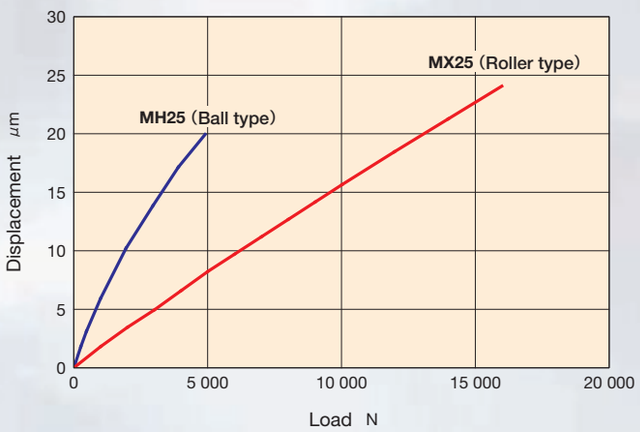
Super high rigidity

The rigidity of linear motion rolling guide significantly affects properties of machines and devices to be incorporated.
The Linear Roller Way Super X achieves high rigidity as a number of small cylindrical rollers with smaller elastic deformation relative to load than that of balls are incorporated in the slide unit.

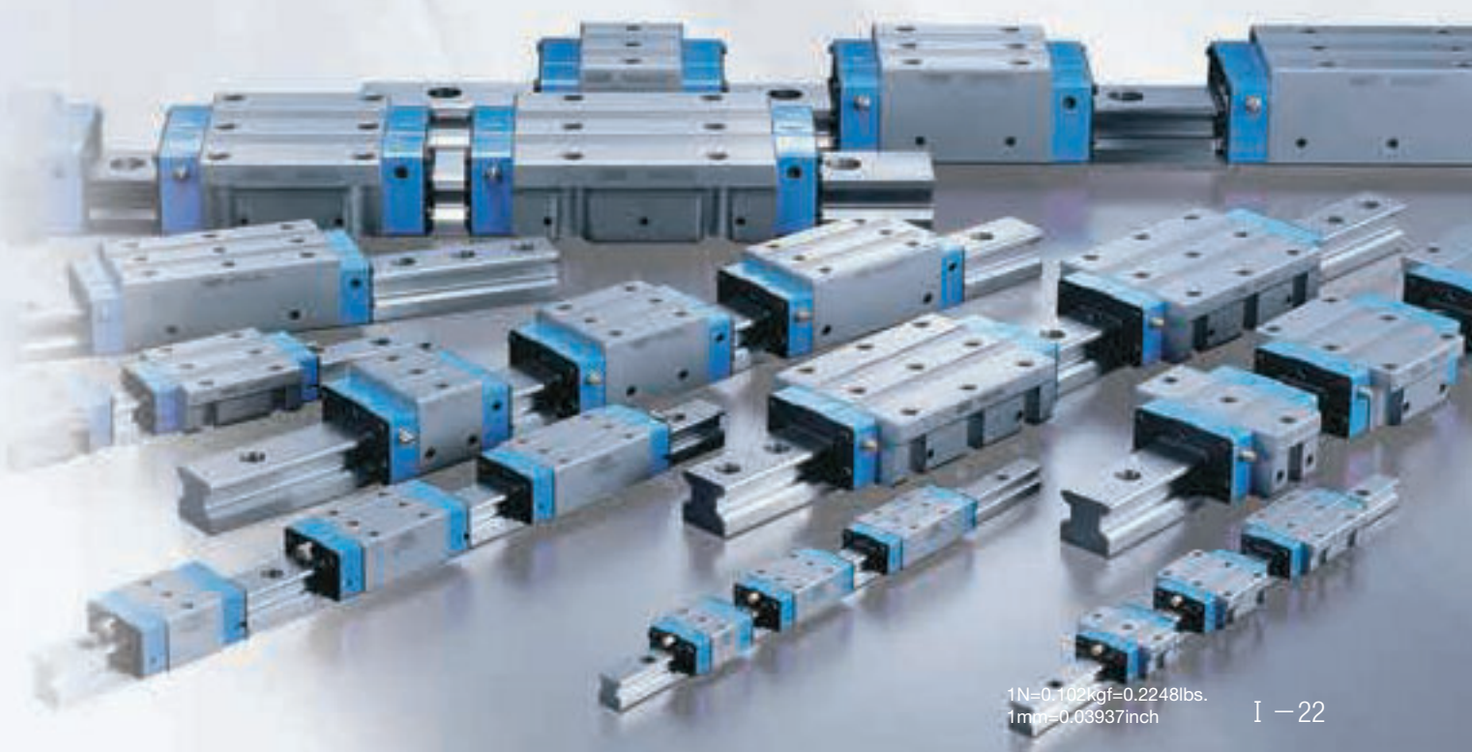




Comparison of elastic deformation



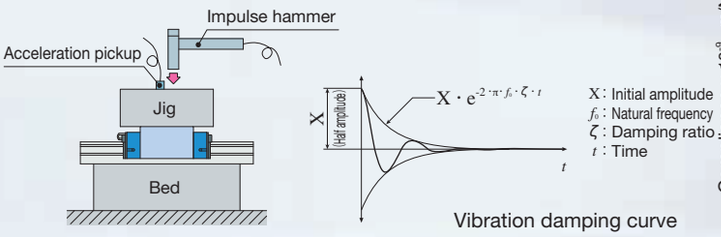
Well-balanced high rigidity is realized in every direction!



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

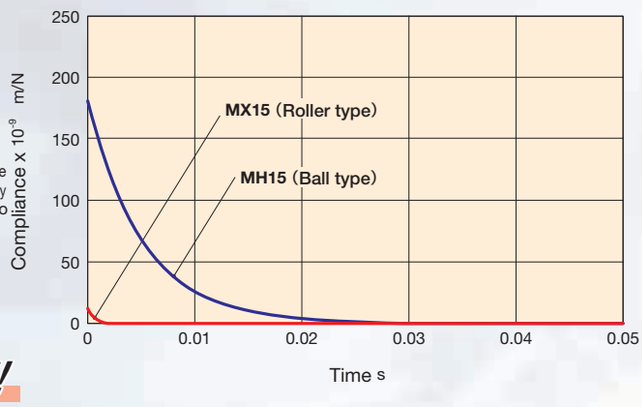
Vibration characteristics

The Linear Roller Way Super X has high rigidity relative to ball types of the same size, so deformation amount is low relative to repeated fluctuating load, natural frequency is high and vibration damping time is short.



Vibration damping curve

Vibration damping curve in downward vibration (Half amplitude)



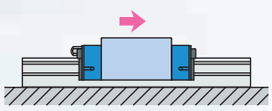
Positioning time can be shortened!

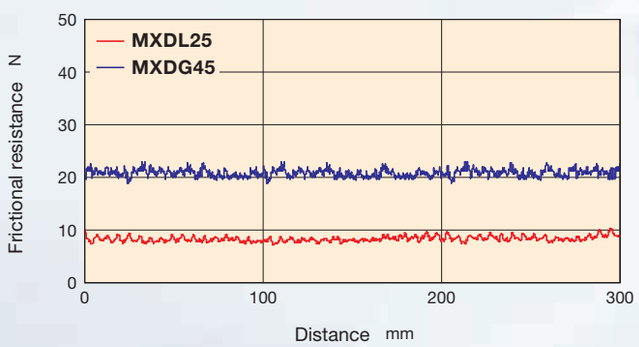
Allows accurate positioning with excellent frictional characteristic

The Linear Roller Way Super X prevents skew of cylindrical roller and achieves smooth motion by adopting unique retaining method to accurately guide cylindrical roller ends with retaining plate.
The Linear Roller Way Super X has good response characteristics to micro-feeding and allows for accurate positioning, thanks to small frictional resistance against preload and load and excellent frictional characteristics relative to plain guides and ball type linear motion rolling guide.

MXDL25 and MXDG45 T_3 preload frictional resistance

Test portion	Extra long unit **MXDL25** Long unit **MXDG45**
Preload	T_3 preload
Velocity	0.6 m/min
Lubrication	C-Lube integrated, with grease





High follow-up property is ensured even for micro-feeding!

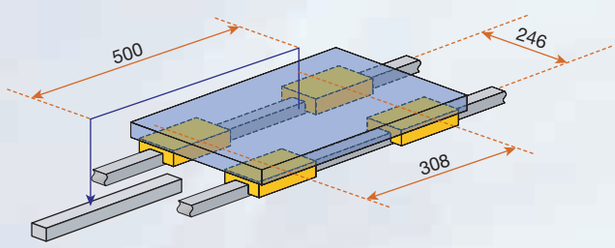
High running accuracy

Optimal design based on analysis of re-circulation behavior of cylindrical roller circulation realizes smooth and quiet motion. In addition, load is applied to many cylindrical rollers and therefore the micro deflection during running is minimized. Extra long unit is optimal for applications requiring higher running accuracy. (For details, see page I -29)

Deflection amount during running

unit: μm

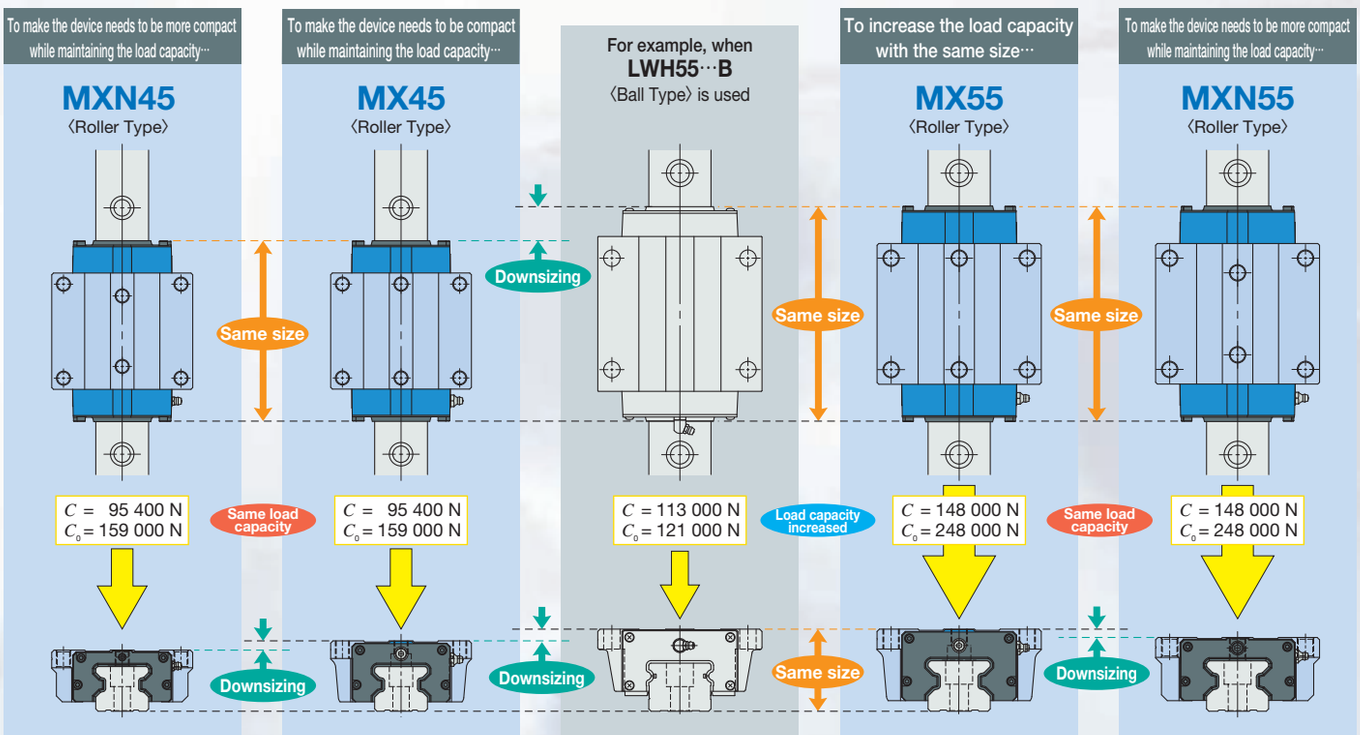
MXDG30 T_3 preload	0.12



Stable running accuracy is achieved!

Corresponding to compactification

Roller type with significantly higher load capacity than the ball type. The Linear Roller Way Super X allows for downsizing from many size variations for compactification of devices.



Downsizing and increased load capacity!

Roller type with large increase of load capacity!

Compatible ball type and mounting dimensions

The Linear Roller Way Super X has mounting dimensions compatible with the ball type Linear Way H.
Replacement with roller type is possible without significant design change to machine or device.

	《Roller Type》 C-Lube Linear Roller Way Super MX	《Ball Type》 C-Lube Linear Way MH
Flange type	MX	MH, MHT
Block type	MXD	MHD
Compact block type	MXS	MHS

Downsizing and increased load capacity are possible!

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

A variety of models and size variations

Ball Type Miniature Series

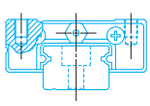
C-Lube Linear Way ML
C-Lube Linear Way MLV
Linear Way L

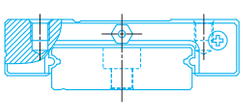
Thanks to the structure with two rows of balls to contact with the way at four points, stable accuracy and rigidity can be achieved even in applications where load has variable direction and size or complex load is applied, despite its very small body.

Micro Linear Way L

As the lineup of track rail width from 1 mm to 6 mm is available, you can select an optimal product for the specifications of your machine and device. For LWL1, world's smallest size is realized: track rail width of 1 mm, slide unit width of 4 mm and assembly height of 2.5 mm.

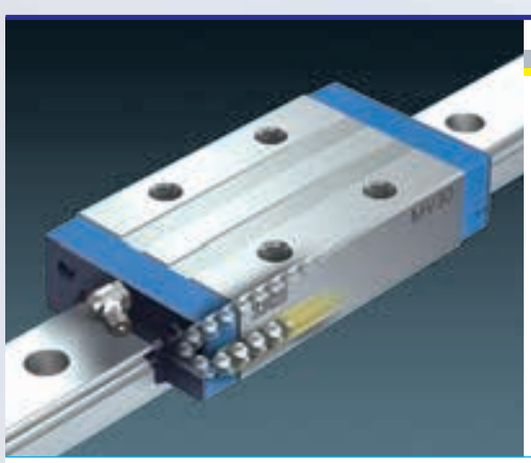
Standard type	Wide type
ML LWL	MLF LWLF





Length of slide unit	
C	Short
No symbol	Standard
G	Long
L	Extra long

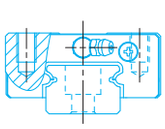
Size	
Standard type	1, 2, 3, 5, 7, 9, 12, 15, 20, 25
Wide type	4, 6, 10, 14, 18, 24, 30, 42



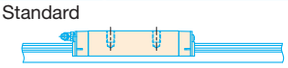
Ball Type Low Profile/Light Weight Series

C-Lube Linear Way MV

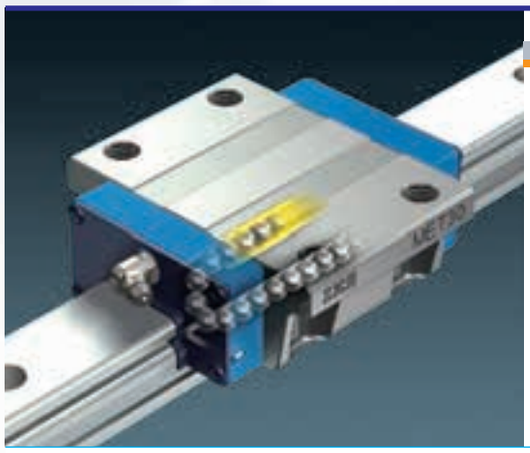
Despite its extra low profile and extra light weight, this linear motion rolling guide has the maximum load rating among the ball types while achieving high load capacity.



Length of slide unit
Standard



Size
20, 25, 30

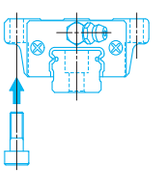


Ball Type Compact Series

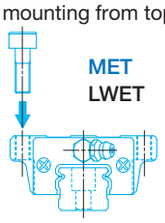
C-Lube Linear Way ME
Linear Way E
Low Decibel Linear Way E

Versatile linear motion rolling guide that has achieved utility pursuing compactness in every aspect. Low decibel types with resin separator to prevent direct contact between balls are also available.

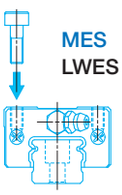
Flange type mounting from bottom
ME
LWE



Flange type mounting from top
MET
LWET

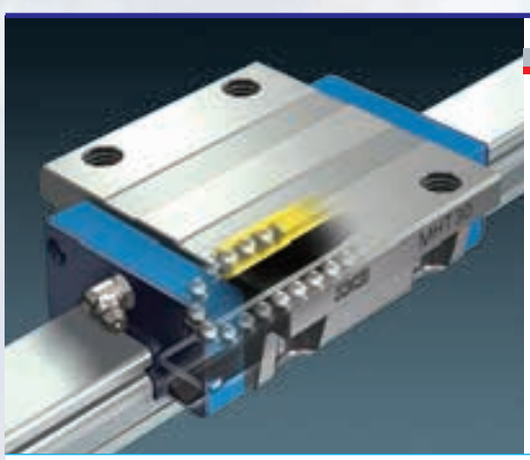


Block type mounting from top
MES
LWES



Length of slide unit	
C	Short
No symbol	Standard
G	Long

Size
15, 20, 25, 30, 35, 45

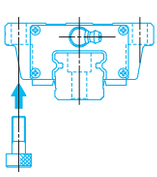


Ball Type High Rigidity Series

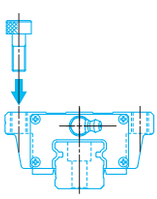
C-Lube Linear Way MH
Linear Way H

High rigidity linear motion rolling guides designed to evenly support high load capacity by incorporating large-diameter balls. Stable accuracy and rigidity can be achieved even in applications where load with variable direction and size and complex load are applied.

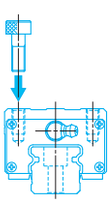
Flange type mounting from bottom
MH
LWH



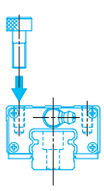
Flange type mounting from top(1)
MHT
LWHT



Block type mounting from top
MHD
LWHD



Compact block type mounting from top
MHS
LWHS



Note (1) Some models may be mounted from bottom.

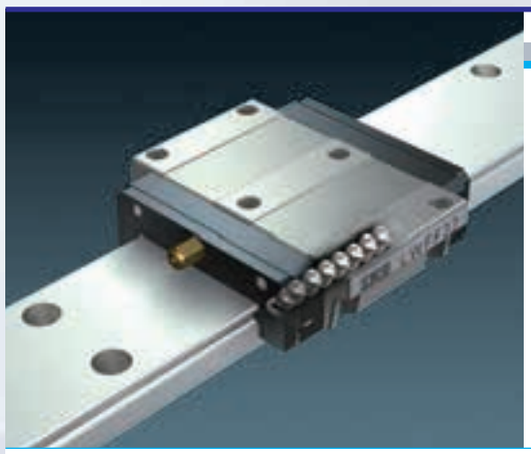
Length of slide unit	
C	Short
No symbol	Standard
G	Long

Size
8, 10, 12, 15, 20, 25, 30, 35, 45, 55, 65

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

Models and Size Variations ②

A variety of models and size variations

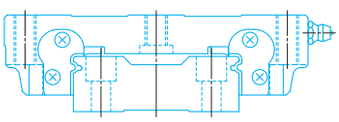


Ball Type Wide Type Series

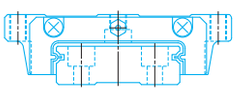
Linear Way F

As wide track rail is used and the distance between the load points is long, this is a linear motion rolling guide suitable to single-row use due to the structure resistant to across-the-width moment load. It is also resistant to complex load.

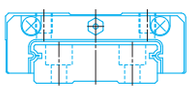
Flange type
mounting from top / bottom
LWFH

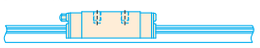


Flange type
mounting from top / bottom
LWFF

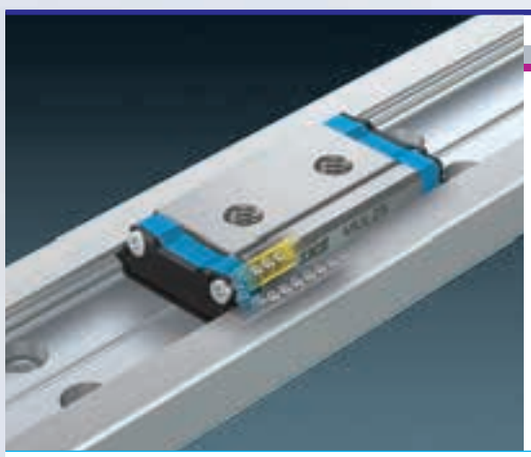


Block type
mounting from top
LWFS



Length of slide unit	
No symbol	Standard 

Size	
LWFH	40,60,90
LWFF	33,37,42,69
LWFS	33,37,42

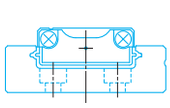


Ball Type U-Shaped Track Rail Series

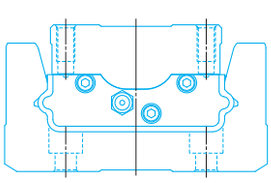
C-Lube Linear Way MUL
Linear Way U

Linear motion rolling guide of the structure with way inside the track rail of U-shaped section and slide unit therein. With the U-shaped track rail, rigidity against the track rail moment load and torsion is significantly improved.

Small type
MUL



Standard type
LWU



Length of slide unit	
No symbol	Standard 

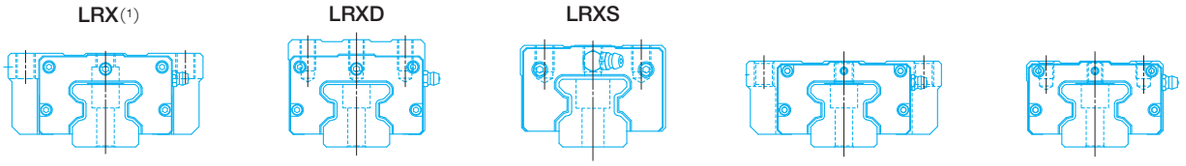
Size	
MUL	25, 30
LWU	40, 50, 60, 86

Roller Type

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

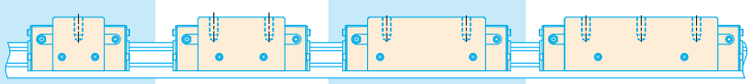
Linear motion rolling guide that has achieved the highest level of performance in all characteristics utilizing the roller's superior characteristic, such as rigidity, load capacity, running accuracy and vibration damping property. With extra long unit with the maximum slide unit length, load capacity and rigidity are improved and running performance with super high accuracy is realized.

Flange type mounting from top / bottom	Block type mounting from top	Compact block type mounting from top	Low profile flange type mounting from top	Low profile block type mounting from top
MX(1) LRX(1)	MXD LRXD	MXS LRXS	MXN	MXNS



Note (1) Size 20 series allows only for mounting from top and model mounting from bottom is MXH and LRXH.

Length of slide unit			
C	No symbol	G	L
Short	Standard	Long	Extra long



Size
10, 12, 15, 20, 25, 30, 35, 45, 55, 65, 85, 100

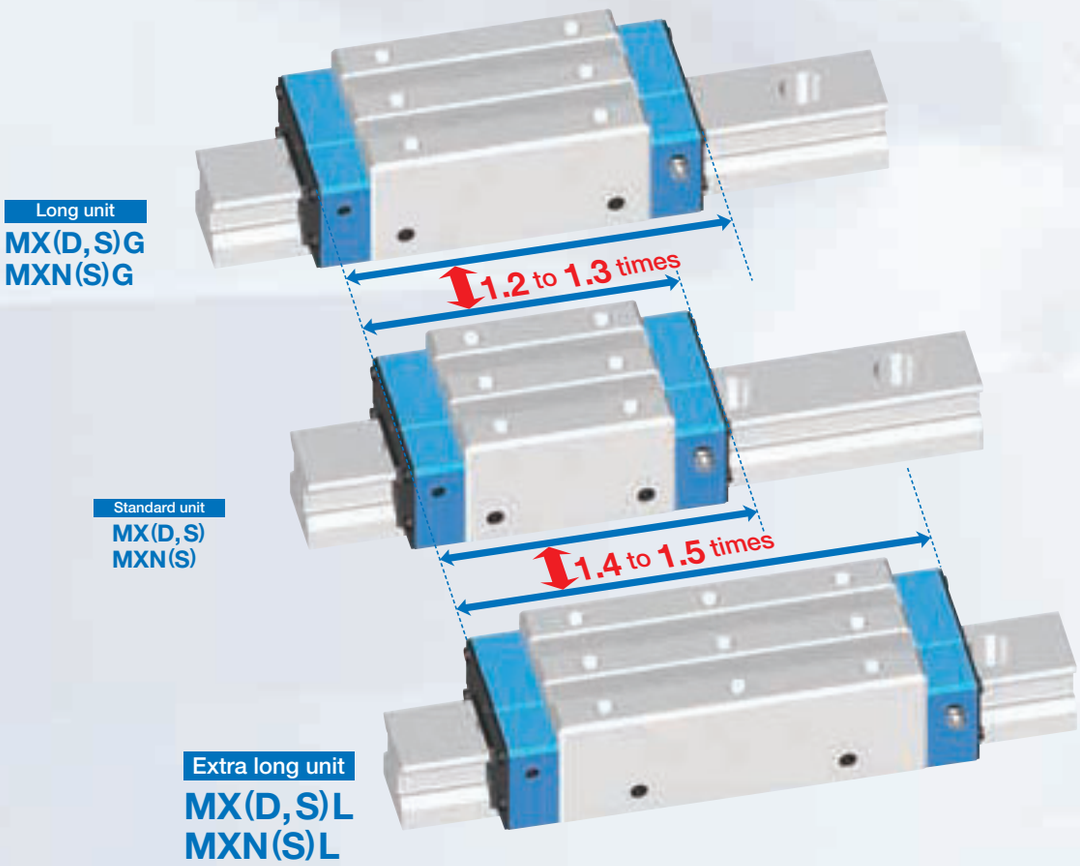
1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

Models and Size Variations ③

Features of extra long unit

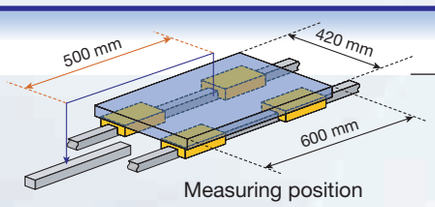
C-Lube Linear Roller Way Super MX

Length of slide unit is 1.4 to 1.5 times longer than that of standard unit



Super accurate feeding mechanism is realized

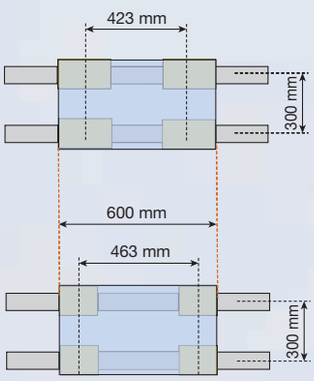
As running accuracy is as low as a half of that of long unit, feeding mechanism with super high accuracy can be realized.



Measuring position

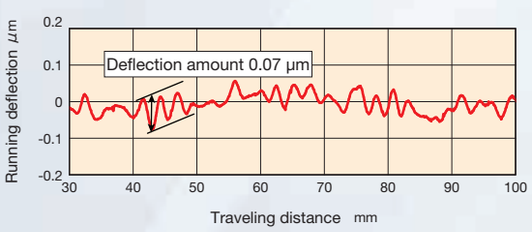
Test conditions

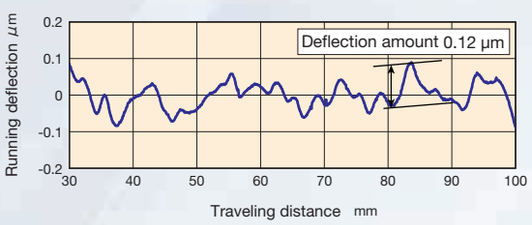
Test portion	Extra long unit **MXDL45**
Preload	T3 preload



Test conditions

Test portion	Long unit **MXDG45**
Preload	T3 preload





High accuracy running performance is realized without major change of machine or device design (1)!

Note (1) Position of the slide unit mounting hole is changed.

Further improvement of running accuracy

Load capacity and rigidity are significantly improved!!

Load capacity of machine or device is improved

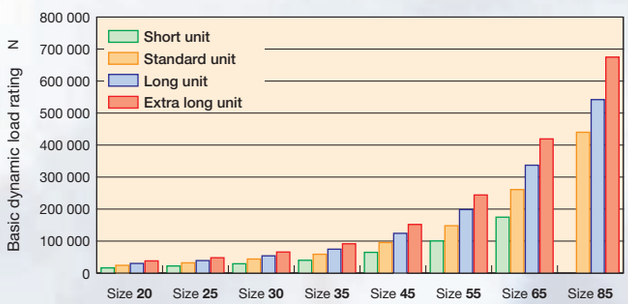
As its basic dynamic load rating and basic static load rating are larger than those of Long type by 122% and 129%, respectively, life and margin safety of machine or device are improved.

Comparison of basic dynamic load rating

Increased to 158% relative to standard unit!

Increased to 122% relative to long unit!

(In case of MXL45)

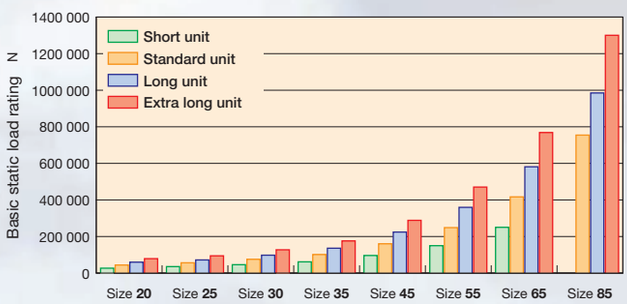


Comparison of basic static load rating

Increased to 181% relative to standard unit!

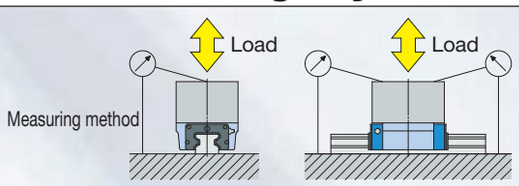
Increased to 129% relative to long unit!

(In case of MXL45)



Contributing to improvement of machine or device rigidity

Elastic deformation relative to load is small in comparison with long unit, device rigidity is improved, accuracy is improved, and resonance can be avoided.

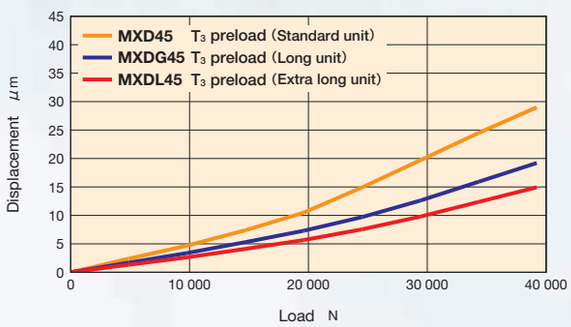


Comparison of elastic deformation under downward load

Rigidity increased to 155% relative to standard unit!

Rigidity increased to 117% relative to long unit!

(With displacement of 10 μm for Size 45)

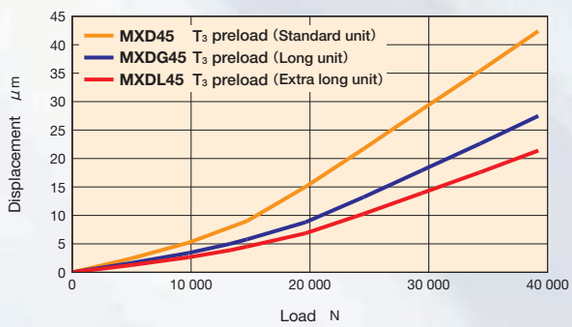


Comparison of elastic deformation under upward load

Rigidity increased to 152% relative to standard unit!

Rigidity increased to 113% relative to long unit!

(With displacement of 10 μm for Size 45)



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

Models and Size Variations ④

C-Lube Linear Roller Way Super MX

MX MASTER GRADE

Introducing the low fluctuation specification product, for superb high-precision feed!

The C-Lube Linear Roller Way Super MX low fluctuation specification MX Master Grade has special precision processing on the roller raceway surface, significantly reducing fluctuation compared to the standard extra long unit and thus making it the ideal product for ultra-precision working machine shaft guides, which require high-precision, high-quality machining.

IKO C-Lube Maintenance-free®

Applicable products

Series	C-Lube Linear Roller Way Super MX
Supported models	MXL、MXDL、MXSL、MXNL、MXNSL
Size	30·35·45·55

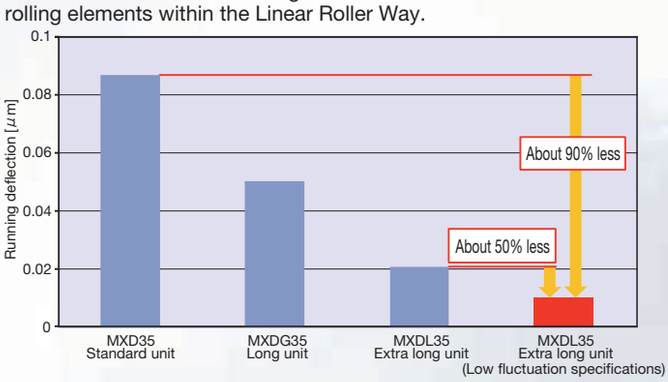
MX Master Grade (low fluctuation specifications) is a special order product; if needed please contact IKO.

Features

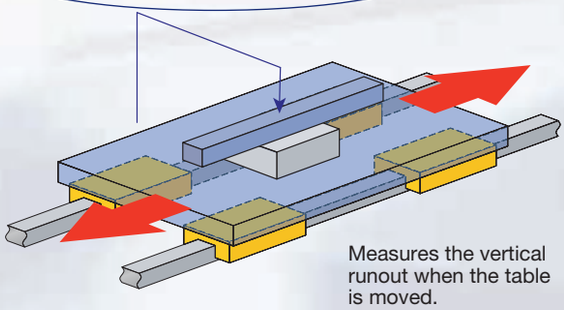
1 Special raceway processing suppresses miniscule running deflection and significantly reduces pulsation compared to standard extra long units.

Fluctuation comparison data

Pulsation: Refers to the running deflection related to movement of the rolling elements within the Linear Roller Way.



Measuring method



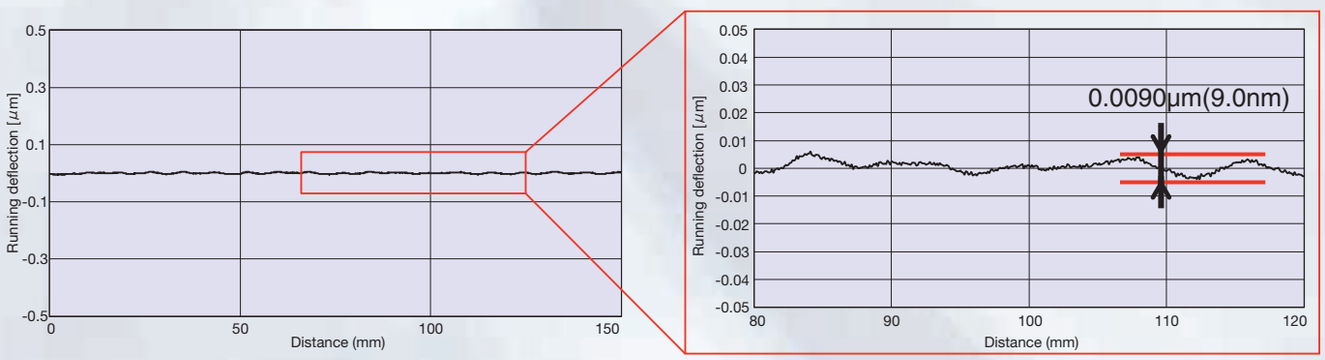
Measures the vertical runout when the table is moved.

Super low fluctuation is achieved!

About 50% less fluctuation compared with the standard extra long unit!

2 Low fluctuation makes it ideal for ultra-precision working machine shaft guides, which require high-precision, high-quality machining.

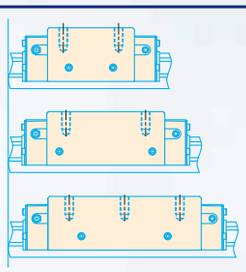
Fluctuation data



The **running deflection value** is within **0.0090μm(9.0nm)** in actual measurement!

Improve machining quality with the use of MX Master Grade!

3 The extra long unit contributes to improved load capacity and rigidity in mechanical equipment.



Standard

Long

Extra long

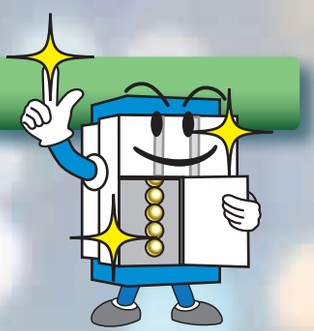
Elastic deformation relative to load is low in comparison with the standard and long types, device rigidity is improved, accuracy is improved, and resonance can be avoided.

IKO's unique ideas and experiences special environment applications.

IKO Linear Way and Linear Roller Way are available for various special environment by using different materials and grease, surface treatment and dust protection measures, etc. Typical application fields and major countermeasures are described below.

Clean Environment

When the Linear Way or Linear Roller Way is used in clean environment such as a clean room, it is required that the environment is not polluted by dust-generation by the Linear Way or Linear Roller Way and it must have excellent rust prevention property as rust prevention oil cannot be used.



Vacuum Environment

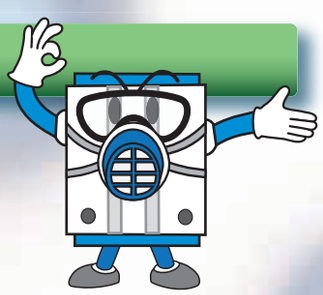
When the Linear Way or Linear Roller Way is used in vacuum environment, it is required that the gas discharged from the Linear Way or Linear Roller Way does not pollute the environment or reduce the degree of vacuum, and it must have excellent rust prevention property as rust prevention oil cannot be used.

Heat Resistance Measures

When the Linear Way is used in an environment where temperature is higher than usual, heat resistance of synthetic resin components and metal parts will be an issue.

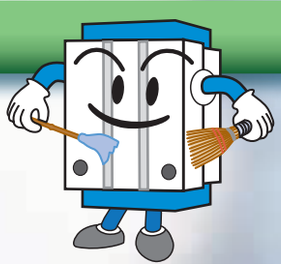
Dust Protection

If dust such as metal or wooden chips get into the way of the Linear Way or Linear Roller Way, reduction of life and accuracy may be caused. Therefore, measures to prevent foreign substances from entering into the way are necessary.



Spatter Protection

Spatter of welding, etc. is so hot that it adheres to components. Foreign substances adhering to the track rail firmly cannot be fully removed by normal dust protection measures, so measures to avoid adherence and enhanced foreign substances removal measures are necessary.



are utilized to explore new world for

Clean

- ○ Stainless Linear Way and Linear Roller Way
- ● Black chrome surface treatment
- ● Specified grease (CG2 or CGL grease)
- ◇ Fluorine grease

Corrosion resistance

- ○ Hybrid C-Lube Linear Way L
- ○ Non-magnetic stainless Linear Roller Way Super X
- ○ Stainless Linear Way and Linear Roller Way
- ● Black chrome surface treatment

Vacuum

- ● No end seal
- ● Stainless steel end plate
- ◇ Fluorine grease

Heat resistance

- ● Stainless steel end plate
- ● Special environment seal
- ◇ High temperature grease

Foreign substances (wood chips and metal powder, etc.)

- ○ Linear Way H Ultra seal specification
- ○ Track rail mounting from bottom
- ● Double end seals
- ● Scrapers
- ● C-Wiper
- ● Caps for rail mounting holes
- ● Rail cover plate for track rail
- ● Rail cover sheet
- ● Female threads for bellows
- ● Specific bellows

Spatter

- ● Scrapers
- ● Caps for rail mounting holes (aluminum alloy)
- ● Rail cover sheet
- ● Fluorine black chrome surface treatment
- ● Stainless steel end plate

○ **Linear motion rolling guide series for special environment :**
Collective name of linear motion rolling guide series models corresponding to special environment.

● **Special specification for special environment :**
Special specification corresponding to special environment by combination of linear motion rolling guide series.

◇ **Lubricant :**
Lubricant suitable for each special environment can be selected.

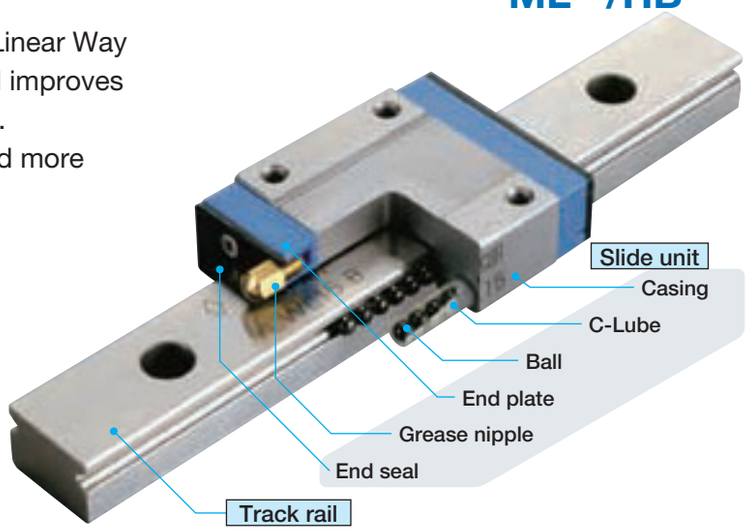
Hybrid C-Lube Linear Way ML

ML…/HB

While maintenance free performance of C-Lube Linear Way ML is maintained, the silicon nitride ceramics ball improves high-speed performance and reduces noise level. Ceramics has more resistance to deformation and more rigidity than bearing steel and stainless steel.

■ Standard specification

Casing	Martensitic stainless steel
Track rail	Martensitic stainless steel
Ball	Silicon nitride ceramics
C-Lube	Capillary lubricating element (Porous resin)



Features

1 Superior high-speed performance ••• More than three times durability

2 Noise reduction ••••••••••• Noise reduction by about 4.5 dB

3 High rigidity ••••••••••• Displacement volume reduced by about 10%

4 Superior abrasion resistance ••• Preload reduction volume is about one fourth

※ All of the above based on comparison with our C-Lube Linear Way ML

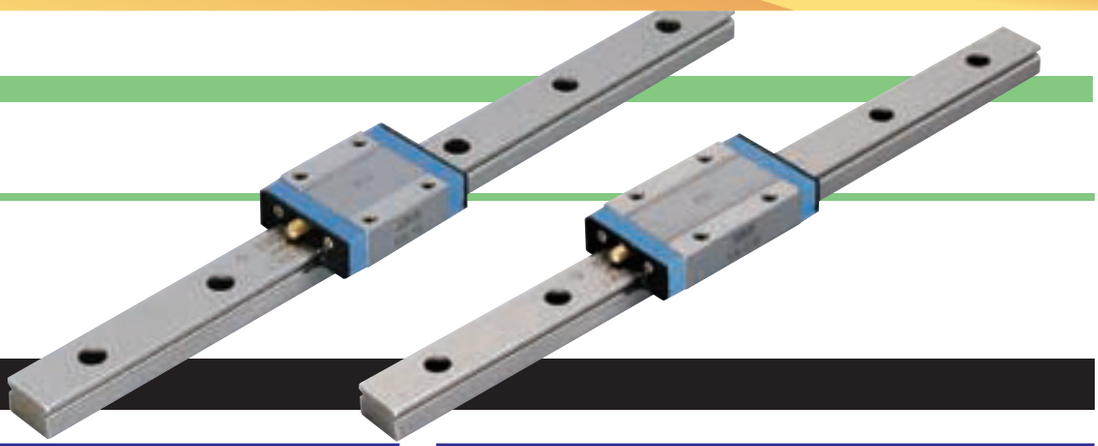
+

Maintenance free
Achieved long term maintenance free

Eco-friendly
Minimized lubrication oil consumption

Compact
Integral lubrication parts

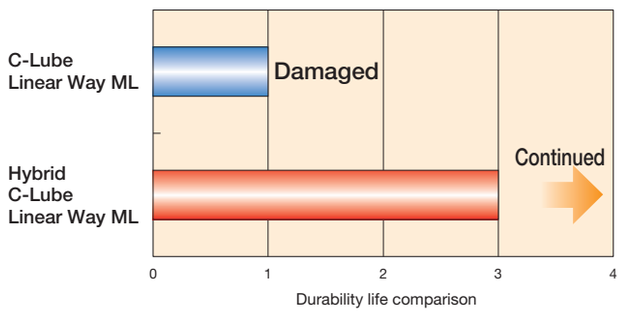
Smooth
Excellent sliding characteristic



Performance

More than three times durability

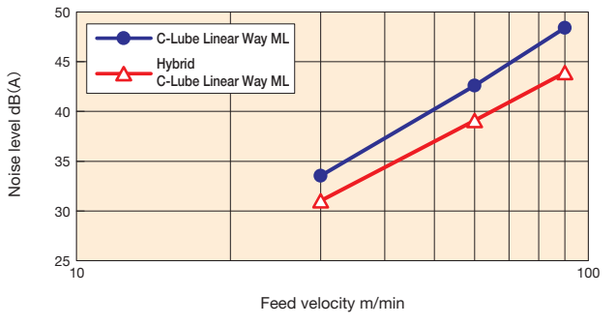
High-speed performance



Test conditions Model : ML12 Velocity: 300 m/min Acceleration: 40 G

Noise reduction by about 4.5 dB

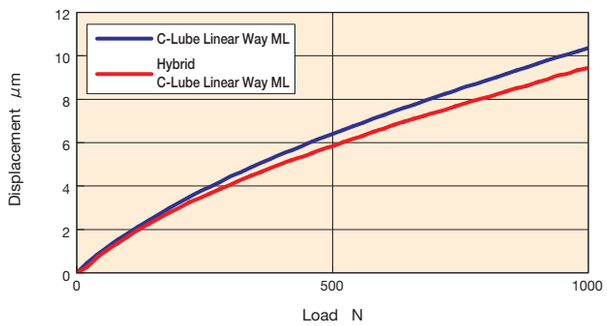
Low decibel



Test conditions Model : ML12 Measurement velocity: 30, 60, 90 m/min

Small deformation of rolling elements and excellent rigidity

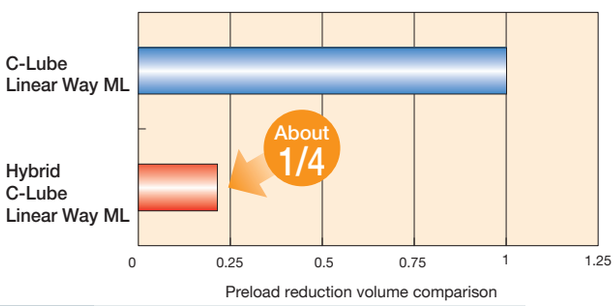
High rigidity



Test conditions Model : ML12 Preload: Standard Preload Load direction: Downward

Low preload reduction volume and accuracy maintained after operation

Abrasion resistance

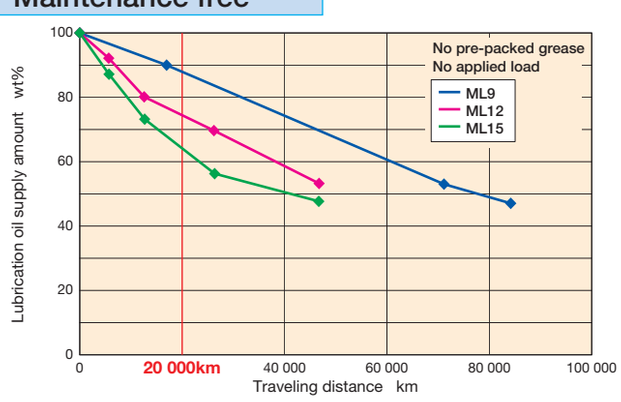


Test conditions Model : ML12 Velocity: 300 m/min
Acceleration: 40 G Traveling distance: 13,000 km

Basic performance of C-Lube Linear Way

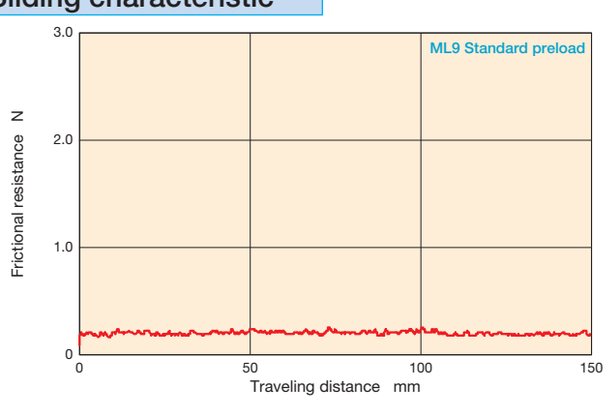
Achieved long term maintenance free

Maintenance free



Achieved light and smooth sliding

Sliding characteristic

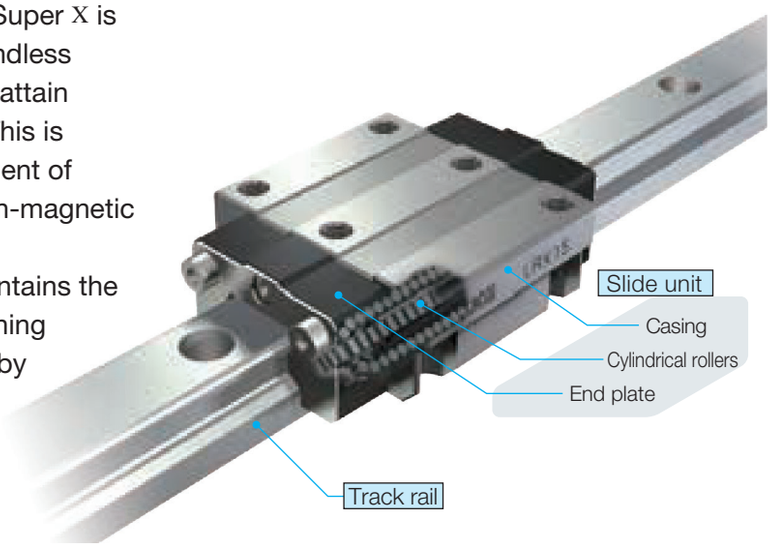


1N=0.102kgf=0.2248lbs.
1mm=0.03937inch

IKO Features of Special Environment Linear Way and Linear Roller Way ③

Non-magnetic stainless Linear Roller Way Super X

The non-magnetic stainless Linear Roller Way Super X is the world's first non-magnetic stainless steel endless motion roller type linear motion rolling guide to attain relative magnetic permeability of 1.01 or less. This is accomplished through the dedicated development of silicon nitride ceramic cylindrical rollers and non-magnetic stainless steel casings and track rails.
Despite being non-magnetic material it still maintains the superior vibration characteristics, excellent running accuracy, and friction characteristics provided by the Linear Roller Way Super X. This allows for accurate and rapid positioning in environments affected by minimal magnetism.



Features

World first for roller types

The first non-magnetic specifications ever realized in the world for endless motion roller type linear motion rolling guides

Relative magnetic permeability 1.01 or less

Allows for accurate and rapid positioning in environments affected by minimal magnetism

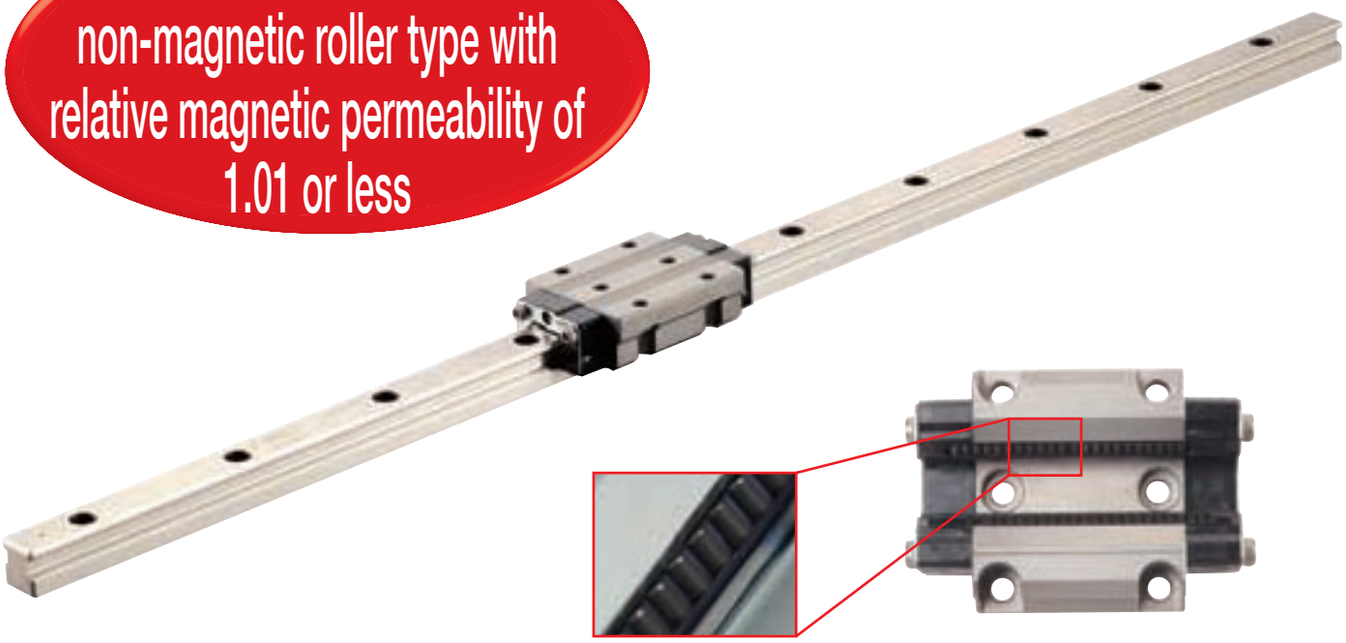
High corrosion resistance

Optimal for use in clean environment thanks to non-magnetic stainless steel

High running accuracy

The superb vibration characteristics of roller type linear motion rolling guides allow superior running accuracy

The world's first non-magnetic roller type with relative magnetic permeability of 1.01 or less



Non-magnetic stainless steel characteristics

Characteristics \ Material name	Non-magnetic stainless steel	Silicon nitride ceramics	Non-magnetic hard alloy
Relative magnetic permeability (1)	1.01 or less (1.005)	1 (0.999991)	1 (1.0002)
Electric conductivity	○	×	○
Hardness (HV)	380~450	1400~1600	1200~1450
Linear expansion coefficient ($\times 10^{-6}$/°C)	19.0 (20~400°C)	3.2 (20~400°C)	5.1 (20~400°C)
Specific gravity (g/cm)	7.9	3.2	14.5
Main ingredients	Fe, Mn, Cr	Si_3N_4	Ni, WC
Cost	○	△	△
Remarks	—	Good corrosion resistance	Sintered alloy

Note(1) ( ) is only an example of the measurement value.

Selection of lubricant

By setting appropriate lubricants such as vacuum grease and low dust-generating grease, any operating environment can be supported.

●Applicable products

Series	Linear Roller Way Super X
Main model	LRX15, LRXD15, LRXS15

For detailed specifications or manufacturing information, please contact IKO.

■Main component materials

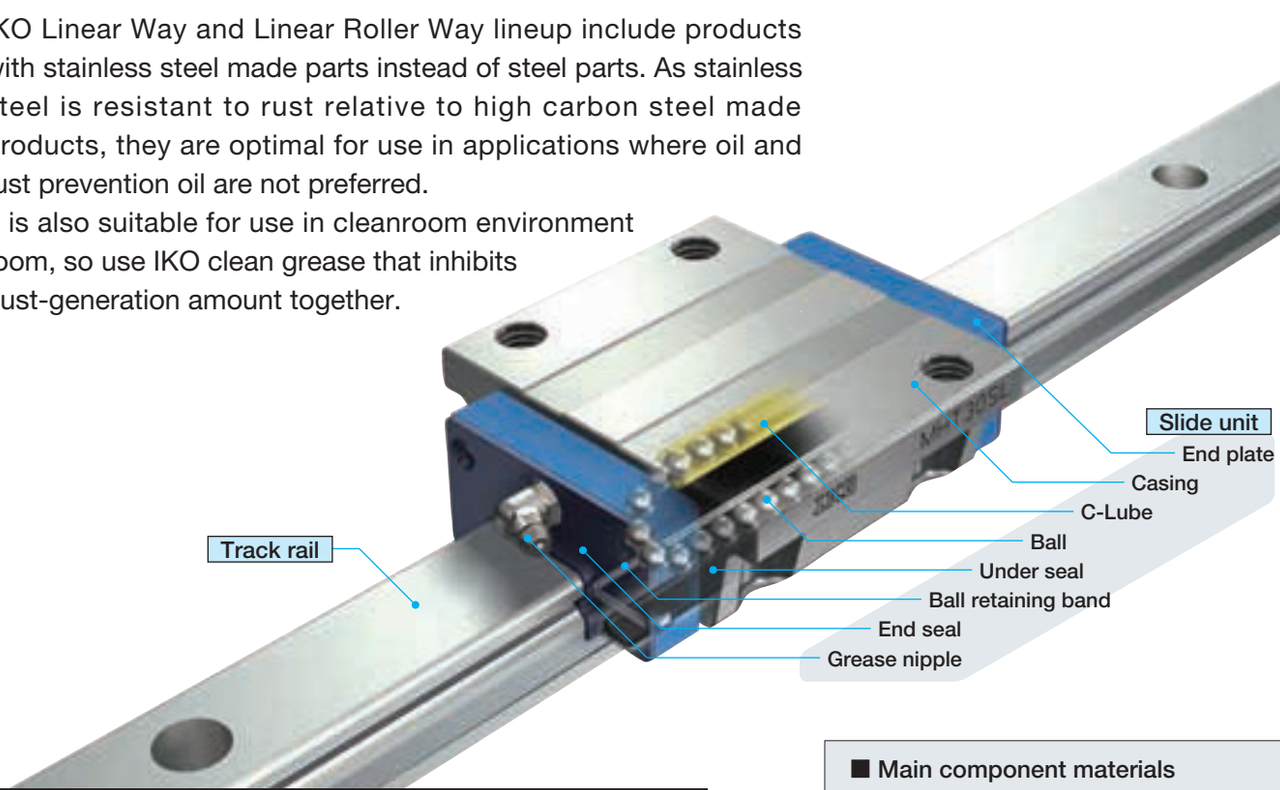
Casing	Non-magnetic stainless steel
Track rail	Non-magnetic stainless steel
Cylindrical roller	Silicon nitride ceramics
End plate	Engineering plastic

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

Stainless Linear Way and Linear Roller Way

A variety of stainless steel series

IKO Linear Way and Linear Roller Way lineup include products with stainless steel made parts instead of steel parts. As stainless steel is resistant to rust relative to high carbon steel made products, they are optimal for use in applications where oil and rust prevention oil are not preferred.
It is also suitable for use in cleanroom environment room, so use IKO clean grease that inhibits dust-generation amount together.



■ Main component materials

Casing	Martensitic stainless steel
Track rail	Martensitic stainless steel
Ball	Martensitic stainless steel
Ball retaining band	Stainless steel
End plate	Engineering plastic
End seal	Stainless steel + Synthetic rubber
Grease nipple	Brass

Series name

Linear Way

Ball Type Miniature Series

C-Lube Linear Way ML
C-Lube Linear Way MLV
Linear Way L
Micro Linear Way L

Ball Type Compact Series

C-Lube Linear Way ME
Linear Way E

Ball Type High Rigidity Series

C-Lube Linear Way MH
Linear Way H

Ball Type Wide Type Series

Linear Way F

Ball Type U-Shaped Track Rail Series

C-Lube Linear Way MUL

Linear Roller Way

Roller Type

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

Combination with special specification corresponds to use in special environment!

Rust prevention

Black chrome surface treatment /L

Black chrome surface treatment on the track rail and slide unit improves rust prevention capacity.

Fluorine black chrome surface treatment /LF

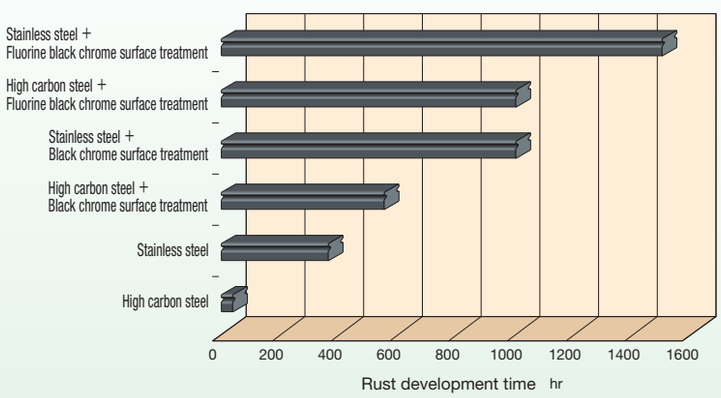
Coating of fluorinated resin is applied over the black chrome surface treatment to prevent foreign substances from sticking and improve the rust prevention capacity.

Black chrome surface treatment

Features

1. Thin film
2. Uniform film
3. Strong adhesion
4. Excellent rust prevention capacity
5. Low temperature processing to prevent distortion
6. No peeling and no effects on life and cleanroom environment

Corrosion resistance comparison based on humidity cabinet test



Test conditions Temperature 50˚C, Relative humidity 95%RH

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

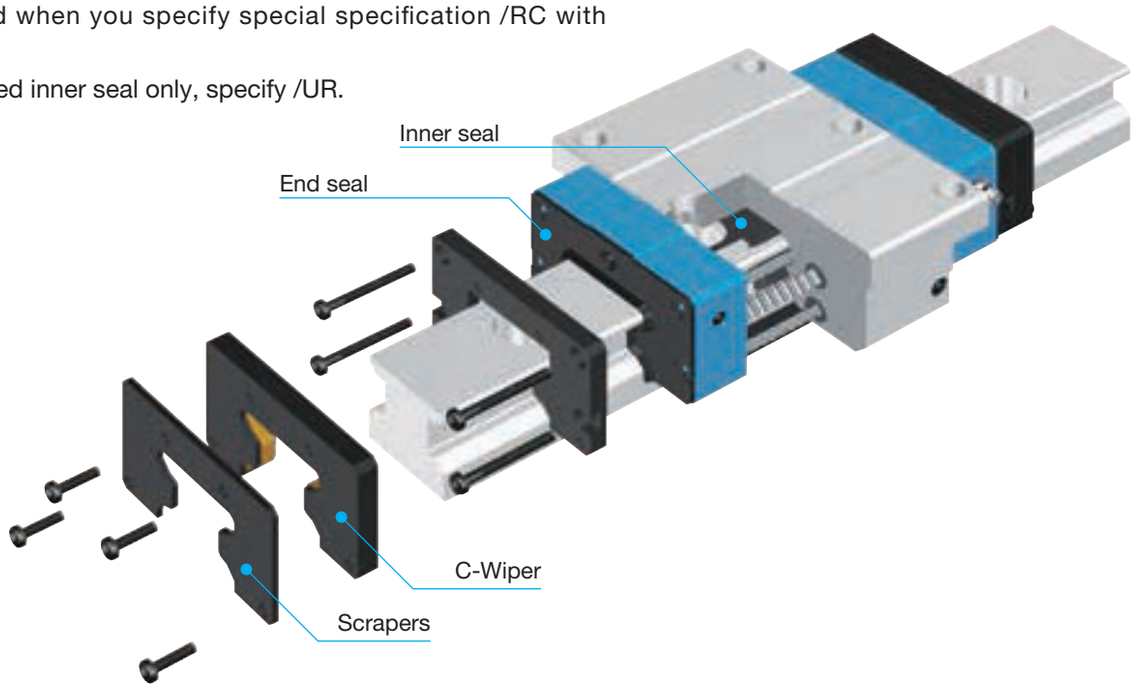
Special specification for special environment

IKO Linear Way and Linear Roller Way lineup include following special specifications to correspond to various special environments.

Dust protection

C-Wiper /RC

Mounted to the outside of end seal, it may be used for long time even under environment where metal chips are spattering. End seal, inner seal (/UR) and scraper (/Z) may be equipped as standard when you specify special specification /RC with C-Wiper.
If you need inner seal only, specify /UR.



Applicable C-Wiper size

Model	Length of slide unit	Model code	Size								
			12	15	20	25	30	35	45	55	65
Flange type mounting from top / bottom	Short	MXC	–	–	○(1)	○	○	○	○	○	○
	Standard	MX	–	–	○(1)	○	○	○	○	○	○
	Long	MXG	–	–	○(1)	○	○	○	○	○	○
	Extra long	MXL	–	–	○(1)	○	○	○	○	○	○
Block type mounting from top	Short	MXDC	–	–	○	○	○	○	○	○	○
	Standard	MXD	–	–	○	○	○	○	○	○	○
	Long	MXDG	–	–	○	○	○	○	○	○	○
	Extra long	MXDL	–	–	○	○	○	○	○	○	○
Compact block type mounting from top	Short	MXSC	–	–	○	○	○	–	–	–	–
	Standard	MXS	–	–	○	○	○	○	○	○	–
	Long	MXSG	–	–	○	○	○	○	○	○	–
	Extra long	MXSL	–	–	○	○	○	–	–	–	–
Low profile flange type mounting from top	Standard	MXN	–	–	–	–	○	○	○	○	–
	Long	MXNG	–	–	–	–	○	○	○	○	–
	Extra long	MXNL	–	–	–	–	○	○	○	○	–
Low profile block type mounting from top	Standard	MXNS	–	–	–	–	○	○	○	○	–
	Long	MXNSG	–	–	–	–	○	○	○	○	–
	Extra long	MXNSL	–	–	–	–	○	○	○	○	–

Note (1) Also applicable to models mounting from bottom (MXHC20, MXH20, MXHG20, MXHL20).

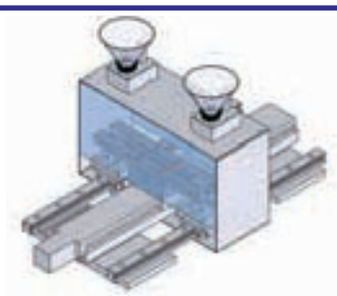
Dust protection

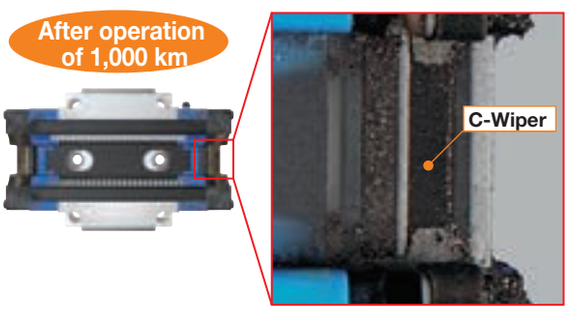
Durability test result backing excellent dust protection effect of [C-Wiper]!

Durability test in environment with foreign substances

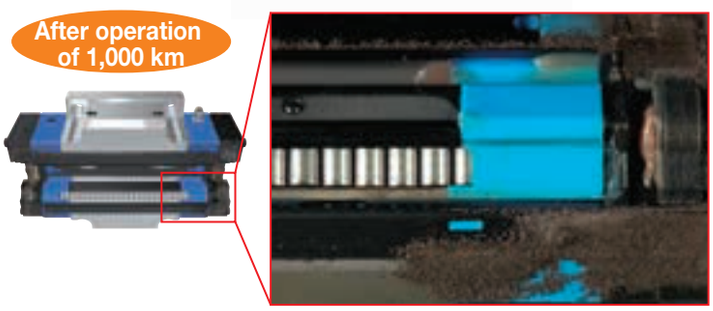
Test conditions

Test portion	**MX35** T3 preload / caps for rail mounting holes and C-Wiper included
Maximum velocity	18 m/min
Stroke length	500 mm
Foreign substances	Fine metal chips Particle diameter lower than 125 μm Hardness 40 ~ 50HRC Application dose 1 g/hr (total dose: 1 kg)





Only few foreign substances may get into the slide unit.

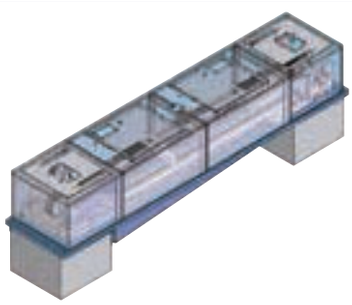


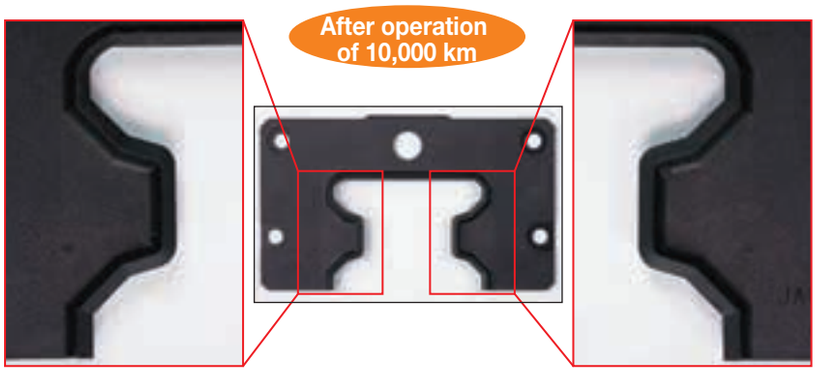
Only few foreign substances get into the way!

Durability test in coolant mist environment

Test conditions

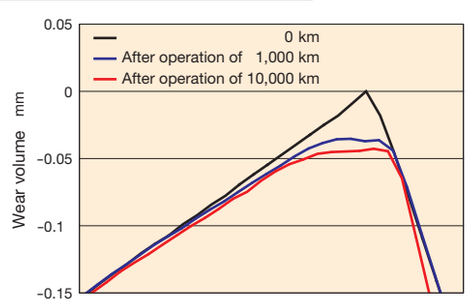
Test portion	**MX35** T3 preload / caps for rail mounting holes and C-Wiper included
Maximum velocity	115.2 m/min
Stroke length	300 mm
Coolant	Soluble type Dilute strength 20 times Spray amount 5 cc/hr





End seal is not damaged.

Wear condition of end seal lip tip



Wear on the end seal is negligible!

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

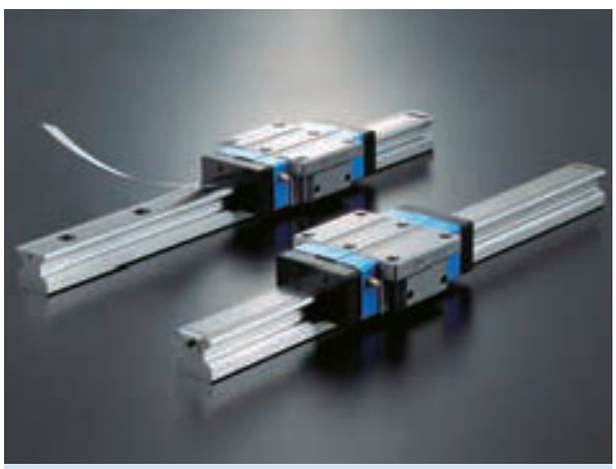
IKO Features of Special Environment Linear Way and Linear Roller Way ⑥

Special specification for special environment

Dust protection

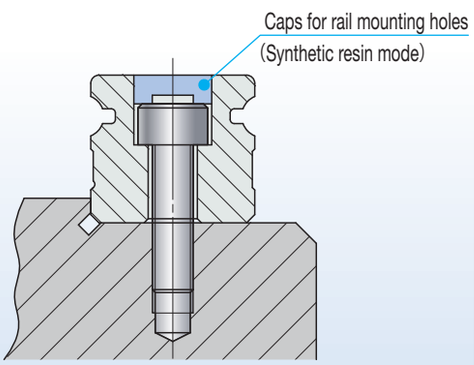
Rail cover sheet

Rail cover sheet that consists of steel plate and adhesive tape and fastened to the dedicated track rail with groove on the track rail prevents foreign substances from entering into the slide unit.



Caps for rail mounting holes /F

Caps for rail mounting holes close the track rail mounting holes to prevent foreign substances from entering into the slide unit.
Contact IKO for aluminum alloy caps for rail mounting holes.

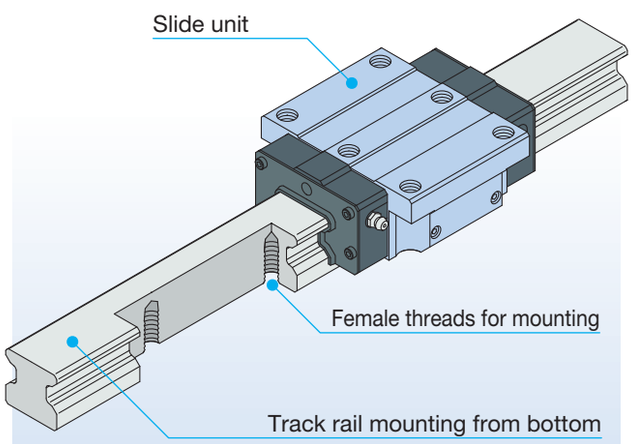


Rail cover plate /PS

Rail cover plate totally covers the upper surface of the track rail to prevent foreign substances from entering into the track rail.

Track rail mounting from bottom

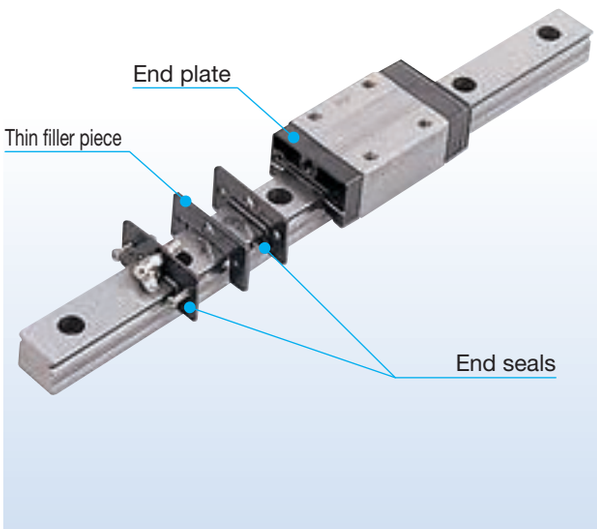
This is the specification that track rail is fixed from the mounting surface side. As there are no mounting holes on the track rail upper surface, adherence with the seal is superior and better dust protection effect is achieved.



Dust protection

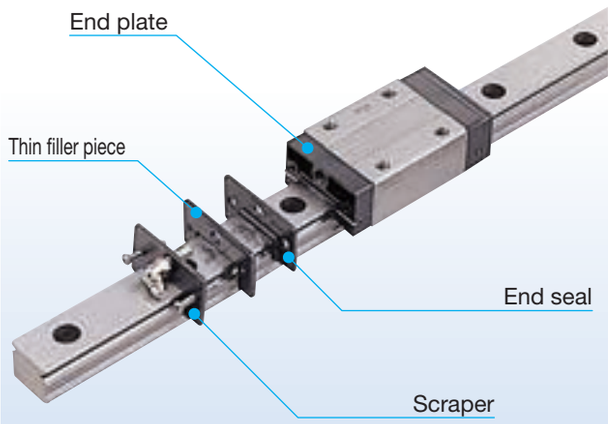
Double end seals /V

Double end seals improve the dust protection property further.



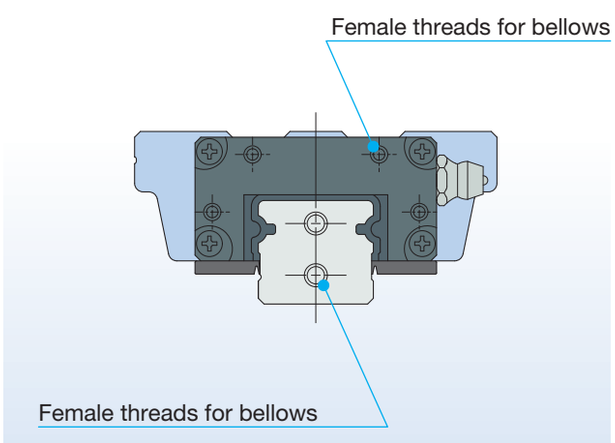
Scraper /Z

Mounted to the outside of end seal, it may remove large foreign substances adhering to the track rail.



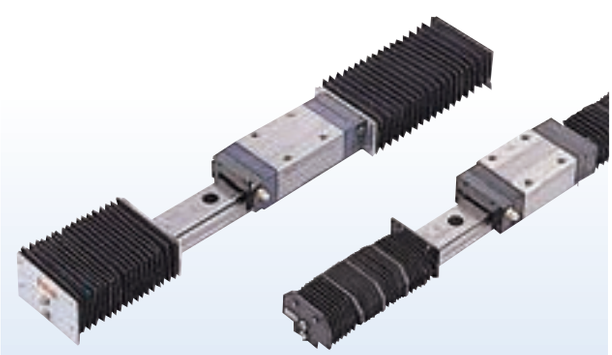
Female threads for bellows /J

Female threads for bellows are prepared on the slide unit and track rail ends.



Specific bellows

Dust protection cover over the exposed part of the track rail.



IKO Features of Special Environment Linear Way and Linear Roller Way ⑦

Special specification for special environment

Lubrication

With C-Lube plate /Q

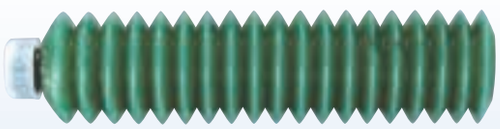
Lubrication parts to substantially reduce the need for lubrication management, i.e. grease job.

Low Dust-Generation Grease for Clean Environment CGL /YCL

For this grease, mixed soap is used as thickener and synthetic oil and low pour point mineral oil are mixed with base oil, so it has excellent low dust generating performance, rolling resistance, lubrication, and rust prevention property.

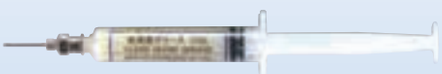
Bellows cartridge (80 g)

JG80 /CGL



With miniature greaser (2.5 ml)

MG2.5 /CGL

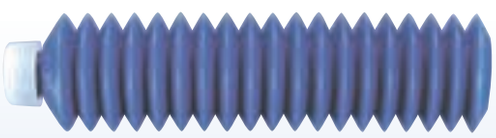


Low Dust-Generation Grease for Clean Environment CG2 /YCG

For this grease, urea is used as thickener and synthetic oil is used as base oil, so it has excellent low dust generating performance, operating temperature range, lubrication property, rust prevention property and oxidation stability.

Bellows cartridge (80 g)

JG80 /CG2



With miniature greaser (2.5 ml)

MG2.5 /CG2

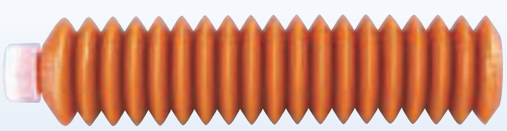
MG10 /CG2 with 10 ml are also available.

Anti-Fretting Corrosion Grease AF2 /YAF

Grease with excellent fretting-proof corrosion property.

Bellows cartridge (80 g)

JG80 /AF2



With miniature greaser (2.5 ml)

MG2.5 /AF2

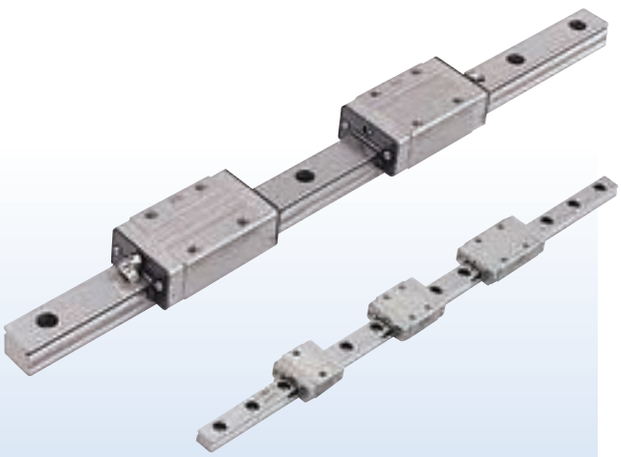
Other special grease

For special grease for vacuum or high temperature, please contact IKO.

Others

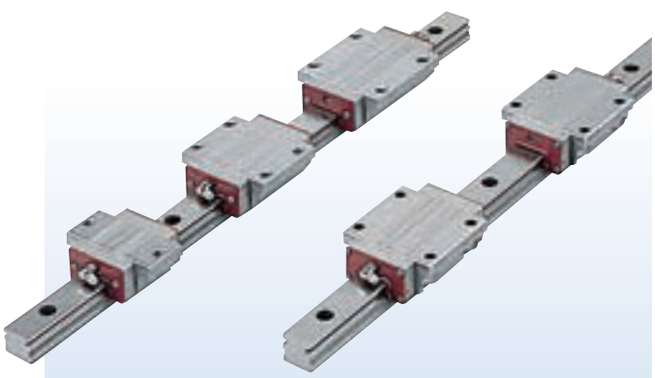
Stainless steel end plate /BS

End plate is changed to stainless steel.



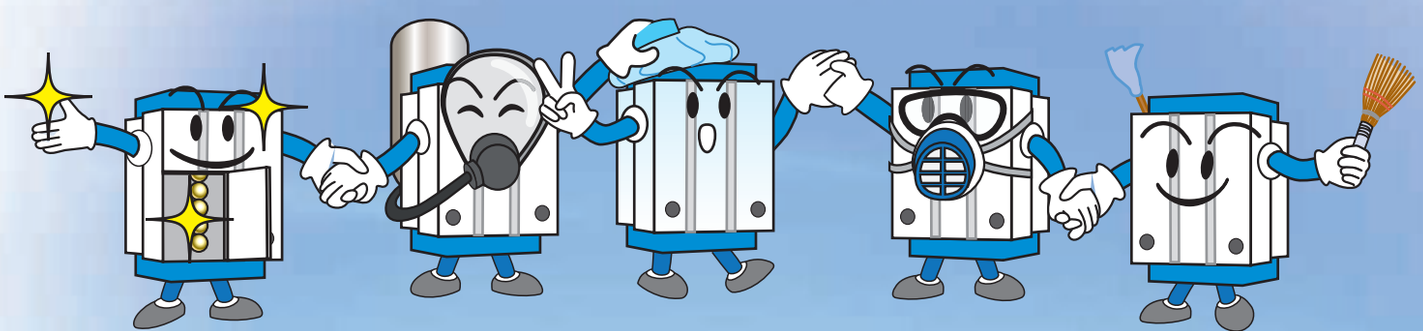
Special environment seal /RE

The end and under seals are replaced with end seals for special environment that can be used at high temperatures. When it is used in high temperature environment, stainless steel end plate (/BS) and high temperature grease should be combined.



The photo shows a combination of special environment seal (/RE) and stainless steel end plate (/BS).

IKO can offer products for special environment!



If needed, please contact IKO.