Precautions on Using the LM Guide

[Handling]

(1) Please use at least two people to move any product weighing 20 kg or more, or use a dolly or another conveyance. Doing so may cause injury or damage.
(2) Do not disassemble the parts. This will result in loss of functionality.
(3) Tilting an LM block or LM rail may cause them to fall by their own weight.
(4) Take care not to drop or strike the LM Guide. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
(5) Do not remove the LM block from the LM rail during setup.
(6) Do not insert hands or fingers into the mounting holes on the LM rail, as they could get caught between the rail and the LM block, resulting in injury.
(7) To ensure personal safety, wear gloves and protective footwear when handling this product.

[Precautions on Use]

(1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
(2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
(3) Do not use this product if the external temperature exceeds 80℃. Unless the unit is specially designed to be heat-resistant, exposure to such temperatures may deform or damage plastic and rubber parts.
(4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
(5) Micro-strokes tend to obstruct oil film to form on the raceway in contact with the rolling element, and may lead to fretting corrosion. Take consideration using grease offering excellent fretting prevention. It is also recommended that a stroke movement corresponding to the length of the LM block be made on a regular basis to make sure oil film is formed between the raceway and rolling element.
(6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate permanent deformation on the raceway, leading to loss of functionality.
(7) If, for operational reasons, it becomes absolutely necessary to remove the LM block from the LM rail and reattach it, a special mounting jig must be used for this purpose. (The mounting jig is not included with standard versions of the product. To obtain one, please contact THK.)
(8) Position the mounting jig so that one end abuts the end of the LM rail. When the rail and the jig are exactly aligned, the LM block can be loaded onto the rail.
(9) Take care to keep the LM block straight. Loading the block at an angle can introduce foreign matter, damage internal components, or cause balls to fall out.
(10) The LM block must contain all its internal rolling elements (balls) when mounted on the LM rail. Using a block with any balls removed may result in premature damage.
(11) Please contact THK if any balls fall out of the LM block; do not use the block if any balls are missing.

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(12) If the LM Guide breaks due to an accident or other cause, the block may come off of the rail and fall. For the safe use of this product, take precautions such as adding a mechanism to prevent the block from falling.
(13) Insufficient rigidity or accuracy of mounting members causes the bearing load to concentrate on one point and the bearing performance will drop significantly. Accordingly, give sufficient consideration to the rigidity/accuracy of the housing and base and strength of the fixing bolts.
(14) When removing the LM block from the LM rail and then replacing the block, an LM block mounting/removing jig that facilitates such installation is available. Contact THK for details.

[Lubrication]
(1) Thoroughly remove anti-rust oil and feed lubricant before using the product.
(2) Do not mix different lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
(3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
(4) When lubricating the product having no grease nipple or oil hole, apply grease directly on the raceway and stroke the product several times to let the grease spread inside.
(5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the LM Guide also changes as the consistency of grease changes.
(6) After lubrication, the slide resistance of the LM Guide may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
(7) Excess grease may scatter immediately after lubrication, so wipe off scattered grease as necessary.
(8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
(9) Although the lubrication interval may vary according to use conditions and the service environment, lubrication should be performed approximately every 100 km in travel distance (three to six months). Set the final lubrication interval/amount based on the actual machine.
(10) If the mounting orientation is other than horizontal use, the lubricant may not reach the raceway completely. For the mounting orientation and the lubrication, see B**1-28** and B**24-2**, respectively.
(11) When adopting oil lubrication, the lubricant may not be distributed throughout the LM block depending on the mounting orientation of the block. Contact THK in advance for details.

[Storage]
When storing the LM Guide, enclose it in a package designated by THK and store it in a room in a horizontal orientation while avoiding high temperature, low temperature and high humidity.
After the product has been in storage for an extended period of time, lubricant inside may have deteriorated, so add new lubricant before use.

[Disposal]
Dispose of the product properly as industrial waste.

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Precautions on Handling the LM Guide for Special Environment

LM Guide for Medium-to-Low Vacuum

[Handling]

(1) This product has been thoroughly cleaned and degreased and then sealed in moisture-proof packaging. If possible, open the package immediately prior to using the product.
(2) Once the packaging has been opened, store the product inside a clean, dry receptacle accompanied by silica gel or another drying agent. Do not use anti-rust oil or corrosion- or tarnish-preventive paper or fluid with this product.
(3) Wear protective rubber or vinyl gloves while handling this product and make sure the surrounding environment is relatively clean.

Oil-Free LM Guide

[Handling]

(1) The Oil-Free LM Guide is suitable for use at high temperatures, under atmospheric pressure or in a high-vacuum environment of 10^{-6} Pa, and is designed for ultra-low dust emission. It is not intended for use in locations requiring rigidity. Because a preload would affect the strength of its Dry Lubrication S-Compound Film, it does not support preloads.
(2) The product can be used in temperatures ranging from −20 to 150℃.
(3) To ensure proper function of the Dry Lubrication S-Compound Film, use this product in an environment free from condensation, at a humidity level of 40% or less.
(4) This product is not intended for joint use.
(5) Great care must be taken in the installation of the Oil-Free LM Guide, which requires greater precision compared to standard LM Guides.
(6) If the LM block is removed from the LM rail, balls may fall out, and the Dry Lubrication S-Compound Film can be damaged when the block is remounted. If it becomes necessary to remove the LM block from the LM rail, please contact THK.
(7) This product should be stored in a horizontal position, in its original wrapping and package, in a controlled, stable environment free from abnormal high or low temperatures or high humidity. THK recommends storing it at room temperature (25±5℃), with a humidity level of 40% RH or lower and an air-purity level of 10,000 or lower.
(8) This product has been thoroughly cleaned and degreased and then sealed in moisture-proof packaging. If possible, open the package immediately prior to using the product.
(9) Once the packaging has been opened, store the product inside a clean, dry receptacle accompanied by silica gel or another drying agent. Do not use anti-rust oil or corrosion- or tarnish-preventive paper or fluid with this product.
(10) Wear protective rubber or vinyl gloves while handling this product and make sure the surrounding environment is relatively clean.

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Precautions on Using Options for the LM Guide

QZ Lubricator for the LM Guide

For details regarding the QZ, see A1-489.

[Precaution on Selection]
Secure a stroke longer than the overall LM block with QZ Lubricator attached.

[Handling]
Take care not to drop or strike this product. This could cause injury or product damage.
Do not block the vent hole with grease or the like.
The QZ device supplies oil only to the raceway, so use it in combination with regular greasing/lubrication. If the product is used in an environment exposed to coolant, cutting chips or other foreign material, oil on the raceway is lost easily. Accordingly, be sure to also use covers, bellows, etc.

[Service environment]
Be sure the service temperature of this product is between −10 to 50℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.

Laminated Contact Scraper LaCS, Side Scraper for LM Guides

For details regarding the LaCS, see A1-466. For details regarding the side scraper, see A1-468.

[Handling]
The lubricant impregnated into the scraper is used to increase its sliding capability. For lubrication of the LM Guide, attach QZ Lubricator, or the grease nipple on the side face of the end plate of the LM block, before providing a lubricant.
When using the product, be sure to attach the rail cap C or the plate cover.

[Service environment]
Be sure the service temperature of this product is between -20 to +80℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.

[Notes on the Product Functions]
It is specifically designed to provide dust prevention capability to remove foreign material and liquid. To seal oil, an end seal is required.

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Light Contact Seal LiCS for LM Guides

For details regarding the LiCS, see A1-471.

[Handling]
The lubricant impregnated into LiCS is used to increase its sliding capability. For lubrication of the LM Guide, attach the grease nipple on the end plate of the LM block before providing a lubricant.

[Service environment]
Be sure the service temperature of this product is between -20 to +80℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.
It contacts only with the LM rail raceway. Do not use it in harsh environments.

Cap GC

For details regarding the GC cap, see A1-515.

[Handling]
If GC caps are specified for the product, the edges of the LM rail mounting hole openings will be sharp. Take great care not to injure your fingers or hands while working.
When fitting GC caps, use a flat aligning tool to gradually punch the cap into the hole until it is level with the upper surface of the LM rail. Then run an oil stone over the rail until the upper surface of the rail and the GC caps are completely flat.

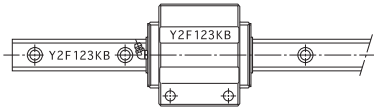
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Mounting the LM Guide

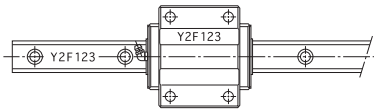
Marking on the Master LM Guide and Combined Use

[Marking on the Master LM Guide]

All LM rails mounted on the same plane are marked with the same serial number. The LM rail marked with “KB” after the serial number is the master LM rail. The LM block on the master LM rail has its reference surface finished to a designated precision, allowing it to serve as the positioning reference for tables. (See Fig.1)
Normal grade LM Guides are not marked with “KB.” Therefore, any one of the LM rails having the same serial number can be used as the master LM rail.



Master LM Guide



Subsidiary LM Guide

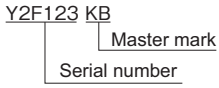
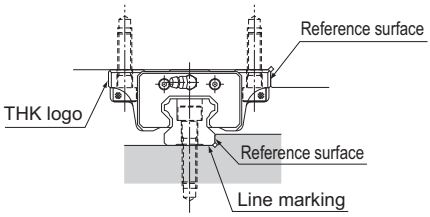


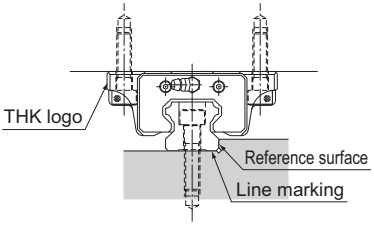
Fig.1 Master and Subsidiary LM Guides (E.g. Model HSR-B)

[Markings on the Reference Surface]

In the LM Guide, the reference surface of the LM block is opposite the surface marked with the THK logo, and that of the LM rail is on the surface marked with a line (see Fig.2). If it is necessary to reverse the reference surface of the LM rail and block, or if the grease nipple must be oriented in the opposite direction, specify it.



Master LM Guide



Subsidiary LM Guide

Fig.2 Markings on the Reference Surface

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[Serial Number Marking and Combined Use of an LM Rail and LM Blocks]

An LM rail and LM block(s) used in combination must have the same serial number. When removing an LM block from the LM rail and reinstalling the LM block, make sure that they have the same serial number and the numbers are oriented in the same direction. (Fig.3)

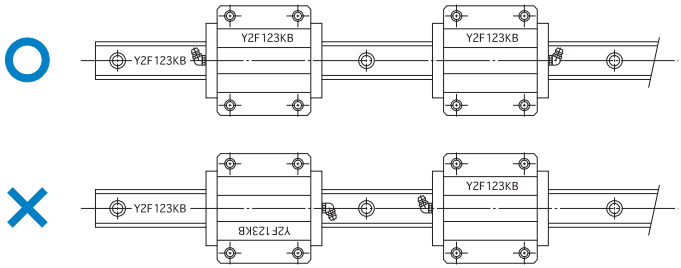


Fig.3 Serial Number Marking and Combined Use of an LM Rail and LM Blocks (E.g. Model HSR-A)

[Use of Jointed Rails]

When a long LM rail is ordered, two or more rails will be jointed together to the desired length. When jointing rails, make sure that the joint match marks shown in Fig.4 are correctly positioned.
When two LM Guides with connected rails are to be arranged in parallel to each other, the two LM Guides will be manufactured so that the two LM Guides are axisymmetrically aligned.
If a large load is applied near the LM rail joint, the LM rail may deflect and cause misalignment. Therefore, we recommend securely fastening the joint section by pressing the LM rail against the datum plane using a set screw or the like and keeping the L dimension as short as possible (Fig.4).
For details, contact THK.

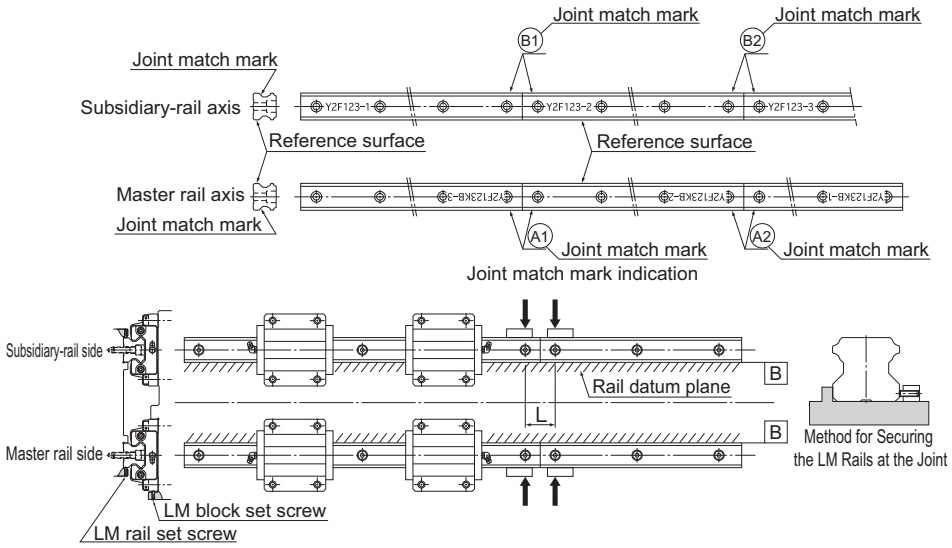


Fig.4 Use of Jointed Rails

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Mounting Procedure

[Example of Mounting the LM Guide When an Impact Load is Applied to the Machine and therefore Rigidity and High Accuracy are Required]

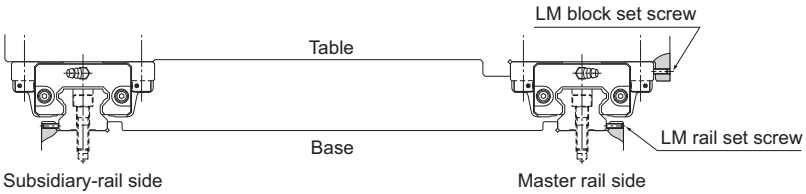


Fig.5 When an Impact Load is Applied to the Machine

● Mounting the LM Rail(s)

(1) Be sure to remove burr, dent and dust from the mounting surface of the machine to which the LM Guide is to be mounted before installing the LM Guide. (Fig.6)

Note) Since the LM Guide is coated with anti-rust oil, remove it from the reference surface by wiping the surface with washing oil before using the guide. Once the anti-rust oil has been removed, the reference surface is prone to getting rusted. We recommend applying low-viscosity spindle oil.

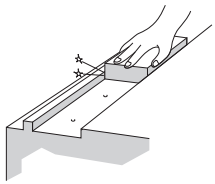


Fig.6 Checking the Mounting Surface

(2) Gently place the LM rail onto the base, and temporarily secure the bolts to the extent that the LM rail lightly contacts the mounting surface (align the line-marked side of the LM rail with the side reference-surface of the base). (Fig.7)

Note) The bolts for securing the LM Guide must be clean. When placing the bolts into the mounting holes of the LM rail, check if the bolt holes are displaced. (Fig.8) Forcibly tightening the bolt into a displaced hole may deteriorate the accuracy.

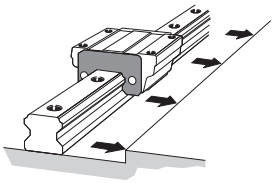


Fig.7 Aligning the LM Rail with the Reference-Surface

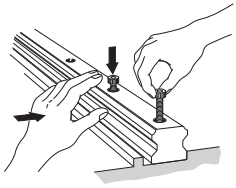


Fig.8 Checking with the Bolt for an Allowance

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(3) Secure the set screws for the LM rail in order with a tightening force just enough to have the rail closely contact the side mounting surface. (Fig.9)

(4) Tighten the mounting bolts at the designated torque using a torque wrench. (See Fig.10, and Table1 and Table2 on B**1-101**.)

Note) To achieve stable accuracy when tightening the LM rail mounting bolts, tighten them in order from the center to the rail ends.

(5) Mount the other rail in the same manner to complete the installation of the LM rails.

(6) Hammer in caps into the bolt holes on the top face of each LM rail until the top of the cap is on the same level as the top face of the rail.

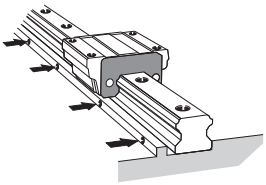


Fig.9 Tightening the Set screws

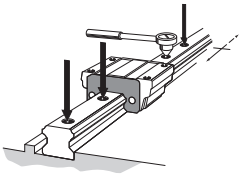


Fig.10 Fully Fastening the Mounting Bolts

● Mounting the LM Blocks

(1) Gently place the table on the LM blocks and temporarily fasten the mounting bolts.

(2) Press the master side LM blocks to the side reference surface of the table using set screws and position the table. (See Fig.5 on B**1-91**.)

(3) Fully fasten the mounting bolts on the master side and the subsidiary side to complete the installation.

Note) To evenly secure the table, tighten the mounting bolts in diagonal order as shown in Fig.11.

This method saves time in establishing straightness of the LM rail and eliminates the need to machine securing dowel pins, thus to drastically shorten the installation man-hours.

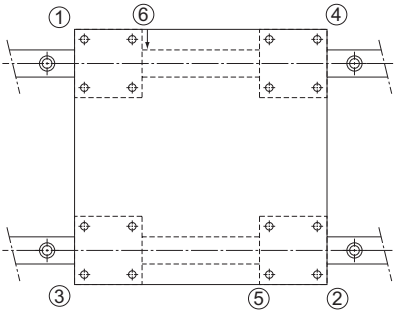


Fig.11 Sequence of Tightening the LM Blocks

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[Example of Mounting the LM Guide When the Master LM Rail is not Provided with Set screws]

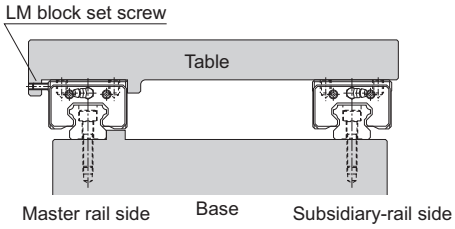


Fig.12 When the Master LM Rail is not Provided with Set screws

● Mounting the Master LM Rail

After temporarily fastening the mounting bolts, firmly press the LM rail to the side reference surface at the position of each mounting bolt using a small vice and fully fasten the bolt. Perform this in order from either rail end to the other. (Fig.13)

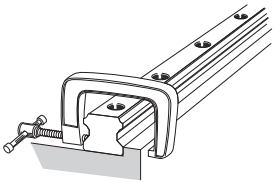


Fig.13

● Mounting the Subsidiary LM Rail

To mount the subsidiary LM rail in parallel with the master LM rail, which has been correctly installed, we recommend adopting the methods below.

■Using a Straight-edge

Place straight-edges between the two rails, and arrange the straight-edges in parallel with the side reference surface of the master LM rail using a dial gauge. Then, secure the mounting bolts in order while achieving straightness of the subsidiary rail with the straight edge as the reference by using the dial gauge. (Fig.14)

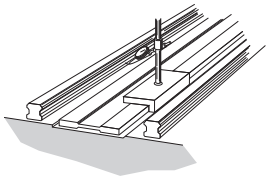


Fig.14

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■Using Parallelism of the Table

Secure the two LM blocks on the master LM rail with the table (or a temporary table for measurement), and temporarily fasten the LM rail and the LM block on the subsidiary LM rail with the table. Place a dial gauge to the side face of the LM block on the subsidiary rail from the dial stand fixed on the table top, then fasten the bolts in order while achieving parallelism of the subsidiary LM rail by moving the table from the rail end. (Fig.15)

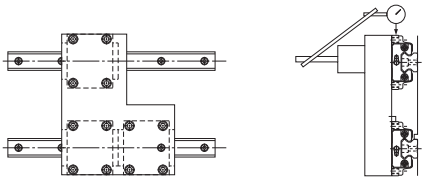


Fig.15

■Having the Subsidiary LM Rail Follow the Master LM Rail

Place the table on the blocks of the correctly mounted master LM rail and the temporarily fastened subsidiary LM rail, and fully fasten the two LM blocks on the master rail and one of the two LM blocks on the subsidiary rail with bolts. Fully tighten the mounting bolts on the subsidiary LM rail in order while temporarily fastening the remaining LM block on the subsidiary LM rail. (Fig.16)

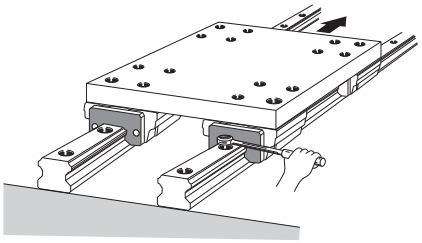


Fig.16

■Using a Jig

Use a jig like the one shown in Fig.17 to achieve parallelism of the reference surface on the subsidiary side against the side reference surface of the master side from one end of the rail by the mounting pitch, and at the same time, fully fasten the mounting bolts in order. (Fig.17)

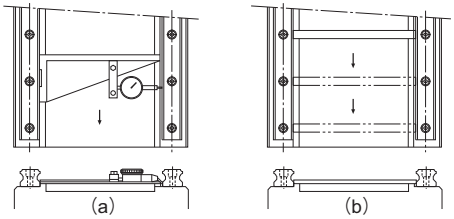


Fig.17

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[Example of Mounting the LM Guide When the Master LM Rail Does not Have a Reference Surface]

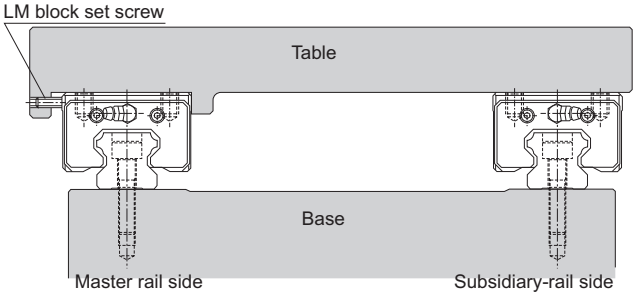


Fig.18

● Mounting the Master LM Rail

■Using a Temporary Reference Surface

You can temporarily set a reference surface near the LM rail mounting position on the base to achieve straightness of the LM rail from the rail end. In this method, two LM blocks must be joined together and attached to a measurement plate, as shown in Fig.19.

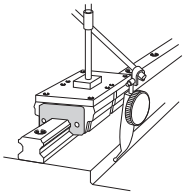


Fig.19

■Using a Straight-edge

After temporarily fastening the mounting bolts, use a dial gauge to check the straightness of the side reference surface of the LM rail from the rail end, and at the same time, fully fasten the mounting bolts.(Fig.20)

To mount the subsidiary LM rail, follow the procedure described on B1-93.

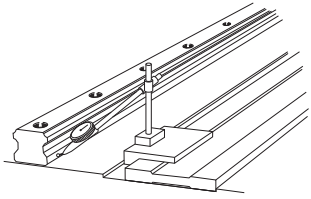


Fig.20

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[Procedure for Assembling Model HR]

The following procedure is recommended for assembling model HR.

(1) Remove burr or knots from the LM rail mounting surface of the base using an oil-stone. (Fig.21)

(2) Use a small vice to press the two LM rails to the base so that they closely contact the reference surface, then tighten the mounting bolts to the recommended torque (see B1-101). (Fig.22)
   a. Check if any of the bolts has a sinking.
   b. Use a torque wrench to tighten the bolts in order from the center to both ends.

(3) Mount the LM blocks on the table, then install them onto the LM rails. Be sure the mounting bolts for the LM blocks are temporarily fastened.

(4) Tighten the clearance adjustment bolt alternately to adjust the clearance.
   If a relatively large preload is applied in order to achieve high rigidity, control the tightening torque or the rolling resistance.
   a. It is preferable to use three clearance adjustment bolts for each LM block as shown in Fig.23.
   b. To obtain a favorable result of the clearance adjustment, set the tightening torque of the two outside screws at approx. 90% of that of the enter screw.

(5) Secure each LM block by gradually tightening the two LM block mounting bolts, which have temporarily been fastened, while sliding the table. (Fig.24)

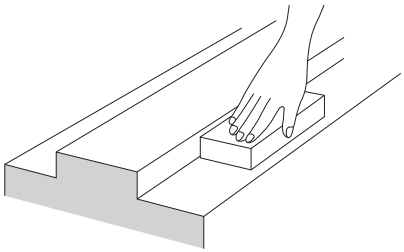


Fig.21

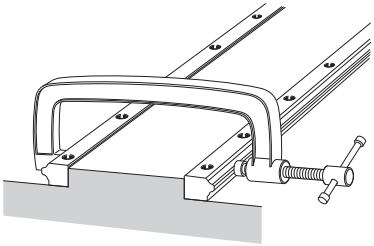


Fig.22

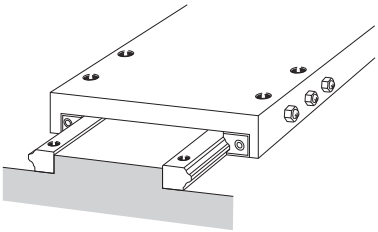


Fig.23

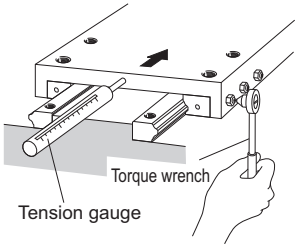


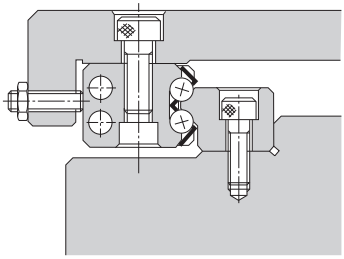
Fig.24

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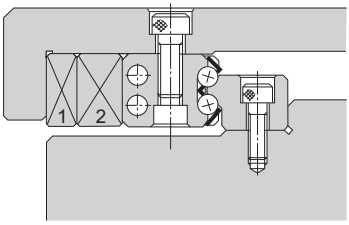
● **Example of Clearance Adjustment**

Design the clearance adjustment bolt so that it presses the center of the side face of the LM block.

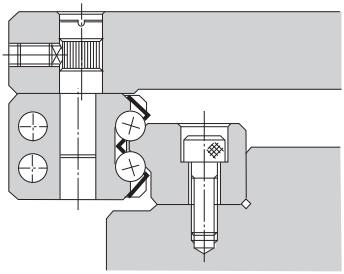
a. Using an adjustment screw
Normally, an adjustment screw is used to press the LM block.



b. Using tapered gibs
When high accuracy and high rigidity are required, use tapered gibs 1) and 2).



c. Using an eccentric pin
A type using an eccentric pin to adjust the clearance is also available.



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[Procedure for Assembling Model GSR]

The procedure for assembling model GSR is as follows:

(1) Align the table with the reference-surface of each LM block and fully fasten the mounting bolts to secure the blocks.
Both ends of the table must have a datum surface. (Fig.25)

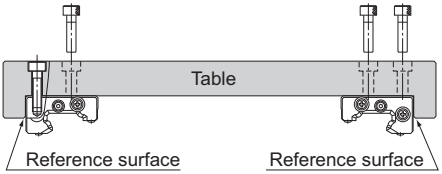


Fig.25

(2) Place LM rail A onto the base and align the rail with a straight-edge.
Fully fasten the mounting bolts using a torque wrench. (Fig.26)

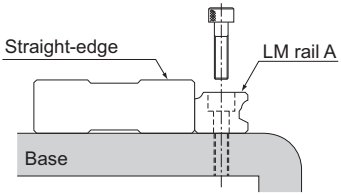


Fig.26

(3) Temporarily secure LM rail B onto the base, then mount the blocks on the rail by sliding the blocks.
Temporarily fasten LM rail B while pressing it toward the LM blocks. (Fig.27)

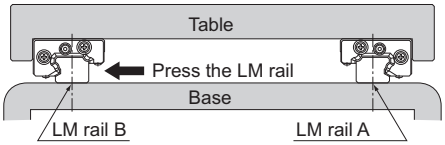


Fig.27

(4) Slide the table a few strokes to fit the LM blocks to LM rail B, then fully fasten LM rail B using a torque wrench. (Fig.28)

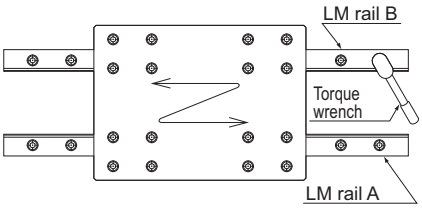


Fig.28

If there are more GSR units to be assembled, we recommend producing a jig like the one shown in Fig.29 first. You can easily mount LM rails while achieving parallelism of the LM rails using the jig.

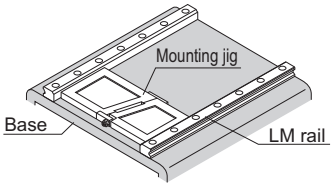


Fig.29

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[Procedure for Assembling Model JR]

● Mounting the LM Rails

When two LM rails are to be used in parallel as shown in Fig.30, first secure one LM rail on the base, and place a dial gauge on the LM block. Then, place the pointer of the dial gauge on the side face and top face of the other LM rail to simultaneously adjust the parallelism and the level, thus to complete mounting the LM rails.

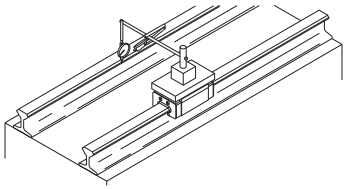


Fig.30

● Jointing LM Rails

When two or more LM rails are to be jointed, a special metal fitting as shown in Fig.31 is available. For such applications, specify this fitting when ordering the LM Guide (the rail will be tapped for attaching a joint fitting).

Installation Procedure

(1) Temporarily fasten the rail presser bolt.
(2) Secure rail A and the joint fitting with bolts C and D.
(3) Apply a dial gauge to side G of the joint between rails A and B. Adjust the left and right level differences using bolt E and set screw F on rail B.
If bolt E is tightened, rail B will move toward b side.
If set screw F is tightened, rail B will move toward a side.
(4) When the adjustment using set screw F is finished, secure set screw F with the nut.
(5) Adjust and secure the vertical direction using the rail presser.

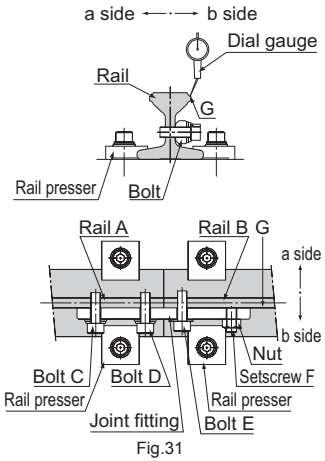


Fig.31

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● **Welding the LM Rail**

When welding the LM rail, it is best to weld the LM rail while clamping it at the welding point with a small vice or the like as shown in Fig.32. For effective welding, we recommend the following welding conditions. (During welding the LM rail, take care to prevent spatter from contacting the LM rail raceway.)

[Welding conditions]
Preheating temperature:200℃
Postheating temperature:350℃
Note) If the temperature exceeds 750℃, the LM rail may be hardened again.

[For shielded metal arc welding]
Welding rod: LB-52 (Kobelco)

[For carbon dioxide arc welding]
Wire: YGW12
Electric current: 200A

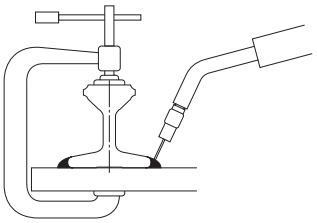


Fig.32

[**Procedure for Assembling Model HCR**]

To install the LM rails of R Guide model HCR, we recommend having any form of datum point (such as a pin) on the reference side (inside) of the LM rail, and pressing the LM rail to the datum point then stopping the LM rail with a presser plate from the counter-reference surface.

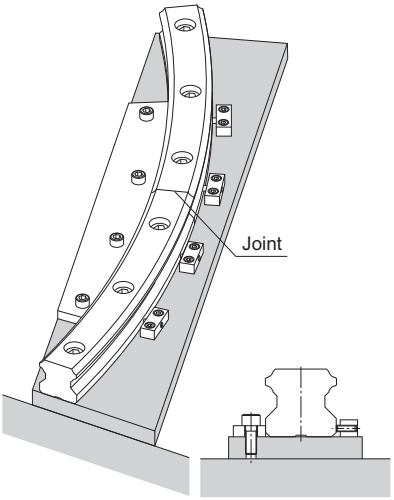


Fig.33 Method for Securing the LM Rails at the Joint

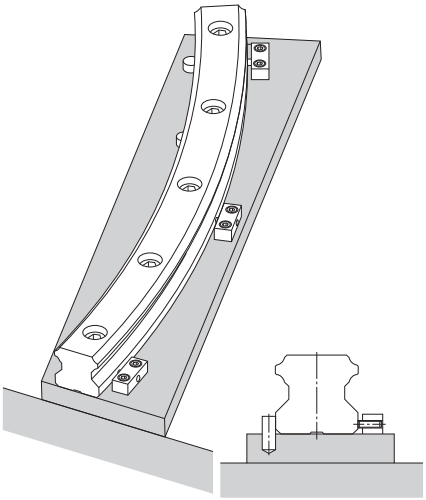


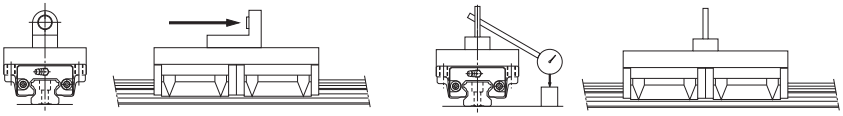
Fig.34 Method for Securing the LM Rail Using a Pin as a Datum Point

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Methods for Measuring Accuracy after Installation

[When Measuring Running Accuracy for Single Rail Application]

When measuring running accuracy of the LM block, stable accuracy can be obtained by securing two LM blocks on an inspection plate, as shown in Fig.35. When using a dial gauge, we recommend placing the straight-edge as close as possible to the LM block in order to perform accurate measurement.



1) Measurement method using an auto-collimator　　2) Measurement method using a dial gauge

Fig.35 Methods for Measuring Accuracy after Installation

Recommended Tightening Torque for LM Rails

With high-precision LM rails for the LM Guide, their raceways are ground and accuracy is inspected with the rails tightened with bolts. When mounting a high-precision LM rail on a machine, we recommend using the corresponding tightening torque indicated in Table1 or Table2

Table1 Tightening Torques when Pan Head Screws are Used
Unit: N-cm

Screw model No.	Tightening torque	
	Not hardened	Hardened
M 2	17.6	21.6
M 2.3	29.4	35.3
M 2.6	44.1	52.9

Table2 Tightening Torques when Hexagonal-Socket-Head Type Bolts are Used
Unit: N-cm

Screw model No.	Tightening torque		
	Steel	Cast Iron	Aluminum
M 2	58.8	39.2	29.4
M 2.3	78.4	53.9	39.2
M 2.6	118	78.4	58.8
M 3	196	127	98
M 4	412	274	206
M 5	882	588	441
M 6	1370	921	686
M 8	3040	2010	1470
M 10	6760	4510	3330
M 12	11800	7840	5880
M 14	15700	10500	7840
M 16	19600	13100	9800
M 20	38200	25500	19100
M 22	51900	34800	26000
M 24	65700	44100	32800
M 30	130000	87200	65200

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Precautions on Using the LM Guide

[Handling]

(1) Please use at least two people to move any product weighing 20 kg or more, or use a dolly or another conveyance. Doing so may cause injury or damage.
(2) Do not disassemble the parts. This will result in loss of functionality.
(3) Tilting an LM block or LM rail may cause them to fall by their own weight.
(4) Take care not to drop or strike the LM Guide. Doing so may cause injury or damage. Giving an impact to it could also cause damage to its function even if the product looks intact.
(5) Do not remove the LM block from the LM rail during setup.
(6) Do not insert hands or fingers into the mounting holes on the LM rail, as they could get caught between the rail and the LM block, resulting in injury.
(7) To ensure personal safety, wear gloves and protective footwear when handling this product.

[Precautions on Use]

(1) Prevent foreign material, such as cutting chips or coolant, from entering the product. Failure to do so may cause damage.
(2) If the product is used in an environment where cutting chips, coolant, corrosive solvents, water, etc., may enter the product, use bellows, covers, etc., to prevent them from entering the product.
(3) Do not use this product if the external temperature exceeds 80℃. Unless the unit is specially designed to be heat-resistant, exposure to such temperatures may deform or damage plastic and rubber parts.
(4) If foreign material such as cutting chips adheres to the product, replenish the lubricant after cleaning the product.
(5) Micro-strokes tend to obstruct oil film to form on the raceway in contact with the rolling element, and may lead to fretting corrosion. Take consideration using grease offering excellent fretting prevention. It is also recommended that a stroke movement corresponding to the length of the LM block be made on a regular basis to make sure oil film is formed between the raceway and rolling element.
(6) Do not use undue force when fitting parts (pin, key, etc.) to the product. This may generate permanent deformation on the raceway, leading to loss of functionality.
(7) If, for operational reasons, it becomes absolutely necessary to remove the LM block from the LM rail and reattach it, a special mounting jig must be used for this purpose. (The mounting jig is not included with standard versions of the product. To obtain one, please contact THK.)
(8) Position the mounting jig so that one end abuts the end of the LM rail. When the rail and the jig are exactly aligned, the LM block can be loaded onto the rail.
(9) Take care to keep the LM block straight. Loading the block at an angle can introduce foreign matter, damage internal components, or cause balls to fall out.
(10) The LM block must contain all its internal rolling elements (balls) when mounted on the LM rail. Using a block with any balls removed may result in premature damage.
(11) Please contact THK if any balls fall out of the LM block; do not use the block if any balls are missing.

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(12) If the LM Guide breaks due to an accident or other cause, the block may come off of the rail and fall. For the safe use of this product, take precautions such as adding a mechanism to prevent the block from falling.
(13) Insufficient rigidity or accuracy of mounting members causes the bearing load to concentrate on one point and the bearing performance will drop significantly. Accordingly, give sufficient consideration to the rigidity/accuracy of the housing and base and strength of the fixing bolts.
(14) When removing the LM block from the LM rail and then replacing the block, an LM block mounting/removing jig that facilitates such installation is available. Contact THK for details.

[Lubrication]
(1) Thoroughly remove anti-rust oil and feed lubricant before using the product.
(2) Do not mix different lubricants. Mixing greases using the same type of thickening agent may still cause adverse interaction between the two greases if they use different additives, etc.
(3) When using the product in locations exposed to constant vibrations or in special environments such as clean rooms, vacuum and low/high temperature, use the grease appropriate for the specification/environment.
(4) When lubricating the product having no grease nipple or oil hole, apply grease directly on the raceway and stroke the product several times to let the grease spread inside.
(5) The consistency of grease changes according to the temperature. Take note that the slide resistance of the LM Guide also changes as the consistency of grease changes.
(6) After lubrication, the slide resistance of the LM Guide may increase due to the agitation resistance of grease. Be sure to perform a break-in to let the grease spread fully, before operating the machine.
(7) Excess grease may scatter immediately after lubrication, so wipe off scattered grease as necessary.
(8) The properties of grease deteriorate and its lubrication performance drops over time, so grease must be checked and added properly according to the use frequency of the machine.
(9) Although the lubrication interval may vary according to use conditions and the service environment, lubrication should be performed approximately every 100 km in travel distance (three to six months). Set the final lubrication interval/amount based on the actual machine.
(10) If the mounting orientation is other than horizontal use, the lubricant may not reach the raceway completely. For the mounting orientation and the lubrication, see B**1-28** and B**24-2**, respectively.
(11) When adopting oil lubrication, the lubricant may not be distributed throughout the LM block depending on the mounting orientation of the block. Contact THK in advance for details.

[Storage]
When storing the LM Guide, enclose it in a package designated by THK and store it in a room in a horizontal orientation while avoiding high temperature, low temperature and high humidity.
After the product has been in storage for an extended period of time, lubricant inside may have deteriorated, so add new lubricant before use.

[Disposal]
Dispose of the product properly as industrial waste.

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Precautions on Handling the LM Guide for Special Environment

LM Guide for Medium-to-Low Vacuum

[Handling]

(1) This product has been thoroughly cleaned and degreased and then sealed in moisture-proof packaging. If possible, open the package immediately prior to using the product.
(2) Once the packaging has been opened, store the product inside a clean, dry receptacle accompanied by silica gel or another drying agent. Do not use anti-rust oil or corrosion- or tarnish-preventive paper or fluid with this product.
(3) Wear protective rubber or vinyl gloves while handling this product and make sure the surrounding environment is relatively clean.

Oil-Free LM Guide

[Handling]

(1) The Oil-Free LM Guide is suitable for use at high temperatures, under atmospheric pressure or in a high-vacuum environment of 10^{-6} Pa, and is designed for ultra-low dust emission. It is not intended for use in locations requiring rigidity. Because a preload would affect the strength of its Dry Lubrication S-Compound Film, it does not support preloads.
(2) The product can be used in temperatures ranging from −20 to 150℃.
(3) To ensure proper function of the Dry Lubrication S-Compound Film, use this product in an environment free from condensation, at a humidity level of 40% or less.
(4) This product is not intended for joint use.
(5) Great care must be taken in the installation of the Oil-Free LM Guide, which requires greater precision compared to standard LM Guides.
(6) If the LM block is removed from the LM rail, balls may fall out, and the Dry Lubrication S-Compound Film can be damaged when the block is remounted. If it becomes necessary to remove the LM block from the LM rail, please contact THK.
(7) This product should be stored in a horizontal position, in its original wrapping and package, in a controlled, stable environment free from abnormal high or low temperatures or high humidity. THK recommends storing it at room temperature (25±5℃), with a humidity level of 40% RH or lower and an air-purity level of 10,000 or lower.
(8) This product has been thoroughly cleaned and degreased and then sealed in moisture-proof packaging. If possible, open the package immediately prior to using the product.
(9) Once the packaging has been opened, store the product inside a clean, dry receptacle accompanied by silica gel or another drying agent. Do not use anti-rust oil or corrosion- or tarnish-preventive paper or fluid with this product.
(10) Wear protective rubber or vinyl gloves while handling this product and make sure the surrounding environment is relatively clean.

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Precautions on Using Options for the LM Guide

QZ Lubricator for the LM Guide

For details regarding the QZ, see B1-117.

[Precaution on Selection]
Secure a stroke longer than the overall LM block with QZ Lubricator attached.

[Handling]
Take care not to drop or strike this product. This could cause injury or product damage.
Do not block the vent hole with grease or the like.
The QZ device supplies oil only to the raceway, so use it in combination with regular greasing/lubrication. If the product is used in an environment exposed to coolant, cutting chips or other foreign material, oil on the raceway is lost easily. Accordingly, be sure to also use covers, bellows, etc.

[Service environment]
Be sure the service temperature of this product is between −10 to 50℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.

Laminated Contact Scraper LaCS, Side Scraper for LM Guides

For details regarding the LaCS, see B1-106. For details regarding the side scraper, see B1-108.

[Handling]
The lubricant impregnated into the scraper is used to increase its sliding capability. For lubrication of the LM Guide, attach QZ Lubricator, or the grease nipple on the side face of the end plate of the LM block, before providing a lubricant.
When using the product, be sure to attach the rail cap C or the plate cover.

[Service environment]
Be sure the service temperature of this product is between -20 to +80℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.

[Notes on the Product Functions]
It is specifically designed to provide dust prevention capability to remove foreign material and liquid. To seal oil, an end seal is required.

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Light Contact Seal LiCS for LM Guides

For details regarding the LiCS, see B1-110.

[Handling]
The lubricant impregnated into LiCS is used to increase its sliding capability. For lubrication of the LM Guide, attach the grease nipple on the end plate of the LM block before providing a lubricant.

[Service environment]
Be sure the service temperature of this product is between -20 to +80℃, and do not clean the product by immersing it in an organic solvent or white kerosene, or leave it unpacked.
It contacts only with the LM rail raceway. Do not use it in harsh environments.

Cap GC

For details regarding the GC cap, see B1-112.

[Handling]
If GC caps are specified for the product, the edges of the LM rail mounting hole openings will be sharp. Take great care not to injure your fingers or hands while working.
When fitting GC caps, use a flat aligning tool to gradually punch the cap into the hole until it is level with the upper surface of the LM rail. Then run an oil stone over the rail until the upper surface of the rail and the GC caps are completely flat.

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