Determining the Operating Conditions

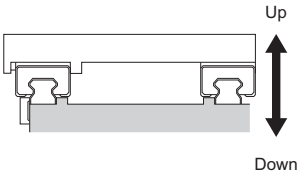
Operating Conditions of the LM Guide

Mounting Orientation

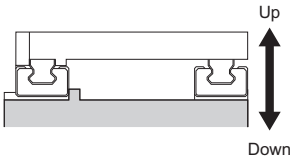
The LM Guide can be mounted in the following five orientations.
The lubricant may not reach the raceway if the LM Guide is not installed in a horizontal orientation. Be sure to let THK know the mounting orientation and the exact position in each LM block where the grease nipple or the piping joint should be attached.
For the lubrication, see A24-2.

Mounting Orientation

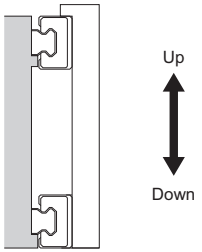
Horizontal (symbol: H)



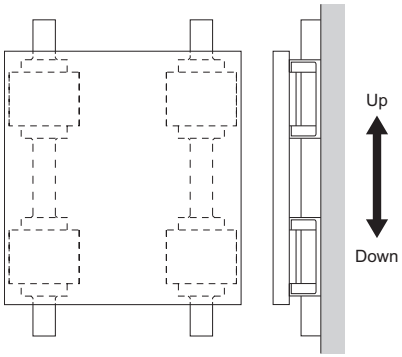
Inverted (symbol: R)



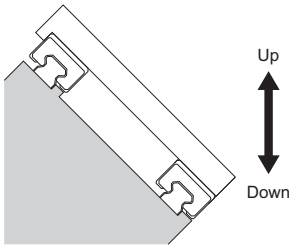
Wall mount (symbol: K)



Vertical (symbol: V)



Slant mount (symbol: T)



Symbol for Number of Axes

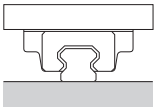
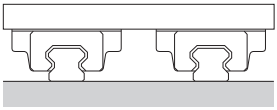
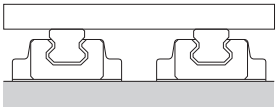
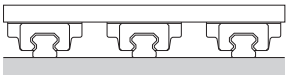
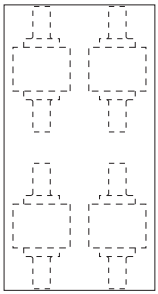
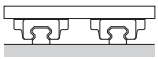
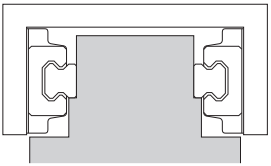
If two or more LM Guide units are used in a parallel combination on the same plane, specify in advance the number of the LM rails (symbol for number of axes) used in combination.
For accuracy standards and radial clearance standards, see A1-78 and A1-73, respectively.

Model number coding

SHS25C2SSCO+1000LP -II

- Model number (details are given on the corresponding page of the model)
- Symbol for number of axes ("II" indicates 2 axes. No symbol for a single axis)

Symbol for Number of Axes

Symbol for number of axes: none	Symbol for number of axes: II	Symbol for number of axes: II
Required number of axes: 1	Required number of axes: 2	Required number of axes: 2
	 Note: When placing an order, specify the number in multiples of 2 axes.	 Note: When placing an order, specify the number in multiples of 2 axes.
Symbol for number of axes: III	**Symbol for number of axes: IV**	**Other**
Required number of axes: 3	**Required number of axes: 4**	**Required number of axes: 2**
 Note: When placing an order, specify the number in multiples of 3 axes.	  Note: When placing an order, specify the number in multiples of 4 axes.	 Using 2 axes opposed to each other

Service Environment

● Lubrication

When using an LM System, it is necessary to provide effective lubrication. Using the product without lubrication may increase wear on the rolling elements and shorten the service life.
A lubricant has effects such as the following.
(1) Minimizes friction on moving elements to prevent seizure and reduce wear.
(2) Forms an oil film on the raceway to decrease stress acting on the surface and extend rolling fatigue life.
(3) Covers metal surfaces with an oil film to prevent the formation of rust.
To optimize an LM Guide's functionality, it is necessary to provide lubrication according to the operating conditions.
The lubricant may not reach the raceway if the LM Guide is not installed in a horizontal orientation. Be sure to let THK know the mounting orientation and the exact position in each LM block where the grease nipple or the piping joint should be attached. For the mounting orientations of the LM Guide, see A1-12. For the lubrication, see A24-2.
Even with an LM Guide with seals, the internal lubricant gradually seeps out during operation. Therefore, the system needs to be lubricated at an appropriate interval according to the operating conditions.

● Corrosion Prevention

■Determining a Material

Any LM System requires a material that suits the operating environment. For use in environments where corrosion resistance is required, some LM System models can use martensitic stainless steel. (Martensitic stainless steel can be used for LM Guide models SHS, SSR, SHW, SRS, HSR, SR, HRW, RSX, RSR, and HR.)
The HSR series includes HSR-M2, a highly corrosion-resistant LM Guide using anti-corrosive austenitic stainless steel. For details, see A1-398.

■Surface Treatment

The surfaces of the rails and shafts of the LM System can be treated for anti-corrosive or aesthetic purposes.
THK offers THK-AP treatment, which is the optimum surface treatment for the LM System.
There are roughly three types of THK-AP treatment: AP-HC, AP-C, and AP-CF. (See B0-20.)

● Contamination Protection

It is necessary to prevent foreign materials from getting inside the product, as it will lead to abnormal wear and a shortened service life. Therefore, when entrance of dust or other foreign material is a possibility, it is necessary to select a sealing device or contamination protection option suited to the operating environment and conditions.

THK offers contamination protection accessories for each model of the LM Guide, such as end seals made of a special synthetic rubber with high wear resistance, and side seals and inner seals that provide further contamination protection.

In addition, for applications in adverse environments, a Laminated Contact Scraper LaCS and dedicated bellows are available for various model numbers.

Also, THK offers dedicated caps designed to prevent cutting chips from entering the LM rail mounting holes.

When it is necessary to provide contamination protection for a ball screw in an environment exposed to cutting chips and moisture, we recommend using a telescopic cover that protects the whole system or a large bellows.

For the options, see A1-510.

Special Environments

Clean Room

In a clean environment, the generation of dust from the LM System has to be reduced and anti-rust oil cannot be used. Therefore, it is necessary to increase the corrosion resistance of the LM System. In addition, depending on the required level of cleanliness, a dust collector may be necessary.

Dust Generation from the LM System

■Measures to prevent dust generation resulting from spattering grease

THK AFE-CA, AFF, and L100 Grease
Use grease that produces little dust and is suited to a clean environment.

■Measures to reduce dust generation resulting from metallic abrasion

Caged Ball LM Guide
Dust generation can be reduced by using a Caged Ball LM Guide, which has no friction between balls and generates little metallic abrasion dust.

Corrosion Prevention

■Material-based measures

Stainless steel LM Guide
This LM Guide uses corrosion-resistant martensitic stainless steel.

Corrosion-resistant LM Guide
The LM rail uses austenitic stainless steel, which has a high corrosion-resistant effect.

■Surface treatment measures

THK AP-HC, AP-C, and AP-CF Treatment
The LM System is surface-treated to increase corrosion resistance.

Caged Ball LM Guide
Supported models: SHS SSR SVR/SVS SHW SRS SCR EPF

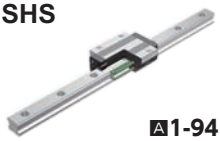
Caged Roller LM Guide
Supported models: SRG SRN SRW

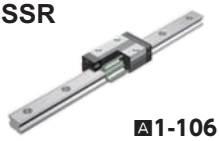
Stainless Steel LM Guide
Supported models: SHS SSR SHW SRS HSR SR HRW HR RSX RSR

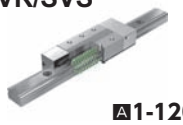
Corrosion-Resistant LM Guide
Supported models: HSR-M2

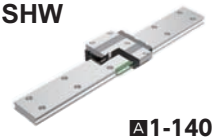
Surface Treatment

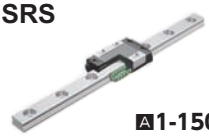
Grease

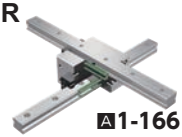
SHS

A1-94

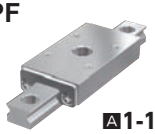
SSR

A1-106

SVR/SVS

A1-120

SHW

A1-140

SRS

A1-150

SCR

A1-166

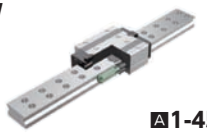
EPF

A1-174

SRG

A1-416

SRN

A1-440

SRW

A1-458

SHS

A1-94

SSR

A1-106

SHW

A1-140

SRS

A1-150

HSR

A1-182

SR

A1-210

HRW

A1-242

HR

A1-272

RSX

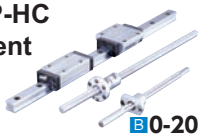
A1-252

RSR

A1-264

HSR-M2

A1-398

THK AP-HC Treatment

B0-20

THK AP-C Treatment

B0-20

THK AP-CF Treatment

B0-20

THK AFE-CA Grease

A24-13

THK AFF Grease

A24-15

L100 Grease

A24-25

Vacuum

In a vacuum environment, measures are required to prevent resin from emitting gas and grease from spattering. Anti-rust oil cannot be used, so it is necessary to select a product with high corrosion resistance.

■Measures to prevent resin from emitting gas

Stainless steel LM Guide

The end plate (ball circulation path normally made of resin) of the LM block is made of stainless steel to reduce emission of gas.

■Measures to prevent grease from evaporating

Vacuum grease

If a general-purpose grease is used in a vacuum environment, oil contained in the grease spatters and the grease loses lubricity. Therefore, use a vacuum grease made with low-vapor-pressure fluorine-based oil.

■Corrosion prevention

Stainless steel LM Guide

In a vacuum environment, use a corrosion-resistant stainless steel LM Guide.

High-temperature LM Guide

If high temperatures are predicted due to baking, use a high-temperature LM Guide, which is highly resistant to heat and corrosion.

Corrosion-resistant LM Guide

This LM Guide uses highly corrosion-resistant austenitic stainless steel in the LM rail.

High-Temperature LM Guide

Supported models: HSR-M1 SR-M1 RSX-M1 RSR-M1

LM Guide for Medium-to-Low Vacuums

Supported models: HSR-M1VV

Corrosion-Resistant LM Guide

Supported models: HSR-M2

Stainless Steel LM Guide

Supported models: HSR SR HRW HR RSX RSR

Vacuum Grease

HSR-M1

A1-350

SR-M1

A1-368

RSX-M1

A1-378

RSR-M1

A1-388

HSR-M1VV

A1-404

HSR-M2

A1-398

HSR

A1-182

SR

A1-210

HRW

A1-242

HR

A1-272

RSX

A1-252

RSR

A1-264

Corrosion Prevention

As with clean room applications, it is necessary to increase corrosion resistance through material selection and surface treatment.

■Material-based measures

Stainless steel LM Guide
This LM Guide uses corrosion-resistant martensitic stainless steel.

Corrosion-resistant LM Guide
This LM Guide uses highly corrosion-resistant austenitic stainless steel in the LM rail.

■Surface treatment measures

THK AP-CF, AP-C, and AP-HC treatment
The LM system is surface-treated to increase corrosion resistance.

Stainless Steel LM Guide

Supported models: SHS SSR SHW SRS HSR SR HRW HR RSX RSR

Corrosion-Resistant LM Guide

Supported models: HSR-M2

Surface Treatment

SHS

A1-94

SSR

A1-106

SHW

A1-140

SRS

A1-150

HSR

A1-182

SR

A1-210

HRW

A1-242

HR

A1-272

RSX

A1-252

RSR

A1-264

HSR-M2

A1-398

THK AP-CF Treatment

B0-20

THK AP-C Treatment

B0-20

THK AP-HC Treatment

B0-20

High Speed

In a high-speed environment, it is necessary to apply an optimal lubrication method that reduces heat generation during high-speed operation and increases grease retention.

■Measures to reduce heat generation

Caged Ball LM Guide

Use of a ball cage eliminates friction between balls to reduce heat generation. In addition, grease retention is increased, contributing to long service life and high-speed operation.

THK AFA Grease, AFJ Grease

It reduces heat generation in high speed operation and has superb lubricity.

■Measures to improve lubrication

QZ Lubricator

Continuous oil lubrication ensures that the lubrication and maintenance interval can be significantly extended. It also applies the right amount of oil to the raceway, making itself an eco-friendly lubrication system that does not contaminate the surrounding area.

Caged Ball LM Guide

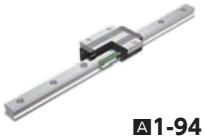
Supported models: SHS SSR SVR/SVS SHW SRS SCR EPF

Caged Roller LM Guide

Supported models: SRG SRN SRW

QZ Lubricator

Grease

SHS

A1-94

SSR

A1-106

SVR/SVS

A1-120

SHW

A1-140

SRS

A1-150

SCR

A1-166

EPF

A1-174

SRG

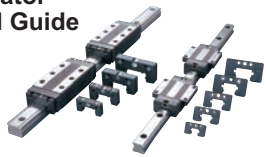
A1-416

SRN

A1-440

SRW

A1-458

QZ Lubricator for the LM Guide

A1-538

THK AFA Grease

A24-7

THK AFJ Grease

A24-21

High Temperature

In a high-temperature environment, dimensional variations caused by heat are problematic. Use a high-temperature LM Guide, which is heat resistant and has minimal dimensional variation when heated. Also, use a high-temperature grease.

■Heat resistance

High-temperature LM Guide

A special heat treatment to maintain dimensional stability minimizes dimensional variations due to heating and cooling.

■Grease

High-temperature grease

Use a high-temperature grease to maintain consistent rolling resistance in the LM System even at high temperatures.

Low Temperature

In a low-temperature environment, use an LM System with a minimal amount of resin components and a grease that minimizes fluctuations in rolling resistance, even at low temperature.

■Impact of low temperature on resin components

Stainless steel LM Guide

The end plate (ball circulation path normally made of resin) of the LM block is made of stainless steel.

■Corrosion prevention

THK AP-CF, AP-C, and AP-HC Treatment

The LM System is surface-treated to increase corrosion resistance.

■Grease

THK AFC Grease

This grease has little rolling resistance fluctuation even in cold temperatures.

Micro Motion

Micro strokes cause the oil film to break, resulting in poor lubrication and early wear. In such applications, select a grease with high oil film strength that can easily form an oil film.

■Grease

THK AFC Grease

AFC Grease is a urea-based grease that excels in oil film strength and wear resistance.

High-Temperature LM Guide

Supported models: HSR-M1 SR-M1 RSX-M1 RSR-M1 HSR-M1VV

High-Temperature Grease

Stainless Steel LM Guide

Supported models: SHS SSR SHW SRS HSR SR HRW HR RSX RSR

Surface Treatment

Low-Temperature Grease

Grease

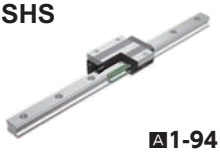
HSR-M1  A1-350

SR-M1  A1-368

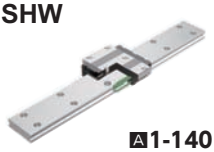
RSX-M1  A1-378

RSR-M1  A1-388

HSR-M1VV  A1-404

SHS  A1-94

SSR  A1-106

SHW  A1-140

SRS  A1-150

HSR  A1-182

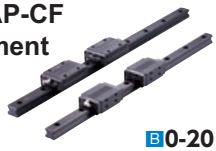
SR  A1-210

HRW  A1-242

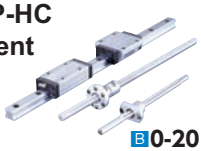
HR  A1-272

RSX  A1-252

RSR  A1-264

THK AP-CF Treatment  B0-20

THK AP-C Treatment  B0-20

THK AP-HC Treatment  B0-20

THK AFC Grease  A24-11

THK AFC Grease  A24-11

Foreign Matter

If foreign matter enters the LM System, it will cause abnormal wear and shorten the service life. Therefore, it is necessary to prevent such entrance of foreign matter.
Especially in an environment containing small foreign matter or a water-soluble coolant that a telescopic cover or a bellows cannot block, it is necessary to attach a contamination protection accessory capable of efficiently removing foreign matter.

■Metal scraper

It removes relatively large foreign objects such as cutting chips, spatter, sand, or hard foreign materials that adhere to the LM rail.

■Laminated Contact Scraper LaCS

Unlike a metal scraper, it removes foreign matter while making contact with the LM rail. Therefore, it is more effective at preventing contamination by small foreign matter that is difficult to remove with conventional metal scrapers.

■QZ Lubricator

The QZ Lubricator is a lubrication system that feeds the right amount of lubricant to the ball raceway through direct contact with a highly oil-impregnated fiber net.

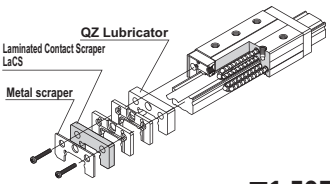
■Dedicated metal caps for LM rail mounting holes - GC caps

GC caps are metal caps that plug LM rail mounting holes (compliant with the RoHS Directives). In harsh environments they prevent the entrance of foreign material and coolant from the top face of the LM rail (mounting holes) and significantly increase contamination protection of the LM Guide if used with a dust seal.

■Protector

The protector minimizes the entrance of foreign material even in harsh environments where foreign material such as fine particles and liquids are present.

LM Guide
+Metal scraper
+Laminated Contact Scraper LaCS
+GC cap etc.

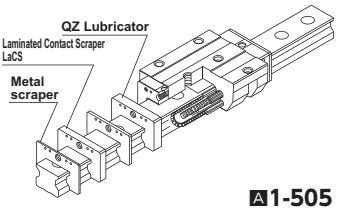


A1-505

Supported models

Caged Ball LM Guide
SHS SSR SVR/SVS SHW SRS
Full-Ball LM Guide
HSR NR-X/NRS-X

Roller Type LM Guide
+Metal scraper
+Laminated Contact Scraper LaCS
+GC cap etc.



A1-505

Supported models

SRG HRX

Caged Ball LM Guide

SHS

A1-94

SSR

A1-106

SHW

A1-140

SRS

A1-150

SVR/SVS

Featuring the protector A1-120

Full-Ball LM Guide

HSR

A1-182

NR-X/NRS-X

A1-222

Caged Roller LM Guide

SRG

Featuring the protector A1-416

Full-Roller LM Guide

HRX

Featuring the protector A1-466