



## Linear Module Maintenance Guide



Industrial  
Automation



Intelligent  
Elevator



New Energy  
Vehicle



Industrial  
Robot



Rail  
Transit



Data code PS00012774A00

# Preface

## Introduction

The brand new LMC series linear modules adopt a dedicated DDL structure and novel electromagnetic design enabling low force fluctuations and low operating noise. The modules are suitable for most of the applications with a wide range of rated force from 51N to 1235N. Combined with SV680L servo and ELOI optical encoder, the modules can achieve one-click adjustment for ease of use. The modules also feature zero transmission clearance between the motor and the load, high-rigidity guide with strong load-bearing capacity, and a repeatability of  $\pm 2 \mu\text{m}$  with the use of optical encoder.

This guide introduces the maintenance of the Inovance linear modules.

## Revision History

Date	Version	Description
July 2023	A00	First release

## Access to the Guide

This guide is not delivered with the product. You can obtain the PDF version in the following way:

- Visit <http://www.inovance.com>, go to Support > Download, search by keyword, and then download the PDF file.
- Scan the QR code on the product with your mobile phone.

# Table of Contents

Preface.....	1
1 Precautions for Use .....	3
2 Installation.....	5
2.1 Pre-Installation Inspection.....	5
2.2 Installation Environment .....	5
2.3 Installation Precautions .....	5
2.4 Removing Transportation Fixtures.....	6
3 Fixation and Transportation .....	8
3.1 Importance of Fixation .....	8
3.2 Fixation Precautions .....	9
3.3 Transportation Precautions.....	11
4 Maintenance Period.....	12
4.1 Maintenance Interval.....	12
5 Maintenance .....	13
5.1 Maintenance of Guide .....	13
5.2 Maintenance of Feedback System .....	16
5.3 Maintenance of Stator.....	18

# 1 Precautions for Use

## Safety Precautions

Read through the safety instructions before installing, operating, and servicing the equipment.

- To ensure personal and equipment safety, observe the notes indicated on the product labels and all the safety instructions in the user guide.
- "CAUTION", "WARNING", and "DANGER" in the user guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper use is not covered by warranty.
- Inovance shall take no responsibility for any personal injury or property damage caused by improper use.

## Safety Levels and Definitions



Indicates that failure to comply with the notice will result in death or severe personal injuries.









Indicates that failure to comply with the notice may result in death or severe personal injuries.



Indicates that failure to comply with the notice may result in minor or moderate personal injuries or equipment damage.

## Safety Signs

To guarantee safe operations and maintenance of the equipment, follow the safety labels on the equipment. Do not damage or remove the safety labels. The following table describes the meaning of the safety labels.

Safety label	Name	Description
	Warning sign	During the handling, installation, and transportation of the module, keep the optical/magnetic scale away from contact with foreign object or strong magnets to avoid damage to the scale.
	Mechanical injury	<ul style="list-style-type: none"> <li>• When the linear module is running, personnel are prohibited from standing at either end of the linear module to prevent injury caused by runaway of the linear motor.</li> <li>• During operation, do not perform operations related to production assembly.</li> <li>• During operation, do not touch, lean on, or push the linear module.</li> </ul>
	Strong magnetic field	The stator inside the linear module is made of strong magnetic material with strong adsorption force. Operators are strictly prohibited from bringing magnetic objects, magnetic conductive objects, and magnetic sensitive objects, such as iron tools, blades, etc. close to the module, to avoid pinching fingers and causing injury to personnel or damage to the product.
 <p data-bbox="308 1391 443 1424">禁止踩踏</p>	No step	It is prohibited to step on the dustproof cover (or steel strip used for a long-stroke linear module).
	Remove the fixing screws	 <p data-bbox="1361 1585 1430 1615">Label</p> <p data-bbox="842 1783 1398 1850">Remove the screws under this label before commissioning.</p>

## 2 Installation

### 2.1 Pre-Installation Inspection

When the equipment has been moved, or unused for a long time, make the following inspections by the authorized service engineer before switching on the power.

1. Power supply inspection

Check that the power supply voltage is normal using a multimeter.

Check that the equipment is well grounded.

2. Cable inspection

Check that the cable connectors are not loose.

Check that the cable connectors are connected correctly as required.

3. Post-unpacking Inspection

Check that the accessories on the packing list are complete.

Check the linear module for any damaged parts.

After removing the transportation fixing screws, manually push the rotor to cover the full stroke and check for any foreign objects inside the linear module, especially between the rotor and stator.

### 2.2 Installation Environment

Item	Requirement
Humidity	≤80% RH (non-condensing)
Temperature	0°C to 40°C, recommended for use in a constant temperature environment of 25 ± 1°C
Environment	<ul style="list-style-type: none"> <li>• Avoid working environments with excessive dust, oil mist, metal polishing and grinding.</li> <li>• No strong electromagnetic signal interference near the equipment.</li> <li>• If used in special environment, please consult Inovance.</li> </ul>

### 2.3 Installation Precautions

1. The module is shipped from the factory with the parameters (motor parameters, positioning accuracy compensation parameters, etc.) stored in the drive. The S/N of the drive and the S/N of the module must match exactly.

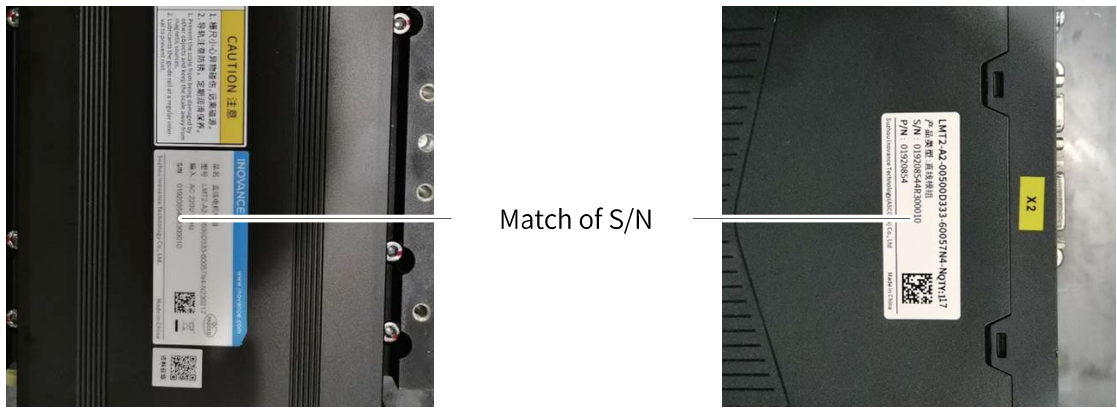


Figure 2-1 Match of S/N between drive and module

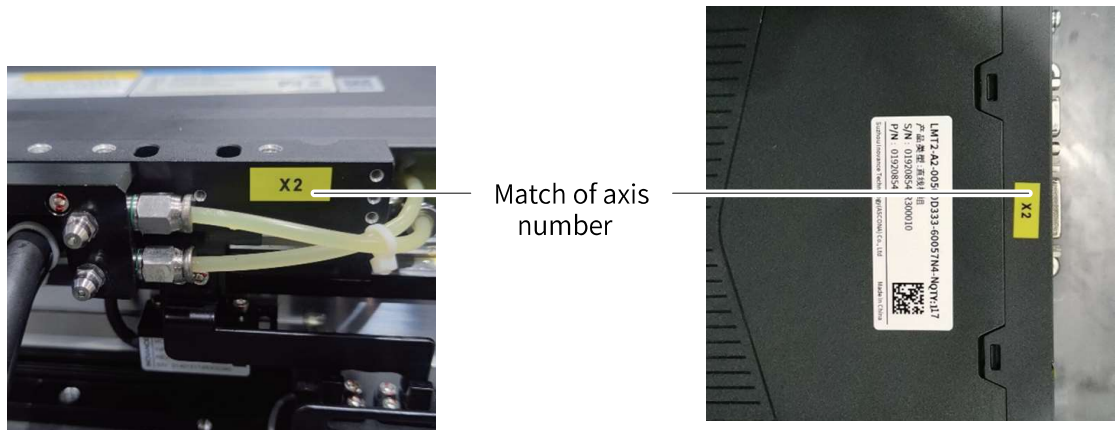


Figure 2-2 Match of axis number between multi-rotor sliding plate and drive

2. Ensure that all screws in the base and load mounting holes of the sliding plate are locked tightly to avoid damage to the module and equipment during commissioning or operation.

## 2.4 Removing Transportation Fixtures

1. During the transportation of the linear module, the sliding plate is fixed to the base or end plate by fixtures. Before operation, it is necessary to remove the transportation fixture, namely, the red fixing plate for the LMS linear module, or end plate screws for the LMC linear module.

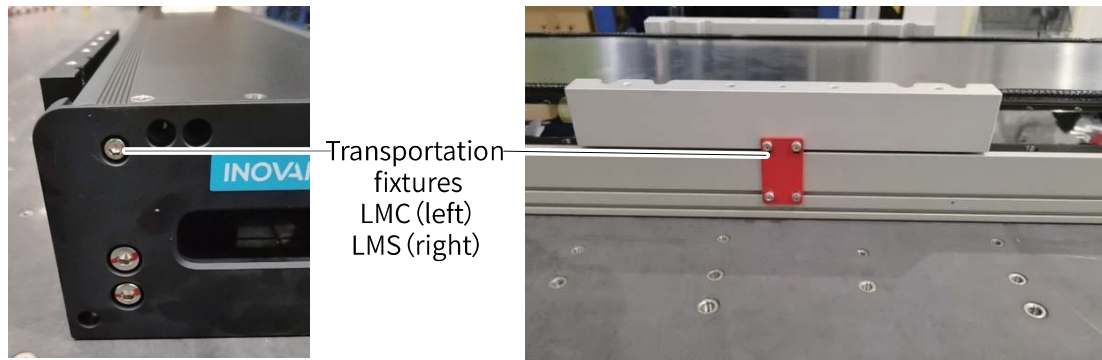


Figure 2-3 Transportation fixture of LMC&LMS modules

2. After the OEM completes the testing, it is necessary to reinstall the transportation fixture before transportation to prevent the load from moving back and forth, which may cause equipment failure.

### 3 Fixation and Transportation

#### 3.1 Importance of Fixation

When the linear module is installed on the equipment for transportation, if the load is not rigidly fixed, indentations will be formed on the guide during the transportation from OEM to end users due to excessive cantilever of the load and lack of corresponding auxiliary fixation measures, causing abnormal noise in the module, reducing the lifespan of the guide slider, and seriously affecting the use of the linear module. It is recommended to transport the linear module with no load.

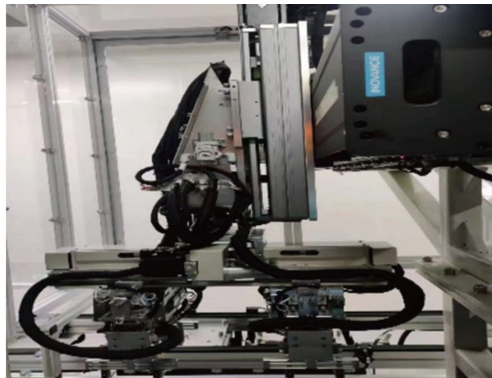


Figure 3-1 Typical user load

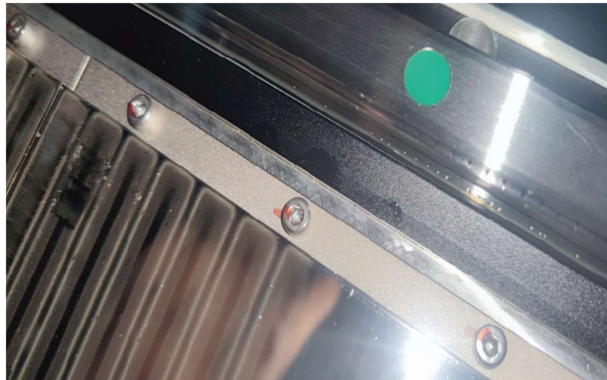


Figure 3-2 Indentations on the guide



Figure 3-3 Indentations on the slider

## 3.2 Fixation Precautions

1. Fix the sliding plate with metal parts.

Rigidly fix the sliding plate using the original materials in the way it was originally delivered to prevent minor wear during transportation.

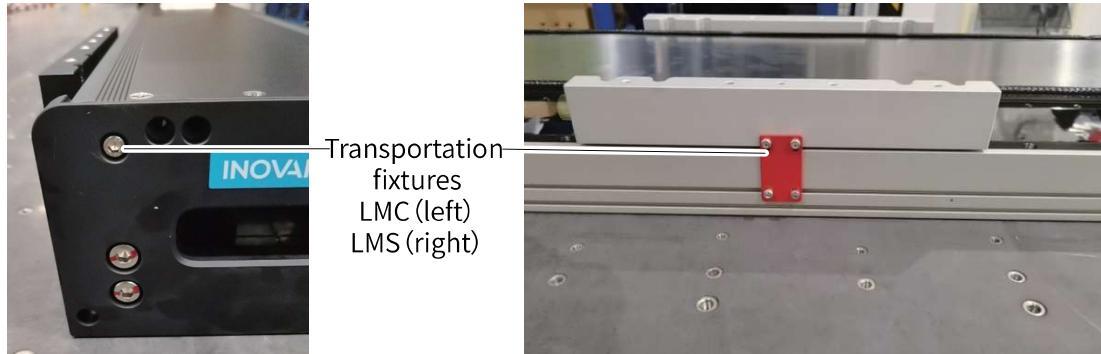


Figure 3-4 Standard fixation of the linear module for transportation

If the standard fixation is impossible due to factors such as space limit, you can use customized sheet metal parts or adapters to achieve rigid connection.

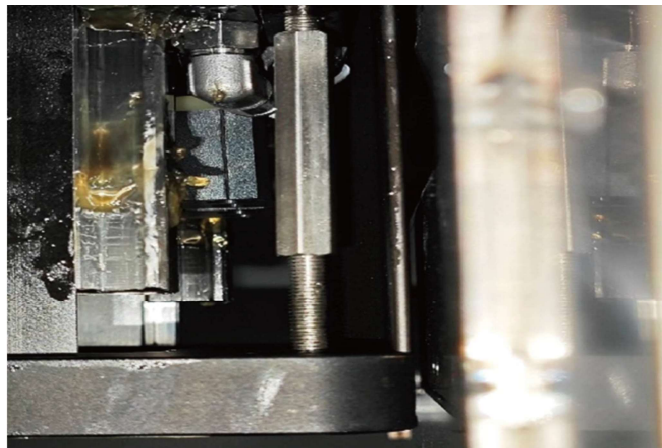


Figure 3-5 Fixation with screw adapter



Figure 3-6 Fixation with customized sheet metal parts

2. Rigidly fix the Z-axis load.

When a load exists on the Z-axis, it needs to be rigidly fixed. It can be fixed by lowering the Z-axis onto a fixed platform, or by customized metal parts or other fasteners.



Figure 3-7 Z-axis fixed and supported on the fixed platform below

3. Add cushions under the equipment.

When transporting the equipment as a whole, place cushions above supporting components such as pallets and skids to reduce vibration energy transmission. You can design the size and quantity of cushions according to the actual contact area and contact points between the equipment and pallets and skids.



Figure 3-8 Rubber cushion under the equipment



Figure 3-9 Image of rubber cushion

### 3.3 Transportation Precautions

1. Handle with care when transporting the equipment with a forklift.

When transporting equipment, drive the forklift slowly when passing through speed bumps to avoid impact on the equipment.



Figure 3-10 Handle with care

2. Ensure smooth transportation, and avoid emergency starts and stops.

In case of emergency starts and stops during the transportation, the equipment on the vehicle will generate inertia force, causing pressure or vibration to internal parts of the equipment.

## 4 Maintenance Period

### 4.1 Maintenance Interval

No.	Item	Interval	Maintenance Measures
1	Slider	Every 100 km, or every 3 to 6 months	Clean the old grease first, then add new grease
2	Feedback system	Monthly	Check and clean
3	Stator	Quarterly	Check and clean
4	Table screws	Quarterly	Check and tighten

## 5 Maintenance

### 5.1 Maintenance of Guide

The fine particles and dust generated during the operation of the guide may enter the slider of the linear guide, accelerating the drying and aging of the grease. If lubricating grease is not regularly replenished, it will increase the running resistance and cause jamming, leading to a decline in precision and even shortened service life of the guide.

#### 1. Lubricating grease refilling process

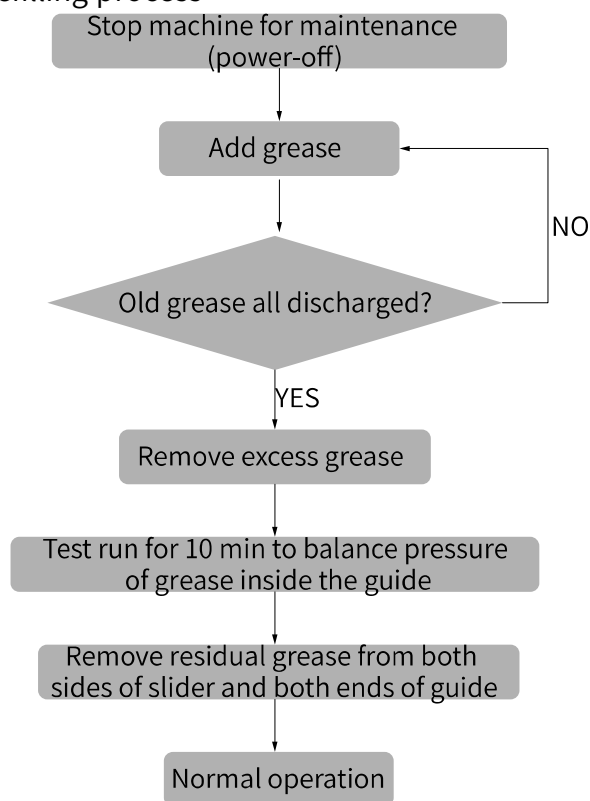


Figure 5-1 Lubricating grease refilling process

2. Inject an appropriate amount of lubricating grease from the grease nozzle with a grease gun. Observe whether there is any grease overflowing from the scraper of the slider. If overflow occurs, stop the injection. Move the slider back and forth 1-2 times in a stroke of "5 times" the full length of the slider. Repeat the above steps until the surface of the guide is completely coated with the grease.

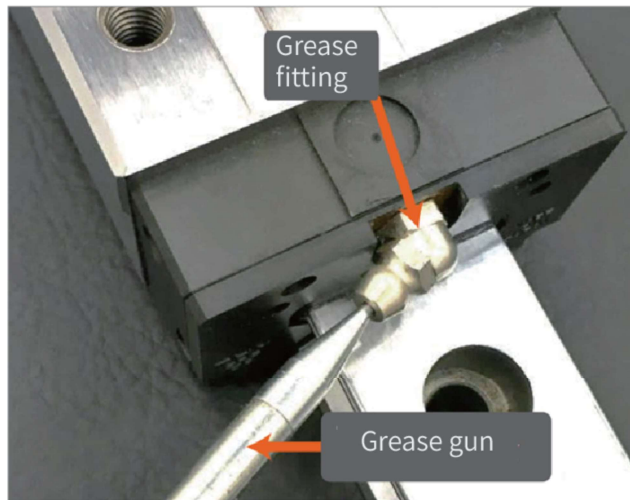


Figure 5-2 Manual grease refilling without centralized grease supply

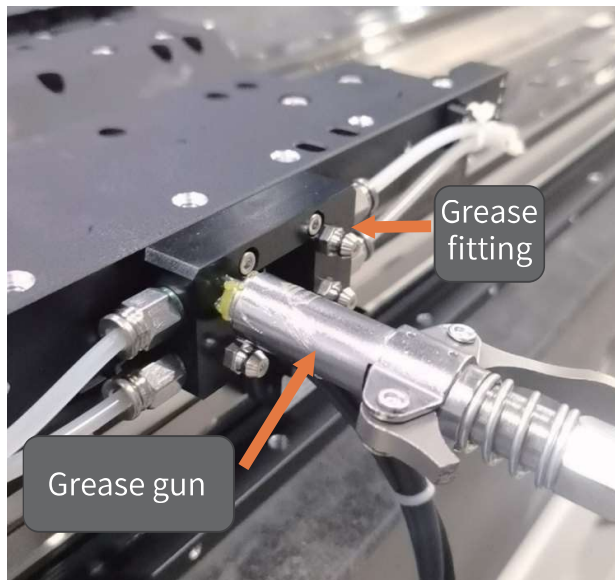


Figure 5-3 Manual grease refilling with centralized grease supply

3. After the refilling, run each axis continuously for more than 10 minutes. This ensures the grease to be evenly combined with the balls in the slider, and releases the saturation pressure of the grease inside the slider. In this way, a pressure balance with the outside is achieved to avoid continuous overflow and accumulation of the grease between the slider and the guide.
4. After the refilling, remove residual grease from both sides of the slider and the guide using a lint free cloth.

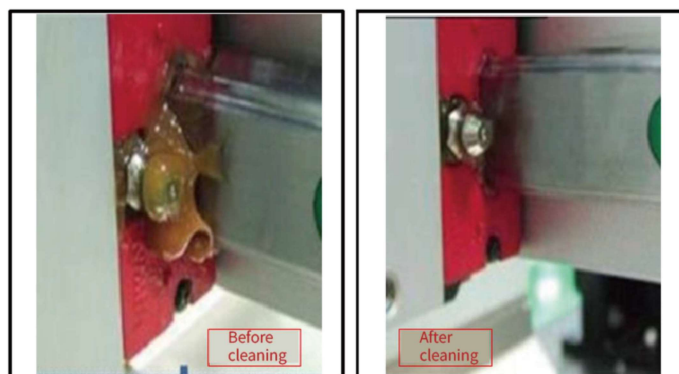


Figure 5-4 Removing excess grease

The grease refilling cycle varies depending on the conditions of use and the environment. In general, the grease should be refilled every 100 km or every 3 to 6 months. If the operating conditions are harsh, the frequency of grease refilling should be increased. Add the same type of grease. If different greases are mixed, it may affect the performance. Regular lubrication and maintenance of the guide can reduce rolling friction, extend service life, and prevent rusting. Places that cannot be reached at the end need to be brushed with grease for rust prevention.

5. The grease gun needs to be used with the nozzle adapter and nozzle. The recommended grease gun and grease models are described in the table below.

Recommended grease gun and grease models					
Guide Manufacturer	Grease gun model	Adapter model	Accessory model	Guide model	Grease model
THK	MG70	H type	-	SSR20XW/SSR25XW/SHS20V	AFB-LF grease 70 g bellow cartridge
		U type	N type	SSR15XW/SHS15V	
HIWIN	GN-80M	-	-	HG20	HIWIN G05 grease 70 g flexible tube
		GT-PT1/8-M5	GNZ-C-M5	EG15	

## Note

1. For THK guide, you can attach either the Type H or dedicated Type U nozzle to the grease gun unit. You can then also install the Type N tip attachment to the Type U nozzle. For the HIWIN guide, the curved nozzle at the front end of the grease gun can adapt to general grease fittings (including M6 and PT1/8 grease fitting), and you can install an adapter or other attachment to the nozzle to adapt to other forms of grease fittings.
2. For centralized greasing, you can use MG70 grease gun with Type H adapter, or GN-80M grease gun.
3. For 12# mini guide without grease fittings, you need to apply the grease to the guide for maintenance.

## 5.2 Maintenance of Feedback System

When using the linear modules in environment with excessive splashing or dust, you need to promptly clean the dust, oil and liquid splashed onto the optical scale to prevent contamination of the scale. Contaminants on the scale may reduce output accuracy of the readhead and increase noise of the module, especially in high-resolution cases, and may even cause runaway accidents.

1. Feedback system maintenance process

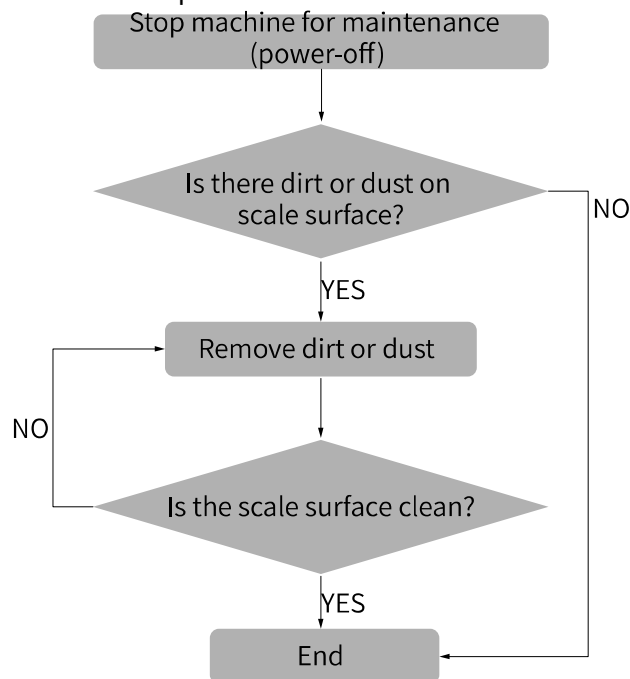


Figure 5-5 Feedback system maintenance process

2. Regularly wipe the surface of the optical scale (here we take the optical scale used in RSF MS15 series encoder as an example) with air-laid paper and anhydrous alcohol, as shown in the following figure.

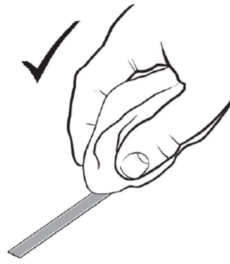


Figure 5-6 Maintain the scale correctly

3. Keep magnetic objects away from the magnetic scale to prevent magnetization of the scale.

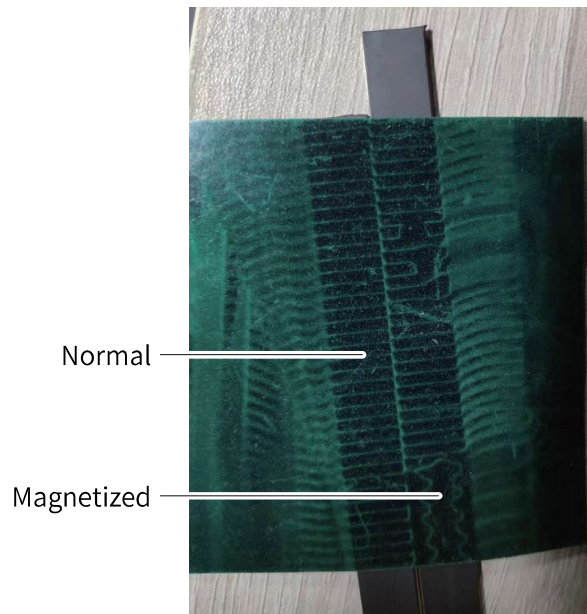


Figure 5-7 Comparison of magnetized and non-magnetized scales

4. Do not scratch the surface of the magnetic scale/optical scale with hard objects to prevent damage to the scale, as shown in the following figure.

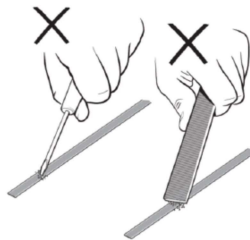


Figure 5-8 Do not scratch the scale with hard objects

5. Do not touch the window of the readhead with hands

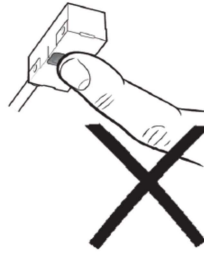


Figure 5-9 Do not touch the readhead window

### 5.3 Maintenance of Stator

During the operation of the linear module, foreign matter or dust may fall into the interior of the module, which needs to be cleaned regularly. Otherwise, long-term accumulation of foreign matter or dust can cause the stator to get stuck and even damage the motor.

#### 1. Stator maintenance process

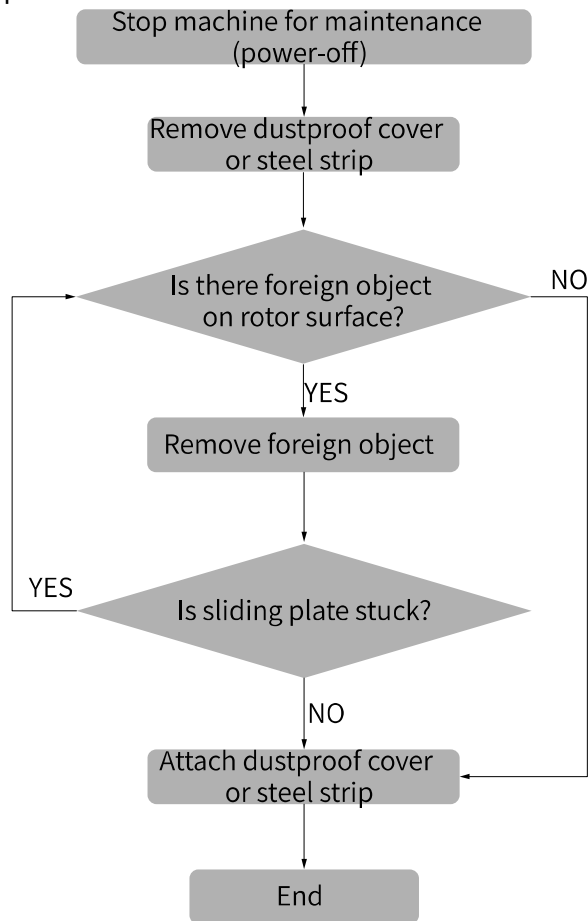


Figure 5-10 Stator maintenance process

2. When cleaning the foreign matter inside the stator magnets, you can use non-metallic brushes to clean the dust between the magnets. If there are magnetic objects adsorbed on the surface of the stator, you can remove them with a clean cloth.

3. When cleaning the stator, the operator should remove the magnetic objects, magnetically conductive objects and magnetically sensitive objects from the wrist to prevent personal injury caused by strong magnetic adsorption.



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