

## Installation Guide

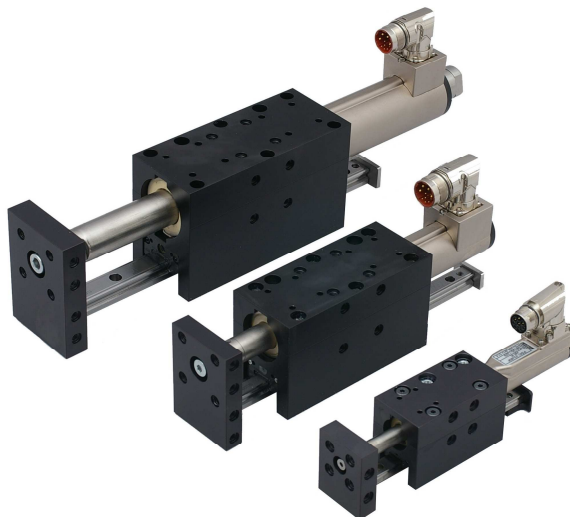
for partly completed machines  
according to machinery directive 2006/42/EG app. VI

## Maintenance Instructions

## Declaration of Conformity

according to machinery directive 2006/42/EG app. II 1. B.

## **HighDynamic<sup>®</sup>** Linear Motor Modules HM01-23, HM01-37 & HM01-48




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## 1. General Information

### 1.1 Introduction

	<p>This manual includes instructions for the assembly, use, installation, risks of danger, maintenance, transport, and storage of linear motor modules. The document is intended for electricians, mechanics, service technicians and warehouse staff. Please comply with the safety instructions at all times. Keep this guide accessible and make it available for the assigned staff.</p>
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### 1.2 Explanation of Signs

	<p>Round command signs indicate what to do.</p>
	<p>Triangular warning signs indicate danger.</p>
	<p>JUNG ANTRIEBSTECHNIK U. AUTOMATION GMBH the company will be referred to as JA<sup>2</sup> GmbH in the following text.</p>

### 1.3 Warranty & Liability



As manufacturer of linear motor systems, JA<sup>2</sup> GmbH does not accept responsibility for the improper use, application or handling of products and declines any liability. Warranty may not be claimed after use or combination with third party products, like cables and power supplies. With purchase every customer confirms to have read and understood the in the installation and maintenance guide listed warnings. This guide is included in every delivery and available online. Please always include this guide in your deliveries, should you resell our linear motor systems as components or install them into machines. We also refer to our general terms and conditions.

### 1.4 Copyright & Trademark Protection



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## 2. Intended Use

### 2.1 Use of Linear Motor Modules



The linear motor modules are high-dynamic actuators. According to European law 2006/42/EG the actuators are partly completed machines, which are further installed into machines. They are used in machines for industrial automation, handling and assembly technologies, packaging, as well as testing technologies.

### 2.2 Assembly of Partly Completed Machines into Machines



In order to assemble the partly completed machines properly and without compromising the safety and health of people, the following conditions must be met:

- The installation of machines may only be carried out by qualified personnel.
- This document must be read and understood completely before installation.
- All warnings in this document must be observed.

A risk assessment for the complete machine must be carried out!

### 2.3 Operating Conditions



#### Conditions

- environmental temperature with nat. cooling 0°C to 40°C
- motor temperature -10°C to +80°C for std. linear motors
- motor temperature -10°C to +110°C for HP linear motors (marked with HP).
- triggering of winding temperature control > 90°C for std. linear motors
- triggering of winding temperature control > 120°C for HP linear motors
- relative humidity ≤ 60 % not condensing
- storage temperature -15°C to +70°C

The storage room must be dry, free of dust and frost and must be protected from shock. The linear module must be protected from extreme weather conditions. The storage room air may not contain any aggressive gases. The maximum installation height is 4.000 m above sea level (MASL). When installing above 1.000 m MASL, with identical motor power, a derating of 1 °C per 100 m is to be expected for air cooling.  
The operating voltage of the linear motor stators ≤ 72 VDC.

### 3. Safety Instructions

#### 3.1 Warnings for Unpacking, Handling, Assembly, Processing & Storage



##### **Contusions**

The sliders of linear motors contain neodymium magnets and have a very strong magnetic force. Careless handling could cause fingers or skin to become caught between sliders and iron parts. This may lead to contusions, bruises, and bone fractures. Protective gloves should be worn, when handling sliders.



##### **Pacemakers / Defibrillators**

When approaching strong magnetic fields, pacemakers or other devices, may switch into test mode and will not function properly. As a wearer of such a device, you should always keep the following minimum distances between the devices and the sliders:

- 250 mm (10") for slider diameters 27 mm and 28 mm (PL01-27 / 28)
- 150 mm (6") for slider diameters 19 mm and 20 mm (PL01-19 / 20)
- 100 mm (4") for slider diameter 12 mm (PL01-12)

Warn other persons, who wear these devices, to avoid getting too close to sliders.



##### **Magnetic Fields**

Magnets integrated into the linear motor sliders produce a strong magnetic field. They could damage TV's, laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids, and speakers.

Keep magnets away from devices and objects that could be damaged by strong magnetic fields.

Please keep a minimum distance of 250 mm (10") from the above mentioned objects.



##### **Flammability**

The drilling dust can easily ignite while processing the magnets. Processing the slider and the contained magnets is not permitted.



#### **Mechanical Handling**

Neodymium magnets are brittle, heat-sensitive and oxidize easily. If two magnets attract and collide, they can crack causing sharp splinters to be catapulted for several meters, which can lead to eye injuries. The magnet could also crack when drilling or sawing with improper tools. The arising heat may cause the magnet to demagnetize, which in turn will cause the magnet to disintegrate due to the damaged coating. Processing the sliders and the therein contained magnets is not permitted.



#### **Linear Motor Sliders**

The sliders consist of highly precise, thin-walled stainless steel tubes, which contain the magnets and are to be handled with extreme care. Prevent contact to other sliders or iron parts, since this can cause damage to the surface of the slider. Sliders with a damaged surface (scratches, deformation, etc.) should not be used, due to the fact that they can cause damage to the stator.



#### **Effects on People**


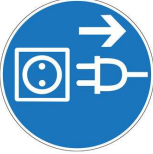




Based on current scientific knowledge, magnetic fields of permanent magnets do not have a measurable positive or negative effects on people. It is unlikely that permanent magnets constitute a health risk, but it cannot be entirely ruled out. For your own safety, avoid constant contact with magnets and store large magnets at least one meter away from your body.



#### **Temperature Resistance**

Keep sliders away from unshielded flames or heat.  
Temperatures above 120°C will cause demagnetization.

### 3.2 Warnings for Intended Use




 	<p><b>Fast moving Machine Parts</b> Our linear motor systems are high-dynamic machine elements. Necessary precautions must be taken to prevent contact with moving parts during operations. This can be done by installing covers, enclosures, light curtains, safety mats, etc.. Operations, without appropriate safety measures are forbidden. Operations may only be carried out by qualified personnel. During assembly the machine is to be turned off!</p>
	<p><b>Burn Hazards</b> The sliders of linear motors can reach temperatures of 80 °C during operations, which may cause burns upon contact.</p>
	<p><b>Bruises &amp; Sprains</b> Our linear motor systems can apply very high accelerations, high top speeds and forces over 1.000 N. Depending on the application and the duration of exposure appropriate protective devices must be used!</p>
	<p><b>Severing of Limbs</b> Our linear motor systems can apply very high accelerations, high top speeds and forces over 1.000 N. Depending on the application and the duration of exposure appropriate protective devices must be used!</p>
	<p><b>Risk Assessment &amp; Performance Level (PL) of Protective Measures</b> Since the risk depends on the type of machine, the assembly conditions and the implemented protective measures, a general specification to minimize risks during assembly cannot be given by us. We recommend the software assistant SISTEMA for risk assessment and evaluation of the PL according to DIN EN ISO 13849.</p>




## 4. Maintenance, Dismantling & Assembly

### 4.1 Maintenance of Linear Motors


The stators and sliders will be shipped with an initial lubrication and are ready for use.


	<p><b>Maintenance of Linear Motors</b></p> <ul style="list-style-type: none"> <li>- Under industrial conditions (assembling and mounting applications, 5 days, 8 h / day) a quarterly inspection and maintenance is sufficient.</li> <li>- The inspection and maintenance cycle must be reduced, if the motors <ul style="list-style-type: none"> <li>- run under 'dry' conditions (caused by heat influence or permanent overload conditions)</li> <li>- run under dust environments caused by production conditions</li> </ul> </li> <li>- Despite the use of PA01 wipers a regular inspection and maintenance of the linear motors is necessary, because the wipers are subject to natural wear.</li> </ul> <p>We are not able to specify a reduced inspection and maintenance interval for all applications. Application specific tests are necessary.</p>
	<p><b>Inspection of Linear Motors</b></p> <p>With inspections of linear motors the following points need to be checked:</p> <ul style="list-style-type: none"> <li>- Is the the slider coated in lubricant?</li> <li>- Is the lubricant not decomposed?</li> <li>- Is the slider free of scratches or dents and does it move easily</li> </ul> <p>A black 'Zebra'-pattern of lubricant is absolutely normal after short use.</p>
	<p><b>Lubrication of Linear Motors</b></p> <p>The lubrication improves the sliding characteristics between the steel surface of the slider and the polymer bearing of the stator. The lubricant prevents corrosion on the slider surface. Only the specified lubricant may be used. Before lubrication the slider and stator should be clean, as far as possible. Do not use harsh brushes, sandpaper, or similar things for cleaning. Cleaning solutions with solvent additives should not be used neither. To lubricate, dismantle die slider and carefully pull it out of the stator. Use small amounts of methylated spirit or alcohol and a soft tissue to gently clean the stator and slider. Coat the slider with a thin coat of fresh lubricant and gently put it back into the stator. Make sure to install the slider in the correct direction. If the slider cannot be dismantled, then cleaning and lubrication is to be done on the extruding ends of the slider.</p>


Lubricant for	Description & application
Linear motor stator / slider 	LU02-lubricant is deliverable in containers of <ul style="list-style-type: none"> <li>- 8 gramm item-No. 2550039</li> <li>- 45 gramm item-No. 2550007</li> <li>- 1.000 gramm item-No. 2550102</li> </ul> This lubricant corresponds to Klübersynth UH1 14-31 from Klüber GmbH, which is also suitable for the FDA food processing industry.

#### 4.2 Maintenance of linear guides

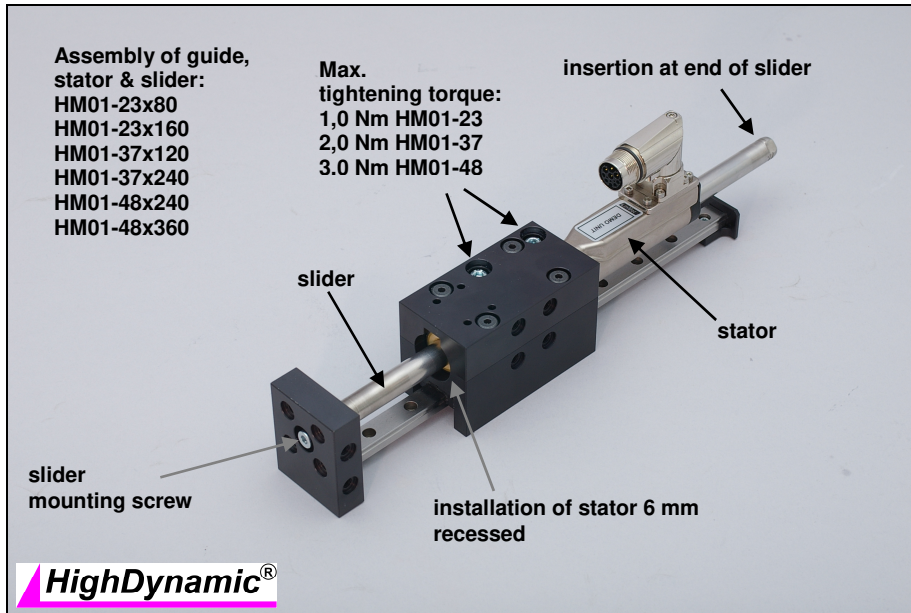
The linear guides will be shipped with an initial lubrication and are ready for use.

	<b>Maintenance of Linear Guides</b> <ul style="list-style-type: none"> <li>- Under industrial conditions (assembling and mounting applications, 5 days, 8 h / day) an inspection and maintenance cycle after an operational performance of 5.000 km or every 6 months is sufficient.</li> <li>- The inspection cycle must be reduced, if the linear guides run under dust environments caused by production conditions.</li> </ul> We are not able to specify a reduced inspection and maintenance intervall for all applications. Application specific tests are necessary.
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	<b>Lubrication of Linear Guides</b> Lubricant can be applied with grease nipples. Alternatively the old lubricant can be washed out with the help of methylated spirits or alcohol and then the new lubricant can be applied.
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Lubricant for	Description & application
Carriages 	for general applications THK lubricant AFB  for FDA applications Klübersynth UH1 14-151 from Klüber Lubrication GmbH

### 4.3 Dismantling & Assembly of Linear Motor Modules

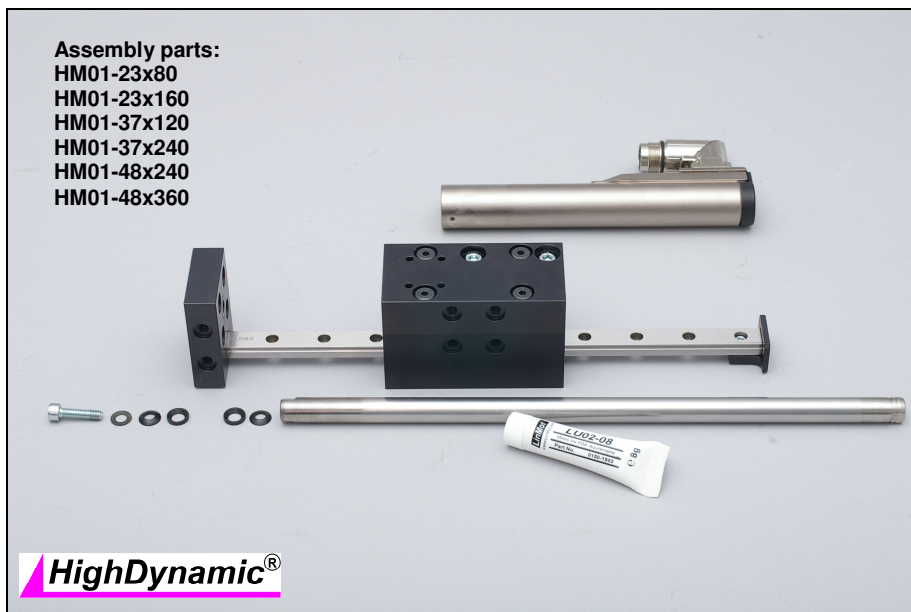


#### Max. friction forces

Attention!  
When friction forces are measured, positioning controllers generally need to be disconnected.  
The following values are max. values:  
 $F_r \leq 10 \text{ N}$  HM01-23  
 $F_r \leq 20 \text{ N}$  HM01-37  
 $F_r \leq 25 \text{ N}$  HM01-48

If the measured friction force is higher, then loosen the slider mounting screw and tighten it again to optimize friction force along the entire stroke.

If PA01-wipers are mounted on the motor stator, friction forces are much more higher than specified above. A large stick-slip-effect is measurable.



## 5. Declaration of Conformity & CE-Marking



The following declaration of conformity is generated by computer.  
We declare, that this declaration has legal validity.

## Declaration of Conformity & CE-Marking

According to **EC Machinery Directives** 2006/42/EG, appendix II 1. B.

We hereby declare, that the below listed partly completed machine is in accordance with safety and health requirements of the EC Machinery Directives 2006/42/EG.

Partly completed machine: HighDynamic® Linear Motor Modules HM01

Drawing number: 0390.000.0

The following EU guidelines are applied:

- Electromagnetic Compatibility Directive 2004/108/EG

We also declare, that the special technical documentation for this partly completed machine was created in accordance with the appendix VII B. Also we commit to sending it to market surveillance authorities on demand. Authorized representative for the compilation of the technical documentation is managing director Wilhelm Jung.

The operating of the partly completed machine is forbidden until it is installed into the complete machine and the machine is in accordance with the requirements of the EU guidelines. The declaration of conformity according to appendix II 1. A. must exist.

Wettenberg, December 01<sup>st</sup>, 2017



Wilhelm Jung

Managing Director

JUNG ANTRIEBSTECHNIK U.  
AUTOMATION GMBH