# Installation Guide Linear Motors with Drive

ENG

# PD03-37Sx120F-HP

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# 1 General information

## 1.1 Introduction

This manual includes instructions for the assembly, installation, maintenance, transport, and storage of linear motors with integrated drive. The document is intended for electricians, mechanics, service technicians, and warehouse staff.
Be sure to observe the general safety instructions as well as those in each chapter at all times.
Keep this manual accessible to the assigned staff.

## 1.2 Explanation of symbols

Triangular warning symbols warn against a danger.

Round command symbols tell what to do.

## 1.3 Qualified personnel

All work such as transport, installation, commissioning and service is only allowed to be carried out by qualified personnel. Qualified personnel in the sense of the safety instructions in this documentation are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and who have the appropriate qualifications.
This manual must be read carefully before transport, installation, commissioning, service and all safety-related information must be adhered to.

## 1.4 Liability

NTI AG (as manufacturer of LinMot linear motors and MagSpring products) excludes all liability for damages and expenses caused by incorrect use of the products. This also applies to false applications, which are caused by NTI AG's own data and notes, for example in the course of sales, support or application activities. It is the sole responsibility of the user to check the information and information provided by NTI AG regarding their safety-relevant correctness. In addition, the entire responsibility for safety-related product functionality lies exclusively with the user.Product warranties are void if products are used with stators, sliders, servo drives or cables not manufactured by NTI AG unless such use was specifically approved by NTI AG.
NTI AG’s warranty is limited to repair or replacement as stated in our standard warranty policy as described in our "terms and conditions" previously supplied to the purchaser of our equipment (please request copy of same if not otherwise available). Further reference is made to our general terms and conditions.

## 1.5 Copyright

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LinMot® is a registered trademark of NTI AG.

# 2 Safety instructions

**For your personal safety**
Disregarding the following safety measures can lead to severe injury to persons and damage to material:

- Only use the product as directed.
- Never commission the product in the event of visible damage.
- Never commission the product before assembly has been completed.
- Do not carry out any technical changes on the product.
- Only use the accessories approved for the product.
- Only use original spare parts from LinMot.
- Observe all regulations for the prevention of accidents, directives and laws applicable on site.
- Transport, installation, commissioning and maintenance work must only be carried out by qualified personnel.
  - Observe IEC 364 and CENELEC HD 384 or DIN VDE 0100 and IEC report 664 or DIN VDE 0110 and all national regulations for the prevention of accidents.
  - According to the basic safety information, qualified, skilled personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.
- Observe all specifications in this documentation.
  - This is the condition for safe and trouble−free operation and the achievement of the specified product features.
  - The procedural notes and circuit details described in this documentation are only proposals. It is up to the user to check whether they can be transferred to the particular applications. NTI AG / LinMot does not accept any liability for the suitability of the procedures and circuit proposals described.
- LinMot servo drives and the accessory components can include live and moving parts (depending on their type of protection) during operation. Surfaces can be hot.
  - Non−authorized removal of the required cover, inappropriate use, incorrect installation or operation create the risk of severe injury to persons or damage to material assets.
  - For more information, please see the documentation.
- High amounts of energy are produced in the drive. Therefore it is required to wear personal protective equipment (body protection, headgear, eye protection, hand guard).

**Application as directed**

- Drives are components which are designed for installation in electrical systems or machines. They are not to be used as domestic appliances, but only for industrial purposes according to EN 61000−3−2.
- When drives are installed into machines, commissioning (i.e. starting of the operation as directed) is prohibited until it is proven that the machine complies with the regulations of the EC Directive 98/37/EC (Machinery Directive); EN 60204 must be observed.
- Commissioning (i.e. starting of the operation as directed) is only allowed when there is compliance with the EMC Directive (2004/108/EC).
- The technical data and supply conditions can be obtained from the nameplate and the documentation. They must be strictly observed.

**Transport, storage**

- Please observe the notes on transport, storage, and appropriate handling.
- Observe the climatic conditions according to the technical data.

**Installation**

- The drives must be installed and cooled according to the instructions given in the corresponding documentation.
- The ambient air must not exceed degree of pollution 2 according to EN 61800−5−1.
- Ensure proper handling and avoid excessive mechanical stress. Do not bend any components and do not change any insulation distances during transport or handling. Do not touch any electronic components and contacts.
- Drives contain electrostatic sensitive devices which can easily be damaged by inappropriate handling. Do not damage or destroy any electrical components since this might endanger your health!

**Electrical connection**

- When working on live drives, observe the applicable national regulations for the prevention of accidents.
- The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross−sections, fuses, PE connection). Additional information can be obtained from the documentation.
- This product can cause high-frequency interferences in non-industrial environments which can require measures for interference suppression.

**Operation**

- If necessary, systems including drives must be equipped with additional monitoring and protection devices according to the valid safety regulations (e.g. law on technical equipment, regulations for the prevention of accidents). The drives can be adapted to your application. Please observe the corresponding information given in the documentation.
- After the drive has been disconnected from the supply voltage, all live components and power connections must not be touched immediately because capacitors can still be charged. Please observe the corresponding stickers on the drive. All protection covers and doors must be shut during operation.

**Caution - Risk of Electric Shock !**

- Before working on the PD03, make sure that no extremely high voltages are applied.
- The power terminal PWR+ remains live for at least 5 minutes after disconnecting from the power supplies.
- Before servicing, disconnect supply, wait 5 minutes and measure between PWR+ and PGND to be sure that the capacitors have discharged below 42VDC.

**Burn hazard**

- The heat sink of the drive can have an operating temperature of > 80 °C: Contact with the heat sink results in burns.
- The sliders of LinMot motors can reach temperatures of 80 °C, which may cause burns upon contact.

**Contusions**

Sliders contain neodynium magnets and have a strong attractive force.
Careless handling could cause fingers or skin to become pinched between two sliders.
This may lead to contusions, bruises, and bone fractures.
When handling sliders, wear thick protective gloves and keep a minimum distance between sliders. Refer to the "Minimum distance from slider" section for minimum distance.

To reduce the risk of injury, never more than one slider should be held or transported by the same person without packaging.

**Pacemaker / Implanted heart defibrillator**
Sliders could affect the functioning of pacemakers and implanted heart defibrillators. For the duration of a strong approach to a magnetic field, these devices switch into test mode and will not function properly.

- If you wear one of those devices keep the following minimum distances between the pacemaker / defibrillator and slider:
  - Min. 250 mm (10") for slider Ø 27 mm and 28 mm (PL01-27 / 28 / PL1028)
  - Min. 150 mm (6") for slider Ø 19 mm and 20 mm (PL01-19 / 20)
  - Min. 100 mm (4") for slider Ø 12 mm (PL01-12)
- Inform others who wear these devices to comply with these minimum distances!

**Fast-moving machine parts**
The sliders of LinMot linear motors are fast-moving machine parts. All necessary precautions must be taken to prevent access during operation (provide covers, guards, etc.).

**Automatic restart**
The motors can start automatically under certain cricumstances!
If necessary, a corresponding warning symbol must be provided and protection against entering the hazardous area or a suitable safe electronic disconnection must be provided!

**Risk of injury due to a defect or fault**
For areas where a defect or fault can result in substantial property damage or even serious personal injury, additional external precautions must be taken or devices must be installed to ensure safe operation even if a defect or fault occurs (eg. suitable safe electronic disconnection, mechanical interlocks, barriers, etc.).

**Magnetic field**
Magnets integrated in the sliders produce a strong magnetic field. They could damage TVs, 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.
- For the above mentioned objects, keep a minimum distance as described in the "Pacemaker / implanted defibrillator" section.
- For non-anti-magnetic watches, keep the double minimum distance.

**Combustibility**
When machining magnets, the drilling dust could easily ignite.
Machining the sliders and the magnets they contain is not permitted.

**Grounding**
All metal parts that are exposed to contact during any user operation or servicing and likely to become energized shall be reliably connected to the means for grounding.

**Mechanical handling**
Neodymium magnets are brittle and heat-sensitive.
Machining the sliders and the magnets they contain is not permitted.

- Colliding magnets could crack. Sharp splinters could be catapulted for several meters and cause eye injury.
- By machining the sliders, heat would result which demagnetises the magnets.

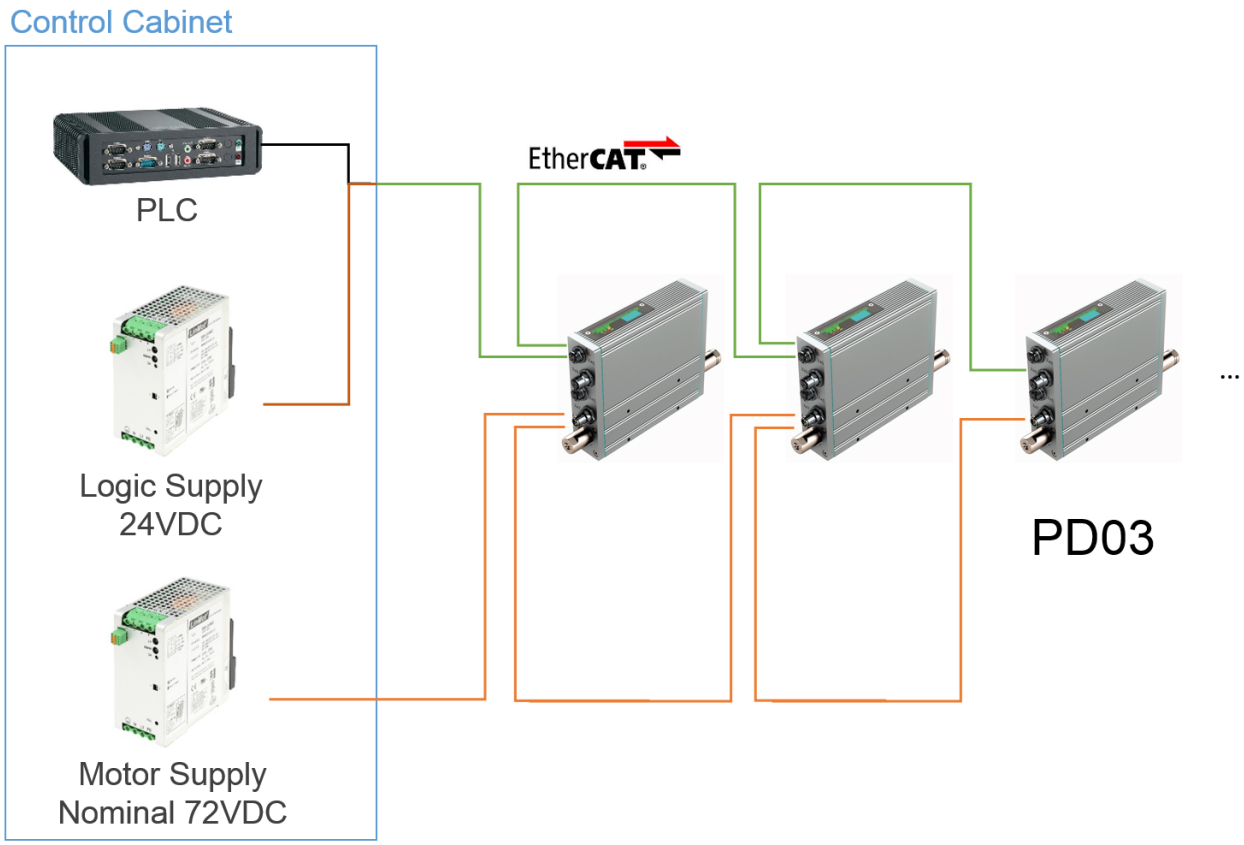
**Slider**
Linear motor sliders consist of a high-precision, thin-walled stainless steel tube in which the neodymium magnets are housed. The LinMot sliders should be handled with care.
Avoid contact with other sliders or iron parts as this can damage the magnets and the slider surface. Do not grip the sliders with pliers, as this can also damage the surface. Do not use sliders which are already damaged on the surface (scratches, deformation, etc.). This can cause further damage to the stator.

**Effects on people**
According to the current level of knowledge, magnetic fields of permanent magnets do not have a measurable positive or negative effect on people. It is unlikely that permanent magnets constitute a health risk, but it cannot be ruled out entirely.

- For your own safety, avoid constant contact with magnets.
- Store large magnets at least one meter away from your body.

**Temperature resistance**
Keep slider away from unshielded flame or heat.
Temperature above 120°C will cause demagnetization.

# 3 System Overview




Typical PSD03 Drive System: PLC, Drive System and power supply.

Not compliant with Power-over-Ethernet (PoE) standard.

The number of devices for "daisy chain" depends on the current load of the individual linear motors and the connectors / cables.

# 4 Functionality

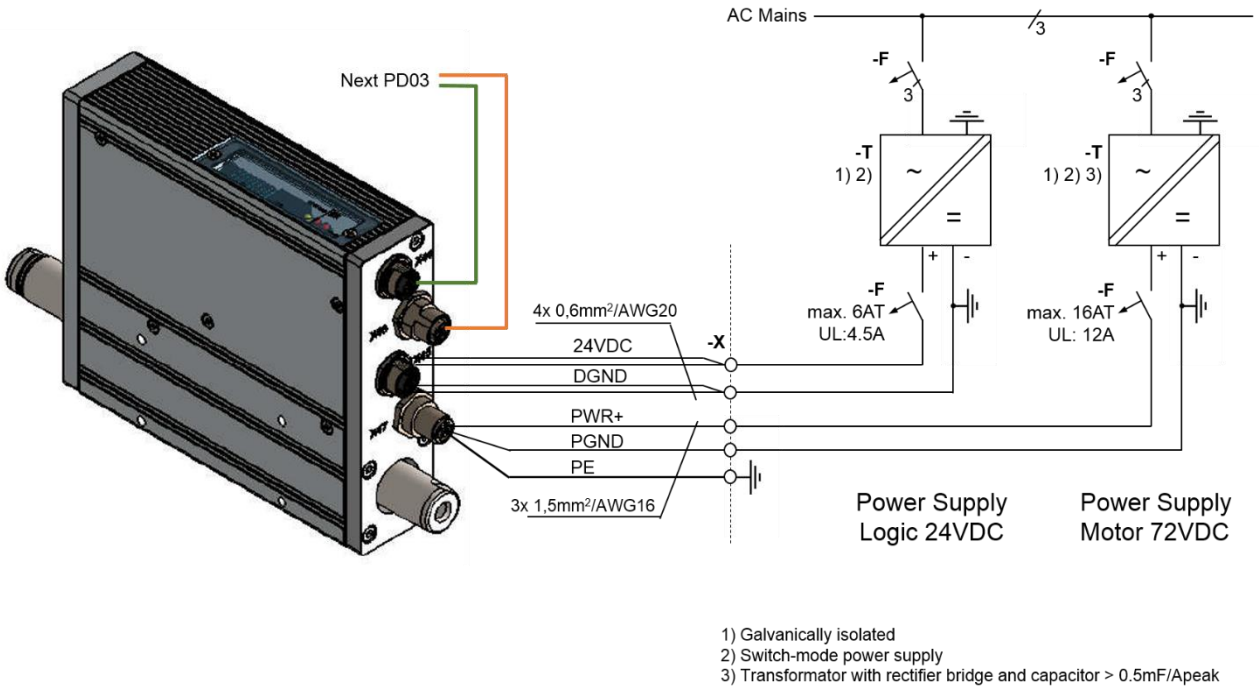
| | PSD03-37Sx120F-HP-I1150… | | |
|---|---|---|---|
| | …-EC-XC-0S-000 | …-DS-XC-0S-000 | …-SE-XC-0S-000 |
| **Supply Voltage** | | | |
| Motor Supply 72VDC (24...85 VDC) | ● | ● | ● |
| Logic Supply 24VDC (22...26 VDC) | ● | ● | ● |
| **Motorphasenstrom** | | | |
| 15A peak (0-599Hz) | ● | ● | ● |
| **Command Interface** | | | |
| ETHERCAT LinMot Profile | ● | | |
| ETHERCAT CiA402 | | ● | |
| ETHERCAT SoE | | | ● |
| **Programmable Motion Profiles (Curves)** | | | |
| Up to 50 Motion Profiles, up to 8110 Curve Points | ● | ● | ● |
| **Programmable Command Table** | | | |
| Command Table with up to 255 entries | ● | ● | ● |
| **Configuration** | | | |
| RS232 Configuration | ● | ● | ● |

# 5 Electrical installation

## 5.1 Software / Configuration

The configuration software LinMot-Talk is free and can be downloaded from the LinMot homepage. You can find the software in the section download / linmot-talk-drive-configuration / linmot-talk-6 / or under http://www.linmot.com/de/download/linmot-talk-drive-konfiguration/linmot-talk-6/

## 5.2 Power Supply and Grounding



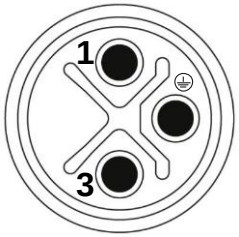
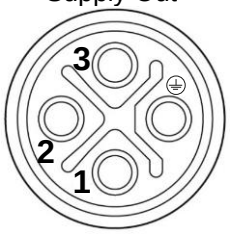

1) Galvanically isolated
2) Switch-mode power supply
3) Transformator with rectifier bridge and capacitor > 0.5mF/Apeak

**Power supply connectors must not be connected or disconnected while DC voltage is present.**
Do not disconnect system components until all PD03 LEDs have turned off. (Capacitors in the power supply may not fully discharge for several minutes after input voltage has been disconnected). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or drives.

**Do not switch Power Supply DC Voltage.**
All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supply. Failure to observe these precautions may result in severe damage to the drive.

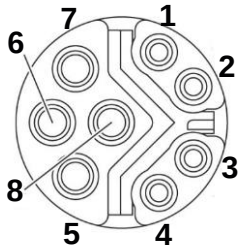
## 5.3 Connector Configuration / Interfaces

### 5.3.1 X47 / 48

| | Motor Supply | |
|---|---|---|
| X47<br>Supply In<br>  <br><br>M12 (m)<br>S-coded | 1<br>3<br>PE | PGND<br>PWR+<br>PE |
| X48<br>Supply Out[1]<br>  <br><br>M12 (f)<br>S-coded | 1<br>2<br>3<br>PE | PGND<br>Not connected<br>PWR+<br>PE |

Motor Supply: 72VDC nominal, 24...85VDC
Absolute max. Rating: 72VDC +20%.
External Fuse: 16AT (16A slow blow) / min. 100VDC
If motor supply voltage exceeds 90VDC, the drive will go into error state.

### 5.3.2 X45 / 46

| | Logic Supply / IO Connection | | |
|---|---|---|---|
| X45 In<br>X46 Out[1]<br>  <br><br>M12 (f)<br>Y-coded | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8 | TD+<br>TD-<br>RD+<br>RD-<br>+24VDC Supply<br>GND Supply<br>+24VDC Supply<br>GND Supply | Transmission Data +<br>Transmission Data -<br>Receiver Data +<br>Receiver Data -<br>Logic Supply 22-26 VDC<br>Ground<br>Logic Supply 22-26 VDC<br>Ground |

Supply 24V / typ. 150 mA
Fieldbus Pin 1-4:
Only use Ethernet cables of category 5 (or higher) for the connection of fieldbus devices.
The permissible power length between two EtherCAT devices must not exceed 100 m.
Pre-assembled cables from third-party manufacturers are recommended for connecting devices.

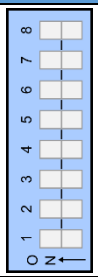
[1] As delivered with blind cap M12

### 5.3.3 X19

| | System | |
|---|---|---|
| RJ-45 | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>Case | (Do not connect)<br>(Do not connect)<br>RS232 Rx<br>GND<br>GND<br>RS232 Tx<br>(Do not connect)<br>(Do not connect)<br>Shield |

Use isolated USB-RS232 converter (Art.-No. 0150-2473) for configuration over RS232.

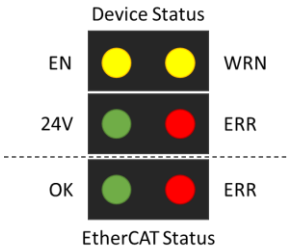
### 5.3.4 S1 - S2

| | Address Selectors (Feldbus) | |
|---|---|---|
|  | S1 (5..8)<br><br>S2 (1..4) | Bus ID High (0 … F). Bit 5 is the LSB, Bit 8 the MSB.<br><br>Bus ID Low (0 … F). Bit 1 is the LSB, Bit 4 the MSB. |

### 5.3.5 S5

| | Bootstrap | |
|---|---|---|
| | S5 | Bootstrap (Internal use only) |

### 5.3.6 LEDs

| | State Displays | | |
|---|---|---|---|
|  | 24V<br>EN<br>WRN<br>ERR<br><br>OK<br>ERR | Green<br>Yellow<br>Yellow<br>Red<br><br>Green<br>Red | 24V Logic Supply OK<br>Motor Enabled / Error Code (Low Nibble)<br>Warning / Error Code (High Nibble)<br>Error<br><br>Feldbus OK<br>Feldbus Error |

## 5.4 Blink codes

| LED Blink Codes | | | |
|---|---|---|---|
| Error 24VOK<br>Warn EN | | | |
| **Error** | **Warn** | **EN** | **Beschreibung** |
| Off | Warning | Operation enabled | **Normal Operation:**<br>Warnings and operation enabled are displayed. |
| On | ● ~2Hz<br>0..15 x<br>Fehler Code<br>High Nibble | ● ~2Hz<br>0..15 x<br>Fehler Code<br>Low Nibble | **Error:**<br>The error code is shown by a blink code with “WARN” and “EN”<br>The error byte is divided into low and high nibble (= 4 bit).<br>”WARN” and “EN” are blinking together.<br>The error can be acknowledged.<br>(e.g.: WARN blinks 3x, EN blinks 2x; Error Code = 32h) |
| ● ~2Hz | ● ~2Hz<br>0..15 x<br>Fehler Code<br>High Nibble | ● ~2Hz<br>0..15 x<br>Fehler Code<br>Low Nibble | **Fatal Error:**<br>The error code is shown by a blink code with “WARN” and “EN”.<br>The error byte is divided into low and high nibble.<br>”WARN” and “EN” are blinking together.<br>Fatal errors can only be acknowledged by a reset or power cycle.<br>(e.g.: WARN blinks 3x, EN blinks 2x; Error Code = 32h) |
| ● ~4Hz | ● ~2Hz<br>0..15 x<br>Fehler Code<br>High Nibble | ● ~2Hz<br>0..15 x<br>Fehler Code<br>Low Nibble | **System Error:**<br>Please reinstall firmware or contact support. |
| ● ~0.5Hz | ● ~0.5Hz | On | **Signal Supply 24V too low:**<br>The error and warn LEDs blink alternating if the signal supply +24V (X4.2) is less than 18VDC. |
| Off | M●●● | ●M●● | **Plug&Play Communication Active:**<br>This sequence (Warn on, then En on, then both off, complete sequence of the 4 states ca. 1 sec) signalizes the state when the plug and play parameters are being read from the motor. |
| M●<br>~4Hz | ●M<br>~4Hz | Off | **Waiting for Defaulting Parameters:**<br>When ID (S1, S2) is set to 0xFF, the drive starts up in a special mode and the „ERROR“ and „WARN“ LED blink alternating ~4Hz. When the ID ist set to 0x00, all parameters will be set to their default value. To leave this state, power down the drive and change the ID. Also see in the Usermanual_LinMot-Talk under chapter trouble shooting. |
| Off | M●<br>~2Hz | M●<br>~2Hz | **Defaulting Parameters Done:**<br>When the parameters have set to their default values (initiated via S1/S2 on power up) the „WARN“ and „EN“ LEDs blink together at 2 Hz. To leave this state, power down the drive. Also see in the Usermanual_LinMot-Talk under chapter trouble shooting. |
| Off | Off | Off | **Bootstrap**<br>The drive is in bootstrap mode if the two fieldbus LEDs are also switched off.<br>Set switch S5 to OFF. |

A description of the error codes can be found in the "Manual 0185-1093 MotionCtrlSW SG5-SG7" and in the user manual of the installed interface software. These documents are available together with the LinMot-Talk configuration software or can be obtained from the homepage www.linmot.com if required.

# 6 Power Supply Requirements

### 6.1.1 Motor Power Supply

The calculation of the needed power for the Motor supply is depending on the application and the used motor. The nominal supply voltage is 72VDC. The possible range is from 24 to 85VDC.

The motor supply can rise up to 95 VDC when braking. This means that everything connected to that power supply needs a voltage rating of 100 VDC. (Additional capacitors, etc...).
**Due to high braking voltage and sudden load variations of linear motor applications, only compatible power supplies can be used (see chapter « Ordering Information »).**

### 6.1.2 Logic Supply

The logic supply needs a regulated power supply of a nominal voltage of 24 VDC. The voltage must be between 22 and 26 VDC.

Current consumption:

- min. 0.15A

# 7 Installation instructions

## 7.1 Operating conditions

Maximum ambient temperature limits:
- 0 °C…35 °C

The maximum sensor temperature is:
- 90 °C (Motor)
- 80 °C (Drive)

The max. housing temperature is:
- 75 °C

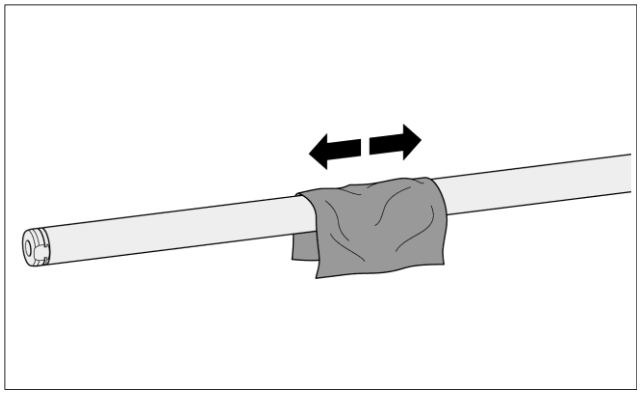
IP Code:
- IP 64[1)] (higher on request)

Relative humidity: Max. 95 % (non-condensing!)

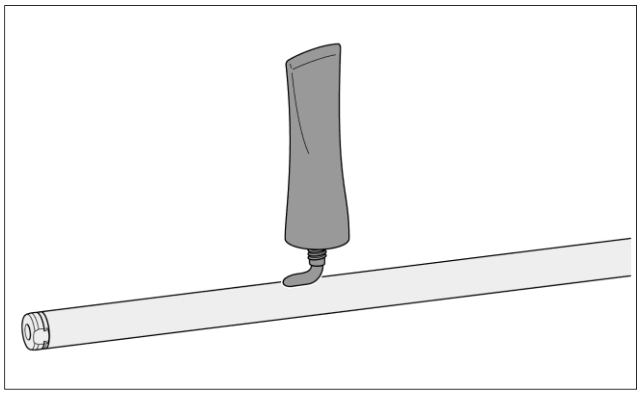
[1)] When plugged in (connector or blind caps) and mounted window (incl. seal).

## 7.2 Mounting instructions linear motor

Please attend to the safety instructions in chapter 2 during the assembling!

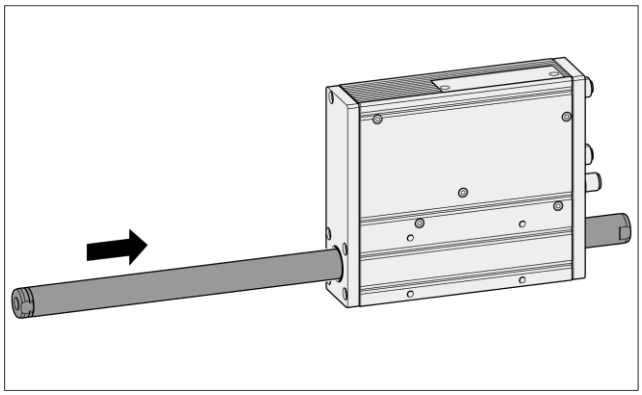


1. **Clean the slider with a paper towel.**



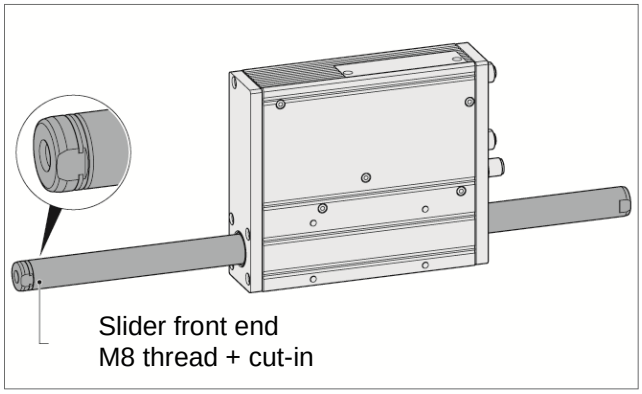
2. **Lubrication of the slider**
Sliders with a length ≤ 500 mm are inserted without lubrication.
Sliders with a length > 500 mm are lubricated with a grease amount of 4 g (0.14 oz) per meter, which is is about ½ of a hazel-nut.

**Important!** For maintenance purposes, please follow the instructions in section "Maintenance".



3. **Insert the slider in the defined direction (see Assembly step 4.).**

**Attention!** The slider is magnetically attracted.




4. **Checking the installed direction of slider**
After the installation, the front end of the slider with M 8 thread and cut-in is located at the opposite side of the stator from the cable exit.

## 7.3 Mounting the stator

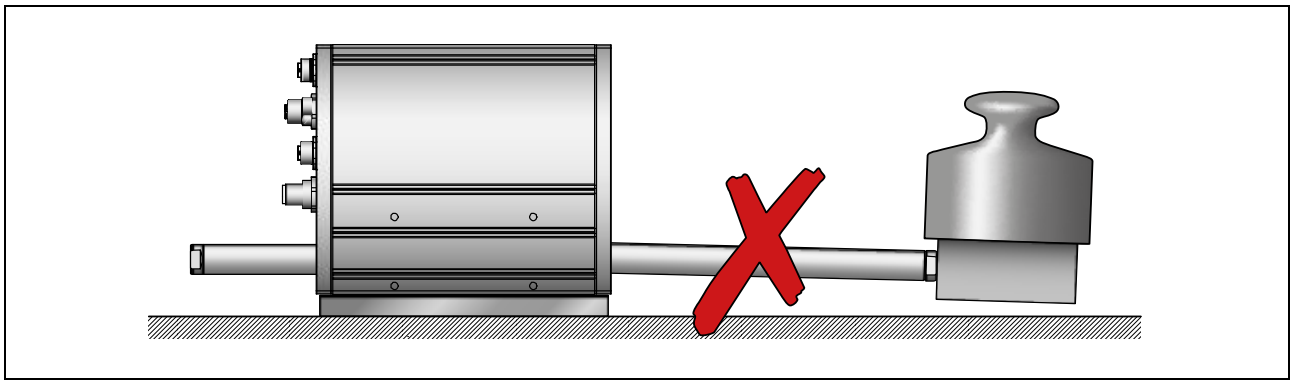
Four M5 x 8 threaded holes are provided on the stator housing. These are located on the underside and on both sides. The threaded holes are used to fasten the stator. The mounting position of the stator can therefore be vertical or horizontal. The distances of the individual holes can be found in the section "Dimensions / Stator".

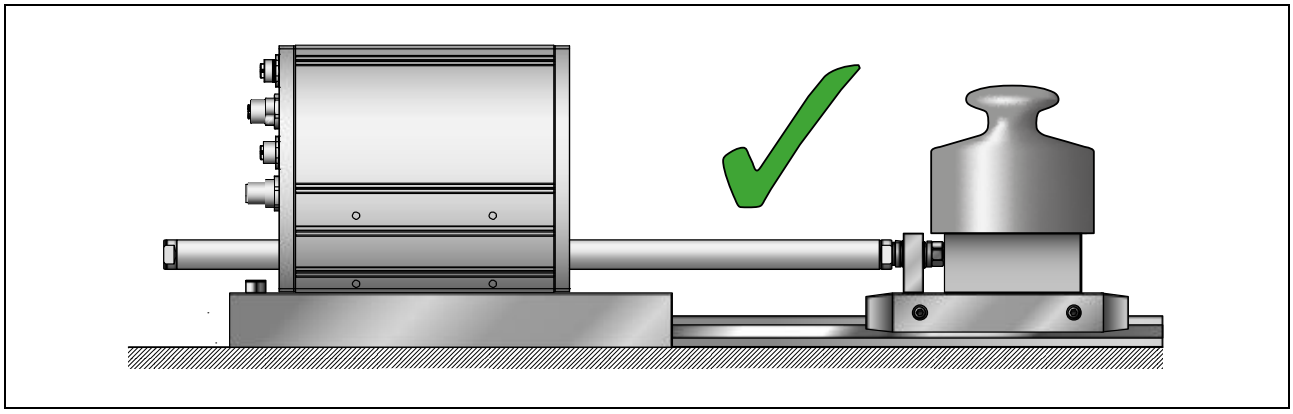
Do not exceed max. torque of **5.5 Nm**.

## 7.4 Mounting the payload to the slider

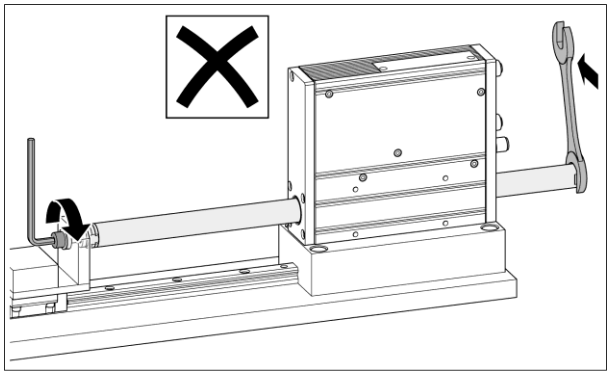
The load is mounted as a fixed bearing using spherical washers and conical seats, see section „Slider mounting kits“

- To avoid shear force on slider and wear on stator, the payload has to be beared by a linear guide.

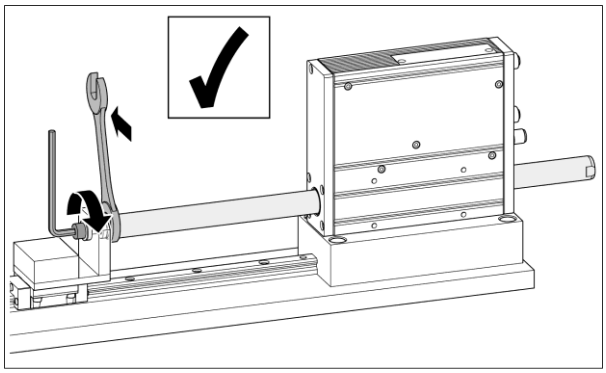




When attaching the load, the wrench for tightening the load must be used only on the loadfacing side of the slider. Avoid torsional stress on slider (note the following figures).



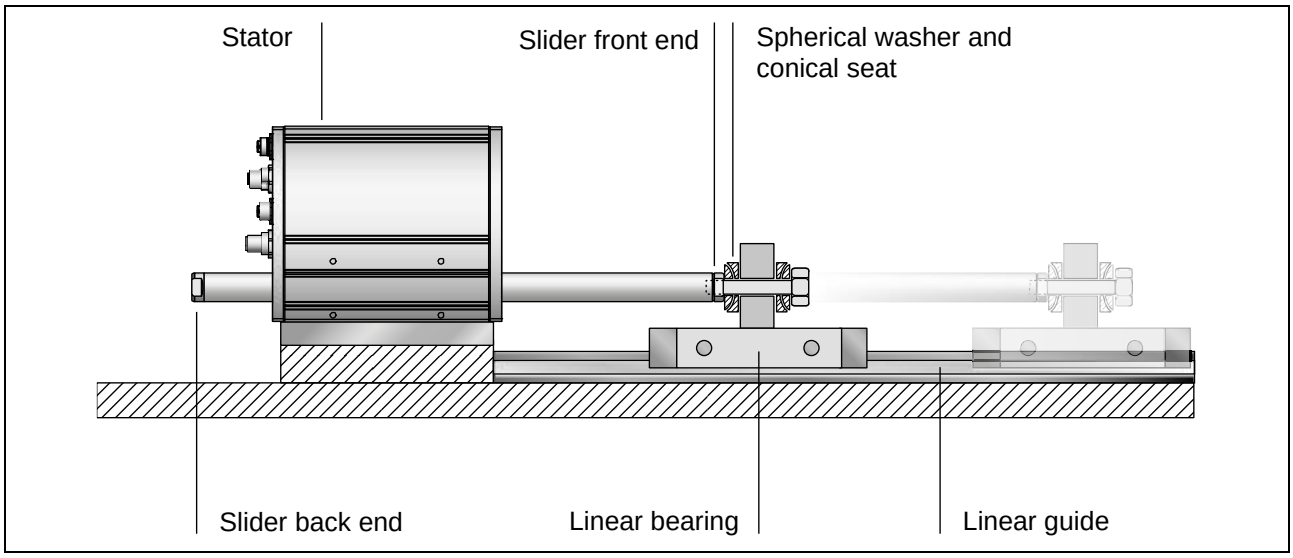
**Incorrect attachment**
Torsional stress on slider!



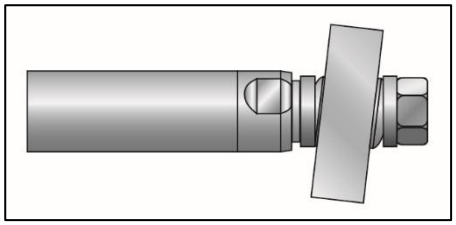
**Correct attachment**

| Slider | Thread | Max. torque for screw |
|---|---|---|
| 20 mm | M 8 | 25 Nm |

## 7.5 "Moving slider" installation

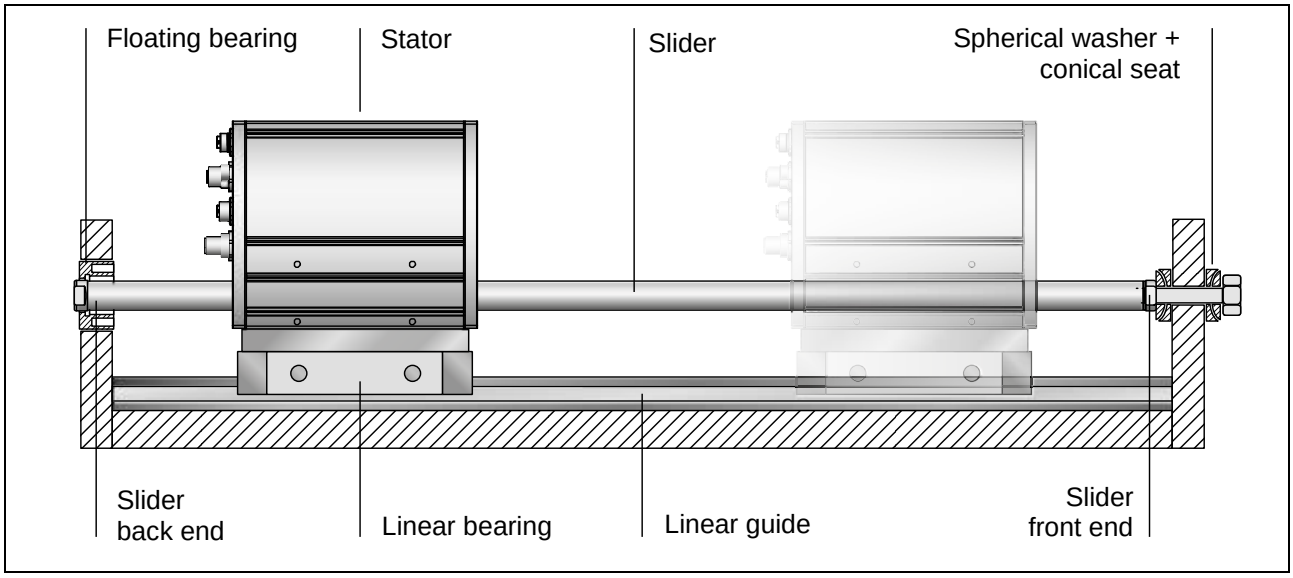



In a "moving slider" installation, the stator is fixed and the slider is the moving part. The load, borne by a linear guide, is attached directly to the end of the slider. In order to compensate for misalignment, spherical axial bearings consisting of spherical washers and conical seats (see the section Slider mounting kits) are used to connect to the load. The mounting kit of slider and an oversized hole for the screw make it possible to adjust a radial and angle offset.



Mounted payload with radial and angle offset.

## 7.6 "Moving stator" installation




In "moving stator" applications, the slider is fixed and the stator is the moving part. The load is attached to the stator, which is mounted on a linear guide. In order to avoid an overconstrained bearing mount and compensate for alignment errors, the slider may be mounted on one end in a fixed bearing with a spherical axial bearing. On the opposite end, the slider is mounted in a floating bearing. Mounting kits are available for mounting the slider (see the section Slider mounting kits).

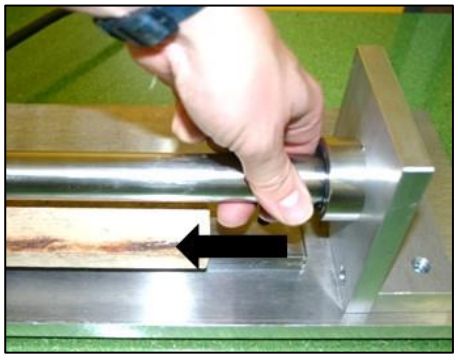
### 7.6.1 Assembling instruction

Please attend to the safety instructions in chapter 2 during the assembling!

If moving stator application is used, the minimum bending radius of the cable should be adhered to. Observe the manufacturer's instructions.

1. **Mount stator to its support bearing.**

2. **Insert slider into stator.**



3. **Placing a spacer**
   Put a spacer (wood, plasic, aluminium with thickness 15 mm) between slider and linear guide. The spacer prevents injuries to the hands and damage to the slider surface!

4. **Installing the slider using the fixed bearing**
   The fixed bearing is screwed to the front end of the slider. **Important!** Do not tighten the screw yet!

**5. Mount floating bearing**

**Important!**
Do not tighten the screw!
The slider is allowed to extend into the floating bearing no more than 15 mm!

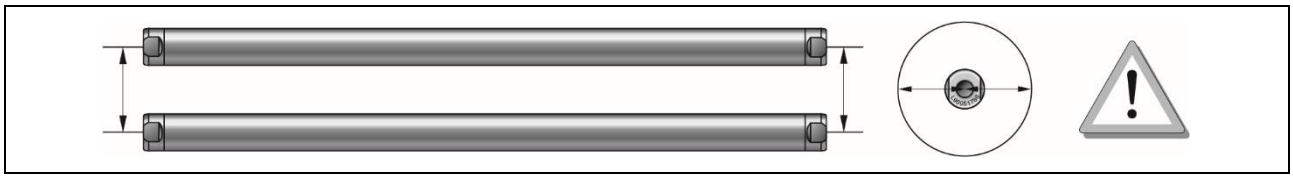
**6. Move stator (back end) to the fixed end of slider, center slider in stator and tighten the screw.**

**7. Move stator (front side) to the floating bearing and tighten screws.**

After the installation of the slider a safety label must be placed close to the slider.

## 7.7 Minimum distance from slider

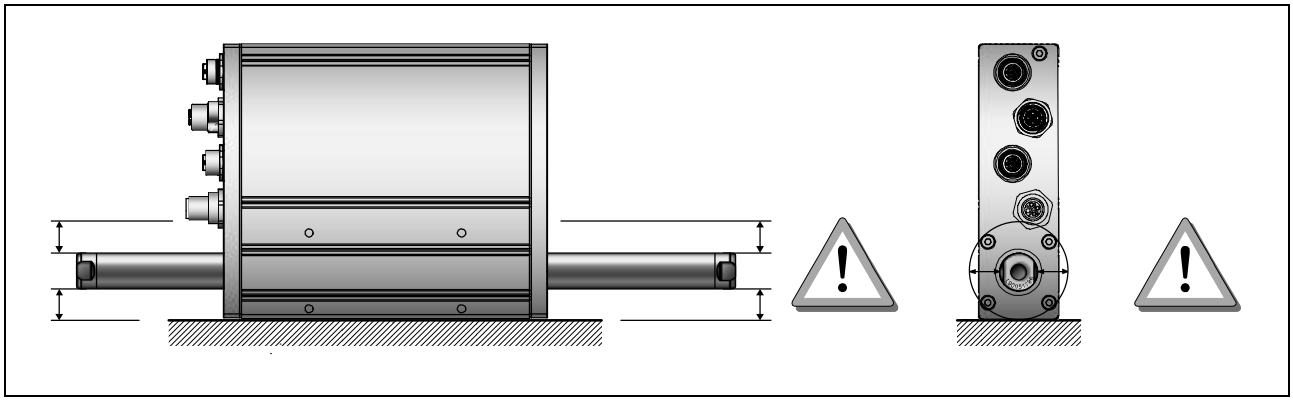
### 7.7.1 Minimum distance from slider to slider



The sliders are made of neodymium magnets and have a strong magnetic attraction. It must be kept a minimum distance between the sliders. This minimized the risk of bruising and secondly, the sliders do not influence each other through their magnetic fields.

| Type of slider | PL01-12 | PL01-20 / PL01-19 | PL01-28 / PL01-27 | PL10-28 |
|---|---|---|---|---|
| PL01-20 / PL01-19 | 50 mm | 50 mm | 80 mm | 70 mm |
| *The data are measured from slider center to slider center.* | | | | |

### 7.7.2 Minimum distance from slider to metallic parts

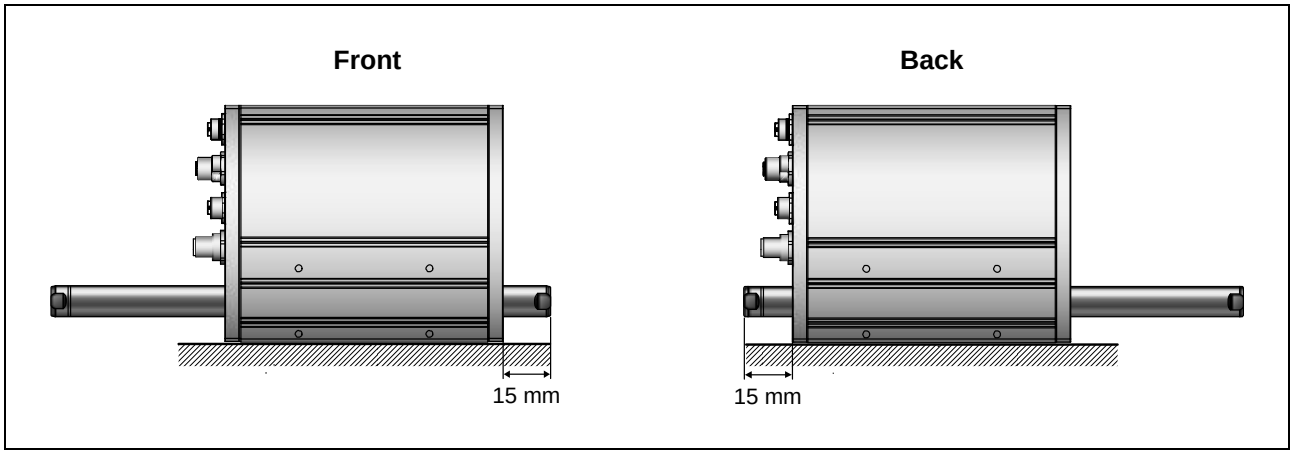


When installing linear motors in modules with metal parts near the slider, undesired forces can arise due to magnetic attraction or eddy currents. These generally manifest as erratic and jerky positioning, or reduced dynamics of the linear motor. In order to avoid this, minimum distances between the slider and any metal parts are to be observed whenever metal materials are used nearby.

| Linear Motor | Minimum distance from slider surface to ferromagnetic parts (iron, steel, etc.) | Minimum distance from slider surface to non-ferromagnetic metallic parts (aluminum, bronze, stainless steel, etc.) |
|---|---|---|
| PD03-37x… | 15 mm | 7 mm |

## 7.8 Referencing / Maximum stroke

Due to the mounted scraper, the rotor must not be driven into the stator. The minimum positions shown below must be observed.




The housing end plates can be used as a stop for referencing.

- The reference run shall not exceed the speed of 10 mm/s.
- The stop on the end plates should be flat and blunt. Surface damage must be avoided at all costs.

# 8 Ordering information

## 8.1 Stator

| Item | Description | Item-No. |
|---|---|---|
| PSD03-37Sx120F-HP-I1150-EC-XC-0S-000 | Stator with EtherCAT Drive (72V/15A) | 0150-2806 |
| PSD03-37Sx120F-HP-I1150-DS-XC-0S-000 | Stator with EtherCAT CoE Drive (72V/15A) | 0150-2807 |
| PSD03-37Sx120F-HP-I1150-SE-XC-0S-000 | Stator with EtherCAT SoE Drive (72V/15A) | 0150-2808 |

**Spare parts Stator**

| Item | Description | Item-No. |
|---|---|---|
| PROT-M12 | Cover cap for connector M12 | 0160-0283 |
| PSD03k-F37 | Transparent viewing panel | 0160-0348 |
| PSD03k-DF37 | Flat seal for viewing panel PSD03 | 0160-0347 |
| Countersunk screws with cross recess | M3x6 | 0230-0367 |

## 8.2 Slider

The rotors are not included in the stator and must be ordered separately.
The matching sliders

- PL01-20 HP
- PL01-20 HP Lochläufer
- PL02-20 HP Heavy Duty

can be found in the technical data sheet of the stator on the LinMot e-catalogue http://shop.linmot.com/ .

## 8.3 M12 round plug connector for external cabling

The round plug connectors are not included in the stator and must be ordered separately.
As a supplier of pre-assembled cable solutions, we recommend for example :
Phoenix Contact AG, Murrelektronik AG etc.

| Description | Contact type | Number of poles | Type of construction |
|---|---|---|---|
| X45 (In), X46 (Out) | Connector (male) | 8 (4 + 4) | M12 Y-coded |
| X47 (In) | Socket (female) | 2 + PE<br>3 + PE [1)] | M12 S-coded |
| X48 (Out) | Connector (male) | 2 + PE<br>3 + PE [1)] | M12 S-coded |

[1)] Pin 2 not connected and used. Three-core connection cables are recommended.

## 8.4 Wiper

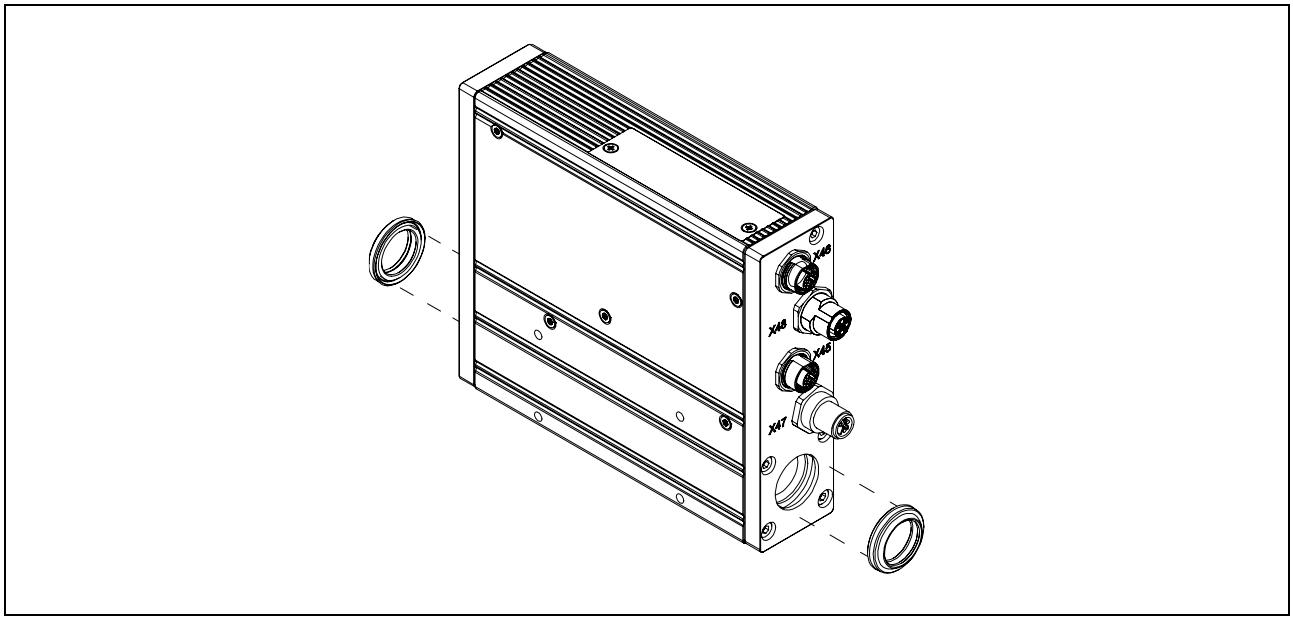
The stators are equipped as standard with wipers. This simplifies maintenance and the maintenance cycles can be extended. The wiper effects that the lubricant is dispensed metered and does not leak outside of the stator. The lubricant is less dirty.

**Ordering information**

| Item | Description | Item-No. |
|---|---|---|
| PAW01-20 | Wiper for PL01-20 | 0150-3112 |

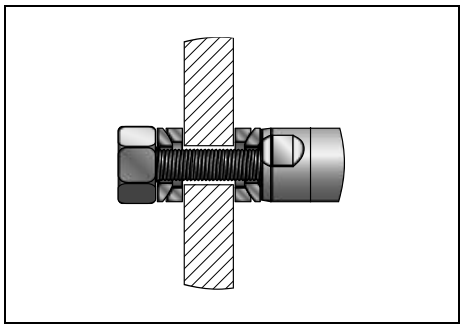
### 8.4.1 Mounting the wiper

The wipers are inserted into the groove at both ends of the stator bore. First clean and lubricate the stator bore and the slider as described in section "Maintenance".

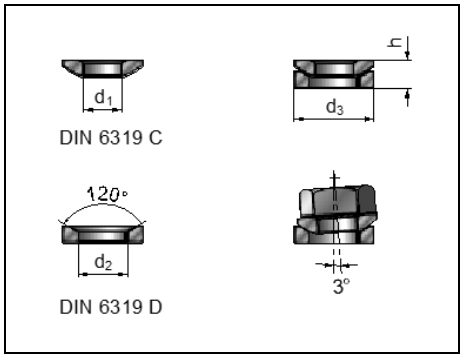


## 8.5 Slider mounting kits

### 8.5.1 Fixed bearing



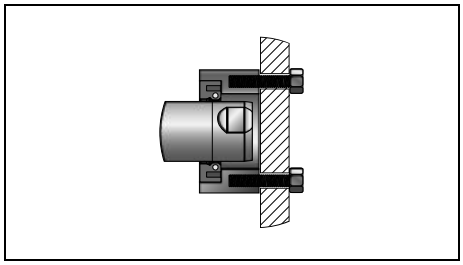
Slider mounting kit consists of a spring washer, a pair of spherical washers, and a pair of conical seats. It allows the slider to be fixed in the direction of motion. It also helps to compensate for radial and angle offset.



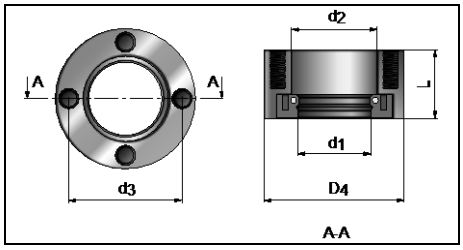

**Material**
Spherical washer / conical seat: case hardened steel

| Item | Item-No. | Slider | Thread | d1 | d2 | d3 | h |
|---|---|---|---|---|---|---|---|
| PLF01-20 | 0150-3083 | 20mm | M8 | 8.4mm (0.33in) | 9.6mm (0.38in) | 17mm (0.67in) | 5.5mm (0.22in) |

### 8.5.2 Floating bearing



Floating bearing assembly that permits radial adjustment of slider position and permits a small amount of radial and axial movement.




**Material**

| | |
|---|---|
| Housing: | Stainless steel 1.4305 |
| Bearing: | Nitrile butadiene rubber |
| | Spring steel DIN17223 |

| Item | Item-No. | Slider | Thread | d1 | d2 | d3 | D4 | L |
|---|---|---|---|---|---|---|---|---|
| PLL01-20 | 0150-3084 | 20mm | M5 | 20mm (0.79in) | 23mm (0.90in) | 30mm (1.18in) | 37mm (1.46in) | 20mm (0.79in) |

### 8.5.3 Complete mounting kit

This kit provides one set of mounting parts for each end of the slider.

**Ordering information**

| Item | Description | Item-No. |
|---|---|---|
| PLM01-20-MK | Mounting kit for PL01-20 slider composed of:<br>1 Fixed End Washer Set (0150-3083)<br>1 Floating support (0150-3084)<br>1 Socket hd. cap screw* DIN 912 / M8, L=35 mm<br>4 Socket hd. cap screw* DIN 912 / M5, L=20 mm | 0150-3079 |
| ** For use with 12 mm (1/2 in) thick mounting plates.* | | |

## 8.6 Power Supplies

The technical data for the switching power supplies offered can be found in the LinMot eCatalogue Servo Drives Accessories / Power Supplies http://shop.linmot.com/D/servo-drives-zubeh%c3%b6r/netzteile.htm

**Ordering information**

| Item | Description | Item-No. |
|---|---|---|
| S01-24/500 | Schaltnetzteil 24V/500W, 1x120/230VAC | 0150-2480 |
| S01-72/500 | Schaltnetzteil 72V/500W | 0150-1874 |
| S01-72/1000 | Schaltnetzteil 72V/1000W | 0150-1872 |

## 8.7 Transformer Supplies

The technical data sheet for the offered transformers can be found in the LinMot eCatalogue under Servo Drives Accessories / Power supplies http://shop.linmot.com/D/servo-drives-zubeh%c3%b6r/netzteile.htm

**Ordering information**

| Item | Description | Item-No. |
|---|---|---|
| T01-72/420-Multi | Transformator Supply 3x230/400/480 VAC, 50/60Hz, 420VA | 0150-1869 |
| T01-72/420-1ph | Transformator Supply 1x208/220/230/240VAC, 50/60Hz, 420VA | 0150-1859 |
| T01-72/900-Multi | Transformator Supply 3x230/400/480 VAC, 50/60Hz, 900VA | 0150-1870 |
| T01-72/1500-Multi | Transformator Supply 3x230/400/480 VAC, 50/60Hz, 1500VA | 0150-1871 |

## 8.8 USB-Converter

Since the RS232 interface of many PCs and laptops is not galvanically isolated and a large number of commercially available USB-RS232 converters do not offer this, LinMot offers a suitable galvanically isolated USB-RS232 converter in its product range.

It is highly recommended to use an isolated USB RS232 converter for configuration!

**Ordering information**

| Item | Description | Item-No. |
|---|---|---|
| USB-RS232 Converter (isolated) | for Drives C1100, C1200, C1400, E1200, E1400, MB8050 Drives, I1100 (PD03) | 0150-2473 |

# 9 Maintenance and testing instructions

The stators will be shipped with an initial lubrication. Maintenance will only be required if the motors run 'dry' or there is a heavy pollution of the motors.Under normal industrial conditions (5 day, 8 h / day) one inspection every 3 months is adequate. The inspection cycle must be shortened if severe motor loads or deviating conditions exist. These conditions are for example:

- Permanent fouling
- Direct sunshine
- Low Humidity
- Outdoor operation
- Increased operating temperature

### 9.1.1 Mounting

Sliders with a length ≤ 500 mm (20 in) are to be inserted in a clean contition in the stator. Sliders with a length > 500 mm (20 in) must be lubricated with LU02. 4 g of lubricant per meter slider is enough to create a film of lubricant on the surface of the sliders. 4 g (0.14 oz) is about ½ of a hazel-nut. The grease can be applied by hand or with a soft paper towel. If wipers are used then the inner side of the seals of the wipers must be lubricated as well.

Basically, it must be ensured that only a thin film of grease is applied. 4 g of grease per 1000 mm of slider length is sufficient for this purpose. Over lubrication leads to a gumming of the grease, which appears particularly at higher operating temperatures! In this case, a complete cleaning of the motor has to be made.

### 9.1.2 Inspection

Inspections must be carried out depending on the ambient conditions and the load on the motors.
When inspecting the motors, the following points must be checked:

a) Is a film of lubricant on the slider? If not -> Lubrication
b) Are the wipers without visible wear? If not -> Replace wipers
c) Is the lubricant homogeneous and not decomposed? If not -> Cleaning (stator, slider) + Lubrication
d) Can the slider be moved easily? If not -> Cleaning (stator, slider) + Lubrication

### 9.1.3 Cleaning

- Pull the sliders carefully out of the stator.
  **Attention!** Strong magnetic attraction forces (note safety instructions on page 5)!
  Use non magnetic material (e.g. wood) to cover close-by iron constructions.
- Clean slider and stator with a soft disposable paper, ideally with the help of LU06 cleaning spray (or methylated spirits or alcohol).
- Afterwards, lubricate the bore of the stators with about 2-3 g (0.1 oz) grease LU02.
  There should only be a slight film of lubricant. **Note:** Do not over lubricate!
- Finally, slider should be lubricated according to the chapter 'mounting'.

### 9.1.4 Cleaning agent / Lubricant

For the cleaning of LinMot stators and sliders cleaning agent spray LU06 is recommended. To improve the sliding characteristics between the stainless steel surface of the slider and the plastic slide bearing the LinMot lubricant LU02 is prescribed.

**Ordering information**

| Item | Description | | Item-No. |
|---|---|---|---|
| LU06-250 | Klüberfood NH1 4-002 Spray* | (250 ml) | 0150-2394 |
| LU02-08 | Lubricant for linear motors** | (8 g) | 0150-1953 |
| LU02-50 | Lubricant for linear motors** | (50 g) | 0150-1954 |
| LU02-1000 | Lubricant for linear motors** | (1000 g) | 0150-1955 |

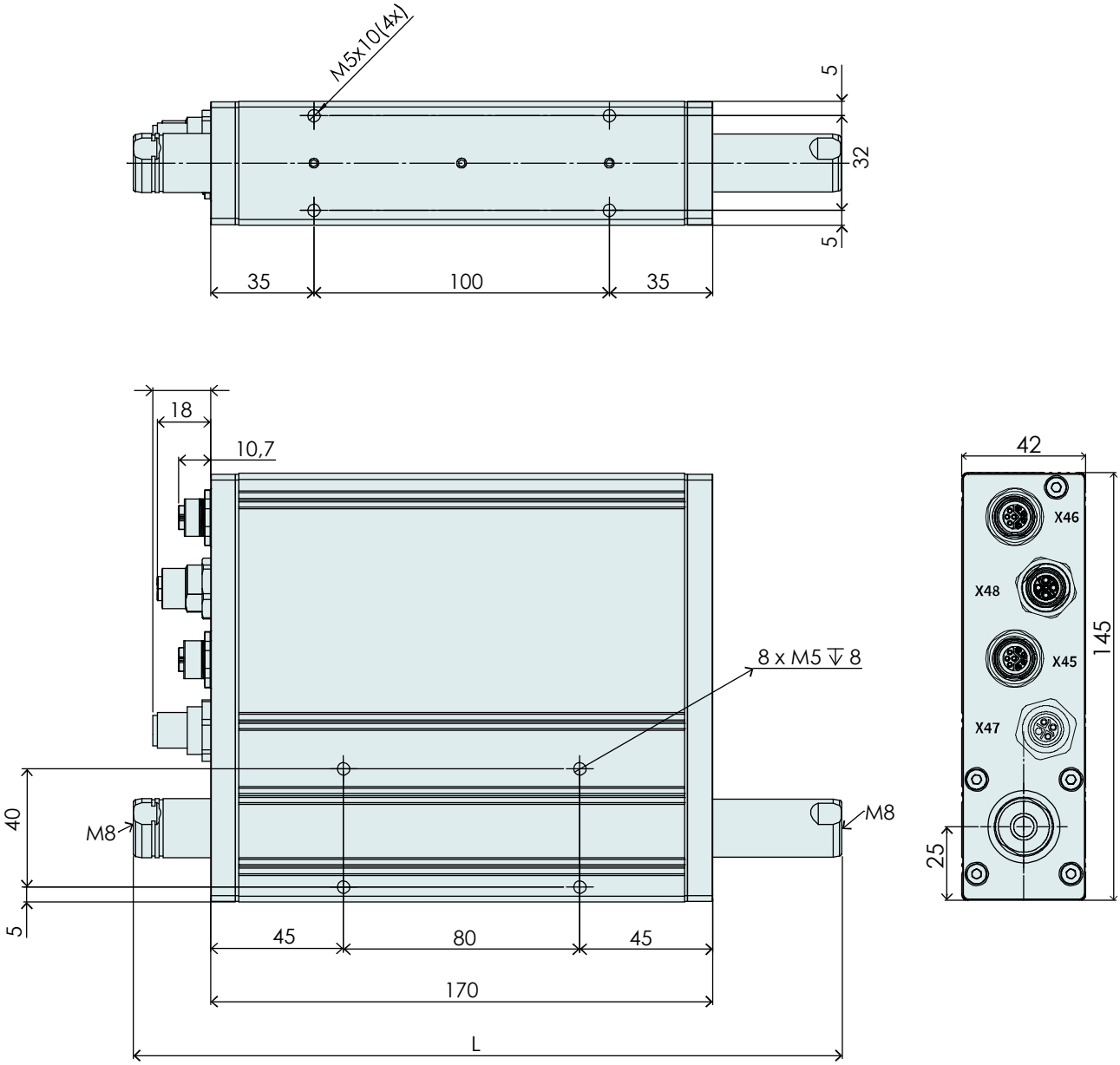
** LinMot Spray LU06 corresponds to KLÜBERFOOD NH1 4-002 which was developed for the food processing industry.*
***LinMot LU02 Lubricant corresponds to KLÜBERSYNTH UH1 14-31 which was developed for the food processing industry.*

# 10 Storage, transport, installation altitude

- Sliders are to be stored and transported only in the plastic containers (with cardboard inlay) provided for this purpose, or already installed and secured in LinMot P stators.
- Remove the slider from this plastic containers only for assembling.
- The storage area must be dry, dust-free, frost-free and vibration-free.
- The relative air humidity should be less than 60 %.
- Prescribed storage temperature: -15 °C…70 °C
- The motor must be protected against extreme weather conditions.
- The air in the storage area must not contain any harmful gases.
- The max. installation altitude is 4'000 m above sea level.
  Beyond 1'000 m, a derating of 0.5% per 100 m must be taken into account on the rated force in the case of air cooling.

# 11 Dimensions

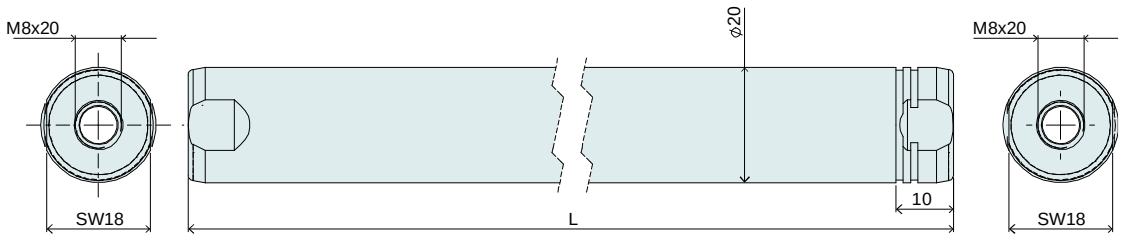
## 11.1 Stator




in mm

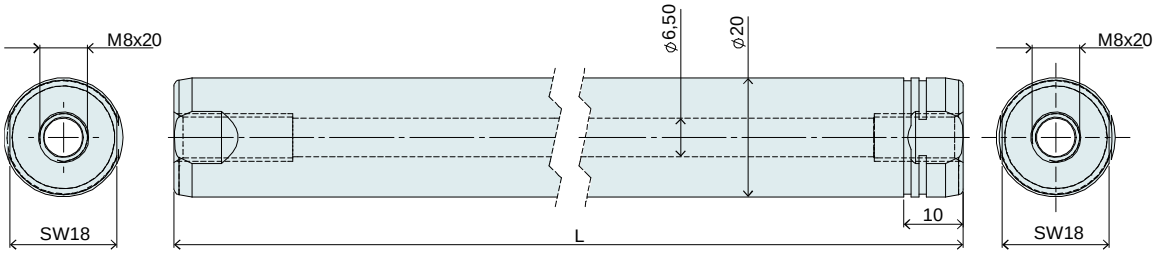
## 11.2 Slider

### 11.2.1 HP Slider




in mm

### 11.2.2 HP Hollow Slider




in mm

# 12 Declaration of Conformity and CE-marking

Wir
We
Nous

**NTI AG**
**Bodenaeckerstrasse 2**
**8957 Spreitenbach**

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
declarons sous notre seule responsabilité que le produit

| Produkt | Art-Nr. |
|---|---|
| PSD03-37Sx120F-HP-I1150-EC-XC-0S-A10 | 0150-2720 |
| PSD03-37Sx120F-HP-I1150-EC-XC-0S-000 | 0150-2806 |
| PSD03-37Sx120F-HP-I1150-DS-XC-0S-000 | 0150-2807 |
| PSD03-37Sx120F-HP-I1150-SE-XC-0S-000 | 0150-2808 |

konform ist mit den Anforderungen der Richtlinien,
is conform to the provisions of directives,
est conformé aux exigences des directives,

**2014/30/EU (EMC)**

gestützt auf die folgenden Normen,
based on the following standards,
base aux normes suivants,

**EN61000-6-2:2005**

**EN61000-6-4:2007 + A1: 2011**

Jahr der CE-Kennzeichnung:
Year of CE marking:
Annee du marquage CE: **2018**

Spreitenbach, 05.07.2021

Dr.-Ing. Ronald Rohner
CEO NTI AG

# ALL LINEAR MOTION
# FROM A SINGLE SOURCE


### LinMot Europe

**NTI AG - LinMot & MagSpring**
Bodenaeckerstrasse 2
CH-8957 Spreitenbach

| | |
|---|---|
| Sales / Administration: | +41-(0)56-419 91 91<br>office@linmot.com |
| Tech. Support: | +41-(0)56-544 71 00<br>support@linmot.com |
| Tech. Support (Skype): | skype:support.linmot |
| Fax: | +41-(0)56-419 91 92 |
| Web: | http://www.linmot.com/ |

### LinMot USA

**LinMot USA, Inc.**
N1922 State Road 120, Unit 1
Lake Geneva, WI 53147

| | |
|---|---|
| Sales / Administration : | 262-743-2555 |
| Tech. Support: | usasupport@linmot.com |
| E-Mail: | usasales@linmot.com |
| Web: | http://www.linmot-usa.com/ |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