

Installation Guide Linear Motors

ENG

P01-23 / P01-37 / P01-48



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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. The document is intended for electricians, mechanics, service technicians, and warehouse staff. Read this manual before using the product and observe the general safety instructions and those in the relevant section at all times.

Keep these operating instructions in an accessible place and make them available to the personnel assigned.

1.2 Explanation of Symbols



Triangular warning signs warn of danger.



Round command symbols tell what to do.

1.3 Qualified Personnel

All work such as installation, commissioning, operation and service of the product may only be carried out by qualified personnel.

The personnel must have the necessary qualifications for the corresponding activity and be familiar with the installation, commissioning, operation and service of the product. The manual and in particular the safety instructions must be carefully read, understood and observed.

1.4 Liability

NTI AG (as manufacturer of LinMot 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 responsibility of the user to check the data and information provided by NTI AG for correct applicability in terms of safety. 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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2 Safety Instructions



Contusions

Sliders contain neodymium 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 / PL10-28)
 - 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!



Caution - Risk of Electric Shock !

Before working, make sure that there are no high voltages.



Fast-moving Machine Parts

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



Automatic Restart

The motors can start automatically under certain circumstances! 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.

**Burn Hazard**

During operation the slider can become hotter than 100 °C, which can cause burns if touched. All necessary precautions (e.g. covers, casing, etc.) must be taken to prevent contact with persons in the vicinity of the slider during operation.

**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 demagnetizes the magnets.

**2S Stators**

Series 2S stators correspond mechanically to the respective standard stators and are to be handled in exactly the same way in terms of assembly.

For special features, please refer to the safety manual (Item-No. 0185-1174).

**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 Installation instructions

3.1 Operating conditions



Maximum ambient temperature limits:

- Standard Motors: -10 °C...80 °C
- HP-Motors: -10 °C...80 °C

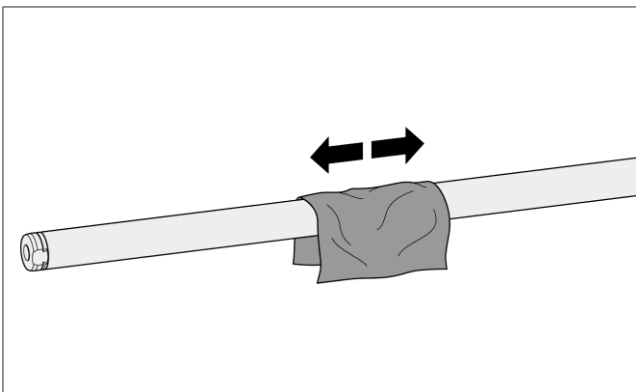
Internal temperature sensor error occurs at:

- Standard Motors: 90 °C
- HP-Motors: 120 °C

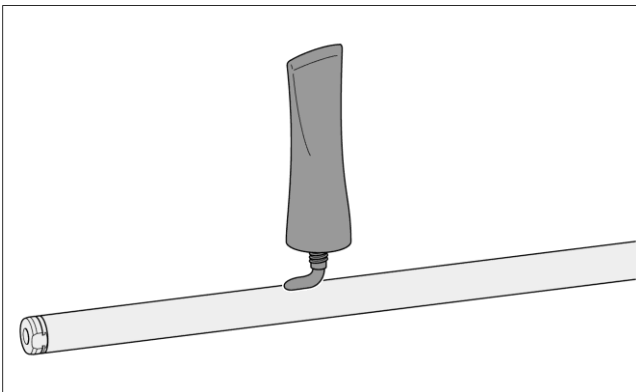
3.2 Instructions for installing the linear motor



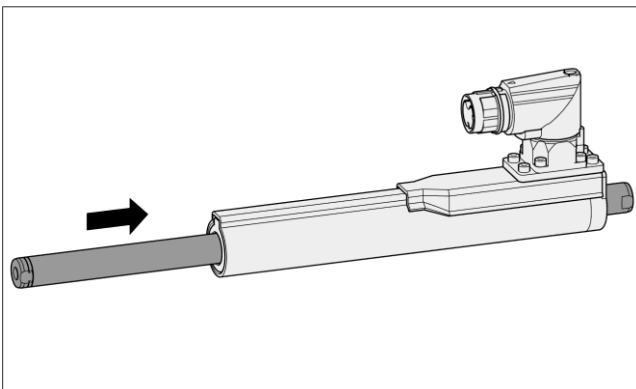
Please attend to the safety instructions in chapter 2 during the assembling!



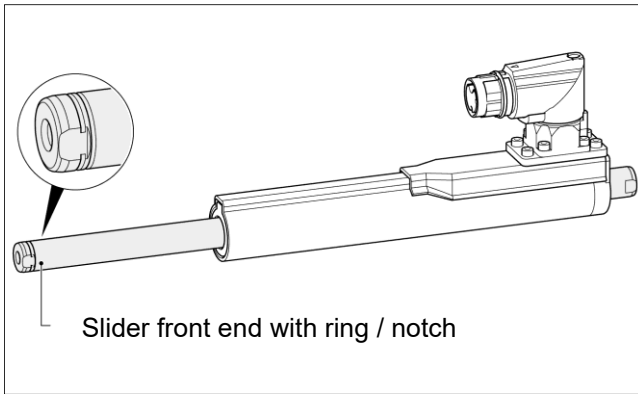
1. Clean the slider with a paper towel.



2. Lubricate the slider in accordance with the 'lubrication order' (see the section 6.3 Maintenance of linear motors)



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



4. Checking the installed direction of slider

After the installation, the front end of the slider is located at the opposite side of the stator from the cable connector or cable exit.

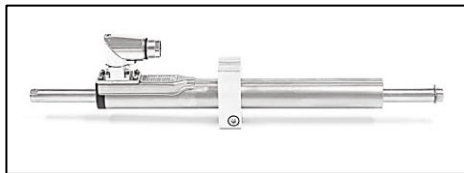
3.3 Mounting the stator

The stator is mounted by clamping. The LinMot flange (see the section 5.2 Accessories) or a similar flange can be used for this purpose. Most important is a broad clamping surface in order to provide good heat dissipation. Forced air cooling can also increase the continuous force of the linear motor by up to a factor of 1.8.



The flange clamp must not deform the stator.
Make sure the torque on the clamp plate screws does not exceed the maximum value.

Type of flange	Max. torque for screws
PF02-23	4 Nm
PF02-37	8 Nm
PF01-48	12 Nm



Incorrect mounting

Small contact area prevents cooling of the linear motor



Correct mounting

Better heat dissipation with the LinMot flange



Correct mounting

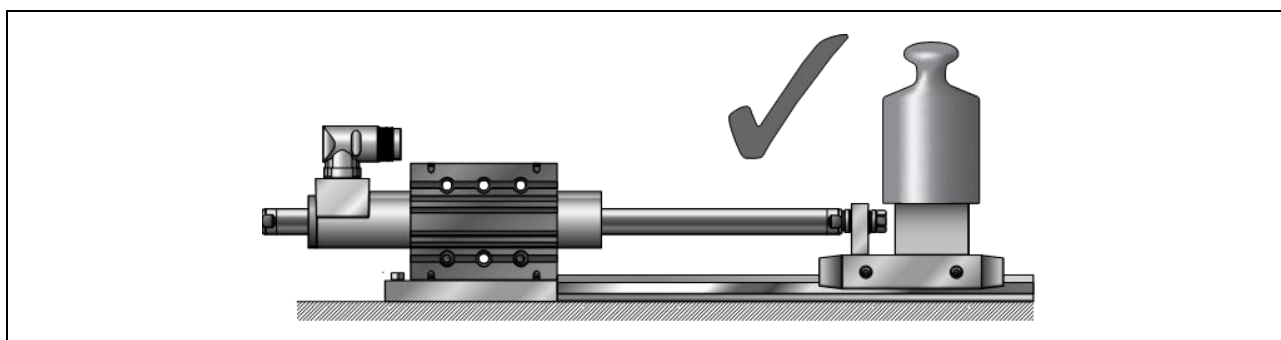
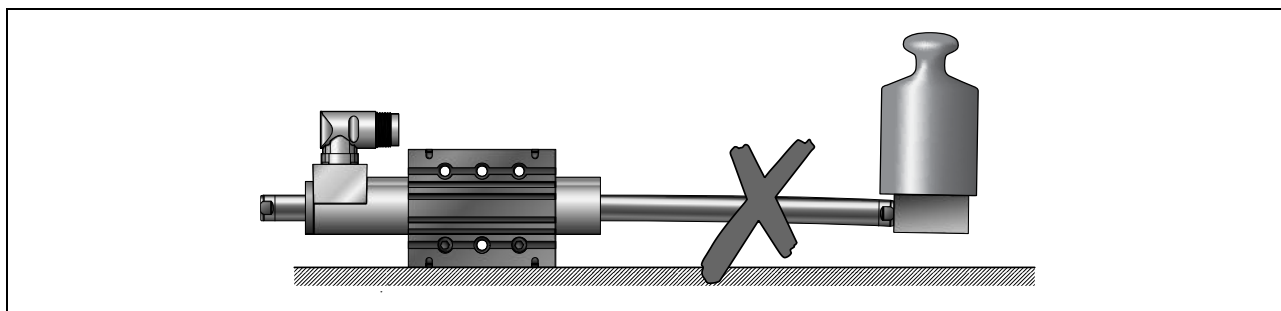
Forced air cooling with LinMot fan to increase the continuous force rating.

3.4 Mounting the payload to the slider

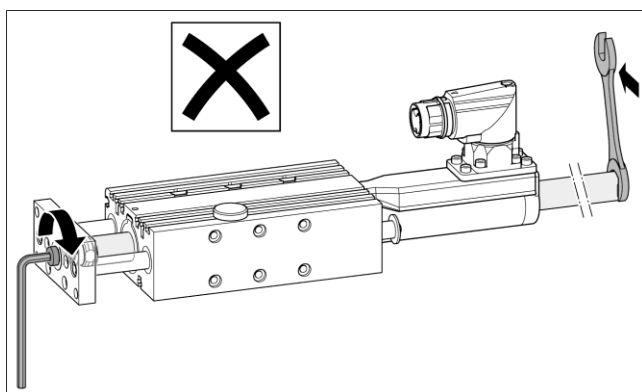
The load is mounted as a fixed bearing using spherical washers and conical seats (see the section « Slider mounting kits »).



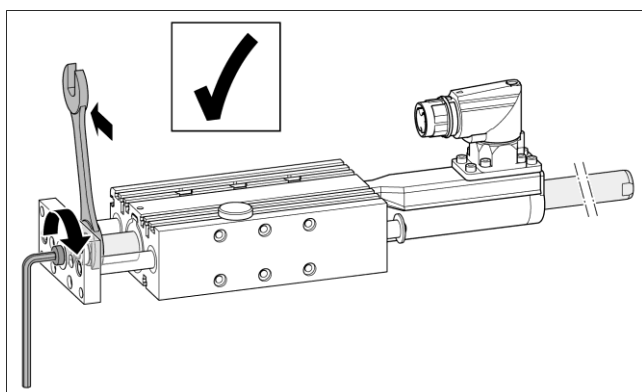
- To avoid shear force on slider and wear on stator, the payload has to be beared by a linear guide.
- Slider back end should not be used for load mounting.



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



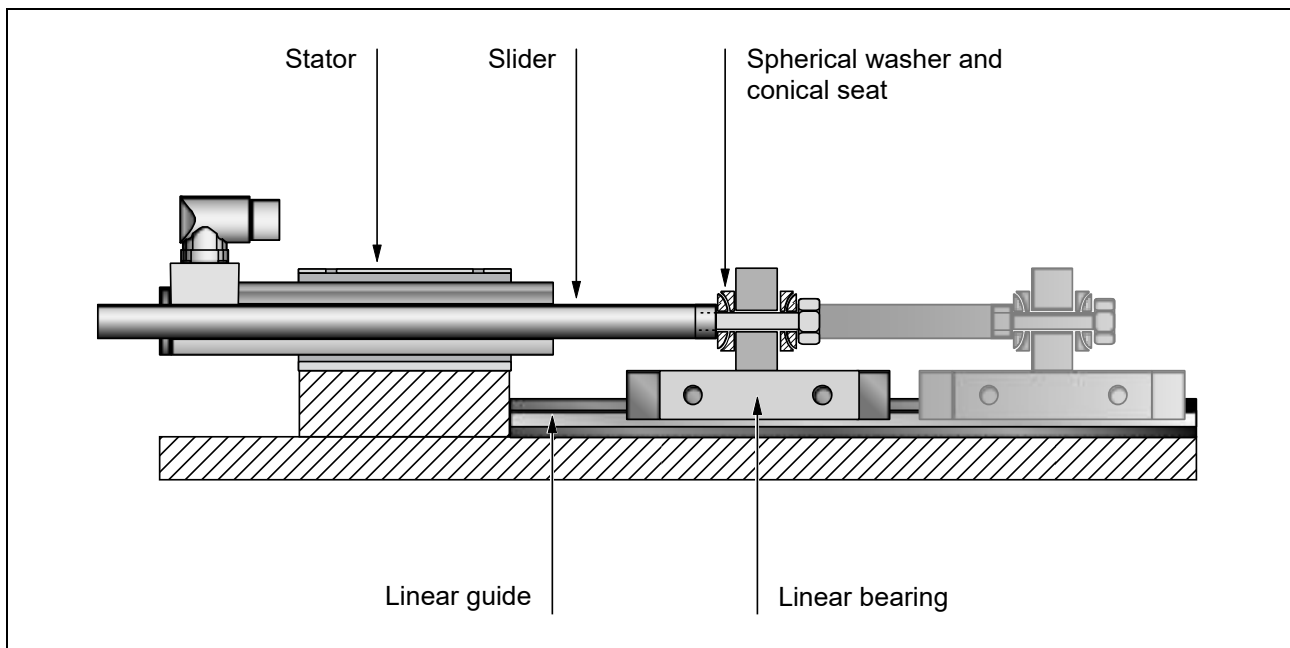
Incorrect attachment



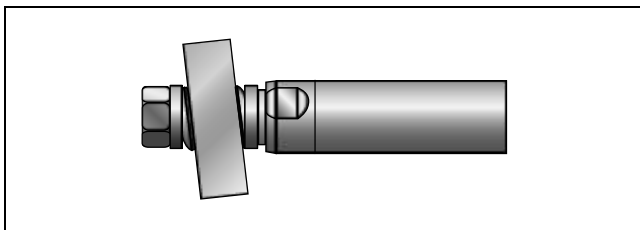
Correct attachment

Slider	Thread	Max. torque for screw (Dry)
12 mm	M 5	5.2 Nm
20 mm	M 8	22.5 Nm
28 mm	M 10	42 Nm

3.5 "Moving slider" installation

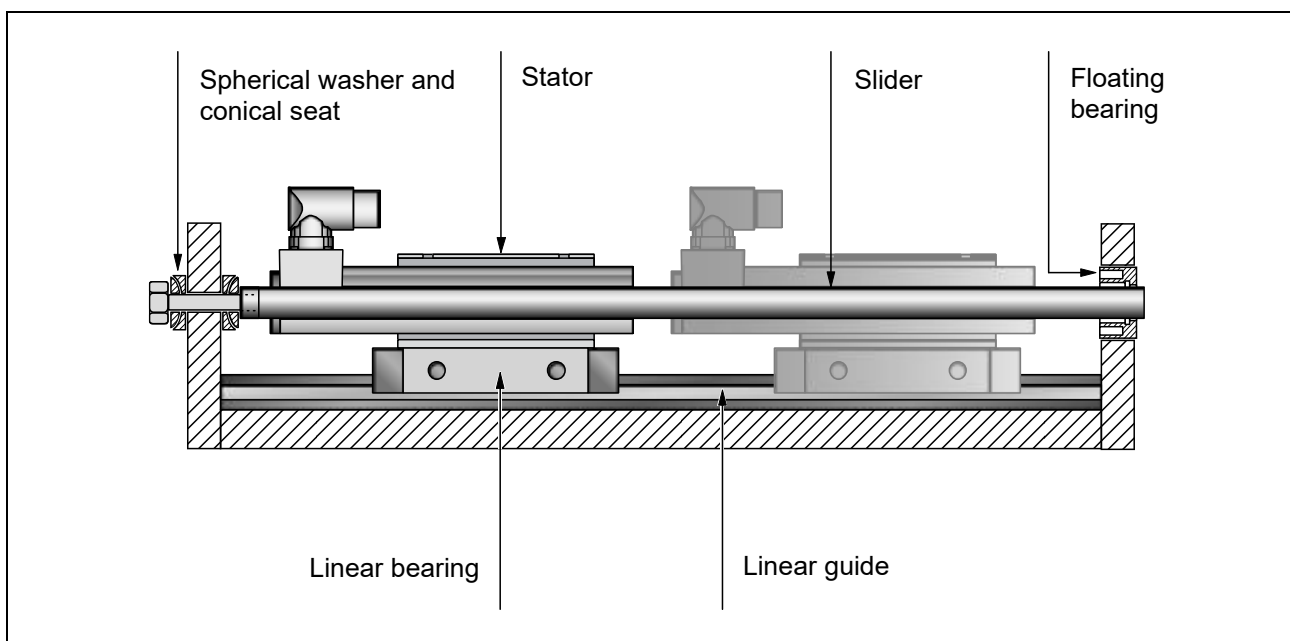


In a "moving slider" installation, the stator is fixed and the slider is the moving part. The load, borne by a linear guide, is attached directly to the end of the slider. In order to compensate for misalignment, spherical axial bearings consisting of spherical washers and conical seats (see the section 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

3.6 "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).

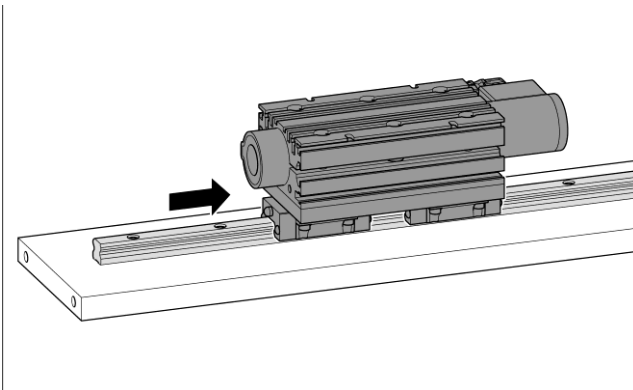
3.6.1 Assembling instruction



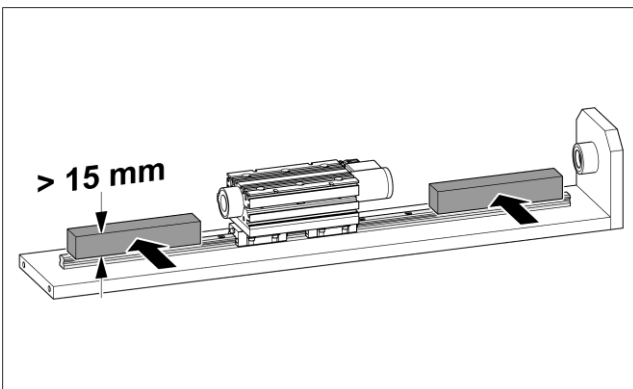
Please attend to the safety instructions in chapter 2 during the assembling!



If moving stator application is used, the minimum bending radius of the motor cable should be adhered to. See chapter Cable, section Technical Data.



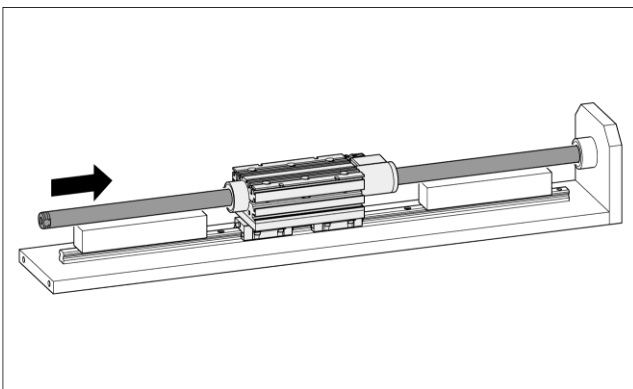
1. Mount stator to its support bearing.



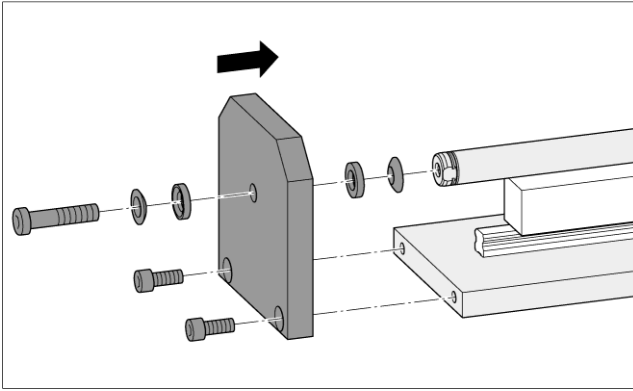
2. Placing a spacer.



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



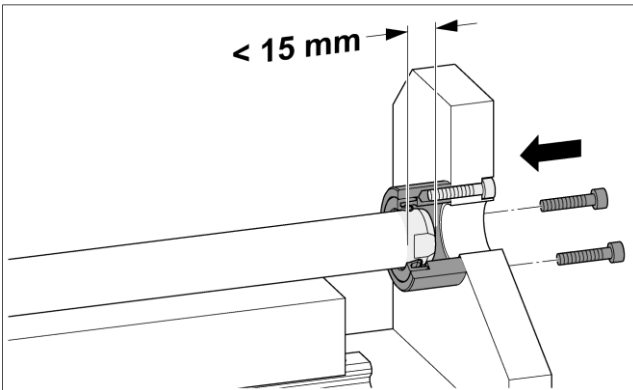
3. Insert slider into stator.



- 4. Installing the slider using the fixed bearing**
The fixed bearing is screwed to the front end of the slider.



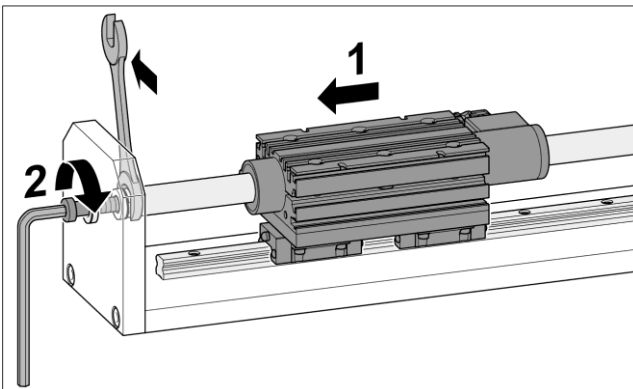
Do not tighten the screw yet!



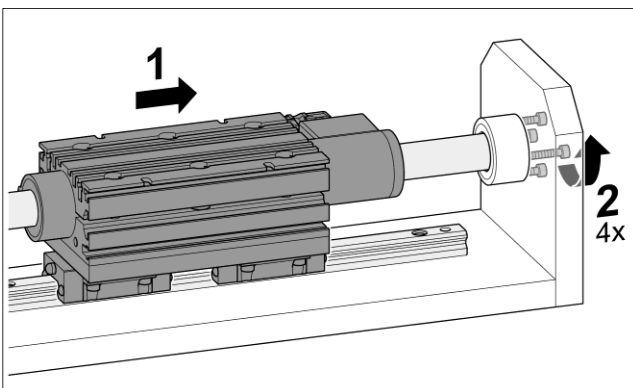
- 5. Mount floating bearing**



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.**



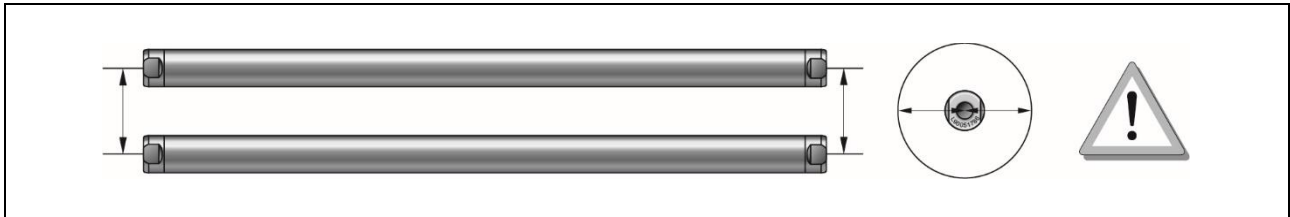
- 7. Move stator (front side) to the floating bearing and tighten screws.**



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

3.7 Minimum distance from slider

3.7.1 Minimum distance from slider to slider

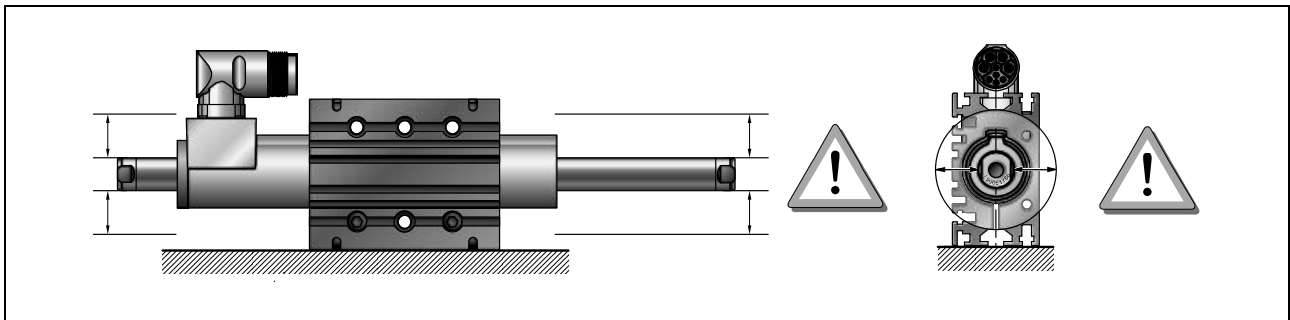


The sliders are made of neodymium magnets and have a strong magnetic attraction. It must be kept a minimum distance between the sliders. This minimized the risk of bruising and secondly, the sliders do not influence each other through their magnetic fields.

Type of slider	PL01-12	PL01-20 / PL01-19	PL01-28 / PL01-27	PL10-28
PL01-12	30 mm			
PL01-20 / PL01-19		50 mm		
PL01-28 / PL01-27			80 mm	
PL10-28				70 mm

The data are measured from slider center to slider center.

3.7.2 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.)
P01-23x...	10 mm	5 mm
P01-37x...	15 mm	7 mm
P01-48x...	20 mm	10 mm

4 Electrical connection



Do not connect or disconnect motor when there is power on the servo drive.
Use only double-shielded original LinMot cable. Cables from other sources must be checked precisely before commissioning.
Incorrect connections can destroy the drive and stator.



The stator is connected to protective earth via the motor cable. The screw connections of the C and R connectors must be tightened up to the stop.
All the connectors used are from different manufacturers, but they are all fully compatible with each other.

4.1 Motor cable

Three types of cables are available for linear motors. The cable attached to the stator is not a high flex cable. For moving cable applications please use the special LinMot KS high flex (suitable for cable tracks) or KR robot cable.

4.1.1 Technical data

	Standard cable		High-Flex cable		Robot cable	
Cable name	K05-04/05	K15-04/05	KS05-04/05	KS10-04/05	KR05-04/05	KR10-04/05
Minimum bending radius for fixed installation	25 mm (1 in)	50 mm (2 in)	30 mm (1.2 in)	50 mm (2 in)	40 mm (1.6 in)	50 mm (2 in)
Minimum bending radius when moving	Not suitable for applications with moving motor cable		60 mm (2.4 in) No torsion	100 mm (4 in) No torsion	80 mm (3.2 in) Max. Torsion: ±270° pro 0.5 m	100 mm (4 in) Max. Torsion: ±270° pro 0.5 m
Approval	(-)	UL / CSA 300V	UL / CSA 300V		UL / CSA 300V	
Material wire insulation	TPE-U		TPE-E		TPE-E	
Material cable sheath	PUR		PUR		PUR	
Oil resistance	very good acc. DIN VDE 0282 Part 10 + HD 22.10		very good acc. DIN VDE 0282 Part 10 + HD 22.10		very good acc. DIN VDE 0282 Part 10 + HD 22.10	
Chemical resistance (to acids, alkalis, solvents, hydraulic fluid)	good		good		good	

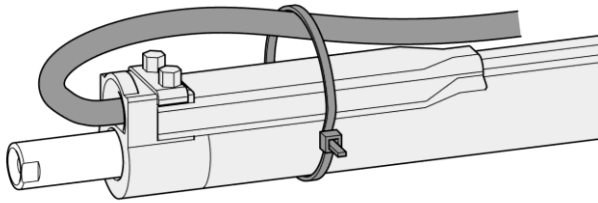
4.2 Cable type stators

Maintain the minimum bending radius of the stator cable (see figure below). In moving applications, the stator cable must not be moved.



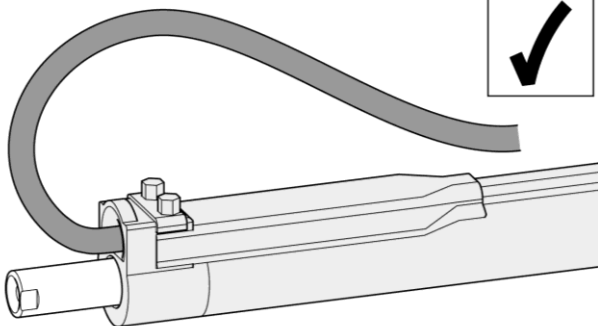
Not correct!

Minimum bending radius not observed



Correct!

Minimum bending radius of 25 mm maintained.



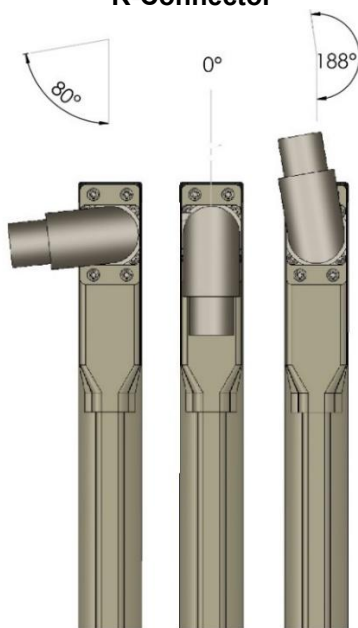
4.3 Rotatability of motor connectors

The motor connectors R and C can be rotated in both directions. (see illustration below).

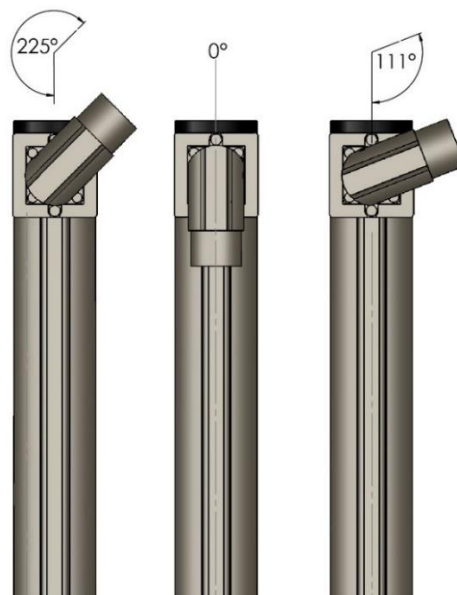


Do not overwind the connector!
Overwinding will damage the motor!

R-Connector

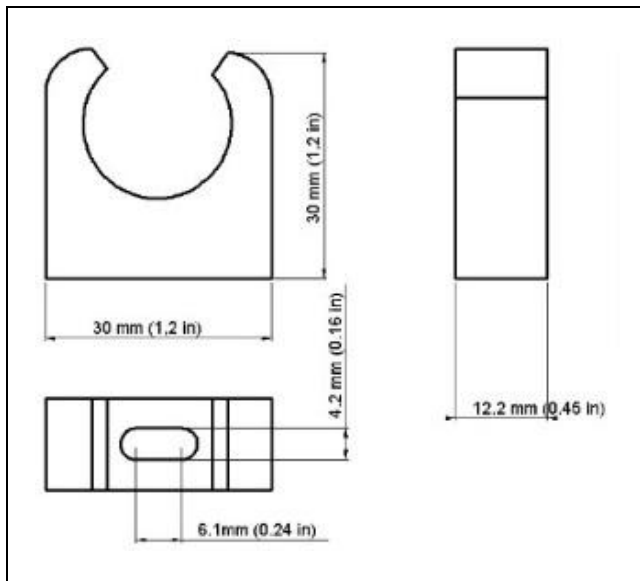


C-Connector



4.4 Mounting clips

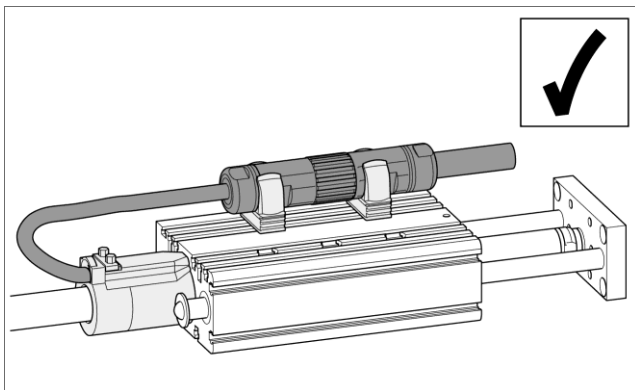
M, C, and R cable type motors are supplied with mounting clips to fix the motor cables. In moving stator applications, these clips prevent damage due to vibrations of the cable. The clips help to attach the cable connection to the flange.



Mounting clip

Material: Polypropylene, grey

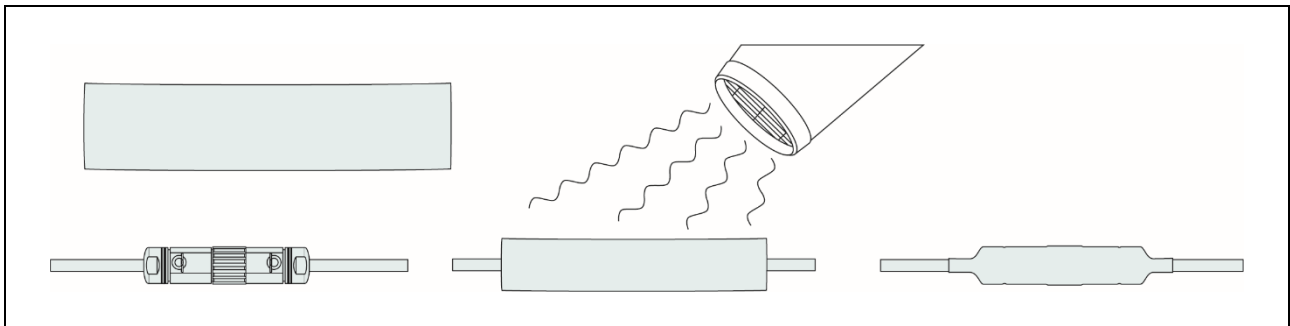
Item-No.: 0150-3076



LinMot PS01-37x120-M stator in a moving stator application. The connectors are attached to the flange with the mounting clips. The cable attached to the motor is not moved and the minimum bending radius is maintained.

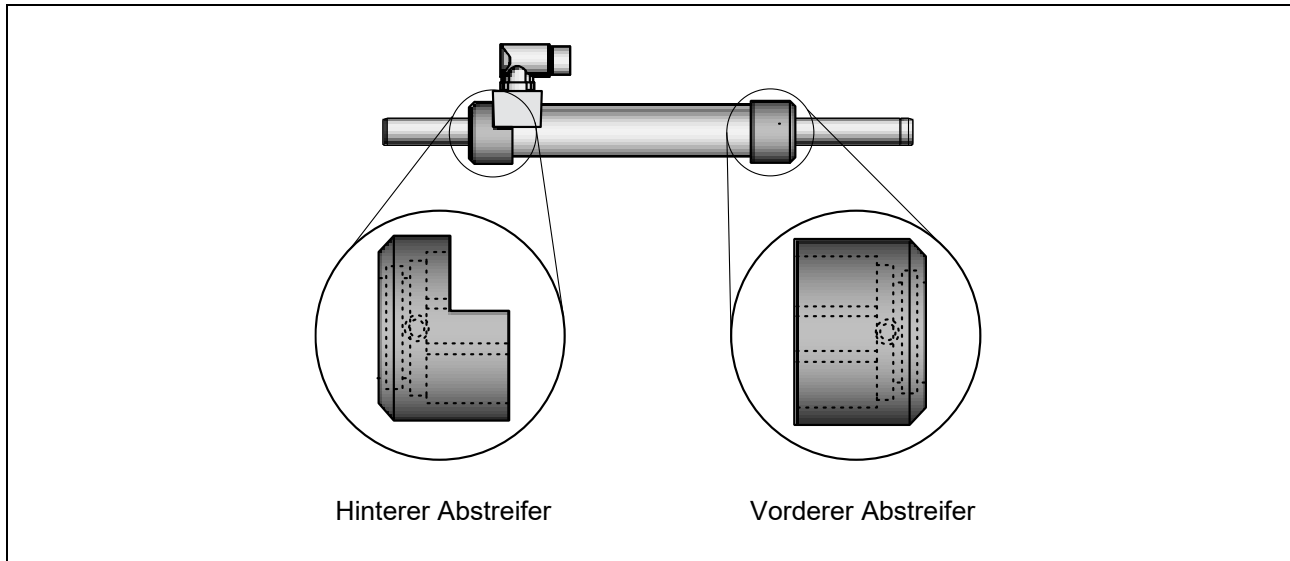
4.5 Shrink tubing

The special heat shrinkable polypropylene tubing (Item-No. 0150-3076) protects the M, C and R-type connector in applications with very difficult environmental conditions.

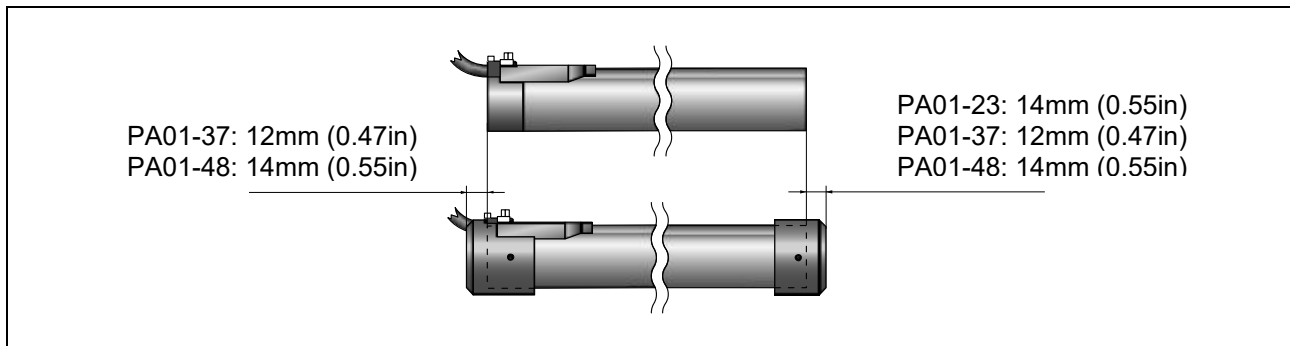


5 Accessories

5.1 Wipers



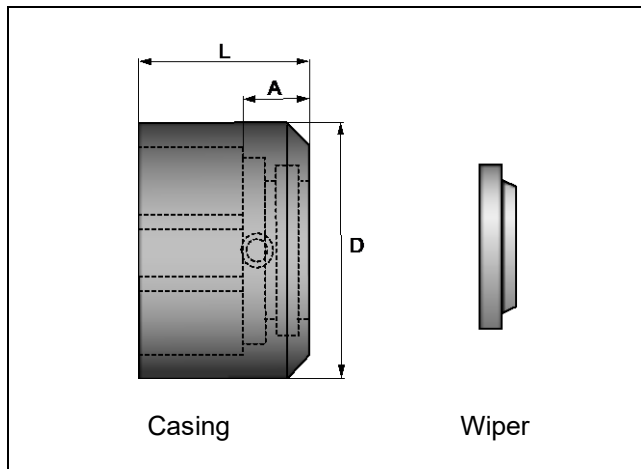
The stators are equipped as standard with wipers. This simplifies maintenance and the maintenance cycles can be extended. The wiper effects that the lubricant is dispensed metered and does not leak outside of the stator. The lubricant is less dirty.



For each wiper, the lengthwise installation space for the stator, increases by 12 mm or 14 mm.

5.1.1 Mounting the wiper

The wipers are inserted into the ends of the installed stator and secured with screws on the side. The stator is then lubricated using the lube nipple (funnel D1a) in the housing of the wiper.



Material

Casing: POM

Lube nipple (funnel D1a): Brass

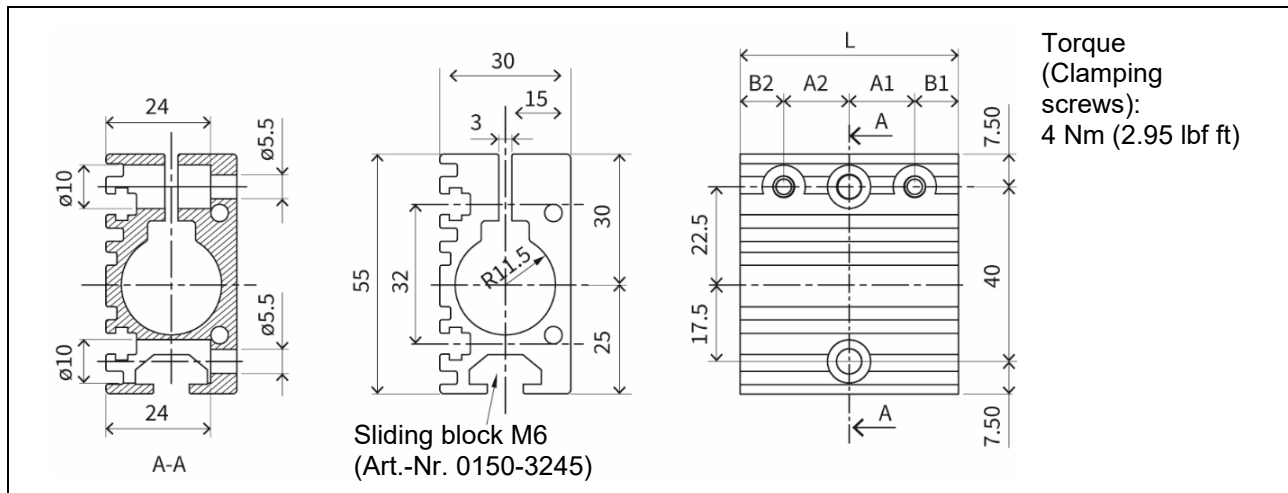
Wiper: H-PU

Item	D	L	A	Weight
PA01-23/12-F	29mm (1.14in)	33mm (1.30in)	14mm (0.55in)	0.014kg
PA01-37/19-F*	45mm (1.77in)	32mm (1.26in)	12mm (0.47in)	0.028kg
PA01-37/19-R*	45mm (1.77in)	37mm (1.45in)	12mm (0.47in)	0.026kg
PA01-37/19-R cable*	45mm (1.77in)	40mm (1.57in)	12mm (0.47in)	0.030kg
PA01-37/20-F	45mm (1.77in)	32mm (1.26in)	12mm (0.47in)	0.028kg
PA01-37/20-R	45mm (1.77in)	37mm (1.45in)	12mm (0.47in)	0.026kg
PA01-37/20-R cable	45mm (1.77in)	40mm (1.57in)	12mm (0.47in)	0.030kg
PA01-48/27-F*	58mm (2.28in)	32mm (1.26in)	14mm (0.55in)	0.056kg
PA01-48/27-R*	58mm (2.28in)	32mm (1.26in)	14mm (0.55in)	0.050kg
PA01-48/28-F	58mm (2.28in)	32mm (1.26in)	14mm (0.55in)	0.056kg
PA01-48/28-R	58mm (2.28in)	32mm (1.26in)	14mm (0.55in)	0.050kg

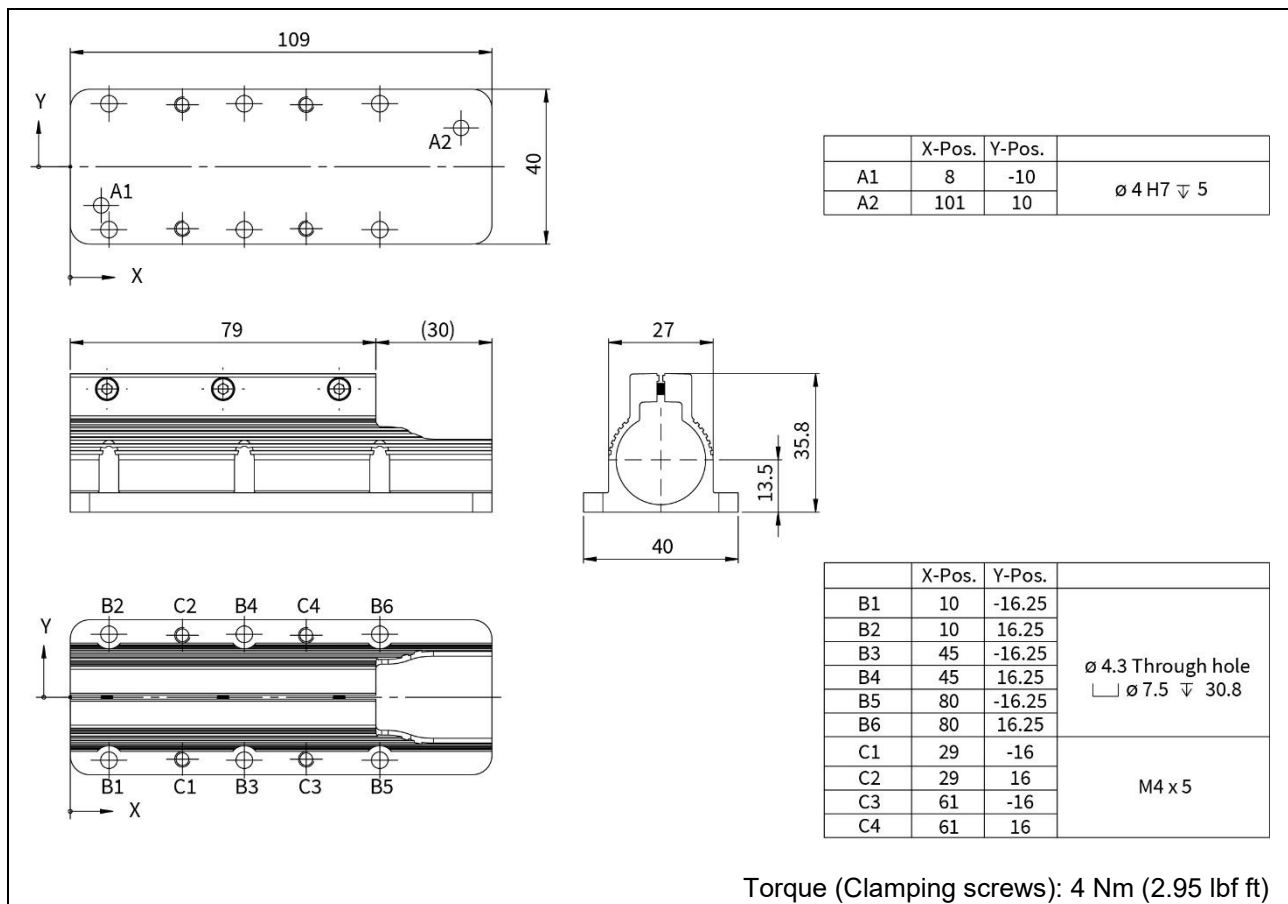
Item	Description	Item-No.
PA01-23/12-F-2	Wiper for PS01-23x... front side	0150-3293
PA01-37/19-F*	Wiper for PS01-37x... front side	0150-3225
PA01-37/19-R*	Wiper for PS01-37x...-C rear side	0150-3226
PA01-37/19-R cable*	Wiper for PS01-37x... Cable rear side	0150-3227
PA01-37/20-F	Wiper for PS01-37x... front side	0150-3126
PA01-37/20-R	Wiper for PS01-37x...-C front side	0150-3201
PA01-37/20-R cable	Wiper for PS01-37x...-Cable rear side	0150-3221
PA01-48/27-F*	Wiper for PS01-48x... front side	0150-3228
PA01-48/27-R*	Wiper for PS01-48x...-C rear side	0150-3229
PA01-48/28-F	Wiper for PS01-48x... front side	0150-3127
PA01-48/28-R	Wiper for PS01-48x...-C rear side	0150-3202

* Wipers for linear motors with high-clearance sliders

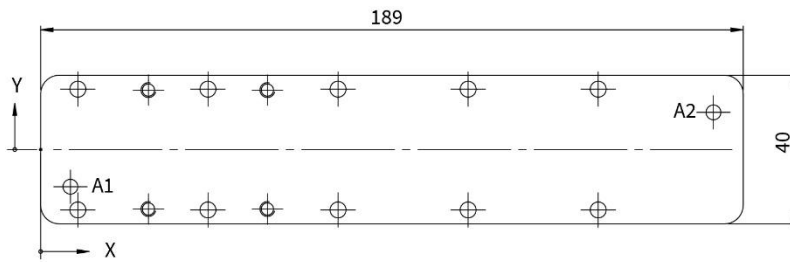
5.2 Mounting flanges



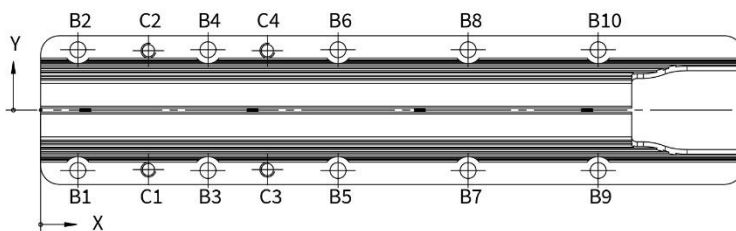
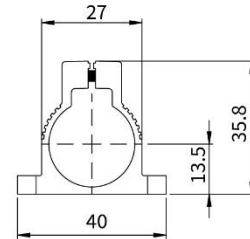
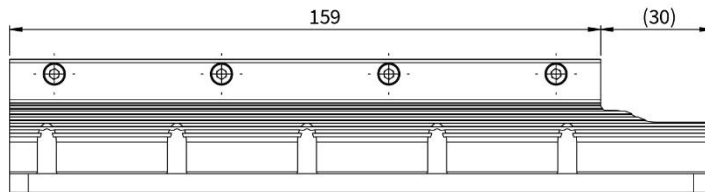
Item	For Stator	Fan-Quantity Std. / Max.	L [mm]	A [mm]	B [mm]	Weight [g / oz]	Item- No.
PF02-23x50	PS01-23x80	1 / 1	50	15	10	115 / 4.1	0150-2102
PF02-23x90	PS01-23x80	1 / 1	90	20 / 30	25 / 15	202 / 7.2	0150-2146
PF02-23x120	PS01-23x160	1 / 2	120	30	30	280 / 9.9	0150-2103
PF02-23x170	PS01-23x160	1 / 2	170	45	40	390 / 13.8	0150-2117
PF02-23 Profil per m	PS01-23x...	(-)	(-)	(-)	(-)	(-)	0150-2101



Item	For Stator	Fan-Quantity Std. / Max.	Weight [g / oz]	Item- No.
PF03-23x109	PS01-23x80	1 / 1	101 / 3.56	0150-4549



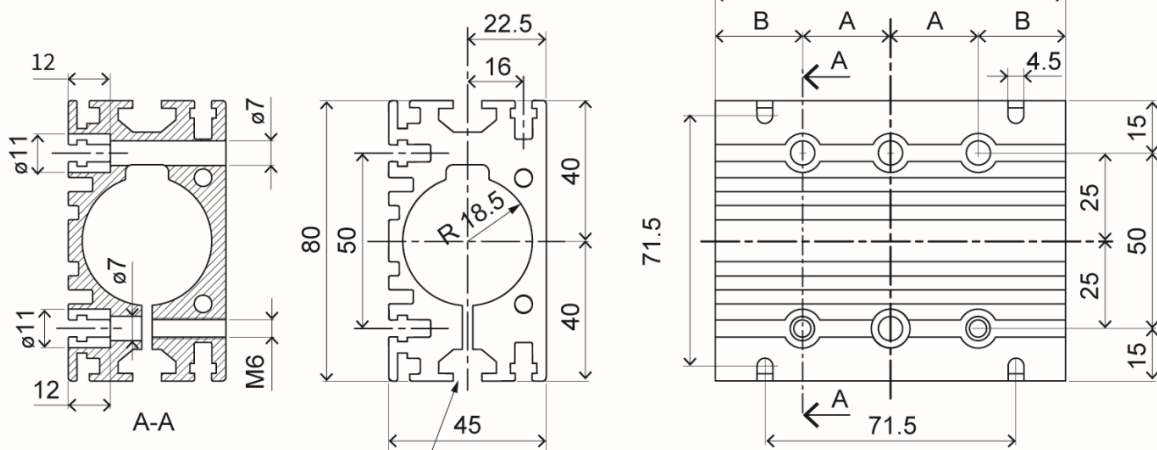
	X-Pos.	Y-Pos.	
A1	8	-10	ø 4 H7 ∇ 5
A2	101	10	



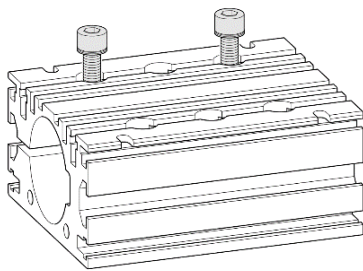
	X-Pos.	Y-Pos.	
B1	10	-16.25	ø 4.3 Through hole □ ø 7.5 ∇ 30.8
B2	10	16.25	
B3	45	-16.25	
B4	45	16.25	
B5	80	-16.25	
B6	80	16.25	
B7	115	-16.25	
B8	115	16.25	
B9	150	-16.25	
B10	150	16.25	
C1	29	-16	M4 x 5
C2	29	16	
C3	61	-16	
C4	61	16	

Torque (Clamping screws): 4 Nm (2.95 lbf ft)

Item	For Stator	Fan-Quantity Std. / Max.	Weight [g / oz]	Item- No.
PF03-23x189	PS01-23x160	1 / 1	184 / 6.49	0150-4550



Sliding block M6
(Item-No. 0150-3245)



Clamping

Clamping screw:

2 spring washers* per screw:

Torque:

M6x30, steel 8.8, ISO 4762

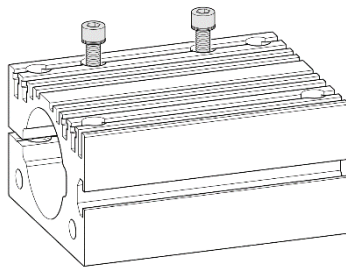
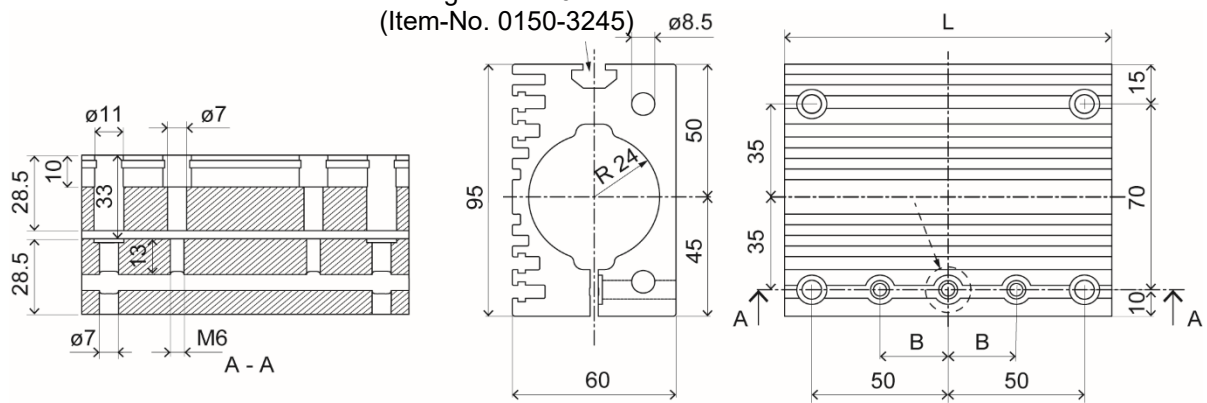
M6, spring steel 43-50 HRC

8 Nm (5.9 lbf ft)

*) Included from lot number 83H

Item	For Stator	Fan-Quantity Std. / Max.	L [mm]	A [mm]	B [mm]	Weight [g / oz]	Item- No.
PF02-37x100	PS01-37x120	1 / 1	100	25	25	450 / 15.9	0150-1998
PF02-37x140	PS01-37x120	1 / 1	140	50	20	630 / 22.2	0150-2105
PF02-37x200	PS01-37x240	1 / 2	200	50	50	920 / 32.5	0150-1999
PF02-37 Flange per m	PS01-37x...	(-)	(-)	(-)	(-)	(-)	0150-1997

Sliding block M6
(Item-No. 0150-3245)



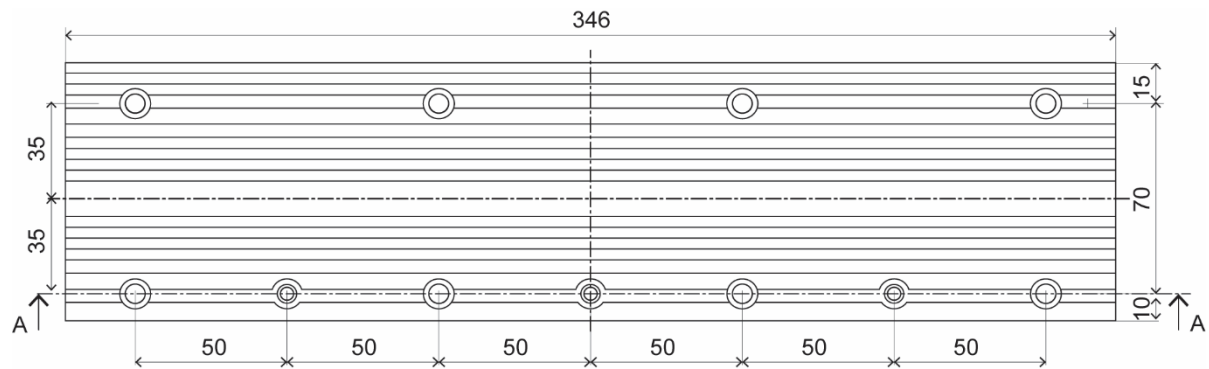
Clamping

Clamping screw:
2 spring washers* per screw:
Torque:

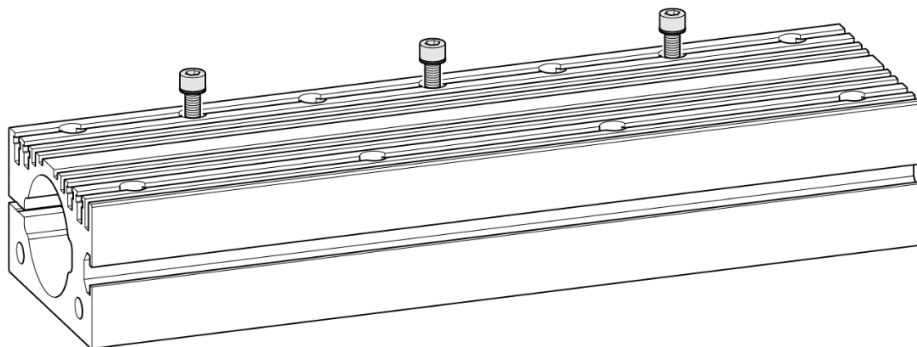
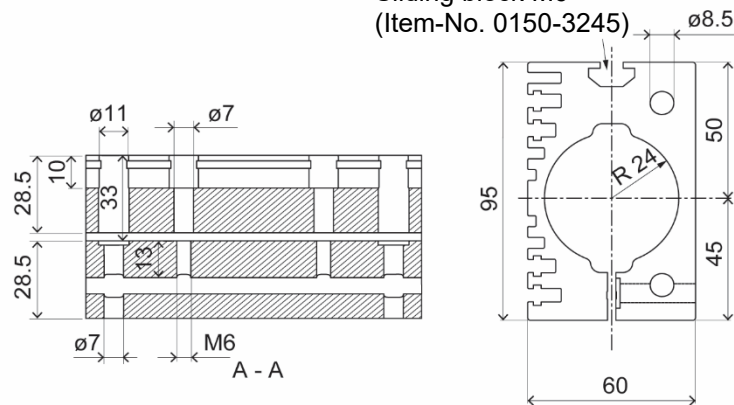
M6x30, steel 8.8, ISO 4762
M6, spring steel 43-50 HRC
12 Nm (8.85 lbf ft)

*) Included from lot number 83H

Item	For Stator	Fan-Quantity Std. / Max.	L [mm]	B [mm]	Weight [g / oz]	Item- No.
PF01-48x120	P01-48x240	1 / 1	120	25	970 / 34.2	0150-1976
PF01-48x136	PS01-48x150	1 / 1	136	26	1100 / 38.8	0150-4072
PF01-48x226	P01-48x240	1 / 2	226	85	1855 / 65.4	0150-2108
PF01-48 Flange per m	P01-48x...	(-)	(-)	(-)	(-)	0150-2104



Sliding block M6
(Item-No. 0150-3245)



Clamping

Clamping screw:

2 spring washers* per screw:

Torque:

M6x30, steel 8.8, ISO 4762

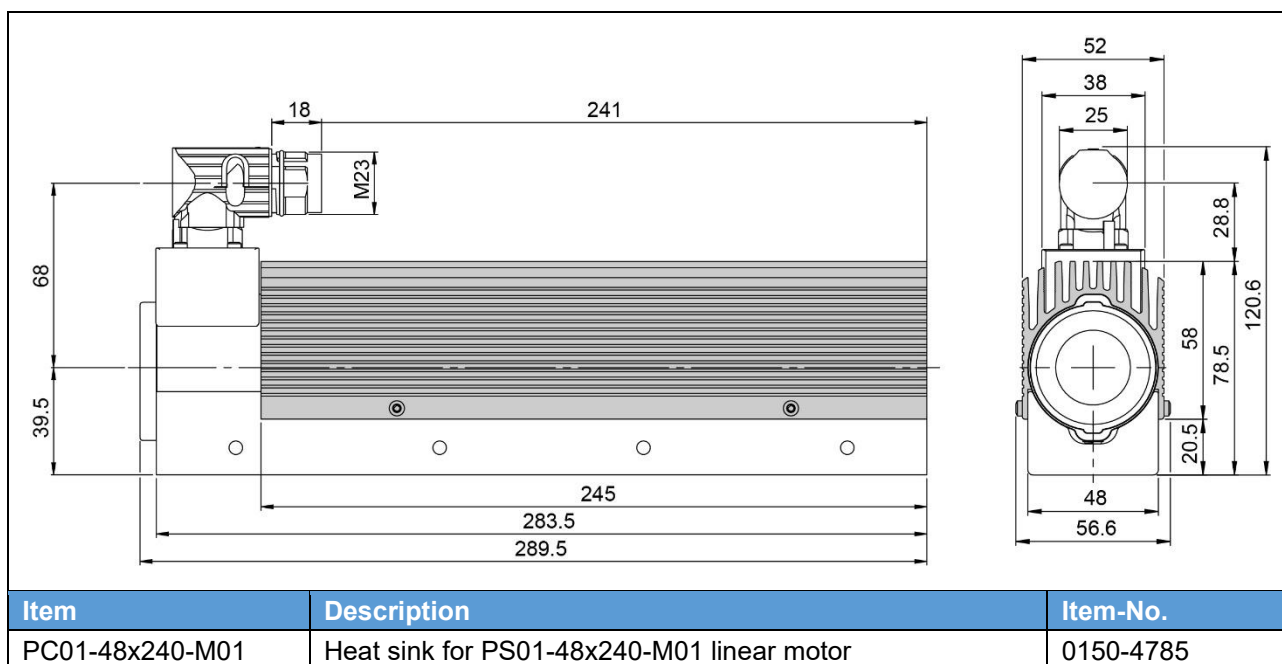
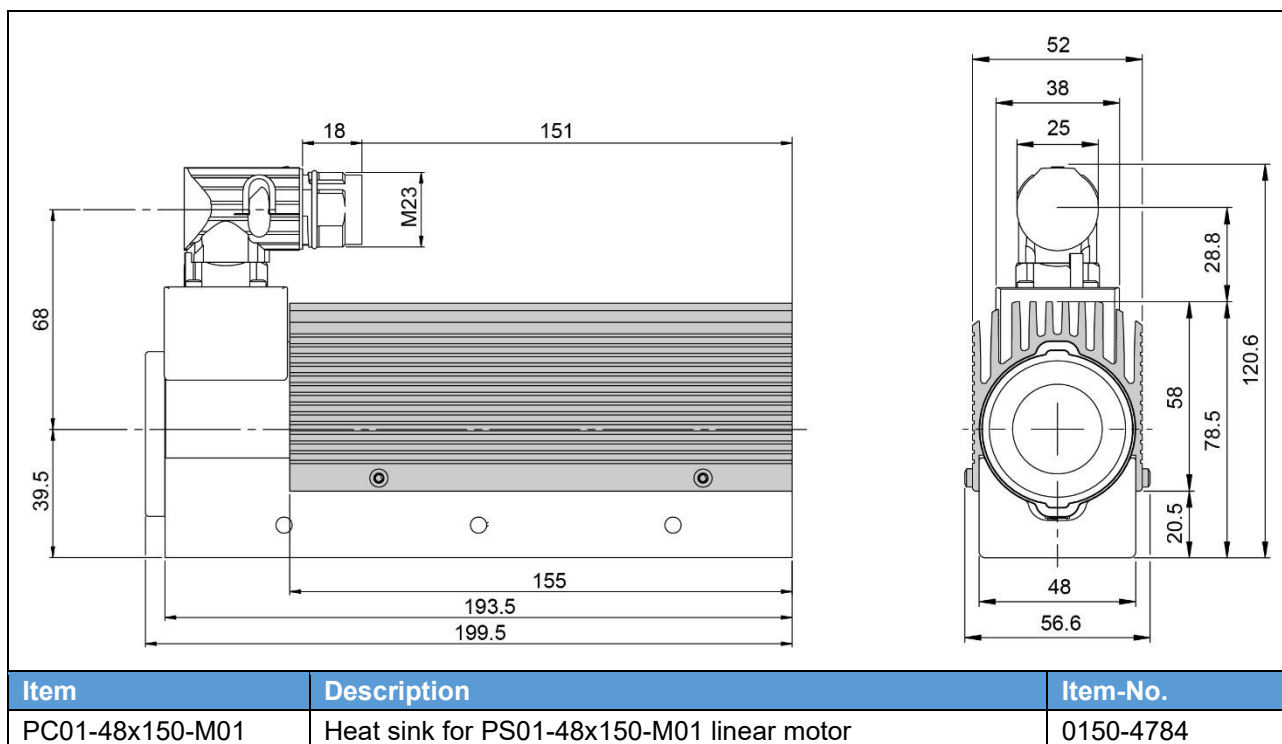
M6, spring steel 43-50 HRC

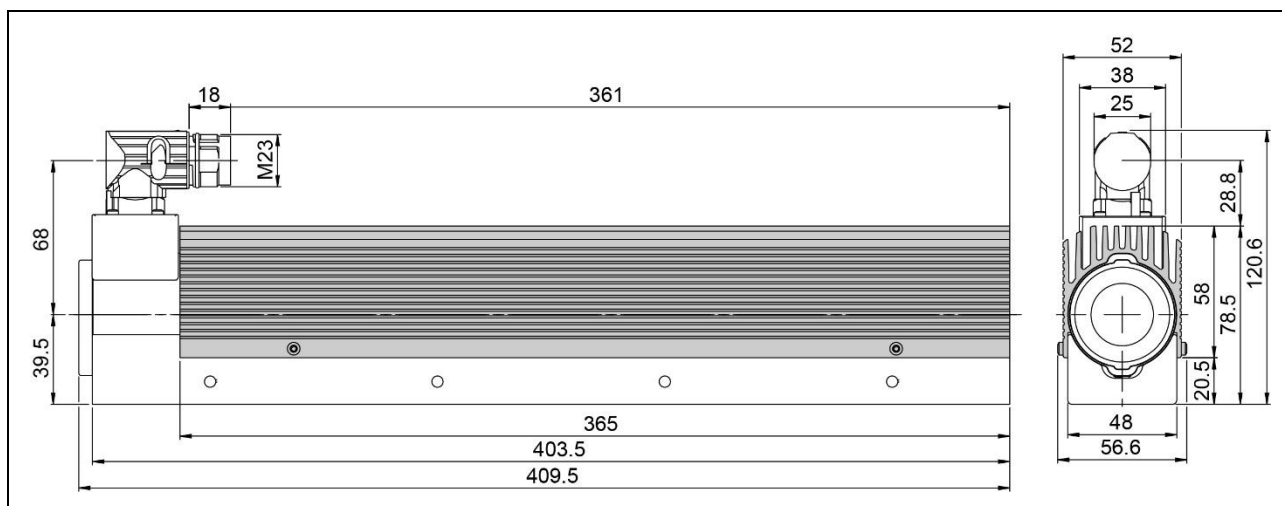
12 Nm (8.85 lbf ft)

*) Included from lot number 83H

Item	For Stator	Fan-Quantity Std. / Max.	L [mm]	Weight [g / oz]	Item- No.
PF01-48x346	PS01-48x360	2 / 3	346	2840 / 100.2	0150-2145

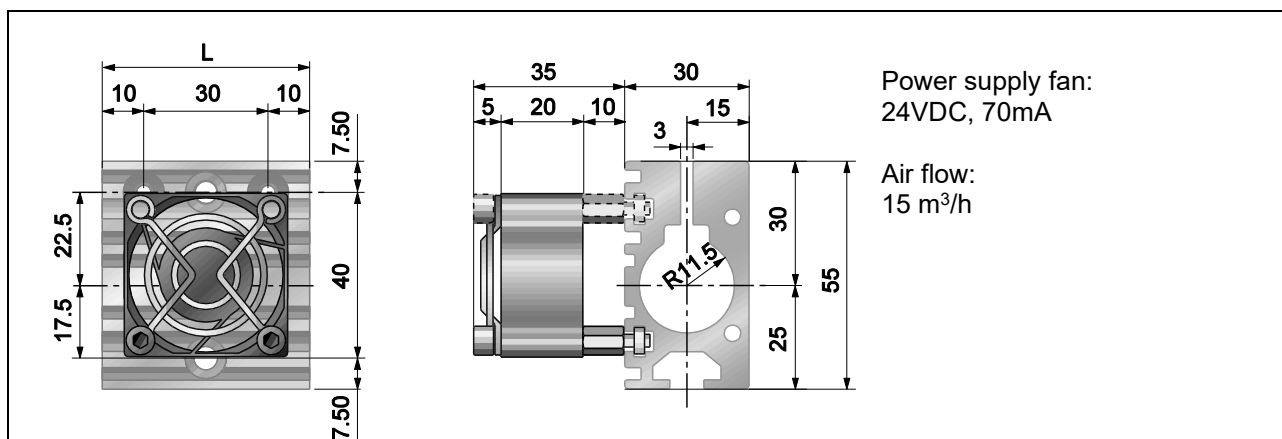
5.3 Heat sink



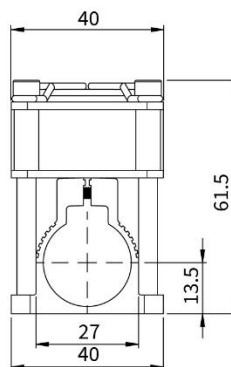
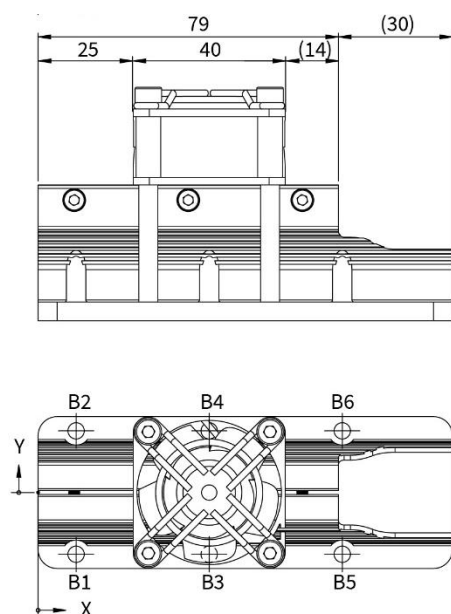


Item	Description	Item-No.
PC01-48x360-M01	Heat sink for PS01-48x360-M01 linear motor	0150-4786

5.4 Fan kits for flanges



Item	Description	Item-No.
HV01-23	Fan Kit for H01-23, PF02-23, PF03-23	0150-5050

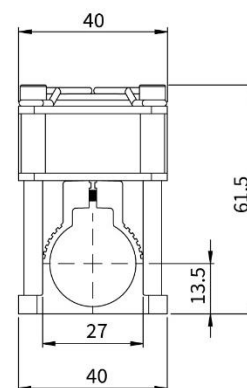
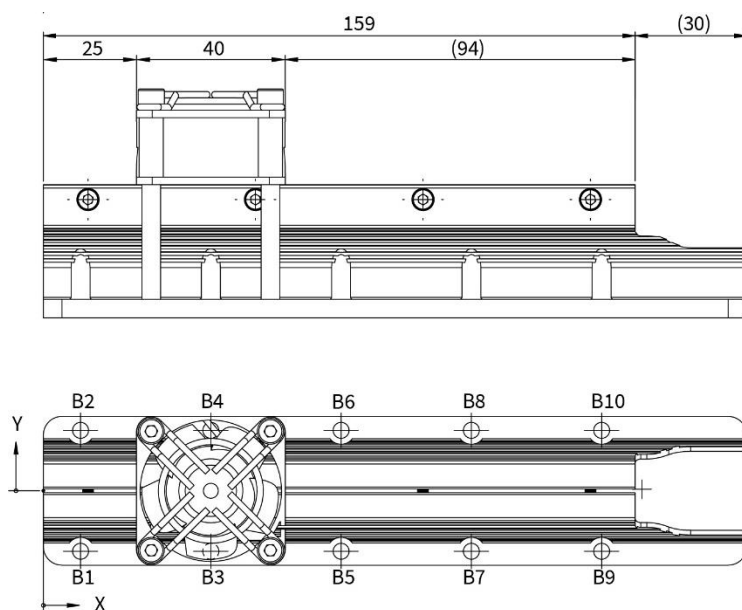


	X-Pos.	Y-Pos.	
B1	10	-16.25	ø 4.3 Through hole □ ø 7.5 ▽ 30.8
B2	10	16.25	
B3	45	-16.25	
B4	45	16.25	
B5	80	-16.25	
B6	80	16.25	

Power supply fan: 24VDC, 70mA

Air flow: 15 m³/h

Item	Description	Item-No.
HV01-23	Fan Kit for H01-23, PF02-23, PF03-23	0150-5050

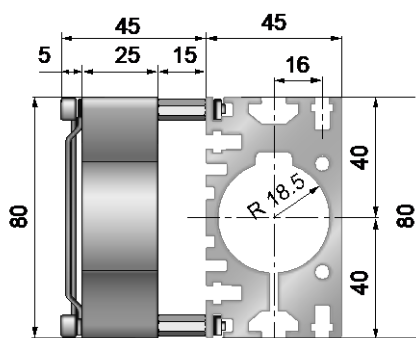
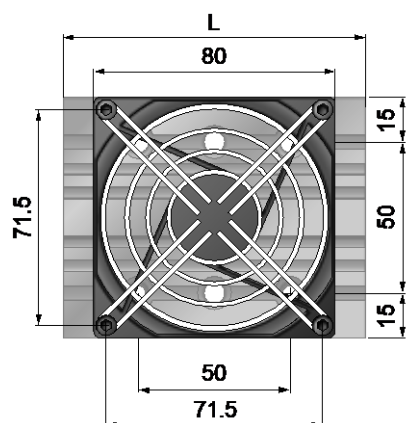


	X-Pos.	Y-Pos.	
B1	10	-16.25	ø 4.3 Through hole □ ø 7.5 ▽ 30.8
B2	10	16.25	
B3	45	-16.25	
B4	45	16.25	
B5	80	-16.25	
B6	80	16.25	
B7	115	-16.25	
B8	115	16.25	
B9	150	-16.25	
B10	150	16.25	

Power supply fan: 24VDC, 70mA

Air flow: 15 m³/h

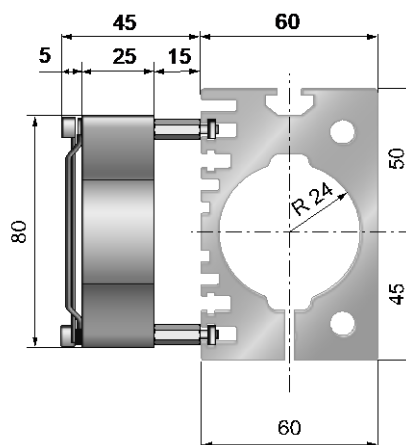
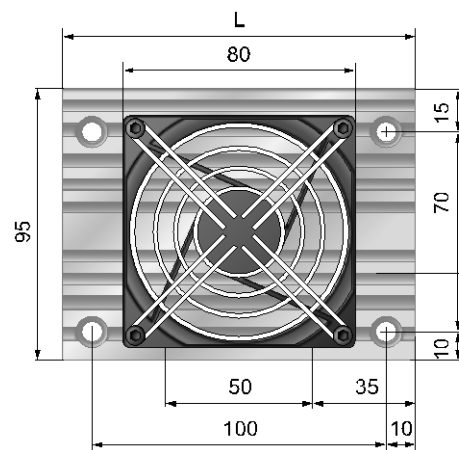
Item	Description	Item-No.
HV01-23	Fan Kit for H01-23, PF02-23, PF03-23	0150-5050



Power supply fan:
24VDC, 120mA

Air flow:
80 m³/h

Item	Description	Item-No.
HV01-37/48	Fan Kit for H01-37, B01-37 and PF02-37	0150-5051

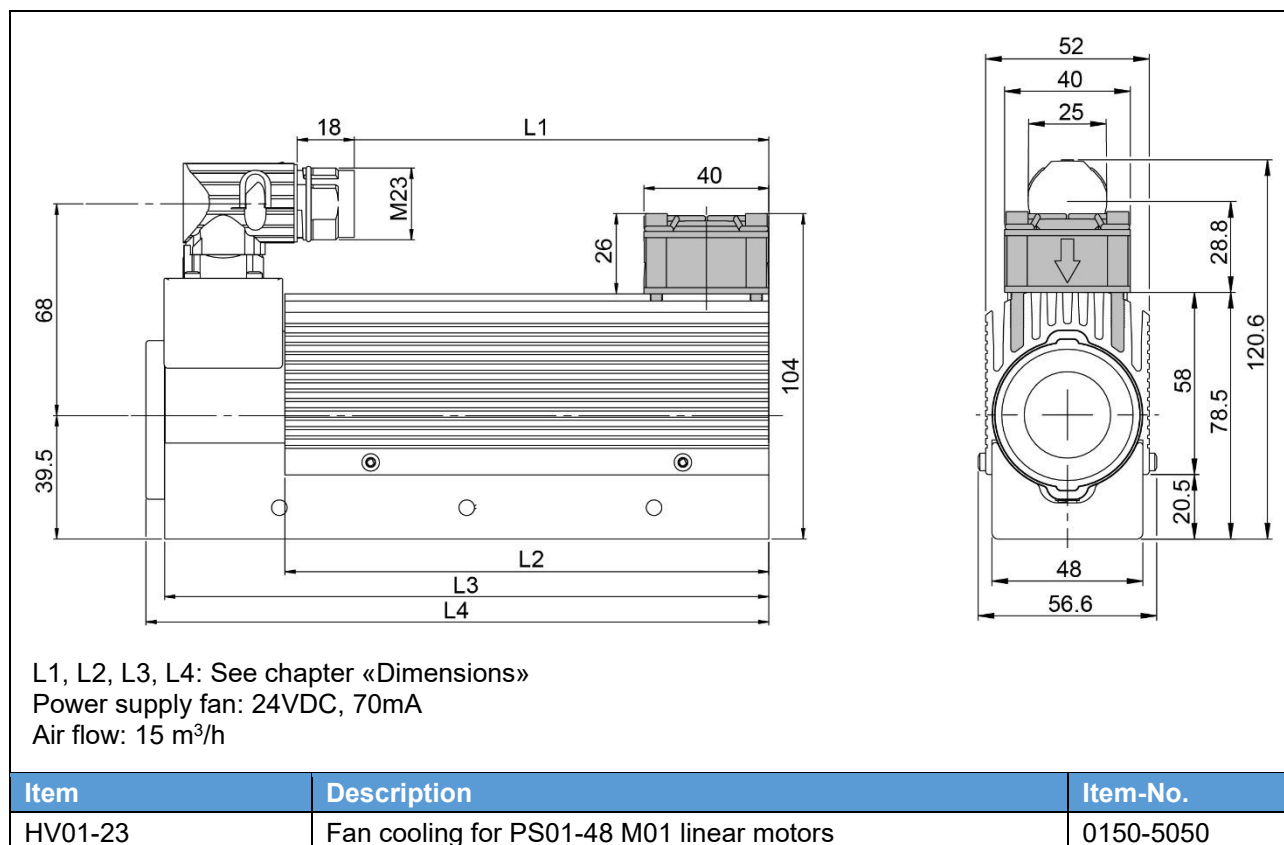


Power supply fan:
24VDC, 120mA

Air flow:
80 m³/h

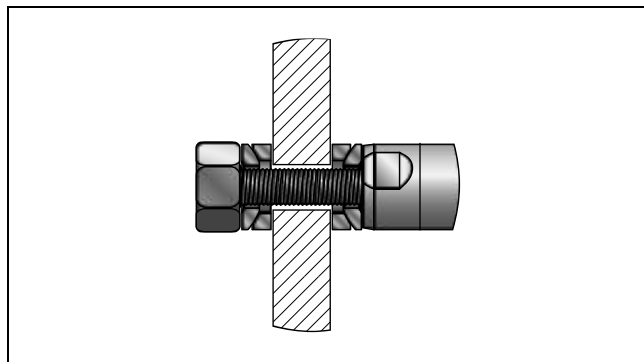
Item	Description	Item-No.
HV01-37/48	Fan Kit for H01-48, B01-48 and PF01-48	0150-5051

5.5 Fan kits for heat sinks

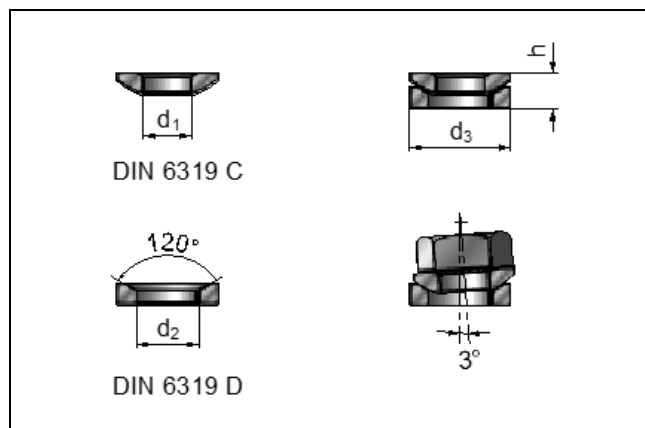


5.6 Slider mounting kits

5.6.1 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.

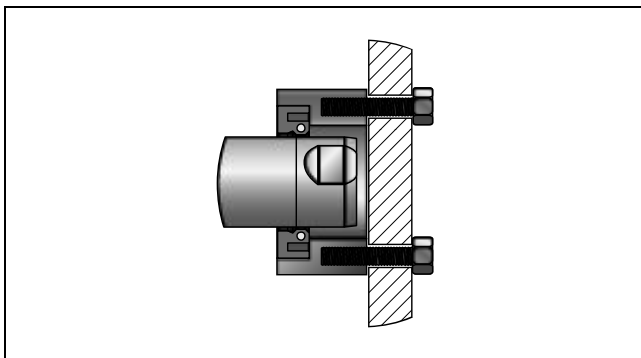


Material

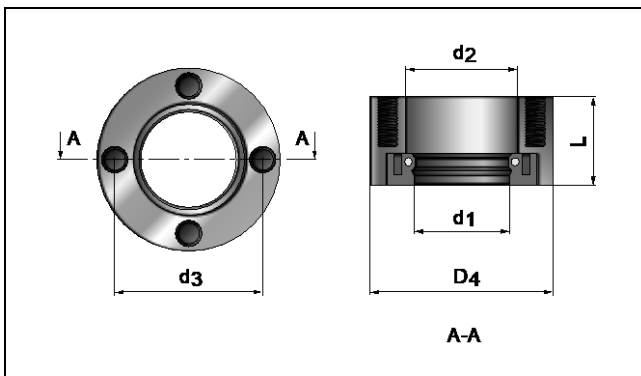
Spherical washer / conical seat: case hardened steel

Item	Item-No.	Slider	Thread	d1	d2	d3	h
PLF01-12	0150-3085	12mm	M5	5.2mm (0.20in)	6.0mm (0.24in)	10.5mm (0.41in)	3.2mm (0.13in)
PLF01-20	0150-3083	20mm	M8	8.4mm (0.33in)	9.6mm (0.38in)	17mm (0.67in)	5.5mm (0.22in)
PLF01-20-SS (Stainless Steel)	0150-3296	19mm 20mm	M8	8.4mm (0.33in)	9.6mm (0.38in)	17mm (0.67in)	5.5mm (0.22in)
PLF01-28	0150-3087	28mm	M10	10.5mm (0.41in)	12mm (0.47in)	21mm (0.83in)	6.5mm (0.26in)
PLF01-28-SS (Stainless Steel)	0150-3297	27mm 28mm	M10	10.5mm (0.41in)	12mm (0.47in)	21mm (0.83in)	6.5mm (0.26in)

5.6.2 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:

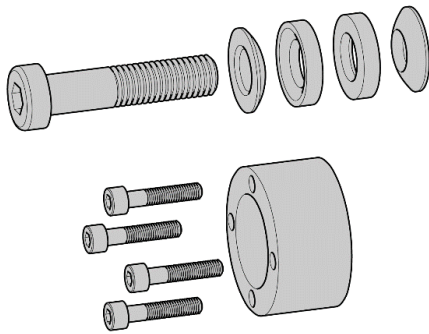
Nitrile butadiene rubber

Spring steel DIN17223

Item	Item-No.	Slider	Thread	d1	d2	d3	D4	L
PLL02-12	0150-3111	12mm	-	12mm (0.47in)	Rubber ring	-	22mm* (0.87in)*	6.6mm* (0.26in)*
PLL01-19	0150-3335	19mm	M5	20mm (0.79in)	23mm (0.90in)	30mm (1.18in)	37mm (1.46in)	20mm (0.79in)
PLL01-20	0150-3084	20mm	M5	20mm (0.79in)	23mm (0.90in)	30mm (1.18in)	37mm (1.46in)	20mm (0.79in)
PLL01-27	0150-3294	27mm	M5	28mm (1.10in)	32mm (1.26in)	40mm (1.57in)	48mm (1.89in)	20mm (0.79in)
PLL01-28	0150-3094	28mm	M5	28mm (1.10in)	32mm (1.26in)	40mm (1.57in)	48mm (1.89in)	20mm (0.79in)

* Mounting hole for rubber ring

5.6.3 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 consisting of: 1 Fixed bearing (0150-3083) 1 Floating bearing (0150-3084) 1 Hexagon socket head screw * DIN 912 / M8, L=35 mm 4 Hexagon socket head screw * DIN 912 / M5, L=20 mm	0150-3079
PLM01-28-MK	Mounting kit for PL01-28 slider consisting of: 1 Fixed bearing (0150-3087) 1 Floating bearing (0150-3094) 1 Hexagon socket head screw * DIN 912 / M10, L=35 mm 4 Hexagon socket head screw * DIN 912 / M5, L=20 mm	0150-3095
* for use with 12 mm (1/2 in) thick mounting plates		

6 Maintenance and test instructions

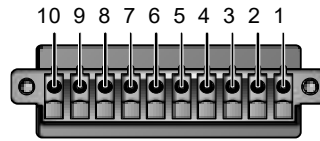
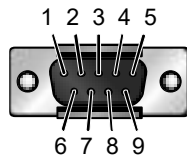
6.1 Stator connector assignment



Do not connect or disconnect motor when there is power on the servo drive.
Use only original LinMot cable. Cables from other sources must be checked precisely before commissioning.
Incorrect connections can destroy the drive and stator.

Connector Type	D-Sub (9 Pole)		P-Connector		M-Connector	
Series	PS01-23x80 PS01-23x160		PS01-37x120 PS01-37x240		PS01-23x...-M PS01-37x...-M	
	PIN	Wire	PIN	Wire	PIN	Wire
Phase1+	1	Red	1	Red	1	Red
Phase1-	6	Pink	2	Pink	2	Pink
Phase2+	2	Blue	3	Blue	3	Blue
Phase2-	7	Grey	4	Grey	4	Grey
+5V	3	White	5	White	5	White
GROUND*	8	Brown	6	Brown	6	Brown
Sensor Sin	4	Yellow	7	Yellow	7	Yellow
Sensor Cos	9	Green	8	Green	8	Green
Temp sensor	5	Black	9	Black	9	Black
SHIELD* of stator and stator cable	Case	Outer shield	10	Inner & outer shield	Case	Inner & outer shield

Connector on the
stator (-cables)



Extension cables are double shielded. The two shields of the extension cables must not be connected together: the inner shield of the extension cables is used as GROUND and must be connected to GROUND*; only the outer shield must be connected to SHIELD* of the connector.

Connector Type	C-Connector	R-Connector
Series	<i>PS01-37x120..-C</i> <i>PS01-37x240..-C</i> <i>PS01-48x..-C</i>	<i>P0S1-23x80..-R</i> <i>PS01-23x160..-R</i>
	PIN	PIN
Phase1+	A	1
Phase1-	B	2
Phase2+	C	3
Phase2-	D	4
+5V	E	A
GROUND*	F	B
Sensor Sin	G	C
Sensor Cos	H	D
Temp sensor	L	E
SHIELD* of stator and stator cable	Case	Case
Connector on the stator (-cables)		



Extension cables are double shielded. The two shields of the extension cables must not be connected together: the inner shield of the extension cables is used as GROUND and must be connected to GROUND*; only the outer shield must be connected to SHIELD* of the connector.

6.2 Stator checking

The following tables show the resistive value between the different connector pins for each stator type. If the value is not within a range of +/- 10% the stator may be damaged (temperature of the stator for all measurements: 20°C).

PS01-23x80 (Item-No. 0150-1201)			
Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 6	10 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 2 / Pin 7	10 Ω
5V / GND	White / Brown	Pin 3 / Pin 8	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin 4 / Pin 8	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin 9 / Pin 8	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin 5 / Pin 8	10.5 k Ω / >20 M Ω^*
Phase / GND	-	Pin 1, 2, 6, 7 / Pin 8	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IJ.xxx

** For stators with serial no. before xxxx.A22.xxx

PS01-23x80-M (Item-No. 0150-1208)			
Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	10 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	10 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10.5 k Ω / >20 M Ω^*
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IJ.xxx

** For stators with serial no. before xxxx.A22.xxx

PS01-23x80-R (Item-No. 0150-1233) PS01-23x80-R20 (Item-No. 0150-1241)			
Phase1+ / Phase1-	Red / Orange	Pin 1 / Pin 2	10 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4(-)	10 Ω
5V / GND	White / Brown	Pin A / Pin B	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin C / Pin B	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin D / Pin B	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin E / Pin B	10.5 k Ω / >20 M Ω^*
Phase / GND	-	Pin 1, 2, 3, 4(-) / Pin B	>20 M Ω
All Pin / Shield	-	Pin 1 – E / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IJ.xxx

** For stators with serial no. before xxxx.A22.xxx

PS01-23x80F-HP-R (Item-No. 0150-1259)
PS01-23x80F-HP-R20 (Item-No. 0150-1260)

Phase1+ / Phase1-	Red / Orange	Pin 1 / Pin 2	4.1 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4(-)	4.1 Ω
5V / GND	White / Brown	Pin A / Pin B	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin C / Pin B	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin D / Pin B	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin E / Pin B	10.5 k Ω / >20 M Ω^*
Phase / GND	-	Pin 1, 2, 3, 4(-) / Pin B	>20 M Ω
All Pin / Shield	-	Pin 1 – E / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IJ.xxx

** For stators with serial no. before xxxx.9E8.xxx

PS01-23x80F-HP-R-2S (Item-No. 0150-21259)

Phase1+ / Phase1-	Red / Orange	Pin 1 / Pin 2	4.2 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4(-)	4.2 Ω
5V / GND	White / Brown	Pin A / Pin B	3.53 k Ω
Sensor Sinus / GND	Yellow / Brown	Pin C / Pin B	>10 M Ω
Sensor Cosine / GND	Green / Brown	Pin D / Pin B	>10 M Ω
Temp. Sensor / GND	Black / Brown	Pin E / Pin B	13.5 k Ω
Phase / GND	-	Pin 1, 2, 3, 4(-) / Pin B	>20 M Ω
All Pin / Shield	-	Pin 1 – E / Housing	>20 M Ω

PS01-23x160 (Item-No. 0150-1202)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 6	20 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 2 / Pin 7	20 Ω
5V / GND	White / Brown	Pin 3 / Pin 8	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin 4 / Pin 8	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin 9 / Pin 8	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin 5 / Pin 8	10.5 k Ω / >20 M Ω^{***}
Phase / GND	-	Pin 1, 2, 6, 7 / Pin 8	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IL.xxx

** For stators with serial no. before xxxx.ADH.xxx

*** For stators with serial no. before xxxx.2VM.xxx

PS01-23x160-M (Item-No. 0150-1209)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	20 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	20 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10.5 k Ω / >20 M Ω^{***}
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IL.xxx

** For stators with serial no. before xxxx.ADH.xxx

*** For stators with serial no. before xxxx.2VM.xxx

PS01-23x160-R (Item-No. 0150-1234)
PS01-23x160-R20 (Item-No. 0150-1242)

Phase1+ / Phase1-	Red / Orange	Pin 1 / Pin 2	20 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4(-)	20 Ω
5V / GND	White / Brown	Pin A / Pin B	930 Ω / 505 Ω^{**} / 275 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin C / Pin B	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin D / Pin B	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin E / Pin B	10.5 k Ω
Phase / GND	-	Pin 1, 2, 3, 4(-) / Pin B	>20 M Ω
All Pin / Shield	-	Pin 1 – E / Housing	>20 M Ω

* For stators with serial no. before xxxx.3IH.xxx

** For stators with serial no. before xxxx.ADH.xxx

PS01-23x160F (Item-No. 0150-1206)
PS01-23x160F-R20 (Item-No. 0150-1243)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	8.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	8.5 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	930 Ω / 505 Ω^*
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10.5 k Ω
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Pin 10	>20 M Ω

* For stators with serial no. before xxxx.ADH.xxx

PS01-23x160H-HP-R (Item-No. 0150-1254)
PS01-23x160H-HP-R20 (Item-No. 0150-1255)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	4.0 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4(-)	4.0 Ω
5V / GND	White / Brown	Pin A / Pin B	930 Ω / 505 Ω^{**}
Sensor Sinus / GND	Yellow / Brown	Pin C / Pin B	37.5 k Ω
Sensor Cosine / GND	Green / Brown	Pin D / Pin B	37.5 k Ω
Temp. Sensor / GND	Black / Brown	Pin E / Pin B	10.5 k Ω
Phase / GND	-	Pin 1, 2, 3, 4(-) / Pin B	>20 M Ω
All Pin / Shield	-	Pin 1 – E / Housing	>20 M Ω

* For stators with serial no. before xxxx.8RE.xxx

PS01-23x160H-HP-R-2S (Item-No. 0150-21254)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	3.8 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4(-)	3.8 Ω
5V / GND	White / Brown	Pin A / Pin B	3.53 k Ω
Sensor Sinus / GND	Yellow / Brown	Pin C / Pin B	>10 M Ω
Sensor Cosine / GND	Green / Brown	Pin D / Pin B	>10 M Ω
Temp. Sensor / GND	Black / Brown	Pin E / Pin B	13.5 k Ω
Phase / GND	-	Pin 1, 2, 3, 4(-) / Pin B	>20 M Ω
All Pin / Shield	-	Pin 1 – E / Housing	>20 M Ω

PS01-37x120 (Item-No. 0150-1204)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	6 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	6 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	155 Ω / 275 Ω*
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	33 kΩ / 40 kΩ*
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	33 kΩ / 40 kΩ*
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10 kΩ / >20 MΩ*
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 MΩ
All Pin / Shield	-	Pin 1 – 9 / Pin 10	>20 MΩ

* For stators with serial no. before xxxx.38A.xxx

PS01-37x120-M (Item-No. 0150-1210)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	6 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	6 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	155 Ω / 275 Ω*
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	33 kΩ / 40 kΩ*
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	33 kΩ / 40 kΩ*
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10 kΩ / >20 MΩ*
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 MΩ
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 MΩ

* For stators with serial no. before xxxx.38A.xxx

PS01-37x120-C (Item-No. 0150-1223)**PS01-37x120-C20 (Item-No. 0150-1237)**

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	6 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	6 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω / 275 Ω*
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 kΩ / 40 kΩ*
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 kΩ / 40 kΩ*
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 kΩ / >20 MΩ*
Phase / GND	-	Pin A, B, C, D / Pin F	>20 MΩ
All Pin / Shield	-	Pin A-L / Housing	>20 MΩ

* For stators with serial no. before xxxx.38A.xxx

PS01-37x120F-HP-C (Item-No. 0150-1251)**PS01-37x120F-HP-C20 (Item-No. 0150-1252)**

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	2.6 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	2.6 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 kΩ
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 kΩ
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 kΩ
Phase / GND	-	Pin A, B, C, D / Pin F	>20 MΩ
All Pin / Shield	-	Pin A-L / Housing	>20 MΩ

PS01-37x120F-HP-C-2S (Item-No. 0150-21251)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	2.33 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	2.33 Ω
5V / GND	White / Brown	Pin E / Pin F	160 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	>10 M Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	>10 M Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-37x120H-HP-C (Art.-Nr. 0150-6183)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	0.9 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	0.9 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-37x240 (Item-No. 0150-1203)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	11.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	11.5 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	155 Ω / 275 Ω *
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	33 k Ω / 40 k Ω *
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	33 k Ω / 40 k Ω *
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10 k Ω / >20 M Ω *
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Pin 10	>20 M Ω

* For stators with serial no. before xxxx.38A.xxx

PS01-37x240-M (Item-No. 0150-1211)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	11.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	11.5 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	155 Ω / 275 Ω *
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	33 k Ω / 40 k Ω *
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	33 k Ω / 40 k Ω *
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10 k Ω / >20 M Ω *
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 M Ω

* For stators with serial no. before xxxx.38A.xxx

PS01-37x240-C (Item-No. 0150-1224)
PS01-37x240-C20 (Item-No. 0150-1238)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	11.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	11.5 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω / 275 Ω *
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω / 40 k Ω *
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω / 40 k Ω *
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10k Ω / >20M Ω *
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

* For stators with serial no. before xxxx.38A.xxx

PS01-37x240F-M (Item-No. 0150-1213)

Phase1+ / Phase1-	Red / Pink	Pin 1 / Pin 2	4.8 Ω
Phase2+ / Phase2-	Blue / Gray	Pin 3 / Pin 4	4.8 Ω
5V / GND	White / Brown	Pin 5 / Pin 6	155 Ω / 275 Ω *
Sensor Sinus / GND	Yellow / Brown	Pin 7 / Pin 6	33 k Ω / 40 k Ω *
Sensor Cosine / GND	Green / Brown	Pin 8 / Pin 6	33 k Ω / 40 k Ω *
Temp. Sensor / GND	Black / Brown	Pin 9 / Pin 6	10k Ω / >20M Ω *
Phase / GND	-	Pin 1, 2, 3, 4 / Pin 6	>20 M Ω
All Pin / Shield	-	Pin 1 – 9 / Housing	>20 M Ω

* For stators with serial no. before xxxx.38A.xxx

PS01-37x240F-C (Item-No. 0150-1225)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	4.8 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	4.8 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω / 275 Ω *
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω / 40 k Ω *
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω / 40 k Ω *
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10k Ω / >20M Ω *
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

* For stators with serial no. before xxxx.38A.xxx

PS01-48x150G-HP-C (Item-No. 0150-2992)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	1.0 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.0 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-48x150G-HP-C-M01 (Item-No. 0150-4800)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	1.0 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.0 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-48x150G-HP-C-2S (Item-No. 0150-22992)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	0.79 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	0.79 Ω
5V / GND	White / Brown	Pin E / Pin F	160 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	>10 M Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	>10 M Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-48x240-C (Item-No. 0150-1219)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	3.1 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	3.1 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω / >20 M Ω **
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω / >20 M Ω **
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

** For stators with serial no. before xxxx.3IK.xxx

PS01-48x240F-C (Item-No. 0150-1220)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	1.1 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.1 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω / >20 M Ω **
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω / >20 M Ω **
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

** For stators with serial no. before xxxx.3IK.xxx

PS01-48x240F-C-2S (Item-No. 0150-21220)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	0.95 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	0.95 Ω
5V / GND	White / Brown	Pin E / Pin F	160 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	>10 M Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	>10 M Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

P01-48x240F-HP-C (Item-No. 0150-2991)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	1.1 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.1 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

P01-48x240F-HP-C-M01 (Item-No. 0150-4801)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	1.1 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.1 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

P01-48x240F-HP-C-2S (Item-No. 0150-22991)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	0.95 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	0.95 Ω
5V / GND	White / Brown	Pin E / Pin F	160 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	>10 M Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	>10 M Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-48x360F-C (Item-No. 0150-1269)

Phase1+ / Phase1-	Red / Orange	Pin A / Pin B	1.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.5 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω / >20 M Ω **
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω / >20 M Ω **
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

** For stators with serial no. before xxxx.3IK.xxx

PS01-48x360F-HP-C (Item-No. 0150-2993)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	1.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.5 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

PS01-48x360F-HP-C-M01 (Item-No. 0150-4802)

Phase1+ / Phase1-	Red / Pink	Pin A / Pin B	1.5 Ω
Phase2+ / Phase2-	Blue / Gray	Pin C / Pin D	1.5 Ω
5V / GND	White / Brown	Pin E / Pin F	155 Ω
Sensor Sinus / GND	Yellow / Brown	Pin G / Pin F	33 k Ω
Sensor Cosine / GND	Green / Brown	Pin H / Pin F	33 k Ω
Temp. Sensor / GND	Black / Brown	Pin L / Pin F	10 k Ω
Phase / GND	-	Pin A, B, C, D / Pin F	>20 M Ω
All Pin / Shield	-	Pin A-L / Housing	>20 M Ω

6.3 Maintenance of linear motors

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

6.3.1 Mounting

Sliders with a length $\leq$ 500 mm (20 in) are to be inserted in a clean condition 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.

6.3.2 Inspection

Inspections have to be executed according to the operating condition and the load of motors. Following points have to be checked during inspection:

- Is a film of lubricant on the slider? If not -> Lubrication
- Is the wiper (if existent) without visible wear? If not -> Replace wipers
- Is the lubricant homogeneous and not decomposed? In case of negation -> Cleaning (stator, slider) + Lubrication
- Can the slider be moved easily? If not -> Cleaning (stator, slider) + Lubrication

6.3.3 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'.

6.3.4 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

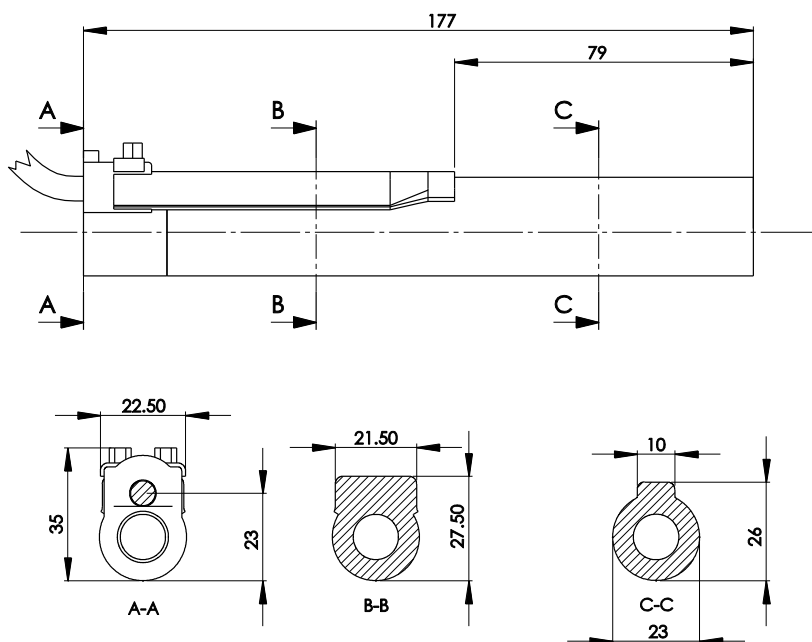
* LinMot Spray LU06 corresponds to KLÜBERFOOD NH1 4-002 which was developed for the food processing industry.
 ** LinMot LU02 Lubricant corresponds to KLÜBERSYNTH UH1 14-31 which was developed for the food processing industry.

7 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 (for higher values contact LinMot) above sea level.
Above 1'000m, a derating of 0.5% per 100m must be taken into account for the nominal force in case of air cooling.

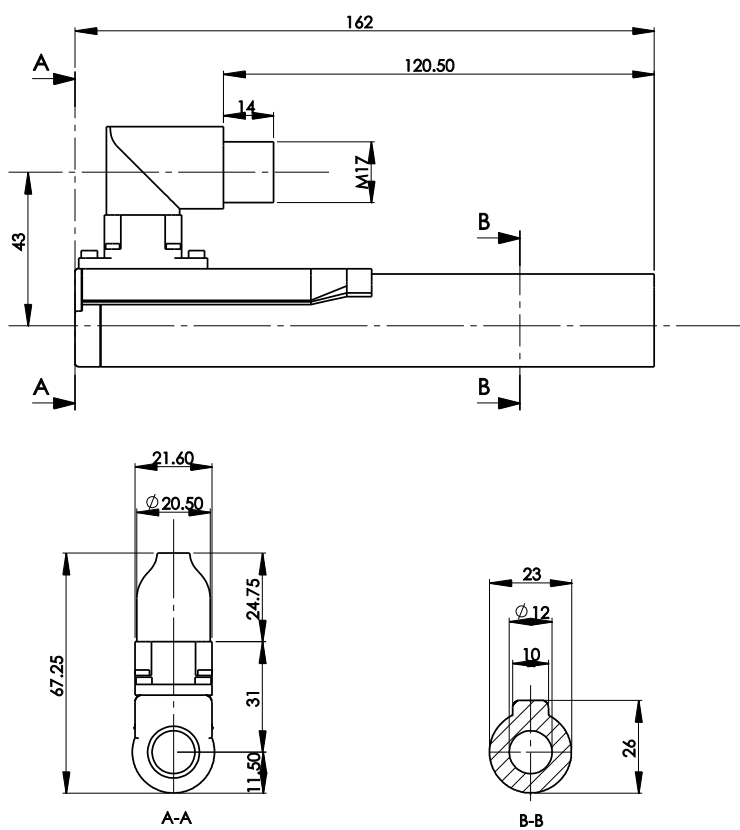
8 Dimensions of stators

8.1 PS01-23x80



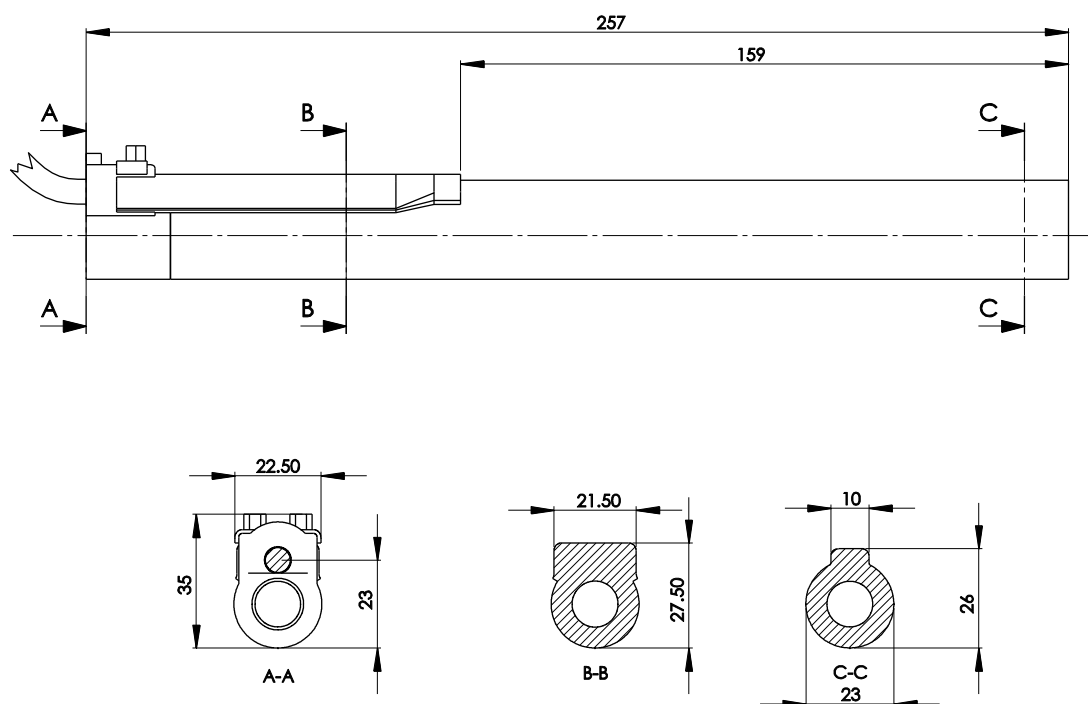
(in mm)

8.2 PS01-23x80-R



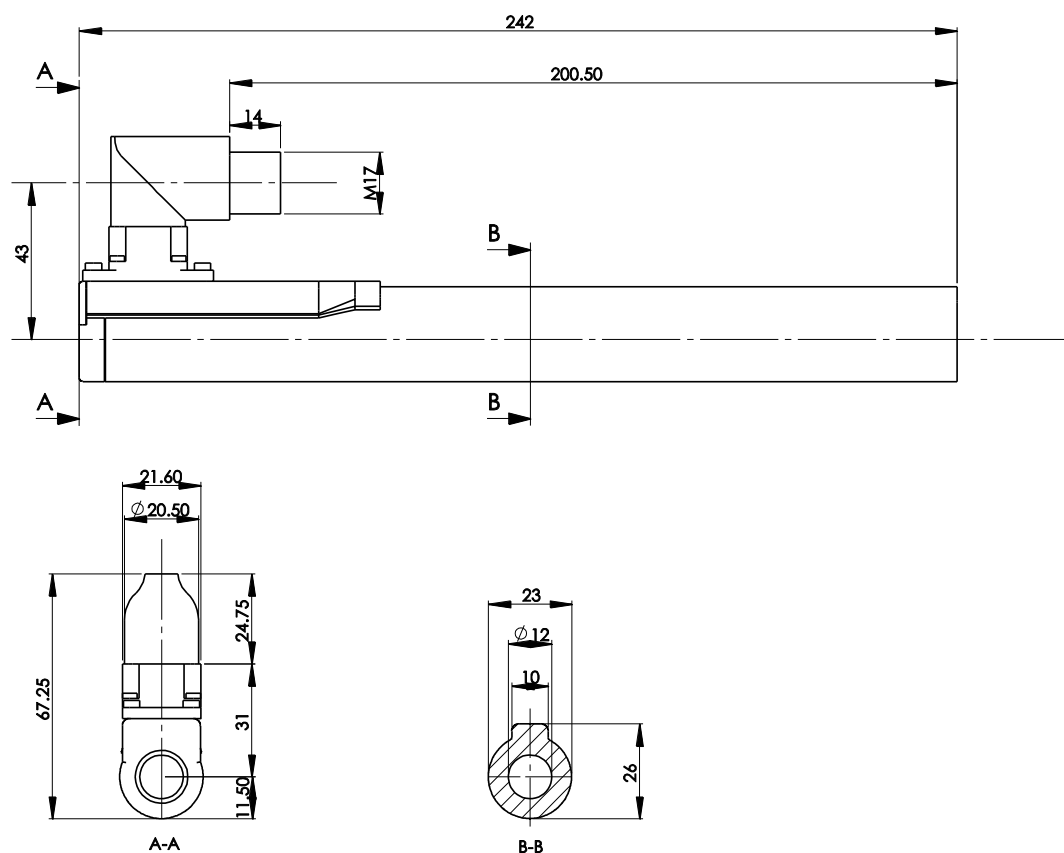
(in mm)

8.3 PS01-23x160



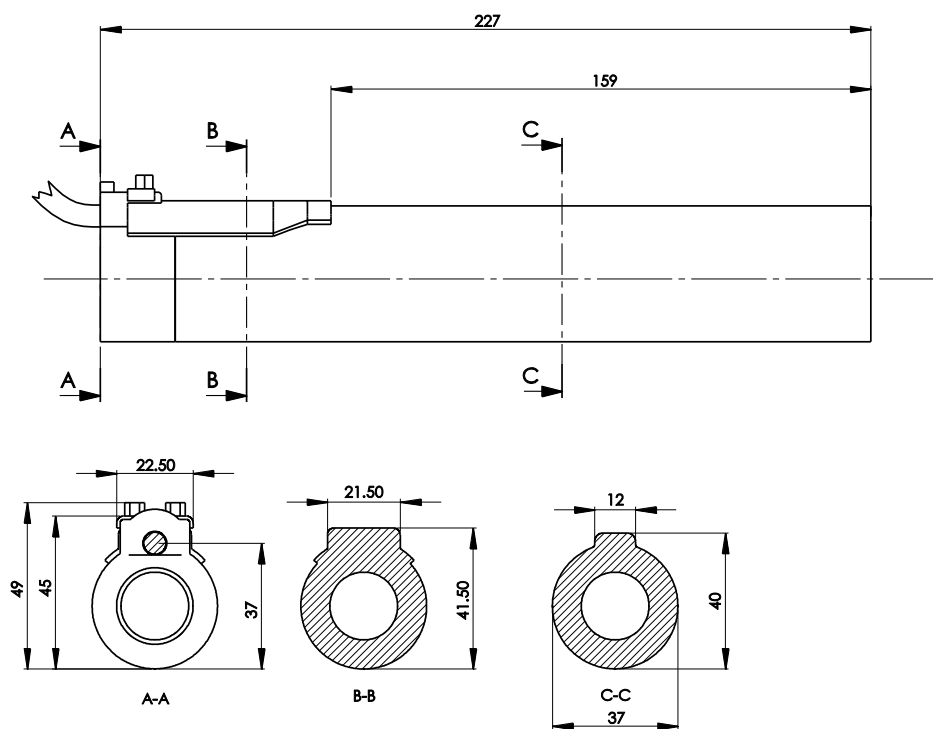
(in mm)

8.4 PS01-23x160-R



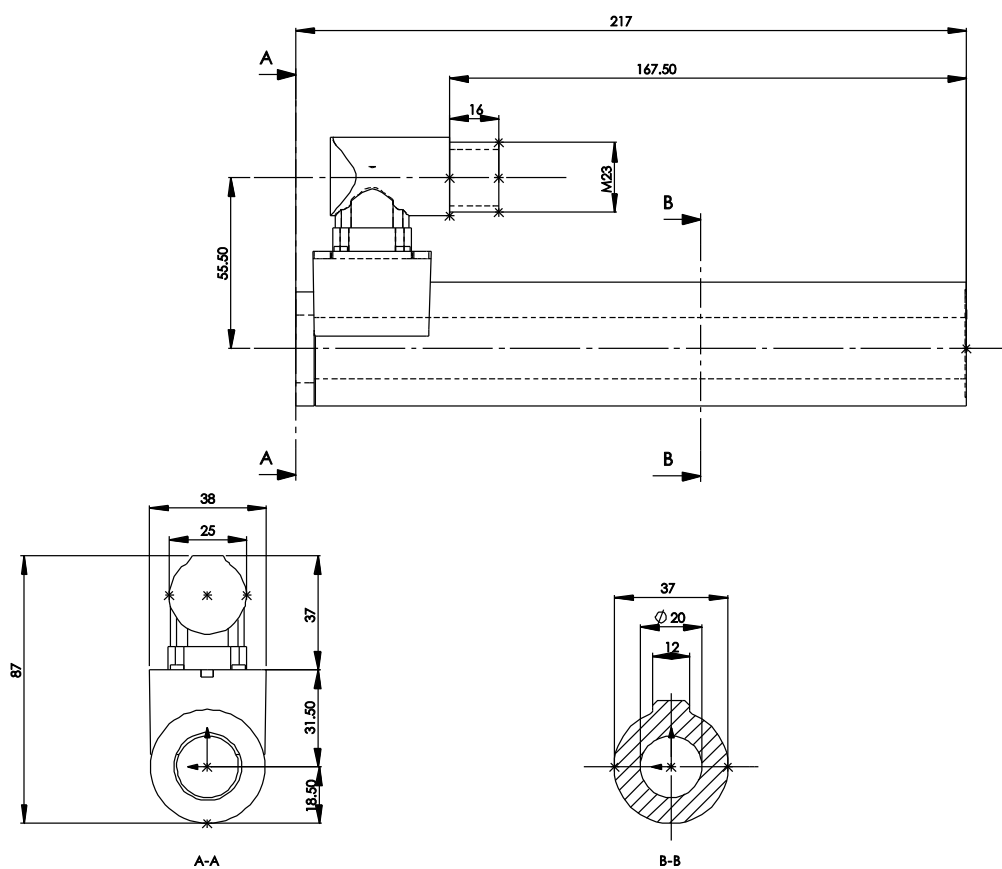
(in mm)

8.5 PS01-37x120



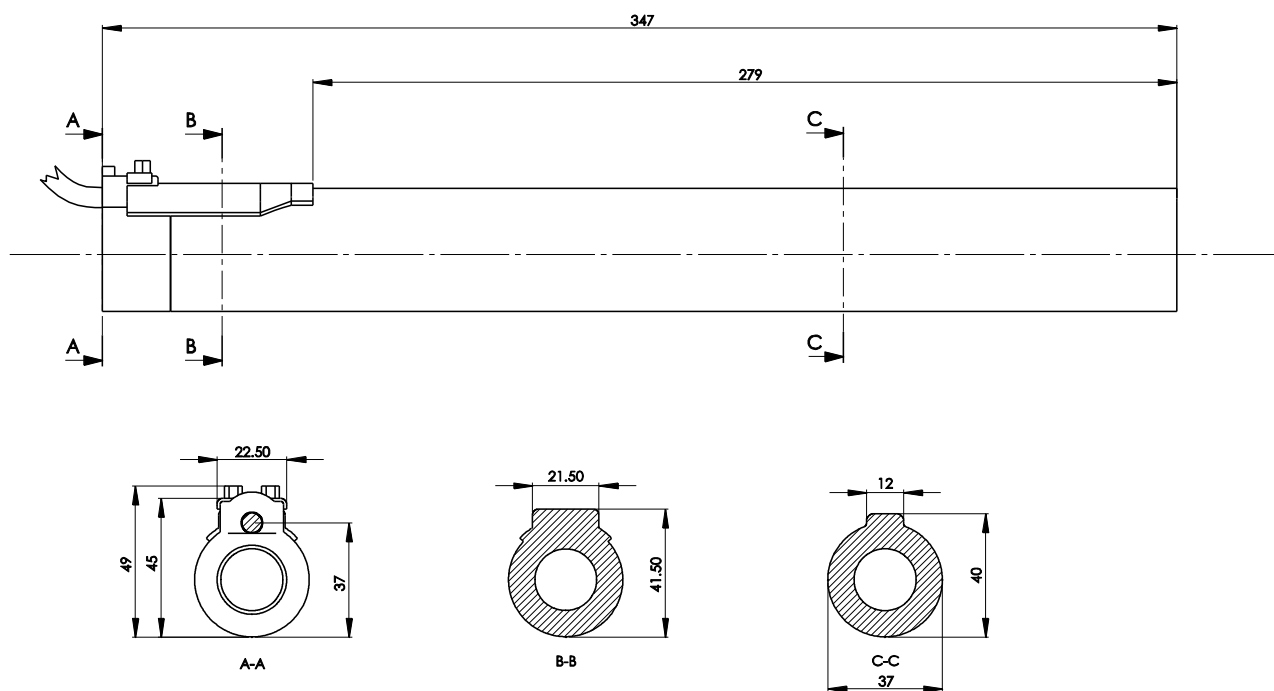
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8.6 PS01-37x120-C



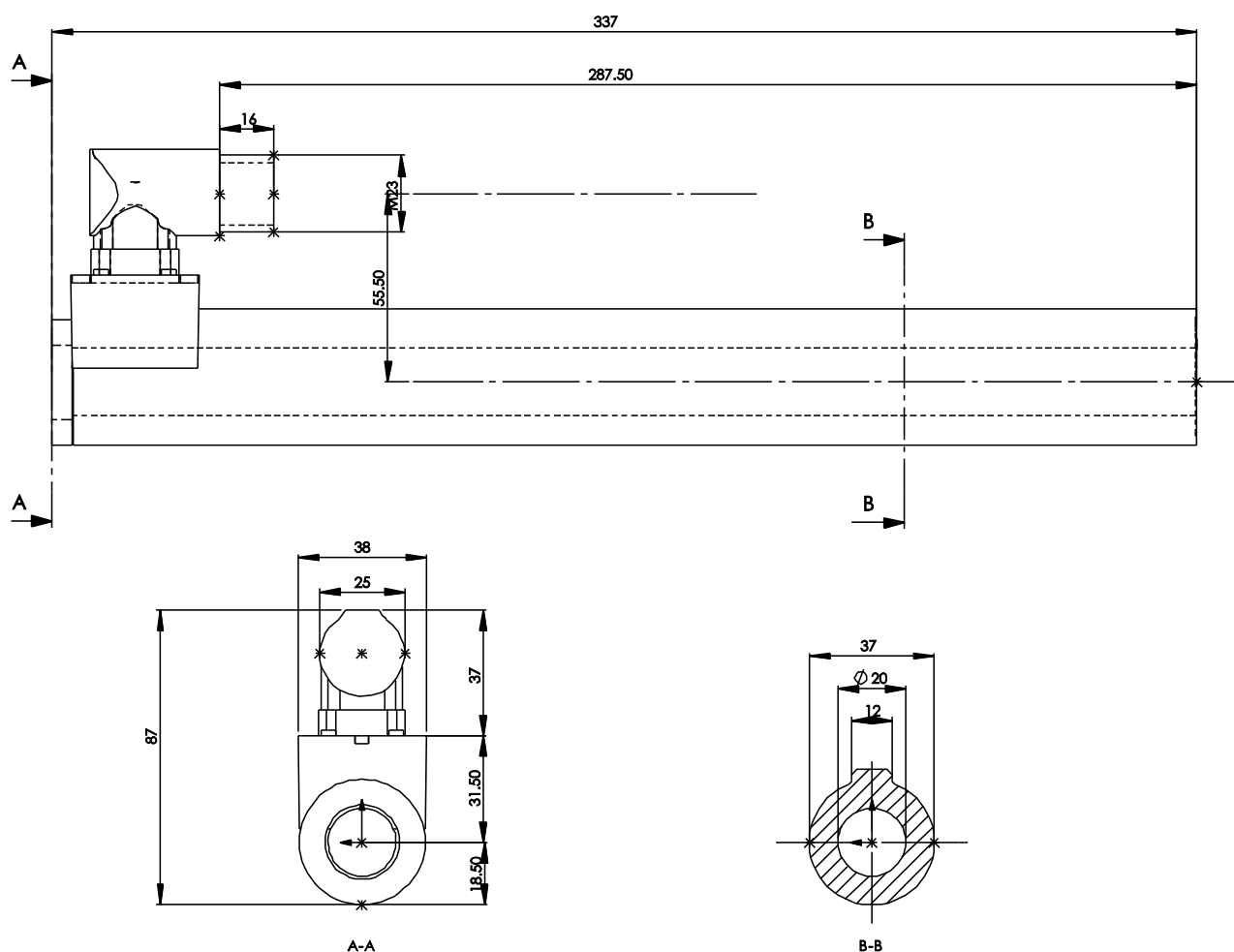
(in mm)

8.7 PS01-37x240

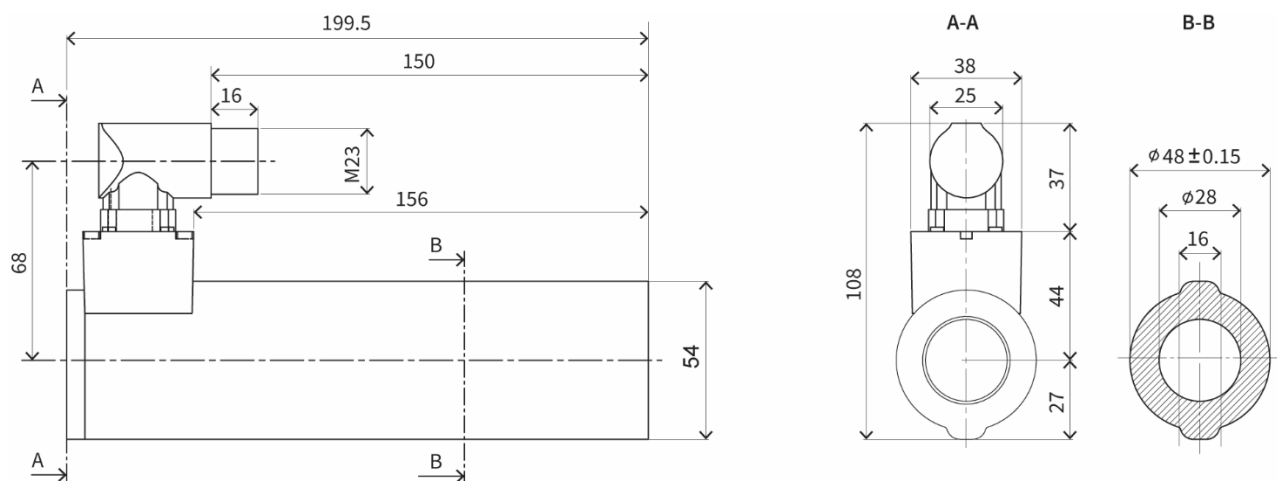


(in mm)

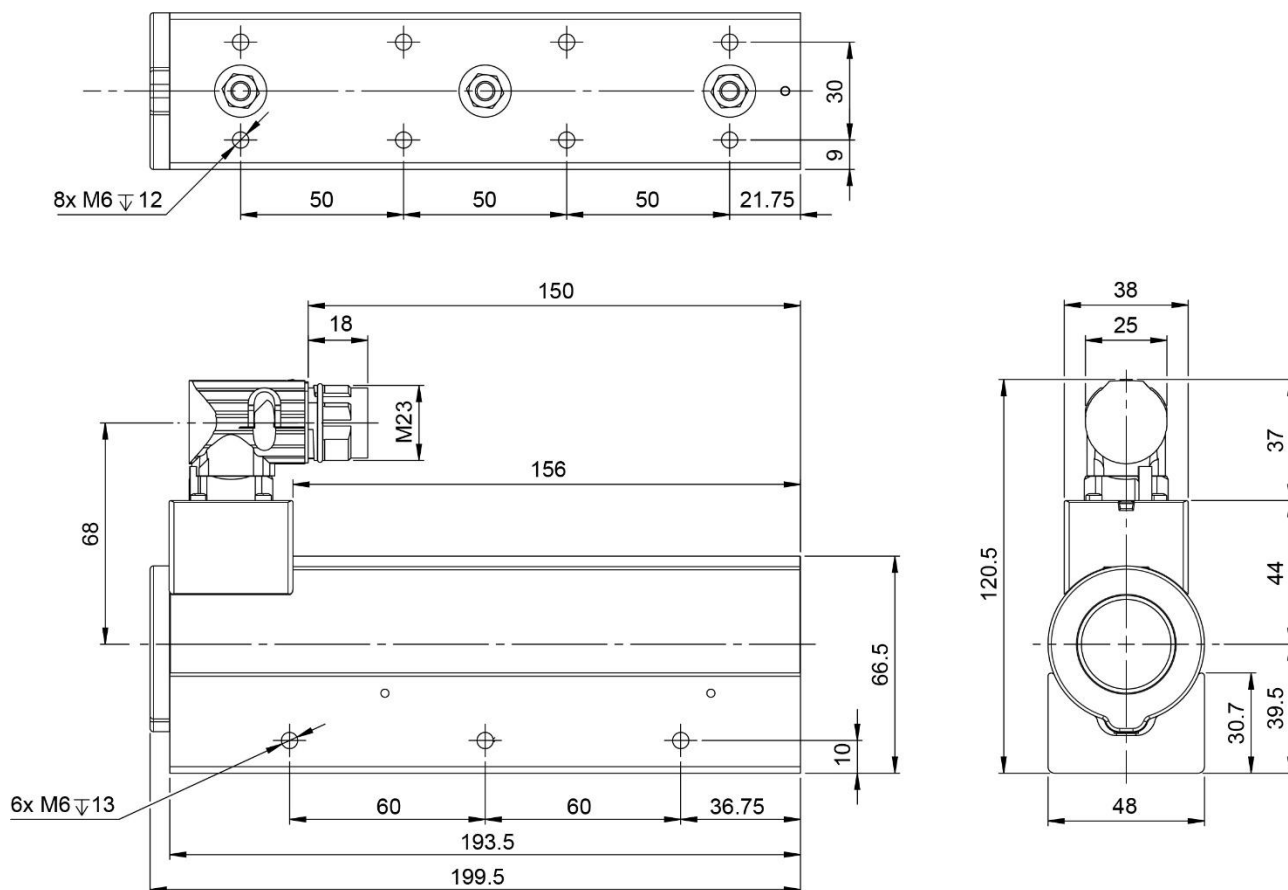
8.8 PS01-37x240-C



(in mm)

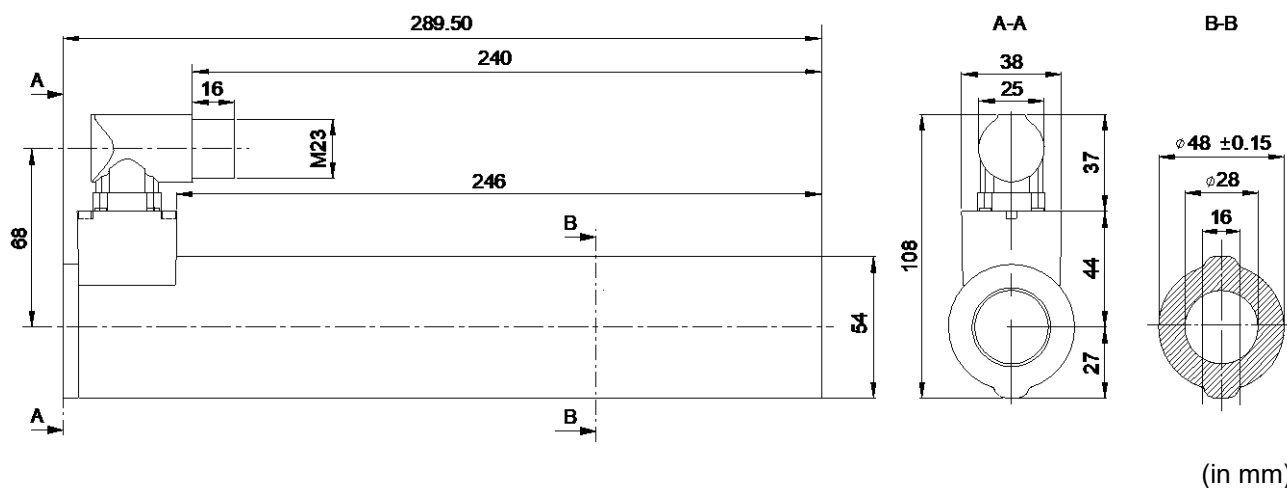
8.9 PS01-48x150G-HP-C

(in mm)

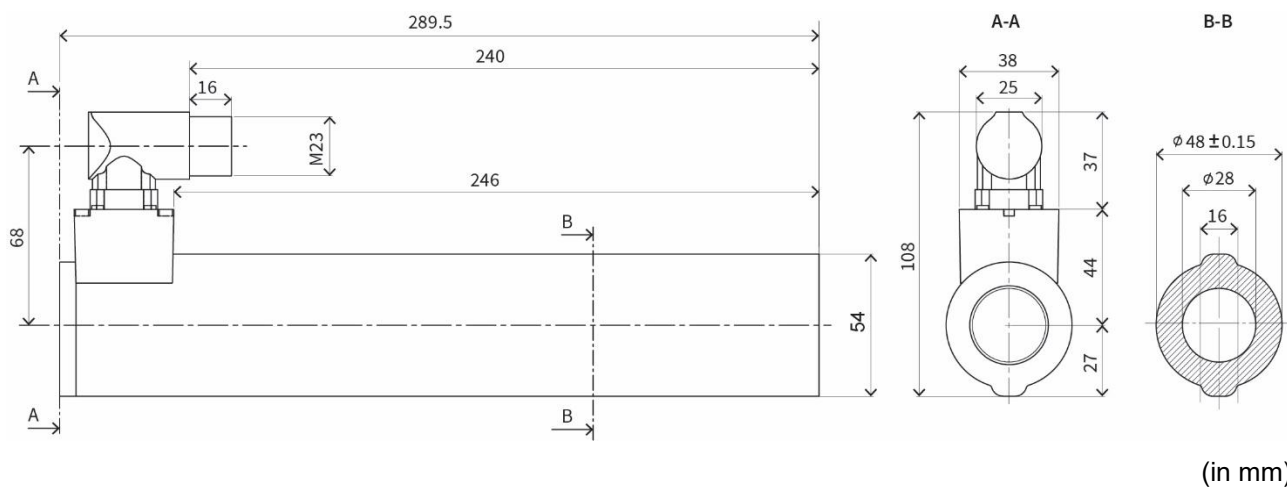
8.10 PS01-48x150G-HP-C-M01

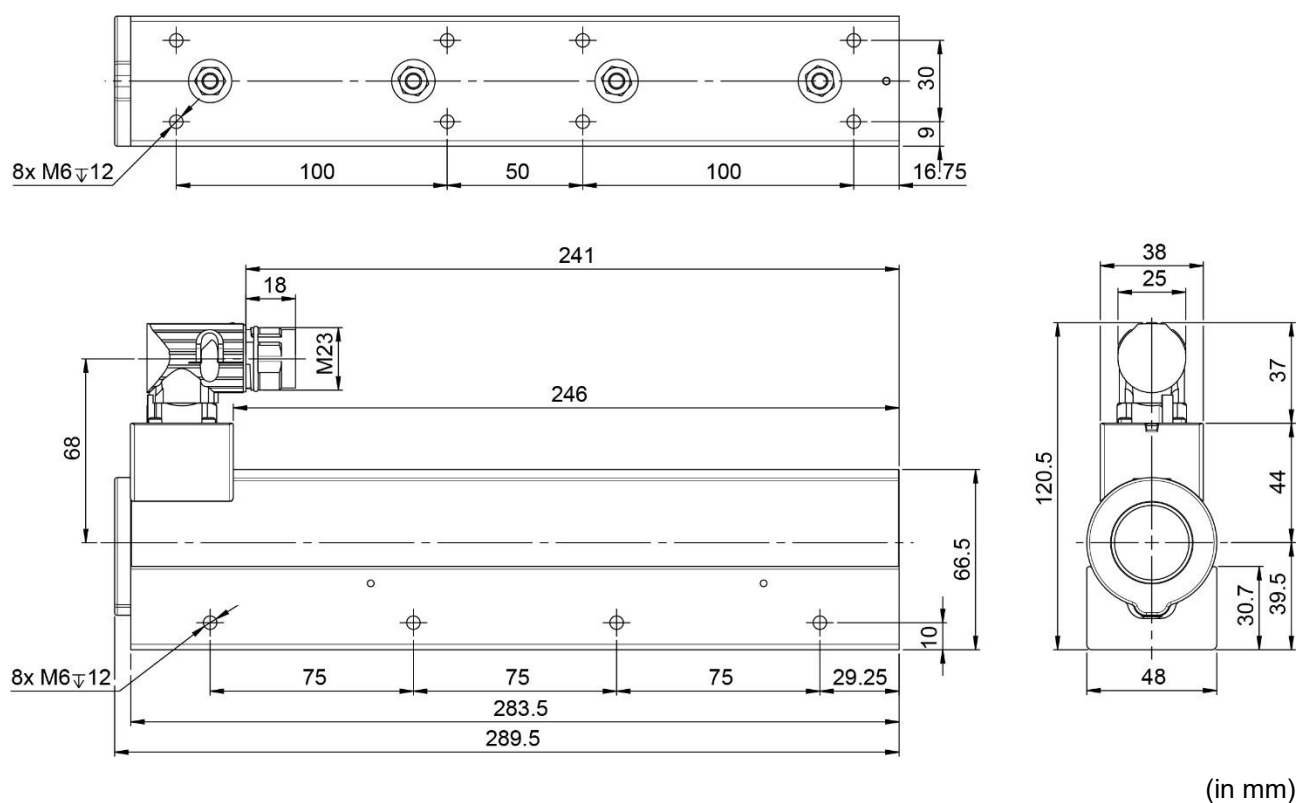
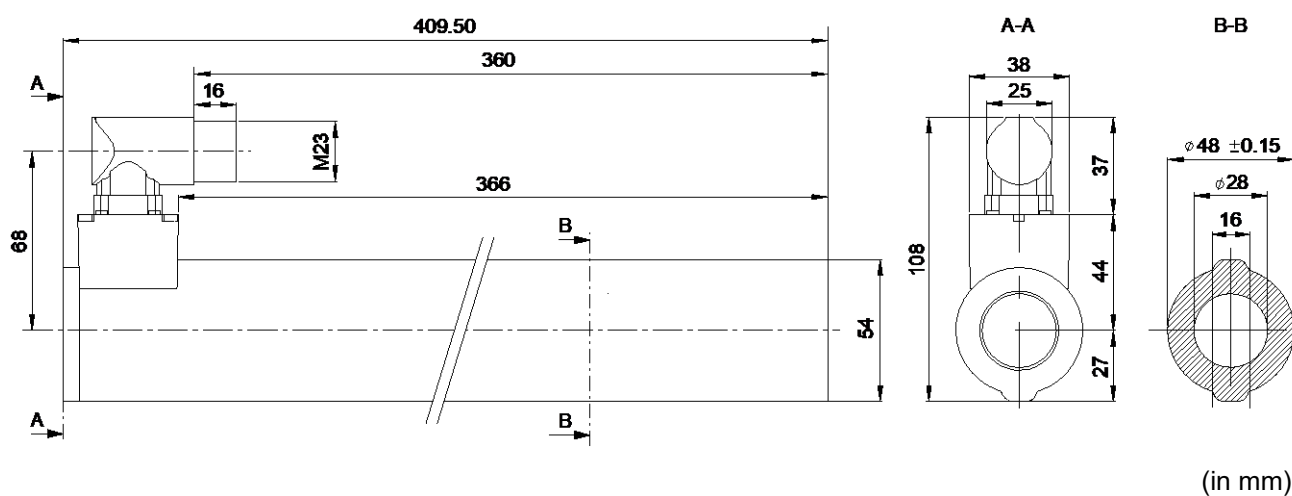
(in mm)

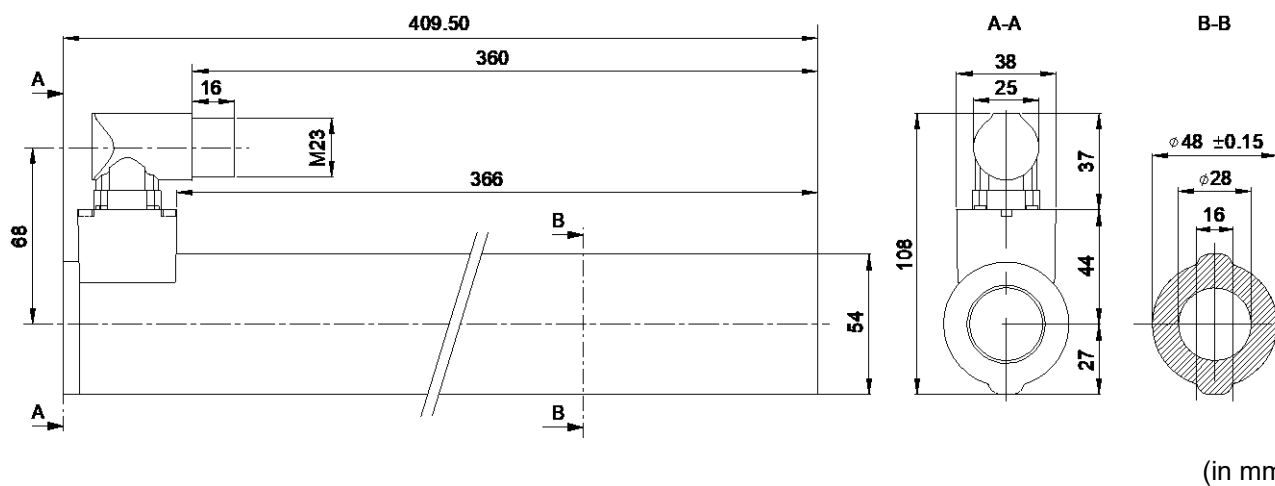
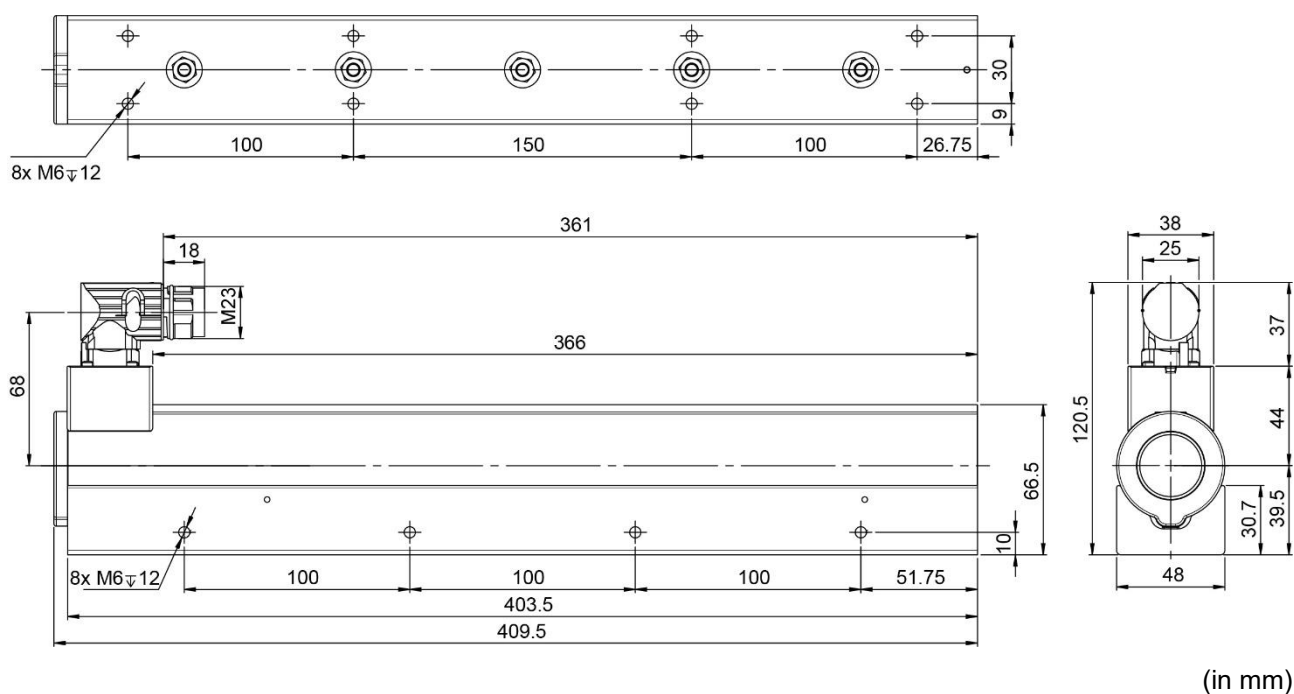
8.11 PS01-48x240-C



8.12 PS01-48x240F-HP-C



8.13 PS01-48x240F-HP-C-M01**8.14 PS01-48x360-C**

8.15 PS01-48x360F-HP-C**8.16 PS01-48x360F-HP-C-M01**

9 International Certificates

Europe 	See chapter “EU Declaration of Conformity CE-Marking”
UK 	See chapter “UK Declaration of Conformity UKCA-Marking”
IECEE CB SCHEME	Ref. Certif. Nr. CH-8521 Ref. Certif. Nr. CH-11537
USA / Canada 	File Number E354430 Refers to cURus marked motors

		Ref. Certif. No. CH-8521
IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME		
CB TEST CERTIFICATE		
Product	Linear motor	
Name and address of the applicant	NTI AG Bodenackerstrasse 2 SWITZERLAND 8957 Spreitenbach	
Name and address of the manufacturer	NTI AG Bodenackerstrasse 2 SWITZERLAND 8957 Spreitenbach	
Name and address of the factory	NTI AG Bodenackerstrasse 2 SWITZERLAND 8957 Spreitenbach	
<i>Note: When more than one factory, please report on page 2</i> Ratings and principal characteristics	☐ Additional Information on page 2 supplied via servo drive, see TR 17-EL-0006.E02 for details	
Trade mark (if any)	LinMot	
Customers's Testing Facility (CTF) Stage used	---	
Model / Type Ref.	PR series PS series P04 series P05 series	
Additional information (if necessary may also be reported on page 2)	---	
A sample of product was tested and found to be in conformity with IEC	☐ Additional Information on page 2 IEC 61000-6-2:2016 IEC 61000-6-4:2006, IEC 61000-6-4:2006/AMD1:2010 IEC 61000-6-7:2014	
National differences	EU Group Differences; EU Special National Conditions; EU A-Deviations	
As shown in the Test Report Ref. No. which forms part of this Certificate	17-EL-0006.E01 + .E02 + .Z01	

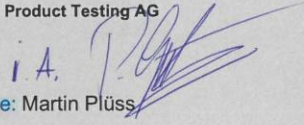
This CB Test Certificate is issued by the National Certification Body

Electrosuisse
 Luppenstrasse 1
 8320 Fehraltorf
 SWITZERLAND

Signed by: Martin Plüss
 Date: 2017-03-13




page 1 of 1

		Ref. Certif. No. CH-11537													
IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME															
CB TEST CERTIFICATE															
Product	Linear motor														
Name and address of the applicant	NTI AG Bodenackerstrasse 2, 8957 Spreitenbach Switzerland														
Name and address of the manufacturer	NTI AG Bodenackerstrasse 2, 8957 Spreitenbach Switzerland														
Name and address of the factory	NTI AG Bodenackerstrasse 2, 8957 Spreitenbach Switzerland														
Note: When more than one factory, please report on page 2 Ratings and principal characteristics	<table border="0"> <tr> <td>PS01-48x240F-HP-C-2S:</td> <td>72V / 5.7A</td> <td>PS01-48x240F-C-2S:</td> <td>72V / 4.7A</td> </tr> <tr> <td>PS01-48x150G-HP-C-2S:</td> <td>72V / 5.0A</td> <td>PS01-37x120F-HP-C-2S:</td> <td>72V / 2.1A</td> </tr> <tr> <td>PS01-23x160H-HP-R-2S:</td> <td>72V / 1.8A</td> <td>PS01-23x80F-HP-R-2S:</td> <td>72V / 1.2A</td> </tr> </table>			PS01-48x240F-HP-C-2S:	72V / 5.7A	PS01-48x240F-C-2S:	72V / 4.7A	PS01-48x150G-HP-C-2S:	72V / 5.0A	PS01-37x120F-HP-C-2S:	72V / 2.1A	PS01-23x160H-HP-R-2S:	72V / 1.8A	PS01-23x80F-HP-R-2S:	72V / 1.2A
PS01-48x240F-HP-C-2S:	72V / 5.7A	PS01-48x240F-C-2S:	72V / 4.7A												
PS01-48x150G-HP-C-2S:	72V / 5.0A	PS01-37x120F-HP-C-2S:	72V / 2.1A												
PS01-23x160H-HP-R-2S:	72V / 1.8A	PS01-23x80F-HP-R-2S:	72V / 1.2A												
Trademark / Brand (if any)	LinMot														
Customer Test Facility (CTF) Stage used	./.														
Model / Type Ref.	PS01-48x240F-HP-C-2S PS01-48x240F-C-2S PS01-48x150G-HP-C-2S PS01-37x120F-HP-C-2S PS01-23x160H-HP-R-2S PS01-23x80F-HP-R-2S														
Additional information (if necessary may also be reported on page 2)	National Differences specified in the CB Test Report														
A sample of the product was tested and found to be in conformity with	IEC 61000-3-2:2018 IEC 61000-3-2:2018/AMD1:2020 IEC 61000-3-3:2013 IEC 61000-3-3:2013/AMD1:2017 IEC 61000-6-2:2016 IEC 61000-6-4:2018 IEC 61326-3-1:2017														
As shown in the Test Report Ref. No. which forms part of this Certificate	21CH-00310.E01, .Z02														
This CB Test Certificate is issued by the National Certification Body															
		Eurofins Electric & Electronic Product Testing AG Luppenstrasse 3 8320 Fehraltorf SWITZERLAND													
Date: 2022-02-28		Signature: Martin Plüss 													

1/1

T01_V04

CERTIFICATE OF COMPLIANCE

Certificate Number 20171024-E354430
Report Reference E354430-20171023
Issue Date 2017-OCTOBER-24

Issued to: NTI AG
Bodenaeckerstr 2,
8957 SPREITENBACH SWITZERLAND

**This is to certify that
representative samples of**

**COMPONENT - INCOMPLETE ROTATING MACHINES
AND ROTATING MACHINE PARTS**

Class A Insulated Linear Motor models Series PS01 and
PS02

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 1004-1 - Rotating Electrical Machines – General
Requirements

CAN/CSA C22.2 No. 100 - Motors and generators

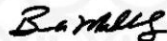
Additional Information: See the UL Online Certifications Directory at
www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's
Certification and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog
number, model number or other product designation as specified under "Marking" for the particular
Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products
that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark:
 may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is
required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual
recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance
capabilities and are intended for use as components of complete equipment submitted for investigation rather
than for direct separate installation in the field. The final acceptance of the component is dependent upon its
installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.



Bruce Mahrenholz, Director North American Certification Program
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please
contact a local UL Customer Service Representative at <http://ul.com/aboutul/locations/>



10 EU Declaration of Conformity CE-Marking

NTI AG / LinMot ®
Bodenaeckerstrasse 2
8957 Spreitenbach

Switzerland

Tel.: +41 (0)56 419 91 91

Fax: +41 (0)56 419 91 92

declares under sole responsibility the compliance of the products:

- Linear Motors of the Series **PS01-23**
- Linear Motors of the Series **PS01-23 2S**
- Linear Motors of the Series **PS01-37**
- Linear Motors of the Series **PS01-37 2S**
- Linear Motors of the Series **PS01-48**
- Linear Motors of the Series **PS01-48 2S**
- Linear Motors of the Series **PS01-48 M01**

with the EMC Directive 2014/30/EU.

Applied harmonized standards:

- **EN 61000-6-2: 2005 (Immunity for industrial environments)**
- **EN 61000-6-4: 2007 + A1: 2011 (Emission for industrial environments)**

According to the EMC directive, the listed devices are not independently operable products.

Compliance of the directive requires the correct installation of the product, the observance of specific installation guides and product documentation. This was tested on specific system configurations.

The safety instructions of the manuals are to be considered.

The product must be mounted and used in strict accordance with the installation instructions contained within the installation guide, a copy of which may be obtained from NTI AG.

Company: NTI AG
Spreitenbach, 05.08.2026



Dr.-Ing. Ronald Rohner
CEO NTI AG

11 UK Declaration of Conformity UKCA-Marking

NTI AG / LinMot ®
Bodenaeckerstrasse 2
8957 Spreitenbach

Switzerland

Tel.: +41 (0)56 419 91 91

Fax: +41 (0)56 419 91 92

declares under sole responsibility the compliance of the products:

- Linear Motors of the Series **PS01-23**
- Linear Motors of the Series **PS01-23 2S**
- Linear Motors of the Series **PS01-37**
- Linear Motors of the Series **PS01-37 2S**
- Linear Motors of the Series **PS01-48**
- Linear Motors of the Series **PS01-48 2S**
- Linear Motors of the Series **PS01-48 M01**

with the EMC Regulation S.I. 2016 No. 1091.

Applied designated standards:

- **EN 61000-6-2: 2005 (Immunity for industrial environments)**
- **EN 61000-6-4: 2007 + A1: 2011 (Emission for industrial environments)**

According to the EMC regulation, the listed devices are not independently operable products.

Compliance of the regulation requires the correct installation of the product, the observance of specific installation guides and product documentation. This was tested on specific system configurations.

The safety instructions of the manuals are to be considered.

The product must be mounted and used in strict accordance with the installation instructions contained within the installation guide, a copy of which may be obtained from NTI AG.

Company: NTI AG
Spreitenbach, 05.08.2026



Dr.-Ing. Ronald Rohner
CEO NTI AG

ALL LINEAR MOTION FROM A SINGLE SOURCE

Europe / Asia Headquarters

NTI AG - LinMot & MagSpring

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CH-8957 Spreitenbach
Switzerland

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Visit <https://linmot.com/contact/> to find a distributor near you.

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