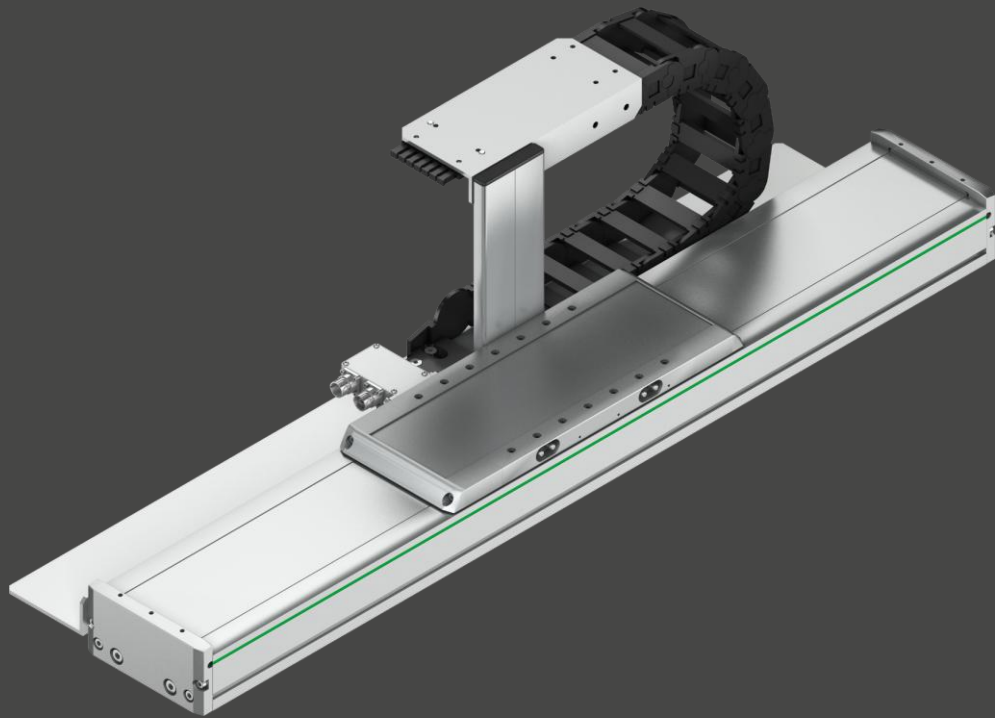


HIWIN®



ASSEMBLY INSTRUCTIONS

Linear Motor Axis HT-L, HB-L

HTL_HBL-03-0-EN-2610-MA

Legal information

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1 General

1.1 About these assembly instructions

These assembly instructions are intended for planners, developers and operators of systems who plan and install the products mentioned as machine components. They are also intended for persons carrying out the following work in connection with the axes mentioned:

- Transport
- Assembly
- Electrical connection, including connection to the higher-level control system
- Integration into a safety system
- Retrofitting or upgrading
- Set-up
- commissioning
- Operation
- Cleaning
- Maintenance
- Troubleshooting and fault rectification
- Decommissioning, dismantling and disposal

1.1.1 Prerequisites

We assume that

- operating personnel have been trained in the safe operation of the products mentioned and have read and understood the assembly instructions in full,
- maintenance staff maintain and repair the products in such a way that they pose no danger to people, the environment or property.

1.1.2 Availability

These assembly instructions must always be available to all persons working with or on the products mentioned. The assembly instructions are also available at [HIWIN.de](https://www.hiwin.de).

1.2 Illustrations used in these assembly instructions

1.2.1 Instructions

Instructions are labelled with triangles in the order in which they are to be carried out. The results of the actions carried out are labelled with tick marks.

Example:

- Step 1
- Step 2
- ✓ Result.

1.2.2 Lists

Lists are labelled with bullet points.

Example:

The products must not be operated:

- outdoors
- in potentially explosive ranges
- ...

1.2.3 Presentation of safety notices

Safety notices are always labelled with a signal word and, in some cases, with a hazard-specific symbol (see section [1.2.4 Symbols used](#)).

The following signal words and hazard levels are used:

 **Danger!** Immediate danger!

 Non-compliance with the safety notices may result in serious injury or death!

 **Warning!** Potentially dangerous situation!

 Non-compliance with the safety notices may result in serious injury or death!

 **Caution!** Potentially dangerous situation!

 Non-compliance with the safety notices may result in moderate to minor injuries!

 **Attention!** Potentially dangerous situation!

 Non-compliance with the safety notices may result in damage to property or environmental pollution!

1.2.4 Symbols used

The following symbols are used in these assembly instructions and on the products:

Warning and prohibition symbols			
	Warning: dangerous electrical voltage!		Warning: risk of hearing damage!
	Warning: risk of cuts!		Warning: risk of crushing!
	Warning: magnetic fields!		Warning: danger from suspended loads!
	Warning: hot surfaces!		Substance hazardous to the environment!

mandatory signs			
	Wear protective gloves!		Wear ear protection!
	Wear safety goggles!		Disconnect from the power supply before carrying out any work!

1.2.5 Notes

Note:

Notes describe general information and recommendations.

1.3 Warranty and liability

The manufacturer's "General Terms and Conditions of Sale and Delivery" apply in all cases.

1.4 Manufacturer's details

Address	HIWIN GmbH Brücklesbünd 1 77654 Offenburg
Telephone	+49 (0) 781 / 9 32 78 - 0
Technical Customer Service	+49 (0) 781 / 9 32 78 - 77
Fax	+49 (0) 781 / 9 32 78 - 90
Technical Customer Service Fax	+49 (0) 781 / 9 32 78 - 97
Email	support@hiwin.de
Website	HIWIN.de

1.5 Product monitoring

Please inform HIWIN GmbH, the manufacturer of the mentioned products, of:

- Accidents
- Potential hazards associated with the products
- Any ambiguities in these assembly instructions

2 Basic safety notices

Warning!

This section is intended to ensure the safety of everyone who works with, assembles, installs, operates, maintains or dismantles the products mentioned. Failure to observe the following instructions may result in danger.

Warning! Danger from strong magnetic fields!

Strong magnetic fields in the vicinity of the products mentioned pose a health risk to people with implants that can be affected by magnetic fields (e.g. pacemakers).

- ▶ People with implants that can be affected by magnetic fields must maintain a safety distance of at least 500 mm from the products! (Trigger threshold for static magnetic fields of 0.5 mT in accordance with Directive 2013/35/EU).

Warning! Risk of damage to property!

Strong magnetic forces may damage watches and magnetisable data storage media in the vicinity of the products.

- ▶ Do not bring watches or magnetisable data storage media into close proximity (< 300 mm) to the products!

2.1 Intended use

The HT-L and HB-L linear axes combine one guide and drive into a compact unit. They are used for the precise positioning, in terms of both time and location, of permanently mounted loads within an automated system.

HT-L and HB-L linear axes must be used exclusively for the specified purpose:

- Performance limits are specified for each size of the products mentioned (see the 'Linear Axes & Linear Axis Systems' catalogue). These performance limits must not be exceeded during operation.
- The products must not be used in potentially explosive atmospheres.
- The products must not be operated in a vacuum.
- The products must only be used and operated indoors.
- The products are used as part of an overall system; therefore, personal safety must be ensured through the design of the overall system.
- Compliance with the assembly instructions and adherence to the maintenance and repair regulations are prerequisites for the intended use of the products.
- Any other use of the products is considered improper.

The products mentioned are supplied as a system (one guide, drive). You must therefore refer to the full documentation for the system. The accompanying documentation may vary depending on the type of linear axis.

Environmental requirements

Operating environmental conditions:	+5 to +40 °C
Relative humidity during operation:	in accordance with IEC 60721-3-3, Class 3K22, non-condensing
Climatic environmental conditions for transport and storage:	Ambient temperature: -20 to +50 °C, non-condensing
Environmental conditions for long-term storage:	Ambient temperature: +20 °C, non-condensing

Note:

Prevent condensation to avoid corrosion of the axis.

2.2 Reasonably foreseeable misuse

The products mentioned must not be operated:

- outdoors
- in potentially explosive ranges

2.3 Modifications or alterations

Modifications or alterations to the products mentioned are not permitted! If you have any special requirements, please contact HIWIN GmbH.

2.4 Residual risks

The products listed do not pose any residual hazards during normal operation, as they are used as part of the overall system and the operator is responsible for ensuring personal safety through the overall system. Warnings regarding hazards that may arise during maintenance and servicing are provided in the relevant sections.

2.5 Requirements for personnel

Only authorised and competent personnel may carry out work on the products! They must be familiar with the safety devices and regulations before commencing work (see table below).

Task	Qualification
Normal operation	Trained staff
Cleaning	Trained staff
Maintenance	Trained specialist staff from the operator or manufacturer
Maintenance	Trained specialist staff from the operator or manufacturer
Transport	Trained staff
Assembly	Trained specialist staff
Dismantling	Trained specialist staff

2.6 Safety devices

Table 2.1 : Personal protective equipment

Operating phase	Personal protective equipment
Normal operation	It is not permitted to remain in the vicinity of the products mentioned during normal operation. If you are in the vicinity of the products, the following personal protective equipment is required, depending on the travel speed: – Safety footwear – Hearing protection, where necessary
All other operating phases (cleaning, maintenance, servicing, changeover, troubleshooting, repair)	During all other operational phases of the products mentioned, the following personal protective equipment is required: – Safety footwear – Protective gloves and safety goggles where necessary – Hearing protection, where necessary – Where applicable, a hairnet

2.7 Labelling on the product

The labelling shown below can be found on the products.

Fig.2 .1 : Example of a type plate

 HIWIN GmbH Brücklesbünd 1 77654 Offenburg www.hiwin.de	Type:	HT200LA23N0550SNNTD	
	S/N:	HSN0000015810	
	Art. No:	25.07315	Year built: 2021
	Rated current I_0 :	5,9 A	Mass of stage: 34 kg
	Rated force F_0 :	543,6 N	Max. DC bus: 600 VDC
	Max. current I_p :	17,6 A	Temp. sensor: PTC120
	Max. force F_p :	1535,0 N	

3 Description of the linear axes

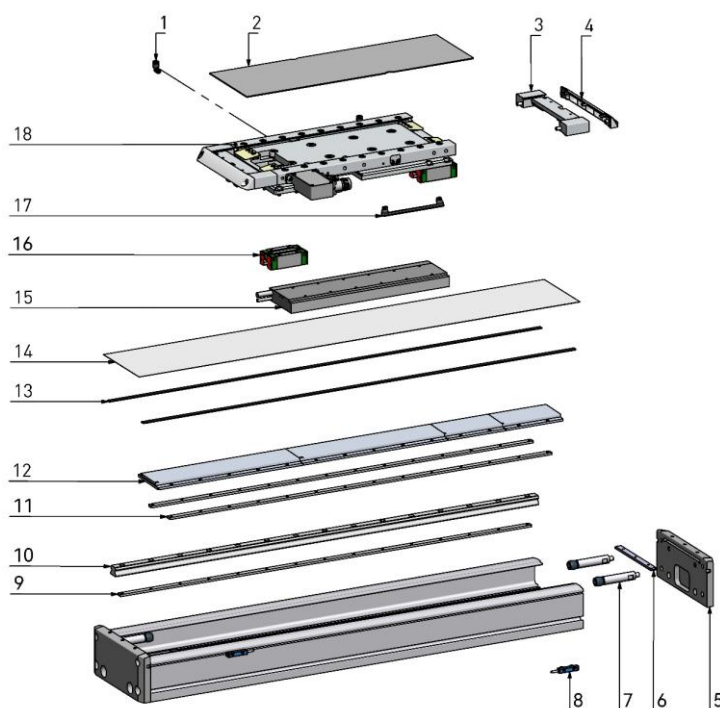
3.1 HT-L linear table

3.1.1 Applications

HIWIN HT-L linear axes with linear motor drives are particularly suitable for applications with the most demanding requirements in terms of dynamic response, accuracy and synchronisation, whilst offering minimal maintenance effort and long stroke lengths. For each size, two to three motor sizes are available to optimally meet the requirements for feed force. The distance measuring system is integrated inside the axis to save space and ensures the highest precision. Optionally, generously dimensioned energy chains provide space for the safe routing of supply cables.

3.1.2 Main components

Fig.3 .1 : Main components of the HT-L linear axes



1	Connection for pneumatic brake element	10	profile rail
2	slide cover	11	Stator threaded strip
3	belt deflection	12	Linear motor magnetic track (stator)
4	slide end piece	13	Magnetic strips
5	end plate	14	Steel cover strip
6	Clamping sheet for cover strip	15	Linear motor primary section (forcer)
7	stop buffer	16	block
8	limit switch	17	damping element
9	Threaded strip profile rail	18	slide

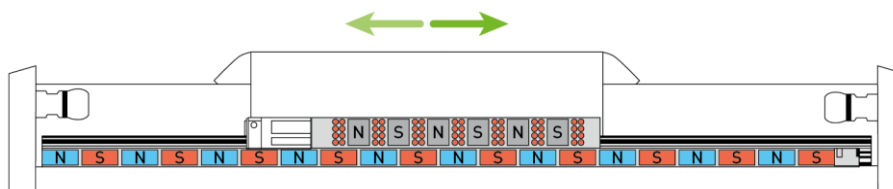
3.1.3 Function description

The HT-L linear motor axes are based on an axis profile and a permanently mounted linear guideway. These not only absorb the weight, acceleration and process forces, but also ensure the precise guidance of the slide. The axis is driven by a linear motor.

The linear motor consists of two components: the forcer (primary part) with coils and the stator (secondary part) with permanent magnets. The coils, through which alternating current flows, generate a time-varying magnetic field that interacts with the constant magnetic field of the stator. The resulting force is used to generate linear motion.

A servo drive supplies power to the motor in such a way that the carriage of the linear motor axis performs the movement with the highest possible accuracy, for example, as specified by a higher-level control system.

Fig.3 .2 : Operating principle of the HT-L linear axis



3.1.4 Order code for HT-L linear tables

Number	1	2	3	4	5	6	7	
order code	HT	150	L	A12	C	1234	S	Chapter
1	HT	series: HT: Table axis						3.1
2	150	size: 100: Profile width 100 mm 150: Profile width 150 mm 200: Profile width 200 mm 250: Profile width 250 mm						
3	L	Drive type: L: linear motor						3.1.3
4	A12	Linear motor size: A01/A02: LMSA01/LMSA02 A12/A13/A14: LMSA12/LMSA13/LMSA14 A22/A23/A24: LMSA22/LMSA23/LMSA24 A32/A33/A34: LMSA32/LMSA33/LMSA34						
5	C	cover strip: N: Without C: With						4.2
6	1234	Stroke length [mm]						4.1
7	S	Sled length: S: Short						4.3

Number	8	9	10	11	
Continued order code	A	N	A	R	Chapter
8	A	limit switch: N: Without A: 2x n/c contacts, connection cable with connector B: 2x n/o contacts, connection cable with connector C: 2x n/c contacts, 5m cable D: 2x n/o contacts, 5m cable			4.4
9	N	brake element: N: Without B: Pneumatic brake element E: 2x pneumatic brake elements			4.5
10	A	distance measuring system: A: Magic analogue 1Vss sin/cos B: Magic analogue 1Vss sin/cos + digital hall sensor D: Magic digital TTL 5V E: Magic digital TTL 5V + digital hall sensor F: APM absolute BissC H: LIC211, absolute optical EnDat 2.2 R: BML-S1GO, absolute BissC S: BML-S1GO, absolute SSI T: Sick TTK70			4.6
11	R	Drive interface: A: Without energy chain, connector on the front left B: Without energy chain, connector on the front right C: Without energy chain, connector at the rear left D: Without energy chain, connector at the rear right E: Energy chain on the left, connector at the rear left F: Energy chain on the right, connector at the rear right L: Energy chain on the left, connector at the front left R: Energy chain on the right, connector at the front right			4.8

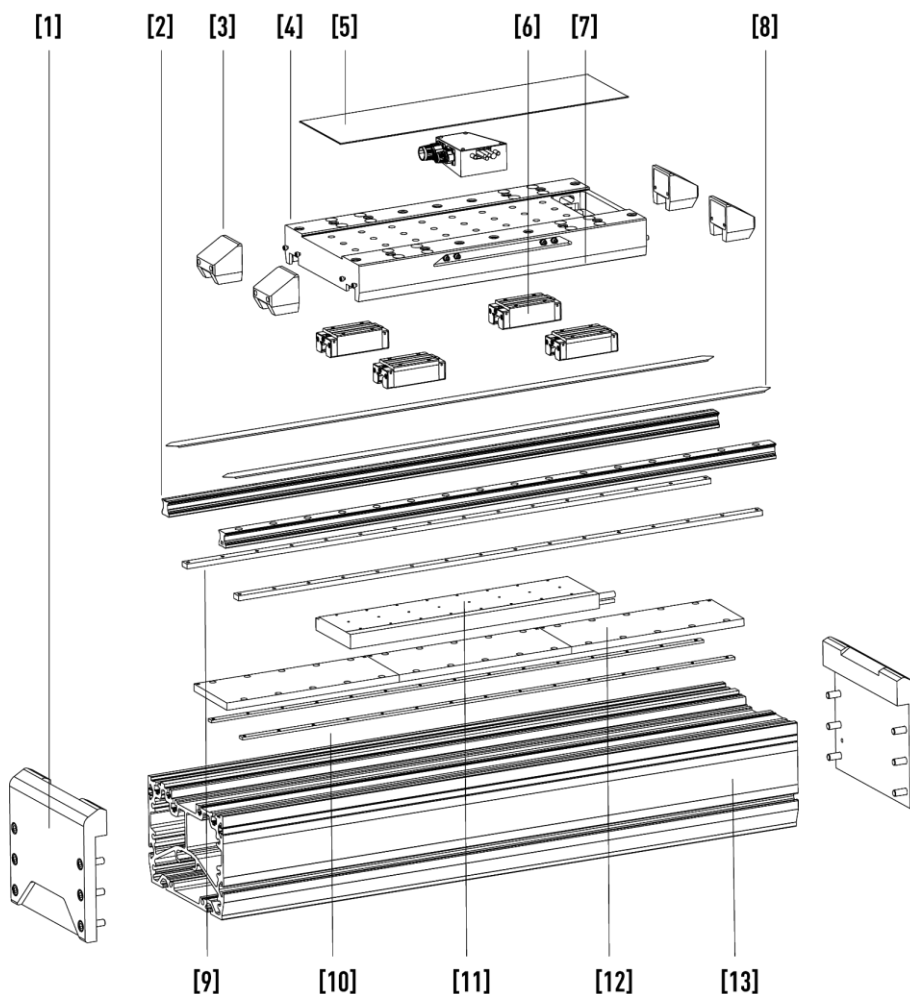
3.2 Bridge axis HB-L

3.2.1 Applications

HIWIN HB-L bridge axes with linear motor drive are particularly suitable for applications with the highest demands on dynamic response, accuracy and synchronisation, whilst offering minimal maintenance effort and long stroke lengths. The distance measuring system is integrated inside the axis to save space and ensures maximum precision. Optionally, generously dimensioned energy chains provide space for the safe routing of supply cables.

3.2.2 Main components

Fig.3 .3 : Main components of the HB-L bridge axes



1	end plate	8	Cover strip profile rail
2	profile rail	9	Threaded strip for profile rail
3	stop buffer	10	Threaded strip, stator
4	slide	11	Linear motor primary section (forcer)
5	slide cover	12	Linear motor magnetic track (stator)
6	block	13	Aluminium axis profile
7	grease nipple		

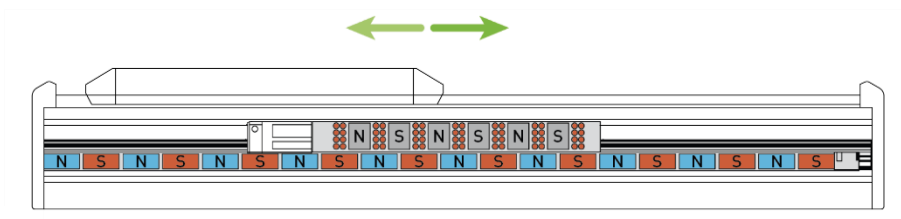
3.2.3 Function description

The HB-L bridge axes are based on a closed axis profile on which the linear guideway is mounted. These guide rails not only absorb the weight, acceleration and process forces, but also ensure the precise guidance of the slide. The axis is driven by a linear motor.

The linear motor consists of two components: the forcer (primary part) with coils and the stator (secondary part) with permanent magnets. The coils, through which alternating current flows, generate a time-varying magnetic field that interacts with the constant magnetic field of the stator. The resulting force is used to generate linear motion.

A servo drive supplies power to the motor in such a way that the carriage of the linear motor axis performs the movement specified, for example, by a higher-level control system with high accuracy.

Fig.3 .4 : Operating principle of the HB-L bridge axis



3.2.4 Order code for HB-L bridge axes

Number	1	2	3	4	5	6	7	
order code	HB	250	L	A34	N	1234	S	Chapter
1	HB	series: HB: bridge axis						3.2
2	250	size: 250: Profile width 250 mm						
3	L	Drive type: L: linear motor						3.2.3
4	A34	Linear motor size: A34: LMSA34						
5	N	cover strip: N: None						
6	1234	Stroke length [mm]						4.1
7	S	Carriage length: S: Short						4.3

Number	8	9	10	11	
Continued order code	A	N	A	F	Chapter
8	A	limit switch: N: Without A: 2x n/c contacts, connection cable with connector B: 2x n/o contacts, connection cable with connector C: 2x n/c contacts, 5m cable D: 2x n/o contacts, 5m cable			4.4
9	N	N			
10	A	distance measuring system: A: Magic analogue 1Vss sin/cos D: Magic digital TTL 5V R: BML-S1GO, absolute BissC S: BML-S1GO, absolute SSI			4.6
11	F	Drive interface: F: Energy chain on the right, connector at the rear right B: No energy chain, connector on the front right D: Without energy chain, connector at the rear right			4.8

4 Linear axis options

4.1 Stroke length

The stroke lengths of the linear axes can be selected in millimetre steps.

The maximum stroke length, depending on the series and size, is listed in the 'Linear Axes & Linear Axis Systems' catalogue, in the 'Product Selection' chapter. Longer stroke lengths are available on request.

Please note that the selection of certain options may result in further restrictions on the maximum stroke length.

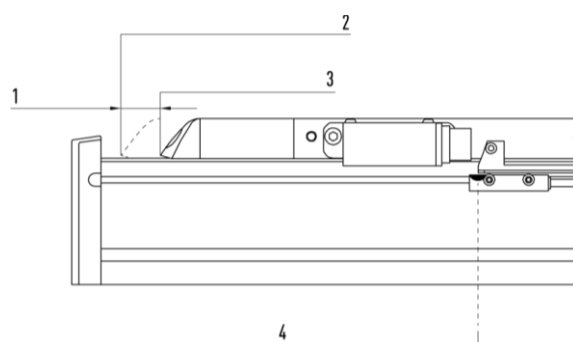
4.1.1 Reserve stroke

! Warning! Potential damage to the linear axes

- The mechanical end position must not be reached during operation.

The reserve stroke L_r corresponds to the distance that can be travelled on both sides of the end positions (stroke 0, max. stroke) in addition to the stroke, before the slide reaches the mechanical end position (mechanical 0) at the fitted stop buffers. The reserve stroke for each axis size can be found in the 'Linear Axes & Linear Axis Systems' catalogue.

Fig.4 .1 : Illustration of reserve stroke



1	Reserve stroke L_r	3	Carriage position when electrically 0 (limit switch actuation point)
2	Carriage position for mechanical 0 (rubber buffer stop)	4	Switching point at electrical 0

4.2 Cover strip

A steel cover strip is available as an option for all sizes of the HT-L linear axis. The cover strip is held in place by magnetic strips to protect the interior of the axis from contamination. Please note that the carriage length is increased on axes with a cover strip due to the required belt deflection.

Note

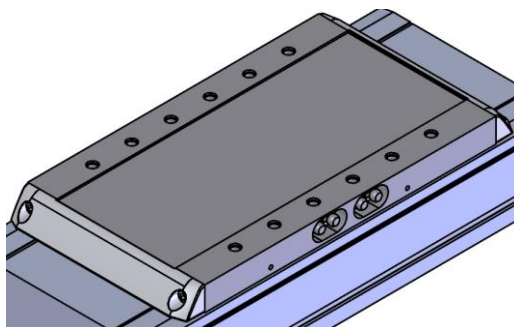
The 'cover strip' option cannot be retrofitted at a later date.

4.3 Slide

The slide features mounting threads for attaching the payload. These have additional counter bores to allow the insertion of centring sleeves.

The length of the slide depends on the selected linear motor size. For further info, see the 'Linear Axes & Linear Axis Systems' catalogue.

Fig.4 .2 : Slide with mounting threads



4.4 Limit switch

On the linear axes, two inductive limit switches indicate the end positions of the travel distance. The limit switch cables can either be routed directly to the interface or laid laterally in the mounting groove. The limit switches are available as n/c contacts or n/o contacts and, optionally, with an open cable end or with a connector.

Note

Additional reference switches are available on request.

4.4.1 Dimensions of the limit switch

Fig.4 .3 : Dimensions of the limit switch

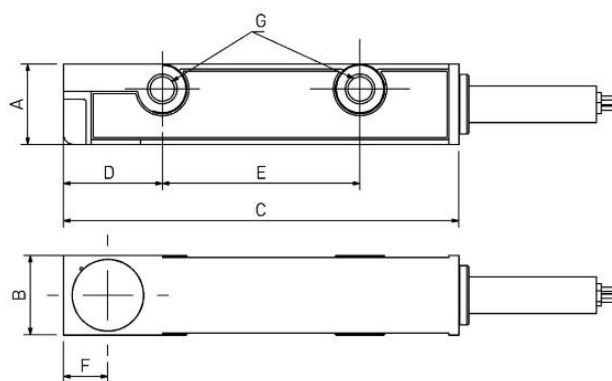


Table4 .1 : Dimensions of the limit switch

	HT-L	HB-L
A	8.1 mm	8.1 mm
B	8 mm	8 mm
C	40 mm	40 mm
D	10 mm	10 mm
E	20 mm	20 mm
F	4.5 mm	4.5 mm
G	3.2 mm	M3

4.4.2 Limit switch specifications

Table4 .2 : General characteristics of limit switches

order code	A	B	C	D
article number				
HT100L	80168980	80168994	80169033	80169036
HT150-250L	80169076	80169099	80169202	80169231
HB-L	80073805	80073846	80073857	80073860
Output function	n/c contact	n/o contact	n/c contact	n/o contact
Connection type	100 mm cable with M8 connector		5 m ^{cable2)} open cable end	
HT-L	300 mm cable with M8 connector		5 m ^{cable3)} open cable end	
HB-L				
Connection	3-pin		3-wire	
Design	Rectangular			
Dimensions (W × H × D)	8 × 8 × 40 mm			
Max. switching distance	2 mm			
Guaranteed switching distance	1.62 mm			
Adjustable switching distance	1 mm			
Switching frequency	2,000 Hz			
Switching output	PNP			
Electrical type	DC 3-wire			
protection class	IP67, IP68 ¹⁾			

¹⁾ In accordance with EN 60529

²⁾ Not suitable for use with energy chains

Table4 .3 : Mechanical and electrical specifications of the limit switches

order code	A	B	C	D
article number				
HT100L	80168980	80168994	80169033	80169036
HT150-250L	80169076	80169099	80169202	80169231
HB-L	80073805	80073846	80073857	80073860
Type	n/c contact	n/o contact	n/c contact	n/o contact
power supply	10 to 30 VDC			
Residual ripple	$\leq 10 \% ^{1)}$			
Voltage drop	$\leq 2 \text{ V} ^{2)}$			
Current consumption	$\leq 10 \text{ mA} ^{3)}$			
Standby delay	$\leq 100 \text{ ms}$			
Hysteresis	5 to 15 %			
Reproducibility	$\leq 2 \% ^{4)}$			
Temperature drift	$\pm 10 \%$			
EMC	In accordance with EN 60947-5-2			
Continuous current I_a	$\leq 200 \text{ mA}$			
Cable material	PVC			
Short-circuit protection	Yes			
Reverse polarity protection	Yes			
Inrush current suppression	Yes			
Shock and vibration resistance	30 g, 11 ms/10 to 55 Hz, 1 mm			
Operating ambient temperature	$-25 ^\circ\text{C}$ to $+75 ^\circ\text{C}$			
Housing material	Plastic, VISTAL®			
Material, active surface	Plastic, VISTAL®			
UL file no. (certificate)	NRKH.E348498			

¹⁾ From U_V

²⁾ At I_a max.

³⁾ Without load

⁴⁾ At constant voltage and temperature

Note

For information on connection and pin configuration, see section [6.6.1](#) .

4.5 Brake element

⚠ Caution! Risk of injury and damage to property!

Incorrect use of the brake element may result in damage to property or personal injury.

- ▶ Observe the maximum number of dynamic braking cycles as specified in the data sheet!
- ▶ Observe the manufacturer's specifications when calculating the stopping distance!

The brake element may be used both for holding a position statically and for dynamic braking cycles.

- If there is no air pressure (air pressure: 0 bar), the brake element clamps by spring force. The clamping profiles are pressed against the guide rail by a spring energy storage device (clamping by spring force).
- When air pressure is between 5.5 and 6.5 bar, free movement is possible. The air pressure keeps the clamping profiles apart (release via air pressure).

Fig.4 .4 : Brake element closed (0 bar)

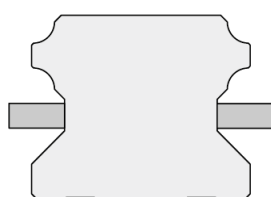
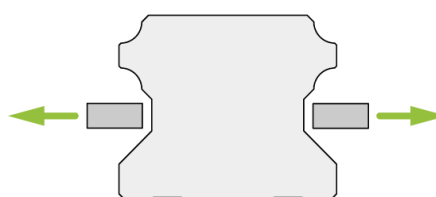


Fig.4 .5 : Brake element open (5.5 to 6.5 bar)



According to EN ISO 13849-1, the brake element is classified as a safety-related part of a control system and, as a tried-and-tested component, can be used in categories B or 1 without the need for further control-related measures.

Table4 .4 : Brake element specifications

Features	size		
	HT150L	HT200L	HT250L
Manufacturer	Zimmer Group		
Type	LBPS1501AS2-A-02	LBPS2001AS2-A-01	LBPS2501AS2-A-05
Static axial holding force	400 N per element	650 N / element	750 N per element
Air connection	M5		
Min. pressure (opening pressure)	5.5 bar		
Max. pressure	6.5 bar		
Clamping cycles	Up to 5 million		
Braking cycles	Up to 500		
Hose connector	6 mm		
Actuation	Pneumatic		
Air quality	Oiled air in accordance with ISO 8573-1, Class 4 Filter size 25 µm/; the air filter must be kept clean		

4.6 Distance measuring system

Linear motor axes are supplied with a distance measuring system as standard. The distance measuring system is integrated inside the axis to save space and consists of an encoder (section A-A, item 1) and a measurement tape (section A-A, item 2). The position of the position measurement system within the axis is marked by a small groove on the axis body (see detail z at Fig. 4.6 and Fig. 4.7). When connecting the position measuring system in accordance with Table 6.9 or Table 6.11, the positive direction of travel shown in Fig. 4.6 and Fig. 4.7 applies. Depending on the requirements regarding the measuring principle, interface and signal period, various measuring systems are available; see the 'Linear Axes & Linear Axis Systems' catalogue.

Fig. 4.6 : Position and positive direction of travel of the distance measuring system for HT-L linear axes

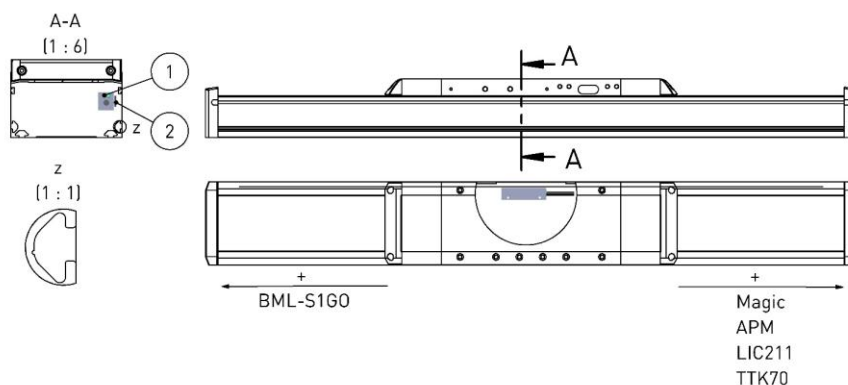
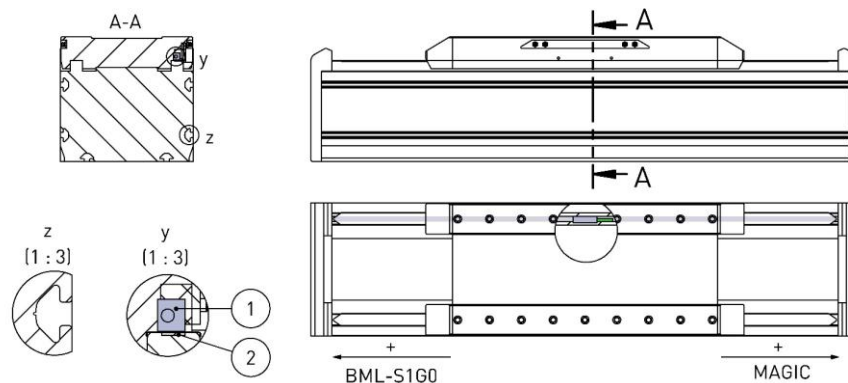


Fig. 4.7 : Position and positive direction of travel of the distance measuring system for HB-L linear axes



4.6.1 HIWIN MAGIC

The HIWIN-MAGIC distance measuring system is used in the HT-L and HB-L linear axes for incremental distance measurement. The output is available as either an analogue or digital

signal. The HIWIN-MAGIC distance measuring system consists of the encoder (Fig.4.8) and the magnetic scale (Fig.4.9) as the measuring medium.

The HIWIN-Magic distance measuring system is compatible with all standard servo drives and the HIWIN ED1 servo drive. Further information on HIWIN servo drives can be found in the 'Servo Drives' catalogue or at hiwin.de.

For zero-movement commutation of the linear motor axes, the HIWIN MAGIC distance measuring system can also be combined with the digital hall sensor from HIWIN; see chapter 4.7.

Fig.4.8 : MAGIC encoder



Fig.4.9 : MAGIC magnetic scale



Note

The measurement tape of the magnetic position measuring systems must not be exposed to strong magnetic fields (maintain a safe distance from permanent magnets!). Severe shocks (e.g. a blow with a hammer) can also damage the magnetisation of the measurement tape. The system is not suitable for environments containing magnetic dust (e.g. graphite dust). This can distort the measurement signal or damage the distance measuring system.

Note

Further information can be found in the 'Linear Motors & Positioning Systems' catalogue, as well as in the 'HIWIN-MAGIC Positioning Systems' assembly instructions.

Note

Information on connection and pin configuration can be found in section 6.6.2.2.

4.6.2 HIWIN APM

The HIWIN APM distance measuring system is used in HT-L linear axes for absolute position determination without a reference run. The APM is a magnetically encoded, non-contact, absolute distance measuring system, consisting of a sensor head and a scale. The scale features two magnetic tracks: one track with alternating magnetic north and south poles, and one track encoding the absolute position. The sensors in the sensor head measure the alternating magnetic field. As the sensor head passes over the scale bar without contact, the sensors scan the magnetic poles and transmit the position data to the controller. This enables the controller to determine the absolute position and the distance travelled. The distance measuring system is integrated inside the axis to save space. The interface for the electrical connection is located on the side of the slide. The system is integrated via a BiSS-C interface.

Note

Further information can be found in the 'Linear Motors & Position Measurement Systems' catalogue, as well as in the 'HIWIN Absolute Position Measurement System' assembly instructions.

Note

Information on connection and pin assignment can be found in section 6.6.2.2.

4.6.3 LIC 211

Manufacturer: Dr. Johannes Heidenhain GmbH

The LIC 211 distance measuring system is used in HT-L linear motor axes for absolute position determination without a reference run. The LIC is an open, non-contact distance measuring system suitable for use at high travel speeds and with long strokes.

The measurement system is integrated inside the axis to save space. It consists of a scanning head on the axis slide and a steel measuring bar, which is bonded into the axis profile. The LIC operates on the principle of photoelectric (optical) scanning.

The reference block has two types: one carries the absolute position data in the form of a serial code structure, and this means that the position value is available as soon as the electronics are switched on. As the scanning head passes over the reference block without contact, the second track is scanned to provide an incremental signal, which is then interpolated to determine the current position value.

The connector for the electrical connection is located on the side of the slide. The system is integrated via EnDat 2.2. This interface fundamentally supports the use of measuring devices in safety-related applications based on DIN EN ISO 13 849-1 (successor to EN 954-1) as well as EN 61 508 and EN 61800-5-2.

Note

Please observe the specifications and restrictions regarding the installation of HT-L linear axes with optical position measurement systems as set out in the chapter '6.1'.

Note

Use only lubricants in accordance with DIN 51825, class KP2K, consistency class NLGI 2. Lubricants of NLGI class 1 (e.g. fluid greases or oils) must not be used. Under high dynamic response conditions, these may come into contact with the optical measuring elements and impair the function of the position measurement system or cause it to fail.

Note

Check the optical measuring body at regular intervals, depending on the environmental conditions, for contamination and clean it if necessary.

For correct commissioning and integration into the system with the EnDat22 interface, please refer to the manufacturer's documentation.

Note

Information on connection and pin assignment can be found in section 6.6.2.2.

4.6.4 BML-S1G0

Manufacturer: Balluff GmbH

The BML-S1G0 distance measuring system is used in the HT-L and HB-L linear axes for absolute position determination, without the need for a reference run. The BML is a magnetically encoded, non-contact, absolute distance measuring system, consisting of a sensor head and a scale. The scale features two magnetic tracks: one track with alternating magnetic north and south poles, and one track encoding the absolute position. The sensors in the sensor head measure the alternating magnetic field. As the sensor head passes over the scale without contact, the sensors detect the magnetic poles and transmit the position data to the controller. This enables the controller to determine the absolute position and the distance travelled. The measuring system is integrated inside the axis to save space. The interface for the electrical connection is located on the side of the slide. The system can be integrated via either an SSI or a BiSS-C interface. The sensor features a safety-related, analogue, incremental real-time signal and can be used in safety-related applications up to Safety Integrity Level 2 (SIL 2) in accordance with EN 61800-5-2/EN 62061/IEC 61508 and Performance Level d (PL d) in accordance with EN ISO 13849-1.

Note

For information on connection and pin assignment, see section 6.6.2.2.

Note

For correct commissioning and integration into the system using the BiSS-C or SSI interface, please refer to the manufacturer's documentation.

4.6.5 TTK70

Manufacturer: Sick AG

The TTK70 distance measuring system is used in the HT-L linear axes for absolute position determination, without a reference run. Position detection is carried out magnetically with very high resolution. The sensor board, which is aligned with the measurement plane, is fitted with hall sensors on two parallel tracks. Their arrangement corresponds to the division of the magnetic scale into an incremental and an absolute component. To calculate the absolute position values during operation, the encoder first detects the absolute starting position using Manchester coding when the linear motor starts. All subsequent actual positions of the drive are then determined via the incremental position on the magnetic track or via sine/cosine signals. The measurement system is integrated inside the axis to save space. The interface for the electrical connection is located on the side of the slide. The system is integrated via the HIPERFACE® interface.

Note

Information on the connection and pin assignment can be found in section 6.6.2.2.

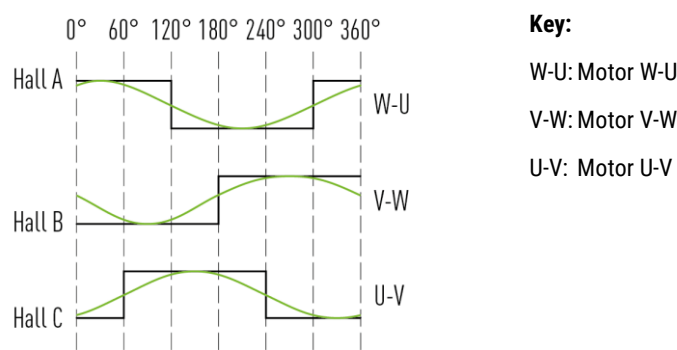
Note

This option has been discontinued and is no longer available.

4.7 Hall sensor

A hall sensor with a digital output signal is available for the HT-L linear axes to enable commutation without movement. The digital hall sensors have three square-wave signals, each phase-shifted by 120° (see Fig. 4.10).

Fig. 4.10 : Output signal of a digital hall sensor with a single-ended output



- Sensor signal is either 0 or 1.
- By combining the analysis of motor voltage and the hall sensor, the motor's direction of rotation can be determined with absolute certainty.
- Evaluation based on the offset of the pole wheel angle between 0° and 90° (ideally 0° and 45°).

Note

For information on connection and pin assignment, see section 6.6.2.2.

4.8 Drive interface and power supply

⚠ Danger! Danger due to electrical voltage!

Dangerous currents may flow before and during assembly, disassembly and repair work.

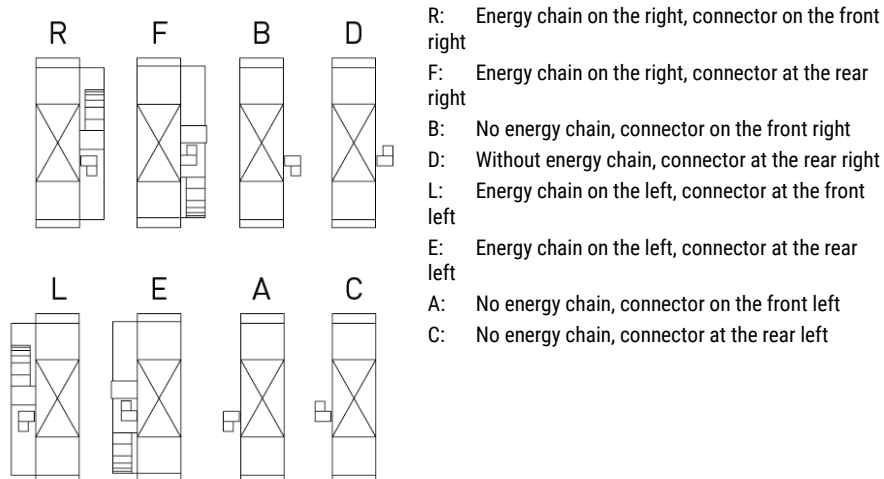
- Ensure that the linear axis is properly earthed via the PE rail in the switch cabinet before connecting the electrical power supply!
- Never disconnect electrical connections whilst they are live. In the worst-case scenario, arcing may occur, causing injury to people and damaging contacts!
- Work on electrical installations must only be carried out by qualified electricians!
- Please follow the assembly instructions for the other system components (e.g. linear motor, servo drive)!

The HT-L and HB-L linear axes feature an interface for motor and position measurement system cables. These are located on the side of the slide and can be connected quickly and easily without tools using the quick-release fasteners. Depending on the installation situation and the desired cable routing, various connector orientations are available as options; see Fig. 4.11.

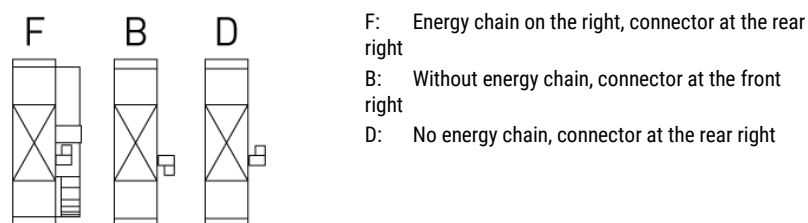
To ensure the safe routing of supply cables, the HT-L and HB-L linear axes are optionally supplied with generously dimensioned energy chains. These energy chains are mounted on the axis in a particularly compact and space-saving manner. The orientation of the energy chain depends on the selected connector orientation; see Fig. 4.11.

Fig.4 .11 : Possible drive interfaces

HT-L



HB-L



4.9 Energy chain

Energy chains are available as an option for the HT-L and HB-L linear axes. They can be fitted on either the right or left side, depending on the selected connector position. The generously dimensioned energy chains provide space for the safe routing of supply cables. The energy chains are integrated in a particularly compact and space-saving manner. Linear axes with energy chains can only be installed in a horizontal mounting position (see Fig.6.1). The energy chain type and specifications can be found at Table4.5.

Table4.5 : Specification for HT-L and HB-L linear axis energy chains

size	Manufacturer's designation ¹⁾	Internal cross-section B × H [mm]	Bending radius [mm]	Max. stroke [mm]
HT100L	2400.05.075.0	57 × 25	75	4,000
HT150L ²⁾	2400.07.100.0	77 × 25	100	4,000
HT150L ³⁾ HT200L/HT250L HB250L	2600.07.100.0	75 × 35	100	5,000

¹⁾ Manufacturer: igus SE & Co. KG

²⁾ with M23/M17 junction box

³⁾ with 915 mounting box, standard for HT150L until 04/2022

The top strand is mounted as a self-supporting structure; an energy chain support is provided for the bottom strand to allow it to unroll. To prevent cables and hoses from sliding over one another, a separating bar is provided in every second chain link. The connectors are of a rigid type. Strain relief combs for securing the cables and hoses with cable ties are provided on both sides. For the correct handling of the energy chains, as well as the routing and securing of cables and hoses, please refer to the energy chain manufacturer's assembly instructions.

General information:

- Please refer to the motor manufacturer's operating manual for details of suitable motor and signal cables.
- Observe the minimum bending radii (industry standard $8 \times D$) for cables and hoses and the associated expected service life.
- For shielded cables, ensure that the shields are resistant to bending.
- The sheaths of cables and hoses should be low-friction and abrasion-resistant.
- To prevent them from sticking together, separate cables and hoses with different outer sheaths using spacers.
- Lay cables and hoses without any twists.
- Allow for sufficient clearance (10–20 per cent, min. 1 mm) around the cables and hoses, and take into account the transverse expansion of hoses when pressurised.
- Ensure an even/symmetrical weight distribution. Position heavy cables and hoses preferably on the outside.
- Ensure strain relief on both sides of cables and hoses so that, when fully extended, they are located in the neutral zone and can move freely within the radius of the energy chain.
- Where necessary, provide additional separator bars in the event of high accelerations or cables with significantly different diameters.
- Observe the maximum permissible additional load caused by cables and hoses, depending on the stroke, as specified in [Fig. 4.13](#).

Fig. 4.12 : Maximum permissible additional load F_{Add} as a function of stroke L_T , Series 2400
(Source: igus SE & Co. KG)

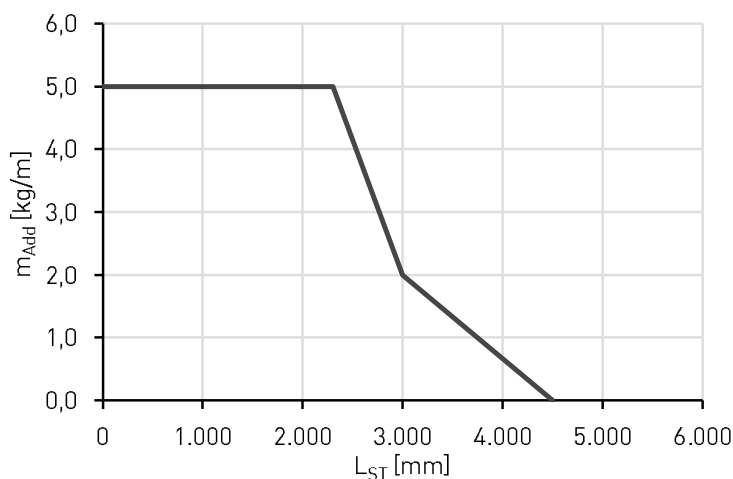
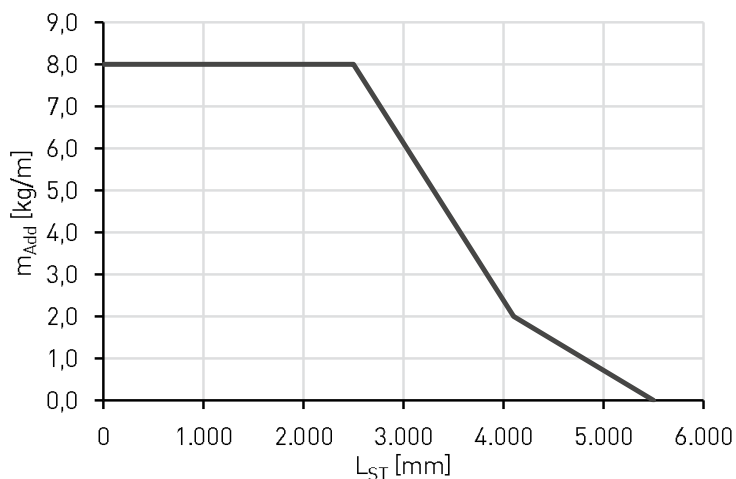


Fig.4 .13 : Maximum permissible additional load F_{Add} as a function of stroke L_T , Series 2600
(Source: igus SE & Co. KG)



4.9.1 Strip for reducing noise in energy chains

Cellular rubber tape for reducing noise generated by energy chains. The single-sided self-adhesive cellular rubber strips must be affixed to the energy chain support. Care must be taken to ensure that the energy chain links rest on the cellular rubber strips as the carriage slides. The elastic damping significantly reduces shock and running noise, thereby effectively lowering the noise emissions of the energy chain.

Fig.4 .14 : Dimensions of the noise-reduction strip for energy chains



Suitable for linear axes	Article number (10 m)
HT-L, HB-L	25-002485

Note

Suitable for all HT-L and HB-L linear motor axes with energy chain (exception: HT150L with connection interface E or F).

5 Transport and installation

5.1 Delivery

5.1.1 Condition on delivery

The linear axes are supplied fully assembled and functionally tested.

5.1.2 scope of delivery

The scope of delivery varies depending on the model, accessories and options ordered.

5.2 Transport to the installation site

⚠ Warning! Danger from suspended loads or falling parts!

Lifting heavy loads can cause injury!

- ▶ Assembly and maintenance of the linear axes must only be carried out by qualified personnel!
- ▶ Take the mass of the parts into account during transport. Use suitable lifting equipment!
- ▶ Observe the applicable health and safety regulations for handling suspended loads!
- ▶ Only lift linear axes at the specified support points!
- ▶ Secure machines and machine parts to prevent them from tipping over!

⚠ Warning! Danger from strong magnetic fields!

Strong magnetic fields in the vicinity of the products mentioned pose a health risk to people with implants that can be affected by magnetic fields (e.g. pacemakers).

- ▶ People with implants that can be affected by magnetic fields must maintain a safety distance of at least 500 mm from the products! (Trigger threshold for static magnetic fields of 0.5 mT in accordance with Directive 2013/35/EU).

⚠ Caution! Risk of shock and crushing!

When moving or manoeuvring the axes manually, injuries may occur due to moving and moving axes as well as attached components (energy chains, customer-supplied components).

- ▶ Observe the applicable health and safety regulations!
- ▶ Transport to the installation site must only be carried out by qualified personnel!

⚠ Warning! Risk of damage to property!

Strong magnetic forces may destroy watches and magnetisable data storage media in the vicinity of the linear axes.

- ▶ Do not place watches or magnetisable data storage media within close proximity (< 300 mm) of the linear axes!

⚠ Warning! Risk of damage to the linear axes!

The linear axes may be damaged if subjected to mechanical stress.

- ▶ Only lift the linear axes at the specified support points (see section 5.5)!
- ▶ For axes with a length, ensure that the centre sections are additionally secured!
- ▶ Ensure that the linear axes do not bend, as this will permanently impair their accuracy!
- ▶ Do not transport any additional loads on the linear axes during transport!
- ▶ Provide additional support for heavy attachments!

! Caution! Magnetic fields may interfere with aircraft on-board electronics!

- ▶ Observe packaging and transport regulations (IATA 953)!

The linear axes are precision products and must be handled with care. Impacts and shocks can damage the axes. This may result in reduced positioning accuracy and a shorter service life. Transport the product, still in its packaging, as close as possible to the installation site. Do not remove the packaging until you reach the installation site.

5.3 Requirements for the installation site

5.3.1 Environmental conditions

Operating environmental conditions:	+5 to +40 °C
Relative humidity during operation:	in accordance with IEC 60721-3-3, Class 3K22, non-condensing
Climatic conditions for transport and storage:	Ambient temperature: –20 to +50 °C, non-condensing
Environmental conditions for long-term storage:	Ambient temperature: +20 °C, non-condensing

5.3.2 Safety devices to be provided by the operator

Possible safety devices/measures:

- Personal protective equipment in accordance with accident prevention regulations
- Non-contact safety devices
- Mechanical safety devices

5.4 Bearing

- Store the linear axes in their transport packaging.
- Alternatively: Choose packaging in which the linear axes are secured against slipping, damage and vibrations.
- Store the linear axes only in dry, frost-free rooms.
- Clean and protect used linear axes before storing them.
- After long-term storage, the linear axes must be relubricated before commissioning.

5.5 Unpacking and installation

⚠ Warning! Danger from strong magnetic fields!

Strong magnetic fields in the vicinity of the products mentioned pose a health risk to people with implants that can be affected by magnetic fields (e.g. pacemakers).

- ▶ People with implants that can be affected by magnetic fields must maintain a safety distance of at least 500 mm from the products! (Trigger threshold for static magnetic fields of 0.5 mT in accordance with Directive 2013/35/EU).

! Warning! Risk of damage to property!

Strong magnetic forces can destroy watches and magnetisable data storage media in the vicinity of the linear axes.

- ▶ Do not bring watches or magnetisable data storage media into close proximity (< 300 mm) to the linear axes!

! Warning! Risk to health and the environment!

Contact with lubricants may cause irritation, poisoning and allergic reactions, as well as environmental damage.

- ▶ Use only suitable media that are safe for humans. Observe the manufacturers' safety data sheets!
- ▶ Ensure proper disposal!

Note

The linear axes must only be installed and operated indoors.

- Remove the packaging.
- Lift the linear axis for transport at the specified support points A and B (see Fig. 5.1). The distance between points A and B should be one quarter of the total length of the axis from each end of the axis.
- Do not lift the linear axis by its attachments. Support heavy attachments, such as e.g. the drive, during transport.
- Dispose of the packaging in an environmentally responsible manner.

Fig. 5.1 : Support points A and B for lifting and transport

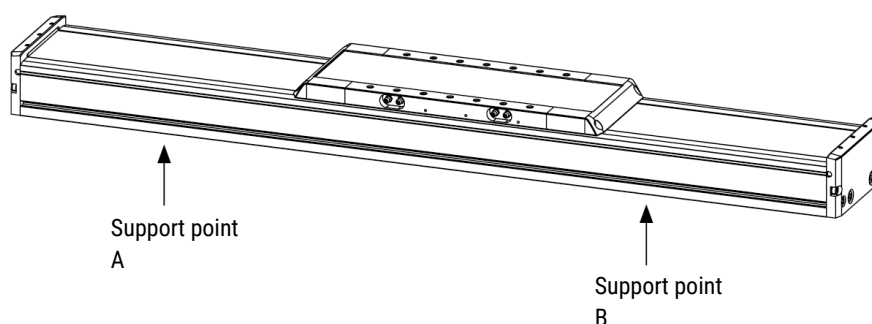


Fig. 5.2 : Correct position of the support points

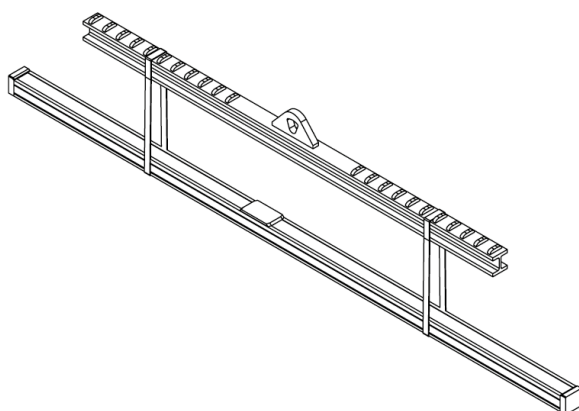
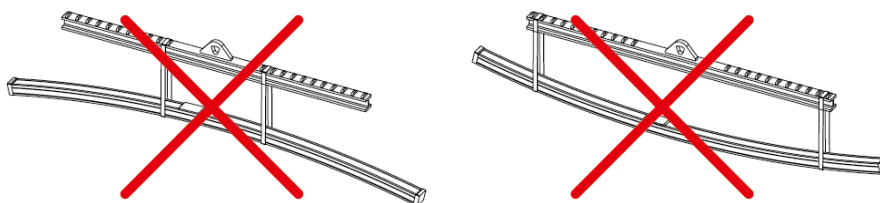


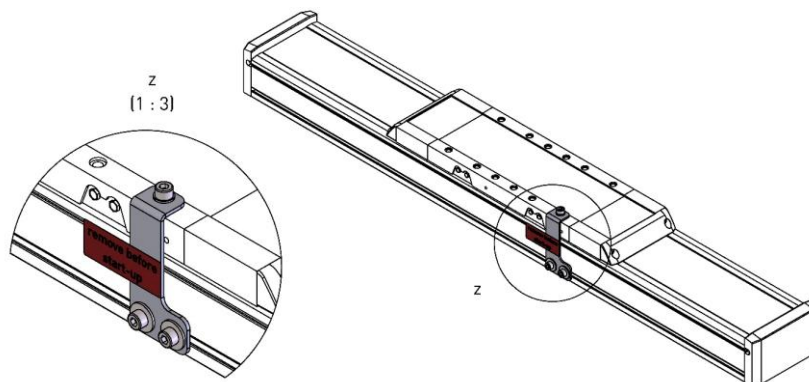
Fig. 5.3 : Incorrect position of the support points



5.6 Removing the transport lock

HT-L and HB-L linear motor axes are supplied as standard with red transport locks or transport locks with a red label to prevent uncontrolled movement of the slide during transport. The transport locks can be removed as soon as the linear motor axis has been positioned at the installation site, but no later than before commissioning.

Fig.5 .4 : transport lock



6 Installation and connection

Danger! Danger due to electrical voltage!

Dangerous currents may flow before and during assembly, disassembly and repair work.

- ▶ Work must only be carried out by a qualified electrician whilst the system is de-energised!
- ▶ Before carrying out any work, disconnect the linear axis from the power supply and secure it against being switched on again!

Warning! Danger from strong magnetic fields!

Strong magnetic fields in the vicinity of the products mentioned pose a health risk to people with implants that can be affected by magnetic fields (e.g. pacemakers).

- ▶ People with implants that can be affected by magnetic fields must maintain a safety distance of at least 500 mm from the products! (Trigger threshold for static magnetic fields of 0.5 mT in accordance with Directive 2013/35/EU).

Warning! Risk of shock and crushing!

Injuries may occur as a result of the slide moving automatically or manually.

- ▶ A protective guard must be fitted for the operation of the linear axes!
- ▶ Commissioning, set-up, troubleshooting and fault rectification must only be carried out by qualified personnel!

Warning! Risk of cuts!

The cover strip may cause cuts during assembly or disassembly.

- ▶ Commissioning and set-up must only be carried out by qualified personnel wearing appropriate protective equipment (gloves, safety goggles)!

Warning! Risk of shock and crushing!

Injuries may result from unintended movements of the driven elements of the linear axes.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Power-up, restoration of power!
 - Troubleshooting!
 - Stopping the machine!

Caution! Risk of hearing damage!

The linear axes can generate noise levels exceeding 70 dB(A) at high speeds.

- ▶ Hearing protection must be worn when linear axes are running at high speeds and producing noise levels above 70 dB(A)!
- ▶ Linear axes with an energy chain and chain support can generate noise levels of up to 94 dB(A), depending on the load and speed. A noise-reduction strap is available as an accessory to reduce noise.

Caution! Danger from suspended loads or falling parts!

- ▶ Installation and maintenance of the linear axes must only be carried out by qualified personnel!
- ▶ Take the mass of the parts into account during transport. Use suitable lifting equipment!
- ▶ Observe the applicable health and safety regulations for handling suspended loads!
- ▶ Only lift linear axes at the specified support points!
- ▶ Secure machines and machine parts to prevent them from tipping over!
- ▶ Secure the linear axes in accordance with the assembly instructions!

⚠ Caution! Risk of shock and crushing!

When moving the axes motorised, injuries may occur due to moving and displaced axes as well as attached components (energy chains, customer-supplied components).

- ▶ A separating safety guard must be provided for the operation of the linear axes!

⚠ Caution! Risk of shock and crushing due to the payload becoming detached!

Incorrect fastening or failure of the fastenings may result in injury from falling or flying parts.

- ▶ Type of assembly to be carried out: ensure that parts do not come loose, even under high acceleration or continuous vibration!
- ▶ Secure the payload in accordance with the assembly instructions!

⚠ Caution! Risk of electric shock or burns due to contact with live parts!

Contact with live parts may result in injury.

Cables installed by the customer may become frayed due to constant movement within the energy chain if laid incorrectly, thereby exposing electrical contact points.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Application, return of energy!
 - Troubleshooting!
 - Stopping the machine!
- ▶ Cabling must only be installed by qualified personnel!
- ▶ Work on electrical installations must only be carried out by qualified personnel!

⚠ Warning! Risk of damage to property!

Strong magnetic forces may damage watches and magnetisable data storage media in the vicinity of the linear axes.

- ▶ Do not place watches or magnetisable data storage media within close proximity (< 300 mm) of the linear axes!

⚠ Warning! Risk of harm to health and the environment!

Contact with lubricants may cause irritation, poisoning and allergic reactions, as well as environmental damage.

- ▶ Use only suitable media that are harmless to humans. Observe the manufacturers' safety data sheets!
- ▶ Ensure proper disposal!

6.1 Installation of the HT-L and HB-L linear axes

HT-L and HB-L linear axes must only be installed in a horizontal position (see Fig. 6.1 and Fig. 6.2). Use in a vertical mounting position (see Fig. 6.4) is not intended. For HT-L linear axes with a cover strip, ceiling mounting (see Fig. 6.3) is only permitted under certain conditions. Please consult HIWIN. Linear axes with an energy chain may only be installed in a horizontal mounting position (see Fig. 6.1). For HT-L linear axes with distance measuring system Option H (LIC 211), when installed in a horizontal position (see Fig. 6.2), the axis must be aligned so that the distance measuring system is at the top (please refer to Fig. 4.6 for this). The use of HT-L linear axes with distance measuring system Option H (LIC 211) is not intended for ceiling mounting (see Fig. 6.3).

Fixing must be carried out on the axis profile. The linear axes can be fixed to the mounting surface using clamping profiles (side grooves) or nut blocks (bottom grooves). Please note that, depending on the installation position, the weight of the linear axis acts as an additional load and that the actual forces and torques must remain below the permissible values (see the 'Linear Axes & Linear Axis Systems' catalogue).

Fig. 6.1 : Horizontal mounting position



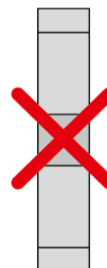
Fig. 6.2 : Installation position: horizontal, upright



Fig. 6.3 : Ceiling mounting



Fig. 6.4 : Vertical installation position



Note

The axis profile is manufactured using the extrusion process in accordance with EN 12020-2 (HT series) or EN 755-9 (HB series).

Note

If increased positioning accuracy is required, the axis must be aligned with and secured to a precise reference edge.

Note

Please note the support spacing for the respective shaft sizes (see 6.1.1). The end plates must not be the only parts resting on the mounting surface!

Note

The screws must be secured against accidental loosening.

6.1.1 Maximum support spacing for HT-L and HB-L linear axes

For linear axes with long stroke lengths and high payloads, depending on the mounting method, the axis body may experience an impermissibly high degree of deflection. To prevent this, the axis body should be supported at multiple points and mounted securely on a level surface. At least one support point must be provided on each side, at the end of each profile. The maximum permissible support spacing L_{SUP} , which depends on the loads F_y and F_z as shown in the diagrams below, must not be exceeded. To ensure this, additional support points may need to be provided where necessary.

Fig.6 .5 : Horizontal, lying position

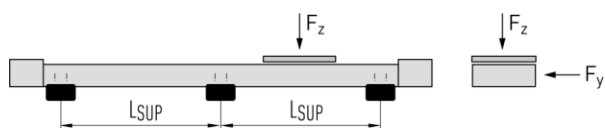


Fig.6 .6 : Horizontal, upright axis position

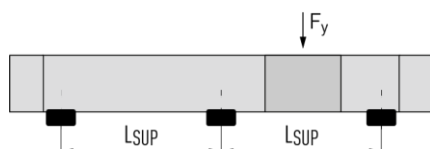


Fig.6 .7 : Maximum support spacing L_{SUP} as a function of the force F_z

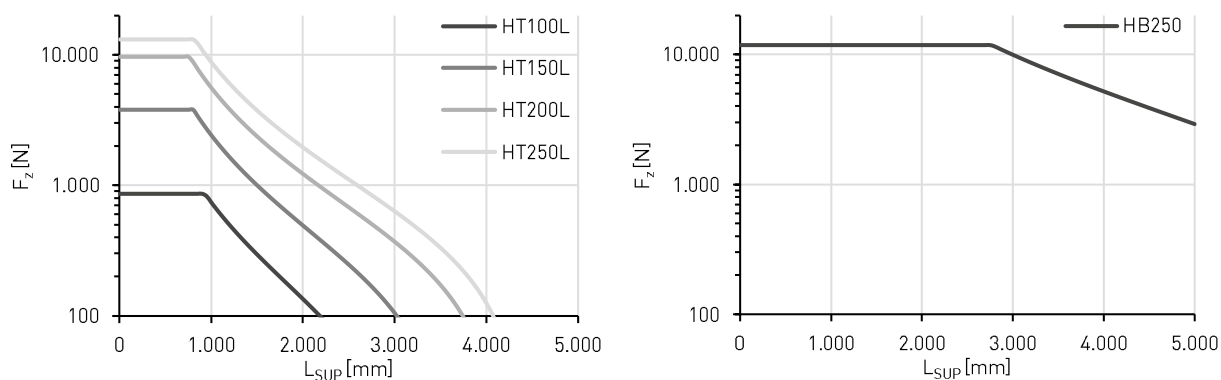
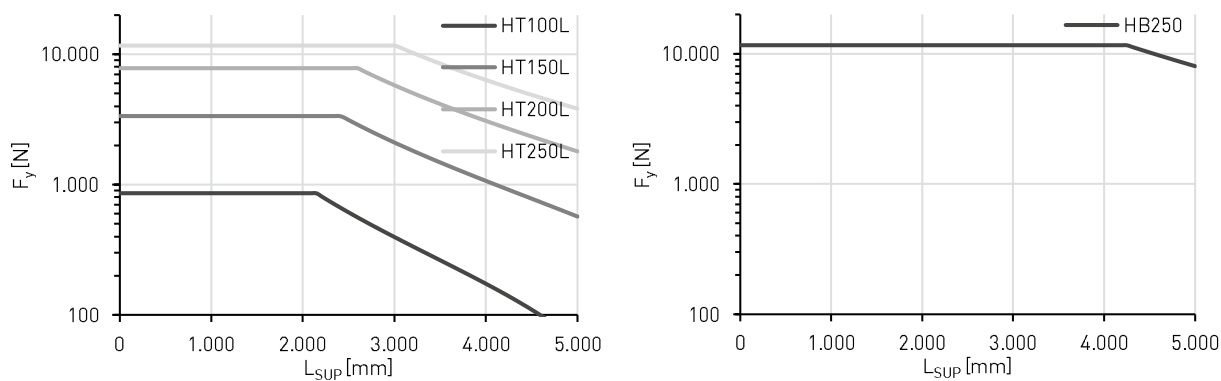
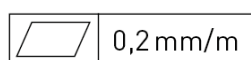


Fig.6 .8 : Maximum support spacing L_{SUP} as a function of force F_y



6.1.2 Accuracy requirements for the mounting surface

When fixing the linear axis, ensure that the axis profile is mounted on a level surface and that the fixing points are aligned with one another in such a way that the required flatness is achieved.



Accuracy requirements for the mounting surface

6.1.3 Mounting with nuts

The slotted nuts to be used for each shaft size can be found in [Table 6.1](#). The slotted nuts must be arranged in accordance with [Fig. 6.9](#), [Fig. 6.10](#), [Fig. 6.12](#), [Fig. 6.13](#) and [Fig. 6.14](#). The required number of slotted nuts depends on the external load. To calculate the required number, the load values listed in [Table 6.1](#) must be taken into account. The minimum number of nuts listed in [Table 6.1](#) must not be undercut. The nuts must be positioned in groups around fixing points, as shown in [Fig. 6.12](#), [Fig. 6.13](#) and [Fig. 6.14](#). It should be noted that there must be at least one fixing point at each end of the shaft and that each fixing point must be capable of safely transferring the external load on its own. The number and spacing of additional fixing points must be selected according to the load conditions. The L_{NX} spacings listed in [Table 6.1](#) are for guidance only.

- Drill the mounting holes into the mounting surface (hole spacing in accordance with [Table 6.1](#)).
- Clean the mounting surface and position the linear axis on the mounting surface.
- Swivel the nut into the lower groove.
- Pre-assemble the nut using the screws with a low screw tightening torque.
- Tighten the screws at each fixing point in a criss-cross pattern, observing the specified screw tightening torques. Observe the sequence of the fixing points: tighten either from the outside in or from one side to the other to avoid stress concentrations.

✓ The linear axis is now installed

When fixing the linear axes, observe the hole spacing L_{NY} .

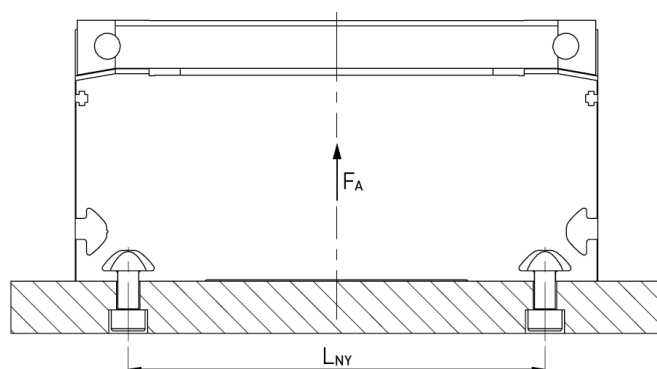


Fig. 6.10 : Bore spacing for mounting the HT250L linear axes from below using nuts

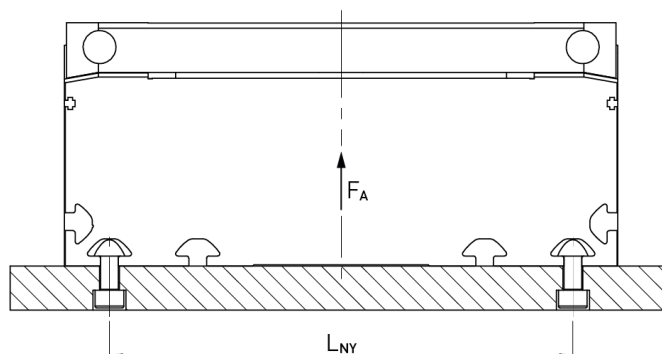


Fig.6 .11 : Permissible axial operating force in the direction of tension per nut ($F_{A_perm.}$)

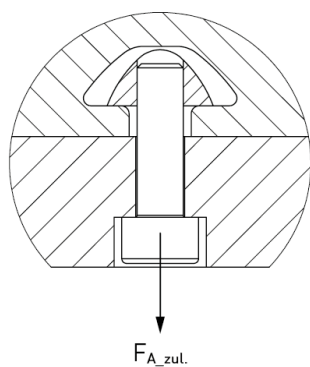


Fig.6 .12 : Fixing with nuts – HT100L, HT150L



Fig.6 .13 : Fixing with nuts – HT200L

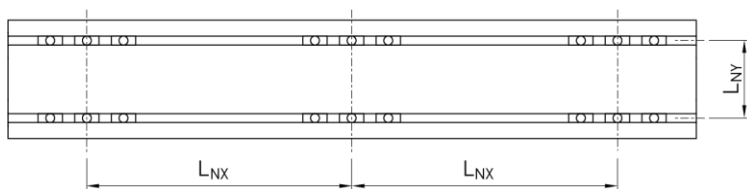


Fig.6 .14 : Fixing with nuts – HT250L, HB250L

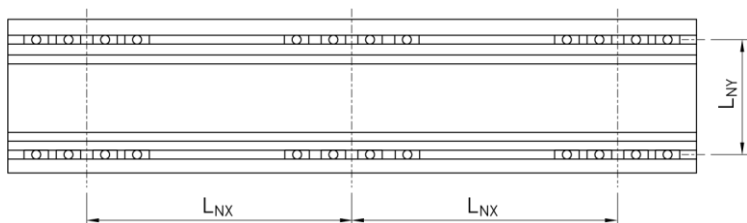


Table6 .1 : Minimum number of nuts required to secure the axis and recommended spacing of fixing points for axes of greater length

size	Minimum number of nuts	L_{NY} [mm]	Recommended spacing L_{NX} [mm]	Thread size	Screw tightening torque [Nm]	$F_{A_permissible}$ ¹⁾ [N]	Item no.
HT100	8	80	500	M5	4.5	500	20-000529
HT150	8	120	600	M6	10.0	1,250	20-000531
HT200	12	160	800	M8	20.0	3,200	20-000534
HT250	16	210	1,000	M8	20.0	3,200	20-000534
HB250	16	150	1,000	M10	46.0	7,000	80114691

¹⁾ Permissible axial operating force in the direction of tension per nut

6.1.4 Installation with clamping profiles

The clamping profiles must always be fitted in pairs (to the left and right of the axle body) (see Fig. 6.16 and Fig. 6.17). The required number of clamping profiles depends on the external load. To calculate the required number, the load values listed in Table 6.2 must be taken into account. The minimum number of clamping profiles specified in Table 6.2 must not be undercut. It should be noted that there must be at least one fixing point at each end of the shaft and that each fixing point must be capable of safely transferring the external load on its own. The number and spacing of additional fixing points must be selected according to the load situation. The L_{SX} spacings listed in Table 6.2 are merely guide values.

- Drill the mounting holes into the mounting surface (hole spacing in accordance with Table 6.2).
- Clean the mounting surface and position the linear axis on the mounting surface.
- Swivel the clamping profile into the side groove.
- Pre-assemble the clamping profile using the screws with a low screw tightening torque.
- Tighten the screws at each fixing point in a criss-cross pattern, observing the specified screw tightening torques. Observe the sequence of the fixing points: tighten either from the outside in or from one side to the other to avoid distortion.

✓ The linear axis is now fitted

When fixing the linear axes, observe the hole spacing L_{SY} (Fig. 6.15).

Fig. 6.15 : Hole spacing for lateral mounting of the linear axes using clamping profiles

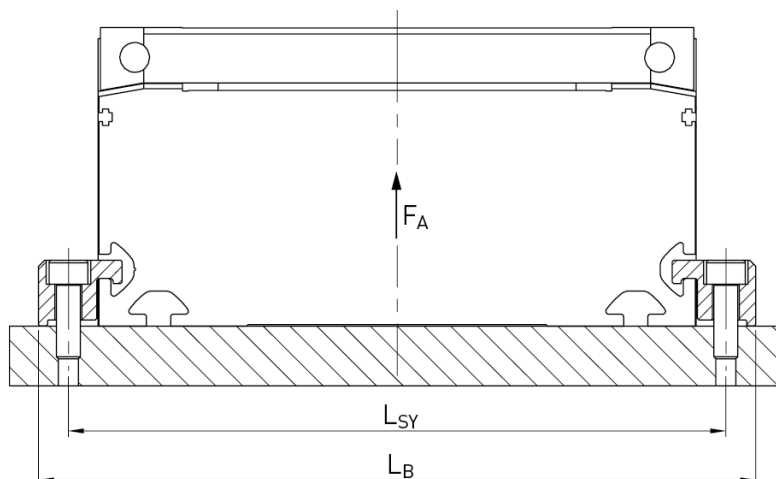


Fig. 6.16 : Mounting with clamping profiles – HT100, HT150

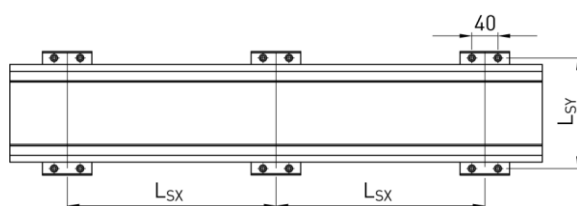


Fig. 6.17 : Mounting with clamping profiles – HT200, HT250, HB250

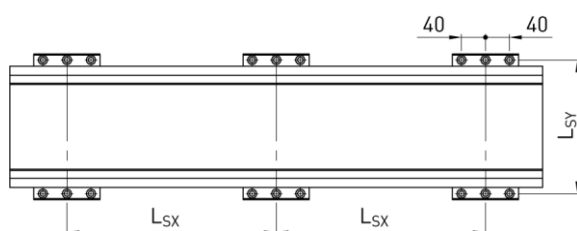


Table6 .2 : Minimum number of clamping profiles required to secure the axis and recommended spacing of fixing points for axes of longer length

size	Minimum number of clamping profiles	LSY [mm]	LB [mm]	Recommended spacing _{LSX} [mm]	Thread size	Screw tightening torque [Nm]	FA _{permissible} ¹⁾ [N]	Item no. Clamping profiles (4 pcs.)
HT100	4	115	130	500	M5	4.9	800	25-000517
HT150	4	170	190	600	M6	10.1	1,600	25-001023
HT200	4	220	240	800	M8	18.5	3,000	25-000520
HT250	6	270	290	1,000	M8	18.5	5,000	25-000520
HB250	8	283	321	1,000	M10	33.0	7,000	80089273

¹⁾ Permissible axial operating force in the direction of tension per pair of clamping profiles

6.2 Mounting the payload

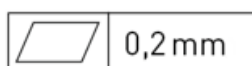
The spacing of the threaded holes for mounting the payload can be found in the 'Linear Axes & Linear Axis Systems' catalogue. Additional counter bores allow for the insertion of centring sleeves. HIWIN recommends arranging two centring sleeves diagonally opposite each other. For axes with more than one slide, it is recommended that only one slide be fitted with centring sleeves in each case to avoid stress concentrations.

Table 6.3 : Threaded holes for securing the payload

Series/Size	Thread size × depth	Counter bore depth for centring sleeve [mm]	Counter bore diameter for centring sleeve [mm]
HT100	M5 × 10	1.5	Ø8 H7
HT150	M6 × 14	1.5	Ø8 H7
HT200	M8 × 14	2.0	Ø12 H7
HT250, HB250	M10 × 20	2.0	Ø15 H7

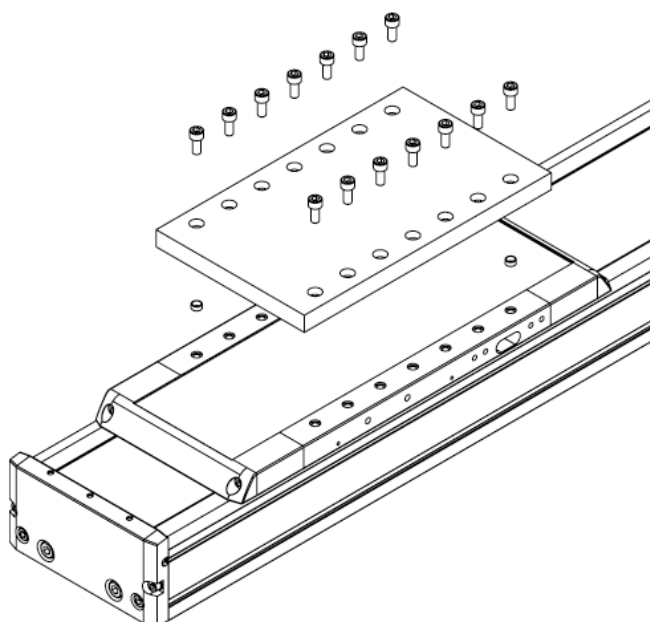
- Clean the mounting surfaces on the slide.
- Clean the mounting surface of the load.
- Use centring sleeves if necessary.
- Position the load on the linear axis slide.
- Tighten the mounting bolts in a crosswise pattern.
- Check that the load moves freely throughout the entire stroke.
- Tighten the screws.

✓ The payload is now fitted.



Accuracy requirements for the payload mounting surface.

Fig.6.18 : Mounting the load with centring sleeves



6.3 Fitting and adjusting the limit switches – HT-L linear tables

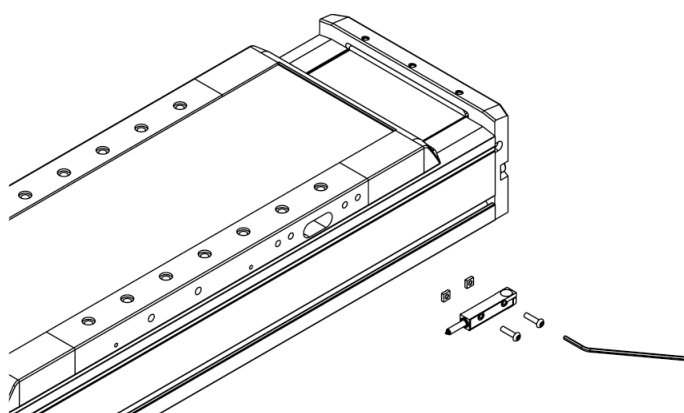
6.3.1 Fitting the limit switches

The limit switches are available as either n/c contacts or normally open contacts. The limit switch can be secured directly in the limit switch groove (T-slot) using the supplied M3 screws and square nuts. The limit switches can be fitted on either the right or left-hand side.

- If necessary, remove the green trim strip from the upper T-slot.
- Slide two square nuts through the cut-out on the drive block into the upper T-slot.
- Fit the limit switch using both screws. For the HT100 size, depending on the type, the limit switch is mounted either with a spacer plate and M3x12 screws or without a spacer plate using M3x10.8 screws. Leave both screws loosely tightened for now.
- Slide the limit switch into the desired position and press it upwards slightly.
- Tighten the screws. The screw tightening torque is 0.5 Nm.

✓ The limit switches are now fitted.

Fig.6 .19 : Fitting limit switches



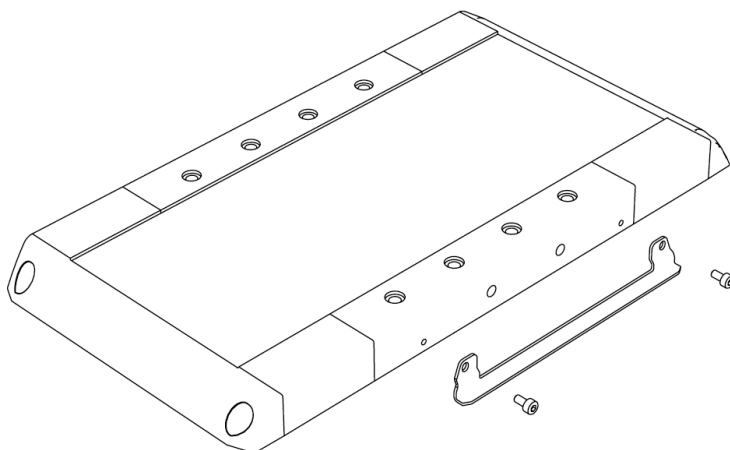
6.3.2 Fitting the damping element

The damping element is used to activate the limit switches at the two end positions of the slide (at stroke 0 and maximum stroke) and must be fitted on the same side as the limit switches.

- Position the damping element against the slide.
- Lightly screw the damping element to the slide using the M3 screws provided.
- Align the damping element parallel to the lower edge of the carriage.

✓ The damping element is pre-assembled.

Fig.6 .20 : Fitting the damping element



6.3.3 Adjusting the switching distance

The limit switches operate inductively and require a defined switching distance between the limit switch and the damping element.

Switching distance	1 mm
screw tightening torque	1 Nm

- Move the slide until the damping element is positioned above a limit switch. Use a feeler gauge to align the damping element so that the switching distance is maintained. Ensure that the damping element remains parallel to the lower edge of the slide.
- Tighten the screws on the damping element to the specified screw tightening torque.
- If a second limit switch is fitted: Move the slide until the damping element is positioned above the second limit switch and use a feeler gauge to check that the switching distance is maintained. Adjust as necessary until the switching distance is maintained for both limit switches.
- Route the limit switch cable through the lower groove. There, the cable can be protected by the groove cover. The groove cover is available separately; see , section11 .

✓ The switching distance is now set.

Note

Check that the limit switch is functioning correctly before commissioning, either using a limit switch test box or by moving the system to the end positions in a controlled manner.

Fig.6 .21 : Adjusting the switching distance using a feeler gauge and tightening the screws

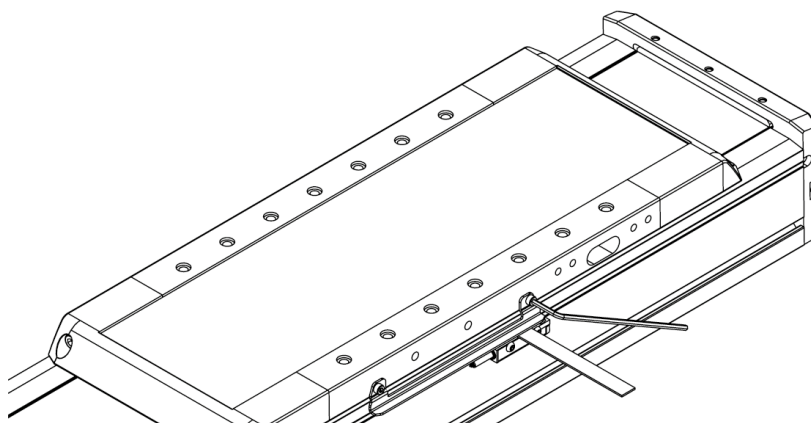
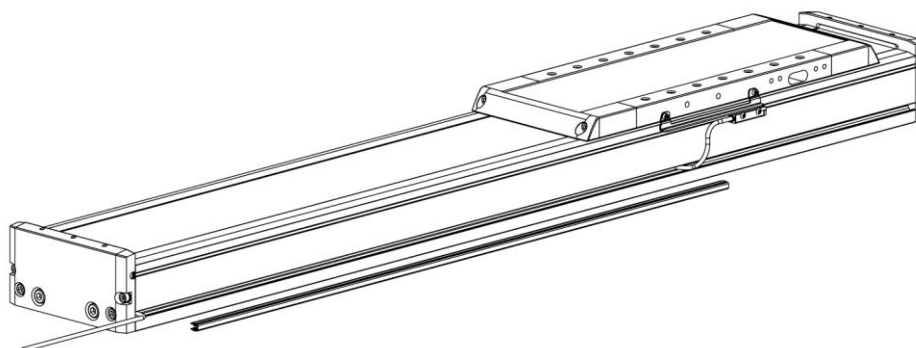


Fig.6 .22 : Limit switch installation: Routing the cables



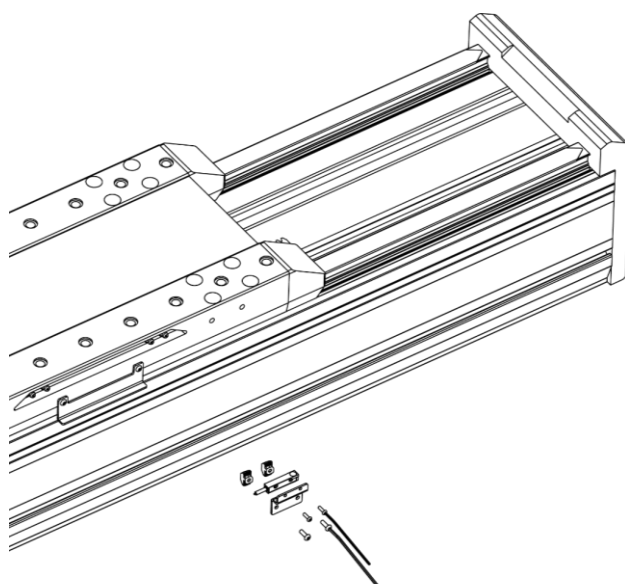
6.4 Fitting and adjusting the limit switches – HB-L bridge axis

6.4.1 Fitting the limit switches

The limit switches are available as either n/c contacts or n/o contacts. The limit switch can be fixed directly into the limit switch groove (T-slot) using the screws and hammer-head nuts supplied.

- If necessary, remove the green trim strip from the upper groove
- The first step is to attach the limit switch to the mounting plate.
- Align the limit switch horizontally with the upper edge of the mounting plate.
- Secure the limit switch using the M3 screws; screw tightening torque 0.5 Nm
- Insert the M4 screw through the holes in the mounting plate and screw in the hammer-head nuts a few threads
- Turn the hammer-head nuts to feed them through the opening in the upper groove
- Tighten the M4 screws slowly and one at a time; the hammer-head nuts will turn into position
- Tighten the M4 screw with a screw tightening torque of 2 Nm

Fig.6 .23 : Installation of limit switch

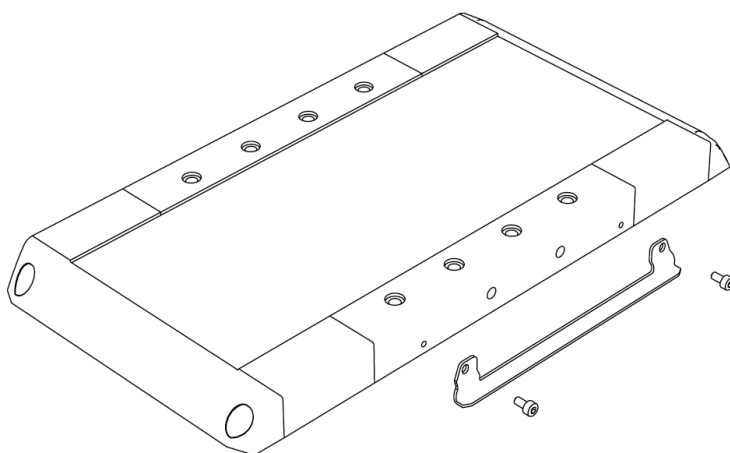


6.4.2 Fitting the damping element

The damping element is used to activate the limit switches in the two end positions of the slide (at stroke 0 and maximum stroke) and must be fitted on the same side as the limit switches.

- Position the damping element against the slide.
- Lightly screw the damping element to the slide using the screws provided.
- Align the damping element parallel to the lower edge of the carriage.
- ✓ The damping element is pre-assembled.

Fig.6 .24 : Fitting the damping element



6.4.3 Adjusting the switching distance

The limit switches operate inductively and require a defined switching distance between the limit switch and the damping element.

Switching distance	1 mm
screw tightening torque	2 Nm

- Move the slide until the damping element is positioned above a limit switch. Use a feeler gauge to align the damping element so that the switching distance of 1 mm is maintained. Ensure that the damping element remains aligned parallel to the lower edge of the slide.
- Tighten the screws on the damping element to the specified screw tightening torque.
- If a second limit switch is fitted: Move the slide until the damping element is positioned above the second limit switch and use a feeler gauge to check that the switching clearance is maintained. Adjust as necessary until the switching clearance is maintained for both limit switches.
- Route the limit switch cable through the lower groove. There, the cable can be protected by the groove cover. The groove cover is available separately; see section 11.
- The switching distance is now set.

Note

Check that the limit switch is functioning correctly before commissioning, either using a limit switch test box or by moving the system to the end positions in a controlled manner.

Fig.6 .25 : Adjusting the switching distance using a feeler gauge and tightening the screws

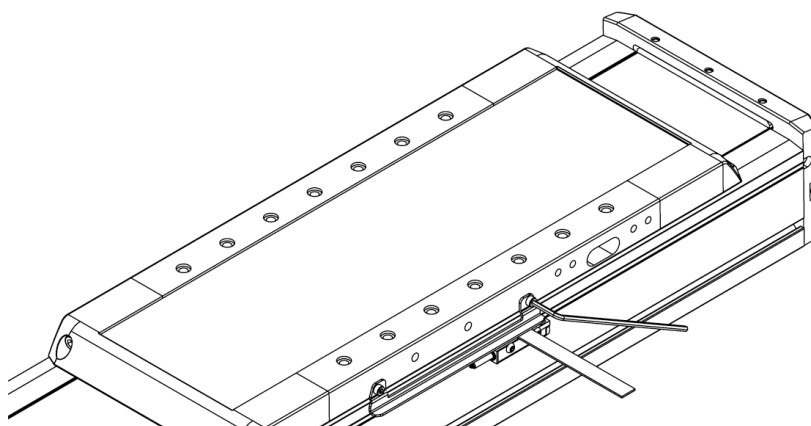
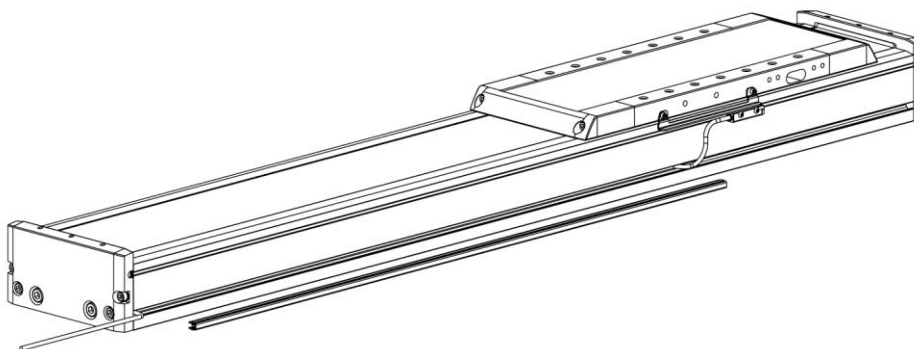


Fig.6 .26 : Fitting limit switches: Routing the cables



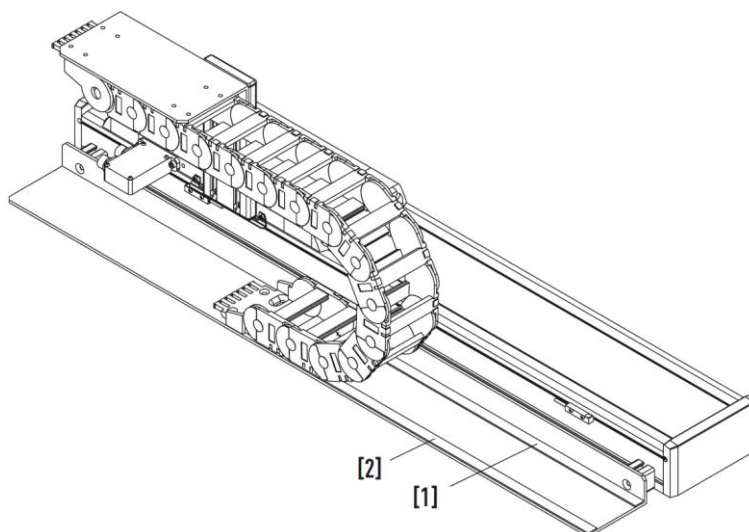
6.5 Fitting the noise-reduction strip to energy chains

The strip serves to reduce the noise emitted by the energy chain.

- Manually push the slide to its mechanical end position so that the energy chain rests as fully as possible on the energy chain support.
- Cut the noise-reduction tape to a length corresponding to the maximum contact length of the energy chain. Two strips of the same length are required per energy chain.
- Push the slide by hand to the other end position so that the lower part of the energy chain is lifted as far as possible off the energy chain support.
- Clean the energy chain support so that it is free of dirt, dust and grease.
- Stick the first strip **[1]** flush with the corner of the energy chain support (see Fig.6 .27).
- Stick the second strip **[2]** flush with the outer edge of the support bracket.
- Move the slide and ensure that the energy chain rolls along the strips over the entire travel distance.

✓ The noise-reduction tape is now fitted.

Fig.6 .27 : Linear axis with noise-reduction tape fitted



6.6 Electrical connection

⚠ Danger! Risk of electric shock!

If the motor is not properly earthed, there is a risk of electric shock.

- ▶ Ensure that the linear axis is properly earthed via the PE rail in the switch cabinet before connecting the electrical power supply!

⚠ Danger! Risk from electrical voltage!

Electric currents can still flow even when the motor is not moving.

- ▶ Ensure that the linear axis is de-energised before disconnecting the motors' electrical connections!
- ▶ After disconnecting the servo drive from the power supply, wait at least 5 minutes before touching live parts or disconnecting any connections!
- ▶ For safety's sake, measure the voltage in the servo drive's DC link. Wait until it has dropped below 40 V!
- ▶ Work on electrical installations must only be carried out by qualified personnel!

⚠ Warning! Risk of injury and damage to property!

If the motor is overloaded, it may overheat and catch fire.

- ▶ Provide control and hardware-based safety measures to protect the motor against overload!
- ▶ Connect PTC temperature sensors for warning and shutdown purposes in the event of an overload!
- ▶ Connect PT1000 or KTY84 sensors for temperature monitoring purposes!
- ▶ Use an I2t model in the servo drive or the higher-level controller to limit currents above I_N over time!

6.6.1 Connection of limit switches

The pin assignment for the limit switch connector in variants A and B can be found at [Fig.6 .29](#) . For variants C and D with open wire ends, the wires must be connected as shown in [Fig. Fig.6 .28](#) .

Fig.6 .28 : Wiring diagram

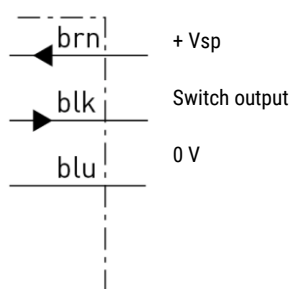
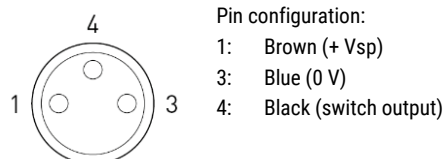


Fig.6 .29 : Pin assignment: limit switch plug



Note

As the sensor operates at a low voltage, it does not normally pose a risk of injury or danger to life on its own.

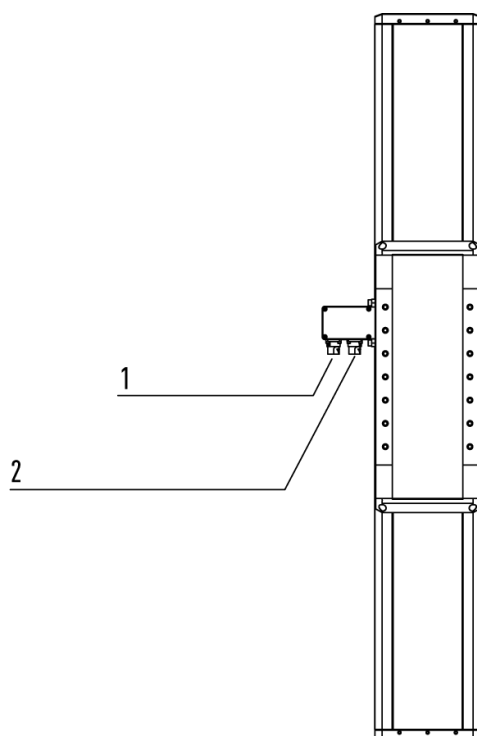
Note

Do not operate the sensor at a voltage other than that specified, as this may damage it!

6.6.2 Connection of motor and internal distance measuring system

The linear motor axes feature an interface for cables for the motor and distance measuring system. These are located on the side of the slide (see Fig. 6.30) and can be connected quickly and easily without tools using the quick-release fasteners.

Fig. 6.30 : Electrical connection interface of the HT-L and HB-L linear motor axes



Pos	Connection	HT100L	HT150L, HT200L, HT250L, HB250L
1	motor	Mounting box 915, E, 9-pin, flange ¹⁾²⁾	M23 mounting box, 8-pin, PRO, flange ²⁾
2	distance measuring system	Mounting box 915, E, 15-pin, flange ¹⁾²⁾	M17 mounting box, N, 17-pin, PRO, flange ²⁾

¹⁾ Up to 04/2022 Standard for HT150L, HT200L, HT250L

²⁾ You can find suitable cables on our website under [HIWIN.de](https://www.hiwin.de) in the 'Accessories' range.

6.6.2.1 Motor connection

Warning! Risk of injury!

Incorrect connection of the motor can lead to uncontrolled movement of the slide and, under certain circumstances, to damage to the axis.

► The motor must only be connected by qualified personnel!

Motor connection: M23 junction box, 8-pin

Table 6.4 : M23 mounting box, 8-pin

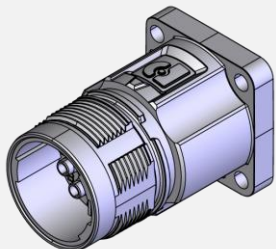
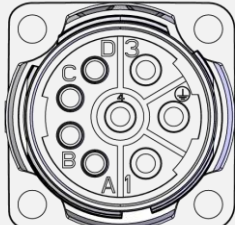
Mounting box	Specification	Pin configuration
	Description: M23 flush-mounted box, 8-pin, PRO, flange Manufacturer: Phoenix Contact GmbH & Co. KG Third-party item number: 1628777 Type: M23-7EP198AW500S Series: PRO	

Table6 .5 : Pin assignment for mounting box, 8-pin

Pin No.	Signal
1	U
4	V
3	W
PE	PE
A	T1+/PTC SNM 120
B	T1-/PTC SNM 120
C	T2+/PT1000
D	T2-/PT1000

Motor connection: 915 flush-mounted box, 9-pin

Table6 .6 : 915 flush-mounted box, 9-pin

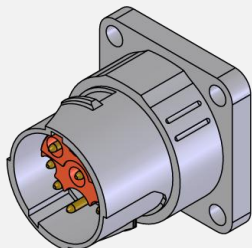
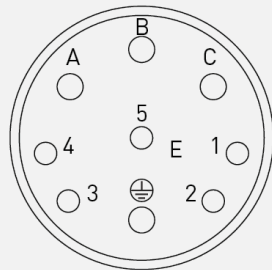
Flush-mounted box	Specification	Pin configuration
	Description: 915 flush-mounted box, E, 9-pin, flange Manufacturer: TE Connectivity Industrial GmbH Type: EEGA201NN00000500000	

Table6 .7 : Pin assignment for 9-pin mounting box

Pin No.	Signal
A	U
B	V
C	W
PE	PE
1	T1+/PTC SNM 120
2	T1-/PTC SNM 120
3	T2+/PT1000
4	T2-/PT1000

6.6.2.2 Connection for internal distance measuring system

Warning! Risk of injury!

Incorrect connection of the position measurement system can lead to uncontrolled movement of the slide and, under certain circumstances, to damage to the axis.

- The position-sensing system must only be connected by qualified personnel!

When connecting the position measurement system in accordance with [Table6 .9](#) or [Table6 .11](#) , the positive direction of travel shown in [Fig.4 .6](#) and [Fig.4 .7](#) applies.

Distance measuring system connection: M17 mounting box, 17-pin

Table6 .8 : M17 flush-mounted box, 17-pin

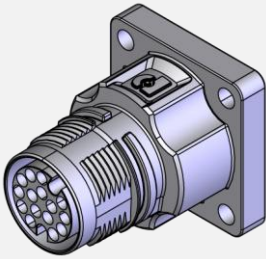
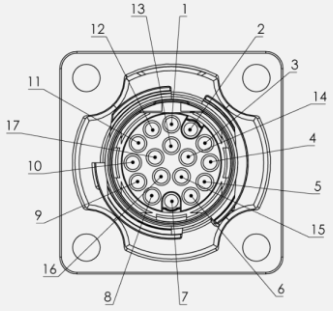
Flush-mounted box	Specification	Pin configuration
	Description: M17, N, 17-pin, PRO, flange Manufacturer: Phoenix Contact GmbH & Co. KG Third-party part number: 1628928 Type: M17-17P1N8AW500S Series: PRO	

Table6 .9 : Pin assignment for mounting box, 17-pin

Pin No.	Signal								
	MAGIC				APM	LIC 211	BML		TTK70
	A	B	D	E	F	H	R	S	T
1	Sin-	Sin-	B-	B-	Cos-	-	Cos-	Cos-	Cos-
2	Cos-	Cos-	A-	A-	Sin-	-	Sin-	Sin-	Sin-
3	Ref+	Ref+	Ref+	Ref+	Data-	Data-	Data-	Data-	Data-
4	5 V	5 V	5 V	5 V	4.5 – 28 V	5 V	4.75 – 5.25 V 10 – 28 V	4.75 – 5.25 V 10 – 28 V	7 – 12 V
5	5 V	5 V	5 V	5 V	4.5 – 28 V	5 V	4.75 – 5.25 V 10 – 28 V	4.75 – 5.25 V 10 – 28 V	7 – 12 V
6	-	-	-	-	Clock-	Clock-	Clock-	Clock-	-
7	-	-	-	-	Clock+	Clock+	Clock+	Clock+	-
8	-	Reverb A-	-	-	-	-	-	-	-
9	Sin+	Sin+	B+	B+	Cos+	-	Cos+	Cos+	Cos+
10	Cos+	Cos+	A+	A+	Sin+	-	Sin+	Sin+	Sin+
11	Ref-	Ref-	Ref-	Ref-	Data+	Data+	Data+	Data+	Data+
12	0 V	0 V	0 V	0 V	0 V	0 V	0 V	0 V	0 V
13	0 V	0 V	0 V	0 V	0 V	0 V	0 V	0 V	0 V
14	-	Hall B+	-	Hall B	-	-	-	-	-
15	-	-	-	-	Umbrella	-	-	-	-
16	-	Hall B-	-	Hall A	-	-	-	-	-
17	-	Hall A+	-	Hall C	-	-	-	-	-
connector housing	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella

A: Magic analogue 1Vss sin/cos
 B: Magic analogue 1Vss sin/cos + hall sensor digital
 D: Magic digital TTL 5V
 E: Magic digital TTL 5V + digital hall sensor
 F: APM absolute BissC
 H: LIC211, absolute optical EnDat 2.2
 R: BML-S1G0, absolute BissC
 S: BML-S1G0, absolute SSI
 T: Sick TTK70

Distance measuring system connection: 915 mounting box, 15-pin

Table6 .10 : Mounting box 915, 15-pin

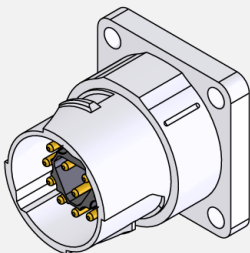
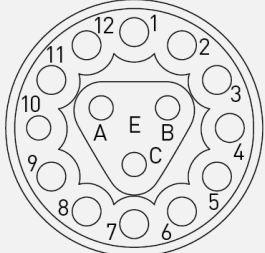
Mounting box	Specification	Pin configuration
	Description: 915 mounting box, E, 15-pin, flange Manufacturer: TE Connectivity Industrial GmbH Type: EEGA204NN00000001000	

Table6 .11 : Pin assignment for 15-pin mounting box

Pin No.	Signal								
	MAGIC				APM	LIC 211	BML		TTK70
	A	B	D	E	F	H	R	S	T
1	Sin-	Sin-	B-	B-	Cos-	-	A-	A-	Cos-
2	Cos-	Cos-	A-	A-	Sin-	-	B-	B-	Sin-
3	Ref+	Ref+	Ref+	Ref+	Data-	Data-	Data-	Data-	Data-
4	5 V	5 V	5 V	5 V	4.5 – 28 V	5 V	4.75 – 5.25 V 10 – 28 V	4.75 – 5.25 V 10 – 28 V	7 – 12 V
5	5 V	5 V	5 V	5 V	4.5 – 28 V	5 V	4.75 – 5.25 V 10 – 28 V	4.75 – 5.25 V 10 – 28 V	7 – 12 V
6	-	Hall A+	-	Hall B	Clock-	Clock-	Clock-	Clock-	-
7	-	Hall B-	-	Hall C	Clock+	Clock+	Clock+	Clock+	-
8	-	Reverb A-	-	-	-	-	-	-	-
9	Sin+	Sin+	B+	B+	Cos+	-	A+	A+	Cos+
10	Cos+	Cos+	A+	A+	Sin+	-	B+	B+	Sin+
11	Ref-	Ref-	Ref-	Ref-	Data+	Data+	Data+	Data+	Data+
12	0 V	0 V	0 V	0 V	0 V	Ground	Ground	Ground	0 V
A	0 V	0 V	0 V	0 V	0 V	Ground	Ground	Ground	0 V
B	-	Hall B+	-	Hall A	-	-	-	-	-
C	-	-	-	-	Umbrella	-	-	-	-
connector housing	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella	Umbrella

A: Magic analogue 1Vss sin/cos
 B: Magic analogue 1Vss sin/cos + hall sensor digital
 D: Magic digital TTL 5V
 E: Magic digital TTL 5V + digital hall sensor
 F: APM absolute BissC
 H: LIC211, absolute optical EnDat 2.2
 R: BML-S1G0, absolute BissC
 S: BML-S1G0, absolute SSI
 T: Sick TTK70

6.6.3 Cables and connectors

For HIWIN linear motor axes and, more generally, for all highly dynamic applications, we recommend our pre-assembled extension cables, which are specifically sized for dynamic use in energy chains. These high-quality extension cables are supplied with a single-ended circular coupling (female). You can find suitable cables for the mounting sockets listed in 'Fig.6 .30) on our website at hiwin.de in the 'Accessories' range.

Note

To prevent EMC interference in the encoder signal, the encoder cable extension must be shielded and the shield must make full-surface contact via the connectors. High-quality, fully shielded connectors must be used!

6.6.4 Servo drive connection

Note

For information on the connection options for the servo drive, please refer to the instruction manual for the servo drive being used!

7 Maintenance and cleaning

Warning! Danger from strong magnetic fields!

Strong magnetic fields in the vicinity of the products mentioned pose a health risk to people with implants that can be affected by magnetic fields (e.g. pacemakers).

- ▶ People with implants that can be affected by magnetic fields must maintain a safety distance of at least 500 mm from the products! (Trigger threshold for static magnetic fields of 0.5 mT in accordance with Directive 2013/35/EU).

Warning! Risk of shock and crushing!

Injuries may occur as a result of the slide being moved or accidentally set in motion.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - energisation or restoration of power!
 - Rectifying a fault!
 - Stopping the machine!

Warning! Risk of injury and damage to property!

Unauthorised work on the system poses a risk of injury and may invalidate the warranty.

- ▶ Installation and maintenance of the system must only be carried out by qualified personnel!

Caution! Risk of crushing due to the axes tipping over!

- ▶ Secure the machine and its components to prevent them from tipping over!

Caution! Risk of shock and crushing due to the axis falling or the payload becoming detached!

Danger from heavy loads!

- ▶ Use suitable lifting equipment!
- ▶ Secure the linear axes in accordance with the assembly instructions (see section [6.1](#))!
- ▶ Secure the payload in accordance with the assembly instructions (see section [6.2](#))!

Caution! Risk of shock and crushing!

When moving or positioning the axes manually, there is a risk of injury from moving and displaced axes as well as attached components (energy chains, customer-supplied components).

- ▶ Observe the applicable health and safety regulations!
- ▶ Transport to the installation site must only be carried out by qualified personnel!

Caution! Risk of electric shock or burns from contact with live parts!

Contact with live parts may result in injury.

Cables installed by the customer may become frayed due to constant movement within the energy chain if laid incorrectly, thereby exposing electrical contact points.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Power-up, return of energy!
 - Troubleshooting!
 - Stopping the machine!
- ▶ Cabling must only be installed by qualified personnel!
- ▶ Work on electrical installations must only be carried out by qualified personnel!

⚠ Warning! Risk of damage to property!

Strong magnetic forces may damage watches and magnetisable data storage media in the vicinity of the linear axes.

- ▶ Do not place watches or magnetisable data storage media within close proximity (< 300 mm) of the linear axes!

⚠ Warning! Risk to health and the environment!

Contact with lubricants may cause irritation, poisoning and allergic reactions, as well as environmental damage.

- ▶ Use only suitable media that are safe for humans. Observe the manufacturers' safety data sheets!
- ▶ Ensure proper disposal!

⚠ Warning! Damage caused by the wrong lubricant!

Using the wrong lubricant can lead to property damage or environmental pollution.

- ▶ Use the correct type of lubricant (grease, oil) as specified in these assembly instructions!

During maintenance work:

- Secure the linear axis to prevent unauthorised activation.
- De-energise the linear axis.
- Secure the linear axis to prevent unauthorised restarting.



Note

It is essential to adhere to the maintenance intervals for cleaning and lubrication. Include the maintenance intervals in your maintenance schedule.

⚠ Warning! Risk of cuts!

The cover strip may cause cuts during assembly or disassembly.

- ▶ Commissioning and set-up must only be carried out by qualified personnel wearing appropriate protective equipment (gloves, safety goggles)!

⚠ Caution! Risk of harm to health and the environment!

Contact with lubricants may cause irritation, poisoning and allergic reactions, as well as environmental damage.

- ▶ Use only suitable media that are harmless to humans. Observe the manufacturers' safety data sheets!
- ▶ Ensure proper disposal!

7.1 Lubrication

The operation of the linear axes results in the continuous consumption of lubricant. The product must be relubricated regularly. Please note that small quantities of lubricant may leak from the lubrication system.

The following factors influence the lubrication intervals:

- Dust and dirt
- Operating temperatures
- Loads
- Vibration loads
- Constantly short positioning strokes
- Rotational speeds

Note

Inadequate lubrication or the use of the wrong lubricant increases wear and reduces service life.

7.1.1 Lubrication of the HT-L and HB-L linear axes

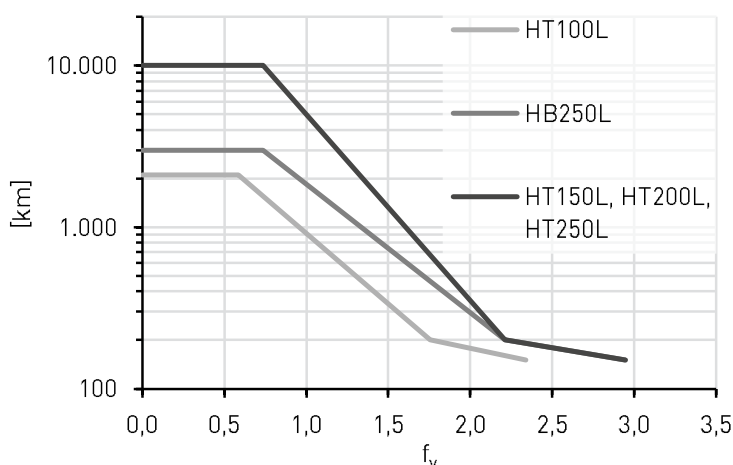
The HT-L and HB-L linear axes comprise two profiled linear guideways, each with two blocks, which are factory-lubricated with an initial lubricant. The initial lubrication is sufficient for the first lubrication interval. For relubrication, there are four grease nipples (one for each block) on the side of the slide. These are accessible on one side for the HT-L and on both sides for the HB-L. The amount of lubricant required for relubrication can be found Table 7.1.

The lubrication interval depends on the load, speed, cycle time and ambient conditions. The guide values given in Fig. 7.1 apply to the lubrication interval.

Table 7.1 : Relubrication quantity per block

size	block	lubricant	Relubrication quantity [cm ³]
HT100L	MGN09H	G04	0.06
HT150L	QEH15CA	G04	0.30
HT200L	QHH20CA	G04	0.50
HT250L	QHH25CA	G04	0.80
HB250L	CGH25HA	G04	1.0

Fig. 7.1 : Load-dependent relubrication intervals [km] for the linear guideway



f_v = load comparison factor as per the 'Linear Axes & Linear Axis Systems' catalogue, chapter 'Calculation Principles'

Table7 .2 : Lubricant for the linear guideway

Designation / Type	Application range	Unit of measurement	article number
G04	HX Standard / high speed	400g cartridge	20-000345
G02	HX Cleanroom / HX Special	400g cartridge	20-000339

7.1.2 Lubrication procedure

Note

Use only lubricants in accordance with DIN 51825, KP2K, NLGI consistency class 2!

Note

Ensure that only lubricants without solid lubricant content (e.g. graphite or MoS_2) are used!

Note

If the linear axes are installed vertically, horizontally or ceiling-mounted, the relubrication quantities must be increased by approx. 50 per cent.

Note

Under special operating conditions (contamination, short stroke, mounting type), the lubrication intervals must be adapted to the specific application.

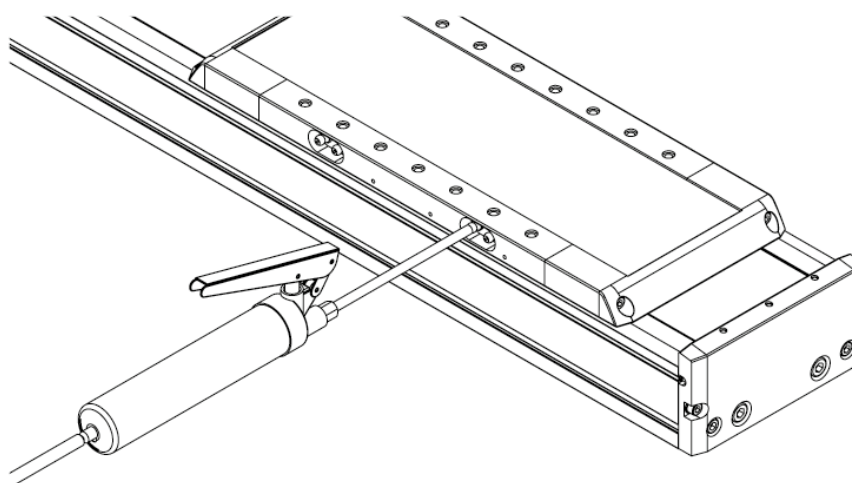
Note:

For cleanroom applications, use lubricant G02.

Lubrication using the linear guideway as an example:

- Move the slide to any position.
- Position the nozzle at a vertical angle to a lubrication point.
- Press the nozzle against the grease nipple using manual force.
- Operate the lubricant gun until the required amount of lubricant (see [Table7 .1](#)) has been applied.
- Repeat the procedure for all lubrication points on the selected carriage side.
- ✓ The linear guideway is now lubricated.

Fig.7 .2 : Lubrication process



7.2 Cleaning the linear axis

The linear axes must be checked regularly and cleaned externally.

Please note the following points when cleaning:

- Do not use compressed air.
- The surface is anodized and only has limited resistance to alkaline cleaning agents. Only neutral cleaning agents must be used for cleaning.
- Remove coarse particles from the surface regularly. A damp, soft, lint-free cleaning cloth is ideal.
- The cover strip is subject to abrasion due to operational friction. Remove the abrasion regularly.

7.3 Replacing the cover strip on HT-L linear axes

The cover strip must be replaced when it begins to ripple and when it is no longer held in position by the magnetic strips. In this case, an adequate sealing effect can no longer be guaranteed.

- Loosen the clamping bolt on the cover strip clamp on both sides of the axis as shown in [Fig. 7.9](#).
 - Loosen the screws on the slide end piece and remove it from both sides on all slides (see [Fig. 7.7](#)).
 - Remove the slide cover by sliding it out of the carriage profile (see [Fig. 7.3](#)).
 - If present, remove the cover belt guide as described in Chapter 7.4
 - Loosen the mounting bolts for the belt deflection and remove them on both sides of all slides (see [Fig. 7.4](#)).
 - Now remove the cover strip by lifting it off the carriage profile.
 - Remove any dirt from the cover tape clamp, slide end piece, belt deflection unit, strip guide and slide cover using a damp, soft, lint-free cloth (with ethanol if necessary).
 - If necessary, replace the strip guides on the top of the carriage profile and the bottom side of the belt deflection (see [Fig. 7.5](#)).
 - Cut the new cover strip to the same length as the cover strip you have removed.
 - Place the cover strip on the magnetic strip of the base profile and guide it over the carriage profile (see [Fig. 7.6](#)).
 - Align the cover strip.
 - Fit the belt deflection on both sides of the slide as shown in [Fig. 7.4](#).
 - Align the belt deflection unit.
 - Tighten the belt deflection unit screws by hand.
 - Fit the slide cover by sliding it into the groove in the carriage profile and the belt deflection guide (see [Fig. 7.3](#)).
 - Fit the slide end pieces onto the belt deflection as shown in [Fig. 7.7](#) and tighten the mounting bolts by hand.
 - Slide the ends of the cover strip on both sides under the cover strip clamp. Ensure that the cover strip is aligned with the axis profile and rests on the magnetic strips along its entire length. Tighten the clamping bolts of the cover strip clamp by hand (see [Fig. 7.8](#) and [Fig. 7.9](#)).
 - Move the slide to both end positions and check the alignment of the cover strip. If necessary, loosen the screws on the cover strip clamp again, align the cover strip and retighten the screws.
- ✓ The new cover strip is fitted

Fig.7 .3 : Removal/installation of the slide cover

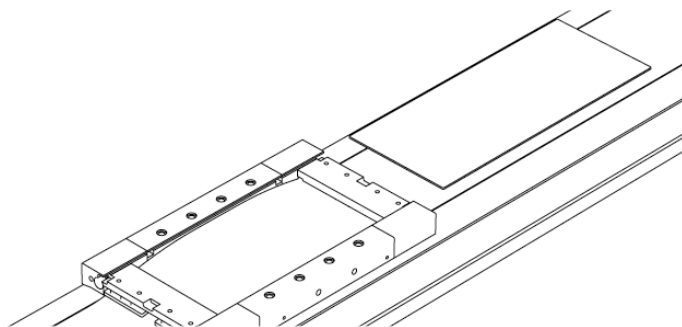


Fig.7 .4 : Dismantling/assembly of belt deflection

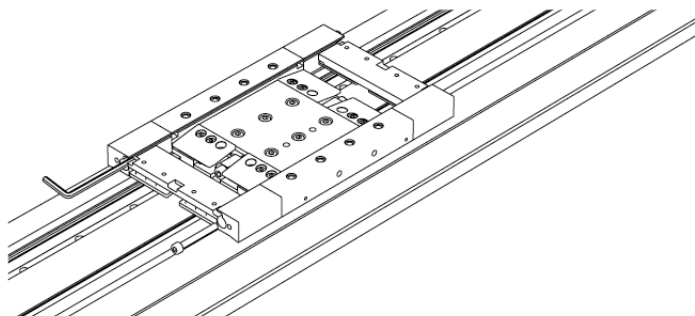


Fig.7 .5 : Removal/installation of strip guide

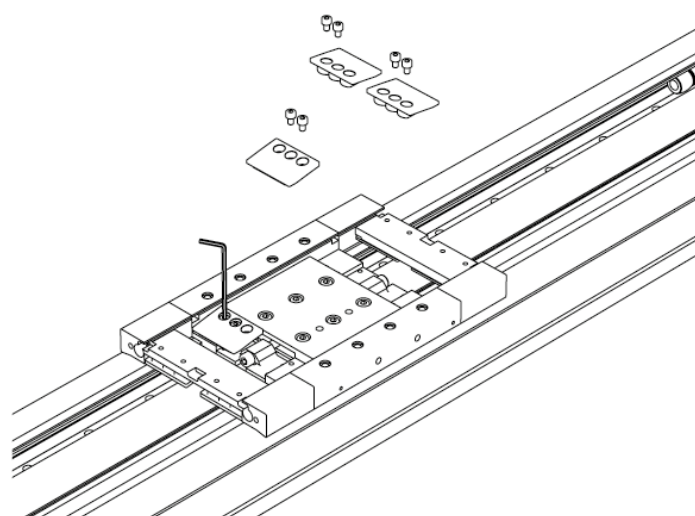


Fig.7 .6 : Cover strip guide

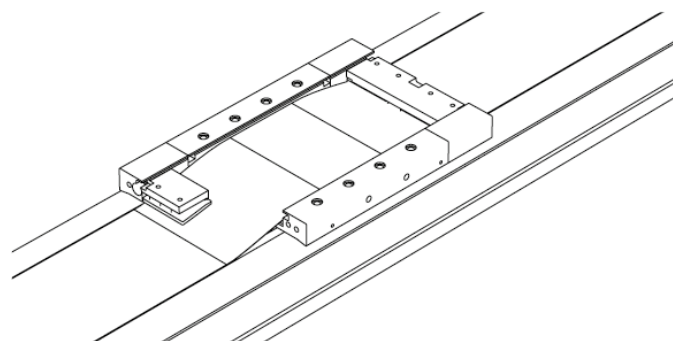


Fig.7 .7 : Removal/installation of slide end piece

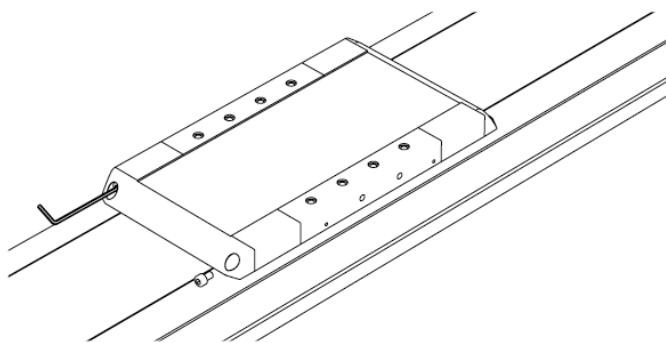


Fig.7 .8 : Fitting the cover strip into the cover strip clamp

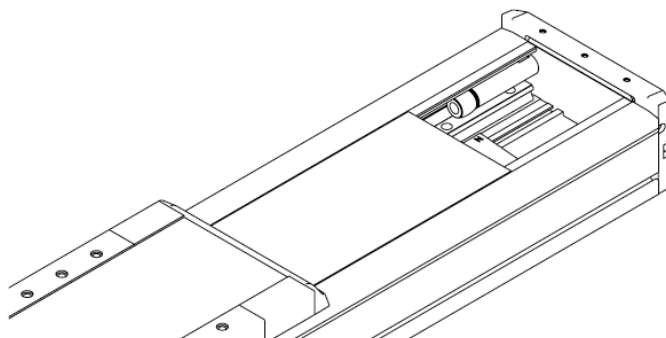
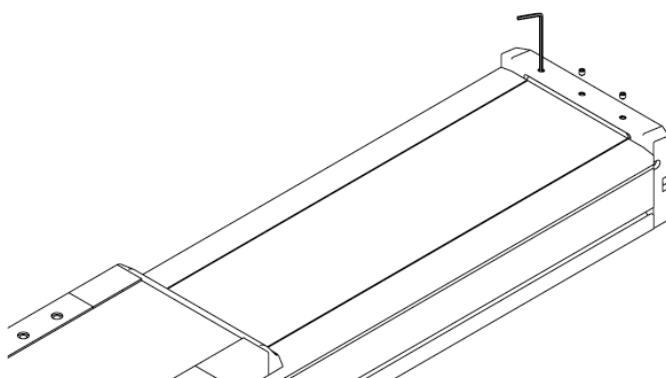


Fig.7 .9 : Removal/installation of the cover strip clamp



7.4 Replacement of the cover strip guide on HT-L linear axes

On longer HT-L linear axes, the cover strip is guided through an additional cover strip guide to ensure that it remains centred within the axis. The cover strip guide is integrated into the slide and consists of a roll holder and a ball bearing over which the cover strip rolls laterally. The ball bearings in the cover belt guides must be checked at regular intervals to ensure they are running smoothly (service life approx. 20,000 km). If necessary, the entire cover belt guide must be replaced on both sides.

- Loosen the mounting bolts for the cover belt guide on both sides.
- Pull the cover belt guides out of the slide from the side (see Fig. 7.10).
- Remove any dirt from the seats of the cover strip guides in the slide.
- Insert the new cover strip guides into the slide on both sides.
- Tighten the mounting bolts to the screw tightening torques specified in Table 7.3.
- Check that the cover strip lies centrally in the axis profile when the slide moves, and, if necessary, align the cover strip by loosening the strip clamp (Fig. 7.9).

✓ The new cover strip guide is now fitted.

Fig. 7.10 : Cover strip guides

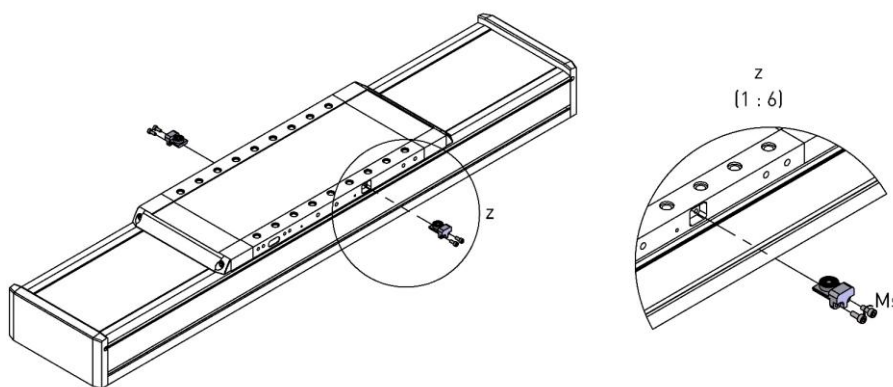


Table 7.3 : Screw tightening torques

Shaft size	Screw size	Screw tightening torque Ms [Nm]
HT100L, HT150L, HT200L, HT250L	M4	3 Nm

7.5 Visual inspection of electrical components

⚠ Caution! Risk of electric shock or burns from contact with live parts!

Contact with live parts may result in injury.

Cables installed by the customer may become frayed due to constant movement within the energy chain if not laid correctly, thereby exposing electrical contact points.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Power-up, return of energy!
 - Troubleshooting!
 - Stopping the machine!
- ▶ Cabling must only be installed by qualified personnel!
- ▶ Work on electrical installations must only be carried out by qualified personnel!

8 Faults

Possible faults affecting the linear axis and their remedies are listed in Table 8.1.

In the event of faults with the servo drive, refer to the servo drive's instruction manual for the nature of the fault and instructions on how to rectify it.

⚠ Caution! Risk of shock and crushing!

When the axes are moved by the motor, injuries may occur due to moving and driven axes as well as attached components (energy chains, customer-supplied components).

- ▶ An isolating safety device must be provided for the operation of the linear axes!

⚠ Caution! Risk of electric shock or burns due to contact with live parts!

Contact with live parts may result in injury.

Cables installed by the customer may, if laid incorrectly, become frayed due to constant movement within the energy chain and expose electrical contact points.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Power-up, return of energy!
 - Troubleshooting!
 - Stopping the machine!
- ▶ Cabling must only be installed by qualified personnel!
- ▶ Work on electrical installations must only be carried out by qualified personnel!

Table 8.1 : Fault table

Fault	Possible cause	Remedy
The slide or axle block does not move	Load too high	Reduce the payload or the drive's acceleration
Limit switch not functioning	Switching distance too large	Readjust the switching distance and set it correctly
	Limit switch faulty or cable break	Replace limit switch
	Signal not reaching the control unit	Check the cable to the control unit
Noise and vibrations at high speed	Tension in the system	Install the linear axis without any tension; check the flatness of the support surface and the mounted payload
	Incorrect settings on the drive controller	Re-tune and adjust the controller settings to suit the application conditions
	Speed too high	Reduce the speed
Noise from the linear guideways	Lack of lubricant	Re-lubricate and, if necessary, reduce relubrication intervals
	Damage to the linear guideways, for example due to extreme impact loads on the slide or extreme contamination	Send the linear axis to HIWIN GmbH for repair
Motor load increases; the control system switches off due to overload	Tension in the system	Install the linear axis free of stress; check the flatness of the support surface and the mounted payload.
	Lack of lubricant	Re-lubricate and, if necessary, reduce relubrication intervals
	Heavy contamination of the linear axis and the internal linear guideways	Clean the linear axis; ensure that the guides and drive elements move freely
Motor fails to start	Cable disconnection	Check the cable and connector; inspect the connector contacts
	The motor protection fuse has tripped	Check that the motor protection is set correctly
On restart, the servo drive reports a commutation fault	Motor phases connected incorrectly	Check the direction of rotation
	Encoder counting direction is incorrect	Swap the sine and cosine wire pairs in the encoder connector
	The slide is too close to the limit switch/end stop	De-energise the linear axis and move the slide by hand to the centre of the axis
	The slide is not moving	Check the slide manually for free movement

Fault	Possible cause	Remedy
	Force distribution is not symmetrical	Check the slide manually for free movement
	Additional travel resistance present	Change the parameter settings in the servo drive
Linear axis 'runs free' on restart	Commutation fault	See 'Commutation faults'
	EMC interference in the encoder signal	Check the shielding of the connectors and cables
Linear axis 'runs away' in positioning mode	Programming error in position transfer; impermissible accelerations requested	Activate safety settings in the servo drive, such as speed monitoring, permissible tracking error, etc.
	Nominal power exceeded due to excessive duty cycle	Adjust the duty cycle to the motor's rated power
Motor overheating	Insufficient cooling	Correct the cooling air supply or clear the cooling air paths; fit an external fan if necessary
	The slide is stiff	Check the lubrication of the linear guideways; check for foreign objects in the travel area
	Ambient temperature too high	Observe the permissible temperature range
	Load cycle has been changed	Calculate the load cycle using the HIWIN sizing tool and adjust accordingly
	The motor commutation of the servo drive is not functioning correctly	Adjust the servo drive's commutation parameters
There is a 1 mm offset after the reference run	The position of the limit switch is exactly between two index pulses of the MAGIC position measurement system	Move the limit switch by approx. 0.5 mm
The linear axis produces clicking noises when in control mode	Commutation fault	Adjust the servo drive's commutation parameters
	EMC interference in the encoder signal	It is essential to use encoder cables with separately shielded sine and cosine signal pairs
The slide jerks during movement and generally produces running noises that do not originate from the linear guideway	EMC interference in the encoder signal	Ensure the shield of the motor cable and/or encoder cable is in full contact with the booster's earth terminal
	Faulty connector on the encoder cable; Pin in the connector is bent	Check the encoder cable and the Pin in the connector
	Incorrect settings on the drive controller	Re-tune and adjust the controller settings to suit the application conditions
The slide or axis body has backlash and is positioning inaccurately	Backlash in the linear guideway or the drive element following a collision or due to extreme external influences (shocks, load peaks, etc.)	Send the linear axis to HIWIN GmbH for repair

9 Dismantling

Danger! Danger due to electrical voltage!

Dangerous currents may flow before and during assembly, disassembly and repair work.

- ▶ Work must only be carried out by a qualified electrician when the system is de-energised!
- ▶ Before carrying out any work, disconnect the linear axes from the power supply and secure them against being switched on again!

Warning! Risk of shock and crushing!

Injuries may occur as a result of the slide moving or starting unintentionally.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Application or restoration of power!
 - Troubleshooting!
 - Stopping the machine!

Warning! Risk of crushing from the carriage!

Risk of injury due to crushing and damage to the linear axis caused by the movement of the slide carriage under the influence of gravity, as the axes are not fitted with brakes as standard.

- ▶ Ensure that the slide is secured against unintentional movement when at a standstill!

Warning! Risk of cuts!

The cover strip may cause cuts during assembly or disassembly.

- ▶ Commissioning and set-up must only be carried out by qualified personnel wearing appropriate protective equipment (gloves, safety goggles)!

Warning! Danger from suspended loads or falling parts!

Lifting heavy loads can cause injury!

- ▶ Assembly and maintenance of the linear axes must only be carried out by qualified personnel!
- ▶ Take the mass of the parts into account during transport. Use suitable lifting equipment!
- ▶ Observe the applicable health and safety regulations for handling suspended loads!
- ▶ Only lift linear axes at the specified support points!
- ▶ Secure machines and machine parts to prevent them from tipping over!

Caution! Risk of shock and crushing!

When moving or manoeuvring the axes manually, injuries may occur due to moving and displaced axes as well as attached components (energy chains, customer-supplied attachments).

- ▶ Observe the applicable health and safety regulations!
- ▶ Transport to the installation site must only be carried out by qualified personnel!

⚠ Caution! Risk of electric shock or burns from contact with live parts!

Contact with live parts may result in injury.

Cables installed by the customer may become frayed due to constant movement within the energy chain if laid incorrectly, thereby exposing electrical contact points.

- ▶ Control system design in accordance with DIN EN 12100. No start-up after:
 - Power-up, return of energy!
 - Troubleshooting!
 - Stopping the machine!
- ▶ Cabling must only be installed by qualified personnel!
- ▶ Work on electrical installations must only be carried out by qualified personnel!

⚠ Caution! Risk of crushing due to the axes tipping over!

- ▶ Secure the machine and its components to prevent them from tipping over!

⚠ Warning! Danger to health and the environment!

Contact with lubricants may cause irritation, poisoning and allergic reactions, as well as environmental damage.

- ▶ Use only suitable media that are harmless to humans. Observe the manufacturers' safety data sheets!
- ▶ Ensure proper disposal!

Dismantling steps:

- Disconnect the linear axis from the electrical system.
- Unscrew the moving load.
- Secure the moving parts (e.g. the slide) to prevent unintended movement.
- Unscrew the linear axis.
- ✓ The linear axis has been removed.

10 Disposal

! Warning! Hazard to health and the environment!

Contact with lubricants can cause irritation, poisoning and allergic reactions, as well as environmental damage.

- ▶ Use only suitable media that are harmless to humans. Observe the manufacturers' safety data sheets!
- ▶ Ensure proper disposal!

Table 10.1 : Disposal

Liquids	
Lubricants	Dispose of as hazardous waste in an environmentally sound manner
Soiled cleaning cloths	Dispose of as hazardous waste in an environmentally sound manner
linear axis	
Cabling, electrical components	Dispose of as electronic waste
Plastic components (e.g. energy chain)	Dispose of by material type
Steel components (e.g. profile rail)	Dispose of by material type
Aluminium components (e.g. profile)	Dispose of by material type

11 Accessory

Information on accessories and replacement parts can be found on our website at [hiwin.de](https://www.hiwin.de)

12 Declaration of Incorporation for partly completed machinery

**in accordance with the Machinery Directive 2006/42/EC, Annex II, Part 1 B,
and the Machinery Regulation (EU) 2023/1230, Annex V, Part B**

The manufacturer: HIWIN GmbH, Brücklesbünd 1, 77654 Offenburg
Documentation Department: HIWIN GmbH, Brücklesbünd 1, 77654 Offenburg

Description and identification of the partly completed machinery:

Product: HT-L linear tables and HB-L bridge axes
Type: HT100L, HT150L, HT200L, HT250L, HB250L
Year of manufacture: from 2017

It is hereby declared that the essential health and safety requirements relevant to this product, as set out in the Machinery Directive 2006/42/EC (Annex I) and the Machinery Regulation (EU) 2023/1230 (Annex III), are met.

1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.9, 1.5.1, 1.5.4, 1.5.5, 1.5.8, 1.5.9, 1.6.2, 1.6.3

It is further declared that the technical documentation for this partly completed machinery has been drawn up in accordance with the requirements of the Machinery Directive 2006/42/EC and the Machinery Regulation (EU) 2023/1230.

It is hereby declared that the partly completed machinery complies with the relevant requirements of the following European legislation.

2006/42/EC	Machinery Directive
(EU) 2023/1230	Machinery Regulation
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	RoHS Directive on the Restriction of Hazardous Substances

The following harmonised standards, in particular, have been applied to meet the essential health and safety requirements.

EN ISO 13732-1:2008	Ergonomics of the thermal environment – Evaluation methods for human responses to contact with surfaces – Part 1: Hot surfaces
EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction
EN 60204-1:2018	Safety of machinery – Electrical equipment of machinery – Part 1: General requirements

The manufacturer or their authorised representative undertakes to provide the competent authorities with the relevant technical documentation for the partly completed machinery upon reasoned request.

This does not affect industrial property rights!

Important note! The partly completed machinery may only be put into service once it has been established that the complete machinery into which the partly completed machinery is to be incorporated complies with the requirements of the Machinery Directive 2006/42/EC or, from 20 January 2027, the Machinery Regulation (EU) 2023/1230.

Offenburg, October 2026

Werner Mäurer, Management

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