

LINEAR MOTOR SHAFTS HN / HG



ASSEMBLY AND INSTRUCTIONS MANUAL

Mechanical system documentation

Linear motor shafts HN 0050...0400

Linear motor shafts HG 0012...0025



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1 Introduction

1.1 Definition

The linear motor shaft is a Handling system with a highly dynamic, high-performance Linear motor.

The linear motor shaft is referred to as machine in the following text of this operating manual.

1.2 Intended use

The machine is an incomplete machine in terms of Directive 2006/42/EC, Article 1g and 2g.

The machine is designed for integration into other machines, into other incomplete machines or equipment or for connection to them.

It may only be used within the limitations defined in the order characteristics.

Commissioning is prohibited until it has been established that the machine into which the aforementioned product should be installed is conform with Directive 2006/42/EC and all other applicable directives governing its use.

Intended use also requires the observance of the included documentation and compliance with the maintenance provisions.

1.3 Non-intended use

Any use of the machine other than intended is considered non-intended use and is not permitted.

The machine must not be subjected to loads that exceed the maximum limits.

The machine is not suitable for use:

- in wet or damp environments of any kind (water, oils, acids, steam or vapours, etc.).
- in an environment with gases or radiation.
- in potentially-explosive atmospheres.
- in environments that contain swarf.

1.4 Laws / EC Directives / Standards

The machine is designed and constructed to conform to:

- applicable laws
- Directive 2006/42/EC (Machinery Directive)
- Low Voltage Directive, 2006/95/EC
- EMC Directive 2004/108/EC
- and the harmonised standards that we have cited

and meets state-of-the-art technological standards in terms of its construction.

1.5 EC Declaration

An EC Declaration as specified by Directive 2006/42/EC (Machinery Directive) is included with each machine at delivery.

The text of this EC Declaration is as follows:

WEISS GmbH

Siemensstrasse 17

D-74722 Buchen, Germany

Declaration of incorporation of partly completed machinery
in accordance with EC Machinery Directive 2006/42/EC, Annex II B

Prohibition of commissioning

We hereby declare that the machine called Linear motor shafts HN0050 - 0400 / HG0012 - 0024 is intended for the installation into another machine or is to be assembled with other machines to a machine in terms of the directive 2006/42/EC.

Commissioning is prohibited until it has been established that the machine into which the aforementioned product should be installed satisfies the provisions of the EC Machinery Directive, and that a Declaration of Conformity in accordance with EC Machinery Directive 2006/42/EC, Annex II A has been issued.

1.6 Further applicable documents

In addition to this manual, further documents are required to ensure safe operation of this machine. The specifications stated in these documents must to be observed.

For control system by WEISS-GmbH:

- Operating manual WAS.handling Control HN
- Operating manual WAS.handling Windows programme
- Operating manual Hand-held grease gun (for the model with lubricating nipples)
- Operating manual automatic lubrication pump (for model with automatic lubrication)

1.7 Operating manual

This operating manual is a translation of the original operating manual and is part of the scope of delivery.

We reserve the right to undertake modifications resulting from further technological development that diverge from the data and illustrations contained in this operating manual.

The operating manual and the associated valid documentation are not subject to an automatic revision service.

Information on the respective current edition can be obtained from the manufacturer.

Local regulations must be observed.

This operating manual describes handling of the machine and contains important instructions and information to assist you in using the machine as intended.

These operating instructions are intended for trained technical personnel or persons who have been instructed. The operating manual must always be stored at the site of installation, and must be read, understood and observed by all persons who work with or on the machine.

Safety instructions in individual chapters should be observed.





1.7.1 Explanation of safety instructions in this manual

This manual contains instructions that you should observe for your personal safety and to avoid material damage.

Safety instructions for your personal safety are highlighted by a sign containing a warning triangle and signal word. The associated text describes the hazard involved, avoidance options and the consequences which may result from failure to observe the safety instruction.

General instructions or instructions relating to possible material damage are highlighted by a sign without a warning triangle.

They are, depending on the degree of risk involved, illustrated as follows:

	<i>A warning triangle with the signal word DANGER indicates an immediate hazardous situation, which, if not avoided, will lead to fatalities or severe injuries.</i>
	<i>A warning triangle with the signal word WARNING indicates a potential hazardous situation, which, if not avoided, can lead to fatalities or severe injuries.</i>
	<i>A warning triangle with the signal word CAUTION indicates a potential hazardous situation, which, if not avoided, can lead to light or medium injuries.</i>
	<i>A sign with the signal word NOTICE indicates potential material damage or provides additional information, which should be observed when operating the machine.</i>

1.7.2 Legend

Symbols and abbreviations with the following meaning are used in this manual to make its content more clear:

1. Indicates a numbered list.
 - a) Indicates the second level of a numbered list.
- Indicates a list.
 - ▶ Indicates the second level of a list.



The book symbol before a section of text indicates further applicable documents.



The information symbol before a section of text indicates an additional note or an important tip for use.

1.7.3 Figures

The figures shown are examples. There may be differences between the illustrations and the actual delivery.

1.7.4 Directory of valid pages

Pages of this operating manual including the title page: 54

1.8 Warranty and liability

The machine is covered by a guarantee of 24 months from the date of delivery without shift limitations.

2 Safety

2.1 Fundamental safety instructions

2.1.1 Operator's obligation to exercise diligence

This machine conforms to state-of-the-art technological standards and ensures a maximum level of safety.

However, this level of safety can only be attained under operating conditions if all measures necessary for this have been taken. The operator's obligation to exercise diligence includes planning of these measures and the inspection of their realisation.

The operator must ensure that

- the machine is only used as intended.
- the machine is only operated in faultless, functional condition and mechanical and electrical safety devices are present.
- required personal protective clothing is provided for and used by operating, maintenance and repair personnel.
- the operating manual and all other applicable documentation is maintained at all times in legible condition and is accessible at the implementation site of the machine. Ensure that all personnel who has to execute activities tasks on the machine can access the operating manual at all times.
- only adequately qualified and authorised personnel maintain and repair the machine.
- such personnel are instructed regularly in all questions concerning occupational safety and environmental protection, including the operating manual and safety instructions contained therein.
- all safety instructions and warnings affixed to the product are not removed and must remain legible.
- national accident prevention guidelines and company-internal guidelines are complied with.
- VDE regulations are complied with.
- the EMC legislation is complied with during installation.

2.2 Safety equipment for the machine

2.1.2 Requirements to be met by personnel

It is imperative that the following safety instructions be observed during all operations involving the machine. This ensures avoidance of life-threatening injuries, machine damage, other material damage and environmental damage.

The personnel must ensure that



- trainees are initially permitted to only work on the machine under the supervision of an experienced person.
- all personnel who maintain the machine read the operating manual and confirm with their signature that they have understood the operating manual.
- unauthorised persons are not in the vicinity of the machine when tasks are being performed.
- supplemental to the operating manual the operating instructions as specified in labour protection legislation and work equipment use legislation are complied with.
- the operator or supervisory personnel are informed in the event of malfunction.
- required personal protective clothing is used.

The following work described in this operating manual should only be realised by qualified personnel:

- Transport
- Installation
- Commissioning
- Maintenance

2.2 Safety equipment for the machine

There are danger signs attached to the machine. Danger signs provide information about possible hazards, which could be caused by the machine.

Danger sign	Meaning
	Beware of magnetic field ASR A1.3 Annex 1; DIN 4844-2: 2001-02 and DIN 4844-2/A1:2004-05; 92/58/EEC directive regarding safety signs
	Beware of hot surface ASR A1.3 Annex 1; DIN 4844-2: 2001-02 and DIN 4844-2/A1:2004-05


2.2 Safety equipment for the machine

The operating company is responsible for ensuring that a suitable safety concept is developed and applied for the safe operation of the machine.

The operating company must take all measures to protect his personnel against injury by the machine.

These include:

- Safety housing with monitored safety door
- Emergency-stop circuit
- Light barriers or switch mats
- Warning signs
- Attach danger sign at the access point of the entire machine

Danger sign	Meaning
	<p>Prohibited for persons with pacemakers ASR A1.3 Annex 1; DIN 4844-2:2001-02 and DIN 4844-2/A1:2004-05; ISO/FDIS 7010: 2003; ISO 7010</p>

i We also recommend that the danger signs shown in chapter 2.2 are attached in an enlarged form at the access points to the protection area of the entire machine.

2.3 Residual hazards



Strong magnetic fields

Strong magnetic fields are emitted from the permanent magnets of the guide rail. Assembly, commissioning and maintenance only by qualified, trained and instructed personnel.

Pacemakers and/or medical implants The functioning of metal implants can be compromised. Persons with pacemakers and/or medical implants made of metal may not handle the machine under any circumstances. Danger of severe to fatal injuries.

Objects made of magnetisable materials such as jewellery, watches or tools can be attracted. Do not wear any magnetisable materials when handling the machine. Handle tools carefully. Injuries caused by being pulled in.

Missing safety equipment

Operation without safety equipment is dangerous. The realisation of a suitable safety concept. The operator must provide for sufficient safety measures such as protective grating, light grids, emergency stop button, covers, warning notices, etc. Operation without safety equipment is prohibited. Injuries caused by squeezing, impact, magnetism.

Missing danger signs

Damaged or illegible danger signs no longer fulfil their purpose. Make sure the danger signs are complete and legible. Replace damaged danger signs.

Danger of explosion

Danger of explosion during operation in a potentially explosive atmosphere. Operation in a potentially explosive atmosphere is prohibited according to correct use. Only correct use is permitted. Injuries caused by an explosion.

Incorrect spare parts / mounting of ancillary equipment

The use of incorrect spare parts or the mounting of unauthorised ancillary equipment can lead to subsequent damage with the risk of injury. Only use spare parts from our spare parts list or spare parts we have approved. The mounting of ancillary equipment must be coordinated with us. Injury of persons due to subsequent damage.

Impermissible modifications

Impermissible modifications can lead to subsequent damage with risk of injury. Modifications on the machine are prohibited. Injury of persons due to subsequent damage.

Electric shock

Power and control connections may still conduct electricity after the machine has been deactivated and is stationary. Energised capacitors inside the servo drive may still be charged, despite the power supply being deactivated. Work on electrical equipment should only be realised by skilled electrical personnel and under observance of specifications in the electrical operating manual. Electrical connections for the machine should only be loosened or plugged in when the power supply is deactivated and secured against reactivation. The status of capacitor charging should be measured prior to working on machine electrical equipment. The procedure for measuring charges is described in the electrical operating manual. Touching energised components can lead to serious or even fatal injuries.

Squeezing or pulling in

The primary part of the machine moves at a very high speed. Extremities can be crushed or pinched when interfering with the motion sequence. Never put hands into the work area of the machine. Injuries caused by squeezing.

3 Product description

3.1 Structure

The freely programmable, dynamic linear motor shaft consists of a primary and secondary part. The primary part is the movable sliding carriage with the electric connections. The secondary part are the stable base body and the guide rail with the permanent magnets.

Base body of linear motor shafts HN is made of steel or aluminum.

Base body of linear motor shafts HG is made of aluminum.

The machine can be supplied in different installation sizes each with different stroke lengths.

Equipment can be mounted to the primary part by the operator.

The electric connections are made via a multi-purpose plug. One connection for a lubrication unit for automatic lubrication is available (Chapter 3.5 „Lubrication“ on page 31).

There is direct access to the multi-purpose plug and lubrication connection on the primary part.

An incremental magnetic length-measuring system is employed.

The primary part is referenced via a reference switch.

An absolute measuring system can be optionally applied for travelling distances up to 500 mm.

Robust limit position dampers prevent damage to the primary part when the end position is crossed. As an option, shock arrestors can also be mounted.

The following parameters of the machine are variable:

- maximum stroke
- Material of the base body
- Measuring system
- Reference method
- Shock arrestors
- Design of the lubrication connections

3 Product description

3.1 Structure

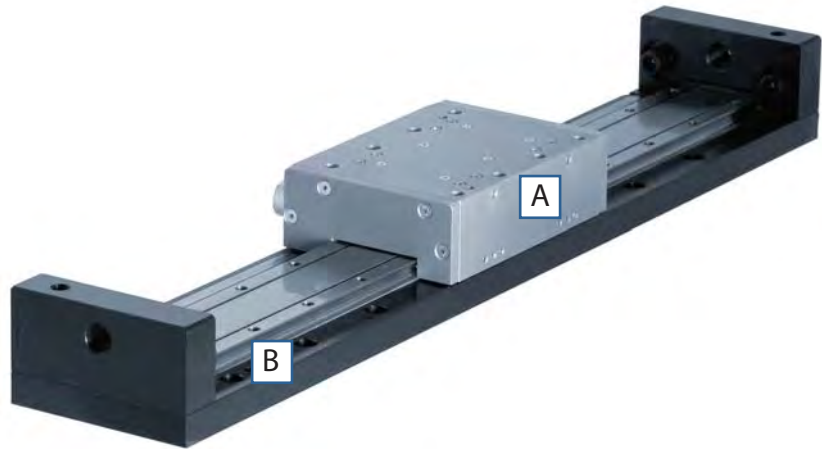


Fig. 1: General view of the linear motor shaft HN

A Primary part

B Secondary part

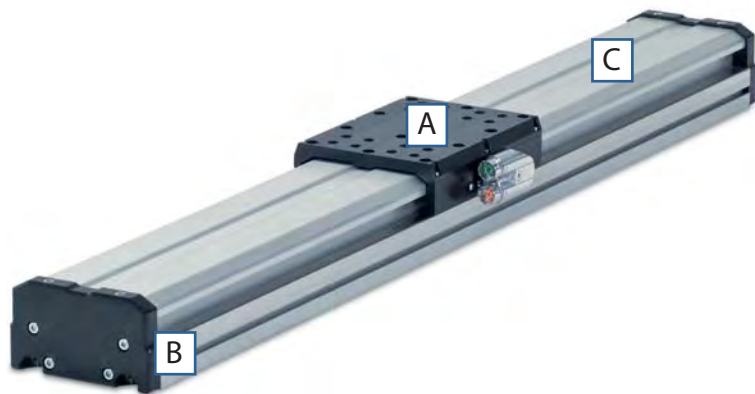


Fig. 2: General view of the linear motor shaft HG

A Primary part

B Secondary part

C Cover

3.2 Function

The primary part conducts linear movements across the indicated stroke length.

The motor of the machine is controlled via servo amplifier. A high level of positional accuracy and repeat accuracy are achieved through the integrated measuring system.

The positional accuracy describes the acceptable tolerance of the linear unit for an operating command involving movement to a specified position. It is determined by mechanical tolerances and the accuracy of the measurement system. Furthermore, the positional accuracy is influenced by external and internal temperature changes. The specified positional accuracy is attained for temperatures within a range of +/-15 K.

The repeat accuracy describes the deviation of the linear unit, which is permissible for the repeated movement to the same position - even after repeated switch on and off. It is influenced by external and internal temperature changes as well as the condition of the mechanical stops for the referencing. The specified repeat accuracy only applies at a constant temperature of +20°C and without any external strain.

3.3 Technical data

3.3.1 General technical data

Linear motor shaft	HN0050	HN0100	HN0200	HN0400
Nominal force	65 N	150 N	250 N	500 N
Maximum Force	180 N	380 N	700 N	1400 N
Max. speed	4 m/s	4 m/s	4 m/s	4 m/s
Max. acceleration	40 m/s ²	40 m/s ²	40 m/s ²	40 m/s ²
Max. payload	15 kg	25 kg	50 kg	100 kg
Max. intermediate circuit voltage	800 VDC	800 VDC	800 VDC	800 VDC
Nominal current	2,4 A _{eff}	3,6 A _{eff}	4,5 A _{eff}	7,0 A _{eff}
Peak current	6,0 A _{eff}	9,5 A _{eff}	11,2 A _{eff}	18,0 A _{eff}
System accuracy	10 µm/m; incremental (Sin/Cos 1 V _{SS}) 5 µm/m; absolute (BISS/C, SSI) bis 1 m			
Repeat accuracy	5 µm/m; incremental (Sin/Cos 1 V _{SS}) 2 µm/m; absolute (BISS/C, SSI) bis 1 m			
	The accuracy applies at a constant ambient temperature of 20 °C.			
Available strokes	up to 2000 mm	up to 4000 mm	up to 4000 mm	up to 4000 mm
Temperature control	PTC-switch			
Weight	made steel			
Weight 0 mm stroke	6,00 kg	11,50 kg	20,42 kg	31,36 kg
Weight per 100 mm stroke	1,82 kg	2,99 kg	4,33 kg	5,52 kg
Weight carriage	2,20 kg	4,70 kg	8,10 kg	13,40 kg
Weight	made aluminum			
Weight 0 mm stroke	2,51 kg	5,59 kg	9,59 kg	15,11 kg
Weight per 100 mm stroke	0,83 kg	1,61 kg	2,22 kg	2,90 kg
Weight carriage	2,20 kg	4,70 kg	8,10 kg	13,40 kg
Max. surface temperature	75 °C			
Max. ambient temperature	depending on the load			

3 Product description

3.3 Technical data

Linear motor shaft	HG0012	HG0025
Nominal force	33 N	65 N
Maximum Force	102 N	200 N
Max. speed	4 m/s	4 m/s
Max. acceleration	40 m/s ²	40 m/s ²
Max. payload	5 kg	10 kg
Max. intermediate circuit voltage	800 VDC	800 VDC
Nominal current	0,6 A _{eff}	2,4 A _{eff}
Peak current	2,0 A _{eff}	6,0 A _{eff}
System accuracy	10 µm/m; incremental (Sin/Cos 1 V _{SS}) 5 µm/m; absolute (BISS/C, SSI) bis 1 m	
Repeat accuracy	5 µm/m; incremental (Sin/Cos 1 V _{SS}) 2 µm/m; absolute (BISS/C, SSI) bis 1 m	
	The accuracy applies at a constant ambient temperature of 20 °C.	
Available strokes	up to 1000 mm	up to 1000 mm
Temperature control	PTC-switch	
Weight		
Weight 0 mm stroke	1,44 kg	2,24 kg
Weight per 100 mm stroke	0,72 kg	1,00 kg
Weight carriage	1,45 kg	2,05 kg
Max. surface temperature	75 °C	
Max. ambient temperature	depending on the load	

3.3 Technical data

3.3.2 Motor data

Linear motor shaft	Unit	HN0050	HN0100	HN0200	HN0400
Electrical Cycle Length	[mm]	27,6	26	30	30
Nominal voltage	[VDC]	600	600	600	600
Back-EMF Constant (RMS)	[V/(m/s)]	23	33	47	69
Nominal Speed	[m/s]	4	4	4	4
Maximum Speed	[m/s]	5	4	4	4
Stall Force	[N]	65	150	250	500
Nominal force	[N]	65	150	250	500
Maximum Force	[N]	180	380	700	1400
Force Constant	[N/A]	35	43	62,2	93
Stall Current	[A]	2,4	3,6	4,5	5
Nominal current	[A]	2,4	3,6	4,5	5
Peak current	[A]	6	9,5	11,25	15
Cross Section Area	[mm ²]	0,176	0,2827	0,1964	0,5655
Stator Resistance (Ph - Ph)	[Ohm]	7,5	8	5,8	4,6
Stator Inductance (PH - Ph)	[Henry]	0,0212	0,048	0,046	0,039
Actuator Mass	[kg]	2,1	4,2	7,5	13,4

Linear motor shaft	Unit	HG0012	HG0025
Electrical Cycle Length	[mm]	18,3	27,6
Nominal voltage	[VDC]	320	320
Back-EMF Constant (RMS)	[V/(m/s)]	6,1	23
Nominal Speed	[m/s]	4	4
Maximum Speed	[m/s]	4	5
Stall Force	[N]	18	65
Nominal force	[N]	30	65
Maximum Force	[N]	102	200
Force Constant	[N/A]	52	35
Stall Current	[A]	0,5	2,4
Nominal current	[A]	0,5	2,4
Peak current	[A]	2	6
Cross Section Area	[mm ²]	0,07	0,176
Stator Resistance (Ph - Ph)	[Ohm]	23,6	7,5
Stator Inductance (PH - Ph)	[Henry]	0,0274	0,212
Actuator Mass	[kg]	1,45	2,05

3.3.3 Measuring system

Linear motor shaft	HN0050.....HN0400	HG0012.....HG0025
Incremental measuring system		
Type	BMH S1F	
Voltage supply	+5 V \pm 5 %, 35 mA	
Incremental signals	sin / cos 1 V _{ss}	
Signal period	1 mm	
Resolution	0,244 μ m (bei 4096times-Interpolation)	
Accuracy measuring system	10 μ m (transmitter + tape measure) at 20 °C	
Reference switch	Balluff BES R04KC-PSC15B-S49-00, 13 Closing contact / PNP; voltage 5...30 VDC; plug M8 - 3pin	
Measuring system absolute - BISS - C mode		
Type	BMH S1H	
Voltage supply	+5 V \pm 5 %, 80 mA max.	
Absolute signals	BISS - C	
Measuring length (max.)	512 mm	
Resolution	19 bits	
Standardisation	1024/mm	
Accuracy measuring system	\pm 5 μ m (transmitter + tape measure) at 20 °C	
Measuring system absolute - SSI		
Type	BMH S1H	
Voltage supply	+5 V \pm 5 %, 80 mA max.	
Absolute signals	SSI	
Baud rate (adjustable)	1000 kHz; 500 kHz; 125 kHz; 62,5 kHz	
Measuring length (max.)	512 mm	
Resolution	19 bits	
Standardisation	1024/mm	
Incremental signals	SIN / COS 1 V _{pp}	
Signal period	1 mm	
Accuracy measuring system	\pm 5 μ m (transmitter + tape measure) at 20 °C	

3.3.4 Inductiv sensor

Linear motor shaft	HN50-1.....HN400	HG0012.....HG0025
Sensing data		
Type	BALLUFF BES R04KC-PSC15B-EP00,13-GS49	
Eff. operating distance Sr	1,50 mm	
Tolerance Sr	± 10%	
Assured operating distance Sa	1,20 mm	
Hysteresis M max (in % of Sr)	15%	
Repeat accuracy R max (% of Sr)	1%	
Ambient temperature Ta min	-25 °C	
Ambient temperature Ta max	70 °C	
Temperature drift max (% of Sr)	10 %	
Switching frequency f max (at Ue)	600 Hz	
Ready delay tv max	10 ms	
Utilization category	DC 12	
Function indicator	YES	
Power indicator	NO	
Electrical data		
Effective operating voltage Ue DC	24,0 V	
Operating voltage UB min DC	10,0 V	
Operating voltage UB max DC	30,0 V	
Ripple max (% von Ue)	10 %	
Voltage drop static max	1,5 V	
Rated insulation voltage Ui	75 DC	
Effective operating current Ie	100 mA	
Minimum operating current Im	0 mA	
No-load current Io damped max	10,0 mA	
No-load current Io undamped	1,0 mA	
Off-state current Ir max	50 µA	
Short circuit protected	YES	
Protected against miswiring	NO	
Polarity reversal protected	NO	
Rated short circuit current	100 A	
Output resistance Ra	open collector	
Load capacitance max (at Ue)	0,010 µF	
Mechanical data		
Housing material	PA6-GF30	
Tightening torque	0,06 Nm	
Sensing face material	PA6-GF30	
Connection type	Cable with connector	
Cable jacket material	PUR	
Cable diameter D max	2,5 mm	
Cable short description	Li12Y11Y-O	
Cable length	0,10 m	
Connector type	M08x1-S49	
Recommended connector	BKS-B 48 / BKS-B 49	
Enclosure type per IEC 60529	IP67	
Shock rating	Schock, half sinus, 30gn, 11 ms	

3 Product description

3.3 Technical data

Linear motor shaft	HN50-1.....HN400	HG0012.....HG0025
Vibration rating	55 Hz, 1 mm amplitude, 3 x 30 minutes	
Degree of contamination	3	
Approval		
Approvals / Conformityt	CE	
	cULus	
Remarks		
The sensor is functional again after the overload has been eliminated.		
EMC: EMV-protection circurity required, see document 825345. IVW: 2,2		
Basic standard: IEC 60947-5-2		

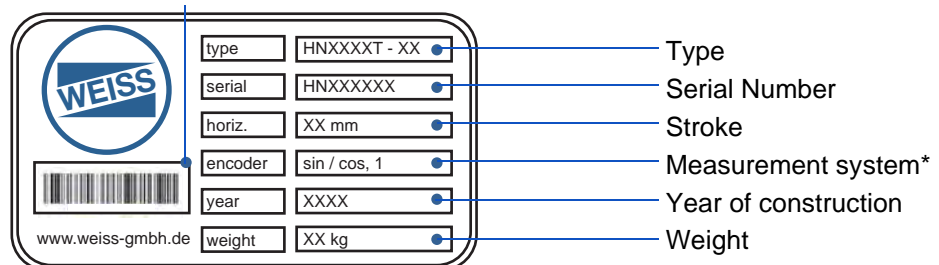
3.3.5 Type plate

The type plate is fitted to the housing of the machine and contains the details described in the illustration.

NOTICE *The illustrated type plate is only an example of a machine and is not identical to the actual type plate of the described product.*

A second type plate is included in the scope of delivery. The second plate can be mounted at a clearly-visible location on the machine to allow viewing of performance data if the type plate fitted by the manufacturer is concealed by any other structures.

Additional barcode serial number



* sinus / cosinus measurement system with pole pitch of 1 mm

Fig. 3: Example of a type plate

3.3.6 Scope of delivery

The scope of delivery of the machine depends on the order involved. Please refer to the order information or order specifications for individual components.

3.3.7 Sound level

The A-weighted emission sound pressure level does not exceed the allowable peak.

3.3.8 Ambient conditions

Humidity	5 % to 95 %, non-condensing
Allowable temperature range	Storage: +5 °C to +55 °C Operation: +15 °C to +45 °C
Environment	It is not permissible to use the machine in environments that contain abrasive dusts.

3.3.9 Installation positions

Permissible installation positions for the machine are:

- horizontal and vertical at any angles.

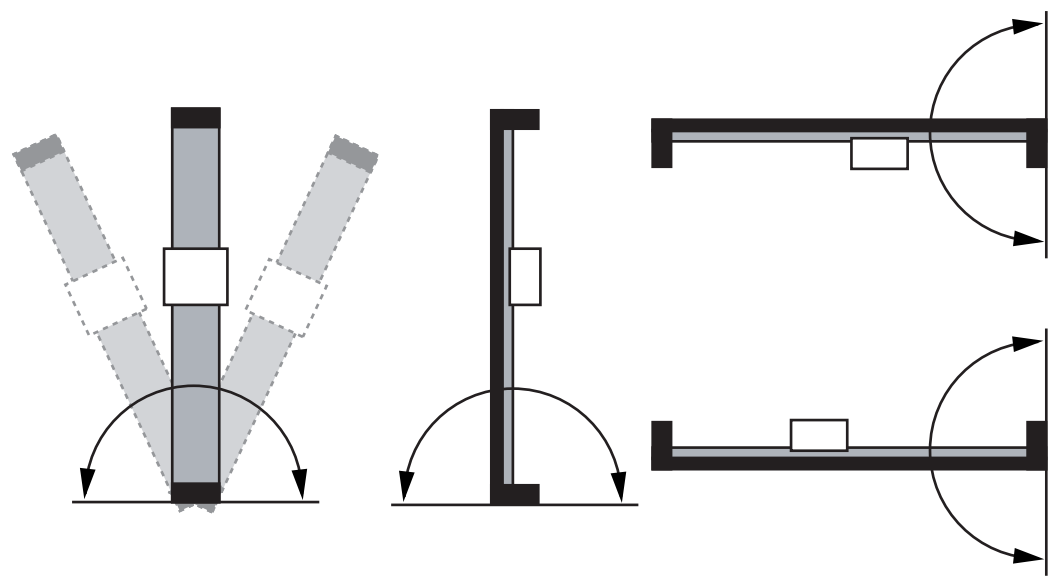


Fig. 4: Installation positions

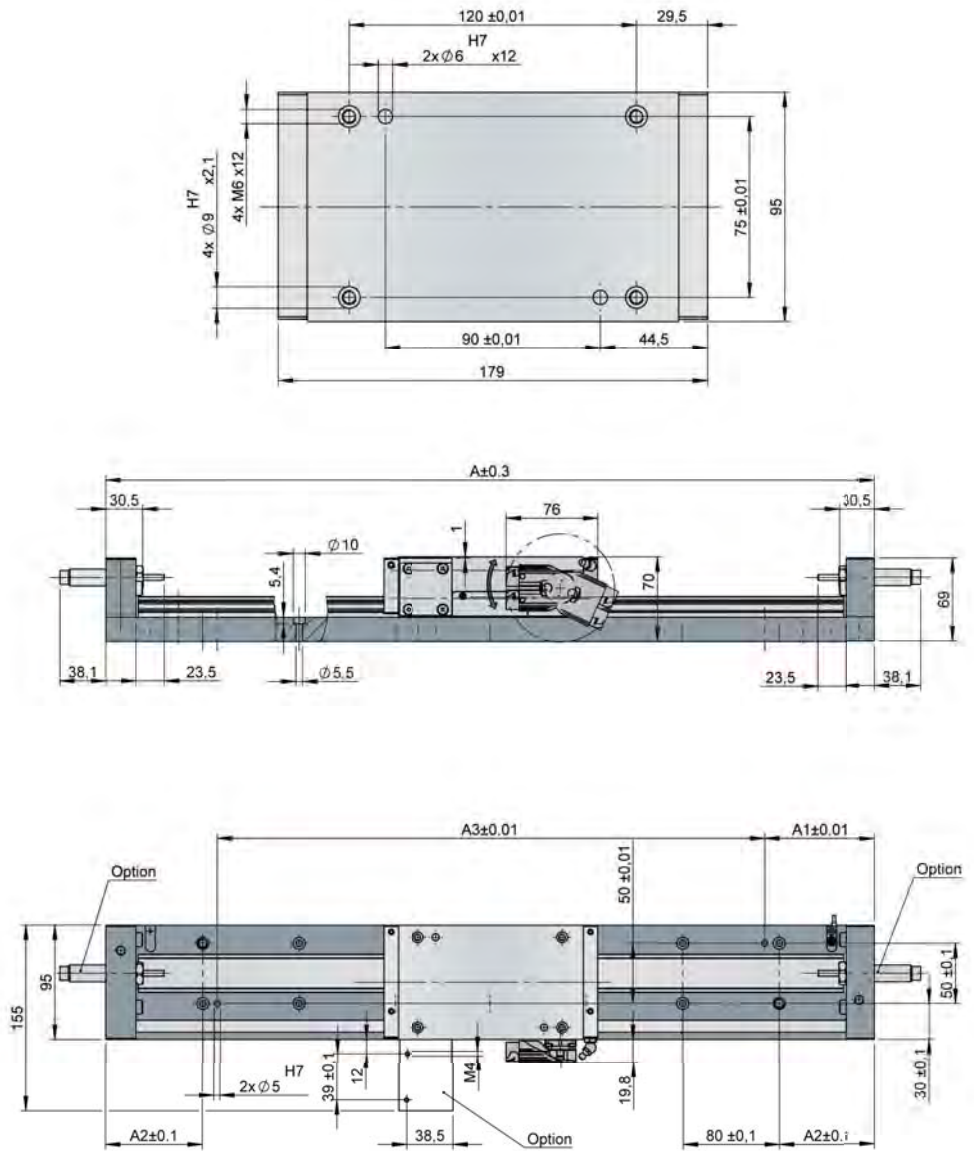
NOTICE The movable primary part does not have brakes. Suitable braking must be provided for, for all non-horizontal installation positions.

3 Product description

3.3 Technical data

3.3.10 Dimensions

3.3.10.1 Linear motor shaft HN50



Tolerance of the drill holes and pinholes: ± 0.02 mm

Measurement table:

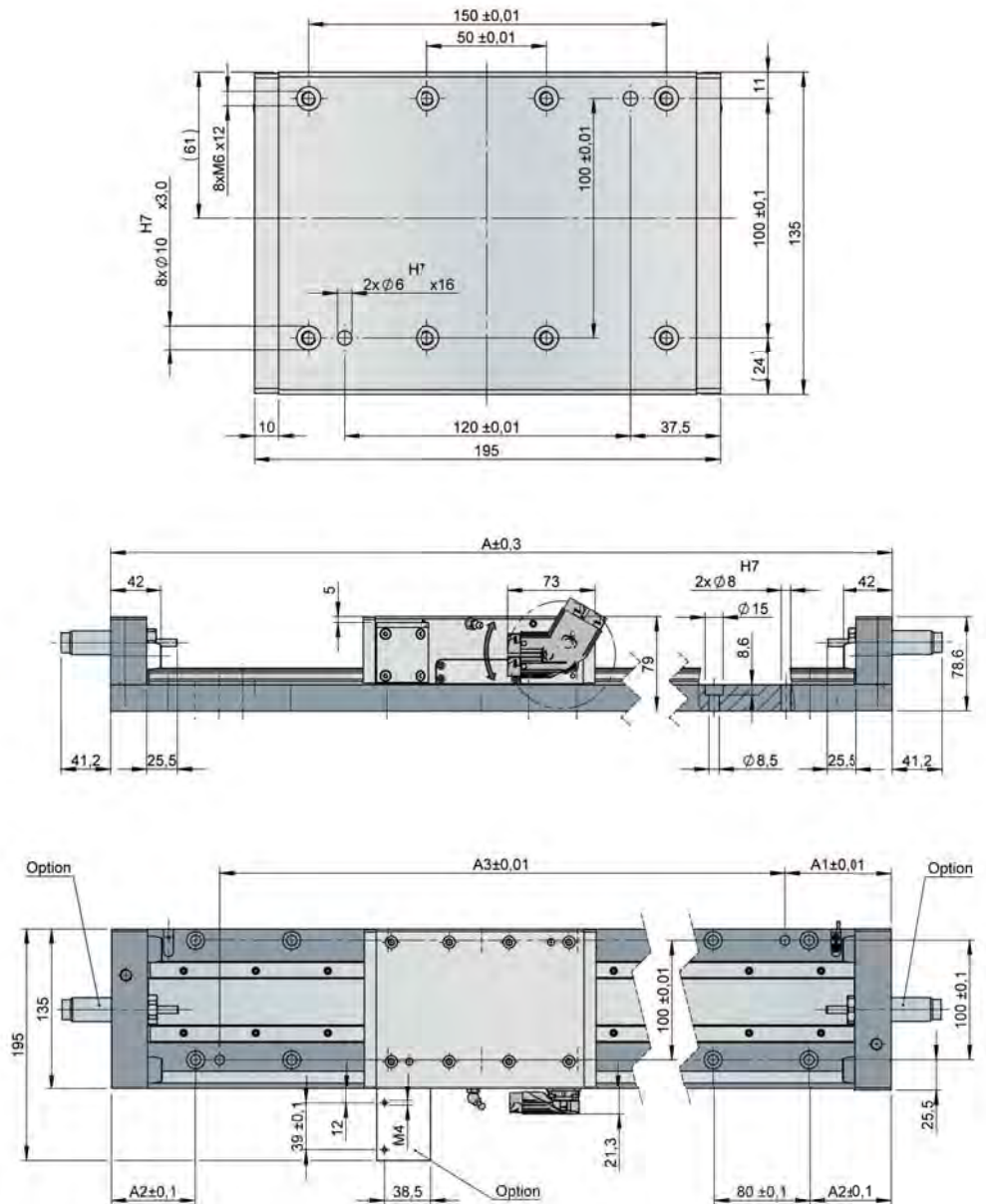
Standard strokes	A	A1	A2	A3
300	541	122,5	110,5	296
500	741	62,5	50,5	616
1000	1241	72,5	60,5	1096

Dimensions in mm

On request: intermediate strokes available in 100-mm-steps

3.3 Technical data

3.3.10.2 Linear motor shaft HN100



Tolerance of the drill holes and pinholes: ± 0.02 mm

Measurement table:

Standard strokes	A	A1	A2	A3
500	780	90	70	600
1000	1280	140	80	1000
1500	1780	140	90	1500
2000	2280	140	100	2000

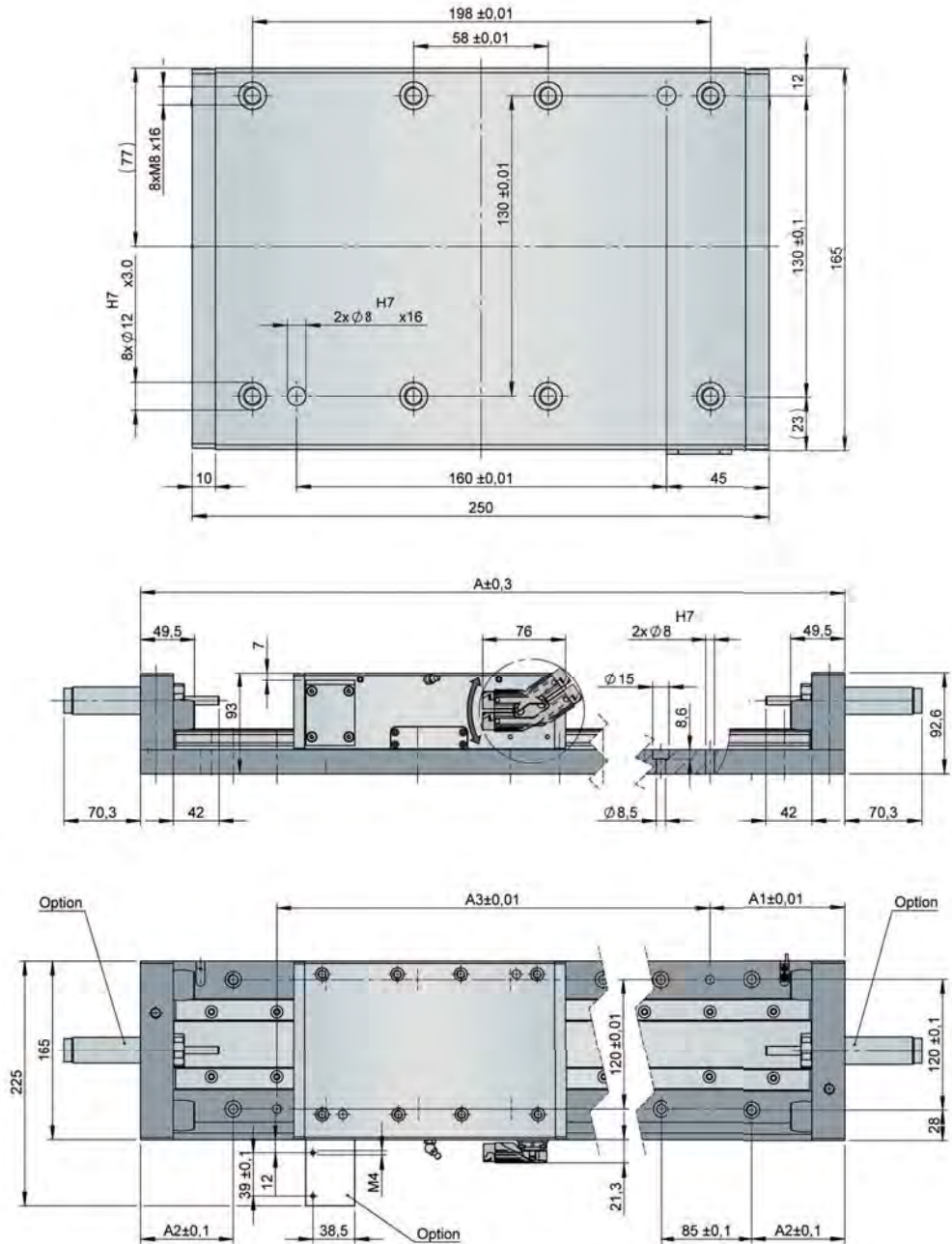
Dimensions in mm

On request: Intermediate strokes available in 100-mm-steps

3 Product description

3.3 Technical data

3.3.10.3 Linear motor shaft HN200



Tolerance of the drill holes and pinholes: ± 0.02 mm

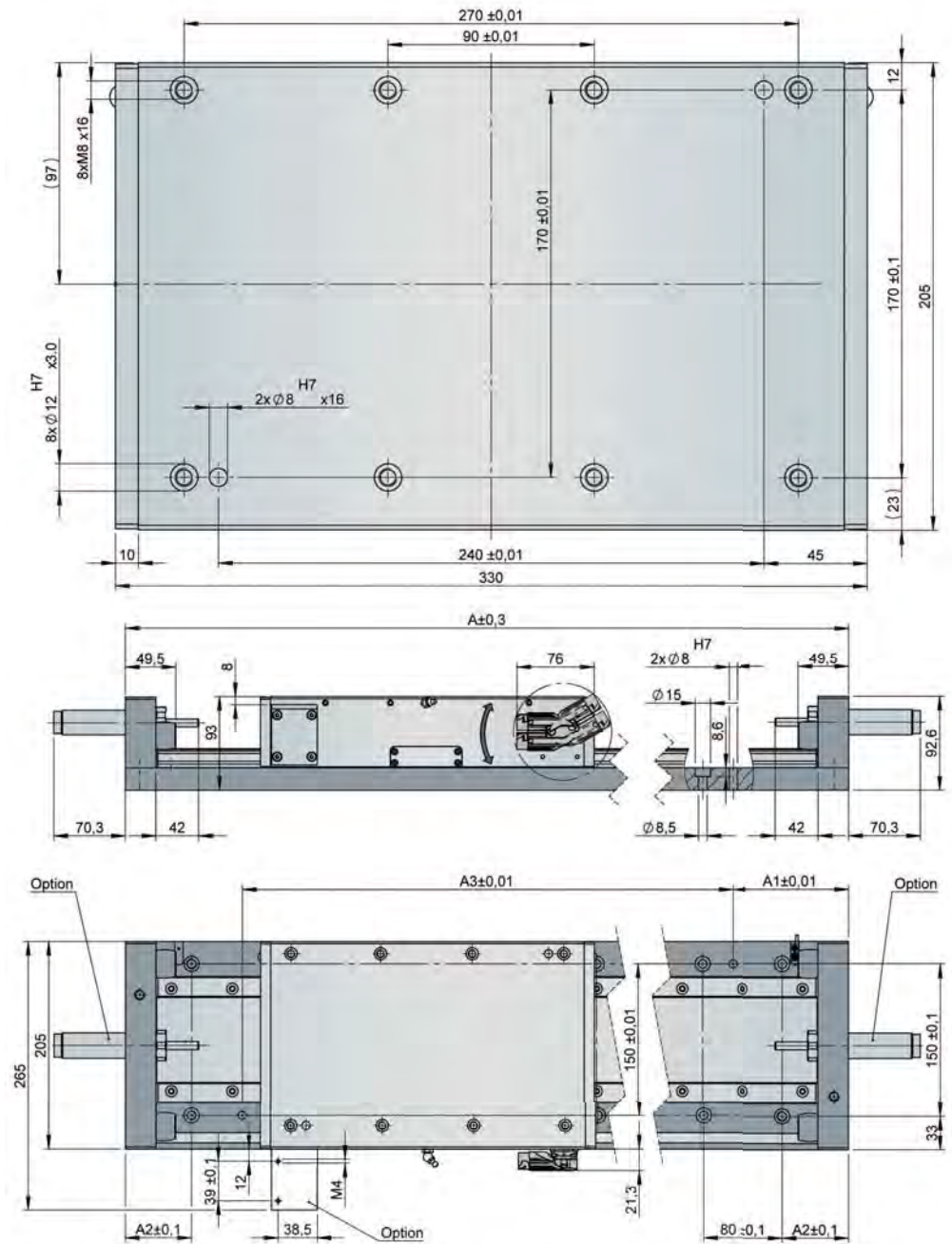
Measurement table:

Standard strokes	A	A1	A2	A3
500	850	125	85	600
1000	1350	125	80	1100
1500	1850	125	75	1600
2000	2350	125	70	2100

Dimensions in mm

On request: Intermediate strokes available in 100-mm-steps

3.3.10.4 Linear motor shaft HN400



Tolerance of the drill holes and pinholes: ± 0.02 mm

Measurement table:

Standard strokes	A	A1	A2	A3
500	930	115	65	700
1000	1430	115	75	1200
1500	1930	115	85	1700
2000	2430	115	95	2200

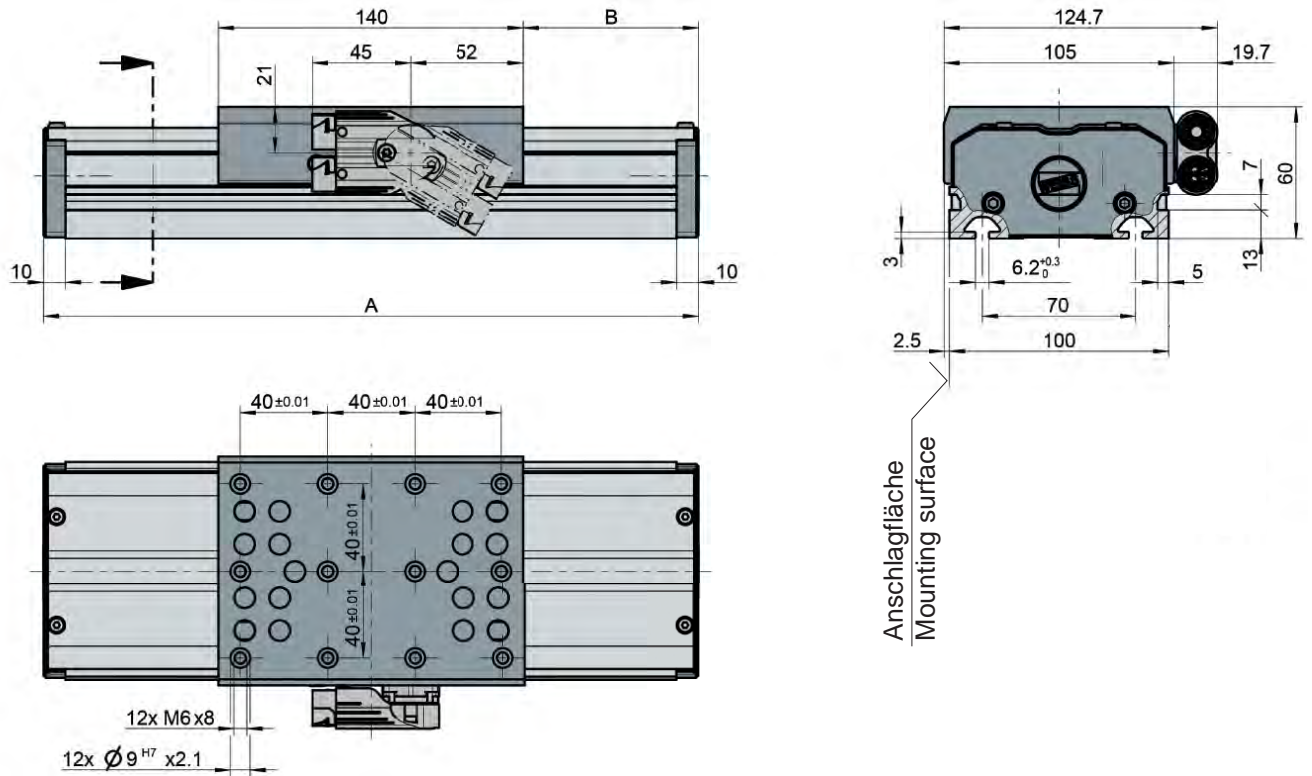
Dimensions in mm

On request: Intermediate strokes available in 100-mm-steps

3 Product description

3.3 Technical data

3.3.10.5 Linear motor shaft HG0012



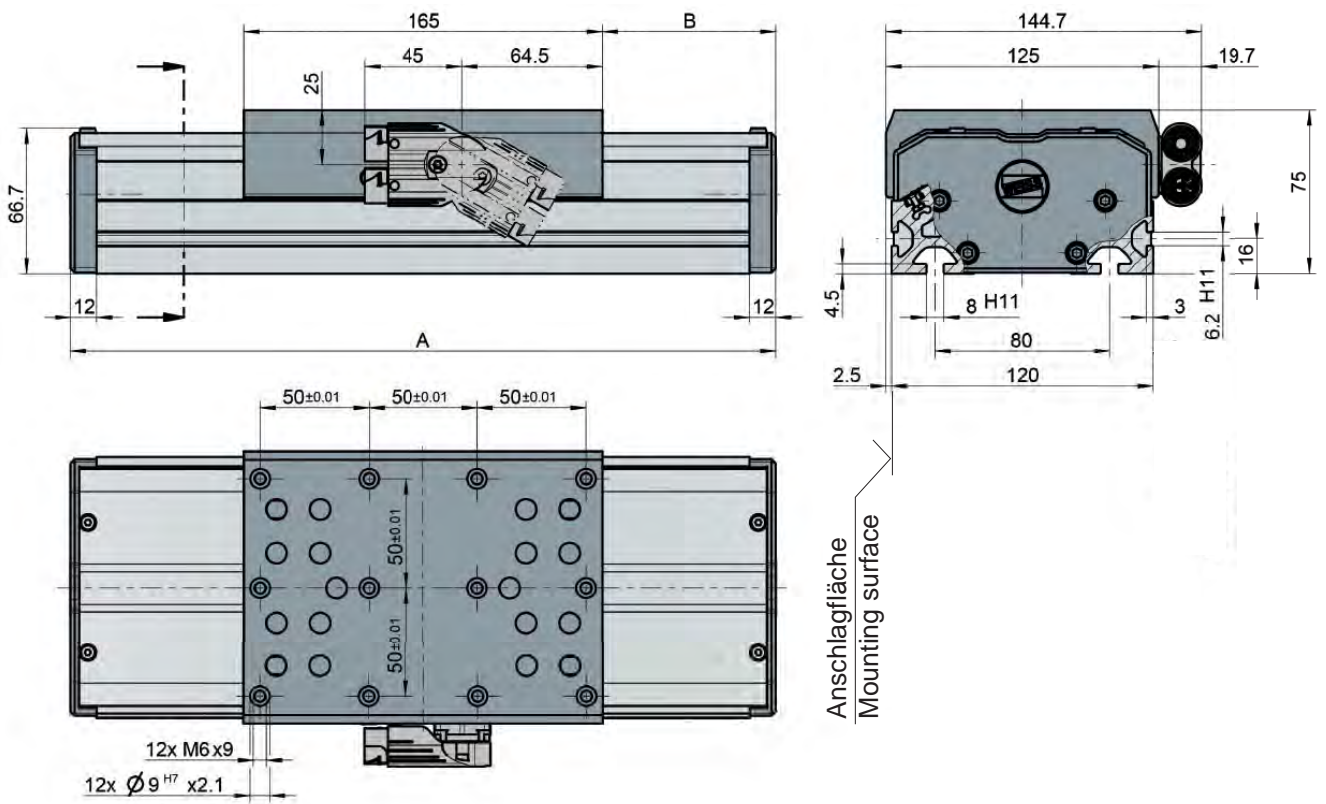
Tolerance of the drill holes and pinholes: ± 0.02 mm

Measurement table:

Standard strokes	A	B
100	300	80
200	400	130
300	500	180
400	600	230
500	700	280
600	800	330
700	900	380
800	1000	430
900	1100	480
1000	1200	530
2000	2200	1030
Dimensions in mm		

3.3 Technical data

3.3.10.6 Linear motor shaft HG0025



Tolerance of the drill holes and pinholes: ± 0.02 mm

Measurement table:

Standard strokes	A	B
100	324	79,5
200	424	129,5
300	524	179,5
400	624	229,5
500	724	279,5
600	824	329,5
700	924	379,5
800	1024	429,5
900	1124	479,5
1000	1224	529,5
2000	2224	1029,5
Abmessungen in mm		

3 Product description

3.4 Electrical connections

3.4 Electrical connections

The servo drive and the ready-made electric cables are included in delivery when the machine is supplied with the electrical package.

3.4.1 Plug-in connections

The multi-purpose plug for motor cable and measuring system are mounted in an easily accessible and rotatable manner on the primary part of the machine.

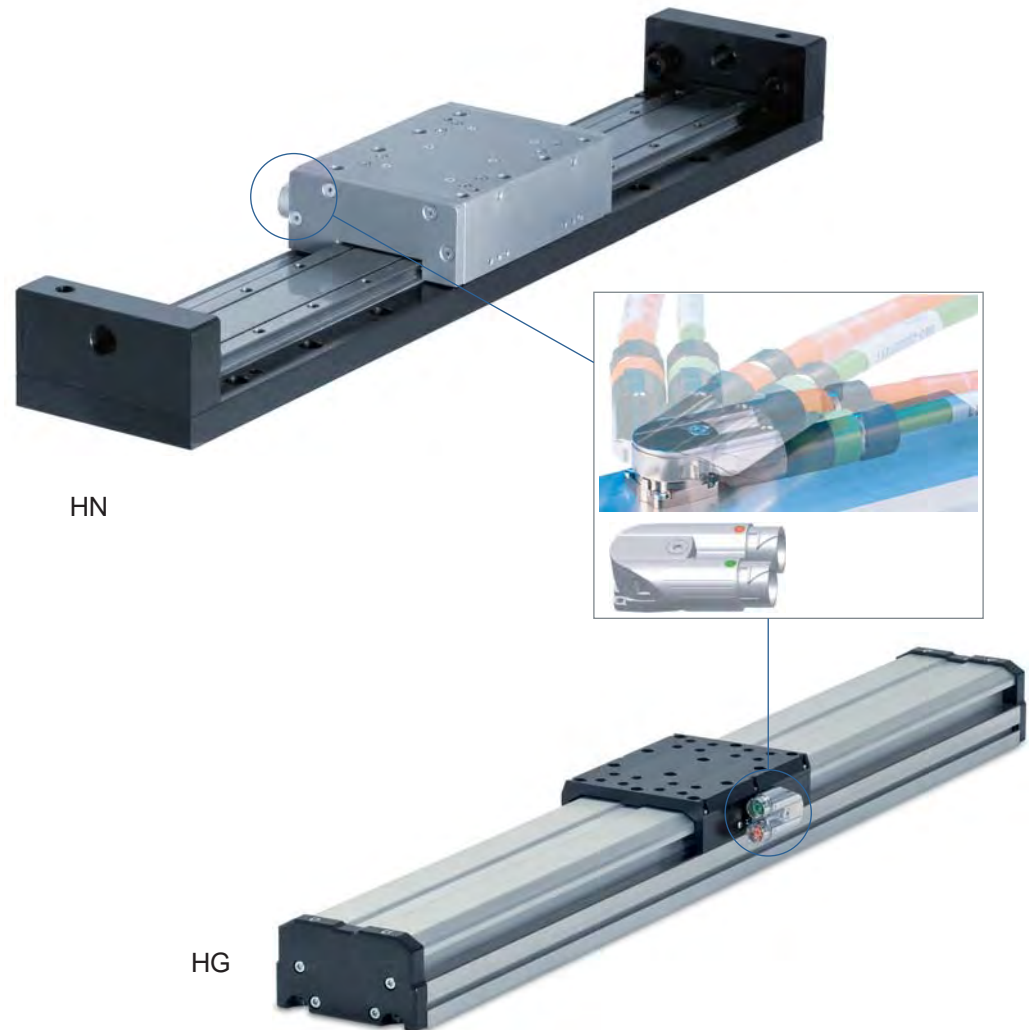
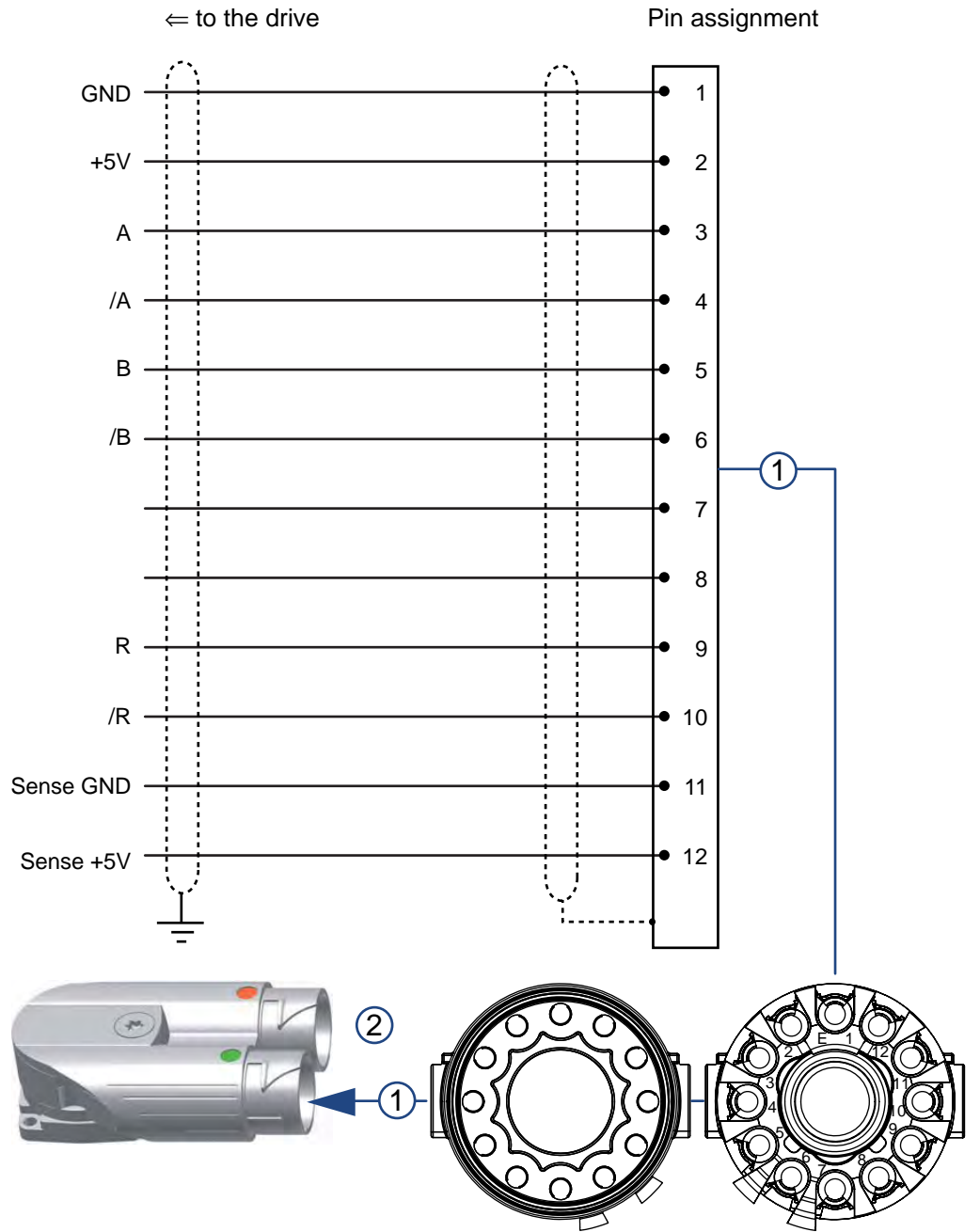


Fig. 5: Plug-in connections

3.4 Electrical connections

3.4.2 Connector pin assignment

3.4.2.1 Encoder connection

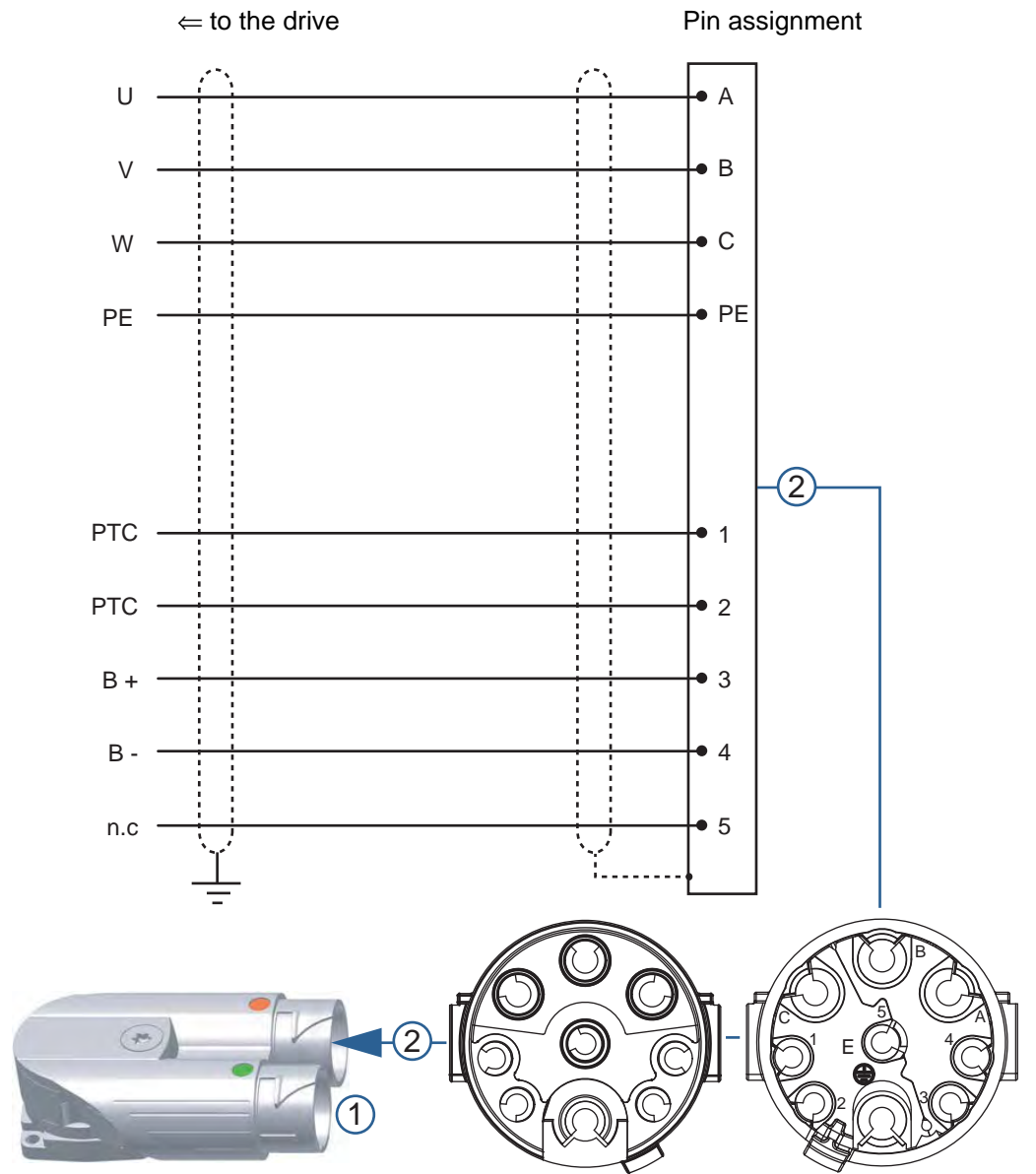


InterContec yTec - 12-pin EEDA101MR04000001000

3 Product description

3.4 Electrical connections

3.4.2.2 Motor connection



InterContec yTec - 9-pin EEDA101MR04000001000


3.5 Lubrication

3.5.1 Linear motor shafts HN

The standard features of the primary part include lubrication nipples via which relubrication can be carried out at regular intervals using a hand-held grease gun (Chapter 9.4.1 „Grease the linear motor shaft HN“ on page 44).

Version with automatic lubrication:

Instead of the lubrication nipples, there is a connection with an automatic lubrication built in.

 Specifications for the automatic lubrication are described in the respective documentation.

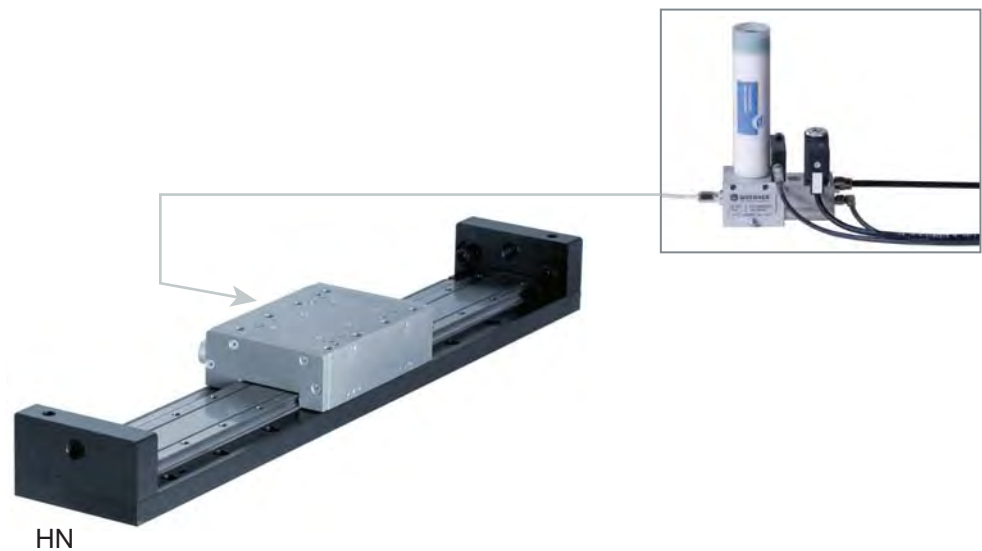



Fig. 6: Connection automatic lubrication

3.5.2 Linear motor shafts HG

 Linear motor shafts HG are equipped with ball monorail guidance systems with integrated oil tank. The linear motor shafts are lifetime lubricated and maintenance free.

4 Transport

WARNING

Strong magnetic fields

Strong magnetic fields are emitted from the permanent magnets of the secondary part. The magnetic pull increases very strongly at close range (< 150 mm). Magnetisable materials but also linear motor shafts mutually, are attracted with a great force.

Only carry the shafts individually. Do not place the shafts on top of each other. Keep separating tools at hand for emergencies. Danger of severe crushing or pinching.

NOTICE

The machine must be protected against impermissible strains (mechanical strain, temperature, humidity, aggressive atmospheres) during transport and when being stored. The guide rail of the machine must be protected against contact with magnetic or metal objects. Do not bring any other magnets in contact with the guide rail. Otherwise the measuring system would lose its function, i.e. the control of the shaft would no longer be possible.

- Transport work may only be conducted by specialised personnel and the safety instructions must be observed.
- Note that projecting sharp edges can cause injuries.
- The transport path must be cordoned off and safeguarded in such a manner that unauthorised personnel cannot enter the danger zone.
- The parts must be safeguarded against tipping or falling.

4.1 Transport damage

The delivery should be inspected for damage immediately after it is received. The contents of the delivery should be checked for damage if damage to the packaging is detected which could indicate damage to the contents. Details of the scope of delivery are provided in Chapter 3.3.6.

Detected damage should be immediately reported to the transportation company and confirmed.

4.2 Intermediate storage

Observe the storage conditions listed in the following table, if intermediate storage is planned for a longer period of time.

Climatic zone	Packaging	Storage location	Storage duration
All	Packed in containers With moisture absorbers and humidity indicator sealed in film Protect against insect damage and mould formation by treating chemically	Roofed over Protected against rain Not exposed to vibrations	Max. 3 years with regular inspection of packaging
	Open	Roofed over and sealed at a constant temperature and air humidity ($5\text{ °C} < T < 60\text{ °C}$, 50% relative humidity) No sudden temperature fluctuation and controlled ventilation with filter (free of dirt and dust) No aggressive vapours and no vibrations Protected against insect damage	2 years and longer with regular inspection. Check for cleanliness and machine damage during inspection. Check that anticorrosion protection is unspoiled.

5 Installation

5.1 Safety during installation



Strong magnetic fields

Strong magnetic fields are emitted from the permanent magnets of the secondary part. The magnetic pull increases very strongly at close range (< 150 mm). Magnetisable materials but also linear motor shafts mutually, are attracted with a great force.

Assembly may only be conducted by qualified, trained and instructed personnel. There must always be a second person present during assembly. Do not remove the attached protective cover until the shaft is firmly assembled. Do not bring any magnetisable objects in the vicinity of the shaft. Keep separating tools at hand for emergencies. Danger of severe crushing or pinching.

Injuries caused by incorrect installation.

The dimensions of the supporting ground and fastening equipment must be sufficient, so that they can withstand the stresses produced during operation.

Auxiliary personnel may only perform work which is assigned to them by plant technicians.

Create a proper electrical grounding.

Particularly ensure that:

- only authorised persons are in the work area and that no other persons are endangered by the assembly work.
- no components are damaged and are only installed in a clean, functional condition.
- all components are installed according to the described instructions.
- specified starting torques are adhered to.
- the key aspect of the structural components is taken into consideration.

5.2 Installation prerequisites

Check prior to installation whether the dimensions of the installation site and building conditions correspond to the necessary prerequisites and measurement specification in the drawing documents.

Particularly ensure that:

- The supporting floor is level and rigid.
- The dimensions of the supporting structure at the installation location must be sufficient to withstand the dynamic forces that occur.

5.2.1 Installation preparation

- Open the packaging unit prior to the assembly and remove the machine from the packaging unit.
- The customer's bores must be made based on the hole pattern in Chapter 3.3.10.
- The attachment screws must be at hand.

5.2.2 Operating media / Auxiliary media / Tools

The following are required for installation of the machine:

- One set of spanners
- One torque wrench
- One set of screwdrivers
- Separating tools (1 hammer appr. 3 kg, 2 pointy wedges made of hardwood or plastic)
- Screw securing agent (e.g. Loctite ® 243)
- Screws which are at least have a property class of 8.8

5.3 Assemble machine

5.3.1 Assemble the linear motor shaft HN

NOTICE

Damage to the machine

Contact of the secondary part to magnetised objects or blows to the secondary part destroy the magnetic measuring system. When assembling more than one machine, please observe that the secondary parts do not come in contact with each other.

1. Set up the machine at the assembly position.
2. Tighten the attachment screws however, not all the way.
3. Drive dowel pin into each pinhole.
4. Tighten the attachment screws all the way.
5. Make electrical connections in accordance with the circuit diagrams.

5.3.2 Assemble the linear motor shaft HG

5.3.2.1 Assembly with sliding blocks

Two profile grooves are milled into the base plate of the primary part.

1. Loose screw in the sliding blocks at mounting position.
2. Shift the assembly over the sliding blocks.
3. Align assembly.
 - ▶ As needed, set dowel pins and align at mounting surface.
4. Tighten the screws of the sliding blocks.
5. Make electrical connections in accordance with the circuit diagrams.



Fig. 7: Assembly with sliding blocks

A Profile groove

5.3 Assemble machine

5.3.2.2 Assembly with clamping shoes

A longitudinal groove is milled into each side plate of the primary part.

1. Place assembly at mounting position.
2. Clip clamping shoes into the longitudinal groove.
3. Loose tighten the screws of the clamping shoes.
4. Align assembly.
 - ▶ As needed, set dowel pins and align at mounting surface.
5. Tighten the screws of the clamping shoes.
6. Make electrical connections in accordance with the circuit diagrams.

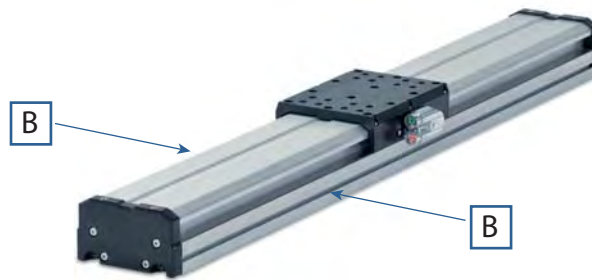


Fig. 8: Assembly with clamping shoes

B Longitudinal groove

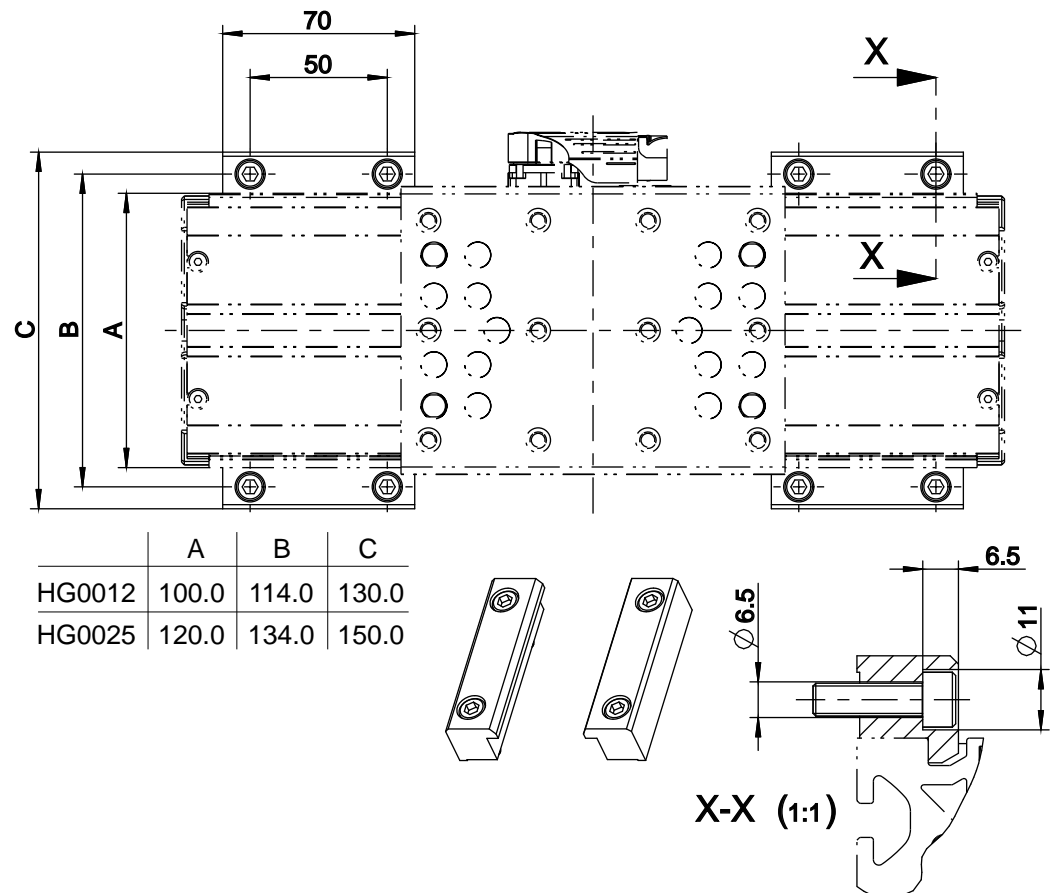


Fig. 9: Dimensions of clamping shoes

5.4 Installing the safety equipment

5.3.3 Mounting of attachment parts

NOTICE *The existing drill holes must be used to attach the attachment parts on the primary part. You may not make additional drill holes. Damage to the machine.*

5.4 Installing the safety equipment

The operator is responsible for providing for safety equipment and emergency stop buttons. The machine may not be operated without suitable safety equipment.

5.5 Instructions on disposal of packaging material

Packaging materials should be reused or disposed of properly in compliance with national regulations.

6 Commissioning

6.1 Safety during commissioning



Risk of injuries emanating from unexpected start-up.

Connections which were not established correctly or external influences on the electrical equipment can cause the machine to start unexpectedly and uncontrolled movement. Activate and check all safety equipment and emergency-stop circuits prior to commissioning.

- Ensure that the machine is only commissioned by qualified personnel in compliance with the safety instructions.
- Ensure that only authorised personnel are in the work area, and that others cannot be injured due to the commissioning process.

The following prerequisites must be met prior to commissioning the machine:

- The machine is correctly mounted.
- The electrical equipment for the power supply is available and correctly fitted.
- All cables are laid properly and correctly connected in compliance with valid electrical circuit documents.
- The shielding of the motor wires is in place.
- The static discharge must be conducted properly.
 - ▶ The shunt resistance must be measured and have a value of $< 10 \text{ MOhm}$.
 - ▶ The measurement must be recorded in a log.
- The required safety equipment and emergency-stop circuits are available and functioning correctly.

Prior to commissioning the machine, check whether

- the drive is undamaged and not blocked.
- all connections have been correctly established.
- no other hazard sources are present.
- no foreign materials, tools or other objects are lying in the operating area of the machine.


The following should be checked during commissioning

- that the primary part is working flawlessly.
 - ▶ A jerking of the primary part can be a sign for incorrect regulator parameters.
- no excessive noise development is detected.
 - ▶ A strong development of noise may indicate improper assembly or incorrect control parameters.

6.2 Initial commissioning

When the machine is delivered with servo amplifier and software, the start-up is conducted via the Weiss Application software WAS.handling Windows programme.



 More information is also contained in the operating manual WAS.handling Control HN, which is included in delivery.

6.3 Recommissioning

⚠️ WARNING *Risk of injury emanating from an operationally unsafe machine. An operationally unsafe machine can cause injuries and material damage. Recommissioning should only be realised after it has been ascertained that the machine is in a functionally reliable condition and no risk emanates from it during operation.*

A visual inspection of the machine should be conducted prior to re-commissioning. The following should be checked and ensured in this regard:

- No damage is present on the machine.
- No foreign materials, tools or other objects are lying in the operating area of the machine.
- All supply units are connected and operating.
- Safety equipment is ready for operation.

7 Operation

7.1 Safety during operation

7 Operation

7.1 Safety during operation



Risk of injury due to incorrect alteration of operating parameters.

Improper changes of operating parameters can cause unforeseeable system behaviour. Operating parameters should only be changed by authorised personnel. Altered operating parameters should be checked in a test. Incorrect parameters can cause consequential damage and thus injuries.

Strong magnetic fields

The information given in the chapter Residual Hazards must be adhered to.

7.2 Operating the machine

The machine is designed for integration into other machines, into other incomplete machines or equipment or for connection to them.

Safe operation and control are the responsibility of the operator.

7.3 Operating personnel workstations

The operating personnel workstations are determined by the operator of the plant or product in which the machine is integrated.

8 Malfunctions


8.1 Safety when remedying malfunctions



Injury of non-authorized personnel.

Malfunctions should only be remedied by instructed personnel provided by the operator who are trained and authorised to perform these tasks. The machine should be deactivated with the main switches and secured against unintentional reactivation prior to remedy. The radius of action of moving machine parts should be secured.

8.2 Errors / Cause / Remedy

 Information on malfunctions and their elimination are contained in the operating manual WAS.handling Control HN.

8.3 Customer Service

Please provide the following details if you require the assistance of our Customer Service:

- Serial number of the machine
- Description of the malfunction that has occurred
- Time and attendant circumstances of the malfunction that has occurred
- Assumed cause

You can contact our Customer Service from Monday to Friday between 08:00 and 17:00 at the

Service number +49 (0) 6281 - 5208-0

or at service@weiss-gmbh.de

An answering machine will provide you with information outside of the hours listed above.

9 Maintenance

9.1 Safety during maintenance

WARNING

Strong magnetic fields

Strong magnetic fields are emitted from the permanent magnets of the secondary part. Maintenance only by qualified, trained and instructed personnel.

Objects made of magnetisable materials such as jewellery, watches or tools can be attracted. Do not wear any magnetisable materials when handling the machine. Handle tools carefully. Injuries caused by being pulled in.

Injuries caused by the power supply and residual energy.

All power sources should be deactivated prior to carrying out maintenance work, and secured against unintentional reactivation and marked with a sign indicating that maintenance work is in progress. All moving parts should be stationary. Loads should be secured against sagging or slipping. All components energized with electrical power should be de-energized (Extinguished LED's on the servo drive do not mean that all components have been completely de-energised). Check by measuring to ensure that all components are de-energised. Work on electrical equipment may only commence if the voltage is less than 42 VDC.

Injury of non-authorized personnel.

Maintenance work should only be realised by instructed personnel who have been authorised to perform these tasks. The operating instructions laid down by the operator must be rigidly adhered to.

Injuries resulting from maintenance work that has not been announced.

The working area should be secured over a wide area prior to realising maintenance work and marked with warning signs. Operating personnel must be informed that maintenance work is being carried out.

Injuries caused by the use of incorrect components or incorrect operating media.

Only spare parts, which are listed in our spare parts list, may be used. Subsequent modifications on the machine are prohibited. Only the specified operating materials may be used.

CAUTION

Hot surfaces

The temperature of the housing and the axle can reach up to 80 °C during operation. Prior to carrying out any work on these components, the machine must first cool down sufficiently, to avoid any risk of burning through contact. Burn injuries will arise from contact with hot components.

- Ensure that only qualified electricians perform all tasks on the electrical equipment.
- Ensure that all work steps for maintenance are performed in the specified sequence.
- Ensure that specified tightening torques are observed.
- Ensure that all foreign objects are removed from the work area after the maintenance.

9.2 Maintenance work

Maintenance includes tasks for the purpose of:

- Inspection
- Maintenance
- Repair

9.3 Inspections

9.3.1 Every 6 months check primary part

Move the primary part manually across a full stroke and check the

- ▶ free movement
- ▶ running noise

9.3.2 Conducting a six-monthly visual inspection

Conduct a visual inspection for


- ▶ loose bolt or pin connections.
- ▶ damage to wires and compressed-air hoses.
- ▶ excessive lubricants on the secondary part. Wipe off excessive lubricants with a soft rag.
- ▶ Damages to the primary and secondary part.
- ▶ For the model with automatic lubrication: Damage to the hose for the automatic lubrication. The hose may not conduct any air.

9.4 Maintenance

9.4.1 Grease the linear motor shaft HN

NOTICE *The lubrication must be carried out after a service performance of 600 km, at the latest however, once a year. The respective service performance can be seen via the WAS software in the menu Extras/Parameters. There is also the alternative (as described in the documentation WAS.handling Windows programme) of reading out and resetting the value via different interfaces.*

1. Place a hand-held grease gun on each existing tapered lubrication nipple and insert the required amount of grease.
 - ▶ During the lubrication process, move the primary part manually approx. 40 mm.
 - ▶ The pump stroke for the hand-held grease gun from Weiss is approx. 0.8 cm³.
2. Wipe off leaked excess grease with a soft cloth.

 For further information on the hand-held grease gun from Weiss see the operating manual for the hand-held grease gun (Art.-No. LUBEMAN-0800-00-0).

9.4.1.1 Grease

a) First lubricating by the factory and re-lubricating with LE special grease Synth EP2 with qualities as follows:

- Standard for cleanness by FDA guideline 21 CFR 178.3570
- Clearance by NSF H1 (National Sanitary Foundation)

Type of thickener	Al-Complex
Operating temperatur for long-term lubrication	-45 °C bis +160 °C
Short time admissible temperature peak value	+200 °C
Drop point (ASTM D 2265)	> 250 °C
Worked penetration (ASTM D 217)	265 - 295
Type od base oil	synthetic
Base oil viscosity at 40 °C (ASTM D 445)	350 mm ² /s
Water resistance (DIN 51807 T1)	0 - 90
SKF Emscor Test (DIN 51802)	Corrosion degree 0/0
Designation (DIN 51502)	KPFHC 2 P-40

Alternative the use of a comparable grease is possible.

b) Use of grease without FDA-Certifikation

- DIN 51502: KP2K-30
- ISO 6743-9: ISO-L-X-CCEB 2


NOTICE *In this case the original grease has to be pressed out of the bearings completely. Do not mix greases.*

9.4.1.2 Amount of grease


- HN50 / HN100: 1.0 cm³ per lubricating nipple
- HN200 / HN400: 1.6 cm³ per lubricating nipple

9.4.1.3 Replace grease cartridge

Only for the model with automatic lubrication:

-  For the replacement of the grease cartridge, please see the operating manual for automatic lubrication, which is included in delivery.

9.4.2 Grease linear motor shaft HG

-  Linear motor shafts HG are equipped with ball monorail guidance systems with integrated oil tank. The linear motor shafts are lifetime lubricated and maintenance free.

9.5 Repair

The operator should not perform any maintenance or repair work on the machine.

Should maintenance or repair work become necessary, the customer service of WEISS GmbH is to be contacted.

10 Decommissioning / Dismantling / Disposal

10.1 Safety during decommissioning and dismantling



Strong magnetic fields

Strong magnetic fields are emitted from the permanent magnets of the secondary part. The magnetic pull increases very strongly at close range (< 150 mm). Magnetisable materials but also linear motor shafts mutually, are attracted with a great force.

Disassembly only by qualified, trained and instructed personnel. A second person must always be present during disassembly. Transport disassembled machines individually. Do not stack disassembled machines. Do not bring any magnetisable objects near the machine. Keep separating tools at hand for emergencies. Danger of severe crushing or pinching.

Ensure that decommissioning and dismantling is only realised by persons trained, instructed and authorised for this purpose. These persons should be familiar with the operating manual and act in accordance with it.

10.2 Decommissioning

10.2.1 Temporary decommissioning

The machine should be deactivated for decommissioning and secured against unintentional reactivation.

The machine should be fitted with a sign that clearly indicates that it is temporarily decommissioned.

NOTICE *For recommissioning, comply with the instructions in chapter 6.3.*

10.2.2 Ultimate decommissioning

For ultimate decommissioning and shutdown:

- Turn off the machine according to specifications.
- Secure the machine against unintended reactivation.
- Provide the machine with a notice which clearly indicates that the the machine is ultimately shut down.

10.3 Dismantling and disposal

⚠ CAUTION *Injuries can occur during disassembly through falling components. The following points must be observed to avoid injuries and/or environmental damage during dismantling and disposal:*

- In order to avoid injury, ensure that suitable tools are used and that dismantled machine components are stable.
- Wear personal protective clothing and protective equipment.

10.3.1 Disposal of components

NOTICE *Subassemblies should be disposed of properly! Improper disposal of subassemblies can cause environmental damage and will be prosecuted!*

Dispose of subassemblies in compliance with valid local regulations. Ensure that auxiliary operational media are disposed of in compliance with environmental protection regulations. Local regulations governing the correct recycling and disposal of waste should be observed.

The machine consists of:

- steel and aluminium (housing, axles)
- copper (motor, electric wires)
- plastic (electric wires, hoses)
- Electronic components (servo drives, boards)

11 Service and spare parts

11.1 Ordering spare parts

Please supply us with the following details when ordering spare parts:

- Serial number of the machine
- Order number of the spare part obtained from the spare parts list
- Number of spare parts required

Please send your spare parts order to

WEISS GmbH
Siemensstraße 17
D-74722 Buchen/Odw.

Tel: +49 (0) 6281 - 5208-0
Fax: +49 (0) 6281 - 5208-99
E-mail: service@weiss-gmbh.de
Internet: <http://www.weiss-gmbh.de>

A complete list of the addresses of our sales representatives is available on our website..

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12.3 Personal notes

A series of horizontal dashed lines for taking notes.



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