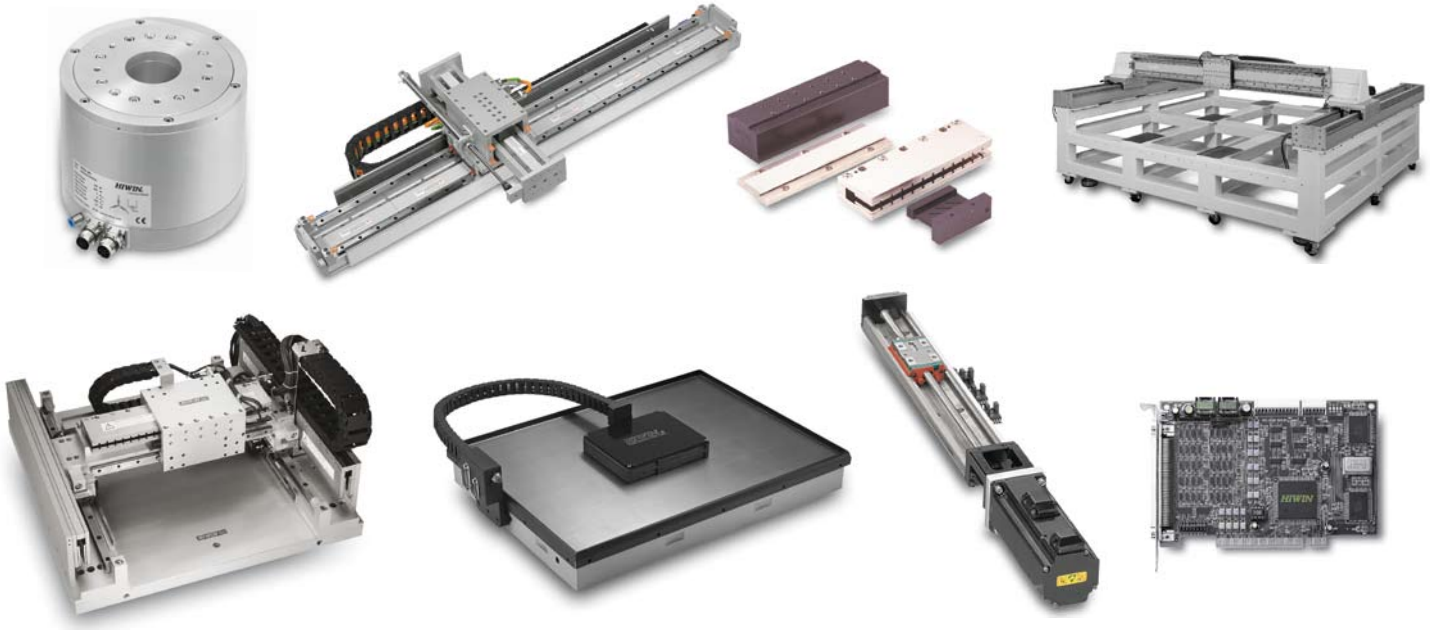
HIWIN®

Lineartechnologie



Positioning Systems

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Note:
The specifications and technical data in
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HIWIN®
Linear Technology

Welcome to HIWIN

HIWIN positioning systems facilitate positioning that is accurate in terms of time and location. These positioning systems are designed as direct drives or as linear stages with ballscrew, depending on the model, and are suitable for installation in a horizontal or vertical position. Due to the direct drive, they are free of backlash, very dynamic and are low maintenance. They can be supplied as a complete solution including a drive amplifier on request.

In addition to the linear axis with direct drive, directly driven rotary tables complete the product portfolio.

Linear stages with ballscrew can be supplied with or without a motor. Various adapter plates allow for the installation of state of the art servo motor models.

Positioning Systems

Making Linear Progress Affordable

HIWIN®
Linear Technology

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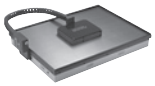

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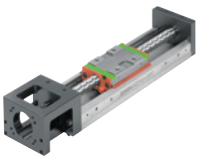

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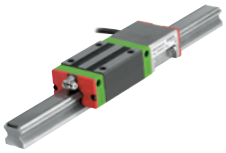

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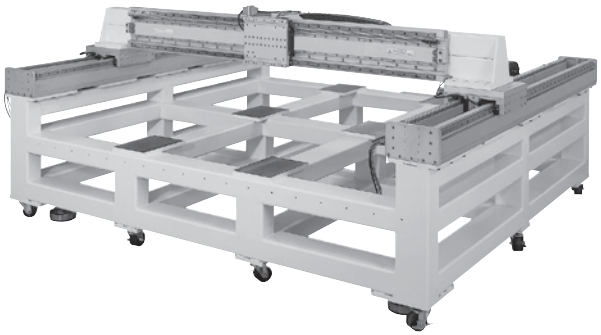
Positioning Systems
Customized Positioning Systems

1. Customized Positioning Systems

The standardized positioning axis shown in this catalog are designed to handle many different kinds of positioning tasks. For positioning tasks that cannot be solved using standard axis, application engineers are available to work out an optimized solution.

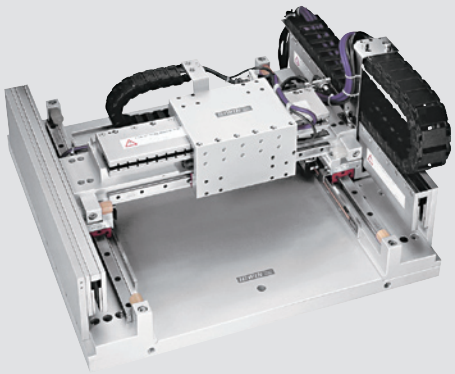
This double page shows a few customized solutions. Sometimes only the mechanics are customized. In the planar motor example, the customized solution used special software for optimum integration of the positioning system in the production process.

1.1 Examples



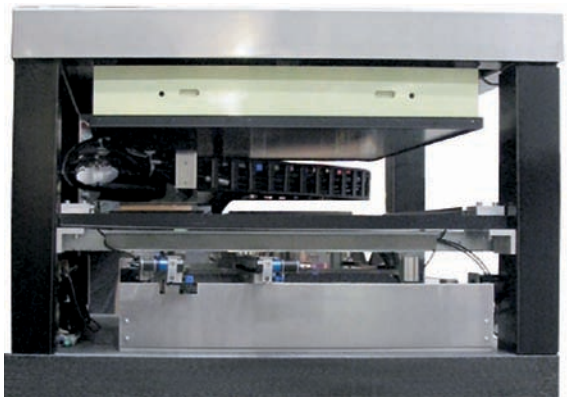
Economic Installation and Inspection
XY gantry systems make many applications extremely economical. Setup of the gantry from standard components.

- Standard axis of the LMX1L series
- Repeatability ± 2 µm
- Supplied with machine bed



Microshapes and Macroshapes
Milling and microstructures with cutting tools and lasers are application areas in which gantry systems can deliver a number of benefits. They are also an excellent buy for your money.

- Coreless LMC motors
- Repeatability ± 2 µm
- Tried and tested technology with high output

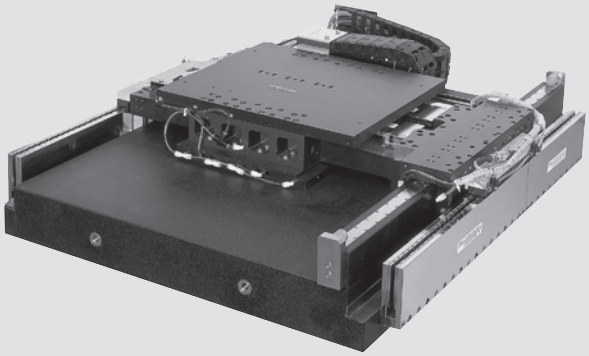


Planar Motors
Servo planar motors offer an excellent technological platform for inspection tasks. In inspection of printed circuit boards, they have an optical sensor for complete monitoring of printed conductive tracks and SMD components.

- Air-cushion bearing ensures minimum wear
- Guaranteed levelness for the complete stroke (up to 1000 mm x 1000 mm)
- Repeatability ± 3 µm

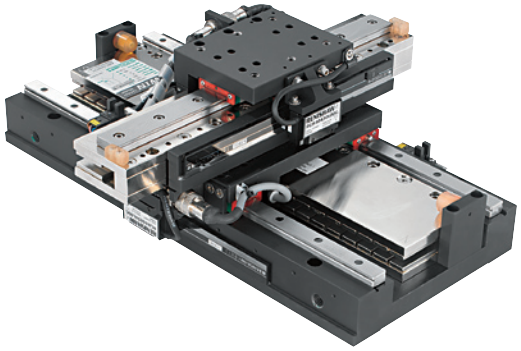
Wafer Quality Control at the Highest Level
High precision X-Y cross tables with air-cushions are the prerequisites for surface monitoring, which even find the smallest errors, for example, in wafer production for the electronics and chip industries.

- Levelness ± 2 µm
- Repeatability ± 2 µm
- Accuracy ± 5 µm



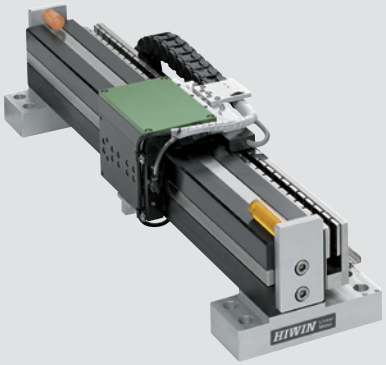
Microsystem Technology and Wafer Processing
Absolute precision and suitability for clean room conditions are the prerequisites for every drive in microsystem technology and wafer processing.
Linear motor cross tables are ideal for these tasks.

- Stroke 200 mm x 200 mm, optional 300 mm x 300 mm
- Levelness ± 4 µm across the complete stroke
- Repeatability ± 1 µm across both axis
- Accuracy ± 4 µm across both axis
- Clean room suitability class 100, optional class 10
- Optionally suitable for vacuums up to 10^{-3} mbar



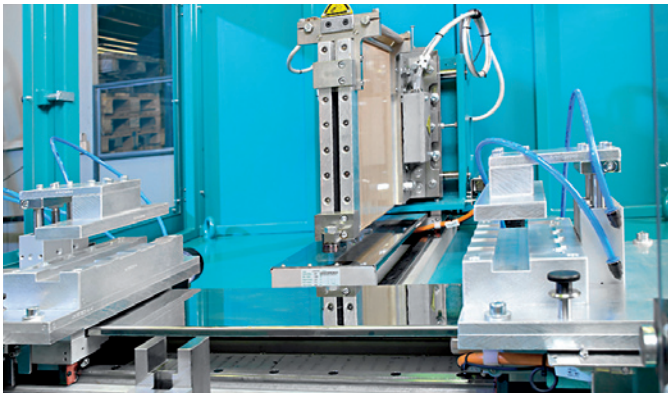
Overview for Laser Scanners
High degree of synchronization and extended operating lives are a must for optical inspection systems such as laser scanners.
Linear motors with air bearings fulfill these requirements.

- No friction thanks to air bearings
- No cogging thanks to coreless linear motors
- Stroke up to 1,500 mm



Horizontal High Speed Heating Element Welding Machine for Welding Synthetic Materials
Axis of the LMX1L series with absolute position measurement

- No commutation required at switching on
- High acceleration prevents "drawing" of the synthetic material when removed from the heated plate
- Welding controlled by time, force and stroke
- Reduction of changing time thanks to high speeds



1.2 Glossary

Resolution
This is the smallest stroke that can be detected by the distance measuring system in use. The achievable >increment is usually higher than the resolution due to additional factors.

Acceleration
This is the speed change per time unit, i.e. acceleration = speed / time or a = v/t.

Acceleration time
This is defined as the time that a drive requires to reach maximum speed from standstill.

Continuous torque, continuous force
(also see Section 1.3, F_c)
A motor can produce continuous torque or nominal torque (with rotational movements) and continuous force or nominal force (with linear movements) in continuous operation (duty cycle = 100 %).

Continuous current I_c
(also see Section 1.3, I_c)
This is the current supplied over a longer period; the maximum permitted continuous current per winding is referred to as the nominal current. The continuous current is characterized by the fact that the dissipation power only results in motor warming of approximately 80 °C.

Torque
This is the dimension which causes a rotation movement in a body and consequently a vectorial dimension, which can be expressed in the following cross product:

$$\vec{M} = \vec{r} \times \vec{F}_1$$

The torque is expressed physically in the unit Nm = kgm^2/s^2.

Levelness
This is a measure for the vertical straightness of a movement on the X axis. A deviation from the absolute levelness is a shift on the Z axis when moving on the X axis.

Eccentricity
This is the deviation of the center point of rotation of rotary tables from its position during rotation. It is created by centering and bearing tolerances.

Guide deviation
This is the linear deviation from the stroke axis. It is dependent on straightness (thus the accuracy at the level of the table) and levelness (the accuracy external to the level of the table).

Back EMF constant
(also see Chapter 1.3, K_u)
This is the relation between the back EMF voltage (rms) and the motor rotational speed or speed (rpm or m/s). Back EMF is the electromagnetic force that is created during the movement of windings in the magnetic field of permanent magnets, e.g. in a servo motor.

Accuracy (Absolute accuracy)
This, or the actual inaccuracy, corresponds to the deviation between a targeted position and the actual position. The accuracy along an axis is defined as the difference between the actual and target positions after all other linear deviations that can be eliminated have been excluded. Such systematic and linear deviations are the result, for example, of cosine errors, angle deviations, shaft pitch errors, thermal expansion etc. Accuracy is calculated for all relevant target positions of an application using to the following formula:
Maximum of all sums of systematic target-actual deviations +2 sigma (standard deviation). Accuracy must not be confused with >repeatability.

Straightness
This is a measure for the horizontal straightness of a movement on the X axis. A deviation from the absolute straightness is a shift on the Y axis when moving on the X axis.

Force, torque
Force (in linear movements) or torque (in rotational movements) is given for defined conditions, e.g. as continuous force or torque at:

- 20 °C ambient temperature
- 80 °C winding temperature
- 100 % operating time for linear motors and torque motors
- 50 % operating time for rotary tables

or as peak force or peak torque.

Force constant K_f
(also see Chapter 1.3, K_f)
This is the winding-specific parameter used to calculate the resultant force as $F = I \times K_f$ by multiplication with the input current.

Attraction force F_a
This force is created between the primary and secondary parts of iron-core linear motors, by biasing voltage of the drive system, which must then be taken up by the guide.

Motor constant K_m
(also see Chapter 1.3, K_m)
This designates the ratio of generated power and dissipation power and consequently is a measure for efficiency of a motor.

Increment
This, or the smallest increment, is the minimum stroke that a linear drive can travel repeatedly. It is determined by the >resolution of the linear drive plus the increment of the motor and all errors in the drive line (reverse play, winding etc.)

Peak torque, peak force F_p
The peak torque (for rotational movements) or the peak force (for linear movements) is the maximum force that a motor can generate for approximately one second. With HIWIN, it is at the end of the linear modulation range at peak current I_p and is significant especially during acceleration and braking.

Peak current I_p
(also see Chapter 1.3, I_p)
It is used for short-term generation of peak power. HIWIN defines peak current as follows: Iron-core motors have double the peak current $I_{p,}$ as Ip, coreless motors have three times the permitted continuous current as Ip. The maximum permitted length of peak current is one second. Thereafter, the motor must cool down to the nominal temperature before peak current can be supplied again.

Stiffness
This corresponds to the mechanical deformation resistance that a component or assembly has against a static external load in a steady-state, static state (static stiffness) or the elastic deformation resistance that a component or assembly has against a dynamic force working from the outside (dynamic stiffness).

Wobbling
This is the angle deviation in the rotation axis from rotary tables during rotational movements, i.e. tipping of the surface of a rotary table. The causes are mainly tolerances in the bearing.

Winding resistance R_{25}
This is the winding-specific dimension that is produced by the winding resistance at 25 °C winding temperature . At 80 °C winding temperature, the winding resistance increases to approximately 1.2 x $R_{25.}$

Winding temperature T_{max}
(also see Chapter 1.3, T)
This is the permitted winding temperature. The actual motor temperature is dependent on the installation, cooling and operating conditions and consequently can only be determined in an actual case and cannot be calculated.

Repeatability
This may not be confused with absolute preciseness. A linear axis can have slight preciseness, but high repeatability. The uni-directional repeatability is measured when there is movement to a target position from an appropriately large stroke in the same direction several times; doing this the other way around does not work. In the measurement of bi-direction repeatability, there is movement to a target position is driven from different movement directions; doing this the other way around does not work.

1.3 Typical Parameters

1.3.1 Winding-Independent Dimensions

F_a Relative constant force between primary and secondary part (magnetic basis) that must be handled by a mechanical guide

F_c Motor power, which is available in nominal operation as continuous force and which results in warming to 70–80 °C

F_p Motor power that can be generated for a short time, which is reached at I_p at the end of the linear modulation range and results in substantial heating up when there is no cooling.

K_m Motor constant, which expresses the ratio of generated power and dissipation power and consequently the degree of effectiveness.

P_v The heat output created in the motor winding, which results in a time-dependent temperature rise dependent on the operating mode (current) and the ambient conditions (cooling) In the upper control P_v is especially high in the upper modulation range (at I_p) due to the quadratic dependency of current, while only relatively slight warming occurs in the range of the nominal current. P_v is calculated using the motor constant K_m for a movement section with the required force F: $P_v = F/K_m^2$

P_{vp} Peak dissipation power at I_p

P_c Dissipation power at I_c

T Permissible winding temperature, which is recorded by sensors or thermal circuit breakers; the created motor surface temperature is dependent on

- the actual installation conditions (table size)
- the heat dissipation conditions (cooling)
- the operating mode and consequently the mean performance entry

can only be determined if these variables are known.

1.3.2 Winding-Dependent Dimensions

I_c For generating the current connected for continuous force

I_p For short-term generation of the peak force of connected peak current

K_f Winding dimension, which produces the created force with the current: $F = I \times K_f$

K_u Winding dimension, which results dependent on the speed created in the motor terminals- in generator operation: $U_g = K_u \times v$

R_{25} Winding resistance at 25 °C; this increases to approx. 1.2 times the value at 80 °C.

HIWIN®
Linear Technology

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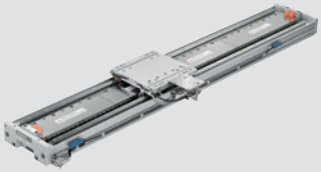
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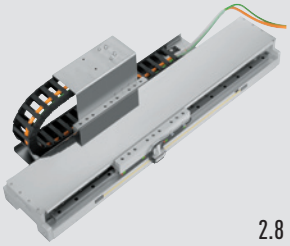
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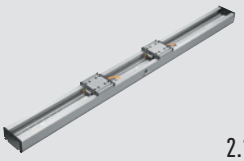
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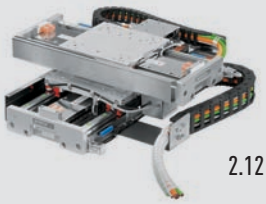
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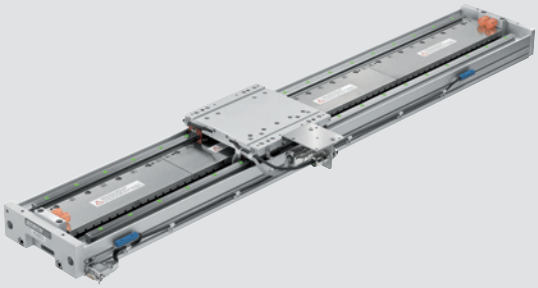
Positioning Systems
Linear Motor Axis

2. Linear Motor Axis

2.1 Product Overview



LMX1E Page 17

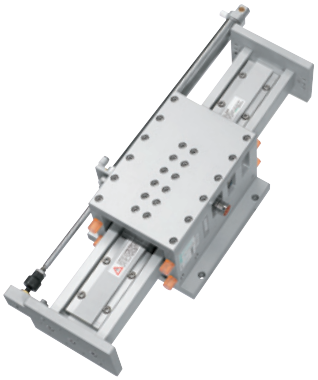
- Complete axis with coreless motor, type LMC
- Ideal for applications with a high degree of synchronization requirements
- Optional enclosure by metal cover or bellow cover
- Also for use as a cross table
- Stroke is measured via optical distance measuring system incrementally or absolutely
- Total length up to 4000 mm

LMX1L-S Page 24

- Complete axis with iron-core motor, type LMS
- Ideal for applications with high continuous power requirements
- Optional enclosure by metal cover or bellow cover
- Also for use as a cross table
- Stroke is measured via optical or magnetic distance measuring system incrementally or absolutely depending on requirements
- Total length up to 4000 mm

LMX1L-T Page 38

- Complete axis with iron-core motor, type LMT
- Sandwich design makes high power density possible without static load of the guideways by attraction forces
- Optional enclosure by metal cover or bellow cover
- Stroke is measured via optical or magnetic distance measuring system incremental or absolutely depending on requirements
- Total length up to 4000 mm



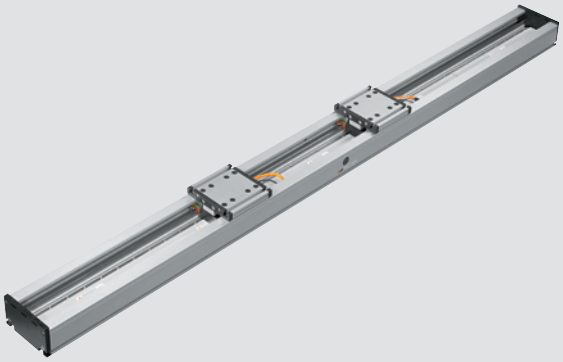
LMV1L Page 40

- Complete axis with iron-core motor, type LMS
- Use as a vertical axis
- For applications with gripper connection
- Stroke is measured via optical or magnetic distance measuring system incrementally or absolutely depending on requirements

LMH1L

Page 42

- Complete axis with iron-core motor, type LMS
- Stroke is measured incrementally via magnetic encoders
- Ideal for applications with long stroke (up to 30 m)
- Enclosure possible



Cross Tables

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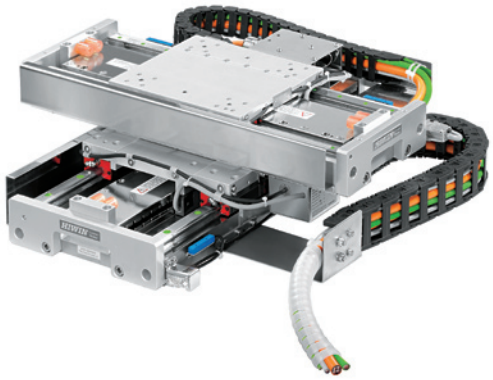
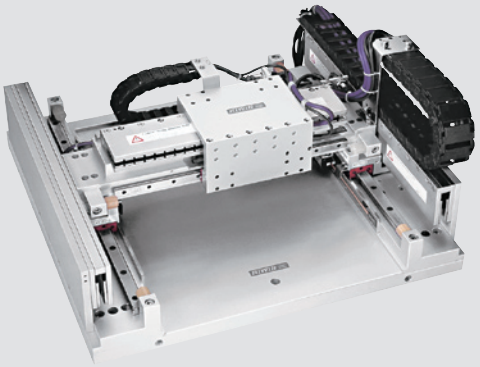
- Combination of axis from the LMX series
- With coreless or iron-core motors



Gantry Systems

Page 48

- Standardized gantry systems with coreless motors or iron-core motors



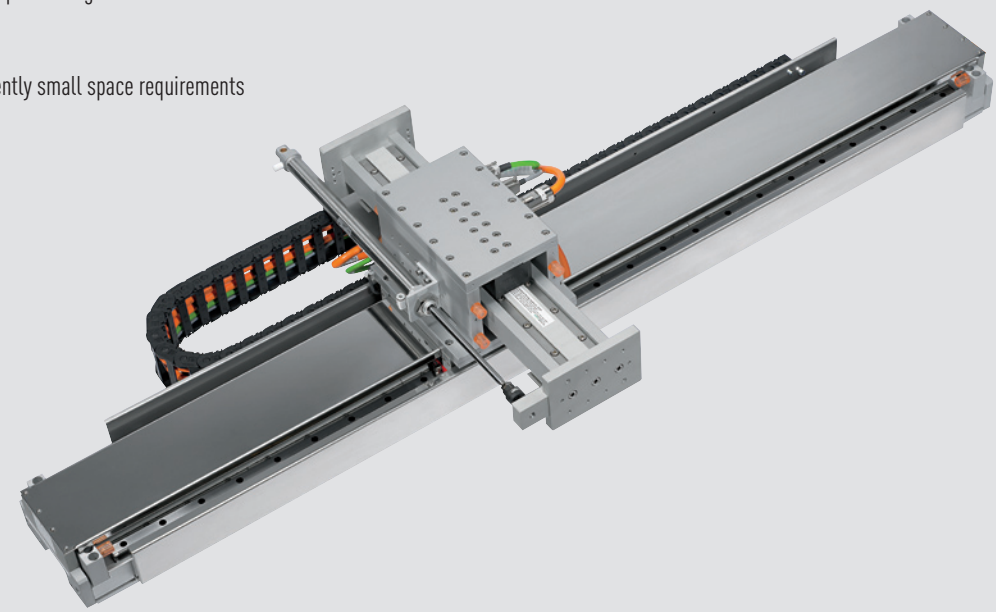
Positioning Systems
Linear Motor Axis

2.2 Typical Properties of Linear Motor Axis

HIWIN linear motor axis are directly driven axis with linear motors, which are designed as a plug and play solution. Standardized energy chains and customized cable guides are available as an option. These are suspended complete axis with distance measuring system, linear guideways, limit switches and optionally with covers as protection against environmental influences. A clamping device can be built in optionally.

Due to the direct drive, the linear axis are free from backlash, very dynamic, low maintenance and can also be equipped with several forcers. The linear axis are supplied as a complete solution including drive amplifier on request. Customers can choose the drive manufacturer of their wish. We supply the required electronic parameters for adaptation of the linear motors.

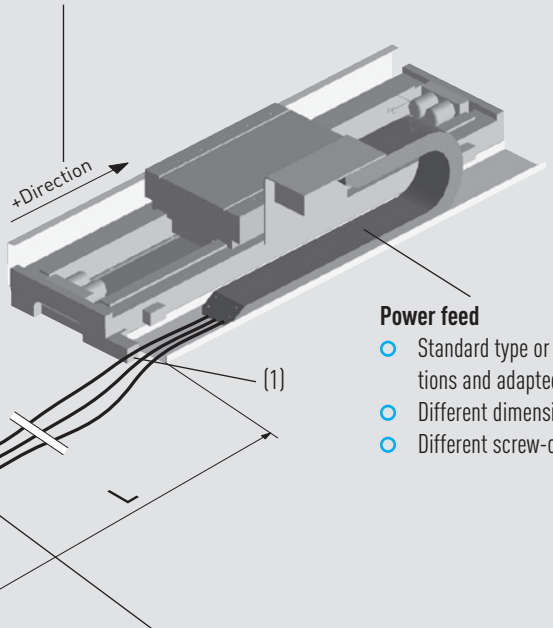
- Several forcers per axis
- Can be combined with other axis
- No realignment
- Low maintenance
- Long operating life and high reliability
- Extremely precise and fast positioning
- Smooth running
- High stroke speed
- Compact design, consequently small space requirements
- Optimum accuracy



2.3 Scope of Delivery

Positive (+) movement direction
The movement direction is defined via the position of the reference switch. As a standard, it is on the same side as the limit switch plug (1).

Drive amplifier
(see page 12)
The suitable drive amplifier is selected according to the customer's applications and parameterized in line with the linear motor axis to be supplied.
This ensures the dynamic running properties of the respective linear motor axis.



Power feed
- Standard type or designed to customer-specifications and adapted to local conditions
- Different dimensions for additional cables possible
- Different screw-on positions possible

Possible interfaces
- Profibus
- CAN-Open
- Sercos
- Serial via RS232
- 10 V analog
- Step/Direction
- Others on request

Three cables:
- Output cable
- Encoder cable
- Limit switch cable

Standard lengths each L = 2 m, optional to L_{max} = 10 m from the end of the cable chain possible; the cables are certified according to CE and UL regulations.

Standard linear motor axis
Different types: see pages 17–50

Positioning Systems
Linear Motor Axis

2.4 Drive Amplifier for Linear Motor Axis

HIWIN selects the drive amplifier suitable for the respective application or according to customer request.

Our system partners for drive amplifiers include:

LUST

SIEB & MEYER

BECKHOFF
New Automation Technology

CONTROL TECHNIQUES
www.controltechniques.de

ACS Tech80
REDEFINING MOTION CONTROL

Parker

DANAHER MOTION

manz automation

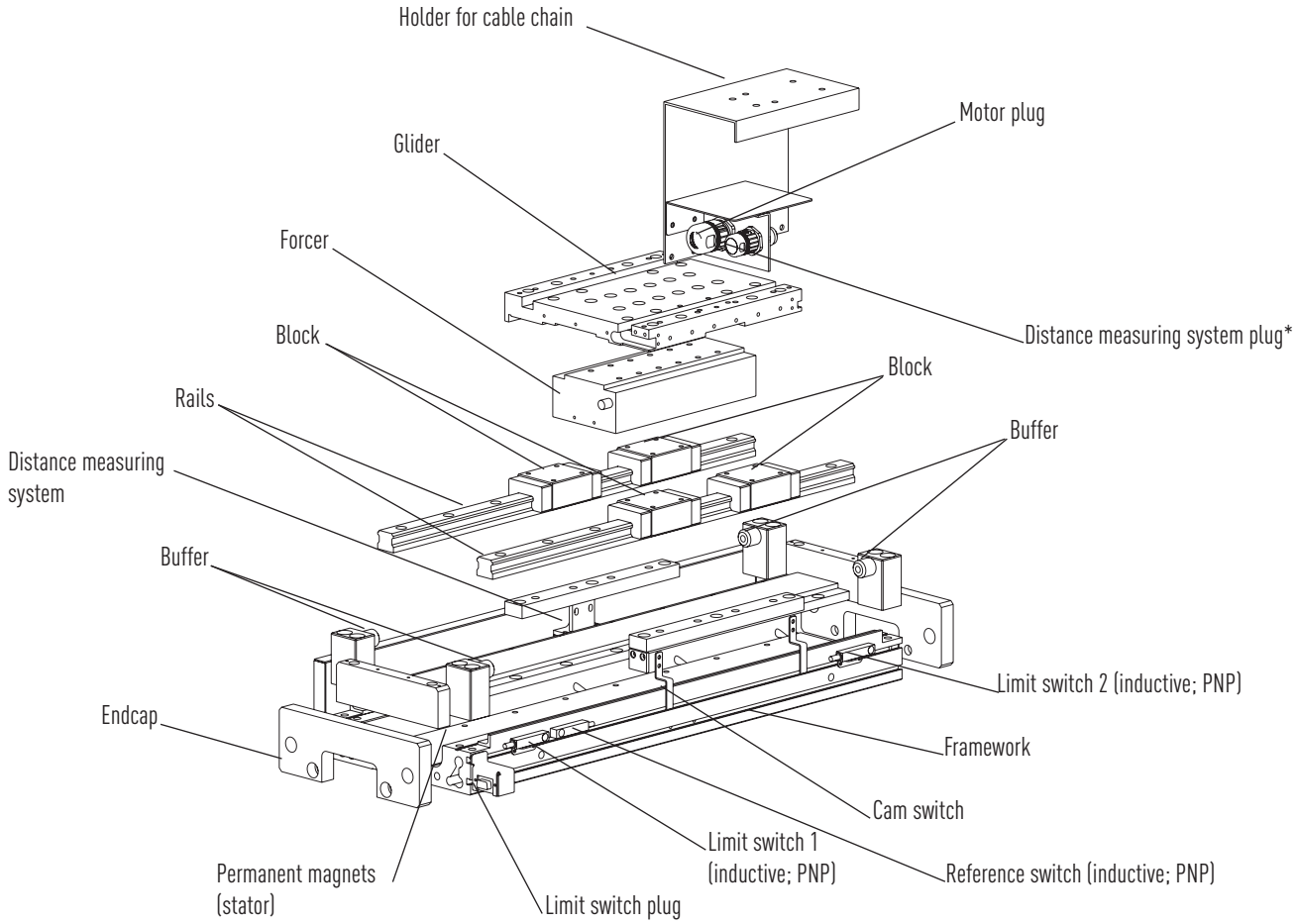
Perfection in Automation
www.br-automation.com

Rexroth
Bosch Group

Copley Controls Corp.

Jetter
Automation. Made easy.

2.5 System Configuration



* Connectors and cables supplied by the customer must be configured in line with HIWIN specifications provided in the instruction manual

General Specifications for Linear Motor Axis

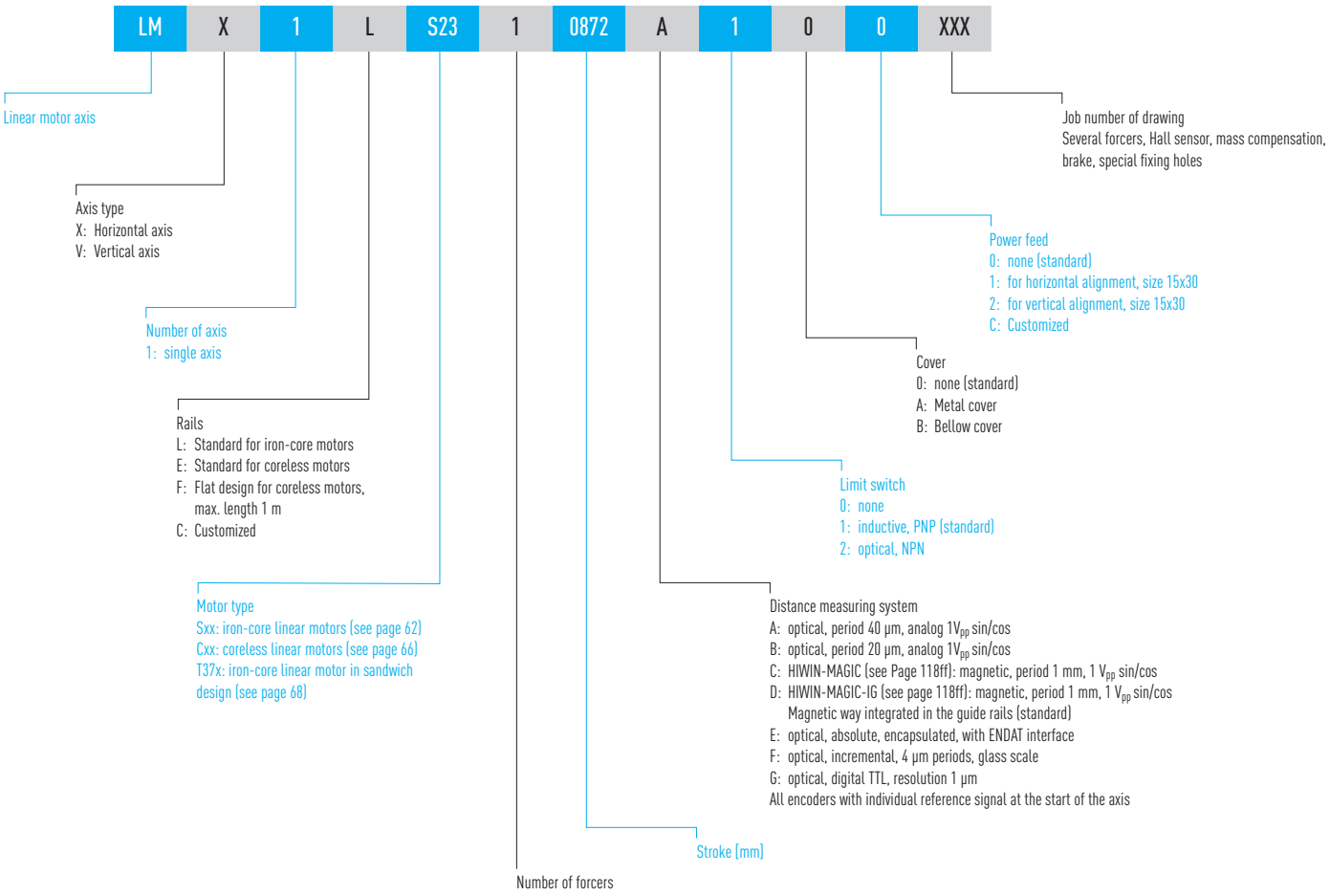
Name	Motor type	v_{max} [m/s]	a_{max} [m/s²]	Total length L_{max} [mm]	Repeatability [mm]	Accuracy [mm/300 mm]	Straightness [mm/300 mm]	Levelness [mm/300 mm]	Page
LMX1E- ...	LMC	5	100***	4000	+/- 0,001*	+/- 0,005*	+/- 0,01	+/- 0,01	17
LMX1L-S ...	LMS	4	50***	4000	+/- 0,001*	+/- 0,005*	+/- 0,01	+/- 0,01	24
LMX1L-T ...	LMT	4	50	4000	+/- 0,001*	+/- 0,005*	+/- 0,01	+/- 0,01	38
LMV1L- ...	LMS	1,8	30	600	+/- 0,001*	+/- 0,005*	+/- 0,01	+/- 0,01	40
LMH1L- ...	LMS	4	50	30000	+/- 0,02**	+/- 0,05**	+/- 0,03	+/- 0,03	42

* Values apply to the optical incremental distance measuring system with 40 µm periods of the sin/cos signal.
** Values apply to the HIWIN-MAGIC optical incremental distance measuring system with a sinus/cosinus signal (see page 117 onwards).
*** If bellow covers are used, the maximum acceleration could be restricted.

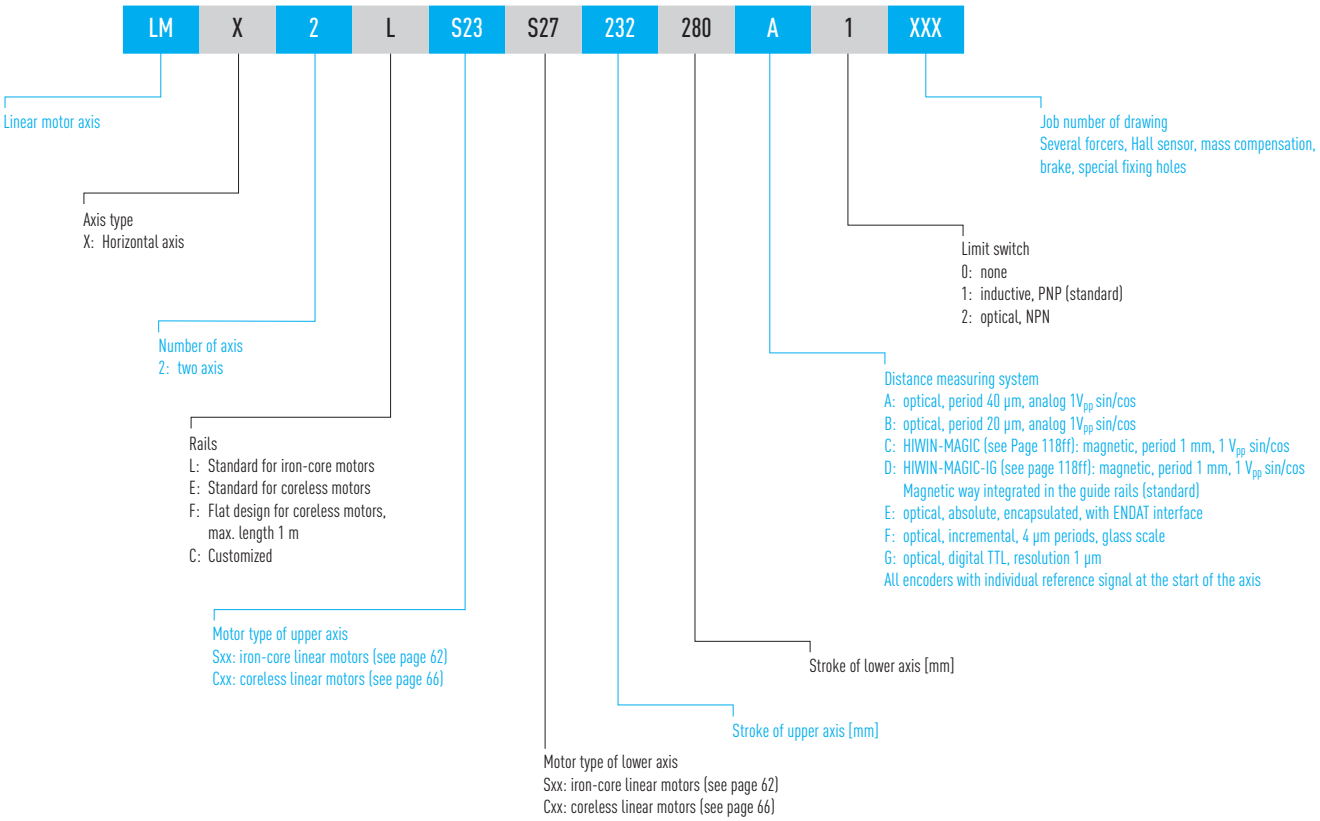
The distance measuring system is optical or magnetic, depending on the linear axis type or the customer's requirement. As standard, sin/cos 1 V_{pp} is processed as an output signal; a TTL signal is also possible (see page 118 ff).
The maximum operating voltage depends on the linear motor type in use. For motor types LMS and LMT (iron-core motors), the maximum permissible operating voltage is AC 530 V. For the LMC motor series (coreless motors), the maximum operating voltage is AC 240 V.

2.6 Model Numbers for Linear Motor Axis

2.6.1 Model Numbers for Single Linear Motor Axis

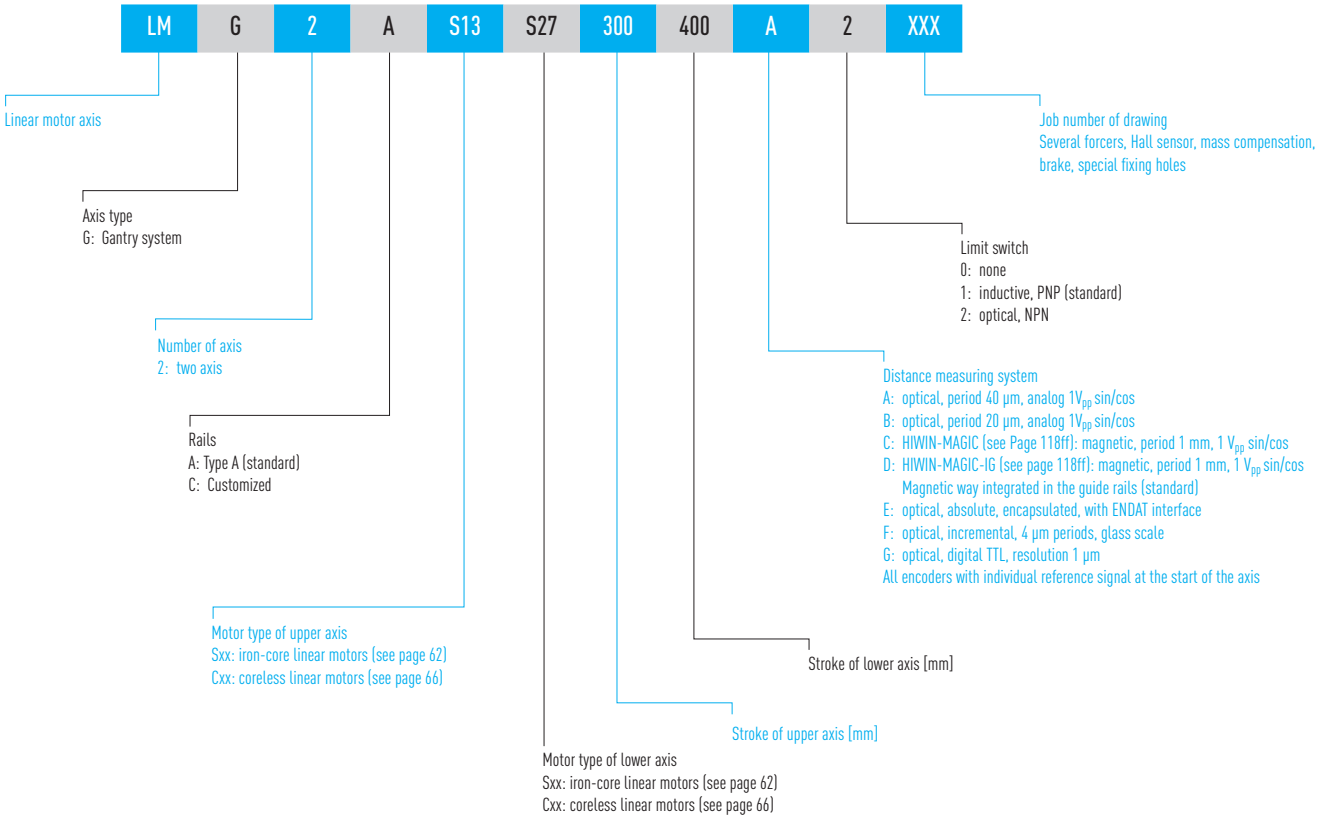


2.6.2 Model Numbers for Cross Tables



Positioning Systems
Linear Motor Axis

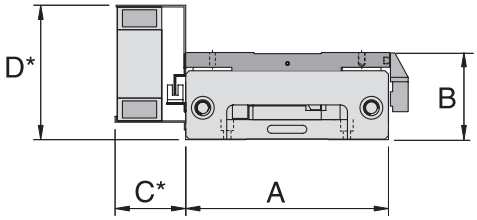
2.6.3 Model Numbers for Gantry Systems



2.7 LMX1E Linear Motor Axis

LMX1E linear motor axis are equipped with a coreless motor and are well suited for applications with a high degree of synchronous operational requirements. They can also be used in cross tables. They are distinguished by their very flat design. The stroke is measured incrementally or absolutely via optical encoders. The LMX1E linear motor axis have very high dynamics and are available in overall lengths up to 4,000 mm.

- Max. acceleration 100 m/s^2
- Max. speed 5 m/s
- Up to 4,000 mm long



*Dimensions C and D are customer-specific

Specifications for LMX1E Linear Motor Axis

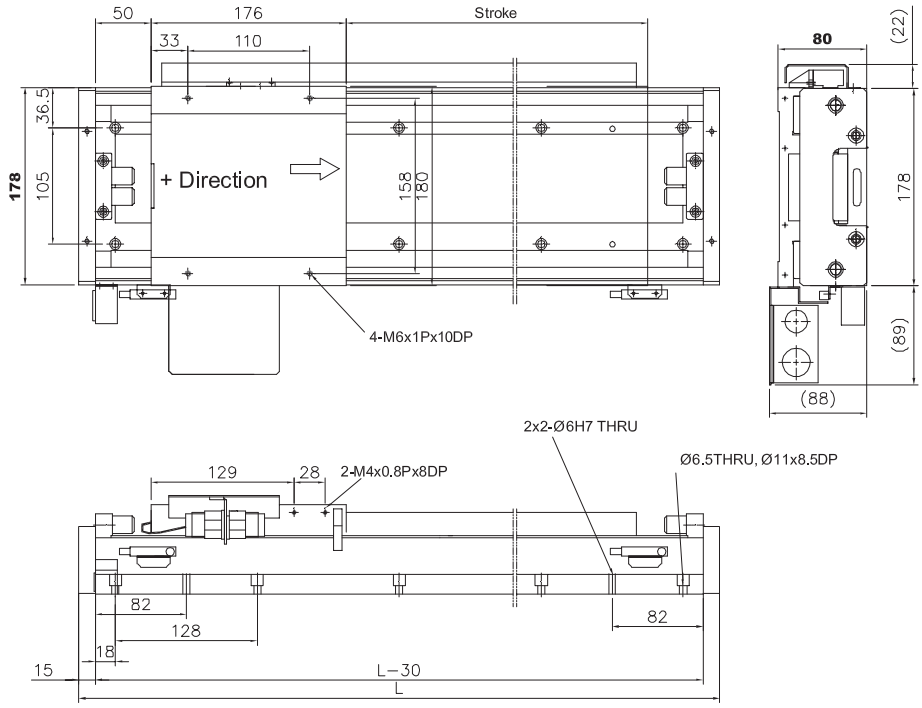
Name (Model number) xxxx = Stroke [mm]	Motor type	F_c [N]	F_p [N]	Mass of glider [kg]	Length of glider [mm]	v_{max} [m/s]	a_{max} [m/s^2]	Dimension A [mm]	Dimension B [mm]
LMX1E-CB5-1-xxxx-A100	LMC B5	90	270	2	178	5	100	178	80
LMX1E-CB6-1-xxxx-A100	LMC B6	110	330	3	208	5	100	178	80
LMX1E-CB8-1-xxxx-A100	LMC B8	145	435	4,2	272	5	100	178	80
LMX1E-CB5-1-xxxx-A1A0	LMC B5	90	270	2,3	178	5	100	178	92/101*
LMX1E-CB6-1-xxxx-A1A0	LMC B6	110	330	3,3	208	5	100	178	92/101*
LMX1E-CB8-1-xxxx-A1A0	LMC B8	145	435	4,5	272	5	100	178	92/101*

Notes: F_c = Continuous power, 100% operating time (ED) at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 66
* See Dimensional Tables on pages 18-23

2.7.1 LMX1E without Cover

Dimensions and Mass of the LMX1E-CB5 Axis without Cover

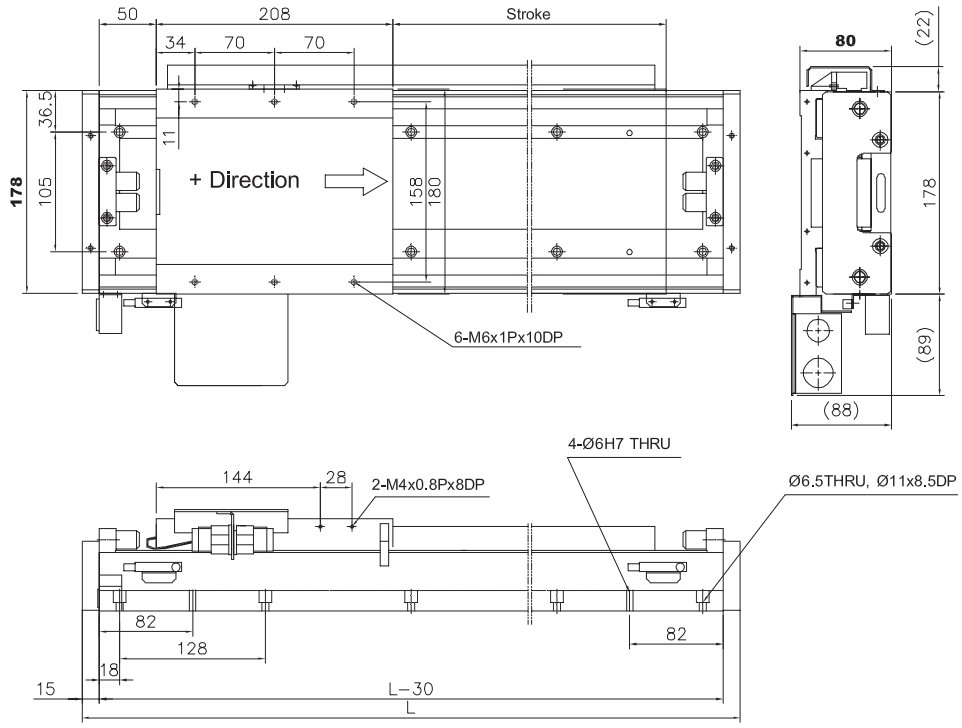
All values in mm



Stroke [mm]	144	272	400	528	656	784	912	1040	1296	1552	1808
Total length L [mm]	450	578	706	834	962	1090	1218	1346	1602	1858	2114
Mass [kg]	19	22,5	26	30	33	36,5	40,5	44	51	58,5	66

Dimensions and Mass of the LMX1E-CB6 Axis without Cover

All values in mm

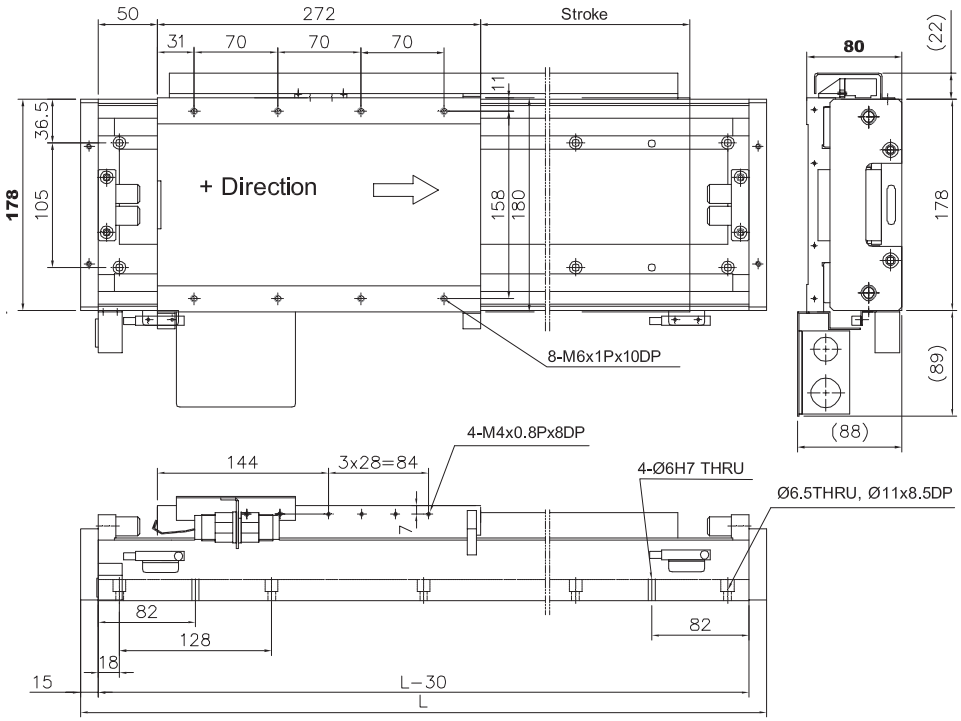


Stroke [mm]	112	240	368	496	624	752	880	1008	1264	1520	1776
Total length L [mm]	450	578	706	834	962	1090	1218	1346	1602	1858	2114
Mass [kg]	19,3	23	26,6	30,2	33,9	37,5	41,2	44,8	52,1	59,4	66,6

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1E-CB8 Axis without Cover

All values in mm
h = H – 80

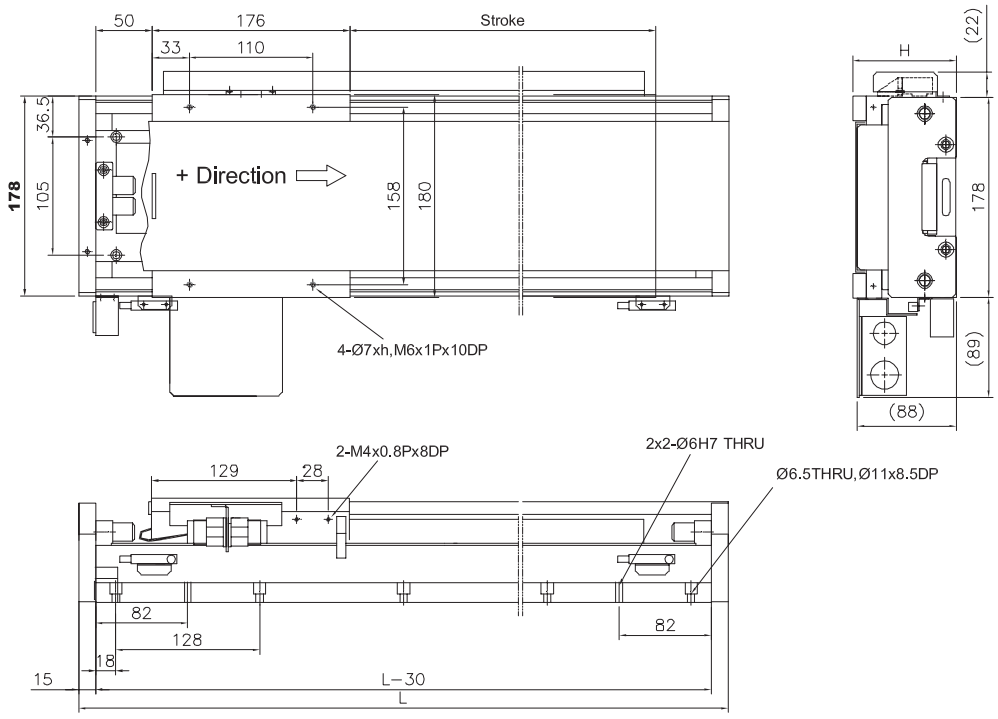


Stroke [mm]	176	304	432	560	688	816	944	1200	1456	1712
Total length L [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114
Mass [kg]	24,5	28,1	31,7	35,4	39	42,7	46,3	53,6	60,8	68,1

2.7.2 LMX1E with Cover

Dimensions and Mass of the LMX1E-CB5 Axis with Cover

All values in mm
h = H – 80



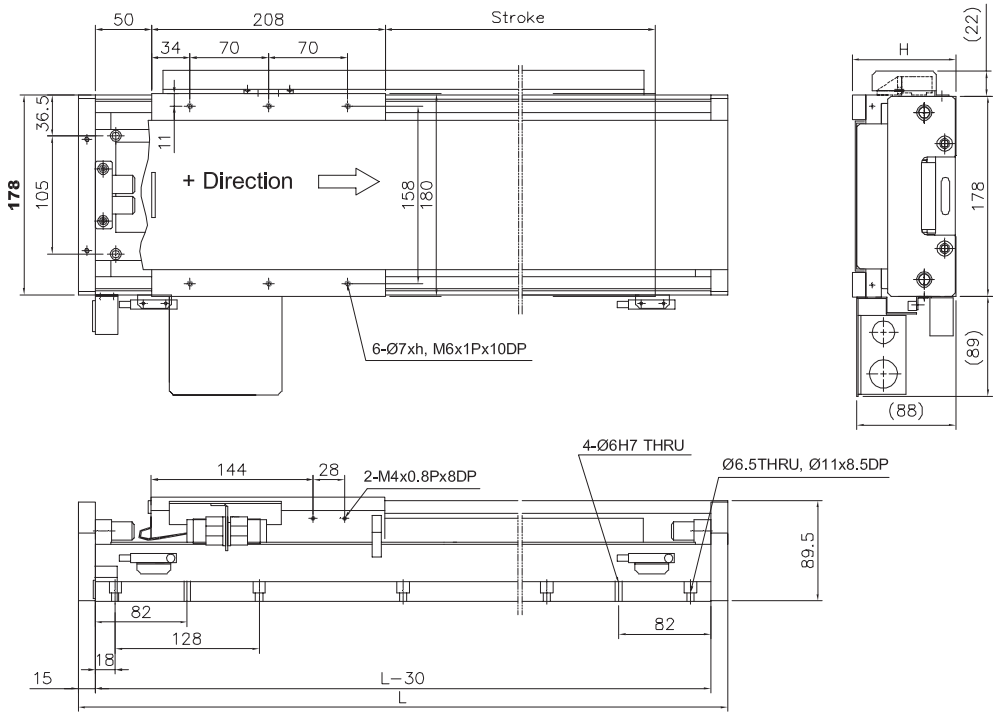
L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	144	272	400	528	656	784	912	1040	1296	1552	1808
Total length L_1 [mm]	450	578	706	834	962	1090	1218	1346	1602	1858	2114
Total length L_2 [mm]	458	660	860	1060	1259	1460	1660	1859	2260	2659	3060
H [mm]	92	92	92	92	92	92	92	92	101	101	101
Mass [kg]	20,3	24,3	28	32	36	40	44	48	56	64	71,7

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1E-CB6 Axis with Cover

All values in mm
h = H – 80

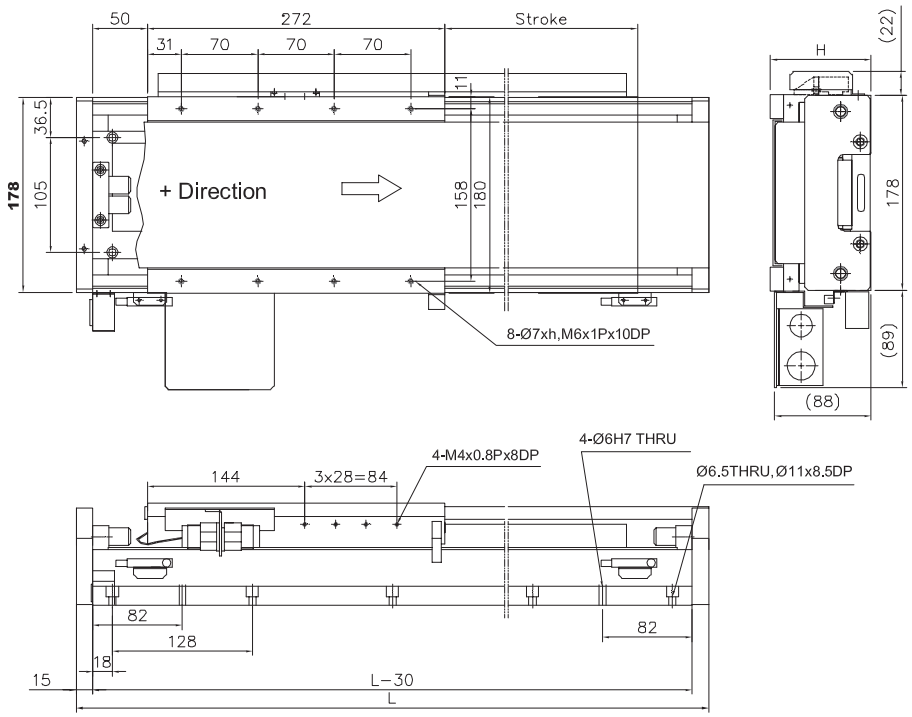


L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	112	240	368	496	624	752	880	1008	1264	1520	1776
Total length L_1 [mm]	450	578	706	834	962	1090	1218	1346	1602	1858	2114
Total length L_2 [mm]	442	642	841	1041	1242	1442	1641	1842	2241	2642	3041
H [mm]	92	92	92	92	92	92	92	92	101	101	101
Mass [kg]	21	25	28,9	32,8	36,8	40,7	44,7	48,7	56,6	64,5	72,4

Dimensions and Mass of the LMX1E-CB8 Axis with Cover

All values in mm
h = H – 80



L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

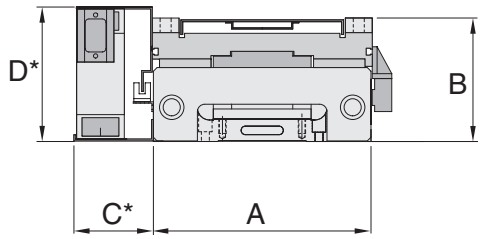
Verfahrweg [mm]	176	304	432	560	688	816	944	1200	1456	1712
Gesamtlänge L_1 [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114
Gesamtlänge L_2 [mm]	606	806	1005	1205	1406	1605	1805	2206	2606	3005
H [mm]	92	92	92	92	92	92	92	101	101	101
Gewicht [kg]	26,4	30,4	34,3	38,3	42,2	46,2	50,2	58	66	74

Positioning Systems
Linear Motor Axis

2.8 LMX1L-S Linear Motor Axis

LMX1L linear motor axis are equipped with an iron-core motor, which provides substantial continuous force. They can also be used in cross tables. The stroke is measured via the optical or magnetic distance measuring systems incrementally or absolutely. The LMX1L-S linear motor axis have a very compact design and are available in overall lengths up to 4,000 mm.

- Max. acceleration 50 m/s^2
- Max. speed 4 m/s
- Up to 4,000 mm long



*Dimensions C and D are customer-specific

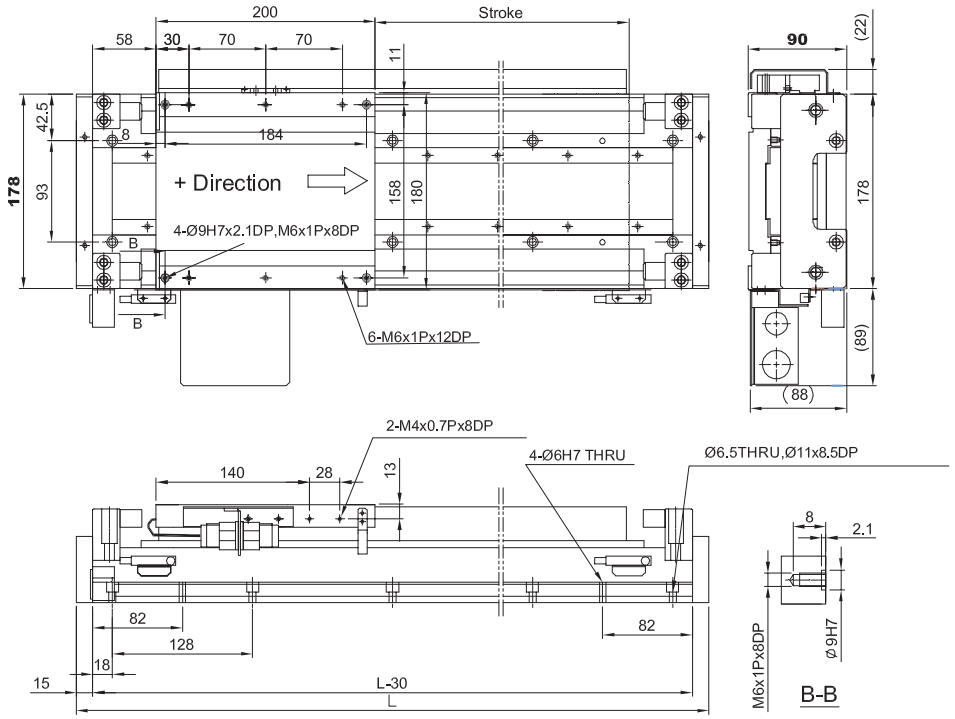
Name (Model number) xxxx = stroke [mm]	Motor type	F_c [N]	F_p [N]	Mass of Glider [kg]	Length of glider [mm]	v_{max} [m/s]	a_{max} [m/s^2]	Dimension A [mm]	Dimension B [mm]
LMX1L-S23-1-xxxx-A100	LMS 23	220	600	7,5	200	4	50	178	90
LMX1L-S27-1-xxxx-A100	LMS 27	340	900	9,5	280	4	50	178	90
LMX1L-S37-1-xxxx-A100	LMS 37	475	1250	12	280	3,5*	50	202	95
LMX1L-S37L-1-xxxx-A100	LMS 37L	475	1250	12	280	4	50	202	95
LMX1L-S47-1-xxxx-A100	LMS 47	650	1700	18	280	2,5*	50	232	95
LMX1L-S47L-1-xxxx-A100	LMS 47L	650	1700	18	280	4	50	232	95
LMX1L-S57-1-xxxx-A100	LMS 57	780	2000	22	280	2*	50	252	100
LMX1L-S57L-1-xxxx-A100	LMS 57L	780	2000	22	280	4	50	252	100
LMX1L-S67-1-xxxx-A100	LMS 67	950	2500	26	280	2*	50	272	100
LMX1L-S67L-1-xxxx-A100	LMS 67L	950	2500	26	280	4	50	272	100
LMX1L-S23-1-xxxx-A1A0	LMS 23	220	600	7,8	200	4	50	178	102/111
LMX1L-S27-1-xxxx-A1A0	LMS 27	340	900	9,9	280	4	50	178	102/111
LMX1L-S37-1-xxxx-A1A0	LMS 37	475	1250	12,5	280	3,5*	50	202	107/116
LMX1L-S37L-1-xxxx-A1A0	LMS 37L	475	1250	12,5	280	4	50	202	107/116
LMX1L-S47-1-xxxx-A1A0	LMS 47	650	1700	18,8	280	2,5*	50	232	107/116
LMX1L-S47L-1-xxxx-A1A0	LMS 47L	650	1700	18,8	280	4	50	232	107/116
LMX1L-S57-1-xxxx-A1A0	LMS 57	780	2000	23	280	2*	50	252	112/121
LMX1L-S57L-1-xxxx-A1A0	LMS 57L	780	2000	23	280	4	50	252	112/121
LMX1L-S67-1-xxxx-A1A0	LMS 67	950	2500	27	280	2*	50	272	112/121
LMX1L-S67L-1-xxxx-A1A0	LMS 67L	950	2500	27	280	4	50	272	112/121

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters of LMS linear motors: see page 62ff
* Limited by back-EMF of the motor winding

2.8.1 LMX1L-S Linear Motor Axis without Cover

Dimensions and Mass of the LMX1L-S23 Linear Axis without Cover

All values in mm

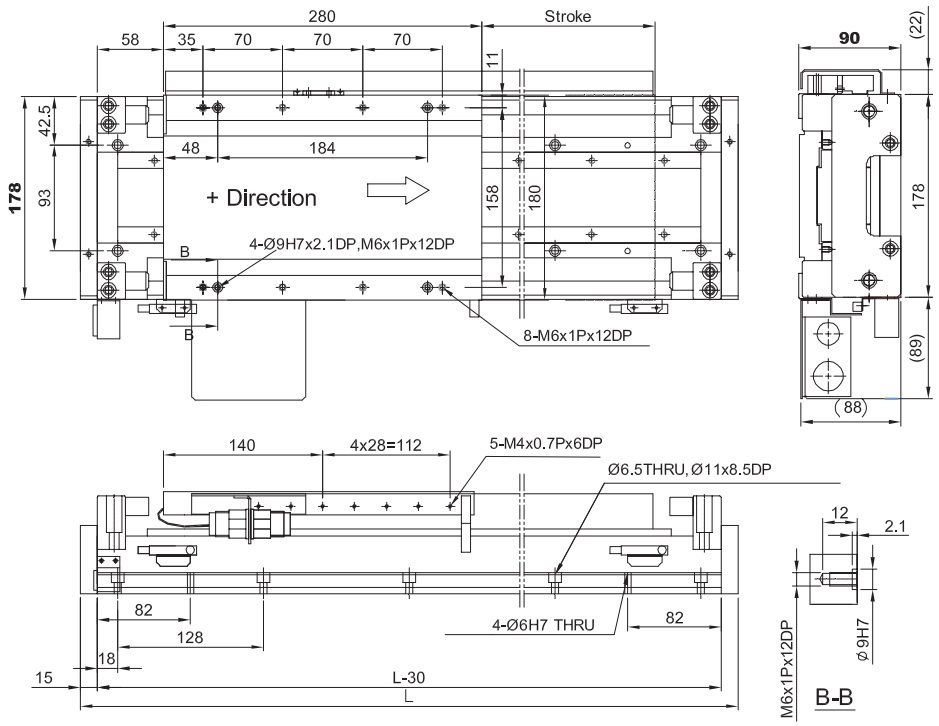


Stroke [mm]	104	232	360	488	616	744	872	1000	1256	1512	1768	2024
Total length L [mm]	450	578	706	834	962	1090	1218	1346	1602	1858	2114	2370
Mass [kg]	21,0	23,5	27,0	31,0	34,0	37,0	40,0	43,0	50,0	56,0	62,0	68,0

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1L-S27 Linear Axis without Cover

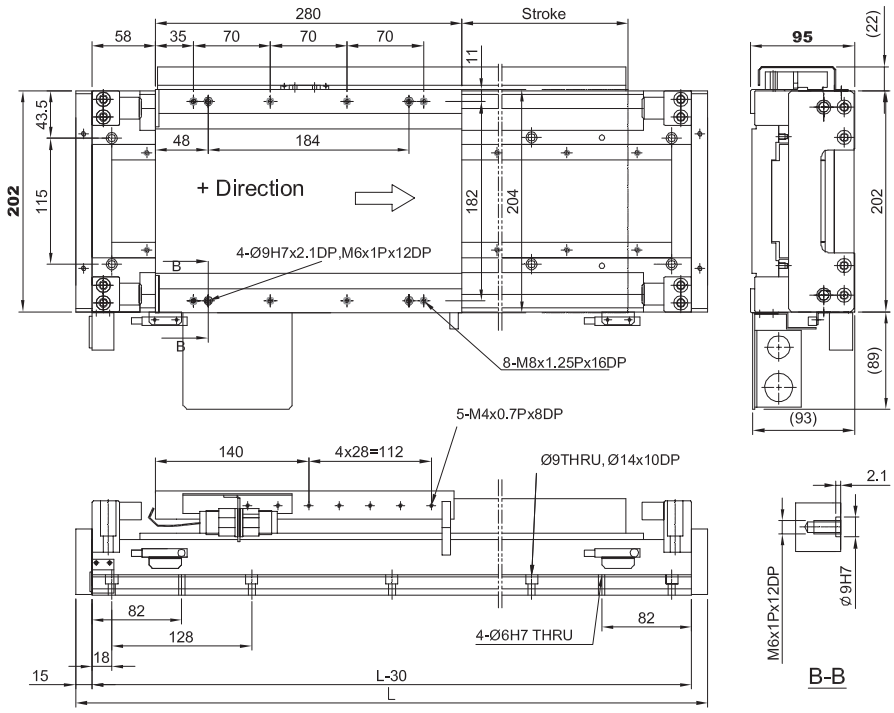
All values in mm



Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Mass [kg]	27,0	30,0	33,5	37,0	40,0	43,5	46,5	52,0	58,0	64,0	70,0	76,0

Dimensions and Mass of the LMX1L-S37 and LMX1L-S37L Linear Axis without Cover

All values in mm

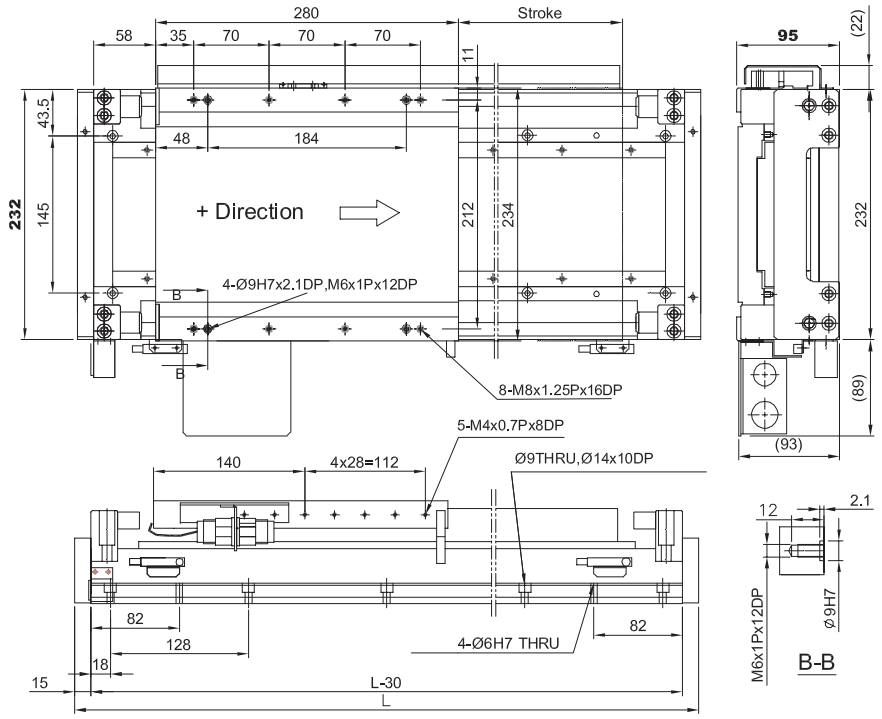


Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Mass [kg]	33	36	40	43	47	50	54	62	70	78	86	94

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1L-S47 and LMX1L-S47L Linear Axis without Cover

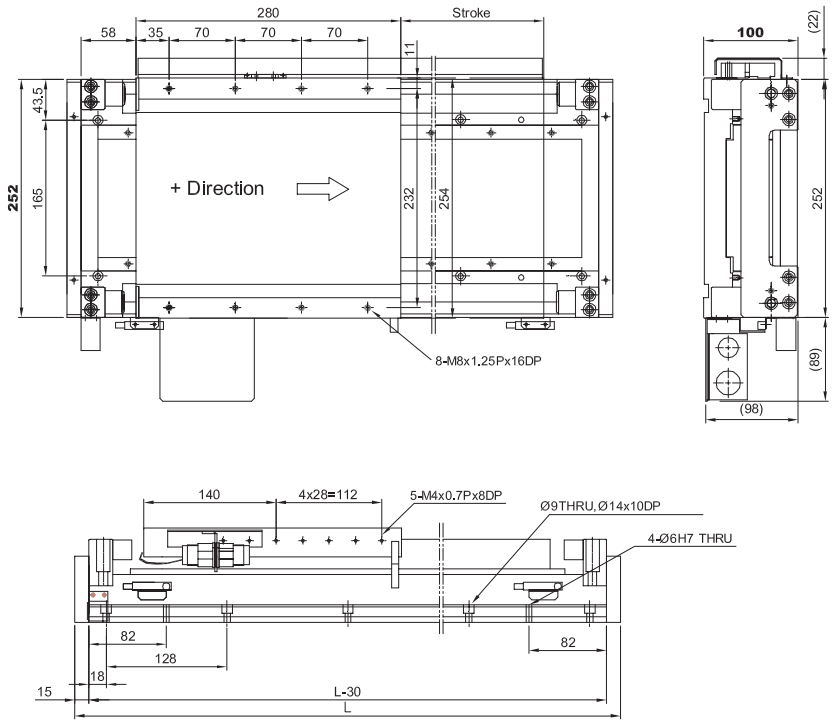
All values in mm



Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Mass [kg]	38	41	46	50	55	58	63	71	80	88	96	105

Dimensions and Mass of the LMX1L-S57 and LMX1L-S57L Linear Axis without Cover

All values in mm

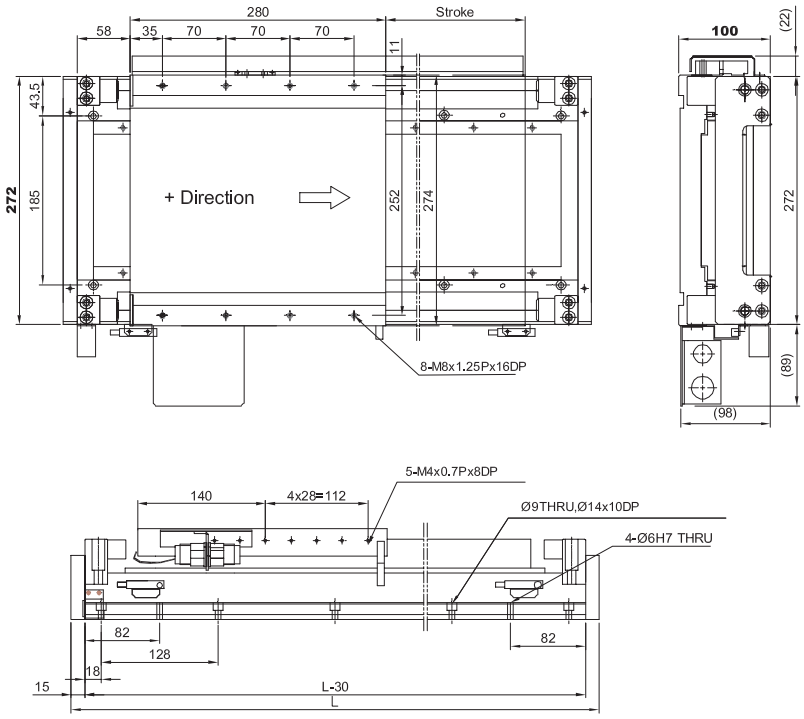


Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Mass [kg]	47	51	57	63	69	73	80	90	100	110	120	130

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1L-S67 and LMX1L-S67L Linear Axis without Cover

All values in mm

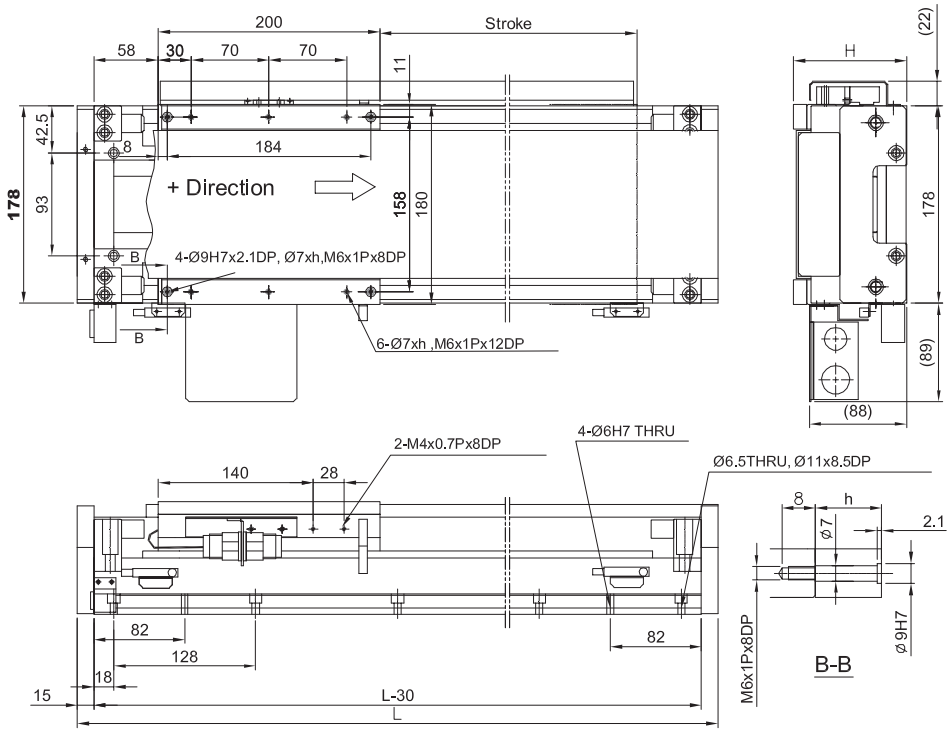


Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Mass [kg]	50	55	61	68	74	78	86	97	107	118	129	140

2.8.2 LMX1L-S linear motor axis with cover

Dimensions and Mass of the LMX1L-S23 Linear Motor Axis with Cover

All values in mm
h = H - 90



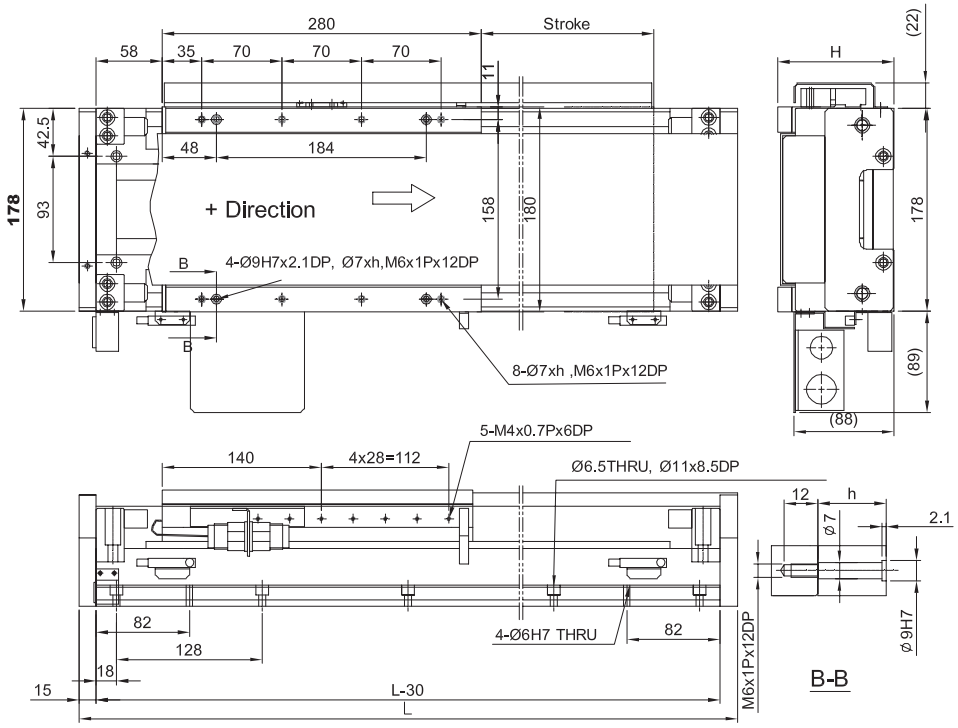
L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	104	232	360	488	616	744	872	1000	1256	1512	1768	2024
Total length L_1 [mm]	450	578	706	834	962	1090	1218	1346	1602	1858	2114	2370
Total length L_2 [mm]	421	621	821	1021	1222	1421	1621	1821	2221	2622	3021	3421
H [mm]	102	102	102	102	102	102	102	102	111	111	111	111
Mass [kg]	23,0	26,0	29,5	34,0	37,0	40,0	43,5	46,5	54,0	60,5	67,0	74,0

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1L-S27 Linear Motor Axis with Cover

All values in mm
h = H - 90

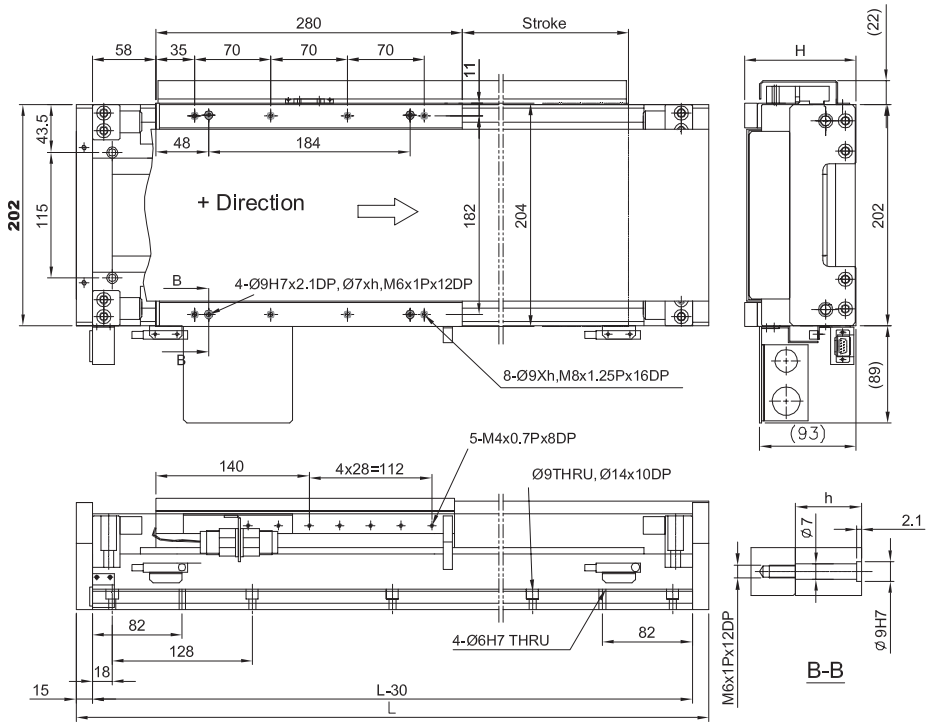


L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L_1 [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Total length L_2 [mm]	576	775	976	1176	1376	1576	1776	2177	2576	2976	3376	3776
H [mm]	102	102	102	102	102	102	102	111	111	111	111	111
Mass [kg]	29,5	32,5	36,0	40,0	43,0	47,0	50,0	56,0	62,5	69,0	75,5	82,0

Dimensions and Mass of the LMX1L-S37 and LMX1L-S37L Linear Motor Axis with Cover

All values in mm
h = H - 95



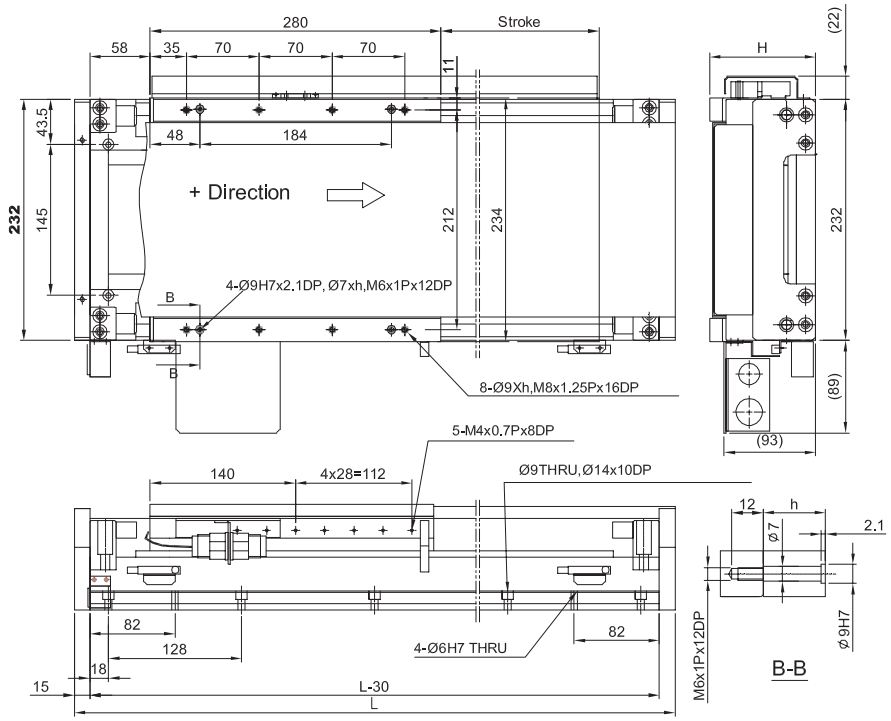
L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L_1 [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Total length L_2 [mm]	576	775	976	1176	1376	1576	1776	2177	2576	2976	3376	3776
H [mm]	107	107	107	107	107	107	107	116	116	116	116	116
Mass [kg]	36	40	44	47	51	55	59	68	76	85	94	103

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1L-S47 and LMX1L-S47L Linear Motor Axis with Cover

All values in mm
h = H - 95

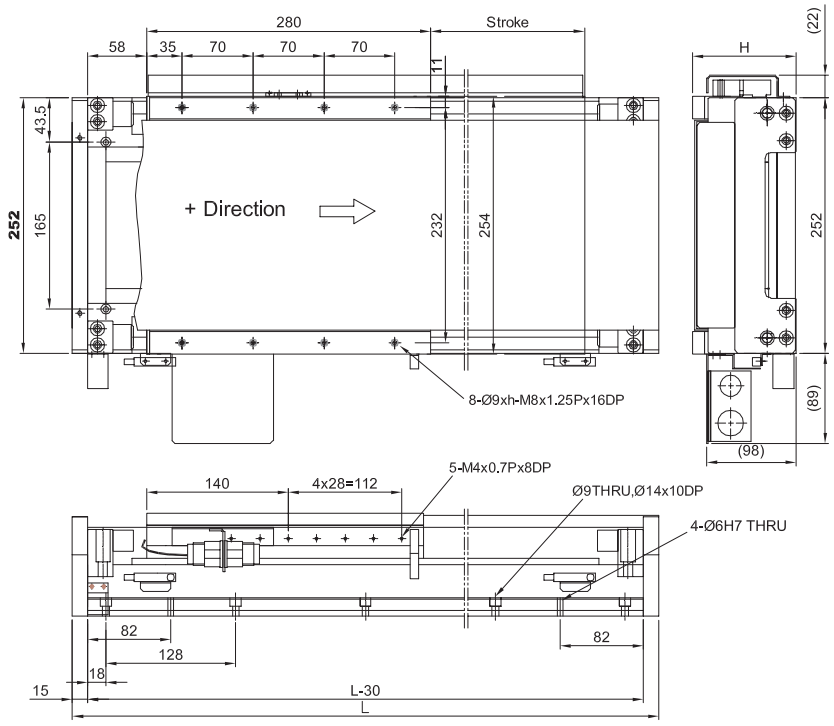


L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L_1 [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Total length L_2 [mm]	576	775	976	1176	1376	1576	1776	2177	2576	2976	3376	3776
H [mm]	107	107	107	107	107	107	107	116	116	116	116	116
Mass [kg]	42	45	50	55	60	63	69	78	87	96	105	114

Dimensions and Mass of the LMX1L-S57 and LMX1L-S57L Linear Motor Axis with Cover

All values in mm
h = H - 100

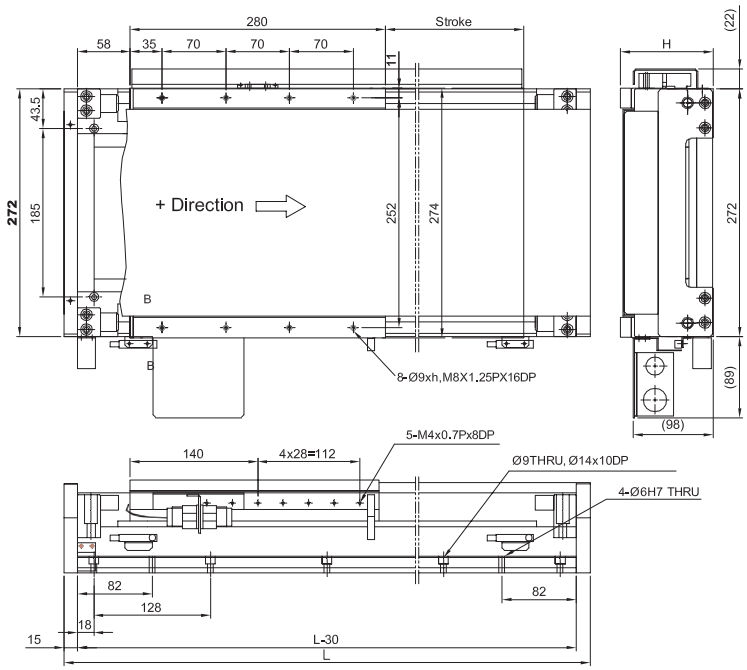


L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L_1 [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Total length L_2 [mm]	576	775	976	1176	1376	1576	1776	2177	2576	2976	3376	3776
H [mm]	112	112	112	112	112	112	112	121	121	121	121	121
Mass [kg]	48,5	53,0	59,0	65,5	72,0	76,0	73,5	94,0	104,0	114,5	125,0	135,5

Positioning Systems
Linear Motor Axis

Dimensions and Mass of the LMX1L-S67 and LMX1L-S67L Linear Motor Axis with Cover



All values in mm

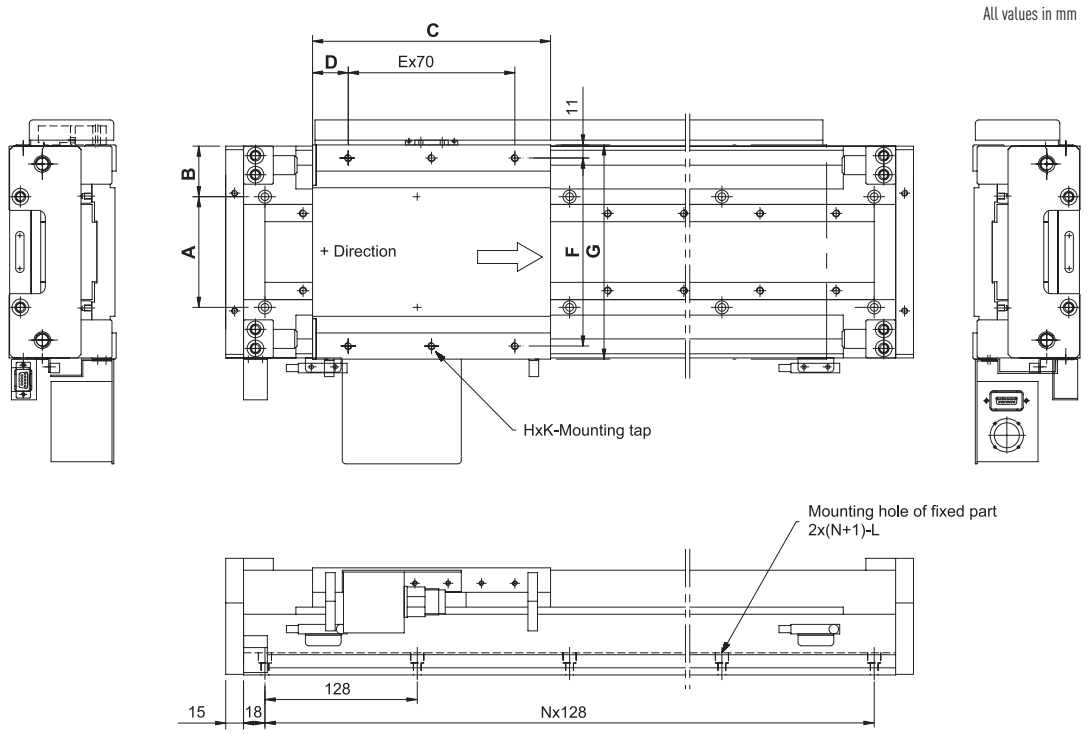
h = H - 100

L_1 = Total length with metal cover [mm]
L_2 = Total length with bellow cover [mm]

Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
Total length L_1 [mm]	578	706	834	962	1090	1218	1346	1602	1858	2114	2370	2626
Total length L_2 [mm]	576	775	976	1176	1376	1576	1776	2177	2576	2976	3376	3776
H [mm]	112	112	112	112	112	112	112	121	121	121	121	121
Mass [kg]	50	55	62	67	73	79	85	96	108	119	130	141

2.8.3 Installation Dimensions for LMX1L-S Linear Motor Axis

Connecting Dimensions for LMX1L-S Linear Motor Axis



Connecting Dimensions for LMX1L-S Linear Motor Axis, Values A-L

	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	K [mm]	L [mm]
LMX1L-S23	93	42,5	200	30	2	158	180	6	M6 x 1P/12 deep	Dia. 6.5/dg*, dia. 11/8.5 deep
LMX1L-S27	93	42,5	280	35	3	158	180	8	M6 x 1P/12 deep	Dia. 6.5/dg*, dia. 11/8.5 deep
LMX1L-S37	115	43,5	280	35	3	182	204	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep
LMX1L-S37L	115	43,5	280	35	3	182	204	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep
LMX1L-S47	145	43,5	280	35	3	212	234	8	M8 x 1.25P/15 deep	Ø 9/dg*, Ø 14/10 deep
LMX1L-S47L	145	43,5	280	35	3	212	234	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep
LMX1L-S57	165	43,5	280	35	3	232	254	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep
LMX1L-S57L	165	43,5	280	35	3	232	254	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep
LMX1L-S67	185	43,5	280	35	3	252	274	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep
LMX1L-S67L	185	43,5	280	35	3	252	274	8	M8 x 1.25P/15 deep	Dia. 9/dg*, dia. 14/10 deep

* dg = continuous

Connecting Dimensions for LMX1L-S Linear Motor Axis, Value N and Stroke

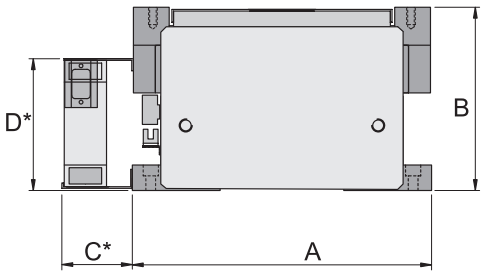
LMX1L-S23												
Stroke [mm]	104	232	360	488	616	744	872	1000	1256	1512	1768	2024
N	3	4	5	6	7	8	9	10	12	14	16	18
LMX1L-S27 (L) to -S67(L)												
Stroke [mm]	152	280	408	536	664	792	920	1176	1432	1688	1944	2200
N	4	5	6	7	8	9	10	12	14	16	18	20

Positioning Systems
Linear Motor Axis

2.9 LMX1L-T Linear Motor Axis

LMX1L-T linear motor axis are complete axis with iron-core motors. The attraction forces are cancelled thanks to the special design of the motor with arrangement of the forcer between two stators (sandwich construction). This relieves the load, especially on the linear guideways.

- Very high power density
- No attraction forces are created thanks to the sandwich construction of the motor, so that the guides are not subject to static loads
- An optical or magnetic encoder measures the stroke incrementally or absolutely
- Total length up to 4000 mm
- Max. acceleration 50 m/s^2
- Max. speed 4 m/s



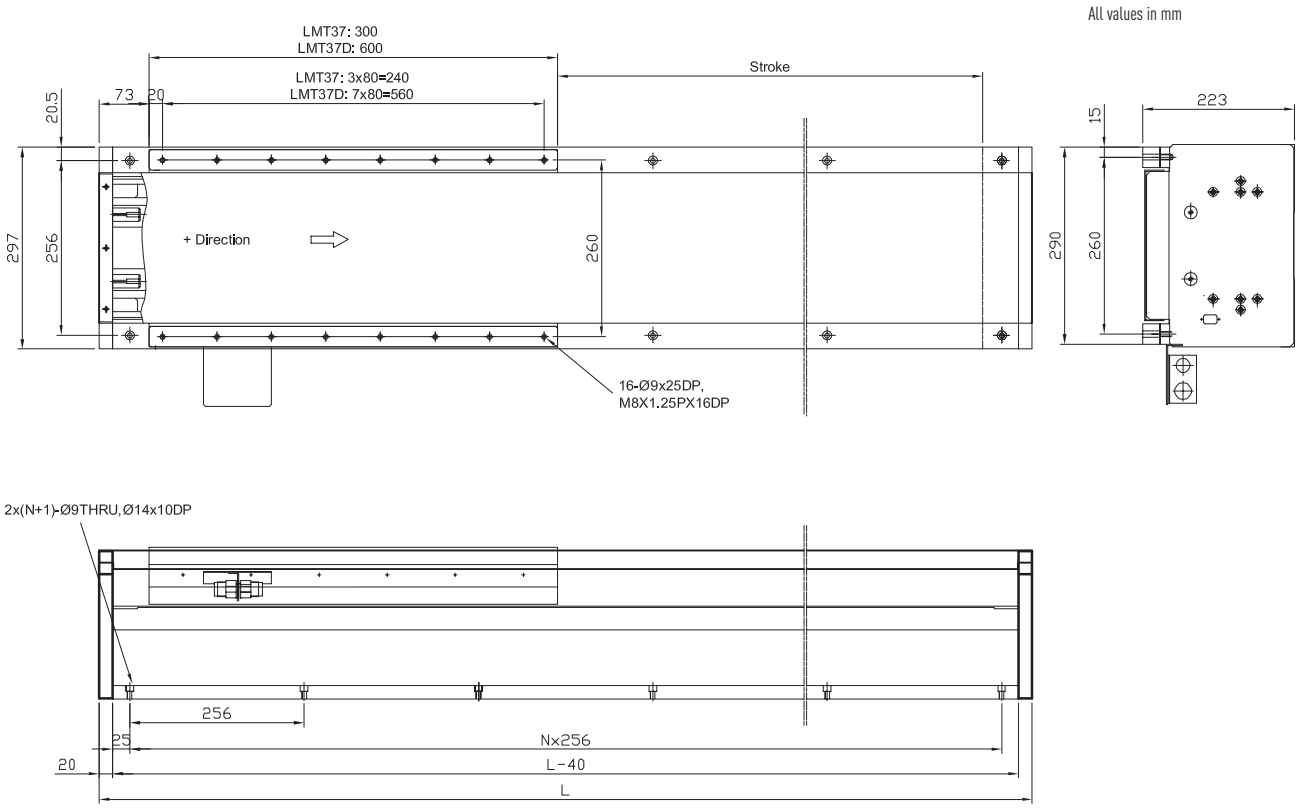
*Dimensions C and D are customer-specific

Specifications for LMX1L-T Linear Motor Axis

Name (Model number) xxxx = Stroke	Motor type	F_c [N]	Fp [N]	Mass of glider [kg]	Length of glider [mm]	v_{max} [m/s]	a_{max} [m/s^2]	Dimension A [mm]	Dimension B [mm]
LMX1L-T37-1-xxxx-A1A0	LMT 37	950	2500	25	300	2*	50	297	223
LMX1L-T37L-1-xxxx-A1A0	LMT 37L	950	2500	25	300	4	50	297	223
LMX1L-T37D-1-xxxx-A1A0	LMT 37D	1900	5000	50	600	2*	50	297	223
LMX1L-T37LD-1-xxxx-A1A0	LMT 37LD	1900	5000	50	600	4	50	297	223

Notes: F_c = Continous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 68ff
* Limited by back-EMF of the motor winding

Dimensions of LMX1L-T Linear Motor Axis



Dimensions and Mass of the LMX1L-T37 and LMX1L-T37L Linear Motor Axis with Cover

Stroke [mm]	388	644	900	1156	1412	1668	1924	2180	3160
Total length L [mm]	858	1124	1370	1626	1882	2138	2394	2650	3674
N	3	4	5	6	7	8	9	10	14
Mass [kg]	120	150	179	208	237	267	297	327	565

Dimensions and Mass of the LMX1L-T37D and LMX1L-T37LD Linear Motor Axis with Cover

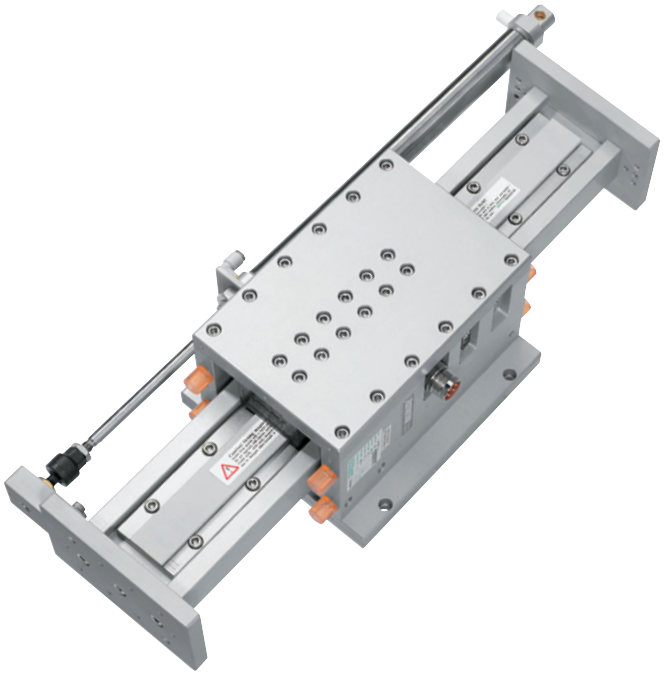
Stroke [mm]	388	644	900	1156	1412	1668	1924	2180	3160
Total length L [mm]	1114	1370	1626	1882	2138	2394	2650	2906	3930
N	4	5	6	7	8	9	10	11	15
Mass [kg]	175	205	234	263	292	322	352	382	620

Positioning Systems
Linear Motor Axis

2.10 LMV1L Linear Motor Axis

LMV1L linear motor axis are equipped with an iron-core motor, which provides substantial continuous force. These axis are equipped with pneumatic weight compensation as a standard to ensure high dynamics in a vertical direction. The moving distance is measured incrementally or absolutely via optical or magnetic encoders depending on requirements.
LMV1L linear motor axis are ideal for applications with a gripper connection, in which the gripper extends completely out of the transfer area. The moved working load is approx. 20 kg.

- Max. acceleration 30 m/s^2
- Max. speed 1.8 m/s



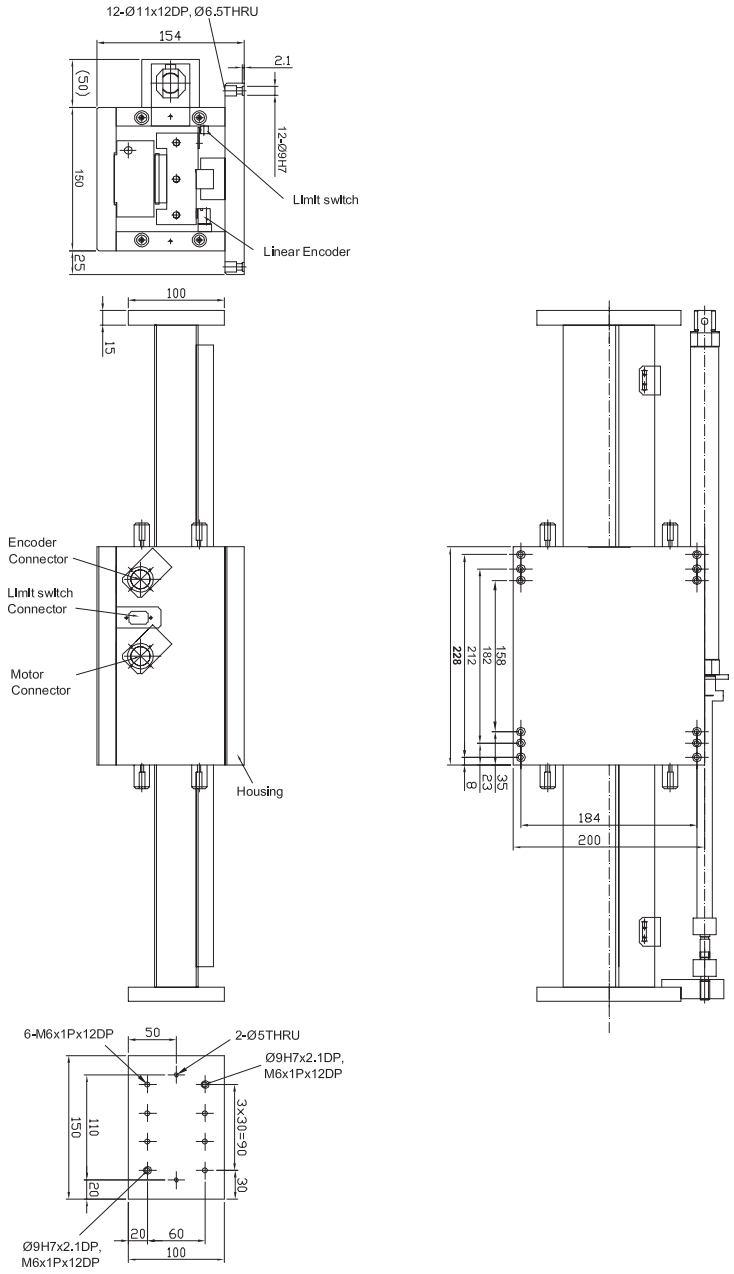
Specifications for LMV1L Linear Motor Axis

Name (Model number)	Motor type	F_c [N]	F_p [N]	Mass of glider [kg]	v_{max} [m/s]	a_{max} [m/s^2]	Stroke [mm] [mm]
LMV1L-S13-1-120-A100	LMS 13	180	470	6	1,8	30	120
LMV1L-S13-1-250-A100	LMS 13	180	470	8	1,8	30	250
LMV1L-S23-1-250-A100	LMS 23	220	600	10	1,8	30	250
LMV1L-S23-1-400-A100	LMS 23	220	600	12	1,8	30	400

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

Dimensions of LMV1L Linear Motor Axis

All values in mm



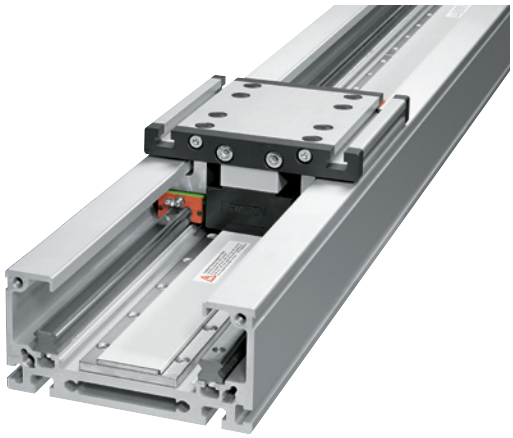
Total Length and Mass of the LMV1L Linear Motor Axis

Model number	Stroke [mm]	Total length L [mm]	Mass [kg]
LMV1L-S13-1-120-A100	120	444	15
LMV1L-S13-1-250-A100	250	572	19
LMV1L-S23-1-250-A100	250	572	26
LMV1L-S23-1-400-A100	400	722	29

Positioning Systems
Linear Motor Axis

2.11 LMH1L Linear Motor Axis

The LMH1L linear motor axis are equipped with two different aluminium frameworks. One is optimized for forces up to 1360 N (LMH1L-S2), the other for forces up to 2600 N (LMH1L-S4).



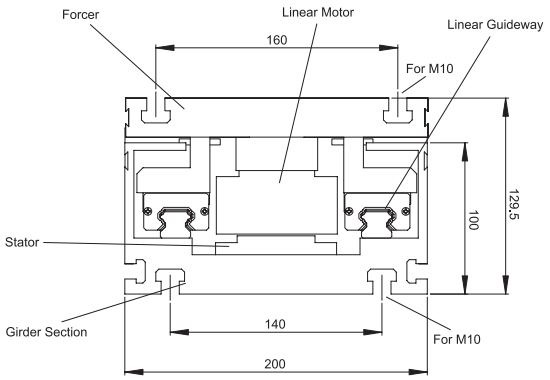
2.11.1 LMH1L-S2

The LMH1L-S2 portal axis equipped with linear motors are designed as a complete axis with strokes up to 30 m. Several gliders can be positioned independently of each other using the linear motor technology. The distance is measured incrementally and enables positioning accuracy up to 0.04 mm. An absolute measuring system can be built in as an option.

- Max. acceleration 50 m/s^2
- Max. speed 4 m/s
- Up to 30 m stroke

Connecting Dimensions for LMH1L-S2 Linear Motor Axis

Installation notes: The axis are attached to the machine bed using T-slots.
The customer mechanism is also attached using T-slots on the glider.



All values in mm

Specifications for LMH1L-S2 Linear Motor Axis

Name (Model number) xxxx = stroke [mm]	Motor type	F_c [N]	F_p [N]	Mass of glider [kg]	Length of glider [mm]	v_{max} [m/s]	a_{max} [m/s^2]	Mass of the girder [kg/m]
LMH1L-S23-1-xxxx-D000	LMS 23	220	600	7	190	4	50	28
LMH1L-S27-1-xxxx-D000	LMS 27	340	900	10	300	4	50	28
LMH1L-S27D-1-xxxx-D000	LMS 27D	680	1800	20	600	4	50	28

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

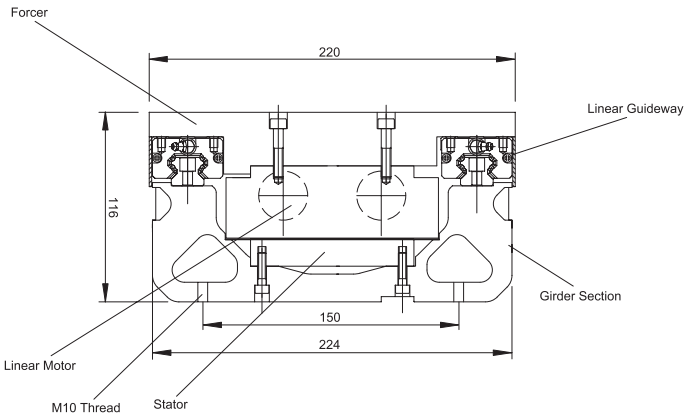
2.11.2 LMH1L-S4 Linear Motor Axis

The portal axis LMH1L-S4 equipped with linear motors is designed as a complete axis with strokes up to 30 m for very high continuous forces. Several gliders can be positioned independently of each other using the linear motor technology. The stroke is measured incrementally and enables positioning accuracy up to 0.05 mm. An absolute measuring system can be built in as an option.

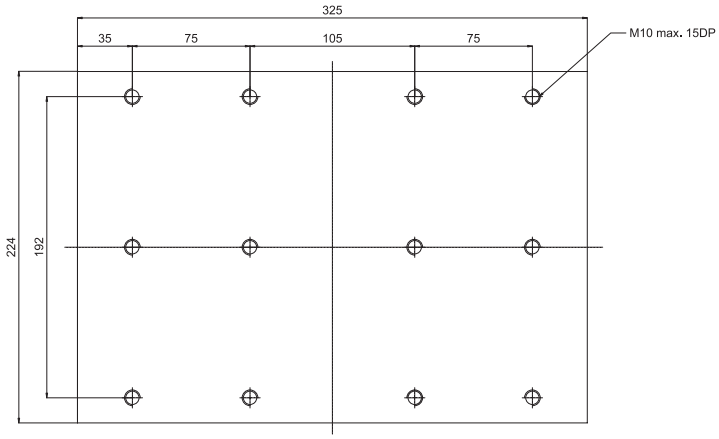
- Max. acceleration 50 m/s^2
- Max. speed 4 m/s
- Up to 30 m stroke

Connecting Dimensions for LMH1L-S4 Linear Motor Axis

Installation note: Mounting of the connection mechanism via M10 threads at distances of 120 mm.



Dimensions of Mounting Area



Specifications for LMH1L-S4 Linear Motor Axis

Name (Model number) xxxx = stroke [mm]	Motor type	F_c [N]	F_p [N]	Mass of glider [kg]	Length of glider [mm]	v_{max} [m/s]	a_{max} [m/s^2]	Mass of the girder [kg/m]
LMH1L-S47L-1-xxxx-D000	LMS 47L	650	1700	19	325	4	50	37
LMH1L-S47LD-1-xxxx-D000	LMS 47LD	1300	3400	36	600	4	50	37

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

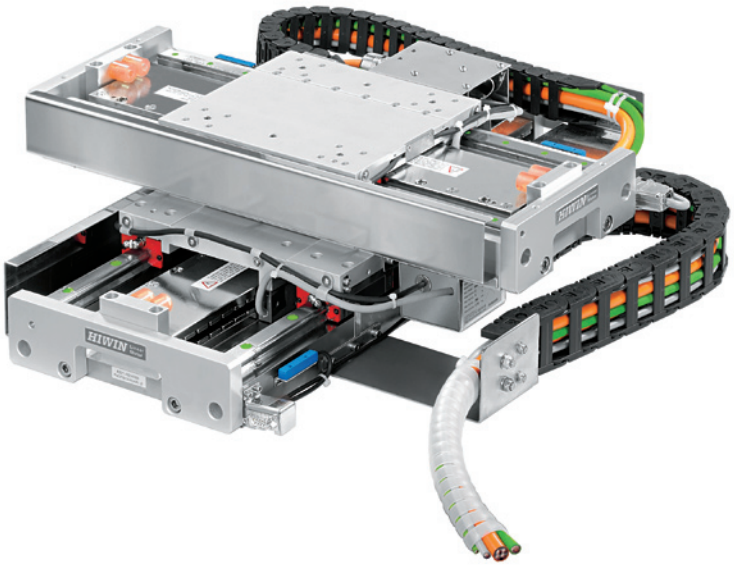
Positioning Systems
Linear Motor Axis

2.12 Cross Tables

The linear motor axis of the LMX series can be combined to form cross tables. The structure of the model number shows that almost any combination of LMX axis is possible. A cross table with LMX2E axis is shown in Chapter 2.12.1. Chapter 2.12.2 shows a cross table with LMX2L axis.

2.12.1 LMX2E-CB5-CB8 Cross Table

- Equipped with coreless linear motors
- Slight inertia and fast acceleration
- No cogging
- Extremely stiff aluminum frame with low profile
- Simple assembly



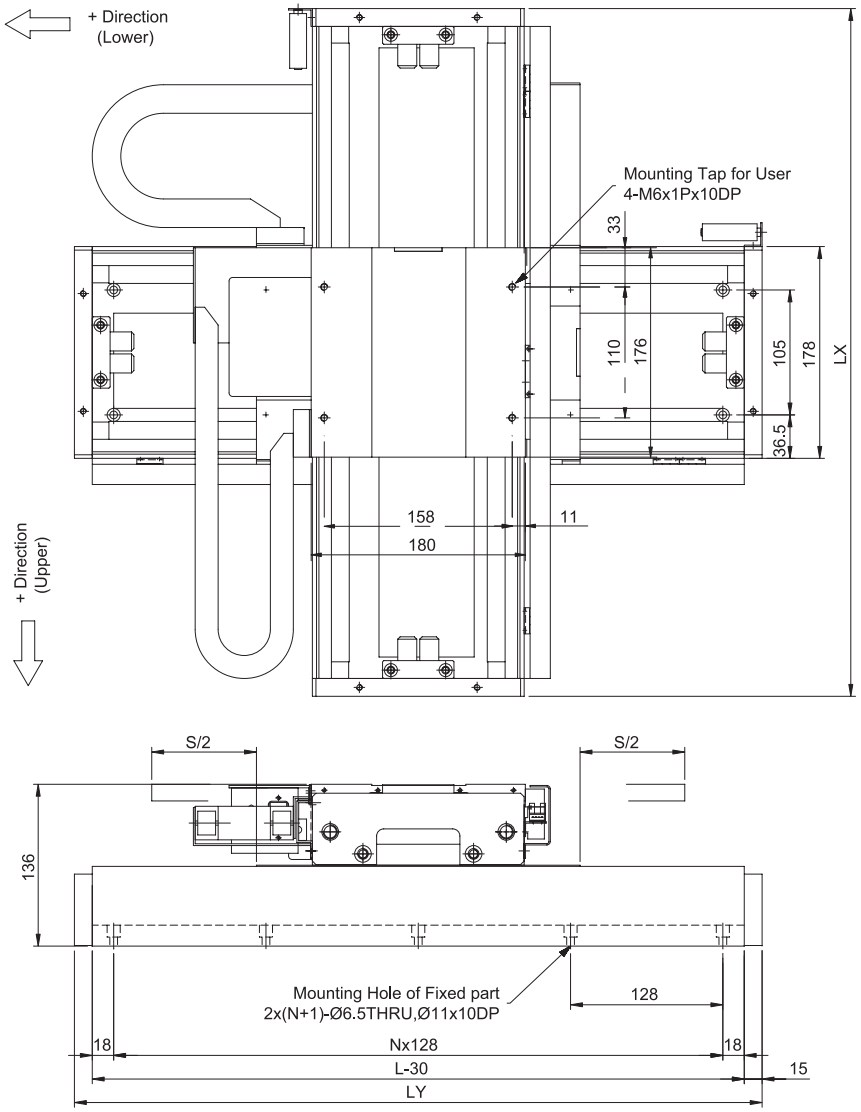
Specifications for LMX2E-CB5-CB8 Cross Table

Name (Model number) xxxx = stroke [mm]	Orthogonality [arc-sec]	Repeatability [mm]	v_{max} [m/s]	a_{max} [m/s²]	Motor type	Fc [N]	Fp [N]	Mass of glider [kg]
LMX2E-CB5 CB8-xxxx-xxxx-A1	+/- 10	+/- 0,002	5	100	Upper axis: LMC B5	90	270	2,5
					Lower axis: LMC B8	145	435	Mass lower axis + 4

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

Dimensions of LMX2E-CB5-CB8 Cross Table

All values in mm



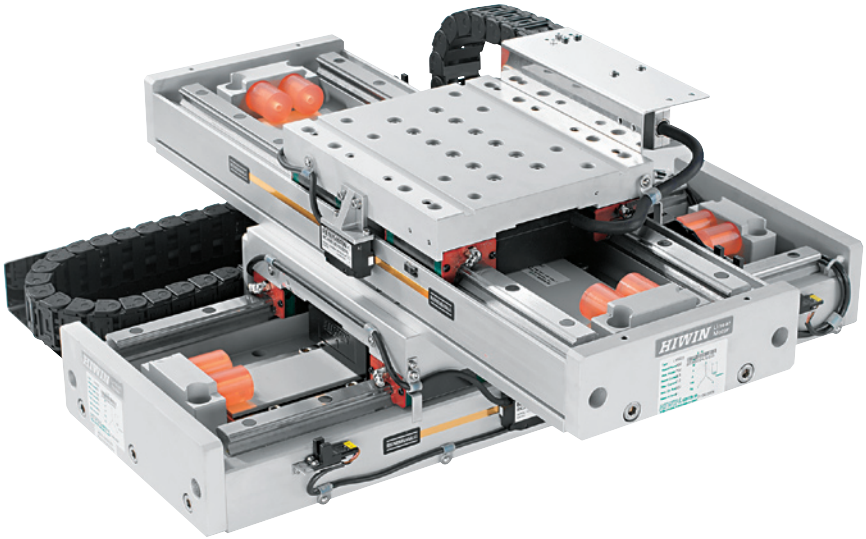
Connecting Dimensions and Mass of the LMX2E-CB5-CB8 Cross Table with Three Stroke Examples

Name (Model number)	Stroke (upper/lower) [mm]	Total length (LX x LY) [mm]	N [mm]	Mass (upper axis) [kg]	Mass (XY axis) [kg]
LMX2E-CB5-CB8-144-176-A1	144 x 179	450 x 578	4	19	42
LMX2E-CB5-CB8-272-304-A1	272 x 304	578 x 706	5	22,5	49,5
LMX2E-CB5-CB8-432-400-A1	400 x 432	706 x 834	6	26	57

Positioning Systems
Linear Motor Axis

2.12.2 LMX2L-S23-S27 Cross Table

- Equipped with iron-core linear motors
- Higher force and fast acceleration
- Extremely stiff aluminum frame with low profile
- Simple assembly



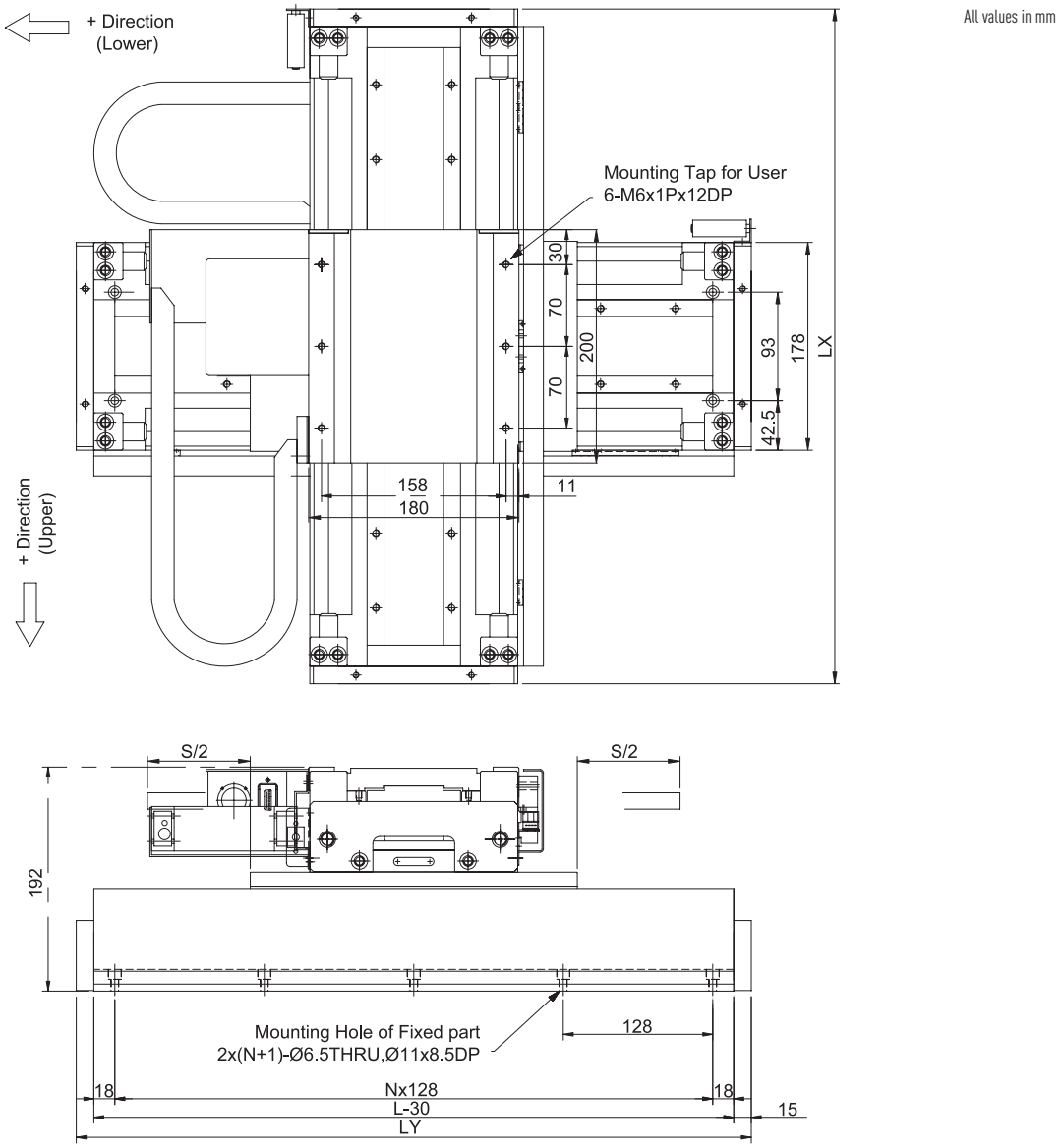
Specifications for LMX2L-S23-S27 Cross Table

Name (Model number) xxxx = stroke [mm]	Orthogonality [arc-sec]	Repeatability [mm]	v_{max} [m/s]	a_{max} [m/s²]	Motor type	Fc [N]	Fp [N]	Mass of glider [kg]
LMX2L-S23 S27-xxxx-xxxx-A1	+/- 10	+/- 0,002	4	50	Upper axis: LMS 23	220	600	7,5
					Lower axis: LMS 27	340	900	Mass upper axis + 9.5

Notes: F_c = Continuous power, 100 % operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

Dimensions of LMX2L-S23-S27 Cross Table

All values in mm



Connecting Dimensions and Mass of the LMX2L-S23-S27 Cross Table with Three Stroke Examples

Name (Model number)	Stroke (upper/lower) [mm]	Total length (LX x LY) [mm]	N [mm]	Mass (upper axis) [kg]	Mass (XY axis) [kg]
LMX2L-S23-S27-232-280-A1	232 x 280	578 x 706	5	26	58,5
LMX2L-S23-S27-360-408-A1	360 x 408	706 x 834	6	29,5	65,5
LMX2L-S23-S27-706-536-A1	706 x 536	706 x 962	7	29,5	70

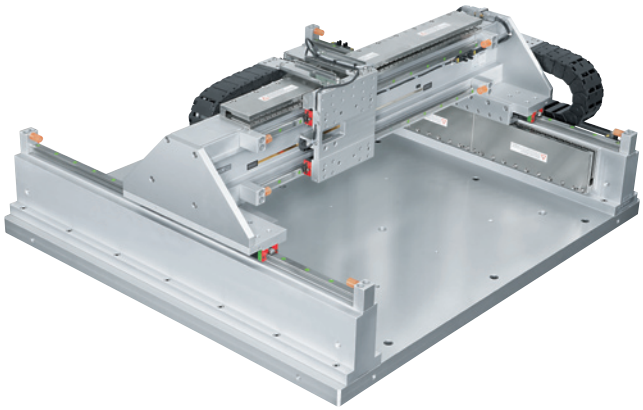
Positioning Systems
Linear Motor Axis

2.13 Gantry Systems

The standardized gantry systems of the LMG2A series are systems with one-sided step bearings. The LMG2A-C type has coreless linear motors. The LMG1A-S type is driven by iron-core linear motors.

2.13.1 LMG2A-CB6 CC8 Gantry System

- Equipped with coreless linear motors
- Slight inertia and fast acceleration
- No cogging
- Stiff aluminum bridge
- Simple assembly

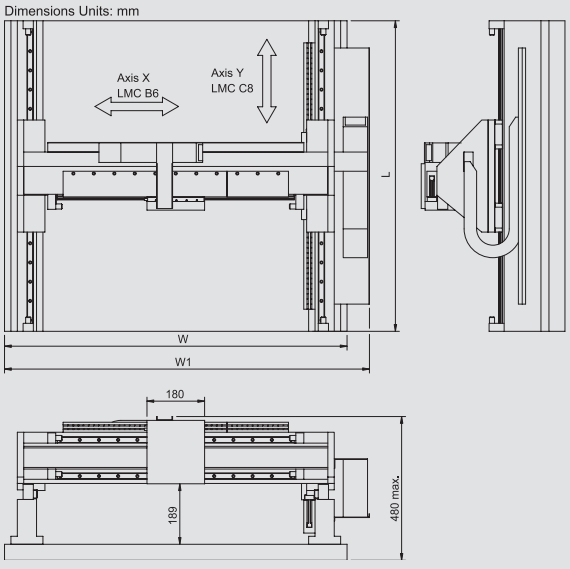


Specifications for LMG2A-CB6 CC8 Gantry System

Name (Model number) xxxx = Stroke [mm]	Orthogonality [arc-sec]	Repeatability [mm]	v_{max} [m/s]	a_{max} [m/s²]	Motor type	F_c [N]	F_p [N]	Mass of the glider [kg]
LMG2A-CB6 CC8-xxxx-xxxx-A1	+/- 10	+/- 0,002/0,004	5	100	Upper axis: LMC B6	110	330	3
					Lower axis: LMC C8	195	585	Mass upper axis + 3.5

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

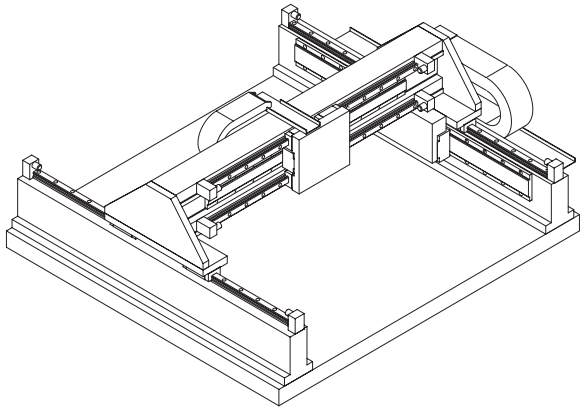
Dimensions of the LMG2A-CB6 CC8 Gantry System



Dimensions of the LMG2A-CB6 CC8 Gantry System with Four Stroke Examples

Type (Model number)	Stroke X axis [mm]	Stroke Y axis [mm]	Dimensions W [mm]	W1 [mm]	L [mm]
LMG2A-CB6 CC8-0300-0400-A1	300	400	870	940	870
LMG2A-CB6 CC8-0500-0500-A1	500	500	1070	1140	970
LMG2A-CB6 CC8-0750-0750-A1	750	750	1390	1390	1220
LMG2A-CB6 CC8-0750-1000-A1	750	1000	1390	1390	1470

2.13.2 LMG2A-S13 S27 Gantry System



- Equipped with iron-core linear motors
- Higher force and fast acceleration
- Less cogging and constant speed
- Stiff aluminum bridge
- Simple assembly

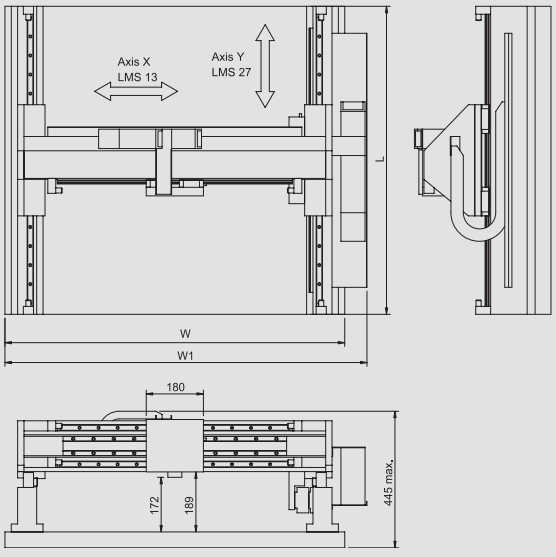
Specifications for LMG2A-S13 S27 Gantry System

Name (Model number) xxxx = Stroke [mm]	Orthogonality [arc-sec]	Repeatability [mm]	v_{max} [m/s]	a_{max} [m/s²]	Motor type	Fc [N]	Fp [N]	Mass of Glider [kg]
LMG2A-S13 S27-xxxx-xxxx-A1	+/- 10	+/- 0,002/0,004	4	50	Upper axis: LMS 13	180	360	5
					Lower axis: LMS 27	340	680	Mass upper axis + 7

Notes: F_c = Continuous power, 100% operating time (ED), at 80 °C winding temperature
F_p = Peak force (1 s)
Electrical parameters for linear motors: see page 62ff

Dimensions of LMG2A-S13 S27 Gantry System

Dimensions Units: mm



Dimensions of LMG2A-S13 S27 Gantry System with Four Stroke Examples

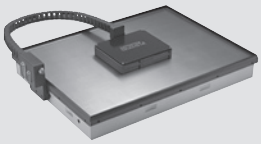
Type (Model number)	Stroke X axis [mm]	Stroke Y axis [mm]	Dimensions W [mm]	W1 [mm]	L [mm]
LMG2A-S13 S27-0300-0400-A1	300	400	870	940	870
LMG2A-S13 S27-0500-0500-A1	500	500	1070	1140	970
LMG2A-S13 S27-0750-0750-A1	750	750	1320	1390	1220
LMG2A-S13 S27-0750-1000-A1	750	1000	1320	1390	1470

Positioning Systems
Linear Motor Axis

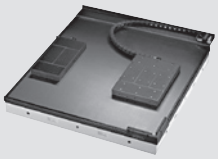
HIWIN®
Linear Technology

3. Planar Servo Motors and Planar Motors

3.1 LMSP Planar Servo Motor	52
3.2 LMPP Planar Motor	56
3.3 Control Card PC14P	59
3.4 Terminal Block PC14B-TB	59

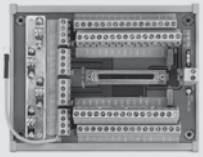


3.1



3.2

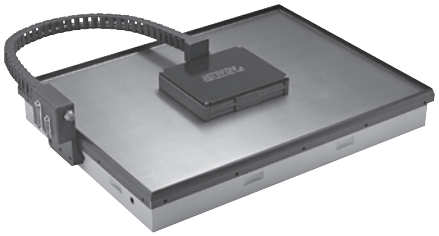
3.3



3.4

3. Planar Servo Motors and Planar Motors

XY movements with air suspension through a planar servo stepping motor with integrated stroke measurement. Can be operated above head and even in a vacuum.

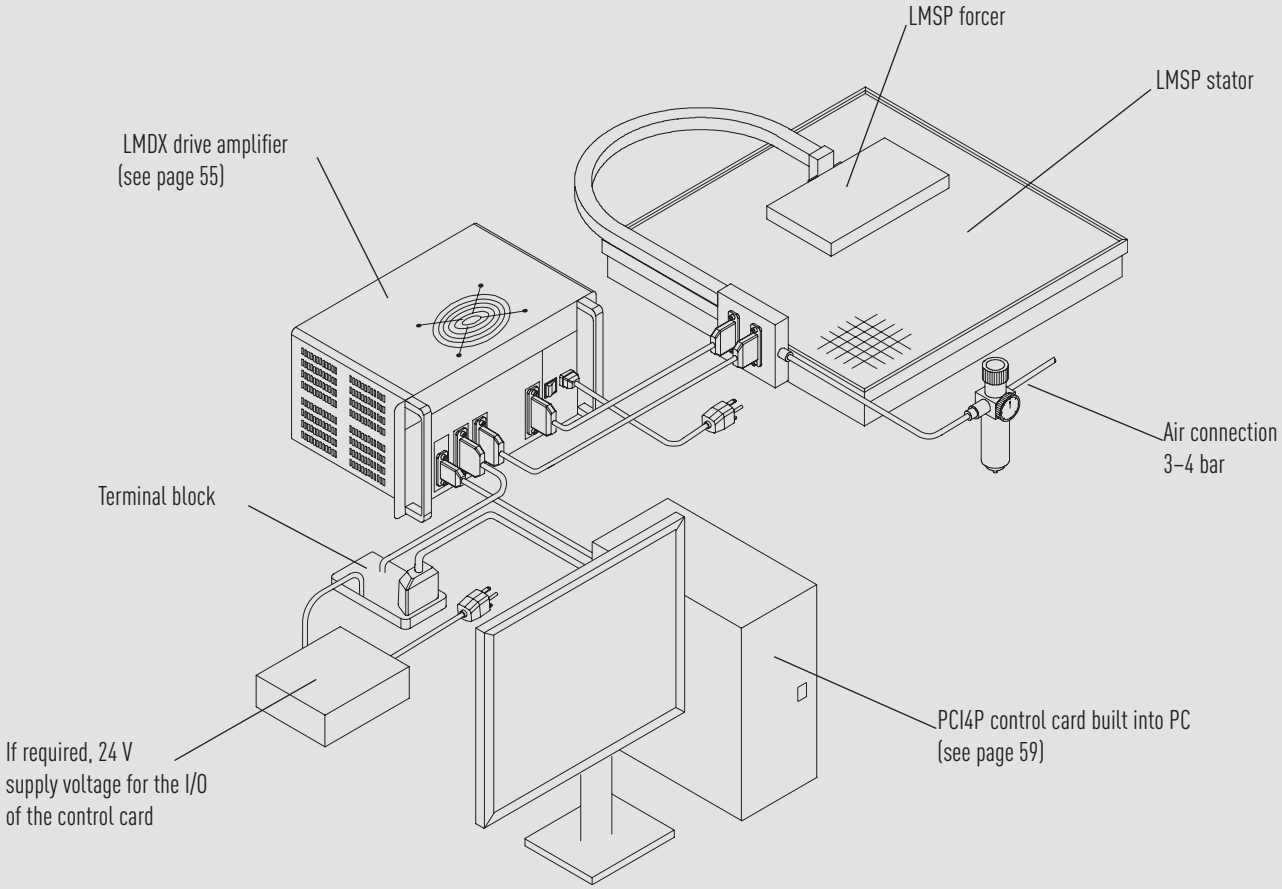


3.1 LMSP Planar Servo Motor

LMSP planar servo motors are equipped with integrated stroke measurement sensors and work with position control (closed loop).

- XY table
- Closed loop thanks to integrated distance measurement
- Stepping motor facilitates the use of simple drive electronics
- Air suspension free of wear
- No externally measurable magnetic fields
- Practically no heating up
- Can be built in above head
- Stator dimensions up to 1000 x 1000 mm
- Can be used in vacuums

3.1.1 Configuration of LMSP with LMDX Servo Driver



3.1.2 Specifications for the LMSP Planar Servo Motor

Connecting Dimensions for the LMSP Planar Servo Motor
(For W_f values see Table 3.1, for W_s values see Table 3.2)

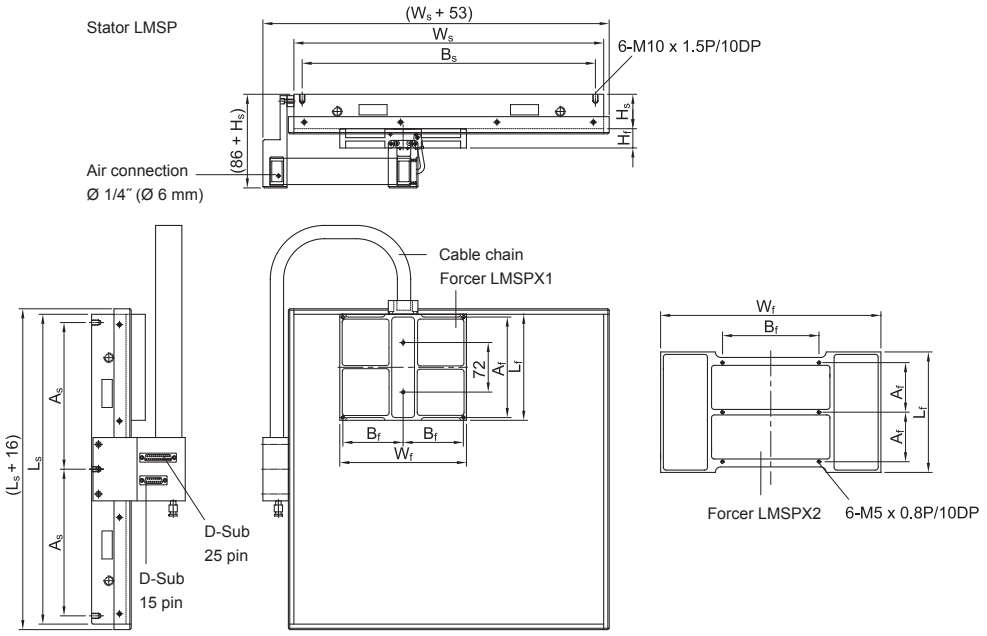


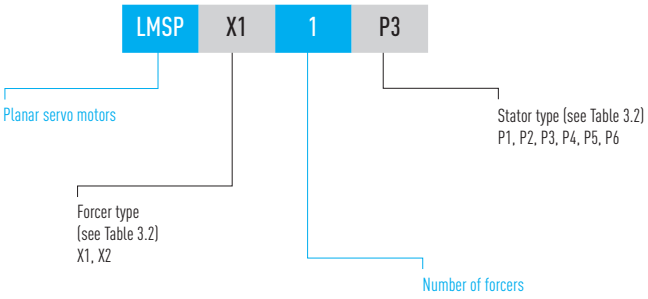
Table 3.1 **Specifications for the LMSP Planar Servo Motor**

		Symbol	Unit	LMSPX1	LMSPX2
Performance	Max. force	T_m	N	75	140
	Resolution	R_s	mm	0,001	0,001
	Repeatability	R_p	mm	0,002	0,002
	Accuracy	A_c	mm	±0,015	±0,015
	Max. speed	v	m/s	0,9	0,8
	Max. load	-	kg	12,2	24,3
Forcer	Length	L_f	mm	154	175
	Width	W_f	mm	184	320
	Height	H_f	mm	28	30
	Air pressure	P_a	kg/cm^2	3-4	3-4
	Air flow rate	F_a	l/min	6,4	11
	Mass	M_f	kg	1,8	3,7
	Distance between fixing holes	A_f x B_f	mm x mm	146 x 87,5	72 x 140

Table 3.2 **Dimensions and Mass of Stators LMSP-P1 to LMSP-P6**

		Unit	P1	P2	P3	P4	P5	P6
Dimensions of stator L_S x W_S		mm	350 x 330	450 x 450	600 x 450	600 x 600	1000 x 600	850 x 850
Max. stroke	**LMSPX1**	mm	190 x 140	290 x 260	440 x 260	440 x 410	840 x 410	690 x 660
(one forcer)	**LMSPX2**	mm	–	270 x 125	420 x 125	420 x 275	820 x 275	670 x 525
Height of stator		mm	50	50	70	70	100	120
Mass of stator		kg	27	36	52	66	120	250
Distance A between fixing holes $_S$ x B_S		mm	165 x 310	213 x 426	288 x 426	288 x 576	(318-324-318) x 280	400 x 400
n = (number of fixing holes)			6	6	6	6	10	9

3.1.3 Model Numbers for LMSP Planar Servo Motors



3.1.4 LMDX Servo Driver

The servo driver for the LMSP planar servo motor is available in two different voltage versions and with a digital I/O interface card.

Dimensions of the LMDX Servo Driver

All values in mm

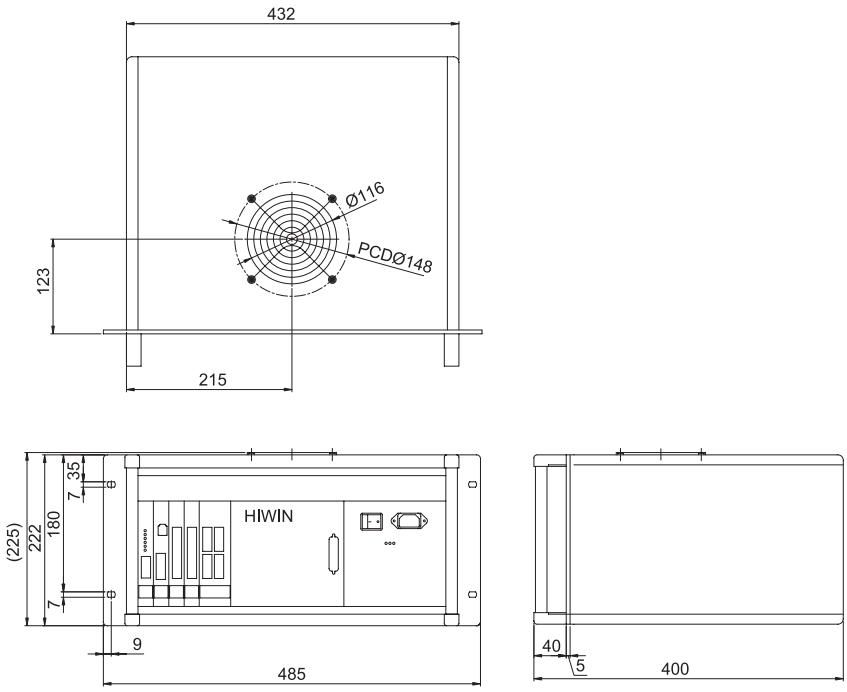


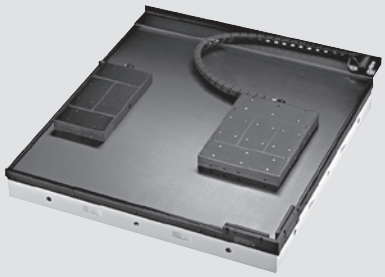
Table 3.3 **Specifications for the LMDX Servo Driver**

		Unit	Value
Power supply	Voltage	V_{AC}	95-125 (Model number LMDX1) 200-240 (Model number LMDX2)
	Frequency	H_z	50/60
	Power	VA	500 (max.)
Output current		A	3 (max.)
Interface	Parameterization: RS-232		9600 baud, 8 data bits, 2 stop bits, unequal parity
	Digital I/O signal		DXI0 modular card: 8 inputs: including HOME and RESET 6 outputs: including IN POSITION, ALARM, SVON DXI016 modularCard (optional): 16 inputs, 16 outputs
	Pulse	Pulse	STEP/DIRECTION
Resolution		µm/Pulse	up to min. 1 (configurable)
Mass		kg	13,3
Max. operating temperature		°C	50

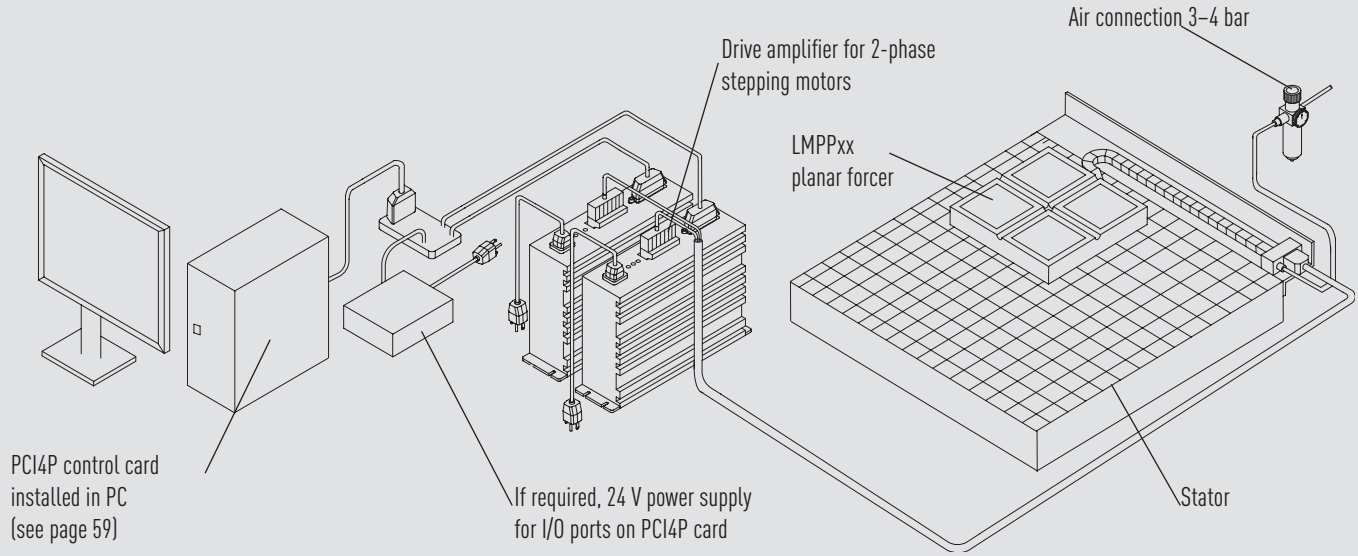
3.2 LMPP Planar Motors

Planar motors in the LMPP series are suitable for positioning tasks without position control (open loop).

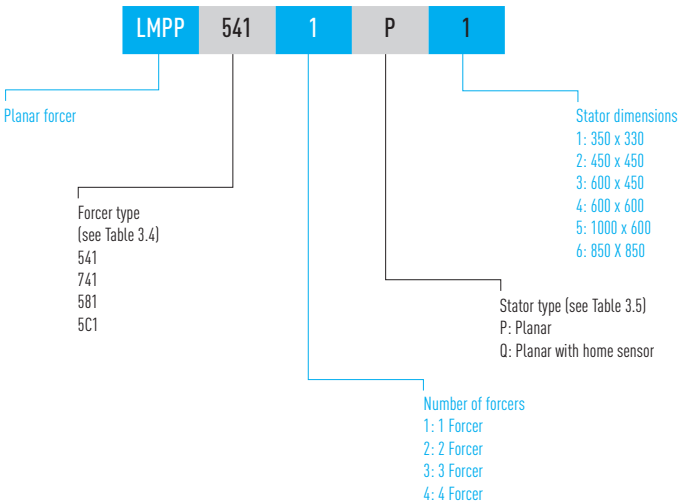
- XY table
- Stepping motor technology (2-phase)
- Stepping motor control electronics
- Can be built in above head
- Stator dimensions up to 1000 x 1000 mm
- Suitable for use in vacuums



System Configuration for LMPP Planar Motors



3.2.1 Model Number for LMPP Planar Forcers



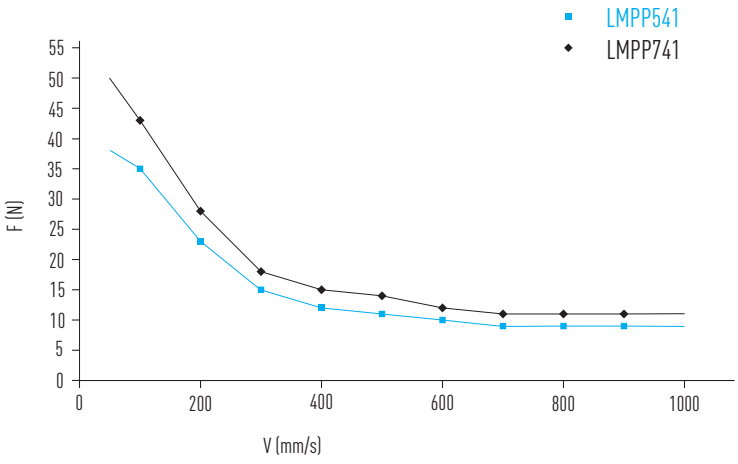
Suitable Drive Amplifier for LMPP Planar Motors
Model number: 8-09-0083
(For description, see page 114 "Drive amplifier for Stepping Motor M12")

Table 3.4 **Specifications for LMPP Planar Forcer**

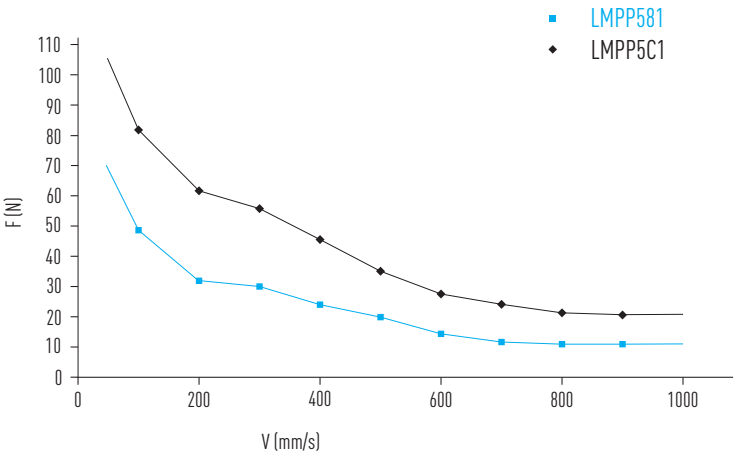
		Symbol	Unit	LMPP541	LMPP741	LMPP581	LMPP5C1
Performance 1)	Max. force	F_m	N	38	50	70	105
	Holding force	F_s	N	48	60	90	140
	Resolution	R_s	mm/stp	0.001|0.01	0.001|0.01	0.001|0.01	0.001|0.01
	Repeatability	R_p	mm	0,002	0,002	0.002	0.002
	Accuracy	A_c	mm	± 0,015	± 0,015	± 0,015	± 0,015
	Max. speed	v	m/s	1,0	1,0	1.0	1.0
	Max. acceleration	a	m/s^2	20	20	20	20
	Max. load	—	kg	9	11,2	14,4	21,7
Forcer	Phases	f	f	2	2	2	2
	Current	I	A	3	3	3	3
	Mechanical pitch	P_t	mm	0,64	0,64	0,64	0,64
	Length	L_f	mm	138	154	240	240
	Width	W_f	mm	131	146	120	181
	Height	H_f	mm	19	19	25	25
	Air gap	T_a	mm	0,015	0,015	0.015	0.015
	Air pressure	P_a	kg/cm^2	3,0±0,3	3,0±0,3	3,0±0,3	3,0±0,3
	Air flow	F_a	l/min	10	10	12	15
	Mass	M_f	kg	0,75	0,9	1,4	2,0
	Operating temperature	T	°C	0|50	0|50	0|50	0|50
	Distance between fixing holes	A_f x B_f	mm	130 x 61,5	146 x 69	118 x 52	164 x 118
Stator 1)	Length	L_s	mm	350 to 1000	350 to 1000	350 to 1000	350 to 1000
	Width	W_s	mm	330 to 850	330 to 850	330 to 850	330 to 850
	Height	H_s	mm	50 to 100	50 to 100	50 to 100	50 to 100
	Mass	M_s	kg	27 to 250	27 to 250	27 to 250	27 to 250

Note: 1) The performance data changes according to the controller used and its settings. Consequently, the values listed are examples only.
If higher performance is required, please contact HIWIN or one of our authorized dealers.
2) Optional: Home sensor

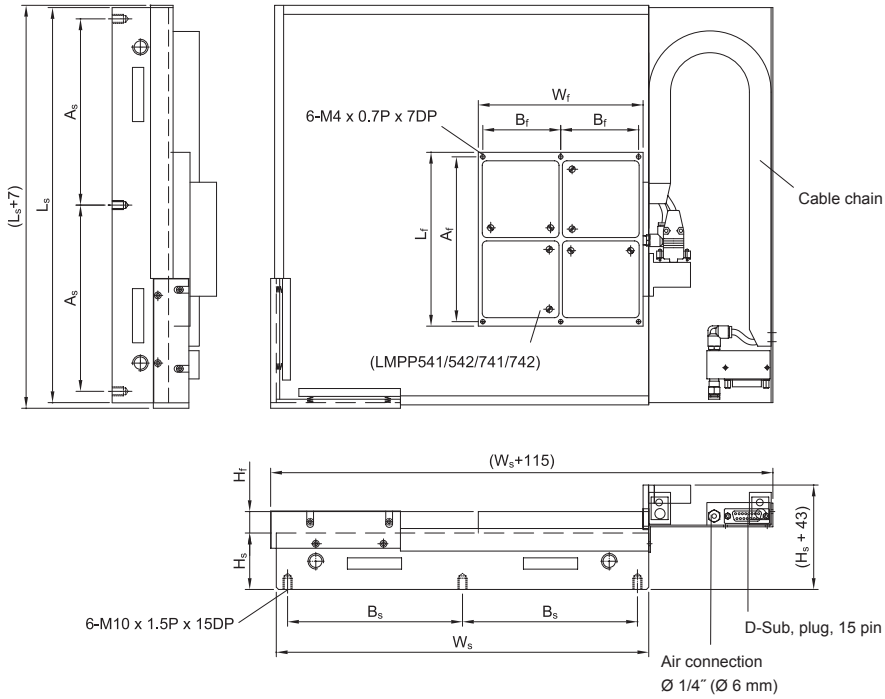
Force-Speed Graph for Planar Forcers LMPP541 and LMPP741



Force-Speed Graph for Planar Forcers LMPP581 and LMPP5C1

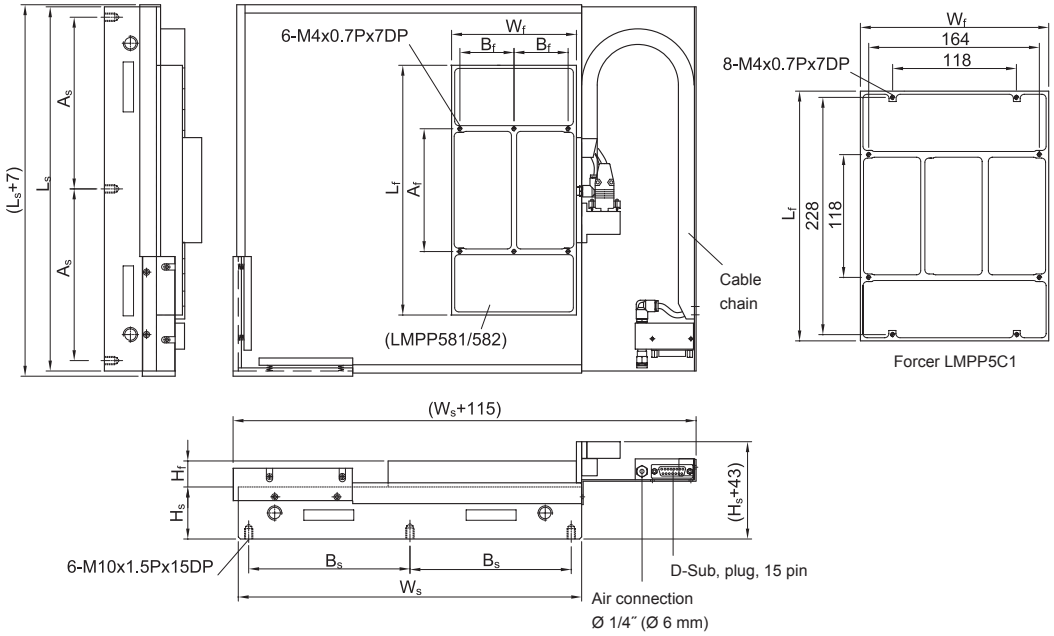


Dimensions of Planar Forcers LMPP541 and LMPP741
(For W_f values, see Table 3.4,
For W_s values, see Table 3.5)



All values in mm

Dimensions of Planar Forcers LMPP581 and LMPP5C1
(For W_f values, see Table 3.4,
For W_s values, see Table 3.5)



All values in mm

Table 3.5 **Dimensions of LMPP Stators**

		Unit	P1	P2	P3	P4	P5	P6
Dimensions of stator L_S x W_S		mm	350 x 330	450 x 450	600 x 450	600 x 600	1000 x 600	850 x 850
Max. stroke (one forcer)	**LMPP541**	mm	175 x 155	275 x 270	425 x 270	425 x 420	825 x 420	675 x 670
	LMPP741	mm	160 x 135	260 x 255	410 x 255	410 x 405	820 x 405	670 x 655
	LMPP581	mm	75 x 160	175 x 280	325 x 280	325 x 430	725 x 430	575 x 680
	LMPP5C1	mm	75 x 100	175 x 220	325 x 220	325 x 370	725 x 370	575 x 620
Height of stator H_S		mm	50	50	70	70	100	120
Mass of stator		kg	27	36	52	66	120	250
Distance between fixing holes A_S x B_S		mm	165 x 310	213 x 426	288 x 426	288 x 576	318/324/318 x 280	400 x 400

3.3 PCI4P Control Card

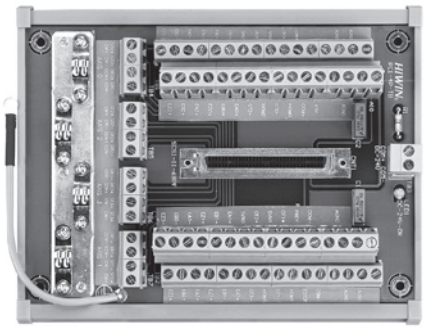
The HIWIN control card PCI4P controls the drive amplifier for up to four axis.
It can be used for stepping motors and for pulse-controlled servo motors.

- 32 bit PCI card, Plug and Play
- 4-output pulse sequence generator
- 13 digital inputs, 5 digital outputs
- Supports the STEP/DIR and (CW/CCW) pulse formats
- Linear interpolation for three axis
- Circular interpolation for two axis
- Supports T and S speed profiles
- 4 x 32-bit counter for digital incremental encoders
- DLL driver libraries for Windows, MCCL Motion Library for VC++/ VB programming under Windows 98/2000/XP with 98 functions
- Referencing, limit switch, jog function
- For operation of stepping motors, AC servo motors and linear motors
- MotionMaker™ user interface for convenient operation
- Differential pulse output reduces noise

3.4 PCI4B-TB Terminal Block

The PCI4B-TB terminal block provides clear connection options
for pulse generators and all control card inputs and outputs.

- Power supply slot
  +5 V DC ±5 %, max. 900 mA via PCI bus in PC
- External supply voltage
  +24 V DC ±5 %, max. 500 mA, user-configured

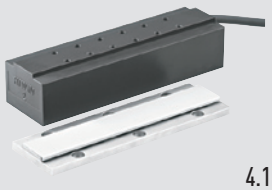


Positioning Systems
Planar Servo Motors and Planar Motors

HIWIN®
Linear Technology

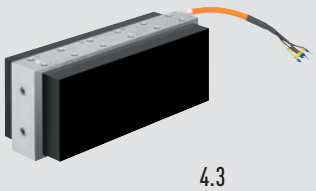
4. Linear Motor Components

4.1 Linear Motors, LMS Series 62
4.2 Linear Motors, LMC Series 66
4.3 Linear Motors, LMT Series 68



4.1

4.2



4.3

4. Linear Motor Components

4.1 Linear Motors, LMS Series

HIWIN synchronous LMS linear motors are the powerhouses of linear drives and are characterized by a particularly high power density and minimal cogging.
The three-phase motors consist of a primary part (forcer) with a wound armature core and a secondary part with permanent magnets (stators). Any length of stroke required can be achieved by combining several stators.

- 3-phase
- High force
- Exceptional acceleration
- Low cogging
- Any length stroke
- Several forcers possible on one stator

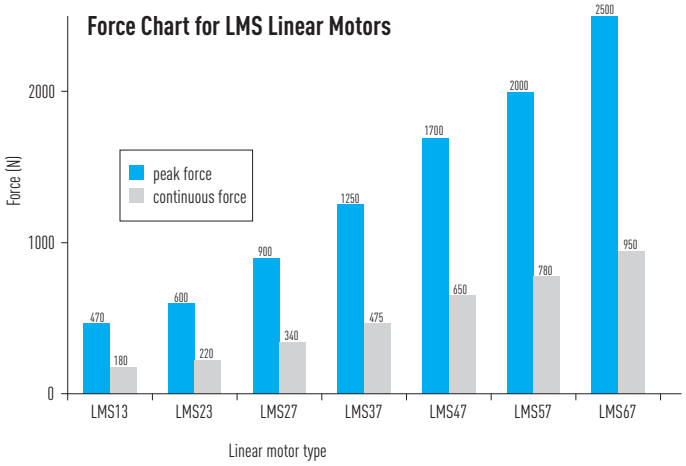


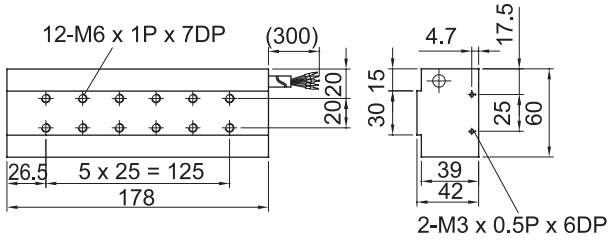
Table 4.1 **Specifications for Linear Motors, LMS Series**

	Symbol	Unit	LMS13	LMS23	LMS27	LMS37	LMS37L	LMS47	LMS47L	LMS57	LMS57L	LMS67	LMS67L
Peak force for 1 second	F_p	N	470	600	900	1250	1250	1700	1700	2000	2000	2500	2500
Continuous force (at 80 °C)	F_c	N	180	220	340	475	475	650	650	780	780	950	950
Peak current for 1 second	I_p	A (rms)	12,3	10,5	10,5	10,5	21,0	10,5	21,0	10,5	21,0	10,5	21,0
Continuous force (at 80 °C)	I_c	A (rms)	4,1	3,5	3,5	3,5	7,0	3,5	7,0	3,5	7,0	3,5	7,0
Force constant	K_f	N/A (rms)	44	61	97	136	68	186	96	223	112	271	136
Attraction force	F_a	N	805	1350	2036	2850	2850	4071	4071	4885	4885	5700	5700
Max. winding temperature	T_{max}	°C	100	100	100	100	100	100	100	100	100	100	100
Electric time constant	K_e	ms	9,8	11,4	10,8	10,8	10,8	11,1	11,1	11,2	11,2	11,3	11,3
Resistance (per phase at 25 °C)	R_{25}	Ω	1,7	2,3	3,1	4,3	1,0	5,6	1,3	6,5	1,6	7,4	1,9
Inductance (per phase)	L	mH	33	55	32	45	10	62	15	73	18	84	21
Pole pitch	2τ	mm	32	32	32	32	32	32	32	32	32	32	32
Bending radius of motor cable	R_{bend}	mm	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5
Back EMF constant	K_v	Vrms/(m/s)	26	43	51	71	41	101	59	121	61	141	71
Motor constant (at 25°C)	K_m	N/√ W	19,4	23,1	31,8	38,0	38,0	45,4	45,5	50,7	50,7	57,6	57,6
Thermal resistance	R_{th}	°C/W	0,33	0,33	0,46	0,40	0,40	0,30	0,30	0,26	0,26	0,23	0,23
Thermal circuit breakers			100 °C, bimetal (opener), DC 12 V/6 A, DC 24 V/3 A										
Max. DC-bus voltage		V	750	750	750	750	750	750	750	750	750	750	750
Mass of forcer	M_f	kg	1,8	2,7	4,1	5,9	5,9	8,0	8,0	9,4	9,4	10,8	10,8
Own mass of stator	M_s	kg/m	4,2	6,2	6,2	8,2	8,2	11,5	11,5	13,7	13,7	15,9	15,9
Width of stator	W_s	mm	60	80	80	100	100	130	130	150	150	170	170
Length of stator / Dimension N	L_s	mm	192 mm/N=2, 256/N=3, 320 mm/N=4, 384 mm/N=5, 448 mm/N=6, 512 mm/N=7										
Distance between fixing holesgen	A_s	mm	45	65	65	85	85	115	115	135	135	155	155
Height of total system	H	mm	55,2	55,2	57,4	57,4	57,4	57,4	57,4	57,4	57,4	57,4	57,4

Note: Values in the table refer to operation without forced cooling

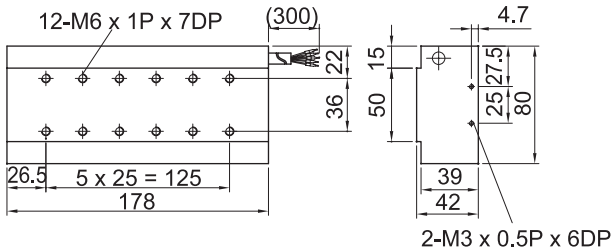
4.1.1 Dimensions for LMS Linear Motors

Dimensions for LMS13 Linear Motors

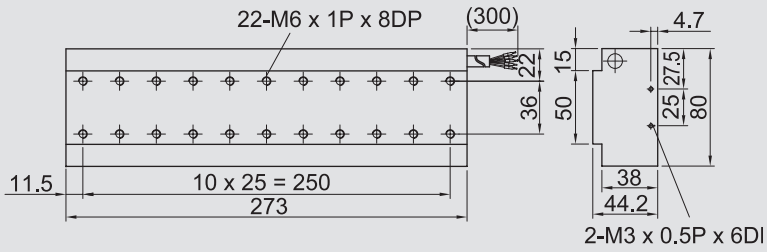


All values in mm

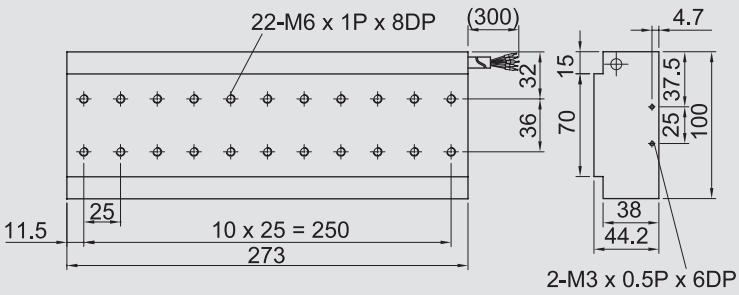
Dimensions for LMS23 Linear Motors



Dimensions for LMS27 Linear Motors

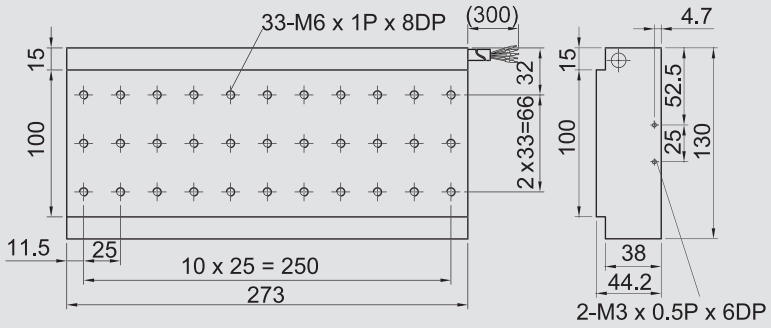


Dimensions for LMS37 Linear Motors



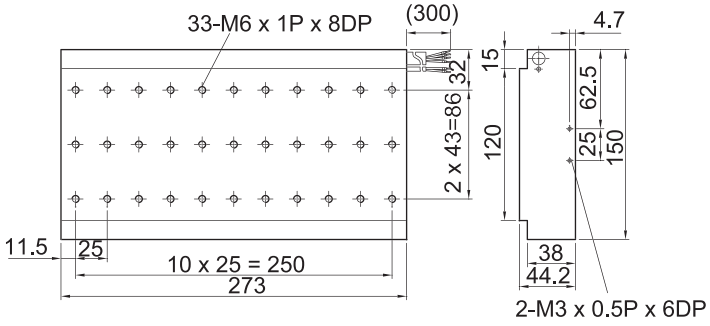
Positioning Systems
Linear Motor Components

Dimensions for LMS47 Linear Motors

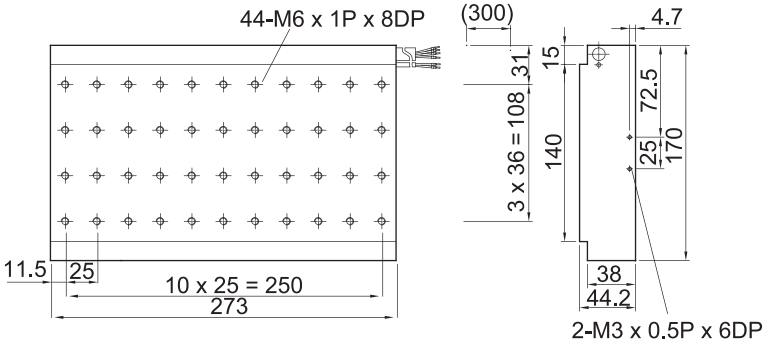


All values in mm

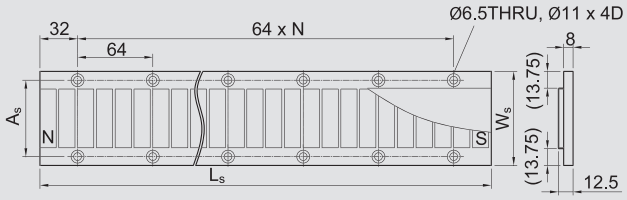
Dimensions for LMS57 Linear Motors



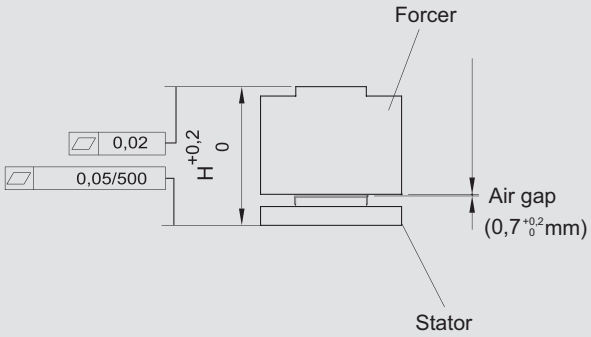
Dimensions for LMS67 Linear Motors



Dimensions for Stators for LMS Linear Motors
(Values for L_s, A_s, W_s and H, see Table 4.1)



Installation of LMS Linear Motors



4.1.2 Model Numbers for LMS Linear Motors

Forcer

LMS	47	L

- LMS: Linear motor
- 47: Motor version (see Table 4.1); Sxx: iron-core linear motor
- L: Winding with low back EMF for high speed

Stator

LMS	1	S	2

- LMS: Stator for LMS linear motor
- 1: Width of stator
  1: suitable for LMS13
  2: suitable for LMS23 and LMS27
  3: suitable for LMS37 (L) and LMT37 (T)
  4: suitable for LMS47 (L)
  5: suitable for LMS57 (L)
  6: suitable for LMS67 (L)
- S: Stator model
  S: standard
  C: customized
- 2: Length of stator [mm]
  1: 192 (Number of fixing holes: N+1=3)
  2: 256 (Number of fixing holes: N+1=4)
  3: 320 (Number of fixing holes: N+1=5)
  4: 384 (Number of fixing holes: N+1=6)
  5: 448 (Number of fixing holes: N+1=7)
  6: 512 (Number of fixing holes: N+1=8)

Positioning Systems
Linear Motor Components

4.2 Linear Motors, LMC Series

HIWIN synchronous LMC linear motors are born sprinters. They are light and extremely dynamic, thanks to their coreless primary part (forcer) with epoxy cast coils, which only need to move an extremely low own mass. The secondary part consists of a U-shaped stator made of permanent magnets.

- 3-phase
- Extremely dynamic
- Good synchronization and high speed consistency
- Low inertia and fast acceleration
- Flat profile
- No cogging
- Several forcers possible on one stator

Force chart for LMC Linear Motors

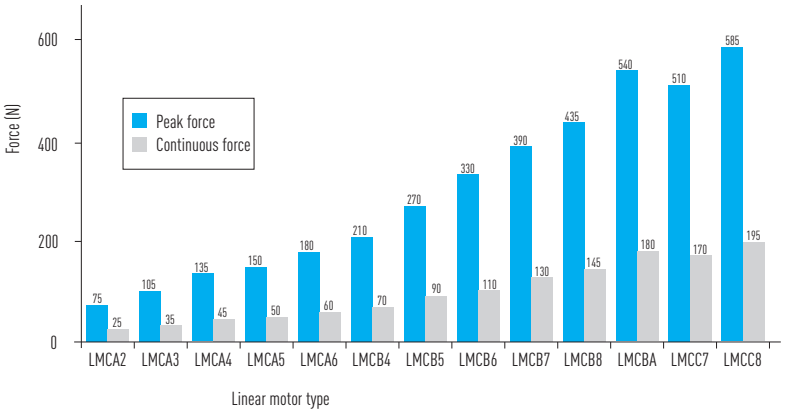


Table 4.2 **Specifications for Linear Motors, LMC Series**

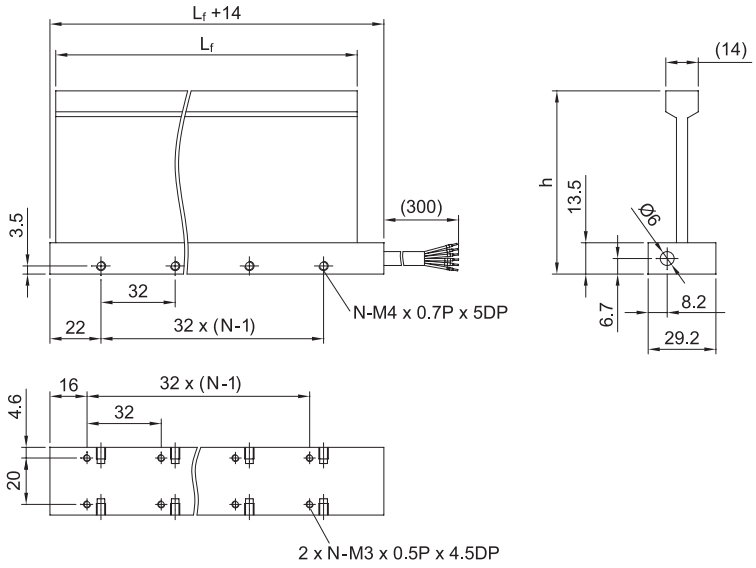
	Symbol	Unit	LMCA2	LMCA3	LMCA4	LMCA5	LMCA6	LMCB4	LMCB5	LMCB6	LMCB7	LMCB8	LMCBA	LMCC7	LMCC8
Peak force (1 s)	F_p	N	75	105	135	150	180	210	270	330	390	435	540	510	585
Continuous force (at 80 °C)	F_c	N	25	35	45	50	60	70	90	110	130	145	180	170	195
Peak current (1 s)	I_p	A (rms)	6,9	6,3	6,3	5,4	5,4	6	6	6	6	6	6	6	6
Continuous force (at 80 °C)	I_c	A (rms)	2,3	2,1	2,1	1,8	1,8	2	2	2	2	2	2	2	2
Force constant	K_f	N/A (rms)	10,6	15,8	21,2	28,2	33,8	32,5	45,4	54,5	63,5	72,5	90,6	85,4	97,5
Max. winding temperature	T_{max}	°C	100	100	100	100	100	100	100	100	100	100	100	100	100
Electric time constant	K_e	ms	0,7	0,7	0,7	0,7	0,7	0,7	0,8	0,7	0,8	0,8	0,8	1,0	1,0
Resistance (per phase at 25 °C)	R_{25}	Ω	1,7	2,4	3,0	3,5	4,0	4,1	5,2	6,7	7,3	8,3	10,4	8,4	9,6
Inductance (per phase)	L	mH	1,3	1,7	2,2	2,4	2,8	2,6	3,9	4,4	5,5	6,3	7,9	8,4	9,6
Pole pitch	2τ	mm	32	32	32	32	32	32	32	32	32	32	32	32	32
Bending radius of motor cable	R_{bend}	mm	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5	37,5
Back EMF constant	K_v	Vrms(m/s)	5,9	8,8	11,9	14,5	17,4	19,0	24,8	29,3	34,7	40,0	50,0	45,4	51,9
Motor constant (at 25°C)	K_m	N/√ W	4,8	6,0	6,9	8,7	9,8	9,3	11,4	12,5	13,7	14,5	16,2	17,0	18,1
Thermal resistance	R_{th}	°C/W	2,25	1,77	1,32	1,48	1,51	1,18	0,92	0,80	0,65	0,57	0,45	0,56	0,49
Thermal circuit breakers			100 °C, bimetal (opener), DC 12 V/6 A, DC 24 V/3 A												
Max. DC-bus voltage		V	325	325	325	325	325	325	325	325	325	325	325	325	325
Mass of forcer	M_f	kg	0,15	0,23	0,31	0,38	0,45	0,38	0,48	0,58	0,68	0,72	0,88	0,74	0,76
Own mass of stator	M_s	kg/m	7	7	7	7	7	12	12	12	12	12	12	21	21
Forcer length/Dimension n	L_f	mm	66/2	98/3	130/4	162/5	194/6	130/4	162/5	194/6	226/7	258/8	290/10	226/7	258/8
Height of forcer	h	mm	59	59	59	59	59	79	79	79	79	79	79	99	99
Height of stator	H_s	mm	60	60	60	60	60	80	80	80	80	80	80	103	103
Width of stator	W_s	mm	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2	31,2	35,2	35,2
Length of stator / Dimension N	L_s	mm	192 mm/N=2, 256 mm/N=3, 320 mm/N=4, 384 mm/N=5, 448 mm/N=6, 512 mm/N=7												
Height of total system	H	mm	74,5	74,5	74,5	74,5	74,5	94,5	94,5	94,5	94,5	94,5	94,5	117,5	117,5

4.2.1 Dimensions

Dimensions for LMC Linear Motor Forcers

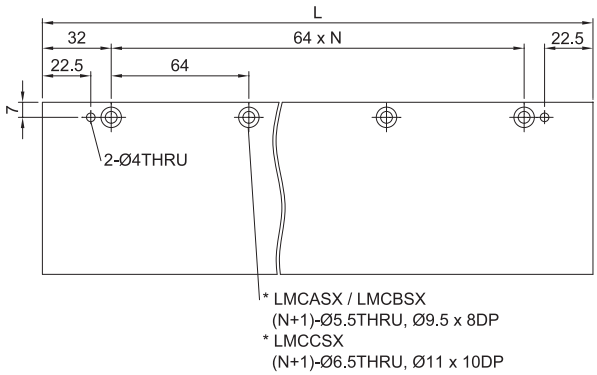
(Values for L_f, h and N see Table 4.2)

All values in mm



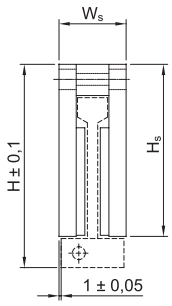
Dimensions for LMC Linear Motor Stators

(Values for L, H_s, W_s, N and H, see Table 4.2)



Assembly of LMC Linear Motors

All values in mm



4.2.2 Model Numbers for LMC Linear Motors

Forcer

LM	CA6

- LM: Linear motor
- CA6: Motor version (see Table 4.2) Cxx: coreless linear motors

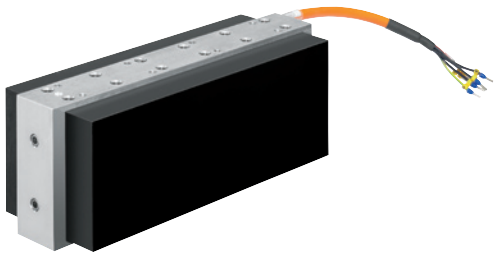
Stator

LMC	1	S	2

- LMC: Stator for LMC linear motor
- 1: Stator height [mm] A: 60 B: 80 C: 103
- S: Stator model S: standard C: customized
- 2: Length of stator [mm] 1: 192 (Number of fixing holes: N=2) 2: 256 (Number of fixing holes: N=3) 3: 320 (Number of fixing holes: N=4) 4: 384 (Number of fixing holes: N=5) 5: 448 (Number of fixing holes: N=6) 6: 512 (Number of fixing holes: N=7)

4.3 Linear Motors, LMT Series

HIWIN synchronous LMT linear motors are iron-core motors with similar properties to the motors of the LMS series. Thanks to the special arrangement of the forcer between two stators, the attraction force in the LMT forcers is cancelled. As a result, the linear guideways are especially relieved of loads and a high power density is achieved with relatively short gliders.



- Exceptionally high continuous force
- Water cooling possible
- Magnetic force compensation
- No introduction of magnetic force into the guide elements
- Several forcers possible on one stator
- Any length stroke

Table 4.3 **Specifications for Linear Motors of the LMT Series**

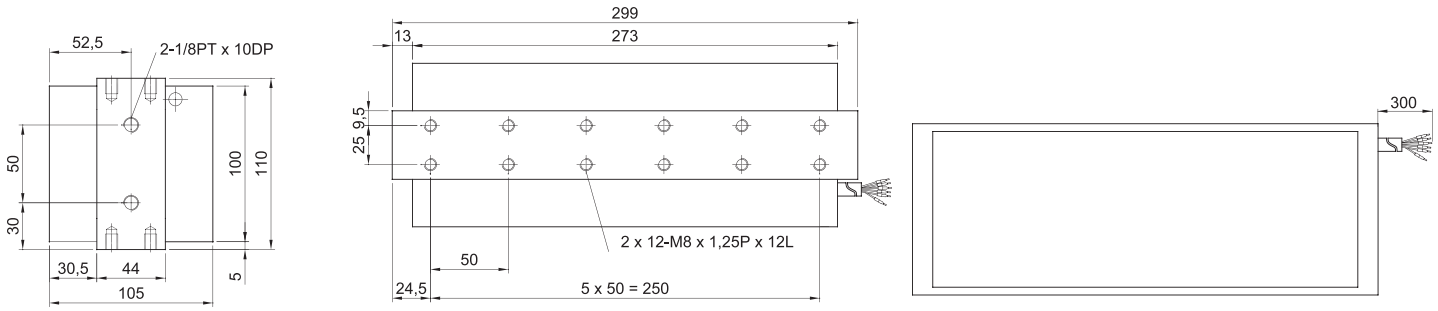
	Symbol	Unit	LMT37	LMT37 (WC) [2]	LMT37L	LMT37L (WC) [2]
Peak force (1 s)	F_p	N	2500	2500	2500	2500
Continuous force (at 80 °C)	F_c	N	950	1600	950	1600
Peak current (1 s)	I_p	A(rms)	10,5	10,5	21,0	21,0
Continuous force (at 80 °C)	I_c	A(rms)	3,5	6,0	7,0	12,0
Force constant	K_f	N/A (rms)	271	271	136	136
Attractive force	F_a	N	0 [1]	0 [1]	0 [1]	0 [1]
Max. winding temperature	T_{max}	°C	100	100	100	100
Electric time constant	K_e	ms	9,6	9,6	9,6	9,6
Resistance (per phase at 25 °C)	R_{25}	Ω	9,0	9	2,3	2,3
Inductance (per phase)	L	mH	86	86	22	22
Pole pitch	2τ	mm	32	32	32	32
Bending radius of motor cable	R_{bend}	mm	37,5	37,5	37,5	37,5
Back EMF constant	K_v	Vrms(m/s)	141	141	71	71
Motor constant (at 25°C)	K_m	N/√W	54,1	54,1	54,1	54,1
Thermal resistance	R_{th}	°C/W	0,23	0,23	0,23	0,23
Thermal circuit breakers			100 °C, bimetal (opener), DC 12 V/6 A, DC 24 V/3 A			
Max. DC-bus voltage		V	750			
Number of phases	ϕ	ϕ	3	3	3	3
Mass of forcer	M_f	kg	14,0	14,0	14,0	14,0
Own mass of stator	M_s	kg/m	16,4	16,4	16,4	16,4
Width of stator	W_s	mm	100	100	100	100
Length of stator / Dimension N	L_s	mm	192 mm/N=2, 256 mm/N=3, 320 mm/N=4, 384 mm/N=5, 448 mm/N=6, 512 mm/N=7			
Distance between fixing holes for stator	A_s	mm	85	85	85	85
Height of total system	H	mm	131,5	131,5	131,5	131,5

Notes: [1] 0 = Corrected by identical attractive forces
[2] WC = with water cooling
Values in the table apply to operation without forced cooling; exception: linear motors marked with (WC)

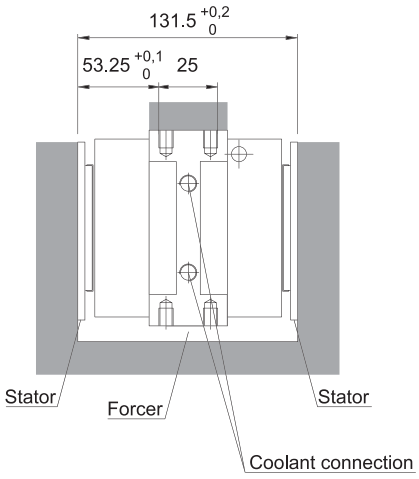
4.3.1 Dimensions

Dimensions for LMT Linear Motor Forcers

All values in mm



Installation of LMT Linear Motors



4.3.2 Model Numbers for LMT Linear Motors

Forcer

LM | T37 | (WC)

- LM: Linear motor
- T37: Motor version (see Table 4.3)
  Txx: iron-core linear motors in sandwich construction
- (WC): Water cooling
  - : without water cooling
  (WC): with water cooling

Stator

LMTS

- LMTS: stator for LMT linear motor

Positioning Systems
Linear Motor Components

HIWIN®
Linear Technology

5. HIWIN Rotary Tables and Torque Motors

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5.2 HIWIN TMS Rotary Tables 73
5.3 Torque Motors, TMR Series 78

5.2

5.3

5. HIWIN Rotary Tables and Torque Motors

5.1 Product Overview and Application Areas

HIWIN rotary tables are directly driven rotary tables and consequently are supplied without gears. The extremely rigid link between motor and load combined with high-quality servo drive regulation ensures excellent acceleration capabilities and good uniformity of movement. HIWIN rotary tables and torque motors are ideally suited for tasks in automation thanks to the hollow shaft model. Media, cable systems or mechanical parts can be fed through without problems.

HIWIN rotary tables are optimized for high torques and substantial dynamics: TMS series is an encapsulated rotary table with cross-roller bearing.

HIWIN torque motors:
Ready-for-installation stators and rotors are application-specific drive solutions

- Drive free from backlash
- Rotating hollow shaft
- Housing manufactured in anodized aluminium
- Protected from contamination, protection class IP40 or IP65
- High torque
- Extremely dynamic
- Drive amplifier can be selected freely
- Precision bearing for maximum repeat accuracy

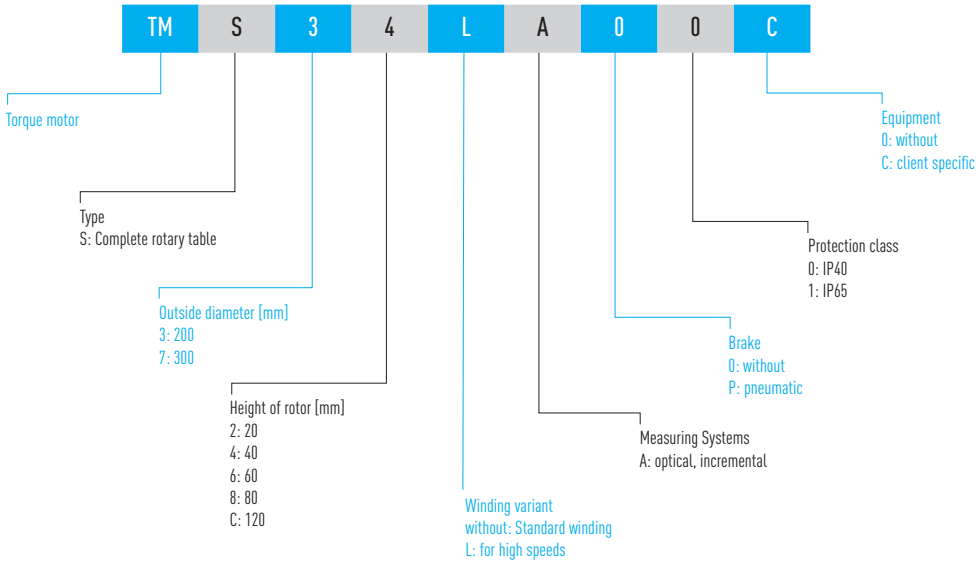
Application Areas of HIWIN Rotary Tables

Classification	Application	Features and main reasons for use					
		Accuracy	Speed	Stiffness	Compact design	Cleanliness	Maintenance-free
Production equipment	CVD, wafer cleaning, ion implantation	○			○	○	○
	Semi-conductor transport, inspection/processing	○			○	○	○
Assembly machinery	Assembly machinery for electric components	○	○		○	○	○
	High-speed assembly machinery for electronic components	○	○		○	○	○
	Various assembly machines	○	○		○		○
Tool machines	Tool changers		○		○		○
	C axes	○		○	○		○
Inspection / testing equipment	Inspection of machine parts	○			○		○
	Inspection of electric components	○			○		○
	Inspection of optical components	○			○		○
	Chemical analysis of liquids		○			○	○
	Various inspection / testing devices	○			○		○
Robots	Various assembly robots	○	○	○	○		○
	Various transportation robots	○	○				○
	Inspections / transportation robots in clean rooms	○	○		○	○	○

5.2 HIWIN TMS Rotary Tables

- Direct driven rotary table with hollow shaft
- Encapsulated, protection class IP65
- Extremely stiff support with cross-roller bearing
- Integrated incremental shaft encoder
- Optional with pneumatic clamping device
- Brushless drive

5.2.1 Model Number for HIWIN TMS Rotary Tables



5.2.2 HIWIN TMS3X Rotary Tables

Dimensions for HIWIN TMS3X Rotary Tables
(For values see Table 5.1)

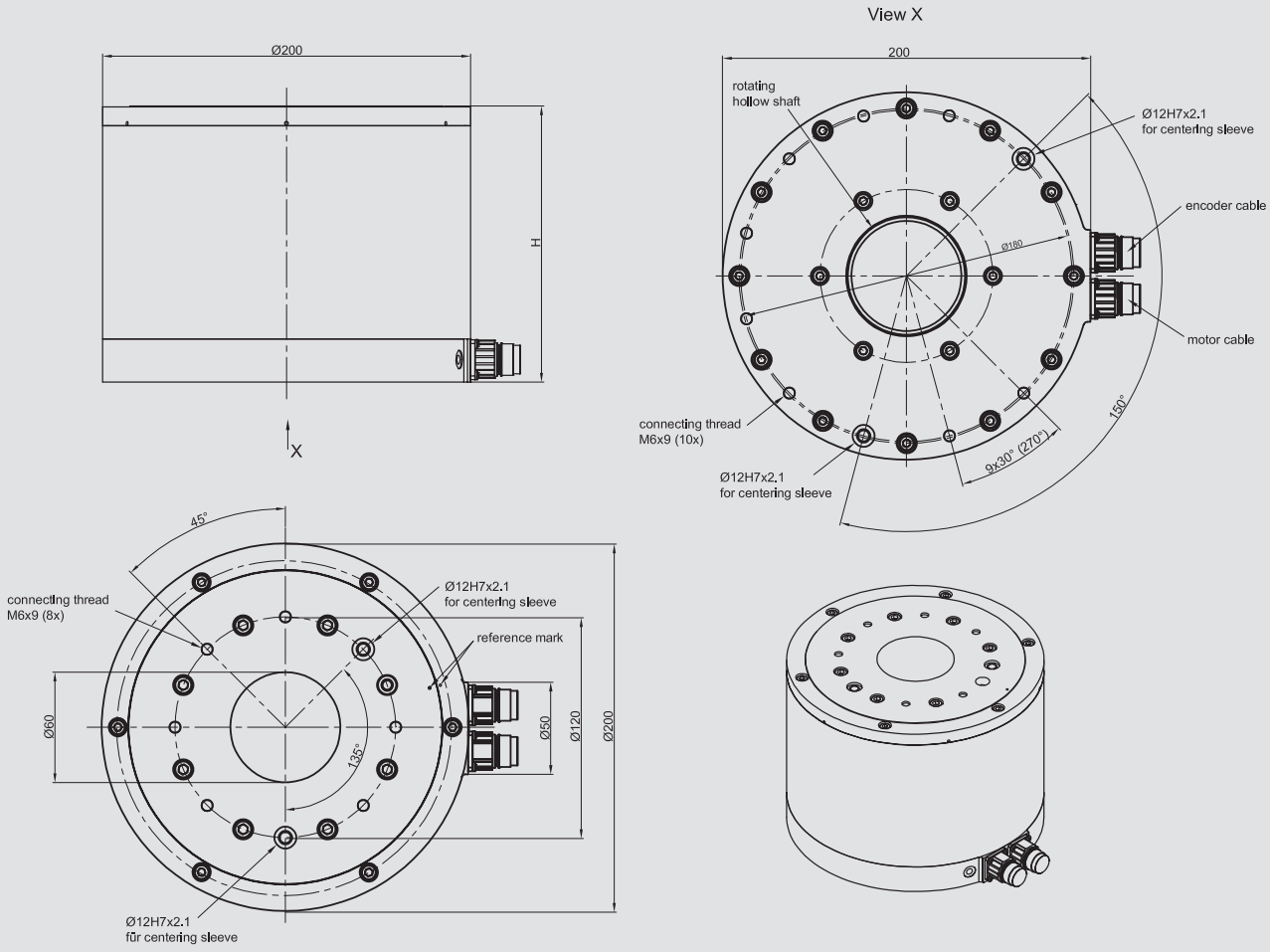


Table 5.1 **Specifications for HIWIN TMS3X Rotary Tables**

Specifications for HIWIN Rotary Tables

	Symbol	Unit	TMS32	TMS34	TMS34L	TMS38	TMS38L	TMS3C	TMS3CL
Peak torque for 1 second	T_p	Nm	20	39	39	78	78	117	117
Continuous torque (coil temp. 80 °C)	T_c	Nm	6	14	14	30	30	45	45
Stationary torque (coil temp..80 °C)	T_s	Nm	6	11	11	23	23	33	33
Moment of inertia of rotating parts	J	kgm^2	0,015	0,020	0,020	0,026	0,026	0,035	0,035
Mass	M_m	kg	16	21	21	26	26	32	32
Max. axial load	F_a	N	15 000	15 000	15 000	15 000	15 000	15 000	15 000
Max. radial load	F_r	N	12 000	12 000	12 000	11 000	11 000	10 000	10 000
Max. speed (at 400 V_{ac}) for 1 second.	n_{max}	1/min	1500	1100	1500	600	1100	400	700
Nominal speed (at 400 V_{ac} and 30% ED)		1/min	700	700	700	500	700	300	600
Accuracy		arc sec	18	18	18	18	18	18	18
Repeatability		arc sec	2	2	2	2	2	2	2
Max. wobble error		arc sec	50	50	50	50	50	50	50
Axial run-out error		mm	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
Height	H	mm	130	150	150	190	190	230	230

Motor Specifications

	Symbol	Unit	TMS32	TMS34	TMS34L	TMS38	TMS38L	TMS3C	TMS3CL
Peak current for 1 second	I_p	A_{eff}	8	8	16	8	16	8	16
Continous current (Coil temp. 80 °C)	I_c	A_{eff}	3	3	6	3	6	3	6
Engine constant (coil temp. 25 °C)	K_m	$Nm/\sqrt{W}$	0,8	1,4	1,4	2,2	2,2	2,8	2,8
Winding resistance (Coil temp.. 25 °C)	R_{25}	Ω	2,4	4,3	1,1	7,2	1,8	10,1	2,6
Winding resistance (Coil temp. 100 °C)	R_{100}	Ω	2,8	5,1	1,3	8,5	2,2	12	3
Motor inductivity	L	mH	8	16	4	27	6,8	37	9,3
Electric time constant	T_e	ms	3,9	3,9	3,9	3,9	3,9	3,9	3,9
Torque constant	K_t	Nm/A_{eff}	2,6	5,2	2,6	10,4	5,2	15,6	7,8
Voltage constant	K_v	$V_{rms}/(rad/s)$	1,6	3,2	1,8	6,4	3,7	9,6	5,5
Number of poles	2p	-	22	22	22	22	22	22	22
Thermal resistance	R_{th}	K/W	0,7	0,58	0,58	0,41	0,41	0,29	029
Thermal circuit breaker			100 °C, bimetal (break contact), DC 12 V/6 A, DC 24 V/3 A						
Max. DC-bus voltage		V	750	750	750	750	750	750	750

Encoder specifications (optical, incremental)

- 3,600 lines / cycle
- Index mark
- Signal output sin/cos 1 V_{ss}

Specifications for pneumatic clamping element (optional)

- Clamping torque 180 Nm at 5 bar
- Suitable for emergency stop due to spring preload

5.2.3 HIWIN TMS7 Rotary Table

Dimensions of HIWIN TMS7 Rotary Tables
(For values, see Table 5.2)

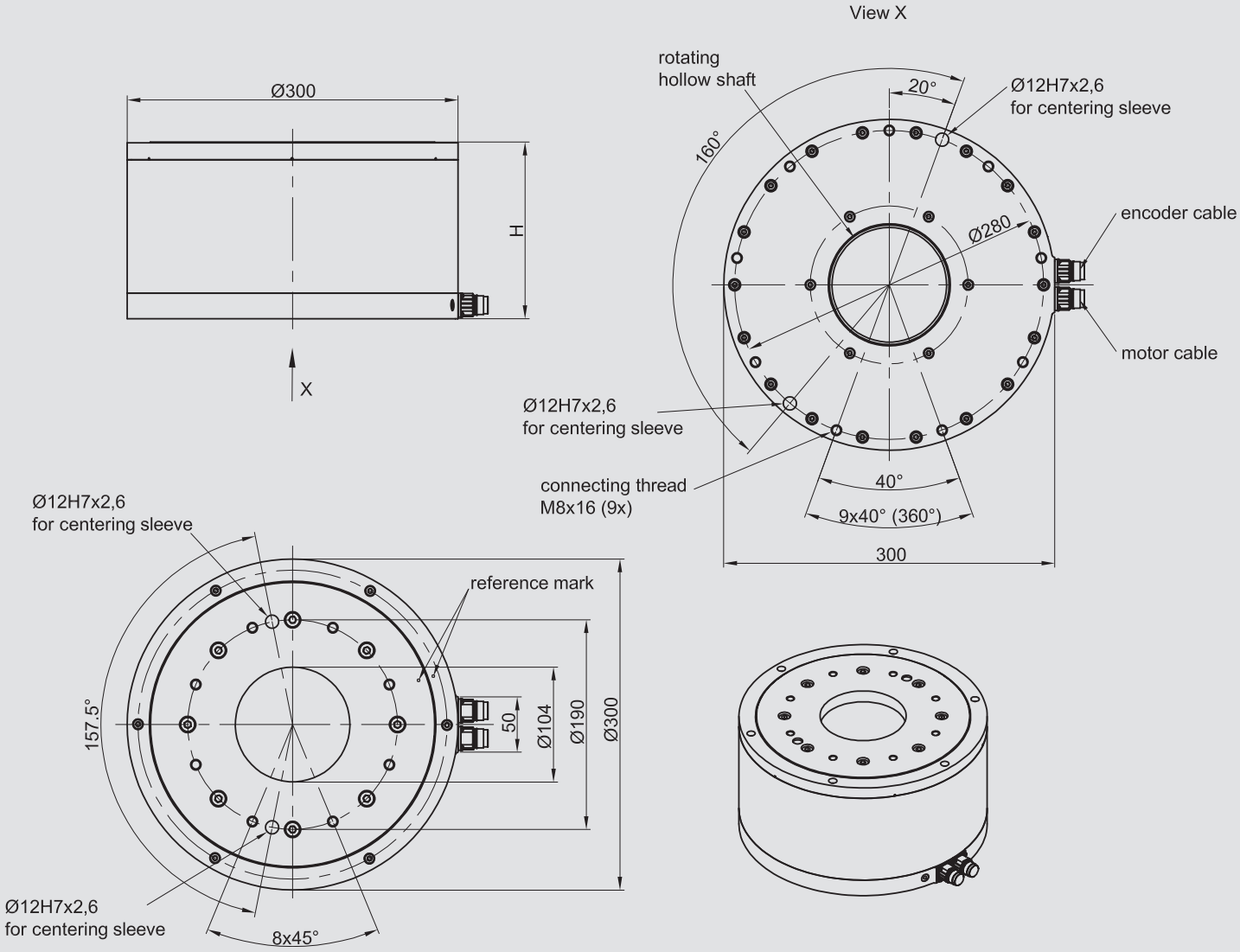


Table 5.2 **Specifications for HIWIN TMS7X Rotary Tables**

Specifications for HIWIN Rotary Tables

	Symbol	Unit	TMS74	TMS74L	TMS76	TMS76L	TMS7C	TMS7CL
Peak torque for 1 second	T_p	Nm	90	90	135	135	270	270
Continuous torque (coil temp. 80 °C)	T_c	Nm	33	33	51	51	105	105
Stationary torque (coil temp..80 °C)	T_s	Nm	25	25	38	38	76	76
Moment of inertia of rotating parts	J	kgm^2	0,152	0,152	0,174	0,174	0,241	0,241
Mass	M_m	kg	39	39	44,5	44,5	61,5	61,5
Max. axial load	F_a	N	25000	25000	25000	25000	25000	25000
Max. radial load	F_r	N	20000	20000	20000	20000	18000	18000
Max. speed (at 400 V_{ac}) for 1 second	n_{max}	1/min	500	900	350	600	170	300
Nominal speed (at 400 V_{ac} and 30% ED)		1/min	400	500	280	500	120	200
Accuracy		arc sec	30	30	30	30	30	30
Repeatability		arc sec	± 2	± 2	± 2	± 2	± 2	± 2
Max. wobble error		arc sec	50	50	50	50	50	50
Axial run-out error		mm	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05	< 0,05
Height	H	mm	160	160	180	180	240	240

Motor Specifications

	Symbol	Unit	TMS74	TMS74L	TMS76	TMS76L	TMS7C	TMS7CL
Peak current for 1 second	I_p	A_{eff}	8	16	8	16	8	16
Continous current (Coil temp. 80 °C)	I_c	A_{eff}	3	6	3	6	3	6
Engine constant (coil temp. 25 °C)	K_m	$Nm/\sqrt{W}$	2,5	2,5	3,0	3,0	5,7	5,7
Winding resistance (Coil temp.. 25 °C)	R_{25}	Ω	8,0	2	10,4	2,6	20,2	5,1
Winding resistance (Coil temp. 100 °C)	R_{100}	Ω	9,5	2,4	12,4	3,1	25,0	6,3
Motor inductivity	L	mH	32	8	42	10,5	84	21
Electric time constant	T_e	ms	4	4	4	4	4	4
Torque constant	K_t	Nm/A_{eff}	12	6	18	9	36	18
Voltage constant	K_v	$V_{rms}/(rad/s)$	7,2	3,6	11,6	5,8	23,1	11,6
Number of poles	2p	-	44	44	44	44	44	44
Thermal resistance	R_{th}	K/W	0,31	0,31	0,25	0,25	0,18	0,18
Thermal circuit breaker			100 °C, bimetal (break contact), DC 12 V/6 A, DC 24 V/3 A					
Max. DC-bus voltage		V	750	750	750	750	750	750

Encoder specifications (optical, incremental)

- 5,400 lines / cycle
- Index mark
- Signal output sin/cos 1 V_{ss}

Specifications for pneumatic clamping element (optional)

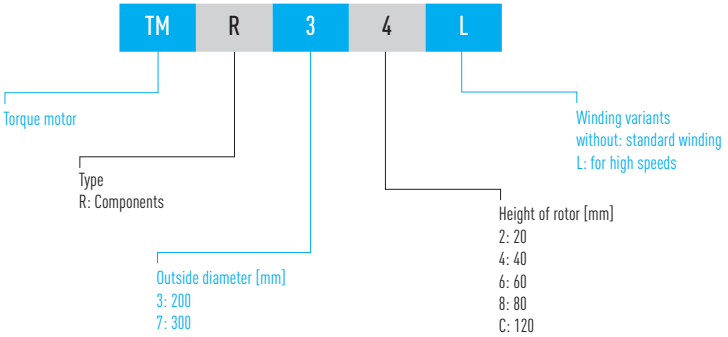
- Clamping torque 400 Nm at 5 bar
- Suitable for emergency stop due to spring preload

5.3 Torque Motors, TMR Series

Torque motors of the TMR series are ready to install motor elements consisting of a stator and rotor. The rotor is a ring element.

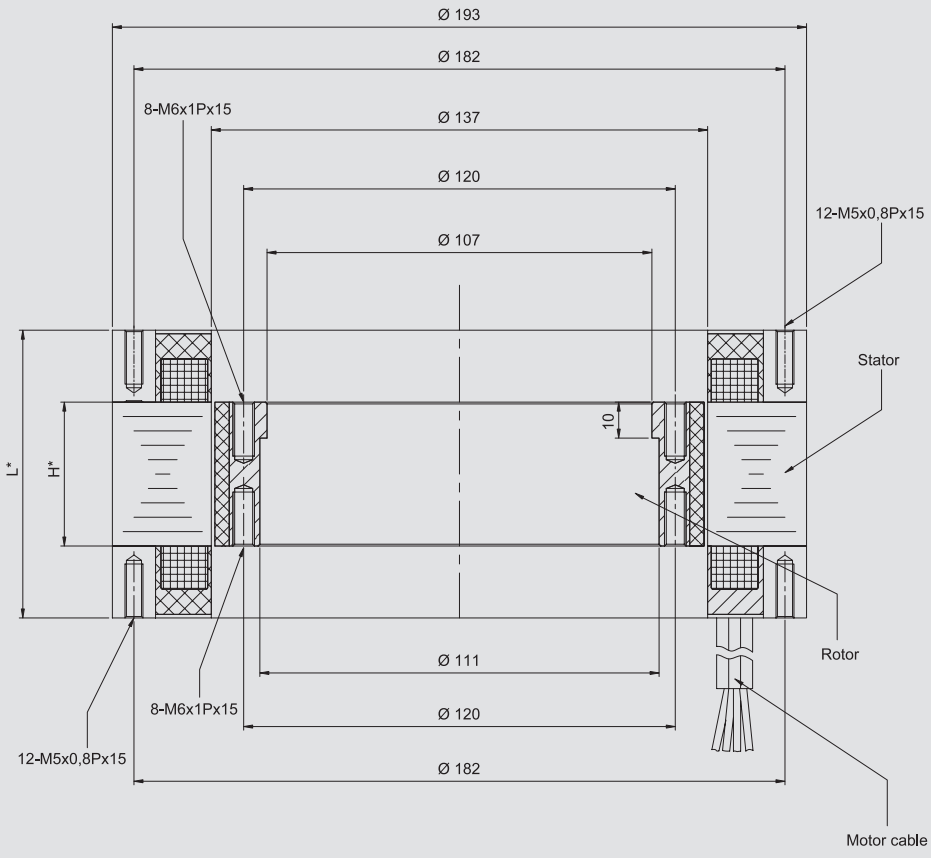
- Brushless drive
- Hollow shaft rotor
- Maintenance-free

5.3.1 Model Number for Torque Motors, TMR Series



5.3.2 Torque Motors, TMR3 Series

Dimensions of TMR3 Torque Motors



All values in mm

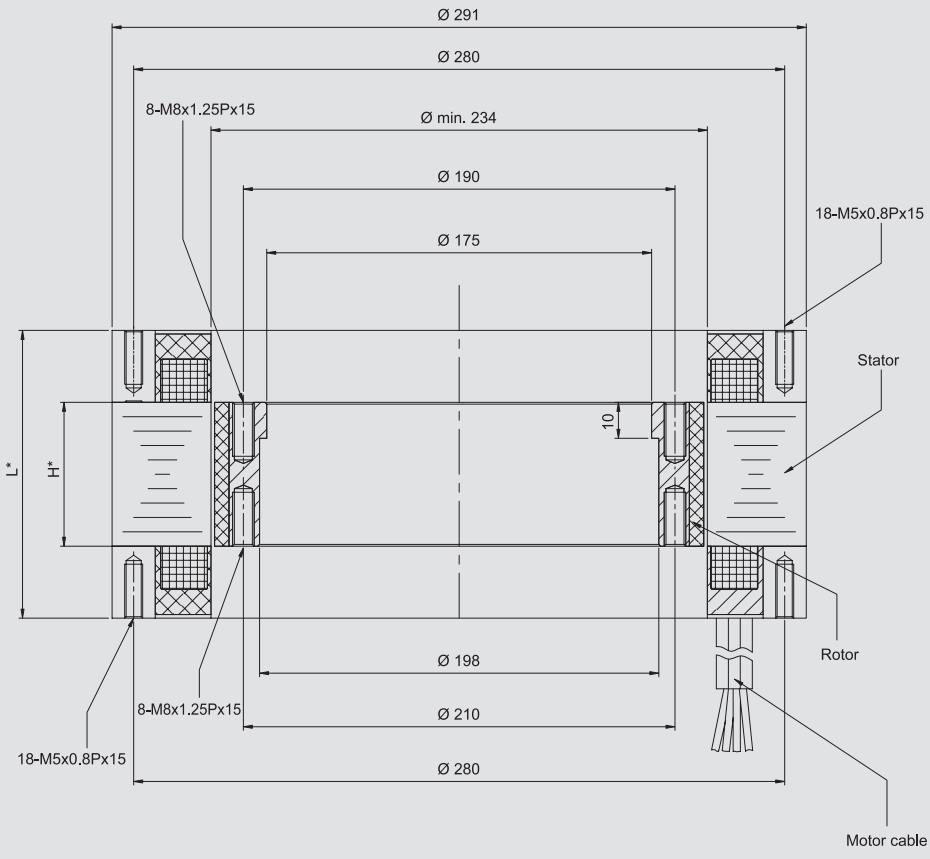
* see Table 5.3

Table 5.3 **Specifications for TMR3 Torque Motors**

	Symbol	Unit	TMR32	TMR34	TMR34L	TMR38	TMR38L	TMR3C	TMR3CL
Peak torque for 1 second	T_p	Nm	22	42	42	80	80	120	120
Continuous torque (coil temp. 80 °C)	T_c	Nm	8	16	16	32	32	47	47
Stationary torque (coil temp..80 °C)	T_s	Nm	6	11	11	23	23	33	33
Peak current for 1 second	I_p	Aeff	8	8	16	8	16	8	16
Continous current (Coil temp. 80 °C)	I_c	Aeff	3	3	6	3	6	3	6
Engine constant (coil temp. 25 °C)	K_m	Nm/√ W	0,8	1,4	1,4	2,2	2,2	2,8	2,8
Winding resistance (Coil temp.. 25 °C)	R_{25}	Ω	2,4	4,3	1,1	7,2	1,8	10,1	2,6
Winding resistance (Coil temp. 100 °C)	R_{100}	Ω	2,8	5,1	1,3	8,5	2,2	12	3
Motor inductivity	L	mH	8	16	4	27	6,8	37	9,3
Electric time constant	T_e	ms	3,9	3,9	3,9	3,9	3,9	3,9	3,9
Torque constant	K_t	Nm/A_{eff}	2,6	5,2	2,6	10,4	5,2	15,6	7,8
Voltage constant	K_v	V_{rms}/(rad/s)	1,6	3,2	1,8	6,4	3,7	9,6	5,5
Number of poles	2p	–	22	22	22	22	22	22	22
Thermal resistance	R_{th}	K/W	0,70	0,58	0,58	0,41	0,41	0,29	0,29
Thermal circuit breakers			100 °C, bimetal (opener), DC 12 V/6 A, DC 24 V/3 A						
Max. DC-bus voltage		V	750	750	750	750	750	750	750
Moment of inertia of rotor ring	J	kgm^2	$2,4 \times 10^{-3}$	$4,8 \times 10^{-3}$	$4,8 \times 10^{-3}$	$8,0 \times 10^{-3}$	$8,0 \times 10^{-3}$	$11,2 \times 10^{-3}$	$11,2 \times 10^{-3}$
Engine mass	M_m	kg	5,5	7,4	7,4	11,8	11,8	16,2	16,2
Height of stator	L	mm	60	80	80	120	120	160	160
Height of rotor	H	mm	20	40	40	80	80	120	120
Standard motor cable length		mm	3000	3000	3000	3000	3000	3000	3000

5.3.3 Torque Motors, TMR7 Series

Dimensions of TMR7 Torque Motors



All values in mm

* see Table 5.4

Table 5.4 **Specifications for TMR7 Torque Motors**

	Symbol	Unit	TMR74	TMR74L	TMR76	TMR76L	TMR7C	TMR7CL
Peak torque for 1 second	T_p	Nm	95	95	140	140	280	280
Continuous torque (coil temp. 80 °C)	T_c	Nm	36	36	54	54	96	96
Stationary torque (coil temp..80 °C)	T_s	Nm	25	25	38	38	76	76
Peak current for 1 second	I_p	A_{eff}	8	16	8	16	8	16
Continous current (Coil temp. 80 °C)	I_c	A_{Eff}	3	6	3	6	3	6
Moment of inertia of rotor ring	J	kgm^2	44 x 10^{-3}	44 x 10^{-3}	66 x 10^{-3}	66 x 10^{-3}	132 x 10^{-3}	132 x 10^{-3}
Engine mass	M_m	kg	11,1	11,1	15,1	15,1	26	26
Engine constant (coil temp. 25 °C)	K_m	Nm/$\sqrt{}$ W	2,5	2,5	3,0	3,0	5,7	5,7
Winding resistance (Coil temp.. 25 °C)	R_{25}	Ω	8,0	2	10,4	2,6	20,2	5,1
Winding resistance (Coil temp. 100 °C)	R_{100}	Ω	9,5	2,4	12,4	3,1	25	6,3
Motor inductivity	L	mH	32	8	42	10,5	84	21
Electric time constant	T_e	ms	4	4	4	4	4	4
Torque constant	K_t	Nm/A_{Eff}	12	6	18	9	36	18
Voltage constant	K_v	V_{rms}/(rad/s)	7,2	3,6	11,6	5,8	23,1	11,6
Number of poles	2p	–	44	44	44	44	44	44
Thermal resistance	R_{th}	K/W	0,31	0,31	0,25	0,25	0,18	0,18
Thermal circuit breakers			100 °C, bimetal (opener), DC 12 V/6 A, DC 24 V/3 A					
Max. DC-bus voltage		V	750	750	750	750	750	750
Height of stator	L	mm	80	80	100	100	160	160
Height of rotor	H	mm	40	40	60	60	120	120
Standard motor cable length		mm	3000	3000	3000	3000	3000	3000

Positioning Systems
HIWIN Rotary Tables and Torque Motors

6. Linear Stages

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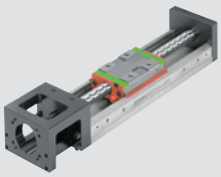
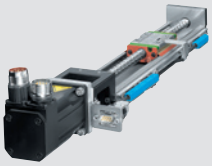
6.4 KK linear Stages with Motor 111



6.1

6.2

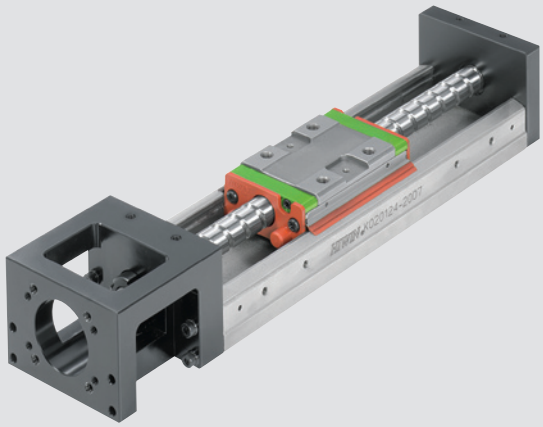


6.4

6. Linear Stages

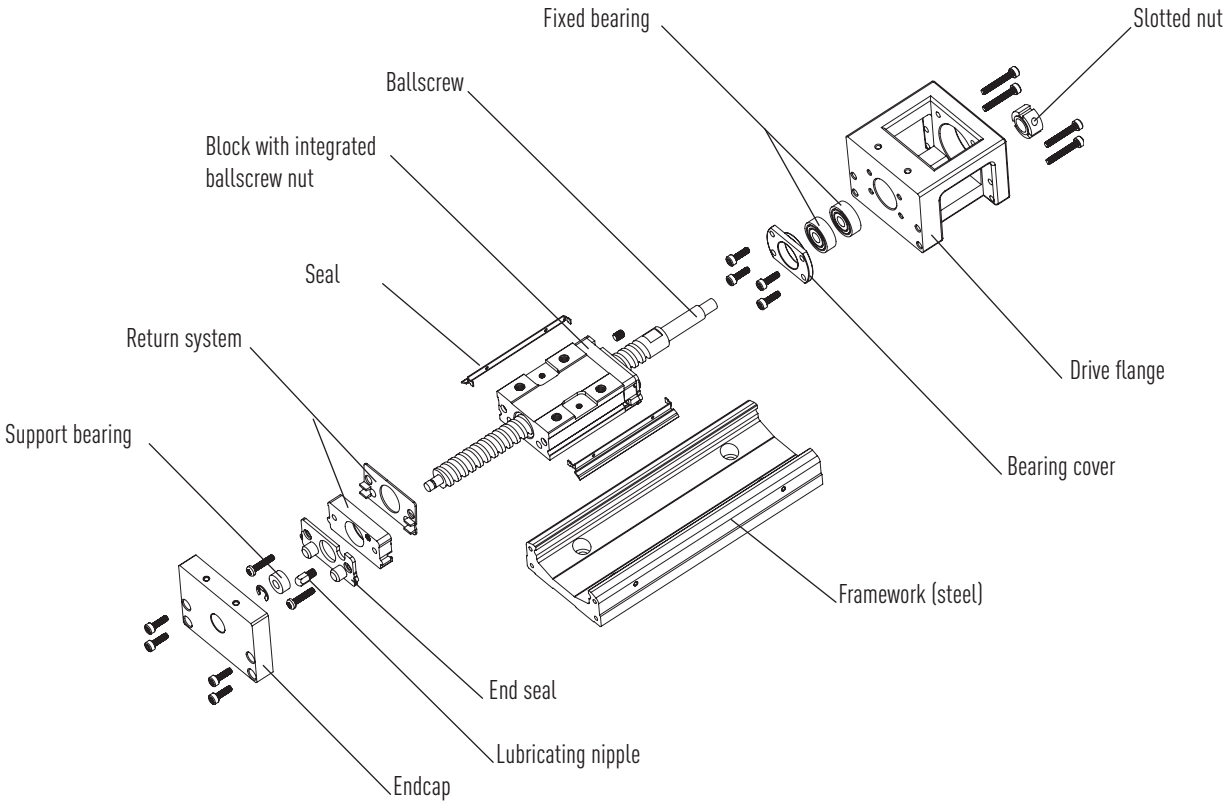
6.1 Product Overview

Linear Stages with Ballscrew (KK Stages)
HIWIN linear stages (KK stages) are compact positioning stages. The advance is generated by a ballscrew, which is mounted in a drive flange ready to use by the motor. Movement is guided by a linear guideway. Various equipment versions and sizes adapt the linear stages to very different tasks and industries.

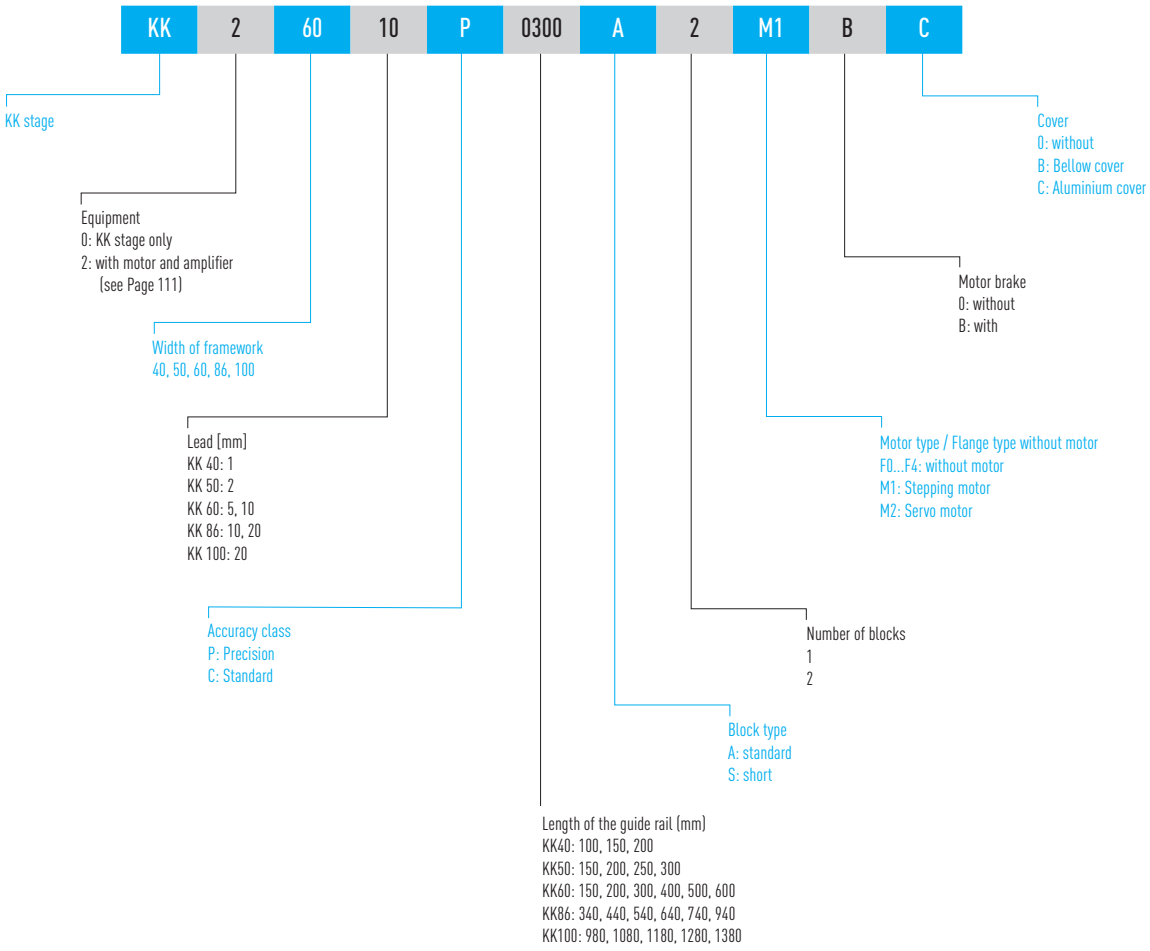


- Module for positioning tasks – KK linear stages with ballscrews from HIWIN can be used universally and are suitable as ready-to-mount stages for many different positioning tasks
- Lean and light – thanks to their compact and lean construction as well as light mass, KK stages can also be integrated into applications with little space.
- Flexible and adaptable – various servo motors, controllers, special models and accessories make KK stages suitable for universal use. KK stages can be supplied with or without a motor on request.
- Modular and multi-dimensional – multiple axis systems can be achieved easily with the KK stages.
- Adaptable and sturdy – KK stages can be equipped with a bellow cover or aluminum cover depending on the ambient requirements.
- Vacuum model possible
- Framework and block made of steel with surface corrosion protection
- Low maintenance

6.1.1 Exploded View of the Linear Stages



6.1.2 Model Numbers for Linear Stages



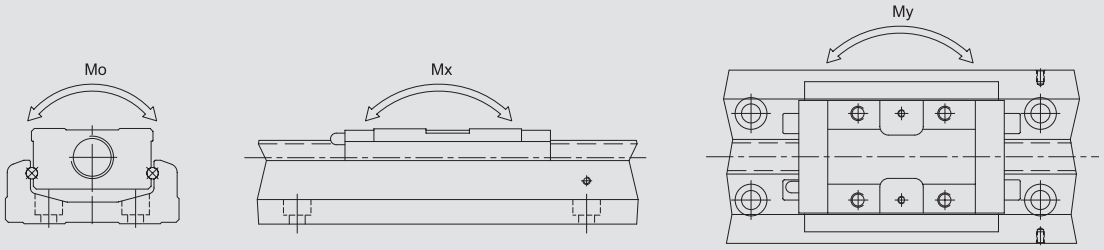
6.2 KK Linear Stages – Technical Data

6.2.1 Maximum Speeds of the KK Modules

Model	Ballscrew Lead [mm]	Rail length [mm]	Speed [mm/s] Precision	Standard
KK40	01	100	190	–
	01	150	190	–
	01	200	190	–
KK50	02	150	270	–
	02	200	270	–
	02	250	270	–
	02	300	270	–
KK60	05	150	550	390
	05	200	550	390
	05	300	550	390
	05	400	550	390
	05	500	550	390
	05	600	340	340
KK60	10	150	1100	790
	10	200	1100	790
	10	300	1100	790
	10	400	1100	790
	10	500	1100	790
	10	600	670	670
KK86	10	340	740	520
	10	440	740	520
	10	540	740	520
	10	640	740	520
	10	740	740	520
	10	940	–	430
KK86	20	340	1480	1050
	20	440	1480	1050
	20	540	1480	1050
	20	640	1480	1050
	20	740	1480	1050
	20	940	–	870
KK100	20	980	1120	–
	20	1080	980	–
	20	1180	750	–
	20	1280	490	–
	20	1380	425	–

6.2.2 Load Capacities

Display of Static Moments Affecting the KK Stages



Load Capacity of KK Stages

		KK4001	KK5002	KK6005		KK6010		KK8610		KK8620		KK10020	
		P*	P*	P*	C**	P*	C**	P*	C**	P*	C**	P*	C**
Ballscrew													
Nominal diameter [mm]		8	8	12	12	12	12	15	15	15	15	20	20
Lead [mm]		1	2	5	5	10	10	10	10	20	20	20	20
Dynamic load [N]		735	2136	3744	3377	2410	2107	7144	6429	4645	4175	7046	4782
Static load [N]		1538	3489	6243	5625	3743	3234	12642	11387	7655	6889	12544	9163
Linear guideway													
Dynamic load [N]	Standard block A	3920	8007	13230	13230	13230	13230	31458	31458	31458	31458	39200	39200
	Short block S	–	–	7173	7173	7173	7173	–	–	–	–	–	–
Static load [N]	Standard block A	6468	12916	21462	21462	21462	21462	50764	50764	50764	50764	63406	63406
	Short block S	–	–	11574	11574	11574	11574	–	–	–	–	–	–
Permissible static moment Mx Pitching [N-m]	Standard block A1	33	116	152	152	152	152	622	622	622	622	960	960
	Standard block A2	182	278	348	348	348	348	3050	3050	3050	30_{50}	4763	4763
	Short block S1	–	–	72	72	72	72	–	–	–	–	–	–
	Short block S2	–	–	205	205	205	205	–	–	–	–	–	–
Permissible static moment My Yawing [N-m]	Standard block A1	33	116	152	152	152	152	622	622	622	622	960	960
	Standard block A2	182	278	348	348	348	348	3050	3050	3050	3050	4763	4763
	Short block S1	–	–	72	72	72	72	–	–	–	–	–	–
	Short block S2	–	–	205	205	205	205	–	–	–	–	–	–
Permissible static moment Mo Rolling [N-m]	Standard block A1	81	222	419	419	419	419	1507	1507	1507	1507	2205	2205
	Standard block A2	162	444	838	838	838	838	3014	3014	3014	3014	4410	4410
	Short block S1	-	-	241	241	241	241	-	-	-	-	-	-
	Short block S2	-	-	482	482	482	482	-	-				

* P = Precision KK stage
** C = Standard KK stage

6.2.3 Accuracies

Accuracies for KK Stages

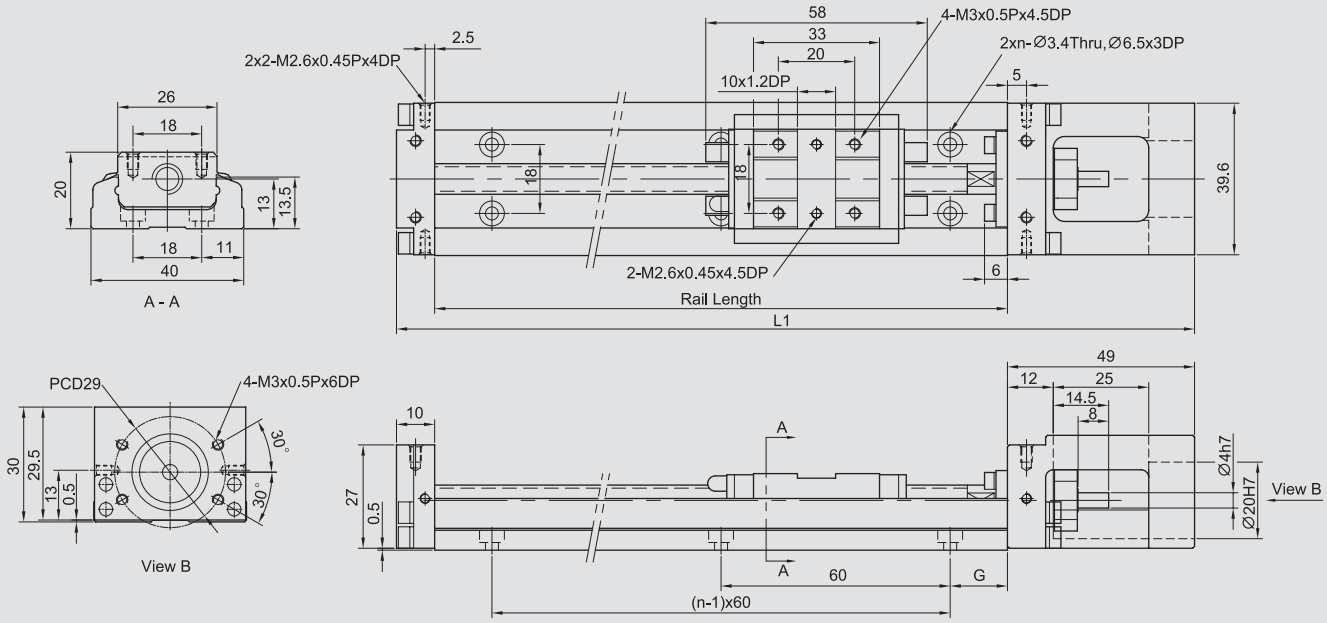
Type	Rail length [mm]	Repeatability [mm]		Accuracy [mm]		Guideway parallelism [mm]		Starting torque [Nmm]	
		P*	C**	P*	C**	P*	C**	P*	C**
KK40	100	±0,003	-	0,020	-	0,010	-	12	-
	150	±0,003	-	0,020	-	0,010	-	12	-
	200	±0,003	-	0,020	-	0,010	-	12	-
KK50	150	±0,003	-	0,020	-	0,010	-	40	-
	200	±0,003	-	0,020	-	0,010	-	40	-
	250	±0,003	-	0,020	-	0,010	-	40	-
	300	±0,003	-	0,020	-	0,010	-	40	-
KK60	150	±0,003	±0,01	0,020	-	0,010	-	150	70
	200	±0,003	±0,01	0,020	-	0,010	-	150	70
	300	±0,003	±0,01	0,020	-	0,010	-	150	70
	400	±0,003	±0,01	0,020	-	0,010	-	150	70
	500	±0,003	±0,01	0,020	-	0,010	-	150	70
	600	±0,003	±0,01	0,020	-	0,010	-	150	70
KK86	340	±0,003	±0,01	0,025	-	0,015	-	150	100
	440	±0,003	±0,01	0,025	-	0,015	-	150	100
	540	±0,003	±0,01	0,025	-	0,015	-	150	100
	640	±0,003	±0,01	0,025	-	0,015	-	150	100
	740	±0,003	±0,01	0,030	-	0,020	-	170	100
	940	±0,003	±0,01	0,040	-	0,030	-	250	100
KK100	980	±0,005	±0,01	0,035	-	0,025	-	170	120
	1080	±0,005	±0,01	0,035	-	0,025	-	170	120
	1180	±0,005	±0,01	0,040	-	0,030	-	200	120
	1280	±0,005	±0,01	0,045	-	0,030	-	230	150
	1380	±0,005	±0,01	0,050	-	0,040	-	250	150

* P = Precision KK stage
** C = Standard KK stage

Reference Side
When observed from the motor flange, the reference side is located on the left side of the linear module

6.2.4 Dimensions of KK40 Stages

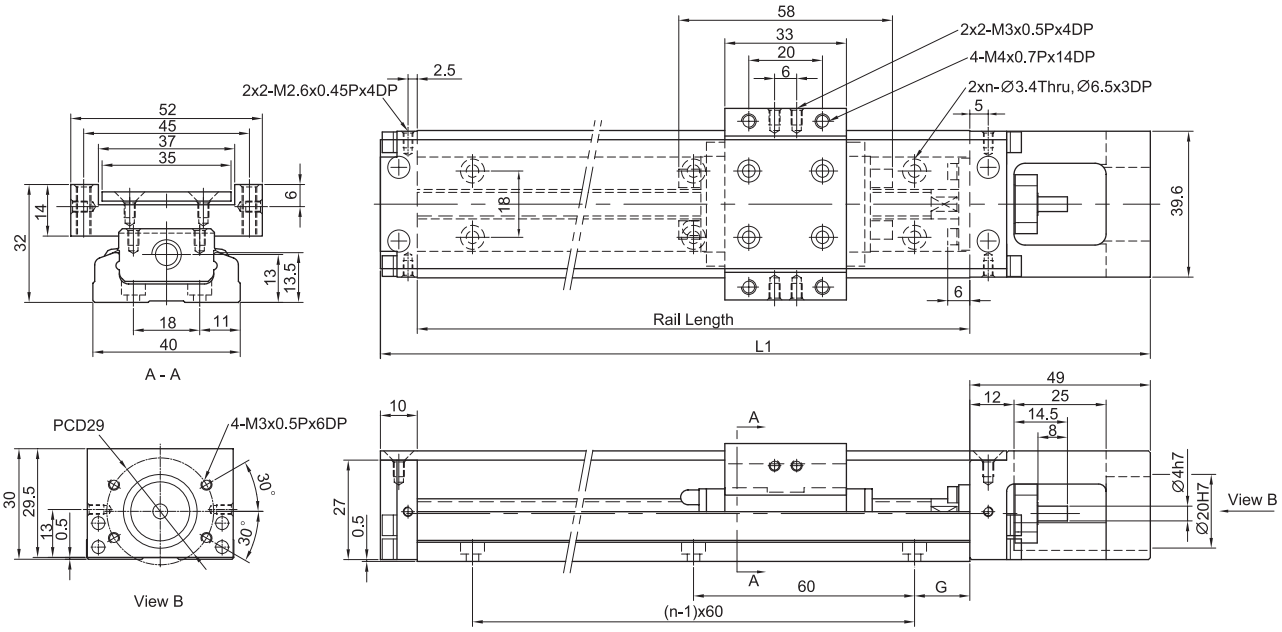
KK40 Stages without Cover



Dimensions and Mass of the KK40 Stages without Cover

		Rail length		
		100	150	200
Total length L1 [mm]		159	209	259
Max. stroke [mm]	Block A1	36	86	136
	Block A2	–	34	84
G [mm]		20	15	40
n		2	3	3
Mass [kg]	Block A1	0,48	0,6	0,72
	Block A2	–	0,67	0,79

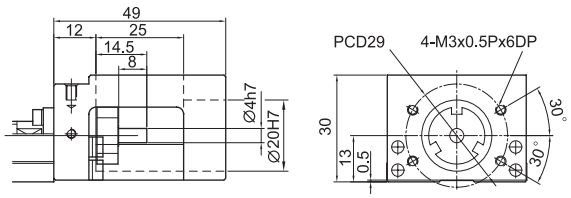
KK40 Stages with Aluminium Cover



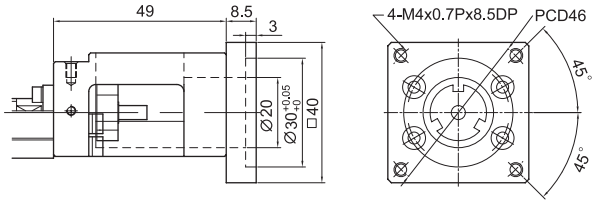
Dimensions and Mass of the KK40 Stages with AluminiumCover

		Rail length		
		100	150	200
Total length L1 [mm]		209	259	159
Max. stroke [mm]	Block A1	86	136	36
	Block A2	–	34	84
G [mm]		20	15	40
n		2	3	3
Mass [kg]	Block A1	0,55	0,68	0,82
	Block A2	–	0,76	0,89

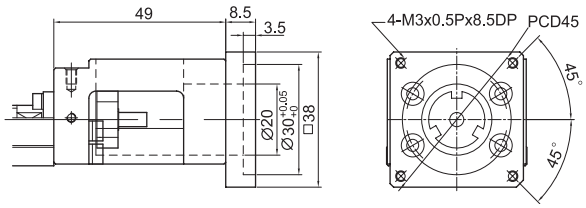
KK40 Stages Adapter Flange F0



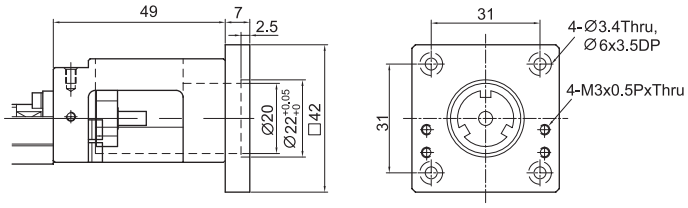
KK40 Stages Adapter Flange F1



KK40 Stages Adapter Flange F2

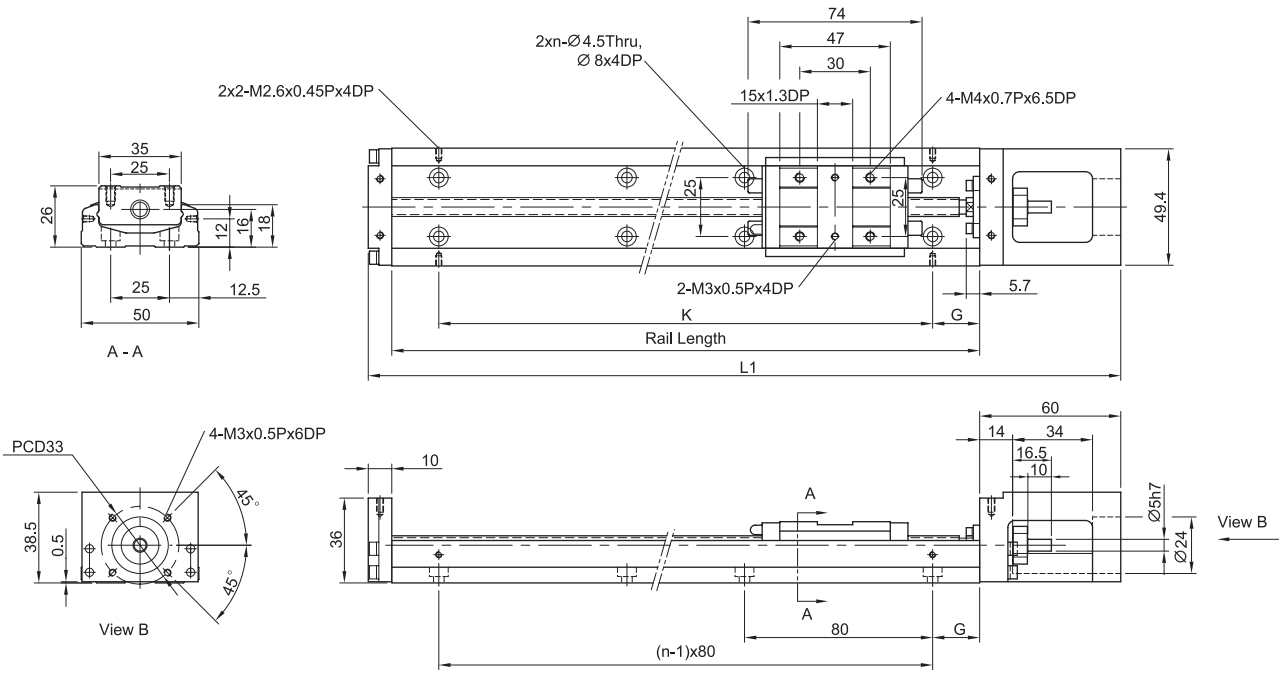


KK40 Stages Adapter Flange F3



6.2.5 Dimensions of KK Stages KK50

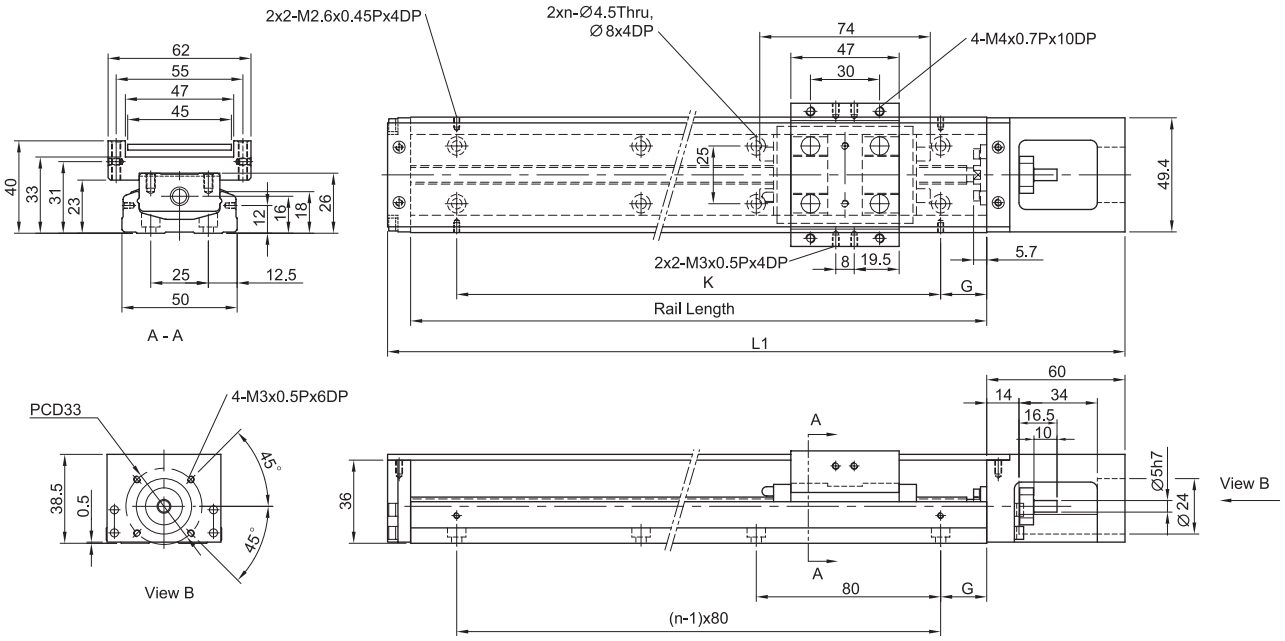
KK50 Stage without Cover



Dimensions and Mass of the KK50-Stages without Cover

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	K [mm]	n	Mass [kg] Block A1	Block A2
150	220	70	-	35	80	2	1	-
200	270	120	55	20	160	3	1,2	1,4
250	320	170	105	45	160	3	1,4	1,6
300	370	220	155	30	240	4	1,6	1,8

KK50 Stages with Aluminium Cover

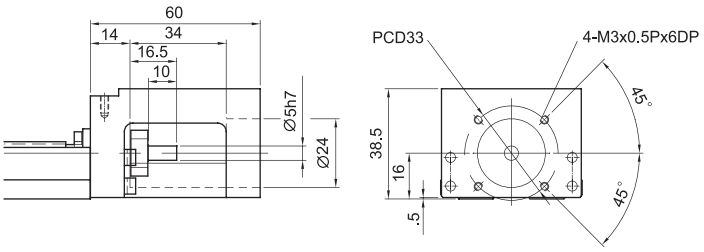


Dimensions and Mass of the KK50-Stages with Aluminium Cover

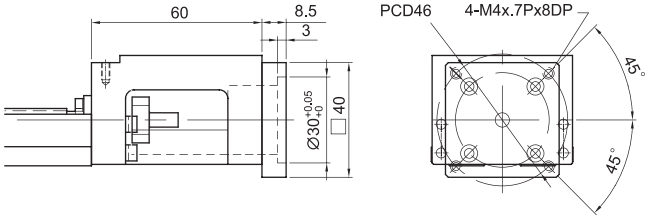
Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm]		G [mm]	K [mm]	n	Mass [kg]	
		Block A1	Block A2				Block A1	Block A2
150	220	70	-	35	80	2	1,1	-
200	270	120	55	20	160	3	1,3	1,5
250	320	170	105	45	160	3	1,6	1,8
300	370	220	155	30	240	4	1,8	2,0

Positioning Systems
Linear Module

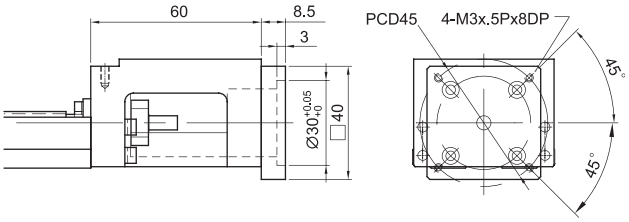
KK50 Stages Adapter Flange F0



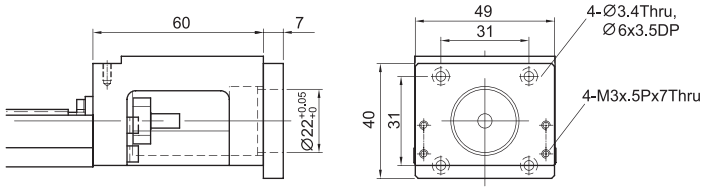
KK50 Stages Adapter Flange F1



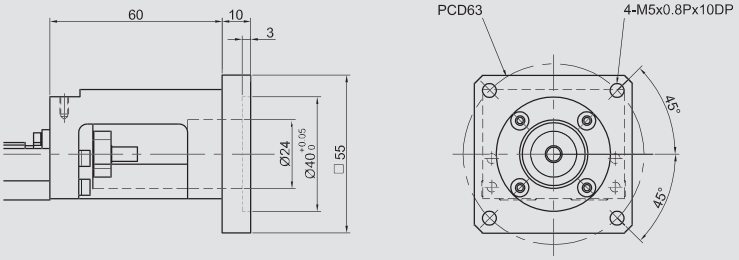
KK50 Stages Adapter Flange F2



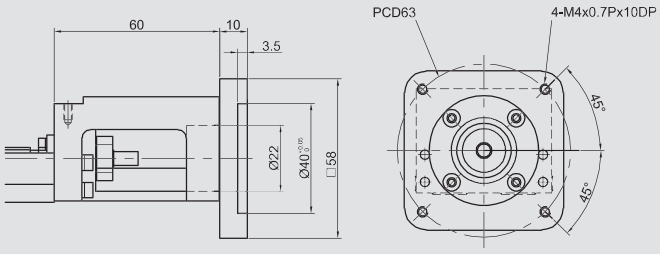
KK50 Stages Adapter Flange F3



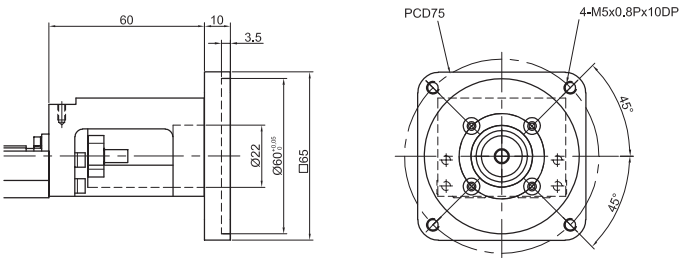
KK50 Stages Adapter Flange F4



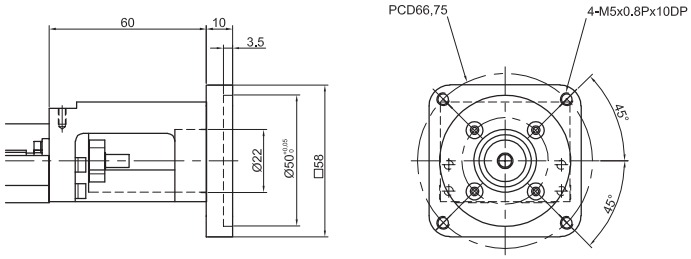
KK50 Stages Adapter Flange F5



KK50 Stages Adapter Flange F6

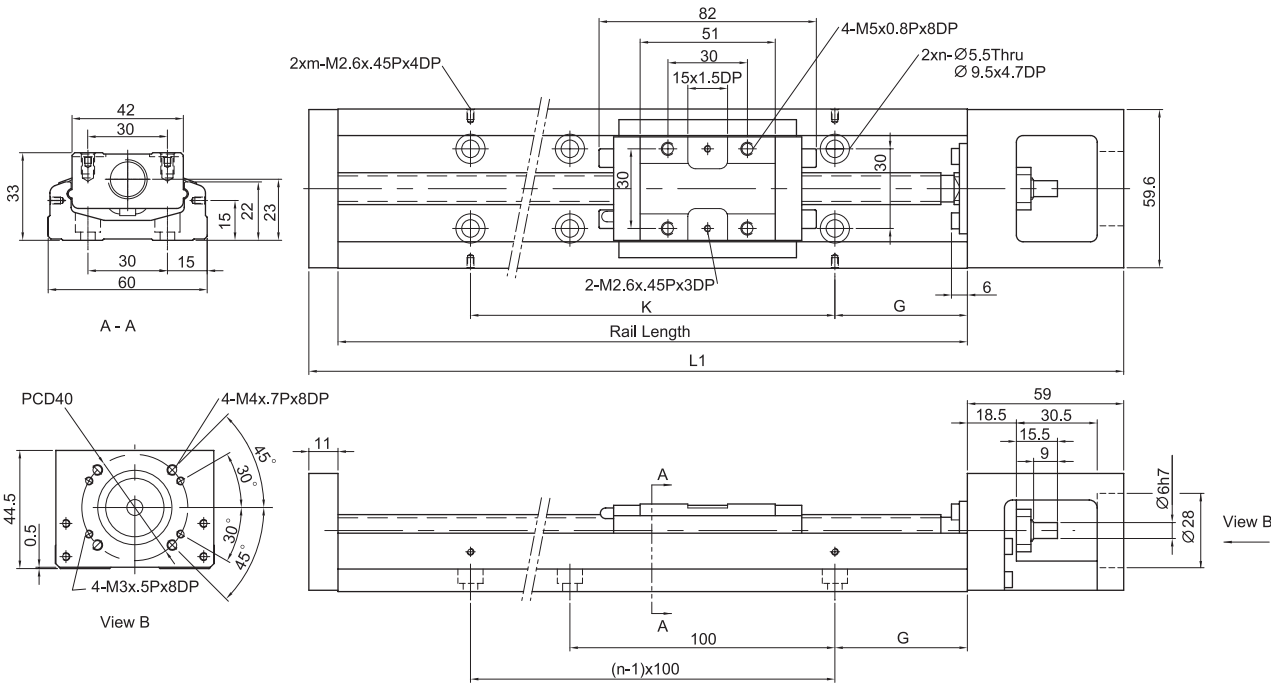


KK50 Stages Adapter Flange F7



6.2.6 Dimensions of KK Stages KK50

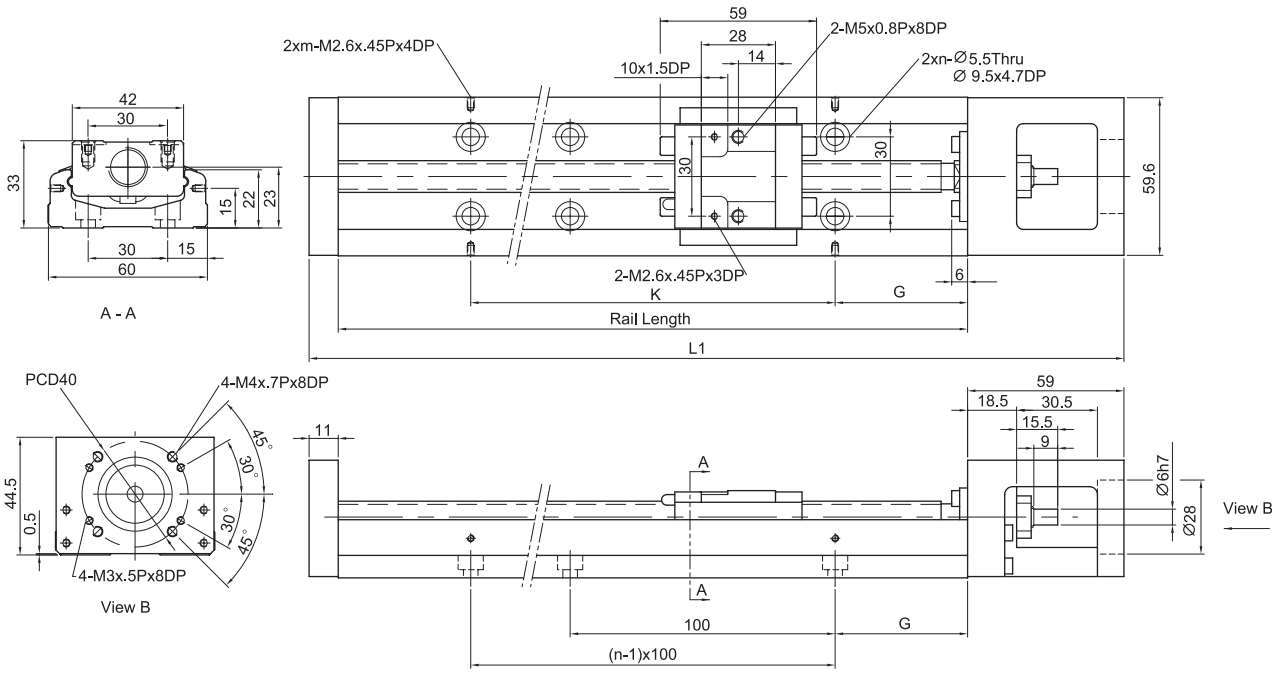
KK60 Stages without Cover, Standard Block



Dimensions and Mass of the KK60 Stages without Cover, Standard Block

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	K [mm]	n	m	Mass [kg] Block A1	Block A2
150	220	60	-	25	100	2	2	1,5	-
200	270	110	-	50	100	2	2	1,8	-
300	370	210	135	50	200	3	2	2,4	2,7
400	470	310	235	50	100	4	4	3	3,3
500	570	410	335	50	200	5	3	3,6	3,9
600	670	510	435	50	100	6	6	4,2	4,6

KK60 Stages without Cover, Short Block

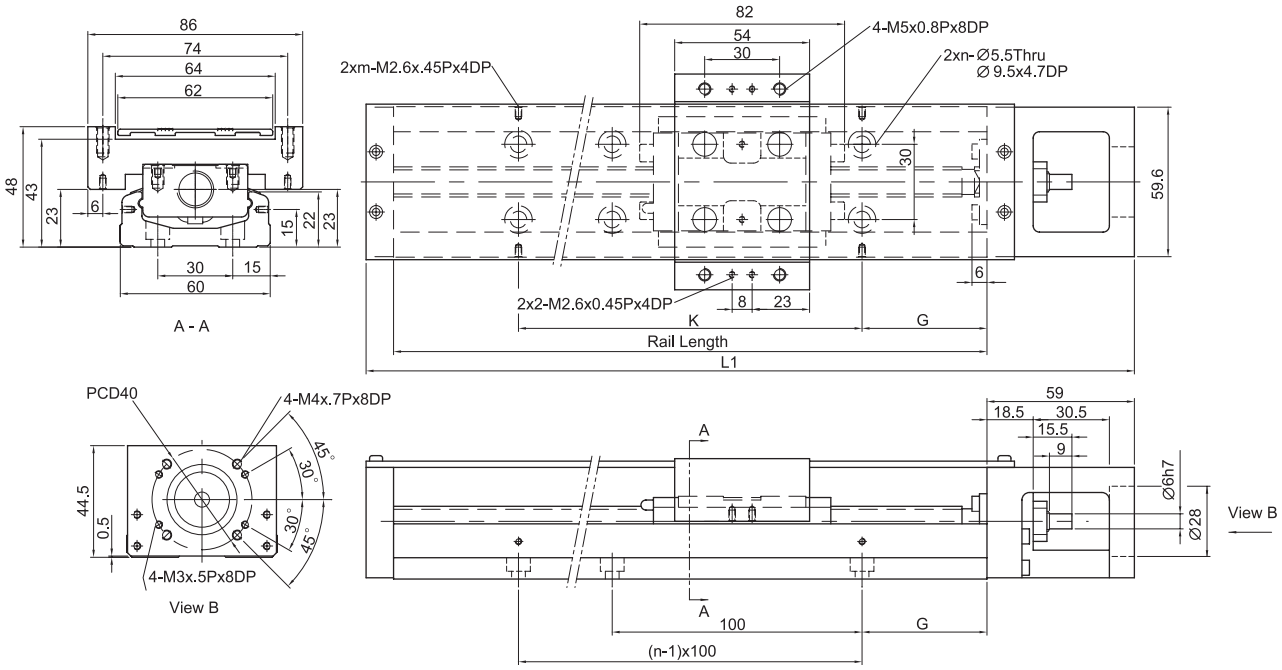


Dimensions and Mass of the KK60 Stages without Cover, Short Block

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	K [mm]	n	m	Mass [kg] Block A1	Block A2
150	220	85	34	25	100	2	2	1,4	1,6
200	270	135	84	50	100	2	2	1,7	1,9
300	370	235	184	50	200	3	2	2,3	2,5
400	470	335	284	50	100	4	4	2,9	3,1
500	570	435	384	50	200	5	3	3,5	3,7
600	670	535	484	50	100	6	6	4,1	4,3

Positioning Systems
Linear Module

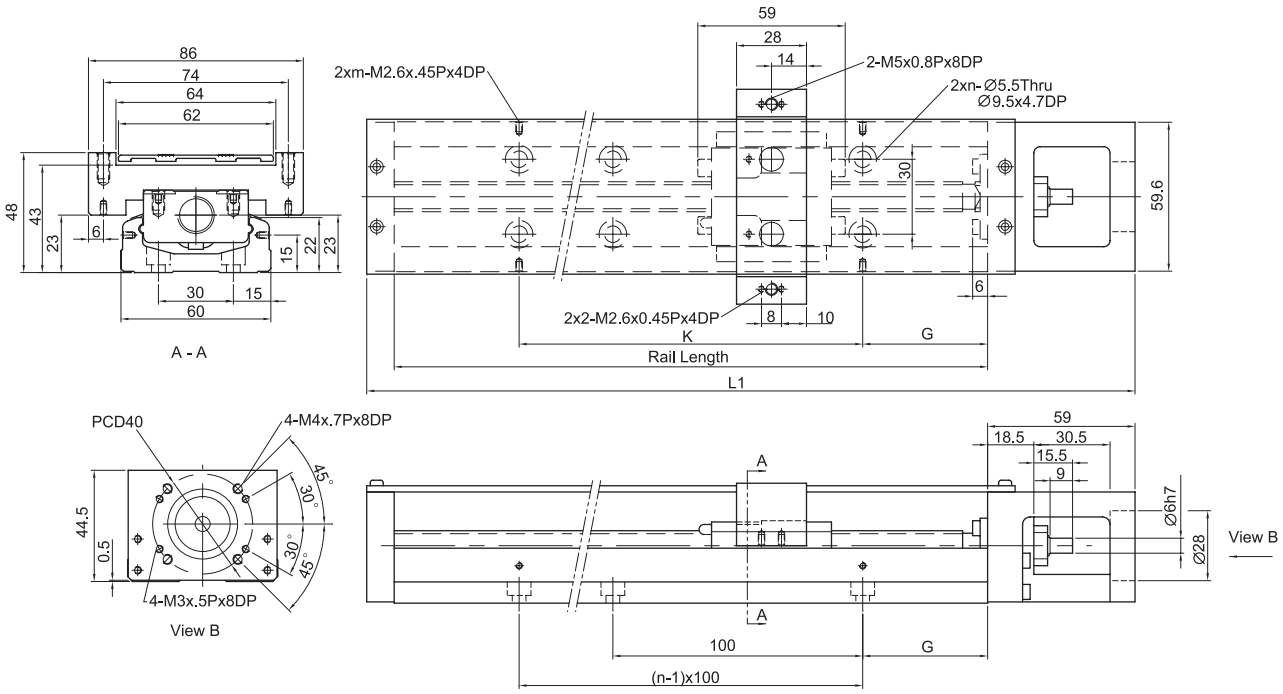
KK60 Stages with Aluminium Cover, Standard Block



Dimensions and Mass of the KK60 Stages without Cover, Short Block

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	K [mm]	n	m	Mass [kg] Block A1	Block A2
150	220	60	-	25	100	2	2	1,7	-
200	270	110	-	50	100	2	2	2,1	-
300	370	210	135	50	200	3	2	2,7	3,0
400	470	310	235	50	100	4	4	3,3	3,6
500	570	410	335	50	200	5	3	3,9	4,2
600	670	510	435	50	100	6	6	4,6	5,0

KK60 Stages with Aluminium Cover, Short Block

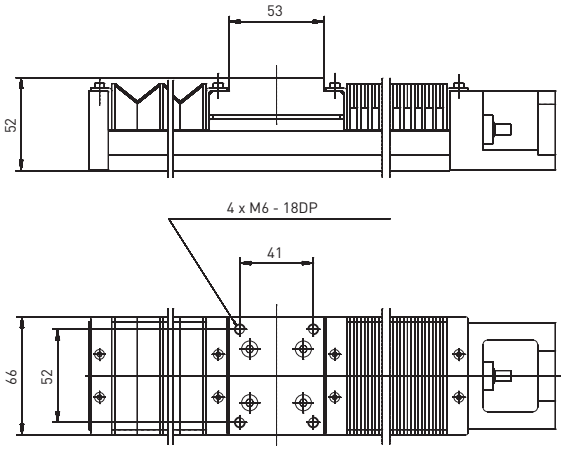


Dimensions and Mass of the KK60-Stages with Aluminium Cover, Short Block

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	K [mm]	n	m	Mass [kg] Block A1	Block A2
150	220	85	34	25	100	2	2	1,6	1,8
200	270	135	84	50	100	2	2	1,9	2,1
300	370	235	184	50	200	3	2	2,5	2,7
400	470	335	284	50	100	4	4	3,1	3,3
500	570	435	384	50	200	5	3	3,7	3,9
600	670	535	484	50	100	6	6	4,4	4,6

Positioning Systems
Linear Module

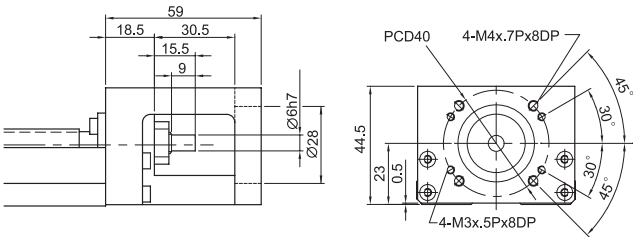
KK60 Stages with Bellow Cover



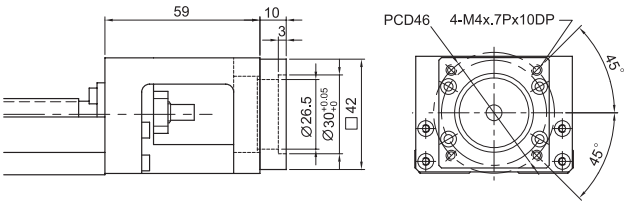
Dimensions and Mass of the KK60 Stages with Bellow Cover

Rail length [mm]	Mass [kg]	Maximum stroke [mm] Block A1	Block A2
150	1,7	45	–
200	2,1	77	–
300	2,7	151	93
400	3,3	230	165
500	3,9	300	241
600	4,6	376	317

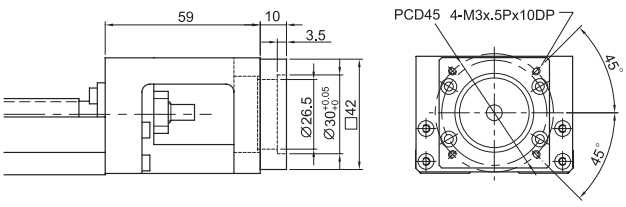
KK60 Stages Adapter Flange F0



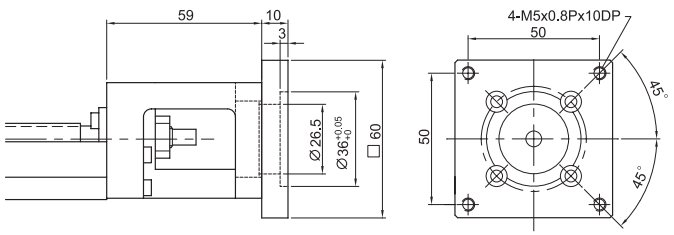
KK60 Stages Adapter Flange F1



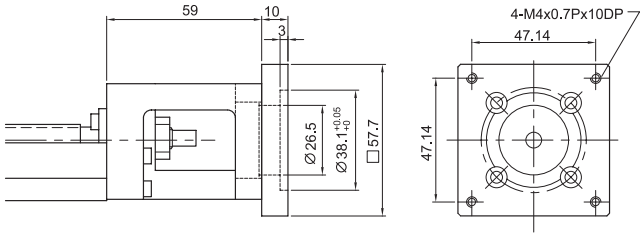
KK60 Stages Adapter Flange F2



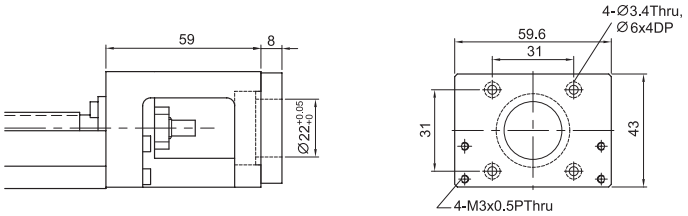
KK60 Stages Adapter Flange F3



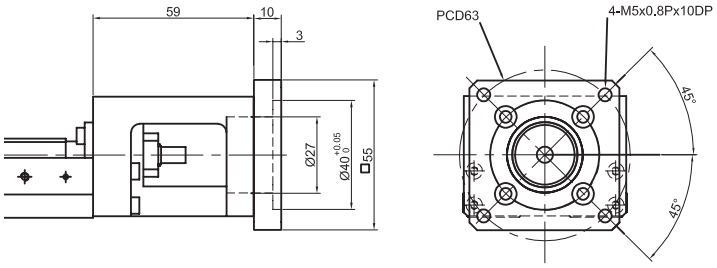
KK60 Stages Adapter Flange F4



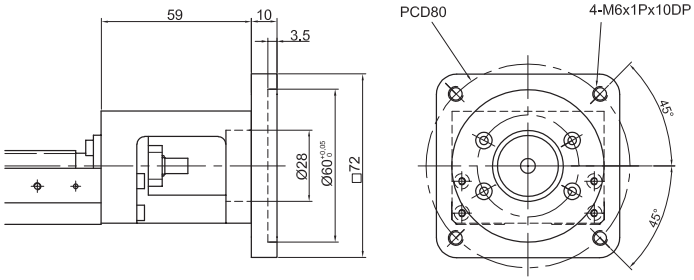
KK60 Stages Adapter Flange F5



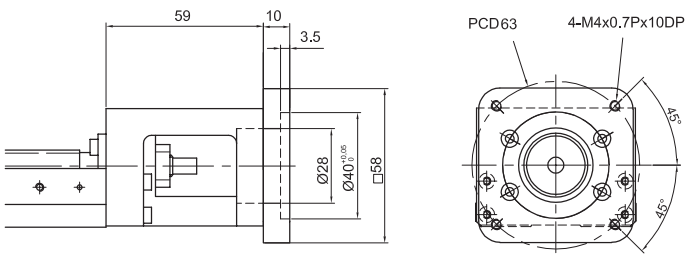
KK60 Stages Adapter Flange F6



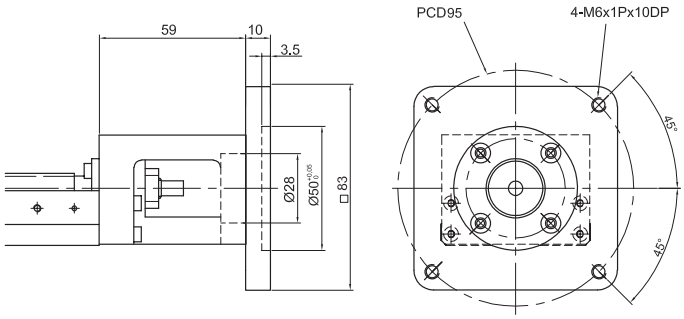
KK60 Stages Adapter Flange F7



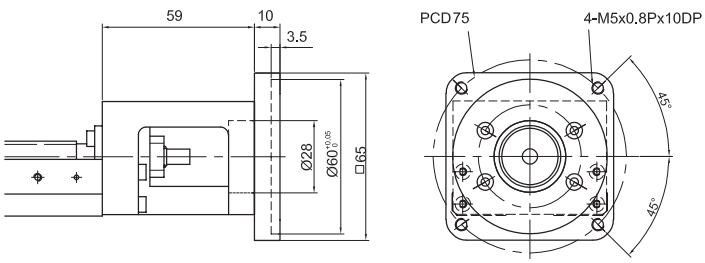
KK60 Stages Adapter Flange F8



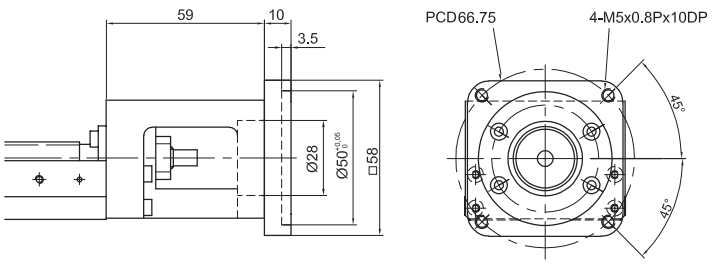
KK60 Stages Adapter Flange F9



KK60 Stages Adapter Flange F10

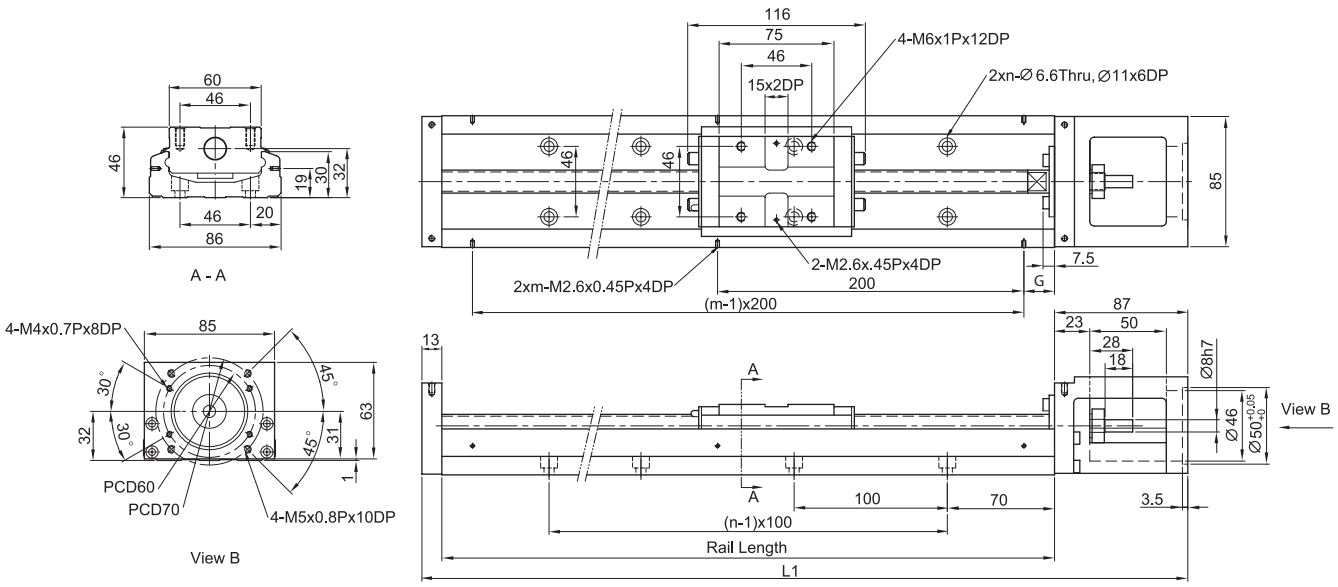


KK60 Stages Adapter Flange F11



6.2.7 Dimensions of KK Stages KK86

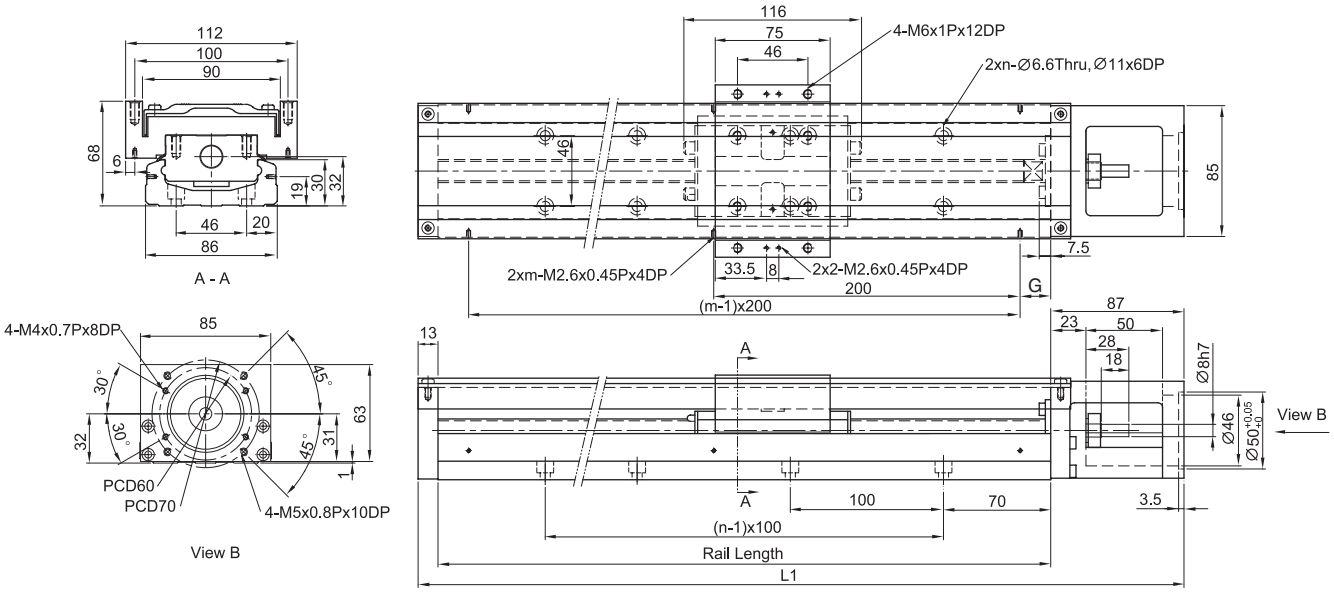
KK86 Stages without Cover



Dimensions and Mass of the KK86 Stages without Cover

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	n	m	Mass [kg] Block A1	Block A2
340	440	210	100	70	3	2	5,7	6,5
440	540	310	200	20	4	3	6,9	7,7
540	640	410	300	70	5	3	8,0	8,8
640	740	510	400	30	6	4	9,2	10,0
740	840	610	500	70	7	4	10,4	11,2
940	1040	810	700	70	9	5	11,6	12,4

KK86 Stages with Aluminium Cover

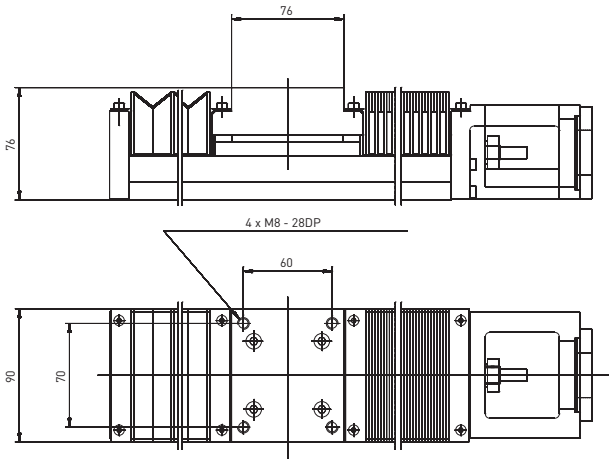


Dimensions and Mass of the KK86 Stages with Aluminium Cover

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	n	m	Mass [kg] Block A1	Block A2
340	440	210	100	70	3	2	6,5	7,3
440	540	310	200	20	4	3	7,8	8,6
540	640	410	300	70	5	3	9,0	9,8
640	740	510	400	30	6	4	10,3	11,3
740	840	610	500	70	7	4	11,6	12,4
940	1040	810	700	70	9	5	13,0	13,8

Positioning Systems
Linear Module

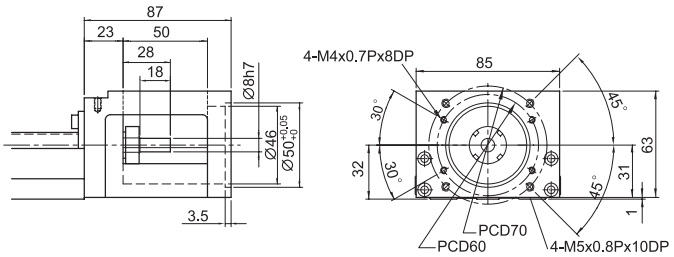
KK86 Stages with Bellow Cover



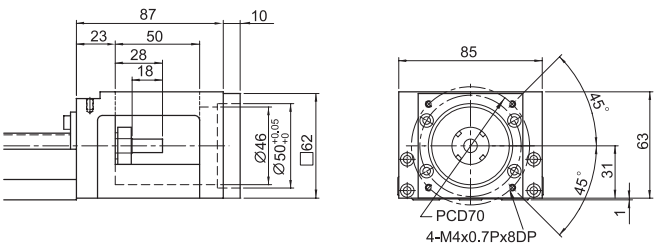
Dimensions and Mass of the KK86 Stages with Bellow Cover

Rail length [mm]	Mass [kg]	Maximum stroke [mm] Block A1	Block A2
340	6,3	174	84
440	7,6	248	158
540	8,8	327	237
640	10	410	318
740	11,3	491	399
940	12,7	654	561

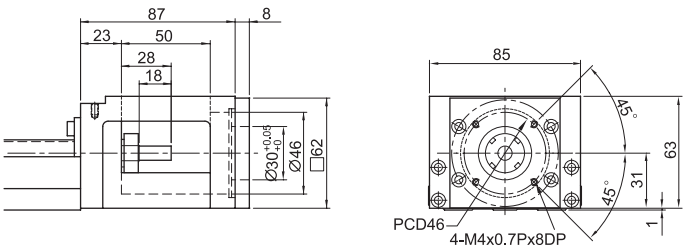
KK86 Stages Adapter Flange F0



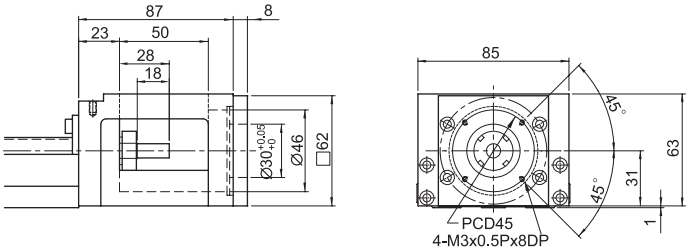
KK86 Stages Adapter Flange F1



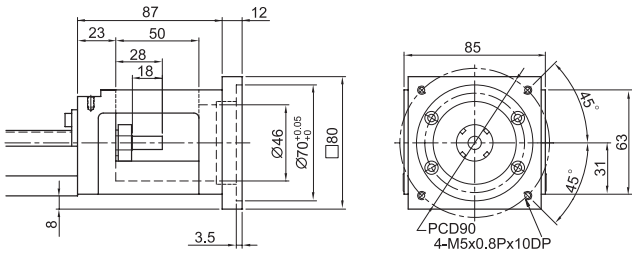
KK86 Stages Adapter Flange F2



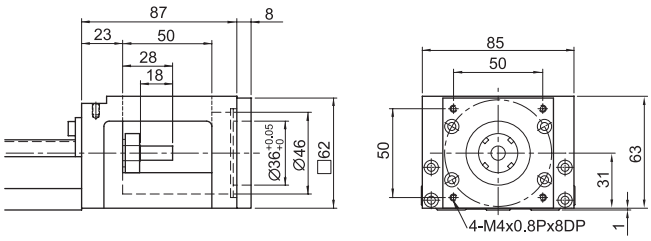
KK86 Stages Adapter Flange F3



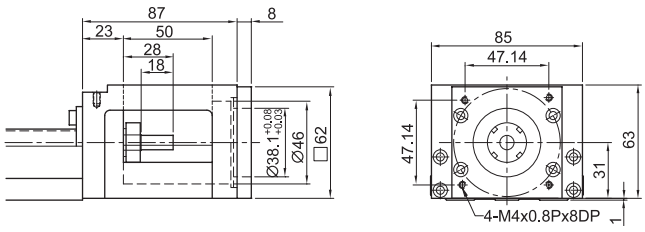
KK86 Stages Aapter Flange F4



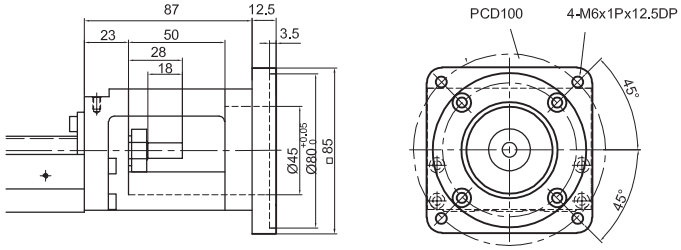
KK86 Stages Adapter Flange F5



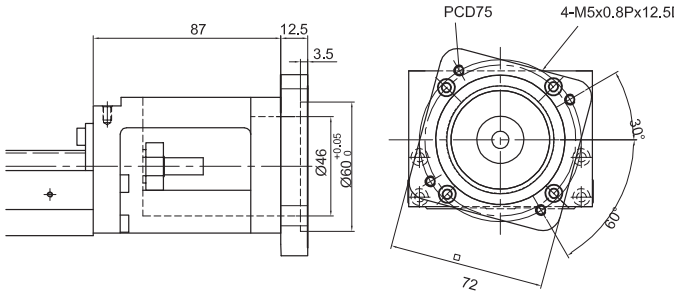
KK86 Stages Adapter Flange F6



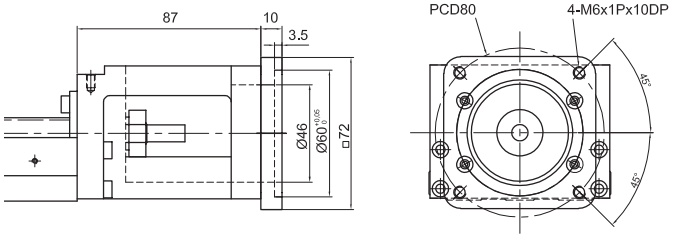
KK86 Stages Adapter Flange F7



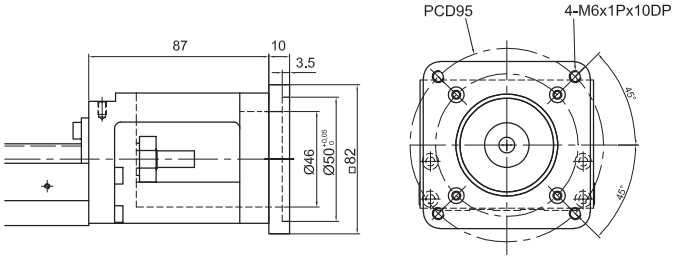
KK86 Stages Adapter Flange F8



KK86 Stages Adapter Flange F9

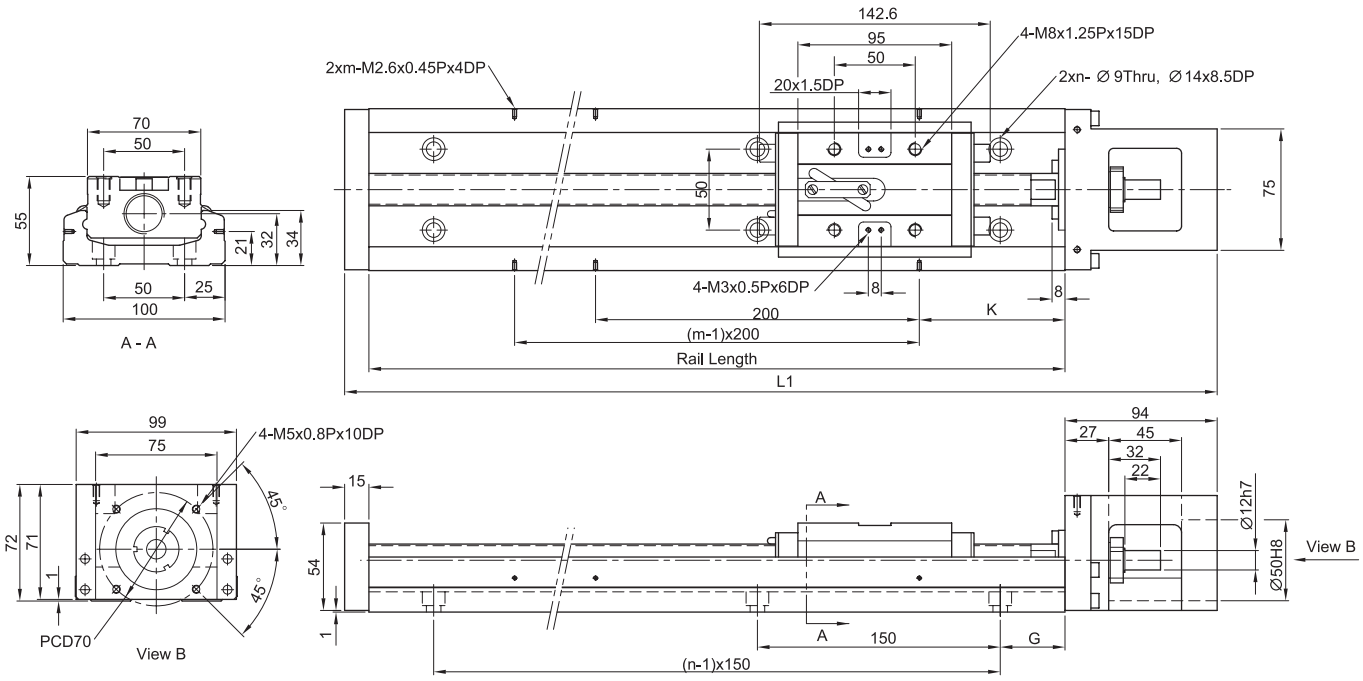


KK86 Stages Adapter Flange F10



6.2.8 Dimensions of KK Stage KK100

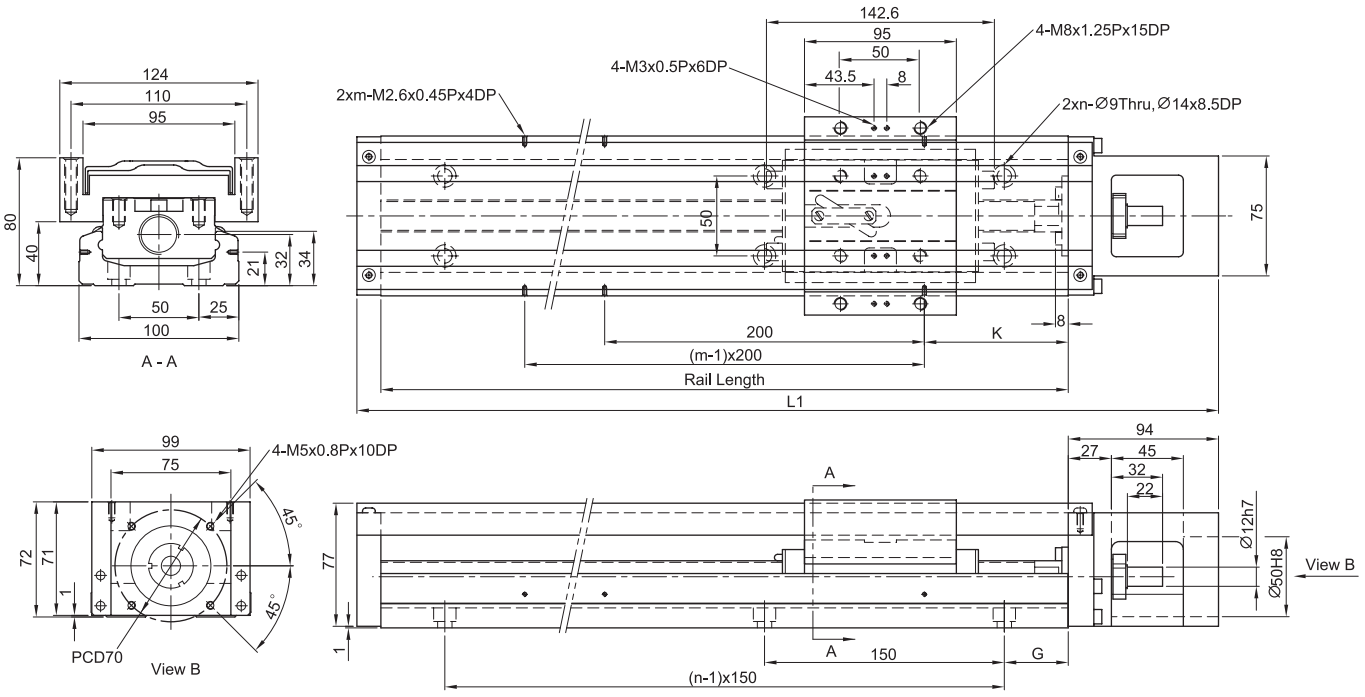
KK100 Stages without Cover



Dimensions and Mass of the KK100 Stages without Cover

Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm]		G [mm]	K [mm]	n	m	Mass [kg]	
		Block A1	Block A2					Block A1	Block A2
980	1089	828	700	40	90	7	5	18,6	20,3
1080	1189	928	800	15	40	8	6	20,3	22,0
1180	1289	1028	900	65	90	8	6	22,0	23,7
1280	1389	1128	1000	40	40	9	7	23,6	25,3
1380	1489	1228	1100	15	90	10	7	25,3	27,0

KK100 Stages with Aluminium Cover

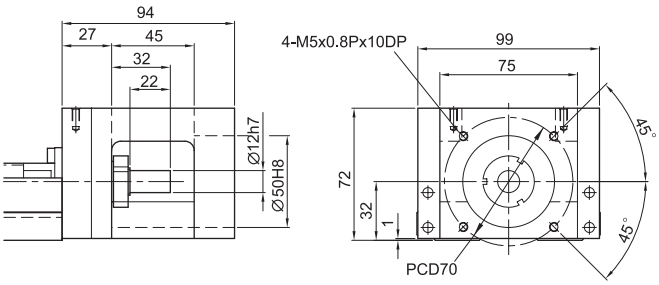


Dimensions and Mass of KK100 Stages with Aluminium Cover

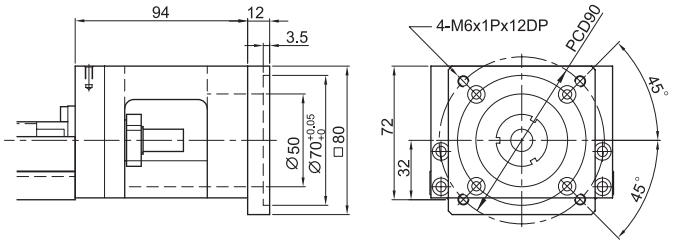
Rail length [mm]	Total length L1 [mm]	Maximum stroke [mm] Block A1	Block A2	G [mm]	K [mm]	n	m	Mass [kg] Block A1	Block A2
980	1089	828	700	40	90	7	5	20,4	22,1
1080	1189	928	800	15	40	8	6	22,2	23,9
1180	1289	1028	900	65	90	8	6	24,0	25,7
1280	1389	1128	1000	40	40	9	7	25,7	27,4
1380	1489	1228	1100	15	90	10	7	27,5	29,2

Positioning Systems
Linear Module

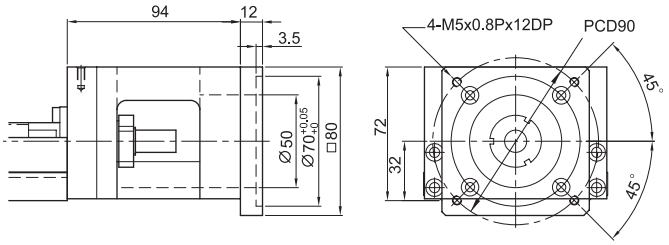
KK100 Stages Adapter Flange F0



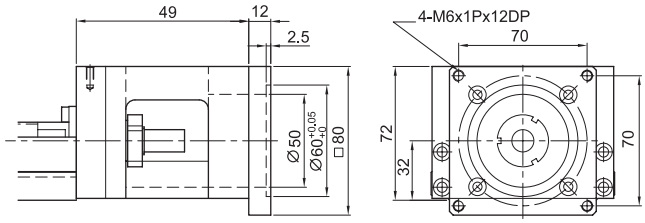
KK100 Stages Adapter Flange F1



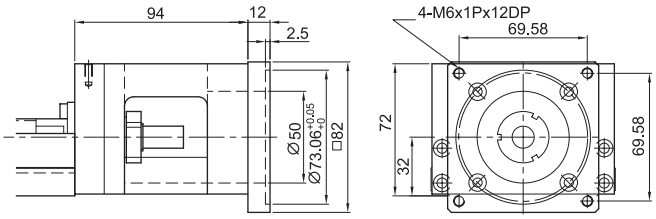
KK100 Stages Adapter Flange F2



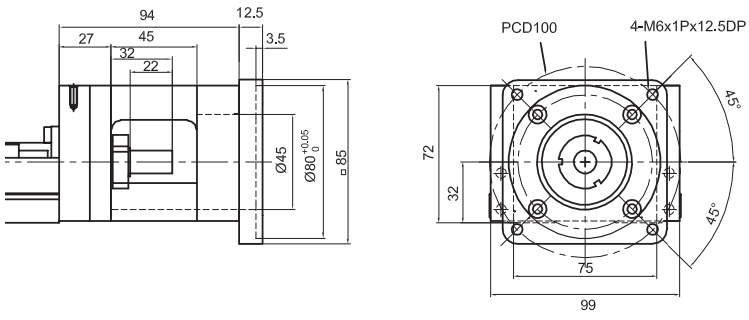
KK100 Stages Adapter Flange F3



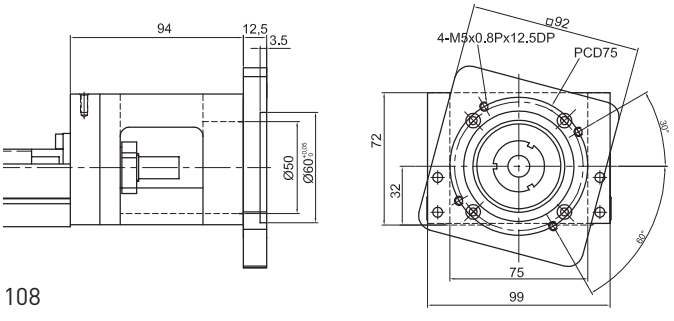
KK100 Stages Adapter Flange F4



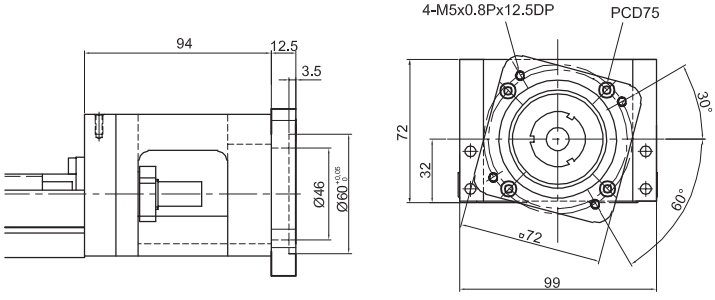
KK100 Stages Adapter Flange F5



KK100 Stages Adapter Flange F6



KK100 Stages Adapter Flange F7



6.3 KK Linear Stage Accessories

6.3.1 Article Overview of Adapter Plates for KK Stages

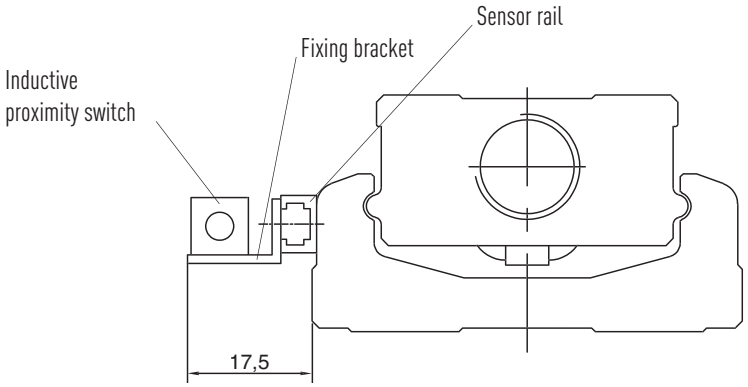
Model	Adapter plate	Article number set (comprising adapter plate and fixing screws)
KK40	KK-40-F1	8-11-0205
	KK-40-F2	8-11-0206
	KK-40-F3	8-11-0207
KK50	KK-50-F1	8-11-0209
	KK-50-F2	8-11-0210
	KK-50-F3	8-11-0211
	KK-50-F4	8-11-0120
	KK-50-F5	8-11-0212
	KK-50-F6	8-11-0213
	KK-50-F7	8-11-0214
KK60	KK-60-F1	8-11-0215
	KK-60-F2	8-11-0216
	KK-60-F3	8-11-0217
	KK-60-F4	8-11-0218
	KK-60-F5	8-11-0219
	KK-60-F6	8-11-0129
	KK-60-F7	8-11-0220
	KK-60-F8	8-11-0221
	KK-60-F9	8-11-0222
	KK-60-F10	8-11-0223
	KK-60-F11	8-11-0224
KK86	KK-86-F1	8-11-0225
	KK-86-F2	8-11-0226
	KK-86-F3	8-11-0227
	KK-86-F4	8-11-0228
	KK-86-F5	8-11-0229
	KK-86-F6	8-11-0230
	KK-86-F7	8-11-0132
	KK-86-F8	8-11-0068
	KK-86-F9	8-11-0231
	KK-86-F10	8-11-0232
KK100	KK-100-F1	8-11-0233
	KK-100-F2	8-11-0234
	KK-100-F3	8-11-0235
	KK-100-F4	8-11-0236
	KK-100-F5	8-11-0132
	KK-100-F6	8-11-0237
	KK-100-F7	8-11-0068

6.3.2 Article Overview of Sensor Rails for KK Stage

KK sizes	Article number Sensor rail set (comprising sensor rail and fixing materials, cam switch)
KKx4001P100A1	8-11-0239
KKx4001P150A1	8-11-0240
KKx4001P200A1	8-11-0241
KKx5002P150A1	8-11-0242
KKx5002P200A1	8-11-0243
KKx5002P250A1	8-11-0244
KKx5002P300A1	8-11-0245
KKx60xxP150EA1	8-11-0246
KKx60xxP200EA1	8-11-0247
KKx60xxP300EA1	8-11-0248
KKx60xxP400EA1	8-11-0249
KKx60xxP500EA1	8-11-0250
KKx60xxP600EA1	8-11-0251
KKx86xxP340A1	8-11-0252
KKx86xxP440A1	8-11-0253
KKx86xxP540A1	8-11-0254
KKx86xxP640A1	8-11-0255
KKx86xxP740A1	8-11-0256
KKx86xxP940A1	8-11-0257
KKx10020P980A1	8-11-0258
KKx10020P1080A1	8-11-0259
KKx10020P1180A1	8-11-0260
KKx10020P1280A1	8-11-0261
KKx10020P1380A1	8-11-0262

Switch set **8-11-0263**
consisting of fixing bracket, one inductive proximity switch and fixing materials) for use as a limit switch or reference switch
Cable length: 2m

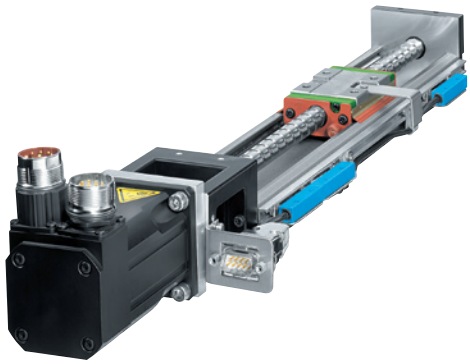
Switch set **8-11-0264**
consisting of fixing bracket, one inductive proximity switch and fixing materials) for use as a limit switch or reference switch
Cable length: 4m



6.4 KK Stages with Motor

6.4.1 Scope of Delivery

Expansion of the KK stage using suitable stepping motors and servo motors with the associated amplifiers extends the KK stage into a complete positioning system. Linear stages are supplied complete with inductive limit switch, reference switch and coupling.



Specifications for KK Stages KK40 with Stepping Motor

	Unit			
Rail length	mm	100	150	200
Max. stroke	mm	36	86	136
Motor		Stepping motor (with micro-step driver) or AC servo motor		
Repeatability	mm	±0,003	±0,003	±0,003
Positioning accuracy	mm	0,02	0,02	0,02
Guideway parallelism	mm	0,01	0,01	0,01
Max. speed	mm/s	10*	10*	10*
Advance force	N	50	50	50

* with stepping motor

Specifications for KK Stages KK50 with Stepping Motor or Servo Motor

	Unit				
Rail length	mm	150	200	250	300
Max. stroke	mm	70	120	170	220
Motor		Stepping motor (with micro-step driver) or AC servo motor			
Repeatability	mm	±0,003	±0,003	±0,003	±0,003
Positioning accuracy	mm	0,02	0,02	0,02	0,02
Guideway parallelism	mm	0,01	0,01	0,01	0,01
Max. speed	mm/s	30*/270**	30*/270**	30*/270**	30*/270**
Advance force	N	150	150	150	150

* with stepping motor ** with servo motor

Specifications for KK Stages KK60, Lead 5 mm with Stepping Motor or Servo Motor

	Unit						
Rail length	mm	150	200	300	400	500	600
Max. stroke	mm	60	110	210	310	410	510
Motor		Stepping motor (with micro-step driver) or AC servo motor					
Repeatability	mm	±0,003	±0,003	±0,003	±0,003	±0,003	±0,003
Ballscrew shaft		Dia. 12, Lead 5					
Positioning accuracy	mm	0,02	0,02	0,02	0,02	0,025	0,025
Guideway parallelism	mm	0,01	0,01	0,01	0,01	0,015	0,015
Max. speed	mm/s	75*/550**	75*/550**	75*/550**	75*/550**	75*/550**	75*/340**
Advance force	N	250	250	250	250	250	250

* with stepping motor ** with servo motor

Positioning Systems
Linear Module

Specifications for KK Stages KK60, Lead 10 mm with Stepping Motor or Servo Motor

	Unit						
Rail length	mm	150	200	300	400	500	600
Max. stroke	mm	60	110	210	310	410	510
Motor		Stepping motor (with micro-step driver) or AC servo motor					
Repeatability	mm	±0,003	±0,003	±0,003	±0,003	±0,003	±0,003
Ballscrew shaft		Dia. 12, Lead 10					
Positioning accuracy	mm	0,02	0,02	0,02	0,02	0,025	0,025
Guideway parallelism	mm	0,01	0,01	0,01	0,01	0,015	0,015
Max. speed	mm/s	120*/1100**	120*/1100**	120*/1100**	120*/1100**	120*/1100**	120*/670**
Advance force	N	150	150	150	150	150	150

* with stepping motor ** with servo motor

Specifications for KK Stages KK86, Lead 10 / Lead 20 mm with Stepping Motor or Servo Motor

	Unit					
Rail length	mm	340	440	540	640	740
Max. stroke	mm	210	310	410	510	610
Motor		Stepping motor (with micro-step driver) or AC servo motor				
Repeatability	mm	±0,003	±0,003	±0,003	±0,003	±0,003
Ballscrew shaft		Dia. 12, Lead 10				
Positioning accuracy	mm	0,02	0,02	0,02	0,025	0,025
Guideway parallelism	mm	0,015	0,015	0,015	0,02	0,03
Max. speed	mm/s	120*/740**	120*/740**	120*/740**	120*/740**	120*/620**
Advance force	N	150*/600**	150*/600**	150*/600**	150*/600**	150*/600**
Ballscrew shaft		Dia. 15, Lead 20				
Positioning accuracy	mm	0,02	0,02	0,02	0,030	0,040
Guideway parallelism	mm	0,015	0,015	0,015	0,020	0,030
Max. speed	mm/s	240*/1480**	240*/1480**	240*/1480**	240*/1480**	240*/1200**
Advance force	N	75*/300**	75*/300**	75*/300**	75*/300**	75*/300**

* with stepping motor ** with servo motor

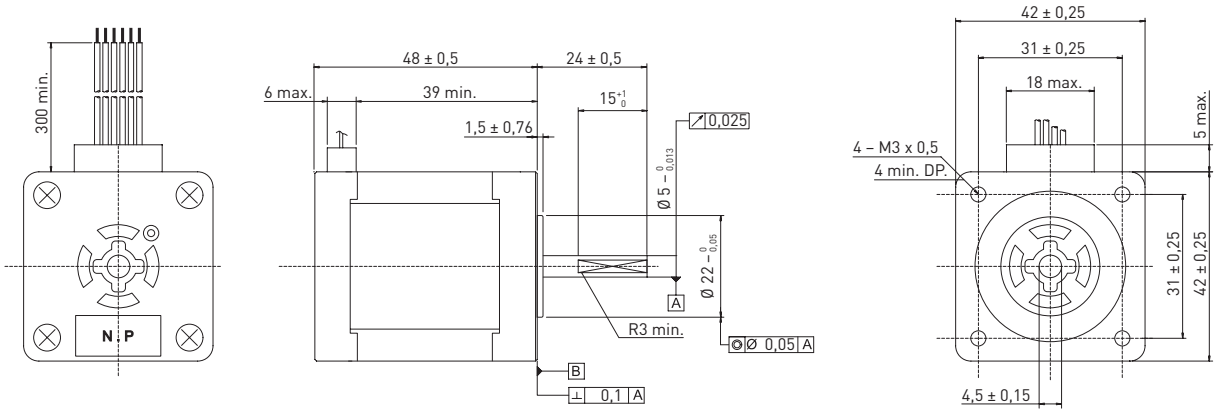
Specifications for KK Stages KK100 with Stepping Motor or Servo Motor

	Unit					
Rail length	mm	870	1080	1180	1280	1380
Max. stroke	mm	828	928	1028	1128	1228
Motor		Stepping motor (with micro-step driver) or AC servo motor				
Repeatability	mm	±0,005	±0,005	±0,005	±0,005	±0,005
Positioning accuracy	mm	0,035	0,035	0,04	0,04	0,04
Guideway parallelism	mm	0,025	0,025	0,030	0,030	0,030
Max. speed	mm/s	240*/1120**	240*/980**	240*/750**	240*/490**	240*/425**
Advance force	N	600	600	600	600	600

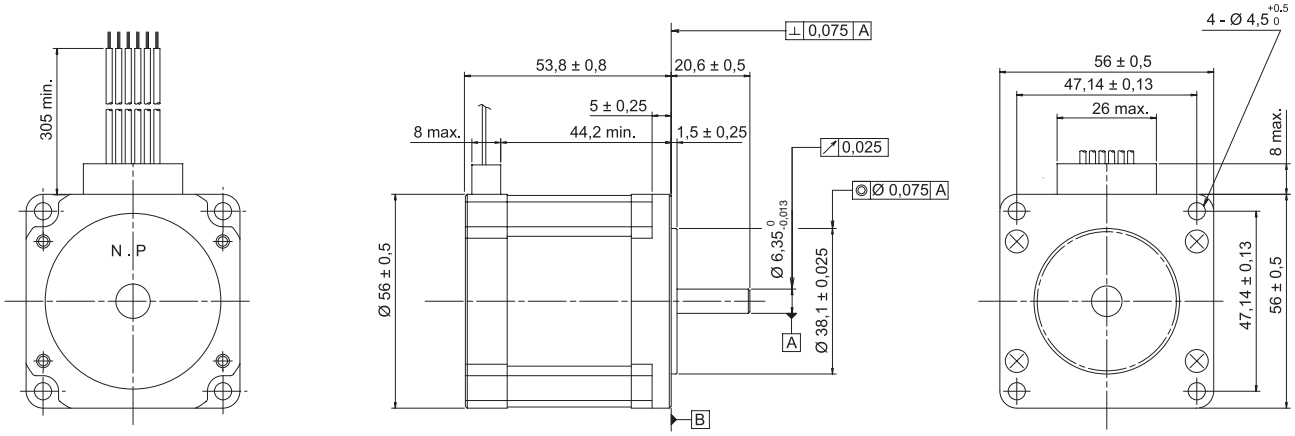
* with stepping motor ** with servo motor

6.4.2 Stepping Motor M1 for KK Stages KK40, KK50, KK60, KK86 and KK100

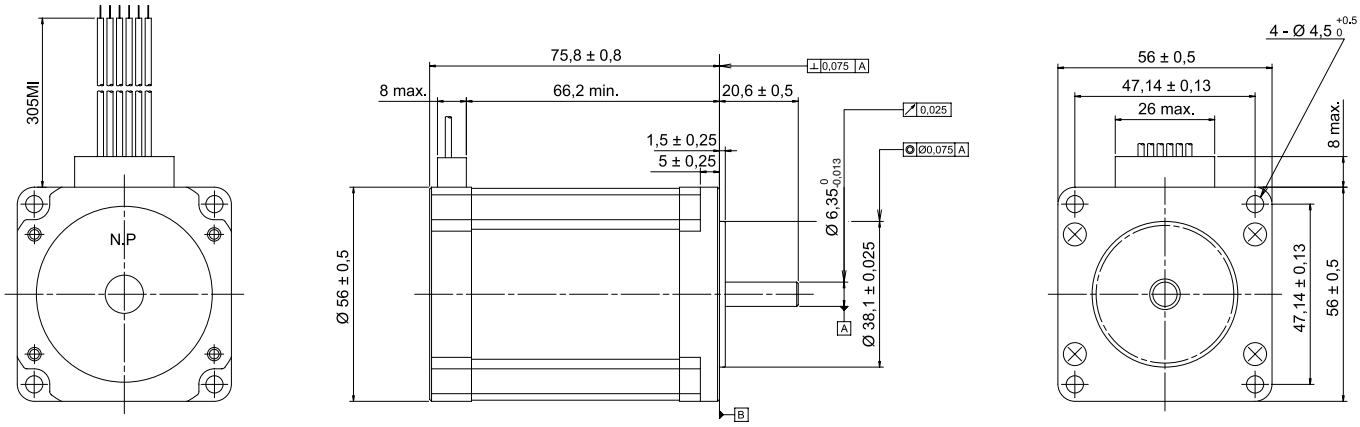
Dimensional Drawing for Stepping Motor M1 (42) for KK Stages KK40/50



Dimensional Drawing for Stepping Motor M1 (56) for KK Stages KK60



Dimensional Drawing for Stepping Motor M1 (86) for KK Stages KK86/100



Specifications for Stepping Motor M1 for KK Stages KK40, KK50, KK60, KK86 and KK100

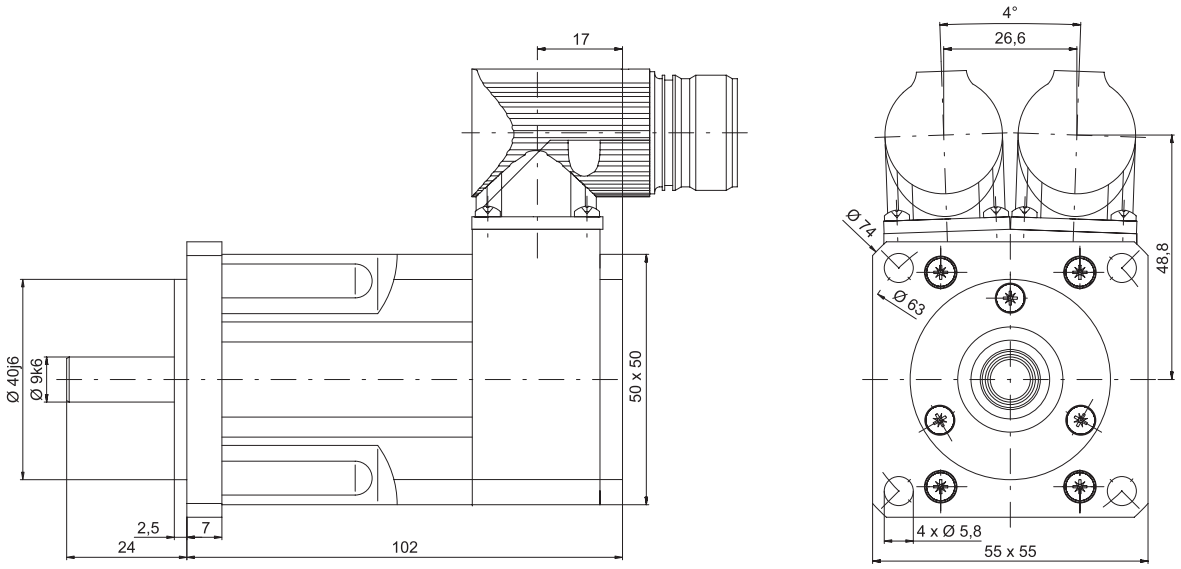
Motor type and flange dimensions	Unit	M1 (42)	M1 (56)	M1 (86)
Motor series		2-phase; unipolar stepping	2-phase; unipolar stepping	2-phase; unipolar stepping
KK stage		KK-40/50	KK-60	KK-86/100
Nominal speed	min^{-1}	dependent on the micro-step width, max. 500		
DC-bus voltage (controller)	V	24	24	24
Nominal voltage	V	12-200	12-200	12-200
Stationary moment	Nm	0,51	0,83	1,27
Stationary current	A	1	2	2
Winding resistance	Ω	4,8	1,6	2
Mass	kg	0,4	0,65	1
Protection class	IP	IP 43	IP 43	IP 43

6.4.3 Drive Amplifier for Stepping Motor M1

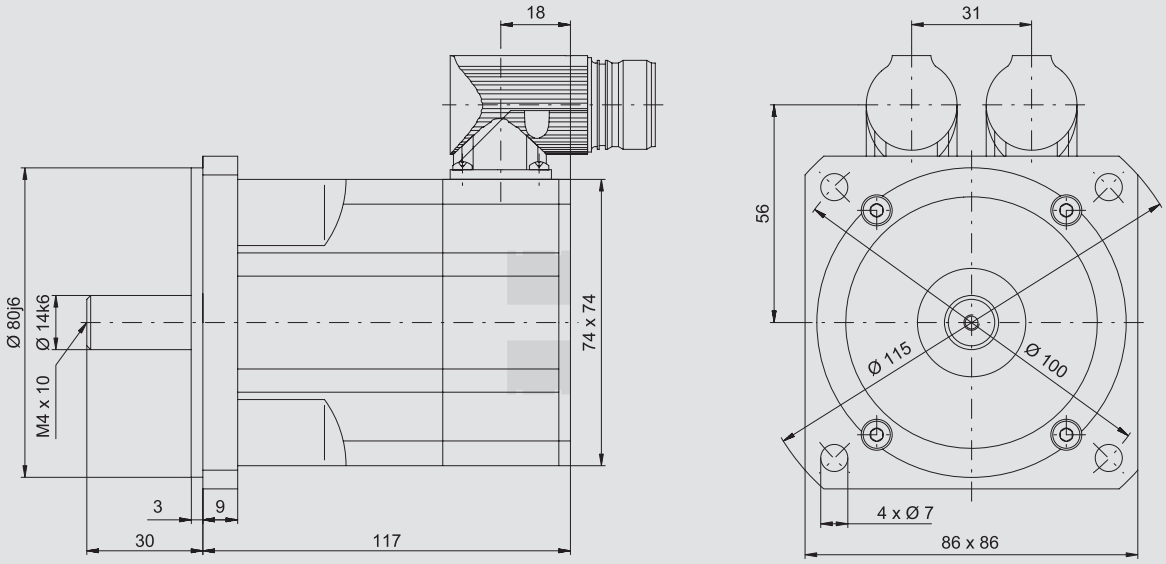
Specifications	
Operating voltage	DC +20 to +75 V
Continuous current	3,54 A
Peak current	5 A
Interface	Can Open Step/Direction
Inputs	12 digital
Outputs	4 digital
Radio interference filter	integrated
Interface	RS 232, Can Open
Encoder	TTL sensor
Stand-alone with CVM Control program	
Dimensions W x H x D	40 mm x 140 mm x 80 mm

6.4.4 Servo Motor M2 for KK Stages KK 50, KK 60, KK 86 and KK 100

Dimensional Drawing for Servo Motor Type M2 (55) for KK Stages KK50 and KK60



Dimensional Drawing for Servo Motor Type M2 (86) for KK Stages KK86 and KK100



Specifications for M2 Servo Motors for KK Stages KK50, KK60, KK86 and KK100

Motor type and flange dimensions	Unit	M2 (55)	M2 (86)
Motor series		3-phase servo	3-phase servo
KK stage		KK-50/60	KK-86/100
Nominal speed	min^{-1}	4500	3000
DC-bus voltage (controller)	V	320	320
Nominal voltage	V	200	200
Stationary moment	Nm	0,7	2,7
Stationary current	A	1,57	3,4
Maximum permissible moment	Nm	2,8	9,5
Maximal permissible speed*	min^{-1}	12.000	12.000
Torque constant	Nm/A	0,45	0,79
Winding resistance	Ω	11.1 (two phases)	2.1 (two phases)
Mass	kg	1,1	3,2
Transmitter system	–	Resolver 1-pin	Resolver 1-pin
Protection class	IP	IP64	IP64

*please also refer to nominal speed of KK Stage

6.4.5 Drive Amplifier for M2 Servo Motors

Specifications	
Operating voltage	AC 400 V
Continuous current	5,5 A
Peak current	1.8 times nominal current for 30 seconds
Interface	Can Open, Option: Profibus
Inputs	8 digital, 2 analog, 12 bit
Outputs	2 digital, 1 relay
Radio interference filter	integrated
Secure hold with relay output	
Encoder	TTL feedback / SSI absolute value feedback
Resolver input	
Brake resistor integrated in cooling attachment	
Stand-alone with motion-maker	
Interface	RS 232, Can Open
Dimensions W x H x D	70 mm x 218 mm x 145 mm

HIWIN®
Linear Technology

7. HIWIN-MAGIC - Magnetic Measuring Systems

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7.3 Formats and Outputs for Analog Variant sin/cos 1 V_{pp}	120
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7.6 Reference Switch	121

7.1

7.5

7. HIWIN-MAGIC – Magnetic Measuring Systems

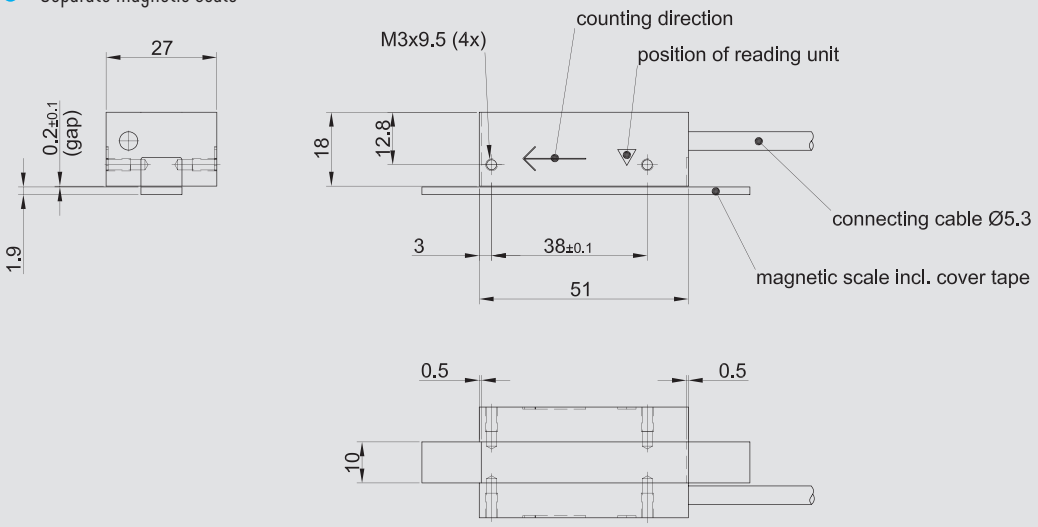
The magnetic measuring systems of the HIWIN-MAGIC series are optimized to measure distances of linear movements, especially in linear motor axis. The measuring system is composed of a magnetic scale on a stainless steel strapping and an extremely flat sensor. The sturdy housing with excellent electrical shielding and signal output in real time make the HIWIN-MAGIC the system of choice for demanding applications. The HIWIN-MAGIC-IG has a special design which makes it possible to mount the reading head directly on a block. The magnetic scale is then integrated into the rail.

- Contactless measuring with 1 V_{pp} -or digital output
- Digital resolution up to 0.5 µm
- The sensor and magnetic scale are insensitive to dust, humidity, oil and chips
- Sensor with metal housing and protection class IP67
- Simple mounting and alignment
- Signal output in real time
- Special housing for optimization of EMC

7.1 Encoders

HIWIN MAGIC Sensor

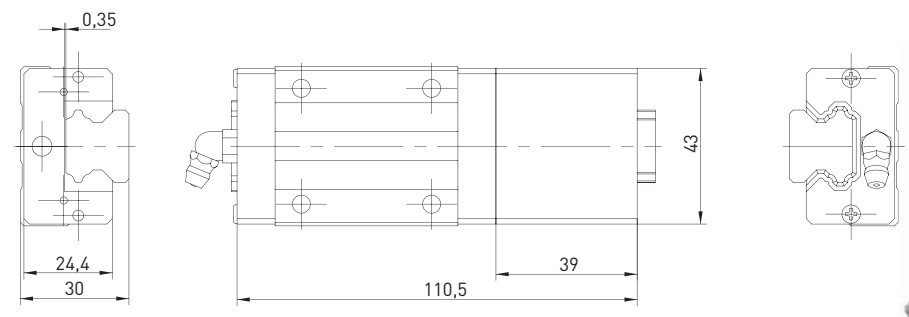
- Optimized for use with linear motors
- Separate magnetic scale



All values in mm

HIWIN-MAGIC-IG Sensor

- Optimized for use with linear motors
- Magnetic scale integrated in the rail
- Measuring head can be fitted to the HGH20 or HGW20 block



All values in mm

Table 7.1 **Specifications for Magnetic Distance Measuring Systems HIWIN-MAGIC and HIWIN-MAGIC-IG**

Type:	1 V_{pp} (analog)	TTL (digital)
Electric properties		
Output signal specification	sin/cos, 1 V_{pp}	Quadrature signal according to RS 422
Resolution	Infinite, signal period 1 mm	1 µm
Bi-directional repeat accuracy	0,01 mm	0,01 mm
Reference signal	periodic index impulse at stroke of 2 mm	
Operating voltage	5 V ± 5%	5 V ± 5%
Power consumption	Type 35 mA, max. 70 mA	Type 70 mA, max. 120 mA
Max. measuring speed	10 m/s	1 m/s
Interference protection class	3, to IEC 801	
Mechanical properties		
Housing material	High grade aluminum alloy, sensor bottom made of stainless steel	
Dimensions for MAGIC sensor head	L x W x H: 51 mm x 27 mm x 18.5 mm	
Dimensions for MAGIC-IG sensor head	L x W x H: 39 mm x 43 mm x 24.4 mm (in addition to block)	
Cable length	1 m / 3 m / 5 m / 10 m	
Min. bending radius of cable	40 mm	40 mm
Protection class	IP67	IP67
Operating temperatures	0°C to +50°C	
Mass of MAGIC sensor head	80 g	80 g
Mass of MAGIC-IG sensor head	80 g	80 g
MAGIC-IG suitable for block	Type HGH20 and HGW20	

* Can be used with a cam controller (see Section 7.6)

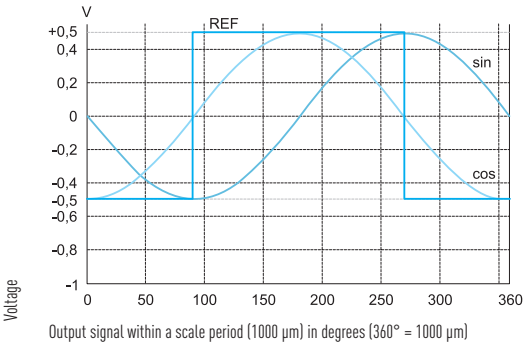
Note: The HIWIN-MAGIC-IG measuring system can also be supplied completely assembled with a linear guideway (type HIG).
For details on ordering codes, please see our "Linear Guideway" catalogue.

7.2 Connection of Analog and Digital Variants

Cable Assignment (for Analog and Digital Variants)
A high-grade, 8-core cable capable of tow is used,
respectively A, B, – and Z, twisted pairs and double shielded.

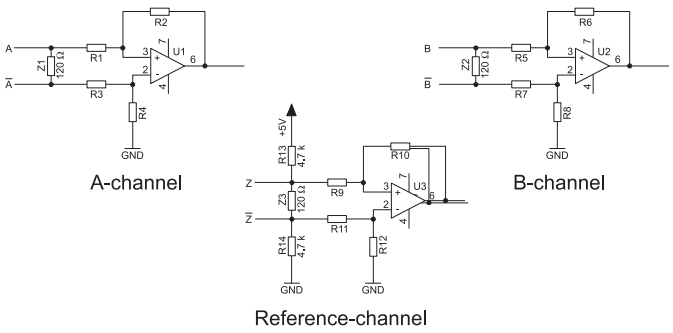
7.3 Formats and Outputs of Analog Variant sin/cos 1 V_{pp}

Signal Format sinus/cosinus 1V_{pp} Output
The electric signals are according to the differential input of the subsequent electronics. The HIWIN-MAGIC(-IG-20) interface sinus/co-sinus 1 V_{pp} is completely in line with Siemens specifications. The period length of the sinus output signal is 1 mm. The period length of the reference signal is 2 mm.



Output signal within a scale period (1000 µm) in degrees (360° = 1000 µm)

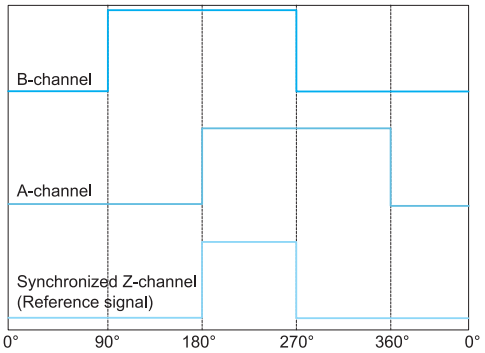
Recommended Connection of the Subsequent Electronics at sinus/co-sinus 1V_{pp} Output



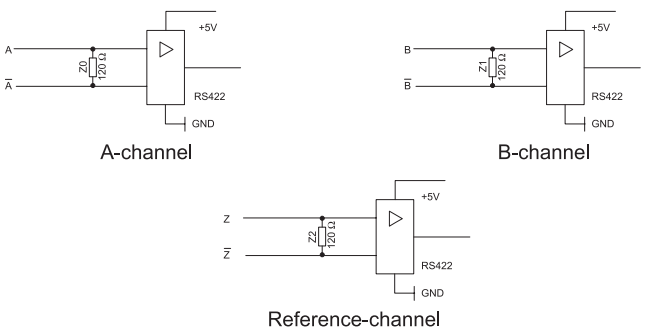
7.4 Formats and Outputs of Digital Variant TLL

Digital TTL Output

- Signals to A and B channels displaced by 90° phase (according to RS422; specification according to DIN 66259)
- Recommended terminal resistance Z = 120 Ω
- Output signals: A, and B, – and Z,
- Single reference pulse (optional)
- Definition of a minimum pulse length (optional)



Recommended Connection of the Subsequent Electronics at Digital TTL Output



7.5 Magnetic Scale

Table 7.2 **Specifications for Magnetic Scale**

Model number (xxxx = length [mm])	8-08-0028-xxxx	Stainless steel strapping
Accuracy class	± 20 µm	-
Period	1 mm	-
Thickness		
Magnetic scale only	1,75 ± 0,05 mm	-
with stainless steel strapping	1,90 ± 0,05 mm	-
includes adhesive tape		ca. 0,15 mm
Width	10 ± 0,20 mm	10 mm
Maximum length	100 m	100 m
Residualmagnetism	> 240 mT	-
Pole length (distance between north-south pole)	1 mm	-
Individual reference marks	Optional	-
Material	Synthetic material with barium-strontium particles	Stainless steel, adhesive tape
Mass	70 g/m	-

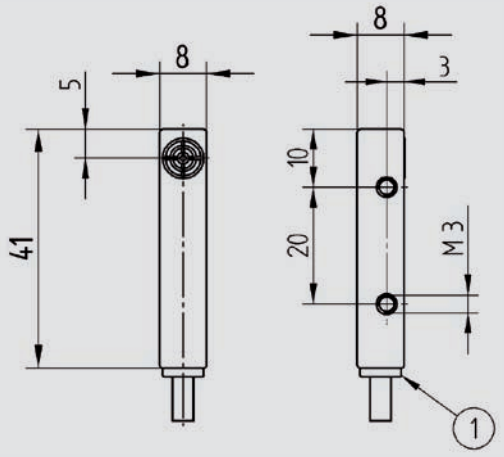
(A) (B)

Example: Separate magnetic scale (A) without stainless steel strapping and integrated within one rail (B) with stainless steel strapping

7.6 Reference Switch

The MAGIC and MAGIC-IG reader head creates a periodic reference signal (see Table 7.1). This can be used as a trigger signal for a reference switch ("cam controller"), which can be placed anywhere within the stroke distance.

HIWIN offers this type of reference switch as an optional accessory.

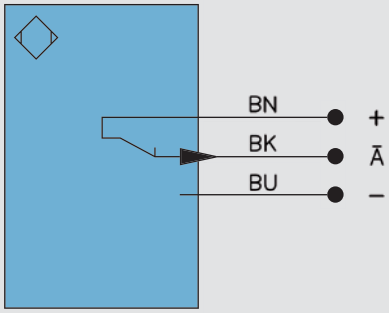


1 = Switch status indicator

Table 7.3 **Reference Switch Specifications**

Inductive	
Switching distance	2 mm
Correction factor V2A / Brass / Al	0,73 / 0,49 / 0,39
Installation type	Flush
Switching hysteresis	< 15 %
Electrical	
Supply voltage	10...30 V DC
Electric current consumption (Ub = 24 V)	< 6 mA
Switching frequency	1500 Hz
Temperature drift	< 10 %
Temperature range	-25...80 °C
Voltage drop at switch output	< 2,5 V
Switching Output / Switching Current	100 mA
Residual current at switch output	< 100 µA
Short circuit Protection	yes
Reverse pole polarity	yes
Overload protection	yes
Mechanical	
Housing material	Plastic
Fully encased	yes
Protection class	IP 67
Connection type	Cable
Cable length	2 m, 4 m
Protective insulation, rated voltage	50 V

Circuit Diagram for Optional Reference Switch



Key to symbols

+ Supply voltage "+"
- Supply voltage "0V"
A Switch output / breaker (NC)

Core colors

BN brown
BK black
BU blue

Notes

Notes

Notes

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