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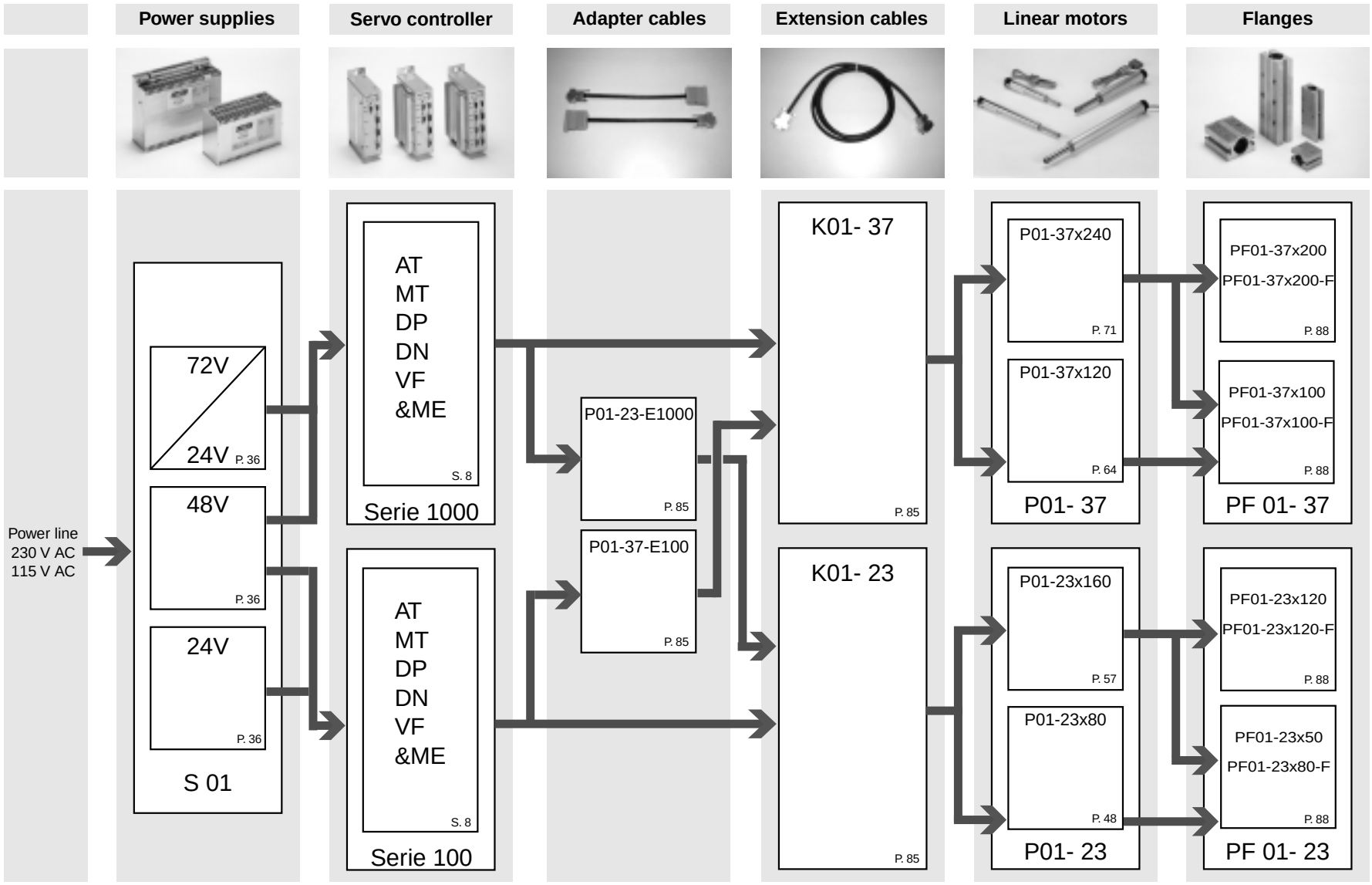


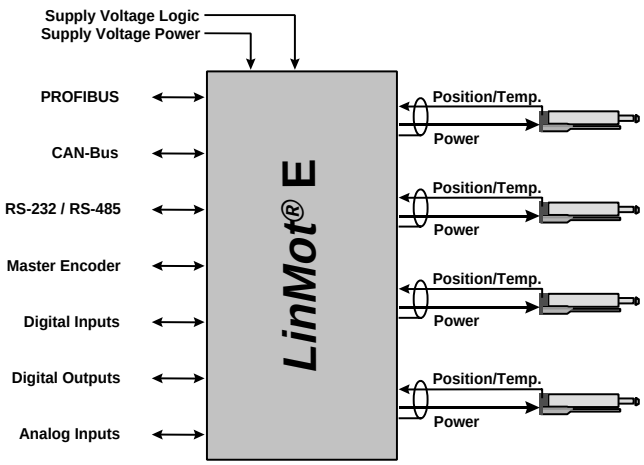
Ordering example:	Pos. 1	Servo Controller	1 x E400-AT	0150-1604	4-Axis Servo Controller
	Pos. 2	Linear motors	2 x P01-23x80/30x90	0150-1101	Linear motor 23x80
	Pos. 3	Linear motors	2 x P01-37x120/20x100	0150-1171	Linear motor 37x120
	Pos. 4	Flanges	2 x PF01-23x50	0150-1901	Flange to Pos. 2
	Pos. 5	Flanges	2 x PF01-37x100	0150-1903	Flange to Pos. 3
	Pos. 6	Adapter cable	2 x AC01-100/37	0150-1921	Adapter cable to Pos. 3
	Pos. 7	Power supply	1 x S01-48/300	0150-1941	Power supply to Pos. 1

Servo Controller *LinMot*® E

LinMot® E

LinMot® comprises various families of servo-drives that are primarily designed for linear motion. For their actuation, highly integrated *LinMot*®-E servo controllers are available. *LinMot*®-E servo controllers include a power section for driving the motors as well as a control section with an integrated position controller. This allows the direct setting of positional set-points or the calling up of stored motion profiles from an overlaid control system by means of simple analog or digital signals. Connection to the overlaid control system can also be made via a serial port or a field bus. The control section looks after all control and monitoring actions necessary for controlling the drives.

LinMot®-E is a family of modular servo controllers that are derived from each other. The user can chose between units in various performance classes for up to four different, independently controllable motors. Linear motors from various LinMot families can be connected to the same controller as well as standard two-phase stepping motors and solenoids.



System representation of a Servo Controller with four linear motors

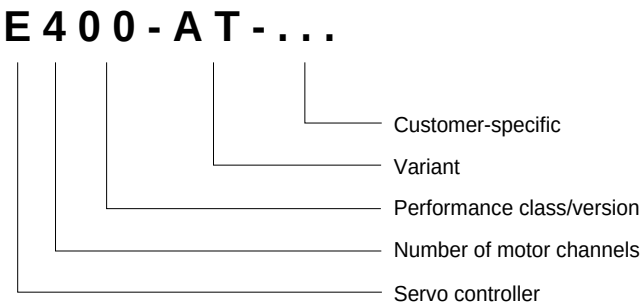
LinMot® servo controllers are normally used as drive controllers. Using signals from an overlaid control system, the motors are driven to the positions required. This action can be combined with the use of integrated motion profile curve functions. This allows jumps in set points to be carried out in a non-jerky and gentle manner. Customised functions, complete sequential control or PLC functions can be integrated into the servo controller using application software.

The configuration of the *LinMot*®-E servo controller is done on a menu basis using the windows-based *LinMot*® Talk PC-software. *LinMot*® Talk also assists the user when commissioning the drives: On-line measurements of motor data and movements made by the controller can be shown in graphical form and stored on a PC.

Construction forms and designation scheme

LinMot®-E servo-controllers are available in two performance classes: Series 100 and Series 1000 for the control of one, two or four motors. Units of a particular performance class with different control interfaces have the same outside dimensions, but differ in respect to hardware and software.

The key to the designation scheme is illustrated by the following example for the *LinMot*®-E 400AT servo controller:



Types of motor which can be connected

The *LinMot*®-E servo controller's hardware allows any type of single or two-phase motors (*LinMot*® linear motors, stepping motors, solenoids etc.) to be connected. Each motor channel consists of the four connections for the two motor phases, two inputs for the collection of positional data and one input for the monitoring of motor temperature. The motor cable between the servo controller and Series P01 linear motors can be extended using *LinMot*® motor cable up to 50m in length.

Mixed system configuration comprising LinMot® P02-23x80 and P01-23x160 linear motors, LinMot®-E 400 servo controller along with a stepping motor and a solenoid.

Position control and motion profiles

The servo controllers include a complete digital position-control system. This means there are no drift or offset problems, such as those encountered with analogue controllers. Further, it is possible to define motion profiles and thus follow adapted motion profiles.
Trajectory control is particularly of great importance in connection with the highly dynamic *LinMot*® P linear motors.

Modes of operation

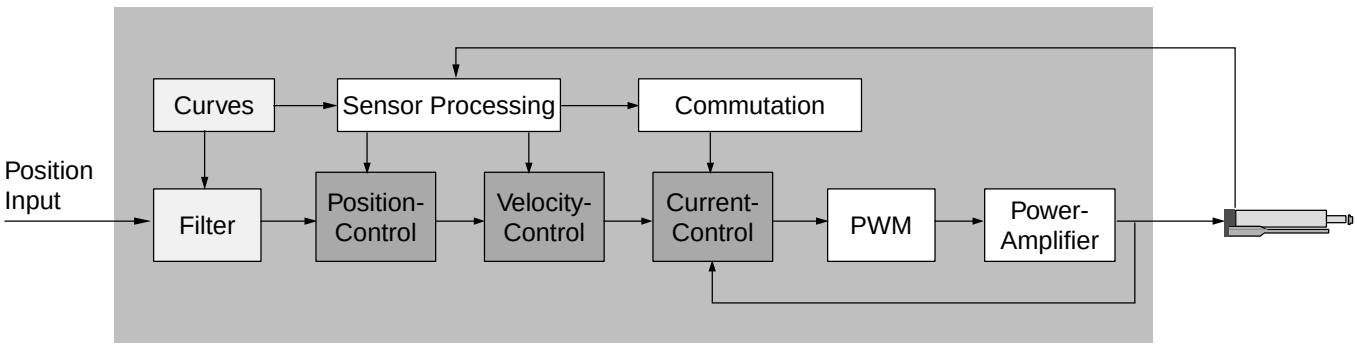
Depending on the type of *LinMot*®-E servo controller, various different modes of operation are available. The modes of operation define the control interface, the method for defining set points and how error reports are handled by the overlaid control system.

±10V Servo Interface
The new VF series Servo Amplifier provides standard interfacing to an external position controller or multi axes motion controller. A ±10V analog signal from the overlaid position control loop controls force or velocity of the linear motor. Position feedback from the linear motor's internal position sensor can be accessed by means of incremental position signal outputs. These signals allow to close the position loop externally without any external position sensors.
In the force mode the VF Servo Amplifier works like a torque-mode Amplifier for rotary motors. The analog command signal is converted into a output current for the linear motor. This current will generate a force in the Linear Motor that is proportional to the input voltage. In the velocity mode the analog input voltage is corresponding to the velocity of the slider. In both operation modes, the position loop must be closed by an external motion controller.

Analogue positional set-point
For the analogue setting of positional set-points, the supervesory controller passes down the set-point directly as an analogue signal. In the servo controller, the working range is defined by allocating positions to the maximum and minimum input voltage. By inputting the appropriate voltage, any position in the working range can be reached.

Two-point operation
In two-point operation, two end positions can be reached by using a digital input signal. The two end positions are configured in the servo controller and can be chosen at will. This mode of operation allows pneumatic cylinders to be directly replaced: instead of the valves, the servo controller is controlled by digital control signals.

Running motion profiles (up to two)
In this mode, two freely defined motion profiles per drive can be called up. The profiles, which are stored in the drive electronics, are run on the rising and falling transitions of the digital input signals.



Simplified block diagram of the digital motor position control

Running motion profiles (up to sixty-four)
This mode allows up to 64 various motion profiles to be defined per drive. The profiles, which are stored in the drive electronics are started by addressing them via the digital input signals.

Programmed sequences
Complex motion sequences are laid down on a step-for step basis in a table. The instructions stored in the drive electronics are worked through one by one via digital input signals or are directly addressed individually.

Teach-in
When configuring the servo controller, the positions targeted are laid down in a table. In the teach-in mode, the slider of the linear motor is brought by hand into the position required and the current position stored in the table. The positions stored in the drive electronics are called up via the digital input signals.

Step, Direction
In the stepping motor mode, one linear motor per controller can be positioned using two digital signals from the overlaid controller. The first signal defines that a step should be carried out and the second defines the direction of motion. Step values can be configured to the values required.

RS 232 serial operation
The overlaid controller can communicate with the servo controller via an RS 232 interface. Using an ASCII protocol, setpoint positions can be directly defined or motion profiles that are stored in the servo controller can be run. The serial interface makes it possible to call up current values such as the actual position or the motor current of the linear motor. A detailed description of the ASCII protocol and the commands available can be found in the annexe.

RS 485 serial operation
Via an RS485 interface, up to 24 linear motors can be controlled from the overlaid system. Using the ASCII protocol the same functions ca be activated as with the RS 232 interface. A detailed description of the ASCII protocol and the commands available can be found in the annexe.

Field buses Profibus / DeviceNet
Using a field bus interface, up to 125 servo controllers can be integrated into a single bus system. The field bus standards for Profibus DP or DeviceNet allows the direct definition of positional set-points, as well as the running of motion profiles stored in the servo controller. The connection via field buses makes it possible to call up current values such as the actual position or the motor current of the linear motor. The standard field bus interfaces guarantees trouble-free commissioning and reliable operation with control systems from different suppliers.

CAN bus
The CAN field bus allows the operation of up to 32 servo controllers in a field bus system. As no standardised protocol for all control systems is available, protocols are integrated on a customer-specific basis. Basically, all the standard functions can be implemented as is possible with the with the ASCII command described in the annexe.

Synchronisation with main shaft / Encoder follower
When mechanical cams are to be replaced or in applications where the linear motor is to perform motions synchronised to a main shaft or to a master drive, the Master Encoder Interface is necessary. The Master Encoder Interface allows the synchronous running of motion profiles that are stored in the servo controller. The overlaid control system only has to indicate which profile is to be implemented.

Synchronisation / PROFIBUS DP
The synchronisation with a main shaft or to a machine drive is possible using the PROFIBUS DP interface. The synchronisation signals are provided over the Master Encoder Interface and the required motion profile is selected via the PROFIBUS DP interface.

Overview *LinMot*® Servo Controllers

Servo Controller		-AT	-MT	-DP	-DN	-VF	-ME
Analog position mode		x	x		x		
Two point operation		x	x	x	x		
Running motion profiles (max 2)		x	x	x	x		
Running motion profiles (max 64)			x	x	x		
Step, Direction			x		x		x
Serial Interface RS232	57.6kBaud	x	x				
Serial Interface RS485	57.6kBaud	x	x				
Profibus DP	12MBaud			x			x
DeviceNet	500kBaud				x		x
SERVOnet	500kBaud				x		
CAN Bus	500kBaud		x				
Synchronisation to main shaft			x	x	x		x
Analog servo interface -10....+10V for velocity						x	
Analog servo interface -10....+10V for force						x	
Customer specific implementations			x	x	x	x	x

* For STEP/DIR or main shaft synchronisation, Master Encoder Module ME01 will be required.

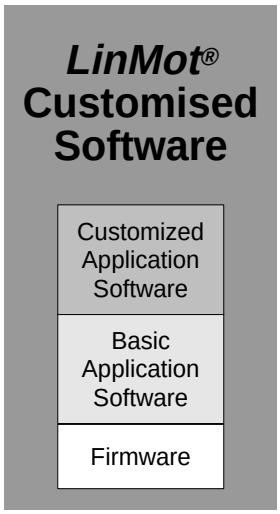
Alarms and error messages

For each of the motors connected, *LinMot*®-E servo controllers are equipped with independently configurable masks for fault signalling and warning messages. Apart from the usual error messages, warnings can be issued. These make it possible for early action to be taken if particular operational parameters are exceeded or for the overlaid control system to run the machine down in a controlled manner. In order to ensure fast and secure fault identification and correction, operational and fault states are indicated in a coded form by LEDs on the front side of the controllers.

Firmware

As with the *LinMot*® series of hardware products, the software is also modular and allows the simple integration of customer-specific extensions (applications).

The following illustrations show graphically how the software is constructed. The so-called "Firmware" forms the base layer, which controls internal, hardware-close functions.



The "basic application software" placed above the firmware provides the user with all functions in connection with the control of motor position. Customer-specific application programmes can be integrated as the third level in the software structure (see chapter on "application software" in the annexe).

Power supplies

All servo controllers are provided with separate power supplies for the logic and power sections. This allows the power section to be cut off if an emergency situation arises at machine level whilst keeping the supply for the logic functions active. In this way, no current data is lost and communication with the up-line control system is still possible even in emergency stop situations.

Power consumption of the power section depends directly on the number of motors connected and their loading. Assuming that all motors do not have to deliver peak power at the same time, the power supply can be dimensioned significantly smaller than if the peak power requirements of all connected motors were added together.

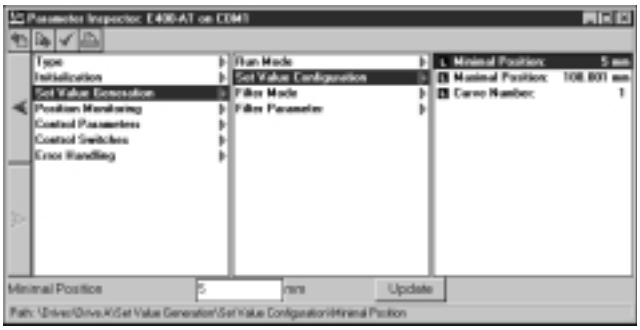
For the supply of voltage to the servo controllers, only approved, DC isolated power supplies may be used.

LinMot® Talk Configuration Software

The *LinMot*® Talk configuration software is an MS-Windows-based interface, which supports the user when configuring and commissioning the *LinMot*®-E servo controllers. The software exhibits a powerful modular graphical interface, which covers all tasks encountered when using of *LinMot*®-E servo controllers. During its development, great value was laid on a high level of usability. A short description of the five main modules follows.

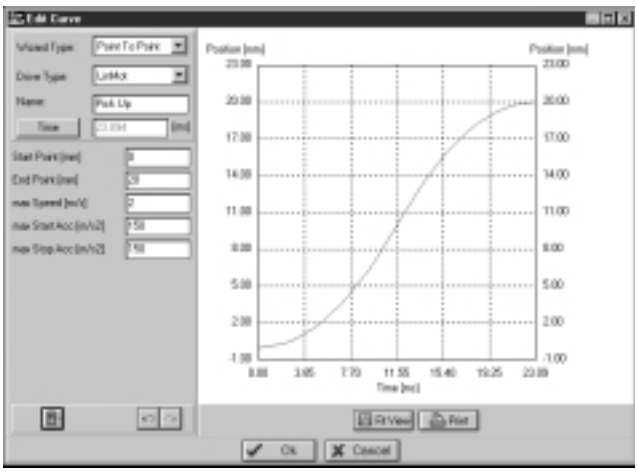
PARAMETER INSPECTOR

Using the parameter inspector, the *LinMot*®-E servo controller's parameters can be adjusted in a simple and easy way. Whole sets of parameters can be loaded, stored and printed. The user is provided with several possibilities for making settings. These apply to initialisation, operating modes, error management, warning messages and control parameters. The parameters are set using the parameter inspector. All settings made may be stored at will and transferred to other controllers.



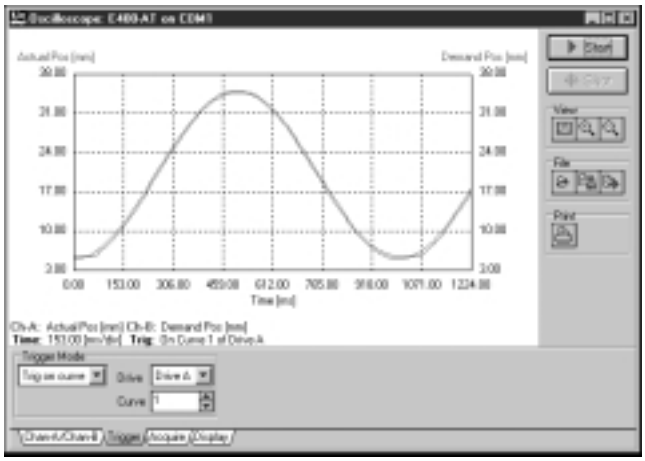
CURVE EDITOR

The "curve editor" can be used to generate and manage the set-point curves required for *LinMot*®-E controllers. Existing curves can be loaded, stored edited, hung together and printed. This allows the required motion profiles to be generated. Also, using MS Excel, existing motion profiles can be imported or complex motions generated which are put together as one likes. These are loaded in the servo controller by the "curve inspector" in a simple manner.



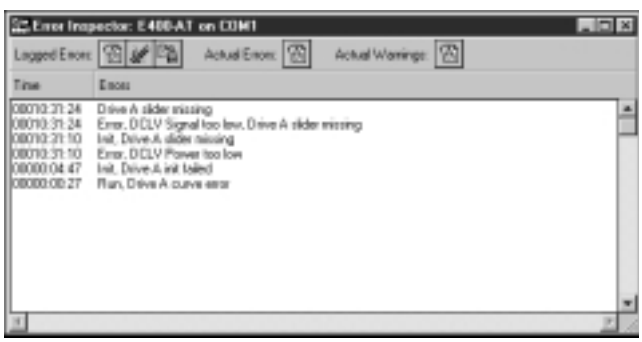
OSCILLOSCOPE

The oscilloscope" assists the user when commissioning a *LinMot*® system. Internal variables like set-points and actual positions are registered in real time and displayed on the screen and can subsequently be printed out. The data captured can be stored in CSV-format for further processing in MS Excel or for use in documentation.



ERROR INSPECTOR

Using the "error inspector", the user can display stored error messages and all current faults and warnings from the *LinMot*® servo controller. The last 10 error messages and the reading of the hours of operation counter are stored in the servo controller's memory.
Further, the status of all inputs and outputs can be read using the "error inspector". This allows the signals to and from the overlaid controller to be looked at in a fast and uncomplicated way.



Force Velocity Servo Amplifier

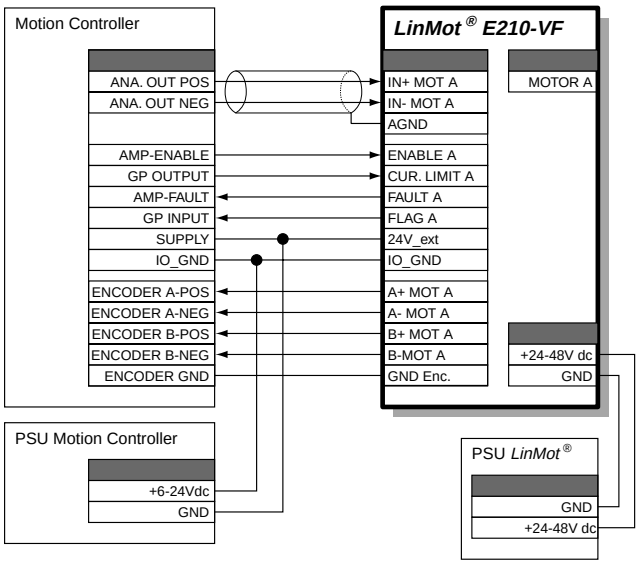
The E210-VF and the more powerful E2010-VF two channel servo amplifiers will allow *LinMot*® P linear motors to be integrated in standard motion controller systems with analog velocity or force (torque) output. For position feedback no additional sensor is required.

SYSTEM DESCRIPTION

The *LinMot*® servo amplifiers E210-VF and E2010-VF accept as command signals between -10V and +10V. These signals command either the force or the velocity of a connected LinMot. The current position of the motor is available as incremental position signal (A/B).

The amplifier supports two completely independent axis. Each axis has its own control and status signals.

The servo amplifiers can be easily configured with the Windows based *LinMot*® Commander over the serial interface.



OPERATING MODES

Force - Mode

The amplifier works in the foce-mode like a torque-mode amplifier for rotary motors. The analog command signal is converted to the current the amplifier is outputting into the connected motor. The current is directly linked to the produced force over the motor constant c_f found in the motor datasheets.
There is no velocity-loop in the amplifier. The velocity-loop must be closed by the motion controller.

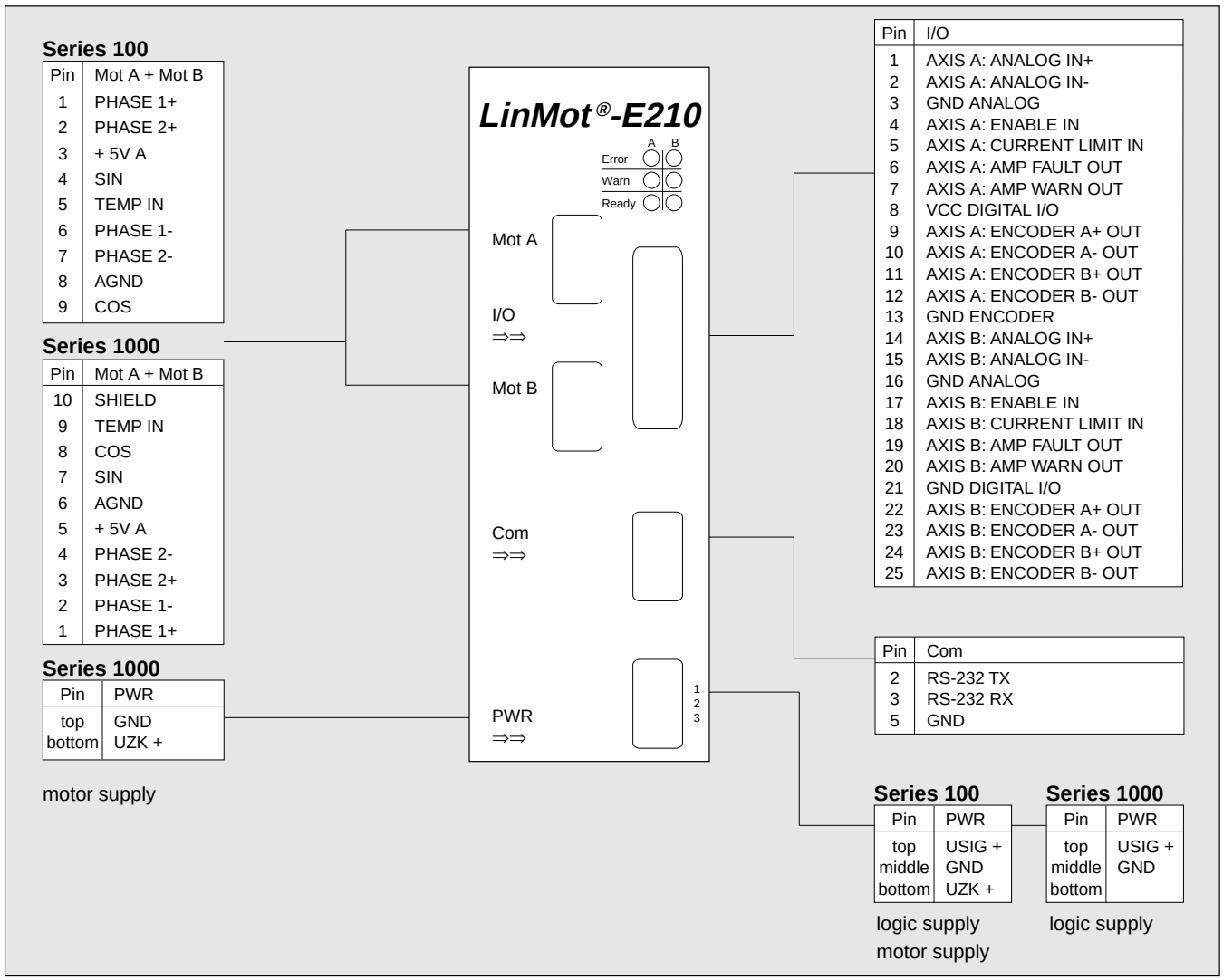
Velocity - Mode

The analog command signal is converted to a velocity the connected linear motor moves with. The velocity loop is closed inside the amplifier by a PI structured controller.

Current Limit Adjustments

The *LinMot*® E2x10-VF Servo Controller features an additional current limit control by a digital input.
Motion can be executed with full dynamic at maximum current. If the work peace has to be handled gently, the maximum current (and force) of the motor can be reduced to a save level.

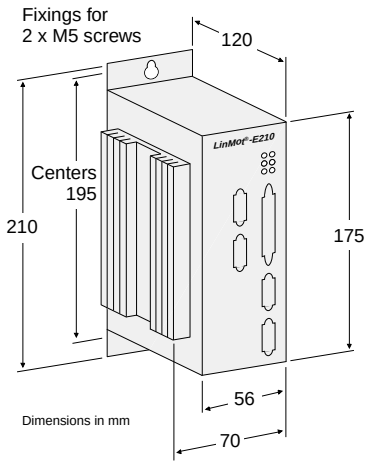
TERMINALS



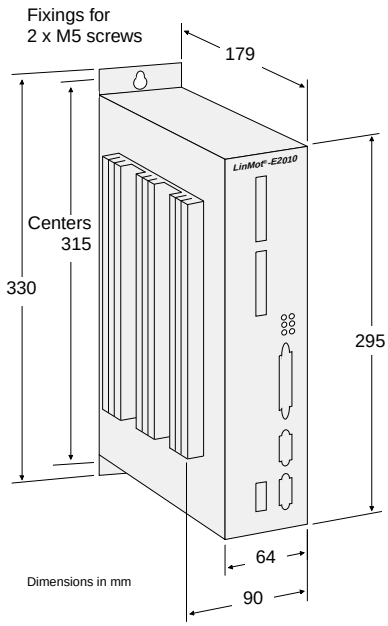
Signal	Description	Electrical Specification	
ANALOG IN +/-	Analog command input	not referenced to analog GND	(-10V ... +10V)
GND ANALOG	Analog GND / Shield	do not be connected with Controller	
ENABLE IN	Amplifier enable / disable	galvanic isolated input	(max. 24V / 20mA)
GP IN	General Purpose Input	galvanic isolated input	(max. 24V / 20mA)
FAULT OUT	Amplifier fault output	isolated high side switch output	(max. 24V / 250mA)
WARNING OUT	Warning output	isolated high side switch output	(max. 24V / 250mA)
VCC DIGITAL I/O	I/O Supply	supply for digital outputs	(6..24V DC / <1A)
GND DIGITAL I/O	I/O GND	return for output supply and inputs	
ENCODER A +/-	Quadrature position outputs A track	differential output (RS422)	(5V)
ENCODER B +/-	Quadrature position outputs B track	differential output (RS422)	(5V)
GND ENCODER	Encoder ground	ground input for position signals	
RS-232 RX/TX	RS232 Receive/Transmit	Serial connection to PC	

LinMot® Servo Amplifier					
		E110-VF	***E210-VF***	***E1010-VF***	***E2010-VF***
Number of motor Channels		1	2	1	2
Max. current output per phase	A	3		6	
Logic supply	V_{DC}	24..48		24..48	
Power consumption logic	W	5		10	
Motor supply	V_{DC}	24..48		48..72	
Digital Inputs		2 per Axis		2 per Axis	
Analog Inputs		1 per Axis (-10V..+10V, 12Bit)		1 per Axis (-10V..+10V, 12Bit)	
Encoder Outputs		A+,A-,B+,B- (RS422) per Axis		A+,A-,B+,B- (RS422) per Axis	
Encoder Resolution		1,2,5,10µm		1,2,5,10µm	
Digital Outputs		2 per Axis		2 per Axis	
RS232-Interface		1		1	
Width	mm (in)	70 (2.8)		90 (3.5)	
Height	mm (in)	210 (8.3)		330 (13)	
Height (without fixings)	mm (in)	175 (6.9)		295 (11.6)	
Depth	mm (in)	120 (4.7)		179 (7)	
Weight	kg (lb)	1.1 (2.4)	1.2 (2.7)	2.5 (5.5)	2.6 (5.7)
Case	IP	40		40	
Storage temperature	°C (°F)	-25..70 (-13..158)		-25..70 (-13..158)	
Operating temperature	°C (°F)	0..50 (32..122)		0..50 (32..122)	
Max. case temperature	°C (°F)	65 (149)		65 (149)	

E110-VF / E210-VF



E1010-VF / E2010-VF



Ordering Information

Servo Amplifier	Description	Art.-No.
E110-VF	Velocity Force Controller 1 axis (48V/3A)	0150-1651
E210-VF	Velocity Force Controller 2 axes (48V/3A)	0150-1652
E1010-VF	Velocity Force Controller 1 axis (72V/6A)	0150-1655
E2010-VF	Velocity Force Controller 2 axes (72V/6A)	0150-1656

Specification of products are subject to change without notification

Analog Trigger Servo Controller

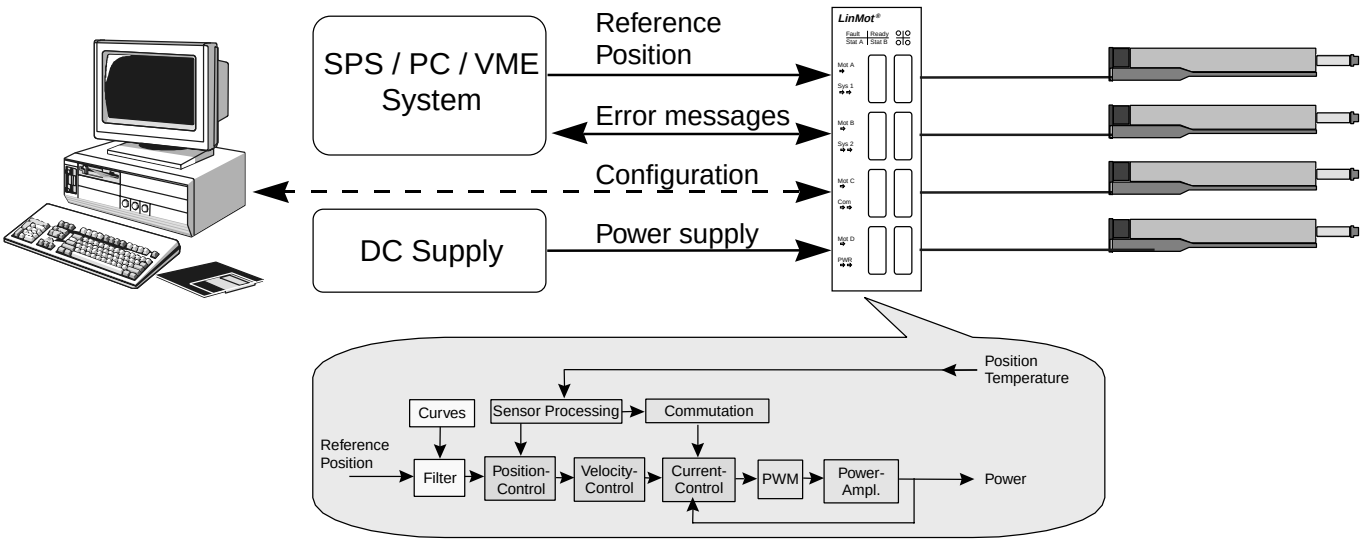
The Series E100-AT servo controllers and the more powerful Series E1000-AT offer, together with the *LinMot*® P family, ready-to-use positioning systems for one, two or four linear motors.

SYSTEM DESCRIPTION

The required value for the position is supplied directly by an overlaid controller (PLC, industrial PC, VME system) via analogue position signals or a serial interface. Motion profiles stored in the AT servo controllers can be run by simple digital triggering signals.

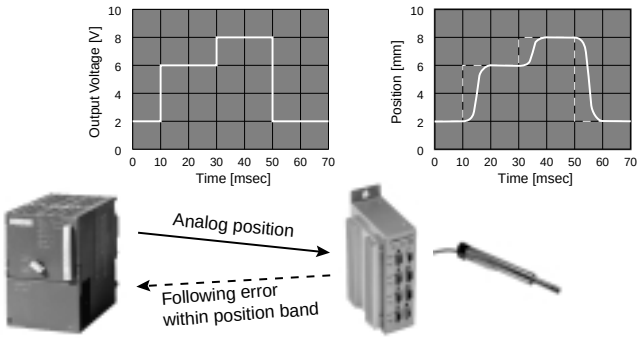
The servo controllers are configured using *LinMot*®Talk configuration software under MS Windows. Adjustments and settings made during commissioning can be stored on a PC and transferred to other servo controllers as necessary. For the configuration work, the servo controller is connected to the PC via an RS232 interface.

As an enhancement to the system, stepping motors and inductive loads such as solenoids or pneumatic valves can be controlled instead of linear motors. This feature allows, amongst other things, the synchronisation of linear motion with the control of gripping devices, solenoids etc.



Operating modes

Analogue position

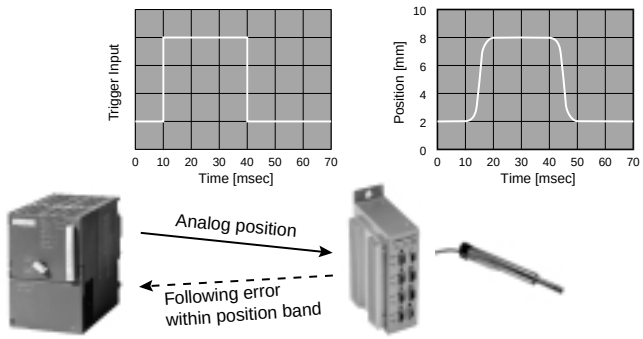


The required position is given via a voltage signal on the analogue input of the servo controller. The user can define the positional range represented by the voltage range at the analogue input.

In order to limit the enormous dynamics of the linear motors when jumps in set point values occur, maximum speed and acceleration can be defined independently for each linear motor.

The resolution of the analogue input is 10 bits.

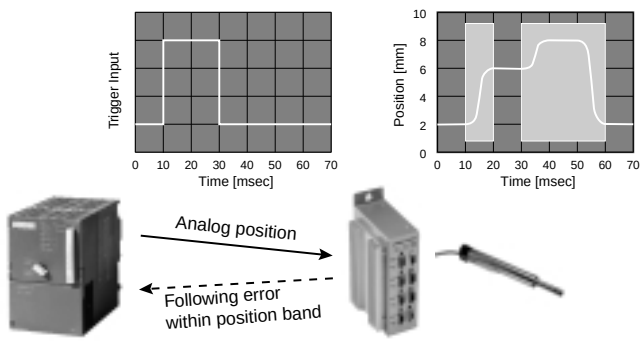
Two-point trig



If only two end positions have to be reached (e.g. replacement for a pneumatic cylinder), control is carried out in "two-point trig" mode. On the basis of a digital control signal, the two positions stored in the servo controller are executed.
The dynamics of the motor can be limited by defining maximum speed and acceleration.

End positions can be defined during operation via the RS 232 or RS485 interface and triggered by a digital signal.

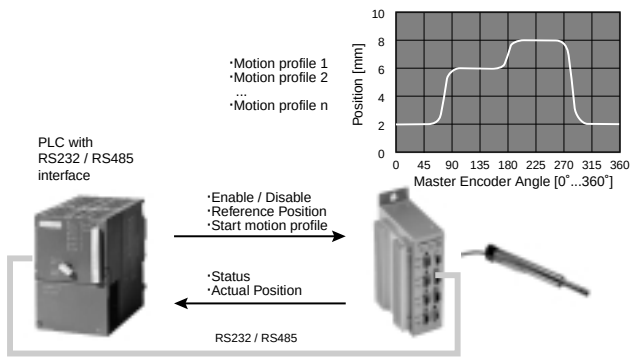
Trig curve / Continuous curve



In the servo controller, two freely chosen motion profiles can be stored per motor which are run on the rising and falling transitions of the digital input signal. An unrestricted number of profiles can be stored with up to 4,000 curve points. A linear interpolation is performed between the individual curve points. Profiles can be selected via the RS232 or RS485 interfaces and started via digital input signals.

In the continuous curve mode, the linear motor travels continuously along the stored curve.

Serial position



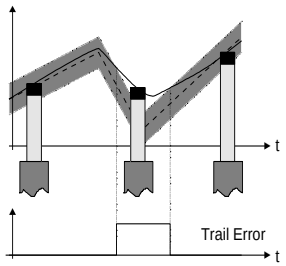
Up to six servo controllers can be controlled from overlaid controller via the serial interface (RS232, RS485). Required positions can be directly defined using the ASCII protocol or motion profiles stored in the servo controller run. The serial interface also provides possibilities to read out current values such as current position or motor current (force) of the linear drives.

A detailed description of the ASCII protocol and a list of commands can be found in the annexe.

Set-point filter

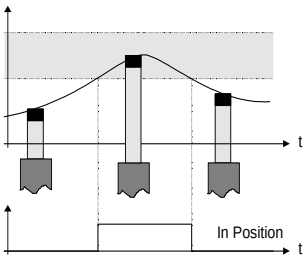
Using the built-in set-point filter, both the dynamics and the speed of the drives can be adjusted to the individual applications. The set-point filter allows a maximum allowable speed and a maximum allowable acceleration to be defined for each drive. Every movement made by the drive (e.g. set-point jump, freeze etc.) is carried out taking these limits into consideration. The dynamics of the profiles stored in the servo controller is not influenced by the filter settings.

POSITION MONITORING



Following Error

The difference between required position and actual position may not exceed tolerance values set by the user. If the difference (following error) is too large, a warning is issued via a digital output or the motors are stopped. Following errors occur when set-point curves are too fast, when moving (too) large masses or when sliders are jammed etc.

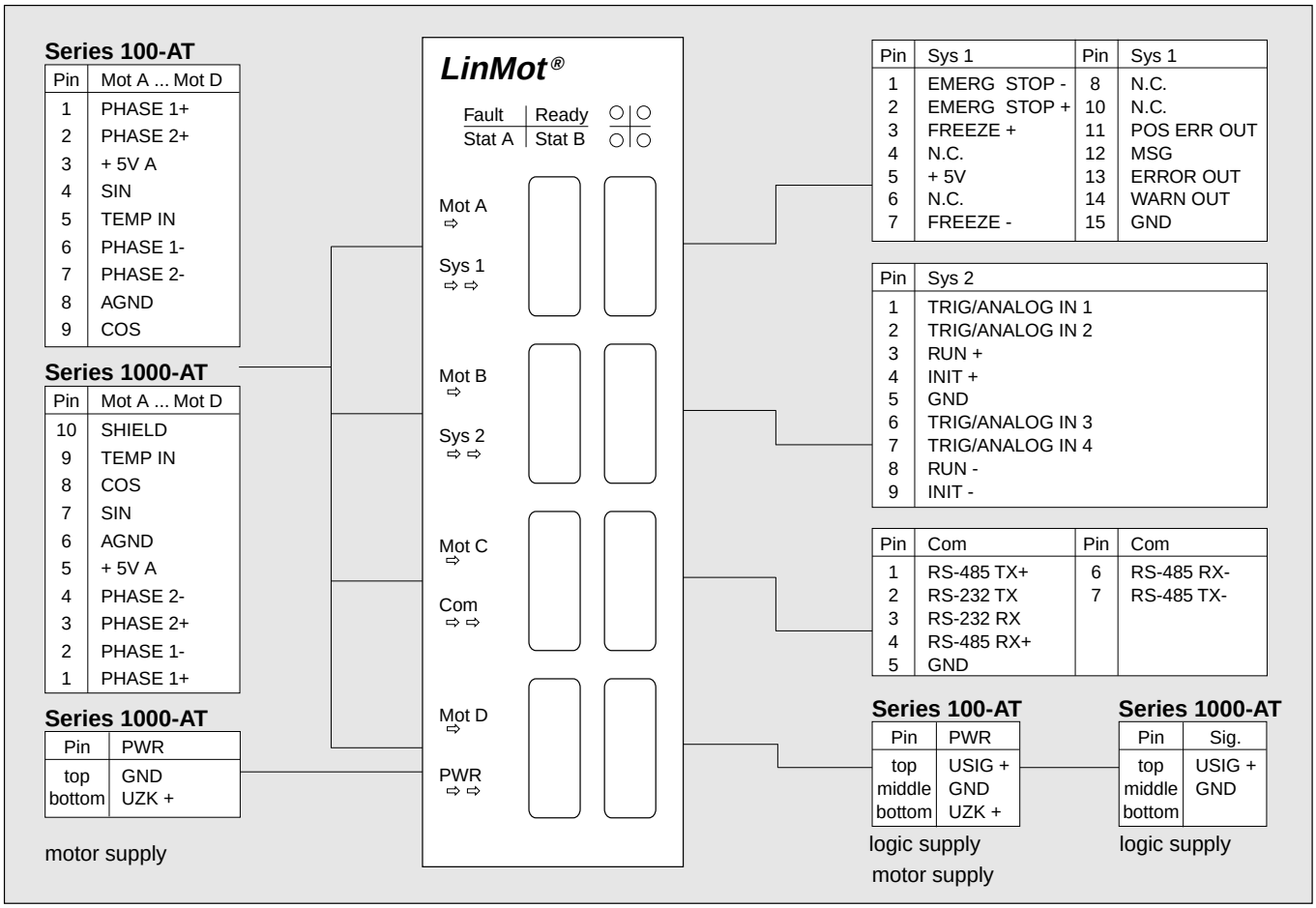


Band monitoring

For each motor there exists a freely definable position band. Should a slider be positioned outside this band, this is signalled via a digital output. This monitoring can be used in situations when a slider is in an area where other parts of the machine are in motion for a period of time and the overlaid controller should be informed when the slider is outside the danger area.

SPECIAL FUNCTIONS

Emergency stop	A SW "emergency stop" mode for the motors can be activated via a digital input. For each linear motor, it can be defined in the case of an emergency stop if the slider should stay where it is, travel to a particular position or if the motor is to be switched off.
Freeze	If this input is activated, all motors connected stop at their current position until the input is reset.
Error handling	To a great extent, the user himself can define under which conditions warning and error messages are issued.
Overheating	Both the electronics unit and the linear motors connected to it are protected from overheating by integrated temperature sensors.
Power supply	All servo controllers are provided with separate power inputs for the power and the logic sections. If the motors have to be switched off (e.g. emergency stop), it is sufficient to disrupt only the power supply to the power section, so that homing is not necessary on restart.
Master / Booster	In order to increase force, up to four linear motors can be driven in parallel in master / booster mode (see annexe).



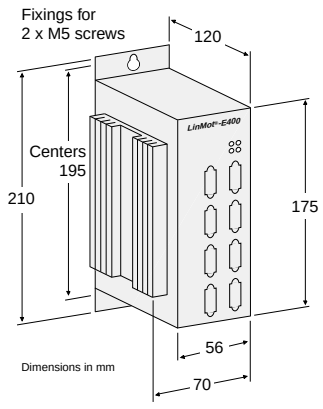
Signal	Description	Electrical specification	
INIT +/-	Motor initialization input	Isolated input	(max. 24 V / 20 mA) *
RUN +/-	Motor start input	Isolated input	(max. 24 V / 20 mA) *
EMERGENCY STOP +/-	Emergency stop input	Isolated input	(max. 24 V / 20 mA) *
FREEZE +/-	Freeze position input	Isolated input	(max. 24 V / 20 mA) *
TRIG/ANALOG IN 1/2/3/4	Analog position set value or digital trigger inputs	Analog position input Digital trigger inputs	(0…10 V / 100 kΩ) * (max. 24 V)
WARNING OUT	Warning output	Open collector output	(max. 24 V / 50 mA)
ERROR OUT	Error output	Open collector output	(max. 24 V / 50 mA)
Pos ERROR OUT	Position error output	Open collector output	(max. 24 V / 50 mA)
MSG OUT	Message output	Open collector output	(max. 24 V / 50 mA)
+5V	5V output	Logic supply output	(max. 50 mA)
RS-232 TX/RX	RS232 Transmit / Receive	Serial connection to the PC	
USIG+	Supply (logic)	Supply input logic	(24-48 VDC)
GND	Ground	Ground input for logic and input drives	
UZK+	Supply (power)	Supply series 100 Supply series 1000	(24-48 VDC) (48-72 VDC)

* Low: < 1.6V, High: > 4.0V

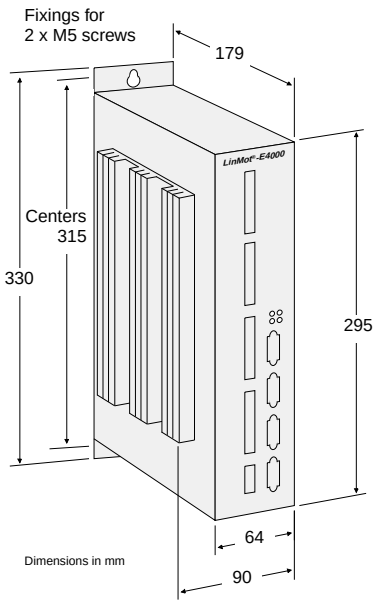
Analog-Trigger Servo Controller							
		E100-AT	***E200-AT***	***E400-AT***	***E1000-AT***	***E2000-AT***	***E4000-AT***
Number of motor channels		1	2	4	1	2	4
Max. Output current per phase	A	3			6		
Logic supply	V_{DC}	24-48			24-48		
Power consumption logic	W	5			10		
Power supply	V_{DC}	24-48			48-72		
Digital inputs		4			4		
Analog inputs*		4 (0...10V, 10 Bit)			4 (0...10V, 10 Bit)		
Trigger inputs*		4			4		
Digital outputs		4			4		
RS-232 interface		1			1		
RS-485 interface		1			1		
Width	mm (in)	70 (2.8)			90 (3.5)		
Height	mm (in)	210 (8.3)			330 (13)		
Height (without fixings)	mm (in)	175 (6.9)			295 (11.6)		
Depth	mm (in)	120 (4.7)			179 (7)		
Weight	kg (lb)	1.1 (2.4)	1.2 (2.7)	1.3 (2.9)	2.5 (5.5)	2.6 (5.7)	2.7 (5.9)
Case	IP	40			40		
Storage temperature	°C	-25...70			-25...70		
Operating temperature	°C	0...50			0...50		
Max. case temperature	°C	65			65		

* optional

E100-AT / E200-AT / E400-AT



E1000-AT / E2000-AT / E4000-AT



Ordering Information

Servo Controller	Description	Art. No.
E100-AT	Analog Trigger Servo Controller for 1 actuator (48V / 3A)	0150-1601
E200-AT	Analog Trigger Servo Controller for 2 actuator (48V / 3A)	0150-1602
E400-AT	Analog Trigger Servo Controller for 4 actuator (48V / 3A)	0150-1604
E1000-AT	Analog Trigger Servo Controller for 1 actuator (72V / 6A)	0150-1605
E2000-AT	Analog Trigger Servo Controller for 2 actuator (72V / 6A)	0150-1606
E4000-AT	Analog Trigger Servo Controller for 4 actuator (72V / 6A)	0150-1608

Specification of products are subject to change without notification

Multi Trigger Servo Controller

The Series E100-MT servo controllers and the more powerful Series E1000-MT offer, together with the *LinMot*® linear motor family, ready-to-use positioning systems for one, two or four linear axes. The multi trigger (MT) functionality allows the programming of complex motion sequences directly in the servo controller. In this way, the MT servo controller can be directly co-ordinated from the overlaid controller without having to employ additional axis and position controllers, even for complex motion sequences.

The multi trigger function is an extension to the analogue trigger functions. In the multi trigger servo controllers, the full range of analogue trigger functions remains available. This data sheet covers only the multi trigger functions. For a description of the analogue trigger functions, please refer to the appropriate data sheet.

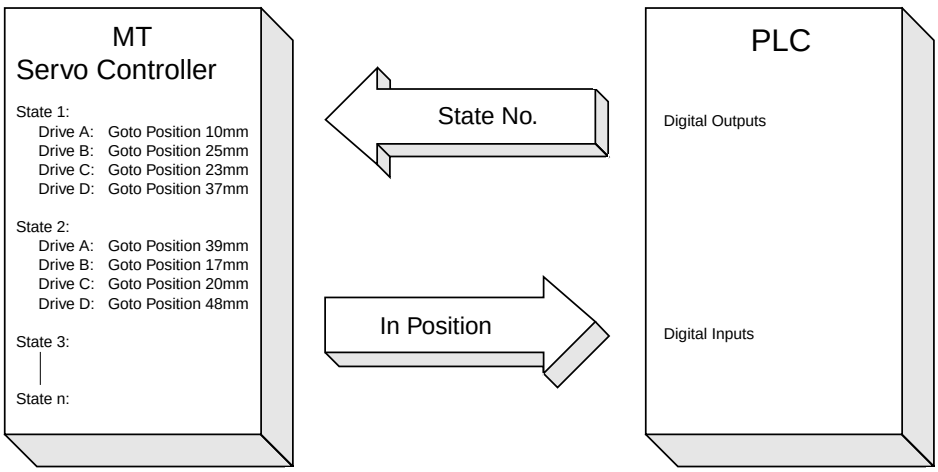
SYSTEM DESCRIPTION

The Series E100-MT and E1000-MT series servo controllers allow the direct programming of complex motion sequences with up to 64 commands per axis. The servo controllers are commanded via digital signals from the overlaid controller.

Commands for each axis are stored in a state table in the servo controller. The individual states in the table are controlled using addressing via digital signals by the overlaid controller. As soon as the overlaid controller calls up a state, the axis-movements or the command defined for that state are carried out.

The IN POSITION signal indicates to the overlaid controller that all commands have been carried out and the target positions have been reached.

If an axis is not to perform any motion, the appropriate axis' entry in the state table is set to a NO OPERATION command.



THE STATE TABLE

Up to 64 states can be defined in the state table. In each of the states, the motions or commands to be performed by the motor concerned are defined. The following commands are available:

No operation
The actor carries out no motion or completes a motion already started. Used for servo controllers for several axes when, in a particular state, an actor should not carry out any motion or should complete a motion already started.

Abs. position
The actor is positioned at the required absolute position (relative to zero-position) while taking adjustable maximum speed and acceleration into consideration. As soon as the actor reaches the final position, the IN POSITION output becomes active.

Abs. current
This command is used to define phase current output when driving inductive loads.

Rel. position
The actor is driven a required distance (relative to current position) while taking adjustable maximum speed and acceleration into consideration. As soon as the actor reaches the new position, the IN POSITION output becomes active.

Rel. current
This command is only available when driving inductive loads and is used to change the value of the phase current in the actor's output.

Curve
A stored motion profile, which is stored in the drive electronics, is run . As soon as the actor reaches the last set-point in the curve, the IN POSITION output becomes active.

Move home position
Curves and absolute positions are always referred to the reference position established during initialisation. With the move home position command, the reference position (zero-point) of the appropriate drive is shifted by the required amount. This command may only be carried out when all actors are motionless and none of the motors is in the FREEZE state.

Redefine position
With this command, the current position is redefined. This command may only be carried out when motor has reached its required position is not in the FREEZE state.

Stop
The current motion is aborted and the actor is brought to a stop while taking adjustable maximum deceleration into consideration. As soon as the actor has stopped, the IN POSITION output becomes active.

Freeze / Unfreeze
On the FREEZE command, the current motion is interrupted and the actor is brought to a stop while taking the maximum deceleration defined for the current motion into consideration. In contrast to the STOP command, the IN POSITION output is not activated for the FREEZE command. Using the UNFREEZE command, the interrupted motion can be finished. As soon as the motion is completed, the IN POSITION output becomes active.

Set current
This command redefines the actor's maximum current and thereby its force. Only positive values may be set.

Set cur. Offset
This command defines the current offset. The current offset is used to compensate a static force (compensation of load mass in vertical applications).

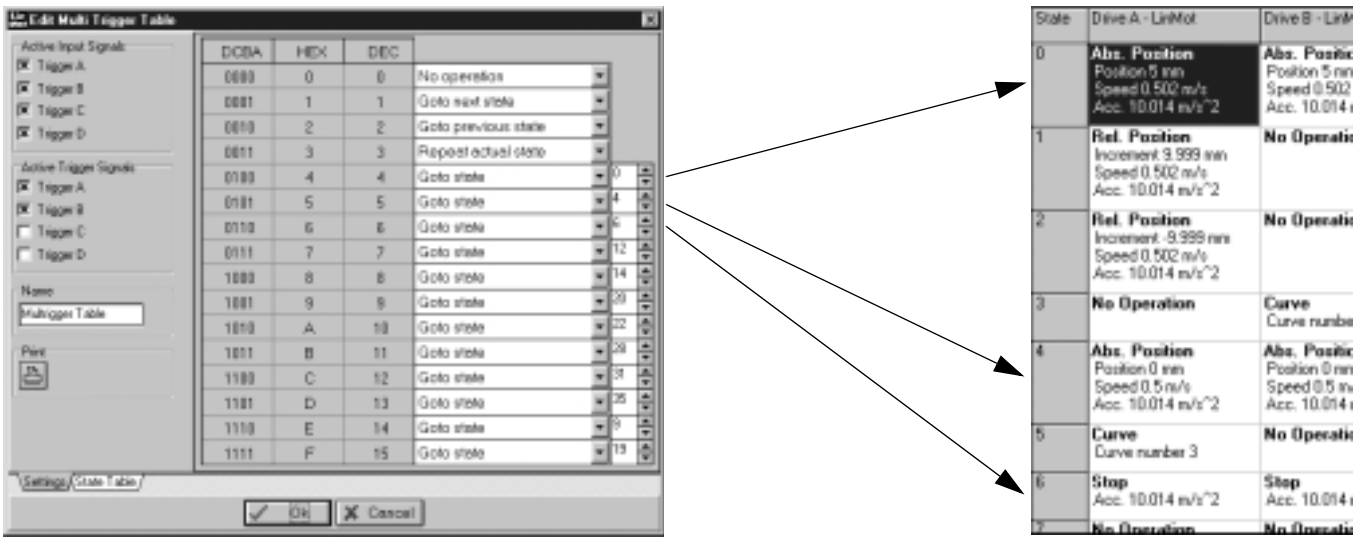
Set FF
This command sets the feed forward parameter. It is used to optimally adjust the position controller when considerable load mass changes occur.

Set PID
This command sets the position controller's PID parameters. It is used to optimally adjust the position controller during operation and when considerable load mass changes occur.

Set CP
This command sets the parameters for the scaling of motion profiles. It allows the adjustment of speed, amplitude and offset for the motion profiles during operation.

CONTROLLING THE INDIVIDUAL STATES

Individual states are set by the overlaid control system (e.g. PLC) via four digital signals (TRIG IN 1 - 4). Each of the 16 possible configurations of the input signals is assigned to a command. These commands allow particular states to be directly addressed, the following state to be called, the previous state to be called or the same state to be carried out again.



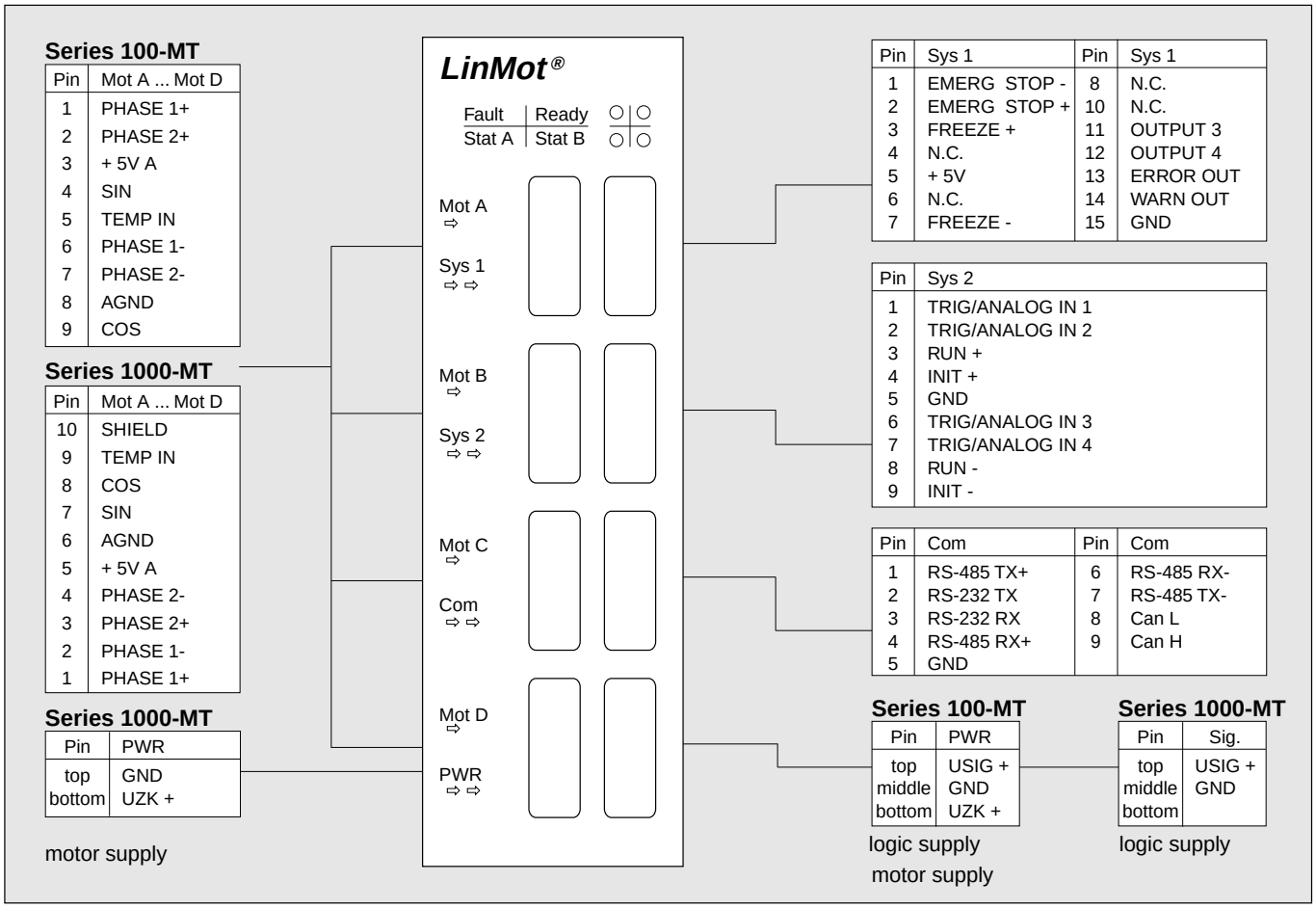
EXAMPLE

In the example shown in the table below, it can be seen how the overlaid controller can call the states required using the four digital input signals TRIG IN-1 - 4. A new command will only be carried out when the changed combination of the input signals has been constantly available for a fixed period of time (jitter-filter). The table shows the motion of drive A in the illustration above.

Input signals	Command	Actual state number	Motion of motor A
0100	Goto state 0	0	Move to absolute position +5mm • max. speed 0.5m/s • max. acceleration 10m/s²
0001	Goto next state	1	Move to absolute position +10mm • max. speed 0.5m/s • max. acceleration 10m/s²
0000	No operation	1	-
0001	Goto next state	2	Move to absolute position -10mm • max. speed 0.5m/s • max. acceleration 10m/s²
0000	No operation	2	-
0011	Repeat actual state	2	Move to absolute position -10mm • max. speed 0.5m/s • max. acceleration 10m/s²
0000	No operation	2	-
0001	Goto next state	3	Slider stays in present position or completes the state motion.
0000	No operation	3	-
0110	Goto state 6	6	Slider is stopped with 10m/s² of acceleration
…	…	…	…

Output signals

The overlaid controller is informed when the motors have reached their target positions via digital output signals. The two digital outputs (OUTPUT 3 and OUTPUT 4) can be configured so that they can be activated when any one, two or four motors reach their target position (IN POSITION).



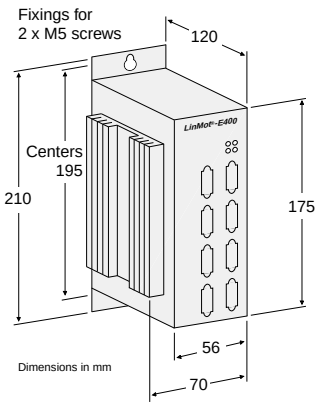
Signal	Description	Electrical specification	
INIT +/-	Motor initialization input	Isolated input	(max. 24 V / 20 mA) *
RUN +/-	Motor start input	Isolated input	(max. 24 V / 20 mA) *
EMERGENCY STOP +/-	Emergency stop input	Isolated input	(max. 24 V / 20 mA) *
FREEZE +/-	Freeze position input	Isolated input	(max. 24 V / 20 mA) *
TRIG IN 1/2/3/4	Analog position set value or digital trigger inputs	Analog position input Digital trigger inputs	(max. 24 V) (0…10 V / 100 kΩ) *
WARNING OUT	Warning output	Open collector output	(max. 24 V / 50 mA)
ERROR OUT	Error output	Open collector output	(max. 24 V / 50 mA)
OUTPUT 3	End position reached outputs	Open collector output	(max. 24 V / 50 mA)
OUTPUT 4	End position reached outputs	Open collector output	(max. 24 V / 50 mA)
+5V	5V output	Logic supply output	(max. 50 mA)
RS-232 TX/RX	RS232 Transmit / Receive	Serial connection to the PC	
USIG+	Supply (logic)	Supply input	(24-48 VDC)
GND	Ground	Ground input for logic and input drives	
UZK+	Supply (drives)	Supply input	(24-48 VDC) (48-72 VDC)

* Low: < 1.6V, High: > 4.0V

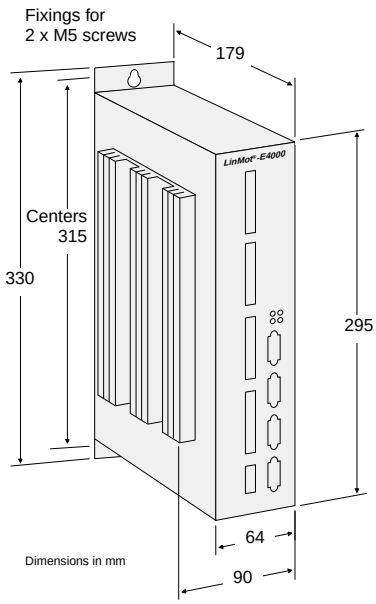
Multi-Trigger Servo Controller							
		E100-MT	***E200-MT***	***E400-MT***	***E1000-MT***	***E2000-MT***	***E4000-MT***
Number of motor channels		1	2	4	1	2	4
Max. Output current per phase	A	3			6		
Logic supply	V_{DC}	24-48			24-48		
Power consumption logic	W	5			10		
Power supply	V_{DC}	24-48			48-72		
Digital inputs		4			4		
Analog inputs*		4 (0...10V, 10 Bit)			4 (0...10V, 10 Bit)		
Trigger inputs*		4			4		
Digital outputs		4			4		
RS-232 interface		1			1		
CAN-Bus / RS-485 interface		1			1		
Width	mm (in)	70 (2.8)			90 (3.5)		
Height	mm (in)	210 (8.3)			330 (13)		
Height (without fixings)	mm (in)	175 (6.9)			295 (11.6)		
Depth	mm (in)	120 (4.7)			179 (7)		
Weight	kg (lb)	1.1 (2.4)	1.2 (2.7)	1.3 (2.9)	2.5 (5.5)	2.6 (5.7)	2.7 (5.9)
Case	IP	40			40		
Storage temperature	°C	-25...70			-25...70		
Operating temperature	°C	0...50			0...50		
Max. case temperature	°C	65			65		

* optional

E100-MT / E200-MT / E400-MT



E1000-MT / E2000-MT / E4000-MT



Ordering Information

Servo Controller	Description	Art. No.
E100-MT	Multi Trigger Servo Controller for 1 actuator (48V / 3A)	0150-1611
E200-MT	Multi Trigger Servo Controller for 2 actuator (48V / 3A)	0150-1612
E400-MT	Multi Trigger Servo Controller for 4 actuator (48V / 3A)	0150-1614
E1000-MT	Multi Trigger Servo Controller for 1 actuator (72V / 6A)	0150-1615
E2000-MT	Multi Trigger Servo Controller for 2 actuator (72V / 6A)	0150-1616
E4000-MT	Multi Trigger Servo Controller for 4 actuator (72V / 6A)	0150-1618

Specification of products are subject to change without notification

PROFIBUS-DP Servo Controller

The Series E130-DP and E1030-DP servo controllers are characterised by their integrated PROFIBUS-DP interface. This standardised interface allows an exceptionally fast and simple connection to controllers at a higher hierarchical level.

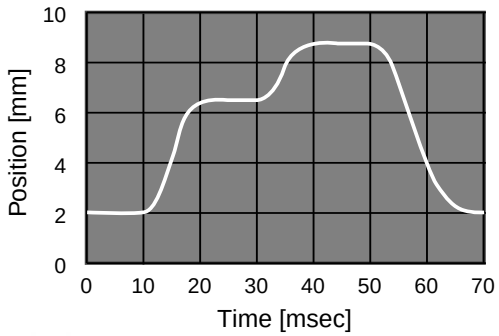
As a result of the cyclical definition of set-point positions and other process data, this servo controller is the ideal solution for applications where movements and sequences often change.

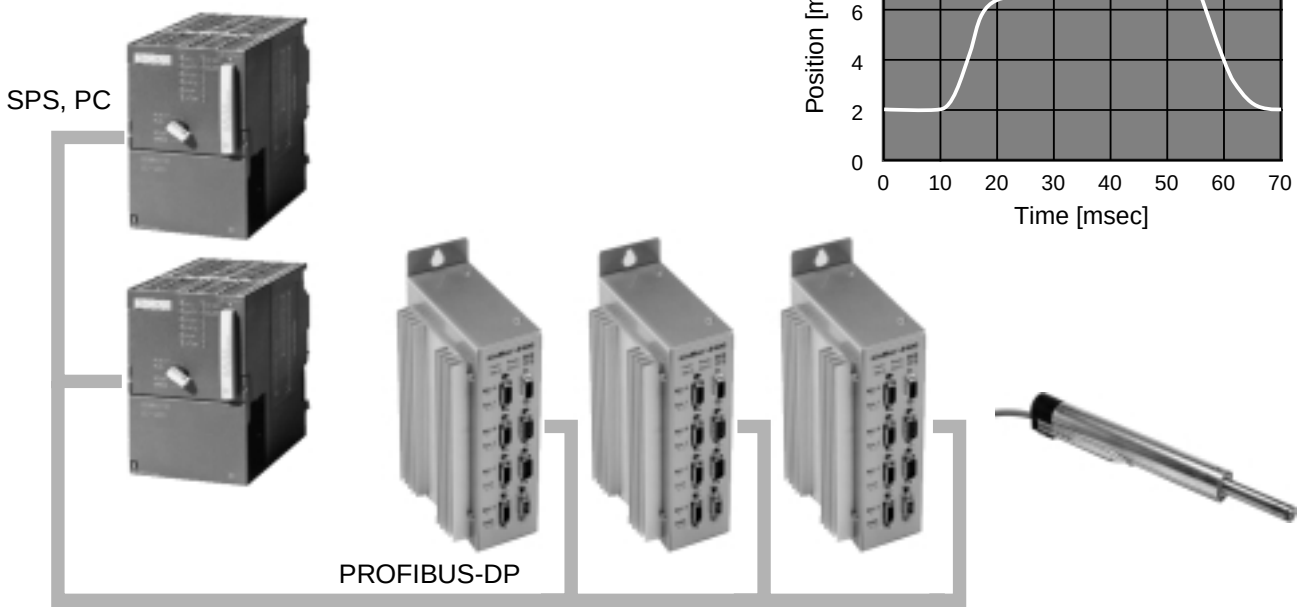
PROFI PROCESS FIELD BUS BUS

SYSTEM DESCRIPTION

PROFIBUS-DP offers the user a standardised field bus interface for the fast transfer of data between servo controller and overlaid controller. The maximum Baud rate of 12 MBit/s guarantees fast system reaction times even if there are many stations on the bus.

The user can freely adapt the type and volume of data to be transmitted per motor according to his requirements.





PROFIBUS-DP INTERFACE

The PROFIBUS-DP interface supports all Baud rates between 9.6 kBit/s up to 12MBit/s. The connection is via a 9-pin female DSUB connector and conforms to the PROFIBUS standard (use of standardised connectors). A power supply for an external bus termination is supplied. A positive direction-control signal is available for the control of repeaters and fibre-optic connections. All signals on the PROFIBUS connector are DC isolated.

The PROFIBUS-DP address is set using two hex code switches (ID1 and ID2). All addresses allowed by the norm are supported (0 -125).

The lowest bus cycle time reached is 100us.

The maximum amount of data transferred in cyclical data transfer mode is 64 Byte per cycle. The structure and amount of the cyclic data can be determined during the planning of the installation using any individual data modules up to a total data volume of 64 bytes, whereby the data for individual motors can differ.

For the open project planning as defined by the PROFIBUS-DP standard, a device master file is supplied.

The total amount of data is variable (only the configured data is exchanged).

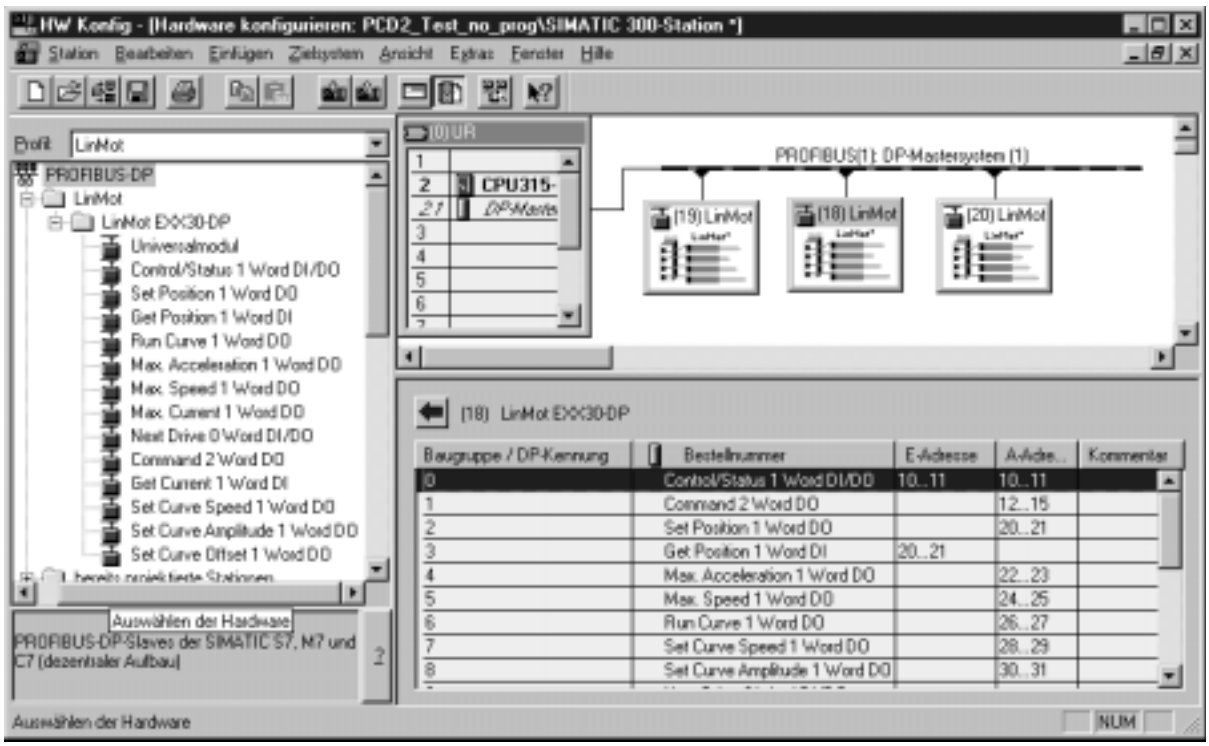
PROFIBUS device diagnosis is supported (configurable) and contains the following information:

- Faults and warnings (separated for system and motors A-D)
- Plain text messages on diagnosis information are supplied by the GSD file.

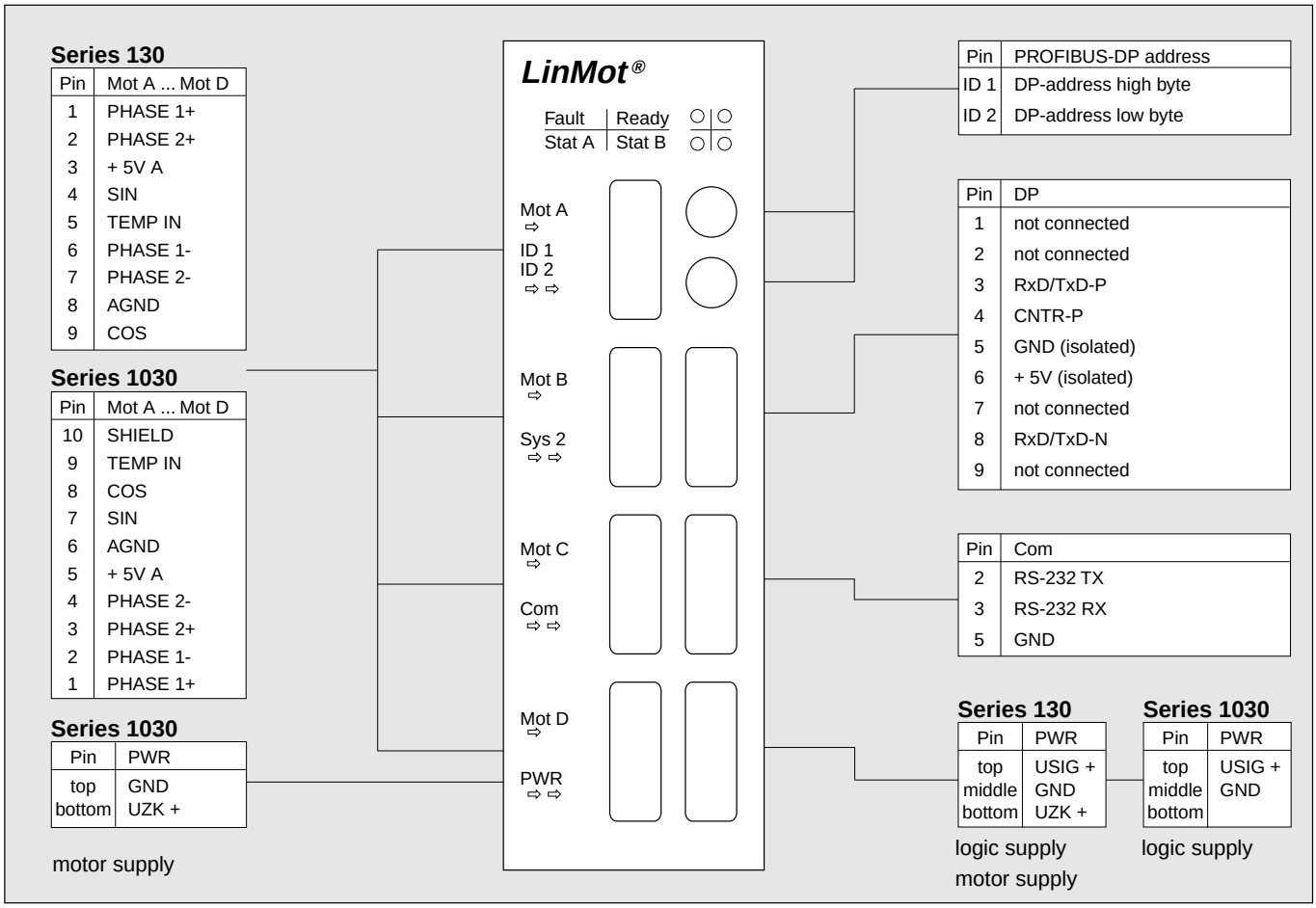
Further information on PROFIBUS is available under the following URL: http://www.profibus.com

PROJECT PLANNING

The PLC configuration tools allow simple graphical bus programming using the GSD file provided. The illustration below shows the Siemens (S7) PC user interface for the graphical programming of the PROFIBUS. In the example shown, three *LinMot*® servo controllers are connected via PROFIBUS to the overlaid controller. The data modules necessary for the control of the linear motors are inserted on the left-hand side of the table.



(Screenshot: STEP7 of Siemens)

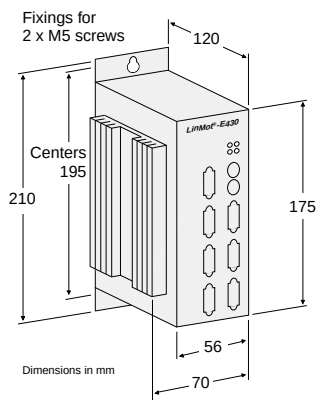


Commands

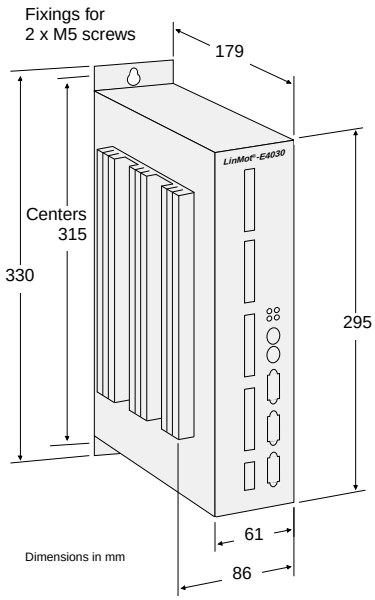
Data module	Description
Command	Enables the configuration of the position contoller for the linear motors as well as shifting to the zero-position.
Control	The states of the servo controller (INIT, RUN, FREEZE, STOP) are requested by the next higher control system over the control data module.
Status	The status module returns the actuator state flags from the servo controlle (ERROR, WARNING, INIT DONE) as well as from the motors (IN POSITION; CURVE DONE).
Get Position	Reads the current position of the motor
Get Current	Reads the actual current
Max. Acceleration	Sets the maximal acceleration
Max. Current	Sets the maximal current/force
Max. Speed	Sets the maximal speed
Next Drive	Tags a new motor
Run Curve	Starts a stored motion profile
Set Position	Sets the wanted position of the motor
Set Curve Speed	Sets the speed
Set Curve Amplitude	Sets the curve amplitude
Set Curve Offset	Sets the curve position offset

PROFIBUS-DP Servo Controller							
		E130-DP	***E230-DP***	***E430-DP***	***E1030-DP***	***E2030-DP***	***E4030-DP***
Number of motor channels		1	2	4	1	2	4
Max. output current per phase	A	3			6		
Logic supply	V_{DC}	24-48			24-48		
Power consumption logic	W	5			10		
Power supply	V_{DC}	24-48			48-72		
PROFIBUS-DP interface		up to 12 MBit/s			up to 12 MBit/s		
PROFIBUS-DP adress		set by switch			set by switch		
RS-232 / CAN-Bus Schnittstelle		1			1		
Width	mm (in)	70 (2.8)			90 (3.5)		
Height	mm (in)	210 (8.3)			330 (13)		
Height (without fixings)	mm (in)	175 (6.9)			295 (11.6)		
Depth	mm (in)	120 (4.7)			179 (7)		
Weight	kg (lb)	1.1 (2.4)	1.2 (2.7)	1.3 (2.9)	2.5 (5.5)	2.6 (5.7)	2.7 (5.9)
Case	IP	40			40		
Storage temperature	°C	-25...70			-25...70		
Operating temperature	°C	0...50			0...50		
Max. case temperature	°C	65			65		

E130-DP / E230-DP / E430-DP



E1030-DP / E2030-DP / E4030-DP



Ordering Information

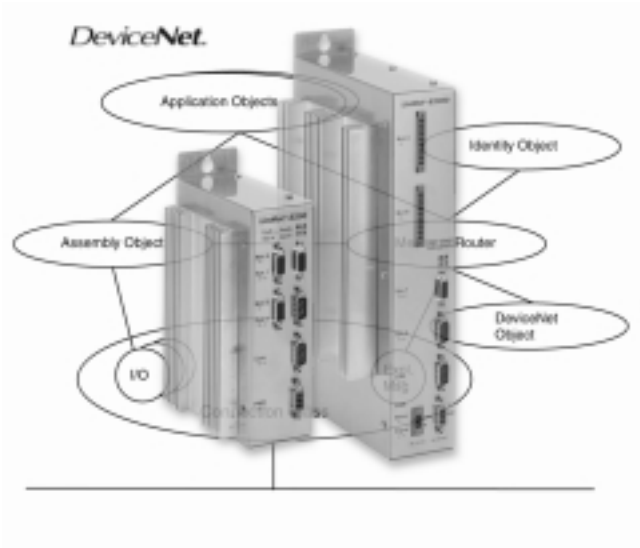
Servo Controller	Description	Art. No.
E130-DP	PROFIBUS-DP Servo Controller for 1 actuator (48V / 3A)	0150-1621
E230-DP	PROFIBUS-DP Servo Controller for 2 actuators (48V / 3A)	0150-1622
E430-DP	PROFIBUS-DP Servo Controller for 4 actuators (48V / 3A)	0150-1624
E1030-DP	PROFIBUS-DP Servo Controller for 1 actuator (72V / 6A)	0150-1625
E2030-DP	PROFIBUS-DP Servo Controller for 2 actuators (72V / 6A)	0150-1626
E4030-DP	PROFIBUS-DP Servo Controller for 4 actuators (72V / 6A)	0150-1628

Specification of products are subject to change without notification

DeviceNet Servo Controller

The Series E100-DN and the more powerful Series E1000-DN servo controllers are characterised by ther integrated DeviceNet Field Bus interface. With this standardised bus interface a fast and simple integration into hierarchical higher controllers is supprted.

With the DeviceNet Field bus interface also complex application can be resolved in a easy way.



SYSTEM DESCRIPTION

DeviceNet is an open field bus standard based on the CAN bus. Within DeviceNet different communication channels are supported. Through the DeviceNet connection the *LinMot*® servo controller can be controlled and monitored.

The basic operation modes and functions of the *LinMot*® DeviceNet servo controllers -DN are identical with the *LinMot*® AT servo controller.

Additional to the -AT functionality, the DeviceNet servo controllers offers extended field bus possibilities:
- Direct position control
- Monitoring of internal Parameters
- Runtime read/write access to all life Parameters
- Runtime configuration
- Diagnostic

The configuration of the servo controller will be done with the delivered *LinMot*® Talk Software.

Supported Connections

Explicit Messaging
The Explicit Message connection is used to setup the DeviceNet IO-connections. The *LinMot*® DeviceNet servo controller offers one Explicit Message Connection for one Master.

If two Masters want to use this connection on the same time, the second Master has to wait until the first Master releases this connection.

Polled IO Connections
The polled IO connection is used to exchange data between a master and a slave. The master starts the data exchange with a Poll Command Message that is responded by the slave with the Poll Response Message.

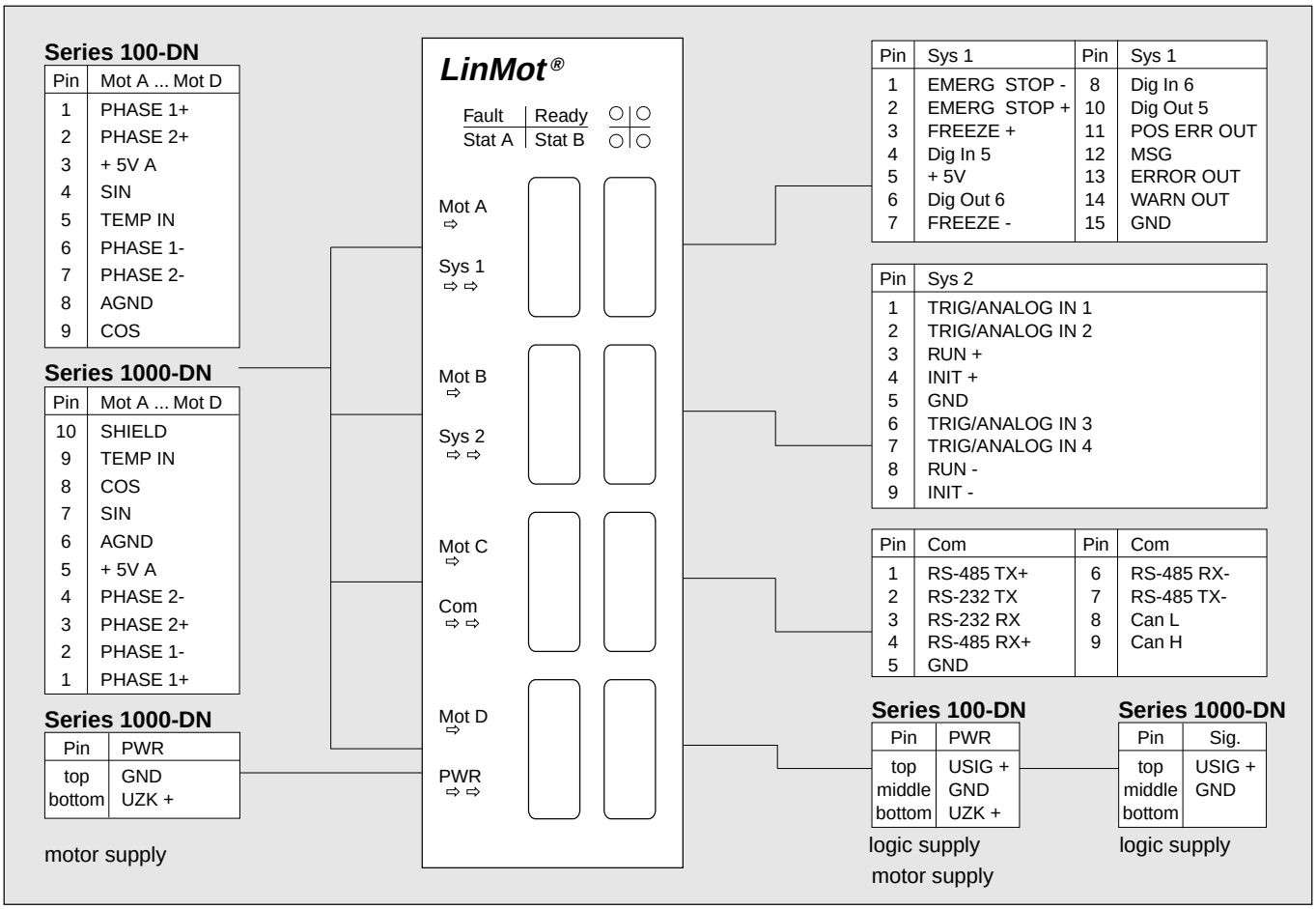
Tough the master uses the same identification for the polled and CoS/Cyclic IO connections only one could be active at time, so if both (Polled and CoS/Cyclic) IO connections are selected the master transmits its data over the polled IO connection.

Change of State IO connection
The Change of State IO connection is used to exchange data between a master and its slave. Data are transmitted if in the master/slave the state has changed. The receiver of the data may acknowledge the reception. In addition the data are transmitted after a specified heartbeat time.

To avoid bus overload an inhibit time can be configured. The inhibit time has to be waited before new data is transmitted even if the state has changed.

Cyclic IO connection
Instead of the Change of State IO connection a cyclic IO connection could be configured.

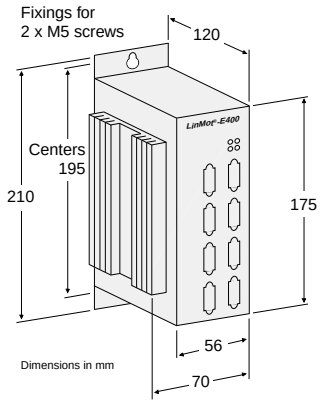
Data are transmitted strictly cyclic. The receiver of the data may acknowledge the reception.



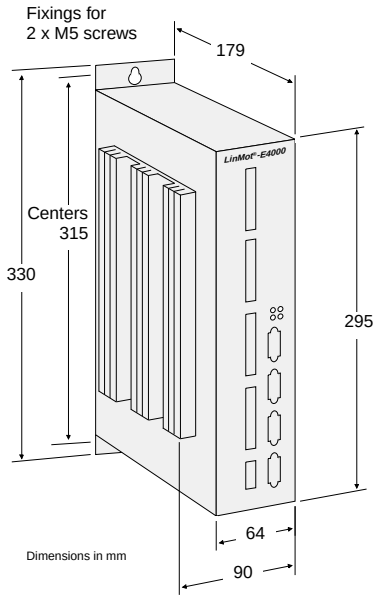
Signal	Description	Electrical specification	
INIT +/-	Motor initialization input	Isolated input	(max. 24 V / 20 mA) *
RUN +/-	Motor start input	Isolated input	(max. 24 V / 20 mA) *
EMERGENCY STOP +/-	Emergency stop input	Isolated input	(max. 24 V / 20 mA) *
FREEZE +/-	Freeze position input	Isolated input	(max. 24 V / 20 mA) *
TRIG/ANALOG IN 1/2/3/4	Analog position set value or digital trigger inputs	Analog position input Digital trigger inputs	(0…10 V / 100 kΩ) * (max. 24 V)
DIG IN 5/6	digital (trigger) inputs	Digital (trigger) inputs	(max. 24 V/ 100kΩ)
WARNING OUT	Warning output	Open collector output	(max. 24 V / 50 mA)
ERROR OUT	Error output	Open collector output	(max. 24 V / 50 mA)
Pos ERROR OUT	Position error output	Open collector output	(max. 24 V / 50 mA)
MSG OUT	Message output	Open collector output	(max. 24 V / 50 mA)
DIG OUT 5	digital output	Open collector output	(max. 24 V / 50 mA)
DIG OUT 6	digital output	Open collector output	(max. 24 V / 100 mA)
+5V	5V output	Logic supply output	(max. 50 mA)
RS-232 TX/RX	RS232 Transmit / Receive	Serial connection to the PC	
RS-485 TX+-/RX+-	RS485 Transmit / Receive	Serial bus connection to higher level controller (PLC/PC)	
CAN +-	CAN +-	Serial bus connection to higher level controller (PLC/PC)	
USIG+	Supply (logic)	Supply input logic	(24-48 VDC)
GND	Ground	Ground input for logic and input drives	
UZK+	Supply (power)	Supply series 100 Supply series 1000	(24-48 VDC) (48-72 VDC)

* Low: < 1.6V, High: > 4.0V

E100-DN / E200-DN / E400-DN



E1000-DN / E2000-DN / E4000-DN



Ordering Information

Servo Controller	Description	Art. No.
E100-DN	DeviceNet Servo Controller for 1 actuator (48V / 3A)	0150-1641
E200-DN	DeviceNet Servo Controller for 2 actuators (48V / 3A)	0150-1642
E400-DN	DeviceNet Servo Controller for 4 actuators (48V / 3A)	0150-1644
E1000-DN	DeviceNet Servo Controller for 1 actuator (72V / 6A)	0150-1645
E2000-DN	DeviceNet Servo Controller for 2 actuators (72V / 6A)	0150-1646
E4000-DN	DeviceNet Servo Controller for 4 actuators (72V / 6A)	0150-1648

Specification of products are subject to change without notification

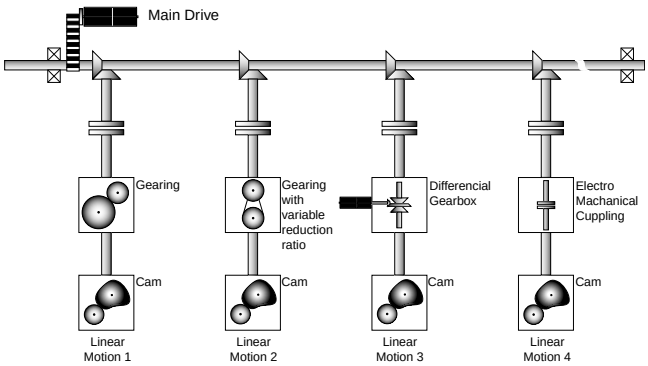
Master Encoder Interface

The Master Encoder Interface is a supplementary module for MT and DP servo controllers. It allows the connection of up to two external rotary encoders for the synchronisation of linear motors with a mechanical main axis.

Using the master encoder interface option, *LinMot*® linear motors can perform movements in synchronism with a main shaft. Mechanical cams, gear boxes and couplings can be directly replaced by linear drives. This leads to flexible solutions where the usual readjustment times of machines - which are dependent on mechanical adjustments - can be cut when changing products.

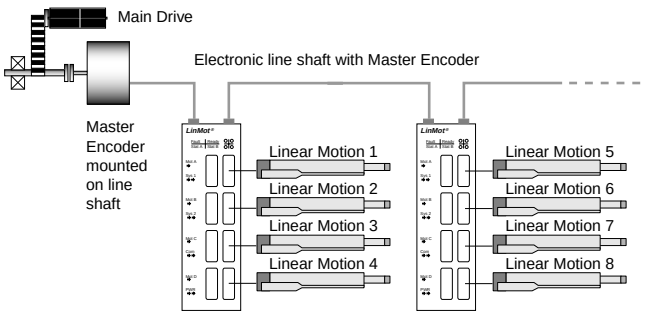
Mechanical main shaft / Electronic main shaft with linear motors

A central drive drives a main shaft. All linear motions are derived from the main shaft using mechanical constructions (gear boxes, mechanical cams, couplings etc.).



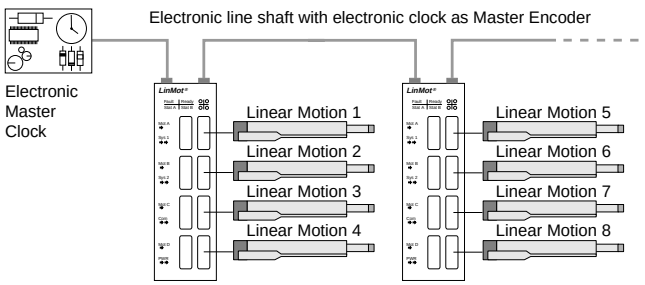
Mechanical Cams

With an electronic main shaft the position of the main drive is converted into electronic angular information using a rotary encoder (master encoder). This is transmitted on to the servo controllers via the master encoder interface. The motion profiles for the linear motors, which are dependent on the position of the main drive, are stored in the servo controller. Functions such as mechanical gear box and mechanical cams are implemented in the servo controller.
In this way, highly adaptable machines can be built, whose linear motor motion profiles can be adjusted by software when the product is changed.



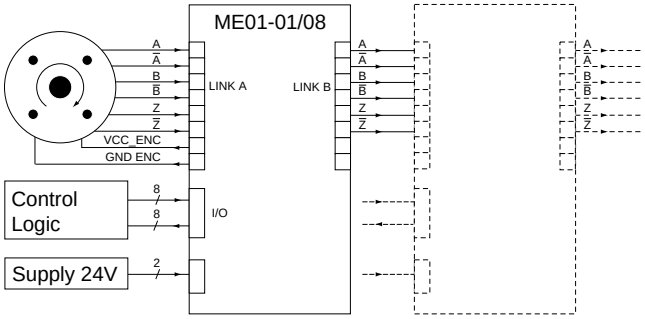
Electronic Cam

If all motions in a machine are electronically synchronised, an electronic master clock can replace the main drive in the machine's control system. All motions are carried out in synchronism with the electronic master clock.



Electronic Master Clock

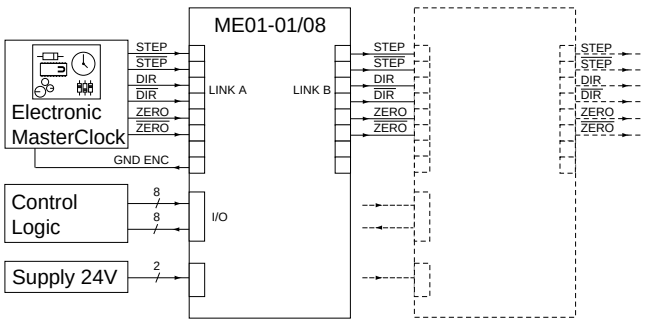
INCREMENTAL TRANSMITTER / SENSOR



The incremental transmitter is connected directly to the master encoder interface ME01-01/08. If several *LinMot*® servo controllers are to be operated from a common incremental transmitter, the master encoder interface ME01-01/08 provides an output with the master encoder signals. This can be connected directly to the input of the following servo controller.

The encoder is supplied with power either directly from the master encoder interface's 5V DC supply or from an external power source.

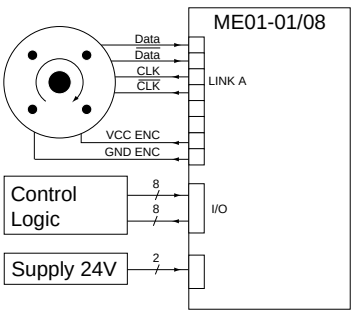
STEP / DIRECTION / ZERO



If the electronic master clock is provided directly by the master control system, this is in most cases implemented using digital STEP, DIRECTION and ZERO signals. The frequency of the STEP signal represents the rotational speed, the DIRECTION signal level the direction of rotation and the ZERO signal the zero position of the virtual main drive.

This interface is also used for the control of stepping motors. This makes it possible for linear motors to be integrated into existing systems with a stepping motor interface in an easy way.

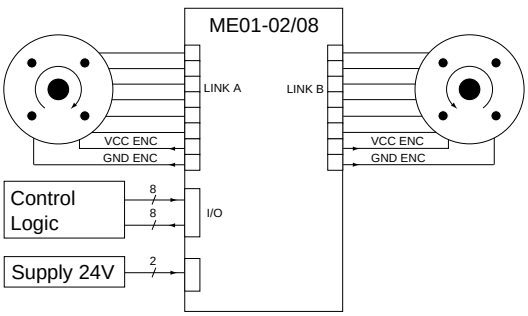
ABSOLUTE ENCODER SSI



Absolute encoder with a serial synchronous interface (SSI) can also be connected to the master encoder interface ME01-01/08.

Using absolute encoders has the advantage that homing by the main drive is not necessary when starting the machine. The current position of the main shaft is transmitted directly to the LinMot servo controllers via the SSI interface on start-up. The linear motors' homing sequence is still required.

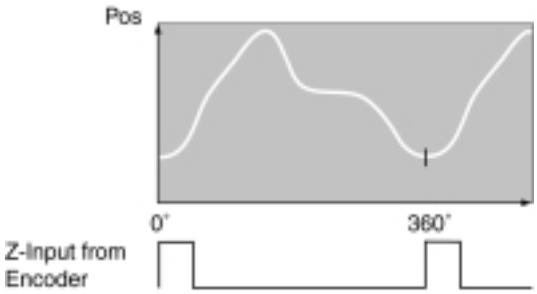
TWO ENCODERS, ABSOLUTE AND INCREMENTAL



Using the master encoder interface ME01-02/08, two rotary transmitters (SSI or incremental) can be connected to a servo controller.

The linear motors can be synchronised to either to the first or second rotary transmitter.

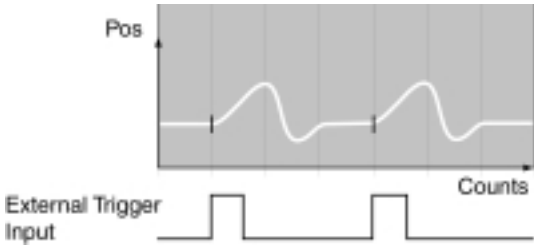
MOTION PROFILE ENCODER TRIGGER OPERATION



The linear motor carries out a movement synchronous to the rotary motion of the master encoder. The motion profile stored in the servo controller is started at a particular angle of the master encoder (adjustable).

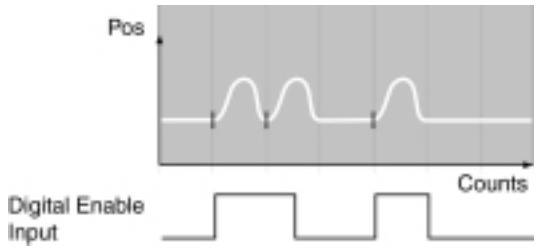
The triggering of the motion profiles can be enabled via digital input signals.

MOTION PROFILE EXTERNAL TRIGGER OPERATION



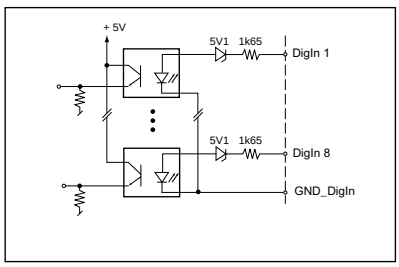
The linear motor carries out a movement synchronous to the rotary motion of the master encoder. The motion profile stored in the servo controller is run on an external trigger signal.
As soon as the motion profile is finished, the linear motor stays where it is until the next trigger impulse comes.

CONTIUOUS CURVES (WRAP) OPERATION



The linear motor carries out a movement synchronous to the rotary motion of the master encoder. The motion profile stored in the servo controller is started on an external signal. Once the motion is completed, the linear motor repeats the motion as long as the external signal is active. Otherwise the linear motor remains at its current position.

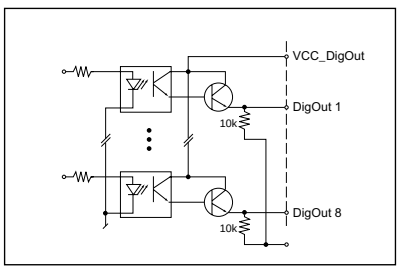
DIGITAL INPUTS



Using the 8 digital inputs available, the following functions can be implemented:

- Selection of motion profiles for the linear motors.
- Triggering the motion profiles.
- Enabling of encoder triggering mode.

DIGITAL OUTPUTS



Using the 8 digital outputs available, the following functions can be implemented:

- Activation of an output in an adjustable range of master encoder angle.
- Activation of an output in an adjustable range of linear motor position.
- Activation of an output, if a following error of a motor occurs.
- In Position (motor)

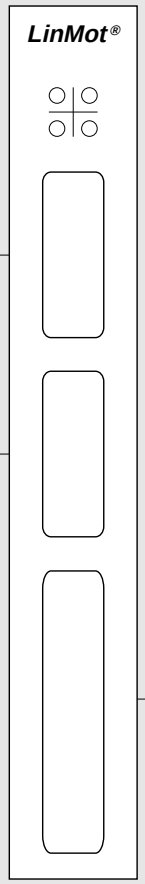
These functions can be freely configured for both outputs.

Link A
(DSUB 9 female)

Pin	incremental	step / dir / zero	absolute
1	VCC ENC	VCC ENC	VCC ENC
2	/A	/STEP	/DATA
3	/B	/DIR	/CLK
4	/Z	/ZERO	-
5	GND ENC	GND ENC	GND ENC
6	A	STEP	DATA
7	B	DIR	CLK
8	Z	ZERO	-
9	-	-	-

Link B
(DSUB 9 male)

Pin	incremental	step / dir / zero	absolute	loop through
1	VCC ENC	VCC ENC	VCC ENC	VCC ENC
2	/A	/STEP	/DATA	Link A pin 2
3	/B	/DIR	/CLK	Link A pin 3
4	/Z	/ZERO	-	Link A pin 4
5	GND ENC	GND ENC	GND ENC	GND ENC
6	A	STEP	DATA	Link A pin 6
7	B	DIR	CLK	Link A pin 7
8	Z	ZERO	-	Link A pin 8
9	-	-	-	-



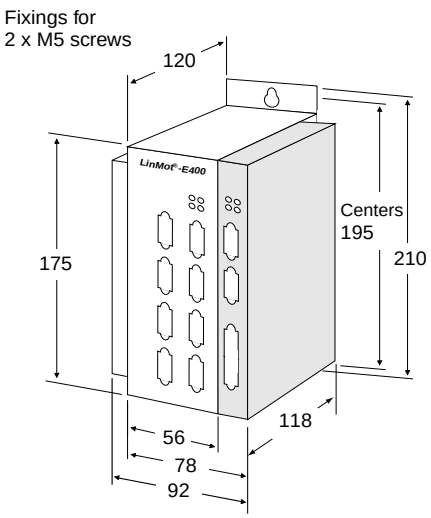
Control I/0
(DSUB 25 female)

Pin	
1	+24V ENC
2	+5V ENC OUT
3	-
4	DIG IN 2
5	DIG IN 4
6	DIG IN 6
7	DIG IN 8
8	-
9	DIG OUT 1
10	DIG OUT 3
11	DIG OUT 5
12	DIG OUT 7
13	GND DIG OUT
14	VCC ENC IN
15	GND ENC
16	DIG IN 1
17	DIG IN 3
18	DIG IN 5
19	DIG IN 7
20	GND DIG IN
21	VCC DIG OUT
22	DIG OUT 2
23	DIG OUT 4
24	DIG OUT 6
25	DIG OUT 8

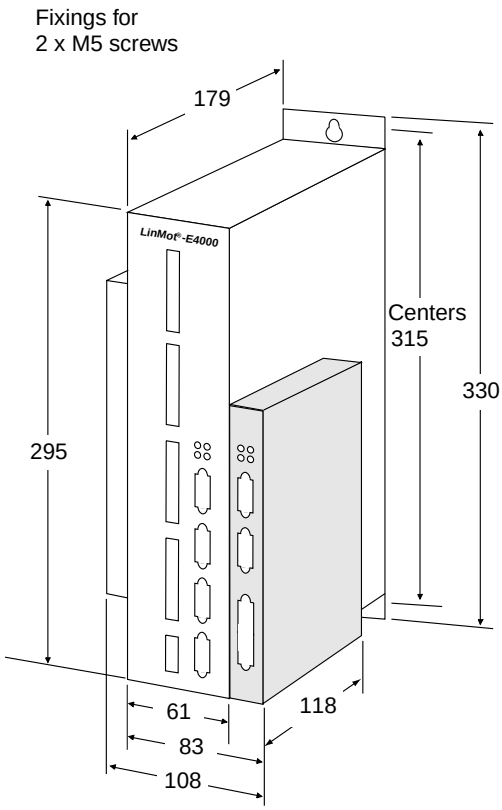
Master Encoder Interface			
		ME01-01/08	**ME01-02/08**
Link A	**Modes**		
	- Incremental	ABZ, max. 16 Bit	ABZ, max. 16 Bit
	- Step / Dir	STEP, DIR and ZERO	STEP, DIR and ZERO
	- Absolute	SSI, max. 24 Bit	SSI, max. 24 Bit
	Signal Level	differential (RS422)	differential (RS422)
	Max. Frequency	500 kHz	500 kHz
	Interface	galvanically isolated	galvanically isolated
	Encoder Supply	Internally generated (5V / max. 500mA) or external (Control I/O Pin 14)	Internally generated (5V / max. 500mA) or external (Control I/O Pin 14)
Link B	**Modes**		
	- Incremental	-	ABZ, max. 16 Bit
	- Step / Dir	-	Step and Dir
	- Absolute	-	SSI, max. 24 Bit
	- Loop Trough	ABZ or Step and Dir	ABZ or Step and Dir
	Signal Level	differential (RS422)	differential (RS422)
	Max. Frequency	500 kHz	500 kHz
	Interface	galvanically isolated	galvanically isolated
	Encoder	-	IInternally generated (5V / max. 500mA) or external (Control I/O Pin 14)

Master Encoder Interface			
		ME01-01/08	**ME01-02/08**
Supply			
	supply voltage	12...40V DC	12...40V DC
	power input	< 6W	< 6W
Digital Inputs	**Number of inputs**	8	8
	Specification	Galvanic isolation	Galvanic isolation
		inverse-polarity protection	inverse-polarity protection
		common ground	common ground
	Signal level	low: <5V, high > 15V	low: <5V, high > 15V
		max. 30V DC	max. 30V DC
	Input current	11mA at 24V	11mA at 24V
	Input frequency	max. 2kHz	max. 2kHz
Digital outputs	**Number of outputs**	8	8
	Specification	Galvanic isolation	Galvanic isolation
		inverse-polarity protection	inverse-polarity protection
		overload protection	overload protection
	Supply Output	6...34V DC	6...34V DC
	Output current	max. 0.5A	max. 0.5A
	Output frequency	max. 1kHz	max. 1kHz

ME01-01/08 / ME01-02/08



ME01-01/08 / ME01-02/08



Ordering Information

Designation	Description	Art. No.
ME01-01/08	Master Encoder Interface (1 Master Encoder Interface)	0150-1631
ME01-02/08	Master Encoder Interface (2 Master Encoder Interface)	0150-1632

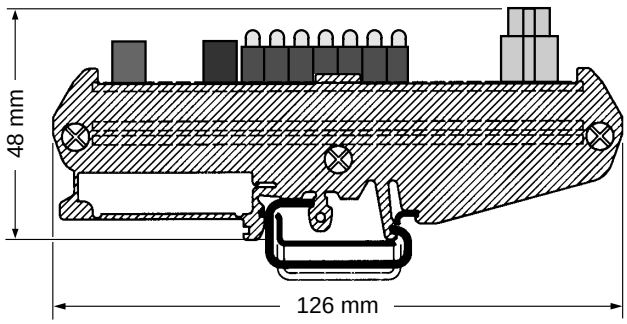
Specification of products are subject to change without notification

Break Out Module

The break out module for the AT and MT servo controllers present all input and output signals of the DSUB connectors SYS1 and SYS2 on plug-in terminals. The break out module is available in two versions for digital or analogue interfaces.

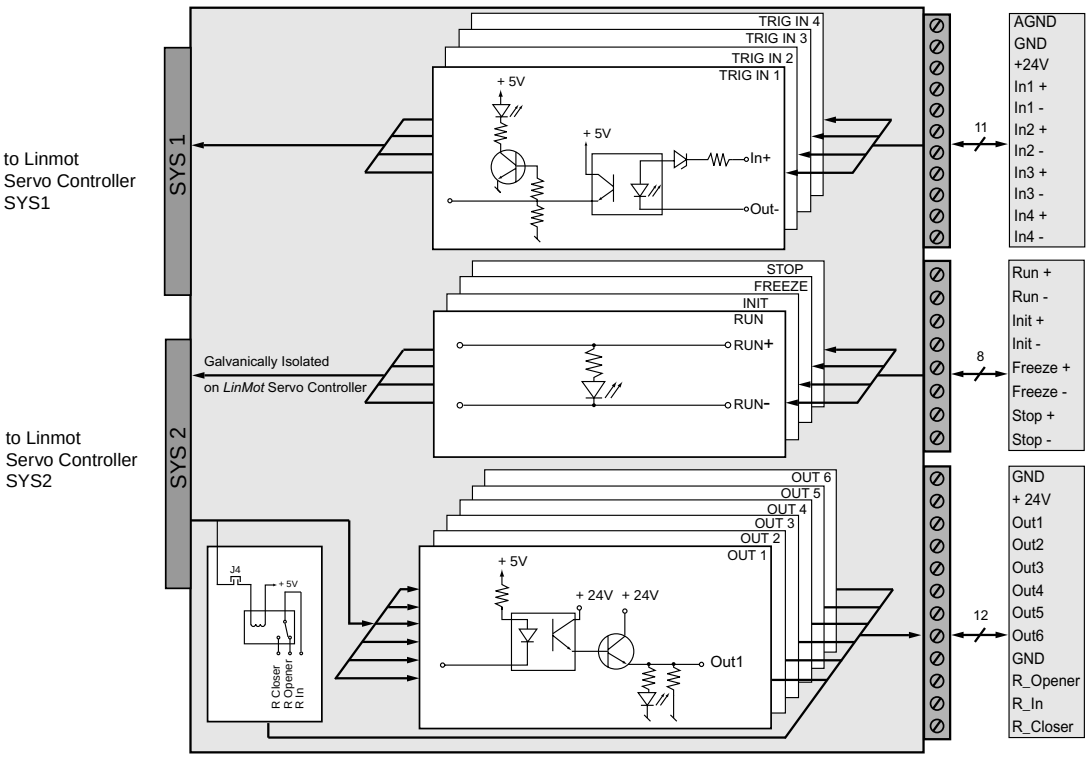
Break Out Module:

- Plug-in terminals for all inputs and outputs
- Digital inputs are DC isolated (24V / 10mA)
- Digital outputs are DC isolated (24V / 0.5A)
- Relay output (48V/2A, max. 60W)
- LED status display for all inputs and outputs
- Analogue input voltage -10 .. +10V, converts to 0 .. +10V for *LinMot*® Servo Controller.
  (only for analogue module)

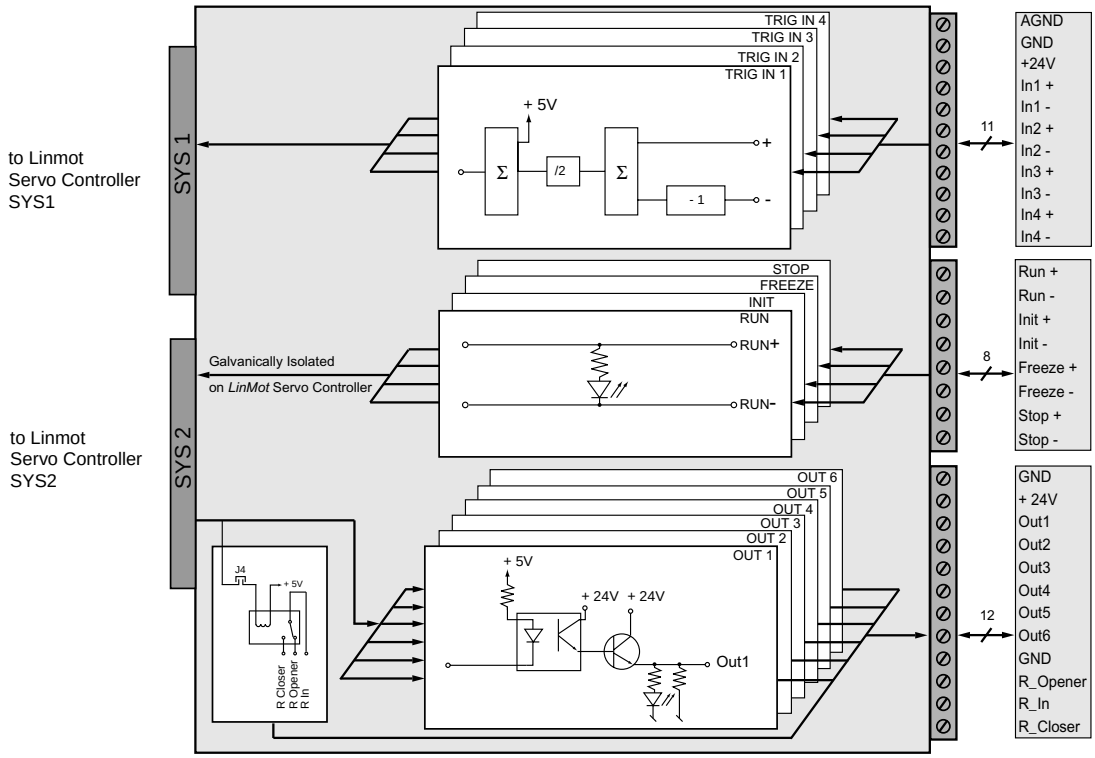


The break out module is clipped directly on a DIN rail in the control cabinet. The delivery also includes two tabs for mounting with screws.

BREAK OUT MODULE M01-DIGITAL



BREAK OUT MODULE M01-ANALOGUE



CABLE AND CONNECTOR SET M01 - CONNECTOR

The connecting cables to the servo controller and the plug-in terminals are available as a set.

The various cable and connector types are listed in the following table:

Connector	Cable and connector type
SYS1	DSUB15 high density female-male, 1:1 (Pin 9 may be missing)
SYS2	DSUB9, female-female, 1:1
J1 Analog/Trigger Inputs	Phoenix Contact Typ MC 1,5/11-STF-3,81 Ordering Nr. 1827790
J2 Control Inputs	Phoenix Contact Typ MCVW 1,5/8-STF-3,81 Ordering Nr. 1828553
J3 Digital Outputs	Phoenix Contact Typ MCVW 1,5/12-STF-3,81 Ordering Nr. 1828595

Ordering Information

Designation	Description	Art. No.
M01-Digital	Break Out Module digital	0150-1932
M01-Analog	Break Out Module analog	0150-1933
M01-Connector	Cable and connector set	0150-1934

Specification of products are subject to change without notification

Control Box

The *LinMot*® B01-4 control box allows the user to put his *LinMot*® system into operation quickly. The box is used in conjunction with the AT and MT electronics units. It enables the control signals for the electronics units to be set manually by means of potentiometers and keys, and is intended primarily for trial operation.

FUNCTIONS

The following functions are assisted:
- Starting and stopping programs
- initialization
- analog position setting by means of potentiometers
- setting trigger signals
- external setting of trigger and position values
- display of status messages

SCOPE OF SUPPLY

Included in the supply are:
1 control box *LinMot*® *B01-4*
1 connector power pack 230V / 50Hz resp. 115V / 60Hz
2 connecting cables: control Box - electronics unit

Ordering Information

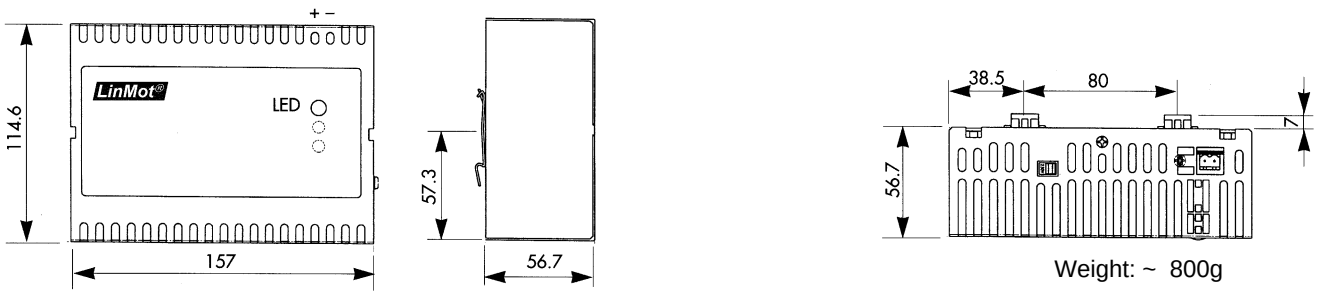
Designation	Description	Art. No.
B01-4 230V / 50Hz	Control Box für AT und MT Servo Controller (230 V)	0150-1930
B01-4 115V / 60Hz	Control Box für AT und MT Servo Controller (115 V)	0150-1931

Specification of products are subject to change without notification

Switch Mode Power Supplies

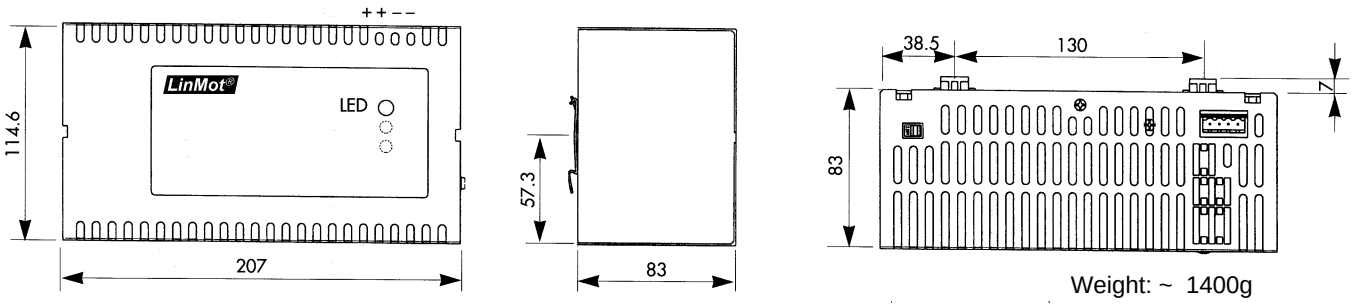
Switch Mode Power Supplies							
Output voltage		***24V***	***48V***			***72V***	
Output power		***150W***	***150W***	***300W***	***600W***	***300W***	***600W***
Input specifications							
Input voltage	[V_{AC}]	93...123 / 187...264					
Input frequency	[Hz]	47...63					
Input current @ full load (230V)	[A]	1.7	1.7	3.3	6.4	3.3	6.4
Input current @ full load (115V)	[A]	3	3	5.4	10.5	5.4	10.5
Inrush current max. (230V)	[A]	70	70	70	80	70	80
Internal fuse	[AT]	4	4	6.3	12	6.3	12
Output specifications							
Output voltage range	[V_{DC}]	24...28	48...52			72...76	
Output current	[A_{DC}]	6	3	6	12	4	8
Hold-up time @ full load	[ms]	30					
Overvoltage protection	[% Uout]	140					
General specifications							
Operating temperature range		-25°C...70°C					
Power reduction above 50°C		2% / °C					
Storage temperature range		-25°C...85°C					
Humidity (not betauend)		95% rel. H max.					
Switching frequency		67kHz typ.					
Efficiency		>85%					
Output voltage indicator		LED					
Isolation input-output		3'000 VAC (1 minute)					
Isolation input-case		2'000 VAC (1 minute)					
Isolation output-case		500 VAC (1 minute)					
Safety class (IEC 536)		class 1					
Safety standart meets		IEC950 EN60950 CE Certification for SELV					
Conducted EMI according to		EN55022 class B EN55011 class B FCC-B					
Electromagnetic susceptibility EMC		EN61000-4-2 4kV / 8kV EN61000-4-3 10V / m EN61000-4-4 2kV EN61000-4-6 10V EN61000-4-8 30A / m					
Case / Schutzart		Steel / IP20					
Mounting		DIN-rail TS35, EN50022					

150 W



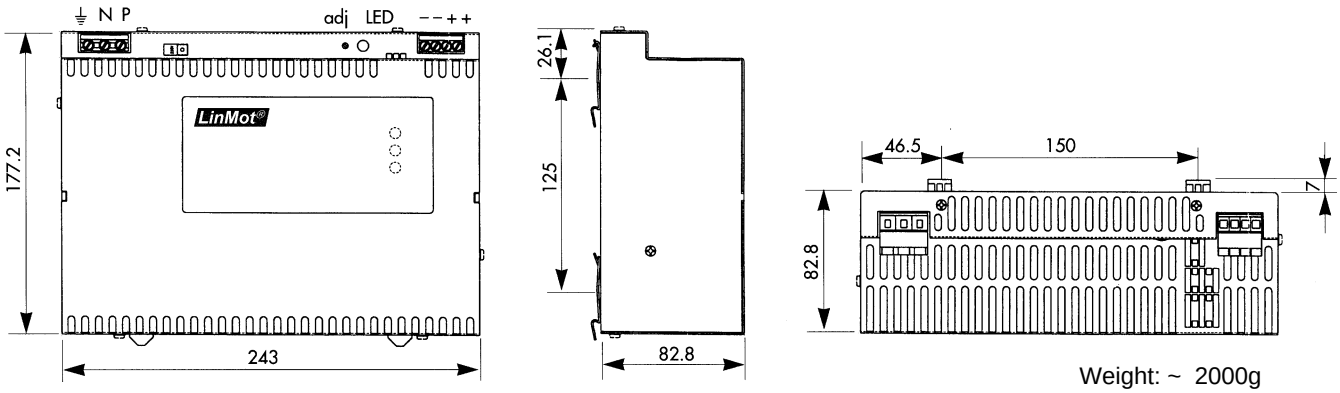
Weight: ~ 800g

300 W



Weight: ~ 1400g

600 W



Weight: ~ 2000g

Dimensions in mm

Ordering Information

Designation	Description	Art. No.
S01-24/150	Power Supply 24V/150W	0150-1944
S01-24/300	Power Supply 24V/300W	0150-1945
S01-48/150	Power Supply 48V/150W (for E100*)	0150-1940
S01-48/300	Power Supply 48V/300W (for E400*)	0150-1941
S01-48/600	Power Supply 48V/600W (for 2x E400*)	0150-1946
S01-72/300	Power Supply 72V/300W (for E1000*)	0150-1942
S01-72/600	Power Supply 72V/600W (for E4000*)	0150-1943

* The recommended power supplies for the electronic units have enough power for most of the applications with linear motors.

Specification of products are subject to change without notification

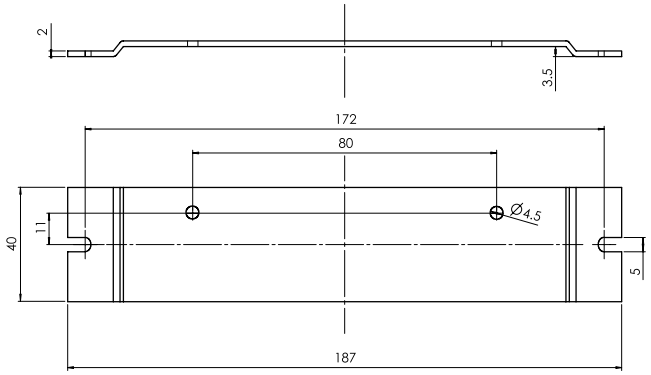
Mounting Parts for Power Supplies

The new mounting parts SM01 for Power Supplies series S01 for screw mounting in the cabinet are available now.

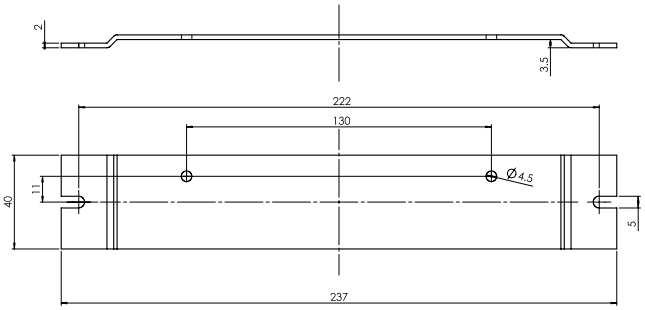
Power Supplies comes with a mounting clip for DIN-rails. If no DIN-rails for mounting are available or the mounting must be more stable, mounting parts SM01 permits a fix mounting of the power supplies with screws.

Material: 1.1203 (surface: galvanic zinc)

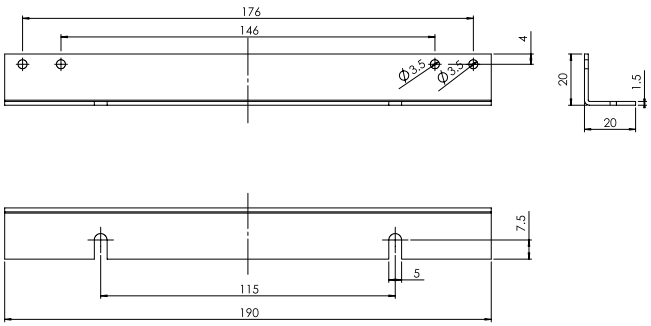
Mounting Parts SM01-150 for 150W Power Supplies



Mounting Parts SM01-300 for 300W Power Supplies



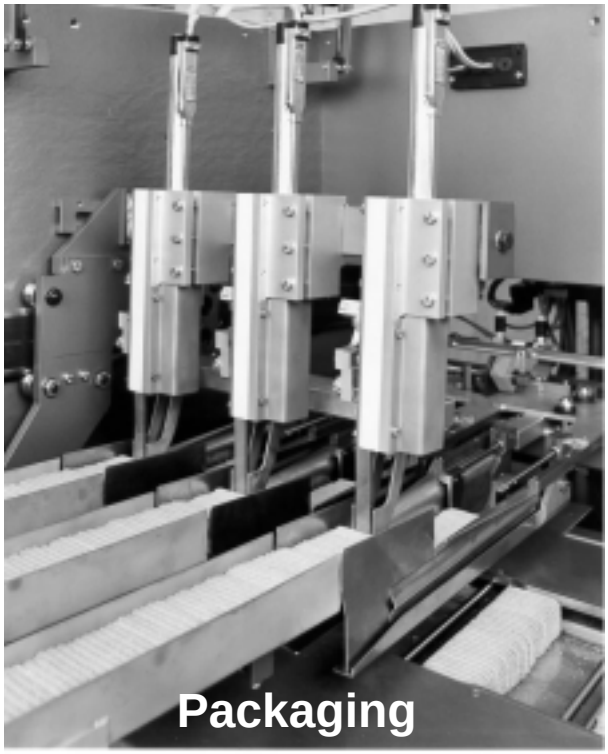
Mounting Parts SM01-600 for 600W Power Supplies

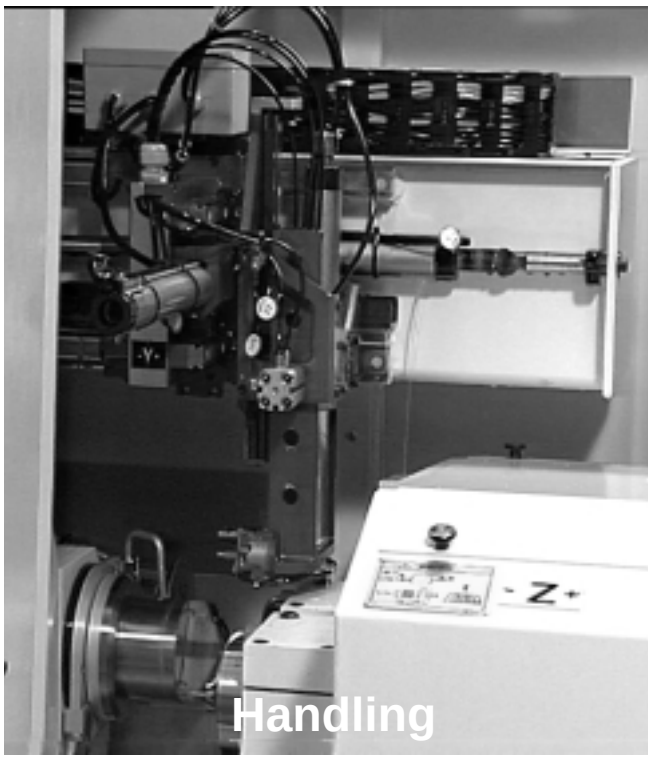


Ordering Information

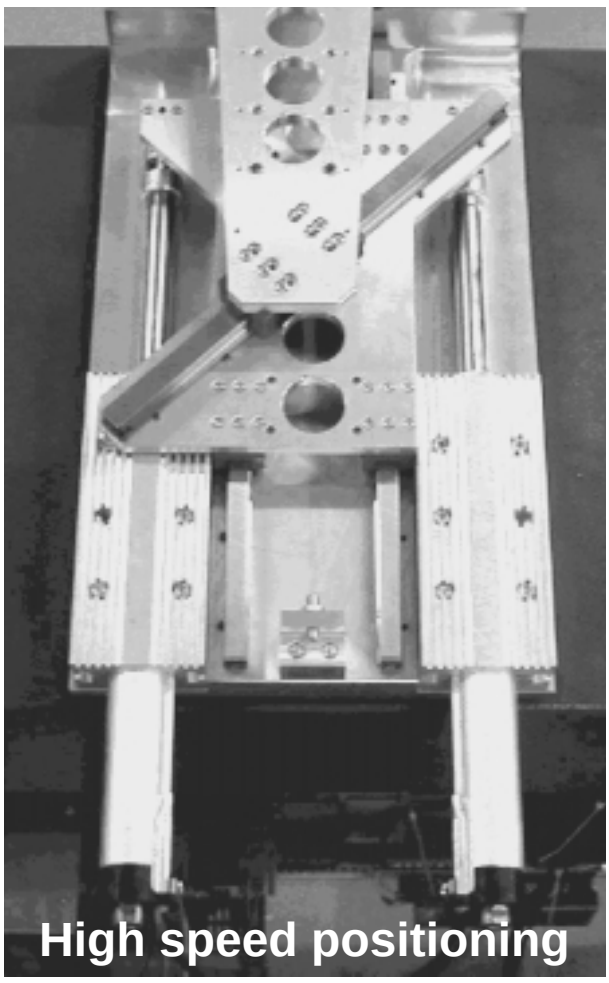
Designation	Description		Art. No.
MS01-150	Mounting Parts for 150W Power Supplies	Weight 118g	0150-3039
MS01-300	Mounting Parts for 300W Power Supplies	Weight 148g	0150-3040
MS01-600	Mounting Parts for 600W Power Supplies	Weight 162g	0150-3041

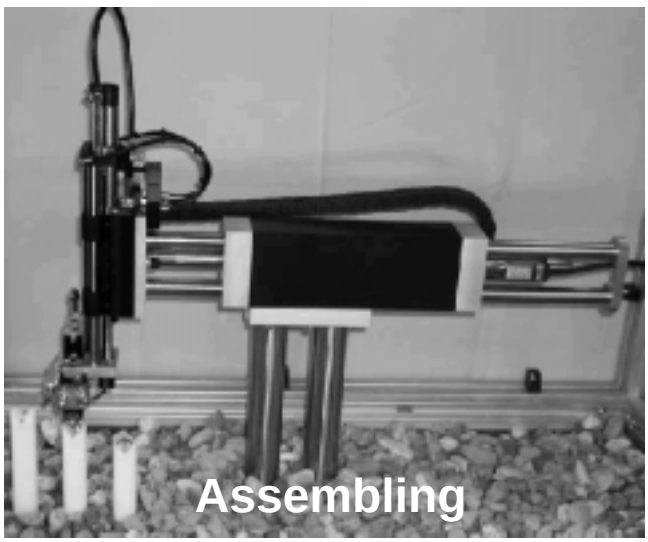
Specification of products are subject to change without notification


Packaging



Handling


High speed positioning


Assembling

Smart solutions are ....

driven by

LinMot®

Linear Motors *LinMot*® P

LinMot® P is a family of highly dynamic electro-magnetic direct drives. Acceleration rates of over 200 m/s2 make cyclic movement at several Hertz possible. The fully integrated position sensors and bearings as well as its solid construction make *LinMot*® P a compact industrial motion control element. For the user, the linear motor consists of just two parts: the fixed stator and the moveable slider. These two parts are not connected by slip rings or by cables. In principal, since the *LinMot*® P performs the linear stroke directly without the use of mechanical gears, belts or ball screws, there is no wear or mechanical play. Together with *LinMot*® E servo controllers, *LinMot*® P linear motors offer a modern mechatronic drive system. Novel machine constructions are made possible since, when using *LinMot*® P linear motors, linear motion can be implemented decentrally on the basis of programmable single-function units. *LinMot*® P linear motors are typically used in applications where fast setting, lifting and sliding movements are necessary, as found in mounting, packing, textile and handling machines. Alongside complex servo applications, *LinMot*® P drives can be used as an alternative to conventional pneumatic cylinders. Independence of compressed air and easy positionability lead, depending on the application, to lower system and operational costs.

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Construction

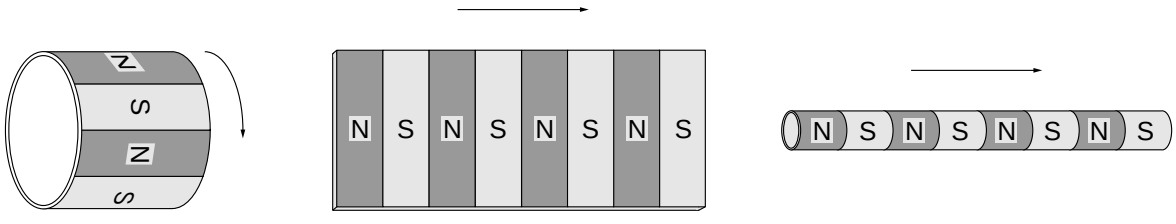
LinMot® P linear motors consist of a slider and a stator. In the stator, the main parts of the motor, including windings, bearings and sensors for position detection and temperature monitoring, are integrated into a stable metal cylinder. All elements are moulded into the stator and are therefore optimally protected against damage and dirt.
The slider consists of a stainless steel tube in which the magnets are fitted. The sliders have a drilled hole at each end with an inside thread for the attachment of loads.
In operation, the slider is guided by slide bearings integrated in the stator. There are no electronic connections between stator and slider. Position detection is done on a contact-free basis using magnetic field sensors in the stator. The linear motors are delivered with a nine-pole cable with an appropriate connector for connection to *LinMot*® E servo controllers.

Mode of operation

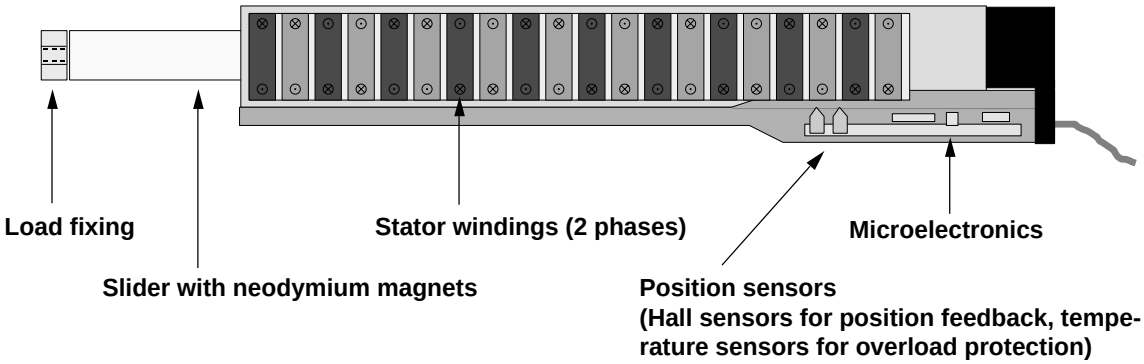
LinMot® P linear motors are two-phase synchronous motors with permanent magnet-excitation, integrated bearings, position sensors and temperature monitoring. Linear motion is generated directly by electromechanical forces without any additional, wear-prone mechanical elements. Extremely dynamic movement processes can thus be implemented using *LinMot*® P linear motors in the simplest possible way and without the use of additional components. In the same way as in rotating synchronous motors, permanent magnets are used in the slider (cf. rotor) and windings in the stator to create force. Due to their special construction and a different arrangement of the permanent magnets, the linear motion is produced directly by electro-mechanical forces (see illustrations a - c below).

Stroke / force characteristics

The maximum force offered by a *LinMot*® P linear motor is determined by its construction and is dependent on the position of the slider in the stator. The maximum force curve is symmetric to the centre of the movement range, the so-called Zero Position ZP. If the distance between the end of the stator and the end of the slider is equal to the Zero Position ZP of the motor, the slider is at the centre of its movement range. The Zero Position ZP can be found in the data sheet of each linear motor and is different for each motor.

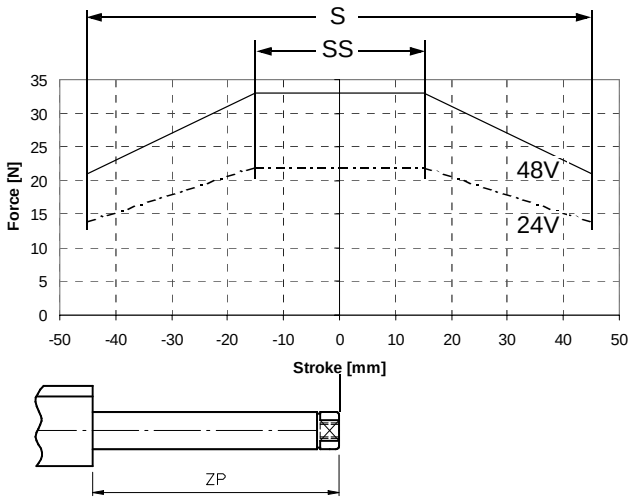


Motor mode of operation



Construction linear motor LinMot® P

In the SS (shortened stroke) range, the slider's drive magnets are wholely inside the active part of the stator. This provides optimum force generation and a constant maximum force over the whole SS- stroke range. The more the slider moves away from the SS-stroke range, the fewer of its magnets are in the active part of the stator. This means that the maximum and effective forces are reduced linearly as the end of the stroke range S is approached.
Further, the maximum force is dependent on the supply voltage. In the stroke - force diagram, the maximum force is shown for various supply voltages in dependence of slider position.

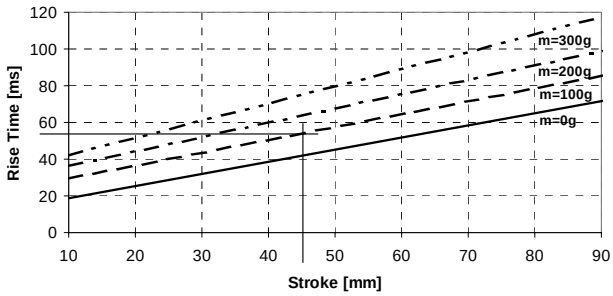


Tip: Choose operational ranges to be symmetrical to the Zero Point ZP of the motor, as the linear motor develops its greatest force in this area.

Stroke - Time diagram

The stroke-time diagram provides information on the minimum travelling times for a horizontal point-to-point motion in dependence of varying load mass. A sinusoidal motion is assumed. In the Position-Time diagram, all factors influencing particular linear motors such as motor reverse voltage, slider mass, or bearing friction are considered. The values shown in the diagram cover the time taken from the definition of a new positional set-point up to standstill at the target position.

Should the travelling times read from the diagrams be at the limit for a particular application or too short, the actual performance should be ascertained by performing practical tests in agreement with the supplier. Only in this manner can all application-specific influencing factors (additional friction in bearings, thermal boundary conditions etc.) be taken into account.



If a linear motor is to move a load mass 45 mm, the time taken between the definition of the set-point and standstill at the target position is, according to the example in the diagram, about 52 ms.

Limits of performance and thermal behaviour

The limit of performance of a linear motor is defined for short-time operation by the maximum force and maximum speed of the slider alone. In cyclic operation with sufficient standstill periods, these are the only factors that limit performance. As soon as a constant force is to be provided and / or standstill periods are not wanted, however, the continuous force of the linear motor is the criterion for defining limits of performance. The continuous force of a linear motor depends on the power dissipation and the maximum allowable operating temperature. This is itself basically dependent on ambient temperature and the cooling and mounting of the motor.

The data sheets show the continuous force of linear motors fitted with a standard flange and without additional cooling. Using forced cooling of the linear motor with a ventilator the continuous force available can be doubled (values marked with [1]).

Behaviour when overloaded or jammed

One of the main advantages of *LinMot*® P drives is that the motors are not subject to damage when jammed by foreign bodies etc. pre-determined breaking points or slip couplings are not necessary in such situations for the protection of sensitive cog wheels, gearboxes and axles. When jams or overload occur, *LinMot*® E servo controllers issue user-definable error signals, which can be used by the overlaid controller to initiate appropriate action. Similarly, thermal overload of the linear motors is detected and thus taken care of.

Mounting the linear motors

Linear motors are mounted by clamping over the largest possible surface in the stator's mounting zone. The size of the clamping surface, together with the heat-sink capability of the motor mounting has a direct influence on the loading capacity of the motor. Mounting flanges with the designation "PF01" which guarantee optimum mounting are available for all motor types.

Load connection

The sliders of the linear motors have at their ends boreholes with an inside thread for the attachment of loads. When attaching the load, only that end of the slider next to the load may be held by a spanner. Using a locating hole, the end of the slider can be connected to the load by clamping (see construction handbook).
The stators of the linear motors are fitted with integrated slide bearings. These are primarily designed as bearings for the slider itself. The load must have external guides and thus it's own bearings. When attaching loads, constructional care must be taken to prevent over-defined bearings and to compensate for errors in parallelism (compensation coupling, precise alignment of motors and external guides). Lateral forces on the slider, which can occur when loads are improperly attached, lead to a reduction of the service life of the linear motors.

Power supply voltage

In the tables on the *LinMot*® P drives, technical data is specified for various supply voltages. This information refers to the supply voltage of the *LinMot*® E servo controllers. Basically, a higher supply voltage offers higher peak force and therefore a more dynamic operation of the drives. The maximum continuous force is, however, limited by power dissipation and is not dependent on supply voltage.

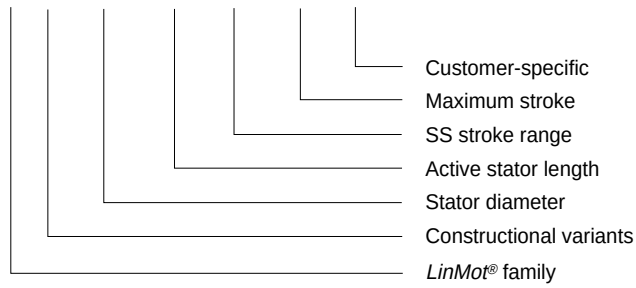
The LinMot P family of linear drives replace a large number of mechanical components.

Product lines and their designation

LinMot® P linear motors are available in four product lines P01-23x80, P01-23x120, P01-37x120 and P01-23x240. The different product lines are primarily distinguished by their different stroke ranges, maximum force and mechanical dimensions. The stators are identical in any particular product line.

The following example shows how the designation scheme works:

P01-23x80/30x90-...



The P02 heavy-duty implementation has sliders whose surfaces are coated on a titanium basis exhibiting a microhardness of 2300 HV 0.05. Design and mechanical dimensions are identical with the P01 series.

The P02 series has the following advantages:
- More resistant against dirt, especially when in contact with abrasive materials.
- Generally longer service life under critical conditions.

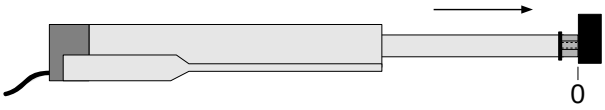
The use of the heavy-duty version is recommended when:
- Drive servicing is difficult.
- Working environment is dirty.
- Stroke frequencies $\geq$ 5 Hz.

INITIALISATION

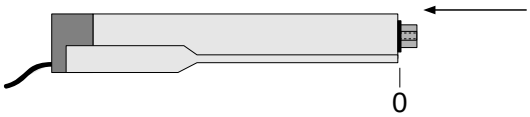
After the servo controllers are switched on, positional initialisation has to be acquired in the form of a homing run to find the reference or zero position.
The user can configure the initialisation. The following initialisation modi are available:

Actual position
The actual position at the start of the initialisation procedure is taken as being the reference position, without moving the slider.

Auto move out
The slider of the linear motor is moved out during initialisation until a stop is reached. This position is set as the reference position.



Auto move in
The slider of the linear motor is moved inwards during initialisation until a stop is reached. This position is set as the reference position.



Trig move in / trig move out
The slider of the linear motor is moved in or out until the trigger signal of an external sensor goes from 0 to logical 1. The position reached at the positive transition of the trigger signal is taken as the reference position.

Turn left / turn right
The stepping motor turns to the right or to the left until the trigger signal of an external sensor goes from 0 to logical 1. The current position is taken as the reference position.
After the initialisation is completed, it can be checked if the slider of the linear motor can be moved freely over the whole of the range of movement necessary. Initialisation faults or jammed sections lead automatically to the sending of appropriate error messages to the overlaid control system.

FORCED COOLING

The continuous force of the linear motors is basically dependent on their cooling. The values for continuous force quoted in the data sheets can be substantially increased by forced cooling using a ventilator.
If linear motors mounted with a standard flange are additionally cooled by a ventilator, they can be operated at double the continuous force in an air current of 2 m/s (see data sheets).

ENVIRONMENTAL CONDITIONS

The stable stator housing, which contains all electronic components, allows the linear motors to be used in raw environments. The magnetic measurement system for position detection guarantees reliable operation even in very dirty environments.

LinMot® linear motors are waterproof and can be even used under water if the appropriate connectors are used. Use in very moist environments, underwater use or use in contact with aggressive fluids or gasses should only take place after consultation with the supplier.

The sliders of long-stroke motors protrude on both sides of the stator, which is open at both ends.

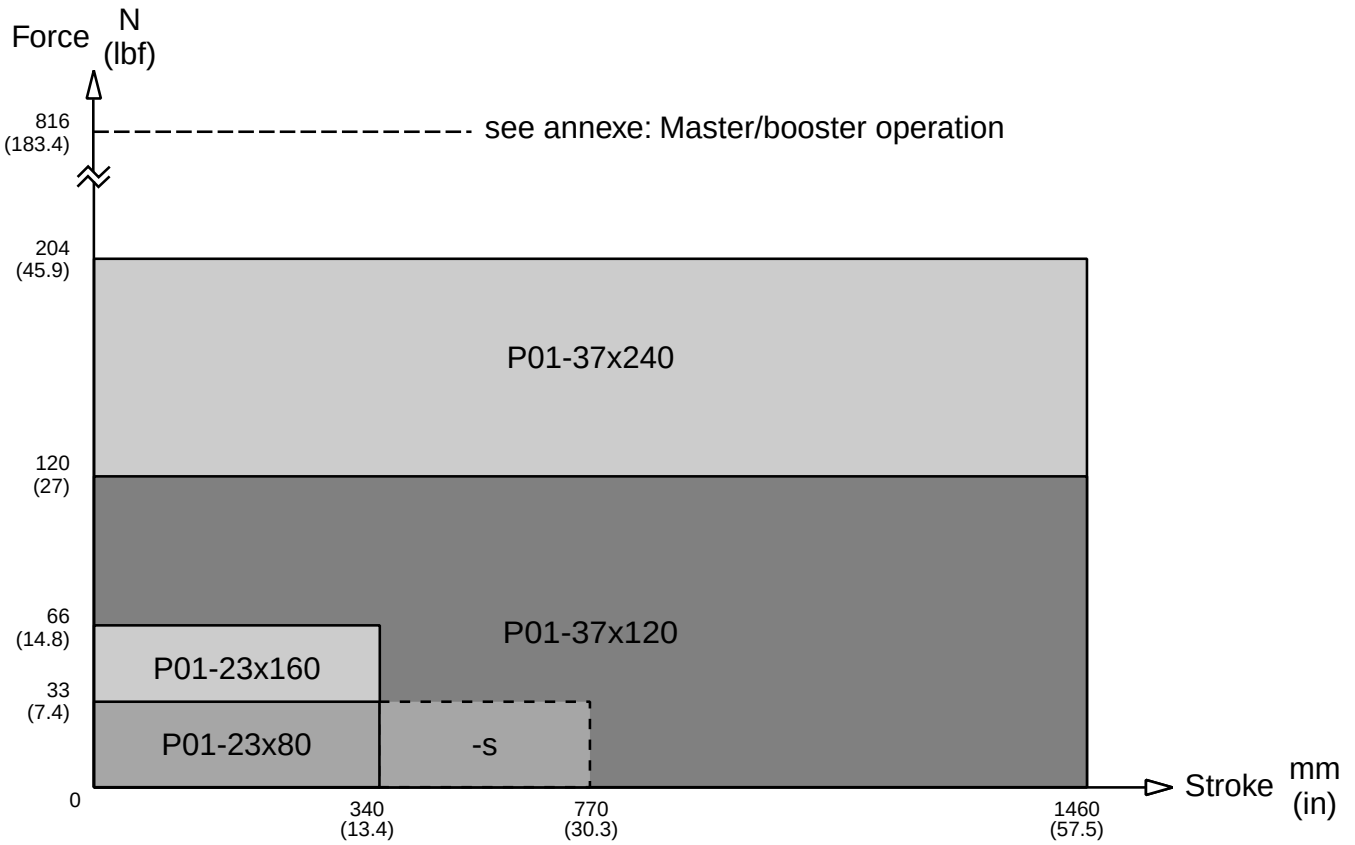
USE IN CLEAN ROOMS

The certificate no. FM9805-3475 from the Fraunhofer Institute in Stuttgart attests the suitability of the motors for use in class 1 clean rooms for speeds of movement up to 0.45 m/s and class 10 for speeds of movement up to 1.2 m/s. Measurements were performed to US Fed. Standard 209E.

FLEXIBILITY

Several stators on the same slider allow several independent linear motions in tight spaces.

MOTOR SELECTION GUIDE

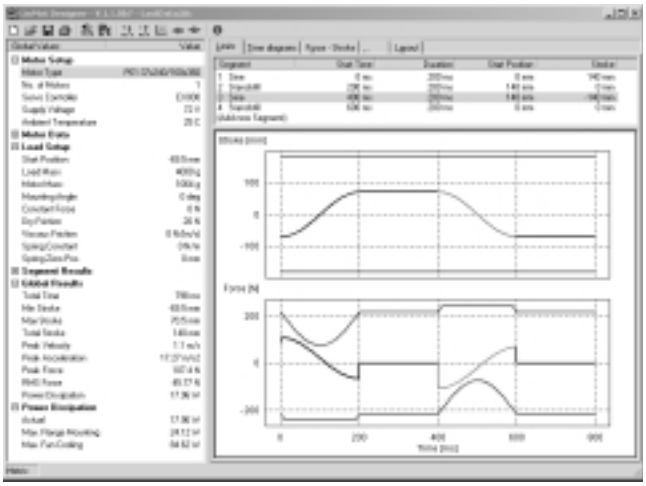


Motor sizing Software

Design linear motors into an existing machine or to build up a new module with linear motors starts with motor sizing. In order to help machine designers and fabricators with motor sizing, LinMot® offers a PC based motor sizing program called LinMot® Designer. Based on the required motions and payloads the LinMot® Designer calculates all the parameters needed for motor selection.

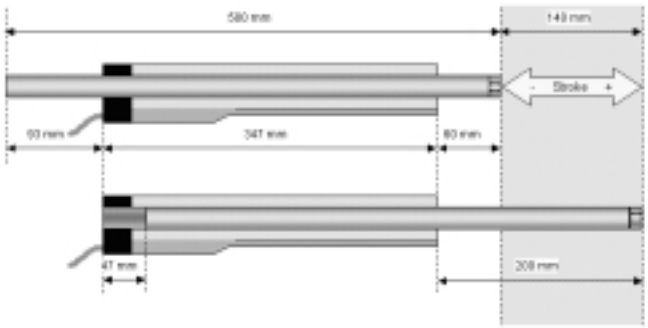
Motor sizing starts with the specification of the global settings (orientation, payload, friction, ...). Once the global parameters are defined, the required motion profile can be simulated step-by-step. The whole motion sequence should be divided in single segmented motions (forward, standstill, backward, ...) with segment specific data for each motion (payload for forward motion, friction for backward motion, ...). The program then calculates the key parameters like peak force, RMS force, peak velocity, ... for selected motor comparisons.

After step-by-step definition of an entire motion cycle, the results will be graphically displayed in two separate windows for stroke and force. In the force window the actual required force and the maximal force of the linear motors are displayed. As long as the required force stays within the maximal force for the time of the entire cycle, the linear motor may generate the requested motion dynamically.



Based on the entered date for a whole motion cycle, the program calculates the power losses in the motor. To be sure that the motor may run the motion cycle also in a continuous operation without overheating, the actual power losses have to be below the max. power losses the motor may dissipate. Max. power losses a motor may dissipate depends on the mounting and cooling (mounted with LinMot standard flange with or without fan).

In the latest Version 1.1. of LinMot Designer, mechanical dimensions together with slider and stator positions are displayed. The mechanical dimensions may be printed together with the detailed data and results of the simulation.



The *LinMot*® designer can be downloaded free of charge from the *LinMot*® homepage **www.LinMot.com** or installed from the *LinMot*® product CD.

Technical data and abbreviations

For each *LinMot*® P motor a specific data sheet is available with all technical data, dimensions, and illustrative diagrams. The information provided in the data sheets is described below.

Active Stator Length l_{Aact} **[mm]**
Length of the (active) part of the stator with windings.

Acceleration **a [m/s²]**
Maximum acceleration of the slider.

Case Temperature T_C **[°C]**
Temperature of the motor casing (surface temperature of the stator).

Linearity **[%]**
Absolute accuracy of the drive with reference to the maximum stroke s of the linear motor.

Velocity **v [m/s]**
Maximum velocity of the slider.

Stroke **s [mm]**
Maximum possible slider stroke in millimetres.

Stroke Frequency **fs [Hz]**
The stroke frequency is defined as the maximum attainable number of movements per second without load and using 50% of the "SS" stroke range. The stroke frequency is only a supplementary aid for first estimates.

Continuous Force **Fc [N]**
Force permanently provided by the linear motor in the SS stroke range when mounted using a standard flange. It is limited by heat dissipation and can be increased using forced cooling (values for continuous force with fan cooling are marked with [1]).

Force Constant c_f **[N/A]**
Describes the relationship between phase current and the force supplied by the linear motor.

Shortened Stroke **SS [mm]**
Operating area of the motor where the whole magnetic part of the slider is in the active part of the stator and whose force curve is therefore constant.

Load Mass **m [g]**
Mass additional to the slider which is to be moved.

Slider Diameter d_S **[mm]**
Diameter of the slider in millimetres.

Slider Length l_S **[mm]**
Length of the slider from end to end.

Slider Mass m_S **[g]**
Own mass of the slider.

Magnetic Slider Length l_{Smag} **[mm]**
Length of the magnetic part of the slider. The effective mechanical length of the slider can be substantially larger than its magnetic length.

Zero Position **ZP [mm]**
Position around which the stroke is symmetrically carried out.

Border Force **Fb [N]**
Short-term force which can be delivered at both ends of the stroke range.

Supply Voltage Power V_P **[V]**
Supply voltage of the power section of the *LinMot*® E servo controller.

Supply Voltage Logic V_L **[V]**
Supply voltage of the logic section of the *LinMot*® E servo controller.

Peak Force **Fp [N]**
Force which can be delivered over a short time. The length of time in which peak force is available is determined by the motor type, ambient temperature and the cooling of the motor.

Stator Diameter d_A **[mm]**
Outside diameter of the stator in millimetres. It should be noted that this value is an average value and that for mechanical construction work the exact dimensions should be taken from the construction drawings.

Stator Length l_A **[mm]**
Length of the stator in millimetres.

Stator Mass m_A **[g]**
Stator mass (without slider).

Repeatability **[mm]**
Maximum difference in mm between the position reached when repeatedly driving to the same target position under identical conditions.

Motor Overview

Motor Type	Maximal Stroke [mm]	Cont. Force without/ with cooling fan [N]	Max. Force with Servo Controller Series 100 [N]	Max. Force with Servo Controller Series 1000 [N]	Slider Mass [g]	Slider Diameter [mm]	Slider Length [mm]	Stator Mass [g]	Stator-Diameter [mm]	Stator Length [mm]
P01-23x80/...										
P01-23x80/30x90	90	9/16	33	44	118	12	170	265 (236) *	23 (23x40) *	177 (105) *
P01-23x80/50x110	110	9/16	33	44	135		190			
P01-23x80/80x140	140	9/16	33	44	171		270			
P01-23x80/150x210 ***	210	9/16	33	44	220		290			
P01-23x80/210x270	270	9/16	33	44	271		350			
P01-23x80/280x340	340	9/16	33	44	330		420			
P01-23x160/...										
P01-23x160/70x70	70	9/16	25	35	112	12	200	450	23	257
P01-23x160/40x100	100	12/22	33	48	137		230			
P01-23x160/0x140	140	17/31	44	60	171		270			
P01-23x160/70x210 ***	210	17/31	44	60	220		290			
P01-23x160/130x270	270	17/31	44	60	271		350			
P01-23x160/200x340	340	17/31	44	60	330		420			
P01-37x120/...										
P01-37x120/20x100 ***	100	30/54	61	122	460	20	240	740	37	227
P01-37x120/80x160 ***	160	30/54	61	122	600		300			
P01-37x120/180x260 ***	260	30/54	61	122	829		395			
P01-37x120/280x360	360	30/54	61	122	1064		500			
P01-37x120/380x460	460	30/54	61	122	1297		600			
P01-37x120/480x560	560	30/54	61	122	1529		700			
P01-37x120/580x660	660	30/54	61	122	1762		800			
P01-37x120/680x760	760	30/54	61	122	1994		900			
P01-37x120/780x860	860	30/54	61	122	2227		1000			
P01-37x120/980x1060	1060	30/54	61	122	2692		1200			
P01-37x120/1180x1260	1260	30/54	61	122	3157		1400			
P01-37x120/1380x1460	1460	30/54	61	122	3622		1600			
P01-37x240/...										
P01-37x240/100x100 ***	100	34/62	70	119 (90) **	496	20	305	1350	37	347
P01-37x240/40x160 ***	160	46/84	103	170 (128) **	635		365			
P01-37x240/60x260 ***	260	55/100	120	204 (154) **	829		395			
P01-37x240/160x360	360	55/100	120	204 (154) **	1064		500			
P01-37x240/260x460	460	55/100	120	204 (154) **	1297		600			
P01-37x240/360x560	560	55/100	120	204 (154) **	1529		700			
P01-37x240/460x660	660	55/100	120	204 (154) **	1762		800			
P01-37x240/560x760	760	55/100	120	204 (154) **	1994		900			
P01-37x240/660x860	860	55/100	120	204 (154) **	2227		1000			
P01-37x240/860x1060	1060	55/100	120	204 (154) **	2692		1200			
P01-37x240/1060x1260	1260	55/100	120	204 (154) **	3157		1400			
P01-37x240/1260x1460	1460	55/100	120	204 (154) **	3622		1600			

* Values for -S Typ in ( )
** Values for -F Typ in ( )
*** Also available with hollow slider

Linear Motor Family P01-23x80

The linear motors of the P01-23x80 family feature a particularly compact design, enabling them to be fitted even where space is restricted. For controlling the P01-23x80 linear motors the servo controllers of Series 100 are employed.

Performance data:		
Max. stroke:	340mm	13.4in
Max. force:	33N	7.4lbf
Max. accel.:	280m/s²	11000in/s²
Max. velocity:	2.4m/s	95in/s

Dimensions:		
Stator length:	177mm	7in
Stator diameter:	23mm	0.9in
Stator mass:	265g	0.58lb
Slider diameter:	12mm	0.5in

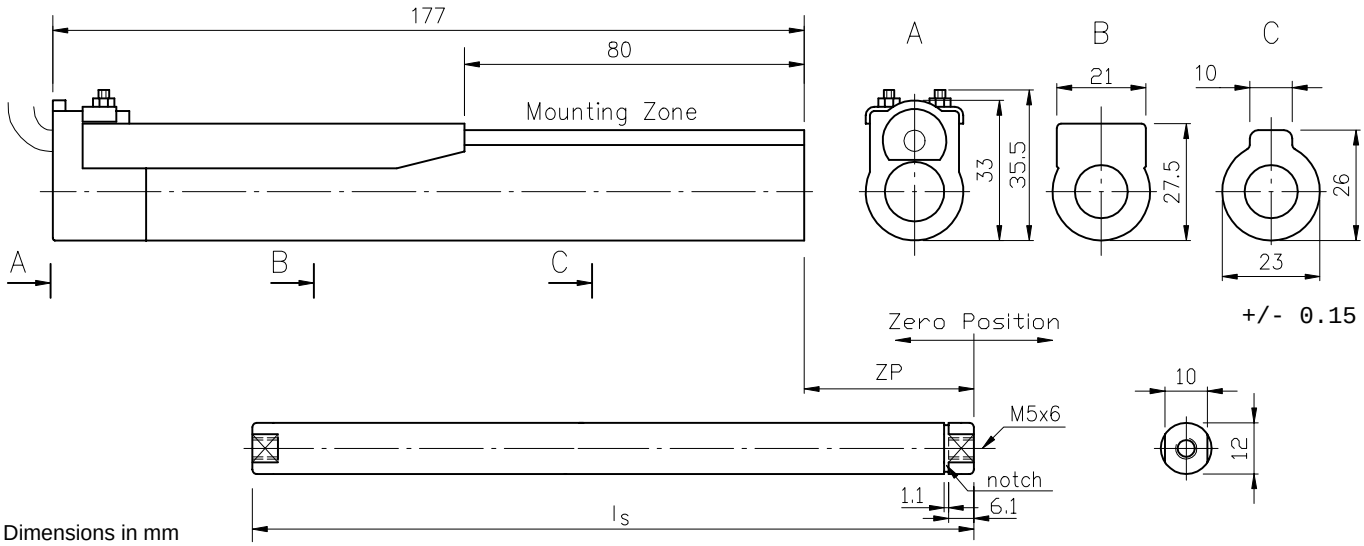
Connections:		
Cable:	9 pole (4+5)	
Cable length:	1m	3.3ft
Connector:	9-pin D-Sub (m)	

Temperature:		
Max. stator temp.:	65°C	150°F

Connector assignment:

1 red	phase 1 +	6 pink	phase 1 -
2 blue	phase 2 +	7 grey	phase 2 -
3 white	+5 V_{DC}	8 brown	ground
4 yellow	sine sensor	9 green	cosine sensor
5 black	temp. sensor	Shield on housing	

Physical dimensions



Dimensions in mm

Accessories

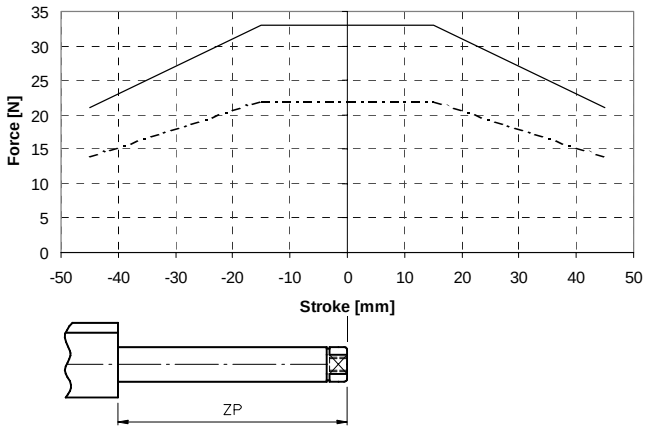
Fixing flange:	PF01-23x50	length 50mm	(2in)	Art. No. 0150-1901
Extension cable:	K01-23/02	length 2m	(6.6ft)	Art. No. 0150-1910
	K01-23/04	length 4m	(13.1ft)	Art. No. 0150-1911
	K01-23/06	length 6m	(19.7ft)	Art. No. 0150-1912
	K01-23/08	length 8m	(26.2ft)	Art. No. 0150-1913

Specifications of products are subject to change without notification

Linear Motor *P01-23x80/30x90*

Motor type *LinMot® P01-23x80/30x90*		Servo Controller Supply Voltage	***Series 100*** 24V	48V
Peak Force	Fp	N (lbf)	22 (4.9)	33 (7.4)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])	
Limit Force	Fb	N (lbf)	14 (3.1)	21 (4.7)
Force Constant	c_F	N/A (lbf/A)	11 (2.5)	
Max. Stroke	s	mm (in)	90 (3.6)	
Shortened Stroke	SS	mm (in)	30 (1.2)	
Zero Position	ZP	mm (in)	40 (1.6)	
Max. Acceleration	a	m/s² (10^3in/s²)	186 (7.3)	280 (11)
Max. Velocity	v	m/s (in/s)	1.9 (75)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.5	
Slider Mass	m_S	g (lb)	118 (0.26)	
Slider Length	l_S	mm (in)	170 (6.7)	

Stroke / Force - Diagram

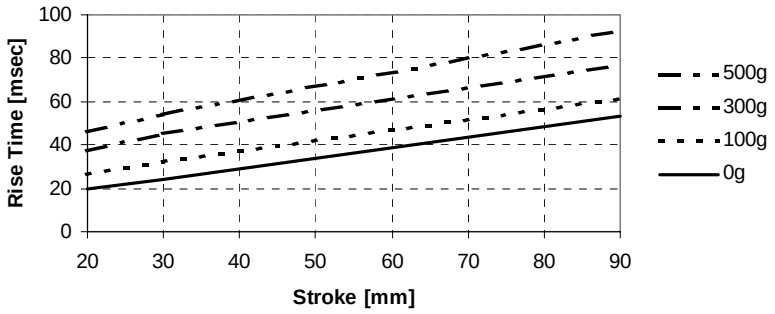


Servo Controller:

——— Series 100
supply voltage 48 V DC
phase current 3.0 A

- — - Series 100
supply voltage 24 V DC
phase current 2.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x80 see page 48.

Ordering Information

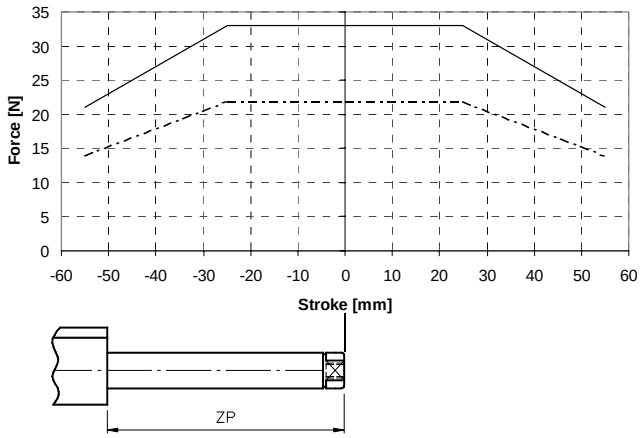
Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x80/30x90	0150-1101	*PS01-23x80*	0150-1201	*PL01-12x170/120*	0150-1301
*P02-23x80/30x90**	0150-1103	*PS01-23x80*	0150-1201	*PL02-12x170/120*	0150-1303

* Motor version P02 "Heavy-Duty" see page 42.

Linear Motor *P01-23x80/50x110*

Motor type ***LinMot® P01-23x80/50x110***		Servo Controller Supply Voltage	***Series 100*** 24V	 48V
Peak Force	Fp	N (lbf)	22 (4.9)	33 (7.4)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])	
Limit Force	Fb	N (lbf)	14 (3.1)	21 (4.7)
Force Constant	c_F	N/A (lbf/A)	11 (2.5)	
Max. Stroke	s	mm (in)	110 (4.3)	
Shortened Stroke	SS	mm (in)	50 (2)	
Zero Position	ZP	mm (in)	50 (2)	
Max. Acceleration	a	m/s² (10^3in/s²)	163 (6.4)	245 (9.6)
Max. Velocity	v	m/s (in/s)	1.9 (75)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.5	
Slider Mass	m_S	g (lb)	135 (0.3)	
Slider Length	l_S	mm (in)	190 (7.5)	

Stroke / Force - Diagram

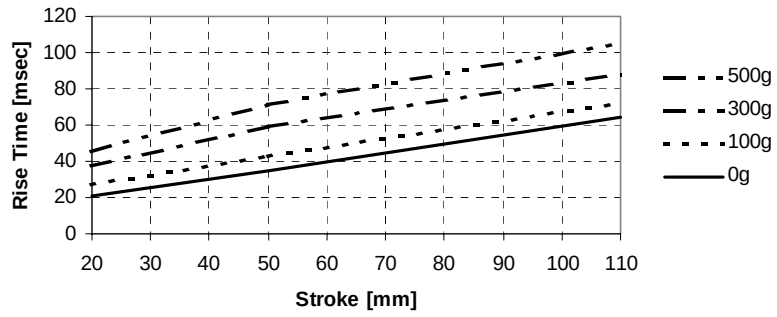


Servo Controller:

——— Series 100
supply voltage 48 V DC
phase current 3.0 A

- — - Series 100
supply voltage 24 V DC
phase current 2.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x80 see page 48.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x80/50x110	0150-1102	*PS01-23x80*	0150-1201	*PL01-12x190/140*	0150-1302
*P02-23x80/50x110**	0150-1104	*PS01-23x80*	0150-1201	*PL02-12x190/140*	0150-1304

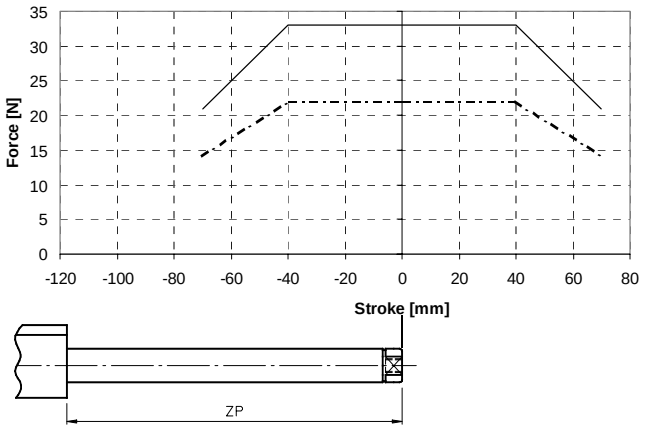
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x80/80x140*

Motor type *LinMot® P01-23x80/80x140*		Servo Controller	***Series 100***	
		Supply Voltage	24V	48V
Peak Force	Fp	N (lbf)	22 (4.9)	33 (7.4)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])	
Limit Force	Fb	N (lbf)	14 (3.1)	21 (4.7)
Force Constant	c_F	N/A (lbf/A)	11 (2.5)	
Max. Stroke	s	mm (in)	140 (5.5)	
Shortened Stroke	SS	mm (in)	80 (3.1)	
Zero Position	ZP	mm (in)	115 (4.5)	
Max. Acceleration	a	m/s² (10^3in/s²)	130 (5.1)	194 (7.6)
Max. Velocity	v	m/s (in/s)	1.9 (75)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.4	
Slider Mass	m_S	g (lb)	171 (0.38)	
Slider Length	l_S	mm (in)	270 (10.6)	

Stroke / Force - Diagram

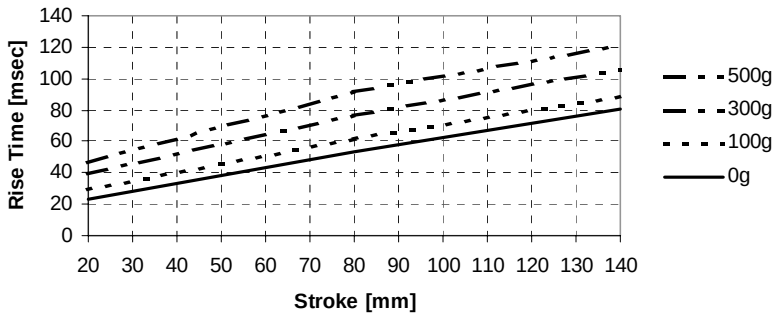


Servo Controller:

——— Series 100
supply voltage 48 V DC
phase current 3.0 A

- — - Series 100
supply voltage 24 V DC
phase current 2.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x80 see page 48.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x80/80x140	0150-1123	*PS01-23x80*	0150-1201	*PL01-12x270/170*	0150-1307
*P02-23x80/80x140**	0150-1124	*PS01-23x80*	0150-1201	*PL02-12x270/170*	0150-1310

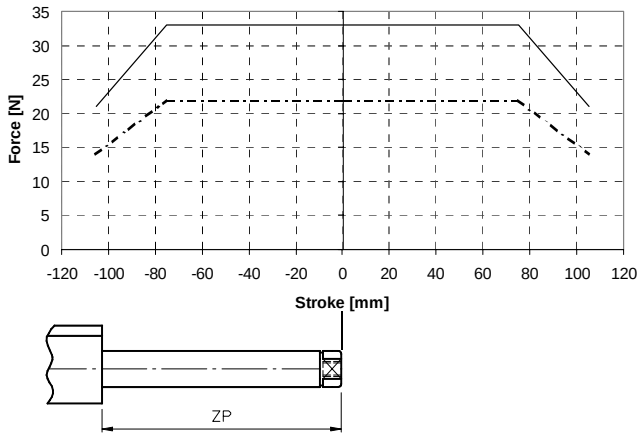
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x80/150x210*

Motor type ***LinMot® P01-23x80/150x210***		Servo Controller Supply Voltage	***Series 100*** 24V	 48V
Peak Force	Fp	N (lbf)	22 (4.9)	33 (7.4)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])	
Limit Force	Fb	N (lbf)	14 (3.1)	21 (4.7)
Force Constant	c_F	N/A (lbf/A)	11 (2.5)	
Max. Stroke	s	mm (in)	210 (8.3)	
Shortened Stroke	SS	mm (in)	150 (5.9)	
Zero Position	ZP	mm (in)	100 (3.9)	
Max. Acceleration	a	m/s² (10^3in/s²)	101 (4)	151 (5.9)
Max. Velocity	v	m/s (in/s)	1.9 (75)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.3	
Slider Mass	m_S	g (lb)	220 (0.49)	
Slider Length	l_S	mm (in)	290 (11.4)	

Stroke / Force - Diagram

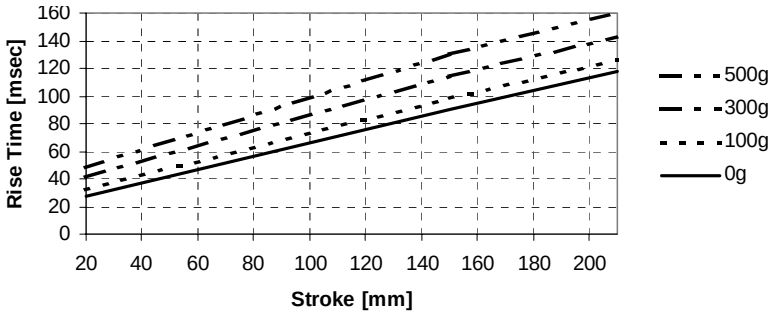


Servo Controller:

——— Series 100
supply voltage 48 V DC
phase current 3.0 A

- — - Series 100
supply voltage 24 V DC
phase current 2.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x80 see page 48.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x80/150x210	0150-1125	*PS01-23x80*	0150-1201	*PL01-12x290/240*	0150-1320
*P02-23x80/150x210**	0150-1126	*PS01-23x80*	0150-1201	*PL02-12x290/240*	0150-1321

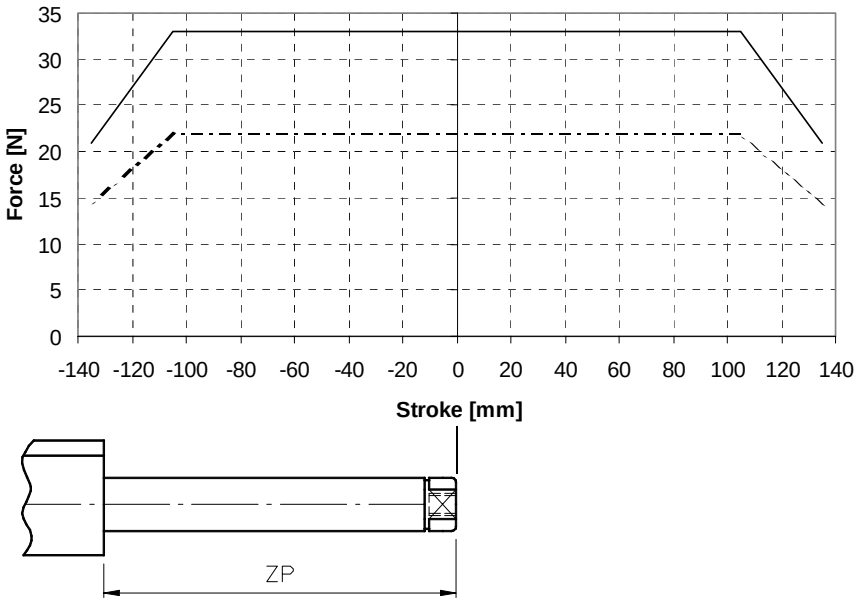
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x80/210x270*

Motor type *LinMot® P01-23x80/210x270*		Servo Controller Supply Voltage	***Series 100*** 24V	48V
Peak Force	Fp	N (lbf)	22 (4.9)	33 (7.4)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])	
Limit Force	Fb	N (lbf)	14 (3.1)	21 (4.7)
Force Constant	c_F	N/A (lbf/A)	11 (2.5)	
Max. Stroke	s	mm (in)	270 (10.6)	
Shortened Stroke	SS	mm (in)	210 (8.3)	
Zero Position	ZP	mm (in)	130 (5.1)	
Max. Acceleration	a	m/s² (10^3in/s²)	81 (3.2)	121 (4.8)
Max. Velocity	v	m/s (in/s)	1.9 (75)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.3	
Slider Mass	m_S	g (lb)	271 (0.60)	
Slider Length	l_S	mm (in)	350 (13.8)	

Stroke / Force - Diagram



Servo Controller:

——— Series 100
supply voltage 48 V DC
phase current 3.0 A

- — - Series 100
supply voltage 24 V DC
phase current 2.0 A

Physical dimensions Linear Motor Family P01-23x80 see page 48.

Ordering Information

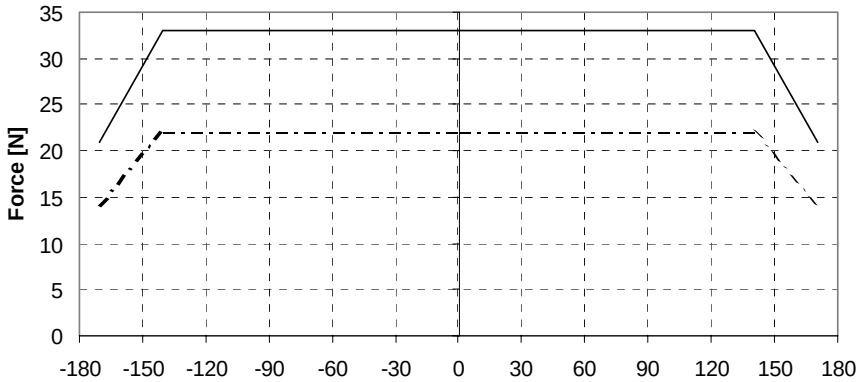
Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x80/210x270	0150-1181	*PS01-23x80*	0150-1201	*PL01-12x350/300*	0150-1322
*P02-23x80/210x270**	0150-1182	*PS01-23x80*	0150-1201	*PL02-12x350/300*	0150-1323

* Motor version P02 "Heavy-Duty" see page 42.

Linear Motor *P01-23x80/280x340*

Motor type *LinMot® P01-23x80/280x340*		Servo Controller	***Series 100***	
		Supply Voltage	24V	48V
Peak Force	Fp	N (lbf)	22 (4.9)	33 (7.4)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])	
Limit Force	Fb	N (lbf)	14 (3.1)	21 (4.7)
Force Constant	c_F	N/A (lbf/A)	11 (2.5)	
Max. Stroke	s	mm (in)	340 (13.4)	
Shortened Stroke	SS	mm (in)	280 (11.0)	
Zero Position	ZP	mm (in)	165 (6.5)	
Max. Acceleration	a	m/s² (10^3in/s²)	67 (2.6)	100 (3.9)
Max. Velocity	v	m/s (in/s)	1.9 (75)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.3	
Slider Mass	m_S	g (lb)	330 (0.72)	
Slider Length	l_S	mm (in)	420 (16.5)	

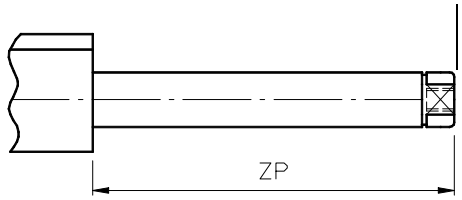
Stroke / Force - Diagram



Servo Controller:

—— Series 100
supply voltage 48 V DC
phase current 3.0 A

- — - Series 100
supply voltage 24 V DC
phase current 2.0 A



Physical dimensions Linear Motor Family P01-23x80 see page 48.

Ordering Information

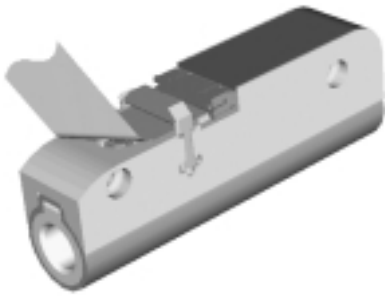
Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x80/280x340	0150-1183	*PS01-23x80*	0150-1201	*PL01-12x420/370*	0150-1324
*P02-23x80/280x340**	0150-1184	*PS01-23x80*	0150-1201	*PL02-12x420/370*	0150-1325

* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor Family P01-23Sx80

The new Linear Motor P01-23Sx80/…. is a shorter version of the P01-23x80 series motors..



In the new P01-23Sx80 motor family, the stator length has been reduced from 177mm of the P01-23x80 linear motors to 105mm. With the shorter stator and the integrated connector for flat conductor cables, the motor may be easily used in applications where the slider is mounted fix and one or several stators are moving. In applications with a moving stator, the flat connector cable may be used directly as the moving motor cable.

The technical data of the new Motor family P01-23Sx80/….. are (except the stator dimensions) identical with the technical data of the P01-23x80/… motor family. Due to the open flat cable connector the new motors, in contrast to the P01-23x80 series, should not be considered for use in dirty or wet environments.

Technical properties

Physical dimensions and electrical properties

Linear Motor	Stroke		Slider			Electrical properties		
	Max.	SS	Length	Weight	ZP	Max. Motor Current		Force Constant
						24V DC	48V DC	
	mm	mm	mm	g	mm	A	A	N/A
P01-23Sx80/30x90	90	30	170	118	40	2.0	3.0	11
P01-23Sx80/50x110	110	50	190	135	50	2.0	3.0	11
P01-23Sx80/80x140	140	80	270	171	115	2.0	3.0	11
P01-23Sx80/150x210	210	150	290	220	100	2.0	3.0	11
P01-23Sx80/210x270	270	210	350	271	130	2.0	3.0	11
P01-23Sx80/280x340	340	280	420	330	165	2.0	3.0	11
P01-23Sx80/440x500	500	440	580	465	245	2.0	3.0	11
P01-23Sx80/620x680	680	620	760	610	335	2.0	3.0	11
P01-23Sx80/710x770	770	710	850	685	380	2.0	3.0	11

Apart from the physical dimension of the stator, the technical properties are identical with the linear motors series P01-23x80

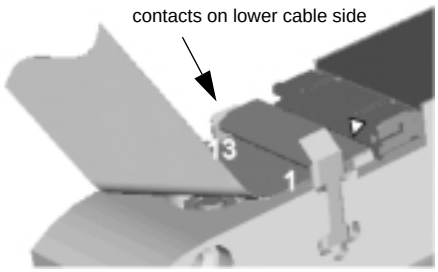
Dynamic properties

Linear Motor	Peak Velocity		Force					
			Peak force		Border force		Continuous force	
	24V DC	48V DC	24V DC	48V DC	24V DC	48V DC	normal	with Fan
	m/s	m/s	N	N	N	N	N	N
P01-23Sx80/30x90	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/50x110	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/80x140	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/150x210	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/210x270	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/280x340	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/440x500	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/620x680	1.9	3.4	22	33	14	21	9	16
P01-23Sx80/710x770	1.9	3.4	22	33	14	21	9	16

Stroke/Force and Position/Time diagrams are identical with the corresponding linear motor of the series P01-23x80.

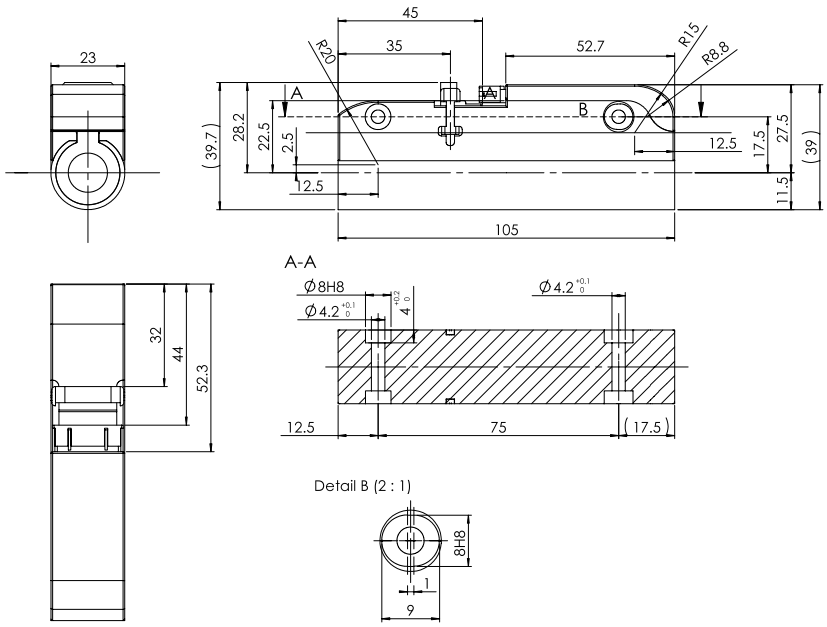
Connector assignment

The motor is to be connected with a 13 pin flat conductor cable. The flat conductor cable may be connected directly on the integrated ZIF connector (ZIF-Line from AMP, 13 pin, pitch 1.27mm).



Pin 1&2	Phase 1+	Pin 8	Temp
Pin 3&4	Phase 2+	Pin 9	+5V
Pin 5	SIN	Pin 10&11	Phase 1-
Pin 6	COS	Pin 12&13	Phase 2-
Pin 7	GND		

Physical dimensions



Ordering Information

Linear Motor		Stators			Sliders	
Description	Art.-No.	Description	Art.-No.		Description	Art.-No.
P01-23Sx80/30x90	->	PS01-23Sx80	0150-1207	&	PL01-12x170/120	0150-1301
P01-23Sx80/50x110	->	PS01-23Sx80	0150-1207	&	PL01-12x190/140	0150-1302
P01-23Sx80/80x140	->	PS01-23Sx80	0150-1207	&	PL01-12x270/170	0150-1307
P01-23Sx80/150x210	->	PS01-23Sx80	0150-1207	&	PL01-12x290/240	0150-1320
P01-23Sx80/210x270	->	PS01-23Sx80	0150-1207	&	PL01-12x350/300	0150-1322
P01-23Sx80/280x340	->	PS01-23Sx80	0150-1207	&	PL01-12x420/370	0150-1324
P01-23Sx80/440x500	->	PS01-23Sx80	0150-1207	&	PL01-12x580/530	0150-1355
P01-23Sx80/620x680	->	PS01-23Sx80	0150-1207	&	PL01-12x760/710	0150-1366
P01-23Sx80/710x770	->	PS01-23Sx80	0150-1207	&	PL01-12x850/800	0150-1365
P02-23Sx80/30x90	->	PS01-23Sx80	0150-1207	&	PL02-12x170/120	0150-1303
P02-23Sx80/50x110	->	PS01-23Sx80	0150-1207	&	PL02-12x190/140	0150-1304
P02-23Sx80/80x140	->	PS01-23Sx80	0150-1207	&	PL02-12x270/170	0150-1310
P02-23Sx80/150x210	->	PS01-23Sx80	0150-1207	&	PL02-12x290/240	0150-1321
P02-23Sx80/210x270	->	PS01-23Sx80	0150-1207	&	PL02-12x350/300	0150-1323
P02-23Sx80/280x340	->	PS01-23Sx80	0150-1207	&	PL02-12x420/370	0150-1325
P02-23Sx80/440x500	->	PS01-23Sx80	0150-1207	&	PL02-12x580/530	0150-1356

Stator and Slider must be ordered separately.

Cable for Linear Motors P01-23Sx80		
Description	Description	Art.-No.
KF01-13/70	Flat Conductor Cable for PS01-23Sx80, length 700mm (27.6in)	0150-1937
AC01-100/23S	Adapter Cable: E100-Flat Conductor Cable, length 1m (39.4in)	0150-1936

Specification of products are subject to change without notification

Linear Motor Family P01-23x160

The linear motors of the P01-23x160 family differ from the P01-23x80 family by their somewhat greater length, which gives higher maximum force. For controlling the P01-23x160 linear motors the servo controllers of Series 100 and 1000 are employed.

Performance data:		
Max. stroke:	340mm	13.4in
Max. force:	60N	13.5lbf
Max. accel.:	350m/s²	13800in/s²
Max. velocity:	4.2m/s	165in/s

Dimensions:		
Stator length:	257mm	10.1in
Stator diameter:	23mm	0.9in
Stator mass:	450g	0.99lb
Slider diameter:	12mm	0.5in

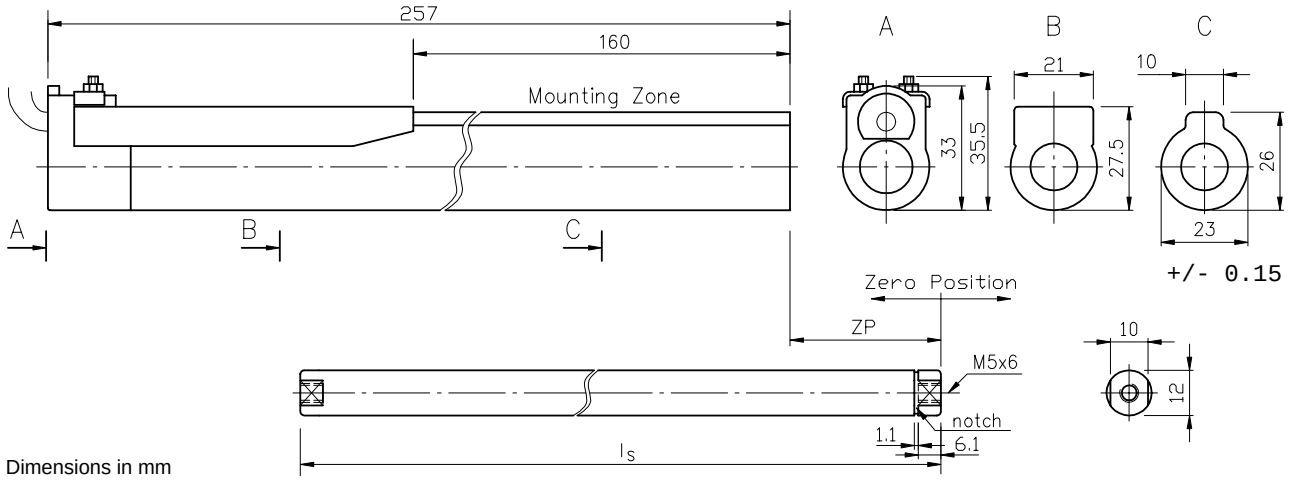
Connections:		
Cable:	9 pole (4+5)	
Cable length:	1m	3.3ft
Connector:	9-pin D-Sub (m)	

Temperature:		
Max. stator temp.:	65°C	150°F

Connector assignment:

1 red	phase 1 +	6 pink	phase 1 -
2 blue	phase 2 +	7 grey	phase 2 -
3 white	+5 V_{DC}	8 brown	ground
4 yellow	sine sensor	9 green	cosine sensor
5 black	temp. sensor	Shield on housing	

Physical dimensions



Dimensions in mm

Accessories

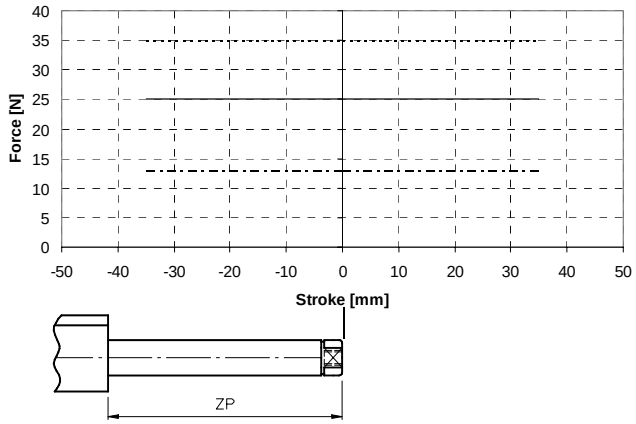
Mounting flange:	PF01-23x50	length 50mm	(2in)	Art. No. 0150-1901
	PF01-23x120	length 120mm	(4.7in)	Art. No. 0150-1902
Extension cable:	K01-23/02	length 2m	(6.6ft)	Art. No. 0150-1910
	K01-23/04	length 4m	(13.1ft)	Art. No. 0150-1911
	K01-23/06	length 6m	(19.7ft)	Art. No. 0150-1912
	K01-23/08	length 8m	(26.2ft)	Art. No. 0150-1913
Adapter cable:	Adapter P01-23 - E1000	length 0.25m	(9.8in)	Art. No. 0150-1922

Specifications of products are subject to change without notification

Linear Motor *P01-23x160/70x70*

Motor Type *LinMot® P01-23x160/70x70*		Servo Controller	***Series 100***		***Series 1000***
		Supply Voltage	24V	48V	72V
Peak Force	Fp	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Continuous Force	Fc	N (lbf)	9 (2) / 16[1] (3.6[1])		
Limit Force	Fb	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Force Constant	c_F	N/A (lbf/A)	12.5 (2.8)		
Max. Stroke	s	mm (in)	70 (2.8)		
Shortened Stroke	SS	mm (in)	70 (2.8)		
Zero Position	ZP	mm (in)	40 (1.6)		
Max. Acceleration	a	m/s² (10^3in/s²)	116 (4.6)	223 (8.8)	312 (12.3)
Max. Velocity	v	m/s (in/s)	1.3 (51)	3.0 (118)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)		
Linearity		%	± 0.5		
Slider Mass	m_S	g (lb)	112 (0.25)		
Slider Length	l_S	mm (in)	200 (7.9)		

Stroke / Force - Diagram



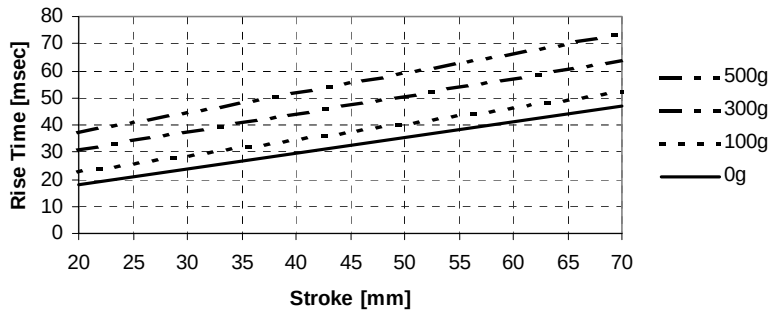
Servo Controller:

- - - - Series 1000
supply voltage 72 V DC
phase current 2.8 A

——— Series 100
supply voltage 48 V DC
phase current 2.0 A

- — - Series 100
supply voltage 24 V DC
phase current 1.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x160 see page 57.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x160/70x70	0150-1105	*PS01-23x160*	0150-1202	*PL01-12x200/100*	0150-1305
*P02-23x160/70x70**	0150-1108	*PS01-23x160*	0150-1202	*PL02-12x200/100*	0150-1308

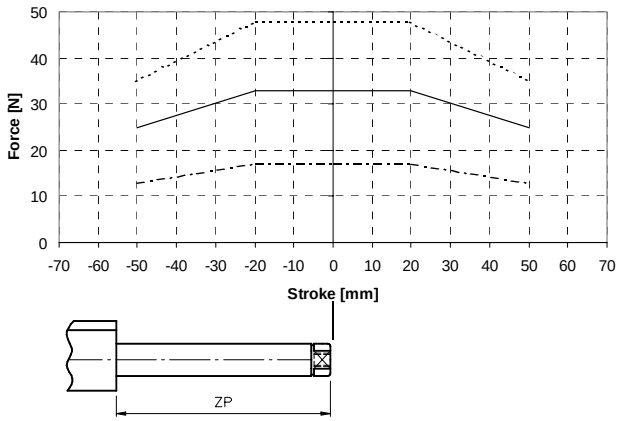
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x160/40x100*

Motor Type *LinMot® P01-23x160/40x100*		Servo Controller	***Series 100***		***Series 1000***
		Supply Voltage	24V	48V	72V
Peak Force	Fp	N (lbf)	17 (3.8)	33 (7.4)	48 (10.8)
Continuous Force	Fc	N (lbf)	12 (2.7) / 22[1] (4.9[1])		
Limit Force	Fb	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Force Constant	c_F	N/A (lbf/A)	16.5 (3.7)		
Max. Stroke	s	mm (in)	100 (3.9)		
Shortened Stroke	SS	mm (in)	40 (1.6)		
Zero Position	ZP	mm (in)	55 (2.2)		
Max. Acceleration	a	m/s² (10³in/s²)	124 (4.9)	242 (9.5)	350 (13.8)
Max. Velocity	v	m/s (in/s)	1.2 (47)	2.8 (110)	4.2 (165)
Position Repeatability		mm (in)	± 0.1 (0.004)		
Linearity		%	± 0.5		
Slider Mass	m_S	g (lb)	137 (0.3)		
Slider Length	l_S	mm (in)	230 (9.1)		

Stroke / Force - Diagram



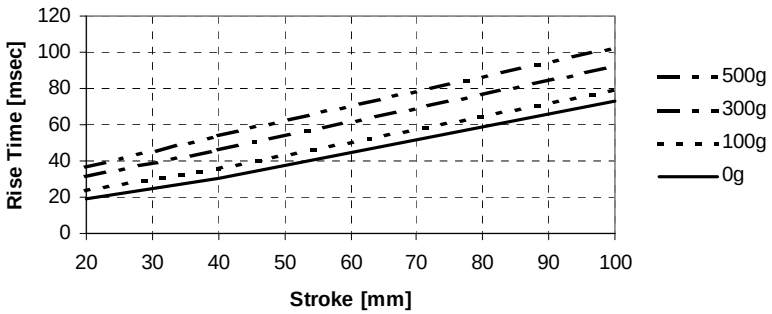
Servo Controller:

- - - - Series 1000
supply voltage 72 V DC
phase current 2.8 A

——— Series 100
supply voltage 48 V DC
phase current 2.0 A

- — - Series 100
supply voltage 24 V DC
phase current 1.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x160 see page 57.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x160/40x100	0150-1106	*PS01-23x160*	0150-1202	*PL01-12x230/130*	0150-1306
*P02-23x160/40x100**	0150-1109	*PS01-23x160*	0150-1202	*PL02-12x230/130*	0150-1309

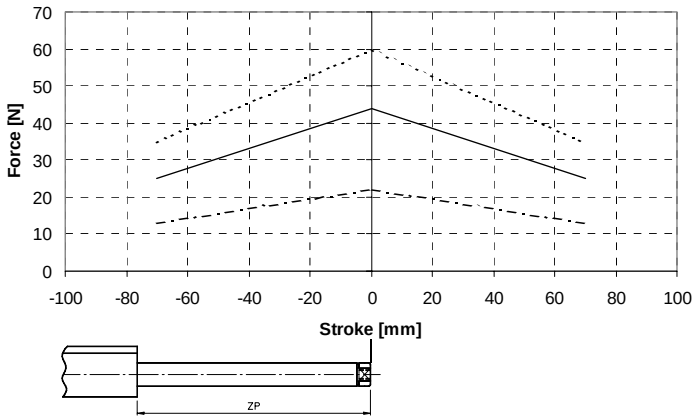
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x160/0x140*

Motor Type *LinMot® P01-23x160/0x140*		Servo Controller	***Series 100***		***Series 1000***
		Supply Voltage	24V	48V	72V
Peak Force	Fp	N (lbf)	22 (4.9)	44 (9.9)	60 (13.5)
Continuous Force	Fc	N (lbf)	17 (3.8) / 31[1] (6.9[1])		
Limit Force	Fb	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Force Constant	c_F	N/A (lbf/A)	22 (4.9)		
Max. Stroke	s	mm (in)	140 (5.5)		
Shortened Stroke	SS	mm (in)	0		
Zero Position	ZP	mm (in)	75 (3)		
Max. Acceleration	a	m/s² (10^3in/s²)	128 (5)	259 (10.2)	350 (13.8)
Max. Velocity	v	m/s (in/s)	1.2 (47)	2.7 (106)	3.6 (142)
Position Repeatability		mm (in)	± 0.1 (0.004)		
Linearity		%	± 0.4		
Slider Mass	m_S	g (lb)	171 (0.38)		
Slider Length	l_S	mm (in)	270 (10.6)		

Stroke / Force - Diagram



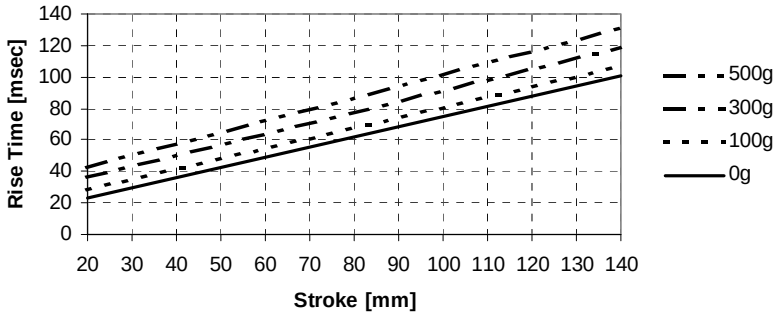
Servo Controller:

- - - - Series 1000
supply voltage 72 V DC
phase current 2.8 A

—— Series 100
supply voltage 48 V DC
phase current 2.0 A

- — - Series 100
supply voltage 24 V DC
phase current 1.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x160 see page 57.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x160/0x140	0150-1107	*PS01-23x160*	0150-1202	*PL01-12x270/170*	0150-1307
*P02-23x160/0x140**	0150-1110	*PS01-23x160*	0150-1202	*PL02-12x270/170*	0150-1310

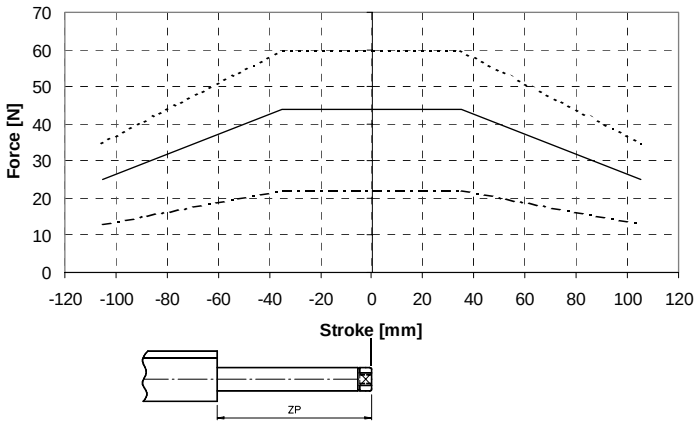
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x160/70x210*

Motor Type *LinMot® P01-23x160/70x210*		Servo Controller Supply Voltage	***Series 100*** 24V	48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	22 (4.9)	44 (9.9)	60 (13.5)
Continuous Force	Fc	N (lbf)	17 (3.8) / 31[1] (6.9[1])		
Limit Force	Fb	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Force Constant	c_F	N/A (lbf/A)	22 (4.9)		
Max. Stroke	s	mm (in)	210 (8.3)		
Shortened Stroke	SS	mm (in)	70 (2.8)		
Zero Position	ZP	mm (in)	60 (2.4)		
Max. Acceleration	a	m/s² (10^3in/s²)	100 (3.9)	201 (7.9)	272 (10.7)
Max. Velocity	v	m/s (in/s)	1.2 (47)	2.4 (94)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)		
Linearity		%	± 0.3		
Slider Mass	m_S	g (lb)	220 (0.49)		
Slider Length	l_S	mm (in)	290 (11.4)		

Stroke / Force - Diagram



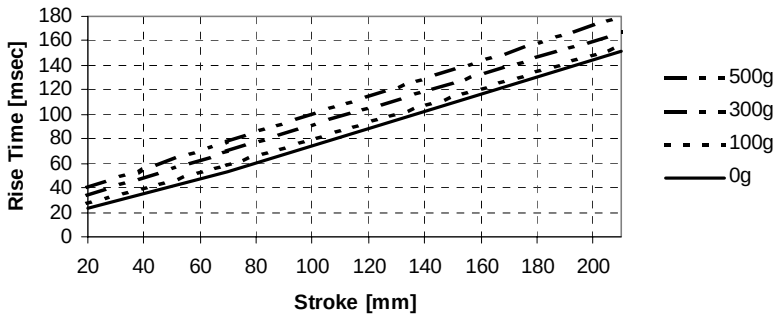
Servo Controller:

- - - - Series 1000
supply voltage 72 V DC
phase current 2.8 A

——— Series 100
supply voltage 48 V DC
phase current 2.0 A

- — - Series 100
supply voltage 24 V DC
phase current 1.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x160 see page 57.

Ordering Information

Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x160/70x210	0150-1119	*PS01-23x160*	0150-1202	*PL01-12x290/240*	0150-1320
*P02-23x160/70x210**	0150-1120	*PS01-23x160*	0150-1202	*PL02-12x290/240*	0150-1321

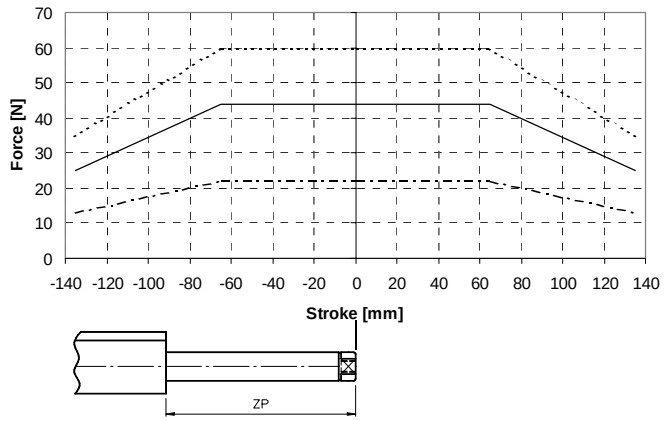
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x160/130x270*

Motor Type *LinMot® P01-23x160/130x270*		Servo Controller	***Series 100***		***Series 1000***
		Supply Voltage	24V	48V	72V
Peak Force	Fp	N (lbf)	22 (4.9)	44 (9.9)	60 (13.5)
Continuous Force	Fc	N (lbf)	17 (3.8) / 31[1] (6.9[1])		
Limit Force	Fb	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Force Constant	c_F	N/A (lbf/A)	22 (4.9)		
Max. Stroke	s	mm (in)	270 (10.6)		
Shortened Stroke	SS	mm (in)	130 (5.1)		
Zero Position	ZP	mm (in)	90 (3.5)		
Max. Acceleration	a	m/s² (10^3in/s²)	82 (3.2)	163 (6.4)	221 (8.7)
Max. Velocity	v	m/s (in/s)	1.2 (47)	2.4 (94)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)		
Linearity		%	± 0.5		
Slider Mass	m_S	g (lb)	271 (0.6)		
Slider Length	l_S	mm (in)	350 (13.8)		

Stroke / Force - Diagram



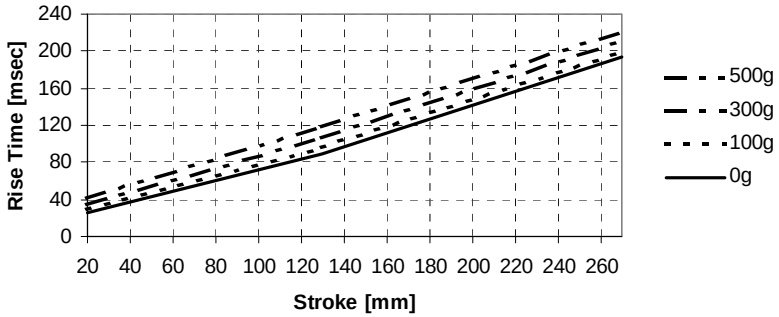
Servo Controller:

- - - - Series 1000
supply voltage 72 V DC
phase current 2.8 A

——— Series 100
supply voltage 48 V DC
phase current 2.0 A

- — - Series 100
supply voltage 24 V DC
phase current 1.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x160 see page 57.

Ordering Information

Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x160/130x270	0150-1127	*PS01-23x160*	0150-1202	*PL01-12x350/300*	0150-1322
*P02-23x160/130x270**	0150-1128	*PS01-23x160*	0150-1202	*PL02-12x350/300*	0150-1323

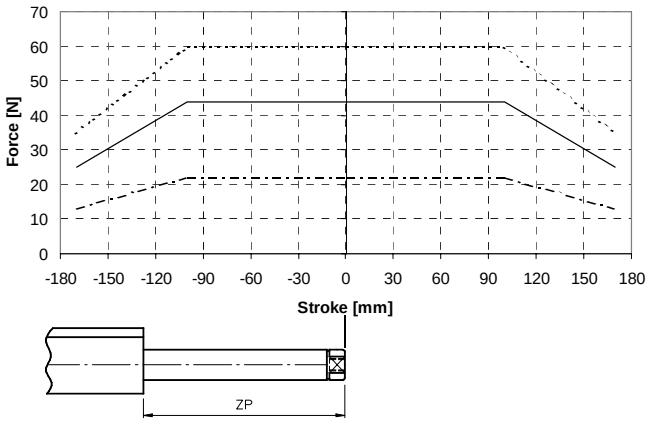
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-23x160/200x340*

Motor Type *LinMot® P01-23x160/200x340*		Servo Controller	***Series 100***		***Series 1000***
		Supply Voltage	24V	48V	72V
Peak Force	Fp	N (lbf)	22 (4.9)	44 (9.9)	60 (13.5)
Continuous Force	Fc	N (lbf)	17 (3.8) / 31[1] (6.9[1])		
Limit Force	Fb	N (lbf)	13 (2.9)	25 (5.6)	35 (7.9)
Force Constant	c_F	N/A (lbf/A)	22 (4.9)		
Max. Stroke	s	mm (in)	340 (13.4)		
Shortened Stroke	SS	mm (in)	200 (7.9)		
Zero Position	ZP	mm (in)	125 (4.9)		
Max. Acceleration	a	m/s² (10^3in/s²)	67 (2.6)	134 (5.3)	181 (7.1)
Max. Velocity	v	m/s (in/s)	1.2 (47)	2.4 (94)	3.4 (134)
Position Repeatability		mm (in)	± 0.1 (0.004)		
Linearity		%	± 0.5		
Slider Mass	m_S	g (lb)	330 (0.73)		
Slider Length	l_S	mm (in)	420 (16.5)		

Stroke / Force - Diagram



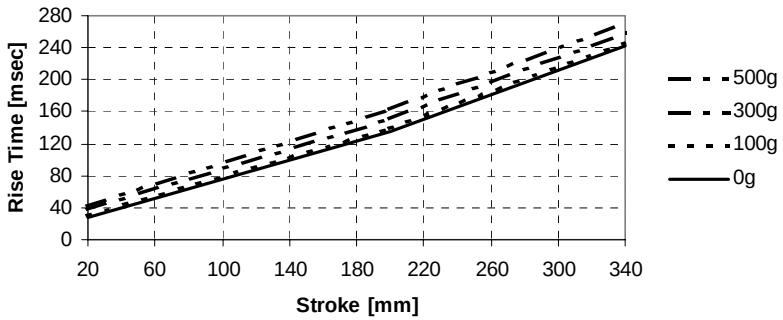
Servo Controller:

- - - - Series 1000
supply voltage 72 V DC
phase current 2.8 A

—— Series 100
supply voltage 48 V DC
phase current 2.0 A

- — - Series 100
supply voltage 24 V DC
phase current 1.0 A

Position / Time - Diagram (Power 48V DC)



Physical dimensions Linear Motor Family P01-23x160 see page 57.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-23x160/200x340	0150-1129	*PS01-23x160*	0150-1202	*PL01-12x420/370*	0150-1324
*P02-23x160/200x340**	0150-1130	*PS01-23x160*	0150-1202	*PL02-12x420/370*	0150-1325

* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor Family P01-37x120

The linear motors of the P01-37x120 family enable long-stroke motions of medium force to be performed. For controlling the P01-37x120 linear motors the servo controllers of Series 100 and 1000 are employed.

Performance data:		
Max. stroke:	1460mm	57.5in
Max. force:	122N	27.4lbf
Max. accel.:	247m/s²	9700in/s²
Max. velocity:	4.0m/s	157in/s

Dimensions:		
Stator length:	227mm	8.9in
Stator diameter:	37mm	1.5in
Stator mass:	740g	1.6lb
Slider diameter:	20mm	0.8in

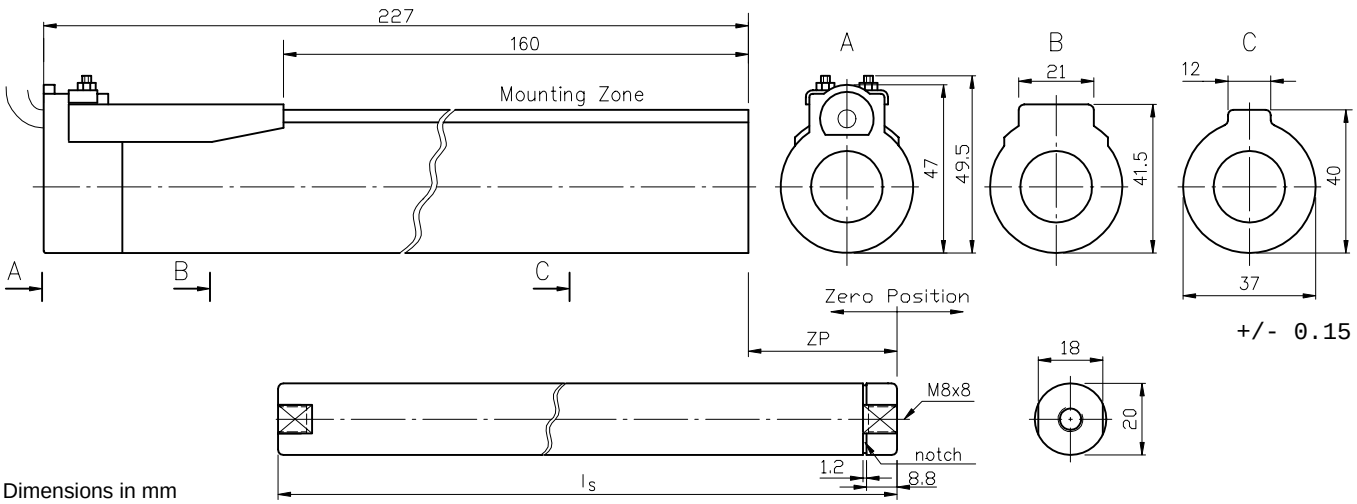
Connections:		
Cable:	9 pole (4+5)	
Cable length:	1.5m	4.9ft
Connector:	10-pin Mini Combicon	

Temperature:		
Max. stator temp.:	65°C	150°F

Connector assignment: **Phoenix Mini Combicon MC1,5/10-STF-3,81**

1 red	phase 1 +	6 brown	ground
2 pink	phase 1 -	7 yellow	sine sensor
3 blue	phase 2 +	8 green	cosine sensor
4 grey	phase 2 -	9 black	temp. sensor
5 white	+5 V_{DC}	10	shielding

Physical dimensions



Dimensions in mm

Accessories

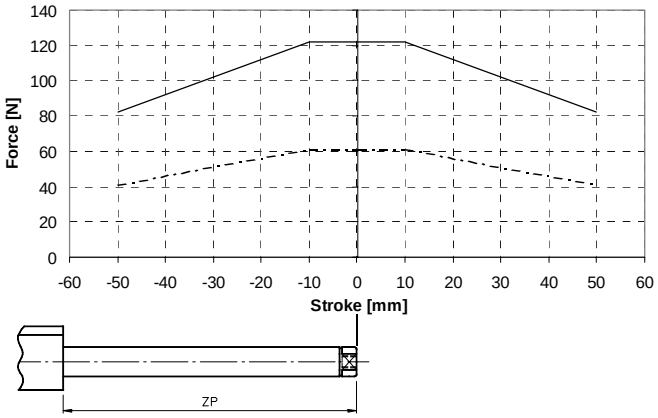
Fixing flange:	PF01-37x100	length 100mm	(3.9in)	Art. No. 0150-1903
Extension cable:	K01-37/02	length 2m	(6.6ft)	Art. No. 0150-1915
	K01-37/04	length 4m	(13.1ft)	Art. No. 0150-1916
	K01-37/06	length 6m	(19.7ft)	Art. No. 0150-1917
	K01-37/08	length 8m	(26.2ft)	Art. No. 0150-1918
Adapter cable:	Adapter P01-37 - E100	length 0.4m	(15.7in)	Art. No. 0150-1921

Specifications of products are subject to change without notification

Linear Motor *P01-37x120/20x100*

Motor Type *LinMot® P01-37x120/20x100*		Servo Controller	*Series 100*		*Series 1000*	
		Supply Voltage	24V	48V	48V	72V
Peak Force	Fp	N (lbf)	61 (13.7)		122 (27.4)	
Continuous Force	Fc	N (lbf)	30 (6.7) / 54[1] (12[1])			
Limit Force	Fb	N (lbf)	41 (9.2)		82 (18.4)	
Force Constant	c_F	N/A (lbf/A)	20 (4.5)			
Max. Stroke	s	mm (in)	100 (3.9)			
Shortened Stroke	SS	mm (in)	20 (0.8)			
Zero Position	ZP	mm (in)	60 (2.4)			
Max. Acceleration	a	m/s² (10^3in/s²)	123 (4.8)		247 (9.7)	
Max. Velocity	v	m/s (in/s)	1.4 (55)	2.6 (102)	2.6 (102)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)			
Linearity		%	± 0.5			
Slider Mass	m_S	g (lb)	460 (18.1)			
Slider Length	l_S	mm (in)	240 (9.4)			

Stroke / Force - Diagram

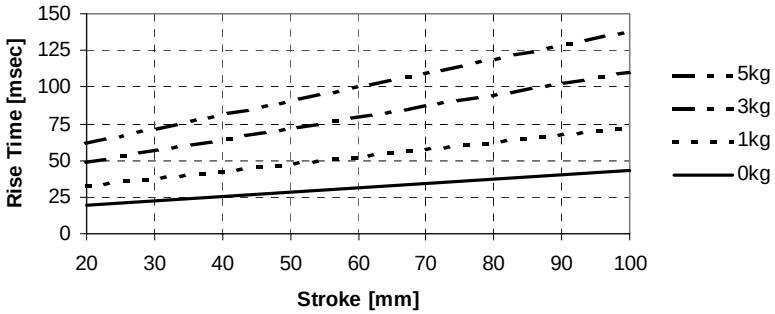


Servo Controller:

——— Series 1000
supply voltage 72 V / 48 V DC
phase current 6.0 A

- — - Series 100
supply voltage 48 V / 24 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x120 see page 64.

Ordering Information

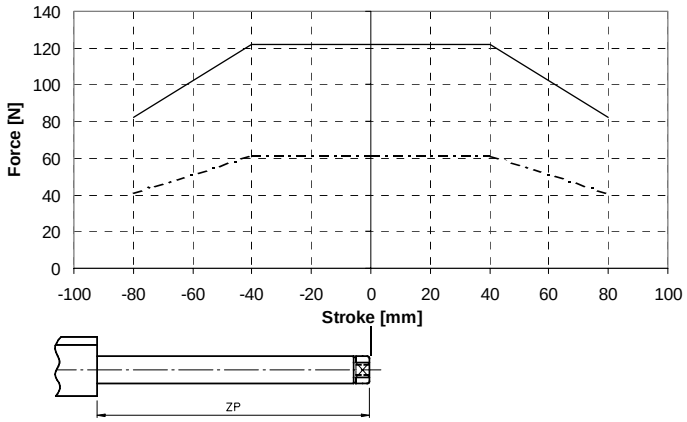
Motor (Stator and Slider)		Spare Parts: Stator		Spare Parts: Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x120/20x100	0150-1171	*PS01-37x120*	0150-1204	*PL01-20x240/160*	0150-1346
*P01-37x120/20x100-L***	0150-1175	*PS01-37x120*	0150-1204	*PL01-20x240/160-L*	0150-1350
*P02-37x120/20x100**	0150-1172	*PS01-37x120*	0150-1204	*PL02-20x240/160*	0150-1347

* Motor version P02 "Heavy-Duty" see page 42. ** hollow slider motor Specification of products are subject to change without notification

Linear Motor *P01-37x120/80x160*

Motor Type *LinMot® P01-37x120/80x160*		Servo Controller	***Series 100***		***Series 1000***	
		Supply Voltage	24V	48V	48V	72V
Peak Force	Fp	N (lbf)	61 (13.7)		122 (27.4)	
Continuous Force	Fc	N (lbf)	30 (6.7) / 54[1] (12[1])			
Limit Force	Fb	N (lbf)	41 (9.2)		82 (18.4)	
Force Constant	c_F	N/A (lbf/A)	20 (4.5)			
Max. Stroke	s	mm (in)	160 (6.3)			
Shortened Stroke	SS	mm (in)	80 (3.1)			
Zero Position	ZP	mm (in)	90 (3.5)			
Max. Acceleration	a	m/s² (10³in/s²)	96 (3.8)		193 (7.6)	
Max. Velocity	v	m/s (in/s)	1.4 (55)	2.6 (102)	2.6 (102)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)			
Linearity		%	± 0.4			
Slider Mass	m_S	g (lb)	600 (23.6)			
Slider Length	l_S	mm (in)	300 (11.8)			

Stroke / Force - Diagram

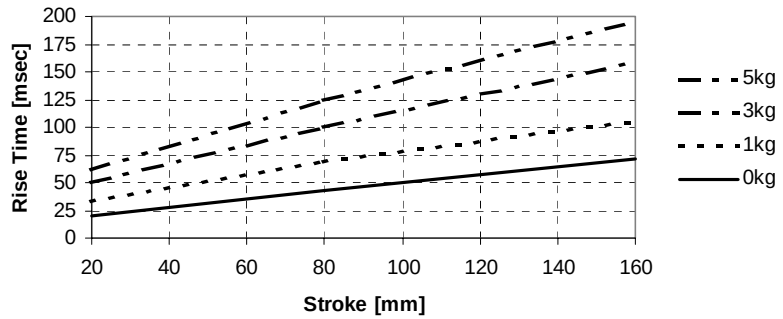


Servo Controller:

——— Series 1000
supply voltage 72 V / 48 V DC
phase current 6.0 A

- — - Series 100
supply voltage 48 V / 24 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x120 see page 64.

Ordering Information

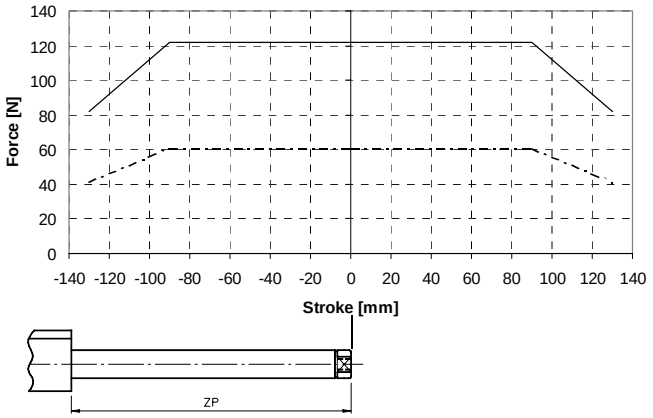
Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x120/80x160	0150-1173	*PS01-37x120*	0150-1204	*PL01-20x300/220*	0150-1348
*P01-37x120/80x160-L***	0150-1176	*PS01-37x120*	0150-1204	*PL01-20x300/220-L*	0150-1351
*P02-37x120/80x160**	0150-1174	*PS01-37x120*	0150-1204	*PL02-20x300/220*	0150-1349

* Motor version P02 "Heavy-Duty" see page 42. ** hollow slider motor Specification of products are subject to change without notification

Linear Motor *P01-37x120/180x260*

Motor Type *LinMot® P01-37x120/180x260*		Servo Controller	*Series 100*		*Series 1000*	
		Supply Voltage	24V	48V	48V	72V
Peak Force	Fp	N (lbf)	61 (13.7)		122 (27.4)	
Continuous Force	Fc	N (lbf)	30 (6.7) / 54[1] (12[1])			
Limit Force	Fb	N (lbf)	41 (9.2)		82 (18.4)	
Force Constant	c_F	N/A (lbf/A)	20 (4.5)			
Max. Stroke	s	mm (in)	260 (10.2)			
Shortened Stroke	SS	mm (in)	180 (7.1)			
Zero Position	ZP	mm (in)	135 (5.3)			
Max. Acceleration	a	m/s² (10³in/s²)	74 (2.9)		148 (5.8)	
Max. Velocity	v	m/s (in/s)	1.4 (55)	2.6 (102)	2.6 (102)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)			
Linearity		%	± 0.3			
Slider Mass	m_S	g (lb)	829 (1.83)			
Slider Length	l_S	mm (in)	395 (15.6)			

Stroke / Force - Diagram

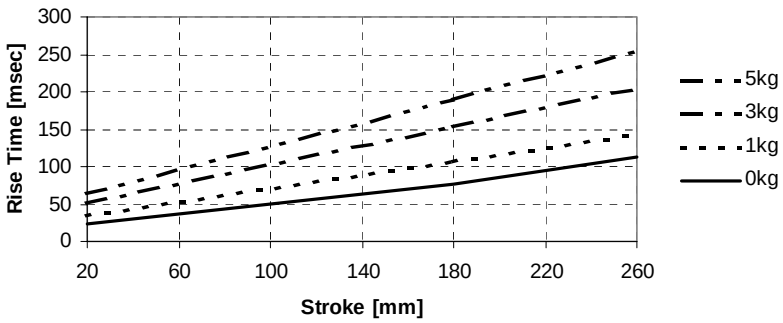


Servo Controller:

——— Series 1000
supply voltage 72 V / 48 V DC
phase current 6.0 A

- — - Series 100
supply voltage 48 V / 24 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x120 see page 64.

Ordering Information

Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x120/180x260	0150-1151	*PS01-37x120*	0150-1204	*PL01-20x395/320*	0150-1318
*P01-37x120/180x260-L***	0150-1177	*PS01-37x120*	0150-1204	*PL01-20x395/320-L*	0150-1354
*P02-37x120/180x260**	0150-1152	*PS01-37x120*	0150-1204	*PL02-20x395/320*	0150-1319

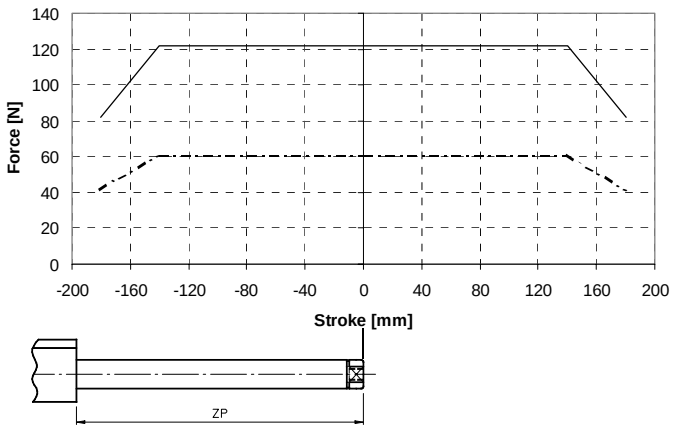
* Motor version P02 "Heavy-Duty" see page 42. ** hollow slider motor Specification of products are subject to change without notification

Linear Motor *P01-37x120/280x360*

Motor Type *LinMot® P01-37x120/280x360*		Servo Controller	***Series 100***		***Series 1000***	
		Supply Voltage	24V	48V	48V	72V
Peak Force	Fp	N (lbf)	61 (13.7)		122 (27.4)	
Continuous Force	Fc	N (lbf)	30 (6.7) / 54[1] (12[1])			
Limit Force	Fb	N (lbf)	41 (9.2)		82 (18.4)	
Force Constant	c_F	N/A (lbf/A)	20 (4.5)			
Max. Stroke	s	mm (in)	360 (14.2)			
Shortened Stroke	SS	mm (in)	280 (11.0)			
Zero Position	ZP	mm (in)	190 (7.5)			
Max. Acceleration**	a	m/s² (10^3in/s²)	82 (3.2)		165 (6.5)	
Max. Velocity	v	m/s (in/s)	1.4 (55)	2.6 (102)	2.6 (102)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)			
Linearity		%	± 0.3			
Slider Mass	m_S	g (lb)	1064 (2.35)			
Slider Length	l_S	mm (in)	500 (19.7)			

** of the moved stator

Stroke / Force - Diagram

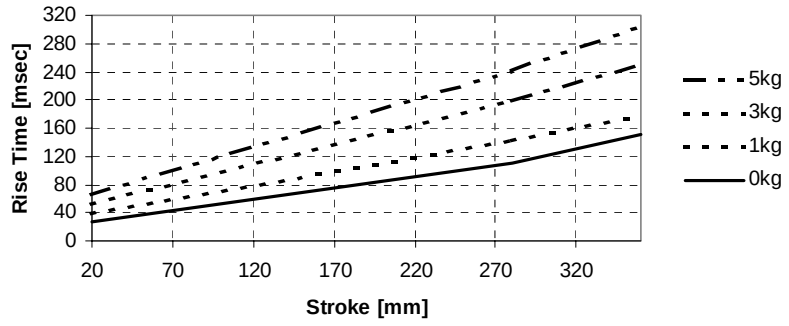


Servo Controller:

——— Series 1000
supply voltage 72 V / 48 V DC
phase current 6.0 A

- — - Series 100
supply voltage 48 V / 24 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x120 see page 64.

Ordering Information

Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x120/280x360	0150-1153	*PS01-37x120*	0150-1204	*PL01-20x500/420*	0150-1328
*P02-37x120/280x360**	0150-1154	*PS01-37x120*	0150-1204	*PL02-20x500/420*	0150-1329

* Motor version P02 "Heavy-Duty" see page 42.

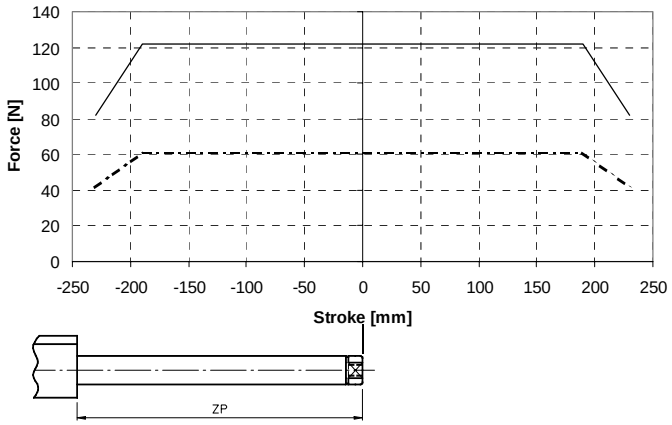
Specification of products are subject to change without notification

Linear Motor *P01-37x120/380x460*

Motor Type *LinMot® P01-37x120/380x460*		Servo Controller Supply Voltage	***Series 100*** 24V	48V	***Series 1000*** 48V	72V
Peak Force	Fp	N (lbf)	61 (13.7)		122 (27.4)	
Continuous Force	Fc	N (lbf)	30 (6.7) / 54[1] (12[1])			
Limit Force	Fb	N (lbf)	41 (9.2)		82 (18.4)	
Force Constant	c_F	N/A (lbf/A)	20 (4.5)			
Max. Stroke	s	mm (in)	460 (18.1)			
Shortened Stroke	SS	mm (in)	380 (15)			
Zero Position	ZP	mm (in)	240 (9.4)			
Max. Acceleration**	a	m/s² (10^3in/s²)	82 (3.2)		165 (6.5)	
Max. Velocity	v	m/s (in/s)	1.4 (55)	2.6 (102)	2.6 (102)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)			
Linearity		%	± 0.2			
Slider Mass	m_S	g (lb)	1297 (2.86)			
Slider Length	l_S	mm (in)	600 (23.6)			

** of the moved stator

Stroke / Force - Diagram

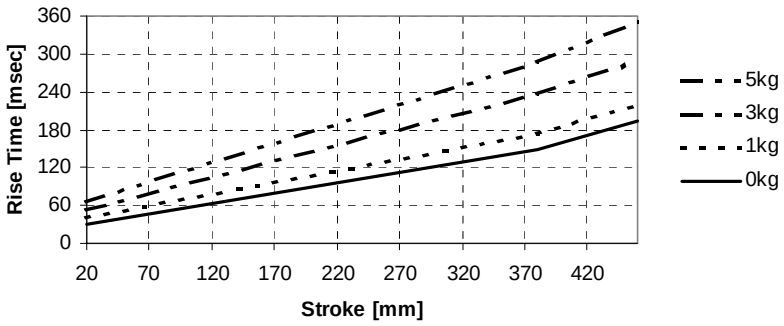


Servo Controller:

——— Series 1000
supply voltage 72 V / 48 V DC
phase current 6.0 A

- — - Series 100
supply voltage 48 V / 24 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x120 see page 64.

Ordering Information

Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x120/380x460	0150-1155	*PS01-37x120*	0150-1204	*PL01-20x600/520*	0150-1330
*P02-37x120/380x460**	0150-1156	*PS01-37x120*	0150-1204	*PL02-20x600/520*	0150-1331

* Motor version P02 "Heavy-Duty" see page 42.

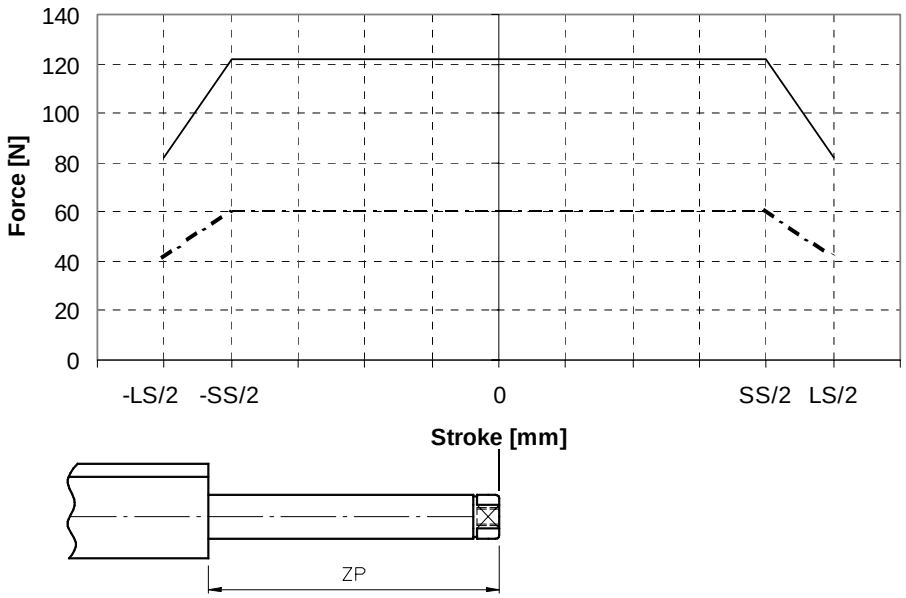
Specification of products are subject to change without notification

Linear Motor *P01-37x120/...* *(Long stroke)*

Motor Type *LinMot® P01-37x120/.. (Long stroke)*		Servo Controller	***Series 100***		***Series 1000***	
		Supply Voltage	24V	48V	48V	72V
Peak Force	Fp	N (lbf)	61 (13.7)		122 (27.4)	
Continuous Force	Fc	N (lbf)	30 (6.7) / 54[1] (12[1])			
Limit Force	Fb	N (lbf)	41 (9.2)		82 (18.4)	
Force Constant	c_F	N/A (lbf/A)	20 (4.5)			
Max. Acceleration**	a	m/s^2 ($10^3 in/s^2$)	82 (3.2)		165 (6.5)	
Max. Velocity	v	m/s (in/s)	1.4 (55)	2.6 (102)	2.6 (102)	4.0 (157)
Position Repeatability		mm (in)	± 0.1 (0.004)			
Linearity		%	± 0.1			

** of the moved stator

Stroke / Force - Diagram



Servo Controller:

—— Series 1000
supply voltage 72 V / 48 V DC
phase current 6.0 A

- — - Series 100
supply voltage 48 V / 24 V DC
phase current 3.0 A

Physical dimensions Linear Motor Family P01-37x120 see page 64.

Motor Type	Article No.	Max. Stroke mm (in)	Shortened Stroke mm (in)	Slider Mass g (lb)	Slider Length mm (in)	Zero Position mm (in)	Spare Slider	Article No.
P01-37x120/480x560	0150-1157	560	480	1529	700	290	PL01-20x700/620	0150-1332
P02-37x120/480x560*	0150-1158						PL02-20x700/620	0150-1333
P01-37x120/580x660	0150-1159	660	580	1762	800	340	PL01-20x800/720	0150-1334
P02-37x120/580x660*	0150-1160						PL02-20x800/720	0150-1335
P01-37x120/680x760	0150-1161	760	680	1994	900	390	PL01-20x900/820	0150-1336
P02-37x120/680x760*	0150-1162						PL02-20x900/820	0150-1337
P01-37x120/780x860	0150-1163	860	780	2227	1000	440	PL01-20x1000/920	0150-1338
P01-37x120/980x1060	0150-1165	1060	980	2692	1200	540	PL01-20x1200/1120	0150-1340
P01-37x120/1180x1260	0150-1167	1260	1180	3157	1400	640	PL01-20x1400/1320	0150-1342
P01-37x120/1380x1460	0150-1169	1460	1380	3622	1600	740	PL01-20x1600/1520	0150-1344
Spare Stator: PS01-37x120	0150-1204	-	-	-	-	-	-	-

* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor Family P01-37x240

With the linear motors of the P01-37x240 family the greatest forces can be brought to bear and the longest strokes performed. For controlling the P01-37x240 linear motors the servo controllers of Series 100 and 1000 are employed.

Performance data:		
Max. stroke:	1460mm	57.5in
Max. force:	204N	45.9lbf
Max. accel.:	268m/s²	10500in/s²
Max. velocity:	3.1m/s	122in/s

Dimensions:		
Stator length:	347mm	13.7in
Stator diameter:	37mm	1.5in
Stator mass:	1385g	3.1lb
Slider diameter:	20mm	0.8in

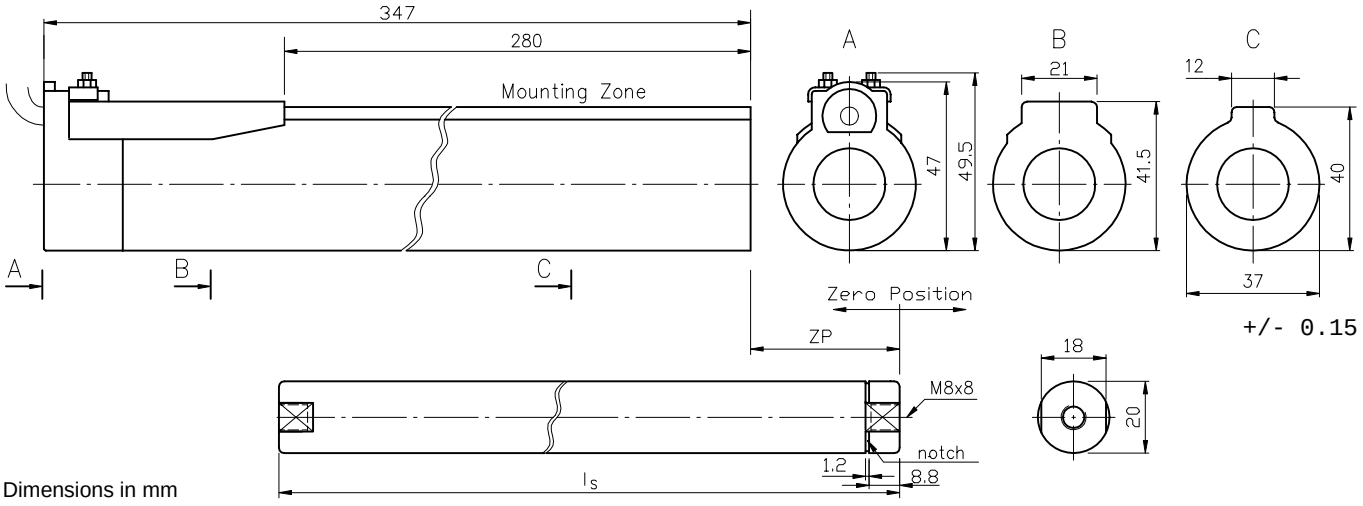
Connections:		
Cable:	9 pole (4+5)	
Cable length:	1m	4.9ft
Connector:	10-pin Mini Combicon	

Temperature:		
Max. stator temp.:	65°C	150°F

Connector assignment: **Phoenix Mini Combicon MC1,5/10-STF-3,81**

1 red	phase 1 +	6 brown	ground
2 pink	phase 1 -	7 yellow	sine sensor
3 blue	phase 2 +	8 green	cosine sensor
4 grey	phase 2 -	9 black	temp. sensor
5 white	+5 V_{DC}	10	shielding

Physical dimension



Dimensions in mm

Accessories

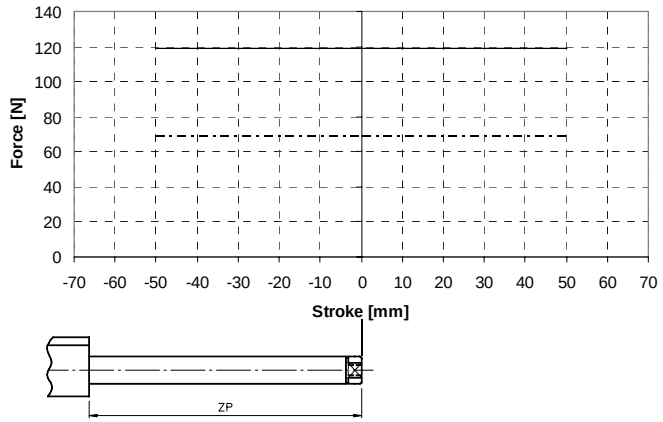
Fixing flange:	PF01-37x100	length 100mm	(3.9in)	Art. No. 0150-1903
	PF01-37x200	length 200mm	(7.9in)	Art. No. 0150-1904
Extension cable:	K01-37/02	length 2m	(6.6ft)	Art. No. 0150-1915
	K01-37/04	length 4m	(13.1ft)	Art. No. 0150-1916
	K01-37/06	length 6m	(19.7ft)	Art. No. 0150-1917
	K01-37/08	length 8m	(26.2ft)	Art. No. 0150-1918
Adapter cable:	Adapter P01-37 - E100	length 0.4m	(15.7in)	Art. No. 0150-1921

Specifications of products are subject to change without notification

Linear Motor *P01-37x240/100x100*

Motor type ***LinMot® P01-37x240/100x100***		Servo Controller Supply Voltage	***Series 100*** 48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	70 (15.7)	119 (26.8)
Continuous Force	Fc	N (lbf)	34 (7.7) / 62[1] (13.7[1])	
Limit Force	Fb	N (lbf)	70 (15.7)	119 (26.8)
Force Constant	c_F	N/A (lbf/A)	24 (5.4)	
Max. Stroke	s	mm (in)	100 (3.9)	
Shortened Stroke	SS	mm (in)	100 (3.9)	
Zero Position	ZP	mm (in)	65 (2.6)	
Max. Acceleration	a	m/s² (10^3in/s²)	140 (5.5)	240 (9.4)
Max. Velocity	v	m/s (in/s)	2.1 (83)	3.1 (122)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.5	
Slider Mass	m_S	g (lb)	496 (1.09)	
Slider Length	l_S	mm (in)	305 (12)	

Stroke / Force - Diagram

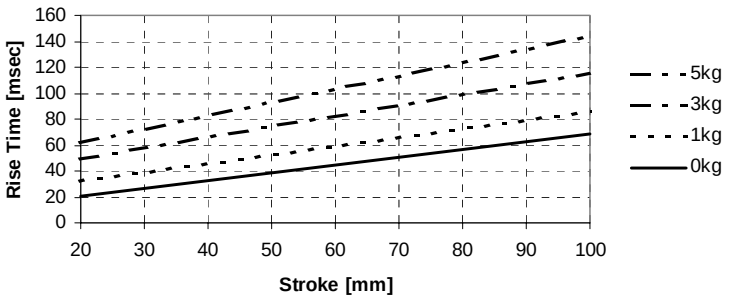


Servo Controller:

——— Series 1000
supply voltage 72 V DC
phase current 5.0 A

- — - Series 100
supply voltage 48 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x240 see page 71.

Ordering Information

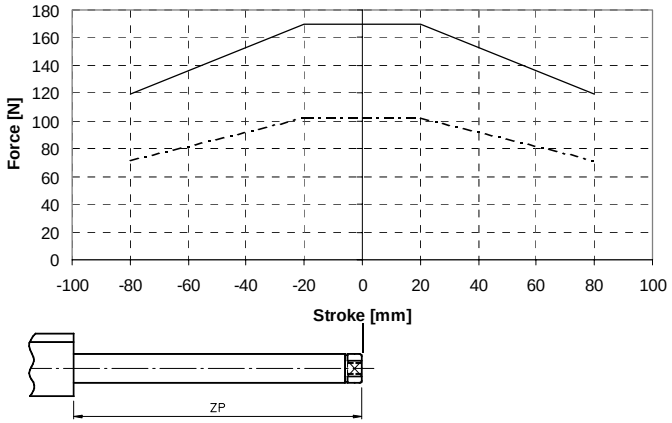
Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x240/100x100	0150-1111	*PS01-37x240*	0150-1203	*PL01-20x305/160*	0150-1311
*P01-37x240/100x100-L***	0150-1178	*PS01-37x240*	0150-1203	*PL01-20x305/160-L*	0150-1352
*P02-37x240/100x100**	0150-1114	*PS01-37x240*	0150-1203	*PL02-20x305/160*	0150-1314

* Motor version P02 "Heavy-Duty" see page 42. ** hollow slider motor Specification of products are subject to change without notification

Linear Motor *P01-37x240/40x160*

Motor type *LinMot® P01-37x240/40x160*		Servo Controller Supply Voltage	***Series 100*** 48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	103 (23.2)	170 (38.2)
Continuous Force	Fc	N (lbf)	46 (10.3) / 84[1] (18.6[1])	
Limit Force	Fb	N (lbf)	72 (16.2)	119 (26.8)
Force Constant	c_F	N/A (lbf/A)	34 (7.6)	
Max. Stroke	s	mm (in)	160 (6.3)	
Shortened Stroke	SS	mm (in)	40 (1.6)	
Zero Position	ZP	mm (in)	95 (3.7)	
Max. Acceleration	a	m/s² (10^3in/s²)	160 (6.3)	268 (10.6)
Max. Velocity	v	m/s (in/s)	1.7 (67)	2.6 (102)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.4	
Slider Mass	m_S	g (lb)	635 (1.4)	
Slider Length	l_S	mm (in)	365 (14.4)	

Stroke / Force - Diagram

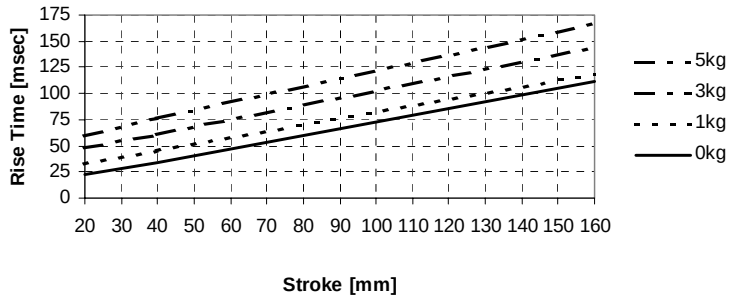


Servo Controller:

——— Series 1000
supply voltage 72 V DC
phase current 5.0 A

- — - Series 100
supply voltage 48 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x240 see page 71.

Ordering Information

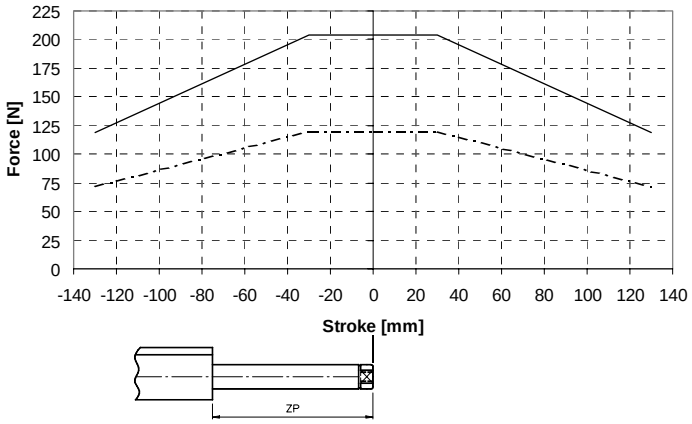
Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x240/40x160	0150-1112	*PS01-37x240*	0150-1203	*PL01-20x365/220*	0150-1312
*P01-37x240/40x160-L***	0150-1179	*PS01-37x240*	0150-1203	*PL01-20x365/220*	0150-1353
*P02-37x240/40x160**	0150-1115	*PS01-37x240*	0150-1203	*PL02-20x365/220*	0150-1315

* Motor version P02 "Heavy-Duty" see page 42. ** hollow slider motor Specification of products are subject to change without notification

Linear Motor *P01-37x240/60x260*

Motor type ***LinMot® P01-37x240/60x260***		Servo Controller Supply Voltage	***Series 100*** 48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	120 (27)	204 (45.9)
Continuous Force	Fc	N (lbf)	55 (12.4) / 100[1] (22[1])	
Limit Force	Fb	N (lbf)	72 (16.2)	119 (26.8)
Force Constant	c_F	N/A (lbf/A)	40 (9)	
Max. Stroke	s	mm (in)	260 (10.2)	
Shortened Stroke	SS	mm (in)	60 (2.4)	
Zero Position	ZP	mm (in)	75 (3)	
Max. Acceleration	a	m/s² (10^3in/s²)	144 (5.7)	246 (9.7)
Max. Velocity	v	m/s (in/s)	1.3 (51)	2.2 (87)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.3	
Slider Mass	m_S	g (lb)	829 (1.83)	
Slider Length	l_S	mm (in)	395 (15.6)	

Stroke / Force - Diagram

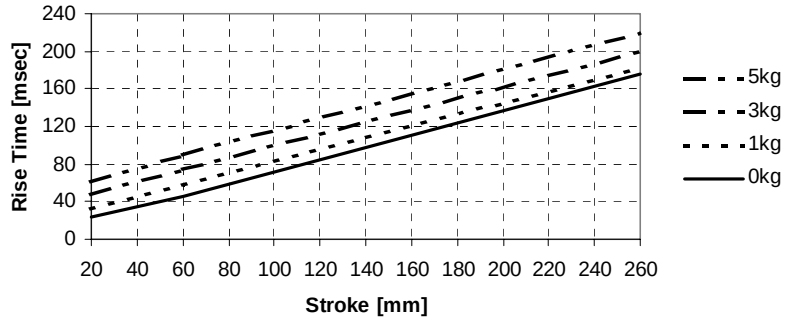


Servo Controller:

——— Series 1000
supply voltage 72 V DC
phase current 5.0 A

- — - Series 100
supply voltage 48 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x240 see page 71.

Ordering Information

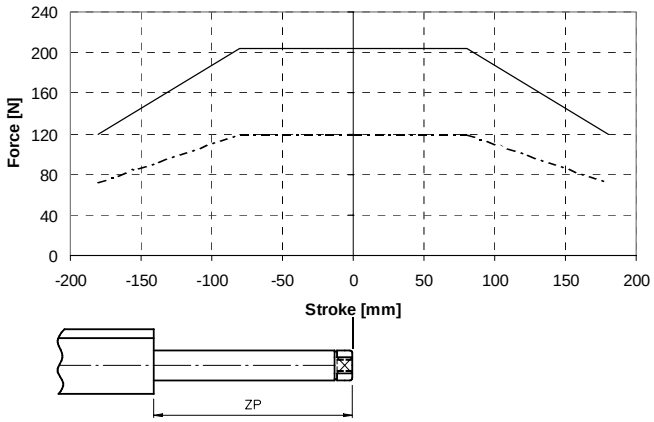
Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x240/60x260	0150-1117	*PS01-37x240*	0150-1203	*PL01-20x395/320*	0150-1318
*P01-37x240/60x260-L***	0150-1180	*PS01-37x240*	0150-1203	*PL01-20x395/320-L*	0150-1354
*P02-37x240/60x260**	0150-1118	*PS01-37x240*	0150-1203	*PL02-20x395/320*	0150-1319

* Motor version P02 "Heavy-Duty" see page 42. ** hollow slider motor Specification of products are subject to change without notification

Linear Motor *P01-37x240/160x360*

Motor type *LinMot® P01-37x240/160x360*		Servo Controller Supply Voltage	***Series 100*** 48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	120 (27)	204 (45.9)
Continuous Force	Fc	N (lbf)	55 (12.4) / 100[1] (22[1])	
Limit Force	Fb	N (lbf)	72 (16.2)	119 (26.8)
Force Constant	c_F	N/A (lbf/A)	40 (9)	
Max. Stroke	s	mm (in)	360 (14.2)	
Shortened Stroke	SS	mm (in)	160 (6.3)	
Zero Position	ZP	mm (in)	130 (5.1)	
Max. Acceleration	a	m/s² (10^3in/s²)	112 (4.4)	192 (7.6)
Max. Velocity	v	m/s (in/s)	1.3 (51)	2.2 (87)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.3	
Slider Mass	m_S	g (lb)	1064 (2.35)	
Slider Length	l_S	mm (in)	500 (19.7)	

Stroke / Force - Diagram

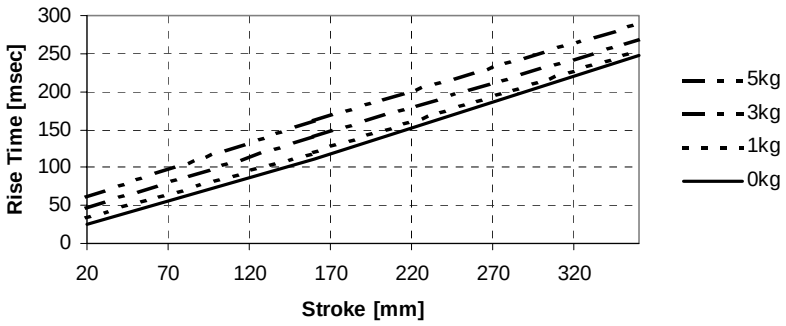


Servo Controller:

—— Series 1000
supply voltage 72 V DC
phase current 5.0 A

- — - Series100
supply voltage 48 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x240 see page 71.

Ordering Information

Motor (Stator and Slider)		**Spare Parts** Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x240/160x360	0150-1131	*PS01-37x240*	0150-1203	*PL01-20x500/420*	0150-1328
*P02-37x240/160x360**	0150-1132	*PS01-37x240*	0150-1203	*PL02-20x500/420*	0150-1329

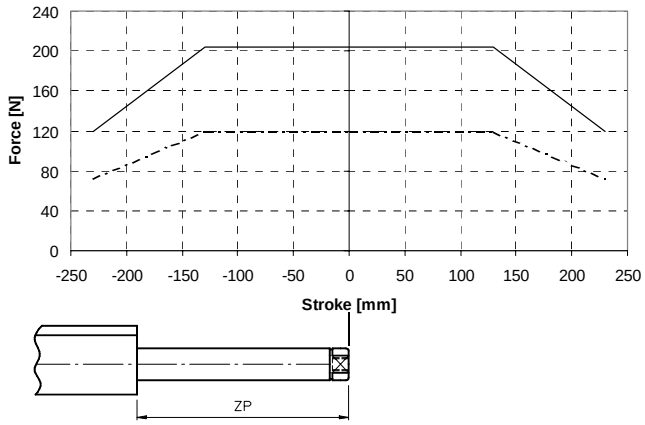
* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor *P01-37x240/260x460*

Motor type ***LinMot® P01-37x240/260x460***		Servo Controller Supply Voltage	***Series 100*** 48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	120 (27)	204 (45.9)
Continuous Force	Fc	N (lbf)	55 (12.4) / 100[1] (22[1])	
Limit Force	Fb	N (lbf)	72 (16.2)	119 (26.8)
Force Constant	c_F	N/A (lbf/A)	40 (9)	
Max. Stroke	s	mm (in)	460 (18.1)	
Shortened Stroke	SS	mm (in)	260 (10.2)	
Zero Position	ZP	mm (in)	180 (7.1)	
Max. Acceleration	a	m/s² (10^3in/s²)	93 (3.7)	157 (6.2)
Max. Velocity	v	m/s (in/s)	1.3 (51)	2.2 (87)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.2	
Slider Mass	m_S	g (lb)	1297 (2.9)	
Slider Length	l_S	mm (in)	600 (23.6)	

Stroke / Force - Diagram

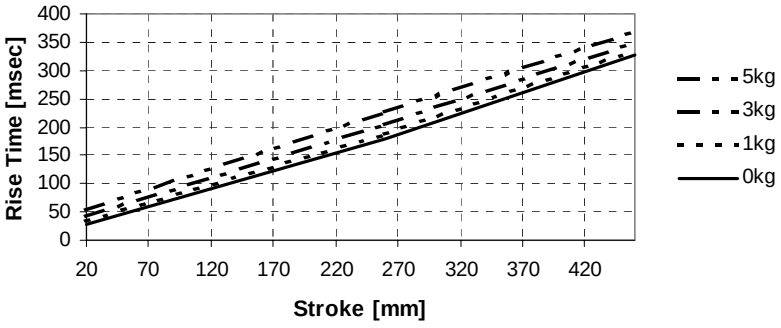


Servo Controller:

——— Series 1000
supply voltage 72 V DC
phase current 5.0 A

- — - Series 100
supply voltage 48 V DC
phase current 3.0 A

Position / Time - Diagram (Power 72V DC)



Physical dimensions Linear Motor Family P01-37x240 see page 71.

Ordering Information

Motor		**Spare Parts**			
(Stator and Slider)		Stator		Slider	
Description	Art. No.	Description	Art. No.	Description	Art. No.
P01-37x240/260x460	0150-1133	*PS01-37x240*	0150-1203	*PL01-20x600/520*	0150-1330
*P02-37x240/260x460**	0150-1134	*PS01-37x240*	0150-1203	*PL02-20x600/520*	0150-1331

* Motor version P02 "Heavy-Duty" see page 42.

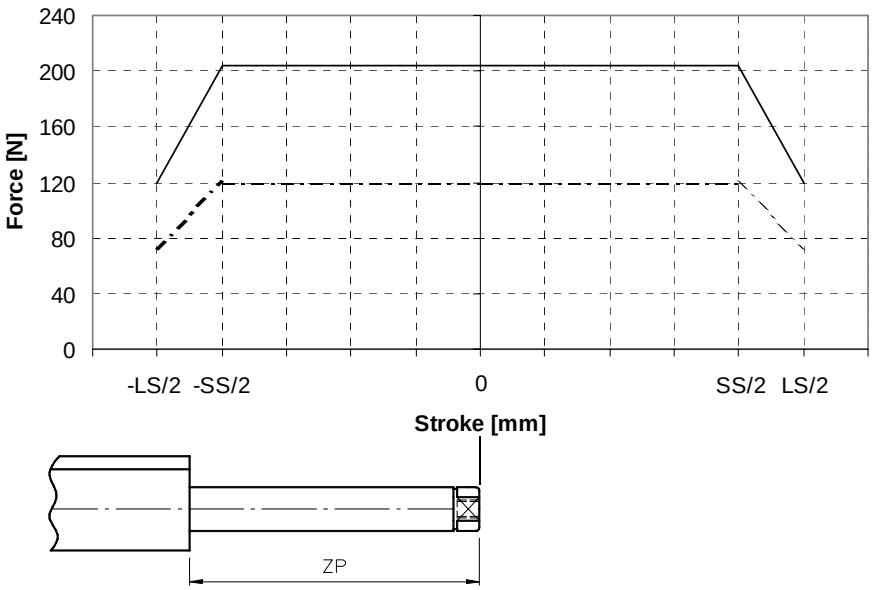
Specification of products are subject to change without notification

Linear Motor *P01-37x240/...* *(Long stroke)*

Motor type *LinMot® P01-37x240/.. (Long stroke)*		Servo Controller Supply Voltage	***Series 100*** 48V	***Series 1000*** 72V
Peak Force	Fp	N (lbf)	120 (27)	204 (45.9)
Continuous Force	Fc	N (lbf)	55 (12.4) / 100[1] (22[1])	
Limit Force	Fb	N (lbf)	72 (16.2)	119 (26.8)
Force Constant	c_F	N/A (lbf/A)	40 (9)	
Max. Acceleration**	a	m/s^2 ($10^3 in/s^2$)	86 (3.4)	147 (5.8)
Max. Velocity	v	m/s (in/s)	1.3 (51)	2.2 (87)
Position Repeatability		mm (in)	± 0.1 (0.004)	
Linearity		%	± 0.1	

** of the moved stator

Stroke / Force - Diagram



Servo Controller:

——— Series 1000
supply voltage 72 V DC
phase current 5.0 A

- — - Series 100
supply voltage 48 V DC
phase current 3.0 A

Physical dimensions Linear Motor Family P01-37x240 see page 71.

Motor Type	Article No.	Max. Stroke mm (in)	Short-ened Stroke mm (in)	Slider Mass g (lb)	Slider Length mm (in)	Zero Po-sition mm (in)	Spare Slider	Article No.
P01-37x240/360x560 P02-37x240/360x560*	0150-1135 0150-1136	560	360	1529	700	230	PL01-20x700/620 PL02-20x700/620	0150-1332 0150-1333
P01-37x240/460x660 P02-37x240/460x660*	0150-1121 0150-1122	660	460	1762	800	280	PL01-20x800/720 PL02-20x800/720	0150-1334 0150-1335
P01-37x240/560x760 P02-37x240/560x760*	0150-1137 0150-1138	760	560	1994	900	330	PL01-20x900/820 PL02-20x900/820	0150-1336 0150-1337
P01-37x240/660x860	0150-1139	860	660	2227	1000	380	PL01-20x1000/920	0150-1338
P01-37x240/860x1060	0150-1141	1060	860	2692	1200	480	PL01-20x1200/1120	0150-1340
P01-37x240/1060x1260	0150-1143	1260	1060	3157	1400	580	PL01-20x1400/1320	0150-1342
P01-37x240/1260x1460	0150-1145	1460	1260	3622	1600	680	PL01-20x1600/1520	0150-1344
Spare Stator: PS01-37x240	0150-1203	-	-	-	-	-	-	-

* Motor version P02 "Heavy-Duty" see page 42.

Specification of products are subject to change without notification

Linear Motor Family P01-37x240F

The new linear motors of the Family P01-37x240F with the extension -F are now available with an increased maximum velocity for long stroke moves. The -F Type motors differ from the standard P01-37x240 types in a velocity-optimised stator winding.

Motor connectors, mechanical dimension and continuous force are identically with standard P01-37x240 types with IP67 connectors.

The speed optimised coil winding result in a higher possible end speed. Due to the higher end speed, positioning time for long stroke movements may be reduced, especially if the motors are driven with a series E1000 controller with 72V supply. The linear Motors P01-37x240F comes with an IP67 connector on a short (200mm) cable. This makes it conducive to use the motors in applications where the stator is moving; the trailing chain extension cable may be directly connected close to the stator.

Technical properties

Physical dimensions and electrical properties

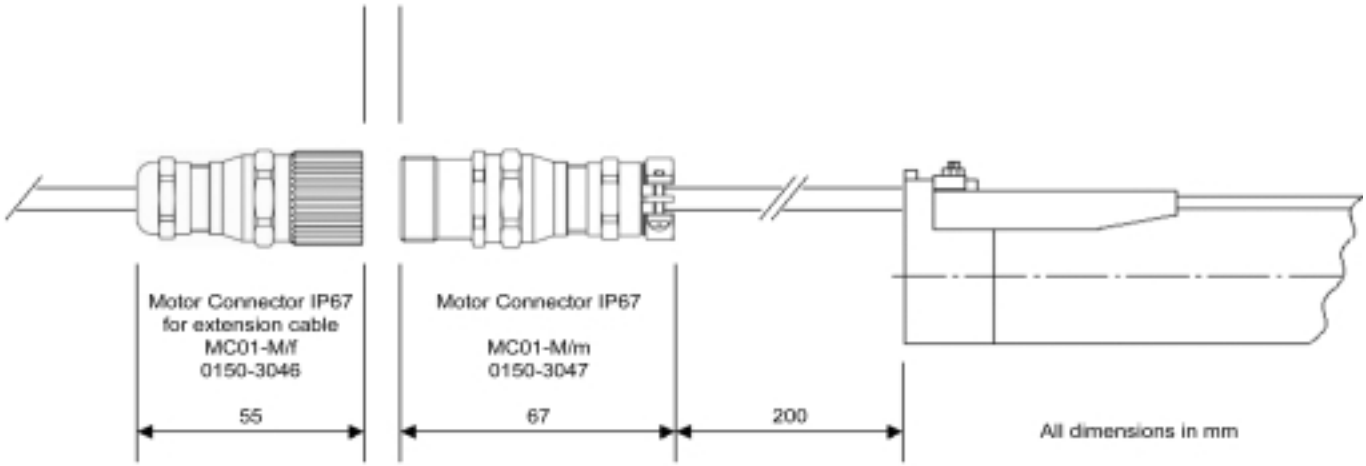
Linear Motor	Stroke		Slider			Electrical properties		
	Max.	SS	Length	Weight	ZP	Max.Motor current		Force constant
						48V DC	72V DC	
	mm	mm	mm	g	mm	A	A	N/A
P01-37x240F/100x100-M	100	100	305	496	65	3.0	6.0	15.0
P01-37x240F/40x160-M	160	40	365	635	95	3.0	6.0	15.0
P01-37x240F/60x260-M	260	60	395	829	75	3.0	6.0	15.0
P01-37x240F/160x360-M	360	160	500	1064	130	3.0	6.0	15.0
P01-37x240F/260x460-M	460	260	600	1297	180	3.0	6.0	15.0
P01-37x240F/360x560-M	560	360	700	1529	230	3.0	6.0	15.0
P01-37x240F/460x660-M	660	460	800	1762	280	3.0	6.0	15.0
P01-37x240F/560x760-M	760	560	900	1994	330	3.0	6.0	15.0
P01-37x240F/660x860-M	860	660	1000	2227	380	3.0	6.0	15.0
P01-37x240F/860x1060-M	1060	860	1200	2692	480	3.0	6.0	15.0
P01-37x240F/1060x1260-M	1260	1060	1400	3157	580	3.0	6.0	15.0
P01-37x240F/1260x1460-M	1460	1260	1600	3622	680	3.0	6.0	15.0

Physical dimensions are identical with the linear motors series P01-37x240.

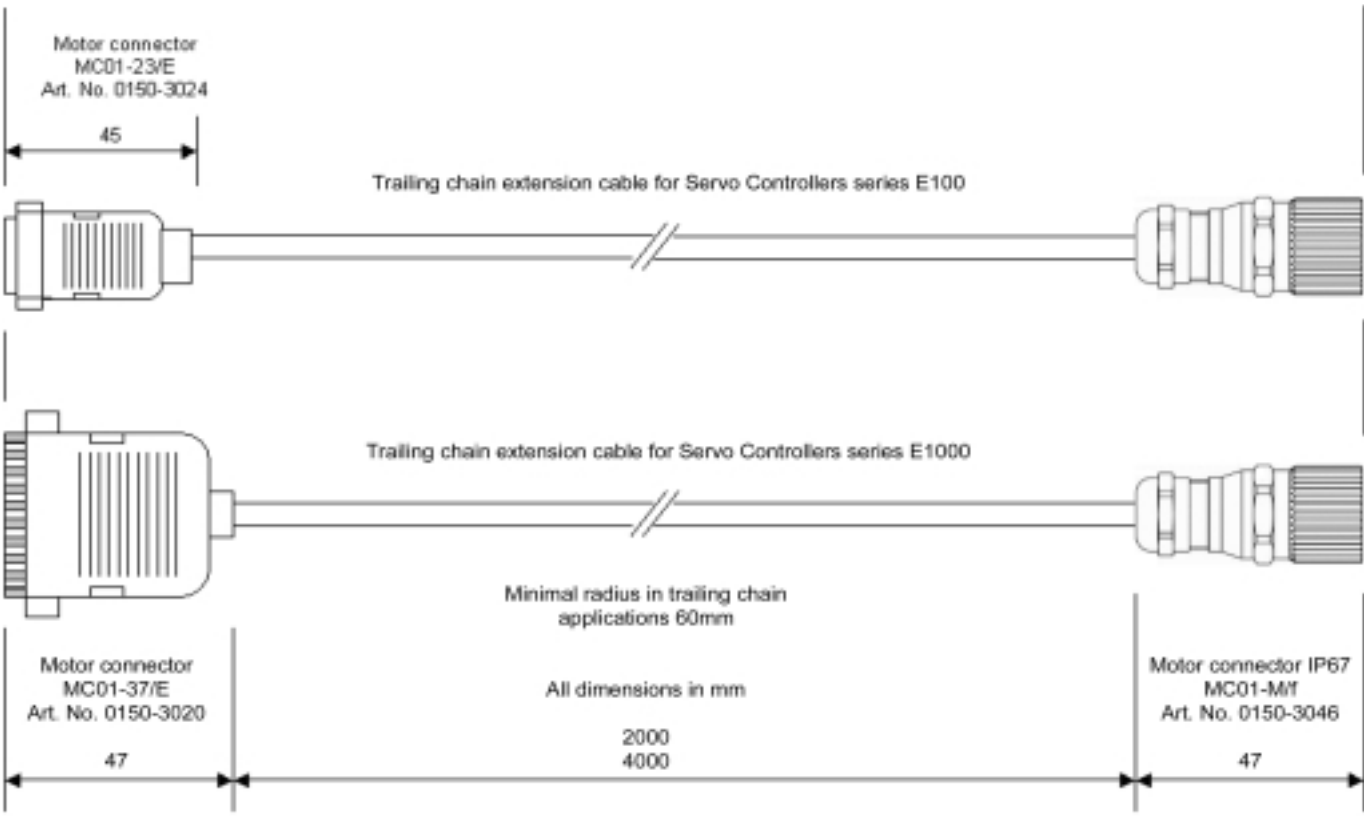
Dynamic properties

Linear Motor	Peak velocity		Force					
			Peak force		Border force		Continuous force	
	48V DC	72V DC	48V DC	72V DC	48V DC	72V DC	Flange	w. Fan
	m/s	m/s	N	N	N	N	N	N
P01-37x240F/100x100-M	2.5	3.8	45	90	26	53	34	61
P01-37x240F/40x160-M	2.1	3.2	64	128	37	75	46	83
P01-37x240F/60x260-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/160x360-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/260x460-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/360x560-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/460x660-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/560x760-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/660x860-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/860x1060-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/1060x1260-M	1.8	2.7	77	154	45	90	55	100
P01-37x240F/1260x1460-M	1.8	2.7	77	154	45	90	55	100

Motor cable | **Linear Motor P01-37x240F/...-M**



Trailing chain cable with IP67 connector



Ordering Information

Linear Motor		Stators			Sliders	
Designation	Art.-No.	Designation	Art.-No.		Designation	Art.-No.
P01-37x240F/100x100-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x305/160	0150-1311
P01-37x240F/40x160-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x365/220	0150-1312
P01-37x240F/60x260-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x392/320	0150-1318
P01-37x240F/160x360-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x500/420	0150-1328
P01-37x240F/260x460-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x600/520	0150-1330
P01-37x240F/360x560-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x700/620	0150-1332
P01-37x240F/460x660-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x800/720	0150-1334
P01-37x240F/560x760-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x900/820	0150-1336
P01-37x240F/660x860-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x1000/920	0150-1338
P01-37x240F/860x1060-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x1200/1120	0150-1340
P01-37x240F/1060x1260-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x1400/1320	0150-1342
P01-37x240F/1260x1460-M	->	PS01-37x240F-M	0150-1213	&	PL01-20x1600/1520	0150-1344
P02-37x240F/100x100-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x305/160	0150-1314
P02-37x240F/40x160-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x365/220	0150-1315
P02-37x240F/60x260-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x392/320	0150-1319
P02-37x240F/160x360-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x500/420	0150-1329
P02-37x240F/260x460-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x600/520	0150-1331
P02-37x240F/360x560-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x700/620	0150-1333
P02-37x240F/460x660-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x800/720	0150-1335
P02-37x240F/560x760-M	->	PS01-37x240F-M	0150-1213	&	PL02-20x900/820	0150-1337

Stators and Sliders must be ordered separately.

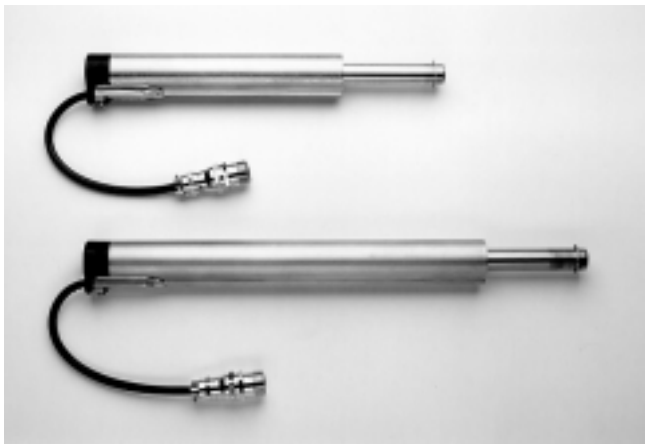
Trailing chain cable with IP67 connectors		
Designation	Description	Art.-No.
KS01-D/M-02	2m trailing chain cable with IP67 connector for Servo Controller series E100	0150-1980
KS01-D/M-04	4m trailing chain cable with IP67 connector for Servo Controller series E100	0150-1981
KS01-P/M-02	2m trailing chain cable with IP67 connector for Servo Controller series E1000	0150-1982
KS01-P/M-04	4m trailing chain cable with IP67 connector for Servo Controller series E1000	0150-1983

Cable and connectors		
Designation	Description	Art.-No.
MC01-M/f	IP67 connector for extension cables (f)	0150-3046
MC01-M/m	IP67 connector of the linear motors (m)	0150-3047
MC01-37/E	Connector (10-pin Phoenix) for Servo Controllers series E1000	0150-3020
MC01-23/E	Connector (9-Pol DSub) for Servo Controllers serie E100	0150-3024
K01-04/05	Motor cable per meter	0150-1920
KS02-04/05	Trailing chain cable per meter	0150-1938

Specification of products are subject to change without notification

Linear Motors with IP67 connector

The stators of the Linear Motor families P01-23x80, P01-23x160, P01-37x120 and P01-37x240 are now available with IP67 connectors. The stators with the round metallic connector may be used directly in rough industrial environment.



The length of the motor cable between stator and connector is 200mm. This makes it easy to use these stators in applications where the stator is moving and the slider is mounted stationary; the high flex extension cables for the use in trailing chains may be connected directly to the motor connector. For Servo Controllers Series E100 and E1000, assembled high flex cables for the use in trailing chains with IP67 connectors are available in different lengths.

Technical properties IP67 connector

Type:	Metallic M23 round connector	No. of pins:	12
Material:	Metall with nickel coating	Contacts:	Gold coated
Protection class:	IP67	Connections:	Solder contacts
Certification:	UL (File Nr. ECBT2.E213337)	Cable diameter	5-10mm
		Temperature range	-40°C ... +125°C

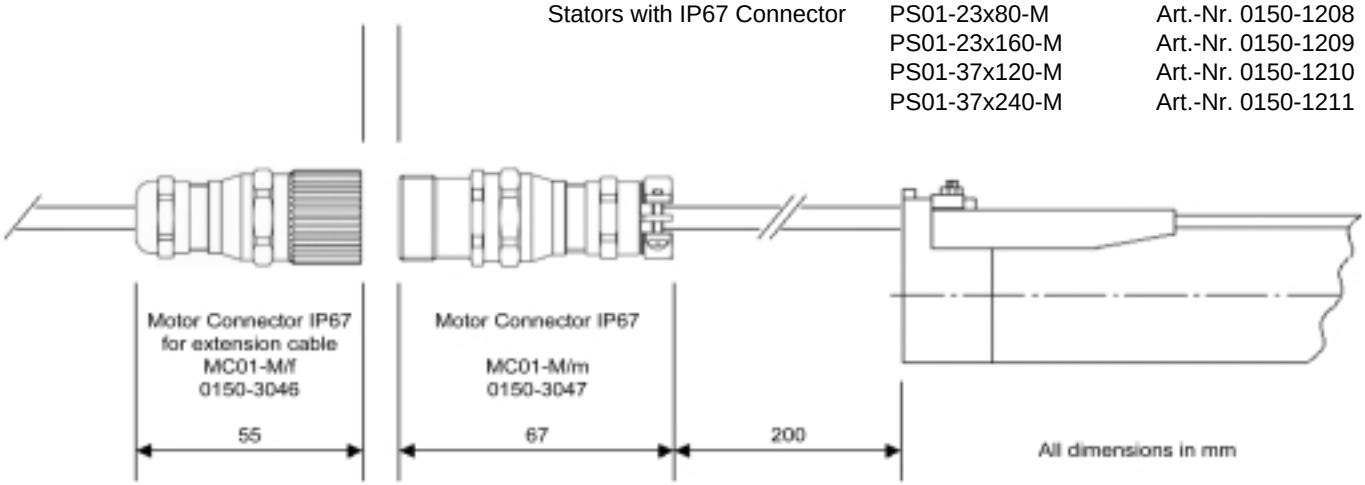
IP67 connector assignment

Pin 1	red	Phase 1+	Pin 7	yellow	Sensor Sinus
Pin 2	pink	Phase 1-	Pin 8	green	Sensor Cosinus
Pin 3	blue	Phase 2+	Pin 9	black	Temp.
Pin 4	grey	Phase 1-	Pin 10	-	-
Pin 5	white	+5V	Pin 11	-	-
Pin 6	inner shield*	GND	Pin 12	-	-
			outer shield on connector housing		

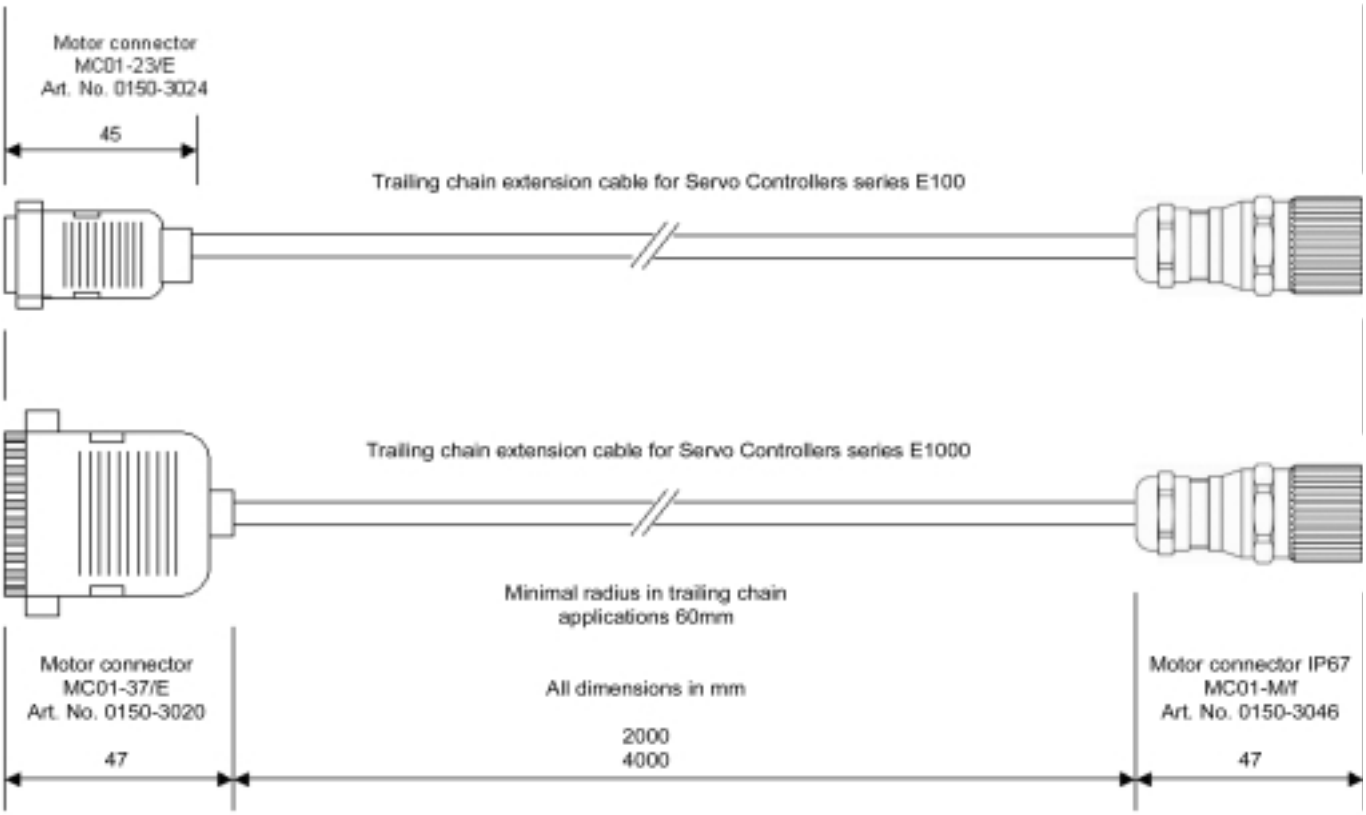
* the inner shield must be connected only to pin 6. It must be isolated from outer shield or connector case.

Motor Cable | **Stator PS01-.....-M**

Stators with IP67 Connector	PS01-23x80-M	Art.-Nr. 0150-1208
	PS01-23x160-M	Art.-Nr. 0150-1209
	PS01-37x120-M	Art.-Nr. 0150-1210
	PS01-37x240-M	Art.-Nr. 0150-1211



Trailing chain motor cable with IP67 connectors



Ordering Information

Linear Motors with IP67 connectors		Stators			Sliders	
Designation	Art.-No.	Description	Art.-No.		Description	Art.-No.
P01-23X80/30x90-M	->	PS01-23x80-M	0150-1208	&	PL01-12x170/120	0150-1301
P01-23X80/50x110-M	->	PS01-23x80-M	0150-1208	&	PL01-12x190/140	0150-1302
P01-23X80/80x140-M	->	PS01-23x80-M	0150-1208	&	PL01-12x270/170	0150-1307
P01-23X80/150x210-M	->	PS01-23x80-M	0150-1208	&	PL01-12x290/240	0150-1320
P01-23X80/210x270-M	->	PS01-23x80-M	0150-1208	&	PL01-12x350/300	0150-1322
P01-23X80/280x340-M	->	PS01-23x80-M	0150-1208	&	PL01-12x420/370	0150-1324
P01-23X160/70x70-M	->	PS01-23x160-M	0150-1209	&	PL01-12x200/100	0150-1305
P01-23X160/40x100-M	->	PS01-23x160-M	0150-1209	&	PL01-12x230/130	0150-1306
P01-23X160/0x140-M	->	PS01-23x160-M	0150-1209	&	PL01-12x270/170	0150-1307
P01-23X160/70x210-M	->	PS01-23x160-M	0150-1209	&	PL01-12x290/240	0150-1320
P01-23X160/130x270-M	->	PS01-23x160-M	0150-1209	&	PL01-12x350/300	0150-1322
P01-23X160/200x340-M	->	PS01-23x160-M	0150-1209	&	PL01-12x420/370	0150-1324
P01-37x120/20x100-M	->	PS01-37x120-M	0150-1210	&	PL01-20x240/160	0150-1346
P01-37x120/80x160-M	->	PS01-37x120-M	0150-1210	&	PL01-20x300/220	0150-1348
P01-37x120/180x260-M	->	PS01-37x120-M	0150-1210	&	PL01-20x395/320	0150-1318
P01-37x120/280x360-M	->	PS01-37x120-M	0150-1210	&	PL01-20x500/420	0150-1328
P01-37x120/380x460-M	->	PS01-37x120-M	0150-1210	&	PL01-20x600/520	0150-1330
P01-37x120/480x560-M	->	PS01-37x120-M	0150-1210	&	PL01-20x700/620	0150-1332
P01-37x120/580x660-M	->	PS01-37x120-M	0150-1210	&	PL01-20x800/720	0150-1334
P01-37x120/680x760-M	->	PS01-37x120-M	0150-1210	&	PL01-20x900/820	0150-1336
P01-37x120/780x860-M	->	PS01-37x120-M	0150-1210	&	PL01-20x1000/920	0150-1338
P01-37x120/980x1060-M	->	PS01-37x120-M	0150-1210	&	PL01-20x1200/1120	0150-1340
P01-37x120/1180x1260-M	->	PS01-37x120-M	0150-1210	&	PL01-20x1400/1320	0150-1342
P01-37x120/1380x1460-M	->	PS01-37x120-M	0150-1210	&	PL01-20x1600/1520	0150-1344
P01-37x240/100x100-M	->	PS01-37x240-M	0150-1211	&	PL01-20x305/160	0150-1311
P01-37x240/40x160-M	->	PS01-37x240-M	0150-1211	&	PL01-20x365/220	0150-1312
P01-37x240/60x260-M	->	PS01-37x240-M	0150-1211	&	PL01-20x395/320	0150-1318
P01-37x240/160x360-M	->	PS01-37x240-M	0150-1211	&	PL01-20x500/420	0150-1328
P01-37x240/260x460-M	->	PS01-37x240-M	0150-1211	&	PL01-20x600/520	0150-1330
P01-37x240/360x560-M	->	PS01-37x240-M	0150-1211	&	PL01-20x700/620	0150-1332
P01-37x240/460x660-M	->	PS01-37x240-M	0150-1211	&	PL01-20x800/720	0150-1334
P01-37x240/560x760-M	->	PS01-37x240-M	0150-1211	&	PL01-20x900/820	0150-1336
P01-37x240/660x860-M	->	PS01-37x240-M	0150-1211	&	PL01-20x1000/920	0150-1338
P01-37x240/860x1060-M	->	PS01-37x240-M	0150-1211	&	PL01-20x1200/1120	0150-1340
P01-37x240/1060x1260-M	->	PS01-37x240-M	0150-1211	&	PL01-20x1400/1320	0150-1342
P01-37x240/1260x1460-M	->	PS01-37x240-M	0150-1211	&	PL01-20x1600/1520	0150-1344

Stators and Sliders must be ordered separately.

Trailing chain motor cable with IP67 connectors		
Designation	Description	Art.-No.
KS01-D/M-02	2m trailing chain cable with IP67 connector for Servo Controller series E100	0150-1980
KS01-D/M-04	4m trailing chain cable with IP67 connector for Servo Controller series E100	0150-1981
KS01-P/M-02	2m trailing chain cable with IP67 connector for Servo Controller series E1000	0150-1982
KS01-P/M-04	4m trailing chain cable with IP67 connector for Servo Controller series E1000	0150-1983

Cable and connectors		
Designation	Description	Art.-No.
MC01-M/f	IP67 connector for extension cables (f)	0150-3046
MC01-M/m	IP67 connector of the linear motors (m)	0150-3047
MC01-73/E	Connector (10-pin Phoenix) for Servo Controllers series E1000	0150-3020
MC01-23/E	Connector (9-Pol DSub) for Servo Controllers serie E100	0150-3024
K01-04/05	Motor cable per meter	0150-1920
KS02-04/05	Trailing chain cable per meter	0150-1938

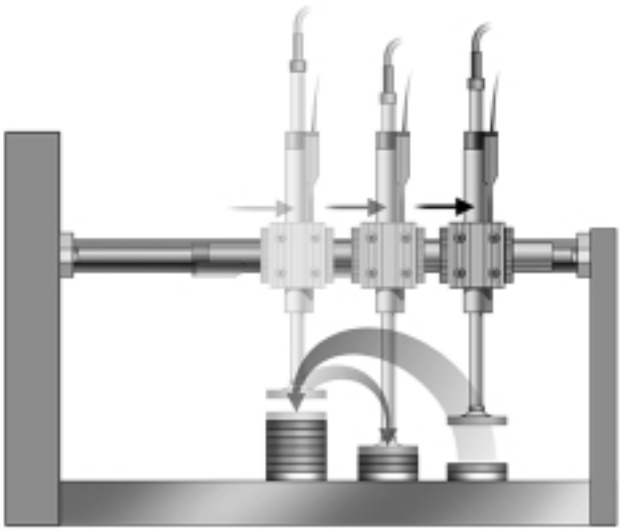
Specification of products are subject to change without notification

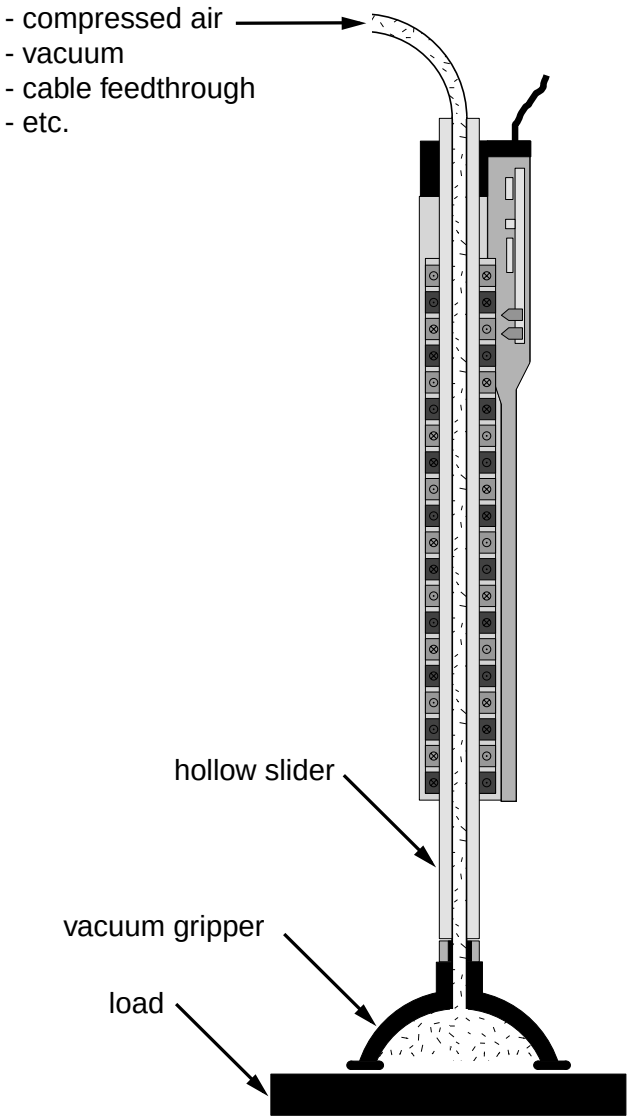
Linear Motors with Hollow Sliders

Series P01-23 and P01-37 linear motors are also available with hollow sliders. These motors have a 4.2mm or 6.5mm diameter concentric hole through the slider. In this way, constructions for handling machines using pneumatic or vacuum gripping devices can be realised in a minimum of space, whereby the linear motor's hollow slider is used for the air or vacuum supply.

If electronic sensors or actors are moved together with the linear motor, their cables can be fed through the slider and connected to the electronics. Expensive and space-wasting constructions for cabling near to the moving parts can thus be avoided.

The mass of the hollow slider is 10% less than the mass of the corresponding standard slider. Apart of the slider mass, the Linear Motors with hollow sliders have the same mechanical dimensions and technical data as the standard types.





Ordering Information

Motor		Spare Parts			
(Stator and Slider)		Stator		Slider	
Description	Art.-No.	Description	Art.-No.	Description	Art.-No.
P01-23x80/150-210-L	->	*PS01-23x80*	0150-1201	*PL01-12x290/240-L*	0150-1363
PL01-23x160/70x210-L	->	*PS01-23x160*	0150-1202	*PL01-12x290/240-L*	0150-1363
P01-37x120/20x100-L	0150-1175	*PS01-37x120*	0150-1204	*PL01-20x240/160-L*	0150-1350
P01-37x120/80x160-L	0150-1176	*PS01-37x120*	0150-1204	*PL01-20x300/220-L*	0150-1351
P01-37x120/180x260-L	0150-1177	*PS01-37x120*	0150-1204	*PL01-20x395/320-L*	0150-1354
P01-37x240/100x100-L	0150-1178	*PS01-37x240*	0150-1203	*PL01-20x305/160-L*	0150-1352
P01-37x240/40x160-L	0150-1179	*PS01-37x240*	0150-1203	*PL01-20x365/220-L*	0150-1353
P01-37x240/60x260-L	0150-1180	*PS01-37x240*	0150-1203	*PL01-20x395/320-L*	0150-1354

Specification of products are subject to change without notification

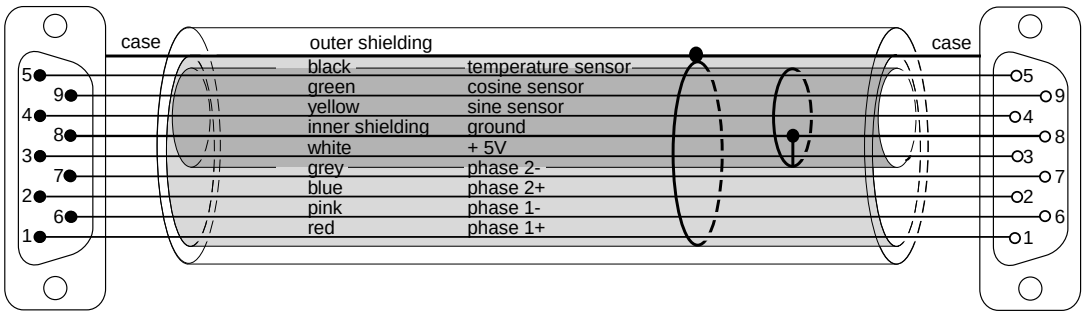
Motor Cable

Extension cables tailored for use with LinMot P Linear Motors are available in two different versions; standard and high flex for the use in trailing chains or cable tracks. Both versions have separate shielding for the motor power wires and the sensor wires. This guarantees a fault-free operation of the linear motors for a total possible cable length of up to 50m (see annexe).

Standard cable for customized motor cables is also available per m or on rolls of 50m, 100m and 200m. Trailing chain cable is also available per m or on rolls of 100m.

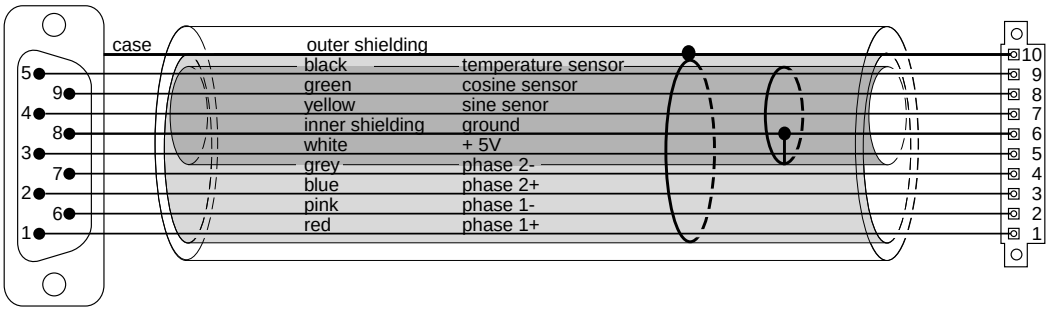
Tailored extension cables with special lengths up to 50m are available on demand.

Motor Cable: E100 - P01-23x...



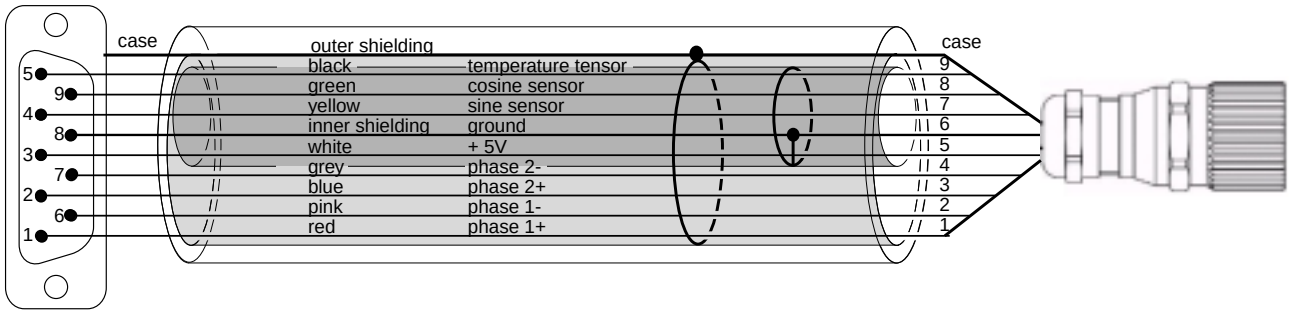
servo controller series 100	D-Sub9 pin (m) MC01-23/E 0150-3024	Standard extension cable series K01-04/05 Art.:0150-1920 High flex (trailing chain) cable series KS02-04/05 Art.:0150-1938	D-Sub9 pin (f) MC01-23/P 0150-3025	linear motors series P01-23

Motor Cable: E100 - P01-37x...



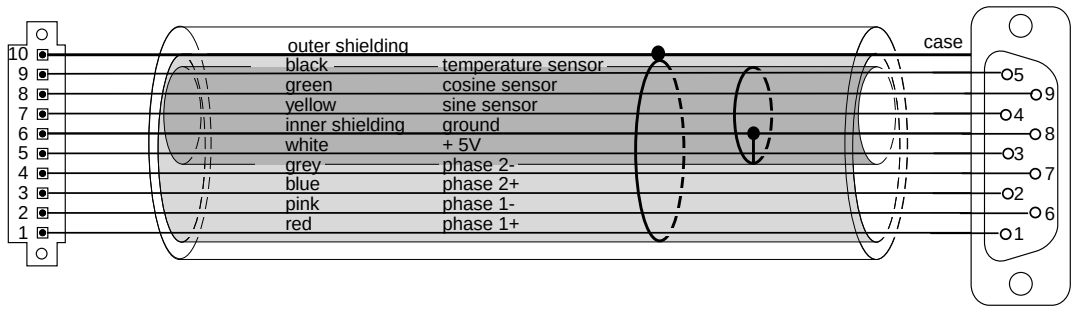
servo controller series 100	D-Sub9 pin (m) MC01-23/E 0150-3024	Standard extension cable series K01-04/05 Art.:0150-1920 High flex (trailing chain) cable series KS02-04/05 Art.:0150-1938	Phoenix MC1,5/10-STGF-3,81 MC01-37/P Art.:0150-3021	linear motors series P01-37

Motor Cable: E100 - P01-... with IP67 connector



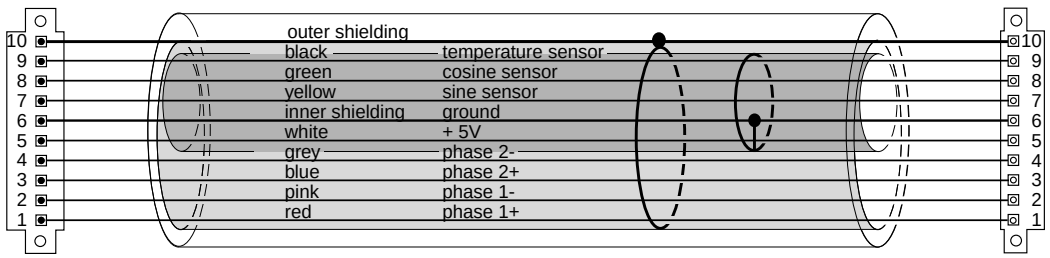
servo controller series 100	D-Sub9 pin (m) MC01-23/E 0150-3024	Standard extension cable series K01-04/05 Art.:0150-1920 High flex (trailing chain) cable series KS02-04/05 Art.:0150-1938	IP67 connector MC01-M/f Art.: 0150-3046	linear motors series P01-.-M

Motor Cable: E1000 - P01-23x...



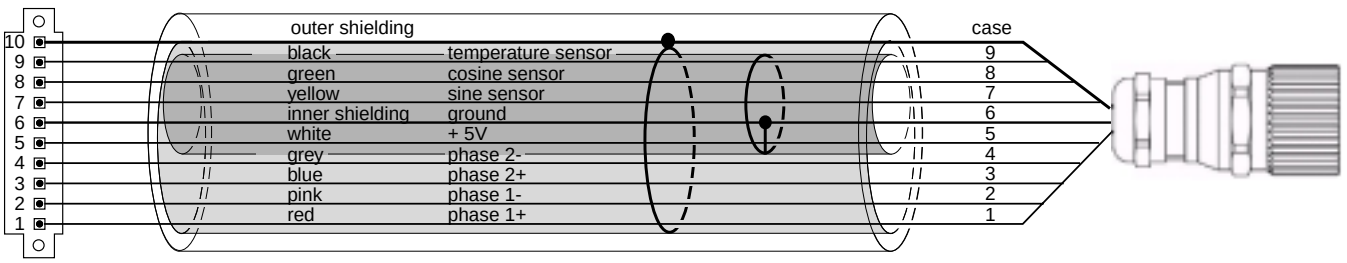
servo controller serie 1000	Phoenix MC1,5/10-STF-3,81 MC01-37/E Art.:0150-3020	Standard extension cable series K01-04/05 Art.:0150-1920 High flex (trailing chain) cable series KS02-04/05 Art.:0150-1938	D-Sub9 pin (f) MC01-23/P 0150-3025	linear motors series P01-23

Motor Cable: E1000 - P01-37x...



servo controller serie 1000	Phoenix MC1,5/10-STF-3,81 MC01-37/E Art.:0150-3020	Standard extension cable series K01-04/05 Art.:0150-1920 High flex (trailing chain) cable series KS02-04/05 Art.:0150-1938	Phoenix MC1,5/10-STGF-3,81 MC01-37/P Art.:0150-3021	linear motors series P01-37

Motor Cable: E1000 - P01... with IP67 connector



servo controller serie 1000	Phoenix MC1,5/10-STF-3,81 MC01-37/E Art.:0150-3020	Standard extension cable series K01-04/05 Art.:0150-1920 High flex (trailing chain) cable series KS02-04/05 Art.:0150-1938	IP67 connector MC01-M/f Art.: 0150-3046	linear motors series P01-.-M

Technical data

Cable type	K01-04/05	KS02-04/05
Diameter	8mm	8.9mm
Weight	83kg/km	96kg/km
Temperature range	-40°C bis + 80°C	-40°C bis + 80°C
Outer cable cladding	PUR (TPE-U base)	PUR (TPE-U base)
Inner cable cladding and isolation	PVC	PUR (TPE-E base)
Colour	Black RAL 9005	Black RAL 9005
Minimal bending radius (moving)	-> use KS02-04/05	60mm, no twisting

Attention:
- The standard motor cable K01-04/05 must not be used in applications where the cable is moving.
- The motor cable attached to the stator must be fixed stationary and not be used in segments of the motor cabling that are moving.
- For the use in cable tracks or trailing chains, the motor cable KS01-04/05 must be used.
- Wiring of customized motor cables must be checked carefully before connected to the Servo controller or Linear Motor. Wrong or carelessly wired motor cable may damage Linear Motors and/or Servo Controllers.

Ordering Information

Motor cable for Servo Controllers series E100

Designation	Description	Art.-No.
K01-23/02	Extension cable 2m for Linear Motors P01-23x...	0150-1910
K01-23/04	Extension cable 4m for Linear Motors P01-23x...	0150-1911
K01-23/06	Extension cable 6m for Linear Motors P01-23x...	0150-1912
K01-23/08	Extension cable 8m for Linear Motors P01-23x...	0150-1913
KS02-23/02	Trailing chain cable 2m for Linear Motors P01-23x...	0150-1988
KS02-23/04	Trailing chain cable 4m for Linear Motors P01-23x...	0150-1989
KS01-D/M-02	Trailing chain cable 2m with IP67 connector	0150-1980
KS01-D/M-04	Trailing chain cable 4m with IP67 connector	0150-1981
AC01-100/37	Adapter cable 0.25m for Linear Motors P01x-37...	0150-1921
AC01-100/37x200	Adapter cable 2m for Linear Motors P01x-37...	0150-1949
AC01-100/37x400	Adapter cable 4m for Linear Motors P01x-37...	0150-1995
AC01-100/37x600	Adapter cable 6m for Linear Motors P01x-37...	0150-1994

special length on demand

Motor cable for Servo Controllers series E1000

Designation	Description	Art.-No.
K01-37/02	Extension cable 2m for Linear Motors P01-37x...	0150-1915
K01-37/04	Extension cable 4m for Linear Motors P01-37x...	0150-1916
K01-37/06	Extension cable 6m for Linear Motors P01-37x...	0150-1917
K01-37/08	Extension cable 8m for Linear Motors P01-37x...	0150-1918
KS02-37/02	Trailing chain cable 2m for Linear Motors P01-37x...	0150-1990
KS02-37/04	Trailing chain cable 4m for Linear Motors P01-37x...	0150-1991
KS01-P/M-02	Trailing chain cable 2m with IP67 connector	0150-1982
KS01-P/M-04	Trailing chain cable 4m with IP67 connector	0150-1983
AC01-1000/23	Adapter cable 0.4 m for Linear Motors P01x-23...	0150-1922

special length on demand

Cable and connectors

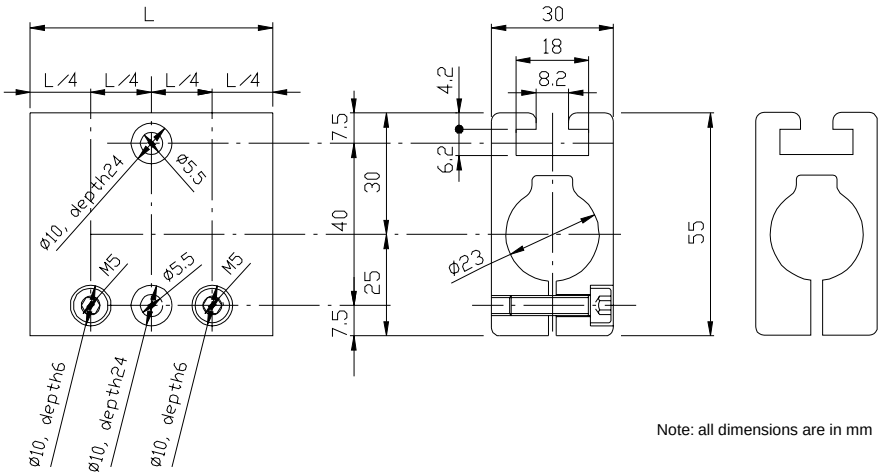
Designation	Description	Art.-No.
K01-04/05	Motor cable (per m)	0150-1920
K01-04/05-50	Motor cable (50m)	0150-1956
K01-04/05-100	Motor cable (100m)	0150-1957
K01-04/05-200	Motor cable (200m)	0150-1958
KS02-04/05	Trailing chain cable (per m)	01501938
KS02-04/05-100	Trailing chain cable (100m)	0150-1959
MC01-23/E	Motor connector DSUB9 (m) for Servo Controllers series E100	0150-3024
MC01-23/P	Motor connector DSUB 9 (f) for Linear Motors P01-23x...	0150-3025
MC01-37/E	Motor connector (Phoenix) for Servo Controllers series E1000	0150-3020
MC01-37/P	Motor connector (Phoenix) for Linear Motors P01-37x...	0150-3021
MC01-M/f	Motor connector IP67 for extension cables	0150-3046
MC01-M/m	Motor connector IP67 on Linear Motors	0150-3047

Flanges

The PF01 flanges facilitate installation of the linear motors *LinMot*® P. Using these flanges gives the best mechanical support and the best thermal conductivity. They may be either screwed straight onto a support or mounted with a T-slot.

Longer flanges assure better cooling of the linear motors. The clamping plate design allows speedy and simple changing of linear motors without dismantling the flanges.

PHYSICAL DIMENSIONS PF01-23x...

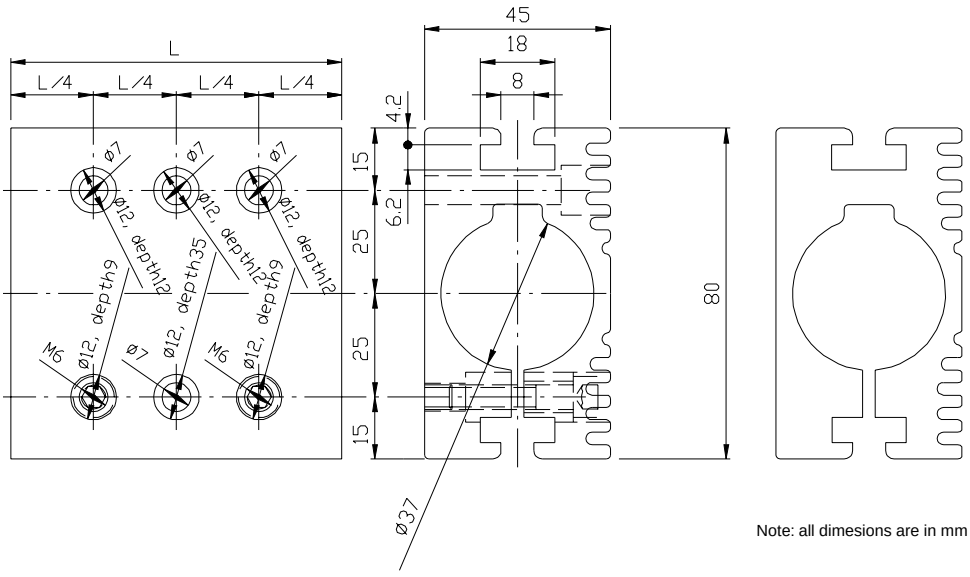


Note: all dimensions are in mm

Max. torque for clamp plate screws: 200Ncm (1.475 lbf ft)

Clamp plate screws M5x16

PHYSICAL DIMENSIONS PF01-37x...



Note: all dimesions are in mm

Max. torque for clamp plate screws: 200Ncm (1.475 lbf ft)

Clamp plate screws M6x24

Ordering Information

Flanges	Used with *LinMot*® P linear drives	Length L	Material, weight	Art. No.
PF01-23x50	P..-23x80	50mm (1.9in)	Aluminium, 120g (0.26lb)	0150-1901
PF01-23x120	P..-23x160	120mm (4.7in)	Aluminium, 306g (0.67lb)	0150-1902
PF01-37x100	P..-37x120	100mm (3.9in)	Aluminium, 507g (1.12lb)	0150-1903
PF01-37x200	P..-37x240	200mm (7.9in)	Aluminium,1020g (2.25lb)	0150-1904

Specification of products are subject to change without notification

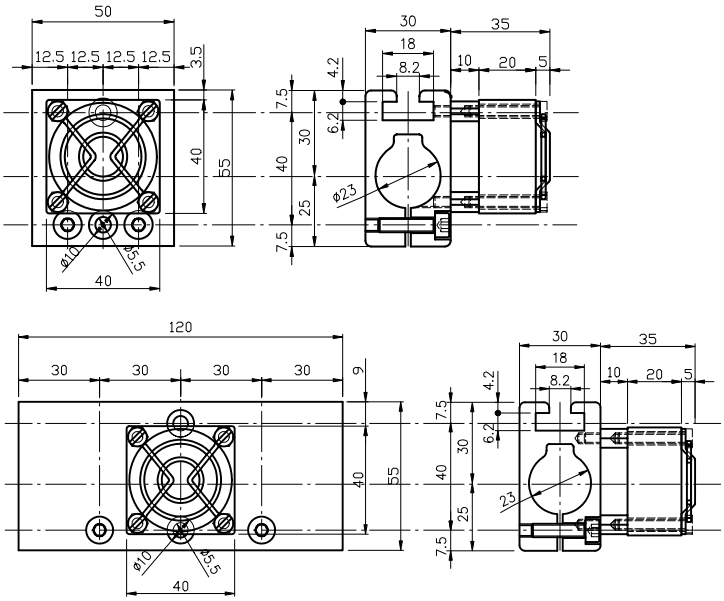
Flanges with fan

The *LinMot*® range of flanges PF01-...-F consist of the standard flange PF01 and an integrated fan (24V DC supply voltage). Because of the effect of forced air cooling, the continuous force Fc of the linear motors can be increased by a factor of 1.8 compared to the performance of the motor without the fan (see data sheets).

Motor type	Used flange type	Continuous Force F_C at 20°C environment temperature
P..-23x80	PF01-23x50-F	16 N (3.6 lbf)
P..-23x160*	PF01-23x120-F	31 N (7.0 lbf)
P..-37x120	PF01-37x100-F	54 N (12.1 lbf)
P..-37x240**	PF01-37x200-F	100 N (22.5 lbf)

* for P..-23x160/70x70: Fc=16N; P..-23x160/40x100: Fc=22N
**for P..-37x240/100x100: Fc=61N; P..-37x240/40x160: Fc=83N

PHYSICAL DIMENSIONS PF01-23x...-F



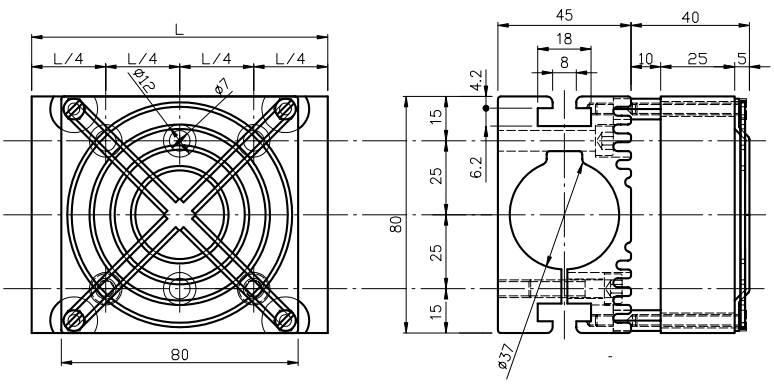
Max. torque for clamp plate screws: 200Ncm (1.475 lbf ft)

Supply: 24V DC, 67mA
Air flow: 13.5m^3/h

Clamp plate screws M5x16

Note: all dimensions are in mm

PHYSICAL DIMENSIONS PF01-37x...-F



Max. torque for clamp plate screws: 200Ncm (1.475 lbf ft)

Supply: 24V DC, 117mA
Air flow: 79m^3/h

Clamp plate screws M6x24

Note: all dimensions are in mm

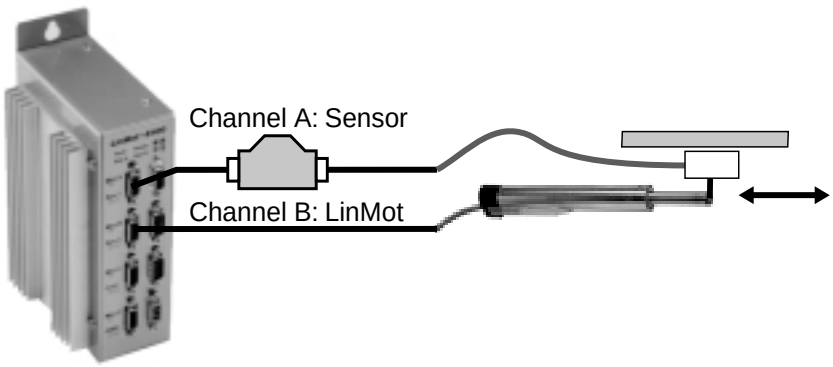
Ordering Information

Flanges	Used with *LinMot*® P linear drives	Length L	Weight	Art. No.
PF01-23x50-F	P..-23x80	50mm (1.9in)	175 (0.39lb)	0150-1971
PF01-23x120-F	P..-23x160	120mm (4.7in)	361 (0.80lb)	0150-1972
PF01-37x100-F	P..-37x120	100mm (3.9in)	647 (1.43lb)	0150-1973
PF01-37x200-F	P..-37x240	200mm (7.9in)	1160g (2.55lb)	0150-1974

Specification of products are subject to change without notification

Option: external Sensors

External sensors can be employed for very exact positioning tasks where the repeatability or linearity of the built-in position sensors is not adequate.



In order to make measurements and collect position information, an external sensor is guided along a rule (magnetic band) and samples distance information in a completely contact-free manner. Because of its sturdiness even in the most difficult environments and its insensitivity to practically all forms of soiling and wear, the magnetic method for measuring distances is superior to conventional methods in many applications. The band is glued onto the machine using a simple adhesive mounting and is mechanically protected by a stainless steel covering band.

PRECISION CLASSES

Sensor with 1mm Pole Separation

Rule linearity error: ± 10 µm/m

resolution	stroke range	repeatability
19.53 µm (20mm/2^10)	1260 mm	± 80 µm
9.77 µm (20mm/2^11)	630 mm	± 50 µm
4.88 µm (20mm/2^12)	315 mm	± 30 µm
2.44 µm (20mm/2^13)	157.5 mm	± 20 µm
1.22 µm (20mm/2^14)	78.75 mm	± 10 µm

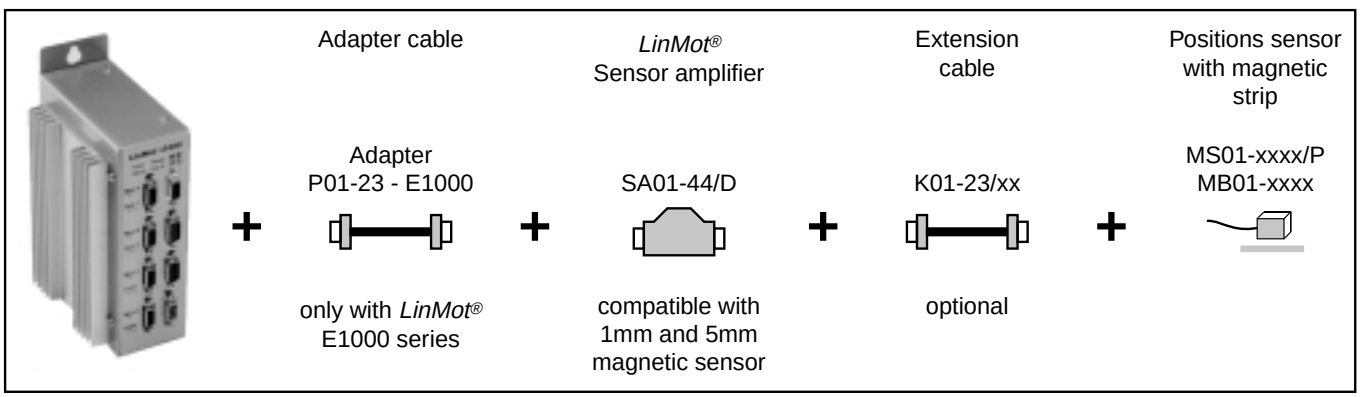
Sensor with 5mm Pole Separation

Rule linearity error: ± 30 µm/m

resolution	stroke range	repeatability
19.53 µm (20mm/2^10)	1260 mm	± 100 µm
9.77 µm (20mm/2^11)	630 mm	± 70 µm
4.88 µm (20mm/2^12)	315 mm	± 40 µm

CONNECTION TO *LinMot*® SERVO CONTROLLER

An external sensor can be connected directly to a motor channel of the *LinMot*® servo controller. The linear motor belonging to it is connected to the next motor channel. A linear motor with an external sensor can be operated using a two-channel servo controller (2 linear motors with external sensors need a four-channel servo controller).

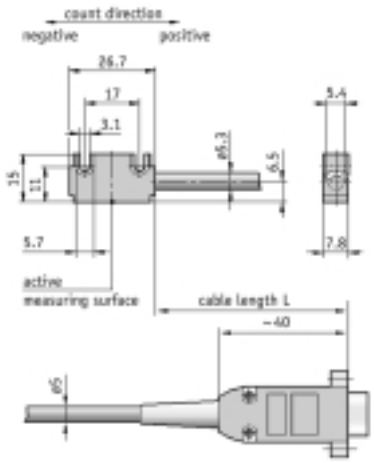


MOUNTING

The external sensor is fitted using two screws. The sensor cable must be laid such that there is no danger of damage by pulling or by other parts of the machine. A cable-track cable or a protective tube should be used and strain relief provided.
The magnetic band must be mounted plane on the mounting surface on the stretch to be measured. Waviness reduces the exactness of measurement. When mounting, a minimum distance of 40mm between magnetic band and slider must be observed.

MAGNETSENSOR MS01

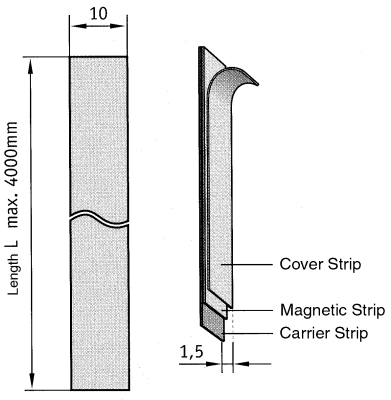
Characteristic	Technical Data	Remarks
Construction	Anodised aluminium	
Cable length	2m	suitable for cable track min. bending radius 40mm
Positioning	free choice	
Cennoctor	9-pole D-SUB	
Distance band / sensor	0.1 - 0.4mm 0.1 - 2.1mm	for 1mm pole separation for 5mm pole separation
Working temperature	-20...70°C	
Storage temperature	-20...85°C	
Protection	IP 67	
Mounting type	Screw mounting	



MAGNETIC BAND MB01

The base material is magnetised at defined intervals and permanently bonded to a carrier strip. For mounting purposes, a special adhesive strip is already fitted. An additional covering band in stainless steel is also supplied.

Characteristic	Technical Data	Remarks
Length	in meters, up to 100m in meters, up to 4m	for 1mm pole separation for 5mm pole separation
Width	10mm	
Carrier material	spring steel band	
Accuracy	± 10 µm/m ± 30 µm/m	for 1mm pole separation for 5mm pole separation
Temperature coefficient	(11 ± 1) x 10^{-6} / °K	
Working temperature	-20...70°C	
Storage temperature	-40...70°C	
Protection	IP 67	
Mounting type	Adhesive	special pre-mounted adhesive band



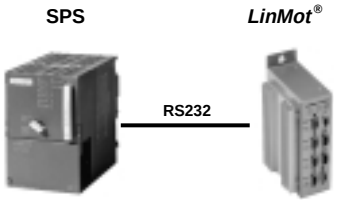
Caution: The magnetic band must at both ends be 25mm longer than the working section.

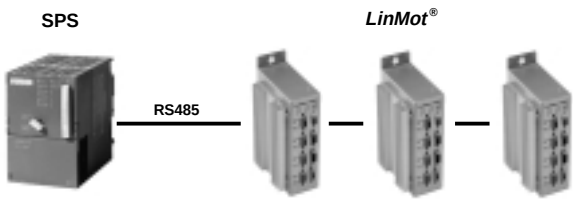
Ordering InformationOrdering Information

Designation	Description	Art. No.
SA01-44/D	Sonsor amplifier for external sensors	0150-1961
MS01-1000/P	Magnetic sensor 1mm	0150-1962
MB01-1000	Magnetic band 1mm pole separation (Ordering unit 1cm)	0150-1963
MS01-5000/P	Magnetic sensor 5mm	0150-1964
MB01-5000	Magnetic band 5mm pole separation (Ordering unit 1cm)	0150-1965

Specification of products are subject to change without notification

ASCII Protocol for RS232/RS485





ASCII commands							
	Value	Set Command	Get Command	LinMot	Stepper	Magnet	System
Set Commands	Increment demand position	!IP	—	✘	✘		
	Increment demand position on next trigger	!TI	—	✘	✘		
	Set demand position on next trigger	!TP	—	✘	✘	✘	
	Run motion profile	!RC	—	✘	✘	✘	
	Run motion profile on next trigger	!TC	—	✘	✘	✘	
	Run motion profile cyclic	!CC	—	✘	✘	✘	
	Run motion profile cyclic on next trigger	!CT	—	✘	✘	✘	
	Stop cyclic motion profile	!CS	—	✘	✘	✘	
	Move home position	!MH	—	✘	✘		
	Redefine position	!RP	—	✘	✘		
	Redefine position to zero	!ZD	—	✘	✘		
Get/Set Commands	Demand position	!SP	!GD	✘	✘	✘	
	FF Acceleration	!DA	!EA	✘			
	FF Deceleration	!DB	!EB	✘			
	FF Friction	!DF	!EF	✘			
	P value of controller	!DP	!EP	✘			
	D value of controller	!DD	!ED	✘			
	I value of controller	!DI	!EI	✘			
	Maximal speed	!SV	!GV	✘	✘		
	Maximal acceleration	!SA	!GA	✘	✘		
	Maximal current	!SC	!GC	✘	✘	✘	
	Current offset	!DK	!GK	✘			
	Motion profile amplitude	!DC	!EC	✘	✘	✘	
	Motion profile offset	!DO	!EO	✘	✘	✘	
	Motion profile speed	!DS	!ES	✘	✘	✘	
	FREEZE flag	!SF	!GX	✘	✘	✘	✘
	INIT flag / **RUN** flag / **STOP** flag	!SI / !SR / !SS	!GX				✘
Get Commands	Actual current	—	!AC	✘			
	Actual position	—	!GP	✘	✘	✘	
	Position resolution	—	!PI	✘	✘	✘	
	Speed resolution	—	!VI	✘	✘		
	Acceleration resolution	—	!AI	✘	✘		
	Current resolution	—	!CI				✘
	State	—	!GS				✘
	Global error status	—	!GE				✘
	Global warn status	—	!GW				✘
	Motor error status	—	!EE	✘	✘	✘	
	Motor warn status	—	!EW	✘	✘	✘	
	State flags	—	!EX				✘
	Protocol version	—	!PV				✘

Command structure		
Byte	**Value**	**Meaning**
0	'!'	Command head
1...2	char, char	Command
3...x	[char], …	Arguments
x+1	'↵' (0xD)	End of command

Every command begins with an exclamation mark, followed by two characters coding the command, then the command arguments and finally a carriage return symbol.

Acknowledge structure		
Byte	**Value**	**Meaning**
0	'#'	Acknowledge head
1...x	char, ...	Acknowledge message
x+1	'↵' (0xD)	End of acknowledge

Every command received on the *LinMot*® servo controller is acknowledged. A further command may be sent only if the last one has been acknowledged by the servo controller.

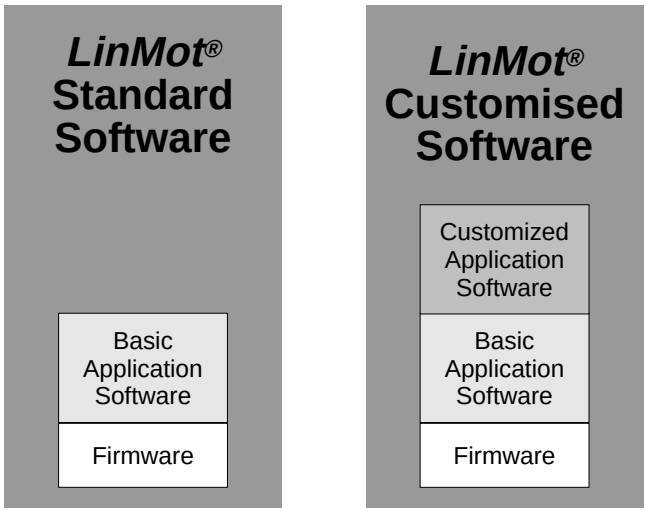
Example		
Direction	**ASCII-sequence**	**Description**
PC -> *LinMot*® servo Controller	'!SP2000A' + 0xD	Sets the demand position of motor A to 2000 increments.
LinMot® servo Controller -> PC	'#' + 0xD	When the '#'-symbol is transmitted, this means the command has been accepted by the *LinMot*® servo controller.

Application Software

The *LinMot*® servo controller's software concept allows customer-specific functional extensions to be integrated in the form of application software. The extensions are delivered as a software package and can be installed by the user on the servo controllers.

LinMot® offers some extensions free of charge. These extensions can be installed on Multi Trigger, Device Net or PROFIBUS-DP servo controllers. After installing these applications, the required interfaces and functions are available in the servo controllers.

The applications can be downloaded from the *LinMot*® website or obtained as a set of diskettes

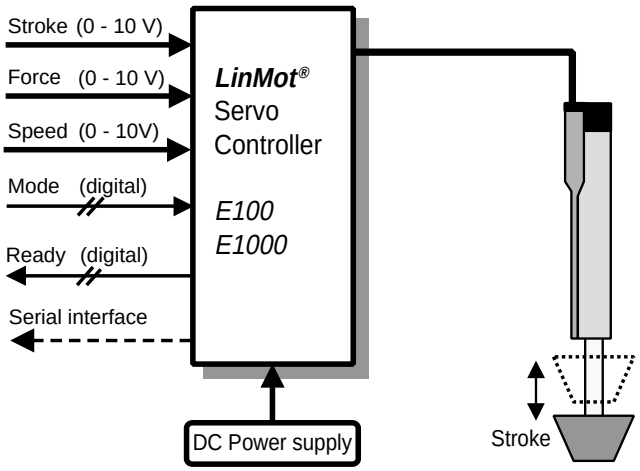


Example: Application software for tampon printing and labelling machines

Using the application software for printing and labelling machines, the possibilities of special, application-specific adaptations can be demonstrated.

LinMot P linear motors are ideally suited for fast and flexible printing (tampon-printing) and the fixing of sticky labels. Thanks to the linear motors, new possibilities are available both in terms of technical performance and in user comfort.

System overview
The printing and labelling module consists of one or more cylindrical linear motors and their electronic control system. The printing head is either directly mounted on the slider of the linear motor or on a parallel guide rod. The linear motor is connected to the electronic controller via a single, multi-wire cable. The system is controlled via either analogue or digital interfaces.



Configuration possibilities
In the simplest application, the process parameters stroke, speed and pressure applied can be continuously adjusted during operation using analogue set-point signals. Using digital input signals, one can switch between different motion profiles. All parameters can be defined digitally via serial or PROFIBUS-DP interfaces or, in more complex installations, by overlaid control systems.

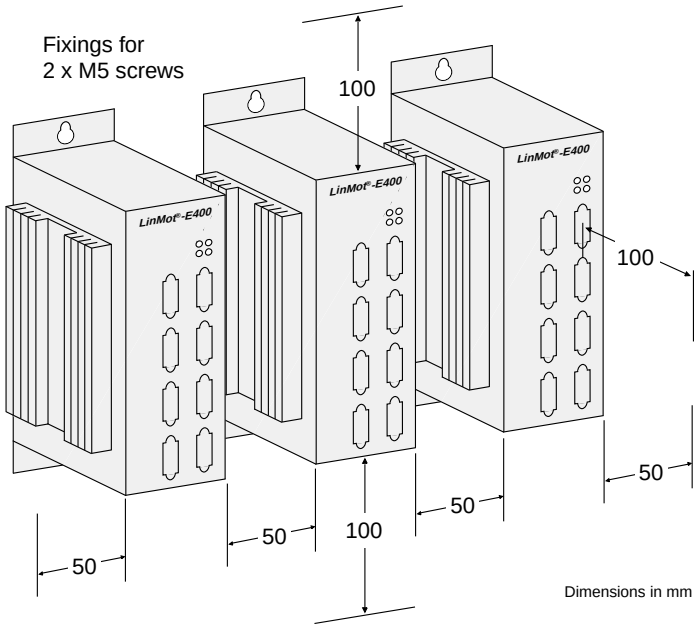
Advantages
In comparison with conventional solutions, the following advantages are available:

- Easy adjustment of stroke
- Continuous speed control
- Adjustment of applied pressure
- Choice of different programmed motion profiles
- Up to 20,000 strokes per hour
- Entirely electrical drives (no compressed air)
- Absolutely reproducible movement sequences (closed loop servo system)
- Control either by simple potentiometer or via digital interfaces.

Installation guidelines for Servo Controllers

The servo controller should be mounted in a cabinet with two M5 screws on the back side. For sufficient cooling the servo controllers have to be mounted vertically in the cabinet respecting the minimal distances according to the drawings. The two dedicated mounting holes on the back side allows easy mounting and removing of the controllers.

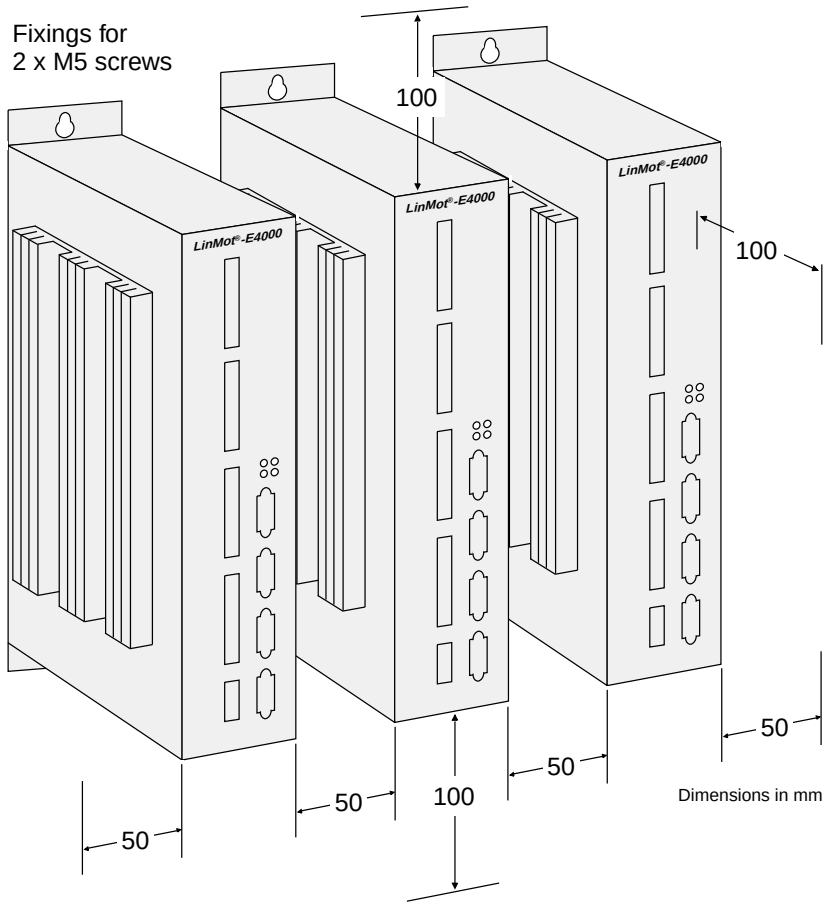
Minimal distances servo controller Series E100



Maximal power dissipation

E100	22W
E200	38W
E400	70W

Minimal distances servo controller Series E1000.



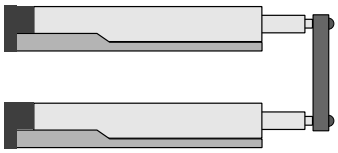
Maximal power dissipation

E1000	55W
E2000	95W
E4000	175W

Master-Booster / Master-Gantry

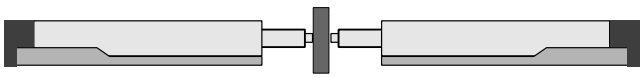
Master-Booster Mode

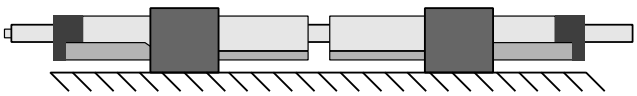
For applications where the peak force of one linear motor is not sufficient, forces of up to 800N can delivered using the Master / Booster mode of operation. Master / Booster operation allows two to four linear motors to be operated in parallel.



Principle of operation

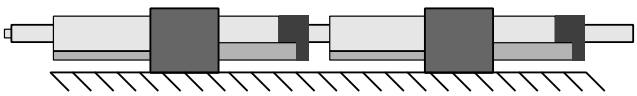
In Master / Booster operation, the linear motors' sliders or the stators are permanently coupled to each other using a mechanical construction. The servo controller sends the master linear motor the required positional set-point. The windings of the booster linear motors are fed with the same amount of current as the master motor. In this way, all the linear motors develop equal force.





Configuration

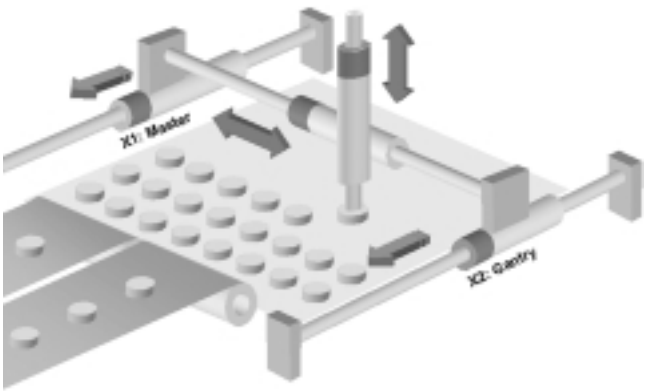
Various arrangements are possible for the parallel operation of linear motors.



Master-Gantry Mode

Two, three or four Linear Motors may run in the Master-Gantry-Mode if the motors are mounted with a long distance to each other and no stiff construction free of mechanical play may be realised.

Each Linear Motor in a Master-Gantry configuration has still his own position controller working independently from the others. But all the Master-Gantry axes will be feed with the same set value for positioning. This makes it easier for the overlaid control, as only one set position has to be sent to the LinMot Servo Controller to control up to four motors.



Electrical and thermal characteristics

PS01-23x80

Max. current @ 24V	I_{max}	[A]	2
Max. current @ 48V	I_{max}	[A]	3
Max. current @ 72V	I_{max}	[A]	4
Force constant	c_F	[N/A]	11
Motor constant	c_M	[N/√W]	3.5
Phase resistance @ 25°C	R_{PH}	[Ω]	10
Phase resistance @ 80°C	R_{PH}	[Ω]	12
Inductance	L_{PH}	[mH]	1.5
Electrical time constante	τ_{el}	[µs]	150
Max. coil temperature	ϑ_w	[°C	80
Thermal resistance *	R_{th}	[K/W]	9.5

PS01-23x160

Max. current @ 24V	I_{max}	[A]	1
Max. current @ 48V	I_{max}	[A]	2
Max. current @ 72V	I_{max}	[A]	2.8
Force constant	c_F	[N/A]	22
Motor constant	c_M	[N/√W]	4.9
Phase resistance @ 25°C	R_{PH}	[Ω]	20
Phase resistance @ 80°C	R_{PH}	[Ω]	24
Inductance	L_{PH}	[mH]	3
Electrical time constante	τ_{el}	[µs]	150
Max. coil temperature	ϑ_w	[°C	80
Thermal resistance *	R_{th}	[K/W]	5.5

PS01-37x120

Max. current @ 24V	I_{max}	[A]	3.4
Max. current @ 48V	I_{max}	[A]	6
Max. current @ 72V	I_{max}	[A]	6
Force constant	c_F	[N/A]	20
Motor constant	c_M	[N/√W]	8
Phase resistance @ 25°C	R_{PH}	[Ω]	5.8
Phase resistance @ 80°C	R_{PH}	[Ω]	7
Inductance	L_{PH}	[mH]	3.5
Electrical time constante	τ_{el}	[µs]	600
Max. coil temperature	ϑ_w	[°C	80
Thermal resistance *	R_{th}	[K/W]	7.8

PS01-37x240

Max. current @ 24V	I_{max}	[A]	1.7
Max. current @ 48V	I_{max}	[A]	3.4
Max. current @ 72V	I_{max}	[A]	5
Force constant	c_F	[N/A]	40
Motor constant	c_M	[N/√W]	11.7
Phase resistance @ 25°C	R_{PH}	[Ω]	11.6
Phase resistance @ 80°C	R_{PH}	[Ω]	14
Inductance	L_{PH}	[mH]	7
Electrical time constante	τ_{el}	[µs]	600
Max. coil temperature	ϑ_w	[°C	80
Thermal resistance *	R_{th}	[K/W]	4.3

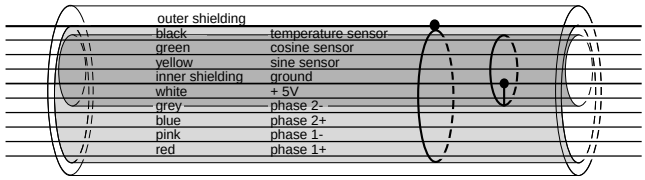
PS01-37x240-F

Max. current @ 24V	I_{max}	[A]	4
Max. current @ 48V	I_{max}	[A]	6
Max. current @ 72V	I_{max}	[A]	6
Force constant	c_F	[N/A]	25.6
Motor constant	c_M	[N/√W]	11.7
Phase resistance @ 25°C	R_{PH}	[Ω]	4.8
Phase resistance @ 80°C	R_{PH}	[Ω]	5.8
Inductance	L_{PH}	[mH]	2.8
Electrical time constante	τ_{el}	[µs]	600
Max. coil temperature	ϑ_w	[°C	80
Thermal resistance *	R_{th}	[K/W]	4.3

* without flange

Long Motor Cables

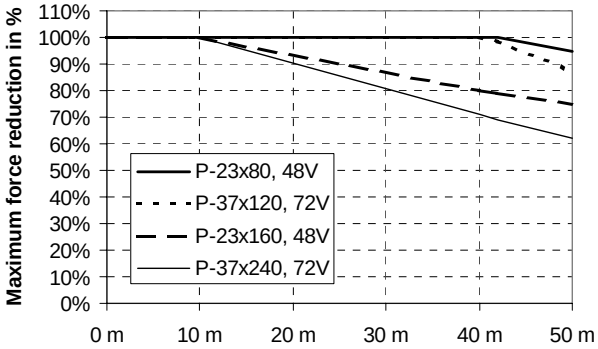
The motor cables between servo controller and linear motor may be extended up to a maximum length of 50m, using the special double shielded LinMot cable K01 or KS02. For specific applications, these cabels are available per meter.
Motor cables longer than10m have an influence on maximum force and on the linearity of the linear motors.



Maximum force

Depending on the motor type, the cable extension can result in the maximum force being reduced. This depends on cable length. The diagram shows the reduction in maximum force for each type of motor in dependence of the cable length.

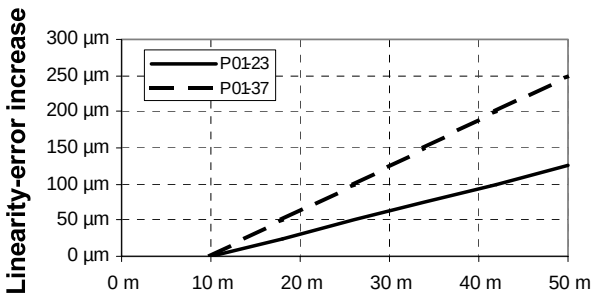
The rated value for the continiuous force is not altered by the cable length.



Linearity

As cable length increases, the linearity-error of the linear motor increases. The maximum increase in linearity-error in dependence of cable length is shown in the diagram.

The repeatability of the linear motor is not affected by cable length.



Cables tailored to length

To assure fault-free operation of the servo controllers, only the K01-04/05 (part-no. 0150-1920) or KS02-04/05 high flex cable (part-no. 0150-1938) specially manufactured for the operation of linear motors should be used. Extension cables for the linear motors should be finished according to the illustration on pages 66/67. When finishing the cables, care should be taken that there is no contact between the inner and outer shielding.

Controllable Actuators

Stepping motors

LinMot® servo controllers can control two-phase stepping motors from any third-party supplier instead of linear motors. The stepping motors are operated by the *LinMot*® standard firmware in open-loop mode (without position sensors).

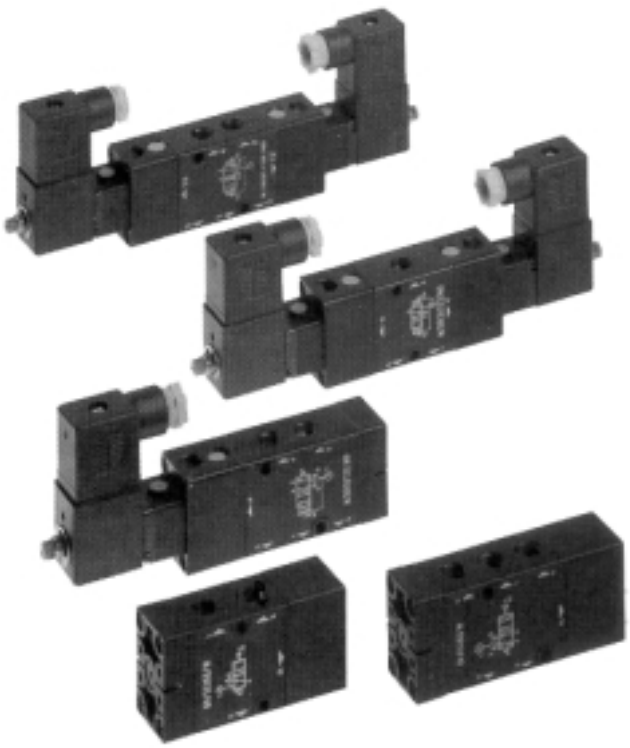
All positional set-point values are defined by the overlaid control system as for linear motors. The stepping motors can be operated in full, half or quarter-step mode as required. Using standard firmware, the following performance can be attained:

Max. stepping frequency:	936 steps/sec
Max. steps per command:	8064 steps

When choosing the stepping motors, the following data should be taken into consideration:

Type of stepping motor:	2-phase stepping motor
Inductivity per phase:	min. 1.0mH (E100)
	min. 3.0mH (E1000)
Phase current:	max. 3A (E100, 48V)
	max. 6A (E1000, 72V)
Phase current resolution:	max. 50mA

Solenoids, valves



Servo controllers with standard *LinMot*® firmware can also operate any inductive load (solenoids, electro-magnetic valves etc.) instead of linear motors.

In systems with several axes, for example, electronic grippers or valves that control pneumatic grippers and adhesive valves can be operated in synchronism with the motions of a linear motor. As a result of fast reaction times and the possibility of synchronisation with linear motors in the servo controllers, idle times, such as would be encountered if the overlaid system controlled the actions, can be avoided.

When choosing the solenoids and electro-magnetic valves to be used, the following technical data should be taken into consideration:

Inductivity per phase:	min. 1.0mH (E100)
	Min. 3.0mH (E1000)
Phase current:	max. 3A (E100, 48V)
	Max. 6A (E1000, 72V)
Phase current resolution:	max. 50mA

DC motors

For relatively slow linear movements, up to four DC motors with mechanical spindles or four linear cylinders with integrated DC motors can be controlled using *LinMot*® Series E200 or E2000 servo controllers. For positional feedback, linear potentiometers are used, so that the initialisation of the axes (homing) is not necessary on machine start-up. The resolution of the analogue position input is 10Bit.

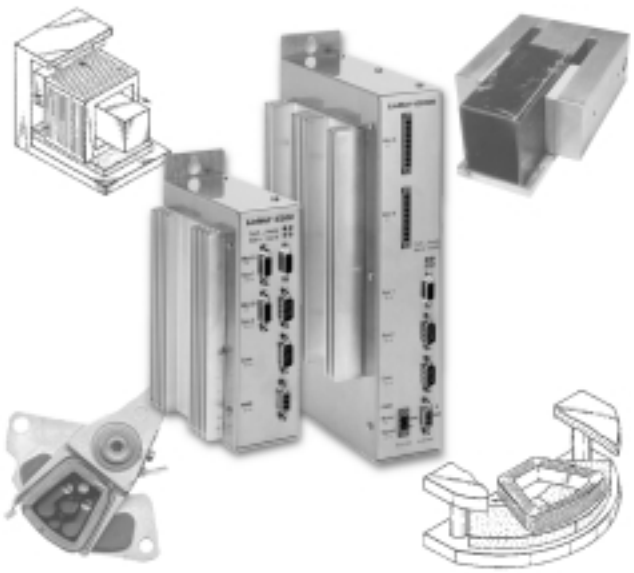
Spindle drives and linear cylinders can be freely positioned over their whole motion range using the *LinMot*® servo controllers. The positional set-point can be defined by an analogue signal or via the serial interface. Motion profiles can be stored in the servo controller and run using digital triggering signals. In this way, the overlaid controller can adjust mechanical stops and feeds in a simple manner.

When choosing the DC motors, the following *LinMot*® servo controller technical data should be taken into consideration:

Inductivity per phase:	min. 1.0mH (E100) Min. 3.0mH (E1000)
Phase current:	max. 3A (E100, 48V) Max. 6A (E1000, 72V)
Phase current resolution:	max. 50mA

For the operation with DC motors, a special firmware is required. This can be obtained from your supplier.

Voice coil motors



For applications with highly dynamic movement of very small masses, special solutions with voice coil motors, which are tailored to meet the problem addressed, are often used.

Using *LinMot*® Series E200 and E2000 servo controllers, up to four voice coil motors can be operated. An analogue signal (0.. 5V) is necessary for positional feedback. Positional resolution is 0.1% of the stroke range and is therefore especially suitable for short stroke applications.

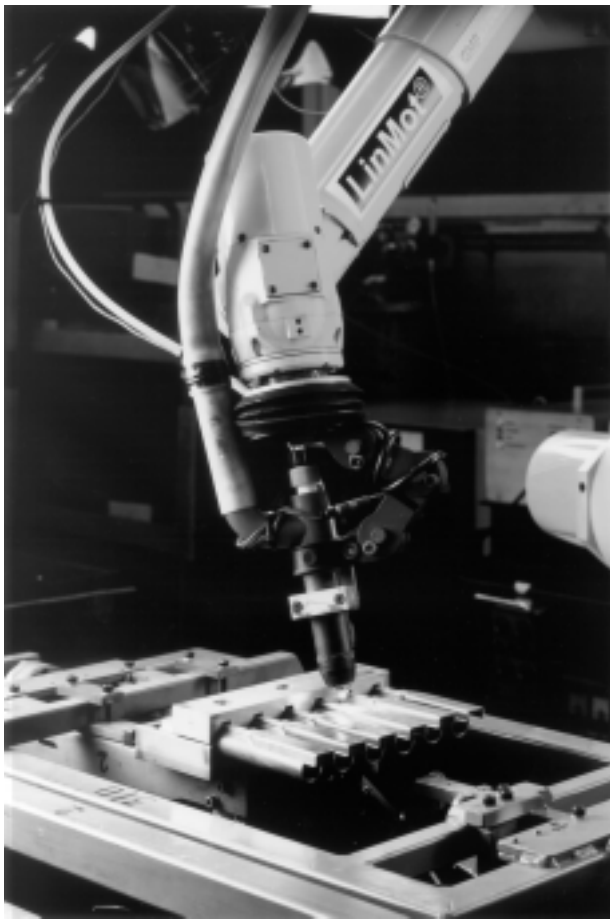
Positional set-points can be defined by an analogue signal or via the serial interface. Motion profiles can be stored in the servo controller and started using digital triggering signals.

When designing the voice coil motors, the following *LinMot*® servo controller technical data should be taken into consideration:

Inductivity per phase:	min. 1.0mH (E100) Min. 3.0mH (E1000)
Phase current:	max. 3A (E100, 48V) Max. 6A (E1000, 72V)
Phase current resolution:	max. 50mA

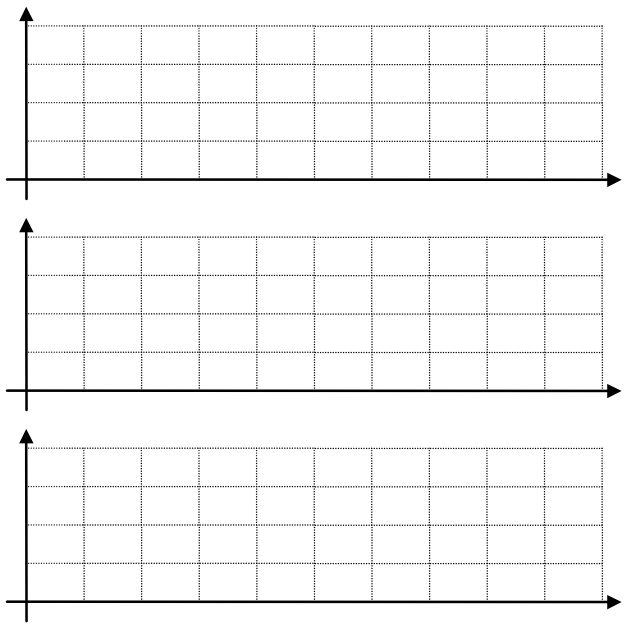
For the operation of voice coil motors, a special voice coil firmware is required. This can be obtained from your supplier.

The *LinMot*® Production



Fax to *LinMot*® 1 800 463-8708 or the distributor in your country.

Company:	Contact:	Tel: Fax: Email:

Description of Application:	Motion Profile
	

General Data

[1]Stroke (max):	[2]Working stroke:	[3]Zero position:
[4]Payload: ❑ permanent	❑ switching payload	
[5]Additional force (spring, ...):	[6]Friction:	[7]Force limitation:
[8]Repeatability:	[9]Absolute accuracy:	[10]Stiffness:

Enviroment

[11]Orientation:	❑horizontal	❑vertical	❑inclined	❑variable	❑special:
[12]Radial force:		[13]External support:			[14]Power-off safety:
[15]Distance motor-electronics:		[16]Operating temperature:			[17]Mounting/Heat sink:
[18]Contamination:	❑clean room	❑food industry	❑Industry	❑special:	

Interfacing to Machine Control Unit

[19]Control:	❑ PLC	❑ IPC	❑ ELAU	❑ QUIN	❑ stand-alone	❑ other:	
[20]Interfacing:	❑ analog	❑ 2-point	❑ trigger	❑ profibus	❑ multitrigger	❑ Can-Bus	❑ RS-232
	❑ encoder	❑ special:					
[21]Power supply:	❑ 24V	❑ 48V	❑ 72V	existing power supply:	V	A	❑ stabilized

Dynamic Requirements

[22]Strokes/sec:	Time per stroke:	Time between strokes:
[23]Velocity (max):	[24]Acceleration (max):	[25]Trailing error:
[26]Operating time:	[27]Stokes/year:	[28]Required life:

Commercial Information

[29]Axes/year:	[30]Costs (target):	[31]Alternative solution:
[32]Project time frame:		

Sources of supply

North America: USA

LinMot services North America through
more than 60 distributor offices in the
United States.
Please contact our US Sales Office
for the name of your nearest distributor.

LinMot, Inc.
N2444 Broad Street
Delavan, WI 53115
USA

Sales: 877-546-3270
Tech. Support: 877-804-0718
Fax: 800-463-8708
Mail: usoffice@LinMot.com

North America: Canada

Group Rotalec Inc.
601 Tradewind Drive, unit 4
Ancaster, Ontario
L9G 4V5
Tel: (905) 648-7100
Fax: (905) 648-7103

E-Mail: ontario@rotalec.com
URL: www.rotalec.com

Group Rotalec Inc.
900 rue McCaffrey
Saint-Laurent, Quebec
H4T 2C7
Tel: (514) 341-3685
Fax: (514) 341-5205

E-Mail: marketing@rotalec.com
URL: www.rotalec.com

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URL: www.rotalec.com

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