SERVO DRIVES

The wide range of drive products allows rapid implementation of simple applications with two end positions, up to complex, high-precision multi-axis applications with synchronization to a main electronic shaft.

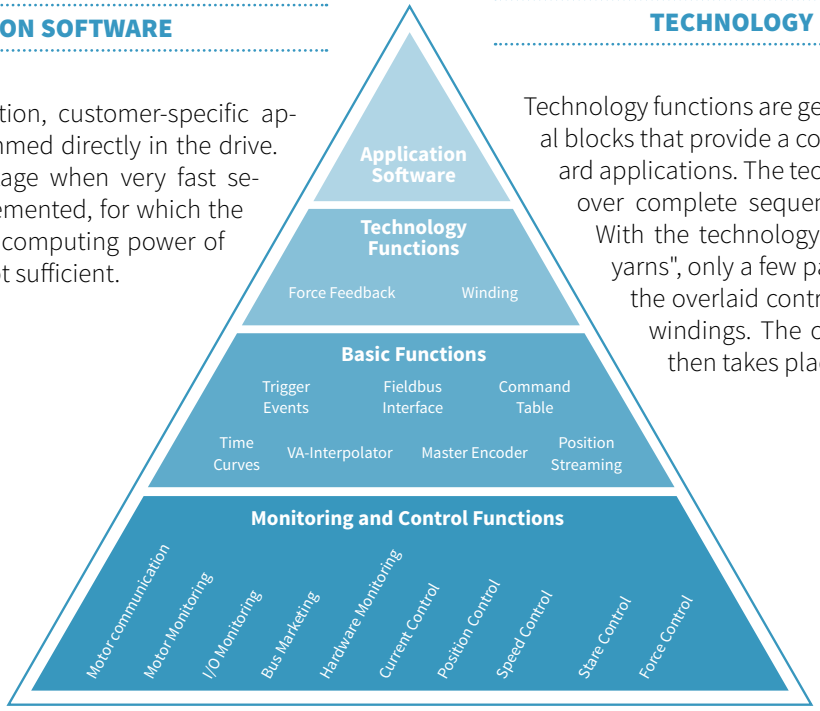
The servo drives cover a wide range in terms of performance. Controlling small actuators with low power as well as high-power servomotors with direct feed from the three-phase network can be realized.

LinMot Servo Drives

LinMot Servo Drives are highly integrated inverters with one or more power elements, for controlling the motors, and an intelligent control element with integrated position regulation. The control element performs all drive-related control and monitoring functions. It allows direct position set points, or travel along internally stored motion profiles from the overlaid control, using simple analog or digital signals. Additionally, using the technology functions or a customer-specific software application, complete sequences or functions can be implemented for customerspecific applications.

APPLICATION SOFTWARE

Using a software application, customer-specific applications can be programmed directly in the drive. This is mainly an advantage when very fast sequences need to be implemented, for which the communication speed or computing power of the overlaid control are not sufficient.



TECHNOLOGY FUNCTIONS

Technology functions are generally available functional blocks that provide a complete solution for standard applications. The technology function can take over complete sequence control of a process. With the technology function "winding textile yarns", only a few parameters are provided by the overlaid control, such as the number of windings. The complete winding process then takes place automatically.

BASIC FUNCTIONS

The basic functions include communication with the overlaid control, generation of target values for speed and acceleration-limited point-to-point motions, travel along motion profiles, synchronization of drives to an electronic main or master shaft, and synchronization in multi-axis applications.

MONITORING AND CONTROL

The basic functions of the Servo Drive, such as position and current control; control and monitoring of the power element; and monitoring the motor temperature, power, and position are handled by the control, monitoring, and regulation element, which also controls the entire finite state machine of the drive.

SPS LIBRARIES AND PROGRAMMING EXAMPLES

LinMot Drives have all common fieldbus interfaces available for connection to a master controller. In order to realize simple control concept integration, extensive function blocks and programming examples are provided for the customer. These function blocks allow for direct and quick LinMot drive integration. The function blocks run standard functions as well as commands such as drive parameterization and configuration directly from the controller. The complete drive configuration of the corresponding axis is thus stored on the controller. Maintenance or replacement can be easily realized via automatic drives detection and configuration over the communication bus. Thus manual and time-consuming configuration of the drives in case of failure is eliminated.

Characteristics

POINT-TO-POINT MOTIONS

Because of their high dynamic capabilities, long life, and ability to travel to several positions, LinMot linear motors are often used as a replacement for pneumatic cylinders.

Various end positions can be stored in the drive and are invoked via digital signals, just as with a pneumatic cylinder. Once the end position is reached, this is reported to the overlaid control via the In-position signal on a digital output. Speed and acceleration can be configured freely for each motion.

NC MOTION

Travel along paths from an overlaid NC drive can be implemented via the +/-10V interface, or in streaming mode (PVT, PV).

The predetermined points are calculated rapidly, so that even irregular and complex curves are realized dynamically.

HIGH-END APPLICATIONS

Complex applications with synchronization to a main or master shaft can be implemented without trouble using the integrated master encoder interface. All incoming signals from the main shaft are processed by the LinMot Drive and depend on the movement type of the linear motor.

Together with a high-resolution, external position sensor, even high-precision positioning tasks in µm range can be handled.

MULTI-AXIS OPERATION

In multi-axes or linked operation, the master encoder interface can control both individually and synchronous to a main or master shaft.

For complex designs, several axes can be synchronized in master-booster or mastergantry mode. This allows simple implementation of portal designs with two synchronized axes, which are controlled by the overlaid control as a single axis.

LINEAR AND ROTARY DRIVES

Using LinMot Servo Drives, rotary servomotors can be used as well as linear motors, or any 1/2/3-phase actuators.

Primarily in assembly automation and feeding applications, small, light brushless DC motors (EC motors) are often needed to rotate a gripper about the Z-axis. The flexibility of the Servo Drive allows such rotary motors to be integrated into the existing controls concept in the same simple manner as linear motors.

STANDARDIZED DEVICE PROFILES

To simplify the integration of different axes, the C Series Servo Drives are equipped with PROFIdrive, Sercos III, SoE (SercosOver-Ethercat) and CoE (CiA402). By using device profiles, the integration of „foreign“ Drives in the motion control is simplified. Further positive aspects are the automatic data exchange in real time and the increase of determinism in the system.

PLUG AND PLAY

LinMot motors with the plug and play functionality are automatically recognized by the A1100 / C1200 / C1100 / E1200 / E1400 servo drives and are immediately ready for use.

The servo drive reads these values when it boots up, and sets the parameters accordingly. This automatic device detection eliminates the selection of the required model parameters from an extensive library. Without having the configuration software to boot, first commands can be sent directly by the PLC control.

INTEGRATED SAFETY FUNCTION

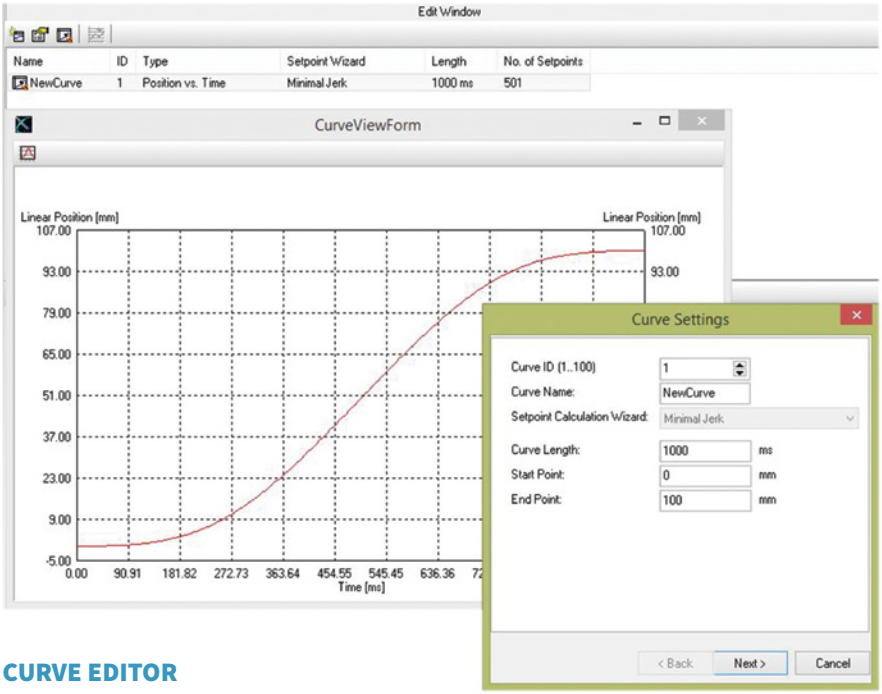
In order to prevent unintended startup, the model C1200 / C1100 / E1200 / E1400 drives have an STO function to safely shut off the output stage. The drive cannot produce any more force when shut off using the "Safe Torque Off" function. A functional safety is currently under preparation and can already be solved today with external components.

CERTIFICATION

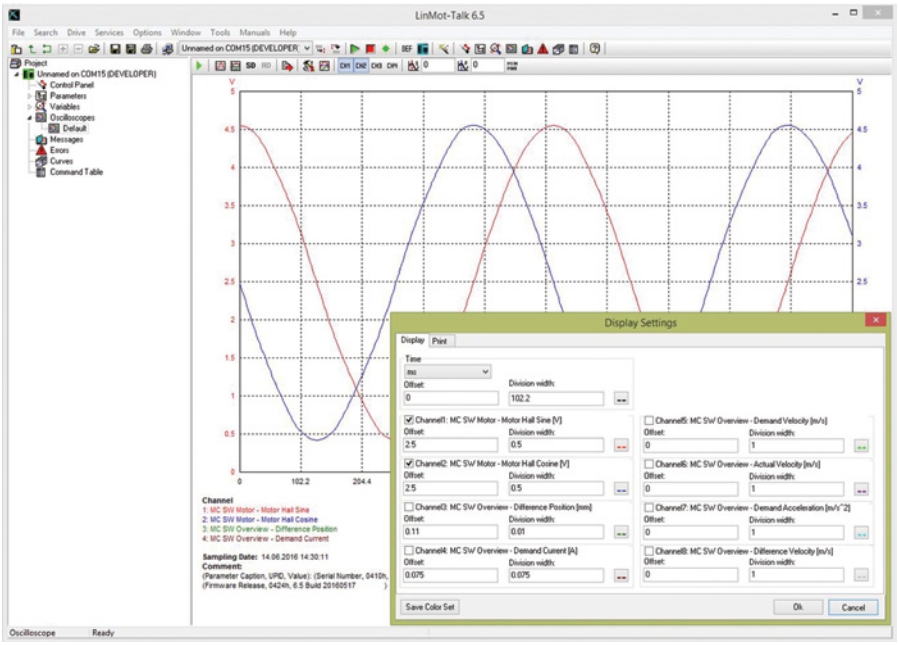
The current LinMot Drives are marked with CE and approved as components according to the UL regulation for variable-frequency controllers. Thus they meet the requirements for the US and Canadian market.

Configuration with LinMot Talk

LinMot Talk configuration software is a Windows- based interface that supports the user during start-up and configuration of the LinMot Servo Drives. The software has a powerful, modular, graphical interface that covers all the tasks surrounding the LinMot Servo Drive. Using LinMot Talk PC interface, the engineer can configure LinMot servo drives. The motors are also monitored during operation and the current motion sequences are analysed (monitoring). The integrated control panel gives the user direct access to the control and status words, as well as all commands that are invoked by the upper-level controller.



CURVE EDITOR



OSCILLOSCOPE

PARAMETERIZATION

Using the "Parameter Inspector," the drives are parameterized in a simple manner. The user has a wide range of adjustments available for operating modes, error management, warning messages, and regulating parameters. Entire parameter sets can be stored, loaded, and printed out.

CURVE EDITOR

The "Curve Editor" allows creation of travel curves. In addition, existing curves can be loaded, stored, edited, combined, and printed out. Further, complex motion sequences can be generated as desired in MS Excel, and loaded into the drive.

OPTIMIZATION

The integrated oscilloscope helps the user during start-up and optimization of the Parameterization Optimization Monitoring drive system. Internal variables, such as the target and actual position, can be shown in real time on the screen, and then printed out. The displayed data can be stored in CSV format for further processing in MS Excel, or stored for documentation purposes.

MONITORING

Using the "Error Inspector," the user can read out stored errors, as well as the currently active warnings and error messages in the LinMot Servo Drive. A list of the last error messages are stored in non-volatile memory on the Servo Drive, together with the operating hours counter.

Overview Servo Drives

A1100

Space-saving servo drive for instrument engineering

C1100

Compact drive for an ideal use in point-to-point applications.

C1200

Servo Drive for demanding tasks with axis, NC synchronization and an industrial ETHERNET interface.

E1200

High-End Servo Drive with configuration via ETHERNET.

C1400

Servo Drive with direct power supply for simple motions as well as complex axis synchronization. Designed to control the P10 motor family.

E1400

Servo Drive for P10 motors with direct main supply and 3x400 VAC technology. Equipped with an ETHERNET Config. interface.

Technical Specifications

	A1100	C1100	C1200
Motor Supply			
	24…72VDC	24…72VDC	24…72VDC
Motor Current			
	$8A_{pk}$	$25A_{pk}$	$25A_{pk}$
Control of			
LinMot Motors P0x/ PR01	•	•	•
LinMot Motors P10			
Rotary Motors		•	•
EC02 Motors		•	•
AC Servo Motors			
3rd Party Motors		•	•
Functionality			
	Point-to-Point	Point-to-Point	Point-to-Point
	Command Table	Closed Loop Force Control	Limited jerk motion commands
	Motion Profiles	Command Table	NC Motion
		Motion Profiles	Closed Loop Force Control
			Command Table
			Motion Profiles
Ethernet & Fieldbuses			
	CANOpen	PROFINET	PROFINET
		EtherCAT (LinMot Profile)	PROFINET Profidrive
		EtherCAT (CiA402)	EtherNet/IP
		EtherCAT (SoE)	Sercos III
		CANOpen	Powerlink
			LinUDP
			EtherCAT
			EtherCAT (CiA402)
			EtherCAT (SoE)
Interfaces			
Analog Inputs 0..10V / +-10V	1 / 0	1/1	1/1
Number of digital Inputs / Outputs	6 / 2	4/2	4/2
Brake Output	(-)	24V/0.5A	24V/0.5A
External Encoder			
		A/B/Z (RS422)	A/B/Z (RS422)
		SSI	SSI
		BISS	BISS
			EnDat
Timings			
Min. Bus Cycle Time	250 µs	250 µs	125 µs
PWM Frequency	16 kHz	16 kHz	16 kHz
Trigger Commands	≥ 250 µs	≥ 250 µs	≥ 125 µs
Position Drive	250 µs	250 µs	125 µs
Configuration			
RS 232	•	•	•
ETHERNET			•
ETHERNET –Maintenance			

E1200	C1400	E1400
24…72VDC	1x200...240VAC	3x400…480VAC
$32A_{pk}$	$15A_{pk}$	$28A_{pk}$
•		
	•	•
•	•	•
•		
	•	•
•		
Point-to-Point	Point-to-Point	Point-to-Point
NC Motion	Limited jerk motion commands	Limited jerk motion commands
Master Encoder / CAM	NC Motion	NC Motion
Belt Synchronization	Master Encoder / CAM	Master Encoder / CAM
Master Booster (up to 4 slaves)	Belt Synchronization	Belt Synchronization
Master Gantry (up to 4 slaves)	Closed Loop Force Control	Master Booster (up to 4 slaves)
Winding Application	Command Table	Master Gantry (up to 4 slaves)
Closed Loop Force Control	Motion Profiles	Winding Application
Command Table		Closed Loop Force Control
Motion Profiles		Command Table
		Motion Profiles
PROFINET	PROFINET	PROFINET
PROFINET Profidrive	PROFINET Profidrive	PROFINET Profidrive
EtherNet/IP	EtherNet/IP	EtherNet/IP
Sercos III	Sercos III	Sercos III
Powerlink	Powerlink	Powerlink
LinUDP	LinUDP	LinUDP
Profibus DP	CANOpen	Profibus DP
CANOpen	EtherCAT	CANOpen
EtherCAT	EtherCAT (CiA402)	EtherCAT
EtherCAT (CiA402)	EtherCAT (SoE)	EtherCAT (CiA402)
EtherCAT (SoE)		EtherCAT (SoE)
LinRS		LinRS
2/1	1/1	2/1
8	4/2	8
24V/1.0A	24V/1.5A	24V/1.5A
A/B/Z (RS422)	A/B/Z (RS422)	A/B/Z (RS422)
Sin/Cos (1Vpp)	SSI	SSI
SSI (only position recovery)	BISS	BISS
	EnDat	EnDat
200 µs	250 µs	250 µs
20 kHz	8 kHz	8 kHz
≥ 100 µs	≥ 125 µs	≥ 125 µs
100 µs	125 µs	125 µs
•	•	•
•	•	•
•		•


C1100
LinMot®
X19 SYSTEM
8 1
DGND
24VDC
3 Out
4 Out
5 In
6 In
7 In
8 In
9 AnIn
10 AnIn+
11 AnIn-
X4 LOGIC SUPPLY / CONTROL
1 11
WARN ERROR
EN
24V OK
X33 STO RELAIS
S2 1..4
S1 5..8
ON
1 2 3 4 5 6 7 8
CTS 206-8 T340
ID LOW
ID HIGH

SERIES E1400

- 3x400...480VAC
- Controls LinMot motors / AC servomotors
- Time Curves
- Real Time (Streaming)
- Synchronous control (Drive profiles)
- Master Encoder Synchronization (In/Out)
- PLC or Stand-Alone Solutions
- Industrial Ethernet Configuration / Remote Access Ethernet
- Safe Torque Off
- Safe Limited Speed Ready
- Interface for optional incremental and absolute sensor
- Position Encoder Simulation (RS 422)
- Master / Slave Solutions
- ± 10 VDC Force Control
- Supports Plug and Play

Servo Drive Series E1400

Series E1400 Servo Drives are modular axis drives, with 32-bit position resolution and an integrated power stage 3x400VAC, for linear motors and rotary motors.

The drives are suitable for simplest, standard and high-end positioning tasks across the entire force range of the LinMot product range.

CONNECTION TO MACHINE DRIVE

The Series E1400 Servo Drives can be actuated by machine controls from many manufacturers or brands, via digital inputs and outputs, RS232 or RS485 serial interface, CanBus CANopen and DeviceNet interfaces, Profibus DP, or industrial ETHERNET.

PROCESS AND SAFETY INTERFACES

Fast process interfaces for direct processing of sensor signals are available as freely programmable analog and digital inputs, a fast trigger input, and a capture input.

The safety interface on Servo Drive with fieldbus interfaces or industrial ETHERNET allows safe stop of the drives via control signals, per EN 954-1, without interrupting the power supply.

LOGIC AND POWER SUPPLY

The Servo Drives have two separate power supply inputs for the logic and power elements.

In an E-stop and safe stop of the drive, only the power element supply is cut off from the drive. The logic supply and the drive continue to run.

This has the advantage that the drive and linear motor do not need to be reinitialized when the machine is restarted, since all process data, including the current position of the linear motor, are still up to date.

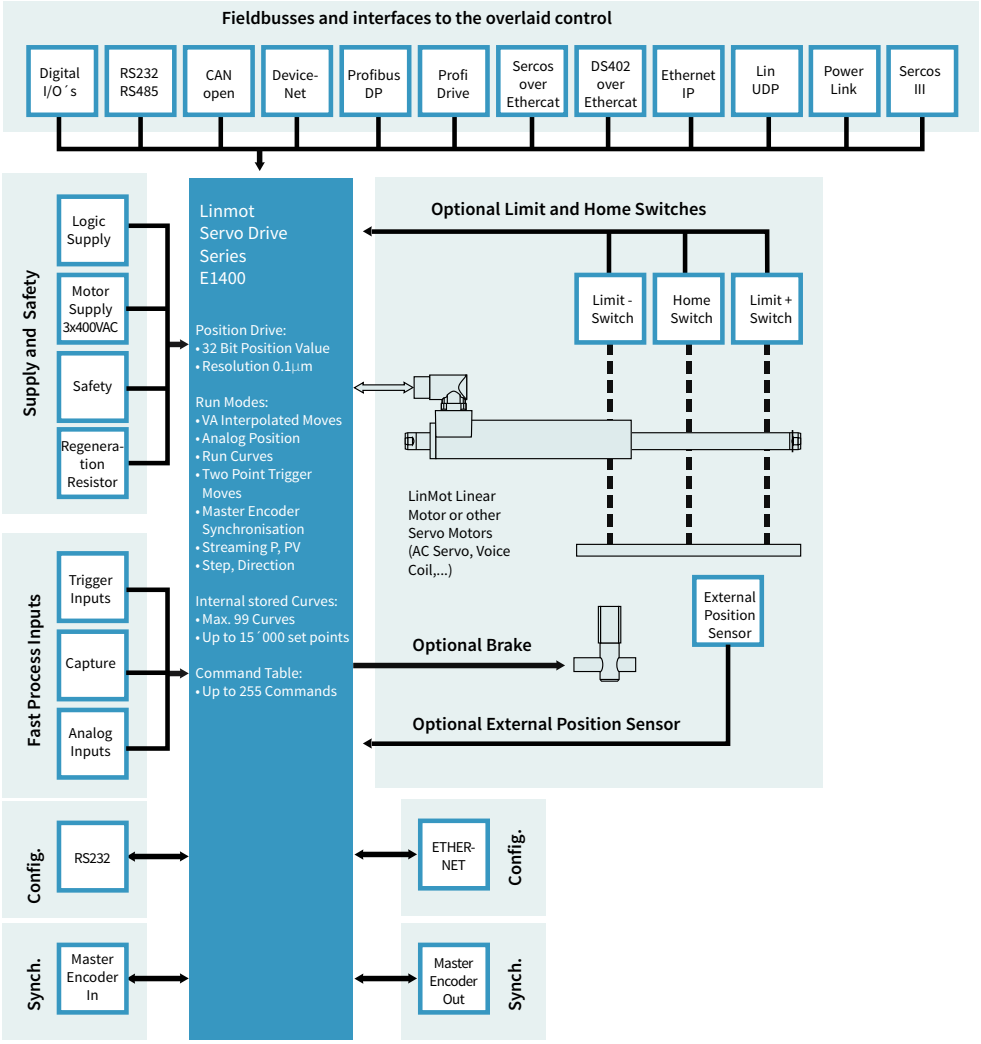
System Integration

Flexible hardware enables control of any 1/2/3- phase motors. Thus, low-power rotary servomotors, such as brushless DC motors, can be integrated in the same control concept.

Additionally, the drives can be equipped with optional peripherals, such as reference and end stop switches, high-precision external position sensors, or a mechanical holding brake.

Series E1400 Servo Drives have analog and digital inputs and outputs, serial interfaces, fieldbusses, and ETHERNET connections. The user is therefore not dependent on the selection of the overlaid drive. An appropriate interface is available, with associated protocols, for any PLC or IPC solution.

With flexibility and a compact form factor, LinMot Series E1400 Servo Drives provide a complete solution for a flexible drive concept in single and multiple axes applications, with linear motors and other actuators.



MASTER ENCODER

For synchronization to a mechanical master shaft, or a rotating main drive, the Axis (linear motors and rotary motors) can be coupled to an electronic main shaft via the Master Encoder Interface.

The encoder signal from the main shaft can be passed through by the Master Encoder Interface, so that any number of linear motors can be synchronized to the main shaft.

MOTOR INTERFACES

E1400 Servo Drives provide all necessary interfaces to operate linear or rotary motors with optional external peripherals, such as end position and reference switches, a mechanical brake, or a high-resolution external position sensor.

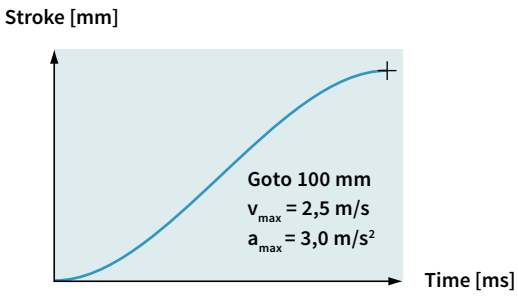
CONFIGURATION

Parameterization and configuration of the Servo Drive is done via the Ethernet interface on the front side for simultaneous configuration of several drives.

LinMot Talk user-friendly PC software is available for configuration. In addition to online documentation, LinMot Talk provides extensive debugging tools, such as an oscilloscope and an error inspector, for simple and rapid start-up of the Axis.

Fieldbus and ETHERNET drives can also be configured directly by the overlaid control.

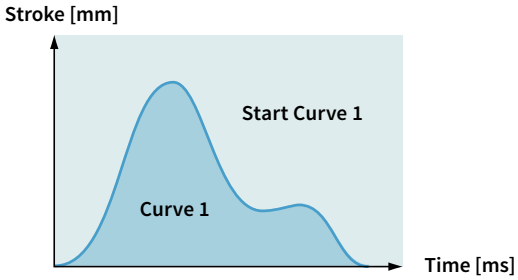
INTERPOLATED MOVES



For direct position targets, using absolute or relative positioning, the desired position is reached using acceleration and velocity-limited motion profiles or jerk optimized profiles (jerk limited and Bestehorn). Positioning commands can be invoked via the serial interfaces, CANopen, DeviceNet, Profibus, Ethernet or a trigger input.

Stroke range:	±100 m
Position Resolution:	0.1 µm (32Bit)
Velocity Resolution:	1.0 µm/s (32Bit)
Acceleration Resol.:	10.0 µm/s² (32Bit)

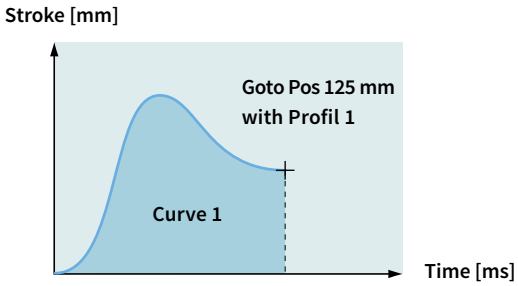
TIME CURVES



Up to 100 different time curves can be stored on Series E1400 drives, with up to 16`000 individual waypoints. The motor can thus travel along time curves of any complexity, such as those generated by CAD programs and stored in the drive (Excel CSV format). The time curves can be invoked via the serial interface, fieldbusses, ETHERNET, or the trigger input.

Stroke range:	±100m
Position Resolution:	0.1 µm (32Bit)
Motion profiles:	Max. 100 Time Curves
Curve points:	Max. 16'000 points

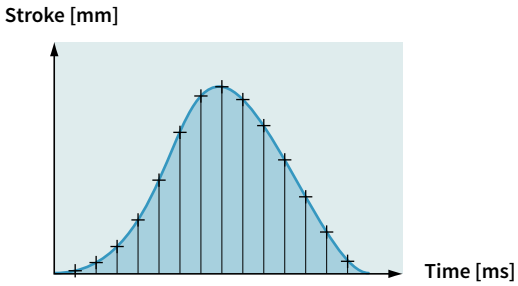
PROFILED MOVES



For travel to an absolute position, or shifting by a relative position, any desired motion rules can be stored besides the VA interpolator. They are stored in the drive as motion profiles (Excel CSV format). The positions can be approached, for example, with a sinusoidal motion to optimize power loss, or special reverse optimized motion profiles.

Stroke range:	±100m
Position Resolution:	0.1 µm (32Bit)
Motion profiles:	Max. 100 Time Curves
Curve points:	Max. 16'000 points

SETPOINT STREAMING



Overlaid NC drives with fieldbus or ETHERNET interfaces communicate with the Servo Drives via "Position Streaming". The position and velocity calculated in the overlaid control is transmitted to the Servo Drive cyclically. The P, PV, or PVT mode is available for this transmission.

Position Resolution:	32 Bit
Velocity Resolution:	32 Bit
Interpolator:	8 kHz
Cycle times:	0.25 - 5 ms

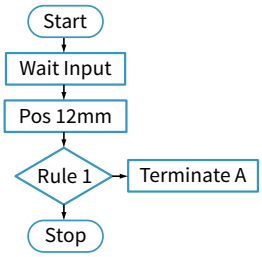
EASY STEPS

Input 1	Pos 125 mm
Input 2	Pos 250 mm
Input 3	Curve 1
Input 4	Pos -30 mm
Input 5	Pos +12,5 mm
Input 6	Curve 2
Input 7	Pos 2 mm
Input 8	Pos -12,5 mm

With the Easy Steps function, up to 8 positions or independent travel commands can be stored on the drive, and addressed via 8 digital inputs or fieldbus interfaces/ETHERNET.

Digital inputs: max. 8
Interface: X4
Scanning rate: 200 µsec

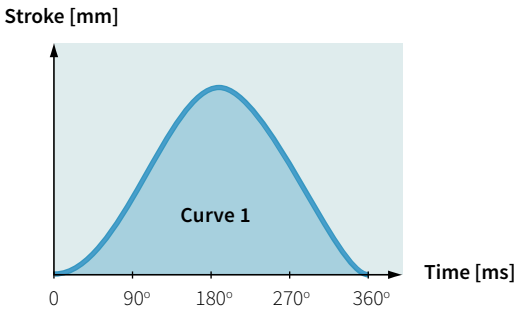
COMMAND TABLE



Entire motion sequences with up to 255 individual motion commands can be stored in the Command Table. This is primarily advantageous if complete motion sequences need to be executed very quickly, without dead time from the overlaid drive. In the Command Table, the programmer has access to all motion commands, internal parameters, and digital inputs and outputs.

Commands: max. 255
Cycle time: 100 µsec

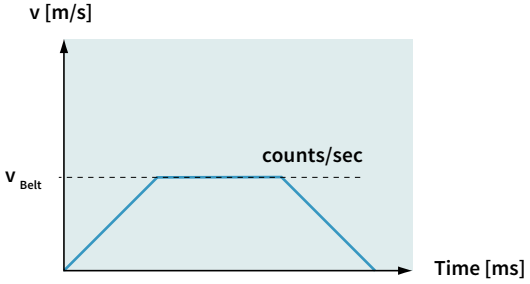
MASTER ENCODER SYNCHRONIZATION (MT)



For synchronization to an external main or master shaft, the linear motor travels along the motion profiles stored in the drive, at the machine speed (machine angle 0…360°). Using this function, mechanical cam discs can be replaced with highly dynamic linear motors. The motion profiles can be freely defined, and the correct motion profile can be invoked during product changeover with no changeover time.

Motion profiles: Max. 100 curve profiles
Curve points: Max. 16'000 points
Encoder counter: 32 Bit
Encoder input: A/B/Z (RS422)
Max. counting frequency Max. 4.5 MHz

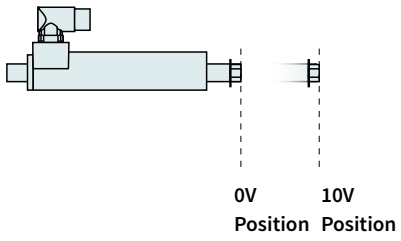
BELT SYNCHRONIZATION



Synchronization to a belt speed can be done using the Master Encoder Interface or Step/Direction/ Zero interface. Applications such as the "flying saw", synchronous loading or unloading, synchronous filling or labeling of bottles or containers on a conveyor belt, and many other applications can be implemented in this way.

Encoder Counter: 32 Bit
Encoder Input: A/B/Z (RS422), max. 5 MHz
STEP/DIR/ZERO
Max. counting frequency Max. 4.5 MHz

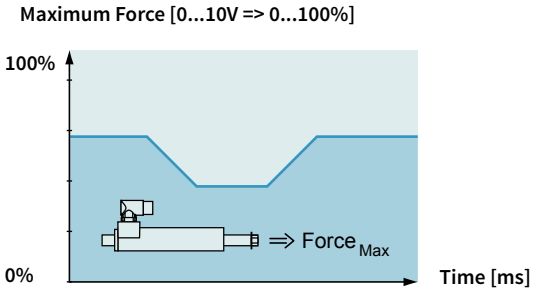
ANALOG POSITION



For an analog position target, the linear motor travels to a position proportional to the input voltage. The position is either scanned continuously, or only after a rising edge of the trigger signal. In order to prevent uncontrolled jumps in position, the motor travels to the positions with a programmable maximum acceleration and velocity (VA interpolator).

Inputs:	Analog Input X4 or X20
Voltage range:	0-10VDC or ±10V
Resolution:	12 Bit
Scanning rate:	>=100 µsec (adjustable)

EASY STEPS PARAMETER SCALE

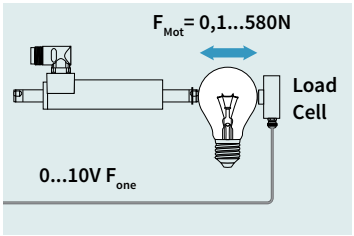


Easy Steps provide the ability to parameterize internal parameters using two analog inputs. If, for example, the maximum motor current is read at an analog input, then the maximum motor force can be provided as analog for freely programmable joining processes.

Inputs:	2 x Analog (X4.4, X4.7)
Voltage range:	0-10VDC
Resolution:	12 Bit
Scanning rate:	200 µsec

11

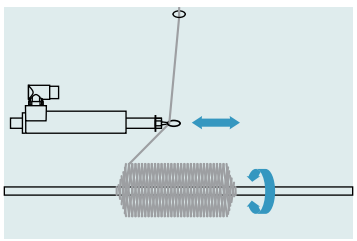
CLOSED LOOP FORCE CONTROL



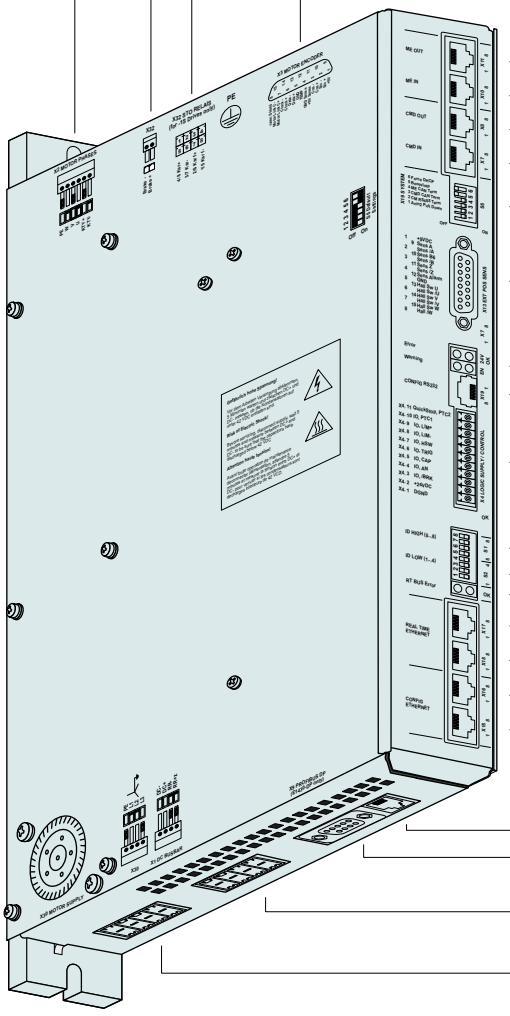
Using the force control technology function, precise joining processes can be implemented reliably and reproducibly with high-precision force control. For force control, the current motor force is measured with a load cell and controlled in the drive. Joining process or quality checks with high requirements for applied force can be implemented.

Analog Input:	0-10V or ±10V
Resolution:	12 Bit
Min. force resolution:	0.1N

WINDING APPLICATION



For winding textile yarns, glass fiber optics, or wires, a complete functional block is available that controls the entire sequence of a complete winding process.

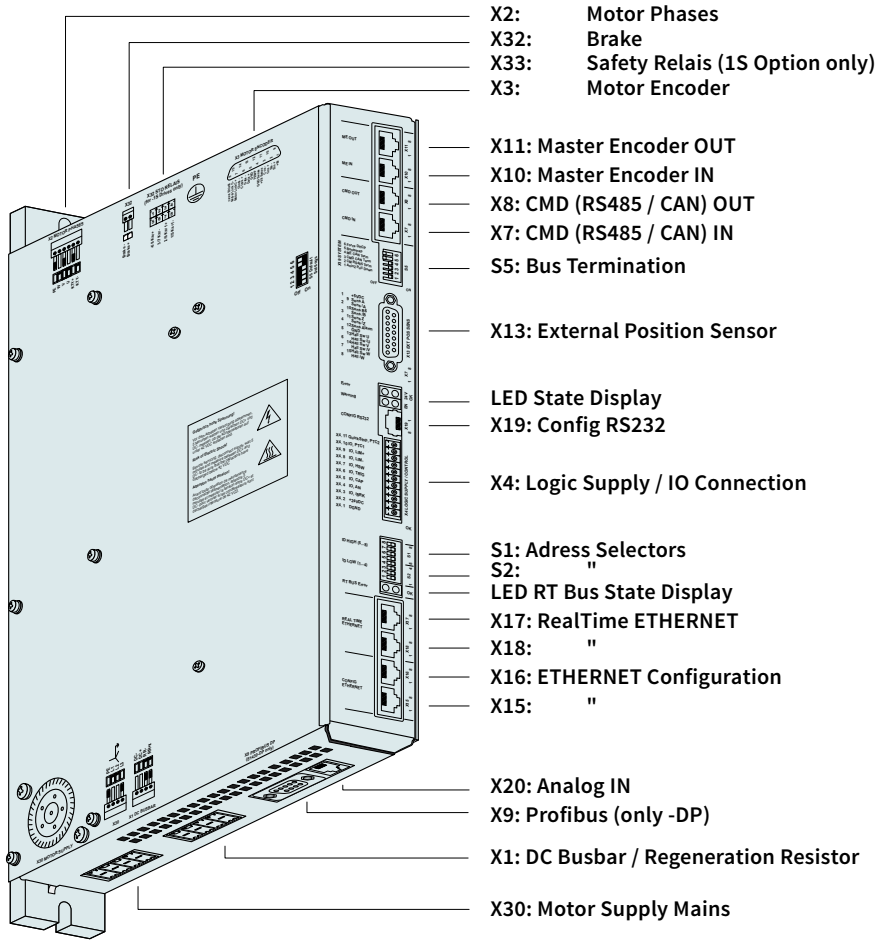


X2: Motor Phases
X32: Brake
X33: Safety Relais (1S Option only)
X3: Motor Encoder
X11: Master Encoder OUT
X10: Master Encoder IN
X8: CMD (RS485 / CAN) OUT
X7: CMD (RS485 / CAN) IN
S5: Bus Termination
X13: External Position Sensor
LED State Display
X19: Config RS232
X4: Logic Supply / IO Connection
S1: Adress Selectors
S2: "
LED RT Bus State Display
X17:RealTime ETHERNET
X18: "
X16: ETHERNET Configuration
X15: "
X20: Analog IN
X9: Profibus (only -DP)
X1: DC Busbar / Regeneration Resistor
X30: Motor Supply Mains

Interfaces	E1450-PL-QN	E1430-PN-QN	E1450-PD-QN	E1450-SC-QN	E1450-IP-QN	E1450-LU-QN	E1450-EC-QN	E1450-DS-QN	E1450-SE-QN	E1430-DP-QN	E1400-GP-QN
CANopen											•
LinRS											•
POWERLINK	•										
PROFINET		•									
PROFINET Profidrive			•								
SERCOS III				•							
ETHERNET IP					•						
LinUDP						•					
ETHERCAT							•				
ETHERCAT CiA402								•			
ETHERCAT SoE									•		
PROFIBUS DP										•	

E1450-PL-QN
E1450-PN-QN
E1450-PD-QN
E1450-SC-QN
E1450-IP-QN
E1450-LU-QN
E1450-EC-QN
E1450-DS-QN
E1450-SE-QN
E1430-DP-QN
E1400-GP-QN

- Absolute & Relative Positioning
- Travel Along Time Curves
- Positioning using Motion Profiles
- Internally stored Motion Commands
- Internally stored Motion Sequences
- Master Encoder Synchronization
- Synchronization to Belt Speed
- Position Streaming
- Analog Position Target
- Analog Parameter Scaling
- Winding Function Block
- Force Control Technology Function
- Customer-Specific Functions



INDUSTRIAL ETHERNET

Series E1400 drives allow integration of LinMot linear motors in control concepts with industrial ETHERNET interfaces. The user can integrate Series E1400 drives regardless of the provider of the overlaid control.

LinMot drives are available with common industrial ETHERNET protocols. Since all ETHERNET drives have the same motion command interface and the control and status word are identical, software blocks that have been implemented once can be transferred to other drives without any problem.

Series E1400 Servo Drives support the following industrial ETHERNET protocols:

- Profinet
- ETHERNET IP
- PowerLink
- EtherCat
- Sercos III
- Profibus

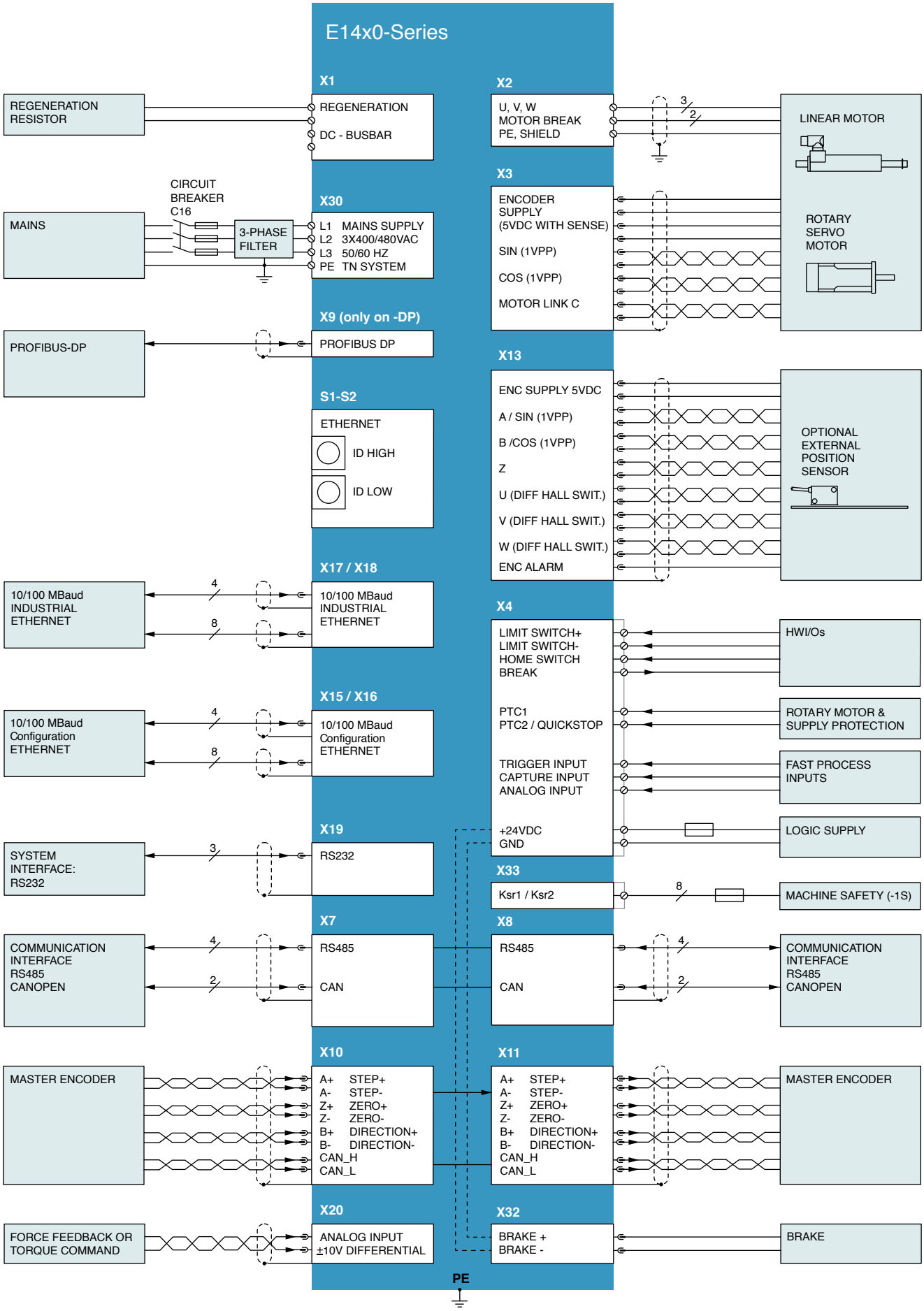
The appropriate drive is available for each protocol.

TECHNICAL DATA

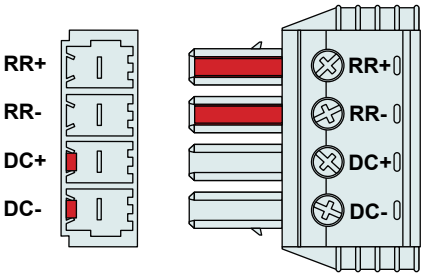
Type:	Realtime ETHERNET
Switch/Hub:	Integrated 2-Port Hub/Switch
Transfer rate:	10/100MBit/sec

Minimal cycle times:

Bus cycle:	250 µs
IO update:	250 µs
Trigger Input:	125 µs
Position control loop:	125 µs
Current control loop:	125 µs


E14x0-Series
X1
REGENERATION
DC - BUSBAR
REGENERATION RESISTOR
X2
U, V, W
MOTOR BREAK
PE, SHIELD
LINEAR MOTOR
X3
ENCODER SUPPLY (5VDC WITH SENSE)
SIN (1VPP)
COS (1VPP)
MOTOR LINK C
ROTARY SERVO MOTOR
CIRCUIT BREAKER C16
3-PHASE FILTER
MAINS
X30
L1 MAINS SUPPLY
L2 3X400/480VAC
L3 50/60 HZ
PE TN SYSTEM
X9 (only on -DP)
PROFIBUS DP
PROFIBUS-DP
X13
ENC SUPPLY 5VDC
A / SIN (1VPP)
B /COS (1VPP)
Z
U (DIFF HALL SWIT.)
V (DIFF HALL SWIT.)
W (DIFF HALL SWIT.)
ENC ALARM
OPTIONAL EXTERNAL POSITION SENSOR
S1-S2
ETHERNET
ID HIGH
ID LOW
X17 / X18
10/100 MBaud INDUSTRIAL ETHERNET
X4
LIMIT SWITCH+
LIMIT SWITCH-
HOME SWITCH
BREAK
PTC1
PTC2 / QUICKSTOP
TRIGGER INPUT
CAPTURE INPUT
ANALOG INPUT
+24VDC
GND
HWI/Os
ROTARY MOTOR & SUPPLY PROTECTION
FAST PROCESS INPUTS
LOGIC SUPPLY
X15 / X16
10/100 MBaud Configuration ETHERNET
X19
RS232
SYSTEM INTERFACE: RS232
X33
Ksr1 / Ksr2
MACHINE SAFETY (-1S)
X7
RS485
CAN
COMMUNICATION INTERFACE RS485 CANOPEN
X8
RS485
CAN
COMMUNICATION INTERFACE RS485 CANOPEN
X10
A+ STEP+
A- STEP-
Z+ ZERO+
Z- ZERO-
B+ DIRECTION+
B- DIRECTION-
CAN_H
CAN_L
MASTER ENCODER
X11
A+ STEP+
A- STEP-
Z+ ZERO+
Z- ZERO-
B+ DIRECTION+
B- DIRECTION-
CAN_H
CAN_L
MASTER ENCODER
X20
ANALOG INPUT
±10V DIFFERENTIAL
FORCE FEEDBACK OR TORQUE COMMAND
X32
BRAKE +
BRAKE -
BRAKE
PE

X1 DC BUSBAR / REGENERATION RESISTOR



Nr	Designation
RR+	Positive connection for Regeneration Resistor
RR-	Negative connection for Regeneration Resistor
DC+	DC busbar +
DC-	DC busbar -

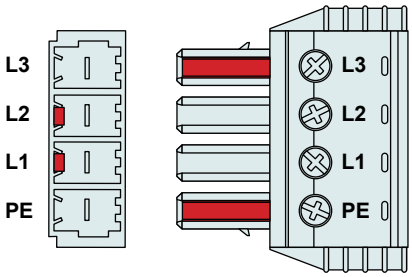
For coupling the DC busbar of different drives, contact support@linmot.com for additional information.

It's not allowed to power the drives through DC+ and DC-!

Screw Terminals:

- Tightening torque: 0.7 - 0.8 Nm (6.2 – 7.0 lbin)
- Use a cross-head screw driver (PH1)
- Use 60/75°C copper conductors only
- Conductor cross-section: 0.25–4 mm² (depends on Motor current)/AWG 24-12
- Stripping length 10 mm

X30 MOTOR SUPPLY MAINS

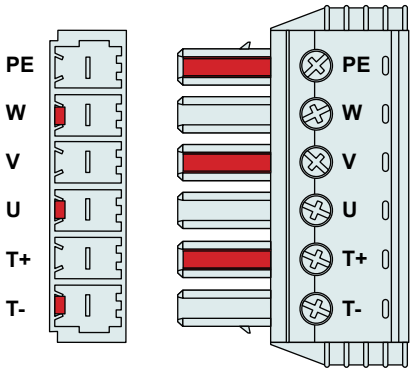


Nr	Designation
L1 - L3	3 x 400/480VAC 50/60 Hz
PE	Protective Earth

Screw Terminals:

- Tightening torque: 0.7 - 0.8 Nm (6.2 – 7.0 lbin)
- Use a cross-head screw driver (PH1)
- Use 60/75°C copper conductors only
- Conductor cross-section: 2.5–4 mm² (depends on Motor current) / AWG 24 -12
- Stripping length 10 mm

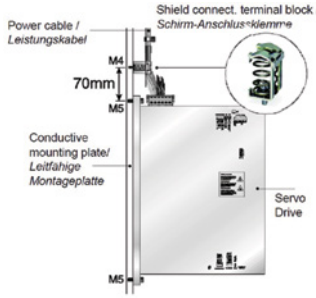
X2 MOTOR PHASES



Nr	Designation
PE	Protective Earth
W	Motor Phase W
V	Motor Phase V
U	Motor Phase U
T+	Temperature Sensor KTY+ (on DC- voltage level!)
T-	Temperature Sensor KTY- (on DC- voltage level!)

The Shield of the motor cable has to be mounted with a surface as large as possible (low ohm, low impedance). Use an EMC shield clamp for fixing.

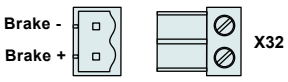
Attention:
An isolated thermistor is necessary! Especially LinMot D01 and D02 Motors can not be connected!



Screw Terminals:

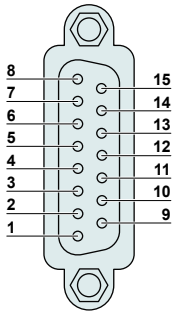
- Tightening torque: 0.7 - 0.8 Nm (6.2 – 7.0 lbin)
- Use a cross-head screw driver (PH1)
- Use 60/75°C copper conductors only
- Conductor cross-section: 0.25–4 mm² (depends on Motor current)/AWG 24 -12
- Stripping length 10 mm

X32 MOTOR BRAKE



Brake -
Brake +
The brake is powered internally by 24VDC from X4! It's suitable for driving inductive loads up to 1.5A (preliminary). The V1 Drives had a separate connector for the brake supply (X31).

X3 MOTOR ENCODER (MOTOR LINK C)

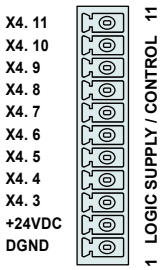


DSUB-15 (m)

Nr		Description
8		Motor Link C-
	15	Motor Link C+
7		do not connect
	14	do not connect
6		do not connect
	13	do not connect
5		GND
	12	do not connect
4		GND Sense
	11	+5V Sense
3		Cos-
	10	Cos+
2		Sin-
	9	Sin+
1		+5V
Case		Shield

Motor Link C is a high speed serial communication protocol to the motor encoder

X4 LOGIC SUPPLY / IO CONNECTION



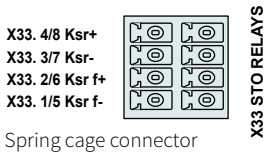
Spring cage connector

Nr	Description		
11	Input	Quickstop	Quickstop, PTC2 Input
10	I/O	X4.10	Configurable IO, PTC 1 Input
9	I/O	X4.9	Configurable IO
8	I/O	X4.8	Configurable IO
7	I/O	X4.7	Configurable IO, Analog Input for EasySteps Application
6	I/O	X4.6	Configurable IO, Trigger Input
5	I/O	X4.5	Configurable IO
4	I/O	X4.4	Configurable IO, Analog Input (configurable as high imp. Input)
3	I/O	X4.3	Configurable IO
2	+24VDC	Supply	Logic Supply 22-26 VDC
1	GND	Supply	Ground

Inputs (X4.3 .. X4.11): shortcut 24V / 5mA (Low Level: –0.5 to 5VDC, High Level: 15 to 30VDC)
Outputs (X4.3 .. X4.10): 24V / max.100mA, Peak 370mA (will shut down if exceeded)

Supply 24V / type. 1A / max. 2.5A (if all outputs “on” with max. load.)
- » Use 60/75°C copper conductors only
- » Conductor cross-section max. 1.5 mm²
- » Stripping length: 10 mm

X33 SAFETY RELAYS (ONLY WITH THE -1S OPTION)

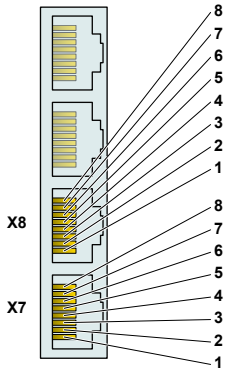


Spring cage connector

Nr	Description	
4/8	Ksr +	Safety Relay 1 / 2 Input positive
3/7	Ksr -	Safety Relay 1 / 2 Input negative
2/6	Ksr f+	Safety Relay 1 / 2 feedback positive
1/5	Ksr f-	Safety Relay 1 / 2 feedback negative

- » Use 60/75°C copper conductors only
- » Conductor cross-section max. 1.5mm² (AWG 16)
- » Stripping length: 10 mm
- » Never connect the safety relays to the logic supply of the drive!

X7-X8 CMD (RS485/CAN)

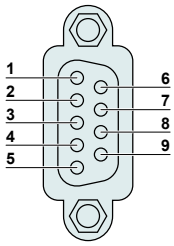


RJ-45

Nr	Description	
1	RS485_Rx+	A
2	RS485_Rx-	B
3	RS485_Tx+	Y
4	GND	
5	GND	
6	RS485_Tx-	Z
7	CAN_H	
8	CAN_L	
Case	Shield	

Use twisted pair (1-2, 3-6, 4-5, 7-8) cable for wiring.
The built in RS485 and CAN terminations can be activated by S5.2 and S5.3. X7 is internally connected to X8 (1:1 connection)

X9 PROFIBUS DP (ONLY AVAILABLE ON E1430-DP-QN)

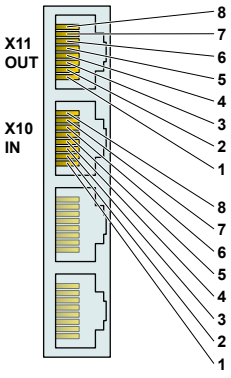


DSUB-9 (f)

Nr		Description	
1		Not connected	
	6	+5V	(isolated)
2		Not connected	
	7	Not connected	
3		RxD/TxD-P	
	8	RxD/TxD-N	
4		CNTR-P	
	9	Not connected	
5		GND	(isolated)
Case		Shield	

Max. Baud rate: 12 Mbaud

X10-X11 MASTER ENCODER IN (X10) / MASTER ENCODER OUT (X11)



RJ-45

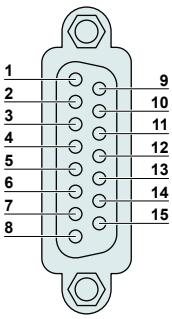
Nr	Incremental	Step/Direction	EIA/TIA 568A colors
1	A+	Step+	Green/White
2	A-	Step-	Green
3	B+	Direction+	Orange/White
4	Z+	Zero+	Blue
5	Z-	Zero-	Blue/White
6	B-	Direction-	Orange
7	CAN_H	CAN_H	Brown/White
8	CAN_L	CAN_L	Brown
Case	Shield	Shield	

Use twisted pair (1-2, 3-6, 4-5, 7-8) cable for wiring.

Master Encoder Inputs: Differential RS422, max. 25 M counts/s, 40ns edge separation
Master Encoder Outputs: Amplified RS422 differential signals from Master Encoder IN (X10)

The CAN bus can be terminated with S5.4.
All devices, which are connected to X10/X11 must be referenced to the same ground.

X13 EXTERNAL POSITION SENSOR DIFFERENTIAL HALL SWITCHES



DSUB-15 (f)

Nr		Description		SSI / BiSS / EnDat	
1		+5V DC		+5V DC	
	9		A+		A+
2		A-		A-	
	10		B+		B+
3		B-		B-	
	11		Z+		Data+
4		Z-		Data-	
	12		Encoder Alarm		Encoder Alarm
5		GND		GND	
	13		U+		nc
6		U-		nc	
	14		V+		nc
7		V-		nc	
	15		W+		Clk+
8		W-		Clk-	
Case		Shield		Shield	

Position Encoder Inputs (RS422): Max Input Frequency: 25 M counts/s with quadrature decoding, 40ns edge separation

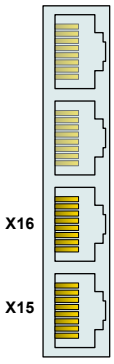
Encoder Simulation Outputs (RS422): Max Output Frequency: 4 M counts/s with quadrature decoding, 250ns edge separation

Differential Hall Switch Inputs (RS422): Input Frequency: <1kHz

Enc. Alarm In: 5V / 1mA

Sensor Supply: 5VDC max. 100mA / 9VDC 100mA (SW selectable)

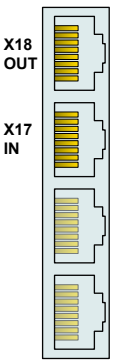
X15-X16 ETHERNET CONFIGURATION 10/100 MBIT/S



RJ-45

Nr	Description
X16	Internal 2-Port 10BASE-T and 100BASE-TX Ethernet Switch with Auto MDIX.
X15	

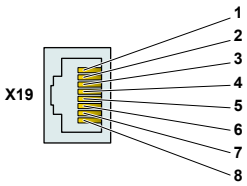
X17 - X18 REALTIME ETHERNET 10/100 MBIT/S



RJ-45

Nr	Description	
X18	RT ETH Out	Specification depends on RT-Bus Type. Please refer to according documentation.
X17	RT ETH In	

X19 SYSTEM

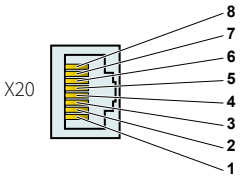


RJ-45

Nr	Description
1	Do not connect
2	Do not connect
3	RS232 Rx
4	GND
5	GND
6	RS232 Tx
7	Do not connect
8	Do not connect
case	Shield

Use isolated USB-RS232 converter (Art.-No. 0150-2473) for configuration over RS232.

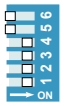
X20 ANALOG IN (+-10V DIFFERENTIAL ANALOG INPUT)



RJ-45

Nr	Description
1	Do not connect
2	Do not connect
3	Analog In-
4	GND
5	GND
6	Analog In+
7	Do not connect
8	Do not connect
case	Shield

S5 BUS TERMINATION / ANIN2 PULL DOWN



Switch	E1400
S5	Switch 6: Override Configuration Ethernet to DHCP
	Switch 5: Bootstrap: Must be off for normal operation
	Switch 4: CAN termination on ME (120R between pin 7 and 8 on X10/X11) on/off
	Switch 3: CAN termination on CMD (120R between pin 7 and 8 on X7/X8) on/off
	Switch 2: Termination resistor for RS485 on CMD (120R between pin 1 and 2 on X7/X8) on/off
	Switch 1: AnIn2 pull down (4k7 Pull down on X4.4). Set to ON, if X4.4 is used as digital output.

Factory setting: all switches “on” except S5.5 (Bootstrap) and S5.6 (Override to DHCP)

LEDS STATE DISPLAY

24VOK	Green	24V Logic Supply OK
EN	Yellow	Motor Enabled / Error Code Low Nibble
Warn	Yellow	Warning / Error Code High Nibble
Error	Red	Error

LEDS RT BUS LED

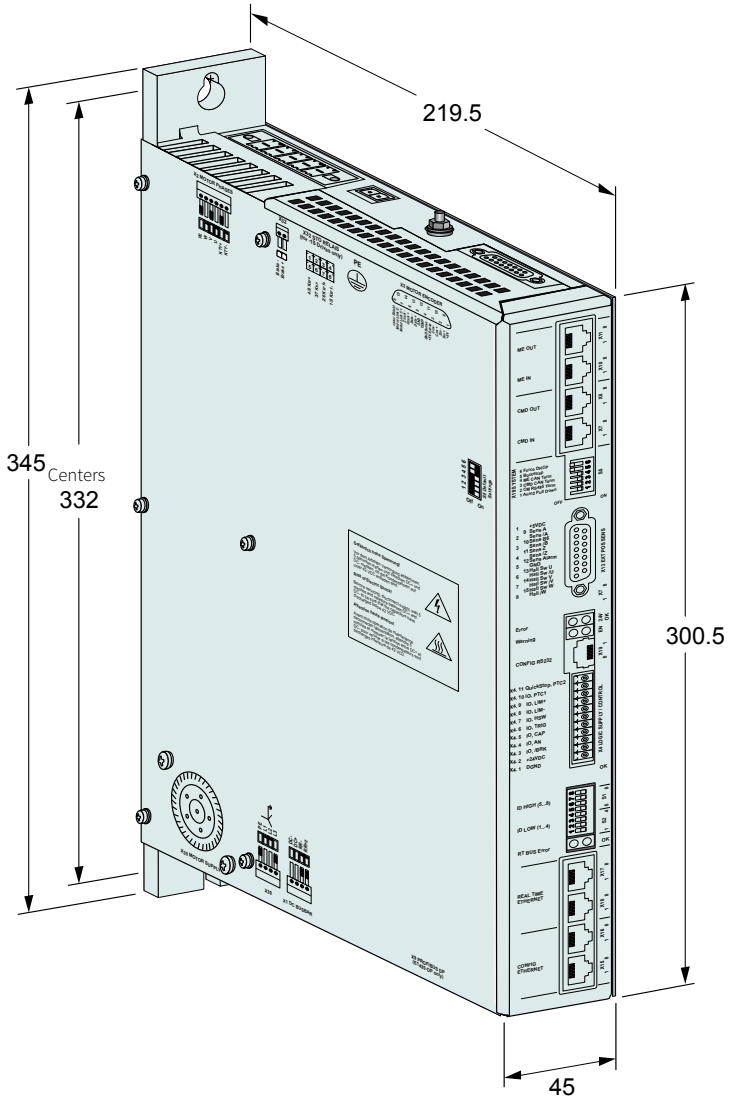
BUS OK	Green	OK
BUS Error	Red	Error

The use of these LEDs depends on the type of fieldbus which is used.
Please see the corresponding manual for further information.

S1 - S2 ADRESS SELECTORS

Switch	
S1 (5...8)	Bus ID High (0…F) Bit 5 is the LSB, bit 8 the MSB
S2 (1...4)	Bus ID Low (0…F) Bit 1 is the LSB, bit 4 the MSB

The use of these switches depends on the type of fieldbus which is used.
Please see the corresponding manual for further information.



Dimensions in mm

E1400		
Width	mm (in)	45 (1.8)
Height	mm (in)	300 (11.8)
Height with fixings	mm (in)	345 (13.6)
Depth	mm (in)	219.5 (8.7)
Weight	kg (lb)	3.7 (8.2)
Mounting	mm (in)	2 x M5, Distance 332 (13.07)
Case IP Code	IP	20
Storage temperature	°C	-25…40
Transport temperature	°C	-25…70
Operating temperature	°C	0…40 at rated data 40...50 with power derating
Relative humidity		95% (non-condensing)
Pollution	IEC/EN 60664-1	Pollution degree 2
Shock resistance (16 ms)	-1S option	3.5g
Vibration resistance (10-200Hz)	-1S option	1g
Max. case temperature	°C	90
Max. power dissipation	W	100
Mounting place		In the control cabinet
Mounting position		vertical
Distance between Drives (fan cooling is integrated on V2 Drives)	mm (in)	≥ 15 (0.6) left and right ≥ 200 (8) top / bottom

Servo Drives		
Item	**Description**	**Part Number**
E1400-GP-QN-0S	GENERAL PURPOSE Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1779
E1430-DP-QN-0S	PROFIBUS-DP Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1786
E1450-DS-QN-0S	ETHERCAT CoE (3x400/480VAC/ 28A / 50/60Hz)	0150-2411
E1450-EC-QN-0S	ETHERCAT Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1784
E1450-IP-QN-0S	ETHERNET IP Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1782
E1450-LU-QN-0S	LinUDP Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-2494
E1450-PD-QN-0S	PROFIdrive Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-2621
E1450-PL-QN-0S	POWERLINK Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1791
E1450-PN-QN-0S	PROFINET Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1783
E1450-SC-QN-0S	SERCOS III Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1785
E1450-SE-QN-0S	SERCOS over ETHERCAT Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1899
E1400-GP-QN-1S	GENERAL PURPOSE Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2351
E1430-DP-QN-1S	PROFIBUS-DP Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2352
E1450-DS-QN-1S	ETHERCAT CoE (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2412
E1450-EC-QN-1S	ETHERCAT Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2353
E1450-IP-QN-1S	ETHERNET IP Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2354
E1450-LU-QN-1S	LinUDP Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2495
E1450-PD-QN-1S	PROFIdrive Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2622
E1450-PL-QN-1S	POWERLINK Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2355
E1450-PN-QN-1S	PROFINET Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2356
E1450-SC-QN-1S	SERCOS III Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2357
E1450-SE-QN-1S	SERCOS over ETHERCAT Drive (3x400/480VAC/ 28A / 50/60Hz / STO)	0150-2358

Accessories		
Item	**Description**	**Part Number**
DC01-E1400/X4/X30	Drive Connector Set for E1400-0S	0150-3452
DC01-E1400/X4/X30/X33	Drive Connector Set for E1400-1S	0150-3453
DC01-E1400/X1	Drive Connector Regeneration / Busbar	0150-3445
DC01-E1400/X30	Drive Connector 3x400VAC Supply	0150-3449
DC01-E1400/X32	Drive Connector Brake	0150-3450