LinMot®

E14x0 V2 Servo Drives
Installation Guide

Für eine Deutsche Version bitte den Support kontaktieren!
Please visit http://www.linmot.com to check for the latest version of this document!

0185-1101-E_6V19_IG_E1400V2 / 20. Aug. 2024

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1 Important Safety Instructions

For your personal safety

Disregarding the following safety measures can lead to severe injury to persons and damage to material:

- Only use the product as directed.
- Never commission the product in the event of visible damage.
- Never commission the product before assembly has been completed.
- Do not carry out any technical changes on the product.
- Only use the accessories approved for the product.
- Only use original spare parts from LinMot.
- Observe all regulations for the prevention of accidents, directives and laws applicable on site.
- Transport, installation, commissioning and maintenance work must only be carried out by qualified personnel.
  - Observe IEC 364 and CENELEC HD 384 or DIN VDE 0100 and IEC report 664 or DIN VDE 0110 and all national regulations for the prevention of accidents.
  - According to the basic safety information, qualified, skilled personnel are persons who are familiar with the assembly, installation, commissioning, and operation of the product and who have the qualifications necessary for their occupation.
- Observe all specifications in this documentation.
  - This is the condition for safe and trouble−free operation and the achievement of the specified product features.
  - The procedural notes and circuit details described in this documentation are only proposals. It is up to the user to check whether they can be transferred to the particular applications. NTI AG / LinMot does not accept any liability for the suitability of the procedures and circuit proposals described.
- LinMot servo drives and the accessory components can include live and moving parts (depending on their type of protection) during operation. Surfaces can be hot.
  - Non−authorized removal of the required cover, inappropriate use, incorrect installation or operation create the risk of severe injury to persons or damage to material assets.
  - For more information, please see the documentation.
- High amounts of energy are produced in the drive. Therefore it is required to wear personal protective equipment (body protection, headgear, eye protection, hand guard).

Application as directed

- Drives are components which are designed for installation in electrical systems or machines. They are not to be used as domestic appliances, but only for industrial purposes according to EN 61000−3−2.
- When drives are installed into machines, commissioning (i.e. starting of the operation as directed) is prohibited until it is proven that the machine complies with the regulations of the EC Directive 2006/42/EG (Machinery Directive); EN 60204 must be observed.
- Commissioning (i.e. starting of the operation as directed) is only allowed when there is compliance with the EMC Directive (2014/30/EU).
- The technical data and supply conditions can be obtained from the nameplate and the documentation. They must be strictly observed.

Transport, storage

- Please observe the notes on transport, storage, and appropriate handling.
- Observe the climatic conditions according to the technical data.

Installation

- The drives must be installed and cooled according to the instructions given in the corresponding documentation.
- The ambient air must not exceed degree of pollution 2 according to EN 61800−5−1.
- Ensure proper handling and avoid excessive mechanical stress. Do not bend any components and do not change any insulation distances during transport or handling. Do not touch any electronic components and contacts.
- Drives contain electrostatic sensitive devices which can easily be damaged by inappropriate handling. Do not damage or destroy any electrical components since this might endanger your health!

Electrical connection

- When working on live drives, observe the applicable national regulations for the prevention of accidents.
- The electrical installation must be carried out according to the appropriate regulations (e.g. cable cross−sections, fuses, PE connection). Additional information can be obtained from the documentation.

- This product can cause high-frequency interferences in non industrial environments which can require measures for interference suppression.

Operation

- If necessary, systems including drives must be equipped with additional monitoring and protection devices according to the valid safety regulations (e.g. law on technical equipment, regulations for the prevention of accidents). The drives can be adapted to your application. Please observe the corresponding information given in the documentation.
- After the drive has been disconnected from the supply voltage, all live components and power connections must not be touched immediately because capacitors can still be charged. Please observe the corresponding stickers on the drive. All protection covers and doors must be shut during operation.

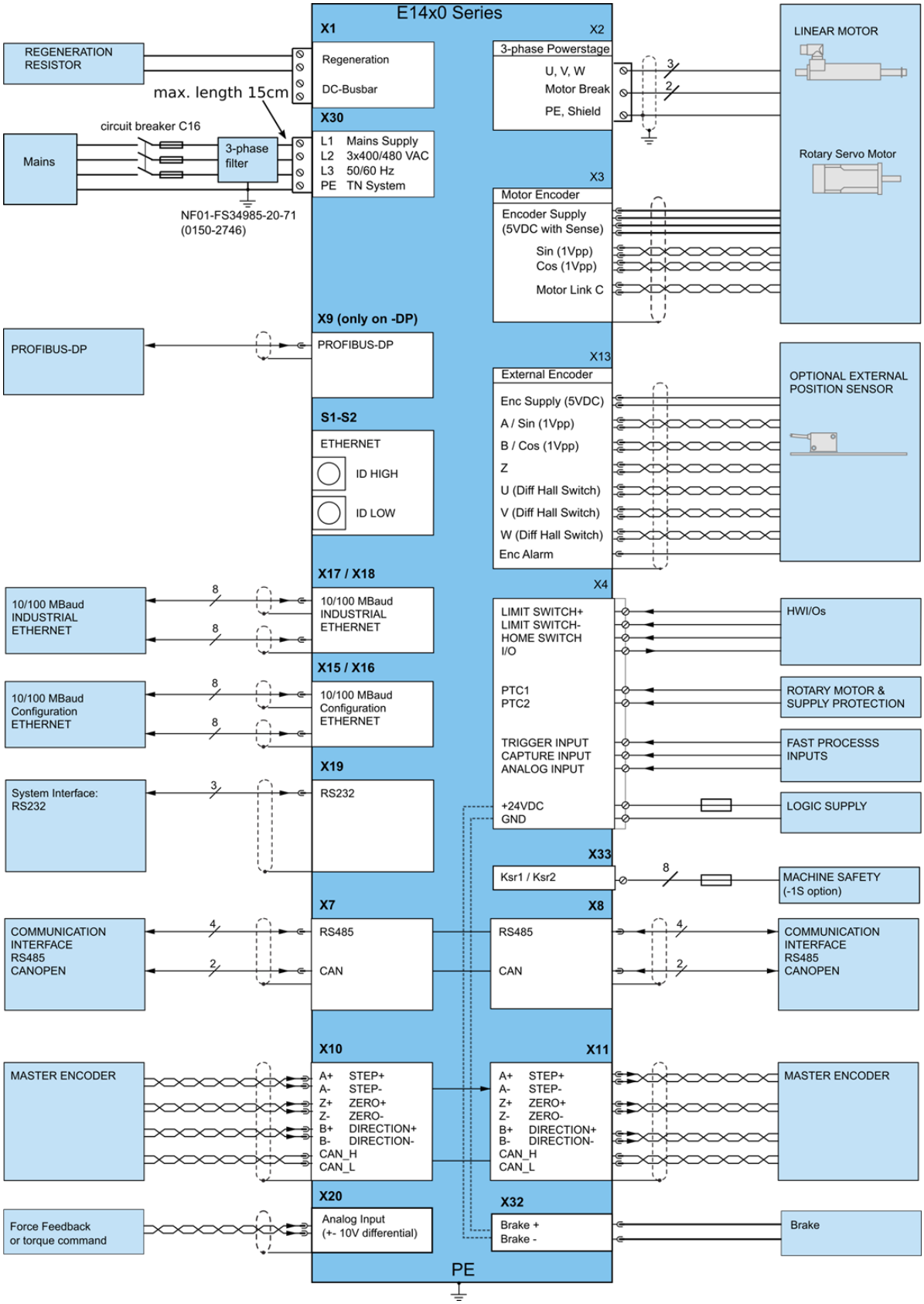
Protection of persons

- Before working on the drive, check that no voltage is applied to the power terminals:
  - The power terminals U, V, W, DC+, DC-, RR+, and RR- remain live for at least 5 minutes after disconnecting from mains.
  - The power terminals L1, L2, L3; U, V, W, KTY+, KTY-, DC+, DC-, RR+ and RR- remain live when the motor is stopped.
- The leakage current to earth (PE) is >3.5 mA. According to EN 50178 a

fixed installation is required and a double PE connection is required.

- The heat sink of the drive has an operating temperature of > 80 °C: Contact with the heat sink results in burns.

2 System Overview



Typical Servo System E14x0-XX: Servo Drive, Motor and Power Supply.

3 Functionality and Interfaces

	E1450-PL-QN-0S	E1450-PN-QN-0S	E1450-PD-QN-0S	E1450-SC-QN-0S	E1450-IP-QN-0S	E1450-LU-QN-0S	E1450-EC-QN-0S	E1450-DS-QN-0S	E1450-SE-QN-0S	E1430-DP-QN-0S	E1450-GP-QN-0S	E1450-MI-QN-0S	E1450-PL-QN-1S	E1450-PN-QN-1S	E1450-PD-QN-1S	E1450-SC-QN-1S	E1450-IP-QN-1S	E1450-LU-QN-1S	E1450-EC-QN-1S	E1450-DS-QN-1S	E1450-SE-QN-1S	E1430-DP-QN-1S	E1400-GP-QN-1S E1450-MI-QN-1S
Supply Voltage																							
Motor Supply 3x400 VAC / 3x480 VAC (50/60Hz)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Logic Supply 24VDC (22...26VDC)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Motor Phase Current (preliminary)																							
28A $_{\text{rms peak}}$ (0-599Hz)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
12 A $_{\text{rms continuous}}$ (0-599Hz) (preliminary)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Controllable Motors																							
LinMot P10-70x…(Motor Link C)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Selected motors (contact support)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Command Interface																							
CANopen											●											●	
LinRS											●											●	
POWERLINK	●											●	●										●
PROFINET		●												●									
PROFINET Profidrive			●									●			●								●
SERCOS III				●								●				●							●
ETHERNET IP					●												●						
LinUDP						●						●						●					●
ETHERCAT							●												●				
ETHERCAT CiA402								●				●								●			●
ETHERCAT SoE									●												●		
PROFIBUS-DP										●												●	
CC-Link												●											●
EtherNet/IP with CIP sync (ident. To -CM intf.)												●											●
Programmable Motion Profiles (Curves)																							
Up to 100 Motion Profiles Up to 16302 Curve Points	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Programmable Command Table																							
Command Table with up to 255 entries	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
External Position Sensor																							
Incremental (RS422 up to 25 M counts/s)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SinCos (1Vpp differential)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Absolute (SSI, BiSS-B*, BiSS-C*, EnDat2.1**, EnDat2.2**)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Synchronisation																							
Master Encoder In/Out (RS422 up to 25 M counts/s)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Configuration Interface																							
RS232	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Config Ethernet 10/100 Mbit/s (2-Port Switch integrated)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
RT Ethernet (EoE, etc... dep. on Interface)	●	●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●			●
Integrated Safety Functions (-1S Option)																							
STO (2 Safety Relays)													●	●	●	●	●	●	●	●	●	●	●

* since firmware version 6.6
** since firmware version 6.7

4 Differences between V1 Rev. E/F and V2

The V2 redesign of the E1400 drives resulted in the following changes, that might be relevant to the customer:

- The cooling fan is integrated into the drive (on the V1 drives it was an option)
- The minimum distances between the drives in the cabinet is reduced
- No double row RJ45 connectors (Ethernet, ME and CMD)
- X19 (RS232 config connector) is now a dedicated RJ45 connector
- X33 (STO) is now located on top of the drive and not on the front
- X20 (Differential analog input) is now on the bottom of the drive and not on the front
- The motor brake (X32) is now powered by the 24VDC from X4 (X31, supply connector for the brake is removed)

Attention: Configuration can not be directly imported from from a V1 into a V2 drive. It has to be done manually!
If assistance is required contact support@linmot.com.

5 IP Address Selection

The default mode for acquiring an IP address is via DHCP. If no servers respond on the connected network, the drive switches to the IPv4 Link-Local addressing scheme (also known as APIPA on Windows systems). This way the drive automatically assigns itself an address within the range of 169.254.0.1 through 169.254.255.254 (Subnet Mask 255.255.0.0).

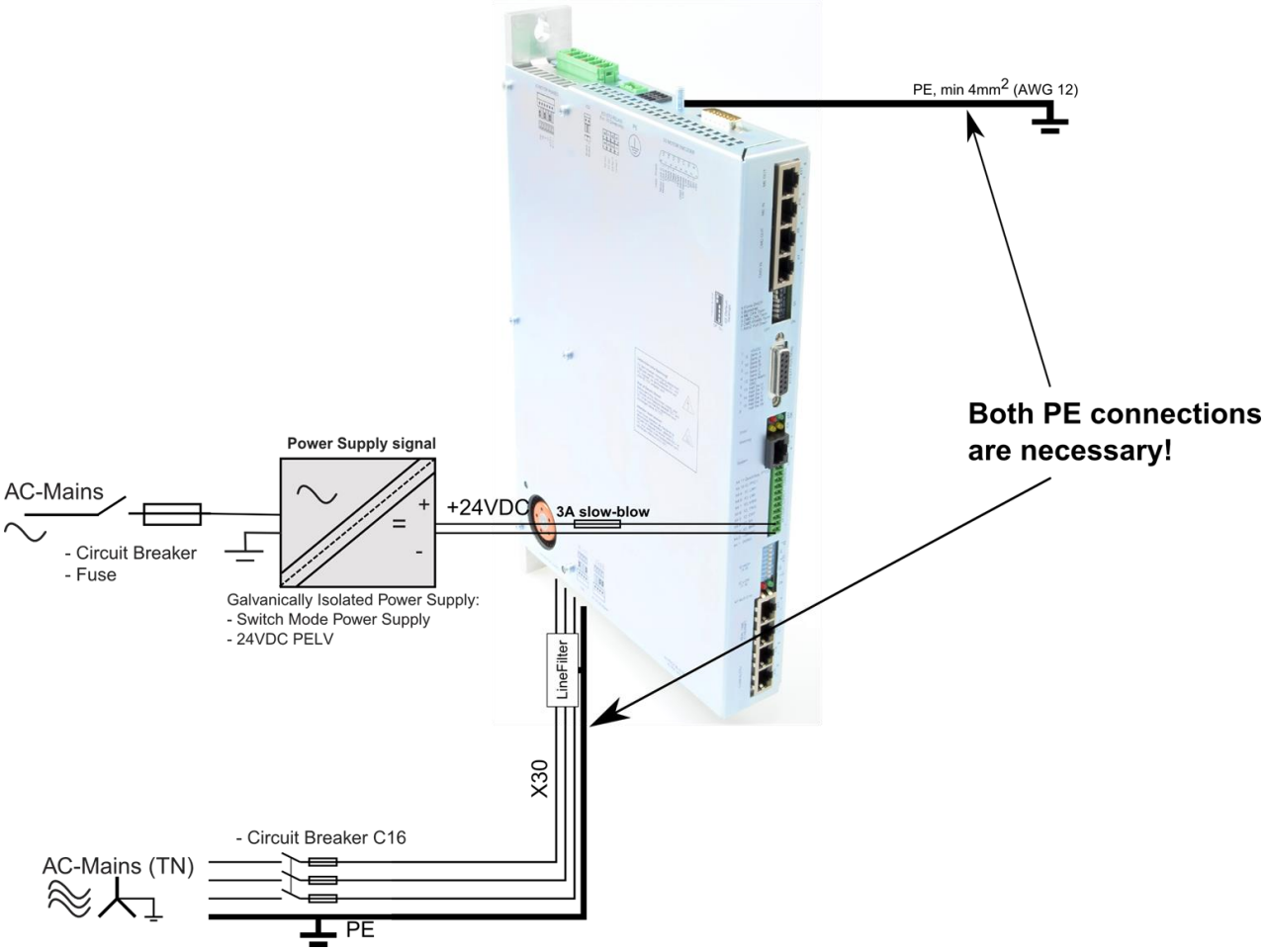
Please note that this process can take up to a minute until a valid address is assigned to the drive.

6 Power Supply and Grounding

In order to assure a safe and error free operation, and to avoid severe damage to system components, **all system components must be well grounded to protective earth PE.** This includes both LinMot and all other control system components on the same ground bus.

The leakage current to earth (PE) is >3.5 mA. According to EN 50178 a fixed installation is required and **a double PE connection is required**. One PE connection is on X30, the second one is an M5 bolt on top of the housing.

Each system component should be tied directly to the ground bus **(star pattern**), rather than daisy chaining from component to component. (LinMot motors are properly grounded through their power cables when connected to LinMot drives.)

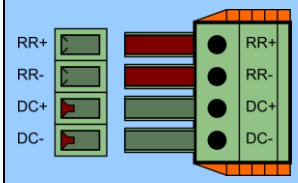


7 Description of the connectors / Interfaces

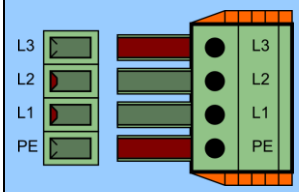
7.1 PE

PE	Protective Earth
PE	• Use min. 4mm² (AWG11) • Tightening torque: 2Nm (18 lbin)

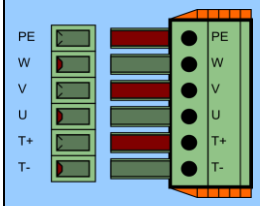
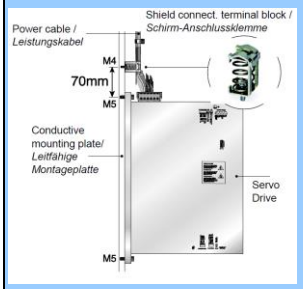
7.2 X1

X1	DC Busbar/ Regeneration Resistor
	RR+: Positive connection for Regeneration Resistor RR-: Negative connection for Regeneration Resistor DC+: DC busbar + DC-: DC busbar - Screw Terminals: - Tightening torque: 0.5 - 0.6 Nm (4.4 – 5.3 lbin) - Use 60/75°C copper conductors only - Conductor cross-section: 0.25 – 4 mm² (depends on Motor current) / AWG 24 -12 - Stripping length 10mm Please check chapter 12 as well.

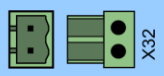
7.3 X30

X30	Motor Supply Mains
	L1 – L3: 3x400 50/60 Hz PE: PE, Protective Earth Screw Terminals: - Tightening torque: 0.5 - 0.6 Nm (4.4 – 5.3 lbin) - Use 60/75°C copper conductors only - Conductor cross-section: 2.5 – 4 mm² (depends on Motor current) / AWG 24 -12 - Stripping length 10mm

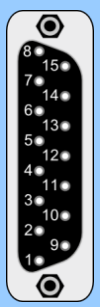
7.4 X2

X2	Motor Phases
	PE: Protective Earth W: Motor Phase W V: Motor Phase V U: Motor Phase U T+: Temperature Sensor T+ T-: Temperature Sensor T-
	**Important Notices:** • **The Shield of the motor cable must be mounted with a surface as large as possible (low ohm, low impedance).** **Use an EMC shield clamp for fixing (LinMot MC10-EMV/14-D Art. Nr. 0150-3631)** • Max. cable length: 20m (with filter NF01-FS34985-20-71 (0150-2746)) 50m (with filter NF01-FN258-16-07 (0150-2359)) may be limited by motor. • Temperature sensors (thermistor) of the following types are supported: - KTY 83/84 - PT1000 - PTC (digital) **Attention: An isolated thermistor is necessary!** • Screw Terminals: - Tightening torque: 0.5 - 0.6 Nm (4.4 – 5.3 lbin) - Use 60/75°C copper conductors only - Conductor cross-section: 0.25 – 4 mm^2 (depends on Motor current) / AWG 24 -12 - Stripping length 10mm

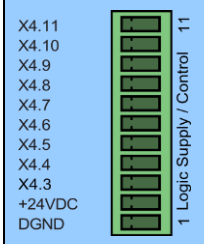
7.5 X32

X32	Motor Brake
Brake- Brake+ 	X32: Brake- Brake+ The brake is powered internally by 24VDC from X4! It's suitable for driving inductive loads up to 1.5A. The V1 Drives had a separate connector for the brake supply (X31).

7.6 X3

X3	Motor Encoder (Motor Link C)	
	8 15 7 14 6 13 5 12 4 11 3 10 2 9 1 case	Motor Link C - Motor Link C + do not connect do not connect do not connect do not connect GND do not connect GND Sense +5V Sense Cos- Cos+ Sin- Sin+ +5V shield
DSUB-15 (m)	• Motor Link C is a high-speed serial communication protocol to the motor encoder • Max. cable length: see 7.4	

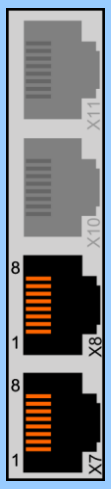
7.7 X4

X4	Logig Supply / IO Connection			
	11 10 9 8 7 6 5 4 3 2 1	Input Quickstop I/O X4.10 I/O X4.9 I/O X4.8 I/O X4.7 I/O X4.6 I/O X4.5 I/O X4.4 I/O X4.3 +24VDC Supply GND Supply	Quickstop, PTC2 Input Configurable IO, PTC1 Input Configurable IO Configurable IO Configurable IO, Analog Input for EasySteps Application Configurable IO, Trigger Input Configurable IO Configurable IO, Analog Input (configurable as high imp. Input) Configurable IO Logic Supply 22-26 VDC Ground
Spring cage connector	Inputs (X4.3 .. X4.11): 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) - Use 60/75°C copper conductors only - Conductor cross-section max. 1.5mm^2 - Stripping length: 10mm - The 24VDC supply for the control circuit (X4.2) must be protected with an external fuse (3A slow blow)			

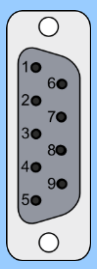
7.8 X33

X33	Safety Relays (only with the -1S option)		
	4 / 8 3 / 7 2 / 6 1 / 5	Ksr + Ksr - Ksr f+ Ksr f-	Safety Relay 1 / 2 Input positive Safety Relay 1 / 2 Input negative Safety Relay 1 / 2 feedback positive Safety Relay 1 / 2 feedback negative
Spring cage connector	- Use 60/75°C copper conductors only - Conductor cross-section max. 1.5mm^2 (AWG 16) - Stripping length: 10mm - The state of the feedback contacts has to be checked after each change of the state of the control contacts! **- Never connect the safety relays to the logic supply of the drive!** → For detailed information see chapter 9.		

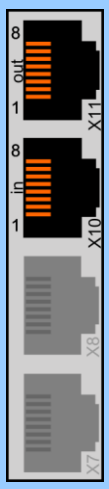
7.9 X7 – X8

X7 - X8	CMD (RS485/CAN)		
	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	
RJ-45	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)		

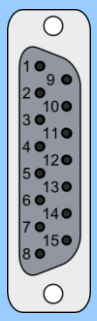
7.10 X9

X9	PROFIBUS DP (only available on E1430-DP-QN)		
	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	
DSUB-9 (f)	Max. Baud rate: 12Mbaud		

7.11 X10 - X11

X10 - X11	Master Encoder IN (X10) / Master Encoder OUT (X11)			
		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	
RJ-45	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.			

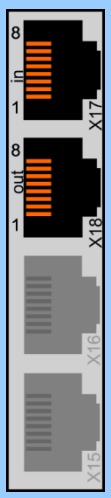
7.12 X13

X13	External Position Sensor		
		ABZ with Hall Switches	SSI / BiSS-B* / BiSS-C* / EnDat2.1** / EnDat2.2**
	1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 case	+5V DC A+ A- B+ B- Z+ Z- Encoder Alarm (optional) GND U+ U- V+ V- W+ W- Shield	+5V DC A+ (optional) A- (optional) B+ (optional) B- (optional) Data+ Data- Encoder Alarm (optional) GND nc nc nc nc Clk+ Clk- Shield
DSUB-15 (f)	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)		
* **	since firmware version 6.6 since firmware version 6.7		

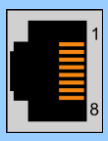
7.13 X15 - X16

X15 - X16	Config Ethernet 10/100 Mbit/s	
	X16 X15	Internal 2-Port 10BASE-T and 100BASE-TX Ethernet Switch with Auto MDIX.
RJ-45		

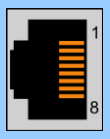
7.14 X17 - X18

X17 - X18	RealTime Ethernet 10/100 Mbit/s	
	X17 RT ETH In X18 RT ETH Out	Specification depends on RT-Bus Type. Please refer to according documentation.
RJ-45		

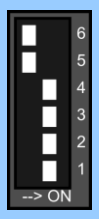
7.15 X19

X19	System	
	1 2 3 4 5 6 7 8 case	Do not connect Do not connect RS232 Rx GND GND RS232 Tx Do not connect Do not connect Shield
RJ-45	Use **isolated USB-RS232 converter (Art.-No. 0150-2473)** for configuration over RS232.	

7.16 X20

X20	Analog In (+-10V Differential Analog Input)	
	1 2 3 4 5 6 7 8 case	Do not connect Do not connect Analog In - GND GND Analog In + Do not connect Do not connect Shield
RJ-45		

7.17 S5

S5	Bus Termination / AnaIn2 Pull Down	
	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)

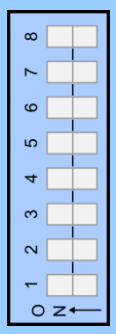
7.18 LEDs

LEDs	State Display		
	**Signal:** 24VOK EN Warn Error	**Color:** Green Yellow Yellow Red	**Description:** 24V Logic Supply OK Motor Enabled / Error Code Low Nibble Warning / Error Code High Nibble Error

7.19 RT BUS LEDs

RT Bus LEDs	RT Bus State Display		
RT BUS ERROR  OK	**Signal:** OK RT BUS ERROR	**Color:** Green Red	**Description:** OK Error
	The use of these LEDs depends on the type of fieldbus which is used. Please see the corresponding manual for further information.		

7.20 S1 - S2

S1 - S2	Address Selectors	
	S1 (5..8)	Bus ID High (0x0 … 0xF). Bit 5 is the LSB, bit 8 the MSB.
	S2 (1..4)	Bus ID Low (0x0 … 0xF). 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.	

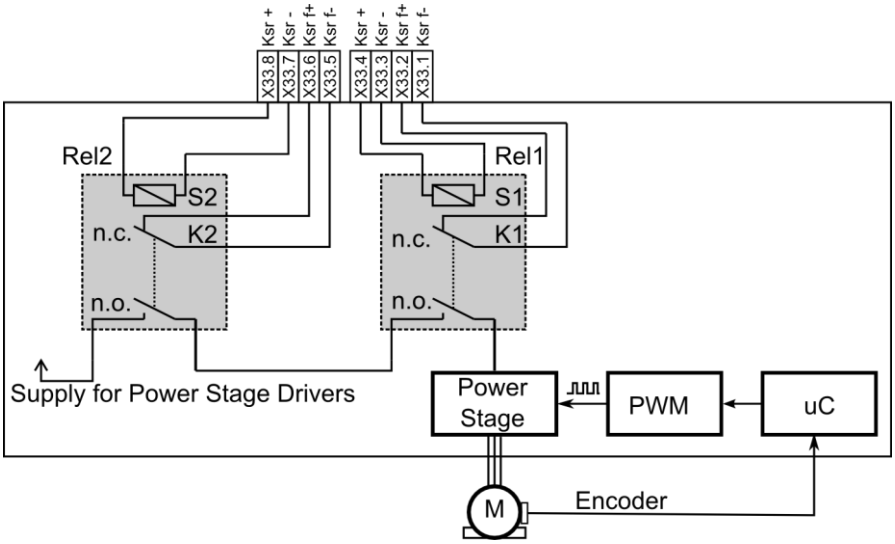
8 Error Codes

Error Codes			
			
Error	**Warn**	**EN**	**Description**
Off	Warning	Operation Enabled	**Normal Operation:** Warnings and operation enabled are displayed.
On	● ~2Hz 0..15 x Error Code High Nibble	● ~2Hz 0..15 x Error Code Low Nibble	**Error**: The error code is shown by a blink code with “WARN” and “EN”. The error byte is divided into low and high nibble (= 4 bit). ”WARN” and “EN” are blinking together. The error can be acknowledged. (e.g.: WARN blinks 3x, EN blinks 2x; Error Code = 32h)
● ~2Hz	● ~2Hz 0..15 x Error Code High Nibble	● ~2Hz 0..15 x Error Code Low Nibble	**Fatal Error**: The error code is shown by a blink code with “WARN” and “EN”. The error byte is divided into low and high nibble. ”WARN” and “EN” are blinking together. Fatal errors can only be acknowledged by a reset or power cycle. (e.g.: WARN blinks 3x, EN blinks 2x; Error Code = 32h)
● ~4Hz	● ~2Hz 0..15 x Error Code High Nibble	● ~2Hz 0..15 x Error Code Low Nibble	**System Error:** Please reinstall firmware or contact support.
● ~0.5Hz	● ~0.5Hz	On	**Signal Supply 24V too low:** The error and warn LEDs blink alternating if the signal supply +24V (X4.2) is less than 18VDC.
Off	✳●●●	●✳●●	**Plug&Play Communication Active** This sequence (Warn on, then En on, then both off, complete sequence of the 4 states ca. 1Sec) signalizes the state when the plug and play parameters are being read from the motor.
✳● ~4Hz	●✳ ~4Hz	Off	**Waiting for Defaulting Parameters** When ID (S1, S2) is set to 0xFF, the drive starts up in a special mode and the Error and Warn LED blink alternating ~4Hz. When the ID ist set to 0x00, all parameters will be set to their default value. To leave this state, power down the drive and change the ID. Also see in the Usermanual_LinMot-Talk under chapter trouble shooting.
Off	✳● ~2Hz	✳● ~2Hz	**Defaulting Parameters Done** When the parameters have set to their default values (initiated via S1/S2 on power up) the Warn and En LEDs blink together at 2 Hz. To leave this state, power down thedrive. Also see in the Usermanual_LinMot-Talk under chapter trouble shooting.
On	On	On	**Bootstrap** If also both RT LEDs are on, the drive is in the bootstrap mode. Set S5.5 to off.

The meaning of the error codes can be found in the Usermanual_MotionCtrl_Software_SG5 and the user manual of the installed interface software. These documents are provided together with LinMot-Talk configuration software and can be downloaded from *www.linmot.com*.

9 Safety Wiring

The E1400 Drive with the -1S option has internal safety functions:
Two Safety relays Ksr in series, which support the supply voltage for the motor drivers. There are also two feedback contacts for each relay.



To enable the -1S drives both relays have to be switched on.
Minimal wiring:
- Connect X33.8 and X33.4 to 24VDC (from safety)
- Connect X33.7 and X33.3 to GND (from safety)

Attention: Never connect X33.8 and X33.4 to the logic supply of X4!

If an over voltage protection is needed, it must be provided externally and sized according the safety circuit of the machine!
Attention: The drop out time of the relays is depending on the external circuitry!

Safety Relay Ksr	
Nominal voltage	24 VDC
Min. pick-up voltage at 20°C	≤ 16.8V
Drop-out voltage at 20°C	≥ 2.4 V
Drop-out time (no protection circuit)	Typ. 3ms
Coil resistance at 20°C	2'100 Ω ± 10%
Type	EN 50205, type A
Contact lifetime	> 10'000'000
Manufacturer and type	Elesta relays / SIS112 24VDC

Drive Classification according EN ISO 13849-1 (safety of machinery)	
Category	cat = 3
Performance Level	PL = d
Diagnostic Coverage	DC = high
Mean Time to hazardous failure of one channel	MTTFd = high (100 years typically, see calculation example below)

DC (Diagnostic Coverage) is high (99%) assuming that the state of the feedback contacts is checked after each change of the state of the control contacts.

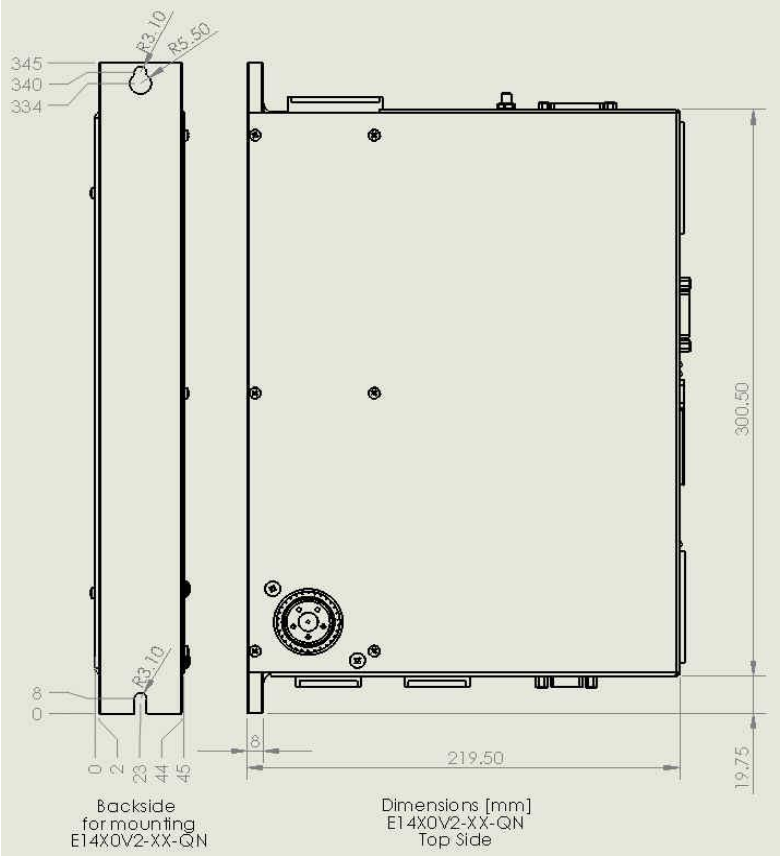
MTTFd mainly depends on the number of operations of the safety relays.

Example calculation of MTTFd:

Assuming that the safety function is requested every 20s on a machine running 24h per day and 7 days per week.

B_{10} = 10'000'000
B_{10d} = 20'000'000 (according EN ISO 13849-1:2008 table C.1)
n_{op} = (24h/day*365.25days/year*3600s/h) / 20s = 1'577'880 operations per year
$MTTF_d$ = B_{10d} / (0.1 x n_{op}) = 126.75 years (this has to be limited to 100years according the standard for further calculations)
= high (100 years)

10 Physical Dimensions



E1400 V2 Series *single axis drive*		
Width	mm (in)	50 (2)
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		2 x M5, Distance 332 (13.07)
Case	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 (16ms)	-1S option	3.5g
Vibration resistance (10-200Hz)	-1S option	1g
Max. Case Temperature	°C	90
Max. Power Dissipation	W	100[1]
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
Distance between drives (cold plate cooling)	mm (in)	≥ 0 (0) left/right ≥ 200 (8) top / bottom

[1]A rough estimation for typical LinMot applications is 7V*RMScurrent+15W

11 Power Supply Requirements

Motor Power Supply

Direct AC mains connection: 3/PE AC 400V (±10%) / 50-60Hz / TN System

- **Only 3-phase supply is supported! The mains must be a symmetrical four-wire system with grounded neutral.**
- **DC Supply (for example 72VDC) for initial test setups can be supplied through the 3-phase supply connector.**
- **Use a circuit breaker C16 and conductor cross section of 2.5mm² for mains connections!**
- **The LinMot line filter NF01-FS34985-20-71 (0150-2746) must be connected as near as possible to the supply connector of the drive to conform to the EMC requirements of CE. Maximum Distance between Drive and Filter is 0.15m.**
- **Max. motor cable length depends on filter: see 7.4**

Current consumption: Startup Current: Soft start over 250 Ohm charge resistor.

Signal Power Supply

The logic supply needs a regulated power supply of a nominal voltage of 24 VDC. The voltage must be between 22 and 26 VDC.

Current to be provided from the supply:

min. 1A	(no load on the outputs)
typ. 1.5A	(all 10 outputs “on” with 100mA load and /Brake with no load)
max. 2.5A	(all 10 outputs “on” with 100mA load and /Brake with 1A load)

- **Do not connect the safety relays to the 24VDC Signal Supply! Use a separate power supply for the safety circuit!**
- **The 24VDC supply for the control circuit must be protected with an external fuse (3A slow blow)**

12 Regeneration of Power / Regeneration Resistor

Install a regeneration resistor to X1 (RR+ and RR-). The threshold value of the voltage depends on the used motor voltage power supply. The max. threshold value must not exceed 780 VDC.

In rare cases it might be useful to connect the DC-Link of two drives on X1 together (for example in too strong coupled gantry setups).
Attention: Wrong wiring may damage the drives!

Item	Description	Art. No.
Regeneration Resistor	RR01-68/100 (68 Ohm, 100 W, X1 connector is included)	0150-3373

13 Ordering Information

Item	Description	Art. No.
E1400-GP-QN-0S	GENERAL PURPOSE Drive (3x400/480VAC/ 28A / 50/60Hz)	0150-1779
E1450-MI-QN-0S	Multi Interface Drive (3x400/480VAC / 28A / 50/60Hz)	0150-5889
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
E1450-MI-QN-1S	Multi Interface Drive (3x400/480VAC / 28A / 50/60Hz / STO)	0150-5890
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	**Description**	**Art. No.**
Isolated USB-RS232 converter	**Isolated USB RS232 converter with config. cable**	**0150-2473**
RR01-68/100	Regeneration resistor (68R, 100W, 1000V) (X1 connector is included)	0150-3373
NF01-FN258-16-07	**3-phase line filter for E1400 (up to 50m motor cable length)**	**0150-2359**
NF01-FS34985-20-71	**3-phase line filter for E1400 (up to 20m motor cable length)**	**0150-2746**
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
MC10-L/m	Drive connector power MC10-L/m for X2	0150-3382
DC01-E1400/X4	Drive Connector 24VDC & Logic	0150-3447
DC01-E1400/X30	Drive Connector Mains Supply (3x400/480VAC)	0150-3449
DC01-E1400/X33	Drive Connector Safety (-1S)	0150-3451
MC10-EMV/14-D	Shield clamp for P10 motor power cable	0150-3631

Bold items are strongly recommended accessories!

ATTENTION:

- **The connectors have to be ordered separately and are not included with the drive!**
- **Use isolated USB RS232 converter for configuration!**

14 International Certifications

Certifications	
Europe 	See chapter “ 15 EU Declaration of Conformity CE-Marking“
UK 	See chapter 15 UK Declaration of Conformity UKCA-Marking

ODVA
Networks Built on a Common Industrial Protocol

Declaration of Conformity to the EtherNet/IP™ Specification

ODVA hereby issues this Declaration of Conformity to *The EtherNet/IP™ Specification* for the product(s) described below. The Vendor listed below (the "Vendor") holds a valid Terms of Usage Agreement, which is incorporated herein by reference, for the EtherNet/IP Technology from ODVA, thereby agreeing that it is the Vendor's ultimate responsibility to assure that its EtherNet/IP Compliant Products conform to *The EtherNet/IP Specification* and that *The EtherNet/IP Specification* is provided by ODVA to the Vendor on an AS IS basis without warranty. NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE BEING PROVIDED BY ODVA.

In recognition of the below EtherNet/IP Compliant Product(s) having been EtherNet/IP Conformance Tested at ODVA-authorized Test Service Provider and having received a passing result from ODVA at the Composite Test Revision Level specified below, this Declaration of Conformity authorizes the Vendor to use the EtherNet/IP Certification Marks in conjunction with the specific EtherNet/IP Compliant Product(s) described below, for so long as the Vendor's Terms of Usage Agreement for the EtherNet/IP Technology remains valid.

EtherNet/IP™ conformance tested

Certification Logo Mark

EtherNet/IP CONFORMANCE TESTED ™

Certification Word Mark

This Declaration of Conformity is issued on February 2, 2015 on behalf of ODVA by:

Katherine Voss

Katherine Voss
Executive Director

Vendor Information	
Vendor Name	NTI Limited

Test Information	
Test Date	December 11, 2014
Composite Test Revision	CT11
ODVA File Number	11332.01

Product Information	**Network Category:**	**Node**
Identity Object Instance		
Vendor ID (Attribute 1)	589	
Device Type (Attribute 2)	0x2B	
Device Profile Name	Generic Device (keyable)	

Products Covered under this Declaration of Conformity (Identity Object Instance)

No.	Product Code (Attribute 3)	Product Name (Attribute 7)	Product Revision (Attribute 4)	SOC File Name
1	1886	C1250IPXC0S	1.001	C1250IPXC0S.stc
2	2346	C1250IPXC1S	1.001	C1250IPXC1S.stc
3	1761	E1250-IP-UC	1.001	Not Tested
4	1782	E1450IPQN0S	1.001	Not Tested
5	2354	E1450IPQN1S	1.001	Not Tested
6	2610	C1450IPQN0S	1.001	Not Tested
7	2611	C1450IPQN1S	1.001	Not Tested
8	2612	C1450IPQD0S	1.001	Not Tested
9	2613	D1450IPVR0S	1.001	Not Tested
10	2614	D1450IPQD0S	1.001	Not Tested
11	2615	D1250IPXC0S	1.001	Not Tested

IEC IECEE CB SCHEME

Ref. Certif. No.
CH-8184

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME

SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D'ESSAIS DES EQUIPMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE / CERTIFICAT D'ESSAI OC

Product Produit	Servo controller
Name and address of the applicant Nom et adresse du demandeur	NTI AG Linmot SWITZERLAND Bodenäckerstrasse 2 8957 Spreitenbach
Name and address of the manufacturer Nom et adresse du fabricant	NTI AG Linmot SWITZERLAND Bodenäckerstrasse 2 8957 Spreitenbach
Name and address of the factory Nom et adresse de l'usine	NTI AG Linmot SWITZERLAND Bodenäckerstrasse 2 8957 Spreitenbach
Note: When more than one factory, please report on page 2 *Note: Lorsque il y plus d'une usine, veuillez utiliser la 2ème page*	☐ Additional Information on page 2
Ratings and principal characteristics Valeurs nominales et caractéristiques principales	Power supply: 3x400/480 VAC, 50/60 Hz Signal supply: 24 VDC, 3 A via ext. power supply 100-240 VAC, 50-60 Hz, Class I
Trade mark (if any) Marque de fabrique (si elle existe)	LinMot
Type of Manufacturer's Testing Laboratories used Type de programme du laboratoire d'essais constructeur	---
Model / Type Ref. Ref. de type	E14x0-xx-QN-xS-xxx
Additional information (if necessary may also be reported on page 2) Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2ème page	--- ☐ Additional Information on page 2
A sample of product was tested and found to be in conformity with IEC Un échantillon de ce produit a été essayé et a été considéré conforme à la CEI	61000-6-2(ed.1) 61000-6-4(ed.2);am1 61000-6-7(ed.1)
National differences / Comments Les différences nationales / Commentaires	
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat	15-EL-0166.E01 + .E02 + .Z01

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de Certification

Electrosuisse
Luppmenstrasse 1,
8320 Fehraltorf
SWITZERLAND

Signed by: Martin Plüss
2016-05-03

electro suisse

page 1 of 1

15 EU Declaration of Conformity CE-Marking

NTI AG / *LinMot* ®
Bodenaeckerstrasse 2
8957 Spreitenbach
Switzerland
Tel.: +41 (0)56 419 91 91
Fax: +41 (0)56 419 91 92

declares under sole responsibility the compliance of the products:

Servo Drives of the Series E14x0-xx-QN-xS-xxx

with the

Low Voltag Directive 2014/35/EU

Applied harmonized standard:

EN 61800-5-1: 2007

EMC Directive 2014/30/EU

Applied harmonized standards:

EN 61000-6-2: 2005 (Immunity for industrial environments)

EN 61000-6-4: 2007 +A1:2011 (Emission for industrial environments)

According to the EMC directive, the listed devices are not independently operable products.

Compliance of the directive requires the correct installation of the product, the observance of specific installation guides and product documentation. This was tested on specific system configurations.

The safety instructions of the manuals are to be considered.

The product must be mounted and used in strict accordance with the installation instructions contained within the installation guide, a copy of which may be obtained from NTI AG.

Company: NTI AG
Spreitenbach, 11.04.2016

Dr. Ronald Rohner / CEO NTI AG

Dr. Marco Hitz / Responsible for documentation

16 UK Declaration of Conformity UKCA-Marking

NTI AG / LinMot ®
Bodenaeckerstrasse 2
8957 Spreitenbach
Switzerland
Tel.: +41 (0)56 419 91 91
Fax: +41 (0)56 419 91 92

declares under sole responsibility the compliance of the products:

- Drives of the Series **E14x0-xx-QN-xS-xxx**

with the
Electrical Equipment (Safety) Regulations 2016 SI 2016 No. 1101

Applied designated standards:

- **EN 61800-5-1: 2007**

EMC Regulation S.I. 2016 No. 1091.

Applied designated standards:

- **EN 61000-6-2: 2005 (Immunity for industrial environments)**
- **EN 61000-6-4: 2007 + A1:2011 (Emission for industrial environments)**

According to the EMC regulation, the listed devices are not independently operable products.

Compliance of the regulation requires the correct installation of the product, the observance of specific installation guides and product documentation. This was tested on specific system configurations.

The safety instructions of the manuals are to be considered.

The product must be mounted and used in strict accordance with the installation instructions contained within the installation guide, a copy of which may be obtained from NTI AG.

Company: NTI AG
Spreitenbach, 23.03.2022

Dr. Ronald Rohner / CEO NTI AG

Dr. Marco Hitz / Responsible for documentation

17 Contact Addresses

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Please visit http://www.linmot.com/ to find the distributor closest to you.

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