

C1200 Servo Drives Installation Guide

*Eine Deutsche Version kann unter <http://www.linmot.com> bezogen werden!
Please visit <http://www.linmot.com> to check for the latest version of this document!*

This document applies to the following drives:

- | | |
|----------------|----------------|
| C1250-PL-XC-xS | C1250-EC-XC-xS |
| C1250-SE-XC-xS | C1250-PN-XC-xS |
| C1250-IP-XC-xS | C1250-SC-XC-xS |



ATTENTION: The connectors have to be ordered separately and are not included with the drive!



DC01-C1200/X4/X30
DC01-C1200/X4/X30/X33

Drive Connector Set for C1200-0S
Drive Connector Set for C1200-1S

0150-????
0150-????

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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 98/37/EC (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 (2004/108/EC).
- 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

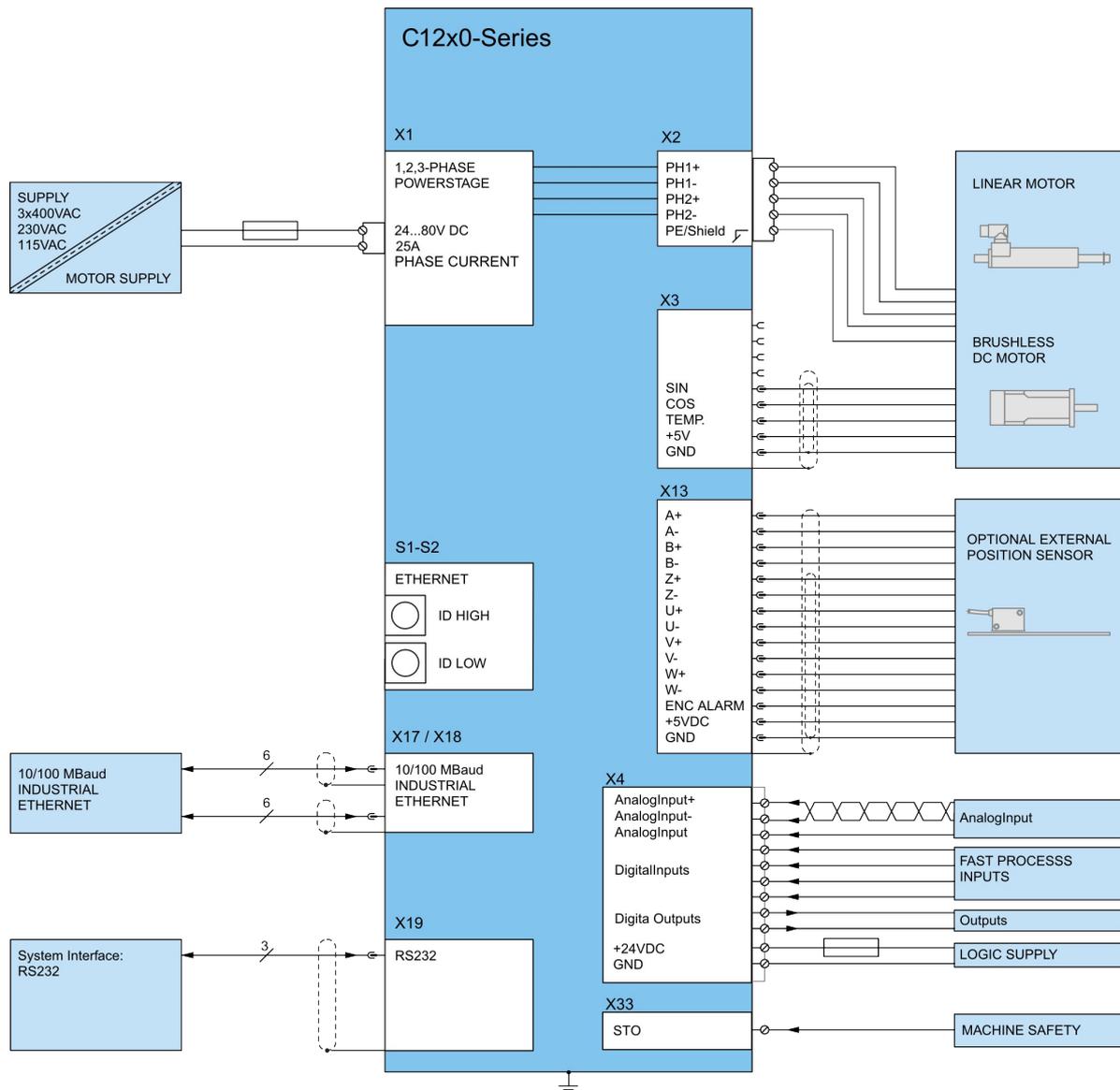


- Before working on the drive, check that no voltage is applied to the power terminals:
 - The power terminals Ph1+, Ph1-, Ph2+, Ph2- and PWR+ remain live for at least 5 minutes after disconnecting from the power supplies.



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

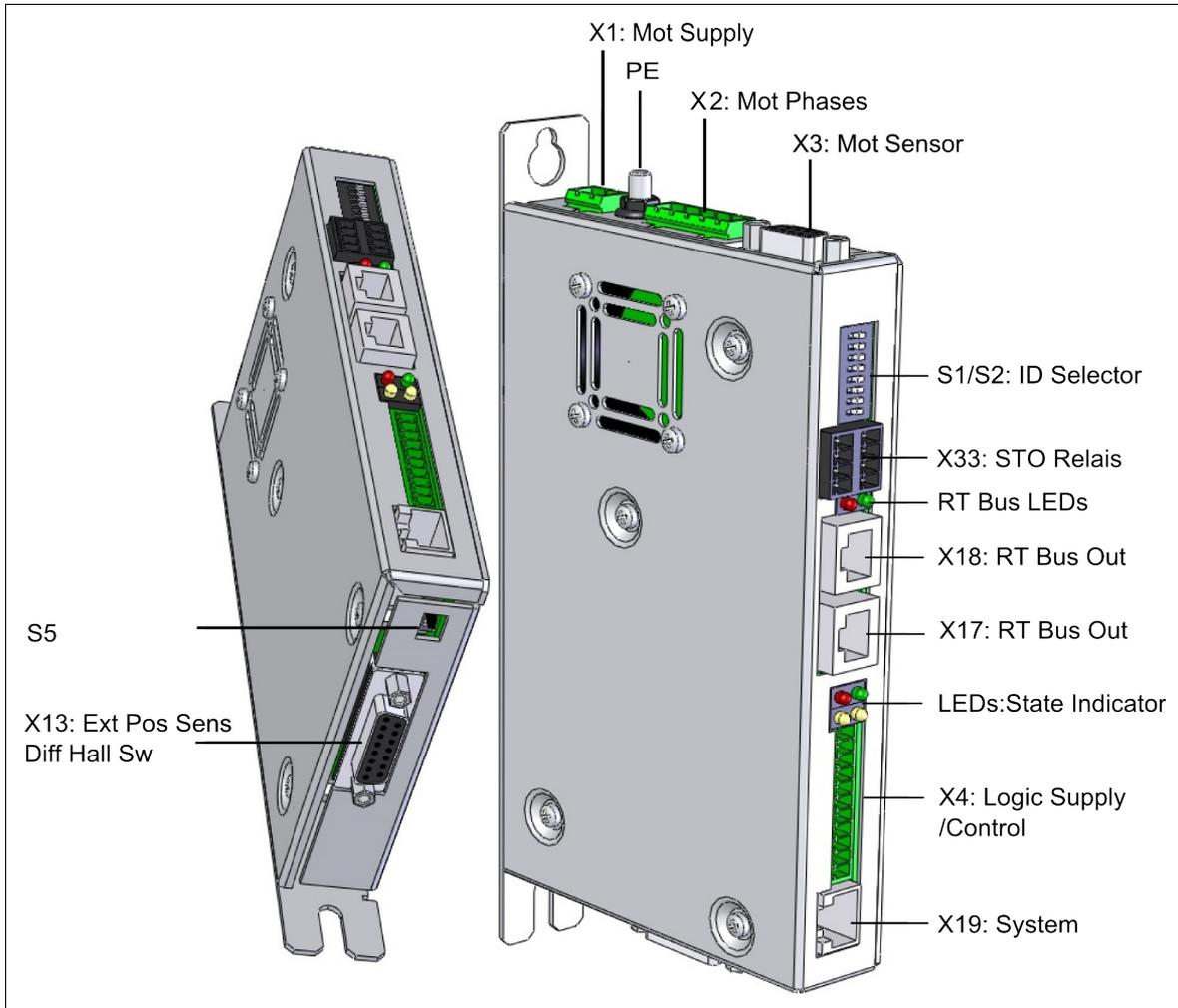
2 System Overview



Typical Servo System C12x0-XX: Servo Drive, Motor and Power Supply.

3 Interfaces

C12x0-xx-xx-xS-xxx



4 Functionality and Interfaces

	C1250-PL-XC-0S	C1250-PN-XC-0S	C1250-SC-XC-0S	C1250-IP-XC-0S	C1250-EC-XC-0S	C1250-SE-XC-0S	C1250-PL-XC-1S	C1250-PN-XC-1S	C1250-SC-XC-1S	C1250-IP-XC-1S	C1250-EC-XC-1S	C1250-SE-XC-1S
Supply Voltage												
Motor Supply 72VDC (24..85VDC)	•	•	•	•	•	•	•	•	•	•	•	•
Logic Supply 24VDC (22...26VDC)	•	•	•	•	•	•	•	•	•	•	•	•
Motor Phase Current (preliminary)												
25A _{peak}	•	•	•	•	•	•	•	•	•	•	•	•
Controllable Motors												
LinMot P01...(Motor Link P)	•	•	•	•	•	•	•	•	•	•	•	•
Selected motors (contact support)	•	•	•	•	•	•	•	•	•	•	•	•
Plug and Play (PnP) Auto Configuration	•	•	•	•	•	•	•	•	•	•	•	•
Command Interface												
POWERLINK	•						•					
PROFINET		•						•				
SERCOS III			•						•			
ETHERNET IP				•						•		
LinUDP				•						•		
ETHERCAT					•	•					•	•
SERCOS over ETHERCAT					•	•					•	•
Programmable Motion Profiles (Curves)												
Up to 100 Motion Profiles	•	•	•	•	•	•	•	•	•	•	•	•
Programmable Command Table												
Command Table with up to 255 entries	•	•	•	•	•	•	•	•	•	•	•	•
External Position Sensor												
Incremental (RS422 up to 25 M counts/s)	•	•	•	•	•	•	•	•	•	•	•	•
Absolute (BiSS)	•	•	•	•	•	•	•	•	•	•	•	•
Configuration Interface												
RS232	•	•	•	•	•	•	•	•	•	•	•	•
Integrated Safety Functions (-1S Option)												
STO (2 Safety Relays)							•	•	•	•	•	•

5 Software

The configuration software LinMot-Talk is free of charge and can be downloaded from the LinMot homepage.

6 Power Supply and Grounding



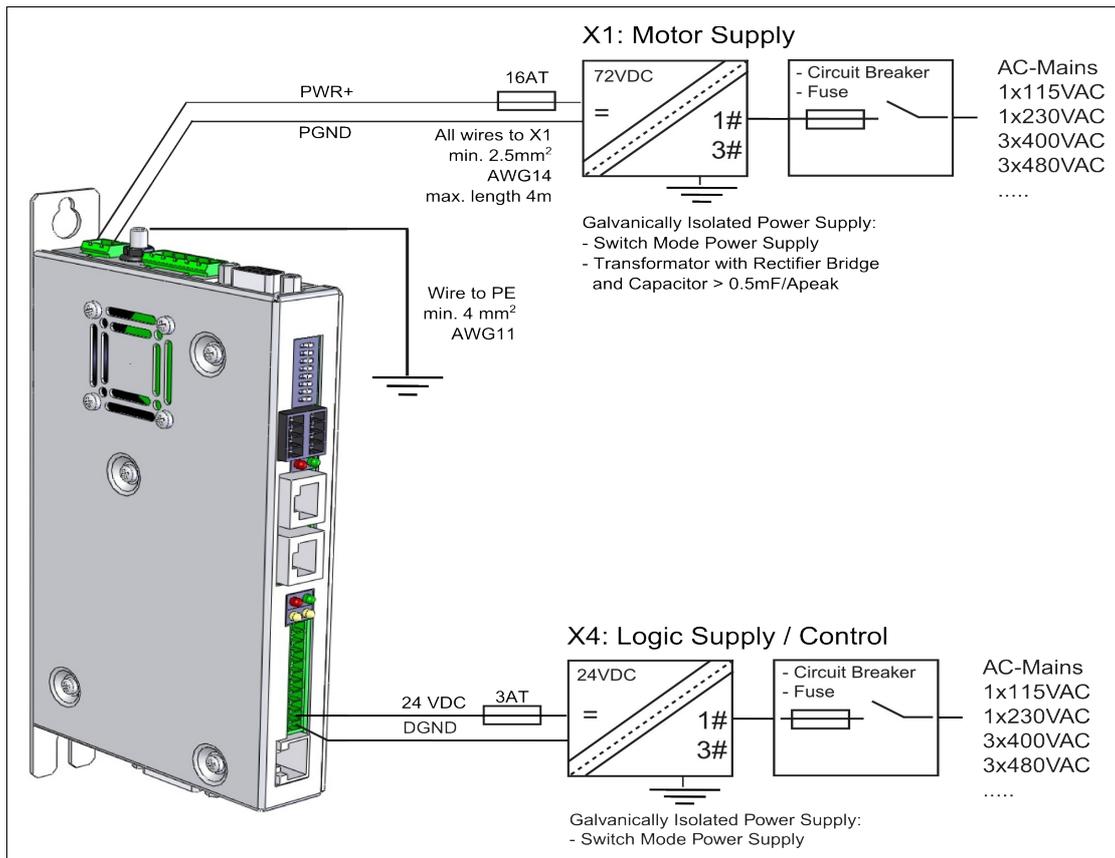
In order to assure a safe and error free operation, and to avoid severe damage to system components, **all system components must be well grounded to protective earth PE**. This includes both LinMot and all other control system components on the same ground bus.



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.

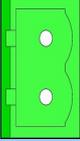
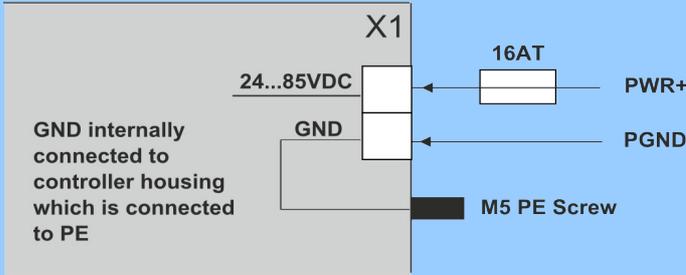


Each system component should be tied directly to the ground bus (**star pattern**), rather than daisy chaining from component to component. (LinMot motors are properly grounded through their power cables when connected to LinMot drives.)

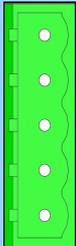


7 Description of the connectors / Interfaces

7.1 X1

X1		Motor Phases
	PWR+ PGND	
		<p>Motor Supply: 72VDC nominal, 24...85VDC Absolute max. Rating: 72VDC +20%. External Fuse: 16AT / min. 100VDC If motor supply voltage exceeds 90VDC, the drive will go into error state.</p> <ul style="list-style-type: none"> - Use 60/75°C copper conductors only - Conductor Cross-Section 2.5mm² (AWG14) max Length 4m

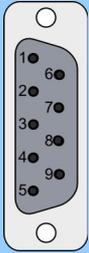
7.2 X2

X2		Motor Phases
	PH1+ PH1- PH2+ PH2- PE/SCRN	<p>LinMot Motor:</p> <p>Motor Phase 1+ red Motor Phase 1- pink Motor Phase 2+ blue Motor Phase 2- grey Protective Earth / Shield</p>
		<ul style="list-style-type: none"> - Use 60/75°C copper conductors only - Conductor cross-section: 0.5 – 2.5mm² (depends on Motor current) / AWG 21 -14

7.3 X3

X3

Motor Sensor

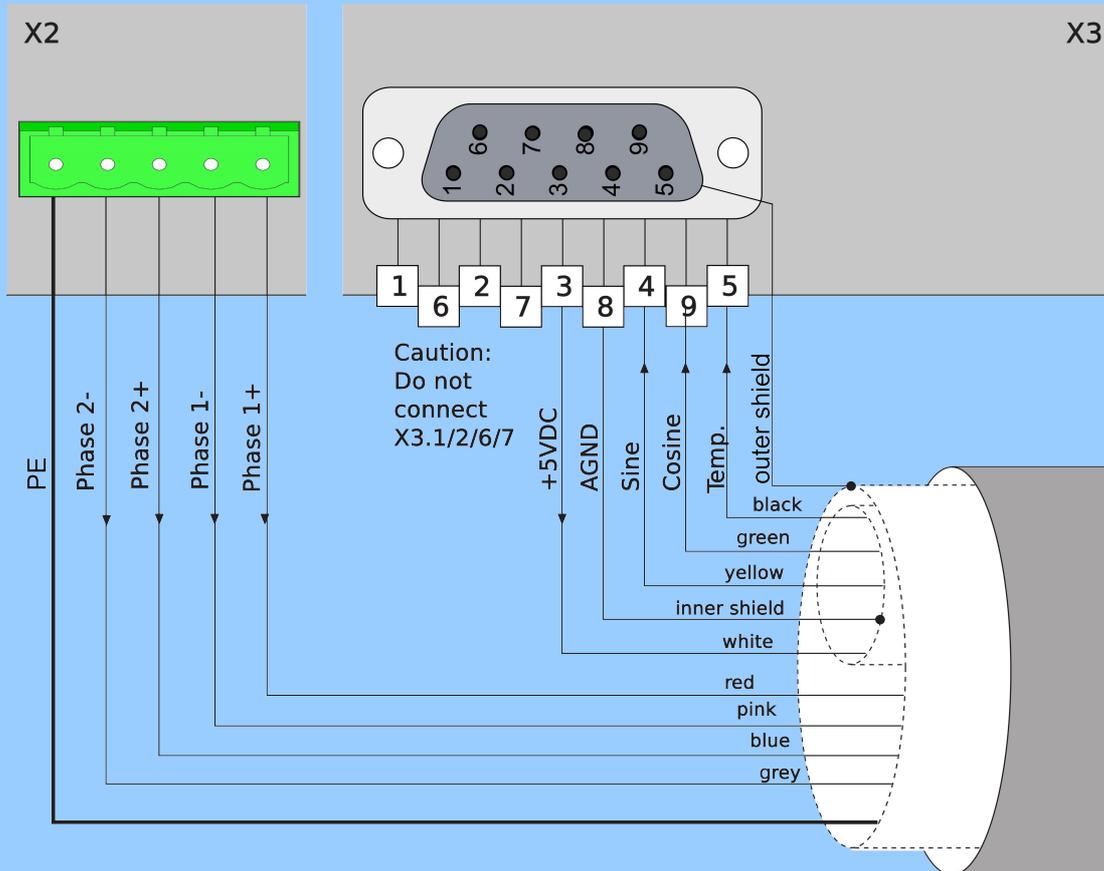


- LinMot Motor:**
- 1 Do not connect
 - 2 Do not connect
 - 3 +5VDC
 - 4 Sensor Sine
 - 5 Temp In
 - 6 Do not connect
 - 7 Do not connect
 - 8 AGND
 - 9 Sensor Cosine
 - case Shield

DSUB-9 (f)

Note:
Use +5V (X3.3) and AGND (X3.8) only for motor internal hall sensor supply (max. 100mA).
Cable length < 30m.

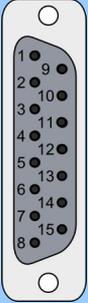
Caution:
Do NOT connect AGND (X3.8) to ground or earth!



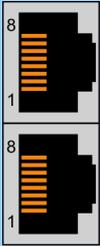
7.4 X4

X4		Logic Supply / IO Connection		
 <p>X4.11 X4.10 X4.9 X4.8 X4.7 X4.6 X4.5 X4.4 X4.3 +24VDC DGND</p>	11	AnIn-	X4.11	Configurable Analog Input differential (with X4.10) Configurable Analog Input differential (with X4.11) Configurable Analog Input single ended Configurable Input Configurable Input Configurable Input Configurable Input Configurable Output Configurable Output Logic Supply 22-26 VDC Ground
	10	AnIn+	X4.10	
	9	AnIn	X4.9	
	8	In	X4.8	
	7	In	X4.7	
	6	In	X4.6	
	5	In	X4.5	
	4	Out	X4.4	
	3	Out	X4.3	
	2	+24VDC	Supply	
	1	GND	Supply	
Spring cage connector	Inputs (X4.5 .. X4.8): 24V / 5mA (Low Level: -0.5 to 5VDC, High Level: 15 to 30VDC) Outputs (X4.3 & X4.4): 24V / max.100mA, Peak 370mA (will shut down if exceeded) Analog inputs: 12 bit A/D converted. Supply 24V / type. 500mA / max. 2.5A (if all outputs "on" with max. load.) - Use 60/75°C copper conductors only - Conductor cross-section max. 1.5mm ² - Stripping length: 10mm			

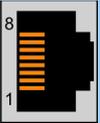
7.5 X13

X13		External Position Sensor Differential Hall Switches		
		ABZ with Hall Switches		
	1	9	+5V DC	
	2	10	A-	A+
	3	11	B-	B+
	4	12	Z-	Z+
	5	12	GND	Encoder Alarm
	6	13	U-	U+
	7	14	V-	V+
	8	15	W-	W+
	8 case		W-	Shield
	DSUB-15 (f)	<u>Position Encoder Inputs (RS422):</u> Max. counting frequency: 25 Mcounts/s with quadrature decoding, 40ns edge separation <u>Differential Hall Switch Inputs (RS422):</u> Input Frequency: <1kHz <u>Enc. Alarm In:</u> 5V / 1mA <u>Sensor Supply:</u> 5VDC max 100mA		

7.6 X17 - X18

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

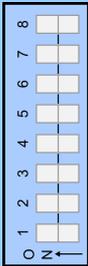
7.7 X19

X19		System
	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
RJ-45	Use Adapter cable AC01-RJ45/Df-2.5-RS1 (Art.-No. 0150-2143) for Configuration over RS232.	

7.8 X33

X33		Safety Relays (only with the -1S option)		
X33.4/8 Ksr+ X33.3/7 Ksr- X33.2/6 Ksr f+ X33.1/5 Ksr f-	 STO Relays	4 / 8	Ksr +	Safety Relay 1 / 2 Input positive Safety Relay 1 / 2 Input negative Safety Relay 1 / 2 feedback positive Safety Relay 1 / 2 feedback negative
		3 / 7	Ksr -	
		2 / 6	Ksr f+	
		1 / 5	Ksr f-	
Spring cage connector	- Use 60/75°C copper conductors only - Conductor cross-section max. 1.5mm ² - Stripping length: 10mm - Never connect the safety relays to the logic supply of the drive!			

7.9 S1 - S2

S1 - S2	Address Selectors	
	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.		

7.10 S5

S5	Bootstrap	
S5	Bootstrap	

7.11 LEDs

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

7.12 RT BUS LEDs

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

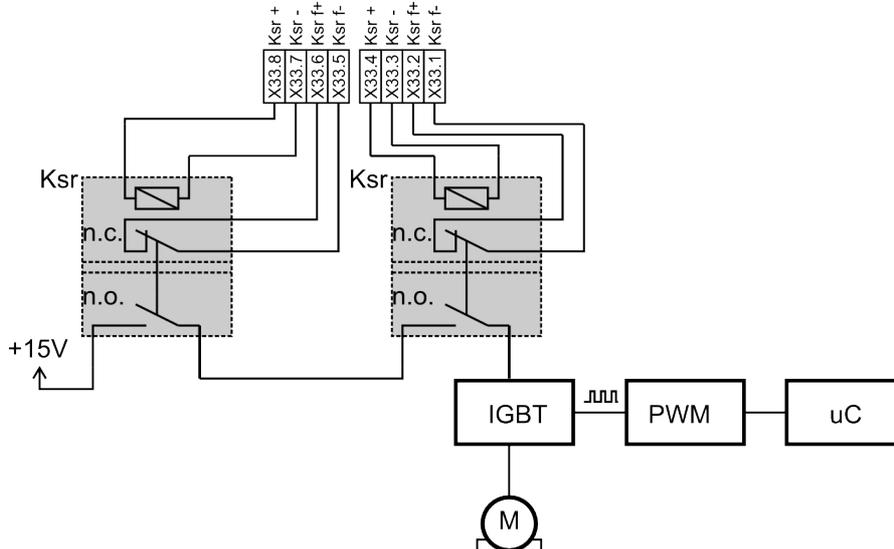
8 Error Codes

Error Codes			
Error  24VOK Warn  EN			
Error	Warn	EN	Description
Off	Warning	Operation Enabled	Normal Operation: Warnings and operation enabled are displayed.
On	<ul style="list-style-type: none"> • ~2Hz 0..15 x Error Code High Nibble 	<ul style="list-style-type: none"> • ~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)
<ul style="list-style-type: none"> • ~2Hz 	<ul style="list-style-type: none"> • ~2Hz 0..15 x Error Code High Nibble 	<ul style="list-style-type: none"> • ~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)
<ul style="list-style-type: none"> • ~4Hz 	<ul style="list-style-type: none"> • ~2Hz 0..15 x Error Code High Nibble 	<ul style="list-style-type: none"> • ~2Hz 0..15 x Error Code Low Nibble 	System Error: Please reinstall firmware or contact support.
<ul style="list-style-type: none"> • ~0.5Hz 	<ul style="list-style-type: none"> • ~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.

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 C1200 drives with the -1S option have 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!

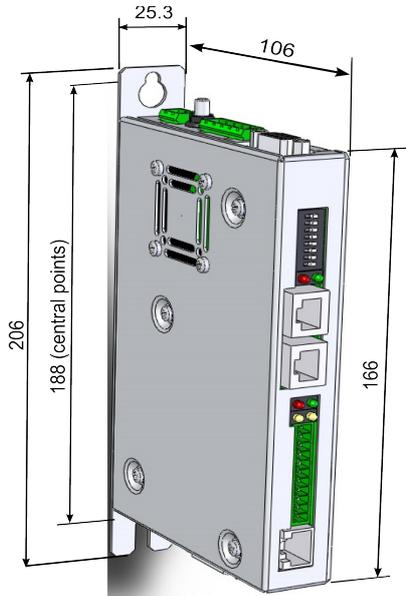
If an overvoltage protection is needed, it must be provided externally and sized according the safety circuit of the machine!

Attention: The drop out time of the relays is depending on the external circuitry!

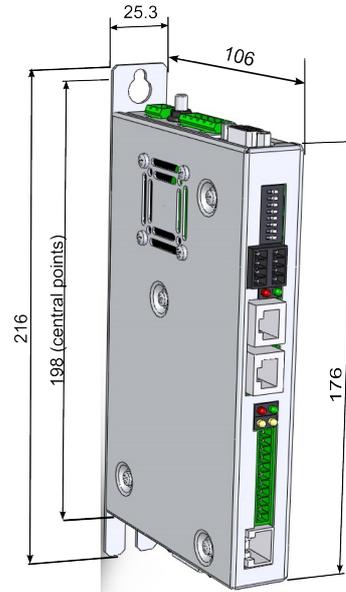
Safety Relay Ksr	
Nominal voltage	24 VDC
Min. pick-up voltage at 20°C	≤ 16.8V
Drop-out voltage at 20°C	≥ 2.4 V
Drop-out time (no protection circuit)	Typ. 3ms
Coil resistance at 20°C	2'100 Ω ± 10%
Type	EN 50205, type A
Contact lifetime	> 10'000'000
Manufacturer and type	Elesta relays / SIS112 24VDC

Drive Classification according EN ISO 13849-1 (safety of machinery) (preliminary)	
Category	cat = 3
Performance Level	PL = d
Diagnostic Coverage	DC = high
Mean Time to hazardous failure of one channel	MTTFd = high

10 Physical Dimensions



C12X0-XX-XX-0S
mounting points for M5 screws
all dimensions in mm



C12X0-XX-XX-1S
mounting points for M5 screws
all dimensions in mm

C1200 Series single axis drive		C12xx-xx-XC-0S	C12xx-xx-XC-1S
Width	mm (in)	25.3 (1.0)	
Height	mm (in)	166 (6.54)	176 (6.93)
Height with fixings	mm (in)	206 (8.11)	216 (8.5)
Depth	mm (in)	106 (4.17)	
Weight	g (lb)	630 (1.4)	700 (1.54)
Mounting		2 x M5	
Case	IP	20	
Storage Temperature	°C	-25...40	
Transport Temperature	°C	-25...70	
Operating Temperature	°C	0...40	
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	???	
Mounting place		In the control cabinet	
Mounting position		vertical	
Distance between Drives	mm (in)	Without Power Derating: 20 (0.8) horizontal / 50 (2) vertical With Power Derating: 5 (0.2) horizontal / 20 (0.8) vertical	

11 Power Supply Requirements

Motor Power Supply

The calculation of the needed power for the Motor supply is depending on the application and the used motor. The nominal supply voltage is 72- 80 VDC. The possible range is from 24 to 85VDC, for UL from 30 to 85 VDC.



ATTENTION:

The motor supply can rise up to 95 VDC when braking.

This means that everything connected to that power supply needs a voltage rating of 100 VDC. (Additional capacitors, etc...). Due to high braking voltage and sudden load variations of linear motor applications,

only specially designed power supplies can be used.

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 consumption:

min. 0.5A (no load on the outputs)

typ. 1.5A (all 10 outputs "on" with 100mA load and /Break with no load)

max. 2.5A (all 10 outputs "on" with 100mA load and /Break with 1A load)



**Do not connect the safety relays to the 24VDC Signal Supply!
Use a separate power supply for the safety circuit!**

12 Regeneration of Power

Connect an additional capacitor to the motor power supply. It is recommended to use a capacitor $\geq 10'000 \mu\text{F}$
(install capacitor close to the drive supply!)

13 Ordering Information

Item	Description	Art. Nr.
C1250-PL-XC-0S	POWERLINK Drive (72V/25A)	0150-1885
C1250-SE-XC-0S	SERCOS over ETHERCAT Drive (72V/25A)	0150-1897
C1250-IP-XC-0S	ETHERNET IP Drive (72V/25A)	0150-1886
C1250-EC-XC-0S	ETHERCAT Drive (72V/25A)	0150-1884
C1250-PN-XC-0S	PROFINET Drive (72V/25A)	0150-1888
C1250-SC-XC-0S	SERCOS III Drive (72V/25A)	0150-1887
C1250-PL-XC-1S	POWERLINK Drive (72V/25A/STO)	0150-2347
C1250-SE-XC-1S	SERCOS over ETHERCAT Drive (72V/25A/STO)	0150-2350
C1250-IP-XC-1S	ETHERNET IP Drive (72V/25A/STO)	0150-2346
C1250-EC-XC-1S	ETHERCAT Drive (72V/25A/STO)	0150-2345
C1250-PN-XC-1S	PROFINET Drive (72V/25A/STO)	0150-2348
C1250-SC-XC-1S	SERCOS III Drive (72V/25A/STO)	0150-2349
RS232 PC config. Cable 2.5m	For E1200 / E1400	0150-2143



ATTENTION: The connectors have to be ordered separately and are not included with the drive!

14 International Certifications

Certifications	
Europe 	See chapter "15 Declaration of Conformity CE-Marking"
UR	UL508C recognition pending

15 Declaration of Conformity CE-Marking

Manufacturer: NTI AG / LinMot®
 Haerdlistrasse 15
 8957 Spreitenbach
 Switzerland
 Tel.: +41 (0)56 419 91 91
 Fax: +41 (0)56 419 91 92

Products: LinMot® drives

Type	Art.-No.	Type	Art.-No.	Type	Art.-No.
C1250-IP-XC-0S	0150-1886	C1250-PL-XC-0S	0150-1885	C1250-SE-XC-0S	0150-1897
C1250-PN-XC-0S	0150-1888	C1250-SC-XC-0S	0150-1887	C1250-EC-XC-0S	0150-1884
C1250-IP-XC-1S	0150-2346	C1250-PL-XC-1S	0150-2347	C1250-SE-XC-1S	0150-2350
C1250-PN-XC-1S	0150-2348	C1250-SC-XC-1S	0150-2349	C1250-EC-XC-1S	0150-2345

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 Ltd.

I declare that as the authorized representative, the above information in relation to the supply/manufacture of this product is in conformity with the stated standards and other related documents in compliance with the protection requirements of the Electromagnetic Compatibility (EMC) Directive 2004/108/EC and Safety tests according to the 2006/95/EC harmonized standard EN 50371: 2002.

Standards Complied with:

EN 61000-6-2: 2005		Immunity for industrial environments	
EN 61000-4-2	Class B and FS	Electrostatic discharge immunity (ESD)	
EN 61000-4-3	Class A and FS	Radiated electromagnetic field immunity	
EN 61000-4-4	Class B and FS	Fast transients / burst immunity (EFT)	
EN 61000-4-5	Class B and FS	Slow transients immunity (Surge)	
EN 61000-4-6	Class A and FS	Conducted radio frequency immunity	
EN 61000-4-8	Class A and FS	Power frequency magnetic field immunity	
EN 61326-3-1	FS	EMC immunity (functional safety)	
EN 61000-6-4: 2007		Emission for industrial environments	
EN 55022	Class A	Stationary interference voltage AC mains	
EN55022	Class A	Stat. Asym. Interference current on Telco lines	
EN 55022	Class A	Radiated Emission	
EN 61326-3-1:2008		Functional Safety	
EN 50371		Human exposure to electromagnetic fields	
EN 5022		Radio disturbance (IT equipment)	
EN 5011		Radio disturbance (ISM)	
CISPR 22: 2005		Radio disturbance (IT equipment)	

Company: NTI Ltd.
 Spreitenbach, June 25, 2013



 R. Rohner / CEO NTI AG

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