LinMot®

Installation Documentation for the following Controllers:

- **B1100-PP (-HC, -XC)**
- **B1100-VF (-HC, -XC)**
- **B1100-GP (-HC, -XC)**

Servo Controller Installation Guide

Document version: 3.9.1 / Ro / November 2008

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Important notes for B1100 series controllers

C A U T I O N !

In order to assure a safe and error free operation, and to avoid severe damage to system components, all system components must be directly attached to a single ground bus that is earth or utility grounded (see chapter Power Supply and Grounding).

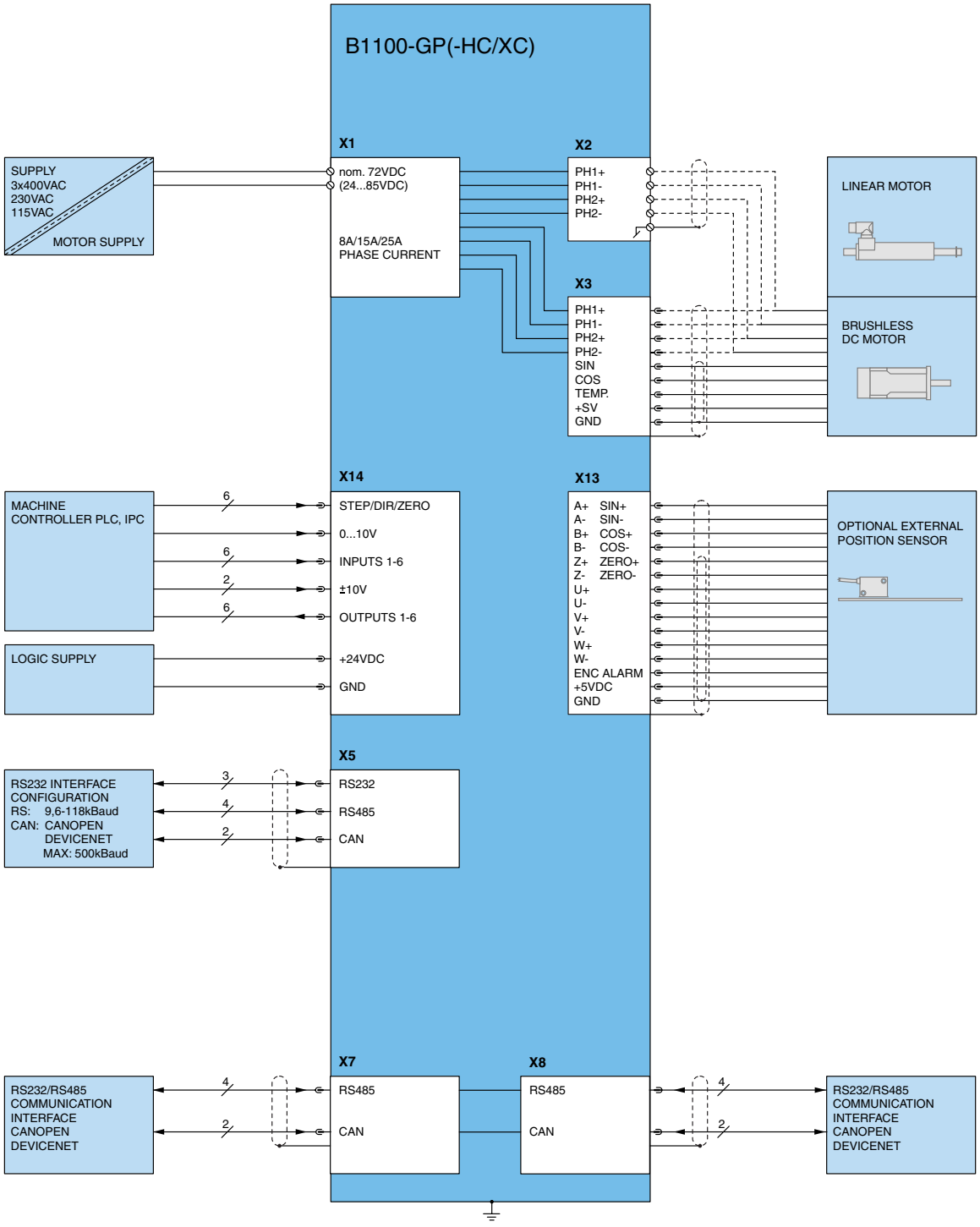
Each system component should be tied directly to the ground bus (star pattern), rather than daisy chaining from component to component. (LinMot motors are properly grounded through their power cables when connected to LinMot controllers) (see chapter Power Supply and Grounding).

All connectors must not be connected or disconnected while DC voltage is present. Do not disconnect system components until all LinMot controllers LEDs have turned off. (Capacitors in the power supply may not fully discharge for several minutes after input voltage has been disconnected). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers.

Do not switch Power Supply DC Voltage. All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supply.

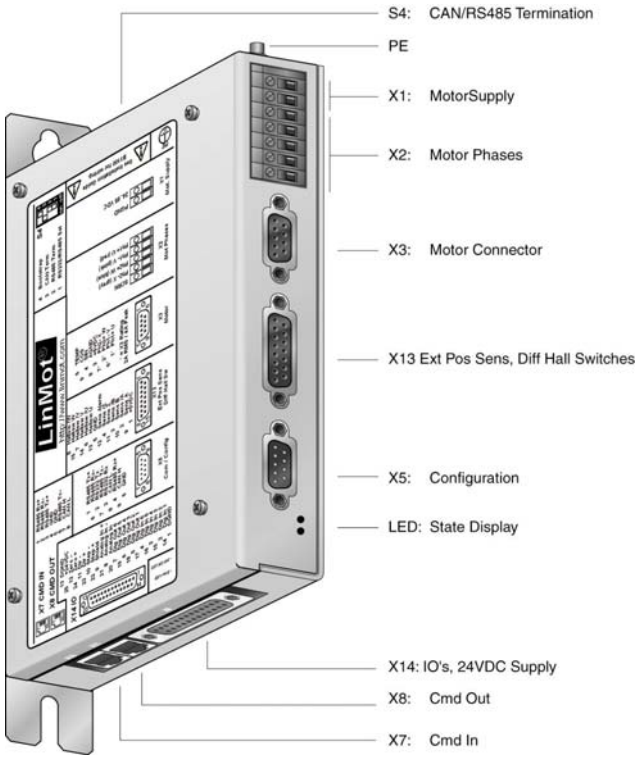
Do not connect or disconnect the motors from controllers with voltage present. Wait to connect or disconnect motors until all LinMot controllers LEDs have turned off. (Capacitors may not fully discharge for several minutes after power has been turned off).
Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers.

System Overview



Typical servo system B1100-XX-YY: Servo controller, motor and power supply.

B1100 Interfaces



		B1100-PP /-HC/-XC	B1100-VF /-HC/-XC	B1100-GP /-HC/-XC
Connector				
X1	Motor Supply	●	●	●
X2	Motor Phases (Screw Terminals)	●	●	●
X3	Motor / Motor Signals	●	●	●
X5	Com / Config RS232, RS485, CAN	●	●	●
X7	RS485 / CAN In	●	●	●
X8	RS485 / CAN Out	●	●	●
X13	External/Simulated Position Encoder Diff Hall Switches	●	●	●
X14	6 Digital Inputs 6 Digital Outputs Analog In 0..10V Analog In –10V.. +10V Diff Step Dir zero 24V Logic Supply	●	●	●
LED	State Indicator	●	●	●
S4	Bus Termination	●	●	●

Functionality

	B1100-PP	B1100-PP-HC	B1100-PP-XC	B1100-VF	B1100-VF-HC	B1100-VF-XC	B1100-GP	B1100-GP-HC	B1100-GP-XC
Supply Voltage									
Motor Supply 72VDC (24...85VDC)	●	●	●	●	●	●	●	●	●
Logic Supply 24VDC (22...26VDC)	●	●	●	●	●	●	●	●	●
Motor Phase Current									
8A $_{peak}$ / 6A $_{rms}$	●			●			●		
15A $_{peak}$ / 9A $_{rms}$		●			●			●	
25A $_{peak}$ / 12A $_{rms}$			●			●			●
Controllable Motors									
LinMot P01-23x…	●	●	●	●	●	●	●	●	●
P01-37x…	●	●	●	●	●	●	●	●	●
P01-48x…	●	●	●	●	●	●	●	●	●
DC Motors	●	●	●	●	●	●	●	●	●
Brushless DC / EC Motors	●	●	●	●	●	●	●	●	●
Command Interface									
Easy Steps Max. 6 Commands	●	●	●	●	●	●	●	●	●
+/-10V Current Command Interface				●	●	●	●	●	●
Step Direction Indexer Interface				●	●	●	●	●	●
Cmd Tab IO Interface (X14-IOs)				●	●	●	●	●	●
RS232 up to 115.2 kBaud							●	●	●
RS485 up to 115.2 kBaud							●	●	●
CANOpen up to 1MBaud							●	●	●
DeviceNet 125, 250, 500 kBaud							●	●	●
External Position Sensor									
Incremental RS422 up to 2 MHz	●	●	●	●	●	●	●	●	●
Position Indexer Input									
Step Dir Zero/ ABZ RS422 up to 2 MHz				●	●	●	●	●	●
Position Encoder Simulation									
AB RS422 up to 2.5 MHz				●	●	●	●	●	●
Configuration									
RS232 Configuration	●	●	●	●	●	●	●	●	●
CAN Multi Axes Configuration	●	●	●	●	●	●	●	●	●

Software

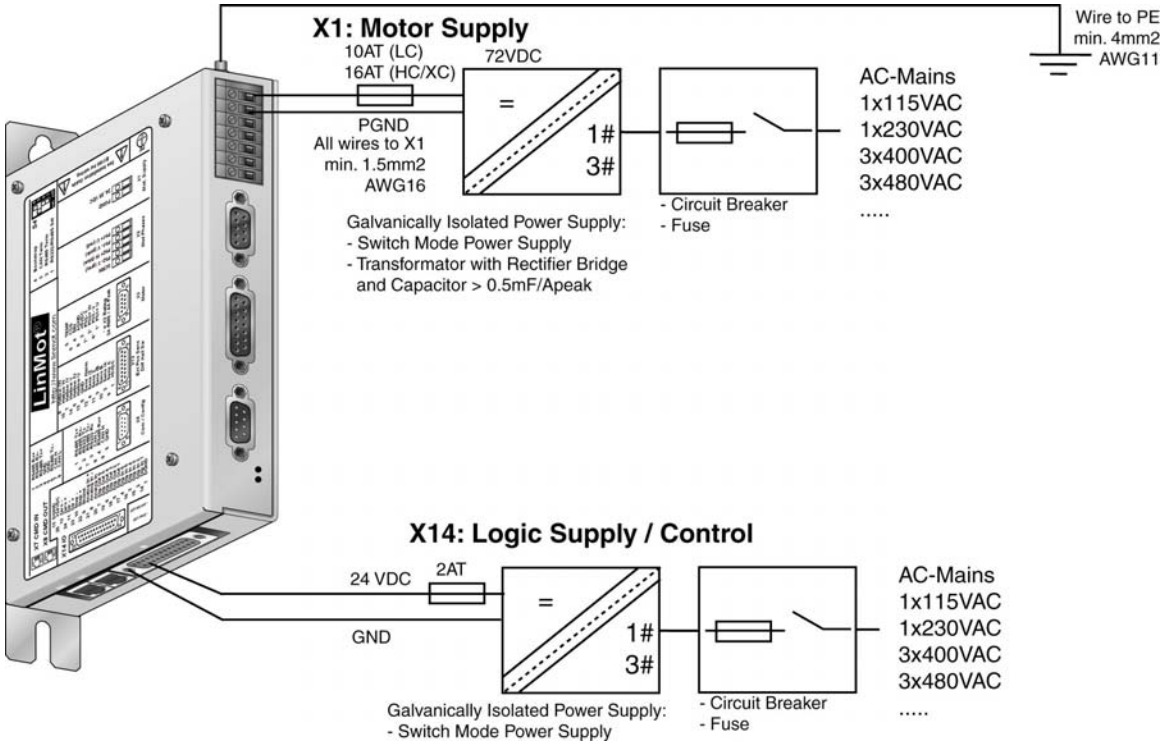
The configuration SW LinMotTalk1100 is free of charge and can be downloaded from our home page.

For fast results see also the quick start guides and configurations for the B1100-PP and B1100-VF controllers:

- QuickStartGuide_B1100-PP.pdf
- QuickStartGuide_B1100-VF.pdf

This quick start guides are distributed with the LinMotTalk1100 SW.

Power Supply and Grounding



*****Inside of the B1100 controller the *PWR motor GND* and *PWR signal GND* is connected together and to the GND of the controller housing. It is recommended that the *PWR motor GND* is NOT grounded at another place than inside of the controller to avoid circular currents.

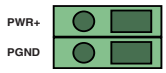
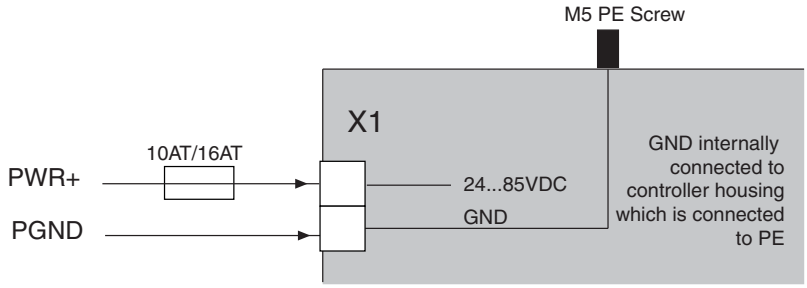
In order to assure a safe and error free operation, and to avoid severe damage to system components, **all system components* must be well grounded to either a single earth or utility ground.** This includes both LinMot and all other control system components to the same ground bus.

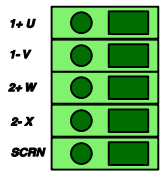
Each system component* should be tied directly to the ground bus **(star pattern**), rather than daisy chaining from component to component. (LinMot motors are properly grounded through their power cables when connected to LinMot controllers.)

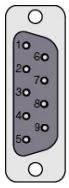
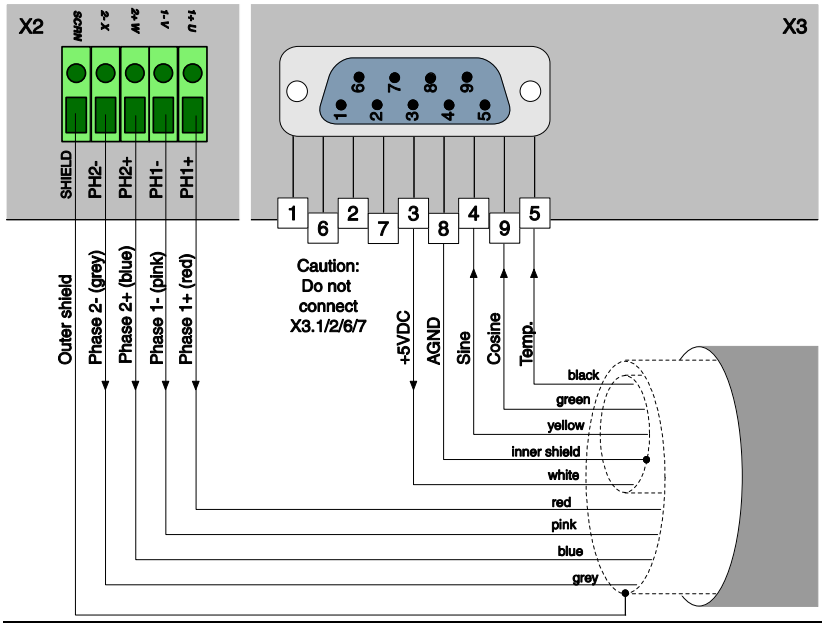
Power supply connectors must not be connected or disconnected while DC voltage is present. Do not disconnect system components until all LinMot controllers LEDs have turned off. (Capacitors in the power supply may not fully discharge for several minutes after input voltage has been disconnected). Failure to observe these precautions may result in severe damage to electronic components in LinMot motors and/or controllers.

Do not switch Power Supply DC Voltage. All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supply. Failure to observe these precautions may result in severe damage to controller.

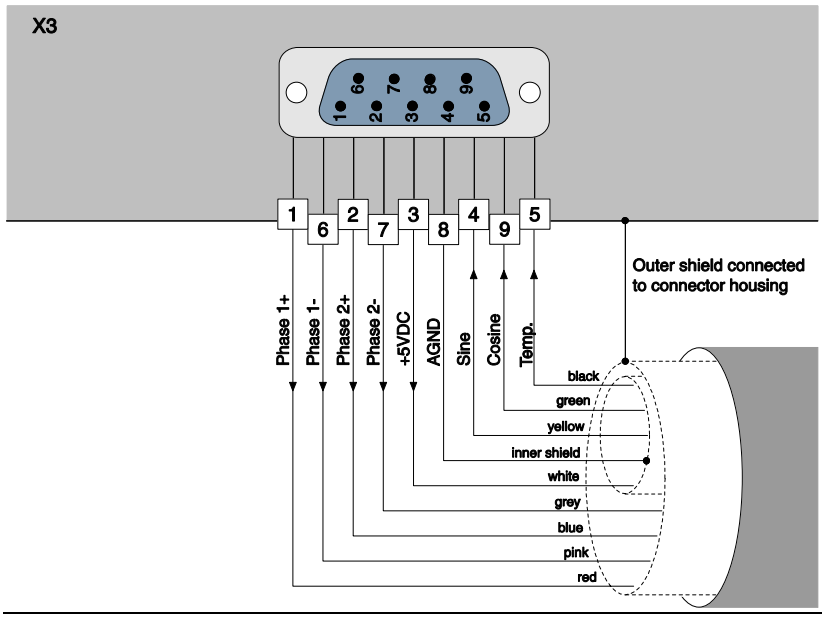
Description of the connectors / Interfaces

X1:	Motor Supply
	
Screw Terminals	Motor Supply: 72VDC nominal, 24...85VDC Absolute max. Rating: 72VDC +20%. External Fuse: 10AT for LC (8Apeak), 16AT for HC and XC (15A/25Apeak) servos. If motor supply voltage exceeds 90VDC, the controller will go into error state. - Tightening Torque: min 0.4Nm - Screw Thread: M 2,5 - Use 60/75°C copper conductors only - Conductor Cross-Section max. 2.5mm^2

X2:	Motor Phases		
		**LinMot Motor:**	**3-phase EC-Motor:**
	PH1+ /U	Motor Phase 1+ red	Motor Phase U
	PH1- /V	Motor Phase 1- pink	Motor Phase V
	PH2+ /W	Motor Phase 2+ blue	Motor Phase W
	PH2-	Motor Phase 2- grey	
	SCRN	Shield	
Screw Terminals	The motor phases are present at X2 and X3. It is recommended to use X2. It is only allowed to use X3 for connecting motor phases if RMS current is below 2A and peak current is below 4A. Never connect motor phases on X2 and X3! - Tightening Torque: min 0.4Nm - Screw Thread: M 2,5 - Conductor Cross-Section: max. 2.5mm^2 - Use 60/75°C copper conductors only		

X3:	Motor		
		**LinMot Motor:**	**3-phase EC-Motor:**
	1	Motor Phase 1+	
	2	Motor Phase 2+	
	3	+5VDC	+5VDC (Hall Supply)
	4	Sensor Sine	Hall 1
	5	Temp. In	Hall 3
	6	Motor Phase 1-	
	7	Motor Phase 2-	
	8	AGND	AGND (Hall Supply)
	9	Sensor Cosine	Hall 2
	case	Shield	
DSUB-9 (f)	Note: Use +5V (X3.3) and AGND (X3.8) only for motor internal hall sensor supply (max. 100mA). Caution: Do NOT connect AGND (X3.8) to ground or earth! It is only allowed to use X3 for connecting the motor phases if RMS current is below 2A and peak current below 4A.		
Motor Wiring for Phase Currents above 2A RMS 4A peak (recommended general wiring)			
			
	Important: If motor phase current exceeds $2A_{RMS}$ or $4A_{peak}$, motor phases must be wired to X2.		

Motor wiring for Phase Currents below 2A RMS 4A peak

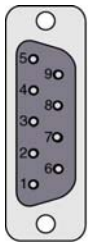


Important:
Motor phases may only be connected to X3 if RMS current is below 2A and peak current is below 4A.

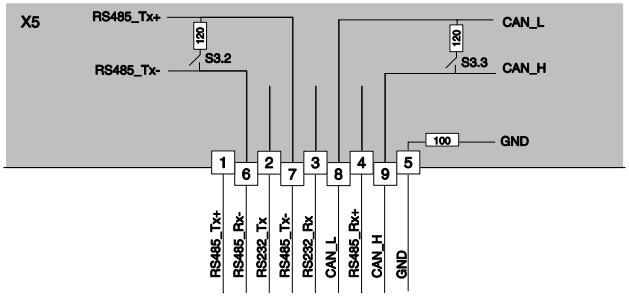
LED:	**State Display**	
Error 24V Ok	Green Red	24V Logic Supply OK Error (Fatal Error blinking)

S4:	**Bus Termination**	
4 3 2 1 on off **S4**	S4	Switch 4: Bootstrap Switch 3: Termination CAN on/off Switch 2: Termination RS485 on/off Switch 1: RS232 (switch “off” / RS485 “on”). Selection for RS232 or RS485 Factory settings: Switch 3 “on”, all other switches “off”

X5: **COM**

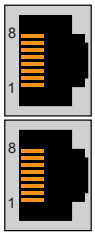


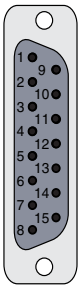
1	RS485_Tx+	Y
2	RS232_Tx	
3	RS232_Rx	
4	RS485_Rx+	A
5	GND	
6	RS485_Rx-	B
7	RS485_Tx-	Z
8	CAN_L	
9	CAN_H	
case	Shield	



DSUB-9 (m)

RS232: Configuration on all controllers: use 1:1 connection cable to PC

X7 - X8	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 CAN and RS485 terminations can be activated by S4.2 and S4.3. X7 is internally connected to X8 (1:1 connection)		

X13:	External Position Sensor Differential Hall Switches	
	1	+5V DC
	9	A+
	2	A-
	10	B+
	3	B-
	11	Z+
	4	Z-
	12	Encoder Alarm
	5	GND
	13	U+
	6	U-
	14	V+
	7	V-
	15	W+
	8	W-
	case	Shield

DSUB-15 (f)

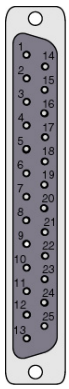
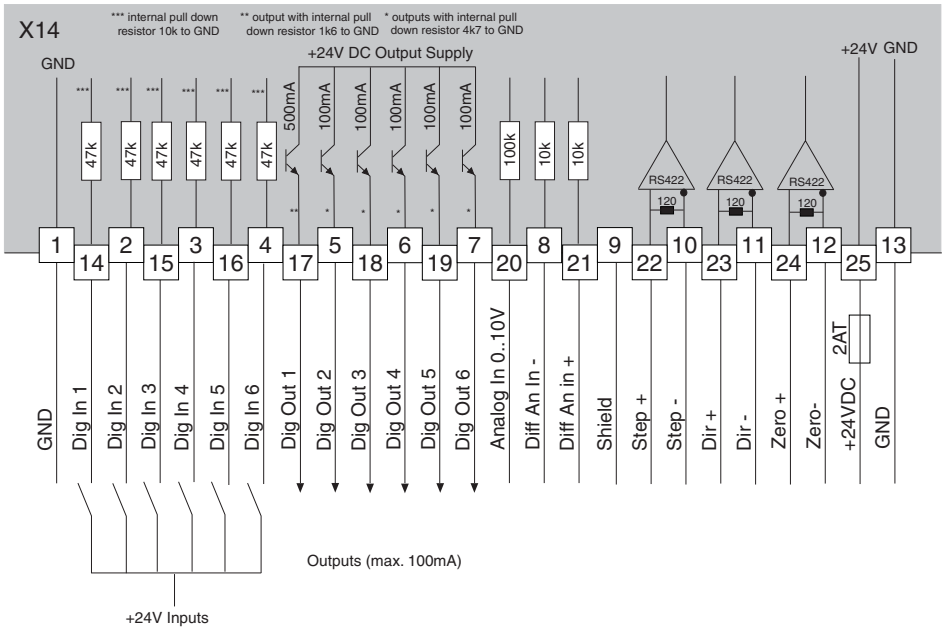
Position Encoder Inputs:
RS422
Max Input Frequency: 2MHz, 4 M counts/s with quadrature decoding, 240ns edge separation

Encoder Simulation Outputs:
RS422
Max Output Frequency: 2.5MHz, 5 M counts/s with quadrature decoding, 200ns edge separation

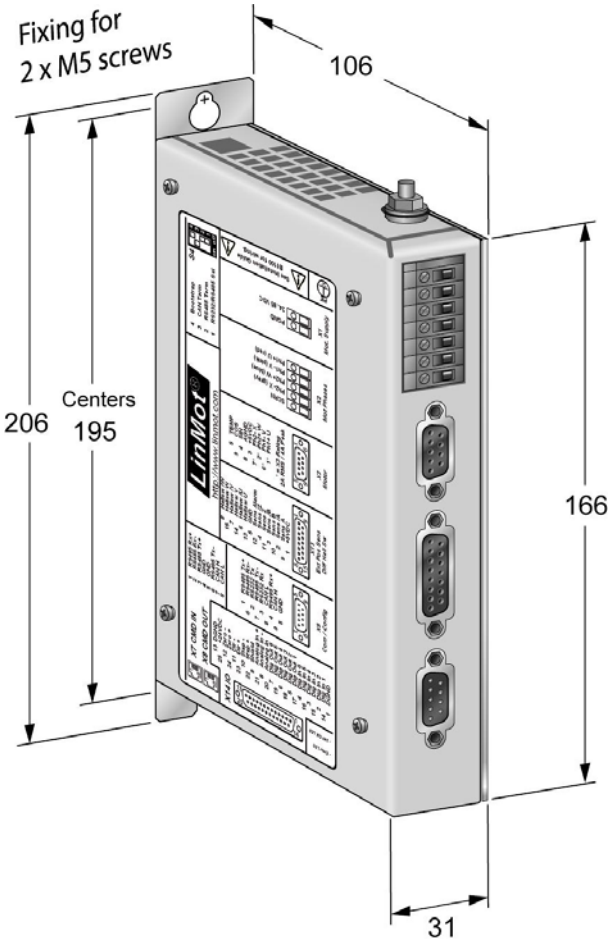
Differential Hall Switch Inputs:
RS422
Input Frequency: <1kHz

Enc. Alarm In:
5V / 1mA

Sensor Supply:
5VDC max 100mA

X14:	24VDC Supply and IOs
	
DSUB-25 (f)	Logic Supply: Switch Mode Power Supply: 24VDC (22...26VDC) External Fuse: 2AT All Digital Inputs: Direct interfacing to digital 24VDC PLC outputs. Input Current: 1mA Sample Rate: 400us All Digital Outputs: Short circuit and overload protected high side switches. Voltage: 24VDC Update Rate: 400us Max. Current: 100mA/500mA (X14.17) Peak Current: 370mA/1100mA (X14.17) will shut down if exceeds Outputs may directly drive inductive loads. Do not connect any capacity because of the peak current! Analog Input on X14.20: Range: 0V..+10V 10Bit ADC Sample Rate: 400us Differential Analog Input on X14.8 X14.21 X14.9 Shield: Range: -10V..+10V 10Bit ADC Sample Rate: 400us Differential Step Dir Zero: Indexer Inputs: RS422, Max. Input Frequency: 2MHz, 4 M counts/s with quadrature decoding, 240ns edge separation

Physical Dimension



B1100 *Single axes controller*		
Width	mm (in)	31 (1.3)
Height	mm (in)	166 (6.6)
Height with fixings	mm (in)	206 (8.1)
Depth	mm (in)	106 (4.2)
Weight	g (lb)	700 (1.6)
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
Max. Case Temperature	°C	70
Max. Power Dissipation	W	30
Distance between Controllers	mm (in)	20 (0.8) horizontal 50 (2) vertical

( ) dimensions in inch

Power Supply Requirement

Power Supply motor

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 VDC. The possible range is from 24 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…)

To provide short circuit power limitation, it is recommended to use an external fuse (10AT for blank labeled (LC) and 16AT for HC and XC labeled controllers).

Recommended Power supplies:

Item	Description	Art. No.
T01-72/420	72VDC, 15A peak, 420VA, 3x400VAC	0150-1966
T01-72/420-US	72VDC, 15A peak, 420VA, 3x230VAC	0150-1967
T01-72/900	72VDC, 30A peak, 900VA, 3x400VAC	0150-1842
T01-72/900-US	72VDC, 30A peak, 900VA, 3x230VAC	0150-1843
T01-72/1500	72VDC, 2x30A peak, 1500VA, 3x400VAC	0150-1844
T01-72/1500-US	72VDC, 2x30A peak, 1500VA, 3x230VAC	0150-1845

Power Supply signal

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. 200mA	(no load on the outputs)
	Typ. 0.5A	(all 6 outputs “on” with 50mA load and /Break with no load)
	Max. 1.2A	(all 6 outputs “on” with 100mA load and /Break with 0.5A load)

To limit the power in case of malfunction, it is recommended to use an external fuse (2AT).

Ordering Information

Servo Controller	Description		Art. No.
B1100-GP	General Purpose Controller	72VDC/8A	0150-1737
B1100-GP-HC	General Purpose Controller	72VDC/15A	0150-1738
B1100-GP-XC	General Purpose Controller	72VDC/25A	0150-1741
B1100-PP	Point to Point Controller	72VDC/8A	0150-1735
B1100-PP-HC	Point to Point Controller	72VDC/15A	0150-1736
B1100-PP-XC	Point to Point Controller	72VDC/25A	0150-1740
B1100-VF	Current Command Controller	72VDC/8A	0150-1685
B1100-VF-HC	Current Command Controller	72VDC/15A	0150-1686
B1100-VF-XC	Current Command Controller	72VDC/25A	0150-1739

International Certifications

Certifications	
Europe CE	See chapter Declaration of Conformity CE-Marking“

Declaration of Conformity CE-Marking

Manufacturer: NTI AG
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Products: *LinMot* ® Controllers

Type	Art.-No.	Type	Art-No.	Type	Art.-No.
B1100-GP	0150-1737	B1100-VF	0150-1685		
B1100-GP-HC	0150-1738	B1100-VF-HC	0150-1686		
B1100-GP-XC	0150-1741	B1100-VF-XC	0150-1739		
B1100-PP	0150-1735				
B1100-PP-HC	0150-1736				
B1100-PP-XC	0150-1740				

The product must be mounted and used in strict accordance with the installation instruction contained within the User's Manual, 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 EMC Directive (89/336/EEC) and is marked in accordance with the CE Marking Directive (93/68/EEC).

Standards Complied with:

EN 61000-6-2			**Immunity for industrial environment**
	EN 61000-4-2	Class B	Electrostatic discharge immunity (ESD)
	EN 61000-4-3	Class A	Radiated electromagnetic field immunity
	EN 61000-4-4	Class B	Fast transients / burst immunity (EFT)
	EN 61000-4-5	Class B	Slow transients immunity (Surges)
	EN 61000-4-6	Class A	Conducted radio frequency immunity
EN 61000-6-4			**Emission for industrial environment**
	EN 55022	Class A	Radiated Emission

Company
NTI Ltd.

Zurich, September 20, 2007

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