
LinMot[®]

CANopen

LinRS



EasySteps

+/-10V Analog

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Servo Controller Installation Guide Preliminary

B1100-PP/HC/XC, B1100-VF/HC/XC, B1100-GP/HC/XC

Document version: 1.0a / whp 21.09.2007

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Note

The information in this documentation reflects the stage of development at the time of press and is therefore without obligation.

NTI AG reserves itself the right to make changes at any time and without notice to reflect further technical advance or product improvement.

Important notes for B1100 series controllers**CAUTION!**

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 controller LED's 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.

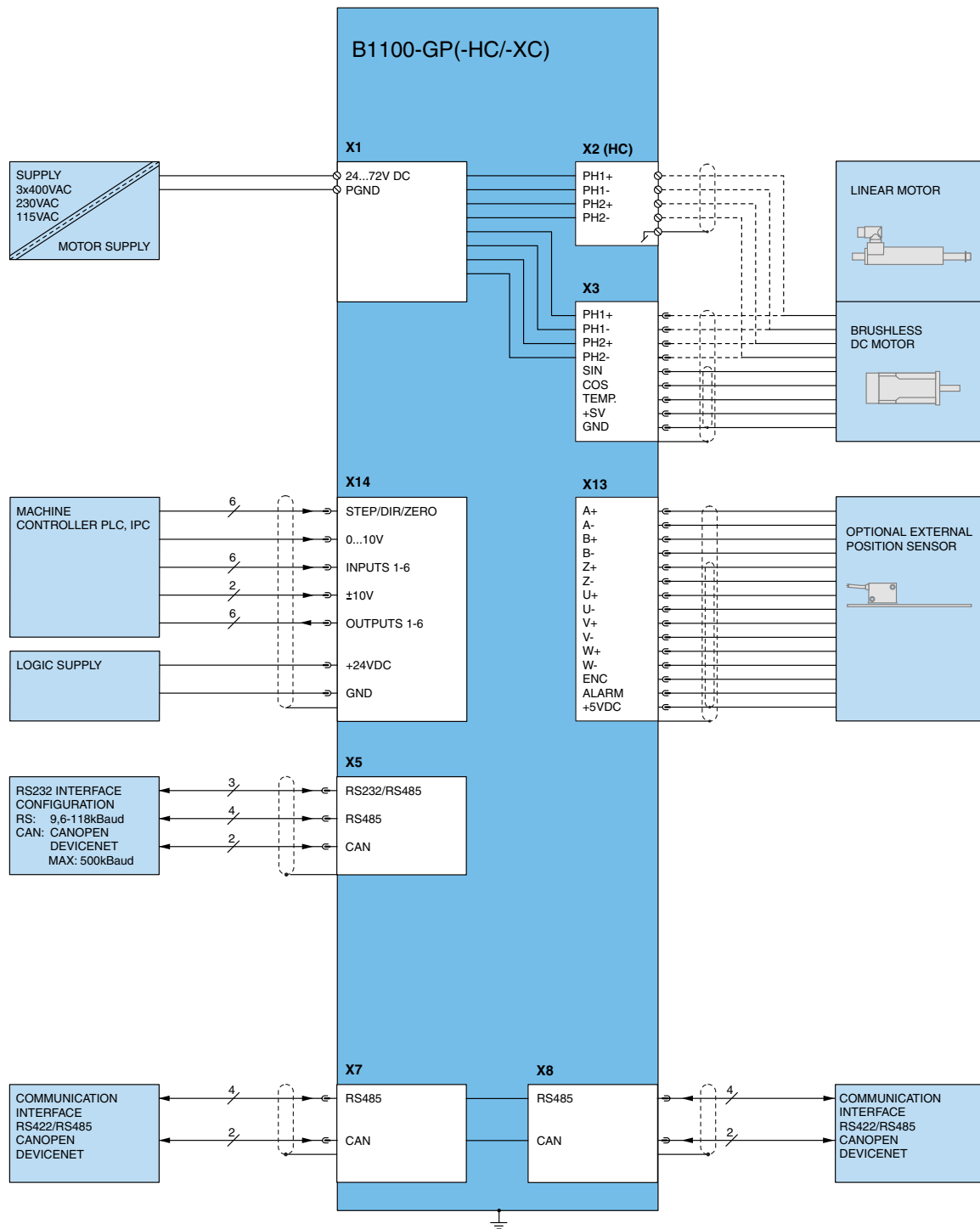


Do not switch Power Supply DC Voltage. All power supply switching and E-Stop breaks should be done to the AC supply voltage of the power supply.



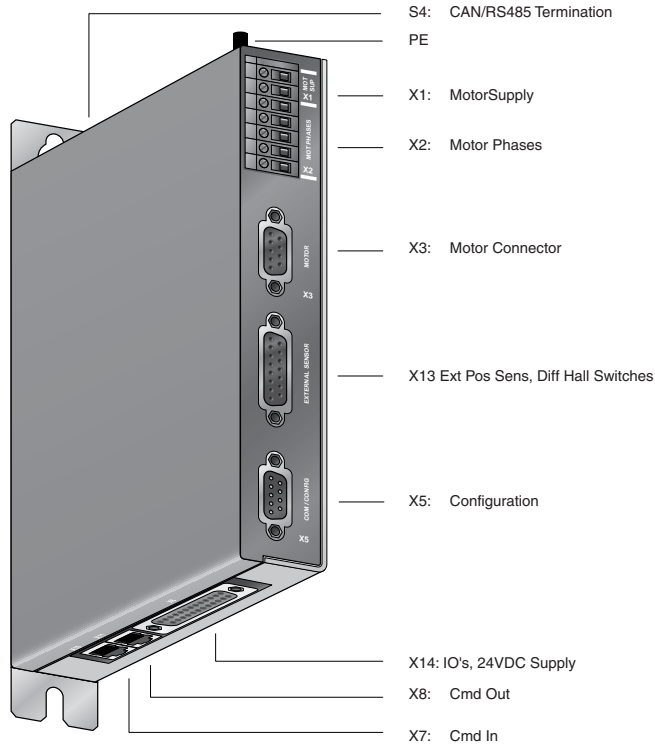
Do not connect or disconnect the motors from controllers with voltage present. Wait to connect or disconnect motors until all LinMot controllers LED's have turned off. (Capacitors may not fully discharge for several minutes after power has been turned off). Failure to observe these precautions may result 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



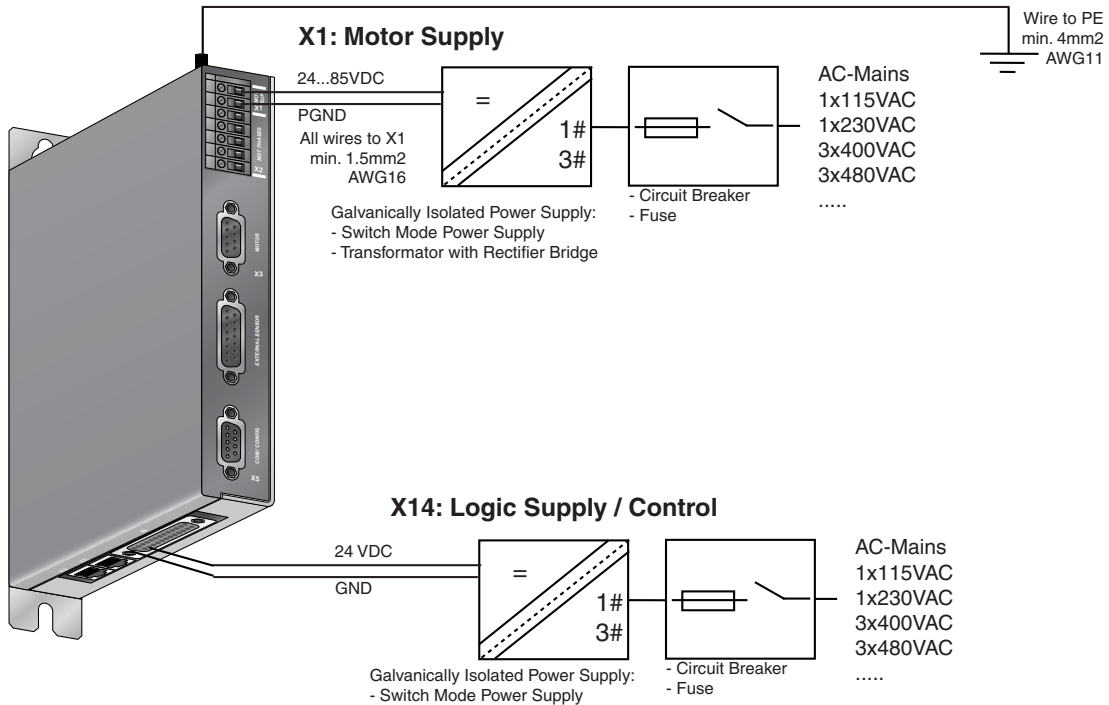
	B1100-PP /-HC/-XC	B1100-VF /-HC/-XC	B1100-GP/-HC/-XC
Connector			
X1 Motor Supply	•	•	•
X2 Motor Phases (Screw Terminals)	•	•	•
X3 Motor / Motor Signals	•	•	•
X5 Com / Config RS232, RS485, CAN	•	•	•
X7 RS485 / CAN In	•	•	•
X8 RS485 / CAN Out	•	•	•
X13 External/Simulated Position Encoder Diff Hall Switches	•	•	•
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}	•			•			•		
15A _{peak}		•			•			•	
25A _{peak}			•			•			•
Controllable Motors									
LinMot P01-23x...	•	•	•	•	•	•	•	•	•
P01-37x...	•	•	•	•	•	•	•	•	•
P01-48x...	•	•	•	•	•	•	•	•	•
DC Motors	•	•	•	•	•	•	•	•	•
Brushless DC / EC Motors	•	•	•	•	•	•	•	•	•
Command Interface									
Easy Steps Max 6 Commands	•	•	•	•	•	•	•	•	•
+/-10V Current or Velocity Command Interface				•	•	•	•	•	•
Step Direction Indexer Interface				•	•	•	•	•	•
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	•	•	•	•	•	•	•	•	•

* Available from Mar 2008

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.)

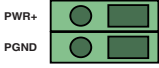
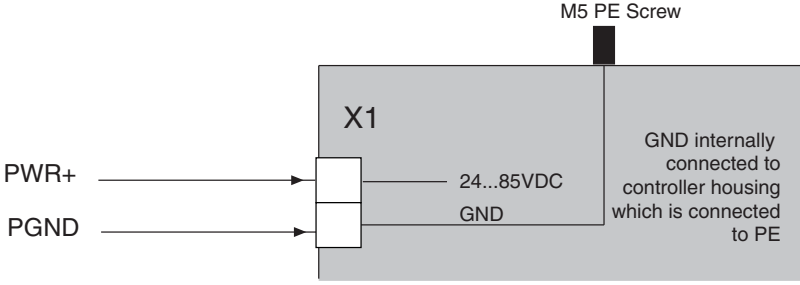
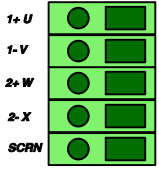


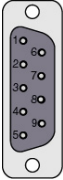
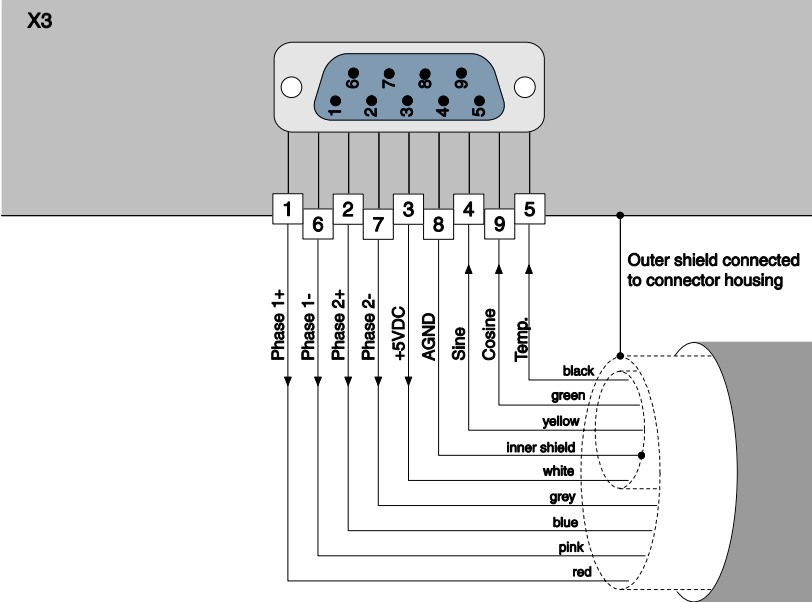
Power supply connectors must not be connected or disconnected while DC voltage is present. Do not disconnect system components until all LinMot controller LED's have turned off. (Capacitors in the power supply may not fully discharge for several minutes after input voltage has been disconnected). Failure 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.

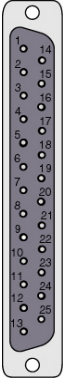
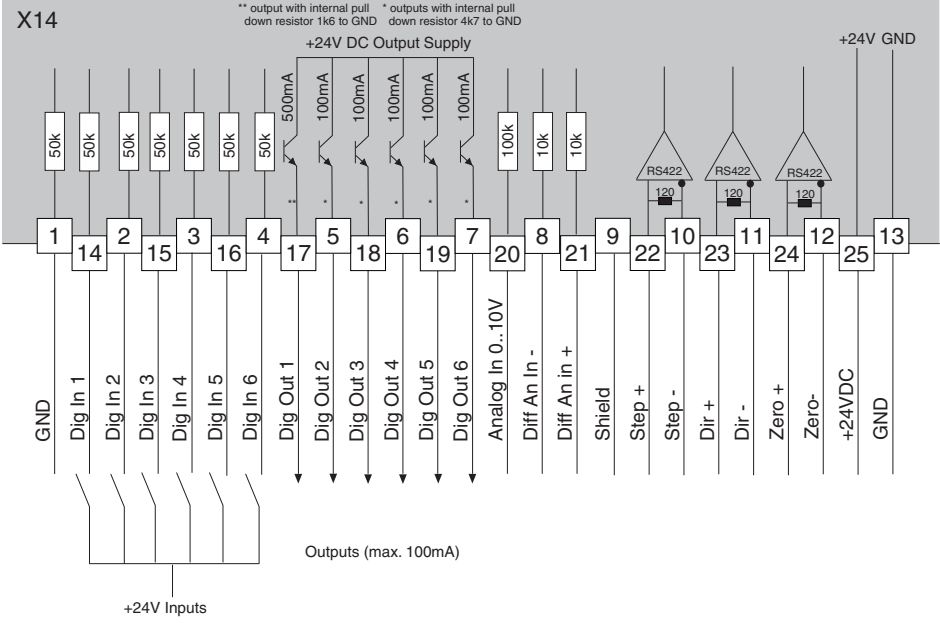
Description of the connectors / Interfaces

X1: Motor Supply																			
 <p>PWR+ PGND</p>	 <p>M5 PE Screw</p> <p>X1</p> <p>PWR+ → 24...85VDC</p> <p>PGND → GND</p> <p>GND internally connected to controller housing which is connected to PE</p>																		
Screw Terminals	<p>Motor Supply: 24...85VDC; 72VDC nominal Absolute max. Rating: 72VDC +20%.</p> <p>If motor supply voltage exceeds 90VDC, the controller will go into error state.</p> <ul style="list-style-type: none"> - Tightening Torque: min 0.4Nm - Screw Thread: M 2,5 - Use 60/75°C copper conductors only - Conductor Cross-Section max. 2.5mm² 																		
X2: Motor Phases																			
 <p>1+ U 1- V 2+ W 2- X SCRN</p>	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%;"></td> <td style="width: 35%;">LinMot Motor:</td> <td style="width: 35%;">3-phase EC-Motor:</td> </tr> <tr> <td>PH1+ /U</td> <td>Motor Phase 1+ red</td> <td>Motor Phase U</td> </tr> <tr> <td>PH1- /V</td> <td>Motor Phase 1- pink</td> <td>Motor Phase V</td> </tr> <tr> <td>PH2+ /W</td> <td>Motor Phase 2+ blue</td> <td>Motor Phase W</td> </tr> <tr> <td>PH2- /X</td> <td>Motor Phase 2- grey</td> <td></td> </tr> <tr> <td>SCRN</td> <td>Shield</td> <td></td> </tr> </table>		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- /X	Motor Phase 2- grey		SCRN	Shield	
	LinMot Motor:	3-phase EC-Motor:																	
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PH2+ /W	Motor Phase 2+ blue	Motor Phase W																	
PH2- /X	Motor Phase 2- grey																		
SCRN	Shield																		
Screw Terminals	<p>The motor phases are present at X2 and X3. If the RMS current is higher than 2A RMS, the phases must be connected to X2 and not to X3. Never connect both.</p> <ul style="list-style-type: none"> - Tightening Torque: min 0.4Nm - Screw Thread: M 2,5 - Conductor Cross-Section: max. 2.5mm² - Use 60/75°C copper conductors only 																		

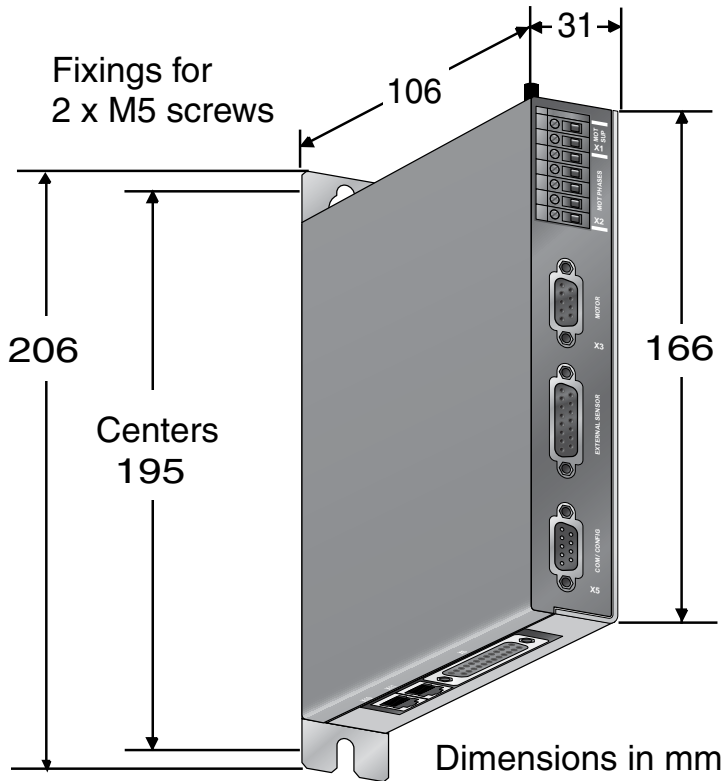
X3:	Motor	
	<p>LinMot Motor:</p> <ul style="list-style-type: none"> 1 Motor Phase 1+ 2 Motor Phase 2+ 3 +5VDC 4 Sensor Sine 5 Temp. In 6 Motor Phase 1- 7 Motor Phase 2- 8 AGND 9 Sensor Cosine case Shield 	<p>3-phase EC-Motor:</p> <ul style="list-style-type: none"> +5VDC (Hall Supply) Hall 1 Hall 3 AGND (Hall Supply) Hall 2
<p>DSUB-9 (f)</p>	<p><u>Note:</u> Use +5V (X3.3) and AGND (X3.8) only for motor internal hall sensor supply (max. 100mA).</p> <p><u>Caution:</u> Do NOT connect AGND (X3.8) to ground or earth! Use X2 for motor phases controllers if RMS current exceeds 2 A_{rms}.</p>	
<p>Motor wiring for Phase Currents below 2A RMS 4A peak</p>		
		
	<p><u>Important:</u> Motor phases may be connected to X3 up to 2A_{rms} and 4A_{peak} phase current.</p>	

Motor Wiring for High Phase Currents above 2A RMS 4A peak																															
	<p>Important: If motor phase current exceeds $2A_{rms}$ or $4A_{peak}$, motor phases must be wired to X2.</p>																														
<p>LED:</p>	<p>State Display</p>																														
<p>Error ● ● 24V Ok</p>	<p>Green 24V Logic Supply OK Red Error (Fatal Error blinking)</p>																														
<p>S4:</p>	<p>Bus Termination</p>																														
	<p>S4 Switch 4: Bootstrap Switch 3: Termination CAN on/off Switch 2: Termination RS485 on/off Switch 4: RS232 (switch "off" / RS485 "on"). Selection for RS232 or RS485 Factory settings: all switches "off"</p>																														
<p>X5:</p>	<p>COM</p>																														
	<table border="1"> <tr> <td>1</td> <td>RS485_Tx+</td> <td>Y</td> </tr> <tr> <td>2</td> <td>RS232_Tx</td> <td></td> </tr> <tr> <td>3</td> <td>RS232_Rx</td> <td></td> </tr> <tr> <td>4</td> <td>RS485_Rx+</td> <td>A</td> </tr> <tr> <td>5</td> <td>GND</td> <td></td> </tr> <tr> <td>6</td> <td>RS485_Rx-</td> <td>B</td> </tr> <tr> <td>7</td> <td>RS485_Tx-</td> <td>Z</td> </tr> <tr> <td>8</td> <td>CAN_L</td> <td></td> </tr> <tr> <td>9</td> <td>CAN_H</td> <td></td> </tr> <tr> <td>case</td> <td>Shield</td> <td></td> </tr> </table>	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	
1	RS485_Tx+	Y																													
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7	RS485_Tx-	Z																													
8	CAN_L																														
9	CAN_H																														
case	Shield																														
<p>DSUB-9 (m)</p>	<p>RS232: Configuration on all controllers: use 1:1 connection cable to PC</p>																														

X7 - X8	RS485/CAN		
	<p>1 2 3 4 5 6 7 8 case</p>	<p>RS485_Rx+ RS485_Rx- RS485_Tx+ GND GND RS485_Tx- CAN_H CAN_L Shield</p>	<p>A B Y Z</p>
<p>RJ-45</p>	<p>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)</p>		
X13:	External Position Sensor Differential Hall Switches		
	<p>1 2 3 4 5 6 7 8 case</p>	<p>+5V DC 9 A+ 10 A- 11 B- 12 Z- 13 GND 14 U- 15 V- W- Shield</p>	<p>B+ Z+ Encoder Alarm U+ V+ W+</p>
<p>DSUB-15 (f)</p>	<p>Max. Input Frequency: 2MHz (incremental RS422), 240ns edge separation Sensor Supply Current: max. 100mA Position Encoder Inputs: RS422, Max Input Frequency: 2MHz, 240ns edge separation Encoder Simulated Outputs: RS422, Max Output Frequency: 5MHz, 200ns edge separation Differential Hall Switch Inputs: RS422, Max Input Frequency: <1kHz Enc. Alarm In: 5V / 1mA</p>		

X14:	24VDC Supply and IO's
	
<p>DSUB-25 (f)</p>	<p><u>All Digital Inputs:</u> Direct interfacing to digital 24VDC PLC outputs. Input Current: 1mA Sample Rate: 400us</p> <p><u>All Digital Outputs:</u> Short circuit and overload protected high side switches Voltage: 24VDC Max. Current: 100mA/500mA (X14.17) Update Rate: 400us</p> <p>Outputs may directly drive inductive loads.</p> <p><u>Analog Input on X14.20:</u> Range: 0V..+10V 10Bit ADC Sample Rate: 400us</p> <p><u>Differential Analog Input on X14.8 X14.21 X14.9 Shield:</u> Range: -10V..+10V 10Bit ADC Sample Rate: 400us</p> <p><u>Differential Step Dir Zero:</u> Indexer Inputs: RS422, Max. Input Frequency: 2MHz, 240ns edge separation</p>

Physical Dimension



Dimensions in mm

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...85VDC.



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...)

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)

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/20A	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/20A	0150-1740
B1100-VF	CANopen Controller 72VDC/8A	0150-1685
B1100-VF-HC	CANopen Controller 72VDC/15A	0150-1686
B1100-VF-XC	CANopen Controller 72VDC/20A	0150-1739

International Certifications

Certifications	
Europe 	See chapter Declaration of Conformity CE-Marking“

Declaration of Conformity CE-Marking

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 Fax: +41 (0)56 419 91 92

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
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Zurich, September 20, 2007



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