

## C1251-MI-XC-2S-0E-xxx Servo Drives

Installation Guide – V2.5



Please visit <http://www.linmot.com> to check for the latest version of this document!  
Additionally the Safety Manual for 2S Products must be applied!

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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.

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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**

The power terminals Ph1+, Ph1-, Ph2+, Ph2- and PWR+ remain live for at least 5 minutes after disconnecting from the power supplies.

Before servicing, disconnect supply, wait 5 minutes and measure between PWR+ and PGND to be sure that the capacitors have discharged below 42 VDC.



The metal case of the drive can have an operating temperature of > 80 °C: Contact with the metal case can result in burns.

### 2 System Overview

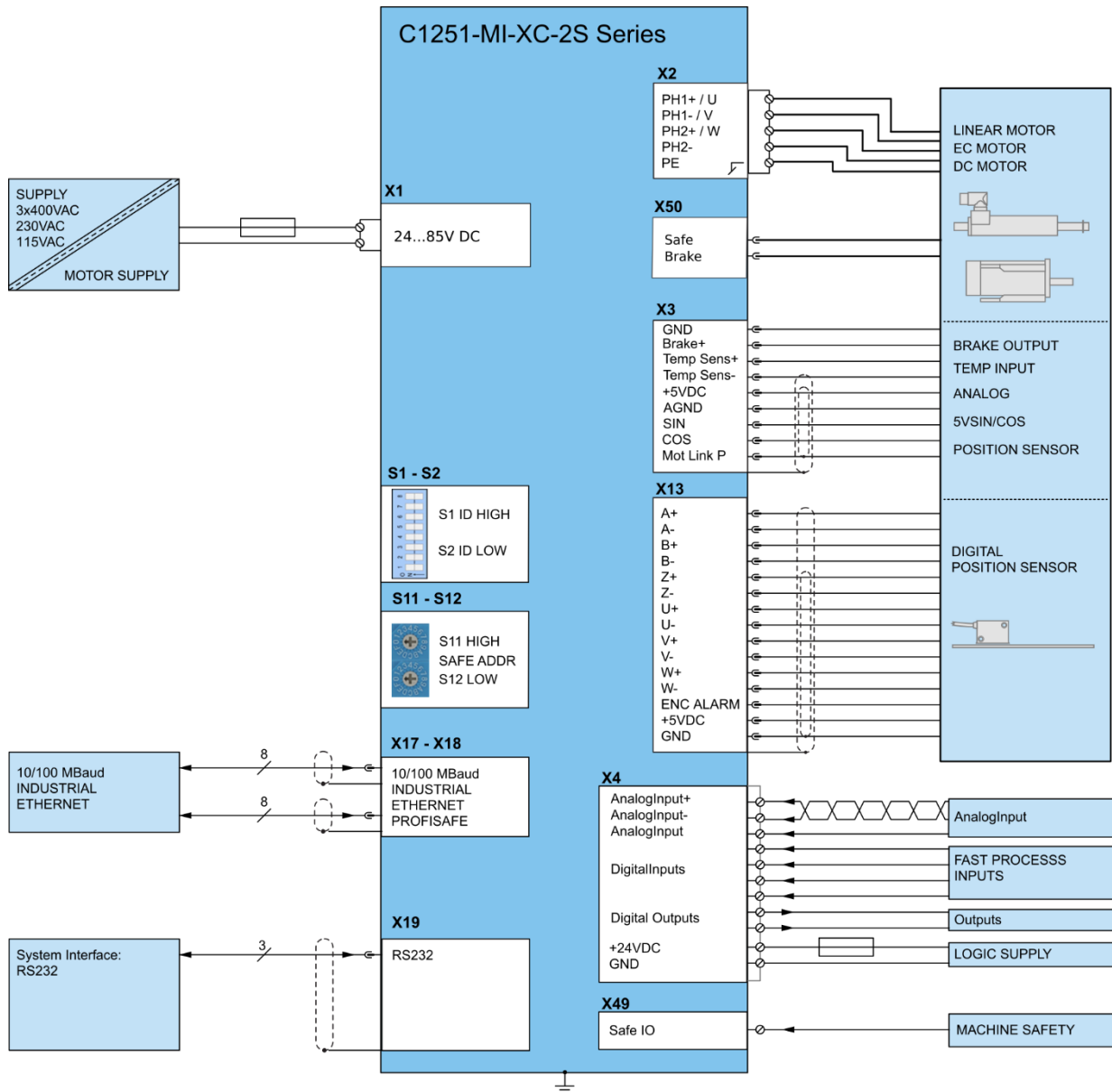


Figure 1: Typical servo system C1251-XX: Servo drive, motor and power supply

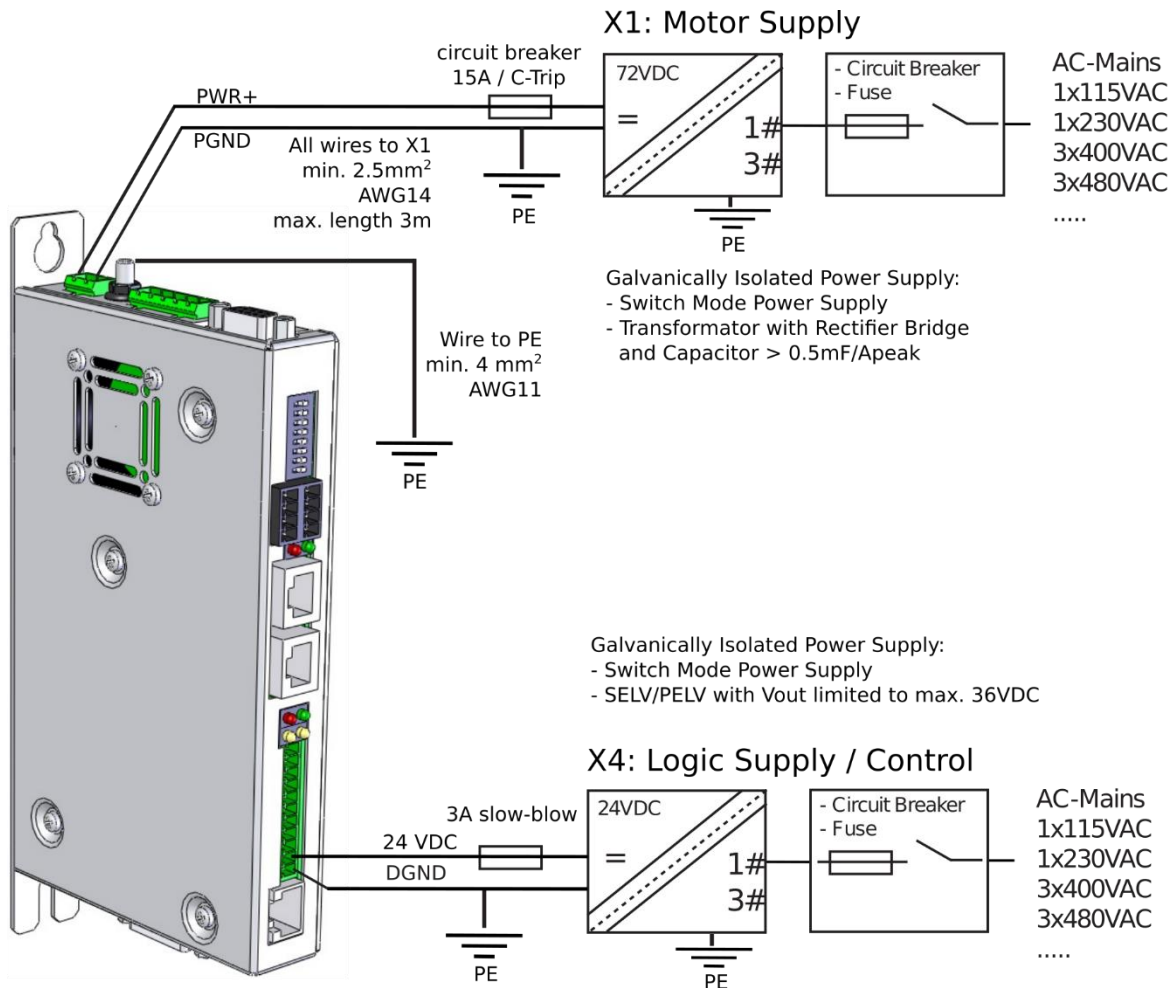
### 3 Functionality

|   | C1251-MI-XC-2S-0E-000 | C1251-MI-XC-2S-0E-C00 |
|---|-----------------------|-----------------------|
| <b>Supply Voltage</b>                               |                       |                       |
| Motor Supply 72VDC (24 to 85 VDC)                   | •                     | •                     |
| Logic Supply 24VDC (22 to 26 VDC)                   | •                     | •                     |
| <b>Motor Phase Current</b>                          |                       |                       |
| 25 A peak (0 to 599 Hz)                             | •                     | •                     |
| <b>Controllable Motors</b>                          |                       |                       |
| LinMot Linear Motors P0x-                           | •                     | •                     |
| LinMot Rotary Motors PR0x-                          | •                     | •                     |
| Selected motors (contact support)                   | •                     | •                     |
| <b>Command Interface</b>                            |                       |                       |
| POWERLINK   | •                     | •                     |
| PROFINET - PROFIdrive - PROFIsafe                   | •                     | •                     |
| SERCOS III  | •                     | •                     |
| ETHERNET IP - CIP Sync                              | •                     | •                     |
| LinUDP  | •                     | •                     |
| EtherCAT - DS402 - FSoE                             | •                     | •                     |
| ETHERNET IP - CIP Sync - CIP Safety                 |                       |                       |
| CC-Link   | •                     | •                     |
| <b>Programmable Motion Profiles (Curves)</b>        |                       |                       |
| Up to 100 Motion Profiles                           | •                     | •                     |
| Up to 16302 Curve Points                            |                       |                       |
| <b>Programmable Command Table</b>                   |                       |                       |
| Command Table with up to 255 entries                | •                     | •                     |
| <b>External Position Sensor</b>                     |                       |                       |
| Incremental (RS422 up to 25 M counts/s)             | •                     | •                     |
| Absolute (SSI, BiSS-B, BiSS-C, EnDat2.1, EnDat 2.2) | •                     | •                     |
| <b>Configuration Interface</b>                      |                       |                       |
| RS232   | •                     | •                     |
| Ethernet (EoE, etc... depending on Interface)       | •                     | •                     |
| <b>Integrated Safety Functions</b>                  |                       |                       |
| 2S Advanced Safety functionality                    | •                     | •                     |
| <b>Calibrated Measuring Functions (-Cxx Option)</b> |                       |                       |
| Calibrated Analog Measuring Functions               |                       | •                     |

### 4 Software

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

### 5 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.



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



**Power supply connectors must not be connected or disconnected while DC voltage is present.** Do not disconnect system components until all LinMot drive 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 drives.



**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 the drive.



## 6 Calibrated Measuring Amplifier (C1251-MI-XC-2S-0E-Cxx)

The drives with the ending **-Cxx** are specially designed for measuring applications. They come with a factory calibration certificate for the analog inputs on X4. The analog inputs on X4 provide a measuring error of less than 1%.

It is the user's responsibility to allow a reasonable period for recalibration. We recommend a calibration interval of 12 months.

## 7 Description of the connectors / Interfaces

### 7.1 PE

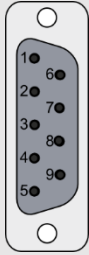
| PE | Protective Earth   |
|----|--|
| PE | <ul style="list-style-type: none"> <li>Use min. 4 mm<sup>2</sup> (AWG11)</li> <li>Tightening torque: 2 Nm (18 lbin)</li> </ul> |

### 7.2 X1

| X1  | Motor Supply   |
|---|--|
|   | <p>PWR+</p> <p>PGND</p>  |
| Connector has to be ordered separately: see chapter 12) | <p><b>Motor Supply:</b> 72VDC nominal, 24 to 85 VDC</p> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>Absolute max. Rating: 72 VDC +20 %.</li> <li>External Circuit Breaker: 15 A / min. 100 VDC / C-Trip / 5 kA rms SCCR</li> <li>If motor supply voltage exceeds 90 VDC, the drive will go into error state.</li> <li>To improve EMC use shielded cables</li> </ul> <p><b>Mating connector (Art. Nr. 0150-3525):</b></p> <ul style="list-style-type: none"> <li>Use 60/75 °C copper conductors only</li> <li>Conductor Cross-Section: 2.5 mm<sup>2</sup> (AWG14) max Length 3 m</li> <li>Stripping length: 7mm</li> <li>Screw thread: M3</li> <li>Tightening torque: 0.5 – 0.6 Nm</li> </ul> |

### 7.3 X2/X3 Motor Connection

| X2  | Motor Phases  |                    |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
|---|---|--------------------|---------------|-------------------|---------|--------------------|-------------------|---------|---------------------|--------------------|---------|---------------------|--------------------|---------|---------------------|--------------------|----|--------|--------|
|   | <table border="1"> <thead> <tr> <th></th> <th>LinMot Motor:</th> <th>3-phase EC-Motor:</th> </tr> </thead> <tbody> <tr> <td>Ph 1+ U</td> <td>Motor Phase 1+ red</td> <td>Motor Phase U red</td> </tr> <tr> <td>Ph 1- V</td> <td>Motor Phase 1- pink</td> <td>Motor Phase V pink</td> </tr> <tr> <td>Ph 2+ W</td> <td>Motor Phase 2+ blue</td> <td>Motor Phase W blue</td> </tr> <tr> <td>Ph 2- X</td> <td>Motor Phase 2- grey</td> <td>Motor Phase X grey</td> </tr> <tr> <td>PE</td> <td>Shield</td> <td>Shield</td> </tr> </tbody> </table> |                    | LinMot Motor: | 3-phase EC-Motor: | Ph 1+ U | Motor Phase 1+ red | Motor Phase U red | Ph 1- V | Motor Phase 1- pink | Motor Phase V pink | Ph 2+ W | Motor Phase 2+ blue | Motor Phase W blue | Ph 2- X | Motor Phase 2- grey | Motor Phase X grey | PE | Shield | Shield |
|   | LinMot Motor:   | 3-phase EC-Motor:  |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
| Ph 1+ U   | Motor Phase 1+ red  | Motor Phase U red  |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
| Ph 1- V   | Motor Phase 1- pink   | Motor Phase V pink |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
| Ph 2+ W   | Motor Phase 2+ blue   | Motor Phase W blue |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
| Ph 2- X   | Motor Phase 2- grey   | Motor Phase X grey |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
| PE  | Shield  | Shield             |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |
| Connector has to be ordered separately: see chapter 12) | <p><b>Mating connector (Art. Nr. 0150-3526):</b></p> <ul style="list-style-type: none"> <li>Use 60/75 °C copper conductors only</li> <li>Conductor Cross-Section: 0.5 - 2.5 mm<sup>2</sup> (depends on Motor current) / AWG 21 -14</li> <li>Stripping length: 7mm</li> <li>Screw thread: M3</li> <li>Tightening torque: 0.5 – 0.6 Nm</li> </ul>   |                    |               |                   |         |                    |                   |         |                     |                    |         |                     |                    |         |                     |                    |    |        |        |

| X3  | Motor Sensor / Brake |      | LinMot Motor: | EC Motor:                     |
|---|----------------------|------|---------------|-------------------------------|
|  | 1                    | 6    | Brake -       | Brake-                        |
|   | 2                    | 7    | Brake+        | Brake+                        |
|   | 3                    | 8    | Temp Sens+    | Temp Sens+                    |
|   | 4                    | 9    | Temp Sens-    | Temp Sens-                    |
|   | 5                    | case | +5VDC         | +5VDC                         |
|   |                      |      | AGND          | AGND                          |
|   |                      |      | Sensor Sine   | Sensor Sine / Hall Switch U   |
|   |                      |      | Sensor Cosine | Sensor Cosine / Hall Switch V |
|   |                      |      | Mot Link P    | Hall Switch W                 |
|   |                      |      | Shield        | Shield                        |

DSUB-9 (f)

**Note:**

- Use +5V (X3.3) and AGND (X3.8) only for motor internal hall sensor supply (max. 100 mA).
- The motor cable length must not exceed 30m.
- Brake+: 24V / max. 500 mA, Peak 1.4 A (will shut down if exceeded) the other terminal must be wired to Brake- (X3.1)

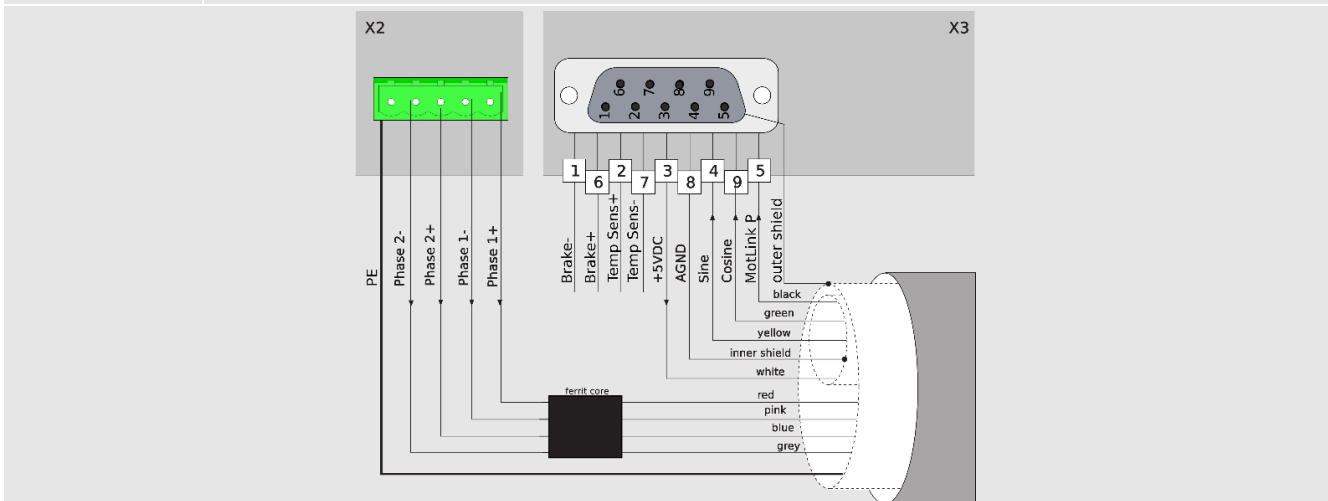
**Locking screws:** Tightening torque 0.4Nm

**Caution:**

- Do NOT connect AGND (X3.8) to GND or earth!

**Temperature Sensor:**

- A resistive temperature sensor (PT1000, KTY) can be connected between Temp Sens+ (X3.2) and Temp Sens- (X3.7)



**Important Notes:**

- Use Y-style motor cables only (for example K15-Y/C)! A W-style cable has a different shielding, so it cannot be modified to a Y-style cable!
- The motor cable length must not exceed 30 m.

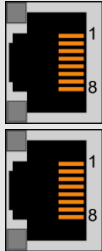
## 7.4 X4

| X4  | Logic Supply / IO Connection   |             |        |   |
|---|--|-------------|--------|---|
|   | 11   | Diff An In- | X4.11  | Configurable differential analog Input (with X4.10) |
|   | 10   | Diff An In+ | X4.10  | Configurable differential analog Input (with X4.11) |
|   | 9  | An In       | X4.9   | Configurable single ended analog Input              |
|   | 8  | Dig In      | X4.8   | Configurable digital Input                          |
|   | 7  | Dig In      | X4.7   | Configurable digital Input                          |
|   | 6  | Dig In      | X4.6   | Configurable digital Input                          |
|   | 5  | Dig In      | X4.5   | Configurable digital Input                          |
|   | 4  | Dig Out     | X4.4   | Configurable digital Output                         |
|   | 3  | Dig Out     | X4.3   | Configurable digital Output                         |
|   | 2  | +24VDC      | Supply | Logic Supply 22-26 VDC                              |
|   | 1  | DGND        | Supply | Ground  |
| <p>Spring cage connector (has to be ordered separately: see chapter 12)</p> | <p><b>Digital inputs</b> (X4.5 ... X4.8): 24 VDC / 5 mA (Low Level: -0.5 to 5 VDC, High Level: 15 to 30 VDC)</p> <p><b>Digital outputs</b> (X4.3 &amp; X4.4): 24 VDC / max. 500 mA, peak 1.4 A (will shut down if exceeded)</p> <p>X4.3: Can be used as brake output for LinMot motors</p> <p>Both outputs are high-side switching with integrated pull-down (1k<math>\Omega</math> to GND)</p> <p><b>Analog inputs:</b> 12 bit A/D converted</p> <p>X4.9: 0..10 V, input resistance: &gt;75 k<math>\Omega</math> to GND</p> <p>X4.10/X4.11: +/- 10 V, input resistance 28.0 k<math>\Omega</math>, common mode range: -5..+10 V to GND,</p> <p><b>Mating connector (Art. Nr. 0150-3447):</b></p> <ul style="list-style-type: none"> <li>Use 60/75 °C copper conductors only</li> <li>Conductor cross-section max. 1.5 mm<sup>2</sup></li> <li>Stripping length: 11.5 mm</li> </ul> <p><b>Important notes:</b></p> <ul style="list-style-type: none"> <li>The 24 VDC logic supply for the control circuit (X4.2) must be protected with an external fuse (3 A slow blow) and it should be SELV/PELV with an output voltage limit <math>U_{max}</math> of 36 VDC.</li> <li>To improve EMC use shielded cables</li> </ul> |             |        |   |

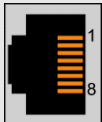
## 7.5 X13

| X13         | External Position Sensor Differential Hall Switches   |                               |                       |
|-------------|---|-------------------------------|-----------------------|
|             | 1   | <b>ABZ with Hall Switches</b> |                       |
|             | 2   | 9                             | +5 VDC                |
|             | 3   | 10                            | Sens A                |
|             | 4   | 11                            | Sens /A               |
|             | 5   | 12                            | Sens B                |
|             | 6   | 13                            | Sens /B               |
|             | 7   | 14                            | Sens Z                |
|             | 8   | 15                            | Sens /Z               |
|             | case  |                               | Sens Alarm (optional) |
|             |   |                               | DGND                  |
|             |   |                               | Hall Sw U             |
|             |   |                               | Hall Sw /U            |
|             |   |                               | Hall Sw V             |
|             |   |                               | Hall Sw /V            |
|             |   |                               | Hall Sw W             |
|             |   | Hall Sw /W                    |                       |
|             |   | Shield                        |                       |
|             | <b>SSI / BiSS-B / BiSS-C / EnDat2.1 / EnDat2.2</b>  |                               |                       |
|             |   | +5 VDC                        |                       |
|             |   | A+ (optional)                 |                       |
|             |   | A- (optional)                 |                       |
|             |   | B+ (optional)                 |                       |
|             |   | B- (optional)                 |                       |
|             |   | Data+                         |                       |
|             |   | Data-                         |                       |
|             |   | Encoder Alarm (optional)      |                       |
|             |   | GND                           |                       |
|             |   | nc                            |                       |
|             |   | nc                            |                       |
|             |   | nc                            |                       |
|             |   | nc                            |                       |
|             |   | Clk+                          |                       |
|             |   | Clk-                          |                       |
|             |   | Shield                        |                       |
| DSUB-15 (f) | <p><b>Position Encoder Inputs (RS422):</b></p> <p>Max. counting frequency: 25 M counts/s with quadrature decoding.</p> <p>A minimum of 40 ns edge separation must be guaranteed by the encoder under any circumstances!</p> <p>The maximal frequency of each signal is 6.25 MHz.</p> <p><b>Differential Hall Switch Inputs (RS422):</b></p> <p>Input Frequency: &lt; 1 kHz</p> <p><b>Enc. Alarm In:</b></p> <p>5 V / 1 mA</p> <p><b>Sensor Supply:</b></p> <p>5 VDC max. 300 mA</p> |                               |                       |

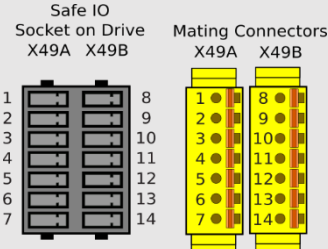
### 7.6 X17 – X18

| X17 – X18   | RealTime Ethernet 10/100 Mbit/s |   |
|---|---------------------------------|---|
|  | X17 RT ETH In                   | Specification depends on RT Bus. 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  | RSGND            |
|   | 5  | RSGND            |
|   | 6  | RS232 TX         |
|   | 7  | (Do not connect) |
|   | 8  | (Do not connect) |
| case  | Shield   |                  |
| RJ-45   | Use isolated USB-RS232 converter (Art.-No. 0150-2473) for configuration over RS232 |                  |

### 7.8 X49

| X49   | Safe Digital IO   |   |
|---|---|---|
|  | X49A:   |   |
|   | 1   | SafeDigIn 1A- (safe digital input 1 channel A negative) |
|   | 2   | SafeDigIn 1B- (safe digital input 1 channel B negative) |
|   | 3   | SafeDigIn 2A- (safe digital input 2 channel A negative) |
|   | 4   | SafeDigIn 2B- (safe digital input 2 channel B negative) |
|   | 5   | DGND  |
|   | 6   | DigInAck- (unsafe Acknowledge negative)                 |
|   | 7   | SafeDigOut A (safe digital output channel A)            |
|   | X49B  |   |
|   | 8   | SafeDigIn 1A+ (safe digital input 1 channel A positive) |
|   | 9   | SafeDigIn 1B+ (safe digital input 1 channel B positive) |
|   | 10  | SafeDigIn 2A+ (safe digital input 2 channel A positive) |
|   | 11  | SafeDigIn 2B+ (safe digital input 2 channel B positive) |
|   | 12  | GND   |
| 13  | DigInAck+ (unsafe Acknowledge positive)   |   |
| 14  | SafeDigOut B (safe digital output channel B)  |   |
| Spring cage connectors (have be ordered separately: see chapter 12)                 | <b>Mating connector (Art. Nr. 0150-4390 – two pieces necessary):</b> <ul style="list-style-type: none"> <li>• Use 60/75 °C copper conductors only</li> <li>• Conductor cross section solid 0.2 mm<sup>2</sup> ... 1.5 mm<sup>2</sup></li> <li>• Conductor cross section flexible 0.2 mm<sup>2</sup> ... 1.5 mm<sup>2</sup></li> <li>• Conductor cross section AWG 24 ... 16</li> <li>• Conductor cross section flexible, with ferrule without plastic sleeve 0.25 mm<sup>2</sup> ... 1.5 mm<sup>2</sup></li> <li>• Conductor cross section flexible, with ferrule with plastic sleeve 0.25 mm<sup>2</sup> ... 0.75 mm<sup>2</sup></li> <li>• Stripping length: 10 mm</li> <li>• To improve EMC use shielded cables</li> </ul> |   |

## 7.9 X50

| X50  | Safe Brake  |   |                |   |                |   |    |   |              |   |              |
|--|---|---|----------------|---|----------------|---|----|---|--------------|---|--------------|
|  | <table border="0"> <tr><td style="padding-right: 20px;">5</td><td>Do not connect</td></tr> <tr><td>4</td><td>Do not connect</td></tr> <tr><td>3</td><td>PE</td></tr> <tr><td>2</td><td>Safe Brake -</td></tr> <tr><td>1</td><td>Safe Brake +</td></tr> </table>   | 5 | Do not connect | 4 | Do not connect | 3 | PE | 2 | Safe Brake - | 1 | Safe Brake + |
| 5  | Do not connect  |   |                |   |                |   |    |   |              |   |              |
| 4  | Do not connect  |   |                |   |                |   |    |   |              |   |              |
| 3  | PE  |   |                |   |                |   |    |   |              |   |              |
| 2  | Safe Brake -  |   |                |   |                |   |    |   |              |   |              |
| 1  | Safe Brake +  |   |                |   |                |   |    |   |              |   |              |
| Spring cage connector (has to be ordered separately: see chapter 12) | <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• Use brake, which is engaged when not powered.</li> <li>• Use 24 V brake or valve.</li> <li>• Maximal current: 0.8 A</li> <li>• At 24 V a minimal current of 10 mA must flow</li> <li>• The brake must be active (braking) when the current is equal or below 10mA</li> <li>• Brake must be tolerant for test pulses in high state of 1 ms every 900 ms.</li> <li>• To improve EMC use shielded cables</li> </ul> <p><b>Mating connector (Art. Nr. 0150-4392):</b></p> <ul style="list-style-type: none"> <li>• Conductor cross section: 0.2 - 1.5 mm<sup>2</sup></li> <li>• Stripping length 6 mm</li> <li>• Clamping screw: M 2</li> <li>• Screwdriver blade: 0.4 x 2.5 (DIN 5264)</li> <li>• Plugging cycles: 25</li> <li>• Tightening torque (wire connection): 0.2 - 0.25 Nm</li> <li>• Tightening torque (screw flange): 0.15 - 0.2 Nm</li> <li>• Use 60/75 °C copper conductors only</li> </ul> |   |                |   |                |   |    |   |              |   |              |





## 7.10 S1 – S2

| S1 – S2  | Address Selectors                 |  |
|--|-----------------------------------|--|
|  | <p>S1 (5..8)</p> <p>S2 (1..4)</p> | <p>Bus ID High (0 ... F). Bit 5 is the LSB, bit 8 the MSB.</p> <p>Bus ID Low (0 ... F). Bit 1 is the LSB, bit 4 the MSB.</p> |
| The use of these switches depends on the type of fieldbus which is used. Please see the corresponding manual for further information.          |                                   |  |
| There are reserved combinations for functions default, load / safe configuration. See in safety manual 0185-1174_E for a detailed description. |                                   |  |

## 7.11 S11 – S12



|   | Safe Address   |
|---|--|
|   | <p><b>S11: High Nibble (Bit 5 .. 8)</b></p> <p><b>S12: Low Nibble (Bit 1 .. 4)</b></p> |
| The use of these switches depends on the type of fieldbus which is used. Please see the corresponding manual for further information. |  |

### 7.12 LEDs

| LEDs   | State Displays |                |                                       |
|--|----------------|----------------|---------------------------------------|
| Error   24VOK<br>Warn   EN | <b>Signal:</b> | <b>Colour:</b> | <b>Description:</b>                   |
|  | 24 V OK        | Green          | 24 V Logic Supply OK                  |
|  | EN             | Yellow         | Motor Enabled / Error Code Low Nibble |
|  | Warn           | Yellow         | Warning / Error Code High Nibble      |
|  | Error          | Red            | Error                                 |

The blink codes are described in chapter 8.

### 7.13 L3 / L4 RT Bus LEDs

| RT Bus LEDs   | RT Bus State Display |                      |                      |
|---|----------------------|----------------------|----------------------|
| L3   L4 | <b>BUS Type:</b>     | <b>L3 (bicolour)</b> | <b>L4 (bicolour)</b> |
|   | EtherCAT             | RUN (green)          | ERR (red)            |
|   | PROFINET             | SF (red)             | BF (red)             |
|   | POWERLINK            | BS (green)           | BE (red)             |
|   | EtherNet/IP          | MS (green/red)       | SN (green/red)       |
|   | SERCOS               | S (green/red)        |                      |

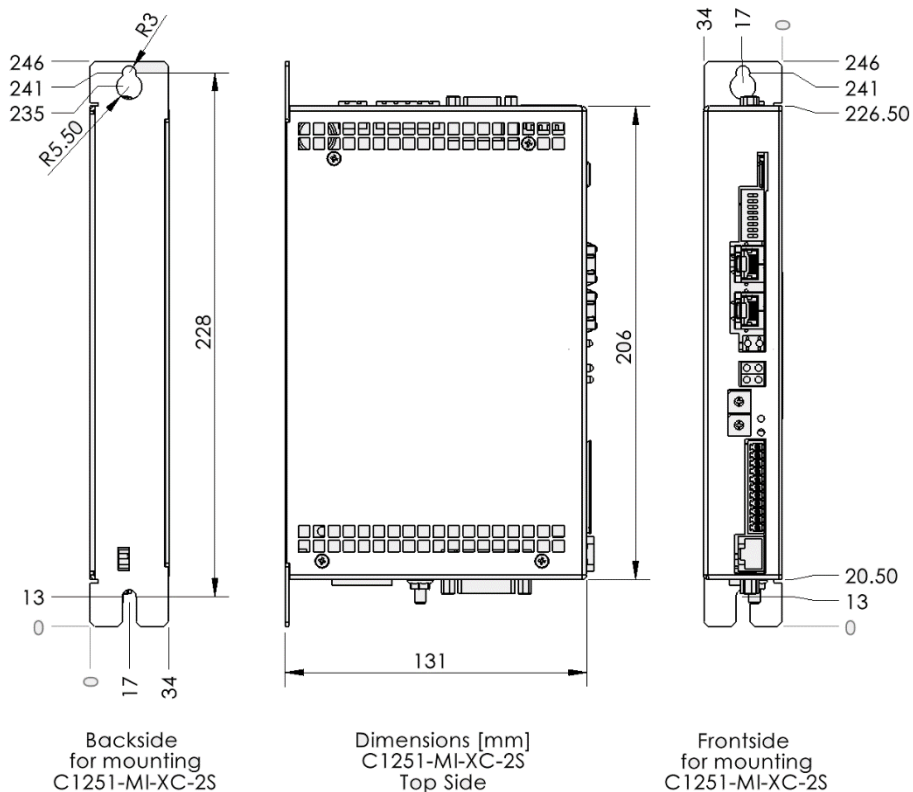
The blink codes are described in the corresponding interface manuals.

## 8 LED Blink Codes

| LED Blink Codes   |   |  |  |
|---|---|--|--|
| Error   24VOK<br>Warn   EN                                |   |  |  |
| Error   | Warn  | EN   | Description  |
| Off   | Warning   | Operation Enabled  | <b>Normal Operation:</b><br>Warnings and operation enabled are displayed.  |
| On  | <ul style="list-style-type: none"> <li>• ~2 Hz</li> <li>0..15 x Error Code High Nibble</li> </ul> | <ul style="list-style-type: none"> <li>• ~2 Hz</li> <li>0..15 x Error Code Low Nibble</li> </ul> | <b>Error:</b><br>The error code is shown by a blink code with "WARN" and "EN"<br>The error byte is divided into low and high nibble (= 4 bit).<br>"WARN" and "EN" are blinking together.<br>The error can be acknowledged.<br>(e.g.: WARN blinks 3x, EN blinks 2x; Error Code = 32h)   |
| <ul style="list-style-type: none"> <li>• ~2 Hz</li> </ul> | <ul style="list-style-type: none"> <li>• ~2 Hz</li> <li>0..15 x Error Code High Nibble</li> </ul> | <ul style="list-style-type: none"> <li>• ~2 Hz</li> <li>0..15 x Error Code Low Nibble</li> </ul> | <b>Fatal Error:</b><br>The error code is shown by a blink code with "WARN" and "EN".<br>The error byte is divided into low and high nibble.<br>"WARN" and "EN" are blinking together.<br>Fatal errors can only be acknowledged by a reset or power cycle.<br>(e.g.: WARN blinks 3x, EN blinks 2x; Error Code = 32h)  |
| <ul style="list-style-type: none"> <li>• ~4 Hz</li> </ul> | <ul style="list-style-type: none"> <li>• ~2 Hz</li> <li>0..15 x Error Code High Nibble</li> </ul> | <ul style="list-style-type: none"> <li>• ~2 Hz</li> <li>0..15 x Error Code Low Nibble</li> </ul> | <b>System Error:</b><br>Please reinstall firmware or contact support.  |
| 0-1 s<br>1-2 s<br>...                                     | <ul style="list-style-type: none"> <li>• ~0.5 Hz</li> </ul>                                       | On   | <b>Signal Supply 24V too low:</b><br>The error and warn LEDs blink alternating if the signal supply +24 V (X4.2) is less than 18 VDC.  |
| 0-250 ms<br>250-500 ms<br>500-1000 ms<br>...              |   |  | <b>Plug&amp;Play Communication Active:</b><br>This sequence (Warn on, then En on, then both off, complete sequence of the 4 states ca. 1 s) signalizes the state when the plug and play parameters are being read from the motor.  |
| 0-125 ms<br>125-250 ms<br>...                             |   |  | <b>Waiting for Defaulting Parameters:</b><br>When ID (S1, S2) is set to 0xFF, the drive starts up in a special mode and the Error and Warn LED blink alternating ~ 4 Hz. 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. |
| 0-250 ms<br>250-500 ms<br>...                             |   |  | <b>Defaulting Parameters Done:</b><br>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 the drive. Also see in the Usermanual_LinMot-Talk under chapter trouble shooting.  |
|   |   |  | <b>Bootstrap</b><br>If also both RT LEDs are on, the drive is in the bootstrap mode. Set S5 to off.  |

The meaning of the error codes can be found in the *Usermanual\_MotionCtrl\_Software\_SG5-SG7* 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](http://www.linmot.com).

### 9 Physical Dimension



| C1251 Series single axis drive  |                  | C1251-MI-XC-2S-0E                         |
|---------------------------------|------------------|---|
| Width                           | mm (in)          | 34 (1.4)                                  |
| Height                          | mm (in)          | 206 (8.11)                                |
| Height with fixings             | mm (in)          | 246 (9.69)                                |
| Depth                           | mm (in)          | 131 (5.16)                                |
| Weight                          | g (lb)           | 1100 (2.42)                               |
| Mounting Screws                 |                  | 2 x M5                                    |
| Mounting Distance               | mm (in)          | 228 (8.98)                                |
| Case, Degree of Protection      | IP               | 20<br>mount in cabinet with at least IP54 |
| Storage Temperature             | °C               | -25 to 40                                 |
| Transport Temperature           | °C               | -20 to 70                                 |
| Operating Temperature           | °C               | 5 to 40                                   |
| Relative humidity               | % r.H.           | 10 to 85 (non-condensing)                 |
| Acceptable air pressure         | hPa              | 700 - 1060                                |
| Pollution                       | IEC/EN 60664-1   | Pollution degree 2                        |
| Shock resistance (22ms)         | m/s <sup>2</sup> | 40 (tested with 50)                       |
| Vibration resistance (10-150Hz) | m/s <sup>2</sup> | 1 (tested with 10)                        |
| Max. Case Temperature           | °C               | 70  |
| Max. Power Dissipation          | W                | 30  |
| Mounting place                  |                  | In the control cabinet (at least IP54)    |
| Mounting position               |                  | vertical                                  |
| Distance between Drives         | mm (in)          | 20 (0.8) horizontal / 50 (2) vertical     |



## 10 Power Supply Requirements

### 10.1 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 VDC. The possible range is from 24 to 85 VDC.



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 compatible power supplies can be used (see chapter 12 Ordering Information).**

### 10.2 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. 0.6 A (no load on the outputs)
- typ. 1.0 A (all 4 outputs (safe and non-safe) "on" with 100mA load and /Brake with no load)
- max. 2.6 A (all safe outputs "on" with 100 mA load, all non-safe outputs "on" with 500 mA and /Brake with 800 mA load)



**The 24 VDC supply for the control circuit must be protected with an external fuse (3 A slow blow)**



**The 24 VDC supply must be by an SELV/PELV power supply unit with an output voltage limit  $U_{max}$  of 36 VDC. Failure to observe this can result in a loss of safety.**

## 11 Regeneration

If the power supply rises too high when braking, 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!).

### 12 Ordering Information

| Drive                               | Description   | Art. No.         |
|-------------------------------------|---|------------------|
| C1251-MI-XC-2S-0E-000               | C1251 with MI interface (72V/25A)                                 | 0150-2933        |
| C1251-MI-XC-2S-0E-C00               | C1251 with MI interface, Calibrated Measuring Amplifier (72V/25A) | 0150-4185        |
| Accessories                         | Description   | Art. No.         |
| <b>DC01-C1251-2S/X1/X4/X49/X50</b>  | <b>Drive Connector Set for C1251-2S</b>                           | <b>0150-4391</b> |
| DC01-C1X00/X1                       | Drive Connector for PWR 72VDC Input                               | 0150-3525        |
| DC01-C1X00/X2                       | Drive Connector Motor Phases                                      | 0150-3526        |
| DC01-Signal/X4                      | Drive Connector 24VDC & Logic                                     | 0150-3447        |
| DC01-Safety/X49                     | Drive Connector 2S Safety (2 pcs. necessary)                      | 0150-4390        |
| DC01-X50 Safe Brake                 | Drive Connector Safe Brake  | 0150-4392        |
| <b>Isolated USB-RS232 converter</b> | <b>Isolated USB RS232 converter with cable</b>                    | <b>0150-2473</b> |
| Isolated USB-serial converter       | Isolated USB RS232/422/485 converter                              | 0150-3120        |
| FC10-000                            | Flash Card for Safety Drives                                      | 0150-2936        |
| Compatible Power Supplies           |   | Art. No.         |
| S01-72/1000                         | Power Supply 72V/1000W, 3x340-550VAC                              | 0150-1872        |
| S02-72/1000                         | Power Supply 72V/1000W, 3x400-480VAC                              | 0150-4535        |
| S01-72/500                          | Power Supply 72V/500W, 1x120/230VAC                               | 0150-1874        |
| S01-24/500                          | Power Supply 24V/500W, 1x120/230VAC                               | 0150-2480        |
| S01-48/300                          | Power Supply 48V/300W, 1x120/230VAC                               | 0150-1941        |
| S01-48/600                          | Power Supply 48V/600W, 1x120/230VAC                               | 0150-1946        |
| T01-72/420-Multi                    | Trafo-Supply 72V/420VA, 3x230/400/480VAC                          | 0150-1869        |
| T01-72/900-Multi                    | Trafo-Supply 900VA, 3x230/400/480 VAC                             | 0150-1870        |
| T01-72/1500-Multi                   | Trafo-Supply 1500VA, 3x230/400/480 VAC                            | 0150-1871        |
| T01-72/420 -1ph                     | Trafo-Supply 420VA, 1x208/220/230/240VAC                          | 0150-1859        |
| Capacitor 10'000uF/100V             | Capacitor with mounting material                                  | 0150-3075        |

Bold items are strongly recommended accessories!








The connectors must be ordered separately and are not included with the drive!



Use isolated USB RS232 converter for configuration!

**13 International Certifications**

| Certifications  |   |
|---|---|
| <p>Europe</p>  | <p>See chapter 14 EU Declaration of Conformity CE-Marking</p>   |
| <p>UK</p>      | <p>See chapter 15 UK Declaration of Conformity UKCA-Marking</p>   |
| <p><b>IECEE<br/>CB SCHEME</b></p>   | <p>Ref. Certif. No. CH-11538</p>  |
|               | <p>TÜV Nord, Certification No. SEBS-A.163705/17</p> <p>IEC 61508-1/-2/-3: 2010, capable up to SIL 2<br/>                 IEC 61800-5-2: 2016, capable up to SIL 2<br/>                 ISO 13849-1: 2015 /-2: 2012, capable up to PL d<br/>                 Capable for safety related applications according to SIL 2 IEC 62061: 2021</p> <p>Safety Functions:<br/>                 Safe Torque Off (STO): capable up to SIL 2 / PL d<br/>                 Safe Brake Control with Safe Brake Test (SBC (+SBT)): capable up to SIL 2 / PL d<br/>                 Safe Stop 1 (SS1): capable up to SIL 2 / PL d<br/>                 Safe Stop 2 (SS2): capable up to SIL 2 / PL d<br/>                 Safe Operating Stop (SOS): capable up to SIL 2 / PL d<br/>                 Safe-Limited Speed (SLS): capable up to SIL 2 / PL d</p> |

|   |   |
|---|---|
|    | <p>Ref. Certif. No.</p> <p><b>CH-11538</b></p>  |
| <p>IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME</p>  |   |
| <p><b>CB TEST CERTIFICATE</b></p>   |   |
| <p><b>Product</b></p> <p><b>Name and address of the applicant</b></p> <p><b>Name and address of the manufacturer</b></p> <p><b>Name and address of the factory</b><br/><i>Note: When more than one factory, please report on page 2</i></p> <p><b>Ratings and principal characteristics</b></p> <p><b>Trademark / Brand (if any)</b></p> <p><b>Customer Test Facility (CTF) Stage used</b></p> <p><b>Model / Type Ref.</b></p> <p><b>Additional information (if necessary may also be reported on page 2)</b></p> <p><b>A sample of the product was tested and found to be in conformity with</b></p> <p><b>As shown in the Test Report Ref. No. which forms part of this Certificate</b></p> | <p>Servo Drive</p> <p>NTI AG<br/>Bodenackerstrasse 2, 8957 Spreitenbach<br/>Switzerland</p> <p>NTI AG<br/>Bodenackerstrasse 2, 8957 Spreitenbach<br/>Switzerland</p> <p>NTI AG<br/>Bodenackerstrasse 2, 8957 Spreitenbach<br/>Switzerland</p> <p>Signal Supply: 24 VDC<br/>Power Supply: 24-85 VDC</p> <p>LinMot</p> <p>./.</p> <p>0150-xxxx (C1251-MI-XC-2S-0E-xxx)</p> <p>National Differences specified in the CB Test Report</p> <p>IEC 61000-3-2:2018<br/>IEC 61000-3-2:2018/AMD1:2020<br/>IEC 61000-3-3:2013<br/>IEC 61000-3-3:2013/AMD1:2017<br/>IEC 61000-6-2:2016<br/>IEC 61000-6-4:2018<br/>IEC 61326-3-1:2017<br/>21CH-00310.E02, .Z01</p> |
| <p>This CB Test Certificate is issued by the National Certification Body</p>  |   |
|  <p>Date: 2022-02-28</p>   | <p><b>Eurofins Electric &amp; Electronic Product Testing AG</b><br/>Luppenstrasse 3<br/>8320 Fehraltorf<br/>SWITZERLAND</p> <p><i>i.A. P. Plüss</i><br/>Signature: Martin Plüss</p>   |

T01\_V04





# Certificate

No. SEBS-A.163705/17 V1.0

TÜV NORD Systems GmbH & Co. KG hereby certifies to

**NTI AG / LinMot**  
 Bodenaeckerstrasse 2  
 8957 Spreitenbach  
 Switzerland

that the safety related functions of the

## 2S Drive System

meet the requirements listed in the following standards.

- IEC 61508-1/-2/-3: 2010, capable up to SIL 2
- IEC 61800-5-2: 2016, capable up to SIL2
- ISO 13849-1:2015 /-2: 2012, capable up to PL d
- Capable for safety related applications according to SIL 2 IEC 62061: 2021

Certification program Leittechnik (SEB-ZE-SEECERT-VA-320-20, Rev. 5.1 / 04.19)

Basis of the certification is the report SEBS-A.163705/17TB1 and the tracking list in the valid version.

This certificate entitles the usage of the adjacent conformity mark.

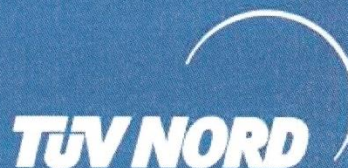
Valid until: 2027-03-21  
 Reference: 8114838559

Hamburg, 2022-03-21

Bianca Pfuff



Certification Body SEECERT  
 TÜV NORD Systems GmbH & Co. KG  
 Große Bahnstraße 31, 22525 Hamburg, Germany






### Tracking-list Revision 2.0 for released versions of the certified 2S Drive Systems

Certification No. SEBS-A.163705/17, V 1.0

| Designation  | Assessment Report        | ID         | Date of certification | Expiry Date |
|--|--------------------------|------------|-----------------------|-------------|
| Drive<br>C1251-MI-XC-2S-0E-xxx   | SEBS-A.163705/17TB1 V2.0 | 8114838559 | 2023-09-18            | 2027-03-23  |
| Motor Encoder<br>PE01-23x80-2S<br>PE01-23x160-2S<br>PE01-37x120-2S<br>PE01-48x150-2S<br>PE01-48x240-2S | SEBS-A.163705/17TB1 V2.0 | 8114838559 | 2023-09-18            | 2027-03-23  |

| Safety Functions                        | Abbreviation | Capable up to |
|---|--------------|---------------|
| Safe Torque Off                         | STO          | SIL2 / PLd    |
| Safe Brake Control with Safe Brake Test | SBC (+ SBT)  | SIL2 / PLd    |
| Safe Stop 1                             | SS1          | SIL2 / PLd    |
| Safe Stop 2                             | SS2          | SIL2 / PLd    |
| Safe Operating Stop                     | SOS          | SIL2 / PLd    |
| Safe-Limited Speed                      | SLS          | SIL2 / PLd    |

|            | Release NTI:   | Release Assessor:  | Release Certification Body:   |
|------------|--|--|---|
| Signature: | <br>NTI AG<br>LinMot<br>Bodenaeckerstrasse 2<br>CH-8957 Spreitenbach<br>Tel. +41 (0)56 419 91 91<br>Fax +41 (0)56 419 91 92 | <br>Digitally signed<br>by Korte Robert<br>Date: 2023.09.18<br>16:32:08 +02'00' | <br>Digitally signed<br>by Pfufl Bianca<br>Date: 2023.09.18<br>16:29:04 +02'00' |
| Date:      | 2023-09-18   |  |   |

## 14 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:

- Drives of the Series **C1251-MI-XC-2S-0E-xxx**

with the 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)**
- **EN 61000-6-4: 2019**

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, 22.11.2021



-----  
Dr. Ronald Rohner / CEO NTI AG



**15 UK Declaration of Conformity UKCA-Marking**

NTI AG / LinMot ®  
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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 **C1251-MI-XC-2S-0E-xxx**

with the 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)**
- **EN 61000-6-4: 2019**

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



**16 Contact & Support**

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Please visit <http://www.linmot.com/contact> to find the distribution close to you.

Smart solutions are...

