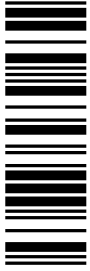


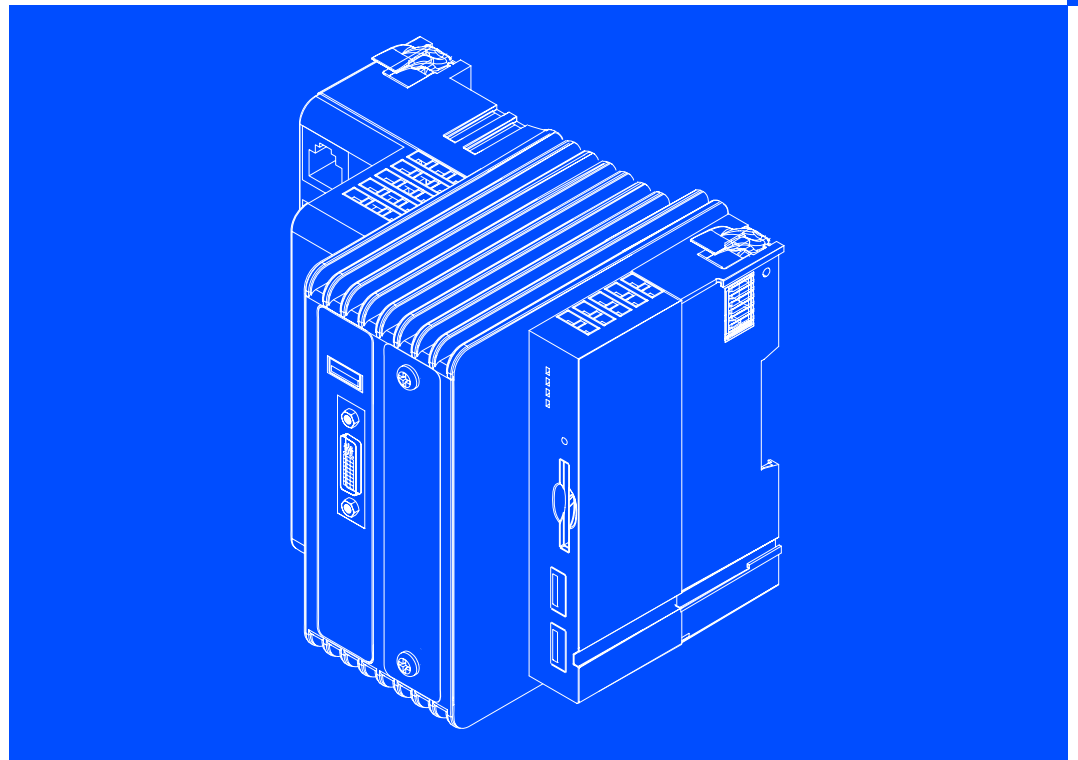
BA 3231C  
13348640

# L-force Controls



Operating Instructions

## Controller



L-force Controller 3221 C, L-force Controller 3231 C

Controller

**Lenze**



Please read these instructions before you start working!  
Follow the enclosed safety instructions.

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# 1 About this documentation

## Contents

This documentation contains information on the intended use of the L-force Controller.

This manual forms part of the "L-Matic" manual collection. The manual collection comprises the following documents:

Documentation	Subject
System manual "L-Matik"	<ul style="list-style-type: none"> <li>● Industrial PC - <i>parameter setting &amp; configuration</i></li> </ul>
Operating instructions "DVI-USB Extender"	<ul style="list-style-type: none"> <li>● Set-up of a decentralised visualisation or control solution</li> </ul>
Mounting instructions "L-force Controller 3200 C"	<ul style="list-style-type: none"> <li>● Mounting and installation</li> </ul>
Mounting instructions "Communication card MC-CAN2"	<ul style="list-style-type: none"> <li>● Installation</li> </ul>
Mounting instructions "Communication card MC-PBM / MC-PBS"	



Information on the use of the L-force Controller in visualisation applications or as an Industrial PC can be found in the system manuals specially suited to particular applications.

## Target group

This documentation is directed at qualified skilled personnel according to IEC 60364.

Qualified skilled personnel are persons who have the required qualifications to carry out all activities involved in installing, mounting, commissioning, and operating the product.



## Tip!

Information and auxiliary devices around the Lenze products can be found in the download area at <http://www.Lenze.com>

## Validity

These instructions are valid for

- ▶ L-force Controller 3221 C
- ▶ L-force Controller 3231 C

# 1 About this documentation

## Document history

### 1.1 Document history

Material number	Version			Description
13348640	1.0	09/2010	TD29	First edition

### 1.2 Conventions used

This documentation uses the following conventions to distinguish between different types of information:

#### Spelling of numbers

Decimal separator	Point	In general, the decimal point is used. For instance: 1234.56
-------------------	-------	---

#### Warnings

UL warnings		Are only given in English.
UR warnings		

#### Text

Program name	» «	PC software For example: »Engineer«, »Global Drive Control« (GDC)
--------------	-----	--

#### Icons

Page reference		Reference to another page with additional information For instance:  16 = see page 16
----------------	---	---

### 1.3 Notes used

The following pictographs and signal words are used in this documentation to indicate dangers and important information:

#### Safety instructions

Structure of safety instructions:



#### Danger!

(characterises the type and severity of danger)

#### Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph and signal word	Meaning
<b>Danger!</b>	<b>Danger of personal injury through dangerous electrical voltage.</b> Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
<b>Danger!</b>	<b>Danger of personal injury through a general source of danger.</b> Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
<b>Stop!</b>	<b>Danger of property damage.</b> Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

#### Application notes

Pictograph and signal word	Meaning
<b>Note!</b>	Important note to ensure troublefree operation
<b>Tip!</b>	Useful tip for simple handling
<b>Reference!</b>	Reference to another documentation

#### Special safety instructions and application notes for UL and UR

Pictograph and signal word	Meaning
<b>Warnings!</b>	<b>Safety or application note for the operation of a UL-approved device in UL-approved systems.</b> Possibly the drive system is not operated in compliance with UL if the corresponding measures are not taken.
<b>Warnings!</b>	<b>Safety or application note for the operation of a UR-approved device in UL-approved systems.</b> Possibly the drive system is not operated in compliance with UL if the corresponding measures are not taken.

## 2 Safety instructions

### 2.1 General safety information

#### Scope

The following general safety instructions apply to all Lenze drive and automation components.

**The product-specific safety and application notes given in this documentation must be observed!**

#### For your own safety



#### **Danger!**

Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets!

- ▶ Lenze drive and automation components ...
  - ... must only be used for the intended purpose.
  - ... must never be operated if damaged.
  - ... must never be subjected to technical modifications.
  - ... must never be operated unless completely assembled.
  - ... must never be operated without the covers/guards.
  - ... can - depending on their degree of protection - have live, movable or rotating parts during or after operation. Surfaces can be hot.
- ▶ For Lenze drive and automation components ...
  - ... only use approved accessories.
  - ... only use original manufacturer spare parts.
- ▶ All specifications of the corresponding enclosed documentation must be observed.  
This is vital for a safe and trouble-free operation and for achieving the specified product features.  
The procedural notes and circuit details provided in this document are proposals which the user must check for suitability for his application. The manufacturer does not accept any liability for the suitability of the specified procedures and circuit proposals.
- ▶ Only qualified skilled personnel are permitted to work with or on Lenze drive and automation components.  
According to IEC 60364 or CENELEC HD 384, these are persons ...
  - ... who are familiar with the installation, assembly, commissioning and operation of the product,
  - ... possess the appropriate qualifications for their work,
  - ... and are acquainted with and can apply all the accident prevent regulations, directives and laws applicable at the place of use.



### **Transport, storage**

- ▶ Transport and storage in a dry, low-vibration environment without aggressive atmosphere; preferably in the packaging provided by the manufacturer.
  - Protect against dust and shocks.
  - Comply with climatic conditions according to the technical data.

### **Mechanical installation**

- ▶ Install the product according to the regulations of the corresponding documentation. In particular observe the section "Operating conditions" in the chapter "Technical data".
- ▶ Provide for a careful handling and avoid mechanical overload. During handling neither bend components, nor change the insulation distances.
- ▶ The product contains electrostatic sensitive devices which can easily be damaged by short circuit or static discharge (ESD). Thus, electronic components and contacts must not be touched unless ESD measures are taken beforehand.

### **Electrical installation**

- ▶ Carry out the electrical installation according to the relevant regulations (e. g. cable cross-sections, fusing, connection to the PE conductor). Additional notes are included in the documentation.
- ▶ Applicable national regulations for the prevention of accidents (e.g. VBG 4) must be observed when working on live products.
- ▶ The documentation contains notes for the EMC-compliant installation (shielding, earthing, arrangement of filters and installation of the cables). The manufacturer of the system or machine is responsible for the compliance with the limit values required in connection with EMC legislation.
- ▶ For compliance with the limit values for radio interference emission at the site of installation, the components - if specified in the technical data - have to be mounted in housings (e. g. control cabinets). The housings have to enable an EMC-compliant installation. In particular observe that for example control cabinet doors preferably have a circumferential metallic connection to the housing. Reduce openings or cutouts through the housing to a minimum.
- ▶ Only plug in or remove pluggable terminals in the deenergised state!

### **Commissioning**

- ▶ If required, you have to equip the system with additional monitoring and protective devices in accordance with the respective valid safety regulations (e. g. law on technical equipment, regulations for the prevention of accidents).

**Maintenance and servicing**

- ▶ The components are maintenance-free if the required operating conditions are observed.
- ▶ If the cooling air is polluted, the cooling surfaces may be contaminated or the air vents may be blocked. Under these operating conditions, the cooling surfaces and air vents must be cleaned at regular intervals. Never use sharp objects for this purpose!
- ▶ After the system has been disconnected from the supply voltage, live components and power connections must not be touched immediately because capacitors may be charged. Please observe the corresponding notes on the device.

**Disposal**

- ▶ Recycle metals and plastic materials. Ensure professional disposal of assembled PCBs.

## 2.2 Product-specific safety instructions

- ▶ The device is classified as a class A device and can cause radio interference in residential areas. In this case, the operator may have to take special measures. Any costs arising from these measures have to be paid by the operator.
- ▶ In case of error the device has to be switched to a deenergised state immediately. For this, disconnect the supply connector and a possibly available battery pack. Afterwards the device is to be sent to the manufacturer. The address can be found on the back of this documentation. For return, please use the original packaging!
- ▶ Printed circuit boards which might be damaged by short circuit or electrostatic discharge (ESD) must be handled appropriately.

## 2.3 Residual hazards



### **Danger!**

#### **Hot surface during operation**

The heatsink at the back of the L-force Controller gets very hot during operation.

#### **Possible consequences:**

- ▶ Burns when touching the heatsink.
- ▶ Fire or smouldering fire if flammable material is placed near the heatsink or may get to it.

#### **Protective measures:**

- ▶ Before working on the controller, check its heatsink temperature.
- ▶ Select the mounting location so that the operating conditions mentioned in the technical data are permanently guaranteed.

### 3 Product description

System overview

### 3 Product description

#### 3.1 System overview

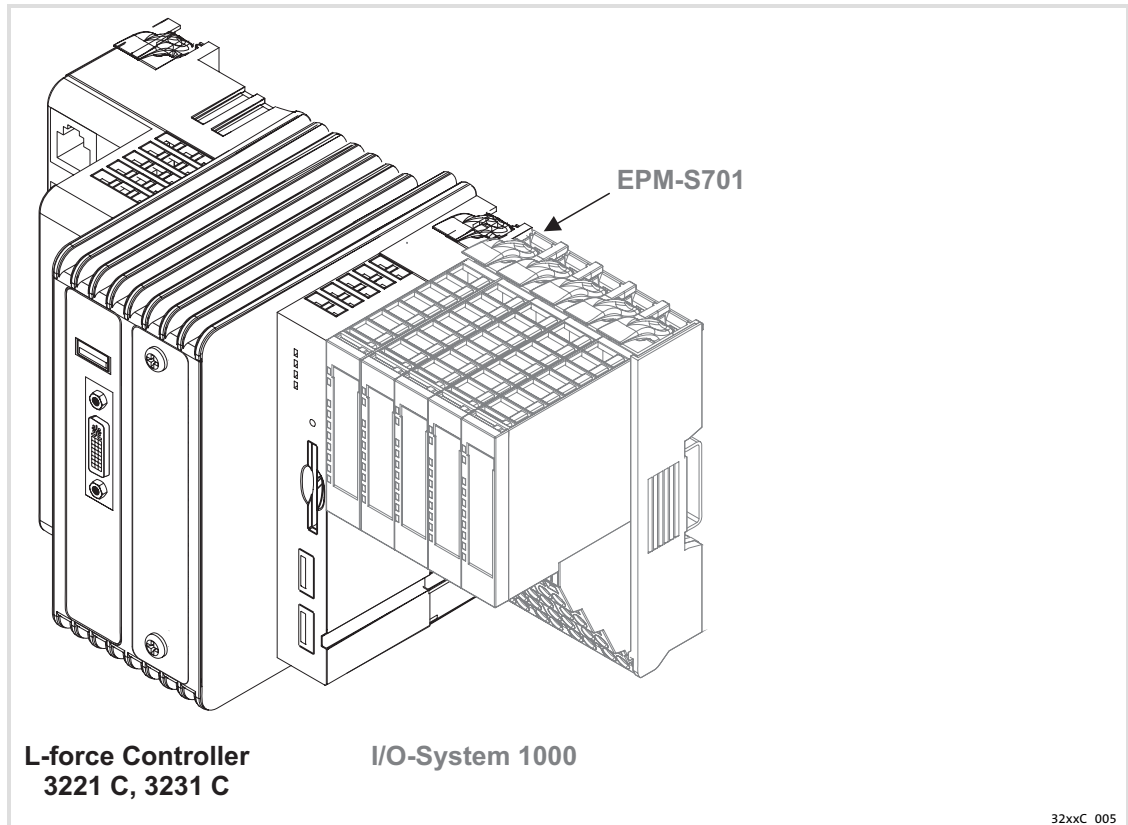


Fig. 3-1 L-force Controller with connected I/O system 1000 (grey)



For information on the I/O system 1000, please refer to the system manual "I/O system 1000".

### 3.2 Device features

The L-force Controllers 3221 C and 3231 C can be used to implement complex automation and visualisation applications.

	L-force Controller 3221 C	L-force Controller 3231 C
Design	<ul style="list-style-type: none"> <li>● Mounting on standard DIN rail (35 mm)</li> <li>● Fanless and maintenance-free</li> <li>● I/O system 1000 can be connected via internal backplane bus</li> </ul>	
Equipment	<ul style="list-style-type: none"> <li>● Intel® Atom™ processor Z510, 1.1 GHz, 512 kB L2 cache</li> <li>● 1 GB DDR2 RAM</li> <li>● Intel® chip set US15W</li> <li>● Intel® GMA 500 graphics, direct X 9.0E, open GL 2.0</li> <li>● AMIBIOS8® (password protection)</li> <li>● ACPI 3.0 compliant power management</li> <li>● Operating system Windows® CE 6.0 on flash memory (2 GB)</li> <li>● UPS functionality via buffer capacitor</li> </ul>	<ul style="list-style-type: none"> <li>● Intel® Atom™ processor Z530, 1.6 GHz, 512 kB L2 cache</li> </ul>
Interfaces	<ul style="list-style-type: none"> <li>● 2 x LAN interface (Ethernet 10/100 Mbps) with integrated switch.</li> <li>● 1 x EtherCAT interface</li> <li>● 1 x slot for communication card (MC)</li> <li>● 1 x slot for SD cards (SD/SDHC compatible)</li> </ul>	
	<ul style="list-style-type: none"> <li>● 2 x USB 2.0</li> </ul>	<ul style="list-style-type: none"> <li>● 3 x USB 2.0</li> <li>● 1 x DVI-D (no VGA) with DDC detection (Display Data Channel)</li> </ul>
Control and display elements	<ul style="list-style-type: none"> <li>● Reset button</li> <li>● 4 diagnostic LEDs (power, PLC status, backplane bus status and one freely programmable LED)</li> </ul>	

#### Accessories

- ▶ Communication card (MC card)
- ▶ L-force Controller 3231 C only:
  - DVI/USB extender
  - Monitor panel MP 600 - 9000, CS 5000 - 9000 DVI

## 3 Product description

### Scope of supply

#### 3.3 Scope of supply

Amount	Designation
1	L-force Controller
1	Connector plug for voltage supply
1	SD card (inserted)
1	Contact cover
1	Mounting instructions
1	Manual and driver CD



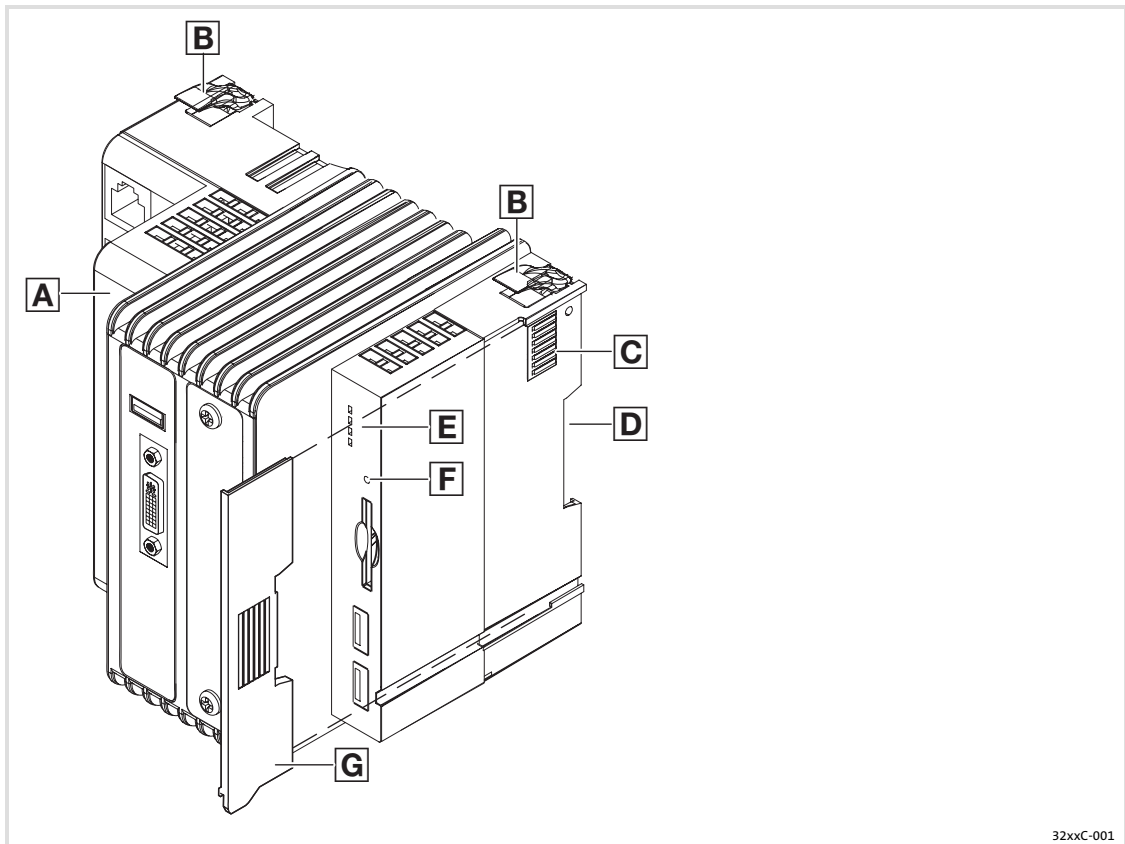
#### Note!

After receipt of the delivery, check immediately whether the items match the accompanying papers. We do not accept any liability for deficiencies claimed subsequently.

#### Claim

- ▶ visible transport damage immediately to the forwarder
- ▶ visible deficiencies/incompleteness immediately to your Lenze representative.

3.4 Controls and displays



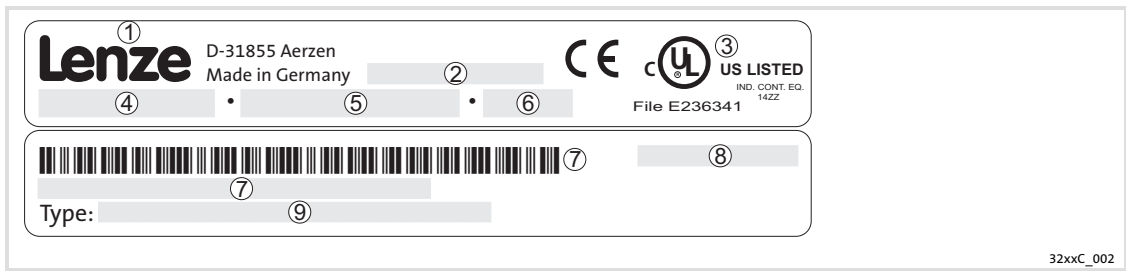
32xxC-001

Pos.	Description
A	L-force Controller
B	Locking lever (DIN rail)
C	Backplane bus contacts
D	Guide for DIN rail with thermal connection via GapPad strips
E	Status LEDs
F	Reset button
G	Contact cover

LED				Message
Power	Error	Status 1	Status 2	
Green is continuously ON	-	-	-	Supply voltage is available and system clock is synchronised.
Yellow is continuously ON	-	-	-	Input voltage has fallen below a minimum value (power fail).
Yellow is blinking	-	-	-	After switch-on or after a reset.
Green/yellow is blinking	-	-	-	System clock is not synchronised.
-	Messages of the optional "backup and restore tool" (see documentation for "backup and restore tool")			

3.5

Identification



- ① Manufacturer
- ② Production number
- ③ Certification
- ④ Type designation
- ⑤ Technical data
- ⑥ Hardware/firmware version
- ⑦ Serial number as bar code and numerically
- ⑧ Material number (customer-specific)
- ⑨ Type code/order number

	⑨				
<b>Type code</b> <b>L-force Controller 3221 C</b>	<b>E32GAC00000B4F</b>	<b>x</b>	<b>XXX-02S13</b>	<b>x</b>	<b>00000</b>
Communication card (MC card) 0 = without 5 = MC-PBM 9 = MC-CAN2					
Runtime 3 = LPC1000 (V3.x) 4 = MPC1200 (V3.x)					

	⑨				
<b>Type code</b> <b>L-force Controller 3231 C</b>	<b>E32GAC10000C4G</b>	<b>x</b>	<b>XXX-02S13</b>	<b>x</b>	<b>14000</b>
Communication card (MC card) 0 = without 5 = MC-PBM 9 = MC-CAN2					
Runtime 3 = LPC1000 (V3.x) 4 = MPC1200 (V3.x)					



### 3.6 Application as directed

The L-force Controller is used as directed if it is solely used for implementing control and operating concepts or for presenting information in usual industrial and commercial fields. A different use, or one beyond these purposes, is not permissible.

A **use that is not intended** also includes a use harbouring fatal risks or dangers which, without the provision of exceptionally high safety measures, may result in death, injury or damage to material assets.

Especially in the following cases, the L-force Controller must **not** be used ...

- ▶ in private areas.
- ▶ in potentially explosive atmospheres.
- ▶ in areas with harmful gases, oils, acids, radiation, etc.
- ▶ in applications where vibration and impact loads occur, exceeding the requirements of EN 50178.
- ▶ for performing safety functions, for instance
  - in air traffic control / in flight-control systems
  - for the monitoring/control of nuclear reactions
  - for the monitoring/control of means of mass transport
  - for the monitoring/control of medical systems
  - for the monitoring/control of weapon systems

**Higher-level safety systems must be used to guarantee the protection of persons and material assets!**

### 3.7 UPS functionality

The integrated buffer capacitor provides backup functionality for user data (saving of retain variables, closing of logbook).

In order to minimise the power consumption and increase the safety during the buffer times, circuitry parts that are not required can optionally be switched off when the power fail signal occurs (e.g. supply of the backplane bus, supply of the devices connected to the USB ports).

Features:

- ▶ Sufficient buffer time for 128 kB retain and logbook data.
- ▶ When the buffer capacitor is discharged, the device will be switched off.

## **3**      **Product description** Real-time clock functionality

### **3.8**      **Real-time clock functionality**

The operating system receives the CMOS-RTC time via a maintenance-free clock chip. The clock chip is buffered for at least 14 days via a super cap. Then the clock must be set again. An additional battery is not required.

### **3.9**      **Resetting the L-force Controller (reset)**

To reset the L-force Controller, press the reset button (📖 15).

## 4 Technical data

### 4.1 General data and operating conditions

#### General data

Conformity and approvals			
Conformity			
CE	73/23/EEC	Low-Voltage Directive	
Approvals			
cULus		In preparation	
Other			
RoHS	-	Products lead-free according to EU Directive 2002/95/EC	
Protection of persons and device protection			
Degree of protection		IP20	
Electrical isolation			
To the fieldbus		Electrically isolated	
To the process level		Electrically isolated	
Insulation resistance	IEC 61131-2		
Insulation voltage against reference earth		500 V	
Protective measures		Against short circuit	
EMC			
Noise emission	EN 61000-6-4	Class A (industrial premises)	
Noise immunity Zone B	EN 61000-6-2	Industrial premises	
		EN 61000-4-2	ESD; severity: 3, i.e. 8 kV in case of air discharge, 4 kV in case of contact discharge
		EN 61000-4-3	RF interference (housing) 80 MHz ... 1000 MHz, 10 V/m 80 % AM (1 kHz)
		EN 61000-4-6	RF conducted 150 kHz ... 80 MHz, 10 V/m 80 % AM (1 kHz)
		EN 61000-4-4	Burst, severity: 3

### Operating conditions

Ambient conditions		
<b>Climatic</b>		
Storage/transport	IEC/EN 60068-2-14	-25 ... +70 °C
Operation	EN 61131-2	Horizontal mounting: L-force Controller 3221 C: 0 ... +55 °C L-force Controller 3231 C: 0 ... +50 °C Vertical mounting: L-force Controller 3221 C: 0 ... +50 °C L-force Controller 3231 C: 0 ... +45 °C
Air humidity	EN 61131-2	RH1 (without condensation, relative humidity 10 ... 95 %)
Pollution	EN 61800-5-1	Pollution degree 2
<b>Mechanical</b>		
Vibration	EN 60068-2-6	1 g
Shock	EN 60068-2-27	15 g
<b>Site altitude</b>		
Storage/transport		< 12000 m amsl
Operation		< 3000 m amsl
<b>Mounting conditions</b>		
Mounting place		In the control cabinet
Mounting position		<ul style="list-style-type: none"> <li>● Horizontal</li> <li>● Vertical               <ul style="list-style-type: none"> <li>– LAN connections point downwards (☐ 23)</li> <li>– With reduced ambient temperature range</li> </ul> </li> </ul>
Mounting type		Clip mounting on DIN rail according to DIN 60715 (TH 35 x 7.5 or TH 35 x 15); maximum of 20 plug cycles, then GapPad strips must be exchanged (☐ 32)

### 4.2

### Electrical data

Type	Supply		Backplane bus	
	Voltage [V DC]	Current at 24 V [A]	Voltage [V DC]	Current [A]
3221 C	24 (+18 ... +30)	1.0	5	1.7
3231 C		1.2		

### 4.3

### Mechanical data

Type	Dimensions W x D x H [mm]	Weight <sup>1)</sup> [kg]
3221 C	136 x 105 x 112	0.6
3231 C		

1) Without communication card (MC)

## 5 Mechanical installation

### 5.1 Important notes

- ▶ The mounting location always must correspond to the operating conditions specified in the technical data. If required, take additional measures.
- ▶ The mechanical connections must always be ensured.
- ▶ The mounting rail and the mounting plate in the control cabinet must be electrically conductive and free of lacquer.
- ▶ Attach and detach L-force Controllers and modules of the I/O system 1000 only when the supply voltage is switched off. Otherwise, they could be damaged by short circuits.
- ▶ Always arrange the modules from left to right starting with the L-force Controller directly followed by a power supply module EMP-S701 on the right side.
- ▶ The module must always be installed directly next to each other. Free slots between the modules are not permissible because otherwise the backplane bus would be interrupted.
- ▶ The side contacts of the last module always must be covered with the supplied contact cover. Otherwise, the modules may be damaged by short circuit or static discharge.



#### **Danger!**

##### **Hot surface during operation**

The heatsink at the back of the L-force Controller gets very hot during operation.

##### **Possible consequences:**

- ▶ Burns when touching the heatsink.
- ▶ Fire or smouldering fire if flammable material is placed near the heatsink or may get to it.

##### **Protective measures:**

- ▶ Before working on the controller, check its heatsink temperature.
- ▶ Select the mounting location so that the operating conditions mentioned in the technical data are permanently guaranteed.



#### **Note!**

On the rear of the L-force Controller, there are two GapPad strips. These strips serve to thermally connect the controller to the DIN rail. If the strips are defective, they must be replaced (📖 32)!

Mounting of the L-force Controller on the DIN rail is limited to 20 plug cycles! Then the GapPad strips must be exchanged!

# 5 Mechanical installation

## Dimensions

### 5.2 Dimensions

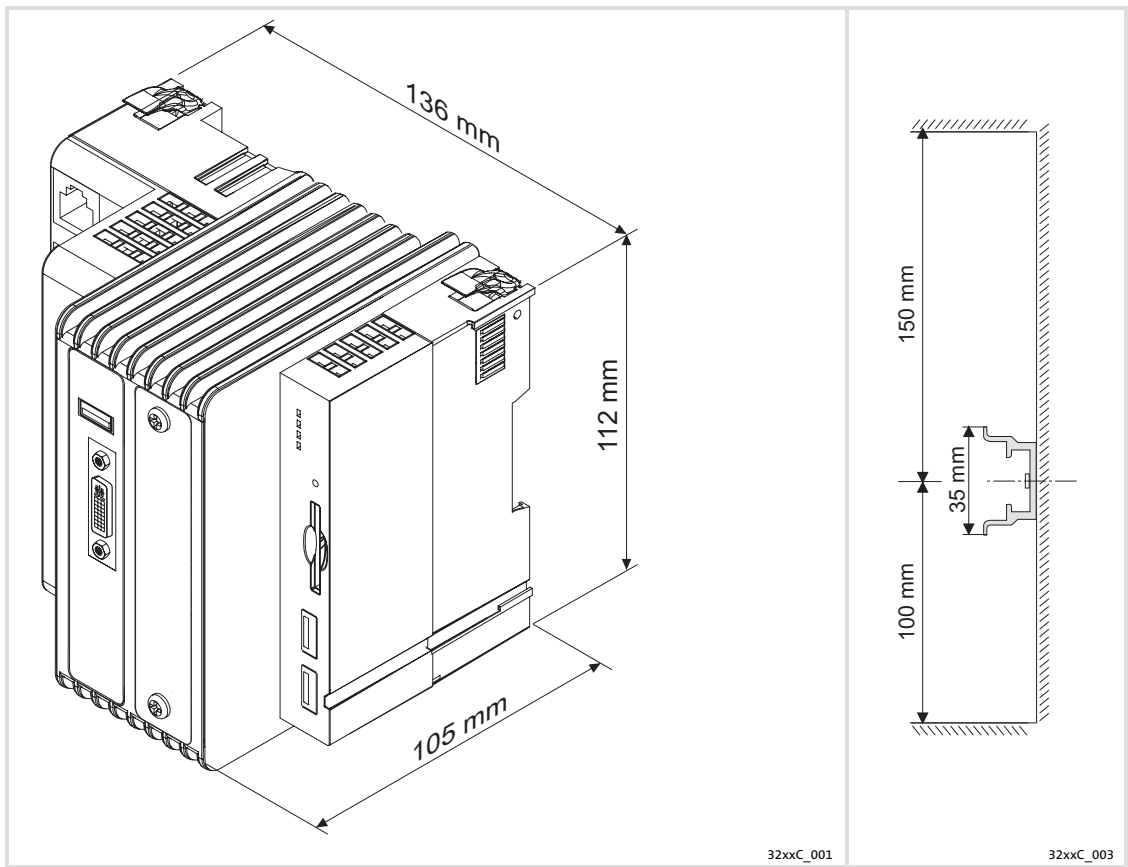


Fig. 5-1 Dimensions and mounting clearances

5.3 Mounting

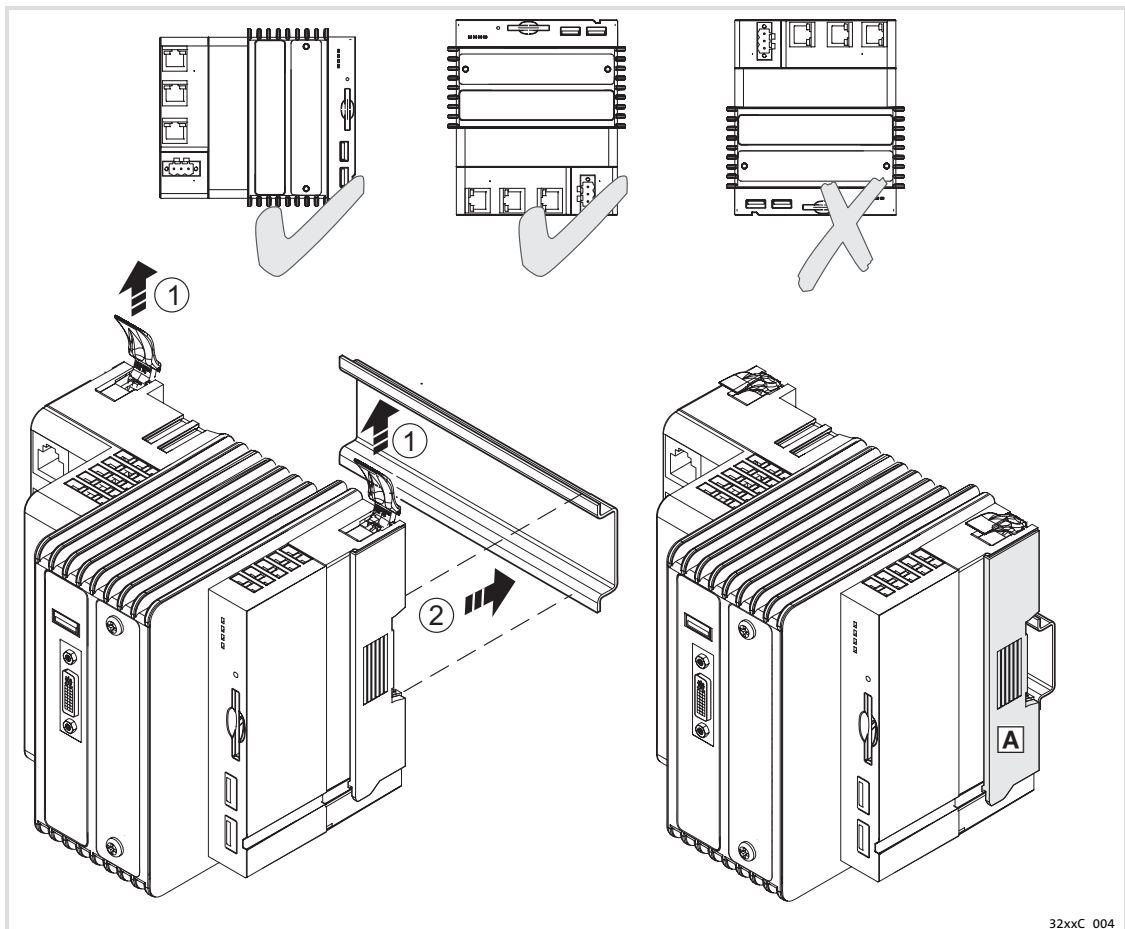


Fig. 5-2 Mounting of L-force Controller

**A** Cover for the "backplane bus" contact strip



**Stop!**

**Short circuit on the backplane bus contact**

The backplane bus signals are forwarded to the adjacent module of the I/O system 1000 via a contact strip. If electrically conductive material contacts this contact strip, a short circuit can be caused. Moreover, touching the contact strip can cause a static discharge.

**Possible consequences:**

- ▶ Damage of the L-force Controller and/or the modules.

**Protective measures:**

- ▶ If no module of the I/O system 1000 is connected, always attach the cover **A**.

**Danger!****Hot surface during operation**

The heatsink at the back of the L-force Controller gets very hot during operation.

**Possible consequences:**

- ▶ Burns when touching the heatsink.
- ▶ Fire or smouldering fire if flammable material is placed near the heatsink or may get to it.

**Protective measures:**

- ▶ Before working on the controller, check its heatsink temperature.
- ▶ Select the mounting location so that the operating conditions mentioned in the technical data are permanently guaranteed.

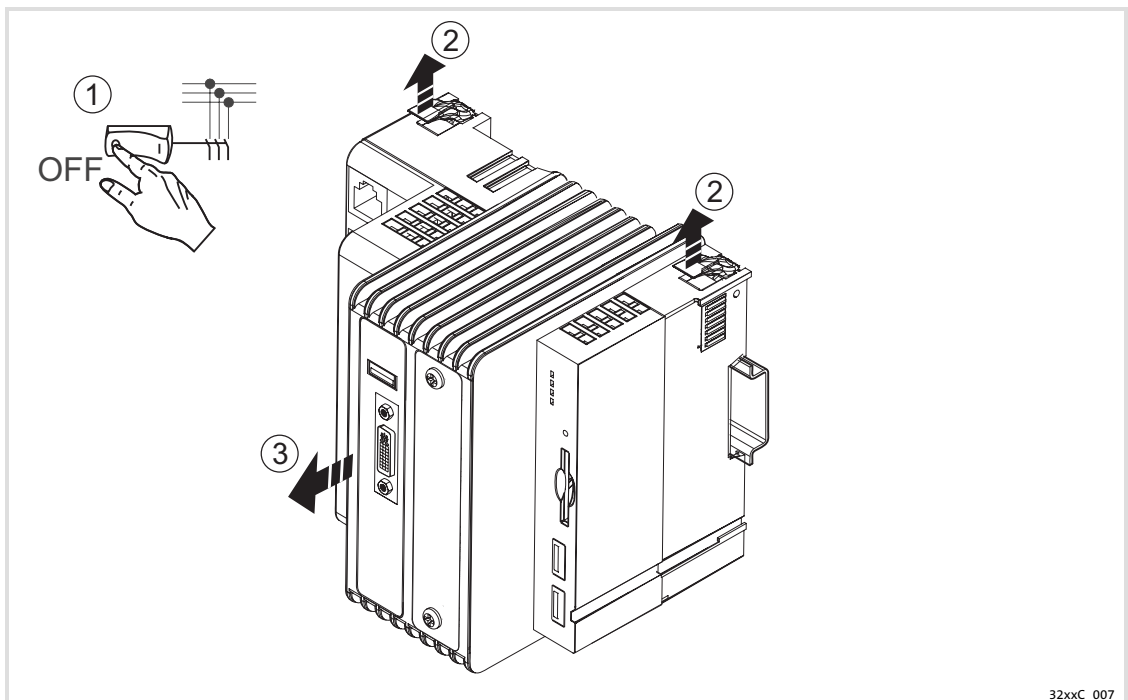


Fig. 5-3 Dismounting of L-force Controller

32xxC\_007



## 6 Electrical installation

### 6.1 Important notes

The installation must be carried out by qualified, skilled personnel familiar with the applicable national standards.



#### **Stop!**

##### **Short circuit and static discharge**

The device contains components which are endangered in the case of short circuit or static discharge.

##### **Possible consequences:**

- ▶ The device or parts of it will be destroyed.

##### **Protective measures:**

- ▶ Always switch off the voltage supply when working on the device. This particularly applies:
  - Before connecting / disconnecting connectors.
  - Before plugging in / plugging out modules.
- ▶ All persons handling printed circuit boards have to take account of ESD measures.
- ▶ Contacts of plug connectors must not be touched.
- ▶ Printed circuit boards may be touched only at places free from electrical contacts and may be placed only on appropriate materials (e.g. on ESD packaging or conductive foam material).
- ▶ Printed circuit boards may only be transported and stored in ESD packaging.

### 6.2 Wiring according to EMC

<b>General notes</b>	<ul style="list-style-type: none"> <li>● The electromagnetic compatibility of the system depends on the type of installation and care taken. Especially consider the following:             <ul style="list-style-type: none"> <li>– Assembly</li> <li>– Shielding</li> <li>– Earthing</li> </ul> </li> <li>● For installations differing from the one described, the evaluation of the conformity with the EMC Directive requires a check of the system regarding the EMC limit values. This for instance applies to:             <ul style="list-style-type: none"> <li>– Use of unshielded cables</li> </ul> </li> <li>● <b>The compliance with the EMC Directive is in the responsibility of the user.</b> <ul style="list-style-type: none"> <li>– If you observe the following measures, you can assume that no EMC problems will occur during operation and that compliance with the EMC Directive and the EMC law is achieved.</li> <li>– If devices which do not comply with the CE requirement concerning noise immunity (EN 610042) are operated close to the system, these devices may be electromagnetically affected by the system.</li> </ul> </li> </ul>
<b>Assembly</b>	<ul style="list-style-type: none"> <li>● Provide electrical contact between the DIN rail and the earthed mounting plate:             <ul style="list-style-type: none"> <li>– Mounting plates with electrically conductive surfaces (zinc-coated or stainless steel) allow permanent contact.</li> <li>– Painted plates are not suitable for an EMC-compliant installation.</li> </ul> </li> <li>● If you use several mounting plates:             <ul style="list-style-type: none"> <li>– Connect as much surface of the mounting plates as possible (e.g. with copper strips).</li> </ul> </li> <li>● When laying the cables, pay attention to the separation of signal cables and mains cables.</li> <li>● Lay the cables as close as possible to the reference potential. Freely suspended cables act like aerials.</li> </ul>
<b>Shielding</b>	<ul style="list-style-type: none"> <li>● Only use cables with braided shield if possible.</li> <li>● The overlap rate of the shield should be higher than 80%.</li> <li>● For data cables for serial connection, always use metal or metallised connectors. Connect the shield of the data cable to the connector shell.</li> </ul>
<b>Earthing</b>	<ul style="list-style-type: none"> <li>● Earth all metallically conductive components using suitable cables connected to a central earthing point (PE bar).</li> <li>● Keep to the minimum cross-sections defined in the safety instructions:             <ul style="list-style-type: none"> <li>– For EMC not the cable cross-section is important, but the surface of the cable and the contact with a cross-section as large as possible, i.e. large surface.</li> </ul> </li> </ul>

### 6.3 Connecting the supply voltage

#### 6.3.1 Mains connection



#### Stop!

##### No device protection against excessive input voltage

The voltage input is not fused internally.

##### Possible consequences:

- ▶ The device can be destroyed when the input voltage is too high.

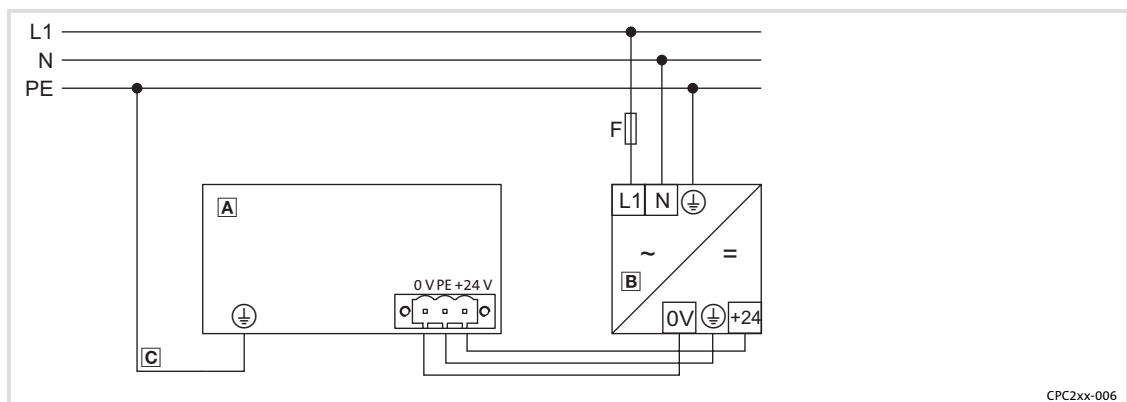
##### Protective measures:

- ▶ Observe the max. permissible input voltage.
- ▶ Professionally fuse the device on the input side against voltage fluctuations and voltage peaks.

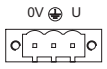


#### Note!

The L-force Controller boots up as soon as the supply voltage is applied. After the operating system has been shut down, the L-force Controller switches off automatically. For restarting, the supply voltage has to be disconnected for a short time.



- A** L-force Controller
- B** Power supply unit
- C** PE conductor connection on the supply side via DIN rail

	Description	Connection type	Cable type
 0V ⊕ U IPC001	X1: Connection of 24 V DC power supply	3-pin Combicon socket	Cable (conductor cross-section max. 2.5 mm <sup>2</sup> ) with Combicon connector

## 6

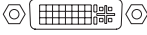
### Electrical installation

Connecting external devices  
Monitor interface


#### 6.4 Connecting external devices

##### 6.4.1 Monitor interface

L-force Controller 3231 C only:

	Description	Connection type	Cable type
 IPC001	X8, monitor connection with DVI-D interface (no VGA)	DVI socket	DVI-I single link (18+5) DVI-I double link (24+5) DVI-D single link (18+1) DVI-D double link (24+1)

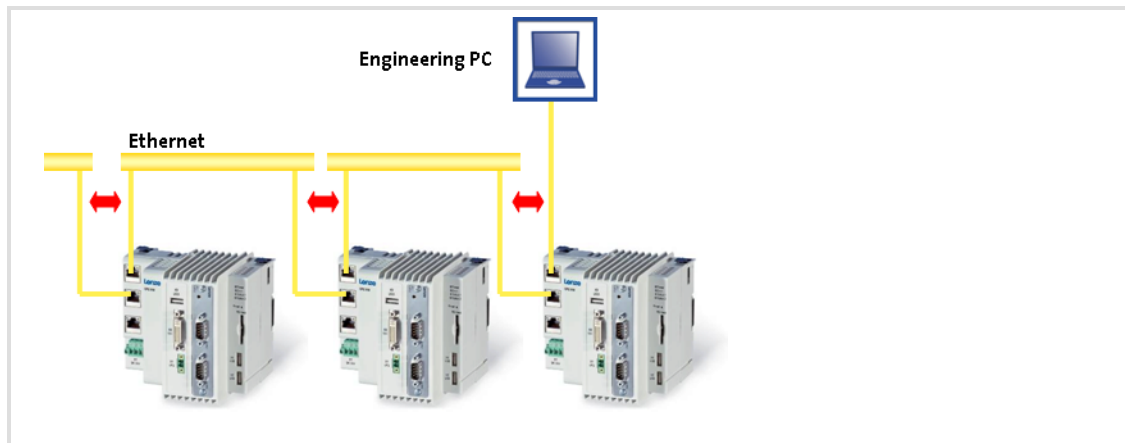
##### 6.4.2 Ethernet interface

	Description	Connection type	Cable type
 IPC001	X3, X4: Ethernet connection X3 LAN1b (internal switch) X4 LAN1a (internal switch)	RJ45 socket	Network cable CAT5e S/FTP (recommended) Max. cable length 100 m




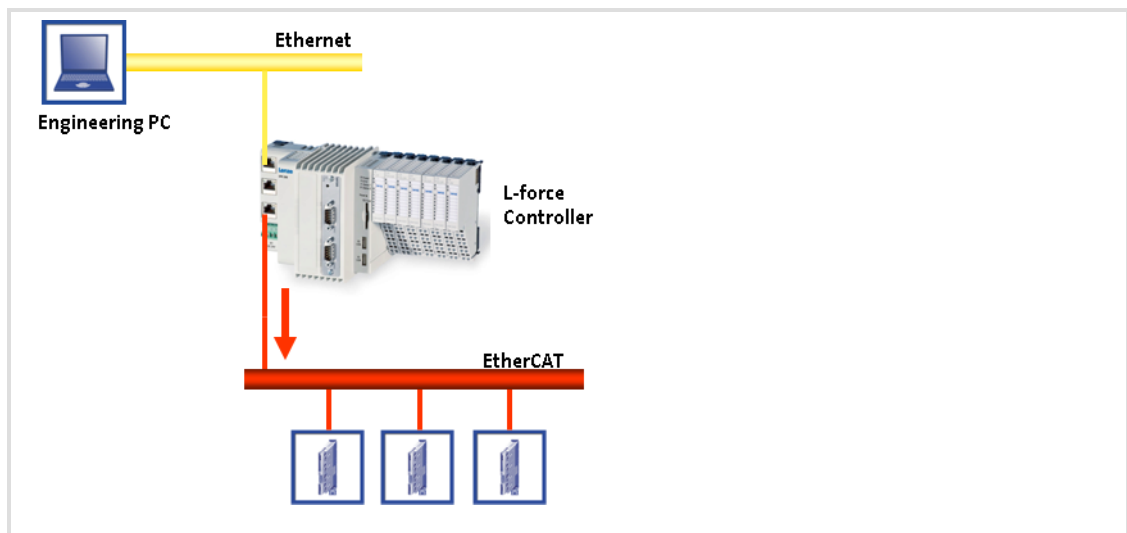
#### Note!

The L-force Controller can be connected to the higher-level network via X3 (LAN1b) or X4 (LAN1a). If the application comprises several L-force Controllers, these can be networked in a line network via the second LAN interface.




### 6.4.3 EtherCAT interface


	Description	Connection type	Cable type
 IPC001	X2 EtherCAT	RJ45 socket	Network cable CAT5e S/FTP (recommended) Max. cable length 100 m



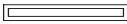
### 6.4.4 USB interface

	Description	Connection type	Cable type
 IPC001	X5 ... X7: USB host connection (X7 L-force Controller 3231C only)	USB-A socket	USB cable with USB-A plug

### 6.4.5 Communication interface (MC card)

	Description	Connection type	Cable type
 EL100-013	Interface for communication card MC-x	Socket connector	-

**6.4.6 SD card interface**

	Description	Connection type	Cable type
	SD/ SDHC compatible	Slot	-

**Note!**

The combination of control technology software and application data on the SD card ensures that the data suit the respective application in the present version. This enables an easy transfer of the SD card to another device. Automatic, possibly unwanted and difficult-to-handle update/downgrade processes can be avoided in this way.

The SD card is used as a flash memory for the following applications:

- ▶ PLC boot project
- ▶ Visualisation
- ▶ Databases of the data manager
- ▶ prestart.txt/poststart.txt
- ▶ Customer-specific data

The SD card is not bootable and must always be inserted!

**Exchanging the SD card**

1. Gently press the SD card into the slot to unclick it.  
The SD card is unlatched.
2. Remove the SD card.
3. Gently press the new SD card into the slot until it clicks into place.

## 7 Maintenance

### 7.1 Regular checks

The system is maintenance-free. Nevertheless, visual inspections must be carried out at regular intervals which must not be too long, depending on the ambient conditions.

Please check the following:

- ▶ Does the environment of the system still meet the operating conditions specified in the Technical data?
- ▶ Is the heat dissipation impeded by dust or dirt?
- ▶ Are the mechanical and electrical connections still okay?

### 7.2 Cleaning



#### **Stop!**

##### **Sensitive surfaces and components**

The system can be damaged if it is not appropriately cleaned.

##### **Possible consequences:**

- ▶ Housings will get scratched or dull if cleaning agents containing alcohol, solvents or abrasives are used.
- ▶ Electrical components will be damaged if humidity enters in the housing.

##### **Protective measures:**

- ▶ Deenergise the complete system before cleaning.
- ▶ Wipe the housing using a clean, lint-free, soft cloth. For stubborn dirt, dampen the cloth with water and an ordinary household cleaning agent.

## 7.3 Repair

## 7.3.1 Exchanging GapPad strips

**Note!**

On the rear of the L-force Controller, there are two GapPad strips. These strips serve to thermally connect the controller to the DIN rail. If the strips are defective, they must be replaced (📖 32)!

Mounting of the L-force Controller on the DIN rail is limited to 20 plug cycles! Then the GapPad strips must be exchanged!

New GapPad strips are available from Lenze (order number EPCZMEG).

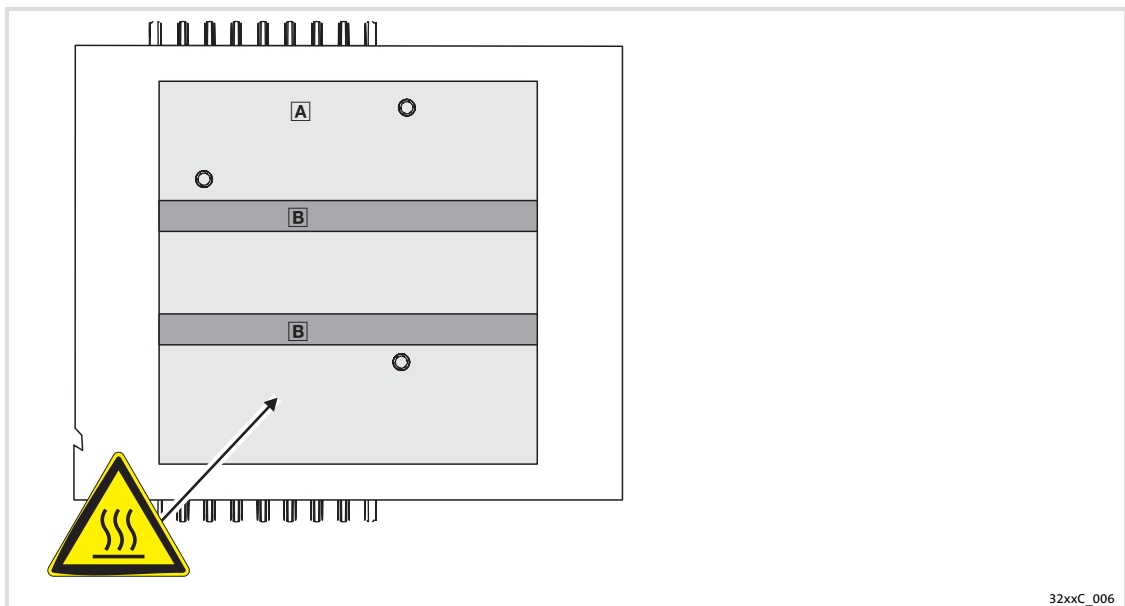


Fig. 7-1 Rear side of L-force Controller

- Ⓐ Heatsink
- Ⓑ GapPad strip

How to exchange the GapPad strips:

1. Check the temperature of the heatsink because it may become very hot during operation and contact may cause burns.
2. Pull off the old GapPad strip from the groove in the heatsink.
3. Remove the blue film from the self-adhesive side of the new GapPad strip and stick the GapPad strip into the groove.
4. Repeat these steps for the second GapPad strip.



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