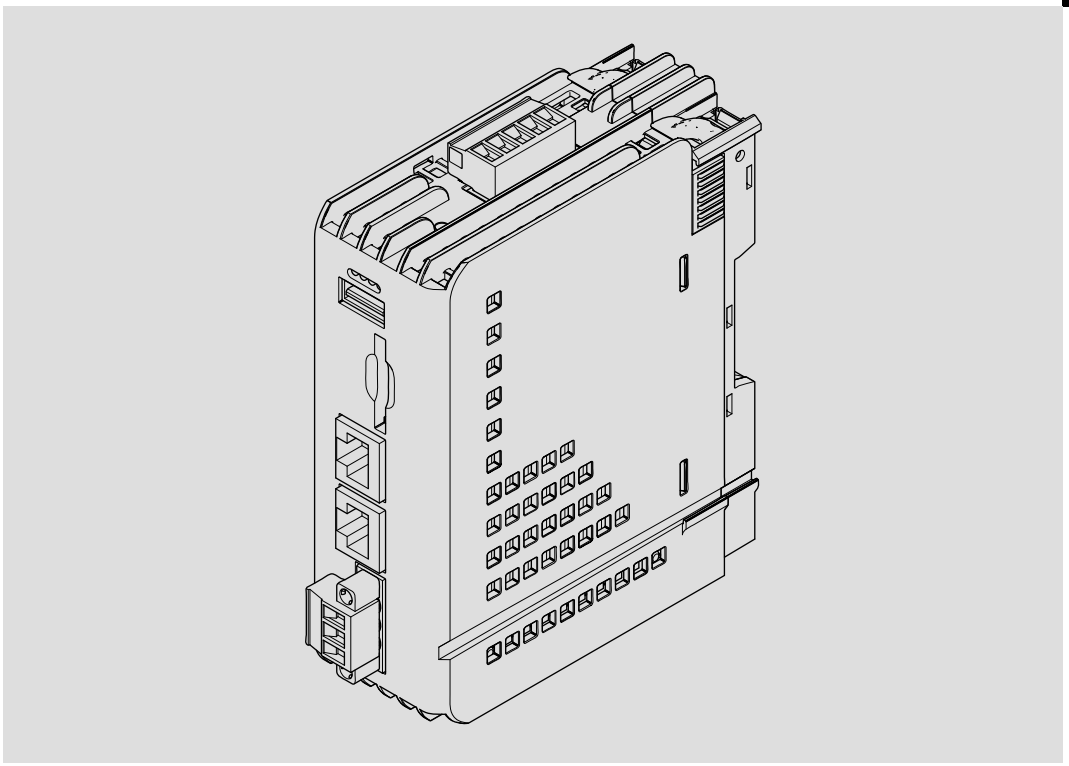
BA_c300
13462750

L-force *Controls*

Operating Instructions

c300



C30GAC...

Controller

Lenze

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

Tip!

Information and auxiliary devices related to the Lenze products can be found in the download area at

http://www.Lenze.com

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1 About this documentation

Contents

This documentation contains some information relating to the intended use of the controller in the context of the ”Controller-based Automation” system.

The present operating instructions are part of the ”Controller-based Automation” manual collection. Further documents with regard to system components can be obtained via download.

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.

Validity

These instructions are valid for

- Controller c300

1.1 Document history

Material number	Version			Description
13462750	1.0	04/2014	TD15	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	Ⓤ	Given in English and French
	UR warnings	ᴿᵁ	Given in English and French
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
	Documentation reference	ⓘ	Reference to another documentation with additional information For example: ⓘ EDKxxx = see documentation EDKxxx

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
 **Danger!**	**Danger of personal injury through dangerous electrical voltage.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 **Danger!**	**Danger of personal injury through a general source of danger.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 **Stop!**	**Danger of property damage.** 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
 **Note!**	Important note to ensure troublefree operation
 **Tip!**	Useful tip for simple handling
	Reference to another documentation

Special safety instructions and application notes

Pictograph and signal word	Meaning
 **Warnings!**	**Safety note or application note for the operation according to UL or CSA requirements.** The measures are required to meet the requirements according to UL or CSA.
 **Warnings!**	

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.
- When working on live products, observe the applicable national regulations for the prevention of accidents (e.g. BGV 3).
- The documentation contains information about EMC-compliant installation (shielding, earthing, arrangement of filters and laying cables). The system or machine manufacturer is responsible for compliance with the limit values required by EMC legislation.

  Warning: The controllers are products which can be used in category C2 drive systems as per EN 61800-3. These products may cause radio interference in residential areas. If this happens, the operator may need to take appropriate action.
- 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 or dispose of the product according to the applicable regulations.

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 the event of an error, the device must be switched to a deenergised state immediately. For this, unplug the supply connector. Afterwards, send the device to the manufacturer. The address can be found on the back cover of this documentation. Please use the original packaging for the return!

Stop!

The product contains electrostatic sensitive devices.

Before working in the connection area, the personnel must be free of electrostatic charge.

3 Product description

3.1 Scope of supply

Quantity	Name
1	Controller
1	Connection plug for voltage supply
1	Plug connection for CAN bus
1	SD card (inserted)
1	Contact cover
1	Mounting instructions

3.2 Application as directed

The 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.

The Controller in particular 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!

3.3 Device features

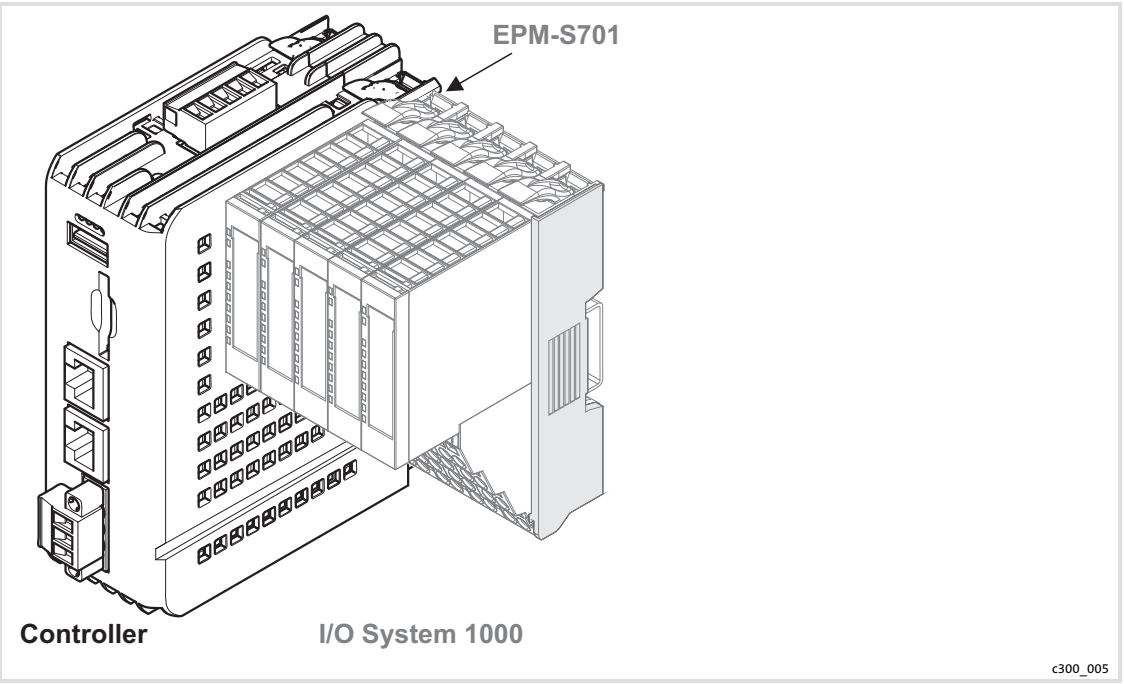


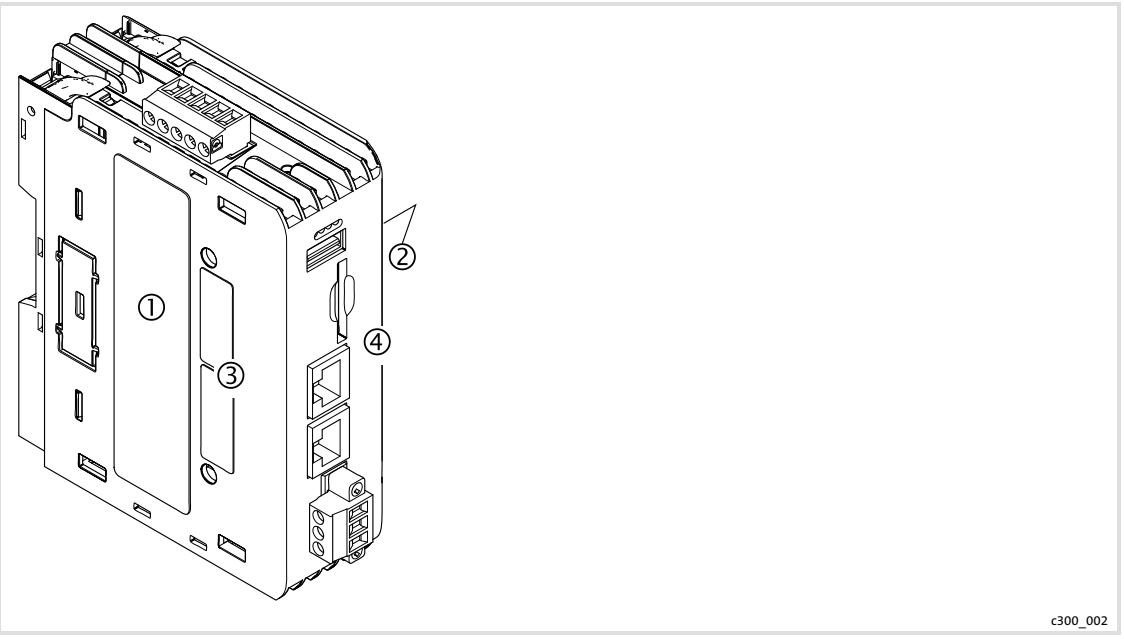
Fig. 3-1 Controller c300 (grey: connected I/O system 1000)

	Controller c300
Design	• I/O system 1000 can be connected via internal backplane bus • Fanless and maintenance-free
Mounting	• on standard DIN rail (35 mm)
Control and display elements	• Reset button • 4 diagnostic LEDs (power, PLC status, backplane bus status and one freely programmable LED)
Processor	• Cortex™-A8, 800 MHz
Equipment	• 512 MB DDR3-RAM • Windows® Embedded Compact 7 operating system (WEC7) on flash memory (2 GB)
Interfaces	• 1 x SD/SDHC card • 1 x USB 2.0 • 1 x Ethernet • 1 x EtherCAT (in preparation) • 1 x CAN
Optional accessories	• MC card (in preparation)
UPS functionality	• Implemented

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

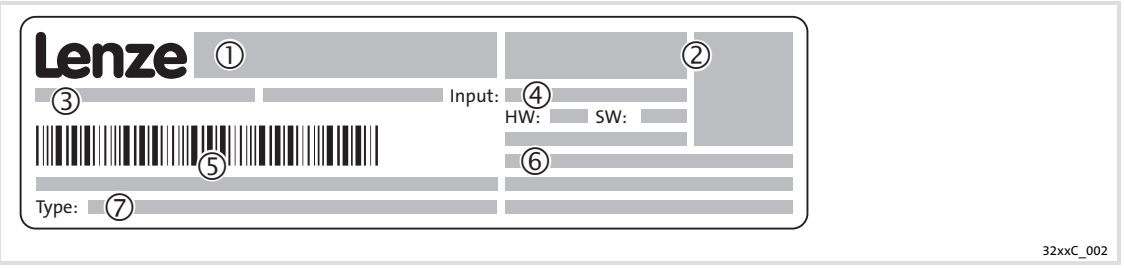
3.4 Identification

How to find information



① Nameplate
② Windows licence number (may also be placed at the side on the right)
③ MAC addresses, for X2 and X3
④ Terminal assignment

Nameplate



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

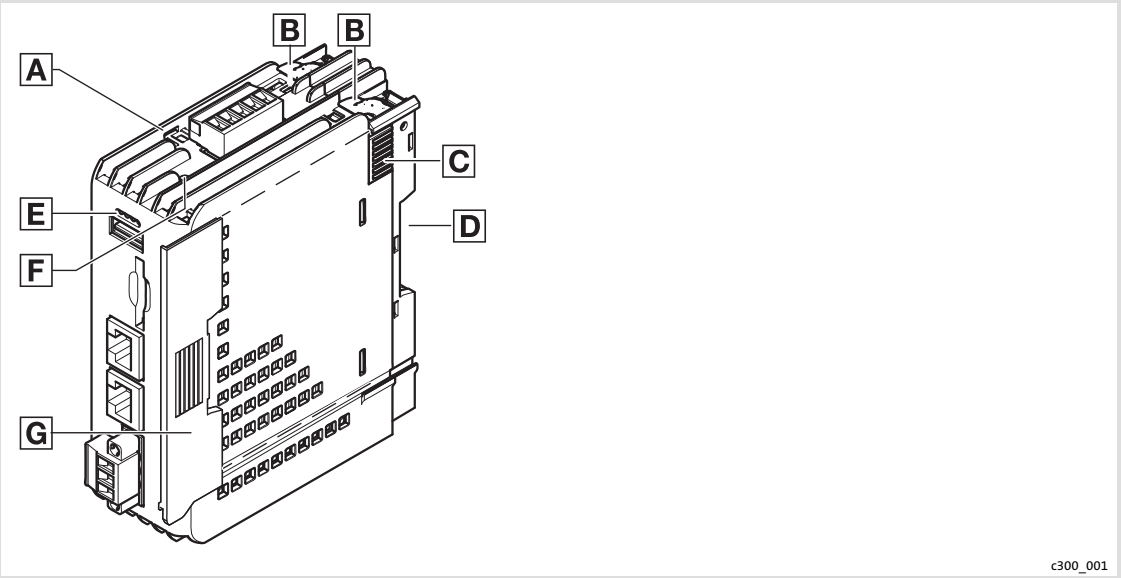
Type code

Controller c300	⑦				
	C30GAC00000F3G	x	XXX-02S3C	x	00 000

Extensions
0 = without

Control technology runtime software
3 = L-force Logic: LPC1000 (V3.x)

3.5 Controls and displays



Pos.	Description
A	Controller
B	Locking lever (DIN rail)
C	Backplane bus contacts
D	DIN rail guide
E	Status LEDs
F	Reset button
G	Contact cover

LED				Message
Power	Error	Status 1	Status 2	
Is lit blue	Off	Off	Off	Supply voltage is available and system clock is synchronised.
Is lit blue	Off	Blinking yellow	Off	Operating system running (WEC7) and the control technology is started
Is lit blue	Blinking red	Blinking yellow	Off	SD card not found
Yellow is continuously ON	Off	Off	Off	Input voltage has fallen below a minimum value (power fail). UPS function is activated.
Yellow is blinking	Off	Off	Off	Reset after failed backup/restore
Is blinking blue/yellow	Off	Off	Off	System clock is not synchronised.
Off	Off	Off	Off	Reset has been activated
-	Messages of the optional ”backup and restore tool”: see documentation for the ”backup and restore tool”			

3.6 UPS functionality

The controller is provided with a backup functionality via which user data (retain variables) are saved in the case of a supply voltage failure before the device is switched off.

	Controller
	c300
UPS functionality via	internal buffer capacitor
Storage medium for backup data	SD/SDHC card
Buffer time sufficient for	128 kB retain data

3.7 Real-time clock functionality

The operating system receives the CMOS-RTC time via a maintenance-free clock chip. The clock chip is buffered internally for at least 28 days. Then the clock must be set again. A battery is not required.

3.8 Reset Device

To reset the device, press the reset button (📖 16).
There are two options:

- Reset button is pressed for >4 s and <10 s.
  - Reset of the complete system is carried out.
  - All LEDs are off during reset.
  - After a successful reset, the POWER-LED is lit blue.
- Reset button is pressed for >10 s.
  - Default setting is loaded and restart is carried out.
  - All LEDs are off during reset.
  - Backup image is loaded.
  - After a successful reset, the POWER-LED is lit blue.

4 Technical data

4.1 General data and operating conditions

General data

Conformity and approval			
Conformity			
CE	2004/108/EC	EMC Directive	
Other			
RoHS	2011/65/EU	Products lead-free in accordance with directive	

Protection of persons and device protection			
Enclosure	EN 60529	IP20	
Electrical isolation			
To the fieldbus		Yes	
To the process level		None	
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 level 3, i. e. 8 kV for air discharge, 4 kV for contact discharge
		EN 61000-4-3	RF interference (housing) 80 MHz ... 1000 MHz, 10 V/m 80 % AM (1 kHz)
		EN 61000-4-4	Burst, severity level 3
		EN 61000-4-5	Surge, severity level 1
		EN 61000-4-6	RF cable-guided 150 kHz ... 80 MHz, 10 V/m 80 % AM (1 kHz)

Operating conditions

Ambient conditions		
Climatic		
Storage/transport	IEC/EN 60068-2-14	-25 ... +70 °C
Operation	EN 61131-2	Vertical mounting: 0 ... +55 °C Horizontal mounting: 0 ... +55 °C
Air humidity	EN 61131-2	RH1 (without condensation, relative humidity 10 ... 95 %)
Pollution	EN 61800-5-1	Pollution degree 2
Mechanical		
Vibration	EN 60068-2-6	1 g
Shock	EN 60068-2-27	15 g
Site altitude		
Operation		< 2000 m amsl

Mounting conditions		
Mounting place		In the control cabinet
Mounting position		• Vertical • Horizontal – CAN connection X5 points to the left (📖 22)
Mounting type		Clip mounting on DIN rail according to DIN 60715 (TH 35 x 7.5 or TH 35 x 15)

4.2 Electrical data

Type	Supply				
		Stand-alone		With maximum configuration of I/O system 1000 (5 V/0.65 A)	
	Voltage	Current	Power [1]	Current	Power
	[V DC]	[A]	[W]	[A]	[W]
c300	24 (+18 ... +30)	0.4	9	0.7	17

[1] Without USB consumer

4.3 Mechanical data

Type	Dimensions	Mass
	W x D x H [mm]	[kg]
c300	42 x 127 x 102	0.35

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 Controller 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 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.

5.2 Dimensions

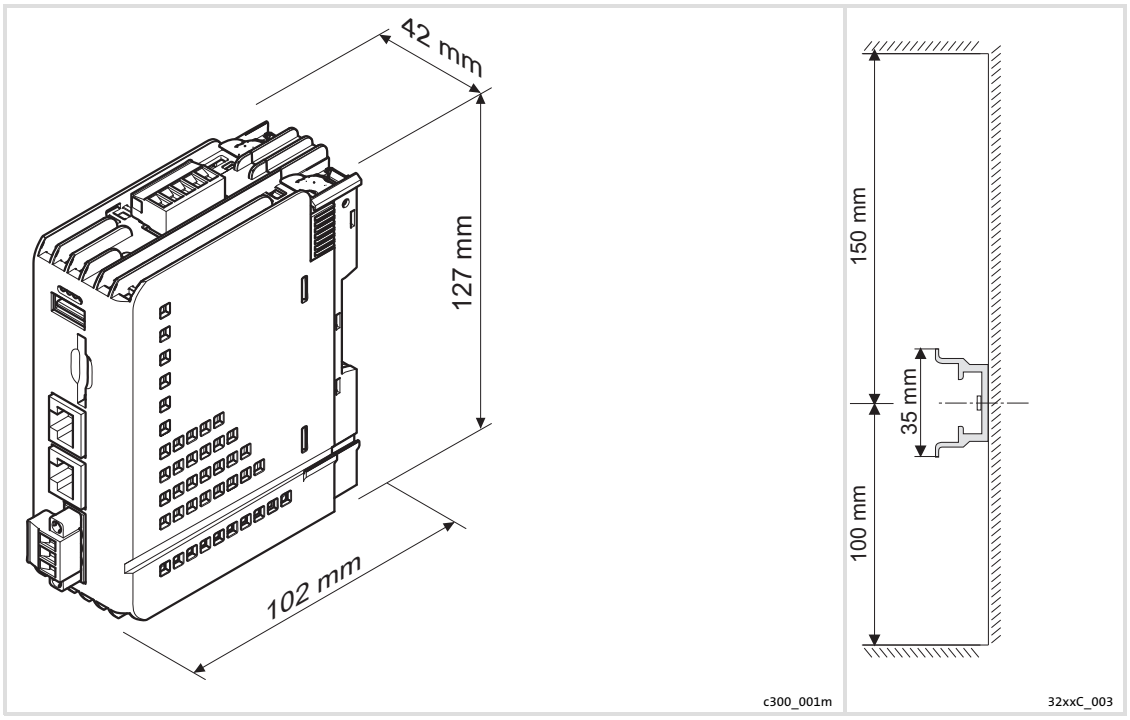
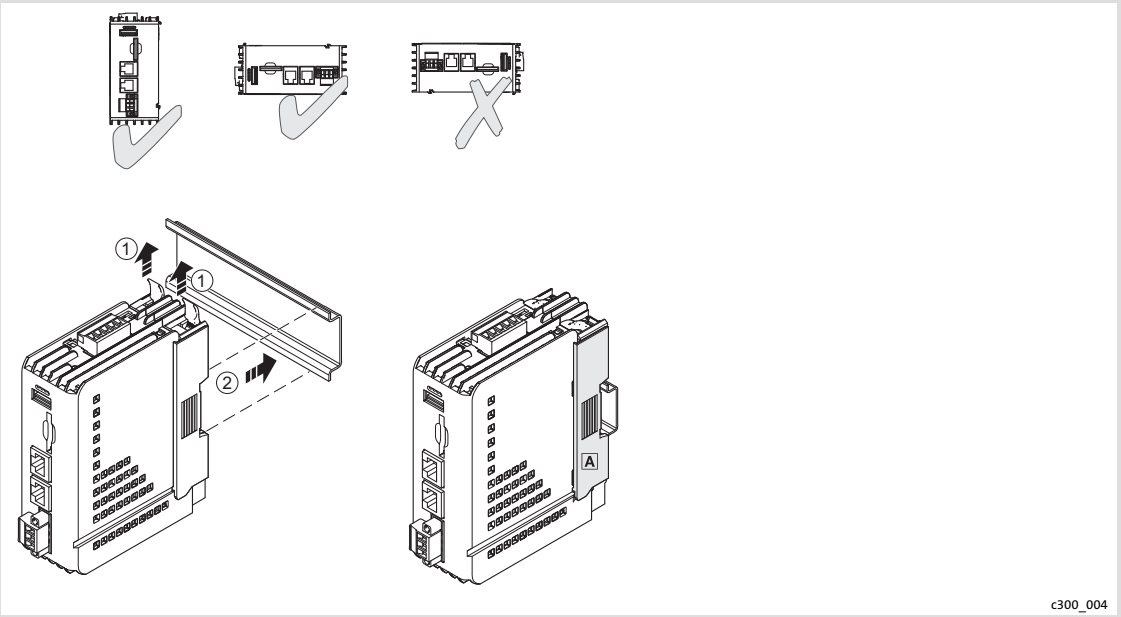


Fig. 5-1 Dimensions and mounting clearances

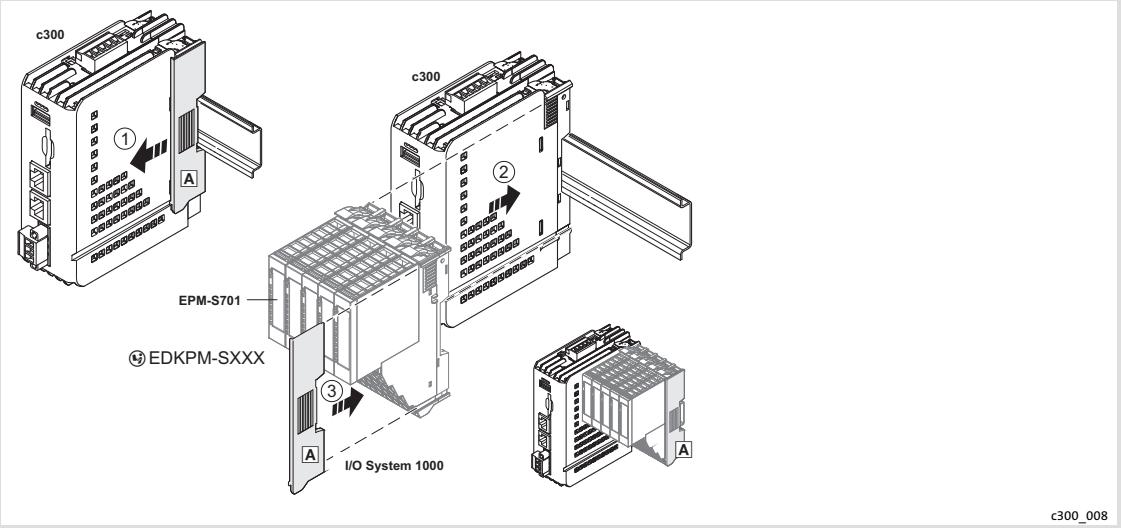
5.3 Mounting

c300:



Always attach the cover A!

I/O System 1000:



Always attach the cover A!

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.

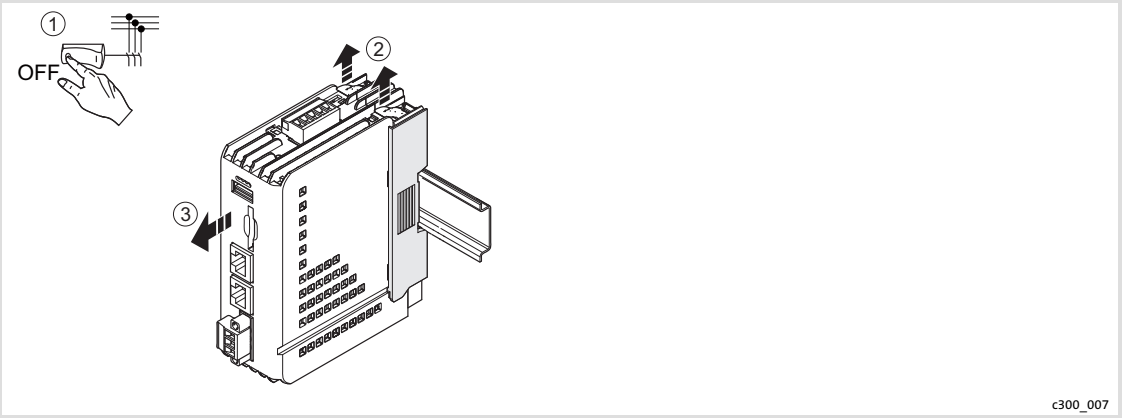
Possible consequences:

► Damage of the device and/or the modules.

Protective measures:

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

5.4 Dismounting



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.

6.2 Wiring according to EMC

General notes	● The electromagnetic compatibility of the system depends on the type of installation and care taken. Especially consider the following: – Assembly – Shielding – Earthing ● 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: – Use of unshielded cables ● **The compliance with the EMC Directive is in the responsibility of the user.** – 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. – If devices which do not comply with the CE requirement concerning noise immunity (EN 6100042) are operated close to the system, these devices may be electromagnetically affected by the system.
Assembly	● Provide electrical contact between the DIN rail and the earthed mounting plate: – Mounting plates with electrically conductive surfaces (zinc-coated or stainless steel) allow permanent contact. – Painted plates are not suitable for an EMC-compliant installation. ● If you use several mounting plates: – Connect as much surface of the mounting plates as possible (e.g. with copper strips). ● When laying the cables, pay attention to the separation of signal cables and mains cables. ● Lay the cables as close as possible to the reference potential. Freely suspended cables act like aerials.
Shielding	● Only use cables with braided shield if possible. ● The overlap rate of the shield should be higher than 80%. ● For data cables for serial connection, always use metal or metallised connectors. Connect the shield of the data cable to the connector shell.
Earthing	● Earth all metallically conductive components using suitable cables connected to a central earthing point (PE bar). ● Keep to the minimum cross-sections defined in the safety instructions: – 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.

6.3 Connecting the supply and peripheral devices

6.3.1 Terminal diagram supply

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:

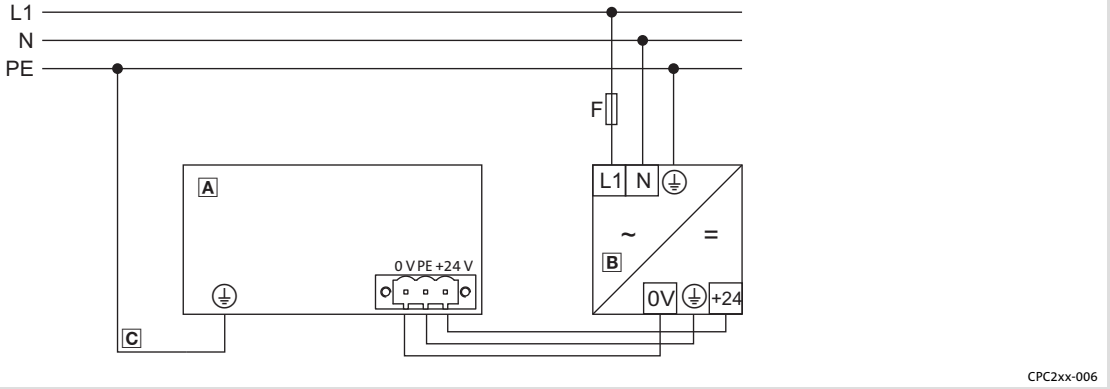
► Observe the max. permissible input voltage.

► Professionally fuse the device on the input side against voltage fluctuations and voltage peaks.

Note!

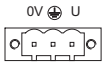
The controller starts as soon as the supply voltage is applied.

After the operating system has been shut down, the controller switches off automatically. For restarting, the supply voltage has to be disconnected for a short time.



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

6.3.2 24 V connection

X1	Description	Connection type	Cable type
 IPC001	Connection of 24 V DC current supply	3-pin Combicon socket	Cable (conductor cross-section max. 2.5 mm²) with Combicon connector

6.3.3 EtherCAT interface

Support of this interface is in preparation!

X2	Beschreibung	Anschlusstyp	Kabeltyp
 IPC001	EtherCAT	RJ45-Buchse	Netzwerkkabel CAT5e S/FTP (empfohlen) Kabellänge max. 100 m

Note!

If the RJ45 plug connection is exposed to oscillating or vibrating stress:

- ► Use a strain relief in the immediate vicinity of the RJ45 socket.
- ► Select the contact surface on which the device is mounted as fixing point of the strain relief.
- ► Comply with the related minimum bending radius of the cable used.

6.3.4 Ethernet interface

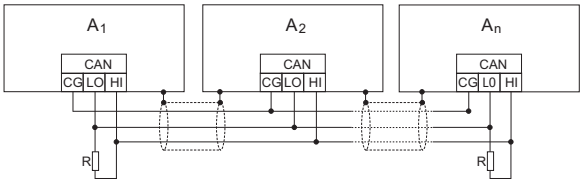
X3	Description	Connection type	Cable type
 IPC001	Ethernet LAN	RJ45 socket	Network cable CAT5e S/FTP (recommended) Max. cable length 100 m

Note!

If the RJ45 plug connection is exposed to oscillating or vibrating stress:

- ► Use a strain relief in the immediate vicinity of the RJ45 socket.
- ► Select the contact surface on which the device is mounted as fixing point of the strain relief.
- ► Comply with the related minimum bending radius of the cable used.

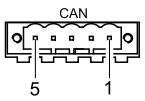
6.3.5 CAN port



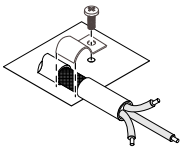
A1	Node 1
A2	Node 2
An	Node n
CG	CAN-GND
LO	CAN-LOW
HI	CAN-HIGH
R	120 Ω-bus terminating resistor

We recommend the use of CAN cables in accordance with ISO 11898-2:

CAN cable in accordance with ISO 11898-2	
Cable type	Paired with shielding
Impedance	120 Ω (95 ... 140 Ω)
Cable resistance/cross-section	
Cable length ≤ 300 m	≤ 70 mΩ/m / 0.25 ... 0.34 mm² (AWG22)
Cable length 301 ... 1000 m	≤ 40 mΩ/m / 0.5 mm² (AWG20)
Signal propagation delay	≤ 5 ns/m

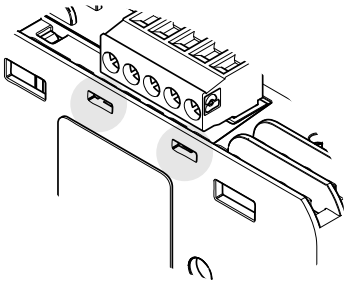
X5	Description	Connection type	Cable type
 EL100-011	CAN bus connection Pin 1: CAN-GND (CG) Pin 2: CAN-LOW (LO) Pin 3: not assigned Pin 4: CAN-HIGH (HI) Pin 5: not assigned	5-pole Phoenix Combicon socket	CAN cable according to ISO 11898-2 with Phoenix Combicon connector, MSTB 2.5 / 5-STF-5.08

Shield connection of CAN cable above cable clamp in the control cabinet:



6.3.6 Cable fixing and strain relief

Fasten the cable bundles on the device using cable ties.



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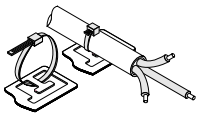
Fastening points for cable ties for strain relief; at the top and at the bottom, respectively



EL100-034

6.3.7 USB interface

X4	Description	Connection type	Cable type
 IPC001	USB 2.0 host connection Max. load: 5 V/500 mA	USB-A socket	USB cable with USB-A plug

6.3.8 SD card interface

SD	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
- ► Retain and logbook data (3241 C only)
- ► Customer-specific data

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

Exchanging the SD card

1. To unlock the SD card, gently press it into the slot and let loose.
2. Remove the SD card carefully.
3. Gently press another SD card into the slot until it locks into place with a click.

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.

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BA_c300 ■ 13462750 ■ EN ■ 1.0 ■ TD15

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