

# Controller c300





# Controller c300

## Contents



<b>General information</b>	Product key	3.4 - 4
	Equipment	3.4 - 5
	Product information	3.4 - 6
	Lenze FAST	3.4 - 8
<b>Technical data</b>	Standards and operating conditions	3.4 - 11
	Rated data	3.4 - 12
	Dimensions	3.4 - 13
<b>Interfaces</b>	Connection plan	3.4 - 14
	Mains connection	3.4 - 14
<b>Accessories</b>	Safety Controller	3.4 - 15
	Application Credit	3.4 - 16
	SD card and USB flash drive	3.4 - 19
	24 V power supply unit	3.4 - 19

# Controller c300

General information



## Product key

### Product

c 3 0 0

### Product key

C 3 0 G A C 0 0 0 0 0 F 3 G  XXX - 0 2 S 3   0 0 0 0 0

#### Option interface MC 1

0 – No  
8 – MC-PND (PROFINET Device)

#### Operating system

C – WEC7 Core

#### Runtime software control technology

3 – FAST Runtime

3.4



Controller c300

# Controller c300

## General information



### Equipment

#### 4 LEDs

Status display

#### CANopen Master and Slave

Status display

#### I/O System 1000

- up to 64 modules
- Analog and digital inputs and outputs
- additional modules

#### USB

USB flash drive connection for backup and maintenance

#### SD card

Data memory for project data

#### Option interface

Bus system extension

#### LAN 1

Ethernet 10/100 Mbps

#### Supply voltage

DC 24 V

#### EtherCAT Master



3.4

### Safety topology extension

#### Safety-Controller c250-Sx

#### Safety-I/O-Modul

#### Safety-bus coupler

Unlocking mechanism

Status-LEDs

Network Out

Network In

24-V-connection

Additional shield connection

E-Bus

(covered)

Status-LEDs

Terminal strip

IO-LEDs



# Controller c300

## General information



### Product information

Based on the 3200 C, the c300 fits seamlessly into our platform which is built on a consistently modern system architecture. The benefits: within the Controller-based Automation system, the precisely tailored Controller c300 takes responsibility for all of your control tasks. It focusses primarily on basic control (PLC) and motion tasks. Space-saving and intelligent at the same time.

#### Highlights

- Small control system with I/O modules which can be connected in series and integrated master interfaces for EtherCAT and CanOpen
- Easy standard set-up and data backup via USB flash drive
- Can be extended with communication interface PROFINET-Device)
- Future-proof due to compliance with industrial standards
- High system-availability
  - Integrated UPS solution
  - Easy device replacement thanks to replaceable memory card
- No maintenance required thanks to batteryless and fanless design

#### I/O system 1000 as local I/Os

At a speed of 48 Mbps, which is extremely fast, the c300 controller and the I/O modules communicate with each other via an extremely efficient backplane bus. Like this, it is possible to mount a great variety of configurations of the IO system directly on the controller in a flexible fashion. Precisely tailored to your application.

#### Safety topology with EtherCAT®

The Safety Controller c250-S clears the way for planning the complete drive and safety technology from one single source. The entire machine safety can be programmed with only one engineering tool, based on the PLCOpen standard - irrespective whether it is about "grey" or "yellow" control technology.

The deep integration of the functional safety into the automation system makes the engineering easier, improves the diagnostics options and reduces the number of interfaces and components.

This saves time and money and finally increases the availability and flexibility of the machine.



# Controller c300

## General information



## Product information



### Logic (PLC) and motion in a single device

- Optimised for machines/machine modules with central motion control
- Easy engineering thanks to central data storage



### Easy to use

- Automated standard set-up and data backup via USB stick
- Easy device replacement by the pluggable SD card Application Credit 0
- Diagnostics via implemented web server or EASY Starter



### Communicative

- EtherCAT® as a fast bus system directly on board (in preparation)
- CANopen on board
- Precisely tailored by modular extension option



### High-precision control for optimum manufacturing results

- Touch probe-compatible inputs
- High-precision output control
- Highly deterministic backplane bus with precise 1  $\mu$ s time stamp

### IEC 61131-3



### Prepared for the future thanks to compliance with industrial standards

- Programming in IEC61131-3
- Motion Control as per PLCopen
- PLC Designer based on CODESYS3



### I/O system 1000 as local I/Os

- Permanent wiring due to separation of electronics and base module
- Fast diagnostics achieved thanks to clear labelling of the LEDs assigned to each channel
- Easy connection thanks to inclusion of printed circuit diagram
- Fully integrated shield connection without special shield terminals

# Controller c300

## General information

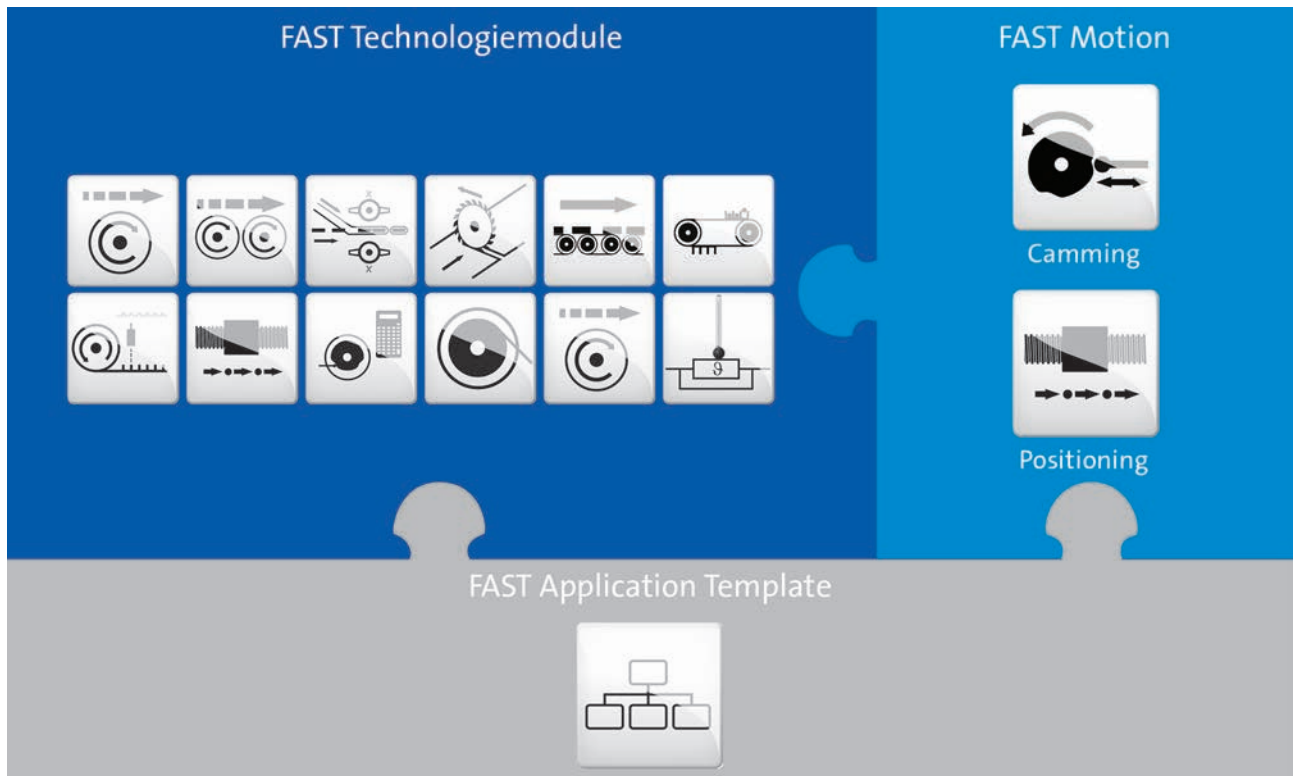


### Lenze FAST

Lenze FAST (Feasibly Applicable Software Toolbox) provides Lenze standard software modules for easily developing a modular machine control.

For this purpose, the »PLC Designer« engineering tool with the "FAST Application Template" provides for an easy programming and commissioning as standardised software structure and with predefined technology modules.

FAST Motion functions serve to implement individual extensions. The »EASY Starter« can be used to subsequently optimise and diagnose the system.



3.4

### FAST Application Template

The FAST Application Template is standardised by Lenze for a modularised and clear programming in the »PLC Designer«.

The FAST Application Template can be used via a library in the »PLC Designer«. The library contains the structure and basic functionality of the FAST Application Template (as, for instance, state machine and error handling).



# Controller c300

## General information

---



### Lenze FAST

#### FAST technology modules

The predefined FAST technology modules serve to easily implement the desired machine functions.

The FAST technology modules are standardised software modules for a modular programming of the machine control. A FAST technology module features a complete and pre-tested drive function. Integrated basic functions and an integrated visualisation provide for an easy commissioning and testing of the modules. The reusability of the modules increases the quality of the software and considerably reduces the time required for programming, commissioning and testing.

#### FAST Motion

FAST Motion provides full flexibility and scalability for programming and comprises optimised function blocks based on "PLCopen motion control":

- "Motion Control" modules (based on PLCopen Motion Control (formerly part 1+2) are optimised for the basic functions "positioning" and "cams" (synchronising).

The FAST technology modules are contained in the »PLC Designer« as independent function blocks in a library. They use the standardised interfaces and can thus be easily integrated into the machine program, combined in any way and extended individually with FAST Motion functions.

If the functionalities of the FAST technology modules are not sufficient, they can be adapted and extended individually using the FAST Motion modules. These modules are capable to program any number of functions.

The »PLC Designer« contains the "Motion Control" modules in two libraries.

# Controller c300

General information

---



# Controller c300

Technical data



## Standards and operating conditions

<b>Mode</b>			
Controller			c300
<b>Conformity</b>			
CE			Low-Voltage Directive 2014/30/EU
EAC			TP TC 020/2011 (TR CU 020/2011)
<b>Approval</b>			
UL 508C			Process Control Equipment (File-No. E236341)
UL/CSA			CSA C22.2 No. 61010-2-201 UL 61010-2-201
<b>Degree of protection</b>			
EN 60529			IP20
NEMA 250			
<b>Climatic conditions</b>			
Storage (EN 60721-3-1)			1K3 (Temperature: -5 °C ... +45 °C)
Transport (EN 60721-3-2)			2K3 (temperature: -25 °C ... +70 °C)
Operation (EN 60721-3-3)			3K3 (temperature: 0 °C ... +55 °C)
<b>Degree of pollution</b>			
EN 61131-2			2
<b>Site altitude</b>			
Amsl	H <sub>max</sub>	[m]	2000
<b>Vibration resistance</b>			
Vibration (EN 61131-2)			1 g
Mechanical shock (EN 61131-2)			15 g
<b>Noise emission</b>			
EN 61000-6-4			Industrial premises
<b>Noise immunity</b>			
EN 61000-4-2			ESD: Severity 3
EN 61000-4-6			150 kHz ... 80 MHz, 10 V/m 80 % AM (1 kHz)
EN 61000-4-3			80 kHz ... 1000 MHz, 10 V/m 80 % AM (1 kHz) 1.4 GHz ... 2.0 GHz, 3 V/m, 80 % AM (1kHz) 2.0 GHz ... 2.7 GHz, 1 V/m, 80 % AM (1kHz)
EN 61000-4-4			Burst: Severity 3


3.4

# Controller c300

Technical data



## Rated data

			
<b>Mode</b>			
Controller			c300
<b>Processor type</b>			
Fanless			ARM Cortex A8800
<b>Storage medium</b>			
SD card		[MB]	512
<b>Interfaces</b>			
Ethernet			1
EtherCAT Master			1
CANopen			1
USB			1
<b>Rated voltage</b>			
DC	$U_{N,DC}$	[V]	24
<b>Max. current consumption</b>			
With connected I/Os	$I_{max}$	[A]	0.70
Without connected I/Os	$I_{max}$	[A]	0.60
<b>Operating system</b>			
			Windows® Embedded Compact 7
<b>Memory size</b>			
Retain data		[kB]	128
Main memory (RAM)		[MB]	512
Min. internal flash memory		[GB]	2
<b>Runtime</b>			
FAST Runtime			•
Visualisation			•
<b>Dimensions</b>			
	h x b x t	[mm]	127 x 42 x 102
<b>Mass</b>			
	m	[kg]	0.33

3.4

# Controller c300

Technical data



## Dimensions

Without PROFINET



3.4

With PROFINET



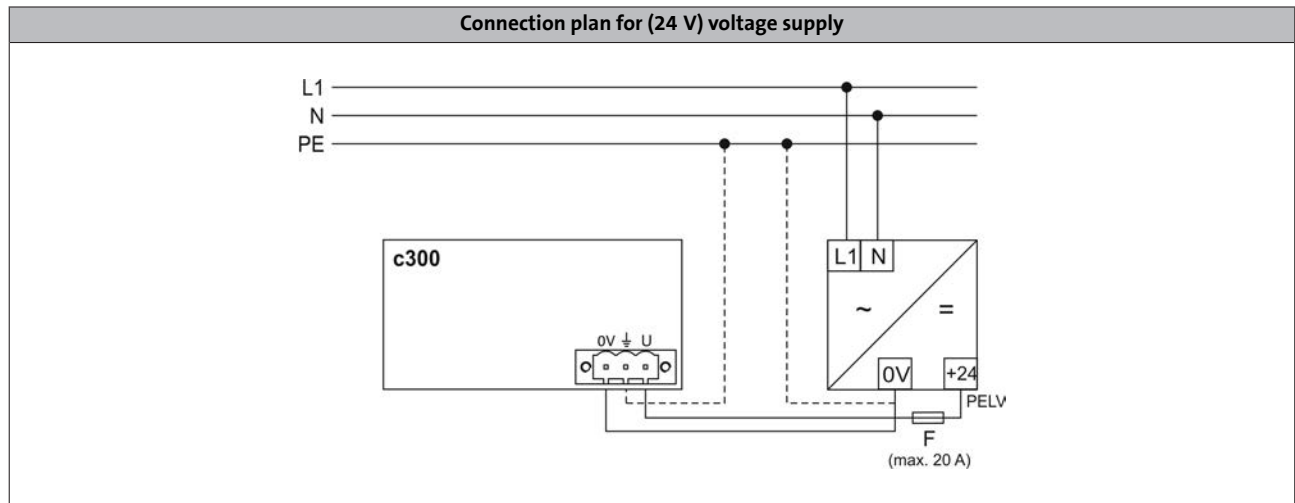
Dimensions [mm]

# Controller c300

## Interfaces



### Connection plan



3.4

### Mains connection

	Connection	Connection type	Cable type
	DC supply (24 V)	3-pole Combicon socket	Cable with Combicon-plug (cable cross-section max. 2.5 mm <sup>2</sup> )

# Controller c300

## Accessories



### Safety Controller

Safety in the system does not begin with the drives first, but at the control level.

With the expansion of the controller software to include the Safety Controller c250-S a complete automation solution is provided for safety engineering and control and drive tasks. Topped with the safety I/O module, all the safety aspects in the machine module can be evaluated. EtherCAT is used for data transfer.



3.4

Mode		Features	Product key
Safety Controller c250-S	-	<ul style="list-style-type: none"> <li>Compact Controller c250-S for easy mounting using the DIN rail</li> <li>High-quality safety solution thanks to PL e/SIL 3</li> </ul>	C25BAYSQ
Safety bus coupler	-	<ul style="list-style-type: none"> <li>Supported network: EtherCAT with safety-over EtherCAT (FSoE = Fail Safe over EtherCAT)</li> </ul>	C25BAYCB
Safety I/O module	-	<ul style="list-style-type: none"> <li>Expansion of the Safety Controller with 4 safe inputs and 2 safe outputs</li> </ul>	C25BAYA42

Safety Controller	
Functions	Implementation according to PLCopen, TC 5
Equivalence / antivalence test	SF_Equivalent SF_Antivalent
Operation mode selector	SF_ModeSelector
Emergency stop, emergency off	SF_EmergencyStop
Monitoring of electro-sensitive protective equipment (ESPE)	SF_ESPE (electro-sensitive protective equipment)
Guard monitoring	SF_GuardMonitoring
Guard monitoring with locking	SF_GuardLocking
Two-hand control	SF_TwoHandControlTypeII SF_TwoHandControlTypeIII
Muting	SF_MutingSeq SF_MutingPar SF_MutingPar_2Sensors
Cyclic test of ESPE	SF_TestableSafetySensor
Enable switch	SF_EnableSwitch
Controlling safety output with standard controller and safety controller	SF_OutControl
Monitoring of feedback loop	SF_EDM (external device monitoring)

Technical data	
Rated current	240 mA via E-bus connection
DC supply voltage	5 V via E-bus connection 24 V via safety bus coupler
Dimensions h x w x d	120 mm x 25 mm x 90 mm
Degree of protection	IP20

# Controller c300


## Accessories



### Application Credit

With Lenze FAST, technology modules for motion control are provided. In order that these modules are used, the following Application Credit is required. If different technology modules are used, the demand for Application Credit must be added for all modules used.






3.4

Mode		Features	Product key
Application Credit		• Licence for use of FAST Application Software, 100 points	EPCZEMSD0L1010
		• Licence for use of FAST Application Software, 150 points	EPCZEMSD0L1015
		• Licence for use of FAST Application Software, 200 points	EPCZEMSD0L1020
		• Licence for use of FAST Application Software, 300 points	EPCZEMSD0L1030
		• Licence for use of FAST Application Software, 400 points	EPCZEMSD0L1040
		• Licence for use of FAST Application Software, 500 points	EPCZEMSD0L1050
		• Licence for use of FAST Application Software, 600 points	EPCZEMSD0L1060
		• Licence for use of FAST Application Software, 700 points	EPCZEMSD0L1070
		• Licence for use of FAST Application Software, 1000 points	EPCZEMSD0L1100
		• Licence for use of FAST Application Software, 1200 points	EPCZEMSD0L1120
		• Licence for use of FAST Application Software, 1500 points	EPCZEMSD0L1150
		• Licence for use of FAST Application Software, 2000 points	EPCZEMSD0L1200
		• Licence for use of FAST Application Software, 2500 points	EPCZEMSD0L1250
		• Licence for use of FAST Application Software, 3000 points	EPCZEMSD0L1300
• Licence for use of FAST Application Software, 4000 points	EPCZEMSD0L1400		

### FAST technology modules



Single drives

Technology module		Function	Points for use
Virtual Master		Implementation of a virtual master axis in the machine	25
Basic Motion		Provides easy basic motion functions: Manual jog, homing, absolute and relative positioning, continuous travel	
Electrical Shaft		Synchronisation and coupling of drives with precise speed and positioning.	
Flex Cam		Implementation of one or several electric cams. Flexible management of curves created online and offline.	50
Cross Cutter		Synchronised movements of drives for cross-sealing and/or cross-cutting of products.	100





### Application Credit

#### FAST technology modules

Technology module		Function	Points for use
Register control		Implementation of a clock-synchronised drive for generating a register control with print mark detection.	100
Winder Dancer		Implementation of a winding drive with dancer position control and/or a winding drive with tensile force/speed control	
Table Positioning		Positioning profiles for single axes with smoothing and touch probe positioning	50
Flying Saw		Cutting and processing of material while moving	100
Temperature Control		Control of the temperature of a system that is provided with a heating element and a thermal sensor.	50
Track Pick & Place		Implementation of gripper movements which, for instance, pick up workpieces from a conveying belt and place or position them onto another conveying belt	300
Smart Track		Distribution of products via several conveying belts. An intelligent distribution results in optimum packaging of products.	50
Magic Track		The preparation of single products to package them in groups. Is implemented comfortably with the two-pass conveyor.	

3.4

#### FAST dimensioning

The FAST modules can be connected easily with the PLC Designer. Which module is to be selected, depends on the automation dimensioning of the machine. In order to define the correct Application Credit, the points of each module simply have to be added up. The required Application Credit is deducted each time a technology module is called.

##### Example 1:

- 1x Virtual Master (25 points)
- 1x Electrical Shaft (25 points)
- 2x Winder Dancer (200 points)
- 1x Cross Cutter (100 points)

Result: 350 points

##### Example 2:

- 1x Virtual Master (25 points)
- 1x Electrical Shaft (25 points)
- 2x Flex Cam (100 points)

Result: 150 points

# Controller c300

## Accessories



### Application Credit



#### FAST Motion

FAST Motion provides a scalable programming of function blocks based on "PLCopen Motion Control".

If you use the technology modules in the application, the basic functions of the FAST Motion are accessed both for single axes and for coordinated multi-axes systems.

If you do not want to use the technology modules for the motion control in your application, the application can, for instance, be implemented as well with your own program code on the basis of the FAST Motion.

3.4

Fast Motion		Function	Points for use
Motion Control		<b>Positioning:</b> FAST Motion basic functions for single-axis movements according to PLCopen Motion Control (formerly part 1) for positioning. This serves to freely program flexible positioning modes and further single-axis movements in IEC 61131.	150
		<b>Camming:</b> FAST Motion basic functions for synchronisation and cam movements according to PLCopen Motion Control (formerly part 2). This serves to freely program flexible axis synchronisations and cams for single axes in IEC 61131.	

If you use FAST technology modules, the Application Credit already includes the required function of the FAST Motion. In this case, no additional points have to be considered for the use of the FAST Motion.

If you use the FAST Motion as a basic function for the motion control, the points according to the FAST Motion table apply.

# Controller c300

## Accessories



### SD card and USB flash drive

SD cards and USB flash drives are available for data storage and data backups.

- ▶ A SD card is part of the scope of supply of the controller.
- ▶ SD card without Application Credit.

Mode		Features	Product key
Application Credit 0		<ul style="list-style-type: none"> <li>• 512 MB</li> </ul>	
USB flash drive		<ul style="list-style-type: none"> <li>• 1 GB</li> </ul>	EPCZEMUS4
		<ul style="list-style-type: none"> <li>• 4 GB</li> </ul>	EPCZEMUS6

3.4

### 24 V power supply unit

An external power supply unit is also available as an alternative for powering the controller's control electronics.



24 V power supply unit

#### Rated data

<b>Product key</b>				EZV2400-000
<b>Rated voltage</b>				
AC	$U_{N, AC}$	[V]		230
<b>Rated mains current</b>				
	$I_{N, AC}$	[A]		1.20
<b>Output voltage</b>				
	$U_{out}$	[V]		DC 22.5 ...28.5
<b>Rated current</b>				
	$I_N$	[A]		10.0
<b>Dimensions</b>				
	h x b x t	[mm]		130 x 85 x 125
<b>Mass</b>				
	m	[kg]		1.24

# Controller c300

Accessories



13555736

Lenze SE  
Hans-Lenze-Straße 1  
D-31855 Aerzen  
Phone: +49 (0)5154 82-0  
Telefax: +49 (0)5154 82 28 00

[www.Lenze.com](http://www.Lenze.com)

**Lenze**