

# EC1000 Ethernet-Controller



Copyright © Berghof Automation GmbH

Reproduction and duplication of this document and distribution and communication of its content is prohibited, unless with our express permission. All rights reserved. Damages will be payable in case of infringement.

### **Disclaimer**

The content of this publication was checked for compliance with the hardware and software described. However, discrepancies may arise, therefore no liability is assumed regarding complete compliance. The information in this document will be checked regularly and all necessary corrections will be included in subsequent editions. Suggestions for improvements are always welcome.

Subject to technical changes.

### **Trademarks**

- CANtrol® and CANtrol®- dialog are registered trademarks of Berghof Automation GmbH
- Microsoft®, Windows® and the Windows® Logo are registered trademarks of Microsoft Corporation in the USA and other countries.
- EtherCAT® is a registered trademark and patented technology, licensed from Beckhoff Automation GmbH, Germany.
- CiA® and CANopen® are registered community trademarks of CAN in Automation e.V.

All rights reserved by the individual copyright holders.

### **General Information on this Manual**

This equipment manual contains product-specific information valid at the time of publication.

This equipment manual is only complete in conjunction with the product-related hardware and software user manuals required for the individual application.

→ [Content](#)

→ [Completeness](#)

You can reach us at:

Berghof Automation GmbH

Harretstr. 1

72800 Eningen

Germany

T +49.7121.894-0

F +49.7121.894-100

e-mail: [controls@berghof.com](mailto:controls@berghof.com)

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

Berghof Automation GmbH works in accordance with DIN EN ISO 9001:2000.

## Update

Version	Date	Subject
1.01	25.09.2012	First Version
1.1	31.10.2012	Update of chapter 'Product description, Block diagram'
1.2	09.11.2012	Update 3ft he trademarks
1.3	06.02.2013	Update of chapter 'Annex, Nameplate' and 'Annex, Addresses' Transition into new CD Update of the title page Update of chapter 'Product description, Module view and pin assignment' Update of chapter 'Product description, Technical data' and 'Product description, Identification'
1.4	20.05.2014	New corporate name 'Berghof Automation GmbH' UL certification
1.5	19.10.2015	Update of chapter 'General Information, Working on the controller module' Update of chapter 'Annex, Nameplate'
1.6	01.02.2017	Update of chapter 'General Information, Conformity Declaration' Update of chapter 'Product description, Technical data' Update of chapter 'Product description, Module view and pin assignment' Update of chapter 'Function Selection, Indicators, Diagnostics, Status Indicators' Update of chapter 'Annex, Nameplate'

Blank page

# Contents

<b>1.</b>	<b>GENERAL INFORMATION</b>	<b>7</b>
1.1.	About This Manual	7
1.2.	Hazard Categories and Terminology	8
1.3.	Conformity Declaration	8
1.4.	Qualified Personnel	9
1.5.	Due Diligence	9
1.5.1.	Working on the controller module	9
1.6.	Use as Prescribed	10
<b>2.</b>	<b>PRODUCT DESCRIPTION EC1000</b>	<b>11</b>
2.1.	Overview	11
2.2.	Technical data	13
2.3.	Block diagram	15
2.4.	Identification	16
2.5.	Module view and pin assignment	16
2.6.	Mounting and connecting	17
2.6.1.	Mounting	17
2.6.2.	Connecting	18
2.6.3.	Earth	19
2.7.	Pin assignment	20
2.7.1.	10/100 Base-T network connection (Ethernet)	20
2.7.2.	USB	20
2.7.3.	CAN bus and serial interface	22
2.7.4.	EtherCAT	23
2.7.5.	SD Card	24
<b>3.</b>	<b>CONTROLLER OPERATION</b>	<b>25</b>
3.1.	Commissioning	25
3.2.	Function Selection, Indicators, Diagnostics	25
3.2.1.	Status Indicators	25
3.3.	Real-Time Clock with Backup Battery	27
<b>4.</b>	<b>ANNEX</b>	<b>29</b>
4.1.	Environmental Protection	29
4.1.1.	Emission	29
4.1.2.	Disposal	29
4.2.	Maintenance/Upkeep	29
4.3.	Repairs/Service	29
4.3.1.	Warranty	29
4.4.	Nameplate	30
	Nameplate descriptions (example)	30

<b>4.5. Addresses and Bibliography / Standards .....</b>	<b>31</b>
4.5.1. Addresses .....	31
4.5.2. Bibliography / Standards .....	32

# 1. General Information

## Documentation

This equipment manual is intended for qualified personnel and contains information regarding mounting, installation, commissioning and maintenance. The information contained in this manual is subject to change without prior notice.

## 1.1. About This Manual

This equipment manual is an integral part of the product. Make sure the equipment manual is always available near the product's point-of-employment. The manual contains information about the following topics:

- Areas of application;
- Safety;
- Mechanical construction;
- Electrical construction;
- Connections;
- Commissioning;
- Care and maintenance;
- Decommissioning;
- Disposal.

## 1.2. Hazard Categories and Terminology

The indications described below are used in connection with safety instructions you will need to observe for your own personal safety and the avoidance of damage to property.

The indications have the following meaning:

	<p><b>Immediate danger.</b></p> <p>Failure to observe the information indicated by this warning will result in death, serious injury or extensive property damage.</p>
	<p><b>Potential danger.</b></p> <p>Failure to observe the information indicated by this warning may result in death, serious injury or extensive property damage.</p>
	<p><b>Danger.</b></p> <p>Failure to observe the information indicated by this warning may result in injury or property damage.</p>
	<p><b>No hazard.</b></p> <p>Information indicated in this manner provides additional notes concerning the product.</p>

## 1.3. Conformity Declaration

Both the standard version of the controller module and the extension modules mentioned below comply with and make allowance for the following directives and standards:

- **EMC Directive 2014/30/EU**
- **DIN EN 61131-2:2009-1** Programmable controllers  
Part 2: Equipment requirements and tests
- **UL 508:2013-10** Industrial Control Equipment  
17 th edition / 1999-01-28

## 1.4. Qualified Personnel

Only qualified personnel may install, operate and maintain the controller module.

Within the context of this documentation and the safety information it contains, qualified personnel constitutes trained specialists who have the authority to mount, install, commission, ground and identify equipment, systems and power circuits in accordance with the standards of safety technology, and who are familiar with the safety concepts of automation technology.

## 1.5. Due Diligence

The operator, or the processor (OEM) must ensure that ...

- the controller module is only used for the purpose for which it was intended;
- the controller module is only operated in impeccable full working order;
- the user manual is always available in full and in a legible condition;
- only specialists with sufficient qualification and authorisation mount, install, commission and maintain the controller module;
- these specialists are regularly instructed in all relevant questions of occupational health and safety and environmental protection and that they also know the contents of the user manual and especially of the safety notes therein;
- the device markings, identifications, safety and warning notes attached to the controller module are not removed and are always kept in a legible state;
- the national and international regulations for controlling machines and systems which apply at the relevant usage site are observed;
- the relevant information about the controller module and its application and operation is always available to the users

### 1.5.1. Working on the controller module

Before carrying out work on the controller module you must always:

- first ensure that the controller and the system are in a secure state;
- only then switch off the controller and the system and
- only now disconnect the controller module from the system.



#### Live parts!

Before starting any work on the device, disconnect all inputs, including any connected peripherals.

Inappropriate handling (installation and movement), while the device is powered on, may result in damage and / or data loss.

## 1.6. Use as Prescribed

This is a modular automation system based on the CANbus, intended for industrial control applications within the medium to high performance range.

The automation system is designed for use within Overvoltage Category I (IEC 364-4-443) for the controlling and regulating of machinery and industrial processes in low-voltage installations in which the rated supply voltage does not exceed 1,000 VAC (50/60 Hz) or 1,500 VDC.

The automation system is further usable in a pollution degree 2 environment or similar.

The modules shall be supplied by a power source with safe separation protected by an UL 248 fuse, rated max. 100/V where V is the DC supply voltage with maximum value of 28.8 VDC, such that the limited voltage / limited current requirements of UL 508 are met.

Wire connection specifications: Use AWG wire size 16-22 or equivalent.

Qualified project planning and design, proper transport, storage, installation, use and careful maintenance are essential to the flawless and safe operation of the automation system.

The automation system may only be used within the scope of the data and applications specified in the present documentation and associated user manuals.

The automation system is to be used only as follows:

- as prescribed
- in technically flawless condition
- without arbitrary or unauthorized changes and
- exclusively by qualified users

The regulations of the German professional and trade associations, the German technical supervisory board (TÜV), the VDE (Association of German electricians) or other corresponding national bodies are to be observed.

### Safety-oriented (fail-safe) systems

Particular measures are required in connection with the use of SPC in safety-oriented systems.

If an SPC is to be used in a safety-oriented system, the user ought to seek the full advice of the SPC manufacturer in addition to observing any standards or guidelines on safety installations which may be available.



**As with any electronic control system, the failure of particular components may result in uncontrolled and/or unpredictable operation.**

All types of failure and the associated fuse systems are to be taken into account at system level. The advice of the SPC manufacturer should be sought if necessary.

## 2. Product description EC1000

### 2.1. Overview

The EC1000 is a CODESYS PLC controller with a broad range of data interfaces.  
In compliance with IEC 61131-3 the module can be programmed either with version 2.3 or 3.x.

[→ Brief description](#)

#### **Installation**

The EC1000 is designed for installation in switching cabinets on a DIN mounting rail in a rough industrial environment. The fanless design and the flash memory make the cost and effort for maintenance minimal.

#### **Ethernet**

A 10/100 Mbit/s Ethernet interface is available. Thanks to the TCP/IP and UDP/IP protocols it is possible to link it very variably to visualisation software, to higher order control units or to the IT infrastructure.

#### **EtherCAT interface**

An EtherCAT E-bus interface with a lateral 10-pin connection is available.

#### **USB**

The USB host interface provides a widely-used peripheral interface. For example it can be used to carry out an application update or data migration simply via a USB stick. Please contact our Technical Support if no driver support is available for a specific USB device.

#### **CAN Interfaces**

The EC1000 possesses 1 standard CAN interface which can be used up to 1 Mbit/s.

#### **Serial Interfaces**

The RS232 can also be used as a programming interface.

#### **Realtime clock**

An accumulator battery-buffered, maintenance-free realtime clock can be set at the current time via a software interface.

#### **SD card**

The EC1000 possesses 1 SD card slot, e.g. for data copies.

#### **Slot extension**

Optionally, for communication purposes a slot is available for an extension module on the left-hand side. Applicable interfaces are LAN, CAN RS485 or RS232.

#### **Visualisation**

CODESYS Target and Web Visualisation are included in the scope of supply. An easy-to-use display is available with the Berghof ET1000 Ethernet Terminal.

#### **Networking**

PROFINET device and BACnet controller function as a software option.

### **Performance features – an overview**

- 400 MHz CPU
- User program and data memory (RAM): 128 MB on board, max. 96 MB for application
- User program memory (Flash): 64 MB on board / 56 MB for CODESYS V2.3 resp. 40 MB for CODESYS V3 application
- Retain memory, 24 kB
- 1 Ethernet 10/100 base T interface
- 1 USB Host interface V1.1
- 1 CAN interface at the front
- 1 RS232 serial interface for programming tools and application
- 1 EtherCAT interface with up to 10 users (or max. 2 A)
- Realtime clock
- 1 SD card slot
- Slot for left-hand extension module for communication (optional)

### → [Scope of Supply and Accessories](#)

#### **Scope of Supply**

The scope of supply of the controller module consists of:

- Ethernet Controller EC1000

#### **Accessories**

- PLUG-IN CONNECTOR SET for EC1000; order no.: 201605600
- Shield connection terminals:
  - 2 x 8 mm; order no.: 204802400
  - 1 x 14 mm; order no.: 204802500

## 2.2. Technical data

Ethernet Controller EC1000		
Module data		
Designation	EC1000 MP400 00 1131	EC1000 MP400 00 1131 V3
Item no.	204900001	204900101
Programming tool	CODESYS V2.3	At least CODESYS V3.5
Installation	Bearing rail NS 35/7.5 EN 50022	
I/O Extension	Via EtherCAT	
CPU, user memory		
CPU	Freescall PowerPC, CPU 400 MHz	
Program memory (Flash)	64 MB on board / 56 MB for CODESYS V2.3 / 40 MB CODESYS V3	
Program memory and data memory (RAM)	128 MB on board / max. 96 MB for application	
Retain memory	24 kB	
Sizes and weights		
Dimensions (WxHxD [mm])	25 x 120 x 90	
Weight	Approx. 150 g	
Operating conditions		
Ambient temperature	0 °C to 50 °C; 55 °C as standalone specification (if installation instructions are observed)	
Relative air humidity	Max. 85 %, non-condensating	
Transportation, storage		
Ambient temperature	-20 °C to +70 °C	
Relative air humidity	Max. 85 %, non-condensating	
Resistance to vibrations		
Vibration	Sinus-shaped (EN 60068-2-6) test: Fc 10 ... 150 Hz, 10 m/s <sup>2</sup>	
Shock resistance	15 G (approximately 150 m/s <sup>2</sup> ), 11 ms duration, semi-sinus (EN 60068-2-27) test: Ea	
EMC, protection class		
Emitted interference	EN 61000-6-4, industrial sector	
Immunity to interference	EN 61000-6-2, industrial sector	
Protection class	III	
Insulation strength	SELV (U <sub>e</sub> < 30 V) in compliance with EN 61131-2	
Protection type	IP20	

## Ethernet Controller EC1000

### Energy supply (24 V power supply unit)

Supply voltage	+24 VDC (-20 % / +25 %) SELV max. proportion of a.c. voltage 5 %
Power consumption	typ. 0.3 A, max. 0.3 A with +24 VDC, fuses depending on number of connected extension modules, max. 2.5 A
Reverse voltage protection	Yes
Potential isolation	No
Bridging in case of power failure	10 ms at < 20.4 VDC (at max. external bus load of 5 V / 2 A) Power Fail < 19.2 VDC

### Ethernet interface

Number / type of interface	1x 10/100 Base T
Connection technology	1x RJ45

### EtherCAT interface

Number / type of interface	1x EtherCAT E-bus, lateral 10-pin connection
Connection technology	Series connectors on right-hand side

### USB interfaces

Number / type of interface	1 x Host USB Rev. 1.1
Number of mating cycles	max. 1.000

### CAN-Bus interfaces

Number / type of interfaces	1x CAN in front (on 2x 5-pin multipoint connector COM / CAN)
Potential isolation	Yes (galvanic isolation)
Transmission rate	ISO 11898 max. 1 Mbit/s
Terminating resistor	external via plug-in connector

### Serial interfaces

Number / type of interfaces	1x RS232 3 wire connection to 2x 5-pin multi-point connector in front panel (RS232+CAN) (RX,TX,GND)
Potential isolation	Yes (galvanic isolation)
Transmission rate	max. Baud rate 115 kBaud

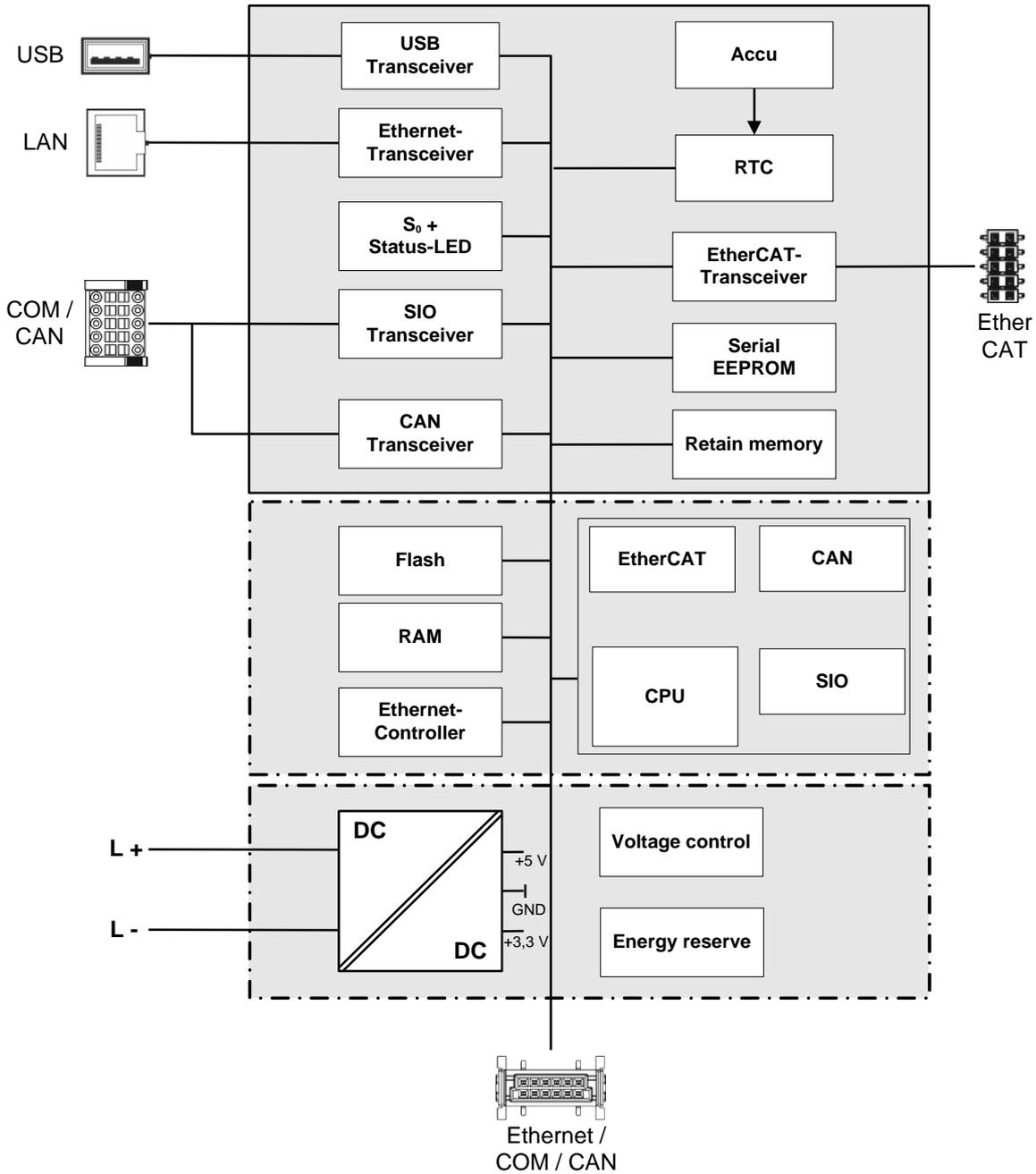
### Other functions

Realtime clock	Yes, accumulator battery-buffered (maintenance-free)
SD card	1 SD card slot
Digital input	24 V (-20 % / +25 %)

### Slot for left-hand extension module for communication (optional)

Number / type of interfaces	prepared for 1x LAN, 1x CAN, 1x RS485 / 1x RS232
-----------------------------	--

### 2.3. Block diagram



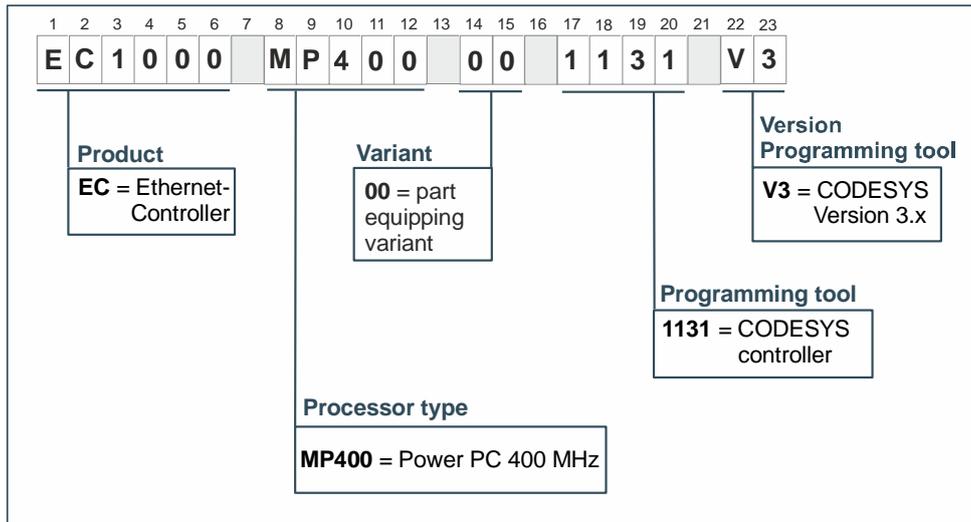
2VF100514DG01.vsd

## 2.4. Identification

**Product:** Ethernet-Controller, Type EC1000

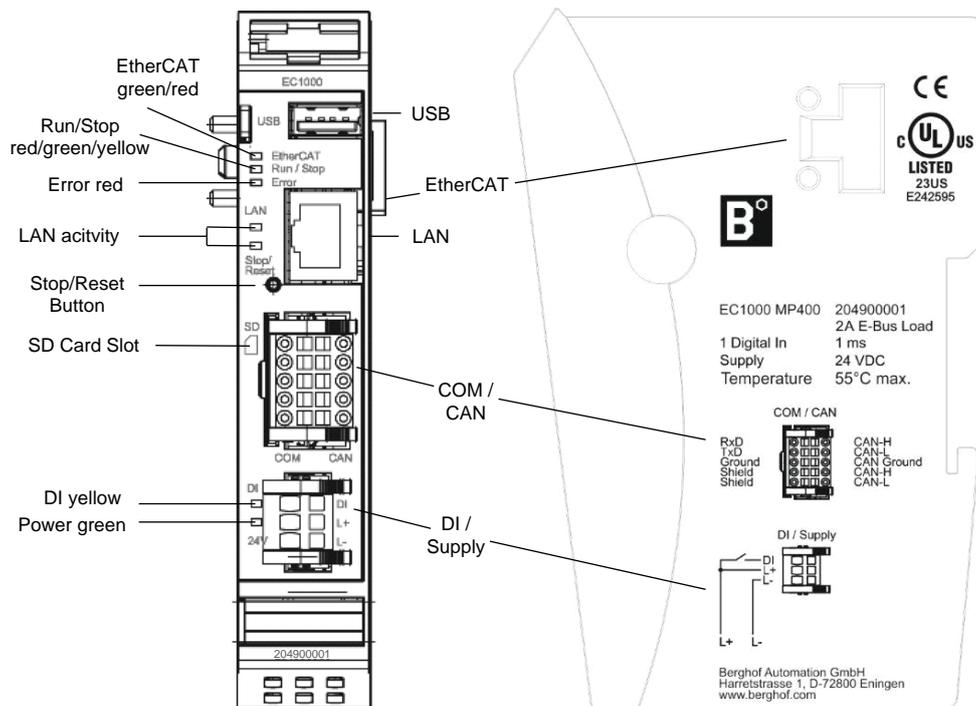
### Identification code

The features of the Ethernet-Controller (see 'Annex, Nameplate') can be itemised according to the identification code.



2VF100582DG00.cdr

## 2.5. Module view and pin assignment



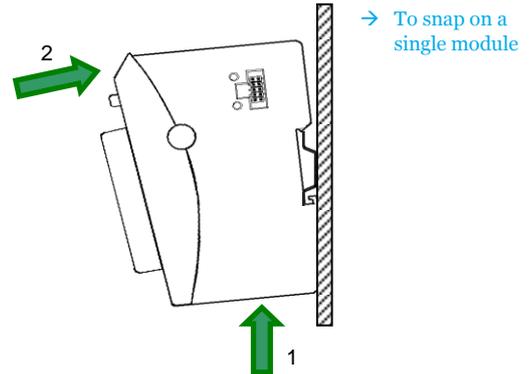
2VF100515DG02.vsd

## 2.6. Mounting and connecting

### 2.6.1. Mounting

The CANtrol E-I/O modules are intended for mounting rail installation (DIN EN 50022, 35 x 7.5 mm).

- Push up the module against the mounting rail from below, allowing the metal spring to snap in between mounting rail and mounting area as illustrated.
- Push the module above against the mounting wall until it snaps in.



Rail mounting of module



**There must be at least 100 mm clearance above and below the EC1000.**  
This guarantees the necessary convection cooling for the EC1000.  
The mounting plate must be metal in order to ensure heat conduction.

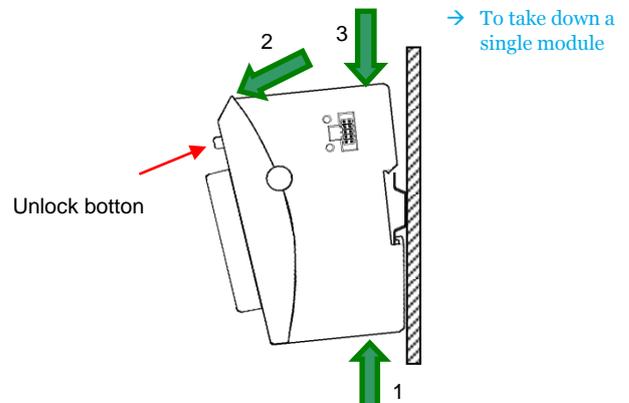
#### To interconnect two modules

After snapping on the first module to the rail, snap on the second module about 1cm away towards the right of the first module. Push the second module along the rail towards the first module until you hear the locking device snap in.

#### To disconnect two modules

Push down the unlock button (see figure below) of the module that you wish to disconnect from the module to the left of it. Push both modules away from one another until they are about 1 cm apart.

- Push the module up and against the metal spring located on the underside of the rail guide.
- Tip the module away from the rail as shown in the illustration.
- Pull the module down and out of the mounting rail.



Uninstalling a module

## 2.6.2. Connecting

### Power supply

The controller is energised from an external 24 VDC external power supply. Before connecting up, check that the specifications required for the external power supply are observed.

External power supply (24 VDC)	
Output voltage	+24 VDC SELV (-15 % / +20 %)
Ripple	Max. 5 %; the DC voltage must not fall short of 20.4 V.

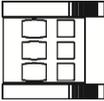
### Internal power supply unit

A power supply unit for the system electronics is installed to provide 24-VDC input voltage (-15 % / +20 %). The power supply unit possesses integrated polarity-reversal protection and inrush-current limitation. Both supply lines and the power supplies must be protected by an external short circuit and overload protection with a maximal tripping current of 5 A in each case (depending on the number of I/O).

### Installation

All connections and lines must be executed so that no faults are caused by inductive and capacitive interference in the controller. The supply lines must be sufficiently resilient to current and voltage. Shielded lines must be used for communication. The shield must be fitted onto the module.

### Plug DI/Supply assignment

DI/Supply		
	DI	Digital input 24 VDC (-20 % / +25 %)
	L+	External power supply 24 VDC (-15 % / +20 %)
	L-	External power supply GND

### Energy buffering

Power Fail 10 ms depending on compliance with the max. number/load by I/O modules.

### 2.6.3. Earth

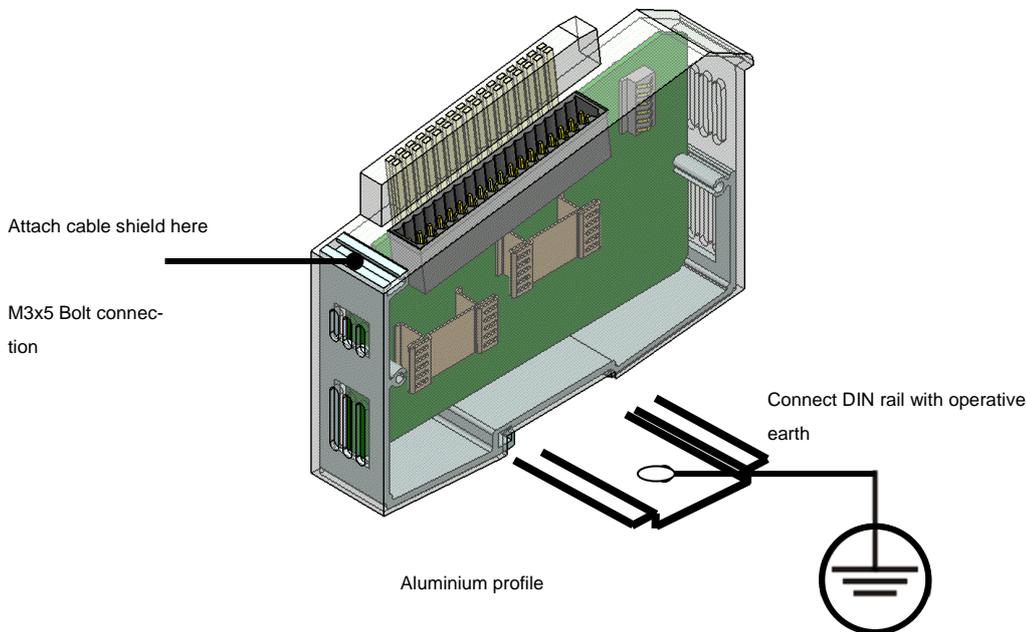
Connect the EC1000 to earth by attaching the metal housing to operative earth.

Since the operative earth connectors dissipate HF currents, it is of utmost importance for the module's noise immunity. HF interference is dissipated from the electronics board to the metal housing. The metal housing therefore needs to be suitably connected to an operative earth connector.

You will normally have to ensure that

- the connection between module housing and DIN rail conducts well,
- the connection between DIN rail and switching cabinet conducts well,
- the switching cabinet is safely connected to earth.

In special cases you may attach the earth wire straight to the module.



**Earth wires should be short and have a large surface (copper mesh).**  
Further details has site [http://en.wikipedia.org/wiki/Ground \(electricity\)](http://en.wikipedia.org/wiki/Ground_(electricity)).

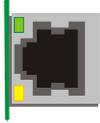
## 2.7. Pin assignment

### 2.7.1. 10/100 Base-T network connection (Ethernet)

→ [Connection to the network](#)

The 10/100 Base-T on board Ethernet adapter with RJ-45 connection enables connection to the network. The “LNK” and “RCV” status LED give information about successful connection to the network in compliance with IEEE 802.3, clause 25.

#### LAN plug-in connector assignment

LAN		
 RJ45	1	TX+
	2	TX-
	3	RX+
	4	75 Ohm
	5	75 Ohm
	6	RX-
	7	75 Ohm
	8	75 Ohm
“LNK” LED	<b>green</b>	ON: ready to operate
“RCV” LED	<b>yellow</b>	FLASHING: Data Receive

### 2.7.2. USB

Devices with USB interfaces can be connected on the USB master port (rev. 1.1). The only classes of USB devices which can be used by CODESYS users are USB sticks. A mouse can only be used at the level of Linux. The following issues must be taken into account when using USB sticks:

 <b>CAUTION</b>	<p><b>A USB stick may only be unplugged during operation if all file operations have been completed, otherwise the USB may become unserviceable!</b></p> <p>If programs still have files open, the directory cannot be deleted when the USB stick is removed. In this situation file or directory operations cause blockages because a reading must be taken from a device which is no longer available in the system. Therefore, when removing the USB stick, always make sure that no program has any files still open on the USB stick.</p>
--	--

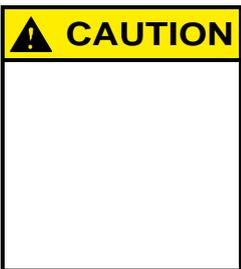
- USB memory sticks can be plugged in and removed during operation. The plugged-in device is automatically identified and mounted in the /media/usbX directory. When the USB stick is unplugged, the relevant /media/usbX directory automatically “vanishes” again, if it is no longer being accessed by a program (see above).
- Either the first partition or – if there is no partition – the entire memory is mounted on the memory stick, i.e. it appears automatically in the appropriate directory.
- The first stick is mounted under /media/usb0, the second under /media/usb1, etc. Maximally 8 sticks can be plugged in and used at once (/media/usb [0-7]). If a new stick is plugged in (or one which has previously been plugged in and then removed), it will be placed in the directory with the lowest free number. By connecting a USB hub it is possible to operate multiple sticks on one USB interface. In this case attention must be paid that there are no USB devices still attached to the hub itself when it is plugged in and unplugged.



The mechanical structure of the USB port is designed for max. 1,000 mating cycles.

**USB plug assignment**

USB		
 USB	<b>B1</b>	VCC
	<b>B2</b>	D-
	<b>B3</b>	D+
	<b>B4</b>	GND



**The maximum current available on the USB port is 0.5 A! Before you use the USB device, check its power consumption.**

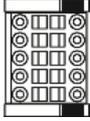
The controller performs a reset if a USB device requires more than the max. permissible current. A reset immediately stops the controller and the machine and plant it controls. This may cause more extensive damage.

A USB device requiring more current cannot function and may be damaged by this.

### 2.7.3. CAN bus and serial interface

The CAN interface conforms to the ISO 11898 standard and can be operated up to the maximum baud rate of 1 Mbit/s. The lowest baud rate which can be set is 50 kBit/s.

#### COM/CAN plug assignment:

COM/CAN		
RS232	 COM/CAN	CAN-Bus
RxD		CAN-H
TxD		CAN-L
Ground		CAN Ground
Shield		CAN-H
Shield		CAN-L
Shield		CAN-L

<b>i NOTICE</b>	<p><b>A 120 <math>\Omega</math> terminal resistor can be connected between the CAN_L and CAN_H connections.</b></p> <p>This is necessary if the appropriate CAN interface is located at the beginning or end of the relevant CAN bus topology.</p>
-----------------	--

<b>i NOTICE</b>	<p><b>The RS232 interface X3 has an exceptional position!</b></p> <p>Depending on the configuration, it can be used either as a Linux console, or as a PPP interface for remote maintenance, or as a CODESYS programming interface.</p> <p>If the controller is started in the configuration mode, the module can be configured via a serial PPP connection in this mode. Here, too, the connection is made via X3.</p>
-----------------	---

The serial interface is addressed in the software under the name of COM1.

## 2.7.4. EtherCAT

The EC1000 PLC controller can be extended by means of a system of EtherCAT I/O modules (E-I/O). The E-I/O modules which are lined up on the side to the right are designed for connecting diverse process signals (refer to the EtherCAT I/O manual).

At the same time the EC1000 assumes the function of the PLC controller and an EtherCAT bus coupler. [→ PLC controller](#)  
Therefore, the conversion of the EtherCAT communication signals to the LVDS (E-bus) transmission physics takes place internally. As the EtherCAT Master the EC1000 sends frames for writing the output data and for reading the input data. The Ethernet EtherCAT protocol is retained right down to the very last I/O module by this method. At the end of the modular device the connection of the outward and return line is made automatically.

Furthermore, the system voltage of the connected I/O modules is generated in the EC1000. While this simplifies the connection of the I/O modules on the one hand, on the other hand the maximum number of I/O modules which can be connected has to be taken into account. [→ System voltage](#)

An extender module facilitates the connection of further EtherCAT Slaves to the EC1000.



### The number of connectable EtherCAT I/O modules is limited!

Each EtherCAT I/O module produces a so-called "E-bus load" load. This is what the power load is called which is required to supply the electronics inside the device. The EC1000 supplies current up to 2 A for the purpose. This means that, at most, one EC1000 can supply maximally 10 I/O modules.

### Status display LED

The EtherCAT LED indicates the status of the EtherCAT ASICs.

EtherCAT		
Status	LED, flash code	Meaning
Init	Red, continuous light	Intialisation status, no data exchange
Pre-Op	Red/Green, 1:1	Preoperational status, no data exchange
Safe-Op	Red/Green, 3:1	Safe operational status, inputs can be read
Op	Green, Continuous light	Operational status, full data exchange

### 2.7.5. SD Card



**While the EC1000 is in operation the SD card may not be inserted or removed, otherwise the functions of the EC1000 may be impaired!**

The SD card may only be inserted when the EC1000 is de-energised!

The compact SD card drive is equipped with a push-in/push-out insertion and ejection mechanism. Gold-plated contacts guarantee low contact resistances and a service life of 10,000 push-in cycles.

- At present the write protection switch on the SD card is not identified.
- The SD card drive has to be activated via the web configuration.
- The files on the SD drive can be written, read and copied.
- The drive can be accessed via the following path: /media/sd.
- At present data memory cards with a memory capacity of up to 1 GB can be used.

## 3. Controller operation



**Never plug in, apply, disconnect or touch connections while the device is operating!**

This could result in malfunction or destruction of the device. Before working on the modules, always switch all infeeds to them off; including infeeds from connected peripheral devices such as remote-feed encoders, programming devices, etc.

### 3.1. Commissioning

Before applying the supply voltage, recheck all connections to ensure they are properly wired and have the correct polarity.

#### Switching on

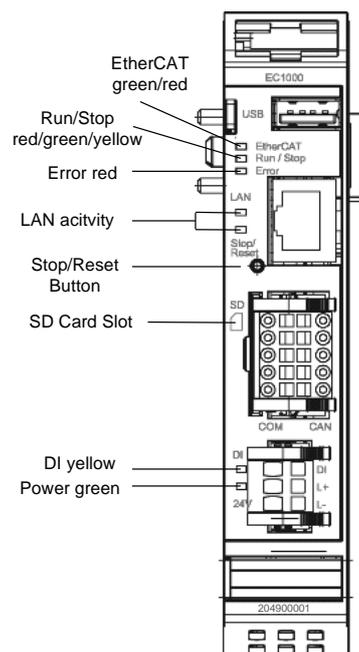
The module is not equipped with its own main power switch. The PLC controller starts when the associated equipment is switched on or when the power supply is connected.

#### Switching off

The PLC controller switches off when the associated equipment is switched off or the power supply is disconnected.

### 3.2. Function Selection, Indicators, Diagnostics

#### 3.2.1. Status Indicators



from 2VF100515DG02.vsd

The function of the status indicators frequently depends on the software development environment employed on the PLC controller.

→ CP1131-P:

PLC programming using CODESYS and Berghof Target Support Package.

→ CPC++:

C programming directly on the LINUX operating system.

### Power LED

4 operating status LED indicate the current status of the voltage supply, module mode and error messages.

LED	Logical status
1	PWR (green) ON = correct voltage supply to the module electronics

### RUN/STOP BUTTON

The Run/Stop control button replaces the former control switch.

This slightly changes the operating concept:

	Action	Command
Submarine, boot phase	Activation of the pushbutton	Change into PPP mode or submarine console
CODESYS PLC/ CP1131-P	Short push	Change between RUN and STOP mode of PLC
	Long push	STOP the PLC using RESET of the variables, but not the retain data (corresponding to the activation of the rocker switch on the DC1000 modules)

It is then no longer possible to force-hold the PLC controller in the STOP state!

### LEDs: RUN/STOP ERROR - LED signalisation

2 LED are available on the module to signalise the system status (RUN/STOP in two colours: red/green/(yellow); ERROR in red only). The flash codes familiar from the DC1000 are therefore no longer applicable. The following system states are signalised via the LED:

System states	LED RUN/STOP	LED ERROR
PPP configuration mode active	Yellow	Off
USB packet update active	Yellow, flashing	Off
System error	Off	On
<b>PLC states</b>		
RUN	Green	Off
STOP	Red	Off
Error stop	Red	On
Reset button registered	Red, flashing	Off
<b>Applicatory states</b>		
Identification of ProfiNET device	Yellow, flashing	Flash

Basic procedure in case of error stop:

- Establish cause of error (read via web browser)
- Eliminate cause of error
- Perform reset on controller, alternatively: Mode selector switch / CODESYS / web browser
- Put controller back into operation



**CP1131-P mode FORCE:**

FORCE means that the user program is running and at least one variable is compulsorily attributed via CODESYS at the beginning of each cycle. The user can therefore see that without this intervention in the sequence of the PLC program the user program might react differently.

**Status LED for CPC++ programs**

The LED can be controlled by user software.

**Ethernet status LED**

Refer to section: 10/100 Base-T network connection (Ethernet).

### 3.3. Real-Time Clock with Backup Battery

The EC1000 is equipped with a real-time clock.

**Setting the clock**

Use either the web configuration or the CODESYS “BGHSysLibRtc.lib” library.

**Power supply**

A rechargeable battery is incorporated to energise this clock.

**Changing the rechargeable battery**

There is no need for the user to change the battery.



**The battery must be changed expertly by the manufacturer of the module.**

**Type of rechargeable battery**

Panasonic VL2020 or equivalent.

**Battery service life**

typ. 10 years depending on temperature in use.

**Battery storage**

> 1 year voltage-free; thereafter the data of the RTC may possibly be lost.

Blank page

## 4. Annex

### 4.1. Environmental Protection

#### 4.1.1. Emission

When used correctly, our modules do not produce any harmful emissions.

#### 4.1.2. Disposal

At the end of their service life, modules may be returned to the manufacturer against payment of an all-inclusive charge to cover costs. The manufacturer will then arrange for the modules to be recycled.

### 4.2. Maintenance/Upkeep



**Do not insert, apply, detach or touch connections while in operation – risk of destruction or malfunction.**

Disconnect all incoming power supplies before working on our modules; this also applies to connected peripheral equipment such as externally powered sensors, programming devices, etc. All ventilation openings must always be kept free of any obstruction.

- The modules are maintenance-free when used correctly.
- Clean only with a dry, non-fluffing cloth.
- Do not use detergents!

### 4.3. Repairs/Service



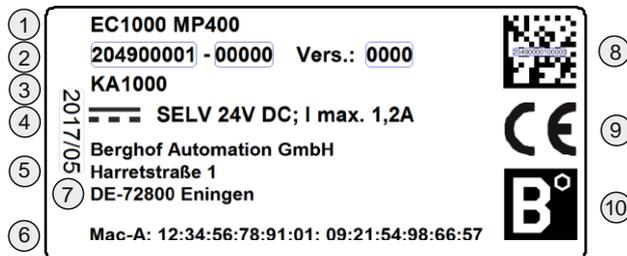
Repair work may only be carried out by the manufacturer or its authorised service engineers.

#### 4.3.1. Warranty

Sold under statutory warranty conditions. Warranty lapses in the event of unauthorised attempts to repair the equipment and/or product, or in the event of any other form of intervention.

## 4.4. Nameplate

### Nameplate descriptions (example)



2VF100080DG04.cdr

- ① Designation of device type
- ② Identification no. (item no. + serial no.)
- ③ Customer no.
- ④ Supply voltage
- ⑤ Manufacturer's address
- ⑥ Mac addresses
- ⑦ Production date
- ⑧ QR code (identification no.)
- ⑨ CE marking
- ⑩ Brand of the manufacturer (trademark)

## 4.5. Addresses and Bibliography / Standards

### 4.5.1. Addresses

CAN in Automation; international manufacturers and users organisation for CAN users in the field of automation: → [CiA](#)

CAN in Automation e.V. (CiA)  
Am Weichselgarten 26  
D-91058 Erlangen / Germany  
headquarters@can-cia.de  
www.can-cia.de

EtherCAT Technology Group → [ETG](#)  
ETG Headquarters  
Ostendstraße 196  
D-90482 Nuremberg / Germany  
info@ethercat.org  
www.ethercat.org

Beuth Verlag GmbH, 10772 Berlin → [DIN-EN Standards](#)  
or  
VDE-Verlag GmbH, 10625 Berlin

VDE Verlag GmbH, 10625 Berlin → [IEC Standards](#)  
or  
Internet search: [www.iec.ch](http://www.iec.ch)

## 4.5.2. Bibliography / Standards

Standard	Label
<b>IEC61131-1 / EN61131-1</b>	Programmable controllers Part 1: General information
<b>IEC61131-2 / EN61131-2</b>	Programmable controllers Part 2: Equipment requirements and tests
<b>IEC61131-3 / EN61131-3</b>	Programmable controllers Part 3: Programming languages
<b>IEC61131-4 / EN61131BI1</b>	Programmable logic controllers Supplementary Sheet 1: User guidelines
<b>IEC61000-6-4 / EN61000-6-4</b>	German EMC Standard: Emitted interference
<b>IEC61000-6-2 / EN61000-6-2</b>	German EMC Standard: Noise immunity
<b>ISO/DIS 11898</b>	Draft International Standard: Road vehicles - Interchange of digital information - Controller Area Network (CAN) for high-speed communication
<b>DIN EN ISO 13849-1</b>	Safety of machinery: Safety-related parts of control systems (Part 1)
<b>UL 508</b>	Industrial Control Equipment 17 th edition / 1999-01-28

Notice: Our Technical Support team will be glad to provide other literature references on request.