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BECKHOFF New Automation Technology

Manual | EN

CX50x0

Embedded-PC

2026-04-28 | Version: 1.9

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1 Foreword

1.1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
For installation and commissioning of the components, it is absolutely necessary to observe the documentation and the following notes and explanations.
The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfies all requirements for safety, including all the relevant laws, regulations, guidelines, and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
No claims to modify products that have already been supplied may be made on the basis of the data, diagrams, and descriptions in this documentation.

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The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:
EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702
and similar applications and registrations in several other countries.

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1.2 For your safety

Safety regulations

Read the following explanations for your safety.
Always observe and follow product-specific safety instructions, which you may find at the appropriate places in this document.

Exclusion of liability

All the components are supplied in particular hardware and software configurations which are appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation, and drive technology who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

⚠ CAUTION
There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product



This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our https://www.beckhoff.com/secguide.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

1.4 Documentation issue status

Version	Changes
0.1	Preliminary version
1.0	First publication
1.1	Changes on system interface N031 and DVI resolution
1.2	Changes on temperature range and K-bus diagnosis
1.3	Requirements for power supply added
1.4	Notes on passive terminals and power supply added
1.5	Notes on K-Bus diagnosis added
1.6	UL requirements added
1.7	Architecture overview added
1.8	Chapter Types reworked
1.9	Chapter 1-second UPS reworked

2 Product overview

2.1 Intended use

The CX5010 / CX5020 device series is a modular control system designed for top-hat rail installation. The system is scalable, so that the required modules can be assembled and installed in the control cabinet or terminal box as required.

Only switch the PC off after closing the software

Before the Embedded PC is switched off, the software currently running on it should be stopped properly in order to avoid data loss on the hard disk. Please read the section on "Switching off [▶ 40]".

Switch off all system components and uncouple the Industrial PC from the system if the PC is not used for control purposes, e.g. during a function test. To disconnect first pull the first terminal behind the power supply unit (optional), then pull the connectors of the fieldbus connections.
System components that have been switched off must be secured against being switched on again.

The Embedded PC's power supply unit must be supplied with 24 V_{DC}.

NOTICE

Damage to the environment or devices

Do not exchange any parts when under power! Replacing control components while the system is live may lead to short circuits or overvoltages, which in turn may damage the controller and connected peripherals (terminals, monitors, input devices etc.).

When components are being fitted or removed, the supply voltage must be switched off.

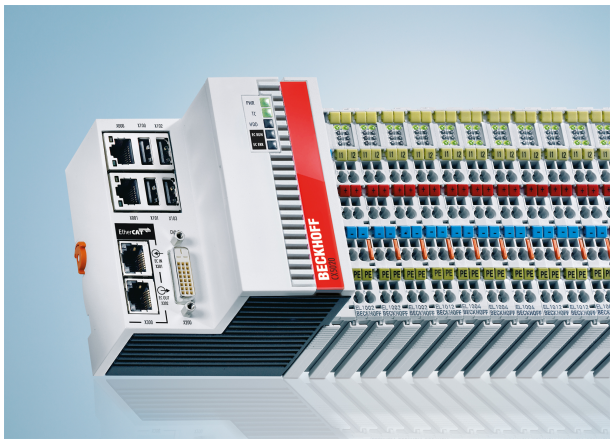
Software knowledge

NOTICE

System malfunctions

Requires software knowledge! Each user must be familiar with all the functions of the software installed on the PC to which he has access.

2.2 System Overview



The system

The CX5000 series devices are DIN rail-mountable, fanless Embedded PCs with direct connection for Beckhoff Bus Terminals or EtherCAT terminals. In contrast to the other CX device families, the CX5000 series has a fixed, non-expandable number of system interfaces. The housing design for this series is optimised for robustness and compactness. No modular expandability for the left-hand side is provided. Although EtherCAT integration offers a wide range of expansion capability. Further master/slave fieldbus connections (PROFIBUS, CANopen, DeviceNet) or communication interfaces (RS232, RS422/RS485) and all other signal types accessible via EtherCAT can be directly connected as EtherCAT Terminals. Two independent Gigabit Ethernet ports and four USB 2.0 interfaces are available. A Beckhoff control panel or a commercially available DVI monitor can be connected to the DVI D interface. A serial port (RS232/RS422/RS485) or a fieldbus connection with master or slave function can be added as an optional interface as required. An interchangeable Compact Flash card located behind a flap that is accessible from outside is used as boot and storage medium. The built-in capacitive 1-second UPS ensures secure backup of persistent application data on the Compact Flash card. The date and time are buffered via a replaceable battery. The operating system can be Windows CE or Windows Embedded Standard. The TwinCAT automation software transforms a CX5000 system into a powerful PLC and motion control system that can be operated with or without visualisation.

EtherCAT as a fast I/O system

Like all Embedded PCs from the CX series (except CX100x), the CX5000 was developed for optimum interaction with EtherCAT. One of the two independent Ethernet interfaces of the CPU module (X001) is intended for EtherCAT mode. The primary EtherCAT connection is generally established via terminals. Both can also be configured as a ring in order to achieve line redundancy.

Interestingly, EtherCAT offers several options for connecting conventional fieldbus systems to the CX50x0: As EtherCAT device in terminal form, for example the PROFIBUS master as EtherCAT Terminal EL6731. In practice, this means that the PROFIBUS master can be positioned exactly where it is required within a machine. It no longer has to be implemented as a plug-in card in the IPC or a master controller in the control cabinet.

PLC, Motion Control and visualisation

As a DIN rail IPC and in conjunction with the TwinCAT software from Beckhoff, the CX50x0 offers the same functionality as large Industrial PCs. In terms of PLC, up to four virtual IEC 61131 CPUs can be programmed with up to four tasks each, with a minimum cycle time of 50 µs. All IEC 61131-3 languages can be used.

Moreover, functionalities are available for Motion Control applications, such as simple point-to-point movements.

In addition to real-time execution of control tasks, the TwinCAT real-time kernel ensures that enough time remains for the user interface (HMI), to communicate with the real-time components via software interfaces such as ADS or OPC.

For CX50x0 the familiar basic principle applies: it is a programming tool for all controllers.
The complete programming of PLC, Motion Control and visualization is transferable to all PC controls from Beckhoff, which is reassuring in cases where it becomes apparent during a project that more processing power is required after all. In this case a system with higher performance can be used.

Fieldbus interfaces

The fieldbus interfaces are currently available as master and slave versions for the following fieldbuses:

Optional interfaces:

The optional interfaces can be used to connect single-channel fieldbus interfaces. Operation is limited to **one** interface at a time. If several fieldbus interfaces are required, they can be added as E-bus terminals (EL67xx). The following fieldbus interfaces are available:

- CX50x0-N030 = RS232, D-Sub connector
- CX50x0-N031 = RS422/RS485, D-Sub socket
- CX50x0-M310 = PROFIBUS master, D-Sub socket, 9-pin
- CX50x0-B310 = PROFIBUS slave, D-Sub socket, 9-pin
- CX50x0-M510 = CANopen master, D-Sub connector, 9-pin
- CX50x0-B510 = CANopen slave, D-Sub connector, 9-pin
- CX50x0-M930 = PROFINET RT, controller, Ethernet (2 x RJ-45 switch)
- CX50x0-B930 = PROFINET RT, device, Ethernet (2 x RJ-45 switch)
- CX50x0-B100 = EtherCAT slave, EtherCAT IN and OUT (2 x RJ 45)

The software

In combination with the TwinCAT automation software, the CX50x0 Industrial PC becomes a powerful IEC 61131-3 PLC with up to four user tasks. Additionally, Motion Control tasks can also be executed. Depending on the required cycle time, several servo axes can be controlled. Even special functions such as flying saw, electronic gearbox and cam plate can be realised.

The CX50x0 system is programmed in the same way as other bus controllers:

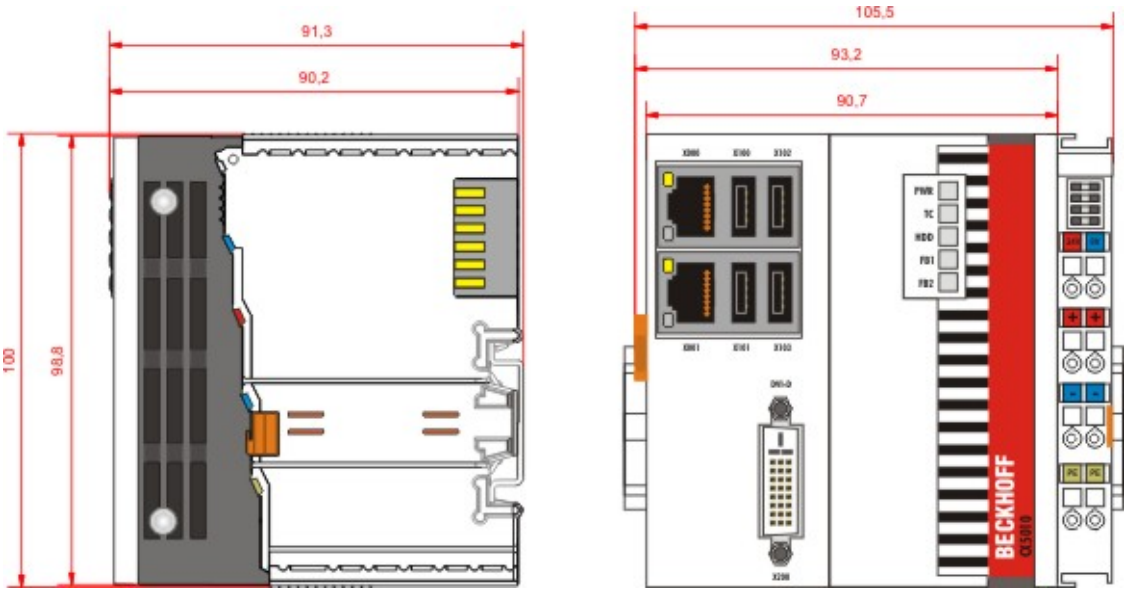
Remote programming via Ethernet

This option is used if the basic unit is equipped with “Windows CE.NET”. In this case, the system is programmed via a laptop or a desktop PC, which is connected to the CX via Ethernet (network or crossover cable). The programs are developed on the laptop with a standard TwinCAT software licence and then loaded into the target device.

Visualisation

The Beckhoff OPC server is available for interfacing with SCADA packets, if the two operating system variants “Windows CE.NET” or “Windows XP Embedded” are used. In other words, the CX50x0 also offers straightforward visualisation and simultaneous control in real-time on a single system.

2.3 CX5010 - Technical data

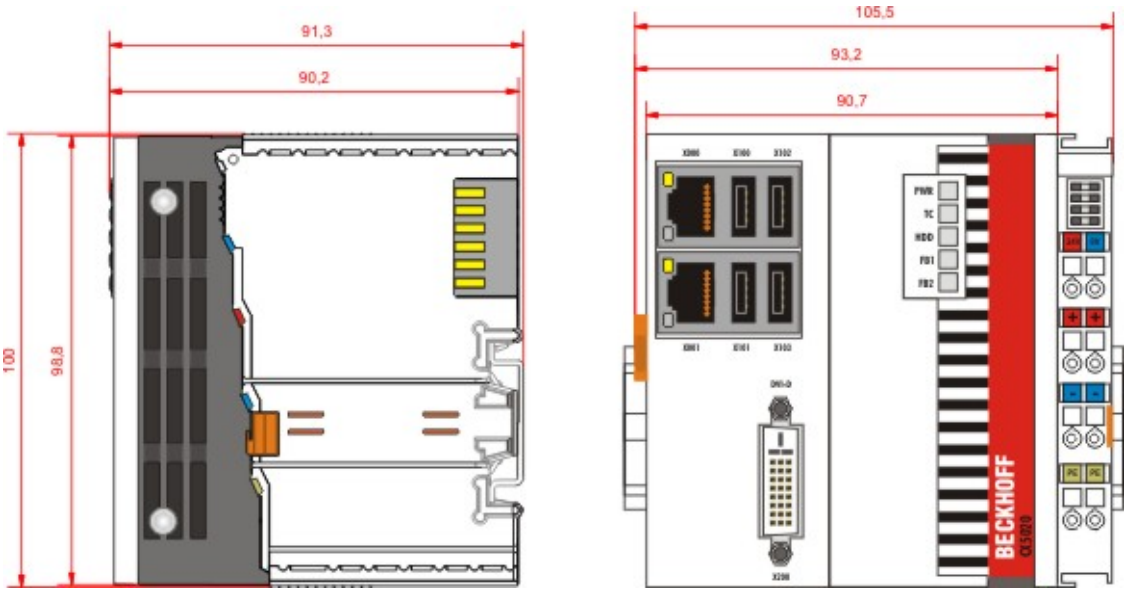


The basic configuration of the CX5010 includes a 128 MB Compact Flash card. The basic configuration includes two Ethernet RJ-45 interfaces, four USB-2.0 interfaces and a DVI-D interface.

Technical data	CX5010
Processor	Intel® Atom™ Z510 processor, 1.1 GHz clock frequency
Internal Flash memory	128 MB Compact Flash card (optionally extendable)
Internal main memory	512 MB RAM (interior, not expandable)
Interfaces	2 x RJ 45, 10/100/1000 Mbit/s, DVI-D, 4 x USB 2.0
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	Internal clock with battery backup for time and date (battery replaceable)
Operating system	Microsoft Windows CE or Microsoft Windows Embedded Standard
Control software	TwinCAT PLC runtime or TwinCAT NC PTP runtime
Power supply	24 V DC (-15 %/+20 %)
Current supply	I/O terminals 2 A
Max. power loss	12 W (including system interfaces)
Dielectric strength	500 Veff (supply/internal electronics)
Dimensions (H x W x D)	100 mm x 106 mm x 92 mm
Weight	approx. 575 g
Operating/storage temperature	-25 °C ... +60 °C/-40 °C ... +85 °C
Relative humidity	95 % no condensation
Vibration/shock resistant	conforms to EN 60068-2-6/EN 60068-2-27/ 29
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP 20

Further Information: www.beckhoff.de/CX5010

2.4 CX5020 - Technical data



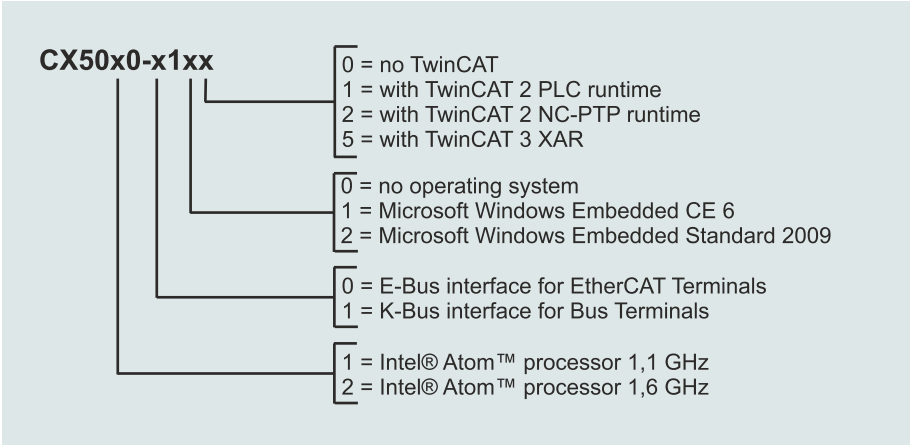
The basic configuration of the CX5020 includes a 128 MB Compact Flash card. The basic configuration includes two Ethernet RJ-45 interfaces, four USB-2.0 interfaces and a DVI-D interface.

Technical data	CX5020
Processor	Intel® Atom™ Z530 processor, 1.6 GHz clock frequency
Internal Flash memory	128 MB Compact Flash card (optionally extendable)
Internal main memory	512 MB RAM (optionally 1 GB installed ex factory)
Interfaces	2 x RJ 45, 10/100/1000 Mbit/s, DVI-D, 4 x USB 2.0
Diagnostics LED	1 x power, 1 x TC status, 1 x flash access, 2 x bus status
Clock	Internal clock with battery backup for time and date (battery replaceable)
Operating system	Microsoft Windows CE or Microsoft Windows Embedded Standard
Control software	TwinCAT PLC runtime or TwinCAT NC PTP runtime
Power supply	24 V DC (-15 %/+20 %)
Current supply	I/O terminals 2 A
Max. power loss	12.5 W (including system interfaces)
Dielectric strength	500 Veff (supply/internal electronics)
Dimensions (H x W x D)	100 mm x 106 mm x 92 mm
Weight	approx. 575 g
Operating/storage temperature	-25 °C ... +60 °C / -40 °C ... +85 °C
Relative humidity	95 % no condensation
Vibration/shock resistant	conforms to EN 60068-2-6/EN 60068-2-27/ 29
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP 20

Further Information: www.beckhoff.de/CX5020

2.5 Types

The CPU module can be equipped with different hardware and software options: "Windows CE" or "Windows Embedded Standard" are available as operating system. The TwinCAT automation software transforms a CX50x0 system into powerful PLC and Motion Control system that can be operated with or without visualisation. Further system interfaces (pre-installed in the factory) or fieldbus connections can be added to the basic CPU module.



The CX 50x0 modules are available in the following types:

Table 1: CX5010 (1.1 GHz)

Module	E-Bus	K-Bus	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC-PTP runtime	TwinCAT 3 XAR
CX5010-0100	X	-	X	-	-	X	-	-	-
CX5010-0110	X	-	-	X	-	X	-	-	-
CX5010-0111	X	-	-	X	-	-	X	-	-
CX5010-0112	X	-	-	X	-	-	X	X	-
CX5010-0115	X	-	-	X	-	-	-	-	X
CX5010-0120	X	-	-	-	X	X	-	-	-
CX5010-0121	X	-	-	-	X	-	X	-	-
CX5010-0122	X	-	-	-	X	-	X	X	-
CX5010-0125	X	-	-	-	X	-	-	-	X
CX5010-1100	-	X	X	-	-	X	-	-	-
CX5010-1110	-	X	-	X	-	X	-	-	-
CX5010-1111	-	X	-	X	-	-	X	-	-
CX5010-1112	-	X	-	X	-	-	X	X	-
CX5010-1115	-	X	-	X	-	-	-	-	X
CX5010-1120	-	X	-	-	X	X	-	-	-
CX5010-1121	-	X	-	-	X	-	X	-	-
CX5010-1122	-	X	-	-	X		X	X	-
CX5010-1125	-	X	-	-	X	-	-	-	X

Table 2: CX5020 (1.6 GHz)

Module	E-Bus	K-Bus	no operating system	Windows Embedded CE 6	Windows Embedded Standard 2009	no TwinCAT	TwinCAT 2 PLC runtime	TwinCAT 2 NC-PTP runtime	TwinCAT 3 XAR
CX5020-0100	X	-	X	-	-	X	-	-	-
CX5020-0110	X	-	-	X	-	X	-	-	-
CX5020-0111	X	-	-	X	-	-	X	-	-
CX5020-0112	X	-	-	X	-	-	X	X	-
CX5020-0115	X	-	-	X	-	-	-	-	X
CX5020-0120	X	-	-	-	X	X	-	-	-
CX5020-0121	X	-	-	-	X	-	X	-	-
CX5020-0122	X	-	-	-	X	-	X	X	-
CX5020-0125	X	-	-	-	X	-	-	-	X
CX5020-1100	-	X	X	-	-	X	-	-	-
CX5020-1110	-	X	-	X	-	X	-	-	-
CX5020-1111	-	X	-	X	-	-	X	-	-
CX5020-1112	-	X	-	X	-	-	X	X	-
CX5020-1115	-	X	-	X	-	-	-	-	X
CX5020-1120	-	X	-	-	X	X	-	-	-
CX5020-1121	-	X	-	-	X	-	X	-	-
CX5020-1122	-	X	-	-	X		X	X	-
CX5020-1125	-	X	-	-	X	-	-	-	X

CX50x0 systems with Windows Embedded Standard 2009 require a Compact Flash card with a minimum capacity of 2 GB.

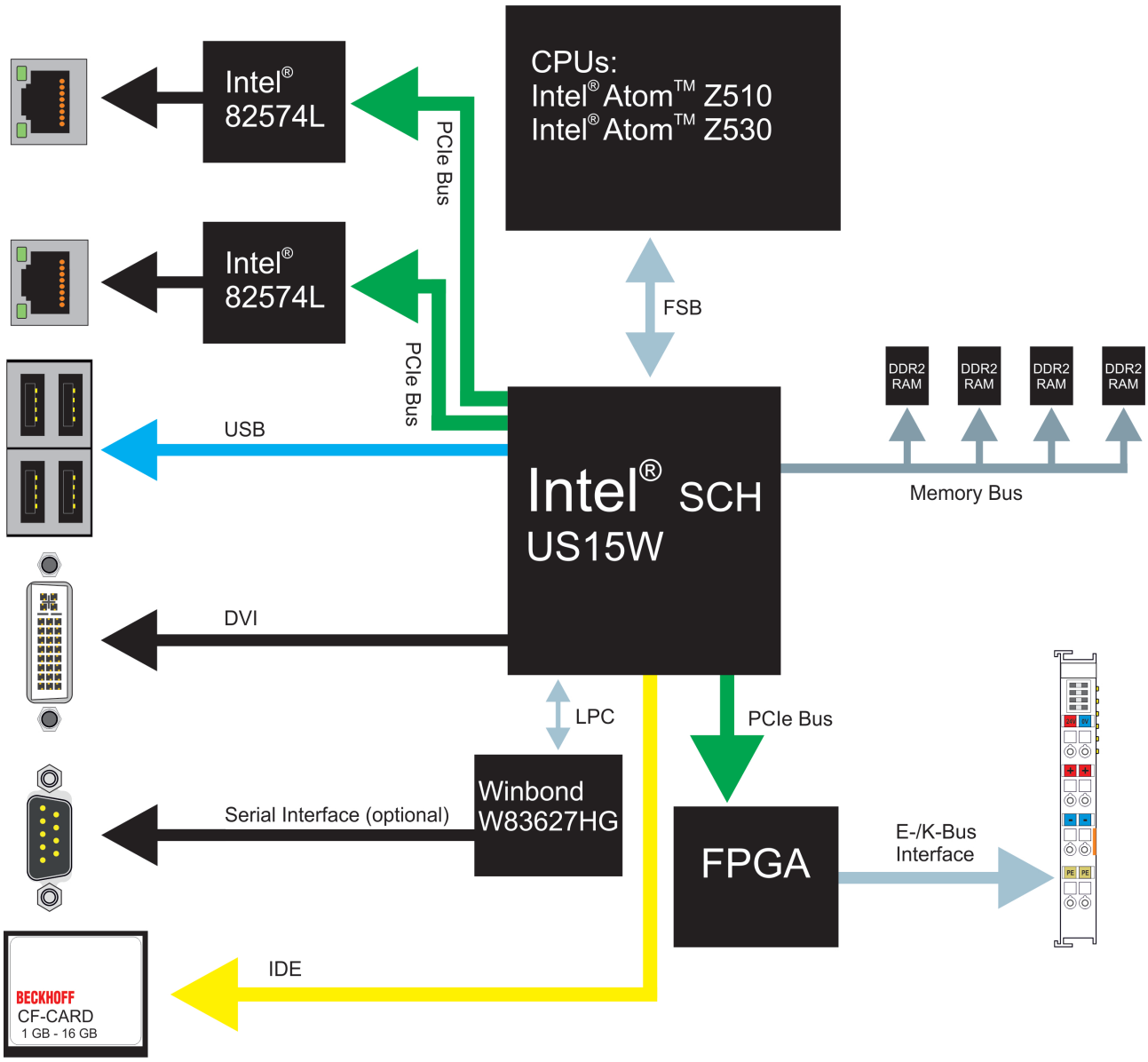
Instead of Windows Embedded Standard 2009 optionally Windows Embedded Standard 7 P (32 Bit) can be used. The minimum requirement for that is a CX5020 with 1 GB RAM (installed ex factory) and an 8 GB Compact Flash Card.

Software Images

A list of the different software images can be found in the CX1000 Software Documentation.

2.6 Architekture overview

The Embedded PCs of the CX50x0 family all have the same architecture, which is described below.



The CX50x0 Embedded PCs are based on the Intel Atom microarchitecture, which was developed by Intel. The CPUs used in the CX50x0 family are:

- Intel®Atom™ Z510 (Singlecore)
- Intel®Atom™ Z530 (Singlecore)

For details on the CPUs please refer to Intel. The graphics controller is located in the Intel® SCH US15W chipset. The two EPC variants therefore have the Intel® GMA 500 as graphics core. The memory is also directly connected to the chipset. The EPC is available in two memory configurations: with 512 MB and optionally with 1 GB DDR2 RAM.

In all CX50x0 EPCs the Intel® SCH US15W chipset is used. This chip provides all required interfaces:

- 4x USB 2.0 (interfaces)
- DVI-D interface
- 1 PCIe lane for each of the two Intel® 82574L Gigabit Ethernet controllers
- LPC interface for Winbond W83627HG controller for serial interface (CX50x0-N03x)
- 1 PCIe for FPGA for K-/E-bus
- 1 IDE for Compact Flash card interface

The interfaces (USB, DVI, and LAN ports) are standard interfaces. They can be used for operating devices that comply with the standard. Intel® 82574L Gigabit Ethernet controllers are used as network controllers. There are two independent ports, which are both gigabit-capable.

Details of the individual system interfaces are described in separate sections.

2.7 Battery compartment

The battery compartment is located under the front cover of the CX50x0. The opening in which the battery bracket is mounted can be seen when the front cover is opened. Use a screwdriver to carefully lift the battery out of the bracket.

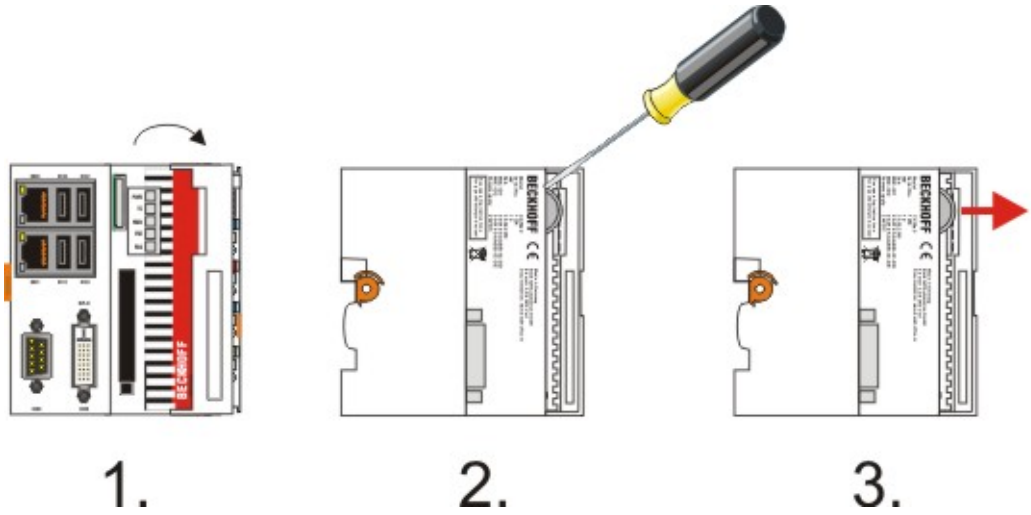


Fig. 1: CX5000_batt_eject

To insert a new battery push it into the battery compartment. Ensure correct polarity. Then close the front cover. The battery change is then complete.

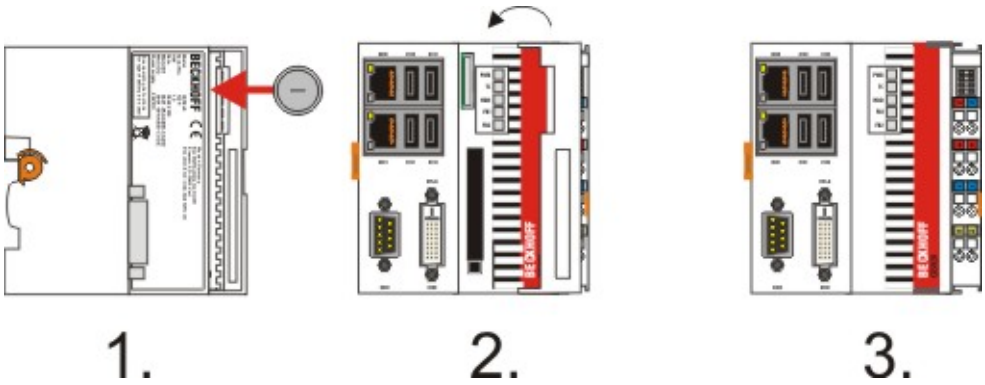


Fig. 2: CX5000_batt_insert

The battery is a CR2032 type from Panasonic.

The correct specifications are:

Battery type	Electrical properties (at 20 °C)		Standard charge	Dimensions		
	nominal voltage	nominal capacity	continuous load	Diameter	Height	Weight
https://infosys.beckhoff.com/content/1033/CX5000_HW/Resources/213053195.pdf	3.0 V	225 mAh	0.20 mA	20.0 mm	3.20 mm	3.1 g

NOTICE

An incorrectly inserted battery may explode!

Only use the same battery type (CR2032) from Sanyo or Panasonic. It is essential that positive and negative terminals of the battery are inserted correctly (negative pole on the left)Never open the battery or throw it into a fire.The battery cannot be recharged.

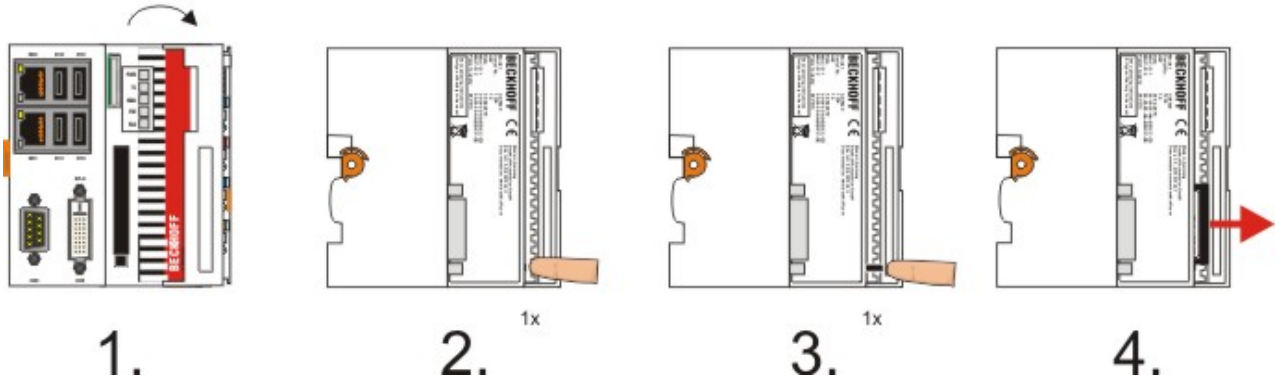
Battery maintenance

The battery must be replaced every 5 years. Spare batteries can be ordered from Beckhoff Service.

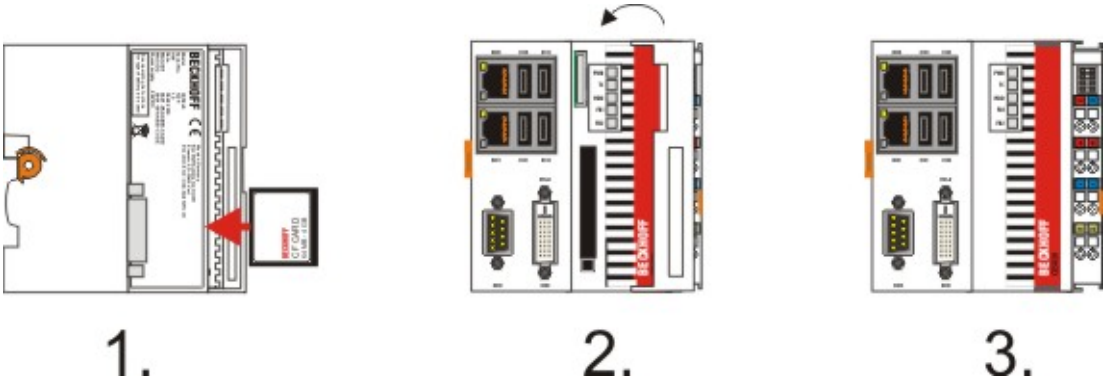
2.8 CF slot

A Compact Flash slot is located at the front, which enables the storage medium to be replaced. In the basic module this should only be done in **switched-off state**, otherwise the system may crash. The Compact Flash card can be removed from the module for maintenance. In this way it is also possible to expand the system (only operating system and program memory). Compact Flash cards (CF cards) are available as accessories in various sizes.

The following images illustrate the handling of the CF cards. Open the front cover. Then eject mechanism and the CF card slot are then visible. The eject mechanism is based on the push-push principle: If the head of the mechanical system is retracted, pushing it makes it move out of the housing. Pushing the head again will lock it back in the housing. At the same time the card moves approx. 4 mm out of the housing, so that it can be pulled out. If the card is pushed in (FIGURE 3), the eject mechanism will re-engage. The card is positioned correctly, if it is located approx. 1 mm lower than the front of the housing.



When the card is pushed back the eject mechanism locks again. The card is positioned correctly, if it is located approx. 1 mm lower than the front of the housing.



Type of CF slot

The Compact Flash slot is a memory interface, not an I/O type CF slot.

2.9 CF card

The Compact-Flash card (CF card) is a non-volatile memory.

Data to be retained in the event of a power failure should be saved on the CF card. The CF card operates like a hard disk.

Using CF cards

We strongly recommend that only CF cards supplied by Beckhoff Automation GmbH should be used. These are industrial CF cards with a higher number of write/read cycles and an extended temperature range (+85 °C). Proper operation can only be guaranteedwith CF cards from Beckhoff Automation GmbH!

3 Assembly and connecting

3.1 Unpacking, installation and transport

The specified storage conditions must be adhered to (see "Technical data").

Dimensions and weight of the individual modules:

Dimensions (H x W x D): 100 x 102 x 92 mm

Weight: 575 g (basic module)

Unpacking

Proceed as follows to unpack the unit:

1. Remove packaging.
2. Do not discard the original packaging. Keep it for transporting the device in the future.
3. Check the delivery for completeness by comparing it with your order.
4. Please keep the associated paperwork. It contains important information for handling the unit.
5. Check the contents for visible shipping damage.
6. If you notice any shipping damage or inconsistencies between the contents and your order, you should notify Beckhoff Service.

NOTICE

Danger of damage to the unit!

During transport in cold conditions, or if the unit is subjected to extreme temperature swings, condensation on and inside the unit must be avoided. Prior to operation, the unit must be allowed to slowly adjust to room temperature. Should condensation occur, a delay time of approximately 12 hours must be allowed before the unit is switched on.

Installation

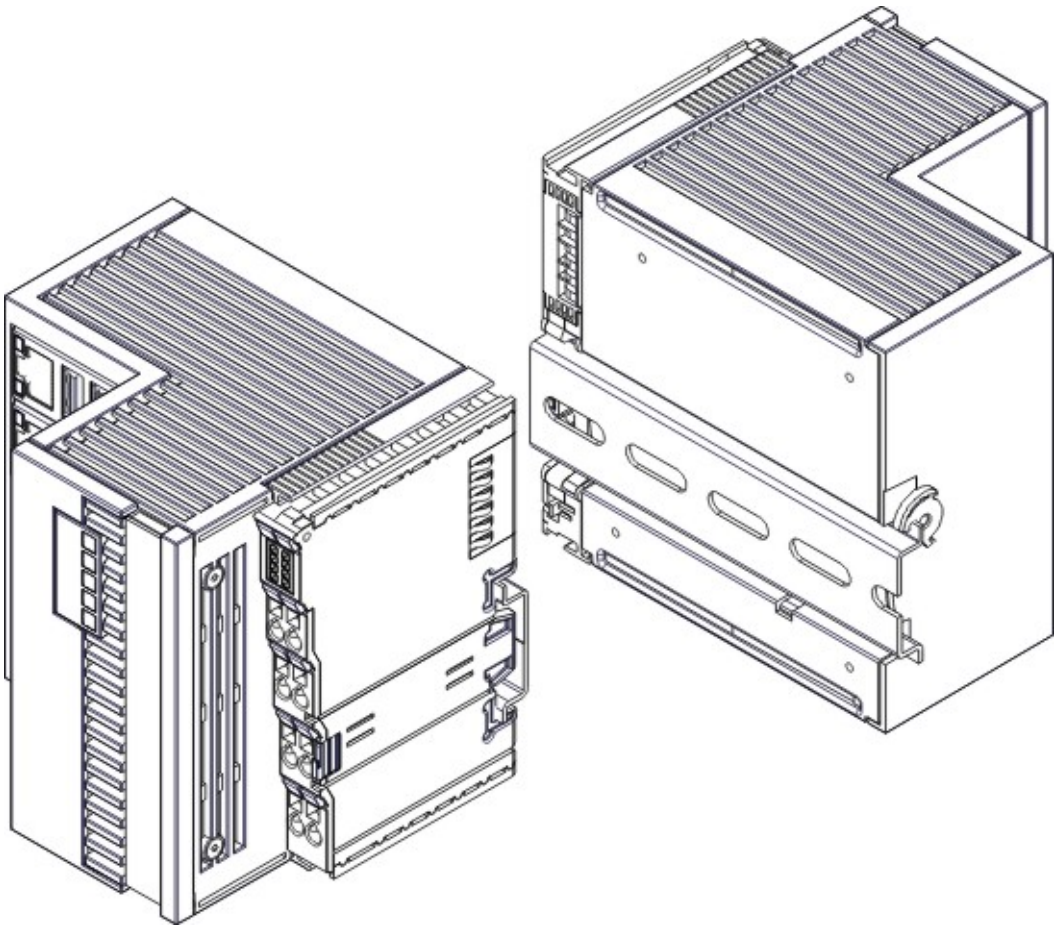
The devices are designed for installation in control cabinets.

Shipping and relocation

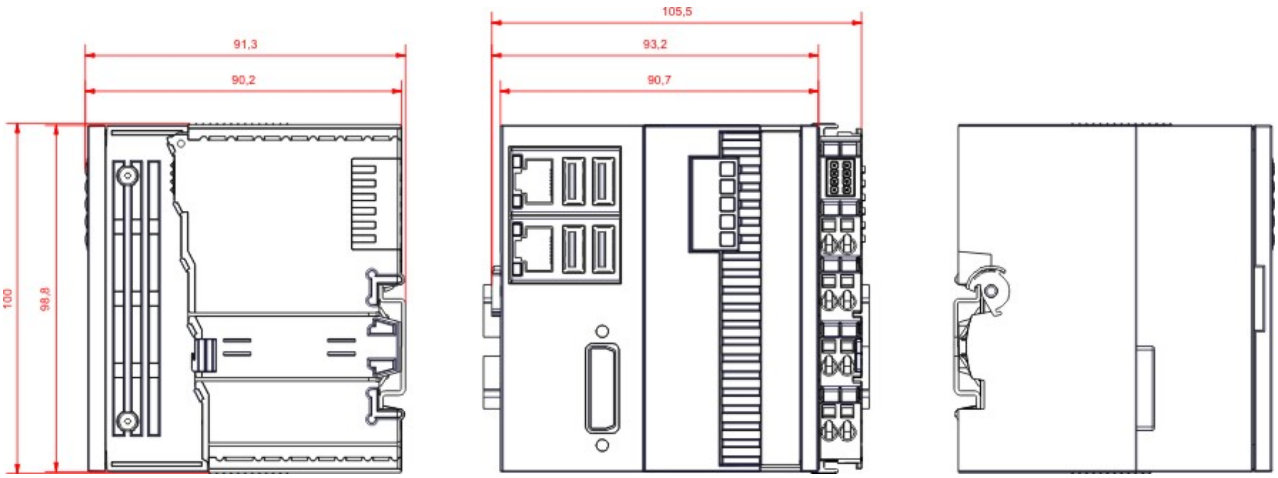
Despite the robust design of the unit, the components are sensitive to strong vibrations and impacts. During transport, your computer should therefore be protected from excessive mechanical stress. Therefore, please use the original packaging.

3.2 Dimensions

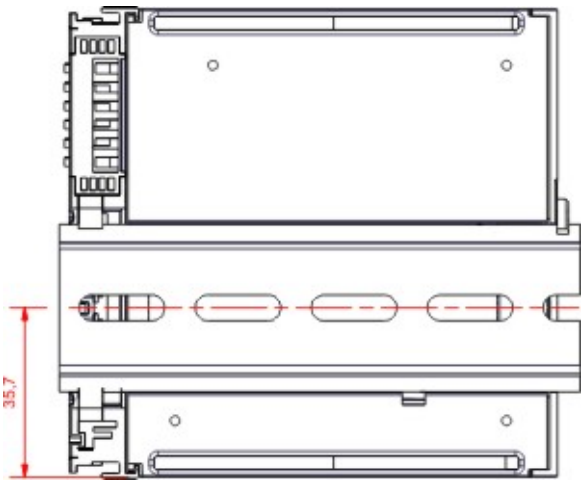
The following drawings show the dimensions of the CX50x0 devices.



Dimensions



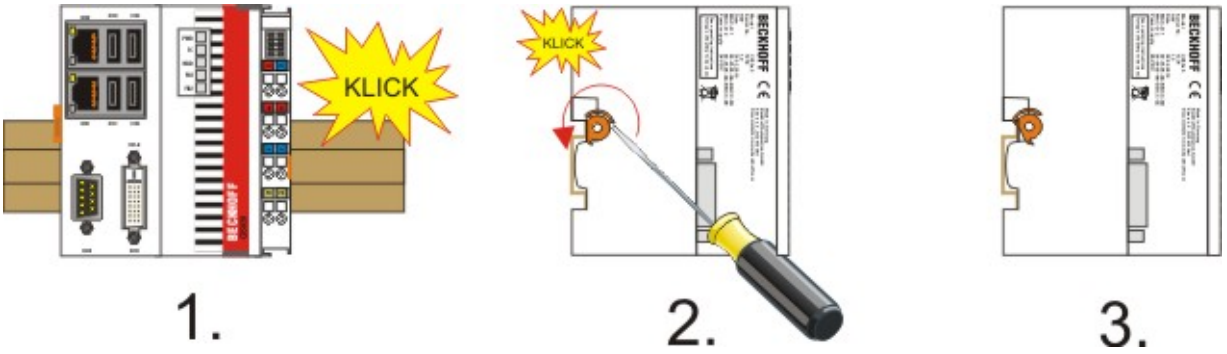
Rear view



3.3 Installation on the mounting rail

Snapping onto the mounting rail

The CX50x0 can simply be snapped onto the mounting rail. To this end position the block on the mounting rail and push it slightly until it engages on the right-hand side. The is indicated by a distinct click. Use a screwdriver to push up the lock on the left-hand side, thereby turning it and causing it to engage audibly.



NOTICE

Avoid damage!

Do not force the module or apply excessive pressure!

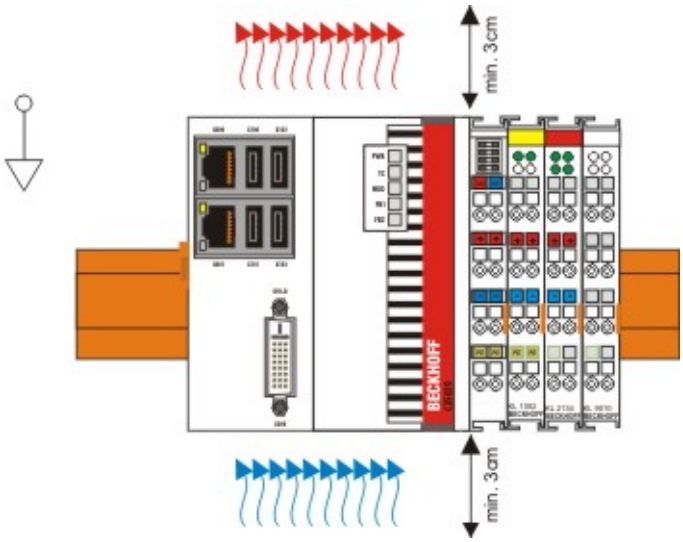
Installation position

NOTICE

Comply with the permitted installation position and minimum distances!

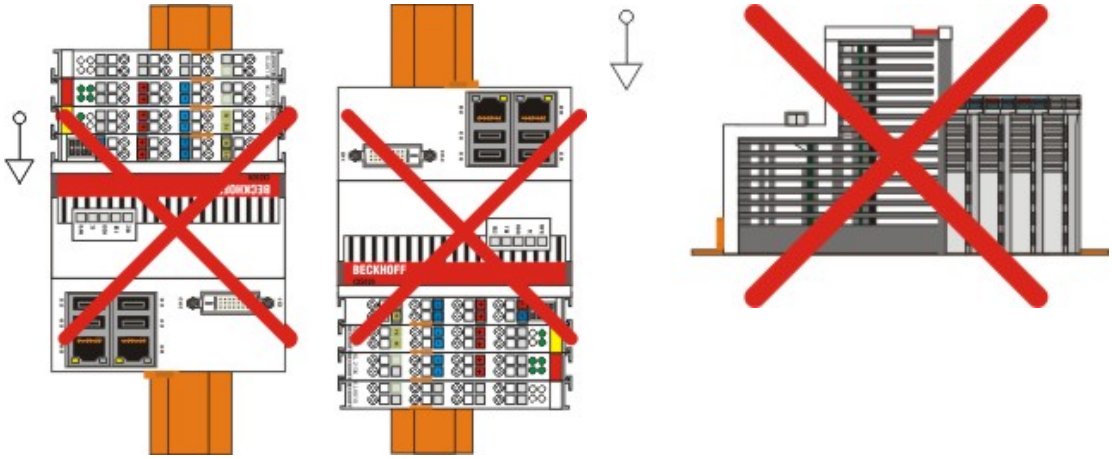
The maximum ambient temperature for CPU modules mounted on a top-hat rail is 60 °C. The orientation in which the device is fitted must be selected in such a way that cooling air can flow vertically through the ventilation holes. The images show the permitted and two incorrect installation positions. Mounting must provide a clearance of 30 mm both above and below a CX50x0 device combination to ensure adequate ventilation of the base CPU module and the power supply unit.

The high performance and the compact design of the CX50x0 systems may result in increased heat generation. The heat is dissipated via a passive ventilation system. This system requires the unit to be mounted correctly. Ventilation openings are located at the top and bottom of the housing. The system therefore has to be installed horizontally. This ensures optimum air flow.



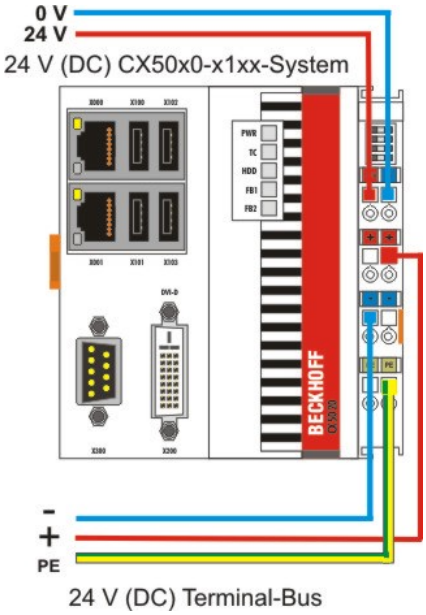
Incorrect installation positions

The CX50x0 system must not be operated vertically on the top-hat rail. A vertical position would lead to insufficient CPU ventilation, since the ventilation openings are located on the top and bottom of the housing. Installation of the system on its side would also lead to inadequate ventilation.



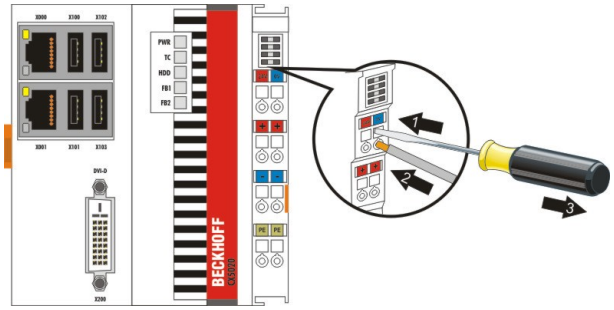
3.4 Power supply

This power supply unit is equipped with an I/O interface, which permits connection of the Beckhoff Bus Terminals. The power is supplied via the upper spring-loaded terminals labeled “24V” and “0V”.
The supply voltage supplies the CX system ant the terminal Bus and Bus Terminal with a voltage of 24 V DC (-15 %/+20 %). The dielectric strength of the power supply unit is 500 V_{rms}. Since the Terminal Bus (K- and E-bus) only transfers data, a separate power supply is required for the Bus Terminals. This is provided by means of the power contacts, which are not connected to the power supply.



Requirements for the 24V power supply

The power supply must be capable to supply 4A to guarantee proper function of CPU module and terminals.



The terminals are implemented in spring force technology. Connect the cables as follows:

1. Open a spring-loaded terminal by slightly pushing with a screwdriver or a rod into the square opening above the terminal.
2. The wire can now be inserted into the round terminal opening without any force.
3. The terminal closes automatically when the pressure is released, holding the wire securely and permanently.

Wire size width	0.5 ... 2.5 mm²	AWG 20 .. AWG 14
Wire stripping length	8 ... 9 mm	0.33 inch

LED

If the power supply unit is connected correctly and the power supply is switched on, the two upper LEDs in the terminal prism are green. The left LED (Us) indicates the CPU supply. The right LED (Up) indicates the terminal supply. The other LEDs indicate the Terminal Bus status. A detailed description of the LEDs can be found in section "LED troubleshooting".

UL requirements

⚠ DANGER

Compliance of the UL requirements

For the compliance of the UL requirements the CX-Controllers should only be supplied by a 24 VDC supply voltage, supplied by an isolating source and protected by means of a fuse (in accordance with UL248), rated maximum 4 Amp.by a 24 VDC power source, that has to satisfy NEC class 2. A NEC class 2 power supply shall not be connected in series or parallel with another (class 2) power source!This UL requirements are valid for all supply voltages of the CX-Controllers!

⚠ DANGER

Compliance of the UL requirements

To meet the UL requirements, the CX-Controllers must not be connected to unlimited power sources!



Power contact PE

NOTICE

Powerkontakt "PE"

The “PE” power contact must not be used for other potentials. "PE" und "0V" (24V CX-System supply) have to be on the same potential. (connected in the cabinet) The wiring the cabinet has to follow the Norm EN EN 60204-1:2006: Safety of machinery - Electrical equipment of machines - (PELV = Protective Extra Low Voltage) EN 60204-1:2006 chapter 6.4.1:b): One side of the circuit or a point of the energy source of the circuit must be connected to protective earth system

NOTICE

Interrupt power supply / switching off

If the power supply should be disconnected the "0V" must not be disconnected. Always disconnect the “24V” wire first. Otherwise there can be electrical current flow via the shield. Possibly connected devices with own power supply (e.g. panel) must have the same electrical potential for "PE" and "GND" as the CX-unit. Otherwise the CX-unit and/or the connected device can be damaged.

Also see about this

Mounting of passive terminals to the power supply of CX50x0 [▶ 28]

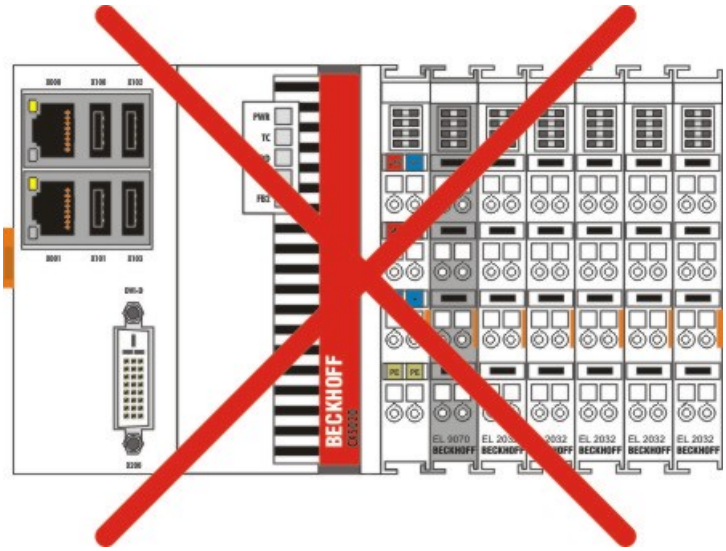
3.5 Mounting of passive terminals to the power supply of CX50x0

Hint for mounting passive terminals

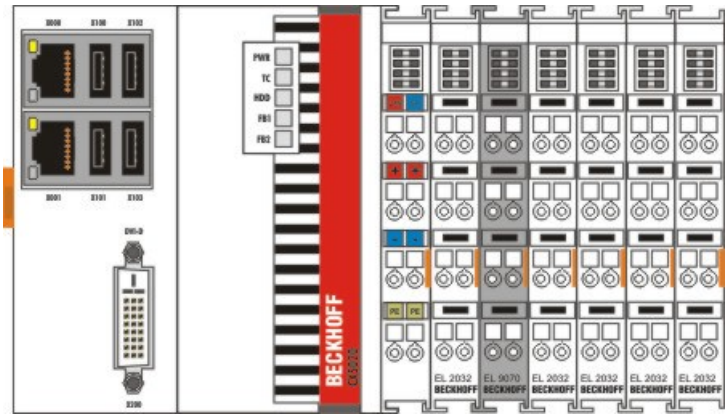
EtherCAT Bus Terminals (ELxxxx / ESxxxx), which do not take an active part in data transfer within the bus terminal block are so called Passive Terminals. The Passive Terminals have no current consumption out of the E-Bus To ensure an optimal data transfer, you must not directly connect the passive terminal directly to the power supply!

Sample for configurations with passive terminals (grey colored):

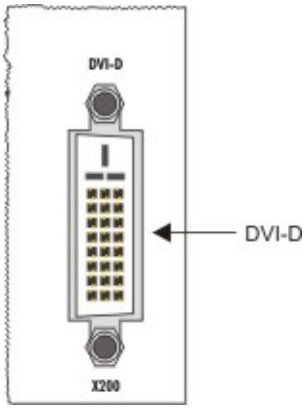
The following picture shows an invalid configuration:



This piczure shows the valid configuration:



3.6 DVI-D connection



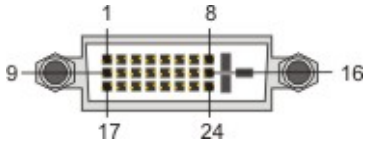
DVI-D connection (X200)

The DVI-D interface transfers digital display data and is suitable for connecting a digital display. The maximum length of the DVI cable is determined by screen resolution and quality of the DVI cable. Without the use of special electronics, a DVI cable length of 5m should not be exceeded. Beckhoff offers various displays with integrated DVI extension electronics, enabling DVI cable length up to 50m.

DVI-D interface

The DVI interface does not use VGA signals, so that the connection of CRT VGA monitors to the CX50x0 system using a DVI to VGA adapter is not possible.

DVI-D socket



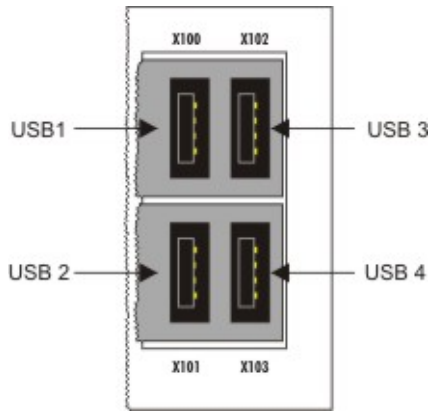
Pin	Assignment	Pin	Assignment	Pin	Assignment
1	TMDS Data 2-	9	TMDS Data 1-	17	TMDS Data 0-
2	TMDS Data 2+	10	TMDS Data 1+	18	TMDS Data 0+
3	TMDS Data 2/4 Shield	11	TMDS Data 1/3 Shield	19	TMDS Data 0/5 Shield
4	not connected	12	not connected	20	not connected
5	not connected	13	not connected	21	not connected
6	DDC Clock	14	+ 5V Power	22	TMDS Clock Shield
7	DDC Data	15	Ground (+5V, Analog H/V Sync)	23	TMDS Clock +
8	Analog Vertical Sync	16	Hot Plug Detect	24	TMDA Clock -

Resolution at the monitor

Resolution in pixels	Distance of the interface from the monitor
1920 x 1200	5 m
1920 x 1080	5 m
1600 x 1200	5 m
1280 x 1024	5 m
1024 x 768	5 m
800 x 600	5 m
640 x 480	5 m

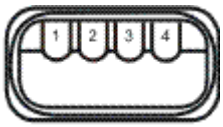
The Embedded PC also supports higher resolutions according to the DVI standard. A maximum resolution of 2560 x 1440 pixels can be set on the Embedded PC. Whether this resolution is achieved is dependent on the monitor, the cable quality and cable length.

3.7 USB connections



USB interface (X100 / X101 / X102 / X103):

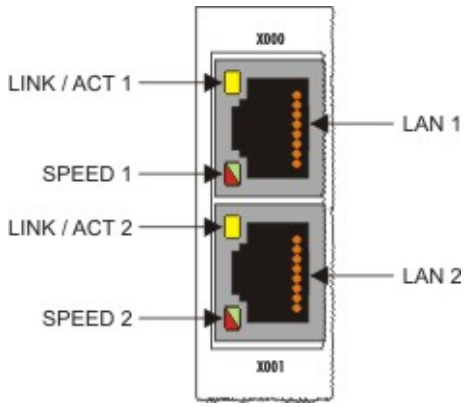
The CX50x0 has 4 independent USB interfaces, for connecting keyboards, mice, touchscreens and other input or data storage devices. Keep an eye on the power consumption of the individual devices. Each port is limited to 500 mA.



The USB socket is a type A socket. The USB interface complies with the USB 2.0 specification.

Pin	Assignment	Typical assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	GND	Black
Shell	Shield	Drain Wire

3.8 LAN connections



LAN interface (X000/ X001)

The CX50x0 systems have two independent LAN interfaces. Both ports are able to operate at speeds of 10 / 100 / 1000 Mbit. The LEDs on the left-hand sides of the RJ45 sockets indicate the status of the LAN connection. The upper LED indicates whether the port is connected to a network. If this is the case the LED is yellow. The LED flashes if data traffic takes place on the port. The lower LED indicates the connection speed. The LED is green if the speed is 10 or 100 Mbit. In 1000 Mbit mode (Gigabit) the LED is red.



Table 3: Configuration of the RJ45 interface, port 1 (X000)

PIN	Signal	Description
1	TD +	Transmit +
2	TD -	Transmit -
3	RD +	Receive +
4	connected	not used
5		
6	RD -	Receive -
7	connected	not used
8		

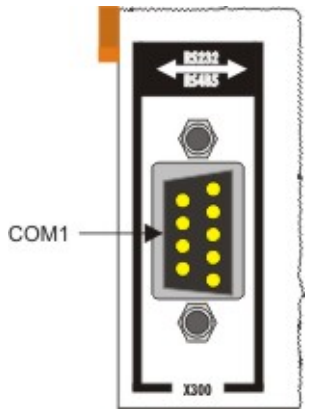
Table 4: Configuration of the RJ45 interface, port 2 (X001)

PIN	Signal	Description
1	TD +	Transmit +
2	TD -	Transmit -
3	RD +	Receive +
4	connected	not used
5		
6	RD -	Receive -
7	connected	not used
8		

Independence of the ports

Both ports are independent of each other. In contrast to the CX1020 and CX9000 systems, no switch is integrated. For a line topology an additional switch is required. The independent ports can be configured in different ways: The upper port (1) is configured as Gigabit IT port, The lower port (2) is configured for EtherCAT communicationin the delivery state.

3.9 RS232 connections (CX50x0-N030)



The CX50x0-N030 system interface provides an RS232 interface, COM1 (X300). It is implemented on a 9-pole Sub-D pin strip. If more than one interface is required the system can be extended via the Terminal Bus (K- or E-bus) or Bus Terminals (KL/EL6001) which provide serial interfaces. The pin assignment is shown at the bottom of the page.

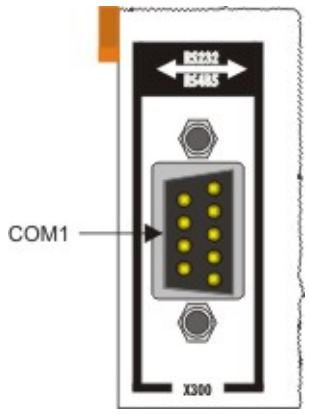
The maximum baud rate on both channels is 115 kbit. The interface parameters are set via the operating system or from the PLC program.

RS232 COM interface (connector)

Table 5: Pin assignment of the COM interface

PIN	Signal	Type	Description
1	DCD	Signal in	Data Carrier Detected
2	RxD	Signal in	Receive Data
3	TxD	Signal out	Transmit Data
4	DTR	Signal out	Data Terminal Ready
5	GND	Ground	Ground
6	DSR	Signal in	Dataset Ready
7	RTS	Signal out	Request to Send
8	CTS	Signal in	Clear to Send
9	RI	Signal in	Ring Indicator

3.10 RS422/RS485 connections (CX50x0-N031)



The CX50x0-N031 system interface provides an RS422 or RS 485 interface, COM1 (X300). It is implemented on a 9-pole Sub-D socket strip. If more than one interface is required the system can be extended via the Terminal Bus (K- or E-bus) or Bus Terminals (KL/EL6021) which provide serial interfaces. The pin assignment is shown at the bottom of the page.

The maximum baud rate on both channels is 115 kbit. The interface parameters are set via the operating system or from the PLC program.

COM interface (socket)

Table 6: Pin assignment of the COM interface

PIN	Signal	Typ	Description
2	TxD+	Data-Out +	Transmit 422
3	RxD+	Data-In +	Receive 422
5	GND	Ground	Ground
6	VCC	VCC	+5V
7	TxD-	Data-Out -	Transmit 422
8	RxD-	Data-In -	Receive 422

For RS 485 pins 2 and 3 (data +) must be connected, and pins 7 and 8 (data -).

Parameter setting of the interface

The interface is parameterized as follows:

Table 7: RS485 without Echo, End-Point (Termination) default setting

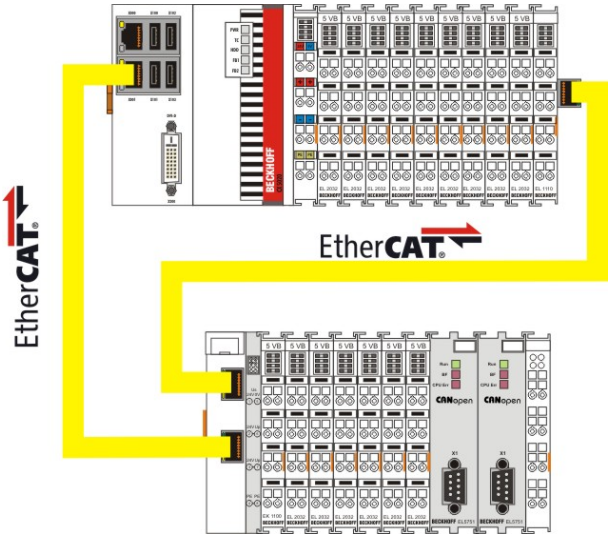
Function	State
Echo on	off
Echo off	on
Auto send on	on
Always send on	off
Auto receive on	on
Always receive on	off
Term on	on
Term on	on

Other parameters

If there are other parameters needed, please contact your local service department.

4 Operating/Configuration

4.1 EtherCAT cable redundancy



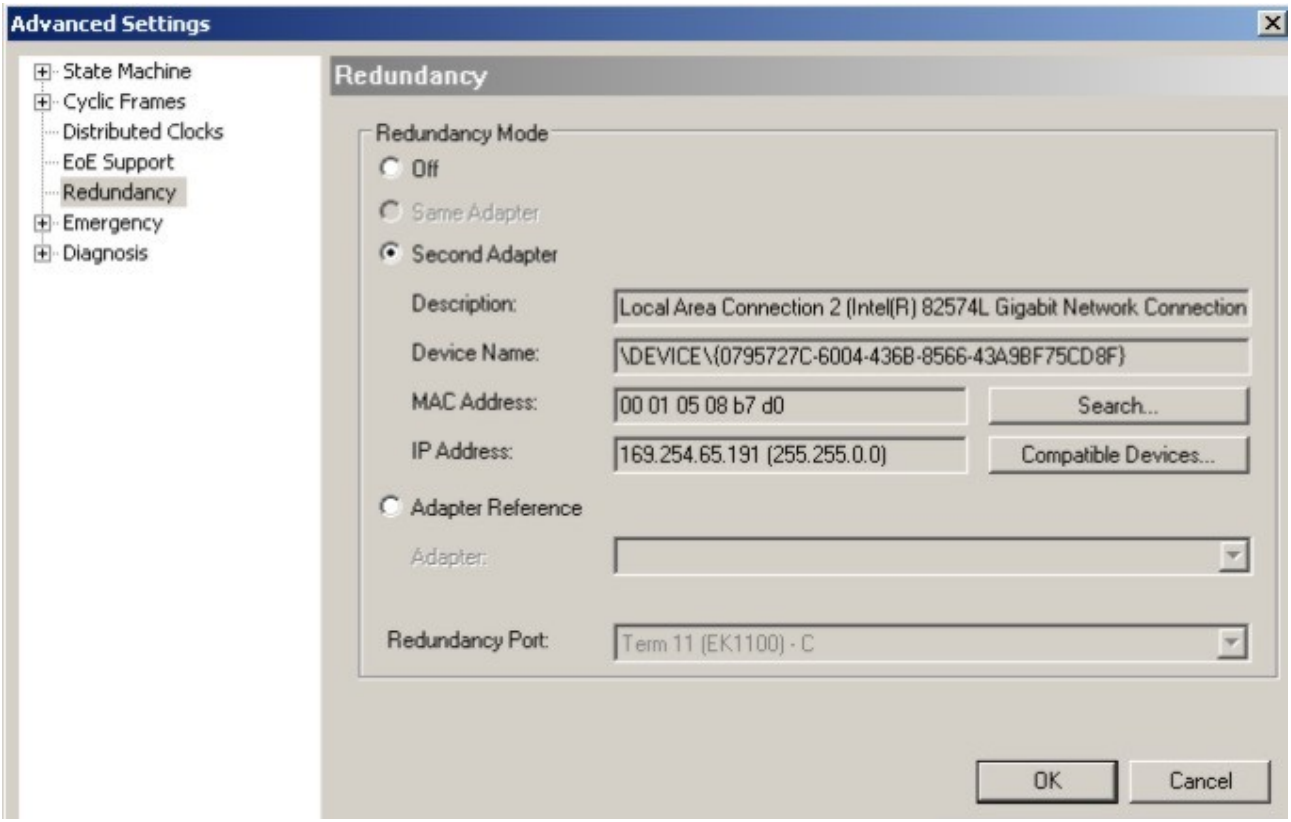
EtherCAT cable redundancy can be realised in the CX50x0 systems through the two independent Ethernet ports. Minimum requirements:

1. EtherCAT redundancy supplement
2. EK1110 (bus extension)
3. EK1100 (Bus Coupler)

The supplement product on the Beckhoff website at

https://www.beckhoff.com/TS622x

can be downloaded. The required licence key can be ordered from our sales division. The required couplers are ordered together with the other hardware. These components can then be used to configure the controller. The upper figure shows a minimum configuration example for cable redundancy. Once the hardware has been wired and commissioned, the supplement must be installed on the device, for example via a USB stick or the IT network. During the installation the system asks for the licence key. The cable redundancy can be set up in the System Manager. The first step involves reading the terminal configuration. Then select "Advanced Settings" under the "EtherCAT" tab in the EtherCAT device properties. The second adapter can be set under the "Redundancy" menu. Use the "Search" button to open the selection menu. Select "Local Area Connection 2 (Intel(R).....)" for the lower network connection (X001). Click "OK" to complete the configuration.

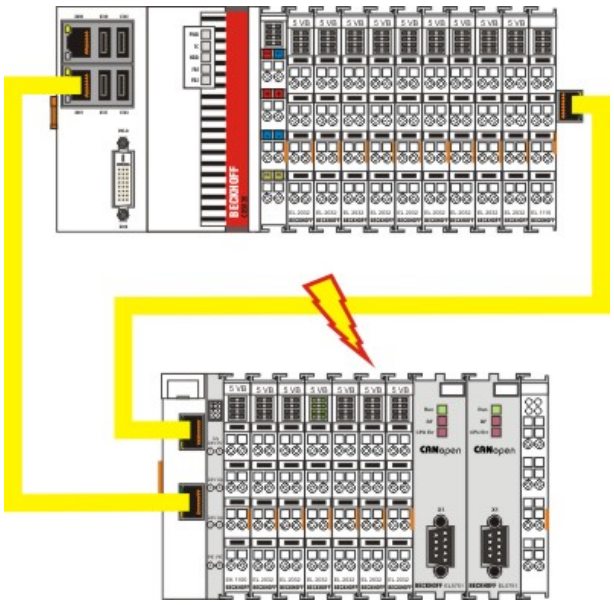


The supplement only supports CABLE REDUNDANCY

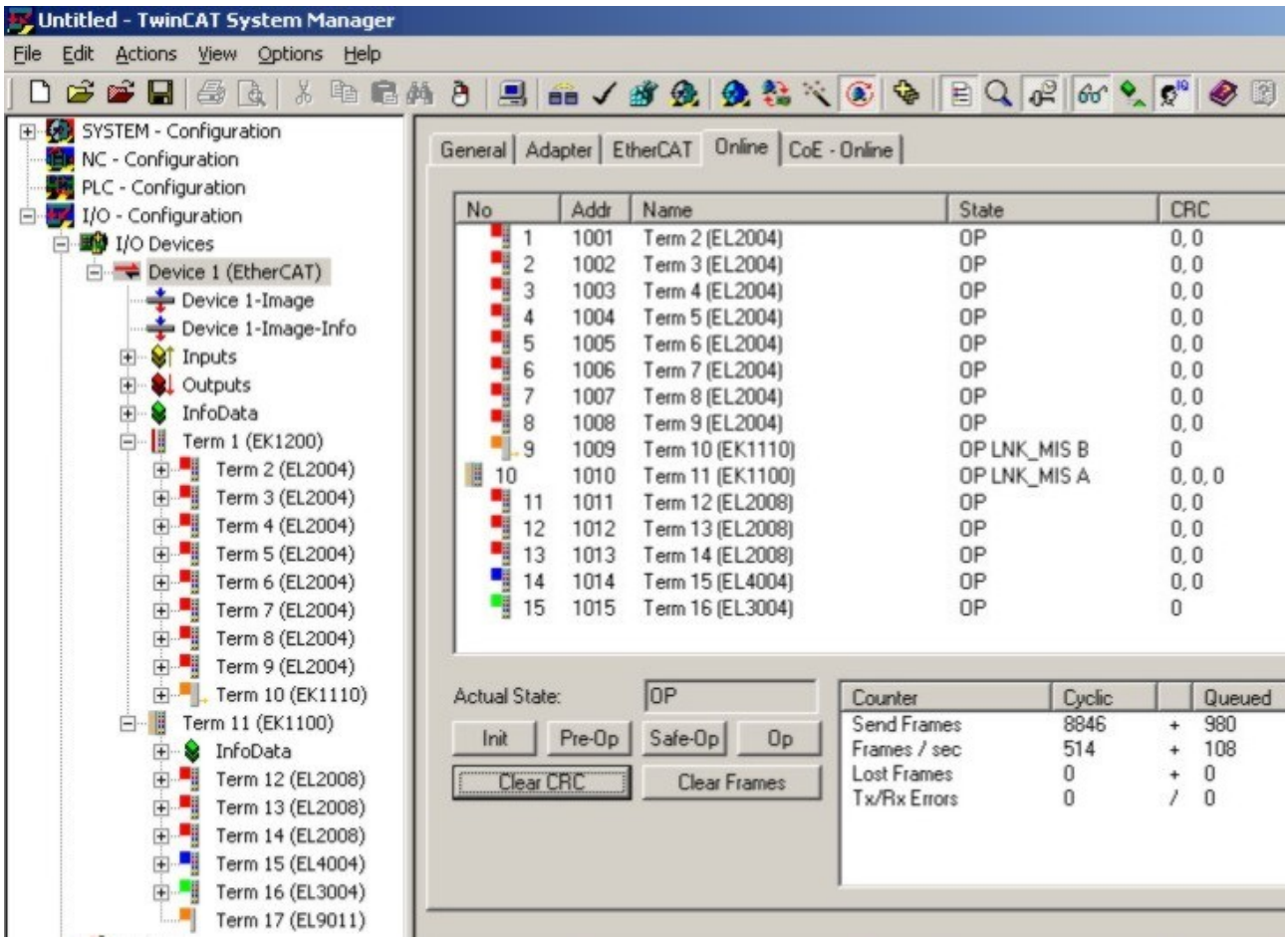
This supplement only supports cable redundancy, which means that only the cable sections can be regarded as fail-safe, i.e. connections between the couplers. Failures of individual terminals are not covered.Further details can be found in the Beckhoff Information System under EtherCAT cable redundancy.

Cases of failure

The two possible failures are described in the example below.

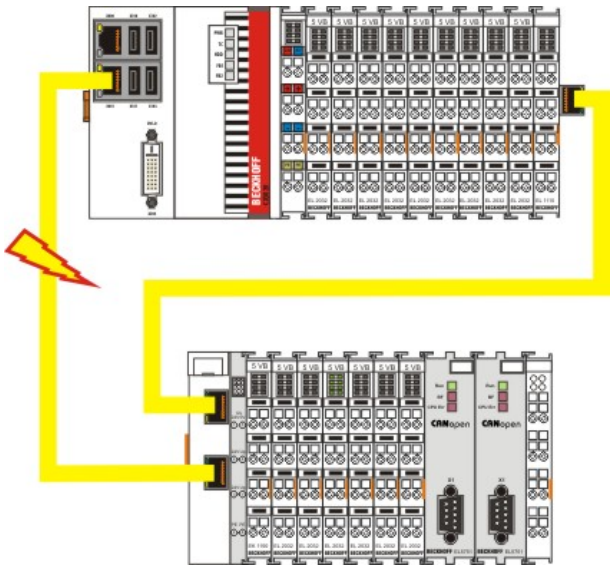


In this example the supply line for coupler EK1100 is faulty. The EK1100 terminals continue to run despite the cable failure. The System Manager indicates the failure as follows:

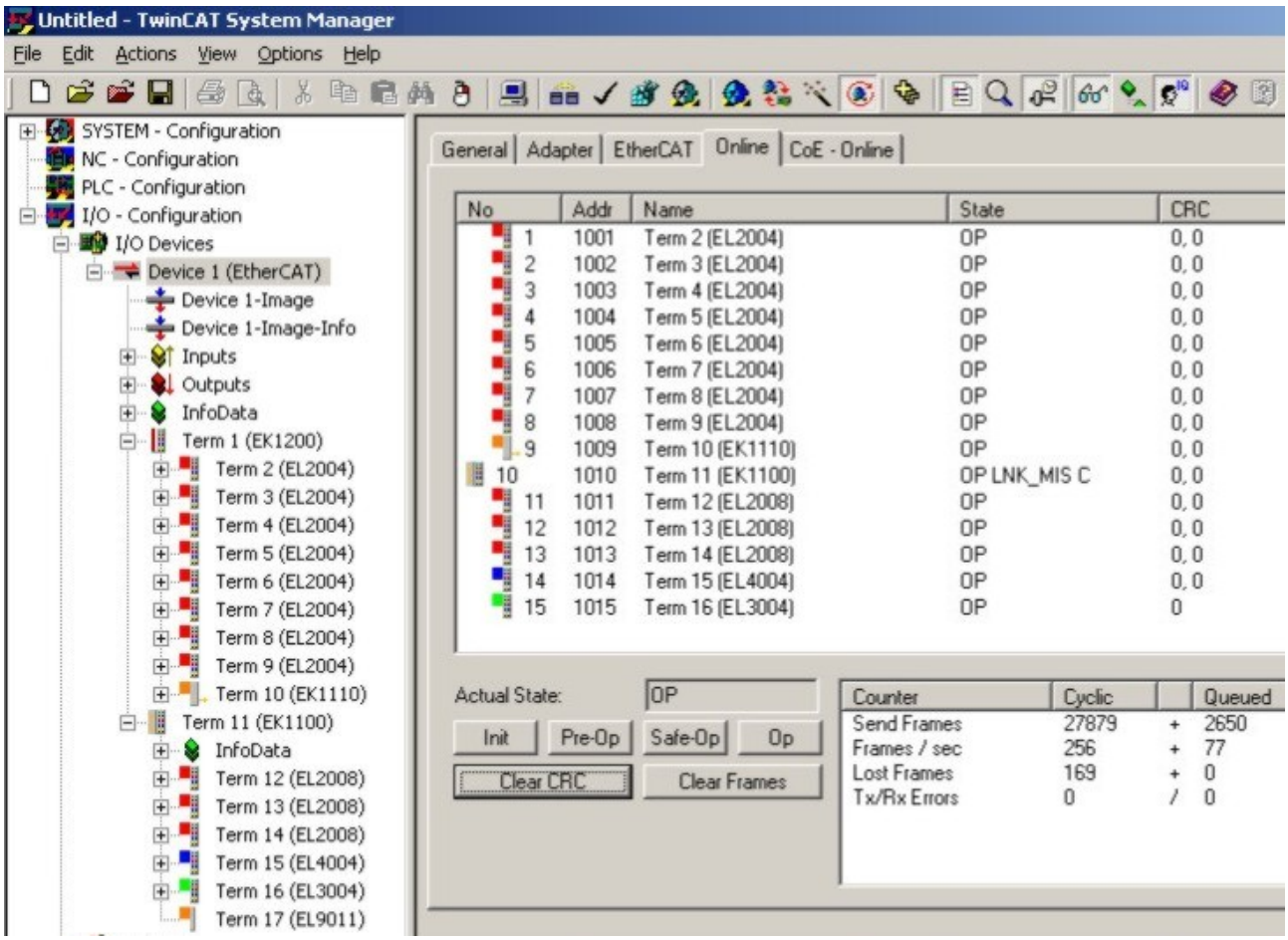


The interruption is indicated by "LNK_MIS B" and "LNK_MIS A".

The next example shows a failure of the "return line":



In this case the second cable is faulty. The terminals at the coupler continue to run without malfunction. The System Manager indicates the behavior as follows:



The interruption is indicated by "LNK_MIS C" at coupler EK1100.

The EtherCAT ring is expandable. The number of devices in the ring is controlled by licenses: up to 250, up to 1000, more than 1000. A master is only able to bridge one failure. In the event of two failures the ring components will continue to run up to the breaking points.

4.2 Switching on and off

Switching on

The power supply for the basic CPU module comes from the power supply unit. The basic CPU module starts automatically when the power supply unit is connected to the mains.

Switching on for the first time

When you switch on the PC for the first time, the pre-installed operating system (optional) will be started.

Switching off

The Embedded PC switches off when the power supply unit is switched off. The control software typically running on Embedded PCs should be shut down or stopped correctly. A user who may not close software may also not switch the Embedded PC off, since data can be lost from the hard disk by switching off while software is running.

Once the software has been stopped, the operating system can be shut down. Only then should the power supply be interrupted.

4.3 Note on using the setup

NOTICE

Changes in the BIOS settings may only be implemented by appropriately trained staff.

The CX50x0 systems are delivered by Beckhoff Automation GmbH in a preconfigured state and are therefore operational! The BIOS settings should only be executed by appropriately trained staff.Under Windows CE the BIOS should not be changed at all, since the operating system is adapted to the hardware configuration. Any change in the addresses or interrupts would lead to unstable system behaviour or even crashing.

Within the individual setup pages, F6 can be used for loading fail-safe defaults, and F7 for optimised default values for the individual setup entries. These default values are applied irrespective of whether the board was previously booted successfully with a particular setup setting. The situation is different if the defaults are called from the TOP menu. Once a setup setting that subsequently led to successful booting was saved, both menu items will load these values as default for the setup pages. See also "Load Fail-Safe Defaults" and "Load Optimized Defaults".

Top menu

Phoenix - AwardBIOS CMOS Setup Utility

▶ Standard CMOS Features [▶ 41]	▶ Frequency/Voltage Control [▶ 62]
▶ Advanced BIOS Features [▶ 45]	Load Fail-Save Defaults
▶ Advanced Chipset Features [▶ 50]	Load Optimized Defaults
▶ Integrated Peripherals [▶ 52]	Set Password
▶ Power Management Setup [▶ 57]	Save & Exit Setup
▶ PnP/PCI Configuration [▶ 59]	Exit Without Saving
▶ PC Health Status [▶ 60]	

ESC: Quit ↑ ↓ → ← Select ItemF10: Save & Exit Setup
"Brief description of the function selected above"

A „►“ sign in front of the menu item indicates that a submenu is available. An "x" before a menu item indicates that there is a setting option that has to be activated via a setting at a higher level.

Load Fail-Save Defaults

This option is used for absolute security settings. It is not suitable for continuous operation, but can be useful if the PC malfunctions.

Load Optimized Defaults

This option is used for setting optimum values as recommended by the manufacturer.

Set Password

Here you can enter a setup password for preventing unauthorised invoking of the BIOS.

Save & Exit Setup

This option is used to save the settings and exit setup. Input: Y (Please note: enter Z with German keyboard).

Exit Without Saving

Quit setup without saving the settings. Setting: Y (Please note: enter Z with German keyboard).

4.3.1 Standard CMOS Features

This menu is used for setting date, time, hard disks, graphics mode and start-up behaviour. At the same time, information about the memory configuration determined by the system is provided. The memory configuration information cannot be changed. The setting options for date, time, graphics mode and startup behaviour are described below. A new menu opens for setting the hard disk data.

Phoenix - AwardBIOS CMOS Setup Utility

Standard CMOS Features

Date (mm:dd:yy)	Wed, Jun 30 2010	Item Help
Time (hh:mm:ss)	11 : 11 : 00	
u8; IDE Channel 0 Master [▶ 42]	[None]	
u8; IDE Channel 0 Slave [▶ 44]	[None]	
Halt On	[All, But Keyboard]	
Base Memory	639K	
Extended Memory	514,048K	
Total Memory	515,072K	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Date (mm:dd:yy)

Options:

- mm … month
- dd … day
- yy … year

Time (hh:mm:ss)

Options:

- hh … hours
- mm … minutes
- ss … seconds

Halt On

This parameter can be used for stopping the boot process in the event of errors. Errors may be ignored. This menu item is used to configure the settings.

Options:

- All Errors (stop for all types of error)
- No Errors (ignore all errors and continue system start-up)
- All , But Keyboard (missing keyboard is ignored)

Base Memory

This option is used for displaying the conventional memory (0 KB to 640 KB) in order to indicate whether it was detected by the POST.

Extended Memory

Available memory from the first MB to the maximum memory capacity.

Total Memory

This is the total of base memory, extended memory and other memory.

4.3.1.1 IDE Primary Master

This menu is used to set the data for the hard disk connected as master to the first IDE bus. The hard disk data (size, number of cylinders, heads, sectors, pre-compensation and home position of the heads when the disk is switched off) are displayed automatically for the connected hard disk.

Phoenix - AwardBIOS CMOS Setup Utility

IDE Primary Master

IDE HDD Auto-Detection	[Press Enter]	Item Help
IDE Channel 0 Master	[Auto]	
Access Mode	[Auto]	
Capacity	0 MB	
Cylinder		
Head	0	
Precomp	0	
Landing Zone	0	
Sector	0	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 41] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

IDE HDD Auto-Detection

Automatic detection of the hard disk is initiated by pressing the <Enter> key. After a few seconds the physical data of the connected hard disk should be displayed in the lower section of the menu.

IDE Channel 0 Master

This parameter is used for configuring the IDE bus. The following options are available:

- None (no hard disk connected to this bus connection)
- Auto (auto-detection during each boot process)
- Manual (the hard disk is addressed with the set parameters)

Access Mode

This option can be used to select the operating system for the hard disk. Setting options: CHS, LBA, LARGE, or Auto. Auto is the recommended setting. Normal (standard) mode supports hard disks with a capacity of up to 528 MB. This mode uses positions for data access that are specified via cylinders (CYLS), heads, and sectors. The older LBA (Logical Block Addressing) mode can support hard disks with a capacity of up to 8.4 GB. This mode uses a different method for calculating the position disk data to be accessed. It translates cylinders, heads and sectors into a logical address for the data location. Large hard disks support this mode. The BIOS supports the INT 13h extension function that enables the LBA mode to manage hard disk drives with a capacity of more than 8.4 GB. If the number of cylinders (CYLs) on the hard disk exceeds 1024 and DOS cannot support it, or if your operating system does not support LBA mode, LARGE mode should be selected. The following options are available for setting the hard disk access mode:

- CHS
- LBA
- LARGE
- Auto

The following parameters are automatically determined and displayed.

Capacity

Storage capacity of the hard disk. This value is calculated from the individual hard disk parameters.

Cylinder

Define or set the number of cylinders. Depending on the BIOS version and the manufacturer it varies between 1,024 and 16,384 cylinders.

Head

Define or set the number of heads. The number is between 1 and 16 heads.

Precomp

Write pre-compensation, required for older hard disks. This parameter specifies the cylinder from which a difference in the information density is to be expected.

Landing Zone

This parameter defines the so-called landing zone or park cylinder. This is the resting position for the hard disk head when the hard disk motor is switched off.

Sector

Define or set the number of sectors per track. Up to 63 sectors are supported, for Phoenix up to 64.

4.3.1.2 IDE Primary Slave

This menu is used to set the data for the hard disk connected as master to the first IDE bus. The hard disk data (size, number of cylinders, heads, sectors, pre-compensation and home position of the heads when the disk is switched off) are displayed automatically for the connected hard disk.

Phoenix - AwardBIOS CMOS Setup Utility

IDE Primary Slave

IDE HDD Auto-Detection	[Press Enter]	Item Help
IDE Channel 0 Slave	[Auto]	
Access Mode	[Auto]	
Capacity	0 MB	
Cylinder		
Head	0	
Precomp	0	
Landing Zone	0	
Sector	0	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 41] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

IDE HDD Auto-Detection:

Automatic detection of the hard disk is initiated by pressing the <Enter> key. After a few seconds the physical data of the connected hard disk should be displayed in the lower section of the menu.

IDE Primary Master:

This parameter is used for configuring the IDE bus. The following options are available:

- None (no hard disk connected to this bus connection)
- Auto (auto-detection during each boot process)
- Manual (the hard disk is addressed with the set parameters)

Access Mode:

This option can be used to select the operating system for the hard disk. Setting options: CHS, LBA, LARGE, or Auto. Auto is the recommended setting. Normal (standard) mode supports hard disks with a capacity of up to 528 MB. This mode uses positions for data access that are specified via cylinders (CYLS), heads, and sectors. The older LBA (Logical Block Addressing) mode can support hard disks with a capacity of up to 8.4 GB. This mode uses a different method for calculating the position disk data to be accessed. It translates cylinders, heads and sectors into a logical address for the data location. Large hard disks support this mode. The BIOS supports the INT 13h extension function that enables the LBA mode to manage hard disk drives with a capacity of more than 8.4 GB. If the number of cylinders (CYLs) on the hard disk exceeds 1024 and DOS cannot support it, or if your operating system does not support LBA mode, LARGE mode should be selected. The following options are available for setting the hard disk access mode:

- CHS
- LBA
- LARGE

- Auto

The following parameters are automatically determined and displayed.

Capacity

Storage capacity of the hard disk. This value is calculated from the individual hard disk parameters.

Cylinder

Define or set the number of cylinders. Depending on the BIOS version and the manufacturer it varies between 1,024 and 16,384 cylinders.

Head

Define or set the number of heads. The number is between 1 and 16 heads.

Precomp

Write pre-compensation, required for older hard disks. This parameter specifies the cylinder from which a difference in the information density is to be expected.

Landing Zone

This parameter defines the so-called landing zone or park cylinder. This is the resting position for the hard disk head when the hard disk motor is switched off.

Sector

Define or set the number of sectors per track. Up to 63 sectors are supported, for Phoenix up to 64.

4.3.2 Advanced BIOS Features

This menu is used to set the data for the hard disk connected as master to the first IDE bus. The hard disk data (size, number of cylinders, heads, sectors, pre-compensation and home position of the heads when the disk is switched off) are displayed automatically for the connected hard disk.

Phoenix - AwardBIOS CMOS Setup Utility

Advanced BIOS Features

u8; CPU Feature [▶ 48]	[Press Enter]	Item Help
u8; Hard Disk Boot Priority [▶ 49]	[Press Enter]	
CPU L1 & L2 Cache	[Enabled]	
Hyper Threading Technology	Enabled	
Quick Power On Self Test	[Enabled]	
First Boot Device	[Harddisk]	
Second Boot Device	[LS120]	
Second Boot Device	[LS120]	
Boot Other Device	[Enabled]	
Boot Up NumLock Status	[On]	
Gate A20 Option	[Fast]	
Typematic Rate Setting	[Disabled]	
Typematic Rate (Chars/Sec)	6	
Typmatic Delay (Msec)	250	
Security Option	[Setup]	
APIC Mode	Enabled	
MPS Version Control For OS	[1.4]	
OS Select For DRAM > 64 MB	[Non-OS2]	
HDD S.M.A.R.T. Capability	[Enabled]	
Full Screen Logo	[Disabled]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

CPU Feature

This menu item can be used for setting the CPU behaviour for thermal profiles.

Virus Warning

On start-up the boot sectors are checked for changes since the last start. Setting options: Enabled (a virus warning may appear until it is acknowledged with Confirm or switched off (Disabled)), Confirm (a required boot sector modification, e.g. after reinstallation of an operating system, is confirmed), Disabled (boot sectors are not verified).

CPU L1 & L2 Cache

The cache memory is an additional memory that is substantially faster than the conventional DRAM (system memory). If the CPU requests data, the system transfers theses data from the main DRAM to the cache memory for faster access by the CPU. Setting options: Enable (standard) - cache activated, Disabled - cache deactivated.

Quick Power On Self Test

If this option is enabled the computer will start significantly faster. Booting will be up to 50 seconds faster with 64 MB RAM or more. However, not all POST tests are carried out.

First Boot Device

Here you can specify which drive should boot first. First set the drive to be used as boot drive. Options:

- LS120 (LS-Drive)
- Hard Disk
- CDROM (CD drive)
- ZIP100 (Zip-Drive)
- USB-FDD (USB-Floppy)

- USB-ZIP (USB Zip-Drive)
- USB-CDROM (USB CDROM)
- Legacy LAN (network)
- WIN CE
- Disabled (deactivated)

Second Boot Device

This setting is used for booting, if the first boot device is not available. First set the drive to be used as boot drive. Options:

- S120 (LS-Drive)
- Hard Disk
- CDROM (CD drive)
- ZIP100 (Zip-Drive)
- USB-FDD (USB-Floppy)
- USB-ZIP (USB Zip-Drive)
- USB-CDROM (USB CDROM)
- Legacy LAN (network)
- WIN CE
- Disabled (deactivated)

Second Boot Device

This setting is used for booting, if the first and second boot device are not available. First set the drive to be used as boot drive. Options:

- S120 (LS-Drive)
- Hard Disk
- CDROM (CD drive)
- ZIP100 (Zip-Drive)
- USB-FDD (USB-Floppy)
- USB-ZIP (USB Zip-Drive)
- USB-CDROM (USB CDROM)
- Legacy LAN (network)
- WIN CE
- Disabled (deactivated)

Boot Other Device

This option offers two choices: Enabled or Disabled. The standard setting is Enabled. The Enabled setting enables the BIOS to try all three types, i.e. "First Boot Device", "Second Boot Device" or "Third Boot Device".

Boot Up NumLock Status

State of the numeric keypad. With On it is activated, with Off not.

Gate A20 Option

Defines how the memory above 1MB is accessed. This should be set to Fast, in order to activate access through the chipset. With the Normal setting it is accessed via the keyboard controller. This option may speed up older computers. The first 64 K Block above 1 MB can be accessed in standard mode via address line A20. DOS will anchor itself there, if DOS=High is inserted in Config.sys.

Typematic Rate Setting

This parameter is used to specify whether the options Keyboard Typematic Speed, Delay Before Keys Repeat, Typematic Rate or Typematic Delay are available. If Disabled, the values are set to 6 characters per second, with a keyboard delay of 250 ms. The settings can also be specified via the operating system.

Typematic Rate (Chars/Sec)

Specifies the repetition rate of the keyboard when a key is pressed. The options are 6, 8, 10, 12, 15, 20, 24 or 30 characters/second.

Typmatic Delay (Msec)

This value determines when the key function is activated after a key is pressed. The options are 250, 500, 750 or 1000 milliseconds.

Security Option

This parameter specifies the option for which a password applies. If the SYSTEM option is selected, a password has to be entered during PC start-up. If the SETUP option is selected, a password is only required for accessing the BIOS.

APIC Mode

This parameter switches the APIC Controller (Advanced Programmable Interrupt Controller) on or off. According to the PC2001 regulations, the system may run in APIC mode. APIC mode offers extended IRQ resources (depending on the board). Settings: Enabled or Disabled

MPS Version Control For OS

This option specifies what MPS version (Multi-Processor Specification) is used by this board. Setting options: 1.1 or 1.4 For older operating systems 1.1 should be used, otherwise leave as 1.4.

OS Select For DRAM > 64 MB

For OS/2 systems with more than 64 MB RAM, option OS/2 should be used.

HDD S.M.A.R.T. Capability

S.M.A.R.T. (Self Monitoring Analysis and Reporting Technology) is implemented in modern hard disks. Among other things, in conjunction with suitable software this technology can be used to detect hard disk read or speed problems at an early stage. If the option is activated, the system will issue a warning regarding an impending crash, for example. The results can be analysed with Norton-Utilities from version 3.0, for example.

Full Screen Logo

This option can be used to specify that the start logo should fill the whole screen during booting, thereby hiding the start data. Setting options: Enabled, Disabled

4.3.2.1 CPU Features

This menu is used for setting the CPU behaviour with thermal profiles.

Phoenix - AwardBIOS CMOS Setup Utility

CPU Feature

Thermal Management	Disabled	Item Help
Limit CPUID MaxVal	[Disabled]	
C1E Function	[Disabled]	
CPU C State Capability	[Disabled]	
Execute Disable Bit	[Enabled]	
Virtualization Technology	[Enabled]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 45] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Thermal Management

The processor used has a thermal monitor. In order to maintain real-time it is switched off.

Limit CPUID MaxVal

This option supports Prescott CPUs in older operating systems. Enabled: Activate this option if an older operating system is used. Disabled: Deactivate the CPUID limit if Windows XP is used.

C1E Function

This option is only available for certain processors with C1E (Enhanced Halt State) function.

CPU C State Capability

This option can be used to set the lowest C-state of the CPU. Usually DISABLED should be selected.

DISABLED: function off

C2 (STOP Grant): CPU clock is stopped, API functions run with normal speed

C4 (Deeper Sleep): CPU voltage is reduced.

C6 (Deep Power Down): CPU voltage is reduced to 0 V.

Execute Disable Bit

This option represents a safety function that can help you to protect your CPU and your operating system from malicious software that may execute a code and harm the BIOS. This option is available only if the CPU supports this function. Setting options: Enabled, Disabled.

Virtualization Technology

This option activates or deactivates the additional hardware capabilities of virtualization technology. Intel Virtualization Technology (code names Vanderpool or Vanderpool Technology) describes the implementation of a Secure Virtual Machine by Intel. AMD Virtualization or AMD-V (also known under the code name "Pacifica") is a technology for virtualization of a computer and refers to AMD's implementation of a Secure Virtual Machine in conjunction with an IOMMU. Setting options: Enabled, Disabled.

4.3.2.2 Hard Disk Boot Priority

This menu is used for setting the boot sequence of the hard disks. The available options may vary depending on the connected equipment.

Phoenix - AwardBIOS CMOS Setup Utility

Hard Disk Boot Priority

1. Ch0 M.	Name	Item Help
2. USB-HDD0	Name	
.		
.		
.		
n. Bootable Add-in Cards		
Boot Priority	[Dynamic]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 45] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

1. Ch0 M. / 2. USB-HDD0 / ... / n. Bootable Add-in Cards

This is where the boot sequence for the HDD setting is specified. Use <↑>, <↓>, <PU> and <PD> to change the boot sequence.

Boot Proirity

This is were the list behaviour is set:

Dynamic: New devices are appended at the end of the list.

Manual: The priority list is stored and remains unchanged as long as no new devices are connected.

Fixed: The boot sequence is fixed: 1. HDD CHx master 2.HDD CHx slave 3. USB-HDD devices

4.3.3 Advanced Chipset Features

This menu is used for memory functions settings. Such settings should be implemented cautiously since they can affect the stability of the whole system.

Phoenix - AwardBIOS CMOS Setup Utility

Advanced Chipset Features

DRAM Timing Selectable	[by SPD]	Item Help
System BIOS Cachable	[Enabled]	
Video BIOS Cachable	[Disabled]	
** On-Chip VGA Setting **		
On-Chip Video Memory Size	[128 MB]	
On-Chip Frame Buffer Size	[8 MB]	
Current Configuration	DVO	
Boot Type	DVI	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

DRAM Timing Selectable

This submenu can be used for setting the optimum timing for options, depending on the memory modules used. By default the options are configured via 'By SPD', by reading the content of the SPD (Serial Presence Detect) unit. During this process critical parameter information relating to memory type, size, speed, voltage interface and module banks are stored in the EEPROM.

System BIOS Cachable

If the function is active the cache memory makes use of the available BIOS-ROM, thereby enhancing the performance, although this applies mainly to DOS and Win3.x. Under Windows 95/98 this option is less relevant.

Video BIOS Cachable

If this option is enabled, the cache memory can take the VIDEO BIOS of the graphics card at the address C0000h to C7FFFh into account. Please note that caching involves risks, if the cache contains the code and a program wants to write into the BIOS area. If this option is enabled, the option Video BIOS Shadow should also be activated. Under DOS the speed benefits is around 40%. Under Win.x and DOS this option should be enabled, otherwise it should be disabled.

On-Chip Video Memory Size

This option can be used to set the size of the video memory. (128 MB, 256 MB)

On-Chip Frame Buffer Size

This option can be used to adapt the frame buffer. Various setting options are available. The individual options can be used to try and enhance the performance. Make sure the system stability is not affected and proceed step-by-step (1 MB, 4 MB, 8 MB)

Current Configuration

The current graphics configuration is shown here. In this device it is set to DVO.

Boot Type

This setting indicates the output source for the boot process. Since the CX50x0 devices support graphic outputs only via DVI-I, this setting is always set to DVI.

4.3.4 Integrated Peripherals

This option can be used for audio, multimedia and LAN interface settings.

Phoenix - AwardBIOS CMOS Setup Utility

Integrated Peripherals

u8; OnChip IDE Device [▶ 52]	[Press Enter]	Item Help
u8; Onboard Device [▶ 53]	[Press Enter]	
u8; SuperIO Device [▶ 54]	[Press Enter]	
u8; USB Device Setting [▶ 55]	[Press Enter]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

OnChip IDE Device

Here you can set the onboard IDE controller settings.

Onboard Device

This menu can be used for audio, multimedia and LAN interface settings.

SuperIO Device

Here you can set the settings for the serial interfaces (port 1 and port 2).

USB Device Setting

This option can be used for USB interface settings.

4.3.4.1 Onchip IDE Device

This menu is used for setting the IDE interfaces.

Phoenix - AwardBIOS CMOS Setup Utility

Onchip IDE Device

IDE HDD Block Mode	[Enabled]	Item Help
IDE Primary Master PIO	[Auto]	
IDE Primary Master PIO	[Auto]	
IDE Primary Master UDMA	[Auto]	
IDE Primary Slave UDMA	[Auto]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 52] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

IDE HDD Block Mode

This option is used to activate block mode for IDE hard disks. If your drive supports this mode and this option is activated, the system will read the number of blocks per request from the configuration sector of the hard disk. The recommended setting is Enabled, although it should be noted that this is not suitable for older hard disks.

IDE Primary Master PIO

PIO refers to the concept of programmed input and output. Instead of the BIOS issuing an instruction sequence for initiating a data transfer from or to the hard disk, PIO enables the BIOS to notify the controller what task should be executed. The task is then fully handled by the controller and the CPU. Your system supports five PIO modes, 0 (standard) to 4, with the main difference relating to timing. If "Auto" (automatic) is selected, the BIOS will assess your drive and automatically specify the optimum PIO mode. Auto**:** The BIOS automatically sets the system value depending on the timing of your hard disk drive. Mode 0-4: You can select a mode suitable mode that matches the timing your hard drive.

IDE Primary Master PIO

PIO refers to the concept of programmed input and output. Instead of the BIOS issuing an instruction sequence for initiating a data transfer from or to the hard disk, PIO enables the BIOS to notify the controller what task should be executed. The task is then fully handled by the controller and the CPU. Your system supports five PIO modes, 0 (standard) to 4, with the main difference relating to timing. If "Auto" (automatic) is selected, the BIOS will assess your drive and automatically specify the optimum PIO mode. Auto**:** The BIOS automatically sets the system value depending on the timing of your hard disk drive. Mode 0-4: You can select a mode suitable mode that matches the timing your hard drive.

IDEPrimary Master UDMA

This option is used to configure the Ultra-DMA/33 mode of your hard disk. Setting options: Auto, Enabled, Disabled. The option should be set to Enabled.

IDE Primary Slave UDMA

This option is used to configure the Ultra-DMA/33 mode of your hard disk. Setting options: Auto, Enabled, Disabled. The option should be set to Enabled.

4.3.4.2 Onboard Device

This menu is used for configuring the audio, multimedia and LAN interfaces.

Phoenix - AwardBIOS CMOS Setup Utility

Onboard Device

Intel HD Audio Controller	[Disabled]	Item Help
USB Client Routing	[Disabled]	
SDIO/MMC Controller	[Disabled]	
Onboard Lan Controller	Enabled	
Console Redirect	[Disabled]	
x Serial Port Mode	115200,8,n,1	
x After Boot	Enabled	
x Flow Control Signals	Ignore	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 52] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Intel HD Audio Controller

Option for activating the internal audio controller. The function is disabled since currently no associated extension is implemented.

USB Client Routing

Option for configuring the second USB port with USB client functionality.

SDIO/MMC Controller

Option for activating/deactivating the SDIO / MMC controller. In general the CX50x0 units are not equipped with the required hardware. The function is therefore disabled.

Onboard Lan Controller

The two Gigabit LAN ports are always enabled.

Console Redirect

Option for redirecting the boot process output to the serial interface. If the function is enabled the communication parameters in the locked menus can be set.

Serial Port Mode

Option for setting the baud rate, number of bits, parity and stop bit.

After Boot

The console can remain active after the boot process. This function is only supported by a small number of operating systems.

Flow Control Signals

Option for activating or deactivating hardware flow control.

4.3.4.3 SuperIO Device

This menu is used for configuring the USB and audio interfaces.

Phoenix - AwardBIOS CMOS Setup Utility

SuperIO Device

Onboard Serial Port 1	[3F8/IRQ4]	Item Help
Onboard Serial Port 2	[2F8/IRQ3]	
UART Mode Select	[Normal]	
RxD, TxD Active	Hi, Lo	
IR Transmission Delay	Enabled	
UR2 Duplex Mode	Half	
Use IR Pins	IR-Rx2Tx2	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 52] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Onboard Serial Port1

Configuration of the serial interface settings: IRQ4 (used for the first serial port), Disabled (no interrupt is used). Setting options: Auto, 3F8/IRQ4, 2F8/IRQ4, 3E8/IRQ4 or 2E8/IRQ4 .

Onboard Serial Port 2

Configuration of the serial interface settings: IRQ3 (used for the second serial port), Disabled (no interrupt is used). Setting options: Auto, 3F8/IRQ3, 2F8/IRQ3, 3E8/IRQ3 or 2E8/IRQ3.

UART Mode Select

Mode for the serial interface driver. Setting options:

- Normal for RS-232 serial interface
- ASKIR for amplitude keyed shift interface for IR devices
- IrDA for IrDA interface

RxD, TxD Active

Settings cannot be changed in standard mode. This option is used for setting IR transmission/reception to High or Low.

IR Transmission Delay

If this option is activated, transmission is delayed. Setting options: Enabled, Disabled.

UR2 Duplex Mode

This option is used for configuring infrared devices. Setting options: Full or Half. Please refer to the IR device manual regarding the duplex mode setting.

Use IR Pins

This option is identical to the TxD, RxD Active option. The required information can be found in the documentation for your IR device.

4.3.4.4 USB Device Settings

This menu is used for configuring the USB and audio interfaces.

Phoenix - AwardBIOS CMOS Setup Utility

Onboard Device

USB 1.0 Controller	[Enabled]	Item Help
USB 2.0 Controller	[Enabled]	
USB Operation Mode	[High Speed]	
USB Keyboard Function	[Enabled]	
USB Storage Function	[Enabled]	
*** USB Mass Storage Device Boor Settings ***		
BeckhoffAutomation 2000	[Auto mode]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 52] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

USB 1.0 Controller

The board contains a USB 1.0 chipset with support for USB 1.0. The option can be switched on or off here.

USB 2.0 Controller

The board contains a USB 2.0 chipset with support for USB 2.0. The option can be switched on or off here.

USB Operation Mode

Option for setting the data transfer rate of the USB port:

High Speed: Each device is connected based on the device-specific speed.

Full / Low Speed: All devices are connected with 1.5 MB/s or 12 MB/s.

USB Keyboard Function

The USB keyboard driver (if available) of the BIOS can be activated/deactivated here. This enables the USB keyboard to be operated during and after system startup, if your operating system does not have a USB driver.

USB Storage Function

Option for activating or deactivating USB mass storage support.

BeckhoffAutomation 2000

This function is intended only for internal purposes!

4.3.5 Power Management Setup

This menu is used for power management settings.

Phoenix - AwardBIOS CMOS Setup Utility

Power Management Setup

Power-Supply Type	[AT]	Item Help
APCI Function	Enabled	
ACPI Suspend Type	[S1(POS)]	
Soft-Off by PWR-BTTN	[Instant-Off]	
u8; HPET Feature [▶ 57]	[Press Enter]	
u8; Intel DTS Feature [▶ 58]	[Press Enter]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Power-Supply Type

Option for setting the power supply unit mode. In AT mode the power supply unit remains switched on when the system is shut down. In ATX mode the internal power supply unit of the controller switches off. For a restart the power supply must be interrupted briefly.

APCI function

APCI is always active.

ACPI Suspend Type

The ACPI option (Advanced Configuration and Power Interface) is an extended PnP and power management function.

S1(POS): Switches the PC to sleep mode. Only a few functions are switched off and are available again at a keystroke

S3(STR): Option for writing the current state of the operating system to the RAM. In this case only the RAM is supplied with power.

Soft-Off by PWR-BTTN

This function is not used, since no power button is installed.

4.3.5.1 HPET power management

This menu is used for HPET settings.

Phoenix - AwardBIOS CMOS Setup Utility

HPET Feature

HPET Support	[Enable]	Item Help
HPET Mode	[32-bit mode]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 57] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

HPET Support

Activates or deactivates HPET support . It is a kind of timer within the PC that is able to trigger an interrupt with very high precision, thereby enabling other programs to better synchronise various applications. If multimedia applications are used this option should be enabled. Setting options: Enabled, Disabled.

HPET Mode

Two operating modes are available: 32-bit mode and 64-bit mode.

4.3.5.2 DTS Powermanagement

Menu for setting the digital thermo sensors.

Phoenix - AwardBIOS CMOS Setup Utility

DTS Feature

Intel DTS function	[Enable]	Item Help
DTS Active temperature	[55°C]	
Passive Cooling Trip Point	[95°C]	
Passive TC1 Value	[2]	
Passive TC2 Value	[2]	
Passive TSP Value	[2]	
Critical Trip Point	[POR]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 57] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Intel DTS function

System monitoring is switched on or off by the thermal sensors. For operation in controller mode the DTS function is switched off in order to avoid problems with real-time functionality.

DTS Active temperature

At this temperature the system switches on the fan.

Passive Cooling Trip Point

At this temperature the CPU is slowed down in order to cool it.

Passive TC1 Value

This value specifies the performance reduction for TC1.

The formula is: DPerformance [%]= _TC1 * (Tn - Tn-1) + _TC2 * (Tn. - Tt)

Passive TC2 Value

This value specifies the performance reduction for TC2.

The formula is: DPerformance [%]= _TC1 * (Tn - Tn-1) + _TC2 * (Tn. - Tt)

Passive TSP Value

This option is used to specified how often the system should analyse the temperature sensors. Values are entered in 10th of a second.

Critical Trip Point

At this temperature the CPU is switched off in order to prevent damage.

4.3.6 PnP/PCI Configurations

This menu is used for configuring the PCI bus and Plug and Play Management.

Phoenix - AwardBIOS CMOS Setup Utility

PnP/PCI Configurations

Init Display First	[PCI Slot]	Item Help
Reset Configuration Data	[Enabled]	
Resources Controlled By	[Manual]	
u8; IRQ Resources [▶ 59]	[Press Enter]	
PCI/VGA Palette Snoop	[Disabled]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

Init Display First

This option can be used to specify which graphics card should be initialised first: either PCI slot, onboard or PCIEx.

Reset Configuration Data

If activated, the option ensures that the BIOS deletes the information relating to built-in components and their resources and reconfigures them (all settings are reset). Setting options: Enabled, Disabled.

Resources Controlled By

Specifies whether the PnP settings should be assigned via setup or automatically. Auto should be used, if there are no problems with IRQ or DMA assignments. The default is auto.

IRQ Resources

If these resources are set manually, each system interrupt should be assigned a type, depending on the type of device using the interrupt.

PCI/VGA Palette Snoop

Used by multimedia video cards. This function should be switched on (Enabled), depending on the card. It is switched off by default.

4.3.6.1 IRQ Resources

This menu is used for disabling interrupts for free allocation to PCI slots.

Phoenix - AwardBIOS CMOS Setup Utility

IRQ Resources

IRQ-3 assigned to	[PCI Device]	Item Help
IRQ-4 assigned to	[PCI Device]	
IRQ-5 assigned to	[PCI Device]	
IRQ-7 assigned to	[PCI Device]	
IRQ-9 assigned to	[PCI Device]	
IRQ-10 assigned to	[PCI Device]	
IRQ-11 assigned to	[PCI Device]	
IRQ-12 assigned to	[PCI Device]	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 59] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

IRQ-n assigned to (n = {3,4,5,7,9,10,11,12,14,15})

This parameter is used for disabling (reserving) an interrupt for free allocation. If the setting [PCI Device] is used, the interrupt is allocated dynamically.

4.3.7 PC Health Status

This menu is used for displaying the settings for CPU and motherboard temperatures, power supply, and fan speed.

Phoenix - AwardBIOS CMOS Setup Utility

PC Health Status

SUSV	[Enabled]	Item Help
SUSV holds USB	[Enabled]	
SUSV Status	100% Cap. / Charging	
On Die Digital Temp.	47°C	
Temp. Board	56°C	
Temp DDR	57°C	
CPU Core	1.07V	
SCH Core	1.04V	
CPU VTT	1.04V	
Memory 1.8 V	1.80V	
+3.3 V	3.39V	
+5 V	5.29V	
+1.5 V	1.480V	
VBatt	3.07V	
Fan1 Speed	0 RPM	
Board Revision	0	

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

SUSV

Option for deactivating the one-second UPS.

SUSV holds USB

If system buffering based on SUSV is active, this option can be used to switch the power supply for the USB port on or off. This is important for data back-up on a USB storage medium, for example.

SUSV Status

This value indicates the status of the one-second UPS.

n% Cap. (n={0..100}) indicates the capacity of the UPS.

State (charging / discharging) describes the state of the one-second UPS.

On Die Digital Temp.

Temperature inside the CPU.

Temp. Board

Board temperature.

Temp. DDR

Memory temperature.

CPU Core

CPU core voltage.

SCH Core

CPU VTT voltage.

CPU VTT

CPU VTT voltage.

Memory 1.8 V

Memory power supply (1.8 V).

+3.3 V

Supply voltage, 3.3 V.

+5 V

Supply voltage, 5 V.

+1.5 V

Supply voltage, 1.5 V.

VBatt

Battery voltage.

Fan1 Speed

0 RPM, since no fan is connected.

Board Revision

Hardware version of the CPU board.

4.3.8 Frequency/Voltage Control

This menu can be used to implement the CLK setting for the PCI bus. Moreover, the tolerances for the power supply can be specified.

Phoenix - AwardBIOS CMOS Setup Utility

Frequency/Voltage Control

XDP-Clock	[Disabled]	Item Help

↑ ↓ → ← :Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit [▶ 40] F1:Help

F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

XDP-Clock

This setting is for internal purposes and may not be modified.

5 1-second UPS (persistent variables)

Loss of data

Use only TwinCAT to control the 1-second UPS and save only persistent data with a maximum size of 1 MB. Use beyond this may result in data loss or corrupt data.

The 1-second UPS is an UltraCap capacitor that continues to supply the processor with power in the event of a power failure. During this period persistent data can be saved, which are available on switching on again.

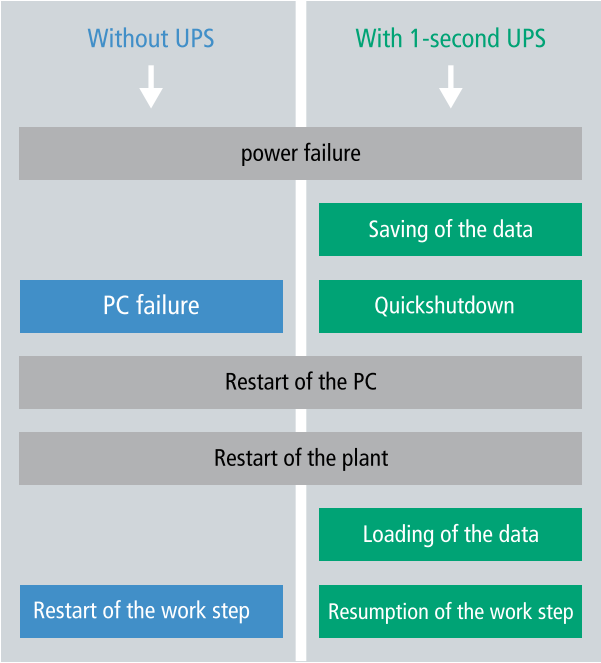


Fig. 3: Behavior of systems in the event of a power failure without and with a 1-second UPS.

Since the 1-second UPS is designed for the entire service life, the holding time is considerably longer with new devices. The capacitors age over the course of time and the holding time decreases. Therefore a maximum of 1 MB persistent data can be reliably saved over the entire service life. Do not save any other data and do not use any other applications to control the 1-second UPS.

Please note that the 1-second UPS does not supply power to the K-bus or the E-bus and that their data may already be invalid when the 1-second UPS is activated. Also, the fieldbus system (or Ethernet) may not work or not work properly once the 1-second UPS was activated.

Table 8: Storage location and names of the files depending on the TwinCAT version.

Development environment	File path	File name
TwinCAT 2	\\TwinCat\Boot\	TCPLC_T_x.wbp TCPLC_T_x.wb~ (backup) The x in the file name stands for the number of the runtime system.
TwinCAT 3	\\TwinCat\3.1\Boot\Plc	Port_85x.bootdata Port_85x.bootdata-old (backup) The x in the file name stands for the number of the runtime system.

Configuration of the 1-second UPS

- In the case of the CX50x0, check whether the 1-second UPS is activated or deactivated in the BIOS (see: BIOS settings [▶ 65]).
- Configure the Windows write filter and issue the corresponding write permissions in order to be able to save persistent data (see: Windows write filter [▶ 66]).
- Declare important data such as counter values in the PLC as VAR PERSISTENT. Then call the function block FB_S_UPS cyclically in TwinCAT in order to control the 1-second UPS (see: FB_S_UPS [▶ 66]).
- Select the mode in the function block in order to specify what should happen in the case of a power failure. Specify, for example, whether persistent data are saved and a quick shutdown is executed (see: Data types [▶ 68]).
- Subsequently you can check the validity of the variables and monitor whether the persistent variables are loaded without error (see: Checking the validity of the variables [▶ 68]).

Sample project:
https://infosys.beckhoff.com/content/1033/CX5000_HW/Resources/1937303563.pro.

Saving and loading persistent data

The persistent data are saved in the Port_85x.bootdata file on the memory card. On starting the PLC the Port_85x.bootdata file is loaded from the memory card, backed up there as Port_85x.bootdata_old (backup) and then deleted.

Another current Port_85x.bootdata file is not written until the system is shut down or the 1-second UPS is activated.

If no Port_85x.bootdata file exists when starting the embedded PC, the persistent data are invalid and will be deleted (standard setting). The reason for this is that the 1-second UPS was activated before the TwinCAT PLC was started during startup of the embedded PC. In this case no persistent data were saved, since the system was unable to ensure sufficient buffer time for saving the data.

Always call the function block from the PLC and always use the fastest task to do so. In the case of a power failure Beckhoff recommends not calling the rest of the application in order to ensure that sufficient time remains for writing the data.

```
IF NOT FB_S_UPS.bPowerFailDetect THEN
    ;//Call programs and function blocks
END_IF
```

The rest of the application influences the CPU load and the CPU load in turn affects the period during which the persistent data are written.

Loading a backup of the persistent data

A registry setting can be used to determine whether the backup file is deleted or used. The backup file is used by default (setting 0):

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Beckhoff\TwinCAT\Plc]"ClearInvalidPersistentData"= 0
```

If the backup file is to be deleted, the value of "ClearInvalidPersistentData" in the registry must be set to 1.

It is also possible in TwinCAT to specify on the left in the tree view under **PLC** whether the backup file is to be used or not.

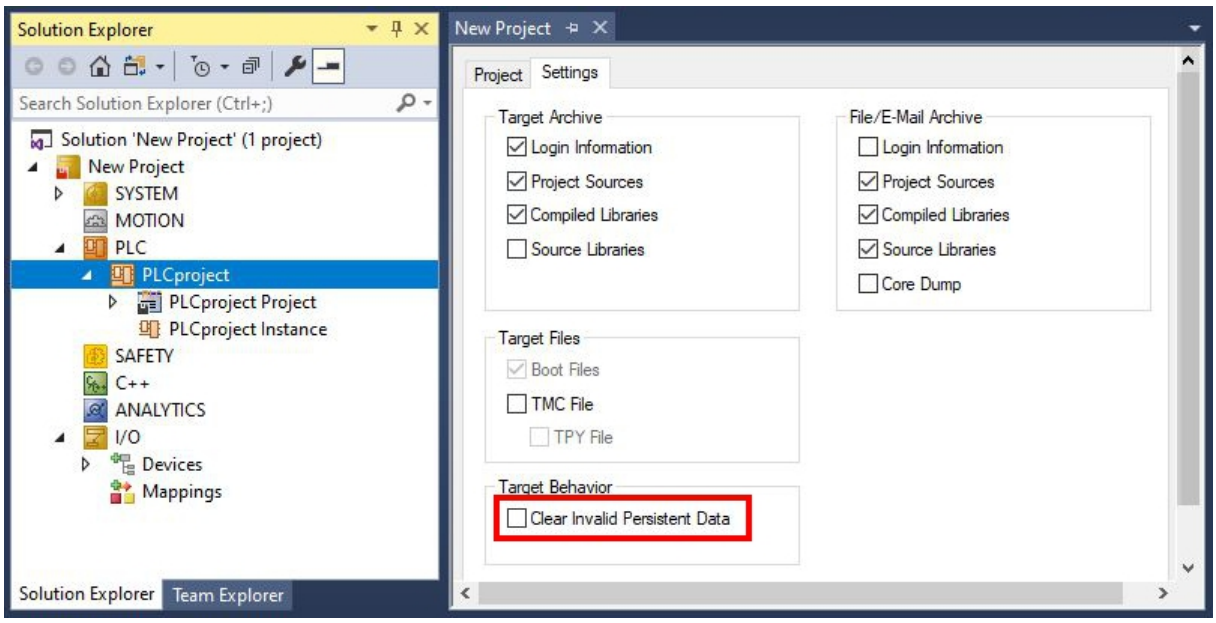


Fig. 4: Loading a backup of the persistent data. Settings in TwinCAT 3.

The backup files will be deleted if the option **Clear Invalid Persistent Data** is activated. Corresponds to registry entry 1.

5.1 BIOS settings

The 1-second UPS can be switched on or off via the BIOS. The parameters of the 1-second UPS are displayed in the following menu and can be adjusted if necessary:

Phoenix - AwardBIOS CMOS Setup Utility

PC Health Status

SUSV	[Enabled]	Item Help
SUSV holds USB	[Enabled]	
SUSV Status	100% Cap. / Charging	
On Die Digital Temp.	47 °C	
Temp. Board	56 °C	
Temp DDR	57 °C	
CPU Core	1.07 V	
SCH Core	1.04 V	
	...	

SUSV

Option for deactivating the one-second UPS.

SUSV holds USB

If system buffering based on SUSV is active, this option can be used to switch the power supply for the USB port on or off. This is important for data back-up on a USB storage medium, for example.

SUSV Status

This value indicates the status of the 1-second UPS.

n% Cap. (n={0..100}) indicates the capacity of the UPS.

State (charging / discharging) describes the state of the one-second UPS.

5.2 Windows write filter

Since the persistent data are stored on a storage medium, the file and the path must be writeable. If you use the Windows write filter, the Windows partition is protected against write access operations, and the persistent data are not saved.

- Switch off the EWF, if you want to save persistent data.
- The FBWF and UWF do not have to be switched off, because an exception can be defined for the directory \Boot.

For Windows CE and Windows Embedded Compact 7 no Windows write filters are used.

FBWF exception list

By default an exception list is automatically created when the FBWF is switched on. The \Boot directory is already entered in this list. Check the configuration of the FBWF if you have made changes to the exception list.

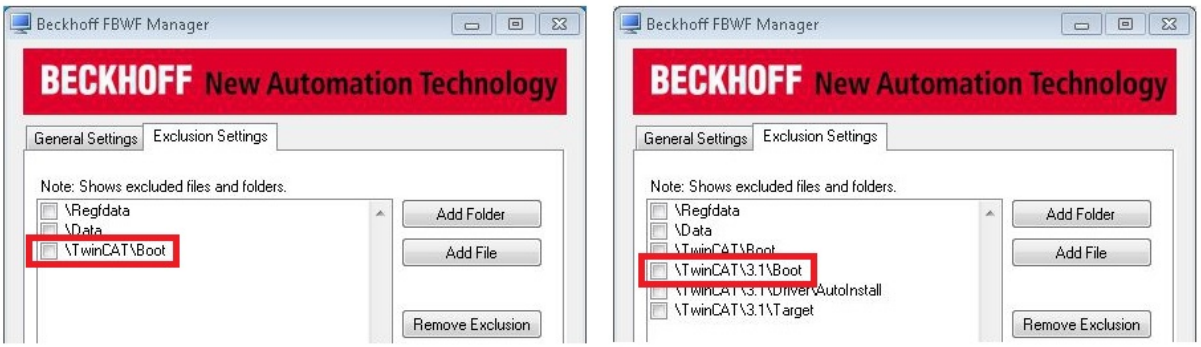


Fig. 5: FBWF exception list, under TwinCAT 2 (left) and TwinCAT 3.

The persistent data are saved by default under \TwinCAT\Boot in TwinCAT 2 and under \TwinCAT\3.1\Boot in TwinCAT 3.

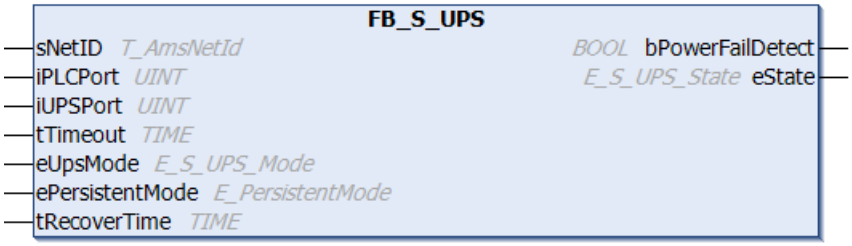
The FBWF can be configured via the Beckhoff FBWF manager.

5.3 FB_S_UPS

NOTICE

Loss of data

If other applications or the PLC keep further files open or write to them, file errors may occur if the 1-second UPS switches off the controller.



In the case of the CX50x0 the function block FB_S_UPS is used to control the 1-second UPS from the PLC. If possible, use the default values of the FB_S_UPS and call the function block cyclically in the PLC.

The 1-second UPS can be used only for a few seconds in the event of a power failure in order, to save persistent data. The data must be saved in the fast “persistent mode” “SPDM_2PASS”, even though this can lead to real-time violations. Make sure you configure adequate router memory for saving the persistent data.

Irrespective of the mode and irrespective of whether data were saved or the quick shutdown was executed, the 1-second UPS switches off the mainboard after the discharging of the capacitors.

Function block modes

A QuickShutdown is performed automatically in the eSUPS_WrPersistData_Shutdown mode (standard setting) after the storage of the persistent data.

In the eSUPS_WrPersistData_NoShutdown mode only the persistent data are saved, no QuickShutdown is performed.

In eSUPS_ImmediateShutdown mode a quick shutdown is executed immediately, without saving data.

In the eSUPS_CheckPowerStatus mode only a check is performed as to whether a power failure has occurred. If this is the case, the function block only switches back to the PowerOK state after the expiry of tRecoverTime (10s).

Inputs

```
VAR_INPUT
    sNetID          : T_AmsNetId:= ''; (* '' = local netid *)
    iPLCPort        : UINT; (* PLC Runtime System for writing persistent data *)
    iUPSPort        : UINT := 16#4A8; (* Port for reading Power State of UPS, dafault 16#4A8 *)
    tTimeout        : TIME := DEFAULT_ADS_TIMEOUT; (* ADS Timeout *)
    eUpsMode        : E_S_UPS_Mode := eSUPS_WrPersistData_Shutdown; (* UPS mode (w/
wo writing persistent data, w/wo shutdown) *)
    ePersistentMode : E_PersistentMode := SPDM_2PASS; (* mode for writing persistent data *)
    tRecoverTime    : TIME := T#10s; (* ON time to recover from short power failure in mode eSUPS_Wr
PersistData_NoShutdown/eSUPS_CheckPowerStatus *)
END_VAR
```

Name	Type	Description
sNetID	T_AmsNetId	AmsNetId of the controller
iPLCPort	UINT	Port number of the PLC runtime system (851 for the first PLC runtime system, 852 for the second PLC runtime system, etc.). If you do not specify a port number, the function block then automatically determines the port of the PLC runtime system.
iUPSPort	UINT	Port number through which the UPS status is read. The default value is 16#4A8.
tTimeout	TIME	Timeout for writing the persistent data or the quick shutdown.
eUpsMode	E_S_UPS_Mode	Defines whether persistent data are to be written and whether a quick shutdown is to be executed. The default value is eSUPS_WrPersistData_Shutdown, i.e. a quick shutdown is executed automatically once the persistent data have been saved.
ePersistentMode	E_PersistentMode	Mode for writing the persistent data. Default value is SPDM_2PASS.
tRecoverTime	TIME	Time after which the UPS returns to the PowerOK state in UPS modes without quick shutdown. The tRecoverTime must be greater than the maximum charging time for the UPS, otherwise the UPS may discharge too much in the event of short, consecutive power failures, which could result in its charge being insufficient for storing the persistent data.

Outputs

```
VAR_OUTPUT
    bPowerFailDetect  : BOOL; (* TRUE while powerfailure is detected *)
    eState            : E_S_UPS_State := eSUPS_PowerOK; (* current ups state *)
END_VAR
```

Name	Type	Description
bPowerFailDetect	BOOL	TRUE during power failure. FALSE if the supply voltage is present.
eState	E_S_UPS_State	Internal state of the function block

Global Variables

```
VAR_GLOBAL
   eGlobalSUpsState  :  E_S_UPS_State; (*current ups state*)
END_VAR
```

Name	Type	Description
eGlobalSUpsState	E_S_UPS_State	Internal state of the function block as global copy of VAR_OUTPUT
eState	E_S_UPS_State	For values see E_S_UPS_State

Requirements

Development environment	Target platform	Hardware	PLC libraries to include
TwinCAT v3.1 B4016	CX50x0	1-second UPS	Tc2_SUPS

5.4 Data types

E_S_UPS_Mode

With the mode selected in the function block you can specify what should happen in the case of a power failure.

```
eSUPS_WrPersistData_Shutdown: Writing of persistent data and then a QuickShutdown

eSUPS_WrPersistData_NoShutdown: Only writing of the persistent data (no QuickShutdown)

eSUPS_ImmediateShutdown: Only QuickShutdown (no writing of persistent data)

eSUPS_CheckPowerStatus: Only check status (neither writing of persistent data nor a QuickShutdown)
```

E_S_UPS_State

The internal state of the function block can be read with E_S_UPS_State.

```
eSUPS_PowerOK:
in all modes: Power supply is OK

eSUPS_PowerFailure:
in all modes: Power supply is faulty (only shown for one PLC cycle)

eSUPS_WritePersistentData:
in mode eSUPS_WrPersistData_Shutdown: Writing of persistent data is active
in mode eSUPS_WrPersistData_NoShutdown: Writing of persistent data is active

eSUPS_QuickShutdown:
in mode eSUPS_WrPersistData_Shutdown: QuickShutdown ist active
in Mode eSUPS_ImmediateShutdown: QuickShutdown is active

eSUPS_WaitForRecover:
in mode eSUPS_WrPersistData_NoShutdown: Wait for the reestablishment of the power supply
in mode eSUPS_CheckPowerStatus: Wait for the reestablishment of the power supply

eSUPS_WaitForPowerOFF:
in mode eSUPS_WrPersistData_Shutdown: Wait for switching off of the PC by the UPS
in mode eSUPS_ImmediateShutdown: Wait for switching off of the PC by the UPS
```

5.5 Checking the validity of the variables

For TwinCAT 2 the implicit structure Systeminfotype.bootDataFlags can be read in order to determine the validity of the persistent data (see: SYSTEMINFOTYPE [▶ 69]).

For TwinCAT 3 the implicit variables PlcAppSystemInfo.BootDataLoaded and PlcAppSystemInfo.OldBootData are available for determining the validity of the persistent data (see: PlcAppSystemInfo).

5.5.1 SYSTEMINFOTYPE

```
TYPE SYSTEMINFOTYPE
STRUCT
runTimeNo :BYTE;
projectName :STRING(32);
numberOfTasks :BYTE;
onlineChangeCount :UINT;
bootDataFlags :BYTE;
systemStateFlags  :WORD;
END_STRUCT
END_TYPE
```

runTimeNo: specifies the number of the runtime system (1..4).

projectName: project name as STRING.

numberOfTasks: number of tasks contained in the runtime system (max. 4).

onlineChangeCount: number of online changes since the last complete download.

bootDataFlags: State of the boot data (RETAIN and PERSISTENT) after loading. The upper four bits indicate the state of the persistent data, while the lower four bits indicate the state of the retain data.

Bit number	Description
0	RETAIN variables: LOADED (without error)
1	RETAIN variables: INVALID (the back-up copy was loaded, since no valid data was present)
2	RETAIN variables: REQUESTED (RETAIN variables should be loaded, a setting in TwinCAT System Control)
3	reserved
4	PERSISTENT variables: LOADED (without error)
5	PERSISTENT variables: INVALID (the back-up copy was loaded, since no valid data was present)
6	reserved
7	reserved

systemStateFlags : Reserved.

When shutting TwinCAT down the PERSISTENT and RETAIN data is written into two files on the hard disk. The path can be specified in TwinCAT System Control by means of the TwinCAT system properties (PLC tab). The standard setting is "<Drive>:\TwinCAT\Boot". The files all have a fixed name with fixed extensions:

File name	Description
TCPLC_P_x.wbp	Boot project (x = number of the run-time system)
TCPLC_S_x.wbp	Packed source code (x = number of the runtime system)
TCPLC_R_x.wbp	RETAIN variables (x = number of the runtime system)
TCPLC_T_x.wbp	PERSISTENT variables (x = number of the runtime system)
TCPLC_R_x.wb~	Backup copy of the RETAIN variables (x = number of the runtime system)
TCPLC_T_x.wb~	Backup copy of the PERSISTENT variables (x = number of the runtime system)

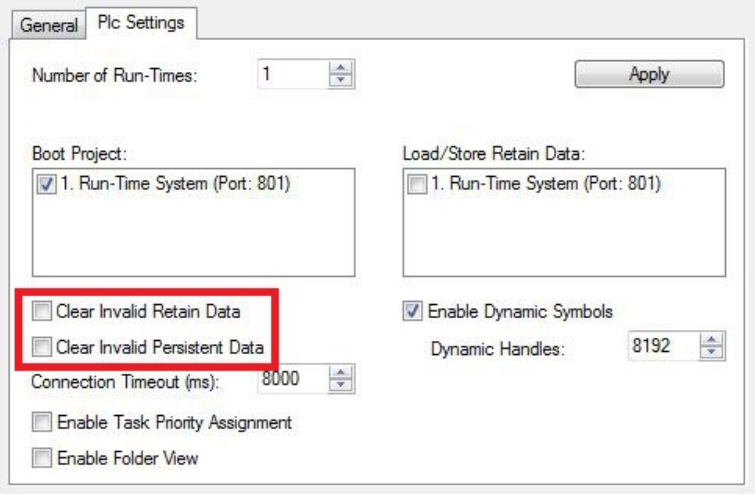
If the persistent or retain variables are not loaded, e.g. because they are invalid, the backup file is loaded by default. In that case bit 1 of the bootDataFlags (for the RETAIN variables) in the PLC and/or bit 5 (for the PERSISTENT variables) is set.

A registry setting can be used to determine whether the backup file is deleted or used. The backup file is used by default (setting 0). If the backup file is to be deleted, the value of "ClearInvalidRetainData" or "ClearInvalidPersistentData" must be set to 1 in the registry under:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Beckhoff\TwinCAT\Plc]
"ClearInvalidRetainData"=dword:00000000
"ClearInvalidPersistentData"=dword:00000000
```

the value of "ClearInvalidRetainData" or of "ClearInvalidPersistentData" must be set to 1.

Whether the backup file is to be used can also be set in the TwinCAT System Manager in the tree structure on the left under **PLC > PLC Settings**:



The backup files are deleted if the option **Clear Invalid Retain Data** or **Clear Invalid Persistent Data** is set in the System Manager. Corresponds to registry entry 1.

Development environment	Target platform	PLC libraries to be linked
TwinCAT v2.7.0	PC or CX (x86)	PLCSystem.Lib
TwinCAT v2.8.0	PC or CX (x86)	TcSystem.Lib
TwinCAT v2.10.0 Build >= 1301	CX (ARM)	TcSystem.Lib

5.5.2 PlcAppSystemInfo

Each PLC contains an instance of type 'PlcAppSystemInfo' with the name '_AppInfo'.

The corresponding namespace is 'TwinCAT_SystemInfoVarList'. This must be specified for use in a library, for example.

```
TYPE PlcAppSystemInfo
STRUCT
     ObjId              : OTCID;
     TaskCnt            : UDINT;
     OnlineChangeCnt    : UDINT;
     Flags              : DWORD;
     AdsPort            : UINT;
     BootDataLoaded     : BOOL;
     OldBootData        : BOOL;
     AppTimestamp       : DT;
     KeepOutputsOnBP    : BOOL;
     ShutdownInProgress : BOOL;
     LicensesPending    : BOOL;
     BSODOccured        : BOOL;

     TComSrvPtr         : ITComObjectServer;

     AppName            : STRING(63);
     ProjectName        : STRING(63);
END_STRUCT
END_TYPE
```

ObjId	Object ID of the PLC project instance
TaskCnt	Number of tasks in the runtime system
OnlineChangeCnt	Number of online changes since the last complete download
Flags	Reserved
AdsPort	ADS port of the PLC application
BootDataLoaded	PERSISTENT variables: LOADED (without error)
OldBootData	PERSISTENT variables: INVALID (the back-up copy was loaded, since no valid file was present)
AppTimestamp	Time at which the PLC application was compiled
KeepOutputsOnBP	The flag can be set and prevents that the outputs are zeroed when a breakpoint is reached. In this case the task continues to run. Only the execution of the PLC code is interrupted.
ShutdownInProgress	This variable has the value TRUE if a shutdown of the TwinCAT system is in progress. Some parts of the TwinCAT system may already have been shut down.
LicensesPending	This variable has the value TRUE if not all licenses that are provided by license dongles have been validated yet.
BSODOccured	This variable has the value TRUE if Windows is in a BSOD.
TComSrvPtr	Pointer to the TcCOM object server
AppName	Name generated by TwinCAT, which contains the port.
ProjectName	Name of the project

6 Error handling and diagnostics

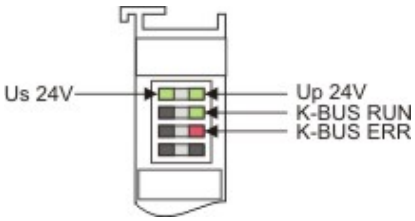
6.1 Basic CPU module

6.1.1 LEDs on the basic CPU module

Display	LED	Meaning
	PWR	Power supply The Power LED comes on when the device is connected to a live power supply unit (green).
	TC	TwinCAT status LED TwinCAT is in Run mode (green) TwinCAT is in Stop mode (red) TwinCAT is in Config mode (blue)
	HDD	Read/Write Compact Flash (red) Indicates access to the CF card.
	FB1	Status LED1 for fieldbus (function is written at the fieldbus interface)
	FB2	Status LED2 for fieldbus (function is written at the fieldbus interface)

6.1.2 LEDs of the power supply in K-bus mode

After switching on, the power supply immediately checks the connected Bus Terminal configuration. Error-free start-up is signalled by the red "I/O ERR" LED being extinguished. If the “I/O ERR” LED blinks, an error in the area of the terminals is indicated. The error code can be determined from the frequency and number of blinks. This permits rapid rectification of the error.

Display	LED	Meaning
	Us 24 V	Power supply for the CPU module. The LED lights green if the power supply is correct.
	Up 24V	Power supply for terminal bus. The LED lights green if the power supply is correct.
	K-BUS RUN	K-bus diagnostics. The green LED lights up in order to indicate fault-free operation. "Fault-free" means that the communication with the fieldbus system is also running.
	K-BUS ERR	K-bus diagnostics. The red LED flashes to indicate an error. The red LED blinks with two different frequencies.

The I/O error LED blink code

Fast blinking	Start of the error code
First slow sequence	Error code
Second slow sequence	Error code argument

LEDs for K-bus diagnostics

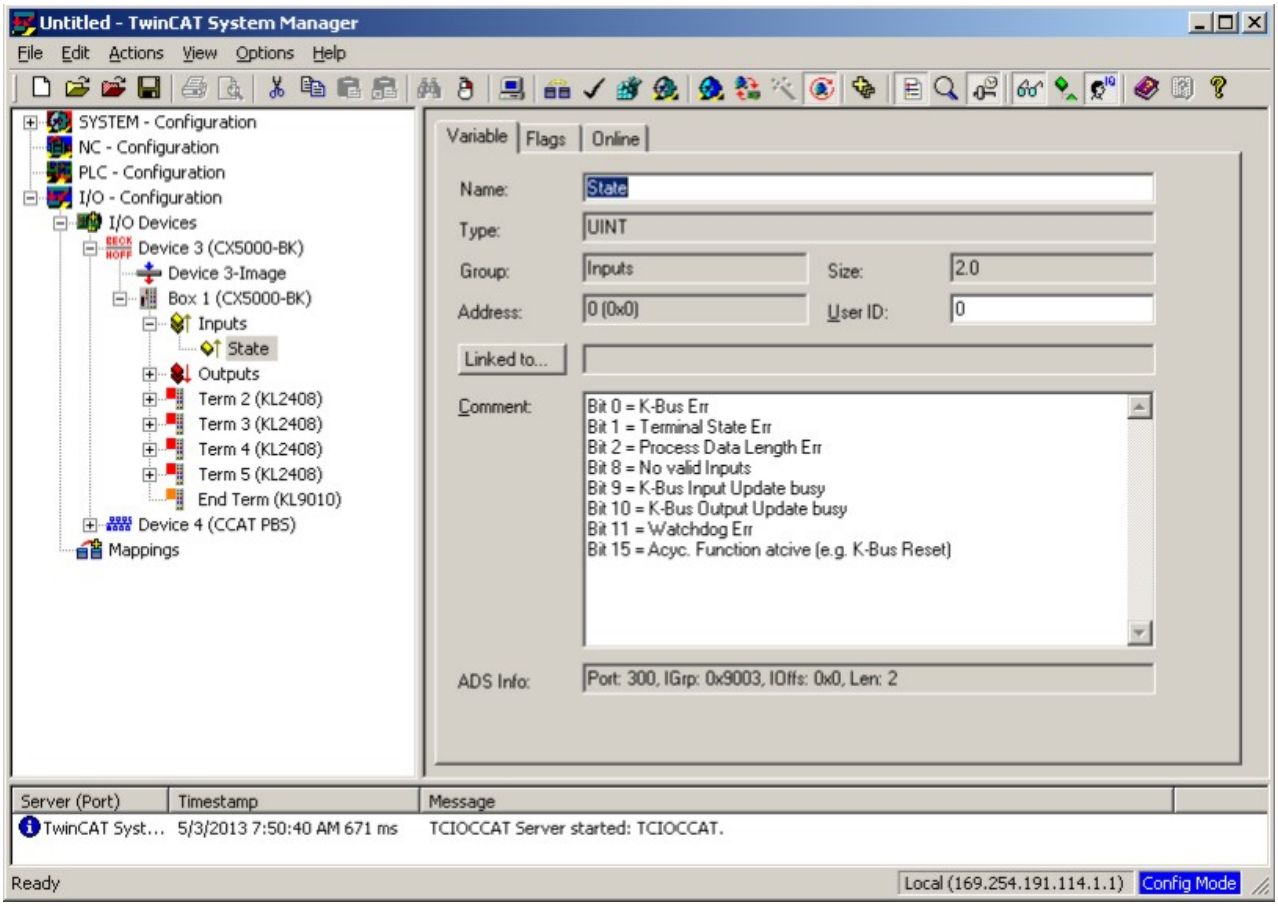
Error code	Error code argument	Description	Remedy
Persistent, continuous flashing		EMC problems	• Check power supply for overvoltage or undervoltage peaks. • Implement EMC measures. • If a K-Bus error is present, it can be localized by a restart of the power supply (by switching it off and then on again).
3 pulses	0	K-bus command error	• No Bus Terminal inserted. • One of the Bus Terminals is defective; halve the number of Bus Terminals attached and check whether the error is still present with the remaining Bus Terminals. Repeat until the defective Bus Terminal is located.
4 pulses	0	K-Bus data error, break behind the power supply	Check whether the Bus End Terminal 9010 is connected.
	n	Break behind Bus Terminal n	Check whether the Bus Terminal n+1 is correctly connected; replace if necessary.
5 pulses	n	K-bus error in register communication with Bus Terminal n	Exchange the Bus Terminal on position n.
6 pulses	0	Error at initialization	Exchange Embedded-PC.
	1	Internal data error	Perform a hardware reset on the Embedded-PC (switch off and on again).
	8	Internal data error	Perform a hardware reset on the Embedded-PC (switch off and on again).
7 pulses	0	Process data lengths of the set and actual configurations do not correspond	Check configuration and terminals for consistency.

Error code argument

The number of pulses indicates the position of the last Bus Terminal before the fault. Passive Bus Terminals, such as a power feed terminal, are not included in the count.

In the case of some errors, rectification does not cause the power supply to leave the blink sequence. The power supply can only be restarted by switching its supply voltage off and on again.

The CX unit recognizes these terminals automatically on scanning, reads out the terminal types and automatically places them in the System Manager.



K-bus state

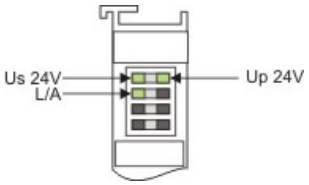
The K-bus status is saved in the state byte (see fig. K-bus interface “1”). If the value is 0 the K-bus is operating synchronously and without errors. If the value is <> ”0” there may be a fault, or it may *only* be an indication that the K-bus cycle is longer than the task, in which case it would no longer by synchronous with the task. The task time should be faster than 100 ms. We recommend a task time of less than 50 ms. The K-bus update time typically lies between one and five ms.

Bit 0 = K-Bus error
Bit 1 = terminal configuration has changed since the start
Bit 2 = process image lengths do not match
Bit 8 = no valid inputs (yet)
Bit 9 = K-bus input update not yet complete
Bit 10 = K-bus output update not yet complete
Bit 11 = watchdog
Bit 15 = acyclic K-bus function active (e.g. K-bus reset)

If there is a K-bus error, this can be reset via the IOF_DeviceReset function block (in the TcIoFunctions.lib).

6.1.3 LEDs of the power supply in E-bus mode

After switching on, the power supply immediately checks the connected Bus Terminal configuration. In the E-Bus mode the “L/A” led lights up. It starts blinking when there is traffic on the bus.

Display	LED		Meaning
	Us 24 V		Power supply for the CPU module The LED lights green if the power supply is correct.
	Up 24 V		Power supply for terminal bus. The LED lights green if the power supply is correct.
	L/A	off	E-bus not connected
		on	E-bus connected / no data traffic
		flashing	E-bus connected / data traffic on the E-bus.

6.2 Faults

Please also refer to the Safety instructions section.

Possible faults and their correction

Fault	Cause	Measures
No function after the Embedded PC has been switched on	No power supply for the Embedded PC other causes	1.Check the fuse 2. Measure voltage at connection, check plug wiring, call Beckhoff support
Embedded PC does not boot fully	Hard disk damaged (e.g. due to switching off while software is running), incorrect setup, other causes	Check setup setting, call Beckhoff support
Computer boots, software starts, but control does not operate correctly	Cause of the fault is either in the software or in parts of the plant outside the Embedded PC	Call the manufacturer of the machine or the software
Error during CFast card access	CFast card faulty, CFast slot faulty	Use a different CFast card to check the CFast slot. Call Beckhoff Support
Embedded PC only works partially or temporarily	Defective components in the Embedded PC	Call Beckhoff support

Please make a note of the following information **before** contacting Beckhoff service or support:

1. Precise device ID: CXxxxx-xxxx
2. Serial number
3. Hardware version
4. Any interfaces (N030, N031, B110, ...)
5. TwinCAT version used
6. Any components / software used

The quickest response will come from support / service in your country. Therefore please contact your regional contact. For details please refer to our website at www.beckhoff.de or ask your distribution partner.

7 Decomissioning

7.1 Disassembly and disposal

A CX50x0 hardware configuration is dismantled in 2 stages:

1. Switching off and disconnecting the power supply

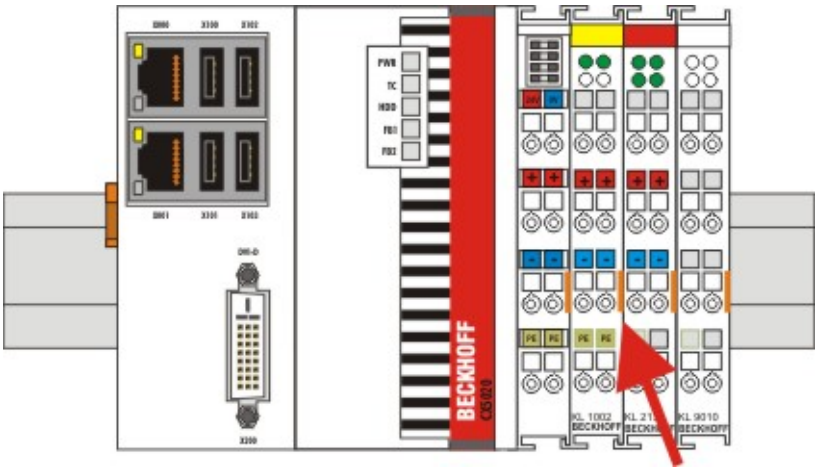
Before a CX50x0 system can be dismantled, the system should be switched off, and the power supply should be disconnected.

2. Removing from the top-hat rail:

Before the individual modules are disconnected, the whole CX50x0 hardware block should be removed from the top-hat rail. Proceed as follows:

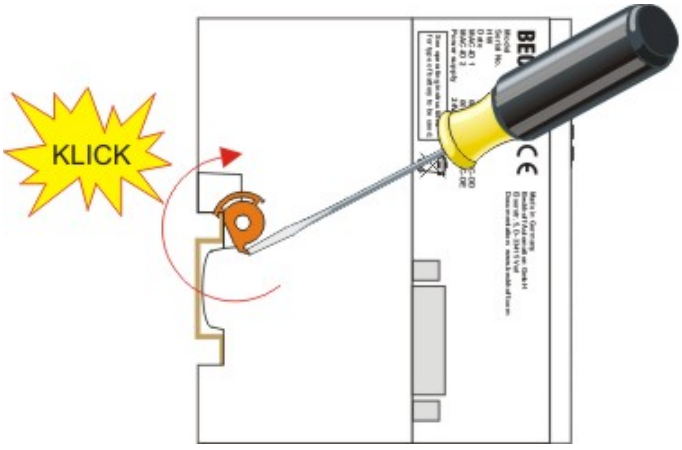
2.1. Release and remove the first Terminal next to the power supply unit on the top-hat rail.

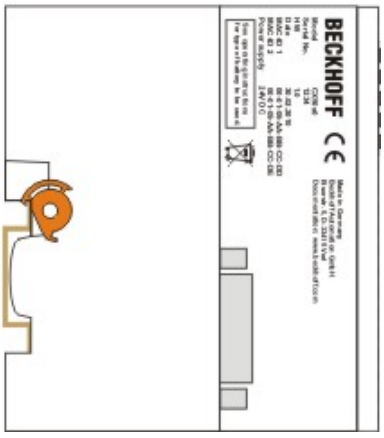
First remove any wiring from power supply unit *and* then from the first terminal on the top-hat rail next to the power supply unit. If the wiring is to be reused for another system, it is advisable to make a note of the connections. Then pull the orange terminal release (see arrow) to release the terminal and pull it out.



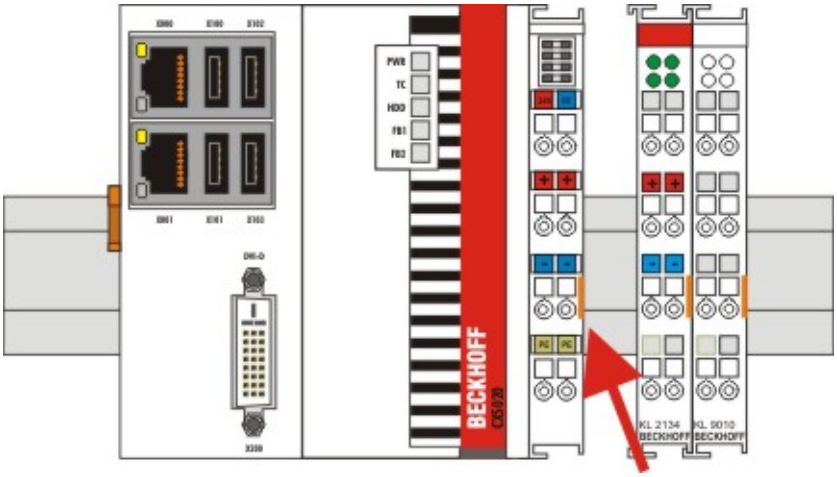
2.2. Releasing the CX50x0 systems

To release the CX50x0 block, release the orange DIN rail bracket on the left-hand side of the device. Push back the lower hook. An audible click indicates that the device is released.





After pulling the terminal release of the power supply unit, the block can be removed **carefully** from the top-hat rail.



NOTICE

Do not us force to open the device!

Opening the module housing by force would destroy it. The devices may only be opened by Beckhoff service personnel.

Disposal

The device must be fully dismantled in order to dispose of it.

Electronic parts must be disposed of in accordance with national electronics scrap regulations.

8 Appendix

8.1 Accessories

Compact flash cards

Order number for the initial order of a compact flash card (instead of the 128 MB compact flash card)

Order number	Description
CX1900-0023	1 GB compact flash card, extended temperature range, instead of 128 MB compact flash card
CX1900-0025	2 GB compact flash card, extended temperature range, instead of 128 MB compact flash card
CX1900-0027	4 GB compact flash card, extended temperature range, instead of 128 MB compact flash card
CX1900-0029	8 GB compact flash card, extended temperature range, instead of 128 MB compact flash card
CX1900-0031	16 GB compact flash card, extended temperature range, instead of 128 MB compact flash card

Spare compact flash cards

Order number	Description
CX1900-0022	128 MB compact flash card, extended temperature range
CX1900-0024	1 GB compact flash card, extended temperature range
CX1900-0026	2 GB compact flash card, extended temperature range
CX1900-0028	4 GB compact flash card, extended temperature range
CX1900-0030	8 GB compact flash card, extended temperature range
CX1900-0032	16 GB compact flash card, extended temperature range

Formatting options

Order number	Description
CX1900-0010	Formatting a compact flash card (bootable) FAT16
CX1900-0012	Formatting a compact flash card (bootable) NTFS

Connectors and Adaptors

Order number	Description
CX1900-0101	DVI-to-VGA passive Adaptor for connecting a standard desktop VGA monitor to the CX1000 system – singles out the VGA signals of the DVI-I interface of the CX1000-N001 module – 29-pin male DVI-A connector (bottom) to 15-pin female connector (top) – weight approx. 40 g – dimensions (W x H x D) 40 x 42 x 15 mm

Spare battery

Order number	Description
CX1900-0102	Battery for the CX-Systems - original product description: Panasonic type CR2032 3V/225mAh

8.2 Certifications

All products of the Embedded PC family are CE, UL and GOST-R certified. Since the product family is continuously developed further, we are unable to provide a full listing here. The current list of certified products can be found at www.beckhoff.com.

FCC Approvals for the United States of America

FCC: Federal Communications Commission Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Approval for Canada

FCC: Canadian Notice

This equipment does not exceed the Class A limits for radiated emissions as described in the Radio Interference Regulations of the Canadian Department of Communications.

8.3 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Download finder

Our download finder contains all the files that we offer you for downloading. You will find application reports, technical documentation, technical drawings, configuration files and much more.

The downloads are available in various formats.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on our internet page: www.beckhoff.com

You will also find further documentation for Beckhoff components there.

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Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

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- and extensive training program for Beckhoff system components

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e-mail:	support@beckhoff.com

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- spare parts service
- hotline service

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