

# **Automation PC 2200**

## **User's manual**

Version: **2.02 (August 2022)**  
Order no.: **MAAPC2200-ENG**

**Translation of the original documentation**

**Publishing information**

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# 1 Introduction

## Information:

B&R makes every effort to keep documents as current as possible. The most current versions are available for download on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 1.1 Manual history

Version	Date	Comment <sup>1)</sup>
2.02	September 2022	Updated document. <ul style="list-style-type: none"> <li>Updated "5ACCIF01.IS00-000" on page 86.</li> <li>Updated "Order number key" on page 17.</li> <li>Updated "Installation accessories" on page 157.</li> <li>Updated "Upgrade information" on page 129.</li> <li>Updated "International and national certifications" on page 164.</li> <li>Name change from "B&amp;R Linux" to "Linux for B&amp;R".</li> </ul>
2.01	November 2021	Updated document. <ul style="list-style-type: none"> <li>EN 60950 replaced by IEC 61010-2-201.</li> <li>Updated "UEFI BIOS options" on page 104.</li> <li>Updated the CAN interface description, see sections "Interface options" on page 52 and "Cable data" on page 169.</li> </ul>
2.00	September 2021	Updated document. <ul style="list-style-type: none"> <li>Updated "Linux for B&amp;R 10 (GNU/Linux)" on page 139.</li> <li>Updated "Windows 10 IoT Enterprise 2019 LTSC" on page 133.</li> <li>Updated "DNV certification" on page 165.</li> <li>Updated "Automation software" on page 142.</li> <li>Updated "Block diagram" on page 34.</li> <li>Updated "UEFI BIOS options" on page 104.</li> <li>Updated "Product information" on page 24.</li> <li>Cables and USB mass storage device are described in their own documentation starting with this version.</li> <li>Updated "Changing the battery" on page 154.</li> </ul>
1.10	August 2019	Updated section "General safety guidelines" on page 10. Updated the following in section "Software" on page 104: <ul style="list-style-type: none"> <li>"UEFI BIOS options" on page 104</li> <li>"OEM features" on page 113</li> <li>"Upgrade information" on page 129</li> <li>"Operating systems" on page 133</li> </ul>
1.05	December 2018	Updated document. <ul style="list-style-type: none"> <li>Added 5CASDL.0060-00.</li> </ul>
1.00	October 2018	<ul style="list-style-type: none"> <li>First version</li> </ul>

1) Editorial corrections are not listed.

## 1.2 Information about this document

**This document is not intended for end customers! The safety guidelines required for end customers must be incorporated into the operating instructions for end customers in the respective national language by the machine manufacturer or system provider.**

### 1.2.1 Organization of notices

#### Safety notices

Contain **only** information that warns of dangerous functions or situations.

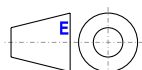
Signal word	Description
<b>Danger!</b>	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
<b>Warning!</b>	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
<b>Caution!</b>	Failure to observe these safety guidelines and notices can result in minor injury or damage to property.
<b>Notice!</b>	Failure to observe these safety guidelines and notices can result in damage to property.

#### General notices

Contain **useful** information for users and instructions for avoiding malfunctions.

Signal word	Description
<b>Information:</b>	Useful information, application tips and instructions for avoiding malfunctions.

### 1.2.2 Guidelines



European dimension standards apply to all dimension diagrams.

#### All dimensions in millimeters.

Unless otherwise specified, the following general tolerances apply:

Nominal dimension range	General tolerance per DIN ISO 2768 medium
Up to 6 mm	±0.1 mm
Over 6 to 30 mm	±0.2 mm
Over 30 to 120 mm	±0.3 mm
Over 120 to 400 mm	±0.5 mm
Over 400 to 1000 mm	±0.8 mm

## 2 General safety guidelines

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### 2.1 Intended use

In all cases, applicable national and international standards, regulations and safety measures must be taken into account and observed!

The B&R products described in this manual are intended for use in industry and industrial applications. The intended use includes control, operation, monitoring, drive and HMI tasks as part of automation processes in machines and systems.

B&R products are only permitted to be used in their original condition. Modifications and extensions are only permitted if they are described in this manual.

B&R excludes liability for damage of any kind resulting from the use of B&R products in any intended way.

B&R products have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions.

B&R products are explicitly not intended for use in the following applications:

- Monitoring and control of thermonuclear processes
- Weapon systems control
- Flight and traffic control systems for passenger and freight transport
- Health monitoring and life support systems

### 2.2 Protection against electrostatic discharge

Electrical assemblies that can be damaged by electrostatic discharge (ESD) must be handled accordingly.

#### 2.2.1 Packaging

- **Electrical assemblies with housing:**  
Do not require special ESD packaging but must be handled properly (see "Electrical assemblies with housing").
- **Electrical assemblies without housing:**  
Are protected by ESD-suitable packaging.

#### 2.2.2 Regulations for proper ESD handling

##### Electrical assemblies with housing

- Do not touch the connector contacts of connected cables.
- Do not touch the contact tips on circuit boards.

## Electrical assemblies without housing

The following applies in addition to "Electrical assemblies with housing":

- All persons handling electrical assemblies and devices in which electrical assemblies are installed must be grounded.
- Assemblies are only permitted to be touched on the narrow sides or front plate.
- Always place assemblies on suitable surfaces (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable surfaces!
- Assemblies must not be subjected to electrostatic discharges (e.g. due to charged plastics).
- A minimum distance of 10 cm from monitors or television sets must be maintained.
- Measuring instruments and devices must be grounded.
- Test probes of floating potential measuring instruments must be discharged briefly on suitable grounded surfaces before measurement.

## Individual components

- ESD protective measures for individual components are implemented throughout B&R (conductive floors, shoes, wrist straps, etc.).
- The increased ESD protective measures for individual components are not required for handling B&R products at customer locations.

## 2.3 Regulations and measures

Electronic devices are generally not failsafe. If the programmable logic controller, operating or control device or uninterruptible power supply fails, the user is responsible for ensuring that connected devices (such as motors) are brought to a safe state.

When using programmable logic controllers as well as when using operating and monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or similar product) or Slot PLC (e.g. B&R LS251 or similar product), the safety measures that apply to industrial controllers (protection by protective equipment such as emergency stops) must be observed in accordance with applicable national and international regulations. This also applies to all other connected devices, such as drives.

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.

The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

## 2.4 Transport and storage

During transport and storage, devices must be protected against undue stress (mechanical stress, temperature, humidity, aggressive atmosphere).

## 2.5 Installation

- The devices are not ready for use and must be installed and wired according to the requirements of this documentation in order to comply with EMC limit values.
- Installation must be carried out according to the documentation using suitable equipment and tools.
- Devices are only permitted to be installed in a voltage-free state and by qualified personnel. The control cabinet must first be disconnected from the power supply and secured against being switched on again.
- General safety regulations and national accident prevention regulations must be observed.
- The electrical installation must be carried out in accordance with relevant regulations (e.g. line cross section, fuse protection, protective ground connection).

## 2.6 Operation

### 2.6.1 Protection against contact with electrical parts

In order to operate programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it is necessary for certain components to carry dangerous voltages over 42 VDC. Touching one of these components can result in a life-threatening electric shock. There is a risk of death, serious injury or damage to property.

Before switching on programmable logic controllers, operating and monitoring devices and uninterruptible power supplies, it must be ensured that the housing is properly connected to ground potential (PE rail). Ground connections must also be made if the operating and monitoring device and uninterruptible power supply are only connected for testing purposes or only operated for a short time!

Before switching on, live parts must be securely covered. All covers must be kept closed during operation.

### 2.6.2 Ambient conditions - Dust, moisture, aggressive gases

The use of operating and monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels) and uninterruptible power supplies in dusty environments must be avoided. This can otherwise result in dust deposits that affect the functionality of the device, especially in systems with active cooling (fans), which may no longer ensure sufficient cooling.

The presence of aggressive gases in the environment can also result in malfunctions. In combination with high temperature and relative humidity, aggressive gases – for example with sulfur, nitrogen and chlorine components – trigger chemical processes that can very quickly impair or damage electronic components. Blackened copper surfaces and cable ends in existing installations are indicators of aggressive gases.

When operated in rooms with dust and condensation that can endanger functionality, operating and monitoring devices such as Automation Panels or Power Panels are protected on the front against the ingress of dust and moisture when installed correctly (e.g. cutout installation). The back of all devices must be protected against the ingress of dust and moisture, however, or the dust deposits must be removed at suitable intervals.

### 2.6.3 Programs, viruses and malicious programs

Any data exchange or installation of software using data storage media (e.g. floppy disk, CD-ROM, USB flash drive) or via networks or the Internet poses a potential threat to the system. It is the direct responsibility of the user to avert these dangers and to take appropriate measures such as virus protection programs and firewalls to protect against them and to use only software from trustworthy sources.



## 2.7 Cybersecurity disclaimer for products

B&R products communicate via a network interface and were developed for secure connection with internal and, if necessary, other networks such as the Internet.

### Information:

**In the following, B&R products are referred to as "product" and all types of networks (e.g. internal networks and the Internet) are referred to as "network".**

It is the sole responsibility of the customer to establish and continuously ensure a secure connection between the product and the network. In addition, appropriate security measures must be implemented and maintained to protect the product and entire network from any security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

B&R Industrial Automation GmbH and its subsidiaries are not liable for damages and/or losses in connection with security breaches, unauthorized access, interference, digital intrusion, data leakage and/or theft of data or information.

The aforementioned appropriate security measures include, for example:

- Segmentation of the network (e.g. separation of the IT network from the control network<sup>1)</sup>)
- Use of firewalls
- Use of authentication mechanisms
- Encryption of data
- Use of anti-malware software

Before B&R releases products or updates, they are subjected to appropriate functional testing. Independently of this, we recommend that our customers develop their own test processes in order to be able to check the effects of changes in advance. Such changes include, for example:

- Installation of product updates
- Significant system modifications such as configuration changes
- Deployment of updates or patches for third-party software (non-B&R software)
- Hardware replacement

These tests should ensure that implemented security measures remain effective and that systems in the customer's environment behave as expected.

<sup>1)</sup> The term "control network" refers to computer networks used to connect control systems. The control network can be divided into zones, and there can be several separate control networks within a company or site. The term "control systems" refers to all types of B&R products such as controllers (e.g. X20), HMI systems (e.g. Power Panel T30), process control systems (e.g. APROL) and supporting systems such as engineering workstations with Automation Studio.

## 3 System overview

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### 3.1 Information about this user's manual

This user's manual contains all the necessary information for a functioning Automation PC 2200 built-in device.

### 3.2 Maximum performance in minimum space

The control cabinet variant of the Automation PC 2200 offers a fully-fledged PC system with a minimum size. The PC design is based on Intel's Apollo Lake architecture, which with dual-core and even quad-core processors represents a milestone in the field of embedded systems – and at an optimal price/performance ratio.



### 3.3 Communicative in all directions

All important interfaces are integrated in the Automation PC 2200. These include 2x Gigabit Ethernet and 2x USB 3.0. In addition, fieldbuses such as POWERLINK and CAN can be implemented via modular interface modules. The compact CFast card is used as the data storage medium, which is also available with 60 GB or more and based on MLC technology.

### 3.4 Best graphics performance

The graphics engine of the Intel Atom processors is derived from the Core i processors and offers powerful graphics processing. It supports DirectX 12 for the first time in this segment, which is now used in many SCADA systems with sophisticated graphics. On the display side, all resolutions and diagonals up to 24.0" Full HD are supported.

### 3.5 Features






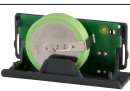




- Intel Atom X processor series (Apollo Lake)
- Up to quad-core CPU performance
- Powerful graphics (Intel HD graphics)
- Compact dimensions

- 2x Gigabit Ethernet
- SDL/DVI or SDL4
- 2x USB 3.0
- 1x CFast slot
- 1x interface option slot
- Fanless operation
- Real time clock, RTC (battery-backed)
- TPM 2.0 security

### 3.6 Configuration

The following individual components are mandatory for operation:

- System unit
- CFast card for the operating system
- Operating system
- Monitor/Panel option (optional, required for operation with graphic output)

Configuration						
System units		Select 1.				
	System unit	Processor	Processor - Clock frequency	Cores	Main memory type	Main memory size
	5APC2200.AL02-000	Intel Atom x5-E3930	1300 MHz	2	LPDDR4 SDRAM	2 GB
	5APC2200.AL04-000	Intel Atom x5-E3930	1300 MHz	2	LPDDR4 SDRAM	4 GB
	5APC2200.AL14-000	Intel Atom x5-E3940	1600 MHz	4	LPDDR4 SDRAM	4 GB
	5APC2200.AL18-000	Intel Atom x5-E3940	1600 MHz	4	LPDDR4 SDRAM	8 GB
Covers		Select 1 each.				
	Front cover <sup>1)</sup>					
	5ACCF03.0000-000 (orange) 5ACCF03.0000-001 (gray)					
	Adhesive label with logo <sup>2)</sup>					
	5ACCST00.0000-000					
Mass storage devices		Select 1.				
	CFast cards					
	5CFAST.2048-00 ≥ E0 5CFAST.4096-00 ≥ E0 5CFAST.8192-00 ≥ E0 5CFAST.016G-00 ≥ E0 5CFAST.032G-00 ≥ E0		5CFAST.032G-10 5CFAST.064G-10 5CFAST.128G-10 5CFAST.256G-10			
Interfaces						
	Graphics option				Optional, select 1.	
	5ACCLI01.SDL0-000 5ACCLI03.SDL4-000					
	Interface options				Optional, select 1.	
	5ACCIF01.FPCC-000 5ACCIF01.FPLK-000 5ACCIF01.FPLS-001 5ACCIF01.FPSC-001 5ACCIF01.ICAN-000 5ACCIF03.CETH-000				5ACCIF01.FPCS-000 5ACCIF01.FPLS-000 5ACCIF01.FPSC-000 5ACCIF01.FSS0-000 5ACCIF01.IS00-000	
	Battery compartment				Selected automatically <sup>3)</sup>	
	5ACCBT01.0000-001					
USB accessories		Optional selection				
	5MMUSB.2048-01	5MMUSB.4096-01	5MMUSB.4096-02	5MMUSB.032G-02		
Cable strain relief clip		Optional selection				
	5ACCRHMI.0011-000					
Terminal blocks		Select 1.				
	Power supply connectors					
	0TB103.9 0TB103.91					
	Terminal block for IF option					
	0TB1210.3100					
Operating systems		Select 1.				
	Windows 10	B&R Linux 10	Automation Runtime			
	5SWWW10.0544-MUL	5SWLIN.0844-MUL	0TG1000.01		1TG4601.06-5	
	5SWWW10.0558-MUL	B&R Linux 9	0TG1000.02		1TC4601.06-5	
	5SWWW10.0900-MUL	5SWLIN.0744-MUL	0TGF016.01		1TG4700.00	
		5SWLIN.0758-MUL			1TC4700.00	

1) If no front cover is selected during device configuration, then front panel 5ACCF03.0000-000 (orange) is installed and delivered by default.

2) If no adhesive label with logo is selected during device configuration, then adhesive label 5ACCST00.0000-000 (B&R logo) is installed and delivered by default.

3) The battery compartment is selected automatically.

### 3.6.1 Order number key

#### Information:

A current order number key is available on the B&R website for easy identification of the device configuration:

[Home > Downloads > Industrial PCs and panels > Automation PC 2200](#)

## 3.7 Overview

Order number	Short description	Page
<b>Accessories</b>		
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm <sup>2</sup>	158
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm <sup>2</sup>	158
5ACCBT01.0000-001	Battery compartment - Dark gray - Includes battery - For APC2200/PPC2200	91
5ACCRHMI.0011-000	Strain relief USB - For APC2100/APC2200 - For SDL3 Converter/SDL4 Converter	161
5SWUT1.0001-000	HMI Service Center USB flash drive - Hardware diagnostic software - For APC910/PPC900 - For PPC1200 - For APC2100/PPC2100 - For APC2200/PPC2200 - For APC3100/PPC3100 - For APC mobile - For AP800/AP900 - For AP9x3/AP9xD - For AP1000/AP5000	152
<b>Front covers</b>		
5ACCF03.0000-000	APC2200 front cover - Orange - Without logo	90
5ACCF03.0000-001	APC2200 front cover - Dark gray - Without logo	90
5ACCST00.0000-000	B&R logo - Adhesive label - For front covers	162
<b>Hypervisor</b>		
1TC4700.00	License for B&R Hypervisor (TC). One license per target system is required.	142
<b>Interface options</b>		
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	52
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	57
5ACCIF01.FPLK-000	Interface card - 1x POWERLINK interface - Integrated 2-port hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	61
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	64
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	67
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	70
5ACCIF01.FPSC-001	Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X Link Interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	74
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	79
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	83
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	86
5ACCIF03.CETH-000	Interface card - 2x ETH 10/100/1000 interface - For APC2200/PPC2200 - Only available with a new device	88
<b>Linux for B&amp;R 10</b>		
5SWLIN.0844-MUL	Linux for B&R 10 - 64-bit - Multilingual - APC2200 (UEFI boot) - Installation - Only available with a new device	139
<b>Linux for B&amp;R 9</b>		
5SWLIN.0744-MUL	Linux for B&R 9 - 64-bit - Multilingual - APC2200 (UEFI boot) - Installation - Only available with a new device	140
5SWLIN.0758-MUL	Linux for B&R 9 - 64-bit - Multilingual - APC2200 (Legacy BIOS boot) - Installation - Only available with a new device	140
<b>Monitor/Panel options</b>		
5ACCLI01.SDL0-000	Monitor/Panel option - 1x SDL/DVI transmitter - For APC2100/APC2200 - Only available with a new device	47
5ACCLI03.SDL4-000	Monitor/Panel option - 1x SDL4 transmitter - For APC2200 - Only available with a new device	50
<b>Other</b>		
5ACCRHMI.0006-000	HMI installation tool for control cabinet - 1x torque wrench 0.4 - 2.0 Nm - 1x hex head bit 2.5, length 89 mm - 1x hex head bit 3.0, length 89 mm - 1x hex head bit 5.0, length 89 mm - 1x Torx 10 bit, length 90 mm - 1x Torx 20 bit, length 89 mm	157
<b>Runtime</b>		
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	142
<b>System units</b>		
5APC2200.AL02-000	APC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 2 GB SDRAM	44
5APC2200.AL04-000	APC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 4 GB SDRAM	44
5APC2200.AL14-000	APC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 4 GB SDRAM	44
5APC2200.AL18-000	APC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 8 GB SDRAM	44
<b>Technology Guard</b>		
0TG1000.01	Technology Guard (MSD)	142
0TG1000.02	Technology Guard (HID)	142
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	142
1TG4601.06-5	Automation Runtime Embedded, TG license	142
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	142
1TG4700.00	B&R Hypervisor	142
<b>Terminal blocks</b>		
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	159
<b>Windows 10 IoT Enterprise 2016 LTSC</b>		
5SWW10.0544-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - Entry - Multilingual - APC2200 (UEFI boot) - CPU E3930/E3940 - License - Only available with a new device	136
5SWW10.0558-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - Entry - Multilingual - APC2200 (Legacy BIOS boot) - CPU E3930/E3940 - License - Only available with a new device	136
<b>Windows 10 IoT Enterprise 2019 LTSC</b>		
5SWW10.0900-MUL	Windows 10 IoT Enterprise 2019 LTSC: - 64-bit - Entry - Multilingual - License - Only available with a new device	133

## 4 Technical data

### 4.1 Complete system

#### 4.1.1 Connection options

An Automation Panel can be connected to the Automation PC with an optional monitor/panel option via DVI, SDL or SDL4. The connection options described in the following provide an overview of the operating modes and possible limitations.

##### Information:

In its minimum configuration, the APC2200 has no possibility to connect an external display (e.g. Automation Panel). In order to implement a display option, a monitor/panel option must be included in the configuration. This option can only be added at the B&R factory and cannot be retrofitted.

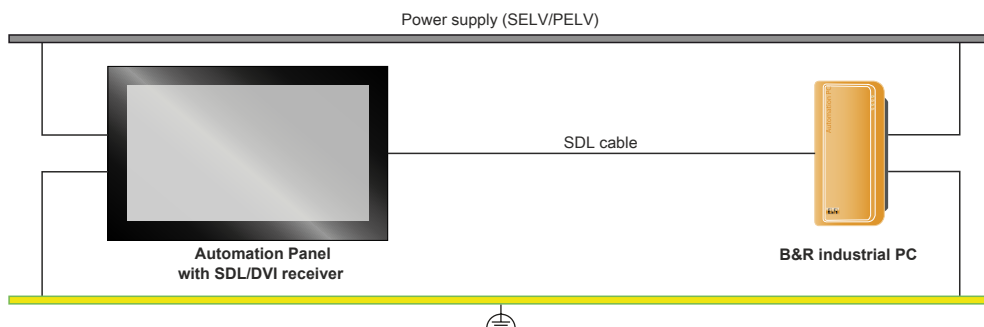
##### 4.1.1.1 SDL operation

###### 4.1.1.1.1 SDL operation without USB cable (mode 1)

With this connection option, all communication between the Automation Panel and B&R industrial PC takes place via a single SDL cable.

In addition to the display data, information from the touch screen, matrix keys, LEDs and service/diagnostic data is transferred. The Automation Panel can be installed up to 40 m away from the B&R industrial PC. USB 1.1 is also transferred over this distance and fully integrated into SDL. External adapter modules are not required.

The brightness of the display can be set via the ADI Control Center, for example.



##### Availability of the interfaces on the Automation Panel with SDL/DVI receiver:

Panel In	✓	USB In	✗	Power supply	✓	Brightness controls	✗
USB1, USB2	✓	COM interface for touch screen	✗	Grounding	✓		

Maximum cable length: 40 m

##### Requirements

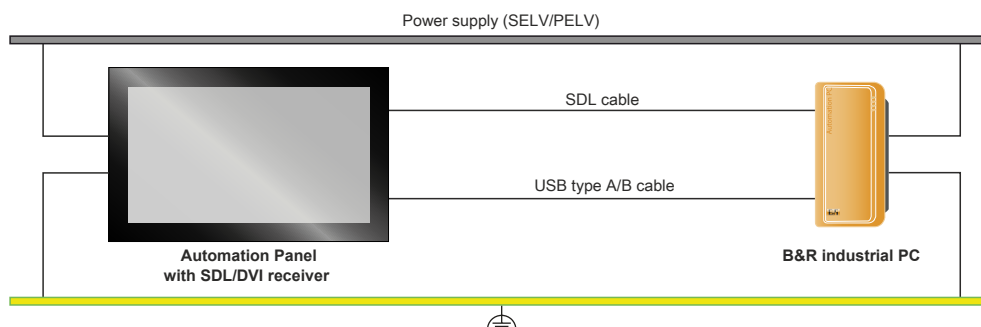
- Automation Panel with SDL/DVI receiver
- B&R industrial PC with SDL interface
- SDL cable

#### 4.1.1.1.2 SDL operation with USB cable (mode 2)

With this connection option, communication between the Automation Panel and B&R industrial PC takes place via an SDL cable that is connected to interface "Panel In" and a USB type A/B cable that is connected to interface "USB In".

Display data as well as information from the resistive touch screen keys, matrix keys, LEDs and service/diagnostic data is transferred via the SDL cable. The touch screen data from the multi-touch screen is transferred via the USB type A/B cable. The Automation Panel can be installed up to 5 m (USB specification) away from the B&R industrial PC. USB 2.0 can be transferred over this distance via the USB type A/B cable. External adapter modules are not required.

The brightness of the display can be set via the ADI Control Center, for example.



##### Availability of the interfaces on the Automation Panel with SDL/DVI receiver:

Panel In	✓	USB In	✓	USB 2.0	Power supply	✓	Brightness controls	✗
USB1, USB2	✓	USB 2.0	COM interface for touch screen	✗	Grounding	✓		

Maximum cable length: 5 m

##### Requirements

- Automation Panel with SDL/DVI receiver
- B&R industrial PC with SDL interface
- SDL cable, USB type A/B cable

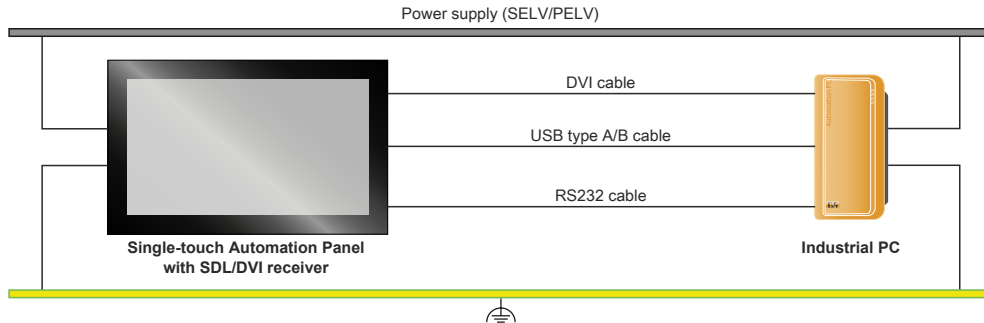


#### 4.1.1.2 DVI operation

In DVI operation, all signals needed to operate the Automation Panel are transferred via a separate cable. The brightness of the display can be set using the brightness buttons.

##### 4.1.1.2.1 DVI operation with single-touch Automation Panel

If an Automation Panel with resistive touch screen (single-touch) is operated with DVI, a DVI, USB type A/B and RS232 cable must be connected.



##### Availability of the interfaces on the Automation Panel with SDL/DVI receiver:

Panel In	✓	USB In	✓	USB 2.0	✓	Power supply	✓	Brightness controls	✓
USB1, USB2	✓	USB 2.0	✓	COM interface for touch screen	✓	Grounding	✓		

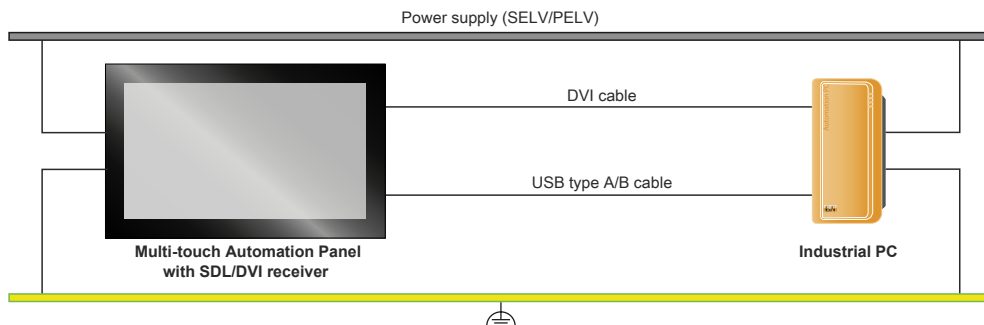
Maximum cable length: 5 m

##### Requirements

- Automation Panel with SDL/DVI receiver
- Industrial PC with DVI interface
- DVI cable, USB type A/B cable, RS232 cable

##### 4.1.1.2.2 DVI operation with multi-touch Automation Panel

If an Automation Panel with PCT touch screen (multi-touch) is operated with DVI, a DVI and USB type A/B cable must be connected.



##### Availability of the interfaces on the Automation Panel with SDL/DVI receiver:

Panel In	✓	USB In	✓	USB 2.0	✓	Power supply	✓	Brightness controls	✓
USB1, USB2	✓	USB 2.0	✓	COM interface for touch screen	✗	Grounding	✓		

Maximum cable length: 5 m

##### Requirements

- Automation Panel with SDL/DVI receiver
- Industrial PC with DVI interface
- DVI cable, USB type A/B cable

##### 4.1.1.2.3 General limitations

- Key and LED data is not transferred.
- Service and diagnostic data is not transferred.

- Updating the firmware of Automation Panels is not possible.
- The maximum cable length is limited to 5 m.

### 4.1.1.3 SDL4 operation

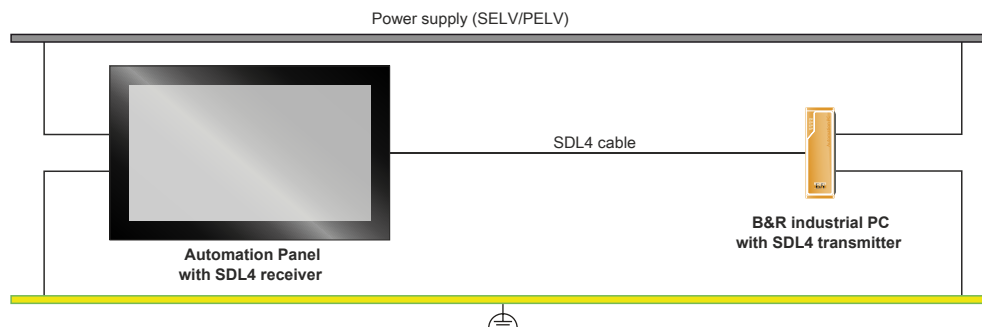
Smart Display Link 4 (SDL4) technology transfers all communication channels between a B&R industrial PC and panel up to 100 m over a standard Ethernet cable (min. Cat 6a). An RJ45 connector is used for the device connection, which is ideal for confined spaces in feed-throughs and swing arm systems.

#### 4.1.1.3.1 SDL4 operation with SDL4 transmitter

In SDL4 operation with an SDL4 transmitter in the B&R industrial PC, all communication between the Automation Panel and B&R industrial PC takes place via a single SDL4 cable.

In addition to the display data, information from the touch screen, matrix keys, LEDs and service/diagnostic data is transferred. The Automation Panel can be installed up to 100 m away from the B&R industrial PC. USB 2.0 is also transferred over this distance and fully integrated into SDL4. External adapter modules are not required.

The brightness of the display can be set via the ADI Control Center, for example.



**Availability of the interfaces on the Automation Panel with SDL4 receiver:**

SDL4 interface	✓	USB1, USB2	✓	USB 2.0	✓	Power supply	✓	Grounding	✓
----------------	---	------------	---	---------	---	--------------	---	-----------	---

Maximum cable length for SDL4: 100 m

#### Requirements

- Automation Panel with SDL4 receiver
- B&R industrial PC with SDL4 interface
- SDL3/SDL4 cable

#### 4.1.1.3.2 General limitations

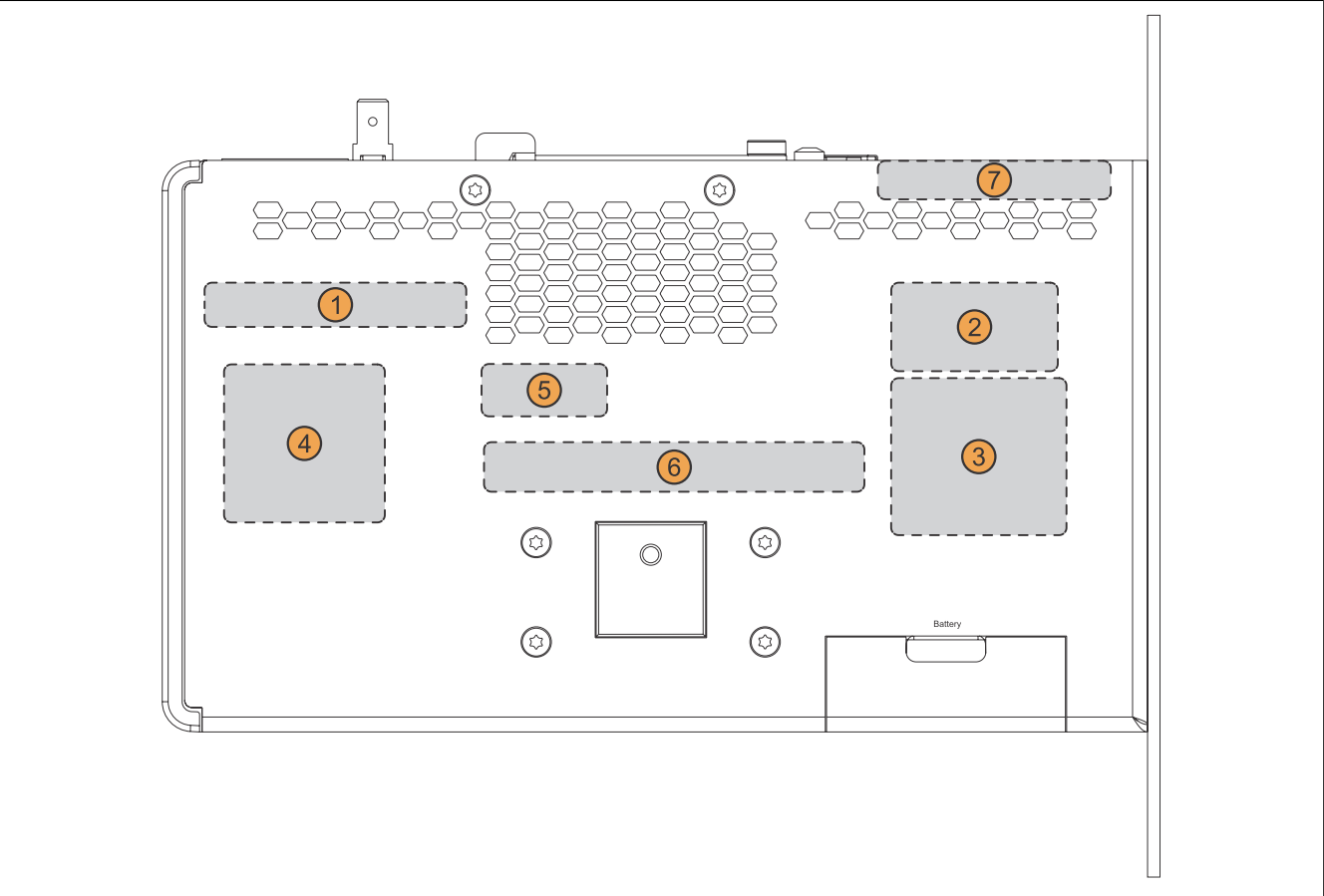
- USB 2.0 transfer is limited to 150 Mbit/s with SDL4.
- A display is always emulated by the SDL4 transmitter using EDID data and hot plug detection, so DVI-compatible operation is possible. For this reason, the following behavior may occur during operation with multiple displays.

In the operating system, a connected panel is reported by the video driver even in the following situations:

- No SDL3/SDL4 cable is connected.
- There is no connection established yet between the SDL4 link module and SDL4 transmitter.

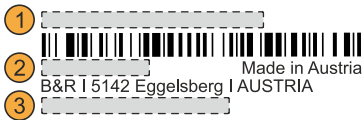
This behavior can be avoided by appropriate configuration in BIOS or via the graphics driver.

4.1.2 Product information



Position	Description
1	Specifications for the device family and electrical properties
2	Device-specific specifications, serial numbers and MAC addresses, see <a href="#">Identification</a> .
3	Valid test and conformity ID for the product, see section " <a href="#">Technical data</a> " on page 19
4	Safety notices, warnings and information about the product
5	License adhesive label for operating systems (configuration-dependent)
6	Space for individual customer information (configuration-dependent)
7	Interfaces on interface options (configuration-dependent)

4.1.2.1 Identification

Figure (symbolic)	Identification	
	1	Device number
	2	Serial number
	3	MAC addresses
		-

The device number can be retrieved from the B&R website ([www.br-automation.com](http://www.br-automation.com)) using the serial number of the device (login required). Information (serial number, material number, revision, delivery date and end of warranty) about all components installed in the system can be retrieved using the device number.

### 4.1.3 Mechanical properties

#### 4.1.3.1 Dimensions

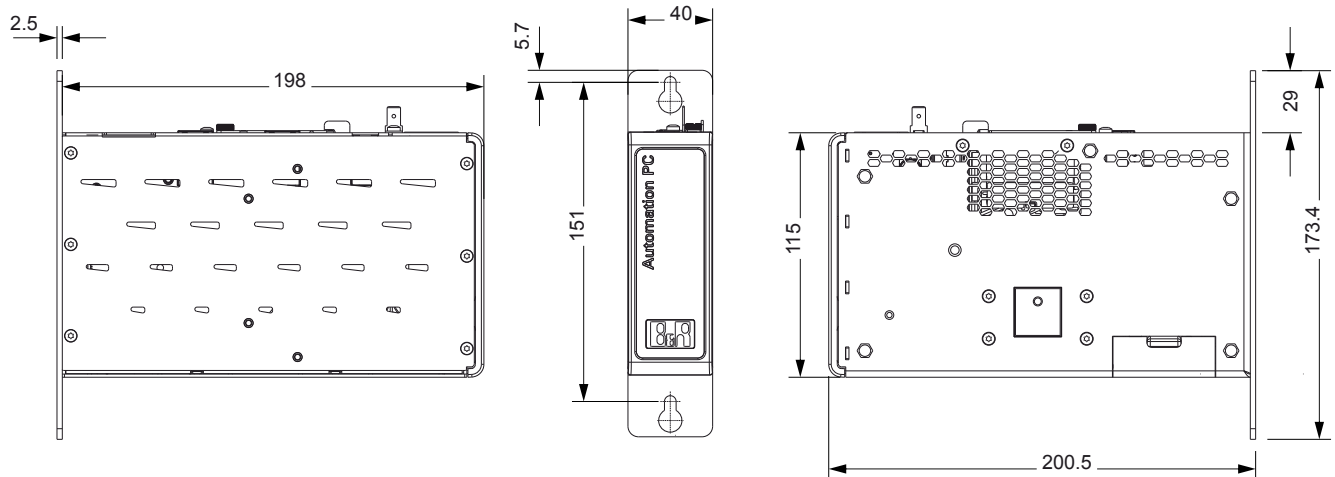
##### Information:

All specifications in dimension diagrams and associated tables are in millimeters [mm].

2D and 3D diagrams (DXF and STEP formats) can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

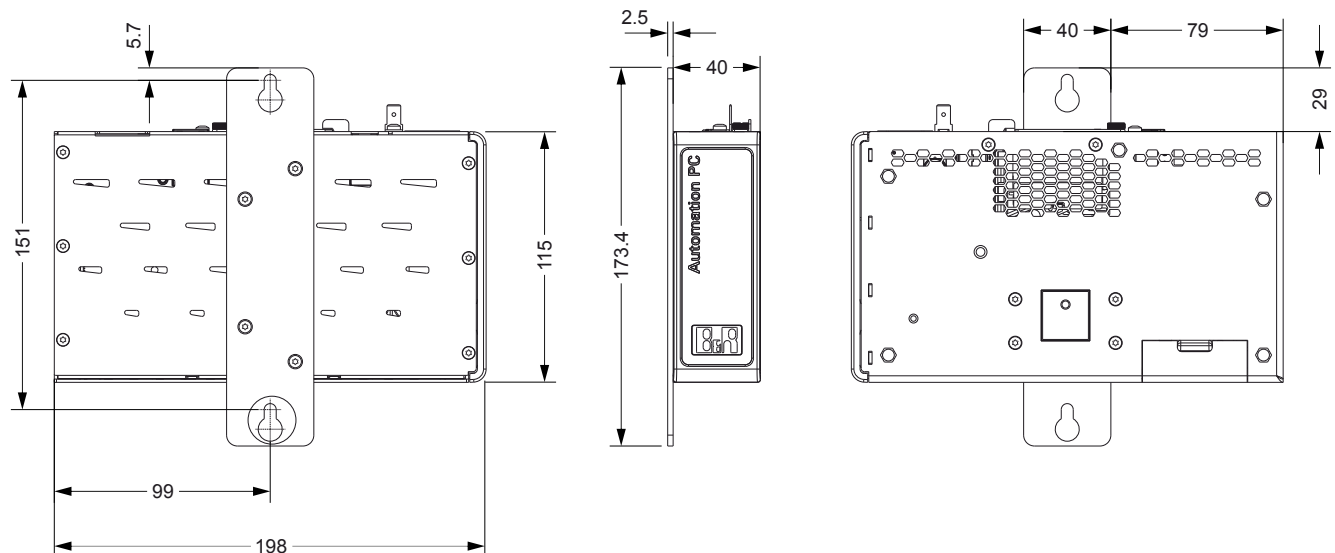
##### Book style

The Automation PC is installed at the rear to occupy as little space as possible to the sides.



##### Box style

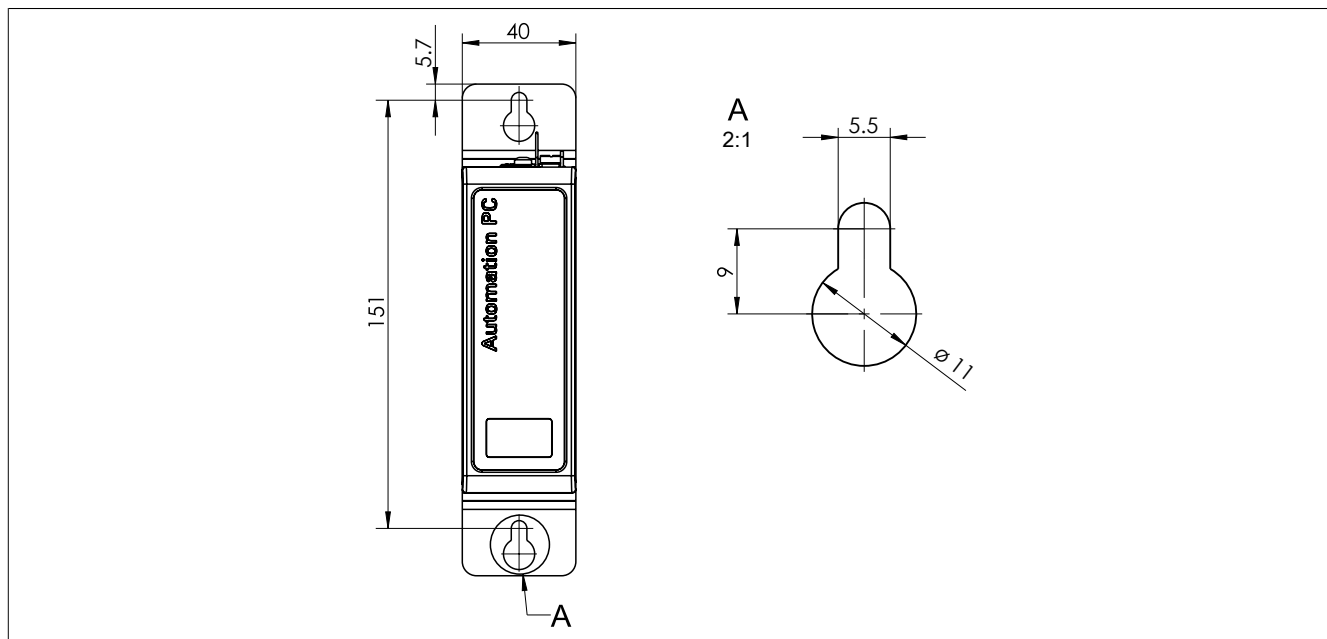
The Automation PC is installed on its side to occupy as little depth space as possible.



### 4.1.3.2 Drilling template

#### Information:

When installing the Automation PC 2200, spacing for air circulation and additional free space for operating and servicing the device must be taken into account.

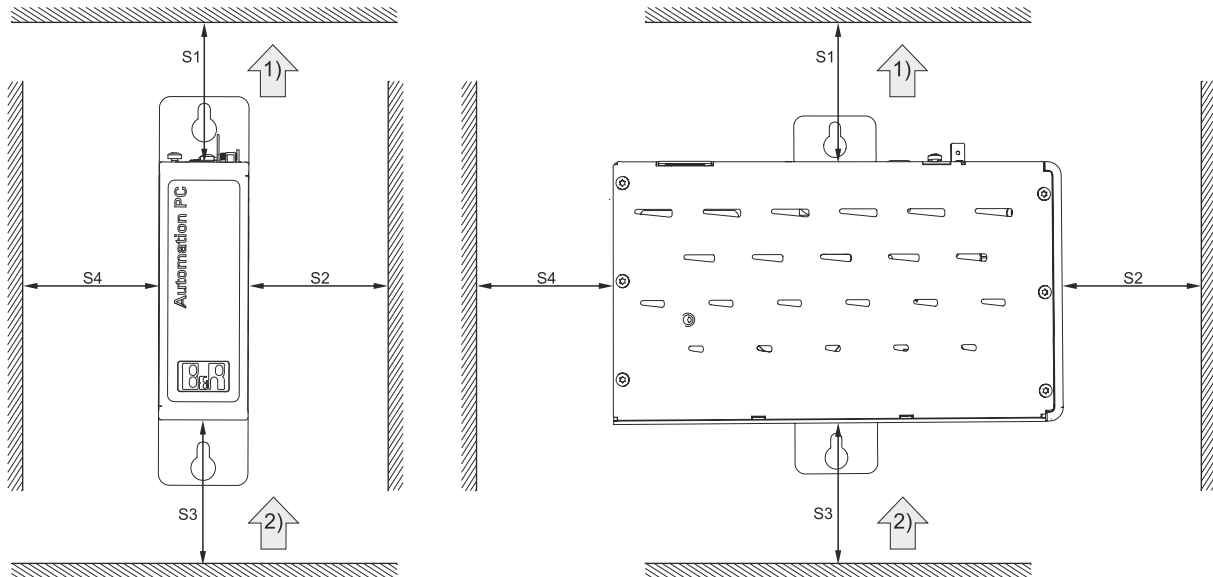


#### 4.1.3.3 Spacing for air circulation

To ensure sufficient air circulation, a specified clearance must be provided above, below, to the side and behind the device. For the minimum specified clearance, see the following diagrams. This is valid for all variants.

##### Information:

The following figure and table exclusively show the thermal view of the complete system. If additional space is required for operating or servicing the device or using accessories (e.g. cable strain relief clips), this must be taken into account during installation.



Legend			
1)	Air outlet	2)	Air inlet
Name	Minimum spacing [mm]	Name	Minimum spacing [mm]
S1	≥100	S2	≥50
S3	≥100	S4	≥50

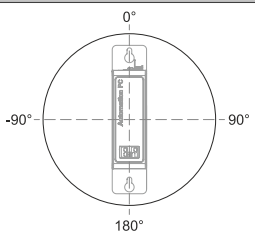
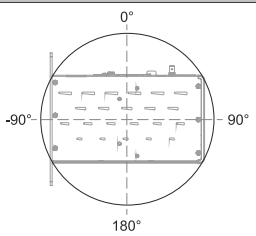
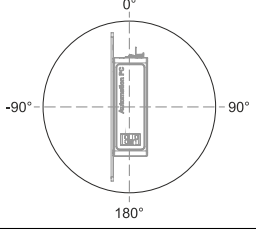
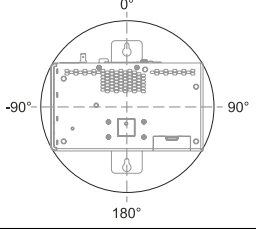
##### Caution!

The specified spacing for air circulation is based on worst-case operation at the maximum specified ambient temperature. The maximum specified ambient temperature is not permitted to be exceeded!

If the specified spacing for air circulation cannot be maintained, the maximum specified temperatures of the temperature sensors (see ["Temperature sensor positions" on page 32](#)) must be monitored in the application and appropriate measures taken if these values are exceeded.

#### 4.1.3.4 Mounting orientations

During installation, it is important to make sure that the spacing as described in section "[Spacing for air circulation](#)" on [page 27](#) is observed in order to achieve natural air circulation.

Book style	Inclination [°]	Derating [°C]	Book style	Inclination [°]	Derating [°C]
	0 to ±5	No limitation		0 to ±5	No limitation
	±5 to ±175	-5		5 to 175	Not allowed!
	±175 to 180	No limitation		-5 to -175	-5
				±175 to 180	-No limitation
Box style	Inclination [°]	Derating [°C]	Box style	Inclination [°]	Derating [°C]
	0 to ±5	No limitation		0 to ±5	No limitation
	5 to 175	Not allowed!		±5 to ±175	-5
	-5 to -175	-5		±175 to 180	No limitation
	±175 to 180	No limitation			

#### 4.1.3.5 Weight specifications

Component	Model number	Weight [g]
System units	5APC2200.ALxx-000	1170
CFast cards	5CFAST.xxxx-00	10
	5CFAST.xxxx-10	10
Monitor/Panel options	5ACCLI01.SDL0-000	20
	5ACCLI03.SDL4-000	50
Interface options	5ACCIF01.FPCC-000	25
	5ACCIF01.FPCS-000	25
	5ACCIF01.FPLK-000	25
	5ACCIF01.FPLS-000	25
	5ACCIF01.FPLS-001	25
	5ACCIF01.FPSC-000	25
	5ACCIF01.FPSC-001	25
	5ACCIF01.FSS0-000	25
	5ACCIF01.ICAN-000	25
	5ACCIF01.IS00-000	25
	5ACCIF03.CETH-000	25



## 4.1.4 Environmental properties

### 4.1.4.1 Temperature specifications

Because it is possible to combine different system units with a monitor/panel option and interface option, the following tables provide a component-dependent overview of the maximum, minimum and typical possible ambient temperatures resulting from these combinations.

#### Information:

The minimum and maximum specified ambient temperatures were determined under worst-case conditions for operation. Experience has shown that higher ambient temperatures can be achieved with typical applications in Microsoft Windows, for example. The relevant test and assessment must be carried out individually by the user on site (reading out the temperatures in BIOS or using the ADI Control Center, for example).

#### Information about worst-case conditions

- Power Thermal Utility from Intel for simulating 100% processor utilization
- BurnInTest V8.1 Pro from PassMark Software for simulating 100% interface utilization (100% network or USB interfaces using loopback adapters)
- Maximum expansion and power consumption of the system

#### 4.1.4.1.1 Maximum ambient temperature for worst-case operation

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, <b>non-condensing</b> .		Maximum worst-case ambient temperature (system unit 5APC2200.ALxx-000)			
The respective ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.		5APC2200.AL02-000 (E3930 1.3 GHz)	5APC2200.AL04-000 (E3930 1.3 GHz)	5APC2200.AL14-000 (E3940 1.6 GHz)	5APC2200.AL18-000 (E3940 1.6 GHz)
		55	55	50	50
Maximum ambient temperature (accessories)					
CFAST cards	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓
Monitor/Panel options	5ACCLI01.SDL0-000	✓	✓	✓	✓
	5ACCLI03.SDL4-000	✓	✓	✓	✓
Interface options	5ACCIF01.FPCC-000	✓	✓	✓	✓
	5ACCIF01.FPCS-000	✓	✓	✓	✓
	5ACCIF01.FPLK-000	✓	✓	✓	✓
	5ACCIF01.FPLS-000	✓	✓	✓	✓
	5ACCIF01.FPLS-001	✓	✓	✓	✓
	5ACCIF01.FPSC-000	✓	✓	✓	✓
	5ACCIF01.FPSC-001	✓	✓	✓	✓
	5ACCIF01.FSS0-000	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓
	5ACCIF01.IS00-000	✓	✓	✓	✓
	5ACCIF03.CETH-000	✓	✓	✓	✓

## 4.1.4.1.2 Minimum ambient temperature for worst-case operation

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, <b>non-condensing</b> .		Minimum worst-case ambient temperature (system unit 5APC2200.ALxx-000)			
		5APC2200.AL02-000 (E3930 1.3 GHz)	5APC2200.AL04-000 (E3930 1.3 GHz)	5APC2200.AL14-000 (E3940 1.6 GHz)	5APC2200.AL18-000 (E3940 1.6 GHz)
		-25	-25	-25	-25
Minimum ambient temperature (accessories)					
CFast cards	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓
Monitor/Panel options	5ACCLI01.SDL0-000	-20	-20	-20	-20
	5ACCLI03.SDL4-000	0	0	0	0
Interface options	5ACCIF01.FPCC-000	-20	-20	-20	-20
	5ACCIF01.FPCS-000	-20	-20	-20	-20
	5ACCIF01.FPLK-000	-20	-20	-20	-20
	5ACCIF01.FPLS-000	-20	-20	-20	-20
	5ACCIF01.FPLS-001	-20	-20	-20	-20
	5ACCIF01.FPSC-000	-20	-20	-20	-20
	5ACCIF01.FPSC-001	-20	-20	-20	-20
	5ACCIF01.FSS0-000	-20	-20	-20	-20
	5ACCIF01.ICAN-000	-20	-20	-20	-20
	5ACCIF01.IS00-000	-20	-20	-20	-20
	5ACCIF03.CETH-000	-20	-20	-20	-20

## 4.1.4.1.3 Maximum ambient temperature for typical operation

## Information about typical conditions

- The total power of all USB interfaces on the system unit is limited to 1 W.
- 2x Gigabit Ethernet
- No permanent 100% processor utilization and graphics utilization
- The power consumption of the complete system is limited to 20 W. For the power consumption of individual components, see 4.1.5.2 "Power calculation".

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, <b>non-condensing</b> .		Maximum ambient temperature for typical operation (system unit 5APC2200.ALxx-000)			
		5APC2200.AL02-000 (E3930 1.3 GHz)	5APC2200.AL04-000 (E3930 1.3 GHz)	5APC2200.AL14-000 (E3940 1.6 GHz)	5APC2200.AL18-000 (E3940 1.6 GHz)
The respective ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.		60	60	60	60
Maximum ambient temperature (accessories)					
CFast cards	5CFAST.xxxx-00 ≥ Rev. E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓
Monitor/Panel options	5ACCLI01.SDL0-000	✓	✓	✓	✓
	5ACCLI03.SDL4-000	55	55	55	55
Interface options	5ACCIF01.FPCC-000	55	55	55	55
	5ACCIF01.FPCS-000	55	55	55	55
	5ACCIF01.FPLK-000	55	55	55	55
	5ACCIF01.FPLS-000	55	55	55	55
	5ACCIF01.FPLS-001	55	55	55	55
	5ACCIF01.FPSC-000	55	55	55	55
	5ACCIF01.FPSC-001	55	55	55	55
	5ACCIF01.FSS0-000	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓
	5ACCIF01.IS00-000	55	55	55	55
	5ACCIF03.CETH-000	✓	✓	✓	✓

#### 4.1.4.1.4 Determining the ambient temperature

1. Select the system unit.
2. The columns specify the maximum or minimum temperature in worst-case operation or the maximum temperature in typical operation of the complete system depending on the respective system unit.

#### Information:

The maximum and typical temperature specifications correspond to a specification at 500 meters above sea level. The respective ambient temperature is derated approx. 1°C per 1000 meters starting at 500 m above sea level.

3. If graphics option, interface options and CFast cards are additionally installed in the APC2200 system, they may result in a temperature limitation.
  - If a "✓" (check mark) is entered for the installed component, it can be operated without any problems.
  - If the installed component has a temperature specification (e.g. "45[°C]"), the ambient temperature of the complete system is not permitted to exceed this value.
4. Possible limitations may arise due to the mounting orientation of the APC2200. For additional information, see section ["Mounting orientations" on page 28](#).
5. The relevant test and assessment must be carried out individually by the user on site (reading out the temperatures in BIOS or using the ADI Control Center). See section ["Information about typical conditions" on page 30](#).

#### 4.1.4.1.5 Ambient temperature during storage and transport

The following table provides an overview of the minimum and maximum ambient temperatures for storing and transporting the complete system. Limitations are possible due to individual components.

Component	Model number	Storage [°C]	Transport [°C]
System units	5APC2200.ALxx-000	-25 to 60	-25 to 60
CFast cards	5CFAST.xxxx-00	-50 to 100	-50 to 100
	5CFAST.032G-10 ≥ Rev. G0	-40 to 85	-40 to 85
	5CFAST.032G-10 ≤ Rev. F0	-55 to 95	-55 to 95
	5CFAST.064G-10 ≥ Rev. E0	-40 to 85	-40 to 85
	5CFAST.064G-10 ≤ Rev. D0	-55 to 95	-55 to 95
	5CFAST.128G-10 ≥ Rev. E0	-40 to 85	-40 to 85
	5CFAST.128G-10 ≤ Rev. D0	-55 to 95	-55 to 95
	5CFAST.256G-10	-40 to 85	-40 to 85
Monitor/Panel options	5ACCLI01.SDL0-000	-20 to 60	-20 to 60
	5ACCLI03.SDL4-000	-20 to 60	-20 to 60
Interface options	5ACCIF01.FPCC-000	-20 to 60	-20 to 60
	5ACCIF01.FPCS-000	-20 to 60	-20 to 60
	5ACCIF01.FPLK-000	-20 to 60	-20 to 60
	5ACCIF01.FPLS-000	-20 to 60	-20 to 60
	5ACCIF01.FPLS-001	-20 to 60	-20 to 60
	5ACCIF01.FPSC-000	-20 to 60	-20 to 60
	5ACCIF01.FPSC-001	-20 to 60	-20 to 60
	5ACCIF01.FSS0-000	-20 to 60	-20 to 60
	5ACCIF01.ICAN-000	-20 to 60	-20 to 60
	5ACCIF01.IS00-000	-20 to 60	-20 to 60
	5ACCIF03.CETH-000	-20 to 60	-20 to 60

#### 4.1.4.1.6 Temperature monitoring

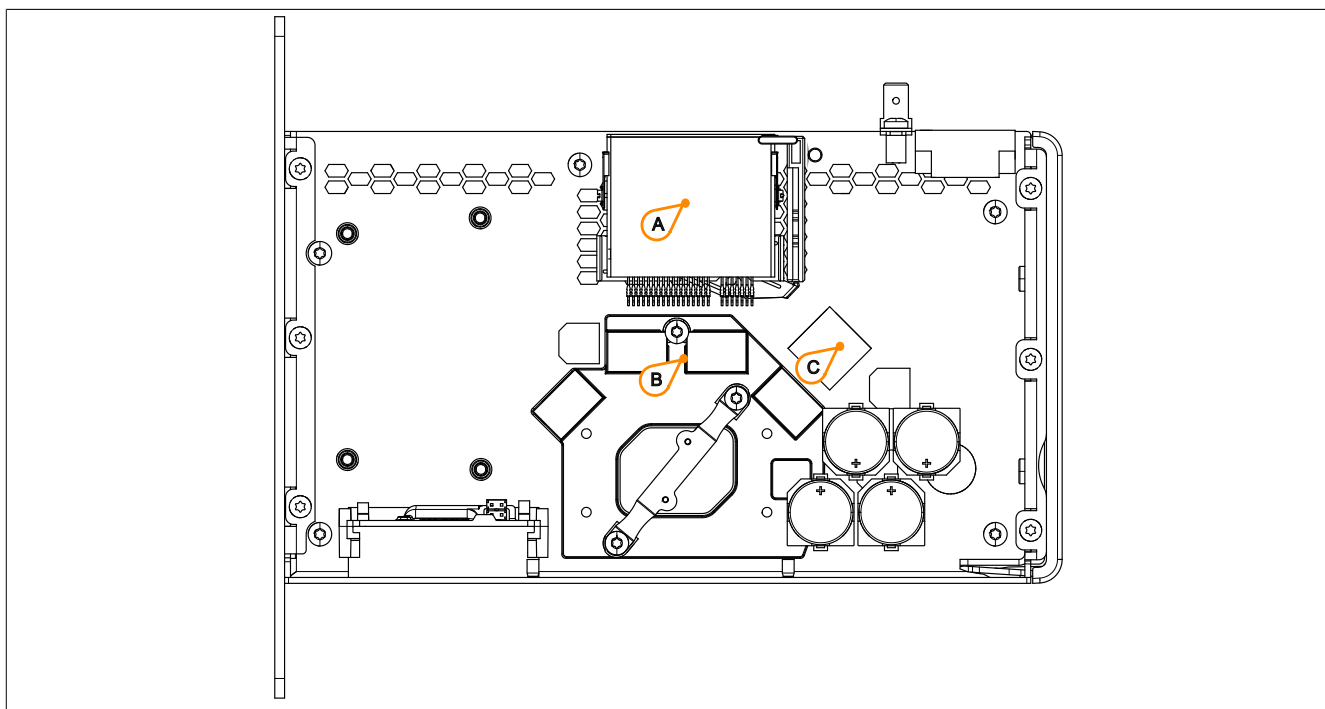
Sensors monitor temperature values at various areas in the xPC2200. For the position of temperature sensors, see section ["Temperature sensor positions" on page 32](#). The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.

Temperatures<sup>1)</sup> can be read out in different ways in approved operating systems:

- BIOS (see ["Baseboard" on page 114](#))
- ADI Control Center
- ADI Development Kit
- ADI .NET SDK
- B&R HMI Service Center
- B&R HMI Report
- ADI OPC UA Server
- Automation Runtime library

The CFast cards available from B&R are equipped with S.M.A.R.T support<sup>2)</sup>. Various parameters (e.g. temperature) can be read out in approved Microsoft Windows or Linux for B&R operating systems.

#### 4.1.4.1.7 Temperature sensor positions



ADI sensors	Position	Measuring point for	Measurement	Max. specified [°C]
System unit sensor 1	A	CFast	Temperature of the CFast area (sensor integrated on the CPU board).	95
System unit sensor 2	B	Main memory	Temperature of the main memory area (sensor integrated on the CPU board).	95
System unit sensor 3	C	MTCX	Temperature of the MTCX area (sensor integrated on the CPU board).	95

<sup>1)</sup> The measured temperature is a guide value for the immediate ambient temperature, but it may have been influenced by neighboring components.

<sup>2)</sup> Self-Monitoring, Analysis and Reporting Technology

#### 4.1.4.2 Relative humidity

The following tables show the minimum and maximum relative humidity (at 30°C, non-condensing) of the individual components that are relevant for limiting the humidity of the complete system. The smallest or largest value must always be used for this determination. For more detailed information, see technical data or temperature/humidity diagrams of the individual components.

Component	Model number	Operation [%]	Storage [%]	Transport [%]
System unit	5APC2200.ALxx-000	5 to 90	5 to 95	5 to 95
CFast card	5CFAST.xxxx-00	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.032G-10 ≥ Rev. G0	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.032G-10 ≤ Rev. F0	10 to 95	10 to 95	10 to 95
	5CFAST.064G-10 ≥ Rev. E0	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.064G-10 ≤ Rev. D0	10 to 95	10 to 95	10 to 95
	5CFAST.128G-10 ≥ Rev. E0	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.128G-10 ≤ Rev. D0	10 to 95	10 to 95	10 to 95
	5CFAST.256G-10	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
Monitor/Panel option	5ACCLI01.SDL0-000	5 to 90	5 to 95	5 to 95
	5ACCLI03.SDL4-000	5 to 90	5 to 95	5 to 95
Interface option	5ACCIF01.FPCC-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.FPCS-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.FPLK-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.FPLS-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.FPLS-001	5 to 90	5 to 95	5 to 95
	5ACCIF01.FPSC-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.FPSC-001	5 to 90	5 to 95	5 to 95
	5ACCIF01.FSS0-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.ICAN-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.IS00-000	5 to 90	5 to 95	5 to 95
	5ACCIF03.CETH-000	5 to 90	5 to 95	5 to 95

#### 4.1.4.3 Vibration and shock

The following table provides an overview of the maximum vibrations and shock values of the complete system. Limitations are possible due to individual components.

Vibration				
Automation PC	Operation <sup>1)</sup>		Storage <sup>1)3)</sup>	Transport <sup>1)3)</sup>
	Continuous	Periodic		
With CFast card	2 to 9 Hz: 1.75 mm amplitude 9 to 200 Hz: 0.5 g	2 to 9 Hz: 3.5 mm amplitude 9 to 200 Hz: 1 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g
With CFast card and cable strain relief clip	2 to 9 Hz: 3.5 mm amplitude 9 to 200 Hz: 1 g	2 to 9 Hz: 3.5 mm amplitude 9 to 200 Hz: 2 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g
Shock				
Automation PC	Operation <sup>2)</sup>		Storage <sup>2)3)</sup>	Transport <sup>2)3)</sup>
With CFast card	15 g, 11 ms		30 g, 6 ms	30 g, 6 ms

1) Testing is performed per EN 60068-2-6.

2) Testing is performed per EN 60068-2-27.

3) The specification refers to a device in its original packaging.

#### 4.1.4.4 Degree of protection

Under the following conditions, the Automation PC 2200 offers IP20 protection per EN 60529:

- Correct installation of the Automation PC 2200 (see ["Installation and wiring" on page 92](#))
- Installation of all covers or components on interfaces and slots
- Compliance with all ambient conditions

4.1.5 Electrical properties

4.1.5.1 Block diagram

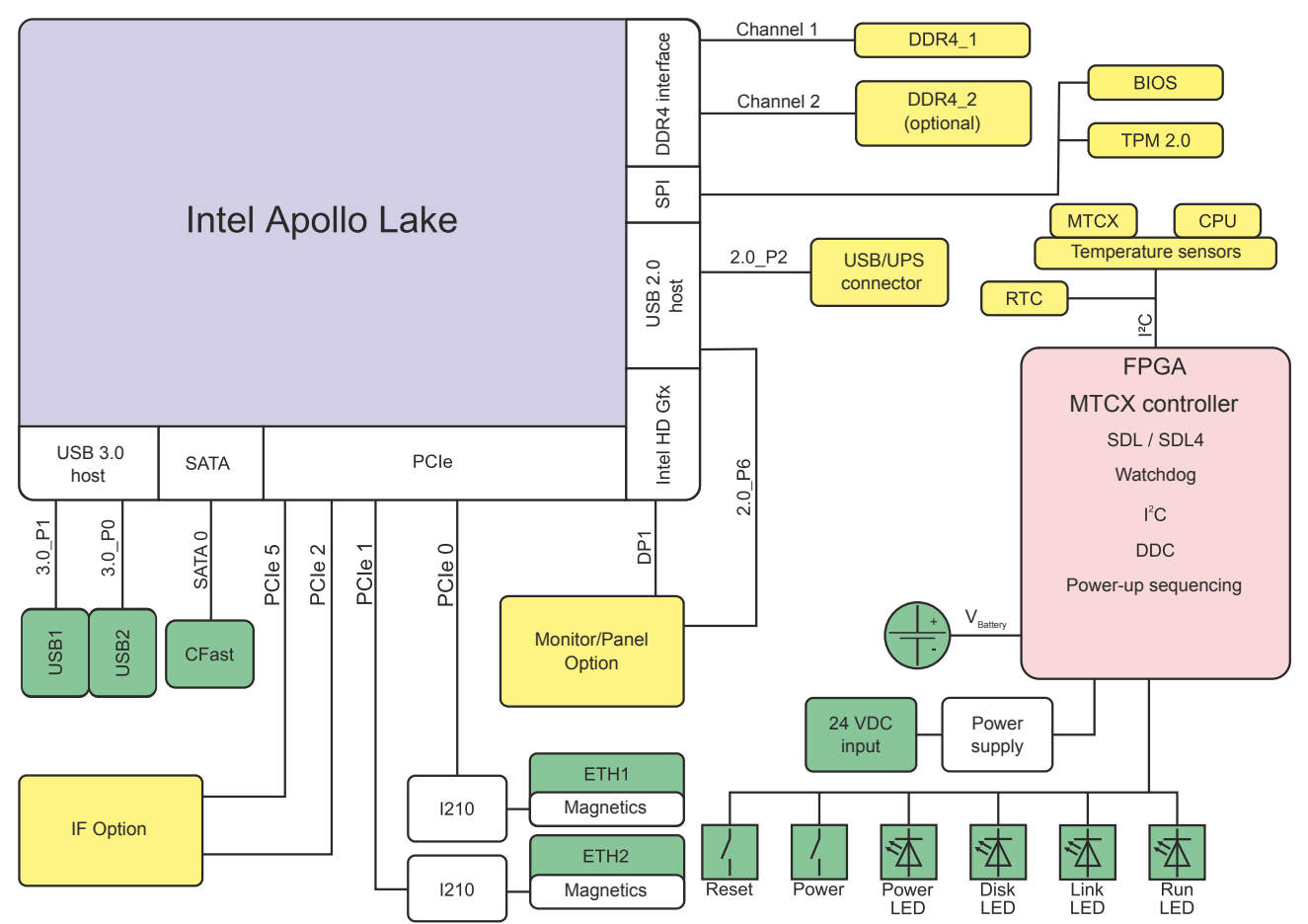


Figure 1: System units (5APC2200.ALxx-000) - Block diagram

Legend			
Internal interface	2.0_Px	USB 2.0 port x	
External interface	3.0_Px	USB 3.0 port x	

#### 4.1.5.2 Power calculation

In order to calculate the total power of the Automation PC 2200, the power ratings of the system unit used all other installed components must be added together.

#### Information:

Unless otherwise specified, the following values are maximum values and additional consumers (e.g. USB devices) are not taken into account.

#### System units

Type	Order number	Total power consumption of the system unit
APC2200 E3930 2C 1.30 GHz	5APC2200.AL02-000	Max. 15 W (without USB consumer) Max. 25 W (with USB consumer)
APC2200 E3930 2C 1.30 GHz	5APC2200.AL04-000	Max. 15 W (without USB consumer) Max. 25 W (with USB consumer)
APC2200 E3940 4C 1.60 GHz	5APC2200.AL14-000	Max. 20 W (without USB consumer) Max. 30 W (with USB consumer)
APC2200 E3940 4C 1.60 GHz	5APC2200.AL18-000	Max. 20 W (without USB consumer) Max. 30 W (with USB consumer)

#### Monitor/Panel options

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
SDL/DVI transmitter	5ACCLI01.SDL0-000	0.25 W	0.75 W	-	1 W
SDL4 transmitter	5ACCLI03.SDL4-000	2.2 W	1.8 W	-	4 W

#### Interface options

Type	Order number	+5 V	+ 3.3 V	+12 V	Total power consumption
POWERLINK CAN X2X	5ACCIF01.FPCC-000	0.45 W	1.55 W	-	2 W
POWERLINK RS485 CAN	5ACCIF01.FPCS-000	0.75 W	1 W	-	1.75 W
POWERLINK	5ACCIF01.FPLK-000	-	1.75 W	-	1.75 W
POWERLINK RS232	5ACCIF01.FPLS-000	0.5 W	1 W	-	1.5 W
POWERLINK RS232	5ACCIF01.FPLS-001	-	1.5 W	-	1.5 W
POWERLINK RS232 CAN	5ACCIF01.FPSC-000	0.75 W	1 W	-	1.75 W
POWERLINK RS232 CAN X2X	5ACCIF01.FPSC-001	0.6 W	1.4 W	-	2 W
2x RS422/RS485	5ACCIF01.FSS0-000	0.8 W	0.2 W	-	1 W
CAN	5ACCIF01.ICAN-000	0.45 W	0.05 W	-	0.5 W
1x RS232	5ACCIF01.IS00-000	-	0.5 W	-	0.5 W
2x ETH 10/100/1000	5ACCIF03.CETH-000	-	2 W	-	2 W

#### CFast cards

All data are maximum values of the current revision. <sup>3)</sup>

Type	Order number	+5 V	+3.3 V	+12 V	Total power consumption
SLC technology	5CFAST.xxxx-00	-	1.14 W	-	1.14 W
MLC technology	5CFAST.xxxx-10	-	2.03 W	-	2.03 W

#### 4.1.5.2.1 Calculation example

System unit 5APC2200.AL04-000 with USB consumers	25 W	25 W
POWERLINK interface option 5ACCIF01.FPLK-000	1.75 W	1.75 W
SDL4 monitor/panel option 5ACCLI03.SDL4-000	2.2 W + 1.8 W	4 W
CFast card 5CFAST.xxxx-10	2.03 W	2.03 W
<b>Total max.:</b>		<b>32.78 W</b>

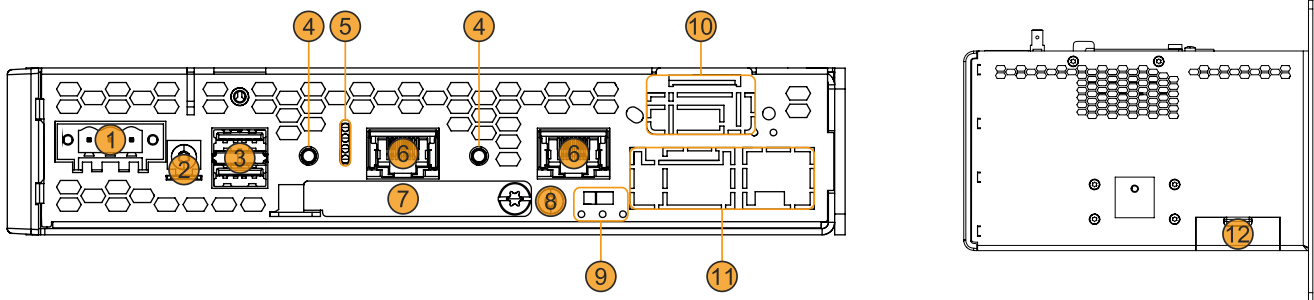
Table 1: Power calculation with example configuration

<sup>3)</sup> For detailed revision-dependent information, see [aggregate data sheet for CFast cards](#).

### 4.1.6 Device interface overview

#### Information:

The interfaces available on the device or module are numbered for the purpose of clear differentiation. The numbering used by the operating system may deviate, however.



Legend			
1	"+24 VDC power supply" on page 36	7	"CFast slot" on page 39
2	"Grounding" on page 37	8	Screw point for cable shield
3	"USB interfaces" on page 38	9	LED status indicators of the interface option <sup>1)</sup> IF option - Terminating resistor <sup>1)</sup>
4	"Power and reset buttons" on page 39	10	"IF option slot " on page 41 <sup>1)</sup>
5	"LED status indicators" on page 40	11	"Monitor/Panel interface" on page 41 <sup>2)</sup>
6	"Ethernet interfaces" on page 38	12	"Battery compartment" on page 42

1) Only available with installed interface option (configuration-dependent, see "Interface options" on page 52).

2) Only available with installed monitor/panel option (configuration-dependent, see "Monitor/Panel options" on page 47).

#### 4.1.6.1 +24 VDC power supply

#### Danger!

This device is only permitted to be supplied by a SELV/PELV power supply unit or with safety extra-low voltage (SELV) per IEC 61010-2-201.

The necessary 3-pin connector is not included in delivery; for suitable accessories, see "0TB103.9x" on page 158.

The device is protected against overload and reverse polarity by a soldered fuse (15 A, fast-acting). If the fuse is defective (e.g. due to overload), the device must be sent to B&R for repairs. If the polarity is reversed, it is not necessary to replace the fuse.

Pin	Description	Figure
1	+	
2	Functional ground	
3	-	
<ul style="list-style-type: none"> <li>Reverse polarity protection</li> <li>3-pin</li> <li>Male</li> </ul>		
Electrical properties		
Nominal voltage	24 VDC ±25%, SELV <sup>1)</sup>	
Nominal current	Max. 3 A	
Overvoltage category per EN 61131-2	II	
Inrush current	Typ. 5 A, max. 50 A for < 500 µs	
Galvanic isolation	Yes	
Uninterruptible power supply	No	

1) IEC 61010-2-201 requirements must be observed.

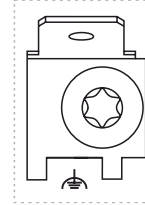


#### 4.1.6.1.1 Grounding

### Caution!

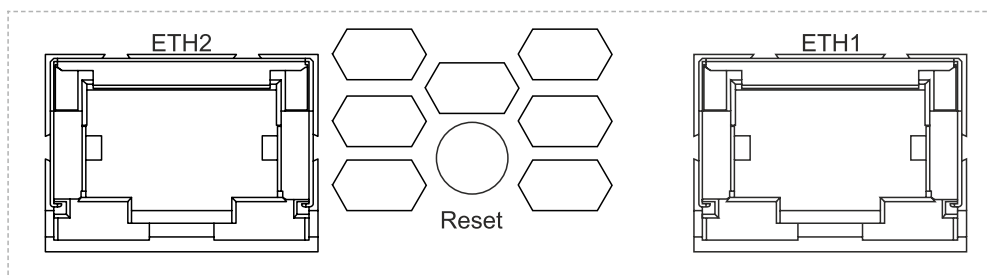
The functional ground (power supply pin 2 and ground connection) must be connected to the central grounding point (e.g. control cabinet or system) via the shortest possible path with the lowest possible resistance and with the largest possible wire cross section. This type of grounding is mandatory for proper functionality.

For example, a copper strip must be attached to the ground connection at a central grounding point of the control cabinet or system in which the device is installed. The wire cross section should be as large as possible (at least 2.5 mm<sup>2</sup>).

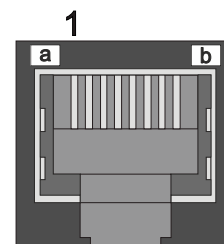


### 4.1.6.2 Ethernet interfaces

The Ethernet controller is routed externally via the system unit.



ETH1, ETH2		
Variant	RJ45, female	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s <sup>1)</sup>	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED "Speed" (b)</b>	<b>On</b>	<b>Off</b>
Green	100 Mbit/s	10 Mbit/s <sup>2)</sup>
Orange (dark)	1000 Mbit/s	-
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Orange (light)	Link (a connection to an Ethernet network exists)	Blinking (data being transferred)



- 1) Switching takes place automatically.
- 2) The 10 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

### Driver support

A special driver is required to operate the Ethernet controller. Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

**Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.**

### 4.1.6.3 USB interfaces

Automation PC 2200 devices are equipped with a Universal Serial Bus 3.0 (USB 3.0) host controller with several USB ports, of which 2 USB 3.0 interfaces are routed externally and freely available to the user.

### Warning!

**USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality. The functionality of USB devices available from B&R is ensured.**

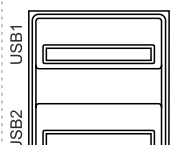
### Caution!

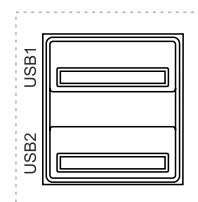
**Due to the general PC specification, this interface must be handled with the utmost care with regard to EMC, cable routing, etc.**

USB1 and USB2		
Standard	USB 3.0	
Variant	Type A, female	
Transfer rate	Low speed (1.5 Mbit/s)	
	Full speed (12 Mbit/s)	
	High speed (480 Mbit/s)	
	SuperSpeed (5 Gbit/s) <sup>1)</sup>	
Current-carrying capacity <sup>2)</sup>	Max. 1 A per connection	
Cable length		
	USB 2.0	Max. 5 m (without hub)
	USB 3.0	Max. 3 m (without hub)

USB1

USB2





- 1) Compatibility with SuperSpeed depends on the operating system used and is only possible with USB 3.0.
- 2) Each USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 1 A).

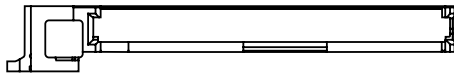
#### 4.1.6.4 CFast slot

The Automation PCPC offers an easily accessible CFast slot so that the CFast card can also be used as a removable storage medium for data transfer or upgrades.

This CFast slot is internally connected to the chipset via SATA 0 and implemented in version SATA III (SATA 6.0 Gbit/s).

### Warning!

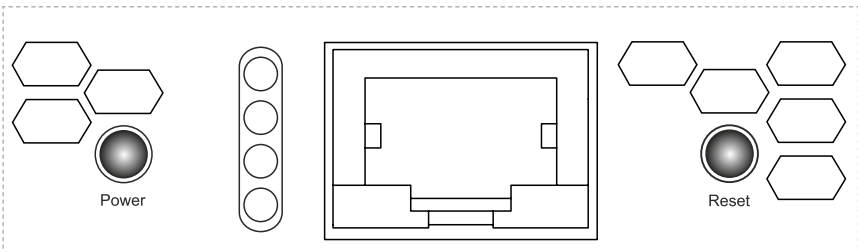
**CFast cards are only permitted to be inserted and removed in a voltage-free state!**

CFast slot		
Connection	SATA 0	
Order number	Short description	
CFast cards		
5CFAST.2048-00	CFast 2 GB SLC	
5CFAST.4096-00	CFast 4 GB SLC	
5CFAST.8192-00	CFast 8 GB SLC	
5CFAST.016G-00	CFast 16 GB SLC	
5CFAST.032G-00	CFast 32 GB SLC	
5CFAST.032G-10	CFast 32 GB MLC	
5CFAST.064G-10	CFast 64 GB MLC	
5CFAST.128G-10	CFast 128 GB MLC	
5CFAST.256G-10	CFast 256 GB MLC	

#### 4.1.6.5 Power and reset buttons

Both buttons can be pressed without any tools.

Description
<b>Power button</b> The power button offers full ATX power supply support and has various configurable functions. <ul style="list-style-type: none"> <li>• <b>Short press:</b> Switches the PC on or off or performs the action configured in the operating system when pressing the power button (shutdown, sleep, etc.).</li> <li>• <b>Long press (approx. 4 s):</b> The ATX power supply switches off the PC without shutting it down.</li> </ul> Pressing the power button does not reset the MTCX processor.
<b>Reset button</b> Pressing the reset button triggers a hardware/PCI reset. The PC is restarted. During a reset, the MTCX processor is not reset.



### Warning!

**Switching off the power without shutting down or resetting the system can result in data loss!**

#### 4.1.6.6 LED status indicators

Assignment	LED	Color	Status	Explanation	LED status indicator <sup>1)</sup>
	Power	Green	On	Power supply OK	
			Blinking	The device is started up; the battery state is "BAD".	
				<b>Information:</b> For additional information, see <a href="#">"Battery compartment"</a> .	
		Red	On	The system is in power saving mode (standby). <sup>1)</sup>	
			Blinking	The MTCX is running; the battery state is "BAD". The system is in power saving mode (standby). <sup>1)</sup>	
		Red-Green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power saving mode (standby) <sup>1)</sup>	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power saving mode (standby) <sup>1)</sup>	
	<b>Information:</b> An update must be performed again.				
	Disk	Yellow	On	Indicates drive access (CFast)	
	Link	Yellow	On	Indicates an active SDL connection on the panel connector.	
			Blinking	An active SDL connection was interrupted due to power loss of the panel.	
		<b>Information:</b> Check the power supply or power connection of the connected panel.			
	Run	Green	Blinking	Automation Runtime is starting up. Controlled by Automation Runtime (ARemb and AR-win).	
		Green	On	Application running Controlled by Automation Runtime (ARemb and AR-win).	
		Red	On	Application in SERVICE mode Controlled by Automation Runtime (ARemb and AR-win).	
Orange		Blinking	A license violation has occurred.		

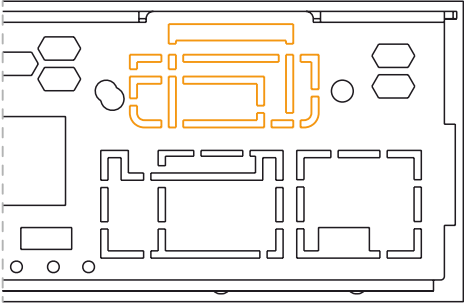
1) Two columns form 1 interval of 500 ms each.

2) S5: Soft-off  
S4: Hibernate (suspend-to-disk)

#### 4.1.6.7 Monitor/Panel interface

Automation PC system units have a monitor/panel interface. This can be configured with different monitor/panel options; a configuration without a monitor/panel option is also possible.

The following table lists the monitor/panel options that can be operated in the interface. For additional information, see section ["Monitor/Panel options" on page 47](#).

Monitor/Panel interface		
Model number	Monitor/Panel option	
	Short description	
5ACCLI01.SDL0-000	SDL/DVI transmitter - For APC2100/APC2200	
5ACCLI03.SDL4-000	SDL4 transmitter - For APC2200	

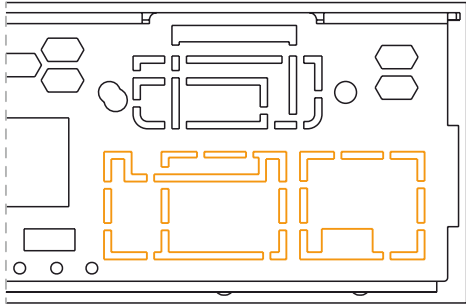
#### Information:

**Monitor/Panel options can only be installed and replaced at the B&R factory.**

#### 4.1.6.8 IF option slot

xPC2200 system units have 1 slot for an interface option.

The following table lists the interface options that can be operated in the IF option slot.

Interface option slot		
Order number	Interface options	
	Short description	
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPLK-000	Interface card - 1x POWERLINK interface - integrated 2-port hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPSC-001	Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF03.CETH-000	Interface card - 2x ETH interface (10/100/1000) - For APC2200/PPC2200	

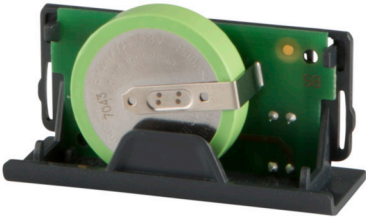
#### Information:

**Interface options can only be installed and replaced at the B&R factory.**

#### 4.1.6.9 Battery compartment

The battery compartment consists of the battery holder and the battery.

The lithium battery (3 V, 1000 mAh) ensures backup power to the internal real-time clock (RTC). It is located on the underside of the device behind the gray cover. The self-discharge time of the battery is at least 8 years (at 50°C, 6 µA for the components being supplied). The battery is subject to wear and should be replaced regularly (at least after the specified service life) by changing the battery (see ["Changing the battery" on page 154](#)).

Order number	Short description	Figure
<b>Accessories</b>		
5ACCBT01.0000-001	Battery compartment - Dark gray - Includes battery - For APC2200/PPC2200	

The battery state is determined by the system immediately after the device is switched on and subsequently every 24 hours. During the measurement, the battery is subjected to a brief load (approx. 1 second) and then assessed. The determined battery state is displayed in BIOS (see ["Baseboard" on page 114](#)) and the ADI Control Center but can also be read out in a customer application via the ADI library.

Battery state	Explanation
N/A	The hardware or firmware used is too old and does not support readout.
GOOD	Data retention is ensured.
BAD	As soon as the battery capacity is recognized as BAD (insufficient), the battery compartment must be replaced.

As soon as the battery capacity is recognized as insufficient, the battery compartment must be replaced. To avoid data loss during battery replacement, data is retained by a capacitor for approx. 2 minutes.

#### 4.1.6.10 Trusted Platform Module (TPM)

A Trusted Platform Module (TPM 2.0) is located on the system unit. A TPM is an additional chip integrated directly into the system hardware that adds important safety functions to the device. In particular, the TPM enables improved protection of the PC against unauthorized tampering by third parties. These safety functions are supported by current operating systems, such as Windows 10.

##### Enabling the Trusted Platform Module

The TPM is disabled by default and can be enabled in BIOS:

1. Parameter *TPM availability* must be set to **Available** under **Setup utility / Security**.
2. Apply this setting with **Save and exit**. The change only takes effect after a reboot, which takes place automatically.
3. Parameter *Target TPM device* must be set to **dTPM** under **Setup utility / Advanced / Security configuration**.

##### Information:

Before enabling the TPM, possible country-specific usage restrictions or regulations must be checked.

##### Using the Trusted Platform Module

The TPM can be used together with the drive encryption *BitLocker* in Windows 10, for example. To do this, follow the instructions in the operating system.

##### Information:

If the password for data encryption is lost, it is not possible to decrypt the data, e.g. after a BIOS update or TPM firmware update. Access to the encrypted drive is lost. Passwords must be carefully stored and protected from unauthorized access.

## 4.2 Individual components

### 4.2.1 System units


#### 4.2.1.1 5APC2200.ALxx-000

##### 4.2.1.1.1 General information

APC2200 system units consist of a CPU board, housing and mounting plate. It includes all interfaces; in addition, an interface option and monitor/panel option can be installed. The main memory is permanently soldered to the CPU board and cannot be replaced or upgraded.

- Intel Atom X processor series
- Intel Apollo Lake
- LPDDR4 memory
- Intel HD Graphics
- 1x CFast slot
- Slot for 1 monitor/panel option
- Slot for 1 interface option

#### 4.2.1.1.2 Order data

Order number	Short description	Figure
System units		
5APC2200.AL02-000	APC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 2 GB SDRAM	
5APC2200.AL04-000	APC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 4 GB SDRAM	
5APC2200.AL14-000	APC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 4 GB SDRAM	
5APC2200.AL18-000	APC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 8 GB SDRAM	
Required accessories		
CFast cards		
5CFAST.016G-00	CFast 16 GB SLC	
5CFAST.032G-00	CFast 32 GB SLC	
5CFAST.032G-10	CFast 32 GB MLC	
5CFAST.064G-10	CFast 64 GB MLC	
5CFAST.128G-10	CFast 128 GB MLC	
5CFAST.2048-00	CFast 2 GB SLC	
5CFAST.256G-10	CFast 256 GB MLC	
5CFAST.4096-00	CFast 4 GB SLC	
5CFAST.8192-00	CFast 8 GB SLC	
Optional accessories		
Interface options		
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FPLK-000	Interface card - 1x POWERLINK interface - Integrated 2-port hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FPSC-001	Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X Link Interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
5ACCIF03.CETH-000	Interface card - 2x ETH 10/100/1000 interface - For APC2200/PPC2200 - Only available with a new device	
Monitor/Panel options		
5ACCLI01.SDL0-000	Monitor/Panel option - 1x SDL/DVI transmitter - For APC2100/APC2200 - Only available with a new device	
5ACCLI03.SDL4-000	Monitor/Panel option - 1x SDL4 transmitter - For APC2200 - Only available with a new device	



## 4.2.1.1.3 Technical data

**Information:**

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5APC2200.AL02-000		5APC2200.AL04-000		5APC2200.AL14-000		5APC2200.AL18-000	
General information								
LEDs	Power, Disk, Link, Run							
B&R ID code	0xF0A9		0xF0AA		0xF0AB		0xF0AC	
Cooling	Passive via housing							
Power button	Yes							
Reset button	Yes							
Buzzer	No							
Certifications								
CE	Yes							
UKCA	Yes							
UL	cULus E115267 Industrial control equipment							
DNV	-						Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>1)</sup>	
LR	-						ENV3	
ABS	Yes		-				Yes	
BV	-						<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck	
Controller								
Bootloader	UEFI BIOS							
Processor								
Type	Intel Atom x5-E3930				Intel Atom x5-E3940			
Clock frequency	1300 MHz				1600 MHz			
Number of cores	2				4			
Architecture					14 nm			
Thermal design power (TDP)	6.5 W				9.5 W			
L2 cache					2 MB			
Intel 64 architecture					Yes			
Intel Hyper-Threading Technology					No			
Intel vPro Technology					No			
Intel Virtualization Technology (VT-x)					Yes			
Intel Virtualization Technology for Directed I/O (VT-d)					Yes			
Enhanced Intel SpeedStep Technology					Yes			
Chipset	Intel Apollo Lake							
Trusted Platform Module	TPM 2.0							
Real-time clock								
Accuracy	At 25°C: Typ. 12 ppm (1 second) per day <sup>2)</sup>							
Battery-backed	Yes							
Power failure logic								
Controller	MTCX <sup>3)</sup>							
Buffer time	10 ms							
Memory								
Type	LPDDR4 SDRAM							
Memory size	2 GB		4 GB				8 GB	
Velocity	DDR4L-2133							
Memory interface width	Single channel						Dual channel	
Removable	No							
Graphics								
Controller	Intel HD Graphics							
Max. dynamic graphics frequency	550 MHz				600 MHz			
Color depth	Max. 32-bit							
DirectX support	12							
OpenGL support	4.3							
Power management	ACPI 5.0							
Interfaces								
CFAST slot								
Quantity	1							
Type	SATA III (SATA 6.0 Gbit/s)							

## Technical data

Order number	5APC2200.AL02-000	5APC2200.AL04-000	5APC2200.AL14-000	5APC2200.AL18-000
USB				
Quantity		2		
Type		USB 3.0		
Variant		Type A		
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s) to SuperSpeed (5 Gbit/s) <sup>4)</sup>			
Current-carrying capacity		Max. 1 A per connection		
Ethernet				
Quantity		2		
Variant		RJ45, shielded		
Transfer rate		10/100/1000 Mbit/s		
Max. baud rate		1 Gbit/s		
<b>Slots</b>				
Interface option <sup>5)</sup>		1		
Monitor/Panel option <sup>6)</sup>		1		
<b>Electrical properties</b>				
Nominal voltage		24 VDC $\pm 25\%$ , SELV <sup>7)</sup>		
Nominal current		Max. 3 A		
Inrush current		Typ. 5 A, max. 50 A for $< 500 \mu\text{s}$		
Overvoltage category per EN 61131-2		II		
Galvanic isolation		Yes		
<b>Operating conditions</b>				
Pollution degree per EN 61131-2		Pollution degree 2		
Degree of protection per EN 60529		IP20 <sup>8)</sup>		
<b>Ambient conditions</b>				
Elevation				
Operation		Max. 3000 m (component-dependent) <sup>9)</sup>		
<b>Mechanical properties</b>				
Dimensions <sup>10)</sup>				
Width		40 mm		
Height		115 mm		
Depth		198 mm		
Weight		1170 g		

- 1) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 2) At max. specified ambient temperature: Typ. 58 ppm (5 seconds) - worst case 220 ppm (19 seconds).
- 3) Maintenance Controller Extended
- 4) The SuperSpeed transfer rate (5 Gbit/s) is only possible with USB 3.0.
- 5) The interface option cannot be replaced.
- 6) The monitor/panel option cannot be replaced.
- 7) IEC 61010-2-201 requirements must be observed.
- 8) Only if all interface covers are installed.
- 9) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 10) All dimensions without mounting plate.

## 4.2.2 Monitor/Panel options

### Information:

Monitor/Panel options can only be installed and replaced at the B&R factory.

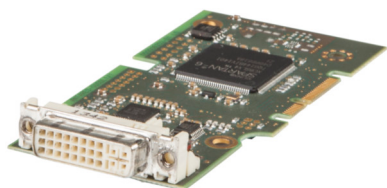
### 4.2.2.1 5ACCLI01.SDL0-000

#### 4.2.2.1.1 General information

Monitor/Panel option 5ACCLI01.SDL0-000 is equipped with an interface to connect panels via SDL or DVI.

- SDL/DVI interface
- Compatible with APC2100 and APC2200

#### 4.2.2.1.2 Order data

Order number	Short description	Figure
	<b>Monitor/Panel options</b>	
5ACCLI01.SDL0-000	Monitor/Panel option - 1x SDL/DVI transmitter - For APC2100/ APC2200 - Only available with a new device	

#### 4.2.2.1.3 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCLI01.SDL0-000
<b>General information</b>	
B&R ID code	0xE6B6
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
KR	Yes
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck Product family certification
EAC	
<b>Interfaces</b>	
Panel/Monitor interface <sup>3)</sup>	
Variant	DVI-I
Type	SDL/DVI/RGB (SDL/DVI/RGB)
<b>Electrical properties</b>	
Power consumption	1 W
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 60°C <sup>4)</sup>
Storage	-20 to 60°C
Transport	-20 to 60°C

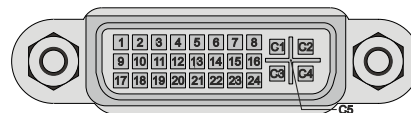
## Technical data

Order number	5ACCLI01.SDL0-000
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	20 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) The APC2200 does not have an RGB interface, DVI-D variant.
- 4) For detailed information, see the temperature tables in the user's manual.  
DVI and SDL operation is possible down to a minimum of -20°C; RGB operation is only possible down to a minimum of 0°C.

### 4.2.2.1.3.1 SDL/DVI interface

The interface is designed as a DVI-I connector (female) and can be operated with DVI-D or SDL transmission technology.



Pin	Pinout	Description	Pin	Pinout	Description
1	TMDS data 2-	DVI lane 2 (negative)	16	HPD	Hot plug detection
2	TMDS data 2+	DVI lane 2 (positive)	17	TMDS data 0-	DVI lane 0 (negative)
3	TMDS data 2/4 SHIELD	Shield for data pairs 2 and 4	18	TMDS data 0+	DVI lane 0 (positive)
4	SDL-	SDL lane (negative)	19	TMDS data 0/XUSB1 SHIELD	Shield of data pair 0 and USB1
5	SDL+	SDL lane (positive)	20	XUSB1-	USB lane 1 (negative)
6	DDC clock	DDC-based control signal (clock)	21	XUSB1+	USB lane 1 (positive)
7	DDC data	DDC-based control signal (data)	22	TMDS clock shield	Shield of clock pair
8	Not connected	Not connected	23	TMDS clock+	DVI clock (positive)
9	TMDS data 1-	DVI lane 1 (negative)	24	TMDS clock -	DVI clock (negative)
10	TMDS data 1+	DVI lane 1 (positive)	C1	Not connected	Not connected
11	TMDS data 1/XUSB0 SHIELD	Shield of data pair 1 and USB0	C2	Not connected	Not connected
12	XUSB0-	USB lane 0 (negative)	C3	Not connected	Not connected
13	XUSB0+	USB lane 0 (positive)	C4	Not connected	Not connected
14	+5 V power <sup>1)</sup>	+5 V power supply	C5	Not connected	Not connected
15	Ground (return for +5 V, HSync and VSync)	Ground	-		-

- 1) Protected internally by a multifuse.

## Information:

Hot plugging output devices on the interface for service purposes is supported by the hardware and graphic drivers of approved operating systems. Recalibration may be required for touch screen devices.

A maximum of 100 mating cycles are specified for this interface.

## Information:

In SDL operation without USB type A/B cable, the USB transfer rate is limited to USB 1.1.

A USB transfer rate of USB 2.0 is possible in DVI or SDL operation with a USB type A/B cable.

### Cable lengths and resolutions for SDL transfer

The following table shows the relationship between segment length and maximum resolution depending on the SDL cable:

SDL cable Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
0.8	5CASDL.0008-00	5CASDL.0008-00	5CASDL.0008-00	5CASDL.0008-00	5CASDL.0008-00	5CASDL.0008-00	5CASDL.0008-00
1.8	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00	5CASDL.0018-00
	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01	5CASDL.0018-01
	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03	5CASDL.0018-03
5	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00	5CASDL.0050-00
	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01	5CASDL.0050-01
	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03	5CASDL.0050-03
6	5CASDL.0060-00	5CASDL.0060-00	5CASDL.0060-00	5CASDL.0060-00	5CASDL.0060-00	5CASDL.0060-00	5CASDL.0060-00
10	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00	5CASDL.0100-00
	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01	5CASDL.0100-01
	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03	5CASDL.0100-03
15	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	5CASDL.0150-00	-	-
	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	5CASDL.0150-01	-	-
	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	5CASDL.0150-03	-	5CASDL.0150-03
20	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	5CASDL.0200-00	-	-
	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	5CASDL.0200-03	-	5CASDL.0200-03
25	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	5CASDL.0250-00	-	-	-
	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	5CASDL.0250-03	-	-	-
30	5CASDL.0300-00	5CASDL.0300-00	-	-	-	-	-
	5CASDL.0300-03	5CASDL.0300-03	5CASDL.0300-13	5CASDL.0300-13	5CASDL.0300-13	-	5CASDL.0300-13
40	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	5CASDL.0400-13	-	5CASDL.0400-13

### Cable lengths and resolutions for DVI transfer

The following table shows the relationship between segment length and maximum resolution depending on the DVI cable:

DVI cable Segment length [m]	Resolution						
	VGA 640 x 480	SVGA 800 x 600	XGA 1024 x 768	HD 1366 x 768	SXGA 1280 x 1024	UXGA 1600 x 1200	FHD 1920 x 1080
1.8	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00	5CADVI.0018-00
5	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00	5CADVI.0050-00

The maximum cable length for DVI transfer is limited to 5 m due to the USB specification.

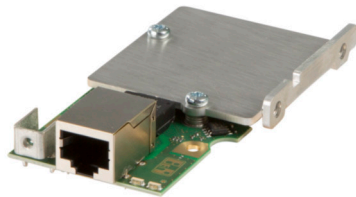
#### 4.2.2.2 5ACCLI03.SDL4-000

##### 4.2.2.2.1 General information

Monitor/Panel option 5ACCLI03.SDL4-000 is equipped with an SDL4 interface.

- SDL4 interface
- Compatible with APC2200

##### 4.2.2.2.2 Order data

Order number	Short description	Figure
5ACCLI03.SDL4-000	<b>Monitor/Panel options</b> Monitor/Panel option - 1x SDL4 transmitter - For APC2200 - Only available with a new device	

##### 4.2.2.2.3 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

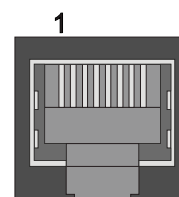
Order number	5ACCLI03.SDL4-000
<b>General information</b>	
B&R ID code	0xF244
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267
EAC	Industrial control equipment Product family certification
<b>Interfaces</b>	
SDL4 Out	
Variant	RJ45, shielded
Type	SDL4
<b>Electrical properties</b>	
Power consumption	4 W
<b>Ambient conditions</b>	
Temperature	
Operation	0 to 55°C <sup>1)</sup>
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	50 g

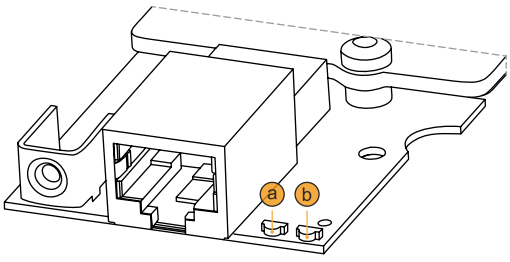
Table 8: 5ACCLI03.SDL4-000 - Technical data

1) For detailed information, see the temperature tables in the user's manual.

##### 4.2.2.2.3.1 SDL4 interface

The SDL4 interface is a female RJ45 connector and operated with SDL4 transmission technology.



SDL4 LEDs				
LED	Color	Status	Explanation	
Link (a)	Yellow	On	Indicates an active SDL4 connection.	
		Off	No active SDL4 connection.	
Status (b)	Yellow	On	The SDL4 connection is established and OK.	
		Blinking	No active SDL4 connection.	

## Information:

Hot plugging output devices on the interface for service purposes is supported by the hardware and graphic drivers of approved operating systems. Recalibration may be required for touch screen devices.

A maximum of 500 mating cycles are specified for this interface.

### 4.2.2.2.3.2 Cable lengths and resolutions

The maximum cable length for SDL4 transfer with a B&R SDL3/SDL4 cable is 100 meters (regardless of the resolution of the panel).

### 4.2.2.2.4 General limitations

- USB 2.0 transfer is limited to 150 Mbit/s with SDL4.
- A display is always emulated by the SDL4 transmitter using EDID data and hot plug detection, so DVI-compatible operation is possible. For this reason, the following behavior may occur during operation with multiple displays.

In the operating system, a connected panel is reported by the video driver even in the following situations:

- No SDL3/SDL4 cable is connected.
- There is no connection established yet between the SDL4 link module and SDL4 transmitter.

This behavior can be avoided by appropriate configuration in BIOS or via the graphics driver.

## 4.2.3 Interface options

### Information:

Interface options can only be installed and replaced at the B&R factory.

#### 4.2.3.1 5ACCIF01.FPCC-000


##### 4.2.3.1.1 General information

Interface option 5ACCIF01.FPCC-000 is equipped with a POWERLINK interface, 2 CAN bus master interfaces and an X2X Link master interface. In addition, 512 kB nvSRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 2x CAN bus master interfaces
- 1x X2X Link master interface
- 512 kB nvSRAM
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

This interface option can only be operated with Automation Runtime.

##### 4.2.3.1.2 Order data

Order number	Short description	Figure
5ACCIF01.FPCC-000	<b>Interface options</b>	
	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

##### 4.2.3.1.3 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPCC-000
<b>General information</b>	
LEDs	L1, L2, L3
B&R ID code	0xE9BD
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
KR	Yes
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
<b>Controller</b>	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)



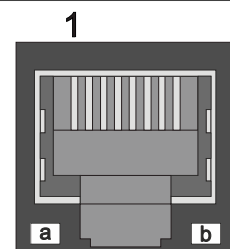
<b>Order number</b>	<b>5ACCIF01.FPCC-000</b>
<b>Interfaces</b>	
<b>POWERLINK</b>	
Quantity	1
Type	Type 4 <sup>3)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
<b>CAN</b>	
Quantity	2
Variant	10-pin, male <sup>4)</sup>
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch <sup>5)</sup>
Default setting	Each off
<b>X2X</b>	
Type	X2X Link master
Quantity	1
Variant	10-pin, male, galvanically isolated
<b>Electrical properties</b>	
Power consumption	2 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
<b>Temperature</b>	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
<b>Relative humidity</b>	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).
- 4) CAN1: Galvanically isolated.  
CAN2: Not galvanically isolated.
- 5) The terminating resistor can only be switched on/off for the CAN1 interface.

#### 4.2.3.1.3.1 POWERLINK interface - Pinout

The POWERLINK interface on the system unit is referred to as "IF option".

POWERLINK <sup>1)2)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	see "LED "S/E" (status/error LED)" on page 171	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)



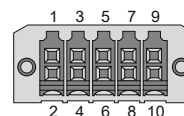
- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

#### 4.2.3.1.3.2 CAN bus 1 interface - Pinout

The CAN bus 1 interface on the system unit is referred to as "IF option".

A terminating resistor can be switched on or off for the CAN bus 1 interface. LED status indicator "L1" indicates whether the terminating resistor is switched on or off.

CAN bus 1 <sup>1)2)</sup>		
Variant	10-pin, male	
Galvanic isolation	Yes	
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
Pin	Pinout	
1	-	
2	Shield	
3	-	
4	-	
5	CAN H	
6	CAN L	
7	CAN GND	
8	-	
9	-	
10	-	



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

#### CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".

For additional information, see Automation Help.

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

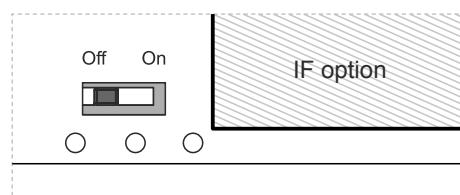
#### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

#### Terminating resistor

A terminating resistor is integrated on the interface option. A switch is used to switch the terminating resistor for the CAN bus 1 interface on and off. The terminating resistor cannot be switched on and off for the CAN bus 2 interface. LED status indicator "L1" indicates whether the terminating resistor of the CAN bus 1 interface is switched on or off.

- ON: Switched on
- OFF (default): Switched off

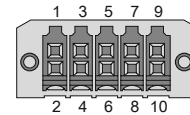


#### 4.2.3.1.3.3 CAN bus 2 interface - Pinout

The CAN bus 2 interface on the system unit is referred to as "IF option".

The terminating resistor cannot be switched on and off for the CAN bus 2 interface. A terminating resistor must therefore be taken into account during wiring.

CAN bus 2 <sup>(1)(2)</sup>		
Variant	10-pin, male	
Galvanic isolation	No	
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
Pin	Pinout	
1	-	
2	Shield	
3	-	
4	-	
5	-	
6	-	
7	-	
8	CAN GND	
9	CAN L	
10	CAN H	



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF4 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

#### CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".

For additional information, see Automation Help.

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

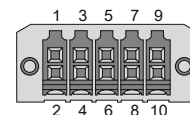
#### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

#### 4.2.3.1.3.4 X2X Link master interface - Pinout

The X2X Link master interface on the system unit is referred to as "IF option".

X2X Link master <sup>(1)(2)</sup>		
Variant	10-pin, male	
Galvanic isolation	Yes	
Pin	Pinout	
1	X2X	
2	Shield	
3	X2X <sub>I</sub>	
4	X2X <sub>L</sub>	
5	-	
6	-	
7	-	
8	-	
9	-	
10	-	

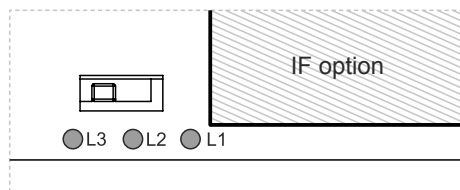


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF2 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

#### 4.2.3.1.3.5 LED status indicators L1, L2, L3

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus 1 terminating resistor is switched on.
		Off	The CAN bus 1 terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.



### POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 171.

#### 4.2.3.1.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

#### 4.2.3.1.5 Driver support and firmware update

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

### 4.2.3.2 5ACCIF01.FPCS-000


#### 4.2.3.2.1 General information

Interface option 5ACCIF01.FPCS-000 is equipped with a POWERLINK, RS485 and CAN bus master interface. In addition, 32 kB FRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x CAN bus master interface
- 1x RS485 interface
- 32 kB FRAM
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

This interface option can only be operated with Automation Runtime.

#### 4.2.3.2.2 Order data

Order number	Short description	Figure
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/ APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.2.3 Technical data

##### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPCS-000
<b>General information</b>	
LEDs	L1, L2, L3
B&R ID code	0xED7C
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck Product family certification
EAC	
<b>Controller</b>	
FRAM	
Size	32 kB
Data retention	10 years
Read/Write endurance	Min. 10 <sup>12</sup> times/byte
Remanent variables in power failure mode	32 kB (for e.g. Automation Runtime, see Automation Help)
<b>Interfaces</b>	
COM	
Quantity	1
Type	RS485, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

## Technical data

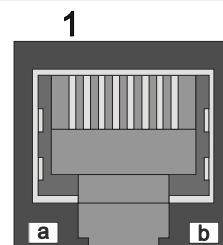
Order number	5ACCIF01.FPCS-000
POWERLINK	
Quantity	1
Type	Type 4 <sup>3)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, not galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
<b>Electrical properties</b>	
Power consumption	1.75 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

### 4.2.3.2.3.1 POWERLINK interface - Pinout

The POWERLINK interface on the system unit is referred to as "IF option".

POWERLINK <sup>1/2)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

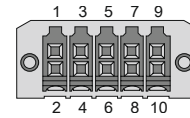


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

#### 4.2.3.2.3.2 Serial interface COM - Pinout

Serial interface COM on the system unit is referred to as "IF option".

Serial interface COM <sup>(1)(2)</sup>	
Variant	RS485
Type	10-pin, male
Galvanic isolation	No
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	Pinout
1	-
2	Shield
3	-
4	-
5	-
6	-
7	-
8	COM GND
9	DATA\
10	DATA



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF7 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

The RTS line must be switched by the driver for each transmission or reception; switching back does not take place automatically.

With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

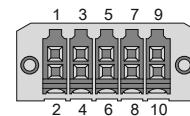
#### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

#### 4.2.3.2.3.3 CAN bus interface - Pinout

The CAN bus interface on the system unit is referred to as "IF option".

CAN bus <sup>(1)(2)</sup>	
Variant	10-pin, male
Galvanic isolation	No
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Pin	Pinout
1	-
2	Shield
3	-
4	-
5	CAN H
6	CAN L
7	CAN GND
8	-
9	-
10	-



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

#### CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".

For additional information, see Automation Help.

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

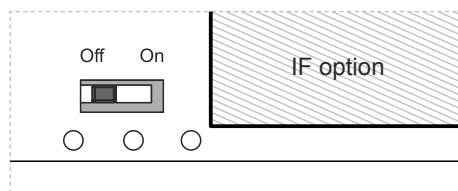
### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

### Terminating resistor

A terminating resistor is integrated on the interface option. It is switched on or off for the CAN bus interface with a switch. LED status indicator L1 indicates the current state:

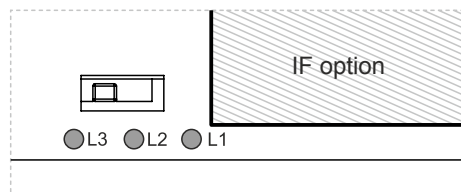
- ON: Activated
- OFF (default): Switched off



#### 4.2.3.2.3.4 LED status indicators

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See <a href="#">"LED "S/E" (status/error LED)" on page 171</a> .
		Off	POWERLINK status/error LED See <a href="#">"LED "S/E" (status/error LED)" on page 171</a> .



### POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see ["LED "S/E" \(status/error LED\)" on page 171](#).

#### 4.2.3.2.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

#### 4.2.3.2.5 Driver support and firmware update

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).



### 4.2.3.3 5ACCIF01.FPLK-000

#### 4.2.3.3.1 General information

Interface option 5ACCIF01.FPLK-000 is equipped with 2 female RJ45 connectors; both connectors are connected to an integrated POWERLINK hub. In addition, 512 kB nvSRAM is installed.

With the integrated 2-port hub, a simple tree structure, daisy chain wiring or optional ring redundancy can be easily implemented without additional effort.

With poll-response chaining (PRC), the IF option offers a solution for the highest demands on response time and the shortest cycle times. Especially for central control tasks, poll-response chaining in combination with the B&R control system provides ideal performance.


- 1x POWERLINK interface for real-time communication
- 512 kB nvSRAM
- Integrated hub for economical wiring
- Configurable ring redundancy
- Poll-response chaining
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

This interface option can only be operated with Automation Runtime.

#### Information:

**Ring redundancy in combination with poll-response chaining is not possible at the same time with this IF option.**

#### 4.2.3.3.2 Order data

Order number	Short description	Figure
	<b>Interface options</b>	
5ACCIF01.FPLK-000	Interface card - 1x POWERLINK interface - Integrated 2-port hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	

#### 4.2.3.3.3 Technical data

#### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPLK-000
<b>General information</b>	
LEDs	L1, L2, L3
B&R ID code	0xE9BA
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
EAC	Product family certification
<b>Controller</b>	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)

## Technical data

<b>Order number</b>	<b>5ACCIF01.FPLK-000</b>
<b>Interfaces</b>	
<b>POWERLINK</b>	
Quantity	1 (integrated 2-port hub)
Type	Type 4, redundant <sup>2)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
<b>Electrical properties</b>	
Power consumption	1.75 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	25 g

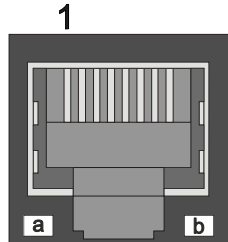
1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.

2) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

### 4.2.3.3.3.1 POWERLINK 1 interface - Pinout

The POWERLINK 1 interface on the system unit is referred to as "IF option".

POWERLINK 1 <sup>1)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

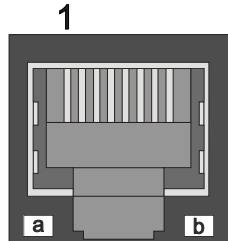


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

### 4.2.3.3.3.2 POWERLINK 2 interface - Pinout

The POWERLINK 2 interface on the system unit is referred to as "IF option".

POWERLINK 2 <sup>1)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

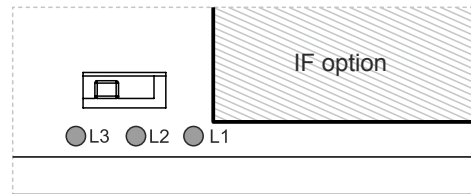


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

#### 4.2.3.3.3 LED status indicators L1, L2, L3

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators			
LED	Color	Status	Explanation
L1	Green	On	POWERLINK 2 link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK 2 link LED Data is being transferred.
L2	Green	On	POWERLINK 1 link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK 1 link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.



#### POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see ["LED "S/E" \(status/error LED\)" on page 171](#).

#### 4.2.3.3.4 Driver support and firmware update

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).


#### 4.2.3.4 5ACCIF01.FPLS-000

##### 4.2.3.4.1 General information

Interface option 5ACCIF01.FPLS-000 is equipped with a POWERLINK and RS232 interface. In addition, 32 kB FRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x RS232 interface
- 32 kB FRAM
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

##### 4.2.3.4.2 Order data

Order number	Short description	Figure
	<b>Interface options</b>	
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

##### 4.2.3.4.3 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPLS-000
<b>General information</b>	
LEDs	L2, L3
B&R ID code	0xE540
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
KR	Yes
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
<b>Controller</b>	
FRAM	
Size	32 kB
Data retention	10 years
Read/Write endurance	Min. 10 <sup>12</sup> times/byte
Remanent variables in power failure mode	32 kB (for e.g. Automation Runtime, see Automation Help)
<b>Interfaces</b>	
COM	
Quantity	1
Type	RS232, modem supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

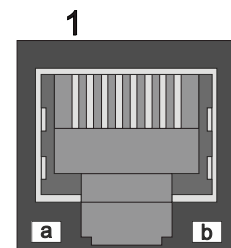
Order number	5ACCIF01.FPLS-000
POWERLINK	
Quantity	1
Type	Type 4 <sup>3)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

#### 4.2.3.4.3.1 POWERLINK interface - Pinout

The POWERLINK interface on the system unit is referred to as "IF option".

POWERLINK <sup>1)2)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

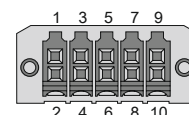


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

#### 4.2.3.4.3.2 Serial interface COMA - Pinout

Serial interface COMA on the system unit is referred to as "IF option".

Serial interface COMA <sup>1)2)3)</sup>		
	<b>RS232</b>	
Variant	10-pin, male	
Type	RS232, modem supported	
Galvanic isolation	No	
UART	16550-compatible, 16-byte FIFO buffer	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
<b>Pin</b>	<b>Pinout</b>	
1	DCD	
2	DSR	
3	RXD	
4	RTS	
5	TXD	
6	CTS	
7	DTR	
8	RI	
9	GND	
10	Shield	



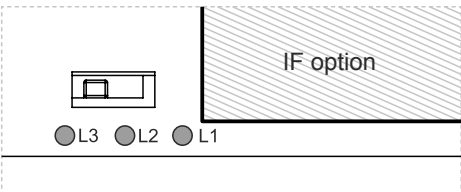
- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface (if available) is automatically enabled in BIOS as COMA with default addresses I/O:3F8h and IRQ:4.
- 3) In Automation Studio / Automation Runtime, this interface is referred to as IF5.

## Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 169.

### 4.2.3.4.3.3 LED status indicators L2, L3

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators				
LED	Color	Status	Explanation	
L1			Not connected	
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.	
		Blinking	POWERLINK link LED Data is being transferred.	
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.	
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.	

## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 171.

### 4.2.3.4.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

### 4.2.3.4.5 Driver support and firmware update

Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- Linux for B&R
- Windows 10

## Automation Runtime / B&R Hypervisor (RTOS)

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

All interfaces of the interface option are supported in Automation Runtime / B&R Hypervisor.

## General purpose operating system (GPOS)

If this interface option is used with a GPOS, only operation of the serial port(s) is supported and the firmware update function cannot be used.


### 4.2.3.5 5ACCIF01.FPLS-001

#### 4.2.3.5.1 General information

Interface option 5ACCIF01.FPLS-001 is equipped with a POWERLINK and RS232 interface. In addition, 512 kB nvSRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x RS232 interface
- 512 kB nvSRAM
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

#### 4.2.3.5.2 Order data

Order number	Short description	Figure
	<b>Interface options</b>	
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.5.3 Technical data

##### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPLS-001
<b>General information</b>	
LEDs	L2, L3
B&R ID code	0xE9B9
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
<b>Controller</b>	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
<b>Interfaces</b>	
COM	
Quantity	1
Type	RS232, modem supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

## Technical data

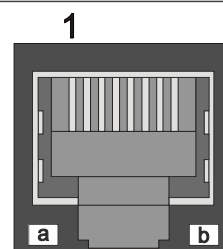
Order number	5ACCIF01.FPLS-001
POWERLINK	
Quantity	1
Type	Type 4 <sup>3)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

### 4.2.3.5.3.1 POWERLINK interface - Pinout

The POWERLINK interface on the system unit is referred to as "IF option".

POWERLINK <sup>1)2)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Off</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

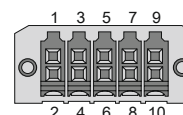


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

### 4.2.3.5.3.2 Serial interface COMA - Pinout

Serial interface COMA on the system unit is referred to as "IF option".

Serial interface COMA <sup>1)2)3)</sup>		
	<b>RS232</b>	
Variant	10-pin, male	
Type	RS232, modem supported	
Galvanic isolation	No	
UART	16550-compatible, 16-byte FIFO buffer	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
<b>Pin</b>	<b>Pinout</b>	
1	DCD	
2	DSR	
3	RXD	
4	RTS	
5	TXD	
6	CTS	
7	DTR	
8	RI	
9	GND	
10	Shield	



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface (if available) is automatically enabled in BIOS as COMA with default addresses I/O:3F8h and IRQ:4.
- 3) In Automation Studio / Automation Runtime, this interface is referred to as IF5.

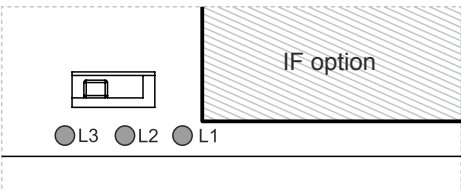


## Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

### 4.2.3.5.3 LED status indicators L2, L3

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators				
LED	Color	Status	Explanation	
L1			Not connected	
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.	
		Blinking	POWERLINK link LED Data is being transferred.	
L3	Green-Red	On	POWERLINK status/error LED See <a href="#">"LED "S/E" (status/error LED)" on page 171</a> .	
		Off	POWERLINK status/error LED See <a href="#">"LED "S/E" (status/error LED)" on page 171</a> .	

## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see ["LED "S/E" \(status/error LED\)" on page 171](#).

### 4.2.3.5.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

### 4.2.3.5.5 Driver support and firmware update

Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- Linux for B&R
- Windows 10

## Automation Runtime / B&R Hypervisor (RTOS)

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

All interfaces of the interface option are supported in Automation Runtime / B&R Hypervisor.

## General purpose operating system (GPOS)

If this interface option is used with a GPOS, only operation of the serial port(s) is supported and the firmware update function cannot be used.

### 4.2.3.6 5ACCIF01.FPSC-000

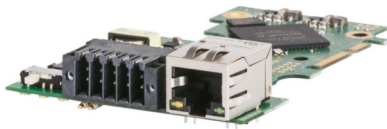
#### 4.2.3.6.1 General information

Interface option 5ACCIF01.FPSC-000 is equipped with a POWERLINK, RS232 and CAN bus master interface. In addition, 32 kB FRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x CAN bus master interface
- 1x RS232 interface
- 32 kB FRAM
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

This interface option can only be operated with Automation Runtime.

#### 4.2.3.6.2 Order data

Order number	Short description	Figure
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/ APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.6.3 Technical data

##### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPSC-000
<b>General information</b>	
LEDs	L1, L2, L3
B&R ID code	0xE53F
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
KR	Yes
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck Product family certification
EAC	
<b>Controller</b>	
FRAM	
Size	32 kB
Data retention	10 years
Read/Write endurance	Min. 10 <sup>12</sup> times/byte
Remanent variables in power failure mode	32 kB (for e.g. Automation Runtime, see Automation Help)
<b>Interfaces</b>	
COM	
Quantity	1
Type	RS232, modem not supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

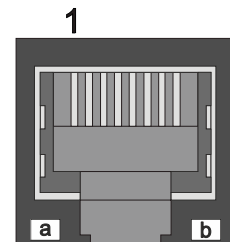
Order number	5ACCIF01.FPSC-000
POWERLINK	
Quantity	1
Type	Type 4 <sup>3)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, not galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
<b>Electrical properties</b>	
Power consumption	1.75 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.  
2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.  
3) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

#### 4.2.3.6.3.1 POWERLINK interface - Pinout

The POWERLINK interface on the system unit is referred to as "IF option".

POWERLINK <sup>1/2)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

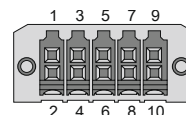


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.  
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

#### 4.2.3.6.3.2 Serial interface COM - Pinout

Serial interface COM on the system unit is referred to as "IF option".

Serial interface COM <sup>(1)(2)</sup>		
	<b>RS232</b>	
Variant	10-pin, male	
Type	RS232, not modem supported	
Galvanic isolation	No	
UART	16550-compatible, 16-byte FIFO buffer	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
	<b>Pin</b>	<b>Pinout</b>
	1	-
	2	Shield
	3	-
	4	-
	5	-
	6	-
	7	-
	8	COM GND
	9	RXD
	10	TXD



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF5 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

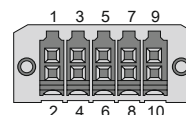
#### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

#### 4.2.3.6.3.3 CAN bus interface - Pinout

The CAN bus interface on the system unit is referred to as "IF option".

CAN bus <sup>(1)(2)</sup>		
	<b>CAN bus</b>	
Variant	10-pin, male	
Galvanic isolation	No	
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
	<b>Pin</b>	<b>Pinout</b>
	1	-
	2	Shield
	3	-
	4	-
	5	CAN H
	6	CAN L
	7	CAN GND
	8	-
	9	-
	10	-



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

#### CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".

For additional information, see Automation Help.

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

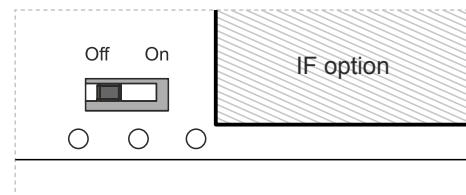
## Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

## Terminating resistor

A terminating resistor is integrated on the interface option. It is switched on or off for the CAN bus interface with a switch. LED status indicator L1 indicates the current state:

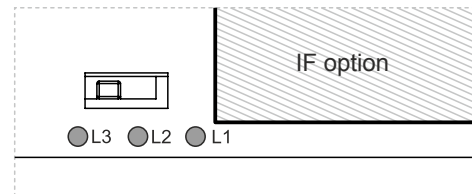
- ON: Activated
- OFF (default): Switched off



### 4.2.3.6.3.4 LED status indicators L1, L2, L3

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See <a href="#">"LED "S/E" (status/error LED)" on page 171</a> .
		Off	POWERLINK status/error LED See <a href="#">"LED "S/E" (status/error LED)" on page 171</a> .



## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see ["LED "S/E" \(status/error LED\)" on page 171](#).

### 4.2.3.6.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

### 4.2.3.6.5 Driver support and firmware update

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

### 4.2.3.7 5ACCIF01.FPSC-001

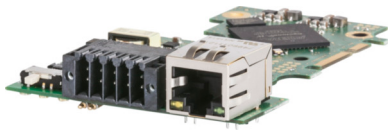
#### 4.2.3.7.1 General information

Interface option 5ACCIF01.FPSC-001 is equipped with a POWERLINK, RS232, CAN bus master and X2X Link master interface. In addition, 512 kB nvSRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x CAN bus master interface
- 1x X2X Link master interface
- 1x RS232 interface
- 512 kB nvSRAM
- Compatible with APC2100/PC2100 and APC2200/PPC2200

This interface option can only be operated with Automation Runtime.

#### 4.2.3.7.2 Order data

Order number	Short description	Figure
	<b>Interface options</b>	
5ACCIF01.FPSC-001	Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X Link Interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.7.3 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FPSC-001
<b>General information</b>	
LEDs	L1, L2, L3
B&R ID code	0xE9BC
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck Product family certification
EAC	
<b>Controller</b>	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
<b>Interfaces</b>	
COM	
Quantity	1
Type	RS232, modem not supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

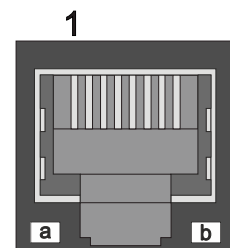
Order number	5ACCIF01.FPSC-001
POWERLINK	
Quantity	1
Type	Type 4 <sup>3)</sup>
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
X2X	
Type	X2X Link master
Quantity	1
Variant	10-pin, male, galvanically isolated
<b>Electrical properties</b>	
Power consumption	2 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

#### 4.2.3.7.3.1 POWERLINK interface - Pinout

The POWERLINK interface on the system unit is referred to as "IF option".

POWERLINK <sup>1)2)</sup>		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED status indicator (b)</b>	<b>On</b>	<b>Off</b>
Green	See status/error LED.	
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

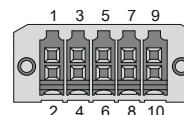


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

#### 4.2.3.7.3.2 Serial interface COM - Pinout

Serial interface COM on the system unit is referred to as "IF option".

Serial interface COM <sup>(1)(2)</sup>		
	<b>RS232</b>	
Variant	10-pin, male	
Type	RS232, not modem supported	
Galvanic isolation	No	
UART	16550-compatible, 16-byte FIFO buffer	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
	<b>Pin</b>	<b>Pinout</b>
	1	-
	2	Shield
	3	-
	4	-
	5	-
	6	-
	7	-
	8	COM GND
	9	RXD
	10	TXD



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF5 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

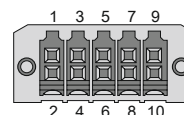
#### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

#### 4.2.3.7.3.3 CAN bus interface - Pinout

The CAN bus interface on the system unit is referred to as "IF option".

CAN bus <sup>(1)(2)</sup>		
Variant	10-pin, male	
Galvanic isolation	Yes	
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
	<b>Pin</b>	<b>Pinout</b>
	1	-
	2	Shield
	3	-
	4	-
	5	CAN H
	6	CAN L
	7	CAN GND
	8	-
	9	-
	10	-



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

#### CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".

For additional information, see Automation Help.

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s



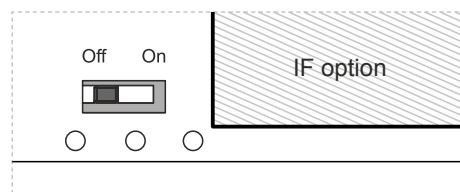
## Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

## Terminating resistor

A terminating resistor is integrated on the interface option. It is switched on or off for the CAN bus interface with a switch. LED status indicator L1 indicates the current state:

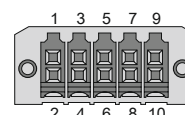
- ON: Activated
- OFF (default): Switched off



### 4.2.3.7.3.4 X2X Link master interface - Pinout

The X2X Link master interface on the system unit is referred to as "IF option".

X2X Link master <sup>1)2)</sup>	
Variant	10-pin, male
Galvanic isolation	Yes
Pin	Pinout
1	X2X
2	Shield
3	X2X <sub>I</sub>
4	X2X <sub>L</sub>
5	-
6	-
7	-
8	-
9	-
10	-

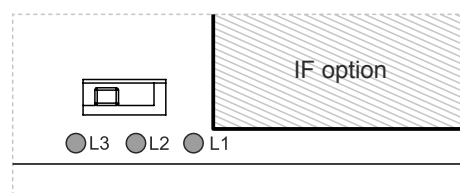


- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface can only be used in Automation Runtime and is displayed as IF2 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not displayed in BIOS.

### 4.2.3.7.3.5 LED status indicators L1, L2, L3

The LEDs of the interface option are located near the ETH1 interface.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 171.



## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see ["LED "S/E" \(status/error LED\)" on page 171](#).

### 4.2.3.7.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

#### 4.2.3.7.5 Driver support and firmware update

The driver is part of the Automation Runtime and the firmware is part of Automation Studio. The module is automatically brought up to this level.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

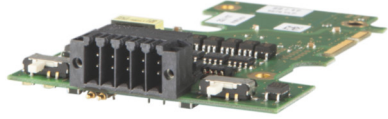
### 4.2.3.8 5ACCIF01.FSS0-000

#### 4.2.3.8.1 General information

Interface option 5ACCIF01.FSS0-000 is equipped with 2 RS422/RS485 interfaces.

- 2x RS422/RS485 interfaces
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

#### 4.2.3.8.2 Order data

Order number	Short description	Figure
5ACCIF01.FSS0-000	<b>Interface options</b>	
	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.8.3 Technical data

##### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.FSS0-000
<b>General information</b>	
LEDs	L2, L3
B&R ID code	0xED7B
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Product family certification
<b>Interfaces</b>	
COM	
Quantity	2
Type	RS422/RS485, galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
<b>Electrical properties</b>	
Power consumption	1 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 60°C <sup>3)</sup>
Storage	-20 to 60°C
Transport	-20 to 60°C

## Technical data

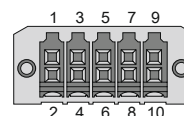
Order number	5ACCIF01.FSS0-000
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) For detailed information, see the temperature tables in the user's manual.

### 4.2.3.8.3.1 Serial interface COM A - Pinout

Serial interface COM A on the system unit is referred to as "IF option".

Serial interface COM A <sup>1)2)3)</sup>	
	<b>RS422/RS485</b>
Variant	10-pin, male
Type	RS422/RS485
Galvanic isolation	Yes
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	Pinout
1	-
2	-
3	-
4	-
5	-
6	COM GND
7	TXD
8	TXD\
9	RXD
10	RXD\



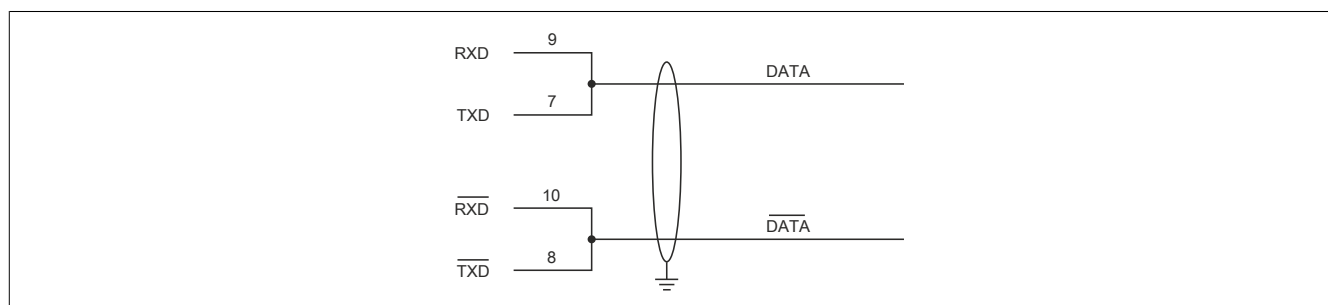
- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface (if available) is automatically enabled in BIOS as COM A with default addresses I/O:3F8h and IRQ:4.
- 3) This interface is displayed as IF7 in Automation Studio / Automation Runtime.

## Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

### Operation as RS485 interface

The pins of the RS422 default interface (7, 8, 9 and 10) must be used for operation. To do this, connect the pins as shown.



The RTS line must be switched by the driver for each transmission or reception; switching back does not take place automatically. This cannot be configured in Windows.

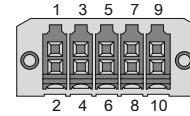
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

The cable ends of an RS485 bus should be terminated (at least for longer cable lengths or higher transfer rates). Passive termination can normally be used by connecting the signal lines via a 120 Ω resistor at each of the two bus ends; see ["Terminating resistor" for the IF card](#).

#### 4.2.3.8.3.2 Serial interface COM D - Pinout

Serial interface COM D on the system unit is referred to as "IF option".

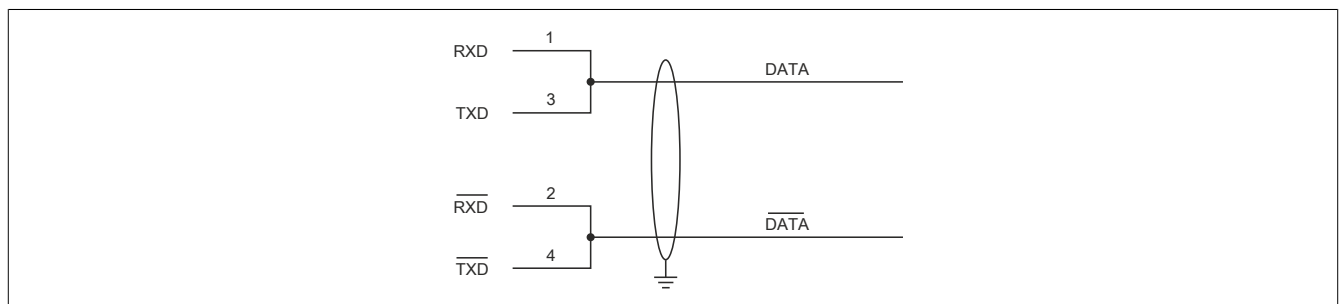
Serial interface COMD <sup>1)2)3)</sup>	
	<b>RS422/RS485</b>
Variant	10-pin, male
Type	RS422/RS485
Galvanic isolation	Yes
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	Pinout
1	RXD
2	RXD\
3	TXD
4	TXD\
5	COM GND
6	-
7	-
8	-
9	-
10	-



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface (if available) is automatically enabled in BIOS as COM D with default addresses I/O:2E8h and IRQ:5.
- 3) This interface is displayed as IF8 in Automation Studio / Automation Runtime.

#### Operating COM D as an RS485 interface

The pins of the RS422 default interface (1, 2, 3 and 4) must be used for operation. To do this, connect the pins as shown.



The RTS line must be switched by the driver for each transmission or reception; switching back does not take place automatically. This cannot be configured in Windows.

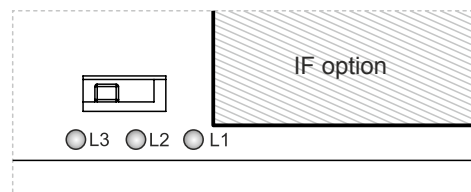
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

The cable ends of an RS485 bus should be terminated (at least for longer cable lengths or higher transfer rates). Passive termination can normally be used by connecting the signal lines via a 120  $\Omega$  resistor at each of the two bus ends; see "Terminating resistor" for the IF card.

#### 4.2.3.8.3.3 LED status indicators L2, L3

The LEDs of the interface option are located near the ETH1 interface.

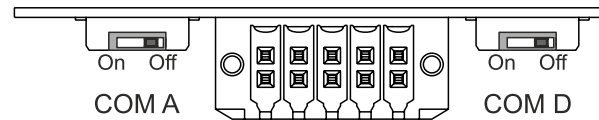
LED status indicators			
LED	Color	Status	Explanation
L1			Not connected
L2	Yellow	On	The COM D terminating resistor is switched on.
		Off	The COM D terminating resistor is switched off.
L3	Yellow	On	The COM A terminating resistor is switched on.
		Off	The COM A terminating resistor is switched off.



#### 4.2.3.8.3.4 Terminating resistor

One terminating resistor per COM is integrated on the interface option; they are located to the left and right of the RS422/RS485 interface. Both can be switched on or off with a switch. LED status indicators L2 and L3 (see "[LED status indicators L2, L3](#)" on page 81) indicate the state of the assigned terminating resistor:

- ON: Switched on
- OFF (default): Switched off



#### 4.2.3.8.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

#### 4.2.3.8.5 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- Linux for B&R
- Windows 10


### 4.2.3.9 5ACCIF01.ICAN-000

#### 4.2.3.9.1 General information

Interface option 5ACCIF01.ICAN-000 is equipped with a CAN bus master interface.

- 1x CAN bus master interface
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

#### 4.2.3.9.2 Order data

Order number	Short description	Figure
	<b>Interface options</b>	
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/ APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.9.3 Technical data

##### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCIF01.ICAN-000
<b>General information</b>	
LEDs	L1
B&R ID code	0xE9BB
<b>Certifications</b>	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
EAC	Product family certification
<b>Interfaces</b>	
CAN	
Quantity	1
Controller	Bosch CC770 (compatible with Intel 82527 CAN controller)
Variant	10-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
<b>Electrical properties</b>	
Power consumption	0.5 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 60°C <sup>2)</sup>
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	25 g

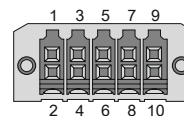
1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.

2) For detailed information, see the temperature tables in the user's manual.

#### 4.2.3.9.3.1 CAN bus interface - Pinout

The CAN bus interface on the system unit is referred to as "IF option".

CAN bus <sup>1)2)</sup>	
Variant	10-pin, male
Galvanic isolation	Yes
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Pin	Pinout
1	-
2	CAN shield
3	-
4	-
5	CAN H
6	CAN L
7	CAN GND
8	-
9	-
10	-



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface (if available) is automatically enabled in BIOS as CAN with default addresses I/O:384h/385h and IRQ:10.

#### I/O address and IRQ

Resource	Default setting	Function
I/O address	384h (address register)	Defines the register number to be accessed.
	385h (data register)	Access to the register defined in the address register.
IRQ	IRQ:10	Interrupt

#### CAN driver settings

The baud rate can be set either with "predefined values" or via the "bit timing register".

For additional information about operation with Automation Runtime, see Automation Help.

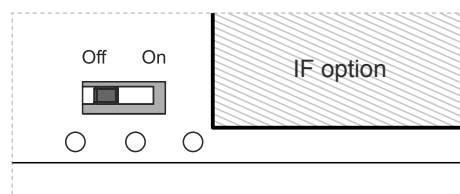
For additional information about operation with approved GPOS, see the user's manual for the B&R CAN driver at [www.br-automation.com](http://www.br-automation.com).

Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

#### Terminating resistor

A terminating resistor is integrated on the interface option. It is switched on or off for the CAN bus interface with a switch. LED status indicator L1 indicates the current state:

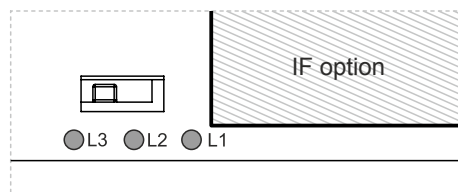
- ON: Activated
- OFF (default): Switched off



#### 4.2.3.9.3.2 LED status indicator L1

The LEDs of the interface option are located near the ETH1 interface.

LED status indicator			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2			Not connected
L3			Not connected
			-





#### 4.2.3.9.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

#### 4.2.3.9.5 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- Linux for B&R 10
- Linux for B&R 9
- Windows 10

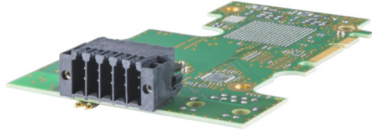
### 4.2.3.10 5ACCIF01.IS00-000

#### 4.2.3.10.1 General information

Interface option 5ACCIF01.IS00-000 is equipped with an RS232 interface.

- 1x RS232 interface
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

#### 4.2.3.10.2 Order data

Order number	Short description	Figure
	<b>Interface options</b>	
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/ APC2200/PPC2200 - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 4.2.3.10.3 Technical data

##### Information:

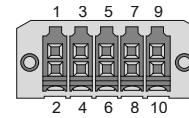
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCIF01.IS00-000
<b>General information</b>	
LEDs	No
B&R ID code	0x2C43
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
<b>Interfaces</b>	
COM	
Quantity	1
Type	RS232, modem supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
<b>Electrical properties</b>	
Power consumption	Max. 0.5 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	Approx. 25 g

#### 4.2.3.10.3.1 Serial interface COMA - Pinout

Serial interface COMA on the system unit is referred to as "IF option".

Serial interface COMA <sup>1)2)</sup>	
	<b>RS232</b>
Variant	10-pin, male
Type	RS232, modem supported
Galvanic isolation	No
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 15 m
Pin	Pinout
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	GND
10	Shield



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface (if available) is automatically enabled in BIOS as COMA with default addresses I/O:3F8h and IRQ:4.

#### Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 169](#).

#### 4.2.3.10.4 Shielding

For the interfaces on the 10-pin female connector, the shield of the interfaces can be connected to pin *Shield* (pin 2) of the female connector.

In addition, there is a functional ground connection on the interface cover of the system unit and a screw point for cable shields that can also be used for the shielded cables.

#### 4.2.3.10.5 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (if required and not already included in the operating system).

Approved operating systems:

- Linux for B&R
- Windows 10


### 4.2.3.11 5ACCIF03.CETH-000

#### 4.2.3.11.1 General information

Interface option 5ACCIF03.CETH-000 is equipped with 2 10/100/1000BASE-T Ethernet interfaces.

- 2x 10/100/1000BASE-T Ethernet interface
- Compatible with APC2200/PPC2200

#### 4.2.3.11.2 Order data

Order number	Short description	Figure
5ACCIF03.CETH-000	Interface options Interface card - 2x ETH 10/100/1000 interface - For APC2200/PPC2200 - Only available with a new device	

#### 4.2.3.11.3 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCIF03.CETH-000
<b>General information</b>	
B&R ID code	0xF1A8
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267
DNV	Industrial control equipment Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>1)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
<b>Interfaces</b>	
Ethernet	
Quantity	2
Controller	Intel I210
Variant	RJ45, shielded
Transfer rate	10/100/1000 Mbit/s <sup>2)</sup>
Line length	Max. 100 m between two stations (segment length)
<b>Electrical properties</b>	
Power consumption	2 W
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	0 to 60°C <sup>3)</sup>
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
<b>Mechanical properties</b>	
Weight	Approx. 25 g

1) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

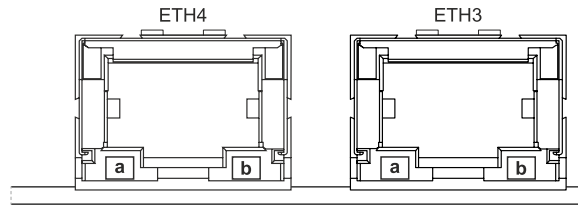
2) Switching takes place automatically.

3) For detailed information, see the temperature tables in the user's manual.

#### 4.2.3.11.3.1 ETH3 and ETH4 - Pinout

LEDs are integrated on the interface option. The ETH interfaces on the system unit are referred to as IF options.

Ethernet interfaces (ETH3 and ETH4) <sup>1)</sup>		
Variant	RJ45, female	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s <sup>2)</sup>	
Cable length	Max. 100 m (min. Cat 5e)	
<b>LED "Speed" (b)</b>	<b>On</b>	<b>Off</b>
Green	100 Mbit/s	10 Mbit/s <sup>3)</sup>
Orange (dark)	1000 Mbit/s	-
<b>LED "Link" (a)</b>	<b>On</b>	<b>Active</b>
Orange (light)	Link (a connection to an Ethernet network exists)	Blinking (data being transferred)



1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

2) Switching takes place automatically.

3) The 10 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

#### 4.2.3.11.4 Driver support

Drivers for approved operating systems are available for download in the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (if required and not already included in the operating system).

Approved operating systems:

- Linux for B&R
- Windows 10

#### Information:

**Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.**

Wake-on-LAN (WoL) and PXE boot are not supported.

## 4.2.4 CFast cards

Additional information about compatible CFast cards is available in [aggregate data sheet for CFast cards](#) on the B&R website.

## 4.2.5 Front covers

### 4.2.5.1 General information


2 front cover variants are available for APC2200 system units.

#### Information:

The front cover cannot be ordered as an individual component; it is part of the complete system.

If no front cover is selected during standard device configuration, then front cover 5ACCF03.0000-000 (orange APC2200 front cover without B&R logo) and B&R logo 5ACCST00.0000-00 (see "Adhesive labels" on page 162) are installed and delivered by default.

### 4.2.5.2 Order data

	
Order number	Short description
	Front covers
5ACCF03.0000-000	APC2200 front cover - Orange - Without logo
5ACCF03.0000-001	APC2200 front cover - Dark gray - Without logo
Optional accessories	
	Front covers
5ACCST00.0000-000	B&R logo - Adhesive label - For front covers

For the replacement part of the front cover selected during configuration, see section "Replacement parts" on page 156.

### 4.2.5.3 Technical data

Order number	5ACCF03.0000-000		5ACCF03.0000-001
General information			
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>1)</sup>		
LR	ENV3		
ABS	Yes		
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck		
Mechanical properties			
Housing			
Front cover	Dyed orange plastic (similar to Pantone 144CV)	Dyed dark gray plastic (similar to Pantone 432C)	
Logo	No		
Material	Plastic		
Weight	Approx. 14 g		

1) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

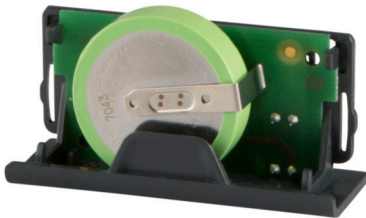
## 4.2.6 Battery compartment

### 4.2.6.1 General information

The lithium battery is needed to retain BIOS CMOS data and to back up the real-time clock (RTC).

The battery is subject to wear and must be replaced if the battery capacity is insufficient (state "Bad").

### 4.2.6.2 Order data

Order number	Short description	Figure
Accessories		
5ACCBT01.0000-001	Battery compartment - Dark gray - Includes battery - For APC2200/PPC2200	

For the battery compartment replacement part, see ["5ACCRPC2.0003-000" on page 156](#).

### 4.2.6.3 Technical data

#### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCBT01.0000-001
General information	
Battery	
Type	Panasonic 1000 mAh
Nominal voltage	3 V
Service life	8 years <sup>1)</sup>
Removable	No <sup>2)</sup>
Variant	Lithium
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>3)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-25 to 60°C
Storage	-25 to 60°C
Transport	-25 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%
Mechanical properties	
Housing	
Material	Dyed gray (similar to Pantone 432C) plastic
Weight	Approx. 13 g

1) At 50°C, 6 µA for the components being supplied.

2) The battery is permanently installed in the battery compartment and cannot be replaced. The entire battery compartment must always be replaced, see section "Accessories".

3) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

## 5 Installation and wiring

### 5.1 Basic information

**A damaged device has unpredictable properties and states. The unintentional installation or startup of a damaged device must be prevented. The damaged device must be marked as such and made inaccessible, or it must be returned for repairs immediately.**

#### Unpacking

The following activities must be performed before unpacking the device:

- Check the packaging for visible transport damage.
- If transport damage is noticeable, document this immediately and submit a complaint. If possible, have the damage confirmed by the carrier/delivery service.
- Check the contents of the shipment for completeness and damage.
- If the contents of the packaging are incomplete, damaged or do not correspond to the order, the responsible sales office or B&R Headquarters must be informed immediately.
- The information in section "[Protection against electrostatic discharge](#)" on page 10 must be observed for unpacked devices and components.
- Keep the original packaging for further transport.

#### Power supply

The following information is generally applicable and should be observed before performing any work on the device:

- The entire power supply must be disconnected before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

#### Caution!

**Energy regeneration is not permitted and can cause damage or the device to become defective. Built-in or connected peripheral devices (e.g. USB hubs) are not permitted to introduce any voltage into the device.**

#### Installation

##### Information:

**Optional sets are available that contain all necessary tools for installation. For additional information about tool sets, see section "[Installation accessories](#)" on page 157.**

##### Before installation

The following activities and limitations must be observed before installing the device.

- Allow sufficient space for installation, operation and maintenance of the device.
- The device must be installed on a flat, clean and burr-free surface.
- The wall or control cabinet panel must be able to support four times the total weight of the device. If necessary, bracing must be attached to reinforce the mounting surface.

#### Caution!

**If the load-bearing capacity of the mounting surface is insufficient, or if the fastening material is inadequate or incorrect, the device may fall and become damaged.**

- To avoid overheating, the device is not permitted to be placed near other heat sources.



### Information about the device's environment

- Observe the notes and regulations regarding the power supply and functional ground.
- Observe the specified bend radius when connecting cables.
- Ventilation openings are not permitted to be covered or blocked.
- The device is only permitted to be operated in closed rooms and not permitted to be exposed to direct sunlight.
- The climatic ambient conditions and environmental conditions must be taken into account – see ["Environmental properties" on page 29](#).

### General installation instructions

- Inclined installation reduces the air convection through the device and thus the maximum permissible ambient temperature for operation. If there is sufficient external ventilation in an inclined mounting orientation, the maximum permissible ambient temperature must be checked in each individual case. Failure to do so may result in damage to the equipment and void the certifications and warranty for the device.
- When installing the device, the permissible mounting orientations must be observed - see ["Mounting orientations" on page 28](#).
- When installed in a closed housing, there must be sufficient volume for air circulation - see ["Spacing for air circulation" on page 27](#).
- When connecting installed or connected peripherals, follow the instructions in the peripheral device's documentation.

### Transport and storage

**Condensation may form under certain environmental conditions or rapid climatic changes. For improved acclimatization and to avoid damage, the device must be slowly adapted to the room temperature.**

When transporting at low temperatures or in the event of large temperature fluctuations, the collection of moisture in or on the device is not permitted. Moisture can cause short circuits in electrical circuits and damage the device.

If a device is transported or stored without packaging, all environmental influences such as shocks, vibrations, pressure and moisture have an unprotected effect on the device. Damaged packaging indicates that the device has been severely affected by environmental influences and may have been damaged.

This can result in malfunctions of the device, machine or system.

### Use of third-party products

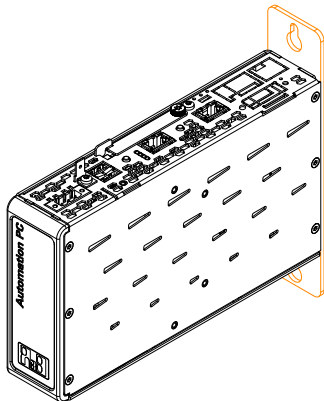
If third-party devices or components are used, the relevant manufacturer's documentation must be observed. If limitations or interactions by or with third-party products are possible, this must be taken into account in the application.

## 5.1.1 Installing the Automation PC

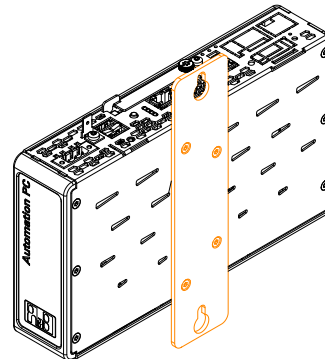
The Automation PC 2200 is installed using two M5 screws, which are not included in delivery.

The Automation PC 2200 offers two different installation options:

Mounting plate on the back (book style)

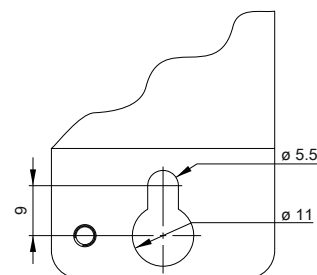


Mounting plate on the right side (box style)



The devices are installed with the mounting holes located on the mounting plate. The mounting holes are designed for M5 screws.

For the exact position of the mounting holes, see section ["Drilling template"](#) on page 26.



### 5.1.1.1 Procedure

#### Preparation

Corresponding M5 screws are not included in delivery and must be selected according to the application; manufacturer's specifications for the max. tightening torque must be observed.

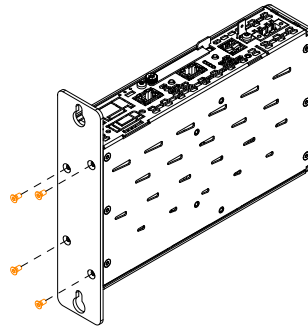
#### Installation

1. Provide the mounting surface with the necessary holes. For the exact position of the mounting holes, see the drilling templates.
2. Install the B&R industrial PC with M5 screws.

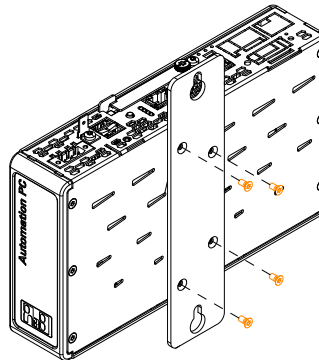
### 5.1.2 Changing the mounting type (removing/installing the mounting plate)

Before changing the mounting type of the Automation PC, it must be checked as to whether all the specifications in sections "[Mechanical properties](#)" and "[Environmental properties](#)" can still be adhered to.

1. Disconnect the power supply cable to the Automation PC (disconnect the power cable). Disconnect from all sources and poles.
2. Carry out electrostatic discharge at the ground connection.
3. Disconnect all connected cables.
4. Remove the Automation PC. To do this, remove the M5 screws and remove the Automation PC.
5. Loosen the 4 Torx screws (T20) of the mounting plate.



6. Remove the mounting plate and reattach it to the Automation PC according to the desired mounting type using the Torx screws (T20) loosened earlier (max. tightening torque 0.5 Nm).

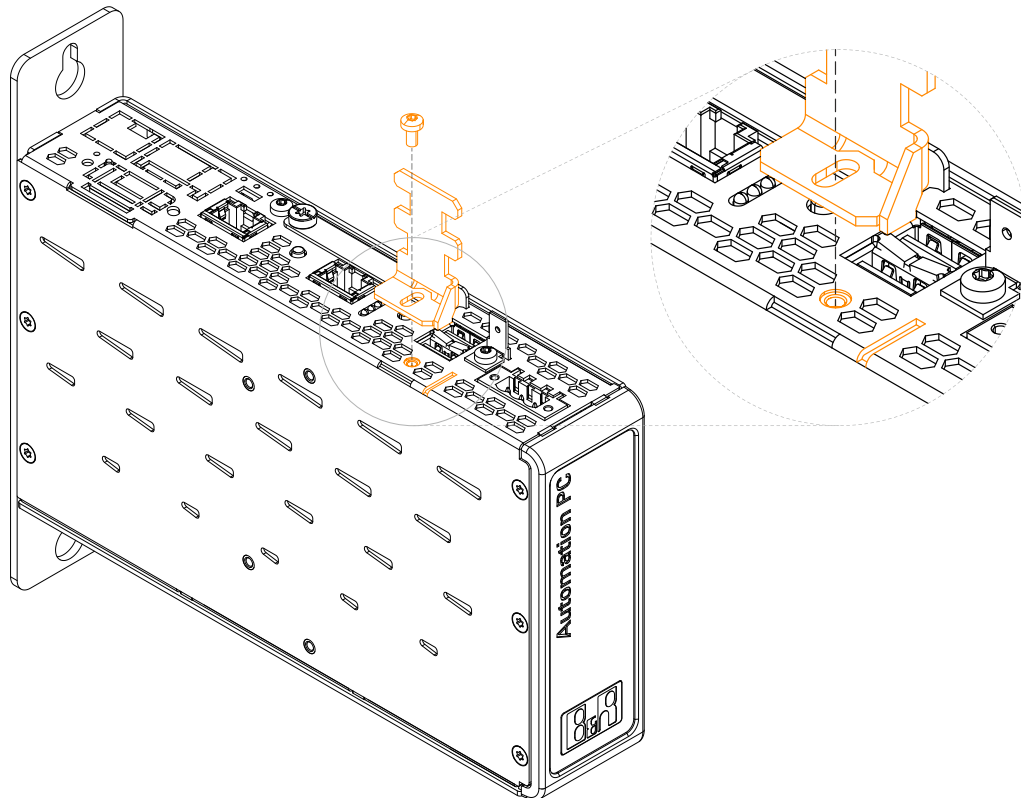


7. The Automation PC can now be installed again.

### 5.1.3 Installing the cable strain relief clip

1. The cable strain relief clip must be positioned on the APC2200 according to the following figure and secured with the supplied locating screws (M3, max. tightening torque 0.5 Nm).

The cable strain relief clip is only permitted to be installed at the intended location on the device.



2. Secure the connected USB cables to the cable strain relief clip using the cable ties provided.

## 5.2 Connecting to the power grid

### Danger!

- The entire power supply must be disconnected and electrostatic discharge must take place on the housing or ground connection before removing any covers or components from the device and installing or removing any accessories, hardware or cables.
- Remove the power cable from the device and from the power supply.
- All covers and components, accessories, hardware and cables must be installed or secured before the device is connected to the power supply and switched on.

### 5.2.1 Installing the DC power cable

### Danger!


The entire power supply to the B&R industrial PC or B&R Automation Panel must be interrupted. Before connecting the DC power cable, it must be checked whether it has been disconnected from the voltage source (e.g. power supply unit).

#### 5.2.1.1 Wiring

### Caution!

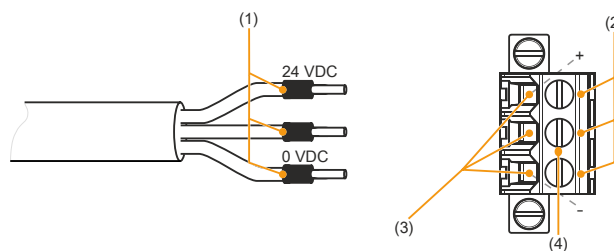
The pinout of the power supply interface must be observed!

The DC power cable must be implemented with a wire cross section of 0.75 mm<sup>2</sup> to 1.5 mm<sup>2</sup> and wire end sleeves.

Conductors of the power cable	Terminal connection symbol
+24 VDC	+
GND	
0 VDC	-

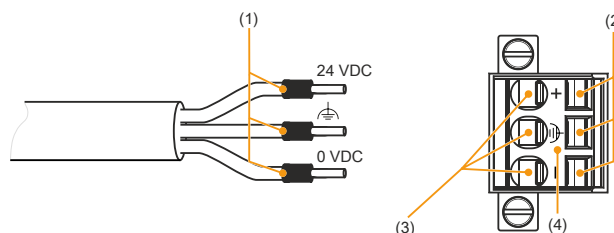
#### Installing screw clamp terminal block 0TB103.9

Secure the conductors with wire end sleeves ① in the terminal contacts ③ as shown in the figure below and tighten the screw clamp terminals ④ with a screwdriver (max. tightening torque 0.4 Nm). It is important to pay attention to the label on the screw clamp terminal ②.



#### Installing cage clamp terminal block 0TB103.91

Insert a screwdriver into the cage clamp terminals ② and secure the conductors with wire end sleeves ① in the terminal contacts ③ as shown in the figure below. Close the terminal contact by removing the screwdriver. It is important to pay attention to the label on the cage clamp terminal ④.

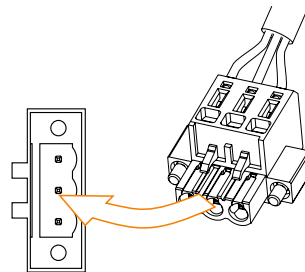


## 5.2.2 Connecting the power supply to a B&R device

### Danger!

The entire power supply to the B&R device must be interrupted. Before connecting the power cable, it must be checked whether it has been disconnected from the voltage source (e.g. power supply unit).

1. Carry out electrostatic discharge on the housing or at the ground connection.
2. Connect the power supply connector to the B&R device and tighten the mounting screws (max. tightening torque 0.5 Nm).



## 5.2.3 Grounding concept - Functional ground

Functional ground is a low impedance current path between circuits and ground. It is used for equipotential bonding and thus for improving immunity to interference.

### Notice!

**Functional grounding does not meet the requirements of protective ground!**

**Suitable measures for electrical safety in the event of operation and faults must be provided separately.**

The device is equipped with the following functional ground connections:

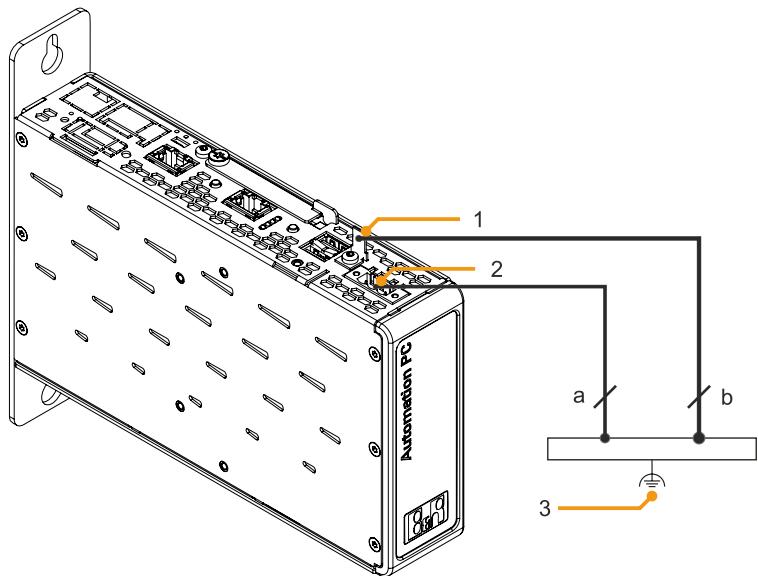
- Functional ground connection of the power supply
- Ground connection


The functional ground on the B&R device is marked with the following symbol:



The following points must be observed to ensure that electrical interference is safely diverted:

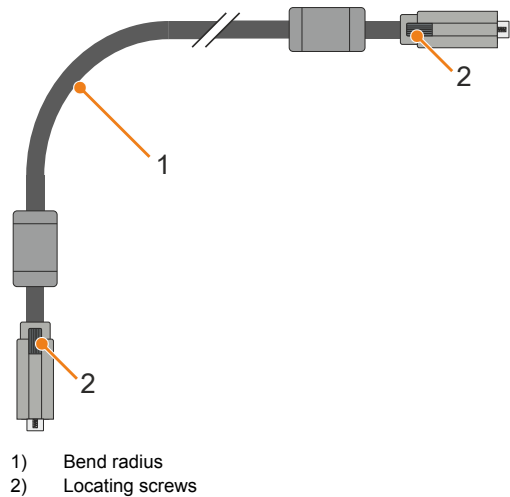
- Connect the device to the central grounding point (e.g. the control cabinet or the system) using the shortest possible low-resistance path.
- Cable design with at least 2.5 mm<sup>2</sup> per connection. If a cable with wire end sleeve is used at terminal block 0TB103.9 or 0TB103.91, a cable with a maximum of 1.5 mm<sup>2</sup> per connection is possible.
- Observe the shielding concept of the conductors. All data cables connected to the device must be shielded.



Legend			
1	Ground connection 	2	Power supply connection +24 VDC pin 2
a	At least 1.5 mm <sup>2</sup>	b	At least 2.5 mm <sup>2</sup>
		3	Central grounding point
			-

### 5.2.4 Connecting cables

When connecting or installing cables, the bend radius specification must be observed. For this specification, see the technical data of the respective cable.  
The maximum tightening torque of the locating screws is 0.5 Nm.



## 6 Commissioning

### 6.1 Basic information

Condensation may form under certain environmental conditions or rapid climatic changes. For improved acclimatization and to avoid damage, the device must be slowly adapted to the room temperature.

#### 6.1.1 Switching on the device for the first time

##### 6.1.1.1 General information before switching on the device

###### Checklist

Before the device is started up for the first time, the following points must be checked:

- Have the installation instructions been observed as described in ["Installation and wiring" on page 92?](#)
- Have the permissible ambient conditions and environmental conditions for the device been taken into account?
- Is the power supply connected correctly and have the values been checked?
- Is the ground cable correctly connected to the ground connection?
- Before installing additional hardware, the device must have been started up.

###### Caution!

**Before the device is started up, it must be gradually adapted to room temperature! Exposure to direct heat radiation is not permitted.**

**When transporting at low temperatures or in the event of large temperature fluctuations, the collection of moisture in or on the device is not permitted.**

**Moisture can cause short circuits in electrical circuits and damage the device.**

###### Requirements

The following criteria must be met before switching on the device for the first time:

- The functional ground connections are as short as possible and connected to the central grounding point using the largest possible wire cross section.
- All connection cables are connected correctly.
- A USB keyboard and USB mouse are connected (optional).

##### 6.1.1.1.1 Switching on the device

###### Procedure

1. Connect the power supply and switch it on (e.g. power supply unit).
2. The device is operating and boots; LED *Power* lights up.

#### 6.1.2 General instructions for the temperature test procedure

The purpose of these instructions is to explain the general procedure for application-specific temperature tests with B&R industrial PCs or Power Panels. These instructions are only guidelines, however.

##### 6.1.2.1 Procedure

In order to obtain meaningful results, the test conditions should correspond to conditions in the field. This means that during the temperature tests, for example, the target application should be running and the PC should be installed in the control cabinet housing that will be used later.



In addition, a temperature sensor should be installed for the device being tested in order to continuously monitor the ambient temperature. To obtain correct values, it must be installed at a distance of approx. 5 to 10 cm from the B&R industrial PC near the air inlet (not near the air outlet).

Every B&R industrial PC or Power Panel is equipped with internal temperature sensors. Depending on the device family, these are installed in different positions. The number and temperature limits vary depending on the device family.

For position specifications of the temperature sensors and their maximum specified temperatures, see section ["Temperature sensor positions" on page 32](#).

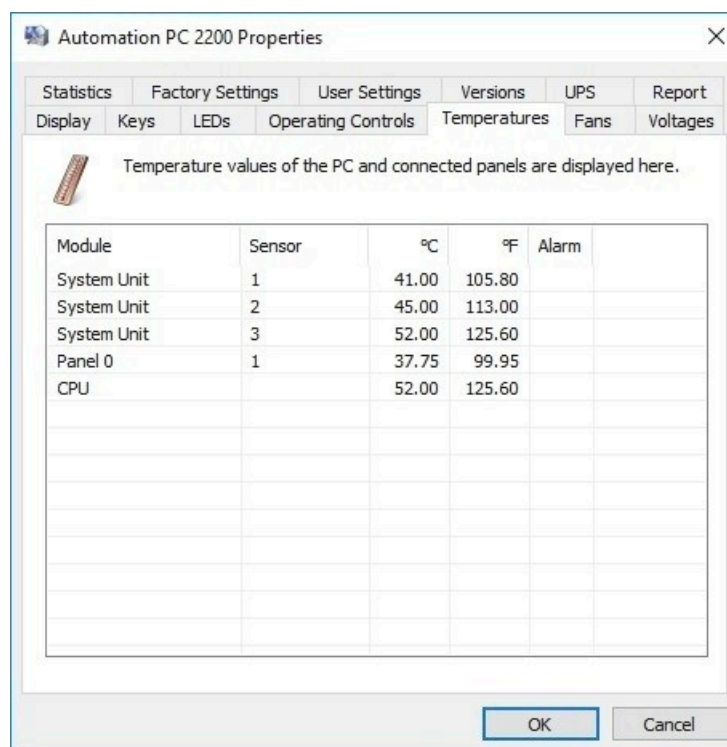
A minimum test time of 8 hours is recommended for to optimally determine and assess the temperature situation.

### 6.1.2.2 Evaluating temperatures in Windows operating systems

#### 6.1.2.2.1 Evaluating with the ADI Control Center

The *ADI Control Center* can be used to evaluate temperatures. The temperatures can be viewed in tab **Temperatures**. The ADI Control Center can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)) at no cost and uses the ADI (Automation Device Interface).

The following figure shows an APC2200 in the ADI Control Center.



If historical recording of the data is necessary, a separate application can be created.

#### Information:

To create a separate application, downloads such as the ADI .NET SDK are available from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 6.1.2.2.2 Evaluation with BurnInTest from PassMark

If a separate application is not created or used for temperature evaluation, B&R recommends using the BurnInTest software tool from PassMark.

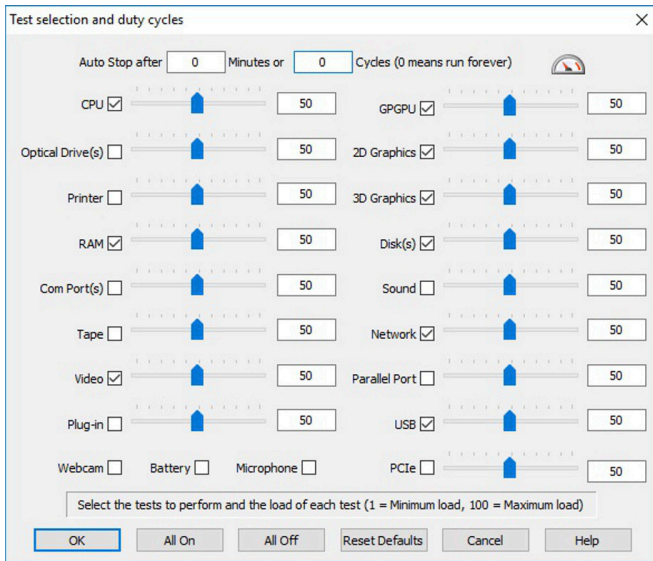
The BurnInTest software tool is available in standard and professional versions. In addition to the software package, various loopback adapters (serial, parallel, USB, etc.) and test CDs or DVDs are also available. Depending on the expansion level of the software and available loopback adapters, a correspondingly high system and peripheral load can be generated.

## Information:

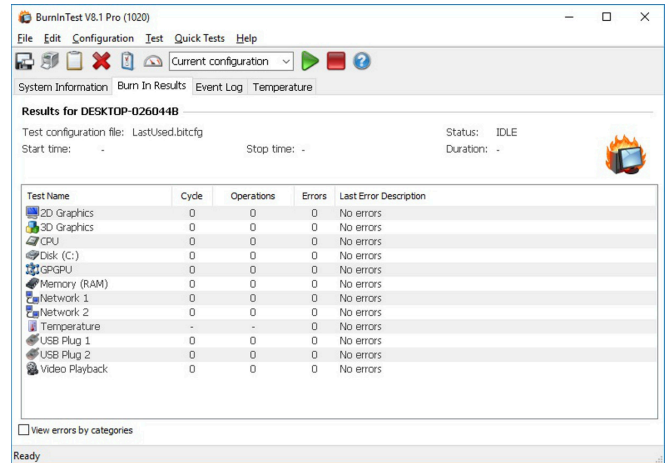
Loopback adapters are also available from PassMark. For additional information, see [www.pass-mark.com](http://www.pass-mark.com).

The following screenshots refer to PassMark BurnInTest Pro V8.1 using an APC2200 without IF options.

Settings:<sup>1)</sup>



Test overview:<sup>1)</sup>



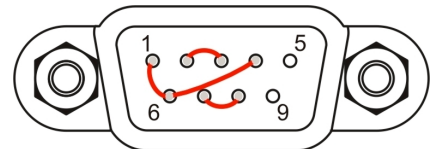
1) Symbolic image.

Depending on the availability of the loopback adapters and DVDs, appropriate adjustments must be made in the respective test settings.

If no USB loopback adapters are available, USB flash drives can also be used. These must be available in Windows as formatted drives. Option **USB** must be deselected under **Test selection and duty cycles**, and **Test this device** must then be selected in the **Disk** settings (**Configuration / Test Preferences / Disk**).



Serial loopback adapters can be easily created by connecting some pins as shown.



### 6.1.2.3 Evaluating the measurement results

The recorded maximum temperature value of each individual sensor is not permitted to exceed the temperature limit specified in the user's manuals.

If the temperature tests cannot be carried out in a climate chamber, they can be carried out in an office environment, for example. It is necessary to record the ambient temperature, however. Based on experience gained at B&R, the measured temperature values can be extrapolated linearly to the ambient temperature for passive systems (systems without a fan kit). In order to also be able to extrapolate the temperature values for systems with a fan kit, the fans must be running. The speed, etc. must also be taken into account.

If the temperature tests are carried out in a controlled climate chamber with a fan, the devices to be tested are cooled by this fan and thus the measurement results are distorted. With passive devices, the measurement results are therefore unusable. In order to be able to carry out temperature tests in climate chambers with fans without distorting the measurement results, however, the fan of the climate chamber must be switched off and a correspondingly long lead time (several hours) must be observed.

## 6.2 Known problems / Characteristics

- USB 2.0 transfer is limited to 150 Mbit/s with SDL4.
- A display is always emulated by the SDL4 transmitter using EDID data and hot plug detection, so DVI-compatible operation is possible. For this reason, the following behavior may occur during operation with multiple displays.

In the operating system, a connected panel is reported by the video driver even in the following situations:

- No SDL3/SDL4 cable is connected.
- There is no connection established yet between the SDL4 link module and SDL4 transmitter.

This behavior can be avoided by appropriate configuration in BIOS or via the graphics driver.

- If problems occur with the ETH1 or ETH2 interface (connection abort, slow data transfer, etc.), the Energy-Efficient Ethernet feature can be disabled in the driver as a possible solution.

## 7 Software

### 7.1 UEFI BIOS options

#### 7.1.1 General information

The Unified Extensible Firmware Interface (UEFI) and its predecessor Extensible Firmware Interface (EFI) establish the basic standardized connection between the user and the system (hardware and firmware), the individual components of a computer and the operating system. This B&R industrial PC uses UEFI BIOS from Insyde Software.

The UEFI BIOS Setup Utility makes it possible to modify basic system configuration settings. These settings are stored in a flash block.

#### Information:

The following BIOS settings are system-optimized. Changes should only be made by experts who have knowledge of their effects.

##### 7.1.1.1 Adaptation for touch operation

The BIOS used for the APC2200/PPC2200 was developed with touch screen systems in mind. Compared to other or older B&R systems, the user interface, especially buttons and selection fields, is therefore larger. In addition, the setting and configuration options are divided into separate submenu structures.

The APC2200/PPC2200 can still be used with ordinary displays and operator panels without any limitation on usability, however.

##### 7.1.1.1.1 Operation

During touch operation, the system does not display a mouse pointer. If operation is carried out using an external operating device, the mouse pointer is displayed. Both input methods can be used simultaneously; the system automatically displays or hides the mouse pointer.

If keyboard entry is required, a keyboard appears on the display that can be operated via touch screen or mouse. All keyboard entries can also be made with an external keyboard.

##### 7.1.1.2 Overview of BIOS description

#### Information:

This description is for the full extent of version 1.23.

*Selection and setting options as well as the menu structure and display may differ slightly depending on the device series, system configuration, BIOS version and BIOS settings that have already been made. The figures in the following section are symbolic.*

For simplification purposes, only setting option **[Enter]** is explicitly listed below. All settings can also be made via mouse click or touch screen.

These figures are only excerpts from the respective menus. A complete list of all parameters and menus is available in a table in each section.

Depending on the display system used, it is possible to navigate to all menus on the device using the slide bar or mouse and keyboard input.

Variables written in *italics* (*n*) are used to maintain clarity and to summarize different menus that have the same setting options. When first mentioned, their range of values is defined and, if necessary, further notes are listed. *n* within a certain range of values of a certain BIOS setting is only valid for this parameter. Each combination of "[BIOS parameter]" and "*n*" is defined independently.

Entries outside a specified range of values are not applied.

**Default values are marked bold and italic in column "Input options" in tables.**

**Submenus are bold in column "BIOS parameter" in tables.**

BIOS parameter			Input options	Description
BIOS parameter 1			<b>Enable(d)</b>	Disables/Enables BIOS parameter 1
			Disable(d)	
BIOS parameter 1 value			UINT Default: <b>42</b>	Defines the value of BIOS parameter 1 Range: 0 to 65535 Resolution: 3
BIOS parameter 2			-	Displays BIOS parameter 2
	BIOS parameter 2.1		a1	Selects mode of BIOS parameter 2.1
			<b>a2</b>	
			b	
		BIOS subparameter 2.1	<b>Disable(d)</b>	Disables/Enables BIOS subparameter 2.1
		value	Enable(d)	
BIOS parameter <i>n</i> <sup>1)</sup>			<b>Disable(d)</b>	Disables BIOS parameter <i>n</i> or selects option
			(Various) <sup>2)</sup>	
Hardware components			Enter	Opens submenu "Hardware components" on page xyz

Table 35: Main menu - Menu - Submenu(s)

- 1) The 16 possible parameters are indexed from 0 to 15.  
2) Setting option "(Various)" combines different values/modes with different dependencies.

## 7.1.2 BIOS Setup and startup procedure

UEFI BIOS is enabled immediately after switching on the B&R industrial PC. A check takes place as to whether the setup data from the FLASH block is OK. If it is OK, the boot procedure is started. If it is not OK, the setup default settings are loaded and the boot procedure is continued.

UEFI BIOS reads the system configuration information, checks the system and configures it through the power-on self-test (POST).

UEFI BIOS then searches the data storage media in the system (CFast cards, USB mass storage devices, SSD, HDD, etc.) for an operating system. UEFI BIOS starts the operating system and transfers to it control over system operations.

To enter UEFI BIOS Setup, **[Esc]**, **[Del]** or **[F2]** must be pressed after initializing the USB controller when the following message appears on the screen (during POST): *Press ESC / DEL / F2 to enter Setup*.

If a B&R panel with touch sensor is used during device configuration, Setup can be opened by quickly tapping the upper edge of the touch area.



### 7.1.2.1 Input options

#### Power-on self-test (POST)

The following keys are enabled during POST:

Keys	Function
Esc, Del, F2	Accesses the BIOS Setup menu or boot manager.
<Pause>	The POST can be stopped with the <Pause> button. POST resumes after pressing any other key.

#### Information:

The key signals of the USB keyboard are only processed after the USB controller is initialized.

#### Boot menu

The following keys are enabled during POST:

Key	Function
F1	Help
ESC	Exits the help documentation
Cursor keys (←, ↑, ↓, →)	Navigation in the boot menu
Enter	Opens the selected submenu

#### BIOS Setup

The following keys can be used after entering BIOS Setup:

Key	Function
F1	Help
ESC	Exits
Cursor keys (←, ↑, ↓, →)	Navigation in the menu
Page ↑, Page ↓	Press once: Cursor jumps to first/last line in the display area Press twice: Cursor jumps to first/last item in the menu
F5	Changes a value (step back)
F6	Changes a value (step forward)

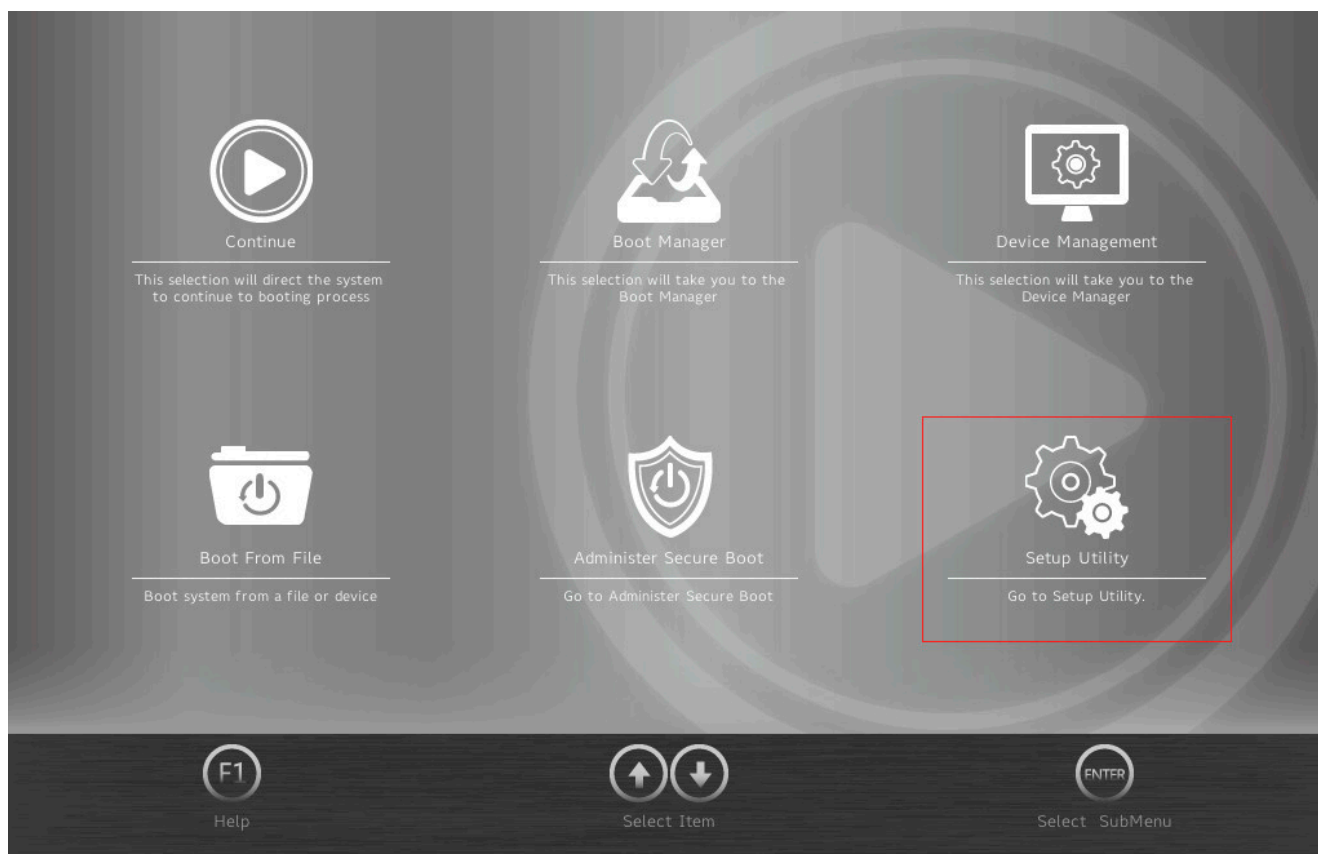
Key	Function
F9	Loads the default settings <sup>1)</sup>
F10	Saves and closes
Enter	Opens the selected submenu/parameter
Alphanumeric keys	Defines manual values for parameters that permit this

1) Save and close to restore the default values.

## Information:

All manual changes are overwritten if the default values are loaded and saved.

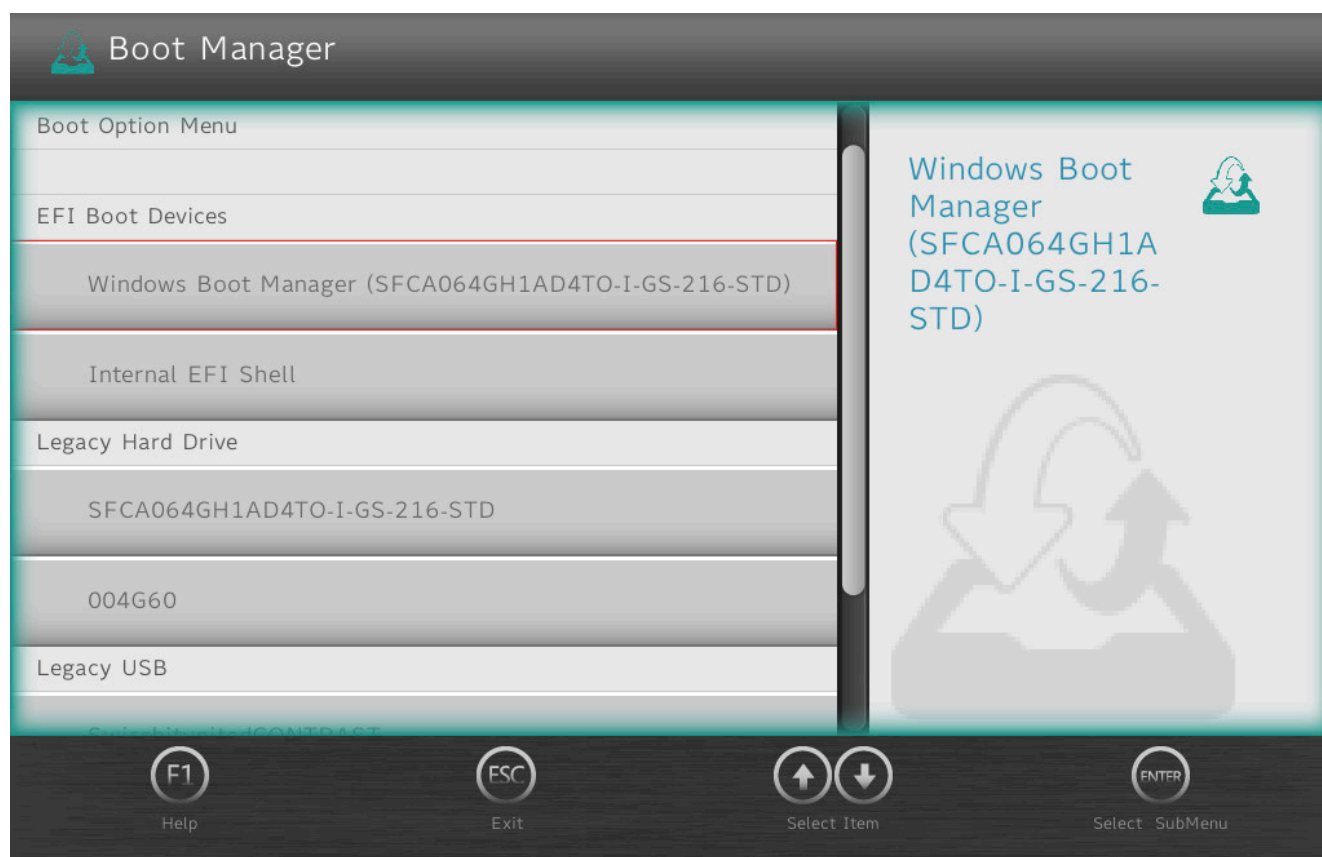
### 7.1.3 Boot menu



Boot menu option	Description
Continue	Resumes the boot process.
Boot manager	Lists all detected and bootable media. See " <a href="#">Boot manager</a> " on page 108.
Device management	Lists all supported and enabled devices (e.g. Ethernet). See " <a href="#">Device manager</a> " on page 109.
Boot from file	Selects a bootable file to boot from. Depending on the boot configuration, the files can also be stored on external storage media.
Administer Secure Boot	For a detailed description of this option, see the user documentation from the operating system manufacturer.
Setup utility	Performs advanced configurations. See " <a href="#">Setup utility</a> " on page 110.

Table 36: Boot menu

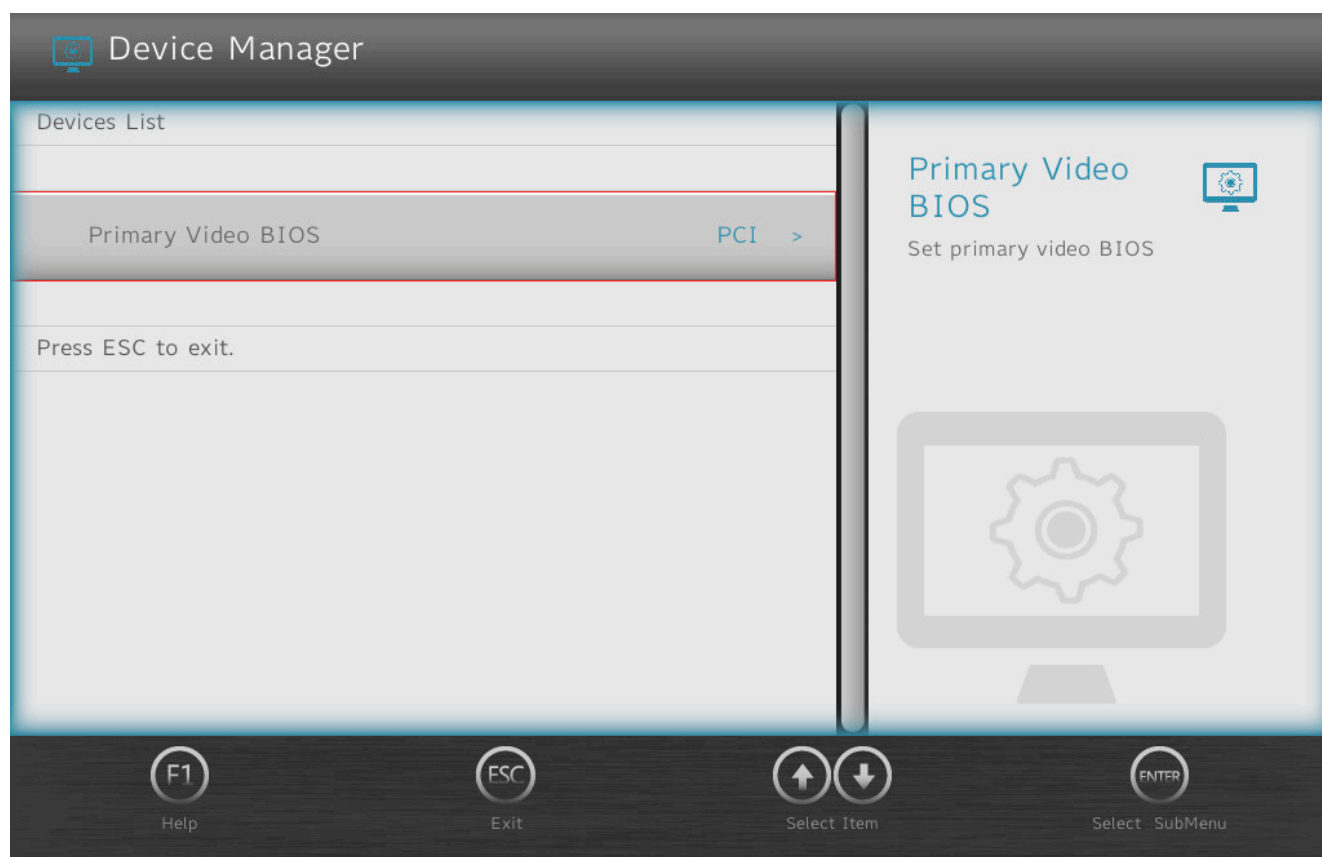
### 7.1.4 Boot manager



The boot manager lists all detected and bootable legacy or UEFI media. It is possible to select the media from which the boot procedure should be performed.



## 7.1.5 Device manager



The device manager lists all compatible and enabled devices.

BIOS parameter	Setting options	Description
Primary video BIOS	<b>PCI</b>	Selects the primary video BIOS
	AGP	

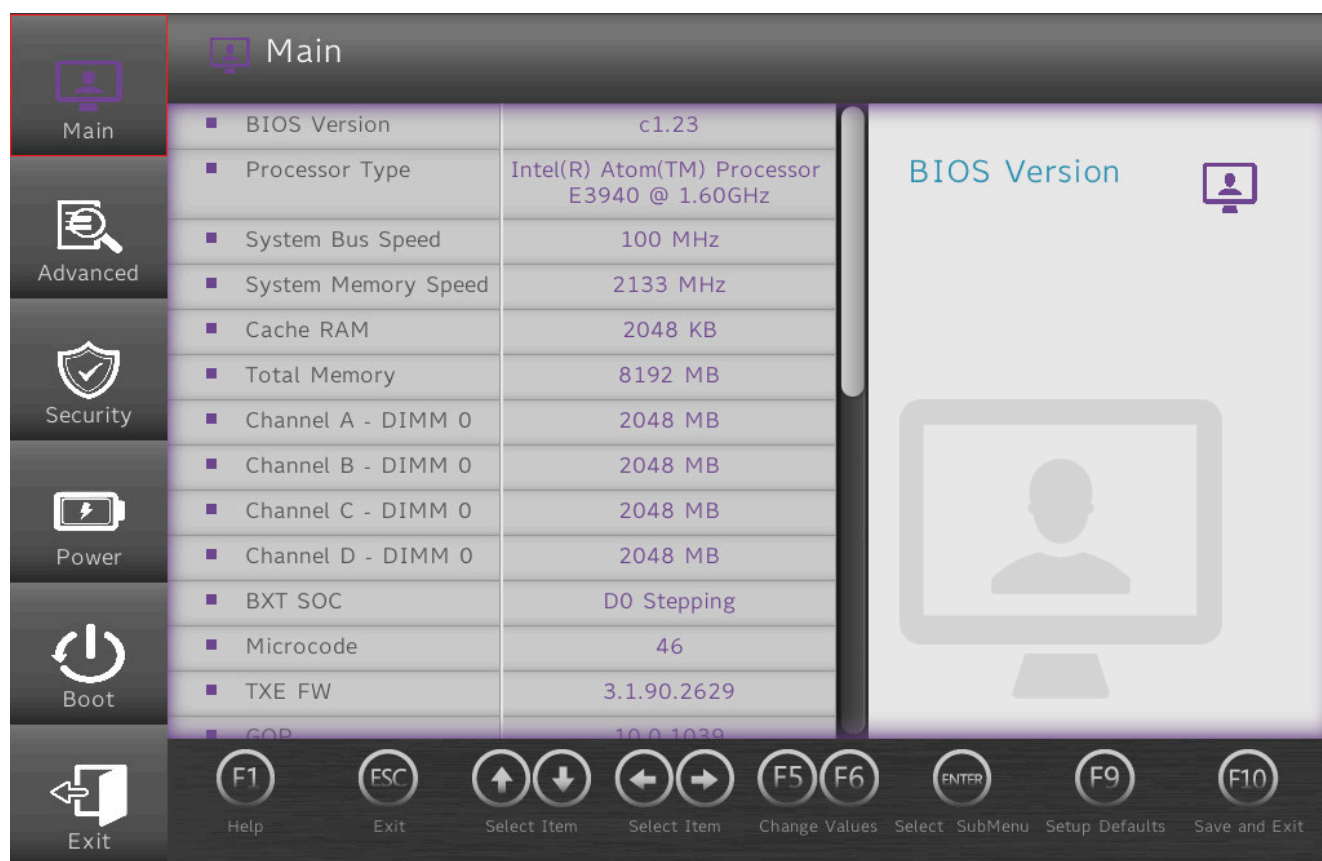
### 7.1.6 Setup utility

Settings can be made in the boot menu under **Setup utility**.

Submenu	Setting options	Description
<b>Main</b>	Enter	Opens submenu "Main" on page 111 Basic system information is displayed and the system time can be set here.
<b>Advanced</b>	Enter	Opens submenu "Advanced" on page 112 Changes to system settings can be made here.
<b>Security</b>	Enter	Opens submenu "Security" on page 122 Changes to the Trusted Platform Module can be made here. Passwords for storage media can be created and managed here.
<b>Power</b>	Enter	Opens submenu "Power" on page 123 Changes that affect the power consumption of the system can be made here.
<b>Boot</b>	Enter	Opens submenu "Boot" on page 125 Changes to the boot modes and boot sequence can be made here.
<b>Exit</b>	Enter	Opens submenu "Exit" on page 128 Changes can be discarded or saved here. User-specific default values can be saved and loaded here or system-optimized default values from B&R can be restored.

Table 37: Boot menu - Setup utility

## 7.1.6.1 Main



BIOS parameter	Setting options	Description
BIOS version	-	Displays the BIOS version
Processor type	-	Displays the processor type
System bus speed	-	Displays the bus speed
System memory speed	-	Displays the memory speed
Cache RAM	-	Displays the processor cache
Total memory	-	Displays the total memory
Channel A - DIMM 0	-	Displays the amount of memory for channel A
Channel B - DIMM 0	-	Displays the amount of memory for channel B
Channel C - SODIMM 0	-	Displays the amount of memory for channel C
Channel D - SODIMM 0	-	Displays the amount of memory for channel D
BXT SOC	-	Displays SOC stepping
Microcode	-	Displays the microcode revision
TXE FW	-	Displays the TXE version
IGD VBIOS version	-	Displays the VBIOS version of the internal graphics device
System time	INT	Adjusts the system time in the format hh:mm:ss
System date	INT	Adjusts the system date in the format yyyy:mm:dd
About this software	Enter	Displays the copyright disclaimer

Table 38: Main

## 7.1.6.2 Advanced



BIOS parameter	Setting options	Description
<b>OEM features</b>	Enter	Opens submenu "OEM features" on page 113
<b>Graphics configuration</b>	Enter	Opens submenu "Graphics configuration" on page 117
<b>IO configuration</b>	Enter	Opens submenu "IO configuration" on page 118
<b>Security configuration</b>	Enter	Opens submenu "Security configuration" on page 121
<b>ACPI settings</b>	Enter	Opens submenu "ACPI settings" on page 121

Table 39: Advanced

### 7.1.6.2.1 OEM features



BIOS parameter	Setting options	Description
BIOS version	-	Displays the BIOS version
MTCX version	-	Displays the MTCX version
Realtime environment	<b>Disabled</b> Enabled	Disables/Enables the real-time environment This must be enabled for real-time operating systems such as Automation Runtime.
Hypervisor environment	<b>Disabled</b> Enabled	Disables/Enables the hypervisor environment Enabling is necessary for hypervisor operation. Parameters "VT-d" and "Intel Virtualization Technology" on page 123 are enabled and cannot be changed during hypervisor operation.
Automatic firmware update	<b>Disabled</b> Enabled	Disables/Enables automatic firmware updates for the mainboard, SDL and SDL4 cards
<b>Super IO</b>	Enter	Opens submenu "Super IO" on page 113
<b>H2OUVE</b>	Enter	Opens submenu "H2OUVE" on page 114
<b>Baseboard</b>	Enter	Opens submenu "Baseboard" on page 114
<b>Interface slot n<sup>1)2)</sup></b>	Enter	Opens submenu "Interface slot n" on page 115
<b>Panel settings</b>	Enter	Opens submenu "Panel settings" on page 115
<b>SSD monitoring service</b>	Enter	Opens submenu "SSD monitoring services" on page 115
<b>Custom boot logo</b>	Enter	Opens submenu "Custom boot logo" on page 116

Table 40: Advanced - OEM features

- 1) A total of 2 interface option slots are available. Slot IF option 2 (label: Monitor/Panel) is reserved for graphic interfaces.
- 2) Unused IF option slots are not displayed.

#### 7.1.6.2.1.1 Super IO

BIOS parameter	Setting options	Description
CAN device	-	Indicates whether a CAN interface (IF option) is installed The CAN interface uses I/O addresses 0x384 - 0x385 and IRQ 10.
COM A	Disable <b>Enable</b>	Disables/Enables COM A (IF option 1)
	Base I/O address 0x2E8 0x2F8 0x338 0x378 0x3E8 <b>0x3F8</b>	Selects the I/O address for COM A

Table 41: Advanced - OEM features - Super IO

BIOS parameter		Setting options	Description
	Interrupt	IRQ3	Selects the interrupt for COM A
		<b>IRQ4</b>	
		IRQ5	
		IRQ7	
		IRQ11	
COM B		Disable	Disables/Enables COM B (LFP touch screen)
		<b>Enable</b>	
	Base I/O address	0x2E8	Selects the I/O address for COM B
		<b>0x2F8</b>	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	<b>IRQ3</b>	Selects the interrupt for COM B
		IRQ4	
		IRQ5	
		IRQ7	
		IRQ11	
COM C		Disable	Disables/Enables COM C (SDL touch screen option)
		<b>Enable</b>	
	Base I/O address	0x2E8	Selects the I/O address for COM C
		0x2F8	
		0x338	
		0x378	
		<b>0x3E8</b>	
		0x3F8	
	Interrupt	IRQ3	Selects the interrupt for COM C
		IRQ4	
		IRQ5	
		IRQ7	
		<b>IRQ11</b>	
COM D		Disable	Disables/Enables COM D (IF option 1)
		<b>Enable</b>	
	Base I/O address	<b>0x2E8</b>	Selects the I/O address for COM D
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	IRQ3	Selects the interrupt for COM D
		IRQ4	
		<b>IRQ5</b>	
		IRQ7	
		IRQ11	
MTCX interrupt		<b>Automatic</b>	Disables the MTCX interrupt or assigns it automatically if permitted by the system configuration (at least 1 IRQ free).
		Disable	

Table 41: Advanced - OEM features - Super IO

#### 7.1.6.2.1.2 H2OUVE

BIOS parameter	Setting options	Description
H2OUVE support	<b>Disabled</b>	Disables/Enables H2OUVE support
	Enabled	

Table 42: Advanced - OEM features - H2OUVE

#### 7.1.6.2.1.3 Baseboard

BIOS parameter	Setting options	Description
Product name	-	Displays the B&R order number of the mainboard
Serial number	-	Displays the B&R serial number of the mainboard
Device ID	-	Displays the device ID of the mainboard
Vendor ID	-	Displays the vendor ID of the mainboard
Compatibility ID	-	Displays the compatibility ID of the mainboard
HW revision	-	Displays the hardware revision of the mainboard
Parent device ID	-	Displays the parent device ID of the mainboard
Parent comp. ID	-	Displays the parent compatibility of the mainboard
ETH1 MAC address	-	Displays the ETH1 MAC address
ETH2 MAC address	-	Displays the ETH2 MAC address
Power on cycles <sup>1)</sup>	-	Displays the power-on cycles of the mainboard
Power on hours	-	Displays the operating time [h] of the mainboard
Battery voltage	-	Displays the battery voltage [V]

Table 43: Advanced - OEM features - Baseboard

BIOS parameter	Setting options	Description
Battery state	-	Displays the battery state
Temperature 1	-	Displays the current temperature at sensor 1 [°C and °F]
Temperature 2	-	Displays the current temperature at sensor 2 [°C and °F]
Temperature 3	-	Displays the current temperature at sensor 3 [°C and °F]

Table 43: Advanced - OEM features - Baseboard

- 1) Each start/restart increases the value by 1.

#### 7.1.6.2.1.4 Interface slot *n*

A total of 2 interface option slots are available. They are indexed from 1 to 2.

BIOS parameter	Setting options	Description
Product name	-	Displays the B&R order number of IF option <i>n</i>
Serial number	-	Displays the B&R serial number of IF option <i>n</i>
Device ID	-	Displays the device ID of IF option <i>n</i>
Vendor ID	-	Displays the vendor ID of IF option <i>n</i>
Compatibility ID	-	Displays the compatibility ID of IF option <i>n</i>
HW revision	-	Displays the hardware revision of IF option <i>n</i>
FW version <sup>1)</sup>	-	Displays the firmware version of IF option <i>n</i>
Parent device ID	-	Displays the parent device ID of IF option <i>n</i>
Parent comp. ID	-	Displays the parent compatibility ID of IF option <i>n</i>
Power on cycles <sup>2)</sup>	-	Displays the power-on cycles of IF option <i>n</i>
Power on hours	-	Displays the operating time [h] of IF option <i>n</i>
Temperature <i>q</i> <sup>3)</sup>	-	Displays the temperature at sensor <i>q</i> [°C and °F]

Table 44: Advanced - OEM features - Interface slot *n*

- 1) For graphics options only.  
 2) Each start/restart increases the value by 1.  
 3) The number of temperature sensors varies depending on the interface option. If no temperature sensor is available, the parameter is not displayed.

#### 7.1.6.2.1.5 Panel settings

BIOS parameter	Setting options	Description
Panel <i>n</i>	Enter	Opens menu "Panel <i>n</i> " on page 115

Table 45: Advanced - OEM features - Panel settings

#### Panel *n*

If the APC2200 has a graphics option in the monitor/panel option slot, the associated panel is assigned index 0.

BIOS parameter	Setting options	Description
Product name	-	Displays the B&R order number of the panel
Serial number	-	Displays the B&R serial number of the panel
Device ID	-	Displays the device ID of the panel
Vendor ID	-	Displays the vendor ID of the panel
Compatibility ID	-	Displays the panel's compatibility ID
HW revision	-	Displays the hardware revision of the panel
Parent device ID	-	Displays the parent device ID of the panel
Parent compat. ID	-	Displays the parent compatibility ID of the panel
Backlight on cycles <sup>1)</sup>	-	Displays the backlight-on cycles of the panel
Backlight on hours	-	Displays the operating time of the backlight [h] for the panel
Power on cycles <sup>2)</sup>	-	Displays the power-on cycles of the panel
Power on hours	-	Displays the operating time [h] of the panel
Brightness	INT Default: <b>100</b>	Screen brightness of the panel [%] Range: 0 to 100 Resolution: 1%

Table 46: Advanced - OEM features - Panel settings - Panel *n*

- 1) Each time the backlight is switched on increases the value by 1.  
 2) Each start/restart increases the value by 1.

#### 7.1.6.2.1.6 SSD monitoring services

BIOS parameter	Setting options	Description
CFAST		
Product name	-	Displays the name of the CFAST card
Serial number	-	Displays the manufacturer serial number of the CFAST card
Firmware version	-	Displays the firmware version of the CFAST card
SMART <sup>1)</sup> status	-	Displays the S.M.A.R.T. status of the CFAST card
WAF <sup>2)</sup>	-	Displays the WAF of the CFAST card

Table 47: Advanced - OEM features - SSD monitoring service

BIOS parameter	Setting options	Description
Average erase count	-	Displays the average number of erase operations on a block of the CFast card
Remaining life	-	Displays the remaining service life of the CFast card [%]
NVMe onboard		
Product name	-	Displays the product ID of the memory module
Serial number	-	Displays the manufacturer's serial number of the memory module
Percentage used	-	Displays the <u>used</u> (expected) lifetime of the memory module [%]
Power on hours	-	Displays the operating hours [h] of the memory module up until now
Critical warning	-	Displays an error code (S.M.A.R.T. status); see the S.M.A.R.T. specifications or manufacturer documentation. 0x00 signalizes operation without critical error.

Table 47: Advanced - OEM features - SSD monitoring service

- 1) Self-Monitoring, Analysis and Reporting Technology  
 2) Write amplification factor

#### 7.1.6.2.1.7 Custom boot logo

BIOS parameter	Setting options	Description
Custom boot logo	-	Displays whether a user-specific logo is being used
Add custom boot logo	Enter	Selects a customized boot logo A JPG graphic with a maximum size of 40 kB and filename "XPCLGO" must be used. The target file for the boot logo must be stored in folder "XPCLGO" in the root directory of the target media ( <i>./XPCLGO/XPCLGO.jpg</i> ).
Delete custom boot logo	Enter	Deletes customized boot logos <sup>1)</sup>

Table 48: Advanced - OEM Features - Custom boot logo

- 1) If no customized boot logo is available, the B&R boot logo is used by default.

#### 7.1.6.2.1.8 Backup settings

BIOS parameter	Setting options	Description
Backup settings	<b>Disabled</b>	Disables/Enables backup of BIOS settings during the next reboot
	Enabled	Folder "XPCSET" ( <i>./XPCSET/</i> ) must exist in the root directory of the target medium as the target for the backup.
Recover settings	<b>Disabled</b>	Disables/Enables restoring BIOS settings from a backup during the next reboot
	Enabled	The backup file must be stored in folder "XPCSET" ( <i>./XPCSET/</i> ) in the root directory of the target medium.

Table 49: Advanced - OEM features - Backup settings



### 7.1.6.2.2 Graphics configuration

BIOS parameter	Setting options	Description
Rotate screen	<b>Disabled</b>	Disables or selects rotation of the screen content
	90° clockwise	Rotation takes place clockwise.
	270° clockwise	
Integrated graphics device	Disabled	Disables/Enables the integrated graphics device (IGD or GPU)
	<b>Enabled</b>	
RC6 (render standby)	Disabled	Disable/Enables RC6 (render standby)
	<b>Enabled</b>	Permits the GPU to go into standby.
GTT <sup>1)</sup> size	2 MB	Selects the GTT size [MB]
	4 MB	
	<b>8 MB</b>	
Aperture size	<b>256 MB</b>	Selects reserved RAM [MB] If the graphics memory is full, the defined amount of memory is made available.
DVMT <sup>2)</sup> total Gfx mem	128M	Selects the memory size [MB] that can be used by the IGD. MAX uses the entire available main memory.
	<b>256M</b>	
	MAX	
GT PM support	Disabled	Disables/Enable GT PM support
	<b>Enabled</b>	
PAVP enable	Disabled	Disables/Enables "Force protected audio video path"
	<b>Enabled</b>	
Panel scaling	<b>Auto</b>	Selects automatic, centered or stretched panel scaling
	Centering	
	Stretching	

Table 50: Advanced - Graphics configuration

- 1) Graphics translation table (cf. graphics aperture/address remapping table (GART))  
 2) Dynamic video memory technology

### 7.1.6.2.3 IO configuration

BIOS parameter	Setting options	Description
PCI Express configuration	Enter	Opens submenu "PCI Express configuration" on page 118
SATA configuration	Enter	Opens submenu "SATA configuration" on page 119
USB configuration	Enter	Opens submenu "USB configuration" on page 120
Miscellaneous configuration	Enter	Opens submenu "Miscellaneous configuration" on page 120

Table 51: Advanced - IO configuration

#### 7.1.6.2.3.1 PCI Express configuration

BIOS parameter	Setting options	Description
PCI Express clock gating	Disabled <b>Enabled</b>	Disables/Enables PCI Express clock gating for root ports
Port8xh decode	<b>Disabled</b> Enabled	Disables/Enables Port8xh decoding
Peer memory write enable	<b>Disabled</b> Enabled	Disables/Enables peer memory write enable
Compliance mode	<b>Disabled</b> Enabled	Disables/Enables compliance mode
PCI Express root port 2 (IF1)	Enter	Opens submenu "PCI Express root port n" on page 118 <sup>1)</sup>
PCI Express root port 3 (ETH1)	Enter	
PCI Express root port 4 (ETH2)	Enter	
PCI Express root port 5 (IF1)	Enter	

Table 52: Advanced - IO configuration - PCI Express configuration

1) Each parameter opens its own menu. Since the included options are the same, schematic menu "PCI Express root port n" is described here.

#### PCI Express root port *n*

BIOS parameter	Setting options	Description
PCI Express root port <i>n</i> <sup>1)</sup>	<b>Auto</b> Disabled Enabled	Disables/Enables PCI Express root port <i>n</i> manually or automatically In mode "Auto", unallocated interfaces are automatically disabled and allocated interfaces are enabled.
ASPM	<b>Auto</b> Disabled L0sL1 L0s L1	Selects PCIe Active State Power Management manually/automatically or disables it
L1 substates	Disabled L1.1 L1.2 <b>L1.1 &amp; L1.2</b>	Selects or disables L1 substates
ACS	Disabled <b>Enabled</b>	Disables/Enables access control services extended capabilities
URR	<b>Disabled</b> Enabled	Disables/Enables unsupported request reporting Notification of unsupported requests
FER	<b>Disabled</b> Enabled	Disables/Enables fatal error reporting Notification of fatal errors <sup>2)</sup>
NFER	<b>Disabled</b> Enabled	Disables/Enables non-fatal error reporting Notification of non-fatal errors <sup>2)</sup>
CER	<b>Disabled</b> Enabled	Disables/Enables correctable error reporting Notification of correctable errors <sup>2)</sup>
CTO	<b>Disabled</b> Enabled	Disables/Enables PCIe completion timer timeout
SEFE	<b>Disabled</b> Enabled	Disables/Enables system error on fatal error <sup>3)</sup>
SENE	<b>Disabled</b> Enabled	Disables/Enables system error on non-fatal error <sup>3)</sup>
SECE	<b>Disabled</b> Enabled	Disables/Enables system error on correctable error <sup>3)</sup>
PME SCI	Disabled <b>Enabled</b>	Disables/Enables system control interrupt on a power management event
Hot plug	<b>Disabled</b> Enabled	Disables/Enables hot plugging
PCIe speed	<b>Auto</b> Gen1 Gen2 Gen3	- Selects the PCIe transfer rate [gigatransfers per second (GT/s)] automatically or manually Gen1: Max. 2.5 GT/s Gen2: Max. 5.0 GT/s Gen3: Max. 8.0 GT/s
Transmitter half swing	<b>Disabled</b> Enabled	Disables/Enables transmitter half-swing Signals are transferred with a half-swing.

Table 53: Advanced - PCH-IO configuration - PCI Express root port *n*

BIOS parameter			Setting options	Description
Extra bus reserved			INT Default: <b>0</b>	Defines the extra bus reserved for bridges after this root bridge Range: 0 to 7
Reserved memory			INT Default: <b>10</b>	Defines reserved memory [MB] for this bridge Range: 0 to 20
Reserved I/O			INT Default: <b>4</b>	Defines the reserved I/O range for this bridge Range: 4 to 20 kB Resolution: 4 kB
PCH PCIE LTR			Disabled	Disables/Enables PCIe latency reporting
			<b>Enabled</b>	
	Snoop latency override		<b>Auto</b>	Disables the snoop latency override or selects manual or automatic mode
			Disabled	
			Manual	
		Snoop latency value	INT Default: <b>60</b>	Defines the snoop latency value Range: 0 to 1023
		Snoop latency multiplier	1 ns	Defines the snoop latency multiplier value [ns]
	32 ns			
	<b>1024 ns</b>			
	32768 ns			
	1048576 ns			
	33554432 ns			
		Non-snoop latency override		<b>Auto</b>
Disabled				
Manual				
		Non-snoop latency value	INT Default: <b>60</b>	Defines the non-snoop latency value Range: 0 to 1023
		Non-snoop latency multiplier	1 ns	Defines the non-snoop latency multiplier value [ns]
			32 ns	
			<b>1024 ns</b>	
			32768 ns	
			1048576 ns	
			33554432 ns	
PCIE1 LTR lock			<b>Disabled</b>	Disables/Enables the PCIe1 LTR lock function
			Enabled	
PCIe selectable de-emphasis			Disabled	Disables/Enables PCIe selectable de-emphasis
			<b>Enabled</b>	

Table 53: Advanced - PCH-IO configuration - PCI Express root port *n*

- 1) PCI Express root port *n* must be enabled in order to make further configurations.
- 2) With a multifunction device, all functions within the device are monitored.  
For the root port, the error occurs within the root complex.
- 3) Generates a system error if an error of this category is reported by a root port or device on a root port.

### 7.1.6.2.3.2 SATA configuration

BIOS parameter			Setting options	Description
Chipset SATA			Disabled <b>Enabled</b>	Disables/Enables the SATA controller
SATA interface speed			Gen1 Gen2 <b>Gen3</b>	Max. 1.5 Gbit/s Max. 3 Gbit/s Max. 6 Gbit/s Selects the SATA speed
SATA test mode			<b>Disabled</b> Enabled	Disables/Enables the test function This is only used for control measurements.
Aggressive LPM support			<b>Disabled</b> Enabled	Disables/Enables Aggressive Link Power Management The host controller can change to a low-power state in the idle phase of the SATA device.
	SATA port 0		-	Displays the name and capacity of the SATA device
	Software preserve		-	Displays support for the software preserve
	SATA port 0		Disabled <b>Enabled</b>	Disables/Enables SATA port 0
	SATA Port 0 hot plug capability		<b>Disabled</b> Enabled	Disables/Enables hot plugging
	SATA port 0 DevSlp		<b>Disabled</b> Enabled	Disables/Enables device sleep
	DITO configuration		<b>Disabled</b> Enabled	Disables/Enables device sleep idle timeout
	DITO value		INT Default: <b>625</b>	Defines the DITO value [ms] Range: 0 to 1024
	DM value		INT Default: <b>15</b>	Defines the DITO multiplier Range: 0 to 15

Table 54: Advanced - IO configuration - SATA configuration

## 7.1.6.2.3.3 USB configuration

BIOS parameter		Setting options	Description
USB BIOS support		Disabled	Disables USB support in BIOS or enables USB support (UEFI only) or USB support (UEFI and Legacy Mode)
		<b>Enabled</b>	
		UEFI only	
XHCl disable compliance mode		<b>False</b>	Selects XHCl disable compliance mode
		True	
USB port disable override		<b>Disabled</b>	Manually disables/enables USB ports or enables all ports Disable this parameter to enable all ports, or enable it to disable/enable each port manually.
		Select per-port	
	USB1 3.0 connector	Disabled	Disables/Enables the interface USB1 3.0 connector
		<b>Enabled</b>	
	USB2 3.0 connector	Disabled	Disables/Enables the interface USB2 3.0 connector
		<b>Enabled</b>	
	USB1 2.0 connector	Disabled	Disables/Enables the interface USB1 2.0 connector
		<b>Enabled</b>	
	USB2 2.0 connector	Disabled	Disables/Enables the interface USB2 2.0 connector
		<b>Enabled</b>	
	USB 2.0 USV	Disabled	Disables/Enables the USB 2.0 interface on the UPS
		<b>Enabled</b>	
	USB1 2.0 onboard panel	Disabled	Disables/Enables the USB1 2.0 interface on the onboard panel
		<b>Enabled</b>	
	USB2 2.0 onboard panel	Disabled	Disables/Enables the USB2 2.0 interface on the onboard panel
		<b>Enabled</b>	
	USB 2.0 IF option	Disabled	Disables/Enables the USB 2.0 interface on the IF option
		<b>Enabled</b>	

Table 55: Advanced - IO configuration - USB configuration

## 7.1.6.2.3.4 Miscellaneous configuration

BIOS parameter		Setting options	Description
8254 clock gating		<b>Disabled</b>	Disables/Enables 8254 clock gating
		Enabled	
State after G3	S0 state	Working	Selects the state after G3
	<b>S5 state</b>	Soft off	Defines how to proceed after "mechanical off" (G3).
	Last state	State previous to G3	S0/S5 after G3 or restores the state before G3
BIOS lock	Disabled	Disables/Enables the PCH BIOS lock function The BIOS lock function must be enabled for SMM <sup>1)</sup> .	
	<b>Enabled</b>		
RTC lock	Disabled	Disables/Enables lock bytes 0x38h to 0x3Fh of RTC RAM	
	<b>Enabled</b>		
TCO lock	<b>Disabled</b>	Disables/Enables the TCO lock	
	Enabled		
Win7 keyboard/mouse support	<b>Disabled</b>	Disables/Enables Windows 7 keyboard/mouse support	
	Enabled		
Wake on USB from S5	<b>Disabled</b>	Disables/Enables wake on USB from S5	
	Enabled		
Numlock	Off	Disables/Enables the numeric keypad during booting Enables BIOS input via the numeric keypad of a keyboard.	
	<b>On</b>		
Real time option	<b>RT Disabled</b>	Disables Intel real-time option or enables it with IDI agent real-time mask bits set (RT enabled, agent IDI1) or not set (RT enabled, agent disabled)	
	RT enabled, agent IDI1		
	RT enabled, agent disabled		
Shell startup script delay	INT Default: <b>3</b>	Defines the shell startup script delay time [s] Range: 0 to 10	
Block boot fail pop-up	<b>Disabled</b>	Enables/Disables the boot-fail pop-up (e.g. for UEFI PXE). The device tries to boot from the next boot device automatically.	
	Enabled		

Table 56: Advanced - IO configuration - Miscellaneous configuration

1) System Management Mode

#### 7.1.6.2.4 Security configuration

BIOS parameter	Setting options	Description
TXE <sup>1)</sup> FW version	-	Displays the TXE firmware version
TXE FW capabilities	-	Displays the TXE firmware capabilities
TXE FW features	-	Displays the TXE firmware features
TXE FW OEM tag	-	Displays the TXE firmware OEM tag
TXE firmware mode	-	Displays the TXE firmware mode
Target TPM device	<b>fTPM</b> dTPM	Selects the target TPM device fTPM: Firmware/CPU TPM dTPM: Dedicated/Hardware TPM

Table 57: Advanced - Security configuration

1) Intel Trusted Execution Engine

#### 7.1.6.2.5 ACPI settings

BIOS parameter	Setting options	Description
<b>ACPI settings</b>	Enter	Opens submenu " <a href="#">ACPI settings</a> " on page 121
FACP - RTC S4 wakeup	Disabled <b>Enabled</b>	Disables/Enables S4 wakeup via RTC
APIC <sup>1)</sup> - IO APIC mode	Disabled <b>Enabled</b>	Disables/Enables IO APIC mode

Table 58: Advanced - ACPI settings

1) Advanced Programmable Interrupt Controller

##### 7.1.6.2.5.1 ACPI settings

BIOS parameter	Setting options	Description
Native PCIe enable	Disabled Enabled	Native operating system PCI Express support
Native ASPM <sup>1)</sup>	Disabled Enabled	Disables native ASPM (BIOS controls ASPM) or enables it (operating system controls ASPM)
Low power S0 idle capability	Disabled Enabled	Disables/Enables low power S0 idle capability

Table 59: Advanced - ACPI settings - ACPI settings

1) Active State Power Management

### 7.1.6.3 Security

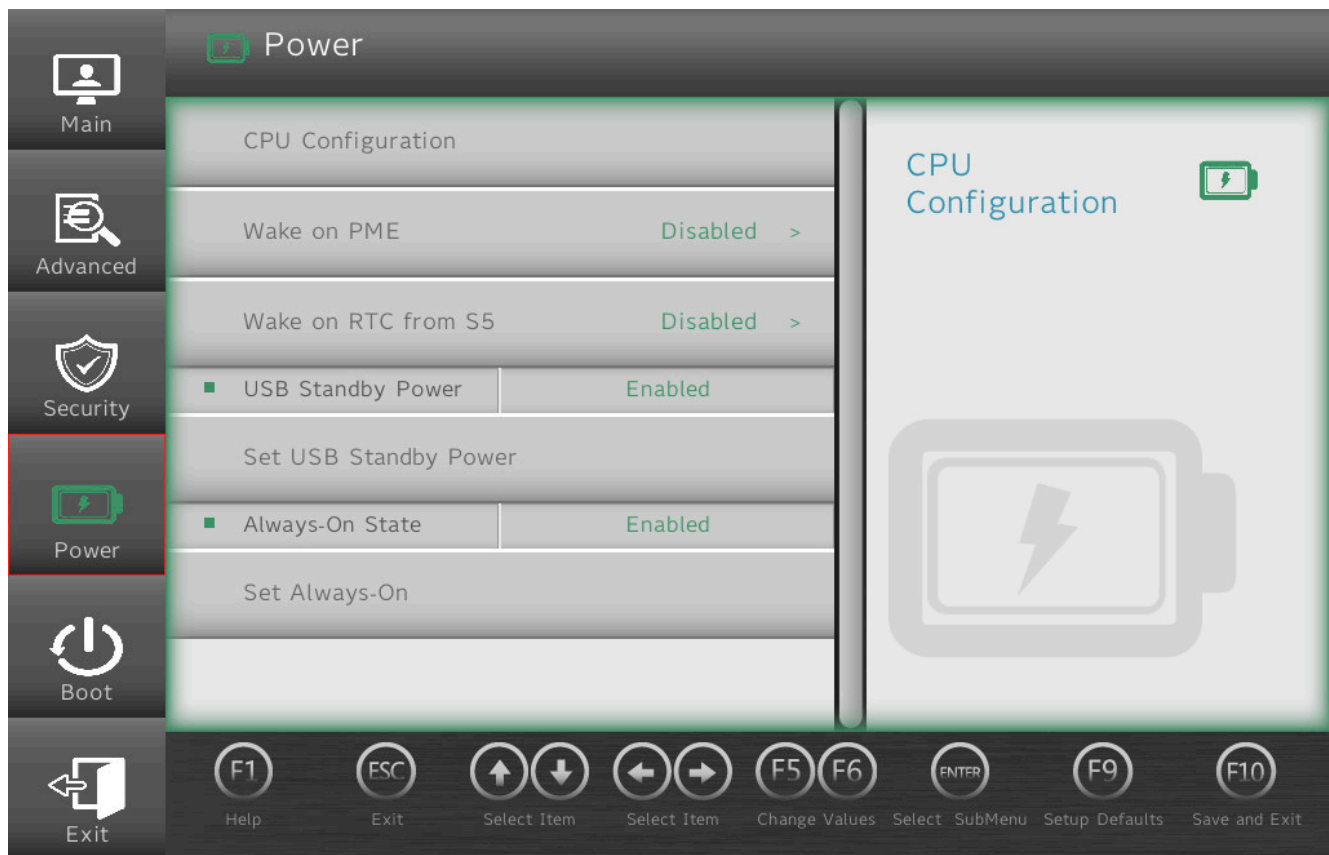


BIOS parameter	Setting options	Description
Current TPM <sup>1)</sup> device	-	Displays the current TPM device
TPM active PCR hash algorithm	-	Displays the current PCR hash algorithm
TPM hardware supported hash algorithm	-	Displays the hash algorithms supported by the hardware
TrEE protocol version	<b>1.0</b> 1.1	Selects the TrEE protocol version
TPM availability	<b>Hidden</b> Available	TPM invisible/visible for the operating system
Clear TPM	<b>Disabled</b> Enabled	Starts clearing TPM by enabling it
Supervisor password	-	Displays whether a supervisor password has been created
Set supervisor password	String	Sets or changes the supervisor password

Table 60: Security

1) Trusted Platform Module

### 7.1.6.4 Power



BIOS parameter	Setting options	Description
<b>CPU configuration</b>	Enter	Opens submenu "CPU configuration" on page 123
Wake on PME	<b>Disabled</b> Enabled	Disables/Enables wake on PME
Wake on RTC from S5	<b>Disabled</b> By every day By day of month By sleep time By OS utility	Disables wake from S5, daily, on a certain day of the month, after a certain sleep time or by operating system utility The configuration for <i>By OS Utility</i> must be made in the operating system.
Wake on S5 hour	INT	Defines the time for wake from S5 <i>By Every Day</i> or <i>By Day of Month</i> [hh:mm:ss]
Wake on S5 minute	INT	[hh] range: 0 to 23
Wake on S5 seconds	INT	Range [mm]: 0 to 59 Range [ss]: 0 to 59
Day of month	INT Default: <b>1</b>	Defines the time for wake from S5 <i>By Day of Month</i> [d @ hh:mm:ss] Range [d]: 1 to 31
Wake from S5 after (seconds)	INT Default: <b>5</b>	Defines the timer for waking from S5 <i>By Sleep Time</i> [s] Range: 5 to 255
USB standby power	-	Displays the USB standby power state
Set USB standby power	Disabled Enabled	Disables/Enables or does not set USB standby power
Always-on	-	Displays the always-on state
Set always-on	Disabled Enabled	Disables/Enables or does not set always-on

Table 61: Power

#### 7.1.6.4.1 CPU configuration

BIOS parameter	Setting options	Description
Intel Virtualization Technology	Disabled <b>Enabled</b>	Enables/Disables Intel Virtualization Technology (VTX-2)
VT-d	<b>Disabled</b> Enabled	Disables/Enables Intel Virtualization Technology for Directed I/O
TM1	Disabled <b>Enabled</b>	Disables/Enables thermal monitoring 1 CPU utilization is reduced by additional idle cycles to control the CPU temperature.
AES-NI	Disabled <b>Enabled</b>	Disables/Enables the Advanced Encryption Standard

Table 62: Power - CPU configuration

BIOS parameter	Setting options	Description
Thermal monitor	Disabled <b>Enabled</b>	Disables/Enables temperature monitoring (DTS)
Active processor cores	<b>Disabled</b> Enabled	Disables/Enables active processor cores If this parameter is disabled, all processor cores are used. Enabling makes it possible to configure individual processor cores.
Core 0	-	This processor core must always be active.
Core 1	Disabled <b>Enabled</b>	Disables/Enables processor core 1
Core 2	Disabled <b>Enabled</b>	Disables/Enables processor core 2
Core 3	Disabled <b>Enabled</b>	Disables/Enables processor core 3
Intel Hyper-Threading Technology	-	Anzeige ob Hyper-Threading unterstützt wird
Monitor Mwait	<b>Auto</b> Disabled Enabled	Disables/Enables Monitor/Mwait or selects it automatically depending on the operating system and hardware
<b>CPU power management</b>	Enter	Opens submenu "CPU power management" on page 124

Table 62: Power - CPU configuration

#### 7.1.6.4.1.1 CPU power management

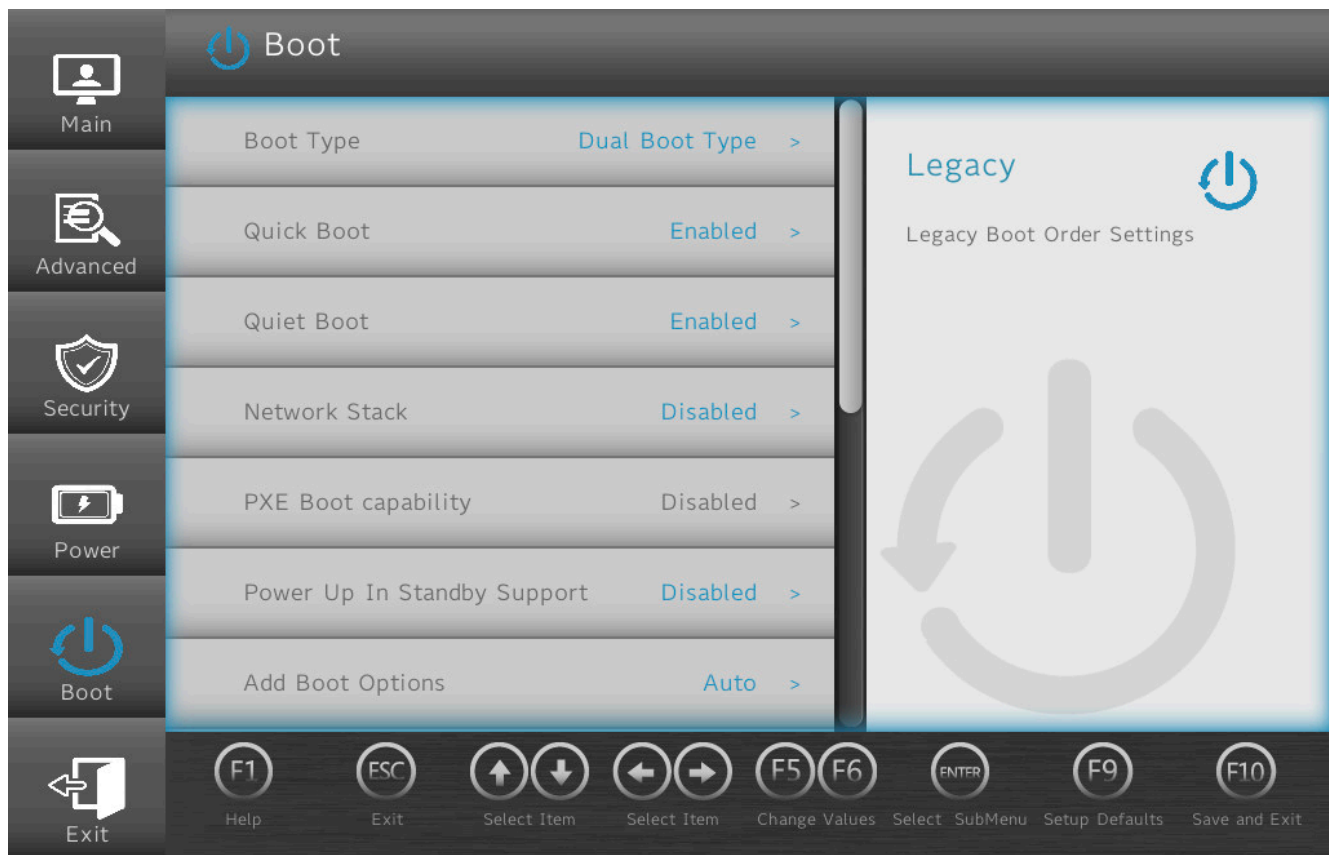
BIOS parameter	Setting options	Description
Boot performance mode	<b>Max performance</b> Max battery	Selects the performance mode for optimized performance or energy optimization BIOS starts in the selected mode and transfers this configuration to the operating system.
Intel SpeedStep	Disabled <b>Enabled</b>	Disables/Enables Intel SpeedStep Enable if more than 2 frequency ranges should be supported.
Turbo mode	Disabled <b>Enabled</b>	Disables/Enables turbo mode
Power limit 1	-	Displays power limit 1 [W]
Power limit 2	-	Displays power limit 2 [W]
Power limit 1 enable	Disabled <b>Enabled</b>	Disables/Enables power limit 1 (PL1)
Power limit 1 clamp mode	Disabled <b>Enabled</b>	Disables/Enables PL1 clamp mode Enabling makes it possible to undershoot the base clock frequency to control the processor core temperature.
Power limit 1 power	<b>Auto</b> (Various)	Selects the value for PL1 [W] or defines it automatically based on the processor Range: 6 to 25
Power limit 1 time window	<b>Auto</b> (Various)	Selects the PL1 time window [s] or defines it automatically based on the processor Range: 1 to 128
C-states	<b>Disabled</b> Enabled	Disables/Enables processor C-states
Enhanced C-states	Disabled <b>Enabled</b>	Disables/Enables enhanced C-states (C1E) Enabling allows the CPU to switch to the lowest speed if all processor cores change to a C-state.
Max package C state	<b>S0ix default</b> PC2 C0	Intel SoC idle standby power states Selects the max. package C-state Handle QPI/PCIe traffic Executing and not idle
Max core C state	<b>Fused value</b> Core C10 Core C9 Core C8 Core C7 Core C6 Core C1 Unlimited	- C9 optimized VR <sup>1)</sup> off C8 + VR off C7 + PCH off Deeper power down Deep power down Halt No limiting for CC-states
C-state auto demotion	Disabled <b>C1</b>	- Halt Disables/Enables C-state auto demotion Can be used to prevent unnecessary changing of C-states
C-state un-demotion	Disabled <b>C1</b>	- Halt Disables/Enables C-state un-demotion
T-states	<b>Disabled</b> Enabled	Disables/Enables T-states

Table 63: Power - CPU configuration - CPU power management

1) Voltage regulator (module)



## 7.1.6.5 Boot



BIOS parameter	Setting options	Description
Boot type	<b>Dual boot type</b>	Selects the boot type
	Legacy boot type	In dual boot mode, both UEFI and Legacy boot are possible and the CSM <sup>1)</sup> is enabled.
	UEFI boot type	In Legacy boot mode, the CSM is enabled. In UEFI boot mode, the CSM is disabled.
Quick boot	Disabled	Disables/Enables quick boot
	<b>Enabled</b>	If quick boot is enabled, certain tests are not performed so the boot procedure is faster.
Quiet boot	Disabled	Disables/Enables booting in text mode
	<b>Enabled</b>	
Network stack	<b>Disabled</b>	Disables/Enables the network stack
	Enabled	Enabling makes ETH booting possible.
PXE boot capability	<b>Disabled</b>	Disables PXE boot or selects the mode
	UEFI:IPV4	
	UEFI:IPV6	
	UEFI:IPV4/IVP6	
	Legacy	
Power up in standby support	<b>Disabled</b>	Disables/Enables power up in standby support
	Enabled	
Add boot options	<b>Auto</b>	Selects or changes the mode of arrangement in the boot sequence for newly added devices
	First	
	Manual	Manual mode is not fully UEFI compatible.
	Last	
ACPI selection <sup>2)</sup>	Acpi1.0B	Selects the ACPI mode
	Acpi3.0	
	Acpi4.0	
	<b>Acpi5.0</b>	
	Acpi6.0	
	Acpi6.1	
USB boot	Disabled	Disables/Enables USB boot
	<b>Enabled</b>	
EFI device first	Disabled	Disables/Enables EFI device first
	<b>Enabled</b>	Enable to boot EFI devices before legacy devices. Disable to boot legacy devices before EFI devices. <sup>2)</sup>
Timeout	INT Default: 0	Delay time until the boot list is processed [s] Range: 0 to 99

Table 64: Boot

BIOS parameter	Setting options	Description
Automatic failover	Disabled	Disables/Enables automatic failover
	<b>Enabled</b>	
EFI	Enter	Opens submenu "EFI" on page 126
Legacy	Enter	Opens submenu "Legacy" on page 127

Table 64: Boot

- 1) Compatibility support module
- 2) When changing the ACPI version, make sure that the operating system used is compatible.

#### 7.1.6.5.1 EFI

BIOS parameter	Setting options	Description
EFI	Enter	Opens submenu "EFI" on page 126
1st device	<b>CFast</b>	Selects this device as first in the boot sequence
	eMMC	
	USB device	
	Internal EFI shell	
	ETH1 IPv4	
	ETH1 IPv6	
	ETH2 IPv4	
	ETH2 IPv6	
	USB CD-ROM	
	Other	
	Disabled	
2nd device <sup>1)</sup>	<b>eMMC</b>	Selects this device as second in the boot sequence
3rd device	<b>USB device</b>	Selects this device as third in the boot sequence
4th Device	<b>Internal EFI shell</b>	Selects this device as fourth in the boot sequence
5th device	<b>ETH1 IPv4</b>	Selects this device as fifth in the boot sequence
6th device	<b>ETH1 IPv6</b>	Selects this device as sixth in the boot sequence
7th device	<b>ETH2 IPv4</b>	Selects this device as seventh in the boot sequence
8th device	<b>ETH2 IPv6</b>	Selects this device as eighth in the boot sequence

Table 65: Boot - EFI

- 1) Starting with the 2nd device, only the respective default values are specified.

##### 7.1.6.5.1.1 EFI

BIOS parameter	Setting options	Description
EFI	Enter, then: <ul style="list-style-type: none"> <li>► Keyboard: F5/F6</li> <li>► Touch screen: Move items at the gray arrows</li> </ul>	Defines the boot sequence

Table 66: Boot - EFI - EFI

### 7.1.6.5.2 Legacy

BIOS parameter	Setting options	Description
Normal boot menu	<b>Normal</b>	Selects the boot sequence type
	Advanced	
Boot type order	Enter	Opens submenu <a href="#">"Boot type order" on page 127</a>
Other	Enter	Opens submenu <sup>1)</sup>
Floppy disk	Enter	
Hard disk drive	Enter	Opens submenu <a href="#">"Hard disk drive" on page 127</a>
CD/DVD-ROM drive	Enter	Opens submenu <sup>1)</sup>
USB	Enter	
Legacy	Enter, then: <ul style="list-style-type: none"> <li>▶ Keyboard: F5/F6</li> <li>▶ Touch screen: Move items at the gray arrows</li> </ul>	Defines the boot sequence

Table 67: Boot - Legacy

- 1) These submenus are only available if at least one corresponding device is available. Their structure corresponds to that of submenu **Hard disk drive**.

#### 7.1.6.5.2.1 Boot type order

BIOS parameter	Setting options	Description
Boot type order	Enter, then: <ul style="list-style-type: none"> <li>▶ Keyboard: F5/F6</li> <li>▶ Touch screen: Move items at the gray arrows</li> </ul>	Defines the boot sequence

Table 68: Boot - Legacy - Boot type order - Boot type order

#### 7.1.6.5.2.2 Hard disk drive

BIOS parameter	Setting options	Description
Hard disk drive	Enter	Opens submenu <a href="#">"Hard disk drive" on page 127</a>

Table 69: Boot - Legacy - Hard disk drive

#### Hard disk drive

BIOS parameter	Setting options	Description
Hard disk drive	Enter, then: <ul style="list-style-type: none"> <li>▶ Keyboard: F5/F6</li> <li>▶ Touch screen: Move items at the gray arrows</li> </ul>	Defines the boot sequence

Table 70: Boot - Legacy - Hard disk drive - Hard disk drive

## 7.1.6.6 Exit



BIOS parameter	Setting options	Description
Exit saving changes	Enter	Saves changes and restarts
Save changes without exit	Enter	Saves changes Some settings only take effect after a restart.
Exit discarding changes	Enter	Discards changes and exits
Load optimal defaults	Enter	Loads system-optimized default values
Load custom defaults	Enter	Loads user-specific default values
Save custom defaults	Enter	Saves user-specific default values
Discard changes	Enter	Discards changes

Table 71: Exit

## 7.2 Upgrade information

### Warning!

The UEFI BIOS and firmware of B&R devices must always be kept up to date. New versions can be downloaded from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Information:

The following notes must be observed for BIOS upgrades:

- With version 1.10 and later, it is no longer possible to downgrade to versions < 1.10.
- Upgrades to versions > 1.10 must be made via version 1.10!<sup>4)</sup>
- With version 1.21 and later, it is no longer possible to downgrade to versions < 1.21.
- Upgrades to versions > 1.21 must be made via version 1.21!<sup>5)</sup>

### 7.2.1 UEFI BIOS upgrade

An upgrade may be necessary for making updated or new functions available.

For a detailed description of changes, see file *Readme.txt* or *Liesmich.txt*, which is included in every upgrade archive (ZIP).

### Information:

Individually saved setup settings are deleted during a UEFI BIOS upgrade.

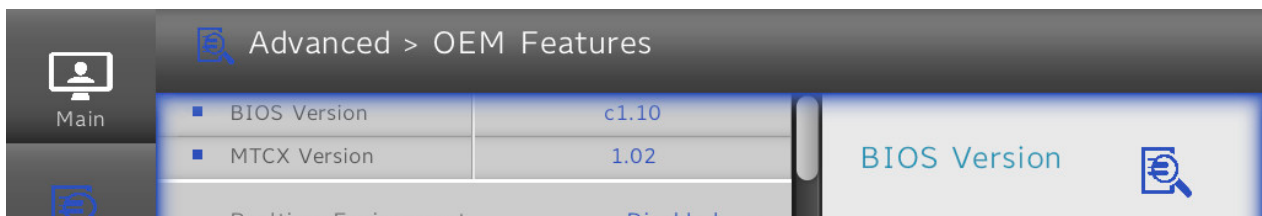
#### 7.2.1.1 BIOS upgrade

The installed software versions should be determined before an upgrade is started.

##### 7.2.1.1.1 Displaying firmware and BIOS version information

Information about the BIOS version and firmware is available in BIOS menu *OEM features*:

1. After switching on the xPC2200, open BIOS Setup with **[Esc]**, **[Del]** or **[F2]**.
2. The installed versions are displayed under **Setup utility / Advanced / OEM features**, see figure (symbolic).



#### 7.2.1.2 Procedure in the EFI shell

### Caution!

The PC is not permitted to be switched off or reset while performing an upgrade!

1. Download the ZIP file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
2. Unzip the ZIP file and copy the files to a USB flash drive formatted in *FAT16* or *FAT32*. Alternatively, a CFast card can also be used.
3. Reboot the PC, open the boot menu with **[Esc]**, **[Del]** or **[F2]** and select *Internal EFI shell* as the boot device.
4. After booting the EFI shell, *startup.nsh* is executed and the UEFI BIOS upgrade is started.

### Information:

With an "Extended" update (e.g. Intel ME firmware), several reboots are necessary. The instructions during the update process must be followed until the upgrade installation is completed with the message "BIOS update done".

<sup>4)</sup> Starting from version 1.0x, version 1.10 must first be installed before a version > 1.10 can be installed.

<sup>5)</sup> Starting from version 1.1x, version 1.21 must first be installed before a version > 1.21 can be installed.

5. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect. Call the boot menu with **[Esc]**, **[Del]** or **[F2]** during the following boot procedure and load the setup defaults and accept them with *Save changes and exit*.
- ✓ The upgrade is installed and in effect.

### 7.2.2 PC firmware upgrade

With *Firmware upgrade (MTCX, SDLT, SDL4T)*, it is possible to update the firmware of several controllers (MTCX, SDLT, SDL4T) depending on the variant of the Automation PC system.

A current firmware upgrade can be downloaded directly from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### Caution!

**The PC is not permitted to be switched off or reset while performing an upgrade!**

#### 7.2.2.1 Procedure in Windows (ADI Control Center)

1. Download the ZIP file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
  2. Open the *ADI Control Center* in the Control Panel.
  3. Open tab **Versions**.
  4. Click on the desired update under **PC firmware** or **Panel firmware**. The dialog box opens.
  5. Enter the name of the firmware file or select a file under "Filename".
  6. Execute file with **Open**.
  7. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.
- ✓ The upgrade is installed and in effect.

The transfer can be canceled by clicking on **Cancel** in dialog box "Download". This is disabled while writing to flash memory.

Erasing the data in flash memory can take several seconds depending on the memory module used. During this time, the progress indicator is not updated.

#### Information:

**For more detailed information about saving and updating the firmware, see the ADI driver user's manual. This is available for download at [www.br-automation.com](http://www.br-automation.com).**

#### 7.2.2.2 Procedure in the EFI shell

1. Download the ZIP file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
  2. Unzip the ZIP file and copy the files to a USB flash drive formatted in *FAT16* or *FAT32*. Alternatively, a CFast card can also be used.
  3. Reboot the PC, open the boot menu with **[Esc]**, **[Del]** or **[F2]** and select *Internal shell* as the boot device.
  4. After booting the EFI shell, *startup.nsh* is executed and the MTCX, SDLT and SDL4T upgrades are started in sequence.
  5. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.
- ✓ The upgrade is installed and in effect.

#### 7.2.2.3 Automatic firmware upgrade

With the APC2200/PPC2200, it is possible to perform updates automatically.

For this, parameter **Automatic firmware update** must be enabled in BIOS (see "[Advanced - OEM features](#)" on [page 113](#)).

A current firmware upgrade can be downloaded directly from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

Upgrades are provided as a *ZIP* file and include a readme file (*TXT* file) that provides additional information.

For automatic upgrades, the upgrade files must be stored in a directory named "XPC2200FWU" that is located in the root directory of a data storage medium formatted in *FAT32* (e.g. CFast card or USB flash drive). The following figure shows the view of a suitable data storage medium with an upgrade.

```

UEFI Interactive Shell v2.1
EDK II
UEFI v2.50 (INSYDE Corp., 0x57301018)
Mapping table
FS0: Alias(s):HD21i0b:;BLK1:
    PciRoot(0x0)/Pci(0x15,0x0)/USB(0x8,0x0)/HD(1,MBR,0xC3072E18,0xF0,0x1D63F10)
BLK0: Alias(s):
    PciRoot(0x0)/Pci(0x15,0x0)/USB(0x8,0x0)
Press ESC in 2 seconds to skip startup.nsh or any other key to continue.
Shell> fs0:
FS0:\> cd XPC2200FWU
FS0:\XPC2200FWU> dir
Directory of: FS0:\XPC2200FWU\
09/27/2018  14:17 <DIR>          8,192 .
09/27/2018  14:17 <DIR>           0 ..
04/13/2018  11:06             3,145,861 61609_0_fw
04/13/2018  11:06             3,145,861 61610_0_fw
04/13/2018  11:06             3,145,861 61611_0_fw
04/13/2018  11:06             3,145,861 61612_0_fw
04/13/2018  11:06             3,145,861 61638_0_fw
04/13/2018  11:06             3,145,861 61639_0_fw
04/13/2018  11:06             3,145,861 61640_0_fw
04/13/2018  11:06             3,145,861 61641_0_fw
04/12/2018  15:11             3,145,864 62020_0_fp
04/13/2018  11:09               5,925 Liesnich.txt
02/12/2018  15:27             411,264 mtcxsvc.efi
04/13/2018  11:10               1,002 HTCxPC2200.nsh
04/13/2018  11:10               5,813 Readme.txt
04/13/2018  11:10               1,004 SDLTxPC2200.nsh
04/13/2018  11:10               913 startup.nsh
08/31/2016  09:16             655,495 59062_0_fp
               16 File(s) 29,394,168 bytes
               2 Dir(s)
FS0:\XPC2200FWU>

```

### Information:

The automatic update only takes place if the installed firmware version differs from the upgrade version.

Automatic downgrades are possible!

#### 7.2.2.4 Firmware upgrade with Automation Runtime

The MTCX firmware is part of Automation Studio. The system is automatically updated to this status by Automation Runtime.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see **Project management / Workspace / Upgrades** in Automation Help).

#### 7.2.3 Automation Panel firmware upgrade

With *Firmware upgrade (Automation Panel, SDL3 Converter, SLD4 converter)*, it is possible to update the firmware of several controllers (SDLR, SDL3R, SDL4R, SDL3 Converter, SDL4 Converter) depending on the variant of the system.

A current firmware upgrade can be downloaded directly from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### Caution!

The Automation Panel is not permitted to be switched off or reset while performing an upgrade!

##### 7.2.3.1 Procedure in Windows (ADI Control Center)

1. Download the ZIP file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
2. Open the *ADI Control Center* in the Control Panel.
3. Open tab **Versions**.
4. Click on the desired update under **PC firmware** or **Panel firmware**. The dialog box opens.
5. Enter the name of the firmware file or select a file under "Filename".
6. Execute file with **Open**.

7. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.
- ✓ The upgrade is installed and in effect.

The transfer can be canceled by clicking on **Cancel** in dialog box "Download". This is disabled while writing to flash memory.

Erasing the data in flash memory can take several seconds depending on the memory module used. During this time, the progress indicator is not updated.

### Information:

For more detailed information about saving and updating the firmware, see the ADI driver user's manual. This is available for download at [www.br-automation.com](http://www.br-automation.com).

#### 7.2.3.2 Procedure in the EFI shell

1. Download the ZIP file from the B&R website ([www.br-automation.com](http://www.br-automation.com)).
  2. Unzip the ZIP file and copy the files to a USB flash drive formatted in *FAT16* or *FAT32*. Alternatively, a CFast card can also be used.
  3. Reboot the PC, open the boot menu with **[Esc]**, **[Del]** or **[F2]** and select *Internal shell* as the boot device.
  4. After booting the EFI shell, *startup.nsh* is executed and the MTCX, SDLT and SDL4T upgrades are started in sequence.
  5. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.
- ✓ The upgrade is installed and in effect.



## 7.3 Operating systems

### 7.3.1 Windows 10 IoT Enterprise 2019 LTSC


#### 7.3.1.1 General information

Windows 10 IoT Enterprise 2019 LTSC is a special version of Windows 10 Enterprise for industrial use (Long-Term Servicing Channel) that provides a high level of protection for applications through additional lockdown functions.

#### Information:

For detailed information, see the user's manual of the operating system. This is available for download on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 7.3.1.2 Order data

Order number	Short description	Figure
5SWW10.0900-MUL	<b>Windows 10 IoT Enterprise 2019 LTSC</b> Windows 10 IoT Enterprise 2019 LTSC: - 64-bit - Entry - Multilingual - License - Only available with a new device	

#### 7.3.1.3 Overview

Order number	5SWW10.0900-MUL
Operating system	
Target systems	
Industrial PC	APC2200, PPC2200
Processor	Atom
Chipset	Apollo Lake
License class	Entry
Architecture	64-bit (UEFI boot)
Language	Multilingual
Minimum size of RAM	2 GB <sup>1)</sup>
Minimum size of data storage medium	20 GB <sup>2)</sup>

1) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using 4 GB RAM or more for 64-bit operating systems.

2) The specified minimum size of the data storage medium does not take into account the memory requirements of additional language packages.

#### 7.3.1.4 Features

Windows 10 IoT Enterprise 2019 LTSC supports the following Microsoft features:

Features	Windows 10 IoT Enterprise 2019 LTSC
Range of functions in Windows 10 Enterprise	✓
Internet Explorer 11 (including Enterprise Mode)	✓
Windows Touch	✓
Multilingual support	With language packs (default: English)
Page file	Configurable (default: disabled by UWF)
Hibernate file	Configurable (default: disabled)
System restore	Configurable (default: disabled by UWF)
SuperFetch	
File indexing service	
Fast boot	
Defragmentation service	✓ (disabled when enabling the UWF)
Additional lockdown features (excerpt)	
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓
Keyboard Filter	Configurable

The following are some differences from standard Windows 10 Enterprise:

- Windows 10 IoT Enterprise 2019 LTSC does not include Cortana, the Microsoft Edge browser or the Microsoft Store.
- The LTSC version is based on build 17763 of Windows 10 and does not receive any feature updates.
- The version installed by B&R contains optimized settings for operation in an industrial environment.

These are described in detail in the **Windows 10 IoT Enterprise 2019 LTSC working guide**. This contains information about installing languages, enabling lockdown and other features.

**Information:**

**These settings, as well as all features not included in the LTSC version, result in different behavior compared to a standard Windows 10 Enterprise installation.**

**7.3.1.5 Installation**

B&R installs and activates Windows 10 IoT Enterprise 2019 LTSC on a suitable data storage medium. After the system has been switched on for the first time, it runs through the out-of-box experience (OOBE), which allows the user to make various settings (e.g. language, region, keyboard, computer name, username).

The operating system is now only installed in UEFI mode.

The data storage medium containing the Windows partition is formatted as a GUID Partition Table (GPT) file system in UEFI mode. For other drives, it is possible to use either the GPT or Master Boot Record (MBR) file format. A GPT drive can have up to 128 partitions.

**Notice!**

**It is important to note that when installing in UEFI mode, the GPT file system must be supported by the software being used when backing up and restoring the installation.**

**7.3.1.6 Drivers**

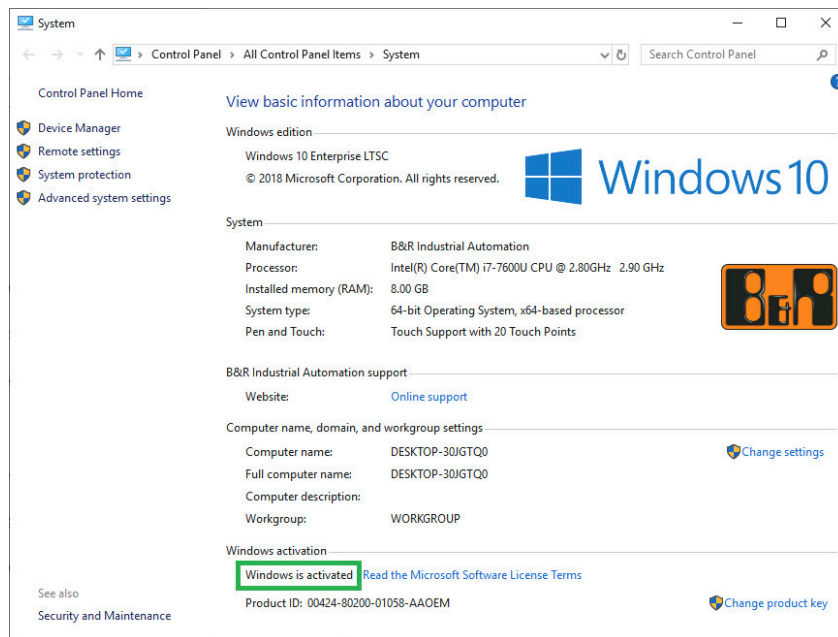
The operating system contains all drivers necessary for operation. If an older driver version is installed, the latest version can be downloaded and installed from the B&R website ([www.br-automation.com](http://www.br-automation.com)). It is important to ensure that "Unified Write Filter (UWF)" is disabled.

**Information:**

**Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.**

### 7.3.1.7 Activation

Windows 10 IoT Enterprise 2019 LTSC must be activated like its predecessor version. This takes place at B&R. The activation status can be checked in the Control Panel:



The activation carried out by B&R is supported by special B&R extensions in the operating system and is not lost when the hardware is changed (e.g. replacement of components in the event of repair) or when the system is reinstalled (Microsoft reserves the right to make technical changes without notice).

### 7.3.1.8 Supported display resolutions

Windows requires SVGA resolution (800 x 600) or higher per Microsoft requirements to activate full operation of the Windows interface (e.g. with system dialog boxes). A lower resolution can be selected for applications.

## 7.3.2 Windows 10 IoT Enterprise 2016 LTSB


### 7.3.2.1 General information

Windows 10 IoT Enterprise 2016 LTSB is a version of Windows 10 Enterprise specifically developed for use in industrial applications (Long-Term Servicing Branch).

#### Information:

For detailed information, see the user's manual of the operating system. This is available for download on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.3.2.2 Order data

Order number	Short description	Figure
	<b>Windows 10 IoT Enterprise 2016 LTSB</b>	
5SWW10.0544-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - APC2200 (UEFI boot) - CPU E3930/E3940 - License - Only available with a new device	
5SWW10.0558-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - APC2200 (Legacy BIOS boot) - CPU E3930/E3940 - License - Only available with a new device	
	<b>Optional accessories</b>	
	<b>Windows 10 IoT Enterprise 2016 LTSB</b>	
5SWW10.0800-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Language Pack DVD	

### 7.3.2.3 Overview

Order number	5SWW10.0544-MUL	5SWW10.0558-MUL
<b>Operating system</b>		
Target systems		
Industrial PC	APC2200	
Processor	x5-E3930, x5-E3940	
Chipset	Apollo Lake	
Edition	Enterprise LTSB - Entry	
Architecture	64-bit (UEFI boot)	64-bit (legacy BIOS boot)
Language	Multilingual	
Minimum size of RAM	2 GB <sup>1)</sup>	
Minimum size of data storage medium	20 GB <sup>2)</sup>	

1) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using 4 GB RAM or more for 64-bit operating systems.

2) The specified minimum size of the data storage medium does not take into account the memory requirements of additional language packages.

### 7.3.2.4 Features

The feature list shows the most important device functions in Windows 10 IoT Enterprise 2016 LTSB.

Function	Windows 10 IoT Enterprise 2016 LTSB
Range of functions in Windows 10 Enterprise	✓
Internet Explorer 11 including Enterprise Mode	✓
Multi-touch support	✓
Multilingual support	Can be installed via Language Pack DVDs (default language is English)
Page file	Configurable (disabled by default in the image by the UWF)
Hibernate file	Configurable (disabled by default in the image)
System restore	Configurable (disabled by default in the image by the UWF)
SuperFetch	Configurable (disabled by default in the image by the UWF)
File indexing service	Configurable (disabled by default in the image by the UWF)
Fast boot	Configurable (disabled by default in the image by the UWF)
Defragmentation service	✓ (Disabled when enabling the UWF)
<b>Additional embedded lockdown functions</b>	
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓
Keyboard Filter	Configurable

Table 76: Device functions in Windows 10 IoT Enterprise 2016 LTSB

### 7.3.2.5 Installation

Windows 10 IoT Enterprise 2016 LTSC is preinstalled by B&R on a suitable data storage medium (64-bit: at least 20 GB). After the system has been switched on for the first time, it runs through the out-of-box experience (OOBE), which allows different settings to be made (e.g. language, region, keyboard, computer name, username).

Windows 10 IoT Enterprise 2016 LTSC can be installed in UEFI or Legacy BIOS mode. In UEFI mode, the data storage medium containing the Windows partition is formatted with a GUID Partition Table (GPT) file system. A GPT drive can have up to 128 partitions.

When backing up and restoring the installation, note that the GPT file system must be supported by the software used.

### 7.3.2.6 Drivers

The operating system contains all drivers necessary for operation. If an older driver version is installed, the latest version can be downloaded and installed from the B&R website ([www.br-automation.com](http://www.br-automation.com)). It is important to ensure that "Unified Write Filter (UWF)" is disabled.

## Information:

**Necessary drivers must be downloaded from the B&R website, not from manufacturer websites.**

### 7.3.2.7 Activation

Windows 10 IoT Enterprise 2016 LTSC must be activated like its predecessor Windows 10 IoT Enterprise 2015 LTSC. This takes place at B&R.

The activation status can be checked in the Control Panel:

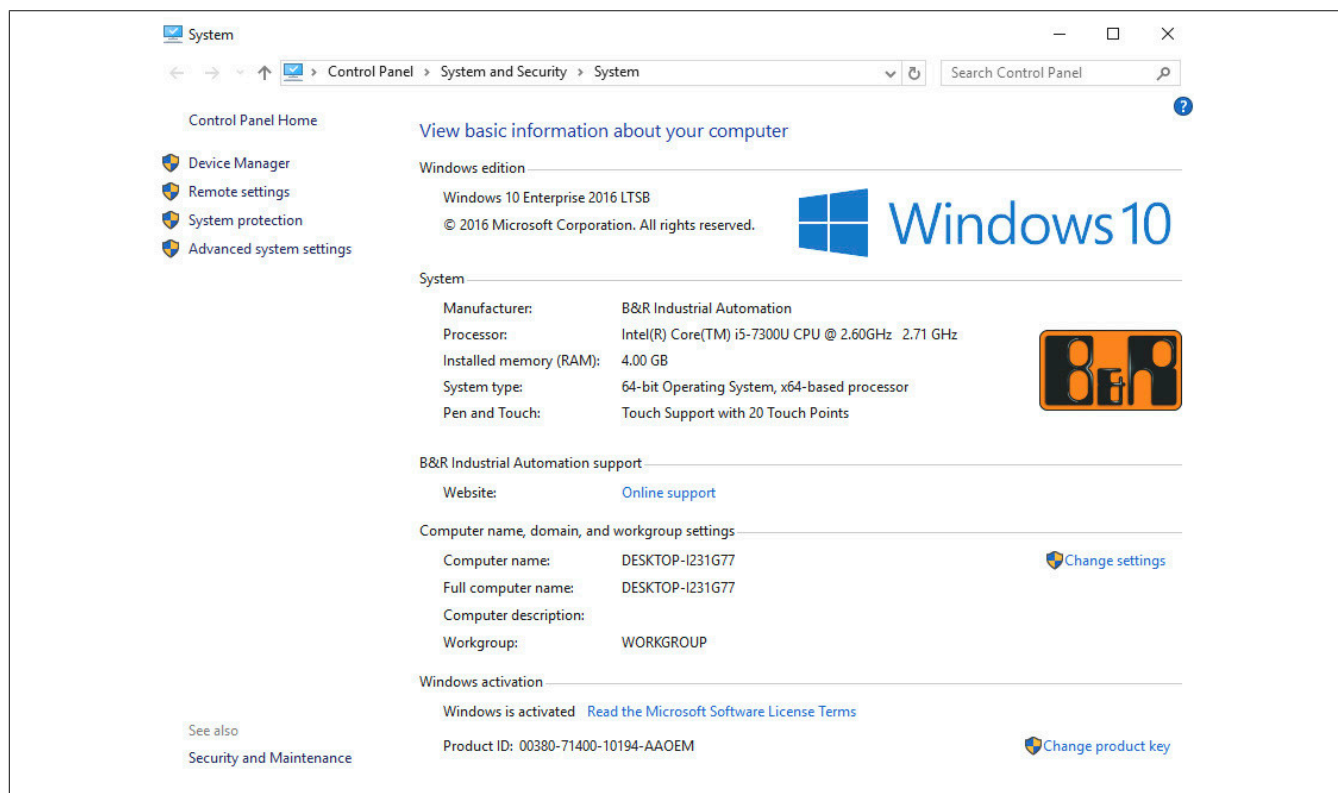


Figure 2: System properties

Activation carried out by B&R is supported by special B&R extensions in the operating system and theoretically not lost when the hardware is changed (e.g. replacement of components in the event of repair) or when the system is reinstalled, unlike Windows 10 IoT Enterprise 2015 LTSC (Microsoft reserves the right to make technical changes without notice).

## Information:

**It is not required to enter a product key for activation.**

#### 7.3.2.8 Characteristics, limitations

- Unlike standard Windows 10 Enterprise, Windows 10 IoT Enterprise 2016 LTSC does not include Cortana, the Microsoft Edge browser or the Microsoft Store, for example.
- The LTSC version is based on build 14393 of Windows 10 and does not receive any feature updates.

The version installed by B&R contains optimized settings for operation in an industrial environment. These are described in detail in a manual for Windows 10 IoT Enterprise 2016 LTSC. This can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)) (login required).

#### **Information:**

**These settings as well as the features not included in the LTSC version cause different behavior compared to a standard Windows 10 Enterprise installation.**

#### 7.3.2.9 Supported display resolutions

Windows requires SVGA resolution (800 x 600) or higher per Microsoft requirements to activate full operation of the Windows interface (e.g. with system dialog boxes). A lower resolution can be selected for applications.

### 7.3.3 Linux for B&R 10 (GNU/Linux)

#### 7.3.3.1 General information

B&R supports Linux in the form of modified images based on Debian GNU / Linux 10 (codename "buster").

Reasons for Debian:


- High stability
- Large package selection
- Wide distribution of Debian and various derivatives (e.g. Ubuntu, Linux Mint)

For additional information, see the Debian website (<https://www.debian.org/>).

#### Information:

For detailed information, see the user's manual of the operating system. This is available for download on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 7.3.3.2 Order data

Order number	Short description	Figure
	<b>Linux for B&amp;R 10</b>	
5SWLIN.0844-MUL	Linux for B&R 10 - 64-bit - Multilingual - APC2200 (UEFI boot) - Installation - Only available with a new device	
	<b>Optional accessories</b>	
	<b>CFAST cards</b>	
5CFAST.016G-00	CFAST 16 GB SLC	
5CFAST.032G-00	CFAST 32 GB SLC	
5CFAST.032G-10	CFAST 32 GB MLC	
5CFAST.064G-10	CFAST 64 GB MLC	
5CFAST.128G-10	CFAST 128 GB MLC	
5CFAST.256G-10	CFAST 256 GB MLC	
5CFAST.8192-00	CFAST 8 GB SLC	

#### 7.3.3.3 Overview

Order number	5SWLIN.0844-MUL
<b>Operating system</b>	
Target systems	
Industrial PC	APC2200
Chipset	Apollo Lake
Architecture	64-bit (UEFI boot)
Language	Multilingual
Minimum size of RAM	2 GB
Minimum size of data storage medium	8 GB

#### 7.3.3.4 Features

Linux for B&R 10 contains a selection of predefined software package groups. Additional packages can be installed later with an existing Internet connection.

Appropriate modifications have been made and certain features provided using custom packages in order to use Debian on B&R Automation Panels and Panel PCs. Most of these packages are already included in Linux for B&R and/or available for download on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 7.3.3.5 Installation

Linux for B&R 10 is preinstalled on the desired data storage medium (e.g. CFAST card).

#### 7.3.3.6 Drivers

The operating system contains all drivers necessary for operation.

The current version of B&R-specific drivers can be downloaded and installed from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.3.4 Linux for B&R 9 (GNU/Linux)

#### 7.3.4.1 General information

B&R supports Linux in the form of modified images based on Debian GNU / Linux 9 ("Stretch").

Reasons for Debian:


- High stability
- Large package selection
- Wide distribution of Debian and various derivatives (e.g. Ubuntu, Linux Mint)

For additional information, see the Debian website (<https://www.debian.org/>).

#### Information:

For detailed information, see the user's manual of the operating system. This is available for download on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 7.3.4.2 Order data

Order number	Short description	Figure
	<b>Linux for B&amp;R 9</b>	
5SWLIN.0744-MUL	Linux for B&R 9 - 64-bit - Multilingual - APC2200 (UEFI boot) - Installation - Only available with a new device	
5SWLIN.0758-MUL	Linux for B&R 9 - 64-bit - Multilingual - APC2200 (Legacy BIOS boot) - Installation - Only available with a new device	
	<b>Optional accessories</b>	
	<b>CFast cards</b>	
5CFAST.016G-00	CFast 16 GB SLC	
5CFAST.032G-00	CFast 32 GB SLC	
5CFAST.032G-10	CFast 32 GB MLC	
5CFAST.064G-10	CFast 64 GB MLC	
5CFAST.128G-10	CFast 128 GB MLC	
5CFAST.256G-10	CFast 256 GB MLC	
5CFAST.4096-00	CFast 4 GB SLC	
5CFAST.8192-00	CFast 8 GB SLC	

#### 7.3.4.3 Overview

Order number	5SWLIN.0744-MUL	5SWLIN.0758-MUL
<b>Operating system</b>		
Target systems	APC2200	
Industrial PC	Apollo Lake	
Chipset	Apollo Lake	
Architecture	64-bit (UEFI boot)	64-bit (Legacy BIOS boot)
Language	Multilingual	
Minimum size of RAM	2 GB	
Minimum size of data storage medium	4 GB	

#### 7.3.4.4 Features

- LXDE desktop
- Touch screen support
- MTCX driver
- ADI library
- Virtual keyboard

Detailed instructions about Linux for B&R 9 can be downloaded from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

#### 7.3.4.5 Installation

Linux for B&R 9 is preinstalled on the desired data storage medium (e.g. CFast card).

#### 7.3.4.6 Drivers

The operating system contains all drivers necessary for operation.

The current version of B&R-specific drivers can be downloaded and installed from the B&R website ([www.br-automation.com](http://www.br-automation.com)).





## 7.4 Automation software

### 7.4.1 Licensing

B&R Automation Runtime software components (e.g. Automation Runtime, B&R Hypervisor, mapp Technology) require a license.

It is possible to choose between the following licensing types:

#### Technology Guarding (TG)

Technology Guarding is license protection used for individual software components. The *Technology Guard* (hardware dongle) serves as the license container; this is connected to an available USB interface on the target system.

#### Information:

Licensing via TG is required for Automation Studio V4.1 or later and Automation Runtime V4.08 or later. No TG is necessary in earlier versions.

#### Terms and conditions (TC)

No *Technology Guard* is necessary; licensing takes place via a license agreement. Licenses are supplied with the sales receipt. The user is responsible for complying with the license conditions. B&R is protected by the terms of the EULA.


#### Information:

Licensing via TC is possible for Automation Studio V4.9 or later as well as Automation Runtime V4.90 or later.


For detailed information about licensing, see Automation Help (**Automation software / Licensing**).

### 7.4.2 Order data

#### Hardware-based licensing (Technology Guard)

Order number	Short description	Figure
	<b>Technology Guard</b>	
0TG1000.01	Technology Guard (MSD)	
0TG1000.02	Technology Guard (HID)	
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	
1TG4601.06-5	Automation Runtime Embedded, TG license	
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	
1TG4700.00	B&R Hypervisor	

#### Contract-based licensing (terms and conditions)

Order number	Short description	Figure
	<b>Runtime</b>	
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	
	<b>Hypervisor</b>	
1TC4700.00	License for B&R Hypervisor (TC). One license per target system is required.	

#### 7.4.3.1 Support

The following table provides an overview of which Automation Runtime software components are supported by the device.

Target system	B&R Hypervisor	ARemb	ARemb Terminal (TG only)
APC2200	Yes	Yes	No

## 7.4.4 Automation Runtime

### 7.4.4.1 General information

The real-time operating system Automation Runtime is an integral part of Automation Studio. This real-time operating system forms the software core for running applications on a target system.

- Guarantees the highest possible performance of the hardware being used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Easy portability of applications between B&R target systems
- Guaranteed determinism through cyclic system
- Configurable jitter tolerance in all task classes
- Support for all relevant programming languages, such as IEC 61131-3 languages and C
- Rich function library per IEC 61131-3 as well as the extended B&R automation library
- Integrated in Automation NET. Access to all networks and bus systems via function calls or by configuration in Automation Studio

B&R Automation Runtime is fully embedded in the corresponding target system (hardware on which Automation Runtime is installed). It thus enables application programs to access I/O systems (also via the fieldbus) and other devices such as interfaces and networks.

### 7.4.4.2 Minimum versions

#### 7.4.4.2.1 Automation Runtime Embedded (ARemb)

##### System requirements

The following software versions (or higher) are required to operate Automation Runtime Embedded on an Automation PC 2200:

- ARemb upgrade AR A4.63
- Automation Studio V4.6.2
- Visual Components Runtime (VC) V4.62
- Automation software license (TG or TC)

##### Information:

In order to use Automation Runtime Embedded (ARemb), BIOS setting *Advanced - OEM features - Realtime environment* must be set to *Enabled*.

##### Information:

For detailed information, see Automation Help or the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.4.5 B&R Hypervisor

B&R Hypervisor allows multiple operating systems to operate simultaneously on a single device. The operating systems can communicate with each other via a virtual network.

#### Intelligent distribution of CPU resources

B&R Hypervisor allows Windows or Linux to run simultaneously with Automation Runtime. This makes it possible to combine a controller and HMI PC in one device. With B&R Hypervisor, an industrial PC can also be used as an edge controller. This serves as a controller and simultaneously transmits pre-processed data to higher-level systems in the cloud via OPC UA.



#### Virtual network

The hypervisor provides a virtual network connection that allows applications to exchange data between operating systems. Similar to an ordinary Ethernet interface, standard network protocols are used. In place of a cable, there is a reserved memory area that is not allocated to either operating system.

#### Maximum flexibility

The user configures the hypervisor and allocates hardware resources in the B&R Automation Studio software development environment. The system configurations are determined individually. This makes the assignment of resources to the respective operating system flexible. Whereas previous simultaneous solutions were tailored to a specific Windows version, B&R Hypervisor is completely independent of the version of the operating systems used.

#### System requirements

The following minimum software versions are required to operate B&R Hypervisor on the Automation PC 2200:

- ARemb upgrade AR A4.63
- Automation Studio V4.6.2
- xPC2200 BIOS V1.05
- xPC2200 MTCX V1.02

#### Information:

The following settings must be made to operate B&R Hypervisor:

- **Advanced - OEM features - Realtime environment** must be enabled.
- **Advanced - OEM features - Hypervisor environment** must be enabled.
- **Boot - EFI device first:**

##### Legacy boot

- **Boot - EFI device first** must be disabled.

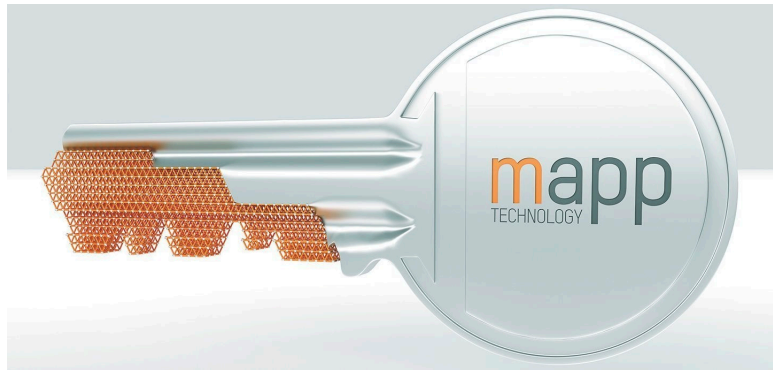
##### UEFI boot

- **Boot - EFI device first** must be enabled (default).

#### Information:

For detailed information, see Automation Help or the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.4.6 mapp Technology



mapp is revolutionizing the creation of software for industrial machinery and equipment. mapp components – mapps for short – are as easy to use as smartphone apps. Rather than write lines and lines of code to build a user management system, alarm system or motion control sequence from the ground up, developers of machine software simply configure the ready-made mapps with a few clicks of the mouse. Complex algorithms are easy to master. Programmers can focus entirely on the machine process.

**Information:**

For detailed information, see Automation Help or the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 7.5 Automation Device Interface (ADI)

The Automation Device Interface (ADI) enables access to specific functions of B&R devices.

### 7.5.1 ADI driver

#### 7.5.1.1 Installation

The ADI driver is included in B&R Windows operating systems.

The ADI driver (also includes the ADI Control Center) and user documentation can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)). If a more recent version is available, it can be installed later.

#### Information:

The *Write filter* must be disabled during installation.

#### 7.5.1.2 ADI Control Center

The settings of B&R devices can be read out and changed in Windows using the ADI Control Center in the Control Panel. The figure shown is a symbolic image; the representation may vary depending on the device.

#### Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) represent uncalibrated information values. No conclusions about possible alarms or hardware malfunctions can be drawn from this. The hardware components used have automatic diagnostic functions in the event of error.

Module	Sensor	°C	°F	Alarm
System Unit	1	25.00	77.00	
System Unit	2	28.00	82.40	
System Unit	3	35.00	95.00	
System Unit	4	29.00	84.20	
IF Module 3	1	45.50	113.90	
IF Module 1	1	24.00	75.20	
Panel 0	1	30.00	86.00	
Panel 8	1	28.50	83.30	
CPU		29.00	84.20	
UPS	Battery	24.00	75.20	

#### 7.5.1.2.1 Functions

The ADI Control Center offers the following functions, for example:

- Changing display-specific parameters
- Reading out device-specific keys
- Updating the key configuration
- Testing keys or device-specific LEDs of a membrane keypad
- Reading out control devices (e.g. key switch, handwheel)
- Reading out temperatures, fan speeds and statistical data
- Reading out operating hours (power-on hours)
- Reading user settings and factory settings
- Reading out software versions
- Updating and backing up firmware
- Creating reports for the current system (support)
- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the user serial ID

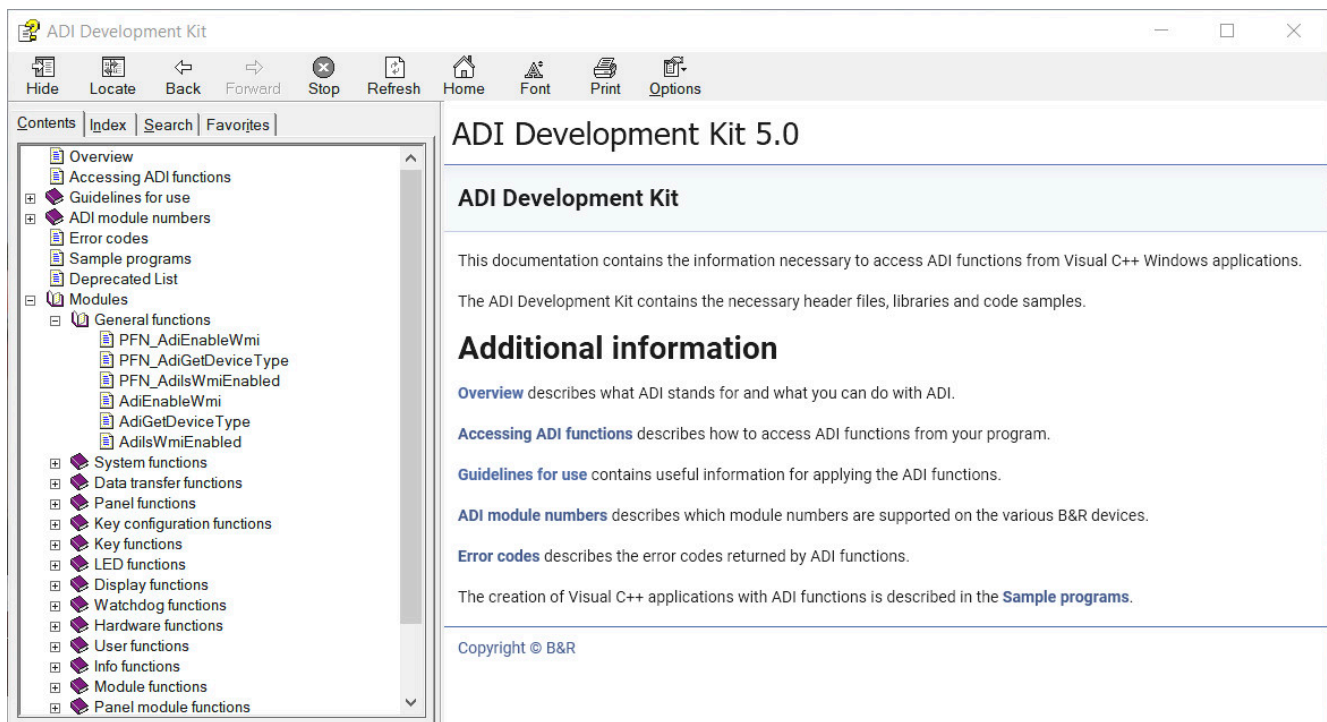
For a detailed description, see the user documentation for the ADI driver.

#### Information:

The functions available in the ADI Control Center depend on the device family.

## 7.5.2 ADI Development Kit

This software allows *ADI* functions to be accessed from Windows applications created with Microsoft Visual Studio, for example:



### Features:

- Header files and import libraries
- Help files
- Example projects
- ADI DLL: For testing applications if no ADI driver is installed.

The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

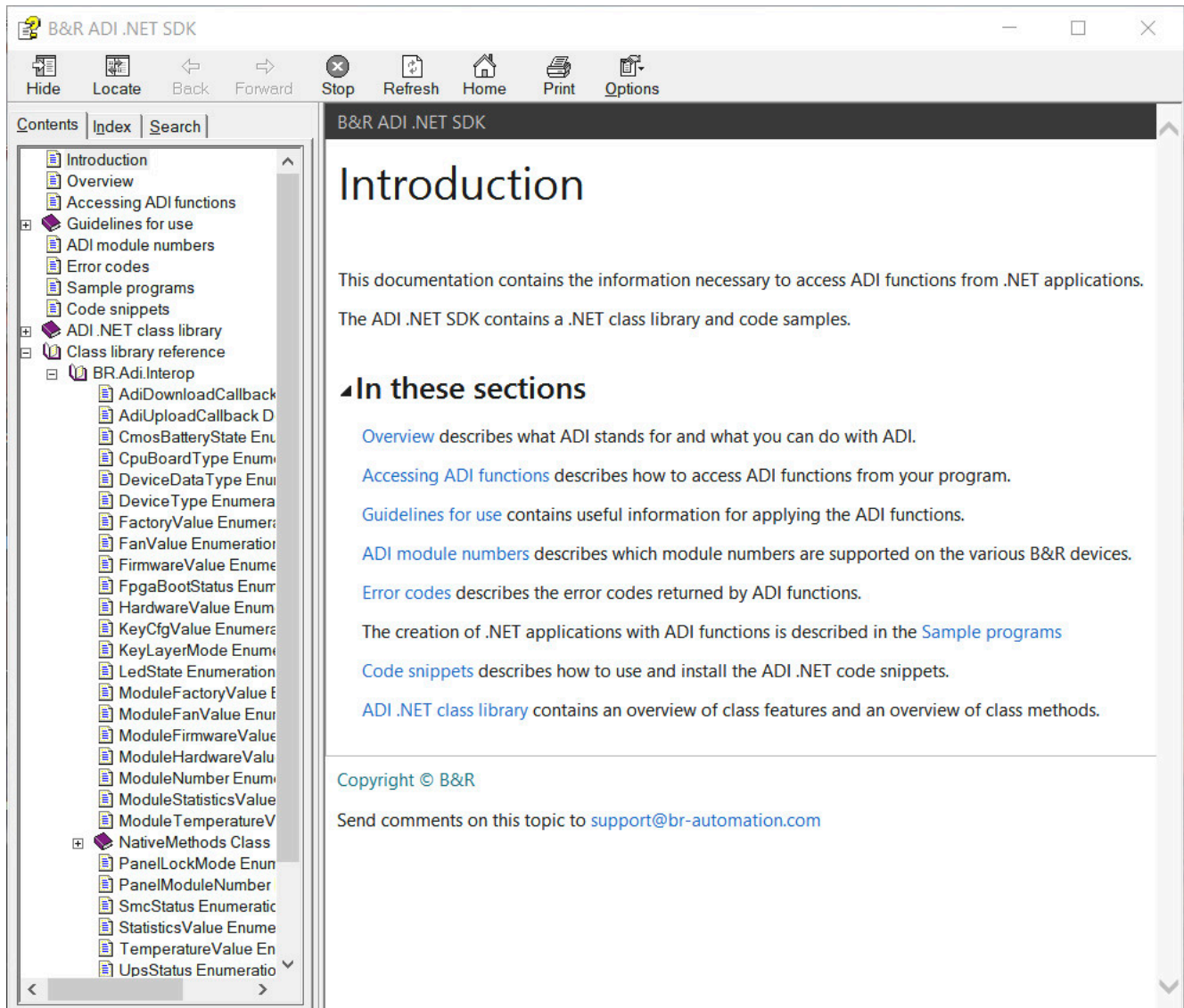
For a detailed description of how to use ADI functions, see Automation Help.

The ADI Development Kit can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).



### 7.5.3 ADI .NET SDK

This software allows *ADI* functions to be accessed from .NET applications created with Microsoft Visual Studio.



#### Features:

- ADI .NET class library
- Help files (in English)
- Sample projects and code snippets
- ADI DLL: For testing applications if no ADI driver is installed.

The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

For a detailed description of how to use ADI functions, see Automation Help.

The ADI .NET SDK can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).



### 7.5.4 ADI OPC UA Server

This document contains technical information about B&R Automation Device Interface OPC UA Server (B&R ADI OPC UA Server).

The descriptions and figures refer to B&R ADI OPC UA Server V2.0.0 and later.

ADI OPC UA Server provides the functions and information of the Automation Device Interface (ADI) as OPC UA variables. OPC UA stands for **O**pen **P**latform **C**ommunications **U**nified **A**rchitecture and is an international standard for secure, reliable, manufacturer- and platform-independent information exchange in industrial communication.

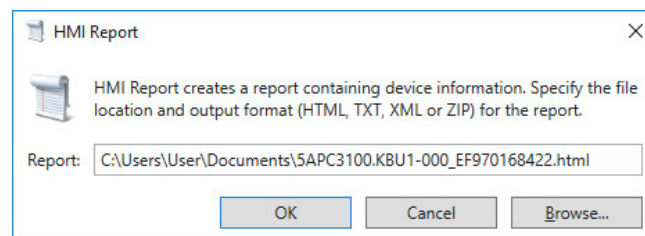
OPC UA is based on the client-server principle and, in the case of ADI OPC UA Server, enables temperatures and device information to be read from B&R devices, for example.

Additional information is available on the OPC Foundation ([www.opcfoundation.org](http://www.opcfoundation.org)) website, for example.

The ADI OPC UA Server and user documentation can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.5.5 HMI Report

HMI Report can be used to create a report with device-specific information. This report can then be used for support purposes or system documentation. The program is opened via the start menu.



The following output formats are available:

- HTML Report (HTML) - Report in HTML format for display in the browser.
- Text Report (TXT) - Report in text format for display in the text editor.
- XML Report (XML) - Report in XML format for display in the browser.
- Diagnostic package (ZIP) - The diagnostic package contains a text report and log files for troubleshooting by B&R.

The following settings can also be made:

- **Report:**  
Specifies the storage location, filename and output format for the report. Alternatively, the file dialog box can be used with **Browse**.

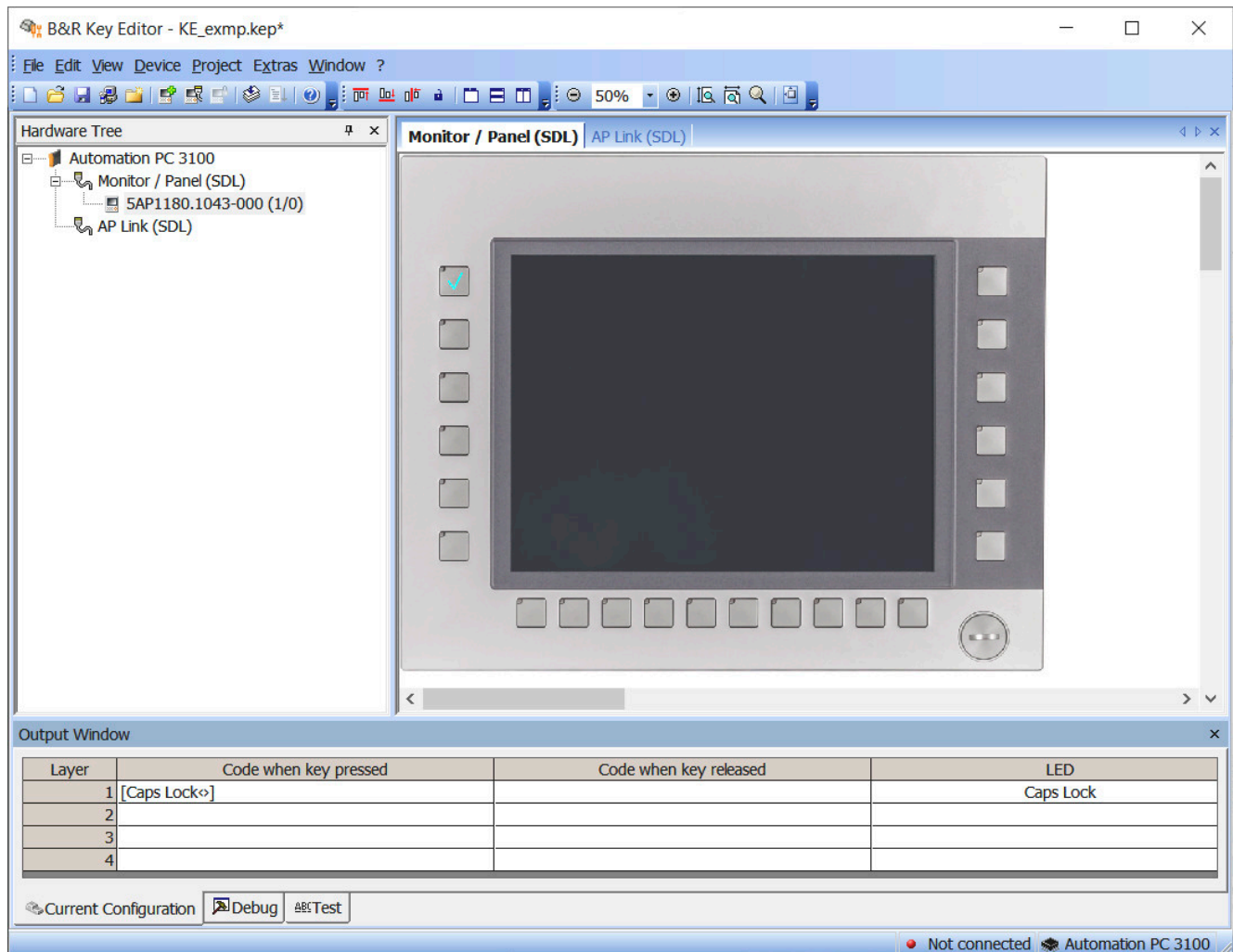
Alternatively, the report can be created from the **command line** with the following command:

```
C:\Programme\BrAutomation\Adi\System\HmiReport\BR.Hmi.Report.Cli.exe <Dateiname>
```

If no filename is specified, a text report is created with filename "<Material number>\_<Serial number>.txt".

## 7.6 Key Editor

A frequently occurring requirement for panels is adapting function keys and LEDs to the application software. With the Key Editor, individual adaptation to the application is possible quickly and easily.



### Features:

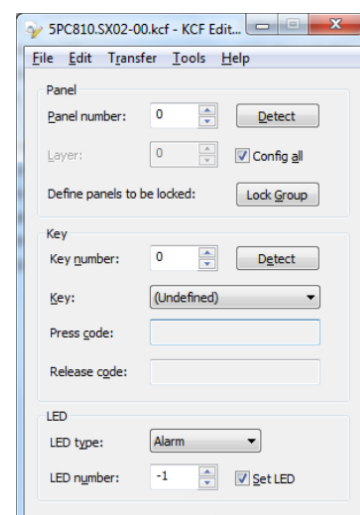
- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel lock time when connecting several Automation Panel devices to Automation PCs and Panel PCs

For detailed instructions about configuring keys and LEDs and installing the key configuration on the target system, see the help documentation for the Key Editor. The Key Editor and help documentation can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 7.7 KCF Editor

The KCF Editor can be used as a simple alternative to the Key Editor. It can also be used to adapt function keys and LEDs to the application software. In contrast to the Key Editor, operation does not take place using a graphical representation of the device, but via a simple Windows dialog box. The KCF Editor can therefore also be used for devices that are not yet supported in the Key Editor. The KCF Editor is a "portable" application and can be started directly from a USB flash drive without installation on the target device, for example.

An installed ADI driver is required for the full range of functions.



### Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel lock time when connecting several Automation Panel devices to B&R PCs.
- Export and import of the configuration (via INI files)
- Save configuration as report (text file)

If the KCF Editor is running on the target device and the ADI driver is installed, the following additional features are available:

- Panel and key detection
- LED test
- Download/Upload the configuration

For detailed instructions about configuring keys and LEDs and installing the key configuration on the target system, see the user documentation for the KCF Editor. The KCF Editor and user documentation can be downloaded at no cost from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 7.8 HMI Service Center

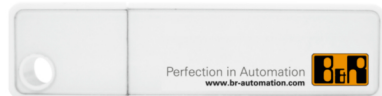
### 7.8.1 General information

The HMI Service Center is software for testing B&R industrial PCs and Automation Panels. Testing covers different categories such as COM, network and SRAM.

The test system consists of a USB flash drive with installed Windows PE operating system and the HMI Service Center.

For details about the HMI Service Center, see the HMI Service Center user's manual. This can be downloaded at no cost from the B&R website ([www.br-automation.com](http://www.br-automation.com)).

### 7.8.2 Order data

Order number	Short description	Figure
	<b>Accessories</b>	
5SWUT1.0001-000	HMI Service Center USB flash drive - Hardware diagnostic software - For APC910/PPC900 - For PPC1200 - For APC2100/PPC2100 - For APC2200/PPC2200 - For APC3100/PPC3100 - For APC mobile - For AP800/AP900 - For AP9x3/AP9xD - For AP1000/AP5000	

The following limitations regarding supported hardware revisions must be observed:

Devices	Starting with D0	Up to E0	Starting with E0
Automation Panel 1000	•		
Automation Panel 5000	•		
Automation PC 3100	•		
Automation PC 3100 mobile			•
Automation PC 2200	•		
Automation PC 810		•	
Automation PC 511		•	
Automation PC 510		•	
Panel PC 3100	•		
Panel PC 2200	•		
Panel PC 1200			•
Panel PC 800		•	
Power Panel 500		•	

## 8 Maintenance

The following chapter describes the maintenance work that can be carried out by a qualified and trained end user.

### Information:

Only components approved by B&R are permitted to be used for maintenance work.

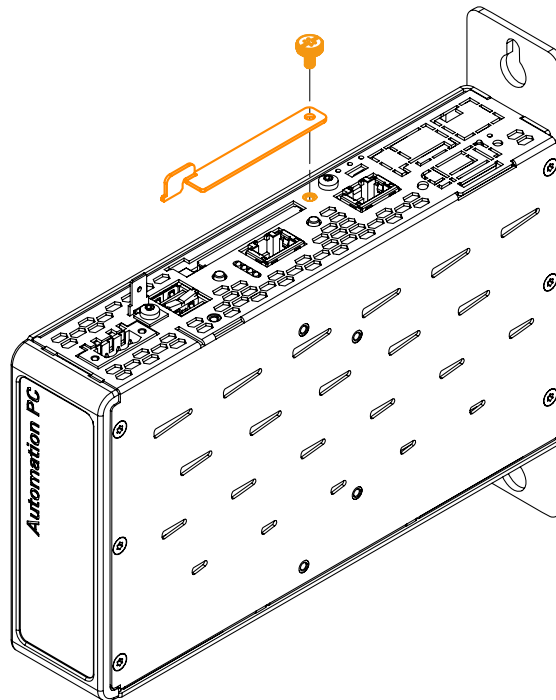
### 8.1 Replacing CFast cards

#### Caution!

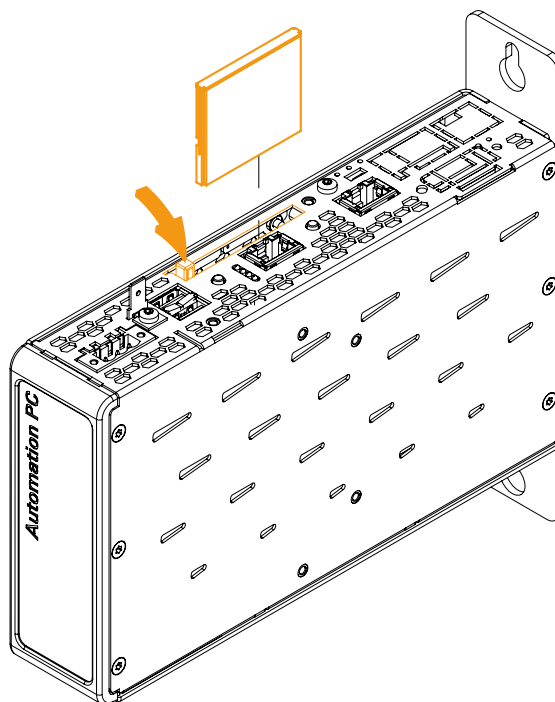
The CFast card is only permitted to be replaced in a voltage-free state.

Improper handling of the ejection lever (e.g. applying a large amount of force) can result in a defect in the ejector mechanism.

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Loosen the Torx screw (T10) of the cover plate and remove the cover plate.



3. Press the ejector next to the card slot. The CFast card is ejected and can be replaced.



4. After replacing, re-secure the cover of the CFast card slot. The max. tightening torque of the screw is 0.55 Nm.

## 8.2 Changing the battery

### Warning!

The battery compartment is only permitted to be replaced by B&R battery compartment 5ACCBT01.0000-001 or 5ACCRPC2.0003-000. The battery is permanently installed and cannot be replaced. The entire battery compartment must always be replaced.

The use of any other battery may present a risk of fire or explosion.

The battery can explode if handled improperly. Do not recharge, disassemble or dispose of the battery in fire.

The lithium battery ensures the retention of the internal real-time clock (RTC) and CMOS data.

Note the following when changing the battery:

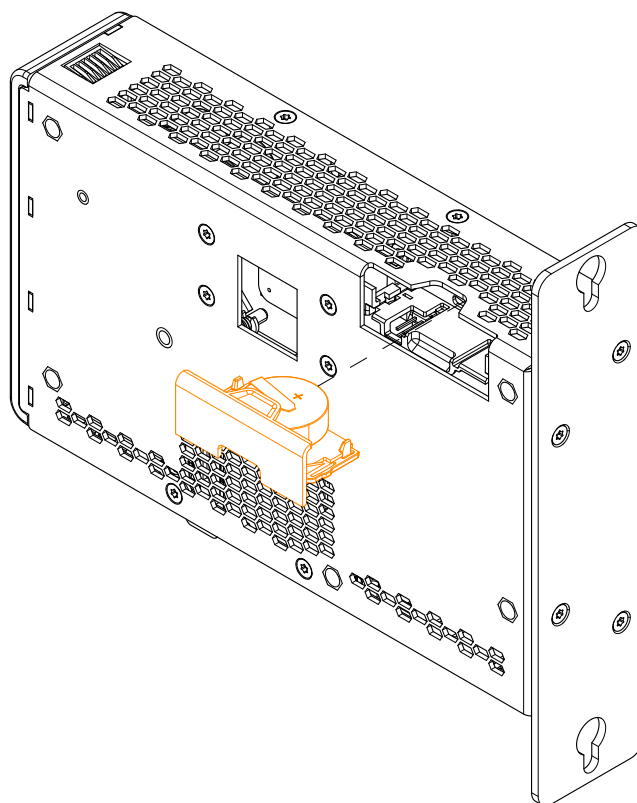
- The product design allows the battery to be changed when the PLC is in a voltage-free state as well as when the B&R device is switched on. In some countries, changing under operating voltage is not permitted, however; local regulations must be observed!
- The battery is only permitted to be changed by qualified personnel.
- When changing the battery in a voltage-free state, any BIOS settings made are retained (stored in voltage-safe EEPROM). The date and time must be set again since this data is lost during the change.

### 8.2.1 Changing the battery

The following instructions apply to battery compartments 5ACCBT01.0000-001 and 5ACCRPC2.0003-000.

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Carry out electrostatic discharge on the housing or ground connection.

3. Pull out and remove the battery compartment.



4. Insert the new battery compartment.
5. Reapply power to the B&R industrial PC (connect the power cable).
6. Reset the date and time.

### Warning!

Lithium batteries are hazardous waste! Used batteries must be disposed of in accordance with local regulations.

## 8.3 Repairs/Complaints and replacement parts

### Danger!

Unauthorized opening or repair of a device may result in personal injury and/or serious damage to property. Repairs are therefore only permitted to be carried out by authorized qualified personnel at the manufacturer's premises.

To process a repair/complaint, a repair order or complaint must be created via the B&R Material Return Portal on the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## 9 Accessories

The following accessories have undergone functional testing by B&R in connection with the device used and can be operated with this device. Possible limitations regarding operation with individual components other than the complete system must be taken into account, however. All individual specifications of the components must be observed when operating the complete system.

All components listed in this manual have undergone intensive system and compatibility testing and been approved accordingly. B&R cannot assume any functional warranty for accessories that have not been approved.

### 9.1 General information

The following products can be used in the event of loss or for conversion or retrofitting.

#### 9.1.1 Order data

Material number	Description
5ACCRHMI.0000-000	HMI grounding clip
5ACCRHMI.0001-000	Retaining clips 16 mm - 14 pcs. with 16 mm setscrews - For AP1000 and AP9x3
5ACCRHMI.0002-000	Retaining clips 20 mm - 14 pcs. with 20 mm setscrews - For AP1000 and AP9x3
5ACCRHMI.0003-000	Retaining clips 25 mm - 12 pcs. with 25 mm setscrews - For AP1000 and AP9x3
5ACCRHMI.0004-000	Rafi replacement key - 1 pc.
5ACCRHMI.0004-C00	Schlegel replacement key - 2 pcs.
5ACCRPC2.0000-000	PPC2100/2200 mounting screws kit - 4x screw M3x34 mm - 2x special screw for PPC2100
5ACCRPC2.0001-000	xPC2100/2200 interface covers - 1x cover set
5ACCRPC2.0002-000	xPC2200 CFast cover
5ACCRPC2.0003-000	xPC2200 battery compartment - 1x battery holder for xPC2200 - 1x battery including circuit board
5ACCRPC2.0007-000	APC2100/2200 front cover - Orange - With logo
5ACCRPC2.0008-000	APC2100/APC2200 front cover - Gray - With logo

##### 9.1.1.1 5ACCRPC2.0003-000 - Technical data

#### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	5ACCRPC2.0003-000
<b>General information</b>	
Battery	
Type	Panasonic 1000 mAh
Nominal voltage	3 V
Service life	8 years <sup>1)</sup>
Removable	No <sup>2)</sup>
Variant	Lithium
Certifications	
CE	Yes
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2
<b>Ambient conditions</b>	
Temperature	
Operation	-25 to 60°C
Storage	-25 to 60°C
Transport	-25 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%
<b>Mechanical properties</b>	
Housing	
Material	Dyed gray (similar to Pantone 432C) plastic
Weight	Approx. 13 g

1) At 50°C, 6 µA for the components being supplied.

2) The battery is permanently installed in the battery compartment and cannot be replaced. The entire battery compartment must always be replaced.



## 9.2 Installation accessories


Suitable tool sets can be ordered to easily install B&R industrial PCs and converters.

- Consisting of:

### 5ACCRHMI.0006-000

- 1x torque screwdriver: 0.4 to 2.0 Nm
- 1x bit set (5 pieces): Hex recess (2.5 mm, 3.0 mm, 5.0 mm), Torx (T10, T20)


### 9.2.1 Order data

Order number	Short description	Figure
	<b>Other</b>	
5ACCRHMI.0006-000	HMI installation tool for control cabinet - 1x torque wrench 0.4 - 2.0 Nm - 1x hex head bit 2.5, length 89 mm - 1x hex head bit 3.0, length 89 mm - 1x hex head bit 5.0, length 89 mm - 1x Torx 10 bit, length 90 mm - 1x Torx 20 bit, length 89 mm	

## 9.3 Terminal block power supply

### 9.3.1 0TB103.9x

#### 9.3.1.1 Order data

Order number	Short description	Figure
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm <sup>2</sup>	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm <sup>2</sup>	

#### 9.3.1.2 Technical data

### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	0TB103.9		0TB103.91
General information			
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>		
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>		
LR	ENV3		
KR	Yes		
ABS	Yes		
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck		
EAC	Yes		
Terminal block			
Note	Protected against vibration by the screw flange Nominal data per UL		
Number of pins	3 (female)		
Type of terminal block	Screw clamp terminal block variant	Cage clamp terminal block variant <sup>3)</sup>	
Cable type	Only copper wires (no aluminum wires!)		
Pitch	5.08 mm		
Connection cross section			
AWG wire	26 to 14 AWG	26 to 12 AWG	
Wire end sleeves with plastic covering	0.20 to 1.50 mm²		
Solid wires	0.20 to 2.50 mm²		
Fine-stranded wires	0.20 to 1.50 mm²	0.20 to 2.50 mm²	
With wire end sleeves	0.20 to 1.50 mm²		
Tightening torque	0.4 Nm	-	
Electrical properties			
Nominal voltage	300 V		
Nominal current <sup>4)</sup>	10 A / contact		
Contact resistance	≤5 mΩ		
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) The cage clamp terminal block cannot be used side by side.
- 4) The respective limit data of the I/O modules must be taken into account!


## 9.4 Terminal block for IF options

### 9.4.1 0TB1210.3100

#### 9.4.1.1 General information

2-row 10-pin terminal block TB1210 is used to connect to the interfaces of various interface options.

#### 9.4.1.2 Order data

Order number	Short description	Figure
	<b>Terminal blocks</b>	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

#### 9.4.1.3 Technical data

#### Information:

The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Order number	0TB1210.3100
<b>General information</b>	
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 <sup>1)</sup>
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>2)</sup>
LR	ENV3
KR	Yes
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
<b>Terminal block</b>	
Note	Nominal data per UL
Number of pins	10 (female)
Type of terminal block	Push-in spring connection
Cable type	Only copper wires (no aluminum wires!)
Pitch	3.5 mm
Connection cross section	
AWG wire	26 to 16 AWG
Wire end sleeves with plastic covering	0.14 to 1 mm <sup>2</sup>
Solid wires	0.14 to 1.5 mm <sup>2</sup>
Fine-stranded wires	0.14 to 1.5 mm <sup>2</sup>
With wire end sleeves	0.14 to 1.5 mm <sup>2</sup>

## Accessories

<b>Order number</b>	<b>0TB1210.3100</b>
<b>Electrical properties</b>	
Nominal voltage	300 V
Nominal current <sup>3)</sup>	10 A
<b>Operating conditions</b>	
Pollution degree per EN 61131-2	Pollution degree 2

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
- 3) The respective limit data of the I/O modules must be taken into account!

## 9.5 Cable strain relief clip

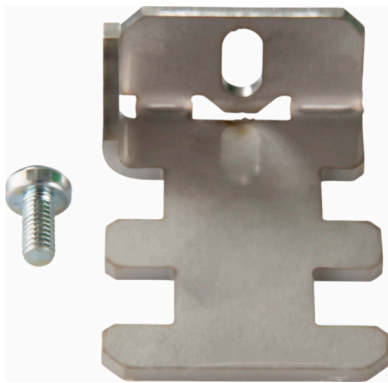
### 9.5.1 5ACCRHMI.0011-000

#### 9.5.1.1 General information

With cable strain relief clip 5ACCRHMI.0011-000 for the USB interfaces of the APC2200, the vibration resistance of the APC2200 can be doubled during operation.

The locating screws and cable ties required for installation on the device are included in delivery. For details about installation, see ["Installing the cable strain relief clip" on page 96](#).

#### 9.5.1.2 Order data

Order number	Short description	Figure
5ACCRHMI.0011-000	Accessories Strain relief USB - For APC2100/APC2200 - For SDL3 Converter/SDL4 Converter	

#### 9.5.1.3 Technical data

Order number	5ACCRHMI.0011-000
<b>General information</b>	
Certifications	
CE	Yes
<b>Mechanical properties</b>	
Material	Stainless steel
Dimensions	
Width	24.5 mm
Length	37 mm (including length overhang)
Height	12 mm
Weight	15 g
Locating screws	
Quantity	1


## 9.6 Adhesive labels

### 9.6.1 5ACCST00.0000-000

#### 9.6.1.1 General

An optional adhesive label with the B&R logo can be selected for the front cover of the APC2200.

#### 9.6.1.2 Order data

Order number	Short description	Figure
	<b>Front covers</b>	
5ACCST00.0000-000	B&R logo - Adhesive label - For front covers	

#### 9.6.1.3 Technical data

Order number	5ACCST00.0000-000
<b>General information</b>	
Certifications	
CE	Yes
UKCA	Yes
DNV	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>A</b> (0.7 g) EMC: <b>B</b> (bridge and open deck) <sup>1)</sup>
LR	ENV3
ABS	Yes
BV	<b>EC31B</b> Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
<b>Mechanical properties</b>	
Material	PU (coated)
Dimensions	
Width	13.3 mm
Length	22.7 mm
Weight	Approx. 1 g

- 1) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

## 9.7 Cables

For additional information about compatible cables, see the B&R website ([HMI cable manual](#)).

## 9.8 USB mass storage device

For additional information about compatible USB mass storage devices, see the B&R website ([USB mass storage devices](#)).

# 10 International and national certifications

## 10.1 Directives and declarations

### 10.1.1 CE marking



All directives applicable to the respective product and their harmonized EN standards are met.

### 10.1.2 EMC Directive

The products meet the requirements of EU directive "Electromagnetic compatibility 2014/30/EU" and are designed for industrial applications:

EN 61131-2:2007	Programmable controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

#### Information:

Declarations of conformity are available on the B&R website under [Downloads > Certificates > Declarations of conformity](#).

## 10.2 Certifications

### Danger!

**A complete system can only receive certification if all individual components installed and connected in it have the corresponding certifications. If an individual component is used that does not have the corresponding certification, the complete system will also not be certified.**

B&R products and services comply with applicable standards. These are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We pay special attention to the reliability of our products in the industrial sector.

#### Information:

The certifications valid for the respective product are available on the website and in the user's manual under the technical data in section "Certifications" or in the associated certificates.

### 10.2.1 UL certification



Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment". The mark is valid for the USA and Canada and facilitates the certification of your machines and systems in this economic area.

Underwriters Laboratories (UL) per standards UL 61010-1 and UL 61010-2-201 Canadian (CSA) standard per C22.2 No. 61010-1-12 and CSA C22.2 No. 61010-2-201:14

Ind. Cont. Eq.  
E115267

The UL certificates are available on the B&R website ([Downloads > Certificates > UL](#)).



When using industrial control equipment per UL 61010-1 / UL 61010-2-201, make sure that the device is classified as "open type". The prerequisite for certification or operation per UL 61010-1 / UL 61010-2-201 is therefore the installation of the device in an appropriate protective housing.

### 10.2.2 EAC



Products with this mark are tested by an accredited test laboratory and permitted to be imported into the Eurasian Customs Union (based on EU conformity).

### 10.2.3 KC



Products with this mark are tested by an accredited test laboratory and permitted to be introduced into the Korean market (based on EU conformity).

### 10.2.4 UKCA



#### UK Conformity Assessed (UKCA)

All directives applicable to the respective product and their relevant standards are met. Products with this marking are permitted to be imported into Great Britain (England, Wales, Scotland).

#### Information:

The declarations of conformity are available on the B&R website ([Downloads > Certificates > Declarations of conformity](#)).

### 10.2.5 RCM



Products with this mark are tested by an accredited test laboratory and certified by the ACMA. The mark is valid for Australia/Oceania and simplifies the certification of your machines and systems in this economic area (based on EU conformity).

### 10.2.6 DNV certification



Products with this certification are certified by the classification society DNV and suitable for the maritime sector. DNV certificates (type approvals) are generally accepted by other classification societies during ship acceptance procedures.

DNV certificates with specifications for permissible environmental conditions as well as a list of revisions from which the DNV type certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

**Information:**

For use in the maritime sector, the Automation PC 2200 must be installed in the box style (mounting plate on the side), see "[Mounting orientations](#)" on page 28.

**10.2.7 American Bureau of Shipping (ABS)**

Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society American Bureau of Shipping (ABS Rules).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

**Information:**

For use in the maritime sector, the Automation PC 2200 must be installed in the box style (mounting plate on the side), see "[Mounting orientations](#)" on page 28.

**10.2.8 Bureau Veritas (BV)**

Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Bureau Veritas (BV).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

**Information:**

For use in the maritime sector, the Automation PC 2200 must be installed in the box style (mounting plate on the side), see "[Mounting orientations](#)" on page 28.

**10.2.9 Lloyd's Register (LR)**

Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Lloyd's Register (LR).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website ([Downloads > Certificates > Maritime](#)).

**Information:**

For use in the maritime sector, the Automation PC 2200 must be installed in the box style (mounting plate on the side), see "[Mounting orientations](#)" on page 28.

# 11 Environmentally friendly disposal

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All programmable logic controllers, operating and monitoring devices and uninterruptible power supplies from B&R are designed to have as little impact on the environment as possible.

## 11.1 Separation of materials

To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials.

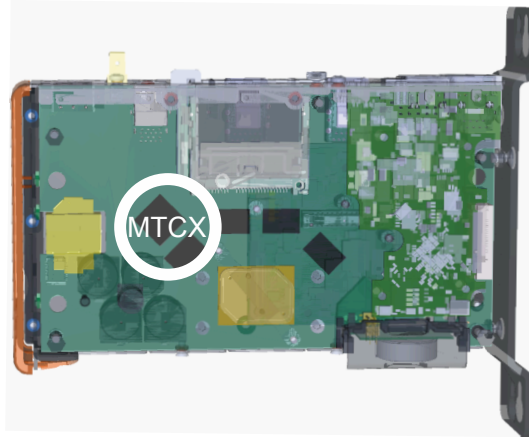
Component	Disposal
Programmable logic controllers Operating and monitoring devices Uninterruptible power supplies Batteries and rechargeable batteries Cables	Electronics recycling
Paper/Cardboard packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

Disposal must be carried out in accordance with applicable legal regulations.

## Appendix A MTCX

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The MTCX controller (FPGA processor) is located on the mainboard (component of every system unit) of the xPC2200:



The MTCX is responsible for the following monitoring and control functions:

- Power failure logic and power on logic (power OK sequencing)
- Handling of watchdog (handling of NMI/reset)
- Temperature monitoring and fan control
- Handling/Coordination of keys and LEDs (matrix keyboard of B&R panels)
- Advanced desktop operation (buttons, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable via the ADI Control Center)
- Backlight control of a connected B&R display
- Calculating statistical data: Power-on cycles, power-on hours and fan hours (resolution: 15 min)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- LED status indicators (Power, Disk, Link, Run)
- Optimal (default) BIOS settings are reported to BIOS by the MTCX depending on the existing hardware.

The functions of the MTCX can be extended by upgrading its firmware<sup>6)</sup>. The version can be read in BIOS or in approved Microsoft Windows operating systems using the ADI Control Center.

<sup>6)</sup> Can be downloaded from the Downloads section of the B&R website ([www.br-automation.com](http://www.br-automation.com)).

## Appendix B Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 169	RS422	"RS422 - Bus length and cable type" on page 169
RS485	"RS485 - Bus length and cable type" on page 170	CAN	"CAN - Bus length and cable type" on page 170

### B.1 RS232 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable length and type of cable used.

Bus length	Transfer rate
≤15 m	Typ. 64 kbit/s
≤10 m	Typ. 115 kbit/s
≤5 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS232 cables		Property
<b>Signal line</b>		
	Cable cross section	4x 0.16 mm <sup>2</sup> (26 AWG), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Wires stranded in pairs
	Shield	Pair shielding with aluminum foil
<b>GND</b>		
	Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
<b>Outer jacket</b>		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

### B.2 RS422 - Bus length and cable type

The RTS line must be switched on to activate the transmitter.

The maximum transfer rate of 115 kbit/s depends on the cable length and type of cable used.

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS422 cables		Property
<b>Signal line</b>		
	Cable cross section	4x 0.25 mm <sup>2</sup> (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Wires stranded in pairs
	Shield	Pair shielding with aluminum foil
<b>GND</b>		
	Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
<b>Outer jacket</b>		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

## B.3 RS485 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable length and type of cable used.

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS485 cables		Property
<b>Signal line</b>		
	Cable cross section	4x 0.25 mm <sup>2</sup> (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Wires stranded in pairs
	Shield	Pair shielding with aluminum foil
<b>GND</b>		
	Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
<b>Outer jacket</b>		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

## B.4 CAN - Bus length and cable type

The type of cable to be used depends largely on the required bus length and number of nodes. The bus length is determined by the transfer rate. Per CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted at a maximum permissible oscillator tolerance of 0.121%:

Bus length <sup>1)</sup>	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
≤20 m <sup>2)</sup>	Typ. 1 Mbit/s
≤15 m <sup>3)</sup>	

- 1) The specified cable length is only valid with the values specified in "CAN driver settings". Cable lengths otherwise depend on the values in the bit timing register, cable quality and number of nodes.
- 2) For CAN interfaces without galvanic isolation and 5ACCIF01.ICAN-000.
- 3) For CAN interfaces with galvanic isolation.

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

CAN cable		Property
<b>Signal line</b>		
	Cable cross section	2x 0.25 mm <sup>2</sup> (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Twisted-pair wires
	Shield	Pair shielding with aluminum foil
<b>GND</b>		
	Cable cross section	1x 0.34 mm <sup>2</sup> (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
<b>Outer jacket</b>		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

## Appendix C POWERLINK

### C.1 LED "S/E" (status/error LED)

This LED is a green/red dual LED and indicates the state of the POWERLINK interface. The LED states have a different meaning depending on the operating mode of the POWERLINK interface.

#### C.1.1 Ethernet mode

In this mode, the interface is operated as an Ethernet interface.

LED "S/E"		Description
Green	Red	
On	Off	The interface is operated as an Ethernet interface.

Table: LED "S/E": Interface in Ethernet mode

#### C.1.2 POWERLINK V2 mode

##### Error message

LED "S/E"		Description
Green	Red	
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	<p>If an error occurs in the following modes, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> <li>PRE_OPERATIONAL_1</li> <li>PRE_OPERATIONAL_2</li> <li>READY_TO_OPERATE</li> </ul>

Table: LED "S/E" - Error message (interface in POWERLINK mode)

##### Interface status

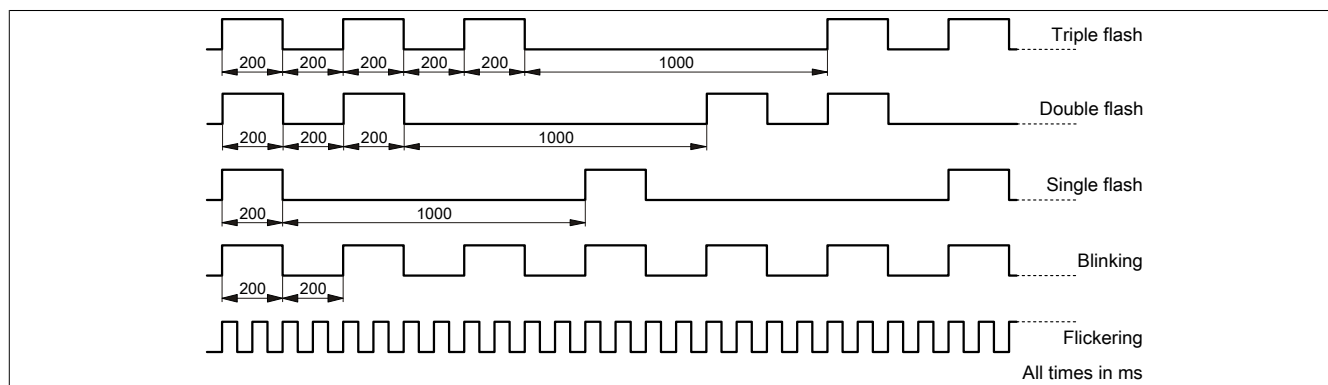
LED "S/E"		Description
Green	Red	
Off	Off	<p><b>Mode: NOT_ACTIVE</b> The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present:</p> <ul style="list-style-type: none"> <li>The device is switched off.</li> <li>The device is in the startup phase.</li> <li>The interface or device is not configured correctly in Automation Studio.</li> <li>The interface or device is defective.</li> </ul> <p><b>Managing node (MN)</b> The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode PRE_OPERATIONAL_1. If POWERLINK communication is detected before the time has elapsed, however, the MN is not started.</p> <p><b>Controlled node (CN)</b> The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode BASIC_ETHERNET. If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1.</p>

Table: LED "S/E" - Interface state (interface in POWERLINK mode)

LED "S/E"		Description
Green	Red	
Flickering (approx. 10 Hz)	Off	<b>Mode: BASIC_ETHERNET</b> The interface is in mode BASIC_ETHERNET. The interface is operated in <a href="#">Ethernet mode</a> .  <b>Managing node (MN)</b> This mode can only be exited by resetting the controller.  <b>Controlled node (CN)</b> If POWERLINK communication is detected during this mode, the interface enters mode PRE_OPERATIONAL_1.
	On	<b>Mode: PRE_OPERATIONAL_1</b> The interface is in mode PRE_OPERATIONAL_1.  <b>Managing node (MN)</b> The MN is in "reduced cycle" mode. The CNs are configured in this mode. Cyclic communication is not yet taking place.  <b>Controlled node (CN)</b> The CN can be configured by the MN in this mode. The CN waits until it receives an SoC frame and then switches to mode PRE_OPERATIONAL_2.
Single flash (approx. 1 Hz)	Off	<b>Mode: PRE_OPERATIONAL_2</b> The interface is in mode PRE_OPERATIONAL_2.  <b>Managing node (MN)</b> The MN starts cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this mode.  <b>Controlled node (CN)</b> The CN can be configured by the MN in this mode. A command then switches the mode to READY_TO_OPERATE.
	On	<b>Controlled node (CN)</b> If the red LED lights up in this mode, this means that the MN has failed.
Double flash (approx. 1 Hz)	Off	<b>Mode: READY_TO_OPERATE</b> The interface is in mode READY_TO_OPERATE.  <b>Managing node (MN)</b> Cyclic and asynchronous communication. Received PDO data is ignored.  <b>Controlled node (CN)</b> The configuration of the CN is completed. Normal cyclic and asynchronous communication. The transmitted PDO data corresponds to the PDO mapping. However, cyclic data is not yet evaluated.
	On	<b>Controlled node (CN)</b> If the red LED lights up in this mode, this means that the MN has failed.
Triple flash (approx. 1 Hz)	Off	<b>Mode: OPERATIONAL</b> The interface is in mode OPERATIONAL. PDO mapping is active and cyclic data is evaluated.
	On	<b>Controlled node (CN)</b> If the red LED lights up in this mode, this means that the MN has failed.
On	Off	<b>Mode: STOPPED</b> The interface is in mode STOPPED.  <b>Managing node (MN)</b> This mode does not occur for the MN.  <b>Controlled node (CN)</b> Output data is not being output, and no input data is being provided. This mode can only be reached and exited by a corresponding command from the MN.

Table: LED "S/E" - Interface state (interface in POWERLINK mode)

## Blink times

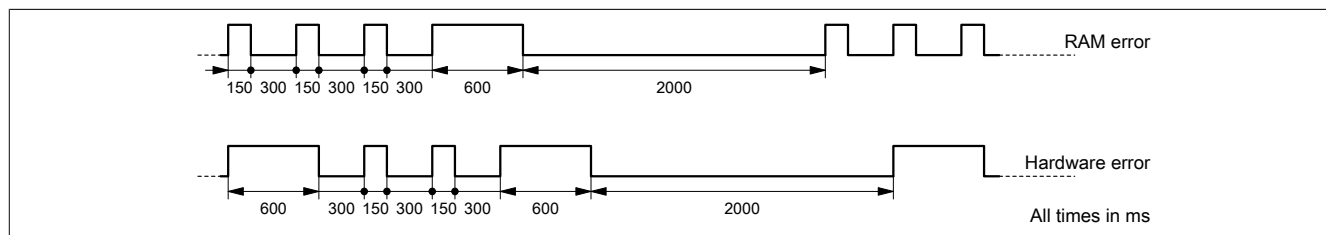




### C.1.3 System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by LED "S/E" blinking red. The blinking signal of the error code consists of 4 switch-on phases with short (150 ms) or long (600 ms) duration. The error code is repeated every 2 seconds.



Error	Error description
RAM error	The device is defective and must be replaced.
Hardware error	The device or a system component is defective and must be replaced.

### C.1.4 POWERLINK V2

By default, the POWERLINK interface is operated as a managing node (MN). In the managing node, the node number is set to a fixed value of 240.

If the POWERLINK node is operated as a controlled node (CN), a node number from 1 to 239 can be set in the POWERLINK configuration in Automation Studio.

## Appendix D Abbreviations

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Abbreviations used in the document are explained here.

Abbreviation	Stands for	Description
NC	Normally closed	Stands for a normally closed relay contact.
	Not connected	Used in pinout descriptions if a terminal or pin is not connected on the module side.
ND	Not defined	Stands for an undefined value in technical data tables. This may be because the cable manufacturer has not provided a value for certain technical data.
NO	Normally open	Stands for a normally open relay contact.
TBD	To be defined	Used in technical data tables if there is currently no value for specific technical data. The value will be supplied later.
MTBF	Mean time between failures	The expected value of the operating time between two consecutive failures.