# Panel PC 2200 swing arm devices User's manual 

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Translation of the original documentation

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## 1 Introduction

## Information:

B\&R makes every effort to keep documents as current as possible. The most current versions can be downloaded from the B\&R website (www.br-automation.com).

### 1.1 Manual history

| Version | Date | Comment ${ }^{1}$ |
| :---: | :---: | :---: |
| 2.00 | December 2021 | Updated document. <br> - Updated "B\&R Linux 10 (GNU/Linux)" on page 240. <br> - Updated "Windows 10 loT Enterprise 2019 LTSC" on page 234. <br> - Added VESA consoles "5ACCMA00.0100-000" on page 145 and "5ACCMA00.0101-000" on page 147. <br> - Added heat pipe "5ACCHP00.0003-000" on page 269. <br> - Added swivel-tilt flange "5ACCFL00.0100-000" on page 151. <br> - Updated "Automation software" on page 243. <br> - Updated "Block diagram" on page 46. <br> - Updated "UEFI BIOS options" on page 205. <br> - Updated "Product information" on page 24. <br> - Updated "Changing the battery" on page 256. <br> - EN 60950 replaced by IEC 61010-2-201. <br> - Cables and USB mass storage device are described in their own documentation starting with this version. <br> - Updated the CAN interface description, see sections "Interface options" on page 101 and "Cable data" on page 279. |
| 1.05 | August 2019 | Updated section "General information": <br> - Updated "General safety guidelines" on page 12. <br> Updated section "Software" on page 205: <br> - Updated "UEFI BIOS options" on page 205. <br> - Updated "OEM features" on page 214. <br> - Updated "Upgrade information" on page 230. <br> - Revised "Operating systems" on page 234: <br> - Added "5SWW10.0559-MUL" on page 237. <br> - Added "5SWLIN.0759-MUL" on page 241. <br> - Updated Automation Runtime. <br> - Added "B\&R Hypervisor" on page 245 and "mapp Technology" on page 246. |
| 1.00 | December 2018 | - First version. |

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### 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 |
| :--- | :--- |
| Danger! | Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property. |
| Warning! | Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property. |
| Caution! | Failure to observe these safety guidelines and notices can result in minor injury or damage to property. |
| Notice! | 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 |
| :--- | :--- |
| Information: | 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 <br> DIN ISO 2768 medium |
| :--- | :---: |
| Up to 6 mm | $\pm 0.1 \mathrm{~mm}$ |
| Over 6 to 30 mm | $\pm 0.2 \mathrm{~mm}$ |
| Over 30 to 120 mm | $\pm 0.3 \mathrm{~mm}$ |
| Over 120 to 400 mm | $\pm 0.5 \mathrm{~mm}$ |
| Over 400 to 1000 mm | $\pm 0.8 \mathrm{~mm}$ |

## 2 General safety guidelines

### 2.1 Intended use

In all cases, it is necessary to observe and comply with applicable national and international standards, regulations and safety measures!

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 ${ }^{1)}$ )
- 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.

1) 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

### 3.1 Information about this user's manual

This user's manual contains all the necessary information for a functioning Panel PC 2200 swing arm device.
For information about the Automation Panel 5000 swing arm device, see the Automation Panel 5000 user's manual.

### 3.2 Easy customization

The Automation Panel 5000 can be used as a remote panel or part of a Panel PC. For this, the panel is either equipped with a receiver for Smart Display Link (SDL), SDL3 or SDL4, or a PC unit is attached. The operator panel is always identical.


### 3.2.1 System units

System units consist of the CPU board and an aluminum housing. All interfaces and the main memory of the PPC2200 are integrated on the system units. An interface option and CFast card can also be connected. The main memory modules are permanently installed on the system unit and cannot
 be replaced.
If a system unit is installed on a panel, this results in a functional Panel PC 2200.
A system unit without a panel is not functional.

### 3.2.1.1 Features

- Intel Atom X processor series (Apollo Lake)
- Up to quad-core CPU performance
- Powerful graphics (Intel HD graphics)
- Compact dimensions
- 2x Gigabit Ethernet
- 2x USB 3.0
- 1x CFast slot
- 1 x interface option slot
- Fanless operation
- Real time clock, RTC (battery-backed)
- TPM 2.0 security


### 3.2.2 AP5000 panels

The AP5000 series forms the basis for the Automation Panel 5000 and two Panel PC variants: Panel PC 2100 or Panel PC 2200 swing arm device with Automation Panel 5000. They consist of a display and touch screen. Different display sizes, touch screen technologies, mounting systems and panels with operating elements are available. The panels can only be operated as a complete system in combination with a link module (Automation Panel 5000) or system unit (PPC2100 or PPC2200 swing arm device with a panel from the Automation Panel 5000 series). Single-touch panels start with order number 5AP5120.xxxx-xxx, multi-touch panels start with 5AP5130.xxxx-xxx and multi-touch panels with an expansion option start with order number 5AP5230.xxxx-xxx.


### 3.2.3 Mounting units

Mounting units are installed on the back of the panel. They are used to protect the installed link module or system unit and thus provide the complete system with a different degree of protection depending on the variant.

A flange is installed on 5ACCMA00.000x-000 swing arm mounting units. Due to the symmetrical design of the back of the panel, it is possible to install the mounting unit in 2 directions. If a flange is selected as the mounting system, a flange output is possible on the top or bottom. This mounting unit provides IP65 protection.


A VESA bracket is installed on VESA IP54 mounting units (5ACCMA00.010x-000). If a VESA bracket is selected as the mounting system, VESA 100 or VESA 75 installation is possible. These mounting units provide IP54 protection.


A VESA bracket is installed on VESA mounting unit 5ACCMA01.0100-000. If a VESA bracket is selected as the mounting system, VESA 100 or VESA 75 installation is possible. This mounting unit provides a degree of protection up to IP20.


### 3.2.4 Flanges

A flange is installed on the mounting unit and establishes the connection between the Automation Panel or Panel PC and the swing arm system.


### 3.2.5 Expansion units

Expansion units can be installed on AP5230 panels with expansion option. It is possible to choose between an expansion cover and an expansion unit.
Expansion covers have cutouts that can be used to install the desired operating elements at a later time.
The operating elements are already integrated in expansion units.


### 3.2.6 Handles

Handles can be installed on the sides of the panel to enable comfortable, ergonomic operation.

### 3.3 PPC2200 swing arm device - Configuration

The following individual components are mandatory for operation as a Panel PC 2200 swing arm device:

- Panel
- System unit
- CFast card
- Operating system
- Mounting unit: Swing arm or VESA
- Flange (swing arm mounting unit only)
- Expansion unit or expansion cover (5AP5230.xxxx-000 only)


| Mass storage devices | Select 1. |  |  |
| :---: | :---: | :---: | :---: |
|  | CFast cards |  |  |
|  | 5CFAST.2048-00 <br> 5CFAST. 4096 -00 <br> 5CFAST.8192-00 <br> 5CFAST.016G-00 <br> 5CFAST.032G-00 |  | 5CFAST.032G-10 5CFAST.064G-10 5CFAST.128G-10 5CFAST.256G-10 |
| Interfaces |  |  |  |
|  | Interface options |  | Optional, select 1 |
|  | 5ACCIF01.FPCC-000 <br> 5ACCIF01.FPLK-000 <br> 5ACCIF01.FSS0-000 <br> 5ACCIF01.FPLS-000 <br> 5ACCIF01.FPLS-001 | 5ACCIF01.FPSC-000 5ACCIF01.FPSC-001 5ACCIF01.ICAN-000 5ACCIF01.FPCS-000 5ACCIF03.CETH-000 |  |
| , | Battery compartment |  | Selected automatically ${ }^{\text {5 }}$ |
|  | 5ACCBT01.0000-001 |  |  |
| USB accessories |  |  | Optional selection |
|  | 5MMUSB.2048-01 5MMUSB.4096-01 5MMUSB.032G-02 |  |  |
| USB hub |  |  | Optional selection |
| (ब) | 5ACCUSB2.0002-000 |  |  |
| Terminal blocks | Power supply connectorsOTB103.9OTB103.91 |  | Select 1 |
|  |  |  | Terminal block for IF option OTB1210.3100 |
| Operating systems |  |  | Select 1 |
| - Windows 10 <br> Linux 3 <br> Automation Runtime | Windows 10 <br> 5SWW10.0545-MUL <br> 5SWW10.0559-MUL <br> 5SWW10.0900-MUL | B\&R Linux 10 5SWLIN.0845-MUL <br> B\&R Linux 9 5SWLIN.0745-MUL 5SWLIN.0759-MUL | Automation Runtime <br> OTG1000.01 <br> OTG1000.02 <br> 1TC4601.06-5 <br> 1TG4601.06-5 <br> 1TG4601.06-T |

1) Must be selected for all 5 ACCMA00.000x-000 mounting units.
2) Expansion units can only be combined with 5AP5230.xxxx-000 panels.
3) Handles must be installed on site.
4) If a configuration is created with a mounting unit, the corresponding heat pipe is selected automatically.
5) The battery compartment is selected automatically.

### 3.4 Overview

| Order number | Short description | Page |
| :---: | :---: | :---: |
|  | Accessories |  |
| OTB103.9 | Connector 24 VDC - 3-pin, female - Screw clamp terminal block $3.31 \mathrm{~mm}^{2}$ | 264 |
| OTB103.91 | Connector 24 VDC - 3-pin, female - Cage clamp terminal block $3.31 \mathrm{~mm}^{2}$ | 264 |
| 5ACCBT01.0000-001 | Battery compartment - Dark gray - Includes battery - For APC2200/PPC2200 | 139 |
| 5ACCUSB2.0002-000 | 2-port USB hub, passive - For Automation Panel 5000 | 266 |
| 5SWUTI.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 | 253 |
|  | B\&R Linux 10 |  |
| 5SWLIN.0845-MUL | B\&R Linux 10-64-bit - Multilingual - PPC2200 (UEFI boot) - Installation - Only available with a new device | 240 |
|  | B\&R Linux 9 |  |
| 5SWLIN.0745-MUL | B\&R Linux 9-64-bit - Multilingual - PPC2200 (UEFI boot) - Installation - Only available with a new device | 241 |
| 5SWLIN.0759-MUL | B\&R Linux 9-64-bit - Multilingual - PPC2200 (Legacy BIOS boot) - Installation - Only available with a new device | 241 |
|  | Expansion units |  |
| 5ACCKP00.156B-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 10x cutouts for 22.3 mm switching elements - For panel 5AP5230.156B/156C-000 | 154 |
| 5ACCKP00.185B-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 11x cutouts for 22.3 mm switching elements - For panel 5AP5230.185B/185C-000 | 154 |
| 5ACCKP00.215C-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 13x cutouts for 22.3 mm switching elements - For panel 5AP5230.215C-000 | 154 |
| 5ACCKP00.2151-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 7x cutouts for 22.3 mm switching elements - For panel 5AP5230.215I-000 | 154 |
| 5ACCKP00.240C-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 14x cutouts for 22.3 mm switching elements - For panel 5AP5230.240C-000 | 154 |
| 5ACCKP01.156B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) 1 x selector switch -1 x key switch -1 x front USB interface - For panel 5AP5230.156B/156C-000 | 156 |
| 5ACCKP01.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) 1x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 | 156 |
| 5ACCKP01.215C-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) 1x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.215C-000 | 156 |
| 5ACCKP01.215I-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) 1x selector switch - 1 x key switch - 1x front USB interface - For panel 5AP5230.215I-000 | 156 |
| 5ACCKP01.240C-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) 1x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.240C-000 | 156 |
| 5ACCKP03.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop $2 x$ pushbutton (red and green) - 1x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 | 158 |
| 5ACCKP03.215C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop $-2 x$ pushbutton (red and green) - $1 \times$ selector switch $-1 \times$ key switch $-1 x$ front USB interface - For panel 5AP5230.215C-000 | 158 |
| 5ACCKP03.240C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop $-2 \times$ pushbutton (red and green) - 1x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.240C-000 | 158 |
| 5ACCKP04.156B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop - $3 x$ pushbutton (red, green, blue) $-1 x$ key switch - 1 x front USB interface - For panel 5AP5230.156B/156C-000 | 160 |
| 5ACCKP04.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-3 x$ pushbutton (red, green, blue) $-1 x$ key switch $-1 x$ front USB interface - For panel 5AP5230.185B/185C-000 | 160 |
| 5ACCKP04.215C-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop - $3 x$ pushbutton (red, green, blue) $-1 x$ key switch - $1 x$ front USB interface - For panel 5AP5230.215C-000 | 160 |
| 5ACCKP04.215I-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop - 3x pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.215I-000 | 160 |
| 5ACCKP04.240C-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-3 x$ pushbutton (red, green, blue) $-1 x$ key switch - 1 x front USB interface - For panel 5AP5230.240C-000 | 160 |
| 5ACCKP05.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - 3x pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 | 162 |
| 5ACCKP05.215C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - 3x pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.215C-000 | 162 |
| 5ACCKP05.240C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - 3x pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.240C-000 | 162 |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit | 150 |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit | 151 |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit | 153 |
|  | Handles |  |
| 5ACCHD00.1505-000 | AP5000 swing arm handles - For panel 5AP5120.1505-000 | 165 |
| 5ACCHD00.156B-000 | AP5000 swing arm handles - For panel 5AP5130.156B/156C-000 | 165 |
| 5ACCHD00.185B-000 | AP5000 swing arm handles - For panel 5AP5130.185B/185C-000 | 165 |
| 5ACCHD00.1906-000 | AP5000 swing arm handles - For panel 5AP5120.1906-000 | 165 |
| 5ACCHD00.215C-000 | AP5000 swing arm handles - For panel 5AP5130.215C-000 | 165 |
| 5ACCHD00.240C-000 | AP5000 swing arm handles - For panel 5AP5130.240C-000 | 165 |
| 5ACCHD01.156B-000 | AP5000 swing arm handles - For panel 5AP5230.156B/156C-000 | 165 |
| 5ACCHD01.185B-000 | AP5000 swing arm handles - For panel 5AP5230.185B/185C-000 | 165 |
| 5ACCHD01.215C-000 | AP5000 swing arm handles - For panel 5AP5230.215C-000 | 165 |
| 5ACCHD01.2151-000 | AP5000 swing arm handles - For panel 5AP5230.215l-000 | 165 |
| 5ACCHD01.240C-000 | AP5000 swing arm handles - For panel 5AP5230.240C-000 | 165 |
|  | Heat pipe |  |
| 5ACCHP00.0002-000 | AP5000 heat pipe - For PPC2200 - For swing arm mounting unit | 269 |


| Order number | Short description | Page |
| :---: | :---: | :---: |
| 5ACCHP00.0003-000 | AP5000 heat pipe - For PPC2200 - For VESA mounting unit | 269 |
|  | Hypervisor |  |
| 1TC4700.00 | License for B\&R Hypervisor (TC). One license per target system is required. | 243 |
|  | Interface options |  |
| 5ACCIF01.FPCC-000 | Interface card - 2 x CAN interfaces - 1 x X2X Link interface - 1 x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device | 101 |
| 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 | 107 |
| 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 | 111 |
| 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 | 114 |
| 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 | 117 |
| 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 | 120 |
| 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 | 124 |
| 5ACCIF01.FSS0-000 | Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device | 129 |
| 5ACCIF01.ICAN-000 | Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device | 133 |
| 5ACCIF03.CETH-000 | Interface card - 2x ETH 10/100/1000 interface - For APC2200/PPC2200-Only available with a new device | 136 |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit | 140 |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface | 141 |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit -2 x rear USB interface | 143 |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. | 145 |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. | 147 |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000-IP10 with 5AP5130.*-000, 5AP5230.*-000 | 149 |
|  | Other |  |
| 5ACCRHMI.0007-000 | HMI installation tool for swing arm: - $1 \times$ torque wrench ESD $0.3-1.2 \mathrm{Nm}-1 \mathrm{x}$ torque wrench $1.0-25.0 \mathrm{Nm}-$ 1 x hex-head bit 3.0 , length $89 \mathrm{~mm}-1 \mathrm{x}$ hex-head bit 5.0 , length $89 \mathrm{~mm}-1 \mathrm{x}$ Torx 10 bit, length $90 \mathrm{~mm}-1 \mathrm{x}$ Torx 20 bit, length $89 \mathrm{~mm}-1 \mathrm{x}$ Torx 25 bit, length $89 \mathrm{~mm}-1 \mathrm{x}$ Torx 30 bit, length $89 \mathrm{~mm}-1 \mathrm{x}$ quick-change chuck for torque wrench | 263 |
|  | Panels |  |
| 5AP5120.1505-000 | Automation Panel 15.0" XGA TFT - $1024 \times 768$ pixels (4:3) - Single-touch (analog resistive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 64 |
| 5AP5120.1906-000 | Automation Panel 19.0" SXGA TFT - $1280 \times 1024$ pixels (5:4) - Single-touch (analog resistive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 66 |
| 5AP5130.156B-000 | Automation Panel 15.6" HD TFT - $1366 \times 768$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 68 |
| 5AP5130.156C-000 | Automation Panel $15.6^{\prime \prime}$ Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 70 |
| 5AP5130.185B-000 | Automation Panel 18.5 " HD TFT - $1366 \times 768$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 72 |
| 5AP5130.185C-000 | Automation Panel 18.5 " Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 74 |
| 5AP5130.215C-000 | Automation Panel 21.5" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 76 |
| 5AP5130.240C-000 | Automation Panel 24.0" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules | 78 |
| 5AP5230.156B-000 | Automation Panel $15.6^{\prime \prime}$ HD TFT - $1366 \times 768$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules | 80 |
| 5AP5230.156C-000 | Automation Panel 15.6" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules | 83 |
| 5AP5230.185B-000 | Automation Panel $18.5^{\prime \prime}$ HD TFT - $1366 \times 768$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules | 86 |
| 5AP5230.185C-000 | Automation Panel 18.5 " Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules | 89 |
| 5AP5230.215C-000 | Automation Panel 21.5" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules | 92 |
| 5AP5230.2151-000 | Automation Panel 21.5" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Portrait format - Expansion option - For PPC2100 / PPC2200 / link modules | 95 |
| 5AP5230.240C-000 | Automation Panel 24.0" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules | 98 |
|  | Runtime |  |
| 1TC4601.06-5 | License for Automation Runtime Embedded (TC). One license per target system is required. | 243 |
|  | System units |  |
| 5PPC2200.AL02-000 | PPC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 2 GB SDRAM | 61 |
| 5PPC2200.AL04-000 | PPC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 4 GB SDRAM | 61 |
| 5PPC2200.AL14-000 | PPC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 4 GB SDRAM | 61 |
| 5PPC2200.AL18-000 | PPC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 8 GB SDRAM | 61 |
|  | Technology Guard |  |
| 0TG1000.01 | Technology Guard (MSD) | 243 |
| OTG1000.02 | Technology Guard (HID) | 243 |
| OTGF016.01 | Technology Guard (MSD) with integrated flash drive, 16 GB (MLC) | 243 |
| 1TG4601.06-5 | Automation Runtime Embedded, TG license | 243 |


| Order number | Short description | Page |
| :--- | :--- | :---: |
| 1TG4601.06-T | Automation Runtime Embedded Terminal TG license | 243 |
| 1TG4700.00 | B\&R Hypervisor | 243 |
|  | Terminal blocks | 265 |
| 0TB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw <br> flange | 265 |
|  | Windows 10 loT Enterprise 2016 LTSB |  |
| 5SWW10.0545-MUL | Windows 10 loT Enterprise 2016 LTSB -64-bit - Entry - Multilingual - PPC2200 (UEFI boot) - CPU E3930/E3940 <br> - License - Only available with a new device | 237 |
| 5SWW10.0559-MUL | Windows 10 loT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2200 (Legacy BIOS boot) - CPU <br> E3930/E3940 - License - Only available with a new device | 237 |
|  | Windows 10 loT Enterprise 2019 LTSC |  |
| 5SWW10.0900-MUL | Windows 10 loT Enterprise 2019 LTSC: - 64-bit - Entry - Multilingual - License - Only available with a new device | 234 |

## 4 Technical data

### 4.1 Complete system

### 4.1.1 Product information



| Position | Description |
| :---: | :--- |
| 1 | Specifications for the device family and electrical properties |
| 2 | Device-specific specifications, serial numbers and MAC addresses, see Identification. |
| 3 | Valid test and conformity ID for the product, see section "Technical data" on page 24 |
| 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) |
| $\mathbf{v}$ | These holes are intended for installing/removing the panel PC on the panel. |

### 4.1.1.1 Identification

| Figure (symbolic) | Identification |  |
| :---: | :---: | :---: |
| (1) B $\bar{Q} \bar{R} \overline{1} \overline{5} 142$ Eggelsberg I AUSTRIA | 1 | Device number |
|  | 2 | Serial number |
|  | 3 | MAC addresses |
|  |  | - |

The device number can be retrieved from the B\&R website (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.

### 4.1.2 Mechanical properties

### 4.1.2.1 Dimensions

## Information:

All specifications in dimension diagrams and associated tables are in millimeters [mm].
The following diagrams are symbolic and only meant to illustrate how the dimension tables should be read.

2D and 3D data (DXF and STEP formats) can be downloaded from the B\&R website (www.br-automation.com). To do this, search for the order number of the device using the search bar.

## AP5120/5130 with flange connection on top - Dimensions



| Panels |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Model number | A | B | C | D | E | F | G | H | 1 | J | K | L | M | N |
| 15.0" single-touch | 5AP5120.1505-000 | 389 | 299 | 54.5 | 280 | 28 | 124 | 10 | 20 | 259 | 501 | 28 | 10 | 32.2 | 54.5 |
| 15.6" multi-touch | 5AP5130.156B-000 | 433 | 269.5 | 76.5 | 280 | 29 | 125 | 10 | 5.25 | 259 | 545 | 28 | 10 | 32.2 | 54.5 |
| 15.6" multi-touch | 5AP5130.156C-000 | 433 | 269.5 | 76.5 | 280 | 29 | 125 | 10 | 5.25 | 259 | 545 | 28 | 10 | 32.2 | 54.5 |
| 18.5" multi-touch | 5AP5130.185B-000 | 494 | 306 | 107 | 280 | 29 | 125 | 10 | 23.5 | 259 | 606 | 28 | 10 | 32.2 | 54.5 |
| 18.5" multi-touch | 5AP5130.185C-000 | 494 | 306 | 107 | 280 | 29 | 125 | 10 | 23.5 | 259 | 606 | 28 | 10 | 32.2 | 54.5 |
| 19.0" single-touch | 5AP5120.1906-000 | 461.2 | 372 | 90.6 | 280 | 28 | 124 | 10 | 56.5 | 259 | 573.2 | 28 | 10 | 32.2 | 54.5 |
| 21.5" multi-touch | 5AP5130.215C-000 | 560.5 | 344 | 140.25 | 280 | 29 | 125 | 10 | 42.5 | 259 | 672.5 | 28 | 10 | 32.2 | 54.5 |
| 24.0" multi-touch | 5AP5130.240C-000 | 617.5 | 375 | 168.75 | 280 | 29 | 125 | 10 | 58 | 259 | 729.5 | 28 | 10 | 32.2 | 54.5 |

AP5120/5130 with flange connection on bottom - Dimensions


| Panels |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Model number | A | B | C | D | E | F | G | H | 1 | J | K | L | M | N |
| 15.0" single-touch | 5AP5120.1505-000 | 389 | 299 | 54.5 | 280 | 28 | 124 | 10 | 20 | 259 | 501 | 28 | 10 | 32.2 | 54.5 |
| 15.6" multi-touch | 5AP5130.156B-000 | 433 | 269.5 | 76.5 | 280 | 29 | 125 | 10 | 5.25 | 259 | 545 | 28 | 10 | 32.2 | 54.5 |
| 15.6" multi-touch | 5AP5130.156C-000 | 433 | 269.5 | 76.5 | 280 | 29 | 125 | 10 | 5.25 | 259 | 545 | 28 | 10 | 32.2 | 54.5 |
| 18.5" multi-touch | 5AP5130.185B-000 | 494 | 306 | 107 | 280 | 29 | 125 | 10 | 23.5 | 259 | 606 | 28 | 10 | 32.2 | 54.5 |
| 18.5" multi-touch | 5AP5130.185C-000 | 494 | 306 | 107 | 280 | 29 | 125 | 10 | 23.5 | 259 | 606 | 28 | 10 | 32.2 | 54.5 |
| 19.0" single-touch | 5AP5120.1906-000 | 461.2 | 372 | 90.6 | 280 | 28 | 124 | 10 | 56.5 | 259 | 573.2 | 28 | 10 | 32.2 | 54.5 |
| 21.5" multi-touch | 5AP5130.215C-000 | 560.5 | 344 | 140.25 | 280 | 29 | 125 | 10 | 42.5 | 259 | 672.5 | 28 | 10 | 32.2 | 54.5 |
| 24.0" multi-touch | 5AP5130.240C-000 | 617.5 | 375 | 168.75 | 280 | 29 | 125 | 10 | 58 | 259 | 729.5 | 28 | 10 | 32.2 | 54.5 |

## AP5230 with flange connection on top - Dimensions



| Panels (with expansion option) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Model number | A | B | C | D | E | F | G | H | 1 | J | K | L | M | N |
| 15.6" multi-touch | 5AP5230.156B-000 | 433 | 349 | 76.5 | 280 | 35 | 131 | 10 | 5.25 | 259 | 545 | 28 | 10 | 38.2 | 54.5 |
| 15.6" multi-touch | 5AP5230.156C-000 | 433 | 349 | 76.5 | 280 | 35 | 131 | 10 | 5.25 | 259 | 545 | 28 | 10 | 38.2 | 54.5 |
| 18.5" multi-touch | 5AP5230.185B-000 | 494 | 385.5 | 107 | 280 | 35 | 131 | 10 | 23.5 | 259 | 606 | 28 | 10 | 38.2 | 54.5 |
| 18.5" multi-touch | 5AP5230.185C-000 | 494 | 385.5 | 107 | 280 | 35 | 131 | 10 | 23.5 | 259 | 606 | 28 | 10 | 38.2 | 54.5 |
| 21.5" multi-touch | 5AP5230.215C-000 | 560.5 | 423.5 | 140.25 | 280 | 35 | 131 | 10 | 42.5 | 259 | 672.5 | 28 | 10 | 38.2 | 54.5 |
| 21.5" multi-touch | 5AP5230.215I-000 | 352 | 632 | 36 | 280 | 35 | 131 | 10 | 146.75 | 259 | 464 | 28 | 10 | 39.9 | 54.5 |
| 24.0" multi-touch | 5AP5230.240C-000 | 617.5 | 454.5 | 168.75 | 280 | 35 | 131 | 10 | 58 | 259 | 729.5 | 28 | 10 | 38.2 | 54.5 |

AP5230 with flange connection on bottom - Dimensions


| Panels (with expansion option) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Model number | A | B | C | D | E | F | G | H | 1 | J | K | L | M | N |
| 15.6" multi-touch | 5AP5230.156B-000 | 433 | 349 | 76.5 | 280 | 35 | 131 | 10 | 84.75 | 259 | 545 | 28 | 10 | 38.2 | 54.5 |
| 15.6" multi-touch | 5AP5230.156C-000 | 433 | 349 | 76.5 | 280 | 35 | 131 | 10 | 84.75 | 259 | 545 | 28 | 10 | 38.2 | 54.5 |
| 18.5" multi-touch | 5AP5230.185B-000 | 494 | 385.5 | 107 | 280 | 35 | 131 | 10 | 103 | 259 | 606 | 28 | 10 | 38.2 | 54.5 |
| 18.5" multi-touch | 5AP5230.185C-000 | 494 | 385.5 | 107 | 280 | 35 | 131 | 10 | 103 | 259 | 606 | 28 | 10 | 38.2 | 54.5 |
| 21.5" multi-touch | 5AP5230.215C-000 | 560.5 | 423.5 | 140.25 | 280 | 35 | 131 | 10 | 122 | 259 | 672.5 | 28 | 10 | 38.2 | 54.5 |
| 21.5" multi-touch | 5AP5230.215I-000 | 352 | 632 | 36 | 280 | 35 | 131 | 10 | 226.25 | 259 | 464 | 28 | 10 | 39.9 | 54.5 |
| 24.0" multi-touch | 5AP5230.240C-000 | 617.5 | 454.5 | 168.75 | 280 | 35 | 131 | 10 | 137.5 | 259 | 729.5 | 28 | 10 | 38.2 | 54.5 |

Rotary flange (5ACCFL00.0000-000) - Dimensions


Swivel-tilt flange (5ACCFL00.0100-000) - Dimensions


Adapter for Rittal flange (5ACCFL00.0200-000) - Dimensions


## AP5120/5130 VESA connection - Dimensions



| Panels |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Model number | A | B | C | D | E | F | G | H | 1 | J | K | L | M |
| 15" single-touch | 5AP5120.1505-000 | 389 | 299 | 59.5 | 270 | 28 | 79 | 189 | 25.5 | 65.5 | 501 | 28 | 10 | 32.2 |
| 15.6" multi-touch | 5AP5130.156B-000 | 433 | 269.5 | 81.5 | 270 | 29 | 80 | 189 | 10.75 | 65.5 | 545 | 28 | 10 | 32.2 |
| 15.6" multi-touch | 5AP5130.156C-000 | 433 | 269.5 | 81.5 | 270 | 29 | 80 | 189 | 10.75 | 65.5 | 545 | 28 | 10 | 32.2 |
| 18.5" multi-touch | 5AP5130.185B-000 | 494 | 306 | 112 | 270 | 29 | 80 | 189 | 29 | 65.5 | 606 | 28 | 10 | 32.2 |
| 18.5" multi-touch | 5AP5130.185C-000 | 494 | 306 | 112 | 270 | 29 | 80 | 189 | 29 | 65.5 | 606 | 28 | 10 | 32.2 |
| 19" single-touch | 5AP5120.1906-000 | 461.2 | 372 | 95.6 | 270 | 28 | 79 | 189 | 62 | 65.5 | 573.2 | 28 | 10 | 32.2 |
| 21.5" multi-touch | 5AP5130.215C-000 | 560.5 | 344 | 145.25 | 270 | 29 | 80 | 189 | 48 | 65.5 | 672.5 | 28 | 10 | 32.2 |
| 24.0" multi-touch | 5AP5130.240C-000 | 617.5 | 375 | 173.75 | 270 | 29 | 80 | 189 | 63.5 | 65.5 | 729.5 | 28 | 10 | 32.2 |

## AP5230 VESA connection - Dimensions



| Panels (with expansion option) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Model number | A | B | C | D | E | F | G | H | 1 | J | K | L | M |
| 15.6" multi-touch | 5AP5230.156B-000 | 433 | 349 | 81.5 | 270 | 35 | 86 | 189 | 90.25 | 65.5 | 545 | 28 | 10 | 38.2 |
| 15.6" multi-touch | 5AP5230.156C-000 | 433 | 349 | 81.5 | 270 | 35 | 86 | 189 | 90.25 | 65.5 | 545 | 28 | 10 | 38.2 |
| 18.5" multi-touch | 5AP5230.185B-000 | 494 | 385.5 | 112 | 270 | 35 | 86 | 189 | 108.5 | 65.5 | 606 | 28 | 10 | 38.2 |
| 18.5" multi-touch | 5AP5230.185C-000 | 494 | 385.5 | 112 | 270 | 35 | 86 | 189 | 108.5 | 65.5 | 606 | 28 | 10 | 38.2 |
| 21.5" multi-touch | 5AP5230.215C-000 | 560.5 | 423.5 | 145.25 | 270 | 35 | 86 | 189 | 127.5 | 65.5 | 672.5 | 28 | 10 | 38.2 |
| 21.5" multi-touch | 5AP5230.215I-000 | 352 | 632 | 41 | 270 | 35 | 86 | 189 | 231.75 | 65.5 | 464 | 28 | 10 | 39.9 |
| 24.0" multi-touch | 5AP5230.240C-000 | 617.5 | 454.5 | 173.75 | 270 | 35 | 86 | 189 | 143 | 65.5 | 729.5 | 28 | 10 | 38.2 |

## AP5120/5130 IP54 VESA connection - Dimensions



| Panels |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Order number | A | B | C | D | E | F | G | H | 1 | J | K | L | M |
| 15" single-touch | 5AP5120.1505-000 | 389 | 299 | 54.5 | 280 | 28 | 88.3 | 259 | 20 | 149.5 | 501 | 28 | 10 | 32.2 |
| 15.6" multi-touch | 5AP5130.156B-000 | 433 | 269.5 | 76.5 | 280 | 29 | 89.3 | 259 | 5.3 | 149.5 | 545 | 28 | 10 | 32.2 |
| 15.6" multi-touch | 5AP5130.156C-000 | 433 | 269.5 | 76.5 | 280 | 29 | 89.3 | 259 | 5.3 | 149.5 | 545 | 28 | 10 | 32.2 |
| 18.5" multi-touch | 5AP5130.185B-000 | 494 | 306 | 107 | 280 | 29 | 89.3 | 259 | 23.5 | 149.5 | 606 | 28 | 10 | 32.2 |
| 18.5" multi-touch | 5AP5130.185C-000 | 494 | 306 | 107 | 280 | 29 | 89.3 | 259 | 23.5 | 149.5 | 606 | 28 | 10 | 32.2 |
| 19" single-touch | 5AP5120.1906-000 | 461.2 | 372 | 90.6 | 280 | 28 | 89.3 | 259 | 56.5 | 149.5 | 573.2 | 28 | 10 | 32.2 |
| 21.5" multi-touch | 5AP5130.215C-000 | 560.5 | 344 | 140.3 | 280 | 29 | 89.3 | 259 | 42.5 | 149.5 | 672.5 | 28 | 10 | 32.2 |
| 24.0" multi-touch | 5AP5130.240C-000 | 617.5 | 375 | 168.8 | 280 | 29 | 89.3 | 259 | 58 | 149.5 | 729.5 | 28 | 10 | 32.2 |

AP5230 IP54 VESA connection - Dimensions


| Panels (with expansion option) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Type | Order number | A | B | C | D | E | F | G | H | 1 | J | K | L | M |
| 15.6" multi-touch | 5AP5230.156B-000 | 433 | 349 | 76.5 | 280 | 35 | 95.3 | 259 | 84.8 | 149.5 | 545 | 28 | 10 | 38.2 |
| 15.6" multi-touch | 5AP5230.156C-000 | 433 | 349 | 76.5 | 280 | 35 | 95.3 | 259 | 84.8 | 149.5 | 545 | 28 | 10 | 38.2 |
| 18.5" multi-touch | 5AP5230.185B-000 | 494 | 385.5 | 107 | 280 | 35 | 95.3 | 259 | 103 | 149.5 | 606 | 28 | 10 | 38.2 |
| 18.5" multi-touch | 5AP5230.185C-000 | 494 | 385.5 | 107 | 280 | 35 | 95.3 | 259 | 103 | 149.5 | 606 | 28 | 10 | 38.2 |
| 21.5" multi-touch | 5AP5230.215C-000 | 560.5 | 423.5 | 140.3 | 280 | 35 | 95.3 | 259 | 122 | 149.5 | 672.5 | 28 | 10 | 38.2 |
| 21.5" multi-touch | 5AP5230.215I-000 | 352 | 632 | 36 | 280 | 35 | 95.3 | 259 | 226.3 | 149.5 | 464 | 28 | 10 | 39.9 |
| 24.0" multi-touch | 5AP5230.240C-000 | 617.5 | 454.5 | 168.8 | 280 | 35 | 95.3 | 259 | 137.1 | 149.5 | 729.5 | 28 | 10 | 38.2 |

### 4.1.2.2 Mounting orientations

## Swing arm mounting units

The angle of rotation of the Panel PC (variant with mounting unit 5ACCMA00.000x-000 and flange 5AC-CFL00.0000-000 or 5ACCFL00.0100-000 flange) can be set between $-150^{\circ}$ and $+150^{\circ}$ using the locking lever on the attached flange.
The tilt angle of the panel PC (only variant with mounting unit 5ACCMA00.000x-000 and flange 5AC-CFL00.0100-000) can be set between $-15^{\circ}$ and $+15^{\circ}$.

## Caution!

After setting the rotation and/or tilt angle, the corresponding locking lever must be locked into position. For the maximum tightening torques, see the description of the flange used.

The screw in the locking lever is not permitted to be tightened. Fixing must be carried out exclusively with the locking lever.

## VESA mounting units

The following diagrams show the specified mounting orientations of Panel PC devices with VESA mounting units 5ACCMA01.0100-000 and 5ACCMA00.010x-000. A PPC2200 (AP5000) with VESA mounting units is only permitted to be installed as shown or described below; the figure shows an example image.


## Technical data

### 4.1.2.3 Weight specifications

AP5000 panels

| Type | Model number | Weight [g] |
| :--- | :--- | :--- |
| $15 "$ single-touch | 5AP5120.1505-000 | 5200 |
| $15.6^{\prime \prime}$ multi-touch | 5AP5130.156B-000 | 4700 |
| $15.6^{\prime \prime}$ multi-touch | 5AP5130.156C-000 | 4700 |
| $15.6^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.156B-000 | 6400 |
| $15.6^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.156C-000 | 6400 |
| $18.5^{\prime \prime}$ multi-touch | 5AP5130.185B-000 | 6700 |
| $18.5^{\prime \prime}$ multi-touch | 5AP5130.185C-000 | 6700 |
| $18.5^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.185B-000 | 8300 |
| $18.5^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.185C-000 | 8300 |
| 19 " single-touch | 5AP5120.1906-000 | 7300 |
| $21.5^{\prime \prime}$ multi-touch | 5AP5130.215C-000 | 7300 |
| $21.5^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.215C-000 | 8900 |
| $21.5^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.215I-000 | 9600 |
| $24.0^{\prime \prime}$ multi-touch | 5AP5130.240C-000 | 8500 |
| $24.0^{\prime \prime}$ multi-touch (expansion option) | 5AP5230.240C-000 | 10300 |

## System units and components

| Type | Model number | Weight [g] |
| :---: | :---: | :---: |
| System units | 5PPC2200.ALxx-000 | 577 |
| CFast cards | 5CFAST. xxxx -00 | 10 |
|  | 5CFAST.xxxx-10 | 10 |
| 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 |
|  | 5ACCIF03.CETH-000 | 25 |

## Mounting units

| Type | Model number | Weight [g] |
| :--- | :--- | :--- |
| Swing arm mounting unit without USB | 5ACCMA00.0000-000 | 2500 |
| Swing arm mounting unit with 1x USB | 5ACCMA00.0001-000 | 2500 |
| Swing arm mounting unit with 2x USB | 5ACCMA00.0002-000 | 2500 |
| VESA mounting unit | 5ACCMA01.0100-000 | 700 |
| VESA IP54 mounting unit without USB | 5ACCMA00.0100-000 | 2500 |
| VESA IP54 mounting unit with 1x USB | 5ACCMA00.0101-000 | 2500 |

## Flanges

| Type | Model number | Weight [g] |
| :--- | :--- | :--- |
| Rotary flange | 5ACCFL00.0000-000 | 530 |
| Swivel-tilt flange | 5ACCFLO0.0100-000 | 1666 |
| Rittal flange adapter | 5ACCFL00.0200-000 | 93 |

## Expansion units

| Type | Model number | Weight [g] |
| :---: | :---: | :---: |
| 15.6" expansion cover | 5ACCKP00.156B-000 | 600 |
| 15.6" expansion units | 5ACCKP01.156B-000 | 800 |
|  | 5ACCKP04.156B-000 | 800 |
| 18.5" expansion cover | 5ACCKP00.185B-000 | 600 |
| 18.5" expansion units | 5ACCKP01.185B-000 | 900 |
|  | 5ACCKP03.185B-000 | 900 |
|  | 5ACCKP04.185B-000 | 900 |
|  | 5ACCKP05.185B-000 | 900 |
| 21.5" expansion cover | 5ACCKP00.215C-000 | 800 |
| 21.5" expansion units | 5ACCKP01.215C-000 | 1000 |
|  | 5ACCKP03.215C-000 | 1000 |
|  | 5ACCKP04.215C-000 | 1000 |
|  | 5ACCKP05.215C-000 | 1000 |
| 21.5" expansion cover | 5ACCKP00.215I-000 | 500 |
| 21.5" expansion units | 5ACCKP01.215I-000 | 700 |
|  | 5ACCKP04.215I-000 | 700 |
| 24.0" expansion cover | 5ACCKP00.240C-000 | 900 |


| Type | Model number | Weight $[\mathrm{g}]$ |
| :--- | :--- | :--- |
|  | 5ACCKP01.240C-000 | 1100 |
|  | 5ACCKP03.240C-000 | 1100 |
|  | 5ACCKP04.240C-000 | 1100 |
|  | 5ACCKP05.240C-000 | 1100 |

## Handles

| Type | Model number | Weight [g] |
| :--- | :--- | :--- |
| $15 "$ handles for AP5120 | 5ACCHD00.1505-000 | 500 |
| $15.6^{\prime \prime}$ handles for AP5130 | 5ACCHD00.156B-000 | 300 |
| $15.6^{\prime \prime}$ handles for AP5230 | 5ACCHD01.156B-000 | 600 |
| $18.5^{\prime \prime}$ handles for AP5130 | 5ACCHD00.185B-000 | 500 |
| $18.5 "$ handles for AP5230 | 5ACCHD01.185B-000 | 700 |
| $19 "$ handles for AP5120 | 5ACCHD00.1906-000 | 600 |
| $21.5^{\prime \prime}$ handles for AP5130 | 5ACCHD00.215C-000 | 600 |
| $21.5^{\prime \prime}$ handles for AP5230 | 5ACCHD01.215C-000 | 700 |
| $21.5^{\prime \prime}$ handles for AP5230 | 5ACCHD01.215I-000 | 1000 |
| 24.0 nandles for AP5130 | 5ACCHD00.240C-000 | 600 |
| 24.0 " handles for AP5230 | 5ACCHD01.240C-000 | 800 |

## Technical data

### 4.1.3 Environmental properties

### 4.1.3.1 Temperature specifications

Because it is possible to combine different system units with different panels, the following tables provide a com-ponent-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 maximum processor utilization (100\% CPU, 100\% memory, 100\% graphics)
- BurnInTest V8.1 Pro from PassMark Software for simulating 100\% interface utilization using loopback adapters (100\% network and USB interfaces)
- Maximum expansion and power consumption of the system
- $100 \%$ display brightness


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

## Information:

The following values apply to swing arm mounting units and VESA mounting units.

| All temperature specifications in degrees Celsius [ ${ }^{\circ} \mathrm{C}$ ] at 500 m above sea level, non-condensing. |  | Maximum worst-case ambient temperature (system unit 5PPC2200.ALxx-000) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| The respective ambient temperature is typically derated $1^{\circ} \mathrm{C}$ per 1000 meters starting at 500 m above sea level. |  | $\begin{gathered} \text { 5PPC2200.AL02-000 } \\ (\text { E3930 1.3 GHz) } \\ \hline \end{gathered}$ | $\begin{gathered} \text { 5PPC2200.AL04-000 } \\ \text { (E3930 1.3 GHz) } \\ \hline \end{gathered}$ | $\begin{gathered} \text { 5PPC2200.AL14-000 } \\ \text { (E3940 1.6 GHz) } \\ \hline \end{gathered}$ | $\begin{gathered} \text { 5PPC2200.AL18-000 } \\ (\mathrm{E} 39401.6 \mathrm{GHz}) \\ \hline \end{gathered}$ |
|  |  | 55 | 55 | 50 | 50 |
| Maximum ambient temperature (accessories) |  |  |  |  |  |
| AP5000 panels | 5AP5120.1505-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5AP5130.156B-000 | 50 | 50 | 45 | 45 |
|  | 5AP5130.156C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.156B-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.156C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5130.185B-000 | 50 | 50 | 50 | 45 |
|  | 5AP5130.185C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.185B-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.185C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5120.1906-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5AP5130.215C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.215C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.215I-000 | 50 | 50 | 45 | 45 |
|  | 5AP5130.240C-000 | 45 | 45 | 40 | 40 |
|  | 5AP5230.240C-000 | 45 | 45 | 40 | 40 |
| AP5000 expansion units | 5ACCKP01.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCKP03.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCKP04.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCKP05.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
| CFast cards | 5CFAST.xxxx-00 $\geq$ Rev. E0 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5CFAST. xxxx -10 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
| Interface options | 5ACCIF01.FPCC-000 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FPCS-000 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FPLK-000 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FPLS-000 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FPLS-001 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FPSC-000 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FPSC-001 | 50 | 50 | 45 | 45 |
|  | 5ACCIF01.FSS0-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCIF01.ICAN-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCIF03.CETH-000 | $\checkmark$ | $\checkmark$ | 45 | 45 |

4.1.3.1.2 Minimum ambient temperature for worst-case operation

## Information:

The following values apply to swing arm mounting units and VESA mounting units.

| All temperature specifications in degrees Celsius [ ${ }^{\circ} \mathrm{C}$ ] at 500 m above sea level, non-condensing. |  | Minimum worst-case ambient temperature (system unit 5PPC2200.ALxx-000) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{gathered} \text { 5PPC2200.AL02-000 } \\ \text { (E3930 1.3 GHz) } \end{gathered}$ | $\begin{gathered} \text { 5PPC2200.AL04-000 } \\ \text { (E3930 1.3 GHz) } \end{gathered}$ | $\begin{gathered} \text { 5PPC2200.AL14-000 } \\ \text { (E3940 1.6 GHz) } \end{gathered}$ | $\begin{gathered} \text { 5PPC2200.AL18-000 } \\ \text { (E3940 1.6 GHz) } \end{gathered}$ |
|  |  | -25 | -25 | -25 | -25 |
| Minimum ambient temperature (accessories) |  |  |  |  |  |
| AP5000 panels | 5AP5120.1505-000 | -20 | -20 | -20 | -20 |
|  | 5AP5130.156B-000 | -10 | -10 | -10 | -10 |
|  | 5AP5130.156C-000 | -10 | -10 | -10 | -10 |
|  | 5AP5230.156B-000 | -10 | -10 | -10 | -10 |
|  | 5AP5230.156C-000 | -10 | -10 | -10 | -10 |
|  | 5AP5130.185B-000 | 0 | 0 | 0 | 0 |
|  | 5AP5130.185C-000 | -10 | -10 | -10 | -10 |
|  | 5AP5230.185B-000 | 0 | 0 | 0 | 0 |
|  | 5AP5230.185C-000 | -10 | -10 | -10 | -10 |
|  | 5AP5120.1906-000 | -20 | -20 | -20 | -20 |
|  | 5AP5130.215C-000 | 0 | 0 | 0 | 0 |
|  | 5AP5230.215C-000 | 0 | 0 | 0 | 0 |
|  | 5AP5230.2151-000 | 0 | 0 | 0 | 0 |
|  | 5AP5130.240C-000 | -10 | -10 | -10 | -10 |
|  | 5AP5230.240C-000 | -10 | -10 | -10 | -10 |
| AP5000 expansion units | 5ACCKP01.xxxx-000 | -20 | -20 | -20 | -20 |
|  | 5ACCKP03.xxxx-000 | -20 | -20 | -20 | -20 |
|  | 5ACCKP04.xxxx-000 | -20 | -20 | -20 | -20 |
|  | 5ACCKP05.xxxx-000 | -20 | -20 | -20 | -20 |
| CFast cards | 5CFAST.xxxx-00 $\geq$ Rev. E0 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5CFAST.xxxx-10 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
| 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 |
|  | 5ACCIF03.CETH-000 | -20 | -20 | -20 | -20 |

## Technical data

### 4.1.3.1.3 Maximum ambient temperature for typical operation

## Information about typical conditions

- BurnInTest V8.1 Pro from PassMark Software for simulating moderate system and interface utilization using loopback adapters
- No permanent $100 \%$ processor utilization and graphics utilization
- 2x Gigabit Ethernet
- The total power of all USB interfaces is limited to 1 W .
- 80\% display brightness
- The power consumption of the complete system is limited to 45 W . For the power consumption of individual components, see "Power calculation" on page 47.


## Information:

The following values apply to swing arm mounting units and VESA mounting units.

| All temperature specifications in degrees Celsius $\left[{ }^{\circ} \mathrm{C}\right]$ at 500 m above sea level, non-condensing. |  | Maximum ambient temperature for typical operation (system unit 5PPC2200.ALxx-000) |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| The respective ambient temperature is typically derated $1^{\circ} \mathrm{C}$ per 1000 meters starting at 500 m above sea level. |  | $\begin{gathered} \text { 5PPC2200.AL02-000 } \\ (\mathrm{E} 39301.3 \mathrm{GHz}) \\ \hline \end{gathered}$ | $\begin{gathered} \hline \text { 5PPC2200.AL04-000 } \\ \text { (E3930 1.3 GHz) } \\ \hline \end{gathered}$ | $\begin{gathered} \hline \text { 5PPC2200.AL14-000 } \\ (\text { E3940 1.6 GHz) } \\ \hline \end{gathered}$ | $\begin{gathered} \hline \text { 5PPC2200.AL18-000 } \\ \text { (E3940 1.6 GHz) } \\ \hline \end{gathered}$ |
|  |  | 60 | 60 | 55 | 55 |
| Maximum ambient temperature (accessories) |  |  |  |  |  |
| AP5000 panels | 5AP5120.1505-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5AP5130.156B-000 | 55 | 55 | 50 | 50 |
|  | 5AP5130.156C-000 | 55 | 55 | 50 | 50 |
|  | 5AP5230.156B-000 | 55 | 55 | 50 | 50 |
|  | 5AP5230.156C-000 | 55 | 55 | 50 | 50 |
|  | 5AP5130.185B-000 | 55 | 55 | 50 | 45 |
|  | 5AP5130.185C-000 | 55 | 55 | 50 | 45 |
|  | 5AP5230.185B-000 | 55 | 55 | 50 | 45 |
|  | 5AP5230.185C-000 | 55 | 55 | 50 | 50 |
|  | 5AP5120.1906-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5AP5130.215C-000 | 55 | 55 | 50 | 50 |
|  | 5AP5230.215C-000 | 55 | 55 | 50 | 50 |
|  | 5AP5230.215I-000 | 55 | 55 | 50 | 50 |
|  | 5AP5130.240C-000 | 50 | 50 | 45 | 45 |
|  | 5AP5230.240C-000 | 50 | 50 | 45 | 45 |
| AP5000 expansion units | 5ACCKP01.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCKP03.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCKP04.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCKP05.xxxx-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
| CFast cards | 5CFAST.xxxx-00 $\geq$ Rev. E0 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5CFAST. xxxx -10 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
| Interface options | 5ACCIF01.FPCC-000 | 50 | 50 | 50 | 50 |
|  | 5ACCIF01.FPCS-000 | 50 | 50 | 50 | 50 |
|  | 5ACCIF01.FPLK-000 | 55 | 55 | 50 | 50 |
|  | 5ACCIF01.FPLS-000 | 50 | 50 | 50 | 50 |
|  | 5ACCIF01.FPLS-001 | 50 | 50 | 50 | 50 |
|  | 5ACCIF01.FPSC-000 | 50 | 50 | 50 | 50 |
|  | 5ACCIF01.FPSC-001 | 50 | 50 | 50 | 50 |
|  | 5ACCIF01.FSS0-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCIF01.ICAN-000 | $\checkmark$ | $\checkmark$ | $\checkmark$ | $\checkmark$ |
|  | 5ACCIF03.CETH-000 | $\checkmark$ | $\checkmark$ | 50 | 50 |

### 4.1.3.1.4 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. $1^{\circ} \mathrm{C}$ per 1000 meters starting at 500 m above sea level.
3. If interface options and CFast cards are additionally installed in the PPC2200 system, they may result in a temperature limitation.

- If a " $\checkmark$ " (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[ $\left.{ }^{\circ} \mathrm{C}\right]$ "), the ambient temperature of the complete system is not permitted to exceed this value.

4. 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 40.

### 4.1.3.1.5 Temperature during storage and transport

The individual components can be transported and stored within the following temperature ranges.
System units and components

| Type | Model number | Storage [ ${ }^{\circ} \mathrm{C}$ ] | Transport [ ${ }^{\circ} \mathrm{C}$ ] |
| :---: | :---: | :---: | :---: |
| System units | 5PPC2200.ALxx-000 | -25 to 60 | -25 to 60 |
| CFast cards | 5CFAST.xxxx-00 | -50 to 100 | -50 to 100 |
|  | 5CFAST.032G-10 $\geq$ Rev. G0 | -40 to 85 | -40 to 85 |
|  | 5CFAST.064G-10 $\geq$ Rev. E0 | -40 to 85 | -40 to 85 |
|  | 5CFAST.128G-10 $\geq$ Rev. E0 | -40 to 85 | -40 to 85 |
|  | 5CFAST.032G-10 $\leq$ Rev. F0 | -55 to 95 | -55 to 95 |
|  | 5CFAST.064G-10 < Rev. D0 | -55 to 95 | -55 to 95 |
|  | 5CFAST.128G-10 < Rev. D0 | -55 to 95 | -55 to 95 |
|  | 5CFAST.256G-10 | -40 to 85 | -40 to 85 |
| 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 |
|  | 5ACCIF03.CETH-000 | -20 to 60 | -20 to 60 |

Panels

| Type | Model number | Storage [ ${ }^{\circ} \mathrm{C}$ ] | Transport [ ${ }^{\circ} \mathrm{C}$ ] |
| :---: | :---: | :---: | :---: |
| 15" single-touch | 5AP5120.1505-000 | -25 to 80 | -25 to 80 |
| 15.6" multi-touch | 5AP5130.156B-000 | -25 to 70 | -25 to 70 |
| 15.6" multi-touch | 5AP5130.156C-000 | -20 to 70 | -20 to 70 |
| 15.6" multi-touch (expansion option) | 5AP5230.156B-000 | -25 to 70 | -25 to 70 |
| 15.6" multi-touch (expansion option) | 5AP5230.156C-000 | -20 to 70 | -20 to 70 |
| 18.5" multi-touch | 5AP5130.185B-000 | -20 to 60 | -20 to 60 |
| 18.5" multi-touch | 5AP5130.185C-000 | -25 to 70 | -25 to 70 |
| 18.5" multi-touch (expansion option) | 5AP5230.185B-000 | -20 to 60 | -20 to 60 |
| 18.5" multi-touch (expansion option) | 5AP5230.185C-000 | -25 to 70 | -25 to 70 |
| 19" single-touch | 5AP5120.1906-000 | -25 to 70 | -25 to 70 |
| 21.5" multi-touch | 5AP5130.215C-000 | -20 to 60 | -20 to 60 |
| 21.5" multi-touch (expansion option) | 5AP5230.215C-000 | -20 to 60 | -20 to 60 |
| 21.5" multi-touch (expansion option) | 5AP5230.215I-000 | -20 to 60 | -20 to 60 |
| 24.0" multi-touch | 5AP5130.240C-000 | -25 to 70 | -25 to 70 |
| 24.0" multi-touch (expansion option) | 5AP5230.240C-000 | -25 to 70 | -25 to 70 |

## Expansion options

| Type | Model number | Storage $\left[{ }^{\circ} \mathbf{C}\right.$ ] | Transport [ ${ }^{\circ}$ C] |
| :--- | :--- | :---: | :---: |
| Expansion units | 5ACCKP01.xxxx-000 | -20 to 80 | -20 to 80 |
|  | 5ACCKP03.xxxx-000 | -20 to 80 | -20 to 80 |
|  | 5ACCKP04.xxxx-000 | -20 to 80 | -20 to 80 |
|  | 5ACCKP05.xxxx-000 | -20 to 80 | -20 to 80 |

### 4.1.3.1.6 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 43. The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.
Temperatures ${ }^{1)}$ can be read out in different ways in approved operating systems:

- BIOS (see "Baseboard" on page 215)
- 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 ${ }^{2}$ ). Various parameters (e.g. temperature) can be read out in approved Microsoft Windows or B\&R Linux operating systems.

### 4.1.3.1.7 Temperature sensor positions



| ADI sensors | Position | Measuring point for | Measurement | Max. specified [ ${ }^{\circ} \mathrm{C}$ ] |
| :---: | :---: | :---: | :---: | :---: |
| Panel | A | Display | Temperature of the display (sensor integrated on the panel). | 5AP5120.1505-000: 85 5AP5130.156B-000: 75 5AP5130.156C-000: 80 5AP5230.156B-000: 80 5AP5230.156C-000: 80 5AP5130.185B-000: 80 5AP5130.185C-000: 80 5AP5230.185B-000: 80 5AP5230.185C-000: 80 5AP5120.1906-000: 80 5AP5130.215C-000: 80 5AP5230.215C-000: 80 5AP5230.215I-000: 80 5AP5130.240C-000: 75 5AP5230.240C-000: 75 |
| System unit sensor 1 | B | CFast | Temperature of the CFast area (sensor integrated on the CPU board). | 95 |
| System unit sensor 2 | C | Main memory | Temperature of the main memory area (sensor integrated on the CPU board). | 95 |
| System unit sensor 3 | D | MTCX | Temperature of the MTCX area (sensor integrated on the CPU board). | 95 |

### 4.1.3.2 Relative humidity

The following tables show the minimum and maximum relative humidity (at $30^{\circ} \mathrm{C}$, 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.

[^1]2) Self-Monitoring, Analysis and Reporting Technology

AP5000 panels

| Type | Model number | Operation [\%] | Storage [\%] | Transport [\%] |
| :---: | :---: | :---: | :---: | :---: |
| 15" single-touch | 5AP5120.1505-000 | 8 to 90 | 8 to 90 | 8 to 90 |
| 15.6" multi-touch | 5AP5130.156B-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 15.6" multi-touch | 5AP5130.156C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 15.6" multi-touch (expansion option) | 5AP5230.156B-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 15.6 " multi-touch (expansion option) | 5AP5230.156C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 18.5" multi-touch | 5AP5130.185B-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 18.5" multi-touch | 5AP5130.185C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 18.5" multi-touch (expansion option) | 5AP5230.185B-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 18.5" multi-touch (expansion option) | 5AP5230.185C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 19" single-touch | 5AP5120.1906-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 21.5" multi-touch | 5AP5130.215C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 21.5" multi-touch (expansion option) | 5AP5230.215C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 21.5" multi-touch (expansion option) | 5AP5230.2151-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 24.0" multi-touch | 5AP5130.240C-000 | 5 to 90 | 5 to 90 | 5 to 90 |
| 24.0" multi-touch (expansion option) | 5AP5230.240C-000 | 5 to 90 | 5 to 90 | 5 to 90 |

System units and components

| Component | Order number | Operation [\%] | Storage [\%] | Transport [\%] |
| :---: | :---: | :---: | :---: | :---: |
| System units | 5PPC2200.ALxx-000 | 5 to 90 | 5 to 95 | 5 to 95 |
| CFast cards | 5CFAST.xxxx-00 | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ |
|  | 5CFAST.032G-10 $\geq$ Rev. G0 | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ |
|  | 5CFAST.064G-10 $\geq$ Rev. E0 | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ |
|  | 5CFAST.128G-10 $\geq$ Rev. E0 | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ |
|  | 5CFAST.032G-10 5 Rev. F0 | 10 to 95 | 10 to 95 | 10 to 95 |
|  | 5CFAST.064G-10 5 Rev. D0 | 10 to 95 | 10 to 95 | 10 to 95 |
|  | 5CFAST.128G-10 < Rev. D0 | 10 to 95 | 10 to 95 | 10 to 95 |
|  | 5CFAST.256G-10 | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ | Max. $85 \%$ at $85^{\circ} \mathrm{C}$ |
| Interface options | 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.FFS0-000 | 5 to 90 | 5 to 95 | 5 to 95 |
|  | 5ACCIF01.ICAN-000 | 5 to 90 | 5 to 95 | 5 to 95 |
|  | 5ACCIF03.CETH-000 | 5 to 90 | 5 to 95 | 5 to 95 |

Expansion units

| Type | Model number | Operation [\%] | Storage [\%] | Transport [\%] |
| :--- | :--- | :---: | :---: | :---: |
| Expansion units | 5ACCKP01.xxxx-000 | 5 to 90 | 5 to 90 | 5 to 90 |
|  | 5ACCKP03.xxxx-000 | 5 to 90 | 5 to 90 | 5 to 90 |
|  | 5ACCKP04.xxxx-000 | 5 to 90 | 5 to 90 | 5 to 90 |
|  | 5ACCKP05.xxxx-000 | 5 to 90 | 5 to 90 | 5 to 90 |

### 4.1.3.3 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.

| Swing arm mounting unit - Vibration |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| PPC2200 (AP5000) | Operation ${ }^{10}$ |  | Storage ${ }^{1 / 3)}$ | Transport ${ }^{1 / 3)}$ |
|  | Continuous | Periodic |  |  |
| With CFast card | 2 to 9 Hz : <br> 1.75 mm amplitude 9 to $200 \mathrm{~Hz}: 0.5 \mathrm{~g}$ | 2 to 9 Hz : 3.5 mm amplitude 9 to $200 \mathrm{~Hz}: 1 \mathrm{~g}$ | 2 to $8 \mathrm{~Hz}: 7.5 \mathrm{~mm}$ amplitude 8 to $200 \mathrm{~Hz}: 2 \mathrm{~g}$ 200 to $500 \mathrm{~Hz}: 4 \mathrm{~g}$ | 2 to $8 \mathrm{~Hz}: 7.5 \mathrm{~mm}$ amplitude 8 to $200 \mathrm{~Hz}: 2 \mathrm{~g}$ 200 to $500 \mathrm{~Hz}: 4 \mathrm{~g}$ |
| VESA IP20/IP10 mounting units VESA IP54 mounting units - Vibration |  |  |  |  |
| PPC2200 (AP5000) | Operation ${ }^{1)}$ |  | Storage ${ }^{133}$ ) | Transport ${ }^{1 / 3)}$ |
|  | Continuous |  |  |  |
| With CFast card | 2 to 9 Hz : <br> 1.75 mm amplitude 9 to $200 \mathrm{~Hz}: 0.5 \mathrm{~g}$ |  | 2 to $8 \mathrm{~Hz}: 7.5 \mathrm{~mm}$ amplitude 8 to $200 \mathrm{~Hz}: 2 \mathrm{~g}$ 200 to $500 \mathrm{~Hz}: 4 \mathrm{~g}$ | 2 to $8 \mathrm{~Hz}: 7.5 \mathrm{~mm}$ amplitude 8 to $200 \mathrm{~Hz}: 2 \mathrm{~g}$ 200 to $500 \mathrm{~Hz}: 4 \mathrm{~g}$ |
| Shock |  |  |  |  |
| PPC2200 (AP5000) | Operation ${ }^{2)}$ |  | Storage ${ }^{233}$ | Transport ${ }^{2 / 3)}$ |
| With CFast card | $15 \mathrm{~g}, 11 \mathrm{~ms}$ |  | $30 \mathrm{~g}, 6 \mathrm{~ms}$ | $30 \mathrm{~g}, 6 \mathrm{~ms}$ |

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.

### 4.1.3.4 Degree of protection

Under the following conditions, the Panel PC 2200 swing arm device offers IP65 protection on all sides per EN 60529:

- Correct installation of the PPC2200 (see "Panel PC 2200 - Installation" on page 169)
- The 5ACCMA00.000x-000 mounting unit is installed correctly.
- Installation of all covers or components on interfaces and slots
- All ambient conditions are observed.

The Panel PC 2200 swing arm device additionally has "Type 4X indoor use only" per UL 50 under the same conditions.

Under the following conditions, the Panel PC 2200 swing arm device offers IP54 protection on all sides per EN 60529:

- Correct installation of the PPC2200 (see "Panel PC 2200 - Installation" on page 169)
- Correct installation of mounting unit 5ACCMA00.010x-000
- Installation of all covers or components on interfaces and slots
- All ambient conditions are observed.

The Panel PC 2200 swing arm device additionally has "Type 1X indoor use only" per UL 50 under the same conditions.

Under the following conditions, the Panel PC 2200 swing arm device offers IP20 or IP10 protection on all sides per EN 60529:

- Correct installation of the PPC2200 (see "Panel PC 2200 - Installation" on page 169)
- Correct installation of mounting unit 5ACCMA01.0100-000
- With panel 5AP5120.xxxx-000: IP20 protection
- With panel 5AP5130.xxxx-000 or 5AP5230.xxxx-000: IP10 protection
- Installation of all covers or components on interfaces and slots
- All ambient conditions are observed.

The Panel PC 2200 swing arm device additionally has "Type 1X indoor use only" per UL 50 under the same conditions.

## Technical data

### 4.1.4 Electrical properties

### 4.1.4.1 Block diagram



| Legend |  |  |  |
| :--- | :--- | :--- | :--- |
| $\square$ | Internal interface | $2.0 \_$Px | USB 2.0 port x |
| $\square$ | External interface | $3.0 \_$Px | USB 3.0 port x |

### 4.1.4.2 Power calculation

In order to calculate the total power of the Panel PC 2200 swing arm (AP5000), the power ratings of the system unit used, the panel and all other installed components must be added together.

## Information:

Unless otherwise specified, the following 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 |
| :--- | :--- | :---: |
| PPC2200 E3930 2C 1.30 GHz | 5PPC2200.ALO2-000 | 15 W (without USB consumer) |
|  |  | 25 W (with USB consumer) |

## AP5000 panels

| Type | Model number | +5 V | +3.3 V | +12 V | Total power consumption |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 15" single-touch | 5AP5120.1505-000 | - | 2.1 W | 8.9 W | 11 W |
| 15.6" multi-touch | 5AP5130.156B-000 | 1.8 W | - | 15.6 W | 17.4 W |
| 15.6" multi-touch | 5AP5130.156C-000 | 6 W | - | 18 W | 24 W |
| 15.6" multi-touch expansion unit | 5AP5230.156B-000 | 1.8 W | - | 15.6 W | 17.4 W |
| 15.6" multi-touch expansion unit | 5AP5230.156C-000 | 6 W | - | 18 W | 24 W |
| 18.5" multi-touch | 5AP5130.185B-000 | 6.1 W | - | 10.8 W | 16.9 W |
| 18.5" multi-touch | 5AP5130.185C-000 | 7 W | - | 18.6 W | 24.6 W |
| 18.5" multi-touch expansion unit | 5AP5230.185B-000 | 6.1 W | - | 10.8 W | 16.9 W |
| 18.5" multi-touch expansion unit | 5AP5230.185C-000 | 7 W | - | 18.6 W | 24.6 W |
| 19" single-touch | 5AP5120.1906-000 | 5 W | - | 22 W | 27 W |
| 21.5" multi-touch | 5AP5130.215C-000 | 4 W | - | 15 W | 19 W |
| 21.5" multi-touch expansion unit | 5AP5230.215C-000 | 4 W | - | 15 W | 19 W |
| 21.5" multi-touch expansion unit | 5AP5230.2151-000 | 4 W | - | 15 W | 19 W |
| 24.0" multi-touch | 5AP5130.240C-000 | 5 W | - | 24.5 W | 29.5 W |
| 24.0" multi-touch expansion unit | 5AP5230.240C-000 | 5 W | - | 24.5 W | 29.5 W |

## Expansion units

| Type | Model number | +5 V | +3.3 V | +12 V | Total power consumption |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Expansion units | 5ACCKP01.xxxx-000 | 0.50 W | 0.20 W | - | 0.70 W |
|  | 5ACCKP03.xxxx-000 | 1.7 W | 0.20 W | - | 1.90 W |
|  | 5ACCKP04.xxxx-000 | 0.50 W | 0.20 W | - | 0.70 W |
|  | 5ACCKP05.xxxx-000 | 1.7 W | 0.20 W | - | 1.90 W |

Interface options

| Type | Order number | +5 V | +3.3 V | +12 V | Total power consumption |
| :---: | :---: | :---: | :---: | :---: | :---: |
| CAN | 5ACCIF01.ICAN-000 | 0.45 W | 0.05 W | - | 0.5 W |
| 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 |
| 2x ETH 10/100/1000 | 5ACCIF03.CETH-000 | - | 2 W | - | 2 W |

## CFast cards

| Type | Order number | +5 V | +3.3 V | +12 V | Total power consumption |
| :---: | :---: | :---: | :---: | :---: | :---: |
| SLC technology | 5CFAST.xxxx-00 | - | 0.7 W read 0.7 W write 0.3 W idle | - | 0.7 W read 0.7 W write 0.3 W idle |
| MLC technology | $\begin{aligned} & \text { 5CFAST.032G-10 } \\ & \text { 5CFAST.064G-10 } \end{aligned}$ | - | 1.1 W read 1 W write 0.25 W idle | - | 1.1 W read 1 W write 0.25 W idle |
|  | 5CFAST.128G-10 | - | 1.1 W read 1.4 W write 0.25 W idle | - | 1.1 W read 1.4 W write 0.25 W idle |
|  | 5CFAST.256G-10 | - | 1.2 W read 1.9 W write 0.25 W idle | - | 1.2 W read 1.9 W write 0.25 W idle |

### 4.1.4.2.1 Calculation example

15.6" panel 5AP5230.156B-000

Expansion unit 5ACCKP01.156B-000
System unit 5PPC2200.AL14-000

POWERLINK interface option 5ACCIF01.FPLK-000

| $1.8 \mathrm{~W}+15.6 \mathrm{~W}$ |  | 17.40 W |
| :--- | ---: | ---: |
| $0.5 \mathrm{~W}+0.2 \mathrm{~W}$ |  | 0.7 W |
| 20.00 W (without USB con- | 20.00 W |  |
| sumers) |  |  |
| 1.75 W |  | 1.75 W |
| 1.90 W (write) |  | 1.90 W |
| Total max.: | $\mathbf{4 1 . 7 5} \mathbf{W}$ |  |

### 4.1.5 Device interfaces and slots

### 4.1.5.1 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 | "IF option slot " on page 54 | 2 | Interface option - LED status indicators1) <br> Interface option - Terminating resistor") |
| 3 | "Ethernet interfaces" on page 50 | 4 | Screw point for cable shield |
| 5 | "Power and reset buttons" on page 52 | 6 | "CFast slot" on page 51 |
| 7 | "LED status indicators" on page 53 | 8 | "USB interfaces" on page 51 |
| 9 | "Grounding" on page 50 | 10 | "+24 VDC power supply" on page 49 |
| 11 | Panel (configuration-dependent) | 12 | "Battery compartment" on page 55 |

1) Only available with installed interface option (configuration-dependent, see "Interface options" on page 101).

### 4.1.5.2 +24 VDC power supply

## Danger!

This device is only permitted to by 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 "OTB103.9x" on page 264.
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.


[^2]
### 4.1.5.2.1 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 $2.5 \mathrm{~mm}^{2}$ ).


### 4.1.5.3 Ethernet interfaces

The Ethernet controller is routed externally via the system unit.


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

1) Switching takes place automatically.
2) The $10 \mathrm{Mbit} / \mathrm{s}$ 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).

## Information:

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

### 4.1.5.4 USB interfaces

Panel 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) | $\xrightarrow{\sim}$ |
|  | High speed (480 Mbit/s) | - |
|  | SuperSpeed (5 Gbit/s) ${ }^{1)}$ | - |
| Current-carrying capacity ${ }^{2}$ ) | Max. 1 A per connection | $\square(\underset{\sim}{\infty}$ |
| Cable length |  | = |
| USB 2.0 | Max. 5 m (without hub) |  |
| USB 3.0 | Max. 3 m (without hub) |  |

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).

## USB interface on mounting unit

For details about the USB interfaces of the mounting units, see section "Mounting units" on page 140.

## Front USB interface

For details about the USB interfaces of the panels with expansion unit, see section "Expansion units" on page 154.

### 4.1.5.5 CFast slot

The The panel PC 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 | Short description |
| Order number | CFast cards |
|  | CFast 2 GB SLC |
| 5CFAST.2048-00 | CFast 4 GB SLC |
| 5CFAST.4096-00 | CFast 8 GB SLC |
| 5CFAST.8192-00 | CFast 16 GB SLC |
| 5CFAST.016G-00 | CFast 32 GB SLC |
| 5CFAST.032G-00 | CFast 32 GB MLC |
| 5CFAST.032G-10 | CFast 64 GB MLC |
| 5CFAST.064G-10 | CFast 128 GB MLC |
| 5CFAST.128G-10 | CFast 256 GB MLC |
| 5CFAST.256G-10 |  |

### 4.1.5.6 Power and reset buttons

Both buttons can be pressed without any tools.

## Power button

Description

The power button offers full ATX power supply support and has various configurable functions.

- Short press: Switches the PC on or off or performs the action configured in the operating system when pressing the power button (shutdown, sleep, etc.).
- Long press (approx. 4 s): The ATX power supply switches off the PC without shutting it down.

Pressing the power button does not reset the MTCX processor.

## Reset button

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!

### 4.1.5.7 LED status indicators



[^3]S4: Hibernate (suspend-to-disk)

### 4.1.5.8 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 |  |  |  |  |  |  |
| 5ACCIF01.FPCC-000 | Interface card - 2x CAN interfaces - 1x X2X Link interface - <br> 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/ <br> PPC2100/APC2200/PPC2200 |  |  |  |  |  |  |
| 5ACCIF01.FPCS-000 | Interface card - 1x RS485 interface - 1x CAN interface - 1x <br> POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/ <br> APC2200/PPC2200 |  |  |  |  |  |  |
| 5ACCIF01.FPLK-000 | Interface card - 1x POWERLINK interface - integrated 2-port <br> hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/ <br> PPC2200 |  |  |  |  |  |  |
| 5ACCIF01.FPLS-001 | Interface card - 1x RS232 interface - 1x POWERLINK interface <br> $-32 ~ k B ~ F R A M ~-~ F o r ~ A P C 2100 / P P C 2100 / A P C 2200 / P P C 2200 ~$ |  |  |  |  |  |  |
| 5ACCIF01.FPSC-000 | Interface card - 1x RS232 interface - 1x POWERLINK interface - <br> 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200 |  |  |  |  |  |  |
| 5ACCIF01.FPSC-001 | Interface card - 1x RS232 interface - 1x CAN interface - 1x <br> POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/ <br> APC2200/PPC2200 |  |  |  |  |  |  |
| 5ACCIF01.ICAN-000 | Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X <br> Link interface - 1x POWERLINK interface - 512 kB nvSRAM - <br> For APC2100/PPC2100/APC2200/PPC2200 |  |  |  |  |  |  |

## Information:

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

### 4.1.5.9 Battery compartment

The battery compartment consists of the battery holder and the battery.
The lithium battery ( $3 \mathrm{~V}, 1000 \mathrm{mAh}$ ) 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 $50^{\circ} \mathrm{C}$, $6 \mu \mathrm{~A}$ 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 256).

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Accessories |  |
| 5ACCBT01.0000-001 | 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 215) 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.

### 4.1.5.10 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.

### 4.1.6 Equipping panels with expansion units

Expansion options can be installed on AP5230 panels. There are two variants of expansion options:

- Expansion cover
- Expansion unit with operating elements


## Expansion covers (5ACCKP00.xxxx-000)

Expansion covers are not equipped by B\&R with operating elements. Depending on the variant, 7 to 14 cutouts are available to be equipped with operating elements by the user.

## Expansion units with operating elements (5ACCKP0x.xxxx-000)

Expansion units with operating elements are equipped with a USB interface on the front, green and red pushbuttons, selector switch or blue pushbutton, key switch and emergency stop device or an RFID interface (see "Expansion units" on page 154).


| Legend |  |  |  |
| :--- | :--- | :--- | :--- |
| 1 | Front USB | 2 | RFID interface (5ACCKP03.xxxx-000 and 5ACCKP05.xxxx-000) |
| 3 | Selector switches (5ACCKP01.xxxx-000 and 5ACCKP03.xxxx-000) <br> Blue pushbuttons (5ACCKP04.xxxx-000 and 5ACCKP05.xxxx-000) | 4 | Green pushbutton |
| 5 | Red pushbutton | 6 | Key switch |
| 7 | Emergency stop |  |  |

### 4.1.6.1 Button/Switching elements

| Button/Switch | Actuating element used | Switching element |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Selector switch | "Selector switch RAFIX 22 FS+, 1.30.272.102/2200" on page 284 | "Switching element RAFIX $1.20 .126 .005 / 0000$ on page 285 | $22 \text { FS }$ | universal, |
| Blue pushbutton | "Pushbutton RAFIX 22 FS+, 1.30.270.021/2600" on page 284 | "Switching element RAFIX $1.20 .126 .005 / 0000$ on page 285 | $22 \text { FS }$ | universal, |
| Green pushbutton | "Pushbutton RAFIX 22 FS+, 1.30.270.021/2500" on page 284 | "Switching element RAFIX $1.20 .126 .005 / 0000$ on page 285 | $22 \text { FS }$ | universal, |
| Red pushbutton | "Pushbutton RAFIX 22 FS+, 1.30.270.021/2300" on page 284 | "Switching element RAFIX $1.20 .126 .005 / 0000$ on page 285 | $22 \text { FS }$ | universal, |
| Key switch | "Key switch RAFIX 22 FS+, 1.30.255.222/0000" on page 285 | "Switching element RAFIX $1.20 .126 .005 / 0000$ on page 285 | $22 \text { FS }$ | universal, |
| Emergency stop | "Emergency stop RAFIX 22 FS+ "Plus 1",    <br> $1.30 .273 .512 / 0300$ " on page 285    | "Switching element RAFIX 22 $1.20 .126 .414 / 0000$ " on page 286 | $2 \text { FS+ }$ | CB gold, |

### 4.1.6.2 Button, switch and LED configuration

Each key and LED can be individually configured and adapted to the application. Various tools from B\&R are available for configuration:

- B\&R Key Editor for Windows operating systems
- B\&R KCF Editor for Windows operating systems
- Visual Components

Keys and LEDs from each device are processed by the matrix controller in a bit string of 128 bits each. The positions of the keys and LEDs in the matrix are displayed as hardware numbers and can be read directly on the target system using B\&R tools and the ADI Control Center.


## Keys and LEDs in the matrix:

- Hardware numbers of keys are specified in the following with black indexes.
- Hardware numbers of LEDs are specified in the following with blue indexes.


ADI Control Center

Illustration examples:


Configuration with mounted expansion unit 5ACCKP0x.xxxx-000 for panels:

- 5AP5230.156x-000
- 5AP5230.185x-000
- 5AP5230.215C-000
- 5AP5230.215I-000
- 5AP5230.240C-000



### 4.1.6.3 USB interface

Panels with expansion options are equipped with a USB 2.0 interface on the front. This is equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

## Front USB

The front USB interface is available to the user for service purposes.
For a more detailed description, see "USB interface" on page 157.

### 4.1.6.4 Button/Switch interface

The button/switch interface can be used to externally wire button and switching elements. It is located inside the panel on the expansion unit. To access, the cover on the back for the expansion option must be removed first (see "Installing the expansion unit/cover" on page 193). Button and switching elements are wired using the 9pin terminal strip and a screwdriver.

| Description |  |  |  | Figure |
| :---: | :---: | :---: | :---: | :---: |
| Pin | Name | Button/Switch | Contact |  |
| 1 | T_Select | Selector switch | (normally open contact) |  |
|  | T_Blue | Blue pushbutton | (normally open contact) |  |
| 2 | T_Green | Green pushbutton | (normally open contact) |  |
| 3 | T_Red | Red pushbutton | (normally open contact) |  |
| 4 | T_Key | Key switch | (normally open contact) |  |
| 5 | V_Button |  | Reference potential for pins 1-4 |  |
| 6 | NH22 | Emergency stop | Normally closed contact pair 1 emergency stop |  |
| 7 | NH21 | Emergency stop | Normally closed contact pair 1 emergency stop | $\begin{array}{lllllllll}9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1\end{array}$ |
| 8 | NH12 | Emergency stop | Normally closed contact pair 2 emergency stop |  |
| 9 | NH11 | Emergency stop | Normally closed contact pair 2 emergency stop |  |



### 4.1.6.5 B\&R wireless assembly

B\&R wireless assembly RFM-2-NF of 5ACCKP03.xxxx-000 or 5ACCK05.xxxx-000 expansion units consists of the following wireless module:

- SRD (RFID/NFC) module TWN4 MultiTech Nano from Elatec with circuit board antenna from B\&R.

The B\&R wireless assembly must be connected internally to the system using the USB 2.0 cable.

### 4.1.6.5.1 Drivers, software and documentation

Drivers, software tools and documentation for approved operating systems are available for download in the Downloads section of the B\&R website (www.br-automation.com). The software packages for the TWN4 MultiTech Nano with the TWN4 Simple Protocol must be used.

### 4.2 Individual components

### 4.2.1 System units

### 4.2.1.1 5PPC2200.ALxx-000

### 4.2.1.1.1 General information

PPC2200 system units consist of a CPU board, housing and mounting plate. It includes all interfaces; in addition, an interface 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 interface option


### 4.2.1.1.2 Order data



### 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 | 5PPC2200.AL02-000 | 5PPC2200.AL04-000 | 5PPC2200.AL14-000 | 5PPC2200.AL18-000 |
| :---: | :---: | :---: | :---: | :---: |
| General information |  |  |  |  |
| LEDs | Power, Disk, Link, Run |  |  |  |
| B\&R ID code | 0xF0C6 | 0xF0C7 | 0xF0C8 | 0xF0C9 |
| Cooling | Passive via housing |  |  |  |
| Power button | Yes |  |  |  |
| Reset button | Yes |  |  |  |
| Buzzer | No |  |  |  |
| Certifications |  |  |  |  |
| CE | Yes |  |  |  |
| UL | cULus E115267 <br> Industrial control equipment |  |  |  |
| DNV |  | - |  | Temperature: B (0-55 $\left.{ }^{\circ} \mathrm{C}\right)$ Humidity: B (up to 100\%) <br> Vibration: A ( 0.7 g ) EMC: B (bridge and open deck) ${ }^{1)}$ |
| 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 $25^{\circ} \mathrm{C}$ : Typ. 12 ppm (1 second) per day ${ }^{2}$ |  |  |  |
| Battery-backed | Yes |  |  |  |
| Power failure logic |  |  |  |  |
| Controller | MTCX ${ }^{3)}$ |  |  |  |
| 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) |  |  |  |
| 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) ${ }^{4)}$ |  |  |  |
| Current-carrying capacity | Max. 1 A per connection |  |  |  |


| Order number | 5PPC2200.AL02-000 | 5PPC2200.AL04-000 | 5PPC2200.AL14-000 | 5PPC2200.AL18-000 |
| :---: | :---: | :---: | :---: | :---: |
| Ethernet |  |  |  |  |
| Quantity | 2 |  |  |  |
| Variant | RJ45, shielded |  |  |  |
| Transfer rate | 10/100/1000 Mbit/s |  |  |  |
| Max. baud rate | $1 \mathrm{Gbit} / \mathrm{s}$ |  |  |  |
| Slots |  |  |  |  |
| Interface option ${ }^{5}$ | 1 |  |  |  |
| Electrical properties |  |  |  |  |
| Nominal voltage | 24 VDC $\pm 25 \%$, SELV ${ }^{6)}$ |  |  |  |
| Nominal current | Max. 4 A |  |  |  |
| Inrush current | Typ. 5 A, max. 50 A for $<500 \mu \mathrm{~s}$ |  |  |  |
| Overvoltage category per EN 61131-2 | 11 |  |  |  |
| Galvanic isolation | Yes |  |  |  |
| Operating conditions |  |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |  |
| Degree of protection per EN 60529 | Back: IP20 (front: depends on the panel used) ${ }^{7}$ ) |  |  |  |
| Ambient conditions |  |  |  |  |
| Elevation |  |  |  |  |
| Operation | Max. 3000 m (component-dependent) ${ }^{\text {8) }}$ |  |  |  |
| Mechanical properties |  |  |  |  |
| Dimensions |  |  |  |  |
| Width | 190 mm |  |  |  |
| Height | 115 mm |  |  |  |
| Depth | 29.7 mm |  |  |  |
| Weight | 577 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 ( $5 \mathrm{Gbit} / \mathrm{s}$ ) is only possible with USB 3.0.
5) The interface option cannot be replaced.
6) IEC 61010-2-201 requirements must be observed
7) Only if all interface covers are installed.

The degree of protection of the complete system depends on the mounting unit used as well as the panel.
8) The maximum ambient temperature is typically derated $1^{\circ} \mathrm{C}$ per 1000 meters starting at 500 m above sea level.

## Technical data

### 4.2.2 Panels

### 4.2.2.1 5AP5120.1505-000

### 4.2.2.1.1 General information

- 15.0" TFT XGA color display
- Single-touch (analog resistive)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP20 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.1.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5120.1505-000 | Automation Panel 15.0" XGA TFT - $1024 \times 768$ pixels (4:3) - Sin-gle-touch (analog resistive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD00.1505-000 | AP5000 swing arm handles - For panel 5AP5120.1505-000 |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit $-2 x$ rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.1.3 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 | 5AP5120.1505-000 |
| :---: | :---: |
| Touch screen |  |
| Technology | Analog, resistive |
| Controller | B\&R, serial, 12-bit |
| Transmittance | 81\% $\pm 3 \%$ |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4 X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum |
| Front |  |
| Frame | Aluminum, coated |
| Panel overlay |  |
| Material | Polyester |
| Dark border color around display | RAL 7024 |
| Dimensions |  |
| Width | 389 mm |
| Height | 299 mm |
| Weight | 5200 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.1.4 Dimensions



### 4.2.2.1.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.2 5AP5120.1906-000

### 4.2.2.2.1 General information

- 19.0" TFT SXGA color display
- Single-touch (analog resistive)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP20 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.2.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Panels |  |
| 5AP5120.1906-000 | Automation Panel 19.0" SXGA TFT - 1280 x 1024 pixels (5:4) <br> - Single-touch (analog resistive) - Swing arm mounting - Land- <br> scape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
|  | AP5000 flange - Swing arm rotary flange - For swing arm mount- <br> ing unit |  |
|  | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm <br> mounting unit |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For <br> swing arm mounting unit |  |
| 5ACCFL00.0100-000 | Handles |  |
| 5ACCFL00.0200-000 | AP5000 swing arm handles - For panel 5AP5120.1906-000 |  |
|  | Mounting units | AP5000 swing arm mounting unit <br> 5ACCHD00.1906-000 |
| AP5000 swing arm mounting unit - 1x rear USB interface |  |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit - 2x rear USB interface |  |
| 5ACCMA00.0001-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided <br> with suitable cable grommets. |  |
| 5ACCMA00.0002-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only <br> provided with suitable cable grommets. |  |
|  | AP5000 VESA mounting unit IP10/IP20 - IP20 with <br> 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.2.3 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 | 5AP5120.1906-000 |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xE9CC |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 19.0" |
| Colors | 16.7 million |
| Resolution | SXGA, $1280 \times 1024$ pixels |
| Contrast | 1500:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 35 to $350 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time ${ }^{1)}$ | 70,000 h |
| Touch screen |  |
| Technology | Analog, resistive |
| Controller | B\&R, serial, 12-bit |
| Transmittance | 81\% $\pm 3 \%$ |


| Order number | 5AP5120.1906-000 |
| :---: | :---: |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum |
| Front |  |
| Frame | Aluminum, coated |
| Panel overlay |  |
| Material | Polyester |
| Dark border color around display | RAL 7024 |
| Dimensions |  |
| Width | 461.2 mm |
| Height | 372 mm |
| Weight | 7300 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.2.4 Dimensions



### 4.2.2.2.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.3 5AP5130.156B-000

### 4.2.2.3.1 General information

- 15.6" TFT HD color display
- Multi-touch (PCT)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.3.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5130.156B-000 | Automation Panel 15.6" HD TFT - $1366 \times 768$ pixels (16:9) -Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD00.156B-000 | AP5000 swing arm handles - For panel  <br> 5AP5130.156B/156C-000     |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2 x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000-IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.3.3 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 ${ }^{\text {a }}$ 5AP5130.156B-000 |  |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xE9C7 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 15.6" |
| Colors | 16.7 million |
| Resolution | HD, $1366 \times 768$ pixels |
| Contrast | 1000:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 40 to $400 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time ${ }^{1)}$ | 70,000 h |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |


| Order number | 5AP5130.156B-000 |
| :---: | :---: |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4 X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 433 mm |
| Height | 269.5 mm |
| Weight | 4700 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.3.4 Dimensions



### 4.2.2.3.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | RH [\%] | Relative humidity (RH) in percent and non-condensing |

## Technical data

### 4.2.2.4 5AP5130.156C-000

### 4.2.2.4.1 General information

- 15.6" TFT FHD color display
- Multi-touch (PCT)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.4.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5130.156C-000 | Automation Panel 15.6" Full HD TFT - $1920 \times 1080$ pixels (16:9) -Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD00.156B-000 | AP5000 swing arm handles - For panel  <br> 5AP5130.156B/156C-000     |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2 x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000-IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.4.3 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 | 5AP5130.156C-000 |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0XF24A |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 15.6" |
| Colors | 16.7 million |
| Resolution | FHD, $1920 \times 1080$ |
| Contrast | Starting with hardware revision F0: 800:1 Up to hardware revision E0: 1500:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Starting with hardware revision F0: Typ. 40 to $450 \mathrm{~cd} / \mathrm{m}^{2}$ Up to hardware revision E0: Typ. 40 to $400 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time | Starting with hardware revision F0: $\geq 50,000 \mathrm{~h}$ Up to hardware revision E0: 70,000 $\mathrm{h}^{1)}$ |


| Order number | 5AP5130.156C-000 |
| :--- | ---: |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |
| Operating conditions | Pollution degree 2 |
| Pollution degree per EN 61131-2 | IP65 with mounting unit 5ACCMA00.000x-000 |
| Degree of protection per EN 60529 | IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.00x-000 |
|  | Type 1 with mounting unit 5ACCMA00.010x-000 |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.4.4 Dimensions



### 4.2.2.4.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.5 5AP5130.185B-000

### 4.2.2.5.1 General information

- 18.5" TFT HD color display
- Multi-touch (PCT)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.5.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5130.185B-000 | Automation Panel 18.5" HD TFT - $1366 \times 768$ pixels (16:9) -Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD00.185B-000 | AP5000 swing arm handles - For panel    <br> 5AP5130.185B/185C-000     |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2 x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.5.3 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 | 5AP5130.185B-000 |
| :---: | :---: |
| O\|l|ler |  |
| B\&R ID code | 0xE9C8 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 18.5" |
| Colors | 16.7 million |
| Resolution | HD, $1366 \times 768$ pixels |
| Contrast | 1000:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=80^{\circ} /$ Direction $\mathrm{D}=80^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 15 to $300 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time ${ }^{1)}$ | 50,000 h |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |


| Order number | 5AP5130.185B-000 |
| :---: | :---: |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 494 mm |
| Height | 306 mm |
| Weight | 6700 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.5.4 Dimensions



### 4.2.2.5.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :--- | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.6 5AP5130.185C-000

### 4.2.2.6.1 General information

- 18.5" TFT FHD color display
- Multi-touch (PCT)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.6.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5130.185C-000 | Automation Panel 18.5 " Full HD TFT - $1920 \times 1080$ pixels (16:9) -Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD00.185B-000 | AP5000 swing arm handles - For panel  <br> 5AP5130.185B/185C-000     |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2 x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.6.3 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 | 5AP5130.185C-000 |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xF24C |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 18.5" |
| Colors | 16.7 million |
| Resolution | FHD, $1920 \times 1080$ pixels |
| Contrast | 1500:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 40 to $400 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time | $50,000 \mathrm{~h}^{1)}$ |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |


| Order number | 5AP5130.185C-000 |
| :---: | :---: |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMAS00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMAS00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 494 mm |
| Height | 306 mm |
| Weight | 6700 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.6.4 Dimensions



### 4.2.2.6.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :--- | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.7 5AP5130.215C-000

### 4.2.2.7.1 General information

- 21.5" TFT FHD color display
- Multi-touch (PCT)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.7.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5130.215C-000 | Automation Panel 21.5" Full HD TFT - $1920 \times 1080$ pixels (16:9) -Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD00.215C-000 | AP5000 swing arm handles - For panel 5AP5130.215C-000 |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit $-2 x$ rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.7.3 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 |  |
| :--- | ---: |
| General information | 5AP5130.215C-000 |
| B\&R ID code |  |
| Certifications | 0xE9C9 |
| CE | Yes |
| UL | cULus E115267 |
| EAC |  |
| Display |  |
| Type |  |
| Diagonal | Yes equipment |


| Order number | 5AP5130.215C-000 |
| :--- | :---: |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 <br> IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 <br> Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating |  |
| Front | White aluminum (similar to RAL 9006) |
| Frame |  |
| Design |  |
| Dimensions |  |
| Width |  |
| Height |  |
| Weight |  |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.7.4 Dimensions



### 4.2.2.7.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :---: |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.8 5AP5130.240C-000

### 4.2.2.8.1 General information

- 24.0" TFT FHD color display
- Multi-touch (PCT)
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.8.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Panels |  |
| 5AP5130.240C-000 | Automation Panel 24.0" Full HD TFT - 1920 x 1080 pixels (16:9)- <br> Multi-touch (projected capacitive) - Swing arm mounting - Land- <br> scape format - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Flanges |  |
|  | AP5000 flange - Swing arm rotary flange - For swing arm mount- <br> ing unit |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm <br> mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For <br> swing arm mounting unit |  |
| 5ACCFL00.0200-000 | Handles |  |
| 5ACCHD00.240C-000 | AP5000 swing arm handles - For panel 5AP5130.240C-000 |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided <br> with suitable cable grommets. |  |
|  | HMI mounting unit VESA IP54 w/USB - Leak tightness is only <br> provided with suitable cable grommets. |  |
|  | AP5000 VESA mounting unit IP10/IP20 - IP20 with <br> 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.8.3 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 | 5AP5130.240C-000 <br> Degree of protection per EN 60529IP65 with mounting unit 5ACCMA00.000x-000 <br> IP54 with mounting unit 5ACCMA00.010x-000 |
| :--- | :---: |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 <br> Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating |  |
| Front | White aluminum (similar to RAL 9006) |
| Frame |  |
| Design |  |
| Dimensions |  |
| Width |  |
| Height | Aluminum (similar to RAL 9006), coated |
| Weight | Black |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.8.4 Dimensions



### 4.2.2.8.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | RH $[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Technical data

### 4.2.2.9 5AP5230.156B-000

### 4.2.2.9.1 General information

- 15.6" TFT HD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.9.2 Order data



### 4.2.2.9.3 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 | 5AP5230.156B-000 |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xE9F5 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 15.6" |
| Colors | 16.7 million |
| Resolution | HD, $1366 \times 768$ pixels |


| Order number ${ }^{\text {a }}$ 5AP5230.156B-000 |  |
| :---: | :---: |
| Contrast | 1000:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 40 to $400 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time ${ }^{1)}$ | 70,000 h |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 433 mm |
| Height | 349 mm |
| Weight | 6400 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.9.4 Dimensions



### 4.2.2.9.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | RH $[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

4.2.2.10 5AP5230.156C-000

### 4.2.2.10.1 General information

- 15.6" TFT FHD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.10.2 Order data



### 4.2.2.10.3 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 |  |
| :--- | ---: |
| General information | 5AP5230.156C-000 |
| B\&R ID code |  |
| Certifications | 0xF24B |
| CE | cULus E115267 |
| UL | Yes |
|  | Industrial control equipment |
| EAC | Yes |
| Display | TFT color |
| Type | FHD, 1920 x 1080 pixels |
| Diagonal |  |
| Colors | 15.6 million |
| Resolution |  |


| Order number ${ }^{\text {a }}$ 5AP5230.156C-000 |  |
| :---: | :---: |
| Contrast | 1500:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 40 to $400 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time | 70,000 h ${ }^{\text {1) }}$ |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 433 mm |
| Height | 349 mm |
| Weight | 6400 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.10.4 Dimensions



### 4.2.2.10.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

### 4.2.2.11 5AP5230.185B-000

### 4.2.2.11.1 General information

- 18.5" TFT HD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.11.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5230.185B-000 | Automation Panel 18.5" HD TFT - $1366 \times 768$ pixels (16:9) -Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Expansion units |  |
| 5ACCKP00.185B-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 11x cutouts for 22.3 mm switching elements - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP01.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) - 1 x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP03.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID $\mathrm{read} /$ write unit - 1 x emergency stop -2 x pushbutton (red and green) - 1 x selector switch -1 x key switch -1 x front USB interface - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP04.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-3 x$ pushbutton (red, green, blue) - $1 x$ key switch 1 x front USB interface - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP05.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - $3 x$ pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD01.185B-000 | AP5000 swing arm handles - For panel  <br> 5AP5230.185B/185C-000     |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2 x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.11.3 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 5AP5230.185B-000 |  |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xE9F6 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 18.5" |
| Colors | 16.7 million |
| Resolution | HD, $1366 \times 768$ pixels |
| Contrast | 1000:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction $\mathrm{U}=80^{\circ} /$ Direction $\mathrm{D}=80^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 15 to $300 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time ${ }^{1)}$ | 50,000 h |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |
| Slots |  |
| Expansion unit | Yes |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4 X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 494 mm |
| Height | 385.5 mm |
| Weight | 8300 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.11.4 Dimensions



### 4.2.2.11.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

### 4.2.2.12 5AP5230.185C-000

### 4.2.2.12.1 General information

- 18.5" TFT FHD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.12.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5230.185C-000 | Automation Panel 18.5 " Full HD TFT - $1920 \times 1080$ pixels (16:9)-Multi-touch (projected capacitive) - Swing arm mounting - Landscape format - Expansion option - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Expansion units |  |
| 5ACCKP00.185B-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 11x cutouts for 22.3 mm switching elements - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP01.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) - 1 x selector switch - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP03.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID $\mathrm{read} /$ write unit - 1 x emergency stop -2 x pushbutton (red and green) - 1 x selector switch -1 x key switch -1 x front USB interface - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP04.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-3 x$ pushbutton (red, green, blue) - $1 x$ key switch 1 x front USB interface - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP05.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - $3 x$ pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 |  |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD01.185B-000 | AP5000 swing arm handles - For panel  <br> 5AP5230.185B/185C-000     |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2 x rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.12.3 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 5AP5230.185C-000 |  |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xF24D |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Yes |
| Display |  |
| Type | TFT color |
| Diagonal | 18.5" |
| Colors | 16.7 million |
| Resolution | FHD, $1920 \times 1080$ |
| Contrast | 1500:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=85^{\circ} /$ Direction $\mathrm{L}=85^{\circ}$ |
| Vertical | Direction U $=85^{\circ} /$ Direction $\mathrm{D}=85^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 40 to $400 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time | $50,000 \mathrm{~h}^{1)}$ |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |
| Slots |  |
| Expansion unit | Yes |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006) |
| Design | Black |
| Dimensions |  |
| Width | 494 mm |
| Height | 385.5 mm |
| Weight | 8300 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.12.4 Dimensions



### 4.2.2.12.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

### 4.2.2.13 5AP5230.215C-000

### 4.2.2.13.1 General information

- 21.5" TFT FHD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.13.2 Order data



### 4.2.2.13.3 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.


1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.13.4 Dimensions



### 4.2.2.13.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

### 4.2.2.14 5AP5230.215I-000

### 4.2.2.14.1 General information

- 21.5" TFT FHD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.14.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Panels |  |
| 5AP5230.215I-000 | Automation Panel 21.5" Full HD TFT - $1920 \times 1080$ pixels (16:9) - Multi-touch (projected capacitive) - Swing arm mounting - Portrait format - Expansion option - For PPC2100 / PPC2200 / link modules |  |
|  | Optional accessories |  |
|  | Expansion units |  |
| 5ACCKP00.215I-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements $-7 x$ cutouts for 22.3 mm switching elements - For panel 5AP5230.215I-000 |  |
| 5ACCKP01.215I-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop $-2 x$ pushbutton (red and green) - $1 x$ selector switch - 1 x key switch - 1 x front USB interface - For panel 5AP5230.215I-000 |  |
| 5ACCKP04.215I-000 | AP5000 swing arm expansion option - Expansion unit - 1x emergency stop - $3 x$ pushbutton (red, green, blue) - $1 x$ key switch 1x front USB interface - For panel 5AP5230.215I-000 | 200 © 0 |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mounting unit |  |
| 5ACCFL00.0100-000 | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm mounting unit |  |
| 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For swing arm mounting unit |  |
|  | Handles |  |
| 5ACCHD01.2151-000 | AP5000 swing arm handles - For panel 5AP5230.215I-000 |  |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |  |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit $-2 x$ rear USB interface |  |
| 5ACCMA00.0100-000 | HMI mounting unit VESA IP54 - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA00.0101-000 | HMI mounting unit VESA IP54 w/USB - Leak tightness is only provided with suitable cable grommets. |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with 5AP5120.*-000 - IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.2.14.3 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 | 5AP5230.2151-000 |
| :--- | ---: |
| General information |  |
| B\&R ID code | 0xE9F8 |
| Certifications |  |
| CE | CULus E115267 |
| UL | Industrial control equipment |


| Order number 5AP5230.2151-000 |  |
| :---: | :---: |
| Contrast | 5000:1 |
| Viewing angles |  |
| Horizontal | Direction $\mathrm{R}=89^{\circ} /$ Direction $\mathrm{L}=89^{\circ}$ |
| Vertical | Direction U $=89^{\circ} /$ Direction $\mathrm{D}=89^{\circ}$ |
| Backlight |  |
| Type | LED |
| Brightness (dimmable) | Typ. 12.5 to $250 \mathrm{~cd} / \mathrm{m}^{2}$ |
| Half-brightness time ${ }^{1)}$ | 30,000 h |
| Touch screen |  |
| Technology | Projected capacitive touch (PCT) |
| Transmittance | >90\% |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 with mounting unit 5ACCMA00.000x-000 IP54 with mounting unit 5ACCMA00.010x-000 |
| Degree of protection per UL 50 | Type 4X indoor with mounting unit 5ACCMA00.000x-000 Type 1 with mounting unit 5ACCMA00.010x-000 |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Front |  |
| Frame | Aluminum (similar to RAL 9006), coated |
| Design | Black |
| Dimensions |  |
| Width | 352 mm |
| Height | 632 mm |
| Weight | 5400 g |

1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.14.4 Dimensions



### 4.2.2.14.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

### 4.2.2.15 5AP5230.240C-000

### 4.2.2.15.1 General information

- 24.0" TFT FHD color display
- Multi-touch (PCT)
- Possible to install expansion unit
- Flexible swing arm mounting or VESA
- IP65 protection with mounting unit 5ACCMA00.000x-000
- IP54 protection with mounting unit 5ACCMA00.010x-000
- IP10 protection with mounting unit 5ACCMA01.0100-000


### 4.2.2.15.2 Order data



### 4.2.2.15.3 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.


1) At $25^{\circ} \mathrm{C}$ ambient temperature. Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.

### 4.2.2.15.4 Dimensions



### 4.2.2.15.5 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

### 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
- $2 x$ 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 |
| :---: | :---: | :---: |
|  | 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 |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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.


## Technical data

| Order number 5ACCIF01.FPCC-000 |  |
| :---: | :---: |
| Interfaces |  |
| POWERLINK |  |
| Quantity | 1 |
| Type | Type $4{ }^{3)}$ |
| Variant | RJ45, shielded |
| Transfer rate | $100 \mathrm{Mbit} / \mathrm{s}$ |
| Transfer | 100BASE-TX |
| Line length | Max. 100 m between two stations (segment length) |
| CAN |  |
| Quantity | 2 |
| Variant | 10-pin, male ${ }^{4)}$ |
| Transfer rate | Max. 1 Mbit/s |
| Terminating resistor |  |
| Type | Can be switched on and off with slide switch ${ }^{5}$ ) |
| Default setting | Each off |
| X2X |  |
| Type | X2X Link master |
| Quantity | 1 |
| Variant | 10-pin, male, galvanically isolated |
| Electrical properties |  |
| Power consumption | 2 W |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | -20 to $55^{\circ} \mathrm{C}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| 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) 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 "IF1".


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 "IFx".
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 - (Fx ${ }^{1)^{2}}{ }^{\text {2 }}$ |  |  |
| :---: | :---: | :---: |
| 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 about CAN interfaces with AS/AR support, see Automation Help. For additional information about CAN interfaces without AS/AR support, see the user's manual for the B\&R CAN driver at www.br-automation.com.

| Bit timing register 0 | Bit timing register 1 | Baud rate |
| :---: | :---: | :---: |
| 00h | 14 h | $1000 \mathrm{kbit} / \mathrm{s}$ |
| 80 h or 00h | 1 Ch | $500 \mathrm{kbit} / \mathrm{s}$ |
| 81 h or 01h | 1 Ch | $250 \mathrm{kbit} / \mathrm{s}$ |
| 83 h or 03h | 1 Ch | $125 \mathrm{kbit} / \mathrm{s}$ |
| 84 h or 04h | 1 Ch | $100 \mathrm{kbit/s}$ |
| 89 h or 09h | 1 Ch | $50 \mathrm{kbit} / \mathrm{s}$ |

## CAN1 - 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 ${ }^{1)}$ |  |
| :--- | :--- |
| $\leq 1000 \mathrm{~m}$ | Transfer rate |
| $\leq 200 \mathrm{~m}$ | Typ. $50 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 100 \mathrm{~m}$ | Typ. 250 kbit/s |
| $\leq 20 \mathrm{~m}^{2}$ | Typ. $500 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 15 \mathrm{~m}^{3}$ |  |

[^4]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 |  |  |
| :---: | :---: | :---: |
| Signal line |  |  |
|  | Cable cross section | $2 \times 0.25 \mathrm{~mm}^{2}$ (24AWG/19), tinned copper stranded wire |
|  | Wire insulation | PE |
|  | Conductor resistance | $\leq 82$ //km |
|  | Stranding | Wires stranded in pairs |
|  | Shield | Pair shielding with aluminum foil |
| GND |  |  |
|  | Cable cross section | $1 \times 0.34 \mathrm{~mm}^{2}$ (22AWG/19), tinned copper stranded wire |
|  | Wire insulation | PE |
|  | Conductor resistance | s59 $\Omega / \mathrm{km}$ |
| Outer jacket |  |  |
|  | Material | PUR compound |
|  | Properties | Halogen-free |
|  | Cable shield | Tinned copper wire |

## 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 "IFx".
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 - IFx ${ }^{1)^{2}}$ |  |  |
| :---: | :---: | :---: |
| 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 about CAN interfaces with AS/AR support, see Automation Help. For additional information about CAN interfaces without AS/AR support, see the user's manual for the B\&R CAN driver at www.br-automation.com.

| Bit timing register 0 | Bit timing register 1 | Baud rate |
| :---: | :---: | :---: |
| 00 h | 14 h | $1000 \mathrm{kbit} / \mathrm{s}$ |
| 80 h or 00h | 1 Ch | $500 \mathrm{kbit} / \mathrm{s}$ |
| 81 h or 01h | 1 Ch | $250 \mathrm{kbit} / \mathrm{s}$ |
| 83 h or 03h | 1 Ch | $125 \mathrm{kbit} / \mathrm{s}$ |
| 84 h or 04h | 1 Ch | $100 \mathrm{kbit} / \mathrm{s}$ |
| 89 h or 09 h | 1 h | $50 \mathrm{kbit} / \mathrm{s}$ |

## CAN2 - 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 ${ }^{1)}$ | Transfer rate |
| :--- | :--- |
| $\leq 1000 \mathrm{~m}$ | Typ. $50 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 200 \mathrm{~m}$ | Typ. 250 kbit/s |
| $\leq 100 \mathrm{~m}$ | Typ. $500 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 20 \mathrm{~m}^{2}$ |  |
| $\leq 15 \mathrm{~m}^{3}$ | Typ. $1 \mathrm{Mbit} / \mathrm{s}$ |

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.


### 4.2.3.1.3.4 X2X Link master interface - Pinout

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

| X2X Link master - IFx ${ }^{\text {1 }}{ }^{\text {2 }}$ |  |  |
| :---: | :---: | :---: |
| Variant | 10-pin, male |  |
| Galvanic isolation | Yes |  |
| Pin | Pinout |  |
| 1 | X2X |  |
| 2 | Shield |  |
| 3 | X2XI |  |
| 4 | $\mathrm{X} 2 \mathrm{X} \perp$ |  |
| 5 | - |  |
| 6 | - |  |
| 7 | - |  |
| 8 | - |  |
| 9 | - |  |
| 10 | - |  |

[^5]
### 4.2.3.1.3.5 LED status indicators L1, L2, L3

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


## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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
- $1 \times$ 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 |
| :---: | :---: | :---: |
|  | Interface options |  |
| 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 |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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 |
| :---: | :---: |
| General information |  |
| LEDs | L1, L2, L3 |
| B\&R ID code | 0xED7C |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| HazLoc | cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 1) |
| DNV | Temperature: $\mathbf{B}\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A ( 0.7 g ) <br> EMC: B (bridge and open deck) ${ }^{2)}$ |
| EAC | Product family certification |
| Controller |  |
| FRAM |  |
| Size | 32 kB |
| Data retention | 10 years |
| Read/Write endurance | Min. $10^{12}$ times/byte |
| Remanent variables in power failure mode | $32 \mathrm{kB}$ <br> (for e.g. Automation Runtime, see Automation Help) |
| Interfaces |  |
| 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 |
| POWERLINK |  |
| Quantity | 1 |
| Type | Type $4{ }^{3)}$ |
| Variant | RJ45, shielded |
| Transfer rate | $100 \mathrm{Mbit} / \mathrm{s}$ |
| Transfer | 100BASE-TX |
| Line length | Max. 100 m between two stations (segment length) |

## Technical data

| Order number | 5ACCIF01.FPCS-000 |
| :---: | :---: |
| 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 |
| Electrical properties |  |
| Power consumption | 1.75 W |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | -20 to $55^{\circ} \mathrm{C}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| 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 produc 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 "IF1".


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 "IFx".

| Serial interface COM - $\mathrm{IFx}^{1{ }^{12)}}$ |  |  |
| :---: | :---: | :---: |
|  | RS485 |  |
| Variant | 10-pin, male |  |
| Type | RS485 |  |
| 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 | DATAI |  |
| 10 | DATA |  |

[^6]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 279.

### 4.2.3.2.3.3 CAN bus interface - Pinout

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

| CAN bus - IFx ${ }^{1 / 2)}$ |  |  |
| :---: | :---: | :---: |
| 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 about CAN interfaces with AS/AR support, see Automation Help. For additional information about CAN interfaces without AS/AR support, see the user's manual for the B\&R CAN driver at www.br-automation.com.

| Bit timing register 0 | Bit timing register 1 | Baud rate |
| :---: | :---: | :---: |
| 00h | 14 h | $1000 \mathrm{kbit} / \mathrm{s}$ |
| 80 h or 00h | 1 Ch | $500 \mathrm{kbit} / \mathrm{s}$ |
| 81 h or 01h | 1 Ch | $250 \mathrm{kbit} / \mathrm{s}$ |
| 83 h or 03h | 1 Ch | $125 \mathrm{kbit} / \mathrm{s}$ |
| 84 h or 04h | 1 Ch | $100 \mathrm{kbit} / \mathrm{s}$ |
| 89 h or 09h | 1 Ch | $50 \mathrm{kbit} / \mathrm{s}$ |

## 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 279.

## 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.


## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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 |  |
| :--- | :--- | :--- |
|  | Interface options |  |
| 5ACCIF01.FPLK-000 | Interface card - 1x POWERLINK interface - Integrated 2-port <br> hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/ <br> 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 |
| :---: | :---: |
| General information |  |
| LEDs | L1, L2, L3 |
| B\&R ID code | 0xE9BA |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| HazLoc | cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 1) |
| EAC | Product family certification |
| Controller |  |
| 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

| Order number ${ }^{\text {a }}$ 5ACCIF01.FPLK-000 |  |
| :---: | :---: |
| Interfaces |  |
| POWERLINK |  |
| Quantity | 1 (integrated 2-port hub) |
| Type | Type 4, redundant ${ }^{2)}$ |
| Variant | RJ45, shielded |
| Transfer rate | $100 \mathrm{Mbit} / \mathrm{s}$ |
| Transfer | 100BASE-TX |
| Line length | Max. 100 m between two stations (segment length) |
| Electrical properties |  |
| Power consumption | 1.75 W |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | -20 to $55^{\circ} \mathrm{C}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| 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) 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 "IF1".


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 "IFx".


[^7]4.2.3.3.3.3 LED status indicators L1, L2, L3

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


## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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).

## Technical data

### 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 |
| :---: | :---: | :---: |
|  | Interface options |  |
| 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 |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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 |
| :---: | :---: |
| General information |  |
| LEDs | L2, L3 |
| B\&R ID code | 0xE540 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| HazLoc | cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 1) |
| DNV | Temperature: B $\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A (0.7 g) <br> EMC: B (bridge and open deck) ${ }^{2)}$ |
| EAC | Product family certification |
| Controller |  |
| FRAM |  |
| Size | 32 kB |
| Data retention | 10 years |
| Read/Write endurance | Min. $10^{12}$ times/byte |
| Remanent variables in power failure mode | 32 kB (for e.g. Automation Runtime, see Automation Help) |
| Interfaces |  |
| 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 |
| POWERLINK |  |
| Quantity | 1 |
| Type | Type $4{ }^{\text {3) }}$ |
| Variant | RJ45, shielded |
| Transfer rate | $100 \mathrm{Mbit} / \mathrm{s}$ |
| 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 |


| Order number |  |
| :--- | ---: |
| Ambient conditions | 5ACCIF01.FPLS-000 |
| Temperature |  |
| Operation | -20 to $55^{\circ} \mathrm{C}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| 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 "IF1".


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 "IFx".

| Serial interface COMA - IFx ${ }^{1 / 2) 3}$ ) |  |  |
| :---: | :---: | :---: |
|  | RS232 |  |
| 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.
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 279.

### 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 <br> A connection to a POWERLINK network exists. |  | IF option |  |
|  |  | Blinking | POWERLINK link LED Data is being transferred. |  |  |  |
| L3 | Green-Red | On | POWERLINK status/error LED <br> See "LED "S/E" (LED "Status/Error")" on page 281. | Ol3 ○l2 ○ |  |  |
|  |  | Off | POWERLINK status/error LED <br> See "LED "S/E" (LED "Status/Error")" on page 281. |  |  |  |

## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- B\&R Linux
- 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 |
| :---: | :---: | :---: |
|  | Interface options |  |
| 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 |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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 |
| :---: | :---: |
| General information |  |
| LEDs | L2, L3 |
| B\&R ID code | 0xE9B9 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| HazLoc | cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 1) |
| DNV | Temperature: B $\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A (0.7 g) <br> EMC: B (bridge and open deck) ${ }^{2)}$ |
| EAC | Product family certification |
| Controller |  |
| 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) |
| Interfaces |  |
| 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 |
| POWERLINK |  |
| Quantity | 1 |
| Type | Type $4{ }^{\text {3) }}$ |
| Variant | RJ45, shielded |
| Transfer rate | $100 \mathrm{Mbit} / \mathrm{s}$ |
| 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 |


| Order number |  |
| :--- | ---: |
| Ambient conditions | 5ACCIF01.FPLS-001 |
| Temperature |  |
| Operation | -20 to $55^{\circ} \mathrm{C}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| 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 "IF1".


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 "IFx".

| Serial interface COMA - IFx ${ }^{1)^{2 / 3}}$ |  |  |
| :---: | :---: | :---: |
|  | RS232 |  |
| Variant | 10-pin, male |  |
| Type | RS232, modem supported |  |
| Galvanic isolation | No |  |
| UART | 16550-compatible, 16-byte FIFO buffer |  |
| Transfer rate | Max. $115 \mathrm{kbit} / \mathrm{s}$ |  |
| 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.
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 279.

### 4.2.3.5.3.3 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 <br> A connection to a POWERLINK network exists. |  | IF option |  |
|  |  | Blinking | POWERLINK link LED Data is being transferred. |  |  |  |
| L3 | Green-Red | On | POWERLINK status/error LED <br> See "LED "S/E" (LED "Status/Error")" on page 281. | Ol3 ○l2 ○ |  |  |
|  |  | Off | POWERLINK status/error LED <br> See "LED "S/E" (LED "Status/Error")" on page 281. |  |  |  |

## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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) (if required and not already included in the operating system).

Approved operating systems:

- Automation Runtime
- B\&R Linux
- 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.

## Technical data

### 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 |  |
| :--- | :--- | :--- |
|  | Interface options |  |
| 5ACCIF01.FPSC-000 | Interface card - 1x RS232 interface - 1x CAN interface -1x <br> POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/ <br>  <br> APC2200/PPC2200 - Only available with a new device |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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 |
| :---: | :---: |
| General information |  |
| LEDs | L1, L2, L3 |
| B\&R ID code | 0xE53F |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| HazLoc | cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 1) |
| DNV | Temperature: $\mathbf{B}\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A ( 0.7 g ) <br> EMC: B (bridge and open deck) ${ }^{2)}$ |
| EAC | Product family certification |
| Controller |  |
| FRAM |  |
| Size | 32 kB |
| Data retention | 10 years |
| Read/Write endurance | Min. $10^{12}$ times/byte |
| Remanent variables in power failure mode | $32 \mathrm{kB}$ <br> (for e.g. Automation Runtime, see Automation Help) |
| Interfaces |  |
| 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 |
| POWERLINK |  |
| Quantity | 1 |
| Type | Type $4{ }^{\text {3) }}$ |
| Variant | RJ45, shielded |
| Transfer rate | $100 \mathrm{Mbit} / \mathrm{s}$ |
| Transfer | 100BASE-TX |
| Line length | Max. 100 m between two stations (segment length) |


| Order number |  |
| :--- | ---: |
| CAN | 5ACCIF01.FPSC-000 |
| Quantity |  |
| Variant | 1 |
| Transfer rate | 10-pin, male, not galvanically isolated |
| Terminating resistor | Max. 1 Mbit/s |
| Type |  |
| Default setting | Can be switched on and off with slide switch |
| Electrical properties | Off |
| Power consumption |  |
| Operating conditions | 1.75 W |
| Pollution degree per EN 61131-2 |  |
| Ambient conditions | Pollution degree 2 |
| Temperature |  |
| Operation |  |
| Storage | -20 to $55^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| Relative humidity | -20 to $60^{\circ} \mathrm{C}$ |
| Operation | 5 to $90 \%$, non-condensing |
| Storage | 5 to $95 \%$, non-condensing |
| Transport | 5 to $95 \%$, non-condensing |
| Mechanical properties |  |
| Weight |  |

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 "IF1".


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 "IFx".

| Serial interface COM - $\mathrm{IFx}^{1{ }^{12)}}$ |  |  |
| :---: | :---: | :---: |
|  | RS232 |  |
| 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 |  |
| Pin | Pinout |  |
| 1 | - |  |
| 2 | Shield |  |
| 3 | - |  |
| 4 | - |  |
| 5 | - |  |
| 6 | - |  |
| 7 | - |  |
| 8 | COM GND |  |
| 9 | RXD |  |
| 10 | TXD |  |

[^8]
## 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 279.

### 4.2.3.6.3.3 CAN bus interface - Pinout

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

| CAN bus - IFx ${ }^{1)^{2}}$ |  |  |
| :---: | :---: | :---: |
| 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 about CAN interfaces with AS/AR support, see Automation Help. For additional information about CAN interfaces without AS/AR support, see the user's manual for the B\&R CAN driver at www.br-automation.com.

| Bit timing register 0 Bit timing register 1 | Baud rate |  |
| :---: | :---: | :---: |
| 00h | 14 h | $1000 \mathrm{kbit} / \mathrm{s}$ |
| 80 h or 00h | 1 Ch | $500 \mathrm{kbit} / \mathrm{s}$ |
| 81 h or 01h | 1 Ch | $250 \mathrm{kbit} / \mathrm{s}$ |
| 83 h or 03h | 1 Ch | $125 \mathrm{kbit} / \mathrm{s}$ |
| 84 h or 04h | 1 Ch | $100 \mathrm{kbbit} / \mathrm{s}$ |
| 89 h or 09h | 1 Ch | $50 \mathrm{kbit} / \mathrm{s}$ |

## 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 279.

## 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.


## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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).

## Technical data

### 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 |
| :---: | :---: | :---: |
|  | Interface options |  |
| 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 |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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.

|  |  |
| :---: | :---: |
|  |  |
| LEDs | L1, L2, L3 |
| B\&R ID code | 0xE9BC |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| HazLoc | cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 1) |
| DNV | Temperature: B (0-55 $\left.{ }^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A (0.7 g) <br> EMC: B (bridge and open deck) ${ }^{2)}$ |
| EAC | Product family certification |
| Controller |  |
| 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) |
| Interfaces |  |
| 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 |



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 "IF1".


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 "IFx".

| Serial interface COM - IFx ${ }^{\text {1 }} \mathbf{2}$ ) |  |  |
| :---: | :---: | :---: |
|  | RS232 |  |
| Variant | 10-pin, male |  |
| Type | RS232, not modem supported |  |
| Galvanic isolation | No |  |
| UART | 16550-compatible, 16-byte FIFO buffer |  |
| Transfer rate | Max. $115 \mathrm{kbit} / \mathrm{s}$ |  |
| Bus length | Max. 15 m |  |
| Pin | Pinout |  |
| 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 279.

### 4.2.3.7.3.3 CAN bus interface - Pinout

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

| CAN bus - IFx ${ }^{\text {12) }}$ |  |  |
| :---: | :---: | :---: |
| 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 about CAN interfaces with AS/AR support, see Automation Help. For additional information about CAN interfaces without AS/AR support, see the user's manual for the B\&R CAN driver at www.br-automation.com.

| Bit timing register 0 | Bit timing register 1 | Baud rate |
| :---: | :---: | :---: |
| 00 h | 14 h | $1000 \mathrm{kbit} / \mathrm{s}$ |
| 80 h or 00h | 1 Ch | $500 \mathrm{kbit} / \mathrm{s}$ |
| 81 h or 01h | 1 Ch | $250 \mathrm{kbit} / \mathrm{s}$ |
| 83 h or 03h | 1 Ch | $125 \mathrm{kbit} / \mathrm{s}$ |
| 84 h or 04h | 1 Ch | $100 \mathrm{kbit} / \mathrm{s}$ |
| 89 h or 09h | 1 Ch | $50 \mathrm{kbit} / \mathrm{s}$ |

## 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 279.

## 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 "IFx".

| X2X Link master - (Fx ${ }^{\text {12) }}$ ) |  |  |
| :---: | :---: | :---: |
| Variant | 10-pin, male |  |
| Galvanic isolation | Yes |  |
| Pin | Pinout |  |
| 1 | X2X |  |
| 2 | Shield |  |
| 3 | X2XI |  |
| 4 | $\mathrm{X} 2 \mathrm{X} \perp$ |  |
| 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.


## POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 281.

### 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.FSSO-000

### 4.2.3.8.1 General information

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

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


### 4.2.3.8.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Interface options |  |
| 5ACCIF01.FSS0-000 | Interface card - 2x RS422/RS485 interface - For APC2100/ PPC2100/APC2200/PPC2200 - Only available with a new device |  |
|  | Optional accessories |  |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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.


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 "IFx".

| Serial interface COM A - (Fx ${ }^{\left.12)^{2}\right)^{3}}$ |  |  |
| :---: | :---: | :---: |
|  | RS422/RS485 |  |
| Variant | 10-pin, male |  |
| Type | RS422/RS485 |  |
| Galvanic isolation | Yes |  |
| UART | 16550-compatible, 16-byte FIFO buffer |  |
| Transfer rate | Max. $115 \mathrm{kbit} / \mathrm{s}$ |  |
| 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.
This interface (if available) is automatically enabled in BIOS as COM A with default addresses I/O:3F8h and IRQ:4
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 279.

## Operation as RS485 interface

The pins of the RS422 default interface (1, 4, 6 and 9 ) 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.

## 4．2．3．8．3．2 Serial interface COM D－Pinout

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

| Serial interface COMD－IFx ${ }^{\text {12）}}$ 3） |  |  |
| :---: | :---: | :---: |
|  | RS422／RS485 |  |
| Variant | 10－pin，male |  |
| Type | RS422／RS485 |  |
| Galvanic isolation | Yes |  |
| UART | 16550－compatible， 16－byte FIFO buffer |  |
| Transfer rate | Max． $115 \mathrm{kbit} / \mathrm{s}$ |  |
| Bus length | Max． 1200 m | $\begin{array}{lllll}1 & 3 & 5 & 7 & 9\end{array}$ |
| Pin | Pinout |  |
| 1 | RXD | ○ 回回回回回○ |
| 2 | RXD |  |
| 3 | TXD | $\begin{array}{llllll}2 & 4 & 6 & 8 & 10\end{array}$ |
| 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．
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．


Figure 1：RS232／RS422／RS485 interface－COM D operation in RS485 mode
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 | － | IF option |  |
| 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． | $\bigcirc \mathrm{l} 3 \bigcirc \mathrm{l} 2 \bigcirc \mathrm{l}$ |  |  |
|  |  | 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 131) indicate the state of the assigned terminating resistor:

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


### 4.2.3.8.4 Shielding

The shields of the cables connected to the female 10-pin connector can be connected to the screw point for cable shields, see, as an alternative to the functional ground connection of the interface cover of the system unit.

### 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) (if required and not already included in the operating system).
Approved operating systems:

- Automation Runtime
- B\&R Linux
- 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 |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
|  | Interface options | Figure |  |  |  |
| 5ACCIF01.ICAN-000 | Interface card - 1x CAN interface - For APC2100/PPC2100/ <br>  <br>  <br> APC2200/PPC2200 - Only available with a new device |  |  |  |  |
|  | Optional accessories |  |  |  |  |
|  | Terminal blocks |  |  |  |  |
| 0TB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br> - 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 |
| :---: | :---: |
| General information |  |
| LEDs | L1 |
| B\&R ID code | 0xE9BB |
| 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 1) |
| EAC | Product family certification |
| Interfaces |  |
| 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 |
| Electrical properties |  |
| Power consumption | 0.5 W |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | -20 to $60^{\circ} \mathrm{C}^{2)}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| 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 |

[^9]
## Technical data

### 4.2.3.9.3.1 CAN bus interface - Pinout

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

| CAN bus - IFx ${ }^{1)^{2} \text { ) }}$ |  |  |
| :---: | :---: | :---: |
| 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 CAN interfaces with AS/AR support, see Automation Help. For additional information about CAN interfaces without AS/AR support, see the user's manual for the B\&R CAN driver at www.br-automation.com.

| Bit timing register 0 | Bit timing register 1 | Baud rate |
| :---: | :---: | :---: |
| 00 h | 14 h | $1000 \mathrm{kbit} / \mathrm{s}$ |
| 80 h or 00h | 1 Ch | $500 \mathrm{kbit} / \mathrm{s}$ |
| 81 h or 01h | 1 Ch | $250 \mathrm{kbit} / \mathrm{s}$ |
| 83 h or 03h | 1 Ch | $125 \mathrm{kbit} / \mathrm{s}$ |
| 84 h or 04h | 1 hh | $100 \mathrm{kbit} / \mathrm{s}$ |
| 89 h or 09 h | 1 Ch | $50 \mathrm{kbit} / \mathrm{s}$ |

## 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.


### 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) (if required and not already included in the operating system).
Approved operating systems:

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


## Technical data

### 4.2.3.10 5ACCIF03.CETH-000

### 4.2.3.10.1 General information

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

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


### 4.2.3.10.2 Order data

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

### 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 | 5ACCIF03.CETH-000 |
| :---: | :---: |
| General information |  |
| B\&R ID code | $0 x F 1$ A8 |
| Diagnostics |  |
| Data transfer | Yes, using LED status indicator |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 Industrial control equipment |
| DNV | Temperature: $\mathbf{B}\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: $\mathbf{A}(0.7 \mathrm{~g})$ <br> EMC: B (bridge and open deck) ${ }^{11}$ |
| Interfaces |  |
| Ethernet |  |
| Quantity | 2 |
| Controller | Intel I210 |
| Variant | RJ45, shielded |
| Transfer rate | 10/100/1000 Mbit/s ${ }^{2)}$ |
| Line length | Max. 100 m between two stations (segment length) |
| Electrical properties |  |
| Power consumption | 2 W |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | 0 to $60^{\circ} \mathrm{C}^{3)}$ |
| Storage | -20 to $60^{\circ} \mathrm{C}$ |
| Transport | -20 to $60^{\circ} \mathrm{C}$ |
| Relative humidity |  |
| Operation | 5 to 90\%, non-condensing |
| Storage | 5 to $95 \%$, non-condensing |
| Transport | 5 to 95\%, non-condensing |
| Mechanical properties |  |
| 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.

### 4.2.3.10.3.1 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) ${ }^{11}$ |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Variant | RJ45, female |  | ETH4 | ETH3 |
| Controller | Intel I210 |  |  |  |
| Wiring | S/STP (Cat 5e) |  |  | ETH3 |
| Transfer rate | 10/100/1000 Mbit/s²) |  |  | $\bigcirc$ |
| Cable length | Max. 100 m (min. Cat 5e) |  |  |  |
| LED "Speed" (b) | On | Off |  | $\square$ |
| Green | $100 \mathrm{Mbit} / \mathrm{s}$ | $10 \mathrm{Mbit} / \mathrm{s}^{3}$ ) |  |  |
| Orange (dark) | $1000 \mathrm{Mbit} / \mathrm{s}$ | - |  | $a \longrightarrow$ |
| LED "Link" (a) | On | Active |  |  |
| 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 $10 \mathrm{Mbit} / \mathrm{s}$ transfer rate / connection is only available if LED "Link" is active at the same time.

### 4.2.3.10.4 Driver support

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

Approved operating systems:

- B\&R Linux
- 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

For detailed information about compatible CFast cards, see the aggregate data sheet for CFast cards on the B\&R website.

### 4.2.5 Battery compartment

### 4.2.5.1 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").

### 4.2.5.2 Order data

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

For the battery compartment replacement part, see "5ACCRPC2.0003-000" on page 262.

### 4.2.5.3 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 | 5ACCBT01.0000-001 |
| :---: | :---: |
| General information |  |
| Battery |  |
| Type | Panasonic 1000 mAh |
| Nominal voltage | 3 V |
| Service life | 8 years ${ }^{1)}$ |
| Removable | No ${ }^{2)}$ |
| Variant | Lithium |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| DNV | Temperature: $\mathbf{B}\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A (0.7 g) <br> EMC: B (bridge and open deck) ${ }^{3)}$ |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | -25 to $60^{\circ} \mathrm{C}$ |
| Storage | -25 to $60^{\circ} \mathrm{C}$ |
| Transport | -25 to $60^{\circ} \mathrm{C}$ |
| 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 $50^{\circ} \mathrm{C}, 6 \mu \mathrm{~A}$ 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.

## Technical data

### 4.2.6 Mounting units

### 4.2.6.1 5ACCMA00.0000-000

### 4.2.6.1.1 General information

The mounting unit is installed on the back of the panel. It protects the installed link module / system unit, enabling IP65 protection for the complete system. The flange is installed on the mounting unit. Due to the symmetrical design of the back of the panel, it is possible to install the mounting unit in 2 directions. If a flange is selected for mounting, flange output is possible towards the top or bottom.

- Protects the installed link module / system unit
- For swing arm mounting with flange
- IP65 protection


### 4.2.6.1.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Mounting units |  |
| 5ACCMA00.0000-000 | AP5000 swing arm mounting unit |  |
|  | Optional accessories |  |
|  | Flanges |  |

### 4.2.6.1.3 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 ${ }^{\text {a }}$ 5ACCMA00.0000-000 |  |
| :---: | :---: |
| General information |  |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 Industrial control equipment |
| EAC | Product family certification |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 ${ }^{1)}$ |
| Degree of protection per UL 50 | Type 4X indoor ${ }^{1)}$ |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Installation | Swing arm (with flange) |
| Dimensions |  |
| Width | 280 mm |
| Height | 259 mm |
| Depth | 96 mm |
| Weight | 2500 g |

1) Only with proper installation on the panel and proper installation on the swing arm.

### 4.2.6.2 5ACCMA00.0001-000

### 4.2.6.2.1 General information

The mounting unit is installed on the back of the panel. It protects the installed link module / system unit, enabling IP65 protection for the complete system. The flange is installed on the mounting unit. Due to the symmetrical design of the back of the panel, it is possible to install the mounting unit in 2 directions. If a flange is selected for mounting, flange output is possible towards the top or bottom.

A USB interface is available on the side of the mounting unit for service purposes.

- Protects the installed link module / system unit
- For swing arm mounting with flange
- USB 2.0 interface
- IP65 protection


### 4.2.6.2.2 Order data

| Order number | Short description |
| :--- | :--- |
|  | Mounting units |
| 5ACCMA00.0001-000 | AP5000 swing arm mounting unit - 1x rear USB interface |
|  | Optional accessories |
|  | Flanges |

### 4.2.6.2.3 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 | 5ACCMA00.0001-000 |
| :---: | :---: |
| General information |  |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Product family certification |
| Interfaces |  |
| USB |  |
| Quantity | 1 |
| Type | USB 2.0 |
| Variant | Type A |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (30 Mbit/s) |
| Current-carrying capacity | Max. 500 mA |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 ${ }^{\text {1) }}$ |
| Degree of protection per UL 50 | Type 4X indoor ${ }^{1)}$ |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Installation | Swing arm (with flange) |
| Dimensions |  |
| Width | 280 mm |
| Height | 259 mm |
| Depth | 96 mm |
| Weight | 2500 g |

[^10]
### 4.2.6.2.4 USB interface

The mounting unit is equipped with a USB 2.0 interface. This is equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

## USB on mounting unit

The USB interface is available to the user for service purposes.

## Information:

In the default configuration, the USB interface is the USB1 interface on the system unit; this can vary depending on the defined configuration.


1) In SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1.

In SDL3 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ )
In SDL4 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A ).

### 4.2.6.3 5ACCMA00.0002-000

### 4.2.6.3.1 General information

The mounting unit is installed on the back of the panel. It protects the installed link module / system unit, enabling IP65 protection for the complete system. The flange is installed on the mounting unit. Due to the symmetrical design of the back of the panel, it is possible to install the mounting unit in 2 directions. If a flange is selected for mounting, flange output is possible towards the top or bottom.

2 USB interfaces are available on the side of the mounting unit for service purposes.

- Protects the installed link module / system unit
- For swing arm mounting with flange
- 2x USB 2.0 interface
- IP65 protection


### 4.2.6.3.2 Order data

| Order number | Short description |
| :--- | :--- |
|  | Mounting units |
| 5ACCMA00.0002-000 | AP5000 swing arm mounting unit - 2x rear USB interface |
|  | Optional accessories |
|  | Flanges |

### 4.2.6.3.3 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 | 5ACCMA00.0002-000 |
| :---: | :---: |
| General information |  |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Product family certification |
| Interfaces |  |
| USB |  |
| Quantity | 2 |
| Type | USB 2.0 |
| Variant | Type A |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (30 Mbit/s) |
| Current-carrying capacity | Max. 500 mA |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP65 ${ }^{\text {1) }}$ |
| Degree of protection per UL 50 | Type 4X indoor ${ }^{1)}$ |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Installation | Swing arm (with flange) |
| Dimensions |  |
| Width | 280 mm |
| Height | 259 mm |
| Depth | 96 mm |
| Weight | 2500 g |

[^11]
### 4.2.6.3.4 USB interface

The mounting unit is equipped with 2 USB 2.0 interfaces. They are equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

## USB on mounting unit

The USB interfaces are available to the user for service purposes.

## Information:

In the default configuration, the USB interfaces are the USB1 and USB 2 interfaces on the system unit, though this can vary depending on the defined configuration.

|  | USB on mou |  |
| :---: | :---: | :---: |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Quantity | 2 |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed (480 Mbit/s) ${ }^{1)}$ |  |
| Current-carrying capacity ${ }^{\text {2 }}$ | Max. 0.5 A |  |
| Cable length |  |  |
| USB 2.0 | <3 m (without hub) |  |
|  |  |  |

[^12]
### 4.2.6.4 5ACCMA00.0100-000

### 4.2.6.4.1 General information

The mounting unit is installed on the back of the panel. It protects the installed link module / system unit.

- For installation with a $75 \times 75$ and $100 \times 100$ VESA mount
- Can also be installed when rotated $180^{\circ}$.
- IP54 protection

VESA IP54 5ACCMA00.010x-000 mounting units are approved for the following configurations:

| AP5000 with system unit | 5ACCMA00.010x-000 |
| :--- | :---: |
| 5PPC2200.ALxx-000 with heat pipe 5ACCHP00.0003-000 | $\checkmark$ |

## Notice!

It is important to note that no cable grommets are included in delivery.
IP54 protection and UL Type 1 enclosure rating can only be ensured if appropriate cable grommets are ordered and installed. The cable grommet must be selected to match the cable diameter.

### 4.2.6.4.2 Order data



### 4.2.6.4.3 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 | 5ACCMA00.0100-000 |
| :---: | :---: |
| General information |  |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 Industrial control equipment |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP54 1) |
| Degree of protection per UL 50 | Type $1^{1)}$ |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Installation | VESA |


| Order number |  |
| :--- | :---: |
| Dimensions | 5ACCMA00.0100-000 |
| Width | 280 mm |
| Length | 259 mm |
| Height | 60.25 mm |
| Weight | 2.6 kg |

1) Only with proper installation on the panel.

### 4.2.6.5 5ACCMA00.0101-000

### 4.2.6.5.1 General information

The mounting unit is installed on the back of the panel. It protects the installed link module / system unit.

- For installation with a $75 \times 75$ and $100 \times 100$ VESA mount
- Can also be installed when rotated $180^{\circ}$.
- USB connection routed externally.
- IP54 protection

VESA IP54 5ACCMA00.010x-000 mounting units are approved for the following configurations:

| AP5000 with system unit | 5ACCMA00.010x-000 |
| :--- | :---: |
| 5PPC2200.ALxx-000 with heat pipe 5ACCHP00.0003-000 | $\checkmark$ |

## Notice!

It is important to note that no cable grommets are included in delivery.
IP54 protection and UL Type 1 enclosure rating can only be ensured if appropriate cable grommets are ordered and installed. The cable grommet must be selected to match the cable diameter.

### 4.2.6.5.2 Order data



### 4.2.6.5.3 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.
$\left.\begin{array}{|l|r|}\hline \text { Order number } & \\ \hline \text { General information } & \text { 5ACCMA00.0101-000 } \\ \hline \text { Certifications } & \\ \hline \text { CE } & \begin{array}{c}\text { cULus E115267 } \\ \text { UL }\end{array} \\ \hline \text { Interfaces } & \text { Yndustrial control equipment }\end{array}\right]$

| Order number | 5ACCMA00.0101-000 |
| :--- | ---: |
| Degree of protection per UL 50 | Type 1 1) |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Installation | VESA |
| Dimensions | 280 mm |
| Width | 259 mm |
| Length | 60.25 mm |
| Height | 2.6 kg |
| Weight |  |

1) Only with proper installation on the panel.

### 4.2.6.5.4 USB interface

The mounting unit is equipped with a USB 2.0 interface. This is equipped with a protective cover.

## Caution!

IP54 protection can only be achieved if the USB protective cover is properly installed.

## 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.

## USB on mounting unit

The USB interface is available to the user for service purposes.

## Information:

In the default configuration, the USB interface is the USB1 interface on the system unit; this can vary depending on the defined configuration.

|  | USB on mou |  |
| :---: | :---: | :---: |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed ( $480 \mathrm{Mbit} / \mathrm{s})^{1}$ ) |  |
| Current-carrying capacity ${ }^{2}$ | Max. 0.5 A |  |
| Cable length |  |  |
| USB 2.0 | <3 m (without hub) |  |
|  |  |  |

[^13]
### 4.2.6.6 5ACCMA01.0100-000

### 4.2.6.6.1 General information

The mounting unit is installed on the back of the panel. It protects the installed link module / system unit. The VESA bracket is installed on the mounting unit. If a VESA bracket is selected for mounting, VESA 100 or VESA 75 installation is possible.

- Protects the installed link module / system unit
- For installation with VESA bracket
- IP20 protection with 5AP5120.xxxx-000
- IP10 protection with 5AP5130.xxxx-000 and 5AP5230.xxxx-000


### 4.2.6.6.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Mounting units |  |
| 5ACCMA01.0100-000 | AP5000 VESA mounting unit IP10/IP20 - IP20 with <br> 5AP5120.*-000-IP10 with 5AP5130.*-000, 5AP5230.*-000 |  |

### 4.2.6.6.3 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 ${ }^{\text {5ACCMA01.0100-000 }}$ |  |
| :---: | :---: |
| General information |  |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 Industrial control equipment |
| EAC | Product family certification |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP10 ${ }^{\text {1) }}$ |
| Degree of protection per UL 50 | Type $1^{1)}$ |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | White aluminum (similar to RAL 9006) |
| Installation | VESA |
| Dimensions |  |
| Width | 270 mm |
| Height | 189 mm |
| Depth | 51 mm |
| Weight | 900 g |

1) Only with proper installation on the panel.

### 4.2.7 Flanges

### 4.2.7.1 5ACCFL00.0000-000

### 4.2.7.1.1 General information

The rotary flange is installed on the mounting unit and designed for swing arm systems with 48 mm shaft diameter. The range of rotation is $-150^{\circ}$ to $+150^{\circ}$.

- Rotary flange
- Range of rotation $\pm 150^{\circ}$
- Stepless adjustment of range of rotation
- For swing arm systems with 48 mm shaft diameter


### 4.2.7.1.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Flanges |  |
| 5ACCFL00.0000-000 | AP5000 flange - Swing arm rotary flange - For swing arm mount- <br> ing unit |  |

### 4.2.7.1.3 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 | 5ACCFL00.0000-000 |
| :--- | :---: |
| General information |  |
| Certifications | Yes |
| CE | cULus E115267 |
| UL | Industrial control equipment |
| EAC | Product family certification |
| Operating conditions | Pollution degree 2 |
| Pollution degree per EN 61131-2 |  |
| Mechanical properties | Aluminum (similar to RAL 9006), coated |
| Material |  |
| Dimensions | 55 mm |
| Height | 75 mm (outer diameter) |
| Diameter | 48.5 mm (inner diameter) |
| Weight | 530 g |

### 4.2.7.2 5ACCFLO0.0100-000

### 4.2.7.2.1 General information

The swivel-tilt flange is installed on the mounting unit and designed for swing arm systems with 48 mm shaft diameter. The range of rotation is from $-150^{\circ}$ to $+150^{\circ}$; the tilting range is up to a maximum of $15^{\circ}$.

- Swivel-tilt flange
- Range of rotation: $\pm 150^{\circ}$
- Tilting range: $\pm 15^{\circ}$
- Stepless adjustment of the range of rotation and tilting range
- For swing arm systems with 48 mm shaft diameter
- Tightening torque for tilt flange locking lever: Max. 7 Nm
- Tightening torque rotary flange locking lever: 5 Nm
- Tightening torque for locking screw (M6) opposite the clamping lever: Max. 3 Nm


## Warning!

The swivel-tilt flange is generally compatible with all panel sizes.
Use in conjunction with panels in portrait format is not recommended since the range of rotation and tilt cannot be fully utilized.

## Caution!

After adjusting the rotation and/or tilt angle, the corresponding locking lever must be fixed in position (see above for the maximum tightening torques).
The screw in the locking lever is not permitted to be tightened. Fixing must be carried out exclusively with the locking lever.

### 4.2.7.2.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
| 5ACCFL00.0100-000 | Flanges |  |
|  | AP5000 flange - Swivel-tilt flange for swing arm - For swing arm <br> mounting unit |  |

### 4.2.7.2.3 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 | 5ACCFL00.0100-000 |
| :--- | :---: |
| General information |  |
| Certifications | Yes |
| CE | cULus E115267 |
| UL | Industrial control equipment |
| EAC | Product family certification |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Mechanical properties | Anodized aluminum E6/C0 |
| Material |  |


| Order number |  |
| :--- | :--- |
| Dimensions | 5ACCFL00.0100-000 |
| Height | 147 mm |
| Diameter | 90 mm |
| Weight | 1666 g |

## Danger!

+24 VDC power supply
The swivel-tilt flange is only permitted to be used in conjunction with devices supplied with a SELV/ PELV power supply unit or with safety extra-low voltage (SELV) per IEC 61010-2-201.

### 4.2.7.3 5ACCFL00.0200-000

### 4.2.7.3.1 General information

The adapter is installed on the mounting unit and designed for the installation of Rittal coupling CP40 (steel).

- Adapter for Rittal coupling CP40 (steel)

Rittal coupling "CP 40" (steel, $90 \times 71 \mathrm{~mm}$ ) must be used for installation.

### 4.2.7.3.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Flanges |  |
| 5 5ACCFL00.0200-000 | AP5000 flange - Swing arm flange adapter - For Rittal - For <br> swing arm mounting unit |  |

### 4.2.7.3.3 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.
\(\left.\begin{array}{|l|r|}\hline Order number \& <br>
\hline General information \& 5ACCFL00.0200-000 <br>
\hline Certifications \& <br>
\hline CE \& CULus E115267 <br>

\hline UL \& Industrial control equipment\end{array}\right]\)|  |
| :--- |
| EAC |
| Operating conditions |
| Pollution degree per EN 61131-2 |
| Mechanical properties |
| Material |
| Dimensions |
| Height |
| Diameter |
| Weight |

### 4.2.8 Expansion units

For more information regarding expansion units and operating elements, see section "Equipping panels with expansion units" on page 57.

### 4.2.8.1 5ACCKP00.xxxx-000

### 4.2.8.1.1 General information

5ACCKP00.xxxx-000 expansion units are expansion covers that can be installed on the Automation Panel 5230. Depending on the variant, 7 to 14 cutouts are available to be equipped with operating elements.

For specifications regarding the operating and switching elements used by $B \& R$, see section "Features" under "5ACCSE00.000x-00x" on page 287.

## Information:

The maximum installation depth of operating and switching elements is $\mathbf{2 6 ~ \mathbf { ~ m m }}$ at the thinnest point and 30 mm at the thickest point.

### 4.2.8.1.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Expansion units |  |
| 5ACCKP00.156B-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 10x cutouts for 22.3 mm switching elements - For panel 5AP5230.156B/156C-000 |  |
| 5ACCKP00.185B-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 11x cutouts for 22.3 mm switching elements - For panel 5AP5230.185B/185C-000 |  |
| 5ACCKP00.215C-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 13x cutouts for 22.3 mm switching elements - For panel 5AP5230.215C-000 |  |
| 5ACCKP00.215I-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements $-7 x$ cutouts for 22.3 mm switching elements - For panel 5AP5230.215I-000 |  |
| 5ACCKP00.240C-000 | AP5000 swing arm expansion option - Expansion cover - For switching elements - 14x cutouts for 22.3 mm switching elements - For panel 5AP5230.240C-000 |  |
|  | Optional accessories |  |
|  | Operating elements |  |
| 5ACCSE00.0000-000 | RAFIX 22 FS+ pushbutton - With 5 replaceable colored lenses - No color, red, green, blue, yellow - Normally open contact Illuminated with white LED |  |
| 5ACCSE00.0000-001 | RAFIX 22 FS+ pushbutton - With 5 replaceable colored lenses - No color, red, green, blue, yellow - Normally closed contact Illuminated with white LED |  |
| 5ACCSE00.0000-002 | RAFIX 22 FS + pushbutton - With 5 replaceable colored lenses - No color, red, green, blue, yellow - Normally closed contact Normally open contact - Illuminated with white LED |  |
| 5ACCSE00.0001-000 | RAFIX 22 FS emergency stop button |  |
| 5ACCSE00.0002-000 | RAFIX 22 FS key switch $2 \times 90^{\circ}$ |  |
| 5ACCSE00.0003-000 | RAFIX 22 FS key switch $1 \times 90^{\circ}$ |  |
| 5ACCSE00.0004-000 | RAFIX 22 FS+ selector switch 1-90 ${ }^{\circ}$ |  |
| 5ACCSE00.0005-000 | RAFIX FS 22+ USB IP65 400 mm |  |

### 4.2.8.1.3 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 | 5ACCKP00.156B-000 | 5ACCKP00.185B-000 | 5ACCKP00.215C-000 | 5ACCKP00.2151-000 | 5ACCKP00.240C-000 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| General information |  |  |  |  |  |
| Certifications |  |  |  |  |  |
| CE | Yes |  |  |  |  |
| UL | cULus E115267 <br> Industrial control equipment |  |  |  |  |
| EAC | Product family certification |  |  |  |  |
| Features |  |  |  |  |  |
| Optional operating elements |  |  |  |  |  |
| Quantity | 10 | 11 | 13 | 7 | 14 |

600 g
800 g
900 g

### 4.2.8.2 5АССКР01.xxxx-000

### 4.2.8.2.1 General information

5ACCKP01.xxxx-000 expansion units are equipped with various operating elements as well as a USB interface and can be installed in Automation Panel 5230.

- Expansion units
- Front USB interface
- Green and red pushbuttons
- Selector switch
- Key switch
- Emergency stop


### 4.2.8.2.2 Order data



### 4.2.8.2.3 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 | 5ACCKP01.156B-000 | 5ACCKP01.185B-000 | 5ACCKP01.215C-000 | 5ACCKP01.2151-000 | 5ACCKP01.240C-000 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| General information |  |  |  |  |  |
| Certifications |  |  |  |  |  |
| CE | Yes |  |  |  |  |
| UL | cULus E115267 <br> Industrial control equipment |  |  |  |  |
| EAC | Product family certification |  |  |  |  |
| Interfaces |  |  |  |  |  |
| USB |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | USB 2.0 |  |  |  |  |
| Variant | Type A |  |  |  |  |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s) |  |  |  |  |
| Current-carrying capacity | 500 mA |  |  |  |  |
| Features |  |  |  |  |  |
| Pushbuttons |  |  |  |  |  |
| Quantity | 2 (green, red) |  |  |  |  |
| Type | RAFIX 22 FS+, 1.30.270.021/2500 (green), 1.30.270.021/2300 (red) |  |  |  |  |
| Contact element | Momentary |  |  |  |  |
| Selector switch |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | RAFIX 22 FS+, 1.30.272.102/2200 |  |  |  |  |
| Contact element | Maintained |  |  |  |  |
| Key switch |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | RAFIX 22 FS 1.30.255.222/0000 |  |  |  |  |
| Contact element | Maintained |  |  |  |  |


| Order number | 5ACCKP01.156B-000 | 5ACCKP01.185B-000 | 5ACCKP01.215C-000 | 5ACCKP01.2151-000 | 5ACCKP01.240C-000 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Emergency stop |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | RAFIX 22 FS+, Plus 1, 1.30.273.512/0300 |  |  |  |  |
| Contact element | Maintained |  |  |  |  |
| Operating conditions |  |  |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |  |  |
| Mechanical properties |  |  |  |  |  |
| Material | Steel sheet |  |  |  |  |
| Weight | 800 g | 900 g | 1000 g | 700 g | 1100 g |

### 4.2.8.2.4 USB interface

The expansion unit is equipped with a USB 2.0 interface. This is equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

The USB interface is internally connected to the system via USB 2.0 and available to the user for service purposes.

| Standard Front USB of the expansion unit ${ }^{1 \text { 1 }}$ |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Standard | USB 2.0 |  |  |  |  |  |  |
| Variant | Type A, female |  |  |  |  |  |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |  |  |  |  |  |
|  | Full speed (12 Mbit/s) |  |  |  |  |  |  |
|  | High speed (480 Mbit/s) ${ }^{2}$ ) |  |  |  |  |  |  |
| Current-carrying capacity ${ }^{3}$ | Max. 0.5 A |  |  |  |  |  |  |
| Cable length    <br> USB 2.0   $<3 \mathrm{~m}$ (without hub) <br>     |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

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 SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ ) In SDL4 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
3) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A ).

### 4.2.8.3 5АССКР03.xxxx-000

### 4.2.8.3.1 General information

5ACCKP03.xxxx-000 expansion units are equipped with various operating elements as well as interfaces (e.g. USB, RFID). They can be installed in Automation Panel 5230.

- Expansion units
- Front USB interface
- Green and red pushbuttons
- Selector switch
- Key switch
- Emergency stop
- RFID read/write unit


### 4.2.8.3.2 Order data

| Order number | Short description | Figure |  |
| :---: | :---: | :---: | :---: |
|  | Expansion units |  |  |
| 5ACCKP03.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - $2 x$ pushbutton (red and green) - 1 x selector switch -1 x key switch -1 x front USB interface - For panel 5AP5230.185B/185C-000 |  | 90〇 (1) |
| 5ACCKP03.215C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - $1 x$ emergency stop $-2 x$ pushbutton (red and green) - 1 x selector switch -1 x key switch -1 x front USB interface - For panel 5AP5230.215C-000 |  |  |
| 5ACCKP03.240C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop $-2 x$ pushbutton (red and green) - 1 x selector switch -1 x key switch -1 x front USB interface - For panel 5AP5230.240C-000 |  |  |

### 4.2.8.3.3 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 | 5ACCKP03.185B-000 | 5ACCKP03.215C-000 | 5ACCKP03.240C-000 |
| :---: | :---: | :---: | :---: |
| General information |  |  |  |
| Certifications |  |  |  |
| CE | Yes |  |  |
| UL | cULus E115267 Industrial control equipment |  |  |
| FCC | Contains FCC ID: 2ADFV-RFM-2-NF |  |  |
| IC | Contains IC: 12444A-RFM2NF |  |  |
| Interfaces |  |  |  |
| USB |  |  |  |
| Quantity | 1 |  |  |
| Type | USB 2.0 |  |  |
| Variant | Type A |  |  |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s) |  |  |
| Current-carrying capacity | 500 mA |  |  |
| RFID read/write transponder unit |  |  |  |
| Variant | RFM-2-NF |  |  |
| Type | ELATEC TWN4 MultiTech Nano |  |  |
| Frequency | Short range device (SRD) 13.56 MHz |  |  |
| Output power | Max. $8.13 \mathrm{~dB} \mu \mathrm{~A} / \mathrm{m}$ @10 m |  |  |
| Standard | ISO14443A/B, ISO15693, ISO18092 / ECMA-340 (NFC) |  |  |
| Read/Write range in air | Up to 2 cm (depends on transponder) |  |  |
| Features |  |  |  |
| Pushbuttons |  |  |  |
| Quantity | 2 (green, red) |  |  |
| Type | RAFIX 22 FS+, 1.30.270.021/2500 (green), 1.30.270.021/2300 (red) |  |  |
| Contact element | Momentary |  |  |
| Selector switch |  |  |  |
| Quantity | 1 |  |  |
| Type | RAFIX 22 FS+, 1.30.272.102/2200 |  |  |
| Contact element | Maintained |  |  |


| Order number | 5ACCKP03.185B-000 | 5ACCKP03.215C-000 | 5ACCKP03.240C-000 |
| :---: | :---: | :---: | :---: |
| Key switch |  |  |  |
| Quantity | 1 |  |  |
| Type | RAFIX 22 FS 1.30.255.222/0000 |  |  |
| Contact element | Maintained |  |  |
| Emergency stop |  |  |  |
| Quantity | 1 |  |  |
| Type | RAFIX 22 FS+, Plus 1, 1.30.273.512/0300 |  |  |
| Contact element | Maintained |  |  |
| Operating conditions |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |
| Mechanical properties |  |  |  |
| Material | Steel sheet |  |  |
| Weight | 900 g | 1000 g | 1100 g |

### 4.2.8.3.4 B\&R wireless assembly

B\&R wireless assembly RFM-2-NF of 5ACCKP03.xxxx-000 or 5ACCK05.xxxx-000 expansion units consists of the following wireless module:

- SRD (RFID/NFC) module TWN4 MultiTech Nano from Elatec with circuit board antenna from B\&R.

The B\&R wireless assembly must be connected internally to the system using the USB 2.0 cable.

### 4.2.8.3.4.1 Drivers, software and documentation

Drivers, software tools and documentation for approved operating systems are available for download in the Downloads section of the B\&R website (www.br-automation.com). The software packages for the TWN4 MultiTech Nano with the TWN4 Simple Protocol must be used.

### 4.2.8.3.5 USB interface

The expansion unit is equipped with a USB 2.0 interface. This is equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

The USB interface is internally connected to the system via USB 2.0 and available to the user for service purposes.

| Front USB of the expansion unit ${ }^{1 \text { ) }}$ |  |  |
| :---: | :---: | :---: |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed (480 Mbit/s) ${ }^{2}$ ) |  |
| Current-carrying capacity ${ }^{3}$ | Max. 0.5 A |  |
| Cable length |  |  |
| USB 2.0 | $<3 \mathrm{~m}$ (without hub) |  |
|  |  |  |

[^14]
## Technical data

### 4.2.8.4 5АССКР04.xxxx-000

### 4.2.8.4.1 General information

5ACCKP04.xxxx-000 expansion units are equipped with various operating elements as well as an interface (e.g. USB). They can be installed in Automation Panel 5230.

- Expansion units
- Front USB interface
- Blue, green and red pushbuttons
- Key switch
- Emergency stop


### 4.2.8.4.2 Order data



### 4.2.8.4.3 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 | 5ACCKP04.156B-000 | 5ACCKP04.185B-000 | 5ACCKP04.215C-000 | 5ACCKP04.2151-000 | 5ACCKP04.240C-000 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| General information |  |  |  |  |  |
| Certifications |  |  |  |  |  |
| CE | Yes |  |  |  |  |
| UL | cULus E115267 Industrial control equipment |  |  |  |  |
| EAC | Product family certification |  |  |  |  |
| Interfaces |  |  |  |  |  |
| USB |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | USB 2.0 |  |  |  |  |
| Variant | Type A |  |  |  |  |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s) |  |  |  |  |
| Current-carrying capacity | 500 mA |  |  |  |  |
| Features |  |  |  |  |  |
| Pushbuttons |  |  |  |  |  |
| Quantity | 3 (blue, green, red) |  |  |  |  |
| Type | RAFIX 22 FS+, 1.30.270.021/2600 (blue), 1.30.270.021/2500 (green), 1.30.270.021/2300 (red) |  |  |  |  |
| Contact element | Momentary |  |  |  |  |
| Key switch |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | RAFIX 22 FS 1.30.255.222/0000 |  |  |  |  |
| Contact element | Maintained |  |  |  |  |
| Emergency stop |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |
| Type | RAFIX 22 FS+, Plus 1, 1.30.273.512/0300 |  |  |  |  |
| Contact element | Maintained |  |  |  |  |
| Operating conditions |  |  |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |  |  |
| Mechanical properties |  |  |  |  |  |
| Material | Steel sheet |  |  |  |  |
| Weight | 800 g | 900 g | 1000 g | 700 g | 1100 g |

### 4.2.8.4.4 USB interface

The expansion unit is equipped with a USB 2.0 interface. This is equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

The USB interface is internally connected to the system via USB 2.0 and available to the user for service purposes.

| Front USB of the expansion unit ${ }^{1)}$ |  |  |
| :---: | :---: | :---: |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed (480 Mbit/s) ${ }^{\text {2 }}$ |  |
| Current-carrying capacity ${ }^{3}$ | Max. 0.5 A |  |
| Cable length |  |  |
| USB 2.0 | <3 m (without hub) |  |
|  |  |  |

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 SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ ) In SDL4 operation: Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
3) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A).

## Technical data

### 4.2.8.5 5АССКР05.xxxx-000

### 4.2.8.5.1 General information

5ACCKP05.xxxx-000 expansion units are equipped with various operating elements as well as interfaces (e.g. USB, RFID). They can be installed in Automation Panel 5230.

- Expansion units
- Front USB interface
- Blue, green and red pushbuttons
- Key switch
- Emergency stop
- RFID read/write unit


### 4.2.8.5.2 Order data

| Order number | Short description | Figure |  |
| :---: | :---: | :---: | :---: |
|  | Expansion units | () $(6)$ |  |
| 5ACCKP05.185B-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - $1 x$ emergency stop $-3 x$ pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.185B/185C-000 |  |  |
| 5ACCKP05.215C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - $1 x$ emergency stop $-3 x$ pushbutton (red, green, blue) - 1 x key switch - 1x front USB interface - For panel 5AP5230.215C-000 |  |  |
| 5ACCKP05.240C-000 | AP5000 swing arm expansion option - Expansion unit - 1x RFID read/write unit - 1x emergency stop - $3 x$ pushbutton (red, green, blue) - 1x key switch - 1x front USB interface - For panel 5AP5230.240C-000 |  |  |

### 4.2.8.5.3 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 | 5ACCKP05.185B-000 | 5ACCKP05.215C-000 | 5ACCKP05.240C-000 |
| :---: | :---: | :---: | :---: |
| General information |  |  |  |
| Certifications |  |  |  |
| CE | Yes |  |  |
| UL | cULus E115267 <br> Industrial control equipment |  |  |
| FCC | Contains FCC ID: 2ADFV-RFM-2-NF |  |  |
| IC | Contains IC: 12444A-RFM2NF |  |  |
| Interfaces |  |  |  |
| USB |  |  |  |
| Quantity | 1 |  |  |
| Type | USB 2.0 |  |  |
| Variant | Type A |  |  |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s) |  |  |
| Current-carrying capacity | 500 mA |  |  |
| RFID read/write transponder unit |  |  |  |
| Variant | RFM-2-NF |  |  |
| Type | ELATEC TWN4 MultiTech Nano |  |  |
| Frequency | Short range device (SRD) 13.56 MHz |  |  |
| Output power | Max. $8.13 \mathrm{~dB} \mu \mathrm{~A} / \mathrm{m}$ @ 10 m |  |  |
| Standard | ISO14443A/B, ISO15693, ISO18092 / ECMA-340 (NFC) |  |  |
| Read/Write range in air | Up to 2 cm (depends on transponder) |  |  |
| Features |  |  |  |
| Pushbuttons |  |  |  |
| Quantity | 3 (blue, green, red) |  |  |
| Type | RAFIX 22 FS+, 1.30.270.021/2600 (blue), 1.30.270.021/2500 (green), 1.30.270.021/2300 (red) |  |  |
| Contact element | Momentary |  |  |
| Key switch |  |  |  |
| Quantity | 1 |  |  |
| Type | RAFIX 22 FS 1.30.255.222/0000 |  |  |
| Contact element | Maintained |  |  |


| Order number | 5ACCKP05.185B-000 | 5ACCKP05.215C-000 | 5ACCKP05.240C-000 |
| :---: | :---: | :---: | :---: |
| Emergency stop |  |  |  |
| Quantity | 1 |  |  |
| Type | RAFIX 22 FS+, Plus 1, 1.30.273.512/0300 |  |  |
| Contact element | Maintained |  |  |
| Operating conditions |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |
| Mechanical properties |  |  |  |
| Material | Steel sheet |  |  |
| Weight | 900 g | 1000 g | 1100 g |

### 4.2.8.5.4 B\&R wireless assembly

B\&R wireless assembly RFM-2-NF of 5ACCKP03.xxxx-000 or 5ACCK05.xxxx-000 expansion units consists of the following wireless module:

- SRD (RFID/NFC) module TWN4 MultiTech Nano from Elatec with circuit board antenna from B\&R.

The B\&R wireless assembly must be connected internally to the system using the USB 2.0 cable.

### 4.2.8.5.4.1 Drivers, software and documentation

Drivers, software tools and documentation for approved operating systems are available for download in the Downloads section of the B\&R website (www.br-automation.com). The software packages for the TWN4 MultiTech Nano with the TWN4 Simple Protocol must be used.

### 4.2.8.5.5 USB interface

The expansion unit is equipped with a USB 2.0 interface. This is equipped with a protective cover.

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## 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.

The USB interface is internally connected to the system via USB 2.0 and available to the user for service purposes.

| Front USB of the expansion unit ${ }^{11}$ |  |  |
| :---: | :---: | :---: |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed (480 Mbit/s) ${ }^{2}$ ) |  |
| Current-carrying capacity ${ }^{3}$ ) | Max. 0.5 A |  |
| Cable length |  |  |
| USB 2.0 | <3 m (without hub) |  |
|  |  |  |

[^15]
### 4.2.8.6 5ACCKPSx.xxxx-xxx

Safe variants of expansion units are also available. For details, see www.br-automation.com.

### 4.2.9 Handles

### 4.2.9.1 5ACCHDOx.xxxx-000

### 4.2.9.1.1 General information

Handles can be installed on the side of the panel to improve its ergonomic properties and ease of use.
Handles are not factory-installed and must be mounted after delivery. For information about installation, see section "Installing the handles" on page 190.

### 4.2.9.1.2 Order data



### 4.2.9.1.3 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.

5ACCHD00.xxxx-000

| Order number | $\begin{gathered} \text { 5ACCHDOO. } \\ 1505-000 \\ \hline \end{gathered}$ | $\begin{gathered} \text { 5ACCHD00. } \\ \text { 156B-000 } \end{gathered}$ | $\begin{gathered} \text { 5ACCHD00. } \\ \text { 185B-000 } \end{gathered}$ | $\begin{gathered} \text { 5ACCHDOO. } \\ \text { 1906-000 } \\ \hline \end{gathered}$ | $\begin{gathered} \text { 5ACCHDOO. } \\ 215 \mathrm{C}-000 \\ \hline \end{gathered}$ | $\begin{aligned} & \text { 5ACCHD00. } \\ & 240 \mathrm{C}-000 \\ & \hline \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| General information |  |  |  |  |  |  |
| Certifications |  |  |  |  |  |  |
| CE | Yes |  |  |  |  |  |
| UL | cULus E115267 <br> Industrial control equipment |  |  |  |  |  |
| EAC | Product family certification |  |  |  |  |  |
| Operating conditions |  |  |  |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |  |  |  |
| Mechanical properties |  |  |  |  |  |  |
| Material | Aluminum, coated |  |  |  |  |  |
| Coating | White aluminum |  |  |  |  |  |
| Dimensions |  |  |  |  |  |  |
| Height | 299 mm | 269.5 mm | 306 mm | 372 mm | 344 mm | 375 mm |
| Weight | 500 g | 300 g | 500 g |  | 600 g |  |

## 5ACCHD01.xxxx-000

| Order number | 5ACCHD01.156B-000 | 5ACCHD01.185B-000 | 5ACCHD01.215C-000 | 5ACCHD01.2151-000 | 5ACCHD01.240C-000 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| General information |  |  |  |  |  |
| Certifications |  |  |  |  |  |
| CE | Yes |  |  |  |  |
| UL | cULus E115267 Industrial control equipment |  |  |  |  |
| EAC | Product family certification |  |  |  |  |
| Operating conditions |  |  |  |  |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |  |  |  |  |
| Mechanical properties |  |  |  |  |  |
| Material | Aluminum, coated | Coated aluminum | Aluminum, coated |  |  |
| Coating | White aluminum |  |  |  |  |
| Dimensions |  |  |  |  |  |
| Height | 349 mm | 385.5 mm | 423.5 mm | 632 mm | 454.5 mm |
| Weight | 600 g | 700 g |  | 1000 g | 800 g |

### 4.2.9.1.4 Content of delivery

- $2 x$ handles
- $4 x$ Torx screws (T20)


## 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 12 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. Builtin 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 263.

## 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 plate 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.
- Observer 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 and ambient conditions must be taken into account - see "Environmental properties" on page 38.


## General installation instructions

- The device must be installed in such a way that it can be optimally viewed by the user.
- The device must be installed in such a way that reflections on the screen are avoided as far as possible.
- When connecting installed or connected peripherals, follow the instructions in the peripheral device's documentation.


## Information about leak tightness

## Warning!

Failure to follow instructions can result in damage to property.

- The gasket must be inspected before installation or reinstallation and at regular intervals according to the requirements of the operating environment.
- Replace the entire device if inspection reveals visible scratches, cracks, dirt deposits or excessive wear.
- Do not stretch the gasket unnecessarily.
- It is important to ensure that the gasket is correctly seated all around.
- The housing components must be secured using the specified tightening torque.


## 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 Panel PC 2200 - Installation

The Panel PC is installed on a swing arm system using a rotary flange.

### 5.1.1.1 Installation with flange

## Information:

Before installing the Panel PC on a swing arm system, it must be checked as to whether the sealing ring is installed on the flange. In addition, only the flange must be installed on the Panel PC. For the defined procedure, see section "Installing the 5ACCFL00.0000-000 rotary flange" on page 175.

An outer diameter of 47.5 to 48.4 mm is permitted for the swing arm shaft. The end of the swing arm shaft installed on the flange must be chamfered at a $45^{\circ}$ angle and deburred.

1. The sealing ring must be placed in the groove of the compression ring.

Slide the rotary swivel and compression ring onto the swing arm shaft and secure them using the 3 M6 headless screws (hex recess, size 3) (tightening torque 5 Nm ). The rings must be installed such that the rotary swivel (with catch) is connected to the flange first. The orientation of the rotary swivel should be taken into account. The distance from the bottom edge of the swing arm shaft and the bottom edge of the rotary swivel must be $21.5 \mathrm{~mm} \pm 0.5 \mathrm{~mm}$ (corresponds to a distance of $19 \mathrm{~mm} \pm 0.5 \mathrm{~mm}$ from the bottom edge of the swing arm shaft to the ring catch). Spacing between the two rings is not permitted.


## Warning!

The headless screws are equipped with a special screw locking mechanism and only designed to be used once. New headless screws must be used if removing and reinstalling.

## Warning!

The distance between the bottom edge of the swing arm shaft and the bottom edge of the rotary swivel must be $21.5 \mathrm{~mm} \pm 0.5 \mathrm{~mm}$. If this measurement is not observed, then the Panel PC will not be sufficiently stable.
2. Feed the necessary cables through the swing arm shaft.

3. Connect the Panel PC to the swing arm system. The rings must be installed in such a way that the ring catch of the rotary swivel points forward towards the panel. The Panel PC has been installed correctly if the upper ring is flush with the flange. Fasten the assembly to the swing arm shaft using the 3 M 6 headless screws (hex recess, size 3 ) with a tightening torque of 5 Nm .

Installation on a swing arm system is possible from the top or bottom depending on how the mounting unit is installed on the panel and the resulting position of the flange output.

## Caution!

After setting the rotation and/or tilt angle, the corresponding locking lever must be locked into position. For the maximum tightening torques, see the description of the flange used.
The screw in the locking lever is not permitted to be tightened. Fixing must be carried out exclusively with the locking lever.


### 5.1.2 Removing the mounting unit cover

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Remove the Torx screws (T25) indicated in the following figure. Insert a flat-blade screwdriver into the slot from the side and remove the cover. Avoid causing irreparable damage to the gasket.

4. Replace the mounting unit cover with the 4 Torx screws removed earlier (tightening torque of the M5x12 screws: 2.5 Nm , for the M5x40 screws: 4.0 Nm ). The cover must be installed correctly to ensure IP65 protection.

### 5.1.3 Disassembling the heat pipe

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Remove the mounting unit cover, see "Removing the mounting unit cover" on page 171.
4. Disconnect all connected cables.
5. Disconnect the Panel PC from the swing arm system by following the steps provided in section "Panel PC 2200 - Installation" on page 169 in reverse order.
6. Remove the Torx screws (T20) indicated in the following figure.

7. Heat pipe .0002-000 or 5ACCHP00.0003-000 can be removed.
8. The heat pipe is installed by performing these steps in reverse order. The max. tightening torque of the Torx screws (T20) is 1.24 Nm .
9. Replace the mounting unit cover with the 4 Torx screws (T25) removed earlier (tightening torque of the M5x12 screws: 3.5 Nm , for the M5x40 screws: 9.75 Nm ). The mounting unit cover must be installed correctly to ensure IP65 protection.

### 5.1.4 Disassembling the system unit

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Remove the Torx screws (T25) indicated in the following figure. Insert a flat-blade screwdriver into the slot from the side and remove the cover. Avoid causing irreparable damage to the gasket.

4. Disconnect all connected cables.
5. Disconnect the Panel PC from the swing arm system by performing the steps provided in section "Panel PC 2200 - Installation" on page 169 in reverse order.
6. Place the Panel PC on a clean, flat surface.

The following steps can only be performed after the heat pipe has been removed as described in section "Disassembling the heat pipe" on page 172.
7. Remove the Torx screws (T10) indicated in the following figure.

8. Pull firmly and evenly to remove the system unit.

9. The system unit can be reinstalled in reverse order. The max. tightening torque of the Torx screws (T10) is 0.5 Nm .
10.Replace the mounting unit cover with the 4 Torx screws removed earlier (tightening torque of the M5x12 screws: 3.5 Nm , for the M5x40 screws: 9.75 Nm ). The cover must be installed correctly to ensure IP65 protection.

### 5.1.5 Installing accessories

### 5.1.5.1 Installing the 5ACCFL00.0000-000 rotary flange

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. Remove the Torx screws (T25) indicated in the following figure. Insert a flat-blade screwdriver into the slot from the side and remove the cover. Avoid causing irreparable damage to the gasket.

5. The heat pipe and system unit must be removed in that order before the rotary flange can be installed. For the defined procedure, see section "Disassembling the system unit" on page 173.
6. Check whether the sealing ring is inserted in the rotary flange. If the sealing ring is not installed in the rotary flange, it must be inserted into the sealing recess.


7. Place the rotary flange in the intended opening on the mounting unit with the locking lever pointing towards the mounting unit. Fasten it to the mounting unit using the 4 provided Torx screws (T30) with a tightening torque of 7.2 Nm .


### 5.1.5.2 Installing the 5ACCFL00.0100-000 swivel-tilt flange

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. Loosen the Torx screws (T25) indicated in the following figure. Insert a flat-blade screwdriver into the slot from the side and remove the cover. Avoid causing irreparable damage to the gasket.


Notice!
Before starting to install the swivel-tilt flange, move it to the zero position!
5. The heat pipe and system unit must be removed in that order before the swivel-tilt flange can be installed. For the defined procedure, see section "Disassembling the system unit" on page 173.
6. Check whether the sealing ring is inserted in the swivel-tilt flange. If the sealing ring is not installed in the swivel-tilt flange, it must be inserted into the sealing recess.

7. Guide the cables to be connected through the swing arm (if this is also newly installed) and the swivel-tilt flange.

## Information:

Due to the geometry of the sealing hose, wider connections such as a DVI connection only fit in one direction through the swivel-tilt flange. It is important to ensure that these are guided through the hose at the appropriate angle.

Failure to do so can result in damage to property.
8. Place the swivel-tilt flange in the provided opening on the mounting unit. The locking lever of the swivel-tilt flange must be installed as shown in the following figure. This makes it possible to operate from the rear. Fasten it to the mounting unit using the 4 provided Torx screws (T30) with a tightening torque of 7.2 Nm .

Note:
It is important to ensure that the cables are not pinched!


## Warning!

The following tightening torques must be observed:

- Tilt flange locking lever: 7 Nm
- Locking lever rotary flange: $5 \mathbf{N m}$

Failure to do so can result in damage to property.

### 5.1.5.3 Removing the swing arm mounting unit

The mounting unit can be rotated $180^{\circ}$, which makes it possible to install on a swing arm system from above or below.

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface
4. Remove the mounting unit cover by following the steps provided in section "Removing the mounting unit cover" on page 171.

The following steps can only be performed after the heat pipe has been removed as described in section "Disassembling the heat pipe" on page 172.
5. Remove the 8 Torx screws used to fasten the mounting unit to the Automation Panel (T25: $2 x \mathrm{M} 5 \times 65,6 \mathrm{x}$ M5x12).

## Warning!

Failure to follow instructions can result in damage to property.

- The gasket must be inspected before installation or reinstallation and at regular intervals according to the requirements of the operating environment.
- Replace the entire device if inspection reveals visible scratches, cracks, dirt deposits or excessive wear.
- Do not stretch the gasket unnecessarily.
- It is important to ensure that the gasket is correctly seated all around.
- The housing components must be secured using the specified tightening torque.



## Warning!

The M5x65 screws are equipped with a special screw locking mechanism and only designed to be used once. New screws must be used if removing and reinstalling.
6. Pull evenly to remove the mounting unit from the panel.


### 5.1.5.4 Installing the swing arm mounting unit

The mounting unit can be rotated $180^{\circ}$, which makes it possible to install on a swing arm system from above or below.

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. Place the mounting unit on the panel. The openings in the mounting unit must be lined up with the mounting pins on the panel.

5. Install the mounting unit on the panel using the 8 provided Torx screws (T25: $2 x \mathrm{M} 5 \mathrm{x} 65,6 \mathrm{x} \mathrm{M} 5 \mathrm{x} 12$ ). The tightening torque for each is 2.5 Nm .

## Warning!

## Failure to follow instructions can result in damage to property.

- The gasket must be inspected before installation or reinstallation and at regular intervals according to the requirements of the operating environment.
- Replace the entire device if inspection reveals visible scratches, cracks, dirt deposits or excessive wear.
- Do not stretch the gasket unnecessarily.
- It is important to ensure that the gasket is correctly seated all around.
- The housing components must be secured using the specified tightening torque.



## Warning!

The M5x65 screws are equipped with a special screw locking mechanism and only designed to be used once. New screws must be used if removing and reinstalling.
6. Install the heat pipe by performing the steps provided in section "Disassembling the heat pipe" on page 172 in reverse order.
7. Install the cover for the mounting unit by performing the steps provided in section "Removing the mounting unit cover" on page 171 in reverse order.

### 5.1.5.5 Removing the VESA mounting unit

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.

The following steps can only be performed after the heat pipe has been removed as described in section "Disassembling the heat pipe" on page 172.
4. Remove the 4 Torx screws (T25: $4 \mathrm{x} \mathrm{M} 5 \times 10$ ) and 2 metal pieces (designed for the cable strain relief clip) used to install the mounting unit on the panel.

5. Pull evenly to remove the mounting unit from the panel.


### 5.1.5.6 Installing the VESA mounting unit

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the on a clean, flat surface.
4. Place the mounting unit on the panel. The openings in the mounting unit must be lined up with the mounting pins on the panel.

5. Install the mounting unit on the panel using the 4 provided Torx screws (T25: $4 \times \mathrm{M} 5 \times 10$ ) and 2 metal pieces (designed for the cable strain relief clip). The tightening torque for each is 3.5 Nm . Follow the order shown in the following figure.

6. Install the heat pipe by performing the steps provided in section "Disassembling the heat pipe" on page 172 in reverse order.
7. 4 Torx screws (T20: $4 \mathrm{x} \mathrm{M} 4 \times 10$ ) and 6 cable ties are supplied for fastening the Panel PC to a VESA bracket. Observer the installation notes from the manufacturer.
5.1.5.7 Uninstalling the IP54 VESA mounting unit

## Notice!

The following note must be observed when using a PPC2200:
The heat pipe can reach an elevated temperature. It is therefore recommended to wait some time after switching off before opening the cover.

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. To uninstall the IP54 VESA mounting unit, perform the installation in reverse order (see "Installing the IP54 VESA mounting unit" on page 186).

### 5.1.5.8 Installing the IP54 VESA mounting unit

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Automation Panel (disconnect the power cable). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the mounting unit frame on the panel. The openings in the frame must be lined up with the mounting pins on the panel.

4. Install the frame on the panel using the 8 provided Torx screws (T25: $8 x \mathrm{M} 5 \times 20$ ). The tightening torque for each is 2.5 Nm .
5. Secure the cable grommets with the flat side facing upwards.

## Notice!

It is important to note that the cables must first be inserted into the grommets before they are pushed into the guide.

Failure to follow this instruction can result in damage to property.

6. If the mounting unit is used in conjunction with a PPC2200, the heat pipe including heat pipe cover must also be installed. The following figure symbolically displays the heat pipe installation.

7. Place the mounting unit cover on the frame.

8. Install the cover using the 8 provided Torx screws (T25: $6 x \mathrm{M} 5 \times 20$ and T20: 2 x M4x12). Tightening torque: 2.5 Nm for M5, 1.24 Nm for M4.

### 5.1.5.9 Installing the USB hub

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Remove the mounting unit cover, see "Removing the mounting unit cover" on page 171.
4. Disconnect all connected cables.
5. Disconnect the Panel PC from the swing arm system by following the steps provided in section "Panel PC 2200 - Installation" on page 169 in reverse order.
6. Place the Panel PC on a clean, flat surface.
7. Place the USB hub on the panel. The screw openings on the hub must be lined up with the openings on the panel.

8. Install the USB hub on the panel using the 2 Torx screws (T10) indicated in the following figure. The tightening torque is 0.55 Nm for each. Connect the upstream cable from the hub to an available USB port on the system unit.

9. The USB hub can be removed by following these steps in reverse order. The max. tightening torque of the Torx screws (T10) is 0.55 Nm .
10. Replace the mounting unit cover with the 4 Torx screws (T25) removed earlier (tightening torque of the M5x12 screws: 3.5 Nm , for the M5x40 screws: 9.75 Nm ). The mounting unit cover must be installed correctly to ensure IP65 protection.

### 5.1.5.10 Installing the handles

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. Remove the top and bottom Torx screws (T20) on the side of the panel.

5. Insert the provided Torx screws (T20) through the handle and tighten with max. tightening torque of 1.24 Nm .


### 5.1.5.11 Removing the expansion unit/cover

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. Remove the back cover of the panel by removing the 14 Torx screws (T20).

5. If an expansion unit is installed, the cables for the circuit board and front USB interface must be disconnected from the panel's circuit board.

6. Remove the 12 nuts (M3) indicated in the following figure and remove the expansion unit / expansion cover from the panel.


## Information about leak tightness

## Warning!

Failure to follow instructions can result in damage to property.

- The gasket must be inspected before installation or reinstallation and at regular intervals according to the requirements of the operating environment.
- Replace the entire device if inspection reveals visible scratches, cracks, dirt deposits or excessive wear.
- Do not stretch the gasket unnecessarily.
- It is important to ensure that the gasket is correctly seated all around.
- The housing components must be secured using the specified tightening torque.


### 5.1.5.12 Installing the expansion unit/cover

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. Insert the front of the expansion unit / expansion cover into the panel. Secure to the back with the 12 nuts (M3). The tightening torque for each is 0.55 Nm .
5. Connect the cables for the circuit board and front USB interface to the terminal strips on the panel's circuit board.



## Warning!

It is important to ensure that cables and wires are not pinched.
6. It is possible to lead any wiring or extensions to the outside through an installed flange via the cable ducts in the panel.

7. If required, wire the operating elements.

For information about wiring operating elements on the expansion unit, see section "Button/Switch interface" on page 60.
For information about wiring or installing operating elements on the expansion cover, see section "Installing operating elements on the expansion cover" on page 195.
8. Install the back cover with the 14 Torx screws (T20). The tightening torque for each is 2.3 Nm .

## Information about leak tightness

## Warning!

## Failure to follow instructions can result in damage to property.

- The gasket must be inspected before installation or reinstallation and at regular intervals according to the requirements of the operating environment.
- Replace the entire device if inspection reveals visible scratches, cracks, dirt deposits or excessive wear.
- Do not stretch the gasket unnecessarily.
- It is important to ensure that the gasket is correctly seated all around.
- The housing components must be secured using the specified tightening torque.


### 5.1.5.13 Installing operating elements on the expansion cover

The following requirements must be met:

- All connected cables must be disconnected.
- The Panel PC must no longer be installed on the VESA or swing arm system.
$B \& R$ recommends the following operating elements for proper installation and operation:
- RAFIX 22 FS series
- RAFIX 22 FS+ series
- SHORTRON series

The corresponding manufacturer specifications must be observed when installing operating elements.

1. Disconnect the power supply cable to the device (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Place the Panel PC on a clean, flat surface.
4. If an expansion unit is installed, it must first be removed. To do so, follow the instructions in section "Removing the expansion unit/cover" on page 191.
5. If an expansion cover is not installed, then one must be installed. To do so, follow the instructions in section "Installing the expansion unit/cover" on page 193.

## Information:

The following steps can only be performed after an expansion cover has been installed in the Automation Panel 5000.
6. Cut through the panel overlay from the inside with a sharp object (e.g. scalpel) along the outer edges of the 3 curved cutout areas.

7. Carefully cut the panel overlay at the notch for the anti-twist lock.
8. Cut through the panel overlay along the outer edges of the middle cutout with a scalpel.
9. Push though the cutout for the operating element with a flat-blade screwdriver.

10. Cut the panel overlay so that it is flush with the edge of the steel plate.
11. Operating elements can now be installed on the expansion cover.

For more information about operating and switching elements, see section "Features" on page 284.

### 5.1.5.14 Replacing colored lenses

1. Place the colored lens on the operating element. Press the notches on the colored lens into the 4 large openings of the pushbutton.
2. If required, the colored lens can be removed using a sharp object.

Refer to the manufacturer guidelines for additional information about installing operating elements.

### 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 $0.75 \mathrm{~mm}^{2}$ to $1.5 \mathrm{~mm}^{2}$ and wire end sleeves.

| Conductors of the power cable | Terminal connection symbol |
| :---: | :---: |
| +24 VDC | + |
| GND | 古 |
| 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 spring clamp terminal (2).


## Installing cage clamp terminal block OTB103.91

Insert a screwdriver into the cage clamp terminals (3) and secure the conductors with wire end sleeves © in the terminal contacts (2) 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 spring 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 current path of low impedance between circuits and ground. It is used to improve immunity to interference, for example, and not as a protective measure. It serves only to divert interference, not to protect against contact with persons.

The device is equipped with the following functional ground connections:

- Functional ground connection of the power supply
- Ground connection

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 $2.5 \mathrm{~mm}^{2}$ 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 $1.5 \mathrm{~mm}^{2}$ per connection is possible.
- Observe the shielding concept of the conductors. All data cables connected to the device must be shielded.

The functional ground on the $B \& R$ device is marked with the following symbol: $\stackrel{1}{\boldsymbol{\wedge}}$


| Legend |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Ground connection $\xlongequal{\circ}$ | 2 | Power supply connection +24 VDC pin 2 | 3 | Central grounding point |
| a | At least $1.5 \mathrm{~mm}^{2}$ | b | At least $2.5 \mathrm{~mm}^{2}$ |  | - |

### 5.3 Connecting cables

## Information:

$B \& R$ generally recommends connecting swing arm devices to the Automation PC via SDL4 instead of SDL. The Cat 6 / Cat 7 cables used with SDL4 are much easier to install and connect.

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 .


1) Bend radius
2) Locating screws

## 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.

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

### 6.2.1 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 167?
- 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).


### 6.2.2 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.

### 6.3 Touch screen calibration

### 6.3.1 Single-touch (analog resistive)

### 6.3.1.1 Windows 10 loT Enterprise

After starting Windows 10 loT Enterprise on a Panel PC for the first time, the appropriate touch screen driver is installed automatically.
On all other devices, the touch screen driver must be subsequently installed to operate the touch screen. The appropriate driver is available for download in the Downloads section of the B\&R website (www.br-automation.com).

### 6.3.2 Multi-touch (projected capacitive - PCT)

### 6.3.2.1 Windows 10 loT Enterprise

Microsoft multi-touch drivers are installed on the device during installation of Windows 10 loT Enterprise. After successful installation, the device is immediately ready for operation.

### 6.4 Display brightness control

1. Open the ADI Control Center in the Control Panel.
2. Select tab "Display".
3. Select a panel from the list. Only the local display (PP Link) and connected panels are displayed in the list.
4. Set the desired brightness using the slider (the figure is symbolic).

## Information:

The changed settings are displayed online but only applied by the system (and used after the next restart) if the ADI Control Center is exited with $O K$.
The configured brightness is independent of the value configured in BIOS Setup, i.e. the value set in BIOS is used until Windows boots. The value set in BIOS is only applied the first time the ADI Control Center is launched.


### 6.5 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.

### 6.5.1 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 43.
A minimum test time of 8 hours is recommended for to optimally determine and assess the temperature situation.

### 6.5.2 Evaluating temperatures in Windows operating systems

### 6.5.2.1 Evaluating with the B\&R 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) at no cost and uses the ADI (Automation Device Interface).


Figure 2: Evaluating with the B\&R Control Center using a PPC2200 without IF options
If historical recording of the data is necessary, a separate application can be created.

## Information:

There are downloads such as the ADI .NET SDK available on the B\&R website (www.br-automation.com) that can be used to create a separate application.

### 6.5.2.2 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.passmark.com.

The following screenshots refer to PassMark BurnInTest Pro V8.1 using a PPC2200 without IF options.


Figure 3: Settings for PassMark BurnInTest Pro V8.1 using a PPC2200 without IF options


Figure 4: Test overview of a PPC2200 without IF options
Depending on the availability of the loopback adapters and DVDs, appropriate fine tuning must be carried out in the respective test properties.

## Information:

If no USB loopback adapters are available, USB flash drives can also be used. The USB flash drives must be available in Windows as formatted drives. Option "USB" must then be deselected in the test configuration, and the USB flash drives must be configured as test devices in the disk properties.


## Information:

Serial loopback adapters can be created relatively easily by yourself. Just connect some pins with wires on the serial interface.


### 6.5.3 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.

### 6.6 Known problems / Characteristics

- If problems occur with the ETH1 or ETH2 interface (connection abort, slow data transfer, etc.), the Ener-gy-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 to these settings should only be made by system experts who are aware of the effects of the modification.

### 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 |  | Enable(d) | Disables/Enables BIOS parameter 1 |
|  |  | Disable(d) |  |
| BIOS parameter 1 value |  | UINT <br> Default: $\mathbf{4 2}$ | Defines the value of BIOS parameter 1 Range: 0 to 65535 <br> Resolution: 3 |
| BIOS parameter 2 |  | - | Displays BIOS parameter 2 |
|  | BIOS parameter 2.1 | a1 | Selects mode of BIOS parameter 2.1 |
|  |  | a2 |  |
|  |  | b |  |
|  | BIOS subpa- | Disable(d) | Disables/Enables BIOS subparameter 2.1 |
|  | $\begin{array}{ll}\begin{array}{l}\text { rameter } \\ \text { value }\end{array} & 2.1 \\ \end{array}$ | Enable(d) |  |
| BIOS parameter $n^{1)}$ |  | Disable(d) | Disables BIOS parameter $n$ or selects option |
|  |  | (Various) ${ }^{2)}$ |  |
| Hardware components |  | Enter | Opens submenu "Hardware components" on |

Table 87: 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 in initialized.

## Boot menu

The following keys are enabled during POST:

| Key | Function |
| :--- | :--- |
| F1 | Help |
| ESC | Exits the help documentation |
| Cursor keys $(\leftarrow, \uparrow, \downarrow, \rightarrow)$ | 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 $(\leftarrow, \uparrow, \downarrow, \rightarrow)$ | Navigation in the menu |
| Page $\uparrow$, Page $\downarrow$ | Press once: Cursor jumps to first/last line in the display area <br> 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 ${ }^{11}$ |
| 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. <br> See "Boot manager" on page 209. |
| Device management | Lists all supported and enabled devices (e.g. Ethernet). <br> See "Device manager" on page 210. |
| Boot from file | Selects a bootable file to boot from. <br> 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. <br> See "Setup utility" on page 211. |

Table 88: 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 | Selects the primary video BIOS |  |
|  |  |  |

### 7.1.6 Setup utility

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

| Submenu | Setting options | Description |
| :--- | :--- | :--- |
| Main | Enter | Opens submenu "Main" on page 212 <br> Basic system information is displayed and the system time can be set here. |
| Advanced | Enter | Opens submenu "Advanced" on page 213 <br> Changes to system settings can be made here. |
| Security | Enter | Opens submenu "Security" on page 223 <br> Changes to the Trusted Platform Module can be made here. <br> Passwords for storage media can be created and managed here. |
| Power | Enter | Opens submenu "Power" on page 224 <br> Changes that affect the power consumption of the system can be made here. |
| Boot | Enter | Opens submenu "Boot" on page 226 <br> Changes to the boot modes and boot sequence can be made here. |
| Exit | Onter <br> Chans submenu "Exit" on page 229 can be discarded or saved here. <br> Chand loaded here or system-optimized default <br> User-spes default values can be saved and loa can be restored. |  |

Table 89: 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 | Displays the copyright disclaimer |  |  |

Table 90: Main

### 7.1.6.2 Advanced



| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| OEM features | Enter | Opens submenu "OEM features" on page 214 |
| Graphics configuration | Enter | Opens submenu "Graphics configuration" on page 218 |
| IO configuration | Enter | Opens submenu "IO configuration" on page 219 |
| Security configuration | Enter | Opens submenu "Security configuration" on page 222 |
| ACPI settings | Enter | Opens submenu "ACPI settings" on page 222 |

Table 91: 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 | Disabled | Disables/Enables the real-time environment This must be enabled for real-time operating systems such as Automation Runtime. |
|  | Enabled |  |
| Hypervisor environment | Disabled | Disables/Enables the hypervisor environment <br> Enabling is necessary for hypervisor operation. <br> Parameters "VT-d" and "Intel Virtualization Technology" on page 224 are enabled and cannot be changed during hypervisor operation. |
|  | Enabled |  |
| Automatic firmware update | Disabled | Disables/Enables automatic firmware updates for the mainboard, SDL and SDL4 cards |
|  | Enabled |  |
| Super IO | Enter | Opens submenu "Super IO" on page 214 |
| H2OUVE | Enter | Opens submenu "H2OUVE" on page 215 |
| Baseboard | Enter | Opens submenu "Baseboard" on page 215 |
| Interface slot $\boldsymbol{n}^{122)}$ | Enter | Opens submenu "Interface slot n " on page 216 |
| Panel settings | Enter | Opens submenu "Panel settings" on page 216 |
| SSD monitoring service | Enter | Opens submenu "SSD monitoring services" on page 216 |
| Custom boot logo | Enter | Opens submenu "Custom boot logo" on page 217 |

Table 92: 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 | Disables/Enables COM A (IF option 1) |
|  | Enable |  |
| Base I/O address | 0x2E8 | Selects the I/O address for COM A |
|  | 0x2F8 |  |
|  | 0x338 |  |
|  | 0x378 |  |
|  | 0x3E8 |  |
|  | 0x3F8 |  |

Table 93: Advanced - OEM features - Super IO


Table 93: Advanced - OEM features - Super IO

### 7.1.6.2.1.2 H2OUVE

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| H2OUVE support | Disabled | Disables/Enables H2OUVE support |
|  | Enabled |  |

Table 94: 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 ${ }^{1}$ ) | - | 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 95: Advanced - OEM features - Baseboard

## Software

| BIOS parameter | Setting options | Description |
| :--- | :---: | :--- |
| Battery state | - | Displays the battery state |
| Temperature 1 | - | Displays the current temperature at sensor $1\left[^{\circ} \mathrm{C}\right.$ and $\left.{ }^{\circ} \mathrm{F}\right]$ |
| Temperature 2 | - | Displays the current temperature at sensor $2\left[{ }^{\circ} \mathrm{C}\right.$ and $\left.{ }^{\circ} \mathrm{F}\right]$ |
| Temperature 3 | - | Displays the current temperature at sensor $3\left[{ }^{\circ} \mathrm{C}\right.$ and $\left.{ }^{\circ} \mathrm{F}\right]$ |

Table 95: Advanced - OEM features - Baseboard

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

### 7.1.6.2.1.4 Interface slot $\boldsymbol{n}$

A total of 1 interface option slots is available.

| BIOS parameter | Setting options | Description |
| :--- | :---: | :--- |
| Product name | - | Displays the B\&R order number of IF option $n$ |
| Serial number | - | Displays the B\&R serial number of IF option $n$ |
| Device ID | - | Displays the device ID of IF option $n$ |
| Vendor ID | - | Displays the vendor ID of IF option $n$ |
| Compatibility ID | - | Displays the compatibility ID of IF option $n$ |
| HW revision | - | Displays the hardware revision of IF option $n$ |
| FW version | - | Displays the firmware version of IF option $n$ |
| Parent device ID | - | Displays the parent device ID of IF option $n$ |
| Parent comp. ID | - | Displays the parent compatibility ID of IF option $n$ |
| Power on cycles ${ }^{1)}$ | - | Displays the power-on cycles of IF option $n$ |
| Power on hours | - | Displays the operating time [h] of IF option $n$ |
| Temperature $q^{2)}$ | - | Displays the temperature at sensor $q\left[{ }^{\circ} \mathrm{C}\right.$ and $\left.{ }^{\circ} \mathrm{F}\right]$ |

Table 96: Advanced - OEM features - Interface slot $n$

1) Each start/restart increases the value by 1 .
2) 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 $\boldsymbol{n}$ | Enter | Opens menu "Panel n" on page 216 |

Table 97: Advanced - OEM features - Panel settings

## Panel n

The panel of the Panel PC is indexed as panel 15.

| 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 ${ }^{1)}$ | - | 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 ${ }^{2)}$ | Displays the power-on cycles of the panel |  |
| Power on hours | - | Displays the operating time [h] of the panel |
| Brightness | Screen brightness of the panel [\%] <br> Range: 0 to 100 <br> Resolution: $1 \%$ |  |

Table 98: 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 | - | Displays the name of the CFast card |
| Product name | - | Displays the manufacturer serial number of the CFast card |
| Serial number | - | Displays the firmware version of the CFast card |
| Firmware version | - | Displays the S.M.A.R.T. status of the CFast card |
| SMART $^{11}$ status | - | Displays the WAF of the CFast card |
| WAF $^{2)}$ | - | Displays the average number of erase operations on a block of the CFast card |
| Average erase count $^{l\|l\|}$ |  |  |

Table 99: Advanced - OEM features - SSD monitoring service

| BIOS parameter | Setting options | Description |
| :--- | :---: | :--- |
| 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 used (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 manu- <br> facturer documentation. <br> Ox00 signalizes operation without critical error. |  |

Table 99: 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 <br> A JPG graphic with a maximum size of 40 kB and filename "XPCLGO" must be used. <br> The target file for the boot logo must be stored in folder "XPCLGO" in the root directory <br> of the target media ( ./XPCLGO/XPCLGO.jpg ). |
| Delete custom boot logo | Deletes customized boot logos ${ }^{1)}$ |  |

Table 100: 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 | Disabled | Disables/Enables backup of BIOS settings during the next reboot <br> Folder "XPCSET" (./XPCSET) must exist in the root directory of the target medium as <br> the target for the backup. |
|  | Enabled | Disables/Enables restoring BIOS settings from a backup during the next reboot <br> The backup file must be stored in folder "XPCSET" (./XPCSET/) in the root directory of <br> the target medium. |
|  | Disabled | Enabled |

Table 101: Advanced - OEM features - Backup settings

## Software

### 7.1.6.2.2 Graphics configuration

| BIOS parameter | Setting options | Description |
| :---: | :---: | :---: |
| Rotate screen | Disabled | Disables or selects rotation of the screen content Rotation takes place clockwise. |
|  | $90^{\circ}$ clockwise |  |
|  | $270^{\circ}$ clockwise |  |
| Integrated graphics device | Disabled | Disables/Enables the integrated graphics device (IGD or GPU) |
|  | Enabled |  |
| RC6 (render standby) | Disabled | Disable/Enables RC6 (render standby) Permits the GPU to go into standby. |
|  | Enabled |  |
| GTT ${ }^{11}$ ) size | 2 MB | Selects the GTT size [MB] |
|  | 4 MB |  |
|  | 8 MB |  |
| Aperture size | 256 MB | Selects reserved RAM [MB] <br> If the graphics memory is full, the defined amount of memory is made available. |
| DVMT ${ }^{2}$ ) total Gfx mem | 128M | Selects the memory size [MB] that can be used by the IGD. MAX uses the entire available main memory. |
|  | 256M |  |
|  | MAX |  |
| GT PM support | Disabled | Disables/Enable GT PM support |
|  | Enabled |  |
| PAVP enable | Disabled | Disables/Enables "Force protected audio video path" |
|  | Enabled |  |
| Panel scaling | Auto | Selects automatic, centered or stretched panel scaling |
|  | Centering |  |
|  | Stretching |  |

Table 102: 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 219 |
| SATA configuration | Enter | Opens submenu "SATA configuration" on page 220 |
| USB configuration | Enter | Opens submenu "USB configuration" on page 221 |
| Miscellaneous configuration | Enter | Opens submenu "Miscellaneous configuration" on page 221 |

Table 103: Advanced - IO configuration

### 7.1.6.2.3.1 PCI Express configuration

| BIOS parameter | Setting options | Description |
| :---: | :---: | :---: |
| PCI Express clock gating | Disabled | Disables/Enables PCI Express clock gating for root ports |
|  | Enabled |  |
| Port8xh decode | Disabled | Disables/Enables Port8xh decoding |
|  | Enabled |  |
| Peer memory write enable | Disabled | Disables/Enables peer memory write enable |
|  | Enabled |  |
| Compliance mode | Disabled | Disables/Enables compliance mode |
|  | Enabled |  |
| PCI Express root port 2 (IF1) | Enter | Opens submenu "PCI Express root port n" on page 2191) |
| PCI Express root port 3 (ETH1) | Enter |  |
| PCI Express root port 4 (ETH2) | Enter |  |
| PCI Express root port 5 (IF1) | Enter |  |

Table 104: 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 parame |  | Setting options | Description |  |
| :---: | :---: | :---: | :---: | :---: |
| PCI Express root port $n^{1)}$ |  | Auto | Disables/Enables PCI Express root port $n$ manually or automatically In mode "Auto", unallocated interfaces are automatically disabled and allocated interfaces are enabled. |  |
|  |  | Disabled |  |  |
|  |  | Enabled |  |  |
| ASPM |  | Auto | Selects PCle Active State Power Management manually/automatically or disables it |  |
|  |  | Disabled |  |  |
|  |  | LOsL1 |  |  |
|  |  | LOs |  |  |
|  |  | L1 |  |  |
| L1 substates |  | Disabled | Selects or disables L1 substates |  |
|  |  | L1.1 |  |  |
|  |  | L1.2 |  |  |
|  |  | L1.1 \& L1.2 |  |  |
| ACS |  | Disabled | Disables/Enables access control services extended capabilities |  |
|  |  | Enabled |  |  |
| URR |  | Disabled | Disables/Enables unsupported request reporting Notification of unsupported requests |  |
|  |  | Enabled |  |  |
| FER |  | Disabled | Disables/Enables fatal error reporting Notification of fatal errors ${ }^{2}$ |  |
|  |  | Enabled |  |  |
| NFER |  | Disabled | Disables/Enables non-fatal error reporting Notification of non-fatal errors ${ }^{2}$ ) |  |
|  |  | Enabled |  |  |
|  | CER | Disabled | Disable/Enable correctable error reporting Notification of correctable errors ${ }^{2}$ |  |
|  |  | Enabled |  |  |
|  | CTO | Disabled | Disables/Enables PCle completion timer timeout |  |
|  |  | Enabled |  |  |
|  | SEFE | Disabled | Disables/Enables system error on fatal error ${ }^{3}$ |  |
|  |  | Enabled |  |  |
|  | SENFE | Disabled | Disables/Enables system error on non-fatal error ${ }^{3}$ |  |
|  |  | Enabled |  |  |
|  | SECE | Disabled | Disables/Enables system error on correctable error |  |
|  |  | Enabled |  |  |
|  | PME SCI | Disabled | Disables/Enables system control interrupt on a power management event |  |
|  |  | Enabled |  |  |
|  | Hot plug | Disabled | Disables/Enables hot plugging |  |
|  |  | Enabled |  |  |
| PCle speed |  | Auto | - | Selects the PCle transfer rate [gigatransfers per second (GT/s)] automatically or manually |
|  |  | Gen1 | Gen1: Max. 2.5 GT/s |  |
|  |  | Gen2 | Gen2: Max. 5.0 GT/s |  |
|  |  | Gen3 | Gen3: Max. 8.0 GT/s |  |
| Transmitter half swing |  | Disabled | Disables/Enables transmitter half-swing Signals are transferred with a half-swing. |  |
|  |  | Enabled |  |  |  |

Table 105: Advanced - PCH-IO configuration - PCI Express root port $n$

| BIOS parame |  |  | Setting options | Description |
| :---: | :---: | :---: | :---: | :---: |
| Extra bus reserved |  |  | INT Default: 0 | Defines the extra bus reserved for bridges after this root bridge Range: 0 to 7 |
| Reserved memory |  |  | INT <br> Default: 10 | Defines reserved memory [MB] for this bridge Range: 0 to 20 |
| Reserved I/O |  |  | INT <br> Default: 4 | Defines the reserved I/O range for this bridge Range: 4 to 20 kB <br> Resolution: 4 kB |
| PCH PCIE LTR |  |  | Disabled | Disables/Enables PCle latency reporting |
|  |  |  | Enabled |  |
|  | Snoop latency override |  | Auto | Disables the snoop latency override or selects manual or automatic mode |
|  |  |  | Disabled |  |
|  |  |  | Manual |  |
|  |  | Snoop latency value | INT <br> Default: 60 | Defines the snoop latency value Range: 0 to 1023 |
|  |  | Snoop latency multiplier | 1 ns | Defines the snoop latency multiplier value [ns] |
|  |  |  | 32 ns |  |
|  |  |  | 1024 ns |  |
|  |  |  | 32768 ns |  |
|  |  |  | 1048576 ns |  |
|  |  |  | 33554432 ns |  |
| Non-snoop latency override |  |  | Auto | Disables the non-snoop latency override or selects manual or automatic mode |
|  |  |  | Disabled |  |
|  |  |  | Manual |  |
|  |  | Non-snoop latency value | INT <br> Default: 60 | 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 |  |
|  |  |  | 1024 ns |  |
|  |  |  | 32768 ns |  |
|  |  |  | 1048576 ns |  |
|  |  |  | 33554432 ns |  |
| PCIE1 LTR lock |  |  | Disabled | Disables/Enables the PCle1 LTR lock function |
|  |  |  | Enabled |  |
| PCle selectable de-emphasis |  |  | Disabled | Disables/Enables PCle selectable de-emphasis |
|  |  |  | Enabled |  |

Table 105: Advanced - PCH-IO configuration - PCI Express root port $n$

1) PCl 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 paramete |  | Setting options | Description |  |
| :---: | :---: | :---: | :---: | :---: |
| Chipset SATA |  | Disabled | Disables/Enables the SATA controller |  |
|  |  | Enabled |  |  |
| SATA interface speed |  | Gen1 | Max. 1.5 Gbit/s | Selects the SATA speed |
|  |  | Gen2 | Max. 3 Gbit/s |  |
|  |  | Gen3 | Max. 6 Gbit/s |  |
| SATA test mode |  | Disabled | Disables/Enables the test function This is only used for control measurements. |  |
|  |  | Enabled |  |  |  |
| Aggressive LPM support |  | Disabled | Disables/Enables Aggressive Link Power Management The host controller can change to a low-power state in the idle phase of the SATA device. |  |
|  |  | Enabled |  |  |  |
|  | SATA port 0 | - | Displays the name and capacity of the SATA device |  |
|  | Software preserve | - | Displays support for the software preserve |  |
| SATA port 0 |  | Disabled | Disables/Enables SATA port 0 |  |
|  |  | Enabled |  |  |  |
| SATA Port 0 hot plug capability |  | Disabled | Disables/Enables hot plugging |  |
|  |  | Enabled |  |  |  |
| SATA port 0 DevSIp |  | Disabled | Disables/Enables device sleep |  |
|  |  | Enabled |  |  |  |
| DITO configuration |  | Disabled | Disables/Enables device sleep idle timeout |  |
|  |  | Enabled |  |  |  |
|  | DITO value | INT <br> Default: $\mathbf{6 2 5}$ | Defines the DITO value [ms] <br> Range: 0 to 1024 |  |
|  | DM value | INT <br> Default: 15 | Defines the DITO multiplier Range: 0 to 15 |  |

Table 106: 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) |
|  |  | Enabled |  |
|  |  | UEFI only |  |
| XHCI disable compliance mode |  | False | Selects XHCI disable compliance mode |
|  |  | True |  |
| USB port disable override |  | Disabled | 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 |
|  |  | Enabled |  |
| USB2 3.0 connector |  | Disabled | Disables/Enables the interface USB2 3.0 connector |
|  |  | Enabled |  |
| USB1 2.0 connector |  | Disabled | Disables/Enables the interface USB1 2.0 connector |
|  |  | Enabled |  |
| USB2 2.0 connector |  | Disabled | Disables/Enables the interface USB2 2.0 connector |
|  |  | Enabled |  |
|  | USB 2.0 USV | Disabled | Disables/Enables the USB 2.0 interface on the UPS |
|  |  | Enabled |  |
|  | USB1 2.0 onboard panel | Disabled | Disables/Enables the USB1 2.0 interface on the onboard panel |
|  |  | Enabled |  |
|  | USB2 2.0 onboard panel | Disabled | Disables/Enables the USB2 2.0 interface on the onboard panel |
|  |  | Enabled |  |
|  | USB 2.0 IF option | Disabled | Disables/Enables the USB 2.0 interface on the IF option |
|  |  | Enabled |  |

Table 107: Advanced - IO configuration - USB configuration

### 7.1.6.2.3.4 Miscellaneous configuration

| BIOS parameter | Setting options | Description |
| :---: | :---: | :---: |
| 8254 clock gating | Disabled | Disables/Enables 8254 clock gating |
|  | Enabled |  |
| State after G3 | S0 state | Selects the state after G3 <br> Defines how to proceed after "mechanical off" (G3). <br> S0/S5 after G3 or restores the state before G3 |
|  | S5 state |  |
|  | Last state |  |
| BIOS lock | Disabled | Disables/Enables the PCH BIOS lock function The BIOS lock function must be enabled for SMM ${ }^{11}$. |
|  | Enabled |  |
| RTC lock | Disabled | Disables/Enables lock bytes 0x38h to 0x3Fh of RTC RAM |
|  | Enabled |  |
| TCO lock | Disabled | Disables/Enables the TCO lock |
|  | Enabled |  |
| Win7 keyboard/mouse support | Disabled | Disables/Enables Windows 7 keyboard/mouse support |
|  | Enabled |  |
| Wake on USB from S5 | Disabled | 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. |
|  | On |  |
| Real time option | RT Disabled | 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 <br> Default: 3 | Defines the shell startup script delay time [s] Range: 0 to 10 |
| Block boot fail pop-up | Disabled | 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 108: Advanced - IO configuration - Miscellaneous configuration

1) System Management Mode

### 7.1.6.2.4 Security configuration

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| TXE ${ }^{11}$ 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 | fTPM | Selects the target TPM device <br> fTPM: Firmware/CPU TPM <br> dTPM: Dedicated/Hardware TPM |
|  | dTPM |  |

Table 109: Advanced - Security configuration

1) Intel Trusted Execution Engine

### 7.1.6.2.5 ACPI settings

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| ACPI settings | Enter | Opens submenu "ACPI settings" on page 222 |
| FACP - RTC S4 wakeup | Disabled | Disables/Enables S4 wakeup via RTC |
|  | Enabled |  |
| APIC $^{1)}$ - IO APIC mode | Disabled | Disables/Enables IO APIC mode |
|  | Enabled |  |

Table 110: 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 | Native operating system PCI Express support |
|  | Enabled |  |
| Native ASPM $^{11}$ | Disables native ASPM (BIOS controls ASPM) or enables it (operating system controls |  |
|  | Enabled | ASPM) |
| Low power S0 idle capability | Disables/Enables low power S0 idle capability |  |
|  | Enabled |  |

Table 111: Advanced - ACPI settings - ACPI settings

[^16]
### 7.1.6.3 Security



| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| Current TPM ${ }^{11}$ 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 | Selects the TrEE protocol version |  |
|  | TPM invisible/visible for the operating system |  |
|  |  |  |
| Clear TPM |  | Starts clearing TPM by enabling it |
|  | Available |  |
| Supervisor password | Disabled | Displays whether a supervisor password has been created |
| Set supervisor password |  | Enabled |

Table 112: Security

[^17]
### 7.1.6.4 Power



| BIOS parameter | Setting options | Description |
| :---: | :---: | :---: |
| CPU configuration | Enter | Opens submenu "CPU configuration" on page 224 |
| Wake on PME | Disabled | Disables/Enables wake on PME |
|  | Enabled |  |
| Wake on RTC from S5 | Disabled | Disables wake from S5, daily, on a certain day of the month, after a certain sleep time or by operating system utility <br> The configuration for By OS Utility must be made in the operating system. |
|  | By every day |  |
|  | By day of month |  |
|  | By sleep time |  |
|  | By OS utility |  |
| Wake on S5 hour | INT | ```Defines the time for wake from S5 By Every Day or By Day of Month [hh:mm:ss] [hh] range: 0 to 23 Range [mm]: 0 to 59 Range [ss]: 0 to 59``` |
| Wake on S5 minute | INT |  |
| Wake on S5 seconds | INT |  |
| Day of month | INT Default: 1 | Defines the time for wake from S5 By Day of Month [d @ hh:mm:ss] Range [d]: 1 to 31 |
| Wake from S5 after (seconds) | INT <br> Default: 5 | Defines the timer for waking from S5 By Sleep Time [s] Range: 5 to 255 |
| USB standby power | - | Displays the USB standby power state |
| Set USB standby power | Disabled | Disables/Enables or does not set USB standby power |
|  | Enabled |  |
| Always-on | - | Displays the always-on state |
| Set always-on | Disabled | Disables/Enables or does not set always-on |
|  | Enabled |  |

Table 113: Power

### 7.1.6.4.1 CPU configuration

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

Table 114: Power-CPU configuration

| BIOS parameter | Setting options | Description |
| :---: | :---: | :---: |
| Thermal monitor | Disabled | Disables/Enables temperature monitoring (DTS) |
|  | Enabled |  |
| Active processor cores | Disabled | Disables/Enables active processor cores If this parameter is disabled, all processor cores are used. Enabling makes it possible to configure individual processor cores. |
|  | Enabled |  |
| Core 0 | - | This processor core must always be active. |
| Core 1 | Disabled | Disables/Enables processor core 1 |
|  | Enabled |  |
| Core 2 | Disabled | Disables/Enables processor core 2 |
|  | Enabled |  |
| Core 3 | Disabled | Disables/Enables processor core 3 |
|  | Enabled |  |
| Intel Hyper-Threading Technology | - | Anzeige ob Hyper-Threading unterstützt wird |
| Monitor Mwait | Auto | Disables/Enables Monitor/Mwait or selects it automatically depending on the operating system and hardware |
|  | Disabled |  |
|  | Enabled |  |
| CPU power management | Enter | Opens submenu "CPU power management" on page 225 |

Table 114: Power - CPU configuration

### 7.1.6.4.1.1 CPU power management



Table 115: Power - CPU configuration - CPU power management

[^18]
### 7.1.6.5 Boot



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

Table 116: Boot

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| Automatic failover | Disabled | Disables/Enables automatic failover |
|  | Enabled |  |
| EFI | Enter | Opens submenu "EFI" on page 227 |
| Legacy | Enter | Opens submenu "Legacy" on page 228 |

Table 116: 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 227 |
| 1st device | CFast | 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 ${ }^{\text {1) }}$ | eMMC | Selects this device as second in the boot sequence |
| 3rd device | USB device | Selects this device as third in the boot sequence |
| 4th Device | Internal EFI shell | Selects this device as fourth in the boot sequence |
| 5th device | ETH1 IPv4 | Selects this device as fifth in the boot sequence |
| 6 th device | ETH1 IPv6 | Selects this device as sixth in the boot sequence |
| 7th device | ETH2 IPv4 | Selects this device as seventh in the boot sequence |
| 8th device | ETH2 IPv6 | Selects this device as eighth in the boot sequence |

Table 117: Boot - EFI

1) Starting with the $2 n d$ device, only the respective default values are specified.

### 7.1.6.5.1.1 EFI

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| EFI | Enter, then: <br> Keyboard: F5/F6 <br> Touch screen: Move items at <br> the gray arrows | Defines the boot sequence |

Table 118: Boot - EFI - EFI

### 7.1.6.5.2 Legacy

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| Normal boot menu | Normal | Selects the boot sequence type |
|  | Advanced | Opens submenu "Boot type order" on page 228 |
| Boot type order | Enter | Onter |
| Other | Enter | Opens submenu ${ }^{1}$ ) |
| Floppy disk | Enter | Onter |
| Hard disk drive | Enter | Opens submenu "Hard disk drive" on page 228 |
| CD/DVD-ROM drive | Enter, then: <br> Keyboard: F5/F6 <br> USB | Touch screen: Move items at <br> the gray arrows |
| Legacy |  |  |

Table 119: 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: <br> Keyboard: F5/F6 <br> Touch screen: Move items at <br> the gray arrows |  |

Table 120: 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 "Hard disk drive" on page 228 |

Table 121: Boot - Legacy - Hard disk drive

## Hard disk drive

| BIOS parameter | Setting options | Description |
| :--- | :--- | :--- |
| Hard disk drive | Enter, then: <br> Keyboard: F5/F6 <br> Touch screen: Move items at <br> the gray arrows | Defines the boot sequence |

Table 122: 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 <br> 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 123: 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).

## 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 $1.10!^{3)}$
- 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 $1.21!^{4)}$


### 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).


[^19]4) Starting from version $1.1 x$, version 1.21 must first be installed before a version $>1.21$ can be installed.

### 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).
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".
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.
$\checkmark$ The upgrade is installed and in effect.

### 7.2.2 Firmware upgrade

A current firmware upgrade can be downloaded directly from the Downloads section of the B\&R website (www.brautomation.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).
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.
$\checkmark$ 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.

### 7.2.2.2 Procedure in the EFI shell

1. Download the ZIP file from the $B \& R$ website (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 upgrade is started.
5. After a successful upgrade, the system must be switched off and on again for the upgrade to take effect.
$\checkmark$ 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 214).
A current firmware upgrade can be downloaded directly from the Downloads section of the B\&R website (www.br-automation.com).

Upgrades are provided as a ZIP file and include a readme file ( $T X T$ 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.


## Information:

The automatic update only takes place if the installed firmware version differs from the upgrade version.
Automatic downgrades are possible!

### 7.3 Multi-touch drivers

Multi-touch panels are approved as human-interface devices (i.e. multi-touch support from the operating system) for the following operating systems:

- Windows 10 IoT Enterprise 2019 LTSC
- Windows 10 loT Enterprise 2016 LTSB
- B\&R Linux 10
- B\&R Linux 9

No guarantee can be given for multi-touch or single-touch operation, compatibility and functionality for operation with other operating systems and/or individual touch screen drivers.

### 7.4 Operating systems

### 7.4.1 Windows 10 IoT Enterprise 2019 LTSC

### 7.4.1.1 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).

### 7.4.1.2 Order data

| Order number | Short description | Figure |
| :--- | :--- | :--- |
|  | Windows 10 IoT Enterprise 2019 LTSC |  |
| 5SWW10.0900-MUL | Windows 10 loT Enterprise 2019 LTSC: - 64-bit - Entry - Multi- <br> lingual - License - Only available with a new device |  |

### 7.4.1.3 Overview

| Order number |  |
| :--- | :--- |
| Operating system |  |
| Target systems | 5SWW10.0900-MUL |
| 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 ${ }^{1)}$ |
| Minimum size of data storage medium | 20 GB ${ }^{2)}$ |

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.

### 7.4.1.4 Features

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

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

### 7.4.1.5 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.

### 7.4.1.6 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). 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.

### 7.4.1.7 Activation

Windows 10 loT 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).

### 7.4.1.8 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.

### 7.4.2 Windows 10 IoT Enterprise 2016 LTSB

### 7.4.2.1 General information

Windows 10 loT 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).

### 7.4.2.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Windows 10 loT Enterprise 2016 LTSB | Windows 10 |
| 5SWW10.0545-MUL | Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2200 (UEFI boot) - CPU E3930/E3940 - License Only available with a new device |  |
| 5SWW10.0559-MUL | Windows 10 loT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2200 (Legacy BIOS boot) - CPU E3930/E3940License - Only available with a new device |  |
|  | Optional accessories |  |
|  | Windows 10 loT Enterprise 2016 LTSB |  |
| 5SWW10.0800-MUL | Windows 10 loT Enterprise 2016 LTSB - 64-bit - Language Pack DVD |  |

### 7.4.2.3 Overview



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.

### 7.4.2.4 Features

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

| Function | Windows $\mathbf{1 0}$ loT Enterprise 2016 LTSB |
| :--- | :---: |
| Range of functions in Windows 10 Enterprise |  |
| Internet Explorer 11 including Enterprise Mode |  |
| Multi-touch support | $\checkmark$ |
| Multilingual support |  |
| Page file | Can be installed via Language Pack DVDs (default language is English) |
| Hibernate file | Configurable (disabled by default in the image by the UWF) |
| System restore | Configurable (disabled by default in the image) |
| 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 | Configurable (disabled by default in the image by the UWF) |
| Additional embedded lockdown functions |  |
| Assigned access |  |
| AppLocker |  |
| Shell Launcher |  |
| Unified Write Filter |  |
| Keyboard Filter |  |

Table 128: Device functions in Windows 10 loT Enterprise 2016 LTSB

### 7.4.2.5 Installation

Windows 10 loT Enterprise 2016 LTSB 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 LTSB 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.

### 7.4.2.6 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). 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.

### 7.4.2.7 Activation

Windows 10 IoT Enterprise 2016 LTSB must be activated like its predecessor Windows 10 loT Enterprise 2015 LTSB. This takes place at $B \& R$.
The activation status can be checked in the Control Panel:


Figure 5: 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 LTSB (Microsoft reserves the right to make technical changes without notice).

## Information:

It is not required to enter a product key for activation.

### 7.4.2.8 Characteristics, limitations

- Unlike standard Windows 10 Enterprise, Windows 10 loT Enterprise 2016 LTSB does not include Cortana, the Microsoft Edge browser or the Microsoft Store, for example.
- The LTSB 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 loT Enterprise 2016 LTSB. This can be downloaded at no cost from the Downloads section of the B\&R website (www.br-automation.com) (login required).

## Information:

These settings as well as the features not included in the LTSB version cause different behavior compared to a standard Windows 10 Enterprise installation.

### 7.4.2.9 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.

## Software

### 7.4.3 B\&R Linux 10 (GNU/Linux)

### 7.4.3.1 General information

B\&R supports Linux in the form of modified images based on Debian GNU / Linux 10 (codename "buster").
With B\&R Linux, B\&R offers a variant of Debian optimized for B\&R industrial PCs that already includes all B\&Rspecific modifications and offers the broadest possible basis for various applications.

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).

### 7.4.3.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | B\&R Linux 10 |  |
| 5SWLIN.0845-MUL | B\&R Linux 10 - 64-bit - Multilingual - PPC2200 (UEFI boot) - <br> Installation - Only available with a new device |  |
|  | Optional 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.256G-10 | CFast 256 GB MLC |  |
| 5CFAST.8192-00 | CFast 8 GB SLC |  |

### 7.4.3.3 Overview

| Order number |  |
| :--- | :---: |
| Operating system |  |
| Target systems | 5SWLIN.0845-MUL |
| Industrial PC | PPC2200 |
| Chipset | Apollo Lake |
| Architecture | 64-bit (UEFI boot) |
| Language | Multilingual |
| Minimum size of RAM | 2 GB |
| Minimum size of data storage medium | 8 GB |

### 7.4.3.4 Features

B\&R Linux 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 B\&R Linux and/or available for download on the B\&R website (www.br-automation.com).

### 7.4.3.5 Installation

$B \& R$ Linux 10 is preinstalled at $B \& R$ on the desired data storage medium (e.g. CFast card).

### 7.4.3.6 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).

### 7.4.4 B\&R Linux 9 (GNU/Linux)

### 7.4.4.1 General information

B\&R supports Linux in the form of modified images based on Debian GNU / Linux 9 ("Stretch").
With B\&R Linux, B\&R offers a variant of Debian optimized for B\&R industrial PCs that already includes all B\&Rspecific modifications and offers the broadest possible basis for various applications.

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).

### 7.4.4.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | B\&R Linux 9 |  |
| 5SWLIN.0745-MUL | B\&R Linux 9 - 64-bit - Multilingual - PPC2200 (UEFI boot) - In- <br> stallation - Only available with a new device |  |
| 5SWLIN.0759-MUL | B\&R Linux 9 - 64-bit - Multilingual - PPC2200 (Legacy BIOS <br> boot) - Installation - Only available with a new device |  |
|  | Optional accessories |  |
|  | CFast cards |  |
|  | CFast 16 GB SLC |  |
| 5CFAST.016G-00 | CFast 32 GB SLC |  |
| 5CFAST.032G-00 | CFast 32 GB MLC |  |
| 5CFAST.032G-10 | CFast 64 GB MLC |  |
| 5CFAST.064G-10 | CFast 128 GB MLC |  |
| 5CFAST.128G-10 | CFast 256 GB MLC |  |
| 5CFAST.256G-10 | CFast 4 GB SLC |  |
| 5CFAST.4096-00 | CFast 8 GB SLC |  |
| 5CFAST.8192-00 |  |  |

### 7.4.4.3 Overview

| Order number | 5SWLIN.0745-MUL | 5SWLIN.0759-MUL |
| :---: | :---: | :---: |
| Operating system |  |  |
| Target systems |  |  |
| Industrial PC | PPC2200 |  |
| 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 |  |

### 7.4.4.4 Features

- LXDE desktop
- Touch screen support
- MTCX driver
- ADI library
- Tool for right-click support via touch screen
- Virtual keyboard

Detailed instructions about B\&R Linux 9 for B\&R devices can be downloaded from the Downloads section of the $B \& R$ website (www.br-automation.com).

### 7.4.4.5 Installation

$B \& R$ Linux 9 is preinstalled at $B \& R$ on the desired data storage medium (e. g. CFast card).

### 7.4.4.6 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).

### 7.5 Automation software

### 7.5.1 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).

### 7.5.2 Order data

Hardware-based licensing (Technology Guard)

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Technology Guard |  |
| OTG1000.01 | Technology Guard (MSD) |  |
| OTG1000.02 | Technology Guard (HID) |  |
| OTGF016.01 | Technology Guard (MSD) with integrated flash drive, 16 GB <br> (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 |  |
| :--- | :--- | :--- |
|  | Runtime |  |
| 1 TC4601.06-5 | License for Automation Runtime Embedded (TC). One license <br> per target system is required. |  |
|  | Hypervisor |  |
| 1 TC4700.00 | License for B\&R Hypervisor (TC). One license per target system <br> is required. |  |

### 7.5.3.1 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) |
| :--- | :--- | :--- | :--- |
| PPC2200 | Yes | Yes | Yes |

### 7.5.4 Automation Runtime

### 7.5.4.1 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.

### 7.5.4.2 Minimum versions

### 7.5.4.2.1 Automation Runtime Embedded (ARemb)

## System requirements

The following software versions (or higher) are required to operate Automation Runtime Embedded on a Panel 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).

### 7.5.5 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 Panel 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).

### 7.5.6 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).

### 7.6 Automation Device Interface (ADI)

The Automation Device Interface (ADI) enables access to specific functions of $B \& R$ devices.

### 7.6.1 ADI driver

### 7.6.1.1 Installation

The ADI driver is included in most B\&R Windows operating systems or can be installed on request.
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). If a more recent version is available, it can be installed later.

## Information:

The Write filter must be disabled during installation.

### 7.6.1.2 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.


### 7.6.1.2.1 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.

## Software

### 7.6.2 ADI Development Kit

This software allows $A D I$ 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).

### 7.6.3 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).

### 7.6.4 ADI OPC UA Server

ADI OPC UA Server provides the functions and information about Automation Device Interface (ADI) as OPC UA variables.

OPC UA stands for Open Platform Communications Unified Architecture 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) 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).

### 7.7 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).

### 7.8 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).

### 7.9 HMI Service Center

### 7.9.1 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).

### 7.9.2 Order data

| Order number | Short description | Figure |
| :---: | :---: | :---: |
|  | Accessories |  |
| 5SWUTI.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 | Perfection in Automation $\square$ |

The following limitations regarding supported hardware revisions must be observed:

| Devices | Starting <br> with D0 | Up <br> to E0 | Starting <br> with E0 |
| :--- | :---: | :---: | :---: |
| Automation Panel 1000 | $\bullet$ |  |  |
| Automation Panel 5000 | $\bullet$ |  |  |
| Automation PC 3100 | $\bullet$ |  |  |
| Automation PC 3100 mobile | $\bullet$ |  |  |
| Automation PC 2200 |  | $\bullet$ |  |
| Automation PC 810 |  | $\bullet$ |  |
| Automation PC 511 |  | $\bullet$ |  |
| Automation PC 510 | $\bullet$ |  |  |
| Panel PC 3100 | $\bullet$ |  |  |
| Panel PC 2200 |  |  | $\bullet$ |
| Panel PC 1200 |  | $\bullet$ |  |
| Panel PC 800 |  | $\bullet$ |  |
| 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 $P C$ (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 volt-age-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 $\mathrm{B} \& \mathrm{R}$ 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 Cleaning

## Danger!

In order to prevent unintentional operation (by touching the touch screen or keys), the device is only permitted to be cleaned when the power is switched off.

- Use a cloth moistened with dishwashing detergent, screen cleaner or alcohol (ethanol) to clean the device.
- The cleaning agent is not permitted to be applied directly to the device.

Abrasive cleaners, aggressive solvents and chemicals, compressed air or steam cleaners are not permitted to be used.

## Information:

Displays with a touch screen should be cleaned at regular intervals.

### 8.4 Pixel errors

## Information:

Displays can contain faulty pixels (pixel errors) due to the manufacturing process. They are not grounds for initiating a complaint or warranty claim.

### 8.5 User tips for increasing the service life of the display

### 8.5.1 Backlight

The service life of the backlight is specified by its "half-brightness time". An operating time of 50,000 hours would mean that the display brightness would still be $50 \%$ after this time.

### 8.5.1.1 Measures to maintain backlight service life

- The display brightness can be set to the lowest level that is comfortable for the user's eyes.
- Bright images should be avoided as far as possible.
- A $50 \%$ reduction in brightness can increase the half-brightness time by about $50 \%$.


### 8.5.1.2 How can the service life of backlights be extended?

- Set the display brightness to the lowest value comfortable for the eyes.
- Use dark images.
- Reducing the brightness by $50 \%$ can increase the half-brightness time by approximately $50 \%$.


### 8.5.2 Image persistence

Image persistence refers to the "burning in" of a static image on a display after being displayed for a long time. It does not only occur with static images, however. Image persistence is also referred to in the technical literature as screen burn-in, image retention, memory effect, memory sticking or ghost image.
There are 2 different types:

- Area type: This type can be seen in a dark gray image. The effect disappears if the display is switched off for a long time.
- Line type: This can result in permanent damage.


### 8.5.2.1 What causes image persistence?

- Static images
- No screensaver
- Sharp transitions in contrast (e.g. black/white)
- High ambient temperatures
- Operation outside of specifications


### 8.5.2.2 How can image persistence be reduced?

- Switch continuously between static and dynamic images.
- Prevent excessive differences in brightness between foreground and background elements.
- Use colors with similar brightness.
- Use complementary colors for subsequent images.
- Use screensavers.


### 8.6 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).

## 9 International and national certifications

### 9.1 Directives and declarations

### 9.1.1 CE marking

C
All directives applicable to the respective product and their harmonized EN standards are met.

### 9.1.2 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:

The declarations of conformity are available on the B\&R website under Declarations of conformity.

### 9.2 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.

### 9.2.1 UL certification

Ind. Cont. Eq. E115267
9.2.2 EAC

## EHI

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).

### 9.2.3 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).

### 9.2.4 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 facilitates the certification of your machines and systems in this economic area (based on EU conformity).

## 10 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.

### 10.1 General information

The following products can be used in the event of loss or for conversion or retrofitting.

### 10.1.1 Order data

| Material number | Description |
| :--- | :--- |
| 5ACCRHMI.0000-000 | HMI grounding clip |
| 5ACCRHMI.0001-000 | Retaining clips $16 \mathrm{~mm}-14 \mathrm{pcs}$. with 16 mm setscrews - For AP1000 and AP9 x3 |
| 5ACCRHMI.0002-000 | Retaining clips $20 \mathrm{~mm}-14 \mathrm{pcs}$. with 20 mm setscrews - For AP1000 and AP9x3 |
| 5ACCRHMI.0003-000 | Retaining clips $25 \mathrm{~mm}-12 \mathrm{pcs}$. 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 $-4 \times$ screw M3x34 mm - 2x special screw for PPC2100 |
| 5ACCRPC2.0001-000 | xPC2100/2200 interface covers $-1 \times$ cover set |
| 5ACCRPC2.0002-000 | xPC2200 CFast cover |
| 5ACCRPC2.0003-000 | xPC2200 battery compartment $-1 \times$ battery holder for $\times P C 2200-1 \times$ battery including circuit board |
| 5ACCRPC2.0007-000 | APC2100/2200 front cover - Orange - With logo |
| 5ACCRPC2.0008-000 | APC2100/APC2200 front cover - Gray - With logo |

10.1.1.1 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 |
| :---: | :---: |
| General information |  |
| Battery |  |
| Type | Panasonic 1000 mAh |
| Nominal voltage | 3 V |
| Service life | 8 years ${ }^{1)}$ |
| Removable | No ${ }^{2)}$ |
| Variant | Lithium |
| Certifications |  |
| CE | Yes |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Ambient conditions |  |
| Temperature |  |
| Operation | -25 to $60^{\circ} \mathrm{C}$ |
| Storage | -25 to $60^{\circ} \mathrm{C}$ |
| Transport | -25 to $60^{\circ} \mathrm{C}$ |
| Relative humidity |  |
| Operation | 5 to 90\% |
| Storage | 5 to 95\% |
| Transport | 5 to 95\% |
| Mechanical properties |  |
| Housing | Dyed gray (similar to Pantone 432C) plastic |
| Material |  |
| Weight | Approx. 13 g |

[^20]
### 10.2 Installation accessories

Suitable tool sets can be ordered to easily install B\&R swing arm devices.

- Screwdriver with quick-change chuck
- Consisting of:


## 5ACCRHMI.0007-000

- 1x torque screwdriver: 0.3 to 1.2 Nm , ESD-protected
- 1x torque wrench: 1 to 25 Nm
- 1x bit set ( 6 pieces): Hex recess ( $3.0 \mathrm{~mm}, 5.0 \mathrm{~mm}$ ), Torx (T10, T20, T25, T30)
- $1 x$ quick-change chuck for torque wrench


### 10.2.1 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Other |  |
| 5ACCRHMI.0007-000 | HMI installation tool for swing arm: $-1 \times$ torque wrench ESD 0.3 |  |
| $-1.2 \mathrm{Nm}-1 \mathrm{x}$ torque wrench $1.0-25.0 \mathrm{Nm}-1 \times$ hex-head bit 3.0, |  |  |
|  | length $89 \mathrm{~mm}-1 \mathrm{x}$ hex-head bit 5.0 , length $89 \mathrm{~mm}-1 \mathrm{x}$ Torx 10 <br> bit, length $90 \mathrm{~mm}-1 \times$ Torx 20 bit, length $89 \mathrm{~mm}-1 \times$ Torx 25 bit, <br> length $89 \mathrm{~mm}-1 \mathrm{x}$ Torx 30 bit, length $89 \mathrm{~mm}-1 \mathrm{x}$ quick-change <br> chuck for torque wrench |  |

## Accessories

### 10.3 Terminal block power supply

### 10.3.1 OTB103.9x

### 10.3.1.1 General information

1-row 3-pin terminal block 0TB103 is used for the power supply.

### 10.3.1.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Accessories |  |
| OTB103.9 | Connector 24 VDC - 3-pin, female - Screw clamp terminal block |  |
| 0TB103.91 | $3.31 \mathrm{~mm}^{2}$ |  |
|  | $3.31 \mathrm{~mm}^{2}$ |  |
|  |  |  |

### 10.3.1.3 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 | 0TB103.9 | 0TB103.91 |
| :---: | :---: | :---: |
| General information |  |  |
| Certifications |  |  |
| CE | Yes |  |
| UL | cULus E115267 <br> Industrial control equipment |  |
| HazLoc | cULus HazLoc E180196Industrial control equipmentfor hazardous locationsClass I, Division 2, Groups ABCD, T4 1) |  |
| DNV | Temperature: B $\left(0-55^{\circ} \mathrm{C}\right)$ <br> Humidity: B (up to 100\%) <br> Vibration: A ( 0.7 g ) <br> EMC: B (bridge and open deck) ${ }^{2)}$ |  |
| KR | Yes |  |
| 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 ${ }^{3)}$ |
| 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 $1.50 \mathrm{~mm}^{2}$ |  |
| Solid wires | 0.20 to $2.50 \mathrm{~mm}^{2}$ |  |
| Fine-stranded wires | 0.20 to $1.50 \mathrm{~mm}^{2}$ | 0.20 to $2.50 \mathrm{~mm}^{2}$ |
| With wire end sleeves | 0.20 to $1.50 \mathrm{~mm}^{2}$ |  |
| Tightening torque | 0.4 Nm | - |
| Electrical properties |  |  |
| Nominal voltage | 300 V |  |
| Nominal current ${ }^{4)}$ | $10 \mathrm{~A} / \mathrm{contact}$ |  |
| Contact resistance | $\leq 5 \mathrm{~m} \Omega$ |  |
| 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!

### 10.4 Terminal block for IF options

### 10.4.1 OTB1210.3100

### 10.4.1.1 General information

2-row 10-pin terminal block TB1210 is used to connect to the interfaces of various interface options.

### 10.4.1.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Terminal blocks |  |
| OTB1210.3100 | Connector 300 VDC - 10-pin female - Cage clamp terminal block <br>  <br> - Protected against vibration by the screw flange |  |

### 10.4.1.3 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.


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!

### 10.5 USB hub

### 10.5.1 5ACCUSB2.0002-000

### 10.5.1.1 General information

- 2x USB 2.0 interfaces
- Compatible with PPC2100 swing arm device (AP5000) and PPC2200 swing arm device (AP5000)


### 10.5.1.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Accessories |  |
| 5ACCUSB2.0002-000 | 2-port USB hub, passive - For Automation Panel 5000 |  |

10.5.1.3 Technical data

## 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.

## 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 | 5ACCUSB2.0002-000 |
| :---: | :---: |
| General information |  |
| B\&R ID code | 0xEAB8 |
| Certifications |  |
| CE | Yes |
| UL | cULus E115267 <br> Industrial control equipment |
| EAC | Product family certification |
| Interfaces |  |
| USB |  |
| Quantity | 2 |
| Type | USB 2.0 |
| Variant | Type A |
| Transfer rate | Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s) |
| Current-carrying capacity | Total max. 1 A (sum of all 2 ports) |
| Operating conditions |  |
| Pollution degree per EN 61131-2 | Pollution degree 2 |
| Degree of protection per EN 60529 | IP20 ${ }^{1)}$ |
| Ambient conditions |  |
| Temperature |  |
| Operation | 0 to $55^{\circ} \mathrm{C}{ }^{2)}$ |
| Storage | -10 to $70^{\circ} \mathrm{C}$ |
| Transport | -10 to $70^{\circ} \mathrm{C}$ |
| Relative humidity |  |
| Operation | 5 to 90\%, non-condensing |
| Storage | 5 to 95\%, non-condensing |
| Transport | 5 to 95\%, non-condensing |
| Elevation |  |
| Operation | Max. 3000 m ${ }^{\text {2) }}$ |


| Order number |  |
| :--- | :--- |
| Mechanical properties |  |
| Housing |  |
| Material | Aluminum, coated |
| Coating | Anthracite gray |
| Dimensions |  |
| Width | 34 mm |
| Height | 23 mm |
| Depth | 57 mm |
| Weight | 70 g |

1) Only if all interface covers are installed.
2) The maximum ambient temperature is typically derated $1^{\circ} \mathrm{C}$ per 1000 meters starting at 500 m above sea level.

### 10.5.1.3.1 USB interfaces

The 2-port USB hub is equipped with a USB 2.0 (Universal Serial Bus) host controller with several USB ports, of which two USB 2.0 interfaces are routed externally and freely available to the user. The USB hub takes up the USB2 interface on the system unit in the standard configuration.

## 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.

USB HUB 1 - USB HUB 2

| USB HUB 1 - USB HUB 2 |  |  |
| :---: | :---: | :---: |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Quantity | 2 |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed (480 Mbit/s) |  |
| Current-carrying capacity ${ }^{11}$ | Total max. 1 A (sum of all 2 ports) |  |
| Cable length |  |  |
| USB 2.0 | Max. 5 m |  |
|  |  |  |

1) The USB hub is protected by a maintenance-free "USB current-limiting switch" (max. 1 A ).

### 10.5.1.4 Dimensions



### 10.6 Heat pipes

### 10.6.1 5ACCHP00.0002-000

### 10.6.1.1 General information

Heat pipe 5ACCHP00.0002-000 is used to improve heat dissipation. It is used only in conjunction with PPC2200 system units and swing arm mounting unit.
10.6.1.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
| 5 | Heat pipe |  |
| 5 5ACCHP00.0002-000 | AP5000 heat pipe - For PPC2200 - For swing arm mounting unit |  |

10.6.2 5АССНР00.0003-000

### 10.6.2.1 General information

Heat pipe 5ACCHP00.0003-000 is used to improve heat dissipation. It is used only in conjunction with PPC2200 system units and VESA IP54 mounting unit.

### 10.6.2.2 Order data

| Order number | Short description |  |
| :--- | :--- | :--- |
|  | Heat pipe |  |
| 5 5ACCHP00.0003-000 | AP5000 heat pipe - For PPC2200 - For VESA mounting unit |  |
|  |  |  |

### 10.7 Cables

For additional information about compatible cables, see the $B \& R$ website (HMI cable manual).

### 10.8 USB mass storage device

For additional information about compatible USB mass storage devices, see the B\&R website (USB mass storage devices).

## 11 Environmentally friendly disposal

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 <br> Operating and monitoring devices | Electronics recycling |  |
| Uninterruptible power supplies |  |  |
| Batteries and rechargeable batteries  <br> Cables  <br> Paper/Cardboard packaging Paper/Cardboard recycling <br> Plastic packaging material Plastic recycling $\mathbf{l}$ |  |  |

Disposal must be carried out in accordance with applicable legal regulations.

## Appendix A Abbreviations

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 <br> side. |
| ND | Not defined | Stands for an undefined value in technical data tables. This may be because the <br> 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 <br> data. The value will be supplied later. |
| MTBF | Mean time between failures | The expected value of the operating time between two consecutive failures. |

## Appendix B MTCX

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 $\mathrm{NMI} /$ 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 firmware5). The version can be read in BIOS or in approved Microsoft Windows operating systems using the ADI Control Center.

[^21]
## Appendix C Viewing angles

For viewing angle specifications ( $R, L, U, D$ ) of the display types, see the technical data of the individual components.


## Appendix D Chemical resistance

All panels are made of a coated aluminum support frame.

## Single-touch panels

- Single-touch panels are manufactured with Autotex panel overlay:



## Multi-touch panels

- Multi-touch panels are manufactured with a continuous glass surface.


## D. 1 Autotex panel overlay (polyester)

Unless otherwise specified, the panel overlay is resistant to the following chemicals per DIN 42115 Part 2 when exposed for up to 24 hours without visible changes:

- Acetaldehyde
- Acetone
- Acetonitrile
- Aliphatic hydrocarbons
- Alkali carbonate
- Formic acid < 50\%
- Ammonia < 40\%
- Amyl acetate
- Ethano
- Ether
- Gasoline
- Bichromate
- Potassium
- Cutting oil
- Brake fluid
- Butyl CELLOSOLVE (2-Butoxyethanol)
- Sodium hypochlorite < 20\%
- Cyclohexanol
- Cyclohexanone
- Decon
- Diacetone alcohol
- Dibutyl phthalate
- Diesel
- Diethyl ether
- Diethyl phthalate
- Dioxan
- Dowandol DRM/PM
- Iron II chloride $\left(\mathrm{FeCl}_{2}\right)$
- Iron III chloride $\left(\mathrm{FeCl}_{3}\right)$
- Acetic acid < 50\%
- Butyl acetate
- Ethyl acetate
- Linseed oil
- Aviation fuel
- Formaldehyde 37 to 42\%
- Glycerine
- Glycol
- Isophorone
- Isopropanol
- Potassium hydroxide
- Potassium carbonate
- Methanol
- Methylisobutylketone (MIBK)
- Sodium bisulphate
- Sodium carbonate
- Caustic soda < 40\%
- Paraffin oil
- Phosphoric acid < 30\%
- Blown castor oil
- Nitric acid < 10\%
- Hydrochloric acid < 36\%
- Sea water
- Sulphuric acid < 10\%
- Silicon oil
- Tenside
- Turpentine oil substitute
- Toluene
- Triacetin
- Trichloracetic acid < 50\%
- Trichloroethane
- Thinner (white spirit)
- Washing agents
- Water
- Hydrogen peroxide < 25\%
- Fabric conditioner
- Xylene

Per DIN 42115 Part 2, the panel overlay is resistant to exposure to glacial acetic acid for less than one hour without visible damage.

## D. 2 Coated aluminum front

Unless otherwise specified, the coated aluminum front is resistant to the following chemicals per DIN 42115 Part 2 when exposed for up to 24 hours without visible changes:

- Formic acid $<50 \%$
- Ammonia <40\%
- Brake fluid
- Hydrogen chloride < $10 \%$
- Diesel
- Acetic acid $<50 \%$
- Gear oil
- Lactic acid <10\%
- Isopropanol
- Coolant <4\%
- Sodium hydroxide $<40 \%$
- Petroleum
- Phosphoric acid <25\%
- Saline $<10 \%$
- Sulphuric acid <25\%
- Sidolin
- Skydrol

The coated aluminum front is not resistant to the following chemicals:

- Acetone
- Ethyl acetate


## Appendix D

## D. 3 Touch screen

## 5-wire touch screen (single-touch)

Unless otherwise specified, the touch screen is resistant to the following chemicals when exposed for up to 1 hour (at $25^{\circ} \mathrm{C}$ ) with no visible changes:

- Acetone
- Beer
- Unleaded gasoline
- Chemical cleaning agents
- Hydrogen chloride < 6\%
- Coca-Cola
- Diesel
- Dimethylbenzene
- Vinegar
- Ethanol
- Antifreeze
- Gear oil
- Ammonia-based glass cleaner
- Household detergents
- Hexane
- n-hexane
- Isopropanol
- Coffee
- Methylbenzene
- Methylene chloride
- Methyl ethyl ketone
- Mineral spirits
- Motor oil
- Nitric acid < 70\%
- Saline solution < 5\%
- Tea
- Turpentine
- Lubricants
- Sulphuric acid < 40\%
- Cooking oil


## Touch screen generation 2 and 3 (multi-touch)

Unless otherwise specified, the touch screen is resistant to the following chemicals per ASTM D 1308-02 and ASTM F 1598-95 when exposed for up to 24 hours without visible changes:

- Acetone
- Ammonia < 5\%
- Gasoline
- Beer
- Lead
- Brake fluid
- Hydrogen chloride < 6\%
- Coca-Cola
- Dimethylbenzene
- Ethanol
- Rubber cement
- Isopropanol
- Coffee
- Ink
- Lipstick
- Lysol
- Methylbenzene
- Methyl ethyl ketone
- Naphtha
- Nitric acid < 70\%
- Lubricants
- Sulphuric acid < 40\%
- Stamping ink
- Tea
- Trichloroethylene
- Water
- White wine vinegar
- Windex Original


## Appendix E Touch screen

## E. 1 5-wire touch screen (single-touch)

## E.1.1 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.

## Note:

Drivers for this touch screen for approved operating systems are available for download in the Downloads section of the B\&R website (www.br-automation.com).

| Order number |  |
| :--- | :--- |
| General information |  |
| Technology |  |
| Release pressure |  |
| Light transmission | Analog, resistive |
| Service life | $<1 \mathrm{~N}$ |
| Operating conditions | $10,000,000$ touch operations at the same position (release pressure: 250 g , interval: 0.25 s) |
| Activation |  |
| Ambient conditions | Finger, stylus, credit card, glove |
| Temperature |  |
| Operation |  |
| Storage | -20 to $70^{\circ} \mathrm{C}$ |
| Transport | -40 to $80^{\circ} \mathrm{C}$ |
| Relative humidity | -40 to $80^{\circ} \mathrm{C}$ |
| Operation |  |
| Storage | $90 \% \mathrm{RH}$ at max. $60^{\circ} \mathrm{C}$ for 504 hours |
| Transport | $90 \% \mathrm{RH}$ at max. $60^{\circ} \mathrm{C}$ for 504 hours |

## E.1.2 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## E. 2 Touch screen (multi-touch generation 3)

## E.2.1 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 | Touchscreen |
| :---: | :---: |
| General information |  |
| Technology | Projected capacitive touch (PCT) |
| Light transmission | >90\% |
| Anti-glare coating | Optical/Gloss $=80$ |
| Operating conditions |  |
| Activation | Finger, thin glove |
| Ambient conditions |  |
| Temperature |  |
| Operation | -10 to $70^{\circ} \mathrm{C}$ |
| Storage | -40 to $70^{\circ} \mathrm{C}$ |
| Transport | -40 to $70^{\circ} \mathrm{C}$ |
| Relative humidity |  |
| Operation | Up to $90 \%$ at max. $35^{\circ} \mathrm{C}$, see diagram for $>35^{\circ} \mathrm{C}$. |
| Storage | Up to $90 \%$ at max. $35^{\circ} \mathrm{C}$, see diagram for $>35^{\circ} \mathrm{C}$. |
| Transport | Up to $90 \%$ at max. $35^{\circ} \mathrm{C}$, see diagram for $>35^{\circ} \mathrm{C}$. |

## E.2.2 Temperature/Humidity diagram



| Diagram legend |  |  |  |
| :---: | :--- | :---: | :--- |
| $(1)$ | Operation | $\mathrm{T}\left[{ }^{\circ} \mathrm{C}\right]$ | Temperature in ${ }^{\circ} \mathrm{C}$ |
| $(2)$ | Storage and transport | $\mathrm{RH}[\%]$ | Relative humidity $(\mathrm{RH})$ in percent and non-condensing |

## Appendix F Cable data

| Signal |  | Signal |  |
| :--- | :--- | :--- | :--- |
| RS232 | "RS232 - Bus length and cable type" on page 279 | RS422 | "RS422 - Bus length and cable type" on page 279 |
| RS485 | "RS485 - Bus length and cable type" on page 280 | CAN | "CAN - Bus length and cable type" on page 280 |

## F. 1 RS232 - Bus length and cable type

The maximum transfer rate of $115 \mathrm{kbit} / \mathrm{s}$ depends on the cable length and type of cable used.

| Bus length | Transfer rate |
| :--- | :--- |
| $\leq 15 \mathrm{~m}$ | Typ. $64 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 10 \mathrm{~m}$ | Typ. $115 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 5 \mathrm{~m}$ | Typ. $115 \mathrm{kbit} / \mathrm{s}$ |

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 |
| :---: | :---: |
| Signal line |  |
| Cable cross section | $4 \times 0.16 \mathrm{~mm}^{2}$ (26 AWG), tinned copper stranded wire |
| Wire insulation | PE |
| Conductor resistance | $\leq 82$ ת/km |
| Stranding | Wires stranded in pairs |
| Shield | Pair shielding with aluminum foil |
| GND |  |
| Cable cross section | $1 \times 0.34 \mathrm{~mm}^{2}$ (22AWG/19), tinned copper stranded wire |
| Wire insulation | PE |
| Conductor resistance | s59 $1 / \mathrm{km}$ |
| Outer jacket |  |
| Material | PUR compound |
| Properties | Halogen-free |
| Cable shield | Tinned copper wire |

## F. 2 RS422-Bus length and cable type

The RTS line must be switched on to activate the transmitter.
The maximum transfer rate of $115 \mathrm{kbit} / \mathrm{s}$ depends on the cable length and type of cable used.

| Bus length |  |
| :--- | :--- |
| 1200 m | Transfer rate |

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 |
| :---: | :---: |
| Signal line |  |
| Cable cross section | $4 \times 0.25 \mathrm{~mm}^{2}$ (24AWG/19), tinned copper stranded wire |
| Wire insulation | PE |
| Conductor resistance | $\leq 82$ ת/km |
| Stranding | Wires stranded in pairs |
| Shield | Pair shielding with aluminum foil |
| GND |  |
| Cable cross section | $1 \times 0.34 \mathrm{~mm}^{2}$ (22AWG/19), tinned copper stranded wire |
| Wire insulation | PE |
| Conductor resistance | s59 $1 / \mathrm{km}$ |
| Outer jacket |  |
| Material | PUR compound |
| Properties | Halogen-free |
| Cable shield | Tinned copper wire |

## Appendix F

## F. 3 RS485-Bus length and cable type

The maximum transfer rate of $115 \mathrm{kbit} / \mathrm{s}$ depends on the cable length and type of cable used.

| Bus length |  |
| :--- | :--- |
| 1200 m | Transfer rate |

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 |
| :---: | :---: |
| Signal line |  |
| Cable cross section | $4 \times 0.25 \mathrm{~mm}^{2}$ (24AWG/19), tinned copper stranded wire |
| Wire insulation | PE |
| Conductor resistance | $\leq 82$ ת/km |
| Stranding | Wires stranded in pairs |
| Shield | Pair shielding with aluminum foil |
| GND |  |
| Cable cross section | $1 \times 0.34 \mathrm{~mm}^{2}$ (22AWG/19), tinned copper stranded wire |
| Wire insulation | PE |
| Conductor resistance | s59 $1 / \mathrm{km}$ |
| Outer jacket |  |
| Material | PUR compound |
| Properties | Halogen-free |
| Cable shield | Tinned copper wire |

## F. 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 ${ }^{1)}$ |  |
| :--- | :--- |
| $\leq 1000 \mathrm{~m}$ | Transfer rate |
| $\leq 200 \mathrm{~m}$ | Typ. $50 \mathrm{kbit} / \mathrm{s}$ |
| $\leq 100 \mathrm{~m}$ | Typ. 250 kbit/s |
| $\leq 20 \mathrm{~m}^{2}$ |  |
| $\leq 15 \mathrm{~m}^{3}$ |  |

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.


## Appendix G POWERLINK

## G. 1 LED "S/E" (LED "Status/Error")

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.

## G.1.1 Ethernet mode

In this mode, the interface is operated as an Ethernet interface.

| LED "S/E" |  |  |
| :--- | :--- | :--- |
| Green | Red | Description |
| On | Off | The interface is operated as an Ethernet interface. |

Table: LED "S/E": Interface in Ethernet mode

## G.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: <br> Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however. |
| Blinking | On | If an error occurs in the following modes, then the green LED blinks over the red LED: <br> - PRE_OPERATIONAL_1 <br> - PRE_OPERATIONAL_2 <br> - READY_TO_OPERATE <br> LED "S/E" |

Table: LED "S/E" - Error message (interface in POWERLINK mode)
Interface status

| LED "S |  | Description |
| :---: | :---: | :---: |
| Green | Red |  |
| Off | Off | Mode: NOT_ACTIVE |
|  |  | The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: |
|  |  | - The device is switched off. |
|  |  | - The device is in the startup phase. |
|  |  | - The interface or device is not configured correctly in Automation Studio. |
|  |  | - The interface or device is defective. |
|  |  | Managing node (MN) |
|  |  | 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. |
|  |  | Controlled node (CN) |
|  |  | 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. |

Table: LED "S/E" - Interface state (interface in POWERLINK mode)

## Appendix G

| LED "S/E" |  | Description |
| :---: | :---: | :---: |
| Green | Red |  |
| Flickering (approx. 10 Hz ) | Off | Mode: BASIC_ETHERNET <br> The interface is in mode BASIC_ETHERNET. The interface is operated in Ethernet mode. <br> Managing node (MN) <br> This mode can only be exited by resetting the controller. <br> Controlled node (CN) <br> If POWERLINK communication is detected during this mode, the interface enters mode PRE_OPERATIONAL_1. |
| Single flash (approx. 1 Hz ) | Off | Mode: PRE_OPERATIONAL_1 <br> The interface is in mode PRE_OPERATIONAL_1. <br> Managing node (MN) <br> The MN is in "reduced cycle" mode. The CNs are configured in this mode. <br> Cyclic communication is not yet taking place. <br> Controlled node (CN) <br> 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. |
|  | On | Controlled node (CN) If the red LED lights up in this mode, this means that the MN has failed. |
| Double flash (approx. 1 Hz ) | Off | Mode: PRE_OPERATIONAL_2 <br> The interface is in mode PRE_OPERATIONAL_2. <br> Managing node (MN) <br> The MN starts cyclic communication (cyclic input data is not yet evaluated). <br> The CNs are configured in this mode. <br> Controlled node (CN) <br> The CN can be configured by the MN in this mode. A command then switches the mode to READY_TO_OPERATE. |
|  | On | Controlled node (CN) <br> If the red LED lights up in this mode, this means that the MN has failed. |
| Triple flash (approx. 1 Hz ) | Off | Mode: READY_TO_OPERATE <br> The interface is in mode READY_TO_OPERATE. <br> Managing node (MN) <br> Cyclic and asynchronous communication. Received PDO data is ignored. <br> Controlled node (CN) <br> 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 | Controlled node (CN) <br> If the red LED lights up in this mode, this means that the MN has failed. |
| On | Off | Mode: OPERATIONAL <br> The interface is in mode OPERATIONAL. PDO mapping is active and cyclic data is evaluated. |
| Blinking (approx. 2.5 Hz ) | Off | Mode: STOPPED <br> The interface is in mode STOPPED. <br> Managing node (MN) <br> This mode does not occur for the MN. <br> Controlled node (CN) <br> 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



## G.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. |
| :--- | :--- |

## G.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 H Features

## H. 1 Pushbutton RAFIX 22 FS+, 1.30.270.021/2300

| Pushbutton 1.30.270.021/2300 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $1.30 .270 .021 / 2300$ |  |
| Quantity | 1 | Example image |
| Illumination | Red |  |
| Contact function | Momentary |  |
| Service life (switching cycles) | $1,000,000$ |  |
| B10 value (switching cycles) | $1,300,000$ |  |
| Actuation travel | 4 mm |  |
| Stop strength | Max. 100 N |  |

Table 148: Pushbutton 1.30.270.021/2300

## H. 2 Pushbutton RAFIX 22 FS+, 1.30.270.021/2500

| Pushbutton 1.30.270.021/2500 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | RAFIX 22 FS+ |
| Type | $1.30 .270 .021 / 2500$ |  |
| Manufacturer number | Green |  |
| Illumination | Momentary |  |
| Contact function | $1,000,000$ |  |
| Service life (switching cycles) | $1,300,000$ |  |
| B10 value (switching cycles) | 4 mm |  |
| Actuation travel | Max. 100 N |  |
| Stop strength |  |  |

Table 149: Pushbutton 1.30.270.021/2500

## H. 3 Pushbutton RAFIX 22 FS+, 1.30.270.021/2600

| Pushbutton 1.30.270.021/2600 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $1.30 .270 .021 / 2600$ | Example image |
| Quantity | 1 |  |
| Illumination | Blue |  |
| Contact function | Momentary |  |
| Service life (switching cycles) | $1,000,000$ |  |
| B10 value (switching cycles) | $1,300,000$ |  |

Table 150: Pushbutton 1.30.270.021/2600

## H. 4 Selector switch RAFIX 22 FS+, 1.30.272.102/2200

| Selector switch 1.30.272.102/2200 |  |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| Manufacturer | RAFI |  |  |  |  |
| Type | RAFIX 22 FS + |  |  |  |  |
| Manufacturer number | $1.30 .272 .102 / 2200$ |  |  |  |  |
| Illumination | White |  |  |  |  |
| Contact function | Maintained |  |  |  |  |
| Angle of rotation | $1 \times 90^{\circ}, \mathrm{L}$ form |  |  |  |  |
| Service life (switching cycles) | 300,000 |  |  |  |  |
| B10 value (switching cycles) | 400,000 |  |  |  |  |
| Actuation torque | Max. 1.5 Nm |  |  |  |  |

Table 151: Selector switch 1.30.272.102/2200

## H. 5 Key switch RAFIX 22 FS+, 1.30.255.222/0000

| Key switch 1.30.255.222/0000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | RAFIX 22 FS+ |
| Manufacturer number | Maintained |
| Contact function | 500 |
| Number of possible closings | $1 \times 90^{\circ}$, L form |
| Angle of rotation | $0+1$ |
| Key removal position | 50,000 maintained $/ 30,000$ key removal switching cycles |
| Service life (switching cycles) | 65,000 maintained $/ 40,000$ key removal switching cycles |
| B10 value (switching cycles) | Max. 1.3 Nm |
| Actuation torque |  |
|  |  |

Table 152: Key switch 1.30.255.222/0000
H.5.1 Replacement key for key switch RAFIX 22 FS+ 5.58.007.001/0000

|  | Replacement key 5.58.007.001/0000 |  |  |
| :--- | :--- | :--- | :--- |
| ROHS-compliant | Yes |  |  |
| REACH-compliant |  |  |  |
|  |  |  |  |

H. 6 Emergency stop RAFIX 22 FS+ "Plus 1", 1.30.273.512/0300

| Emergency stop 1.30.273.512/0300 |  |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| Manufacturer | RAFI | Example image |  |  |  |
| Type | RAFIX 22 FS+ emergency stop button "Plus 1" |  |  |  |  |
| Manufacturer number | $1.30 .273 .512 / 0300$ |  |  |  |  |
| Contact function | Maintained |  |  |  |  |
| Resetting | By rotating to the right |  |  |  |  |
| Service life (switching cycles) | 50,000 |  |  |  |  |
| B10 value (switching cycles) | 65,000 |  |  |  |  |
|  |  |  |  |  |  |

Table 153: Emergency stop 1.30.273.512/0300

## H. 7 Switching element RAFIX 22 FS universal, 1.20.126.005/0000

|  | Switching element 1.20.126.005/0000 |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | $1.20 .126 .005 / 0000$ |
| Manufacturer number | Self-cleaning bridge contact |
| Contact system | Au |
| Contact material | 2 normally open contacts |
| Contacts | THT soldered connection with anti-rotation element |
| Connection | $1,000,000$ at $10 \mathrm{~mA} / 24 \mathrm{VDC}$ |
| Service life (switching cycles) | $1,300,000$ |
| B10 value (switching cycles) | Min. 1 V |
| AC/DC operating voltage | Max. 35 V |
| AC/DC operating voltage | Min. 1 mA |
| AC/DC operating current | Max. 100 mA |
| AC/DC operating current | Max. 250 mW |
| Switching capacity |  |

Table 154: Switching element 1.20.126.005/0000

## H. 8 Switching element RAFIX 22 FS+ PCB gold, 1.20.126.414/0000

| Switching element 1.20.126.414/0000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | RAFIX 22 FS+ - PCB gold, emergency stop "Plus 1" |
| Manufacturer number | $1.20 .126 .414 / 0000$ |
| Contact system | Self-cleaning bridge contact |
| Contact material | Au |
| Contacts | 2 normally closed contacts + 1 alarm contact 1) |
| Normally closed contact with positive <br> separation per IEC 60947-5-1 | Yes |
| Connection | THT soldered connection with anti-rotation element |
| Service life (switching cycles) | 50,000 at 10 mA / 24 VDC |
| B10 value (switching cycles) | 65,000 |
| AC/DC operating voltage | Min. 1 V |
| AC/DC operating voltage | Max. 35 V |
| AC/DC operating current | Min. 1 mA |
| AC/DC operating current | Max. 100 mA |
| Switching capacity | Max. 250 mW |

Table 155: Switching element 1.20.126.414/0000

[^22]
## H. 9 5ACCSE00.000x-00x

B\&R recommends RAFIX operating and switching elements with model number 5ACCSE00.000x-00x for use on expansion covers.

RAFIX operating and switching elements with model number 5ACCSE00.000x-00x must be ordered separately.

## H.9.1 5ACCSE00.0000-000

## General information

- 1x pushbutton
- $1 x$ colored lens (no color, red, yellow, green, blue)
- $1 x$ switching element
- 1xLED


## H.9.1.1 Pushbutton RAFIX 22 FS+, 1.30.270.921/2200

| Pushbutton 1.30.270.921/2200 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | RAFIX 22 FS+ |
| Type | $1.30 .270 .921 / 2200$ |  |
| Manufacturer number | 1 | Example image |
| Quantity | Flat lens |  |
| Form of lens | Momentary |  |
| Contact function | $1,300,000$ |  |
| Service life (switching cycles) |  |  |
| B10 value (switching cycles) |  |  |

Table 156: Pushbutton 1.30.270.921/2200

## H.9.1.2 Colored lens RAFIX 22 FS+, 5.49.263.062/1000

| Colored lens 5.49.263.062/1000 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | RAFIX 22 FS+ |
| Type | $5.49 .263 .062 / 1000$ |  |
| Manufacturer number | 1 | Example image |
| Quantity | Flat lens |  |
| Form of lens | Colorless |  |
| Lens color |  |  |

Table 157: Colored lens 5.49.263.062/1000
H.9.1.3 Colored lens RAFIX 22 FS+, 5.49.263.062/1300

| Colored lens 5.49.263.062/1300 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $5.49 .263 .062 / 1300$ |  |
| Quantity | 1 | Example image |
| Form of lens | Flat lens |  |
| Lens color | Red |  |

Table 158: Colored lens 5.49.263.062/1300

## H.9.1.4 Colored Iens RAFIX 22 FS+, 5.49.263.062/1400

| Colored lens 5.49.263.062/1400 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $5.49 .263 .062 / 1400$ |  |
| Quantity | 1 | Example image |
| Form of lens | Flat lens |  |
| Lens color | Yellow |  |

Table 159: Colored lens 5.49.263.062/1400

## Appendix H

H.9.1.5 Colored lens RAFIX 22 FS+, 5.49.263.062/1500

| Colored lens 5.49.263.062/1500 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ | Example image |
| Manufacturer number | $5.49 .263 .062 / 1500$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Green |  |

Table 160: Colored lens 5.49.263.062/1500

## H.9.1.6 Colored lens RAFIX 22 FS+, 5.49.263.062/1600

| Colored lens 5.49.263.062/1600 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | Example image |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $5.49 .263 .062 / 1600$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Blue |  |

Table 161: Colored lens 5.49.263.062/1600

## H.9.1.7 Switching element RAFIX FS, 1.20.126.102/9000

| Switching element 1.20.126.102/9000 |  |  |
| :---: | :---: | :---: |
| Manufacturer | RAFI | Example image |
| Type | RAFIX FS |  |
| Manufacturer number | 1.20.126.102/9000 |  |
| Quantity | 1 |  |
| Contact system | Self-cleaning bridge contact |  |
| Contacts | 1 normally open contact |  |
| Normally closed contact with direct opening action per IEC 947-5-1 | Yes |  |
| Connection | Connector $2.8 \times 0.8 \mathrm{~mm}$ |  |
| Lamp | LED clip |  |
| Service life (switching cycles) | 1,000,000 |  |
| B10 value (switching cycles) | 1,300,000 |  |
| Min. AC/DC operating voltage | 5 V |  |
| Max. AC/DC operating voltage | 35 V |  |
| Min. AC/DC operating current | 1 mA |  |
| Max. AC/DC operating current | 100 mA |  |
| Max. switching capacity | 250 mW |  |

Table 162: Switching element 1.20.126.102/9000

## H.9.2 5ACCSE00.0000-001

## General information

- 1x pushbutton
- 1x colored lens (no color, red, yellow, green, blue)
- $1 x$ switching element
- 1x LED


## H.9.2.1 Pushbutton RAFIX 22 FS+, 1.30.270.921/2200

| Pushbutton 1.30.270.921/2200 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $1.30 .270 .921 / 2200$ | Example image |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Contact function | Momentary |  |
| Service life (switching cycles) | $1,000,000$ |  |
| B10 value (switching cycles) | $1,300,000$ |  |

Table 163: Pushbutton 1.30.270.921/2200
H.9.2.2 Colored lens RAFIX 22 FS+, 5.49.263.062/1000

| Colored lens 5.49.263.062/1000 |  |  |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: | :---: |
| Manufacturer | RAFI | Example image |  |  |  |  |
| Type | RAFIX 22 FS+ |  |  |  |  |  |
| Manufacturer number | $5.49 .263 .062 / 1000$ |  |  |  |  |  |
| Quantity | 1 |  |  |  |  |  |
| Form of lens | Flat lens |  |  |  |  |  |
| Lens color | Colorless |  |  |  |  |  |

Table 164: Colored lens 5.49.263.062/1000

## H.9.2.3 Colored lens RAFIX 22 FS+, 5.49.263.062/1300

| Colored lens 5.49.263.062/1300 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS + | Example image |
| Manufacturer number | $5.49 .263 .062 / 1300$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Red |  |

Table 165: Colored lens 5.49.263.062/1300

## H.9.2.4 Colored lens RAFIX 22 FS+, 5.49.263.062/1400

| Colored lens 5.49.263.062/1400 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $5.49 .263 .062 / 1400$ | Example image |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Yellow |  |

Table 166: Colored lens 5.49.263.062/1400

## H.9.2.5 Colored lens RAFIX 22 FS+, 5.49.263.062/1500

| Colored lens 5.49.263.062/1500 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | Example image |
| Type | RAFIX 22 FS + |  |
| Manufacturer number | $5.49 .263 .062 / 1500$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Green |  |

Table 167: Colored lens 5.49.263.062/1500

## Appendix H

## H.9.2.6 Colored Iens RAFIX 22 FS+, 5.49.263.062/1600

| Colored lens 5.49.263.062/1600 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS + | Example image |
| Manufacturer number | $5.49 .263 .062 / 1600$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Blue |  |

Table 168: Colored lens 5.49.263.062/1600

## H.9.2.7 Switching element RAFIX FS, 1.20.126.101/9000

| Switching element 1.20.126.101/9000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | RAFIX FS |
| Manufacturer number | $1.20 .126 .101 / 9000$ |
| Quantity | Self-cleaning bridge contact |
| Contact system | 1 normally closed contact |
| Contacts | Yes |
| Normally closed contact with direct <br> opening action per IEC $947-5-1$ | Connector 2.8x0.8 mm |
| Connection | LED clip |
| Lamp | $1,000,000$ |
| Service life (switching cycles) | $1,300,000$ |
| B10 value (switching cycles) | 5 V |
| Min. AC/DC operating voltage | 35 V |
| Max. AC/DC operating voltage | 1 mA |
| Min. AC/DC operating current | 100 mA |
| Max. AC/DC operating current | 250 mW |
| Max. switching capacity |  |

Table 169: Switching element 1.20.126.101/9000

## H.9.3 5ACCSE00.0000-002

## General information

- 1x pushbutton
- 1x colored lens (no color, red, yellow, green, blue)
- 1x switching element
- 1x LED
H.9.3.1 Pushbutton RAFIX 22 FS+, 1.30.270.921/2200

| Pushbutton 1.30.270.921/2200 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $1.30 .270 .921 / 2200$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Contact function | Momentary |  |
| Service life (switching cycles) | $1,000,000$ |  |
| B10 value (switching cycles) | $1,300,000$ |  |

Table 170: Pushbutton 1.30.270.921/2200

## H.9.3.2 Colored lens RAFIX 22 FS+, 5.49.263.062/1000

| Colored lens 5.49.263.062/1000 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | Example image |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | $5.49 .263 .062 / 1000$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Colorless |  |

Table 171: Colored lens 5.49.263.062/1000
H.9.3.3 Colored lens RAFIX 22 FS+, 5.49.263.062/1300

| Colored lens 5.49.263.062/1300 |  |  |
| :--- | :--- | :--- |
| Example image |  |  |
|  | RAFI |  |
|  | RAFIX 22 FS + |  |
| Manufacturer number | $5.49 .263 .062 / 1300$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Red |  |

Table 172: Colored lens 5.49.263.062/1300

## H.9.3.4 Colored lens RAFIX 22 FS+, 5.49.263.062/1400

| Colored lens 5.49.263.062/1400 |  |  |  |
| :--- | :--- | :--- | :---: |
| Manufacturer | RAFI |  |  |
| Type | RAFIX 22 FS+ | Example image |  |
| Manufacturer number | $5.49 .263 .062 / 1400$ |  |  |
| Quantity | 1 |  |  |
| Form of lens | Flat lens |  |  |
| Lens color | Yellow |  |  |

Table 173: Colored lens 5.49.263.062/1400

## H.9.3.5 Colored lens RAFIX 22 FS+, 5.49.263.062/1500

| Colored lens 5.49.263.062/1500 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | Example image |
| Type | RAFIX 22 FS + |  |
| Manufacturer number | $5.49 .263 .062 / 1500$ |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Green |  |

Table 174: Colored lens 5.49.263.062/1500

## H.9.3.6 Colored Iens RAFIX 22 FS+, 5.49.263.062/1600

| Colored lens 5.49.263.062/1600 |  |  |
| :---: | :---: | :---: |
| Manufacturer | RAFI | Example image |
| Type | RAFIX 22 FS+ |  |
| Manufacturer number | 5.49.263.062/1600 |  |
| Quantity | 1 |  |
| Form of lens | Flat lens |  |
| Lens color | Blue |  |

Table 175: Colored lens 5.49.263.062/1600

## H.9.3.7 Switching element RAFIX 22 FS, 1.20.126.103/9000

| Switching element 1.20.126.103/9000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | RAFIX 22 FS |
| Manufacturer number | $1.20 .126 .103 / 9000$ |
| Quantity | 1 |
| Contact system | Self-cleaning bridge contact |
| Contacts | 1 normally closed contact + 1 normally open contact |
| Connection | Connector 2.8x0.8 mm |
| Service life (switching cycles) | $1,000,000$ at $10 \mathrm{~mA} / 24 \mathrm{VDC}$ |
| Min. AC/DC operating voltage | 5 V |
| Max. AC/DC operating voltage | 42 V |
| Min. AC/DC operating current | 1 mA |
| Max. AC/DC operating current | 100 mA |
| Max. switching capacity | 250 mW |

Table 176: Switching element 1.20.126.103/9000

## Appendix H

## H.9.4 5ACCSE00.0001-000

## General information

- 1x emergency stop button
- 1x switching element


## H.9.4.1 Emergency stop RAFIX 22 FS+ "Plus 1", 1.30.273.512/0300

| Emergency stop 1.30.273.512/0300 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | Example image |
| Type | RAFIX 22 FS+ emergency stop button "Plus 1" |  |
| Manufacturer number | $1.30 .273 .512 / 0300$ |  |
| Quantity | 1 |  |
| Contact function | Maintained |  |
| Resetting | By rotating to the right |  |
| Service life (switching cycles) | 50,000 |  |
| B10 value (switching cycles) | 65,000 |  |
|  |  |  |

Table 177: Emergency stop 1.30.273.512/0300
H.9.4.2 Switching element RAFIX 22 FS+ "Plus 1", 1.20.126.514/0000

| Switching element 1.20.126.514/0000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | RAFIX 22 FS+ "Plus 1" |
| Manufacturer number | $1.20 .126 .514 / 0000$ |
| Quantity | 1 |
| Contact system | Self-cleaning bridge contact |
| Contacts | 2 normally closed contact +1 normally open contact |
| Normally closed contact with positive <br> separation per IEC 60947-5-1 | Yes |
| Connection | Connector $2.8 \times 0.8 \mathrm{~mm}$ |
| Service life (switching cycles) | 50,000 at 10 mA 24 VDC |
| B10 value (switching cycles) | 65,000 |
| Min. AC/DC operating voltage | 5 V |
| Max. AC/DC operating voltage | 42 V |
| Min. AC/DC operating current | 1 mA |
| Max. AC/DC operating current | 100 mA |
| Max. switching capacity | 250 mW |

Table 178: Switching element 1.20.126.514/0000
H.9.5 5ACCSE00.0002-000

## General information

- 1x key switch
- $1 x$ switching element


## H.9.5.1 Key switch RAFIX 22 FS+, 1.30.255.432/0000

| Key switch 1.30.255.432/0000 |  |  |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: | :---: |
| Manufacturer | RAFI | RAFIX 22 FS+ |  |  |  |  |
| Type | $1.30 .255 .432 / 0000$ |  |  |  |  |  |
| Manufacturer number | 1 |  |  |  |  |  |
| Quantity | Maintained |  |  |  |  |  |
| Contact function | 500 |  |  |  |  |  |
| Number of possible closings | $2 \times 90^{\circ}$ |  |  |  |  |  |
| Angle of rotation | $0+1+2$ |  |  |  |  |  |
| Key removal position | 50,000 maintained $/ 30,000$ key removal switching cycles |  |  |  |  |  |
| Service life | 65,000 maintained $/ 40,000$ key removal switching cycles |  |  |  |  |  |
| B10 value |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

Table 179: Key switch 1.30.255.432/0000

## H.9.5.1.1 Replacement key for key switch RAFIX 22 FS+ 5.58.007.001/0000

|  | Replacement key 5.58.007.001/0000 |  |  |
| :--- | :--- | :--- | :--- |
| ROHS-compliant | Yes |  |  |
| REACH-compliant |  |  |  |
|  |  |  |  |

H.9.5.2 Switching element RAFIX 22 FS, 1.20.126.105/9000

| Switching element 1.20.126.105/9000 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI |  |
| Type | RAFIX 22 FS |  |
| Manufacturer number | $1.20 .126 .105 / 9000$ |  |
| Quantity | Self-cleaning bridge contact |  |
| Contact system | 2 normally open contacts |  |
| Contacts | Yes |  |
| Normally closed contact with direct <br> opening action per IEC $947-5-1$ | Connector $2.8 \times 0.8 \mathrm{~mm}$ |  |
| Connection | $1,000,000$ |  |
| Service life (switching cycles) | 5 V |  |
| Min. AC/DC operating voltage | 35 V |  |
| Max. AC/DC operating voltage | 1 mA |  |
| Min. AC/DC operating current | 100 mA |  |
| Max. AC/DC operating current | 250 mW |  |
| Max. switching capacity |  |  |

Table 180: Switching element 1.20.126.105/9000

## Appendix H

## H.9.6 5ACCSE00.0003-000

- 1x key switch
- 1x switching element


## H.9.6.1 Key switch RAFIX 22 FS+, 1.30.255.222/0000

| Key switch 1.30.255.222/0000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | RAFIX 22 FS + |
| Manufacturer number | Maintained |
| Contact function | 500 |
| Number of possible closings | $1 \times 90^{\circ}, \mathrm{L}$ form |
| Angle of rotation | $0+1$ |
| Key removal position | 50,000 maintained $/ 30,000$ key removal switching cycles |
| Service life (switching cycles) | 65,000 maintained $/ 40,000$ key removal switching cycles |
| B10 value (switching cycles) | Max. 1.3 Nm |
| Actuation torque |  |
|  |  |

Table 181: Key switch 1.30.255.222/0000

## H.9.6.1.1 Replacement key for key switch RAFIX 22 FS+ 5.58.007.001/0000



## H.9.6.2 Switching element RAFIX 22 FS, 1.20.126.103/9000

| Switching element 1.20.126.103/9000 |  |  |
| :--- | :--- | :--- |
| Manufacturer | RAFI | RAFIX 22 FS |
| Type | $1.20 .126 .103 / 9000$ |  |
| Manufacturer number | 1 | Self-cleaning bridge contact |
| Quantity | 1 normally closed contact +1 normally open contact |  |
| Contact system | Connector $2.8 \times 0.8 \mathrm{~mm}$ |  |
| Contacts | $1,000,000$ at $10 \mathrm{~mA} / 24 \mathrm{VDC}$ |  |
| Connection | 5 V |  |
| Service life (switching cycles) | 42 V |  |
| Min. AC/DC operating voltage | 1 mA |  |
| Max. AC/DC operating voltage | 100 mA |  |
| Min. AC/DC operating current | 250 mW |  |
| Max. AC/DC operating current |  |  |
| Max. switching capacity |  |  |

Table 182: Switching element 1.20.126.103/9000

## H.9.7 5ACCSE00.0004-000

## General information

- 1 x selector switch
- 1x switching element


## H.9.7.1 Selector switch RAFIX 22 FS+, 1.30.272.102/2200

| Selector switch 1.30.272.102/2200 |  |  |  |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: | :---: |
| Manufacturer | RAFI |  |  |  |  |  |
| Type | RAFIX 22 FS+ |  |  |  |  |  |
| Manufacturer number | $1.30 .272 .102 / 2200$ |  |  |  |  |  |
| Illumination | White |  |  |  |  |  |
| Contact function | Maintained |  |  |  |  |  |
| Angle of rotation | $1 \times 90^{\circ}$, L form |  |  |  |  |  |
| Service life (switching cycles) | 300,000 |  |  |  |  |  |
| B10 value (switching cycles) | 400,000 |  |  |  |  |  |
| Actuation torque | Max. 1.5 Nm |  |  |  |  |  |

Table 183: Selector switch 1.30.272.102/2200

## H.9.7.2 Switching element RAFIX FS, 1.20.126.102/9000

| Switching element 1.20.126.102/9000 |  |
| :--- | :--- |
| Manufacturer | RAFI |
| Type | $1.20 .126 .102 / 9000$ |
| Manufacturer number | 1 |
| Quantity | Self-cleaning bridge contact |
| Contact system | 1 normally open contact |
| Contacts | Yes |
| Normally closed contact with direct <br> opening action per IEC $947-5-1$ | Connector 2.8x0.8 mm |
| Connection | LED clip |
| Lamp | $1,000,000$ |
| Service life (switching cycles) | $1,300,000$ |
| B10 value (switching cycles) | 5 V |
| Min. AC/DC operating voltage | 35 V |
| Max. AC/DC operating voltage | 1 mA |
| Min. AC/DC operating current | 100 mA |
| Max. AC/DC operating current | 250 mW |
| Max. switching capacity |  |

Table 184: Switching element 1.20.126.102/9000

## H.9.8 5ACCSE00.0005-000

## H.9.8.1 USB extension RAFIX 22 FS+, 9.30.279.003/0700

## Caution!

IP65 protection can only be achieved if the USB protective cover is properly installed.

## Caution!

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

| USB extension 9.30.279.003/0700 |  |  |
| :---: | :---: | :---: |
| Manufacturer | RAFI |  |
| Type | RAFIX $22 \mathrm{FS}+$ |  |
| Manufacturer number | 9.30.279.003/0700 | $)$ |
| Standard | USB 2.0 |  |
| Variant | Type A, female |  |
| Transfer rate | Low speed (1.5 Mbit/s) |  |
|  | Full speed (12 Mbit/s) |  |
|  | High speed (480 Mbit/s) ${ }^{1)}$ |  |
| Current-carrying capacity ${ }^{2}$ ) | Max. 500 mA |  |
| Cable length |  |  |
| USB 2.0 | 400 mm |  |

Table 185: USB extension 9.30.279.003/0700

1) In SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ ) In SDL4 operation: Low speed (1.5 Mbit/s), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 500 mA ).

[^0]:    1) Editorial corrections are not listed.
[^1]:    1) The measured temperature is a guide value for the immediate ambient temperature, but it may have been influenced by neighboring components
[^2]:    1) IEC 61010-2-201 requirements must be observed.
[^3]:    1) Two columns form 1 interval of 500 ms each.
    2) S 5 : Soft-off
[^4]:    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.
[^5]:    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.
[^6]:    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.
[^7]:    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.
[^8]:    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.
[^9]:    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.
[^10]:    1) Only with proper installation on the panel and proper installation on the swing arm.
[^11]:    1) Only with proper installation on the panel and proper installation on the swing arm.
[^12]:    1) In SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ ) In SDL4 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
    2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A ).
[^13]:    1) In SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ ) In SDL4 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
    2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A ).
[^14]:    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 SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $30 \mathrm{Mbit} / \mathrm{s}$ ) In SDL4 operation: Low speed ( $1.5 \mathrm{Mbit} / \mathrm{s}$ ), full speed ( $12 \mathrm{Mbit} / \mathrm{s}$ ) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
    3) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A ).
[^15]:    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 SDL operation without USB cable (mode 1), the USB transfer rate is limited to USB 1.1. In SDL3 operation: Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (30 Mbit/s) In SDL4 operation: Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed ( $150 \mathrm{Mbit} / \mathrm{s}$ )
    3) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A).
[^16]:    1) Active State Power Management
[^17]:    1) Trusted Platform Module
[^18]:    1) Voltage regulator (module)
[^19]:    3) Starting from version $1.0 x$, version 1.10 must first be installed before a version $>1.10$ can be installed.
[^20]:    1) At $50^{\circ} \mathrm{C}, 6 \mu \mathrm{~A}$ 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.
[^21]:    ${ }^{5)}$ Can be downloaded from the Downloads section of the B\&R website (www.br-automation.com).

[^22]:    1) The alarm contact is only momentary and not designed as a maintained contact
