Panel PC 2200 panel mount devices

User's manual

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1 Introduction

Information:

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

1.1 Manual history

Version	Date	Comment[1)]
2.01	September 2022	Updated document. • Updated "5ACCIF01.IS00-000" on page 165. • Updated "Order number key" on page 18. • Updated "AP9x3 panels" on page 58 and "AP1000 panels" on page 77. • Updated "Installation accessories" on page 244. • Updated "Upgrade information" on page 216. • Updated "International and national certifications" on page 249. • Name change from "B&R Linux" to "Linux for B&R".
2.00	December 2021	Updated document. • Added panels "5AP1130.101D-000" on page 87, "5AP1130.121E-010" on page 107 and "5AP1130.156C-001" on page 124. • Updated "Linux for B&R 10 (GNU/Linux)" on page 225. • Updated "Windows 10 IoT Enterprise 2019 LTSC" on page 219. • Updated "DNV certification " on page 251. • Updated "Automation software" on page 228. • Updated "Block diagram" on page 39. • Updated "UEFI BIOS options" on page 190. • Updated "Product information" on page 21. • Updated "Changing the battery" on page 240. • EN 60950 replaced by IEC 61010-2-201. • Cables and USB mass storage device are described in their own documentation starting with this version. • Updated the CAN interface description, see sections "Interface options" on page 131 and "Cable data" on page 264.
1.10	August 2019	Updated section "General safety guidelines" on page 11. Updated the following in section "Software" on page 190: • "UEFI BIOS options" on page 190 • "OEM features" on page 200 • "Upgrade information" on page 216 • "Operating systems" on page 219
1.05	December 2018	Updated document.
1.00	November 2018	First version.

1) Editorial corrections are not listed.

1.2 Information about this document

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

1.2.1 Organization of notices

Safety notices

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

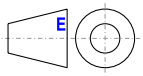
Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	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 DIN ISO 2768 medium
Up to 6 mm	±0.1 mm
Over 6 to 30 mm	±0.2 mm
Over 30 to 120 mm	±0.3 mm
Over 120 to 400 mm	±0.5 mm
Over 400 to 1000 mm	±0.8 mm

2 General safety guidelines

2.1 Intended use

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

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

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

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

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

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

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

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

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

Electrical assemblies without housing

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

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

Individual components

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

2.3 Regulations and measures

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

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

All work such as installation, commissioning and servicing are only permitted to be carried out by qualified personnel. Qualified personnel are persons who are familiar with the transport, installation, assembly, commissioning and operation of the product and have the appropriate qualifications for their job (e.g. IEC 60364). National accident prevention regulations must be observed.
The safety guidelines, information about connection conditions (nameplate and documentation) and limit values specified in the technical data must be read carefully before installation and commissioning and must be strictly observed.

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against contact with electrical parts

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

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

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

2.6.2 Ambient conditions - Dust, moisture, aggressive gases

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

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

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

2.6.3 Programs, viruses and malicious programs

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

2.7 Cybersecurity disclaimer for products

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

Information:

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

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

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

The aforementioned appropriate security measures include, for example:

- Segmentation of the network (e.g. separation of the IT network from the control network[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 built-in device.

3.2 Description of individual modules

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
- 1x interface option slot
- Fanless operation
- Real time clock, RTC (battery-backed)
- TPM 2.0 security

3.2.2 AP9x3 panels

AP9x3 panels form the basis for the Automation Panel 9x3, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 system families. They consist of a display and touch screen. Different display diagonals and touch screen technologies are available. The panels are installed using retaining clips.

Single-touch panels start with order number 5AP923.xxxx-xx; multi-touch panels start with order number 5AP933.xxxx-xx.

The panels can only be operated as a complete system in combination with a link module or Panel PC.

3.2.3 AP1000 panels

AP1000 panels form the basis for the Automation Panel 1000, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 system families. Different display diagonals and touch screentechnologies as well as panels with touch screen and keys are available.

Panels are installed using retaining clips or clamping blocks.

The panels can only be operated as a complete system in combination with a link module or Panel PC.

3.3 Configuration

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

- Panel
- System unit
- CFast card for the operating system
- Operating system

Base system - Configuration

Panels — Select 1.





	Diagonal	Resolution	Touch screen	Keys	Format
923 panels					
5AP923.1215-00	12.1"	XGA	Single-touch	No	Landscape
5AP923.1505-00	15.0"	XGA	Single-touch	No	Landscape
5AP923.1906-00	19.0"	SXGA	Single-touch	No	Landscape
933 panels					
5AP933.156B-00	15.6"	HD	Multi-touch	No	Landscape
5AP933.185B-00	18.5"	HD	Multi-touch	No	Landscape
5AP933.215C-00	21.5"	FHD	Multi-touch	No	Landscape
5AP933.240C-00	24.0"	FHD	Multi-touch	No	Landscape
1120 panels					
5AP1120.0573-000	5.7"	VGA	Single-touch	No	Landscape
5AP1120.0702-000	7.0"	WVGA	Single-touch	No	Landscape
5AP1120.101E-000	10.1"	WXGA	Single-touch	No	Landscape
5AP1120.1043-000	10.4"	VGA	Single-touch	No	Landscape
5AP1120.1214-000	12.1"	SVGA	Single-touch	No	Landscape
5AP1120.121E-000	12.1"	WXGA	Single-touch	No	Landscape
5AP1120.1505-000	15.0"	XGA	Single-touch	No	Landscape
5AP1120.156B-000	15.6"	HD	Single-touch	No	Landscape
5AP1120.1906-000	19.0"	SXGA	Single-touch	No	Landscape
1130 panels					
5AP1130.0702-000	7.0"	WVGA	Multi-touch	No	Landscape
5AP1130.101D-000	10.1"	WUXGA	Multi-touch	No	Landscape
5AP1130.101E-000	10.1"	WXGA	Multi-touch	No	Landscape
5AP1130.121E-000	12.1"	WXGA	Multi-touch	No	Landscape
5AP1130.121E-010	12.1"	WXGA	Multi-touch	No	Landscape
5AP1130.156C-000	15.6"	FHD	Multi-touch	No	Landscape
5AP1130.156C-001	15.6"	FHD	Multi-touch	No	Landscape
5AP1130.185C-000	18.5"	FHD	Multi-touch	No	Landscape
1151 panels					
5AP1151.0573-000	5.7"	VGA	No	Yes	Portrait
1180 panels					
5AP1180.1043-000	10.4"	VGA	Single-touch	Yes	Landscape
5AP1180.1505-000	15.0"	XGA	Single-touch	Yes	Landscape
1181 panels					
5AP1181.1043-000	10.4"	VGA	Single-touch	Yes	Portrait
5AP1181.1505-000	15.0"	XGA	Single-touch	Yes	Landscape
1182 panels					
5AP1182.1043-000	10.4"	VGA	Single-touch	Yes	Landscape

System units — Select 1.

System unit	Processor	Processor - Clock frequency	Cores	Main memory type	Main memory size
5PPC2200.AL02-000	Intel Atom x5-E3930	1300 MHz	2	LPDDR4 SDRAM	2 GB
5PPC2200.AL04-000	Intel Atom x5-E3930	1300 MHz	2	LPDDR4 SDRAM	4 GB
5PPC2200.AL14-000	Intel Atom x5-E3940	1600 MHz	4	LPDDR4 SDRAM	4 GB
5PPC2200.AL18-000	Intel Atom x5-E3940	1600 MHz	4	LPDDR4 SDRAM	8 GB

Mass storage devices — Select 1.

CFast cards

5CFAST.2048-00 5CFAST.4096-00 5CFAST.8192-00 5CFAST.016G-00 5CFAST.032G-00	5CFAST.032G-10 5CFAST.064G-10 5CFAST.128G-10 5CFAST-256G-10

Interfaces

Battery compartment — Selected automatically[1)]

5ACCBT01.0000-001

1) The battery compartment is selected automatically.

Accessories and software - Configuration				
Interfaces				
	**Interface options**			Optional, select 1.
	5ACCIF01.FPCC-000 5ACCIF01.FPLK-000 5ACCIF01.FPLS-001 5ACCIF01.FPSC-001 5ACCIF01.ICAN-000 5ACCIF03.CETH-000		5ACCIF01.FPCS-000 5ACCIF01.FPLS-000 5ACCIF01.FPSC-000 5ACCIF01.FSS0-000 5ACCIF01.IS00-000	
Accessories				Optional selection
	5MMUSB.2048-01	5MMUSB.4096-01	5MMUSB.4096-02	5MMUSB.032G-02
Terminal blocks				Select 1.
	**Power supply connectors** 0TB103.9 0TB103.91			
	Terminal block for IF option 0TB1210.3100			
Operating systems				Select 1.
	**Windows 10** 5SWW10.0545-MUL 5SWW10.0559-MUL 5SWW10.0900-MUL		**B&R Linux 10** 5SWLIN.0845-MUL **B&R Linux 9** 5SWLIN.0745-MUL 5SWLIN.0759-MUL	**Automation Runtime** 0TG1000.01 0TG1000.02 1TC4601.06-5 1TG4601.06-5 1TG4601.06-T

3.3.1 Order number key

> **Information:**
>
> **A current order number key is available on the B&R website for easy identification of the device configuration:**
>
> Home > Downloads > Industrial PCs and panels > Panel PC 2200

3.4 Overview

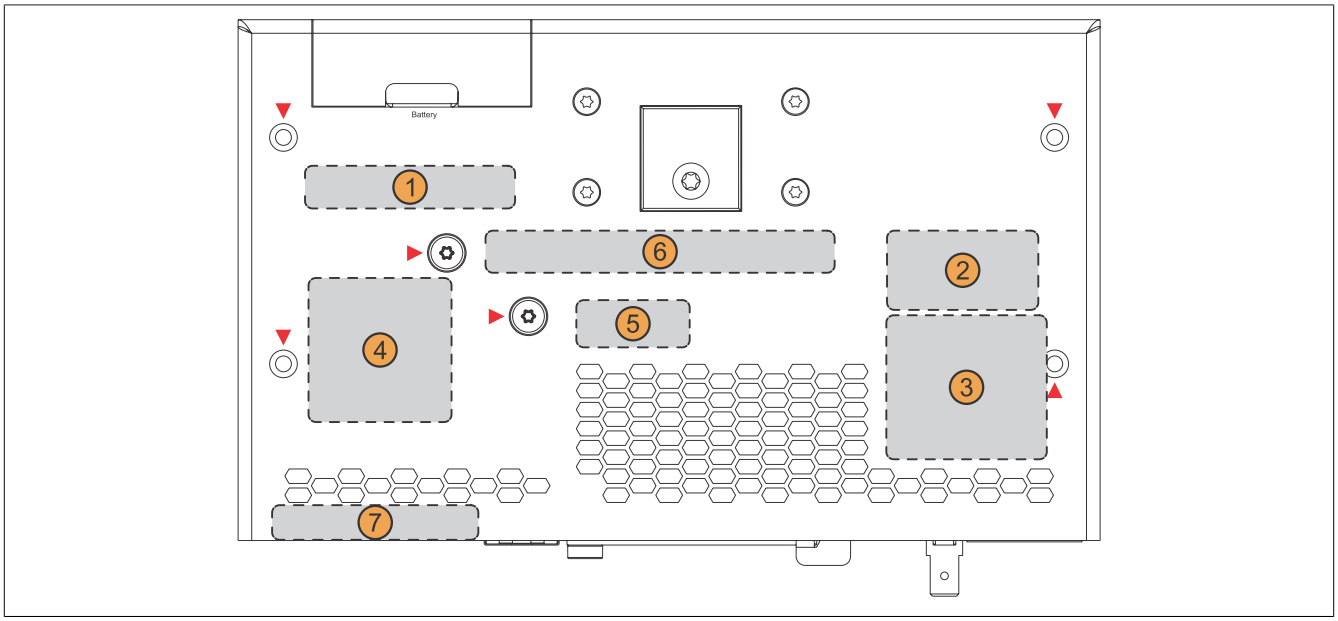
Order number	Short description	Page
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	245
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	245
5ACCBT01.0000-001	Battery compartment - Dark gray - Includes battery - For APC2200/PPC2200	170
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	238
	Hypervisor	
1TC4700.00	License for B&R Hypervisor (TC). One license per target system is required.	228
	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	131
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	136
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	140
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	143
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	146
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	149
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	153
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	158
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	162
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	165
5ACCIF03.CETH-000	Interface card - 2x ETH 10/100/1000 interface - For APC2200/PPC2200 - Only available with a new device	167
	Linux for B&R 10	
5SWLIN.0845-MUL	Linux for B&R 10 - 64-bit - Multilingual - PPC2200 (UEFI boot) - Installation - Only available with a new device	225
	Linux for B&R 9	
5SWLIN.0745-MUL	Linux for B&R 9 - 64-bit - Multilingual - PPC2200 (UEFI boot) - Installation - Only available with a new device	226
5SWLIN.0759-MUL	Linux for B&R 9 - 64-bit - Multilingual - PPC2200 (Legacy BIOS boot) - Installation - Only available with a new device	226
	Other	
5ACCRHMI.0006-000	HMI installation tool for control cabinet - 1x torque wrench 0.4 - 2.0 Nm - 1x hex head bit 2.5, length 89 mm - 1x hex head bit 3.0, length 89 mm - 1x hex head bit 5.0, length 89 mm - 1x Torx 10 bit, length 90 mm - 1x Torx 20 bit, length 89 mm	244
	Panels	
5AP1120.0573-000	Automation Panel 5.7" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC2200 / link modules - Compatible with 5PP520.0573-00	77
5AP1120.0702-000	Automation Panel 7" WVGA TFT - 800 x 480 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC2200 / link modules - Compatible with 5PP520.0702-00	83
5AP1120.101E-000	Automation Panel 10.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	89
5AP1120.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP520.1043-00	93
5AP1120.1214-000	Automation Panel 12.1" SVGA TFT - 800 x 600 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP520.1214-00	103
5AP1120.121E-000	Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	105
5AP1120.1505-000	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP520.1505-00, 5AP920.1505-01, 5PC720.1505-xx, 5PC820.1505-00	111
5AP1120.156B-000	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	119
5AP1120.1906-000	Automation Panel 19.0" SXGA TFT - 1280 x 1024 pixels (5:4) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5AP920.1906-01, 5PC720.1906-00, 5PC820.1906-00	128
5AP1130.0702-000	Automation Panel 7.0" WVGA TFT - 800 x 480 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC2200 / link modules - Compatible with 5PP520.0702-00	85
5AP1130.101D-000	Automation Panel 10.1" High Resolution - 1920 x 1200 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100/PPC3100/PPC2200 - For link modules	87
5AP1130.101E-000	Automation Panel 10.1" WXGA TFT - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	91
5AP1130.121E-000	Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	109
5AP1130.121E-010	Automation Panel 12.1" sunlight readable - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100/PPC3100/PPC2200 - For link modules	107
5AP1130.156C-000	Automation Panel 15.6" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	122

Order number	Short description	Page
5AP1130.156C-001	Automation Panel 15.6" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - Optical bonding - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	124
5AP1130.185C-000	Automation Panel 18.5" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	126
5AP1151.0573-000	Automation Panel 5.7" VGA TFT - 640 x 480 pixels (4:3) - Control cabinet installation - Portrait format - 22 function keys and 20 system keys - For PPC2100 / PPC2200 / link modules - Compatible with 5PP551.0573-00	80
5AP1180.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 22 function keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP580.1043-00, 5AP980.1043-01	95
5AP1180.1505-000	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 32 function keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP580.1505-00, 5AP980.1505-01	113
5AP1181.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Portrait format - Front USB - 38 function keys and 20 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP581.1043-00, 5AP981.1043-01, 5PC781.1043-00	98
5AP1181.1505-000	Automation Panel 15" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 32 function keys and 92 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP581.1505-000	116
5AP1182.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 44 function keys and 20 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP582.1043-00, 5AP982.1043-01, 5PC782.1043-00	101
5AP923.1215-00	Automation Panel 12.1" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	58
5AP923.1505-00	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	60
5AP923.1906-00	Automation Panel 19.0" SXGA TFT - 1280 x 1024 pixels (5:4) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	62
5AP933.156B-00	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	65
5AP933.185B-00	Automation Panel 18.5" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	68
5AP933.215C-00	Automation Panel 21.5" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	71
5AP933.240C-00	Automation Panel 24.0" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	74
	Runtime	
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	228
	System units	
5PPC2200.AL02-000	PPC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 2 GB SDRAM	55
5PPC2200.AL04-000	PPC2200 system unit - Intel Atom E3930 1.30 GHz - Dual core - 4 GB SDRAM	55
5PPC2200.AL14-000	PPC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 4 GB SDRAM	55
5PPC2200.AL18-000	PPC2200 system unit - Intel Atom E3940 1.60 GHz - Quad core - 8 GB SDRAM	55
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	228
0TG1000.02	Technology Guard (HID)	228
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	228
1TG4601.06-5	Automation Runtime Embedded, TG license	228
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	228
1TG4700.00	B&R Hypervisor	228
	Terminal blocks	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	246
	Windows 10 IoT Enterprise 2016 LTSB	
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	222
5SWW10.0559-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2200 (Legacy BIOS boot) - CPU E3930/E3940 - License - Only available with a new device	222
	Windows 10 IoT Enterprise 2019 LTSC	
5SWW10.0900-MUL	Windows 10 IoT Enterprise 2019 LTSC: - 64-bit - Entry - Multilingual - License - Only available with a new device	219

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 21
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)
▼	These holes are intended for installing/removing the panel PC on the panel.

4.1.1.1 Identification

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

The device number can be retrieved from the B&R website (www.br-automation.com) 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

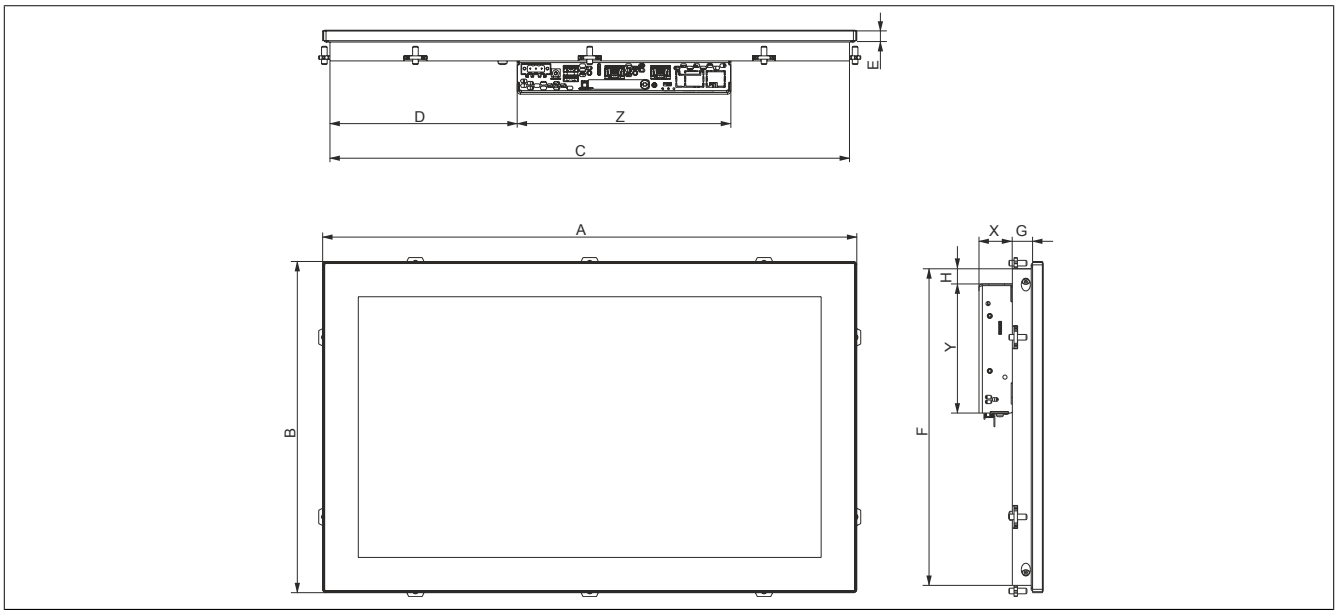
Information:

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.

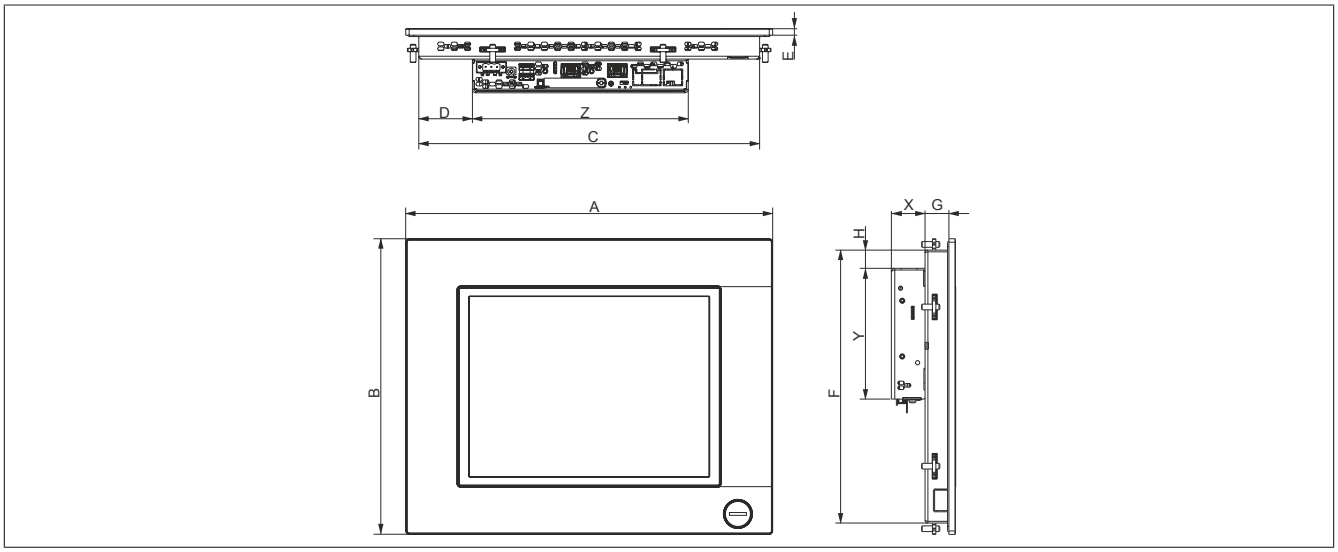
2D and 3D data (DXF and STEP formats) can be downloaded from the B&R website (www.br-automation.com). To do this, search for the order number of the device using the search bar.

AP9x3 panels - Dimensions



Display type	Model number	A	B	C	D	E	F	G	H
12.1" single-touch	5AP923.1215-00	315	239	302	48	9	226	13.5	13.5
15.0" single-touch	5AP923.1505-00	370	288	357	84.5	9	275	14.5	13.5
15.6" multi-touch	5AP933.156B-00	414	258.5	401	105.5	9	245.5	20	13.5
18.5" multi-touch	5AP933.185B-00	475	295	462	166.5	9	282	18	13.5
19.0" single-touch	5AP923.1906-00	440	358	427	149	9	345	23	13.5
21.5" multi-touch	5AP933.215C-00	541.5	333	528.5	199.75	9	320	18	13.5
24.0" multi-touch	5AP933.240C-00	598.5	364	585.5	228.25	9	351	18	13.5
Components									
Type	**Order number**	**X**	**Y**	**Z**					
System units	5PPC2200.ALxx-000	29.7	115	190					

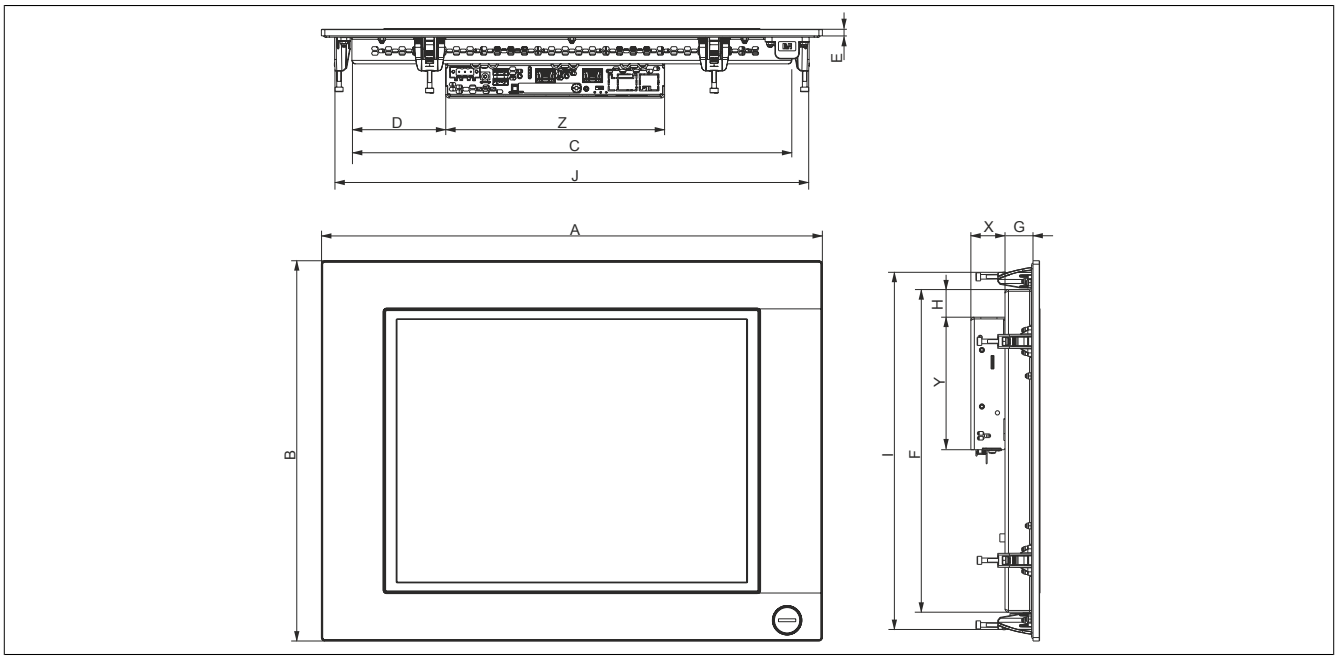
AP1000 panels with retaining clips - Dimensions



Display type	Model number	A	B	C	D	E	F	G	H
5.7" single-touch	5AP1120.0573-000	212	156	196	3	5.7	140	19.5	2.5
5.7" with buttons	5AP1151.0573-000	212	245	196	3	5.7	229	19.5	2.5
7.0" single-touch	5AP1120.0702-000	212	156	196	3	5.7	140	19.5	2.5
7.0" multi-touch	5AP1130.0702-000	209	153	196	3	9	140	20	7.25
10.1" single-touch	5AP1120.101E-000	279	191	266	38	9	178	18	13.5
10.1" multi-touch	5AP1130.101D-000	279	191	266	38	9	178	18	13.5
10.1" multi-touch	5AP1130.101E-000	279	191	266	38	9	178	18	13.5
10.4" single-touch	5AP1120.1043-000	323	260	300	47.2	5.7	240	21	16
10.4" single-touch with keys	5AP1180.1043-000	323	260	300	47.2	5.7	240	21	16
12.1" single-touch	5AP1120.121E-000	324	221.5	311	60.5	9	208.5	18	13.5
12.1" multi-touch	5AP1130.121E-000	324	221.5	311	60.5	9	208.5	18	13.5
12.1" multi-touch	5AP1130.121E-010	324	221.5	311	60.5	9	208.5	18	13.5
15.6" single-touch	5AP1120.156B-000	414	258.5	401	105.5	9	245.5	20	13.5
15.6" multi-touch	5AP1130.156C-000	414	258.5	401	105.5	9	245.5	20	13.5

Display type	Model number	A	B	C	D	E	F	G	H
15.6" multi-touch	5AP1130.156C-001	414	258.5	401	105.5	9	245.5	20	13.5
18.5" multi-touch	5AP1130.185C-000	475	295	462	166.5	9	282	18	13.5
Components									
Type	**Order number**	**X**	**Y**	**Z**					
System units	5PPC2200.ALxx-000	29.7	115	190					

AP1000 panels with clamping blocks - Dimensions



AP9x3	Model number	A	B	C	D	E	F	G	H	I	J
10.4" single-touch with keys	5AP1181.1043-000	323	358	270	70.5	5.7	305	21.3	17.5	338	300
10.4" single-touch with keys	5AP1182.1043-000	423	288	355.5	70.5	5.7	234	21.3	17.5	268	400
12.1" single-touch	5AP1120.1214-000	362	284	309	52.5	5.7	234	20.3	17.5	264	339
15.0" single-touch	5AP1120.1505-000	435	330	382	81.5	5.7	280	24.3	24	310	412
15.0" single-touch with keys	5AP1180.1505-000	435	330	382	81.5	5.7	280	24.3	24	310	412
15.0" single-touch with keys	5AP1181.1505-000	435	430	382	81.5	5.7	380	24.3	24	410	413
19.0" single-touch	5AP1120.1906-000	527	421	445	186.5	5.7	351	23.3	19.3	401	507
Components											
Type	**Order number**	**X**	**Y**	**Z**							
System units	5PPC2200.ALxx-000	29.7	115	190							

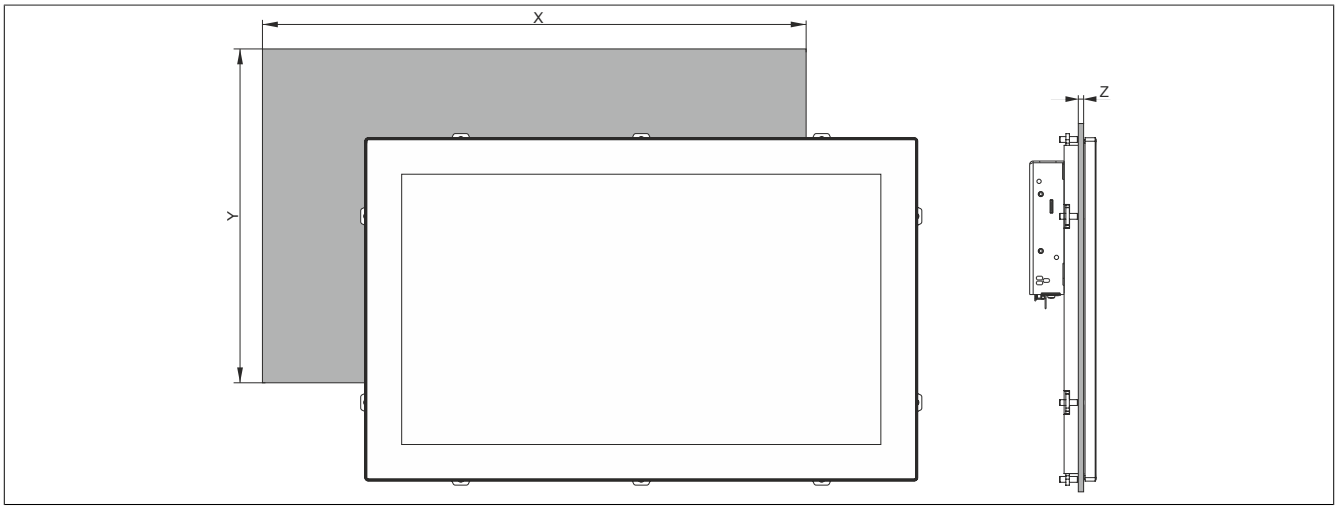
4.1.2.2 Installation diagrams

Information:

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

The cutout tolerances are +0 mm / -0.5 mm.

AP9x3 panels - Installation diagrams

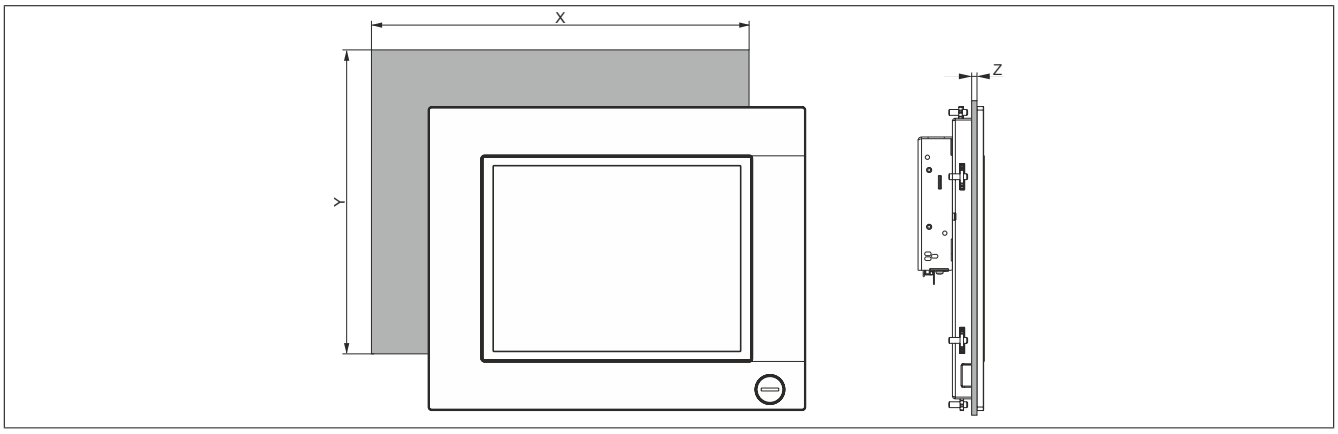


Panels						
Type	**Model number**	**X**	**Y**	**Z min.**	**Z max.**	**Number of retaining clips**
12.1" single-touch	5AP923.1215-00	304	228	1	6	10
15.0" single-touch	5AP923.1505-00	359	277	1	6	10
19.0" single-touch	5AP923.1906-00	429	347	1	6	12
15.6" multi-touch	5AP933.156B-00	403	247.5	1	6	10
18.5" multi-touch	5AP933.185B-00	464	284	1	6	10
21.5" multi-touch	5AP933.215C-00	530.5	322	1	6	14
24.0" multi-touch	5AP933.240C-00	587.5	353	1	6	14

Dimension "Z" describes the thickness of the wall or control cabinet plate.

A hex screwdriver is needed to tighten and loosen the screw on the retaining clips. The maximum tightening torque of the retaining clips is 1 Nm.

AP1000 panels with retaining clips - Installation diagrams



Panels						
Type	**Model number**	**X**	**Y**	**Z min.**	**Z max.**	**Number of retaining clips**
5.7" single-touch	5AP1120.0573-000	199	143	1	8	4
5.7" with buttons	5AP1151.0573-000	199	232	1	8	6
7.0" single-touch	5AP1120.0702-000	199	143	1	8	4
7.0" multi-touch	5AP1130.0702-000	199	143	1	8	4
10.1" single-touch	5AP1120.101E-000	268	180	1	6	8
10.1" multi-touch	5AP1130.101D-000	268	180	1	6	8
10.1" multi-touch	5AP1130.101E-000	268	180	1	6	8
10.4" single-touch	5AP1120.1043-000	303	243	1	10	8
10.4" single-touch with keys	5AP1180.1043-000	303	243	1	10	8
12.1" single-touch	5AP1120.121E-000	313	210.5	1	6	10
12.1" multi-touch	5AP1130.121E-000	313	210.5	1	6	10
12.1" multi-touch	5AP1130.121E-010	313	210.5	1	6	10
15.6" single-touch	5AP1120.156B-000	403	247.5	1	6	10
15.6" multi-touch	5AP1130.156C-000	403	247.5	1	6	10
15.6" multi-touch	5AP1130.156C-001	403	247.5	1	6	10
18.5" multi-touch	5AP1130.185C-000	464	284	1	6	10

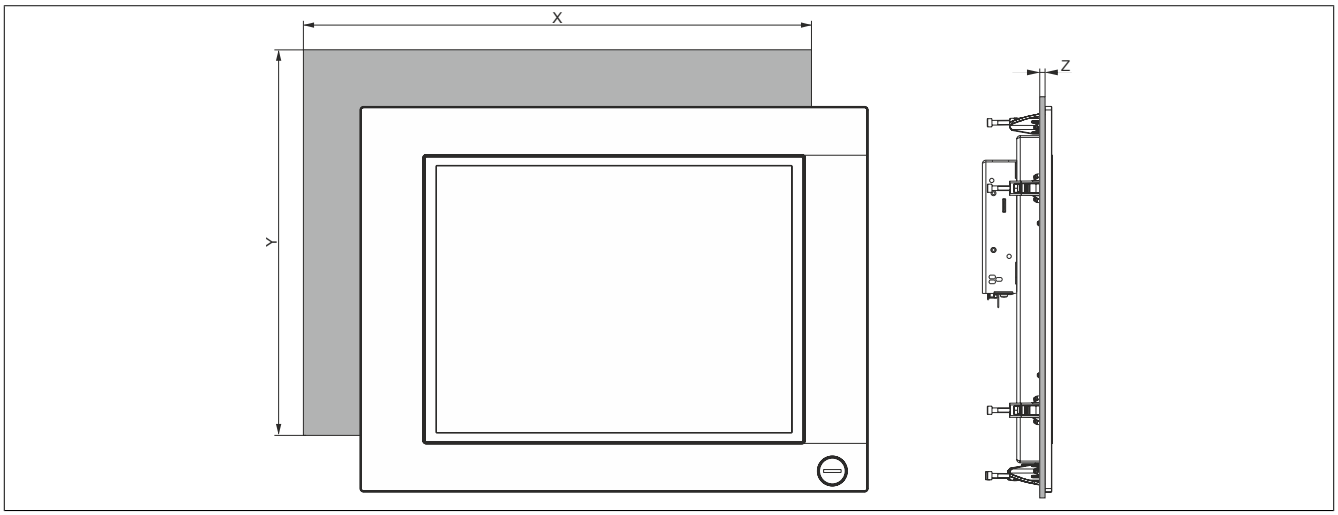
Dimension "Z" describes the thickness of the wall or control cabinet plate.

A 2.5 mm hex screwdriver is needed to tighten and remove the screw on the retaining clips. The maximum tightening torque of the retaining clips is 1 Nm.

Information:

A minimum circumferential distance of 30 mm must be maintained in order to enable installation with retaining clips.

AP1000 panels with clamping blocks - Installation diagrams



Panels						
Type	**Model number**	**X**	**Y**	**Z min.**	**Z max.**	**Number of clamping blocks**
10.4" single-touch with keys	5AP1181.1043-000	303	341	2	10	10
10.4" single-touch with keys	5AP1182.1043-000	403	271	2	10	8
12.1" single-touch	5AP1120.1214-000	342	267	2	10	8
15.0" single-touch	5AP1120.1505-000	415	313	2	10	8
15.0" single-touch with keys	5AP1180.1505-000	415	313	2	10	8
15.0" single-touch with keys	5AP1181.1505-000	415	413	2	10	10
19.0" single-touch	5AP1120.1906-000	510	404	2	10	12

Dimension "Z" describes the thickness of the wall or control cabinet plate.

A 3 mm hex screwdriver is needed to tighten or remove the screw on the clamping blocks. The maximum tightening torque of the clamping block is 0.5 Nm.

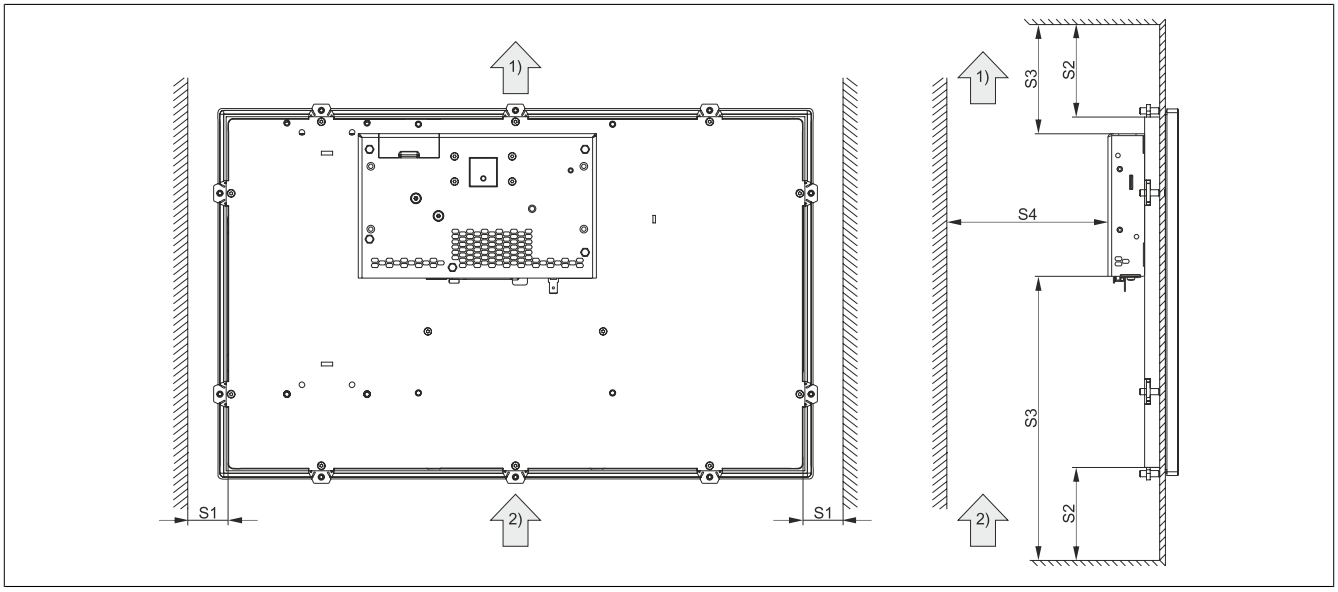
4.1.2.3 Spacing for air circulation

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

Information:

The following figure and table exclusively show the thermal view of the complete system. If additional space is required for operating or servicing the device, this must be taken into account during installation.

The air inlet and air outlet are shown in the following figure. Because the warm air rises from bottom to top, the air inlet is at the bottom.



Legend			
1)	Air outlet	2)	Air inlet

Name	Minimum spacing [mm]	Name	Minimum spacing [mm]
S1	≥20	S2	≥50
S3	≥100	S4	≥50

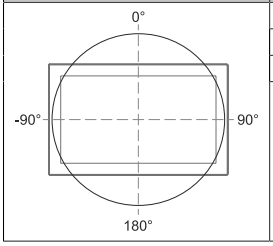
Caution!

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

If the specified spacing for air circulation cannot be maintained, the maximum specified temperatures of the temperature sensors (see "Temperature sensor positions" on page 36) must be monitored in the application and appropriate measures taken if these values are exceeded.

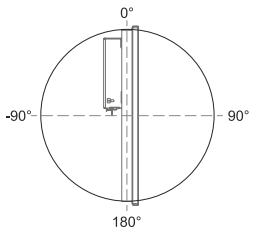
4.1.2.4 Mounting orientations

The following figures show the specified mounting orientations of Panel PC 2200 devices. An PPC2200 is only permitted to be installed as shown or described below.



Inclination [°]	Derating [°C]
0	No limitation
Up to ±90	-5
180	No limitation

-



Inclination [°]	Derating [°C]
0	No limitation
Up to ±90	-5
180	No limitation

-

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

4.1.2.5 Weight specifications

AP9x3 panels

Type	Order number	Weight [g]
12.1" single-touch	5AP923.1215-00	2200
15.0" single-touch	5AP923.1505-00	3700
19.0" single-touch	5AP923.1906-00	5800
15.6" multi-touch	5AP933.156B-00	3850
18.5" multi-touch	5AP933.185B-00	4470
21.5" multi-touch	5AP933.215C-00	5400
24.0" multi-touch	5AP933.240C-00	7800

AP1000 panels

Type	Model number	Weight [g]
5.7" single-touch	5AP1120.0573-000	1100
5.7" keys	5AP1151.0573-000	1400
7.0" single-touch	5AP1120.0702-000	900
7.0" multi-touch	5AP1130.0702-000	1200
10.1" multi-touch	5AP1130.101D-000	2000
10.1" single-touch	5AP1120.101E-000	1900
10.1" multi-touch	5AP1130.101E-000	2000
10.4" single-touch	5AP1120.1043-000	2800
10.4" single-touch with keys	5AP1180.1043-000	2800
10.4" single-touch with keys	5AP1181.1043-000	3400
10.4" single-touch with keys	5AP1182.1043-000	3500
12.1" single-touch	5AP1120.1214-000	3200
12.1" single-touch	5AP1120.121E-000	2300
12.1" multi-touch	5AP1130.121E-000	2400
12.1" multi-touch	5AP1130.121E-010	2900
15.0" single-touch	5AP1120.1505-000	5000
15.0" single-touch with keys	5AP1180.1505-000	4900
15.0" single-touch with keys	5AP1181.1505-000	6000
15.6" single-touch	5AP1120.156B-000	4200
15.6" multi-touch	5AP1130.156C-000	3700
15.6" multi-touch	5AP1130.156C-001	3800
18.5" multi-touch	5AP1130.185C-000	4700
19.0" single-touch	5AP1120.1906-000	7300

System units and components

Component	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
	5ACCIF01.IS00-000	25
	5ACCIF03.CETH-000	25

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 component-dependent overview of the maximum, minimum and typical possible ambient temperatures resulting from these combinations.

Information:

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

Information about worst-case conditions

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

4.1.3.1.1 Maximum ambient temperature for worst-case operation

All temperature specifications in degrees Celsius [°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°C per 1000 meters starting at 500 m above sea level.		**5PPC2200.AL02-000** (E3930 1.3 GHz)	**5PPC2200.AL04-000** (E3930 1.3 GHz)	**5PPC2200.AL14-000** (E3940 1.6 GHz)	**5PPC2200.AL18-000** (E3940 1.6 GHz)
		55	**55**	**50**	**50**
Maximum ambient temperature (accessories)					
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓
	5AP923.1906-00 ≤ D0	50	50	✓	✓
	5AP923.1906-00 ≥ E0	✓	✓	✓	✓
	5AP933.156B-00 ≤ C0	50	50	✓	✓
	5AP933.156B-00 ≥ D0	✓	✓	✓	✓
	5AP933.185B-00	50	50	✓	✓
	5AP933.215C-00 ≤ C0	40	40	40	40
	5AP933.215C-00 ≥ D0	50	50	✓	✓
	5AP933.240C-00 ≤ C0	40	40	40	40
	5AP933.240C-00 ≥ D0	50	50	✓	✓
AP1000 panels	5AP1120.0573-000	✓	✓	✓	✓
	5AP1151.0573-000	✓	✓	✓	✓
	5AP1120.0702-000	✓	✓	✓	✓
	5AP1130.0702-000	✓	✓	✓	✓
	5AP1130.101D-000	✓	✓	✓	✓
	5AP1120.101E-000	50	50	✓	✓
	5AP1130.101E-000	50	50	✓	✓
	5AP1120.1043-000	✓	✓	✓	✓
	5AP1180.1043-000	✓	✓	✓	✓
	5AP1181.1043-000	✓	✓	✓	✓
	5AP1182.1043-000	✓	✓	✓	✓
	5AP1120.1214-000	✓	✓	✓	✓
	5AP1120.121E-000	✓	✓	✓	✓
	5AP1130.121E-000	✓	✓	✓	✓
	5AP1130.121E-010	50	50	45	45
	5AP1120.1505-000	✓	✓	✓	✓
	5AP1180.1505-000	✓	✓	✓	✓
	5AP1181.1505-000	✓	✓	✓	✓
	5AP1120.156B-000	✓	✓	✓	✓
	5AP1130.156C-000	✓	✓	✓	✓
	5AP1130.156C-001	✓	✓	✓	✓
	5AP1130.185C-000	50	50	✓	✓
	5AP1120.1906-000	✓	✓	✓	✓
CFast cards	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓

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	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓
	5ACCIF01.IS00-000	✓	✓	✓	✓
	5ACCIF03.CETH-000	✓	✓	45	45

4.1.3.1.2 Minimum ambient temperature for worst-case operation

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Minimum worst-case ambient temperature (system unit 5PPC2200.ALxx-000)**			
		5PPC2200.AL02-000 (E3930 1.3 GHz)	**5PPC2200.AL04-000** (E3930 1.3 GHz)	**5PPC2200.AL14-000** (E3940 1.6 GHz)	**5PPC2200.AL18-000** (E3940 1.6 GHz)
		-25	**-25**	**-25**	**-25**
Minimum ambient temperature (accessories)					
AP9x3 panels	5AP923.1215-00	-20	-20	-20	-20
	5AP923.1505-00	-20	-20	-20	-20
	5AP923.1906-00 ≤ D0	0	0	0	0
	5AP923.1906-00 ≥ E0	-20	-20	-20	-20
	5AP933.156B-00 ≤ C0	0	0	0	0
	5AP933.156B-00 ≥ D0	-10	-10	-10	-10
	5AP933.185B-00	0	0	0	0
	5AP933.215C-00 ≤ C0	0	0	0	0
	5AP933.215C-00 ≥ D0	0	0	0	0
	5AP933.240C-00 ≤ C0	0	0	0	0
	5AP933.240C-00 ≥ D0	-10	-10	-10	-10
AP1000 panels	5AP1120.0573-000	-10	-10	-10	-10
	5AP1151.0573-000	0	0	0	0
	5AP1120.0702-000	-20	-20	-20	-20
	5AP1130.0702-000	-10	-10	-10	-10
	5AP1130.101D-000	-10	-10	-10	-10
	5AP1120.101E-000	-20	-20	-20	-20
	5AP1130.101E-000	-10	-10	-10	-10
	5AP1120.1043-000	-20	-20	-20	-20
	5AP1180.1043-000	-20	-20	-20	-20
	5AP1181.1043-000	-20	-20	-20	-20
	5AP1182.1043-000	-20	-20	-20	-20
	5AP1120.1214-000	-20	-20	-20	-20
	5AP1120.121E-000	-20	-20	-20	-20
	5AP1130.121E-000	-10	-10	-10	-10
	5AP1130.121E-010	-10	-10	-10	-10
	5AP1120.1505-000	-20	-20	-20	-20
	5AP1180.1505-000	-20	-20	-20	-20
	5AP1181.1505-000	-20	-20	-20	-20
	5AP1120.156B-000	-20	-20	-20	-20
	5AP1130.156C-000	-10	-10	-10	-10
	5AP1130.156C-001	-10	-10	-10	-10
	5AP1130.185C-000	-10	-10	-10	-10
	5AP1120.1906-000	-20	-20	-20	-20
CFast cards	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓
Interface options	5ACCIF01.FPCC-000	-20	-20	-20	-20
	5ACCIF01.FPCS-000	-20	-20	-20	-20
	5ACCIF01.FPLK-000	-20	-20	-20	-20
	5ACCIF01.FPLS-000	-20	-20	-20	-20
	5ACCIF01.FPLS-001	-20	-20	-20	-20
	5ACCIF01.FPSC-000	-20	-20	-20	-20
	5ACCIF01.FPSC-001	-20	-20	-20	-20
	5ACCIF01.FSS0-000	-20	-20	-20	-20
	5ACCIF01.ICAN-000	-20	-20	-20	-20
	5ACCIF01.IS00-000	-20	-20	-20	-20
	5ACCIF03.CETH-000	-20	-20	-20	-20

4.1.3.1.3 Maximum ambient temperature for typical operation

Information about typical conditions

- The total power of all USB interfaces on the system unit is limited to 1 W.
- 2x Gigabit Ethernet.
- No permanent 100% processor utilization and graphics utilization.
- The power consumption of the complete system is limited to 45 W. For information about the power consumption of individual components, see "Power calculation" on page 40.
- 80% display brightness.

All temperature specifications in degrees Celsius [°C] 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°C per 1000 meters starting at 500 m above sea level.		**5PPC2200.AL02-000** (E3930 1.3 GHz)	**5PPC2200.AL04-000** (E3930 1.3 GHz)	**5PPC2200.AL14-000** (E3940 1.6 GHz)	**5PC2200.AL18-000** (E3940 1.6 GHz)
		60	**60**	**55**	**55**
Maximum ambient temperature (accessories)					
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓
	5AP923.1906-00 ≤ D0	50	50	50	50
	5AP923.1906-00 ≥ E0	✓	✓	✓	✓
	5AP933.156B-00 ≤ C0	50	50	50	50
	5AP933.156B-00 ≥ D0	✓	✓	✓	✓
	5AP933.185B-00	50	50	50	50
	5AP933.215C-00 ≤ C0	40	40	40	40
	5AP933.215C-00 ≥ D0	50	50	50	50
	5AP933.240C-00 ≤ C0	40	40	40	40
	5AP933.240C-00 ≥ D0	50	50	50	50
AP1000 panels	5AP1120.0573-000	✓	✓	✓	✓
	5AP1151.0573-000	✓	✓	✓	✓
	5AP1120.0702-000	✓	✓	✓	✓
	5AP1130.0702-000	✓	✓	✓	✓
	5AP1130.101D-000	✓	✓	✓	✓
	5AP1120.101E-000	50	50	50	50
	5AP1130.101E-000	50	50	50	50
	5AP1120.1043-000	✓	✓	✓	✓
	5AP1180.1043-000	✓	✓	✓	✓
	5AP1181.1043-000	✓	✓	✓	✓
	5AP1182.1043-000	✓	✓	✓	✓
	5AP1120.1214-000	✓	✓	✓	✓
	5AP1120.121E-000	55	55	✓	✓
	5AP1130.121E-000	55	55	✓	✓
	5AP1130.121E-010	55	55	50	50
	5AP1120.1505-000	✓	✓	✓	✓
	5AP1180.1505-000	✓	✓	✓	✓
	5AP1181.1505-000	✓	✓	✓	✓
	5AP1120.156B-000	✓	✓	✓	✓
	5AP1130.156C-000	55	55	✓	✓
	5AP1130.156C-001	55	55	✓	✓
	5AP1130.185C-000	55	55	✓	✓
	5AP1120.1906-000	✓	✓	✓	✓
CFast cards	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓
Interface options	5ACCIF01.FPCC-000	50	50	50	50
	5ACCIF01.FPCS-000	50	50	50	50
	5ACCIF01.FPLK-000	50	50	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	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓
	5ACCIF01.IS00-000	55	55	✓	✓
	5ACCIF03.CETH-000	✓	✓	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°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 "✓" (check mark) is entered for the installed component, it can be operated without any problems.
    - If the installed component has a temperature specification (e.g. "45[°C]"), the ambient temperature of the complete system is not permitted to exceed this value.
4. Possible limitations may arise due to the mounting orientation of the PPC2200. For additional information, see section "Mounting orientations" on page 28.
5. The relevant test and assessment must be carried out individually by the user on site (reading out the temperatures in BIOS or using the ADI Control Center). See section "Information about typical conditions" on page 32.

4.1.3.1.5 Ambient temperature during storage and transport

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

AP9x3

Type	Model number	Storage [°C]	Transport [°C]
12.1" single-touch	5AP923.1215-00	-25 to 80	-25 to 80
15.0" single-touch	5AP923.1505-00	-25 to 80	-25 to 80
19.0" single-touch	5AP923.1906-00 ≤ D0	-20 to 60	-20 to 60
19.0" single-touch	5AP923.1906-00 ≥ E0	-25 to 70	-25 to 70
15.6" multi-touch	5AP933.156B-00 ≤ C0	-10 to 60	-10 to 60
15.6" multi-touch	5AP933.156B-00 ≥ D0	-25 to 70	-25 to 70
18.5" multi-touch	5AP933.185B-00 ≤ C0	-10 to 60	-10 to 60
18.5" multi-touch	5AP933.185B-00 ≥ D0	-20 to 60	-20 to 60
21.5" multi-touch	5AP933.215C-00 ≤ C0	-10 to 60	-10 to 60
21.5" multi-touch	5AP933.215C-00 ≥ D0	-20 to 60	-20 to 60
24.0" multi-touch	5AP933.240C-00 ≤ C0	-10 to 60	-10 to 60
24.0" multi-touch	5AP933.240C-00 ≥ D0	-25 to 70	-25 to 70

AP1000

Type	Model number	Storage [°C]	Transport [°C]
5.7" single-touch	5AP1120.0573-000	-25 to 80	-25 to 80
5.7" keys	5AP1151.0573-000	-25 to 70	-25 to 70
7.0" single-touch	5AP1120.0702-000	-25 to 80	-25 to 80
7.0" multi-touch	5AP1130.0702-000	-25 to 70	-25 to 70
10.1" multi-touch	5AP1130.101D-000	-30 to 70	-30 to 70
10.1" single-touch	5AP1120.101E-000	-25 to 70	-25 to 70
10.1" multi-touch	5AP1130.101E-000	-25 to 70	-25 to 70
10.4" single-touch	5AP1120.1043-000	-25 to 80	-25 to 80
10.4" single-touch with keys	5AP1180.1043-000	-25 to 70	-25 to 70
10.4" single-touch with keys	5AP1181.1043-000	-25 to 70	-25 to 70
10.4" single-touch with keys	5AP1182.1043-000	-25 to 70	-25 to 70
12.1" single-touch	5AP1120.1214-000	-25 to 80	-25 to 80
12.1" single-touch	5AP1120.121E-000	-25 to 80	-25 to 80
12.1" multi-touch	5AP1130.121E-000	-25 to 70	-25 to 70
12.1" multi-touch	5AP1130.121E-010	-30 to 70	-30 to 70
15.0" single-touch	5AP1120.1505-000	-25 to 80	-25 to 80
15.0" single-touch with keys	5AP1180.1505-000	-25 to 70	-25 to 70
15.0" single-touch with keys	5AP1181.1505-000	-25 to 70	-25 to 70
15.6" single-touch	5AP1120.156B-000	-25 to 70	-25 to 70
15.6" multi-touch	5AP1130.156C-000	-20 to 70	-20 to 70
15.6" multi-touch	5AP1130.156C-001	-20 to 70	-20 to 70
18.5" multi-touch	5AP1130.185C-000	-25 to 70	-25 to 70
19.0" single-touch	5AP1120.1906-000	-25 to 70	-25 to 70

System units and components

Type	Model number	Storage [°C]	Transport [°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 ≥ Rev. G0	-40 to 85	-40 to 85
	5CFAST.064G-10 ≥ Rev. E0	-40 to 85	-40 to 85
	5CFAST.128G-10 ≥ Rev. E0	-40 to 85	-40 to 85
	5CFAST.032G-10 ≤ 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
	5ACCIF01.IS00-000	-20 to 60	-20 to 60
	5ACCIF03.CETH-000	-20 to 60	-20 to 60

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 36. The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.

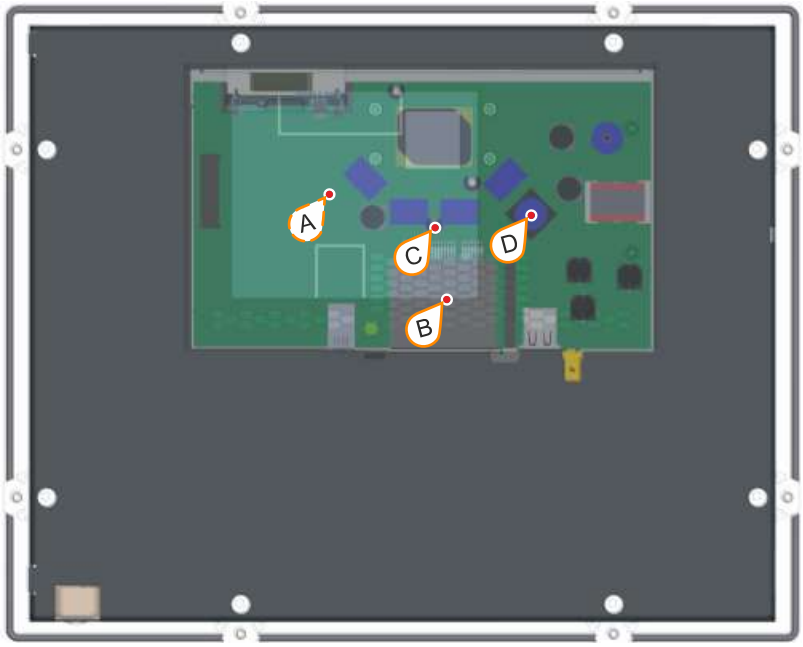
Temperatures[1)] can be read out in different ways in approved operating systems:

- BIOS (see "Baseboard" on page 201)
- 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 Linux for B&R operating systems.

1) The measured temperature is a guide value for the immediate ambient temperature, but it may have been influenced by neighboring components.
2) Self-Monitoring, Analysis and Reporting Technology

4.1.3.1.7 Temperature sensor positions



ADI sensors	Position	Measuring point for	Measurement	Max. specified [°C]
Panel	A	Display	Temperature of the display (sensor integrated on the panel).	5AP923.1215-00: 90 5AP923.1505-00: 90 5AP923.1906-00 ≤ D0: 75 5AP923.1906-00 ≥ E0: 80 5AP933.156B-00 ≤ C0: 75 5AP933.156B-00 ≥ D0: 80 5AP933.185B-00: 75 5AP933.215C-00: 80 5AP933.240C-00 ≤ C0: 75 5AP933.240C-00 ≥ D0: 80 5AP1120.0573-000: 80 5AP1151.0573-000: 80 5AP1120.0702-000: 85 5AP1130.0702-000: 85 5AP1130.101D-000: 80 5AP1120.101E-000: 80 5AP1130.101E-000: 80 5AP1120.1043-000: 90 5AP1180.1043-000: 90 5AP1181.1043-000: 90 5AP1182.1043-000: 90 5AP1120.1214-000: 80 5AP1120.121E-000: 80 5AP1130.121E-000: 80 5AP1130.121E-010: 80 5AP1120.1505-000: 90 5AP1180.1505-000: 90 5AP1181.1505-000: 90 5AP1120.156B-000: 80 5AP1130.156C-000: 80 5AP1130.156C-001: 80 5AP1130.185C-000: 80 5AP1120.1906-000: 80
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°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.

AP9x3

Type	Model number	Operation [%]	Storage [%]	Transport [%]
12.1" single-touch	5AP923.1215-00	5 to 90	5 to 90	5 to 90
15.0" single-touch	5AP923.1505-00	8 to 90	8 to 90	8 to 90
19.0" single-touch	5AP923.1906-00	5 to 90	5 to 90	5 to 90
15.6" multi-touch	5AP933.156B-00	5 to 90	5 to 90	5 to 90
18.5" multi-touch	5AP933.185B-00	5 to 90	5 to 90	5 to 90
21.5" multi-touch	5AP933.215C-00 ≤ C0	10 to 90	10 to 90	10 to 90
21.5" multi-touch	5AP933.215C-00 ≥ D0	5 to 90	5 to 90	5 to 90
24.0" multi-touch	5AP933.240C-00	5 to 90	5 to 90	5 to 90

AP1000

Type	Model number	Operation [%]	Storage [%]	Transport [%]
5.7" single-touch	5AP1120.0573-000 ≤ Rev. D0	5 to 90	5 to 90	5 to 90
5.7" single-touch	5AP1120.0573-000 ≥ Rev. E0	20 to 90	10 to 90	10 to 90
5.7" keys	5AP1151.0573-000 ≤ Rev. D0	5 to 90	5 to 90	5 to 90
5.7" keys	5AP1151.0573-000 ≥ Rev. E0	20 to 90	10 to 90	10 to 90
7.0" single-touch	5AP1120.0702-000	20 to 90	10 to 90	10 to 90
7.0" multi-touch	5AP1130.0702-000	20 to 90	10 to 90	10 to 90
10.1" single-touch	5AP1120.101E-000	20 to 90	10 to 90	10 to 90
10.1" multi-touch	5AP1130.101D-000	5 to 85	5 to 85	5 to 85
10.1" multi-touch	5AP1130.101E-000	20 to 90	10 to 90	10 to 90
10.4" single-touch	5AP1120.1043-000	5 to 90	5 to 90	5 to 90
10.4" single-touch with keys	5AP1180.1043-000	5 to 80	5 to 90	5 to 90
10.4" single-touch with keys	5AP1181.1043-000	5 to 80	5 to 90	5 to 90
10.4" single-touch with keys	5AP1182.1043-000	5 to 80	5 to 90	5 to 90
12.1" single-touch	5AP1120.1214-000	20 to 90	10 to 90	10 to 90
12.1" single-touch	5AP1120.121E-000	5 to 90	5 to 90	5 to 90
12.1" multi-touch	5AP1130.121E-000	5 to 90	5 to 90	5 to 90
12.1" multi-touch	5AP1130.121E-010	5 to 90	5 to 90	5 to 90
15.0" single-touch	5AP1120.1505-000	8 to 90	8 to 90	8 to 90
15.0" single-touch with keys	5AP1180.1505-000	8 to 90	8 to 90	8 to 90
15.0" single-touch with keys	5AP1181.1505-000	8 to 90	8 to 90	8 to 90
15.6" single-touch	5AP1120.156B-000	5 to 90	5 to 90	5 to 90
15.6" multi-touch	5AP1130.156C-000	5 to 90	5 to 90	5 to 90
15.6" multi-touch	5AP1130.156C-001	5 to 90	5 to 90	5 to 90
18.5" multi-touch	5AP1130.185C-000	5 to 90	5 to 90	5 to 90
19.0" single-touch	5AP1120.1906-000	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°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.032G-10 ≥ Rev. G0	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.064G-10 ≥ Rev. E0	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.128G-10 ≥ Rev. E0	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
	5CFAST.032G-10 ≤ Rev. F0	10 to 95	10 to 95	10 to 95
	5CFAST.064G-10 ≤ Rev. 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°C	Max. 85% at 85°C	Max. 85% at 85°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
	5ACCIF01.IS00-000	5 to 90	5 to 95	5 to 95
	5ACCIF03.CETH-000	5 to 90	5 to 95	5 to 95

4.1.3.3 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.

Vibration				
Panel PC	Operation[1)]		Storage[1)3)]	Transport[1)3)]
	Continuous	Periodic		
With CFast card	2 to 9 Hz: 1.75 mm amplitude 9 to 200 Hz: 0.5 g	2 to 9 Hz: 3.5 mm amplitude 9 to 200 Hz: 1 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g	2 to 8 Hz: 7.5 mm amplitude 8 to 200 Hz: 2 g 200 to 500 Hz: 4 g
Shock				
Panel PC	Operation[2)]		Storage[2)3)]	Transport[2)3)]
With CFast card	15 g, 11 ms		30 g, 6 ms	30 g, 6 ms

1) Testing is performed per EN 60068-2-6.
2) Testing is performed per EN 60068-2-27.
3) The specification refers to a device in its original packaging.

4.1.3.4 Degree of protection

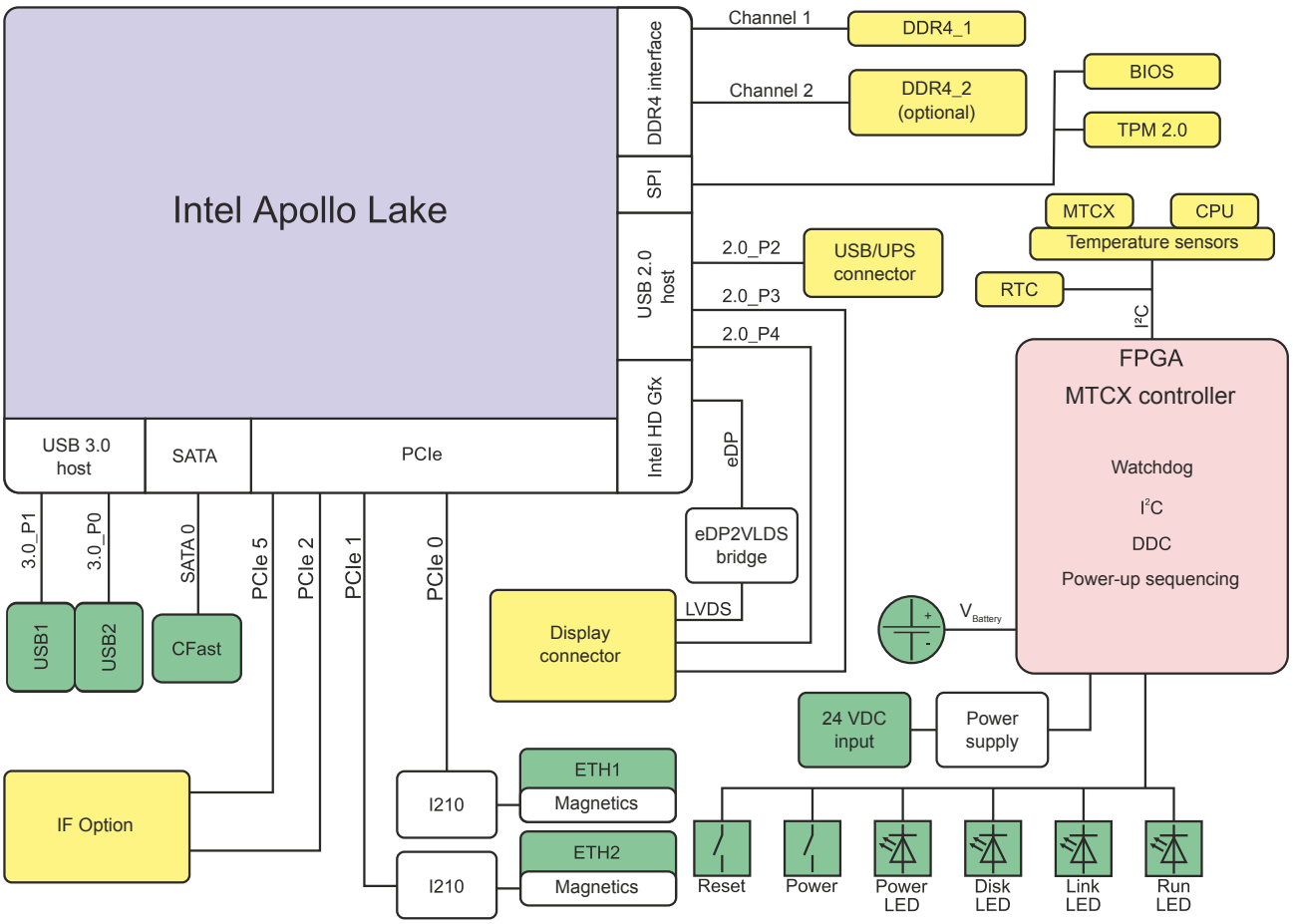
Under the following conditions, the Panel PC 2200 offers IP65 protection on the front and IP20 protection on the back per EN 60529:

- Correct installation of the Panel PC 2200 (see "Installation and wiring" on page 171)
- Installation of all covers or components on interfaces and slots
- Compliance with all ambient conditions

The Panel PC 2200 with AP9x3 and AP1000 panels additionally has "Type 4X indoor use only" on the front per UL 50 under the same conditions.

4.1.4 Electrical properties

4.1.4.1 Block diagram



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

4.1.4.2 Power calculation

In order to calculate the total power of the Panel PC 2200, 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 values are maximum values and additional consumers (e.g. USB devices) are not taken into account.

System units

Type	Order number	Total power consumption of the system unit
PPC2200 E3930 2C 1.30 GHz	5PPC2200.AL02-000	15 W (without USB consumer) 25 W (with USB consumer)
PPC2200 E3930 2C 1.30 GHz	5PPC2200.AL04-000	15 W (without USB consumer) 25 W (with USB consumer)
PPC2200 E3940 4C 1.60 GHz	5PPC2200.AL14-000	20 W (without USB consumer) 30 W (with USB consumer)
PPC2200 E3940 4C 1.60 GHz	5PPC2200.AL18-000	20 W (without USB consumer) 30 W (with USB consumer)

AP9x3

Type	Order number	+5 V	+3.3 V	+12 V	Total power consumption
12.1" single-touch	5AP923.1215-00	-	4.2 W	7.2 W	11.4 W
15.0" single-touch	5AP923.1505-00	-	2.1 W	8.9 W	11 W
19.0" single-touch	5AP923.1906-00 ≤ D0	8 W	-	22.4 W	30.4 W
19.0" single-touch	5AP923.1906-00 ≥ E0	5 W	-	22 W	27 W
15.6" multi-touch	5AP933.156B-00 ≤ C0	3.35 W	-	10.5 W	13.85 W
15.6" multi-touch	5AP933.156B-00 ≥ D0	1.8 W	-	15.6 W	17.4 W
18.5" multi-touch	5AP933.185B-00 ≤ J0	6.1 W	-	10.8 W	16.9 W
18.5" multi-touch	5AP933.185B-00 ≥ K0	3.9 W	-	7.9 W	11.77 W
21.5" multi-touch	5AP933.215C-00 ≤ C0	7.4 W	-	18.3 W	25.7 W
21.5" multi-touch	5AP933.215C-00 ≥ D0	4 W	-	15 W	19 W
24.0" multi-touch	5AP933.240C-00 ≤ C0	6.35 W	-	24 W	30.35 W
24.0" multi-touch	5AP933.240C-00	5 W	-	24.5 W	29.5 W

AP1000

Type	Order number	+5 V	+3.3 V	+12 V	Total power consumption
5.7" single-touch	5AP1120.0573-000	-	0.7 W	2.5 W	3.2 W
5.7" keys	5AP1151.0573-000	0.5 W	1.3 W	2.5 W	4.3 W
7.0" single-touch	5AP1120.0702-000	-	1.0 W	3.5 W	4.5 W
7.0" multi-touch	5AP1130.0702-000	1.0 W	1.0 W	3.5 W	5.5 W
10.1" single-touch	5AP1120.101E-000	-	1.1 W	7.1 W	8.2 W
10.1" single-touch	5AP1120.101E-000 = F0	-	1.0 W	5.8 W	6.8 W
10.1" multi-touch	5AP1130.101D-000	1.0 W	2.2 W	7.5 W	10.7 W
10.1" multi-touch	5AP1130.101E-000	1.0 W	1.1 W	7.1 W	9.2 W
10.4" single-touch	5AP1120.1043-000	-	1.3 W	3.6 W	4.9 W
10.4" single-touch with keys	5AP1180.1043-000	0.5 W	1.9 W	3.6 W	6.0 W
10.4" single-touch with keys	5AP1181.1043-000	0.7 W	1.9 W	3.6 W	6.2 W
10.4" single-touch with keys	5AP1182.1043-000	1.0 W	1.9 W	3.6 W	6.5 W
12.1" single-touch	5AP1120.1214-000	-	1.9 W	7.0 W	8.9 W
12.1" single-touch	5AP1120.121E-000	-	2.5 W	7.8 W	10.3 W
12.1" multi-touch	5AP1130.121E-000	1.0 W	2.5 W	7.8 W	11.3 W
12.1" multi-touch	5AP1130.121E-010	1.0 W	1.9 W	10.7 W	13.6 W
15.0" single-touch	5AP1120.1505-000	-	2.1 W	8.9 W	11.0 W
15.0" single-touch with keys	5AP1180.1505-000	0.5 W	2.7 W	8.9 W	12.1 W
15.0" single-touch with keys	5AP1181.1505-000	0.8 W	2.7 W	8.9 W	12.4 W
15.6" single-touch	5AP1120.156B-000	1.8 W	-	15.6 W	17.4 W
15.6" multi-touch	5AP1130.156C-000	6 W	-	18 W	24 W
15.6" multi-touch	5AP1130.156C-001	6 W	-	18 W	24 W
18.5" multi-touch	5AP1130.185C-000	7 W	-	18.6 W	25.6 W
19.0" single-touch	5AP1120.1906-000	5.0 W	-	22.0 W	27.0 W

Interface options

Type	Order number	+5 V	+ 3.3 V	+12 V	Total power consumption
POWERLINK CAN X2X	5ACCIF01.FPCC-000	0.45 W	1.55 W	-	2 W
POWERLINK RS485 CAN	5ACCIF01.FPCS-000	0.75 W	1 W	-	1.75 W
POWERLINK	5ACCIF01.FPLK-000	-	1.75 W	-	1.75 W
POWERLINK RS232	5ACCIF01.FPLS-000	0.5 W	1 W	-	1.5 W

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

CFast cards

All data are maximum values of the current revision. [3)].

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

4.1.4.2.1 Calculation example

12" panel 5AP923.1215-00	4.2 W + 7.2 W =	11.4 W
System unit 5PPC2200.AL04-000	25 W (with USB consumers)	25 W
POWERLINK interface option 5ACCIF01.FPLK-000	1.75 W	1.75 W
CFast card 5CFAST.xxxx-10	2.03	2.03 W
	Total max.:	**40.18 W**

Table 1: Power calculation with example configuration

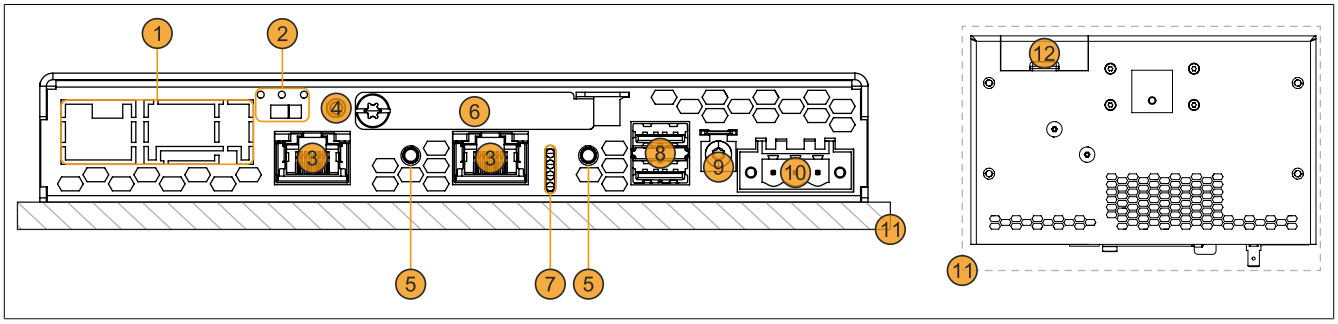
[3)] For detailed revision-dependent information, see aggregate data sheet for CFast cards.

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 47	2	Interface option - LED status indicators[1)] Interface option - Terminating resistor[1)]
3	"Ethernet interfaces" on page 43	4	Screw point for cable shield
5	"Power and reset buttons" on page 45	6	"CFast slot" on page 45
7	"LED status indicators" on page 46	8	"USB interfaces" on page 44
9	"Grounding" on page 43	10	"+24 VDC power supply" on page 42
11	Panel (configuration-dependent)	12	"Battery compartment" on page 47

1) Only available with installed interface option (configuration-dependent, see "Interface options" on page 131).

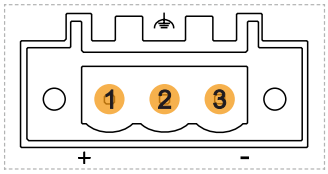
4.1.5.1.1 +24 VDC power supply

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 "0TB103.9x" on page 245.

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

Pin	Description	Figure
1	+	
2	Functional ground	
3	-	

- Reverse polarity protection
- 3-pin
- Male

Electrical properties	
Nominal voltage	24 VDC ±25%, SELV[1)]
Nominal current	Max. 4 A
Overvoltage category per EN 61131-2	II
Inrush current	Typ. 5 A, max. 50 A for < 500 µs
Galvanic isolation	Yes
Uninterruptible power supply	No

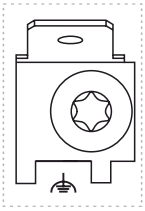
1) IEC 61010-2-201 requirements must be observed.

4.1.5.1.1.1 Grounding

Caution!

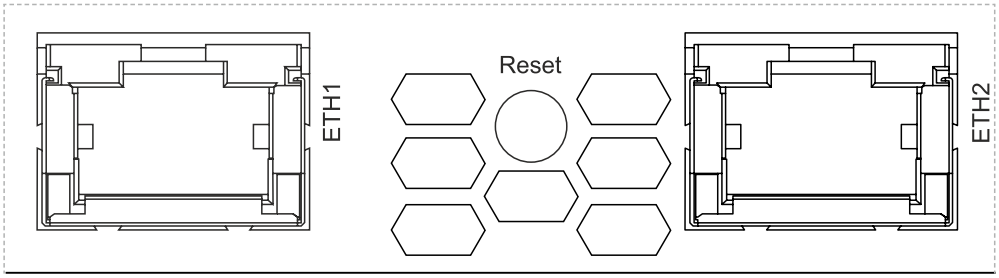
The functional ground (power supply pin 2 and ground connection) must be connected to the central grounding point (e.g. control cabinet or system) via the shortest possible path with the lowest possible resistance and with the largest possible wire cross section. This type of grounding is mandatory for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

For example, a copper strip must be attached to the ground connection at a central grounding point of the control cabinet or system in which the device is installed. The wire cross section should be as large as possible (at least 2.5 mm²).

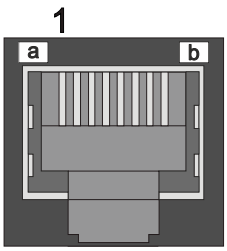


4.1.5.1.2 Ethernet interfaces

The Ethernet controller is routed externally via the system unit.



ETH1, ETH2		
Variant	RJ45, female	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s[1]	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Speed" (b)	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[2]
Orange (dark)	1000 Mbit/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 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

Driver support

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

Information:

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

4.1.5.1.3 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.

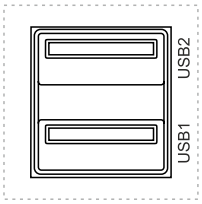
Warning!

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)
		High speed (480 Mbit/s)
		SuperSpeed (5 Gbit/s)[1]
Current-carrying capacity[2]		Max. 1 A per connection
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).

4.1.5.1.4 CFast slot

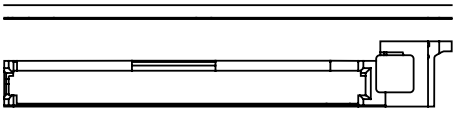
The The panel PC offers an easily accessible CFast slot so that the CFast card can also be used as a removable storage medium for data transfer or upgrades.

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!

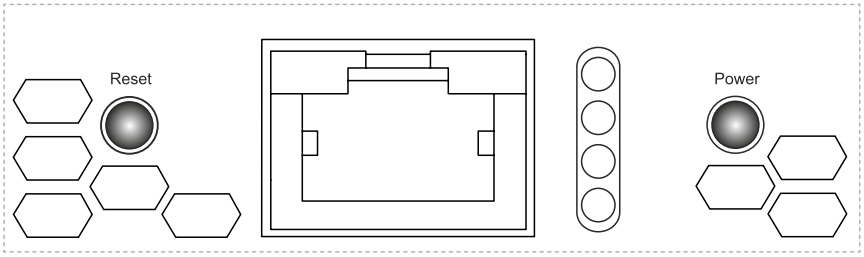
CFast slot	
Connection	SATA 0
Order number	**Short description**
	CFast cards
5CFAST.2048-00	CFast 2 GB SLC
5CFAST.4096-00	CFast 4 GB SLC
5CFAST.8192-00	CFast 8 GB SLC
5CFAST.016G-00	CFast 16 GB SLC
5CFAST.032G-00	CFast 32 GB SLC
5CFAST.032G-10	CFast 32 GB MLC
5CFAST.064G-10	CFast 64 GB MLC
5CFAST.128G-10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



4.1.5.1.5 Power and reset buttons

Both buttons can be pressed without any tools.

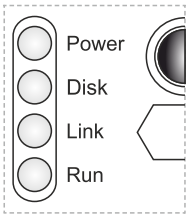
Description
Power button
The power button offers full ATX power supply support and has various configurable functions. • **Short press:** Switches the PC on or off or performs the action configured in the operating system when pressing the power button (shutdown, sleep, etc.). • **Long press (approx. 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!

4.1.5.1.6 LED status indicators

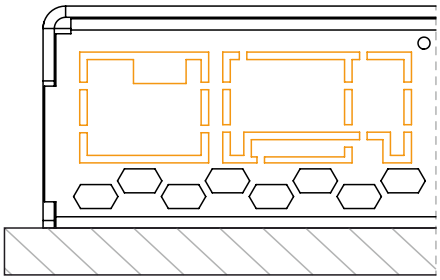
Assignment	LED	Color	Status	Explanation	LED status indicator[1]
	**Power**	Green	On	Power supply OK	
			Blinking	The device is started up; the battery state is "BAD".	
				Information: **For additional information, see "Battery compartment".**	
		Red	On	The system is in power saving mode (standby).[1]	
			Blinking	The MTCX is running; the battery state is "BAD". The system is in power saving mode (standby).[1]	
		Red-Green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power saving mode (standby)[1]	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power saving mode (standby)[1]	
				Information: **An update must be performed again.**	
	Disk	Yellow	On	Indicates drive access (CFast)	
	Link	Reserved			
	Run	Green	Blinking	Automation Runtime is starting up. Controlled by Automation Runtime (ARemb and ARwin).	
		Green	On	Application running Controlled by Automation Runtime (ARemb and ARwin).	
		Red	On	Application in SERVICE mode Controlled by Automation Runtime (ARemb and ARwin).	
		Orange	Blinking	A license violation has occurred.	

1) Two columns form 1 interval of 500 ms each.
2) S5: Soft-off
S4: Hibernate (suspend-to-disk)

4.1.5.1.7 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		
	Interface options	
Order number	Short description	
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPLK-000	Interface card - 1x POWERLINK interface - integrated 2-port hub - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FPSC-001	Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200	
5ACCIF03.CETH-000	Interface card - 2x ETH interface (10/100/1000) - For APC2200/PPC2200	

Information:

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

4.1.5.1.8 Battery compartment

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

The lithium battery (3 V, 1000 mAh) ensures backup power to the internal real-time clock (RTC). It is located on the underside of the device behind the gray cover. The self-discharge time of the battery is at least 8 years (at 50°C, 6 µA for the components being supplied). The battery is subject to wear and should be replaced regularly (at least after the specified service life) by changing the battery (see "Changing the battery" on page 240).

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

The battery state is determined by the system immediately after the device is switched on and subsequently every 24 hours. During the measurement, the battery is subjected to a brief load (approx. 1 second) and then assessed. The determined battery state is displayed in BIOS (see "Baseboard" on page 201) 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.

4.1.5.1.9 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.

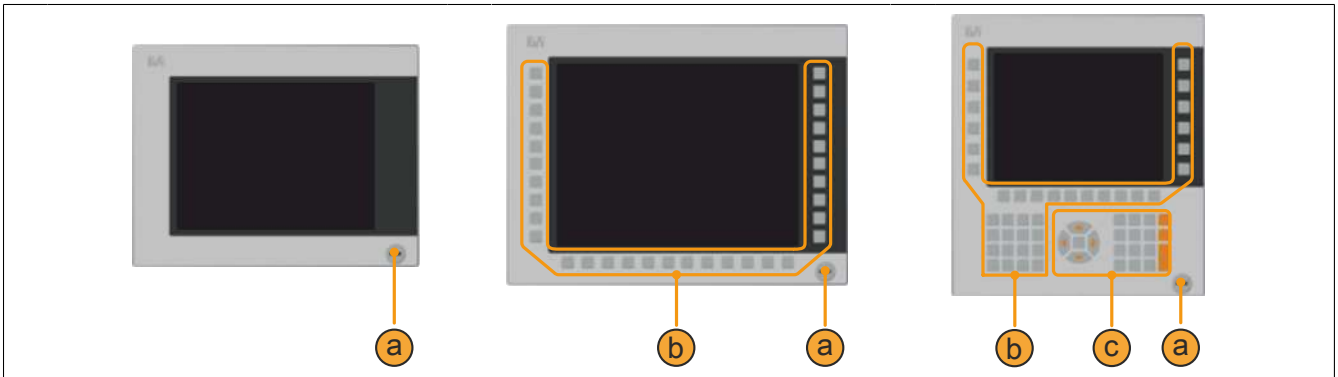
Information:

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 Features of AP1000 panels

Different display diagonals as well as panels with touch screen and keys are available. The following table provides an overview of the panels and their features. For examples of different equipment variants, see the figure below.

Display type	Order number	Resolution	Touch screen	Function keys	System keys	Front USB interface
5.7" single-touch	5AP1120.0573-000	VGA	Single-touch	No	No	No
5.7" keys	5AP1151.0573-000	VGA	No	Yes	Yes	No
7.0" single-touch	5AP1120.0702-000	WVGA	Single-touch	No	No	No
7.0" multi-touch	5AP1130.0702-000	WVGA	Multi-touch	No	No	No
10.1" single-touch	5AP1120.101E-000	WXGA	Single-touch	No	No	No
10.1" multi-touch	5AP1130.101D-000	WUXGA	Multi-touch	No	No	No
10.1" multi-touch	5AP1130.101E-000	WXGA	Multi-touch	No	No	No
10.4" single-touch	5AP1120.1043-000	VGA	Single-touch	No	No	Yes
10.4" single-touch with keys	5AP1180.1043-000	VGA	Single-touch	Yes	No	Yes
10.4" single-touch with keys	5AP1181.1043-000	VGA	Single-touch	Yes	Yes	Yes
10.4" single-touch with keys	5AP1182.1043-000	VGA	Single-touch	Yes	Yes	Yes
12.1" single-touch	5AP1120.1214-000	SVGA	Single-touch	No	No	Yes
12.1" single-touch	5AP1120.121E-000	WXGA	Single-touch	No	No	No
12.1" multi-touch	5AP1130.121E-000	WXGA	Multi-touch	No	No	No
12.1" multi-touch	5AP1130.121E-010	WXGA	Multi-touch	No	No	No
15.0" single-touch	5AP1120.1505-000	XGA	Single-touch	No	No	Yes
15.0" single-touch with keys	5AP1180.1505-000	XGA	Single-touch	Yes	No	Yes
15.0" single-touch with keys	5AP1181.1505-000	XGA	Single-touch	Yes	Yes	Yes
15.6" single-touch	5AP1120.156B-000	HD	Single-touch	No	No	No
15.6" multi-touch	5AP1130.156C-000	FHD	Multi-touch	No	No	No
15.6" multi-touch	5AP1130.156C-001	FHD	Multi-touch	No	No	No
18.5" multi-touch	5AP1130.185C-000	FHD	Multi-touch	No	No	No
19.0" single-touch	5AP1120.1906-000	SXGA	Single-touch	No	No	Yes



a	Front USB interface	**b**	Function keys	**c**	System keys

4.1.6.1 Slide-in labels

Panels with keys are delivered with inserted, transparent slide-in labels in the function keys. These can be labeled by hand.

It is also possible to download a template for slide-in labels with individual captions from the B&R website (www.br-automation.com).

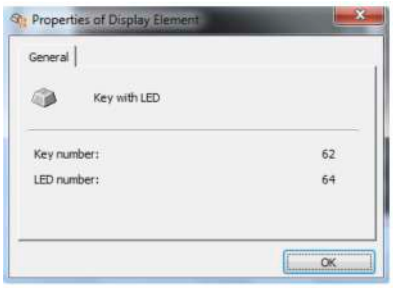
The slots provided for slide-in labels are accessible on the rear of the Automation Panel devices.

4.1.6.2 Key and LED configuration

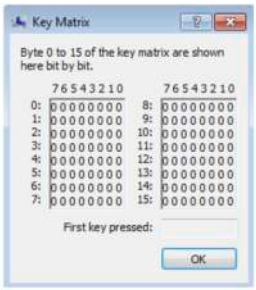
Each key and LED can be individually configured and adapted to the application. Various tools from B&R are available for configuration:

- 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.



B&R Key Editor

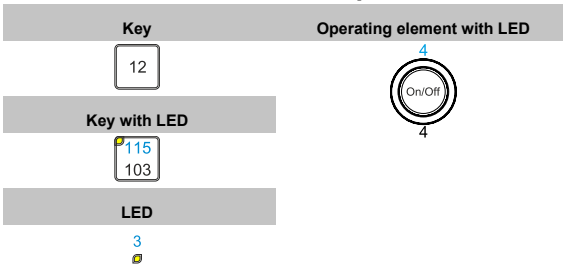


ADI Control Center

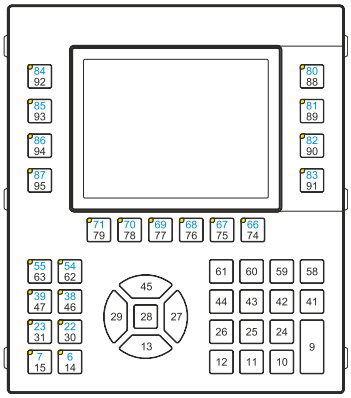
Keys and LEDs in the matrix:

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

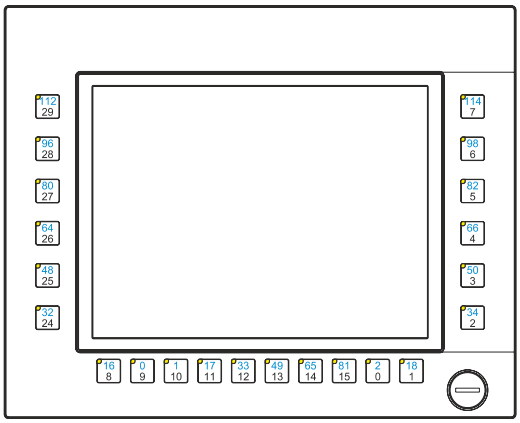
Illustration examples:



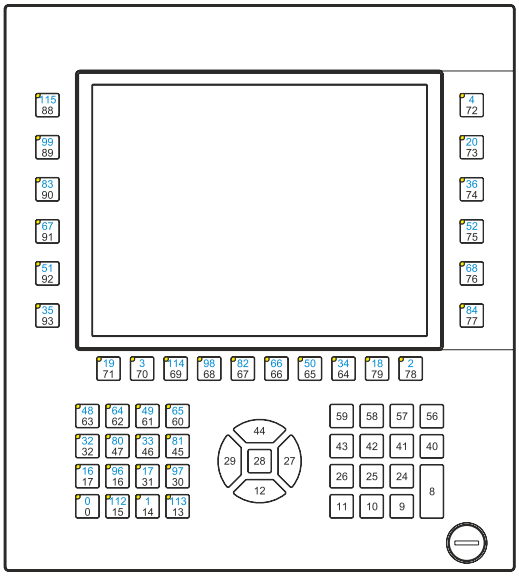
5AP1151.0573-000



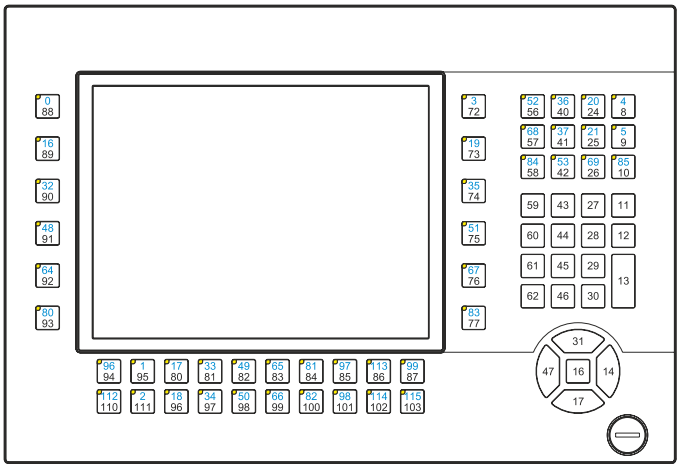
5AP1180.1043-000



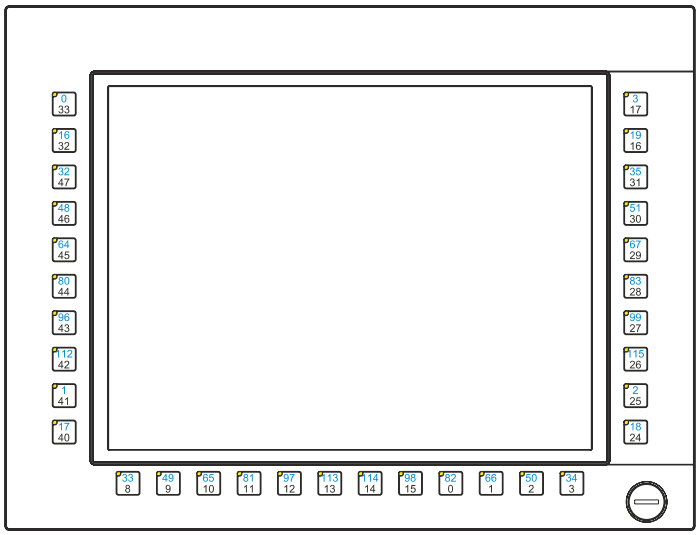
5AP1181.1043-000



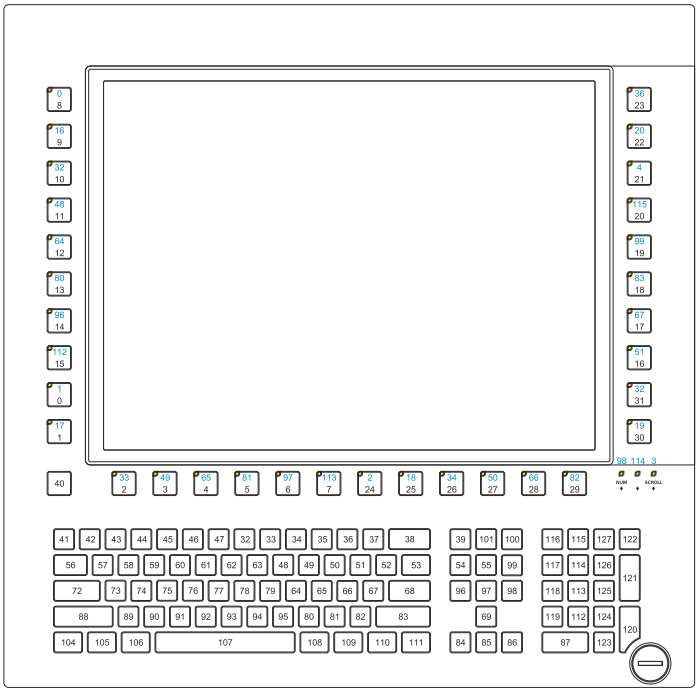
5AP1182.1043-000



5AP1180.1505-000



5AP1181.1505-000



4.1.6.3 USB interface

AP1000 panels with 10.4", 12.1" (4:3 format only), 15" (4:3 format only) and 19" display diagonals are equipped with a front USB 2.0 interface. This is equipped with a USB interface cover. IP65 protection (front) is only provided if the USB interface cover is correctly installed.

Warning!

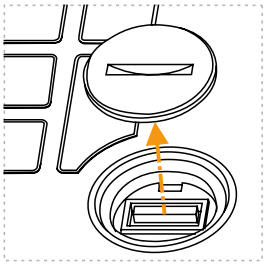
USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality. The functionality of USB devices available from B&R is ensured.

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.

Front USB		
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)	
Current-carrying capacity	Max. 500 mA	
Cable length	Max. 5 m (without hub)	
-		

1) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 500 mA).

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

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

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			
UKCA	Yes			
UL	cULus E115267 Industrial control equipment			
DNV	-			Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [1]
LR	-			ENV3
ABS	-			Yes
BV	-			**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
Controller				
Bootloader	UEFI BIOS			
Processor				
Type	Intel Atom x5-E3930		Intel Atom x5-E3940	
Clock frequency	1300 MHz		1600 MHz	
Number of cores	2		4	
Architecture	14 nm			
Thermal design power (TDP)	6.5 W		9.5 W	
L2 cache	2 MB			
Intel 64 architecture	Yes			
Intel Hyper-Threading Technology	No			
Intel vPro Technology	No			
Intel Virtualization Technology (VT-x)	Yes			
Intel Virtualization Technology for Directed I/O (VT-d)	Yes			
Enhanced Intel SpeedStep Technology	Yes			
Chipset	Intel Apollo Lake			
Trusted Platform Module	TPM 2.0			
Real-time clock				
Accuracy	At 25°C: Typ. 12 ppm (1 second) per day [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)			

Order number	5PPC2200.AL02-000	5PPC2200.AL04-000	5PPC2200.AL14-000	5PPC2200.AL18-000
USB				
Quantity	2			
Type	USB 3.0			
Variant	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s) to SuperSpeed (5 Gbit/s) [4]			
Current-carrying capacity	Max. 1 A per connection			
Ethernet				
Quantity	2			
Variant	RJ45, shielded			
Transfer rate	10/100/1000 Mbit/s			
Max. baud rate	1 Gbit/s			
Slots				
Interface option [5]	1			
Electrical properties				
Nominal voltage	24 VDC ±25%, SELV [6]			
Nominal current	Max. 4 A			
Inrush current	Typ. 5 A, max. 50 A for < 500 µs			
Overvoltage category per EN 61131-2	II			
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) [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 Gbit/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°C per 1000 meters starting at 500 m above sea level.

4.2.2 AP9x3 panels

4.2.2.1 5AP923.1215-00

4.2.2.1.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 12.1" TFT XGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.2.1.2 Order data

Order number	Short description	Figure
	Panels	
5AP923.1215-00	Automation Panel 12.1" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.1.3 Technical data

Information:

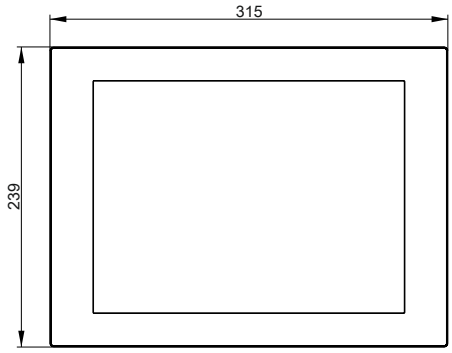
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP923.1215-00
General information	
B&R ID code	0xE1B0
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 25 to 500 cd/m²
Half-brightness time [2]	50,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Order number	5AP923.1215-00
Mechanical properties	
Front	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	315 mm
Height	239 mm
Weight	2200 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

4.2.2.1.4 Dimensions



4.2.2.1.5 Temperature/Humidity diagram

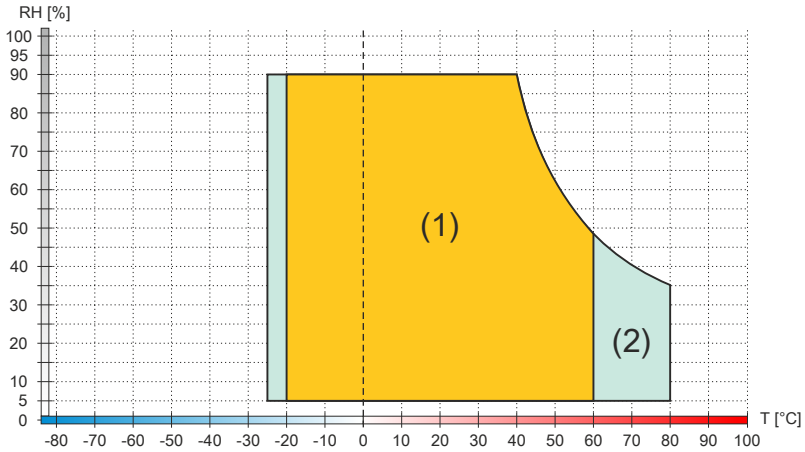


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.2.2 5AP923.1505-00

4.2.2.2.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 15.0" TFT XGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.2.2.2 Order data

Order number	Short description	Figure
	Panels	
5AP923.1505-00	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.2.3 Technical data

Information:

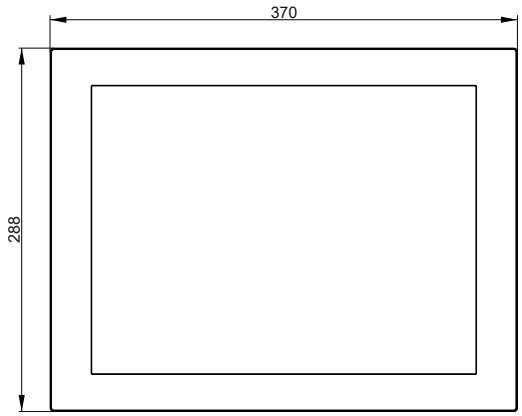
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP923.1505-00
General information	
B&R ID code	0xE169
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 20 to 400 cd/m²
Half-brightness time [3]	50,000 h

Order number	5AP923.1505-00
Touch screen [4]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	370 mm
Height	288 mm
Weight	3700 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
4) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

4.2.2.2.4 Dimensions



4.2.2.2.5 Temperature/Humidity diagram

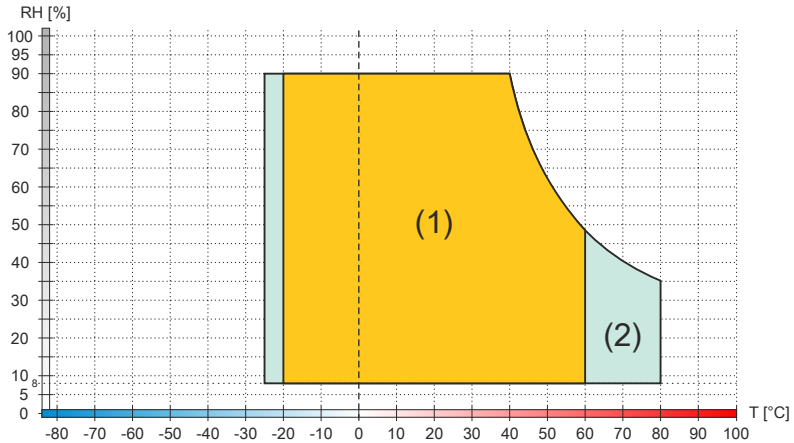


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.2.3 5AP923.1906-00

4.2.2.3.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 19.0" TFT SXGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.2.3.2 Order data

Order number	Short description	Figure
	Panels	
5AP923.1906-00	Automation Panel 19.0" SXGA TFT - 1280 x 1024 pixels (5:4) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.3.3 Technical data

Information:

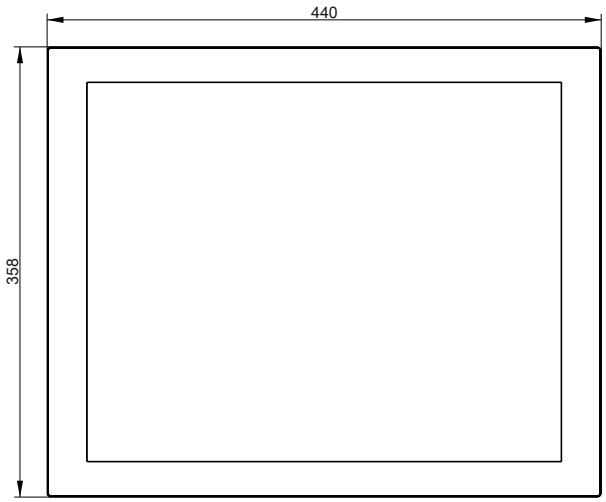
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP923.1906-00	
Revision	**D0**	**E0**
General information		
B&R ID code	0xE1B1	
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]	
EAC	Yes	
Display		
Type	TFT color	
Diagonal	19.0"	
Colors	16.7 million	
Resolution	SXGA, 1280 × 1024 pixels	
Contrast	2000:1	1500:1
Viewing angles		
Horizontal	Direction R = 89° / Direction L = 89°	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 89° / Direction D = 89°	Direction U = 85° / Direction D = 85°
Backlight		
Type	LED	
Brightness (dimmable)	Typ. 30 to 300 cd/m²	Typ. 35 to 350 cd/m²
Half-brightness time [2]	50,000 h	70,000 h
Touch screen [3]		
Technology	Analog, resistive	
Controller	B&R, serial, 12-bit	
Transmittance	81% ±3%	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Degree of protection per UL 50	Front: Type 4X indoor use only	

Order number	5AP923.1906-00	
Revision	**D0**	**E0**
Mechanical properties		
Front		
Frame	Aluminum, coated	
Panel overlay		
Material	Polyester	
Light background color	RAL 9006	
Dark border color around display	RAL 7024	
Gasket	3 mm fixed gasket	
Dimensions		
Width	440 mm	
Height	358 mm	
Weight	5800 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

4.2.2.3.4 Dimensions



4.2.2.3.5 Temperature/Humidity diagram

5AP923.1906-00 ≥ Rev. E0

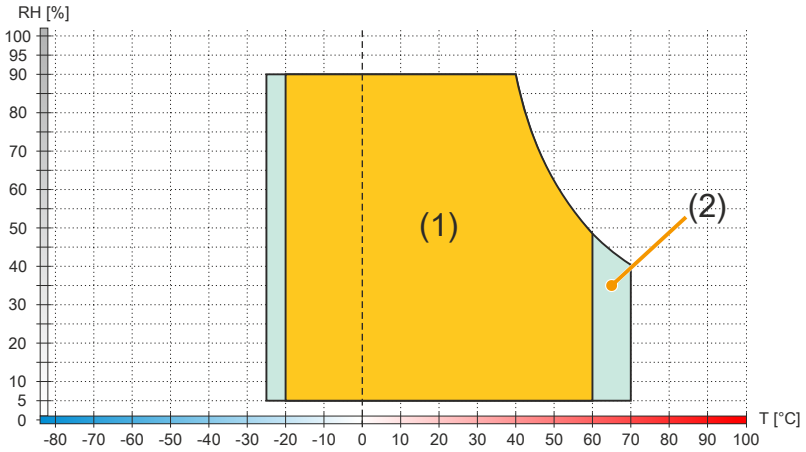


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP923.1906-00 ≤ Rev. D0

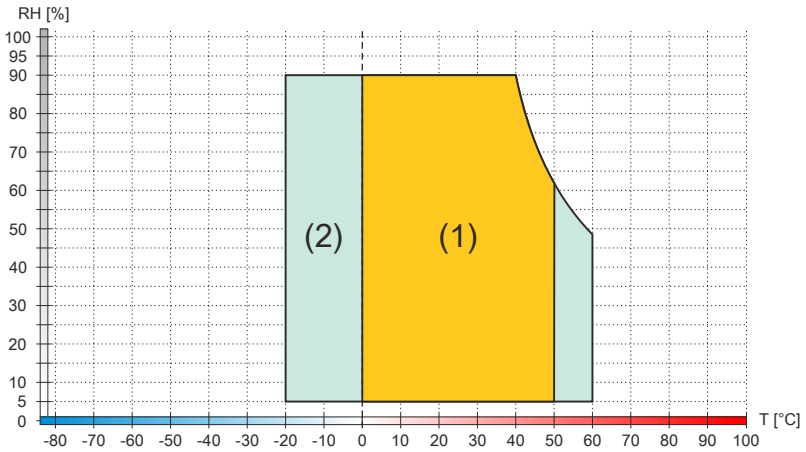


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.2.4 5AP933.156B-00

4.2.2.4.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 15.6" TFT HD color display
- Multi-touch (PCT)
- Control cabinet installation

4.2.2.4.2 Order data

Order number	Short description	Figure
	Panels	
5AP933.156B-00	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.4.3 Technical data

Information:

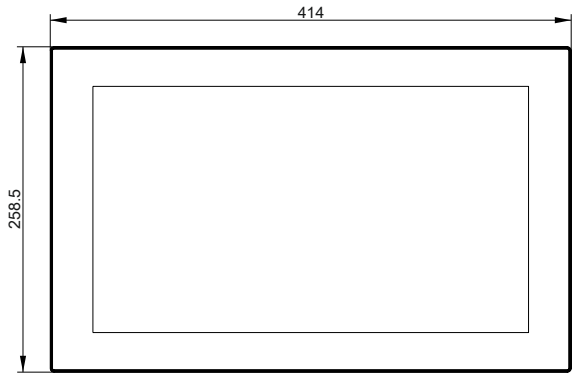
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP933.156B-00	
Revision	**C0**	**D0**
General information		
B&R ID code	0xE16A	
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
EAC	Yes	
Display		
Type	TFT color	
Diagonal	15.6"	
Colors	16.7 million	
Resolution	HD, 1366 × 768 pixels	
Contrast	500:1	1000:1
Viewing angles		
Horizontal	Direction R = 85° / Direction L = 85°	
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 85° / Direction D = 85°
Backlight		
Type	LED	
Brightness (dimmable)	Typ. 15 to 300 cd/m²	Typ. 40 to 400 cd/m²
Half-brightness time [1]	50,000 h	70,000 h
Touch screen [2]		
Technology	Projected capacitive touch (PCT)	
Transmittance	88% ±2%	>90%
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm fixed gasket	

Order number	5AP933.156B-00	
Revision	**C0**	**D0**
Dimensions		
Width	414 mm	
Height	258.5 mm	
Weight	3850 g	

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications of the touch screen driver must be taken into account; see section "Multi-touch driver".

4.2.2.4.4 Dimensions



4.2.2.4.5 Temperature/Humidity diagram

5AP933.156B-00 ≥ Rev. D0

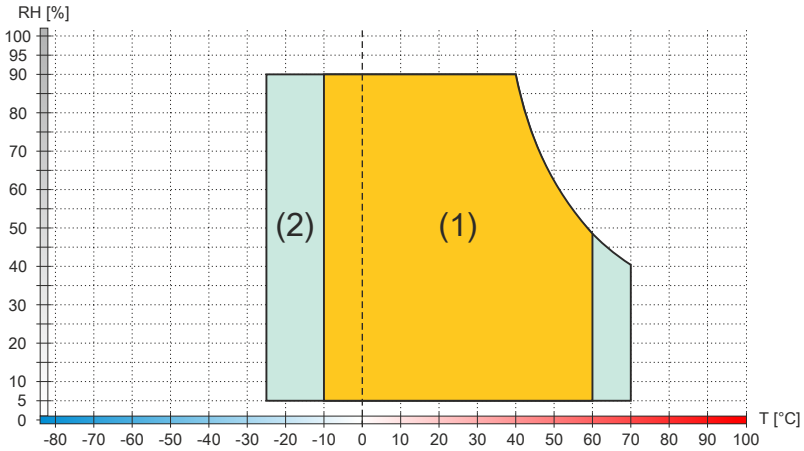


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.156B-00 ≤ Rev. C0

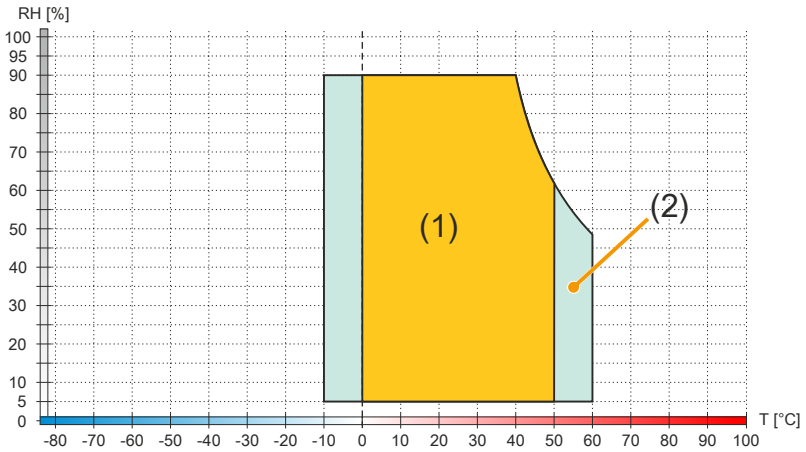


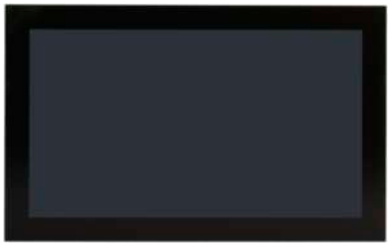
Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.2.5 5AP933.185B-00

4.2.2.5.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 18.5" TFT HD color display
- Multi-touch (PCT)
- Control cabinet installation

4.2.2.5.2 Order data

Order number	Short description	Figure
	Panels	
5AP933.185B-00	Automation Panel 18.5" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.5.3 Technical data

Information:

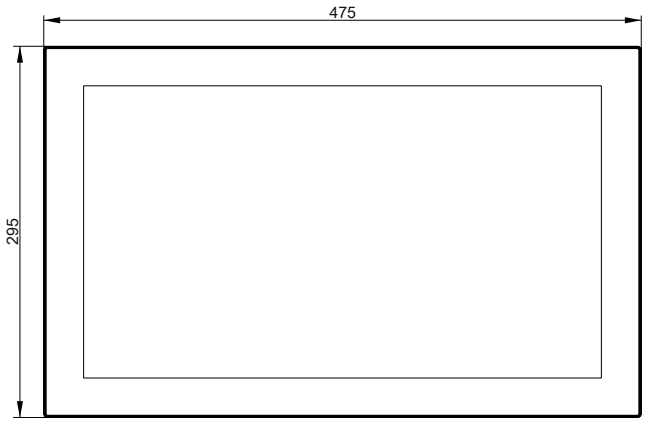
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP933.185B-00		
Revision	**C0**	**D0**	**K0**
General information			
B&R ID code	0xE16B		
Certifications			
CE	Yes		
UKCA	Yes		
UL	cULus E115267 Industrial control equipment		
EAC	Yes		
Display			
Type	TFT color		
Diagonal	18.5"		
Colors	16.7 million		
Resolution	HD, 1366 × 768 pixels		
Contrast	1000:1		
Viewing angles			
Horizontal	Direction R = 85° / Direction L = 85°		
Vertical	Direction U = 80° / Direction D = 80°		
Backlight			
Type	LED		
Brightness (dimmable)	Typ. 15 to 300 cd/m²		Typ. 15 to 450 cd/m²
Half-brightness time [1]	50,000 h		
Touch screen [2]			
Technology	Projected capacitive touch (PCT)		
Transmittance	88% ±2%	>90%	
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)		
Degree of protection per UL 50	Front: Type 4X indoor use only		
Mechanical properties			
Front			
Frame	Aluminum, coated		
Design	Black		
Gasket	3 mm fixed gasket		

Order number	5AP933.185B-00		
Revision	**C0**	**D0**	**K0**
Dimensions			
Width	475 mm		
Height	295 mm		
Weight	4850 g		Approx. 4470 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications of the touch screen driver must be taken into account; see section "Multi-touch driver".

4.2.2.5.4 Dimensions



4.2.2.5.5 Temperature/Humidity diagram

5AP933.185B-00 ≥ Rev. D0

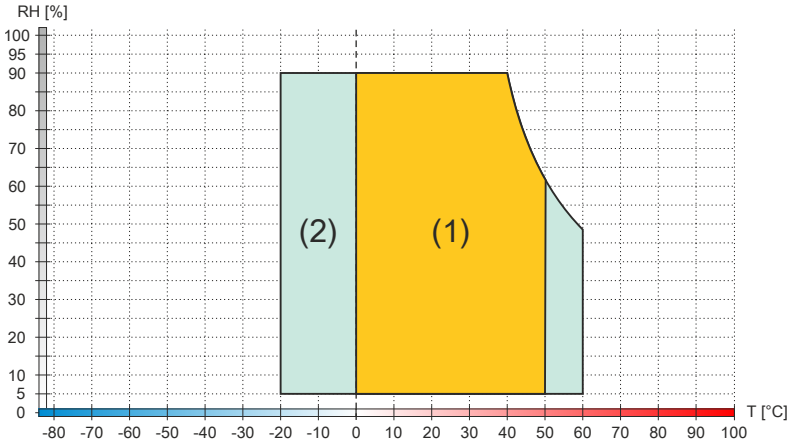


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.185B-00 ≤ Rev. C0

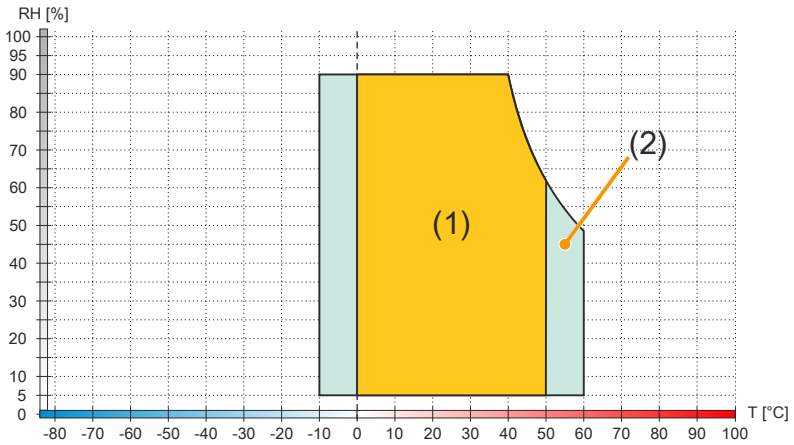


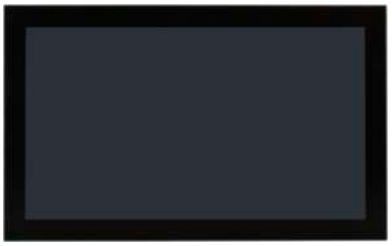
Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.2.6 5AP933.215C-00

4.2.2.6.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 21.5" TFT FHD color display
- Multi-touch (PCT)
- Control cabinet installation

4.2.2.6.2 Order data

Order number	Short description	Figure
	Panels	
5AP933.215C-00	Automation Panel 21.5" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.6.3 Technical data

Information:

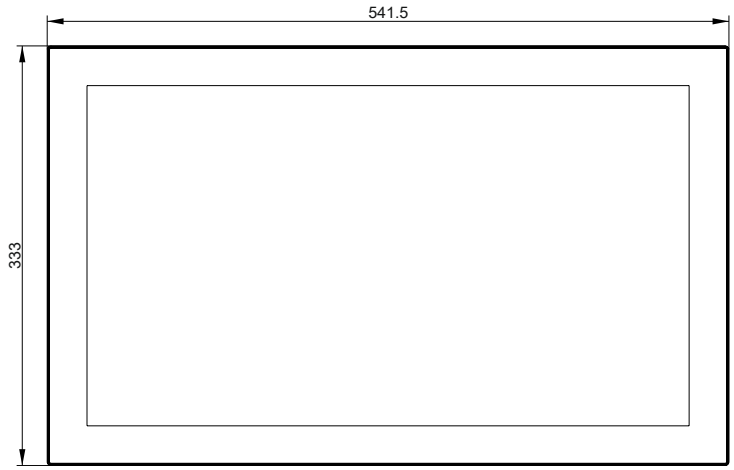
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP933.215C-00	
Revision	**C0**	**D0**
General information		
B&R ID code	0xE16C	
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
EAC	Yes	
Display		
Type	TFT color	
Diagonal	21.5"	
Colors	16.7 million	
Resolution	FHD, 1920 × 1080 pixels	
Contrast	1000:1	5000:1
Viewing angles		
Horizontal	Direction R = 89° / Direction L = 89°	
Vertical	Direction U = 89° / Direction D = 89°	
Backlight		
Type	LED	
Brightness (dimmable)	Typ. 12.5 to 250 cd/m²	
Half-brightness time [1]	30,000 h	
Touch screen [2]		
Technology	Projected capacitive touch (PCT)	
Transmittance	88% ±2%	>90%
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm fixed gasket	

Order number	5AP933.215C-00	
Revision	**C0**	**D0**
Dimensions		
Width	541.5 mm	
Height	333 mm	
Weight	5400 g	

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications of the touch screen driver must be taken into account; see section "Multi-touch driver".

4.2.2.6.4 Dimensions



4.2.2.6.5 Temperature/Humidity diagram

5AP933.215C-00 ≥ Rev. D0

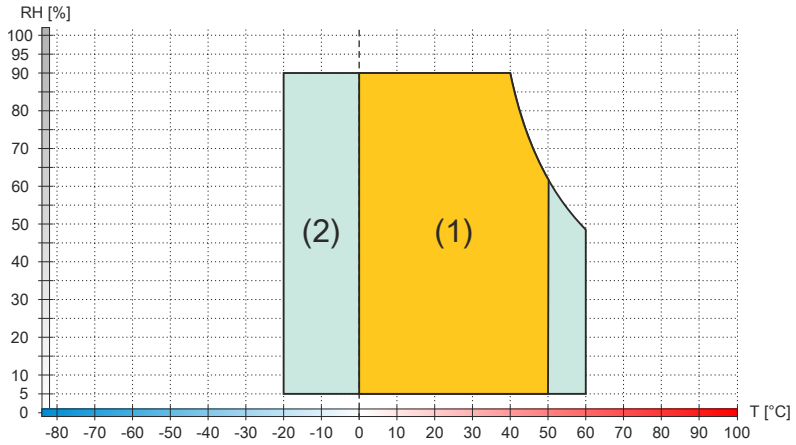


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.215C-00 ≤ Rev. C0

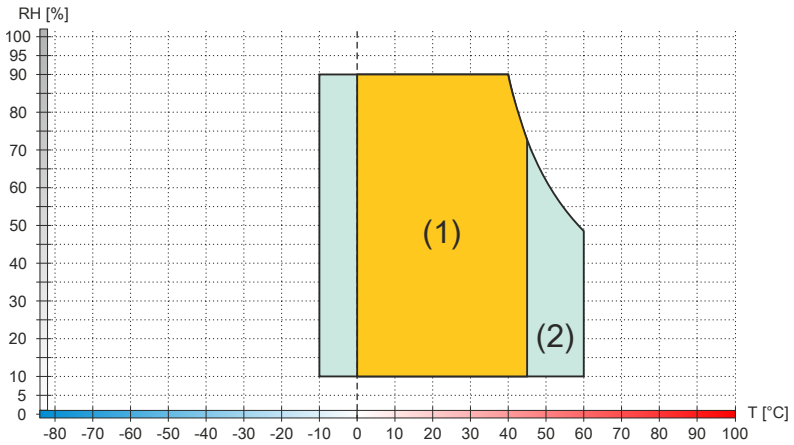


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.2.7 5AP933.240C-00

4.2.2.7.1 General information

- Panel for AP9x3, PPC900, PPC2100, PPC2200 or PPC3100
- 24" TFT FHD color display
- Multi-touch (PCT)
- Control cabinet installation

4.2.2.7.2 Order data

Order number	Short description	Figure
	Panels	
5AP933.240C-00	Automation Panel 24.0" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.2.7.3 Technical data

Information:

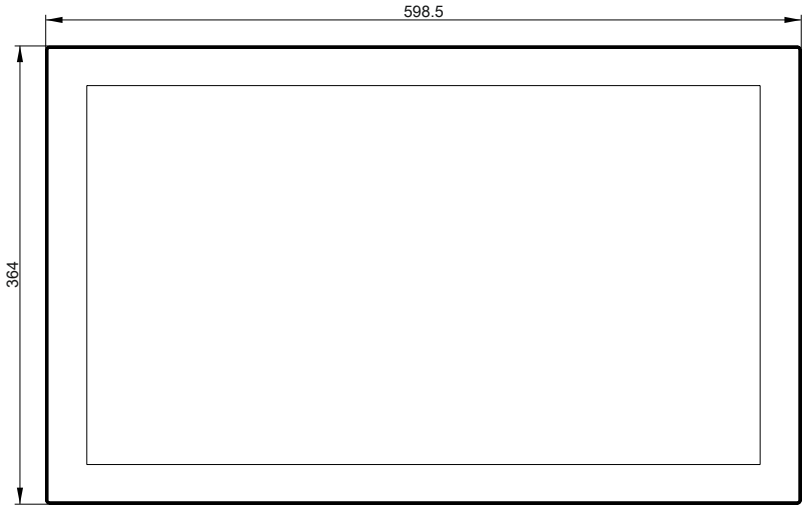
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP933.240C-00	
Revision	**C0**	**D0**
General information		
B&R ID code	0xE1B4	
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [1]	
LR	ENV3	
KR	Yes	
ABS	Yes	
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck	
EAC	Yes	
Display		
Type	TFT color	
Diagonal	24.0"	
Colors	16.7 million	
Resolution	FHD, 1920 × 1080 pixels	
Contrast	5000:1	
Viewing angles		
Horizontal	Direction R = 89° / Direction L = 89°	
Vertical	Direction U = 89° / Direction D = 89°	
Backlight		
Type	LED	
Brightness (dimmable)	Typ. 30 to 300 cd/m²	
Half-brightness time [2]	50,000 h	
Touch screen [3]		
Technology	Projected capacitive touch (PCT)	
Transmittance	88% ±2%	>90%
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Degree of protection per UL 50	Front: Type 4X indoor use only	

Order number	5AP933.240C-00	
Revision	**C0**	**D0**
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm fixed gasket	
Dimensions		
Width	598.5 mm	
Height	364 mm	
Weight	Approx. 7800 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 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) The specifications of the touch screen driver must be taken into account; see section "Multi-touch driver".

4.2.2.7.4 Dimensions



4.2.2.7.5 Temperature/Humidity diagram

5AP933.240C-00 ≥ Rev. D0

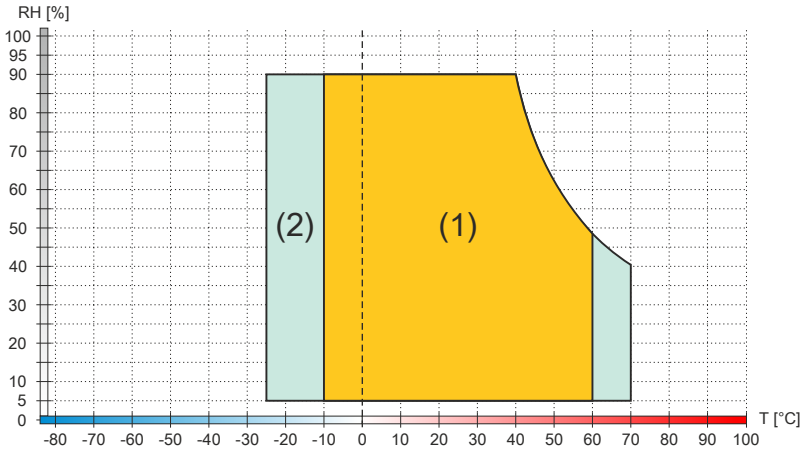


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.240C-00 ≤ Rev. C0

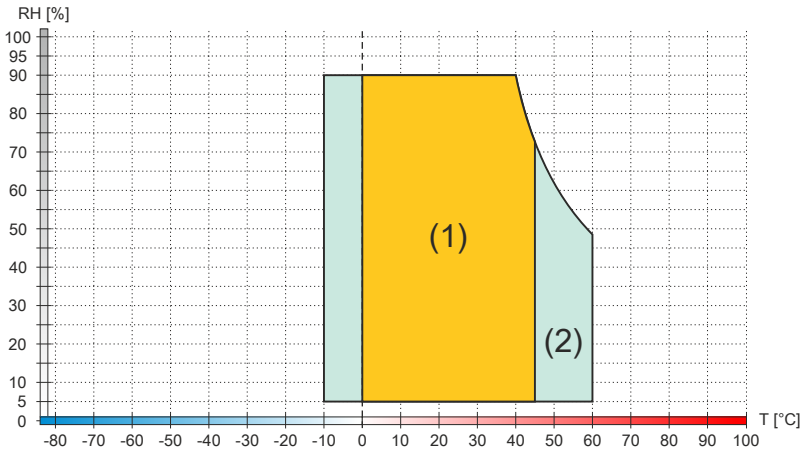


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3 AP1000 panels

4.2.3.1 5AP1120.0573-000

4.2.3.1.1 General information

- Panel for AP1000, PPC2100 or PPC2200
- 5.7" TFT VGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.3.1.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.0573-000	Automation Panel 5.7" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC2200 / link modules - Compatible with 5PP520.0573-00	

4.2.3.1.3 Technical data

Information:

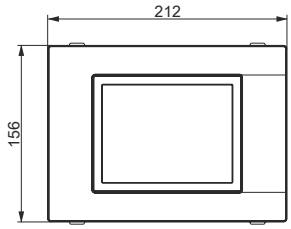
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.0573-000	
Revision	**D0**	**E0**
General information		
B&R ID code	0xE7AA	
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]	
EAC	Yes	
Display		
Type	TFT color	
Diagonal	5.7"	
Colors	262,144	
Resolution	VGA, 640 x 480 pixels	
Contrast	850:1	800:1
Viewing angles		
Horizontal	Direction R = 80° / Direction L = 80°	
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 70° / Direction D = 70°
Backlight		
Type	LED	
Brightness (dimmable)	Typ. 20 to 400 cd/m²	Typ. 22.5 to 450 cd/m²
Half-brightness time [2)]	50,000 h	
Touch screen [3)]		
Technology	Analog, resistive	
Controller	B&R, serial, 12-bit	
Transmittance	81% ±3%	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Degree of protection per UL 50	Front: Type 4X indoor use only	

Order number	5AP1120.0573-000	
Revision	**D0**	**E0**
Mechanical properties		
Front [4]		
Frame	Aluminum, naturally anodized	
Panel overlay		
Material	Polyester	
Light background color	RAL 9006	
Dark border color around display	RAL 7024	
Gasket	3 mm fixed gasket	
Dimensions		
Width	212 mm	
Height	156 mm	
Weight	1100 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.1.4 Dimensions



4.2.3.1.5 Temperature/Humidity diagram

5AP1120.0573-000 ≥ Rev. E0

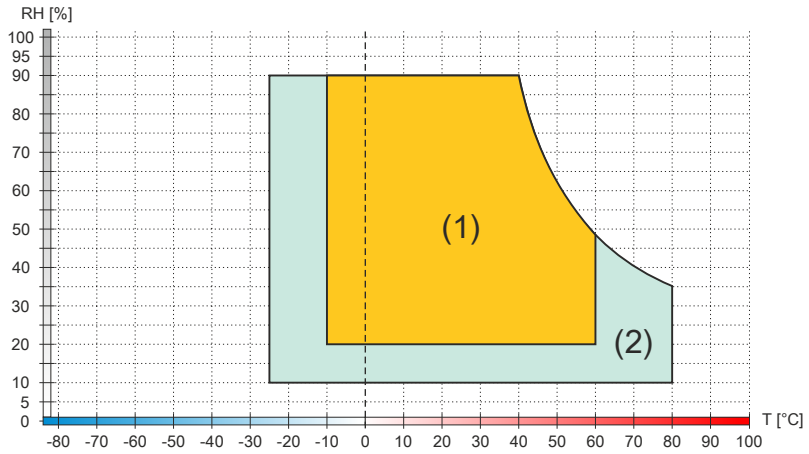


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP1120.0573-000 ≤ Rev. D0

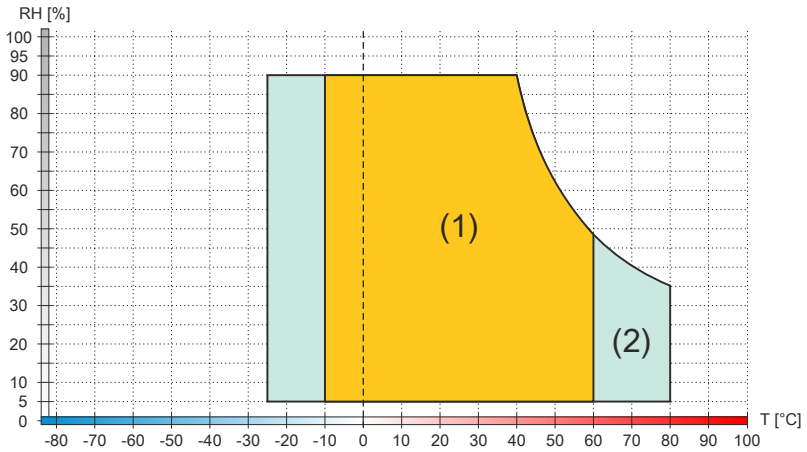


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.2 5AP1151.0573-000

4.2.3.2.1 General information

- Panel for AP1000, PPC2100 or PPC2200
- 5.7" TFT VGA color display
- 22 function keys and 20 system keys
- Control cabinet installation

4.2.3.2.2 Order data

Order number	Short description	Figure
	Panels	
5AP1151.0573-000	Automation Panel 5.7" VGA TFT - 640 x 480 pixels (4:3) - Control cabinet installation - Portrait format - 22 function keys and 20 system keys - For PPC2100 / PPC2200 / link modules - Compatible with 5PP551.0573-00	

4.2.3.2.3 Technical data

Information:

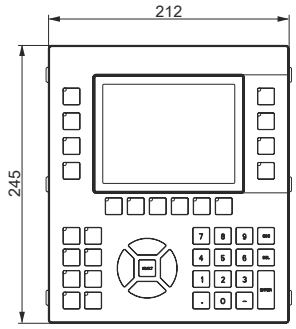
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1151.0573-000	
Revision	**D0**	**E0**
General information		
B&R ID code	0xE7AB	
Certifications		
CE	Yes	
UKCA	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]	
EAC	Yes	
Display		
Type	TFT color	
Diagonal	5.7"	
Colors	262,144	
Resolution	VGA, 640 x 480 pixels	
Contrast	850:1	800:1
Viewing angles		
Horizontal	Direction R = 80° / Direction L = 80°	
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 70° / Direction D = 70°
Backlight		
Type	LED	
Brightness (dimmable)	Typ. 20 to 400 cd/m²	Typ. 22.5 to 450 cd/m²
Half-brightness time [2)]	50,000 h	
Keys		
Function keys	22 with LED (yellow)	
System keys	Numeric keys, cursor block	
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force	
LED luminous intensity		
Yellow	Typ. 38 mcd	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	

Order number	5AP1151.0573-000	
Revision	**D0**	**E0**
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front [3]		
Frame	Aluminum, naturally anodized	
Panel overlay		
Material	Polyester	
Light background color	RAL 9006	
Dark border color around display	RAL 7024	
Gasket	3 mm fixed gasket	
Dimensions		
Width	212 mm	
Height	245 mm	
Weight	1400 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.2.4 Dimensions



4.2.3.2.5 Temperature/Humidity diagram

5AP1151.0573-000 ≥ Rev. E0

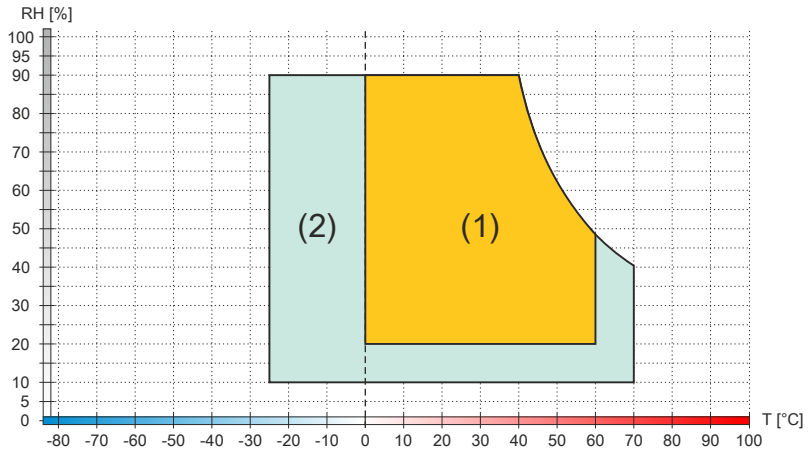


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP1151.0573-000 ≤ Rev. D0

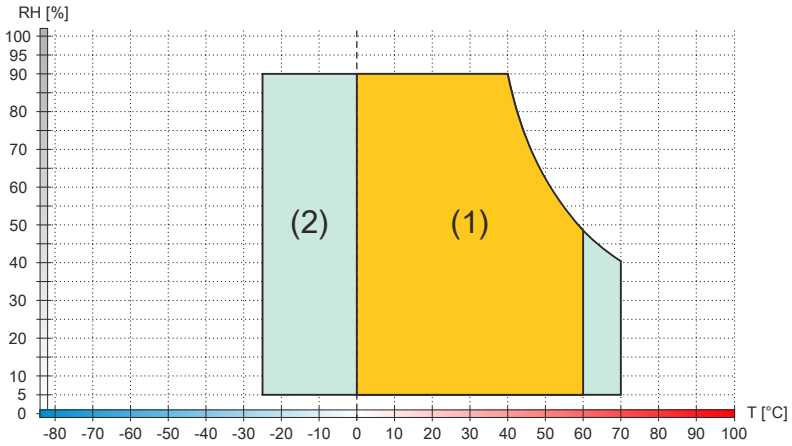


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.3 5AP1120.0702-000

4.2.3.3.1 General information

- Panel for AP1000, PPC2100 or PPC2200
- 7.0" TFT WVGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.3.3.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.0702-000	Automation Panel 7" WVGA TFT - 800 x 480 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC2200 / link modules - Compatible with 5PP520.0702-00	

4.2.3.3.3 Technical data

Information:

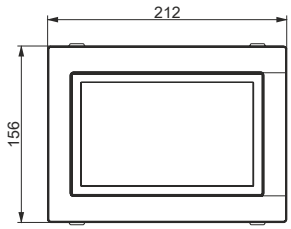
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.0702-000
General information	
B&R ID code	0xE7AC
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Yes
Display	
Type	TFT color
Diagonal	7.0"
Colors	16.7 million
Resolution	WVGA, 800 x 480 pixels
Contrast	Rev. D0 and later: 550:1 Up to Rev. C0: 600:1
Viewing angles	
Horizontal	Direction R = 70° / Direction L = 70°
Vertical	Rev. D0 and later: Direction U = 50° / Direction D = 60° Up to Rev. C0: Direction U = 60° / Direction D = 60°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 80 to 500 cd/m²
Half-brightness time [2)]	50,000 h
Touch screen [3)]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Order number	5AP1120.0702-000
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	212 mm
Height	156 mm
Weight	Approx. 900 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.3.4 Dimensions



4.2.3.3.5 Temperature/Humidity diagram

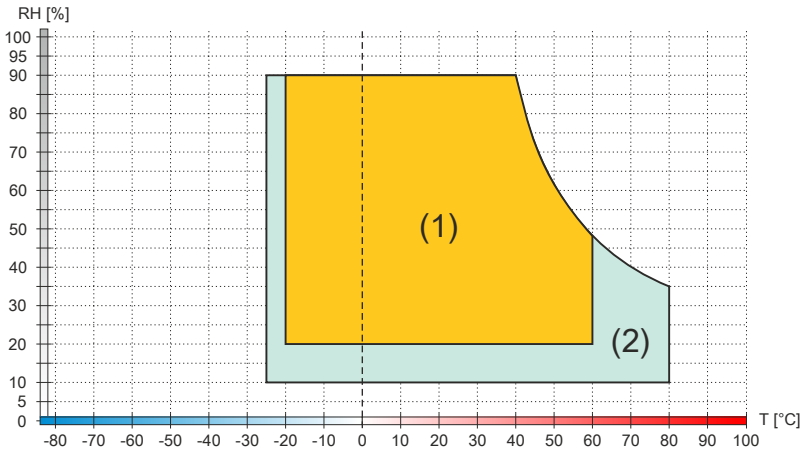


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.4 5AP1130.0702-000

4.2.3.4.1 General information

- Panel for AP1000, PPC2100 or PPC2200
- 7.0" TFT WVGA color display
- Multi-touch (projected capacitive)
- Control cabinet installation

4.2.3.4.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.0702-000	Automation Panel 7.0" WVGA TFT - 800 x 480 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC2200 / link modules - Compatible with 5PP520.0702-00	

4.2.3.4.3 Technical data

Information:

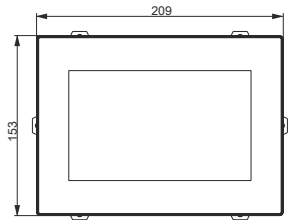
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.0702-000
General information	
B&R ID code	0xEB61
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Yes
Display	
Type	TFT color
Diagonal	7.0"
Colors	16.7 million
Resolution	WVGA, 800 x 480 pixels
Contrast	Rev. G0 and later: 550:1 Up to Rev. F0: 600:1
Viewing angles	
Horizontal	Direction R = 70° / Direction L = 70°
Vertical	Rev. G0 and later: Direction U = 50° / Direction D = 60° Up to Rev. F0: Direction U = 60° / Direction D = 60°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 80 to 500 cd/m²
Half-brightness time [2)]	50,000 h
Touch screen [3)]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Order number	5AP1130.0702-000
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	209 mm
Height	153 mm
Weight	1200 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) The specifications for the touch screen driver must be taken into account. See chapter 4 "Software", section 2 "Multi-touch drivers".
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.4.4 Dimensions



4.2.3.4.5 Temperature/Humidity diagram

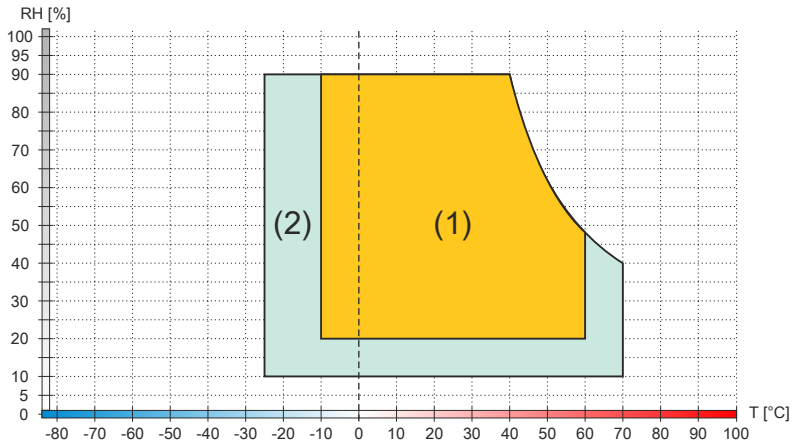


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.5 5AP1130.101D-000

4.2.3.5.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 10.1" TFT WUXGA color display
- Multi-touch (projected capacitive)
- Brighter display
- Control cabinet installation

4.2.3.5.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.101D-000	Automation Panel 10.1" High Resolution - 1920 x 1200 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100/PPC3100/PPC2200 - For link modules	

4.2.3.5.3 Technical data

Information:

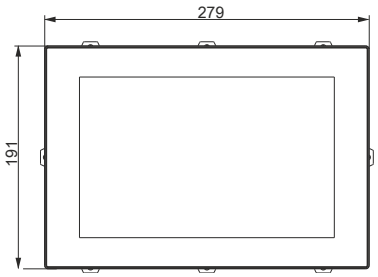
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.101D-000
General information	
B&R ID code	0x27AD
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	In preparation [1]
Display	
Type	TFT color
Diagonal	10.1"
Colors	16.7 million
Resolution	WUXGA, 1920 x 1200 pixels
Contrast	800:1
Air bonding	Yes
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 80 to 800 cd/m²
Half-brightness time [2]	40,000 h
Touch screen [3]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket

Order number	5AP1130.101D-000
Dimensions	
Width	279 mm
Height	191 mm
Weight	Approx. 2000 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.5.4 Dimensions



4.2.3.5.5 Temperature/Humidity diagram

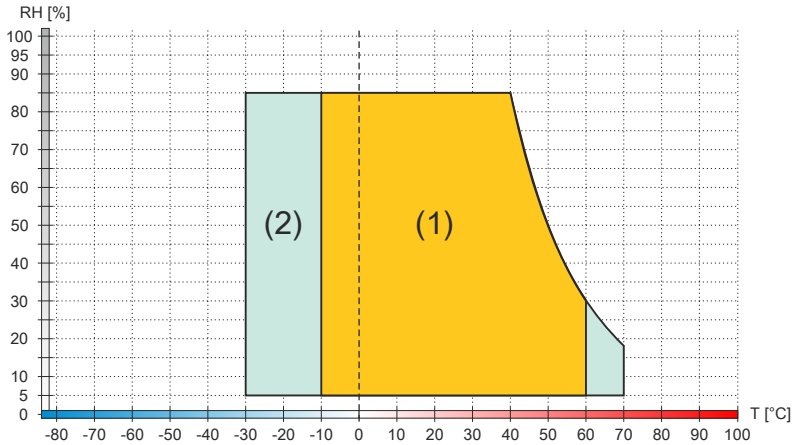


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.6 5AP1120.101E-000

4.2.3.6.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 10.1" TFT WXGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.3.6.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.101E-000	Automation Panel 10.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

4.2.3.6.3 Technical data

Information:

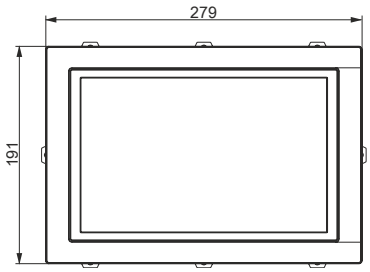
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.101E-000
General information	
B&R ID code	0xE93D
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	10.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	Hardware revision G0 and later: 700:1 Hardware revision F0: 1000:1 Hardware revision E0: 700:1 Up to hardware revision D0: 1000:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Hardware revision G0 and later: Typ. 25 to 1000 cd/m² Hardware revision F0: Typ. 25 to 500 cd/m² Hardware revision E0: Typ. 25 to 1000 cd/m² Up to hardware revision D0: Typ. 25 to 500 cd/m²
Half-brightness time [2]	50,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Order number	5AP1120.101E-000
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	1900 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.6.4 Dimensions



4.2.3.6.5 Temperature/Humidity diagram

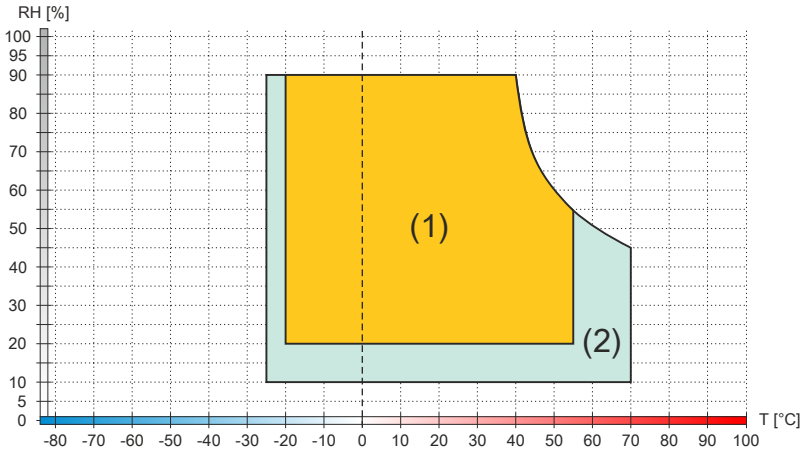


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.7 5AP1130.101E-000

4.2.3.7.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 10.1" TFT WXGA color display
- Multi-touch (projected capacitive)
- Control cabinet installation

4.2.3.7.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.101E-000	Automation Panel 10.1" WXGA TFT - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

4.2.3.7.3 Technical data

Information:

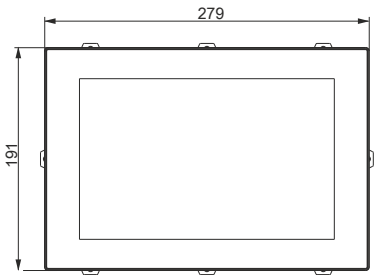
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.101E-000
General information	
B&R ID code	0xEB62
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
Display	
Type	TFT color
Diagonal	10.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	Starting with hardware revision I0: 700:1 Up to hardware revision H0: 1000:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Starting with hardware revision I0: Typ 25 to 1000 cd/m² Up to hardware revision H0: Typ. 25 to 500 cd/m²
Half-brightness time [3]	50,000 h
Touch screen [4]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".

Order number	5AP1130.101E-000
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [5]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	2000 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
4) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
5) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.7.4 Dimensions



4.2.3.7.5 Temperature/Humidity diagram

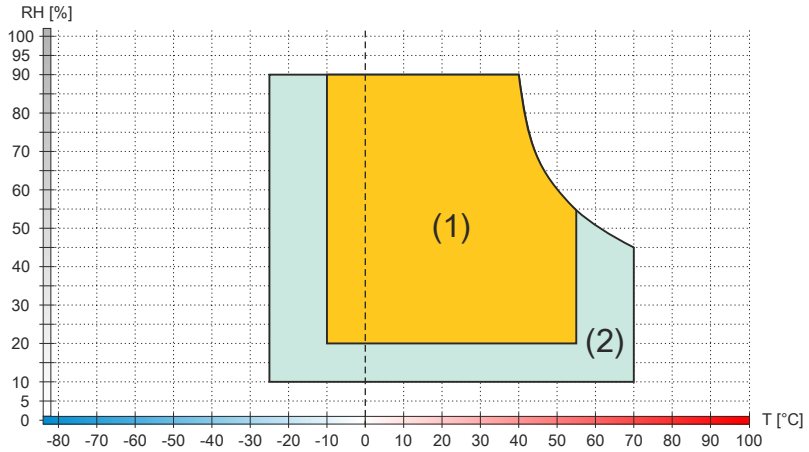


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.8 5AP1120.1043-000

4.2.3.8.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 10.4" TFT VGA color display
- Single-touch (analog resistive)
- Front USB interface
- Control cabinet installation

4.2.3.8.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP520.1043-00	

4.2.3.8.3 Technical data

Information:

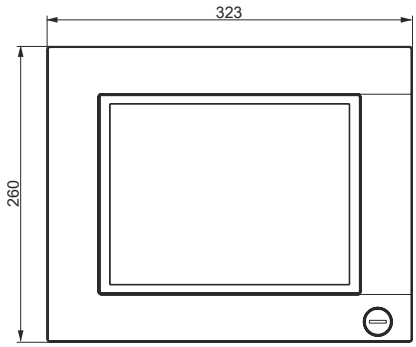
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.1043-000
General information	
B&R ID code	0xE7AD
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	10.4"
Colors	16.7 million
Resolution	VGA, 640 x 480 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 22.5 to 450 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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	Max. 500 mA

Order number	5AP1120.1043-000
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	323 mm
Height	260 mm
Weight	2800 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.8.4 Dimensions



4.2.3.8.5 Temperature/Humidity diagram

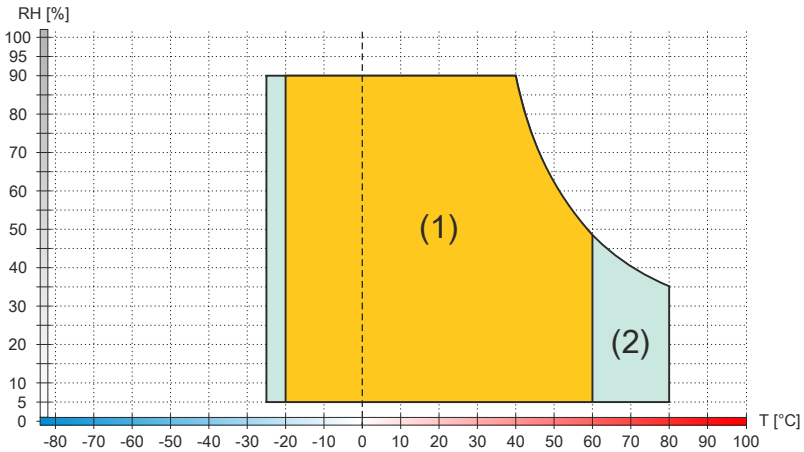


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.9 5AP1180.1043-000

4.2.3.9.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 10.4" TFT VGA color display
- Single-touch (analog resistive)
- 22 function keys
- Front USB interface
- Control cabinet installation

4.2.3.9.2 Order data

Order number	Short description	Figure
	Panels	
5AP1180.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 22 function keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP580.1043-00, 5AP980.1043-01	

4.2.3.9.3 Technical data

Information:

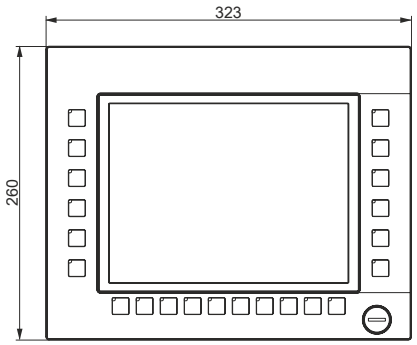
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1180.1043-000
General information	
B&R ID code	0xE7AE
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	10.4"
Colors	16.7 million
Resolution	VGA, 640 x 480 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 22.5 to 450 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Order number	5AP1180.1043-000
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	Max. 500 mA
Keys	
Function keys	22 with LED (yellow)
System keys	No
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED luminous intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	323 mm
Height	260 mm
Weight	2800 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.9.4 Dimensions



4.2.3.9.5 Temperature/Humidity diagram

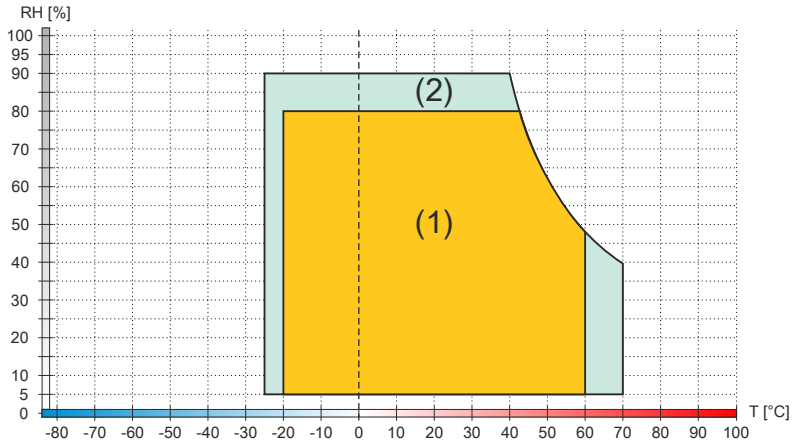


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.10 5AP1181.1043-000

4.2.3.10.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 10.4" TFT VGA color display
- Single-touch (analog resistive)
- 38 function keys and 20 system keys
- Front USB interface
- Control cabinet installation

4.2.3.10.2 Order data

Order number	Short description	Figure
	Panels	
5AP1181.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Portrait format - Front USB - 38 function keys and 20 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP581.1043-00, 5AP981.1043-01, 5PC781.1043-00	

4.2.3.10.3 Technical data

Information:

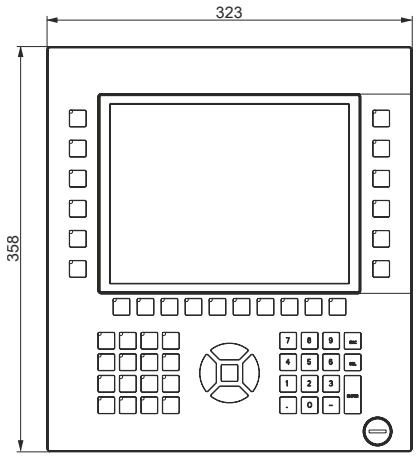
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1181.1043-000
General information	
B&R ID code	0xE7AF
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	10.4"
Colors	16.7 million
Resolution	VGA, 640 x 480 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 22.5 to 450 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Order number	5AP1181.1043-000
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	Max. 500 mA
Keys	
Function keys	38 with LED (yellow)
System keys	Numeric keys, cursor block
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED luminous intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	323 mm
Height	358 mm
Weight	3400 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.10.4 Dimensions



4.2.3.10.5 Temperature/Humidity diagram

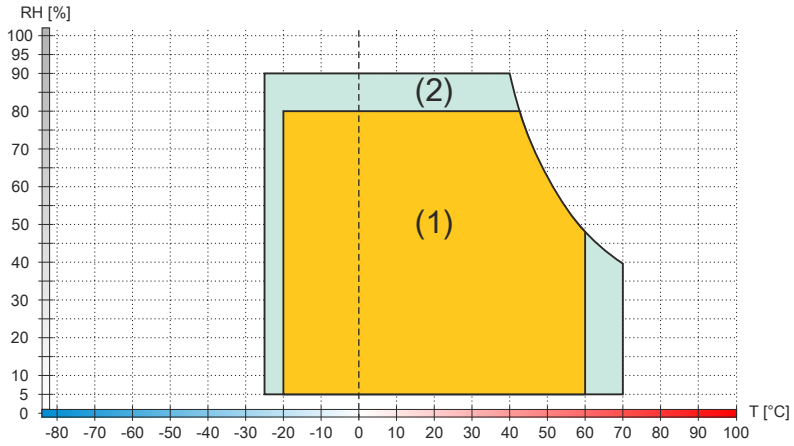


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.11 5AP1182.1043-000

4.2.3.11.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 10.4" TFT VGA color display
- Single-touch (analog resistive)
- 44 function keys and 20 system keys
- Front USB interface
- Control cabinet installation

4.2.3.11.2 Order data

Order number	Short description	Figure
	Panels	
5AP1182.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 44 function keys and 20 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP582.1043-00, 5AP982.1043-01, 5PC782.1043-00	

4.2.3.11.3 Technical data

Information:

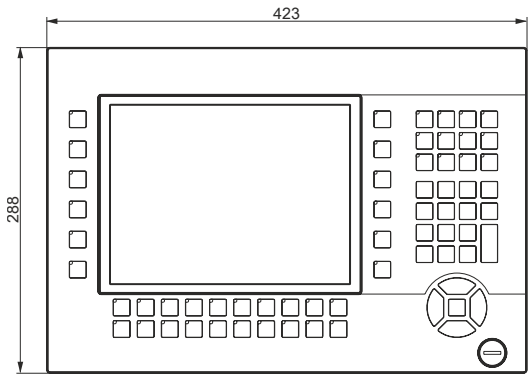
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1182.1043-000
General information	
B&R ID code	0xE7B0
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	10.4"
Colors	16.7 million
Resolution	VGA, 640 x 480 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 22.5 to 450 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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	Max. 500 mA

Order number	5AP1182.1043-000
Keys	
Function keys	44 with LED (yellow)
System keys	Numeric keys, cursor block
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED luminous intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	423 mm
Height	288 mm
Weight	3500 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.11.4 Dimensions



4.2.3.11.5 Temperature/Humidity diagram

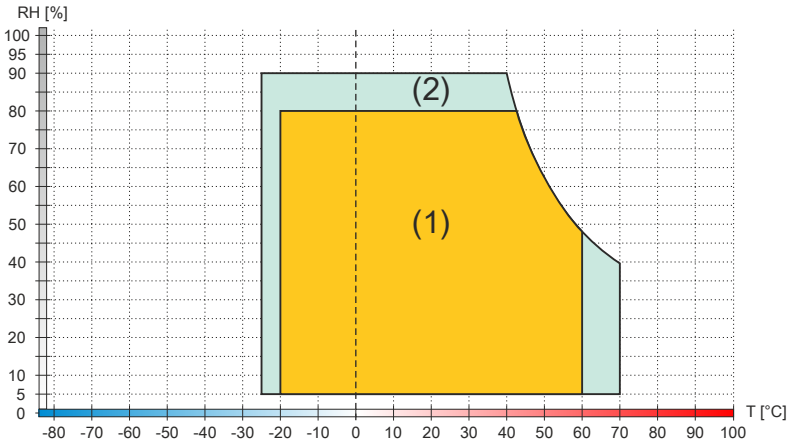


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.12 5AP1120.1214-000

4.2.3.12.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 12.1" TFT SVGA color display
- Single-touch (analog resistive)
- Front USB interface
- Control cabinet installation

4.2.3.12.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.1214-000	Automation Panel 12.1" SVGA TFT - 800 x 600 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP520.1214-00	

4.2.3.12.3 Technical data

Information:

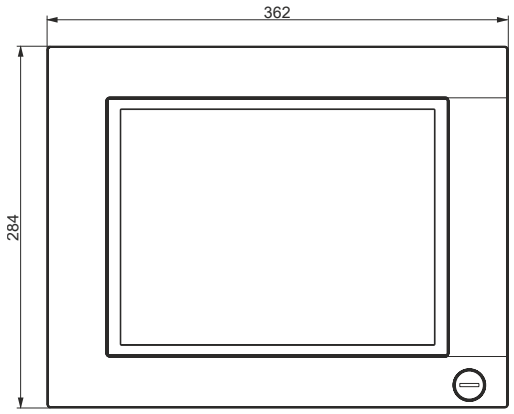
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.1214-000
General information	
B&R ID code	0xE7BB
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	SVGA, 800 x 600 pixels
Contrast	1500:1
Viewing angles	
Horizontal	Direction R = 89° / Direction L = 89°
Vertical	Direction U = 89° / Direction D = 89°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 22.5 to 450 cd/m²
Half-brightness time [2]	50,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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	Max. 500 mA

Order number	5AP1120.1214-000
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	362 mm
Height	284 mm
Weight	3200 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.12.4 Dimensions



4.2.3.12.5 Temperature/Humidity diagram

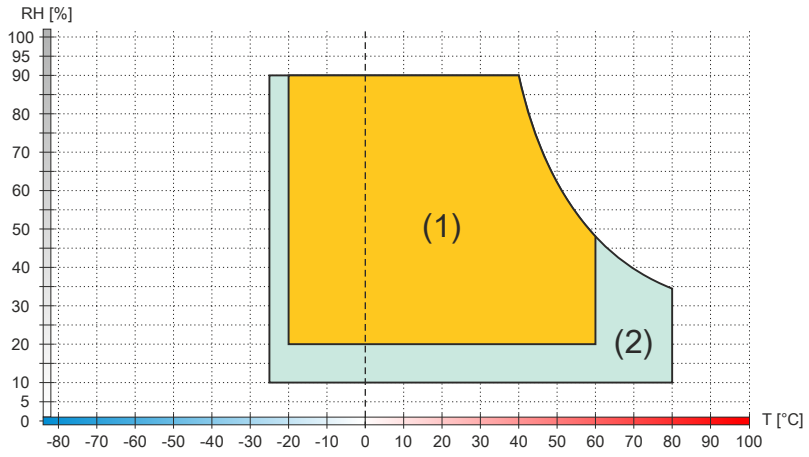


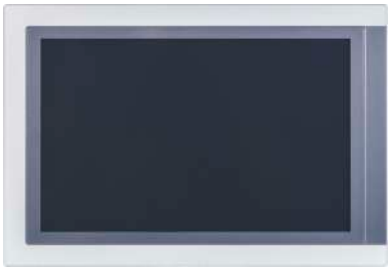
Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.13 5AP1120.121E-000

4.2.3.13.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 12.1" TFT WXGA color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.3.13.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.121E-000	Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

4.2.3.13.3 Technical data

Information:

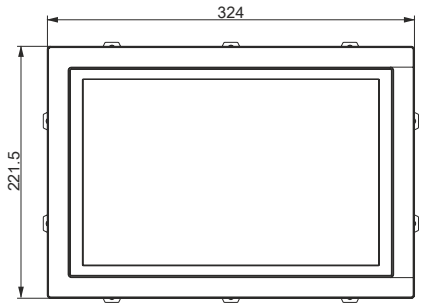
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.121E-000
General information	
B&R ID code	0xE8E4
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Yes
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 65° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 40 to 400 cd/m²
Half-brightness time [2)]	50,000 h
Touch screen [3)]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Order number	5AP1120.121E-000
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	2300 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.13.4 Dimensions



4.2.3.13.5 Temperature/Humidity diagram

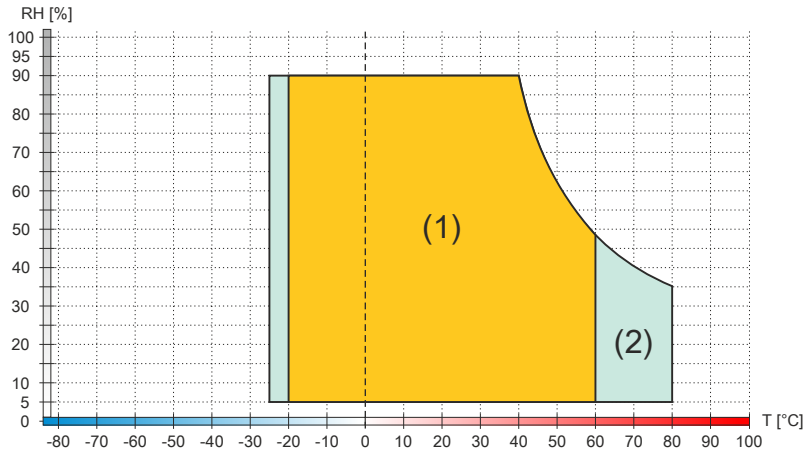


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.14 5AP1130.121E-010

4.2.3.14.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 12.1" TFT WXGA color display
- Multi-touch (projected capacitive)
- Sunlight-readable display

4.2.3.14.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.121E-010	Automation Panel 12.1" sunlight readable - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100/PPC3100/PPC2200 - For link modules	

4.2.3.14.3 Technical data

Information:

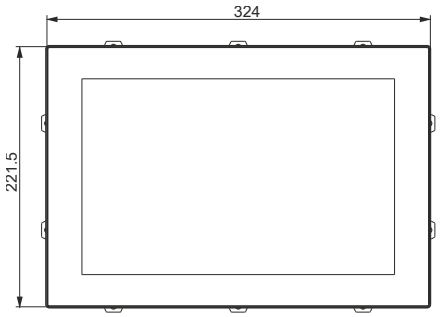
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.121E-010
General information	
B&R ID code	0x27D9
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	1000:1
Sunlight readable	Yes
Air bonding	Yes
Viewing angles	
Horizontal	Direction R = 89° / Direction L = 89°
Vertical	Direction U = 89° / Direction D = 89°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 150 to 1500 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket

Order number	5AP1130.121E-010
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	Approx. 2900 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.14.4 Dimensions



4.2.3.14.5 Temperature/Humidity diagram

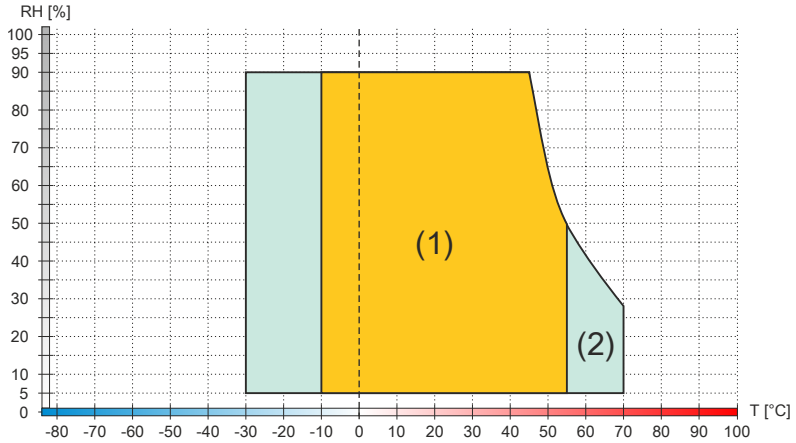


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.15 5AP1130.121E-000

4.2.3.15.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 12.1" TFT WXGA color display
- Multi-touch (projected capacitive)
- Control cabinet installation

4.2.3.15.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.121E-000	Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

4.2.3.15.3 Technical data

Information:

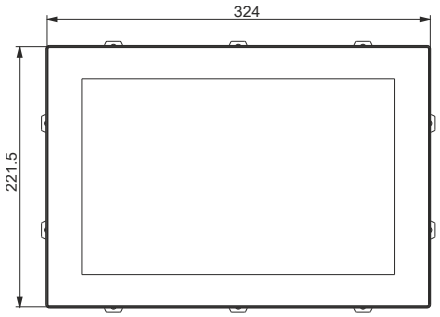
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.121E-000
General information	
B&R ID code	0xEB63
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Yes
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	900:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 65° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 40 to 400 cd/m²
Half-brightness time [2)]	50,000 h
Touch screen [3)]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4)]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket

Order number	5AP1130.121E-000
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	2400 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.15.4 Dimensions



4.2.3.15.5 Temperature/Humidity diagram

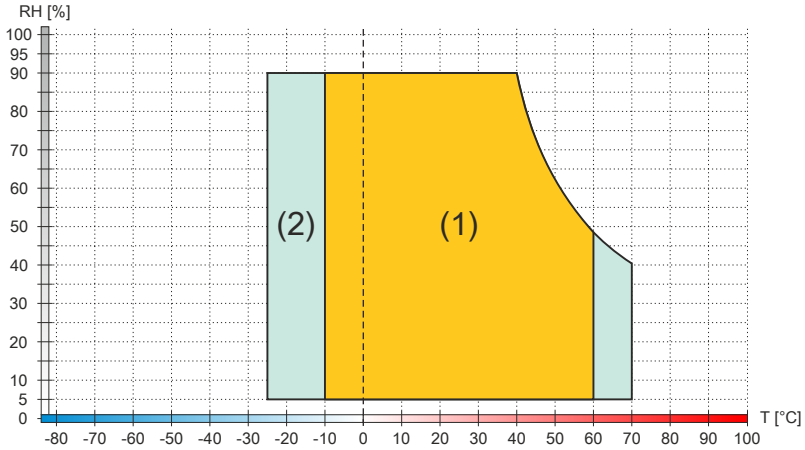


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.16 5AP1120.1505-000

4.2.3.16.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 15.0" TFT XGA color display
- Single-touch (analog resistive)
- Front USB interface
- Control cabinet installation

4.2.3.16.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.1505-000	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP520.1505-00, 5AP920.1505-01, 5PC720.1505-xx, 5PC820.1505-00	

4.2.3.16.3 Technical data

Information:

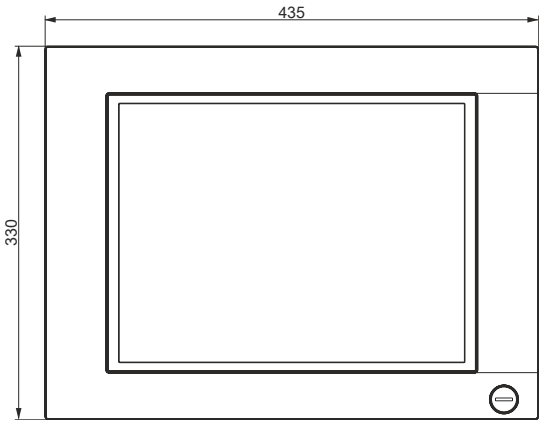
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.1505-000
General information	
B&R ID code	0xE7BC
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1)]
EAC	Yes
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 20 to 400 cd/m²
Half-brightness time [2)]	50,000 h
Touch screen [3)]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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	Max. 500 mA

Order number	5AP1120.1505-000
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	435 mm
Height	330 mm
Weight	5000 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.16.4 Dimensions



4.2.3.16.5 Temperature/Humidity diagram

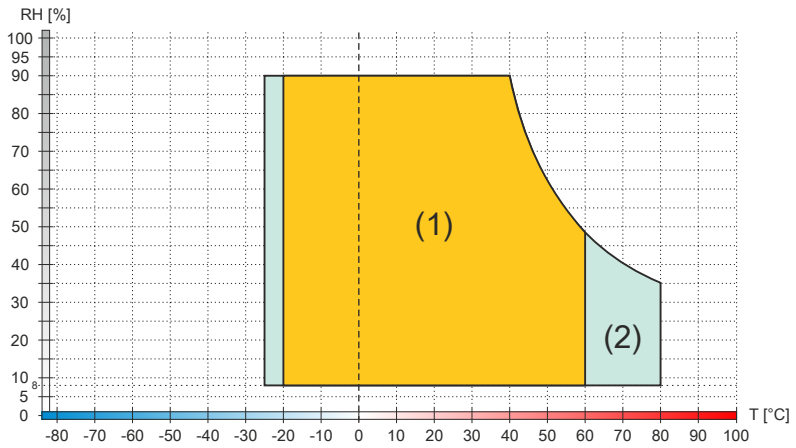


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.17 5AP1180.1505-000

4.2.3.17.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 15.0" TFT XGA color display
- Single-touch (analog resistive)
- 32 function keys
- Front USB interface
- Control cabinet installation

4.2.3.17.2 Order data

Order number	Short description	Figure
	Panels	
5AP1180.1505-000	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 32 function keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP580.1505-00, 5AP980.1505-01	

4.2.3.17.3 Technical data

Information:

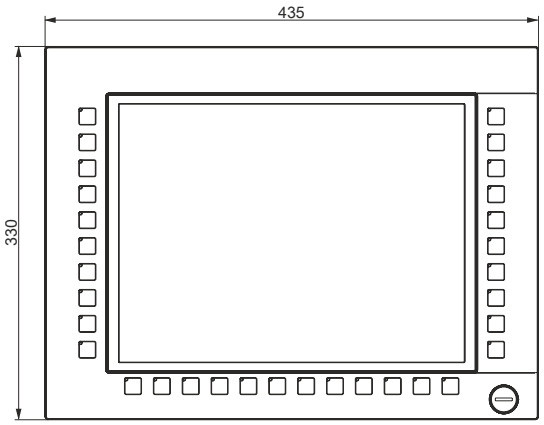
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1180.1505-000
General information	
B&R ID code	0xE7BD
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 20 to 400 cd/m²
Half-brightness time [2]	50,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Order number	5AP1180.1505-000
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	Max. 500 mA
Keys	
Function keys	32 with LED (yellow)
System keys	No
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED luminous intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	435 mm
Height	330 mm
Weight	4900 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.17.4 Dimensions



4.2.3.17.5 Temperature/Humidity diagram

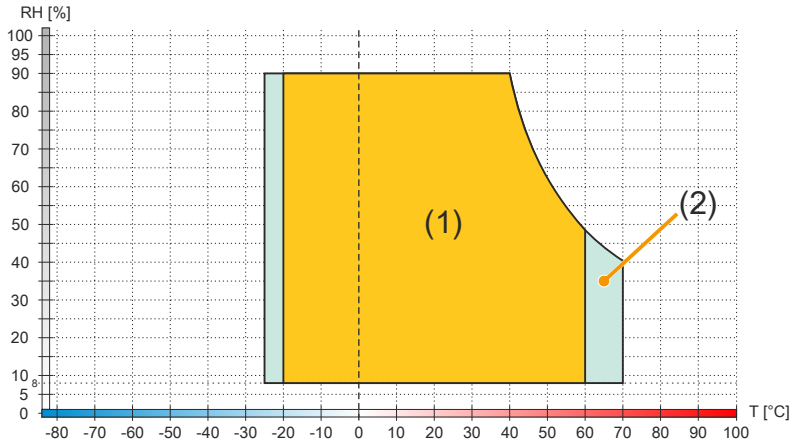


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.18 5AP1181.1505-000

4.2.3.18.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 15.0" TFT XGA color display
- Single-touch (analog resistive)
- 32 function keys
- 92 system keys
- Front USB interface
- Control cabinet installation

Information:

This Automation Panel is not approved for DVI operation.

4.2.3.18.2 Order data

Order number	Short description	Figure
	Panels	
5AP1181.1505-000	Automation Panel 15" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 32 function keys and 92 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP581.1505-000	

4.2.3.18.3 Technical data

Information:

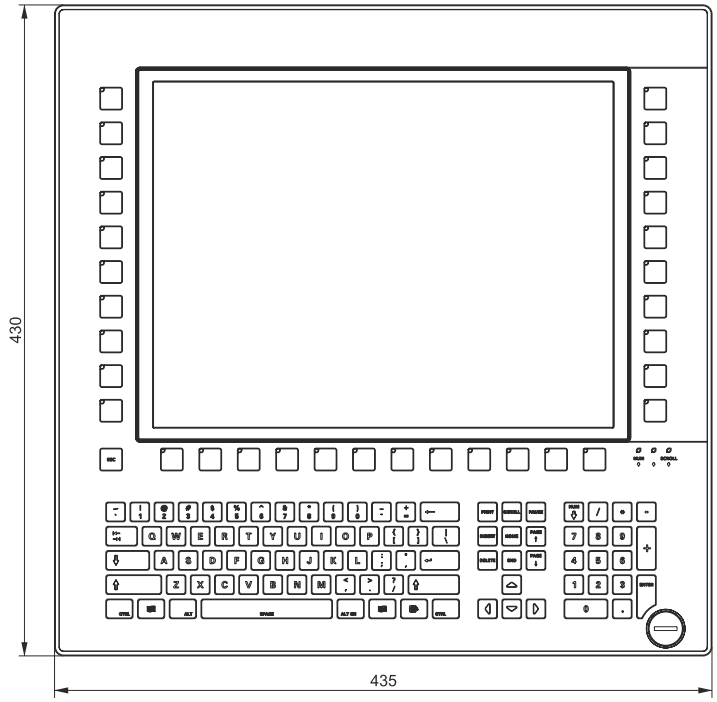
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1181.1505-000
General information	
B&R ID code	0xEF61
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 20 to 400 cd/m²
Half-brightness time [2]	50,000 h

Order number	5AP1181.1505-000
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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	Max. 500 mA
Keys	
Function keys	32 with LED (yellow)
System keys	Alphanumeric keys, numeric keys, cursor block
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED luminous intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	435 mm
Height	430 mm
Weight	6000 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.18.4 Dimensions



4.2.3.18.5 Temperature/Humidity diagram

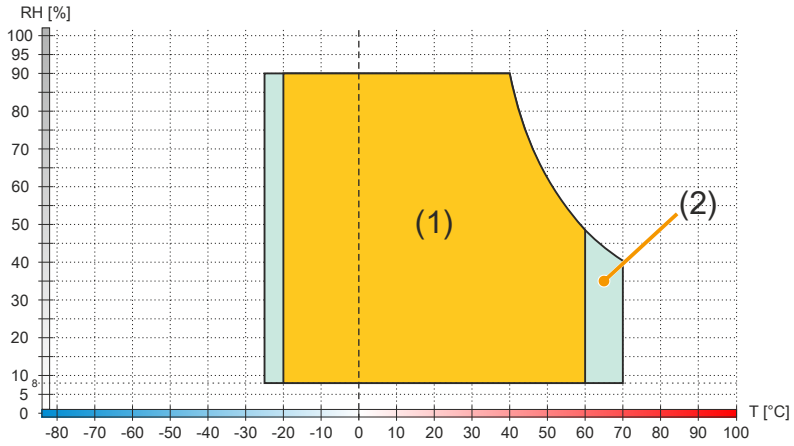


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.19 5AP1120.156B-000

4.2.3.19.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 15.6" TFT HD color display
- Single-touch (analog resistive)
- Control cabinet installation

4.2.3.19.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.156B-000	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.3.19.3 Technical data

Information:

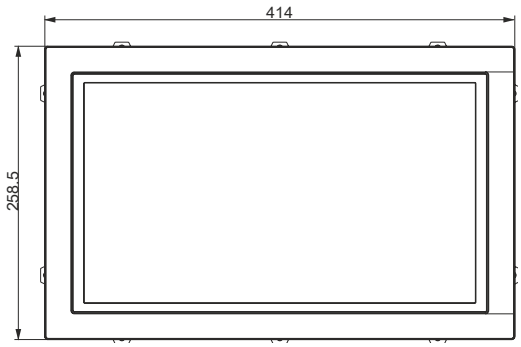
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.156B-000
General information	
B&R ID code	0xE8E5
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Yes
Display	
Type	TFT color
Diagonal	15.6"
Colors	16.7 million
Resolution	HD, 1366 x 768 pixels
Contrast	1000:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 40 to 400 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Light transmission	80 ±3%
Service life	10,000,000 touch operations at the same position (release pressure: 250 g, interval: 0.25 s)
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Order number	5AP1120.156B-000
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	4200 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.19.4 Dimensions



4.2.3.19.5 Temperature/Humidity diagram

Hardware revision H0 and later

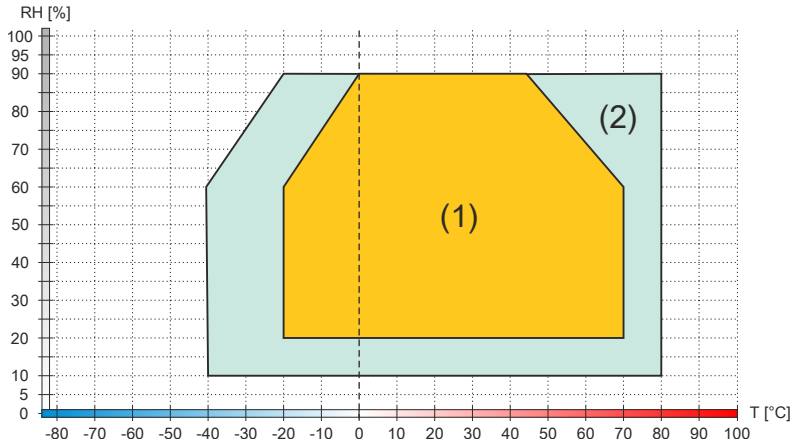


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

Up to hardware revision G0

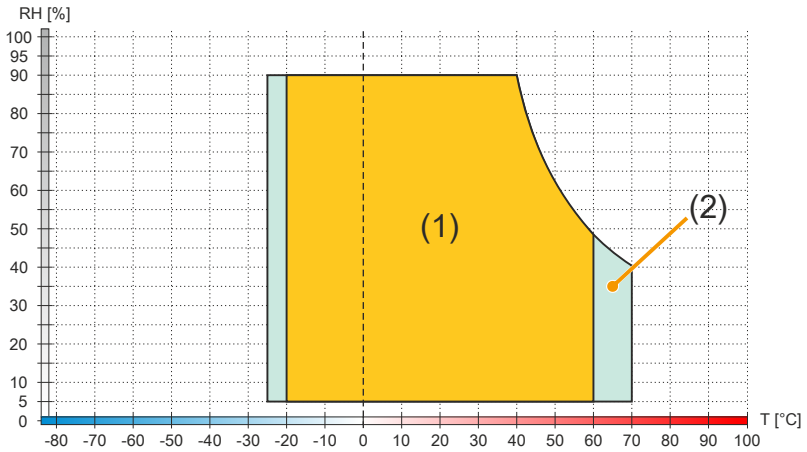


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.20 5AP1130.156C-000

4.2.3.20.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 15.6" FHD color display
- Multi-touch (projected capacitive)
- Control cabinet installation

4.2.3.20.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.156C-000	Automation Panel 15.6" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.3.20.3 Technical data

Information:

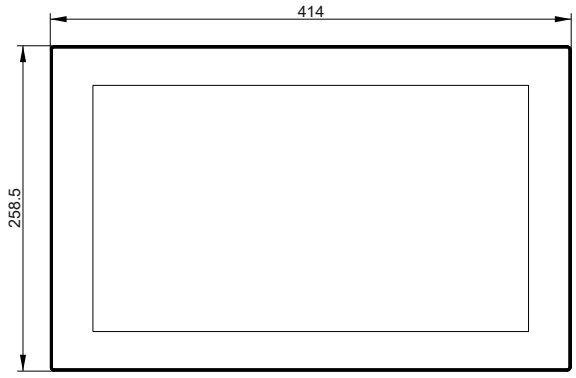
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.156C-000
General information	
B&R ID code	0xEC5D
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
Display	
Type	TFT color
Diagonal	15.6"
Colors	16.7 million
Resolution	FHD, 1920 x 1080 pixels
Contrast	800:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 40 to 450 cd/m²
Half-brightness time [3]	≥50,000 h
Touch screen [4]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Order number	5AP1130.156C-000
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [5]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	3700 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
4) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
5) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.20.4 Dimensions



4.2.3.20.5 Temperature/Humidity diagram

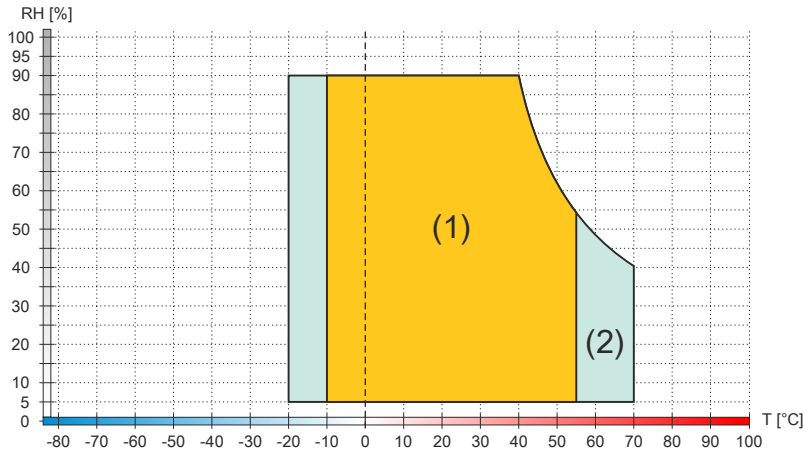


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.21 5AP1130.156C-001

4.2.3.21.1 General information

- Panel for AP1000, PPC2100, PPC2200 or PPC3100
- 15.6" TFT WXGA color display
- Multi-touch (projected capacitive)
- Manufactured with optical bonding technology

4.2.3.21.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.156C-001	Automation Panel 15.6" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - Optical bonding - For PPC900/PPC2100/ PPC3100/PPC2200 - For link modules	

4.2.3.21.3 Technical data

Information:

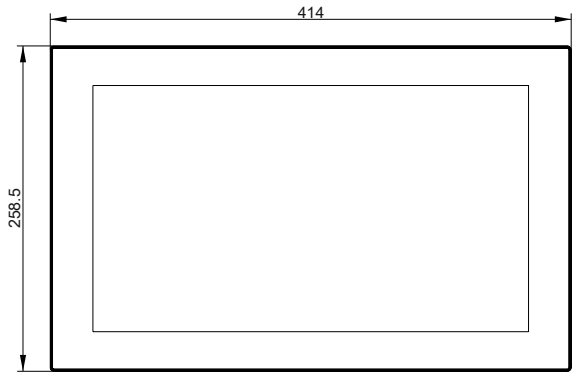
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.156C-001
General information	
B&R ID code	0x28B5
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
Display	
Type	TFT color
Diagonal	15.6"
Colors	16.7 million
Resolution	FHD, 1920 x 1080 pixels
Contrast	1500:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 40 to 400 cd/m²
Half-brightness time [2]	70,000 h
Touch screen [3]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [4]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket

Order number	5AP1130.156C-001
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	Approx. 3,800 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
3) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.21.4 Dimensions



4.2.3.21.5 Temperature/Humidity diagram

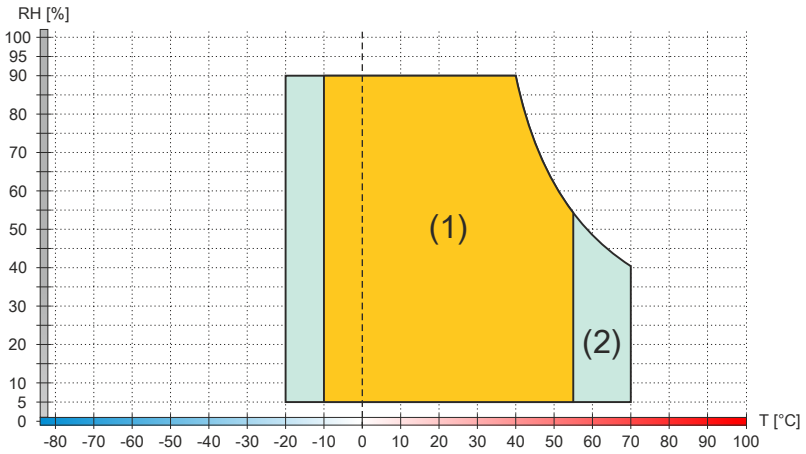


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.22 5AP1130.185C-000

4.2.3.22.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 18.5" FHD color display
- Multi-touch (projected capacitive)
- Control cabinet installation

4.2.3.22.2 Order data

Order number	Short description	Figure
	Panels	
5AP1130.185C-000	Automation Panel 18.5" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

4.2.3.22.3 Technical data

Information:

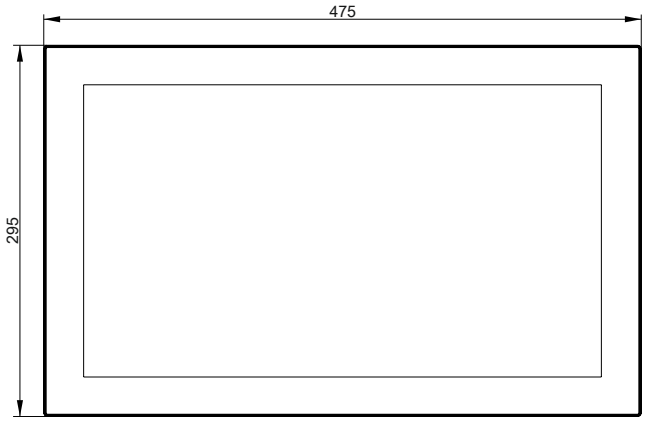
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1130.185C-000
General information	
B&R ID code	0xEC5E
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
Display	
Type	TFT color
Diagonal	18.5"
Colors	16.7 million
Resolution	FHD, 1920 x 1080 pixels
Contrast	1500:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 40 to 400 cd/m²
Half-brightness time [3]	50,000 h
Touch screen [4]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Order number	5AP1130.185C-000
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [5]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	475 mm
Height	295 mm
Weight	4700 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
4) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
5) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.22.4 Dimensions



4.2.3.22.5 Temperature/Humidity diagram

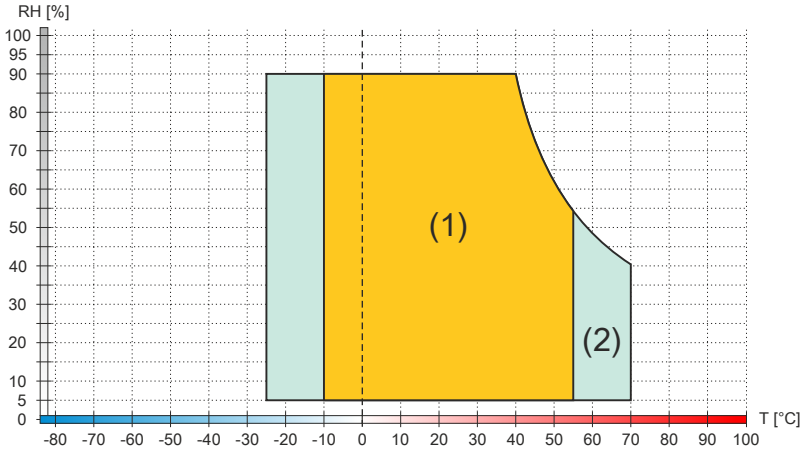


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.23 5AP1120.1906-000

4.2.3.23.1 General information

- Panel for AP1000, PPC900, PPC2100, PPC2200 or PPC3100
- 19.0" TFT SXGA color display
- Single-touch (analog resistive)
- Front USB interface
- Control cabinet installation

4.2.3.23.2 Order data

Order number	Short description	Figure
	Panels	
5AP1120.1906-000	Automation Panel 19.0" SXGA TFT - 1280 x 1024 pixels (5:4) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5AP920.1906-01, 5PC720.1906-00, 5PC820.1906-00	

4.2.3.23.3 Technical data

Information:

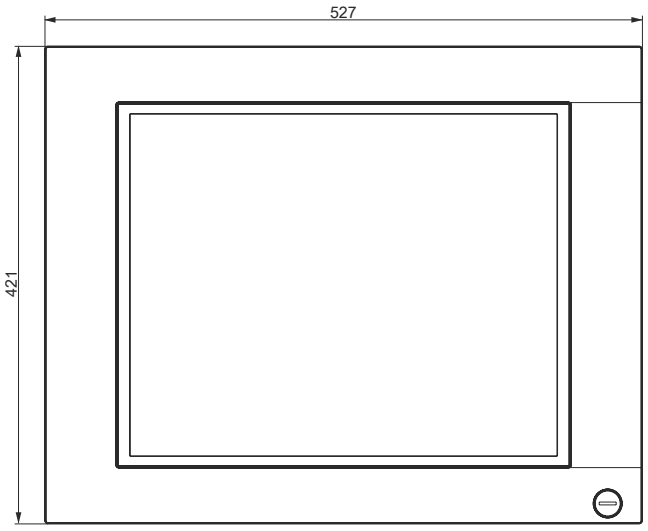
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5AP1120.1906-000
General information	
B&R ID code	0xE7BE
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
Display	
Type	TFT color
Diagonal	19.0"
Colors	16.2 million
Resolution	SXGA, 1280 x 1024 pixels
Contrast	1500:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 35 to 350 cd/m²
Half-brightness time [3]	70,000 h

Order number	5AP1120.1906-000
Touch screen [4]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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	Max. 500 mA
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [5]	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	527 mm
Height	421 mm
Weight	7300 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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
4) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
5) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.2.3.23.4 Dimensions



4.2.3.23.5 Temperature/Humidity diagram

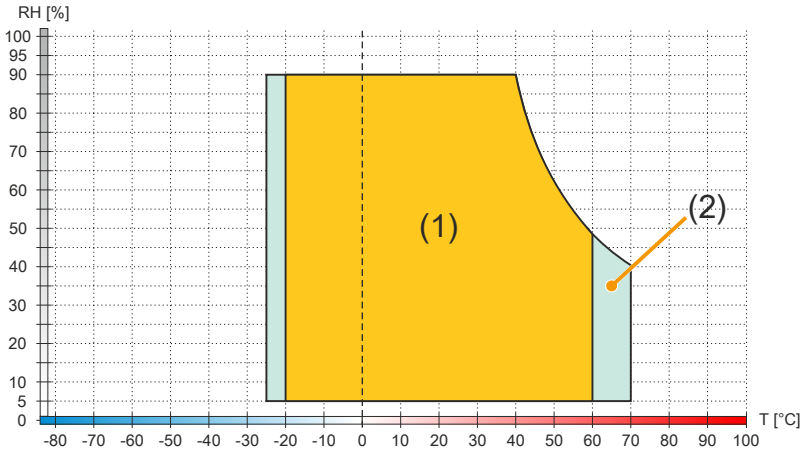


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.4 Interface options

Information:

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

4.2.4.1 5ACCIF01.FPCC-000

4.2.4.1.1 General information

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

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

This interface option can only be operated with Automation Runtime.

4.2.4.1.2 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	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.1.3 Technical data

Information:

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

Order number	5ACCIF01.FPCC-000
General information	
LEDs	L1, L2, L3
B&R ID code	0xE9BD
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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)

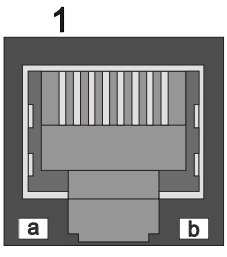
Order number	5ACCIF01.FPCC-000
Interfaces	
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	2
Variant	10-pin, male [4]
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
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°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

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

4.2.4.1.3.1 POWERLINK interface - Pinout

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

POWERLINK[1][2]		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED status indicator (b)	**On**	**Off**
Green	see "LED "S/E" (status/error LED)" on page 266	
LED "Link" (a)	**On**	**Active**
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)



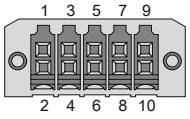
1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.1.3.2 CAN bus 1 interface - Pinout

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

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

CAN bus 1[1)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, see Automation Help.

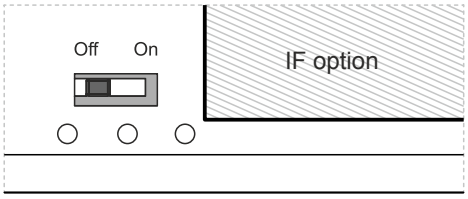
Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

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.



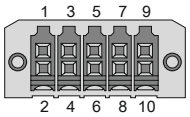
- ON: Switched on
- OFF (default): Switched off

4.2.4.1.3.3 CAN bus 2 interface - Pinout

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

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

CAN bus 2[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, see Automation Help.

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

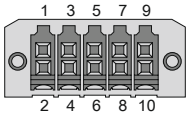
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

4.2.4.1.3.4 X2X Link master interface - Pinout

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

X2X Link master[1)2)]	
Variant	10-pin, male
Galvanic isolation	Yes
Pin	**Pinout**
1	X2X
2	Shield
3	X2X\
4	X2X⊥
5	-
6	-
7	-
8	-
9	-
10	-

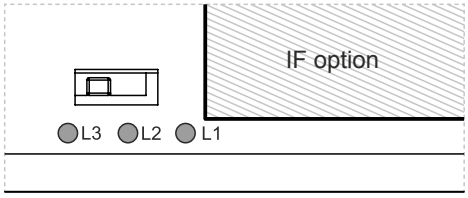


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface can only be used in Automation Runtime and is displayed as IF2 in Automation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

4.2.4.1.3.5 LED status indicators L1, L2, L3

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

LED status indicators			
LED	**Color**	**Status**	**Explanation**
L1	Yellow	On	The CAN bus 1 terminating resistor is switched on.
		Off	The CAN bus 1 terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.1.4 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.

4.2.4.1.5 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).

4.2.4.2 5ACCIF01.FPCS-000

4.2.4.2.1 General information

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

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

This interface option can only be operated with Automation Runtime.

4.2.4.2.2 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	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.2.3 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.

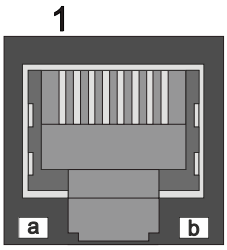
Order number	5ACCIF01.FPCS-000
General information	
LEDs	L1, L2, L3
B&R ID code	0xED7C
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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	RS485, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

Order number	5ACCIF01.FPCS-000
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, not galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
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°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

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

4.2.4.2.3.1 POWERLINK interface - Pinout

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

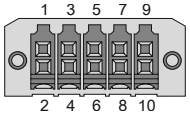
POWERLINK[1)2)]			
Variant	RJ45, female		
Wiring	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
LED status indicator (b)	**On**	**Off**	
Green	See status/error LED.		
LED "Link" (a)	**On**	**Active**	
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)	

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

4.2.4.2.3.2 Serial interface COM - Pinout

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

Serial interface COM[1)2)]	
	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	DATA\
10	DATA



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

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

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

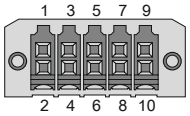
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

4.2.4.2.3.3 CAN bus interface - Pinout

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

CAN bus[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, see Automation Help.

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

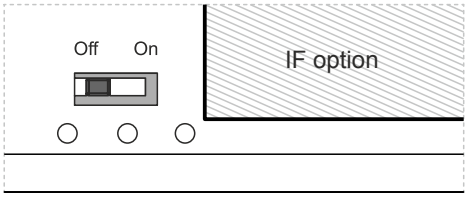
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

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:

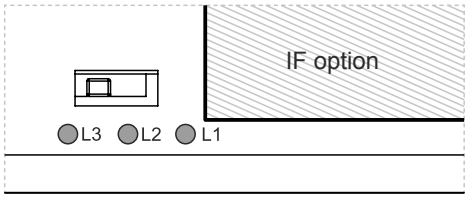
- ON: Activated
- OFF (default): Switched off



4.2.4.2.3.4 LED status indicators

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

LED status indicators			
LED	**Color**	**Status**	**Explanation**
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.2.4 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.

4.2.4.2.5 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).

4.2.4.3 5ACCIF01.FPLK-000

4.2.4.3.1 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.

4.2.4.3.2 Order data

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

4.2.4.3.3 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
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [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)

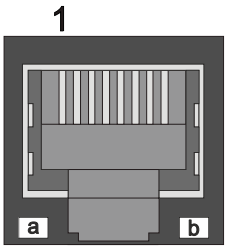
Order number	5ACCIF01.FPLK-000
Interfaces	
POWERLINK	
Quantity	1 (integrated 2-port hub)
Type	Type 4, redundant [2]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.75 W
Operating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

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

4.2.4.3.3.1 POWERLINK 1 interface - Pinout

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

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

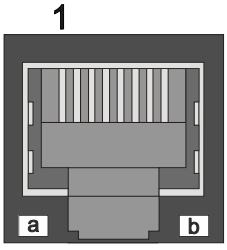


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

4.2.4.3.3.2 POWERLINK 2 interface - Pinout

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

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

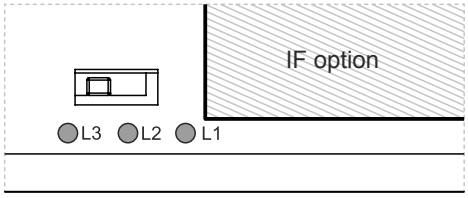


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

4.2.4.3.3.3 LED status indicators L1, L2, L3

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

LED status indicators			
LED	**Color**	**Status**	**Explanation**
L1	Green	On	POWERLINK 2 link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK 2 link LED Data is being transferred.
L2	Green	On	POWERLINK 1 link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK 1 link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.3.4 Driver support and firmware update

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

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

4.2.4.4 5ACCIF01.FPLS-000

4.2.4.4.1 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

4.2.4.4.2 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	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.4.3 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
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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

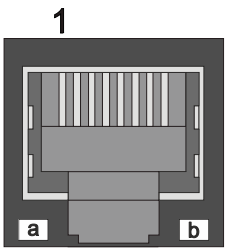
Order number	5ACCIF01.FPLS-000
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution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

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

4.2.4.4.3.1 POWERLINK interface - Pinout

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

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

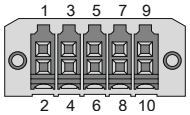


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.4.3.2 Serial interface COMA - Pinout

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

Serial interface COMA[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.

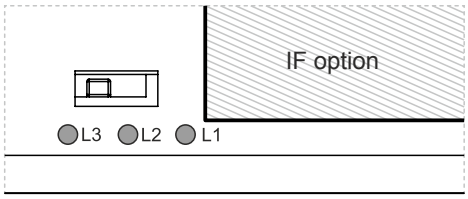
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

4.2.4.4.3.3 LED status indicators L2, L3

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

LED status indicators			
LED	**Color**	**Status**	**Explanation**
L1	Not connected		
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.4.4 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.

4.2.4.4.5 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
- Linux for B&R
- Windows 10

Automation Runtime / B&R Hypervisor (RTOS)

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

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

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

General purpose operating system (GPOS)

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

4.2.4.5 5ACCIF01.FPLS-001

4.2.4.5.1 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

4.2.4.5.2 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	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.5.3 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
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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

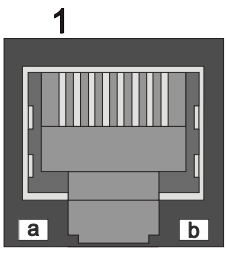
Order number	5ACCIF01.FPLS-001
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution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

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

4.2.4.5.3.1 POWERLINK interface - Pinout

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

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

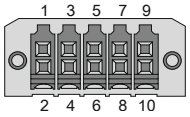


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.5.3.2 Serial interface COMA - Pinout

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

Serial interface COMA[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.

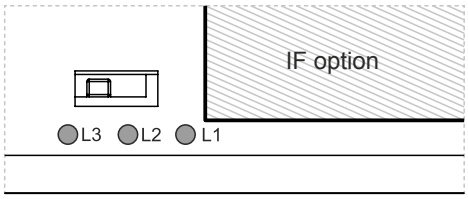
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

4.2.4.5.3.3 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 A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.5.4 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.

4.2.4.5.5 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
- Linux for B&R
- Windows 10

Automation Runtime / B&R Hypervisor (RTOS)

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

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

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

General purpose operating system (GPOS)

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

4.2.4.6 5ACCIF01.FPSC-000

4.2.4.6.1 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.

4.2.4.6.2 Order data

Order number	Short description	Figure
	Interface options	
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	
	Optional accessories	
	Terminal blocks	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.6.3 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.

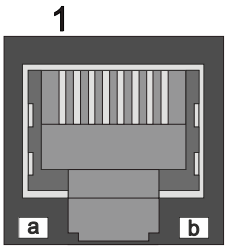
Order number	5ACCIF01.FPSC-000
General information	
LEDs	L1, L2, L3
B&R ID code	0xE53F
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 not supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

Order number	5ACCIF01.FPSC-000
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, not galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
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°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

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

4.2.4.6.3.1 POWERLINK interface - Pinout

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

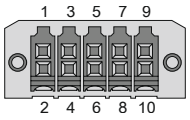
POWERLINK[1)2)]			
Variant	RJ45, female		
Wiring	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
LED status indicator (b)	**On**	**Off**	
Green	See status/error LED.		
LED "Link" (a)	**On**	**Active**	
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)	

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

4.2.4.6.3.2 Serial interface COM - Pinout

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

Serial interface COM[1)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 kbit/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.

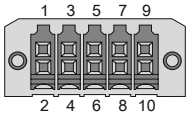
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

4.2.4.6.3.3 CAN bus interface - Pinout

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

CAN bus[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, see Automation Help.

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

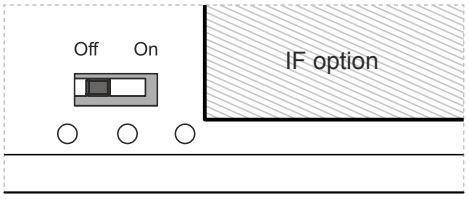
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

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:

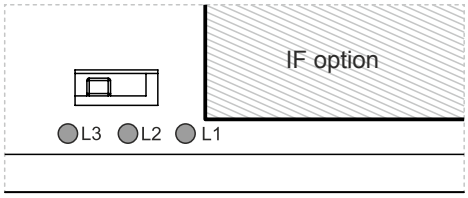
- ON: Activated
- OFF (default): Switched off



4.2.4.6.3.4 LED status indicators L1, L2, L3

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

LED status indicators			
LED	**Color**	**Status**	**Explanation**
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.6.4 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.

4.2.4.6.5 Driver support and firmware update

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

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

4.2.4.7 5ACCIF01.FPSC-001

4.2.4.7.1 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.

4.2.4.7.2 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	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.7.3 Technical data

Information:

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

Order number	5ACCIF01.FPSC-001
General information	
LEDs	L1, L2, L3
B&R ID code	0xE9BC
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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

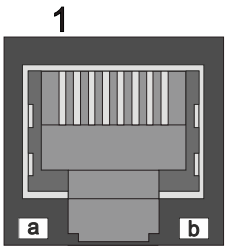
Order number	5ACCIF01.FPSC-001
POWERLINK	
Quantity	1
Type	Type 4 [3]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor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

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

4.2.4.7.3.1 POWERLINK interface - Pinout

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

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

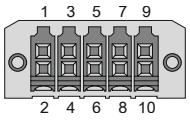


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.7.3.2 Serial interface COM - Pinout

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

Serial interface COM[1)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 kbit/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.

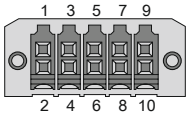
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

4.2.4.7.3.3 CAN bus interface - Pinout

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

CAN bus[1)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, see Automation Help.

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

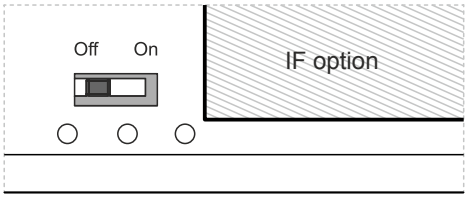
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

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:

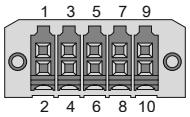
- ON: Activated
- OFF (default): Switched off



4.2.4.7.3.4 X2X Link master interface - Pinout

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

X2X Link master[1)2)]	
Variant	10-pin, male
Galvanic isolation	Yes
Pin	**Pinout**
1	X2X
2	Shield
3	X2X\
4	X2X⊥
5	-
6	-
7	-
8	-
9	-
10	-

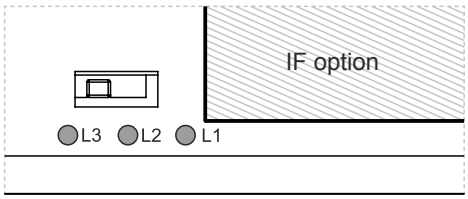


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface can only be used in Automation Runtime and is displayed as IF2 in Automation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

4.2.4.7.3.5 LED status indicators L1, L2, L3

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

LED status indicators			
LED	**Color**	**Status**	**Explanation**
L1	Yellow	On	The CAN bus terminating resistor is switched on.
		Off	The CAN bus terminating resistor is switched off.
L2	Green	On	POWERLINK link LED A connection to a POWERLINK network exists.
		Blinking	POWERLINK link LED Data is being transferred.
L3	Green-Red	On	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 266.



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (status/error LED)" on page 266.

4.2.4.7.4 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.

4.2.4.7.5 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).

4.2.4.8 5ACCIF01.FSS0-000

4.2.4.8.1 General information

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

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

4.2.4.8.2 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	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

4.2.4.8.3 Technical data

Information:

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

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

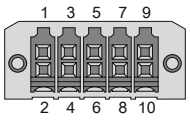
Order number	5ACCIF01.FSS0-000
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

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

4.2.4.8.3.1 Serial interface COM A - Pinout

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

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



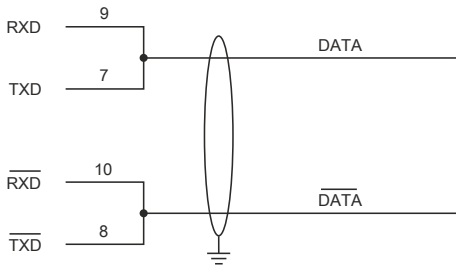
1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface (if available) is automatically enabled in BIOS as COM A with default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

Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 264.

Operation as RS485 interface

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



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

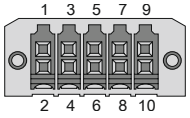
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

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

4.2.4.8.3.2 Serial interface COM D - Pinout

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

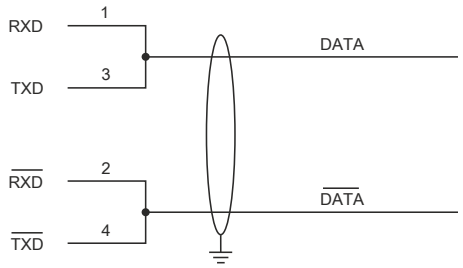
Serial interface COMD[1)2)3)]	
	RS422/RS485
Variant	10-pin, male
Type	RS422/RS485
Galvanic isolation	Yes
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	**Pinout**
1	RXD
2	RXD\
3	TXD
4	TXD\
5	COM GND
6	-
7	-
8	-
9	-
10	-



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

Operating COM D as an RS485 interface

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



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

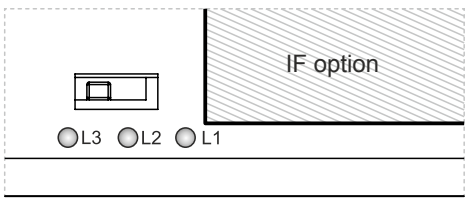
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

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

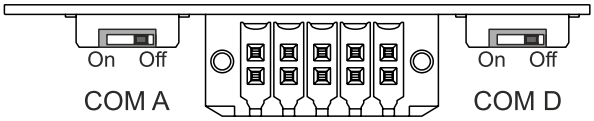
4.2.4.8.3.3 LED status indicators L2, L3

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

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



4.2.4.8.3.4 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 160) indicate the state of the assigned terminating resistor:

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

4.2.4.8.4 Shielding

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

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

4.2.4.8.5 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
- Linux for B&R
- Windows 10

4.2.4.9 5ACCIF01.ICAN-000

4.2.4.9.1 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

4.2.4.9.2 Order data

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

4.2.4.9.3 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.

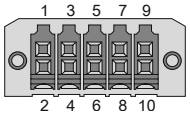
Order number	5ACCIF01.ICAN-000
General information	
LEDs	L1
B&R ID code	0xE9BB
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
EAC	Product family certification
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°C [2]
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) For detailed information, see the temperature tables in the user's manual.

4.2.4.9.3.1 CAN bus interface - Pinout

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

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



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

I/O address and IRQ

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

CAN driver settings

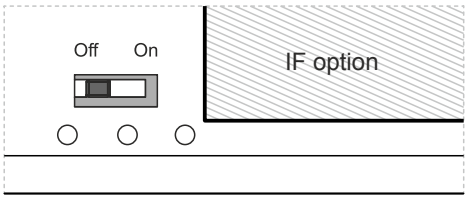
The baud rate can be set either with "predefined values" or via the "bit timing register".
For additional information about operation with Automation Runtime, see Automation Help.
For additional information about operation with approved GPOS, see the user's manual for the B&R CAN driver at www.br-automation.com.

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

Terminating resistor

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

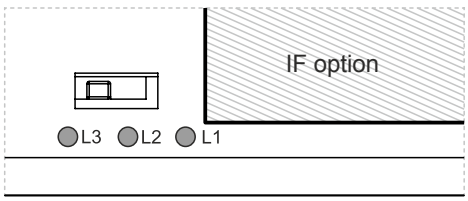
- ON: Activated
- OFF (default): Switched off



4.2.4.9.3.2 LED status indicator L1

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

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



4.2.4.9.4 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.

4.2.4.9.5 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
- Linux for B&R 10
- Linux for B&R 9
- Windows 10

4.2.4.10 5ACCIF01.IS00-000

4.2.4.10.1 General information

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

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

4.2.4.10.2 Order data

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

4.2.4.10.3 Technical data

Information:

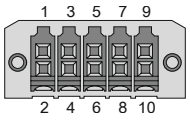
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this individual component is used, for example.

Order number	5ACCIF01.IS00-000
General information	
LEDs	No
B&R ID code	0x2C43
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
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
Electrical properties	
Power consumption	Max. 0.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-20 to 55°C
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 25 g

4.2.4.10.3.1 Serial interface COMA - Pinout

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

Serial interface COMA[1)2)]	
	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.

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 264.

4.2.4.10.4 Shielding

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

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

4.2.4.10.5 Driver support

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

Approved operating systems:

- Linux for B&R
- Windows 10

4.2.4.11 5ACCIF03.CETH-000

4.2.4.11.1 General information

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

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

4.2.4.11.2 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	

4.2.4.11.3 Technical data

Information:

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

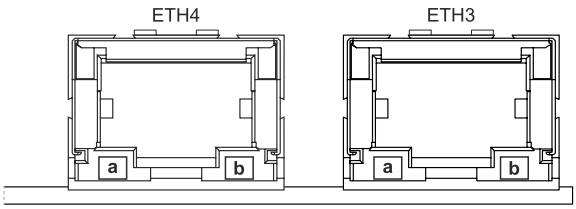
Order number	5ACCIF03.CETH-000
General information	
B&R ID code	0xF1A8
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) 1)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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°C 3)
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	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.

4.2.4.11.3.1 ETH3 and ETH4 - Pinout

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

Ethernet interfaces (ETH3 and ETH4)[1]		
Variant	RJ45, female	
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s[2]	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Speed" (b)	**On**	**Off**
Green	100 Mbit/s	10 Mbit/s[3]
Orange (dark)	1000 Mbit/s	-
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 Mbit/s transfer rate / connection is only available if LED "Link" is active at the same time.

4.2.4.11.4 Driver support

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

Approved operating systems:

- Linux for B&R
- Windows 10

Information:

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

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

4.2.5 CFast cards

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

4.2.6 Battery compartment

4.2.6.1 General information

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

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

4.2.6.2 Order data

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

For the battery compartment replacement part, see "5ACCRPC2.0003-000" on page 243.

4.2.6.3 Technical data

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

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

1) At 50°C, 6 µA for the components being supplied.
2) The battery is permanently installed in the battery compartment and cannot be replaced. The entire battery compartment must always be replaced, see section "Accessories".
3) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.

5 Installation and wiring

5.1 Basic information

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

Unpacking

The following activities must be performed before unpacking the device:

- Check the packaging for visible transport damage.
- If transport damage is noticeable, document this immediately and submit a complaint. If possible, have the damage confirmed by the carrier/delivery service.
- Check the contents of the shipment for completeness and damage.
- If the contents of the packaging are incomplete, damaged or do not correspond to the order, the responsible sales office or B&R Headquarters must be informed immediately.
- The information in section "Protection against electrostatic discharge" on page 11 must be observed for unpacked devices and components.
- Keep the original packaging for further transport.

Power supply

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

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

Caution!

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

Installation

Information:

Optional sets are available that contain all necessary tools for installation. For additional information about tool sets, see section "Installation accessories" on page 244.

Before installation

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

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

  #### Caution!

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

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

Information about the device's environment

- Observe the notes and regulations regarding the power supply and functional ground.
- 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 ambient conditions and environmental conditions must be taken into account – see "Environmental properties" on page 30.

General installation instructions

- Inclined installation reduces the air convection through the device and thus the maximum permissible ambient temperature for operation. If there is sufficient external ventilation in an inclined mounting orientation, the maximum permissible ambient temperature must be checked in each individual case. Failure to do so may result in damage to the equipment and void the certifications and warranty for the device.
- When installing the device, the permissible mounting orientations must be observed - see "Mounting orientations" on page 28.
- 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 Installing a Panel PC with an AP9x3 panel

The Panel PC 2200 with AP9x3 panel is installed in the installation cutout using retaining clips. The number of retaining clips depends on the panel.

The device must be installed on a flat, clean and burr-free surface since tightening screws on an uneven area can result in damage to the display or the ingress of dust and water.

Required tools:

- 2.5 mm hex screwdriver

The following AP9x3 panels are installed with retaining clips:

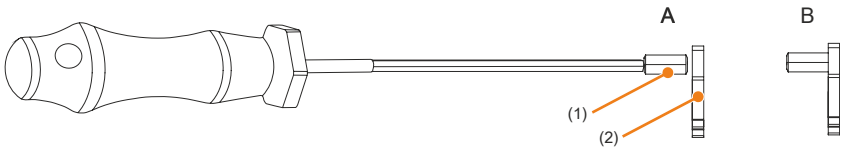
- 5AP923.1215-00
- 5AP923.1505-00
- 5AP923.1906-00
- 5AP933.156B-00
- 5AP933.185B-00
- 5AP933.215C-00
- 5AP933.240C-00

Notice!

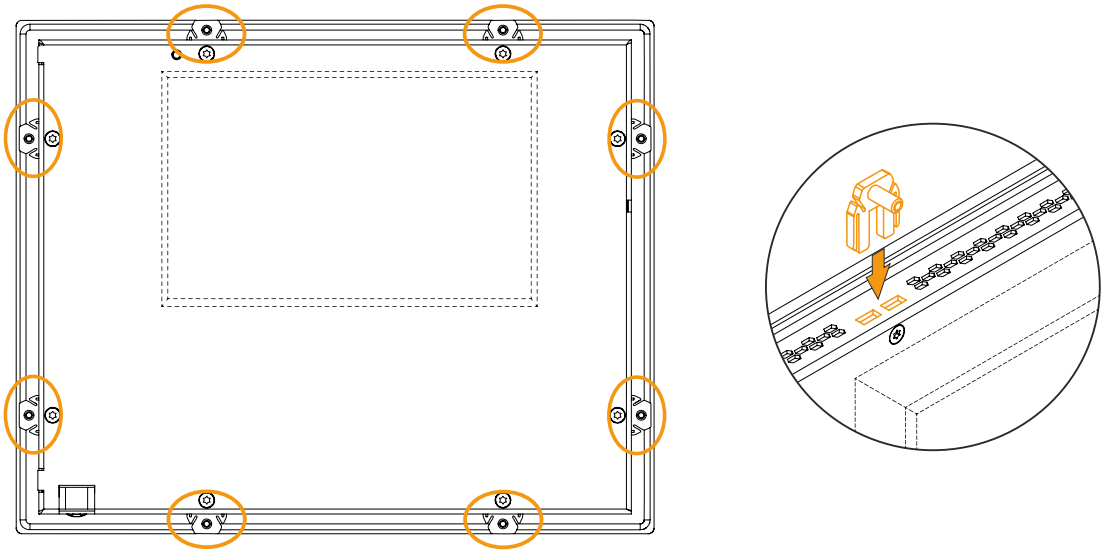
All the included retaining clips and clamping blocks must be used during installation. Failure to do so can result in damage to property due to loss of leak tightness between the device and housing (pollution) or mechanical stress.

Procedure

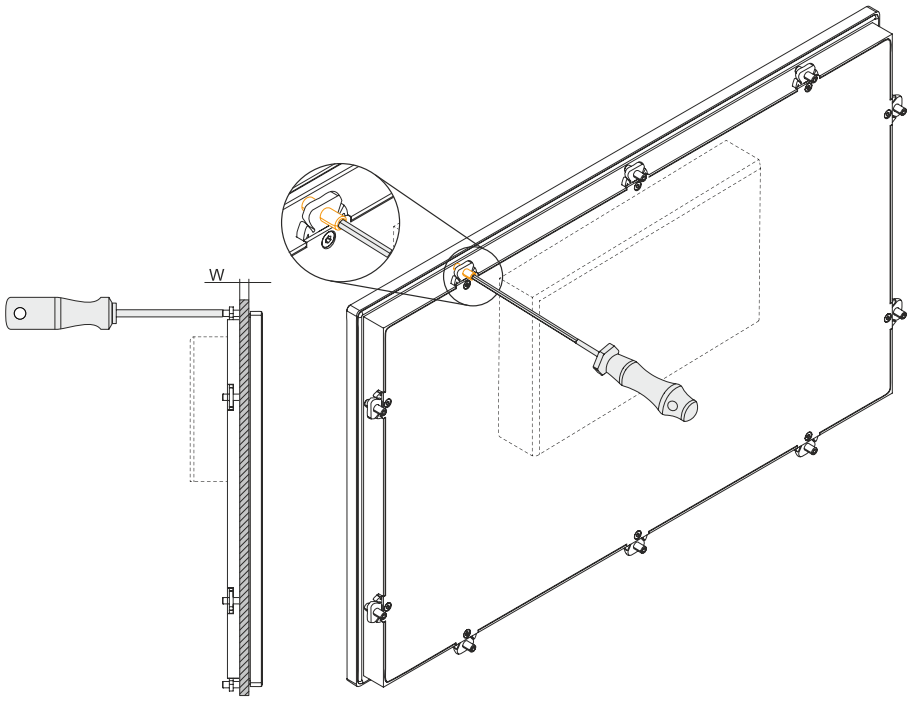
1. Check whether the supplied mounting screws (1) are screwed into the retaining clips (2). If this is not the case, then the mounting screws must be screwed into the retaining clips with a 2.5 mm hex screwdriver (A). The mounting screws are only permitted to be screwed in to the point where they do not project beyond the retaining clip (B).



2. Insert the device into the prepared installation cutout (see "Installation diagrams" on page 24).
3. Install the retaining clips on the device. To do this, insert all retaining clips into the recesses (marked with orange circles) on the device.



4. Secure the retaining clips by alternately tightening the mounting screws with a 2.5 mm hex screwdriver (max. tightening torque 1 Nm).



Thickness of the wall or control cabinet	Minimum	Maximum
W	See "Installation diagrams" on page 24	

5.1.2 Installing the Automation Panel 1000 with retaining clips

The Panel PC 2200 with AP1000 panel is installed in the installation cutout using retaining clips. The number of retaining clips depends on the panel.

The device must be installed on a flat, clean and burr-free surface since tightening screws on an uneven area can result in damage to the display or the ingress of dust and water.

Required tools:

- 2.5 mm hex screwdriver

The following AP1000 panels are installed with retaining clips:

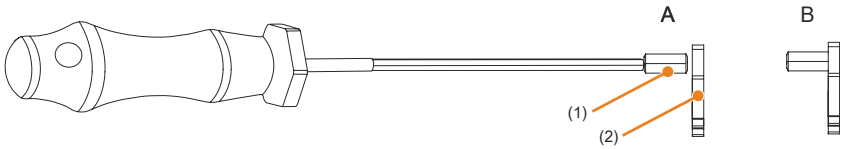
- 5AP11xx.0573-000
- 5AP11x0.101x-000
- 5AP11x0.121E-0x0
- 5AP1130.185C-000
- 5AP11x0.0702-000
- 5AP1120.1043-000
- 5AP11x0.156x-00x
- 5AP1180.1043-000

Notice!

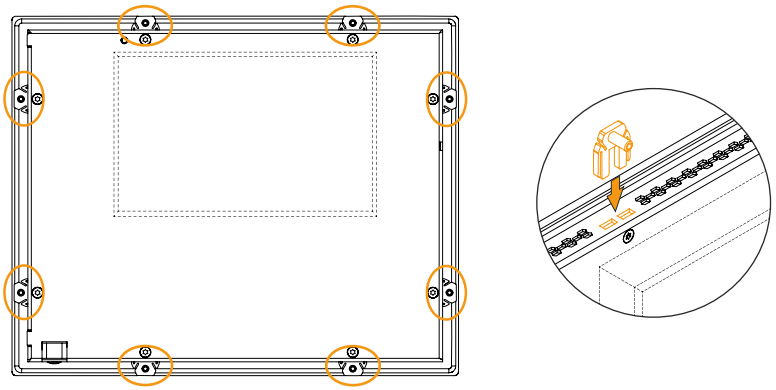
All the included retaining clips and clamping blocks must be used during installation. Failure to do so can result in damage to property due to loss of leak tightness between the device and housing (pollution) or mechanical stress.

Procedure

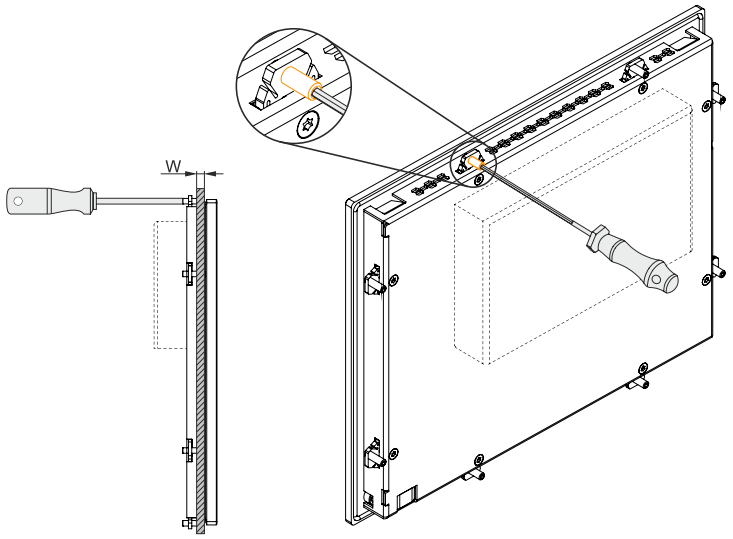
1. Check whether the supplied mounting screws (1) are screwed into the retaining clips (2). If this is not the case, then the mounting screws must be screwed into the retaining clips with a 2.5 mm hex screwdriver (A). The mounting screws are only permitted to be screwed in to the point where they do not project beyond the retaining clip (B).



2. Insert the device into the prepared installation cutout (see "Installation diagrams" on page 24).
3. Install the retaining clips on the device. To do this, insert all retaining clips into the recesses (marked with orange circles) on the device.



4. Secure the retaining clips by alternately tightening the mounting screws with a 2.5 mm hex screwdriver (max. tightening torque 1 Nm).



Thickness of the wall or control cabinet	Minimum	Maximum
W	See "Installation diagrams" on page 24	

5.1.3 Installing the Automation Panel 1000 with clamping blocks

The Panel PC 2200 with AP1000 panel is installed in the installation cutout using clamping blocks. The number of clamping blocks depends on the panel.

The device must be installed on a flat, clean and burr-free surface since tightening screws on an uneven area can result in damage to the display or the ingress of dust and water.

Required tools:

- 3.0 mm hex screwdriver

The following AP1000 panels are installed with clamping blocks:

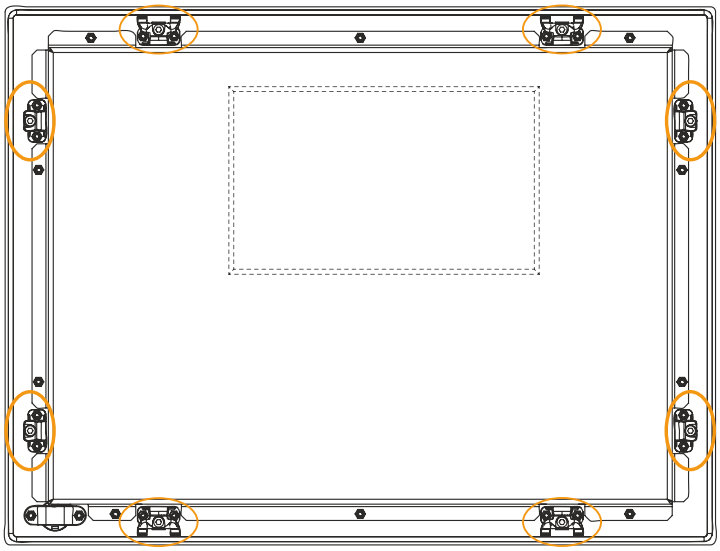
- 5AP118x.1043-000
- 5AP1120.1214-000
- 5AP1120.1505-000
- 5AP118x.1505-000
- 5AP1120.1906-000

Notice!

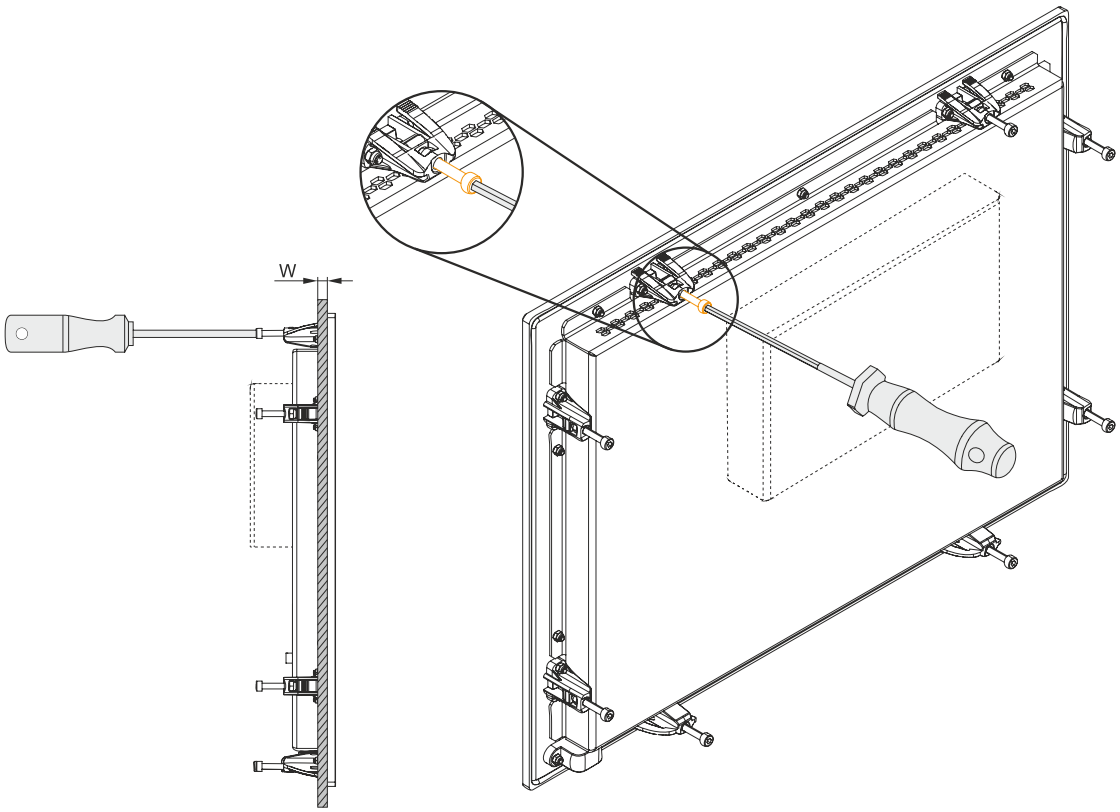
All the included retaining clips and clamping blocks must be used during installation. Failure to do so can result in damage to property due to loss of leak tightness between the device and housing (pollution) or mechanical stress.

Procedure

1. Insert the device into the prepared installation cutout (see "Installation diagrams" on page 24).



2. Secure the clamping blocks by alternately tightening the mounting screws with a 3 mm hex screwdriver (max. tightening torque 0.5 Nm). The mounting screws push the clamping lever downwards, which in turn secures the device to the wall or control cabinet panel.



Thickness of the wall or control cabinet	Minimum	Maximum
W	See "Installation diagrams" on page 24	

5.1.4 Installation information for separate shipments

Information:

If the Panel PC 2200 is not delivered as a complete system but as a separate shipment, or if individual components are retrofitted, these components must be enabled in BIOS. To do this, launch BIOS during system startup, load the BIOS default values and save the settings. For additional information, see "Exit" on page 215. This is required for the following individual components:

- **System unit**
- **Panel**

5.1.5 Replacing a 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 Panel PC from the control cabinet by following the installation steps in reverse order.
4. Place the Panel PC on a clean, flat surface.
5. The Torx screws (T10) marked in the following figure must be removed, see also "Product information - Installation markings" on page 21 .

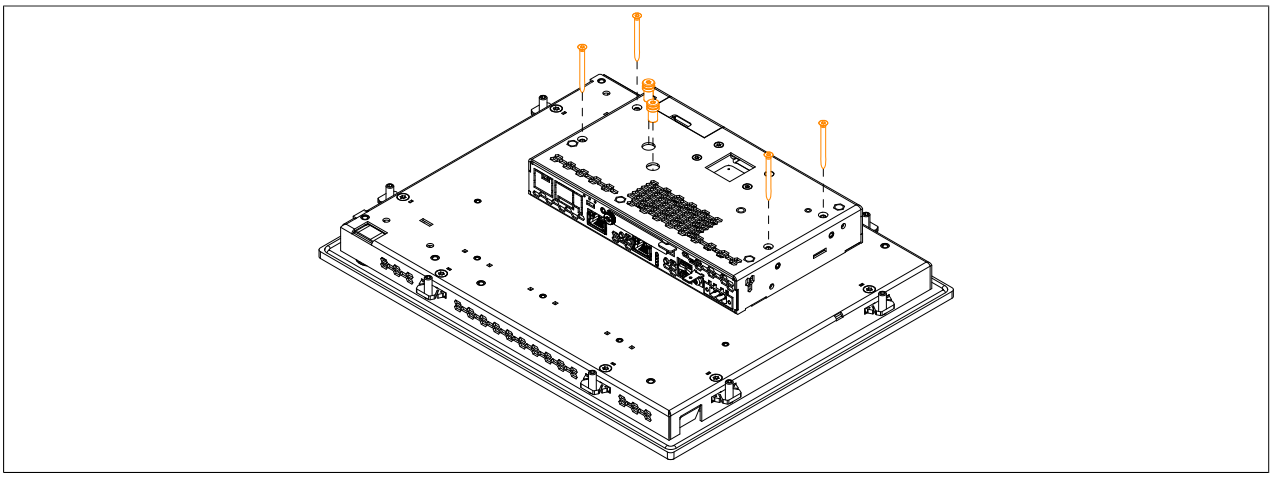


Figure 1: Loosening the Torx screws

6. The system unit can now be removed by pulling upwards.

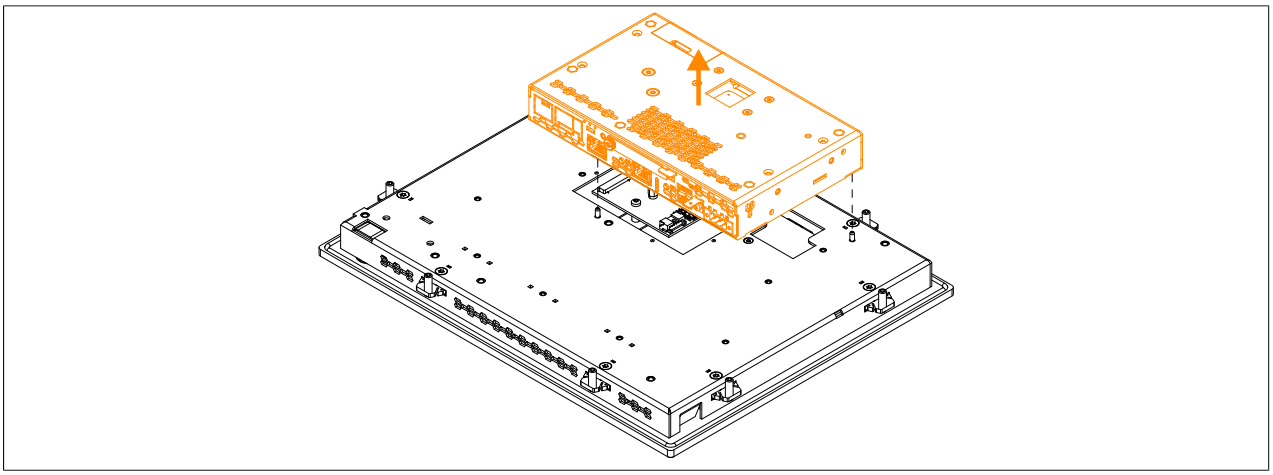


Figure 2: Removing the system unit

7. The system unit can be reinstalled in reverse order. The max. tightening torque of the Torx screws (T10) is 0.5 Nm.
   Only the supplied installation materials are permitted to be used to install the system unit.

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!

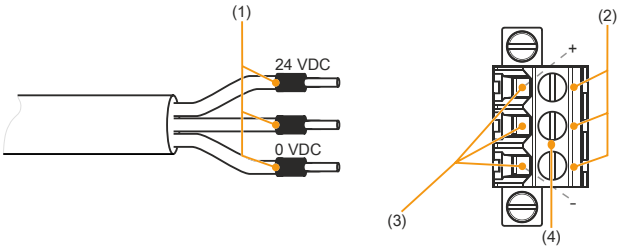
The pinout of the power supply interface must be observed!

The DC power cable must be implemented with a wire cross section of 0.75 mm² to 1.5 mm² and wire end sleeves.

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

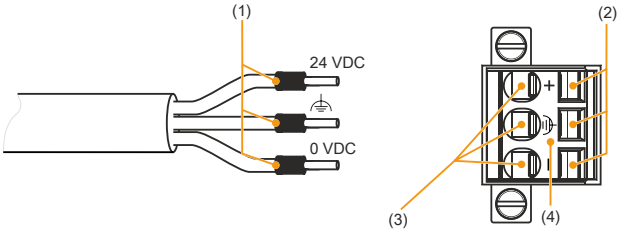
Installing screw clamp terminal block 0TB103.9

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



Installing cage clamp terminal block 0TB103.91

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

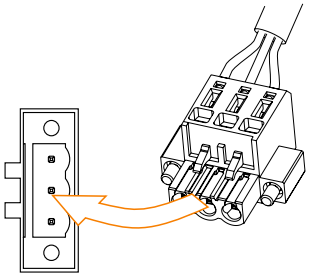


5.2.2 Connecting the power supply to a B&R device

Danger!

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

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



5.2.3 Grounding concept - Functional ground

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

Notice!

Functional grounding does not meet the requirements of protective ground!
Suitable measures for electrical safety in the event of operation and faults must be provided separately.

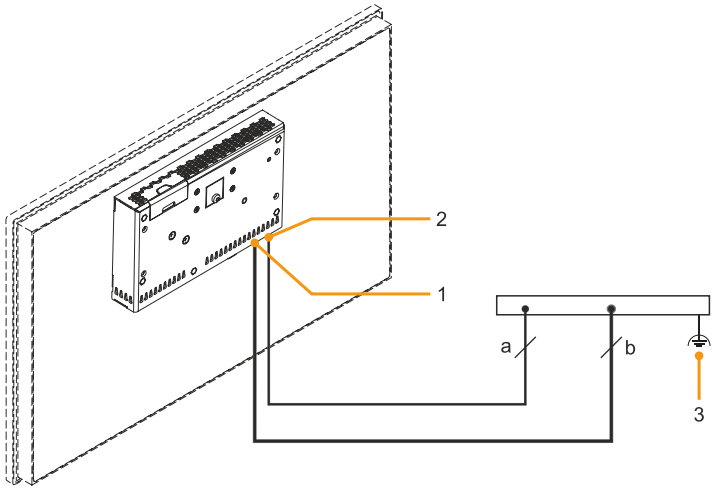
The device is equipped with the following functional ground connections:

- Functional ground connection of the power supply
- Ground connection

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

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

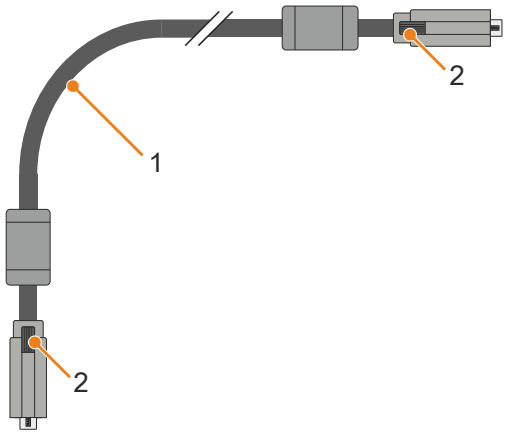
- Connect the device to the central grounding point (e.g. the control cabinet or the system) using the shortest possible low-resistance path.
- Cable design with at least 2.5 mm² per connection. If a cable with wire end sleeve is used at terminal block 0TB103.9 or 0TB103.91, a cable with a maximum of 1.5 mm² per connection is possible.
- Observe the shielding concept of the conductors. All data cables connected to the device must be shielded.



Legend					
1	Ground connection	2	Power supply connection +24 VDC pin 2	3	Central grounding point
a	At least 1.5 mm²	b	At least 2.5 mm²		-

5.2.4 Connecting cables

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



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.

6.1.1 Switching on the device for the first time

6.1.1.1 General information before switching on the device

Checklist

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

- Have the installation instructions been observed as described in "Installation and wiring" on page 171?
- Have the permissible ambient conditions and environmental conditions for the device been taken into account?
- Is the power supply connected correctly and have the values been checked?
- Is the ground cable correctly connected to the ground connection?
- Before installing additional hardware, the device must have been started up.

Caution!

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

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

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

Requirements

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

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

6.1.1.1.1 Switching on the device

Procedure

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

6.1.2 General instructions for the temperature test procedure

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

6.1.2.1 Procedure

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

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

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

For position specifications of the temperature sensors and their maximum specified temperatures, see section "Temperature sensor positions" on page 36.

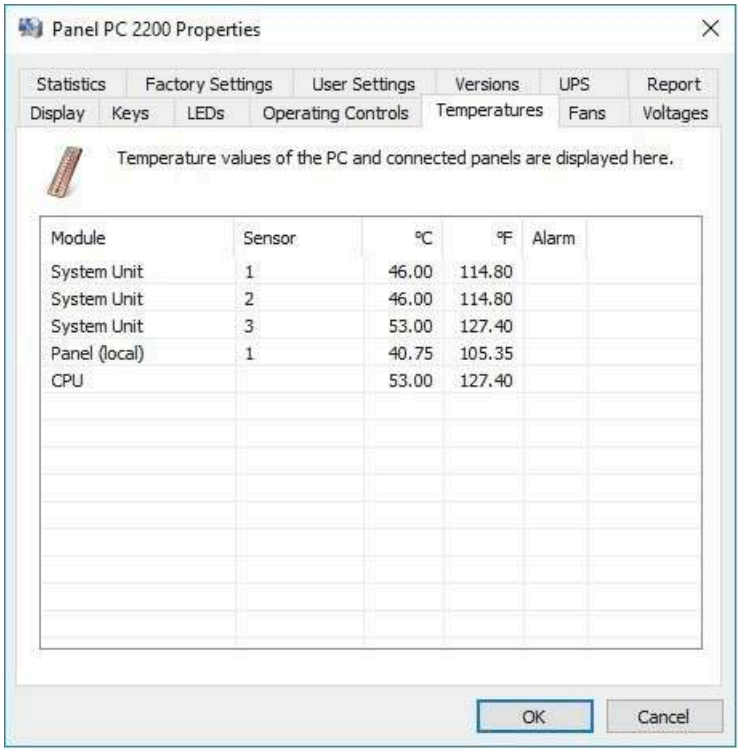
A minimum test time of 8 hours is recommended for to optimally determine and assess the temperature situation.

6.1.2.2 Evaluating temperatures in Windows operating systems

6.1.2.2.1 Evaluating with the ADI Control Center

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

The following figure shows a PPC2200 in the ADI Control Center.



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

Information:

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

6.1.2.2.2 Evaluation with BurnInTest from PassMark

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

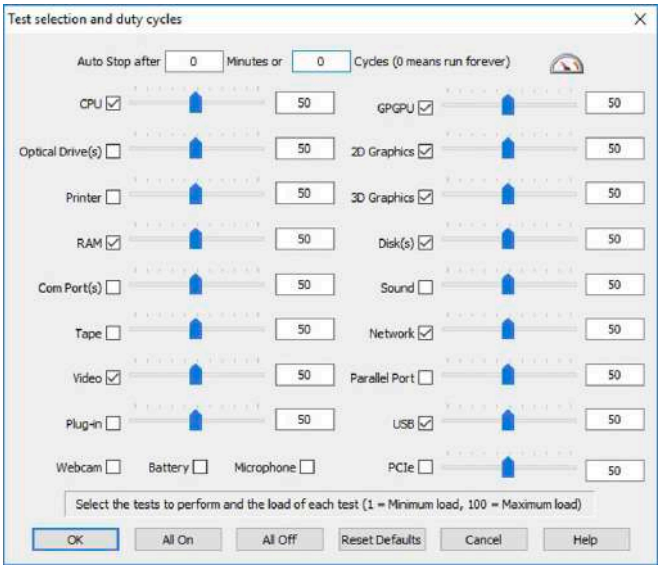
The BurnInTest software tool is available in standard and professional versions. In addition to the software package, various loopback adapters (serial, parallel, USB, etc.) and test CDs or DVDs are also available. Depending on the expansion level of the software and available loopback adapters, a correspondingly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

Information:

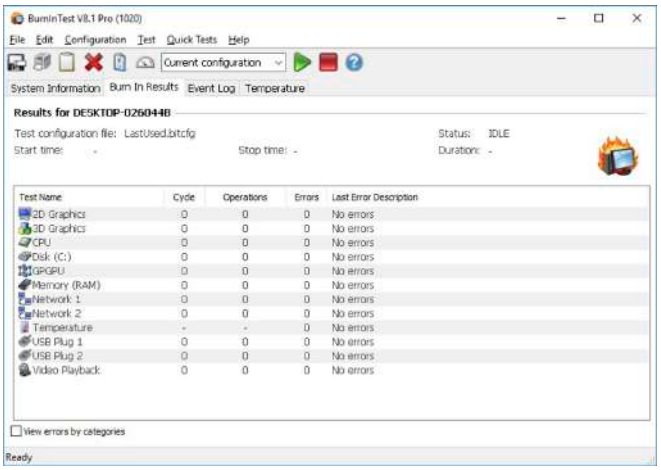
Loopback adapters are also available from PassMark. For additional information, see www.passmark.com.

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

Settings:[1)]



Test overview:[1)]

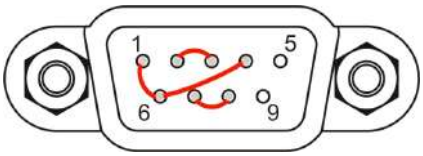


1) Symbolic image.

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

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

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



6.1.2.3 Evaluating the measurement results

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

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

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

6.1.3 Touch screen calibration

6.1.3.1 Single-touch (analog resistive)

6.1.3.1.1 Windows 10 IoT Enterprise

After starting Windows 10 IoT 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).

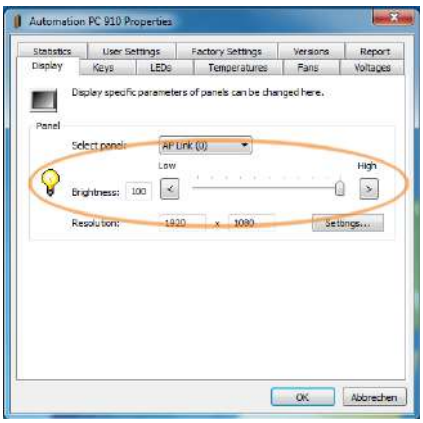
6.1.3.2 Multi-touch (projected capacitive - PCT)

6.1.3.2.1 Windows 10 IoT Enterprise

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

6.1.4 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 *OK*.

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.

6.2 Known problems / Characteristics

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

7 Software

7.1 UEFI BIOS options

7.1.1 General information

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

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

Information:

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

7.1.1.1 Adaptation for touch operation

The BIOS used for the APC2200/PPC2200 was developed with touch screen systems in mind. Compared to other or older B&R systems, the user interface, especially buttons and selection fields, is therefore larger. In addition, the setting and configuration options are divided into separate submenu structures.
The APC2200/PPC2200 can still be used with ordinary displays and operator panels without any limitation on usability, however.

7.1.1.1.1 Operation

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

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

7.1.1.2 Overview of BIOS description

Information:

This description is for the full extent of version 1.23.

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

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

These figures are only excerpts from the respective menus. A complete list of all parameters and menus is available in a table in each section.
Depending on the display system used, it is possible to navigate to all menus on the device using the slide bar or mouse and keyboard input.

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

Entries outside a specified range of values are not applied.

Default values are marked bold and italic in column "Input options" in tables.
Submenus are bold in column "BIOS parameter" in tables.

BIOS parameter			Input options	Description
BIOS parameter 1			***Enable(d)***	Disables/Enables BIOS parameter 1
			Disable(d)	
BIOS parameter 1 value			UINT Default: ***42***	Defines the value of BIOS parameter 1 Range: 0 to 65535 Resolution: 3
BIOS parameter 2			-	Displays BIOS parameter 2
	BIOS parameter 2.1		a1	Selects mode of BIOS parameter 2.1
			a2	
			b	
		BIOS subparameter 2.1 value	***Disable(d)***	Disables/Enables BIOS subparameter 2.1
			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 page xyz

Table 89: 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 (←, ↑, ↓, →)	Navigation in the boot menu
Enter	Opens the selected submenu

BIOS Setup

The following keys can be used after entering BIOS Setup:

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

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

1) Save and close to restore the default values.

Information:

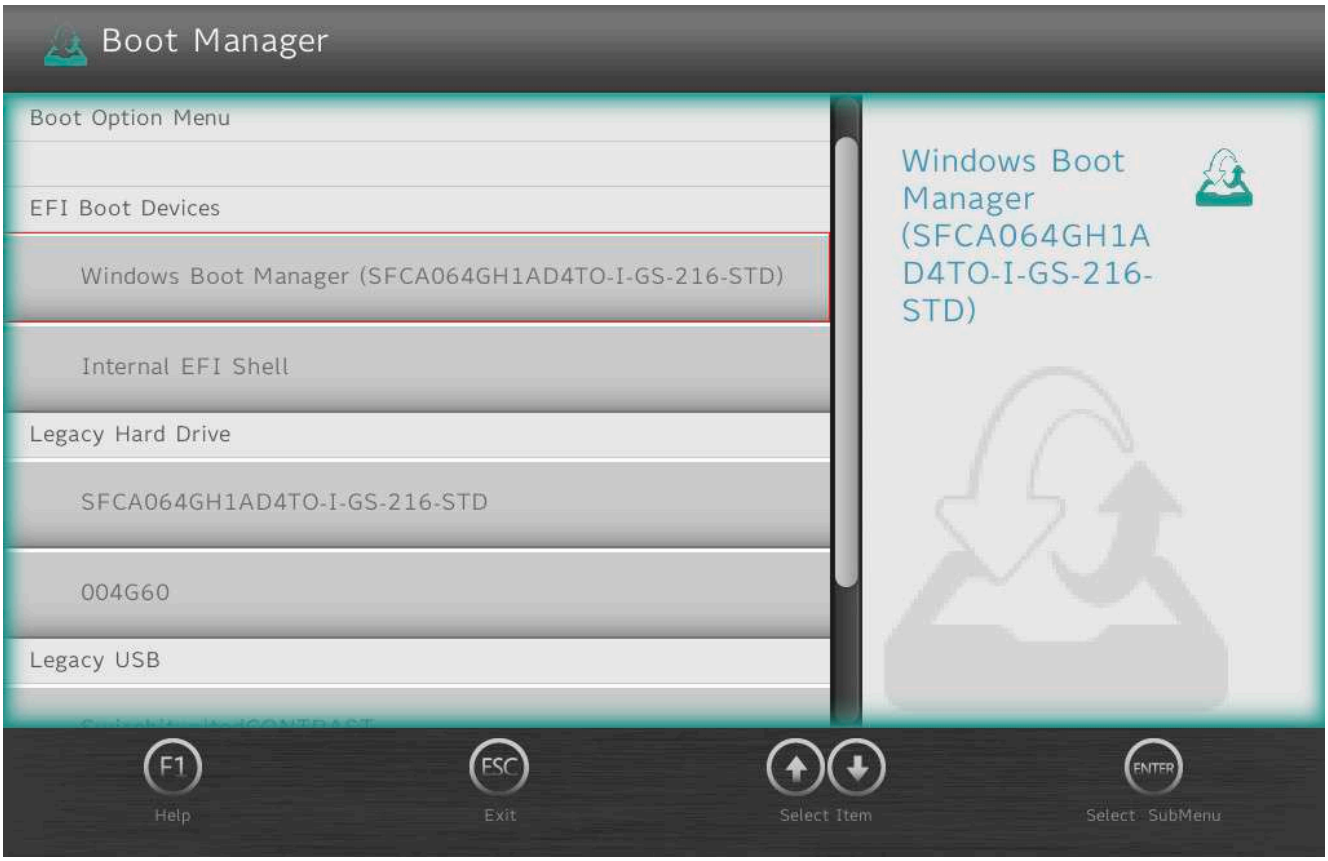
All manual changes are overwritten if the default values are loaded and saved.

7.1.3 Boot menu

Boot menu option	Description
Continue	Resumes the boot process.
Boot manager	Lists all detected and bootable media. See "Boot manager" on page 195.
Device management	Lists all supported and enabled devices (e.g. Ethernet). See "Device manager" on page 196.
Boot from file	Selects a bootable file to boot from. Depending on the boot configuration, the files can also be stored on external storage media.
Administer Secure Boot	For a detailed description of this option, see the user documentation from the operating system manufacturer.
Setup utility	Performs advanced configurations. See "Setup utility" on page 197.

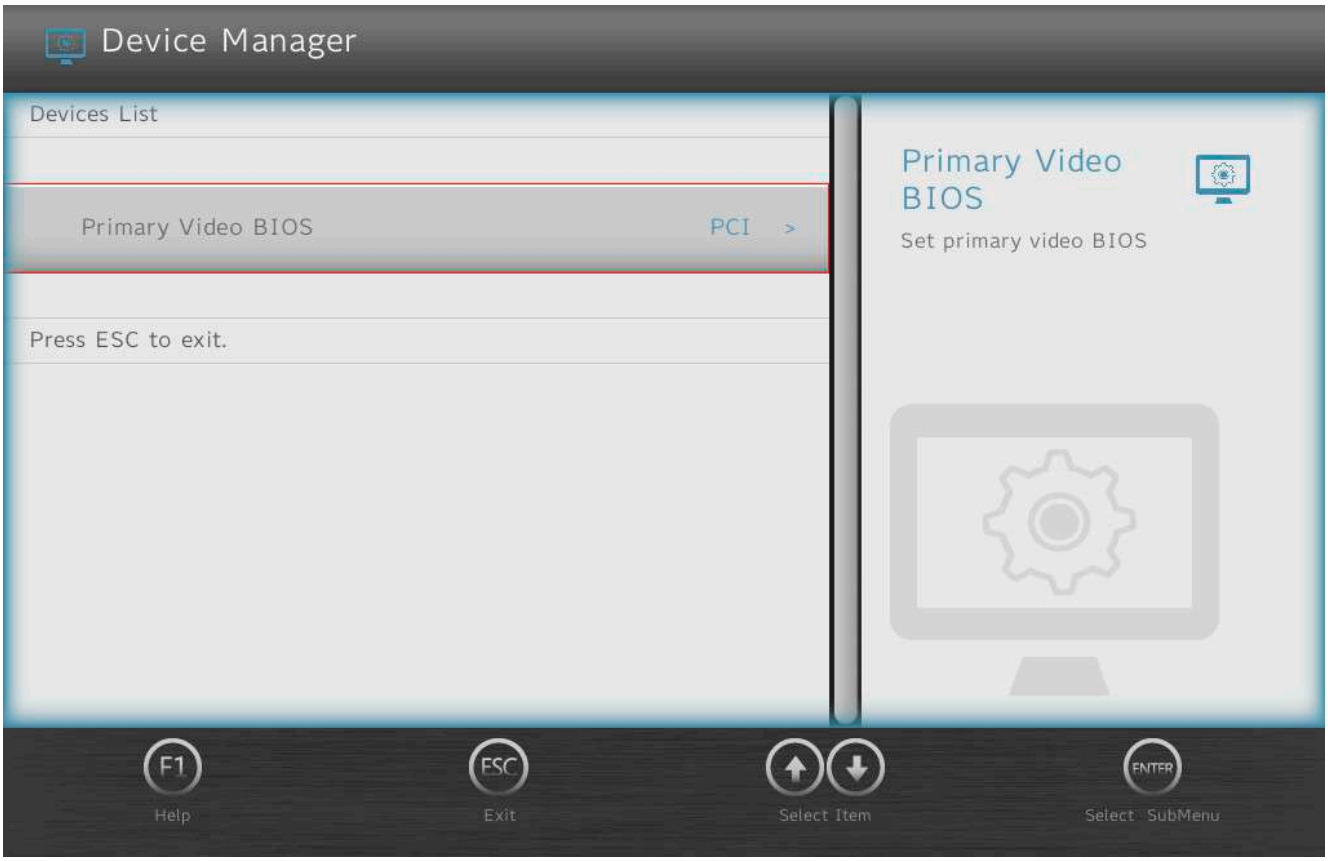
Table 90: Boot menu

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	***PCI***	Selects the primary video BIOS
	AGP	

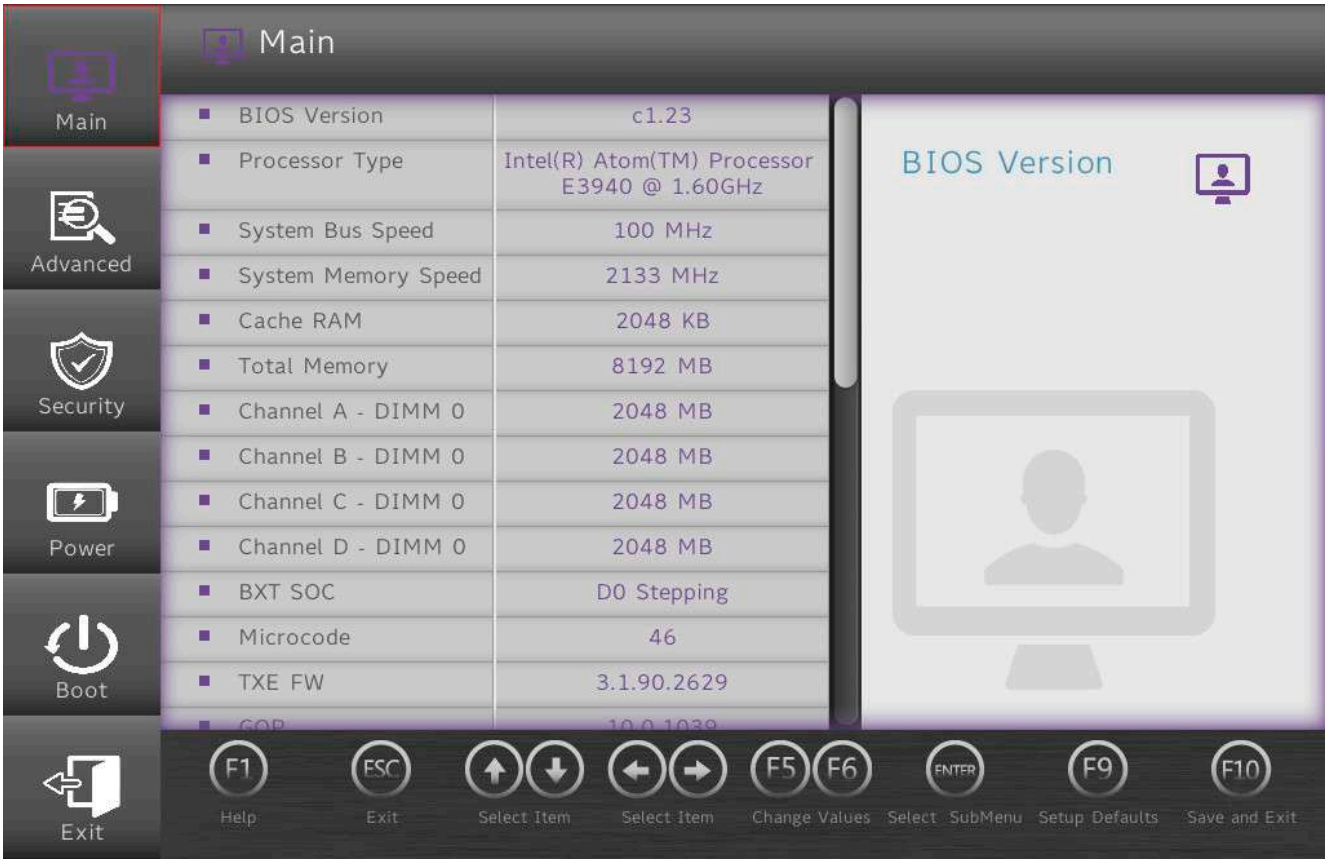
7.1.6 Setup utility

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

Submenu	Setting options	Description
Main	Enter	Opens submenu "Main" on page 198 Basic system information is displayed and the system time can be set here.
Advanced	Enter	Opens submenu "Advanced" on page 199 Changes to system settings can be made here.
Security	Enter	Opens submenu "Security" on page 209 Changes to the Trusted Platform Module can be made here. Passwords for storage media can be created and managed here.
Power	Enter	Opens submenu "Power" on page 210 Changes that affect the power consumption of the system can be made here.
Boot	Enter	Opens submenu "Boot" on page 212 Changes to the boot modes and boot sequence can be made here.
Exit	Enter	Opens submenu "Exit" on page 215 Changes can be discarded or saved here. User-specific default values can be saved and loaded here or system-optimized default values from B&R can be restored.

Table 91: Boot menu - Setup utility

7.1.6.1 Main



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

Table 92: Main

7.1.6.2 Advanced

BIOS parameter	Setting options	Description
OEM features	Enter	Opens submenu "OEM features" on page 200
Graphics configuration	Enter	Opens submenu "Graphics configuration" on page 204
IO configuration	Enter	Opens submenu "IO configuration" on page 205
Security configuration	Enter	Opens submenu "Security configuration" on page 208
ACPI settings	Enter	Opens submenu "ACPI settings" on page 208

Table 93: 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 Enabling is necessary for hypervisor operation. Parameters "VT-d" and "Intel Virtualization Technology" on page 210 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 200
H2OUVE	Enter	Opens submenu "H2OUVE" on page 201
Baseboard	Enter	Opens submenu "Baseboard" on page 201
Interface slot *n* [1)2)]	Enter	Opens submenu "Interface slot n " on page 202
Panel settings	Enter	Opens submenu "Panel settings" on page 202
SSD monitoring service	Enter	Opens submenu "SSD monitoring services" on page 202
Custom boot logo	Enter	Opens submenu "Custom boot logo" on page 203

Table 94: 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 95: Advanced - OEM features - Super IO

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

Table 95: 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 96: 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 97: Advanced - OEM features - Baseboard

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

Table 97: Advanced - OEM features - Baseboard

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

7.1.6.2.1.4 Interface slot *n*

A total of 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* [°C and °F]

Table 98: 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 *n*	Enter	Opens menu "Panel n" on page 202

Table 99: 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	INT Default: ***100***	Screen brightness of the panel [%] Range: 0 to 100 Resolution: 1%

Table 100: Advanced - OEM features - Panel settings - Panel *n*

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

7.1.6.2.1.6 SSD monitoring services

BIOS parameter	Setting options	Description
CFast		
Product name	-	Displays the name of the CFast card
Serial number	-	Displays the manufacturer serial number of the CFast card
Firmware version	-	Displays the firmware version of the CFast card
SMART[1)] status	-	Displays the S.M.A.R.T. status of the CFast card
WAF[2)]	-	Displays the WAF of the CFast card
Average erase count	-	Displays the average number of erase operations on a block of the CFast card

Table 101: 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 manufacturer documentation. 0x00 signalizes operation without critical error.

Table 101: Advanced - OEM features - SSD monitoring service

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

7.1.6.2.1.7 Custom boot logo

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

Table 102: 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 Folder "XPCSET" (*./XPCSET/*) must exist in the root directory of the target medium as the target for the backup.
	Enabled	
Recover settings	***Disabled***	Disables/Enables restoring BIOS settings from a backup during the next reboot The backup file must be stored in folder "XPCSET" (*./XPCSET/*) in the root directory of the target medium.
	Enabled	

Table 103: Advanced - OEM features - Backup settings

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° clockwise	
	270° 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[1] size	2 MB	Selects the GTT size [MB]
	4 MB	
	8 MB	
Aperture size	***256 MB***	Selects reserved RAM [MB] 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 104: 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 205
SATA configuration	Enter	Opens submenu "SATA configuration" on page 206
USB configuration	Enter	Opens submenu "USB configuration" on page 207
Miscellaneous configuration	Enter	Opens submenu "Miscellaneous configuration" on page 207

Table 105: 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 205[1]
PCI Express root port 3 (ETH1)	Enter	
PCI Express root port 4 (ETH2)	Enter	
PCI Express root port 5 (IF1)	Enter	

Table 106: Advanced - IO configuration - PCI Express configuration

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

PCI Express root port *n*

BIOS parameter		Setting options		Description
PCI Express root port *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 PCIe Active State Power Management manually/automatically or disables it
		Disabled		
		L0sL1		
		L0s		
		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 PCIe 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[3]
		Enabled		
	PME SCI	Disabled		Disables/Enables system control interrupt on a power management event
		Enabled		
	Hot plug	***Disabled***		Disables/Enables hot plugging
		Enabled		
PCIe speed		***Auto***	-	Selects the PCIe 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 107: Advanced - PCH-IO configuration - PCI Express root port *n*

BIOS parameter			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 Default: ***10***	Defines reserved memory [MB] for this bridge Range: 0 to 20
Reserved I/O			INT Default: ***4***	Defines the reserved I/O range for this bridge Range: 4 to 20 kB Resolution: 4 kB
PCH PCIE LTR			Disabled	Disables/Enables PCIe latency reporting
			Enabled	
	Snoop latency override		***Auto***	Disables the snoop latency override or selects manual or automatic mode
			Disabled	
			Manual	
		Snoop latency value	INT 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 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 PCIe1 LTR lock function
			Enabled	
PCIe selectable de-emphasis			Disabled	Disables/Enables PCIe selectable de-emphasis
			Enabled	

Table 107: Advanced - PCH-IO configuration - PCI Express root port *n*

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

7.1.6.2.3.2 SATA configuration

BIOS parameter		Setting options	Description	
Chipset SATA		Disabled	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 DevSlp	***Disabled***	Disables/Enables device sleep	
		Enabled		
	DITO configuration	***Disabled***	Disables/Enables device sleep idle timeout	
		Enabled		
	DITO value	INT Default: ***625***	Defines the DITO value [ms] Range: 0 to 1024	
	DM value	INT Default: ***15***	Defines the DITO multiplier Range: 0 to 15	

Table 108: 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 109: 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	Working	Selects the state after G3 Defines how to proceed after "mechanical off" (G3). S0/S5 after G3 or restores the state before G3
	S5 state	Soft off	
	Last state	State previous to G3	
BIOS lock	Disabled	Disables/Enables the PCH BIOS lock function The BIOS lock function must be enabled for SMM[1].	
	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 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 110: Advanced - IO configuration - Miscellaneous configuration

1) System Management Mode

7.1.6.2.4 Security configuration

BIOS parameter	Setting options	Description
TXE[1] 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 fTPM: Firmware/CPU TPM dTPM: Dedicated/Hardware TPM
	dTPM	

Table 111: 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 208
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 112: 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[1]	Disabled	Disables native ASPM (BIOS controls ASPM) or enables it (operating system controls ASPM)
	Enabled	
Low power S0 idle capability	Disabled	Disables/Enables low power S0 idle capability
	Enabled	

Table 113: Advanced - ACPI settings - ACPI settings

1) Active State Power Management

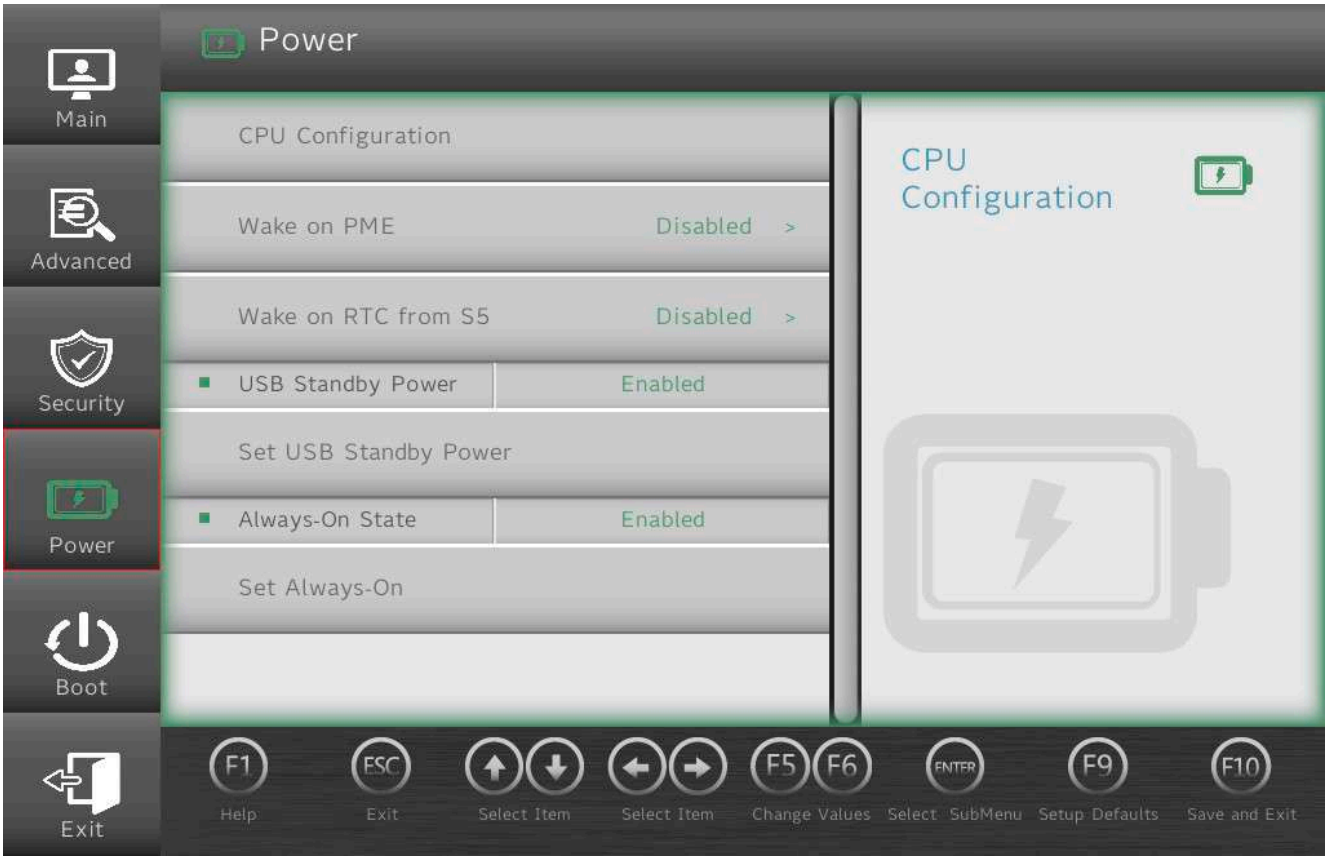
7.1.6.3 Security

BIOS parameter	Setting options	Description
Current TPM[1] 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	***1.0***	Selects the TrEE protocol version
	1.1	
TPM availability	***Hidden***	TPM invisible/visible for the operating system
	Available	
Clear TPM	***Disabled***	Starts clearing TPM by enabling it
	Enabled	
Supervisor password	-	Displays whether a supervisor password has been created
Set supervisor password	String	Sets or changes the supervisor password

Table 114: Security

1) Trusted Platform Module

7.1.6.4 Power



BIOS parameter		Setting options	Description
CPU configuration		Enter	Opens submenu "CPU configuration" on page 210
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 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 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 115: Power

7.1.6.4.1 CPU configuration

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

Table 116: 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 211

Table 116: Power - CPU configuration

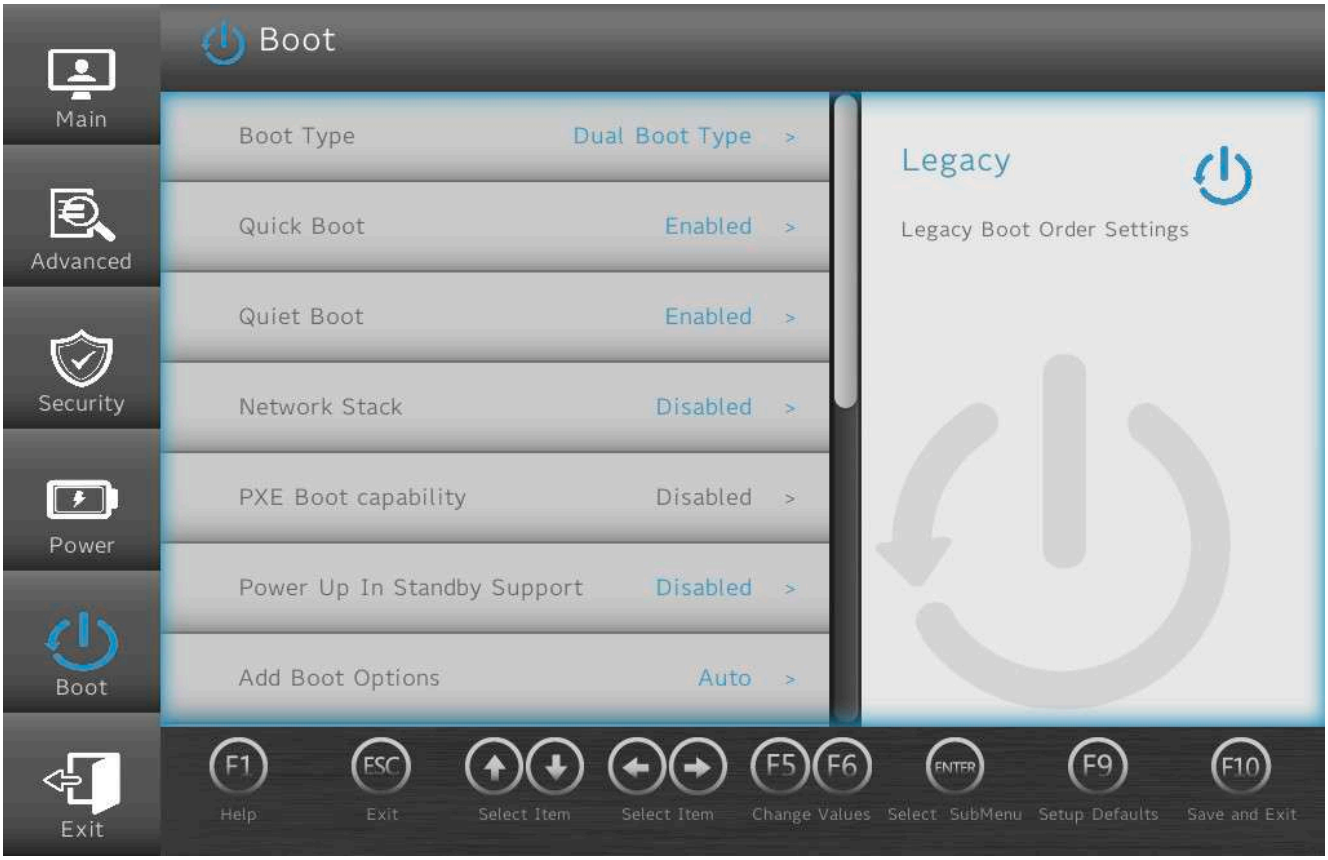
7.1.6.4.1.1 CPU power management

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

Table 117: Power - CPU configuration - CPU power management

1) Voltage regulator (module)

7.1.6.5 Boot



BIOS parameter	Setting options	Description
Boot type	***Dual boot type***	Selects the boot type 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. In UEFI boot mode, the CSM is disabled.
	Legacy boot type	
	UEFI boot type	
Quick boot	Disabled	Disables/Enables quick boot 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 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 Enable to boot EFI devices before legacy devices. Disable to boot legacy devices before EFI devices.[2)]
	Enabled	
Timeout	INT Default: ***0***	Delay time until the boot list is processed [s] Range: 0 to 99

Table 118: Boot

BIOS parameter	Setting options	Description
Automatic failover	Disabled	Disables/Enables automatic failover
	Enabled	
EFI	Enter	Opens submenu "EFI" on page 213
Legacy	Enter	Opens submenu "Legacy" on page 214

Table 118: 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 213
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[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
6th 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 119: Boot - EFI

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

7.1.6.5.1.1 EFI

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

Table 120: Boot - EFI - EFI

7.1.6.5.2 Legacy

BIOS parameter	Setting options	Description
Normal boot menu	***Normal***	Selects the boot sequence type
	Advanced	
Boot type order	Enter	Opens submenu "Boot type order" on page 214
Other	Enter	Opens submenu[1)]
Floppy disk	Enter	
Hard disk drive	Enter	Opens submenu "Hard disk drive" on page 214
CD/DVD-ROM drive	Enter	Opens submenu[1)]
USB	Enter	
Legacy	Enter, then: ► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 121: 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: ► Keyboard: F5/F6 ► Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 122: 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 214

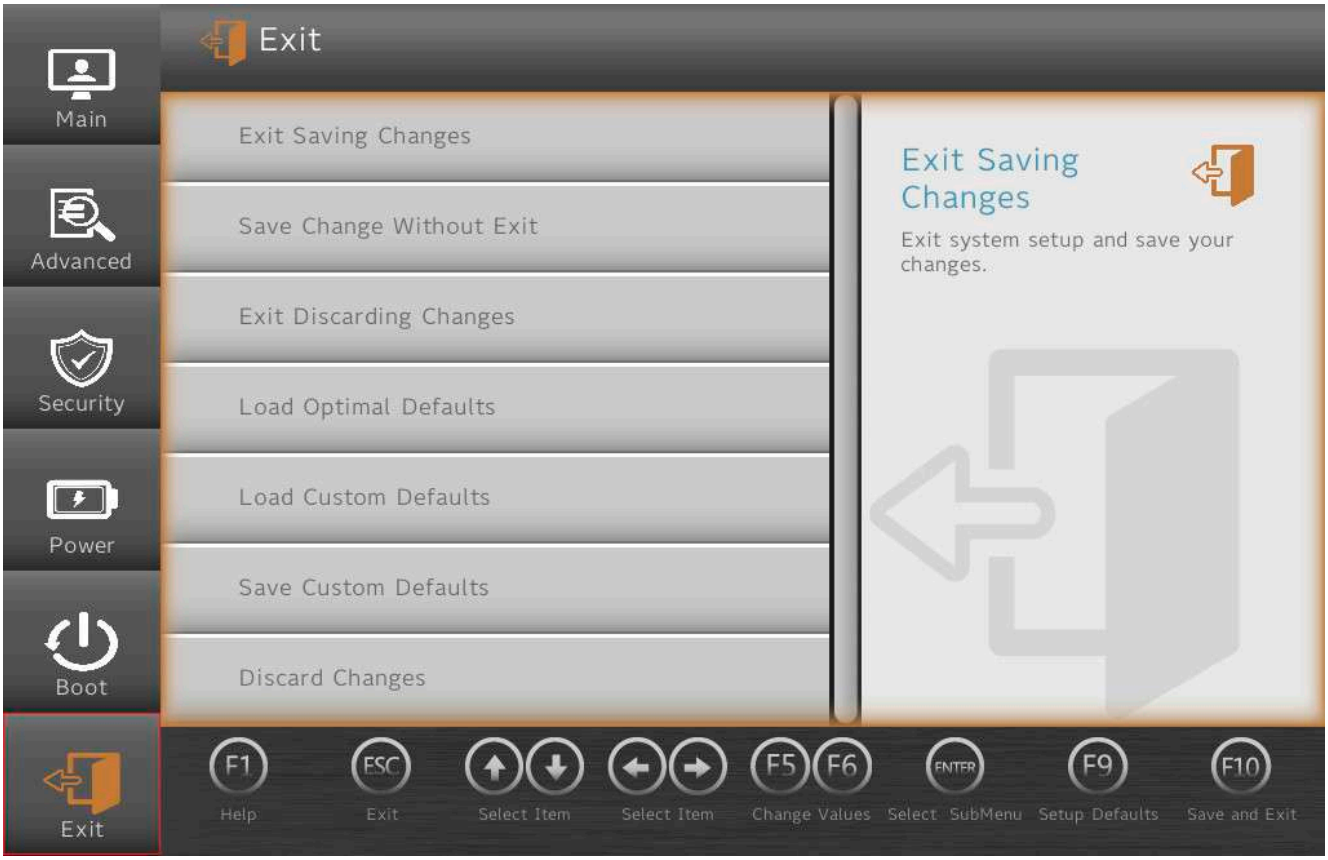
Table 123: Boot - Legacy - Hard disk drive

Hard disk drive

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

Table 124: Boot - Legacy - Hard disk drive - Hard disk drive

7.1.6.6 Exit



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

Table 125: 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!**[4)]
- **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!**[5)]

7.2.1 UEFI BIOS upgrade

An upgrade may be necessary for making updated or new functions available.
For a detailed description of changes, see file *Readme.txt* or *Liesmich.txt*, which is included in every upgrade archive (ZIP).

Information:

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

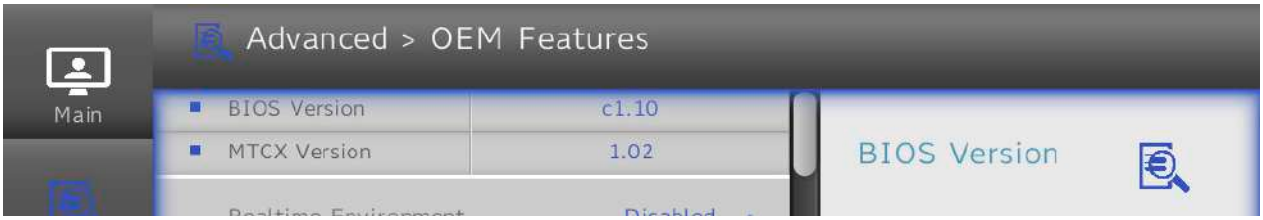
7.2.1.1 BIOS upgrade

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

7.2.1.1.1 Displaying firmware and BIOS version information

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

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



7.2.1.2 Procedure in the EFI shell

Caution!

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

1. Download the ZIP file from the B&R website (www.br-automation.com).
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".

[4)] Starting from version 1.0x, version 1.10 must first be installed before a version > 1.10 can be installed.
[5)] Starting from version 1.1x, version 1.21 must first be installed before a version > 1.21 can be installed.

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

✓ The upgrade is installed and in effect.

7.2.2 PC firmware upgrade

With *Firmware upgrade (MTCX)*, it is possible to update the firmware depending on the variant of the Panel PC system.

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

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

7.2.2.1 Procedure in Windows (ADI Control Center)

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

✓ The upgrade is installed and in effect.

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

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

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

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.

✓ The upgrade is installed and in effect.

7.2.2.3 Automatic firmware upgrade

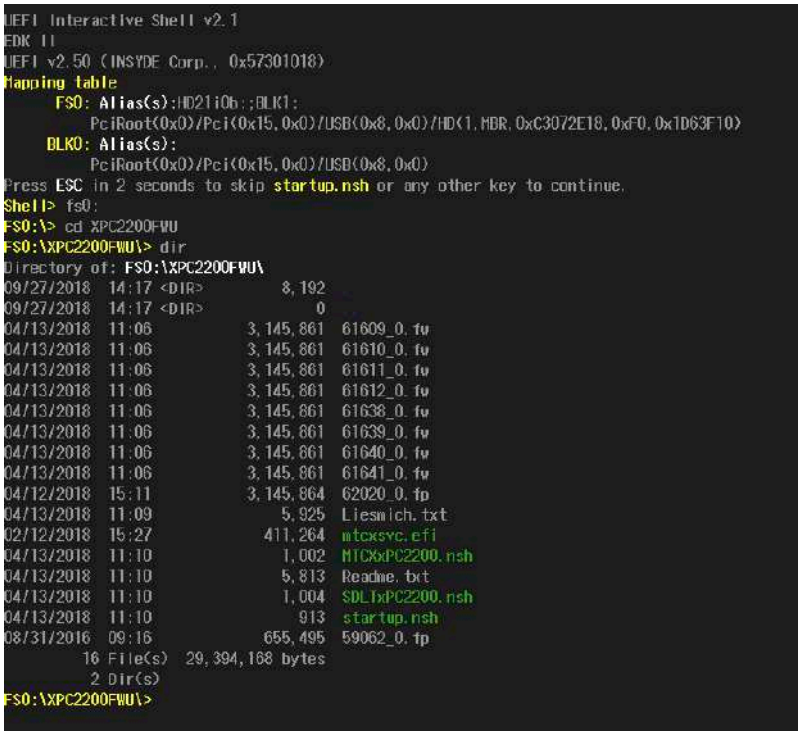
With the APC2200/PPC2200, it is possible to perform updates automatically.

For this, parameter **Automatic firmware update** must be enabled in BIOS (see "Advanced - OEM features" on page 200).

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 (*TXT* file) that provides additional information.

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



Information:

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

7.2.2.4 Firmware upgrade with Automation Runtime

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

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

7.3 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 IoT Enterprise 2016 LTSB
- Linux for B&R 10
- Linux for B&R 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 IoT Enterprise 2019 LTSC: - 64-bit - Entry - Multilingual - License - Only available with a new device	

7.4.1.3 Overview

Order number	5SWW10.0900-MUL
Operating system	
Target systems	
Industrial PC	APC2200, PPC2200
Processor	Atom
Chipset	Apollo Lake
License class	Entry
Architecture	64-bit (UEFI boot)
Language	Multilingual
Minimum size of RAM	2 GB 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 IoT Enterprise 2019 LTSC
Range of functions in Windows 10 Enterprise	✓
Internet Explorer 11 (including Enterprise Mode)	✓
Windows Touch	✓
Multilingual support	With language packs (default: English)
Page file	Configurable (default: disabled by UWF)
Hibernate file	Configurable (default: disabled)
System restore	Configurable (default: disabled by UWF)
SuperFetch	
File indexing service	
Fast boot	
Defragmentation service	✓ (disabled when enabling the UWF)
Additional lockdown features (excerpt)	
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓
Keyboard Filter	Configurable

The following are some differences from standard Windows 10 Enterprise:

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

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

Information:

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

7.4.1.5 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

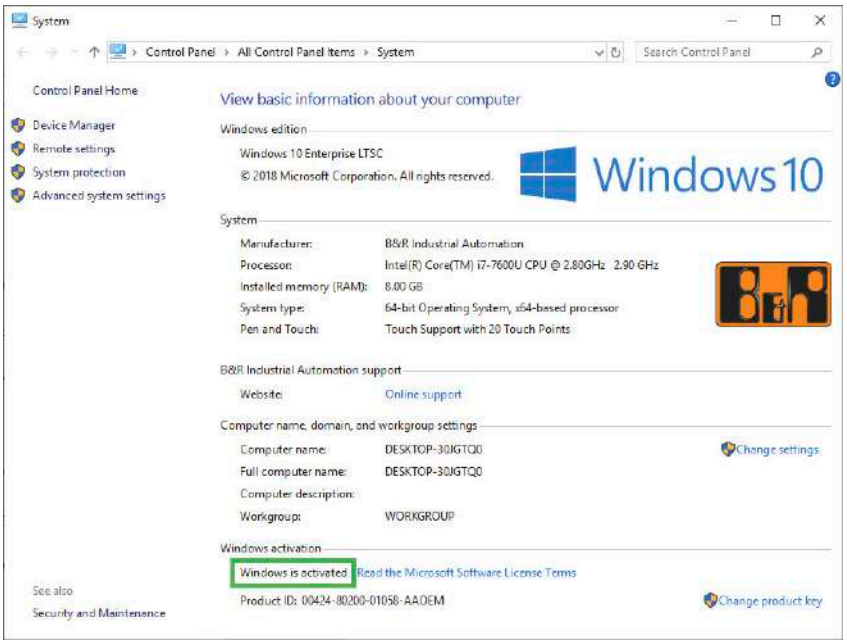
The operating system contains all drivers necessary for operation. If an older driver version is installed, the latest version can be downloaded and installed from the B&R website (www.br-automation.com). It is important to ensure that "Unified Write Filter (UWF)" is disabled.

Information:

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

7.4.1.7 Activation

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



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

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

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

7.4.2.2 Order data

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

7.4.2.3 Overview

Order number	5SWW10.0545-MUL	5SWW10.0559-MUL
Operating system		
Target systems		
Industrial PC	PPC2200	
Processor	x5-E3930, x5-E3940	
Chipset	Apollo Lake	
Edition	Enterprise LTSB - Entry	
Architecture	64-bit (UEFI boot)	64-bit (legacy BIOS boot)
Language	Multilingual	
Minimum size of RAM	2 GB [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.

7.4.2.4 Features

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

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

Table 130: Device functions in Windows 10 IoT Enterprise 2016 LTSB

7.4.2.5 Installation

Windows 10 IoT 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 IoT Enterprise 2015 LTSB. This takes place at B&R.

The activation status can be checked in the Control Panel:

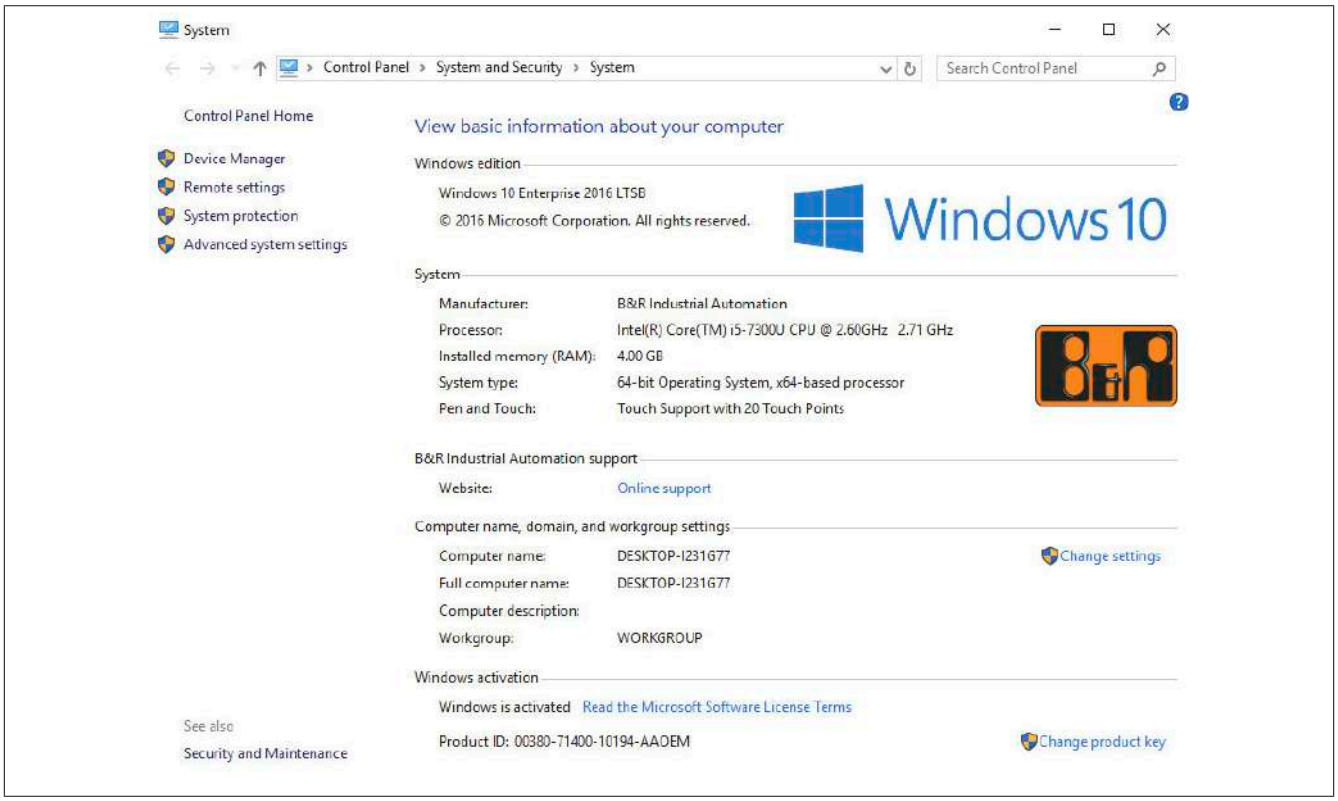


Figure 3: System properties

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 IoT 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 IoT 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.

7.4.3 Linux for B&R 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").

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	Figure
	Linux for B&R 10	
5SWLIN.0845-MUL	Linux for B&R 10 - 64-bit - Multilingual - PPC2200 (UEFI boot) - 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	5SWLIN.0845-MUL
Operating system	
Target systems	
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

Linux for B&R 10 contains a selection of predefined software package groups. Additional packages can be installed later with an existing Internet connection.

Appropriate modifications have been made and certain features provided using custom packages in order to use Debian on B&R Automation Panels and Panel PCs. Most of these packages are already included in Linux for B&R and/or available for download on the B&R website (www.br-automation.com).

7.4.3.5 Installation

Linux for B&R 10 is preinstalled 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 Linux for B&R 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").

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	Figure
	Linux for B&R 9	
5SWLIN.0745-MUL	Linux for B&R 9 - 64-bit - Multilingual - PPC2200 (UEFI boot) - Installation - Only available with a new device	
5SWLIN.0759-MUL	Linux for B&R 9 - 64-bit - Multilingual - PPC2200 (Legacy BIOS boot) - 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.4096-00	CFast 4 GB SLC	
5CFAST.8192-00	CFast 8 GB SLC	

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 Linux for B&R 9 can be downloaded from the Downloads section of the B&R website (www.br-automation.com).

7.4.4.5 Installation

Linux for B&R 9 is preinstalled 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	Figure
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	
0TG1000.02	Technology Guard (HID)	
0TGF016.01	Technology Guard (MSD) with integrated flash drive, 16 GB (MLC)	
1TG4601.06-5	Automation Runtime Embedded, TG license	
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	
1TG4700.00	B&R Hypervisor	

Contract-based licensing (terms and conditions)

Order number	Short description	Figure
	Runtime	
1TC4601.06-5	License for Automation Runtime Embedded (TC). One license per target system is required.	
	Hypervisor	
1TC4700.00	License for B&R Hypervisor (TC). One license per target system 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*****:**

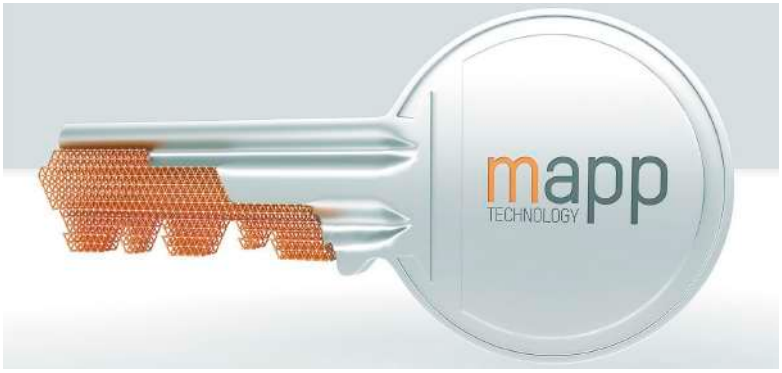
  Legacy boot
  - ***Boot - EFI device first*** **must be disabled.**

  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.

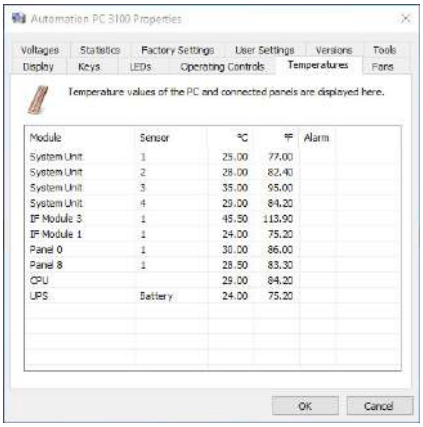
The ADI driver (also includes the ADI Control Center) and user documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com). If a more recent version is available, it can be installed later.

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

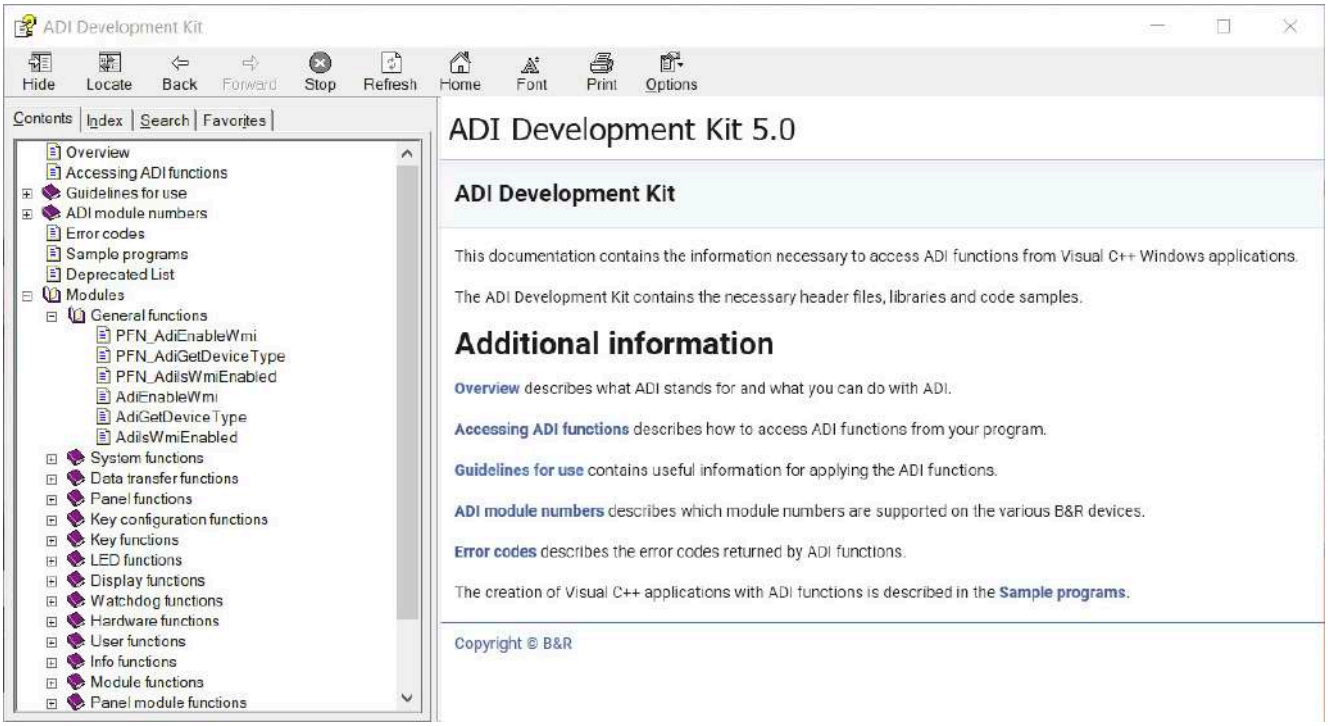
For a detailed description, see the user documentation for the ADI driver.

Information:

The functions available in the ADI Control Center depend on the device family.

7.6.2 ADI Development Kit

This software allows *ADI* functions to be accessed from Windows applications created with Microsoft Visual Studio, for example:



Features:

- Header files and import libraries
- Help files
- Example projects
- ADI DLL: For testing applications if no ADI driver is installed.

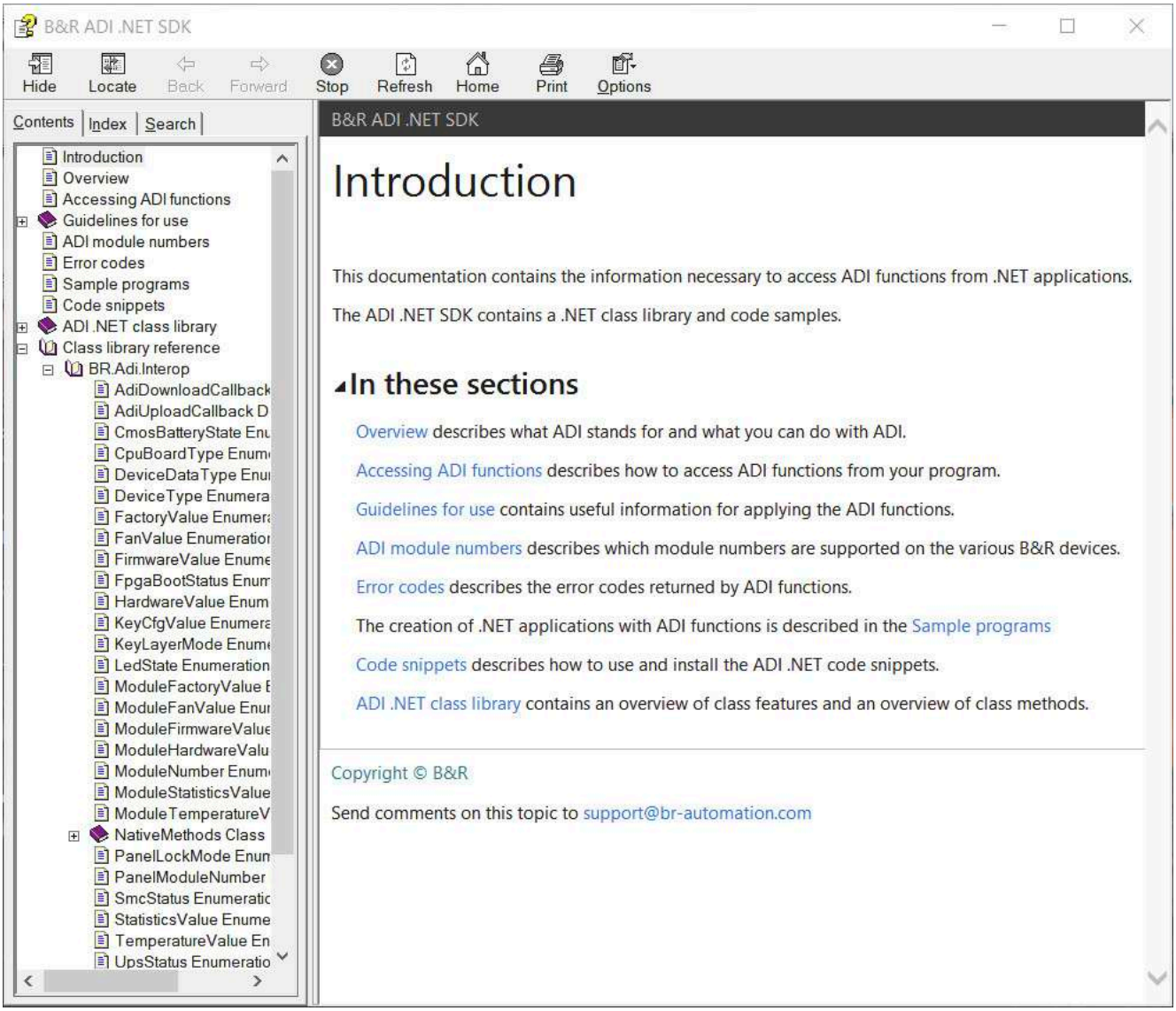
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

For a detailed description of how to use ADI functions, see Automation Help.

The ADI Development Kit can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

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

This document contains technical information about B&R Automation Device Interface OPC UA Server (B&R ADI OPC UA Server).

The descriptions and figures refer to B&R ADI OPC UA Server V2.0.0 and later.

ADI OPC UA Server provides the functions and information of the Automation Device Interface (ADI) as OPC UA variables. OPC UA stands for **O**pen **P**latform **C**ommunications **U**nified **A**rchitecture and is an international standard for secure, reliable, manufacturer- and platform-independent information exchange in industrial communication.

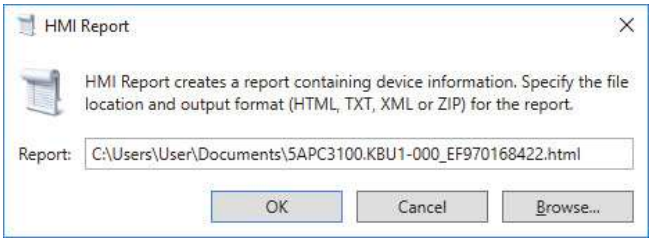
OPC UA is based on the client-server principle and, in the case of ADI OPC UA Server, enables temperatures and device information to be read from B&R devices, for example.

Additional information is available on the OPC Foundation (www.opcfoundation.org) 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).

7.6.5 HMI Report

HMI Report can be used to create a report with device-specific information. This report can then be used for support purposes or system documentation. The program is opened via the start menu.



The following output formats are available:

- HTML Report (HTML) - Report in HTML format for display in the browser.
- Text Report (TXT) - Report in text format for display in the text editor.
- XML Report (XML) - Report in XML format for display in the browser.
- Diagnostic package (ZIP) - The diagnostic package contains a text report and log files for troubleshooting by B&R.

The following settings can also be made:

- **Report**:
  Specifies the storage location, filename and output format for the report. Alternatively, the file dialog box can be used with **Browse**.

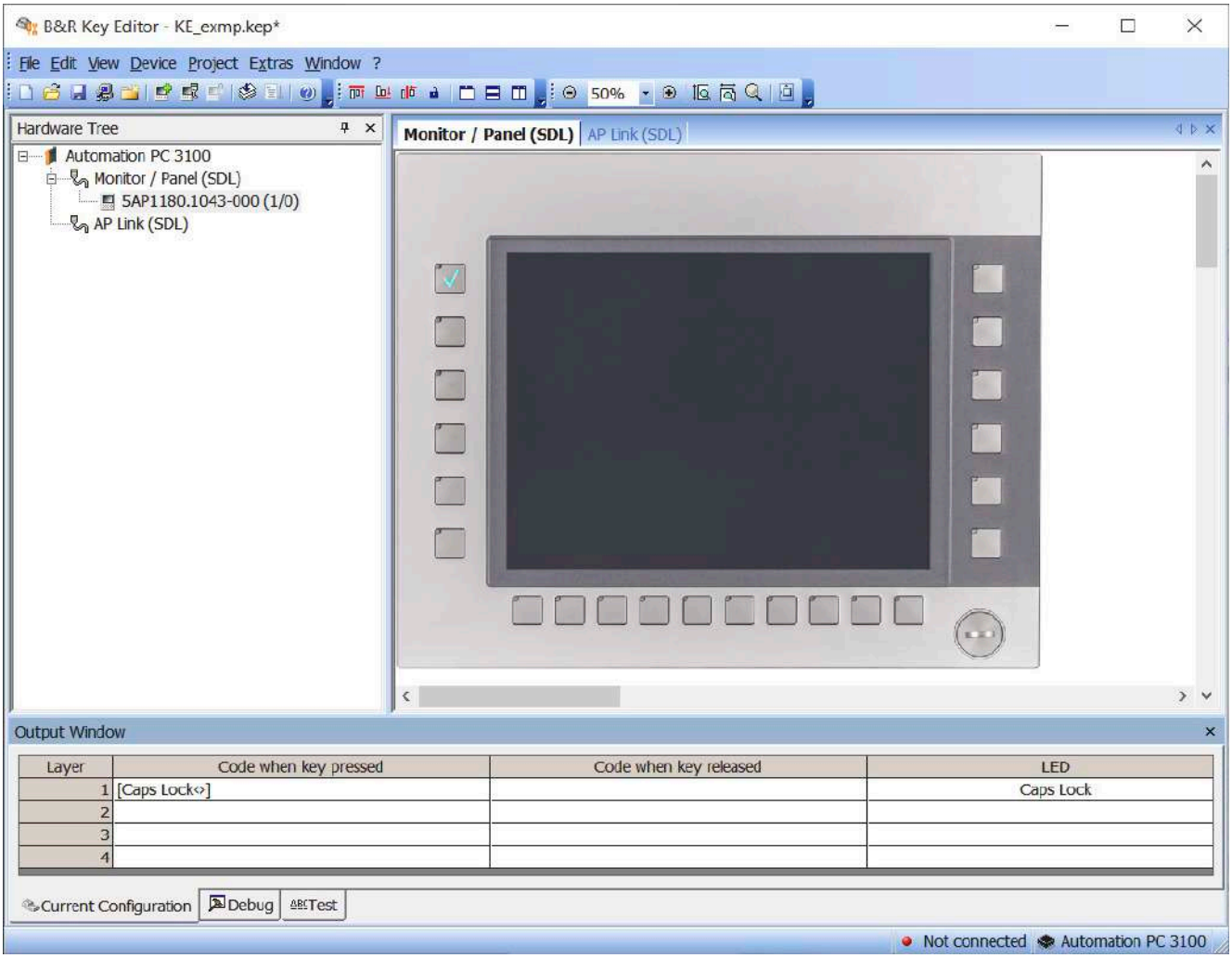
Alternatively, the report can be created from the **command line** with the following command:

```
C:\Programme\BrAutomation\Adi\System\HmiReport\BR.Hmi.Report.Cli.exe <Dateiname>
```

If no filename is specified, a text report is created with filename "<Material number>_<Serial number>.txt".

7.7 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:

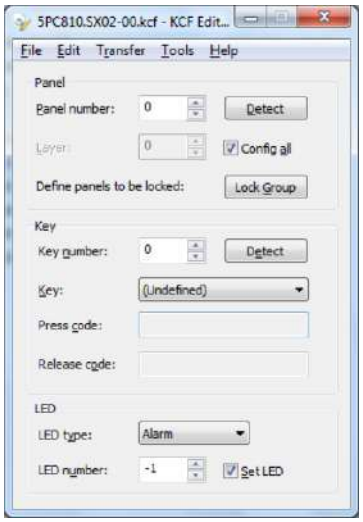
- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the 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	

The following limitations regarding supported hardware revisions must be observed:

Devices	Starting with D0	Up to E0	Starting with E0
Automation Panel 1000	●		
Automation Panel 5000	●		
Automation PC 3100	●		
Automation PC 3100 mobile			●
Automation PC 2200	●		
Automation PC 810		●	
Automation PC 511		●	
Automation PC 510		●	
Panel PC 3100	●		
Panel PC 2200	●		
Panel PC 1200			●
Panel PC 800		●	
Power Panel 500		●	

8 Maintenance

The following chapter describes the maintenance work that can be carried out by a qualified and trained end user.

Information:

Only components approved by B&R are permitted to be used for maintenance work.

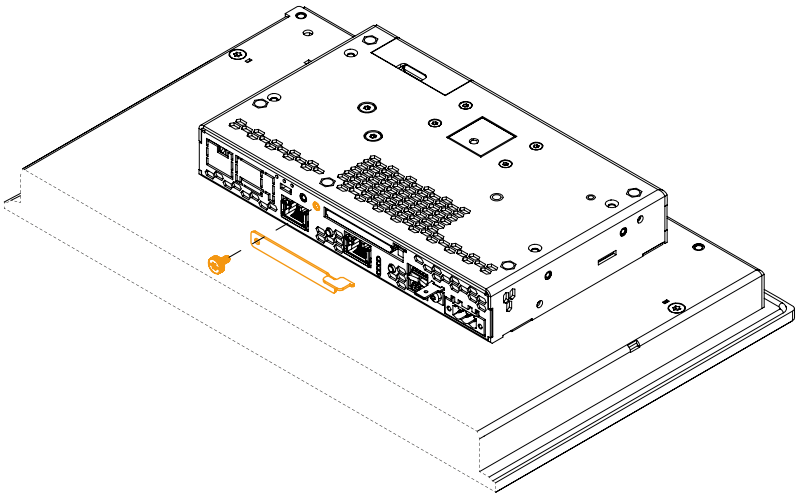
8.1 Replacing CFast cards

Caution!

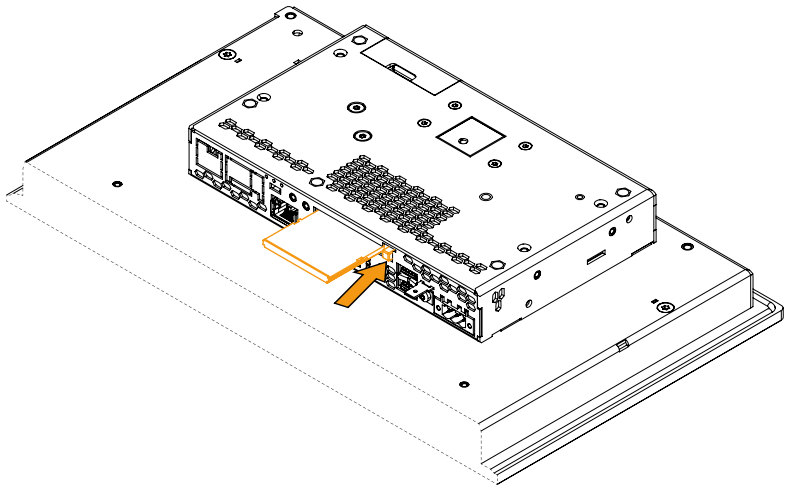
The CFast card is only permitted to be replaced in a voltage-free state.

Improper handling of the ejection lever (e.g. applying a large amount of force) can result in a defect in the ejector mechanism.

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Loosen the Torx screw (T10) of the cover plate and remove the cover plate.



3. Press the ejector next to the card slot. The CFast card is ejected and can be replaced.



4. After replacing, re-secure the cover of the CFast card slot. The max. tightening torque of the screw is 0.55 Nm.

8.2 Changing the battery

Warning!

The battery compartment is only permitted to be replaced by B&R battery compartment 5ACCBT01.0000-001 or 5ACCRPC2.0003-000. The battery is permanently installed and cannot be replaced. The entire battery compartment must always be replaced.

The use of any other battery may present a risk of fire or explosion.

The battery can explode if handled improperly. Do not recharge, disassemble or dispose of the battery in fire.

The lithium battery ensures the retention of the internal real-time clock (RTC) and CMOS data.

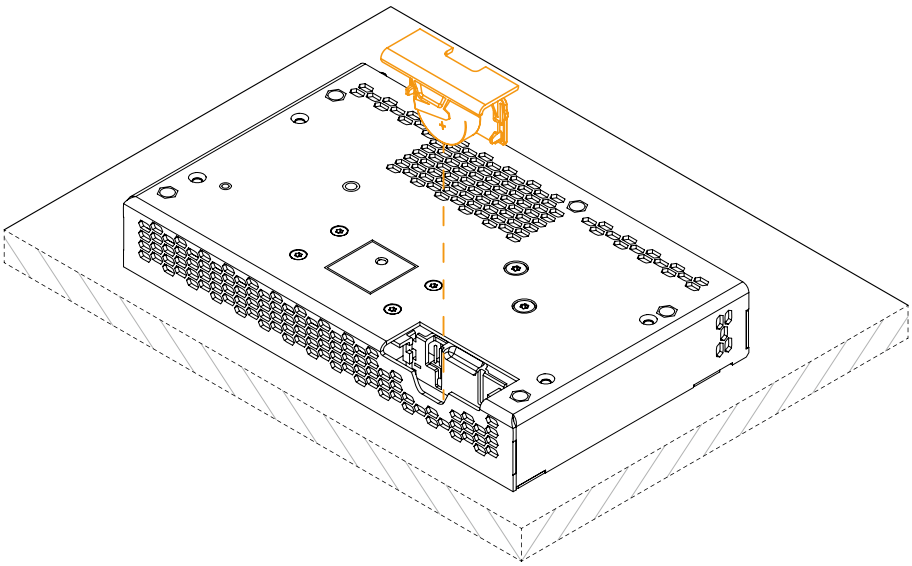
Note the following when changing the battery:

- The product design allows the battery to be changed when the PLC is in a voltage-free state as well as when the B&R device is switched on. In some countries, changing under operating voltage is not permitted, however; local regulations must be observed!
- The battery is only permitted to be changed by qualified personnel.
- When changing the battery in a voltage-free state, any BIOS settings made are retained (stored in voltage-safe EEPROM). The date and time must be set again since this data is lost during the change.

8.2.1 Changing the battery

The following instructions apply to battery compartments 5ACCBT01.0000-001 and 5ACCRPC2.0003-000.

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Carry out electrostatic discharge on the housing or ground connection.
3. Pull out and remove the battery compartment.



4. Insert the new battery compartment.
5. Reapply power to the B&R industrial PC (connect the power cable).
6. Reset the date and time.

Warning!

Lithium batteries are hazardous waste! Used batteries must be disposed of in accordance with local regulations.

8.3 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.
- When cleaning, areas with adhesive labels and product information should be left out to avoid damage.

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%.

8.5.2 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 Accessories

The following accessories have undergone functional testing by B&R in connection with the device used and can be operated with this device. Possible limitations regarding operation with individual components other than the complete system must be taken into account, however. All individual specifications of the components must be observed when operating the complete system.

All components listed in this manual have undergone intensive system and compatibility testing and been approved accordingly. B&R cannot assume any functional warranty for accessories that have not been approved.

9.1 General information

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

9.1.1 Order data

Material number	Description
5ACCRHMI.0000-000	HMI grounding clip
5ACCRHMI.0001-000	Retaining clips 16 mm - 14 pcs. with 16 mm setscrews - For AP1000 and AP9x3
5ACCRHMI.0002-000	Retaining clips 20 mm - 14 pcs. with 20 mm setscrews - For AP1000 and AP9x3
5ACCRHMI.0003-000	Retaining clips 25 mm - 12 pcs. with 25 mm setscrews - For AP1000 and AP9x3
5ACCRHMI.0004-000	Rafi replacement key - 1 pc.
5ACCRHMI.0004-C00	Schlegel replacement key - 2 pcs.
5ACCRPC2.0000-000	PPC2100/2200 mounting screws kit - 4x screw M3x34 mm - 2x special screw for PPC2100
5ACCRPC2.0001-000	xPC2100/2200 interface covers - 1x cover set
5ACCRPC2.0002-000	xPC2200 CFast cover
5ACCRPC2.0003-000	xPC2200 battery compartment - 1x battery holder for xPC2200 - 1x battery including circuit board
5ACCRPC2.0007-000	APC2100/2200 front cover - Orange - With logo
5ACCRPC2.0008-000	APC2100/APC2200 front cover - Gray - With logo

9.1.1.1 5ACCRPC2.0003-000 - Technical data

Information:

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

Order number	5ACCRPC2.0003-000
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°C
Storage	-25 to 60°C
Transport	-25 to 60°C
Relative humidity	
Operation	5 to 90%
Storage	5 to 95%
Transport	5 to 95%
Mechanical properties	
Housing	
Material	Dyed gray (similar to Pantone 432C) plastic
Weight	Approx. 13 g

1) At 50°C, 6 µA for the components being supplied.
2) The battery is permanently installed in the battery compartment and cannot be replaced. The entire battery compartment must always be replaced.

9.2 Installation accessories

Suitable tool sets can be ordered to easily install B&R industrial PCs and converters.

- Consisting of:

  5ACCRHMI.0006-000

  - 1x torque screwdriver: 0.4 to 2.0 Nm
  - 1x bit set (5 pieces): Hex recess (2.5 mm, 3.0 mm, 5.0 mm), Torx (T10, T20)

9.2.1 Order data

Order number	Short description	Figure
	Other	
5ACCRHMI.0006-000	HMI installation tool for control cabinet - 1x torque wrench 0.4 - 2.0 Nm - 1x hex head bit 2.5, length 89 mm - 1x hex head bit 3.0, length 89 mm - 1x hex head bit 5.0, length 89 mm - 1x Torx 10 bit, length 90 mm - 1x Torx 20 bit, length 89 mm	

9.3 Terminal block power supply

9.3.1 0TB103.9x

9.3.1.1 Order data

Order number	Short description	Figure
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	

9.3.1.2 Technical data

Information:

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

Order number	0TB103.9	0TB103.91
General information		
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]	
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]	
LR	ENV3	
KR	Yes	
ABS	Yes	
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck	
EAC	Yes	
Terminal block		
Note	Protected against vibration by the screw flange Nominal data per UL	
Number of pins	3 (female)	
Type of terminal block	Screw clamp terminal block variant	Cage clamp terminal block variant [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 mm²	
Solid wires	0.20 to 2.50 mm²	
Fine-stranded wires	0.20 to 1.50 mm²	0.20 to 2.50 mm²
With wire end sleeves	0.20 to 1.50 mm²	
Tightening torque	0.4 Nm	-
Electrical properties		
Nominal voltage	300 V	
Nominal current [4]	10 A / contact	
Contact resistance	≤5 mΩ	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	

1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) Yes, but applies only if all components installed in the complete system have this certification and are listed on the associated DNV certificate for the product family.
3) The cage clamp terminal block cannot be used side by side.
4) The respective limit data of the I/O modules must be taken into account!

9.4 Terminal block for IF options

9.4.1 0TB1210.3100

9.4.1.1 General information

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

9.4.1.2 Order data

Order number	Short description	Figure
	Terminal blocks	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	

9.4.1.3 Technical data

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

Order number	0TB1210.3100
General information	
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 [1]
DNV	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck) [2]
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
EAC	Yes
Terminal block	
Note	Nominal data per UL
Number of pins	10 (female)
Type of terminal block	Push-in spring connection
Cable type	Only copper wires (no aluminum wires!)
Pitch	3.5 mm
Connection cross section	
AWG wire	26 to 16 AWG
Wire end sleeves with plastic covering	0.14 to 1 mm²
Solid wires	0.14 to 1.5 mm²
Fine-stranded wires	0.14 to 1.5 mm²
With wire end sleeves	0.14 to 1.5 mm²

Order number	0TB1210.3100
Electrical properties	
Nominal voltage	300 V
Nominal current [3]	10 A
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 respective limit data of the I/O modules must be taken into account!

9.5 Cables

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

9.6 USB mass storage device

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

10 International and national certifications

10.1 Directives and declarations

10.1.1 CE marking

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

10.1.2 EMC Directive

The products meet the requirements of EU directive "Electromagnetic compatibility 2014/30/EU" and are designed for industrial applications:

EN 61131-2:2007	Programmable controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Information:

Declarations of conformity are available on the B&R website under Downloads > Certificates > Declarations of conformity.

10.2 Certifications

Danger!

A complete system can only receive certification if all individual components installed and connected in it have the corresponding certifications. If an individual component is used that does not have the corresponding certification, the complete system will also not be certified.

B&R products and services comply with applicable standards. These are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We pay special attention to the reliability of our products in the industrial sector.

Information:

The certifications valid for the respective product are available on the website and in the user's manual under the technical data in section "Certifications" or in the associated certificates.

10.2.1 UL certification

Ind. Cont. Eq.
E115267

Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment". The mark is valid for the USA and Canada and facilitates the certification of your machines and systems in this economic area.

Underwriters Laboratories (UL) per standards UL 61010-1 and UL 61010-2-201
Canadian (CSA) standard per C22.2 No. 61010-1-12 and CSA C22.2 No. 61010-2-201:14

The UL certificates are available on the B&R website (Downloads > Certificates > UL).

When using industrial control equipment per UL 61010-1 / UL 61010-2-201, make sure that the device is classified as "open type". The prerequisite for certification or operation per UL 61010-1 / UL 61010-2-201 is therefore the installation of the device in an appropriate protective housing.

The front of the device meets IP65 (EN 60529) and "Type 4X indoor use only" (UL 50E) requirements.

10.2.2 EAC

Products with this mark are tested by an accredited test laboratory and permitted to be imported into the Eurasian Customs Union (based on EU conformity).

10.2.3 KC

Products with this mark are tested by an accredited test laboratory and permitted to be introduced into the Korean market (based on EU conformity).

10.2.4 UKCA

UK Conformity Assessed (UKCA)
All directives applicable to the respective product and their relevant standards are met. Products with this marking are permitted to be imported into Great Britain (England, Wales, Scotland).

Information:

The declarations of conformity are available on the B&R website (Downloads > Certificates > Declarations of conformity).

10.2.5 RCM

Products with this mark are tested by an accredited test laboratory and certified by the ACMA. The mark is valid for Australia/Oceania and simplifies the certification of your machines and systems in this economic area (based on EU conformity).

10.2.6 DNV certification

Products with this certification are certified by the classification society DNV and suitable for the maritime sector. DNV certificates (type approvals) are generally accepted by other classification societies during ship acceptance procedures.

DNV certificates with specifications for permissible environmental conditions as well as a list of revisions from which the DNV type certification applies to individual devices are available on the B&R website (Downloads > Certificates > Maritime).

10.2.7 American Bureau of Shipping (ABS)

Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society American Bureau of Shipping (ABS Rules).

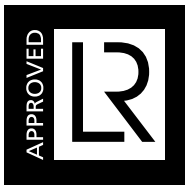
Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website (Downloads > Certificates > Maritime).

10.2.8 Bureau Veritas (BV)

Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Bureau Veritas (BV).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website (Downloads > Certificates > Maritime).

10.2.9 Lloyd's Register (LR)



Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Lloyd's Register (LR).

Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website (Downloads > Certificates > Maritime).

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 Operating and monitoring devices Uninterruptible power supplies Batteries and rechargeable batteries Cables	Electronics recycling
Paper/Cardboard packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

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

Appendix A 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 side.
ND	Not defined	Stands for an undefined value in technical data tables. This may be because the cable manufacturer has not provided a value for certain technical data.
NO	Normally open	Stands for a normally open relay contact.
TBD	To be defined	Used in technical data tables if there is currently no value for specific technical data. The value will be supplied later.
MTBF	Mean time between failures	The expected value of the operating time between two consecutive failures.

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:

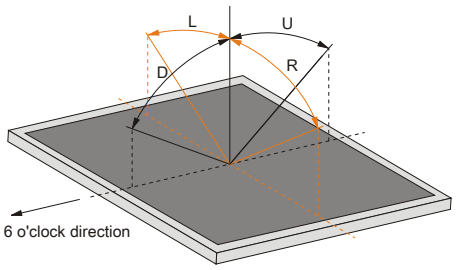
- Power failure logic and power on logic (power OK sequencing)
- Handling of watchdog (handling of NMI/reset)
- Temperature monitoring and fan control
- Handling/Coordination of keys and LEDs (matrix keyboard of B&R panels)
- Advanced desktop operation (buttons, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable via the ADI Control Center)
- Backlight control of a connected B&R display
- Calculating statistical data: Power-on cycles, power-on hours and fan hours (resolution: 15 min)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- LED status indicators (Power, Disk, Link, Run)
- Optimal (default) BIOS settings are reported to BIOS by the MTCX depending on the existing hardware.

The functions of the MTCX can be extended by upgrading its firmware[6)]. The version can be read in BIOS or in approved Microsoft Windows operating systems using the ADI Control Center.

[6)] Can be downloaded from the Downloads section of the B&R website (www.br-automation.com).

Appendix C Viewing angles

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

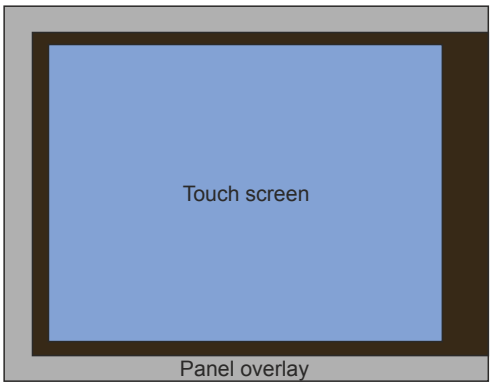


Appendix D Chemical resistance

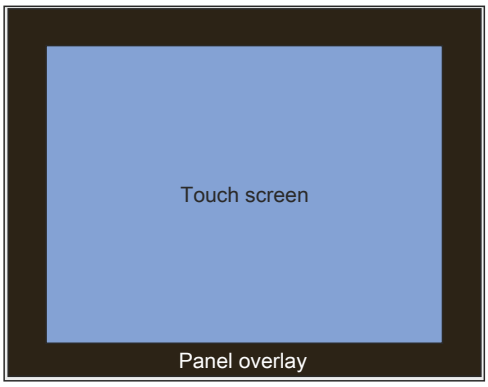
All panels are made of a coated aluminum support frame.

Single-touch panels

- AP1000 single-touch panels are manufactured with an Autotex panel overlay.
- AP9x3 single-touch panels are manufactured with an Autotex panel overlay starting with the following revision:
  - 5AP923.1215-00 ≥ revision B8
  - 5AP923.1505-00 ≥ revision B8
  - 5AP923.1906-00 ≥ revision B8

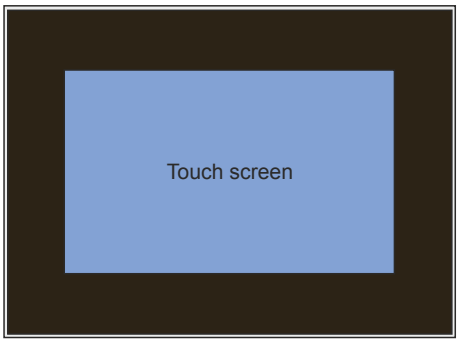


- AP9x3 single-touch panels < revision B8 were manufactured with an aluminum panel overlay.



Multi-touch panels

- AP9x3 and AP1000 multi-touch panels are equipped with a continuous glass surface.



D.1 Autotex panel overlay (polyester)

Unless otherwise specified, the panel overlay is resistant to the following chemicals, materials and substances 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
- Ethanol
- 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 ($FeCl_2$)
- Iron III chloride ($FeCl_3$)
- 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 Aluminum panel overlay

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

- Acetaldehyde
- Acetone
- Acetonitrile
- Alkali carbonate
- Alkane
- Formic acid <50%
- Ammonia <40%
- Amyl acetate
- Gasoline
- Bichromate
- Brake fluid
- Castor oil
- Hydrogen chloride <36%
- Cyclohexanol
- Cyclohexanone
- Decon
- Diacetone alcohol
- Diesel
- Diethyl ether
- Diethyl phthalate
- Dimethylbenzene
- Dioxan
- Dowandol
- DRM/PM
- Iron chloride
- Iron II chloride (FeCl2)
- Iron III chloride (FeCl3)
- Acetic acid <50%
- Butyl acetate
- Ethanol
- Ether
- Ethyl acetate
- 2-Butoxyethanol (Butyl CELLOSOVLE)
- Aviation fuel
- Formaldehyde 37 to 42%
- Gear oil
- Glycerine
- Glycol
- Isophorone
- Isopropanol
- Potassium
- Potassium carbonate
- Potassium hydroxide
- White spirit
- Linseed oil
- Methanol
- Methylbenzene
- Methyl ethyl ketone
- Methylisobutylketone
- Sodium bisulphate
- Sodium carbonate
- Sodium hydroxide <40%
- Sodium hypochlorite <20%
- Paraffin oil
- Phosphoric acid <30%
- Phthalate
- Nitric acid <10%
- Sea water
- Cutting oil
- Sulphuric acid <10%
- Turpentine oil replacement
- Triacetin
- Trichloracetic acid <50%
- Trichloroethane
- Washing agents
- Water
- Hydrogen peroxide <25%
- Fabric conditioner

The panel overlay is not resistant to the following chemicals:

- Benzyl alcohol
- Dimethyl formamide
- Concentrated mineral acid
- Concentrated caustic solution
- High-pressure steam over 100°C
- Methylene chloride
- Tetrahydrofuran

D.3 Coated aluminum front

Unless otherwise specified, the coated aluminum front is resistant to the following chemicals, materials and substances 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

D.4 Touch screen

5-wire touch screen (single-touch)

Unless otherwise specified, the touch screen is resistant to the following chemicals, materials and substances when exposed for up to 1 hour (at 25°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, materials and substances 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	Touchscreen 5-Draht
General information	
Technology	Analog, resistive
Release pressure	<1 N
Light transmission	80% ±3%
Service life	10,000,000 touch operations at the same position (actuating force: 250 g, interval: 0.25 s)
Operating conditions	
Activation	Finger, stylus, credit card, glove
Ambient conditions	
Temperature	
Operation	-20 to 70°C
Storage	-40 to 80°C
Transport	-40 to 80°C
Relative humidity	
Operation	90% at max. 50°C
Storage	90% RH at max. 60°C for 504 hours
Transport	90% RH at max. 60°C for 504 hours

E.1.2 Temperature/Humidity diagram

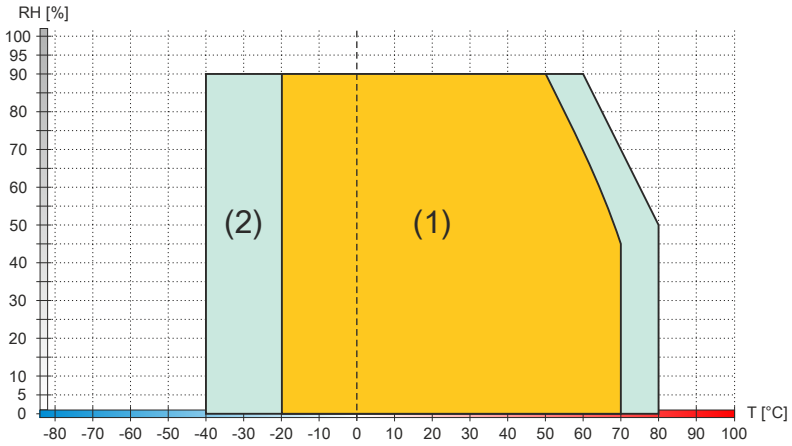


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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

E.2.1 General information

Valid for the following products:

- 5AP933.156B-00 with Rev. ≤ C0
- 5AP933.185B-00 with Rev. ≤ C0
- 5AP933.215C-00 with Rev. ≤ C0
- 5AP933.240C-00 with Rev. ≤ C0

E.2.2 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	88 ±2%
Anti-glare coating	Optical/Gloss = 70
Operating conditions	
Activation	Finger, thin glove
Ambient conditions	
Temperature	
Operation	0 to 50°C
Storage	-10 to 70°C
Transport	-10 to 70°C
Relative humidity	
Operation	90% at max. 35°C
Storage	90% at max. 35°C
Transport	90% at max. 35°C

E.2.3 Temperature/Humidity diagram

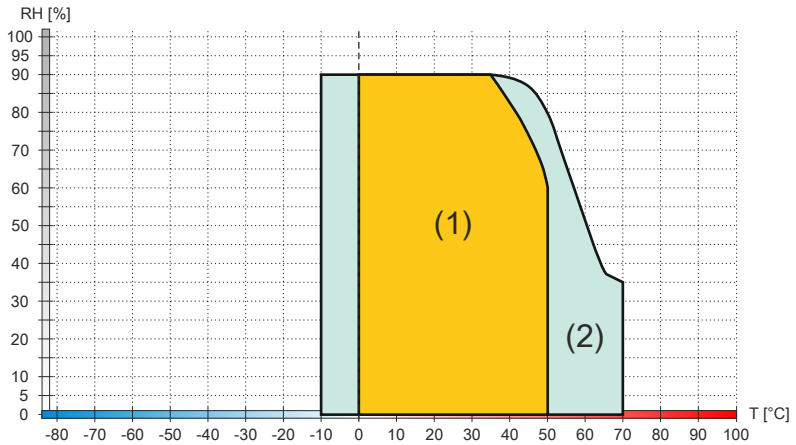


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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

E.3.1 General information

Valid for the following products:

- 5AP1130.0702-000
- 5AP1130.101x-000
- 5AP1130.121E-0x0
- 5AP1130.156C-00x
- 5AP1130.185C-000
- 5AP933.156B-00 with Rev. ≥ D0
- 5AP933.185B-00 with Rev. ≥ D0
- 5AP933.215C-00 with Rev. ≥ D0
- 5AP933.240C-00 with Rev. ≥ D0

E.3.2 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°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity	
Operation	Up to 90% at max. 35°C, see diagram for > 35°C.
Storage	Up to 90% at max. 35°C, see diagram for > 35°C.
Transport	Up to 90% at max. 35°C, see diagram for > 35°C.

E.3.3 Temperature/Humidity diagram

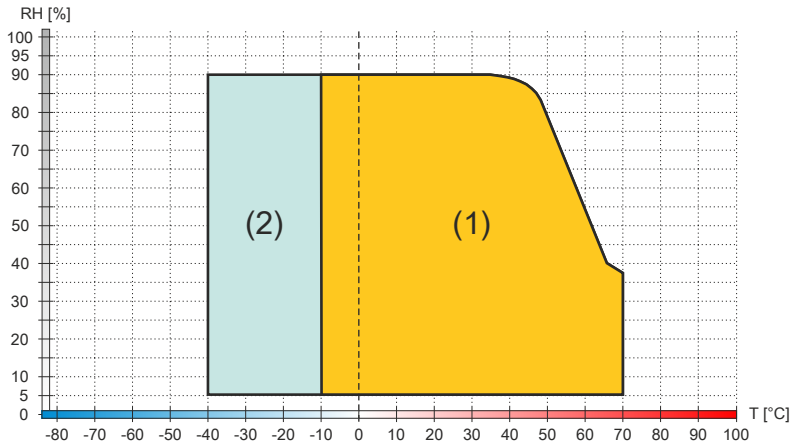


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

Appendix F Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 264	RS422	"RS422 - Bus length and cable type" on page 264
RS485	"RS485 - Bus length and cable type" on page 265	CAN	"CAN - Bus length and cable type" on page 265

F.1 RS232 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable length and type of cable used.

Bus length	Transfer rate
≤15 m	Typ. 64 kbit/s
≤10 m	Typ. 115 kbit/s
≤5 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS232 cables		Property
Signal line		
	Cable cross section	4x 0.16 mm² (26 AWG), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Wires stranded in pairs
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/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 kbit/s depends on the cable length and type of cable used.

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS422 cables		Property
Signal line		
	Cable cross section	4x 0.25 mm² (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Wires stranded in pairs
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
Outer jacket		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

F.3 RS485 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable length and type of cable used.

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS485 cables		Property
Signal line		
	Cable cross section	4x 0.25 mm² (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Wires stranded in pairs
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/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)]	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
≤20 m[2)]	Typ. 1 Mbit/s
≤15 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.

CAN cable		Property
Signal line		
	Cable cross section	2x 0.25 mm² (24AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤82 Ω/km
	Stranding	Twisted-pair wires
	Shield	Pair shielding with aluminum foil
GND		
	Cable cross section	1x 0.34 mm² (22AWG/19), tinned copper stranded wire
	Wire insulation	PE
	Conductor resistance	≤59 Ω/km
Outer jacket		
	Material	PUR compound
	Properties	Halogen-free
	Cable shield	Tinned copper wire

Appendix G POWERLINK

G.1 LED "S/E" (status/error LED)

This LED is a green/red dual LED and indicates the state of the POWERLINK interface. The LED states have a different meaning depending on the operating mode of the POWERLINK interface.

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

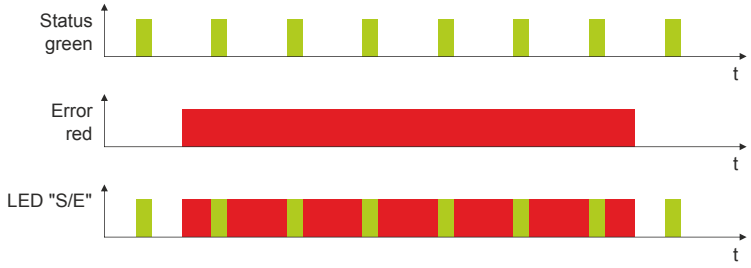
LED "S/E"		
Green	**Red**	**Description**
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	If an error occurs in the following modes, then the green LED blinks over the red LED: • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE 

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

Interface status

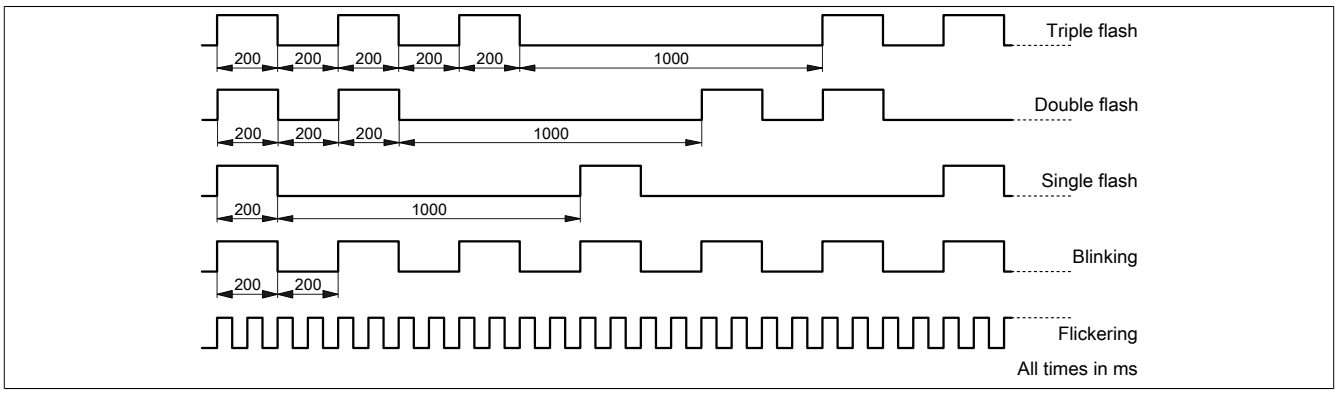
LED "S/E"		
Green	**Red**	**Description**
Off	Off	**Mode:** NOT_ACTIVE The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: • The device is switched off. • The device is in the startup phase. • The interface or device is not configured correctly in Automation 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)

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

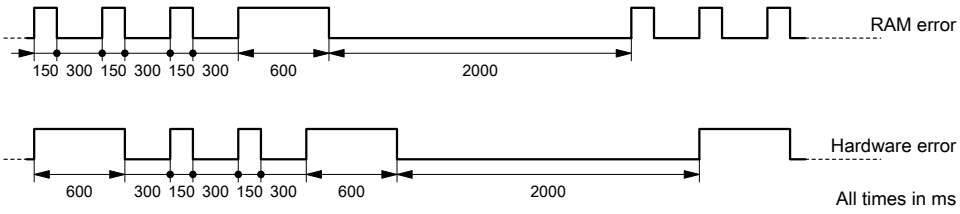
Blink times



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 Installation compatibility

This section describes the compatibility of the installation dimensions for Power Panel 100/200, Power Panel 300/400, Power Panel 500, Automation Panel 900, Automation Panel 1000, Panel PC 700 and Panel PC 800 devices depending on the respective device diagonals.

The external dimensions of the device types of the respective diagonals are identical.

Information:

Device designation "AP1000" refers to the Automation Panel 1000 as well as to the Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 with an installed AP1000 panel.

The various device types are abbreviated as follows:

Device type	Short form
Power Panel xxx	PPxxx
Panel PC xxxx	PPCxxxx
Automation Panel xxxx	APxxxx

H.1 Compatibility overview

The following table gives a brief overview of the PP100/200, PP300/400, PP500, AP900, AP1000, PPC700 and PPC800 devices. For more information, see section "Compatibility details" on page 270.

Information:

The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm. The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Diagonal	Format		PP100/200	PP300/400	PP500	AP900	AP1000[1)]	PPC700	PPC800
5.7"	Landscape1	Outer dimensions	212 x 156			-	212 x 156	-	
		Installation dimensions	199 x 143			-	199 x 143	-	
	Landscape2	Outer dimensions	302 x 187			-			
		Installation dimensions	289 x 174			-			
	Portrait1	Outer dimensions	212 x 245			-	212 x 245	-	
		Installation dimensions	199 x 226.8		199 x 232	-	199 x 232	-	
7"	Landscape1	Outer dimensions	-		212 x 156	-	212 x 156	-	
		Installation dimensions	-		199 x 143	-	199 x 143	-	
10.4"	Landscape1	Outer dimensions	323 x 260						-
		Installation dimensions	303 x 243						-
	Landscape2	Outer dimensions	423 x 288						-
		Installation dimensions	402 x 266.5		403 x 271	402 x 271	403 x 271	402 x 271	-
	Portrait1	Outer dimensions	323 x 358						-
		Installation dimensions	303 x 336		303 x 341				-
12.1"	Landscape1	Outer dimensions	362 x 284						-
		Installation dimensions	345 x 267		342 x 267				-

Diagonal	Format		PP100/200	PP300/400	PP500	AP900	AP1000[1)]	PPC700	PPC800
15"	Land-scape1	Outer dimen-sions	435 x 330						
		Installation dimensions	415 x 312		415 x 313	415 x 312	415 x 313	415 x 312	
	Por-trait1	Outer dimen-sions	435 x 430				-	435 x 430	-
		Installation dimensions	415 x 412		415 x 413	415 x 412	-	415 x 412	-
17"	Land-scape1	Outer di-mensions	-			477 x 390	-	477 x 390	-
		Installation dimensions	-			460 x 373	-	460 x 373	-
19"	Land-scape1	Outer di-mensions	-			527 x 421			
		Installation dimensions	-			510 x 404			
21.3"	Land-scape1	Outer di-mensions	-			583 x 464	-		
		Installation dimensions	-			566 x 447	-		

1) Device designation "AP1000" refers to the Automation Panel 1000 as well as to Panel PCs installed on AP1000 panels.

H.2 Compatibility details

H.2.1 Example

The dimensions (mm) in the subsequent figures have the following meaning.

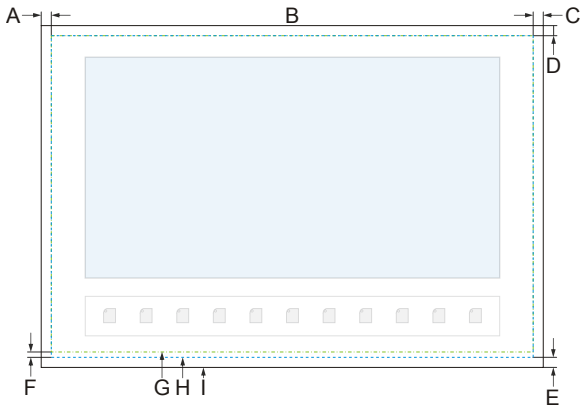
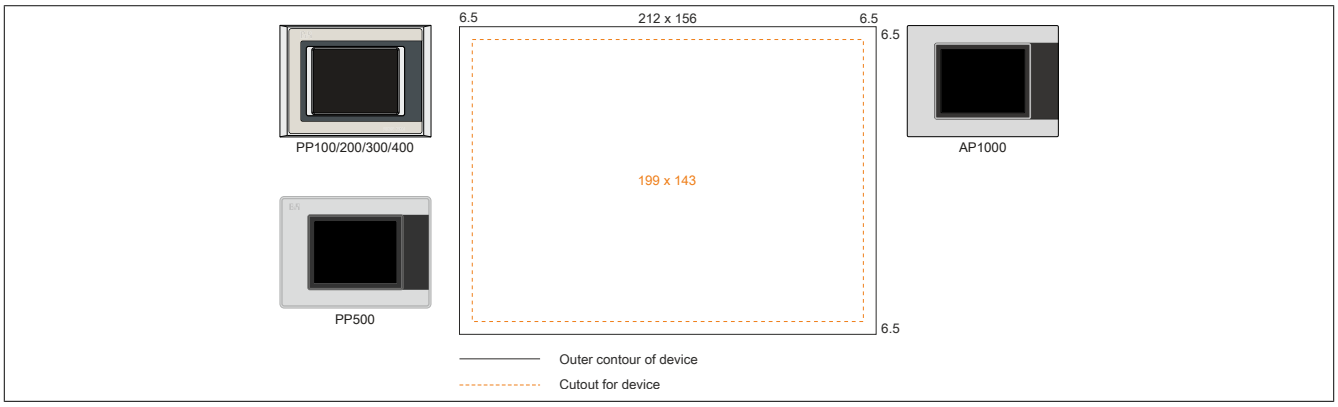


Diagram legend			
A	Spacing (left) to device edge	F	Difference value
B	Outer dimensions	G	Installation dimensions/Cutout for PP100/200/300/400 device
C	Spacing (right) to device edge	H	Installation dimensions/Cutout AP900/PP500/PPC700 device
D	Spacing (top) to device edge	I	Outer contour of device
E	Spacing (bottom) to device edge		

H.2.2 5.7" devices

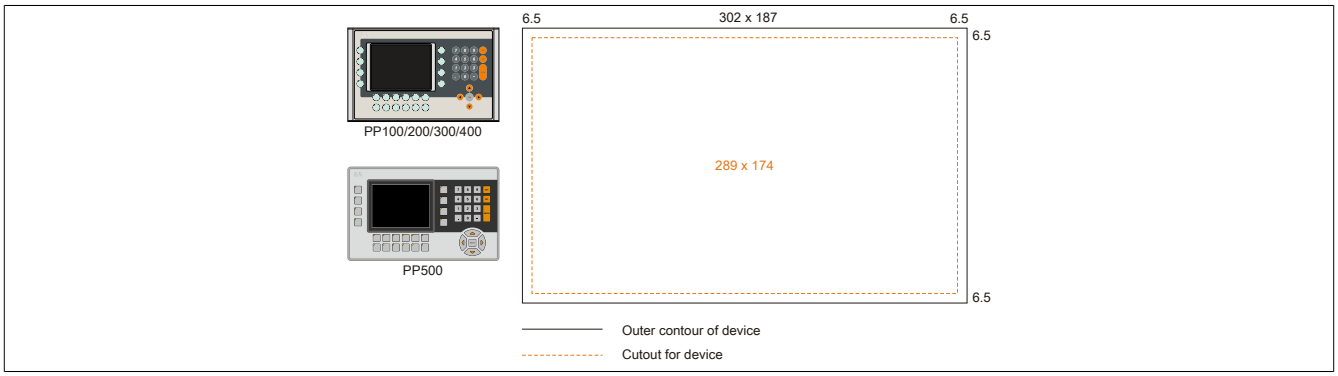
The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 5.7" devices - Landscape1



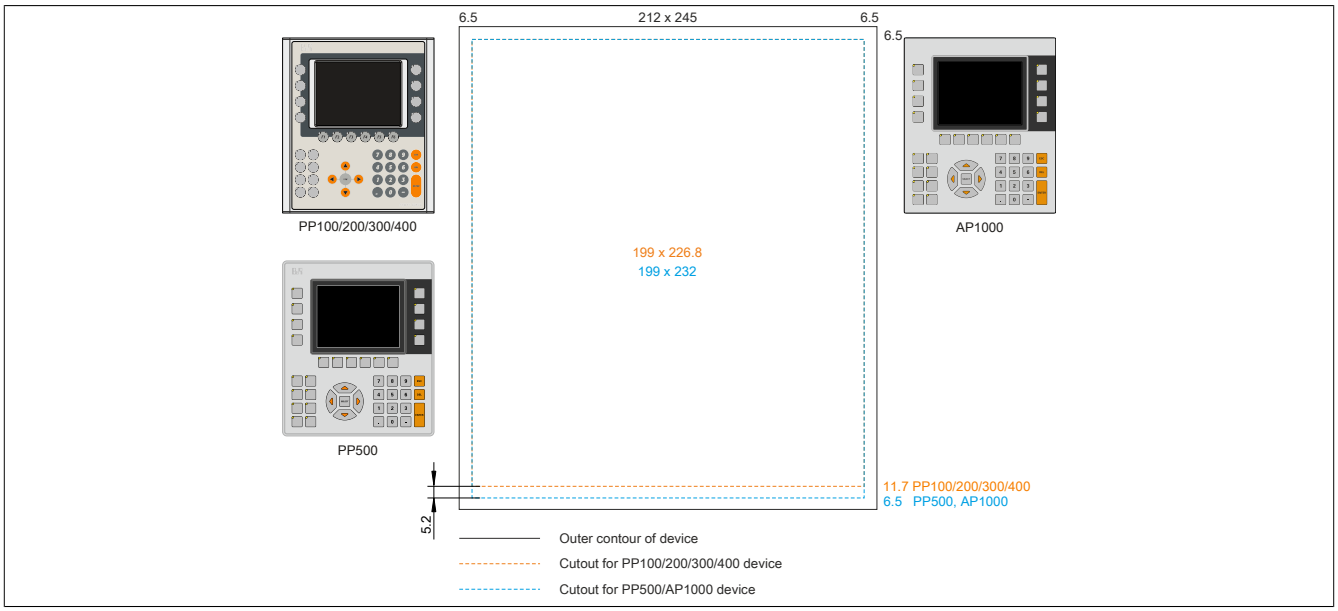
The 5.7" Automation Panel 1000, Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Landscape1 format are 100% compatible.

Installation compatibility - 5.7" devices - Landscape2



The 5.7" Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Landscape2 format are 100% compatible.

Installation compatibility - 5.7" devices - Portrait1



The 5.7" Automation Panel 1000 and Power Panel 500 are not 100% compatible with Power Panel 300/400 and Power Panel 100/200 devices in Portrait1 format. Automation Panel 1000 and Power Panel 500 devices need a cutout that is 5.2 mm larger (bottom edge).

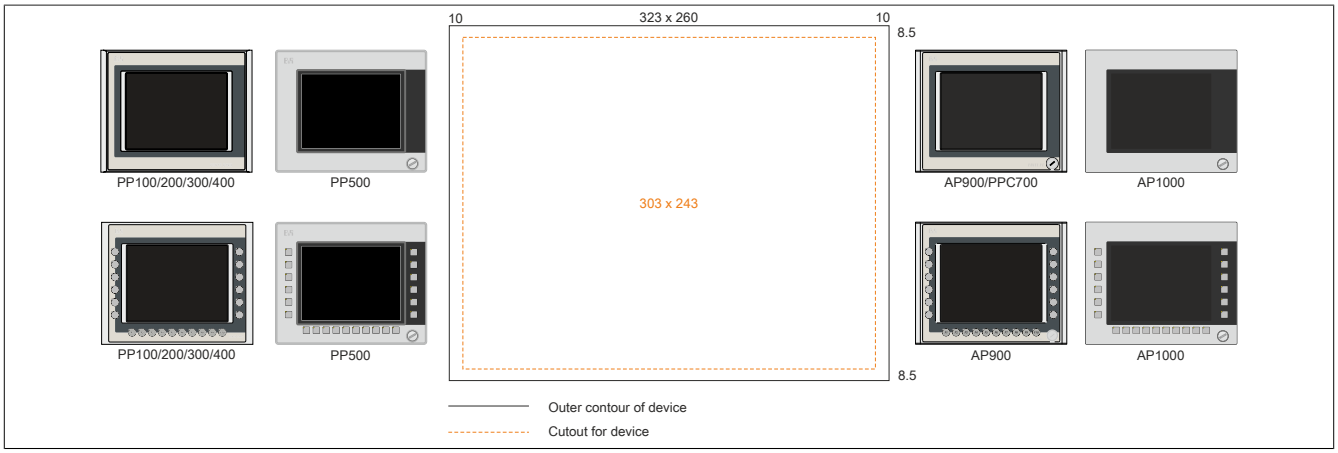
The larger cutout can be used conditionally for all devices:

- During installation, it is important to ensure that the PP100/200 and PP300/400 devices are positioned and installed as centrally as possible in the cutout. If this is not the case, the retaining clips can no longer grip and impermeability is no longer ensured by the circumferential cord gasket (IP65).

H.2.3 10.4" devices

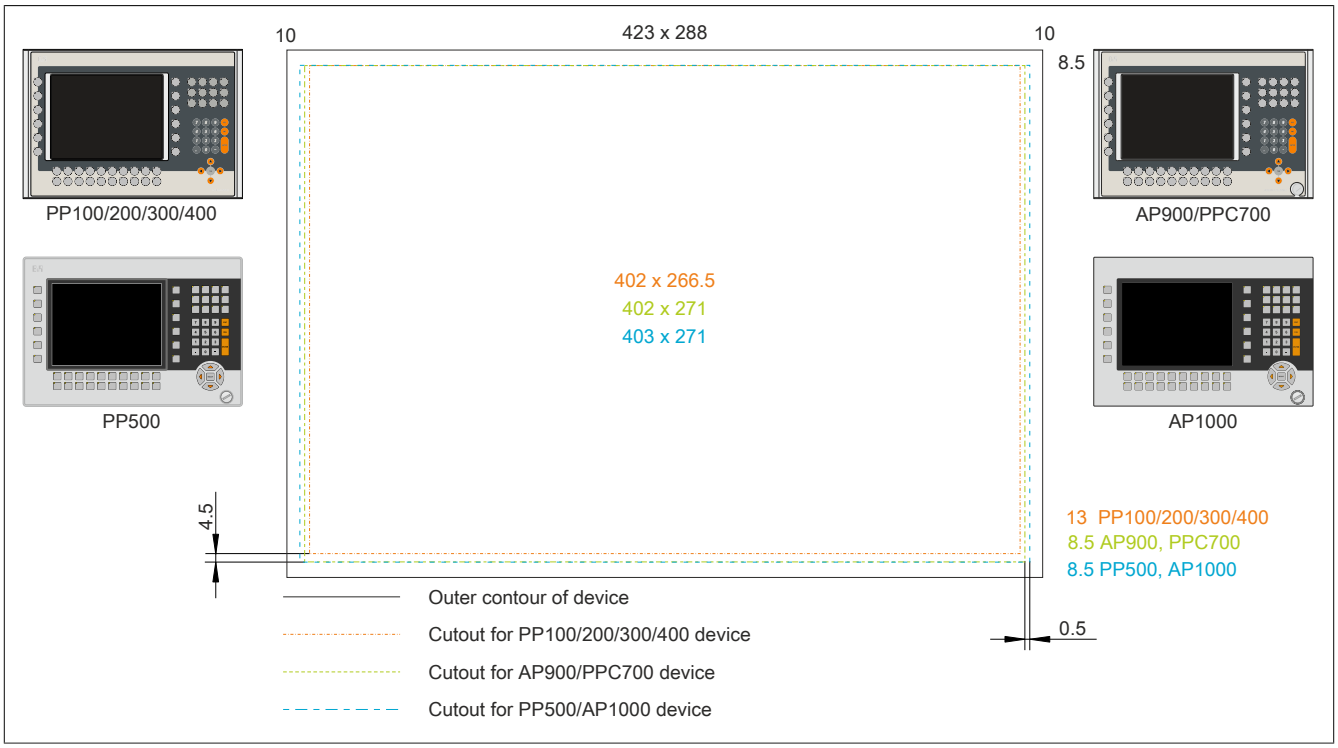
The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 10.4" devices - Landscape1



10.4" Automation Panel 1000, Automation Panel 900, Panel PC 700, Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Landscape1 format are 100% compatible.

Installation compatibility - 10.4" devices - Landscape2



10.4" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices are not 100% compatible with Power Panel 300/400 or Power Panel 100/200 devices in Landscape2 format. Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices need a cutout that is 4.5 mm larger (bottom edge) and 0.5 mm wider (left and right).

The larger cutout can be used conditionally for all devices:

- During installation, it is important to ensure that the PP100/200 and PP300/400 devices are positioned and installed as centrally as possible in the cutout. If this is not the case, the retaining clips can no longer grip and impermeability is no longer ensured by the circumferential cord gasket (IP65).

Installation compatibility - 10.4" devices - Portrait1

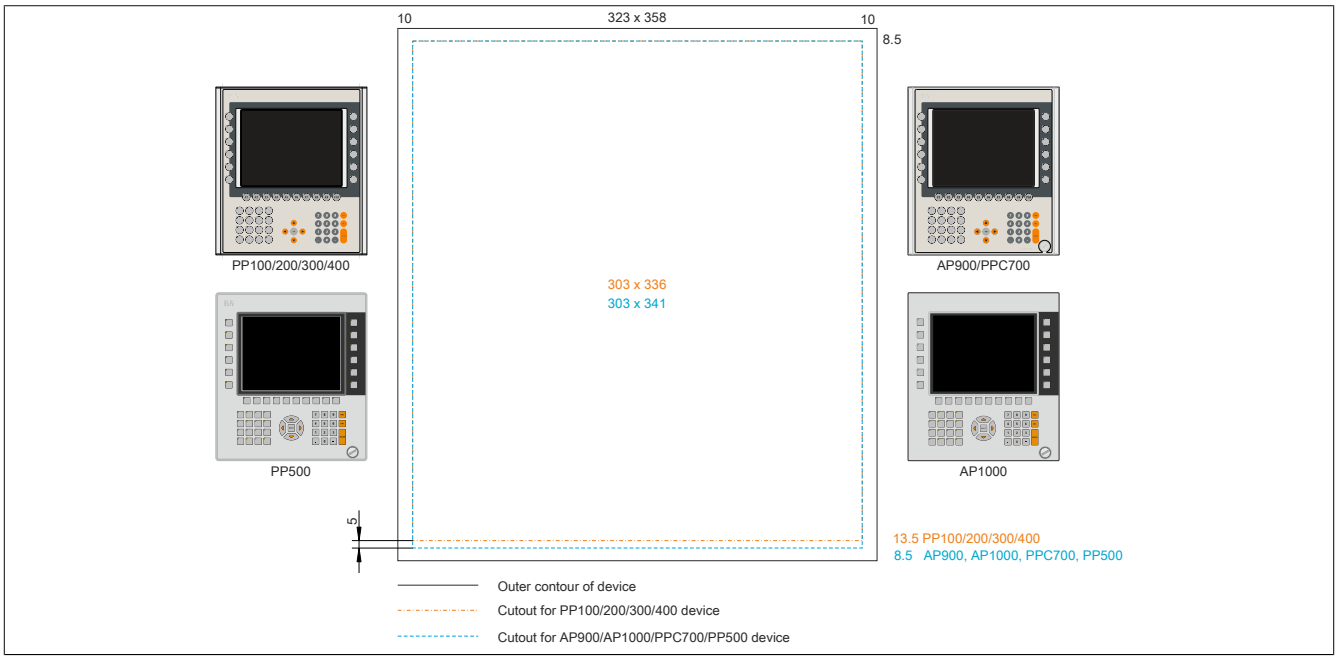


Figure 4: Installation compatibility - 10.4" devices - Portrait1

10.4" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices are not 100% compatible with Power Panel 300/400 or Power Panel 100/200 devices in Portrait1 format. Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices need a cutout that is 5 mm larger (bottom edge).

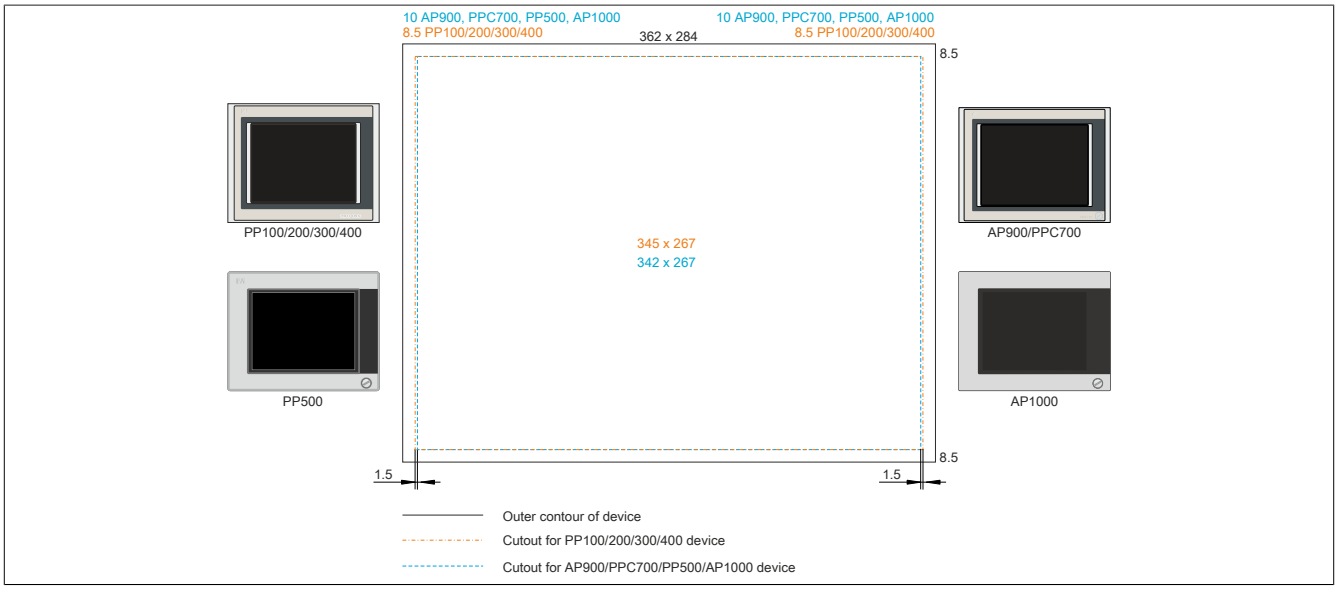
The larger cutout can be used conditionally for all devices:

- During installation, it is important to ensure that the PP100/200/300/400 devices are positioned and installed as centrally as possible in the cutout. If this is not the case, the retaining clips can no longer grip and impermeability is no longer ensured by the circumferential cord gasket (IP65).

H.2.4 12.1" devices

The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 12.1" devices - Landscape1



12.1" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices are not 100% compatible with Power Panel 300/400 or Power Panel 100/200 devices in Landscape1 format. Power Panel 300/400 and Power Panel 100/200 devices need a cutout that is 1.5 mm wider (left and right).

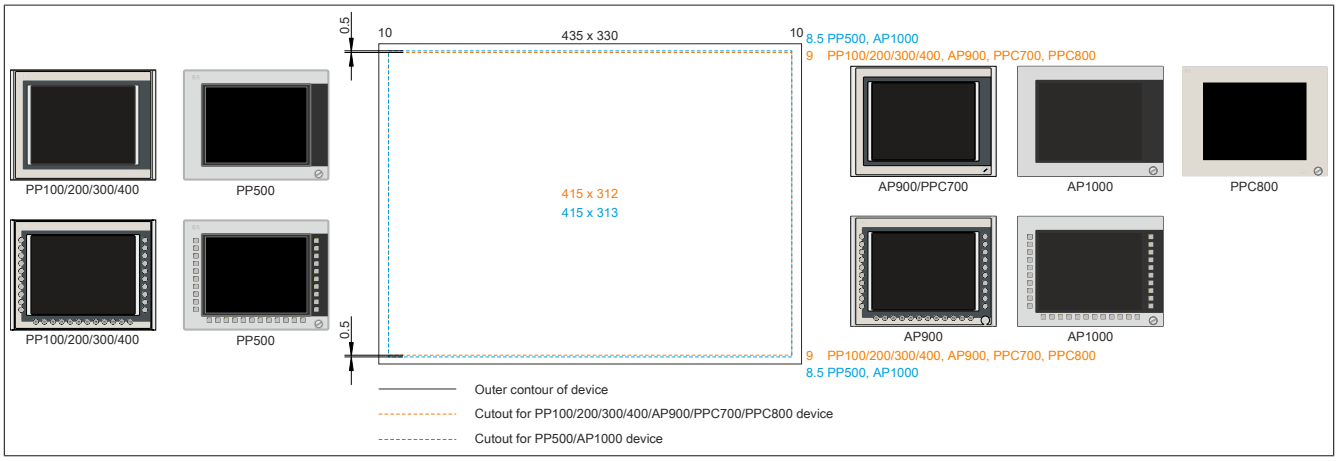
The larger cutout can be used conditionally for all devices:

- During installation, it is important to ensure that the AP1000, AP900, PPC700 and PP500 devices are positioned and installed as centrally as possible in the cutout.

H.2.5 15" devices

The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 15" devices - Landscape1

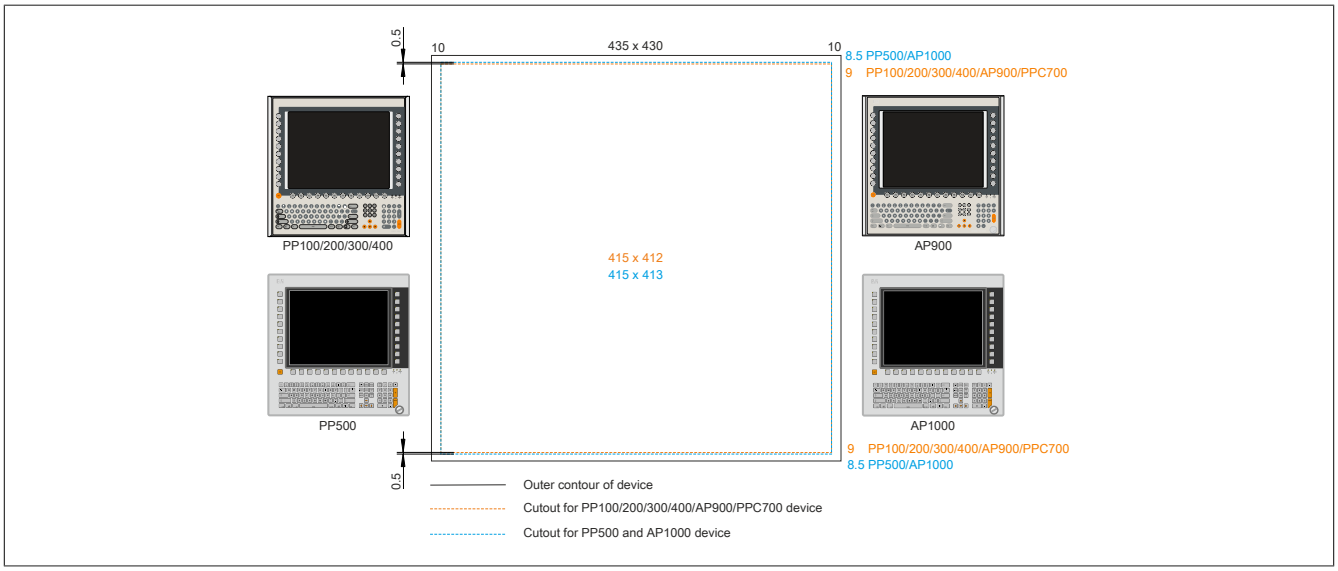


15" Automation Panel 1000 and Power Panel 500 devices are not 100% compatible with Power Panel 100/200, Power Panel 300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 devices in Landscape1 format. Automation Panel 1000 and Power Panel 500 devices need a cutout that is 0.5 mm larger (top and bottom edge).

The larger cutout can be used conditionally for all devices:

- During installation, it is important to ensure that the PP100/200, PP300/400, AP900, PPC700 and PPC800 devices are positioned and installed as centrally as possible in the cutout. If this is not the case, the retaining clips can no longer grip and impermeability is no longer ensured by the circumferential cord gasket (IP65).

Installation compatibility - 15" devices - Portrait1



15" Automation Panel 1000 and Power Panel 500 devices are not 100% compatible with Power Panel 100/200, Power Panel 300/400, Automation Panel 900 and Panel PC 700 devices in Portrait1 format. Automation Panel 1000 and Power Panel 500 devices need a cutout that is 0.5 mm larger (top and bottom edge).

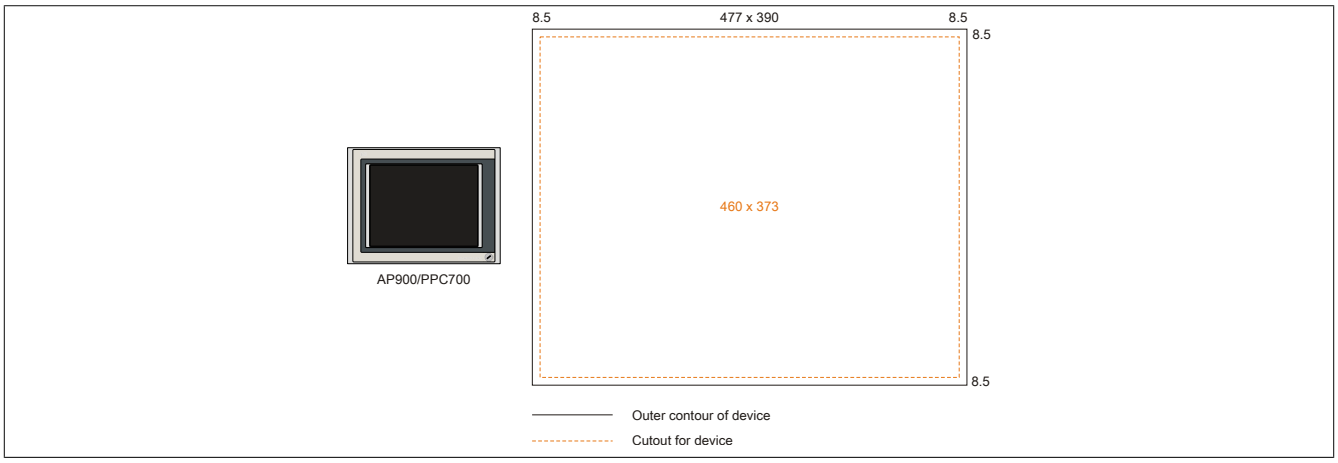
The larger cutout can be used conditionally for all devices:

- During installation, it is important to ensure that the PP100/200, PP300/400, AP900 and PPC700 devices are positioned and installed as centrally as possible in the cutout. If this is not the case, the retaining clips can no longer grip and impermeability is no longer ensured by the circumferential cord gasket (IP65).

H.2.6 17" devices

The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 17" devices - Landscape1

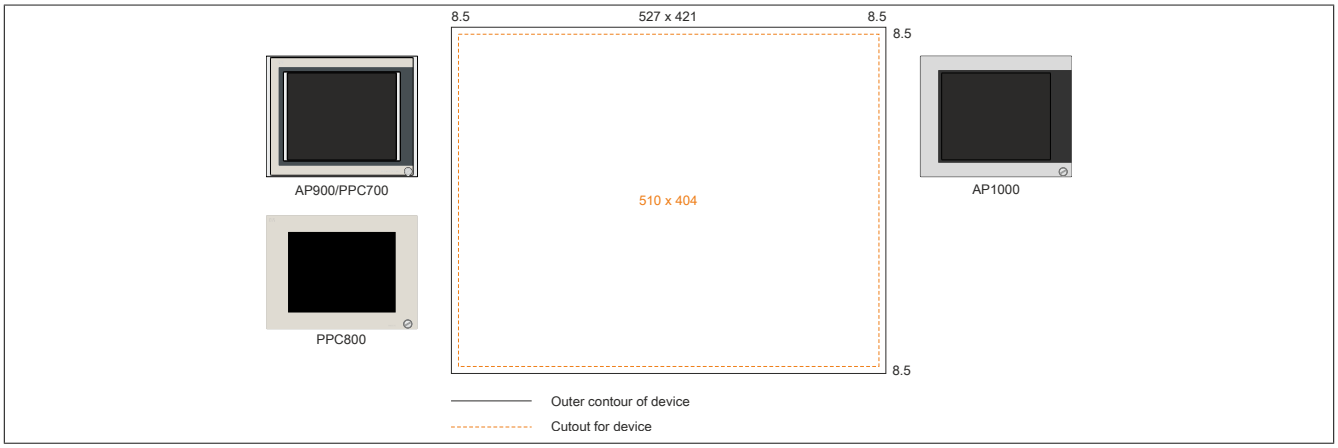


The 17" Automation Panel 900 and Panel PC 700 in Landscape1 format are 100% compatible.

H.2.7 19" devices

The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 19" devices - Landscape1



The 19" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Panel PC 800 in Landscape1 format are 100% compatible.

H.2.8 21.3" devices

The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 21.3" devices - Landscape1