Panel PC 2100
Panel mount devices

User's manual

Version: **2.02 (July 2024)**
Order no.: **MAPPC2100-ENG**

Translation of the original documentation

Publishing information

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1 Introduction

Information:

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

1.1 Manual history

Version	Date	Changes[1)]
2.02	July 2024	Updated the following sections: • "Device interfaces - Overview" on page 47 • "Ethernet interfaces" on page 49 • "System units" on page 59 • "Touch screen calibration" on page 187
2.01	June 2024	• Name change from "B&R Linux" to "Linux for B&R". • Updated the following sections: ° "USB interfaces" on page 50 ° "Known problems / Characteristics" on page 189 ° "BIOS options" on page 190 ° "Operating systems" on page 224 ° "International and national certifications" on page 254 • Updated the following sections: ° "Order number key" on page 22 ° "5ACCIF01.IS00-000" on page 166 ° "Firmware upgrade with Automation Runtime" on page 222
2.00	January 2022	• Updated the following panels: ° "5AP1130.101D-000" on page 88 ° "5AP1130.121E-010" on page 111 ° "5AP1130.156C-001" on page 125 • Updated the following sections: ° "General safety guidelines" on page 14 ° "Software" on page 190 ° "USB hub" on page 270 and "Installing the USB hub" on page 179 ° "Accessories" on page 265 • EN 60950 replaced by IEC 61010-2-201. • "CFast cards", "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 132 and "Appendix A" on page 275.
1.17	2018-06-22	Updated section "Network stack" on page 207.
1.16	2018-06-20	• Documented interface option "5ACCIF01.FSS0-000" on page 159. • Updated entire chapter "Technical data". • Updated the following sections: ° "Configuration" on page 20 ° Important information for installation/commissioning ° "Installing the Automation Panel 1000 with clamping blocks" on page 175 ° "Grounding concept - Functional ground" on page 180 ° "Known problems / Characteristics" on page 189 ° "BIOS options" on page 190 ° "Multi-touch drivers" on page 223 ° "Linux for B&R 8 (GNU/Linux)" on page 241 ° "UL certification" on page 255 ° "DNV certification " on page 256 ° "Maintenance" on page 251 ° "Repairs/Complaints and replacement parts" on page 253 ° "Chemical resistance" on page 278 • Updated the following sections: ° "Linux for B&R 9 (GNU/Linux)" on page 243 ° "Windows 10 IoT Enterprise 2016 LTSB" on page 224 ° "B&R Hypervisor" on page 239 ° "mapp Technology" on page 240
1.15	2017-04-25	• Renamed "display units" to "panels". • Updated 4-port USB hub "5ACCUSB4.0000-000" on page 270. • Updated installation of 4-port USB hub, see "Installing the USB hub" on page 179. • Updated section "Multi-touch drivers" on page 223. • Updated section "+24 VDC power supply" on page 48. • Updating chapter 9 "International and national certifications". • Documented configuration option for XHCI controller, see "USB configuration" on page 209. • Updated the following panels: ° "5AP1130.0702-000" on page 86 ° "5AP1130.101E-000" on page 92

Version	Date	Changes[1)]
		◦ "5AP1130.121E-000" on page 109 ◦ "5AP1130.156C-000" on page 123 ◦ "5AP1130.185C-000" on page 127 • Documented system unit 5PPC2100.BY48-000 on page 59. • Documented interface option "5ACCIF01.FPCS-000" on page 137. • Updated data in sections "Mechanical properties", "Environmental properties" and "Electrical properties". • Updated section "Touch screen" with "Touch screen (multi-touch generation 2)" and "Touch screen (multi-touch generation 3)". • Updated CFast card 5CFAST.256G-10, see "CFast cards" on page 168.

1) Editorial changes 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.

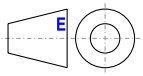
Signal word	Description
Danger!	Failure to observe these safety guidelines and notices will result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Caution!	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, specifications in dimension diagrams and associated tables are in millimeters [mm].

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 About this user's manual

This user's manual contains all relevant information about an operational Panel PC 2100 cabinet-mounted device.

Information:

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

3.2 Description of individual modules

3.2.1 System units

System units consist of a CPU board and aluminum housing. They include all of the interfaces and main memory on PPC2100 devices in addition to interface option and CFast card connections. Main memory is permanently built into the system unit and cannot be replaced.

If a system unit is installed on a panel, the result is an operational Panel PC 2100. Panel PC 2100 systems are mounted using retaining clips.

A system unit cannot function without a panel.

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 Design/Configuration

Automation Panel 9x3, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 systems can be assembled to meet individual requirements and operating conditions. Automation Panel 9x3, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 systems are flexible so that an Automation Panel can be converted to a Panel PC or vice versa.

3.3.1 Configuration

The following individual components are required for operation as a Panel PC 2100:

- 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
5PPC2100.BY01-000	Intel Atom E3815	1460 MHz	1	DDR3 SDRAM	1 GB
5PPC2100.BY11-000	Intel Atom E3825	1330 MHz	2	DDR3 SDRAM	1 GB
5PPC2100.BY22-000	Intel Atom E3826	1460 MHz	2	DDR3 SDRAM	2 GB
5PPC2100.BY34-000	Intel Atom E3827	1750 MHz	2	DDR3 SDRAM	4 GB
5PPC2100.BY44-000	Intel Atom E3845	1910 MHz	4	DDR3 SDRAM	4 GB
5PPC2100.BY48-000	Intel Atom E3845	1910 MHz	4	DDR3 SDRAM	8 GB

Mass storage devices

CFast cards — Select 1.

5CFAST.2048-00 ≥ E0	5CFAST.032G-10
5CFAST.4096-00 ≥ E0	5CFAST.064G-10
5CFAST.8192-00 ≥ E0	5CFAST.128G-10
5CFAST.016G-00 ≥ E0	5CFAST-256G-10
5CFAST.032G-00 ≥ E0	

Accessories and software - Configuration

Interfaces

Interface options — Optional, select 1.

5ACCIF01.FPCC-000	5ACCIF01.FPLK-000
5ACCIF01.FPLS-000	5ACCIF01.FPLS-001
5ACCIF01.FPSC-000	5ACCIF01.FPSC-001
5ACCIF01.FPCS-000	5ACCIF01.FSS0-000
5ACCIF01.ICAN-000	5ACCIF01.IS00-000

<table>
<tr><td>USB accessories</td><td colspan="3">Optional selection</td></tr>
<tr><td></td><td colspan="3">5MMUSB.2048-01
5MMUSB.4096-01
5MMUSB.032G-02</td></tr>
<tr><td>USB hub</td><td colspan="3">Optional selection</td></tr>
<tr><td>  </td><td colspan="3">5ACCUSB4.0000-000</td></tr>
<tr><td>Terminal blocks</td><td colspan="3">Select 1.</td></tr>
<tr><td>  </td><td>Power supply connectors
0TB103.9
0TB103.91</td><td colspan="2">Terminal block for IF option
0TB1210.3100</td></tr>
<tr><td>Operating systems</td><td colspan="3">Select 1.</td></tr>
<tr><td>  </td><td>Windows 7
5SWWI7.1100-ENG
5SWWI7.1100-GER
5SWWI7.1300-MUL
5SWWI7.1200-ENG
5SWWI7.1200-GER
5SWWI7.1400-MUL
Windows Embedded Standard 7
5SWWI7.1543-ENG
5SWWI7.1643-ENG
5SWWI7.1743-MUL
5SWWI7.1843-MUL</td><td>Windows Embedded 8.1 Industry
5SWWI8.0343-MUL
5SWWI8.0443-MUL
Windows 10
5SWW10.0243-MUL
5SWW10.0543-MUL
Linux for B&R 8
5SWLIN.0543-MUL
5SWLIN.0643-MUL</td><td>Automation Runtime
0TG1000.01
0TG1000.02
1TG4600.10-5
1TG4601.06-5
1TG4601.06-T
Linux for B&R 9
5SWLIN.0743-MUL</td></tr>
</table>

3.3.2 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 2100

3.4 Overview

Order number	Short description	Page
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin, female - Screw clamp terminal block 3.31 mm²	267
0TB103.91	Connector 24 VDC - 3-pin, female - Cage clamp terminal block 3.31 mm²	267
5ACCUSB4.0000-000	USB hub 4x passive - For APC2100/PPC2100	270
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	250
	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	132
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	137
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	141
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	144
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	147
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	150
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	154
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	159
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	163
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	166
	Linux for B&R 8	
5SWLIN.0543-MUL	Linux for B&R 8 - 32-bit - Multilingual - PPC2100 Bay Trail chipset - Installation - Only available with a new device	241
5SWLIN.0643-MUL	Linux for B&R 8 - 64-bit - Multilingual - PPC2100 Bay Trail chipset - Installation - Only available with a new device	241
	Linux for B&R 9	
5SWLIN.0743-MUL	Linux for B&R 9 - 64-bit - Multilingual - PPC2100 Bay Trail chipset - Installation - Only available with a new device	243
	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	266
	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	78
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	84
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	90
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	94
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	105
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	107
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	113
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	120
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	129
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	86
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	88
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	92
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	111
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	123
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	125
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	127

Order number	Short description	Page
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	81
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	96
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	115
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	99
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	117
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	102
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	62
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	64
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	66
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	69
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	71
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	73
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	75
	System units	
5PPC2100.BY01-000	PPC2100 system unit - Intel Atom E3815 1.46 GHz - Single core - 1 GB SDRAM - For Automation Panel 923/933/1000	59
5PPC2100.BY11-000	PPC2100 system unit - Intel Atom E3825 1.33 GHz - Dual core - 1 GB SDRAM - For Automation Panel 923/933/1000	59
5PPC2100.BY22-000	PPC2100 system unit - Intel Atom E3826 1.46 GHz - Dual core - 2 GB SDRAM - For Automation Panel 923/933/1000	59
5PPC2100.BY34-000	PPC2100 system unit - Intel Atom E3827 1.75 GHz - Dual core - 4 GB SDRAM - For Automation Panel 923/933/1000	59
5PPC2100.BY44-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 4 GB SDRAM - For Automation Panel 923/933/1000	59
5PPC2100.BY48-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 8 GB SDRAM - For Automation Panel 923/933/1000	59
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	237
0TG1000.02	Technology Guard (HID)	237
1TG4600.10-5	Automation Runtime Windows TG license	237
1TG4601.06-5	Automation Runtime Embedded, TG license	237
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	237
	Terminal blocks	
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	268
	Windows 10 IoT Enterprise 2015 LTSB	
5SWW10.0243-MUL	Windows 10 IoT Enterprise 2015 LTSB - 64-bit - Multilingual - PPC2100 chipset Bay Trail - License (without Recovery DVD) - Only available with a new device	227
	Windows 10 IoT Enterprise 2016 LTSB	
5SWW10.0543-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2100 chipset Bay Trail - CPU E3826/E3827/E3845 - License - Only available with a new device	224
	Windows 7 Professional/Ultimate	
5SWWI7.1100-ENG	Windows 7 Professional SP1 - 32-bit - English - DVD	233
5SWWI7.1100-GER	Windows 7 Professional SP1 - 32-bit - German - DVD	233
5SWWI7.1200-ENG	Windows 7 Professional SP1 - 64-bit - English - DVD	233
5SWWI7.1200-GER	Windows 7 Professional SP1 - 64-bit - German - DVD	233
5SWWI7.1300-MUL	Windows 7 Ultimate SP1 - 32-bit - Multilingual - DVD	233
5SWWI7.1400-MUL	Windows 7 Ultimate SP1 - 64-bit - Multilingual - DVD	233
	Windows Embedded 8.1 Industry Pro	
5SWWI8.0343-MUL	Windows Embedded 8.1 Industry Pro - 32-bit - Multilingual - For the PPC2100 - License	230
5SWWI8.0443-MUL	Windows Embedded 8.1 Industry Pro - 64-bit - Multilingual - For the PPC2100 - License	230
	Windows Embedded Standard 7	
5SWWI7.1543-ENG	Windows Embedded Standard 7 SP1 - 32-bit - Service Pack 1 - English - PPC2100 - License (without Recovery DVD) - Only available with a new device	235
5SWWI7.1643-ENG	Windows Embedded Standard 7 SP1 - 64-bit - Service Pack 1 - English - PPC2100 - License (without Recovery DVD) - Only available with a new device	235
5SWWI7.1743-MUL	Windows Embedded Standard 7 Premium SP1 - 32-bit - Service Pack 1 - Multilingual - PPC2100 - License (without Recovery DVD) - Only available with a new device	235
5SWWI7.1843-MUL	Windows Embedded Standard 7 Premium SP1 - 64-bit - Service Pack 1 - Multilingual - PPC2100 - License (without Recovery DVD) - Only available with a new device	235

4 Technical data

4.1 Complete system

4.1.1 Mechanical properties

4.1.1.1 Dimensions

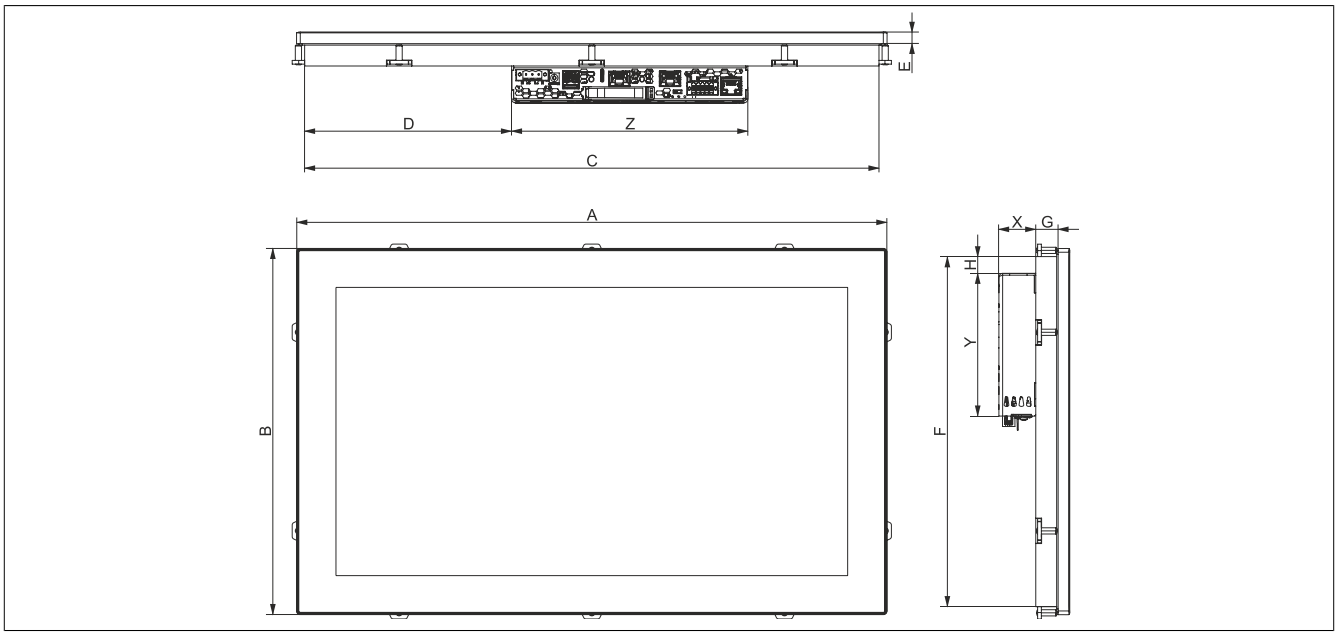
Information:

All dimensions, 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.

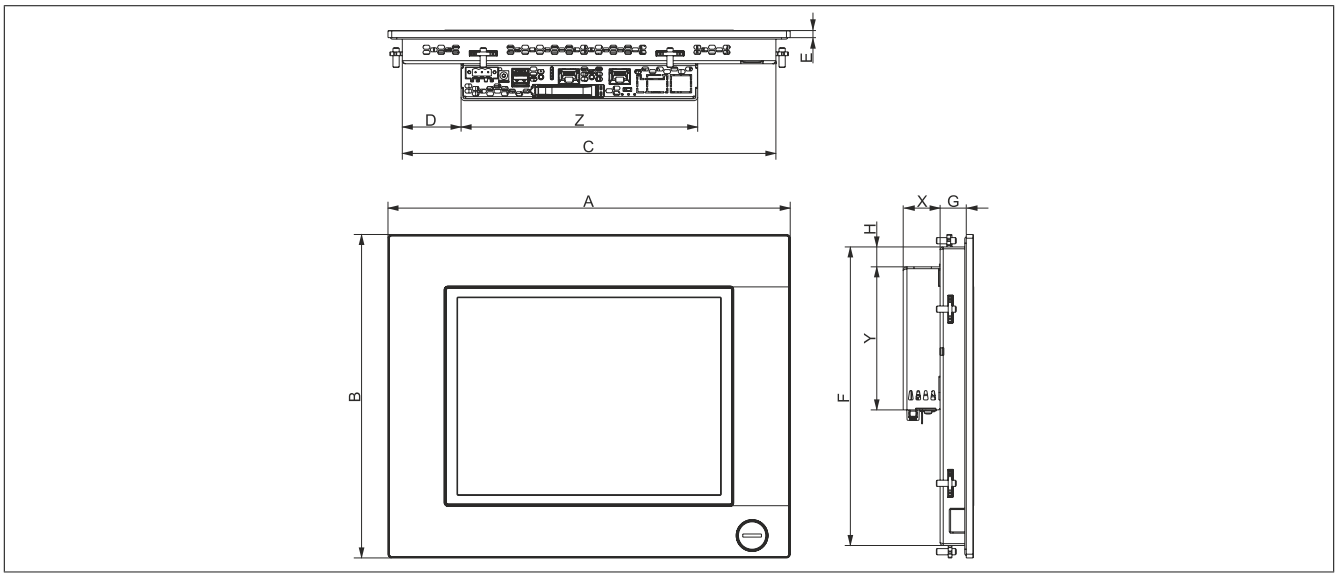
AP9x3 panels - Dimensions



Panels									
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
19.0" single-touch	5AP923.1906-00	440	358	427	149	9	345	23	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
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	

System units				
Type	**Order number**	**X**	**Y**	**Z**
System unit	5PPC2100.BYxx-000	29.7	115	190

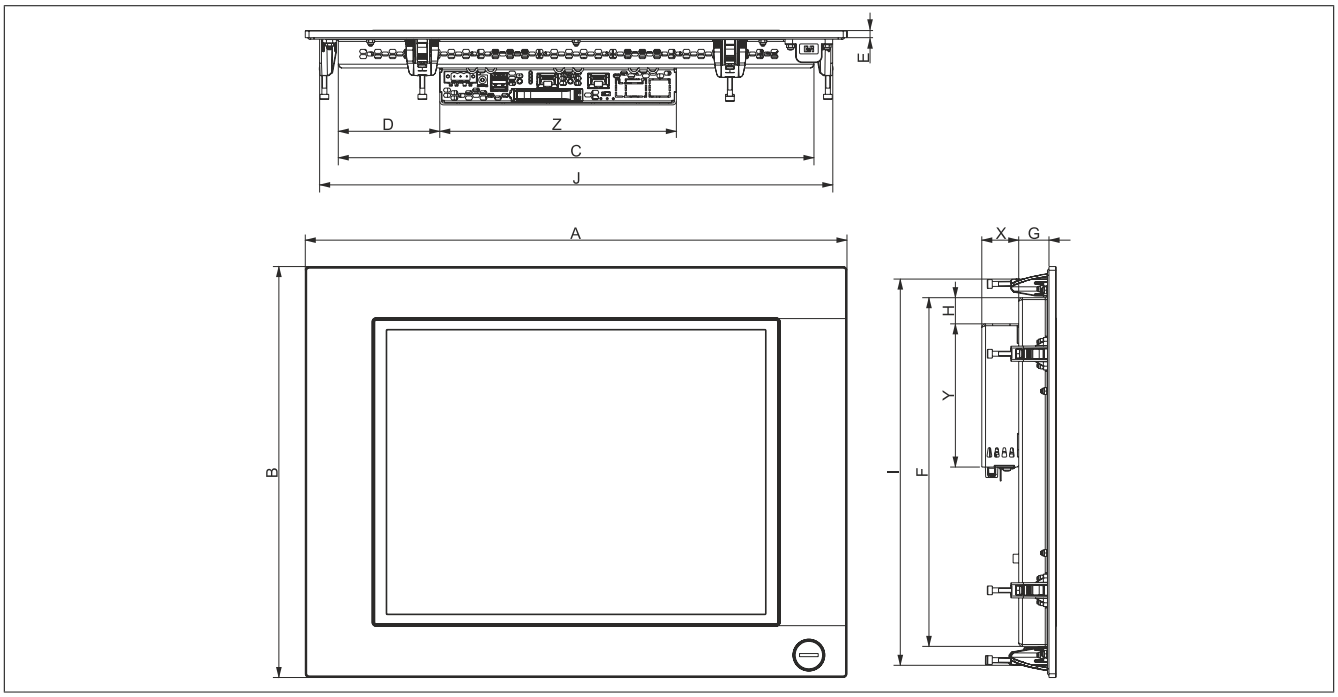
AP1000 panels with retaining clips - Dimensions



Panels									
Type	**Order 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 keys	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
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

System units				
Type	**Order number**	**X**	**Y**	**Z**
System unit	5PPC2100.BYxx-000	29.7	115	190

AP1000 panels with clamping blocks - Dimensions



Panels											
Type	**Order 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	330	382	81.5	5.7	280	24.3	24	310	412
19.0" single-touch	5AP1120.1906-000	527	421	445	186.5	5.7	351	23.3	19.3	401	507

System units				
Type	**Order number**	**X**	**Y**	**Z**
System unit	5PPC2100.BYxx-000	29.7	115	190

4.1.1.2 Mounting orientations

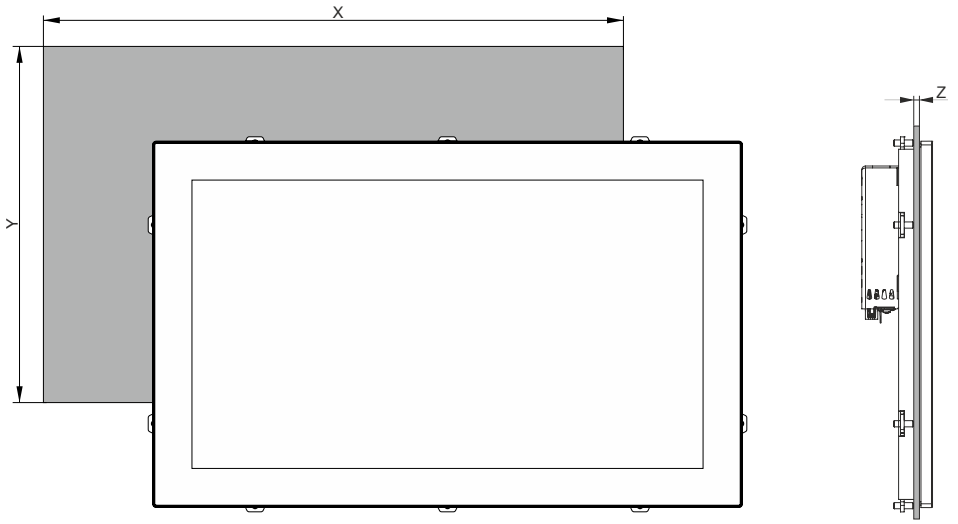
Information:

When installing the Panel PC 2100, spacing for air circulation and additional free space for operating and servicing the device must be taken into account.

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

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

AP9x3 panels - Installation diagrams

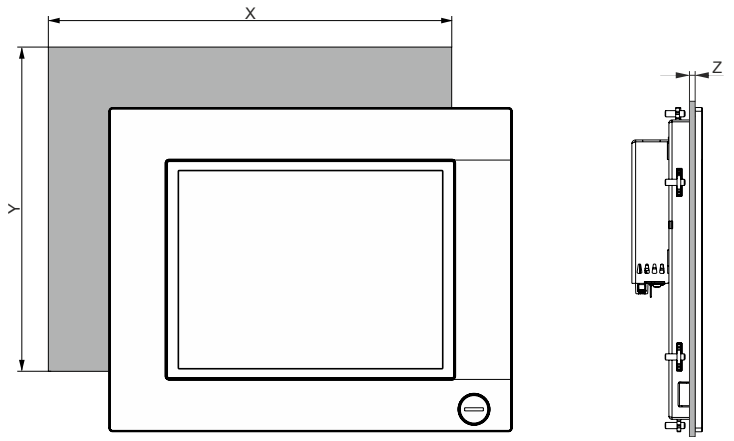


Panels						
Type	**Model number**	**X**	**Y**	**Z min.**	**Z max.**	**Number of retaining clips**
12.1" single-touch	5AP923.1215-00	304	228	1	6	10
15.0" single-touch	5AP923.1505-00	359	277	1	6	10
19.0" single-touch	5AP923.1906-00	429	347	1	6	12
15.6" multi-touch	5AP933.156B-00	403	247.5	1	6	10
18.5" 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

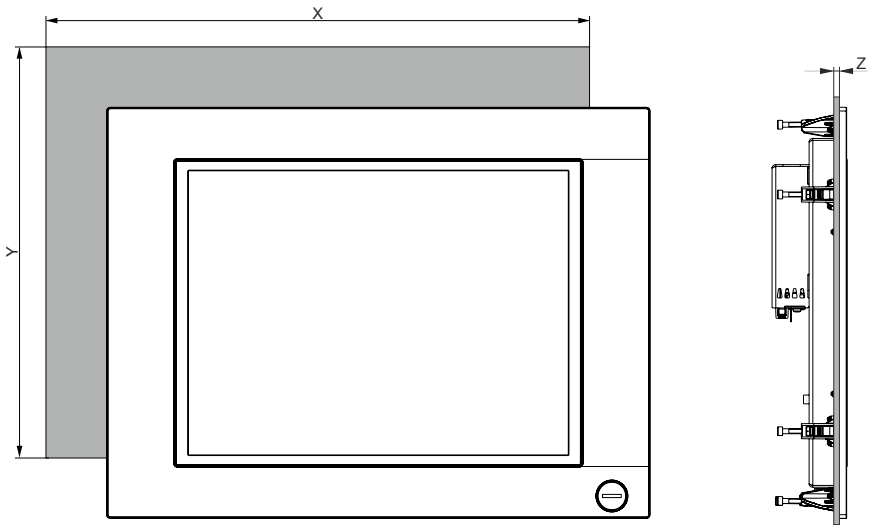
Dimension "Z" describes the thickness of the wall or control cabinet plate.

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.

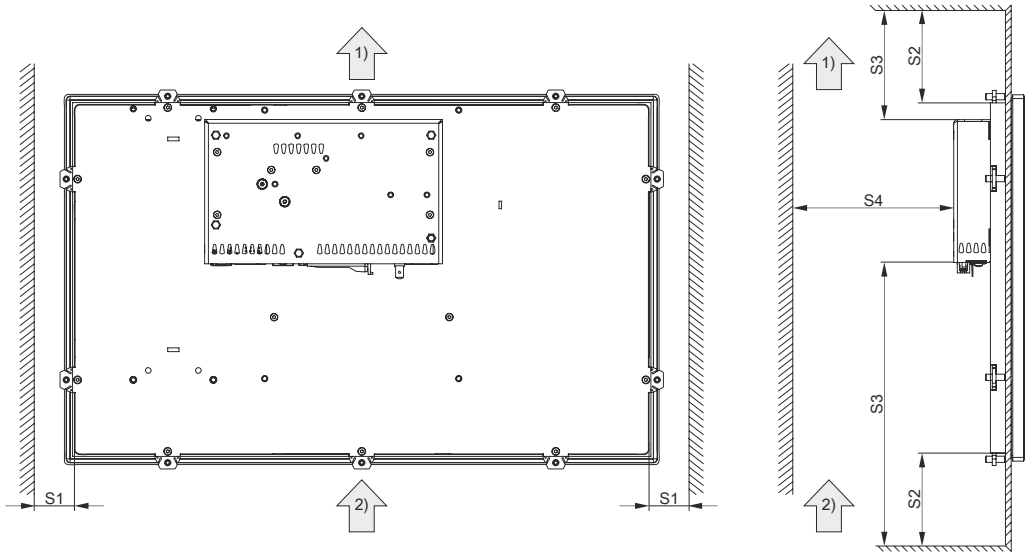
4.1.1.3 Spacing for air circulation

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 intake and outlet are indicated in the following image. The air intake is located on the bottom to accommodate the rising warm air.



Legend			
1)	Air outlet	2)	Air inlet

Name	Dimension	Name	Dimension
S1	≥20	S2	≥50
S3	≥100	S4	≥50

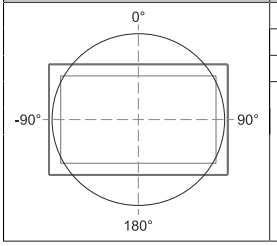
Caution!

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 spacing specifications for air circulation cannot be observed, then the maximum specified temperatures for the temperature sensors (see "Temperature sensor positions" on page 41) must be monitored by the user and appropriate measures taken if they are exceeded.

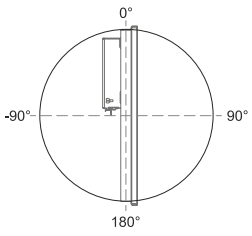
4.1.1.4 Mounting orientations

The following figures show the specified mounting orientations of Panel PC 2100 devices. A PPC2100 is only permitted to be installed as shown and described below.



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

-



Inclination [°]	Derating
0	No limitation
Up to +90	-10
Up to -45	-5
Up to -90	-10
180	-5

-

During installation, it is important to make sure that the spacing as described in section "Spacing for air circulation" on page 31 is observed in order to achieve natural air circulation.

4.1.1.5 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	4850
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	5PPC2100.BYxx-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

4.1.2 Environmental properties

4.1.2.1 Temperature specifications

Various system units can be combined with a panel. The many different configurations possible result in varying minimum, maximum and typical ambient temperatures, which can be seen in the following tables in this section.

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 B&R Control Center, for example).

Information regarding worst-case conditions

- Thermal Analysis Tool (TAT V4.3.4.13.01) from Intel for simulating a 100% processor load
- BurnInTest tool (BurnInTest V7.0 Pro from PassMark Software) for simulating a 100% load on the interface using loopback adapters (USB interfaces)
- Maximum system expansion and power consumption

4.1.2.1.1 Maximum ambient temperature for worst-case operation

All specifications apply to non-condensing operation.

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Maximum ambient temperature (system unit 5PPC2100.BYxx-000)**					
The respective ambient temperature is derated approx. 1°C per 1000 meters starting at 500 m above sea level.		**5PPC2100. BY01-000** (E3930 1.3 GHz)	**5PPC2100. BY11-000** (E3930 1.3 GHz)	**5PPC2100. BY22-000** (E3940 1.6 GHz)	**5PPC2100. BY34-000** (E3940 1.6 GHz)	**5PPC2100. BY44-000** (E3845 1,91 GHz)	**5PPC2100. BY48-000** (E3845 1.91 GHz)
		55	**55**	**55**	**50**	**50**	**50**
Maximum ambient temperature (accessories)							
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓	✓	✓
	5AP923.1906-00 ≤ D0	50	50	50	✓	✓	✓
	5AP923.1906-00 ≥ E0	✓	✓	✓	✓	✓	✓
	5AP933.156B-00 ≤ C0	50	50	50	✓	✓	✓
	5AP933.156B-00 ≥ D0	✓	✓	✓	✓	✓	✓
	5AP933.185B-00	50	50	50	✓	✓	✓
	5AP933.215C-00 ≤ C0	40	40	40	40	40	40
	5AP933.215C-00 ≥ D0	50	50	50	✓	✓	✓
	5AP933.240C-00 ≤ C0	40	40	40	40	40	40
	5AP933.240C-00 ≥ D0	✓	✓	✓	✓	✓	✓
AP1000 panels	5AP1120.0573-000	✓	✓	✓	✓	✓	✓
	5AP1151.0573-000	✓	✓	✓	✓	✓	✓
	5AP1120.0702-000	✓	✓	✓	✓	✓	✓
	5AP1130.0702-000	✓	✓	✓	✓	✓	✓
	5AP1130.101D-000	✓	✓	✓	✓	✓	✓
	5AP1120.101E-000	✓	✓	✓	✓	✓	✓
	5AP1130.101E-000	✓	✓	✓	✓	✓	✓
	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	50	45	45	45
	5AP1120.1505-000	✓	✓	✓	✓	✓	✓
	5AP1180.1505-000	✓	✓	✓	✓	✓	✓
	5AP1181.1505-000	✓	✓	✓	✓	✓	✓
	5AP1120.156B-000	✓	✓	✓	✓	✓	✓
	5AP1130.156C-000	50	50	50	45	45	45
	5AP1130.156C-001	50	50	50	45	45	45
	5AP1130.185C-000	50	50	50	45	45	45
	5AP1120.1906-000	✓	✓	✓	✓	✓	✓
CFast cards	5CFAST.xxxx-00 ≥ Rev. E0	✓	✓	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓	✓	✓
Interface options	5ACCIF01.FPCC-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPCS-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLK-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLS-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLS-001	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPSC-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPSC-001	✓	✓	✓	✓	✓	✓
	5ACCIF01.FSS0-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.IS00-000	✓	✓	✓	✓	✓	✓

4.1.2.1.2 Minimum ambient temperature for worst-case operation

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Minimum ambient temperature (system unit 5PPC2100.BYxx-000)**					
		5PPC2100. BY01-000 (E3815 1.46 GHz)	**5PPC2100. BY11-000** (E3825 1.33 GHz)	**5PPC2100. BY22-000** (E3826 1.46 GHz)	**5PPC2100. BY34-000** (E3927 1.75 GHz)	**5PPC2100. BY44-000** (E3845 1.91 GHz)	**5PPC2100. BY48-000** (E3845 1.91 GHz)
		-20	**-20**	**-20**	**-20**	**-20**	**-20**
Minimum ambient temperature (accessories)							
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓	✓	✓
	5AP923.1906-00 ≤ D0	0	0	0	0	0	0
	5AP923.1906-00 ≥ E0	✓	✓	✓	✓	✓	✓
	5AP933.156B-00 ≤ C0	0	0	0	0	0	0
	5AP933.156B-00 ≥ D0	-10	-10	-10	-10	-10	-10
	5AP933.185B-00	0	0	0	0	0	0
	5AP933.215C-00	0	0	0	0	0	0
	5AP933.240C-00 ≤ C0	0	0	0	0	0	0
	5AP933.240C-00 ≥ D0	-10	-10	-10	-10	-10	-10
AP1000 panels	5AP1120.0573-000	-10	-10	-10	-10	-10	-10
	5AP1151.0573-000	0	0	0	0	0	0
	5AP1120.0702-000	✓	✓	✓	✓	✓	✓
	5AP1130.0702-000	-10	-10	-10	-10	-10	-10
	5AP1130.101D-000	-10	-10	-10	-10	-10	-10
	5AP1120.101E-000	✓	✓	✓	✓	✓	✓
	5AP1130.101E-000	-10	-10	-10	-10	-10	-10
	5AP1120.1043-000	✓	✓	✓	✓	✓	✓
	5AP1180.1043-000	✓	✓	✓	✓	✓	✓
	5AP1181.1043-000	✓	✓	✓	✓	✓	✓
	5AP1182.1043-000	✓	✓	✓	✓	✓	✓
	5AP1120.1214-000	✓	✓	✓	✓	✓	✓
	5AP1120.121E-000	✓	✓	✓	✓	✓	✓
	5AP1130.121E-000	-10	-10	-10	-10	-10	-10
	5AP1130.121E-010	-10	-10	-10	-10	-10	-10
	5AP1120.1505-000	✓	✓	✓	✓	✓	✓
	5AP1180.1505-000	✓	✓	✓	✓	✓	✓
	5AP1181.1505-000	✓	✓	✓	✓	✓	✓
	5AP1120.156B-000	✓	✓	✓	✓	✓	✓
	5AP1130.156C-000	-10	-10	-10	-10	-10	-10
	5AP1130.156C-001	-10	-10	-10	-10	-10	-10
	5AP1130.185C-000	-10	-10	-10	-10	-10	-10
	5AP1120.1906-000	✓	✓	✓	✓	✓	✓
CFast cards	5CFAST.xxxx-00 ≥ Rev. E0	✓	✓	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓	✓	✓
Interface options	5ACCIF01.FPCC-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPCS-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLK-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLS-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLS-001	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPSC-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPSC-001	✓	✓	✓	✓	✓	✓
	5ACCIF01.FSS0-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.IS00-000	✓	✓	✓	✓	✓	✓

4.1.2.1.3 Maximum ambient temperature for typical operation

Information regarding typical conditions

- The total power of all system unit USB interfaces is limited to 1 W.
- 2x Gigabit Ethernet
- No permanent 100% processor load and graphics load
- The power consumption of the entire system is limited to 45 W. For information about the power consumption of individual components, see 4.1.3.2 "Power calculation".

All temperature specifications in degrees Celsius [°C] at 500 m above sea level, **non-condensing**.		**Maximum ambient temperature for typical operation (system unit 5PPC2100.BYxx-000)**					
The respective ambient temperature is derated approx. 1°C per 1000 meters starting at 500 m above sea level.		**5PPC2100.BY01-000** (E3815 1.46 GHz)	**5PPC2100.BY11-000** (E3825 1.33 GHz)	**5PPC2100.BY22-000** (E3826 1.46 GHz)	**5PPC2100.BY34-000** (E3827 1.75 GHz)	**5PPC2100.BY44-000** (E3845 1.91 GHz)	**5PPC2100.BY48-000** (E3845 1.91 GHz)
		60	**60**	**60**	**55**	**55**	**55**
Maximum ambient temperature (accessories)							
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓	✓	✓
	5AP923.1906-00 ≤ D0	50	50	50	50	50	50
	5AP923.1906-00 ≥ E0	55	55	55	✓	✓	✓
	5AP933.156B-00 ≤ C0	50	50	50	50	50	50
	5AP933.156B-00 ≥ D0	55	55	55	✓	✓	✓
	5AP933.185B-00	50	50	50	50	50	50
	5AP933.215C-00 ≤ C0	40	40	40	40	40	40
	5AP933.215C-00 ≥ D0	50	50	50	50	50	50
	5AP933.240C-00 ≤ C0	40	40	40	40	40	40
	5AP933.240C-00 ≥ D0	55	55	55	✓	✓	✓
AP1000 panels	5AP1120.0573-000	55	55	55	✓	✓	✓
	5AP1151.0573-000	55	55	55	✓	✓	✓
	5AP1120.0702-000	✓	✓	✓	✓	✓	✓
	5AP1130.0702-000	55	55	55	✓	✓	✓
	5AP1130.101D-000	55	55	55	✓	✓	✓
	5AP1120.101E-000	55	55	55	✓	✓	✓
	5AP1130.101E-000	55	55	55	✓	✓	✓
	5AP1120.1043-000	✓	✓	✓	✓	✓	✓
	5AP1180.1043-000	✓	✓	✓	✓	✓	✓
	5AP1181.1043-000	✓	✓	✓	✓	✓	✓
	5AP1182.1043-000	✓	✓	✓	✓	✓	✓
	5AP1120.1214-000	✓	✓	✓	✓	✓	✓
	5AP1120.121E-000	✓	✓	✓	✓	✓	✓
	5AP1130.121E-000	55	55	55	✓	✓	✓
	5AP1130.121E-010	55	55	55	50	50	50
	5AP1120.1505-000	✓	✓	✓	✓	✓	✓
	5AP1180.1505-000	✓	✓	✓	✓	✓	✓
	5AP1181.1505-000	✓	✓	✓	✓	✓	✓
	5AP1120.156B-000	55	55	55	✓	✓	✓
	5AP1130.156C-000	55	55	55	50	50	50
	5AP1130.156C-001	55	55	55	50	50	50
	5AP1130.185C-000	55	55	55	50	50	50
	5AP1120.1906-000	55	55	55	✓	✓	✓
CFast cards	5CFAST.xxxx-00 ≥ Rev. E0	55	55	55	✓	✓	✓
	5CFAST.xxxx-10	55	55	55	✓	✓	✓
Interface options	5ACCIF01.FPCC-000	✓	✓	✓	✓	✓	
	5ACCIF01.FPCS-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLK-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLS-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPLS-001	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPSC-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.FPSC-001	✓	✓	✓	✓	✓	✓
	5ACCIF01.FSS0-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.ICAN-000	✓	✓	✓	✓	✓	✓
	5ACCIF01.IS00-000	✓	✓	✓	✓	✓	✓

4.1.2.1.4 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 additional interface options and CFast cards are installed, these components can change the temperature limits of the PPC2100 system.
    - 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 Panel PC 2100. 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 regarding typical conditions" on page 37.

4.1.2.1.5 Ambient temperature during storage and transport

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

AP9x3 panels

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 panels

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

Component	Model number	Storage [°C]	Transport [°C]
System units	5PPC2100.BYxx-000	-20 to 60	-20 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

4.1.2.1.6 Temperature monitoring

Sensors monitor temperature values at various areas in the PPC2100. For the position of temperature sensors, see section "Temperature sensor positions" on page 41. The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.

These temperatures [2)] can be read in various ways in approved operating systems:

- BIOS
- 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[3)]. Various parameters (e.g. temperature) can be read out in approved Microsoft Windows or Linux for B&R operating systems.

[2)] The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.
[3)] Self-Monitoring, Analysis and Reporting Technology

4.1.2.1.7 Temperature sensor positions

ADI sensors	Position	Measurement point for	Measurement	Max. specified
Panel	A	Display	Temperature of the display (sensor integrated in panel).	5AP923.1215-00: 90°C 5AP923.1505-00: 90°C 5AP923.1906-00 ≤ D0: 75°C 5AP923.1906-00 ≥ E0: 80°C 5AP933.156B-00 ≤ C0: 75°C 5AP933.156B-00 ≥ D0: 80°C 5AP933.185B-00: 75°C 5AP933.215C-00: 80°C 5AP933.240C-00 ≤ C0: 75°C 5AP933.240C-00 ≥ D0: 80°C 5AP1120.0573-000: 80°C 5AP1151.0573-000: 80°C 5AP1120.0702-000: 85°C 5AP1130.0702-000: 85°C 5AP1120.101E-000: 80°C 5AP1130.101D-000: 80°C 5AP1130.101E-000: 80°C 5AP1120.1043-000: 90°C 5AP1180.1043-000: 90°C 5AP1181.1043-000: 90°C 5AP1182.1043-000: 90°C 5AP1120.1214-000: 80°C 5AP1120.121E-000: 80°C 5AP1130.121E-000: 80°C 5AP1130.121E-010: 80°C 5AP1120.1505-000: 90°C 5AP1180.1505-000: 90°C 5AP1120.156B-000: 80°C 5AP1130.156C-000: 80°C 5AP1130.156C-001: 80°C 5AP1130.185C-000: 80°C 5AP1120.1906-000: 80°C 5AP1181.1505-000: 90°C
System unit sensor 2	B	CPU	Temperature of the processor area (sensor integrated on the CPU board)	95°C
System unit sensor 1	C	Main memory	Temperature of the main memory area (sensor integrated on the CPU board)	95°C

4.1.2.2 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 panels

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 panels

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	5PPC2100.BYxx-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.FSS0-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.ICAN-000	5 to 90	5 to 95	5 to 95
	5ACCIF01.IS00-000	5 to 90	5 to 95	5 to 95

4.1.2.3 Vibration

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

Panel PC	Operation[1]		Storage[1][2]	Transport[1][2]
	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

1) Testing is performed in accordance with EN 60068-2-6.
2) This value applies to a device in its original packaging.

4.1.2.4 Shock

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

Panel PC	Operation[1]	Storage[1][2]	Transport[1][2]
With CFast card	15 g, 11 ms	30 g, 6 ms	30 g, 6 ms

1) Testing is performed in accordance with EN 60068-2-27.
2) This value applies to a device in its original packaging.

4.1.2.5 Degree of protection

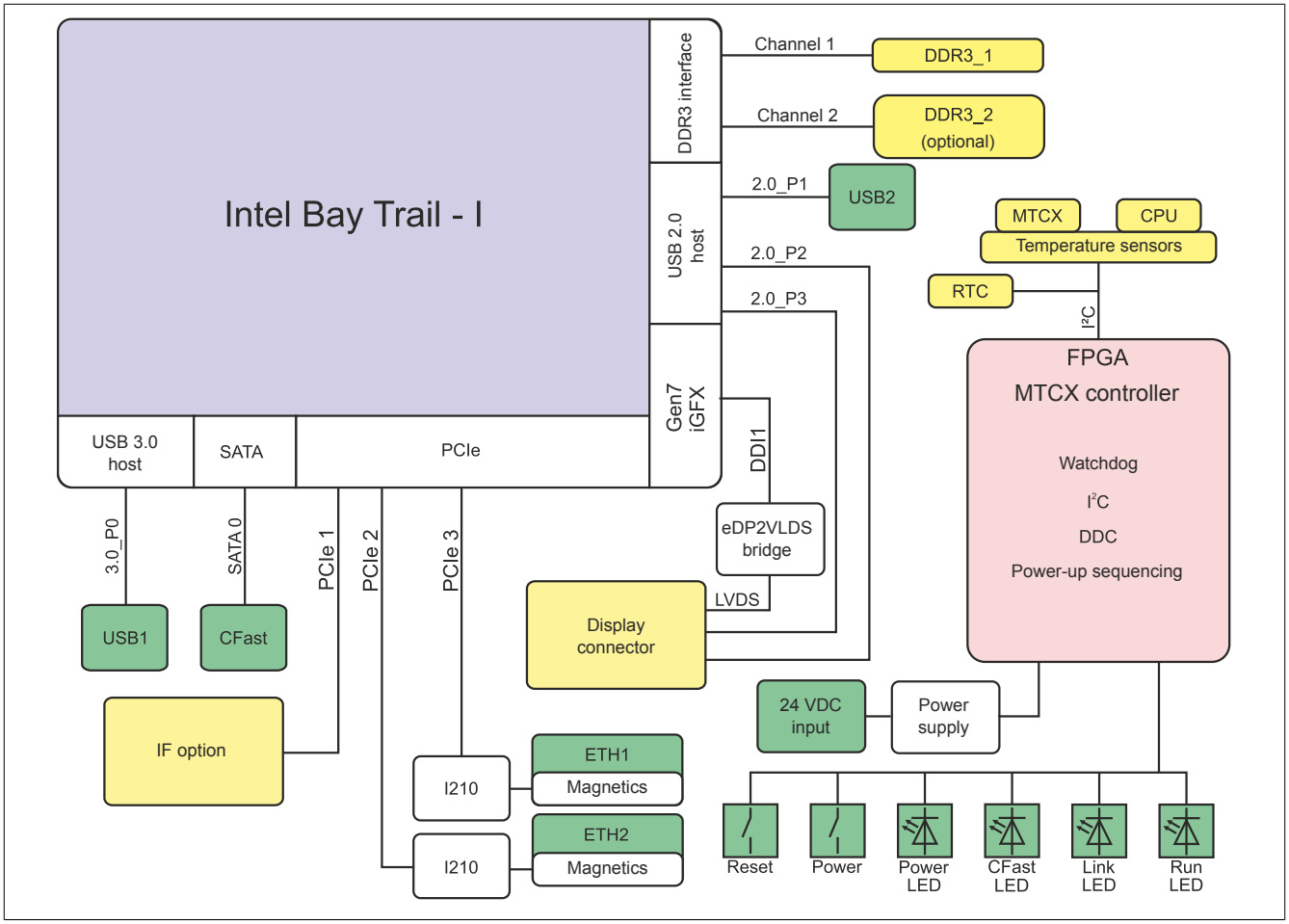
Under the following conditions, the Panel PC 2100 offers IP65 protection on the front and IP20 protection on the back per EN 60529:

- Correct installation of the Panel PC 2100 (see "Installation and wiring" on page 169)
- Installation of all covers or components on interfaces and slots
- Compliance with all ambient conditions

The Panel PC 2100 with AP9x3 and AP1000 panels additionally has "Type 4X indoor use only" on the front per UL 50 under the same conditions.

4.1.3 Electrical properties

4.1.3.1 System units - Block diagram



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

4.1.3.2 Power calculation

In order to calculate the total power of the Panel PC 2100, the power rating of the display used (see or) must be added to the power rating of the system unit; if an interface option or optional CFast card is connected, these power ratings must be added as well.

System units

Type	Model number	Total power consumption
PPC2100 E3815 1C 1.46 GHz	5PPC2100.BY01-000	12 W (without USB consumer) 22 W (with USB consumer)
PPC2100 E3825 2C 1.33 GHz	5PPC2100.BY11-000	13 W (without USB consumer) 23 W (with USB consumer)
PPC2100 E3826 2C 1.46 GHz	5PPC2100.BY22-000	15 W (without USB consumer) 25 W (with USB consumer)
PPC2100 E3827 2C 1.75 GHz	5PPC2100.BY34-000	17 W (without USB consumer) 27 W (with USB consumer)
PPC2100 E3845 4C 1.91 GHz	5PPC2100.BY44-000	19 W (without USB consumer) 29 W (with USB consumer)
PPC2100 E3845 4C 1.91 GHz	5PPC2100.BY48-000	20 W (without USB consumer) 30 W (with USB consumer)

AP9x3 panels

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	6.1 W	-	10.8 W	16.9 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 panels

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 (hardware revision F0 and later)	-	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	-	2.00 W
POWERLINK RS485 CAN	5ACCIF01.FPCS-000	0.75 W	1.00 W	-	1.75 W
POWERLINK	5ACCIF01.FPLK-000	-	1.75 W	-	1.75 W
POWERLINK RS232	5ACCIF01.FPLS-000	0.50 W	1.00 W	-	1.50 W
POWERLINK RS232	5ACCIF01.FPLS-001	-	1.50 W	-	1.50 W

Type	Order number	+5 V	+3.3 V	+12 V	Total power consumption
POWERLINK RS232 CAN	5ACCIF01.FPSC-000	0.75 W	1.00 W	-	1.75 W
POWERLINK RS232 CAN X2X	5ACCIF01.FPSC-001	0.60 W	1.40 W	-	2.00 W
2x RS422/RS485	5ACCIF01.FSS0-000	0.80 W	0.20 W	-	1.00 W
CAN	5ACCIF01.ICAN-000	0.45 W	0.05 W	-	0.50 W
RS232	5ACCIF01.IS00-000	-	0.50 W	-	0.50 W

CFast cards

Type	Order number	+5 V	+3.3 V	+12 V	Total power consumption
SLC technology	5CFAST.xxxx-00	-	0.7 W read 0.7 W write 0.3 W idle	-	0.7 W read 0.7 W write 0.3 W idle
MLC technology	5CFAST.032G-10 ≥ G0 5CFAST.064G-10 ≥ E0	-	1.1 W read 1 W write 0.25 W idle	-	1.1 W read 1 W write 0.25 W idle
	5CFAST.128G-10 ≥ E0	-	1.1 W read 1.4 W write 0.25 W idle	-	1 W read 1.4 W write 0.25 W idle
	5CFAST.032G-10 ≤ F0 5CFAST.064G-10 ≤ D0 5CFAST.128G-10 ≤ D0	-	0.8 W read 1 W write 0.4 W idle	-	0.8 W read 1 W write 0.4 W idle
	5CFAST.256G-10	-	1.2 W read 1.9 W write 0.25 W idle	-	1.2 W read 1.9 W write 0.25 W idle

Example

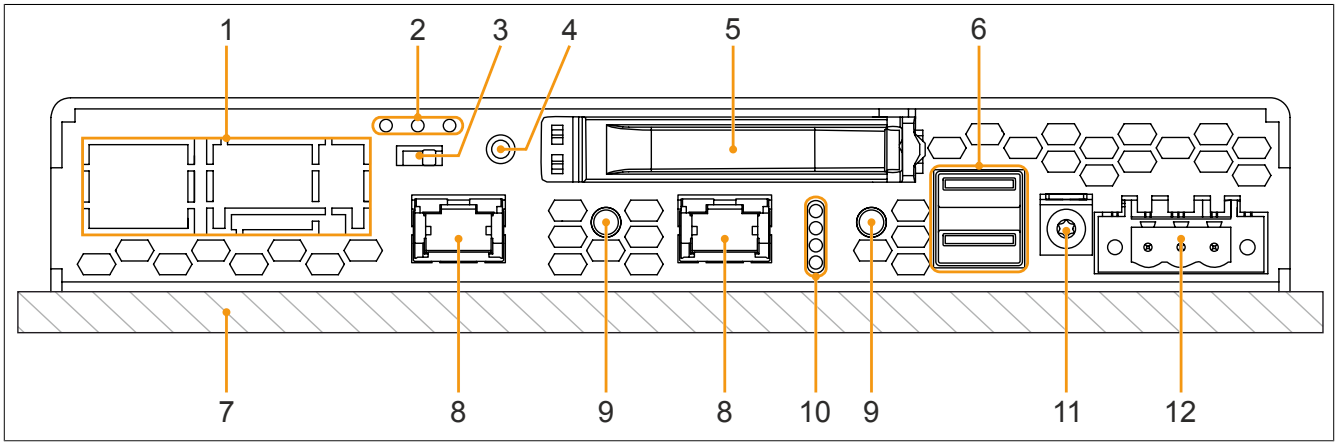
12" panel 5AP923.1215-00	4.2 W + 7.2 W =	11.4 W
5PPC2100.BY11-000 system unit	23 W (with USB consumer)	23 W
CFast card 5CFAST.064G-10 ≥ E0		1.1 W
	Total max.:	**35.5 W**

4.1.4 Device interfaces and slots

4.1.4.1 Device interfaces - 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(IF1, IFx)" on page 53	7	Panel (configuration-dependent)
2	IF option - LED status indicators[1)]	8	"Ethernet interfaces" on page 49
3	IF option - Terminating resistor[1)]	9	"Power and reset buttons" on page 51
4	Screw point for cable shield	10	"LED status indicators" on page 52
5	"CFast slot" on page 51	11	"Grounding" on page 48
6	"USB interfaces" on page 50	12	"+24 VDC power supply" on page 48

1) Only available with installed interface option (configuration-dependent, see "Interface options" on page 132).

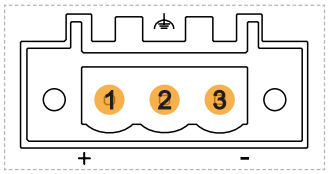
4.1.4.2 +24 VDC power supply

Danger!

This device is only permitted to be supplied with 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 267.

The device is protected against overload and reverse polarity by a soldered fuse (10 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. 3.5 A
Overvoltage category per EN 61131-2		II
Inrush current		Typ. 6 A, max. 10 A for < 300 µs
Galvanic isolation		Yes
Uninterruptible power supply		No

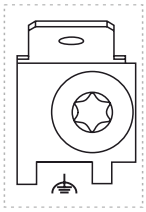
1) IEC 61010-2-201 requirements must be observed.

4.1.4.2.1 Grounding

Caution!

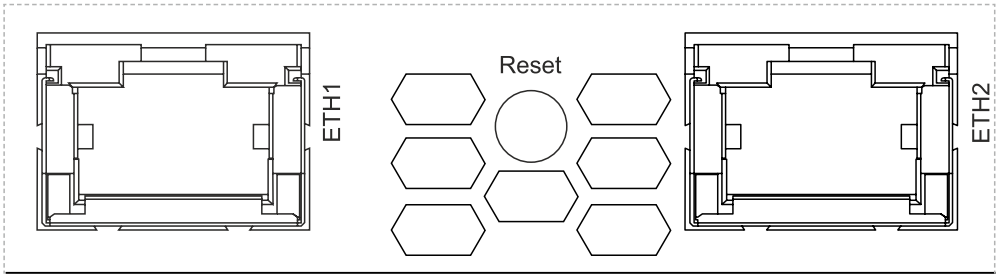
The functional ground (power supply pin 2 and ground connection) must be connected to the central grounding point (e.g. control cabinet or system) via the shortest possible path with the lowest possible resistance and with the largest possible wire cross section. This type of grounding is mandatory for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

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

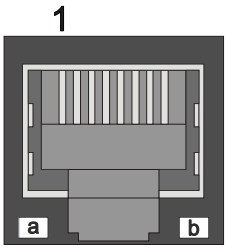


4.1.4.3 Ethernet interfaces

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**
Yellow	100 Mbit/s	10 Mbit/s[2)]
Green	1000 Mbit/s	-
LED "Link" (a)	**On**	**Active**
Green	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.

4.1.4.4 USB interfaces

The Panel PC is equipped with a Universal Serial Bus 3.0 (USB 3.0) host controller with several USB ports, of which one USB 3.0 interface and one USB 2.0 interface 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.

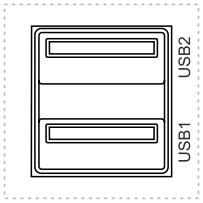
Driver support

A special driver is necessary to operate the USB 3.0 host controller with multiple USB ports. 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.

USB1 and USB2		
Standard		
	USB1	USB 3.0
	USB2	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)
		SuperSpeed (5 Gbit/s)[1]
Current-carrying capacity[2]		Max. 1 A per connection
Cable length		
	USB 2.0	Max. 5 m (without hub)[3]
	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).
3) With revisions < B0 for system units, the max. cable length has been specified at 3 m.

Front USB interface panel

Automation Panel 1000 devices with 10.4", 12.1" (4:3 format only), 15" (4:3 format only) and 19" diagonals are equipped with a front USB 2.0 interface. For additional information, see section "USB interfaces" in chapter "Device interfaces and slots" on page 47.

USB hub interfaces

4-port USB hub 5ACCUSB4.0000-000 provides up to 4 additional USB interfaces for the Panel PC 2100. For additional information, see section "USB hub" on page 270.

4.1.4.5 CFast slot

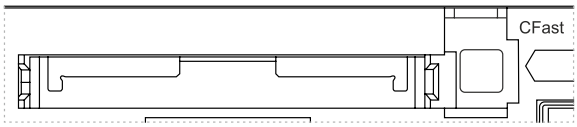
The Panel PC offers an easy-to-access CFast slot so that a CFast card can also be used as a removable storage medium for transferring data or performing upgrades.

This CFast slot is internally connected to the chipset and implemented in version SATA II (SATA 3.0 Gbit/s).

Information:

5CFAST.0xxx-00 CFast cards are only permitted to be operated in the xPC2100 with revision E0 or later.

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

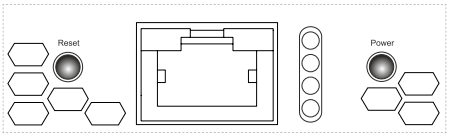


Warning!

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

4.1.4.6 Power and reset buttons

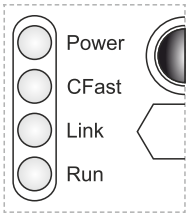
Both buttons can be pressed without any tools.

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!

4.1.4.7 LED status indicators

Assignment	LED	Color	Status	Explanation	LED status indicators[1]
	**Power**	Green	On	Power supply OK	
		Red	On	The system is in power saving mode (standby).[1]	
		Red-Green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, power supply OK	
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, power saving mode (standby)	
				Information: **An update must be performed again.**	
	CFast	Yellow	On	Indicates CFast access	
	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.	

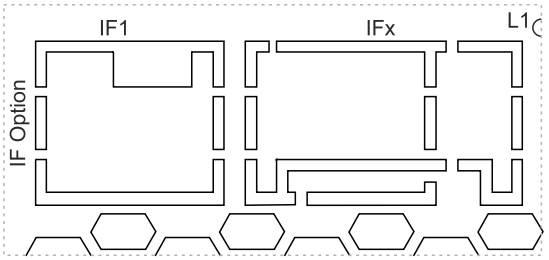
1) Two columns form 1 interval of 500 ms each.
2) S5: Soft-off
S4: Hibernate (suspend-to-disk)

4.1.4.8 IF option slot(IF1, IFx)

Panel PC 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.

IF option IF1, IFx slot	
Model number	**Interface option - Short description**
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.FPLK-000	Interface card - 2x POWERLINK interfaces - 512 kB nvSRAM - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100 and 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 and APC2200/PPC2200
5ACCIF01.FSS0-000	Interface card - 2x RS422/RS485 interface - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100 and APC2200/PPC2200
5ACCIF01.IS00-000	Interface card - 1x RS232 interface - For APC2100/PPC2100/APC2200/PPC2200



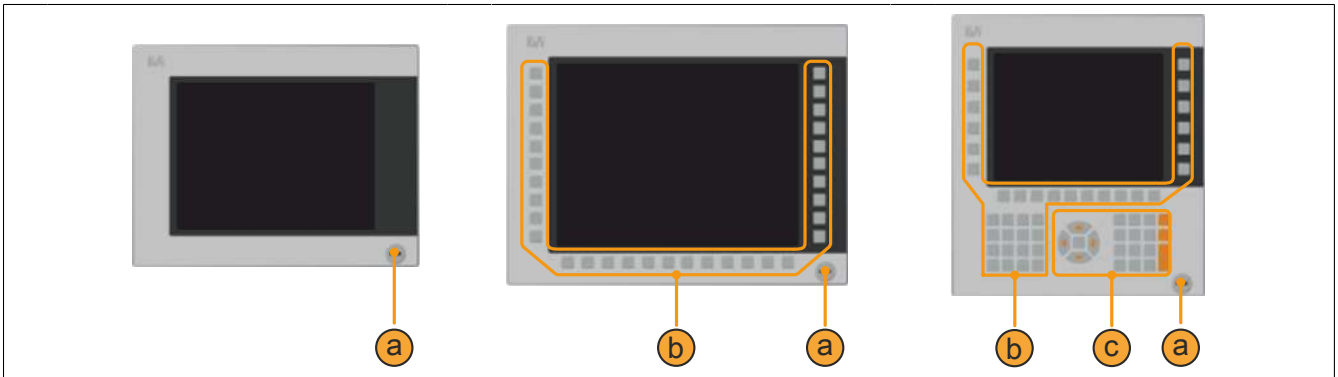
Information:

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

4.1.5 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

4.1.5.1 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.

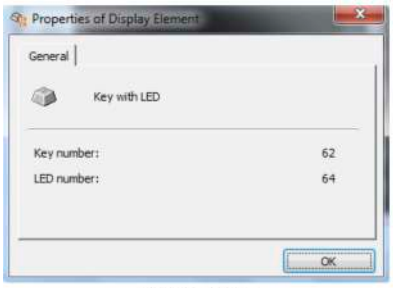
4.1.5.2 Key and LED configuration

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.



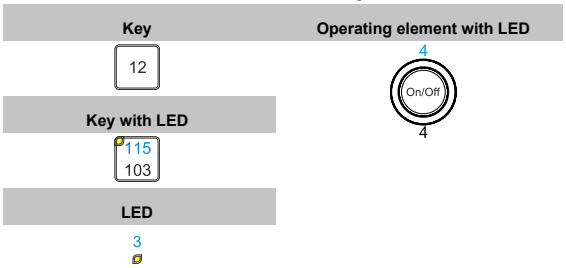
B&R Key Editor

ADI Control Center

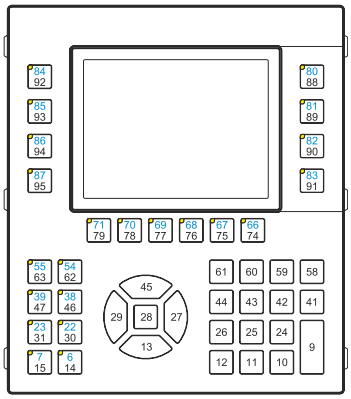
Keys and LEDs in the matrix:

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

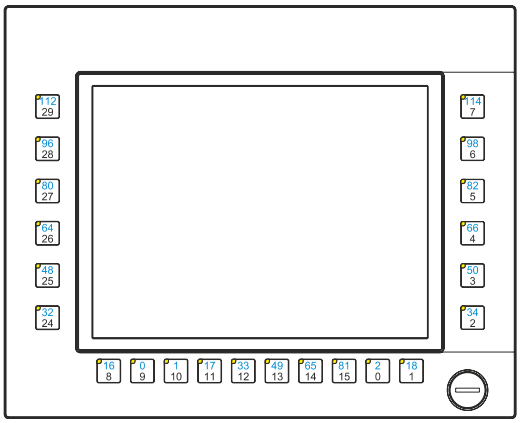
Illustration examples:



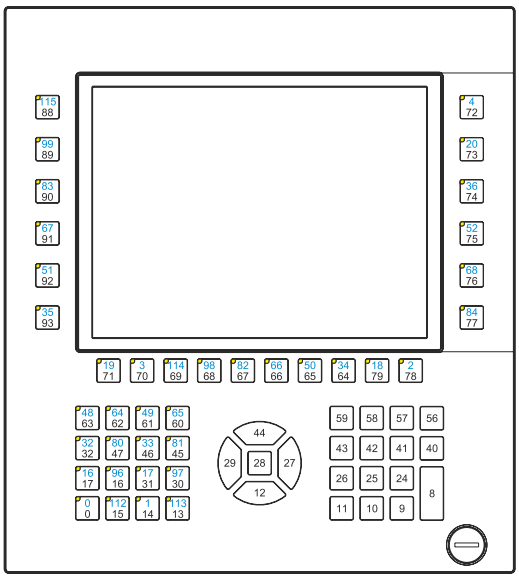
5AP1151.0573-000



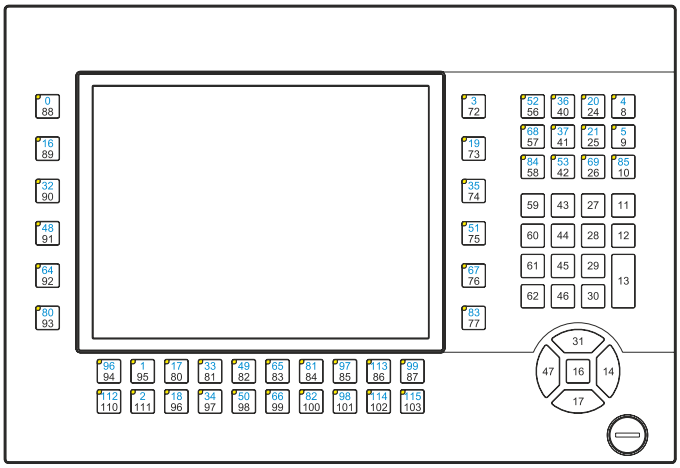
5AP1180.1043-000



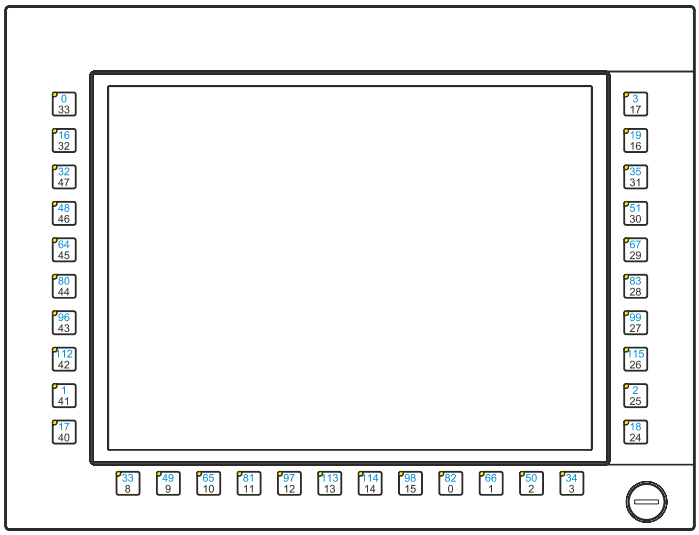
5AP1181.1043-000



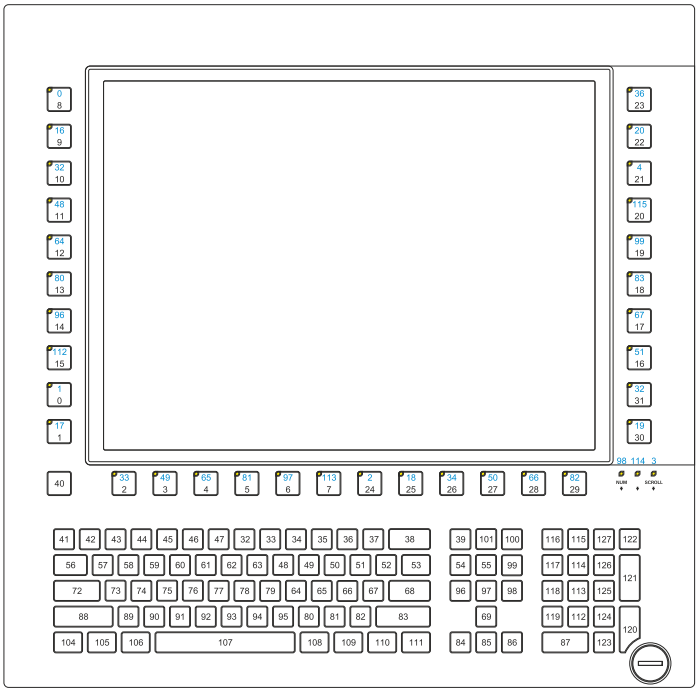
5AP1182.1043-000



5AP1180.1505-000



5AP1181.1505-000



4.1.5.3 USB interface

The following AP1000 panels are equipped with a USB 2.0 interface on the front panel. This is equipped with a USB interface cover. IP65 protection (front) is only provided if the USB interface cover is correctly installed.

- 5AP11xx.1043-000
- 5AP1120.1214-000
- 5AP11xx.1505-000
- 5AP1120.1906-000

Warning!

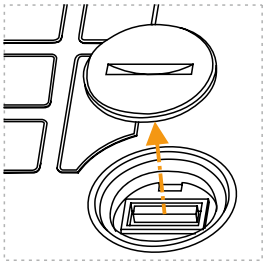
USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality. The functionality of USB devices available from B&R is ensured.

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 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[1)]	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 5PPC2100.BYxx-000

4.2.1.1.1 General information

PPC2100 system units consist of a CPU board, main memory and housing. 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 processors
- Intel Bay Trail platform
- DDR3 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	
5PPC2100.BY01-000	PPC2100 system unit - Intel Atom E3815 1.46 GHz - Single core - 1 GB SDRAM - For Automation Panel 923/933/1000	
5PPC2100.BY11-000	PPC2100 system unit - Intel Atom E3825 1.33 GHz - Dual core - 1 GB SDRAM - For Automation Panel 923/933/1000	
5PPC2100.BY22-000	PPC2100 system unit - Intel Atom E3826 1.46 GHz - Dual core - 2 GB SDRAM - For Automation Panel 923/933/1000	
5PPC2100.BY34-000	PPC2100 system unit - Intel Atom E3827 1.75 GHz - Dual core - 4 GB SDRAM - For Automation Panel 923/933/1000	
5PPC2100.BY44-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 4 GB SDRAM - For Automation Panel 923/933/1000	
5PPC2100.BY48-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 8 GB SDRAM - For Automation Panel 923/933/1000	
	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.256G-10	CFast 256 GB MLC	
	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	

4.2.1.1.3 Technical data

Order number	5PPC2100.BY01-000	5PPC2100.BY11-000	5PPC2100.BY22-000	5PPC2100.BY34-000	5PPC2100.BY44-000	5PPC2100.BY48-000
General information						
LEDs	Power, CFast, Link, Run					
B&R ID code	0xE522	0xE524	0xE545	0xE547	0xE54B	0xED0B
Cooling	Passive via housing					
Power button	Yes					
Reset button	Yes					
Buzzer	No					
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					
DNV	-				Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)	
LR	-				ENV3	
KR	-				Yes	
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 E3815	Intel Atom E3825	Intel Atom E3826	Intel Atom E3827	Intel Atom E3845	
Clock frequency	1460 MHz	1330 MHz	1460 MHz	1750 MHz	1910 MHz	
Number of cores	1	2			4	
Architecture	22 nm					
Thermal design power (TDP)	5 W	6 W	7 W	8 W	10 W	
L2 cache	512 kB	1 MB			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)	No					
Enhanced Intel SpeedStep Technology	Yes					
Chipset	Intel Bay Trail					
Real-time clock						
Accuracy	At 25°C: Typ. 12 ppm (1 second) per day [1]					
Retention time [2]	Typ. approx. 400 h Min. approx. 200 h					
Battery-backed	No					
Power failure logic						
Controller	MTCX [3]					
Buffer time	10 ms					
Memory						
Type	DDR3 SDRAM					
Memory size	1 GB		2 GB	4 GB		8 GB
Speed	DDR3L-1067			DDR3L-1333		
Memory interface width	Single channel					Dual channel
Removable	No					
Graphics						
Controller	Intel HD Graphics					
Max. dynamic graphics frequency	400 MHz	533 MHz	667 MHz	792 MHz		
Color depth	Max. 32-bit					
DirectX support	11					
OpenGL support	4.0					
Power management	ACPI 4.0					
Interfaces						
CFast slot						
Quantity	1					
Type	SATA II (SATA 3.0 Gbit/s)					

Order number	5PPC2100. BY01-000	5PPC2100. BY11-000	5PPC2100. BY22-000	5PPC2100. BY34-000	5PPC2100. BY44-000	5PPC2100. BY48-000
USB						
Quantity	2					
Type	1x USB 3.0 1x USB 2.0					
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					
Support						
Software						
Automation Studio	Up to V4.12					
Electrical properties						
Nominal voltage	24 VDC ±25% [6]					
Nominal current	3.5 A					
Inrush current	Typ. 6 A, max. 10 A for < 300 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) At max. specified ambient temperature: Typ. 58 ppm (5 seconds) - worst case 220 ppm (19 seconds).
2) To achieve the specified values for the self-discharge time, the product must be supplied with power for min. 8 hours.
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.
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:

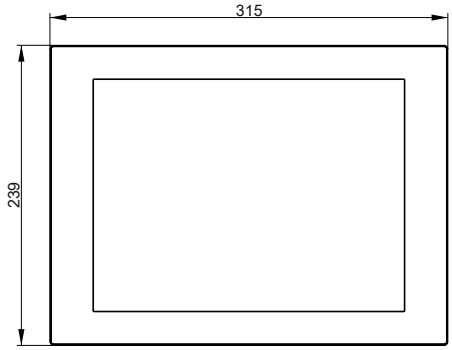
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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	Rev. F0 and later: Direction U = 70° / Direction D = 70° Rev. < F0: Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 25 to 500 cd/m²
Half-brightness time [1)]	50,000 h
Touch screen [2)]	
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
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	315 mm
Height	239 mm
Weight	2200 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) 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

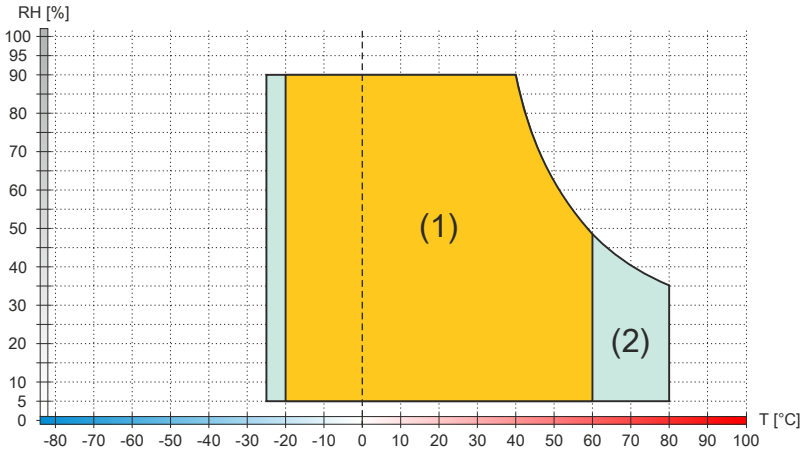


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

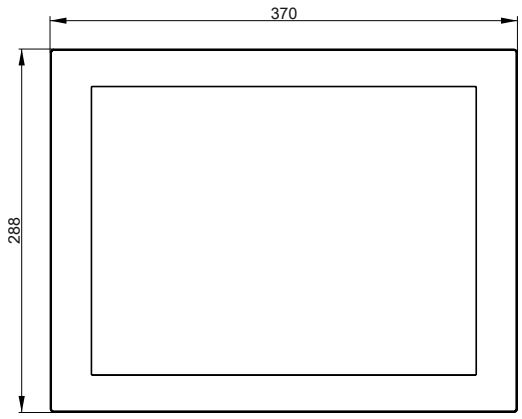
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1)]	50,000 h
Touch screen [2)]	
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Order number	5AP923.1505-00
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
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) 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

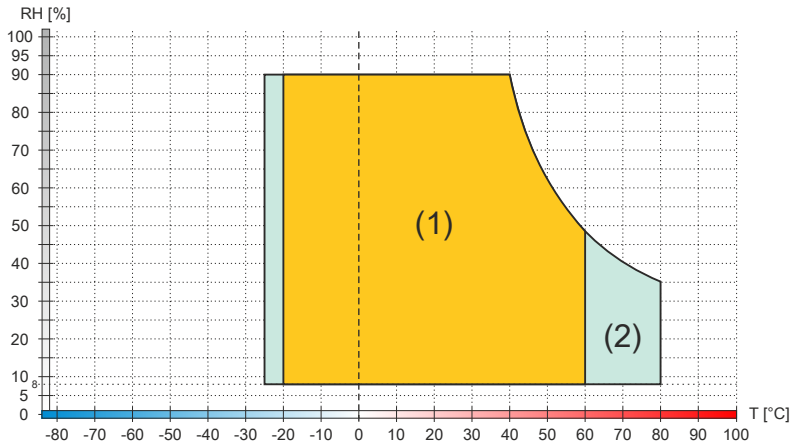


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

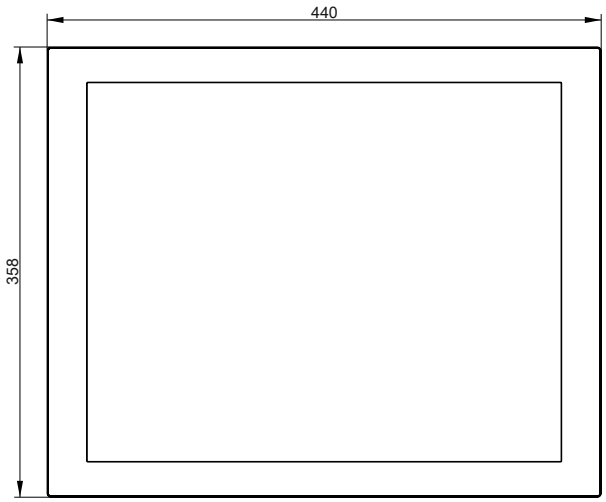
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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	
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 [1]	50,000 h	70,000 h
Touch screen [2]		
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	
Design	Black	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) 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

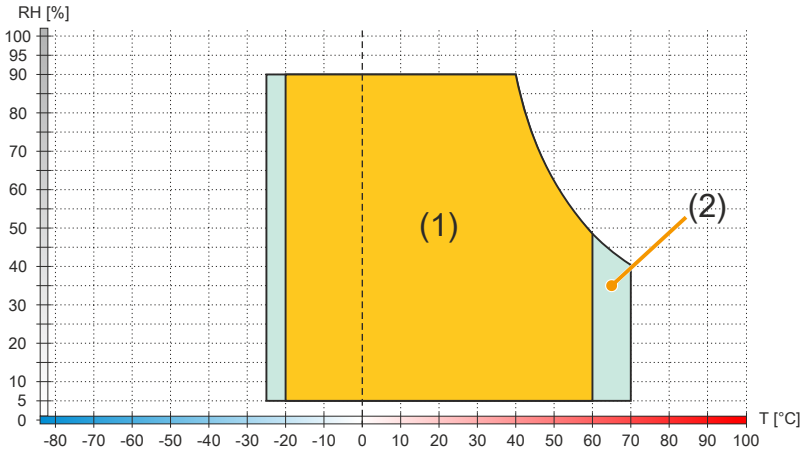


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP923.1906-00 ≤ Rev. D0

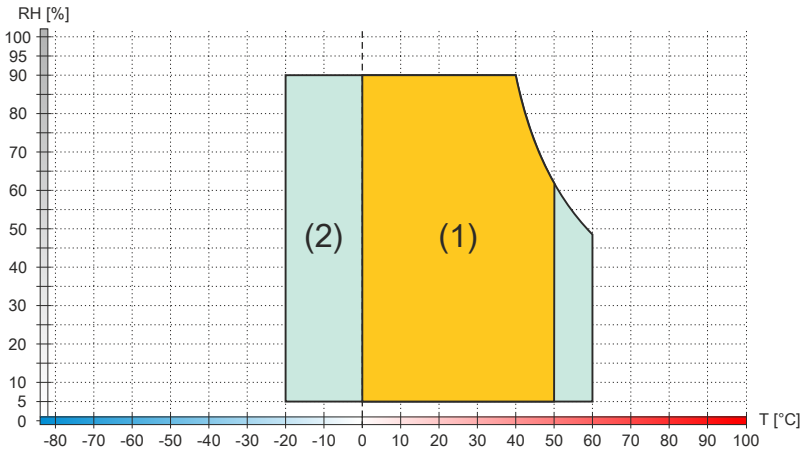


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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

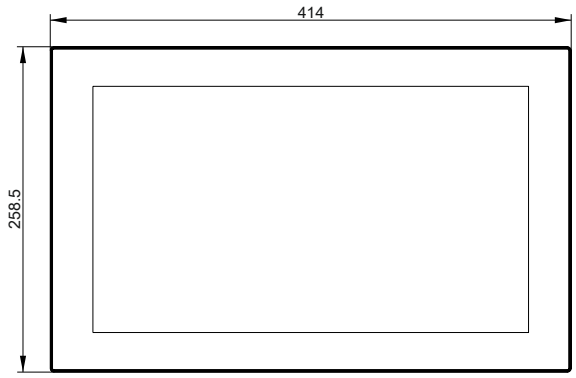
Information:

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 an individual component is used.

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	
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	
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

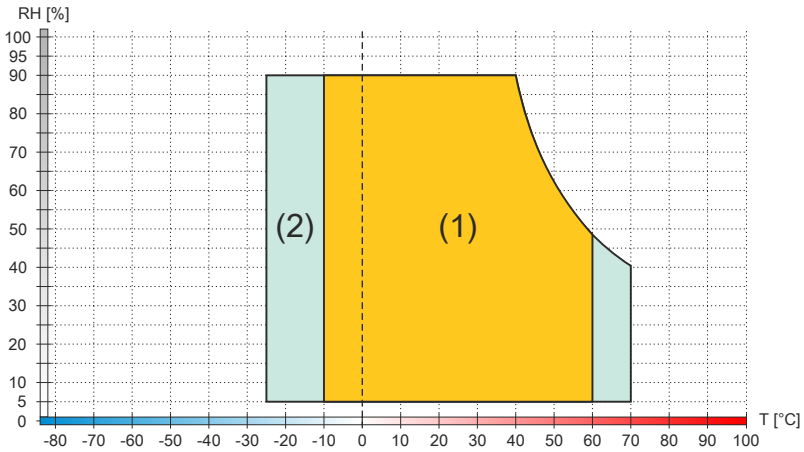


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.156B-00 ≤ Rev. C0

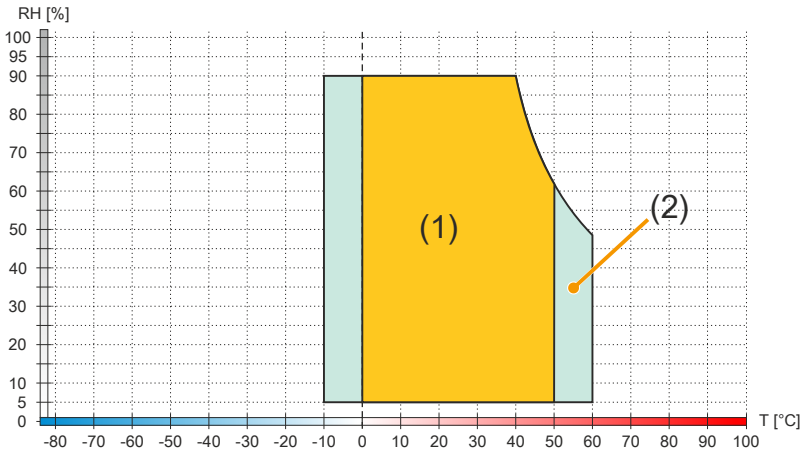


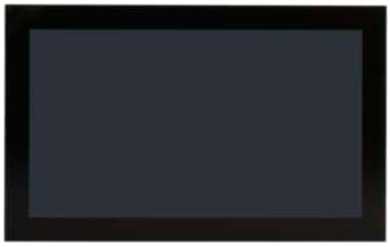
Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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

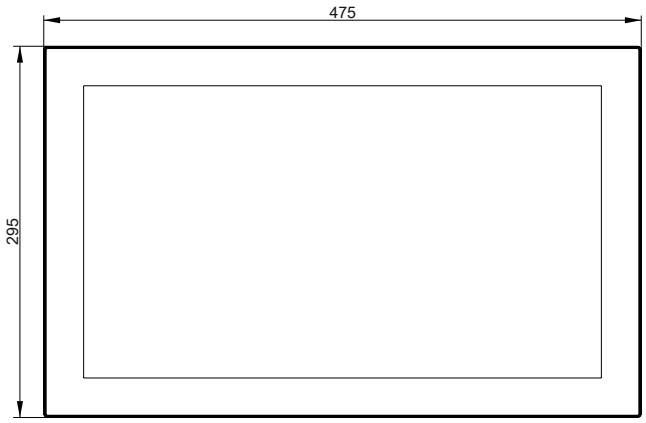
Information:

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 an individual component is used.

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		
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		
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

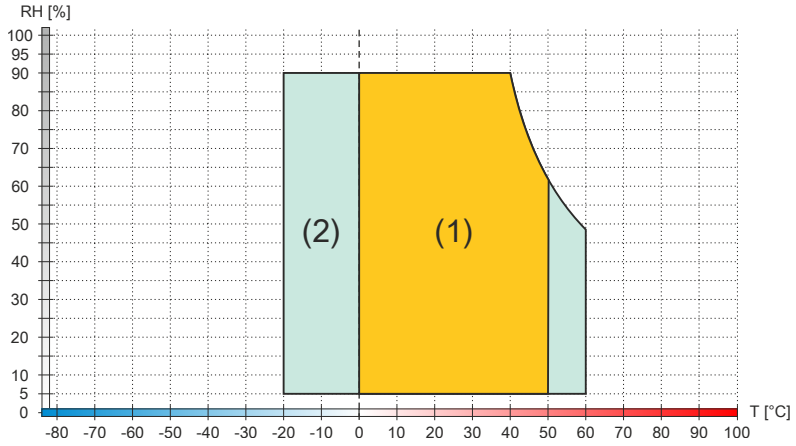


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.185B-00 ≤ Rev. C0

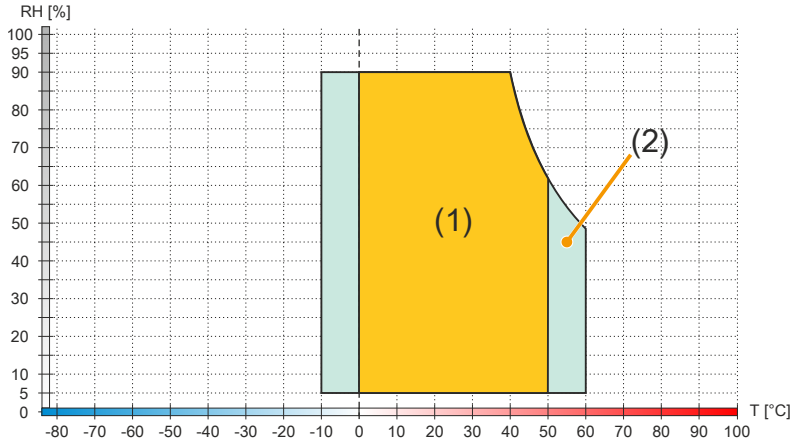


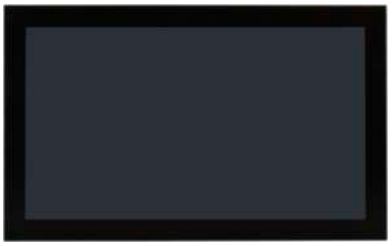
Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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

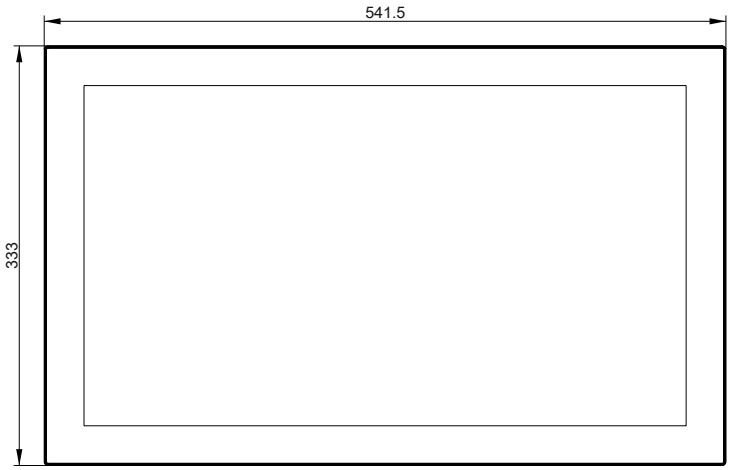
Information:

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 an individual component is used.

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	
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	
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

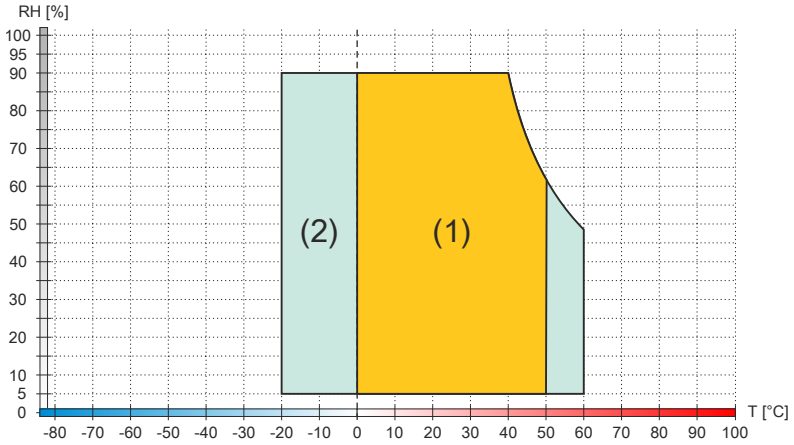


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.215C-00 ≤ Rev. C0

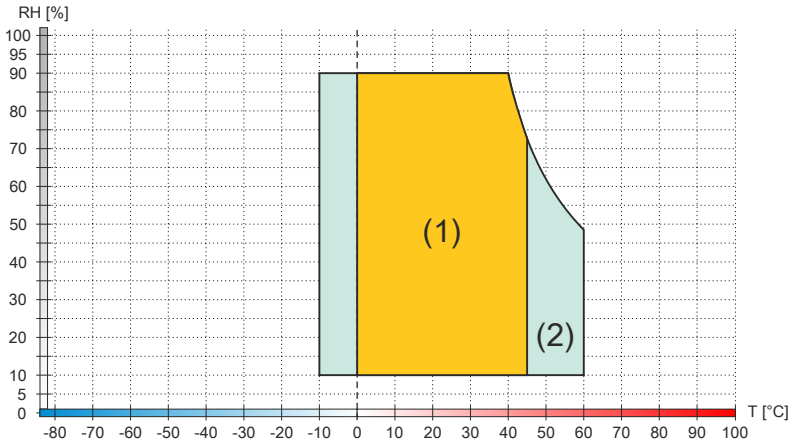


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

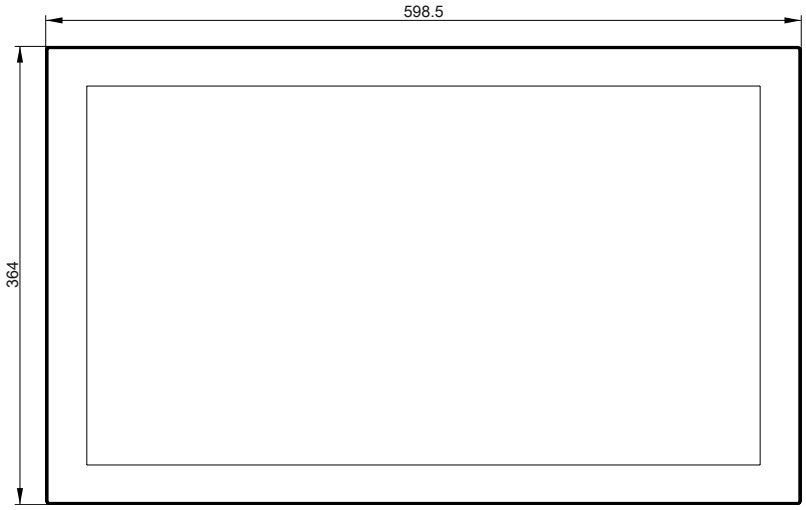
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)	
LR	ENV3	
KR	Yes	
ABS	Yes	
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck	
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 [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	

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) 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".

4.2.2.7.4 Dimensions



4.2.2.7.5 Temperature/Humidity diagram

5AP933.240C-00 ≥ Rev. D0

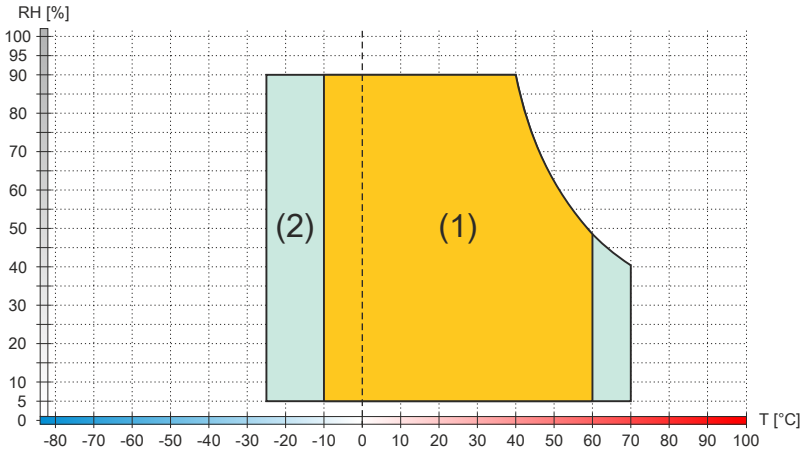


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP933.240C-00 ≤ Rev. C0

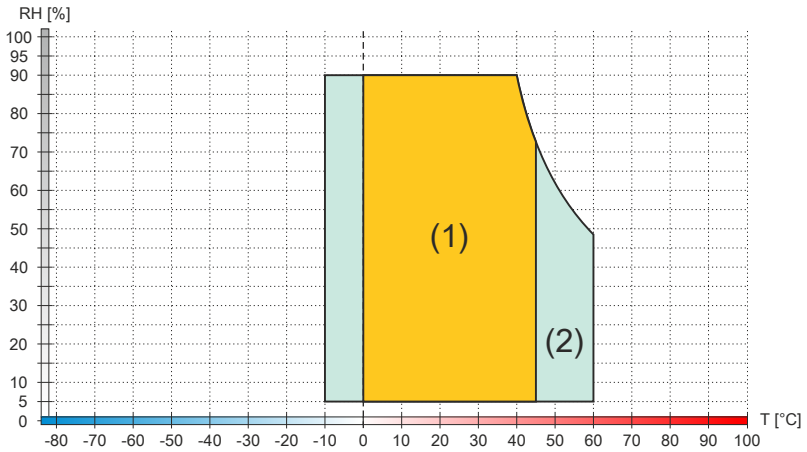


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

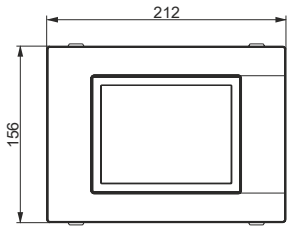
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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	
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 [1]	50,000 h	
Touch screen [2]		
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 [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	156 mm	
Weight	1100 g	

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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 Requirements

5.7" AP1000 panels are supported starting with the following firmware versions:

- Firmware V03.11 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.08 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V01.03 or later with PPC2100 system unit 5PPC2100.BYxx-000.

4.2.3.1.6 Temperature/Humidity diagram

5AP1120.0573-000 ≥ Rev. E0

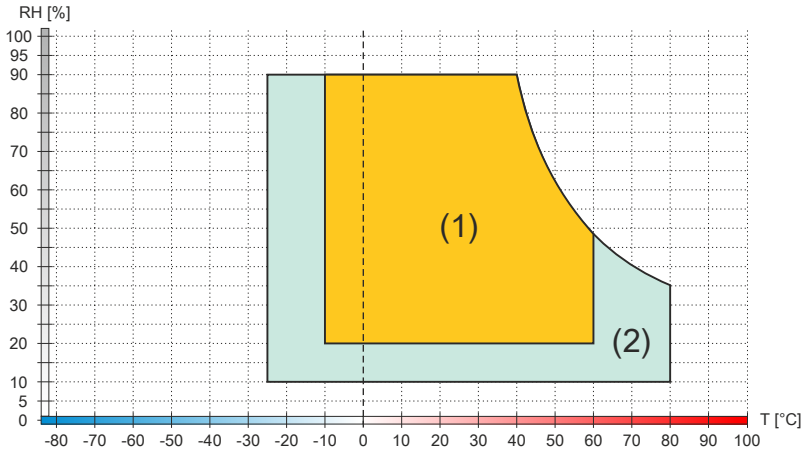


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP1120.0573-000 ≤ Rev. D0

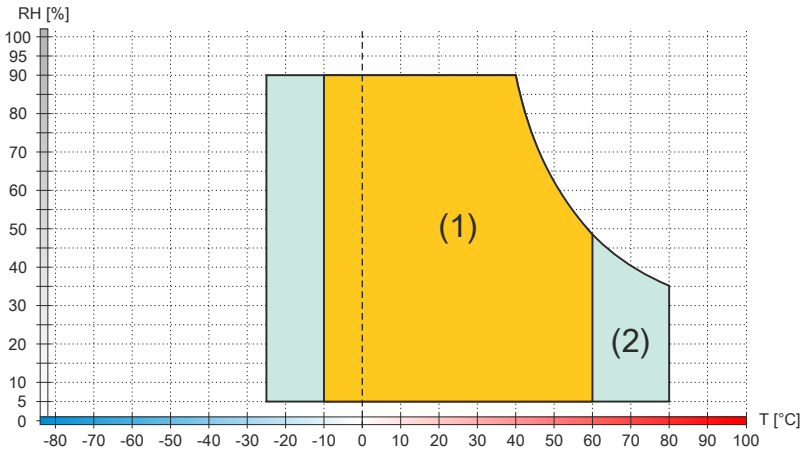


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

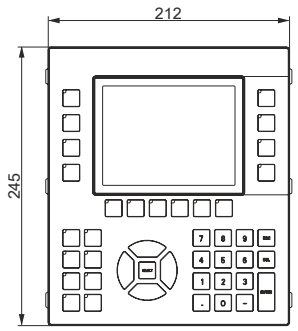
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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	
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 [1)]	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	
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	

Order number	5AP1151.0573-000	
Revision	**D0**	**E0**
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front [2]		
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) 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 Requirements

5.7" AP1000 panels are supported starting with the following firmware versions:

- Firmware V03.11 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.08 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V01.03 or later with PPC2100 system unit 5PPC2100.BYxx-000.

4.2.3.2.6 Temperature/Humidity diagram

5AP1151.0573-000 ≥ Rev. E0

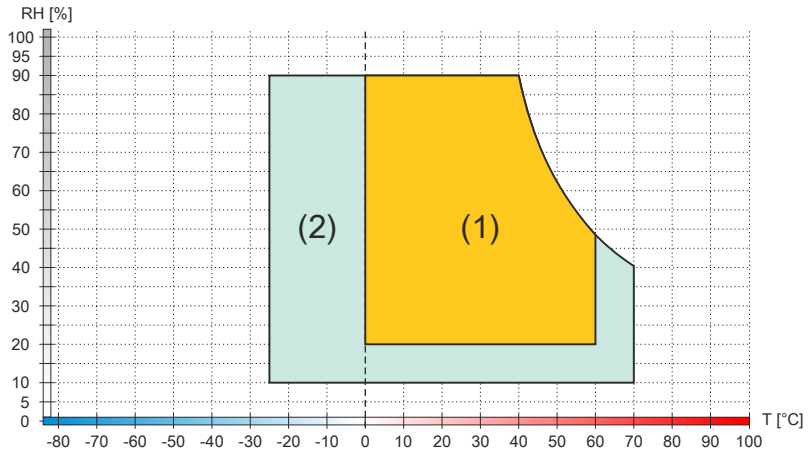


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

5AP1151.0573-000 ≤ Rev. D0

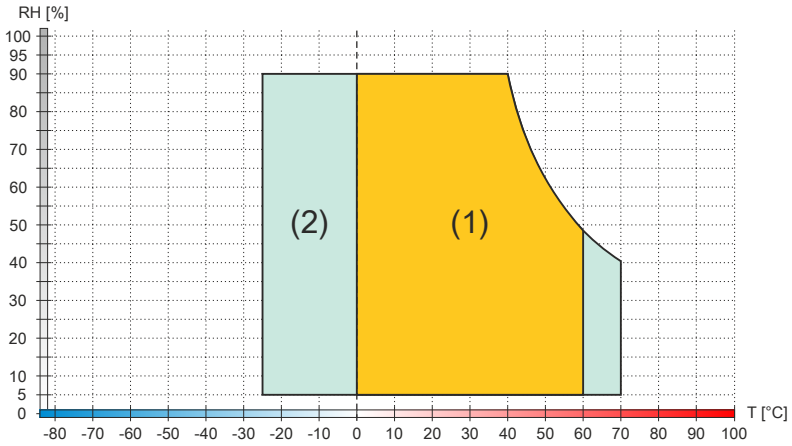


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

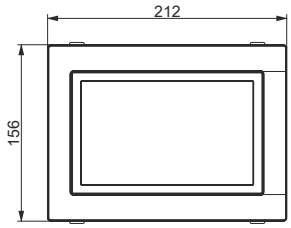
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	50,000 h
Touch screen [2)]	
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 [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	156 mm
Weight	Approx. 900 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

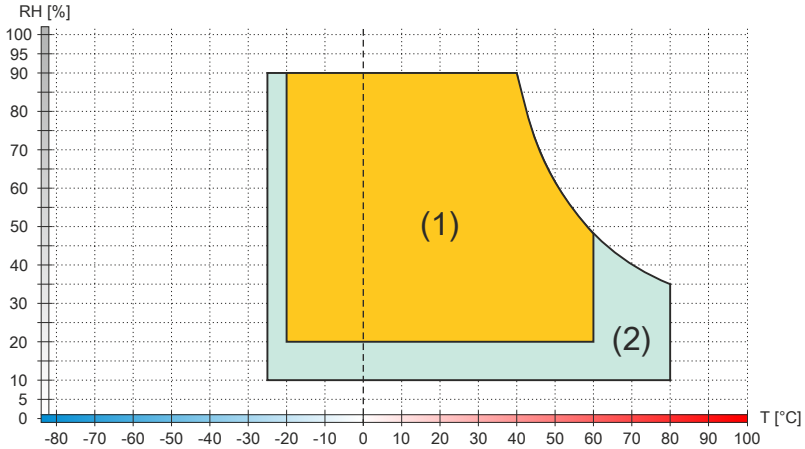


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

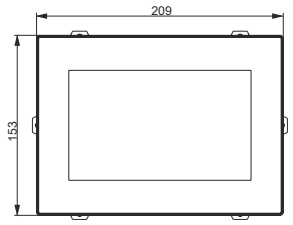
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	50,000 h
Touch screen [2)]	
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 [3]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	209 mm
Height	153 mm
Weight	1200 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See chapter 4 "Software", section 2 "Multi-touch drivers".
3) 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

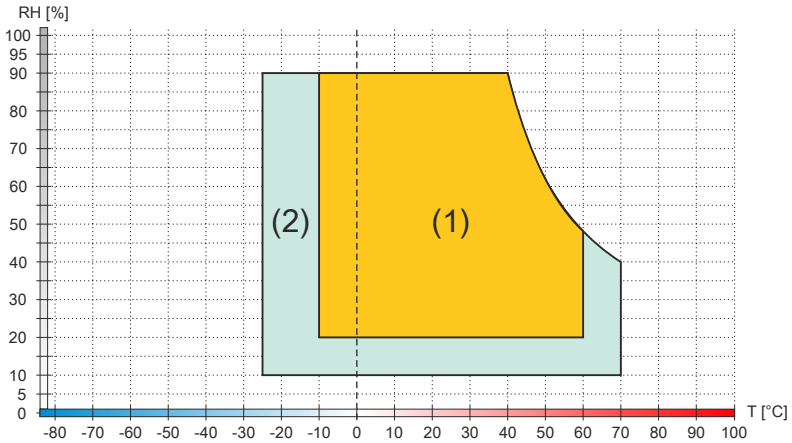


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

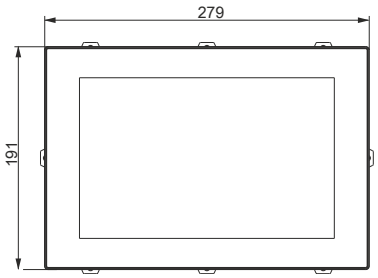
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	40,000 h
Touch screen [2)]	
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 [3)]	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

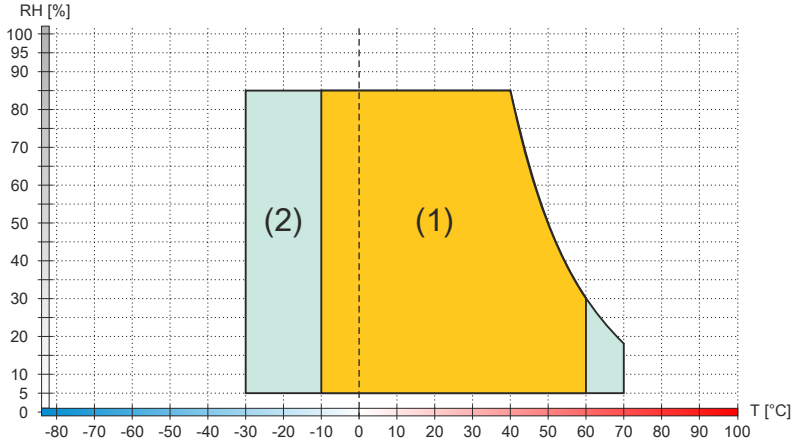


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

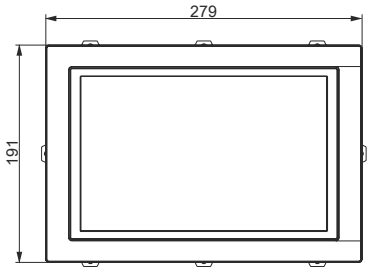
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	50,000 h
Touch screen [2]	
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 [3]	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

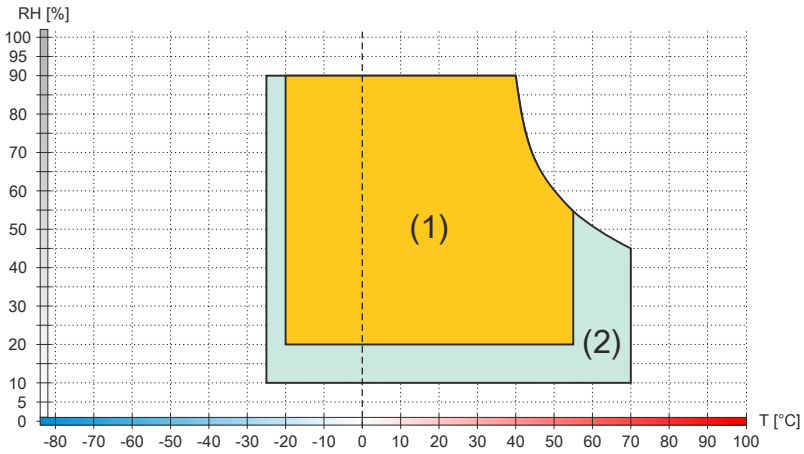


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

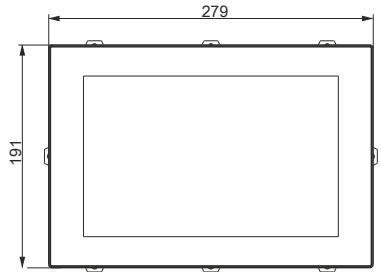
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1)]	50,000 h
Touch screen [2)]	
Technology	Projected capacitive touch (PCT)
Transmittance	See "Appendix A - Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Order number	5AP1130.101E-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 [3]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	2000 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

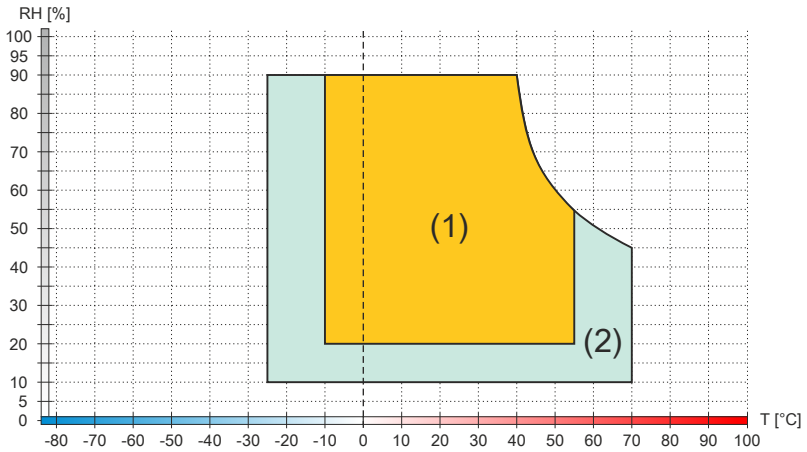


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

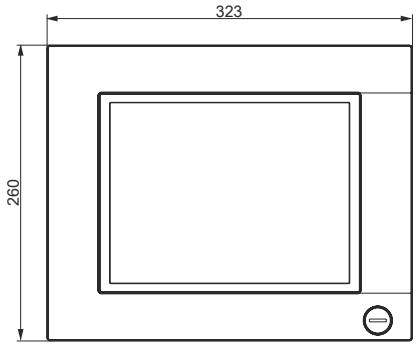
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	70,000 h
Touch screen [2]	
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 [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	323 mm
Height	260 mm
Weight	2800 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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 Requirements

10.4" AP1000 panels are supported starting with the following firmware versions:

- Firmware V03.11 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.08 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V01.03 or later with PPC2100 system unit 5PPC2100.BYxx-000

4.2.3.8.6 Temperature/Humidity diagram

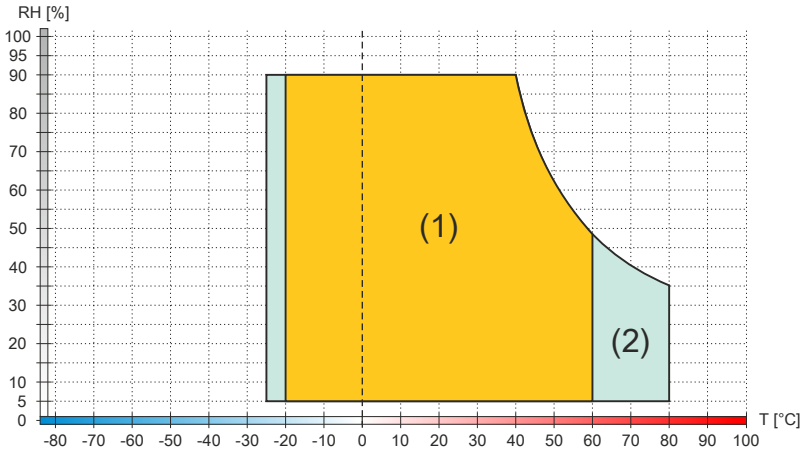


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

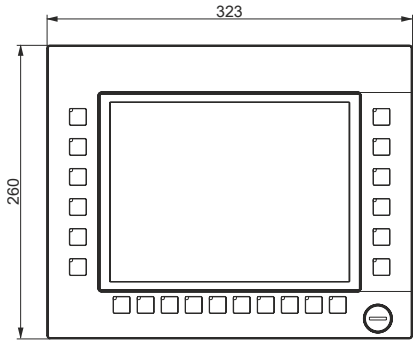
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	70,000 h
Touch screen [2)]	
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	5AP1180.1043-000
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 [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	323 mm
Height	260 mm
Weight	2800 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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 Requirements

10.4" AP1000 panels are supported starting with the following firmware versions:

- Firmware V03.11 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.08 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V01.03 or later with PPC2100 system unit 5PPC2100.BYxx-000

4.2.3.9.6 Temperature/Humidity diagram

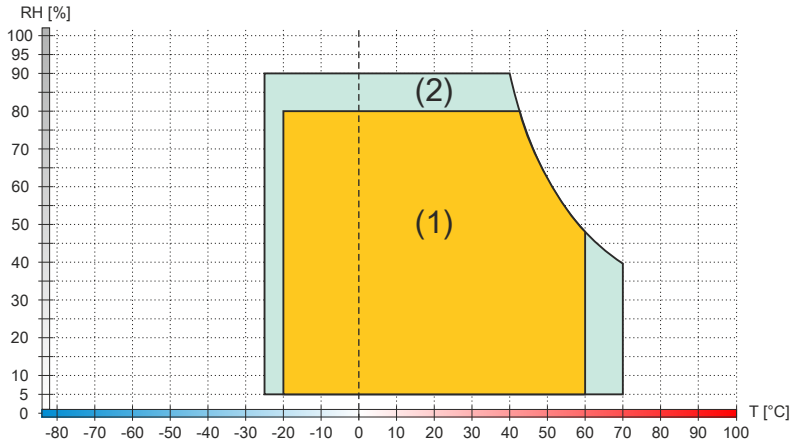


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

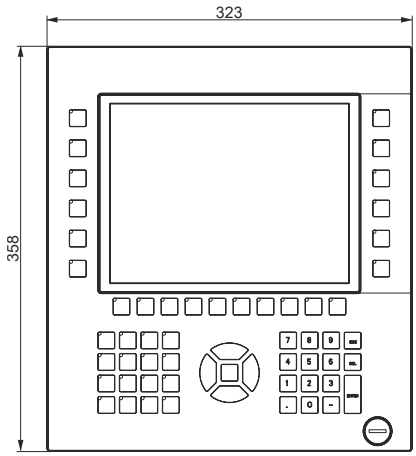
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	70,000 h
Touch screen [2)]	
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 [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	323 mm
Height	358 mm
Weight	3400 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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 Requirements

10.4" AP1000 panels are supported starting with the following firmware versions:

- Firmware V03.11 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.08 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V01.03 or later with PPC2100 system unit 5PPC2100.BYxx-000

4.2.3.10.6 Temperature/Humidity diagram

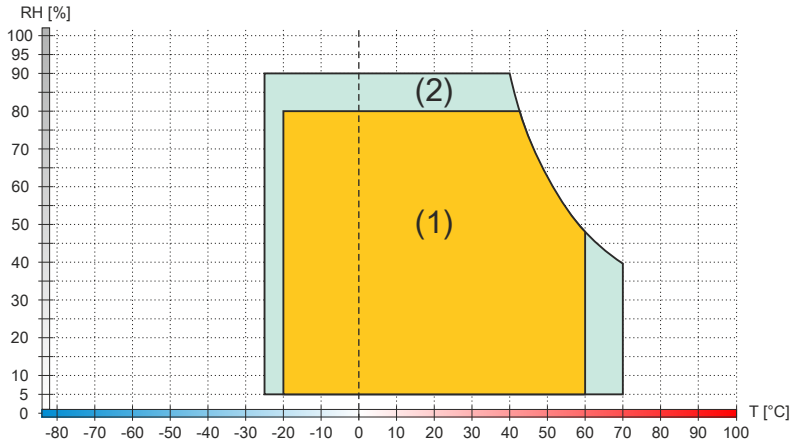


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

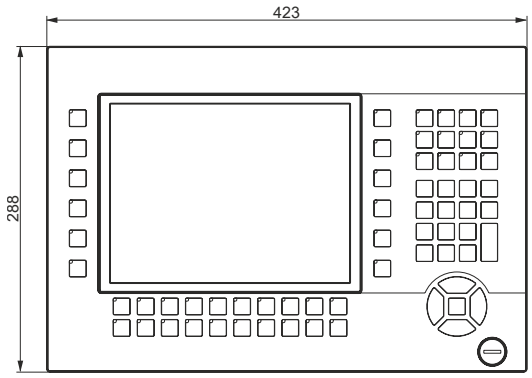
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	70,000 h
Touch screen [2]	
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	44 with LED (yellow)

Order number	5AP1182.1043-000
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 [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	423 mm
Height	288 mm
Weight	3500 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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 Requirements

10.4" AP1000 panels are supported starting with the following firmware versions:

- Firmware V03.11 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.08 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V01.03 or later with PPC2100 system unit 5PPC2100.BYxx-000

4.2.3.11.6 Temperature/Humidity diagram

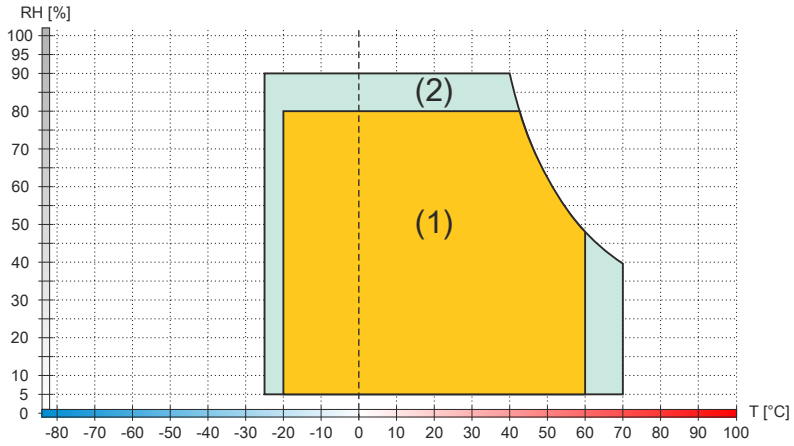


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

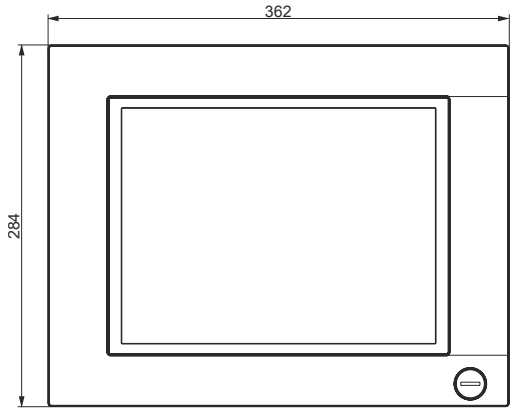
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	50,000 h
Touch screen [2]	
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 [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	362 mm
Height	284 mm
Weight	3200 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

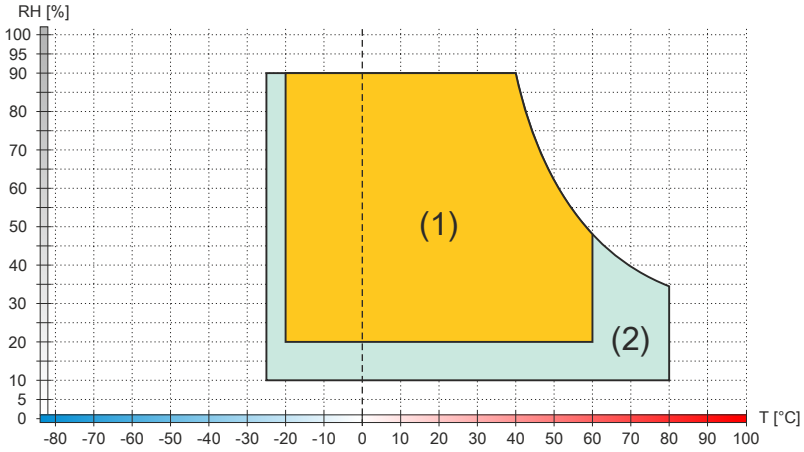


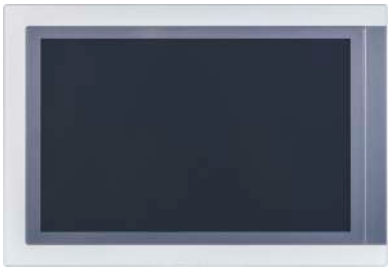
Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

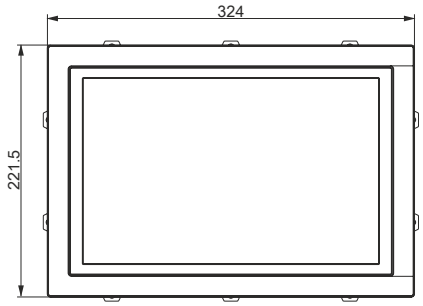
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	50,000 h
Touch screen [2)]	
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 [3]	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

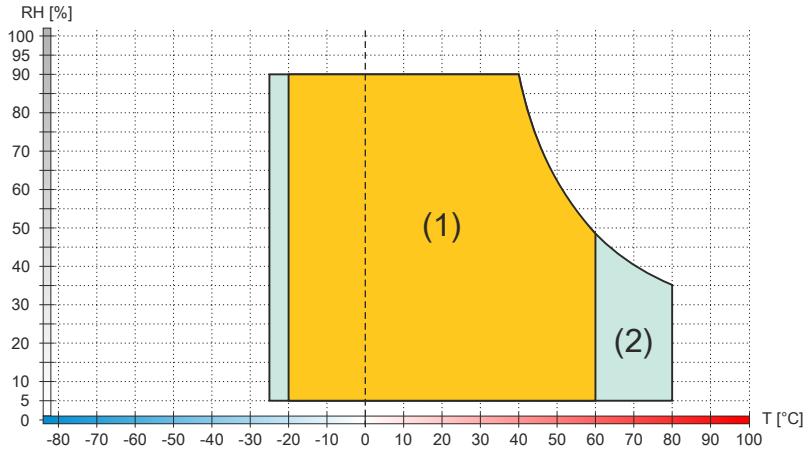


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.14 5AP1130.121E-000

4.2.3.14.1 General information

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

4.2.3.14.2 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	

4.2.3.14.3 Technical data

Information:

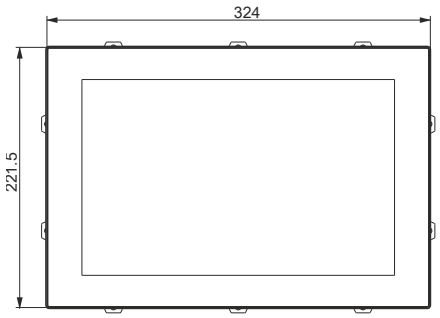
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	50,000 h
Touch screen [2)]	
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 [3)]	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

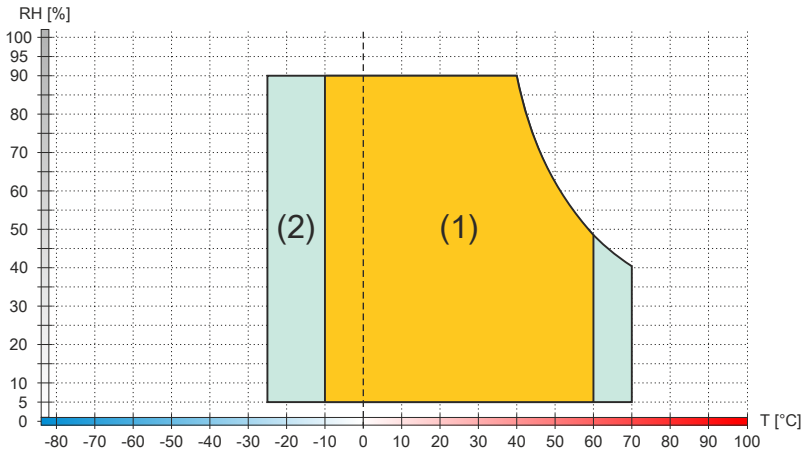


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.15 5AP1130.121E-010

4.2.3.15.1 General information

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

4.2.3.15.2 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	

4.2.3.15.3 Technical data

Information:

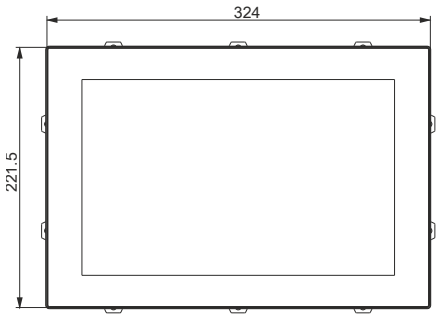
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	70,000 h
Touch screen [2]	
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 [3]	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

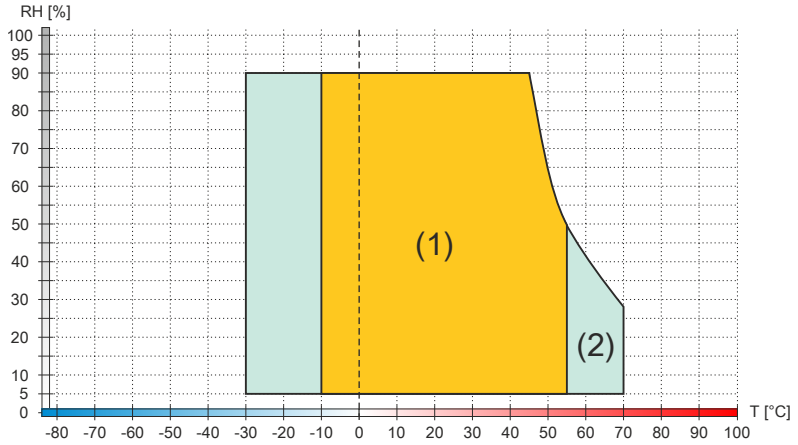


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

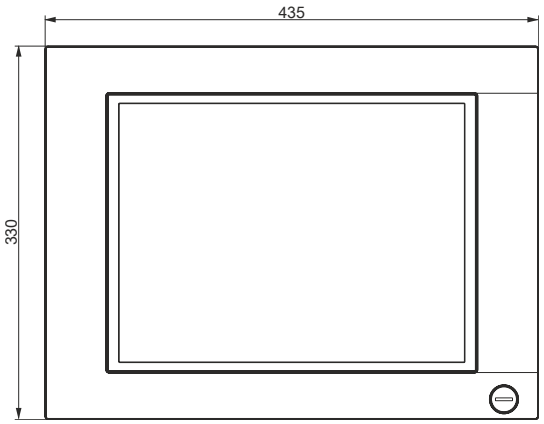
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	50,000 h
Touch screen [2)]	
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

Order number	5AP1120.1505-000
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 [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	435 mm
Height	330 mm
Weight	5000 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

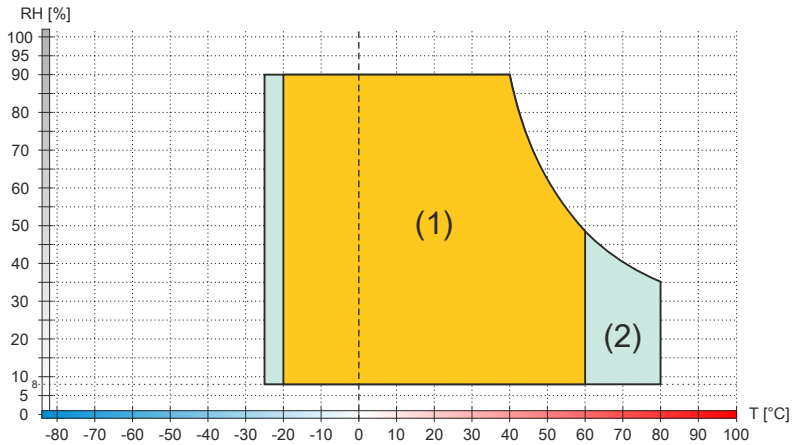


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

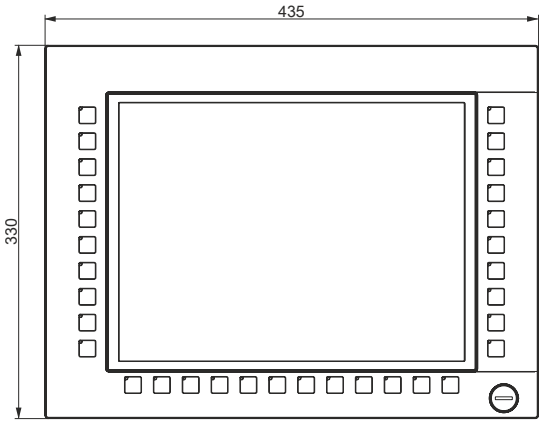
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	50,000 h
Touch screen [2]	
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	5AP1180.1505-000
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 [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	435 mm
Height	330 mm
Weight	4900 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

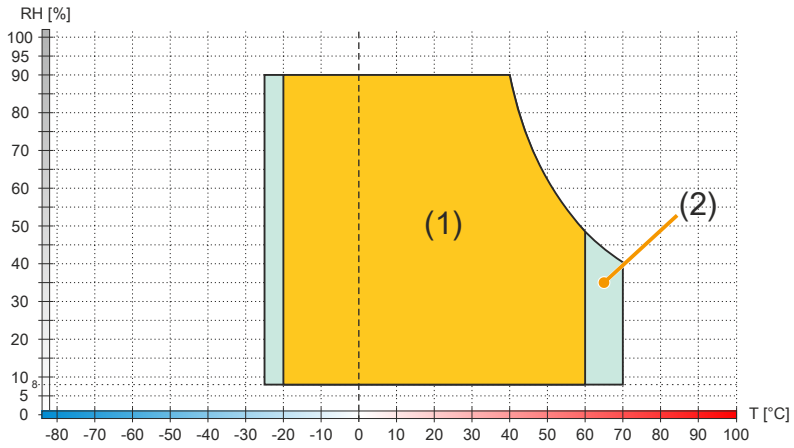


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

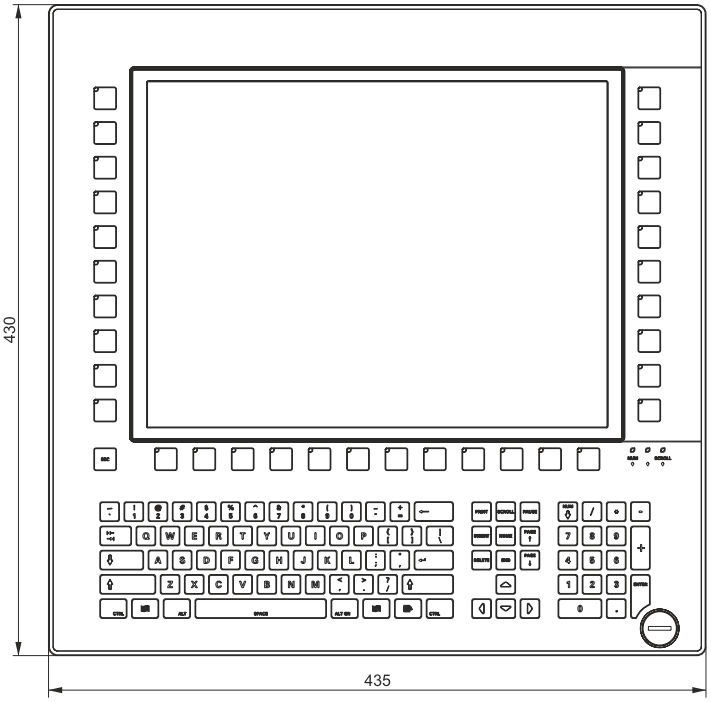
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1)]	50,000 h

Order number	5AP1181.1505-000
Touch screen [2]	
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 [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	435 mm
Height	430 mm
Weight	6000 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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 Requirements

5AP1181.1505-000 is supported starting with the following firmware versions:

- Firmware V03.15 or later with SDL/DVI receiver 5DLSDL.1001-00
- Firmware V04.11 or later with SDL3 receiver 5DLSD3.1001-00
- Firmware V06.12 or later with SDL4 receiver 5DLSD4.1001-00

4.2.3.18.6 Temperature/Humidity diagram

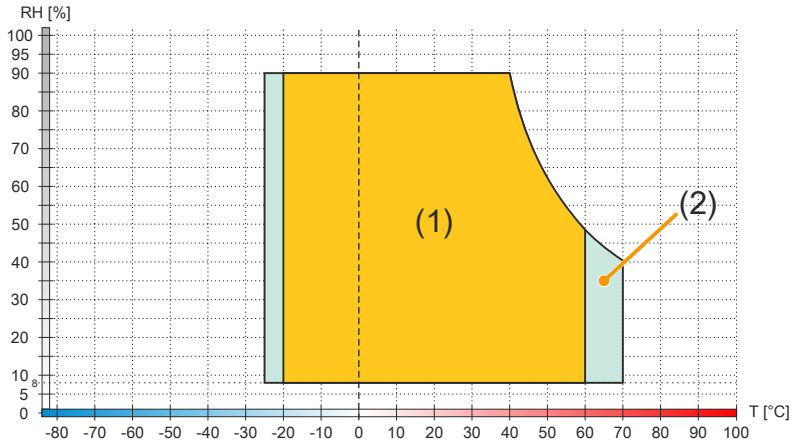


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

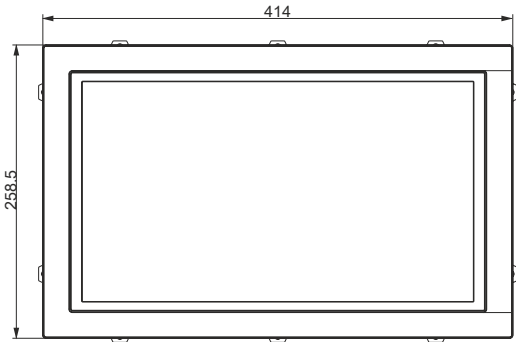
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
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 [1]	70,000 h
Touch screen [2]	
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 [3]	
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) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

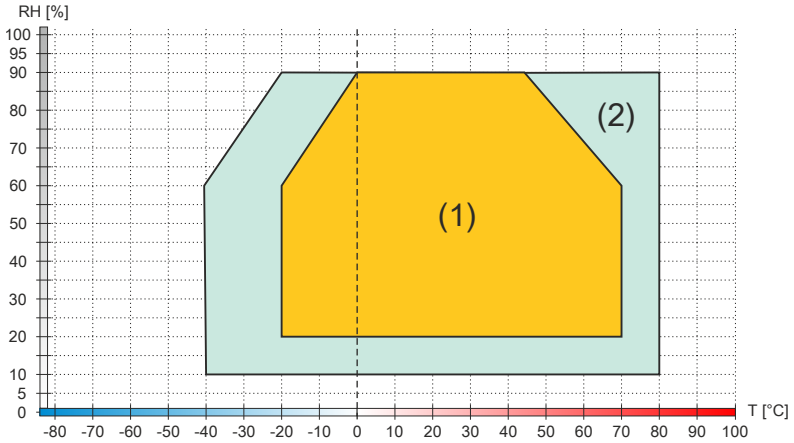


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

Up to hardware revision G0

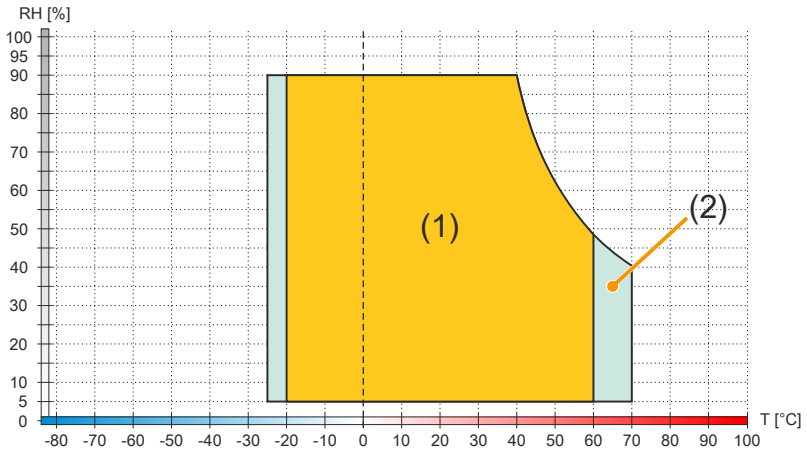


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

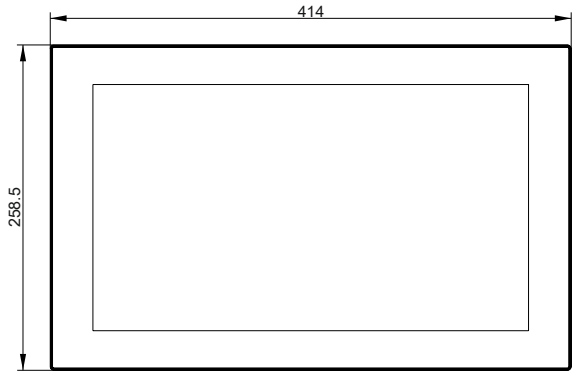
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1)]	≥50,000 h
Touch screen [2)]	
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 [3]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	3700 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

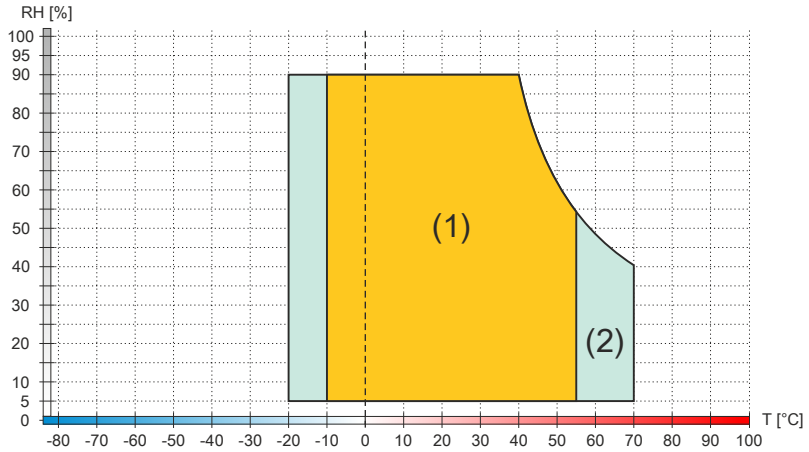


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.3.21 5AP1130.156C-001

4.2.3.21.1 General information

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

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:

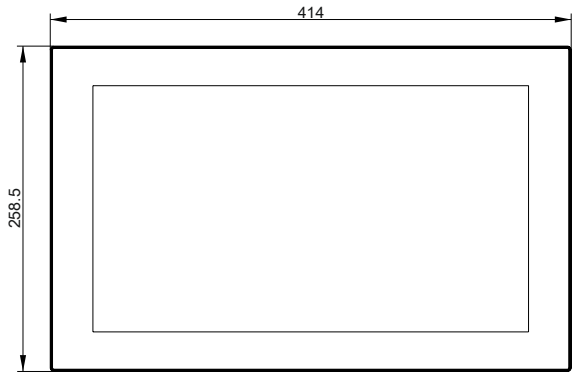
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
Display	
Type	TFT color
Diagonal	15.6"
Colors	16.7 million
Resolution	FHD, 1920 x 1080 pixels
Contrast	Rev. D0 and later: 800:1 Up to Rev. C0: 1500:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimmable)	Rev. D0 and later: Typ. 40 to 450 cd/m² Up to Rev. C0: Typ. 40 to 400 cd/m²
Half-brightness time [1)]	Rev. D0 and later: ≥50,000 h Up to rev. C0: 70,000 h
Touch screen [2)]	
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	5AP1130.156C-001
Mechanical properties	
Front [3]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	Rev. D0 and later: Approx. 3,905 g Up to rev. C0: Approx. 3,800 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

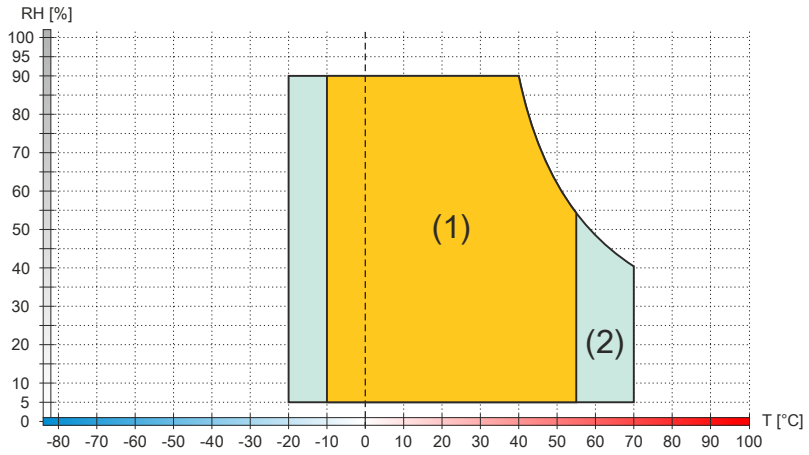


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

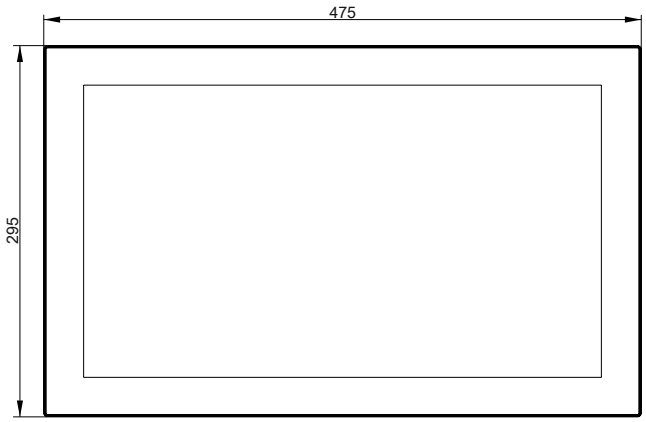
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1)]	50,000 h
Touch screen [2)]	
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)

Order number	5AP1130.185C-000
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front [3]	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	475 mm
Height	295 mm
Weight	4700 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) The specifications for the touch screen driver must be taken into account. See section "Multi-touch drivers" in chapter 4 "Software".
3) 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

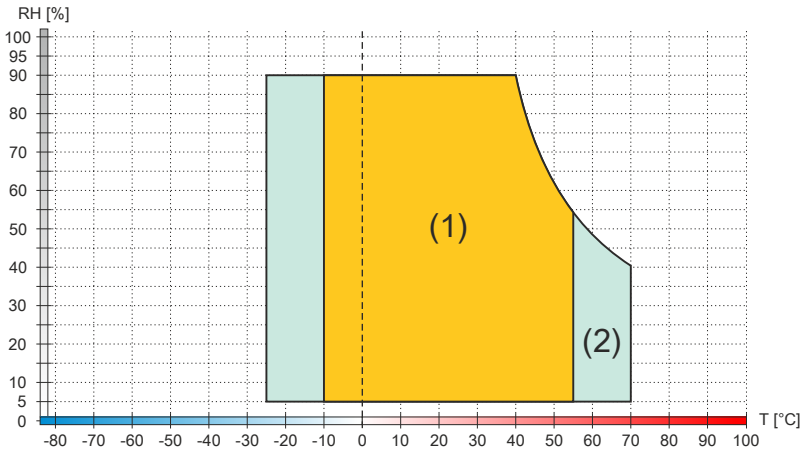


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

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:

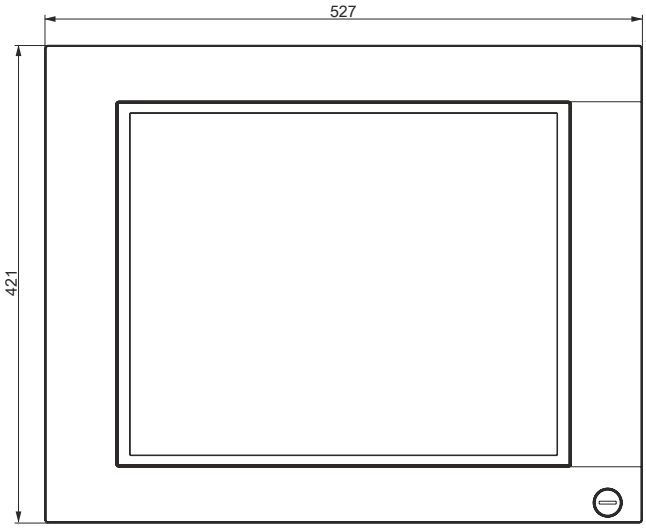
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1)]	70,000 h

Order number	5AP1120.1906-000
Touch screen [2]	
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 [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	527 mm
Height	421 mm
Weight	7300 g

1) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
2) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
3) 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

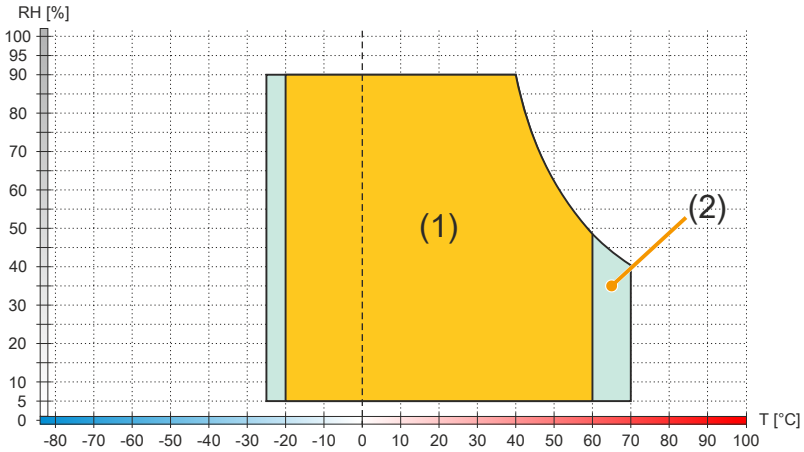


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

4.2.4 Interface options

Information:

It is important to note that not every interface option can be connected to interface slot IF1 and IFx. For additional information, see section "IF option slot(IF1, IFx)" on page 53.

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 an accessory is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck

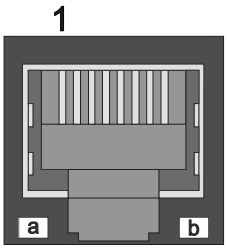
Order number	5ACCIF01.FPCC-000
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Battery-backed	No
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Interfaces	
POWERLINK	
Quantity	1
Type	Type 4 [1]
Variant	RJ45, 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 [2]
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch [3]
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) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).
2) CAN1: Galvanically isolated.
CAN2: Not galvanically isolated.
3) 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 "IF1".

POWERLINK - IF1[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 287	
LED "Link" (a)	**On**	**Active**
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)

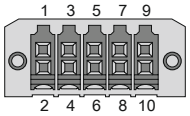


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.1.3.2 CAN bus 1 interface - Pinout

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

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

CAN bus 1 - IFx[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.

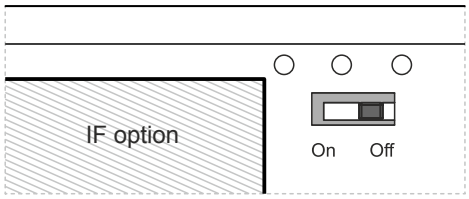
Bit timing register 0	Bit timing register 1	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

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 285.

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.



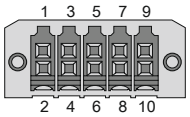
- ON: Switched on
- OFF (default): Switched off

4.2.4.1.3.3 CAN bus 2 interface - Pinout

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

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

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



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

CAN driver settings

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

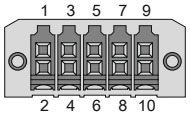
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

4.2.4.1.3.4 X2X Link master interface - Pinout

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

X2X Link master - IFx[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	-

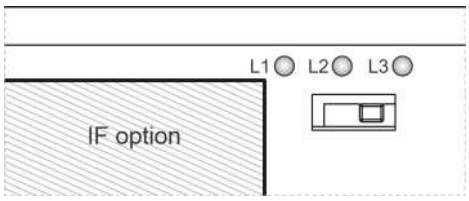


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface can only be used in Automation Runtime and is displayed as IF2 in Automation 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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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 an accessory is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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

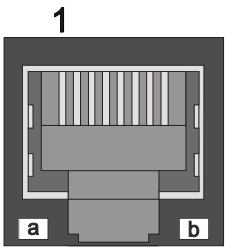
Order number	5ACCIF01.FPCS-000
POWERLINK	
Quantity	1
Type	Type 4 [1]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, not galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating 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) 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 "IF1".

POWERLINK - IF1[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)

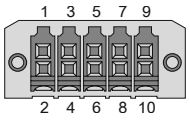


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.2.3.2 Serial interface COM - Pinout

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

Serial interface COM - IFx[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.

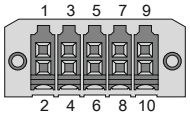
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

4.2.4.2.3.3 CAN bus interface - Pinout

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

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



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

CAN driver settings

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

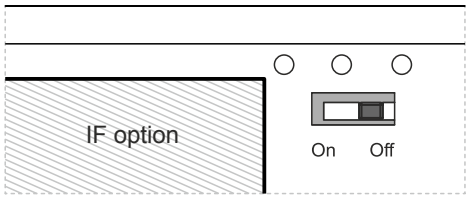
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

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:

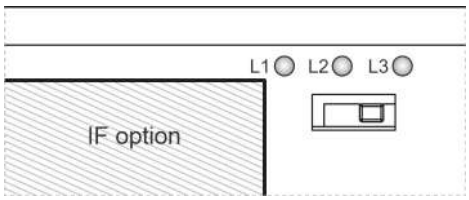
- ON: Activated
- OFF (default): Switched off



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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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 an accessory is used.

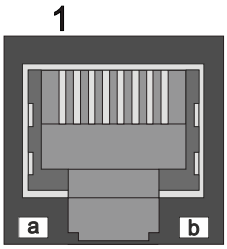
Order number	5ACCIF01.FPLK-000
General information	
LEDs	L1, L2, L3
B&R ID code	0xE9BA
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Battery-backed	No
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 1)
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) For additional information, see Automation Help (**Communication / POWERLINK / General information / Hardware - IF / LS**).

4.2.4.3.3.1 POWERLINK 1 interface - Pinout

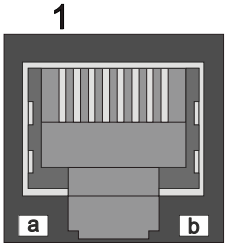
The POWERLINK 1 interface on the system unit is referred to as "IF1".

POWERLINK 1 - IF1 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 "IFx".

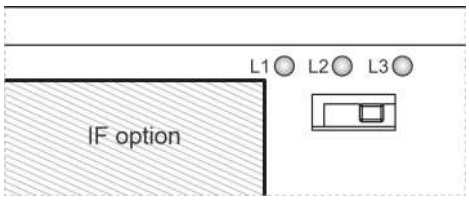
POWERLINK 2 - IFx 1)			
Variant	RJ45, female		
Wiring	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
LED status indicator (b)	**On**	**Off**	
Green	See status/error LED.		
LED "Link" (a)	**On**	**Active**	
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)	

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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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 an accessory is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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

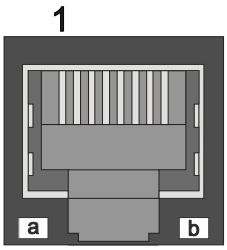
Order number	5ACCIF01.FPLS-000
POWERLINK	
Quantity	1
Type	Type 4 [1]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution 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) 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 "IF1".

POWERLINK - IF1[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)

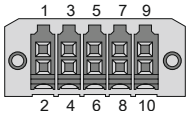


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.4.3.2 Serial interface COMA - Pinout

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

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



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

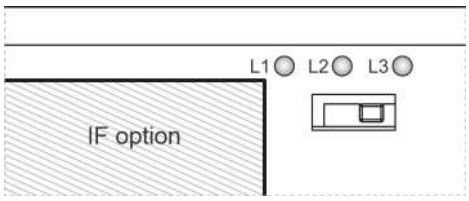
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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
- Windows Embedded 8.1 Industry
- Windows 7
- Windows Embedded Standard 7

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 an accessory is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Battery-backed	No
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

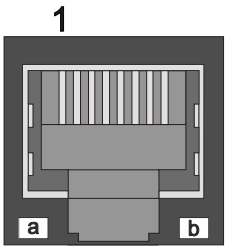
Order number	5ACCIF01.FPLS-001
POWERLINK	
Quantity	1
Type	Type 4 [1]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution 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) 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 "IF1".

POWERLINK - IF1[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)

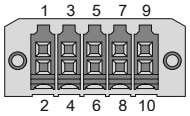


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.5.3.2 Serial interface COMA - Pinout

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

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



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

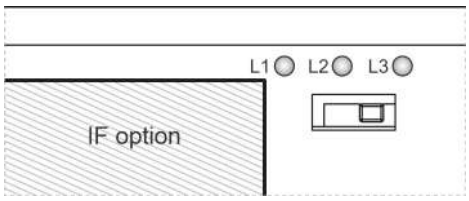
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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
- Windows Embedded 8.1 Industry
- Windows 7
- Windows Embedded Standard 7

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 an accessory is used.

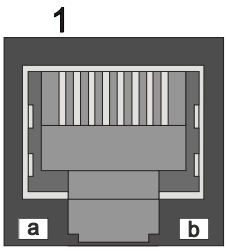
Order number	5ACCIF01.FPSC-000
General information	
LEDs	L1, L2, L3
B&R ID code	0xE53F
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1]
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) 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 "IF1".

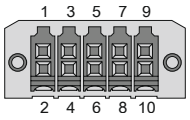
POWERLINK - IF1[1)2)]			
Variant	RJ45, female		
Wiring	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
LED status indicator (b)	**On**	**Off**	
Green	See status/error LED.		
LED "Link" (a)	**On**	**Active**	
Yellow	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)	

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 "IFx".

Serial interface COM - IFx[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.

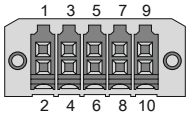
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

4.2.4.6.3.3 CAN bus interface - Pinout

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

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



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

CAN driver settings

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

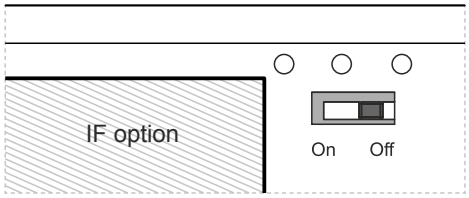
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

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:

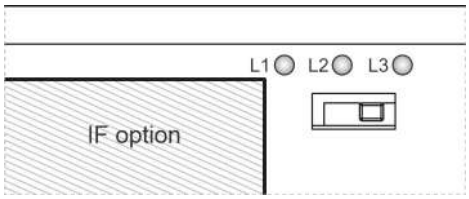
- ON: Activated
- OFF (default): Switched off



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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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 an accessory is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Battery-backed	No
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

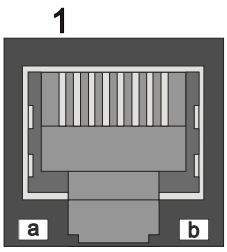
Order number	5ACCIF01.FPSC-001
POWERLINK	
Quantity	1
Type	Type 4 [1]
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
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) 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 "IF1".

POWERLINK - IF1[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)

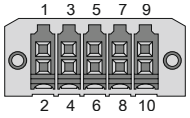


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) In Automation Studio / Automation Runtime, this interface is referred to as IF1.

4.2.4.7.3.2 Serial interface COM - Pinout

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

Serial interface COM - IFx[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.

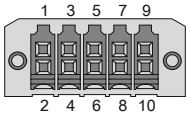
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

4.2.4.7.3.3 CAN bus interface - Pinout

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

CAN bus - IFx[1)2)]	
Variant	10-pin, male
Galvanic isolation	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

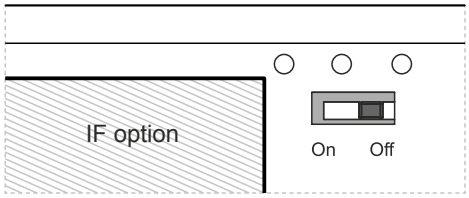
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "Cable data" on page 285.

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:

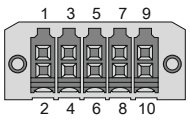
- ON: Activated
- OFF (default): Switched off



4.2.4.7.3.4 X2X Link master interface - Pinout

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

X2X Link master - IFx[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	-

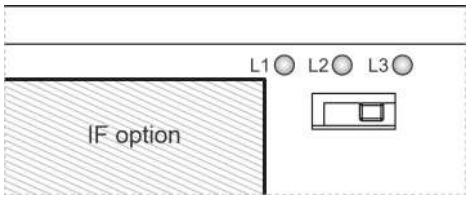


1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface can only be used in Automation Runtime and is displayed as IF2 in Automation 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 287.
		Off	POWERLINK status/error LED See "LED "S/E" (status/error LED)" on page 287.



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 287.

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 an accessory is used.

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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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 [1)]
Storage	-20 to 60°C
Transport	-20 to 60°C

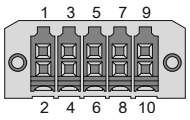
Order number	5ACCIF01.FSS0-000
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	25 g

1) 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 "IFx".

Serial interface COM A - IFx[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\



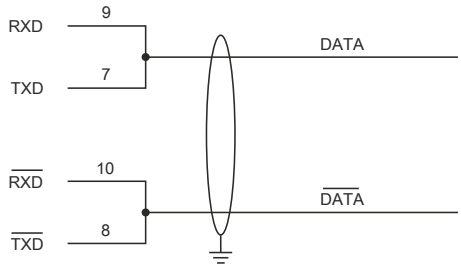
1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface (if available) is automatically enabled in BIOS as COM A with default 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 285.

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.

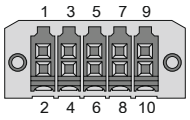
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

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 "IFx".

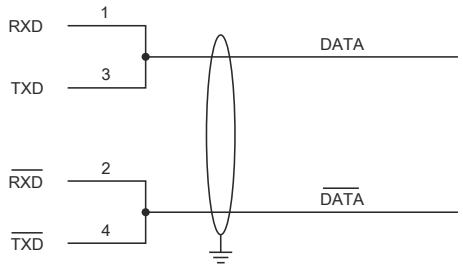
Serial interface COMD - IFx[1)2)3)]	
	RS422/RS485
Variant	10-pin, male
Type	RS422/RS485
Galvanic isolation	Yes
UART	16550-compatible, 16-byte FIFO buffer
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	**Pinout**
1	RXD
2	RXD\
3	TXD
4	TXD\
5	COM GND
6	-
7	-
8	-
9	-
10	-



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:10.
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.

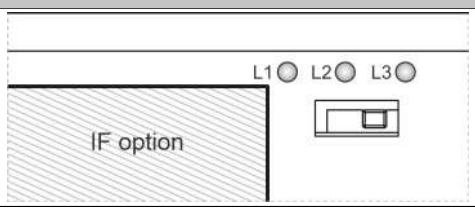
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

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.

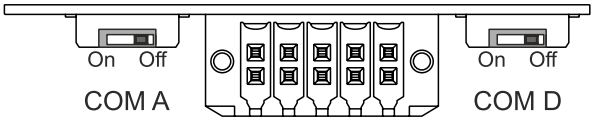
4.2.4.8.3.3 LED status indicators L2, L3

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 161) indicate the state of the assigned terminating resistor:

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

4.2.4.8.3.5 Firmware

In order to ensure the functionality of the interface option, at least the following firmware version (MTCX) must be installed on the PC:

- Automation PC 2100: V1.10
- Panel PC 2100: V1.10

The firmware can be downloaded from the B&R website (www.br-automation.com).

For information about upgrading the firmware, see section "Upgrading the firmware on the Panel PC 2100" on page 222.

4.2.4.8.3.6 Hardware

In order to ensure the functionality of the interface option, the PC must have at least the following hardware revision:

- 5PPC2100.BY01-000 - Rev. I0 or later
- 5PPC2100.BY11-000 - Rev. H0 or later
- 5PPC2100.BY22-000 - Rev. I0 or later
- 5PPC2100.BY34-000 - Rev. I0 or later
- 5PPC2100.BY44-000 - Rev. J0 or later
- 5PPC2100.BY48-000 - Rev. D0 or later

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
- Windows Embedded 8.1 Industry
- Windows 7
- Windows Embedded Standard 7

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 an accessory is used.

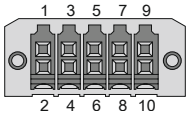
Order number	5ACCIF01.ICAN-000
General information	
LEDs	L1
B&R ID code	0xE9BB
Certifications	
CE	Yes
UKCA	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4
Interfaces	
CAN	
Quantity	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 [1]
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) 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 "IFx".

CAN bus - IFx[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

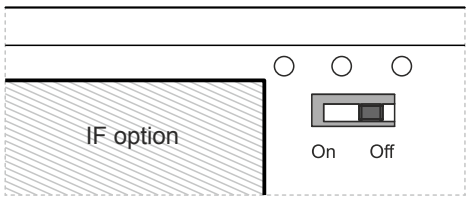
The baud rate can be set either with "predefined values" or via the "bit timing register".
For additional information about operation with Automation Runtime, see Automation Help.
For additional information about operation with approved GPOS, see the user's manual for the B&R CAN driver at www.br-automation.com.

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:

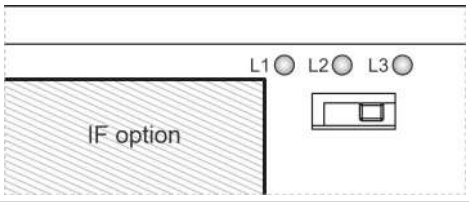
- ON: Activated
- OFF (default): Switched off



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		
-			



4.2.4.9.3.3 Firmware

In order to ensure the functionality of the interface option, at least the following firmware version (MTCX) must be installed on the PC:

- Automation PC 2100: V1.06
- Panel PC 2100: V1.06

The firmware can be downloaded from the B&R website (www.br-automation.com).

For information about upgrading the firmware, see section "Upgrading the firmware on the Panel PC 2100" on page 222.

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
- Windows 10
- Windows Embedded 8.1 Industry
- Windows 7
- Windows Embedded Standard 7

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:

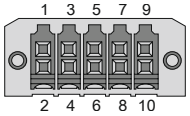
The following specified characteristic data, features and limit values are only valid for these individual components and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which an individual component is used.

Order number	5ACCIF01.IS00-000
General information	
LEDs	No
B&R ID code	0x2C43
Certifications	
CE	Yes
UKCA	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 "IFx".

Serial interface COMA - IFx[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 285.

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
- Windows Embedded 8.1 Industry
- Windows 7
- Windows Embedded Standard 7

4.2.5 CFast cards

Detailed information about compatible CFast cards is available on the B&R website (CFast cards).

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 14 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 266.

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 34.

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 - .
- 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

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.

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 2100 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:

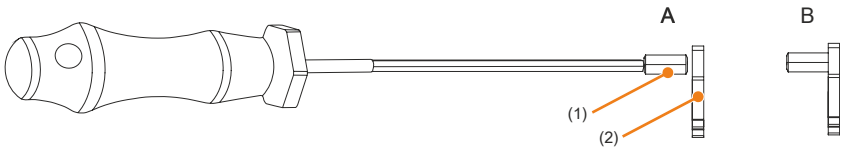
- 5AP923.1215-00
- 5AP923.1505-00
- 5AP923.1906-00
- 5AP933.156B-00
- 5AP933.185B-00
- 5AP933.215C-00
- 5AP933.240C-00

Notice!

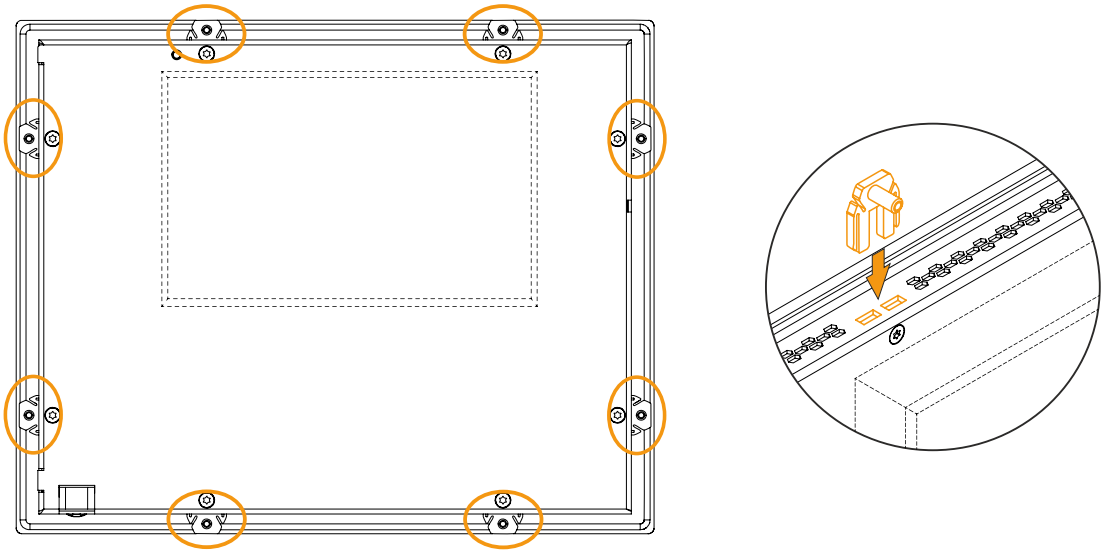
All the included retaining clips and clamping blocks must be used during installation. Failure to do so can result in damage to property due to loss of leak tightness between the device and housing (pollution) or mechanical stress.

Procedure

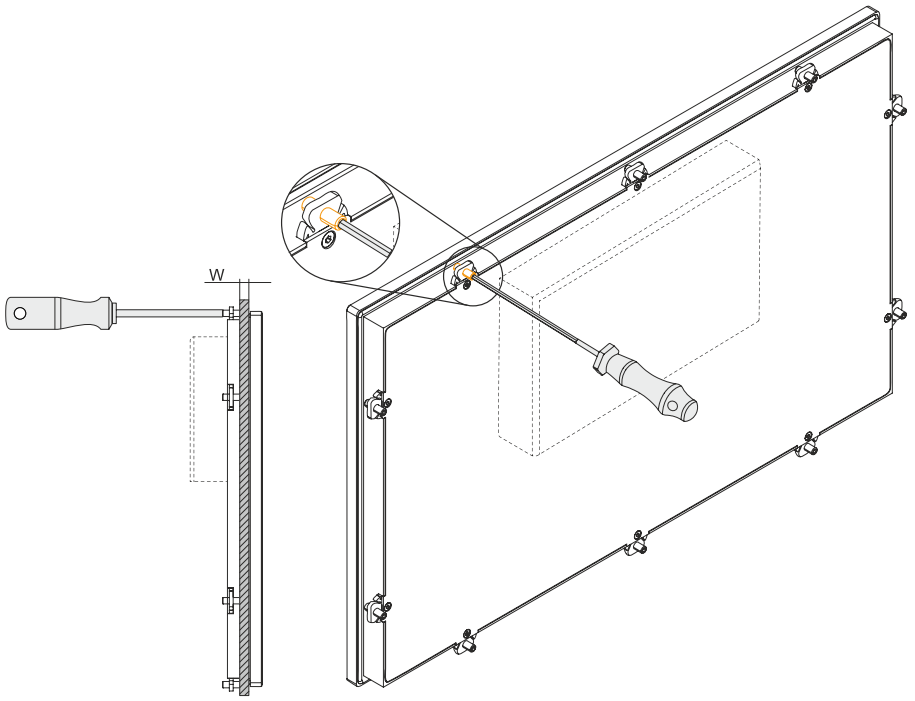
1. Check whether the supplied mounting screws (1) are screwed into the retaining clips (2). If this is not the case, then the mounting screws must be screwed into the retaining clips with a 2.5 mm hex screwdriver (A). The mounting screws are only permitted to be screwed in to the point where they do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



2. Insert the device into the prepared installation cutout (see "Mounting orientations" on page 28).
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 "Mounting orientations" on page 28	

5.1.2 Installing the Automation Panel 1000 with retaining clips

The Panel PC 2100 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:

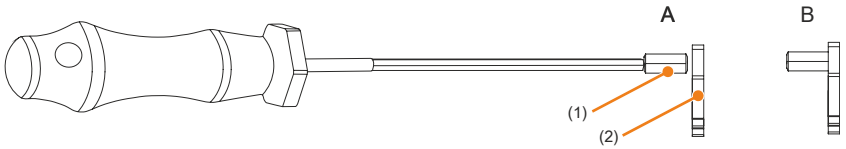
- 5AP11xx.0573-000
- 5AP11x0.101x-000
- 5AP11x0.121E-0x0
- 5AP1130.185C-000
- 5AP11x0.0702-000
- 5AP1120.1043-000
- 5AP11x0.156x-00x
- 5AP1180.1043-000

Notice!

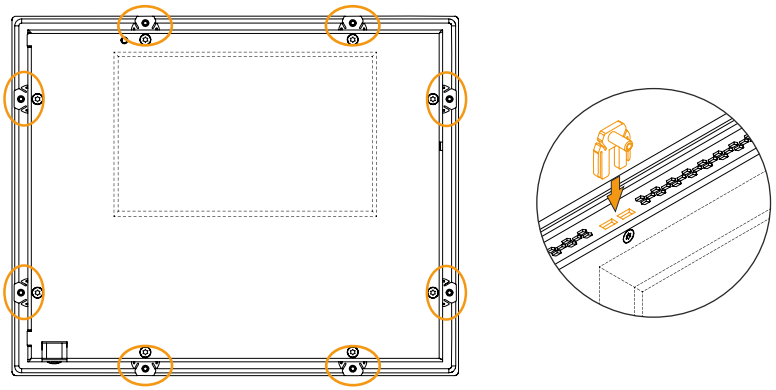
All the included retaining clips and clamping blocks must be used during installation. Failure to do so can result in damage to property due to loss of leak tightness between the device and housing (pollution) or mechanical stress.

Procedure

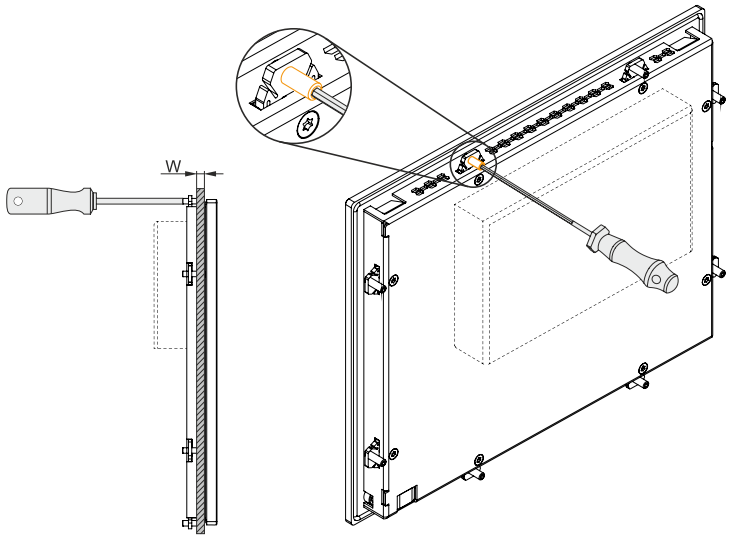
1. Check whether the supplied mounting screws (1) are screwed into the retaining clips (2). If this is not the case, then the mounting screws must be screwed into the retaining clips with a 2.5 mm hex screwdriver (A). The mounting screws are only permitted to be screwed in to the point where they do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



2. Insert the device into the prepared installation cutout (see "Mounting orientations" on page 28).
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 "Mounting orientations" on page 28	

5.1.3 Installing the Automation Panel 1000 with clamping blocks

The Panel PC 2100 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:

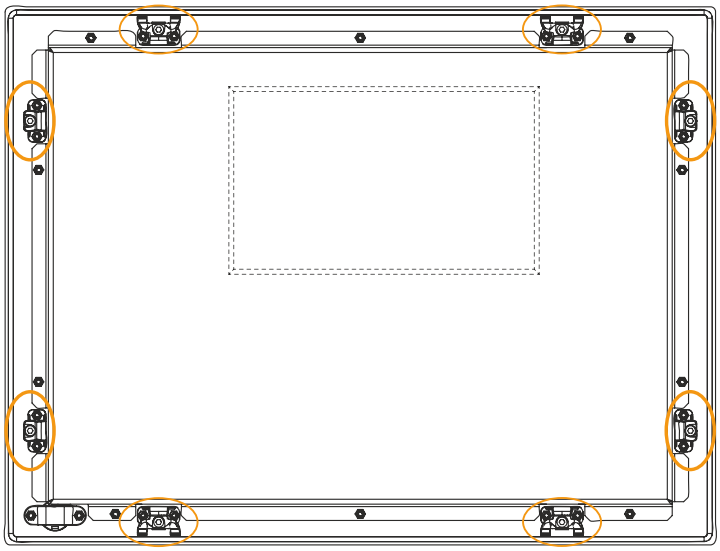
- 5AP118x.1043-000
- 5AP1120.1214-000
- 5AP1120.1505-000
- 5AP118x.1505-000
- 5AP1120.1906-000

Notice!

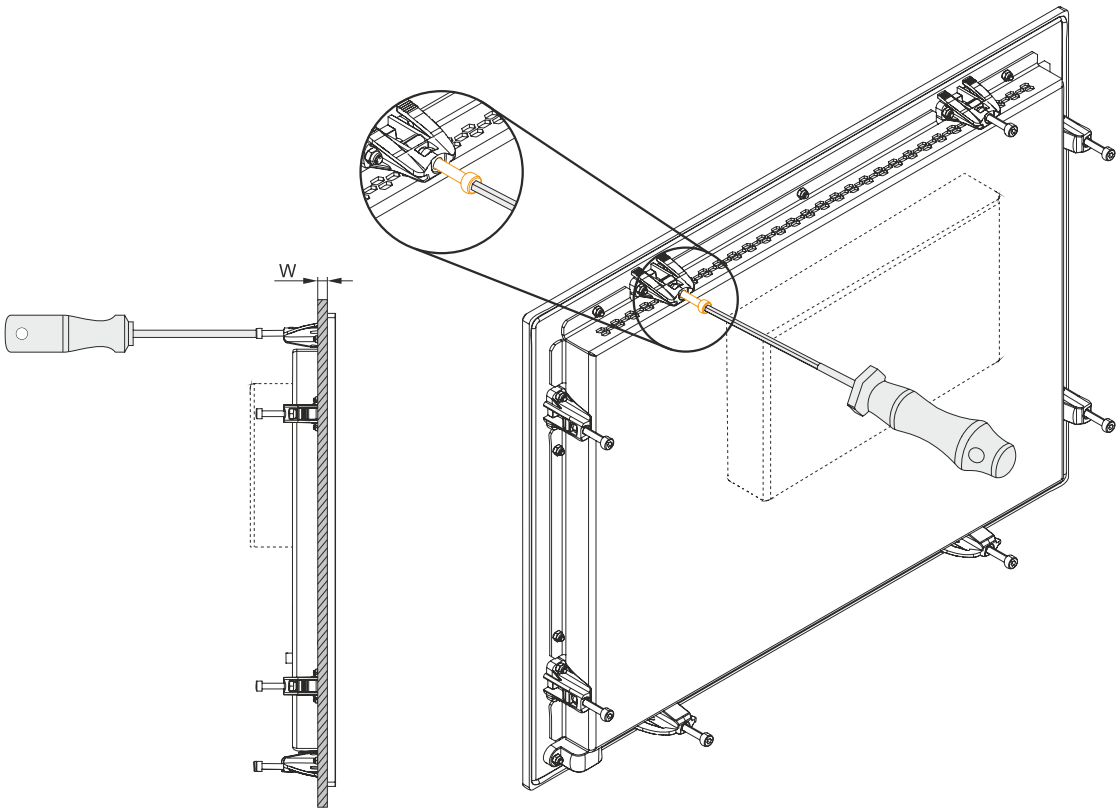
All the included retaining clips and clamping blocks must be used during installation. Failure to do so can result in damage to property due to loss of leak tightness between the device and housing (pollution) or mechanical stress.

Procedure

1. Insert the device into the prepared installation cutout (see "Mounting orientations" on page 28).



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 "Mounting orientations" on page 28	

5.1.4 Installation information for individual components

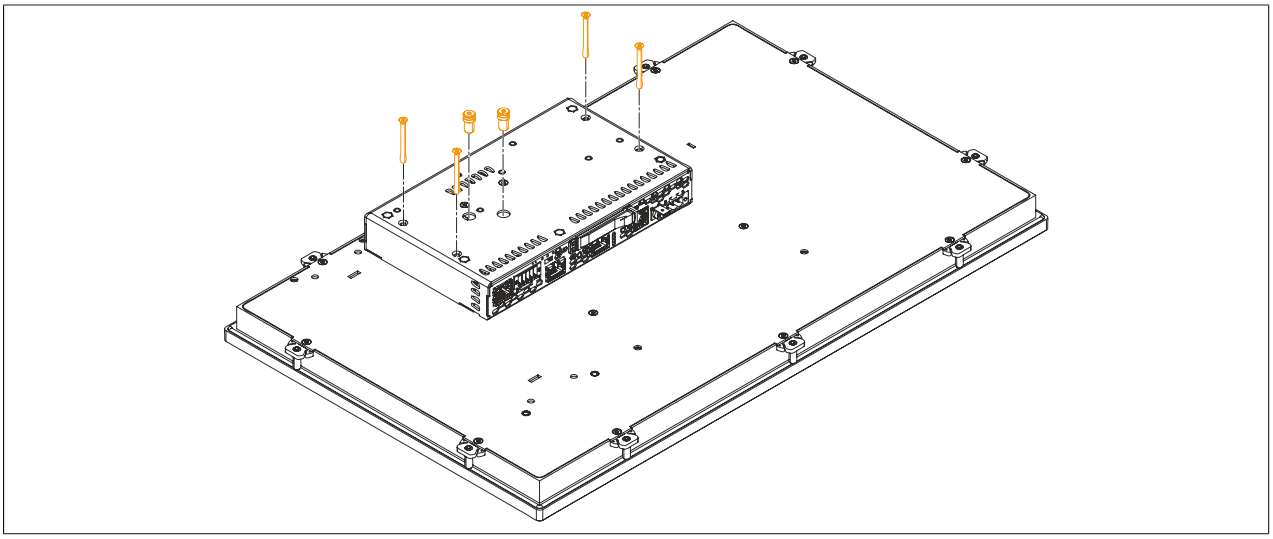
Information:

If the Panel PC 2100 is not delivered as a complete system but as individual components (or individual components are installed afterward), then these components must be enabled in BIOS. This is done by launching BIOS when booting the system, loading the default BIOS values and then saving the settings. For additional information, see "Exit" on page 217. This is required for the following individual components:

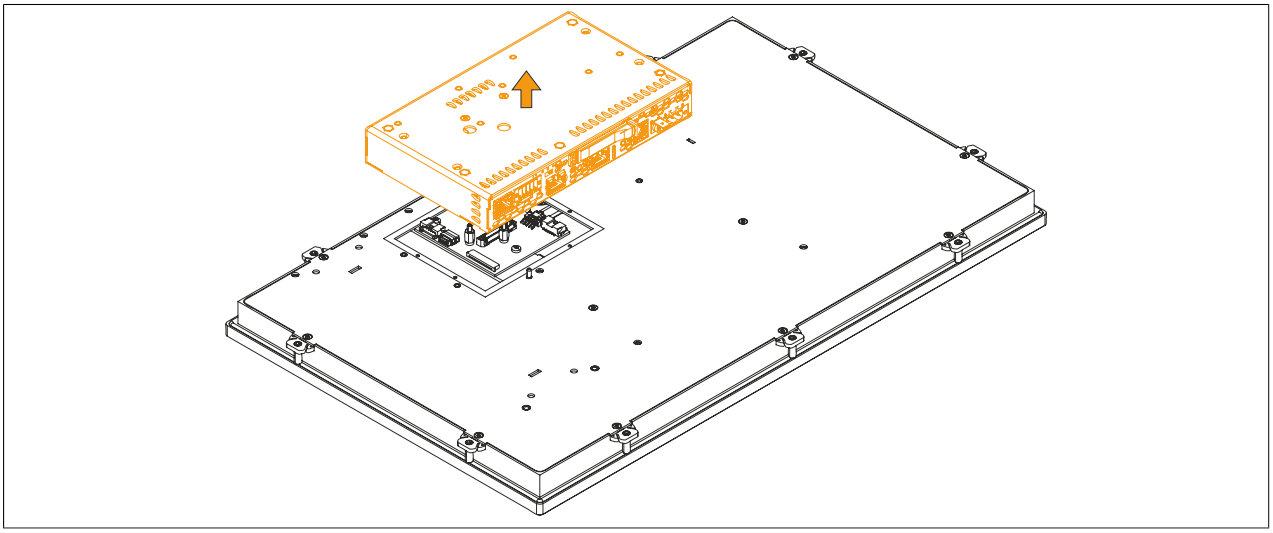
- **System unit**
- **Interface option**

5.1.5 Replacing the system unit

1. Disconnect the power supply to the Panel PC (disconnect the power cable). Isolate the system from all potential sources of electrical power!
2. Discharge any electrostatic charge on 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. Remove the Torx screws (T10) indicated in the following image.



6. The system unit can now be removed by pulling it straight up.



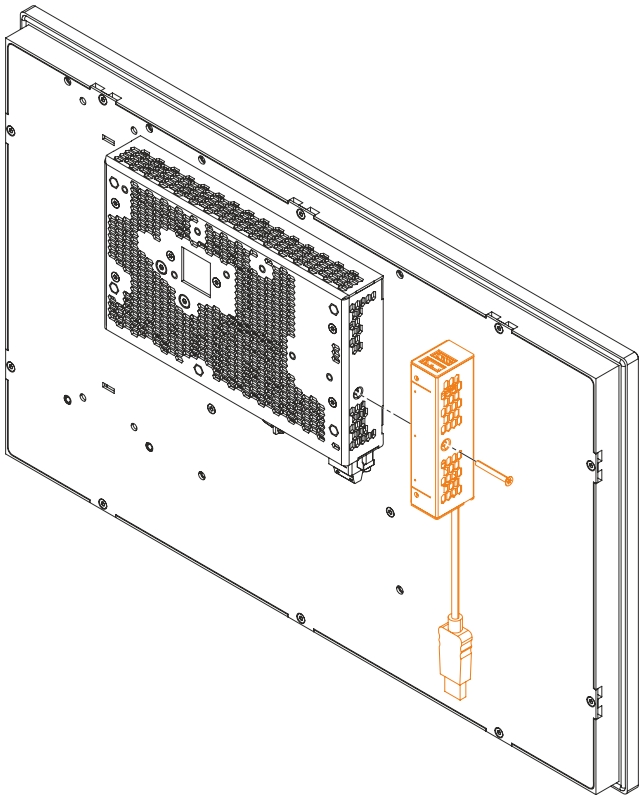
7. The system unit can now be replaced by following these steps in reverse order. The maximum tightening torque of the Torx screws (T10) is 0.5 Nm.
   Only the mounting materials included in delivery are permitted to be used to install the system unit.

5.1.6 Installing the USB hub

- USB hub 5ACCUSB4.0000-000 can be used starting with a display diagonal of the panel of at least 10.1".
- The USB hub can be installed starting with the following revisions of the system units:

System unit	Minimum revision	System unit	Minimum revision
5PPC2100.BY01-000	F0	5PPC2100.BY11-000	F0
5PPC2100.BY22-000	F0	5PPC2100.BY34-000	F0
5PPC2100.BY44-000	G0	5PPC2100.BY48-000	A0

1. Install the 4-port USB hub on the side of the system unit using the Torx screws (T10) supplied, tightening torque 0.55 Nm. The mounting direction of the USB hub must be taken into account in order to be able to connect the USB cable to the PPC2100 later.



2. Connect the USB cable attached to the USB hub to the USB2 interface of 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!

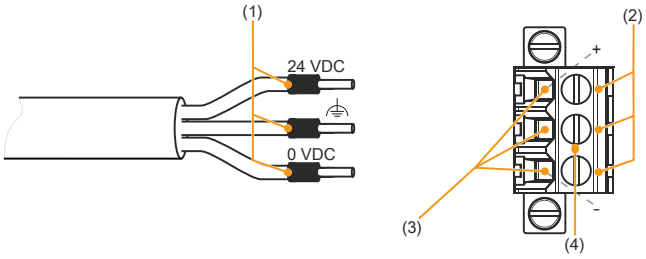
The pinout of the power supply interface must be observed!

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

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

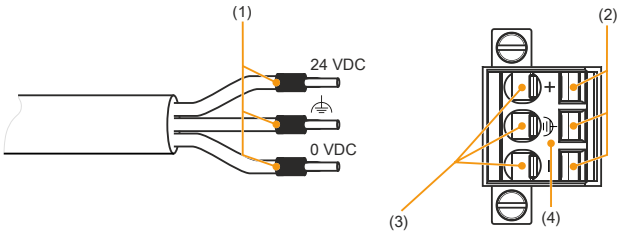
Installing screw clamp terminal block 0TB103.9

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.

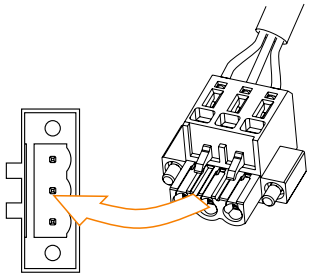


5.2.1.2 Connecting the power supply to a B&R device

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).



5.2.2 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.

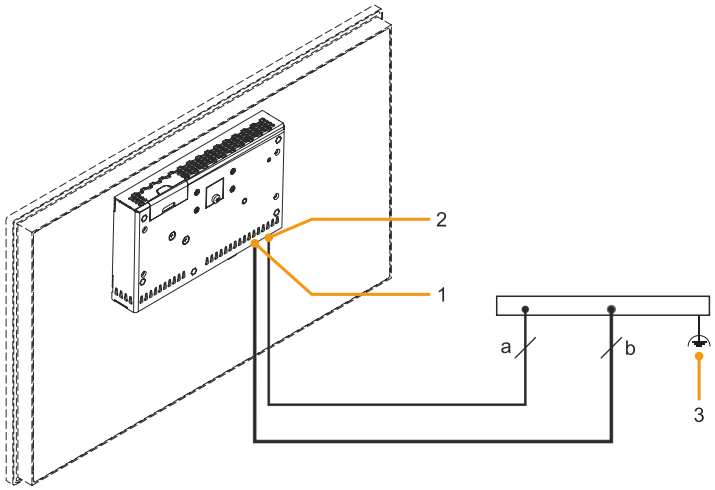
The device is equipped with the following functional ground connections:

- 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 with 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 implemented using shielded lines.

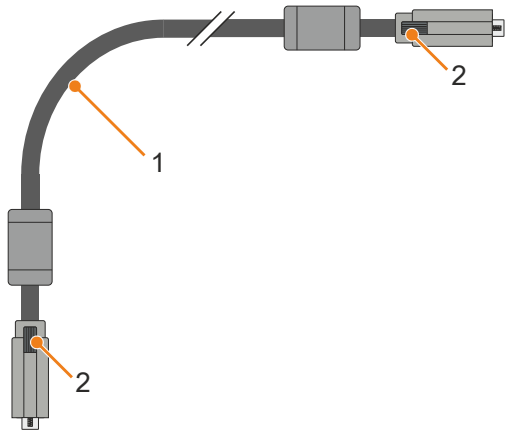


Legend					
1	Ground connection ⏚	2	Power supply connection +24 VDC pin 2	3	Central grounding point
a	At least 1.5 mm²	b	At least 2.5 mm²		-

Legend			
1	Ground connection ⏚	2	Central grounding point
a	At least 2.5 mm²		-

5.3 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

Information:

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

6.2 Switching on the device for the first time

6.2.1 General information before switching on the device

Checklist

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

- Have the installation instructions been observed as described in "Installation and wiring" on page 169?
- Have the permissible ambient conditions and environmental conditions for the device been taken into account?
- Is the power supply connected correctly and have the values been checked?
- Is the ground cable correctly connected to the ground connection?
- Before installing additional hardware, the device must have been started up.

Caution!

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

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

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

Requirements

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

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

6.2.2 Switching on the device

Procedure

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

6.3 General instructions about the procedure for temperature testing

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.

6.3.1 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.

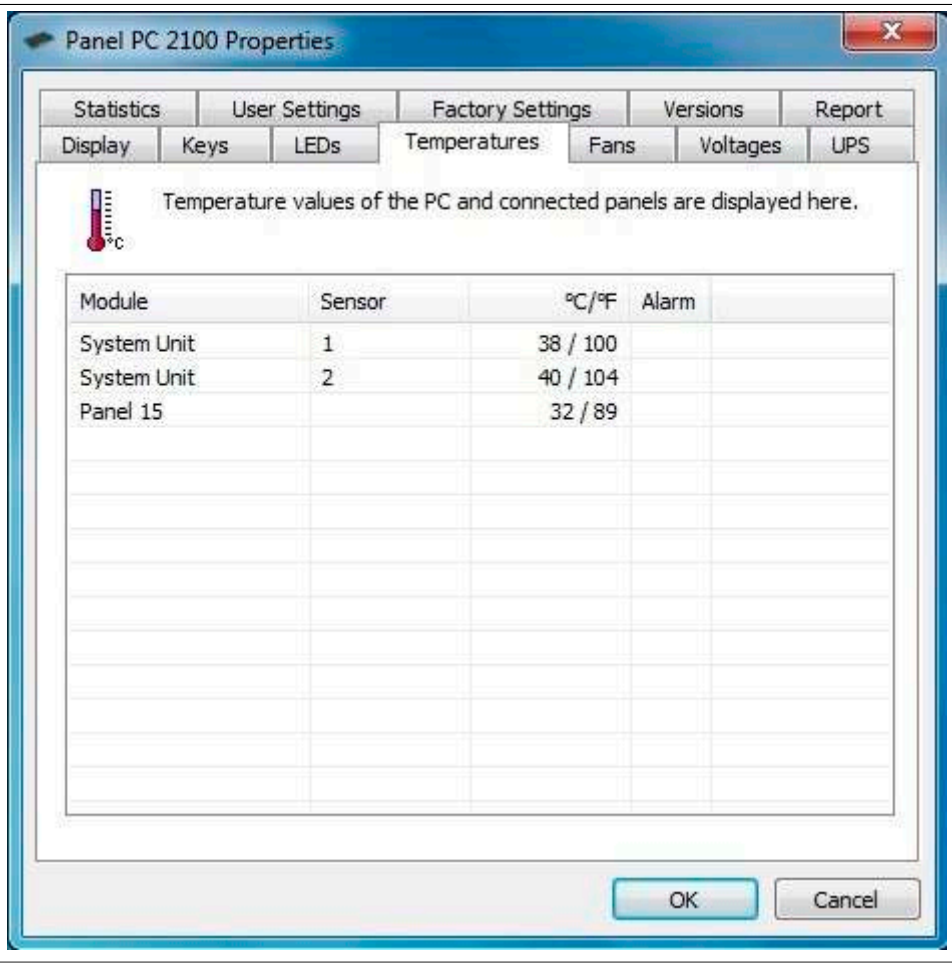
For position specifications of the temperature sensors and their maximum specified temperatures, see section "Temperature sensor positions" on page 41.

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

6.3.2 Evaluating temperatures in Windows operating systems

6.3.2.1 Evaluating with the B&R Control Center

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



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 available from the B&R website (www.br-automation.com).

6.3.2.2 Evaluating with the BurnInTest tool from PassMark

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

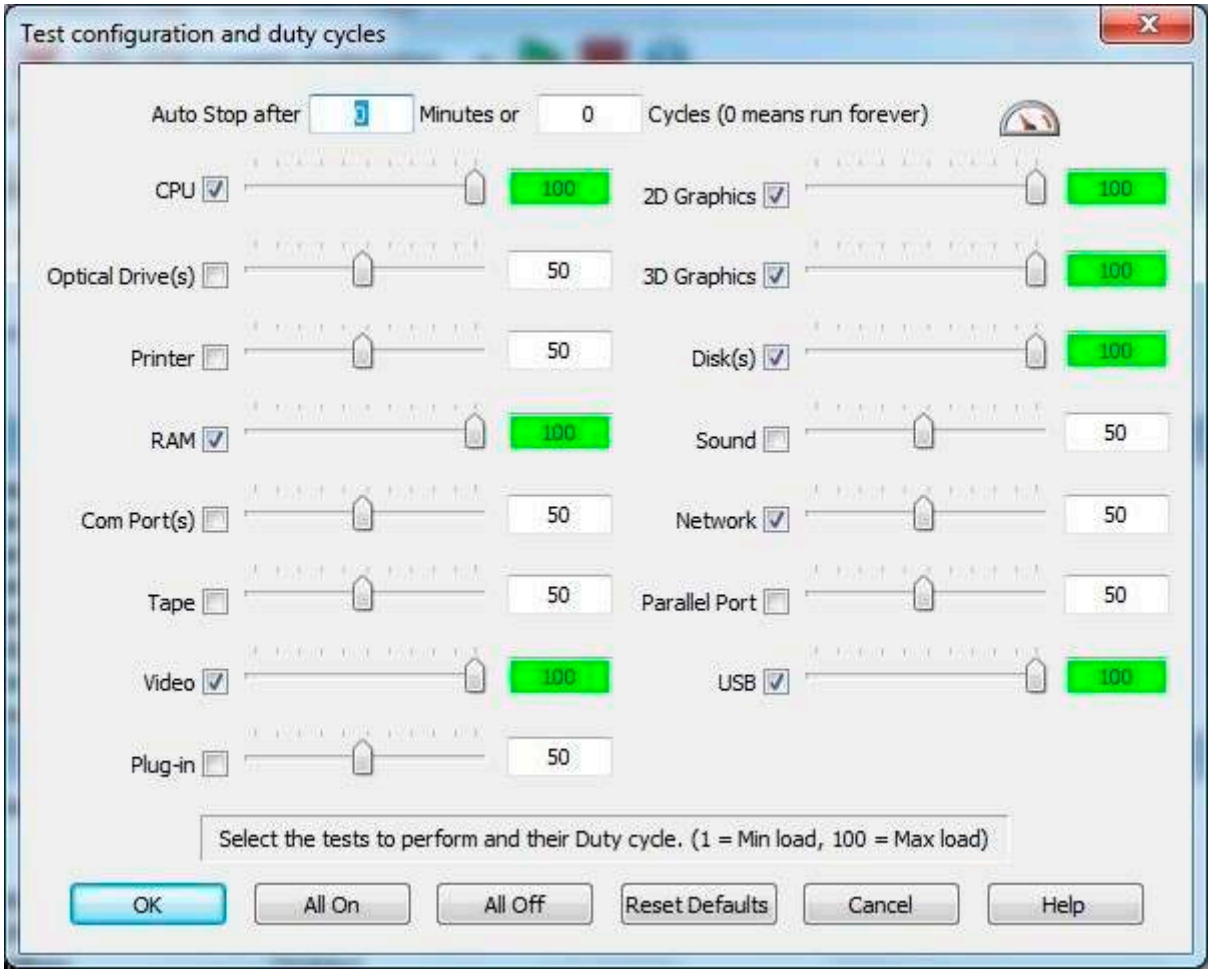
The BurnInTest software tool is available in standard and professional versions. In addition to the software package, various loopback adapters (serial, parallel, USB, etc.) and test CDs or DVDs are also available. Depending on the expansion level of the software and available loopback adapters, a correspondingly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

Information:

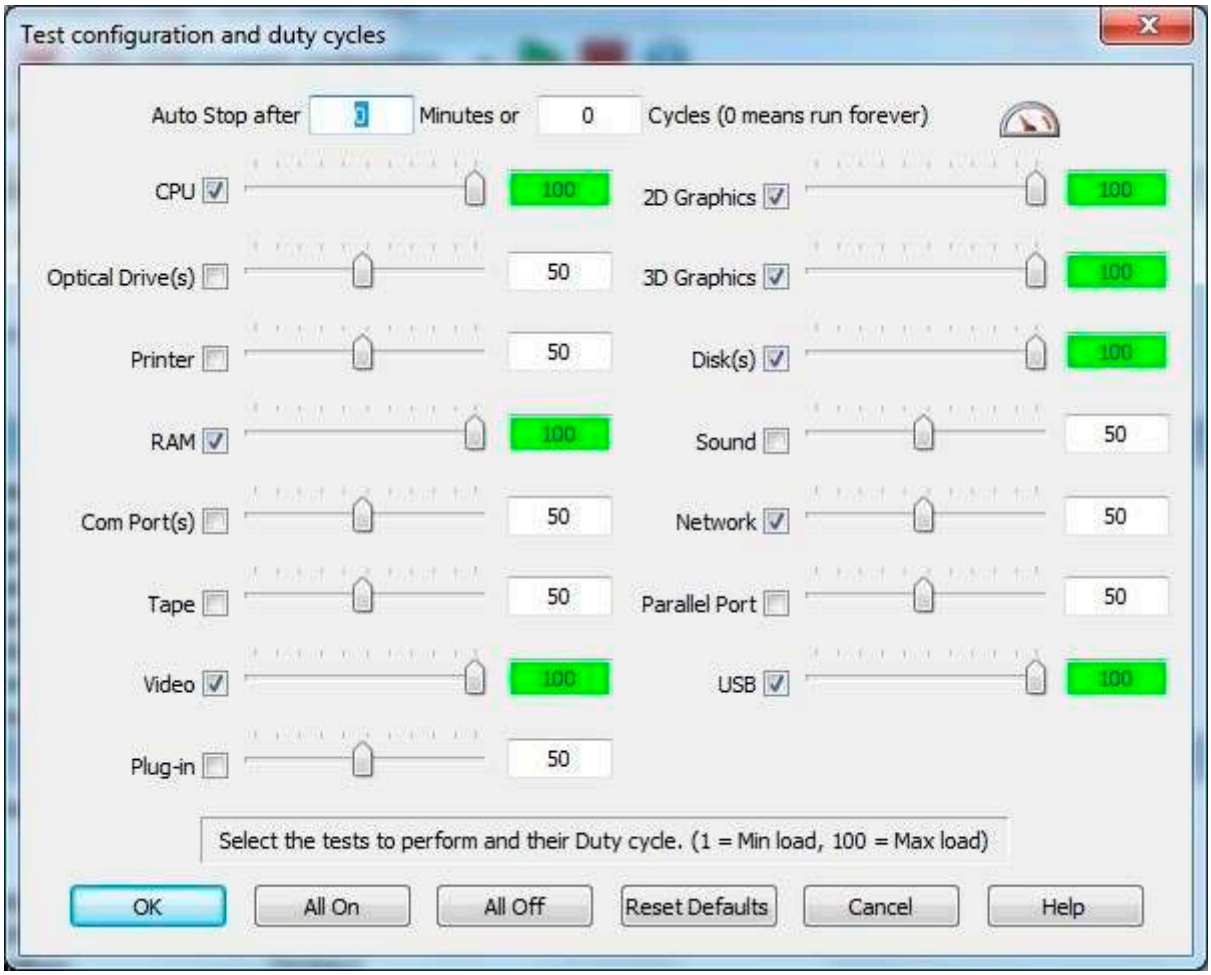
Loopback adapters are also available from PassMark. For additional information, see www.passmark.com.

The following screenshots refer to PassMark BurnInTest Pro V7.1 using a PPC2100 without IF options.

Overview of settings:



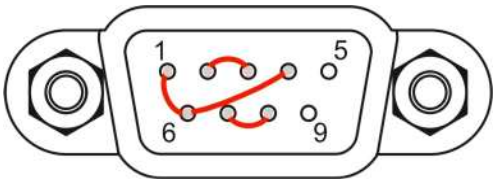
Test overview:



Depending on the availability of the loopback adapters and DVDs, appropriate fine tuning must be carried out in the respective test properties.

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.



6.3.3 Evaluating temperatures in other operating systems

Implementation instructions and sample program are available for evaluating in other operating systems. These can be used to create customized functionality.

Sample programs and implementation instructions can be downloaded at no cost directly from the Downloads section of the B&R website (www.br-automation.com).

6.3.4 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.

6.4 Touch screen calibration

B&R panels are hardware-calibrated at the factory. This means that recalibration is not usually necessary.

6.4.1 Single-touch (analog resistive)

Recalibration is generally not necessary, but B&R recommends recalibration in order to achieve the best results and to adapt the touch screen to the user's needs.

6.4.1.1 Windows 10 IoT Enterprise 2016 LTSB

After starting Windows 10 IoT Enterprise 2016 LTSB 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).

6.4.1.2 Windows 10 IoT Enterprise 2015 LTSB

After starting Windows 10 IoT Enterprise 2015 LTSB 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).

6.4.1.3 Windows Embedded 8.1 Industry Pro

After starting Windows Embedded 8.1 Industry Pro on the Panel PC for the first time, the corresponding 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).

6.4.1.4 Windows 7 Professional / Ultimate

After installing Windows 7 on the device, the touch screen driver must be installed in order 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).

6.4.1.5 Windows Embedded Standard 7 Embedded / Premium

A touch screen driver will be installed automatically if a touch controller is detected during the Windows Embedded Standard 7 installation.

The touch screen driver must be installed manually if a touch screen controller was not detected when installing Windows Embedded Standard 7 or if an Automation Panel has been connected after installation. The appropriate driver is available for download in the Downloads section of the B&R website (www.br-automation.com).

6.4.2 Multi-touch (projected capacitive - PCT)

6.4.2.1 Windows 10 IoT Enterprise 2016 LTSB

Microsoft multi-touch drivers are installed on the device during installation of Windows 10 IoT Enterprise 2016 LTSB. After successful installation, the device is immediately ready for operation.

6.4.2.2 Windows 10 IoT Enterprise 2015 LTSB

Microsoft multi-touch drivers are installed on the device during installation of Windows 10 IoT Enterprise 2015 LTSB. After successful installation, the device is immediately ready for operation.

6.4.2.3 Windows Embedded 8.1 Industry Pro

Microsoft multi-touch drivers are installed on the device during installation of Windows Embedded 8.1 Industry Pro. After successful installation, the device is immediately ready for operation.

6.4.2.4 Windows 7 Professional / Ultimate

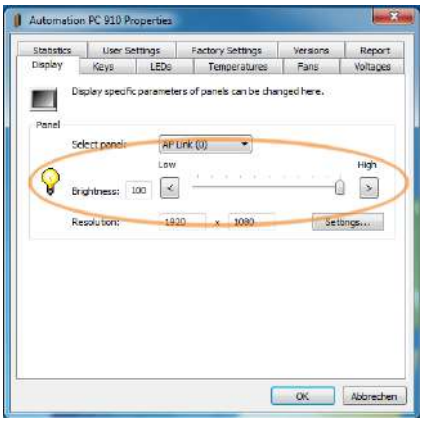
Microsoft multi-touch drivers are installed on the device during installation of Windows 7. After successful installation, the device is immediately ready for operation.

6.4.2.5 Windows Embedded Standard 7 Premium

Microsoft multi-touch drivers are installed on the device during installation of Windows Embedded Standard 7 Premium. After successful installation, the device is immediately ready for operation.

6.5 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.

6.6 Known problems / Characteristics

- CAN IF option 5ACCIF01.ICAN-000 is supported in Windows 7 and later by PVI V4.2.5 or Windows CAN driver V3.0.
- 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.
- If USB 3.0 should be used, XHCI mode must be set in the "USB configuration" for the following operating systems:
    - Windows 10 or Windows 8.1 to "Enabled"
    - Windows 7 to "Smart auto"

  If XHCI mode is set to "Smart auto" in Windows 8.1 or Windows 10, then only USB 2.0 is supported. The default value for setting "XHCI mode" is "Smart auto".
- If problems occur during shutdown or rebooting in Linux for B&R, the USB 3.0 function can be disabled as a possible workaround. To do this, the XHCI controller must be set to "Disabled" in the BIOS USB configuration.
- To slightly improve the real-time behavior (jitter) of the Automation Runtime Windows (ARwin) or Automation Runtime Embedded (ARemb) with a graphics-intensive application, the BIOS setting *Advanced - Graphics (IGD) Configuration - IGD Turbo* can be set to *Disabled*. If the BIOS setting *Advanced - Graphics (IGD) Configuration - IGD Turbo* is set to *Disabled*, the graphics performance of the system is noticeably reduced.
- MTCX version 1.25 or higher must be used starting with the following revisions. New devices are delivered with the corresponding MTCX version.

Order number	Rev.	Order number	Rev.	Order number	Rev.
5PPC2100.BY01-000	N0	5PPC2100.BY22-000	N0	5PPC2100.BY44-000	N0
5PPC2100.BY11-000	M0	5PPC2100.BY34-000	N0	5PPC2100.BY48-000	J0

  If an MTCX version less than 1.25 is used on a device with the previously mentioned revisions, the system unit does not provide correct temperature values from system unit sensors 1 and 2.
  Projects in Automation Studio must be updated with the following HWX upgrades or higher:

Order number	HWX	Order number	HWX	Order number	HWX
5PPC2100.BY01-000	V1.4.2.0	5PPC2100.BY22-000	V2.1.2.0	5PPC2100.BY44-000	V2.1.2.0
5PPC2100.BY11-000	V1.4.2.0	5PPC2100.BY34-000	V2.1.2.0	5PPC2100.BY48-000	V2.1.2.0

7 Software

7.1 BIOS options

Information:

The following figures, BIOS menu options and descriptions refer to BIOS version 1.44. It is therefore possible that these diagrams and BIOS descriptions will not correspond with the BIOS version actually installed. In addition, the BIOS menu options provided depend on the system configuration.

7.1.1 General information

BIOS is the abbreviation for "Basic Input and Output System". It is the basic standardized connection between user and system (hardware). This B&R industrial PC uses BIOS from Phoenix.

The BIOS Setup Utility allows you to modify basic system configuration settings. These settings are stored in the CMOS and EEPROM (as backup).

CMOS data is nonvolatile and remains stored on the B&R industrial PC for a certain amount of time even when the power is switched off (no 24 VDC power supply). For more information, see the technical data of the system unit.

Information:

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

7.1.2 BIOS Setup and start procedure

BIOS is enabled immediately after switching on the power supply of the B&R industrial PC or pressing the power button. A check takes place as to whether the setup data from the EEPROM is "OK". If "OK", the data is transferred to the CMOS. If "not OK", the CMOS data is checked for validity. If the CMOS data is also invalid, an error message is output and the boot procedure can be resumed without problems by pressing the <F1> key. To prevent an error message from appearing on each restart, launch the BIOS Setup utility by pressing <F2> and resave the settings.

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

When these "preparations" are completed, BIOS searches the system for an operating system in the available data storage devices (hard disk drive, floppy disk drive, etc.). BIOS starts the operating system and transfers to it control over system operations.

To enter BIOS Setup, the "F2" key must be pressed after the USB controller has been initialized as soon as the following message appears on the monitor (during POST): "F2 = Setup"

7.1.3 BIOS default settings

Setting options marked in bold represent the default value.

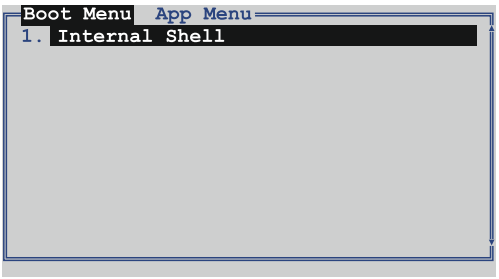
If function "Load setup defaults" is selected in the BIOS Setup main menu, or if "Exit" is selected (or F9 is pressed) in the individual setup screens, the default values are the optimized values that will be used.

7.1.4 BIOS Setup buttons

The following keys are enabled during POST:

Information:

The key signals of the USB keyboard are only accepted after initializing the USB controller.

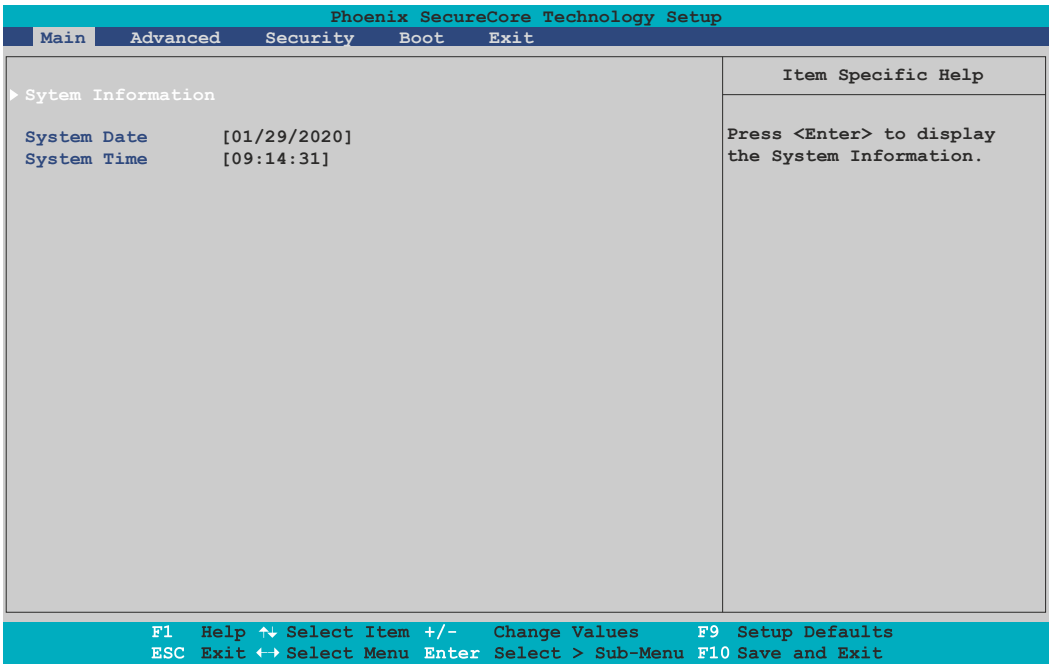
Keys	Function
F2	Access to the BIOS Setup menu.
F5	Opens the boot menu. This lists all bootable devices that are connected to the system. Selecting a device with cursor ↑, cursor ↓ and then pressing <ENTER> will boot from that device. 
<Pause>	The POST can be stopped with the <Pause> button. After pressing any other key, the POST continues to run.

The following keys can be used after entering BIOS Setup:

Key	Function
F1	General help.
Cursor ↑	Go to previous object.
Cursor ↓	Go to next object.
Cursor ←	Go to previous object.
Cursor →	Go to next object.
+-	Changes the setting of the selected function.
Enter	Switches to the selected menu.
Page ↑	Jumps to the first BIOS menu option or object.
Page ↓	Jumps to the last BIOS menu option or object.
Home	Jumps to the first BIOS menu option or object.
End	Jumps to the last BIOS menu option or object.
F7	Resets the changes.
F9	Loads and sets CMOS default values for all BIOS settings.
F10	Saves and closes.
Esc	Exits the submenu.

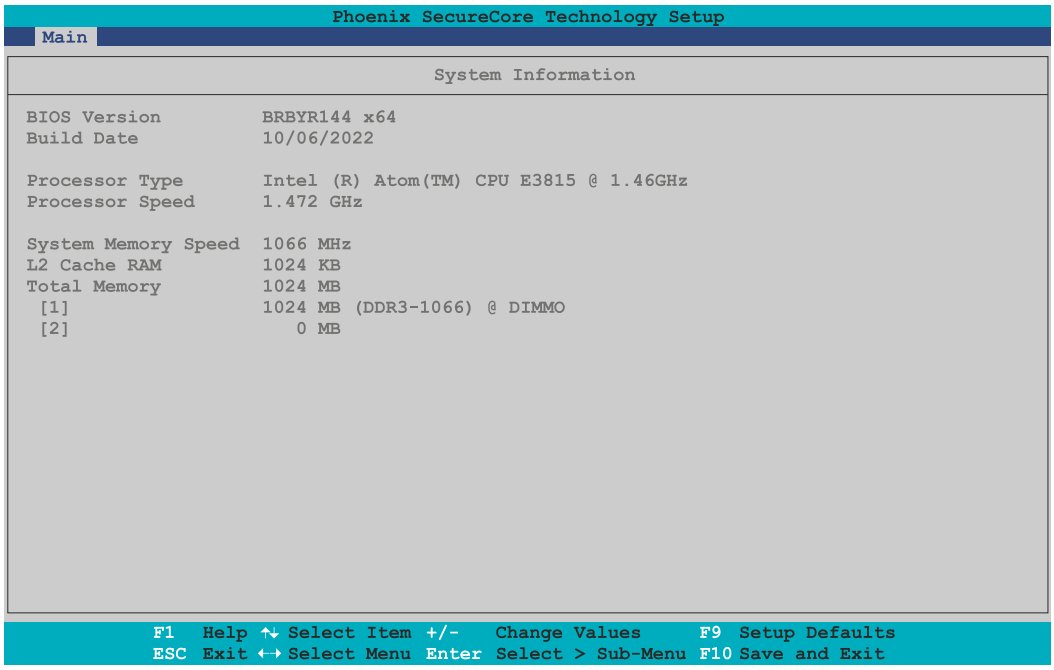
7.1.5 Main

The BIOS Setup main menu appears immediately after the F2 button is pressed during system startup.



BIOS setting	Explanation	Configuration options	Effect
System information	Displays information about the chipset, CPU board and main memory.	Enter	Opens this submenu See "System information" on page 192.
System date	The currently configured system date. Buffered after the system is switched off. For details, see technical data of the system unit.	Change the system date	Sets the system date in the format Month:Day:Year (mm:dd:yyyy).
System time	The currently configured system time setting. Buffered after the system is switched off. For details, see technical data of the system unit.	Change the system time	Sets the system time in the format Hour:Minute:Second (hh:mm:ss).

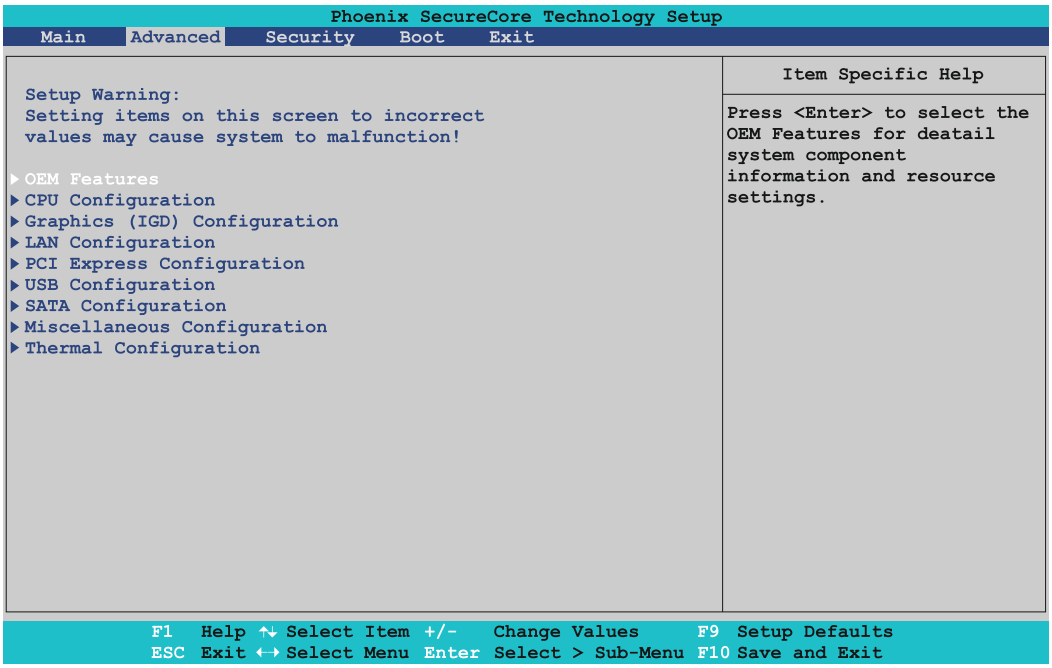
7.1.5.1 System information



BIOS setting	Explanation	Configuration options	Effect
BIOS version	Displays the BIOS version.	None	-
Build time	Displays the date the BIOS was created.	None	-
Processor type	Displays the processor type.	None	-
Processor speed	Displays the processor frequency.	None	-
System memory speed	Displays the main memory frequency.	None	-

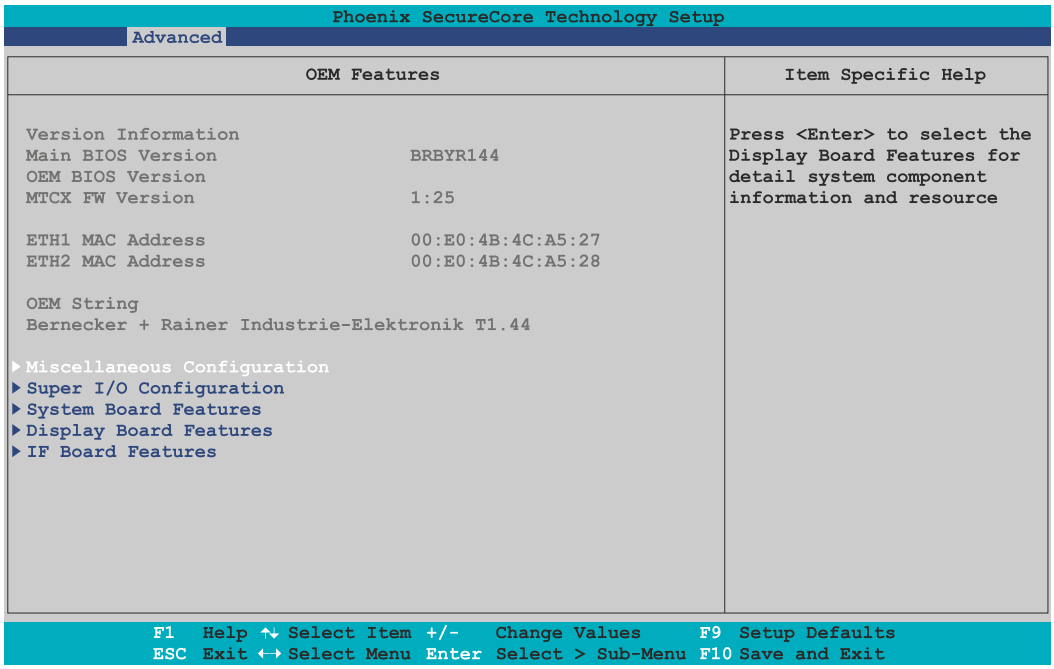
BIOS setting	Explanation	Configuration options	Effect
L2 cache RAM	Displays the L2 cache size.	None	-
Total memory	Displays the total main memory size.	None	-
[1]	Displays the main memory size in slot 1.	None	-
[2]	Displays the main memory size in slot 2.	None	-

7.1.6 Advanced



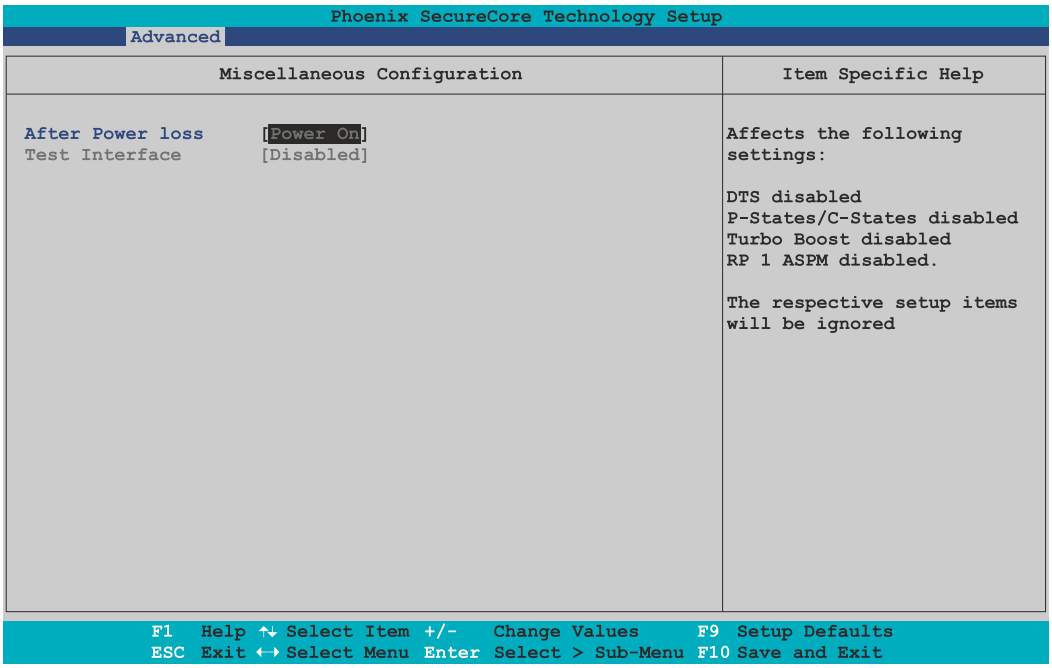
BIOS setting	Explanation	Configuration options	Effect
OEM features	Configures OEM features.	Enter	Opens this submenu See "OEM features" on page 195.
CPU configuration	Configures CPU settings.	Enter	Opens this submenu See "CPU configuration" on page 202.
Graphics (IGD) configuration	Configures the graphic settings.	Enter	Opens this submenu See "Graphics (IGD) configuration" on page 204.
LAN configuration	Configures LAN settings.	Enter	Opens this submenu See "LAN" on page 206.
PCI Express configuration	Configures PCI Express settings.	Enter	Opens this submenu See "PCI express configuration" on page 207.
USB configuration	Configures USB settings.	Enter	Opens this submenu See "USB configuration" on page 209.
SATA configuration	Configures SATA settings.	Enter	Opens this submenu See "SATA configuration" on page 210.
Miscellaneous configuration	Configures various settings.	Enter	Opens this submenu See "Miscellaneous configuration" on page 210.
Thermal configuration	Configures the temperature settings.	Enter	Opens this submenu See "Thermal configuration" on page 211.

7.1.6.1 OEM features



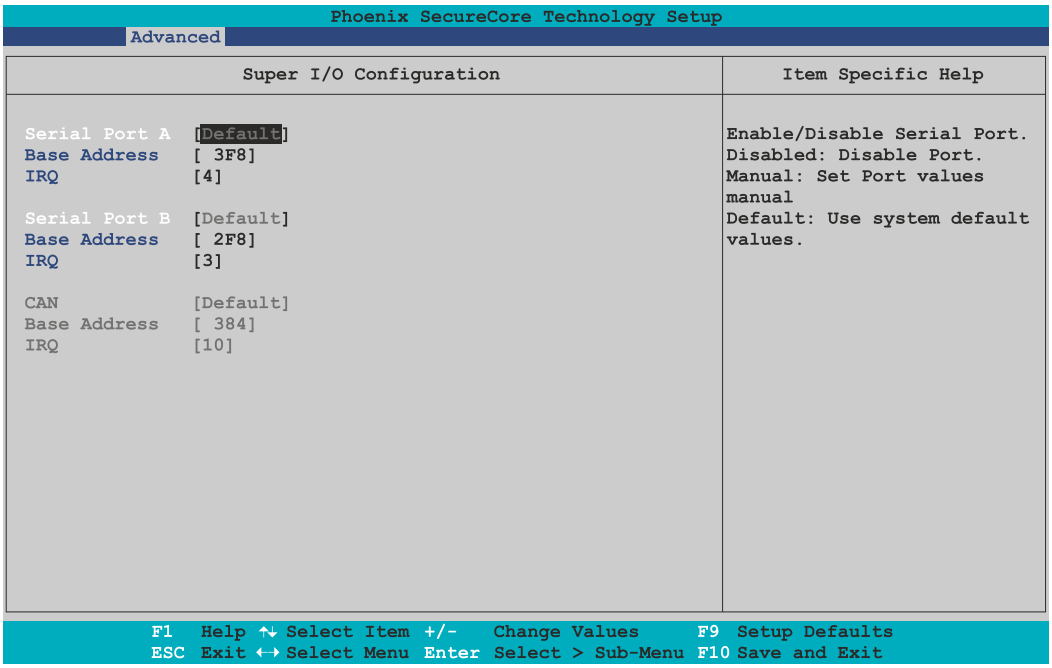
BIOS setting	Explanation	Configuration options	Effect
Version information		None	-
Main BIOS version	Displays the installed B&R BIOS version.	None	-
OEM BIOS version		None	-
MTCX firmware version	Displays the installed MTCX version.	None	-
ETH1 MAC address	Displays the assigned MAC address for the ETH1 interface.	None	-
ETH2 MAC address	Displays the assigned MAC address for the ETH2 interface.	None	-
OEM string	Displays the OEM string.	None	-
Miscellaneous configuration	Configures various settings.	Enter	Opens this submenu See "Miscellaneous configuration" on page 196.
Super I/O configuration	Configures special settings for the interfaces.	Enter	Opens this submenu See "Super I/O configuration" on page 196.
System board features	Displays device-specific information for the system unit.	Enter	Opens this submenu See "System board features" on page 197.
Display board features	Displays device-specific information for the display.	Enter	Opens this submenu See "Display board features" on page 199.
IF board features	Displays device-specific information for the IF option.	Enter	Opens this submenu See "IF board features" on page 201.

7.1.6.1.1 Miscellaneous configuration



BIOS setting	Explanation	Configuration options	Effect
After power loss	Option for setting the behavior after a power loss.	Stay off	The PC remains switched off during a power on.
		Power on	The PC is restarted during a power on.
Test interface		None	-

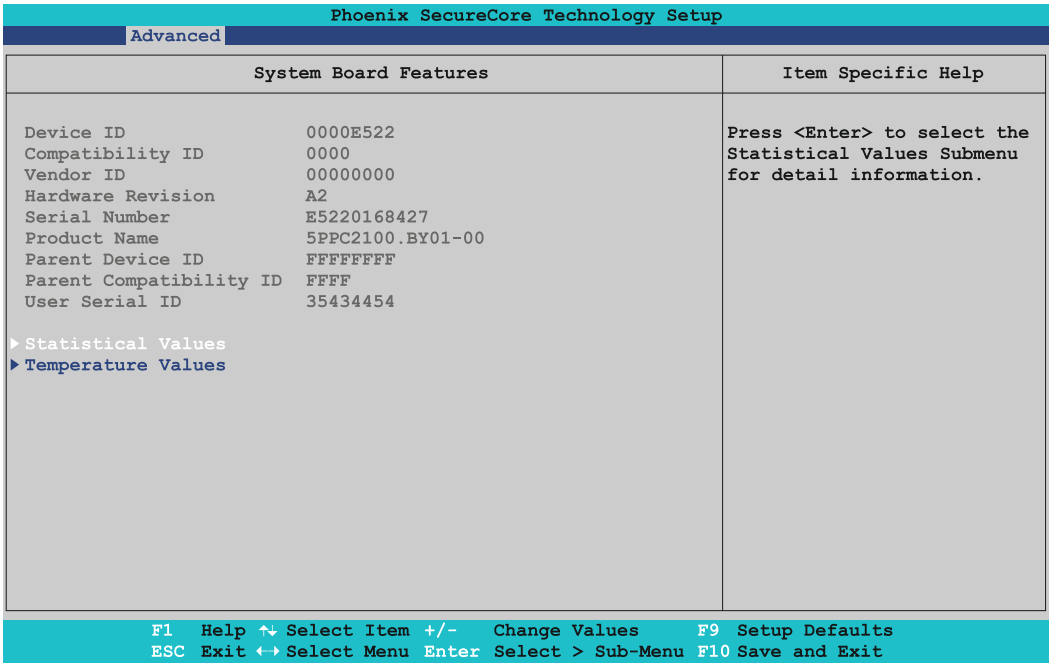
7.1.6.1.2 Super I/O configuration



BIOS setting	Explanation	Configuration options	Effect
Serial port A	Setting for the COM interface of the IF option.	Disabled	Disables the interface.
		Manual	Manual settings for "Base address" and "IRQ" are possible.
		Default	Default settings are used.
Base address	Sets or displays the I/O address.	**3F8h**	Default setting
		Any	Any I/O address can be entered.
IRQ	Sets or displays the IRQ.	3, **4**, 5, 6, 7, 10, 11, 12, 14, 15	Manual assignment.
Serial port B	Setting for the onboard touch screen.	Disabled	Disables the interface.
		Manual	Manual settings for "Base address" and "IRQ" are possible.
		Default	Default settings are used.
Base address	Sets or displays the I/O address.	**2F8h**	Default setting
		Any	Any I/O address can be entered.

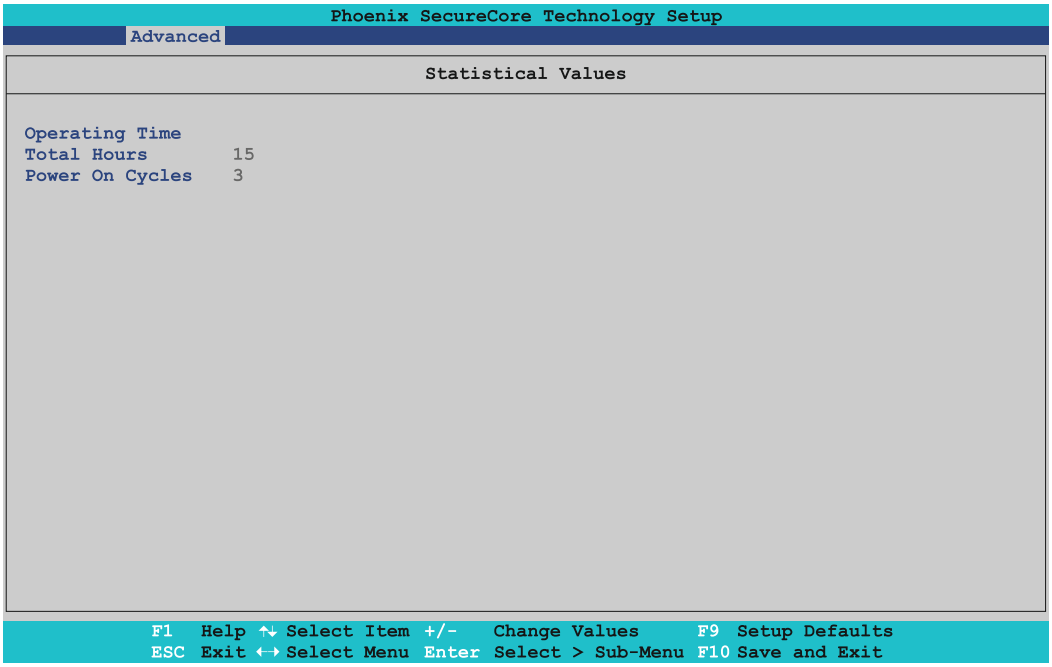
BIOS setting	Explanation	Configuration options	Effect
IRQ	Sets or displays the IRQ.	**3**, 4, 5, 6, 7, 10, 11, 12, 14, 15	Manual assignment.
CAN	Setting for the CAN interface of the IF option.	**Default**	Default settings are used. Further settings are not possible.
Base address	Displays the I/O address.	**384h/385h**	Fixed assignment. This setting cannot be changed.
IRQ	Displays IRQ.	**10**	Fixed assignment. This setting cannot be changed.

7.1.6.1.3 System board features



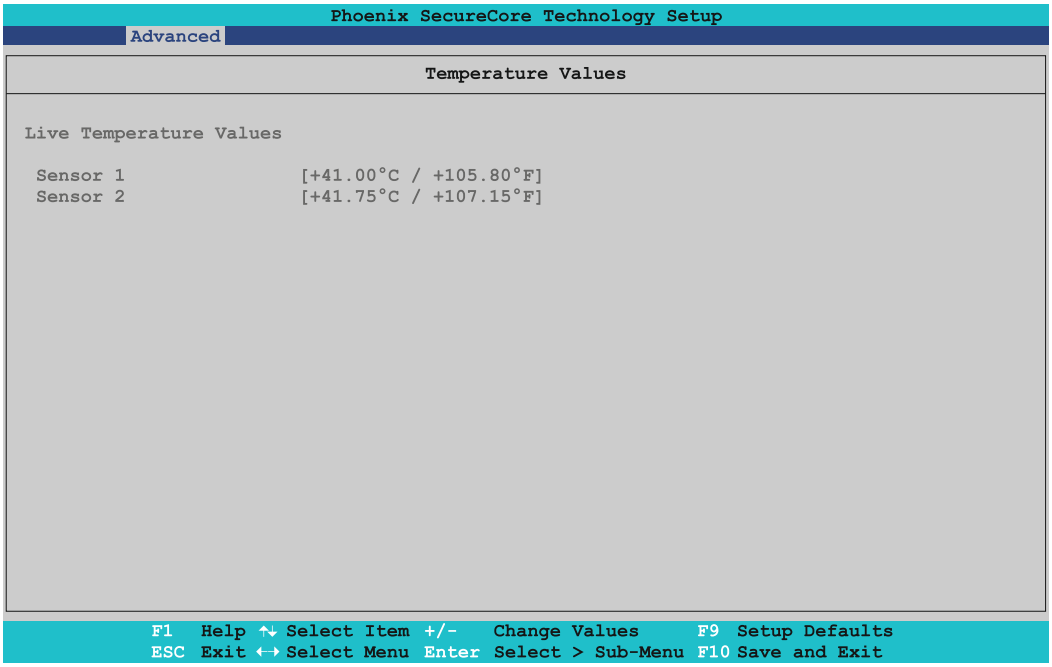
BIOS setting	Explanation	Configuration options	Effect
Device ID	Displays the device ID of the system unit.	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is required for Automation Runtime.	None	-
Vendor ID	Displays the manufacturer ID.	None	-
Hardware revision	Displays the hardware revision of the system unit.	None	-
Serial number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
Parent device ID	Displays the manufacturer number.	None	-
Parent Compatibility ID	Displays the manufacturer ID.	None	-
User serial ID	Displays the user serial ID. This 8-digit hex value is freely available to the user (e.g. to allow the device to be uniquely identified) and can only be changed with the B&R Control Center provided by B&R via the ADI driver.	None	-
Statistical values	Displays the statistical values.	Enter	Opens this submenu See "Statistical values" on page 198.
Temperature Values	Displays current temperature values.	Enter	Opens this submenu See "Temperature values" on page 198.

7.1.6.1.3.1 Statistical values



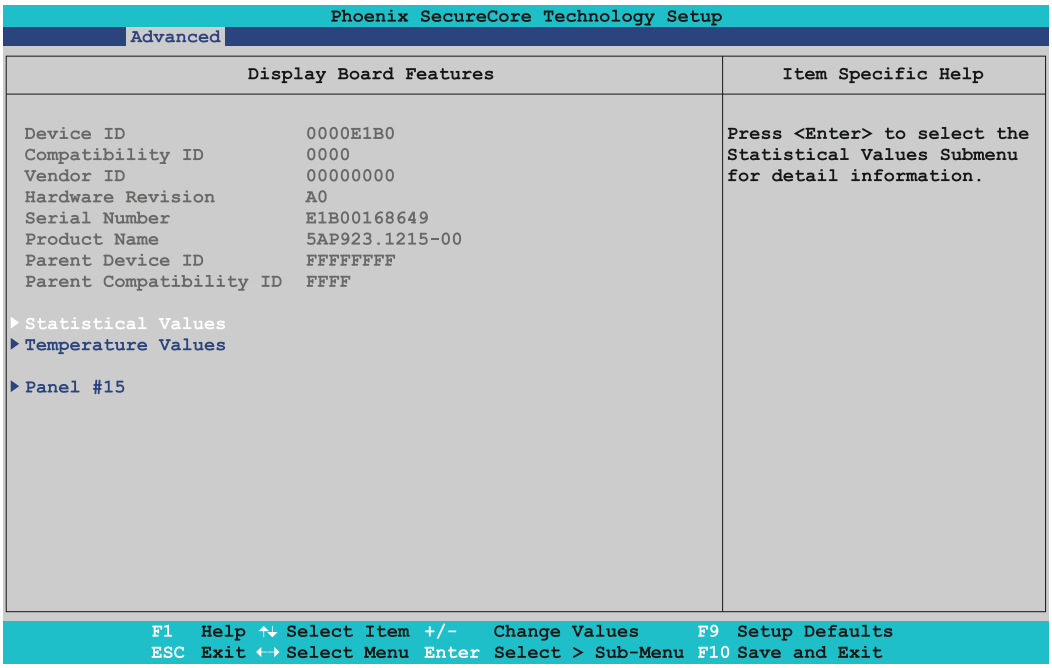
BIOS setting	Explanation	Configuration options	Effect
Total hours	Displays the runtime in hours.	None	-
Power on cycles	Displays the power on cycles - Each restart increases the counter by one.	None	-

7.1.6.1.3.2 Temperature values



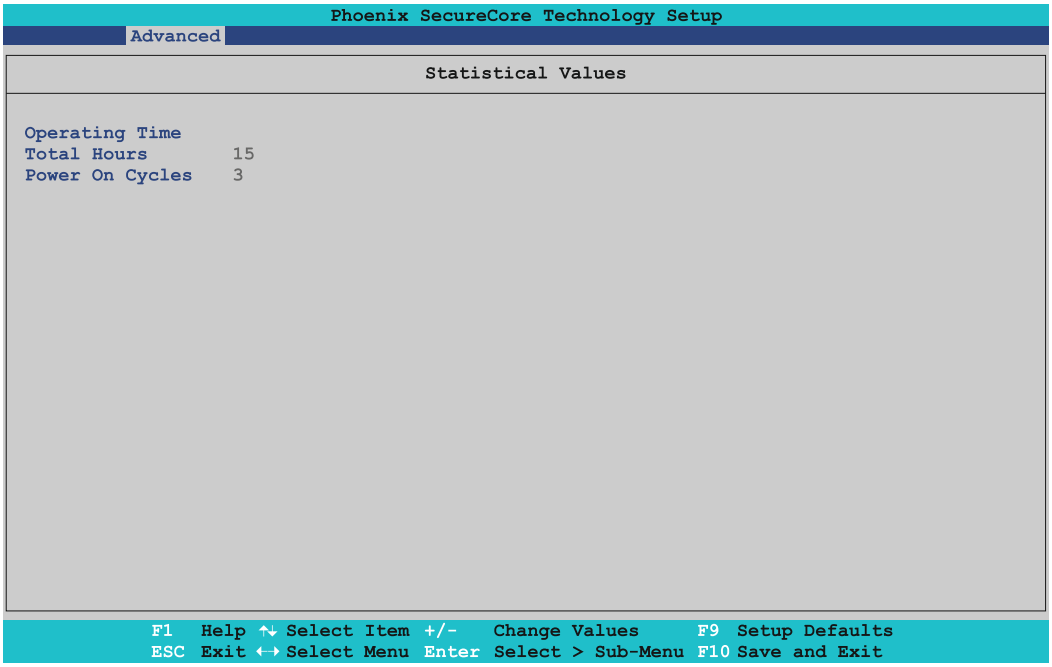
BIOS setting	Explanation	Configuration options	Effect
Sensor 1	Displays the current temperature of sensor 1 (system unit sensor 2) in °C and °F (sensor close to the RAM).	None	-
Sensor 2	Displays the current temperature of sensor 2 (system unit sensor 1) in °C and °F (sensor near the CPU).	None	-

7.1.6.1.4 Display board features



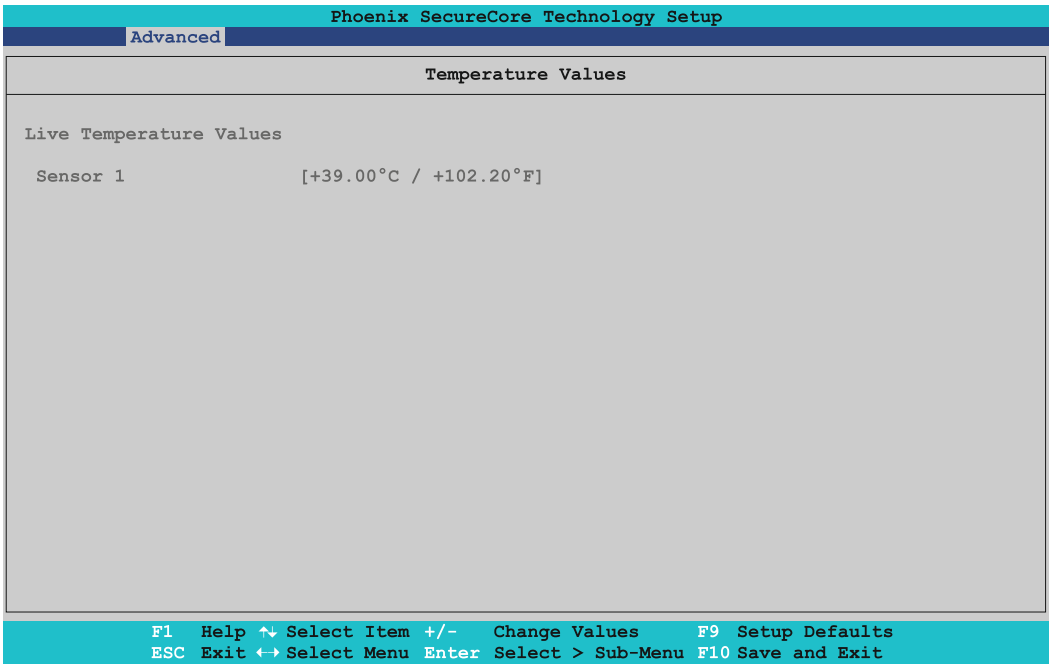
BIOS setting	Explanation	Configuration options	Effect
Device ID	Displays the device ID of the panel.	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is required for Automation Runtime.	None	-
Vendor ID	Displays the manufacturer ID.	None	-
Hardware revision	Displays the hardware revision of the panel.	None	-
Serial number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
Parent device ID	Displays the manufacturer number.	None	-
Parent Compatibility ID	Displays the manufacturer ID.	None	-
Statistical values	Displays the statistical values.	Enter	Opens this submenu See "Statistical values" on page 199.
Temperature Values	Displays current temperature values.	Enter	Opens this submenu See "Temperature values" on page 200.
Panel #15	Displays the panel properties of the panel.	Enter	Opens this submenu See "Panel #15" on page 200.

7.1.6.1.4.1 Statistical values



BIOS setting	Explanation	Configuration options	Effect
Total hours	Displays the runtime in hours.	None	-
Power on cycles	Displays the power on cycles - Each restart increases the counter by one.	None	-

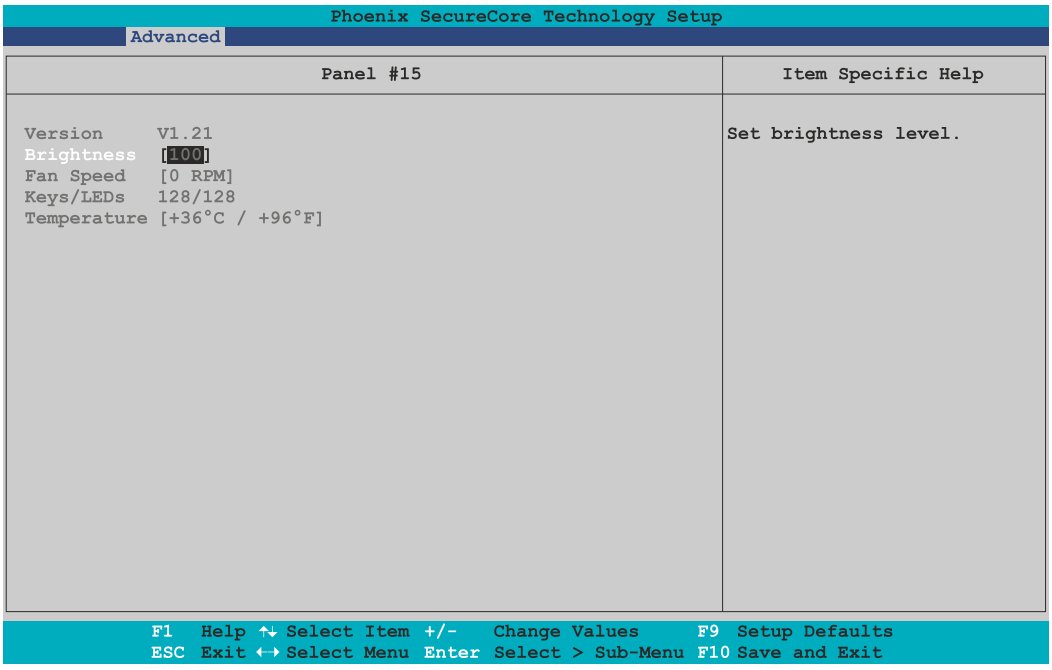
7.1.6.1.4.2 Temperature values



BIOS setting	Explanation	Configuration options	Effect
Sensor 1	Displays the current temperature of sensor 1 (display or panel) in °C and °F.	None	-

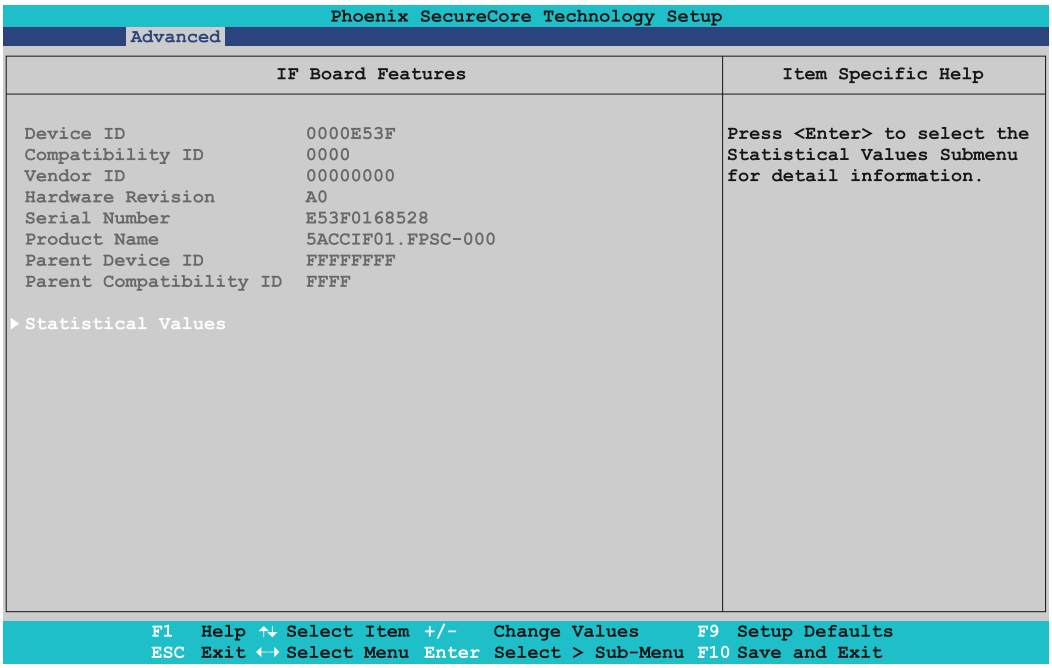
Table 83: Advanced - OEM features - Display board features - Temperature values

7.1.6.1.4.3 Panel #15



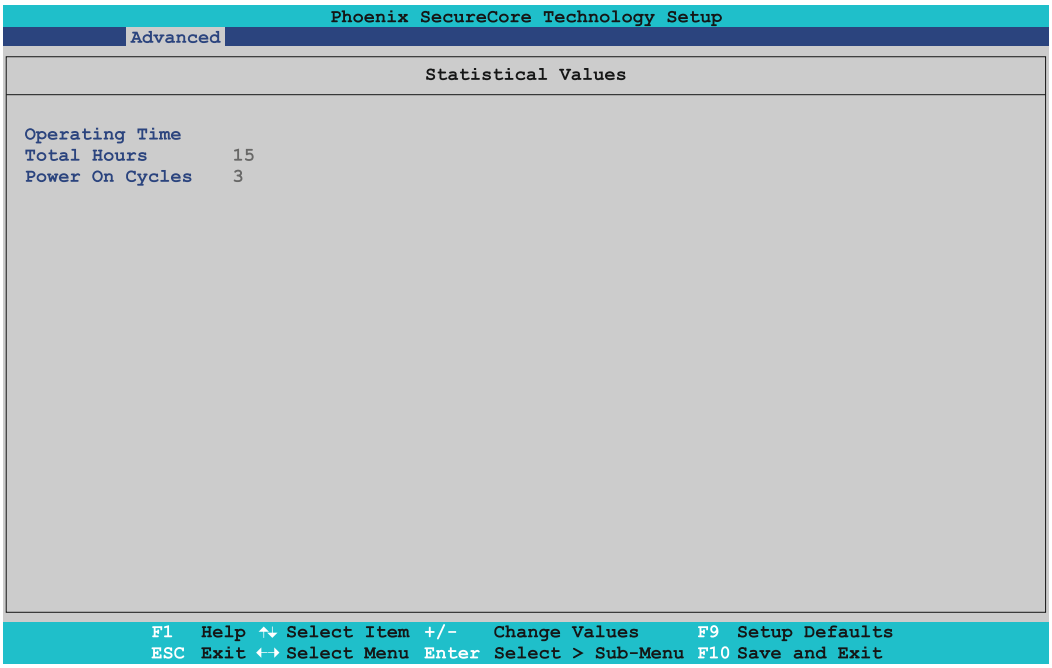
BIOS setting	Explanation	Configuration options	Effect
Version	Displays the panel firmware version.	None	-
Brightness	Sets the display brightness.	0 to **100**	Sets the brightness of the selected panel in %. Settings take effect immediately.
Fan speed	Displays the fan speed of the panel.	None	-
Keys/LEDs	Displays the available keys and LEDs for the panel.	None	-
Temperature	Displays the temperature of the panel in °C and °F.	None	-

7.1.6.1.5 IF board features



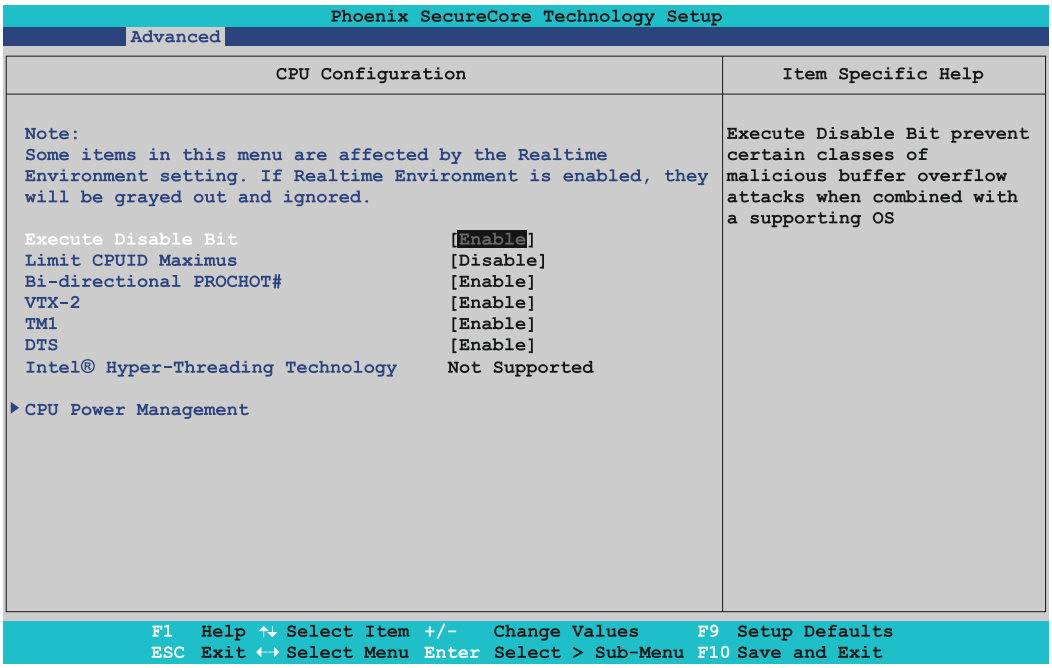
BIOS setting	Explanation	Configuration options	Effect
Device ID	Displays the device ID of IF option.	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is required for Automation Runtime.	None	-
Vendor ID	Displays the manufacturer ID.	None	-
Hardware revision	Displays the hardware revision of the IF option.	None	-
Serial number	Displays the B&R serial number.	None	-
Product name	Displays the B&R model number.	None	-
Parent device ID	Displays the manufacturer number.	None	-
Parent Compatibility ID	Displays the manufacturer ID.	None	-
Statistical values	Displays the statistical values.	Enter	Opens this submenu See "Statistical values" on page 201.

7.1.6.1.5.1 Statistical values



BIOS setting	Explanation	Configuration options	Effect
Total hours	Displays the runtime in hours.	None	-
Power on cycles	Displays the power on cycles - Each restart increases the counter by one.	None	-

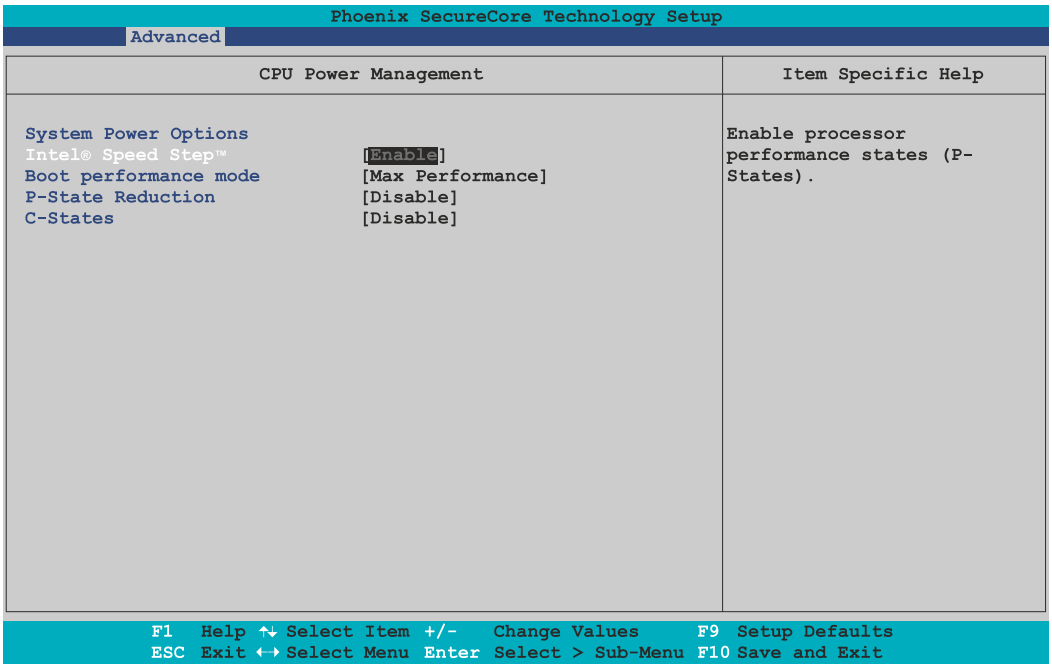
7.1.6.2 CPU configuration



BIOS setting	Explanation	Configuration options	Effect
Execute disable bit	Option for enabling/disabling hardware support for prevention of data execution.	Disabled	Disables this function.
		Enabled	Enables this function.
Limit CPUID maximum	Option for limiting the CPU ID value. This may be necessary for older operating systems that do not support CPUID functions.	**Disabled**	The processor returns the current maximum value when the CPU ID value is requested.
		Enabled	If necessary, the processor limits the maximum CPU ID value to 03h if the processor supports a higher value.
Bi-directional PROCHOT#[1)]	Option for enabling/disabling the PROCHOT signal. The PROCHOT signal initializes temperature throttling so that the CPU can be slowed down and protected against overheating.	Disabled	Disables this function. Only the processor cores can enable the PROCHOT signal and throttle the processor.
		Enabled	Enables this function. External services can enable the PROCHOT signal and choke the processor.
VTX-2	Option for enabling/disabling a virtual machine. **Information:** **A restart is required in order to apply changes made to this setting.**	Disabled	Disables this function.
		Enabled	If this function is enabled, a virtual machine can use the additional hardware capacity.
TM1	Option for setting the temperature monitoring.	Disabled	The temperature monitoring is disabled.
		Enabled	Intel thermal mode 1 is enabled. If the CPU temperature is too high, the processor speed is reduced by 50%.
DTS	Option for enabling/disabling the CPU digital thermal sensor function.	Disabled	Disables this function.
		Enabled	Enables this function.
Intel Hyper-Threading Technology	Displays whether Intel Hyper-Threading Technology is supported.	None	-
CPU power management	Configures CPU energy settings.	Enter	Opens this submenu See "CPU power management" on page 203.

1) PROCHOT = Processor Hot

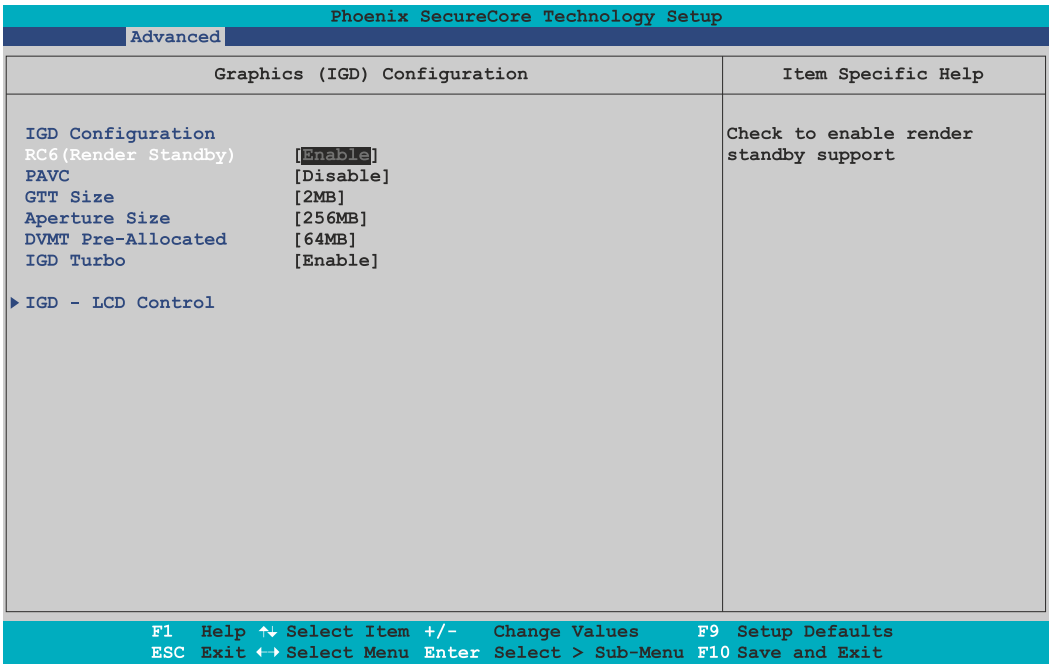
7.1.6.2.1 CPU power management



BIOS setting	Explanation	Configuration options	Effect
Intel SpeedStep	Option for controlling Intel SpeedStep Technology. The processor is clocked up or down according to the number of calculations to be performed. As a result, the energy consumption depends heavily on the utilization of the processor.	Disabled	Disables this function.
		Enabled	The processor speed is controlled by the operating system.
Boot performance mode	Option for setting the CPU speed. **Information:** **This setting can be changed in ACPI operating systems by enabling Intel SpeedStep Technology.**	**Max performance**	Maximum CPU and graphics speed.
		Max battery	The CPU and graphics speed is choked.
P-state reduction	Option for reducing CPU performance and power usage.	**Disabled**	Disables this function.
		By 1, 2, 3, 4, 5, 6, 7, 8	Reduces the performance by the configured value depending on the CPU being used.
C-states	This setting allows the operating system to set the clock frequency of the processor itself. This saves energy.	**Disabled**	Disables this function.
		Enabled	Enables this function; additional settings can be made.
Max C states[1)]	This setting controls the maximum C state that the processor supports.	C7	Maximum C state C7. The CPU voltage is completely switched off.
		C6	Maximum C state C6. The CPU voltage is reduced to almost 0 V.
		C1	Maximum C state C1. The processor is in sleep mode. Switch between C0 and C1.

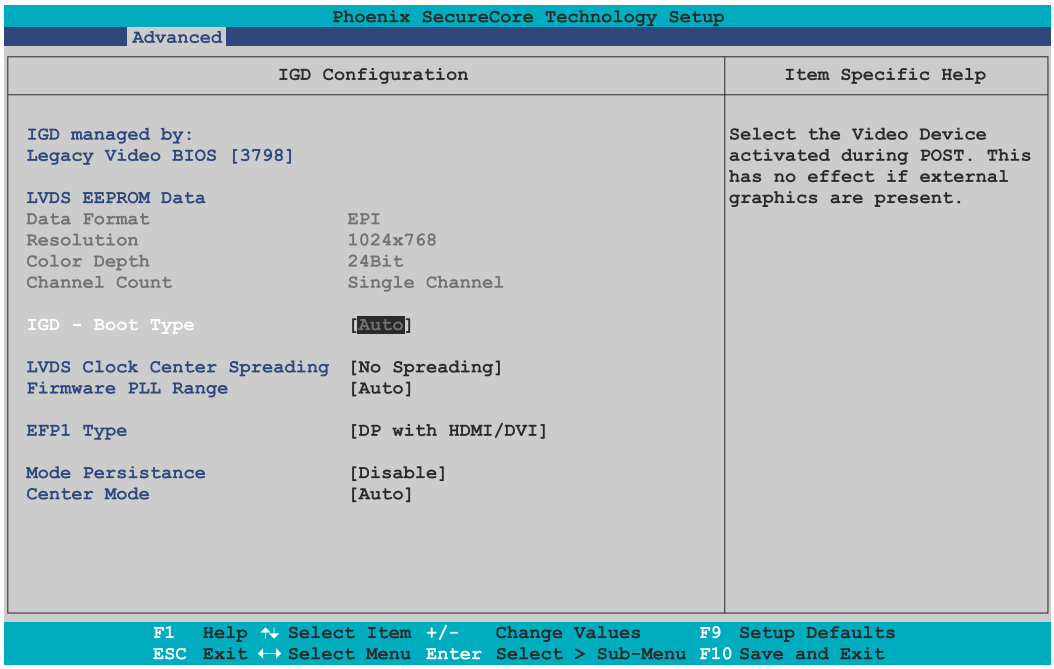
1) This setting is only possible if *C-states* is set to *Enabled*.

7.1.6.3 Graphics (IGD) configuration



BIOS setting	Explanation	Configuration options	Effect
RC6 (render standby)	Option for enabling/disabling standby mode for the onboard graphics in order to consume less energy.	Disabled	Disables this function.
		Enabled	Enables this function.
PAVC	Protected Audio Video Control protects data on the PC.	**Disabled**	Disables this function.
		LITE mode	Reserves the memory.
		SERPENT mode	Reserves the memory; this is not recognized by the operating system.
GTT size	Option for setting the size of the graphics translation table (GTT).	1 MB	1 MB GTT
		2 MB	2 MB GTT
Aperture size	Option for setting the maximum amount of RAM made available to the main memory when graphics memory is full.	128 MB	Reserves 128 MB
		256 MB	Reserves 256 MB
		512 MB	Reserves 512 MB
DVMT pre-allocated	Option for setting the fixed memory size used for the internal graphics controller.	**64 M**, 96 M, 128 M, 160 M, 192 M, 224 M, 256 M, 288 M, 320 M, 352 M, 384 M, 416 M, 448 M, 480 M, 512 M	Defines the static graphics memory as a value between 64 and 512 MB.
IGD turbo	Option for setting the turbo boost on the graphics controller.	Disabled	Disables this function.
		Enabled	Enables this function.
IGD - LCD control	Configures the display settings of the PPC2100.	Enter	Opens this submenu See "IGD - LCD control" on page 205.

7.1.6.3.1 IGD - LCD control

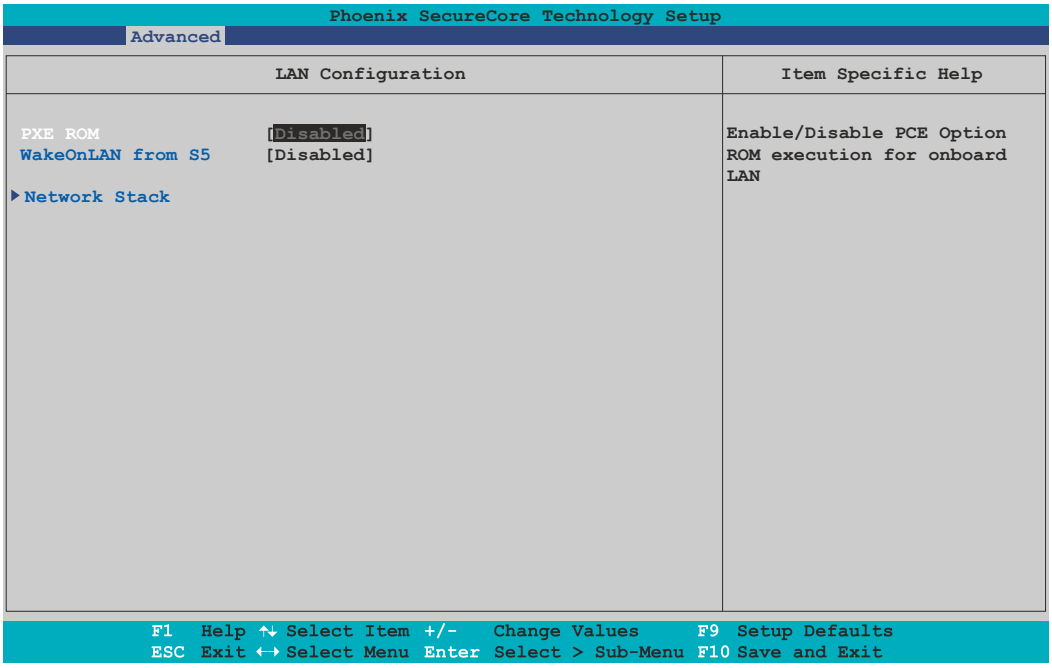


BIOS setting	Explanation	Configuration options	Effect
Data format	Displays the data format of the LFP[1].	None	-
Resolution	Displays the display resolution of the LFP.	None	-
Color depth	Displays the color depth of the LFP display.	None	-
Channel count	Displays LFP channels.	None	-
IGD - Boot type	Option for defining the primary enabled display device during POST.	**Auto**	Automatic selection.
		CRT	The CRT (cathode ray tube) channel is used.
		EFP	The EFP (external flat panel) channel is used.
		LFP	The LFP (local flat panel) channel is used.
IGD - Secondary boot type[2]	Option for defining the secondary enabled display device during POST. **Information:** **After the BIOS boot screen, this display and BIOS will no longer show anything until the graphics driver is reloaded by the operating system.**	Disabled	Disables this function.
		CRT	The CRT (cathode ray tube) channel is used.
		EFP	The EFP (external flat panel) channel is used.
		LFP	The LFP (local flat panel) channel is used.
LFP type[3]	Option for manually setting the LFP (local flat panel) type.	Auto	The LFP type is automatically set based on the EDID data.
		VGA 640 x 480 1x18 up to WUXGA 1920 x 1200 2 x 24	Manual adjustment of the resolution from 640 x 480 to 1920 x 1200.
LVDS clock center spreading	Option for modulating the LVDS clock frequency to slightly reduce electromagnetic interference.	**No spreading**	Disables this function.
		0.5%, 1.0%, 1.5%, 2.0%, 2.5%	The LVDS clock frequency varies around the set value and the EMC behavior can be improved.
Firmware PLL Range	Option for manual setting of the phase-locked loop.	**Auto**	The system uses 0x03 for SVGA resolution and 0x02 for all other resolutions.
		1.56%, 3.12%, 6.5%, 12.5%, 25%, 50%, 100%	Set manually.
EFP1 type[4]	Option for setting the type for external flat panel 1.	DisplayPort only	Configures the interface as a DisplayPort interface.
		DP with HDMI/DVI	The interface is configured as a DisplayPort with HDMI/DVI.
		HDMI/DVI	Configures the interface as an HDMI/DVI.
Mode "Persistence"	Mode "Persistence" means that the operating system can remember and restore past display connection configurations. For example, a dual DVI display configuration is automatically restored when both DVI monitors are reconnected, even if only one DVI monitor was connected and activated during a previous boot procedure.	**Disabled**	Disables this function.
		Enabled	Enables this function.

BIOS setting	Explanation	Configuration options	Effect
Center mode	For panels without a scaler chip, the image is centered.	Disabled	Disables this function.
		Auto	Enables this function for all connected panels/monitors.
		CRT	Enables this function for CRT monitors.
		EFP	Enables this function for panels.

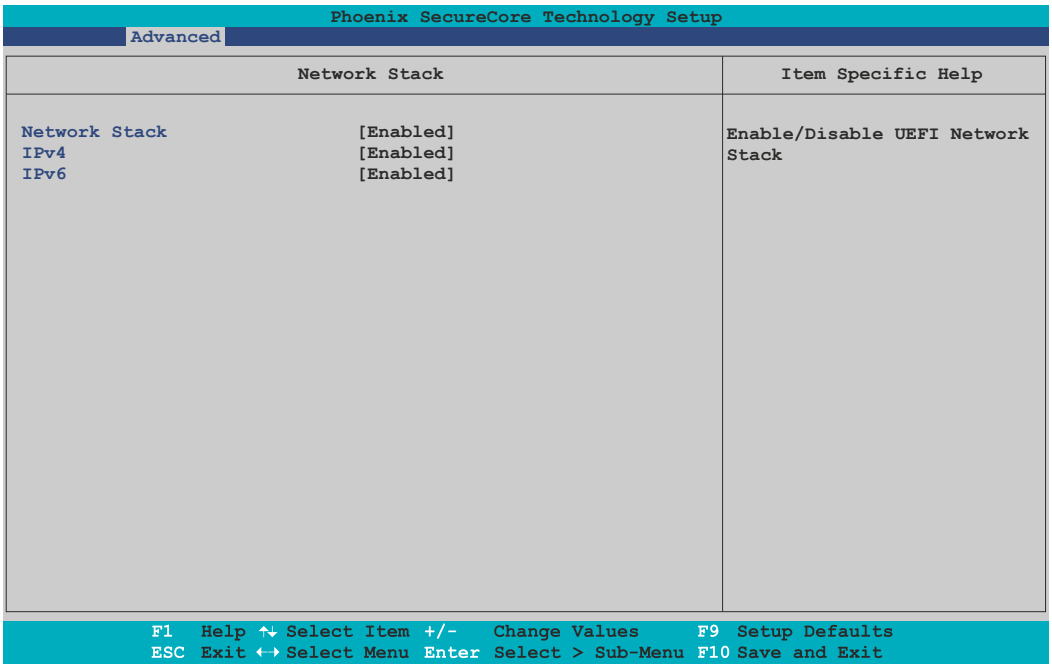
1) LFP = Local flat panel
2) This setting is only possible if *IGD - Boot type* is set to *CRT*, *EFP* or *LFP*.
3) This setting is only possible if *IGD - Boot type* is set to *LFP*.
4) This setting is only possible if *IGD - Boot type* is set to *Auto* or *EFP*.

7.1.6.4 LAN



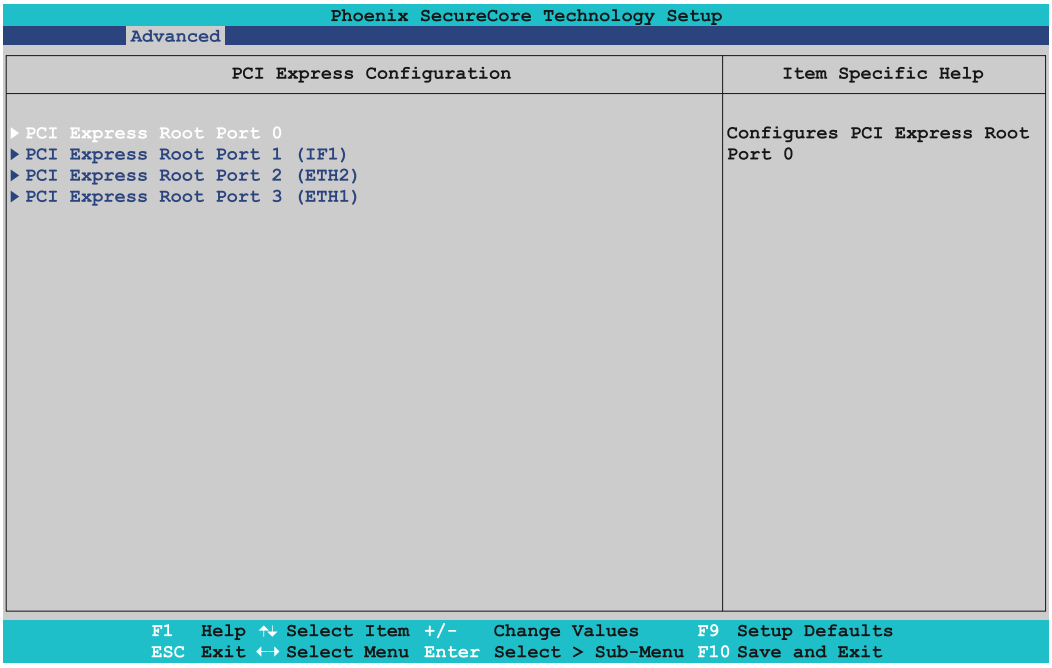
BIOS setting	Explanation	Configuration options	Effect
PXE ROM	Option for setting the PXE boot features.	**Disabled**	Disables this function.
		Onboard ETH1 only	Enables this function for ETH1.
		Onboard ETH2 only	Enables this function for ETH2.
		Both onboard only	Enables this function for ETH1 and ETH2.
		Add-on only	Enables this function for an optionally connected add-on card.
		Any	Enables this function for all devices, ETH1 and ETH2.
WakeOnLAN from S5	Option for switching on the system via the onboard Ethernet controller (ETH1) from mode S5.	Disabled	Disables this function. The Ethernet controller cannot switch on the system.
		Enabled	Enables this function. The Ethernet controller can switch on the system.
Network stack	Configures the network stack	Enter	Opens submenu "Network stack" on page 207

7.1.6.4.1 Network stack



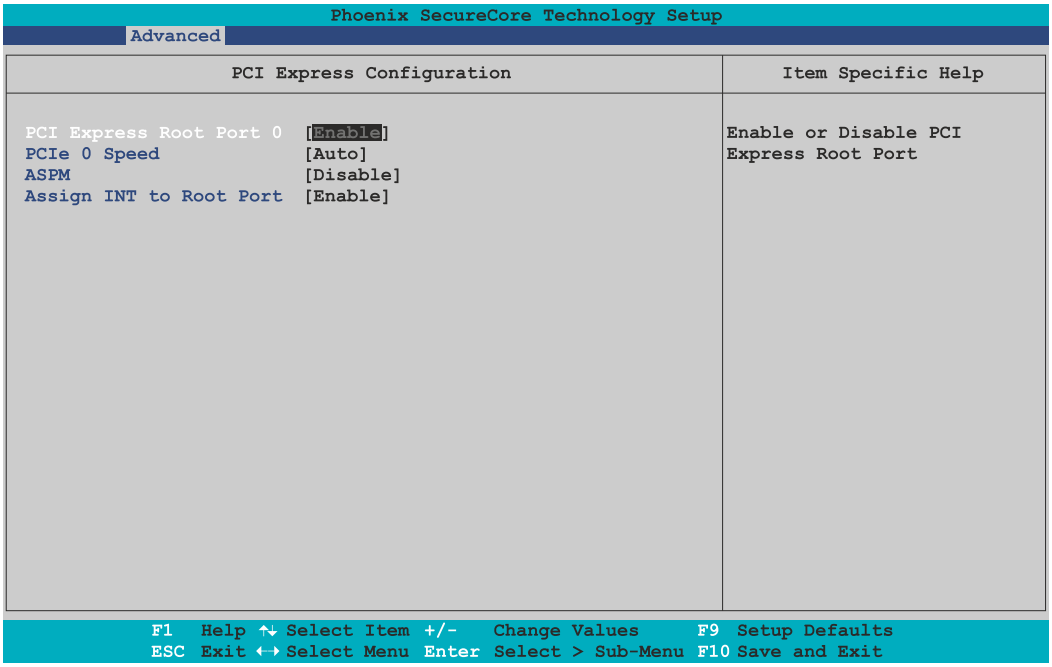
BIOS setting	Explanation	Configuration options	Effect
Network stack	Option for enabling/disabling the UEFI network stack	**Disabled**	Disables this function.
		Enabled	Enables this function.
IPv4	Option for enabling/disabling IPv4 PXE support.	**Enabled**	Enables this function.
		Disabled	Disables this function.
IPv6	Option for enabling/disabling IPv6 PXE support.	**Enabled**	Enables this function.
		Disabled	Disables this function.

7.1.6.5 PCI express configuration



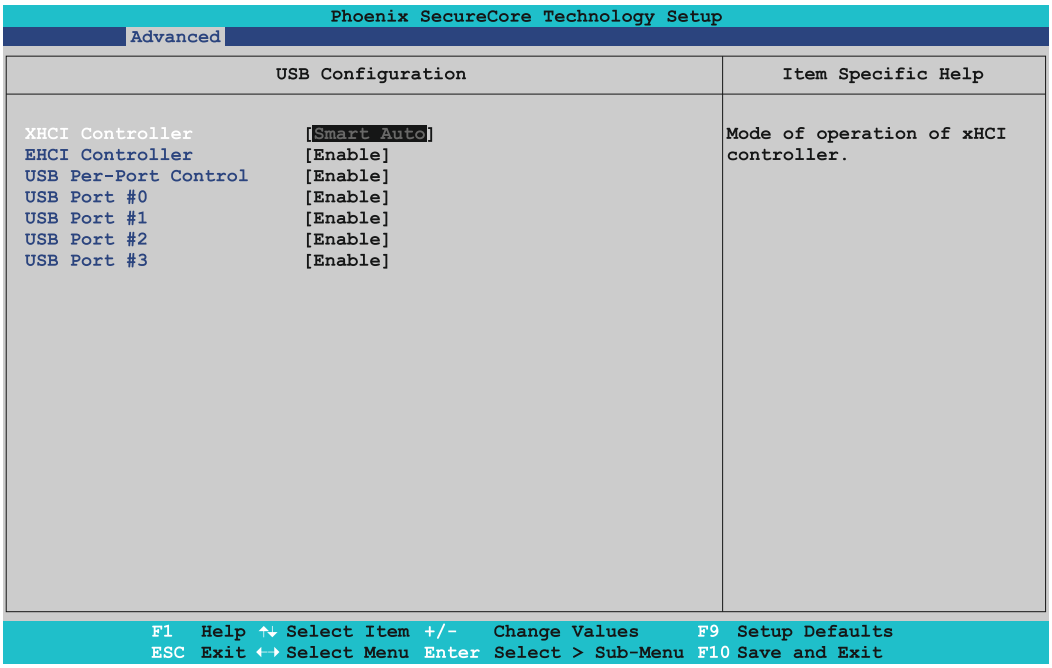
BIOS setting	Explanation	Configuration options	Effect
PCI Express root port 0	Configures PCI Express settings on port 0.	Enter	Opens this submenu See "PCI Express root port 0 to 3" on page 208.
PCI Express root port 1 (IF1)	Configures PCI Express settings on port 1 (interface option).	Enter	Opens this submenu See "PCI Express root port 0 to 3" on page 208.
PCI Express root port 2 (ETH2)	Configures PCI Express settings on port 2 (ETH2).	Enter	Opens this submenu See "PCI Express root port 0 to 3" on page 208.
PCI Express root port 3 (ETH1)	Configures PCI Express settings on port 3 (ETH1).	Enter	Opens this submenu See "PCI Express root port 0 to 3" on page 208.

7.1.6.5.1 PCI Express root port 0 to 3



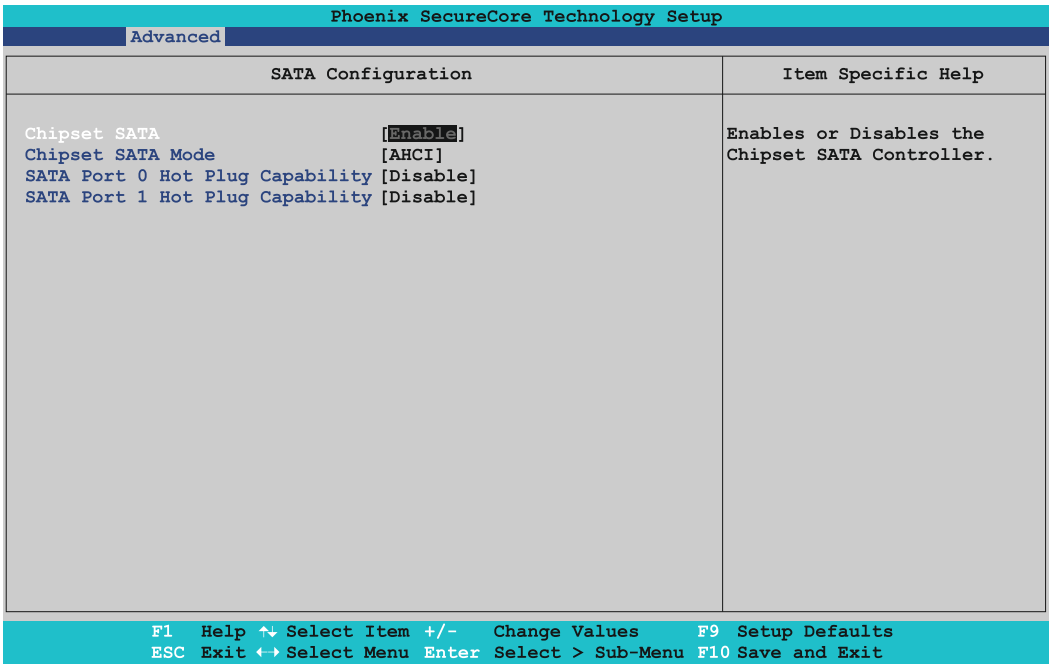
BIOS setting	Explanation	Configuration options	Effect
PCI Express root port x	Option for enabling/disabling the PCI Express root port x.	**Enabled**	Enables the PCI Express root port.
		Disabled	Disables the PCI Express root port.
PCIe x speed	Option for setting the PCI Express transfer rate.	**Auto**	Automatically sets the transfer rate.
		Gen1	Maximum transfer rate = 2.5 GT/s.
		Gen2	Maximum transfer rate = 5 GT/s.
ASPM	*Active State Power Management* Option for setting a power saving function (L0s/L1) for PCIe devices if they do not require full power.	**Disabled**	Disables this function.
		L0s	Enables the L0 energy saving function.
		L0sL1	Automatic assignment of L0s or L1 power saving function by the PCIe device.
		Auto	Automatic assignment by BIOS and the operating system.
Assign INT to root port	Option for enabling/disabling the IRQ for the root port.	**Enabled**	Enables this function.
		Disabled	Disables this function.

7.1.6.6 USB configuration



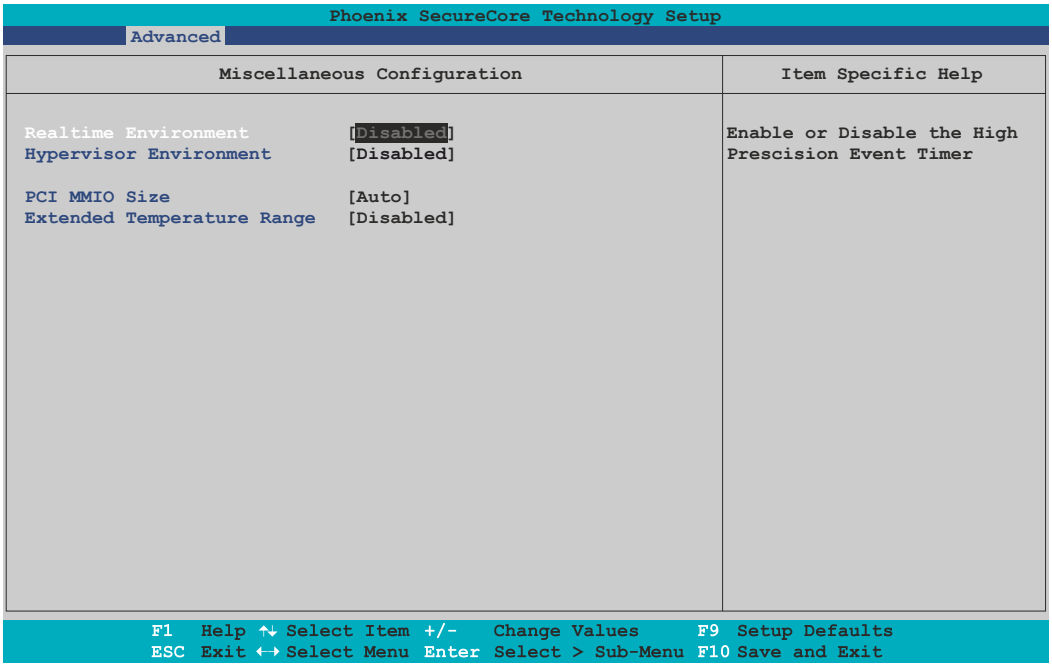
BIOS setting	Explanation	Configuration options	Effect
XHCI controller	Option for setting the xHCI controllers.	**Smart auto**	The USB 3.0 interfaces are only treated as USB 3.0 when the operating system is started; until then, they are treated as USB 2.0 interfaces. If the PC is rebooted, then the USB 3.0 interfaces are handled as USB 3.0 during booting.
		Disabled	The xHCI controller is disabled. All USB 3.0 interfaces become USB 2.0 interfaces.
		Enabled	The xHCI controller is enabled and the USB 3.0 interfaces are always recognized as such.
EHCI controller	Sets the USB EHCI controller for the USB ports.	Disabled	Disables the EHCI controller.
		Enabled	Enables the EHCI controller.
USB per-port control	Option for enabling/disabling individual USB ports.	Disabled	The BIOS settings "USB port #x" are hidden.
		Enabled	The BIOS settings "USB port #x" are displayed.
USB port #0	Option for enabling/disabling the USB1 port.	Disabled	The USB port is disabled.
		Enabled	The USB port is enabled.
USB port #1	Option for enabling/disabling the USB2 port.	Disabled	The USB port is disabled.
		Enabled	The USB port is enabled.
USB port #2	Option for enabling/disabling the multi-touch or the optional front USB interface.	Disabled	The USB port is disabled.
		Enabled	The USB port is enabled.
USB port #3	Option for enabling/disabling the multi-touch or the optional front USB interface.	Disabled	The USB port is disabled.
		Enabled	The USB port is enabled.

7.1.6.7 SATA configuration



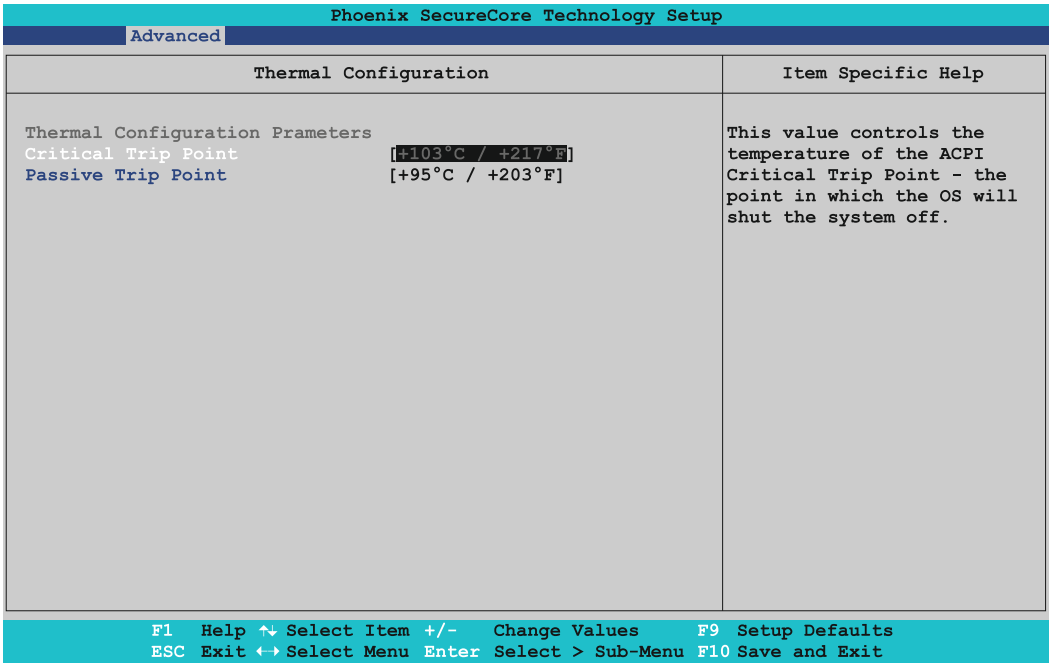
BIOS setting	Explanation	Configuration options	Effect
Chipset SATA	Option for setting the SATA support.	**Enabled**	Provides support for SATA devices.
		Disabled	No support for SATA devices.
Chipset SATA mode	Option for setting supported serial ATA connections.	IDE	The serial ATA hard disk is used as a parallel ATA physical disk drive. It is not possible to configure the SATA ports.
		AHCI	The AHCI setting enables the internal memory driver for SATA functions, which increases the storage performance for random read-write access by allowing the drive itself to determine the sequence of commands.
SATA Port 0 hot plug capability	Option for setting the hot plugging for SATA port 0.	Enabled	Enables hot plugging for SATA interface 0. Devices can be connected/disconnected during operation.
		Disabled	Disables hot plugging for SATA port 0.
SATA Port 1 hot plug capability	Option for setting the hot plugging for SATA port 1.	Enabled	Enables hot plugging for SATA interface 1. Devices can be connected/disconnected during operation.
		Disabled	Disables hot plugging for SATA port 1.

7.1.6.8 Miscellaneous configuration



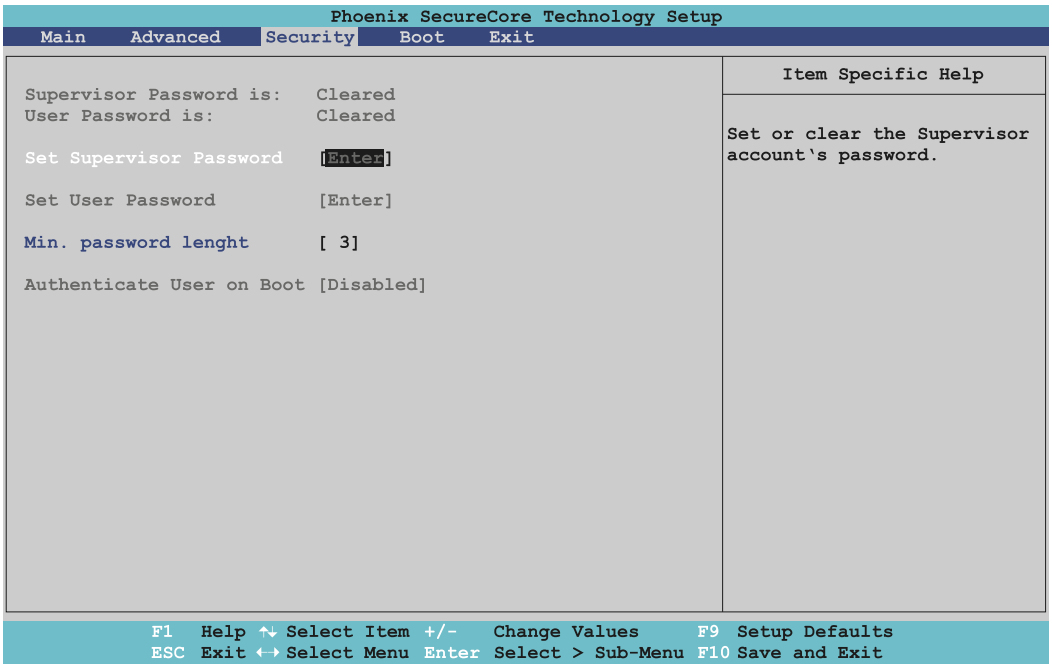
BIOS setting	Explanation	Configuration options	Effect
Realtime environment	Configures settings for real-time operating systems such as Automation Runtime.	**Disabled**	Disables this function.
		Enabled	Disables DTS, turbo boost, SpeedStep, ASPM and the INT of root port 1 (IF). In addition, the CPU C-states are disabled and the boot performance mode is set to "Max. performance". Starting with BIOS V1.41, parameter "RC6" (render standby) is also disabled. The options that are configured and disabled by the real-time environment are grayed out and cannot be changed.
Hypervisor environment	This option configures settings for hypervisor operation.	**Disabled**	Disables this function.
		Enabled	VTX (Virtualization Technology) is enabled. The options that are configured by the hypervisor environment are grayed out and cannot be changed.
PCI MMIO size	Option for setting the PCI MMIO (memory mapped IO) size. **Information:** **With 32-bit operating systems, the set MMIO size is stored under 4 GB in memory. This means that systems with 4 GB of main memory have less MMIO size available.** **This is not the case with 64-bit operating systems.**	2 GB, 1.5 GB, 1.25 GB, 1 GB, **Auto**	Sets the selected memory size.
Extended temperature range	Option for setting the RAM refresh rate for extended temperature.	**Disabled**	Default RAM refresh rate.
		Enabled	Increases the RAM refresh rate.

7.1.6.9 Thermal configuration



BIOS setting	Explanation	Configuration options	Effect
Critical trip point	This function sets the CPU temperature at which the operating system automatically shuts down the PC.	15°C / 59°F, 23°C / 73°F, 31°C / 88°F, 39°C / 102°F, 47°C / 117°F, 55°C / 131°F, 63°C / 145°F, 71°C / 160°F, 79°C / 174°F, 85°C / 185°F, 87°C / 189°F, 90°C / 194°F, 95°C / 203°F, **103°C / 217°F**, 111°C / 232°F	Temperature setting for the critical trip point.
		Disabled	Disables this function.
Passive trip point	Function for setting a CPU temperature at which the operating system throttles the CPU speed.	15°C / 59°F, 23°C / 73°F, 31°C / 88°F, 39°C / 102°F, 47°C / 117°F, 55°C / 131°F, 63°C / 145°F, 71°C / 160°F, 79°C / 174°F, 85°C / 185°F, 87°C / 189°F, 90°C / 194°F, **95°C / 203°F**, 103°C / 217°F	Temperature setting for the passive trip point.
		Disabled	Disables this function.

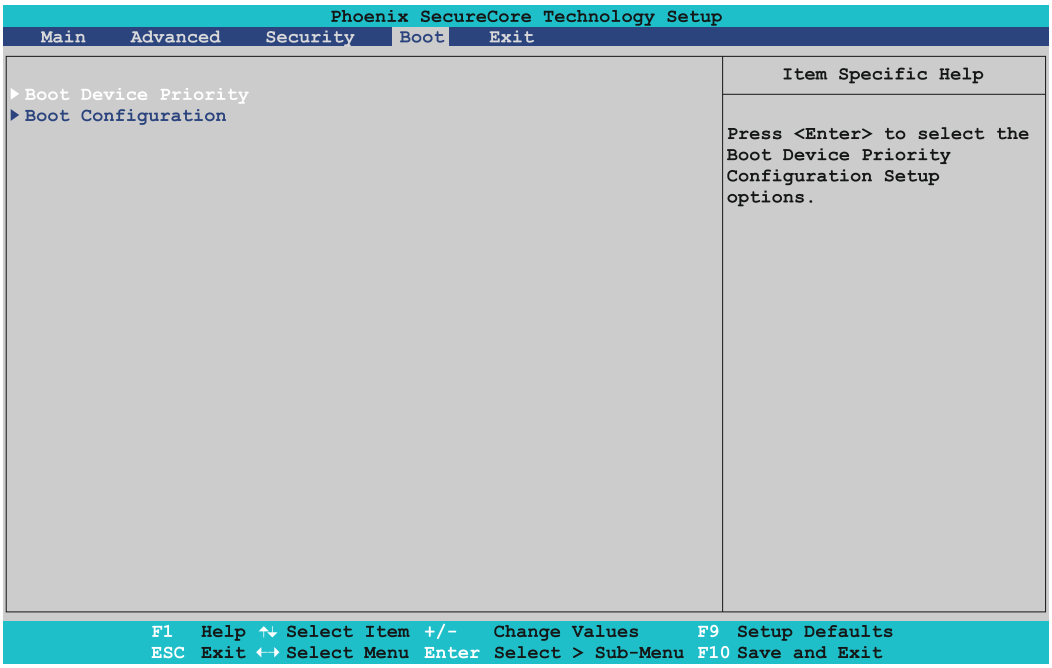
7.1.7 Security



BIOS setting	Explanation	Configuration options	Effect
Supervisor password is:	Indicates whether a supervisor password has been assigned.	None	-
User password is:	Indicates whether a user password has been assigned.	None	-
Set supervisor password	Function for entering, changing and deleting a supervisor password. All BIOS settings can only be edited with the supervisor password.	Enter	Password entry.
Set user password[1)]	Function for entering, changing and deleting a user password. With the supervisor password, only certain BIOS settings can be edited.	Enter	Password entry.
Min. password length	Function for setting the minimum password length.	**3** to 20	Enter the minimum password length.
Authenticate user on boot[1)]	Option for setting whether the user password must be entered for each boot procedure.	Disabled	A user password is not required for the boot procedure.
		Enabled	The user password must be entered for each boot procedure.

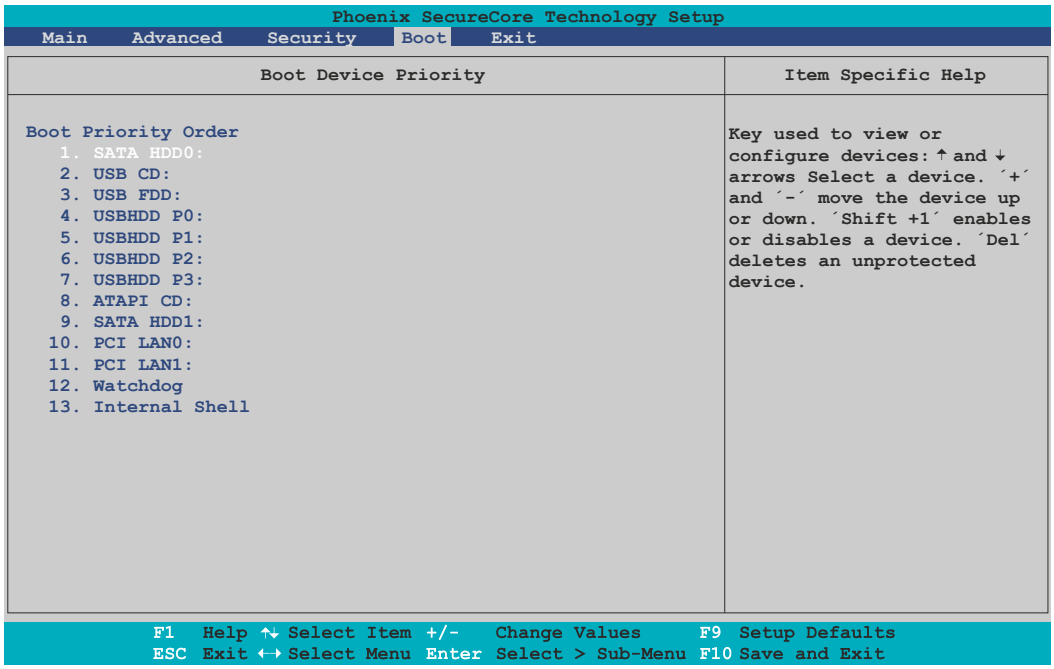
1) The setting can only be set if a *supervisor password* is assigned.

7.1.8 Boot



BIOS setting	Explanation	Configuration options	Effect
Boot device priority	Configures the boot sequence.	Enter	Opens this submenu See "Boot device priority" on page 214.
Boot configuration	Configures boot settings.	Enter	Opens this submenu See "Boot configuration" on page 215.

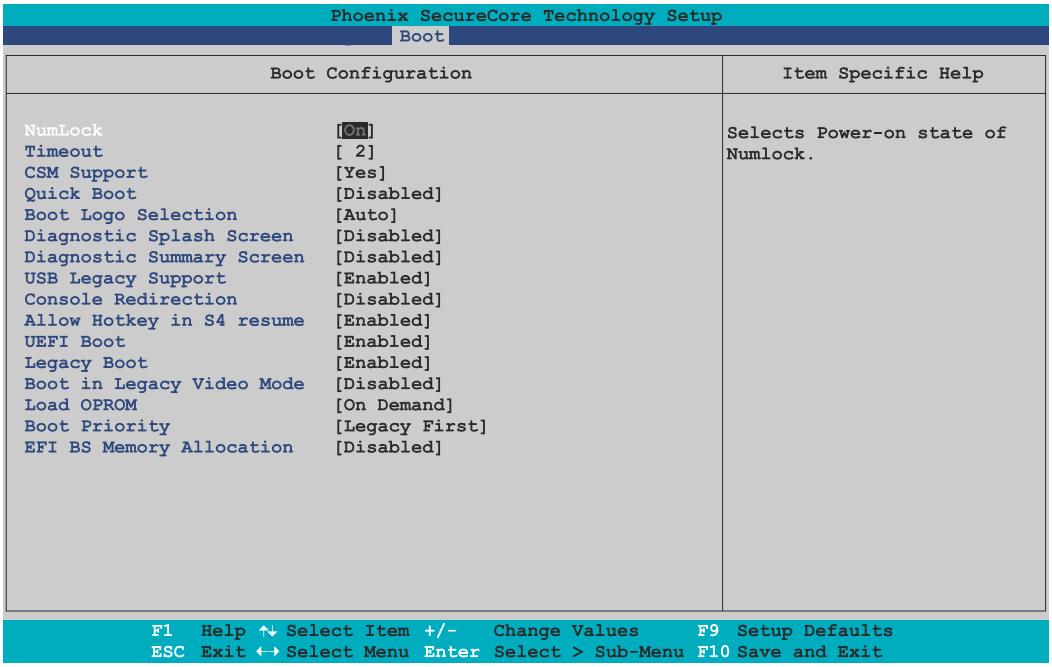
7.1.8.1 Boot device priority



BIOS setting	Explanation	Configuration options	Effect
Boot priority order	Option for setting the desired boot sequence.	SATA HDD0:	Specifies the desired boot sequence. Boot devices can be selected with the ↑and ↓arrow keys. Use "+" and "-" to change the sequence. "Shift + 1" activates/deactivates a boot device.
		USB CD:	
		USB FDD:	
		USBHDD P0:	
		USBHDD P1:	
		USBHDD P2:	
		USBHDD P3:	
		ATAPI CD:	
		SATA HDD1:	
		PCI LAN0:	
		PCI LAN1:	
		Watchdog[1)]	
		Internal shell	

1) This watchdog can be used for sporadic recognition problems with CFast cards. If such a case occurs, a reset is triggered.
If boot problems occur with SATA devices, their firmware version must be checked and updated if necessary.

7.1.8.2 Boot configuration

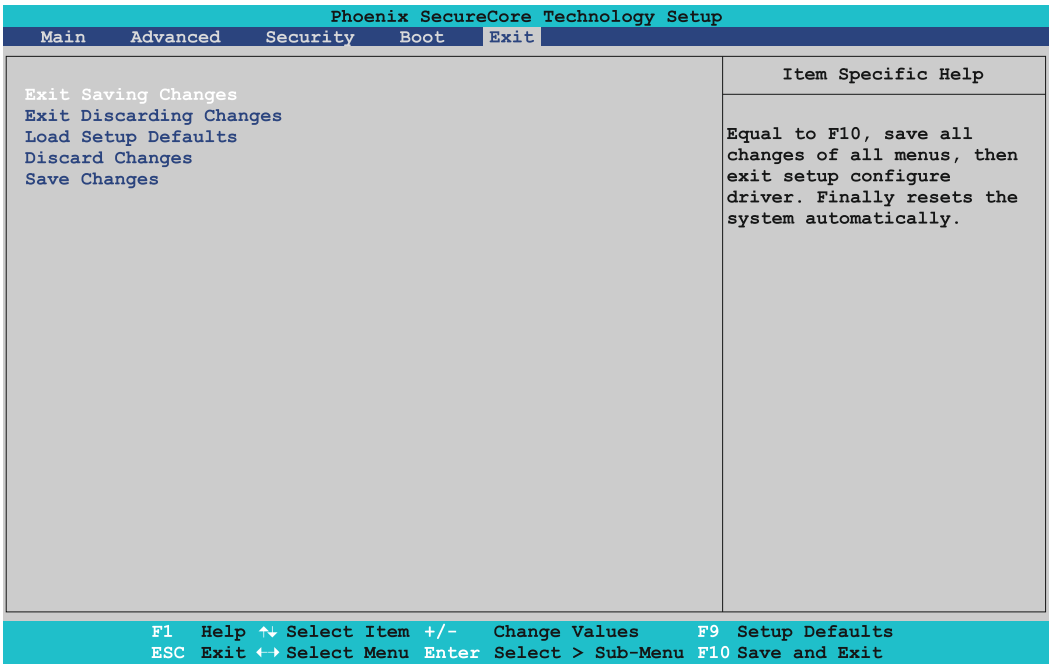


BIOS setting	Explanation	Configuration options	Effect
NumLock	Option for setting the numeric keypad when booting the system.	**On**	Enables the numeric keypad.
		Off	Only enables the cursor (movement) functions of the numeric keypad.
Timeout	Option for setting how long the setup activation key (key for entering BIOS) and boot logo is displayed.	**2** to 99	Displays the setup activation key for x seconds.
CSM support	The compatibility support module (BIOS compatibility mode) supports backward compatibility for legacy BIOS settings of the legacy boot depending on the operating system.	**Yes**	BIOS compatibility mode is enabled and operating systems without UEFI support can be used. Legacy and UEFI boot are possible.
		No	The BIOS compatibility mode is enabled and only the UEFI boot is possible. Legacy boot is not supported.
Quick boot	This function reduces the boot time by skipping some POST procedures.	**Disabled**	Disables this function.
		Enabled	Enables this function.
Boot logo selection	Option for displaying the boot logo.	Disabled	The default logo is displayed.
		Enabled	The OEM logo is displayed.
		Auto	The OEM logo is automatically displayed if it exists.
Diagnostic splash screen	Setting for enabling/disabling the "Diagnostic splash screen" during the boot procedure.	**Disabled**	The "Diagnostic splash screen" is not displayed.
		Enabled	The "Diagnostic splash screen" is always displayed during the boot procedure.
Diagnostic summary screen	Option for enabling/disabling the "Diagnostic summary screen" during the boot procedure.	**Disabled**	Disables this function.
		Enabled	Enables this function.
USB legacy support	Option for setting the USB legacy support.	Disabled	Disables this function. The complete USB support is disabled (mouse, keyboard, USB mass storage, etc.).
		Enabled	Enables this function.

BIOS setting	Explanation	Configuration options	Effect
Console redirection	Option for setting the remote console. With the remote console, BIOS Setup can be accessed via the serial interface using a terminal emulator (PuTTY or HyperTerminal). **Information:** **This function is only possible with IF option 5ACCIF01.FPLS-000 or 5ACCIF01.FPLS-001.**	**Disabled**	Disables this function.
		Enabled	Enables this function.
Console port[1]	Option for setting the serial interface.	All	Can be accessed via any serial interface.
		UART A, UART B, UART C, UART D, UART E, UART F	Accessed via the selected serial interface.
Terminal type[1]	Option for setting keyboard input.	ANSI	Enables the ANSI convention (extended ASCII character set).
		VT100	Enables the VT100 convention (ASCII character set).
		VT100+	Enables the VT100+ convention (ASCII character set and support for color, function keys, etc.).
		UTF8	Enables the UTF-8 convention (uses UTF-8 encoding to assign Unicode characters to one or more bytes).
Baud rate[1]	Option for setting the transfer rate of the serial interface (bits per second).	9600, 19200, 38400, 57600, 115200	Enables a transfer rate of x bits
Flow control[1]	Option for setting the data flow control.	None	Disables data flow control.
		RTS/CTS	Enables hardware handshake.
		XON/XOFF	Enables software handshake.
Continue C.R. after POST[1]	Option for enabling/disabling console redirection after POST.	Disabled	Disables this function.
		Enabled	Enables this function.
Allow hotkey in S4 resume	Option for enabling/disabling hotkey detection from the S4 state.	Disabled	Disables this function.
		Enabled	Enables this function. The PC exits the S4 state when a key is pressed.
UEFI boot	Option for enabling/disabling the UEFI boot.	Disabled	Disables this function.
		Enabled	Enables this function.
Legacy boot	Option for enabling/disabling the legacy boot.	Disabled	Disables this function.
		Enabled	Enables this function.
Boot in legacy video mode[2]	Option for enabling/disabling graphic initialization after BIOS POST with legacy ROM.	**Disabled**	Disables this function.
		Enabled	Enables this function. **Information:** **Nothing is displayed after BIOS POST; the screen remains black.**
Load OPROM[2]	Setting for loading all option ROMs or depending on the boot device.	All	All option ROMs are loaded.
		On demand	Option ROMs are loaded depending on the boot device.
Boot priority	Setting for prioritizing the boot option between UEFI and legacy boot.	UEFI first	Boots first from UEFI ROM.
		Legacy first	Boots first from legacy ROM.
EFI BS memory allocation	Option for setting the memory for the EFI boot services.	**Disabled**	The minimum memory required for EFI boot services is reserved.
		Enabled	The maximum memory required for EFI boot services (approx. 130 MB more) is reserved.

1) This setting is only possible if *Console redirection* is set to *Enabled*.
2) This setting is only possible if *Legacy boot* is set to *Enabled*.

7.1.9 Exit



BIOS setting	Explanation	Configuration options	Effect
Exit saving changes	Selecting this option closes BIOS Setup. Selecting this option saves any changes made to CMOS after confirmation.	Yes/No	
Exit discarding changes	Selecting this option closes BIOS Setup without saving any changes made.	Yes/No	
Load setup defaults	Selecting this option restores the BIOS default values.	Yes/No	
Discard changes	Selecting this option resets any settings that may have been made but forgotten in the meantime (provided they have not yet been saved).	Yes/No	
Save changes	Selecting this option saves any changes made to CMOS after confirmation.	Yes/No	

7.1.10 Allocation of resources

7.1.10.1 RAM address assignment

Address in hexadecimal	Size	Resource
00000000 to 0009FFFF	640 kB	DOS (real mode) memory
000A0000 to 000BFFFF	128 kB	Video memory
000C0000 to 000CBFFF	48 kB	VGA BIOS
000CC000 to 000DFFFF	80 kB	Option ROM or XMS
000E0000 to 000FFFFF	64 kB	System BIOS shadow RAM
00100000 to 7FFFFFFFF	2 GB to 1 MB	System memory (low DRAM)
80000000 to FFF00000	2 GB to 1 MB	PCI low MMIO
FEC00000 to FEC00040	64 bytes	IO APIC
FED00000 to FED003FF	1 kB	HPET (timer)
FED01000 to FED1CFFF	112 kB	Chipset internal register space
FEE00000 to FEFFFFFF	2 MB	Local APIC
100000000 to 17FFFFFFF	2 GB	System memory (high DRAM)
180000000 to F00000000	58 GB	High MMIO

7.1.10.2 I/O address assignments

I/O address	Resource
0000h - 00FFh	Motherboard resources
02E8h - 02EFh	COM D (optional)
02F8h - 02FFh	COM B (optional)
0384h - 0385h	CAN controller (optional)
03B0h - 03DFh	Video system
03E8h - 03EFh	COM C (optional)
03F8h - 03FFh	COM A (optional)
0400h - 04FFh	Motherboard resources
0500h - 0G1Fh	Motherboard resources
0CF8h - 0CFBh	PCI config address register
0CFCh - 0CFFh	PCI config data register
0D00h - FFFFh	PCI / PCI Express bus
4100h - 41FFh	MTCX

7.1.10.3 Interrupt assignments in PIC mode

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	NONE
System timer		●																
Keyboard			●															
IRQ cascade				●														
ACPI[1]											●							
Real-time clock										●								
Co-processor (FPU)															●			
B&R Option-al	COM B[2]				●	○	○	○	○			○	○	○				
	COM C[3]				○	○	○	○	○			○	●	○				
	COM A[4]				○	●	○	○	○			○	○	○				
	COM D[5]				○	○	○	○	○			●	○	○				
	CAN				○	○	○	○	○			●	○	○				

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface
2) Resistive onboard touchscreen for Panel PC 2100
3) Monitor/Panel option, SDL/DVI transmitter, SDL3 transmitter
4) 5ACCIF01.FPLS-000 IF option, 5ACCIF01.FPLS-001, COM A.
5) IF option

● ... Default setting
○ ... Optional setting

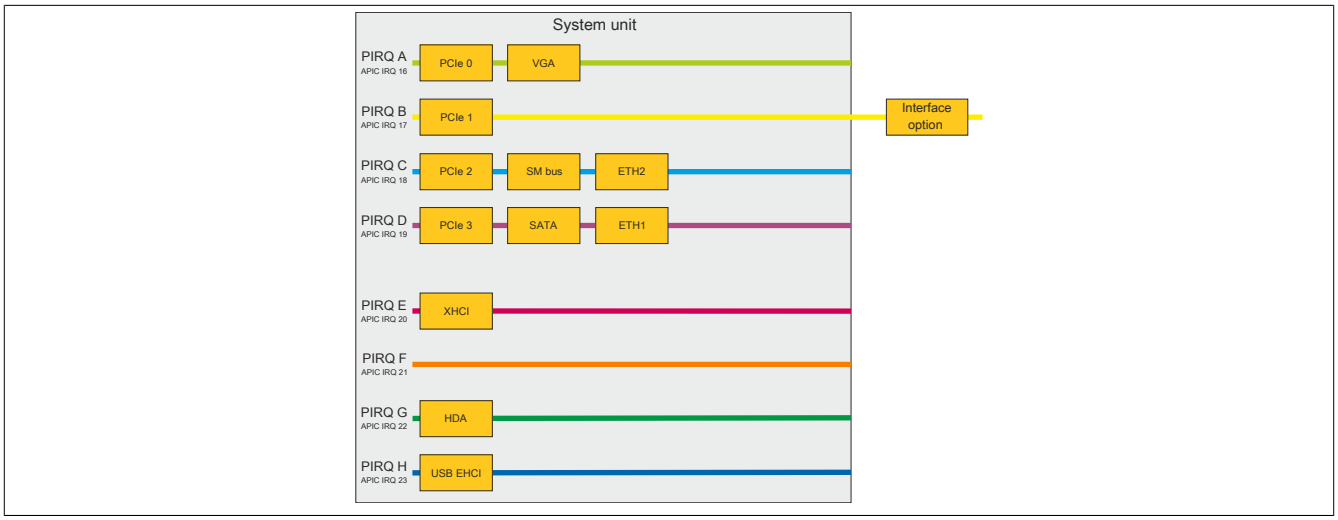
7.1.10.4 Interrupt assignments in APIC mode

A total of 23 IRQs are available in APIC (**A**dvanced **P**rogrammable **I**nterrupt **C**ontroller) mode. Enabling this option is only effective if done before the Windows operating system is installed.

IRQ		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	NONE
System timer		●																								
Keyboard			●																							
IRQ cascade				●																						
ACPI[1]											●															
Real-time clock										●																
Co-processor (FPU)															●											
B&R Option-al	COM B[2]				●	○	○	○	○			○	○	○												
	COM C[3]				○	○	○	○	○			○	●	○												
	COM A[4]				○	●	○	○	○			○	○	○												
	COM D[5]				○	○	○	○	○			●	○	○												
	CAN				○	○	○	○	○			●	○	○												
PIRQ A[6]																		●								
PIRQ B[7]																			●							
PIRQ C[8]																				●						
PIRQ D[9]																					●					
PIRQ E[10]																						●				
PIRQ F[11]																							●			
PIRQ G[12]																								●		
PIRQ H[13]																									●	

1) **A**dvanced **C**onfiguration and **P**ower **I**nterface
2) Resistive onboard touchscreen for Panel PC 2100
3) Monitor/Panel option, SDL/DVI transmitter, SDL3 transmitter
4) 5ACCIF01.FPLS-000 IF option, 5ACCIF01.FPLS-001, COM A.
5) IF option
6) PIRQ A: For PCIe; PCI Express root port 0, VGA, controller
7) PIRQ B: For PCIe; PCI Express root port 1, optional interface option.
8) PIRQ C: For PCIe; PCI Express root port 2, SMBus controller, ETH2 controller
9) PIRQ D: For PCIe; PCI Express root port 3, serial ATA controller, ETH1 controller
10) PIRQ E: XHCI host controller
11) PIRQ F: Unused
12) PIRQ G: Optional high definition audio controller
13) PIRQ H: EHCI host controller

● ... Default setting
○ ... Optional setting



7.2 Upgrade information

Warning!

The BIOS and firmware on B&R devices must always be kept up to date. New versions can be downloaded from the B&R website (www.br-automation.com).

7.2.1 BIOS upgrade

An upgrade may be necessary for the following reason, for example:

- To update the functions implemented in BIOS Setup or to add newly implemented functions or components (for information about changes, see the readme file of the BIOS upgrade).

7.2.1.1 Basic information

Information:

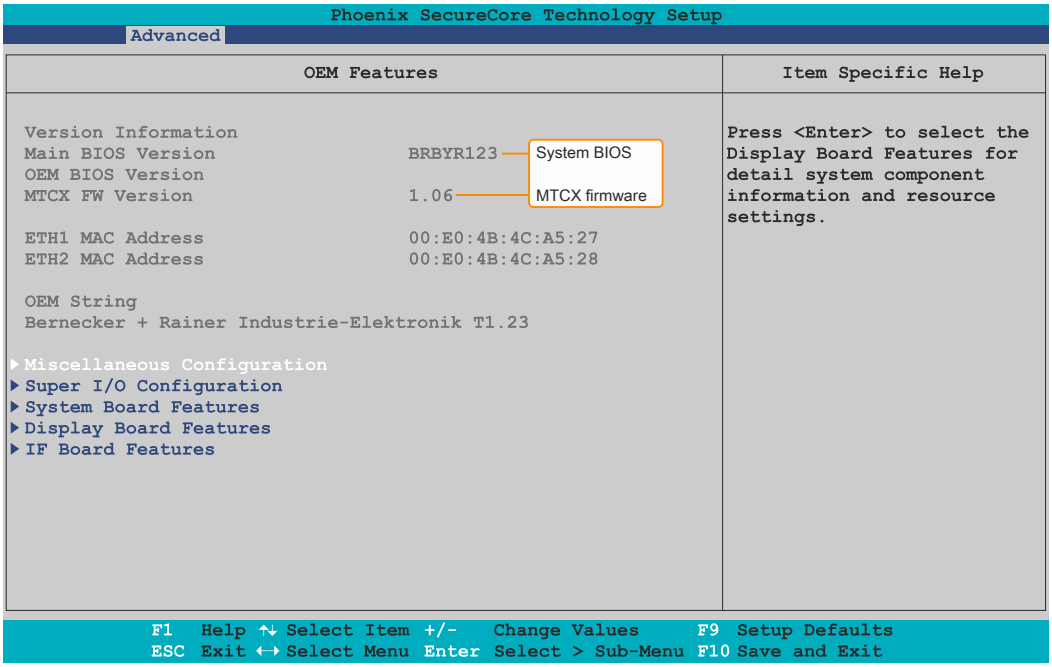
During a BIOS upgrade, individually saved BIOS settings are deleted.

It is helpful to determine the different software versions before starting the upgrade.

7.2.1.1.1 Which BIOS version and firmware are already installed?

This information is listed on the following BIOS Setup page.

- After switching on the PC, press "F2" to access BIOS Setup.
- Select "OEM features" from BIOS main menu "Advanced".



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 and select "Internal shell" as the boot device ("F5" key to open the boot menu).
4. After booting the EFI shell, "startup.nsh" is executed and the BIOS upgrade is started.
5. After a successful upgrade, the system must be rebooted.
6. Reboot and press key "F2" to enter BIOS Setup and load the setup defaults; then select "Save changes and exit".

7.2.2 Upgrading the firmware on the Panel PC 2100

With "Firmware upgrade (MTCX)", it is possible to update the firmware depending on the version of the PPC2100 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 and select "Internal shell" as the boot device ("F5" key to open the boot menu).
4. After booting the EFI shell, "startup.nsh" is executed and the MTCX upgrade is started.
5. After a successful upgrade, a the system must be switched off and on again.

Warning!

Pressing panel keys during firmware transfer is not permitted! This can interfere with the process.

Information:

The power supply to the PC must be switched off and on again for the new firmware to take effect and the updated version to be displayed.

7.2.2.3 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 2016 LTSB
- Windows 10 IoT Enterprise 2015 LTSB
- Windows Embedded 8.1 Industry Pro
- Windows 7 Professional/Ultimate
- Windows Embedded Standard 7 Premium
- Linux for B&R 9
- Linux for B&R 8

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 Windows 10 IoT Enterprise 2016 LTSB

7.4.1 General information

Information:

Discontinuation of support for Windows 10 IoT Enterprise 2016 LTSB by Microsoft:

Security updates, hotfixes, free or paid support and technical resources will no longer be offered after October 13, 2026.

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 PPC2100 - Order data

Order number	Short description	Figure
	Windows 10 IoT Enterprise 2016 LTSB	
5SWW10.0543-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2100 chipset Bay Trail - CPU E3826/E3827/E3845 - 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	

7.4.3 PPC2100 - Overview

Order number	5SWW10.0543-MUL
Operating system	
Target systems	
Industrial PC	PPC2100
Processor	E3826/E3827/E3845
Chipset	Bay Trail
Edition	Entry
Architecture	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.

7.4.4 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

7.4.5 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 is 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 is installed on the APC2100 and PPC2100 in BIOS mode.

7.4.6 Drivers

The operating system contains all drivers necessary for operation. If an older driver version is installed, the current 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.

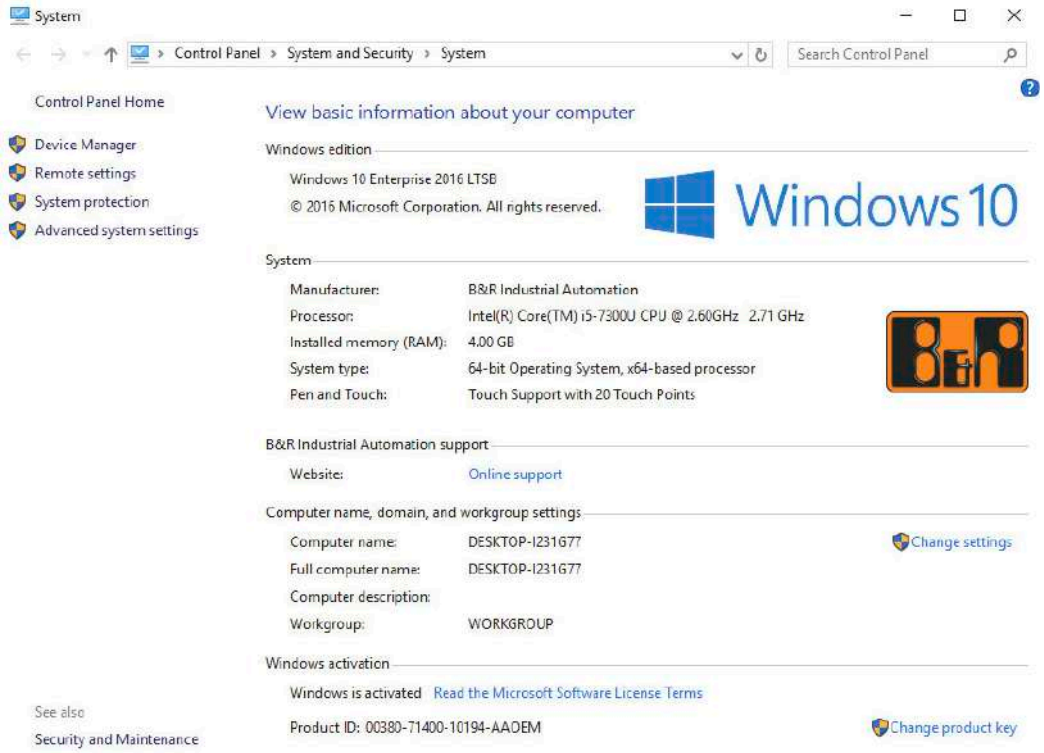
Information:

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

7.4.7 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 (symbolic image):



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.

7.4.8 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.

7.4.9 Supported display resolutions

Per Microsoft requirements, Windows 10 IoT Enterprise 2016 LTSB requires SVGA resolution (800 x 600) or higher to enable full operation of the Windows user interface (including system dialog boxes, apps, etc.). A lower resolution can be selected for applications.

7.5 Windows 10 IoT Enterprise 2015 LTSB

7.5.1 General information

> **Information:**
>
> **Discontinuation of support for Windows 10 IoT Enterprise 2015 LTSB by Microsoft:**
>
> **Security updates, hotfixes, free or paid support and technical resources will no longer be offered after October 14, 2025.**

Windows 10 IoT Enterprise 2015 LTSB is the successor to Windows Embedded 8.1 Industry and based on new Windows 10 technology. The operating system also offers a higher level of protection for industrial applications through additional lockdown functions. Windows 10 IoT Enterprise 2015 LTSB is a special version of Windows 10 Enterprise for industrial use (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).**

7.5.2 PPC2100 - Order data

Order number	Short description	Figure
	Windows 10 IoT Enterprise 2015 LTSB	
5SWW10.0243-MUL	Windows 10 IoT Enterprise 2015 LTSB - 64-bit - Multilingual - PPC2100 chipset Bay Trail - License (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	Windows 10 IoT Enterprise 2015 LTSB	
5SWW10.0200-MUL	Windows 10 IoT Enterprise 2015 LTSB - 64-bit - Multilingual - Recovery DVD	
5SWW10.0400-MUL	Windows 10 IoT Enterprise 2015 LTSB - 64-bit - Language Pack DVD	

7.5.3 Overview

Order number	5SWW10.0243-MUL
Operating system	
Target systems	
Industrial PC	PPC2100
Processor	No limitation
Chipset	Bay Trail
Edition	Embedded
Architecture	64-bit
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 at least 4 GB RAM with 64-bit operating systems, however.
2) The specified minimum size of the data storage medium does not take into account the memory requirements of additional language packages.

7.5.4 Features

The feature list shows the most important device functions in Windows 10 IoT Enterprise 2015 LTSB.

Function	Windows 10 IoT Enterprise 2015 LTSB
Range of functions of Windows 10 Enterprise 2015 LTSB	✓
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	Configurable (disabled by default in the image by the UWF)
Additional embedded lockdown functions	

Function	Windows 10 IoT Enterprise 2015 LTSB
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓

7.5.5 Installation

Windows 10 IoT Enterprise 2015 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).

7.5.6 Drivers

The operating system contains all drivers necessary for operation. If an older driver version is installed, the current 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.

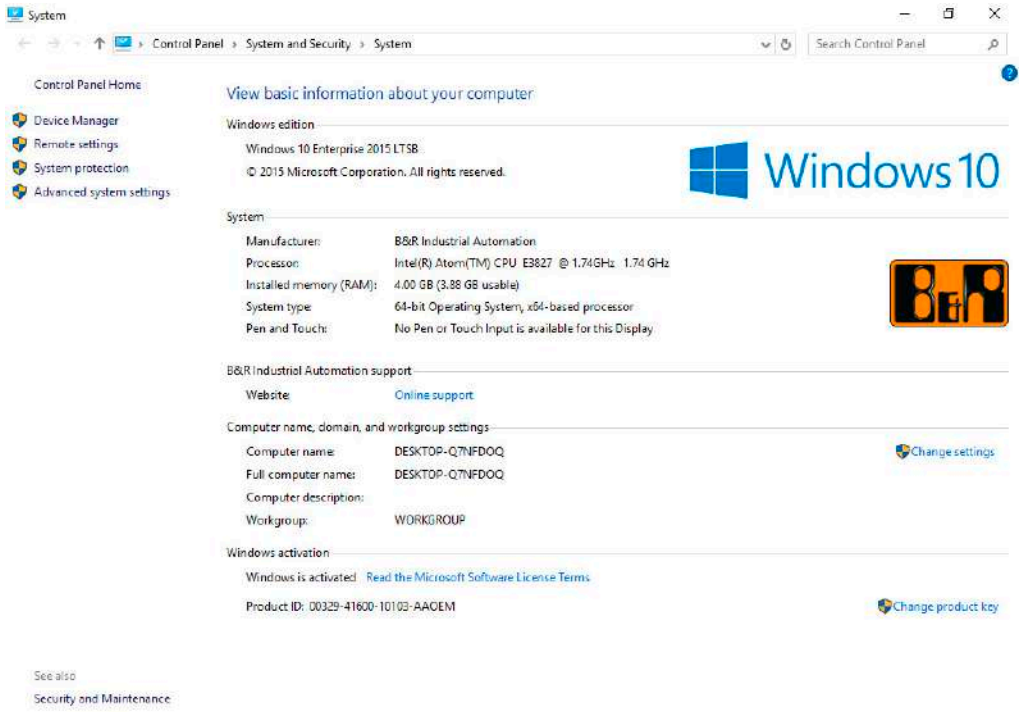
Information:

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

7.5.7 Activation

Windows 10 IoT Enterprise 2015 LTSB must be activated like its predecessor Windows Embedded 8.1 Industry Pro. This takes place at B&R.

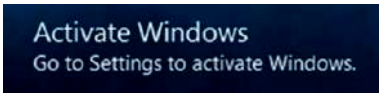
The activation status can be checked in the Control Panel (symbolic image):



Information:

Activation may be lost if the hardware is changed (e.g. replacement of components in the event of repairs) or if the system is reinstalled (e.g. with the recovery DVD).

In this case, a message is displayed on the screen that is always visible (watermark):



Windows 10 IoT Enterprise 2015 LTSB does not carry out any restarts or show any pop-up messages, which means that it is fully functional at all times. "Personalization" is not possible, however (e.g. setting the desktop background image).

The product can be activated at a later time either over the phone or via the Internet. For corresponding instructions, see "Update & Security > Activation" in the Windows Control Panel.

Information:

Entering a product key is not required for a new activation in any case.

7.5.8 Content of delivery of the recovery DVD

The DVD with the order number 5SWW10.0200-MUL is for recovery purposes only.

Information:

This only performs the basic installation of a Windows 10 Enterprise 2015 LTSB. In contrast to the preinstalled operating system versions, the operating system does not include device-specific drivers (network, graphics, ADI, etc.) or optimized settings, nor is it activated! The product can be activated at a later time either over the phone or via the Internet (see "Activation").

7.5.9 Characteristics, limitations

- Unlike standard Windows 10 Enterprise, Windows 10 IoT Enterprise 2015 LTSB does not include Cortana, the Microsoft Edge browser or the Microsoft Store, for example.
- The LTSB version is based on build 10240 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 2015 LTSB working guide". 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.

7.5.10 Supported display resolutions

Per Microsoft requirements, Windows 10 IoT Enterprise 2015 LTSB requires SVGA resolution (800 x 600) or higher to enable full operation of the Windows user interface (including system dialog boxes, apps, etc.). A lower resolution can be selected for applications.

7.6 Windows Embedded 8.1 Industry Pro

7.6.1 General information

> **Information:**
>
> **Discontinuation of support for Windows Embedded 8.1 Industry Professional by Microsoft:**
>
> **Security updates, hotfixes, free or paid support and technical resources will no longer be offered after July 11, 2023.**

Windows Embedded 8.1 Industry Pro is an operating system specially tailored to industrial applications. It is based on the new Windows 8.1 technology and contains additional lockdown functions to make industrial PCs more secure. The system is based on the complete Windows 8.1 Pro operating system and therefore offers full compatibility for applications and drivers.

7.6.2 Order data

Order number	Short description	Figure
	Windows Embedded 8.1 Industry Pro	
5SWWI8.0343-MUL	Windows Embedded 8.1 Industry Pro - 32-bit - Multilingual - For the PPC2100 - License	
5SWWI8.0443-MUL	Windows Embedded 8.1 Industry Pro - 64-bit - Multilingual - For the PPC2100 - License	
	Optional accessories	
	Windows Embedded 8.1 Industry Pro	
5SWWI8.0100-MUL	Windows Embedded 8.1 Industry Professional - 32-bit - Recovery DVD	
5SWWI8.0200-MUL	Windows Embedded 8.1 Industry Professional - 64-bit - Recovery DVD	
5SWWI8.0500-MUL	Windows Embedded 8.1 Industry Professional - 32-bit - Language Pack DVD	
5SWWI8.0600-MUL	Windows Embedded 8.1 Industry Professional - 64-bit - Language Pack DVD	

7.6.3 Overview

Order number	5SWWI8.0343-MUL	5SWWI8.0443-MUL
Operating system		
Target systems		
Industrial PC	PPC2100	
Chipset	Bay Trail	
Edition	Embedded	
Architecture	32-bit	64-bit
Language	Multilingual	
Minimum size of RAM	1 GB [1)]	2 GB [2)]
Minimum size of data storage medium	16 GB [3)]	20 GB [3)]

1) If UWF (Unified Write Filter) is enabled, 2 GB RAM are recommended.
The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 2 GB RAM with 32-bit operating systems, however.
2) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 4 GB RAM with 64-bit operating systems, however.
3) The specified minimum size of the data storage medium does not take into account the memory requirements of additional language packages.

7.6.4 Features

The feature list shows the most important device functions in Windows Embedded 8.1 Industry Pro.

Function	Windows Embedded 8.1 Industry Pro
Range of functions in Windows 8.1 Pro	✓
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	Configurable (disabled by default in the image by the UWF)
Additional embedded lockdown functions	
Assigned access	Configurable
Dialog box filter	Configurable

Function	Windows Embedded 8.1 Industry Pro
Embedded lockdown manager	✓
Keyboard Filter	Configurable
Shell Launcher	Configurable
Toast notification filter	Configurable
USB filter	Configurable
Unified Write Filter	✓
Windows 8 application launcher	Configurable
Gesture filter	Configurable

7.6.5 Installation

Windows Embedded 8.1 Industry Pro is preinstalled by B&R on a suitable data storage medium (32-bit: at least 16 GB, 64-bit: at least 20 GB). After the system is 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).

Information:

If entering the product key is required during the OOBE, this can be skipped by entering "SKIP".

7.6.6 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 only important to ensure that "Unified Write Filter (UWF)" is disabled.

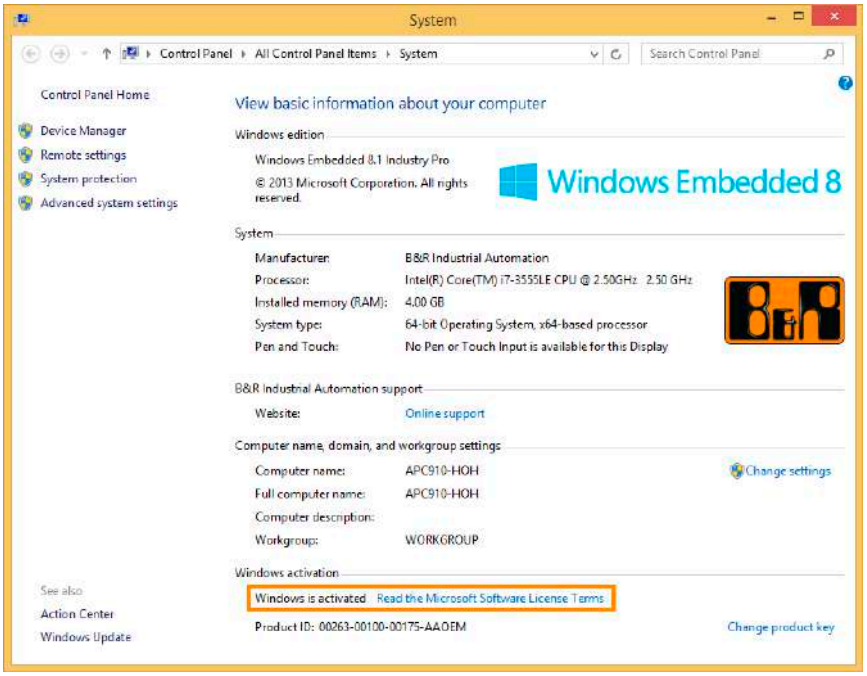
Information:

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

7.6.7 Activation

Windows Embedded 8.1 Industry Pro must be activated in contrast to the previous versions Windows 7 and Windows XP Pro. This takes place at B&R.

The activation status can be checked in the Control Panel:



Information:

Activation may be lost if the hardware is changed (e.g. if components are replaced in case of repair) or if the system is reinstalled (e.g. with the recovery DVD).

In this case, a "watermark message" will always be shown on the screen:

Windows Embedded 8.1 Industry Pro does not carry out any restarts or show any pop-up messages, which means that it is fully functional at all times. Only "personalizations" (e.g. setting the desktop background image) cannot be carried out.

The product can be activated at a later time either over the phone or via the Internet. Instructions are available on the Microsoft website.

Activation via direct Internet connection:
http://msdn.microsoft.com/en-us/library/dn449258(v=winembedded.82).aspx
Activation by telephone:
http://msdn.microsoft.com/en-us/library/dn449379(v=winembedded.82).aspx

Information:

Entering a product key is not required for a new activation in any case.

7.6.8 Content of delivery of the recovery DVD.

DVDs with order numbers 5SWWI8.0100-MUL and 5SWWI8.0200-MUL are only for recovery purposes.

Information:

This only performs the basic installation of a Windows Embedded 8.1 Industry Pro. In contrast to the preinstalled operating system versions, the operating system does not include device-specific drivers (network, graphics, ADI, etc.) or optimized settings, nor is it activated! The product can be activated at a later time either over the phone or via the Internet (see "Activation").

7.6.9 Lockdown features

The lockdown functions in Windows Embedded 8.1 Industry Pro make it possible to individually configure the device while making the system more secure at the same time. Among other things, they include:

- Unified Write Filter (UWF):
  This allows a data storage medium (e.g. CFast card) to be configured for read-only access, for example, and only certain registry keys can be accessed. As a result, the system always starts with the same configuration after rebooting.
- Dialog box filter:
  This can be used to suppress pop-up windows and dialog boxes. Such dialog boxes can occur, for example, if virus scanners are updated, network connections fail or the Windows Security Center shows warnings. These dialog boxes are simply hidden.
- Keyboard Filter:
  This allows individual keys or key combinations to be locked, e.g. so that the user cannot access the Task Manager.

For further information about the lockdown functions, see the Microsoft website:
http://msdn.microsoft.com/en-us/library/dn449278(v=winembedded.82).aspx

7.6.10 Supported display resolutions

Per Microsoft requirements, Windows Embedded 8.1 Industry Pro requires XGA resolution (1024 x 768) or higher to enable full operation of the Windows user interface (including system dialog boxes, apps, etc.). A lower resolution can be selected for applications.

7.7 Windows 7

7.7.1 General information

> **Information:**
>
> **Discontinuation of support for Windows 7 by Microsoft:**
>
> **After January 14, 2020, Microsoft will no longer be providing any security updates, hotfixes, support (free or paid) or technical resources for Windows 7.**

Windows 7 offers a variety of innovative features and performance enhancements. The 64-bit variants make full use of the current PC infrastructure. Faster switching to sleep mode, quicker restores, less memory usage and high-speed detection of USB devices are just a few of the advantages provided by Windows 7. Both English and German are available in Windows 7 Professional, while Windows 7 Ultimate supports up to 35 different languages (up to 36 languages in Service Pack 1). Product activation is not required for use on B&R PCs, which is a great advantage for simple logistical processes in the area of machine automation.

All Windows operating systems offered by B&R are from the Microsoft Embedded division. This means considerably longer availability compared to the consumer market.

7.7.2 Order data

Order number	Short description	Figure
	Windows 7 Professional/Ultimate	
5SWWI7.1100-GER	Windows 7 Professional SP1 - 32-bit - German - DVD	
5SWWI7.1100-ENG	Windows 7 Professional SP1 - 32-bit - English - DVD	
5SWWI7.1200-GER	Windows 7 Professional SP1 - 64-bit - German - DVD	
5SWWI7.1200-ENG	Windows 7 Professional SP1 - 64-bit - English - DVD	
5SWWI7.1300-MUL	Windows 7 Ultimate SP1 - 32-bit - Multilingual - DVD	
5SWWI7.1400-MUL	Windows 7 Ultimate SP1 - 64-bit - Multilingual - DVD	

7.7.3 Overview

Order number	5SWWI7. 1100-GER	5SWWI7. 1100-ENG	5SWWI7. 1200-GER	5SWWI7. 1200-ENG	5SWWI7. 1300-MUL	5SWWI7. 1400-MUL
Operating system						
Target systems						
Industrial PC	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500		APC810 APC910 APC2100 PPC800 PPC900 PPC2100		APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	APC810 APC910 APC2100 PPC800 PPC900 PPC2100
Chipset	945GME GM45 QM77/HM76 NM10 US15W Bay Trail		945GME GM45 QM77/HM76 QM170/HM170/CM236 Bay Trail		945GME GM45 QM77/HM76 NM10 US15W Bay Trail	945GME GM45 QM77/HM76 QM170/ HM170/CM236 Bay Trail
Edition	Professional				Ultimate	
Architecture	32-bit		64-bit		32-bit	64-bit
Service pack	SP1					
Language	German	English	German	English	Multilingual	
Minimum size of RAM	1 GB [1]		2 GB [2]		1 GB [1]	2 GB [2]
Required storage space on data storage medium	16 GB		20 GB		16 GB [3]	20 GB [3]

1) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 2 GB RAM with 32-bit operating systems, however.
2) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 4 GB RAM with 64-bit operating systems, however.
3) The memory space required by additional language packs is not taken into account in the minimum size for the data storage medium.

7.7.4 Installation

Windows 7 is preinstalled by B&R on the desired data storage medium (e.g. CFast card). All necessary drivers (graphics, network, etc.) for operation are also installed.

7.7.5 Drivers

Current drivers for all 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.

7.7.6 Characteristics, limitations

- Beep.sys no longer exists in Windows 7; therefore, an acoustic signal (e.g. when a button is pressed) can no longer be heard.
- Determining the Windows 7 system assessment (system classification) is currently not supported (this does not apply to PP500, APC2100, APC510, APC511, APC910, PPC2100 and PPC800 with NM10 chipset).

Information:

32-bit operating systems are not recommended for system units with 4 GB or more of main memory. For further information, see section "Miscellaneous configuration" on page 210 under "PCI MMIO size".

7.7.7 Supported display resolutions

Per Microsoft requirements, Windows 7 requires XGA resolution (1024 x 768) or higher to enable full operation of the Windows user interface (including system dialog boxes, etc.). A lower resolution can be selected for applications.

7.8 Windows Embedded Standard 7

7.8.1 General information

> **Information:**
>
> **Discontinuation of support for Windows Embedded Standard 7 by Microsoft:**
>
> **After October 13, 2020, Microsoft will no longer be providing any security updates, hotfixes, support (free or paid) or technical resources for Windows Embedded Standard 7.**

The successor variant to Windows XP Embedded is Windows Embedded Standard 7. As with previous versions, the embedded operating system offers full system support for B&R industrial PCs. In addition to new features that are also included in Windows 7 Professional, Windows Embedded Standard 7 includes embedded components such as Enhanced Write Filter, File-Based Write Filter, Registry Filter and USB boot. Windows Embedded Standard 7 is available in two versions. The main difference is the ability to execute in multiple languages. Windows Embedded Standard 7 is only available in a single language, whereas Windows Embedded Standard 7 Premium supports the installation of several languages simultaneously.

With Windows Embedded Standard 7, Microsoft has made substantial improvements in the area of security. The AppLocker program, available in the premium variant, can prevent the execution of unknown or potentially undesired applications that are being installed over a network or from drives that are directly connected. A tiered approach allows the differentiation between scripts (.ps1, .bat, .cmd, .vbs and .js), installation files (.msi, .msp) and libraries (.dll, .ocx). AppLocker can also be configured to record undesired activity and display it in the Event Viewer. Windows Embedded Standard 7 is available in both 32-bit and 64-bit versions (64-bit versions are not supported by all systems). As a result, even demanding applications based on 64-bit technology are supported.

7.8.2 Order data

Order number	Short description	Figure
	Windows Embedded Standard 7	
5SWWI7.1543-ENG	Windows Embedded Standard 7 SP1 - 32-bit - Service Pack 1 - English - PPC2100 - License (without Recovery DVD) - Only available with a new device	
5SWWI7.1643-ENG	Windows Embedded Standard 7 SP1 - 64-bit - Service Pack 1 - English - PPC2100 - License (without Recovery DVD) - Only available with a new device	
5SWWI7.1743-MUL	Windows Embedded Standard 7 Premium SP1 - 32-bit - Service Pack 1 - Multilingual - PPC2100 - License (without Recovery DVD) - Only available with a new device	
5SWWI7.1843-MUL	Windows Embedded Standard 7 Premium SP1 - 64-bit - Service Pack 1 - Multilingual - PPC2100 - License (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	Windows Embedded Standard 7	
5SWWI7.1900-MUL	Windows Embedded Standard 7 SP1 - 32-bit - Language Pack DVD	
5SWWI7.2000-MUL	Windows Embedded Standard 7 SP1 - 64-bit - Language Pack DVD	

7.8.3 Overview

Order number	5SWWI7.1543-ENG	5SWWI7.1643-ENG	5SWWI7.1743-MUL	5SWWI7.1843-MUL
Operating system				
Target systems				
Industrial PC	PPC2100			
Chipset	Bay Trail			
Edition	Embedded		Premium	
Architecture	32-bit	64-bit	32-bit	64-bit
Service pack	SP1			
Language	English		Multilingual	
Minimum size of RAM	1 GB [1]	2 GB [2]	1 GB [1]	2 GB [2]
Minimum size of data storage medium	16 GB		16 GB [3]	

1) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 2 GB RAM with 32-bit operating systems, however.
2) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using at least 4 GB RAM with 64-bit operating systems, however.
3) The memory space required by additional language packs is not taken into account in the minimum size for the data storage medium.

7.8.4 Features

The feature list shows the most important device functions in Windows Embedded Standard 7.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
Enhanced Write Filter (EWF)	✓	✓
File Based Write Filter (FBWF)	✓	✓
Administrator account	✓	✓
User account	Configurable	Configurable
Windows Explorer shell	✓	✓
Registry filter	✓	✓
Internet Explorer 11.0	✓	✓
Internet Information Service (IIS) 7.0	✓	✓
Anti-malware (Windows Defender)	-	✓
Add-ons (Snipping Tool, Sticky Notes)	-	✓
Windows firewall	✓	✓
.NET Framework 3.5	✓	✓
32-bit and 64-bit support	✓	✓
Remote Desktop Protocol 7.0	✓	✓
File compression utility	✓	✓
Windows Installer service	✓	✓
Windows XP mode	-	-
Media Player 12	✓	✓
DirectX	✓	✓
Multilingual user interface packs in the same image	-	✓
International components and language services	✓	✓
Language pack installer	✓	✓
Windows Update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
BitLocker	-	✓
AppLocker	-	✓
Tablet PC support	-	✓
Multi-touch support	-	✓
Boot from USB stick	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 94: Device functions in Windows Embedded Standard 7

7.8.5 Installation

Windows Embedded Standard 7 is preinstalled by B&R on a suitable CFast card (32-bit: at least 16 GB, 64-bit: at least 16 GB). After the system is switched on for the first time, it is configured automatically. This procedure takes approx. 30 minutes, and the device will be automatically rebooted a number of times.

Information:

If the EWF (Enhanced Write Filter) should be used, all mass storage devices (except the boot drive) must be removed from the system during setup or SYSPREP. Alternatively, the additional mass storage devices can also be disabled in BIOS.

7.8.6 Drivers

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

7.8.7 Characteristics, limitations

Information:

32-bit operating systems are not recommended for system units with 4 GB or more of main memory. For further information, see section "Miscellaneous configuration" on page 210 under "PCI MMIO size".

7.8.8 Supported display resolutions

Per Microsoft requirements, Windows Embedded Standard 7 requires XGA resolution (1024 x 768) or higher to enable full operation of the Windows user interface (including system dialog boxes, etc.). A lower resolution can be selected for applications.

7.9 Automation Runtime

7.9.1 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.

7.9.2 Order data

Order number	Short description	Figure
	Technology Guard	
0TG1000.01	Technology Guard (MSD)	
0TG1000.02	Technology Guard (HID)	
1TG4600.10-5	Automation Runtime Windows TG license	
1TG4601.06-5	Automation Runtime Embedded, TG license	
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	

7.9.3 Automation Runtime Windows (ARwin)

System requirements

The following software versions (or higher) are required to operate Automation Runtime Windows on a Panel PC 2100:

- ARwin upgrade AR C4.10
- ARwin upgrade AR N4.10 for 5PPC2100.BY48-000
- Automation Studio V4.1.4.0
- Technology Guard

Information:

In order to operate Automation Runtime Windows (ARwin), BIOS setting *Advanced - Miscellaneous configuration - Realtime environment* must be set to *Enabled*.

Information:

To slightly improve the real-time behavior (jitter) of Automation Runtime Windows (ARwin) with a graphics-heavy application, BIOS settings *Advanced - Graphics (IGD) configuration - IGD turbo* and *Advanced - Graphics (IGD) configuration - RC6 (render standby)*[4] can be set to *Disabled*.

If the BIOS setting *Advanced - Graphics (IGD) Configuration - IGD Turbo* is set to *Disabled*, the graphics performance of the system is noticeably reduced.

7.9.4 Automation Runtime Embedded (ARemb)

System requirements

The following software versions (or higher) are required to operate Automation Runtime Embedded on a Panel PC 2100:

- ARemb upgrade AR C4.10
  - There is support with single-touch functionality starting with this version for 5AP933* multi-touch panels with Rev. ≤ B7.
- ARemb upgrade AR F4.10
  - There is support with single-touch functionality starting with this version for 5AP933* multi-touch panels with Rev. ≤ B7 and Rev. ≥ B8.
- ARemb upgrade AR M4.10
  - There is support with single-touch functionality starting with this version for 5AP1130* multi-touch panels.
- ARemb upgrade AR N4.10 for 5PPC2100.BY48-000
- Automation Studio V4.1.4.0
- Visual Components Runtime (VC) V4.15.0
- Process Visualization Interface (PVI) V4.1.5
- Technology Guard

PVI Development Setup must be downloaded from the B&R website (www.br-automation.com) and installed separately!

Information:

In order to operate Automation Runtime Embedded (ARemb), BIOS setting *Advanced - Miscellaneous configuration - Realtime environment* must be set to *Enabled*.

Information:

In order to slightly improve the real-time behavior (jitter) of Automation Runtime Embedded (ARemb) in graphics-intensive applications, set BIOS setting *Advanced - Graphics (IGD) configuration - IGD turbo* to *Disabled*.

Important: If BIOS setting *Advanced - Graphics (IGD) configuration - IGD turbo* is set to *Disabled*, the graphics performance of the system is noticeably reduced.

7.9.5 Technology Guarding

Technology Guarding is license protection used for individual software components. The "Technology Guard" (dongle) serves as the license container; this is connected to an available USB interface on the target system.

B&R Automation Runtime software components are subject to licensing. The use of the Technology Guard is mandatory if these components have not been selected as a software package.

Information:

Licensing using the Technology Guarding wizard is available starting with Automation Studio V4.1 and Automation Runtime V4.08. A Technology Guard is not necessary in earlier Automation Runtime versions.

For additional information about Technology Guarding, see Automation Help.

[4] For BIOS versions 1.40 and later: *RC6 (render standby)* is automatically disabled when *Realtime environment* is enabled.

7.10 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 2100 :

- ARemb upgrade AR F4.44
- Automation Studio V4.4
- PPC2100 BIOS V1.40
- PPC2100 MTCX V1.13

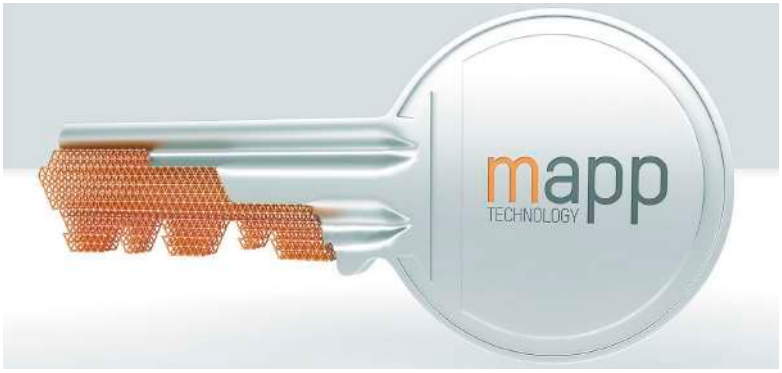
Information:

To operate B&R Hypervisor, settings *Advanced - Miscellaneous configuration - Realtime environment* and *Hypervisor environment* must be set to *Enabled*.

Information:

For detailed information, see Automation Help or the B&R website (www.br-automation.com).

7.11 mapp Technology



mapp Technology is revolutionizing the creation of machine and plant software. "mapps" are as easy to use as smartphone apps. Instead of programming user/role systems, alarm systems or the control of axes line by line, the machine software developer simply configures the finished mapps. Complex algorithms are easy to master. The programmer can concentrate fully on the machine process.

Information:

For detailed information, see Automation Help or the B&R website (www.br-automation.com).

7.12 Linux for B&R 8 (GNU/Linux)

7.12.1 General information

> **Information:**
>
> **Security updates, hotfixes, free or paid support and technical resources will no longer be offered after June 30, 2020.**

Linux or GNU/Linux are usually free, UNIX-like multi-user operating systems based on the Linux kernel and fundamentally on GNU software. Wide (also commercial) distribution was made possible starting in 1992 by licensing the Linux kernel under the GPL.

The Linux version created by B&R is based on Debian 8. It already contains all the drivers required for the respective device and can therefore be used immediately without any additional effort.

Advantages of Debian:

- High stability
- Large package selection

For more information about Debian, see http://www.debian.org.

7.12.2 Order data

Order number	Short description	Figure
	Linux for B&R 8	
5SWLIN.0543-MUL	Linux for B&R 8 - 32-bit - Multilingual - PPC2100 Bay Trail chipset - Installation - Only available with a new device	
5SWLIN.0643-MUL	Linux for B&R 8 - 64-bit - Multilingual - PPC2100 Bay Trail chipset - 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.4096-00	CFast 4 GB SLC	
5CFAST.8192-00	CFast 8 GB SLC	

7.12.3 Overview

Order number	5SWLIN.0543-MUL	5SWLIN.0643-MUL
Operating system		
Target systems		
Industrial PC	PPC2100	
Chipset	Bay Trail	
Architecture	32-bit	64-bit
Language	Multilingual	
Minimum size of RAM	1 GB	
Minimum size of data storage medium	4 GB	

7.12.4 Features

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

Detailed instructions about Linux for B&R 8 can be downloaded from the Downloads section of the B&R website (www.br-automation.com).

7.12.5 Installation

Linux for B&R 8 is preinstalled by B&R on the desired data storage medium (e.g. CFast card). All necessary drivers (graphics, network, etc.) for operation are also installed.

Debian 8 can also be downloaded from the Debian website (http://www.debian.org) and installed separately. Instructions are also available on the Debian website.

Notes regarding special features of installation on B&R devices are described in a separate document that can be downloaded from the B&R website (www.br-automation.com).

Installation packages are available for the necessary B&R adjustments; these can also be downloaded from the B&R website (www.br-automation.com).

7.12.6 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).

7.13 Linux for B&R 9 (GNU/Linux)

7.13.1 General information

> **Information:**
>
> **Security updates, hotfixes, free or paid support and technical resources will no longer be offered after June 30, 2022.**

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).**

7.13.2 Order data

Order number	Short description	Figure
	Linux for B&R 9	
5SWLIN.0743-MUL	Linux for B&R 9 - 64-bit - Multilingual - PPC2100 Bay Trail chipset - 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	

7.13.3 Overview

Order number	5SWLIN.0743-MUL
Operating system	
Target systems	
Industrial PC	PPC2100
Chipset	Bay Trail
Architecture	64-bit
Language	Multilingual
Minimum size of RAM	1 GB
Minimum size of data storage medium	4 GB

7.13.4 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).

7.13.5 Installation

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

7.13.6 Drivers

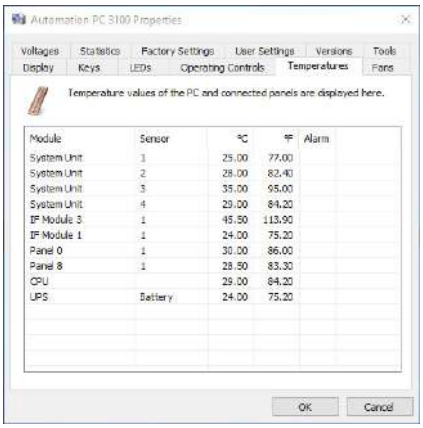
Current drivers for all approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

Information:

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

7.14 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.

7.14.1 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 or calibrating control devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading out temperatures, fan speeds, switch positions and statistical data
- Reading out operating hours (power-on hours)
- Reading user settings and factory settings
- Reading out software versions
- Updating and backing up BIOS and 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.

7.14.2 Installation

The ADI driver is included in most B&R Windows operating systems or can be installed on request.

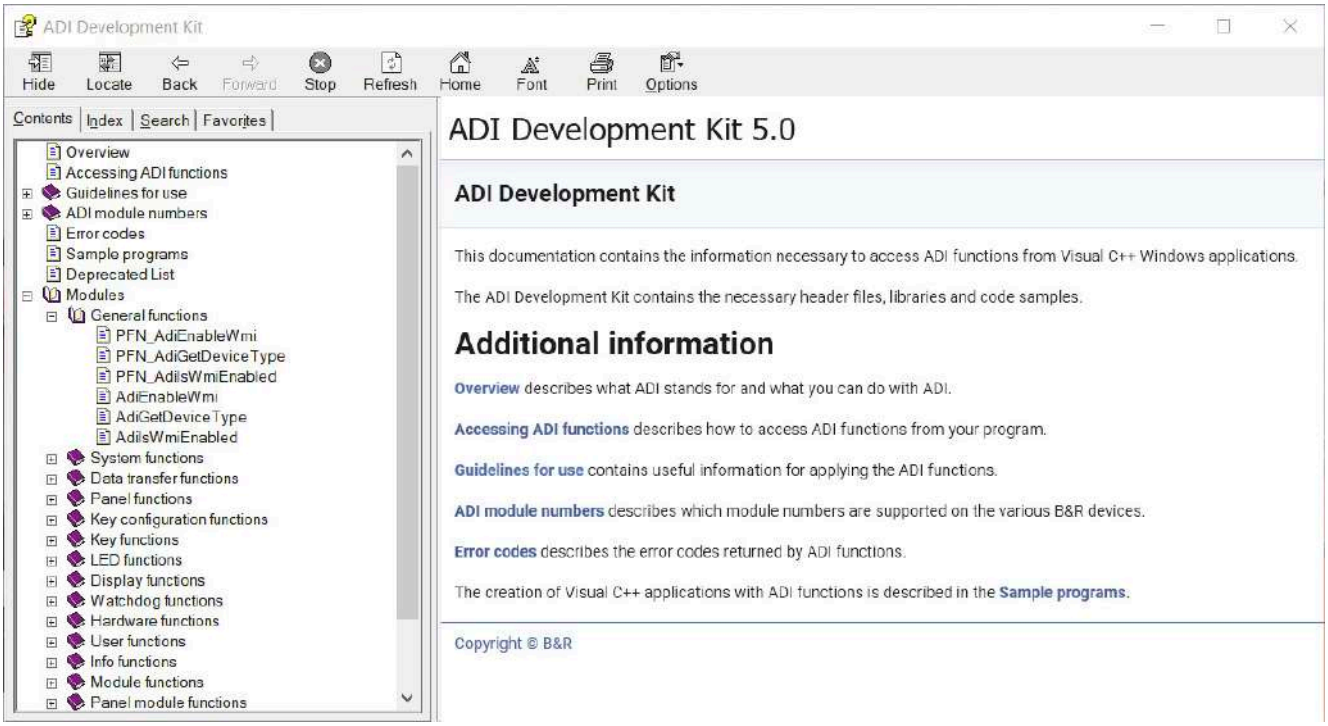
The ADI driver (also includes the ADI Control Center) and user documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com). If a more recent version is available, it can be installed later.

Information:

The *Write filter* must be disabled during installation.

7.15 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.

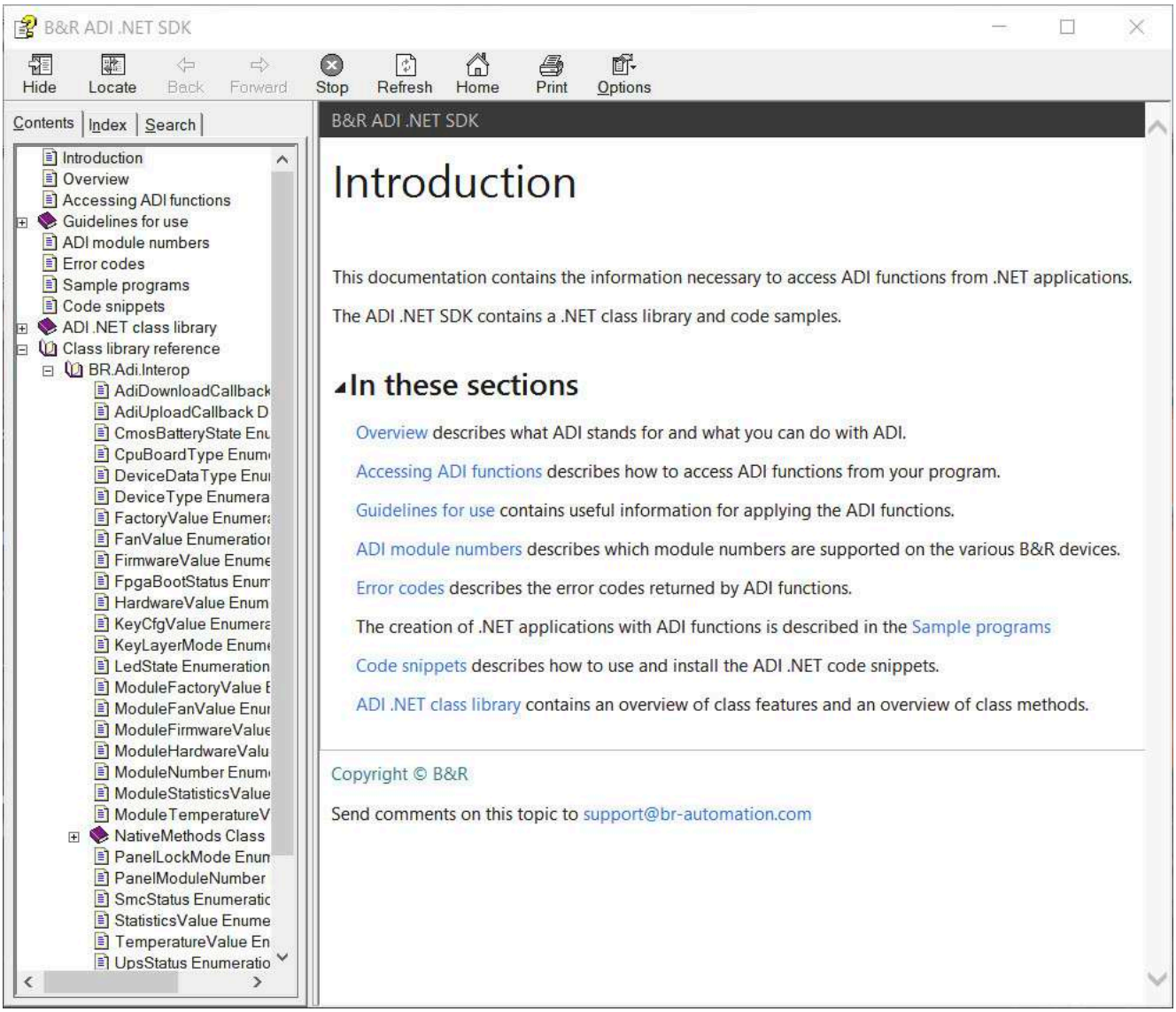
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

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).

7.16 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.

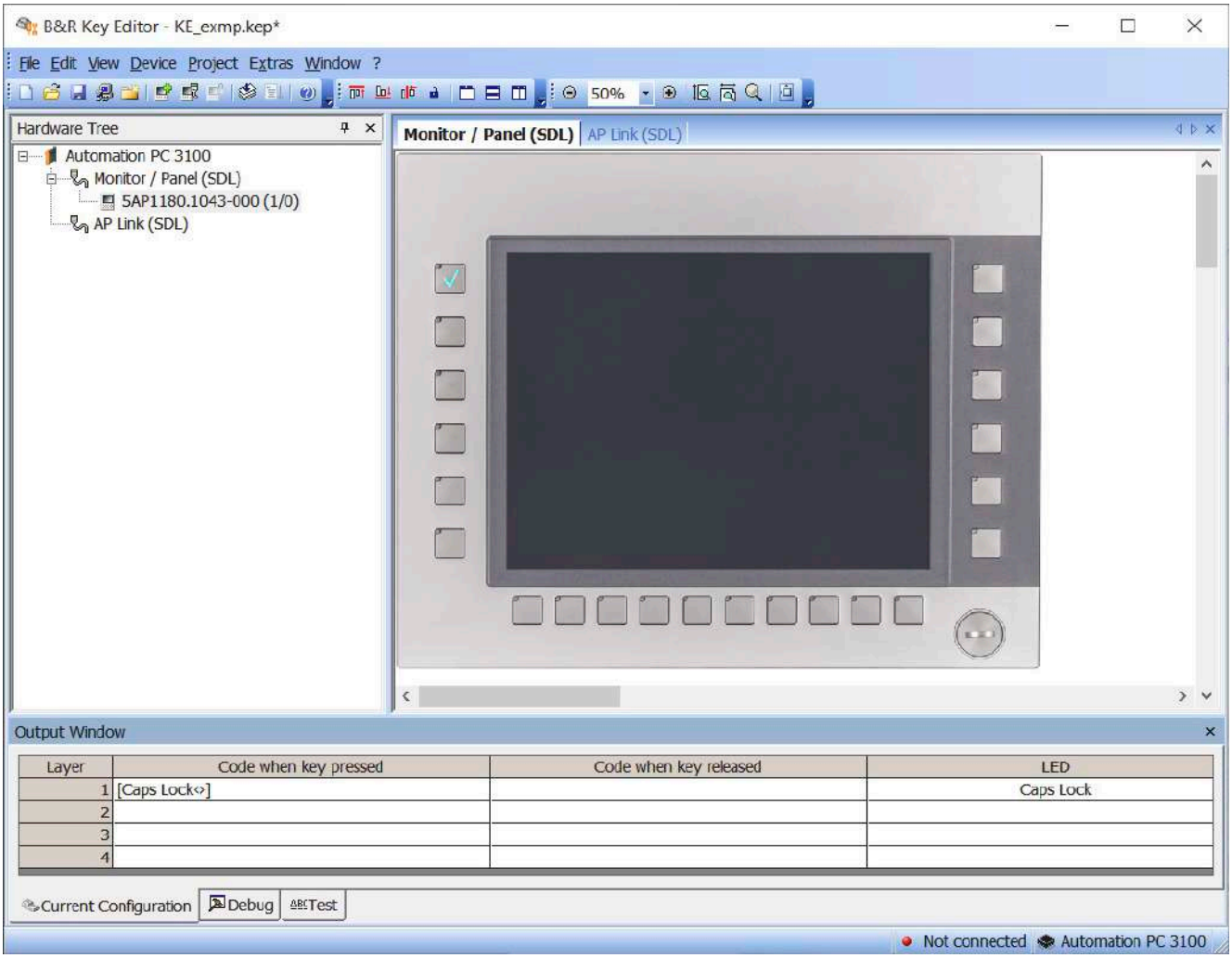
The appropriate ADI driver must be installed for the device. The ADI driver is already included in B&R images of embedded operating systems.

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).

7.17 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:

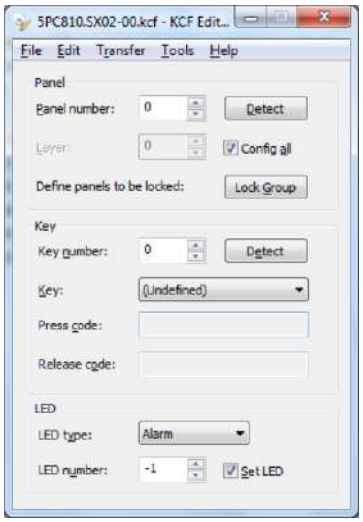
- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the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

7.18 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).

7.19 HMI Service Center

7.19.1 5SWUTI.0001-000

7.19.1.1 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).

7.19.1.2 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	

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 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.

8.2 User tips for increasing the service life of the display

8.2.1 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.

8.2.1.1 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%.

8.2.2 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.

8.2.2.1 What causes image persistence?

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

8.2.2.2 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.

8.3 Information about display properties

The following limitations result from the current state of the technology and do not constitute any claims or warranty.

Pixel errors:

Displays can contain faulty pixels (pixel errors) due to the manufacturing process.

Color variation:

Displays can display colors or color ranges differently due to the manufacturing process, the properties of the components used, environmental influences and aging. This cannot be completely ruled out even with two similar devices of the same revision.

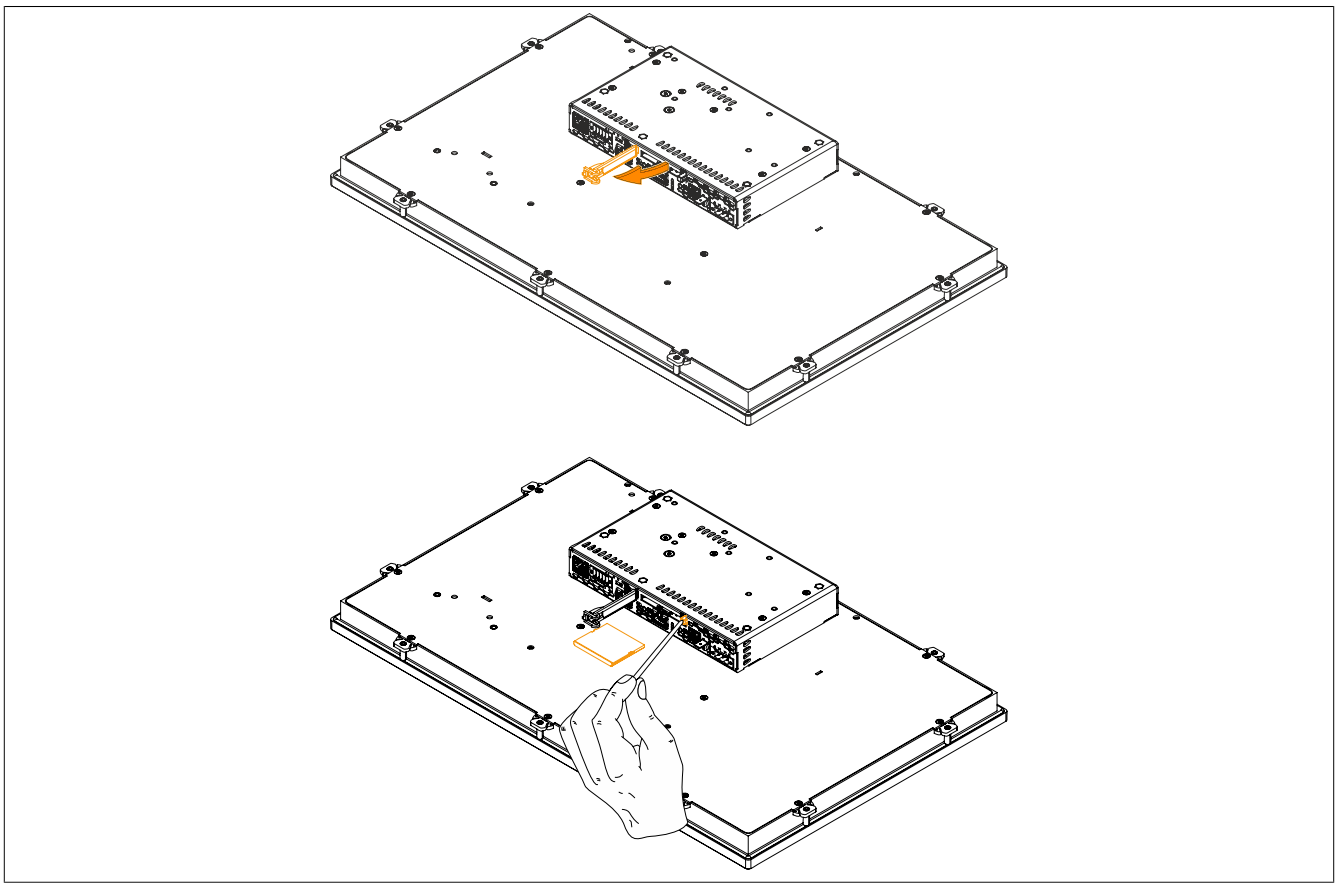
8.4 Replacing CFast cards

Caution!

The CFast card is only permitted to be exchanged when the power is switched off!

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

The CFast card can be exchanged quickly and easily by pressing the ejector (see figure) with a pointed object (e.g. ballpoint pen).



8.5 Repairs/Complaints and replacement parts

Danger!

Unauthorized opening or repair of a device may result in personal injury and/or serious damage to property. Repairs are therefore only permitted to be carried out by authorized qualified personnel at the manufacturer's premises.

To process a repair/complaint, a repair order or complaint must be created via the B&R Material Return Portal on the B&R website (www.br-automation.com).

9 International and national certifications

9.1 Directives and declarations

9.1.1 CE marking

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

9.1.2 EMC Directive

The products meet the requirements of EU directive "Electromagnetic compatibility 2014/30/EU" and are designed for industrial applications:

EN 61131-2:2007	Programmable controllers - Part 2: Equipment requirements and tests
EN 61000-6-2:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Information:

Declarations of conformity are available on the B&R website under Downloads > Certificates > Declarations of conformity.

9.2 Certifications

Danger!

A complete system can only receive certification if all individual components installed and connected in it have the corresponding certifications. If an individual component is used that does not have the corresponding certification, the complete system will also not be certified.

B&R products and services comply with applicable standards. These are international standards from organizations such as ISO, IEC and CENELEC, as well as national standards from organizations such as UL, CSA, FCC, VDE, ÖVE, etc. We pay special attention to the reliability of our products in the industrial sector.

Information:

The certifications valid for the respective product are available on the website and in the user's manual under the technical data in section "Certifications" or in the associated certificates.

9.2.1 UL certification

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 simplifies the certification of your machines and systems in this economic area.

Underwriters Laboratories (UL) per standard UL 508
Canadian (CSA) standard per C22.2 no. 142-M1987

UL certificates are available on the B&R website under Downloads > Certificates > UL.

Ind. Cont. Eq.
E115267

The device is classified as "open type" for use in the area of "Industrial control equipment" sector per UL 508. The device must therefore be installed in a UL 508-compliant protective housing as a requirement for certification or operation per UL 508.

The front of the device satisfies IP65 (EN 60529) and "Type 4X indoor use only" (UL 50E) requirements.

9.2.2 KC

Products with this mark are tested by an accredited test laboratory and permitted to be introduced into the Korean market (based on EU conformity).

9.2.3 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:

Declarations of conformity are available on the B&R website under Downloads > Certificates > Declarations of conformity.

9.2.4 RCM

Products with this mark are tested by an accredited test laboratory and certified by the ACMA. The mark is valid for Australia/Oceania and simplifies the certification of your machines and systems in this economic area (based on EU conformity).

9.2.5 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.
Products used on a ship's bridge must be dimmable using software in accordance with the regulations and guidelines from the respective classification society.

Windows 7 operating systems are only permitted to be used as embedded variants. There are no limitations for all other operating systems approved by B&R.

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).

9.2.6 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).

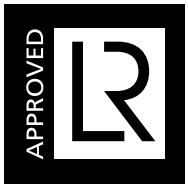
Certificates with specifications for permissible environmental conditions as well as a list of revisions from which the certification applies to individual devices are available on the B&R website (Downloads > Certificates > Maritime).

9.2.7 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).

9.2.8 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).

9.2.9 Korean Register of Shipping (KR)

Products with this certification are suitable for use in the maritime sector according to the regulations of the classification society Korean Register of Shipping (KR).

Certificates with specifications for permissible environmental conditions are available on the B&R website (Downloads > Certificates > Maritime).

9.2.10 Certifications for use in potentially explosive environments

9.2.10.1 UL Haz. Loc. certification

Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment for use in hazardous locations". The mark is valid for the USA and Canada and simplifies the certification of your machines and systems in this economic area.

Underwriters Laboratories (UL) per standard ANSI/ISA 12.12.01
Canadian (CSA) standard per C22.2 no. 213-16

Ind. Cont. Eq.
for Haz.Loc.
Cl. I, Div. 2,
Groups ABCD
E180196 (T4)

The UL HazLoc certificates are available on the B&R website (Downloads > Certificates > HazLoc).

9.2.10.1.1 General safety guidelines

PPC2100 systems with AP923 or AP1000 panels that are certified for use in potentially explosive environments and carry the marking above are suitable for use in Class 1, Division 2, Groups A, B, C and D or in nonexplosive environments and correspond to the following standards: UL 508 - 17th Edition, ANSI/ISA 12.12.01:2013, CSA C22.2 No. 213-M1987, and CSA C22.2 No. 157-92 (R2012).

9.2.10.1.2 Mounting and installation

Devices with explosion protection are to be used as intended and are only permitted to be operated by knowledgeable and qualified personnel according to these operating instructions and the other information contained in the corresponding user's manual. Operation in any other way endangers the safety and functionality of the devices and the connected systems. The operator is responsible for following all applicable safety and accident prevention regulations, as well as adhering to standards.

Devices must be installed in a suitable protective housing that can only be opened by using a tool. In order to guarantee sufficient air circulation, allow the specified amount of space around the device. Use only in environments with pollution degree 2. The maximum ambient temperature varies depending on the individual components being used, see section "Temperature specifications" on page 34.

The certification marking on the device must be checked before each installation or use of the device in potentially explosive environments. Additional equipment must be suitable for the operating location. Final assembly must be approved by the relevant local authorities. Wiring must follow national regulations and meet all legal requirements.

Devices must remain voltage-free until installation work is complete. The tightening torque for the power supply terminals is 0.5 Nm. Cables must be able to handle a surface temperature of 75°C. PPC2100 systems with AP923 or AP1000 panels are only permitted to be operated with 24 VDC.

Unshielded/Ungrounded cables are never permitted to be used in potentially explosive areas. Devices must be securely connected to the potential offset. Power supply, communication and accessory cables must be secured on the device or control cabinet. Power supply, communication and accessory cables are not permitted to exert excessive tensile stress on the interfaces. Possible vibrations in the environment must be taken into account for this.

9.2.10.1.3 Operation

To switch PPC2100 systems with AP923 or AP1000 panels on/off in a potentially explosive area, either the switch must be located outside the explosive area or a switch certified for use in potentially explosive areas must be used.

> **Danger!**
>
> **Risk of explosion: Accessories are not permitted to be connected or disconnected when the power is switched on unless the area is considered nonhazardous and is free of ignitable concentrations!**
>
> **Risk of explosion: Replacing components may impair eligibility for Class I, Division 2!**

Danger !

Risque d'explosion – Ne pas connecter ou déconnecter un quelconque équipement lorsque le circuit est sous tension, à moins que la zone soit connue comme étant sans risque et sans concentrations inflammables!

Risque d'explosion – Le remplacement de composants peut compromettre l'aptitude au respect de la Classe I, Division 2!

With the exception of USB dongle 0TG1000.01 or in line with the requirements set forth in "USB connection with the Panel PC 2100" and "USB connection with the Automation Panel 1000", USB interfaces are not certified for operation in potentially explosive areas and may only be used for service purposes.

9.2.10.1.4 Maintenance, breakdowns and disassembly

Devices must be shut down and protected against accidental startup. A voltmeter must be used to verify that the power supply is cut off.

Before removing or installing accessories, components or cables, all power supplies to PPC2100 systems with AP923 or AP1000 panels must be interrupted. Defective devices must only be replaced by knowledgeable and qualified personnel. Before switching on or connecting the power supply, all covers and system components must be reinstalled and secured.

Danger!

Failure to follow this instruction can result in death, serious bodily injury or damage to property!

Danger !

Le non-respect de ces instructions peut entraîner des blessures graves ou mortelles!

9.2.10.1.5 USB connection with the Panel PC 2100

9.2.10.1.5.1 Introduction

The information below describes the use of USB peripheral devices on USB interfaces 1 and 2 of the B&R Panel PC 2100 in Hazardous Locations Class I, Division 2, Groups A, B, C and D.

Danger!

EXPLOSION HAZARD

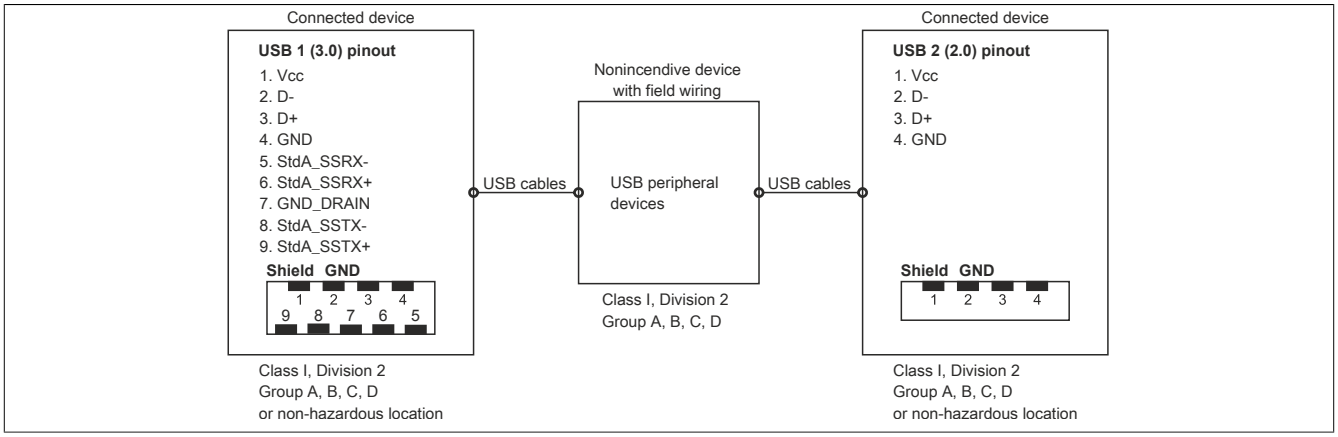
- **Before installation or use in potentially explosive atmospheres, the explosion protection class of the device must be checked according to ANSI/ISA 12.12.01 and CSA C22.2 N°213.**
- **To switch on/off B&R devices installed in potentially explosive atmosphere, one of the following conditions must be met:**
  - **A switch outside the hazardous area must be used, or**
  - **A switch certified according to hazardous location class and division for "tube use" must be used.**
- **As long as the electrical circuit is activated, cables or lines are not permitted to be connected or disconnected unless the area is knowingly free of flammable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and circuits. This includes power, ground and network connections as well as series and parallel connections.**
- **Unshielded/Ungrounded cables are never permitted to be used in potentially explosive atmospheres.**
- **Only configurations with nonincendive USB devices are permitted to be used.**
- **The doors and openings of housings must always remain closed. This prevents the accumulation of foreign bodies within the workstation.**

Failure to follow this instruction can result in death, serious bodily injury or damage to property!

9.2.10.1.5.2 Description

Nonincendive devices (keyboards, mouse) are certified for use on the rear USB interfaces of the B&R Panel PC 2100 (connected device) and are permitted to be connected and disconnected during operation. In addition to the nonincendive property, devices that can be connected to rear USB interfaces 1 and 2 must meet the following criteria.

The figure shows the USB cable wiring:



The following tables indicate the nonincendive electrical circuit parameters:

Interface USB1 (USB 3.0):	
No-load voltage [V_{oc}]	5.13 V
Short circuit current [I_{sc}]	2060 mA
Associated capacitance [C_a]	20 µF
Associated inductance [L_a]	4.8 µH

Table 101: Nonincendive circuit parameters for interface USB1

Interface USB2 (USB 2.0):	
No-load voltage [V_{oc}]	5.13 V
Short circuit current [I_{sc}]	2060 mA
Associated capacitance [C_a]	20 µF
Associated inductance [L_a]	4.8 µH

Table 102: Nonincendive circuit parameters for interface USB2

The unit concept allows the interconnection of nonincendive devices with connected devices with non-specifically tested combinations as a system. For this purpose, the permissible values of V_{oc} (or U_o) and I_{sc} (or I_o) for the connected device must be less than or equal to V_{max} (U_i) and I_{max} (I_i) for the nonincendive device, the permissible values of C_a (C_o) and L_a (L_o) for the connected device must be greater than or equal to $C_i + C_{Cable}$ and $L_i + L_{Cable}$ for the nonincendive device with field wiring.

The nonincendive device with field wiring must meet the following criteria:

B&R device (connected device)	-	Connected, nonincendive device with field wiring (mouse, keyboard)
V_{oc}	≤	V_{max}
I_{sc}	≤	I_{max}
C_a	≥	$C_i + C_{Cable}$
L_a	≥	$L_i + L_{Cable}$

Table 103: Connected, nonincendive device with field wiring

If the electrical parameters of the cable are unknown, the following values can be used:

Where C_{Cable} = 196.85 pF/m (60 pF/ft) if unknown

Where L_{Cable} = 0.656 µH/m (0.20 µH/ft) if unknown

Wiring must be carried out in accordance with national regulations and the requirements of the authorities.

The B&R device must be installed in a suitable protective housing. For installations in Class I, Division 2 hazardous locations, the housing must be capable of withstanding one or more Division 2 wiring methods.

Warning!

- **Replacing components may impair the suitability of the Division 2 hazardous location (classified) under certain circumstances.**
- **As long as the area is knowingly at risk of explosion, the device is not permitted to be switched on or off.**
- **The nonincendive device with field wiring is not permitted to be connected via a parallel connection. This is valid unless the device has received express permission for this.**

The B&R device is suitable for use in Class I, Division 2, Groups A, B, C and D areas. It also provides nonincendive field wiring for devices in Class I, Division 2, Groups A, B, C and D.

9.2.10.1.6 USB connection with the Automation Panel 1000

9.2.10.1.6.1 Introduction

The information below describes the use of USB peripheral devices on the front USB interface of the B&R Automation Panel 1000 in hazardous locations Class I, Division 2, Groups A, B, C and D.

Danger!

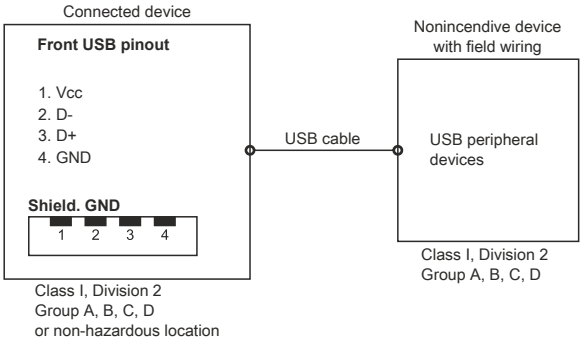
RISK OF EXPLOSION

- **Before installation or use in potentially explosive atmospheres, the explosion protection class of the device must be checked according to ANSI/ISA 12.12.01 and CSA C22.2 N°213.**
- **To switch on/off B&R devices that are installed in potentially explosive atmospheres, at least one of the following conditions must be met:**
  - **A suitable switch installed outside the hazardous area is used.**
  - **A switch certified according to the hazardous location class and division for *tube use* is used.**
- **As long as the electrical circuit is activated, cables or lines are not permitted to be connected or disconnected unless the area is knowingly free of flammable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and circuits. This includes power, ground and network connections as well as series and parallel connections.**
- **Unshielded/Ungrounded cables are never permitted to be used in potentially explosive atmospheres.**
- **Only configurations with nonincendive USB devices are permitted to be used.**
- **The doors and openings of housings must always remain closed. This prevents the accumulation of foreign bodies within the workstation.**

Failure to follow this instruction can result in death, serious bodily injury or damage to property!

9.2.10.1.6.2 Description

Nonincendive devices (keyboards, mouse) are certified for use on the front USB interface of the B&R Automation Panel 1000 (connected device) and are permitted to be connected and disconnected during operation. In addition to the nonincendive property, devices that can be connected to the front USB interface must meet the following criteria.



Front USB interface (USB 2.0):	
Open-circuit voltage [V_{oc}]	5.04 V
Short-circuit current [I_{sc}]	1170 mA
Connected capacity [$_{Ca}$]	20 µF
Connected inductance [$_{La}$]	16.8 µH

Table 104: Nonincendive electrical circuit parameters for the front USB interface

The unit concept allows the interconnection of nonincendive devices with connected devices with non-specifically tested combinations as a system. For this purpose, the permissible values of V_{oc} (or U_o) and I_{sc} (or I_o) for the connected device must be less than or equal to V_{max} (U_i) and I_{max} (I_i) for the nonincendive device, the permissible values of C_a (C_o) and L_a (L_o) for the connected device must be greater than or equal to $C_i + C_{Cable}$ and $L_i + L_{Cable}$ for the nonincendive device with field wiring.

The nonincendive device with field wiring must meet the following criteria:

B&R device (connected device)	-	Connected, nonincendive device with field wiring (mouse, keyboard)
V_{oc}	≤	V_{max}
I_{sc}	≤	I_{max}
C_a	≥	$C_i + C_{Cable}$
L_a	≥	$L_i + L_{Cable}$

Table 105: Connected, nonincendive device with field wiring

If the electrical parameters of the cable are unknown, the following values can be used:

Where C_{Cable} = 196.85 pF/m (60 pF/ft) if unknown

Where L_{Cable} = 0.656 µH/m (0.20 µH/ft) if unknown

Wiring must be carried out in accordance with national regulations and the requirements of the authorities.

The B&R device must be installed in a suitable protective housing. For installations in Class I, Division 2 hazardous locations, the housing must be capable of withstanding one or more Division 2 wiring methods.

Warning!

- **Replacing components may impair the suitability of the Division 2 hazardous location (classified) under certain circumstances.**
- **As long as the area is knowingly at risk of explosion, the device is not permitted to be switched on or off.**
- **The nonincendive device with field wiring is not permitted to be connected via a parallel connection. This is valid unless the device has received express permission for this.**

The B&R device is suitable for use in Class I, Division 2, Groups A, B, C and D areas. It also provides nonincendive field wiring for devices in Class I, Division 2, Groups A, B, C and D.

9.2.10.1.7 USB connection with the 4-port hub

9.2.10.1.7.1 Introduction

The information below describes the use of USB peripheral devices for the B&R 4-port USB hub in hazardous locations Class I, Division 2, Groups A, B, C and D.

Danger!

RISK OF EXPLOSION

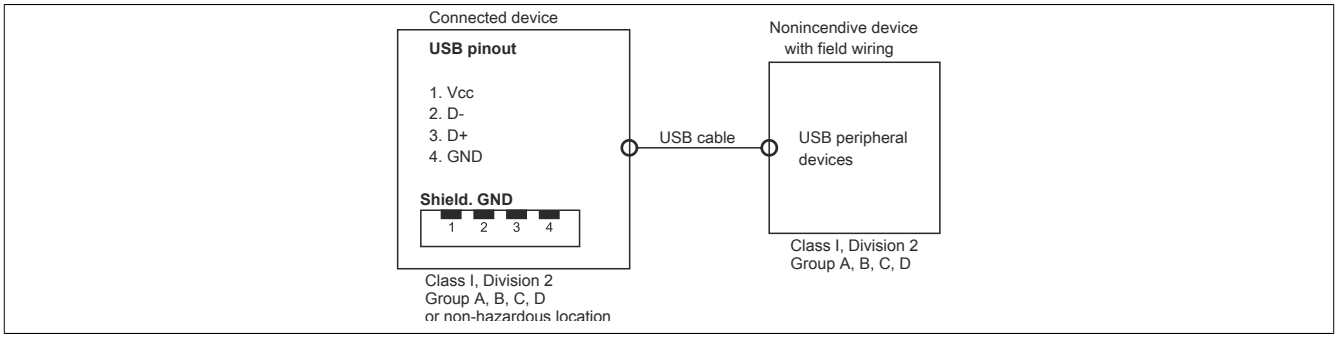
- **Before installation or use in potentially explosive atmospheres, the explosion protection class of the device must be checked according to ANSI/ISA 12.12.01 and CSA C22.2 N°213.**
- **To switch on/off B&R devices that are installed in potentially explosive atmospheres, at least one of the following conditions must be met:**
  - **A suitable switch installed outside the hazardous area is used.**
  - **A switch certified according to the hazardous location class and division for *tube use* is used.**
- **As long as the electrical circuit is activated, cables or lines are not permitted to be connected or disconnected unless the area is knowingly free of flammable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and circuits. This includes power, ground and network connections as well as series and parallel connections.**
- **Unshielded/Ungrounded cables are never permitted to be used in potentially explosive atmospheres.**
- **Only configurations with nonincendive USB devices are permitted to be used.**
- **The doors and openings of housings must always remain closed. This prevents the accumulation of foreign bodies within the workstation.**

Failure to follow this instruction can result in death, serious bodily injury or damage to property!

9.2.10.1.7.2 Description

Nonincendive devices (keyboards, mouse) are certified for use on the B&R 4-port hub (connected device) and are permitted to be connected and disconnected during operation. In addition to the nonincendive property, devices that can be connected to the USB interfaces must meet the following criteria.

The figure shows a wiring diagram of the USB cable:



The following table shows the nonincendive circuit parameters of the 4-port hub USB interfaces:

USB interfaces (USB 2.0):	
No-load voltage [V_{oc}]	5.11 V
Short circuit current [I_{sc}]	1621 mA
Associated capacitance [C_a]	20 µF
Associated inductance [L_a]	16.8 µH

The unit concept allows the interconnection of nonincendive devices with connected devices with non-specifically tested combinations as a system. For this purpose, the permissible values of V_{oc} (or U_o) and I_{sc} (or I_o) for the connected device must be less than or equal to V_{max} (U_i) and I_{max} (I_i) for the nonincendive device, the permissible values of C_a (C_o) and L_a (L_o) for the connected device must be greater than or equal to $C_i + C_{Cable}$ and $L_i + L_{Cable}$ for the nonincendive device with field wiring.

The nonincendive device with field wiring must meet the following criteria:

B&R device (connected device)	-	Connected, nonincendive device with field wiring (mouse, keyboard)
V_{oc}	≤	V_{max}
I_{sc}	≤	I_{max}
C_a	≥	$C_i + C_{Cable}$
L_a	≥	$L_i + L_{Cable}$

If the electrical parameters of the cable are unknown, the following values can be used:

Where C_{Cable} = 196.85 pF/m (60 pF/ft) if unknown

Where L_{Cable} = 0.656 µH/m (0.20 µH/ft) if unknown

Wiring must be carried out in accordance with national regulations and the requirements of the authorities.

The B&R device must be installed in a suitable protective housing. For installations in Class I, Division 2 hazardous locations, the housing must be capable of withstanding one or more Division 2 wiring methods.

Warning!

- **Replacing components may impair the suitability of the Division 2 hazardous location (classified) under certain circumstances.**
- **As long as the area is knowingly at risk of explosion, the device is not permitted to be switched on or off.**
- **The nonincendive device with field wiring is not permitted to be connected via a parallel connection. This is valid unless the device has received express permission for this.**

The B&R device is suitable for use in Class I, Division 2, Groups A, B, C and D areas. It also provides nonincendive field wiring for devices in Class I, Division 2, Groups A, B, C and D.

10 Accessories

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

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

10.1 General accessories

The following accessories can be ordered for the Automation PC, Panel PC link modules and converters:

- Grounding clip

10.1.1 Accessories - Order data

Material number	Description
5ACCRHMI.0000-000	REP HMI grounding clip

10.2 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)

10.2.1 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	

10.3 Terminal block power supply

10.3.1 0TB103.9x

10.3.1.1 General information

One-row 3-pin terminal block 0TB103.9x is used for the power supply.

10.3.1.2 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	

10.3.1.3 Technical data

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

Order number	0TB103.9	0TB103.91
General information		
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	
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)	
LR	ENV3	
KR	Yes	
ABS	Yes	
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck	
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 [1]
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	
Single-wire	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	150 V	
Nominal current [2]	13 A / contact	15 A / contact
Contact resistance	≤5 mΩ	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	

1) The cage clamp terminal block cannot be used side by side.
2) The respective limit data of the I/O modules must be taken into account!

10.4 Terminal block for IF options

10.4.1 0TB1210.3100

10.4.1.1 General information

Two-row 10-pin terminal block 0TB1210.3100 is used to connect to the interfaces of various interface options.

10.4.1.2 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	

10.4.1.3 Technical data

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

Order number	0TB1210.3100
General information	
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
DNV	Temperature: **B** (0 to 55°C) Humidity: **B** (up to 100%) Vibration: **A** (0.7 g) EMC: **B** (bridge and open deck)
LR	ENV3
KR	Yes
ABS	Yes
BV	**EC31B** Temperature: 5 - 55°C Vibration: 0.7 g EMC: Bridge and open deck
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
Single-wire	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
Electrical properties	
Nominal voltage	300 V
Nominal current [1)]	10 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

1) The respective limit data of the I/O modules must be taken into account!

10.5 USB mass storage device

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

10.6 USB hub

10.6.1 5ACCUSB4.0000-000

10.6.1.1 General information

- USB hub 5ACCUSB4.0000-000 can be used starting with a display diagonal of the panel of at least 10.1".
- The USB hub can be installed starting with the following revisions of the system units:

System unit	Minimum revision	System unit	Minimum revision
5PPC2100.BY01-000	F0	5PPC2100.BY11-000	F0
5PPC2100.BY22-000	F0	5PPC2100.BY34-000	F0
5PPC2100.BY44-000	G0	5PPC2100.BY48-000	A0

Features

- 4x USB 2.0, interfaces
- Compatible with the APC2100 and PPC2100

Installation

For details about installing the USB hub, see section "Installing the USB hub" on page 179.

10.6.1.2 Order data

Order number	Short description	Figure
	Accessories	
5ACCUSB4.0000-000	USB hub 4x passive - For APC2100/PPC2100	
	Required accessories	
	Front covers	
5ACCFF00.0001-000	APC2100 front cover - Orange - With B&R logo - For USB hub	
5ACCFF00.0001-001	APC2100 front cover - Dark gray - Without logo - For USB hub	
5ACCFF00.0001-002	APC2100 front cover - Orange - Without logo - For USB hub	

10.6.1.3 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 an accessory is used.**

Order number	5ACCUSB4.0000-000
General information	
B&R ID code	0xEABA
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
EAC	Product family certification
Interfaces	
USB	
Quantity	4
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Total max. 1 A (sum of all 4 ports)
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) [1)]

Order number	5ACCUSB4.0000-000
Ambient conditions	
Temperature	
Operation	0 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
Elevation	
Operation	Max. 3000 m [2]
Mechanical properties	
Housing	
Material	Stainless steel, coated
Coating	Anthracite gray
Dimensions	
Width	21.5 mm
Height	29.5 mm
Depth	97 mm
Weight	100 g

1) Only if all interface covers are installed.
2) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.

10.6.1.3.1 USB interfaces

The 4-port USB hub is equipped with a USB 2.0 (Universal Serial Bus) host controller with several USB ports, of which four USB 2.0 interfaces are routed externally and freely available to the user.

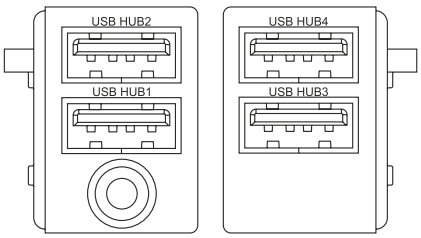
Warning!

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.

USB HUB 1 - USB HUB 4

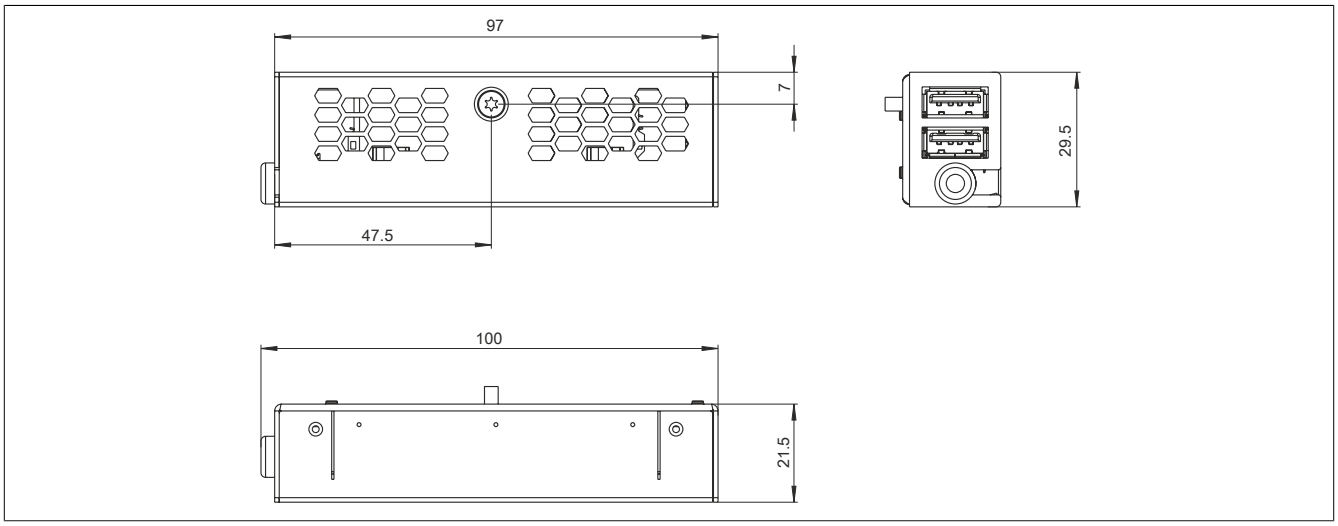
USB HUB 1 - USB HUB 4		
Standard	USB 2.0	
Variant	Type A, female	
Quantity	4	
Transfer rate	Low speed (1.5 Mbit/s)	
	Full speed (12 Mbit/s)	
	High speed (480 Mbit/s)	
Current-carrying capacity[1]	Total max. 1 A (sum of all 4 ports)	
Cable length		
USB2.0	Max. 5 m	

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

Information:

If a Technology Guard (USB dongle) is used, it is recommended to connect it to the USB HUB 3 interface.

10.6.1.4 Dimensions



10.7 Cables

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

10.8 Replacement parts

The following replacement parts can be ordered for the PPC2100:

- Mounting screws for PPC2100
- Slot cover for interfaces
- Cover for CFast slot

10.8.1 Replacement parts - Order data

Material number	Description
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

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

A.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.
B_{10D}	-	Number of cycles until 10% of the components fail dangerously (per channel).
MTBF	Mean time between failures	The expected value of the operating time between two consecutive failures.
$MTTF_D$	Mean time to dangerous failure	Mean time to dangerous failure (per channel).
DC	Diagnostic coverage	Degree of diagnostic coverage
PL	Performance level	Discrete level specifying the ability of safety-related devices to perform a safety function under foreseeable conditions.
PFH	Probability of failure per hour	Probability of a failure per hour.
SIL	Safety integrity level	Safety integrity level

A.B Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the mainboard (part of each system unit) of the APC2100 and PPC2100 device.

The MTCX is responsible for the following monitoring and control functions:

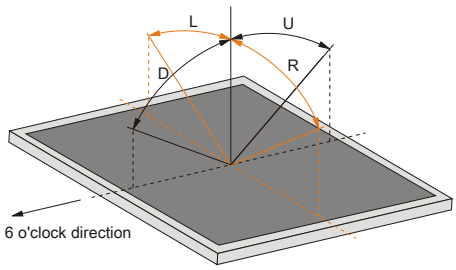
- Switching on (power OK sequencing) and power failure logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring
- Fan control
- Handling/Coordination of keys and LEDs (matrix keyboard of B&R panels)
- Advanced desktop operation (buttons, USB forwarding)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable via the B&R Control Center - ADI driver)
- 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, HDD, 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[5)]. The version can be read in BIOS or in approved Microsoft Windows operating systems using the B&R Control Center.

[5)] Can be downloaded from the Downloads section of the B&R website (www.br-automation.com).

A.C Viewing angles

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

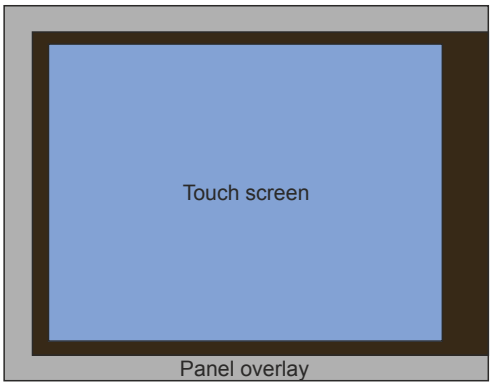


A.D Chemical resistance

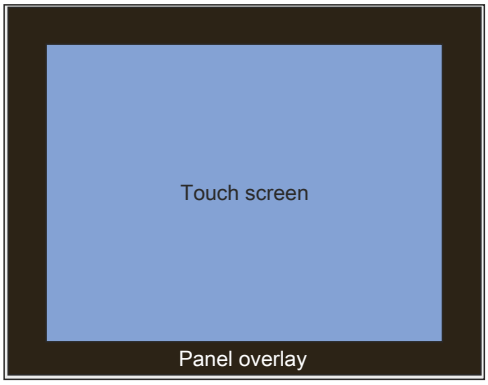
All panels are made of a coated aluminum support frame.

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

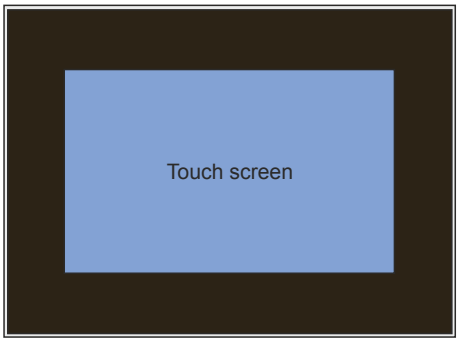


- AP9x3 single-touch panels < revision B8 were manufactured with an aluminum panel overlay.



Multi-touch panels

- AP9x3 and AP1000 multi-touch panels are equipped with a continuous glass surface.



A.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.

A.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

A.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

A.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

A.E Touch screen

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

A.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 an individual component is used.

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
Actuating force	<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

A.E.1.2 Temperature/Humidity diagram

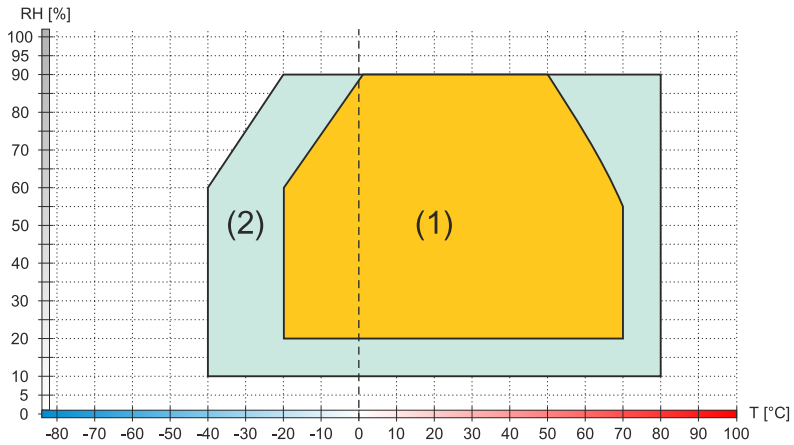


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

A.E.2 Touch screen (multi-touch generation 2)

A.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

A.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 an individual component is used.**

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

A.E.2.3 Temperature/Humidity diagram

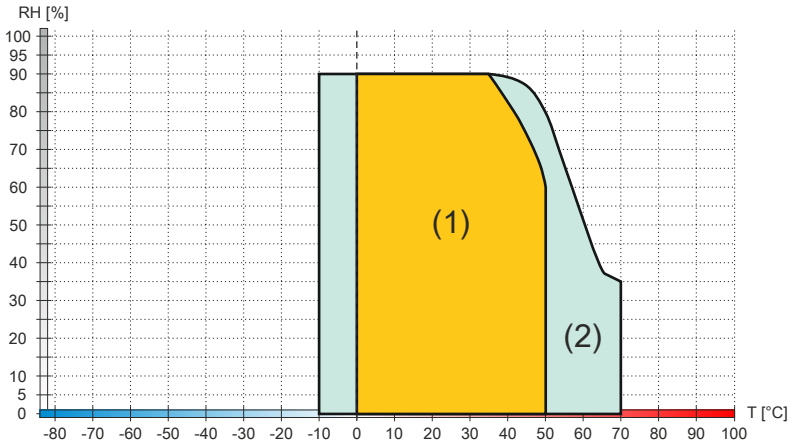


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

A.E.3 Touch screen (multi-touch generation 3)

A.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

A.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 an individual component is used.**

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.

A.E.3.3 Temperature/Humidity diagram

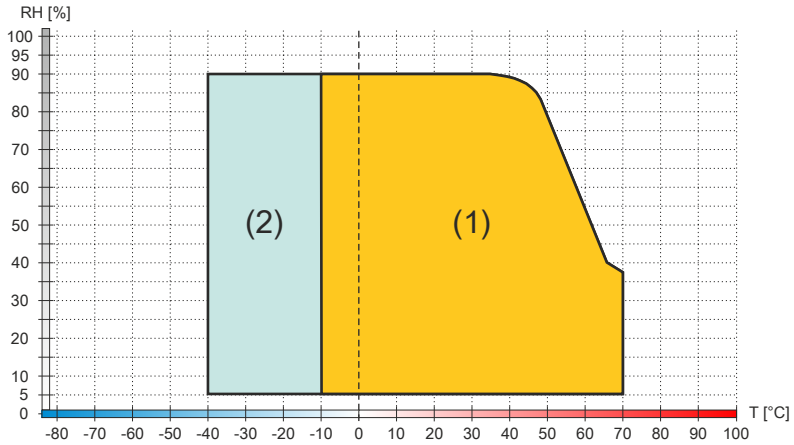


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and **non-condensing**

A.F Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 285	RS422	"RS422 - Bus length and cable type" on page 285
RS485	"RS485 - Bus length and cable type" on page 286	CAN	"CAN - Bus length and cable type" on page 286

A.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	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

A.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	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

A.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	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

A.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

A.G POWERLINK

A.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.

A.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

A.G.1.2 POWERLINK V2 mode

Error message

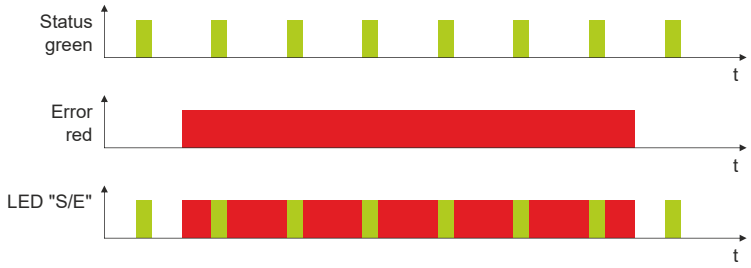
LED "S/E"		
Green	**Red**	**Description**
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	If an 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

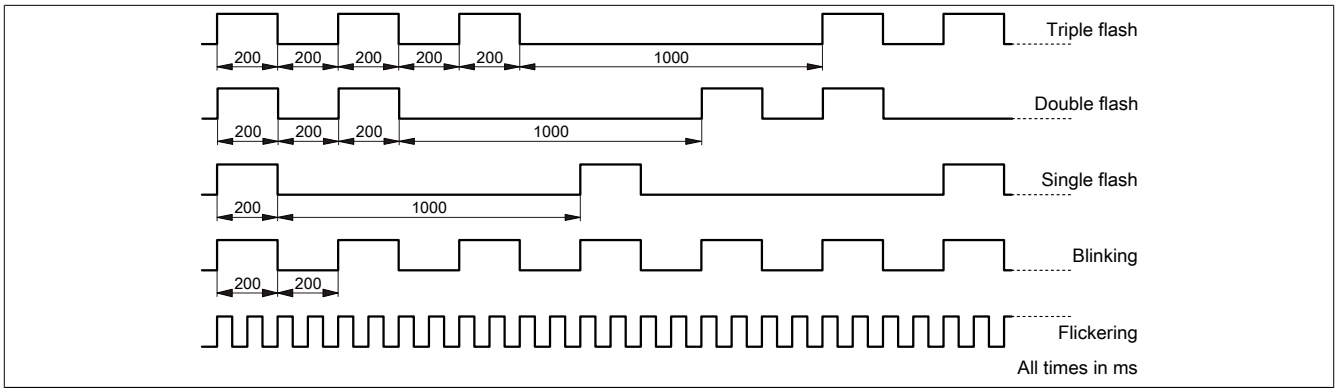
LED "S/E"		
Green	**Red**	**Description**
Off	Off	**Mode:** NOT_ACTIVE The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: • The device is switched off. • The device is in the startup phase. • The interface or device is not configured correctly in Automation 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.
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.

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

LED "S/E"		
Green	**Red**	**Description**
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)

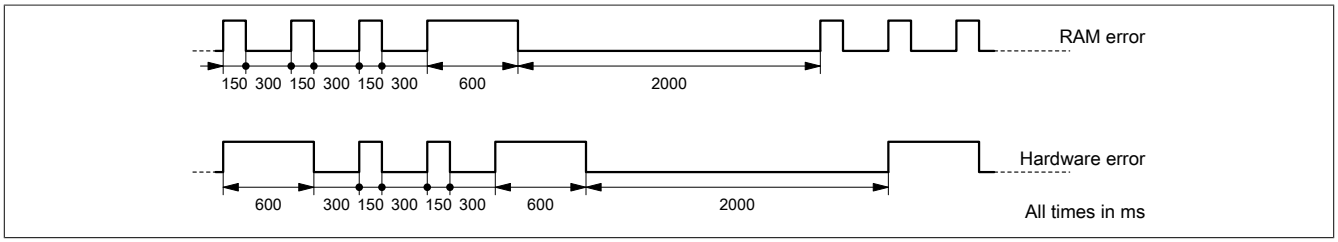
Blink times



A.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.

A.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.

A.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

A.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 292.

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"	Landscape1	Outer dimensions	435 x 330						
		Installation dimensions	415 x 312		415 x 313	415 x 312	415 x 313	415 x 312	
	Portrait1	Outer dimensions	435 x 430				-	435 x 430	-
		Installation dimensions	415 x 412		415 x 413	415 x 412	-	415 x 412	-
17"	Landscape1	Outer dimensions	-			477 x 390	-	477 x 390	-
		Installation dimensions	-			460 x 373	-	460 x 373	-
19"	Landscape1	Outer dimensions	-			527 x 421			
		Installation dimensions	-			510 x 404			
21.3"	Landscape1	Outer dimensions	-			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.

A.H.2 Compatibility details

A.H.2.1 Example

The dimensions (mm) in the subsequent figures have the following meaning.

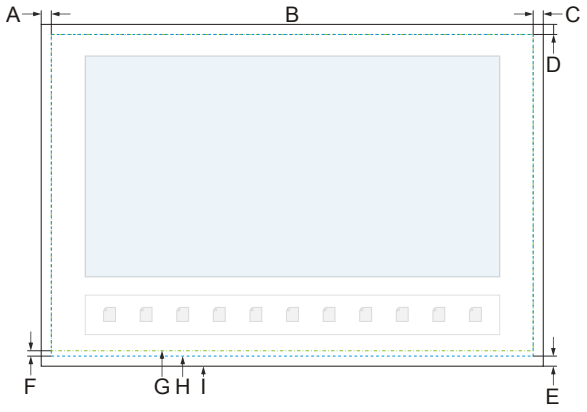
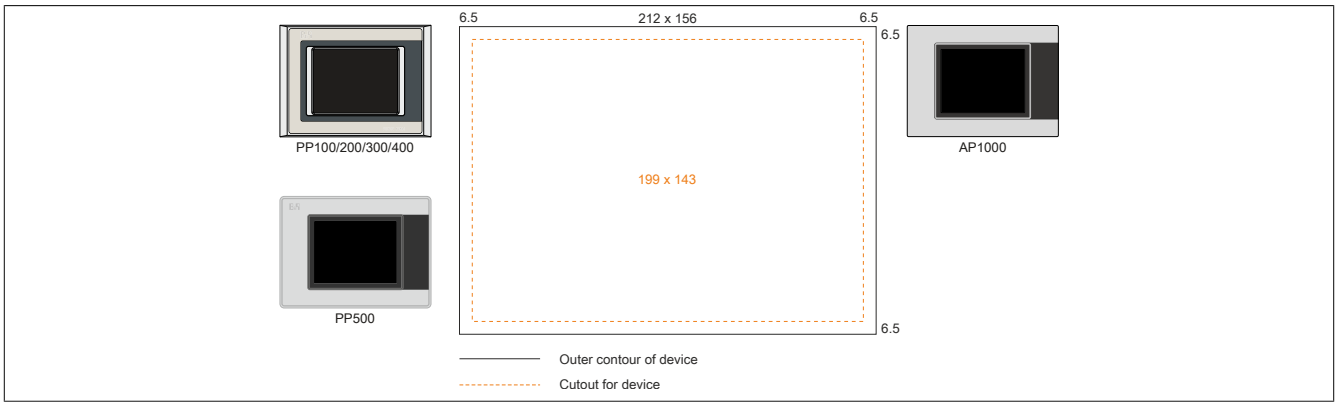


Diagram legend			
A	Spacing (left) to device edge	F	Difference value
B	Outer dimensions	G	Installation dimensions/Cutout for PP100/200/300/400 device
C	Spacing (right) to device edge	H	Installation dimensions/Cutout AP900/PP500/PPC700 device
D	Spacing (top) to device edge	I	Outer contour of device
E	Spacing (bottom) to device edge		

A.H.2.2 5.7" devices

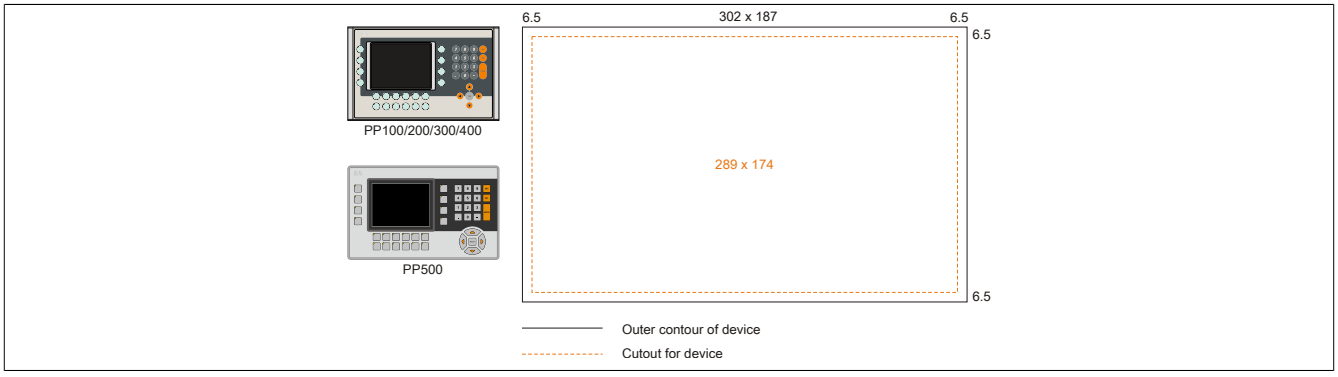
The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

Installation compatibility - 5.7" devices - Landscape1



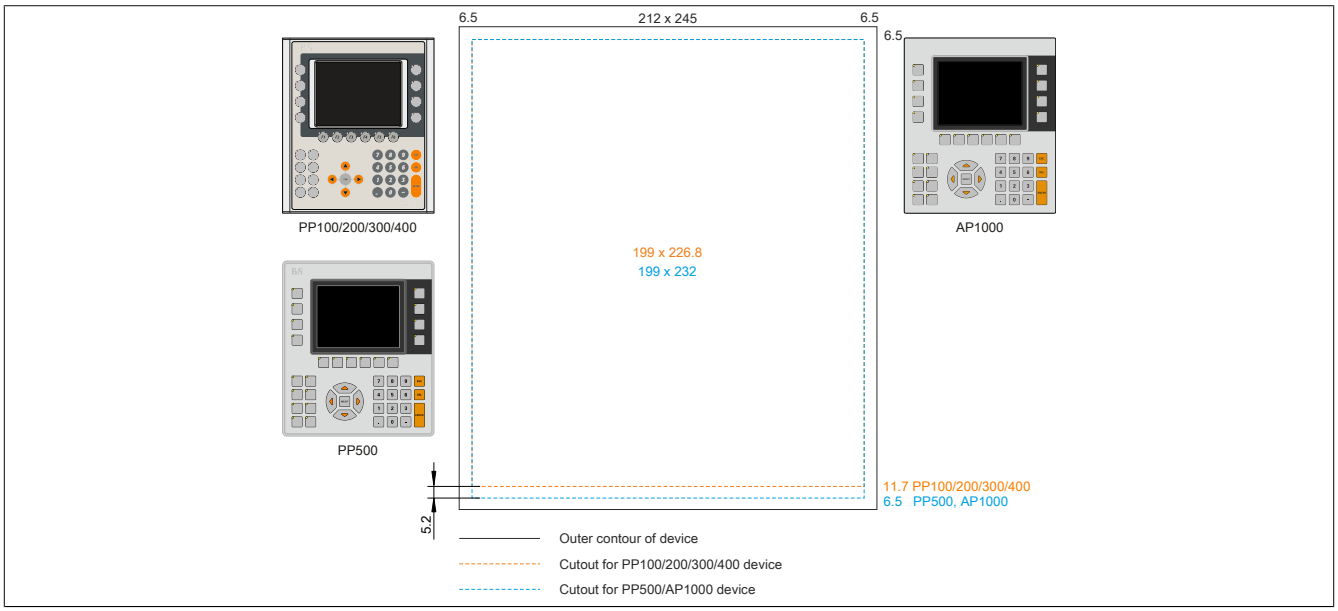
The 5.7" Automation Panel 1000, Power Panel 500, Power Panel 300/400 and Power Panel 100/200 devices in Landscape1 format are 100% compatible.

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).

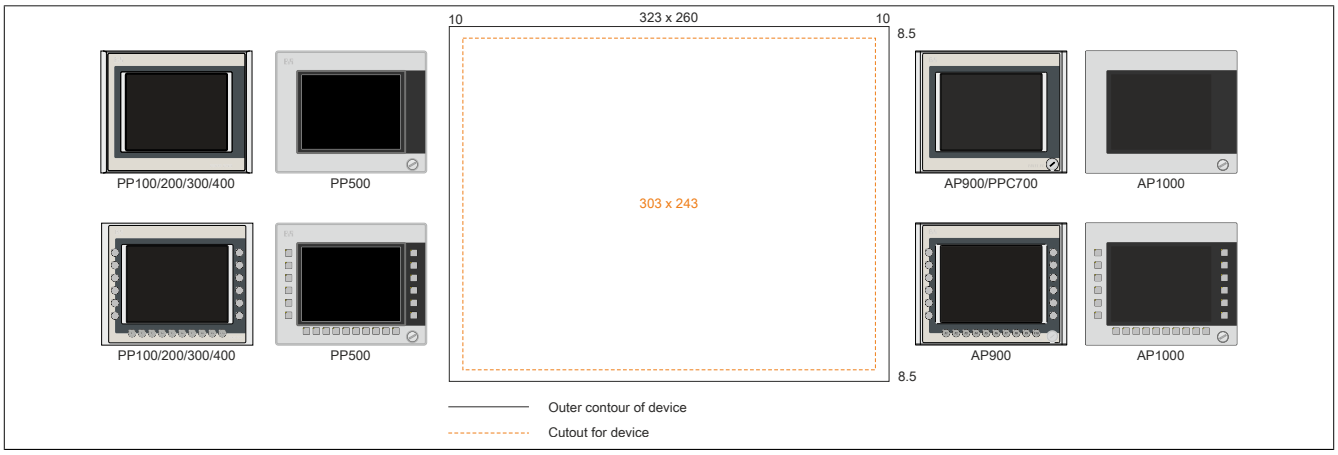
The larger cutout can be used conditionally for all devices:

- 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).

A.H.2.3 10.4" devices

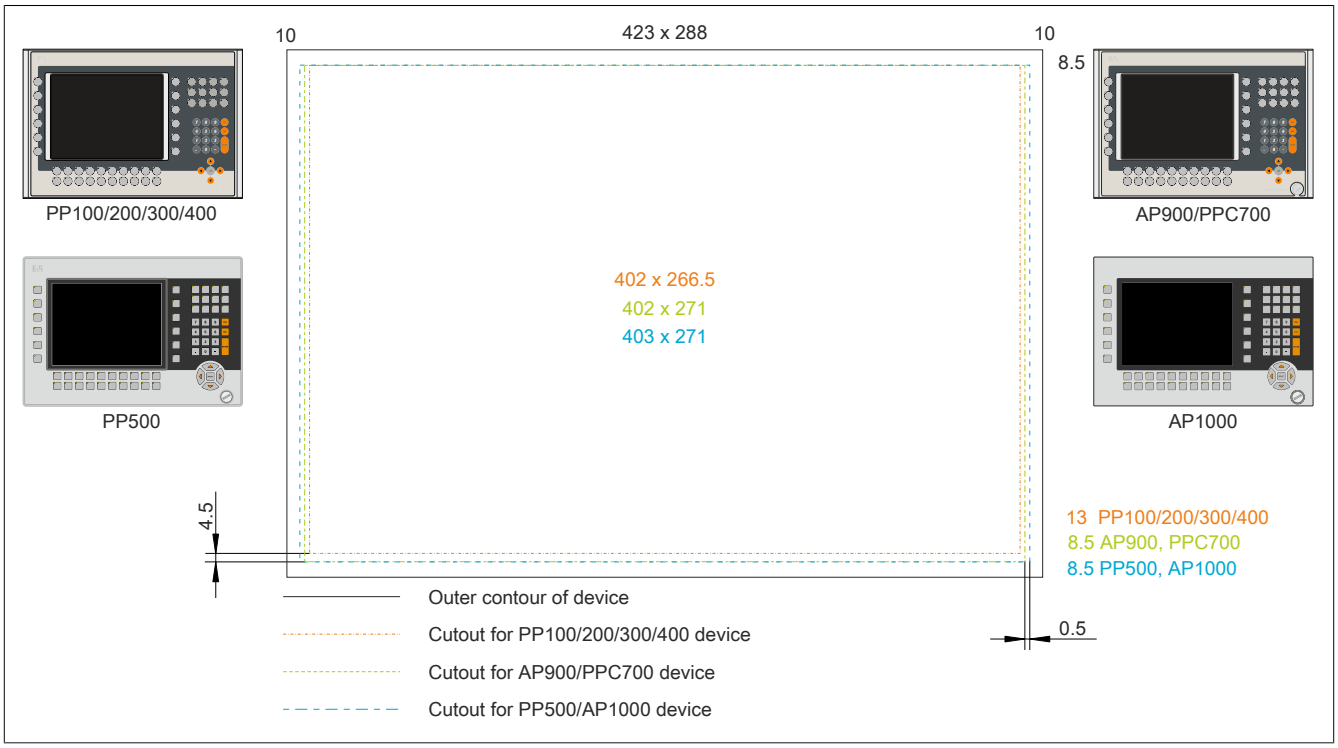
The cutout tolerance for the PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 is ±0.5 mm.
The cutout tolerance for the AP1000 is +0 mm / -0.5 mm.

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

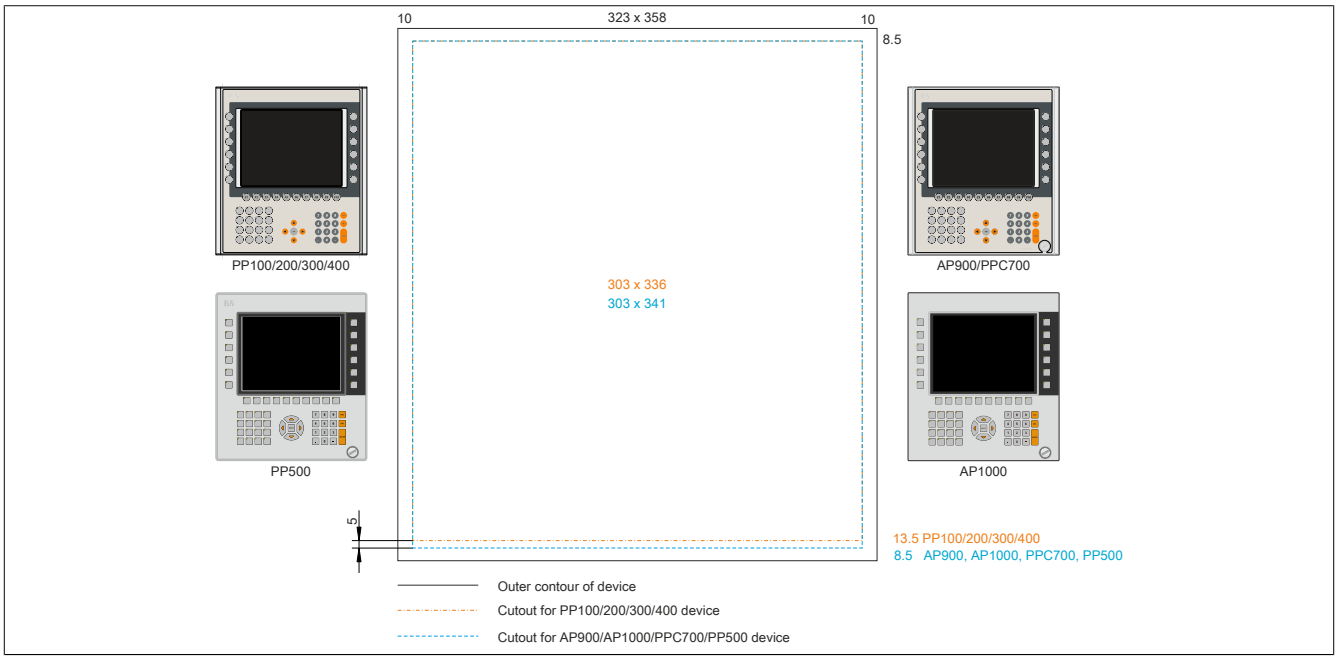


Figure 1: Installation compatibility - 10.4" devices - Portrait1

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).

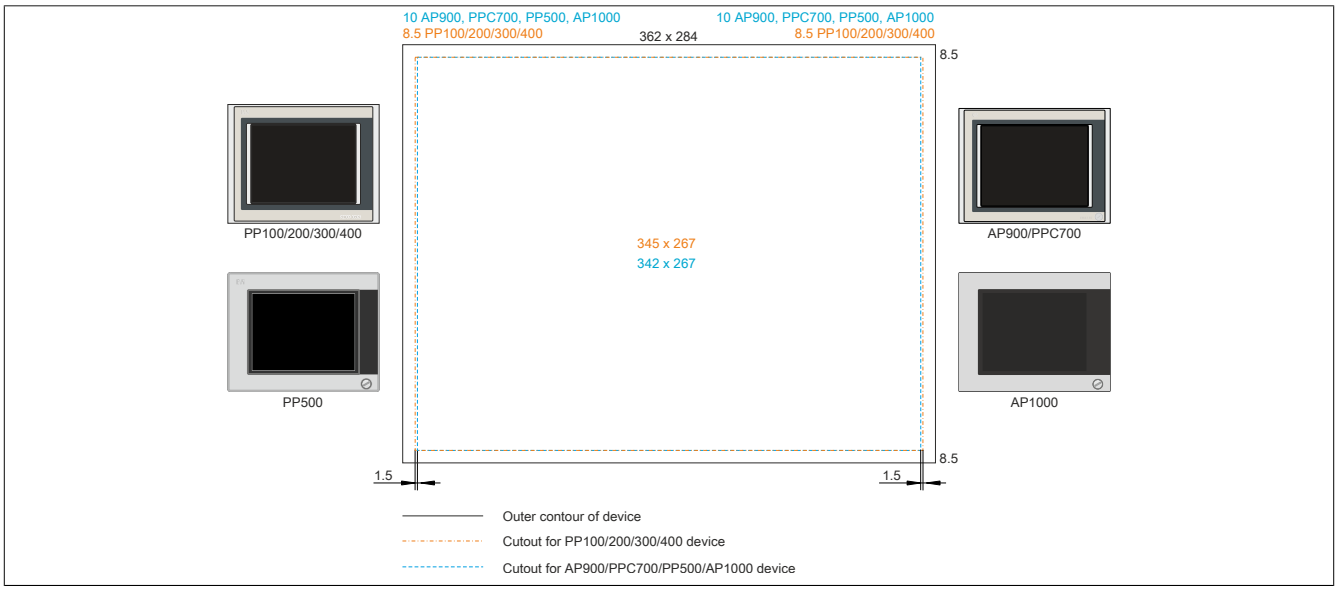
The larger cutout can be used conditionally for all devices:

- 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).

A.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).

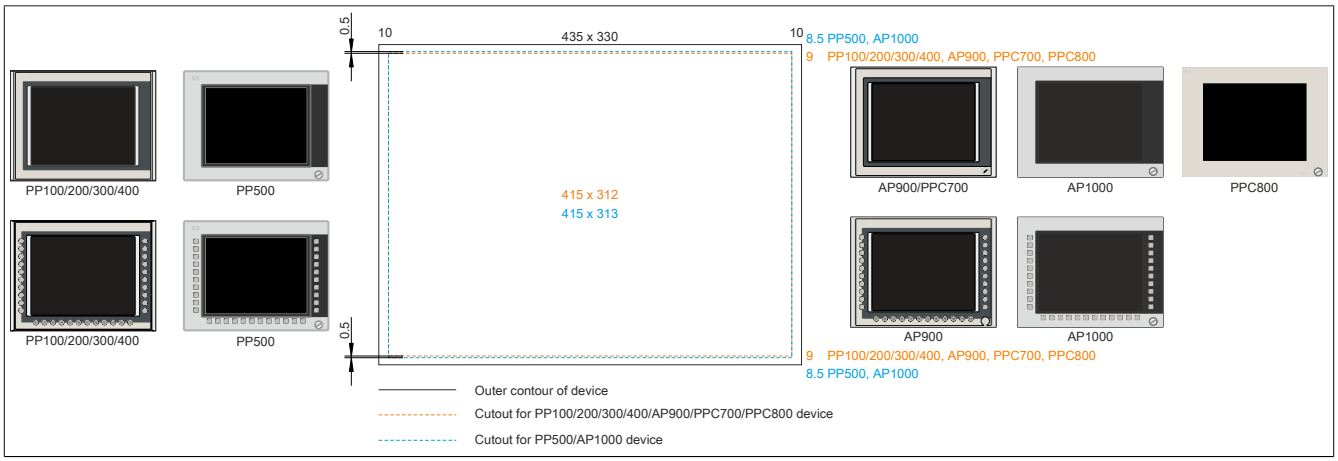
The larger cutout can be used conditionally for all devices:

- 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.

A.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

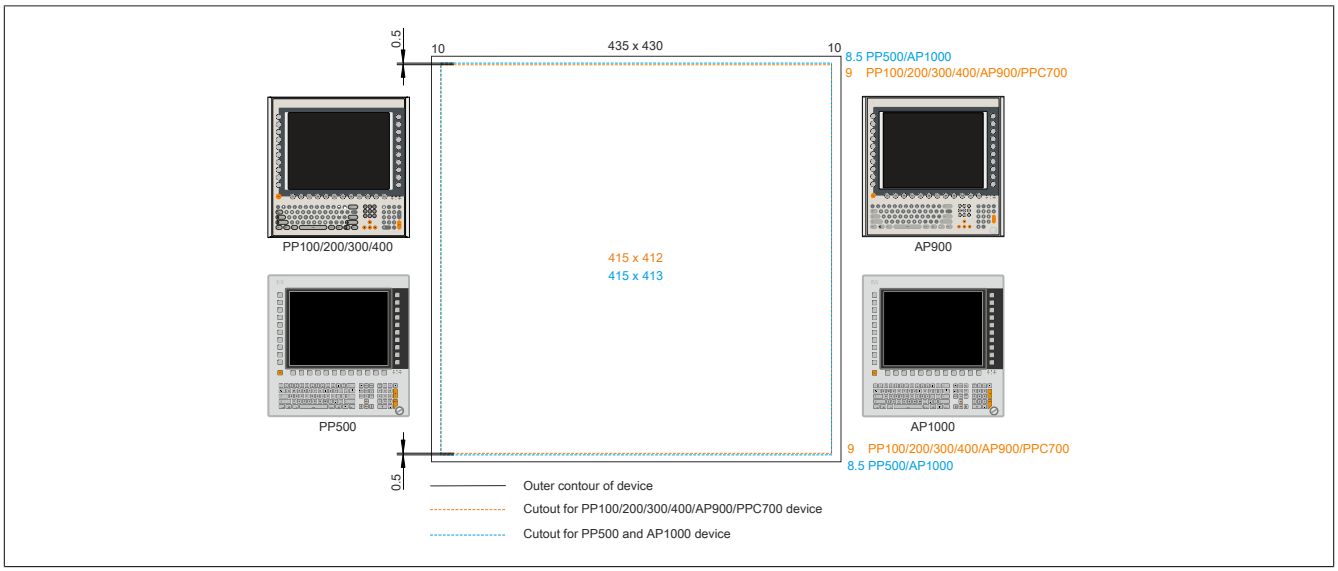


15" Automation Panel 1000 and Power Panel 500 devices are not 100% compatible with Power Panel 100/200, Power Panel 300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 devices in Landscape1 format. Automation Panel 1000 and Power Panel 500 devices need a cutout that is 0.5 mm larger (top and 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).

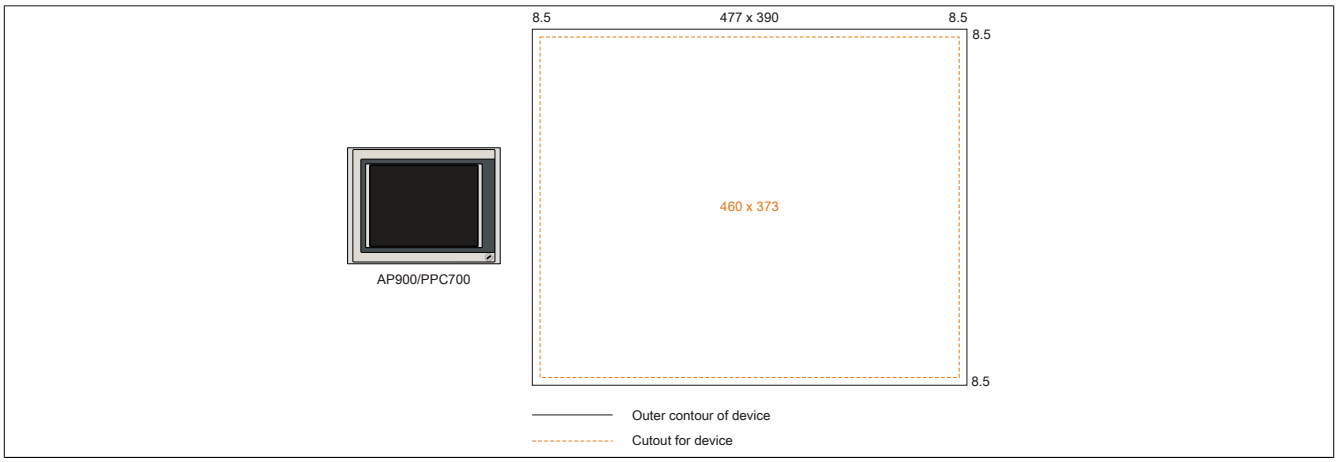
The larger cutout can be used conditionally for all devices:

- 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).

A.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

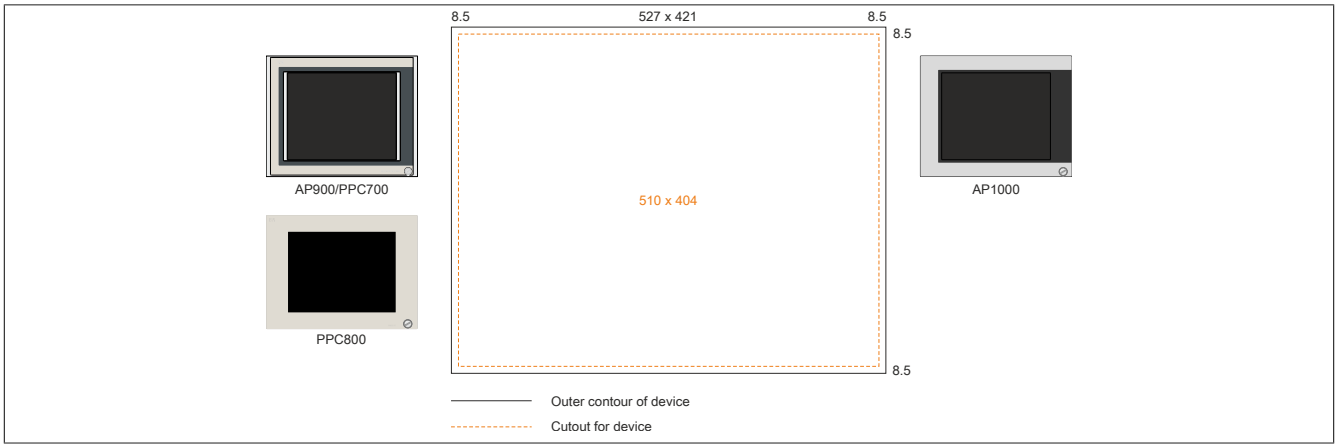


The 17" Automation Panel 900 and Panel PC 700 in Landscape1 format are 100% compatible.

A.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.

A.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