

Panel PC 2100

Built-in devices

User's manual

Version: **1.17 (June 2018)**
Model no.: **MAPPC2100-ENG**

Translation of the original manual

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The place of jurisdiction, in accordance with article 17 of the European Convention on Courts of Jurisdiction and Enforcement, is A-4910

Ried im Innkreis, Austria, commercial register court: Ried im Innkreis, Austria

Commercial register number: FN 111651 v.

The place of fulfillment in accordance with article 5 of the European Convention on Courts of Jurisdiction and Enforcement is A-5142 Eggelsberg, Austria

Austrian DVR no.: 0721301

VATIN: ATU62367156

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1 General information

Information:

This user's manual is not intended for end customers! It is the responsibility of the machine manufacturer or system provider to provide the safety guidelines relevant to end customers in the operating instructions for the end customer in the respective local language.

1.1 Manual history

Version	Date	Change
1.00	2014-10-23	<ul style="list-style-type: none"> First version
1.05	2015-02-13	<ul style="list-style-type: none"> Updated section "Certifications" on page 304. Updated section "Automation Runtime" on page 288. Updated interface options 5ACCIF01.FPLS-000 and 5ACCIF01.FPSC-000, see "Interface options" on page 158. Updated terminal block for IF options "0TB1210.3100" on page 316. Updated "Windows Embedded 8.1 Industry Pro" on page 280. Updated 5CFAST.032G-10, 5CFAST.064G-10 and 5CFAST.128G-10 CFast cards, see "CFast cards" on page 147. Updated section 3.1.5 "Installation information for individual components". Updated section 4.1.10 "Allocation of resources". Modified section "Minimum ambient temperature for worst-case operation" on page 34. Corrected section "LED status indicators" on page 55. Updated "B&R Key Editor" on page 300.
1.10	2016-01-29	<ul style="list-style-type: none"> Updated AP1000 display units, see "AP1000 panels" on page 92. Updated interface options "5ACCIF01.FPCC-000" on page 158, "5ACCIF01.FPLS-001" on page 183, "5ACCIF01.FPLK-000" on page 173, "5ACCIF01.FPSC-001" on page 194 and "5ACCIF01.ICAN-000" on page 206. Updated max. cable length for USB 2.0 in section "USB interfaces" on page 52. Updated "Maximum ambient temperature for typical operation" on page 35. Updated section "Ambient temperature during storage and transport" on page 37. Updated section "Power calculation" on page 43. Modified section "Protection" on page 41. Updated BIOS to V1.23, see "BIOS options" on page 234. Updated section "Upgrade information" on page 271. Revised overview of "Windows Embedded 8.1 Industry Pro", "Windows 7" and "Windows Embedded Standard 7". Updated section about Debian 8, see "Debian (GNU/Linux)" on page . Updated section "Automation Runtime Embedded (ARemb)" on page 289. Updated Technology Guard (HID) 0TG1000.02 and Automation Runtime Embedded Terminal TG 1TG4601.06-T, see "Automation Runtime" on page 288. Updated "B&R KCF Editor" on page 301. Updated "HMI Service Center" on page 302 (5SWUTI.0001-000). Updated chapter 5 "Standards and certifications". Updated section "UL Haz. Loc. Certifications" on page and UL HazLoc certification for technical data of certain individual components. Updated section "DNV GL certification" on page 305. Updated section "Mounting orientations" on page 30. Updated color of Ethernet connector LEDs, see "Ethernet 1 interface (ETH1)" on page 51 and "Ethernet 2 interface (ETH2)" on page 51.
1.11	2016-03-16	<ul style="list-style-type: none"> Updated "Windows 10 IoT Enterprise 2015 LTSC" on page 277. Updated section "General instructions for performing temperature testing" on page 226 in chapter 3 "Commissioning". Revised section "Temperature specifications" on page 32. Updated section "Known problems / Issues" on page 233. Harmonized RAM specifications in the technical data for "Interface options" on page 158.

Table 1: Manual history

Version	Date	Change
1.15	2017-04-25	<ul style="list-style-type: none"> Renamed "display units" to "panels". Updated 4-port USB hub "5ACCUSB4.0000-000" on page 322. Updated installation of 4-port USB hub, see "Installation the 4-port USB hub" on page 220. Updated section "Multi-touch drivers" on page 274. Updated section "+24 VDC power supply" on page 42. Updated chapter 5 "Standards and certifications". Documented configuration option for XHCI controller, see "USB configuration" on page 259. Updated the following panels: <ul style="list-style-type: none"> "5AP1130.0702-000" on page 100 "5AP1130.101E-000" on page 104 "5AP1130.121E-000" on page 123 "5AP1130.156C-000" on page 137 "5AP1130.185C-000" on page 139 Documented system unit 5PPC2100.BY48-000 on page 144. Documented interface option "5ACCIF01.FPCS-000" on page 166. Updated data in sections "Mechanical properties", "Environmental characteristics" and "Electrical characteristics". Updated section "Touch screen" with "3M touch screen (multi-touch generation 2)" and "3M touch screen (multi-touch generation 3)". Updated CFast card 5CFAST.256G-10, see "CFast cards" on page 147.
1.16	2018-06-20	<ul style="list-style-type: none"> Documented interface option "5ACCIF01.FSS0-000" on page 201. Updated entire chapter "Technical data". Updated the following sections: <ul style="list-style-type: none"> "Configuration" on page 21 "Important information concerning installation/commissioning" on page 210 "Mounting an Automation Panel 1000 with clamping blocks" on page 216 "Functional ground - Grounding concept" on page 222 "Known problems / Issues" on page 233 "BIOS options" on page 234 "Multi-touch drivers" on page 274 "B&R Linux 8 (GNU/Linux)" on page 292 "UL certification" on page 304 "DNV GL certification" on page 305 "Servicing and maintenance" on page 325 "Repairs, complaints and replacement parts" on page 327 "Chemical resistance" on page 330 Updated the following sections: <ul style="list-style-type: none"> "B&R Linux 9 (GNU/Linux)" on page 294 "Windows 10 IoT Enterprise 2016 LTSB" on page 275 "B&R Hypervisor" on page 290 "mapp Technology" on page 291
1.17	2018-06-22	Updated section "Network stack" on page 256.

Table 1: Manual history

1.2 Safety guidelines

1.2.1 Intended use

Programmable logic controllers (PLCs), operating/monitoring devices (industrial PCs, Power Panels, Mobile Panels, etc.) and uninterruptible power supplies from B&R have been designed, developed and manufactured for conventional use in industrial environments. They were not designed, developed and manufactured for any use involving serious risks or hazards that could lead to death, injury, serious physical impairment or loss of any kind without the implementation of exceptionally stringent safety precautions. In particular, this includes the use of these devices to monitor nuclear reactions in nuclear power plants, in flight control or flight safety systems as well as in the control of mass transportation systems, medical life support systems or weapons systems.

1.2.2 Protection against electrostatic discharge

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

1.2.2.1 Packaging

- **Electrical components with a housing**
...do not require special ESD packaging but must be handled properly (see "Electrical components with a housing").
- **Electrical components without a housing**
...are protected by ESD-suitable packaging.

1.2.2.2 Guidelines for proper ESD handling

Electrical components with a housing

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

Electrical components without a housing

The following points apply in addition to the points listed under "Electrical components with a housing":

- Any persons handling electrical components or devices with installed electrical components must be grounded.
- Components are only permitted to be touched on their narrow sides or front plate.
- Components must always be placed on or stored in a suitable medium (ESD packaging, conductive foam, etc.). Metallic surfaces are not suitable storage surfaces!
- Components must not be subjected to electrostatic discharge (e.g. caused by charged plastics).
- Observe a minimum distance of 10 cm from monitors and television sets.
- Measuring instruments and equipment must be grounded.
- Probe tips of galvanically isolated measuring instruments must be temporarily discharged on suitably grounded surfaces before taking measurements.

Individual components

- ESD protective measures for individual components are thoroughly implemented at B&R (conductive floors, footwear, arm bands, etc.).
- Increased ESD protective measures for individual components are not required for handling B&R products at customer locations.

1.2.3 Policies and procedures

Electronic devices are never completely failsafe. If the programmable logic controller, operating/monitoring device or uninterruptible power supply fails, the user is responsible for ensuring that other connected devices such as motors are brought to a safe state.

When using programmable logic controllers or operating/monitoring devices as control systems in connection with a Soft PLC (e.g. B&R Automation Runtime or comparable product) or Slot PLC (e.g. B&R LS251 or comparable product), safety precautions relevant to industrial control systems (e.g. the provision of safety devices such as emergency stop, etc.) must be observed in accordance with applicable national and international regulations. This also applies to all other devices connected to the system, such as drives.

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications to perform these tasks (e.g. IEC 60364). National accident prevention regulations must be observed.

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

1.2.4 Transport and storage

During transport and storage, devices must be protected against undue stress (mechanical loads, temperature, moisture, corrosive atmospheres, etc.).

1.2.5 Installation

- Devices are not ready for use immediately upon delivery. They must be installed and wired according to the requirements of this documentation in order for EMC limit values to be observed.
- Installation must be performed according to this documentation using suitable equipment and tools.
- Devices are only permitted to be installed by qualified personnel and when the power is switched off. Before installation, voltage to the control cabinet must be switched off and prevented from being switched on again.
- General safety guidelines and national accident prevention regulations must be observed.
- Electrical installation must be carried out in accordance with applicable guidelines (e.g. wire cross sections, fuses, protective ground connections).

1.2.6 Operation

1.2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating/monitoring devices and uninterruptible power supplies, certain components must carry dangerous voltage levels over 42 VDC. Touching one of these components can result in a life-threatening electric shock. This could lead to death, severe injury or damage to property.

Before switching on programmable logic controllers, operating/monitoring devices or the uninterruptible power supply, it must be ensured that the housing is properly connected to ground (PE rail). Ground connections must also be established when the operating/monitoring device or uninterruptible power supply is connected for test purposes or only being operated for a short period of time!

Before switching on the device, all voltage-carrying components must be securely covered. During operation, all covers must remain closed.

1.2.6.2 Environmental conditions - Dust, moisture, corrosive gases

The use of operating/monitoring devices (e.g. industrial PCs, Power Panels, Mobile Panels) and uninterruptible power supplies in very dusty environments must be avoided. The collection of dust on devices can affect functionality and may prevent sufficient cooling, especially in systems with active cooling (fans).

The presence of corrosive gases can also result in impaired functionality. When combined with high temperature and humidity, corrosive gases – e.g. with sulfur, nitrogen and chlorine components – can induce chemical reactions that can damage electronic components very quickly. The presence of corrosive gases is indicated by blackened copper surfaces and cable ends on existing installations.

When operated in dusty or moist environments that could potentially impair functionality, operating/monitoring devices such as the Automation Panel and Power Panel are protected on the front against the ingress of dust or moisture when installed properly (e.g. cutout installation). The back of all devices must be protected from the ingress of dust and moisture, however; any collected dust must be removed at suitable intervals.

1.2.6.3 Viruses and dangerous programs

This system is subject to potential risk each time data is exchanged or software is installed from a data storage device (e.g. diskette, CD-ROM, USB flash drive, etc.), network connection or the Internet. The user is responsible for assessing these risks, implementing preventive measures such as virus protection programs, firewalls, etc. and making sure that software is obtained only from trusted sources.

1.2.7 Environmentally friendly disposal

All programmable controllers, operating/monitoring devices and uninterruptible power supplies from B&R are designed to minimize harm to the environment as far as possible.

1.2.7.1 Separation of materials

It is necessary to separate out the different materials so that devices can undergo an environmentally friendly recycling process.

Component	Disposal
Programmable logic controllers Operating/Monitoring devices Uninterruptible power supply Batteries and rechargeable batteries Cables	Electronics recycling
Cardboard/Paper packaging	Paper/Cardboard recycling
Plastic packaging material	Plastic recycling

Table 2: Environmentally friendly disposal

Disposal must take place in accordance with applicable legal regulations.

1.2.8 Security concept

To protect plants, systems, machines and networks against cyber threats, it is necessary to implement (and continuously maintain) an integrated security concept that is state of the art. B&R products and solutions form only one part of such a concept.

The user is responsible for preventing unauthorized access to his plants, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or Internet if and to the extent necessary and appropriate protective measures (e.g. use of firewalls and network segmentation) have been taken.

B&R products and solutions are constantly being developed further to make them even more secure. B&R strongly recommends that updates be performed as soon as the corresponding updates are available and that only the latest product versions are used. Using outdated or unsupported versions can increase the risk of cyber threats.

1.2.9 Third-party software updates

This product contains third-party software (e.g. drivers, etc.). B&R only assumes warranty for updates/patches to the third-party software if they have been officially released by B&R. Otherwise, updates/patches are undertaken at your own risk.

1.2.10 Administrator accounts

A user with administrator rights has extensive access and manipulation options available on the system.

Therefore, make sure that your administrator accounts are adequately secured to prevent unauthorized changes. Use secure passwords and a standard user account for regular operation. Further measures such as the use of security guidelines are to be applied as needed.

1.3 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.

Table 3: Organization of safety notices

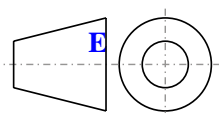
General notices

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

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

Table 4: Organization of general notices

1.4 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions are specified in mm.

Unless otherwise specified, the following general tolerances apply:

Range of nominal size	General tolerance per DIN ISO 2768 (medium)
Up to 6 mm	±0.1 mm
6 to 30 mm	±0.2 mm
30 to 120 mm	±0.3 mm
120 to 400 mm	±0.5 mm
400 to 1000 mm	±0.8 mm

Table 5: Range of nominal sizes

1.5 Overview

Model number	Short description	Page
	Accessories	
5ACCUSB4.0000-000	USB hub 4x passive - For APC2100/PPC2100	322
5SWUTI.0001-000	HMI Service Center USB flash drive - Hardware diagnostic software - For APC810/PPC800 - For APC910/PPC900 - For APC2100/PPC2100 - For APC2200/PPC2200 - For APC3100/PPC3100 - For APC51x/PP500 - For Automation Panel 800/900 - For Automation Panel 1000/5000	302
	B&R Linux 8	
5SWLIN.0543-MUL	B&R Linux 8 - 32-bit - Multilingual - PPC2100 chipset Bay Trail - Installation (without Recovery DVD) - Only available with a new device	292
5SWLIN.0643-MUL	B&R Linux 8 - 64-bit - Multilingual - PPC2100 chipset Bay Trail - Installation (without Recovery DVD) - Only available with a new device	292
	B&R Linux 9	
5SWLIN.0743-MUL	B&R Linux 9 - 64-bit - Multilingual - PPC2100 chipset Bay Trail - Installation (without Recovery DVD) - Only available with a new device	294
	CFast cards	
5CFAST.016G-00	CFast card, 16 GB SLC	149
5CFAST.032G-00	CFast card, 32 GB SLC	149
5CFAST.032G-10	CFast card, 32 GB MLC ≤Rev. F0	152
5CFAST.064G-10	CFast card, 64 GB MLC ≤Rev. D0	152
5CFAST.128G-10	CFast card, 128 GB MLC ≤Rev. D0	152
5CFAST.2048-00	CFast card, 2 GB SLC	149
5CFAST.256G-10	CFast card, 256 GB MLC	152
5CFAST.4096-00	CFast card, 4 GB SLC	149
5CFAST.8192-00	CFast card, 8 GB SLC	149
	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	158
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	166
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	173
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	178
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	183
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface card - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	188
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	194
5ACCIF01.FSS0-000	Interface card - 2x RS422/485 interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	201
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100/APC2200/PPC2200 - Only available with a new device	206
	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	92
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	98
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	102
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	106
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	118
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	121
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	125
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	135
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	141
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	100
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	104
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	123
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	137
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	139

General information

Model number	Short description	Page
5AP1151.0573-000	Automation Panel 5.7" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Portrait format - 22 function keys and 20 system keys - For PPC2100 / PPC2200 / link modules - Compatible with 5PP551.0573-00	95
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	109
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 - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP580.1505-00, 5AP980.1505-01	128
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	112
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	131
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	115
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	73
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	75
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	77
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	80
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	83
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	86
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	89
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	144
5PPC2100.BY11-000	PPC2100 system unit - Intel Atom E3825 1.33 GHz - Dual core - 1 GB SDRAM - For Automation Panel 923/933/1000	144
5PPC2100.BY22-000	PPC2100 system unit - Intel Atom E3826 1.46 GHz - Dual core - 2 GB SDRAM - For Automation Panel 923/933/1000	144
5PPC2100.BY34-000	PPC2100 system unit - Intel Atom E3827 1.75 GHz - Dual core - 4 GB SDRAM - For Automation Panel 923/933/1000	144
5PPC2100.BY44-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 4 GB SDRAM - For Automation Panel 923/933/1000	144
5PPC2100.BY48-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 8 GB SDRAM - For Automation Panel 923/933/1000	144
Technology Guard		
0TG1000.01	Technology Guard (MSD)	288
0TG1000.02	Technology Guard (HID)	288
1TG4600.10-5	Automation Runtime Windows TG license	288
1TG4601.06-5	Automation Runtime Embedded TG license	288
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	288
Terminal blocks		
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamp terminal block 3.31 mm ²	314
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamp terminal block 3.31 mm ²	314
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	316
USB accessories		
5MMUSB.032G-02	USB 3.0 flash drive 32 GB MLC	320
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	317
5MMUSB.4096-01	USB 2.0 flash drive 4096 MB B&R	317
Windows 10 IoT Enterprise		
5SWW10.0243-MUL	Windows 10 IoT Enterprise 2015 LTSB - 64-bit - Multilingual - PPC2100 with Bay Trail chipset - License (without Recovery DVD) - Only available with a new device	277
5SWW10.0543-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2100 with Bay Trail chipset - License (without Recovery DVD) - Only available with a new device	275
Windows 7 Professional/Ultimate		
5SWWI7.1100-ENG	Windows 7 Professional SP1 - 32-bit - English - DVD	283
5SWWI7.1100-GER	Windows 7 Professional SP1 - 32-bit - German - DVD	283
5SWWI7.1200-ENG	Windows 7 Professional SP1 - 64-bit - English - DVD	283
5SWWI7.1200-GER	Windows 7 Professional SP1 - 64-bit - German - DVD	283
5SWWI7.1300-MUL	Windows 7 Ultimate SP1 - 32-bit - Multilingual - DVD	283
5SWWI7.1400-MUL	Windows 7 Ultimate SP1 - 64-bit - Multilingual - DVD	283
Windows Embedded 8.1 Industry Professional		
5SWWI8.0343-MUL	Windows Embedded 8.1 Industry Pro - 32-bit - Multilingual - For PPC2100 - License	280
5SWWI8.0443-MUL	Windows Embedded 8.1 Industry Pro - 64-bit - Multilingual - For PPC2100 - License	280
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	286

Model number	Short description	Page
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	286
5SWWI7.1743-MUL	Windows Embedded Standard 7 Premium SP1 - 32-bit - Service Pack 1 - English - PPC2100 - License (without Recovery DVD) - Only available with a new device	286
5SWWI7.1843-MUL	Windows Embedded Standard 7 Premium SP1 - 64-bit - Service Pack 1 - English - PPC2100 - License (without Recovery DVD) - Only available with a new device	286

2 Technical data

2.1 Introduction

2.1.1 About this user's manual

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

2.1.2 Description of individual modules

2.1.2.1 AP9x3 panels

AP9x3 panels consist of a display and touch screen and form the basis for the Automation Panel 9x3, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 system families. Different display diagonals and touch screen technologies are available. The panels can only be operated as a complete system in combination with a link module (Automation Panel 9x3) or CPU board and system unit (Panel PC 900, Panel PC 2100, Panel PC 2200, Panel PC 3100). The panels are installed using retaining clips.

Model numbers for single-touch panels start with 5AP923.xxxx-xx; model numbers for multi-touch panels start with 5AP933.xxxx-xx.



2.1.2.2 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. A wide selection of different display diagonals as well as panels with touch screen and keys are available. The panels can only be operated as a complete system in combination with a link module (Automation Panel 1000) or CPU board and system unit (Panel PC 900, Panel PC 2100, Panel PC 2200, Panel PC 3100). The panels are installed using retaining clips or clamping blocks.



2.1.2.3 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.



2.1.3 System components / Configuration


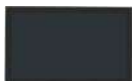












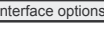

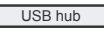





Automation Panel 9x3, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 systems can be assembled to meet individual requirements and operating conditions. Automation Panel 9x3, Panel PC 900, Panel PC 2100, Panel PC 2200 and Panel PC 3100 systems are flexible so that an Automation Panel can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

2.1.3.1 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

System unit	Processor - Type	Processor - Clock frequency	Processor - 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	3	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	3	4 GB
5PPC2100.BY48-000	Intel Atom E3845	1910 MHz	4	DDR3 SDRAM	8 GB

Configuration						
Panels	Select 1					
	Panel 923	Diagonal	Resolution	Touch screen	Keys	Format
	5AP923.1215-00	12.1"	XGA	Single-touch	No	ndscape
	5AP923.1505-00	15.0"	XGA	Single-touch	No	ndscape
	5AP923.1906-00	19.0"	SXGA	Single-touch	No	ndscape
	Panel 933					
	5AP933.156B-00	15.6"	HD	Multi-touch	No	ndscape
	5AP933.185B-00	18.5"	HD	Multi-touch	No	ndscape
	5AP933.215C-00	21.5"	FHD	Multi-touch	No	ndscape
	5AP933.240C-00	24.0"	FHD	Multi-touch	No	ndscape
	Panel 1120					
	5AP1120.0573-000	5.7"	VGA	Single-touch	No	ndscape
	5AP1120.0702-000	7.0"	WVGA	Single-touch	No	ndscape
	5AP1120.101E-000	10.1"	WXGA	Single-touch	No	ndscape
	5AP1120.1043-000	10.4"	VGA	Single-touch	No	ndscape
	5AP1120.1214-000	12.1"	SVGA	Single-touch	No	ndscape
	5AP1120.121E-000	12.1"	WXGA	Single-touch	No	ndscape
	5AP1120.1505-000	15.0"	XGA	Single-touch	No	ndscape
	5AP1120.156B-000	15.6"	HD	Single-touch	No	ndscape
	5AP1120.1906-000	19.0"	SXGA	Single-touch	No	ndscape
	Panel 1130					
	5AP1130.0702-000	7.0"	WVGA	Multi-touch	No	Landscape
	5AP1130.101E-000	10.1"	WXGA	Multi-touch	No	Landscape
	5AP1130.121E-000	12.1"	WXGA	Multi-touch	No	Landscape
	5AP1130.156C-000	15.6"	FHD	Multi-touch	No	Landscape
	5AP1130.185C-000	18.5"	FHD	Multi-touch	No	Landscape
	Panel 1151					
	5AP1151.0573-000	5.7"	VGA	No	Yes	Portrait
	Panel 1180					
	5AP1180.1043-000	10.4"	VGA	Single-touch	Yes	ndscape
	5AP1180.1505-000	15.0"	XGA	Single-touch	Yes	ndscape
	Panel 1181					
	5AP1181.1043-000	10.4"	VGA	Single-touch	Yes	Portrait
	5AP1181.1505-000	15.0"	XGA	Single-touch	Yes	ndscape
	Panel 1182					
	5AP1182.1043-000	10.4"	VGA	Single-touch	Yes	ndscape
System units	Select 1					
	5PPC2100.BY01-000		5PPC2100.BY34-000			
	5PPC2100.BY11-000		5PPC2100.BY44-000			
	5PPC2100.BY22-000		5PPC2100.BY48-000			
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					
	Select 1 as an option					
	5ACCIF01.FPCC-000	5ACCIF01.FPLS-000	5ACCIF01.FPSC-000	5ACCIF01.ICAN-000	5ACCIF01.FPCS-000	
	5ACCIF01.FPLK-000	5ACCIF01.FPLS-001	5ACCIF01.FPSC-001			
	Select 1 as an option ¹⁾					
	5ACCUSB4.0000-000					
	Select as an option					
	5MMUSB.2048-01 5MMUSB.4096-01					
Terminal blocks	Select 1					
	Power connectors		Terminal block IF option			
	0TB103.9		0TB1210.3100			
	0TB103.91					
Operating systems	Select 1					
	Windows 7		Windows Embedded Standard 7		Automation Runtime	
	5SWWI7.1100-ENG		5SWWI7.1543-ENG		0TG1000.01	
	5SWWI7.1100-GER		5SWWI7.1643-ENG		0TG1000.02	
	5SWWI7.1300-MUL		5SWWI7.1743-MUL		1TG4600.10-5	
	5SWWI7.1200-ENG		5SWWI7.1843-MUL		1TG4601.06-5	
	5SWWI7.1200-GER				1TG4601.06-T	
	5SWWI7.1400-MUL					
	Windows Embedded 8.1 Industry		B&R Linux 8 (GNU/Linux)		Windows 10	
	5SWWI8.0343-MUL		5SWLIN.0543-MUL		5SWWI10.0243-MUL	
	5SWWI8.0443-MUL		5SWLIN.0643-MUL		5SWWI10.0543-MUL	
	B&R Linux 9 (GNU/Linux)					
	5SWLIN.0743-MUL					

) Certain limitations must be taken into account during operation/installation. For additional information, see "chapter 6 - Accessories", section "USB hub".

¹⁾ Certain limitations must be taken into account during operation/installation. For additional information, see "chapter 6 - Accessories", section "USB hub".

Figure 1: PPC2100 configuration

2.2 Complete system

2.2.1 Mechanical properties

2.2.1.1 Dimensions

AP9x3 panels - Dimensions

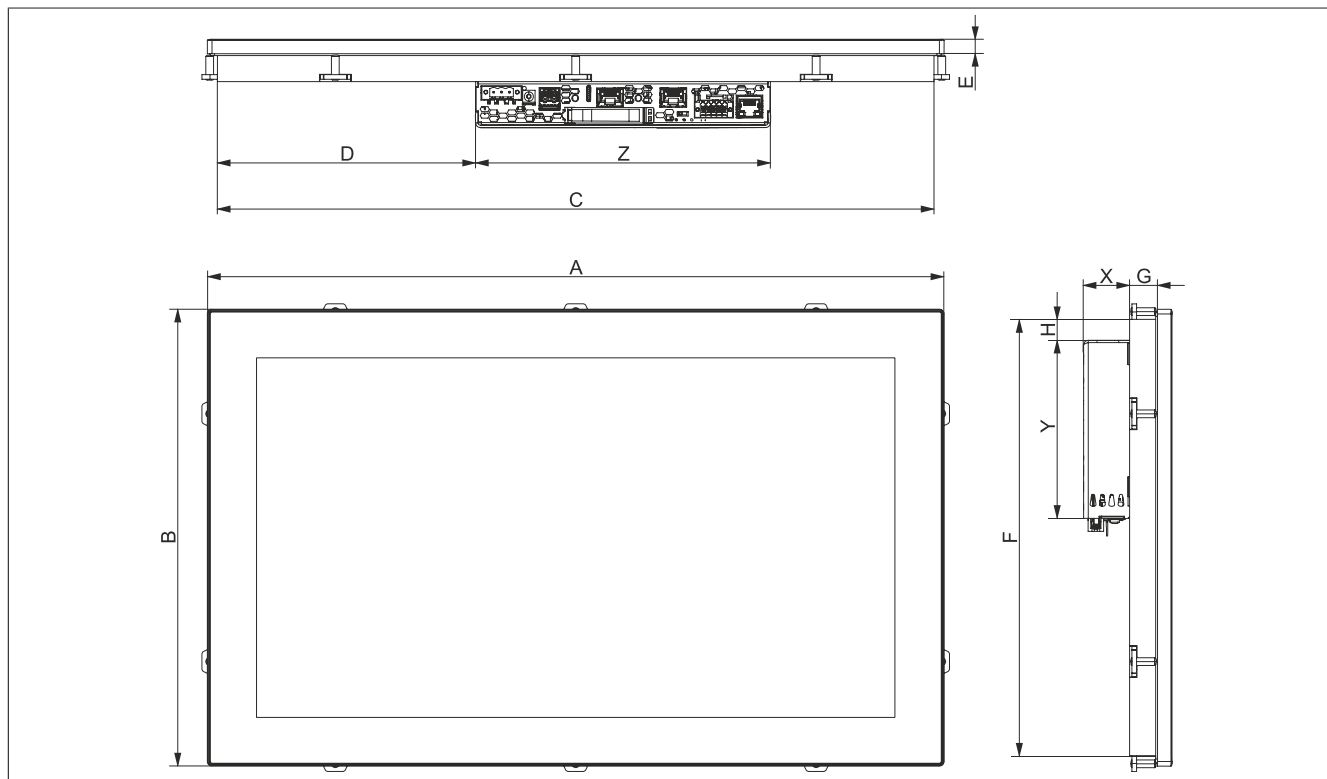


Figure 2: Panel PC 2100 with AP9x3 panels (sample figure) - Dimensions

All dimensions are specified in mm.

Display type	Model number	A	B	C	D	E	F	G	H
12.1" single-touch	5AP923.1215-00	315	239	302	48	9	226	13.5	13.5
15.0" single-touch	5AP923.1505-00	370	288	357	84.5	9	275	14.5	13.5
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	13.5

Table 6: AP9x3 panels - Dimensions

Component	Model number	X	Y	Z
System unit	5PPC2100.BYxx-000	29.7	115	190

Table 7: System units - Dimensions

Information:

2D and 3D drawings (in DXF and STEP format) can be downloaded from the B&R website (www.br-automation.com).

AP1000 panels with retaining clips - Dimensions

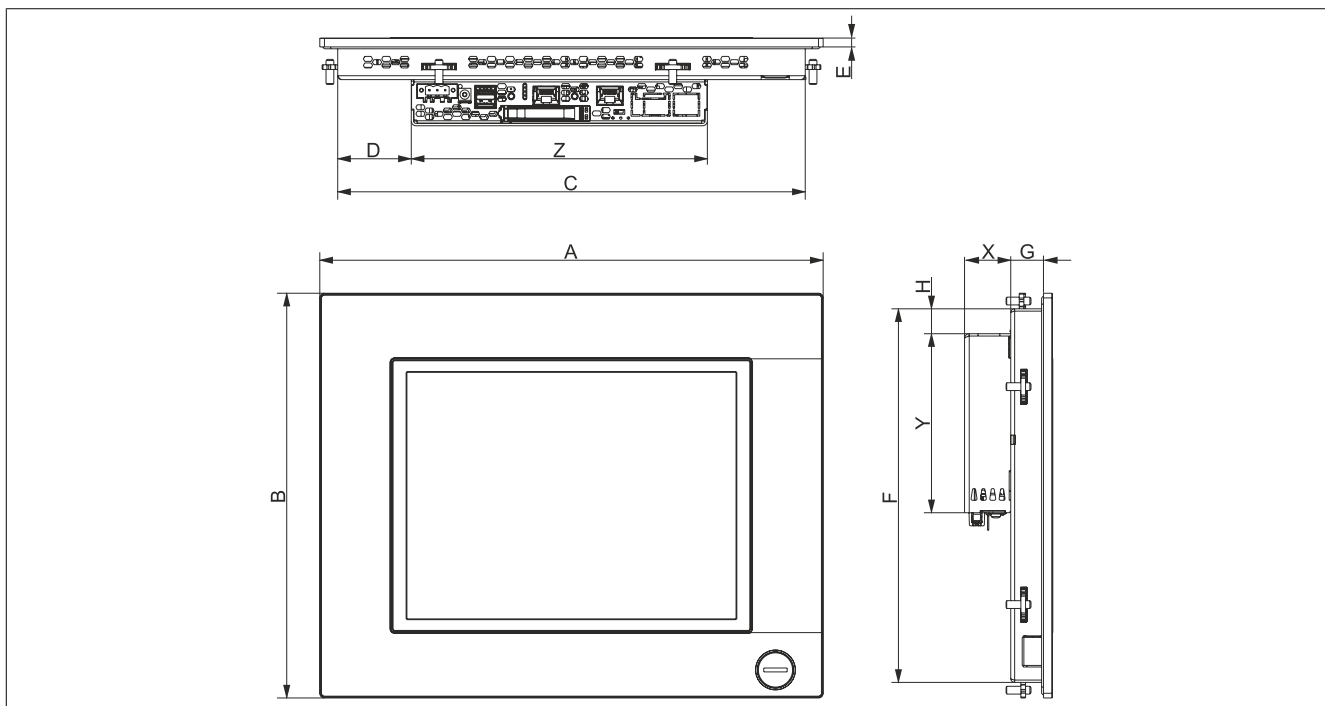


Figure 3: Panel PC 2100 with AP1000 panels with retaining clips (sample figure) - Dimensions

All dimensions are specified in mm.

Display type	Model number	A	B	C	D	E	F	G	H
5.7" single-touch	5AP1120.0573-000	212	156	196	3	5.7	140	19.5	2.5
5.7" with 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	5AP1130.101E-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
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
18.5" multi-touch	5AP1130.185C-000	475	295	462	166.5	9	282	18	13.5

Table 8: AP1000 panels with retaining clips - Dimensions

Component	Model number	X	Y	Z
System unit	5PPC2100.BYxx-000	29.7	115	190

Table 9: System units - Dimensions

Information:

2D and 3D drawings (in DXF and STEP format) can be downloaded from the B&R website (www.br-automation.com).

AP1000 panels with clamping blocks - Dimensions

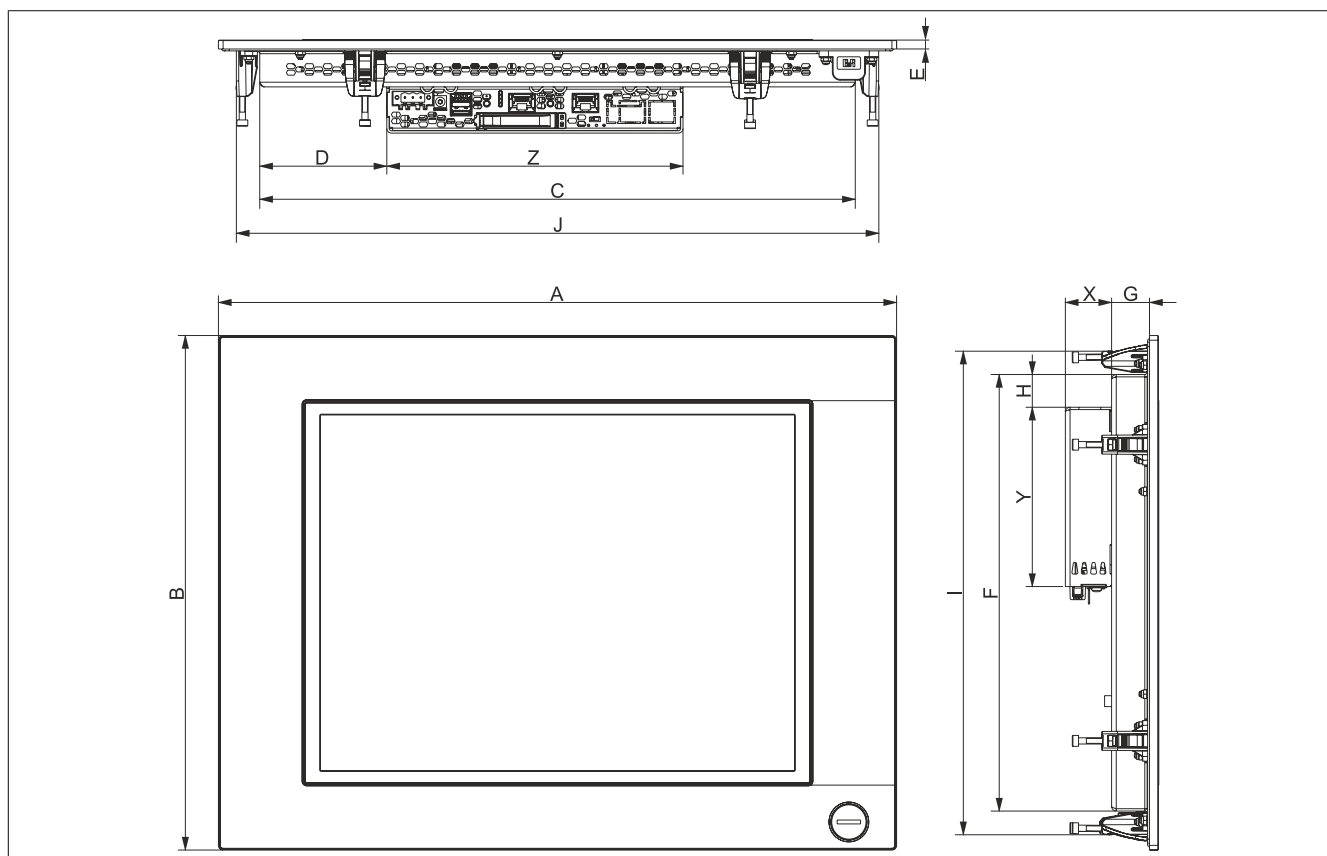


Figure 4: Panel PC 2100 with AP1000 panels with clamping blocks (sample figure) - Dimensions

All dimensions are specified in mm.

Display type	Model number	A	B	C	D	E	F	G	H	I	J
10.4" single-touch with keys	5AP1181.1043-000	323	358	270	70.5	5.7	305	21.3	17.5	338	300
10.4" single-touch with keys	5AP1182.1043-000	423	288	355.5	70.5	5.7	234	21.3	17.5	268	400
12.1" single-touch	5AP1120.1214-000	362	284	309	52.5	5.7	234	20.3	17.5	264	339
15.0" single-touch	5AP1120.1505-000	435	330	382	81.5	5.7	280	24.3	24	310	412
15.0" single-touch with keys	5AP1180.1505-000	435	330	382	81.5	5.7	280	24.3	24	310	412
15.0" single-touch with keys	5AP1181.1505-000	435	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

Table 10: AP1000 panels with clamping blocks - Dimensions

Component	Model number	X	Y	Z
System unit	5PPC2100.BYxx-000	29.7	115	190

Table 11: System units - Dimensions

Information:

2D and 3D drawings (in DXF and STEP format) can be downloaded from the B&R website (www.br-automation.com).

2.2.1.2 Installation diagrams

Information:

When installing the Panel PC 2100, be sure to leave sufficient space for air circulation as well as additional space for operation and maintenance of the device.

AP9x3 panels - Installation diagrams

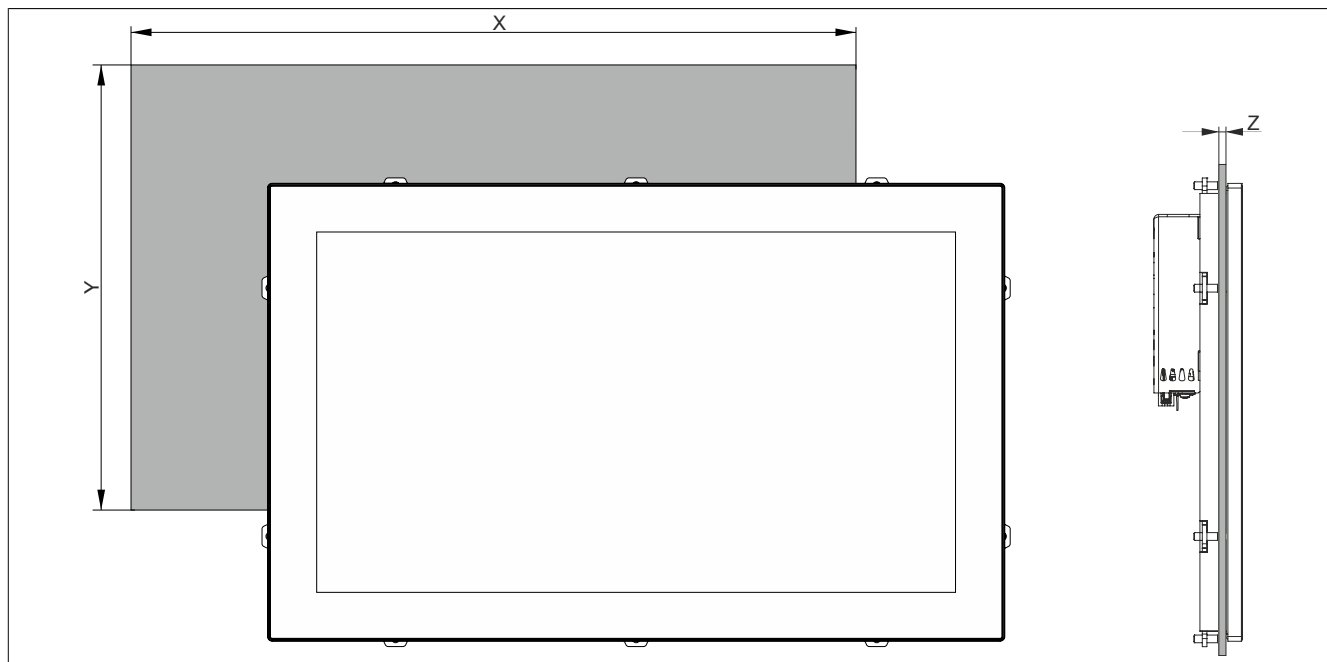


Figure 5: Panel PC 2100 with AP9x3 panels (sample figure) - Installation diagram

All dimensions are specified in mm.

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

Display 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 pcs.
15.0" single-touch	5AP923.1505-00	359	277	1	6	10 pcs.
19.0" single-touch	5AP923.1906-00	429	347	1	6	12 pcs.
15.6" multi-touch	5AP933.156B-00	403	247.5	1	6	10 pcs.
18.5" multi-touch	5AP933.185B-00	464	284	1	6	10 pcs.
21.5" multi-touch	5AP933.215C-00	530.5	322	1	6	14 pcs.
24.0" multi-touch	5AP933.240C-00	587.5	353	1	6	14 pcs.

Table 12: AP9x3 panels - Installation diagrams

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

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

AP1000 panels with retaining clips - Installation diagrams

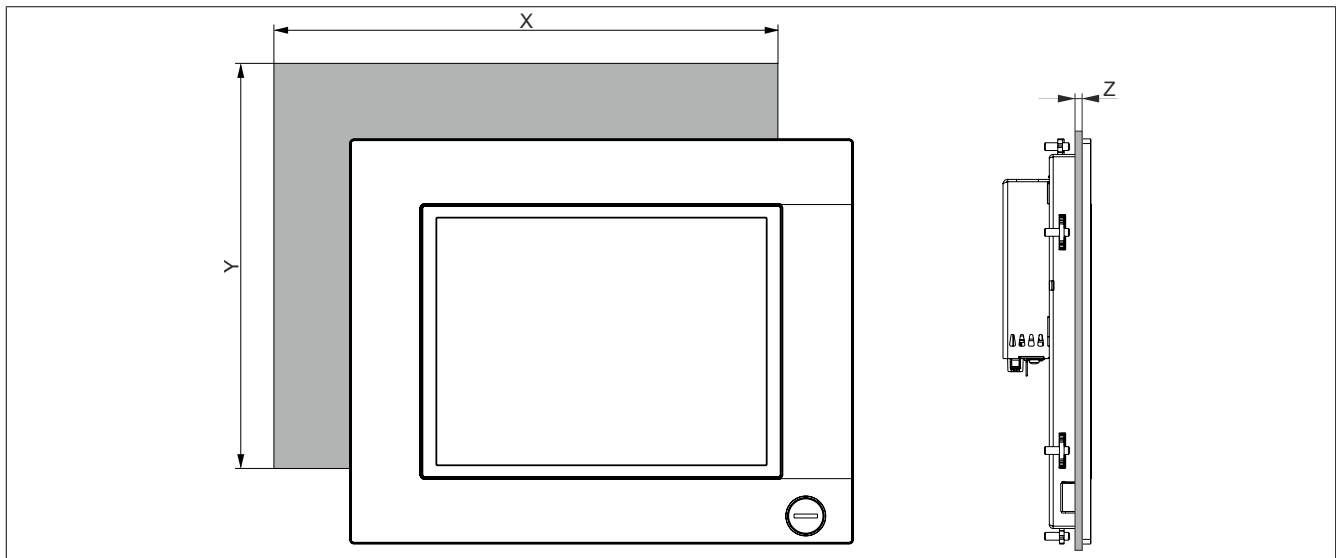


Figure 6: Panel PC 2100 with AP1000 panels with retaining clips (sample figure) - Installation diagram

All dimensions are specified in mm.

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

Display 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 keys	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	5AP1130.101E-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
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
18.5" multi-touch	5AP1130.185C-000	464	284	1	6	10

Table 13: AP1000 panels with retaining clips - Installation diagrams

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

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:

Additional spacing of at least 30 mm is required along the entire cutout in order to perform installation using retaining clips.

AP1000 panels with clamping blocks - Installation diagrams

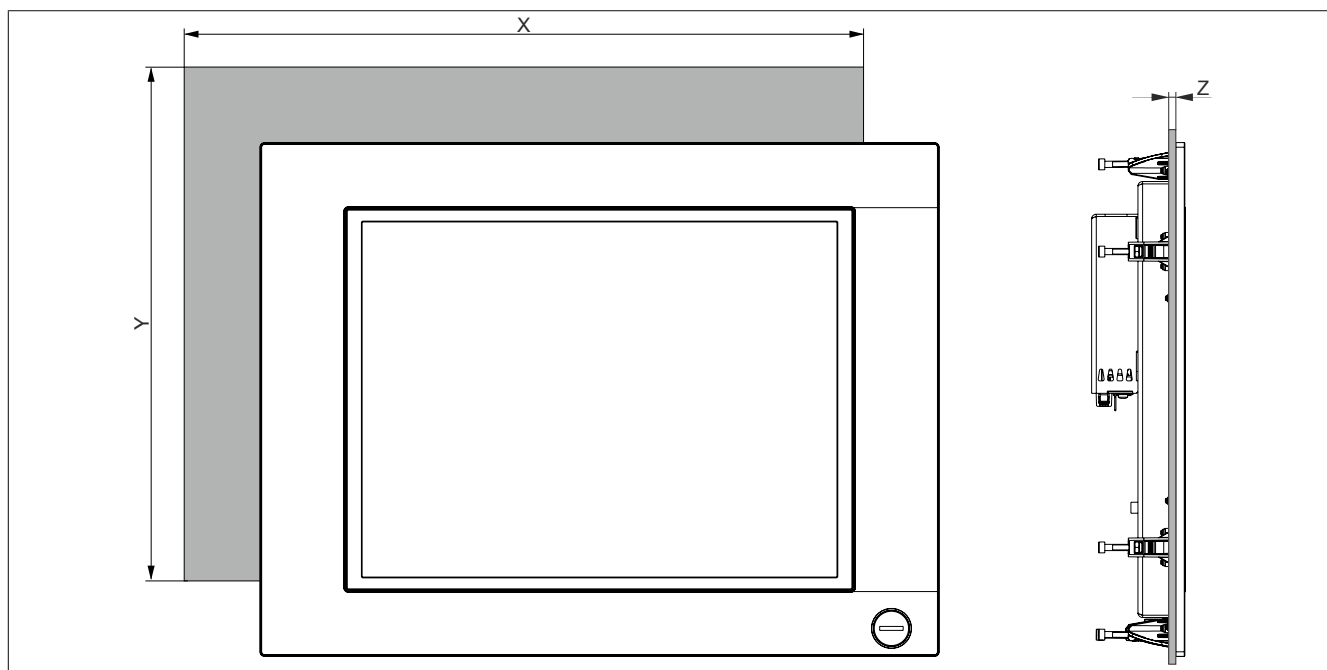


Figure 7: Panel PC 2100 with AP1000 panels with clamping blocks (example figure) - Installation diagram

All dimensions are specified in mm.

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

Display 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

Table 14: AP1000 panels with clamping blocks - Installation diagrams

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

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

2.2.1.3 Spacing for air circulation

In order to ensure sufficient air circulation, the specified clearance values must be observed above, below, to the side and behind the device. For the minimum specified clearance, see the following diagrams. This applies to all variants.

Information:

The following figure and table illustrate the complete system from a thermal point of view. Additional space needed to operate or service the device 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.

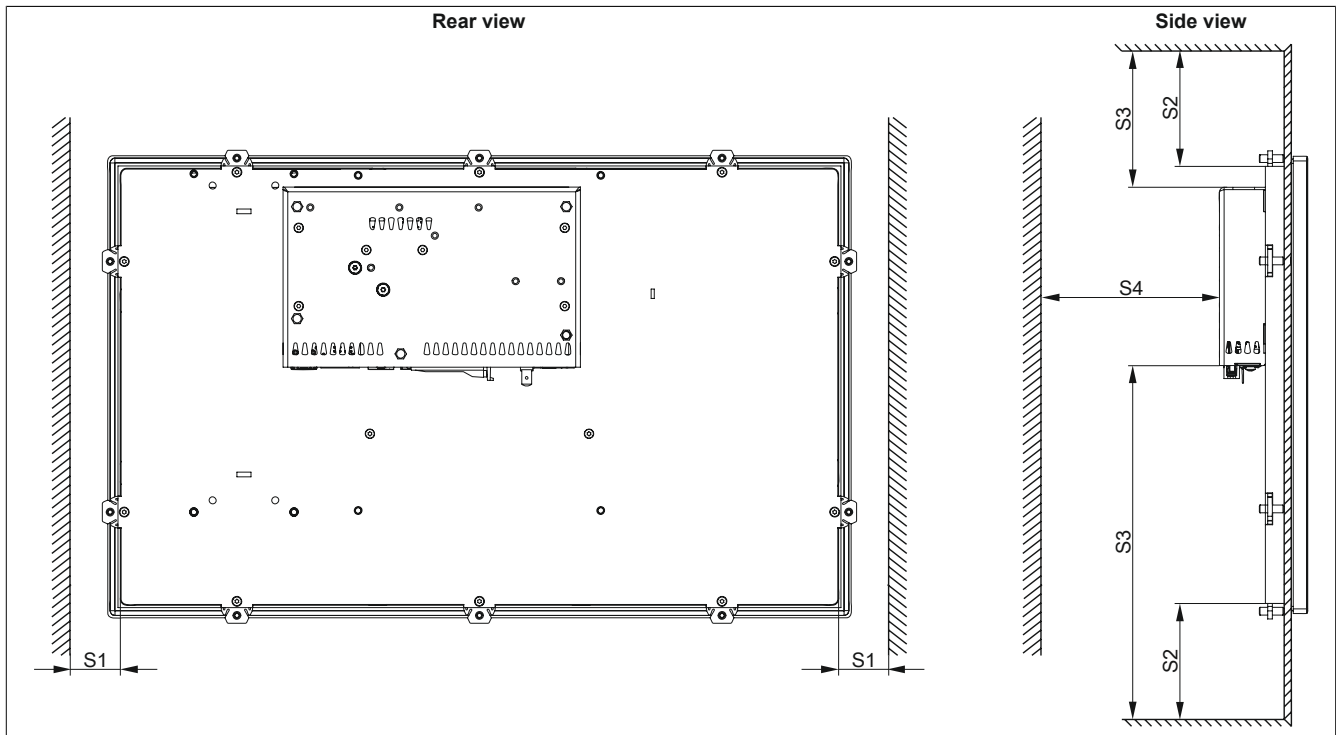


Figure 8: Panel PC 2100 - Spacing for air circulation

S1: ≥ 20 mm

S2: ≥ 50 mm

S3: ≥ 100 mm

S4: ≥ 50 mm

Caution!

The spacing specifications for air circulation are based on the worst-case scenario for operation at the maximum specified ambient temperature. The maximum specified ambient temperature must not 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 39](#)) must be monitored by the user and appropriate measures taken if they are exceeded.

2.2.1.4 Mounting orientations

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

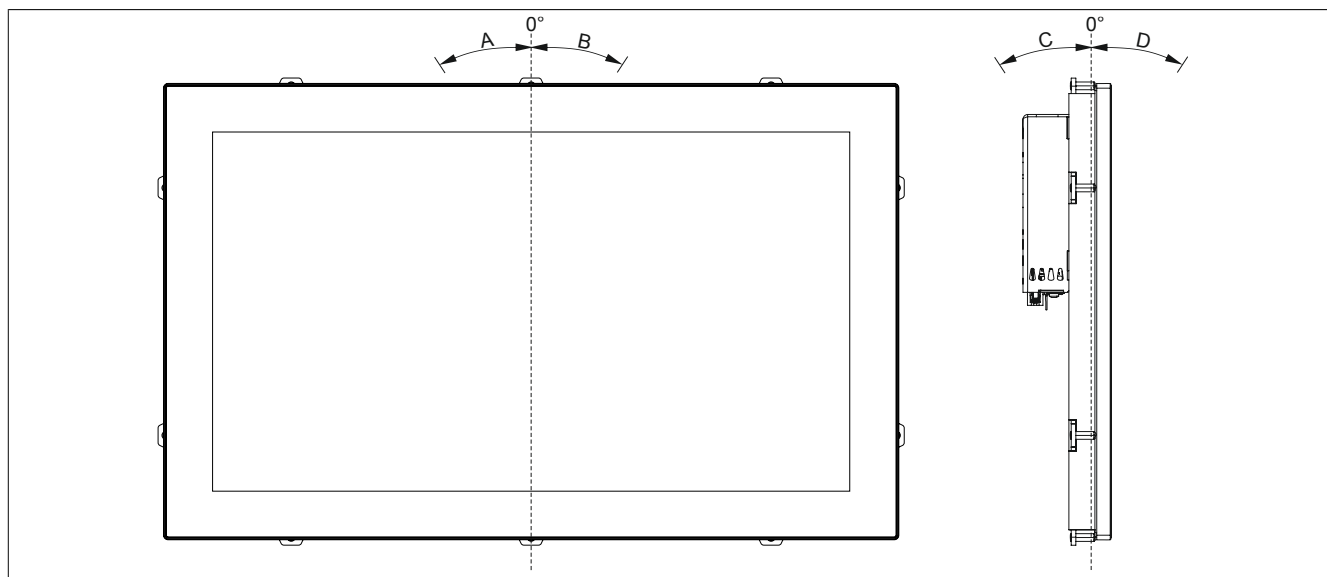


Figure 9: Panel PC 2100 - Mounting orientation

Mounting orientation		Ambient temperature limitation ¹⁾
0°	0°	None
A	-1° to -90° (counterclockwise)	5°C
B	+1° to +90° (clockwise)	5°C
C, D	±180° (interfaces on top)	5°C
C	-1° to -45°	5°C
C	-46° to -90°	10°C
D	+1° to +90° (display facing down)	10°C

Table 15: Mounting orientations during operation

1) The maximum ambient temperature must be reduced by

To achieve natural air circulation, it is important to ensure that the clearance values specified in section "[Spacing for air circulation](#)" on page 29 are observed during installation.

2.2.1.5 Weight specifications

All weights are specified in g (grams).

Display type	Model number	Weight
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

Table 16: AP9x3 panels - Weight

Display type	Model number	Weight
5.7" single-touch	5AP1120.0573-000	1100
5.7" with keys	5AP1151.0573-000	1400
7.0" single-touch	5AP1120.0702-000	900
7.0" multi-touch	5AP1130.0702-000	1200
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
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
18.5" multi-touch	5AP1130.185C-000	4600
19.0" single-touch	5AP1120.1906-000	7300

Table 17: AP1000 panels - Weight

Component	Model number	Weight
System unit	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

Table 18: System units, CFast cards, interface options - Weight

2.2.2 Environmental characteristics

2.2.2.1 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 have been calculated for operation under worst-case conditions. Experience has shown that higher ambient temperatures can be achieved in typical applications, e.g. in Microsoft Windows. Testing and evaluation in this regard must be performed on-site by the user in each individual case (temperatures can be read 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

2.2.2.1.1 Maximum ambient temperature for worst-case operation

All values apply to non-condensing operation.

		E3815 1.46 GHz	E3825 1.33 GHz	E3826 1.46 GHz	E3827 1.75 GHz	E3845 1.91 GHz	E3845 1.91 GHz	Location of sensor(s)
		5PPC2100.BY01-000	5PPC2100.BY11-000	5PPC2100.BY22-000	5PPC2100.BY34-000	5PPC2100.BY44-000	5PPC2100.BY48-000	
All temperature values in degrees Celsius (°C) at 500 m above sea level, non-condensing								
The maximum ambient temperature is typically derated by 1°C per 1000 meters starting at 500 meters above sea level.								
Maximum ambient temperature for worst-case operation		55	55	55	50	50	50	
What else can also be operated at the max. ambient temperature, or is there a limitation?								
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓	✓	✓	Display - See temperature sensor position
	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	✓	✓	✓	✓	✓	✓	
	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	✓	✓	✓	✓	✓	✓	
	5AP1120.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1180.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1181.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1120.156B-000	✓	✓	✓	✓	✓	✓	
	5AP1130.156C-000	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	✓	✓	✓	✓	✓	✓	

Table 19: Maximum ambient temperature for worst-case operation

2.2.2.1.2 Minimum ambient temperature for worst-case operation

All values apply to non-condensing operation.

								Location of sensor(s)
		E3815 1.46 GHz 5PPC2100.BY01-000	E3825 1.33 GHz 5PPC2100.BY11-000	E3826 1.46 GHz 5PPC2100.BY22-000	E3827 1.75 GHz 5PPC2100.BY34-000	E3845 1.91 GHz 5PPC2100.BY44-000	E3845 1.91 GHz 5PPC2100.BY48-000	
All temperature values in degrees Celsius (°C) at 500 m above sea level, non-condensing								
Minimum ambient temperature for worst-case operation		-20	-20	-20	-20	-20	-20	
What else can also be operated at the min. ambient temperature, or is there a limitation?								
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓	✓	✓	Display - See temperature sensor position
	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	
AP1000 panels	5AP933.240C-00 ≥D0	-10	-10	-10	-10	-10	-10	Display - See temperature sensor position
	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	
	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	
	5AP1120.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1180.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1181.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1120.156B-000	✓	✓	✓	✓	✓	✓	
	5AP1130.156C-000	-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	✓	✓	✓	✓	✓	✓	

Table 20: Minimum ambient temperature for worst-case operation

2.2.2.1.3 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 [2.2.3.2 "Power calculation"](#).

All values apply to non-condensing operation.

		<div> <div> <div> <div> <div>E3815</div> <div>1.46 GHz</div> </div> <div> <div>5PPC2100.BY01-000</div> <div>max. 8 W</div> <div>without USB</div> </div> </div> <div> <div>E3825</div> <div>1.33 GHz</div> </div> <div> <div>5PPC2100.BY11-000</div> <div>max. 8 W</div> <div>without USB</div> </div> <div> <div>E3826</div> <div>1.46 GHz</div> </div> <div> <div>5PPC2100.BY22-000</div> <div>max. 9 W</div> <div>without USB</div> </div> <div> <div>E3827</div> <div>1.75 GHz</div> </div> <div> <div>5PPC2100.BY34-000</div> <div>max. 11 W</div> <div>without USB</div> </div> <div> <div>E3845</div> <div>1.91 GHz</div> </div> <div> <div>5PPC2100.BY44-000</div> <div>max. 13 W</div> <div>without USB</div> </div> <div> <div>E3845</div> <div>1.91 GHz</div> </div> <div> <div>5PPC2100.BY48-000</div> <div>max. 13 W</div> <div>without USB</div> </div> </div> </div>						Location of sensor(s)
Maximum ambient temperature for typical operation		60	60	60	55	55	55	
What else can also be operated at the typ. ambient temperature, or is there a limitation?								
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓	✓	✓	Display - See temperature sensor position
	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	✓	✓	✓	
	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	✓	✓	✓	
	5AP1120.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1180.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1181.1505-000	✓	✓	✓	✓	✓	✓	
	5AP1120.156B-000	55	55	55	✓	✓	✓	
	5AP1130.156C-000	55	55	55	50	50	50	
	5AP1130.185C-000	55	55	55	50	50	50	
	5AP1120.1906-000	55	55	55	✓	✓	S	
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	✓	✓	✓	✓	✓	✓	

Table 21: Maximum ambient temperature for typical operation

2.2.2.1.4 How to determine the maximum, minimum and typical ambient temperatures

1. Select the system unit.
2. Rows "Maximum, minimum ambient temperature for worst-case operation" and "Maximum ambient temperature for typical operation" show the minimum, maximum and typical ambient temperatures for the complete system in connection with the respective system unit.

Information:

The maximum and typical temperature values correspond to operation at 500 meters above sea level. The maximum/typical ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).

3. If additional interface options and CFast cards are installed, these components can change the temperature limits of the PPC2100 system.
4. Limitations are possible due to the mounting orientation of the Panel PC 2100. For more information, see section ["Mounting orientations" on page 30](#).
5. ["Information regarding typical conditions" on page 35](#) must be taken into account for typical ambient temperatures. Testing and evaluation in this regard must be performed on-site by the user in each individual case (temperatures can be read in BIOS or using the B&R Control Center).

If the installed component is marked by a "✓", it can be operated at the minimum/maximum/typical ambient temperature of the complete system without problems.

If a temperature value is specified for the installed component, for example "45", then the ambient temperature of the complete PPC2100 system is not permitted to exceed this temperature.

2.2.2.1.5 Ambient temperature during storage and transport

The following table provides an overview of the minimum and maximum ambient temperatures for storing and transporting individual components.

Display type	Model number	Storage	Transport
12.1" single-touch	5AP923.1215-00	-25 to 80°C	-25 to 80°C
15.0" single-touch	5AP923.1505-00	-25 to 80°C	-25 to 80°C
19.0" single-touch	5AP923.1906-00 ≤ D0	-20 to 60°C	-20 to 60°C
19.0" single-touch	5AP923.1906-00 ≥ E0	-25 to 70°C	-25 to 70°C
15.6" multi-touch	5AP933.156B-00 ≤ C0	-10 to 60°C	-10 to 60°C
15.6" multi-touch	5AP933.156B-00 ≥ D0	-25 to 70°C	-25 to 70°C
18.5" multi-touch	5AP933.185B-00 ≤ C0	-10 to 60°C	-10 to 60°C
18.5" multi-touch	5AP933.185B-00 ≥ D0	-20 to 60°C	-20 to 60°C
21.5" multi-touch	5AP933.215C-00 ≤ C0	-10 to 60°C	-10 to 60°C
21.5" multi-touch	5AP933.215C-00 ≥ D0	-20 to 60°C	-20 to 60°C
24.0" multi-touch	5AP933.240C-00 ≤ C0	-10 to 60°C	-10 to 60°C
24.0" multi-touch	5AP933.240C-00 ≥ D0	-30 to 70°C	-30 to 70°C

Table 22: AP9x3 panels - Ambient temperature during storage and transport

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

Table 23: AP1000 panels - Ambient temperature during storage and transport

Component	Model number	Storage	Transport
System unit	5PPC2100.BYxx-000	-20 to 60°C	-20 to 60°C
CFast cards	5CFAST.xxxx-00	-50 to 100°C	-50 to 100°C
	5CFAST.032G-10 ≥Rev. G0	-40 to 85°C	-40 to 85°C
	5CFAST.064G-10 ≥Rev. E0	-40 to 85°C	-40 to 85°C
	5CFAST.128G-10 ≥Rev. E0	-40 to 85°C	-40 to 85°C
	5CFAST.032G-10 ≤Rev. F0	-55 to 95°C	-55 to 95°C
	5CFAST.064G-10 ≤Rev. D0	-55 to 95°C	-55 to 95°C
	5CFAST.128G-10 ≤Rev. D0	-55 to 95°C	-55 to 95°C
	5CFAST.256G-10	-40 to 85°C	-40 to 85°C
Interface options	5ACCIF01.FPCC-000	-20 to 60°C	-20 to 60°C
	5ACCIF01.FPCS-000	-20 to 60°C	-20 to 60°C
	5ACCIF01.FPLK-000	-20 to 60°C	-20 to 60°C
	5ACCIF01.FPLS-000	-20 to 60°C	-20 to 60°C
	5ACCIF01.FPLS-001	-20 to 60°C	-20 to 60°C
	5ACCIF01.FPSC-000	-20 to 60°C	-20 to 60°C
	5ACCIF01.FPSC-001	-20 to 60°C	-20 to 60°C
	5ACCIF01.FSS0-000	-20 to 60°C	-20 to 60°C
	5ACCIF01.ICAN-000	-20 to 60°C	-20 to 60°C

Table 24: System units, CFast cards, interface options - Ambient temperature during storage and transport

2.2.2.1.6 Temperature monitoring

Sensors monitor temperature values at various locations in the PPC2100 device. The location of these temperature sensors is illustrated in [Fig. 10 "Panel PC 2100 - Temperature sensor positions" on page 39](#). The values listed in [Tab. 25 "Temperature sensor locations" on page 39](#) represent the defined maximum temperature for this measurement point. An alarm is not triggered if this temperature is exceeded.

These temperatures ¹⁾ can be read in various ways in approved operating systems:

- BIOS
- B&R Control Center²⁾
- B&R ADI Development Kit²⁾
- B&R ADI .NET SDK²⁾
- B&R HMI Service Center²⁾
- B&R HMI Diagnose²⁾
- B&R PVI ADI line²⁾
- B&R ADI SNMP Agent²⁾
- Automation Runtime Library²⁾

In addition, the CFast cards for PPC2100 systems available from B&R are equipped with S.M.A.R.T, or Self-Monitoring, Analysis and Reporting Technology. This makes it possible to read various parameters such as temperature using software (e.g. HDD Thermometer, a freeware program) on approved Microsoft operating systems.

For applications that do not run in approved operating systems, temperatures can be evaluated using the MTCX Development Kit. In addition to the MTCX Development Kit, sample programs in EFI are also available.

¹⁾ The temperature measured approximates the immediate ambient temperature but may also be influenced by neighboring components.

²⁾ Drivers for approved operating systems can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

2.2.2.1.7 Temperature sensor positions

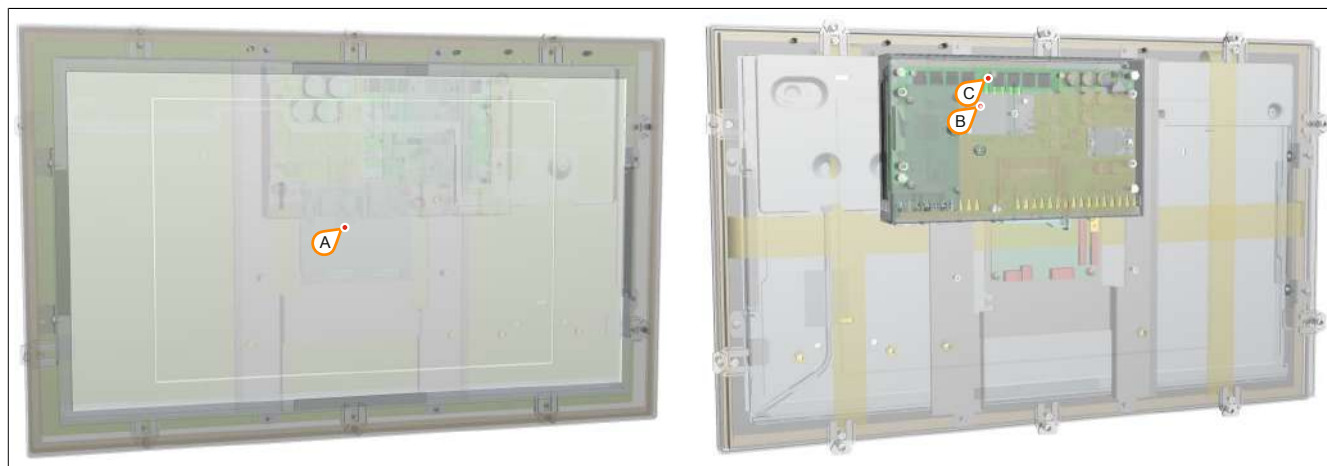


Figure 10: Panel PC 2100 - Temperature sensor positions

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 5AP1130.101E-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 5AP1120.1505-000: 90°C 5AP1180.1505-000: 90°C 5AP1120.156B-000: 80°C 5AP1130.156C-000: 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

Table 25: Temperature sensor locations

2.2.2.2 Humidity

The following table shows the minimum and maximum relative humidity values (non-condensing) of the individual components that are relevant to the humidity limitations of the complete system. The lowest and highest common values are always used for this determination.

Display 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%

Table 26: AP9x3 panels - Relative humidity

Display 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" with keys	5AP1151.0573-000 ≤ Rev. D0	5 to 90%	5 to 90%	5 to 90%
5.7" with keys	5AP1151.0573-000 ≥ Rev. D0	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	5AP1130.101E-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%
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%
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%

Table 27: AP1000 panels - Relative humidity

All values apply to non-condensing operation/storage/transport.

Component	Model 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%

Table 28: System units, IF options, CFast cards - Humidity

The specifications listed correspond to the relative humidity (non-condensing) at an ambient temperature of 30°C. For more detailed information about specific temperature-dependent humidity values, see the technical data for the individual components.

2.2.2.3 Vibration

The following table provides an overview of the maximum vibration values of the complete system. Limitations are possible through the use of 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

Table 29: Vibration

1) Testing is performed in accordance with EN 60068-2-6.

2) This value applies to a device in its original packaging.

2.2.2.4 Shock

The following table provides an overview of the maximum shock values of the complete system. Limitations are possible through the use of 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

Table 30: Shock

1) Testing is performed in accordance with EN 60068-2-27.

2) This value applies to a device in its original packaging.

2.2.2.5 Protection

The Panel PC 2100 has IP65 protection on the front and IP20 protection on the back per EN 60529 under the following conditions:

- The Panel PC 2100 is installed correctly (see "[Installation](#)" on page 210).
- All covers or components are installed on the interfaces and slots.
- All environmental conditions are being observed.

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

2.2.3 Electrical characteristics

2.2.3.1 +24 VDC power supply

Danger!


This device is only permitted to be supplied by a SELV/PELV power supply or with safety extra-low voltage (SELV) per EN 60950.

The 3-pin male connector required for connecting the power supply is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp terminal block) or 0TB103.91 (cage clamp terminal block).

For the pinout, see the following table. The supply voltage is protected internally by a soldered fuse (10 A, fast-acting) to prevent damage to the device in the event of overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection → fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is destroyed in the event of error.

+24 VDC power supply	
Protected against reverse polarity	
Pin	Description
1	+
2	Functional ground
3	-
Model number	Short description
	Terminal blocks
0TB103.9	Connector 24 V 5.08 3-pin screw clamp terminal block
0TB103.91	Male connector 24 V 5.08 3-pin cage clamp terminal block

3-pin male power supply connector



+24 VDC power supply

Table 31: +24 VDC power supply connection

Electrical characteristics	
Nominal voltage	24 VDC ±25%, SELV ¹⁾
Nominal current	3.5 A
Inrush current	Typ. 6 A; max. 10 A for <300 µs
Overvoltage category per EN 61131-2	II
Electrical isolation	Yes
Uninterruptible power supply	No

1) EN 60950 requirements must be observed.

2.2.3.2 Power calculation

In order to calculate the total power of the Panel PC 2100 device, the power rating of the display being used (see [AP9x3 panels - Power calculation](#) or [AP1000 panels - Power calculation](#)) must be added to the power ratings of the system unit being used, any connected interface options and an optional CFast card.

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

Table 32: System unit - Power calculation

The following values are maximum values without additional consumers (e.g. USB devices).

Display type	Model number	+5 V	3V3	+12 V	Power consumption Total
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 ≥ C0	5 W	-	24.5 W	29.5 W

Table 33: AP9x3 panels - Power calculation

The following values are maximum values without additional consumers (e.g. USB devices).

Display type	Model number	+5 V	3V3	+12 V	Power consumption Total
5.7" single-touch	5AP1120.0573-000	-	0.7 W	2.5 W	3.2 W
5.7" with 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	-	1.0 W	5.8 W	6.8 W
10.1" multi-touch	5AP1130.101E-000	1.0 W	1.0 W	5.8 W	7.8 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
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
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

Table 34: AP1000 panels - Power calculation

The following values are maximum values:

Interface option	Model number	+5 V	3V3	+12 V	Power consumption Total
CAN	5ACCIF01.ICAN-000	0.45 W	0.05 W	-	0.50 W
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
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 RS422/485	5ACCIF01.FSS0-000	0.80 W	0.20 W	-	1.00 W

Table 35: Interface options - Power calculation

The following values are maximum values:

CFast cards	Model number	+5 V	3V3	+12 V	Power consumption Total
CFast cards with 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
CFast cards with 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

Table 36: CFast cards - Power calculation

Example

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

POWERLINK/RS485/CAN/FRAM

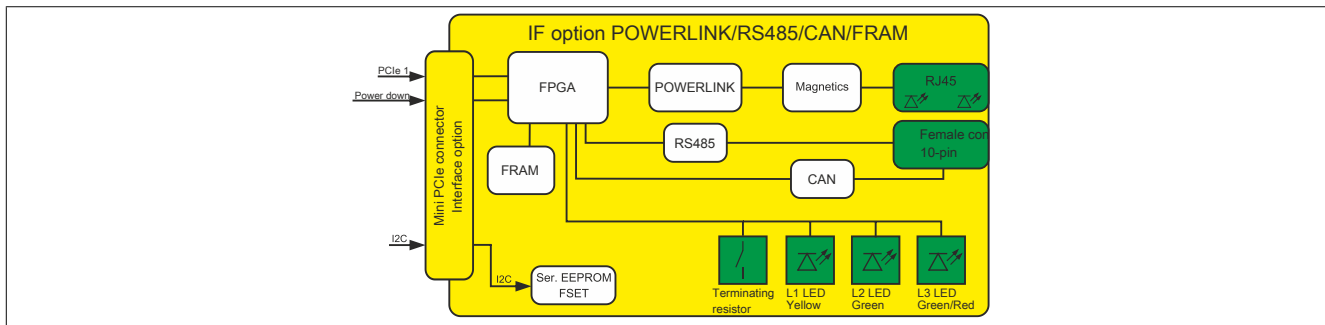


Figure 13: IF option POWERLINK/RS485/CAN/FRAM (5ACCIF01.FPCS-000) - Block diagram

2x POWERLINK / nvSRAM

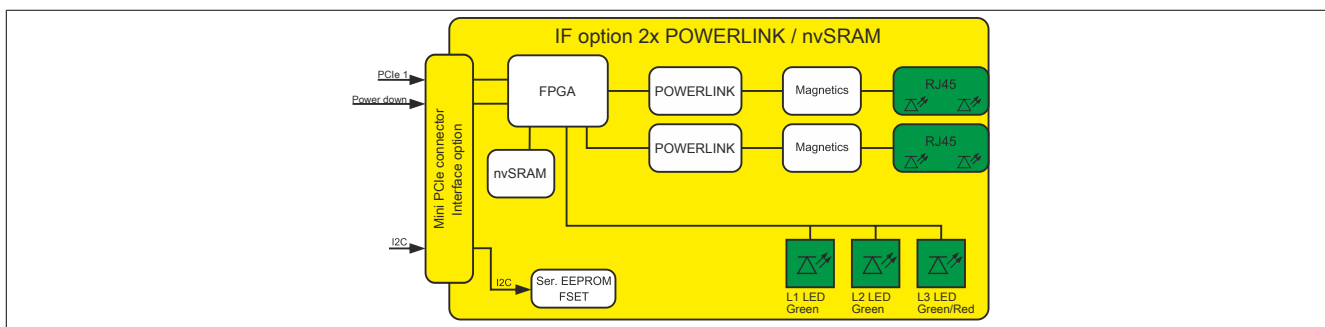


Figure 14: IF option 2x POWERLINK / nvSRAM (5ACCIF01.FPLK-000) - Block diagram

POWERLINK/RS232/FRAM

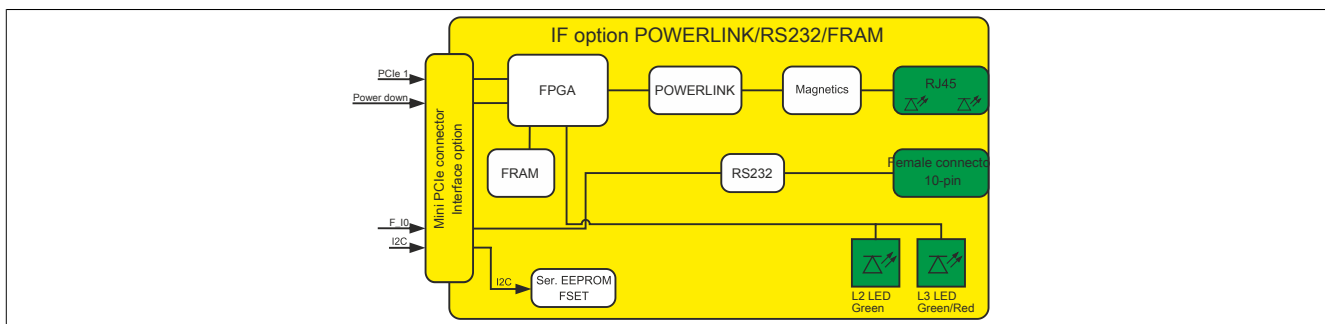


Figure 15: IF option POWERLINK/RS232/FRAM (5ACCIF01.FPLS-000) - Block diagram

POWERLINK/RS232/nvSRAM

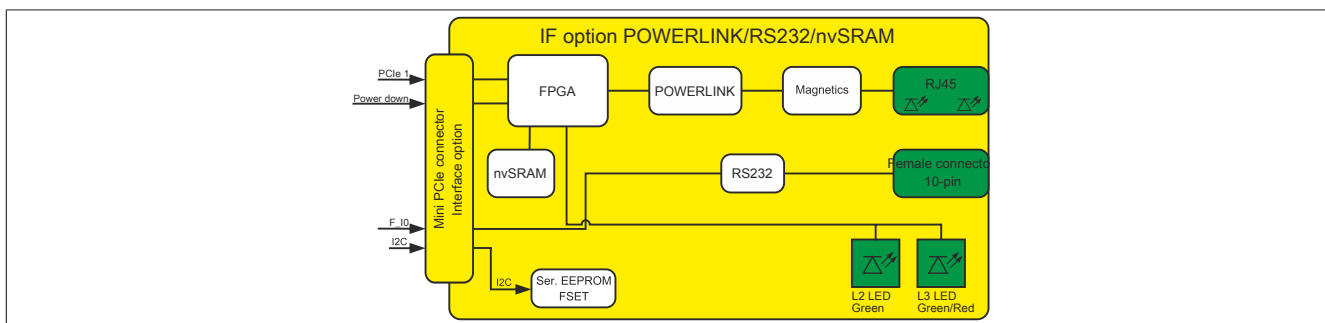


Figure 16: IF option POWERLINK/RS232/nvSRAM (5ACCIF01.FPLS-001) - Block diagram

POWERLINK/RS232/CAN/FRAM

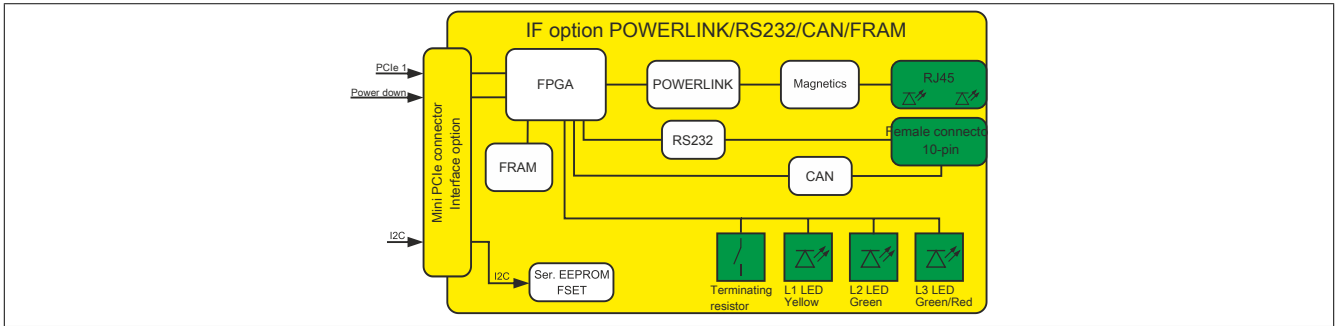


Figure 17: IF option POWERLINK/RS232/CAN/FRAM (5ACCIF01.FPSC-000) - Block diagram

POWERLINK/RS232/CAN/X2X/nvSRAM

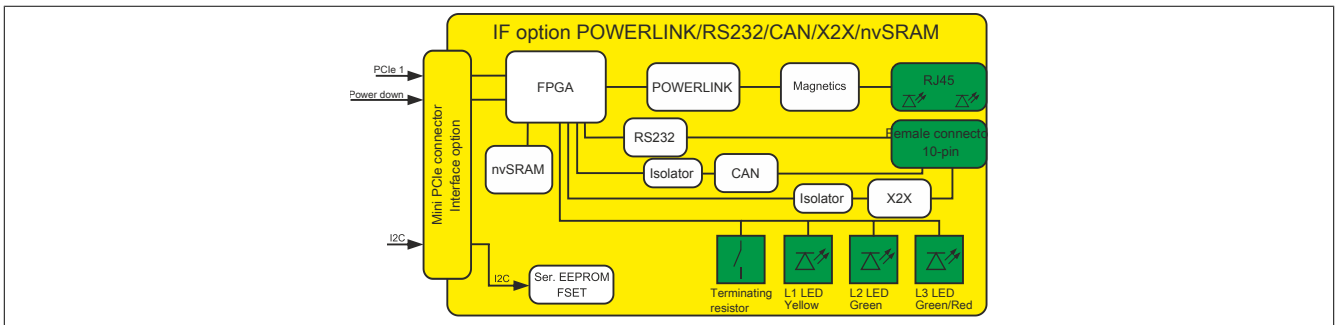


Figure 18: IF option POWERLINK/RS232/CAN/X2X/nvSRAM (5ACCIF01.FPSC-001) - Block diagram

CAN

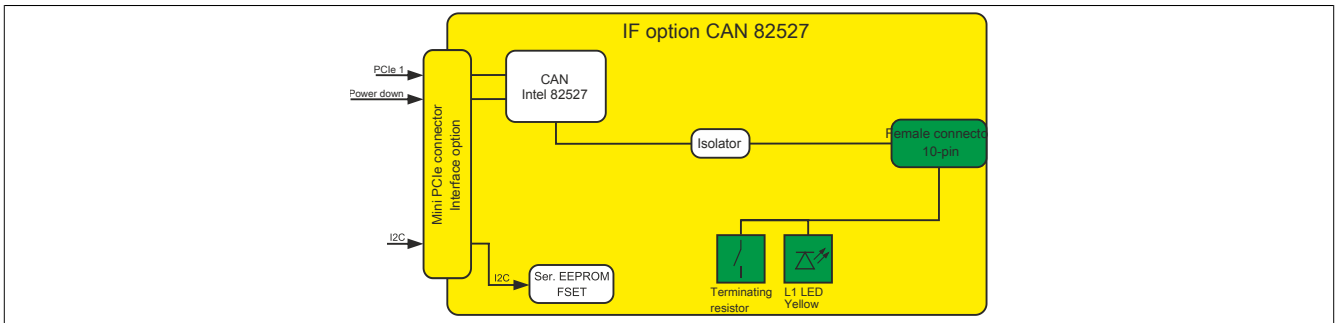


Figure 19: IF option CAN (5ACCIF01.ICAN-000) - Block diagram

2x RS422/RS485

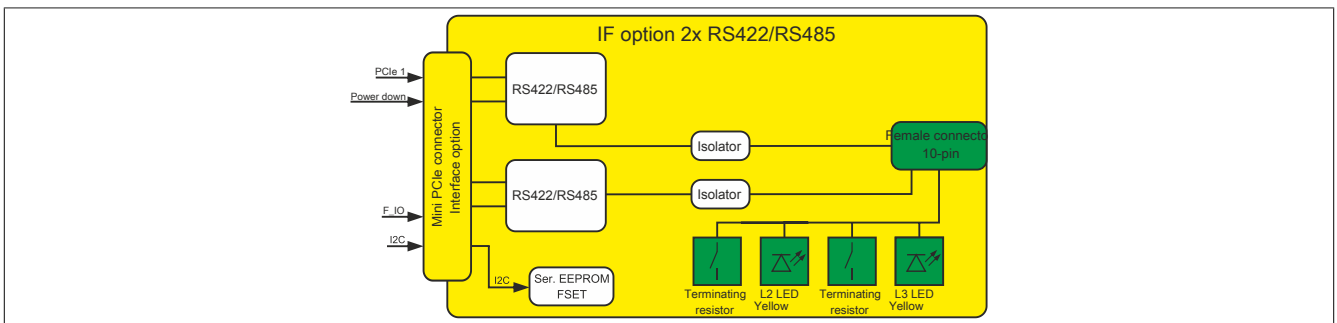


Figure 20: IF option 2x RS422/RS485 (5ACCIF01.FSS0-000) - Block diagram

2.2.4 Device interfaces and slots

2.2.4.1 Device interfaces - Overview

Interfaces are located on the bottom of the Panel PC 2100.

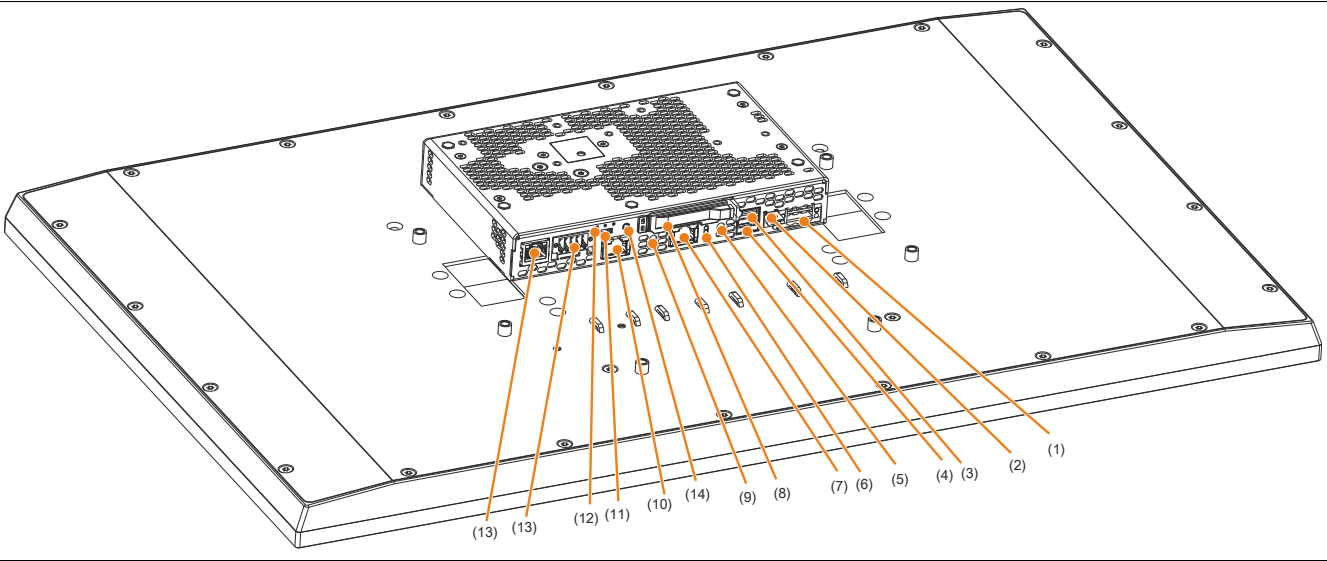


Figure 21: Device interfaces - Overview (sample screenshot)

No.	Type of interface		No.	Type of interface	
1	24 VDC power	" +24 VDC power supply "	8	CFast	" CFast slot "
2	Functional ground connection	" Grounding "	9	Reset button	" Reset button "
3	USB2	" USB interfaces "	10	ETH1	" Ethernet 1 interface (ETH1) "
4	USB1	" USB interfaces "	11	On/Off	" Terminating resistor " ¹⁾
5	Power button	" Power button "	12	L1, L2, L3	" LED status indicators - L2, L3 " on page 180 " LED status indicators - L1, L2, L3 " on page 191 ¹⁾
6	Power, CFast, Link, Run	" LED status indicators "	13	IF1, IFx IF option	" IF option slot (IF1, IFx) "
7	ETH2	" Ethernet 2 interface (ETH2) "	14	Screw connection for cable shield	

1) Only available if interface option installed.

2.2.4.2 +24 VDC power supply

Danger!


This device is only permitted to be supplied by a SELV/PELV power supply or with safety extra-low voltage (SELV) per EN 60950.

The 3-pin male connector required for connecting the power supply is not included in delivery. It can be ordered from B&R using model number 0TB103.9 (screw clamp terminal block) or 0TB103.91 (cage clamp terminal block).

For the pinout, see the following table. The supply voltage is protected internally by a soldered fuse (10 A, fast-acting) to prevent damage to the device in the event of overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection → fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is destroyed in the event of error.

+24 VDC power supply	
Protected against reverse polarity	
Pin	Description
1	+
2	Functional ground
3	-
Model number	Short description
	Terminal blocks
0TB103.9	Connector 24 V 5.08 3-pin screw clamp terminal block
0TB103.91	Male connector 24 V 5.08 3-pin cage clamp terminal block

3-pin male power supply connector



+24 VDC power supply

Table 37: +24 VDC power supply connection

Electrical characteristics	
Nominal voltage	24 VDC $\pm 25\%$, SELV ¹⁾
Nominal current	3.5 A
Inrush current	Typ. 6 A; max. 10 A for $<300 \mu\text{s}$
Overvoltage category per EN 61131-2	II
Electrical isolation	Yes
Uninterruptible power supply	No

1) EN 60950 requirements must be observed.

2.2.4.2.1 Grounding

Caution!

Functional ground (pin 2 of power supply and ground connection) must be connected to the central grounding point (e.g. of the control cabinet or system) using the shorted path with the lowest resistance and largest possible wire cross section. This type of grounding is mandatory to ensure the system functions properly.

Automation PC systems are equipped with a ground connection on the interface cover.



The ground connection must be used, for example, to fasten a copper strip to a central grounding point in the control cabinet or system where the device is installed. The largest possible wire cross section should be selected (at least 2.5 mm²).

Panel PC systems have a ground connection on the interface cover.



The ground connection must be used, for example, to fasten a copper strip to a central grounding point in the control cabinet or system where the device is installed. The largest possible wire cross section should be selected (at least 2.5 mm²).

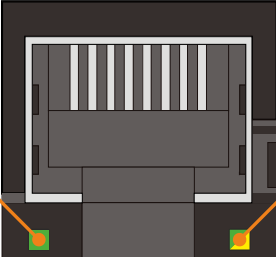
2.2.4.3 Ethernet 1 interface (ETH1)

This Ethernet controller is connected to external devices via the system unit.

Ethernet 1 interface (ETH1 ¹⁾)		
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s ²⁾	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Speed"	On	Off
Yellow	100 Mbit/s	10 Mbit/s ³⁾
Green	1000 Mbit/s	-
LED "Link"	On	Off
Green	Link (indicates connection to an Ethernet network)	Activity (blinks to indicate active data transfer)

RJ45, female

1



LED "Link"

LED "Speed"

Table 38: Ethernet interface (ETH1)

- 1) The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) Switching takes place automatically.
- 3) The 10 Mbit/s transfer rate / connection only exists if LED "Link" is also lit 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:

Only download necessary drivers from the B&R website, not from vendor websites.

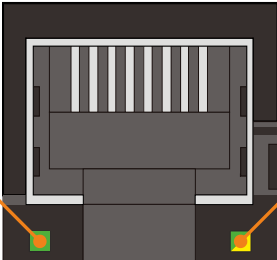
2.2.4.4 Ethernet 2 interface (ETH2)

This Ethernet controller is connected to external devices via the system unit.

Ethernet 2 interface (ETH2 ¹⁾)		
Controller	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s ²⁾	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Speed"	On	Off
Yellow	100 Mbit/s	10 Mbit/s ³⁾
Green	1000 Mbit/s	-
LED "Link"	On	Off
Green	Link (indicates connection to an Ethernet network)	Activity (blinks to indicate active data transfer)

RJ45, female

1



LED "Link"

LED "Speed"

Table 39: Ethernet interface (ETH2)

- 1) The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) Switching takes place automatically.
- 3) The 10 Mbit/s transfer rate / connection only exists if LED "Link" is also lit 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:

Only download necessary drivers from the B&R website, not from vendor websites.

2.2.4.5 USB interfaces

Panel PC devices are equipped with a Universal Serial Bus 3.0 (USB) host controller with multiple USB interfaces, of which one USB 3.0 and one USB 2.0 interface are accessible externally for the user.

Warning!

Peripheral USB devices can be connected to the USB interfaces. Due to the large number of USB devices available on the market, B&R cannot guarantee their functionality. Functionality is ensured when using the USB devices available from B&R.

Caution!

Because this interface is designed according to general PC specifications, extreme care should be taken with regard to EMC, wiring, etc.

Driver support

A special driver is necessary to operate the USB 3.0 (Universal Serial Bus) host controller with multiple USB interfaces. Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

Information:

Only download necessary drivers from the B&R website, not from vendor websites.

USB1

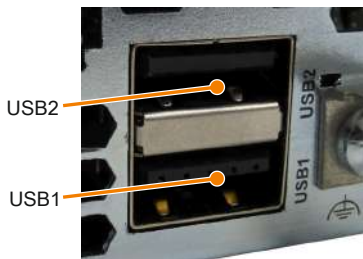
Universal Serial Bus (USB1) ¹⁾		1x USB type A, female 
Type	USB 3.0	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s), SuperSpeed (5 Gbit/s) ²⁾	
Current-carrying capacity ³⁾ USB1	Max. 1 A	
Cable length USB 2.0 USB 3.0	Max. 5 m (without hub) Max. 3 m (without hub)	

Table 40: USB1 interface

- 1) The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) Compatibility with SuperSpeed USB depends on the operating system being used.
- 3) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 1 A).
- 4) With revisions <B0 for the system units, the max. cable length has been specified at 3 m.

USB2

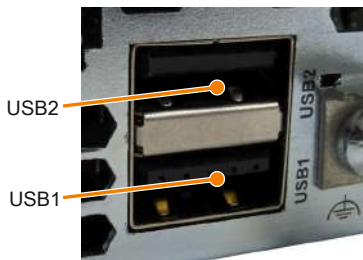
Universal Serial Bus (USB2) ¹⁾		1x USB type A, female 
Type	USB 2.0	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current-carrying capacity ²⁾ USB2	Max. 1 A	
Cable length USB 2.0	Max. 5 m (without hub)	

Table 41: USB2 interface

- 1) The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 1 A).
- 3) With revisions <B0 for the system units, the max. cable length has been specified at 3 m.

Front USB

Automation Panel 1000 systems with 10.4", 12.1" (4:3 format only), 15" (4:3 format only) and 19" display sizes are equipped with a USB 2.0 interface on the front. For more information, see section ["USB interface" on page 62](#).

USB hub interfaces

4-port USB hub 5ACCUSB4.0000-000 provides up to 4 additional USB interfaces for the Panel PC 2100. For more information, see section ["USB hub" on page 322](#).

2.2.4.6 CFast slot

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

This CFast slot is connected to the chipset internally via SATA 0 with SATA II design (SATA 3.0 Gbit/s).

Information:

5CFAST.0xxx-00 CFast cards are only permitted to be operated in the PPC2100 with revision E0 or later.

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



Table 42: CFast slot

Warning!

The CFast card is only permitted to be connected or disconnected when the power is switched off.

2.2.4.7 Power button

The power button provides a wide range of ATX power supply functions.

Power button	
The Power button can be operated without any tools.	
The power button acts like the on/off switch on a normal desktop PC with ATX power supply:	
Press and release ... Switches on the Panel PC or executes the action configured in the operating system when pressing the Power button (shut down, sleep, etc.) and switches off the Panel PC.	
Press and hold ... The ATX power supply switches off the Panel PC without shutting down the operating system (approx. 4 s - possible data loss!)	
Pressing the power button does not reset the MTCX processor.	

Table 43: Power button

2.2.4.8 Reset button

Reset button	
The Reset button can be operated without any tools.	
Pushing the reset button triggers a hardware and PCI reset. The Panel PC is restarted (cold restart - possible data loss!).	
Pressing the reset button does not reset the MTCX processor.	

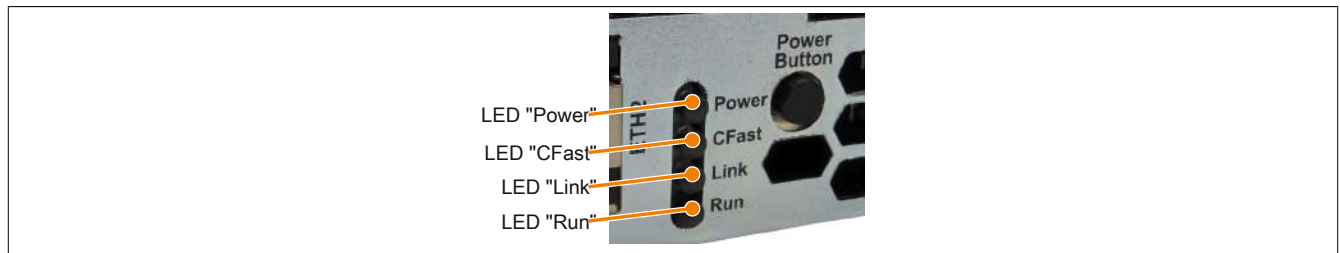
Table 44: Reset button

Warning!

Resetting the system can result in data loss!

2.2.4.9 LED status indicators

LED status indicators are located on the bottom of the PPC2100 between the ETH2 interface and the power button.



The following intervals are used for the LED status indicators:

Block size: 250 ms

Repeat interval: 500 ms, 2 boxes thus represent one interval

[illegible]

Table 45: LED status indicators - Data

2.2.4.10 IF option slot (IF1, IFx)

Panel PC system units include 1 slot for an interface option.

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

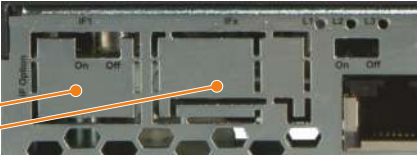
IF option IF1, IFx slot		
Model number	Short description	
	Interface option	
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100	
5ACCIF01.FPCS-000	Interface card - 1x RS485 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100	
5ACCIF01.FPLK-000	Interface card - 2x POWERLINK interfaces - 512 kB nvSRAM - For APC2100/PPC2100	
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100	
5ACCIF01.FPLS-001	Interface card - 1x RS232 interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100	
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100	
5ACCIF01.FPSC-001	Interface card - 1x RS232 interface - 1x CAN interface - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100	
5ACCIF01.FSS0-000	Interface card - 2x RS422/485 interfaces - For APC2100/PPC2100	
5ACCIF01.ICAN-000	Interface card - 1x CAN interface - For APC2100/PPC2100	

Table 46: IF1 IF option, IFx slot

Information:

Interface options can only be installed and replaced by B&R.

2.2.5 Features of AP1000 panels

A wide selection of 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.

Display type	Model 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" with 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	5AP1130.101E-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
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
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

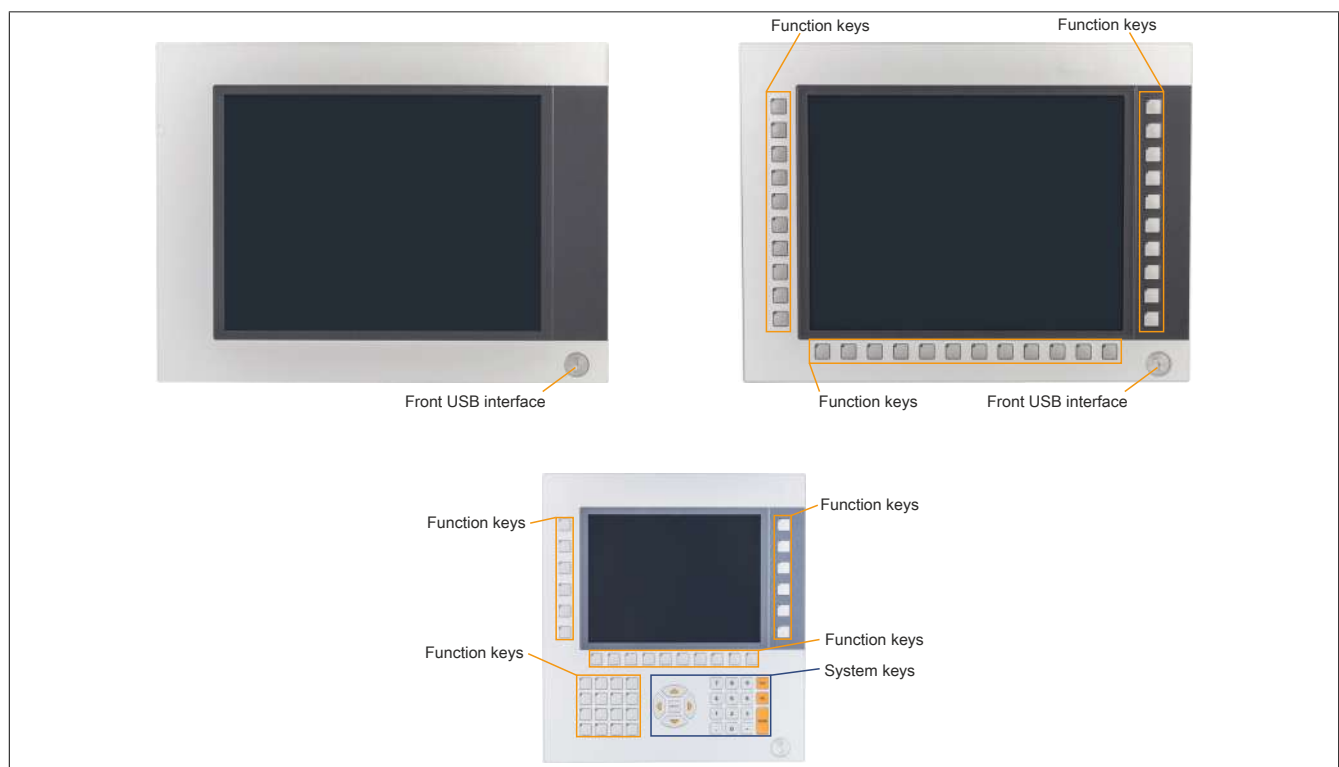


Figure 22: Features of AP1000 panels (sample screenshot)

2.2.5.1 Slide-in labels

Panels with keys are delivered with transparent slide-in labels inserted in the function keys for custom labeling.

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 slide-in label slots are accessible on the back of Automation Panel devices.

2.2.5.2 Key and LED configuration

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

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

Keys and LEDs from each device are processed by the matrix controller in a bit string of 128 bits each.

The positions of keys and LEDs in the matrix are represented as hardware numbers. The hardware numbers can be read directly on the target system using the B&R Key Editor or B&R Control Center.

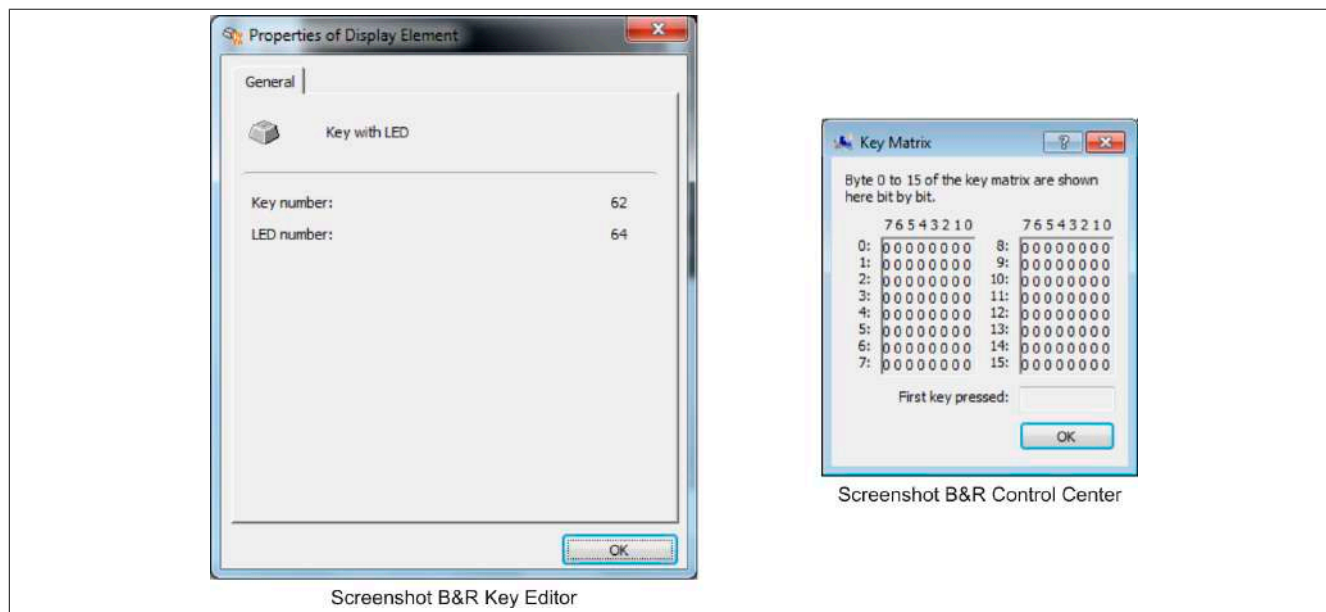


Figure 23: Hardware numbers in the B&R Key Editor and B&R Control Center

The following graphics show the positions of the keys and LEDs in the matrix. They are represented as follows.

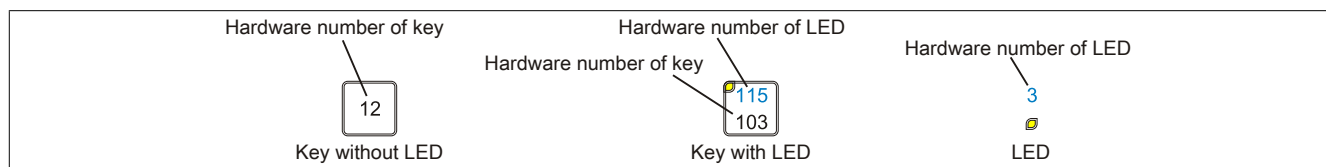


Figure 24: Representation of keys and LEDs

5AP1151.0573-000

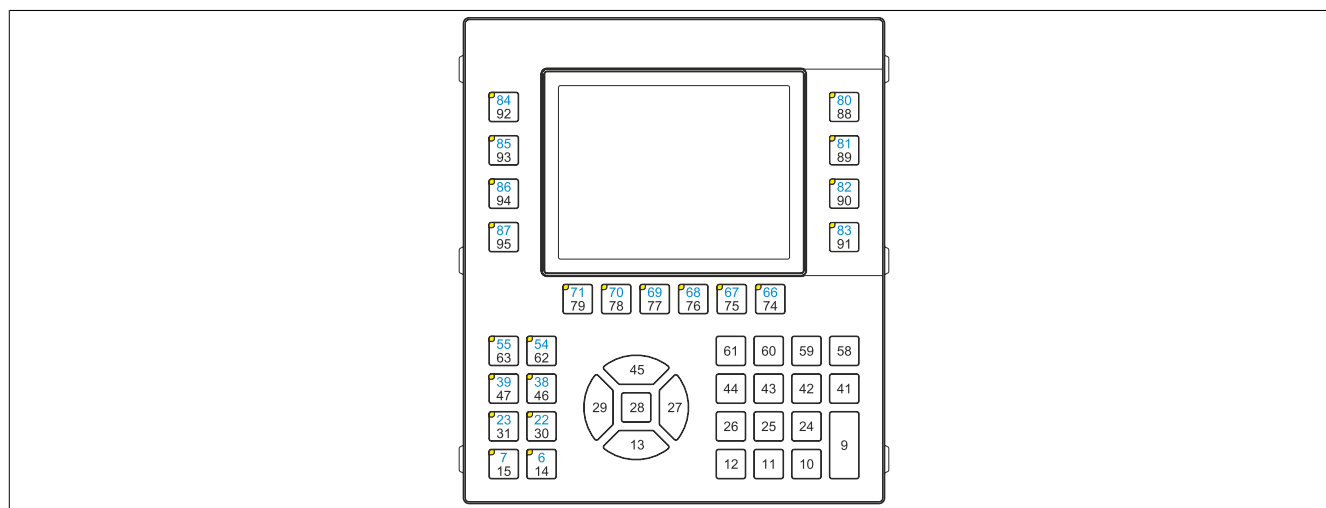


Figure 25: 5AP1151.0573-000 - Key and LED configuration

5AP1180.1043-000

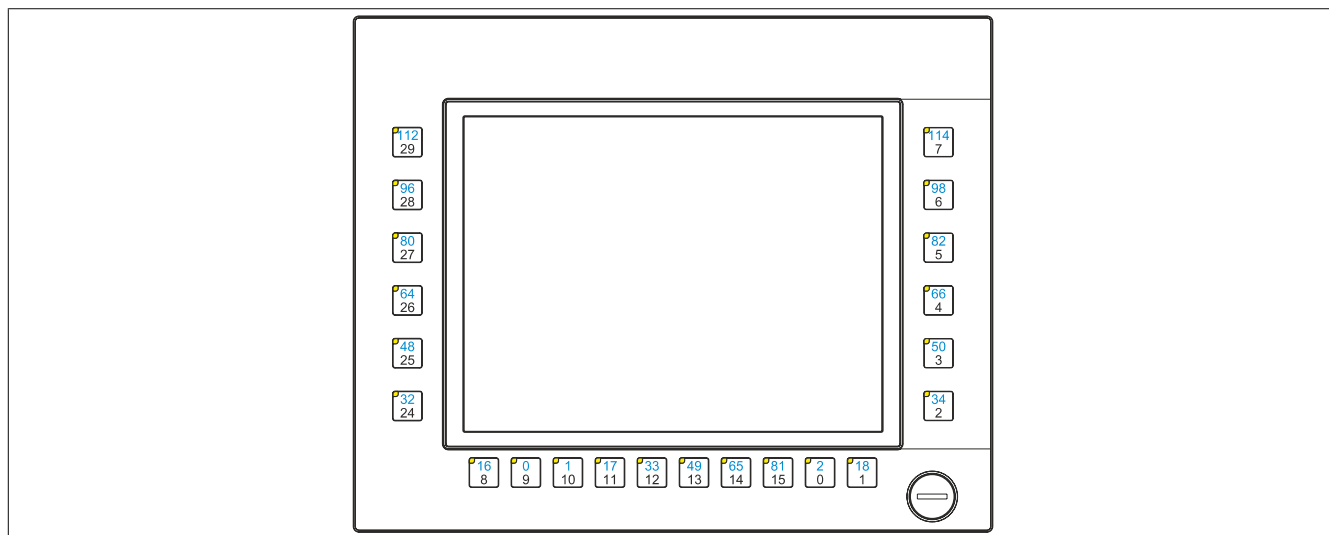


Figure 26: 5AP1180.1043-000 - Key and LED configuration

5AP1181.1043-000

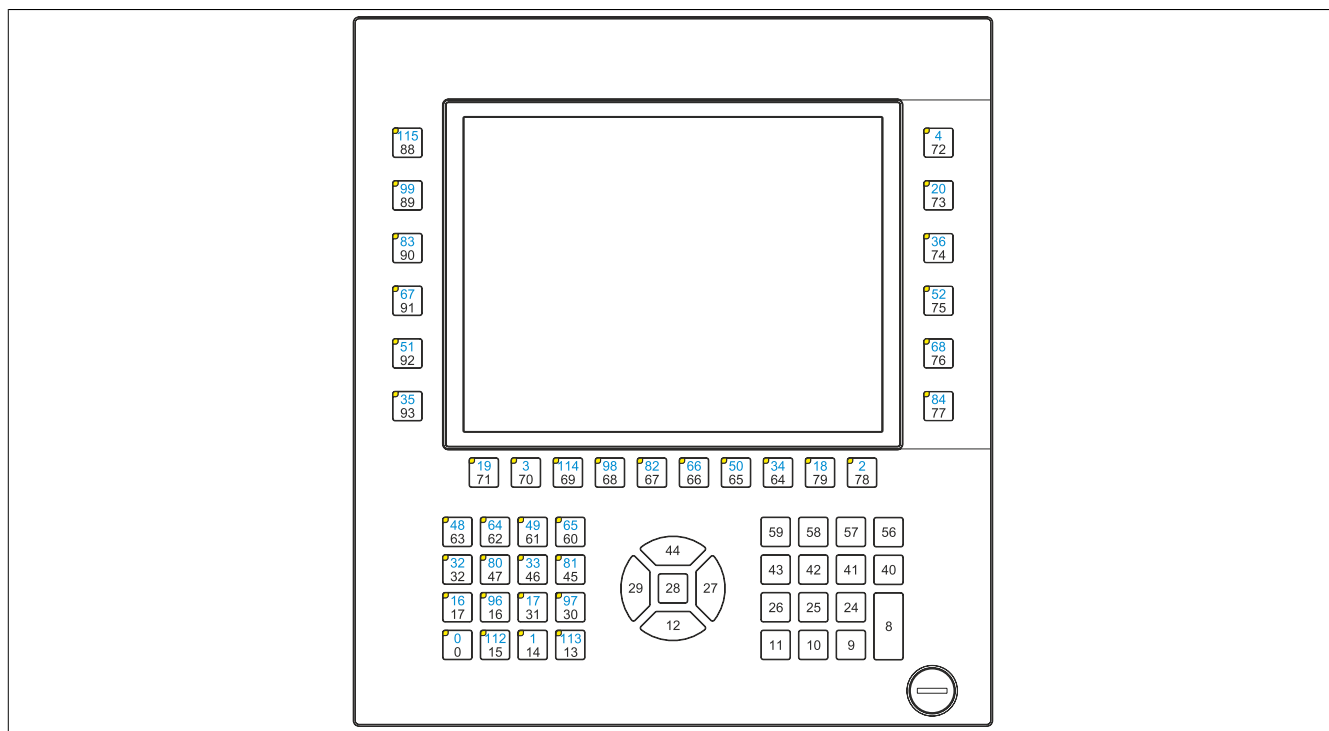


Figure 27: 5AP1181.1043-000 - Key and LED configuration

5AP1182.1043-000

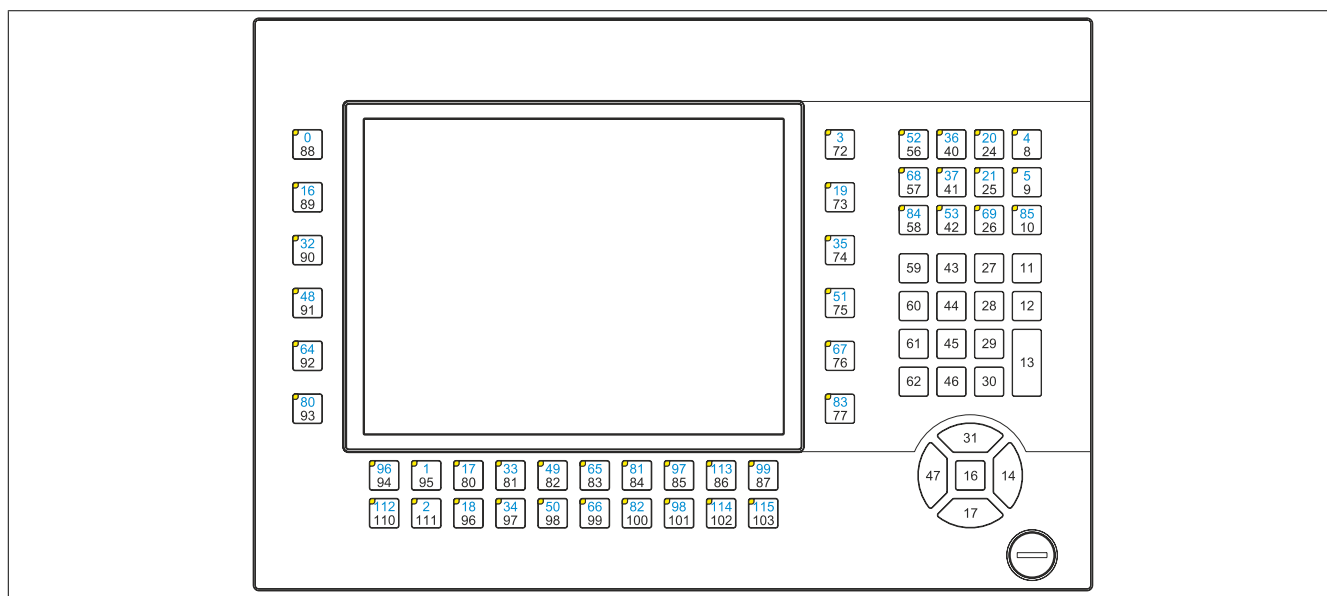


Figure 28: 5AP1182.1043-000 - Key and LED configuration

5AP1180.1505-000

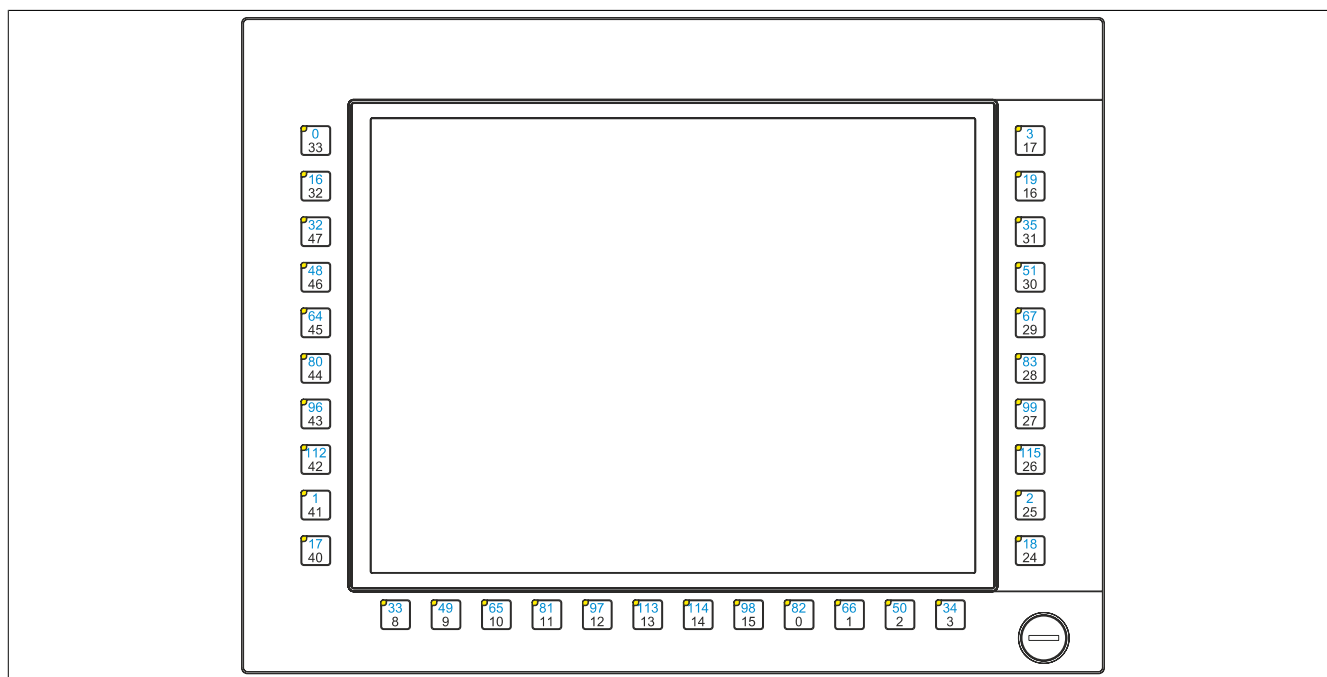


Figure 29: 5AP1180.1505-000 - Key and LED configuration

5AP1181.1505-000

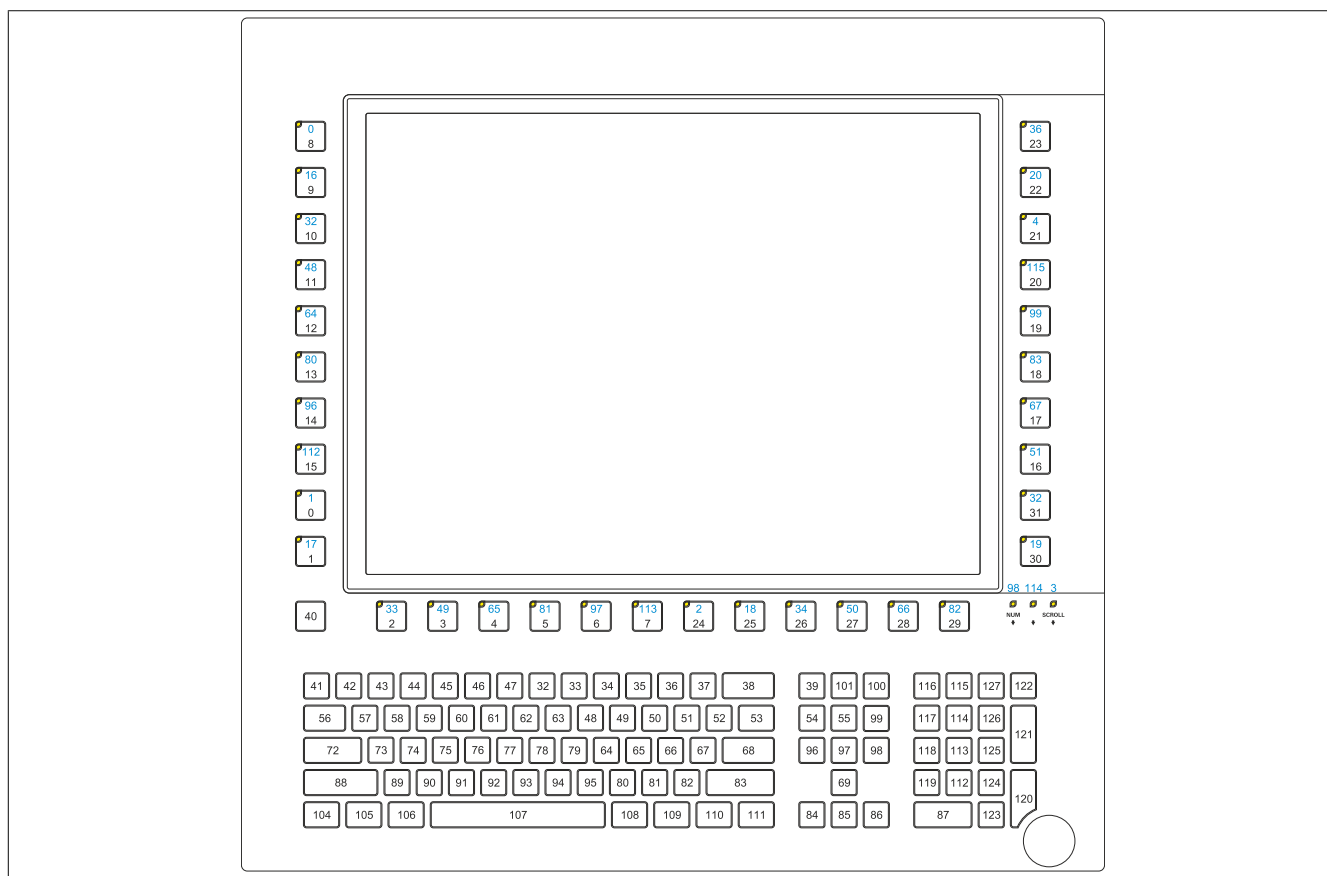


Figure 30: 5AP1181.1505-000 - Key and LED configuration

2.2.5.3 USB interface

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

Warning!

Peripheral USB devices can be connected to the USB interfaces. Due to the large number of USB devices available on the market, B&R cannot guarantee their functionality. Functionality is ensured when using the USB devices available from B&R.

Caution!

Because this interface is designed according to general PC specifications, extreme care should be taken with regard to EMC, wiring, etc.

Front USB

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


Universal Serial Bus (front USB) ¹⁾		1x USB type A, female 
Type	USB 2.0	
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current-carrying capacity ²⁾ Front USB	Max. 500 mA	
Cable length USB 2.0	Max. 5 m (without hub)	

Table 47: Front USB interface

- 1) The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 500 mA).

2.2.6 Mounting compatibility

This section provides information about the compatibility of the installation dimensions for Power Panel 100/200, Power Panel 300/400, Power Panel 500, Automation Panel 900, Automation Panel 1000, Automation Panel 700 and Panel PC 800 devices in relation to the respective device display size.

The outer dimensions of the device types are identical for the respective display sizes.

Information:

The device name "AP1000" refers to the Automation Panel 1000 as well as Panel PC 900 and Panel PC 2100 systems with an installed AP1000 panel.

The names of the different device types are shortened as follows:

Device type	Shortened form
Power Panel 100/200	PP100/200
Power Panel 300/400	PP300/400
Power Panel 500	PP500
Automation Panel 900	AP900
Automation Panel 1000	AP1000
Panel PC 700	PPC700
Panel PC 800	PPC800

Table 48: Shortened product names

2.2.6.1 Compatibility overview

The following table provides an overview of PP100/200, PP300/400, PP500, AP900, AP1000, PPC700 and PPC800 devices. For more information, see section ["Compatibility details"](#).

Information:

The cutout tolerance for PP100/200, PP300/400, PP500, AP900, PPC700 and PPC800 systems is ± 0.5 mm.

The cutout tolerance for the AP1000 is $+0$ mm / -0.5 mm.

Compatibility between device types is represented on each line by matching symbols.

Diagonal	Format		PP100/200	PP300/400	PP500	AP900	AP1000 ¹⁾	PPC700	PPC800
5.7"	Horizontal1	Outer dimensions	■ 212 x 156	■ 212 x 156	■ 212 x 156	-	■ 212 x 156	-	-
		Installation dimensions	● 199 x 143	● 199 x 143	● 199 x 143	-	● 199 x 143	-	-
	Horizontal2	Outer dimensions	■ 302 x 187	■ 302 x 187	■ 302 x 187	-	-	-	-
		Installation dimensions	● 289 x 174	● 289 x 174	● 289 x 174	-	-	-	-
	Vertical1	Outer dimensions	■ 212 x 245	■ 212 x 245	■ 212 x 245	-	■ 212 x 245	-	-
		Installation dimensions	● 199 x 226.8	● 199 x 226.8	▲ 199 x 232	-	▲ 199 x 232	-	-
7"	Horizontal1	Outer dimensions	-	-	■ 212 x 156	-	■ 212 x 156	-	-
		Installation dimensions	-	-	▲ 199 x 143	-	▲ 199 x 143	-	-
10.4"	Horizontal1	Outer dimensions	■ 323 x 260	■ 323 x 260	■ 323 x 260	■ 323 x 260	■ 323 x 260	■ 323 x 260	-
		Installation dimensions	● 303 x 243	● 303 x 243	● 303 x 243	● 303 x 243	● 303 x 243	● 303 x 243	-
	Horizontal2	Outer dimensions	■ 423 x 288	■ 423 x 288	■ 423 x 288	■ 423 x 288	■ 423 x 288	■ 423 x 288	-
		Installation dimensions	● 402 x 266.5	● 402 x 266.5	▲ 403 x 271	□ 402 x 271	▲ 403 x 271	□ 402 x 271	-
	Vertical1	Outer dimensions	■ 323 x 358	■ 323 x 358	■ 323 x 358	■ 323 x 358	■ 323 x 358	■ 323 x 358	-
		Installation dimensions	● 303 x 336	● 303 x 336	▲ 303 x 341	▲ 303 x 341	▲ 303 x 341	▲ 303 x 341	-

Table 49: Overview of device compatibility

Technical data

Diagonal	Format		PP100/200	PP300/400	PP500	AP900	AP1000 ¹⁾	PPC700	PPC800
12.1"	Horizontal1	Outer dimensions	■ 362 x 284	■ 362 x 284	■ 362 x 284	■ 362 x 284	■ 362 x 284	■ 362 x 284	-
		Installation dimensions	● 345 x 267	● 345 x 267	▲ 342 x 267	▲ 342 x 267	▲ 342 x 267	▲ 342 x 267	-
15"	Horizontal1	Outer dimensions	■ 435 x 330	■ 435 x 330	■ 435 x 330	■ 435 x 330	■ 435 x 330	■ 435 x 330	■ 435 x 330
		Installation dimensions	● 415 x 312	● 415 x 312	▲ 415 x 313	● 415 x 312	▲ 415 x 313	● 415 x 312	● 415 x 312
	Vertical1	Outer dimensions	■ 435 x 430	■ 435 x 430	■ 435 x 430	■ 435 x 430	-	■ 435 x 430	-
		Installation dimensions	● 415 x 412	● 415 x 412	▲ 415 x 413	● 415 x 412	-	● 415 x 412	-
	Horizontal1	Outer dimensions	-	-	-	■ 477 x 390	-	■ 477 x 390	-
		Installation dimensions	-	-	-	▲ 460 x 373	-	▲ 460 x 373	-
19"	Horizontal1	Outer dimensions	-	-	-	■ 527 x 421	■ 527 x 421	■ 527 x 421	■ 527 x 421
		Installation dimensions	-	-	-	▲ 510 x 404	▲ 510 x 404	▲ 510 x 404	▲ 510 x 404
21.3"	Horizontal1	Outer dimensions	-	-	-	■ 583 x 464	-	-	-
		Installation dimensions	-	-	-	▲ 566 x 447	-	-	-

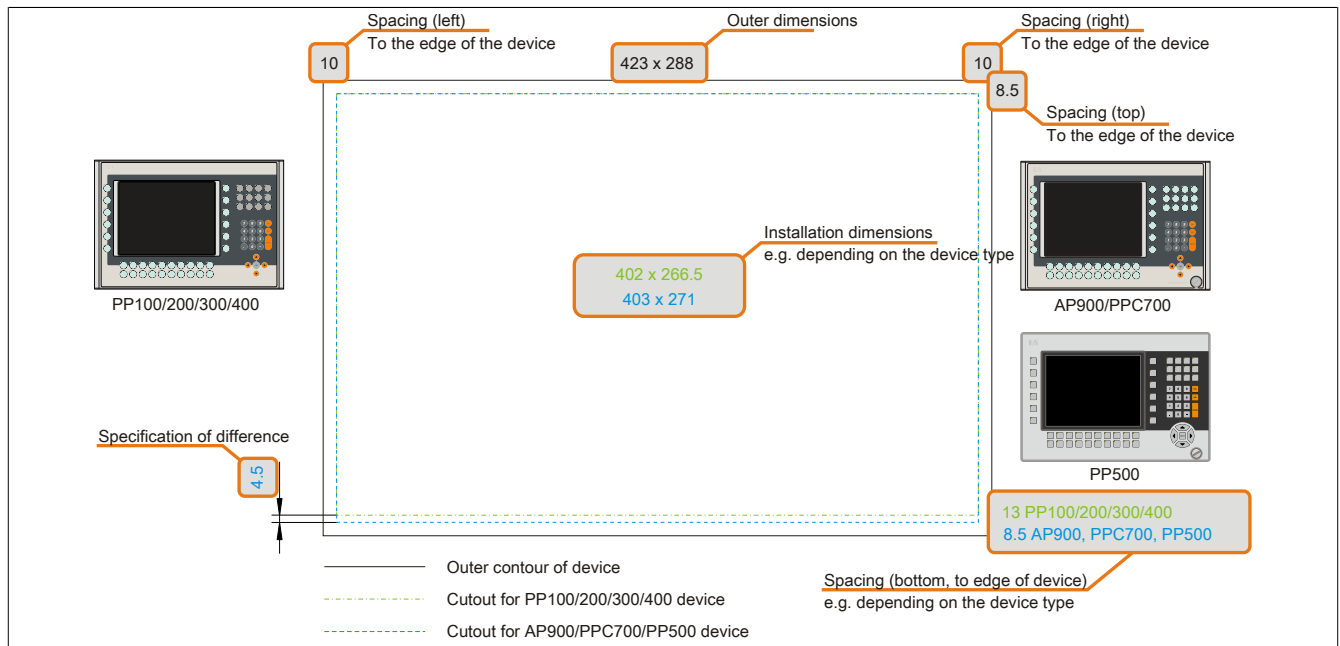
Table 49: Overview of device compatibility

- 1) The device name "AP1000" refers to the Automation Panel 1000 as well as Panel PC 900 and Panel PC 2100 systems with an installed AP1000 panel.

2.2.6.2 Compatibility details

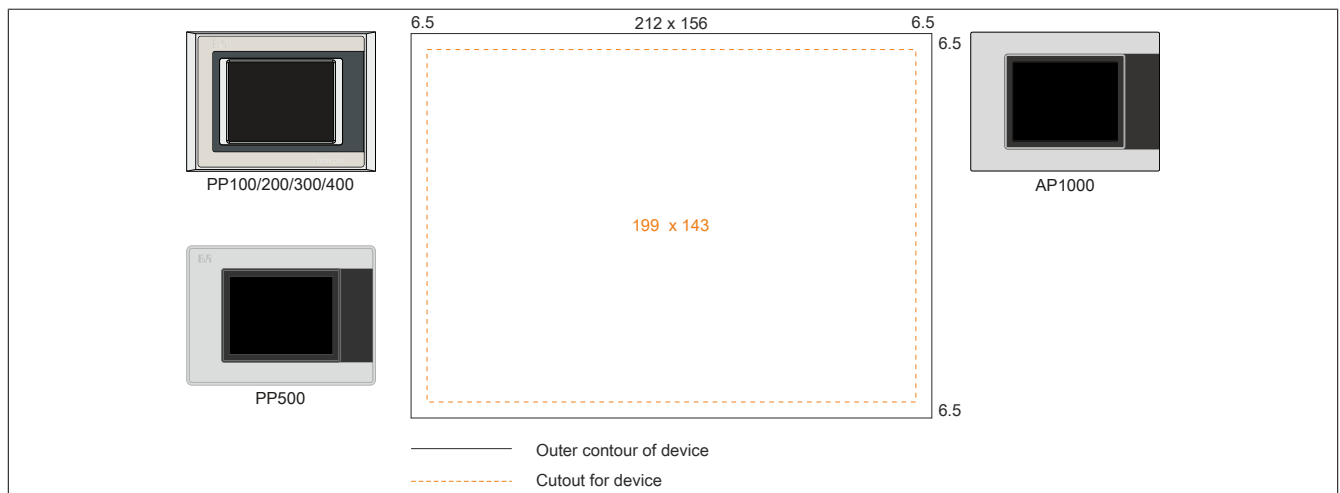
2.2.6.2.1 Example

The measurement values (all in mm) and information in the following figure also apply to the other figures below.



2.2.6.2.2 5.7" devices

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



5.7" Automation Panel 1000, Power Panel 500 devices and Power Panel 100/200/300/400 devices are 100% mounting compatible in the Horizontal1 format.

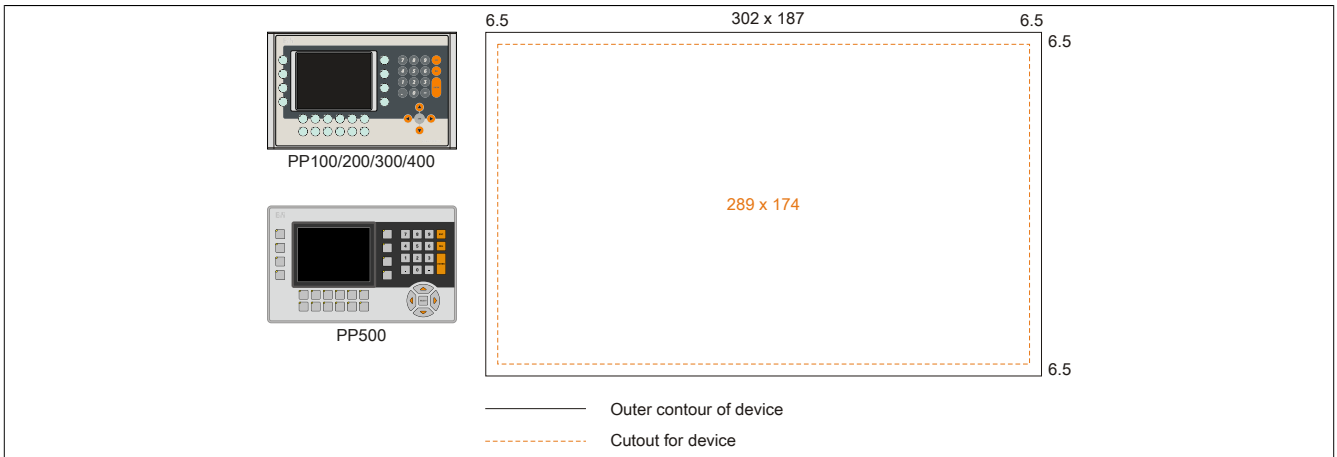


Figure 33: Mounting compatibility - 5.7" device - Horizontal2

5.7" Power Panel 500 devices and Power Panel 100/200/300/400 devices are 100% mounting compatible in the Horizontal2 format.

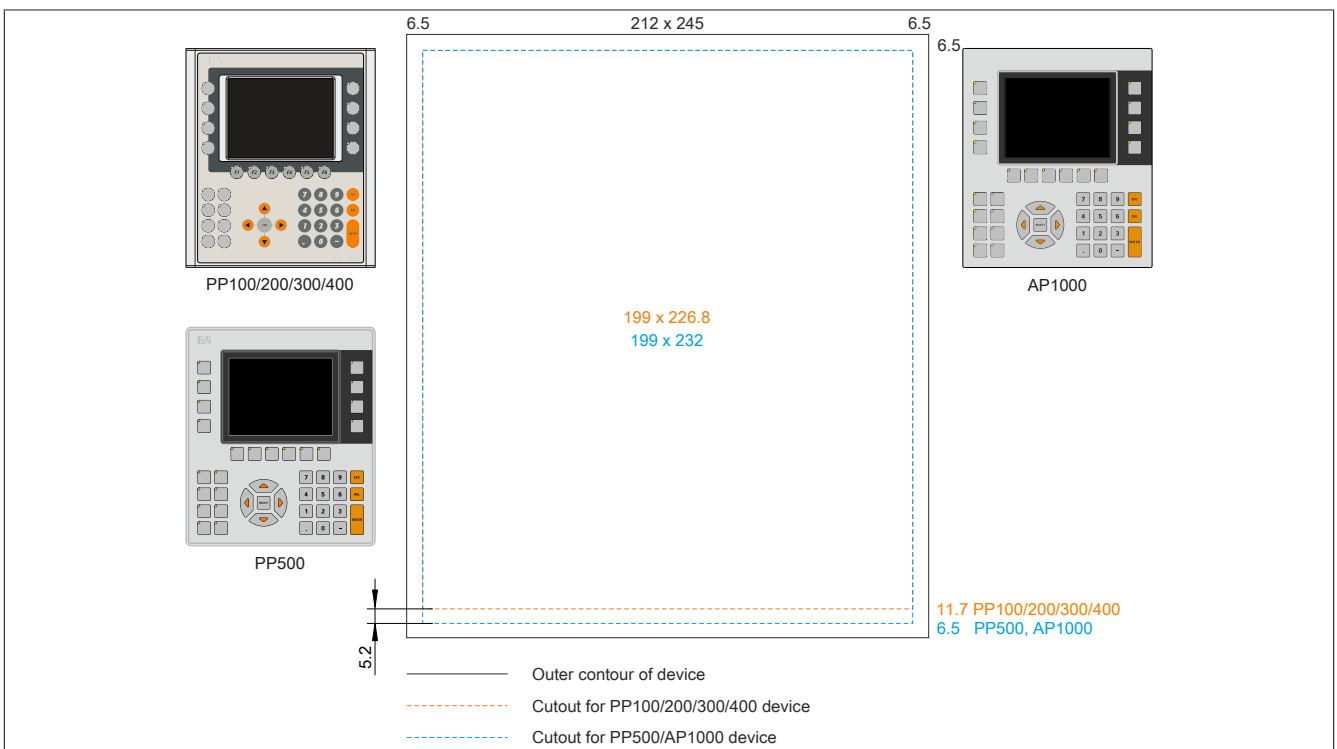


Figure 34: Mounting compatibility - 5.7" device - Vertical1

5.7" Automation Panel 1000 and Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in the Vertical1 format. Automation Panel 1000 and Power Panel 500 devices require a cutout that is 5.2 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a solid seal is no longer guaranteed by the gasket (IP65).

2.2.6.2.3 10.4" devices

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

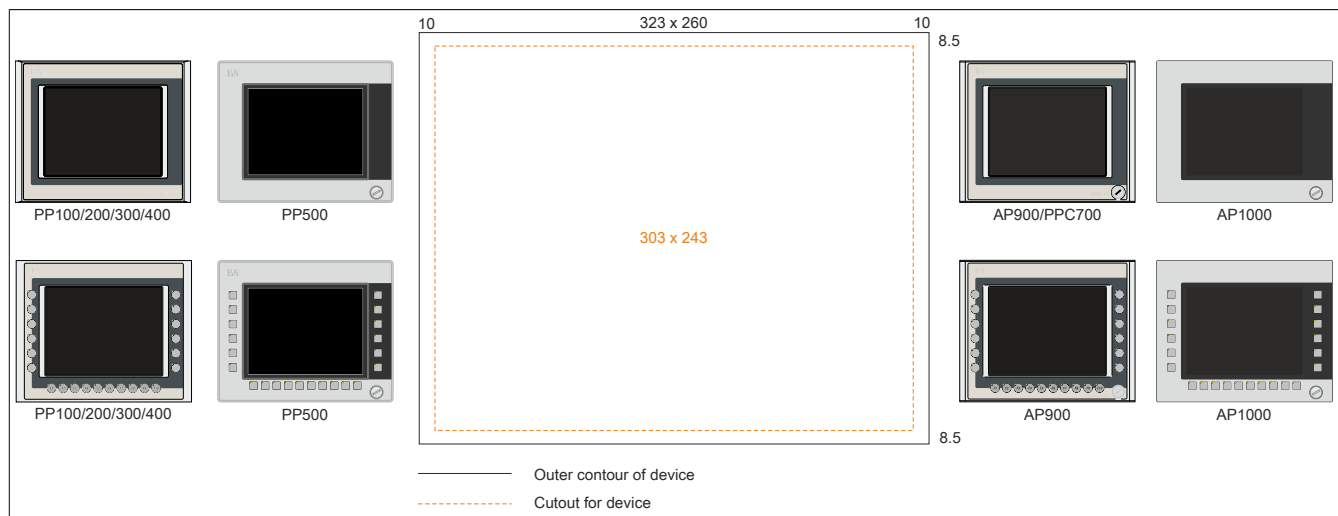


Figure 35: Mounting compatibility - 10.4" device - Horizontal1

10.4" Automation Panel 1000, Automation Panel 900, Panel PC 700, Power Panel 500 devices and Power Panel 100/200/300/400 devices are 100% mounting compatible in Horizontal1 format.

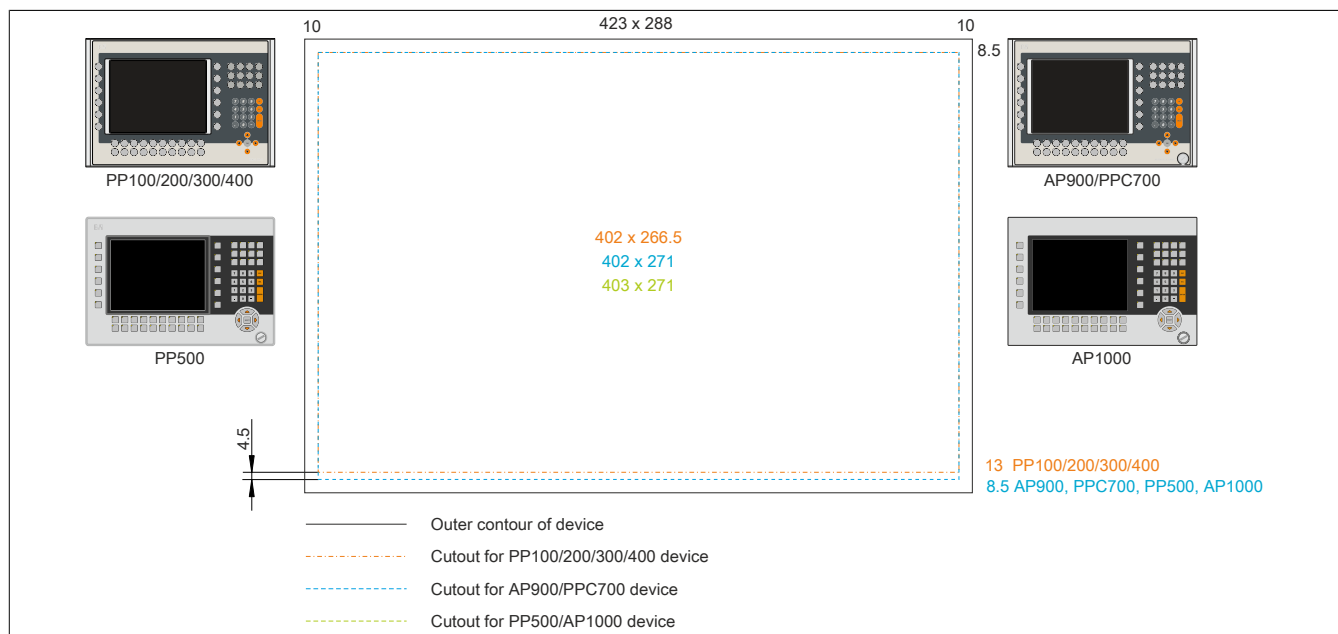


Figure 36: Mounting compatibility - 10.4" device - Horizontal2

10.4" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Horizontal2 format. Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices require a cutout that is 4.5 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a solid seal is no longer guaranteed by the gasket (IP65).

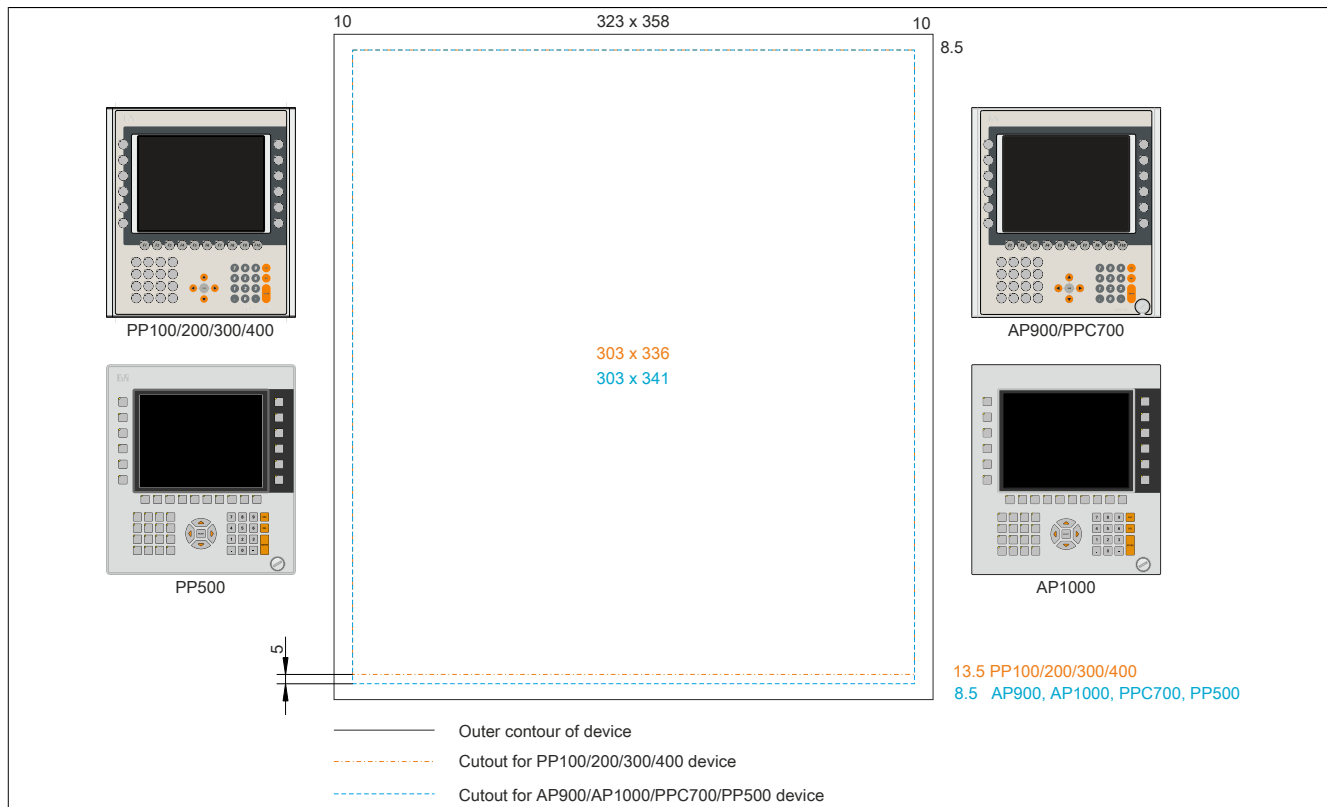


Figure 37: Mounting compatibility - 10.4" device - Vertical1

10.4" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Vertical1 format. Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices require a cutout that is 5 mm higher (bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200/300/400 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a solid seal is no longer guaranteed by the gasket (IP65).

2.2.6.2.4 12.1" devices

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

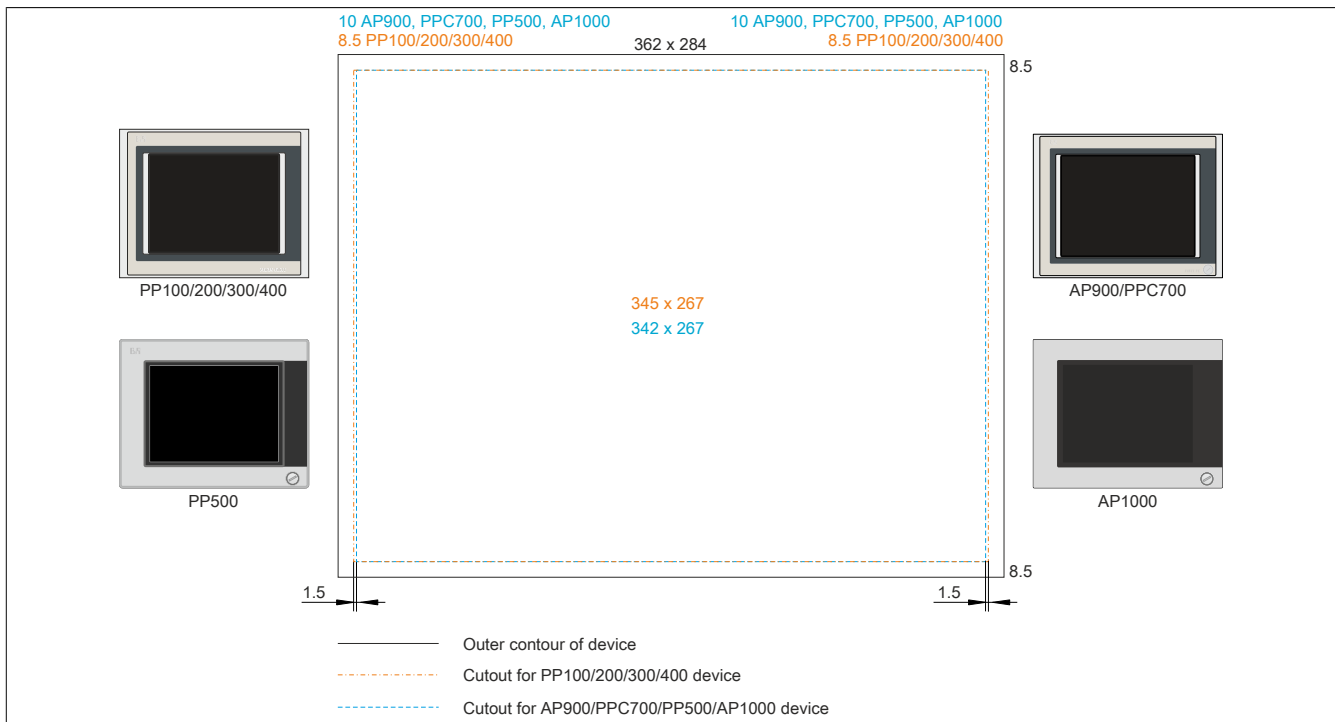


Figure 38: Mounting compatibility - 12.1" device - Horizontal1

12.1" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400 devices in Horizontal1 format. The Power Panel 300/400 and Power Panel 100/200 devices require a cut that is 1.5 mm wider (left and right).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the AP1000, AP900, PPC700 and PP500 devices are placed and mounted as close to the center of the cutout as possible.

2.2.6.2.5 15" devices

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

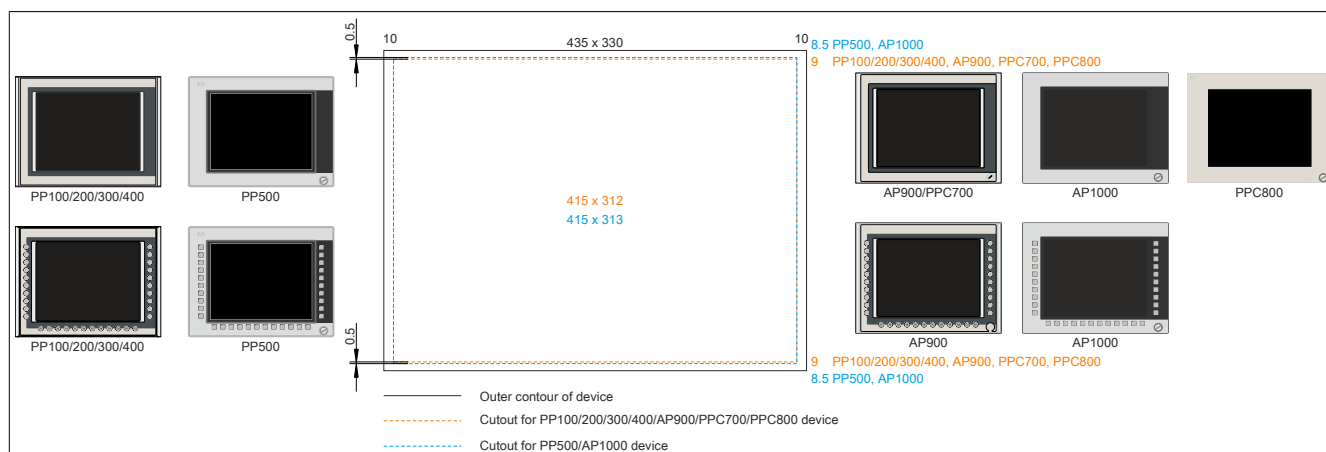


Figure 39: Mounting compatibility - 15" device - Horizontal1

15" Automation Panel 1000 and Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400, Automation Panel 900, Panel PC 700 and Panel PC 800 devices in the Vertical1 format. Automation Panel 1000 and Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200, PP300/400, AP900, PPC700 and PPC800 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a solid seal is no longer guaranteed by the gasket (IP65).

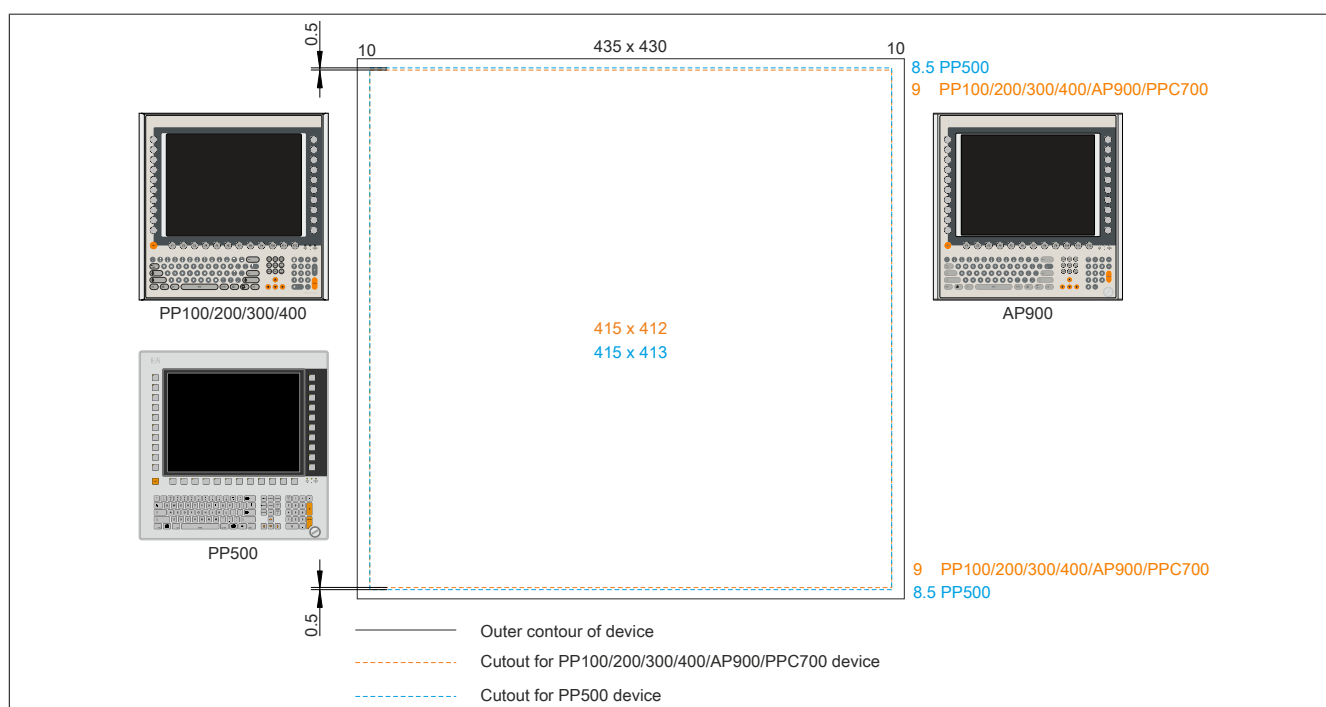


Figure 40: Mounting compatibility - 15" device - Vertical1

15" Power Panel 500 devices are not 100% mounting compatible with Power Panel 100/200/300/400, Automation Panel 900 and Panel PC 700 devices in the Vertical1 format. The Power Panel 500 devices require a cutout that is 0.5 mm higher (top and bottom edge).

The larger cutout can be used for all devices under certain conditions:

- When mounting, make sure that the PP100/200, PP300/400, AP900 and PPC700 devices are placed and mounted as close to the center of the cutout as possible. Failure to do so can prevent the retaining clips from holding firmly, which means that a solid seal is no longer guaranteed by the gasket (IP65).

2.2.6.2.6 17" devices

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

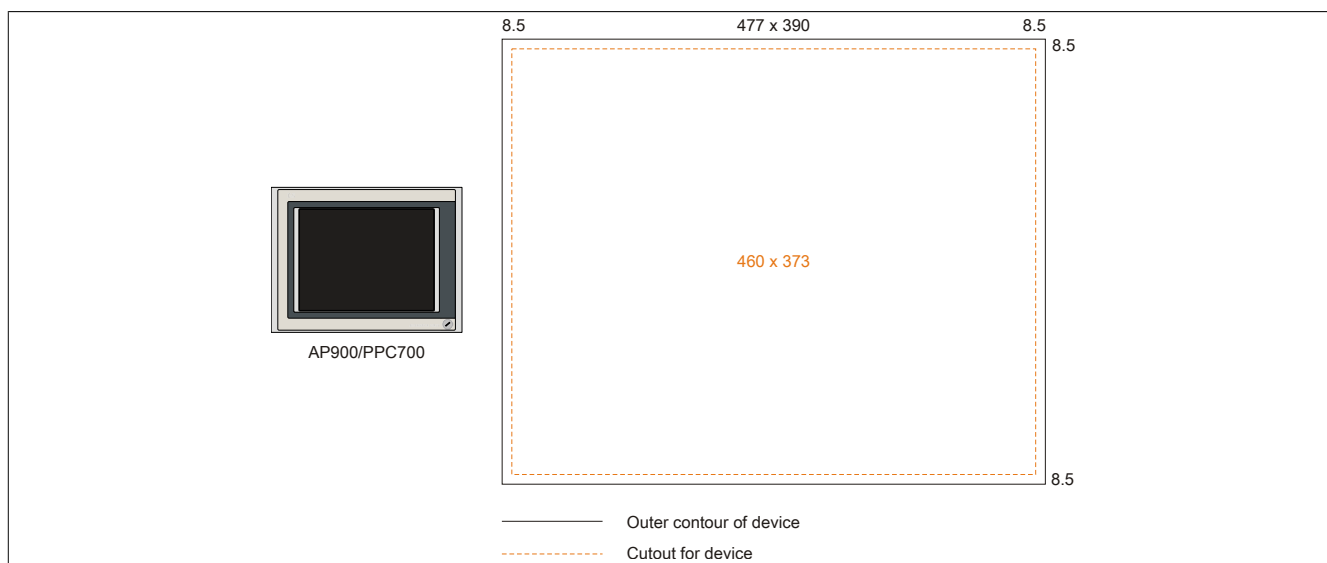


Figure 41: Mounting compatibility - 17" device - Horizontal1

17" Automation Panel 900 devices are 100% mounting compatible with Panel PC 700 devices in the Horizontal1 format.

2.2.6.2.7 19" devices

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

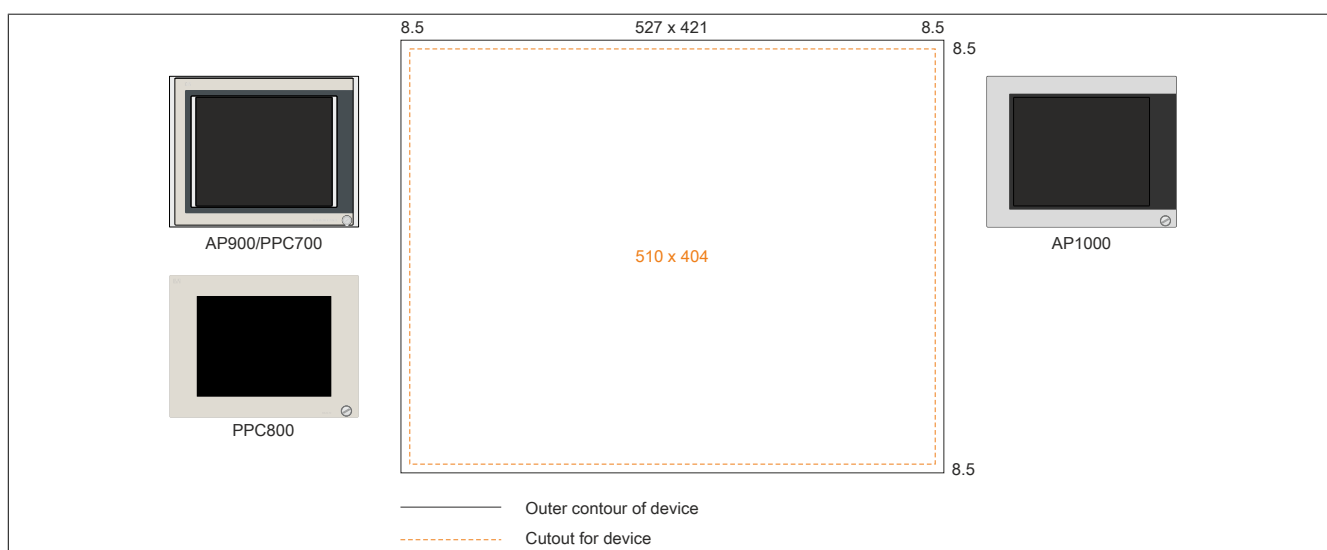


Figure 42: Mounting compatibility - 19" device - Horizontal1

19" Automation Panel 1000, Automation Panel 900, Panel PC 700 and Panel PC 800 are 100% mounting compatible in the Horizontal1 format.

2.2.6.2.8 21.3" devices

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

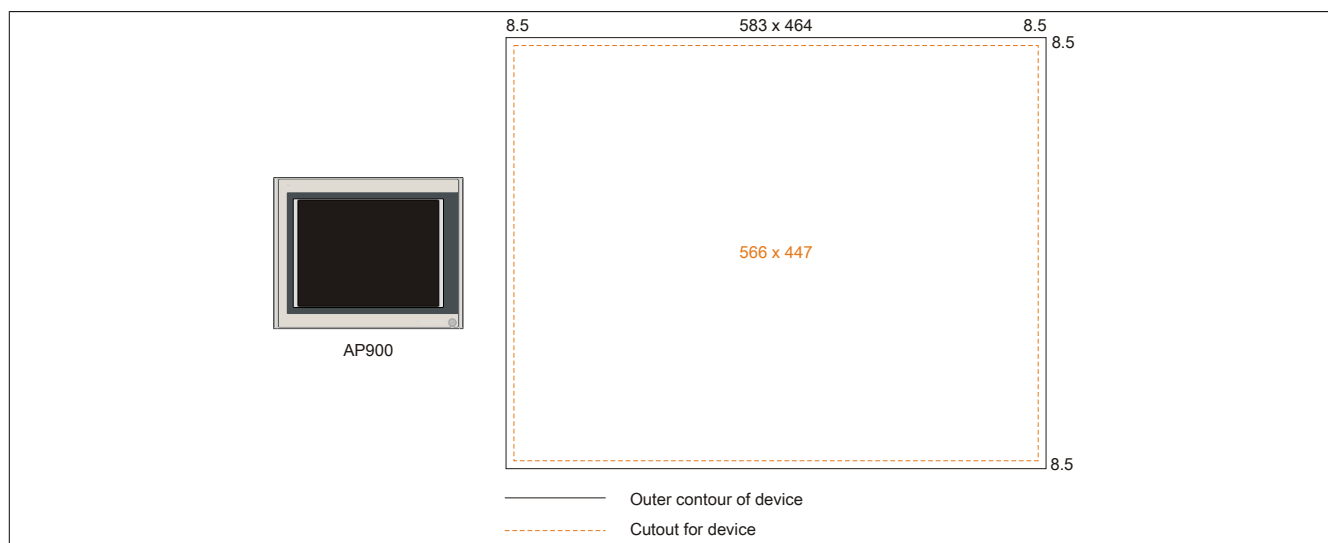


Figure 43: Mounting compatibility - 21.3" device - Horizontal1

2.3 Individual components

2.3.1 AP9x3 panels

2.3.1.1 5AP923.1215-00

2.3.1.1.1 General information

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

2.3.1.1.2 Order data


Model number	Short description	Figure
5AP923.1215-00	Panels 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	

Table 50: 5AP923.1215-00 - Order data

2.3.1.1.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP923.1215-00
General information	
B&R ID code	0xE1B0
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°
Backlight	
Type	LED
Brightness (dimnable)	Typ. 25 to 500 cd/m ²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 51: 5AP923.1215-00 - Technical data

Model number	5AP923.1215-00
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front	
Frame	Aluminum, coated
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	315 mm
Height	239 mm
Weight	2200 g

Table 51: 5AP923.1215-00 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

2.3.1.1.4 Dimensions

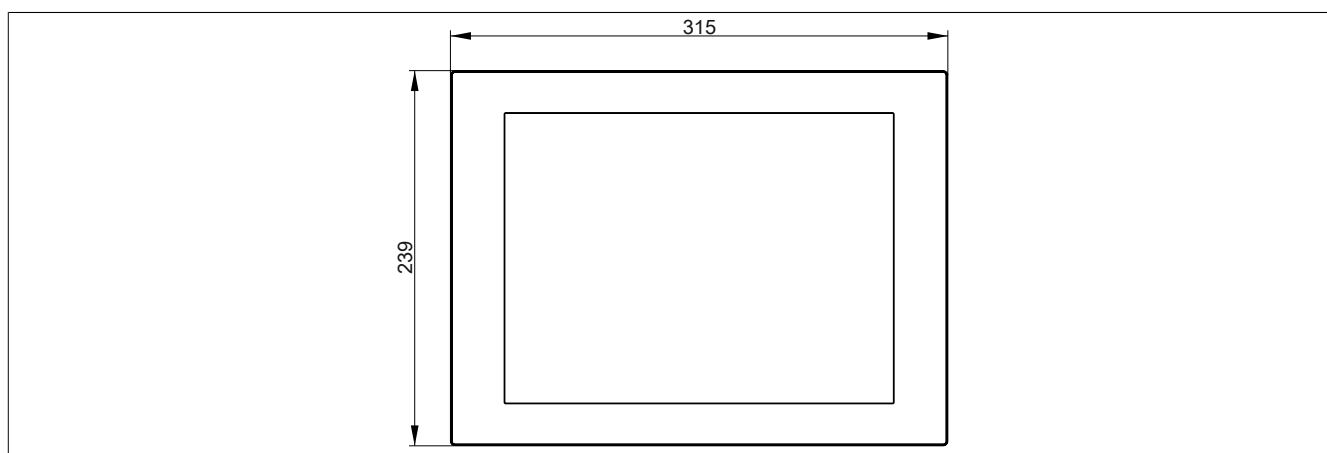


Figure 44: 5AP923.1215-00 - Dimensions

2.3.1.1.5 Temperature/Humidity diagram

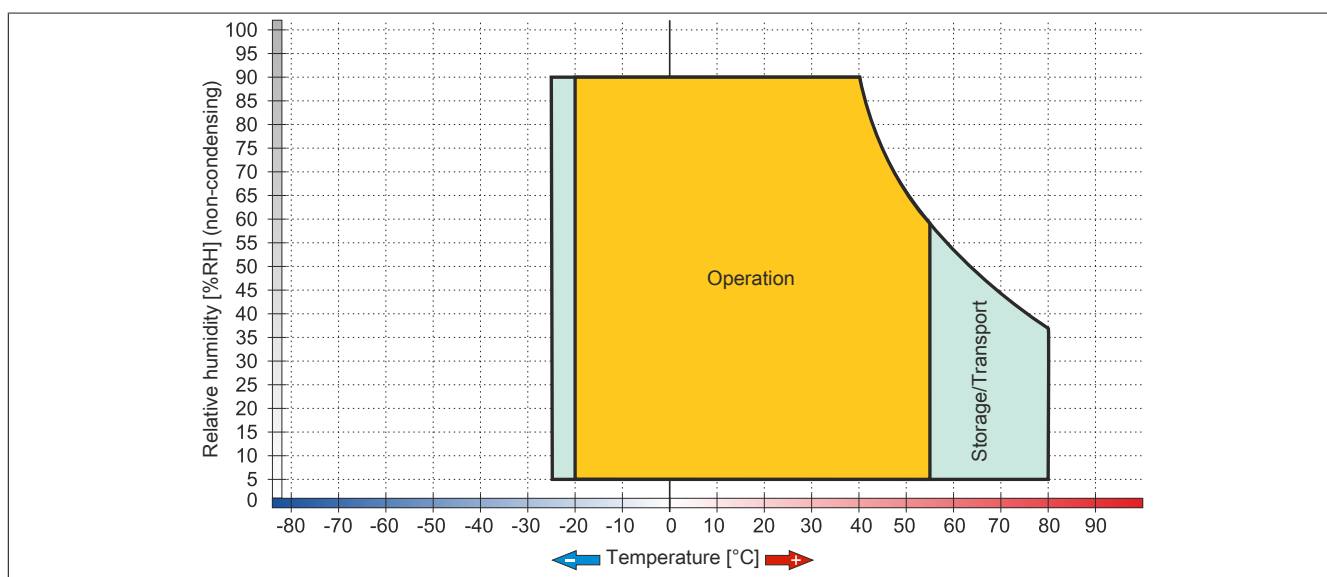


Figure 45: 5AP923.1215-00 - Temperature/Humidity diagram

2.3.1.2 5AP923.1505-00

2.3.1.2.1 General information

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

2.3.1.2.2 Order data


Model number	Short description	Figure
5AP923.1505-00	Panels	
	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	

Table 52: 5AP923.1505-00 - Order data

2.3.1.2.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP923.1505-00
General information	
B&R ID code	0xE169
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾
GOST-R	Yes
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimable)	Typ. 20 to 400 cd/m ²
Half-brightness time ³⁾	50,000 h
Touch screen ⁴⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 53: 5AP923.1505-00 - Technical data

Model number	5AP923.1505-00
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front	
Frame	Aluminum, coated
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	370 mm
Height	288 mm
Weight	3700 g

Table 53: 5AP923.1505-00 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 3) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 4) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

2.3.1.2.4 Dimensions

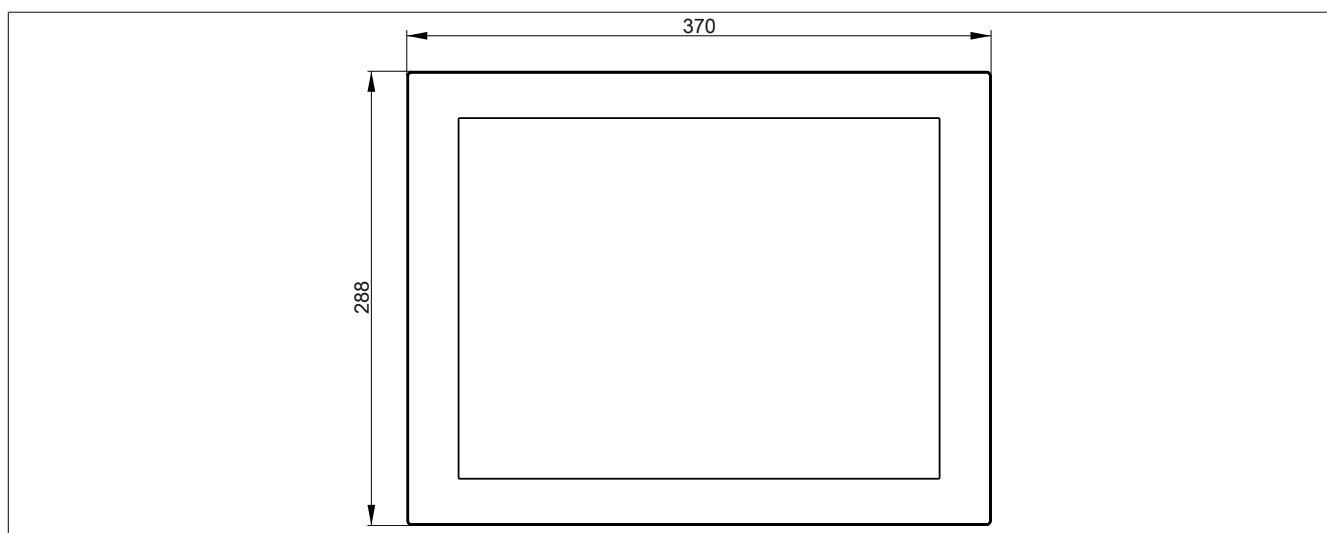


Figure 46: 5AP923.1505-00 - Dimensions

2.3.1.2.5 Temperature/Humidity diagram

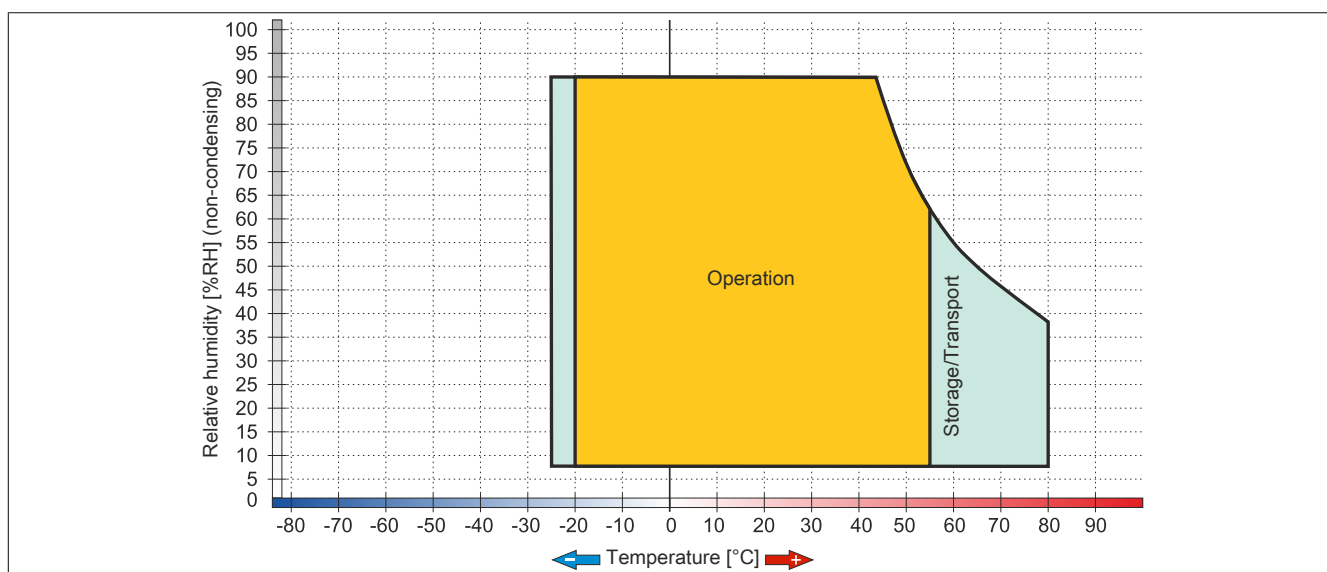


Figure 47: 5AP923.1505-00 - Temperature/Humidity diagram

2.3.1.3 5AP923.1906-00

2.3.1.3.1 General information

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

2.3.1.3.2 Order data


Model number	Short description	Figure
5AP923.1906-00	Panels 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	

Table 54: 5AP923.1906-00 - Order data

2.3.1.3.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP923.1906-00	
Revision	D0	E0
General information		
B&R ID code	0xE1B1	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾	
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 (dimnable)	Typ. 30 to 300 cd/m²	Typ. 35 to 350 cd/m²
Half-brightness time ²⁾	50,000 h	70,000 h
Touch screen ³⁾		
Type	AMT	
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)	
Protection per UL 50	Front: Type 4X indoor use only	

Table 55: 5AP923.1906-00, 5AP923.1906-00 - Technical data

Model number	5AP923.1906-00	
Revision	D0	E0
Mechanical properties		
Front		
Frame	Aluminum, coated	
Keypad overlay		
Material	Polyester	
Light background	RAL 9006	
Dark gray border around display	RAL 7024	
Gasket	3 mm built-in gasket	
Dimensions		
Width	440 mm	
Height	358 mm	
Weight	5800 g	

Table 55: 5AP923.1906-00, 5AP923.1906-00 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

2.3.1.3.4 Dimensions

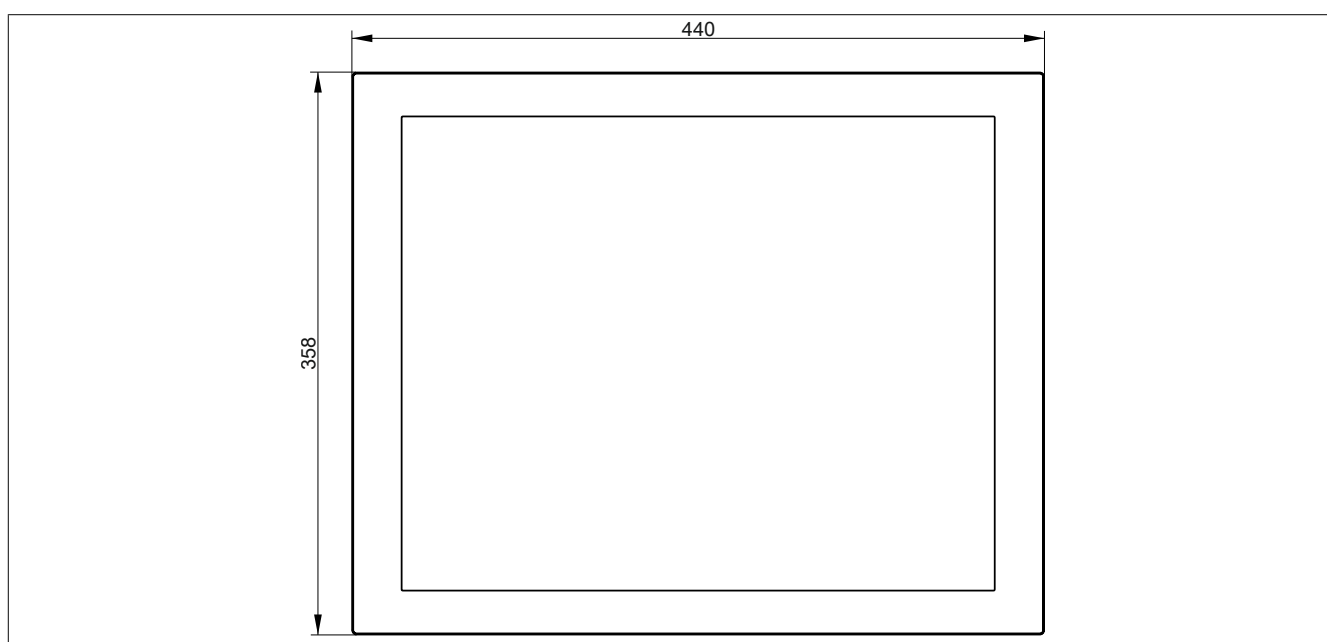


Figure 48: 5AP923.1906-00 - Dimensions

2.3.1.3.5 Temperature/Humidity diagram

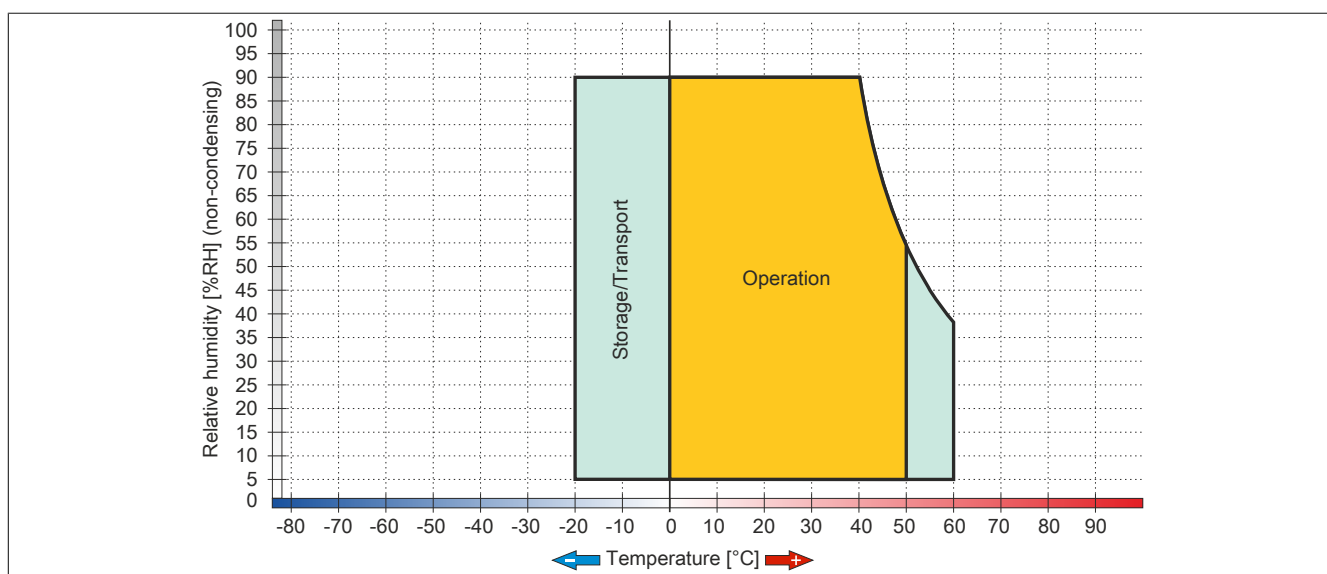


Figure 49: 5AP923.1906-00 ≤Rev. D0 - Temperature/Humidity diagram



Figure 50: 5AP923.1906-00 ≥Rev. E0 - Temperature/Humidity diagram

2.3.1.4 5AP933.156B-00

2.3.1.4.1 General information

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

2.3.1.4.2 Order data


Model number	Short description	Figure
5AP933.156B-00	Panels	
	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	

Table 56: 5AP933.156B-00 - Order data

2.3.1.4.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP933.156B-00	
Revision	C0	D0
General information		
B&R ID code	0xE16A	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
GOST-R	Yes	
Display		
Type	TFT color	
Diagonal	15.6"	
Colors	16.7 million	
Resolution	HD, 1366 × 768 pixels	
Contrast	500:1	1000:1
Viewing angles		
Horizontal	Direction R = 85° / Direction L = 85°	
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 85° / Direction D = 85°
Backlight		
Type	LED	
Brightness (dimnable)	Typ. 15 to 300 cd/m²	Typ. 40 to 400 cd/m²
Half-brightness time ¹⁾	50,000 h	70,000 h
Touch screen		
Type	3M	
Technology	Projected capacitive touch (PCT)	
Controller	3M	
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)	
Protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm built-in gasket	

Table 57: 5AP933.156B-00, 5AP933.156B-00 - Technical data

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

Table 57: 5AP933.156B-00, 5AP933.156B-00 - Technical data

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

2.3.1.4.4 Dimensions

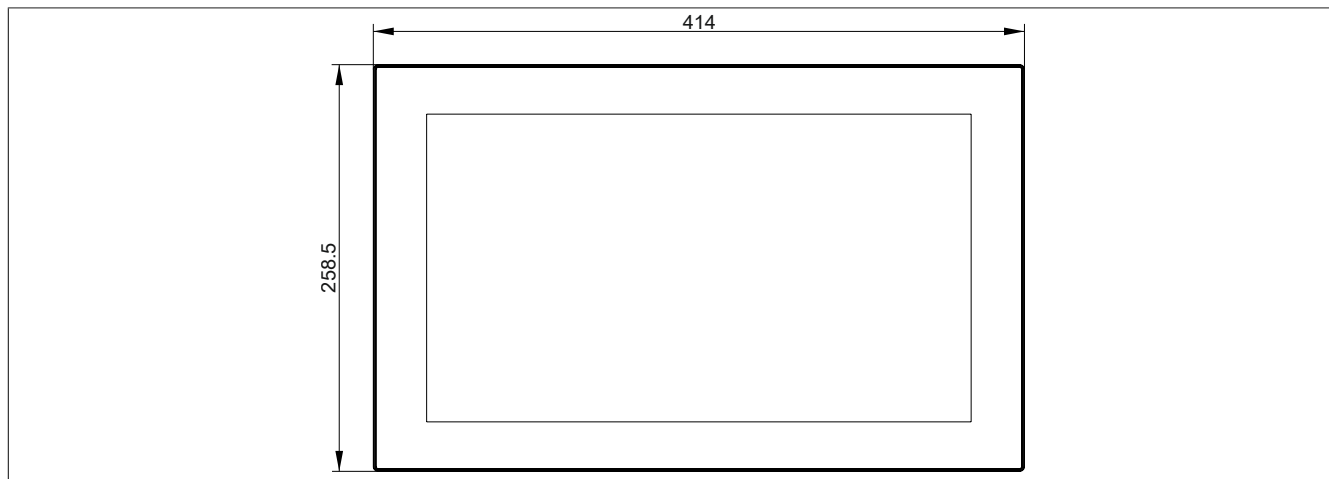


Figure 51: 5AP933.156B-00 - Dimensions

2.3.1.4.5 Temperature/Humidity diagram

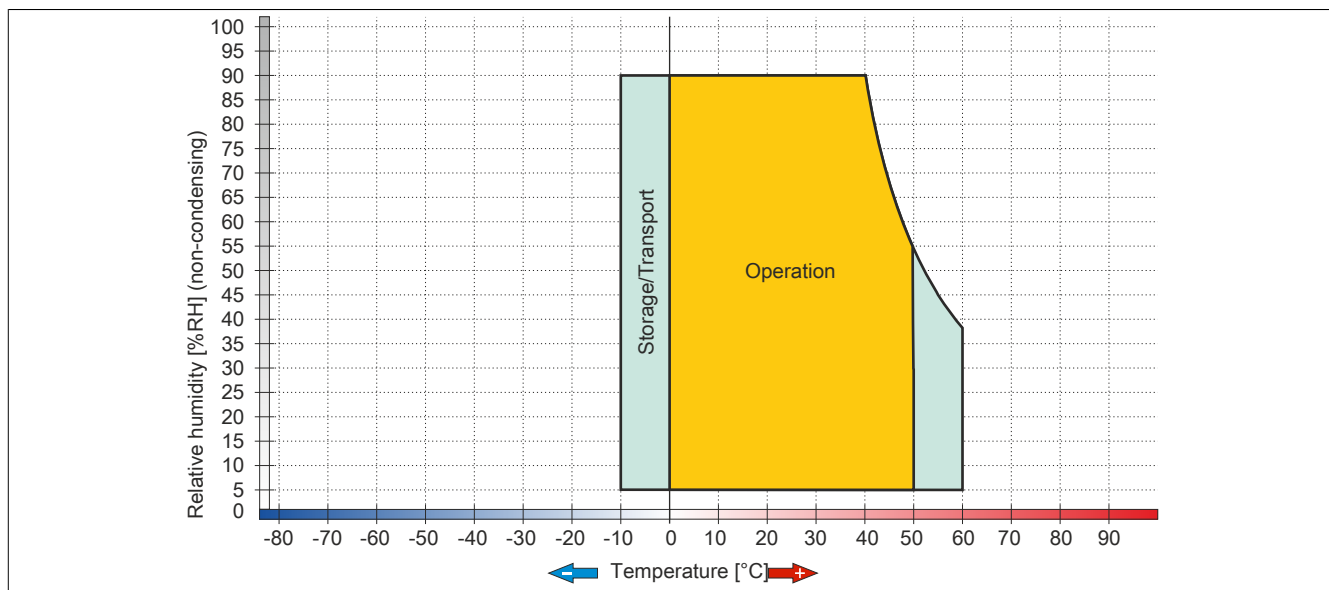


Figure 52: 5AP933.156B-00 ≤C0 - Temperature/Humidity diagram

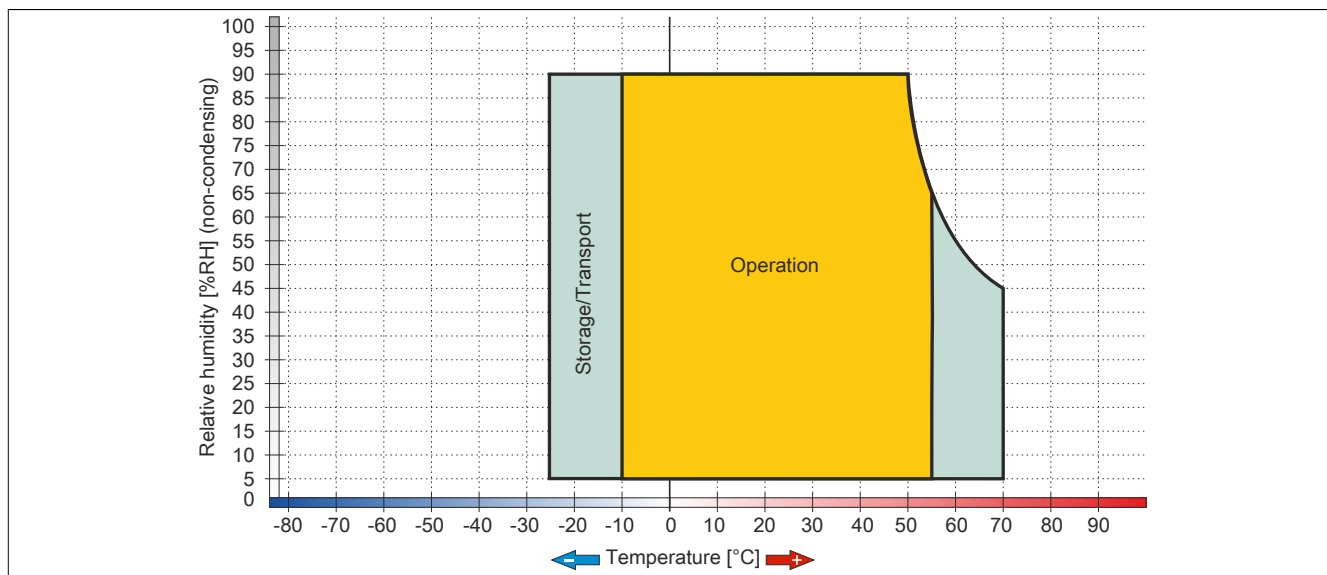


Figure 53: 5AP933.156B-00 ≥D0 - Temperature/Humidity diagram

2.3.1.5 5AP933.185B-00

2.3.1.5.1 General information

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

2.3.1.5.2 Order data

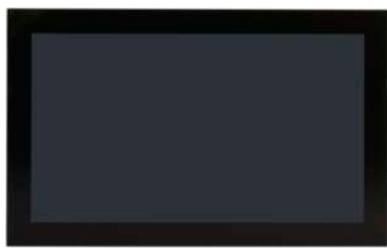
Model number	Short description	Figure
5AP933.185B-00	Panels	
	Automation Panel 18.5" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 58: 5AP933.185B-00 - Order data

2.3.1.5.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP933.185B-00	
Revision	C0	D0
General information		
B&R ID code	0xE16B	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
GOST-R	Yes	
Display		
Type	TFT color	
Diagonal	18.5"	
Colors	16.7 million	
Resolution	HD, 1366 × 768 pixels	
Contrast	1000:1	
Viewing angles		
Horizontal	Direction R = 85° / Direction L = 85°	
Vertical	Direction U = 80° / Direction D = 80°	
Backlight		
Type	LED	
Brightness (dimnable)	Typ. 15 to 300 cd/m²	
Half-brightness time ¹⁾	50,000 h	
Touch screen		
Type	3M	
Technology	Projected capacitive touch (PCT)	
Controller	3M	
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)	
Protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm built-in gasket	

Table 59: 5AP933.185B-00, 5AP933.185B-00 - Technical data

Technical data

Model number	5AP933.185B-00	
Revision	C0	D0
Dimensions		
Width	475 mm	
Height	295 mm	
Weight	4850 g	

Table 59: 5AP933.185B-00, 5AP933.185B-00 - Technical data

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

2.3.1.5.4 Dimensions

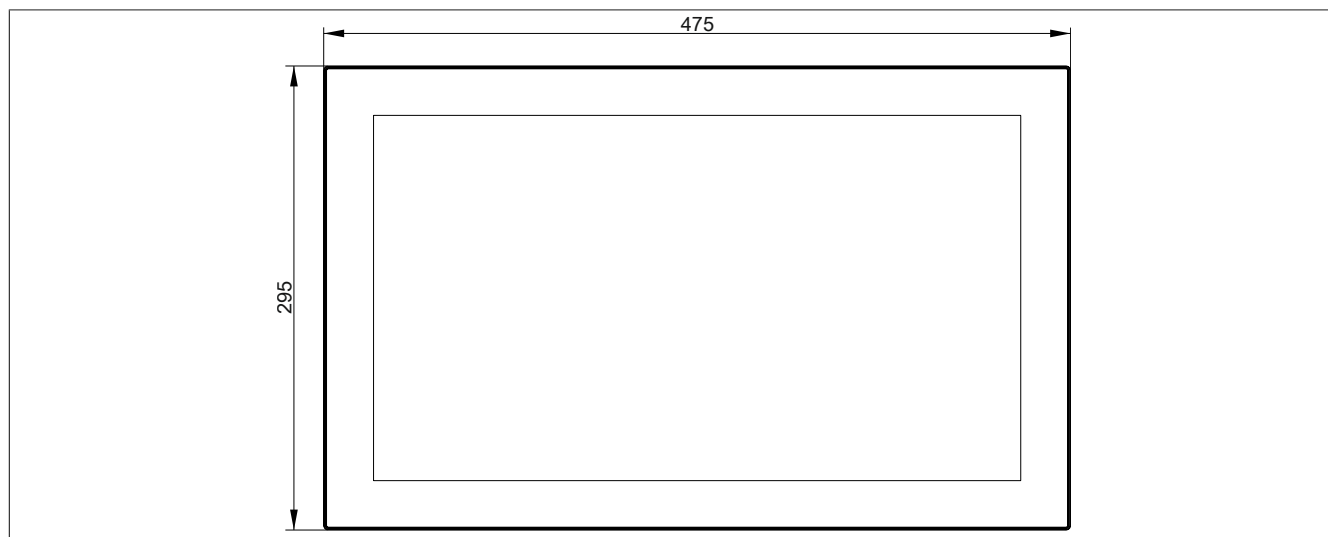


Figure 54: 5AP933.185B-00 - Dimensions

2.3.1.5.5 Temperature/Humidity diagram

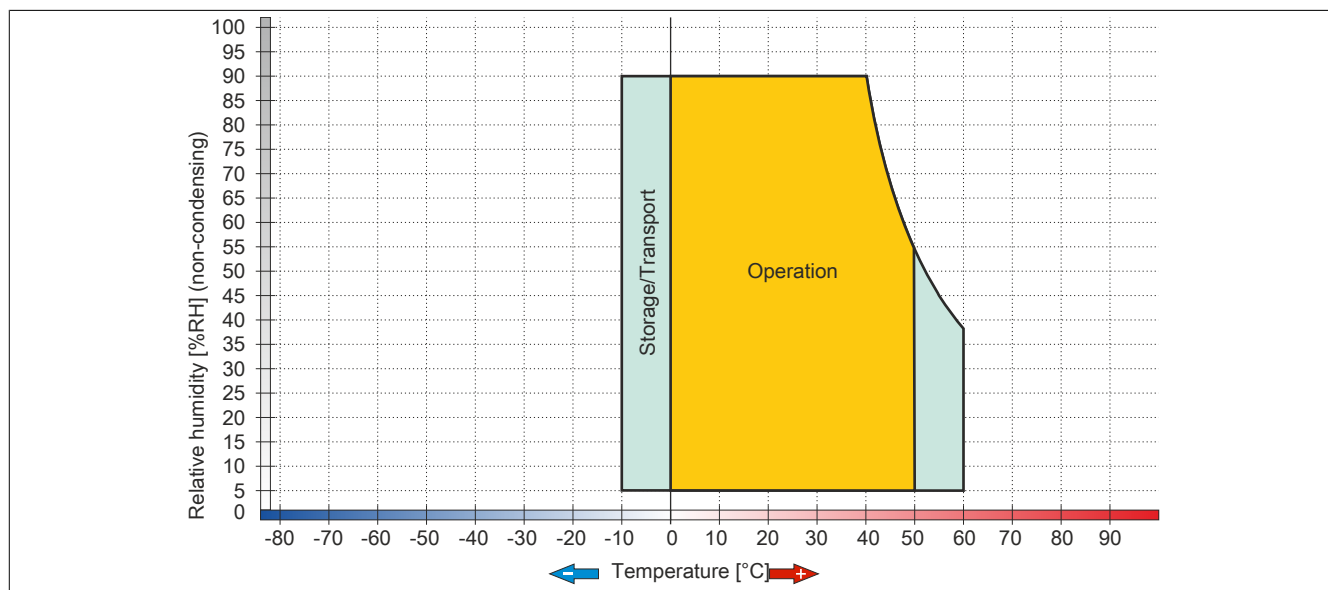


Figure 55: 5AP933.185B-00 ≤C0 - Temperature/Humidity diagram

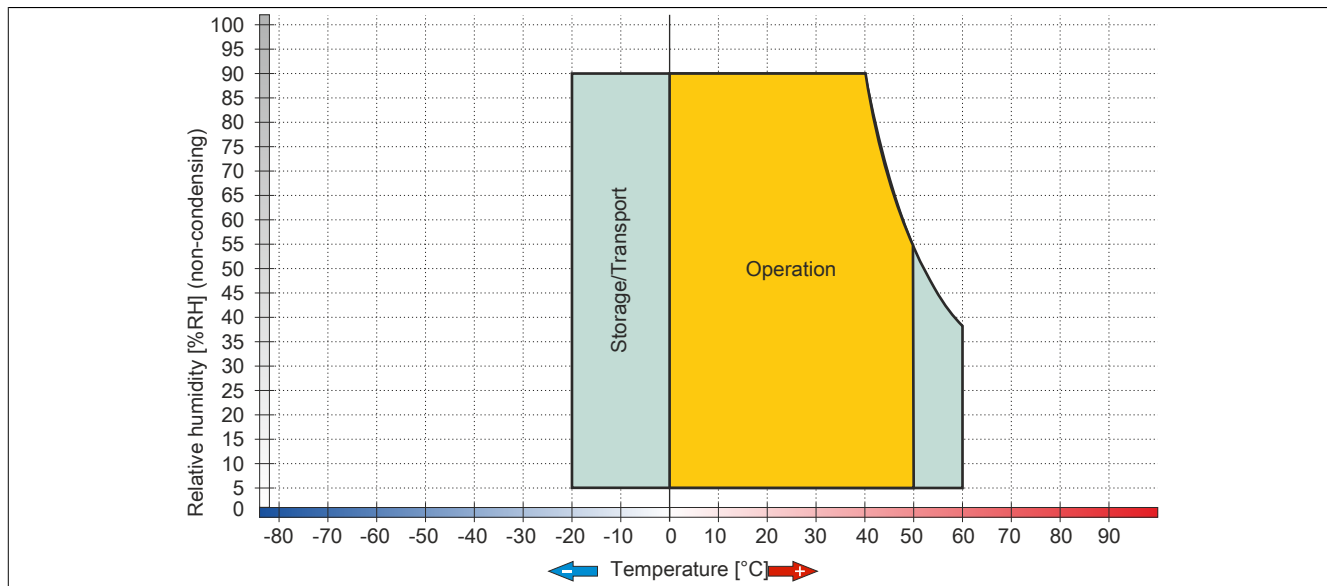


Figure 56: 5AP933.185B-00 ≥D0 - Temperature/Humidity diagram

2.3.1.6 5AP933.215C-00

2.3.1.6.1 General information

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

2.3.1.6.2 Order data

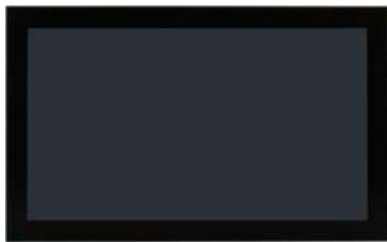
Model number	Short description	Figure
	Panels	
5AP933.215C-00	Automation Panel 21.5" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 60: 5AP933.215C-00 - Order data

2.3.1.6.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP933.215C-00	
Revision	C0	D0
General information		
B&R ID code	0xE16C	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
GOST-R	Yes	
Display		
Type	TFT color	
Diagonal	21.5"	
Colors	16.7 million	
Resolution	FHD, 1920 × 1080 pixels	
Contrast	1000:1	5000:1
Viewing angles		
Horizontal	Direction R = 89° / Direction L = 89°	
Vertical	Direction U = 89° / Direction D = 89°	
Backlight		
Type	LED	
Brightness (dimnable)	Typ. 12.5 to 250 cd/m²	
Half-brightness time ¹⁾	30,000 h	
Touch screen		
Type	3M	
Technology	Projected capacitive touch (PCT)	
Controller	3M	
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)	
Protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm built-in gasket	

Table 61: 5AP933.215C-00, 5AP933.215C-00 - Technical data

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

Table 61: 5AP933.215C-00, 5AP933.215C-00 - Technical data

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

2.3.1.6.4 Dimensions

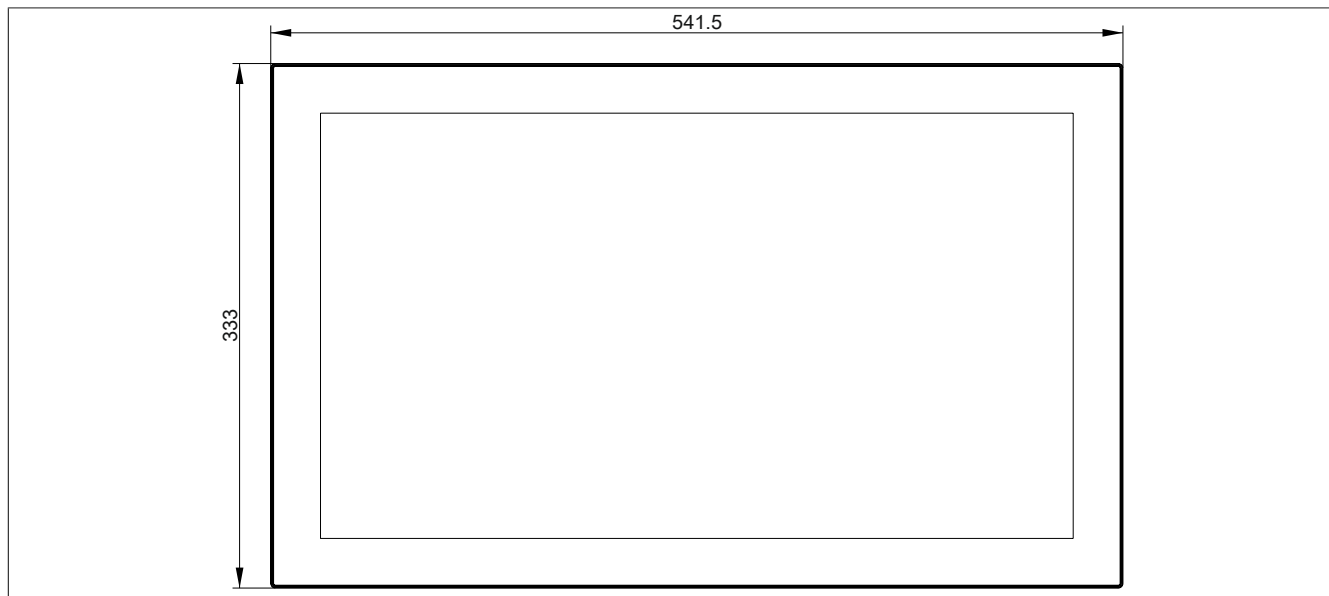


Figure 57: 5AP933.215C-00 - Dimensions

2.3.1.6.5 Temperature/Humidity diagram

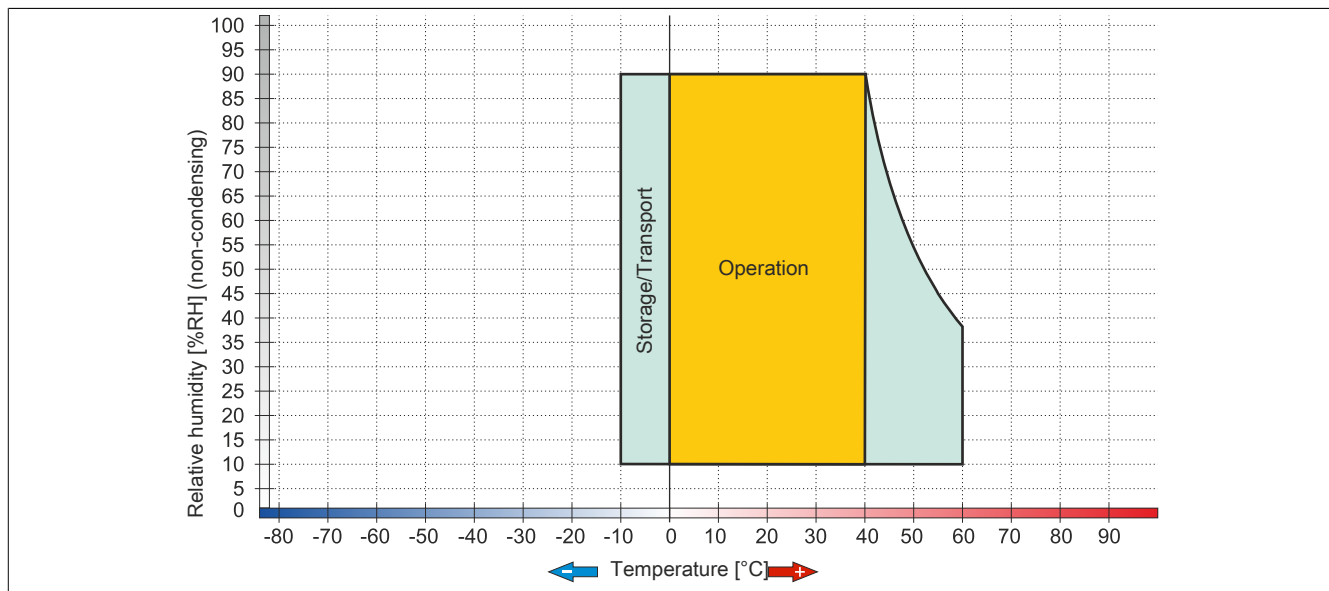


Figure 58: 5AP933.215C-00 ≤C0 - Temperature/Humidity diagrams

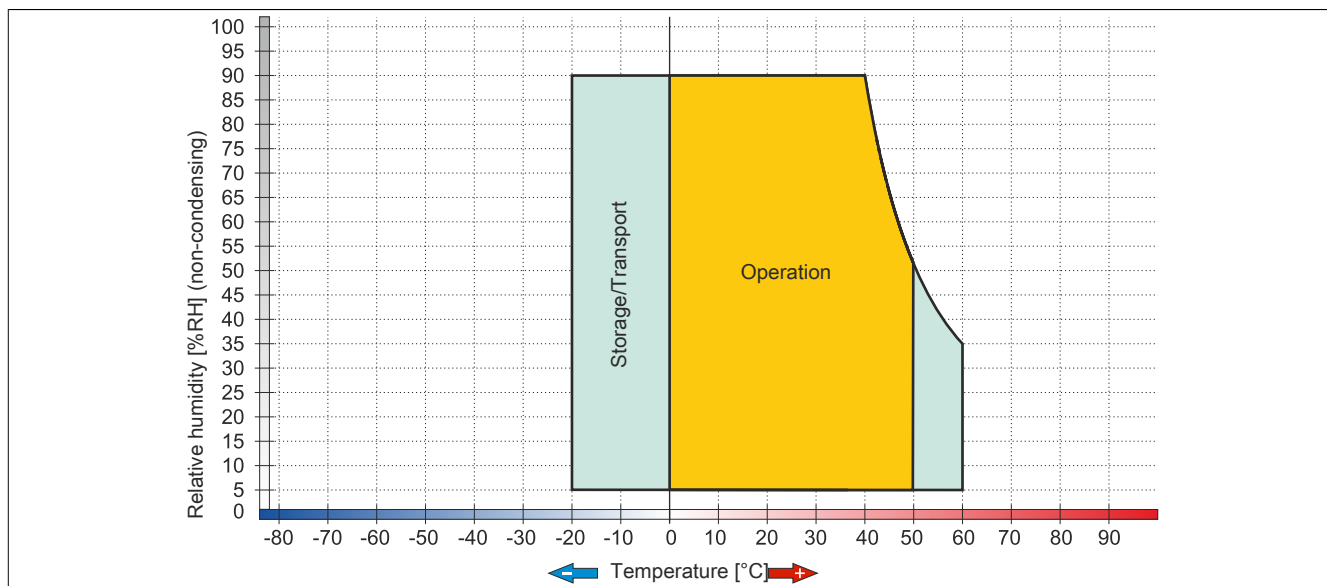


Figure 59: 5AP933.215C-00 ≥D0 - Temperature/Humidity diagrams

2.3.1.7 5AP933.240C-00

2.3.1.7.1 General information

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

2.3.1.7.2 Order data

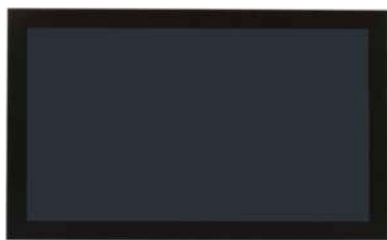
Model number	Short description	Figure
5AP933.240C-00	Panels	
	Automation Panel 24.0" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 62: 5AP933.240C-00 - Order data

2.3.1.7.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP933.240C-00	
Revision	C0	D0
General information		
B&R ID code	0xE1B4	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ¹⁾	
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 (dimnable)	Typ. 30 to 300 cd/m²	
Half-brightness time ²⁾	50,000 h	
Touch screen		
Type	3M	
Technology	Projected capacitive touch (PCT)	
Controller	3M	
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)	
Protection per UL 50	Front: Type 4X indoor use only	

Table 63: 5AP933.240C-00, 5AP933.240C-00 - Technical data

Technical data

Model number	5AP933.240C-00	
Revision	C0	D0
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm built-in gasket	
Dimensions		
Width	598.5 mm	
Height	364 mm	
Weight	Approx. 7800 g	

Table 63: 5AP933.240C-00, 5AP933.240C-00 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.

2.3.1.7.4 Dimensions

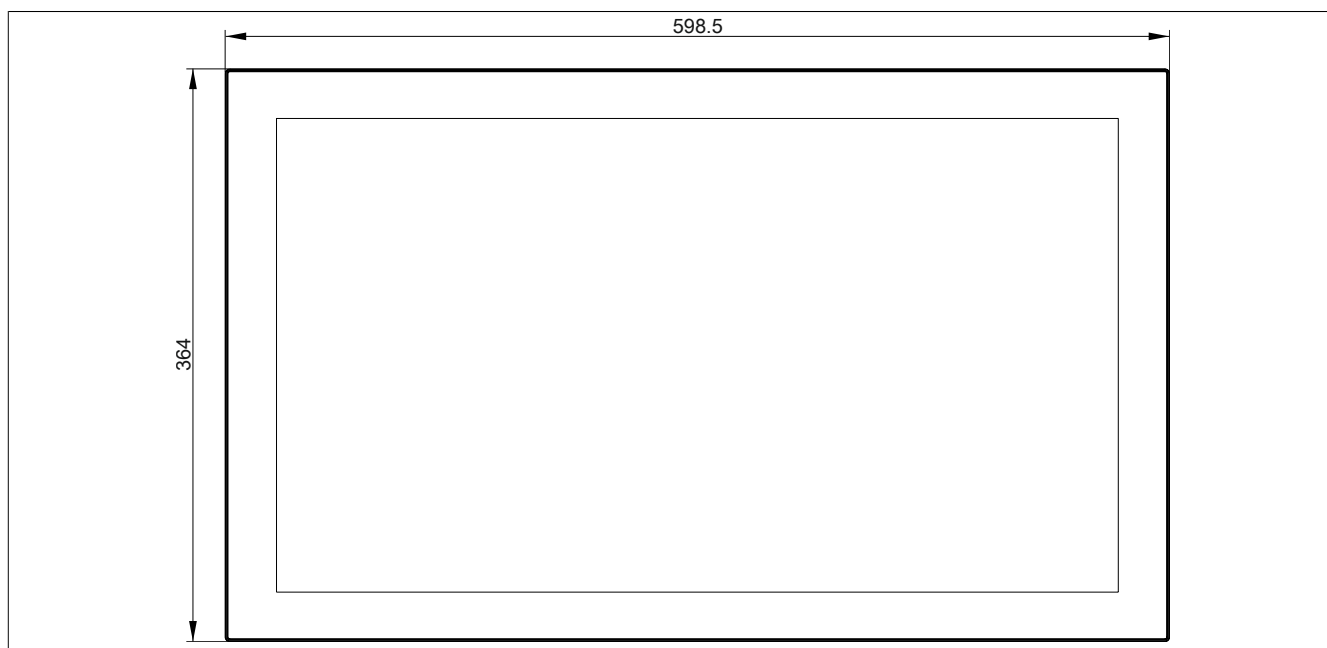


Figure 60: 5AP933.240C-00 - Dimensions

2.3.1.7.5 Temperature/Humidity diagram

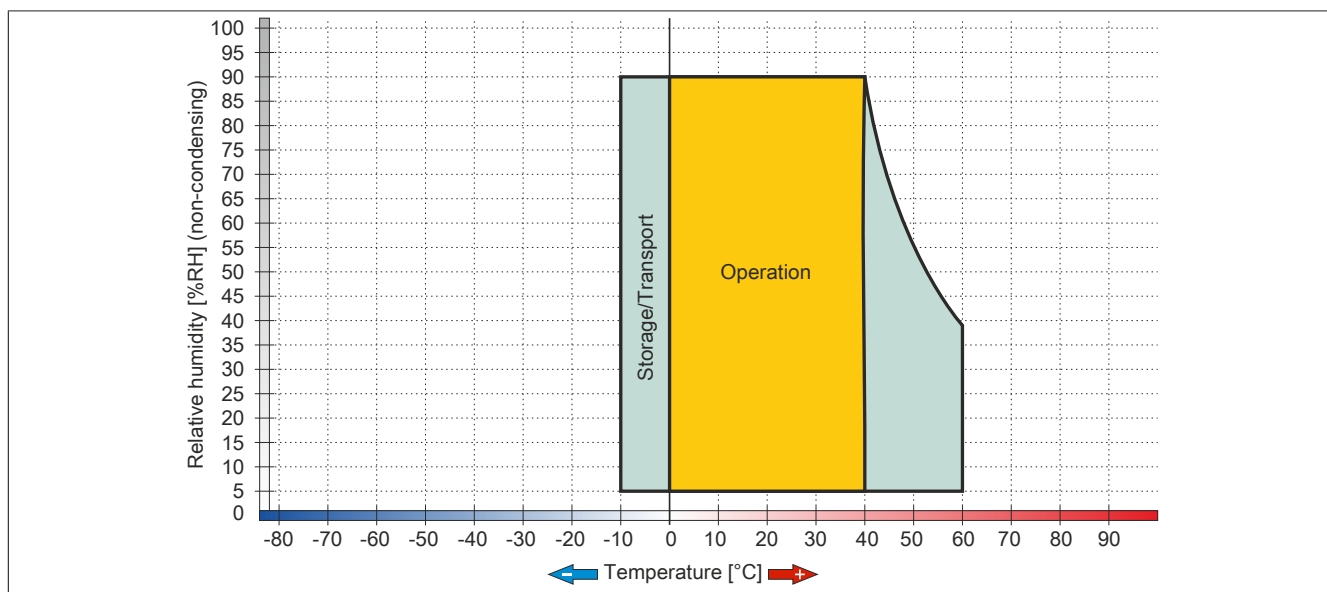


Figure 61: 5AP933.240C-00 ≤C0 - Temperature/Humidity diagram



Figure 62: 5AP933.240C-00 ≥D0 - Temperature/Humidity diagrams

2.3.2 AP1000 panels

2.3.2.1 5AP1120.0573-000

2.3.2.1.1 General information

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

2.3.2.1.2 Order data


Model 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	

Table 64: 5AP1120.0573-000 - Order data

2.3.2.1.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Product ID	5AP1120.0573-000	
Revision	D0	E0
General information		
B&R ID code	0xE7AA	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾	
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°	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 70° / Direction D = 70°
Backlight		
Type	LED	
Brightness (dimnable)	Typ. 20 to 400 cd/m²	Typ. 22.5 to 450 cd/m²
Half-brightness time ²⁾	50,000 h	
Touch screen ³⁾		
Type	AMT	
Technology	Analog, resistive	
Controller	B&R, serial, 12-bit	
Transmittance	81% ±3%	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	

Table 65: 5AP1120.0573-000, 5AP1120.0573-000 - Technical data

Product ID	5AP1120.0573-000	
Revision	D0	E0
General information		
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)	
Protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front ⁴⁾		
Frame	Aluminum, naturally anodized	
Keypad overlay		
Material	Polyester	
Light background	RAL 9006	
Dark gray border around display	RAL 7024	
Gasket	3 mm built-in gasket	
Dimensions		
Width	212 mm	
Height	156 mm	
Weight	1100 g	

Table 65: 5AP1120.0573-000, 5AP1120.0573-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.1.4 Dimensions

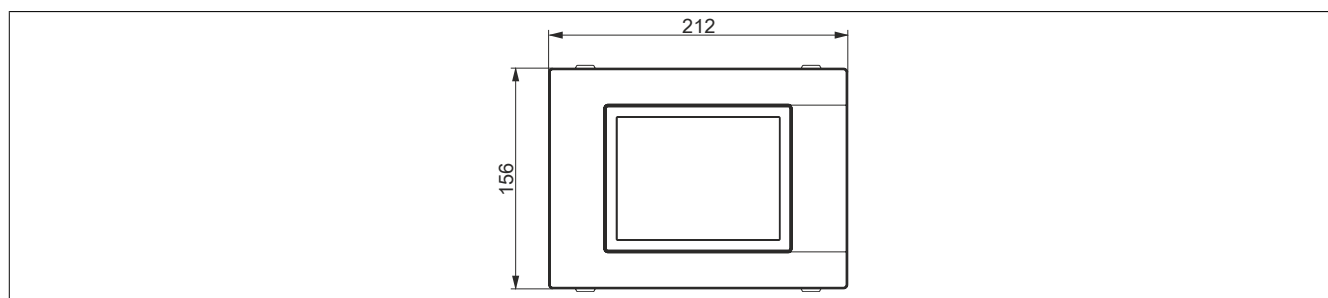


Figure 63: 5AP1120.0573-000 - Dimensions

2.3.2.1.5 Requirements

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

- Firmware V3.11 or later for SDL/DVI receiver 5DLSDL.1001-00
- Firmware V4.08 or later for SDL3 receiver 5DLSD3.1001-00
- V1.03 for the 5PPC2100.BYxx-000 PPC2100 system unit

2.3.2.1.6 Temperature/Humidity diagram

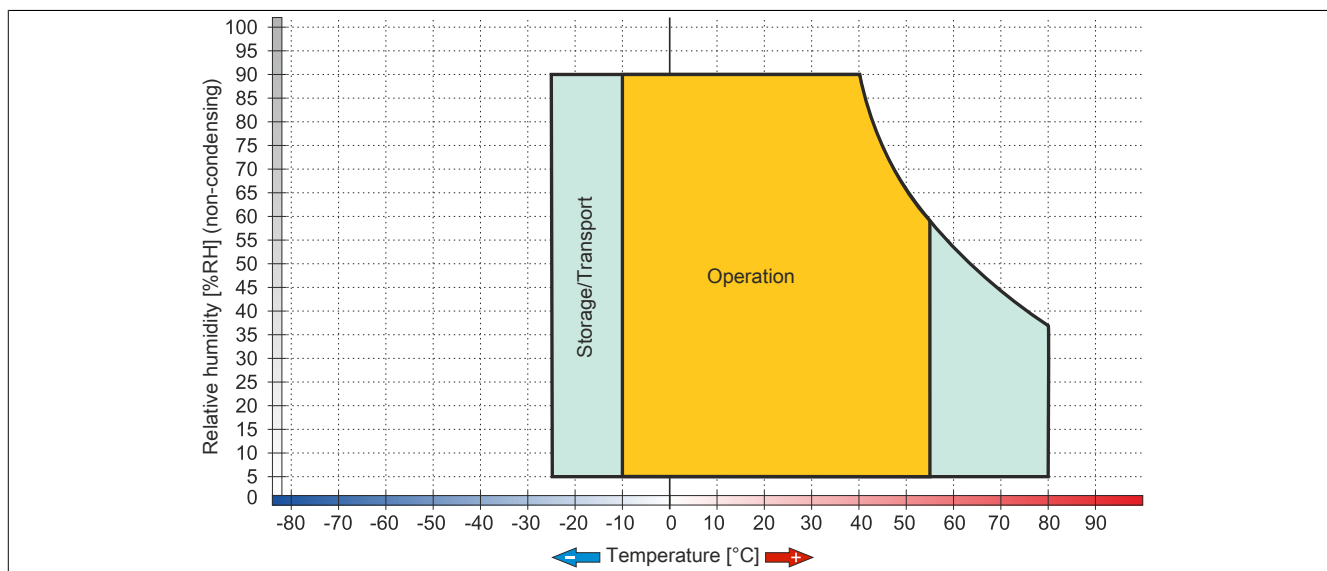


Figure 64: 5AP1120.0573-000 - Temperature/humidity diagram

2.3.2.2 5AP1151.0573-000

2.3.2.2.1 General information

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

2.3.2.2.2 Order data


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

Table 66: 5AP1151.0573-000 - Order data

2.3.2.2.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Product ID	5AP1151.0573-000	
Revision	D0	E0
General information		
B&R ID code	0xE7AB	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾	
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°	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 70° / Direction D = 70°
Backlight		
Type	LED	
Brightness (dimnable)	Typ. 20 to 400 cd/m²	Typ. 22.5 to 450 cd/m²
Half-brightness time ²⁾	50,000 h	
Keys		
Function keys	22 with LED (yellow)	
System keys	Numeric keys, cursor block	
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force	
LED brightness		
Yellow	Typ. 38 mcd	

Table 67: 5AP1151.0573-000, 5AP1151.0573-000 - Technical data

Technical data

Product ID	5AP1151.0573-000	
Revision	D0	E0
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)	
Protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front ³⁾		
Frame	Aluminum, naturally anodized	
Keypad overlay		
Material	Polyester	
Light background	RAL 9006	
Dark gray border around display	RAL 7024	
Gasket	3 mm built-in gasket	
Dimensions		
Width	212 mm	
Height	245 mm	
Weight	1400 g	

Table 67: 5AP1151.0573-000, 5AP1151.0573-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.2.4 Dimensions

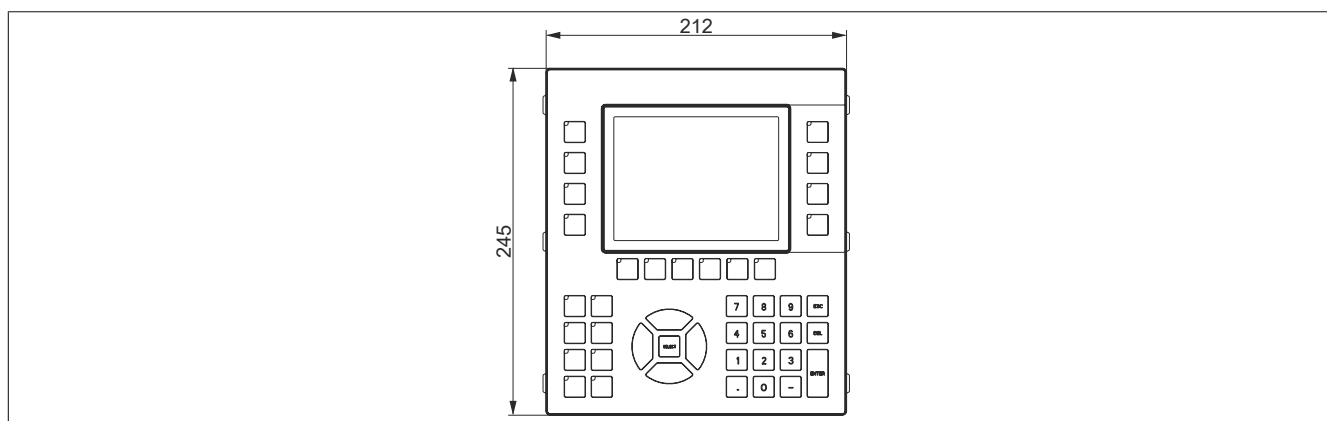


Figure 65: 5AP1151.0573-000 - Dimensions

2.3.2.2.5 Requirements

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

- Firmware V3.11 or later for SDL/DVI receiver 5DLSDL.1001-00
- Firmware V4.08 or later for SDL3 receiver 5DLSD3.1001-00
- V1.03 for the 5PPC2100.BYxx-000 PPC2100 system unit

2.3.2.2.6 Temperature/Humidity diagram

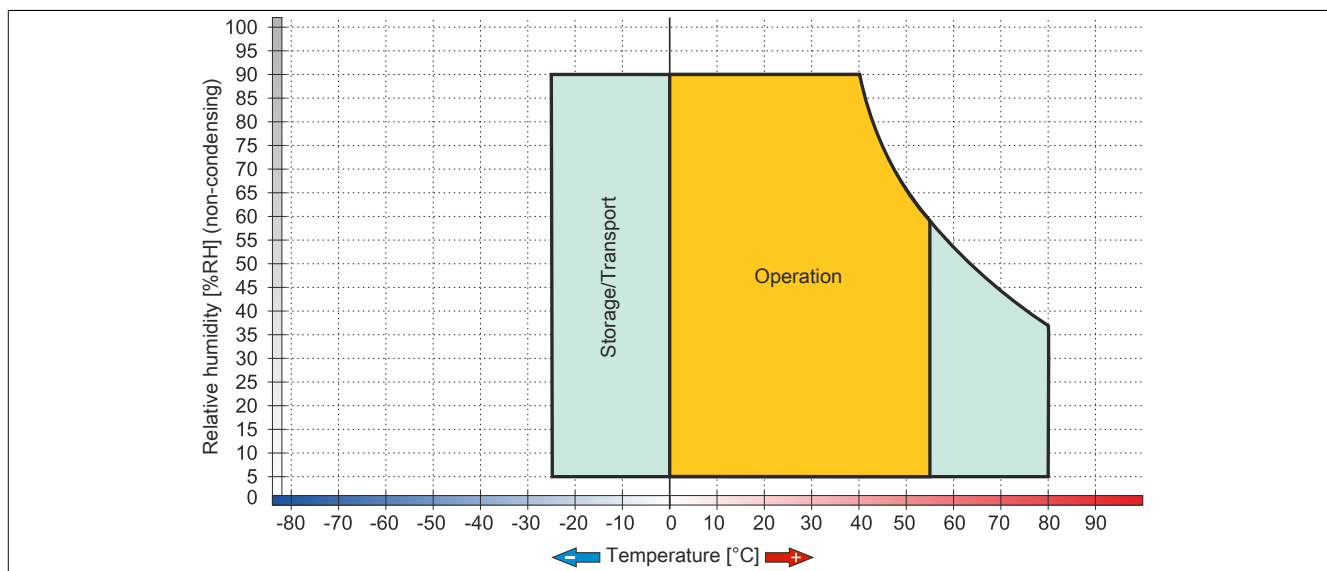


Figure 66: 5AP1151.0573-000 - Temperature/humidity diagram

2.3.2.3 5AP1120.0702-000

2.3.2.3.1 General information

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

2.3.2.3.2 Order data


Model 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	

Table 68: 5AP1120.0702-000 - Order data

2.3.2.3.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.0702-000
General information	
B&R ID code	0xE7AC
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
Diagonal	7.0"
Colors	16.7 million
Resolution	WVGA, 800 x 480 pixels
Contrast	600:1
Viewing angles	
Horizontal	Direction R = 70° / Direction L = 70°
Vertical	Direction U = 60° / Direction D = 60°
Backlight	
Type	LED
Brightness (dimnable)	Typ. 80 to 500 cd/m ²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 69: 5AP1120.0702-000 - Technical data

Model number	5AP1120.0702-000
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	212 mm
Height	156 mm
Weight	Approx. 900 g

Table 69: 5AP1120.0702-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.3.4 Dimensions

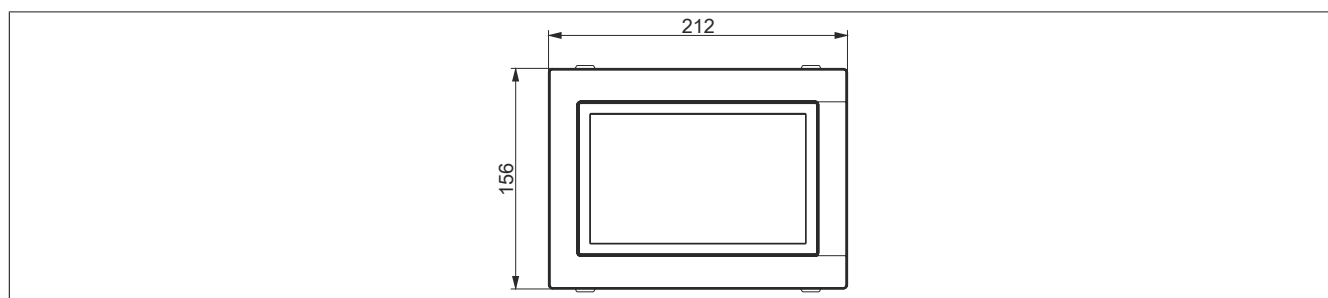


Figure 67: 5AP1120.0702-000 - Dimensions

2.3.2.3.5 Temperature/Humidity diagram

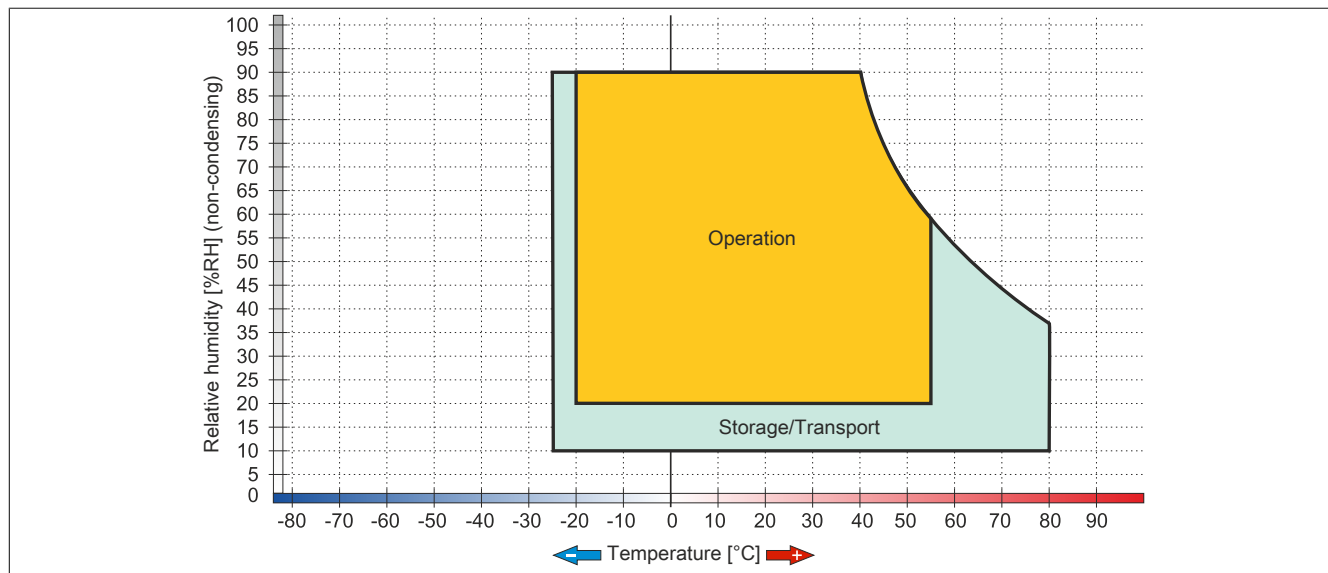


Figure 68: 5AP1120.0702-000 - Temperature/humidity diagram

2.3.2.4 5AP1130.0702-000

2.3.2.4.1 General information

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

2.3.2.4.2 Order data


Model number	Short description	Figure
5AP1130.0702-000	Panels	
	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	

Table 70: 5AP1130.0702-000 - Order data

2.3.2.4.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1130.0702-000
General information	
B&R ID code	0xEB61
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
Diagonal	7.0"
Colors	16.7 million
Resolution	WVGA, 800 x 480 pixels
Contrast	600:1
Viewing angles	
Horizontal	Direction R = 70° / Direction L = 70°
Vertical	Direction U = 60° / Direction D = 60°
Backlight	
Type	LED
Brightness (dimable)	Typ. 80 to 500 cd/m ²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	3M
Technology	Projected capacitive touch (PCT)
Controller	3M
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 71: 5AP1130.0702-000 - Technical data

Model number	5AP1130.0702-000
Mechanical properties	
Front ⁴⁾	
Frame	Coated aluminum
Design	Black
Gasket	3 mm built-in gasket
Dimensions	
Width	209 mm
Height	153 mm
Weight	1200 g

Table 71: 5AP1130.0702-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) The specifications for the touch screen driver must be taken into consideration. See chapter 4 "Software", section 2 "Multi-touch drivers".
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.4.4 Dimensions

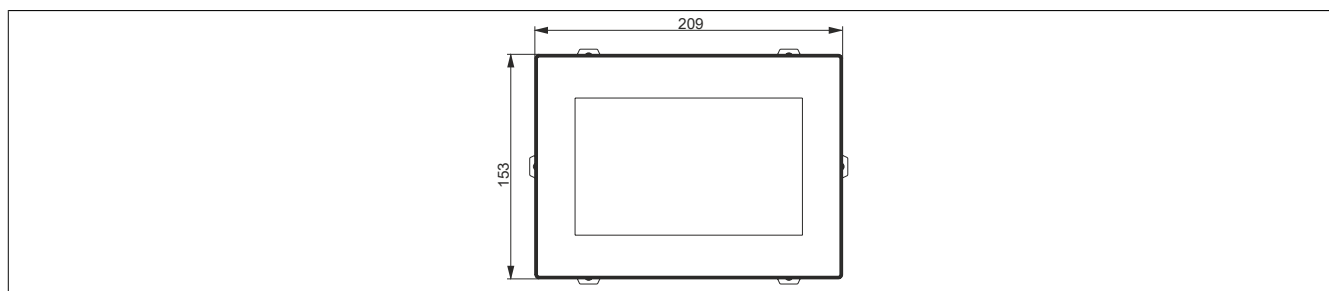


Figure 69: 5AP1130.0702-000 - Dimensions

2.3.2.4.5 Temperature/Humidity diagram

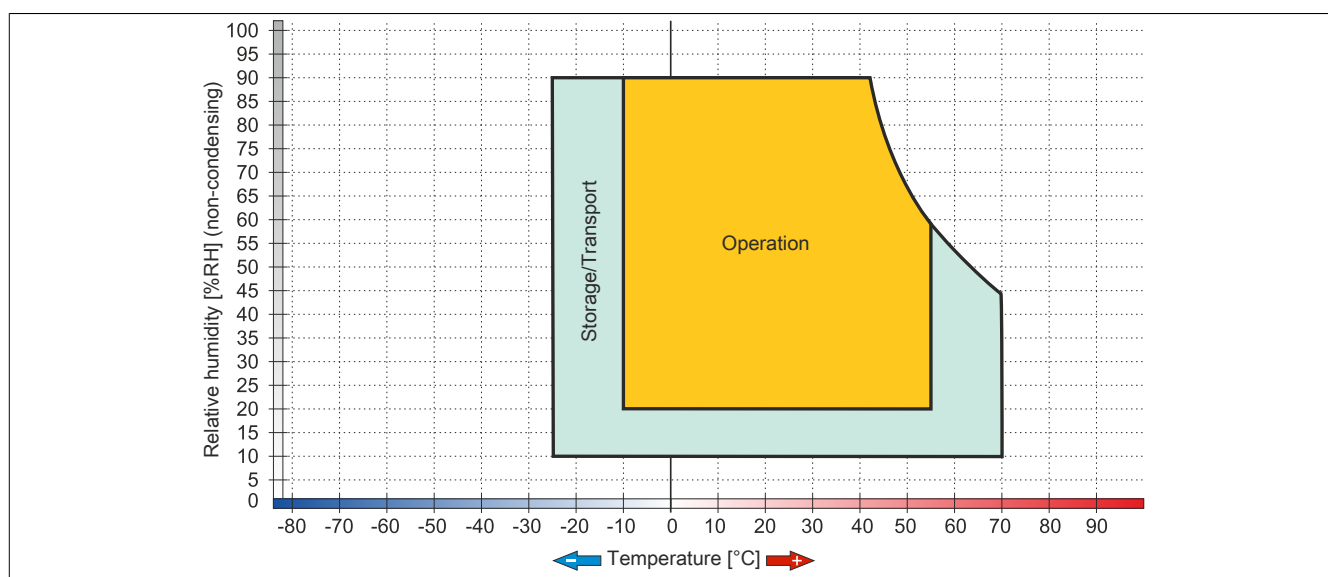


Figure 70: 5AP1130.0702-000 - Temperature/humidity diagram

2.3.2.5 5AP1120.101E-000

2.3.2.5.1 General information

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

2.3.2.5.2 Order data


Model number	Short description	Figure
5AP1120.101E-000	Panels 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	

Table 72: 5AP1120.101E-000 - Order data

2.3.2.5.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.101E-000
General information	
B&R ID code	0xE93D
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
Diagonal	10.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	1000:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimable)	Typ. 25 to 500 cd/m²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 73: 5AP1120.101E-000 - Technical data

Model number	5AP1120.101E-000
Mechanical properties	
Front ⁴⁾	
Frame	Coated aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	1900 g

Table 73: 5AP1120.101E-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.5.4 Dimensions

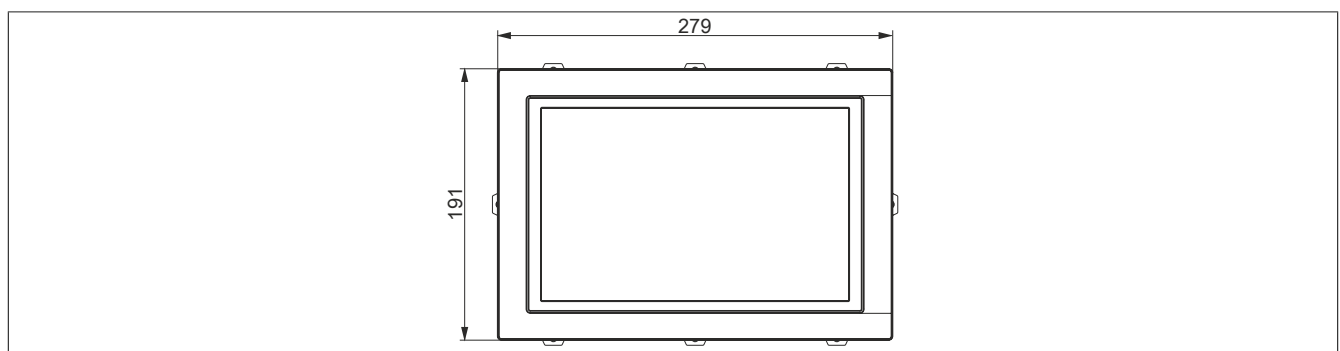


Figure 71: 5AP1120.101E-000 - Dimensions

2.3.2.5.5 Temperature/Humidity diagram

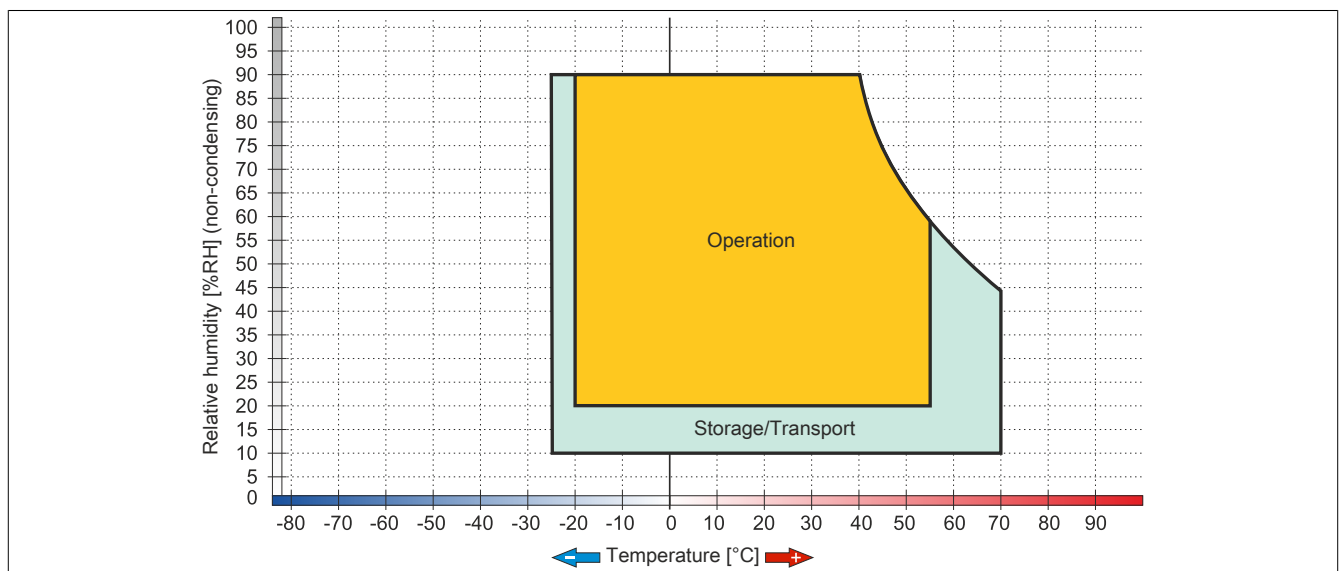


Figure 72: 5AP1120.101E-000 - Temperature/Humidity diagram

2.3.2.6 5AP1130.101E-000

2.3.2.6.1 General information

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

2.3.2.6.2 Order data


Model number	Short description	Figure
5AP1130.101E-000	Panels 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	

Table 74: 5AP1130.101E-000 - Order data

2.3.2.6.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1130.101E-000
General information	
B&R ID code	0xEB62
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
Diagonal	10.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	1000:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimnable)	Typ. 25 to 500 cd/m²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	3M
Technology	Projected capacitive touch (PCT)
Controller	3M
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 75: 5AP1130.101E-000 - Technical data

Model number	5AP1130.101E-000
Mechanical properties	
Front ⁴⁾	
Frame	Coated aluminum
Design	Black
Gasket	3 mm built-in gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	2000 g

Table 75: 5AP1130.101E-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) The specifications for the touch screen driver must be taken into consideration. See chapter 4 "Software", section 2 "Multi-touch drivers".
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.6.4 Dimensions

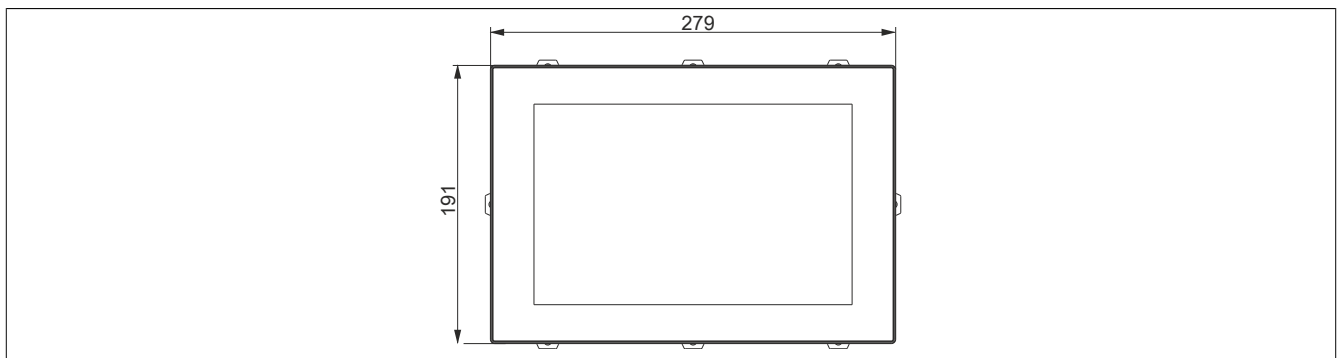


Figure 73: 5AP1130.101E-000 - Dimensions

2.3.2.6.5 Temperature/Humidity diagram

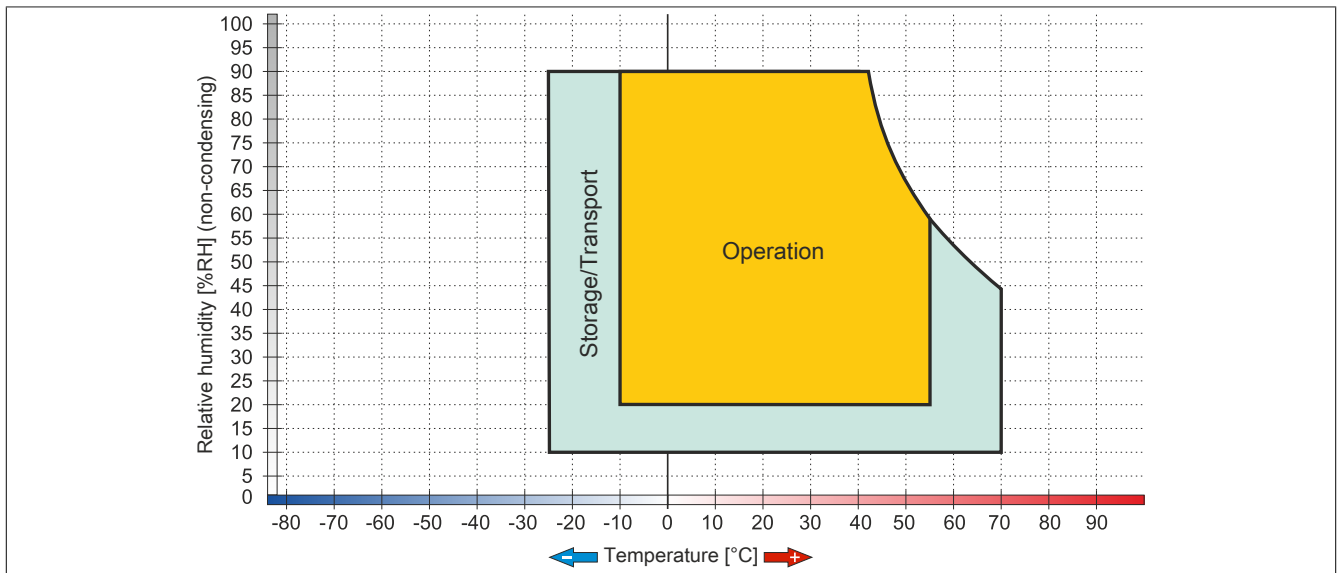


Figure 74: 5AP1130.101E-000 - Temperature/Humidity diagram

2.3.2.7 5AP1120.1043-000

2.3.2.7.1 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

2.3.2.7.2 Order data


Model 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	

Table 76: 5AP1120.1043-000 - Order data

2.3.2.7.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.1043-000
General information	
B&R ID code	0xE7AD
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
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 (dimnable)	Typ. 22.5 to 450 cd/m ²
Half-brightness time ²⁾	70,000 h

Table 77: 5AP1120.1043-000 - Technical data

Model number	5AP1120.1043-000
Touch screen ³⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	323 mm
Height	260 mm
Weight	2800 g

Table 77: 5AP1120.1043-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.7.4 Dimensions

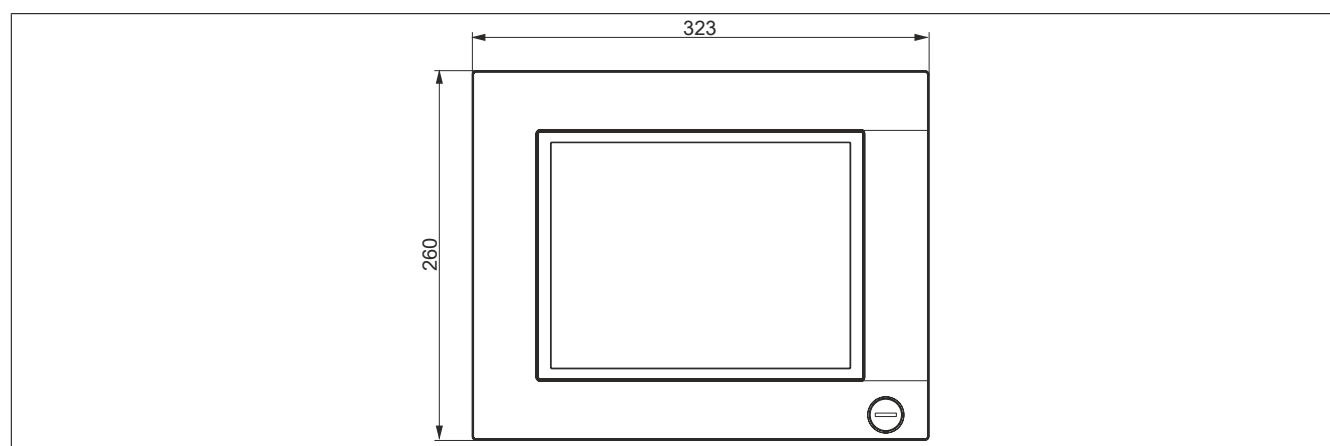


Figure 75: 5AP1120.1043-000 - Dimensions

2.3.2.7.5 Requirements

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

- Firmware V3.11 or later for SDL/DVI receiver 5DLSDL.1001-00
- Firmware V4.08 or later for SDL3 receiver 5DLSD3.1001-00
- Firmware V1.03 or later for PPC2100 system unit 5PPC2100.BYxx-000
- Firmware V1.18 or later for PPC900 system unit 5PC901.TS77-xx

2.3.2.7.6 Temperature/Humidity diagram



Figure 76: 5AP1120.1043-000 - Temperature/Humidity diagram

2.3.2.8 5AP1180.1043-000

2.3.2.8.1 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

2.3.2.8.2 Order data


Model 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	

Table 78: 5AP1180.1043-000 - Order data

2.3.2.8.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1180.1043-000
General information	
B&R ID code	0xE7AE
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
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 (dimnable)	Typ. 22.5 to 450 cd/m ²
Half-brightness time ²⁾	70,000 h

Table 79: 5AP1180.1043-000 - Technical data

Technical data

Model number	5AP1180.1043-000
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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 brightness	
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	323 mm
Height	260 mm
Weight	2800 g

Table 79: 5AP1180.1043-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.8.4 Dimensions

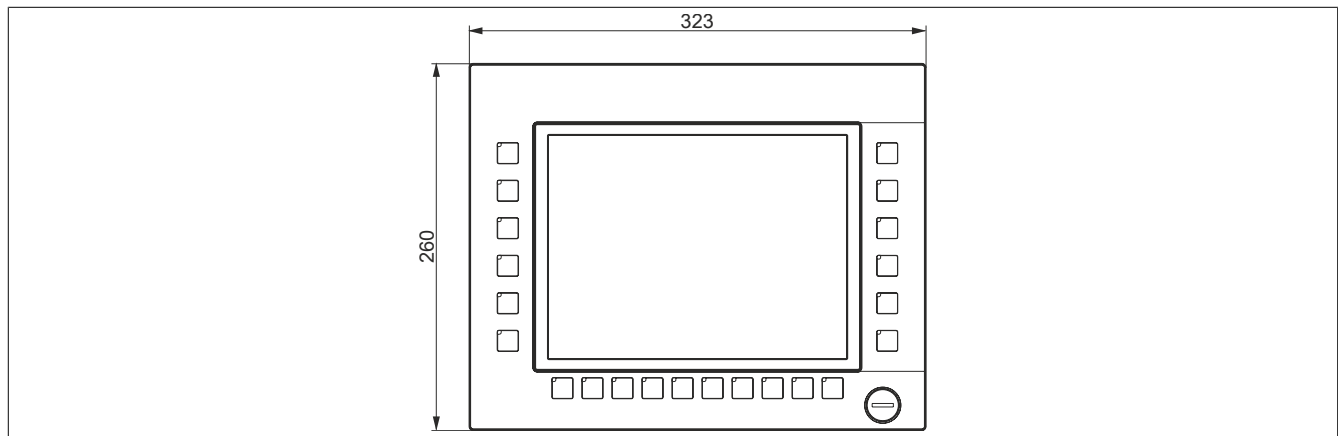


Figure 77: 5AP1180.1043-000 - Dimensions

2.3.2.8.5 Requirements

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

- Firmware V3.11 or later for SDL/DVI receiver 5DLSDL.1001-00
- Firmware V4.08 or later for SDL3 receiver 5DLSD3.1001-00
- Firmware V1.03 or later for PPC2100 system unit 5PPC2100.BYxx-000
- Firmware V1.18 or later for PPC900 system unit 5PC901.TS77-xx

2.3.2.8.6 Temperature/Humidity diagram

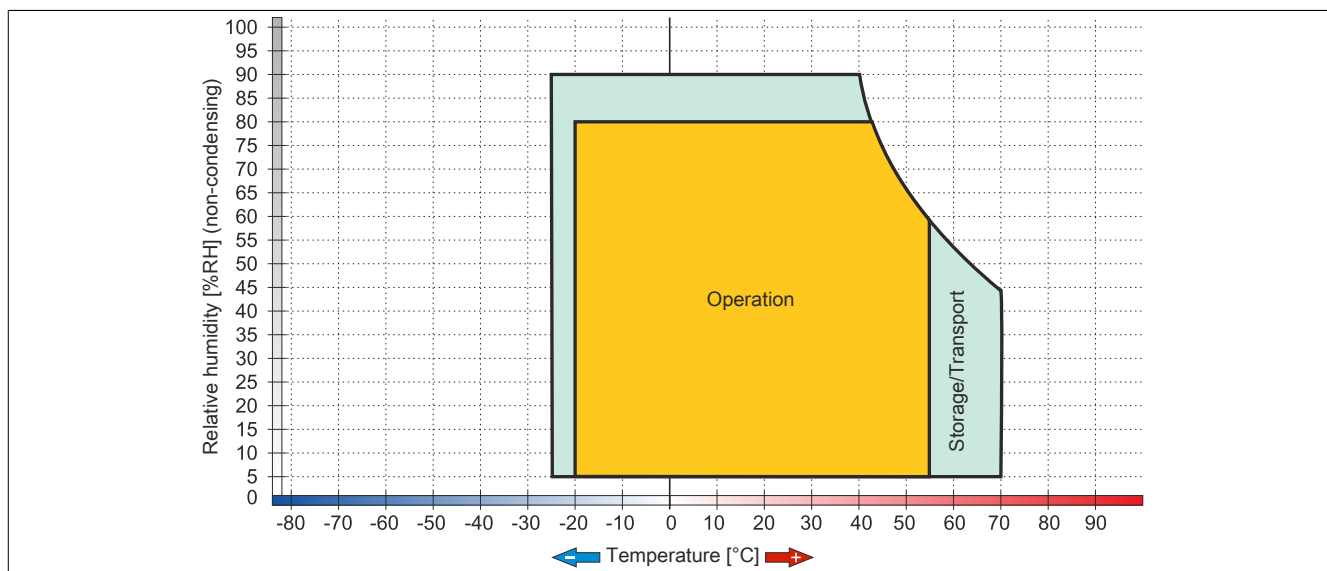


Figure 78: 5AP1180.1043-000 - Temperature/Humidity diagram

2.3.2.9 5AP1181.1043-000

2.3.2.9.1 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

2.3.2.9.2 Order data


Model 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	

Table 80: 5AP1181.1043-000 - Order data

2.3.2.9.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1181.1043-000
General information	
B&R ID code	0xE7AF
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
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°

Table 81: 5AP1181.1043-000 - Technical data

Model number	5AP1181.1043-000
Backlight	
Type	LED
Brightness (dimnable)	Typ. 22.5 to 450 cd/m ²
Half-brightness time ²⁾	70,000 h
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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 brightness	
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	323 mm
Height	358 mm
Weight	3400 g

Table 81: 5AP1181.1043-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.9.4 Dimensions

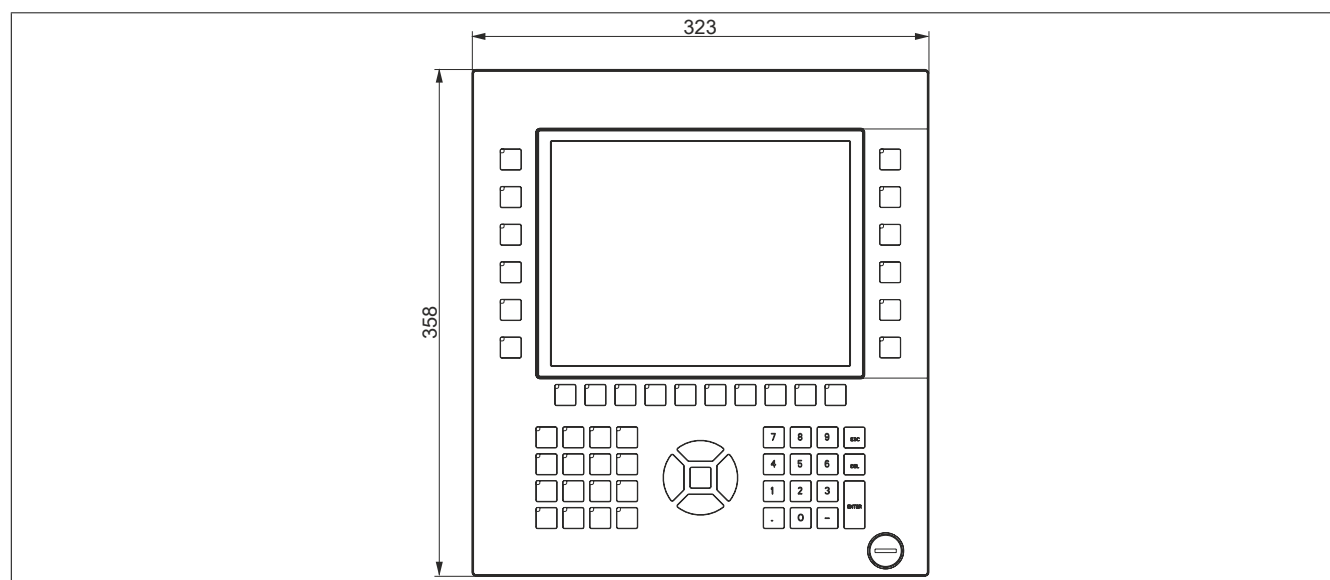


Figure 79: 5AP1181.1043-000 - Dimensions

2.3.2.9.5 Requirements

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

- Firmware V3.11 or later for SDL/DVI receiver 5DLSDL.1001-00
- Firmware V4.08 or later for SDL3 receiver 5DLSD3.1001-00

- Firmware V1.03 or later for PPC2100 system unit 5PPC2100.BYxx-000
- Firmware V1.18 or later for PPC900 system unit 5PC901.TS77-xx

2.3.2.9.6 Temperature/Humidity diagram

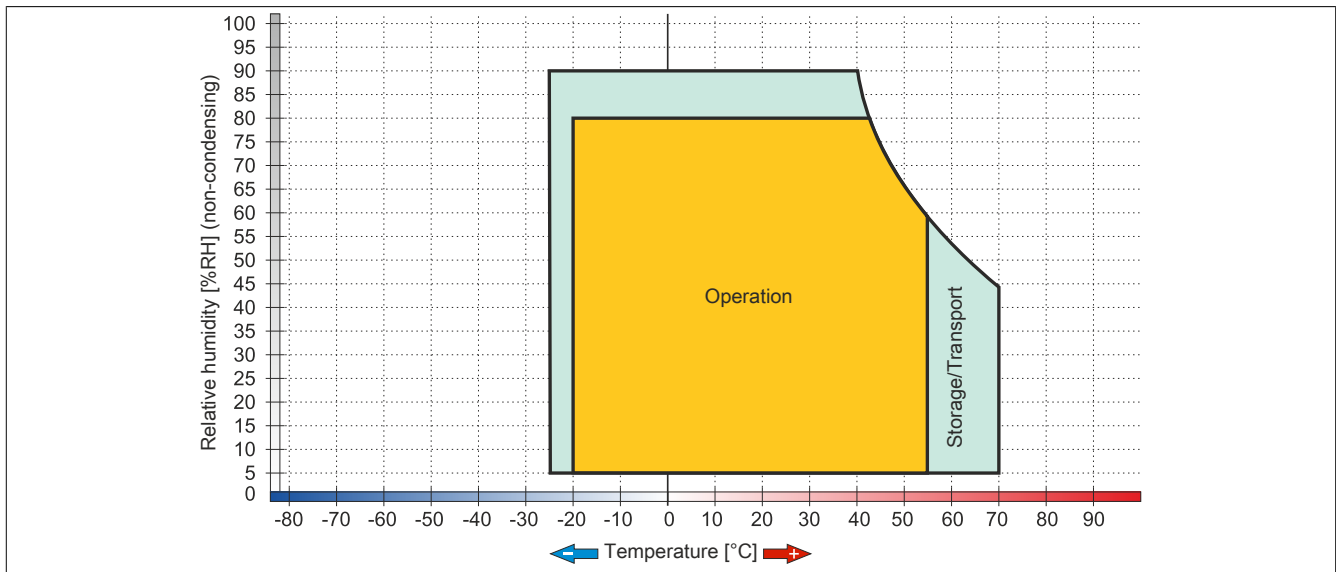


Figure 80: 5AP1181.1043-000 - Temperature/Humidity diagram

2.3.2.10 5AP1182.1043-000

2.3.2.10.1 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

2.3.2.10.2 Order data


Model 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	

Table 82: 5AP1182.1043-000 - Order data

2.3.2.10.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1182.1043-000
General information	
B&R ID code	0xE7B0
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
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 (dimnable)	Typ. 22.5 to 450 cd/m ²
Half-brightness time ²⁾	70,000 h

Table 83: 5AP1182.1043-000 - Technical data

Technical data

Model number	5AP1182.1043-000
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Keys	
Function keys	44 with LED (yellow)
System keys	Numeric keys, cursor block
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED brightness	
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	423 mm
Height	288 mm
Weight	3500 g

Table 83: 5AP1182.1043-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.10.4 Dimensions

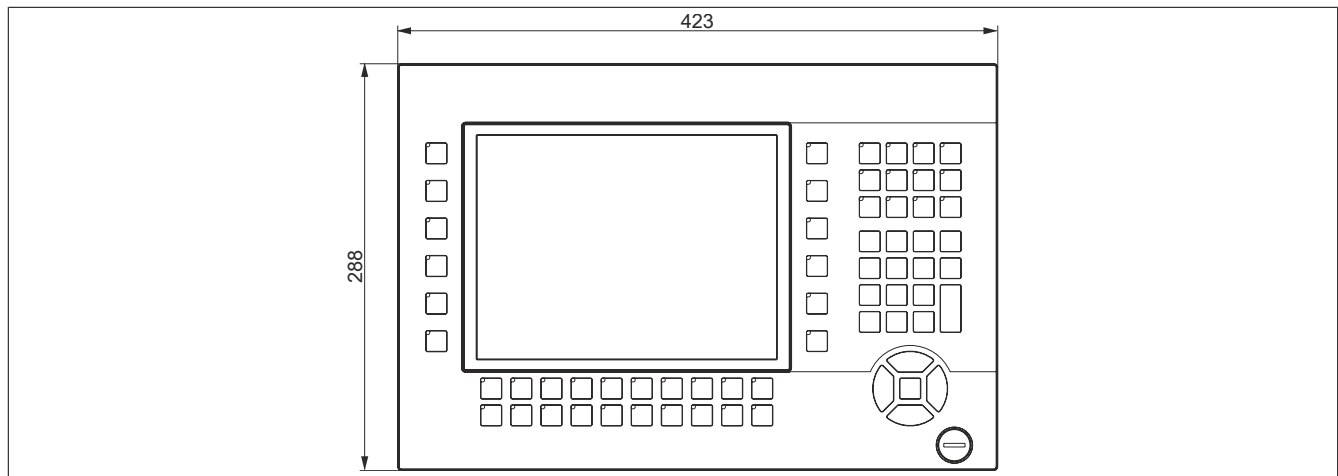


Figure 81: 5AP1182.1043-000 - Dimensions

2.3.2.10.5 Requirements

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

- Firmware V3.11 or later for SDL/DVI receiver 5DLSDL.1001-00
- Firmware V4.08 or later for SDL3 receiver 5DLSD3.1001-00
- Firmware V1.03 or later for PPC2100 system unit 5PPC2100.BYxx-000
- Firmware V1.18 or later for PPC900 system unit 5PC901.TS77-xx

2.3.2.10.6 Temperature/Humidity diagram

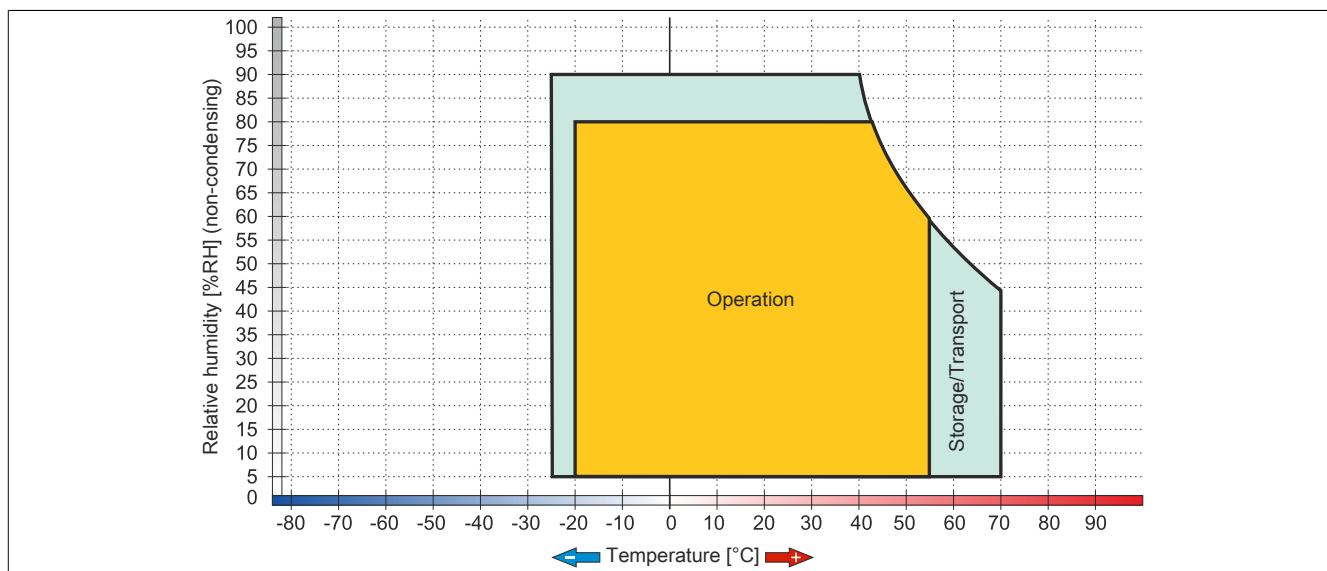


Figure 82: 5AP1182.1043-000 - Temperature/Humidity diagram

2.3.2.11 5AP1120.1214-000

2.3.2.11.1 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

2.3.2.11.2 Order data


Model 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	

Table 84: 5AP1120.1214-000 - Order data

2.3.2.11.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.1214-000
General information	
B&R ID code	0xE7BB
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Display	
Type	Color TFT
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 (dimnable)	Typ. 22.5 to 450 cd/m ²
Half-brightness time ²⁾	50,000 h

Table 85: 5AP1120.1214-000 - Technical data

Model number	5AP1120.1214-000
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% \pm 3%
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in seal
Dimensions	
Width	362 mm
Height	284 mm
Weight	3200 g

Table 85: 5AP1120.1214-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.11.4 Dimensions

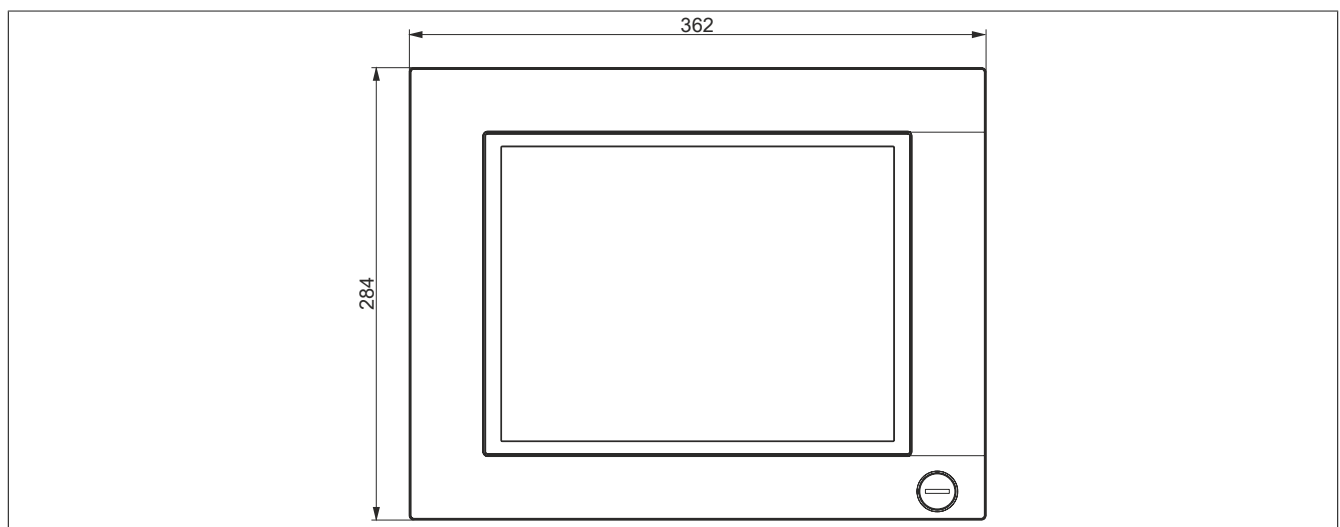


Figure 83: 5AP1120.1214-000 - Dimensions

2.3.2.11.5 Temperature/Humidity diagram

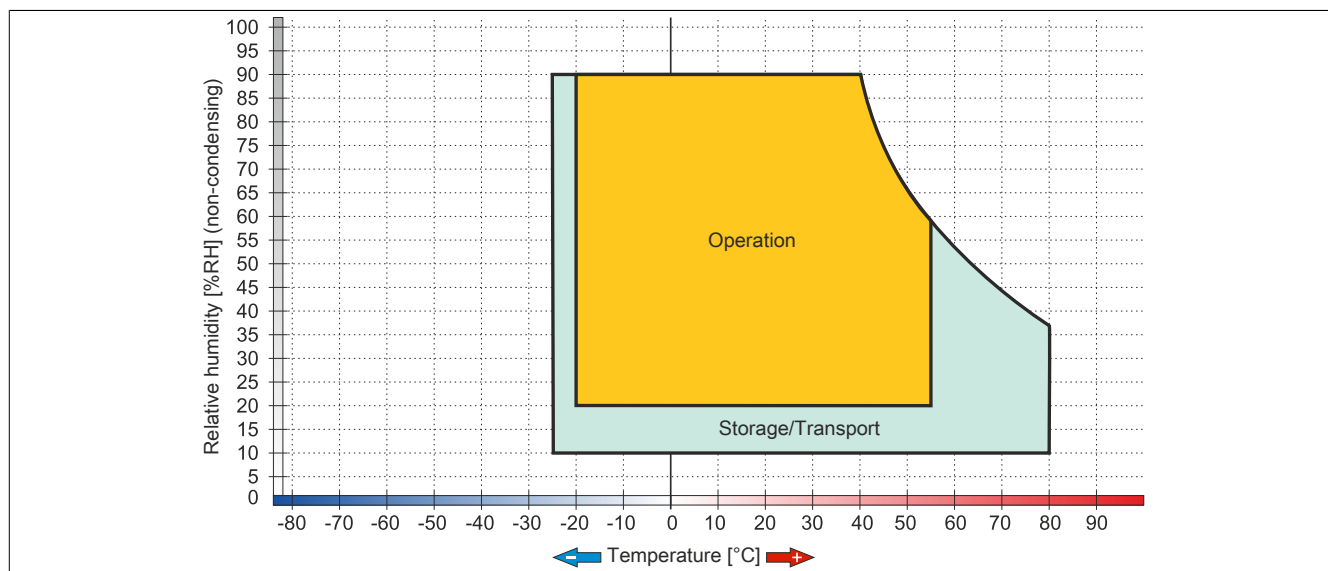


Figure 84: 5AP1120.1214-000 - Temperature/Humidity diagram

2.3.2.12 5AP1120.121E-000

2.3.2.12.1 General information

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

2.3.2.12.2 Order data

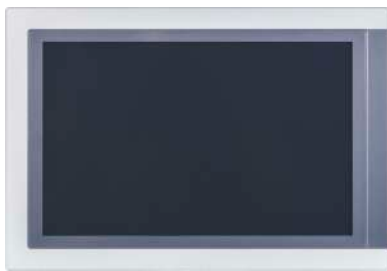
Model number	Short description	Figure
5AP1120.121E-000	Panels Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

Table 86: 5AP1120.121E-000 - Order data

2.3.2.12.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.121E-000
General information	
B&R ID code	0xE8E4
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
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 (dimable)	Typ. 40 to 400 cd/m²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 87: 5AP1120.121E-000 - Technical data

Technical data

Model number	5AP1120.121E-000
Mechanical properties	
Front ⁴⁾	
Frame	Coated aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	2300 g

Table 87: 5AP1120.121E-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.12.4 Dimensions

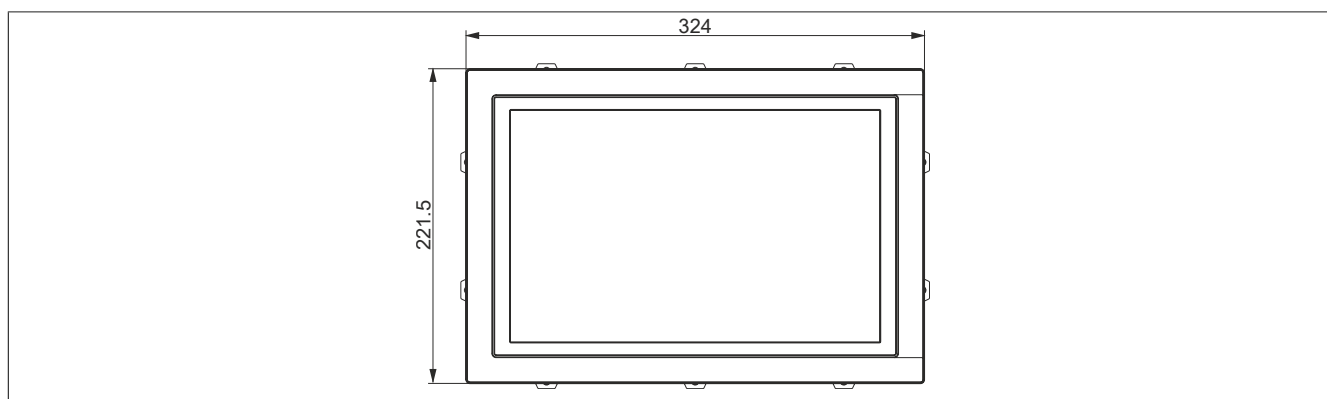


Figure 85: 5AP1120.121E-000 - Dimensions

2.3.2.12.5 Temperature/Humidity diagram

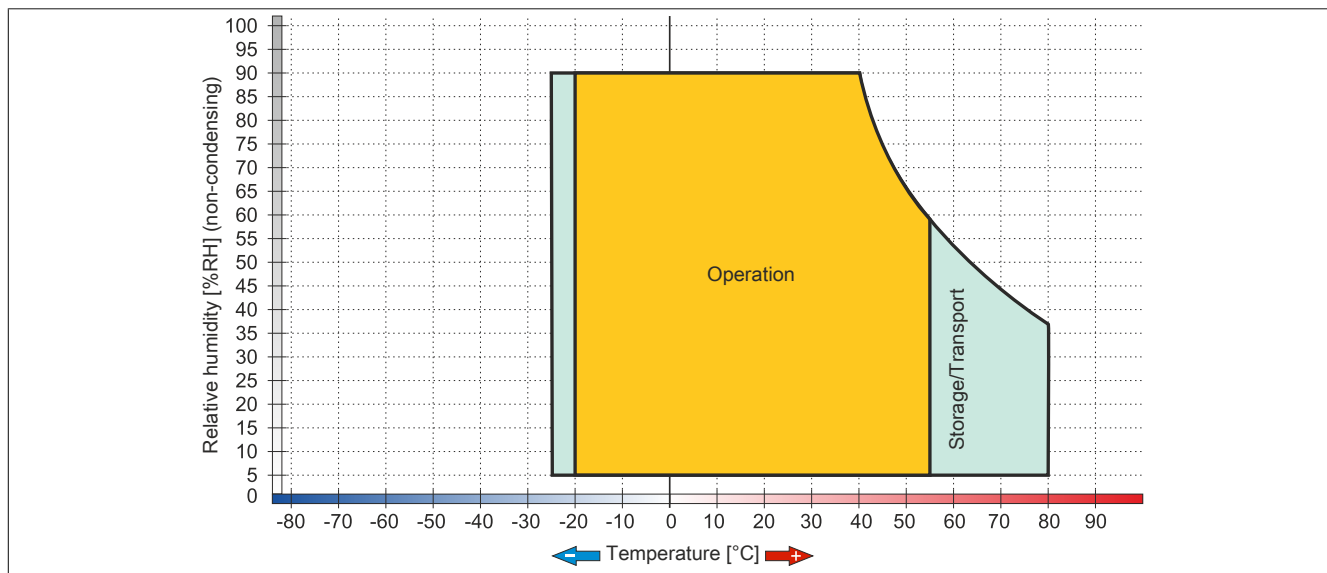


Figure 86: 5AP1120.121E-000 - Temperature/Humidity diagram

2.3.2.13 5AP1130.121E-000

2.3.2.13.1 General information

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

2.3.2.13.2 Order data

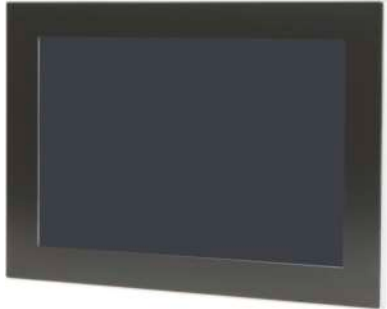
Model number	Short description	Figure
5AP1130.121E-000	Panels	
	Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

Table 88: 5AP1130.121E-000 - Order data

2.3.2.13.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1130.121E-000
General information	
B&R ID code	0xEB63
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
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 (dimnable)	Typ. 40 to 400 cd/m ²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	3M
Technology	Projected capacitive touch (PCT)
Controller	3M
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 89: 5AP1130.121E-000 - Technical data

Technical data

Model number	5AP1130.121E-000
Mechanical properties	
Front ⁴⁾	
Frame	Coated aluminum
Design	Black
Gasket	3 mm built-in gasket
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	2400 g

Table 89: 5AP1130.121E-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) The specifications for the touch screen driver must be taken into consideration. See chapter 4 "Software", section 2 "Multi-touch drivers".
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.13.4 Dimensions

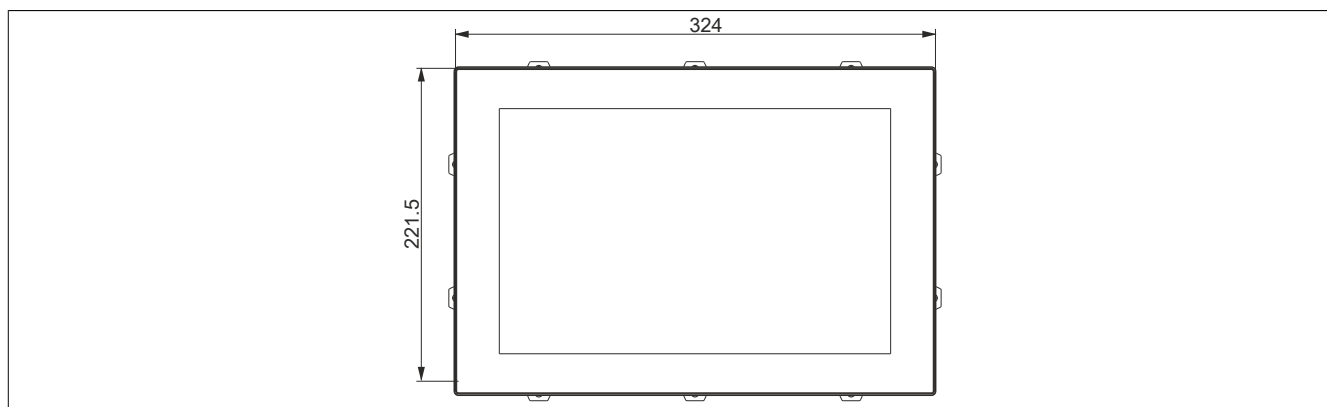


Figure 87: 5AP1130.121E-000 - Dimensions

2.3.2.13.5 Temperature/Humidity diagram

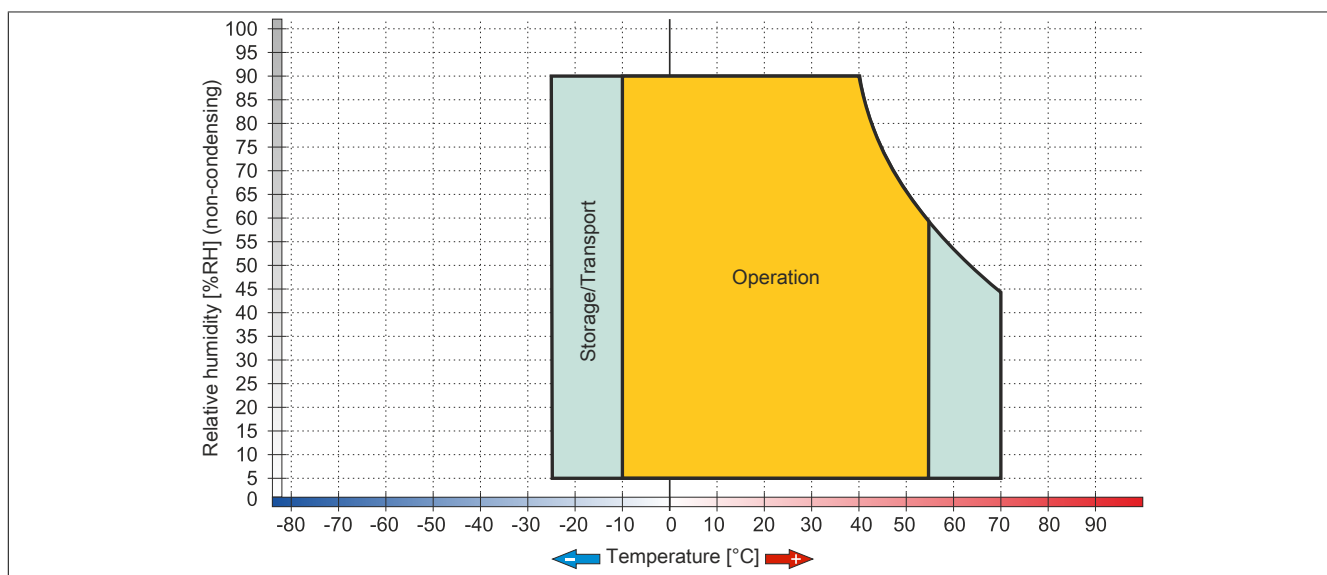


Figure 88: 5AP1130.121E-000 - Temperature/Humidity diagram

2.3.2.14 5AP1120.1505-000

2.3.2.14.1 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

2.3.2.14.2 Order data


Model 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	

Table 90: 5AP1120.1505-000 - Order data

2.3.2.14.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.1505-000
General information	
B&R ID code	0xE7BC
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Display	
Type	Color TFT
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 (dimnable)	Typ. 20 to 400 cd/m ²
Half-brightness time ²⁾	50,000 h

Table 91: 5AP1120.1505-000 - Technical data

Technical data

Model number	5AP1120.1505-000
Touch screen ³⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in seal
Dimensions	
Width	435 mm
Height	330 mm
Weight	5000 g

Table 91: 5AP1120.1505-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.14.4 Dimensions

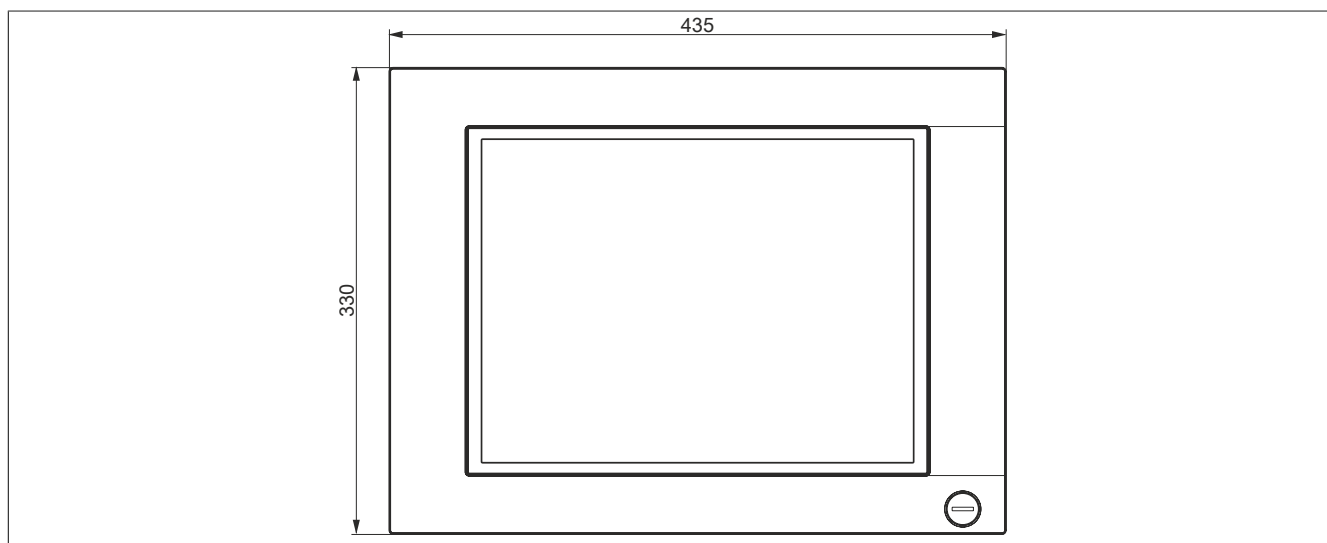


Figure 89: 5AP1120.1505-000 - Dimensions

2.3.2.14.5 Temperature/Humidity diagram



Figure 90: 5AP1120.1505-000 - Temperature/Humidity diagram

2.3.2.15 5AP1180.1505-000

2.3.2.15.1 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

2.3.2.15.2 Order data


Model 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 - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP580.1505-00, 5AP980.1505-01	

Table 92: 5AP1180.1505-000 - Order data

2.3.2.15.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1180.1505-000
General information	
B&R ID code	0xE7BD
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Display	
Type	Color TFT
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 (dimnable)	Typ. 20 to 400 cd/m ²
Half-brightness time ²⁾	50,000 h

Table 93: 5AP1180.1505-000 - Technical data

Model number	5AP1180.1505-000
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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 brightness	
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	435 mm
Height	330 mm
Weight	4900 g

Table 93: 5AP1180.1505-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.15.4 Dimensions

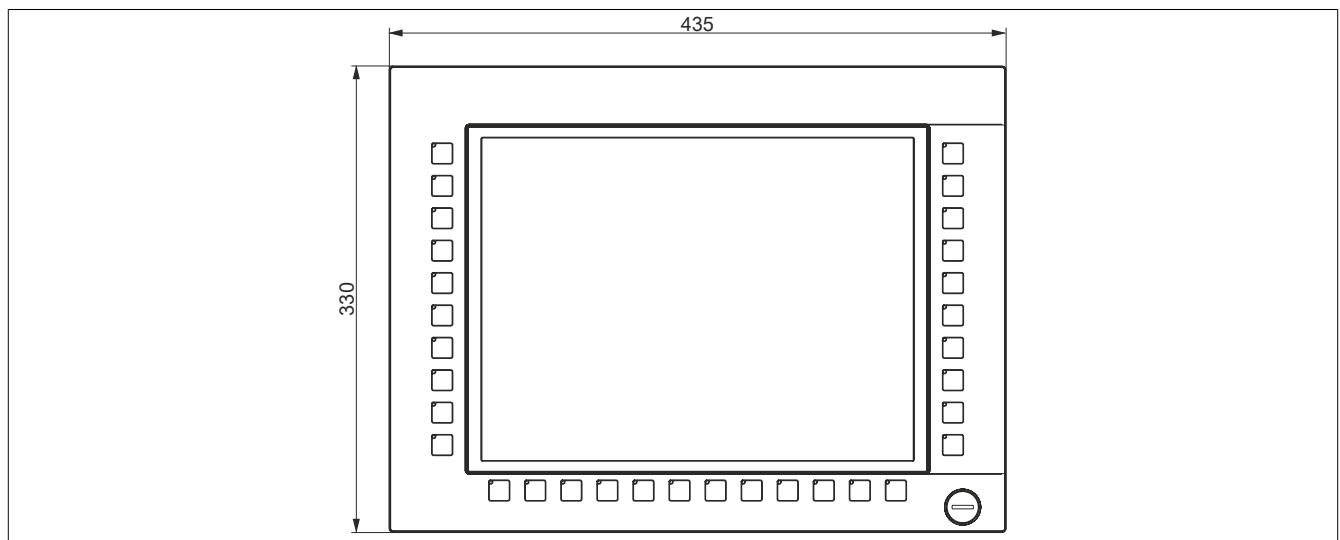


Figure 91: 5AP1180.1505-000 - Dimensions

2.3.2.15.5 Temperature/Humidity diagram



Figure 92: 5AP1180.1505-000 - Temperature/Humidity diagram

2.3.2.16 5AP1181.1505-000

2.3.2.16.1 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 enabled for DVI mode.

2.3.2.16.2 Order data

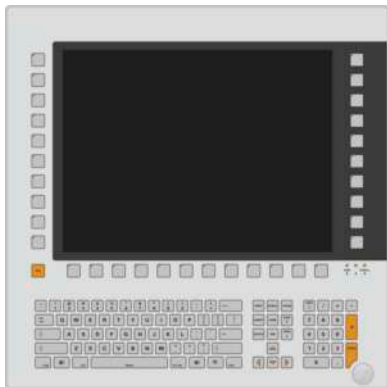
Model number	Short description	Figure
5AP1181.1505-000	Panels Automation Panel 15" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 32 function keys and 92 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules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

Table 94: 5AP1181.1505-000 - Order data

2.3.2.16.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1181.1505-000
General information	
B&R ID code	0xEF61
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels

Table 95: 5AP1181.1505-000 - Technical data

Technical data

Model number	5AP1181.1505-000
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimnable)	Typ. 20 to 400 cd/m²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
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 brightness	
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	435 mm
Height	430 mm
Weight	6000 g

Table 95: 5AP1181.1505-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.16.4 Dimensions

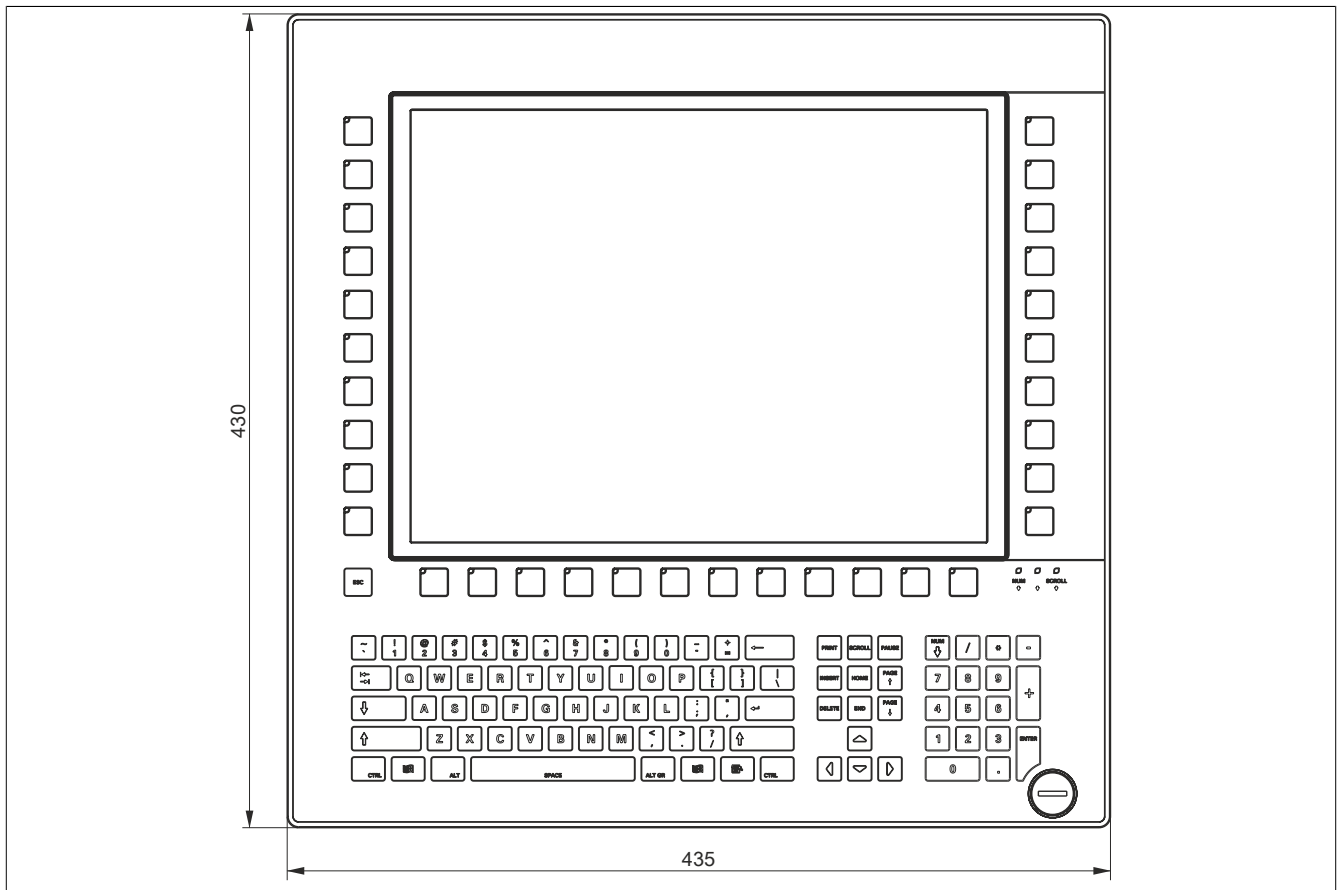


Figure 93: 5AP1181.1505-000 - Dimensions

2.3.2.16.5 Requirements

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

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

2.3.2.16.6 Temperature/Humidity diagram

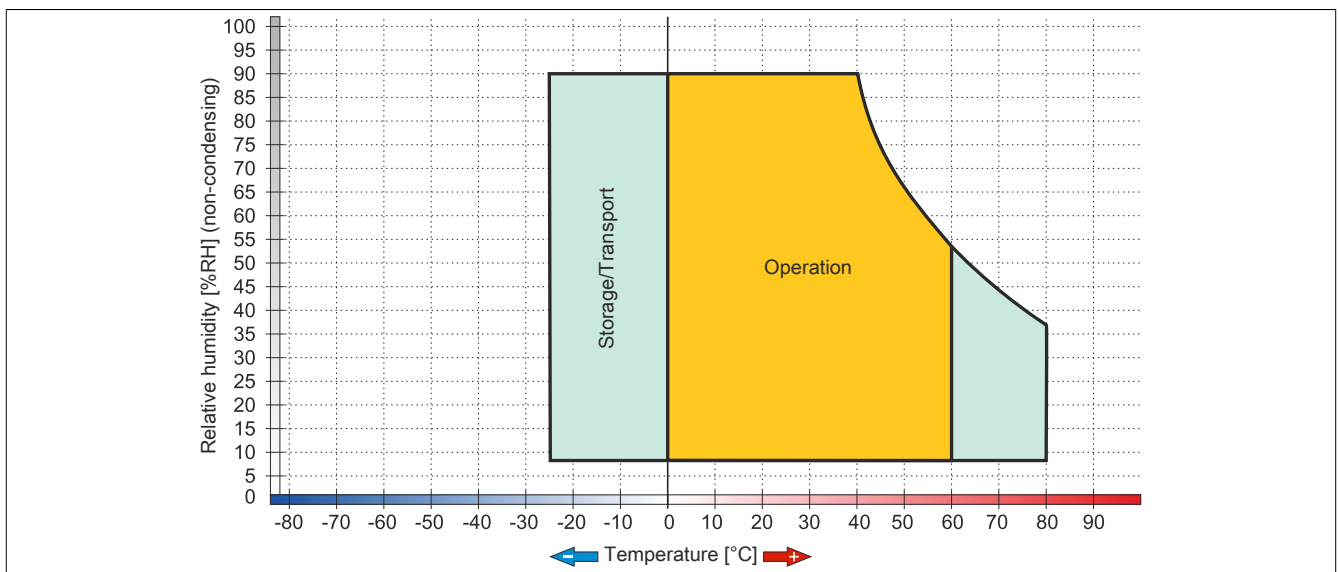


Figure 94: 5AP1181.1505-000 - Temperature/Humidity diagram

2.3.2.16.7 Cutout installation

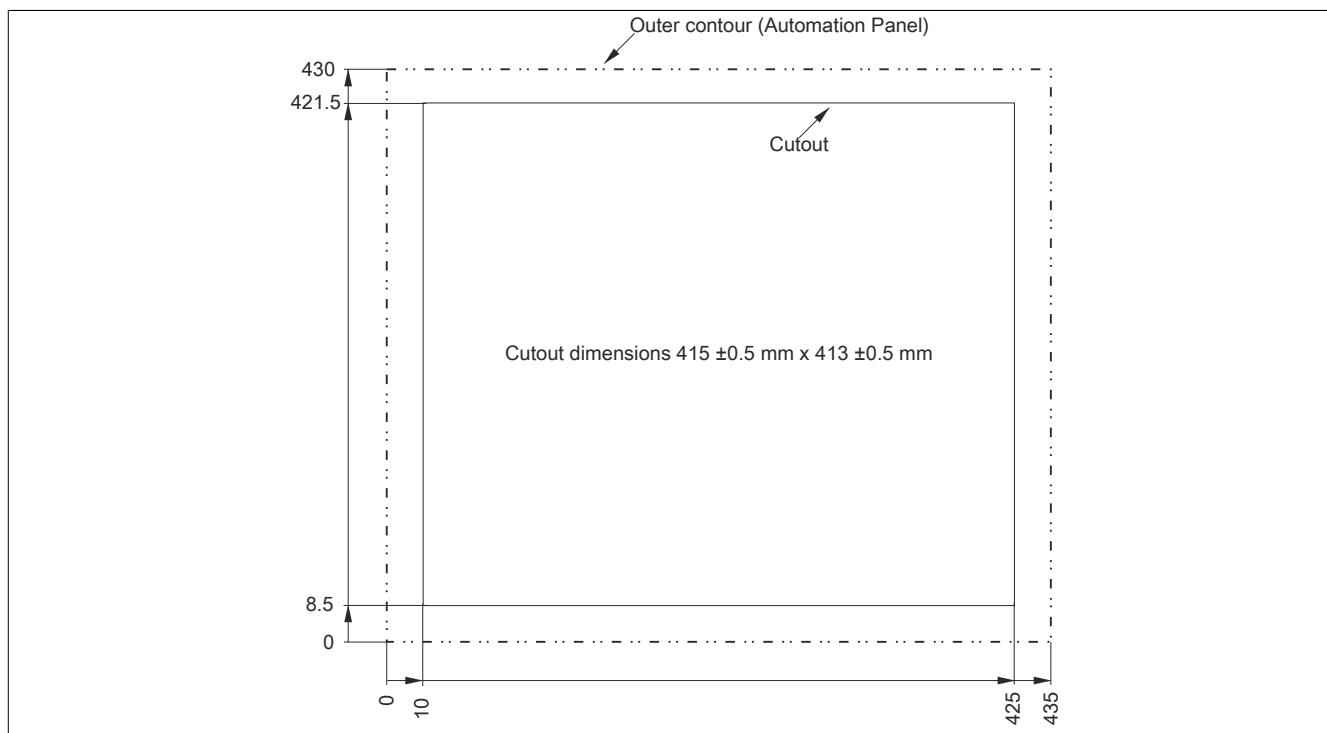


Figure 95: 5AP1181.1505-000 - Cutout installation

2.3.2.17 5AP1120.156B-000

2.3.2.17.1 General information

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

2.3.2.17.2 Order data

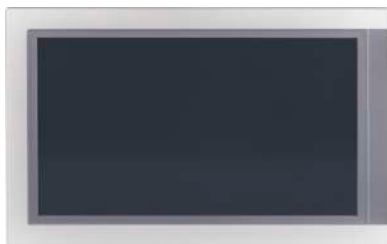
Model number	Short description	Figure
5AP1120.156B-000	Panels	
	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 96: 5AP1120.156B-000 - Order data

2.3.2.17.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.156B-000
General information	
B&R ID code	0xE8E5
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	Color TFT
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 (dimnable)	Typ. 40 to 400 cd/m ²
Half-brightness time ²⁾	70,000 h
Touch screen ³⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 97: 5AP1120.156B-000 - Technical data

Technical data

Model number	5AP1120.156B-000
Mechanical properties	
Front ⁴⁾	
Frame	Coated aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	4200 g

Table 97: 5AP1120.156B-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can result in an approximately 50% increase in the half-brightness time.
- 3) Touch screen drivers for approved operating systems are available in the Downloads section of the B&R website.
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.17.4 Dimensions

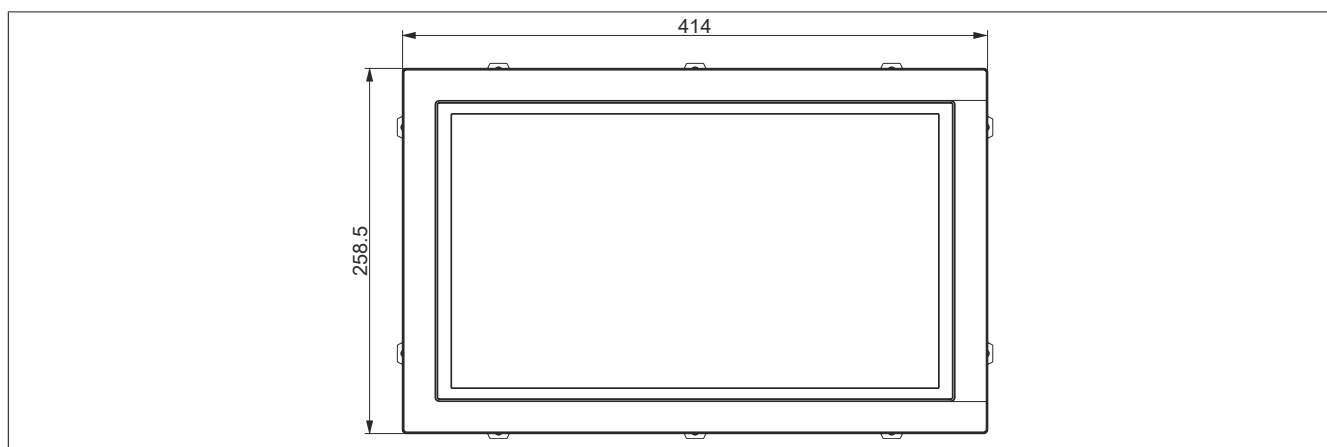


Figure 96: 5AP1120.156B-000 - Dimensions

2.3.2.17.5 Temperature/Humidity diagram



Figure 97: 5AP1120.156B-000 - Temperature/Humidity diagram

2.3.2.18 5AP1130.156C-000

2.3.2.18.1 General information

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

2.3.2.18.2 Order data


Model number	Short description	Figure
5AP1130.156C-000	Panels 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	

Table 98: 5AP1130.156C-000 - Order data

2.3.2.18.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1130.156C-000
General information	
B&R ID code	0xEC5D
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations
DNV GL	Class I, Division 2, Groups ABCD, T4 ¹⁾ Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾
Display	
Type	TFT color
Diagonal	15.6"
Colors	16.7 million
Resolution	FHD, 1920 x 1080 pixels
Contrast	1500:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (dimnable)	Typ. 40 to 400 cd/m ²
Half-brightness time ³⁾	70,000 h
Touch screen ⁴⁾	
Type	3M
Technology	Projected capacitive touch (PCT)
Controller	3M
Transmittance	See section "Touch screen" in appendix A.

Table 99: 5AP1130.156C-000 - Technical data

Technical data

Model number	5AP1130.156C-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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁵⁾	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm built-in gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	3700 g

Table 99: 5AP1130.156C-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 3) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 4) The values for the touch screen driver must be taken into account. See chapter 4 "Software", section 2 "Multi-touch drivers".
- 5) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.18.4 Dimensions

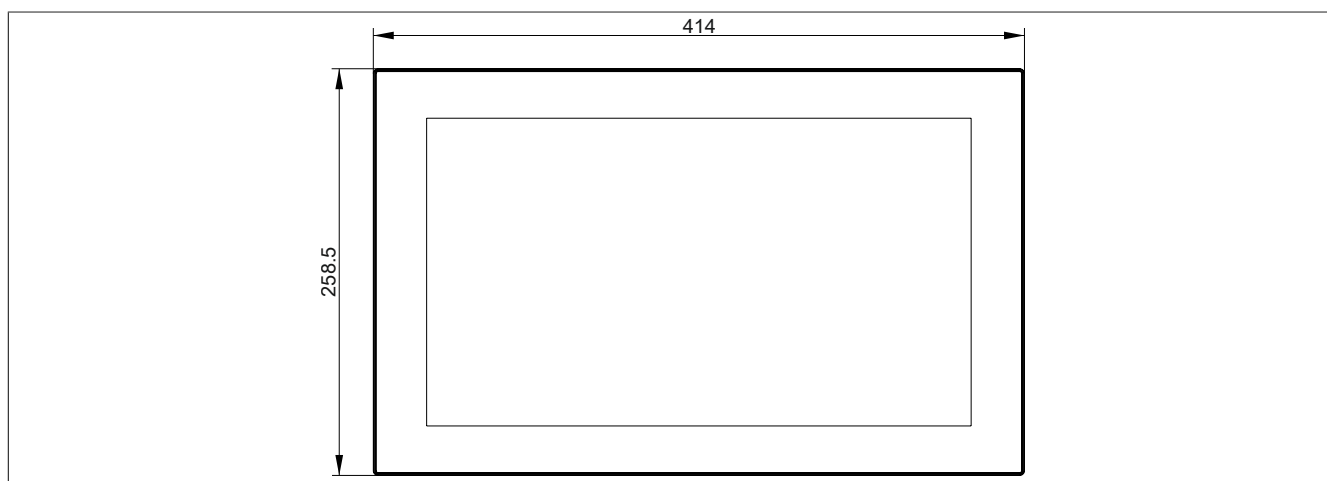


Figure 98: 5AP1130.156C-000 - Dimensions

2.3.2.18.5 Temperature/Humidity diagram

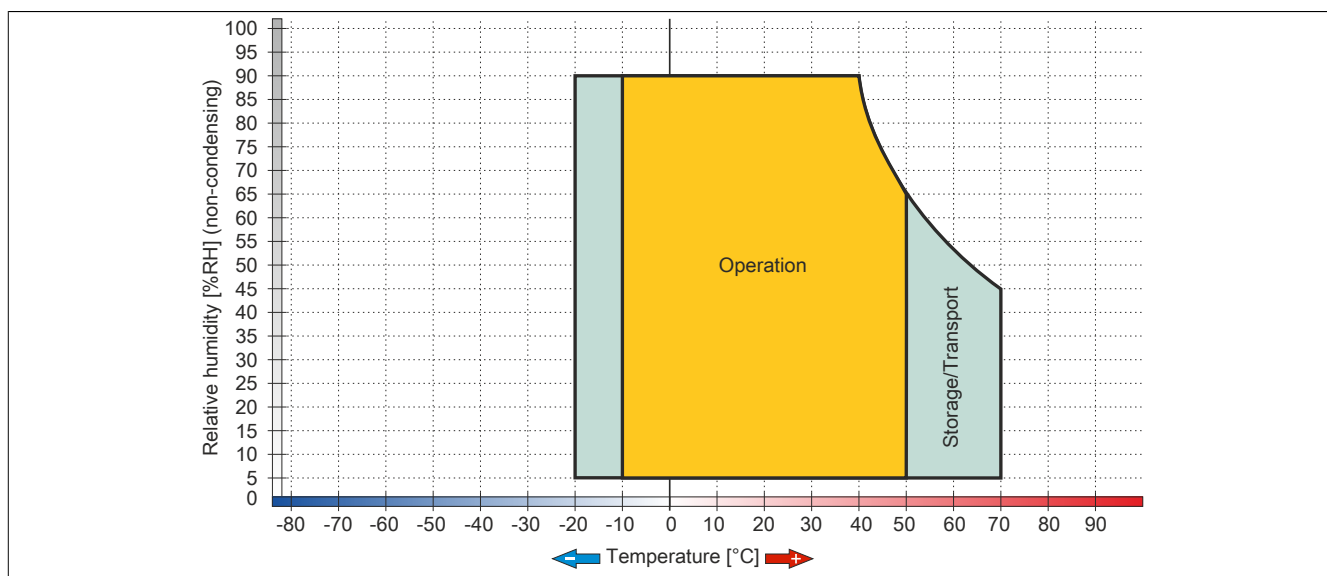


Figure 99: 5AP1130.156C-000 - Temperature/Humidity diagram

2.3.2.19 5AP1130.185C-000

2.3.2.19.1 General information

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

2.3.2.19.2 Order data


Model number	Short description	Figure
5AP1130.185C-000	Panels 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	

Table 100: 5AP1130.185C-000 - Order data

2.3.2.19.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1130.185C-000
General information	
B&R ID code	0xEC5E
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
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 (dimable)	Typ. 40 to 400 cd/m²
Half-brightness time ²⁾	50,000 h
Touch screen ³⁾	
Type	3M
Technology	Projected capacitive touch (PCT)
Controller	3M
Transmittance	See section "Touch screen" in appendix A.
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)
Protection per UL 50	Front: Type 4X indoor use only

Table 101: 5AP1130.185C-000 - Technical data

Model number	5AP1130.185C-000
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm built-in gasket
Dimensions	
Width	475 mm
Height	295 mm
Weight	4700 g

Table 101: 5AP1130.185C-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) The values for the touch screen driver must be taken into account. See chapter 4 "Software", section 2 "Multi-touch drivers".
- 4) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.19.4 Dimensions

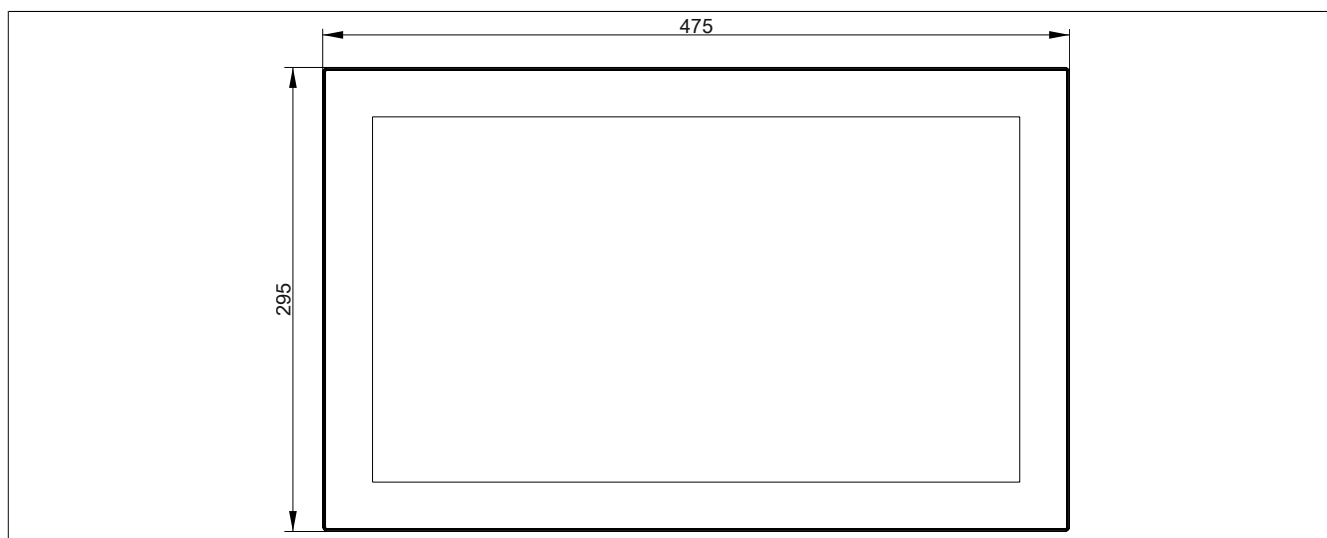


Figure 100: 5AP1130.185C-000 - Dimensions

2.3.2.19.5 Temperature/Humidity diagram



Figure 101: 5AP1130.185C-000 - Temperature/Humidity diagram

2.3.2.20 5AP1120.1906-000

2.3.2.20.1 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

2.3.2.20.2 Order data


Model 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	

Table 102: 5AP1120.1906-000 - Order data

2.3.2.20.3 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Model number	5AP1120.1906-000
General information	
B&R ID code	0xE7BE
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
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°

Table 103: 5AP1120.1906-000 - Technical data

Technical data

Model number	5AP1120.1906-000
Backlight	
Type	LED
Brightness (dimnable)	Typ. 35 to 350 cd/m ²
Half-brightness time ³⁾	70,000 h
Touch screen ⁴⁾	
Type	AMT
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)
Protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁵⁾	
Frame	Naturally anodized aluminum
Keypad overlay	
Material	Polyester
Light background	RAL 9006
Dark gray border around display	RAL 7024
Gasket	3 mm built-in gasket
Dimensions	
Width	527 mm
Height	421 mm
Weight	7300 g

Table 103: 5AP1120.1906-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 3) At an ambient temperature of 25°C. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 4) Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).
- 5) There may be visible deviations in the color and surface appearance depending on the process or batch.

2.3.2.20.4 Dimensions

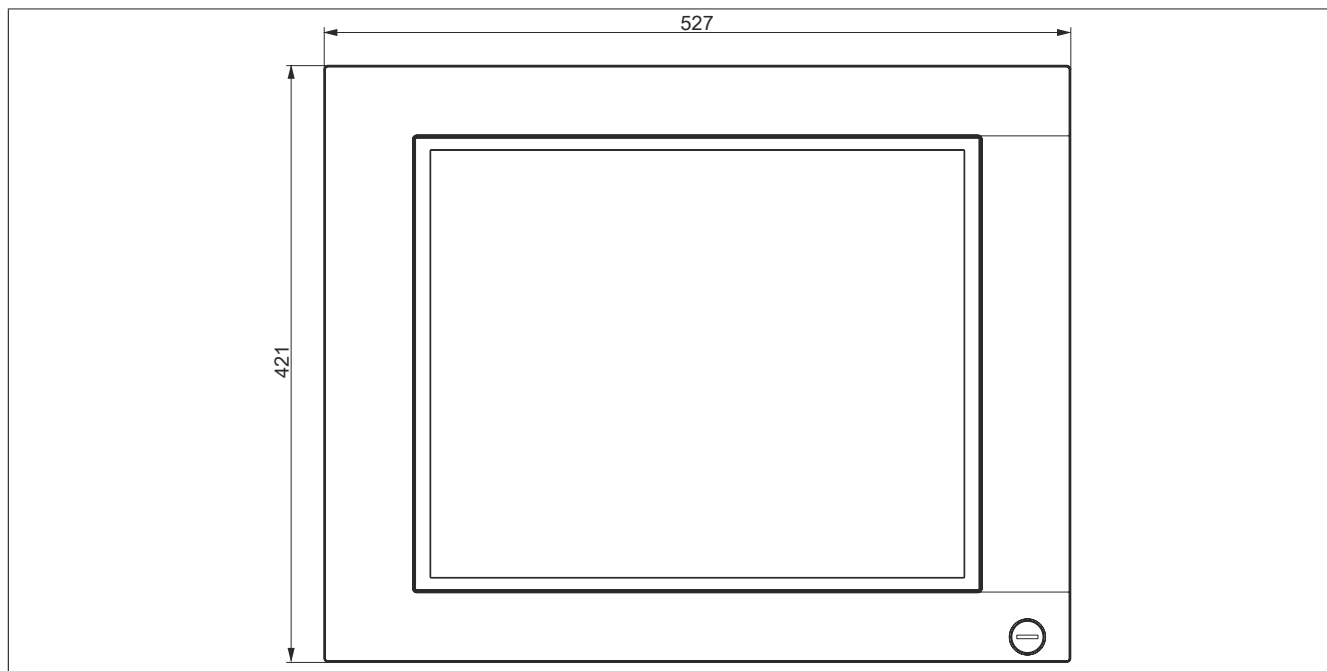


Figure 102: 5AP1120.1906-000 - Dimensions

2.3.2.20.5 Temperature/Humidity diagram

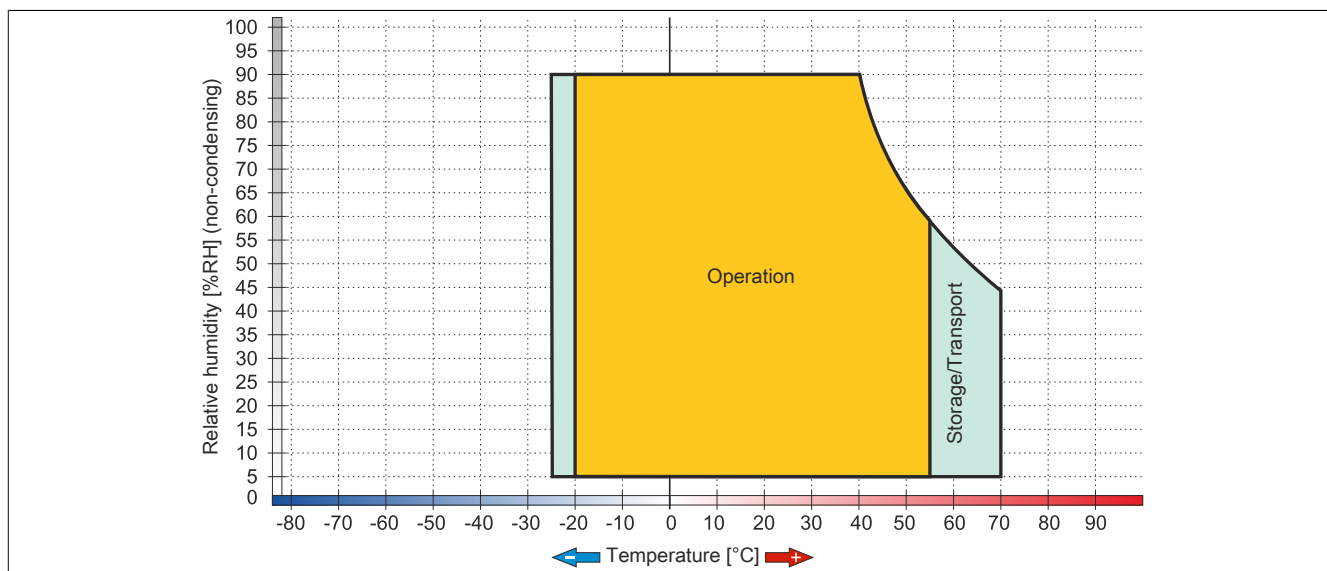


Figure 103: 5AP1120.1906-000 - Temperature/Humidity diagram

2.3.3 System units

2.3.3.1 5PPC2100.BYxx-000

2.3.3.1.1 General information

PPC2100 system units consist of a CPU board, main memory and housing. They include all required interfaces and offer the possibility of installing an interface option. The main memory is permanently soldered to the CPU board and cannot be replaced or expanded.

- Intel Atom processors
- Intel Bay Trail platform
- DDR3 memory
- Intel HD graphics
- 1 CFast slot
- Slot for 1 interface option

2.3.3.1.2 Order data


Model 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 card, 16 GB SLC	
5CFAST.032G-00	CFast card, 32 GB SLC	
5CFAST.032G-10	CFast card, 32 GB MLC	
5CFAST.064G-10	CFast card, 64 GB MLC	
5CFAST.128G-10	CFast card, 128 GB MLC	
5CFAST.256G-10	CFast card, 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 card - 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 RS422/485 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	

Table 104: 5PPC2100.BY01-000, 5PPC2100.BY11-000, 5PPC2100.BY22-000, 5PPC2100.BY34-000, 5PPC2100.BY44-000, 5PPC2100.BY48-000 - Order data

2.3.3.1.3 Technical data

Model number	5PPC2100. BY01-000	5PPC2100. BY11-000	5PPC2100. BY22-000	5PPC2100. BY34-000	5PPC2100. BY44-000	5PPC2100. BY48-000
General information						
Cooling	Passive via housing					
LED status indicators	Power, CFast, Link, Run					
B&R ID code	0xE522	0xE524	0xE545	0xE547	0xE54B	0xED0B
Power button	Yes					
Reset button	Yes					
Buzzer	No					
Certifications						
CE	Yes					
UL	cULus E115267 Industrial control equipment					
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾					
DNV GL	-				Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾	
Controller						
Boot loader	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						
Precision	At 25°C: typ. 12 ppm (1 second) per day ³⁾					
Self-discharge time ⁴⁾	Typ. approx. 400 hours Min. approx. 200 hours					
Battery-backed	No					
Power failure logic						
Controller	MTCX ⁵⁾					
Buffer time	10 ms					
Memory						
Type	DDR3 SDRAM	3	DDR3 SDRAM		3	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 30 Gbit/s)					
USB						
Quantity	2					
Type	1x USB 3.0 1x USB 2.0					
Design	Type A					
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s), SuperSpeed (5 Gbit/s) ⁶⁾					
Current-carrying capacity	Max. 1 A per connection					

Table 105: 5PPC2100.BY01-000, 5PPC2100.BY11-000, 5PPC2100.BY22-000, 5PPC2100.BY34-000, 5PPC2100.BY44-000, 5PPC2100.BY48-000 - Technical data

Technical data

Model number	5PPC2100. BY01-000	5PPC2100. BY11-000	5PPC2100. BY22-000	5PPC2100. BY34-000	5PPC2100. BY44-000	5PPC2100. BY48-000
Ethernet						
Quantity	2					
Design	Shielded RJ45					
Transfer rate	10/100/1000 Mbit/s					
Max. baud rate	1 Gbit/s					
Inserts						
Interface option ⁷⁾	1					
Electrical characteristics						
Nominal voltage	24 VDC ±25% ⁸⁾					
Nominal current	3.5 A					
Inrush current	Typ. 6 A; max. 10 A for <300 µs					
Overvoltage category per EN 61131-2	II					
Electrical 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) ⁹⁾					
Environmental conditions						
Elevation						
Operation	Max. 3000 m (component-dependent) ¹⁰⁾					
Mechanical characteristics						
Dimensions						
Width	190 mm					
Height	115 mm					
Depth	29.7 mm					
Weight	577 g					

Table 105: 5PPC2100.BY01-000, 5PPC2100.BY11-000, 5PPC2100.BY22-000, 5PPC2100.BY34-000, 5PPC2100.BY44-000, 5PPC2100.BY48-000 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 3) At max. specified ambient temperature: typ. 58 ppm (5 seconds) - worst-case 220 ppm (19 seconds).
- 4) The product must be supplied with power for min. 8 hours to achieve the specified puffer duration values.
- 5) Maintenance Controller Extended.
- 6) The SuperSpeed transfer rate (5 Gbit/s) is only possible with USB 3.0.
- 7) The interface option cannot be replaced.
- 8) EN 60950 requirements must be observed; see section "+24 VDC power supply" in the user's manual.
- 9) Only when all interface covers are installed.
- 10) The maximum ambient temperature is typically derated by 1°C per 1000 meters (starting at 500 meters above sea level).

2.3.4 CFast cards

2.3.4.1 General information

CFast cards are easily exchangeable data storage devices. Due to their robustness against environmental influences (temperature, shock, vibration, etc.), CFast cards are ideal for use as storage media in industrial environments.

CFast cards are a variant of CompactFlash that use the SATA protocol instead. CFast cards are not compatible with CompactFlash cards.

2.3.4.2 Basic information

CFast cards used in industrial automation must be extremely reliable. To achieve this, the following points are very important:

- The flash technology used
- An efficient algorithm for maximizing service life
- Good mechanisms for detecting and correcting errors in the flash memory

2.3.4.2.1 Flash technology

CFast cards are currently available with MLC (multi-level cell) and SLC (single-level cell) flash blocks.

In addition to a service life that is 10 times longer than MLC flash blocks, SLC flash blocks also have write/erase cycles that are 33 times faster, making CFast cards with SLC flash blocks the preferred choice for industrial environments. These factors are heavily dependent on the actual application, however, so no blanket statement can be made.

Due to increasing cost pressure as well as improved wear level algorithms and monitoring features (S.M.A.R.T.), MLC flash technology is still also widely used in this market.

2.3.4.2.2 Wear leveling

Wear leveling refers to an algorithm that can be used to maximize the service life of a CFast card. Different algorithms are possible:

- Dynamic wear leveling
- Static wear leveling

The basic idea behind wear leveling is that data is distributed over a broad range of blocks or cells on the data storage device so that the same areas are not erased and rewritten over and over again.

2.3.4.2.2.1 Dynamic wear leveling

Dynamic wear leveling makes it possible to utilize unused flash blocks when writing to a file.

If 80% of the data storage device is already taken up by files, then only 20% can be used for wear leveling.

The service life of the CFast card therefore depends on the unused flash blocks.

2.3.4.2.2.2 Static wear leveling

Static wear leveling additionally monitors which data is only seldom modified. From time to time, the controller moves this data to blocks that have already been written to frequently in order to prevent further wear on those cells.

2.3.4.2.3 ECC error correction

Bit errors can result from the inactivity or operation of a certain cell. Error-correcting code (ECC) added by the hardware or software can detect and correct many errors of this type.

2.3.4.2.4 S.M.A.R.T. support

Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.) is an industry standard for mass storage devices that was introduced to monitor important parameters and detect imminent failures. Critical performance and calibration data is monitored and stored in an effort to predict the probability of error states.

2.3.4.2.5 Calculating the expected service life for an existing application

The following procedure can be used to better verify whether a CFast card with SLC or MLC technology should be used in a particular application.

- Read the "Average erase count" of the data storage device via S.M.A.R.T.
- Fully operate the system with the respective data storage device over a defined period of time (e.g. 1 week).
- Determine the number of completed erase cycles with "Average erase count".
- Calculate the expected service life using the maximum guaranteed write/erase cycles (MLC: 3000, SLC: 100,000).

Example for an MLC CFast card over the period of a week:

$$\text{Expected service life} = \frac{3000 * 1 \text{ week}}{\text{Completed erase cycles}}$$

2.3.4.2.6 Dimensions

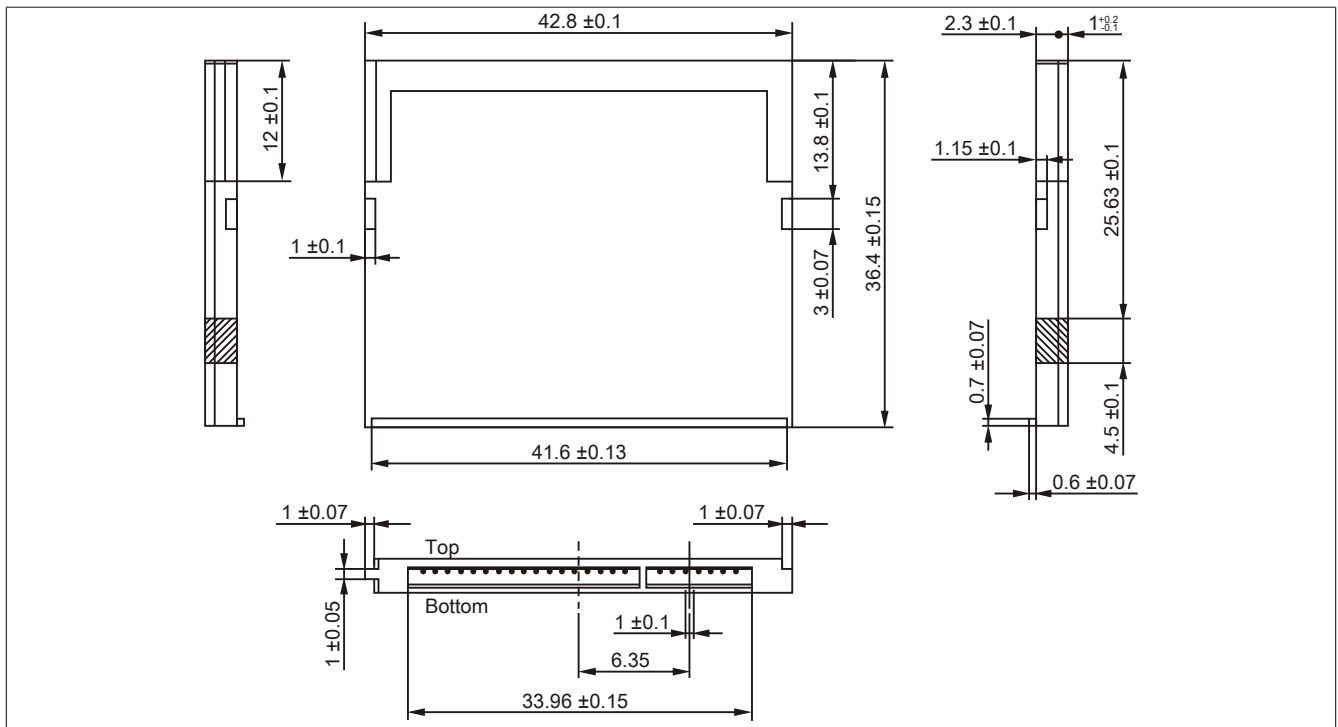


Figure 104: CFast card - Dimensions

2.3.4.3 5CFAST.xxxx-00

2.3.4.3.1 General information

These CFast cards are based on single-level cell (SLC) technology and compatible with SATA 2.6. Their dimensions are identical to CompactFlash cards.

2.3.4.3.2 Order data


Model number	Short description	Figure
	CFast cards	
5CFAST.2048-00	CFast card, 2 GB SLC	
5CFAST.4096-00	CFast card, 4 GB SLC	
5CFAST.8192-00	CFast card, 8 GB SLC	
5CFAST.016G-00	CFast card, 16 GB SLC	
5CFAST.032G-00	CFast card, 32 GB SLC	

Table 106: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Order data

2.3.4.3.3 Technical data

Caution!

A sudden power failure may result in data loss! In very rare cases, the mass storage device may also become damaged.

To prevent damage and loss of data, the use of a UPS is recommended.

Information:

Due to the changeover to the new controller, revision E0 may not be image-compatible to previous revisions when using older cloning tools. This is generally not the case when using current cloning tools.

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5CFAST.2048-00	5CFAST.4096-00	5CFAST.8192-00	5CFAST.016G-00	5CFAST.032G-00
General information					
Capacity	2 GB	4 GB	8 GB	16 GB	32 GB
Data retention ¹⁾	10 years				
Data reliability	<1 unrecoverable error per 10 ¹⁴ bits read				
Lifetime monitoring	Yes				
MTBF	>2,500,000 hours (at 25°C)				
Maintenance	None				
Supported operating modes	SATA 2.6, max. PIO mode 4, Multiword DMA mode 2, Ultra DMA mode 6				
Sequential read					
Typical					
With 128 kB block size	94 MB/s	108 MB/s	108 MB/s	108 MB/s	116 MB/s
With 4 kB block size	42 MB/s	46 MB/s	46 MB/s	46 MB/s	46 MB/s
Maximum					
With 128 kB block size	100 MB/s	115 MB/s	115 MB/s	115 MB/s	120 MB/s
With 4 kB block size	50 MB/s				

Table 107: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

Technical data

Model number	5CFAST.2048-00	5CFAST.4096-00	5CFAST.8192-00	5CFAST.016G-00	5CFAST.032G-00
Sequential write					
Typical					
With 128 kB block size	57 MB/s	86 MB/s	86 MB/s	86 MB/s	111 MB/s
With 4 kB block size	36 MB/s	40 MB/s	40 MB/s	40 MB/s	40 MB/s
Maximum					
With 128 kB block size	65 MB/s	95 MB/s	95 MB/s	95 MB/s	120 MB/s
With 4 kB block size	40 MB/s	45 MB/s	45 MB/s	45 MB/s	45 MB/s
Certifications					
CE	Yes				
UL	cULus E115267 Industrial control equipment				
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ²⁾				
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ³⁾				
GOST-R	Yes				
Endurance ¹⁾					
SLC flash	Yes				
Guaranteed data volume					
Guaranteed ⁴⁾	185 TBW	371 TBW	745 TBW	1468 TBW	2937 TBW
Erase/Write cycles					
Guaranteed	100,000				
Wear leveling	Static				
S.M.A.R.T. support	Yes				
Support					
Hardware	APC3100, APC2200, APC2100, APC910, PPC3100, PPC2200, PPC2100, PPC900				
Operating systems					
Windows 10 IoT Enterprise LTSC 64-bit	No	No	No	No	Yes
Windows Embedded 8.1 Industry Pro 32-bit	No	No	No	Yes	Yes
Windows Embedded 8.1 Industry Pro 64-bit	No	No	No	No	Yes
Windows 7 32-bit	No	No	No	Yes	Yes
Windows 7 64-bit	No	No	No	No	Yes
Windows Embedded Standard 7 32-bit	No	No	No	Yes	Yes
Windows Embedded Standard 7 64-bit	No	No	No	Yes	Yes
Windows XP Professional	No	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	Yes				
B&R Linux 8	No	Yes	Yes	Yes	Yes
B&R Linux 9	No	Yes	Yes	Yes	Yes
Software					
PVI Transfer	≥V4.0.0.8 (part of PVI Development Setup ≥V3.0.2.3014)				
B&R Embedded OS Installer	≥V3.10	≥V3.10	≥V3.10	≥V3.20	≥V3.21
Environmental conditions					
Temperature					
Operation	-40 to 85°C				
Storage	-50 to 100°C				
Transport	-50 to 100°C				
Relative humidity					
Operation	Max. 85% at 85°C, non-condensing				
Storage	Max. 85% at 85°C, non-condensing				
Transport	Max. 85% at 85°C, non-condensing				
Vibration					
Operation	10 to 2000 Hz: 20 g peak				
Storage	10 to 2000 Hz: 20 g peak				
Transport	10 to 2000 Hz: 20 g peak				
Shock					
Operation	1500 g peak, 0.5 ms				
Storage	1500 g peak, 0.5 ms				
Transport	1500 g peak, 0.5 ms				

Table 107: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

Model number	5CFAST.2048-00	5CFAST.4096-00	5CFAST.8192-00	5CFAST.016G-00	5CFAST.032G-00
Mechanical properties					
Dimensions					
Width	42.8 ±0.10 mm				
Length	36.4 ±0.10 mm				
Depth	3.6 ±0.10 mm				
Weight	10 g				

Table 107: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Technical data

- 1) Per JEDEC (JESD47), EOL conditions are not permitted to be reached before 18 months. A higher average of the daily write workload reduces the expected service life and data retention of the data storage device.
- 2) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 3) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 4) TBW = Terabytes written
Sequential access without a file system

2.3.4.3.4 Temperature/Humidity diagram

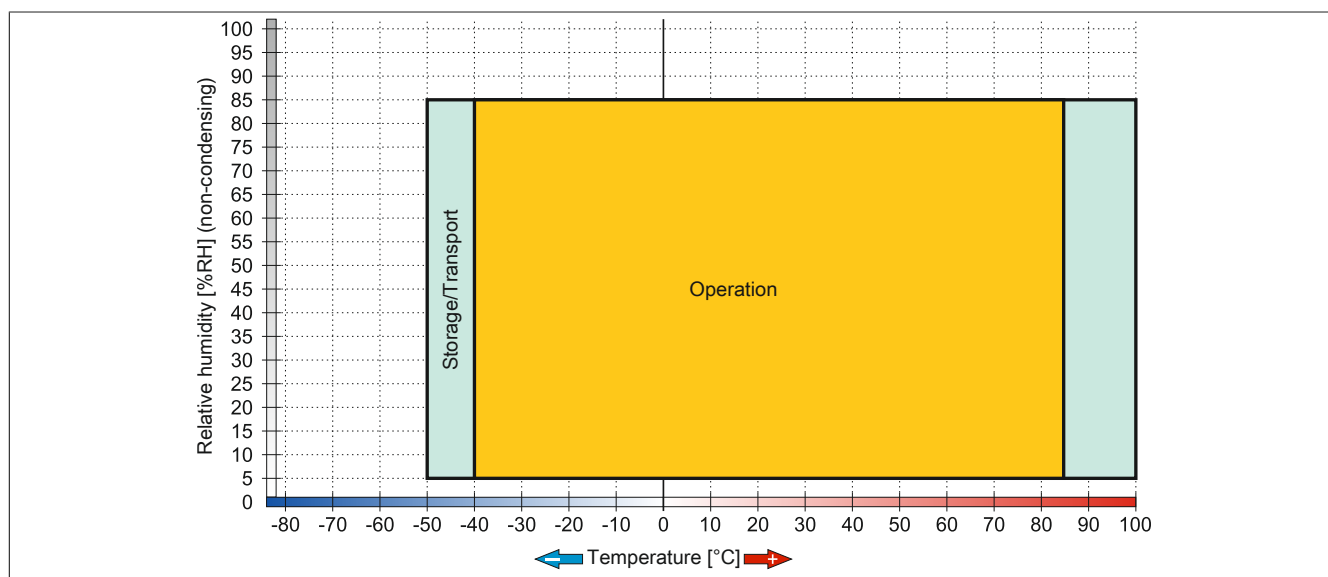


Figure 105: 5CFAST.xxxx-00 - Temperature/Humidity diagram

2.3.4.3.5 Dimensions

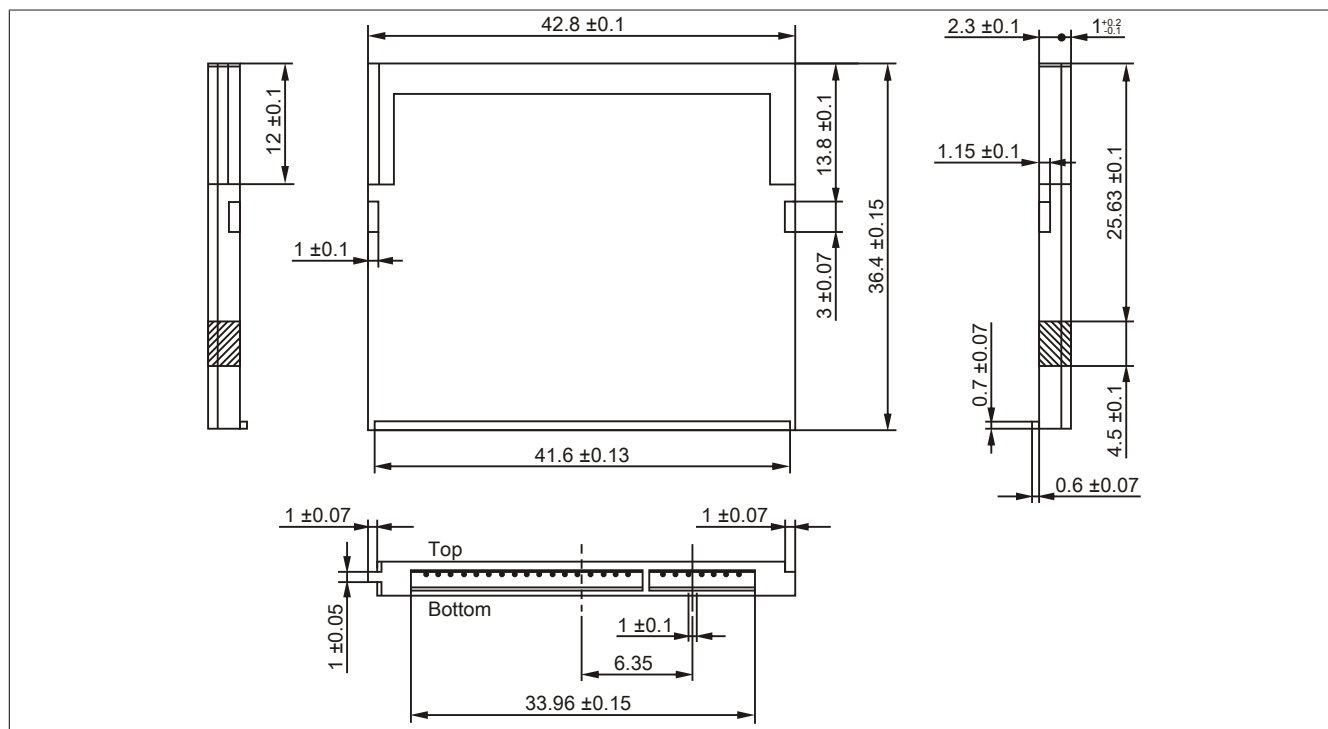


Figure 106: CFAST card - Dimensions

2.3.4.4 5CFAST.xxxx-10

2.3.4.4.1 General information

These CFast cards are based on multi-level cell (MLC) technology and compatible with SATA 3. Their dimensions are identical to CompactFlash cards.

2.3.4.4.2 Order data


Model number	Short description	Figure
	CFast cards	
5CFAST.032G-10	CFast 32 GB MLC CFast 32 GB MLC ≥Rev. G0	
5CFAST.064G-10	CFast card, 64 GB MLC ≥Rev. E0	
5CFAST.128G-10	CFast card, 128 GB MLC ≥Rev. E0	
5CFAST.256G-10	CFast card, 256 GB MLC	

Table 108: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Order data


Model number	Short description	Figure
	CFast cards	
5CFAST.032G-10	CFast card, 32 GB MLC ≤Rev. F0	
5CFAST.064G-10	CFast card, 64 GB MLC ≤Rev. D0	
5CFAST.128G-10	CFast card, 128 GB MLC ≤Rev. D0	

Table 109: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10 - Order data

2.3.4.4.3 Technical data

Caution!

A sudden power failure may result in data loss! In very rare cases, the mass storage device may also become damaged.

To prevent damage and loss of data, the use of a UPS is recommended.

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Product ID	5CFAST.032G-10 ≥Rev. G0	5CFAST.064G-10 ≥Rev. E0	5CFAST.128G-10 ≥Rev. E0	5CFAST.256G-10
General information				
Capacity	32 GB	64 GB	128 GB	256 GB
Data retention ¹⁾	10 years ²⁾			
Data reliability	<1 unrecoverable error per 10 ¹⁶ bits read			
Lifetime monitoring	Yes			
MTBF	>2,000,000 hours (at 25°C)			
Maintenance	None			

Table 110: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Technical data

Product ID	5CFAST.032G-10 ≥Rev. G0	5CFAST.064G-10 ≥Rev. E0	5CFAST.128G-10 ≥Rev. E0	5CFAST.256G-10
General information				
Supported operating modes	SATA 3, SATA 2, SATA 1			
Sequential read				
Maximum	495 MB/s	500 MB/s	500 MB/s	500 MB/s
Sequential write				
Maximum	115 MB/s	100 MB/s	195 MB/s	330 MB/s
Certifications				
CE	Yes			
UL	cULus E115267 Industrial control equipment			
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations			
DNV GL	Class I, Division 2, Groups ABCD, T4 ³⁾ Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ⁴⁾			
Endurance ¹⁾				
MLC flash	Yes			
Guaranteed data volume				
Guaranteed ⁵⁾	86.4 TBW	172.8 TBW	345.6 TBW	691.2 TBW
Client workload ⁶⁾	39.06 TBW	71.02 TBW	104.17 TBW	159.57 TBW
Erase/Write cycles				
Guaranteed	3000			
Wear leveling	Static			
Error correction coding (ECC)	Yes			
S.M.A.R.T. support	Yes			
Support				
Hardware	APC3100, APC2200, APC2100, APC910, PPC3100, PPC2200, PPC2100, PPC900			
Operating systems				
Windows 10 IoT Enterprise LTSB 64-bit	Yes			
Windows Embedded 8.1 Industry Pro 32-bit	Yes			
Windows Embedded 8.1 Industry Pro 64-bit	Yes			
Windows 7 32-bit	Yes			
Windows 7 64-bit	Yes			
Windows Embedded Standard 7 32-bit	Yes			
Windows Embedded Standard 7 64-bit	Yes			
Windows XP Professional	Yes			
Windows Embedded Standard 2009	Yes			
B&R Linux 8	Yes			
B&R Linux 9	Yes			
Software				
PVI Transfer	≥V4.0.20 or V4.1.5	≥V4.0.20 or V4.1.5	≥V4.0.22 or V4.1.6	≥V4.0.22 or V4.1.6
B&R Embedded OS Installer	≥V3.21			
Environmental conditions				
Temperature				
Operation	-40 to 85°C			
Storage	-40 to 85°C			
Transport	-40 to 85°C			
Relative humidity				
Operation	Max. 85% at 85°C, non-condensing			
Storage	Max. 85% at 85°C, non-condensing			
Transport	Max. 85% at 85°C, non-condensing			
Vibration				
Operation	10 to 2000 Hz: 20 g peak			
Storage	10 to 2000 Hz: 20 g peak			
Transport	10 to 2000 Hz: 20 g peak			
Shock				
Operation	1500 g peak, 0.5 ms			
Storage	1500 g peak, 0.5 ms			
Transport	1500 g peak, 0.5 ms			

Table 110: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Technical data

Technical data

Product ID	5CFAST.032G-10 ≥Rev. G0	5CFAST.064G-10 ≥Rev. E0	5CFAST.128G-10 ≥Rev. E0	5CFAST.256G-10
General information				
Mechanical properties				
Dimensions				
Width	42.8 ±0.10 mm			
Length	36.4 ±0.10 mm			
Depth	3.6 ±0.10 mm			
Weight	10 g			

Table 110: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Technical data

- 1) Per JEDEC (JESD47), EOL conditions are not permitted to be reached before 18 months. A higher average daily write workload reduces the expected service life and data retention of the data storage device.
- 2) At an ambient temperature of 25°C at the start of service life.
- 3) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 4) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 5) TBW = Terabytes written
Sequential access without a file system
- 6) TBW = Terabytes written
Client workload per standard JEDEC JESD219

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Product ID	5CFAST.032G-10 ≤Rev. F0	5CFAST.064G-10 ≤Rev. D0	5CFAST.128G-10 ≤Rev. D0
General information			
Capacity	32 GB	64 GB	128 GB
Data retention ¹⁾	10 years ²⁾		
Data reliability	<1 unrecoverable error per 10 ¹⁷ bits read		
Lifetime monitoring	Yes		
MTBF	>3,000,000 hours (at 25°C)		
Maintenance	None		
Supported operating modes	SATA 3, SATA 2, SATA 1		
Sequential read			
Maximum	300 MB/s	310 MB/s	310 MB/s
Sequential write			
Maximum	75 MB/s	150 MB/s	150 MB/s
Certifications			
CE	Yes		
UL	cULus E115267 Industrial control equipment		
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ³⁾		
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ⁴⁾		
Endurance ¹⁾			
MLC flash	Yes		
Guaranteed data volume			
Guaranteed ⁵⁾	86.4 TBW	172.8 TBW	345.6 TBW
Erase/Write cycles			
Guaranteed	3000		
Wear leveling	Static		
Error correction coding (ECC)	Yes		
S.M.A.R.T. support	Yes		
Support			
Hardware	APC2100, APC910, PPC2100, PPC900		

Table 111: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10 - Technical data

Product ID	5CFAST.032G-10 ≤Rev. F0	5CFAST.064G-10 ≤Rev. D0	5CFAST.128G-10 ≤Rev. D0
General information			
Operating systems			
Windows 10 IoT Enterprise LTSC 64-bit		Yes	
Windows Embedded 8.1 Industry Pro 32-bit		Yes	
Windows Embedded 8.1 Industry Pro 64-bit		Yes	
Windows 7 32-bit		Yes	
Windows 7 64-bit		Yes	
Windows Embedded Standard 7 32-bit		Yes	
Windows Embedded Standard 7 64-bit		Yes	
Windows XP Professional		Yes	
Windows Embedded Standard 2009		Yes	
B&R Linux 8		Yes	
Software			
PVI Transfer	≥V4.0.20 or V4.1.5	≥V4.0.20 or V4.1.5	≥V4.0.22 or V4.1.6
B&R Embedded OS Installer		≥V3.21	
Environmental conditions			
Temperature			
Operation		-40 to 85°C	
Storage		-55 to 95°C	
Transport		-55 to 95°C	
Relative humidity			
Operation		10 to 95%, non-condensing	
Storage		10 to 95%, non-condensing	
Transport		10 to 95%, non-condensing	
Vibration			
Operation		7 to 2000 Hz: 20 g peak	
Storage		7 to 2000 Hz: 20 g peak	
Transport		7 to 2000 Hz: 20 g peak	
Shock			
Operation		1500 g peak, 0.5 ms	
Storage		1500 g peak, 0.5 ms	
Transport		1500 g peak, 0.5 ms	
Mechanical properties			
Dimensions			
Width		42.8 ±0.10 mm	
Length		36.4 ±0.10 mm	
Depth		3.6 ±0.10 mm	
Weight		10 g	

Table 111: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10 - Technical data

- 1) Per JEDEC (JESD47), EOL conditions are not permitted to be reached before 18 months. A higher average daily write workload reduces the expected service life and data retention of the data storage device.
- 2) At an ambient temperature of 25°C at the start of service life.
- 3) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 4) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 5) TBW = Terabytes written
Sequential access without a file system

2.3.4.4.4 Temperature/Humidity diagrams

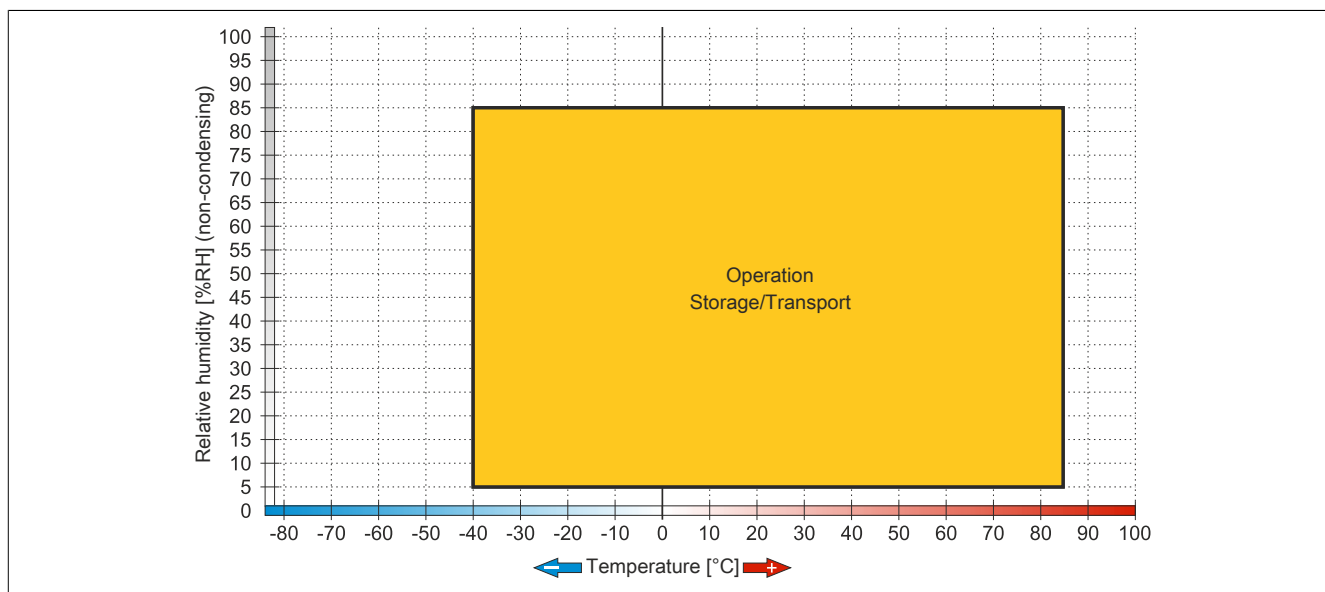


Figure 107: 5CFAST.032G-10 ≥Rev. G0, 5CFAST.064G-10 ≥Rev. E0, 5CFAST.128G-10 ≥Rev. E0, 5CFAST.256G-10 - Temperature/Humidity diagram

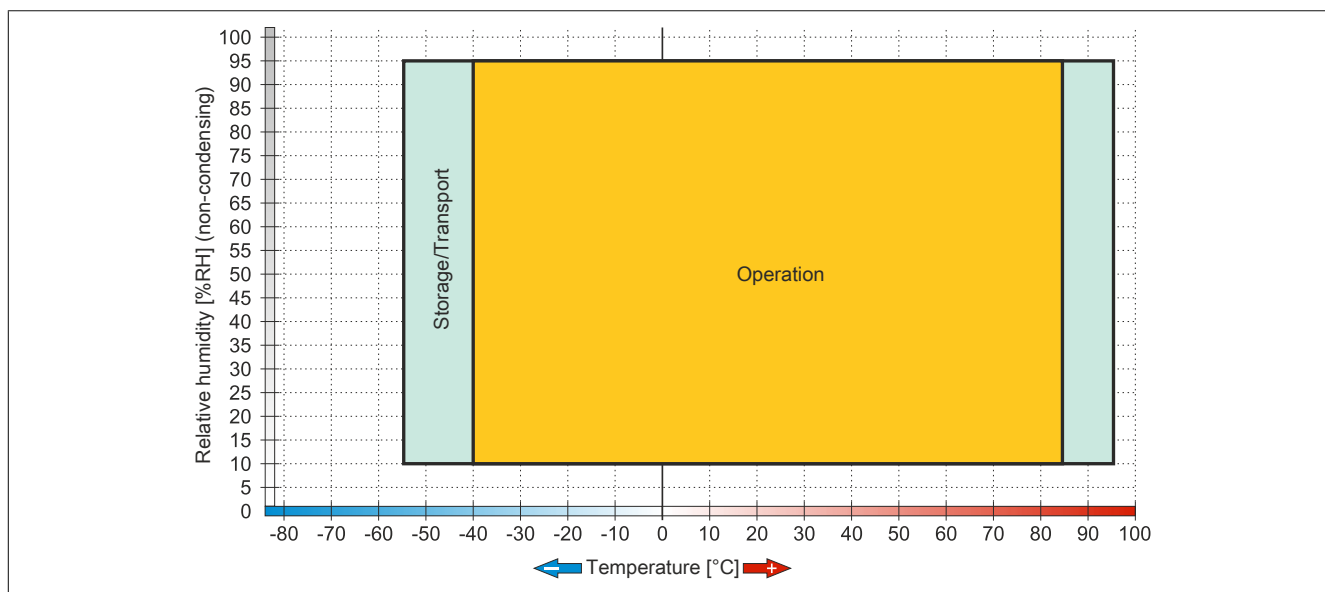


Figure 108: 5CFAST.032G-10 ≤Rev. F0, 5CFAST.064G-10 ≤Rev. D0, 5CFAST.128G-10 ≤Rev. D0 - Temperature/Humidity diagram

2.3.4.4.5 Write protection

Write protection can prevent data from being deleted or changed on the CFast card. If write protection is enabled, data can only be read.

Information:

If an operating system is installed on the CFast card, write protection must be disabled.

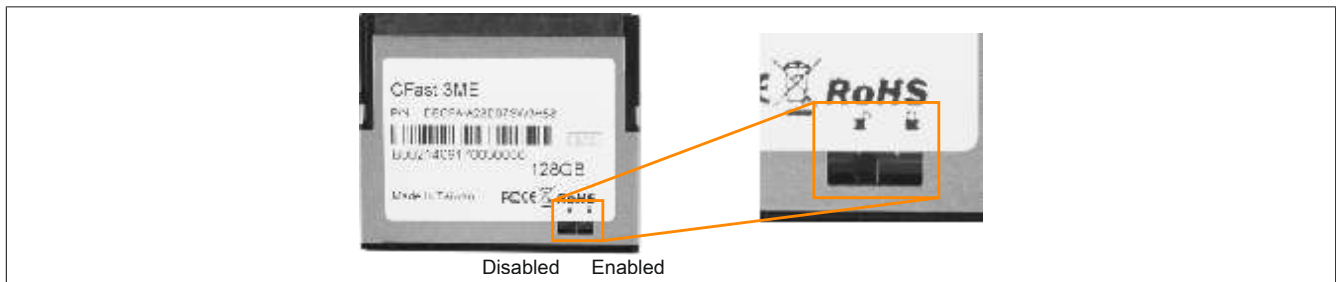


Figure 109: CFast card - Write protection

Write protection is only present on the following CFast cards:

- 5CFAST.032G-10 ≤Rev. F0
- 5CFAST.064G-10 ≤Rev. D0
- 5CFAST.128G-10 ≤Rev. D0

2.3.5 Interface options

Information:

It is important to note that not every interface option can be connected in interface slots IF1 and IFx. For more information, see section "IF option slot (IF1, IFx)" on page 56.

Information:

Interface options can only be installed and replaced by B&R.

2.3.5.1 5ACCIF01.FPCC-000

2.3.5.1.1 General information

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

- 1x POWERLINK interface for 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.

2.3.5.1.2 Order data


Model 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	

Table 112: 5ACCIF01.FPCC-000 - Order data

2.3.5.1.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FPCC-000
General information	
LED status indicators	L1, L2, L3
B&R ID code	0xE9BD
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations
DNV GL	Class I, Division 2, Groups ABCD, T4 ¹⁾ Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾

Table 113: 5ACCIF01.FPCC-000 - Technical data

Model number	5ACCIF01.FPCC-000
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see Automation Help)
Interfaces	
POWERLINK	
Quantity	1
Transfer	100BASE-TX
Type	Type 4 ³⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
CAN	
Quantity	2
Design	10-pin, male ⁴⁾
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be enabled or disabled using a slide switch ⁵⁾
X2X	
Type	X2X Link master
Quantity	1
Design	10-pin, male, electrically isolated
Electrical characteristics	
Power consumption	2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 113: 5ACCIF01.FPCC-000 - Technical data

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

2.3.5.1.3.1 POWERLINK interface - Pinout

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

POWERLINK - IF1 ¹⁾²⁾		
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Status LED	On	Off
Green	See Status/Error LED.	
Link LED	On	Off
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)

RJ45, female

1

LED "Link"

LED "Status"

Table 114: 5ACCIF01.FPCC-000 - POWERLINK interface

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

2.3.5.1.3.2 CAN bus 1 interface - Pinout

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

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

CAN bus 1 - IFx ¹⁾²⁾	
The electrically isolated CAN bus interface is a 10-pin female connector.	
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Pin	Assignment
1	-
2	Shield
3	-
4	-
5	CAN H
6	CAN L
7	CAN GND
8	-
9	-
10	-

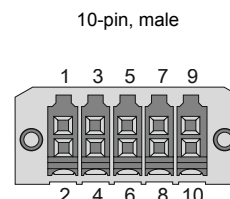


Table 115: 5ACCIF01.FPCC-000 - CAN bus 1 interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

CAN driver settings

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

Bit timing register 1	Bit timing register 0	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

Table 116: CAN driver settings

CAN1 - Bus length and cable type

The type of cable to be used depends largely on the required bus length and number of nodes. The bus length is determined by the bit rate. In accordance with CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Extension	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
≤15 m ¹⁾	Typ. 1 Mbit/s

Table 117: CAN1 - Bus length and transfer rate

- 1) The specified cable length is only valid with the values specified in Tab. 116 "CAN driver settings". Cable lengths additionally depend on the values in the timing register.

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 118: CAN cable requirements

Terminating resistor

A terminating resistor is integrated in the interface option above the ETH1 interface. A switch is used to switch the terminating resistor on or off for the CAN bus 1 interface. The L1 LED status indicator indicates whether the terminating resistor is switched on or off. The terminating resistor cannot be switched on/off for the CAN bus 2 interface.

Terminating resistor	
On	The terminating resistor is switched on.
Off	The terminating resistor is switched off.


Terminating resistor
On
Off

Table 119: Terminating resistor

2.3.5.1.3.3 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/off for the CAN bus 2 interface. A terminating resistor must therefore be taken into account when wiring.

CAN bus 2 - IFx ⁽¹⁾⁽²⁾	
The CAN bus interface is a 10-pin female connector without electrical isolation.	
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Pin	Assignment
1	-
2	Shield
3	-
4	-
5	-
6	-
7	-
8	CAN GND
9	CAN L
10	CAN H

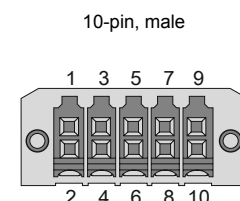


Table 120: 5ACCIF01.FPCC-000 - CAN bus 2 interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF4 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

CAN driver settings

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

Bit timing register 1	Bit timing register 0	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

Table 121: CAN driver settings

CAN2 - Bus length and cable type

The type of cable to be used depends largely on the required bus length and number of nodes. The bus length is determined by the bit rate. In accordance with CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Extension	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
<20 m ¹⁾	Typ. 1 Mbit/s

Table 122: CAN2 - Bus length and transfer rate

- 1) The specified cable length is only valid with the values specified in Tab. 121 "CAN driver settings". Cable lengths additionally depend on the values in the timing register.

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 123: CAN cable requirements

2.3.5.1.3.4 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⁾	
The electrically isolated X2X Link master interface is a 10-pin connector.	
Pin	Assignment
1	X2X H
2	Shield
3	X2X L
4	X2X GND
5	-
6	-
7	-
8	-
9	-
10	-

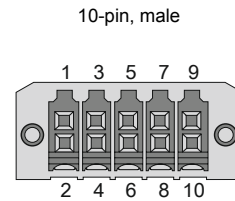


Table 124: 5ACCIF01.FPCC-000 - X2X Link master interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF2 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

2.3.5.1.3.5 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector. A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.1.3.6 LED status indicators - L1, L2, L3

The interface option has 3 integrated LEDs located above the terminating resistor.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus 1 terminating resistor is enabled.
		Off	The CAN bus 1 terminating resistor is disabled.
L2	Green	On	POWERLINK Link LED Indicates a connection to a POWERLINK network.
		Blinking	POWERLINK Link LED Data transfer in progress.
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"".
		Off	POWERLINK Status/Error LED See "LED "Status/Error"".

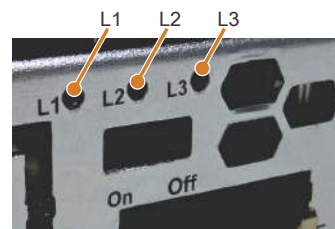


Table 125: 5ACCIF01.FPCC-000 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 126: LED "Status/Error" - Ethernet mode

POWERLINK

Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> BASIC_ETHERNET PRE_OPERATIONAL_1 PRE_OPERATIONAL_2 READY_TO_OPERATE

Table 127: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>

Table 128: LED "Status/Error" - POWERLINK - Status

Green - Status	Description
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	State The interface is in state PRE_OPERATIONAL_2. Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state. Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.
Triple flash (approx. 1 Hz) READY_TO_OPERATE	State The interface is in state READY_TO_OPERATE. Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored. Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.
On OPERATIONAL	State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.
Blinking (approx. 2.5 Hz) STOPPED	State The interface is in state STOPPED. Managing node (MN) This state is not possible for the MN. Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.

Table 128: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 129: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.1.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.2 5ACCIF01.FPCS-000

2.3.5.2.1 General information

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

- 1x POWERLINK interface for 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.

2.3.5.2.2 Order data


Model 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	

Table 130: 5ACCIF01.FPCS-000 - Order data

2.3.5.2.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FPCS-000
General information	
LED status indicators	L1, L2, L3
B&R ID code	0xED7C
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
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 (e.g. for Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS485, not electrically isolated
Design	10-pin, male
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
POWERLINK	
Quantity	1
Transfer	100BASE-TX
Type	Type 4 ²⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)

Table 131: 5ACCIF01.FPCS-000 - Technical data

Model number	5ACCIF01.FPCS-000
CAN	
Quantity	1
Design	10-pin, male, not electrically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be enabled or disabled using a slide switch
Electrical characteristics	
Power consumption	1.75 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 131: 5ACCIF01.FPCS-000 - Technical data

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

2.3.5.2.3.1 POWERLINK interface - Pinout

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

POWERLINK - IF1 ¹⁾²⁾		
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Status LED	On	Off
Green	See Status/Error LED.	
Link LED	On	Off
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)

RJ45, female

1

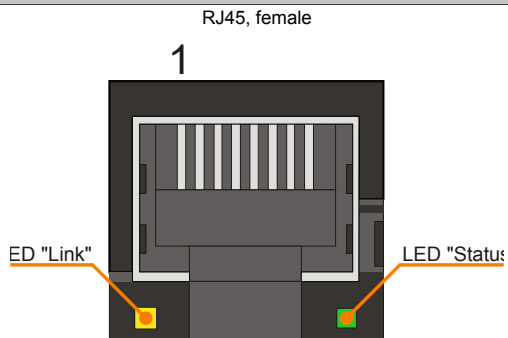


Table 132: 5ACCIF01.FPCS-001 - POWERLINK interface

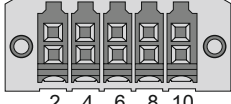
- 1) The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) This interface is referred to as IF1 in Automation Studio / Automation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

2.3.5.2.3.2 COM serial interface - Pinout

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

Serial interface COM - IFx ¹⁾²⁾	
	RS485
Type	RS485, not electrically isolated
UART	16550-compatible, 16-byte FIFO
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	Assignment
1	-
2	Shield
3	-
4	-
5	-
6	-

10-pin, male



The diagram shows a 10-pin male connector with two circular mounting holes on the sides. The pins are arranged in two rows of five. The top row is numbered 1, 3, 5, 7, 9 from left to right. The bottom row is numbered 2, 4, 6, 8, 10 from left to right.

Table 133: 5ACCIF01.FPCS-000 - COM interface

Serial interface COM - IFx ^(1,2)		
7	-	
8	COM GND	
9	DATA\	
10	DATA	

Table 133: 5ACCIF01.FPCS-000 - COM interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF7 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

The RTS line must be switched by the driver for each transmission or reception; there is no automatic switch-back mechanism.

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

2.3.5.2.3.3 RS485 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable length as well as the type of cable being used.

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 134: RS485 - Bus length and transfer rate

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

RS485 cables	Property
Signal lines	
Cable cross section	4x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor cross section	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 135: RS485 - Cable requirements

2.3.5.2.3.4 CAN bus interface - Pinout

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

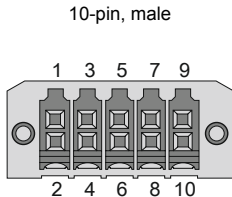
CAN bus - IFx ^(1,2)		
The CAN bus interface is a 10-pin female connector without electrical isolation.		
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
Pin	Assignment	
1	-	
2	Shield	
3	-	
4	-	
5	CAN H	
6	CAN L	
7	CAN GND	
8	-	
9	-	
10	-	

Table 136: 5ACCIF01.FPCS-000 - CAN bus interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

CAN driver settings

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

Bit timing register 1	Bit timing register 0	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

Table 137: CAN driver settings

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 bit rate. In accordance with CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Extension	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
<20 m ¹⁾	Typ. 1 Mbit/s

Table 138: CAN - Bus length and transfer rate

- 1) The specified cable length is only valid with the values specified in Tab. 137 "CAN driver settings". Cable lengths additionally depend on the values in the timing register.

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 139: CAN cable requirements

Terminating resistor

A terminating resistor is integrated in the interface option above the ETH1 interface. A switch is used to enable or disable the terminating resistor for the CAN bus interface. The L1 LED status indicator indicates whether the terminating resistor is switched on or off.

Terminating resistor	
On	The terminating resistor is switched on.
Off	The terminating resistor is switched off.



Table 140: Terminating resistor

2.3.5.2.3.5 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector.

A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.2.3.6 LED status indicators

The interface option has 3 integrated LEDs located above the terminating resistor.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is enabled.
		Off	The CAN bus terminating resistor is disabled.
L2	Green	On	POWERLINK Link LED Indicates a connection to a POWERLINK network.
		Blinking	POWERLINK Link LED Data transfer in progress.
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"".
		Off	POWERLINK Status/Error LED See "LED "Status/Error"".

Table 141: 5ACCIF01.FPCS-000 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 142: LED "Status/Error" - Ethernet mode

POWERLINK

Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> • BASIC_ETHERNET • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE <p>The diagram illustrates the LED behavior during an error state. It consists of three vertically stacked plots sharing a common time axis 't'.</p> <ul style="list-style-type: none"> Status Green: Shows a series of periodic green pulses. Error Red: Shows a single, long red pulse that occurs during the period when Status Green is pulsing. LED "S/E": Shows the combined LED output. During the error state (red pulse), the LED alternates between green and red, with green being dominant. Outside the error state, it shows only green pulses.

Table 143: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	<p>State The interface is in state PRE_OPERATIONAL_2.</p> <p>Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state.</p> <p>Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.</p>
Triple flash (approx. 1 Hz) READY_TO_OPERATE	<p>State The interface is in state READY_TO_OPERATE.</p> <p>Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored.</p> <p>Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.</p>
On OPERATIONAL	<p>State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.</p>
Blinking (approx. 2.5 Hz) STOPPED	<p>State The interface is in state STOPPED.</p> <p>Managing node (MN) This state is not possible for the MN.</p> <p>Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.</p>

Table 144: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 145: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.2.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.3 5ACCIF01.FPLK-000

2.3.5.3.1 General information

Interface option 5ACCIF01.FPLK-000 is equipped with 2 female RJ45 connectors connected to an integrated POWERLINK hub. 512 kB of nvSRAM is also installed.

The integrated 2-port hub allows for the easiest possible implementation of a simple tree structure, daisy chain wiring or optional ring redundancy without extra effort.

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

- 1x POWERLINK interface for real-time communication
- 512 kB nvSRAM
- Integrated hub for efficient cabling
- 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 and simultaneous poll-response chaining operation is not possible with this IF option.

2.3.5.3.2 Order data


Model 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	

Table 146: 5ACCIF01.FPLK-000 - Order data

2.3.5.3.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

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

Table 147: 5ACCIF01.FPLK-000 - Technical data

Technical data

Model number	5ACCIF01.FPLK-000
Interfaces	
POWERLINK	
Quantity	1 (integrated 2-port hub)
Transfer	100BASE-TX
Type	Type 4, redundant ²⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
Electrical characteristics	
Power consumption	1.75 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 147: 5ACCIF01.FPLK-000 - Technical data

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

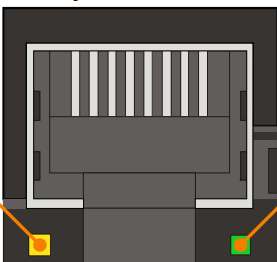
2.3.5.3.3.1 POWERLINK 1 interface - Pinout

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

POWERLINK 1 - IF1 ¹⁾		
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Status LED	On	Off
Green	See Status/Error LED.	
Link LED	On	Off
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)

RJ45, female

1



ED "Link"

LED "Status"

Table 148: 5ACCIF01.FPLK-000 - POWERLINK 1 interface

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

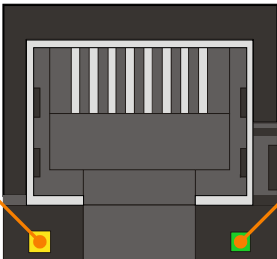
2.3.5.3.3.2 POWERLINK 2 interface - Pinout

The POWERLINK 2 interface on the system unit is referred to as IFx.

POWERLINK 2 - IFx ¹⁾			
Wiring	S/STP (Cat 5e)		
Cable length	Max. 100 m (min. Cat 5e)		
Status LED	On	Off	
Green	See Status/Error LED.		
Link LED	On	Off	
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)	

RJ45, female

1



ED "Link"

LED "Status"

Table 149: 5ACCIF01.FPLK-000 - POWERLINK 2 interface

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

2.3.5.3.3 LED status indicators - L1, L2, L3

3 LEDs are integrated on the interface option.

LED status indicators			
LED	Color	Status	Explanation
L1	Green	On	POWERLINK 2 Link LED Indicates a connection to a POWERLINK network.
		Blinking	POWERLINK 2 Link LED Data transfer in progress.
L2	Green	On	POWERLINK 1 Link LED Indicates a connection to a POWERLINK network.
		Blinking	POWERLINK 1 Link LED Data transfer in progress.
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"".
		Off	POWERLINK Status/Error LED See "LED "Status/Error"".

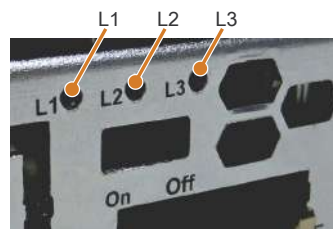


Table 150: 5ACCIF01.FPLK-000 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 151: LED "Status/Error" - Ethernet mode

POWERLINK

Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> BASIC_ETHERNET PRE_OPERATIONAL_1 PRE_OPERATIONAL_2 READY_TO_OPERATE

Table 152: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	<p>State The interface is in state PRE_OPERATIONAL_2.</p> <p>Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state.</p> <p>Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.</p>
Triple flash (approx. 1 Hz) READY_TO_OPERATE	<p>State The interface is in state READY_TO_OPERATE.</p> <p>Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored.</p> <p>Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.</p>
On OPERATIONAL	<p>State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.</p>
Blinking (approx. 2.5 Hz) STOPPED	<p>State The interface is in state STOPPED.</p> <p>Managing node (MN) This state is not possible for the MN.</p> <p>Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.</p>

Table 153: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 154: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.3.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.4 5ACCIF01.FPLS-000

2.3.5.4.1 General information

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

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

2.3.5.4.2 Order data


Model 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	

Table 155: 5ACCIF01.FPLS-000 - Order data

2.3.5.4.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FPLS-000
General information	
LED status indicators	L2, L3
B&R ID code	0xE540
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾
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 (e.g. for Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS232, modem supported, not electrically isolated
Design	10-pin, male
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
POWERLINK	
Quantity	1
Transfer	100BASE-TX
Type	Type 4 ³⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)

Table 156: 5ACCIF01.FPLS-000 - Technical data

2.3.5.4.3.3 LED status indicators - L2, L3

2 LEDs are integrated on the interface option.

LED status indicators			
LED	Color	Status	Explanation
L1	-	-	-
L2	Green	On	POWERLINK Link LED Indicates a connection to a POWERLINK network
		Blinking	POWERLINK Link LED Data transfer in progress
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"".
		Off	POWERLINK Status/Error LED See "LED "Status/Error"".

Table 159: 5ACCIF01.FPLS-000 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 160: LED "Status/Error" - Ethernet mode

POWERLINK

Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> • BASIC_ETHERNET • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE <p>The diagram illustrates the LED behavior during an error state. It consists of three vertically stacked plots sharing a common time axis 't'.</p> <ul style="list-style-type: none"> Status Green: The top plot shows a series of periodic green pulses, indicating that the interface is periodically checking for errors. Error Red: The middle plot shows a continuous red bar, indicating that an error state has been detected and is active. LED "S/E": The bottom plot shows the combined LED output. During the error period (when Error Red is active), the LED alternates between green and red pulses, representing a blinking state. Outside the error period, it shows only green pulses.

Table 161: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	<p>State The interface is in state PRE_OPERATIONAL_2.</p> <p>Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state.</p> <p>Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.</p>
Triple flash (approx. 1 Hz) READY_TO_OPERATE	<p>State The interface is in state READY_TO_OPERATE.</p> <p>Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored.</p> <p>Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.</p>
On OPERATIONAL	<p>State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.</p>
Blinking (approx. 2.5 Hz) STOPPED	<p>State The interface is in state STOPPED.</p> <p>Managing node (MN) This state is not possible for the MN.</p> <p>Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.</p>

Table 162: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 163: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.4.3.4 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector.

A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.4.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.5 5ACCIF01.FPLS-001

2.3.5.5.1 General information

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

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

2.3.5.5.2 Order data


Model 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	

Table 164: 5ACCIF01.FPLS-001 - Order data

2.3.5.5.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FPLS-001
General information	
LED status indicators	L2, L3
B&R ID code	0xE9B9
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS232, modem supported, not electrically isolated
Design	10-pin, male
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
POWERLINK	
Quantity	1
Transfer	100BASE-TX
Type	Type 4 ²⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
Electrical characteristics	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 165: 5ACCIF01.FPLS-001 - Technical data

Technical data

Model number	5ACCIF01.FPLS-001
Environmental 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 characteristics	
Weight	25 g

Table 165: 5ACCIF01.FPLS-001 - Technical data

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

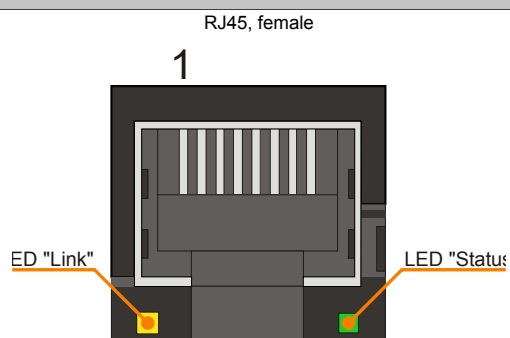
2.3.5.5.3.1 POWERLINK interface - Pinout

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

POWERLINK - IF1 ¹⁾²⁾		
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Status LED	On	Off
Green	See Status/Error LED.	
Link LED	On	Off
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)

RJ45, female

1



ED "Link"

LED "Status"

Table 166: 5ACCIF01.FPLS-001 - POWERLINK interface

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

2.3.5.5.3.2 COMA serial interface - Pinout

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

Serial interfaceCOM A - IFx¹⁾²⁾³⁾

	RS232
Type	RS232, modem supported, not electrically isolated
UART	16550-compatible, 16-byte FIFO
Transfer rate	Max. 115 kbit/s
Bus length	Max. 15 m
Pin	Assignment
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	GND
10	GND

10-pin, male

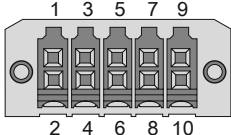


Table 167: 5ACCIF01.FPLS-001 - Interface COMA

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 enabled automatically in BIOS as COMA with default I/O address 3F8h and IRQ 4.
- 3) This interface is referred to as IF5 in Automation Studio / Automation Runtime.

2.3.5.5.3.3 LED status indicators - L2, L3

2 LEDs are integrated on the interface option.

LED status indicators			
LED	Color	Status	Explanation
L1	-	-	-
L2	Green	On	POWERLINK Link LED Indicates a connection to a POWERLINK network
		Blinking	POWERLINK Link LED Data transfer in progress
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"".
		Off	POWERLINK Status/Error LED See "LED "Status/Error"".

Table 168: 5ACCIF01.FPLS-001 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 169: LED "Status/Error" - Ethernet mode

POWERLINK

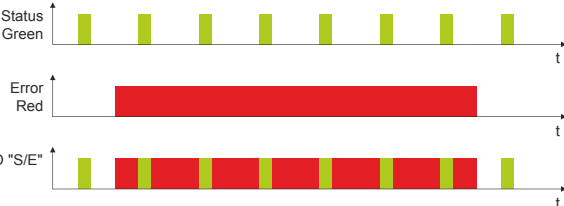
Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> • BASIC_ETHERNET • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE  <p>The diagram consists of three vertically stacked plots sharing a common horizontal time axis labeled 't'. 1. Status Green: Shows a series of eight green rectangular pulses, each of equal duration, spaced evenly along the time axis. 2. Error Red: Shows a single, continuous red rectangular pulse that starts at the beginning of the first green pulse and ends at the end of the eighth green pulse. 3. LED "S/E": Shows the combined LED output. It starts with a green pulse, followed by a period where the red and green pulses overlap (appearing as a darker color), and then continues with green pulses. The red pulse is present throughout the duration of the eighth green pulse.</p>

Table 170: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	<p>State The interface is in state PRE_OPERATIONAL_2.</p> <p>Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state.</p> <p>Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.</p>
Triple flash (approx. 1 Hz) READY_TO_OPERATE	<p>State The interface is in state READY_TO_OPERATE.</p> <p>Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored.</p> <p>Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.</p>
On OPERATIONAL	<p>State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.</p>
Blinking (approx. 2.5 Hz) STOPPED	<p>State The interface is in state STOPPED.</p> <p>Managing node (MN) This state is not possible for the MN.</p> <p>Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.</p>

Table 171: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 172: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.5.3.4 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector.

A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.5.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.6 5ACCIF01.FPSC-000

2.3.5.6.1 General information

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

2.3.5.6.2 Order data


Model number	Short description	Figure
	Interface options	
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface card - 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	

Table 173: 5ACCIF01.FPSC-000 - Order data

2.3.5.6.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FPSC-000
General information	
LED status indicators	L1, L2, L3
B&R ID code	0xE53F
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾
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 (e.g. for Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS232, not modem-capable, not electrically isolated
Design	10-pin, male
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s

Table 174: 5ACCIF01.FPSC-000 - Technical data

Model number	5ACCIF01.FPSC-000
POWERLINK	
Quantity	1
Transfer	100BASE-TX
Type	Type 4 ³⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Design	10-pin, male, not electrically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be enabled or disabled using a slide switch
Electrical characteristics	
Power consumption	1.75 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 174: 5ACCIF01.FPSC-000 - Technical data

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

2.3.5.6.3.1 POWERLINK interface - Pinout

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

POWERLINK - IF1 ¹⁾²⁾		
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Status LED	On	Off
Green	See Status/Error LED.	
Link LED	On	Off
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)

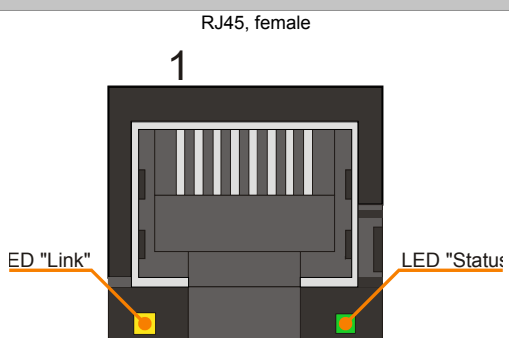


Table 175: 5ACCIF01.FPSC-000 - POWERLINK interface

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

2.3.5.6.3.2 COM serial interface - Pinout

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

Serial interface COM - IFx ¹⁾²⁾		
Type	RS232, not modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
Pin	Assignment	
1	-	
2	Shield	
3	-	
4	-	
5	-	
6	-	
7	-	
8	COM GND	
9	RXD	
10	TXD	

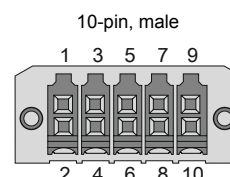


Table 176: 5ACCIF01.FPSC-000 - Interface COM

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF5 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

2.3.5.6.3.3 CAN bus interface - Pinout

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

CAN bus - IFx ¹⁾²⁾		
The CAN bus interface is a 10-pin female connector without electrical isolation.		
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
Pin	Assignment	
1	-	
2	Shield	
3	-	
4	-	
5	CAN H	
6	CAN L	
7	CAN GND	
8	-	
9	-	
10	-	

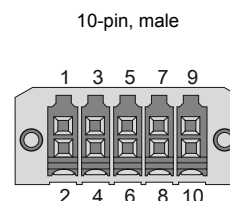


Table 177: 5ACCIF01.FPSC-000 - CAN bus interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

CAN driver settings

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

Bit timing register 1	Bit timing register 0	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

Table 178: CAN driver settings

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 bit rate. In accordance with CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Extension	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
<20 m ¹⁾	Typ. 1 Mbit/s

Table 179: CAN - Bus length and transfer rate

- 1) The specified cable length is only valid with the values specified in Tab. 178 "CAN driver settings". Cable lengths additionally depend on the values in the timing register.

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 180: CAN cable requirements

Terminating resistor

A terminating resistor is integrated in the interface option above the ETH1 interface. A switch is used to enable or disable the terminating resistor for the CAN bus interface. The L1 LED status indicator indicates whether the terminating resistor is switched on or off.


Terminating resistor	
On	The terminating resistor is switched on.
Off	The terminating resistor is switched off.
	

Table 181: Terminating resistor

2.3.5.6.3.4 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector. A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.6.3.5 LED status indicators - L1, L2, L3

The interface option has 3 integrated LEDs located above the terminating resistor.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is enabled.
		Off	The CAN bus terminating resistor is disabled.
L2	Green	On	POWERLINK Link LED Indicates a connection to a POWERLINK network.
		Blinking	POWERLINK Link LED Data transfer in progress.
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"".
		Off	POWERLINK Status/Error LED See "LED "Status/Error"".

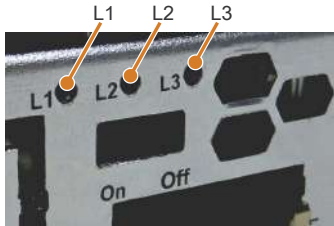


Table 182: 5ACCIF01.FPSC-000 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 183: LED "Status/Error" - Ethernet mode

POWERLINK

Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> BASIC_ETHERNET PRE_OPERATIONAL_1 PRE_OPERATIONAL_2 READY_TO_OPERATE

Table 184: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>

Table 185: LED "Status/Error" - POWERLINK - Status

Green - Status	Description
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	State The interface is in state PRE_OPERATIONAL_2. Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state. Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.
Triple flash (approx. 1 Hz) READY_TO_OPERATE	State The interface is in state READY_TO_OPERATE. Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored. Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.
On OPERATIONAL	State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.
Blinking (approx. 2.5 Hz) STOPPED	State The interface is in state STOPPED. Managing node (MN) This state is not possible for the MN. Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.

Table 185: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 186: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.6.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.7 5ACCIF01.FPSC-001

2.3.5.7.1 General information

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

- 1x POWERLINK interface for 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.

2.3.5.7.2 Order data


Model 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	

Table 187: 5ACCIF01.FPSC-001 - Order data

2.3.5.7.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FPSC-001
General information	
LED status indicators	L1, L2, L3
B&R ID code	0xE9BC
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Controller	
nvSRAM	
Size	512 kB
Data retention	20 years
Read/Write endurance	Min. 1,000,000
Remanent variables in power failure mode	256 kB (e.g. for Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS232, not modem-capable, not electrically isolated
Design	10-pin, male
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s

Table 188: 5ACCIF01.FPSC-001 - Technical data

Model number	5ACCIF01.FPSC-001
POWERLINK	
Quantity	1
Transfer	100BASE-TX
Type	Type 4 ²⁾
Design	Shielded RJ45
Transfer rate	100 Mbit/s
Cable length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Design	10-pin, male, electrically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be enabled or disabled using a slide switch
X2X	
Type	X2X Link master
Quantity	1
Design	10-pin, male, electrically isolated
Electrical characteristics	
Power consumption	2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 188: 5ACCIF01.FPSC-001 - Technical data

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

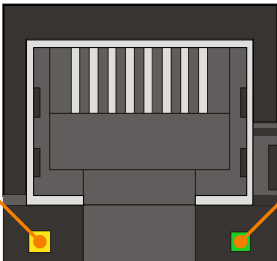
2.3.5.7.3.1 POWERLINK interface - Pinout

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

POWERLINK - IF1 ¹⁾²⁾		
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
Status LED	On	Off
Green	See Status/Error LED.	
Link LED	On	Off
Yellow	Link (POWERLINK network connection available)	Activity (blinks to indicate active data transfer)

RJ45, female

1



ED "Link"

LED "Status"

Table 189: 5ACCIF01.FPSC-001 - POWERLINK interface

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

2.3.5.7.3.2 COM serial interface - Pinout

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

Serial interface COM - IFx ¹⁾²⁾		
Type	RS232, not modem-capable, not electrically isolated	
UART	16550-compatible, 16-byte FIFO	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
Pin	Assignment	
1	-	
2	Shield	
3	-	
4	-	
5	-	
6	-	
7	-	
8	COM GND	
9	RXD	
10	TXD	

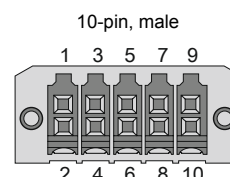


Table 190: 5ACCIF01.FPSC-001 - Interface COM

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF5 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

2.3.5.7.3.3 CAN bus interface - Pinout

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

CAN bus - IFx ¹⁾²⁾		
The electrically isolated CAN bus interface is a 10-pin female connector.		
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 m	
Pin	Assignment	
1	-	
2	Shield	
3	-	
4	-	
5	CAN H	
6	CAN L	
7	CAN GND	
8	-	
9	-	
10	-	

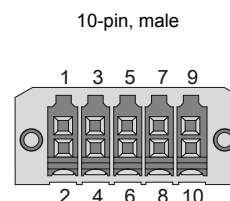


Table 191: 5ACCIF01.FPSC-001 - CAN bus interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF3 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

CAN driver settings

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

Bit timing register 1	Bit timing register 0	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

Table 192: CAN driver settings

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 bit rate. In accordance with CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Extension	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
≤15 m ¹⁾	Typ. 1 Mbit/s

Table 193: CAN - Bus length and transfer rate

- 1) The specified cable length is only valid with the values specified in Tab. 192 "CAN driver settings". Cable lengths additionally depend on the values in the timing register.

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 194: CAN cable requirements

Terminating resistor

A terminating resistor is integrated in the interface option above the ETH1 interface. A switch is used to enable or disable the terminating resistor for the CAN bus interface. The L1 LED status indicator indicates whether the terminating resistor is switched on or off.

Terminating resistor	
On	The terminating resistor is switched on.
Off	The terminating resistor is switched off.



Table 195: Terminating resistor

2.3.5.7.3.4 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⁾	
The electrically isolated X2X Link master interface is a 10-pin connector.	
Pin	Assignment
1	X2X H
2	Shield
3	X2X L
4	X2X GND
5	-
6	-
7	-
8	-
9	-
10	-

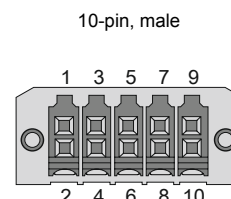


Table 196: 5ACCIF01.FPSC-001 - X2X Link master interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 referred to as IF2 in Automation Studio / Automation Runtime. It is not a "PC interface" and therefore not shown in BIOS.

2.3.5.7.3.5 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector. A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.7.3.6 LED status indicators - L1, L2, L3

The interface option has 3 integrated LEDs located above the terminating resistor.

LED status indicators			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is enabled.
		Off	The CAN bus terminating resistor is disabled.
L2	Green	On	POWERLINK Link LED Indicates a connection to a POWERLINK network.
		Blinking	POWERLINK Link LED Data transfer in progress.
L3	Green-Red	On	POWERLINK Status/Error LED See "LED "Status/Error"". See "LED "Status/Error"" .
		Off	POWERLINK Status/Error LED See "LED "Status/Error"". See "LED "Status/Error"" .

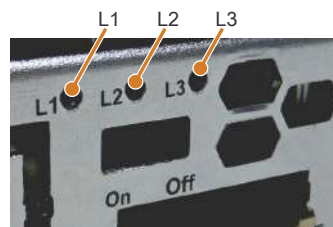


Table 197: 5ACCIF01.FPSC-000 - LED status indicators

LED "Status/Error"

LED "Status/Error" is a green and red dual LED. The LED states have a different meaning depending on the operating mode.

Ethernet mode

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

Green - Status	Description
On	The interface is being operated as an Ethernet interface.

Table 198: LED "Status/Error" - Ethernet mode

POWERLINK

Red - Error	Description
On	<p>The interface is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED:</p> <ul style="list-style-type: none"> BASIC_ETHERNET PRE_OPERATIONAL_1 PRE_OPERATIONAL_2 READY_TO_OPERATE

Table 199: LED "Status/Error" - POWERLINK - Error

Green - Status	Description
Off NOT_ACTIVE	<p>State The interface is in state NOT_ACTIVE or:</p> <ul style="list-style-type: none"> Switched off Starting up Not configured correctly in Automation Studio Defective <p>Managing node (MN) The bus 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 (single flash). If POWERLINK communication is detected before the time expires, however, then the MN is not started.</p> <p>Controlled node (CN) The bus is monitored for POWERLINK frames. If a corresponding frame is not received within the configured time frame (timeout), then the module immediately enters mode BASIC_ETHERNET (flickering). If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1 (single flash).</p>
Flickering green (approx. 10 Hz) BASIC_ETHERNET	<p>State The interface is in state BASIC_ETHERNET and operated as an Ethernet TCP/IP interface.</p> <p>Managing node (MN) This state can only be exited by resetting the interface.</p> <p>Controlled node (CN) If POWERLINK communication is detected during this state, the interface enters state PRE_OPERATIONAL_1 (single flash).</p>
Single flash (approx. 1 Hz) PRE_OPERATIONAL_1	<p>State The interface is in state PRE_OPERATIONAL_1.</p> <p>Managing node (MN) The MN starts "reduced cycle" operation. Cyclic communication is not yet taking place.</p> <p>Controlled node (CN) The module can be configured by the MN in this state. The CN waits until it receives an SoC frame and then switches to state PRE_OPERATIONAL_2 (double flash). A solid red LED in this state indicates failure of the MN.</p>
Double flash (approx. 1 Hz) PRE_OPERATIONAL_2	<p>State The interface is in state PRE_OPERATIONAL_2.</p> <p>Managing node (MN) The MN begins cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this state.</p> <p>Controlled node (CN) The interface can be configured by the MN in this state. A command then switches the state to READY_TO_OPERATE (triple flash). A solid red LED in this mode indicates failure of the MN.</p>
Triple flash (approx. 1 Hz) READY_TO_OPERATE	<p>State The interface is in state READY_TO_OPERATE.</p> <p>Managing node (MN) Cyclic and asynchronous communication is taking place. Any received PDO data is ignored.</p> <p>Controlled node (CN) The configuration of the module is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however. A solid red LED in this mode indicates failure of the MN.</p>
On OPERATIONAL	<p>State The interface is in state OPERATIONAL. The PDO mapping is active and cyclic data is evaluated.</p>
Blinking (approx. 2.5 Hz) STOPPED	<p>State The interface is in state STOPPED.</p> <p>Managing node (MN) This state is not possible for the MN.</p> <p>Controlled node (CN) No output data is output, and no input data is provided. It is only possible to enter or leave this mode by a corresponding command from the MN.</p>

Table 200: LED "Status/Error" - POWERLINK - Status

System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by the red "Error" LED and four switch-on phases. Each switch-on phase has a duration of either 150 ms or 600 ms. The error code output is repeated cyclically every 2 seconds.

Error description	Error code indicated by red "Status" LED									
RAM error: The interface is defective and must be replaced.	•	•	•	-	Pause	•	•	•	-	Pause
Hardware error: The interface or a system component is defective and must be replaced.	-	•	•	-	Pause	-	•	•	-	Pause

Table 201: System stop error codes

Legend:

- ...150 ms
- ...600 ms
- Pause 2-second pause

2.3.5.7.4 Updating firmware

The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware included in Automation Studio, the hardware must be upgraded (see "Project management" / "The workspace" / "Upgrades" in Automation Help).

2.3.5.8 5ACCIF01.FSS0-000

2.3.5.8.1 General information

Interface option 5ACCIF01.FSS0-000 is equipped with 2 RS422/485 interfaces.

- 2x RS422/485 interfaces
- Compatible with APC2100/PPC2100 and APC2200/PPC2200

2.3.5.8.2 Order data


Model number	Short description	Figure
	Interface options	
5ACCIF01.FSS0-000	Interface card - 2x RS422/485 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	

Table 202: 5ACCIF01.FSS0-000 - Order data

2.3.5.8.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.FSS0-000
General information	
LED status indicators	L2, L3
B&R ID code	0xED7B
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
COM	
Quantity	2
Type	RS422/RS485, electrically isolated
Design	10-pin, male
UART	16550-compatible, 16-byte FIFO
Max. baud rate	115 kbit/s
Terminating resistor	
Type	Can be enabled or disabled using a slide switch
Electrical characteristics	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 203: 5ACCIF01.FSS0-000 - Technical data

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

2.3.5.8.3.1 COMA serial interface - Pinout

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

Serial interface COM A - IFx ¹⁾²⁾³⁾	
Type	RS422/RS485
UART	RS422/RS485, electrically isolated
Transfer rate	16550-compatible, 16-byte FIFO
Bus length	Max. 115 kbit/s
Pin	Max. 1200 m
Assignment	
1	-
2	-
3	-
4	-
5	-
6	COM GND
7	TXD
8	TXD\
9	RXD
10	RXD\

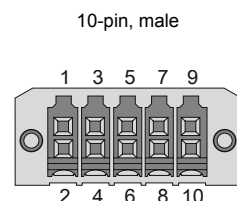


Table 204: 5ACCIF01.FSS0-000 - Interface COMA

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 enabled automatically in BIOS as COMA with default I/O address 3F8h and IRQ 4.
- 3) This interface is referred to as IF7 in Automation Studio / Automation Runtime.

Operating COMA as an RS485 interface

The pins of the RS422 default interface (7, 8, 9 and 10) must be used to operate in this mode. Pins must be connected as shown.

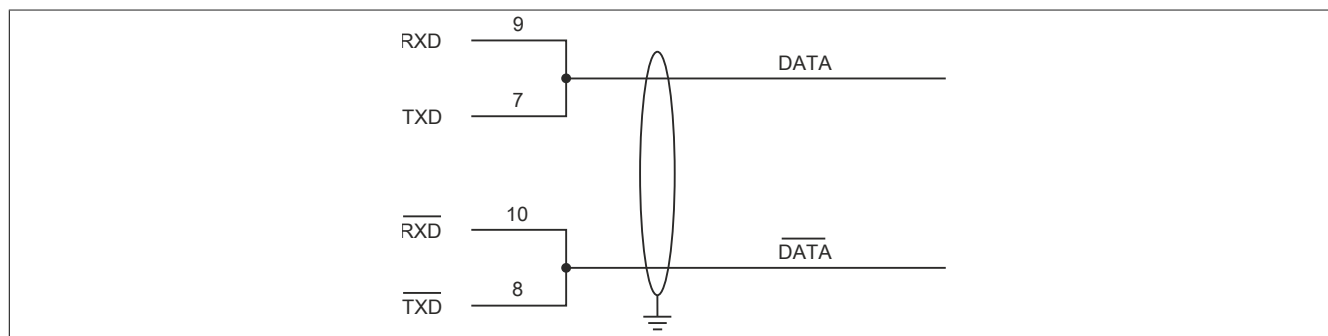


Figure 110: RS232/422/485 interface - COMA operation in RS485 mode

The RTS line must be switched by the driver for each transmission or reception; there is no automatic switch-back mechanism.

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

2.3.5.8.3.2 COMD serial interface - Pinout

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

Serial interface COMD - IFx ¹⁾²⁾³⁾	
Type	RS422/RS485
UART	RS422/RS485, electrically isolated
Transfer rate	16550-compatible, 16-byte FIFO
Transfer rate	Max. 115 kbit/s
Bus length	Max. 1200 m
Pin	Assignment
1	RXD
2	RXD\
3	TXD
4	TXD\
5	COM GND
6	-
7	-
8	-
9	-
10	-

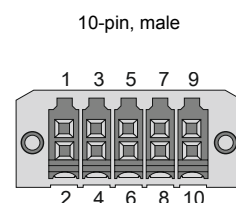


Table 205: 5ACCIF01.FSS0-000 - Interface COMD

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 enabled automatically in BIOS as COMD with default I/O address 2F8h and IRQ 10.
- 3) This interface is referred to as IF8 in Automation Studio / Automation Runtime.

Operating COMD as an RS485 interface

The pins of the RS422 default interface (1, 2, 3 and 4) must be used for operation. Pins must be connected as shown.

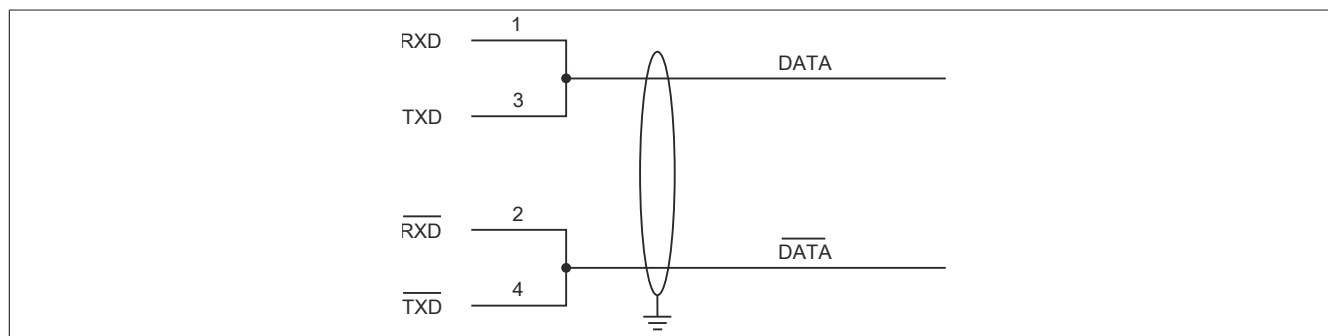


Figure 111: RS232/422/485 interface - COMD operation in RS485 mode

The RTS line must be switched by the driver for each transmission or reception; there is no automatic switch-back mechanism.

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

2.3.5.8.3.3 RS422 - Bus length and cable type

The RTS line must be switched on to switch the transmitter to active.

The maximum transfer rate of 115 kbit/s depends on the cable length as well as the type of cable being used.

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 206: RS422 - Bus length and transfer rate

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

RS422 cable	Property
Signal lines	
Cable cross section	4x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 207: RS422 - Cable requirements

2.3.5.8.3.4 RS485 - Bus length and cable type

The maximum transfer rate of 115 kbit/s depends on the cable length as well as the type of cable being used.

Extension	Transfer rate
1200 m	Typ. 115 kbit/s

Table 208: RS485 - Bus length and transfer rate

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

RS485 cables	Property
Signal lines	
Cable cross section	4x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor cross section	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 209: RS485 - Cable requirements

2.3.5.8.3.5 Terminating resistor

A terminating resistor is integrated for each COM on the interface option; they are located to the left and right of the IFx connector. The terminating resistor is enabled or disabled using a switch. LED status indicators L2 and L3 indicate whether the terminating resistor is enabled or disabled.


Terminating resistor		
On	The terminating resistor is switched on.	 <p>Terminating resistor On Off</p>
Off	The terminating resistor is switched off.	

Table 210: Terminating resistor

2.3.5.8.3.6 Shielding

The shields for the cables connected to the 10-pin female connector can be connected to the screw connection for cable shields (see "[Device interfaces - Overview](#)" on page 48) as an alternative to the functional ground connection of the system unit's interface cover.

2.3.5.8.3.7 LED status indicators L2, L3

LEDs are integrated in the interface option; they are located above the terminating resistor.

LED status indicators			
LED	Color	Status	Explanation
L2	Yellow	On	The COM D terminating resistor is enabled.
		Off	The COM D terminating resistor is disabled.
L3	Yellow	On	The COM A terminating resistor is enabled.
		Off	The COM A terminating resistor is disabled.

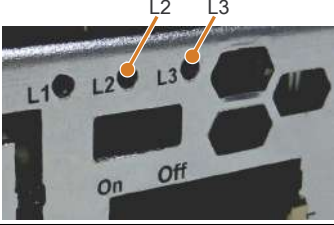


Table 211: 5ACCIF01.FSS0-000 - LED status indicators

2.3.5.8.3.8 Firmware

In order to ensure the functionality of the interface option, the following firmware version (MTCX) or later 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 firmware upgrades, see section "[Upgrading the firmware on the Panel PC 2100](#)" on page 273.

2.3.5.8.3.9 Hardware

The following minimum hardware revisions are required on the PC to ensure the functionality of the interface option:

- 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

2.3.5.9 5ACCIF01.ICAN-000

2.3.5.9.1 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

2.3.5.9.2 Order data


Model 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	

Table 212: 5ACCIF01.ICAN-000 - Order data

2.3.5.9.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCIF01.ICAN-000
General information	
LED status indicators	L1
B&R ID code	0xE9BB
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
CAN	
Quantity	1
Controller	Bosch CC770 (compatible with Intel 82527 CAN controller)
Design	10-pin, male, electrically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be enabled or disabled using a slide switch
Electrical characteristics	
Power consumption	0.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental 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 characteristics	
Weight	25 g

Table 213: 5ACCIF01.ICAN-000 - Technical data

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

2.3.5.9.3.1 CAN bus interface - Pinout

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

CAN bus - IFx ¹⁾²⁾	
The electrically isolated CAN bus interface is a 10-pin female connector.	
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 m
Pin	Assignment
1	-
2	CAN shield
3	-
4	-
5	CAN H
6	CAN L
7	CAN GND
8	-
9	-
10	-

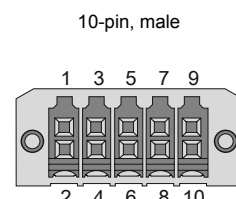


Table 214: 5ACCIF01.ICAN-000 - CAN bus interface

- 1) The interfaces, etc. available on the device or module have been numbered as such 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 enabled automatically in BIOS as CAN with default I/O address 384h/385h and IRQ 10.

I/O address and IRQ

Resource	Default setting	Function
I/O address	384h (address register)	Defines the register number that should be accessed.
	385h (data register)	Access to the register defined in the address register.
IRQ	IRQ10	Interrupt

Table 215: I/O address and IRQ

CAN driver settings

The baud rate can be set either with predefined values or the bit timing register. For additional information, see Automation Help or the technical description of the B&R CAN driver.

Bit timing register 1	Bit timing register 0	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

Table 216: CAN driver settings

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 bit rate. In accordance with CiA (CAN in Automation), the maximum bus length is 1000 meters.

The following bus lengths are permitted with a maximum oscillator tolerance of 0.121%:

Extension	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤100 m	Typ. 500 kbit/s
≤20 m	Typ. 1 Mbit/s

Table 217: CAN - Bus length and transfer rate

The material used for the cable should have all of the following properties or deviate from them as little as possible to achieve an optimal transfer rate.

CAN cable	Property
Signal lines	
Cable cross section	2x 0.25 mm ² (24 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Paired shield with aluminum foil
Ground line	
Cable cross section	1x 0.34 mm ² (22 AWG / 19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Complete shielding	Composed of tinned copper wires

Table 218: CAN cable requirements

Terminating resistor

A terminating resistor is integrated in the interface option above the ETH1 interface. A switch is used to enable or disable the terminating resistor for the CAN bus interface. The L1 LED status indicator indicates whether the terminating resistor is switched on or off.

Terminating resistor	
On	The terminating resistor is switched on.
Off	The terminating resistor is switched off.



Table 219: Terminating resistor

2.3.5.9.3.2 Shielding

For the interfaces on the 10-pin female connector, the interface shield can be put on pin 2 of the female connector. A functional ground connection and screw, which can also be used for the cable shields, is located on the interface plate of the system unit.

2.3.5.9.3.3 LED status indicator - L1

The interface option has 1 integrated LED located above the terminating resistor.

LED "Status"			
LED	Color	Status	Explanation
L1	Yellow	On	The CAN bus terminating resistor is enabled.
		Off	The CAN bus terminating resistor is disabled.
L2	-	-	-
L3	-	-	-

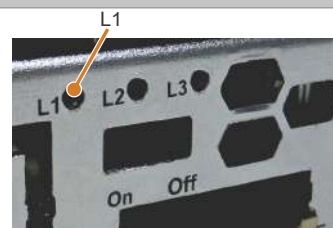


Table 220: 5ACCIF01.ICAN-000 - LED status indicator

2.3.5.9.3.4 Firmware

In order to ensure the functionality of the interface option, the following firmware version (MTCX) or later 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 firmware upgrades, see section "Upgrading the firmware on the Panel PC 2100" on page 273.

2.3.5.9.3.5 Drivers

In Windows 7 and later, the CAN IF option is supported by PVI V4.2.5 or Windows CAN driver V3.0.

3 Commissioning

3.1 Installation

Danger!

- All power supplies must be disconnected before removing device covers or components and installing/removing accessories, hardware or cables.
- The power cable must be disconnected from the device and from the power supply.
- All covers, components, accessories, hardware and cables must be installed or connected before the device can be connected to the power supply and switched on.

3.1.1 Important information concerning installation/commissioning

- Checking the delivery
 - When receiving the delivery, check the packaging for any visible transport damage.
 - Any visible transport damage must be documented and reported immediately, or the damage must be confirmed by the shipping/delivery company.
 - Keep the original packaging in the event that goods must be reshipped.

Information:

If a device is transported or stored without packaging, it is unprotected against all environmental factors such as impacts, vibration, pressure, moisture, etc. Damaged packaging indicates that environmental conditions have already heavily affected and possibly damaged the device.

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

- Check the packaging contents and any ordered optional accessories for completeness and damage.
- If the packaging contents are incomplete, damaged or do not match your order, inform your local sales office or B&R headquarters immediately.

Danger!

A damaged device is subject to unpredictable properties and states. The unintentional installation or operation of a damaged device must be prevented. The damaged device must be marked as such and removed from the productive environment or sent immediately for repairs.

- The environmental conditions must be observed, see ["Environmental characteristics"](#).

Caution!

Before the device is put into service, it must slowly be acclimated to room temperature! Subjecting it to thermal radiation is not permitted. If transported at low temperatures or if there are large temperature fluctuations, the device is not permitted to be subjected to any type of moisture. Moisture can cause short circuits in the electrical circuits and damages the device.

- The permissible mounting orientations when installing the device must be observed, see ["Mounting orientations"](#).

Caution!

When installed at an angle, the convection of air through the device is reduced, which decreases the maximum permissible ambient temperature for operation. If sufficient external cooling is present when the device is installed at an angle, the limit of the maximum permissible ambient temperature must be checked in each case. Otherwise, the device can become damaged and the certifications and warranty for the device nullified.

- The requirements for device standards and certifications must be observed, see "[Standards and certifications](#)".
- The device is only certified for operation in enclosed rooms.
- The device is not permitted to be subjected to direct sunlight.
- Ventilation holes are not permitted to be covered.
- When installed in a closed housing, enough space must be available for air to circulate sufficiently, see "[Spacing for air circulation](#)".

Information:

Additional space needed to operate or service the device must be taken into account during installation.

- The device must be installed on a flat, clean and burr-free surface. The specified IP ratings of the device are only ensured if the following requirements for the surface / installation cutout / mounting surface are met:
 - Permissible deviation from the evenness on the installation cutout: ≤ 0.5 mm.
 - Permissible surface roughness in the area of the mounting seal: ≤ 120 μm (Rz 120).
 - Material thickness of the installation cutout: Min. 1.5 mm steel sheet
- It is important to ensure that the wall or control cabinet plate can hold four times the total weight of the device. If necessary, the interior of the installation cutout must be reinforced in order to strengthen the installation surface.

Caution!

In the event of insufficient load-carrying capacity of the installation surface, inadequate mounting or improper mounting materials, the device may fall and become damaged.

- The device is not permitted to be positioned next to other heat sources that could cause overheating.
- When connecting cables (DVI, SDL, USB, etc.), the bend radius must be taken into account.
- When connecting built-in or connected peripherals, the instructions in the documentation of the peripheral device must be followed.

Caution!

Built-in or connected peripherals (e.g. a USB drive) are not permitted to bring any voltage into the device. Energy regeneration is generally not permitted and can damage the device.

- Instructions and regulations on the power supply and functional ground must be observed.
- The device must be installed in a position that minimizes glare on the screen.
- The device must be installed such that viewing is optimized for the user.

- Loss of seal

Caution!

- The gasket must be inspected before initial installation, subsequent installation as well as at regular intervals appropriate to the requirements of the operating environment.
- Replace the entire device if visible scratches, cracks, collected dirt or excessive wear is detected during inspection.
- Do not unnecessarily stretch the gasket.
- Avoid contact between the gasket and the corners and edges of the frame.
- It is important to ensure that the gasket is completely inserted into the installation notch.
- The housing components must be secured using the specified tightening torque.

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

3.1.2 Installing a Panel PC with an AP9x3 panel

The Panel PC 2100 with AP9x3 panel is installed in the cutout using retaining clips. The number of retaining clips depends on the panel.

The thickness of the wall or control cabinet plate must be at least 1 mm and is not permitted to exceed 6 mm.

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.

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

Procedure

1. Check whether the included mounting screws are screwed into the retaining clips. If not, then the mounting screws must be screwed into the retaining clips with a 2.5 mm hex key screwdriver. The mounting screws are permitted to be screwed in far enough that they no longer protrude above the retaining clip.

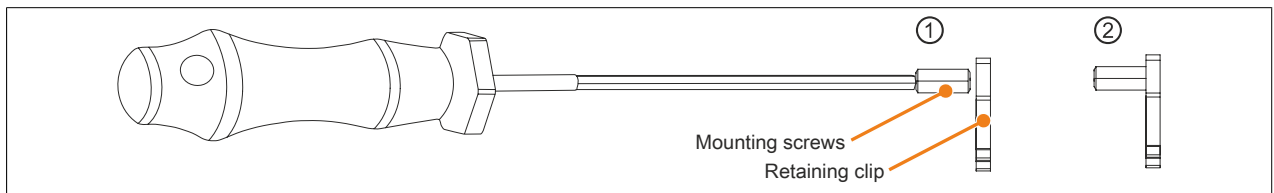


Figure 112: Preparing the retaining clips

2. Insert the device into the front of the prepared, burr-free and flat installation cutout. For the dimensions of the cutout, see [Fig. X "AP9x3 panels - Installation diagrams" on page](#) .

3. Install the retaining clips on the device. This is done by inserting the clips into the openings on the sides of the device (indicated by the orange circles). The number of retaining clips may vary depending on the panel. For the exact number, see [Fig. X "AP9x3 panels - Installation diagrams" on page .](#)

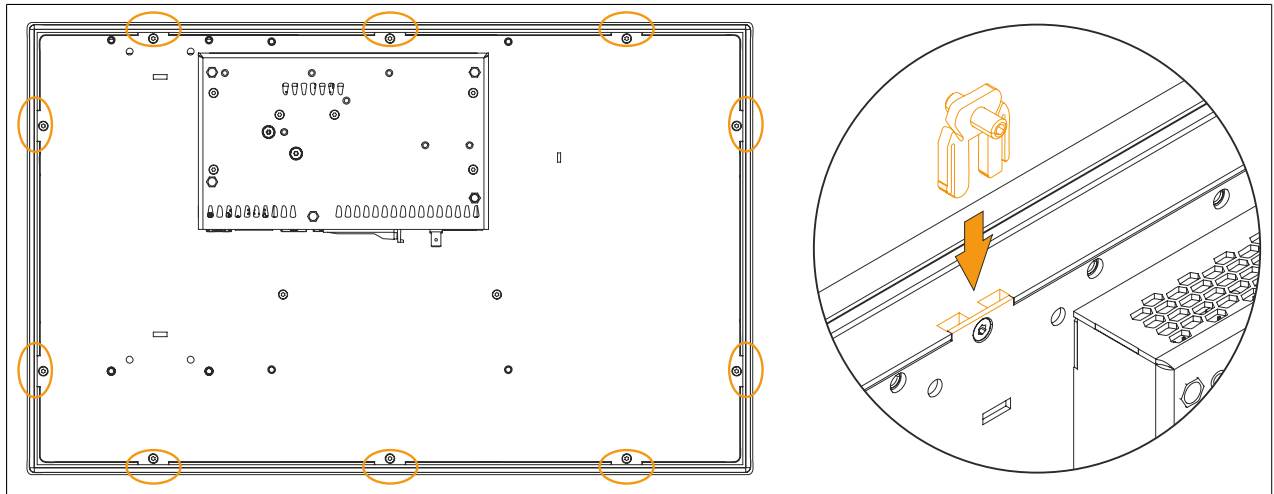


Figure 113: Inserting the retaining clips (sample figure)

4. Fasten the retaining clips to the wall or control cabinet by alternately tightening the screws with a 2.5 hex key screwdriver. The tightening torque should be max. 1 Nm to provide an optimal seal.

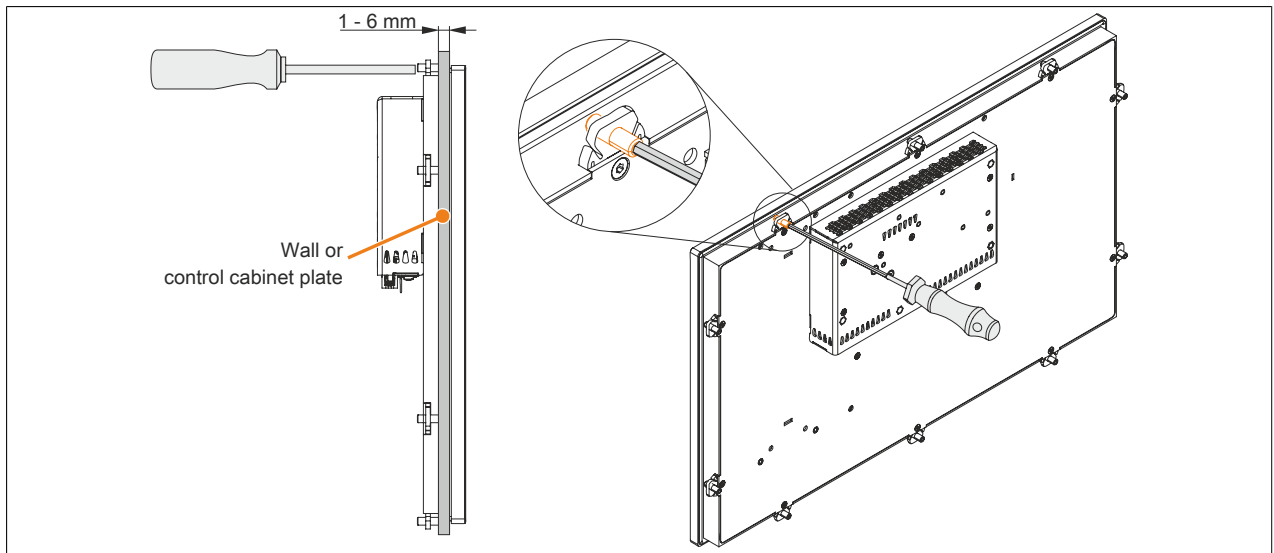


Figure 114: Fastening the retaining clips (sample figure)

3.1.3 Mounting an Automation Panel 1000 with retaining clips

The Panel PC 2100 with AP1000 panel is installed in the cutout using retaining clips. The number of retaining clips depends on the panel.

The following Automation Panel 1000 panels are mounted using retaining clips:

- 5AP1120.0573-000
- 5AP1151.0573-000
- 5AP1120.0702-000
- 5AP1130.0702-000
- 5AP1120.101E-000
- 5AP1130.101E-000
- 5AP1120.1043-000
- 5AP1180.1043-000
- 5AP1120.121E-000
- 5AP1130.121E-000
- 5AP1120.156B-000
- 5AP1130.156C-000
- 5AP1130.185C-000

The thickness of the wall or control cabinet plate must be at least 1 mm and is not permitted to exceed 6 mm.

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.

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

Procedure

1. Check whether the included mounting screws are screwed into the retaining clips. If not, then the mounting screws must be screwed into the retaining clips with a 2.5 mm hex key screwdriver. The mounting screws are permitted to be screwed in far enough that they no longer protrude above the retaining clip.

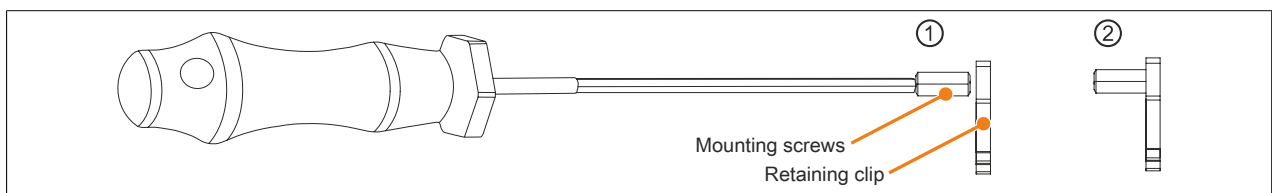


Figure 115: Preparing the retaining clips

2. Insert the device into the front of the prepared, burr-free and flat installation cutout. For the dimensions of the cutout, see [Fig. X "AP1000 panels with retaining clips - Installation diagrams" on page](#).
3. Install the retaining clips on the device. This is done by inserting the clips into the openings on the sides of the device (indicated by the orange circles). The number of retaining clips may vary depending on the panel. For the exact number, see [Fig. X "AP1000 panels with retaining clips - Installation diagrams" on page](#).

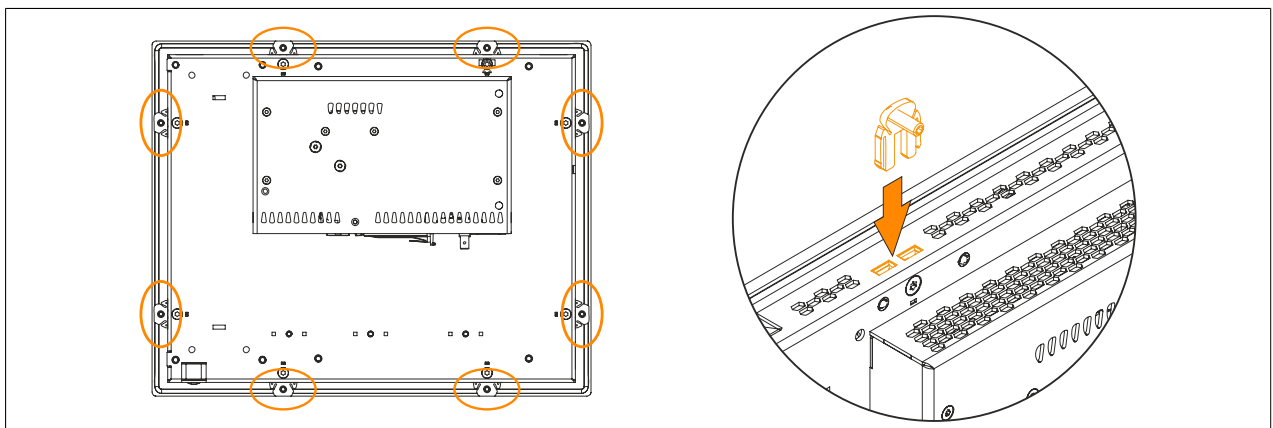


Figure 116: Inserting the retaining clips (sample figure)

4. Fasten the retaining clips to the wall or control cabinet by alternately tightening the screws with a 2.5 hex key screwdriver. The tightening torque should be max. 1 Nm to provide an optimal seal.

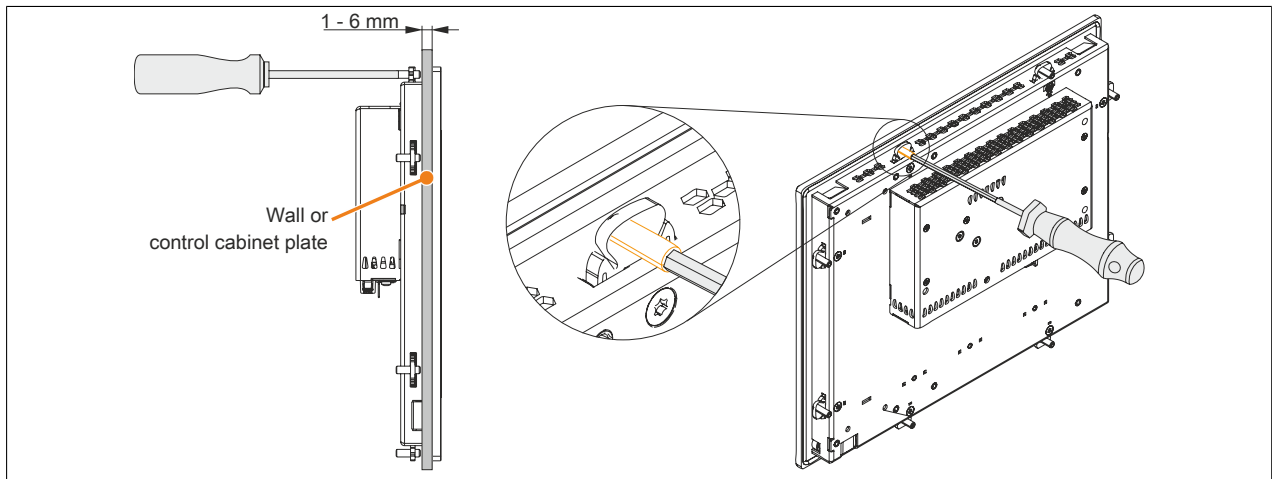


Figure 117: Fastening the retaining clips (sample figure)

3.1.4 Mounting an Automation Panel 1000 with clamping blocks

The Panel PC 2100 with AP1000 panel is installed in the cutout using clamping blocks. The number of clamping blocks depends on the panel.

The following Automation Panel 1000 panels are mounted using clamping blocks:

- 5AP1181.1043-000
- 5AP1182.1043-000
- 5AP1120.1214-000
- 5AP1120.1505-000
- 5AP1180.1505-000
- 5AP1181.1505-000
- 5AP1120.1906-000

The thickness of the wall or control cabinet plate must be at least 2 mm and is not permitted to exceed 10 mm.

A 3 mm hex socket screwdriver is needed to tighten and remove the screw on the clamping block. The maximum tightening torque for the screw is 0.5 Nm.

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

Procedure

1. Insert the device into the front of the prepared, burr-free and flat installation cutout. For the dimensions of the cutout, see [Tab. 14 "AP1000 panels with clamping blocks - Installation diagrams" on page 28](#). The number of clamping blocks may vary depending on the panel. For the exact number, see [Tab. 14 "AP1000 panels with clamping blocks - Installation diagrams" on page 28](#).

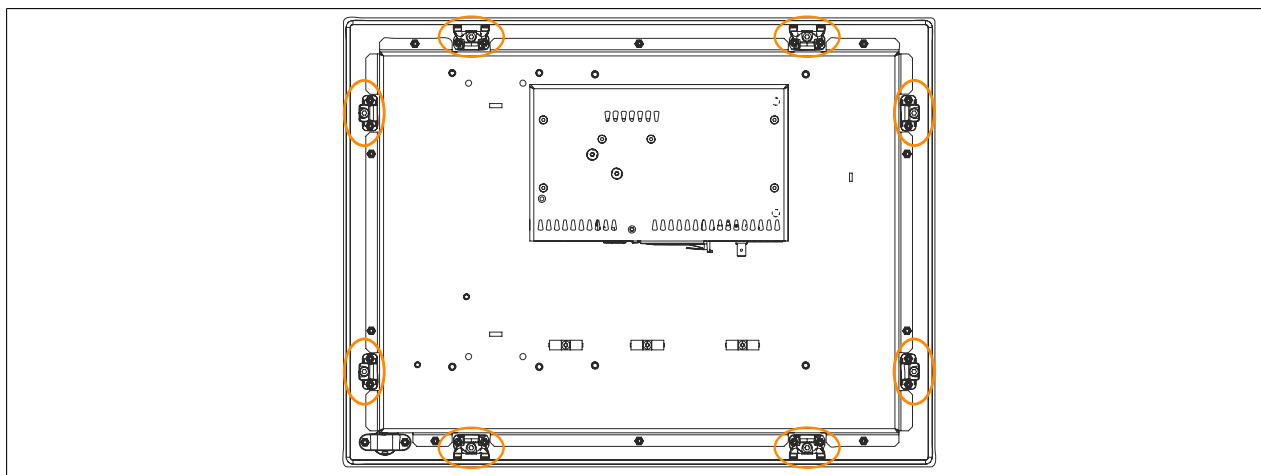


Figure 118: Position of the clamping blocks (sample figure)

2. Fasten the clamping blocks to the wall or control cabinet by alternately tightening the screws with a 3 mm hex key screwdriver. Tightening the screw presses down the integrated clamping lever to hold the device securely in place. The tightening torque should be max. 0.5 Nm to provide an optimal seal.

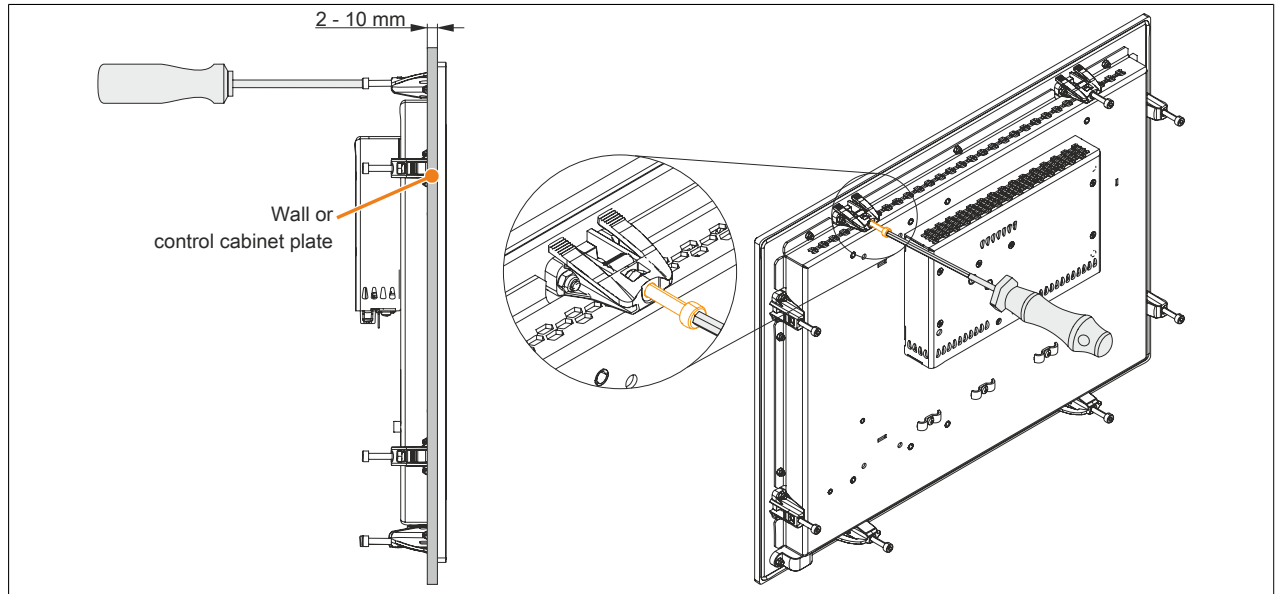


Figure 119: Fastening the clamping blocks (sample figure)

3.1.5 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 268](#). This is required for the following individual components:

- System unit
- Interface option

3.1.6 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.

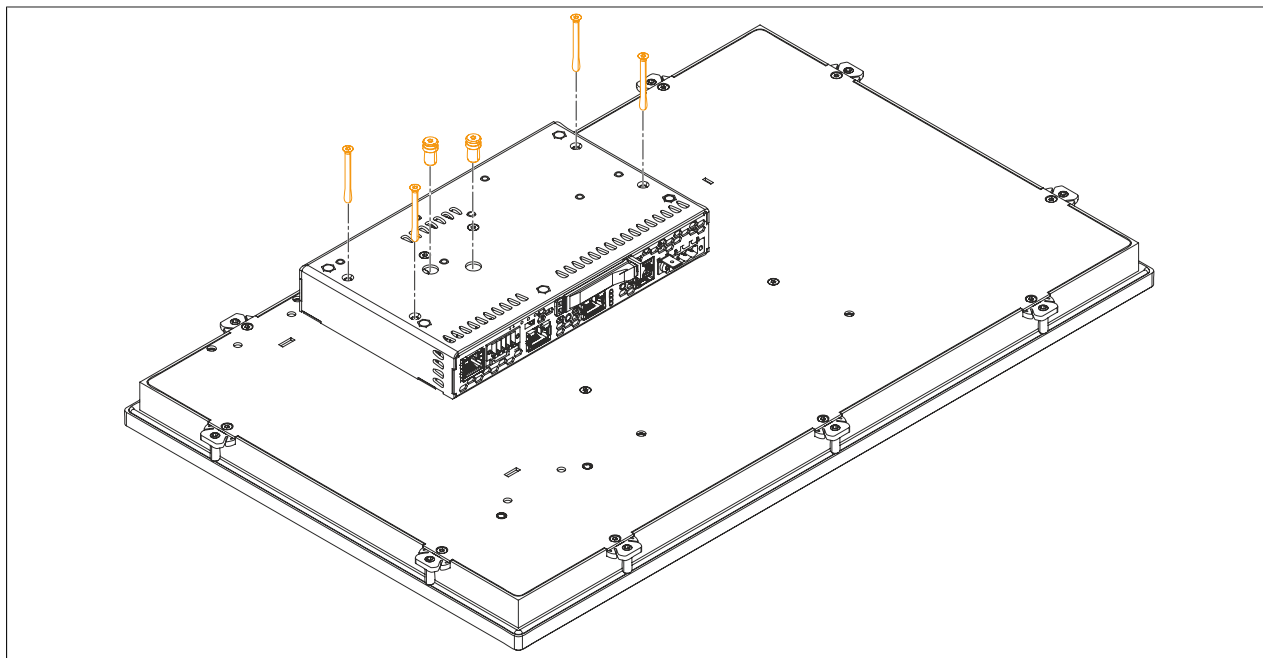


Figure 120: Removing the Torx screws

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

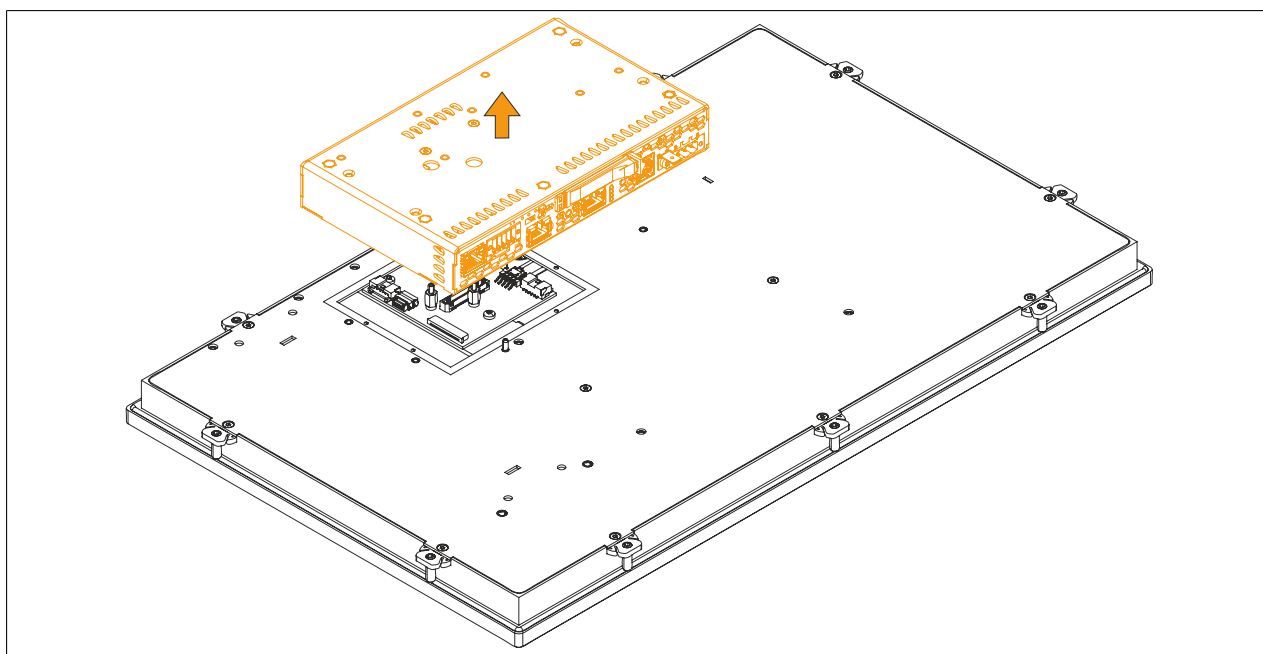


Figure 121: Removing the system unit

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.

3.1.7 Installation the 4-port USB hub

Installation on the Panel PC 2100 is possible with display diagonals $\geq 10.1"$.

The USB hub can be installed starting with the following revisions:

- 5PPC2100.BY01-000 - Rev. F0 and later
- 5PPC2100.BY11-000 - Rev. F0 and later
- 5PPC2100.BY22-000 - Rev. F0 and later
- 5PPC2100.BY34-000 - Rev. F0 and later
- 5PPC2100.BY44-000 - Rev. G0 and later
- 5PPC2100.BY48-000 - Rev. A0 and later

1. Screw the 4-port USB hub to the side of the system unit using the included Torx screw (T10). Tightening torque 0.55 Nm.

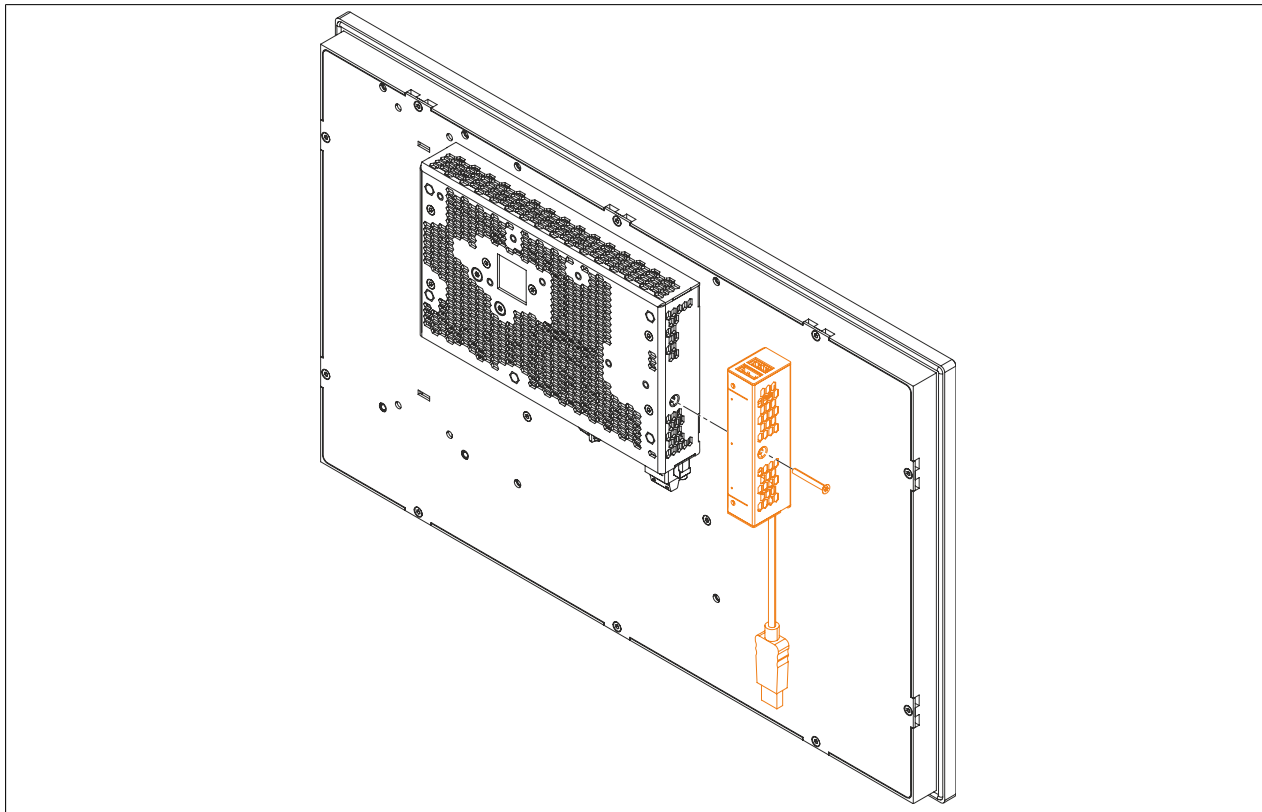


Figure 122: Mounting the 4-port USB hub on the system unit

2. Connect the USB cable attached to the USB hub to the USB2 interface on the system unit.

3.2 Connecting to the electrical grid

Danger!

- All power supplies must be disconnected before removing device covers or components and installing/removing accessories, hardware or cables.
- The power cable must be disconnected from the device and from the power supply.
- All covers, components, accessories, hardware and cables must be installed or connected before the device can be connected to the power supply and switched on.

3.2.1 Installing the DC power cable

Danger!

All power supplies to the B&R industrial PC and B&R Automation Panel must be interrupted. Before connecting the DC power cable, it is necessary to check whether it has been disconnected from the power source (e.g. power supply).

3.2.1.1 Wiring

The DC power cable must be installed in the terminal block (power supply connector) as shown in the image below. Wires with a cross section of 0.75 mm² to 1.5 mm² and wire end sleeves must be used.

Installing screw clamp terminal block 0TB103.9

Fasten the wires with wire end sleeves into the terminal contacts ② as shown in the image below and tighten the screw clamp terminals ① with a screwdriver (max. tightening torque 0.4 Nm).

Observe the pinout of the power supply connection on the device during wiring!

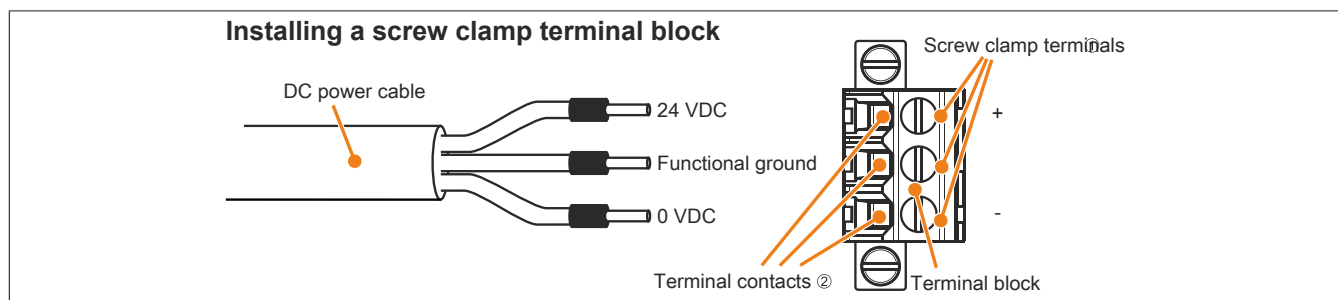


Figure 123: Installing a screw clamp terminal block

Installing cage clamp terminal block 0TB103.91

Insert a screwdriver into the cage clamp terminals ① and secure the wires with wire end sleeves in the terminal contacts ② as shown in the image below. Close the terminal contact by removing the screwdriver.

Observe the pinout of the power supply connection on the device during wiring!

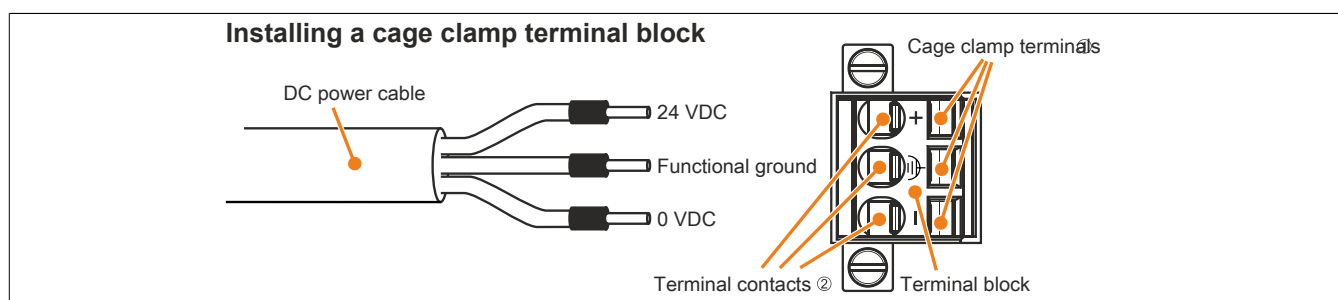


Figure 124: Installing a cage clamp terminal block

3.2.2 Connecting the power supply to a B&R device

Danger!

The power supply to the B&R device must be completely interrupted. Before connecting the power cable, it is necessary to check whether it has been disconnected from the power source (e.g. power supply).

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

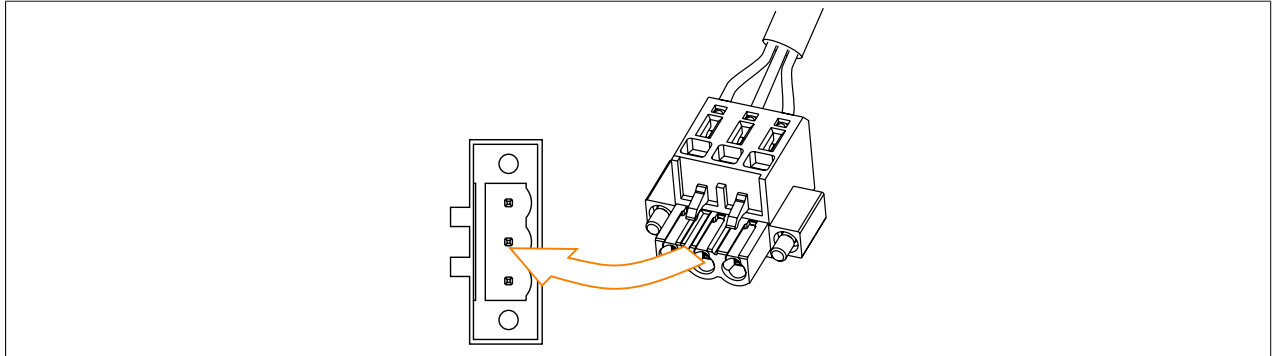


Figure 125: Connecting the power supply connector to a B&R device

3.2.3 Functional ground - Grounding concept


Functional ground is a current path of low impedance between electrical circuits and ground. It is used to improve immunity to interference, for example, and not necessarily as a protective measure. It therefore serves only to conduct interference, not to provide any kind of protection against electric shock.

This device comes equipped with 2 functional ground connections:

- Functional ground connection for the power supply
- Ground connection

To ensure the safe conductance of electrical interference, the following points must be observed:

- Connect the device to the central grounding point (e.g. the control cabinet or the system) using the shortest path with the lowest resistance.
- A cable with a minimum cross section of 2.5 mm² per connection must be used. If a cable with wire end sleeves is connected to terminal block 0TB103.9 or 0TB103.91, then a cable with maximum 1.5 mm² per connection is possible.
- Observe the line shielding concept. All data cables connected to the device must be shielded.

The following symbol is used to indicate functional ground on the B&R device: 

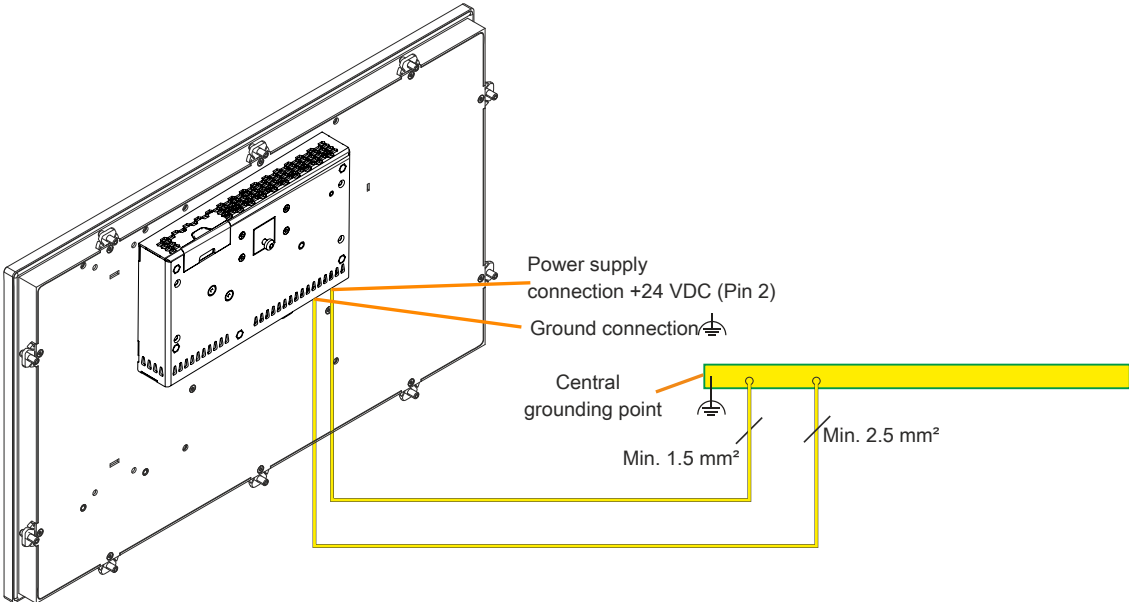


Figure 126: Panel PC 2200 - Grounding concept

3.3 Cable connections

The bend radius specifications must be taken into account when installing or connecting cables.

Information:

The maximum tightening torque for the locating screws is 0.5 Nm.

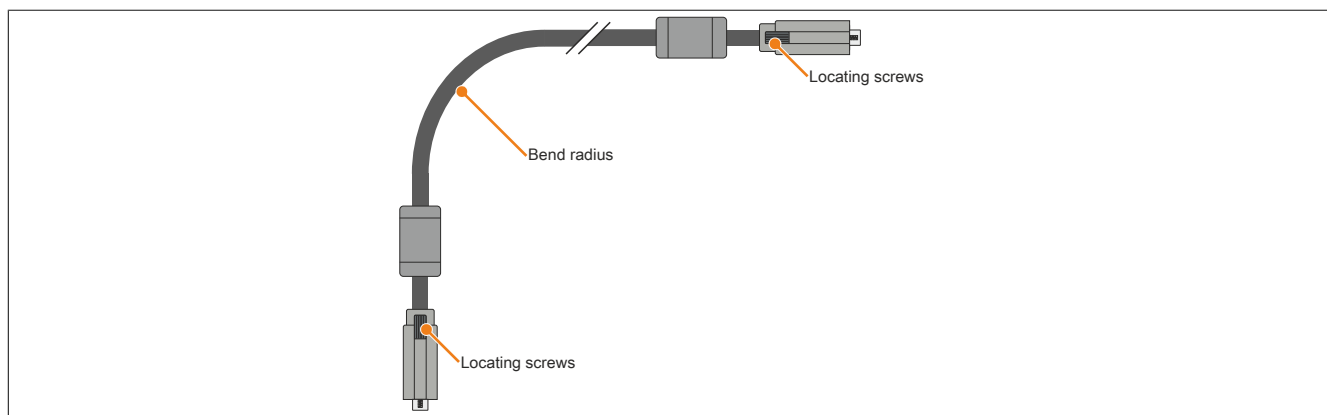


Figure 127: Bend radius - Cable connection

Information:

For the specified bend radius, see the technical data for the respective cable.

3.4 Switching on the device for the first time

3.4.1 General information before switching on the device

Checklist

The following items must be checked before the device is put into service for the first time:

- Have the installation notes specified in ["Installation" on page 210](#) been observed?
- Have the permissible 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 connected correctly to the ground connection?
- The device must first be put into service before additional hardware is installed.

Caution!

Before the device is put into service, it must slowly be acclimated to room temperature! Subjecting it to thermal radiation is not permitted.

If transported at low temperatures or if there are large temperature fluctuations, the device is not permitted to be subjected to any type of moisture.

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

Requirements

The following requirements 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).

3.4.2 Switching on the device

Procedure

1. Connect and switch on the power supply.
2. The device is in service and booting; LED "Power" is lit.

3.5 General instructions for performing temperature testing

The purpose of these instructions is to explain general procedures for performing application-specific temperature testing on B&R industrial PCs or Power Panels. These instructions only represent guidelines, however.

3.5.1 Procedure

In order to obtain accurate results, test conditions should match conditions in the field. This means that for the duration of the temperature tests, the target application should be running, the PC should be installed in the control cabinet that will be used later, etc.

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

Every B&R industrial PCs and Power Panel is equipped with internal temperature sensors. They are positioned in different locations depending on the device family. Their number as well as the temperature limits also vary depending on the device family.

For information about the location of temperature sensors as well as their maximum specified temperatures, see section "Temperature sensor positions" in 2 "Technical data".

A minimum testing time of 8 hours is recommended for an optimal determination and assessment of the temperature situation.

3.5.2 Evaluating temperatures in Windows operating systems

3.5.2.1 Evaluating with the B&R Control Center

The B&R Control Center can be used to evaluate temperatures. The temperatures can be viewed on the "Temperatures" tab. The B&R Control Center is available for download at no cost in the Downloads section of the B&R website (www.br-automation.com). The B&R Control Center uses the B&R Automation Device Interface (ADI).

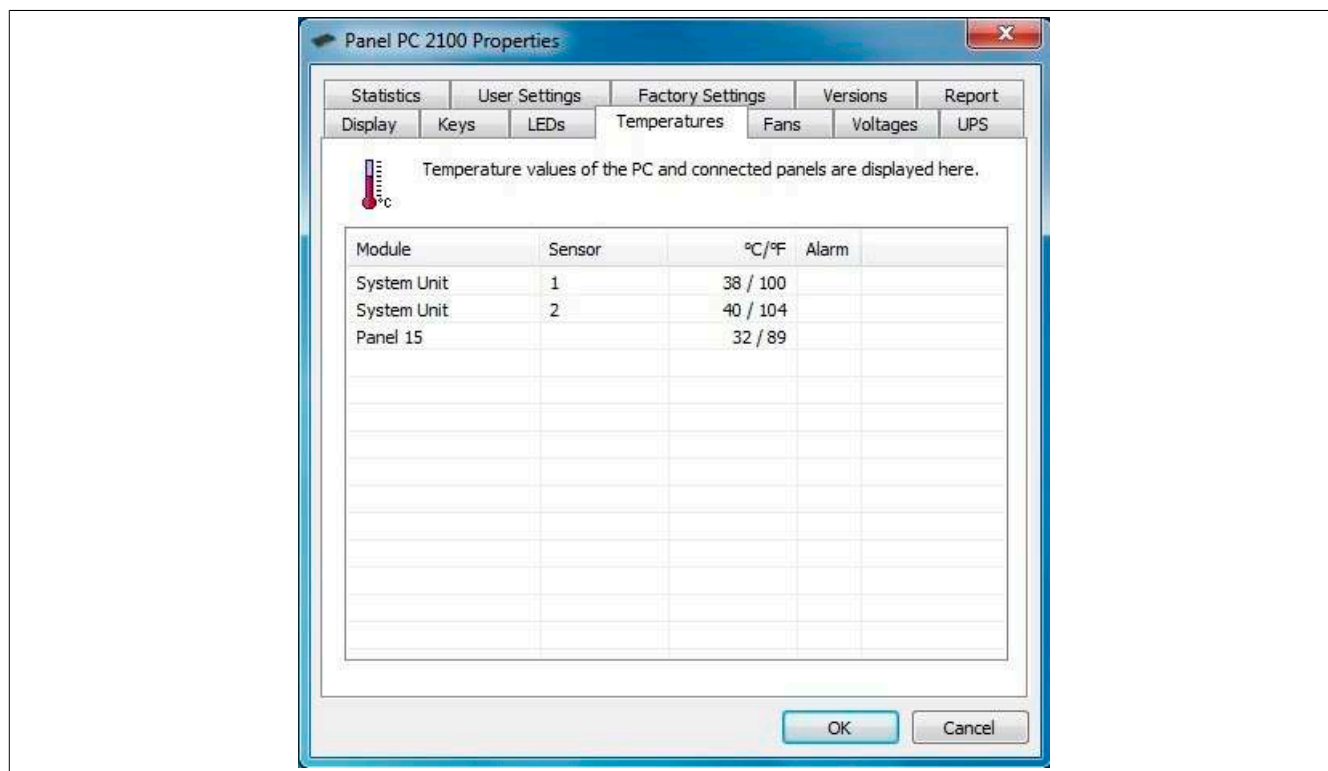


Figure 128: Evaluating with the B&R Control Center using a PPC2100 without IF options

A separate application can be developed if it is necessary to collect historical data.

Information:

Software development kits such as the ADI .NET SDK are available on the B&R website (www.br-automation.com) for developing a separate application.

3.5.2.2 Evaluating with the BurnInTest tool from PassMark

If a separate application is not developed or used to evaluate the temperature, then B&R recommends using the BurnInTest software tool from PassMark.

Standard and professional versions of BurnInTest are available. In addition to the software package, there are also various loopback adapters (serial, parallel, USB, etc.) and test CDs/DVDs available. A corresponding load can be generated on the system and peripheral devices based on the extent of the software and existing loopback adapters.

Information:

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

The following screenshots are based on PassMark BurnInTest Pro V7.1 using a PPC2100 without IF options.

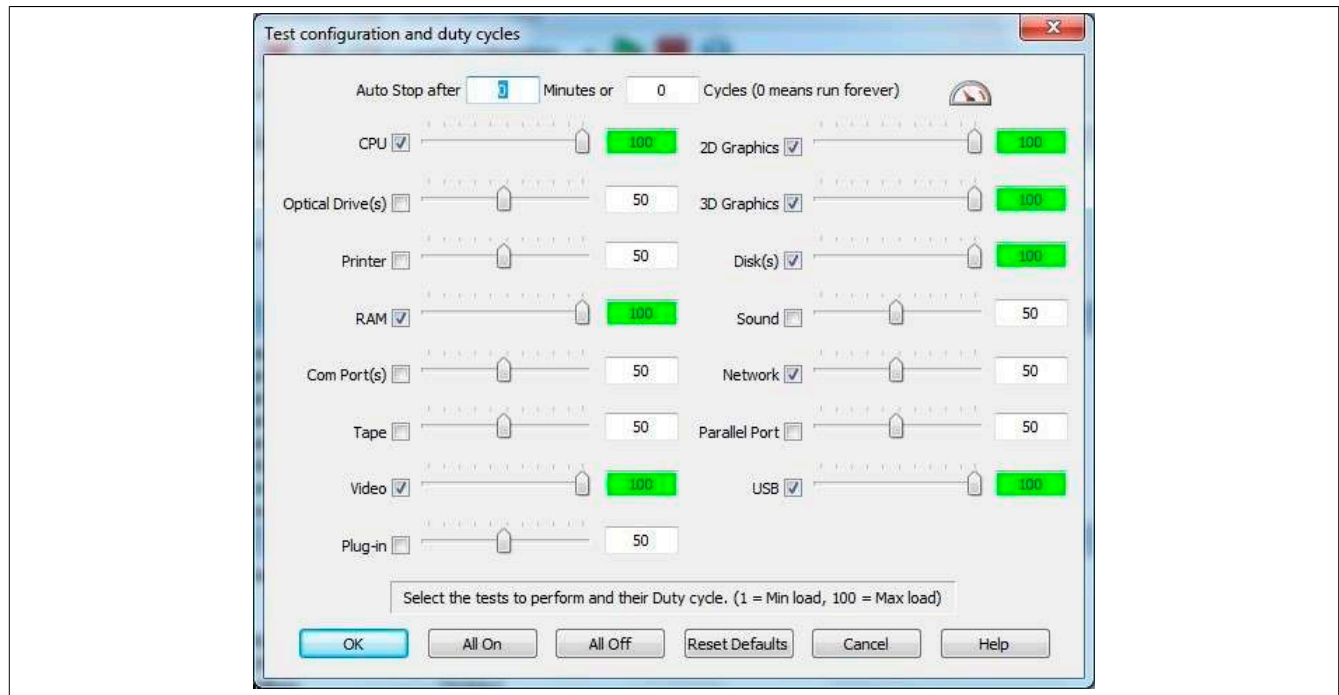


Figure 129: Settings for PassMark BurnInTest Pro V6 using a PPC2100 without IF options

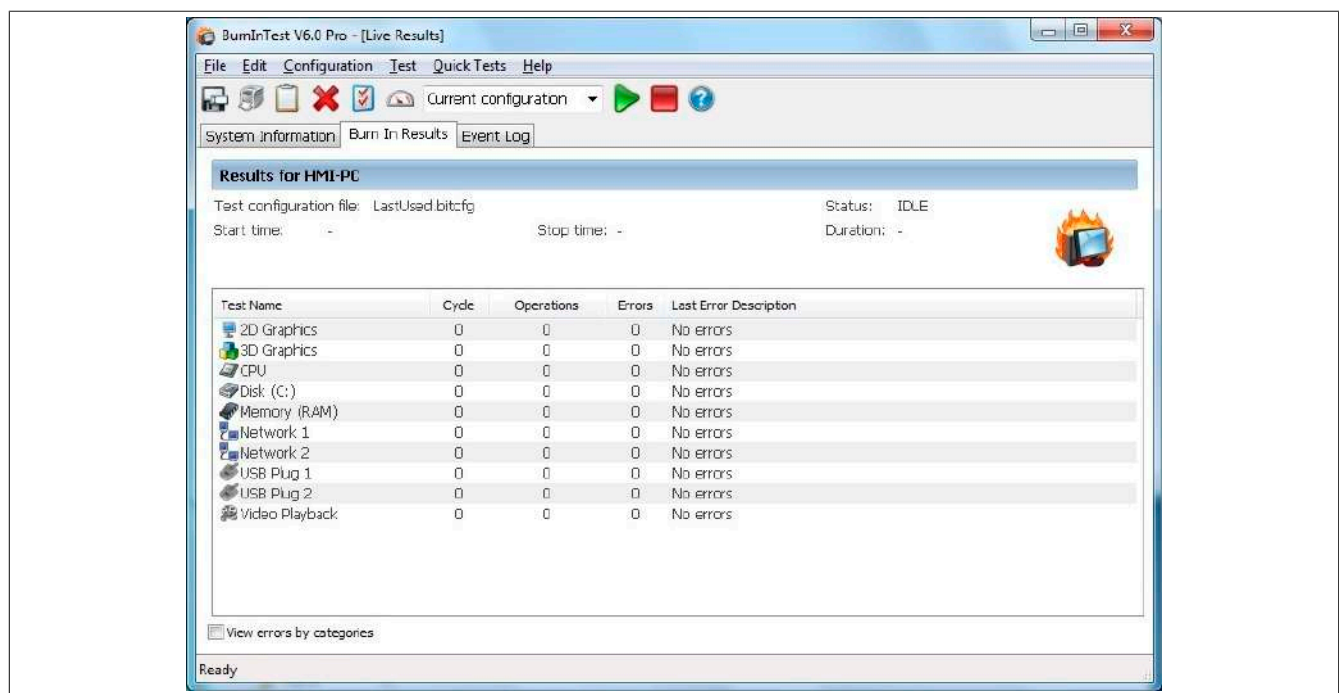


Figure 130: Test overview of a PPC2100 without IF options

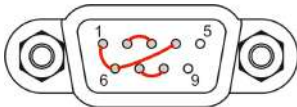
Test properties may need to be fine-tuned depending on the availability of loopback adapters and DVDs.

Information:

USB flash drives can also be used if no USB loopback adapters are available. The USB flash drives must be available in Windows as formatted drives. The test USB must then be deselected, and the USB flash drives must be configured as the testing device in the disk properties.

**Information:**

Serial loopback adapters are relatively easy to create. Simply connect some pins on the serial interface with wires.



3.5.3 Evaluating temperatures in non-Windows operating systems

For applications that do not run in Windows, temperatures can be evaluated using the B&R MTCX Development Kit. In addition to the MTCX Development Kit, sample programs in EFI are also available.

The implementation guide only describes device-specific functions, not the main functions of the sample programs.

If code from the sample programs is used, it is important to take into account the notes in the implementation guide regarding TODO comments, I/O access functions, etc.

Information:

For current B&R PC series (starting with the APC910), the MTCX Development Kit can be downloaded at no cost from the B&R website (www.br-automation.com).

Sample programs and implementation guides for all other B&R series can be downloaded free of charge from the B&R website (www.br-automation.com).

3.5.4 Evaluating the measurement results

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

If the temperature tests cannot be performed in a climate chamber, they can be performed in an office environment, for example. It is necessary to measure the ambient temperature in this case, however. Experience at B&R has shown that temperature values measured on passive systems (systems without a fan kit) can be calculated linearly based on the ambient temperature. In order to calculate temperature values for systems with a fan kit, the fans must be running. It is also important to take speed, etc. into account.

If the temperature tests are performed in a climate-controlled chamber with fans, the fans will cool the devices being tested and distort the results. The measurement results for passive devices are therefore unusable. In order to be able to still perform temperature tests in climate-controlled chambers with fans without distorting the results, the fans in the climate chamber must be switched off and a sufficient amount of time (several hours) observed before beginning the test.

3.6 Touch screen calibration

B&R touch screen devices are equipped with a B&R touch controller that supports hardware calibration. This means that devices are pre-calibrated when delivered. This is a beneficial property when replacing devices of the same model or type since the new device does not require recalibration. Nevertheless, calibrating the device is still recommended in order to achieve the best results and to better adapt the touch screen to the user's preferences.

3.6.1 Single-touch (analog resistive)

3.6.1.1 Windows 10 IoT Enterprise 2016 LTSC

After starting Windows 10 IoT Enterprise 2016 LTSC 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).

3.6.1.2 Windows 10 IoT Enterprise 2015 LTSC

After starting Windows 10 IoT Enterprise 2015 LTSC 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).

3.6.1.3 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).

3.6.1.4 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).

3.6.1.5 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 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).

3.6.2 Multi-touch (projected capacitive - PCT)

3.6.2.1 Windows 10 IoT Enterprise 2016 LTSC

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

3.6.2.2 Windows 10 IoT Enterprise 2015 LTSC

Microsoft multi-touch drivers are installed when Windows 10 IoT Enterprise 2015 LTSC is installed on the device. Once the installation of Windows 10 IoT Enterprise 2015 LTSC has completed, the device can be operated immediately.

3.6.2.3 Windows Embedded 8.1 Industry Pro

Microsoft multi-touch drivers are installed when Windows Embedded 8.1 Industry Pro is installed on the device. Once the installation of Windows Embedded 8.1 Industry Pro has completed, the device can be operated immediately.

3.6.2.4 Windows 7 Professional / Ultimate

Microsoft multi-touch drivers are installed when Windows 7 is installed on the device. Once the installation of Windows 7 has completed, the device can be operated immediately.

3.6.2.5 Windows Embedded Standard 7 Premium

Microsoft multi-touch drivers are installed when Windows Embedded Standard 7 Premium is installed on the device. Once the installation of Windows Embedded Standard 7 Premium has completed, the device can be operated immediately.

3.7 Adjusting the display brightness

1. Open the 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.

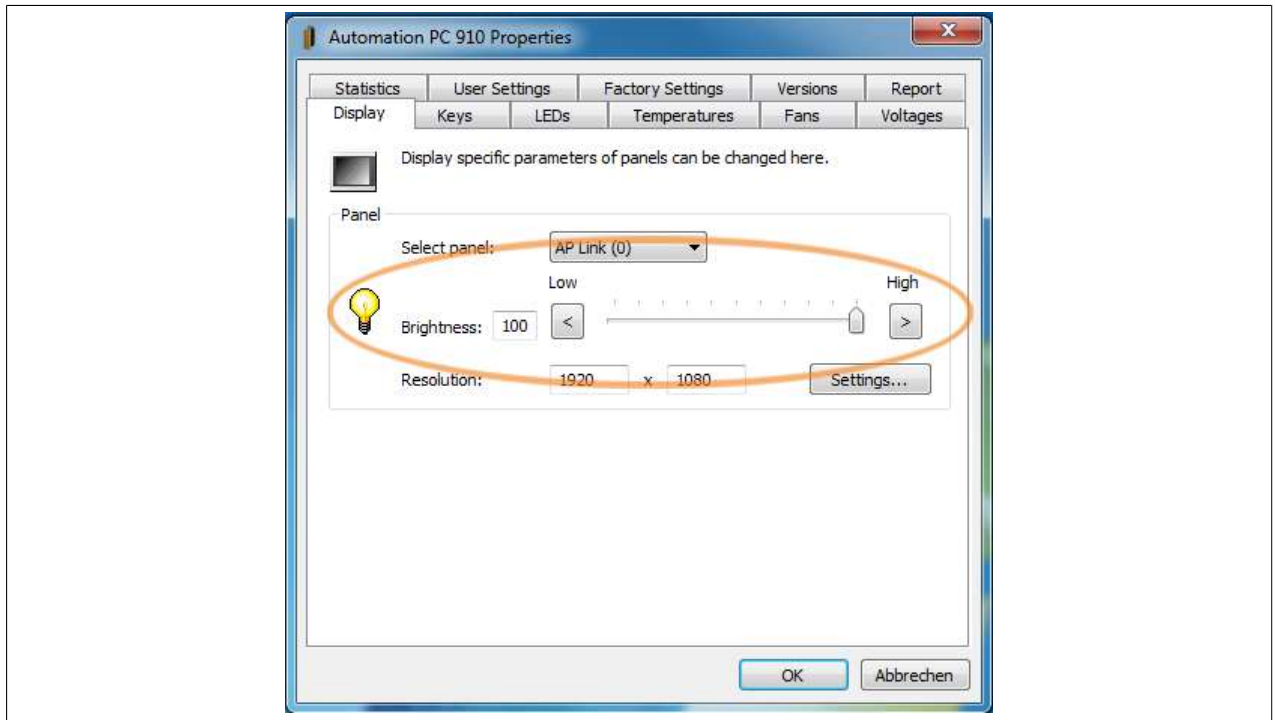


Figure 131: Adjusting the display brightness

Information:

The changed settings are displayed online but only applied by the system (and used after the next restart) if the 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 Control Center is launched.

3.8 Known problems / Issues

- In Windows 7 and later, CAN IF option 5ACCIF01.ICAN-000 is supported 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.), one possible solution is to disable the EEE feature (Energy-Efficient Ethernet) in the driver.
- If USB 3.0 should be used, XHCI mode must be set for the following operating systems in the "[USB configuration](#)":
 - Windows 10 or Windows 8.1 set to "Enabled"
 - Windows 7 set 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 B&R Linux, disabling the USB 3.0 function is one possible solution. To do this, the XHCI controller must be set to "Disabled" in the BIOS USB configuration.
- In order to slightly improve the real-time behavior (jitter) of Automation Runtime Windows (ARwin) or Automation Runtime Embedded (ARemb) in graphics-intensive applications, set BIOS setting *Advanced - Graphics (IGD) configuration - IGD turbo* to *Disabled*. If BIOS setting *Advanced - Graphics (IGD) configuration - IGD turbo* is set to *Disabled*, the graphics performance of the system is noticeably reduced.

4 Software

4.1 BIOS options

Information:

The following figures, BIOS menu options and descriptions refer to BIOS version 1.40. 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.

4.1.1 General information

BIOS is an acronym for "Basic Input/Output System". It is the most basic standardized interface between the user and the system (hardware). The BIOS system used in this B&R industrial PC was developed by Phoenix.

The BIOS Setup utility can be used to modify basic system configuration settings. These settings are stored in CMOS and EEPROM memory (as a 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 additional information, see the technical data for the system unit.

4.1.2 BIOS Setup and boot procedure

BIOS is activated immediately when switching on the power supply or pressing the power button on the B&R industrial PC. The system checks if the setup data from EEPROM memory is "OK". If the data is "OK", then it is transferred to CMOS. If the data is "Not OK", then the CMOS data is checked to see whether it is valid. An error message is output if the CMOS data contains errors, and the boot procedure can be continued by pressing <F1>. 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 and configures the system with the Power-On Self-Test (POST).

When these "preliminaries" are finished, BIOS looks for an operating system on the available data storage devices (hard drive, floppy drive, etc.). BIOS then launches the operating system and hands over to it the control of 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".

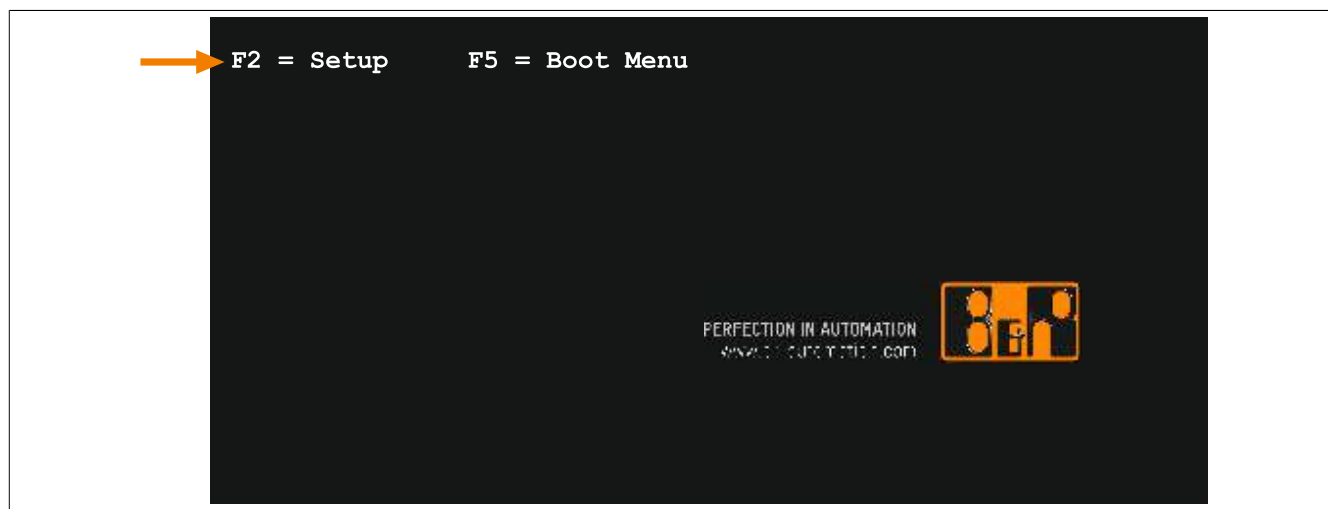


Figure 132: Boot screen

4.1.3 BIOS default settings

Configuration options in bold typeface represent the default value.

The default settings are the optimized settings that are applied when selecting the "Load setup defaults" function on the BIOS Setup "Exit" screen or pressing <F9> on the individual screens (applies the default settings for the respective screen only).

4.1.4 BIOS Setup keys

The following keys are enabled during POST:

Information:

Key signals from USB keyboards will only be registered after the USB controller has been initialized.

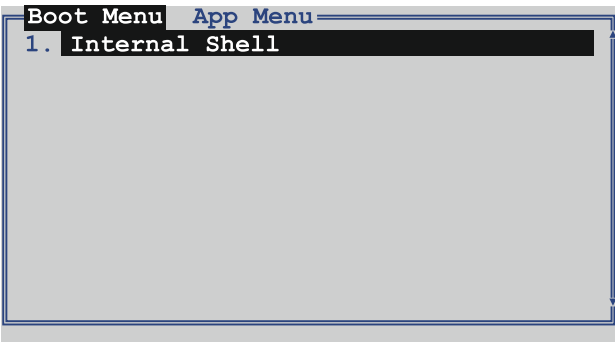
Keys	Function
F2	Opens the main BIOS Setup screen.
F5	Opens the boot menu. This lists all bootable devices that are connected to the system. Selecting a device with cursor ↑, cursor ↓ and then pressing <ENTER> will boot from that device.
	
<Pause>	Pauses POST. Pressing any other key resumes POST.

Table 221: BIOS-relevant keys for POST

The following keys can be used once inside BIOS Setup:

Key	Function
F1	Opens general help information.
Cursor ↑	Moves to the previous item.
Cursor ↓	Moves to the next item.
Cursor ←	Moves to the previous item.
Cursor →	Moves to the next item.
+/-	Changes the setting for the selected function.
Enter	Changes to the selected screen.
Page ↑	Jumps to the first BIOS menu item or object.
Page ↓	Jumps to the last BIOS menu item or object.
Home	Jumps to the first BIOS menu item or object.
End	Jumps to the last BIOS menu item or object.
F7	Resets any changes.
F9	Loads and configures CMOS default values for all BIOS settings.
F10	Saves and exits.
ESC	Exits a submenu.

Table 222: BIOS-relevant keys

4.1.5 Main

The main BIOS Setup screen appears immediately after the <F2> button is pressed during startup:

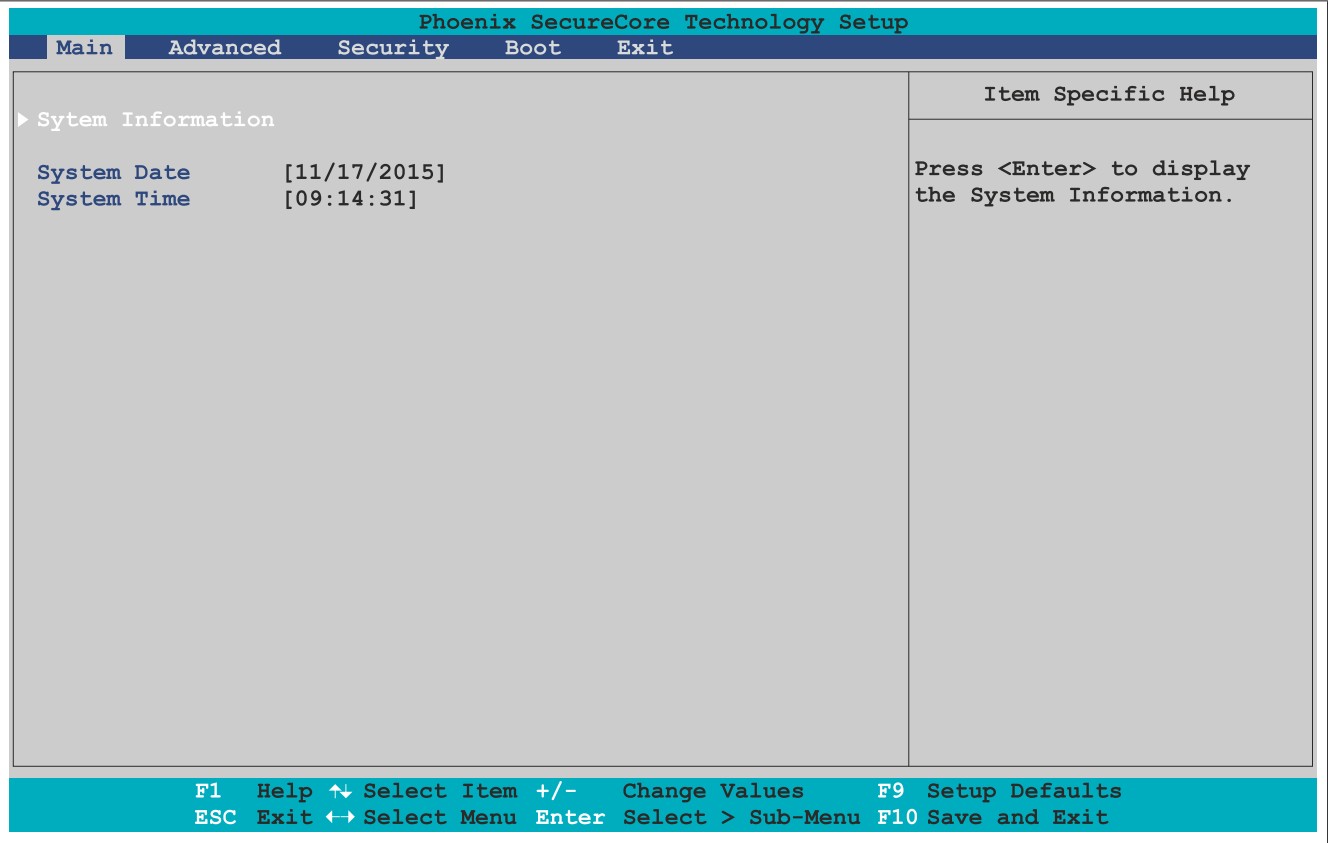


Figure 133: Main

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 237.
System date	The currently configured system date. This is retained when the system is switched off. For details, see the technical data for 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. This is retained when the system is switched off. For details, see the technical data for the system unit.	Change the system time	Sets the system time in the format Hour:Minute:Second (hh:mm:ss).

Table 223: Main

4.1.5.1 System information

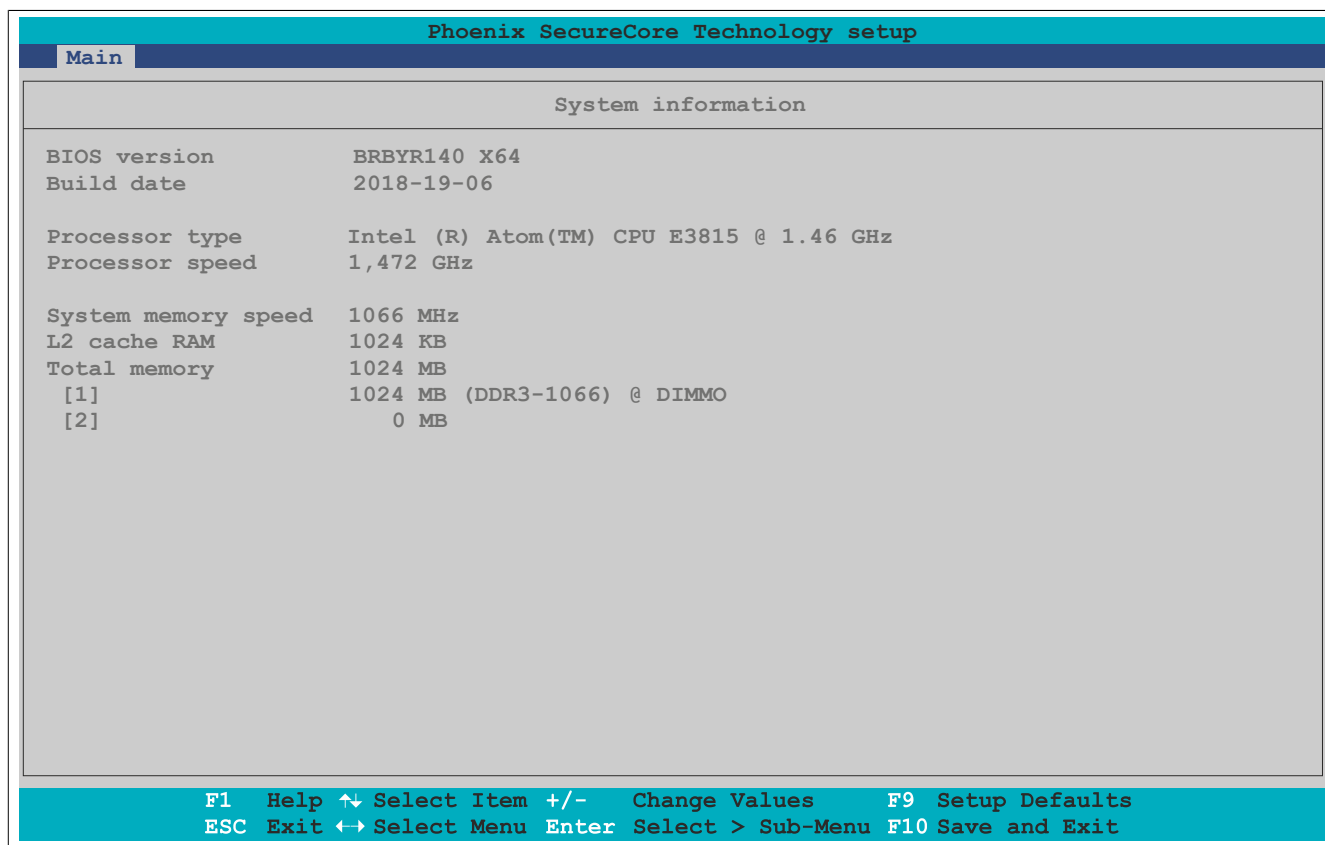


Figure 134: Main - System information

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	-
L2 cache RAM	Displays the size of the L2 code cache.	None	-
Total memory	Displays the size of all main memory.	None	-
[1]	Displays the size of the main memory in slot 1.	None	-
[2]	Displays the size of the main memory in slot 2.	None	-

Table 224: Main - System information

4.1.6 Advanced

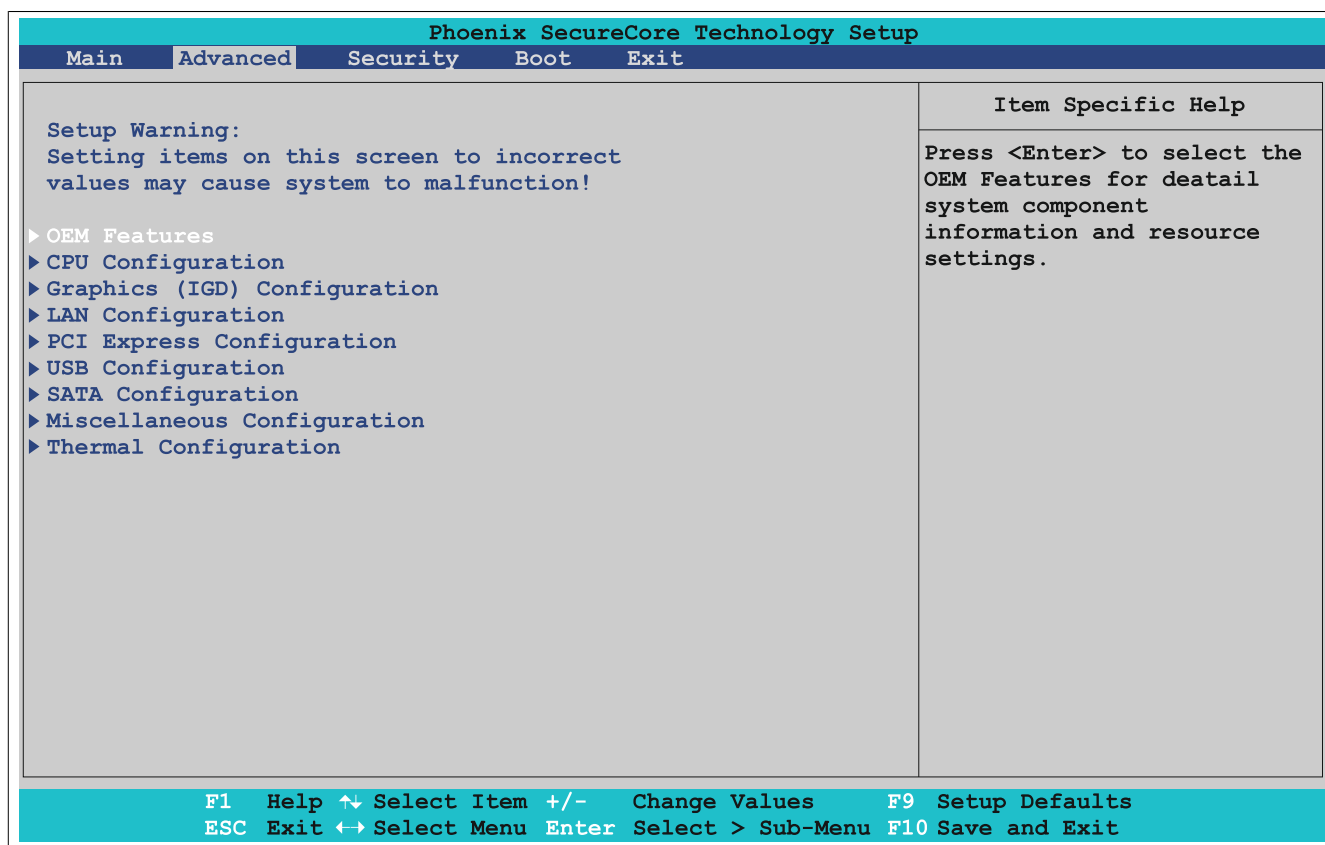


Figure 135: Advanced

BIOS setting	Explanation	Configuration options	Effect
OEM features	Configures OEM features.	Enter	Opens this submenu See "OEM features" on page 239.
CPU configuration	Configures CPU settings.	Enter	Opens this submenu See "CPU configuration" on page 251.
Graphics (IGD) configuration	Graphics settings configuration.	Enter	Opens this submenu See "Graphics (IGD) configuration" on page 253.
LAN configuration	Configures LAN settings.	Enter	Opens this submenu See "LAN" on page 255.
PCI express configuration	Configures PCI Express settings.	Enter	Opens this submenu See "PCI express configuration" on page 257.
USB configuration	Configures USB settings.	Enter	Opens this submenu See "USB configuration" on page 259.
SATA configuration	Configures SATA settings.	Enter	Opens this submenu See "SATA configuration" on page 260.
Miscellaneous configuration	Configures miscellaneous settings.	Enter	Opens this submenu See "Miscellaneous configuration" on page 261.
Thermal configuration	Configures temperature settings.	Enter	Opens this submenu See "Thermal configuration" on page 262.

Table 225: Advanced

4.1.6.1 OEM features

Phoenix SecureCore Technology setup		
Advanced		
OEM features		Item specific help
Version information Main BIOS version BRBYR140 OEM BIOS version MTCX firmware version 1.13 ETH1 MAC Address 00:E0:4B:4C:A5:27 ETH2 MAC Address 00:E0:4B:4C:A5:28 OEM string Bernecker + Rainer Industrie-Elektronik T1.40 ▶ Miscellaneous configuration ▶ Super I/O configuration ▶ System board features ▶ Display board features ▶ IF board features		Press <Enter> to select the Display board features for detail system component information and resource settings.
F1 Help ↕ Select Item +/- Change Values F9 Setup Defaults ESC Exit ↕ Select Menu Enter Select > Sub-Menu F10 Save and Exit		

Figure 136: Advanced - 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 miscellaneous settings.	Enter	Opens this submenu See "Miscellaneous configuration" on page 240.
Super I/O configuration	Configures special interface settings.	Enter	Opens this submenu See "Super I/O configuration" on page 241.
System board features	Displays device-specific information for the system unit.	Enter	Opens this submenu See "System board features" on page 242.
Display board features	Displays device-specific information for the display.	Enter	Opens this submenu See "Display board features" on page 245.
IF board features	Displays device-specific information for the IF option.	Enter	Opens this submenu See "IF board features" on page 249.

Table 226: Advanced - OEM features

4.1.6.1.1 Miscellaneous configuration

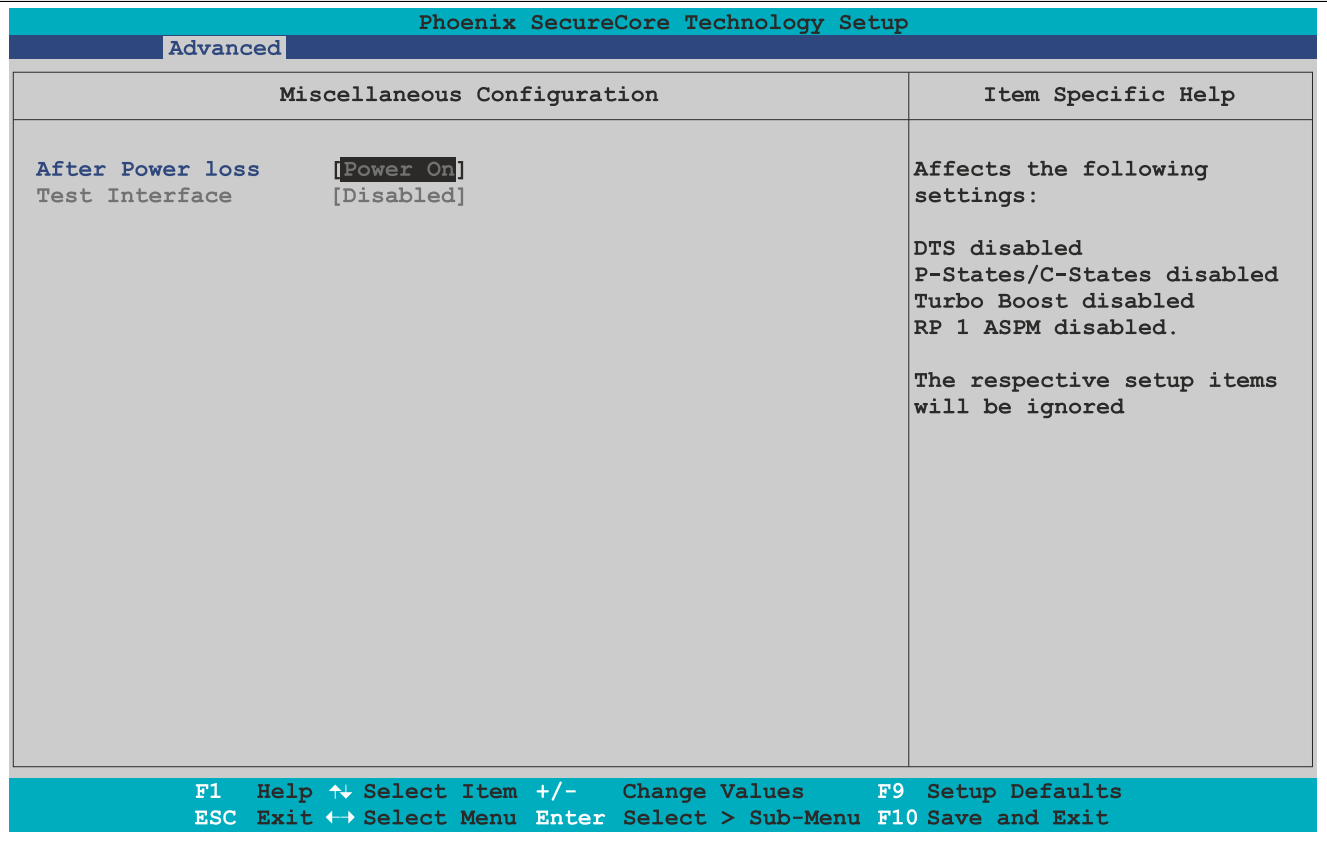


Figure 137: Advanced - OEM features - Miscellaneous configuration

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

Table 227: Advanced - OEM features - Miscellaneous configuration

4.1.6.1.2 Super I/O configuration

Phoenix SecureCore Technology Setup	
Advanced	
Super I/O Configuration	Item Specific Help
Serial Port A [Default] Base Address [3F8] IRQ [4]	Enable/Disable Serial Port. Disabled: Disable Port. Manual: Set Port values manual Default: Use system default values.
Serial Port B [Default] Base Address [2F8] IRQ [3]	
CAN [Default] Base Address [384] IRQ [10]	
F1 Help ↕ Select Item +/- Change Values F9 Setup Defaults ESC Exit ↔ Select Menu Enter Select > Sub-Menu F10 Save and Exit	

Figure 138: Advanced - OEM features - Super I/O configuration

BIOS setting	Explanation	Configuration options	Effect
Serial port A	Setting for the COM interface on the IF option.	Disabled	Disables this interface.
		Manual	Allows manual settings for "Base address" and "IRQ".
		Default	Uses the default settings.
Base address	Sets and displays the I/O address.	3F8h	Default setting
		Any	Allows any I/O address to be entered.
		3, 4, 5, 6, 7, 10, 11, 12, 14, 15	Manual assignment.
Serial port B	Setting for the onboard touch screen.	Disabled	Disables this interface.
		Manual	Allows manual settings for "Base address" and "IRQ".
		Default	Uses the default settings.
Base address	Sets and displays the I/O address.	2F8h	Default setting
		Any	Allows any I/O address to be entered.
		3, 4, 5, 6, 7, 10, 11, 12, 14, 15	Manual assignment.
IRQ	Sets and displays the IRQ.	Default	Uses the default settings. No other settings are possible.
CAN	Setting for the CAN interface on the IF option.	Default	Uses the default settings. No other settings are possible.
Base address	Displays the I/O address.	384h/385h	Permanently assigned. This setting cannot be modified.
IRQ	Displays IRQ.	10	Permanently assigned. This setting cannot be modified.

Table 228: Advanced - OEM features - Super I/O configuration

4.1.6.1.3 System board features

Phoenix SecureCore Technology Setup		
Advanced		
System Board Features		Item Specific Help
Device ID 0000E522 Compatibility ID 0000 Vendor ID 00000000 Hardware Revision A2 Serial Number E5220168427 Product Name 5PPC2100.BY01-00 Parent Device ID FFFFFFFF Parent Compatibility ID FFFF User Serial ID 35434454 ▶ Statistical Values ▶ Temperature Values		Press <Enter> to select the Statistical Values Submenu for detail information.
F1 Help ↕ Select Item +/- Change Values F9 Setup Defaults ESC Exit ↔ Select Menu Enter Select > Sub-Menu F10 Save and Exit		

Figure 139: Advanced - OEM features - 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 needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor 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 hexadecimal value can be freely specified by the user (e.g. to give the device a unique ID) and can only be changed using the "B&R Control Center" included with the ADI driver.	None	-
Statistical values	Displays statistical values.	Enter	Opens this submenu See "Statistical values" on page 243.
Temperature values	Displays current temperature values.	Enter	Opens this submenu See "Temperature values" on page 244.

Table 229: Advanced - OEM features - System board features

4.1.6.1.3.1 Statistical values

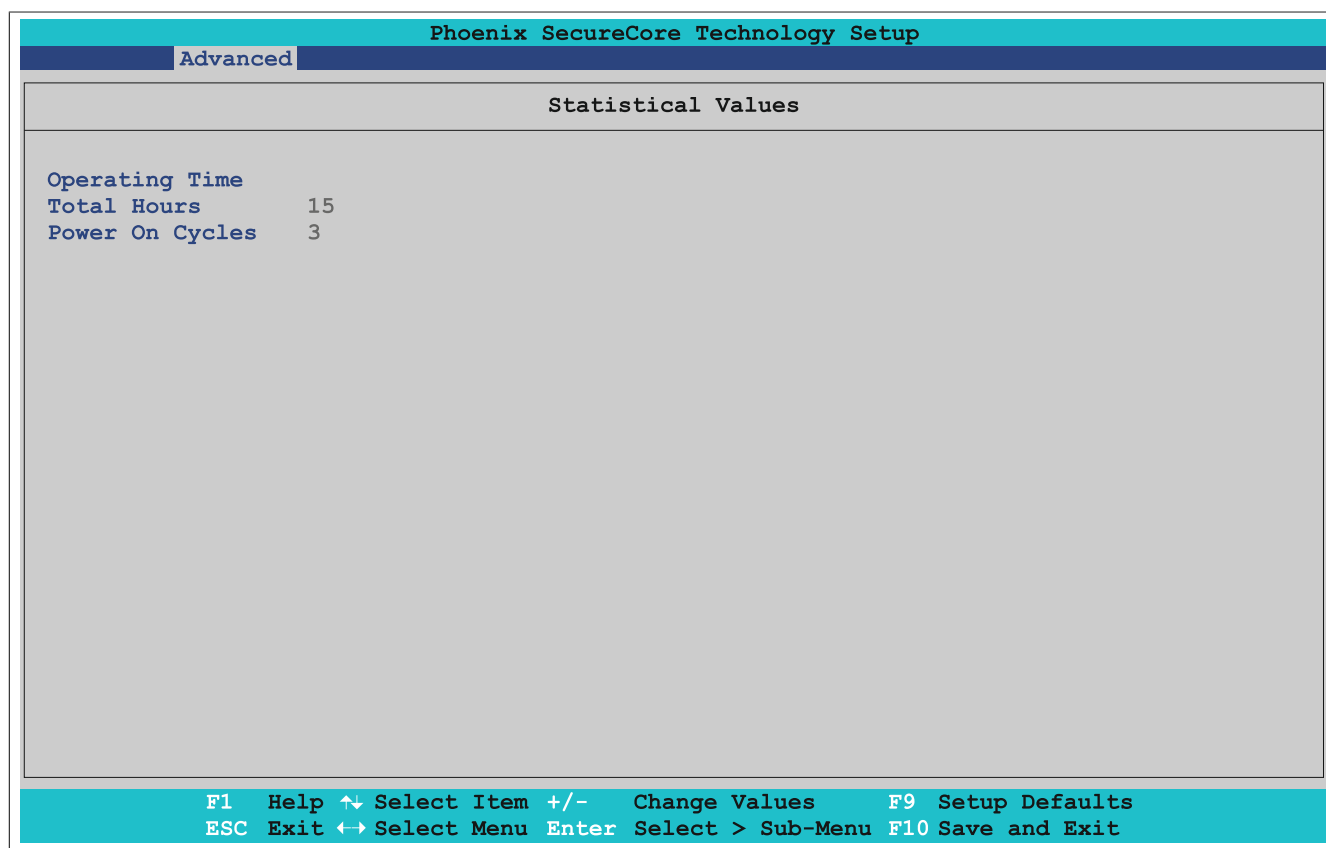


Figure 140: Advanced - OEM features - System board features - Statistical values

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

Table 230: Advanced - OEM features - System board features - Statistical values

4.1.6.1.3.2 Temperature values

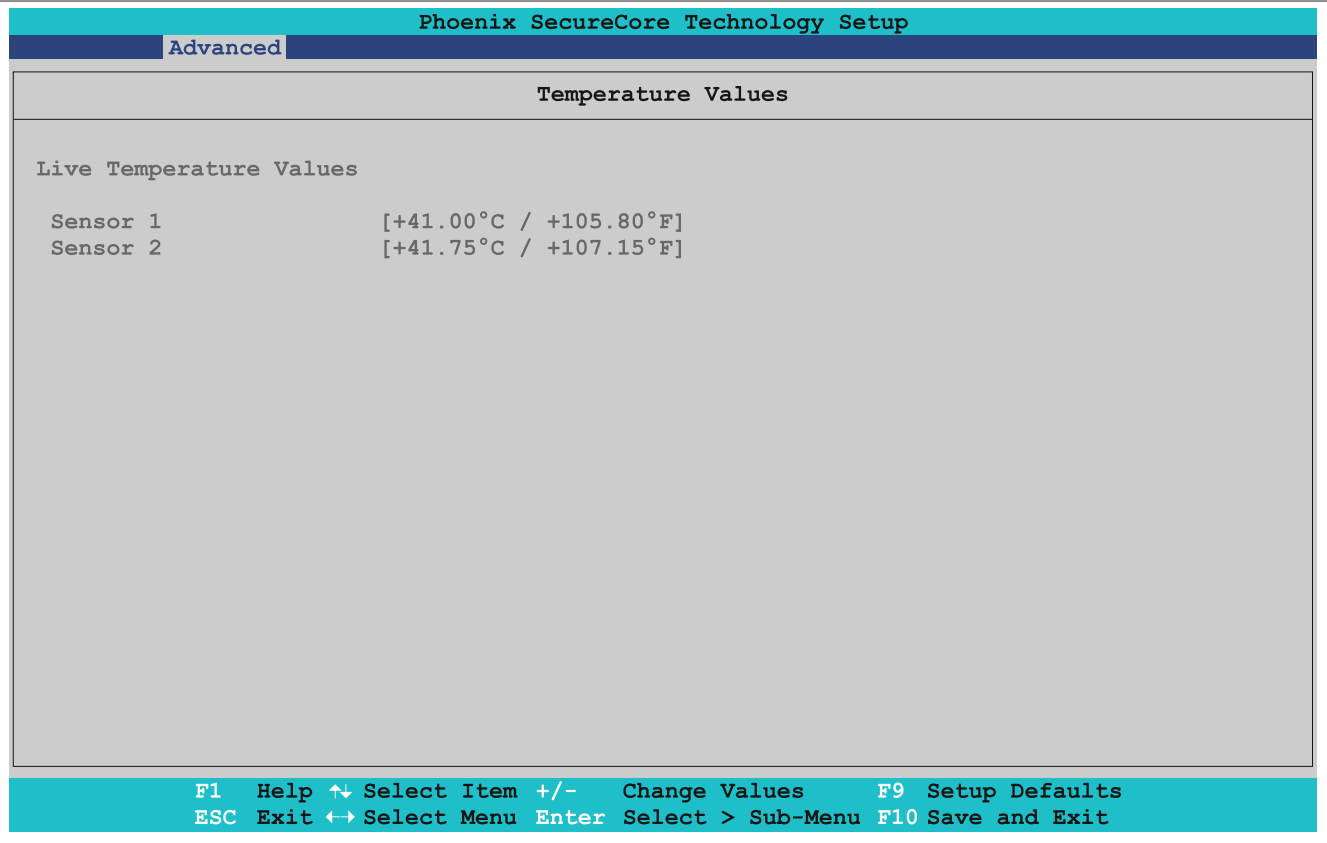


Figure 141: Advanced - OEM features - System board features - Temperature values

BIOS setting	Explanation	Configuration options	Effect
Sensor 1	Displays the current temperature of sensor 1 (system unit sensor 2) in °C and °F (sensor near 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	-

Table 231: Advanced - OEM features - System board features - Temperature values

4.1.6.1.4 Display board features

Phoenix SecureCore Technology Setup		
Advanced		
Display Board Features		Item Specific Help
Device ID 0000E1B0 Compatibility ID 0000 Vendor ID 00000000 Hardware Revision A0 Serial Number E1B00168649 Product Name 5AP923.1215-00 Parent Device ID FFFFFFFF Parent Compatibility ID FFFF ▶ Statistical Values ▶ Temperature Values ▶ Panel #15		Press <Enter> to select the Statistical Values Submenu for detail information.
F1 Help ↕ Select Item +/- Change Values F9 Setup Defaults ESC Exit ↔ Select Menu Enter Select > Sub-Menu F10 Save and Exit		

Figure 142: Advanced - OEM features - 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 needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor 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 statistical values.	Enter	Opens this submenu See "Statistical values" on page 246.
Temperature values	Displays current temperature values.	Enter	Opens this submenu See "Temperature values" on page 247.
Panel #15	Displays the panel properties of the panel.	Enter	Opens this submenu See "Panel #15" on page 248.

Table 232: Advanced - OEM features - Display board features

4.1.6.1.4.1 Statistical values

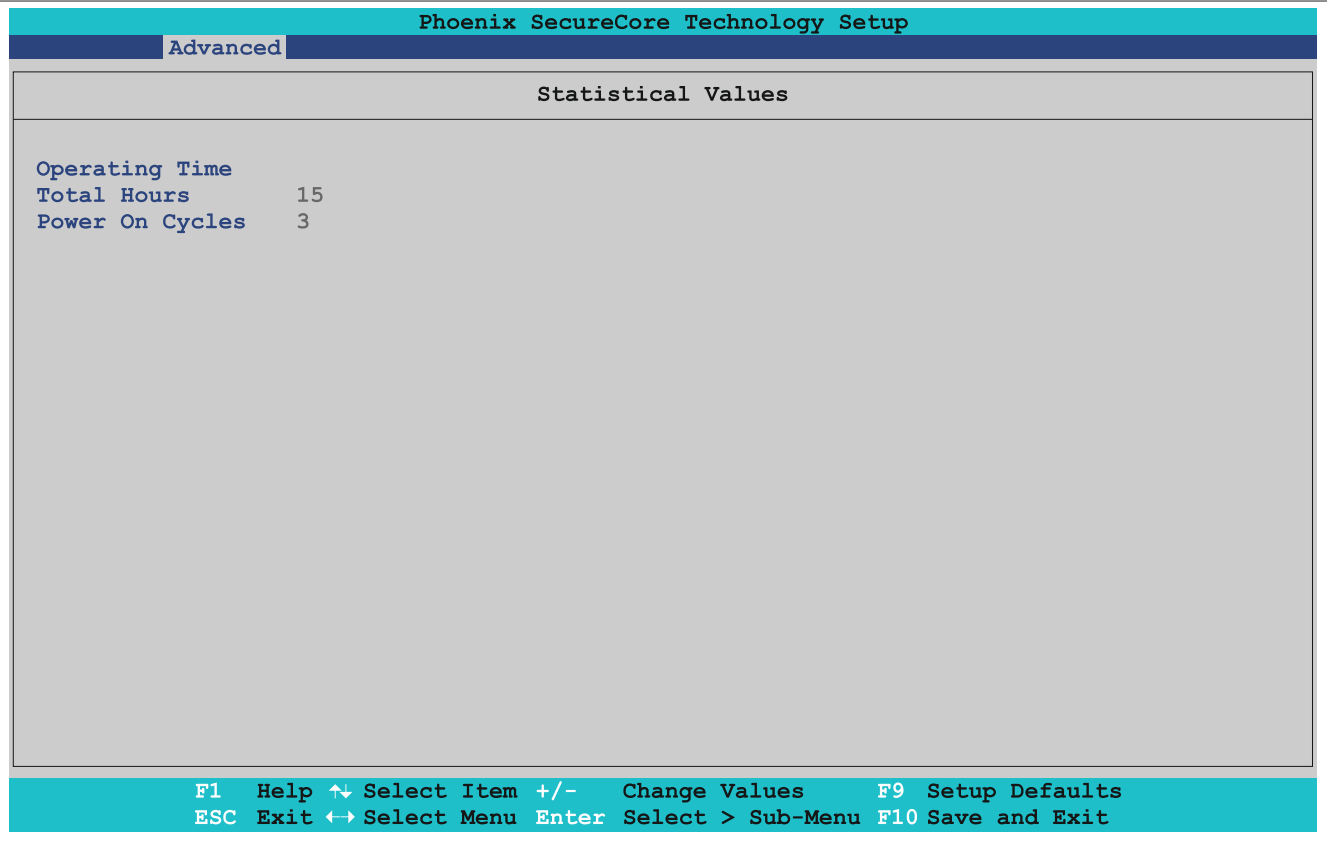


Figure 143: Advanced - OEM features - Display board features - Statistical values

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

Table 233: Advanced - OEM features - Display board features - Statistical values

4.1.6.1.4.2 Temperature values

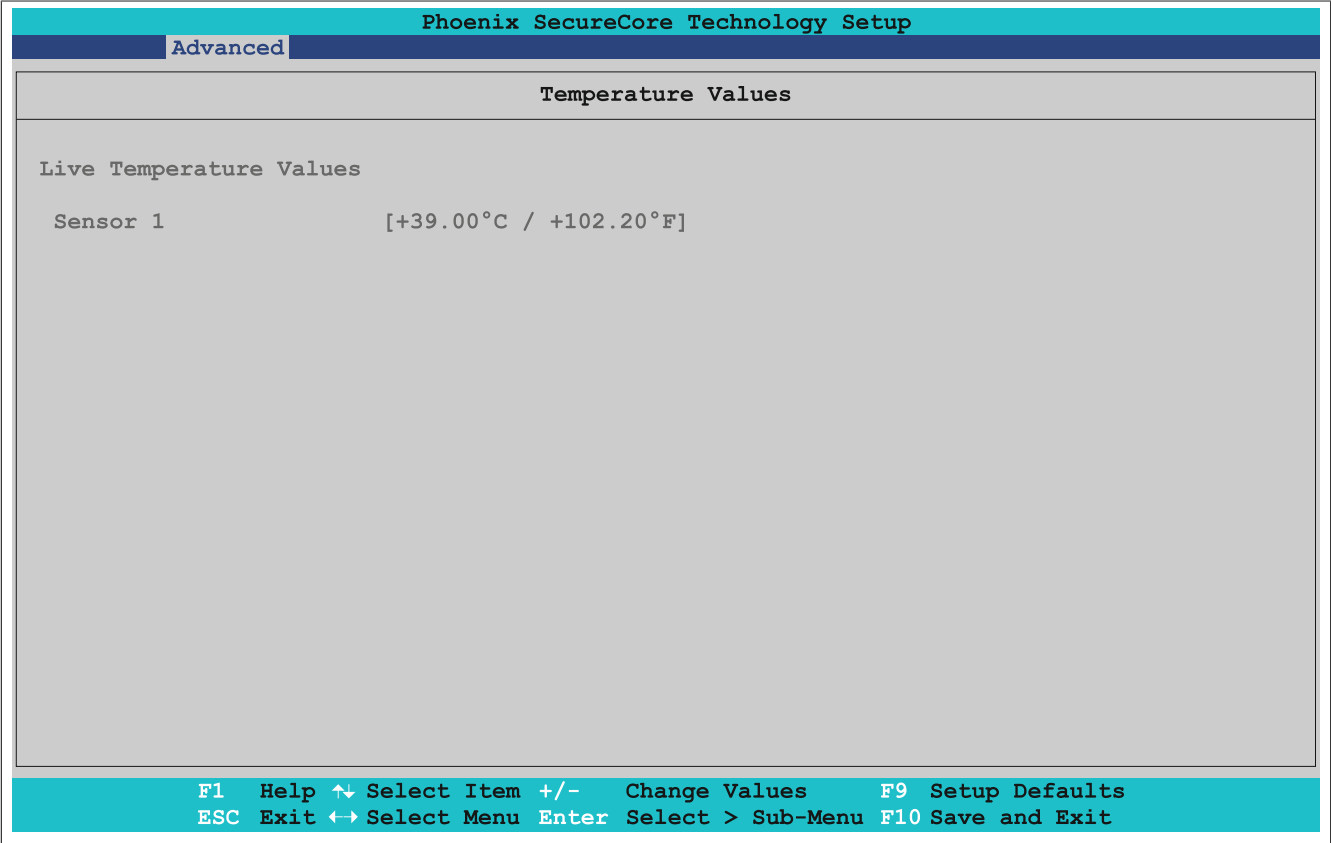


Figure 144: Advanced - OEM features - Display board features - Temperature values

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

Table 234: Advanced - OEM features - Display board features - Temperature values

4.1.6.1.4.3 Panel #15

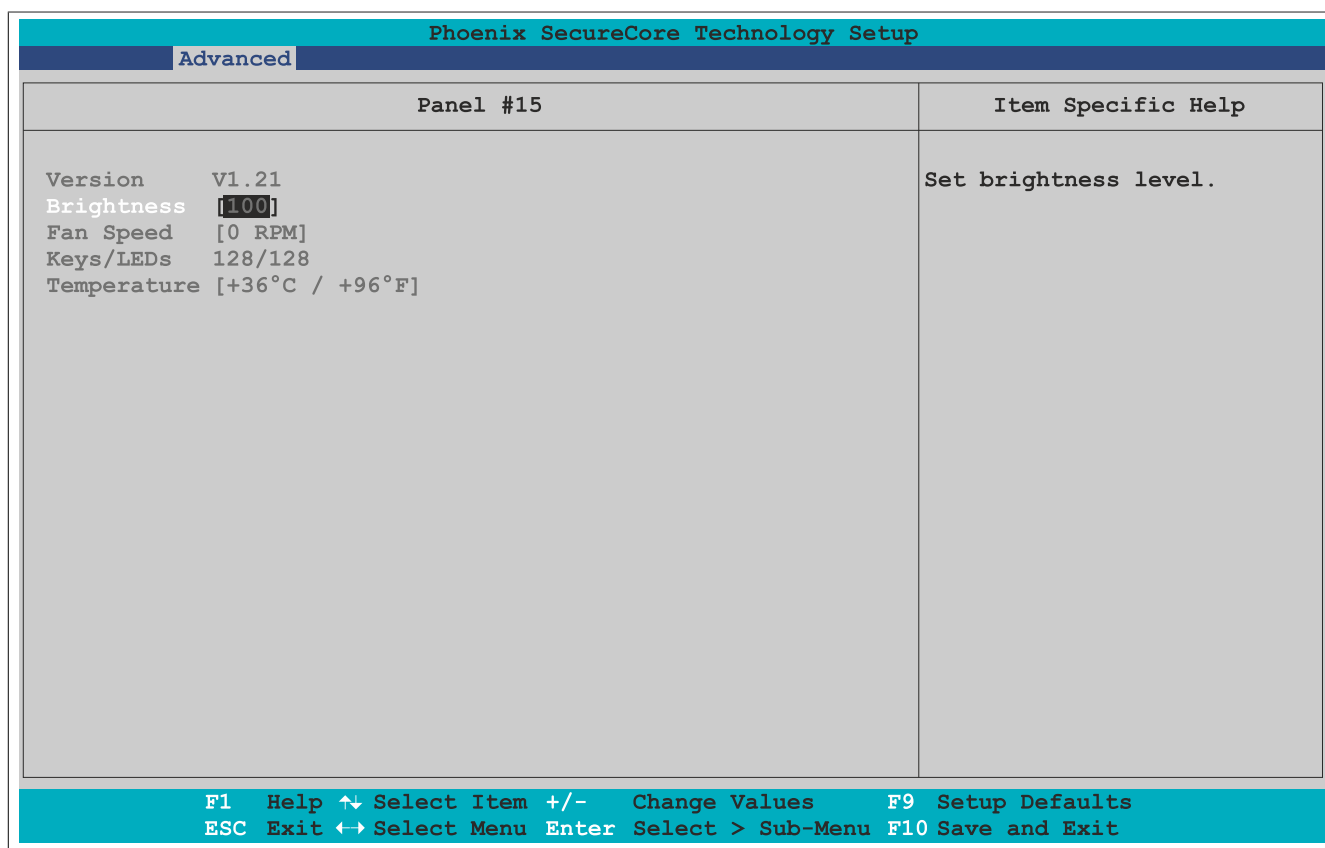


Figure 145: Advanced - OEM features - Display board features - Panel #15

BIOS setting	Explanation	Configuration options	Effect
Version	Displays the panel firmware version.	None	-
Brightness	Sets the display brightness.	0 to 100	Sets the brightness (in %) of the selected panel. 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	-

Table 235: Advanced - OEM features - Display board features - Panel #15

4.1.6.1.5 IF board features

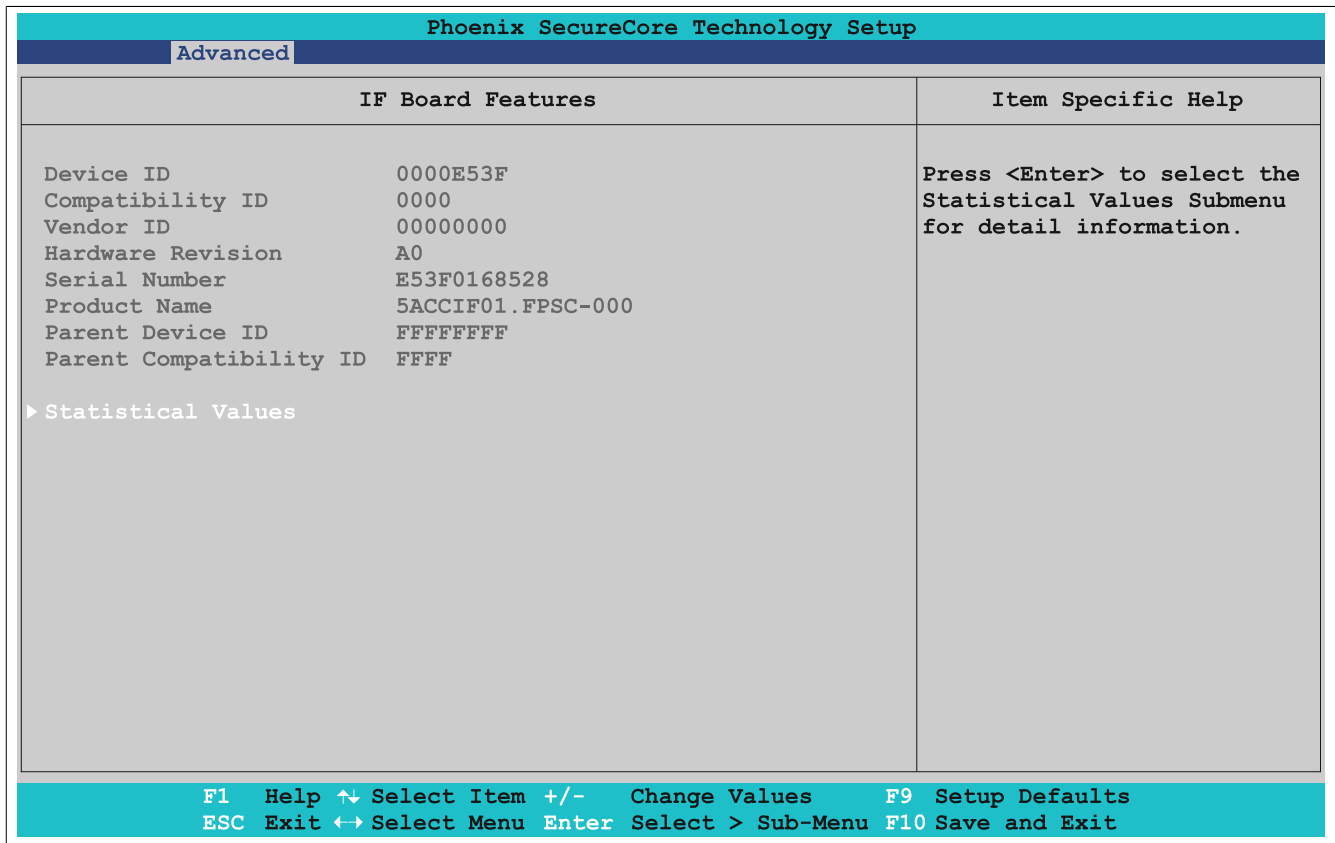


Figure 146: Advanced - OEM features - IF board features

BIOS setting	Explanation	Configuration options	Effect
Device ID	Displays the device ID of the IF option.	None	-
Compatibility ID	Displays the version of the device within the same B&R device ID. This ID is needed for Automation Runtime.	None	-
Vendor ID	Displays the vendor 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 statistical values.	Enter	Opens this submenu See "Statistical values" on page 250.

Table 236: Advanced - OEM features - IF board features

4.1.6.1.5.1 Statistical values

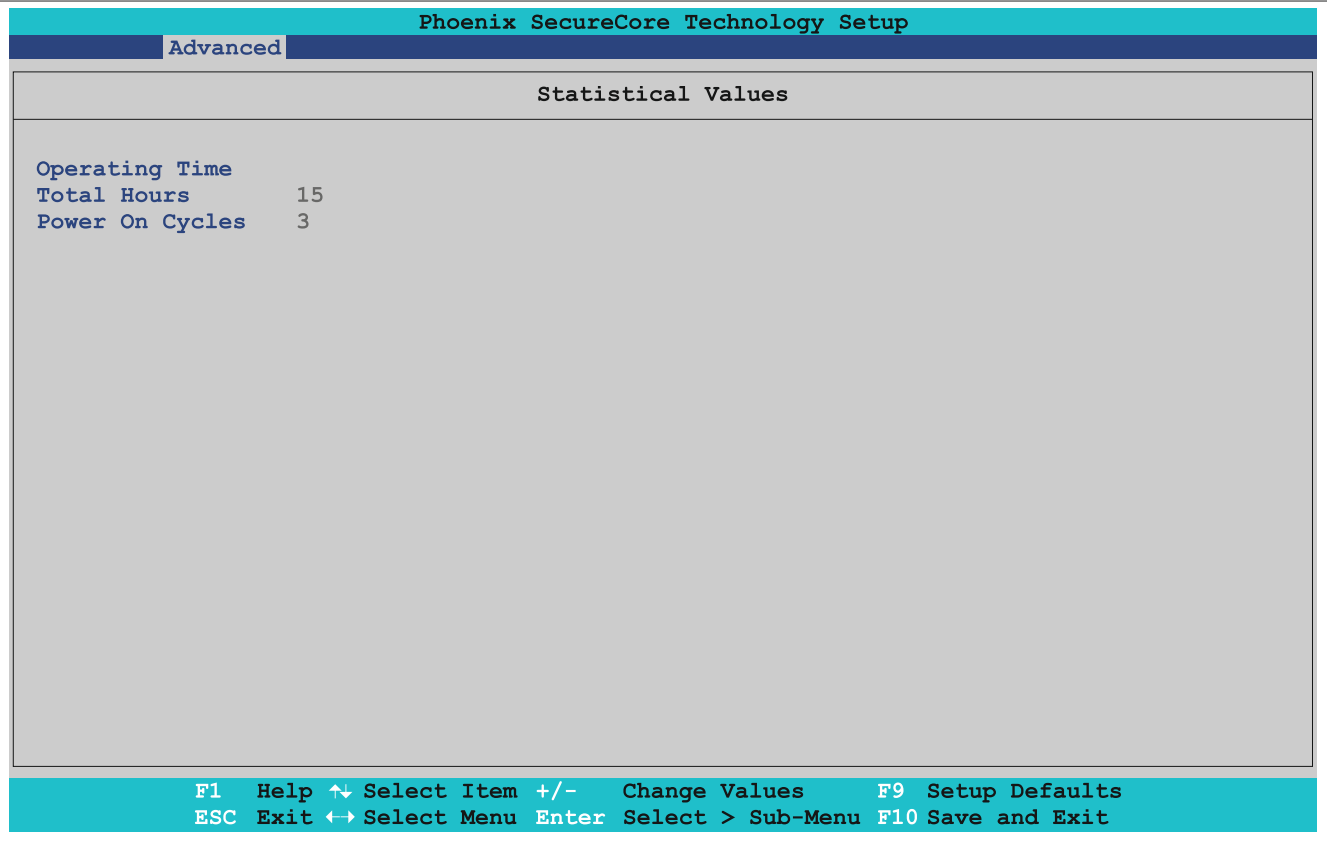


Figure 147: Advanced - OEM features - IF board features - Statistical values

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

Table 237: Advanced - OEM features - IF board features - Statistical values

4.1.6.2 CPU configuration

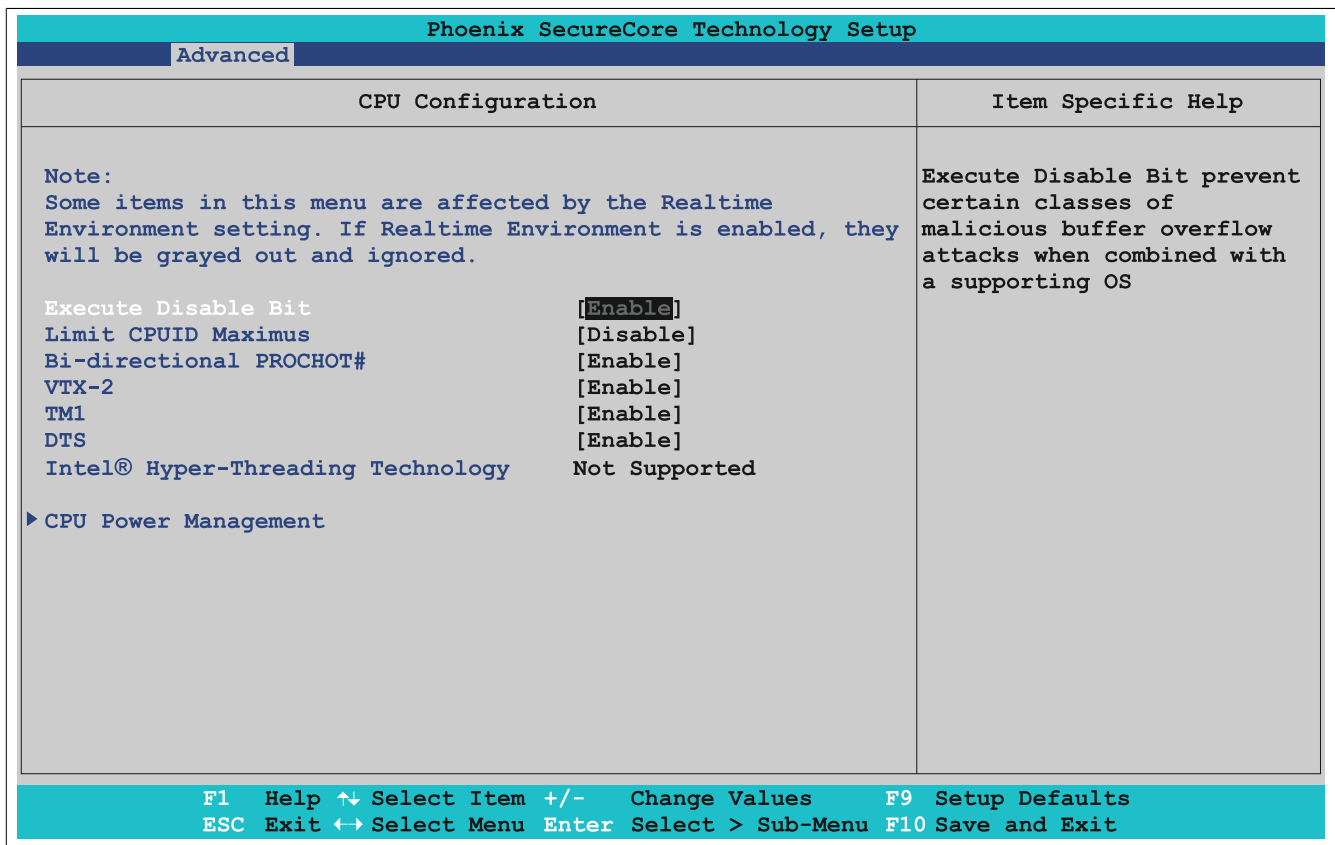


Figure 148: Advanced - CPU configuration

BIOS setting	Explanation	Configuration options	Effect
Execute disable bit	Option for enabling/disabling hardware support for prevention of data execution.	Disabled Enabled	Disables this function. 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 any CPUID functions, for example.	Disabled Enabled	Current maximum value returned by the processor when requesting the CPU ID value. Maximum CPU ID value limited by the processor to 03h if needed if the processor supports a higher value.
Bi-directional PROCHOT# ¹⁾	Option for enabling/disabling the PROCHOT signal. The PROCHOT signal initiates temperature throttling to reduce the speed of the CPU and protect it from overheating.	Disabled Enabled	Disables this function. Only allows the processor cores to enable the PROCHOT signal and throttle down the processor. Enables this function. Allows external services to enable the PROCHOT signal and throttle down 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 Enabled	Disables this function. Allows a virtual machine to use the additional hardware capacity.
TM1	Option for configuring temperature monitoring.	Disabled Enabled	Disables temperature monitoring. Enables Intel thermal mode 1. If the CPU reaches excessive temperatures, the processor speed will be reduced by 50%.
DTS	Option for enabling/disabling the CPU digital thermal sensor function.	Disabled Enabled	Disables this function. Enables this function.
Intel® Hyper-Threading Technology	Indicates whether Intel® Hyper-Threading Technology is supported.	None	-
CPU power management	Configuration of CPU energy settings.	Enter	Opens this submenu See "CPU power management" on page 252.

Table 238: Advanced - CPU configuration

1) PROCHOT = Processor hot.

4.1.6.2.1 CPU power management

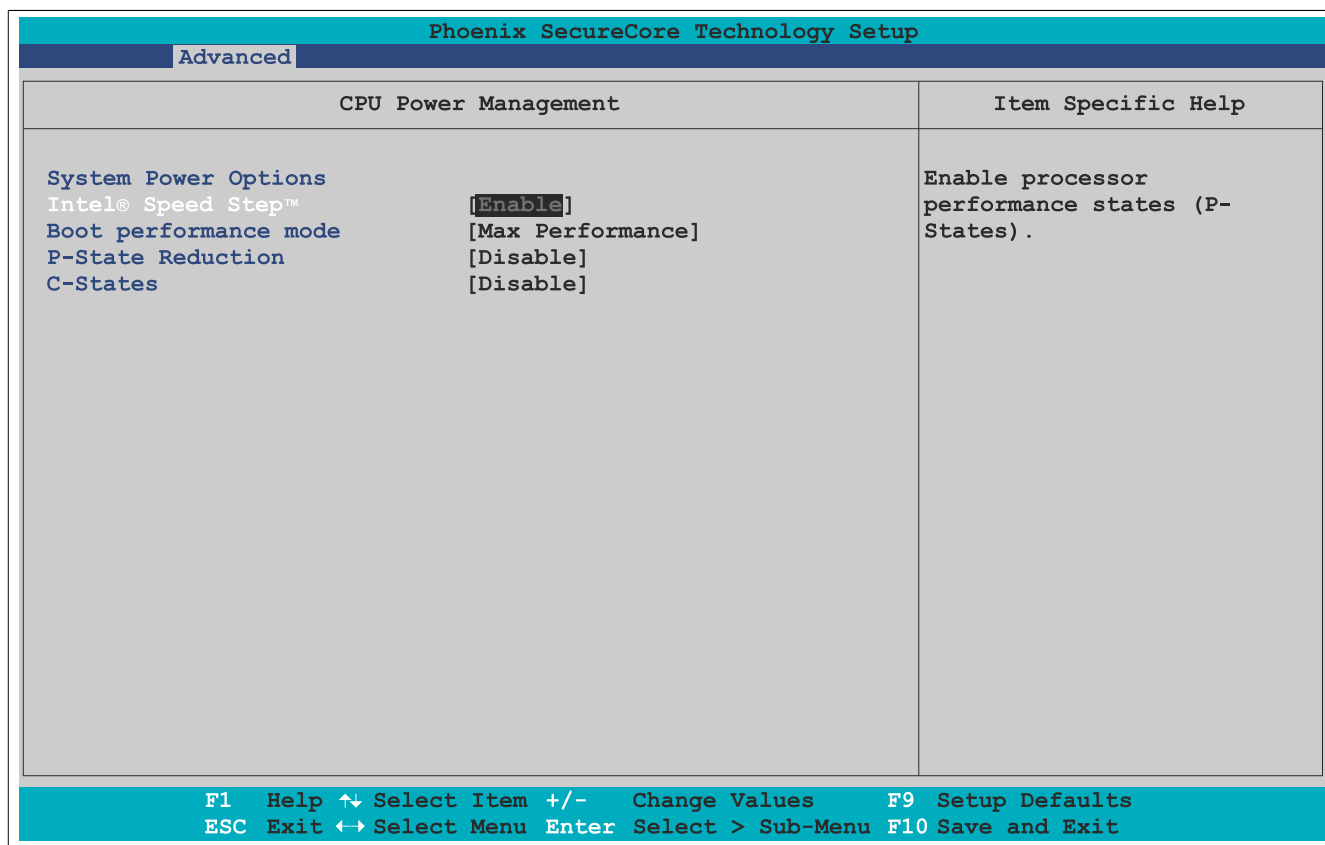


Figure 149: Advanced - CPU configuration - CPU power management

BIOS setting	Explanation	Configuration options	Effect
Intel® SpeedStep™	Option for controlling Intel® SpeedStep™ Technology. The processor clock speed is increased or decreased according to the number of calculations that must be made. As a result, the power consumption depends largely on the processor load.	Disabled	Disables this function.
		Enabled	The processor speed is regulated by the operating system.
Boot performance mode	Option for setting the CPU speed. Information: This setting can be changed in ACPI operating systems by activating Intel® SpeedStep™ technology.	Max performance	Maximum CPU and graphics speed.
		Max battery	Throttles down the CPU and graphics speed.
P-state reduction	Option for reducing CPU performance and power usage.	Disabled By 1, 2, 3, 4, 5, 6, 7, 8	Disables this function. Reduces the performance by the configured value depending on the CPU being used.
C-States	This setting allows the operating system to set the processor clock speed on its own, thereby saving energy.	Disabled	Disables this function.
		Enabled	Enables this function. Additional settings can be selected.
Max C-States ¹⁾	This setting monitors the maximum C-State that the processor can support.	C7	Maximum C-State C7. CPU voltage is switched off completely.
		C6	Maximum C-State C6. CPU voltage is reduced to nearly 0 V.
		C1	Maximum C-State C1. Processor is in sleep mode, switch between C0 and C1.

Table 239: Advanced - CPU configuration - CPU power management

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

4.1.6.3 Graphics (IGD) configuration

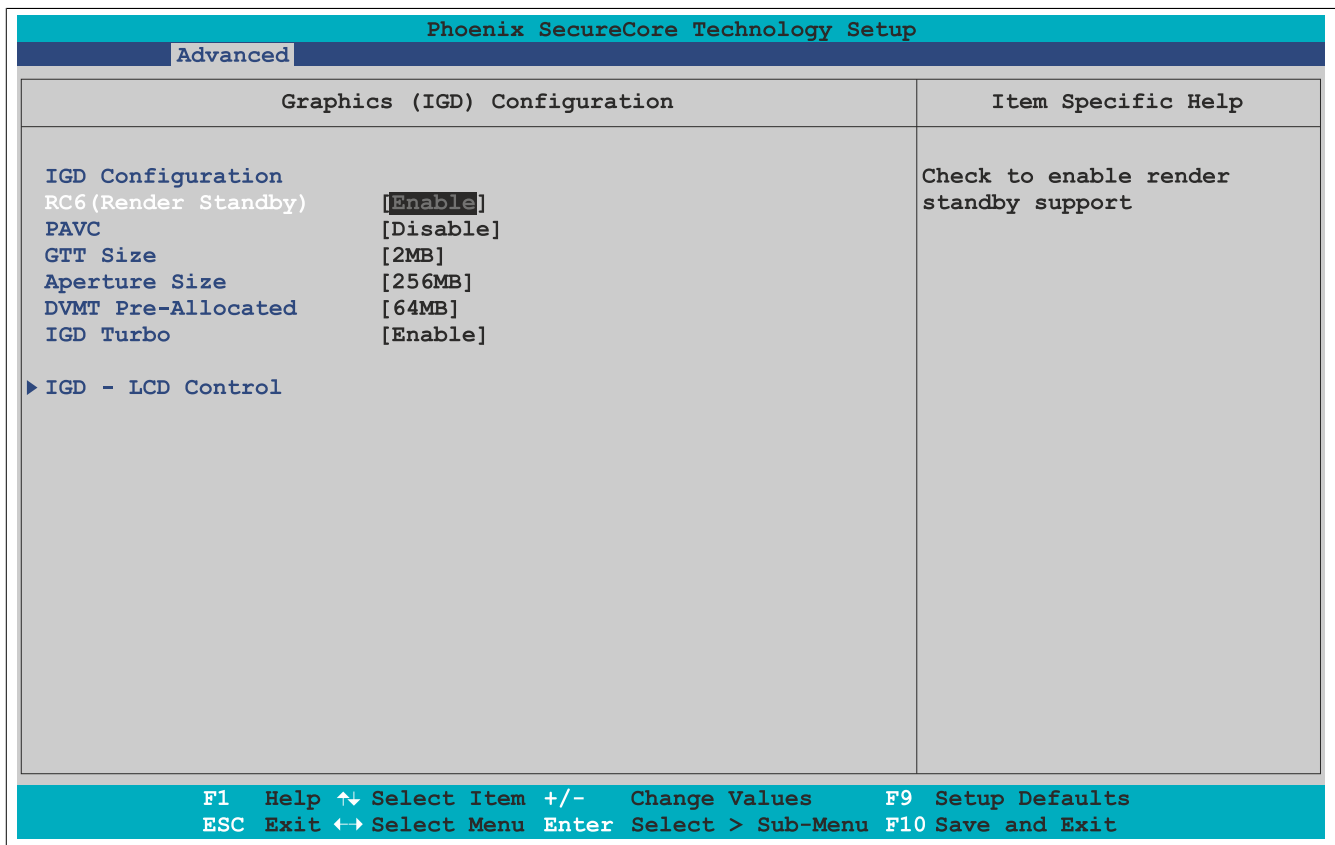


Figure 150: Advanced - Graphics (IGD) configuration

BIOS setting	Explanation	Configuration options	Effect
RC6 (render standby)	Option for enabling/disabling standby mode for onboard graphics to use less power.	Disabled	Disables this function.
		Enabled	Enables this function.
PAVC	Protected audio video control that protects data inside of the PC.	Disabled	Disables this function.
		LITE mode	Reserves memory.
		SERPENT mode	Reserves memory, which is not recognized by the operating system.
GTT size	Option for setting the size of the GTT (graphics translation table).	1 MB	1 MB GTT
		2 MB	2 MB GTT
Aperture size	Option for configuring 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 amount of memory used for the internal graphics controller.	64 MB , 96 MB, 128 MB, 160 MB, 192 MB, 224 MB, 256 MB, 288 MB, 320 MB, 352 MB, 384 MB, 416 MB, 448 MB, 480 MB, 512 MB	Specifies the permanent graphic memory between 64 and 512 MB.
IGD turbo	Option for setting the graphic controller's turbo boost.	Disabled	Disables this function.
		Enabled	Enables this function.
IGD - LCD control	Configures PPC2100 display settings.	Enter	Opens this submenu See "IGD - LCD control" on page 254.

Table 240: Advanced - Graphics (IGD) configuration

4.1.6.3.1 IGD - LCD control

Phoenix SecureCore Technology Setup		
Advanced		
IGD Configuration	Item Specific Help	
IGD managed by: Legacy Video BIOS [3798]	Select the Video Device activated during POST. This has no effect if external graphics are present.	
LVDS EEPROM Data Data Format EPI Resolution 1024x768 Color Depth 24Bit Channel Count Single Channel		
IGD - Boot Type [Auto]		
LVDS Clock Center Spreading [No Spreading]		
EFP1 Type [DP with HDMI/DVI]		
Mode Persistence [Disable]		
Center Mode [Auto]		
F1 Help ↕ Select Item +/- Change Values F9 Setup Defaults ESC Exit ↔ Select Menu Enter Select > Sub-Menu F10 Save and Exit		

Figure 151: Advanced - Graphics (IGD) configuration - IGD configuration

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 display color depth of the LFP.	None	-
Channel count	Displays the LFP channels.	None	-
IGD - Boot type	Option for defining the primary enabled panel during POST.	Auto	Automatic selection.
		CRT	Uses the CRT (cathode ray tube) channel.
		EFP	Uses the EFP (external flat panel) channel.
		LFP	Uses the LFP (local flat panel) channel.
IGD - Secondary boot type ²	Option for defining the secondary enabled panel during POST. Information: After the BIOS boot screen, nothing more is shown on this display until the graphics driver is reloaded by the operating system.	Disabled	Disables this function.
		CRT	Uses the CRT (cathode ray tube) channel.
		EFP	Uses the EFP (external flat panel) channel.
		LFP	Uses the LFP (local flat panel) channel.
LFP type ³	Option for manually setting the LFP (local flat panel) type.	Auto	Automatically defines the LFP type based on the EDID data.
		VGA 640 x 480 1x18 to WUXGA 1920 x 1200 2x24	Manual setting 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%	Varies the LVDS clock frequency by the configured value to improve the EMC characteristics.
EFP1 type ⁴	Option for setting the type of external flat panel 1.	DisplayPort only	Configures the interface as a DisplayPort interface.
		DP with HDMI/DVI	Configures the interface as a DisplayPort interface with HDMI/DVI.
		HDMI/DVI	Configures the interface as an HDMI/DVI interface.
Mode persistence	Mode persistence means that the operating system remembers and can restore previous display connection configurations. For example, a dual DVI configuration is automatically restored when both DVI monitors are reconnected, even if only one of them was connected and enabled during a previous boot.	Disabled	Disables this function.
		Enabled	Enables this function.

Table 241: Advanced - Graphics (IGD) configuration - IGD configuration

BIOS setting	Explanation	Configuration options	Effect
Center mode	Displays the image in the middle of panels without a scaler chip.	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.

Table 241: Advanced - Graphics (IGD) configuration - IGD configuration

- 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*.

4.1.6.4 LAN

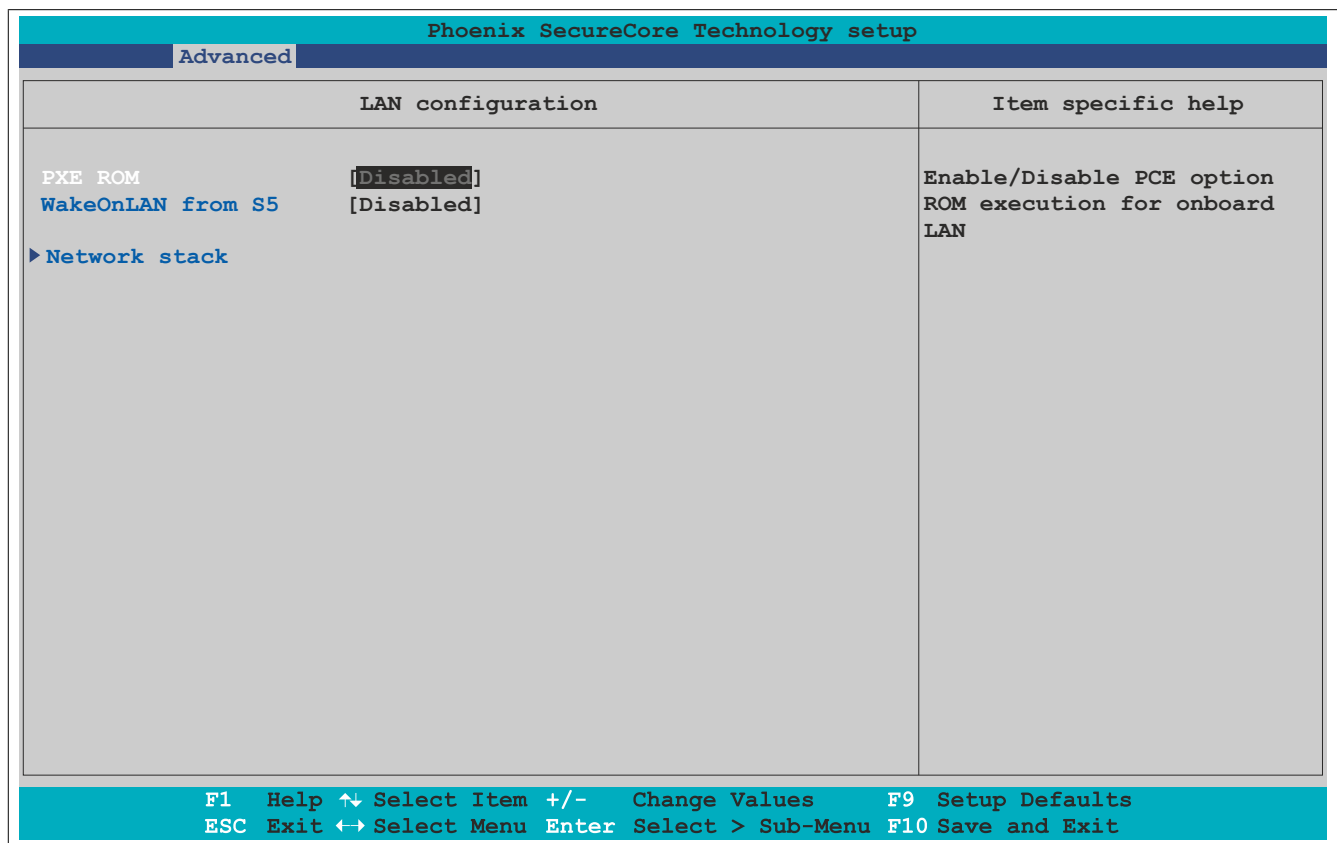


Figure 152: Advanced - LAN

BIOS setting	Explanation	Configuration options	Effect
PXE ROM	Option for configuring 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 optional add-on card.
		Any	Enables this function for all devices, ETH1 and ETH2.
WakeOnLAN from S5	Option for switching on the system via the on-board 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 this submenu "Network stack" on page 256

Table 242: Advanced - LAN

4.1.6.4.1 Network stack

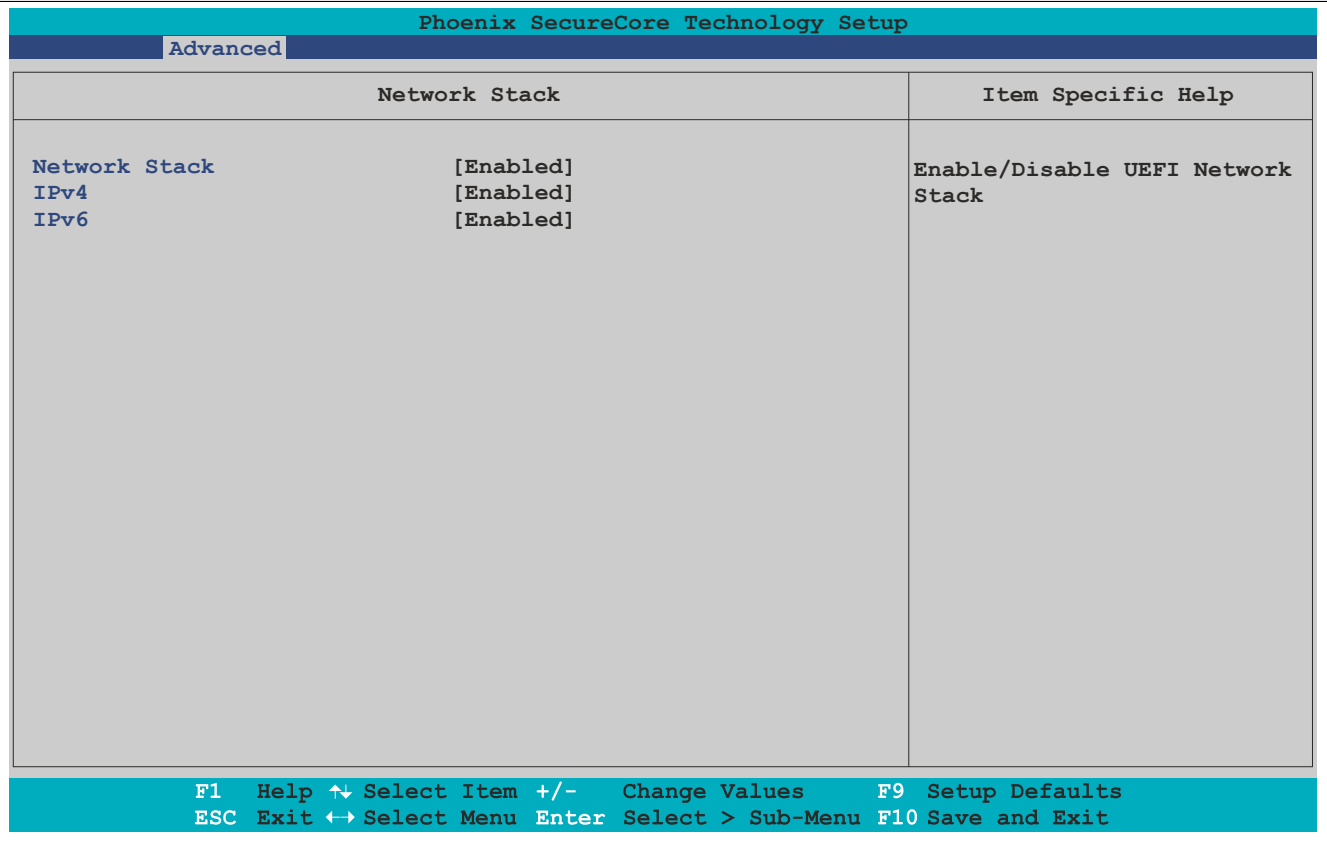


Figure 153: Advanced - Network stack

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.

Table 243: Advanced - Network stack

4.1.6.5 PCI express configuration

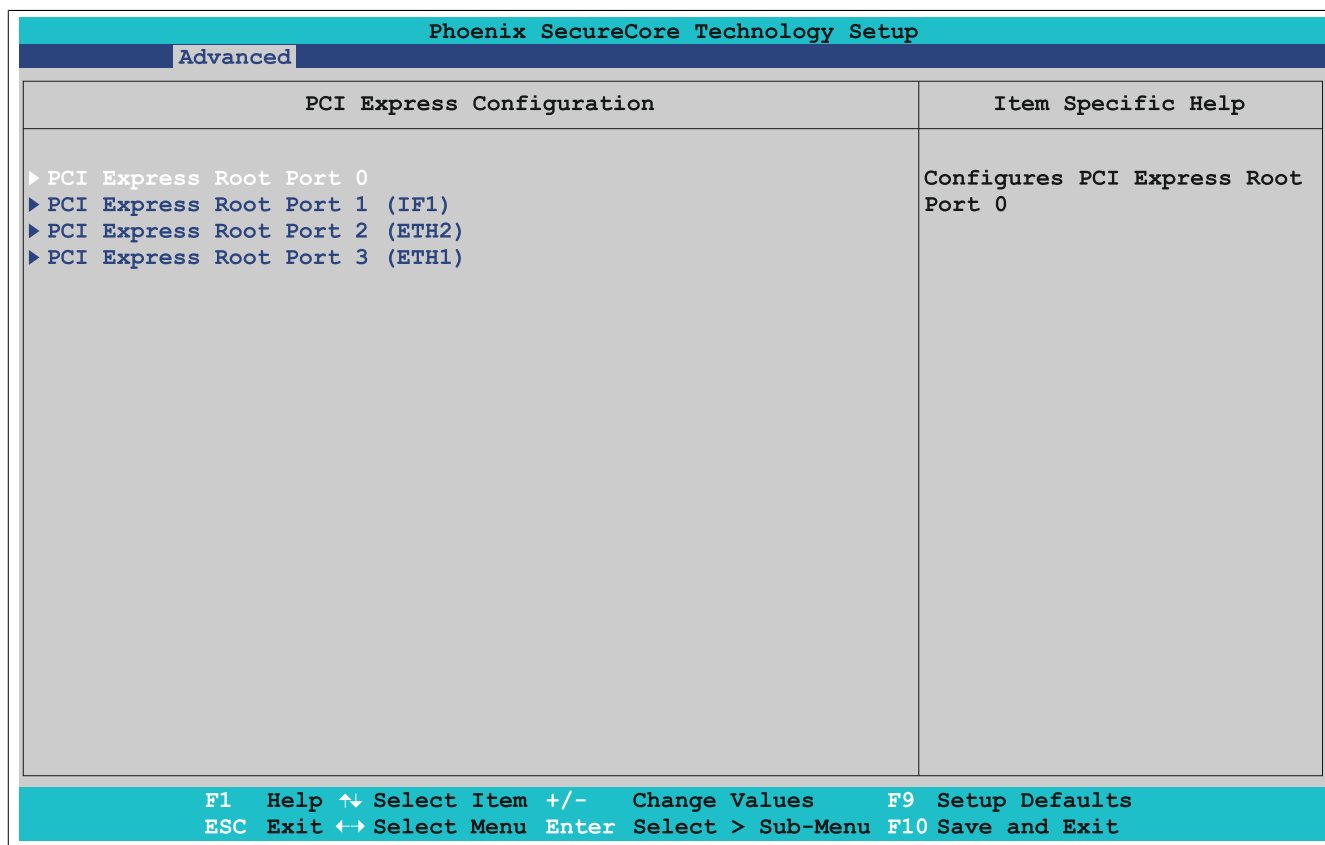


Figure 154: Advanced - PCI express configuration

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 258.
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 258.
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 258.
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 258.

Table 244: Advanced - PCI express configuration

4.1.6.5.1 PCI Express root port 0 to 3

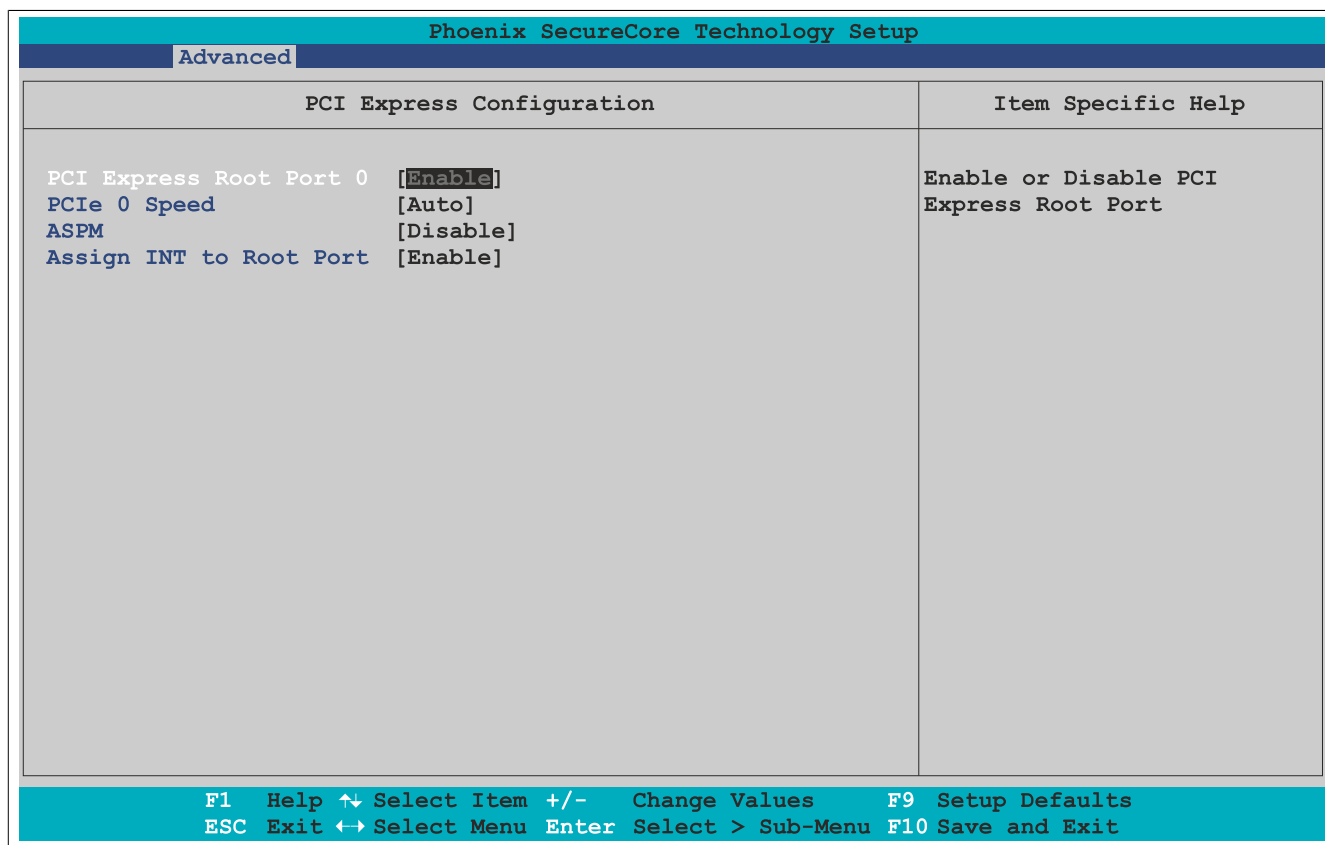


Figure 155: Advanced - PCI Express configuration - PCI Express root port

BIOS setting	Explanation	Configuration options	Effect
PCI Express root port x	Option for enabling/disabling the PCI Express root port.	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	<i>Active State Power Management</i> Option for configuring 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.

Table 245: Advanced - PCI Express configuration - PCI Express root port

4.1.6.6 USB configuration

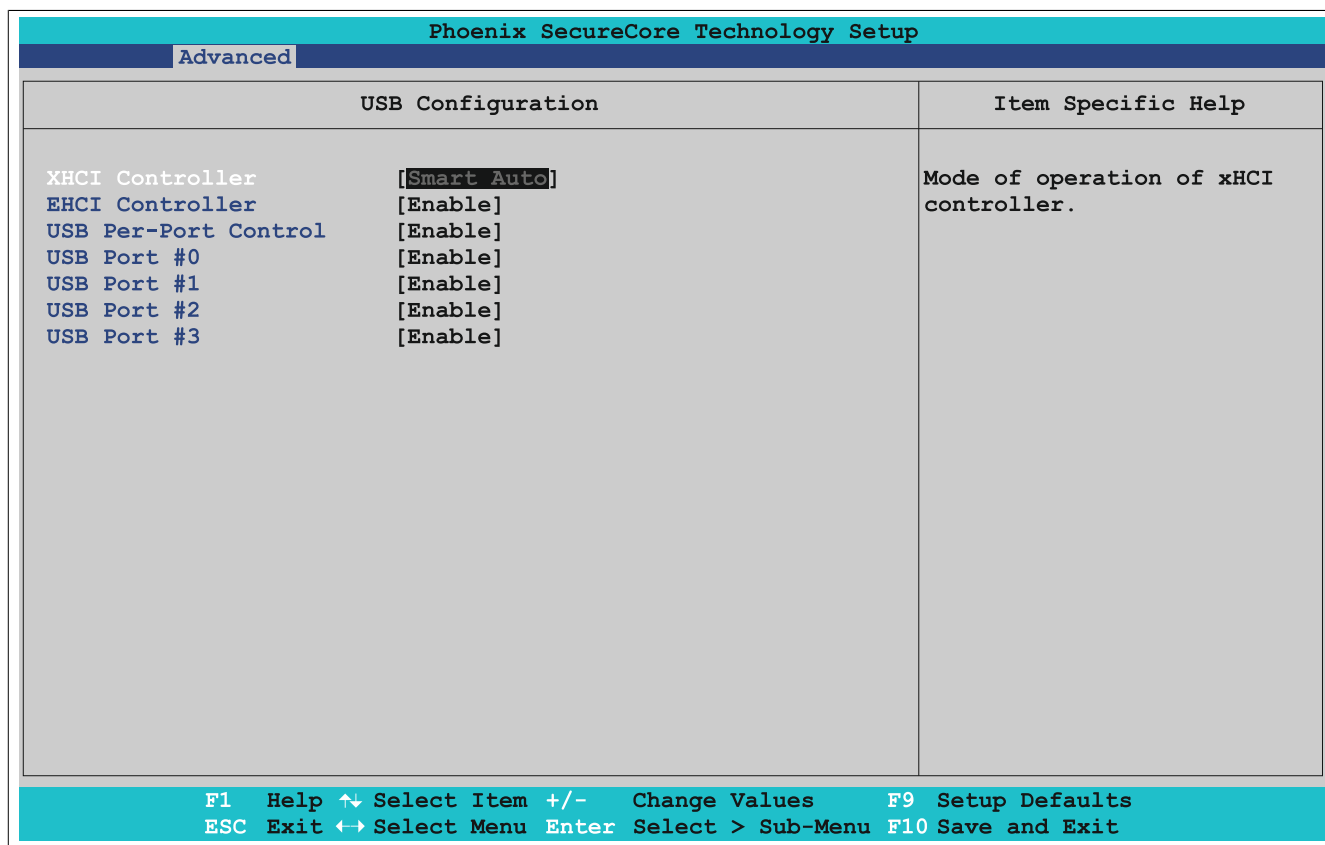


Figure 156: Advanced - USB configuration

BIOS setting	Explanation	Configuration options	Effect
XHCI controller	Option for configuring the xHCI controller.	Smart auto	USB 3.0 interfaces are not handled as USB 3.0 until after the operating system has started. Until then, they are handled as USB 2.0 interfaces. If the PC is rebooted, then the USB 3.0 interfaces are still handled as USB 3.0 during booting.
		Disabled	Disables the xHCI controller. All USB 3.0 interfaces become USB 2.0 interfaces.
		Enabled	Enables the xHCI controller so that USB 3.0 interfaces are always identified as such.
EHCI controller	Configures USB EHCI controllers for the USB interfaces.	Disabled	Disables the EHCI controller.
		Enabled	Enables the EHCI controller.
USB per port control	Option for enabling/disabling individual USB interfaces.	Disabled	Hides the BIOS settings for "USB port #x".
		Enabled	Shows the BIOS settings for "USB port #x".
USB port #0	Option for enabling/disabling the USB1 interface.	Disabled	Disables this USB interface.
		Enabled	Enables this USB interface.
USB port #1	Option for enabling/disabling the USB2 interface.	Disabled	Disables this USB interface.
		Enabled	Enables this USB interface.
USB port #2	Option for enabling/disabling the multi-touch or the optional front USB interface.	Disabled	Disables this USB interface.
		Enabled	Enables this USB interface.
USB port #3	Option for enabling/disabling the multi-touch or the optional front USB interface.	Disabled	Disables this USB interface.
		Enabled	Enables this USB interface.

Table 246: Advanced - USB configuration

4.1.6.7 SATA configuration

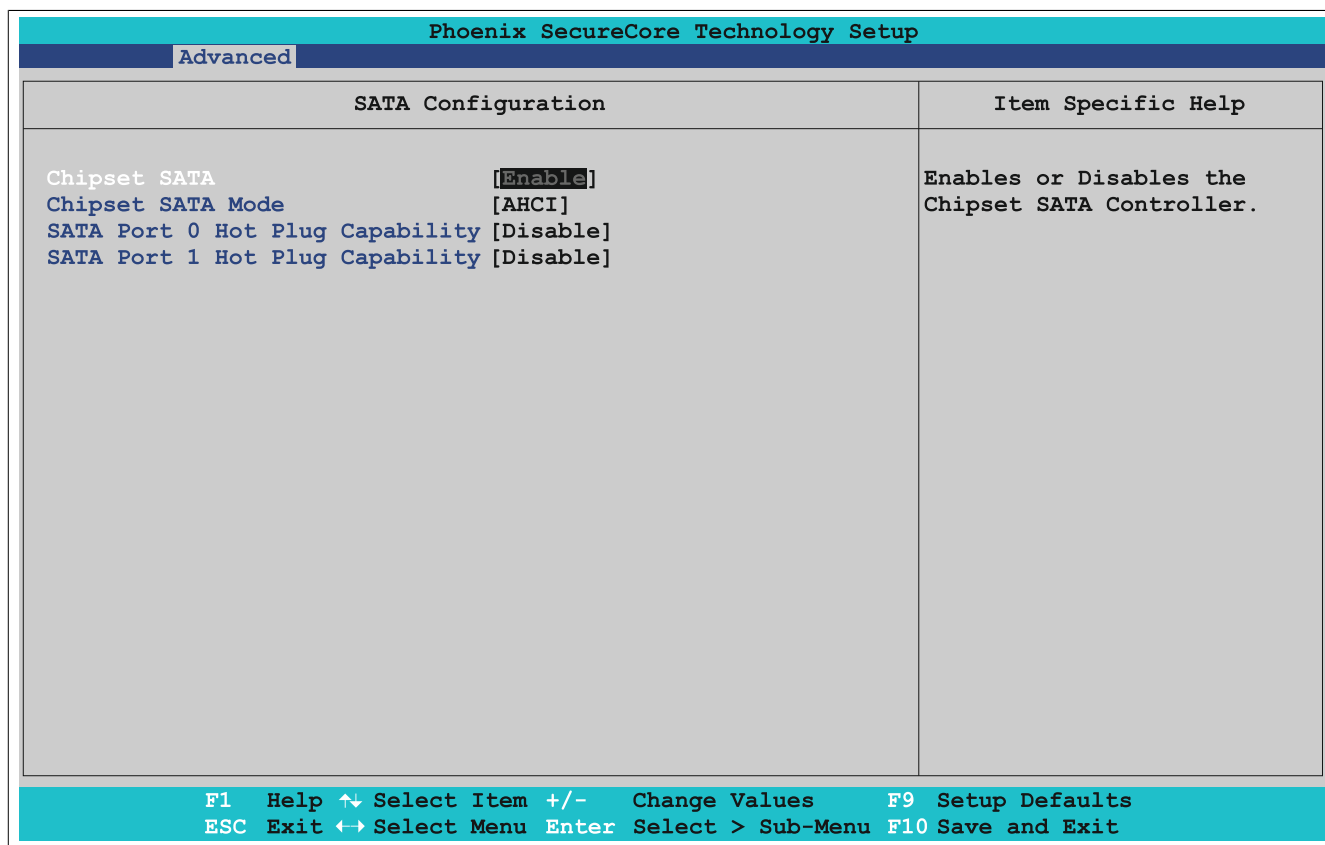


Figure 157: Advanced - SATA configuration

BIOS setting	Explanation	Configuration options	Effect
Chipset SATA	Option for configuring SATA support.	Enabled	Provides support for SATA devices.
		Disabled	No support for SATA devices.
Chipset SATA mode	Option for configuring supported serial ATA connections.	IDE	Uses the serial ATA hard drive as a parallel ATA physical drive. It is not possible to configure the SATA port.
		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 configuring hot plugging for SATA interface 0.	Enabled	Enables hot plugging for SATA interface 0. Devices can be connected/disconnected during operation.
		Disabled	Disables hot plugging for SATA interface 0.
SATA port 1 hot plug capability	Option for configuring hot plugging for SATA interface 1.	Enabled	Enables hot plugging for SATA interface 1. Devices can be connected/disconnected during operation.
		Disabled	Disables hot plugging for SATA interface 1.

Table 247: Advanced - SATA configuration

4.1.6.8 Miscellaneous configuration

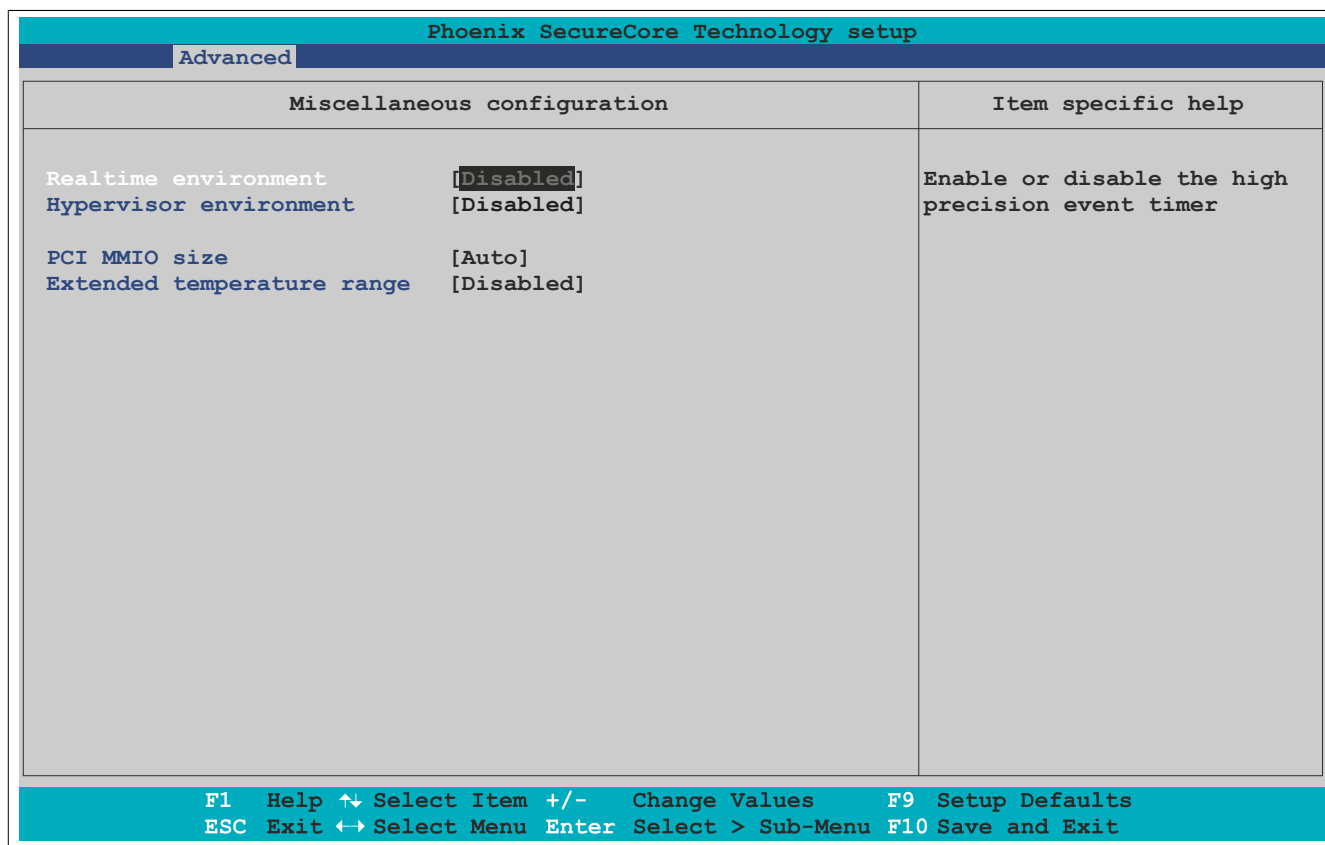


Figure 158: Advanced - Miscellaneous configuration

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). "CPU C-states" are also disabled, and "Boot performance mode" is set to "Max. performance". The options that are disabled and configured by Realtime 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 I/O) size. Information: With 32-bit operating systems, the configured MMIO size is stored in the memory under 4 GB. There is therefore less memory available (by the MMIO size) on systems with 4 GB main memory. 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 configuring the RAM refresh rate for the extended temperature range.	Disabled	Default RAM refresh rate.
		Enabled	Increases the RAM refresh rate.

Table 248: Advanced - Miscellaneous configuration

4.1.6.9 Thermal configuration

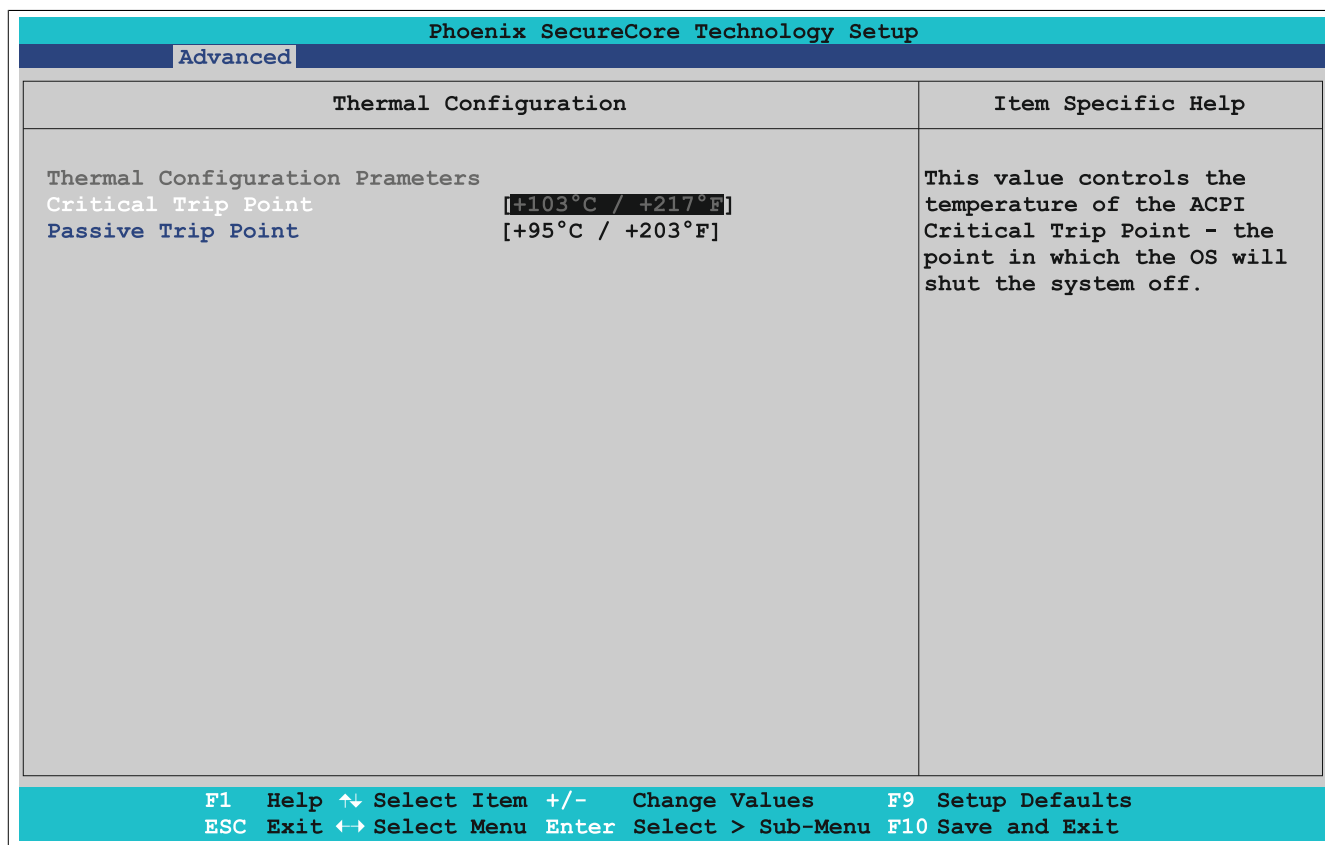


Figure 159: Advanced - Thermal configuration

BIOS setting	Explanation	Configuration options	Effect
Critical trip point	Option for configuring a CPU temperature at which the operating system automatically shuts down.	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	Option for configuring 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.

Table 249: Advanced - Thermal configuration

4.1.7 Security

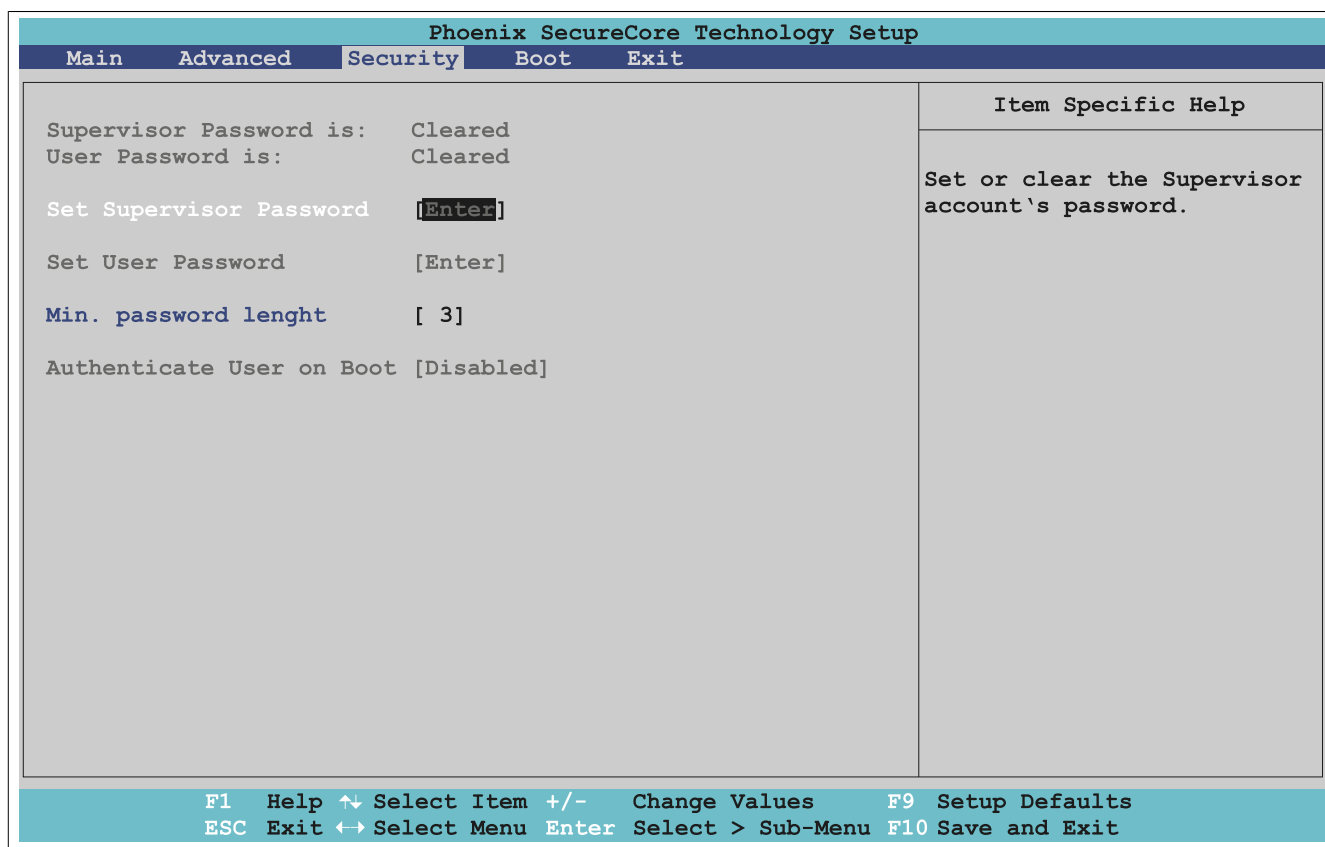


Figure 160: Security

BIOS setting	Explanation	Configuration options	Effect
Supervisor password is:	Displays whether a supervisor password has been set.	None	-
User password is:	Displays whether a user password has been set.	None	-
Set supervisor password	Function for entering, changing or deleting a supervisor password. A supervisor password is necessary to edit all BIOS settings.	Enter	Password entry.
Set user password ¹⁾	Function for entering, changing or deleting a user password. The user password allows only certain BIOS settings to be changed.	Enter	Password entry.
Minimum password length	Option for setting the minimum length of a password.	3 to 20	Enters the minimum length of a password.
Authenticate user on boot ¹⁾	Option for configuring whether the user password must be entered on each system boot.	Disabled	Does not require the user password to be entered when booting.
		Enabled	Requires the user password to be entered when booting.

Table 250: Security

1) This setting can only be configured if a *supervisor password* has been set.

4.1.8 Boot

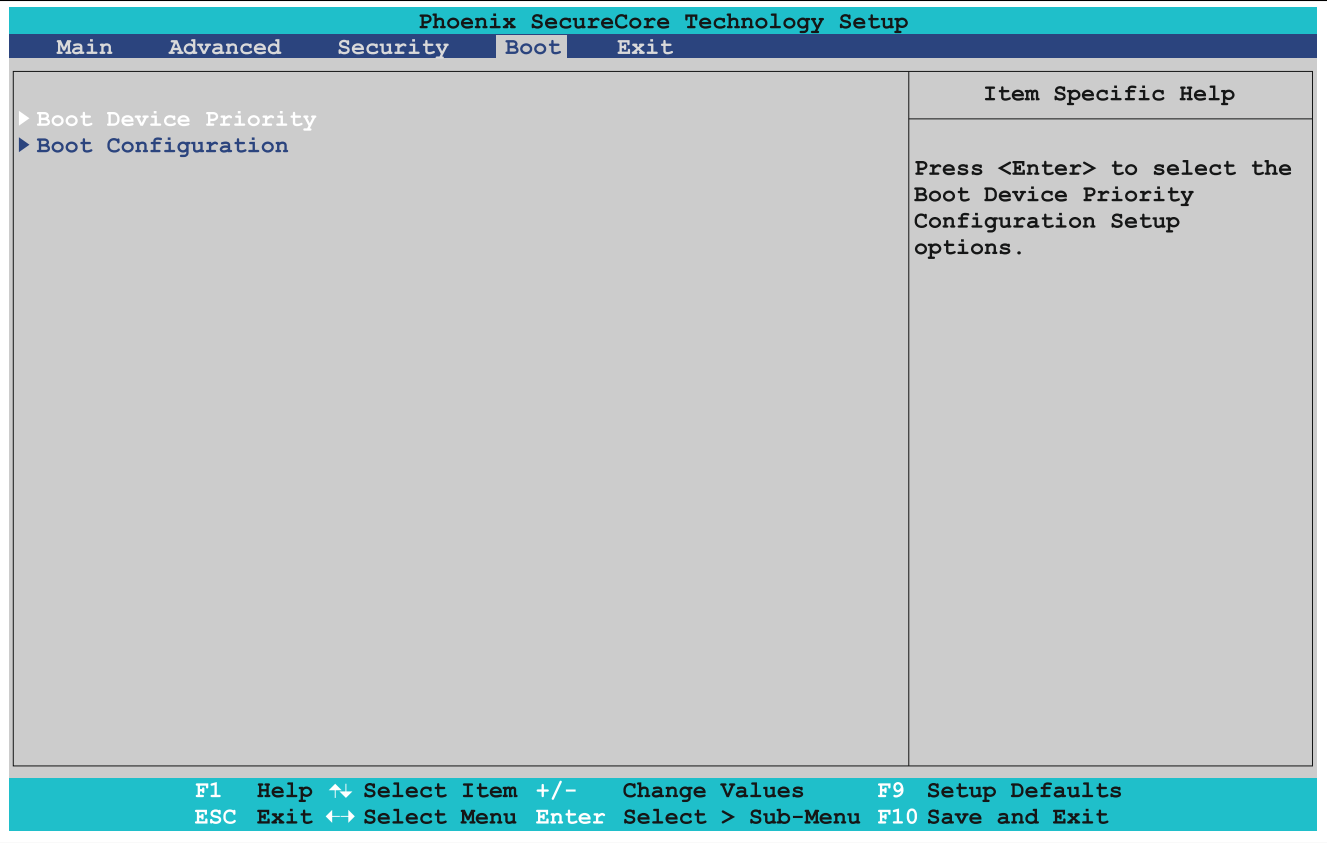


Figure 161: Boot

BIOS setting	Explanation	Configuration options	Effect
Boot device priority	Configures the boot order.	Enter	Opens this submenu See "Boot device priority" on page 265.
Boot configuration	Configures the boot settings.	Enter	Opens this submenu See "Boot configuration" on page 266.

Table 251: Boot

4.1.8.1 Boot device priority

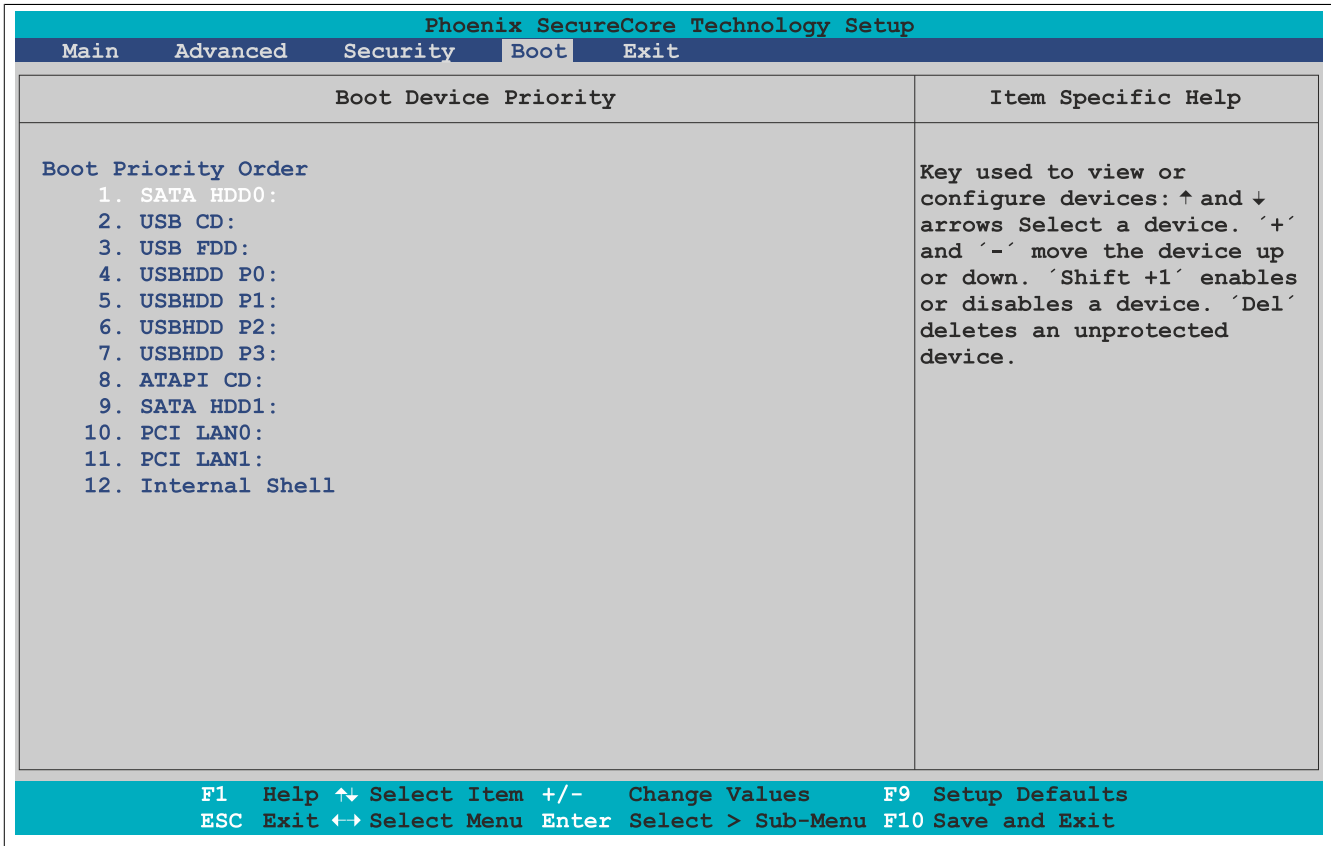


Figure 162: Boot - Boot device priority

BIOS setting	Explanation	Configuration options	Effect
Boot priority order	Option for configuring the desired boot order.	SATA HDD0:	Specifies the desired boot sequence. Boot devices can be selected with the ↑ and ↓ arrow keys. The order is changed with "+" and "-". "Shift + 1" enables/disables a boot device.
		USB CD:	
		USB FDD:	
		USBHDD P0:	
		USBHDD P1:	
		USBHDD P2:	
		USBHDD P3:	
		ATAPI CD:	
		SATA HDD1:	
		PCI LAN0:	
		PCI LAN1:	
		Internal shell	

Table 252: Boot - Boot device priority

4.1.8.2 Boot configuration

Phoenix SecureCore Technology Setup		
Boot		
Boot Configuration		Item Specific Help
NumLock	[On]	Selects Power-on state of Numlock.
Timeout	[2]	
CSM Support	[Yes]	
Quick Boot	[Disabled]	
Boot Logo Selection	[Auto]	
Diagnostic Splash Screen	[Disabled]	
Diagnostic Summary Screen	[Disabled]	
USB Legacy Support	[Enabled]	
Console Redirection	[Disabled]	
Allow Hotkey in S4 resume	[Enabled]	
UEFI Boot	[Enabled]	
Legacy Boot	[Enabled]	
Boot in Legacy Video Mode	[Disabled]	
Load OPROM	[On Demand]	
Boot Priority	[Legacy First]	
EFI BS Memory Allocation	[Disabled]	
F1 Help ↕ Select Item +/- Change Values F9 Setup Defaults ESC Exit ↔ Select Menu Enter Select > Sub-Menu F10 Save and Exit		

Figure 163: Boot - Boot configuration

BIOS setting	Explanation	Configuration options	Effect
NumLock	Option for configuring the numeric keypad (Num Lock) when booting the system.	On	Enables the numeric keypad.
		Off	Only enables the cursor (movement) functions of the numeric keypad.
Timeout	Option for configuring how long the setup activation key (key for entering BIOS) and boot logo are displayed.	2 to 99	Displays the setup activation key for x seconds.
CSM support	Depending on the operating system, the compatibility support module (BIOS compatibility mode) supports backwards compatibility for BIOS legacy boot settings.	Yes	Enables BIOS compatibility mode and allows the use of operating systems without UEFI support. Legacy and UEFI boot are possible.
		No	BIOS compatibility mode is enabled and only the UEFI boot is possible. Legacy boot is not supported.
Quick boot	Option for reducing the boot time by skipping some POST procedures.	Disabled	Disables this function.
		Enabled	Enables this function.
Boot logo selection	Options for displaying the boot logo.	Disabled	Displays the default logo.
		Enabled	Displays the OEM logo.
		Auto	Displays the OEM logo automatically (if present).
Diagnostic splash screen	Setting for enabling/disabling the "Diagnostic splash screen" when booting.	Disabled	Does not display the "Diagnostic splash screen".
		Enabled	Always displays the "Diagnostic splash screen" when booting.
Diagnostic summary screen	Option for enabling/disabling the "Diagnostic splash screen" when booting.	Disabled	Disables this function.
		Enabled	Enables this function.
USB legacy support	Option for configuring USB legacy support.	Disabled	Disables this function. Disables all USB support (mouse, keyboard, USB mass storage devices, etc.).
		Enabled	Enables this function.
Console redirection	Option for configuring the remote console. The remote console can be used to access BIOS Setup via the serial interface using a terminal emulator (PuTTY or HyperTerminal).	Disabled	Disables this function.
		Enabled	Enables this function.

Information:
 This function is only possible with IF option 5ACCIF01.FPLS-000 or 5AC-CIF01.FPLS-001.

Table 253: Boot - Boot configuration

BIOS setting	Explanation	Configuration options	Effect
Port console ¹⁾	Option for configuring the serial interface.	All	Allows access via any serial interface.
		UART A, UART B, UART C, UART D, UART E, UART F	Allows access via the selected serial interface.
Terminal type ¹⁾	Option for configuring 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 configuring 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 recognition 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 UEFI boot.	Disabled	Disables this function.
Legacy boot	Option for enabling/disabling legacy boot.	Enabled	Enables this function.
		Disabled	Disables this function.
Boot in legacy video mode ²⁾	Option for enabling/disabling graphics initialization after BIOS POST with legacy ROM.	Enabled	Enables this function.
		Disabled	Disables this function.
		Disabled	Disables this function.
Load OPROM ²⁾	Setting for loading all option ROMs or those depending on the boot device.	All	Loads all option ROMs.
		On demand	Loads option ROMs 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 configuring the memory for EFI boot services.	Disabled	Reserves the minimum amount of memory necessary for EFI boot services.
		Enabled	Reserves the maximum amount of memory necessary for EFI boot services (approx. 130 MB more).

Information:

The screen remains black and displays nothing after BIOS POST.

Table 253: Boot - Boot configuration

- 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*.

4.1.9 Exit

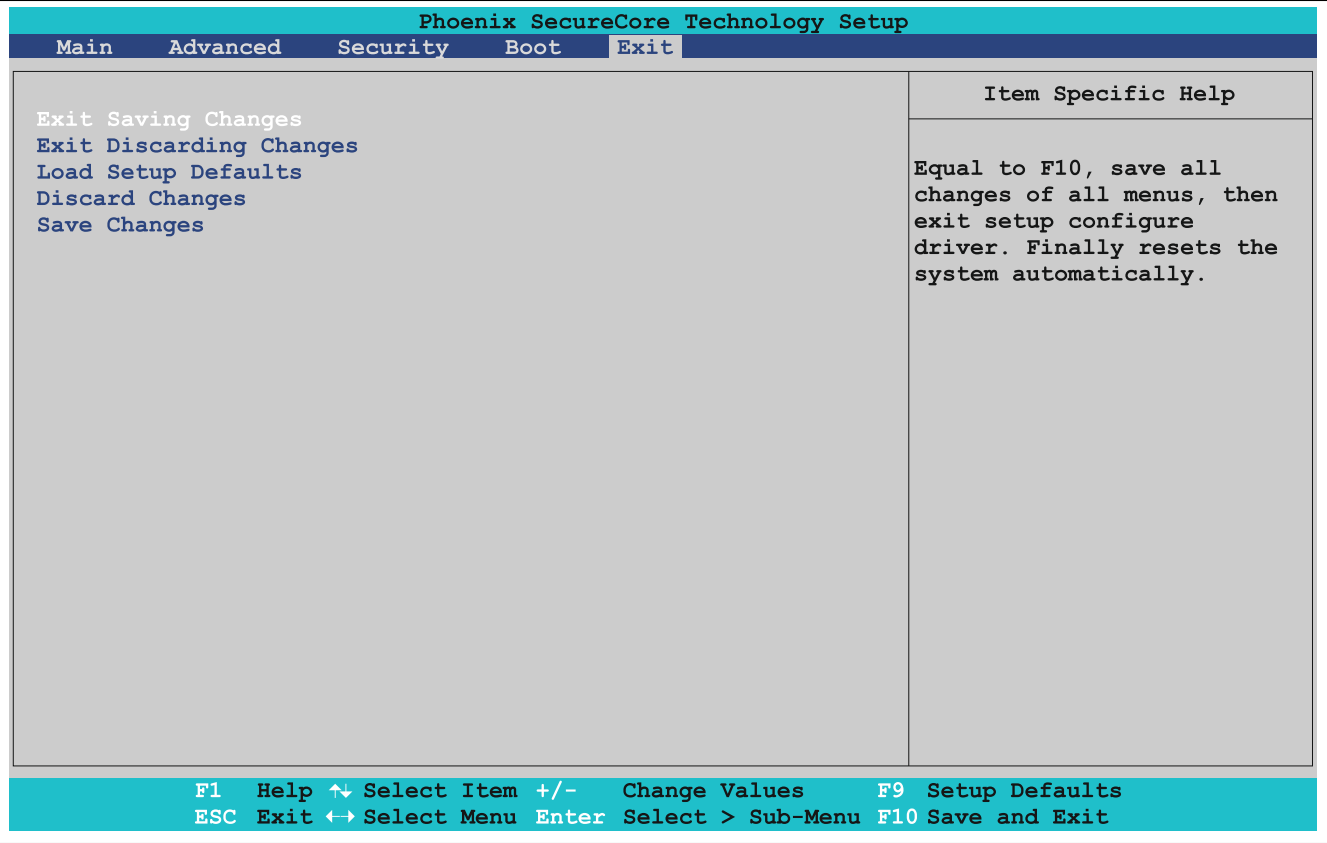


Figure 164: Exit

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	

Table 254: Exit

4.1.10 Allocation of resources

4.1.10.1 RAM address assignments

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 000FFFFFFF	64 kB	System BIOS shadow RAM
00100000 to 7FFFFFFF	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 FFFFFFFF	2 MB	Local APIC
100000000 to 17FFFFFFF	2 GB	System memory (high DRAM)
180000000 to F00000000	58 GB	High MMIO

Table 255: RAM address assignments

4.1.10.2 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

Table 256: I/O address assignments

4.1.10.3 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			○	○	○	○	○			•	○	○				

Table 257: IRQ interrupt assignments in PIC mode

- 1) Advanced Configuration and Power Interface.
- 2) Onboard resistive touch screen on Panel PC 2100.
- 3) Monitor/Panel option, SDL/DVI transmitter, SDL3 transmitter
- 4) If option 5ACCIF01.FPLS-000, 5ACCIF01.FPLS-001, COMA
- 5) IF option

- ... Default setting
- ... Optional setting

4.1.10.4 Interrupt assignments in APIC mode

A total of 23 IRQs are available in APIC (**A**dvanced **P**rogrammable Interrupt **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⁾																								•	

Table 258: IRQ interrupt assignments in APIC mode

- 1) Advanced Configuration and Power Interface.
- 2) Onboard resistive touch screen on Panel PC 2100.
- 3) Monitor/Panel option, SDL/DVI transmitter, SDL3 transmitter
- 4) If option 5ACCIF01.FPLS-000, 5ACCIF01.FPLS-001, COMA
- 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

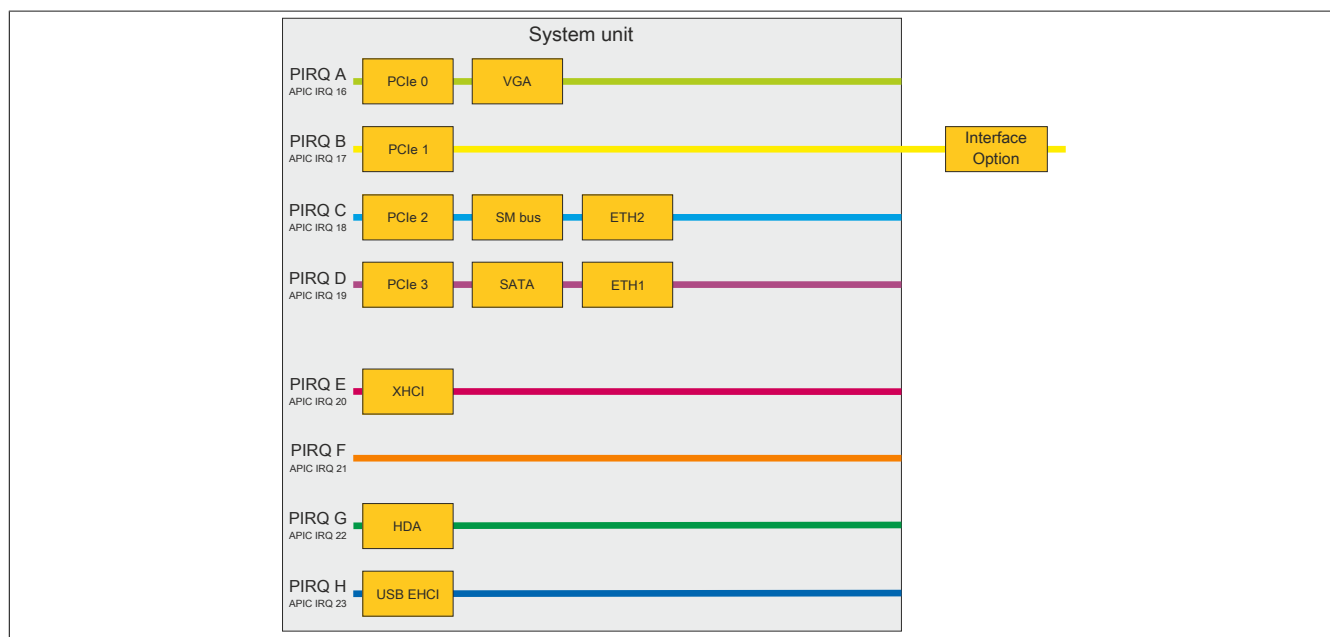


Figure 165: PCIe routing with enabled APIC

4.2 Upgrade information

Warning!

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

4.2.1 BIOS upgrade

An upgrade may be necessary in order to accomplish the following:

- Updating implemented functions or adding newly implemented functions or components to BIOS Setup (for information about changes, see the "Readme" file for the BIOS upgrade).

4.2.1.1 Important information

Information:

Customized BIOS settings are deleted when upgrading BIOS.

Before starting an upgrade, it helps to determine the various software versions.

4.2.1.1.1 Which BIOS version and firmware are already installed?

This information is displayed on the following BIOS Setup screen:

- After switching on the PC, BIOS Setup is accessed by pressing "F2".
- From the "Advanced" menu in BIOS, select "OEM features".

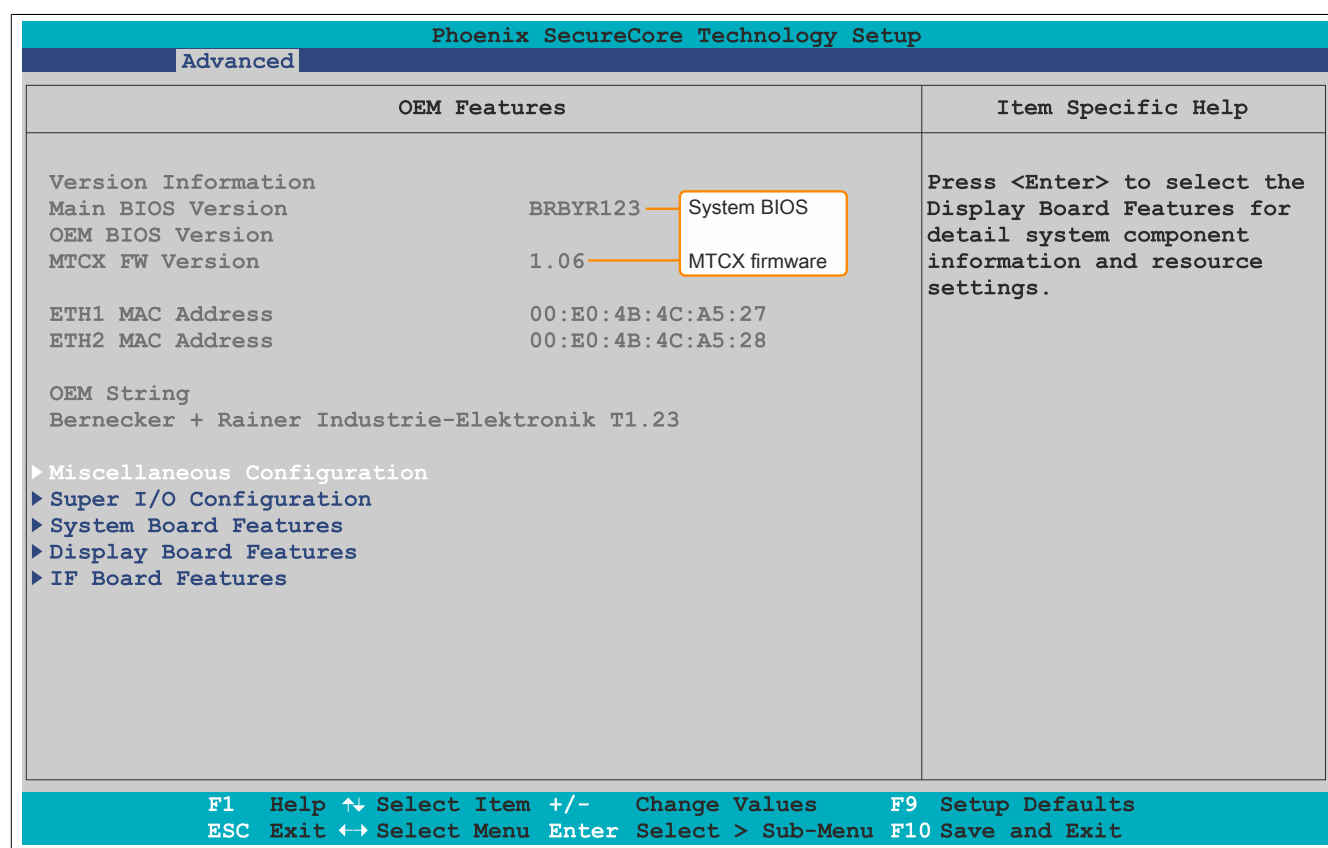


Figure 166: Software version

4.2.1.2 Procedure in EFI shell

Caution!

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

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the data to a USB flash drive formatted in FAT16 or FAT32. Alternatively, a CFast card can be used.
3. Reboot the PC and select "UEFI: Internal shell" as the boot device (press key "F5" to open the boot menu).
4. After the EFI shell is booted, "startup.nsh" is executed and the BIOS upgrade is started.
5. The system must be rebooted after a successful upgrade.
6. Reboot and press "F2" to enter BIOS Setup and load the setup defaults; then select "Save changes and exit".

4.2.2 Upgrading the firmware on the Panel PC 2100

The "Firmware upgrade (MTCX)" software makes it possible to update the firmware depending on the PPC2100 system variant.

The latest firmware upgrade is available in 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 update!

4.2.2.1 Procedure in Windows (B&R Control Center)

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Open the **Control Center** in the Control Panel.
3. Select the **Versions** tab.
4. Under "System unit", click on **Update** for **MTCX**. This brings up the "Open" dialog box.
5. Enter the name of the firmware file or select the file under **Filename**.
6. Click on **Open**. This brings up the "Open" dialog box.

The transfer can be canceled by clicking on **Cancel**. **Cancel** is disabled when writing to flash memory.

Deleting the data in flash memory can take several seconds depending on the memory block being used. The progress indicator is not updated during this time.

Information:

The PC's power supply must be switched off and then switched back on again in order for the new firmware to take effect and the updated version to be displayed. The user is prompted to do this when closing the Control Center.

Information:

For more information about saving and updating firmware, please refer to the ADI driver user's manual.

4.2.2.2 Procedure in EFI shell

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the data to a USB flash drive formatted in FAT16 or FAT32. Alternatively, a CFast card can be used.
3. Reboot the PC and select "UEFI: Internal shell" as the boot device (press key "F5" to open the boot menu).
4. After the EFI shell is booted, "startup.nsh" is executed and the MTCX upgrade is started.
5. The system must be switched off and back on after a successful upgrade.

Warning!

Pressing panel keys while the firmware is being transferred is not permitted! This can disrupt the procedure.

Information:

The PC's power supply must be switched off and then switched back on again in order for the new firmware to take effect and the updated version to be displayed.

4.3 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 LTSC
- Windows 10 IoT Enterprise 2015 LTSC
- Windows Embedded 8.1 Industry Pro
- Windows 7 Professional/Ultimate
- Windows Embedded Standard 7 Premium
- B&R Linux 8 and 9

No guarantee can be made regarding multi-touch or single-touch operation, compatibility and functionality when using other operating systems and/or individual touch screen drivers.

4.4 Windows 10 IoT Enterprise 2016 LTSB

4.4.1 General information

Windows 10 IoT Enterprise 2016 LTSB is the successor to Windows 10 IoT Enterprise 2015 LTSB and based on new Windows 10 technology. This operating system also provides a high degree of protection for industrial applications with additional lockdown functions. Windows 10 IoT Enterprise 2016 LTSB is a version of Windows 10 Enterprise specifically developed for use in industrial applications (Long-Term Servicing Branch).

4.4.2 PPC2100 - Order data


Model number	Short description	Figure
	Windows 10 IoT Enterprise	
5SWW10.0543-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Entry - Multilingual - PPC2100 with Bay Trail chipset - License (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	Windows 10 IoT Enterprise	
5SWW10.0800-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Language Pack DVD	

Table 259: 5SWW10.0543-MUL - Order data

4.4.3 PPC2100 - Overview

Model number	Edition	Target system	Processor	Chipset	Architecture	Language	Minimum size of data storage device	Minimum RAM required
5SWW10.0543-MUL	Entry	PPC2100	E3826/E3827/E3845	Bay Trail	64-Bit (legacy BIOS boot)	Multilingual	20 GB ¹⁾	2 GB ²⁾

1) The memory used by additional language packs is not taken into account in the minimum size specified for the disk.

2) The specified amount of memory is the minimum requirement according to Microsoft. B&R recommends using at least 4 GB RAM with 64-bit operating systems, however.

4.4.4 Features

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

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

Table 260: Features with Windows 10 IoT Enterprise 2016 LTSB.

4.4.5 Installation

B&R preinstalls Windows 10 IoT Enterprise 2016 LTSB on a suitable data storage device (64-bit: minimum 20 GB). When switched on for the first time, the system runs through the out-of-box experience (OOBE), which allows different settings to be made (e.g. language, region, keyboard layout, computer name, username, etc.).

Windows 10 IoT Enterprise 2016 LTSB is installed on APC2100 and PPC2100 devices in Legacy BIOS mode.

4.4.6 Drivers

The operating system contains all drivers necessary for operation. If an older version of the driver is still being used, the latest version can be downloaded from the B&R website (www.br-automation.com) and installed over it. Note that the Unified Write Filter (UWF) must be disabled for this.

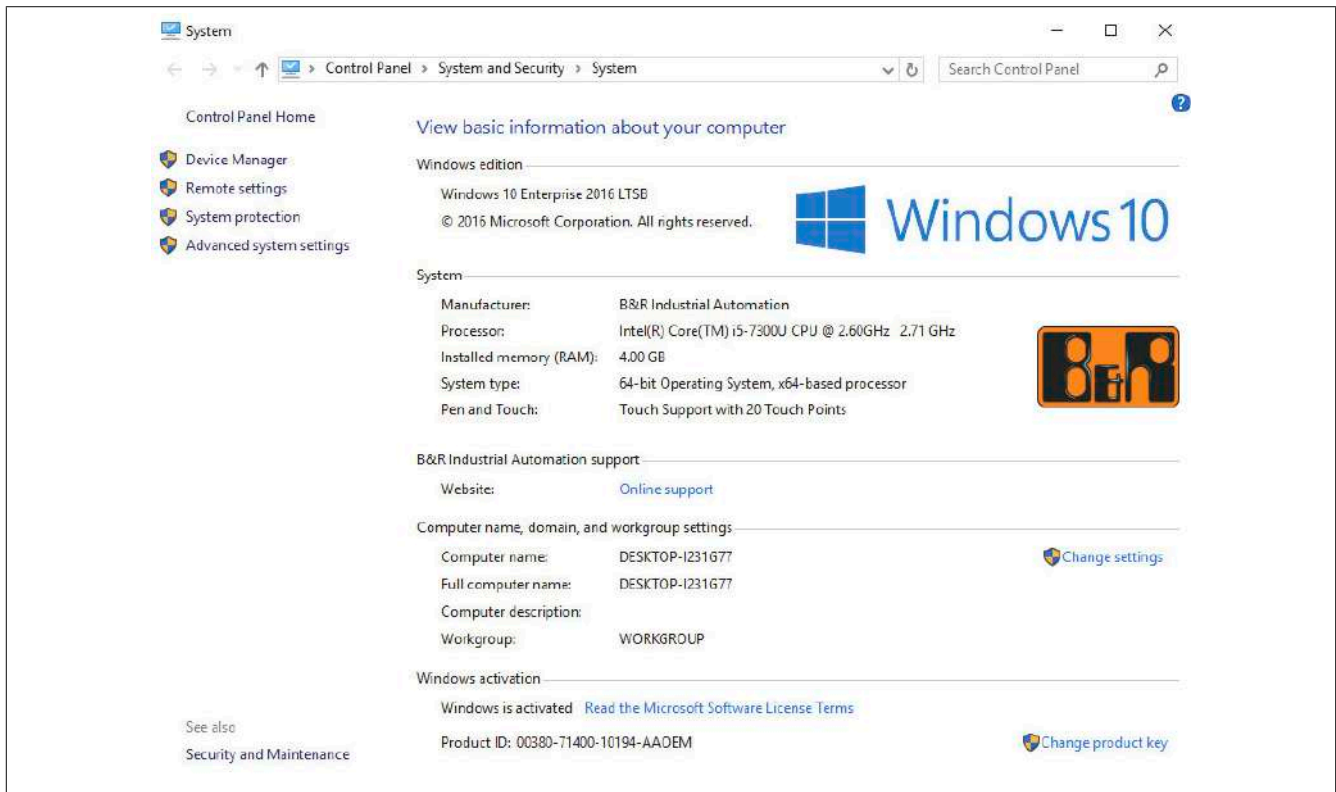
Information:

Only download necessary drivers from the B&R website, not from vendor websites.

4.4.7 Activation

Windows 10 IoT Enterprise 2016 LTSC must be activated like its predecessor, Windows 10 IoT Enterprise 2015 LTSC. This has already been done at B&R.

The activation status can be checked in the Control Panel:



The activation performed by B&R is supported by special B&R extensions in the operating system and theoretically should not be lost when modifying hardware (e.g. replacing components in the event of repair) or, in contrast to Windows 10 IoT 2015 LTSC, when reinstalling the system (subject to technical changes by Microsoft).

Information:

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

4.4.8 Issues and limitations

- Unlike the standard Windows 10 Enterprise edition, Windows 10 IoT Enterprise 2016 LTSC does not include applications such as Cortana, the Microsoft Edge browser or the Microsoft Store.
- The LTSC version is based on Windows 10 Build 14393 and does not contain any feature updates.

The version installed by B&R includes settings that have been optimized for industrial environments. These are described in detail in the "Windows 10 IoT 2016 LTSC application note". It can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com) (login required).

Information:

As a result of these settings and the features that are excluded from the LTSC version, the system will behave differently than a standard Windows 10 Enterprise installation.

4.4.9 Supported display resolutions

In accordance with Microsoft requirements, Windows 10 IoT Enterprise 2016 LTSC requires SVGA resolution (800 x 600) or higher in order to fully operate the Windows user interface (including system dialog boxes, apps, etc.). A lower resolution can be selected for applications.

4.5 Windows 10 IoT Enterprise 2015 LTSB

4.5.1 General information

Windows 10 IoT Enterprise 2015 LTSB is the successor to Windows Embedded 8.1 Industry and based on new Windows 10 technology. This operating system also provides a high degree of protection for industrial applications with additional lockdown functions. Windows 10 IoT Enterprise 2015 LTSB is a version of Windows 10 Enterprise specifically developed for use in industrial applications (Long-Term Servicing Branch).

4.5.2 PPC2100 - Order data


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

Table 261: 5SWW10.0243-MUL - Order data

4.5.3 Overview

Model number	Edition	Target system	Processor	Chipset	Architecture	Language	Minimum size of data storage device	Minimum RAM required
5SWW10.0243-MUL	Embedded	PPC2100	No limitation	Bay Trail	64-bit	Multilingual	20 GB ¹⁾	2 GB ²⁾

1) The memory used by additional language packs is not taken into account in the minimum size specified for the disk.

2) The specified size is the minimum requirement according to Microsoft. B&R recommends, however, using 4 GB or more of RAM with 64-bit operating systems.

4.5.4 Features

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

Function	Windows 10 IoT Enterprise 2015 LTSB
Range of functions in Windows 10 Enterprise 2015 LTSB	✓
Internet Explorer 11, including Enterprise Mode	✓
Multi-touch support	✓
Multilingual support	After installation using language pack DVDs (default language is English)
Page file	Configurable (disabled in image by default by the UWF)
Hibernate file	Configurable (disabled in image by default)
System restore	Configurable (disabled in image by default by the UWF)
SuperFetch	Configurable (disabled in image by default by the UWF)
File indexing service	Configurable (disabled in image by default by the UWF)
Fast boot	Configurable (disabled in image by default by the UWF)
Defragmentation service	Configurable (disabled in image by default by the UWF)
Additional embedded lockdown functions	
Assigned access	Configurable
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓

Table 262: Features with Windows 10 IoT Enterprise 2015 LTSB.

4.5.5 Installation

B&R preinstalls Windows 10 IoT Enterprise 2015 LTSB on a suitable data storage device (64-bit: minimum 20 GB). When switched on for the first time, the system runs through the out-of-box experience (OOBE), which allows different settings to be made (e.g. language, region, keyboard layout, computer name, username, etc.).

4.5.6 Drivers

The operating system contains all drivers necessary for operation. If an older version of the driver is still being used, the latest version can be downloaded from the B&R website (www.br-automation.com) and installed over it. Note that the Unified Write Filter (UWF) must be disabled for this.

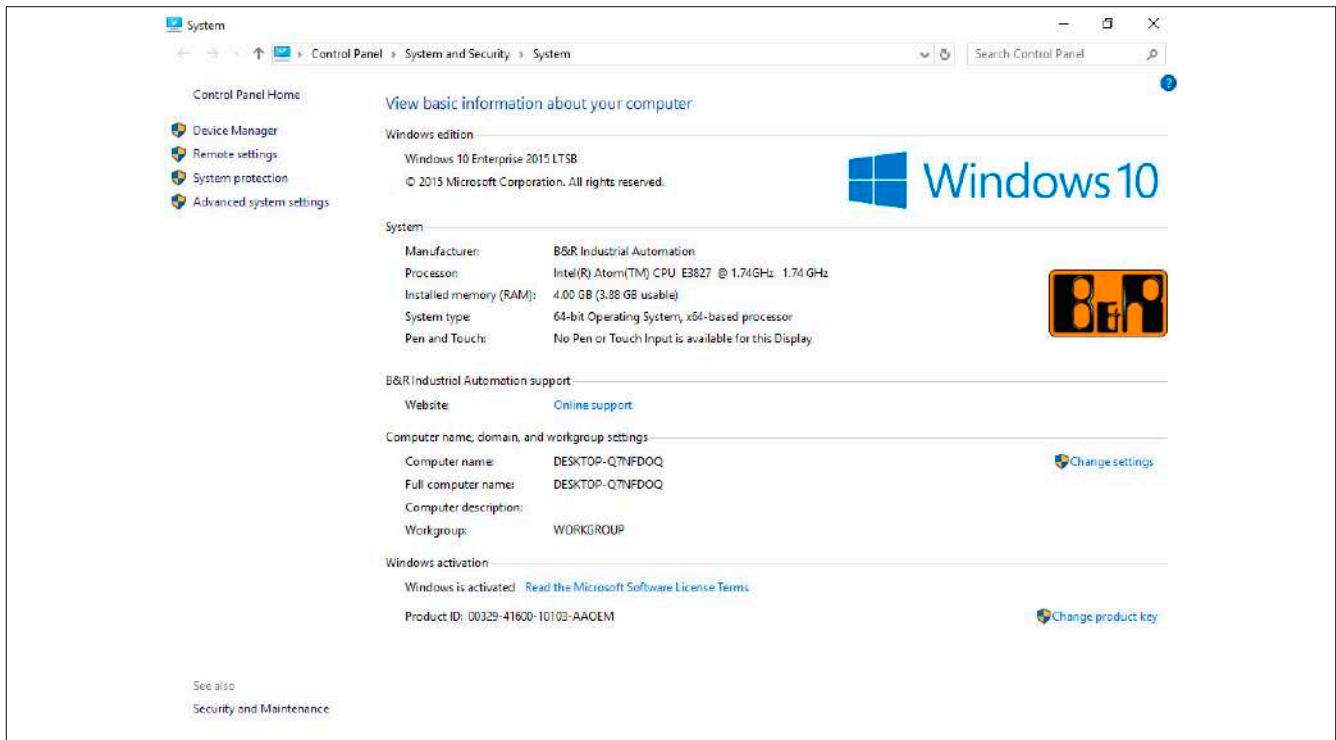
Information:

Only download necessary drivers from the B&R website, not from vendor websites.

4.5.7 Activation

Windows 10 IoT Enterprise 2015 LTSC must be activated like its predecessor, Windows Embedded 8.1 Industry Pro. This has already been done at B&R.

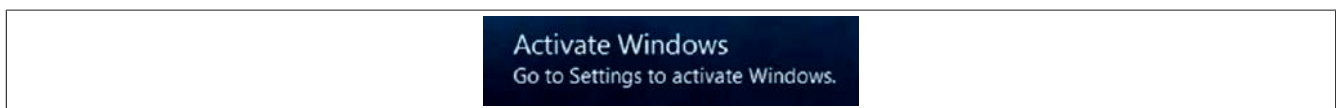
The activation status can be checked in the Control Panel:



Information:

Activation can become negated when making changes to hardware (e.g. replacing components in repair situations) and when reinstalling the system (e.g. with the Recovery DVD).

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



Windows 10 IoT Enterprise 2015 LTSC 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).

The product can be activated at a later time either over the phone or via the Internet. For instructions on how to do this, see the Windows Control Panel under Update & Security > Activation.

Information:

The product key never has to be entered for reactivation.

4.5.8 Recovery DVD - Content of delivery

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

Information:

It is only used to carry out the basic installation of Windows 10 Enterprise 2015 LTSC. 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").

4.5.9 Issues and limitations

- Unlike the standard Windows 10 Enterprise edition, Windows 10 IoT Enterprise 2015 LTSB does not include applications such as Cortana, the Microsoft Edge browser or the Microsoft Store.
- The LTSB version is based on Windows 10 Build 10240 and does not contain any feature updates.

The version installed by B&R includes settings that have been optimized for industrial environments. These are described in detail in the "Windows 10 IoT 2015 LTSB working guide". It can be downloaded free of charge from the Downloads section of the B&R website (www.br-automation.com) (login required).

Information:

As a result of these settings and the features that are excluded from the LTSB version, the system will behave differently than a standard Windows 10 Enterprise installation.

4.5.10 Supported display resolutions

In accordance with Microsoft requirements, Windows 10 IoT Enterprise 2015 LTSB requires SVGA resolution (800 x 600) or higher in order to fully operate the Windows user interface (including system dialog boxes, apps, etc.). A lower resolution can be selected for applications.

4.6 Windows Embedded 8.1 Industry Pro

4.6.1 General information

Windows Embedded 8.1 Industry Pro is an operating system specially tailored to industrial applications. Based on new Windows 8.1 technology, this edition offers full compatibility for applications and drivers while also integrating additional lockdown functions that make industrial PCs more secure.

4.6.2 Order data

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

Table 263: 5SWWI8.0343-MUL, 5SWWI8.0443-MUL - Order data

4.6.3 Overview

Model number	Edition	Target system	Chipset	Architecture	Language	Minimum size of data storage device	Minimum RAM required
5SWWI8.0343-MUL	Embedded	PPC2100	Bay Trail	32-bit	Multilingual	16 GB ¹⁾	1 GB ²⁾
5SWWI8.0443-MUL	Embedded	PPC2100	Bay Trail	64-bit	Multilingual	20 GB ¹⁾	2 GB ³⁾

- 1) The memory space required by additional language packs is not taken into account in the minimum size specified for the data storage device.
- 2) With an active UWF (Unified Write Filter), 2 GB RAM are recommended.
The specified memory size is the minimum requirement according to Microsoft. B&R recommends using at least 2 GB RAM with 32-bit operating systems, however.
- 3) The specified memory size is the minimum requirement according to Microsoft. B&R recommends using at least 4 GB RAM with 64-bit operating systems, however.

4.6.4 Features

The list of features shows the most important device functions included 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	After installation using language pack DVDs (default language is English)
Page file	Configurable (disabled in image by default by the UWF)
Hibernate file	Configurable (disabled in image by default)
System restore	Configurable (disabled in image by default by the UWF)
SuperFetch	Configurable (disabled in image by default by the UWF)
File indexing service	Configurable (disabled in image by default by the UWF)
Fast boot	Configurable (disabled in image by default by the UWF)
Defragmentation service	Configurable (disabled in image by default by the UWF)
Additional embedded lockdown functions	
Assigned access	Configurable
Dialog filter	Configurable
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

Table 264: Device functions in Windows Embedded 8.1 Industry Pro

4.6.5 Installation

B&R preinstalls Windows Embedded 8.1 Industry Pro on a suitable data storage device (32-bit: minimum 16 GB, 64-bit: minimum 20 GB). When switched on for the first time, the system runs through the out-of-box experience (OOBE), which allows different settings to be made (e.g. language, region, keyboard layout, computer name, username, etc.).

Information:

If the product key is requested during the OOBE, it can be skipped by pressing "Skip".

4.6.6 Drivers

The operating system contains all drivers necessary for operation. If an older version of the driver is still being used, the latest version can be downloaded from the B&R website (www.br-automation.com) and installed over it. Note that only the Unified Write Filter (UWF) must be disabled for this.

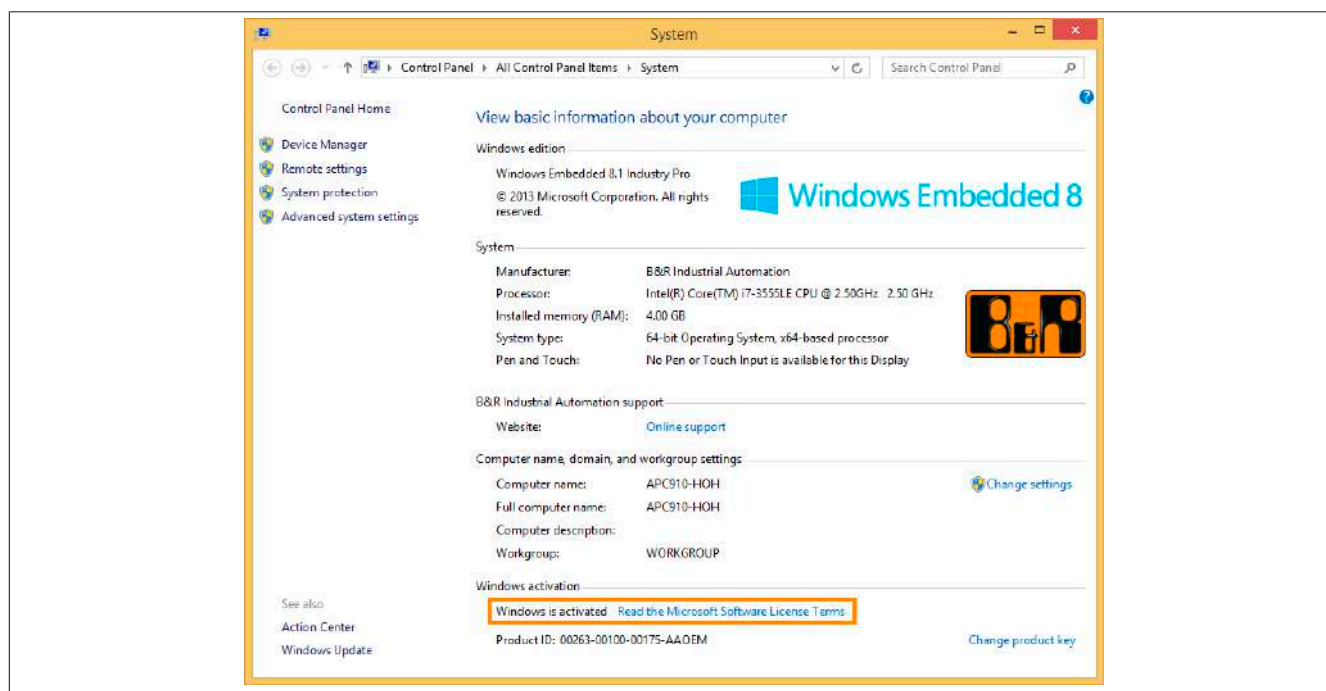
Information:

Only download necessary drivers from the B&R website, not from vendor websites.

4.6.7 Activation

In contrast to previous versions – Windows 7 and Windows XP Professional – Windows Embedded 8.1 Industry Pro must be activated. This has already been done at B&R.

The activation status can be checked in the Control Panel:



Information:

Activation can become negated when making changes to hardware (e.g. replacing components in repair situations) and when reinstalling the system (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. Personalization is not possible, however (e.g. setting the desktop background).

The product can be activated at a later time either over the phone or via the Internet. For instructions, see the Microsoft website.

Activation via direct Internet connection:

[http://msdn.microsoft.com/en-us/library/dn449258\(v=winembedded.82\).aspx](http://msdn.microsoft.com/en-us/library/dn449258(v=winembedded.82).aspx)

Activation over the telephone:

[http://msdn.microsoft.com/en-us/library/dn449379\(v=winembedded.82\).aspx](http://msdn.microsoft.com/en-us/library/dn449379(v=winembedded.82).aspx)

Information:

The product key never has to be entered for reactivation.

4.6.8 Contents of the Recovery DVD

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

Information:

They are only used to carry out the basic installation of 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](#)").

4.6.9 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. They include:

- Unified Write Filter (UWF)
These features make it possible to configure a data storage device (e.g. CFast) for read-only access or to allow only certain registry keys to be accessed, for example. As a result, the system always starts with the same configuration after rebooting.
- Dialog filter
This feature 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 windows can simply be hidden.
- Keyboard Filter
The keyboard filter allows individual keys or certain keyboard shortcuts to be locked to prevent users from accessing certain functions (e.g. Task Manager).

For more information about lockdown functions, see the Microsoft website:

[http://msdn.microsoft.com/en-us/library/dn449278\(v=winembedded.82\).aspx](http://msdn.microsoft.com/en-us/library/dn449278(v=winembedded.82).aspx)

4.6.10 Supported display resolutions

In accordance with Microsoft requirements, Windows Embedded 8.1 Industry Pro requires XGA resolution (1024 x 768) or higher in order to fully operate the Windows user interface (including system dialog boxes, apps, etc.). A lower resolution can be selected for applications.

4.7 Windows 7

4.7.1 General information

Windows 7 offers a wide range of innovative features and performance improvements. The 64-bit variants can also exploit the full power of current PC architectures. 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 starting with Service Pack 1). Product activation is not necessary on B&R PCs, which is an enormous advantage for simple logistical procedures relating to machine automation.

All Windows operating systems offered by B&R are from the Microsoft Embedded division. This guarantees much longer availability, especially compared to products offered on the consumer market.

4.7.2 Order data


Model 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	

Table 265: 5SWWI7.1100-GER, 5SWWI7.1100-ENG, 5SWWI7.1200-GER, 5SWWI7.1200-ENG, 5SWWI7.1300-MUL, 5SWWI7.1400-MUL - Order data

4.7.3 Overview

Model number	Edition	Target system	Chipset	Service pack	Architecture	Language	Required storage space on data storage device	Minimum RAM required
5SWWI7.1100-GER	Professional	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	945GME GM45 QM77/HM76 NM10 US15W Bay Trail	SP1	32-bit	German	16 GB	1 GB ¹⁾
5SWWI7.1100-ENG	Professional	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	945GME GM45 QM77/HM76 NM10 US15W Bay Trail	SP1	32-bit	English	16 GB	1 GB ¹⁾
5SWWI7.1200-GER	Professional	APC810 APC910 APC2100 PPC800 PPC900 PPC2100	945GME Intel Core 2 Duo GM45 QM77/HM76 QM170/HM170/ CM236 Bay Trail	SP1	64-bit	German	20 GB	2 GB ²⁾
5SWWI7.1200-ENG	Professional	APC810 APC910 APC2100 PPC800 PPC900 PPC2100	945GME Intel Core 2 Duo GM45 QM77/HM76 QM170/HM170/ CM236 Bay Trail	SP1	64-bit	English	20 GB	2 GB ²⁾
5SWWI7.1300-MUL	Ultimate	APC510 APC511 APC810 APC910 APC2100 PPC800 PPC900 PPC2100 PP500	945GME GM45 QM77/HM76 NM10 US15W Bay Trail	SP1	32-bit	Multilingual	16 GB ³⁾	1 GB ¹⁾
5SWWI7.1400-MUL	Ultimate	APC810 APC910 APC2100 PPC800 PPC900 PPC2100	945GME Intel Core 2 Duo GM45 QM77/HM76 QM170/HM170/ CM236 Bay Trail	SP1	64-bit	Multilingual	20 GB ³⁾	2 GB ²⁾

Table 266: Windows 7 - Overview

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

4.7.4 Installation

B&R preinstalls the required Windows 7 version on a desired storage device (e.g. CFast card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed in this process.

4.7.5 Drivers

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

Information:

Only download necessary drivers from the B&R website, not from vendor websites.

4.7.6 Issues and limitations

- Windows 7 does not contain a Beep.sys file, which means that an audible signal is not sounded when pressing a key, for example.
- There is currently no support for the Windows 7 system rating (although this does not apply to PP500, APC2100, APC510, APC511, APC910, PPC2100 or PPC800 devices with an NM10 chipset).

Information:

32-bit operating systems are not recommended for system units with 4 GB or more of main memory. For more information, see section "[Miscellaneous configuration](#)" on [page 261](#) under heading "PCI MMIO Size".

4.7.7 Supported display resolutions

In accordance with Microsoft requirements, Windows 7 requires XGA resolution (1024 x 768) or higher in order to fully operate the Windows user interface (including system dialog boxes, etc.). A lower resolution can be selected for applications.

4.8 Windows Embedded Standard 7

4.8.1 General information

The successor to Windows XP Embedded is Windows Embedded Standard 7. As with previous versions, this 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 2 different versions. The main difference between them has to do with multilingual support. 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 version, 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 as both a 32-bit and 64-bit version³⁾, which ensures that even the most demanding applications have the level of support they need.

4.8.2 Order data


Model 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 - English - 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 - English - 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	

Table 267: 5SWWI7.1543-ENG, 5SWWI7.1643-ENG, 5SWWI7.1743-MUL, 5SWWI7.1843-MUL - Order data

4.8.3 Overview

Model number	Edition	Target system	Chipset	Service pack	Architecture	Language	Minimum size of data storage device	Minimum RAM required
5SWWI7.1543-ENG	Embedded	PPC2100	Bay Trail	SP1	32-bit	English	16 GB	1 GB ¹⁾
5SWWI7.1643-ENG	Embedded	PPC2100	Bay Trail	SP1	64-bit	English	16 GB	2 GB ²⁾
5SWWI7.1743-MUL	Premium	PPC2100	Bay Trail	SP1	32-bit	Multilingual	16 GB ³⁾	1 GB ¹⁾
5SWWI7.1843-MUL	Premium	PPC2100	Bay Trail	SP1	64-bit	Multilingual	16 GB ³⁾	2 GB ²⁾

- 1) The specified memory size is the 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 the 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 device.

4.8.4 Features

The list of features shows the most important device functions included 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 accounts	✓	✓
User accounts	Configurable	Configurable
Windows Explorer shell	✓	✓

Table 268: Device functions in Windows Embedded Standard 7

³⁾ 64-bit versions are not supported by all systems.

Function	Windows Embedded Standard 7	Windows Embedded Standard 7 Premium
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	✓	✓
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 setup	✓	✓
Windows Update	Configurable	Configurable
Windows PowerShell 2.0	✓	✓
BitLocker	-	✓
AppLocker	-	✓
Tablet PC support	-	✓
Multi-touch support	-	✓
Boot from USB flash drive	✓	✓
Accessories	✓	✓
Page file	Configurable	Configurable
Number of fonts	134	134

Table 268: Device functions in Windows Embedded Standard 7

4.8.5 Installation

B&R preinstalls Windows Embedded Standard 7 on a suitable CFast card (32-bit: minimum 16 GB, 64-bit: minimum 16 GB). The system is then automatically configured when it is switched on for the first time. This procedure takes approximately 30 minutes, with the device being rebooted a number of times.

Information:

If Enhanced Write Filter (EWF) should be used, all mass storage devices should be disconnected from the system during installation or SYSPREP (except for the boot drive). It is also possible to disable additional mass storage devices in BIOS.

4.8.6 Drivers

The operating system contains all drivers necessary for operation. If an older driver version is installed, the latest version of it can be downloaded and installed from the B&R website (www.br-automation.com). Note that the "Enhanced Write Filter" (EWF) must be disabled for this.

4.8.7 Issues and limitations

Information:

32-bit operating systems are not recommended for system units with 4 GB or more of main memory. For more information, see section "Miscellaneous configuration" on page 261 under heading "PCI MMIO Size".

4.8.8 Supported display resolutions

In accordance with Microsoft requirements, Windows Embedded Standard 7 requires XGA resolution (1024 x 768) or higher in order to fully operate the Windows user interface (including system dialog boxes, etc.). A lower resolution can be selected for applications.

4.9 Automation Runtime

4.9.1 General information

An integral component of Automation Studio is the Automation Runtime real-time operating system. This real-time operating system is the software kernel that allows applications to run on a target system.

- Guaranteed highest possible performance for 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
- Deterministic behavior guaranteed by cyclic system
- Configurable jitter tolerance in all task classes
- Supports all relevant programming language such as IEC 61131-3 and C
- Extensive function library conforming to IEC 61131-3 as well as the expanded B&R Automation library
- Integrated into Automation NET. Access to all networks and bus systems via function calls or the Automation Studio™ configuration

B&R Automation Runtime is fully embedded in the corresponding target system (the hardware where Automation Runtime is installed). It allows application programs to access I/O systems (e.g. via the fieldbus) and other devices (interfaces, networks, etc.).

4.9.2 Order data


Model 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	

Table 269: 0TG1000.01, 0TG1000.02, 1TG4600.10-5, 1TG4601.06-5, 1TG4601.06-T - Order data

4.9.3 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:

In order to slightly improve the real-time behavior (jitter) of Automation Runtime Windows (ARwin) 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.

4.9.4 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.

4.9.5 Technology Guarding

Technology Guarding is a licensing approach used to safeguard individual software components. Licenses are stored on a "Technology Guard" (also referred to simply as a dongle), which is connected to an available USB interface on the target system.

The B&R software components Automation Runtime Embedded (ARemb), Automation Runtime Windows (ARwin) and Automation Runtime Embedded Terminal require a license, so a Technology Guard must always be used.

Information:

Licensing with the Technology Guarding wizard is available in Automation Studio 4.1 and Automation Runtime 4.08 and later. Earlier versions of Automation Runtime do not require a Technology Guard.

For more information about Technology Guarding, see Automation Help.

4.10 B&R Hypervisor



The B&R hypervisor allows multiple operating systems to run in parallel 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 alongside 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 assigned 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 configurations are defined separately for each system, providing maximum flexibility in how resources are utilized. Whereas previous parallelization solutions were tailored to a specific Windows version, the 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

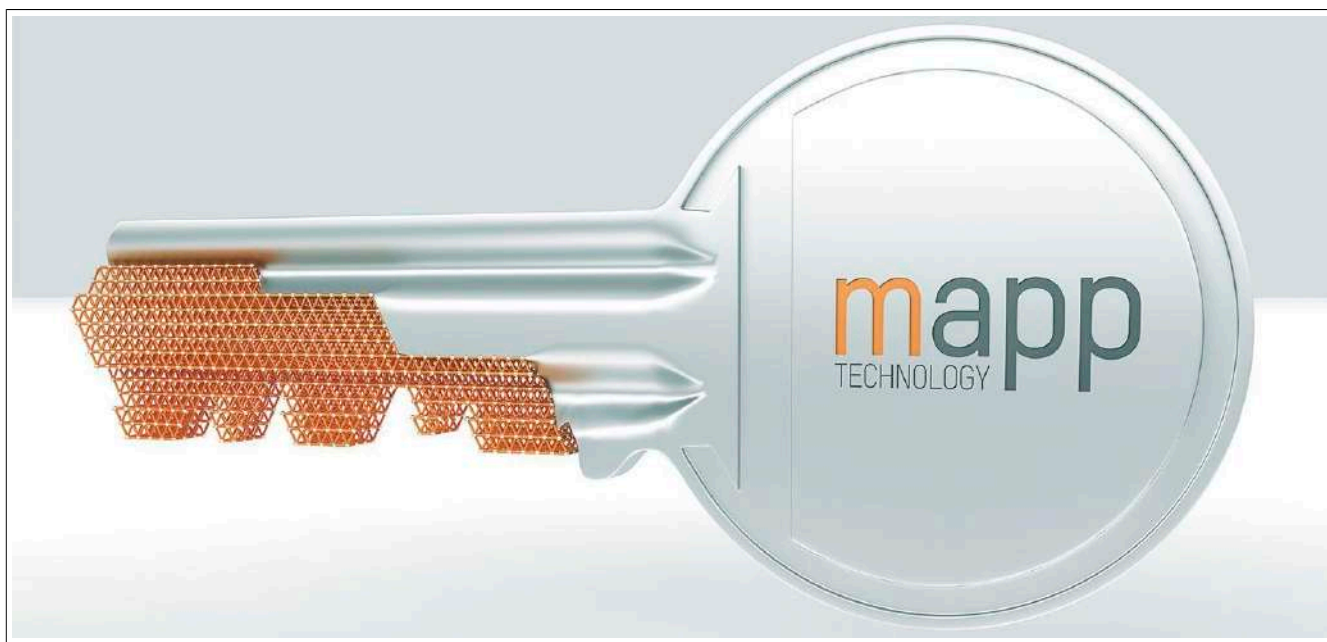
Information:

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

Information:

For details about the B&R Hypervisor, see Automation Help.

4.11 mapp Technology



mapp Technology revolutionizes the creation of machine and plant software. mapp components – mapps for short – are as easy to use as smartphone apps. Instead of programming user/role systems, alarm systems or axis control line by line, the developer of the machine software only configures the finished mapps. Complex algorithms are easy to master. The programmer can fully concentrate on the machine process.



Set up all basic functions for a machine or system with just a few clicks: recipe system, alarm system, OEE evaluation, user-role system, audit trail system, energy monitoring, database system and much more.

Complex control algorithms in the form of easy-to-use software blocks. Crane control, hydraulics control, filter design, closed-loop design and much more. Advanced technology made accessible for the average user.

The only HMI solution on the market that works independently of platform and operating system. Modern HTML5-based HMI applications are easily created with ready-made widgets.

Maximum productivity through integrated safety technology. mapp Safety covers the entire spectrum, including safe axes and robots. Safe machine options can be enabled or disabled in the field.

mapp Motion provides uniform solutions for all areas of motion control: from individual axes to multi-axis systems and even complex robotics and CNC applications.

Information:

For details about mapp Technology, see the B&R website www.br-automation.com or Automation Help.

4.12 B&R Linux 8 (GNU/Linux)

4.12.1 General information

A Linux or GNU/Linux system is an open, Unix-like multiuser operating system based on the Linux kernel and GNU software. Widespread use and commercial applications were made possible starting in 1992 with the licensing of the Linux kernel under the GPL.

The Linux operating system developed by B&R is based on Debian 8, already contains all of the necessary drivers for the devices and can be used immediately without additional work.

Advantages of Debian:

- High degree of stability
- Wide selection of packages

For more information about Debian, visit <http://www.debian.org>.

4.12.2 Order data


Model number	Short description	Figure
	B&R Linux 8	
5SWLIN.0543-MUL	B&R Linux 8 - 32-bit - Multilingual - PPC2100 chipset Bay Trail - Installation (without Recovery DVD) - Only available with a new device	
5SWLIN.0643-MUL	B&R Linux 8 - 64-bit - Multilingual - PPC2100 chipset Bay Trail - Installation (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	CFast cards	
5CFAST.016G-00	CFast card, 16 GB SLC	
5CFAST.032G-00	CFast card, 32 GB SLC	
5CFAST.032G-10	CFast card, 32 GB MLC	
5CFAST.064G-10	CFast card, 64 GB MLC	
5CFAST.128G-10	CFast card, 128 GB MLC	
5CFAST.4096-00	CFast card, 4 GB SLC	
5CFAST.8192-00	CFast card, 8 GB SLC	

Table 270: 5SWLIN.0543-MUL, 5SWLIN.0643-MUL - Order data

4.12.3 Overview

Model number	Target system	Chipset	Architecture	Language	Minimum size of data storage device	Minimum RAM required
5SWLIN.0543-MUL	PPC2100	Bay Trail	32-bit	Multilingual	4 GB	1 GB
5SWLIN.0643-MUL	PPC2100	Bay Trail	64-bit	Multilingual	4 GB	1 GB

4.12.4 Features

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

Detailed information about B&R Linux 8 for B&R devices is available in the Downloads section of the B&R website (www.br-automation.com).

4.12.5 Installation

B&R preinstalls B&R Linux 8 on the desired storage device (e.g. CompactFlash card, CFast card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed in this process.

Debian 8 can also be downloaded from the Debian website (<http://www.debian.org>). The Debian website also provides more detailed instructions.

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

Installation packages are also available on the B&R website (www.br-automation.com) for the necessary B&R modifications.

4.12.6 Drivers

The operating system contains all drivers necessary for operation.

The most current versions of B&R-specific drivers can be downloaded and installed from the B&R website (www.br-automation.com).

4.13 B&R Linux 9 (GNU/Linux)

4.13.1 General information

Linux and GNU/Linux are usually free, Unix-like multi-user operating systems based on the Linux kernel and essentially on GNU software. The wide, also commercial distribution was made possible by the licensing of the Linux kernel under the GPL starting in 1992.

The Linux-based Debian 9 operating system developed by B&R already contains all of the necessary drivers for the devices and can be used immediately without additional work.

Advantages of Debian:

- High degree of stability
- Wide selection of packages

For more information about Debian, visit <http://www.debian.org>.

4.13.2 Order data


Model number	Short description	Figure
	B&R Linux 9	
5SWLIN.0743-MUL	B&R Linux 9 - 64-bit - Multilingual - PPC2100 chipset Bay Trail - Installation (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	CFast cards	
5CFAST.016G-00	CFast card, 16 GB SLC	
5CFAST.032G-00	CFast card, 32 GB SLC	
5CFAST.032G-10	CFast card, 32 GB MLC	
5CFAST.064G-10	CFast card, 64 GB MLC	
5CFAST.128G-10	CFast card, 128 GB MLC	
5CFAST.256G-10	CFast card, 256 GB MLC	
5CFAST.4096-00	CFast card, 4 GB SLC	
5CFAST.8192-00	CFast card, 8 GB SLC	

Table 271: 5SWLIN.0743-MUL - Order data

4.13.3 Overview

Model number	Target system	Chipset	Architecture	Language	Minimum size of data storage device	Minimum RAM required
5SWLIN.0743-MUL	PPC2100	Bay Trail	64-bit	Multilingual	4 GB ¹⁾	1 GB ²⁾

1) The memory space required by additional language packs is not taken into account in the minimum size specified for the data storage device.

2) The specified memory size is the minimum requirement according to Microsoft. B&R recommends at least 4 GB RAM when using 64-bit operating systems, however.

4.13.4 Features

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

Detailed information about B&R Linux 9 for B&R devices is available in the Downloads section of the B&R website (www.br-automation.com).

4.13.5 Installation

B&R preinstalls B&R Linux 9 on the desired storage device (e.g. CompactFlash card, CFAST card, etc.). All of the drivers required for operation (graphics, network, etc.) are also installed in this process.

Debian 9 can also be downloaded from the Debian website (<http://www.debian.org>). Corresponding instructions are also available on the Debian website.

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

Installation packages are also available on the B&R website for the necessary B&R modifications (www.br-automation.com).

4.13.6 Drivers

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

Information:

Only download necessary drivers from the B&R website, not from vendor websites.

4.14 B&R Automation Device Interface (ADI) Control Center

The Automation Device Interface (ADI) makes it possible to access specific functions of B&R devices. In Windows, the settings for these devices can be viewed and modified using the B&R Control Center in the Control Panel.

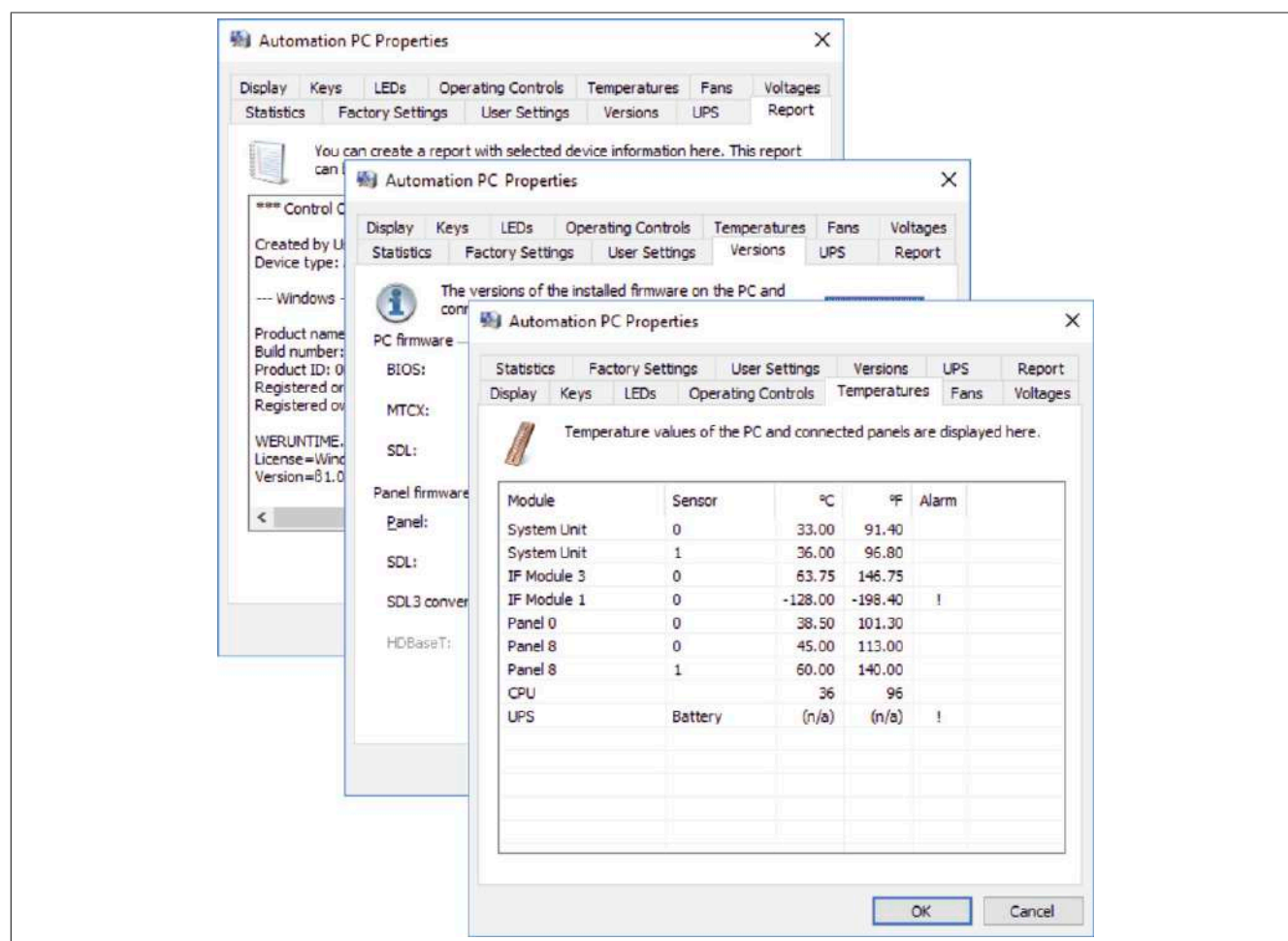


Figure 167: ADI Control Center screenshots - Examples

Information:

The temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) displayed represent uncalibrated values for informational purposes. They cannot be used to draw conclusions about possible hardware alarms or error states. The hardware components being used include automatic diagnostic functions in the event of error.

4.14.1 Functions

Information:

The functions provided by the Control Center depend on the device family.

- Changing display-specific parameters
- Reading device-specific keys
- Updating the key configuration
- Enabling device-specific LEDs on a membrane keypad or keys
- Reading and calibrating control devices (e.g. key switches, handwheels, joysticks, potentiometers)
- Reading temperatures, fan speeds, statistical data and switch positions
- Reading operating hours (power-on hours)
- Reading user settings and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports about the current system (support assistance)

- Setting the SDL equalizer value when adjusting SDL cables
- Changing the user serial ID

For a detailed description of the Control Center, see Automation Help or the user documentation (depends on the version).

4.14.2 Installation

The B&R Automation Device Interface (ADI) driver (also includes the Control Center) and user documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

Information:

The ADI driver is included in most B&R Windows operating systems; it can also be installed on demand.

If a more current ADI driver version exists (see the Downloads section of the B&R website), it can be installed later. Note that the write filter must be disabled during installation.

4.15 B&R Automation Device Interface (ADI) Development Kit

This software can be used to access B&R Automation Device Interface (ADI) functions directly from Windows applications created in Microsoft Visual Studio, for example.

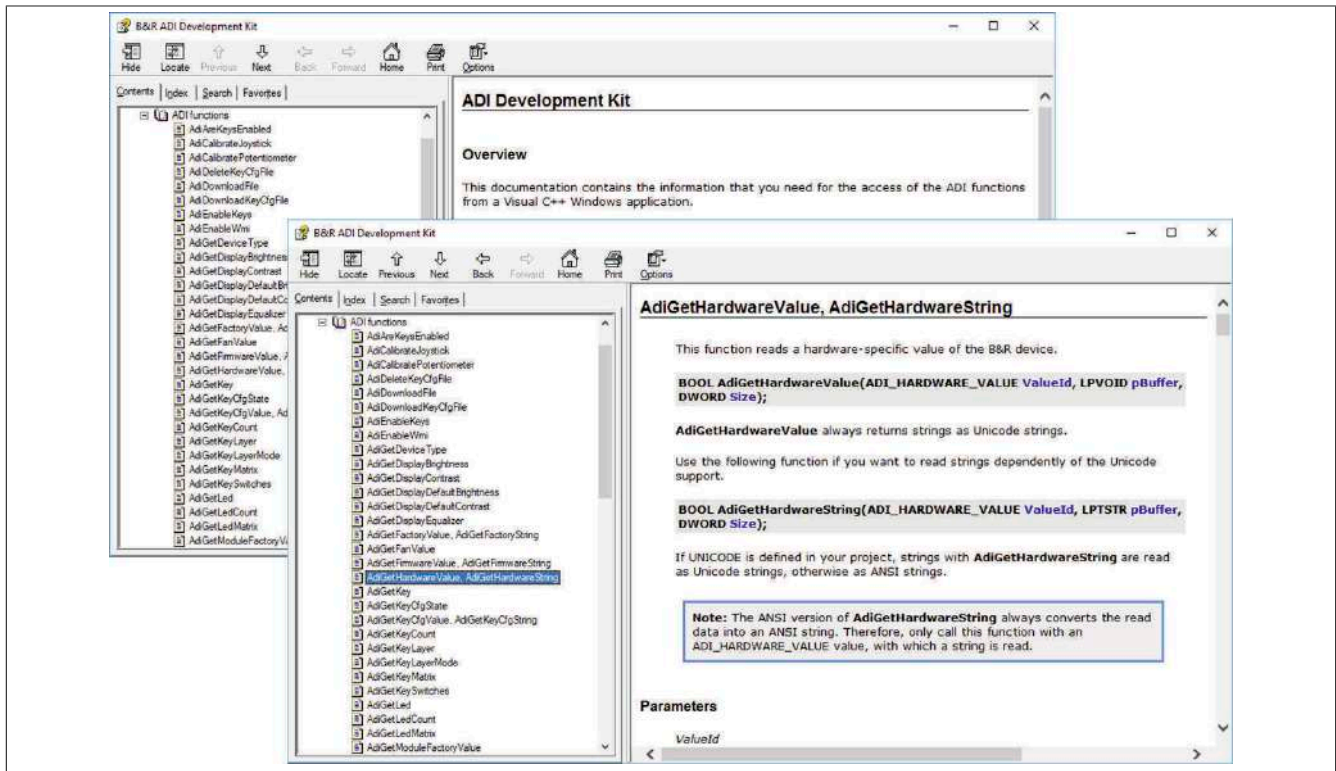


Figure 168: ADI Development Kit Screenshots (Symbolbild)

Features:

- Header files and import libraries
- Help files
- Sample projects
- ADI DLL (for testing applications if no ADI driver is installed)

The appropriate ADI driver must be installed for the specified product family. The ADI driver is already included in the embedded operating system images from B&R.

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

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

4.16 B&R Automation Device Interface (ADI) .NET SDK

This software can be used to access B&R Automation Device Interface (ADI) functions directly from .NET applications created in Microsoft Visual Studio.

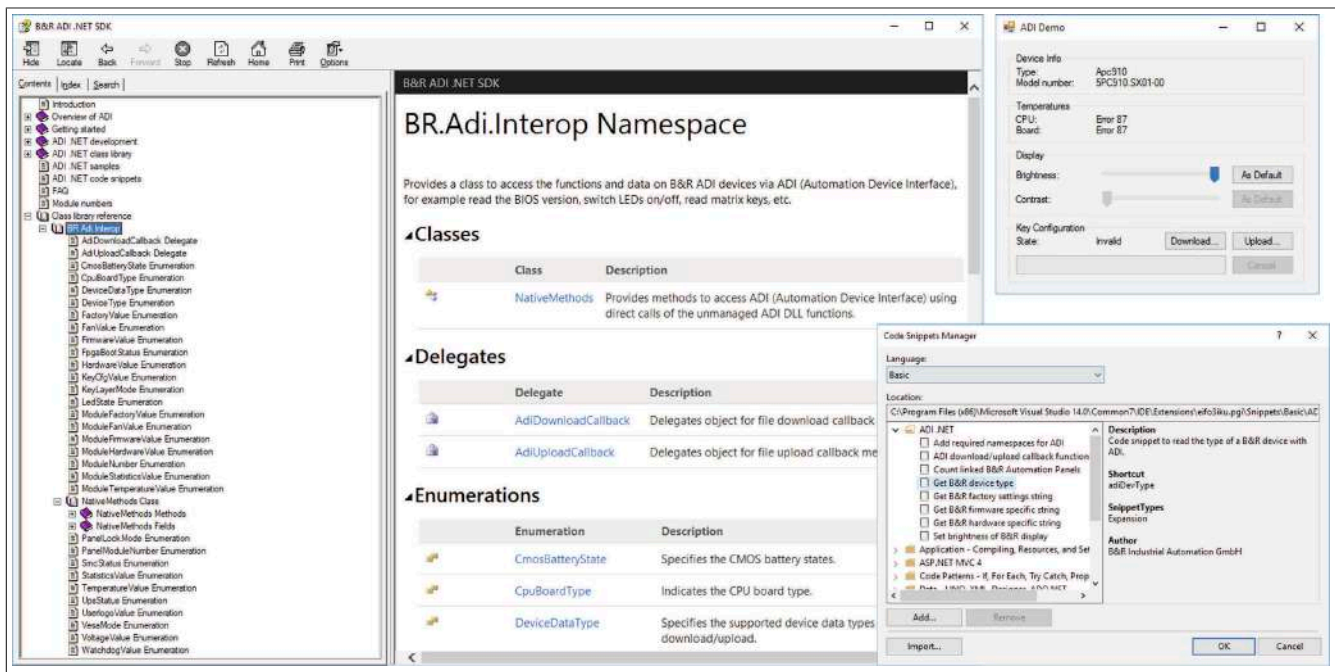


Figure 169: ADI .NET SDK screenshots

Features:

- ADI .NET class library
- Help files (the help documentation is 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 specified product family. The ADI driver is already included in the embedded operating system images from B&R.

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).

4.17 B&R Key Editor

A common panel requirement is to adapt function keys and LEDs directly to the application software. The B&R Key Editor makes this individual adaptation to the application quick and easy.

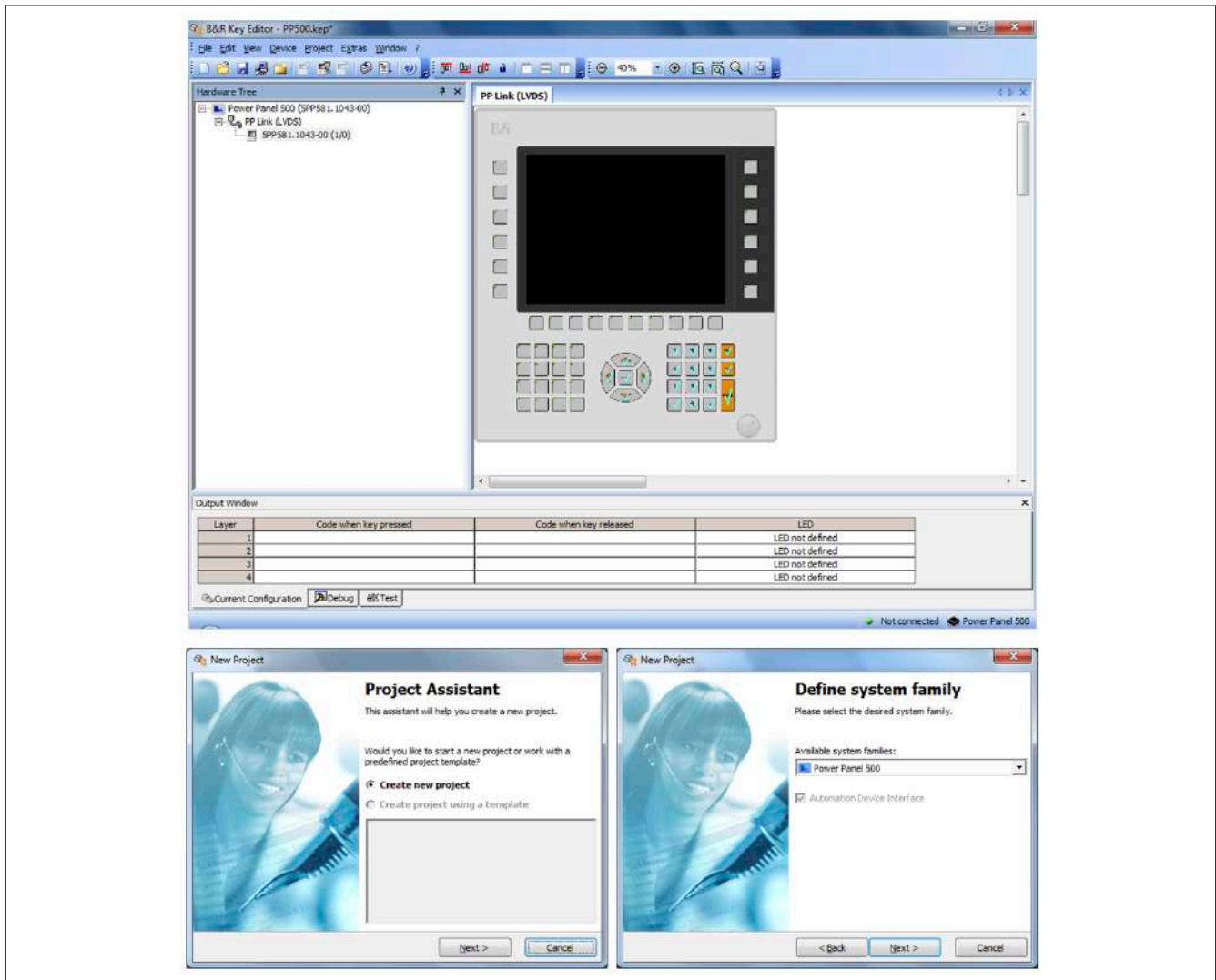


Figure 170: B&R Key Editor screenshots

Features:

- Configuration of normal keyboard keys (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) using a single key
- Special key functions (change brightness, etc.)
- Assignment of functions to LEDs (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when connecting multiple Automation Panel devices to Automation PCs and Panel PCs.

For a detailed guide on configuring keys and LEDs as well as installing the key configuration on the target system, see the help documentation for the B&R Key Editor. The B&R Key Editor and its help documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

4.18 B&R KCF Editor

The B&R KCF Editor can be used as a simple alternative to B&R Key Editor. This tool also allows function keys and LEDs to be adapted to the application software. Unlike the B&R Key Editor, operation takes place in a simple Windows dialog box instead of on a visual representation of the device. This makes it possible to use the B&R KCF Editor for devices that are not yet supported by the B&R Key Editor. The B&R KCF Editor is a portable application and can be launched on the target device without prior installation (directly from a USB flash drive, for example). An installed ADI driver is required to use the software's full range of functions.

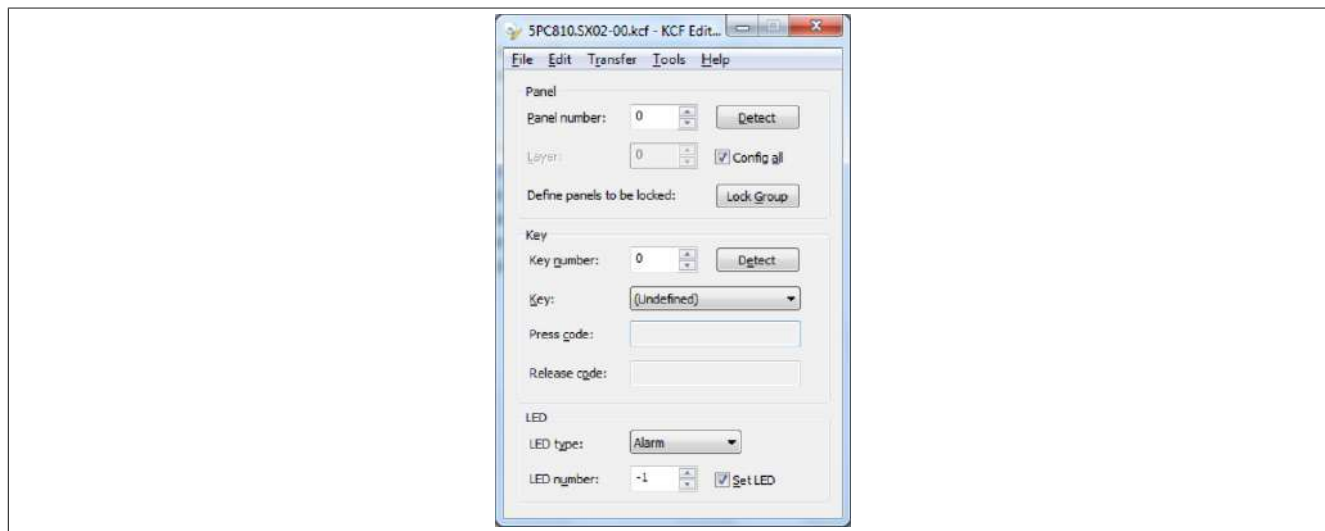


Figure 171: B&R KCF Editor V1.0 screenshot

Features

- Configuration of normal keyboard keys (A, B, C, etc.)
- Special key functions (change brightness, etc.)
- Assignment of functions to LEDs (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel locking time when connecting multiple Automation Panel devices to B&R PCs.
- Exporting and importing configurations (INI files)
- Saving configurations as a report (text file)

Additional features if the B&R KCF Editor is executed on the target device⁴⁾

- Panel and key detection
- LED test
- Configuration uploads/downloads

⁴⁾ The ADI driver must be installed on the B&R PC to use these features.

4.19 HMI Service Center

4.19.1 5SWUTI.0001-000

4.19.1.1 General information

The HMI Service Center is software for testing B&R industrial PCs and Automation Panels. Various categories such as COM interfaces, network connectivity and SRAM are tested.

The test system consists of a USB flash drive with an 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 for free from the B&R website (www.br-automation.com).

4.19.1.2 Order data


Model number	Short description	Figure
	Accessories	
5SWUTI.0001-000	HMI Service Center USB flash drive - Hardware diagnostic software - For APC810/PPC800 - For APC910/PPC900 - For APC2100/PPC2100 - For APC2200/PPC2200 - For APC3100/PPC3100 - For APC51x/PP500 - For Automation Panel 800/900 - For Automation Panel 1000/5000	

Table 272: 5SWUTI.0001-000 - Order data

5 Standards and certifications

5.1 Standards and guidelines

5.1.1 CE marking



All guidelines applicable to the product and their harmonized EN standards are fulfilled.

5.1.2 EMC directive

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

EN 61131-2:2007	Programmable logic 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](#).

5.2 Certifications

Danger!

A complete system can only receive certification if ALL of the individual components installed therein have the corresponding certifications. If an individual component is used that DOES NOT have a corresponding certification, then the complete system also DOES NOT have certification.

Products and services from B&R comply with applicable standards. This includes 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 are committed to ensuring the reliability of our products in industrial environments.

Information:

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

5.2.1 UL certification



Products with this mark are tested by Underwriters Laboratories and listed as "industrial control equipment". This mark is valid for the USA and Canada and simplifies the certification of your machines and manufacturing systems in this economic region.

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

Note that the device is classified as "open type" when used in the area of "Industrial control equipment" 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.

5.2.2 GOST-R



Products with this mark are tested by an accredited testing laboratory and permitted for import to the Russian Federation (based on EU compliance).

5.2.3 EAC



Products with this mark are tested by an accredited testing laboratory and permitted for import to the Eurasian Economic Union (based on EU compliance).

5.2.4 KC



Products with this mark are tested by an accredited testing laboratory and permitted for import to the Korean market (based on EU compliance).

5.2.5 RCM



Products with this mark are tested by an accredited testing laboratory and certified by the ACMA. This mark is valid in Australia/Oceania and simplifies the certification of your machines and systems in this economic region (based on EU compliance).

5.2.6 DNV GL certification



Products with this certification have been certified by classification society DNV GL and are suitable for maritime environments. DNV GL certificates (type approval) are generally accepted by other classification societies during ship acceptance procedures.

DNV GL per standard DNVGL-CG-0339 from November 2016
IACS E10
EN 60945 section 1c

These products are suitable for the following DNV GL environmental conditions (DNV GL classes):

Temperature	B
Moisture	B
Vibration	A
EMC	B
Housing	When installing on board, the guidelines for meeting the required protection level must be observed.

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. For all other B&R-approved operating systems there are no restrictions.

The following table lists the revisions from which DNV GL certification applies to individual components.

Model number	Description	DNV GL beginning with rev.
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 / Link module	D0
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 / link modules	F0
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 interface - For PPC900 / PPC2100 / link modules - Compatible with 5AP920.1906-01/ 5PC720.1906-00/5PC820.1906-00	D0
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 / link modules	C0
5PPC2100.BY44-000	Panel PC 2100 - Intel Atom E3845 1.91 GHz - Quad core - 4 GB SDRAM - For Automation Panel 923/933	E0
5PPC2100.BY48-000	PPC2100 system unit - Intel Atom E3845 1.91 GHz - Quad core - 8 GB SDRAM - For Automation Panel 923/933/1000	C5
5CFAST.2048-00	CFast card, 2 GB SLC	D0

Model number	Description	DNV GL beginning with rev.
5CFAST.4096-00	CFast card, 4 GB SLC	D0
5CFAST.8192-00	CFast card, 8 GB SLC	D0
5CFAST.016G-00	CFast card, 16 GB SLC	D0
5CFAST.032G-00	CFast card, 32 GB SLC	D0
5CFAST.032G-10	CFast card, 32 GB MLC	D0
5CFAST.064G-10	CFast card, 64 GB MLC	D0
5CFAST.128G-10	CFast card, 128 GB MLC	D0
5CFAST.256G-10	CFast card, 256 GB MLC	C0
5ACCIF01.FPCC-000	Interface card - 2x CAN interfaces - 1x X2X Link interface - 1x POWERLINK interface - 512 kB nvSRAM - For APC2100/PPC2100	C0
5ACCIF01.FPLS-000	Interface card - 1x RS232 interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100 - Only available with a new device	D0
5ACCIF01.FPSC-000	Interface card - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 32 kB FRAM - For APC2100/PPC2100 - Only available with a new device	D0
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamp terminal block 3.31 mm ²	D0
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamp terminal block 3.31 mm ²	D0
0TB1210.3100	Connector 300 VDC - 10-pin female - Cage clamp terminal block - Protected against vibration by the screw flange	D0

DNV GL certificates with specifications for permitted environmental conditions are available on the B&R website at [Downloads - Certificates - Maritime - DNV GL](#).

Certificates for compass safe distance are available at [Downloads - Certificates - Maritime - Compass safe distance](#).

5.2.7 UL Haz. Loc. certification



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

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

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

UL HazLoc certificates are available on the B&R website under [Downloads - Certificates - HazLoc](#).

5.2.7.1 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).

5.2.7.2 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 32](#).

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.

5.2.7.3 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!

Explosion hazard: Accessories are not permitted to be connected or disconnected with voltage applied unless the area is considered nonhazardous and is free of ignitable concentrations!

Explosion hazard: 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 OTG1000.01 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.

5.2.7.4 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 these instructions can result in death, serious injury or damage to property!

Danger !

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

5.2.7.5 USB connection with the Panel PC 2100

5.2.7.5.1 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!

DANGER OF EXPLOSION

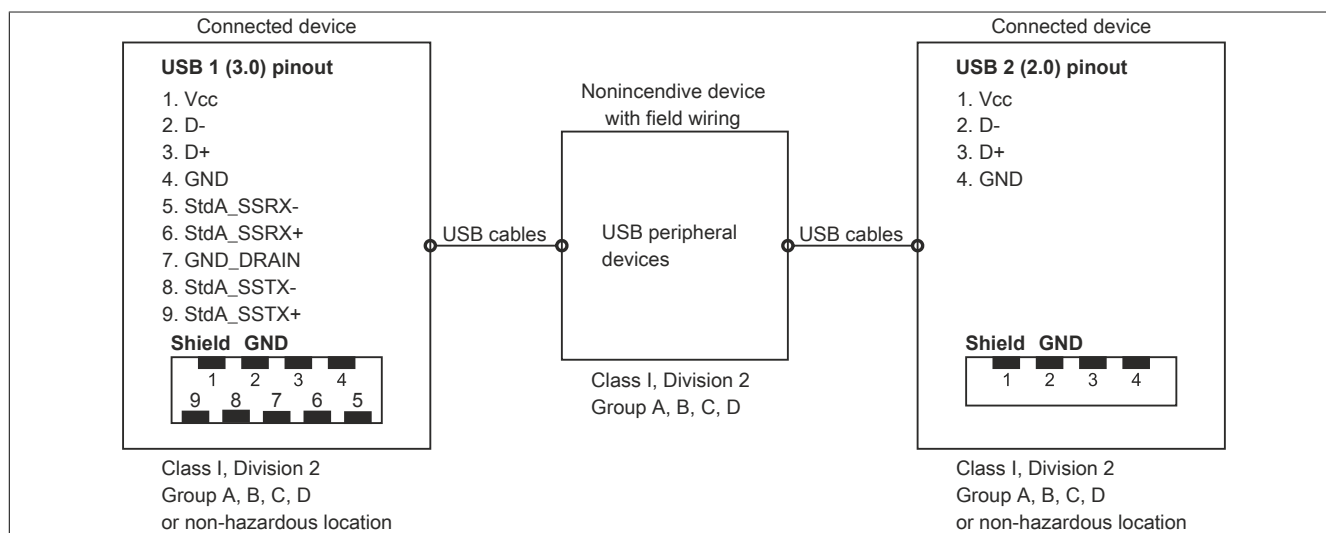
- Before installation or use in a potentially explosive atmosphere, the explosion protection class of the device must be checked per ANSI/ISA 12.12.01 and CSA C22.2 No. 213.
- The following must be used to switch on/off B&R devices installed in a potentially explosive atmosphere:
 - A switch outside the potentially explosive atmosphere, or
 - A switch that is certified in accordance with the hazardous location class and division for "tube use"
- As long as the electrical circuit is activated, cables or wires are not permitted to be connected or disconnected unless the area is known to be free of ignitable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and switches. This includes electrical, ground and network connections as well as series and parallel connections.
- Unshielded/Ungrounded cables are not permitted to be used in potentially explosive atmospheres under any circumstances.
- Only configurations with nonincendive USB devices are permitted to be used.
- Doors and openings on housings must remain closed. This prevents the accumulation of foreign bodies within the workstation.

Failure to follow these instructions can result in death, serious injury or damage to property!

5.2.7.5.2 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 μ F
Associated inductance [L_a]	4.8 μ H

Table 273: 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 μ F
Associated inductance [L_a]	4.8 μ H

Table 274: Nonincendive circuit parameters for interface USB2

The entity concept allows interconnection of nonincendive devices with connected devices with not specifically inspected combinations as a system. For this, 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, and 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 satisfy the following criteria:

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

Table 275: 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 $L_{Cable} = 0.656$ μ H/m (0.20 μ H/ft), if unknown

Wiring must be performed 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 accepting one or more Division 2 wiring methods.

Warning!

- Replacing components may impair eligibility for Division 2 hazardous (classified) locations.
- The device is not permitted to be switched on or off if the area is known to represent an explosion hazard.
- The nonincendive device with field wiring is not permitted to be connected via a parallel connection. This applies unless the device has received express approval for this.

This B&R device is suitable for use in Class I, Division 2, Groups A, B, C and D. In addition, it offers nonincendive field wiring for devices in Class I, Division 2, Groups A, B, C and D.

5.2.7.6 USB connection with the Automation Panel 1000

5.2.7.6.1 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!

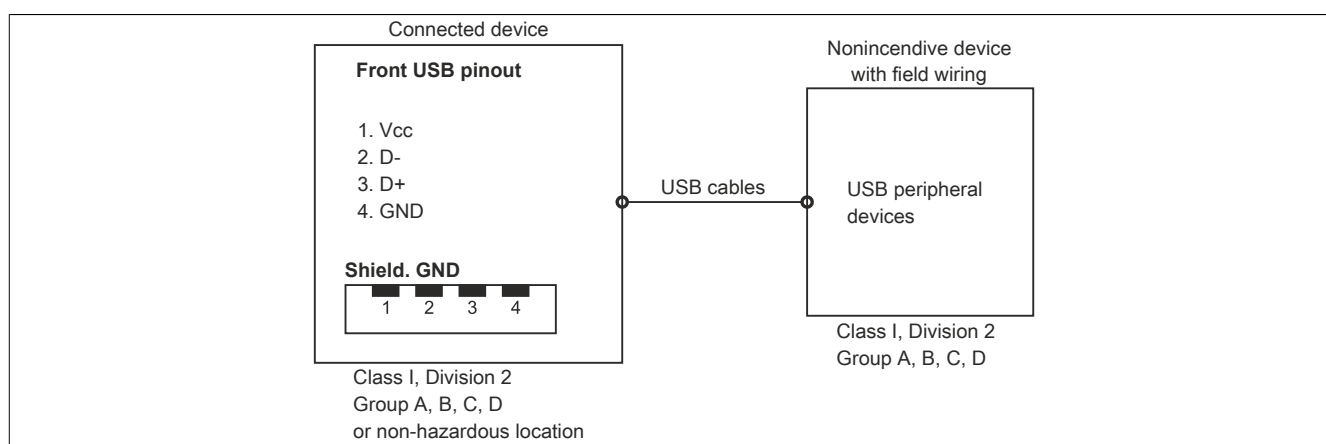
DANGER OF EXPLOSION

- Before installation or use in a potentially explosive atmosphere, the explosion protection class of the device must be checked per ANSI/ISA 12.12.01 and CSA C22.2 No. 213.
- The following must be used to switch on/off B&R devices installed in a potentially explosive atmosphere:
 - A switch outside the potentially explosive atmosphere, or
 - A switch that is certified in accordance with the hazardous location class and division for "tube use"
- As long as the electrical circuit is activated, cables or wires are not permitted to be connected or disconnected unless the area is known to be free of ignitable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and switches. This includes electrical, ground and network connections as well as series and parallel connections.
- Unshielded/Ungrounded cables are not permitted to be used in potentially explosive atmospheres under any circumstances.
- Only configurations with nonincendive USB devices are permitted to be used.
- Doors and openings on housings must remain closed. This prevents the accumulation of foreign bodies within the workstation.

Failure to follow these instructions can result in death, serious injury or damage to property!

5.2.7.6.2 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):

No-load voltage [V _{oc}]	5.04 V
Short circuit current [I _{sc}]	1170 mA
Associated capacitance [C _a]	20 µF
Associated inductance [L _a]	16.8 µH

Table 276: Nonincendive electrical circuit parameters for the front USB interface

The entity concept allows interconnection of nonincendive devices with connected devices with not specifically inspected combinations as a system. For this, 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, and 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 satisfy the following criteria:

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

Table 277: Connected nonincendive device with field wiring

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

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

Where $L_{Cable} = 0.656 \text{ }\mu\text{H/m}$ (0.20 $\mu\text{H/ft}$), if unknown

Wiring must be performed 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 accepting one or more Division 2 wiring methods.

Warning!

- Replacing components may impair eligibility for Division 2 hazardous (classified) locations.
- The device is not permitted to be switched on or off if the area is known to represent an explosion hazard.
- The nonincendive device with field wiring is not permitted to be connected via a parallel connection. This applies unless the device has received express approval for this.

This B&R device is suitable for use in Class I, Division 2, Groups A, B, C and D. In addition, it offers nonincendive field wiring for devices in Class I, Division 2, Groups A, B, C and D.

5.2.7.7 USB connection with the 4-port hub

5.2.7.7.1 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!

DANGER OF EXPLOSION

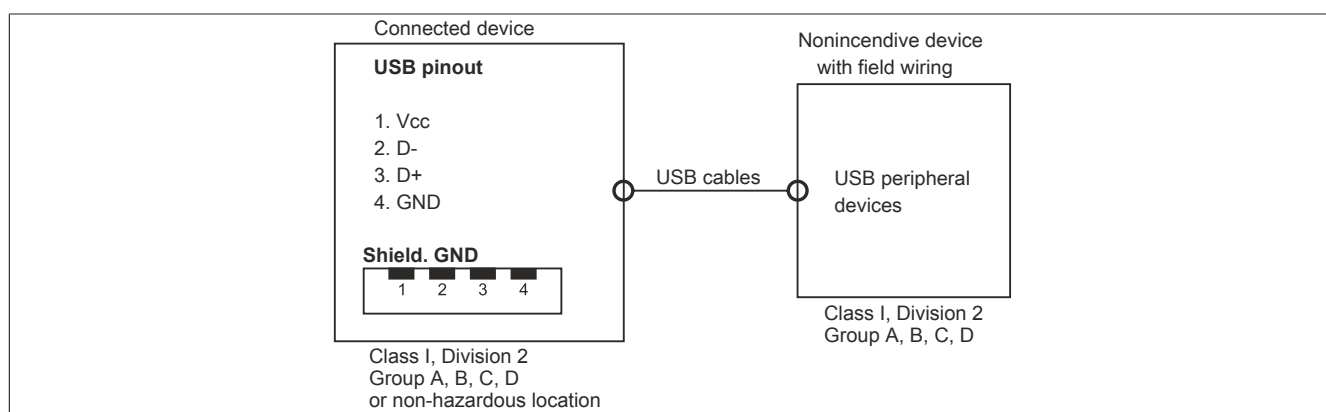
- Before installation or use in a potentially explosive atmosphere, the explosion protection class of the device must be checked per ANSI/ISA 12.12.01 and CSA C22.2 No. 213.
- The following must be used to switch on/off B&R devices installed in a potentially explosive atmosphere:
 - A switch outside the potentially explosive atmosphere, or
 - A switch that is certified in accordance with the hazardous location class and division for "tube use"
- As long as the electrical circuit is activated, cables or wires are not permitted to be connected or disconnected unless the area is known to be free of ignitable concentrations of vapors, gases and other flammable or combustible materials. This applies to all connections and switches. This includes electrical, ground and network connections as well as series and parallel connections.
- Unshielded/Ungrounded cables are not permitted to be used in potentially explosive atmospheres under any circumstances.
- Only configurations with nonincendive USB devices are permitted to be used.
- Doors and openings on housings must remain closed. This prevents the accumulation of foreign bodies within the workstation.

Failure to follow these instructions can result in death, serious injury or damage to property!

5.2.7.7.2 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 indicates the nonincendive electrical circuit parameters:

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

Table 278: Nonincendive electrical circuit parameters for the 4-port USB interfaces

The entity concept allows interconnection of nonincendive devices with connected devices with not specifically inspected combinations as a system. For this, 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, and 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 satisfy the following criteria:

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

Table 279: Connected nonincendive device with field wiring

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

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

Where $L_{Cable} = 0.656 \text{ }\mu\text{H/m}$ (0.20 $\mu\text{H/ft}$), if unknown

Wiring must be performed 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 accepting one or more Division 2 wiring methods.

Warning!

- Replacing components may impair eligibility for Division 2 hazardous (classified) locations.
- The device is not permitted to be switched on or off if the area is known to represent an explosion hazard.
- The nonincendive device with field wiring is not permitted to be connected via a parallel connection. This applies unless the device has received express approval for this.

This B&R device is suitable for use in Class I, Division 2, Groups A, B, C and D. In addition, it offers nonincendive field wiring for devices in Class I, Division 2, Groups A, B, C and D.

6 Accessories

The functionality of the following accessories has been tested and approved by B&R in connection with this device. Nevertheless, there may be possible limitations with regard to operation with other individual components as part of the complete system. For the operation of the complete system, all individual specifications of the components must be observed.

All components listed in this manual have been subjected to extensive system and compatibility testing and approved accordingly. B&R cannot guarantee the functionality of non-approved accessories.

6.1 Power supply connectors

6.1.1 0TB103.9x

6.1.1.1 General information

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

6.1.1.2 Order data


Model number	Short description	Figure
	Terminal blocks	
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamp terminal block 3.31 mm ²	
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamp terminal block 3.31 mm ²	

Table 280: 0TB103.9, 0TB103.91 - Order data

6.1.1.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	0TB103.9	0TB103.91
General information		
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾	
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾	
Terminal block		
Note	Protected against vibration by the screw flange Nominal values per UL	
Number of pins	3 (female)	
Type of terminal block	Screw clamp terminal block	Cage clamp terminal block ³⁾
Cable type	Only copper wires (no aluminum wires!)	
Spacing	5.08 mm	

Table 281: 0TB103.9, 0TB103.91 - Technical data

Model number	0TB103.9	0TB103.91
Connection cross section		
AWG wire	26 to 14 AWG	26 to 12 AWG
Wire end sleeves with plastic covering		0.20 to 1.50 mm ²
Solid wires		0.20 to 2.50 mm ²
Fine strand wires	0.20 to 1.50 mm ²	0.20 to 2.50 mm ²
With wire end sleeves		0.20 to 1.50 mm ²
Tightening torque	0.4 Nm	-
Electrical characteristics		
Nominal voltage		300 V
Nominal current ⁴⁾		10 A / contact
Contact resistance		≤5 mΩ
Operating conditions		
Pollution degree per EN 61131-2		Pollution degree 2

Table 281: 0TB103.9, 0TB103.91 - Technical data

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

6.2 Terminal block IF options

6.2.1 0TB1210.3100

6.2.1.1 General information

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

6.2.1.2 Order data


Model 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	

Table 282: 0TB1210.3100 - Order data

6.2.1.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	0TB1210.3100
General information	
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
DNV GL	Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (Bridge and open deck) ²⁾
Terminal block	
Note	Nominal values according to UL
Number of pins	10 (female)
Type of terminal block	PUSH IN cage clamp terminal block connector
Cable type	Only copper wires (no aluminum wires!)
Spacing	3.5 mm
Connection cross section	
AWG wire	26 to 16 AWG
Wire end sleeves with plastic covering	0.14 to 1 mm ²
Solid wires	0.14 to 1.5 mm ²
Fine strand wires	0.14 to 1.5 mm ²
With wire end sleeves	0.14 to 1.5 mm ²
Electrical characteristics	
Nominal voltage	300 V
Nominal current ³⁾	10 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 283: 0TB1210.3100 - Technical data

- 1) Yes, although applies only if all components installed within the complete system have this certification and the complete system itself carries the corresponding mark.
- 2) Yes, although applies only if all components installed in the complete system have this certification and are listed on the associated DNV GL certificate for the product family.
- 3) The limit data for each I/O module must be taken into consideration.

6.3 USB flash drives

6.3.1 5MMUSB.xxxx-01

6.3.1.1 General information

USB flash drives are easily exchangeable data storage devices. Because of their high-speed data transfer (USB 2.0), USB flash drives are ideal for use as portable storage media. Without requiring additional drivers ("Hot Plug & Play"), the USB flash drive becomes an additional drive where data can be read or written.

Information:

Due to the large number of USB flash drives available on the market as well as their short product lifecycle, we reserve the right to provide alternative products. The following measures may therefore be necessary in order to also boot from these USB flash drives:

- The USB flash drive must be reformatted or in some cases also repartitioned (set partition as active).
- The USB flash drive must be in the first position of the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if command "fdisk / mbr" is additionally executed on the USB flash drive.

6.3.1.2 Order data


Model number	Short description	Figure
	USB accessories	
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	
5MMUSB.4096-01	USB 2.0 flash drive 4096 MB B&R	

Table 284: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

6.3.1.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
LED status indicators	1 LED (green) ¹⁾	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Maintenance	None	
Default file system	FAT32	
Certifications		
CE	Yes	
GOST-R	Yes	
Interfaces		
USB		
Type	USB 1.1, USB 2.0	
Connection	To any USB type A interface	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Sequential reading	Full speed max. 1 MB/s, High speed max. 32 MB/s	
Sequential writing	Full speed max. 0.9 MB/s, High speed max. 23 MB/s	
Endurance		
SLC flash	Yes	
Data retention	>10 years	
Data reliability	<1 unrecoverable error per 10 ¹⁴ bits read	
Connection cycles	>1500	

Table 285: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

Accessories

Model number	5MMUSB.2048-01	5MMUSB.4096-01
Support		
Operating systems		
Windows 10 IoT Enterprise LTSC 64-bit	Yes	
Windows Embedded 8.1 Industry Pro 32-bit	Yes	
Windows Embedded 8.1 Industry Pro 64-bit	Yes	
Windows 7 32-bit	Yes	
Windows 7 64-bit	Yes	
Windows Embedded Standard 7 32-bit	Yes	
Windows Embedded Standard 7 64-bit	Yes	
Windows XP Professional	Yes	
Windows XP Embedded	Yes	
Windows 2000	Yes	
Windows CE 5.0	Yes	
Windows CE 4.2	Yes	
B&R Linux 8	Yes	
B&R Linux 9	Yes	
Electrical characteristics		
Current consumption	Max. 500 µA in sleep mode, max. 120 mA read/write	
Environmental conditions		
Temperature		
Operation	0 to 70°C ²⁾	0 to 70°C ²⁾
Storage	-50 to 100°C	
Transport	-50 to 100°C	
Relative humidity		
Operation	85%, non-condensing	
Storage	85%, non-condensing	
Transport	85%, non-condensing	
Vibration		
Operation	20 to 2000 Hz: 20 g (peak)	
Storage	20 to 2000 Hz: 20 g (peak)	
Transport	20 to 2000 Hz: 20 g (peak)	
Shock		
Operation	Max. 1500 g (peak)	
Storage	Max. 1500 g (peak)	
Transport	Max. 1500 g (peak)	
Elevation		
Operation	Max. 3048 m ²⁾	Max. 3048 m ²⁾
Storage	Max. 12192 m	
Transport	Max. 12192 m	
Mechanical properties		
Dimensions		
Width	17.97 mm	
Length	67.85 mm	
Height	8.35 mm	

Table 285: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

- 1) Indicates data transfer (receiving and transmitting).
2) The maximum ambient temperature is typically derated by 1°C per 1000 meters starting at 500 meters above sea level.

6.3.1.4 Temperature/Humidity diagram

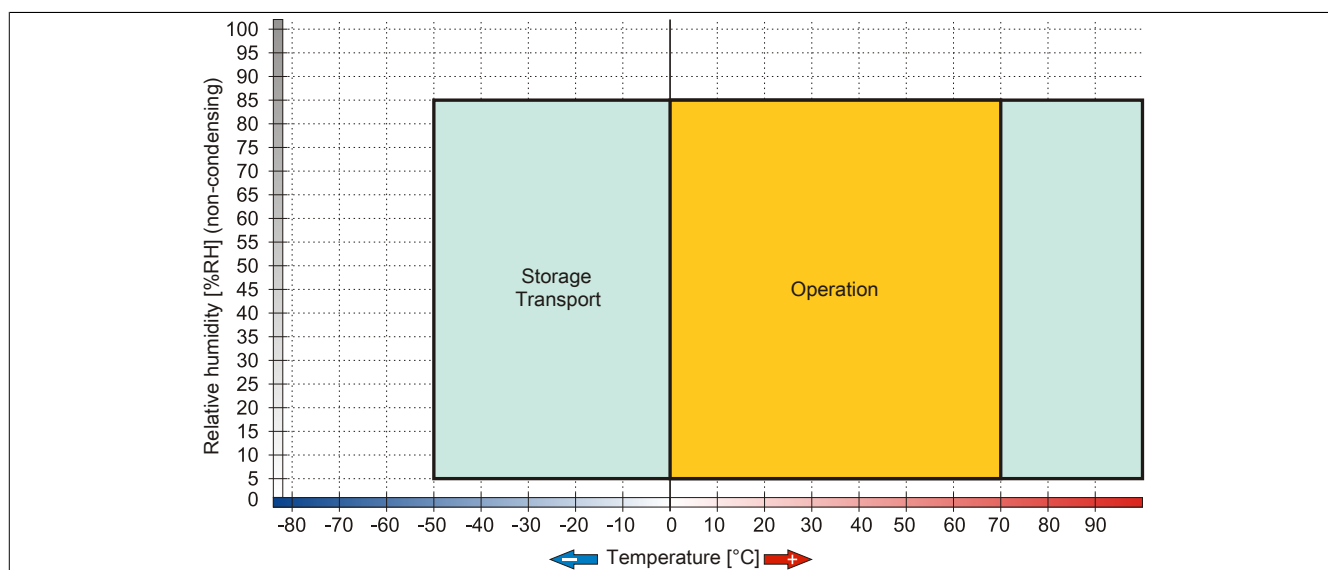


Figure 172: 5MMUSB.xxxx-01 - Temperature/Humidity diagram

6.3.2 5MMUSB.032G-02

6.3.2.1 General information

USB flash drives are easily exchangeable data storage devices. Because of their high-speed data transfer (USB 3.0), USB flash drives are ideal for use as portable storage media. Without requiring additional drivers ("Hot Plug & Play"), the USB flash drive becomes an additional drive where data can be read or written. USB 3.0 (XHCI) is supported starting with Windows 7 (USB 3.0 driver required).

Information:

Due to the large number of USB flash drives available on the market as well as their short product lifecycle, we reserve the right to provide alternative products. The following measures may therefore be necessary in order to also boot from these USB flash drives:

- The USB flash drive must be reformatted or in some cases also repartitioned (set partition as active).
- The USB flash drive must be in the first position of the BIOS boot order; alternatively, the IDE controllers can be disabled in BIOS. This can be avoided in most cases if command "fdisk /mbr" is additionally executed on the USB flash drive.

6.3.2.2 Order data


Model number	Short description	Figure
	USB accessories	
5MMUSB.032G-02	USB 3.0 flash drive 32 GB MLC	

Table 286: 5MMUSB.032G-02 - Order data

6.3.2.3 Technical data

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5MMUSB.032G-02
General information	
Capacity	32 GB
LED status indicators	1 LED (green) ¹⁾
MTBF	>3,000,000 hours
Type	USB 2.0, USB 3.0
Maintenance	None
Certifications	
CE	Yes
Interfaces	
USB	
Type	USB 2.0, USB 3.0
Connection	To any USB type A interface
Transfer rate	High speed (480 Mbit/s) to SuperSpeed (4 Gbit/s)
Sequential reading	USB 3.0 max. 100 MB/s
Sequential writing	USB 3.0 max. 50 MB/s
Endurance	
MLC flash	Yes
Data reliability	<1 unrecoverable error per 10 ¹⁴ bits read
Connection cycles	>1500
Electrical characteristics	
Current consumption	Max. 67 mA in sleep mode, max. 122 mA read, max. 141 mA write
Environmental conditions	
Temperature	
Operation	0 to 70°C ²⁾
Storage	-55 to 95°C
Transport	-55 to 95°C

Table 287: 5MMUSB.032G-02 - Technical data

Model number	5MMUSB.032G-02
Relative humidity	
Operation	10 to 95%, non-condensing
Storage	10 to 95%, non-condensing
Transport	10 to 95%, non-condensing
Vibration	
Operation	7 to 2000 Hz: 20 g
Storage	7 to 2000 Hz: 20 g
Transport	7 to 2000 Hz: 20 g
Shock	
Operation	1500g, 0.5 ms
Storage	1500g, 0.5 ms
Transport	1500g, 0.5 ms
Elevation	
Operation	Max. 3048 m ²⁾
Storage	Max. 12192 m
Transport	Max. 12192 m
Mechanical properties	
Dimensions	
Width	16.58 mm
Length	48.30 mm
Height	7.60 mm
Weight	10 g
Manufacturer information	
Manufacturer	Innodisk
Manufacturer's product ID	DEUA1-32Gi61BCH88 (USB drive 3ME)

Table 287: 5MMUSB.032G-02 - Technical data

- 1) Indicates data transfer (receiving and transmitting).
2) The maximum ambient temperature is typically derated by 1°C per 1000 meters starting at 500 meters above sea level.

6.3.2.4 Temperature/Humidity diagram

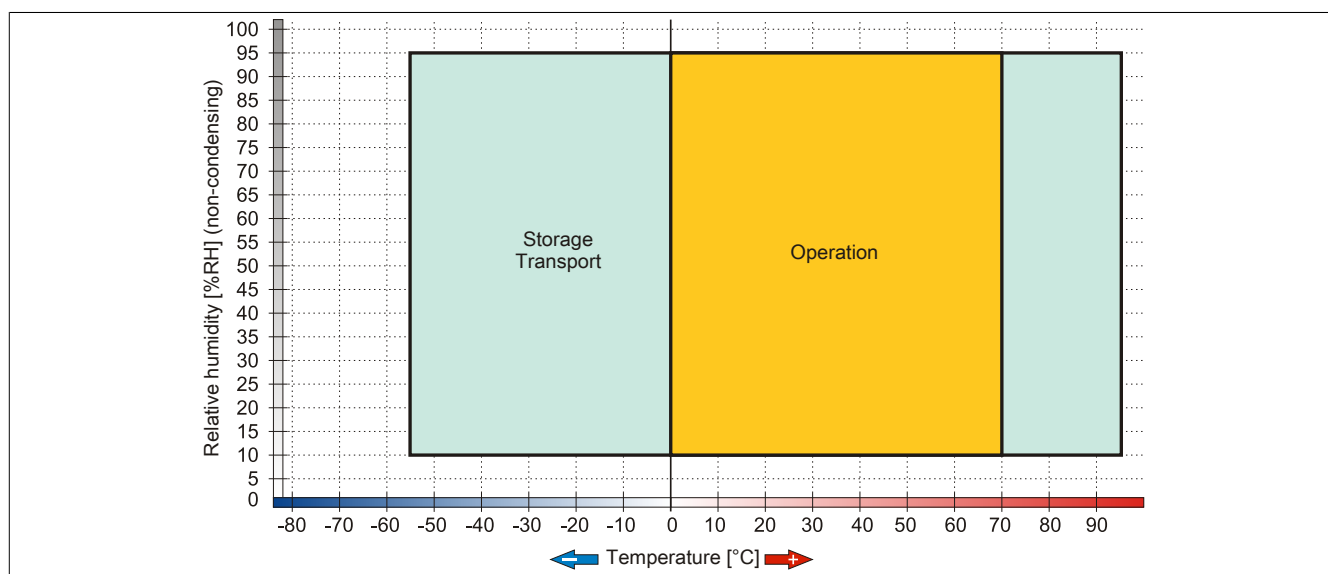


Figure 173: 5MMUSB.032G-02 - Temperature/Humidity diagram

6.4 USB hub

6.4.1 5ACCUSB4.0000-000

6.4.1.1 General information

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

Installation on the Panel PC 2100 is possible with display diagonals $\geq 10.1"$.

The USB hub can be installed starting with the following revisions:

- 5PPC2100.BY01-000 - Rev. F0 and later
- 5PPC2100.BY11-000 - Rev. F0 and later
- 5PPC2100.BY22-000 - Rev. F0 and later
- 5PPC2100.BY34-000 - Rev. F0 and later
- 5PPC2100.BY44-000 - Rev. G0 and later
- 5PPC2100.BY48-000 - Rev. A0 and later

6.4.1.2 Order data


Model number	Short description	Figure
	Accessories	
5ACCUSB4.0000-000	USB hub 4x passive - For APC2100/PPC2100	

Table 288: 5ACCUSB4.0000-000 - Order data

6.4.1.3 Technical data

Warning!

Peripheral USB devices can be connected to the USB interfaces. Due to the large number of USB devices available on the market, B&R cannot guarantee their functionality. Functionality is ensured when using the USB devices available from B&R.

Caution!

Because this interface is designed according to general PC specifications, extreme care should be taken with regard to EMC, wiring, etc.

Information:

The following specifications, properties and limit values apply only to this accessory and may deviate from those that apply to the complete system. For the complete system in which this accessory is installed, for example, the data specified for that complete system applies.

Model number	5ACCUSB4.0000-000
General information	
B&R ID code	0xEABA
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
USB	
Quantity	4
Type	USB 2.0
Design	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), 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) ²⁾
Environmental conditions	
Temperature	
Operation	0 to 60°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Elevation	
Operation	Max. 3000 m ³⁾
Mechanical characteristics	
Housing	
Material	Stainless steel, coated
Coating	Anthracite gray
Dimensions	
Width	21.5 mm
Height	29.5 mm
Depth	97 mm
Weight	100 g

Table 289: 5ACCUSB4.0000-000 - Technical data

- 1) Yes, although applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
2) Only when all interface covers are installed.
3) The maximum ambient temperature is typically derated by 1°C per 1000 meters starting at 500 meters above sea level.

6.4.1.3.1 USB interfaces

The 4-port USB hub is equipped with a Universal Serial Bus 2.0 (USB) host controller with multiple USB interfaces, of which 4 USB 2.0 interfaces are accessible externally for the user.

Warning!

Peripheral USB devices can be connected to the USB interfaces. Due to the large number of USB devices available on the market, B&R cannot guarantee their functionality. Functionality is ensured when using the USB devices available from B&R.

Caution!

Because this interface is designed according to general PC specifications, extreme care should be taken with regard to EMC, wiring, etc.

USB HUB 1, USB HUB 2, USB HUB 3, USB HUB 4


Universal Serial Bus (USB HUB 1, USB HUB 2, USB HUB 3, USB HUB 4) ¹⁾		
Type	USB 2.0	<div>1x USB type A, female</div> 
Design	Type A	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s)	
Current-carrying capacity ²⁾	Max. 1 A	
Cable length	Max. 5 m	

Table 290: USB HUB 1, USB HUB 2, USB HUB 3, USB HUB 4 interface

- 1)
- The interfaces, etc. available on the device or module have been numbered as such for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2)
- The USB interface 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 inter-face.

6.4.1.4 Dimensions

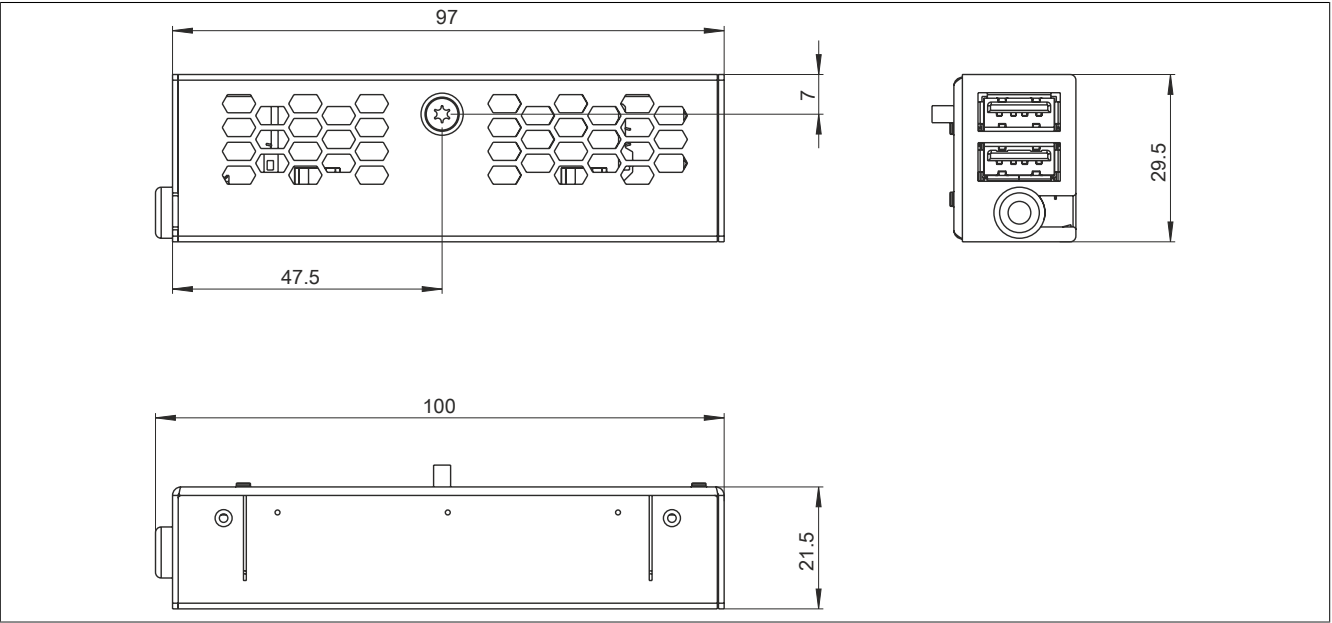


Figure 174: 5ACCUSB4.0000-000 - Dimensions

7 Servicing and maintenance

This chapter describes the servicing/maintenance work that is possible to be carried out by a trained and qualified end user.

Information:

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

7.1 Cleaning

Danger!

The device is only permitted to be cleaned when power is switched off in order to prevent unintended functions from being triggered by touching the touch screen or pressing keys.

Use a moist cloth to clean the device. Only use water with detergent, a screen cleaning agent or alcohol (ethanol) to moisten the cleaning cloth. Apply the cleaning agent to the cloth beforehand; do not spray it directly on the device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam-jet air ejectors.

Information:

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

7.2 Tips for extending the service life of the display

7.2.1 Backlight

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

7.2.1.1 How can the service life of backlights be extended?

- Setting the display brightness to the lowest value that is still comfortable for the eyes
- Using dark images
- Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.

7.2.2 Image persistence

Image persistence refers to the "burning in" of a static image on a display after being displayed for a prolonged period of time. This not only occurs with static images, however. Image persistence is also referred to in the technical literature as burn-in effect, image retention, memory effect, memory sticking or ghost image.

There are basically 2 types:

- Area type: This type is characterized by a dark gray image. The effect disappears if the display is switched off for a long period of time.
- Line type: Can result in permanent damage.

7.2.2.1 What causes image persistence?

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

7.2.2.2 How can image persistence be reduced?

- Constantly switching between static and dynamic images
- Avoiding excessive brightness differences between foreground and background elements
- Using colors with similar brightness
- Using complementary colors in consecutive images
- Using screensavers

7.3 Pixel errors

Information:

Displays may contain defective pixels (pixel errors) that result from the manufacturing process. They are not grounds for initiating a complaint or warranty claim.

7.4 Replacing a CFast card

Caution!

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

Improper handling of the ejection lever (e.g. using too much force) can result in a defective ejection mechanism.

The CFast card can be replaced quickly and easily by pressing the ejector (see image) with a pointed object such as a pen.

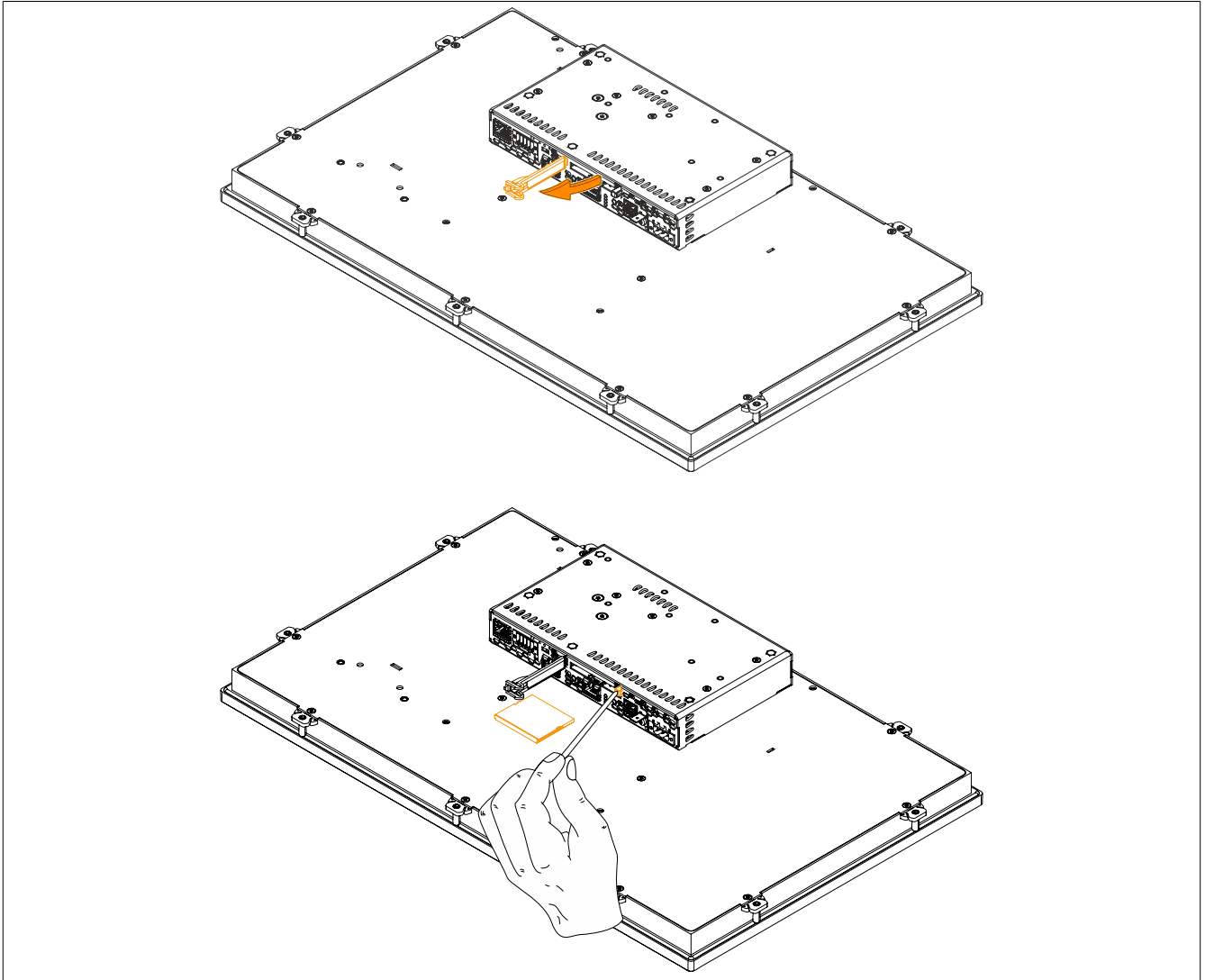


Figure 175: Replacing a CFast card

7.5 Repairs, complaints and replacement parts

Danger!

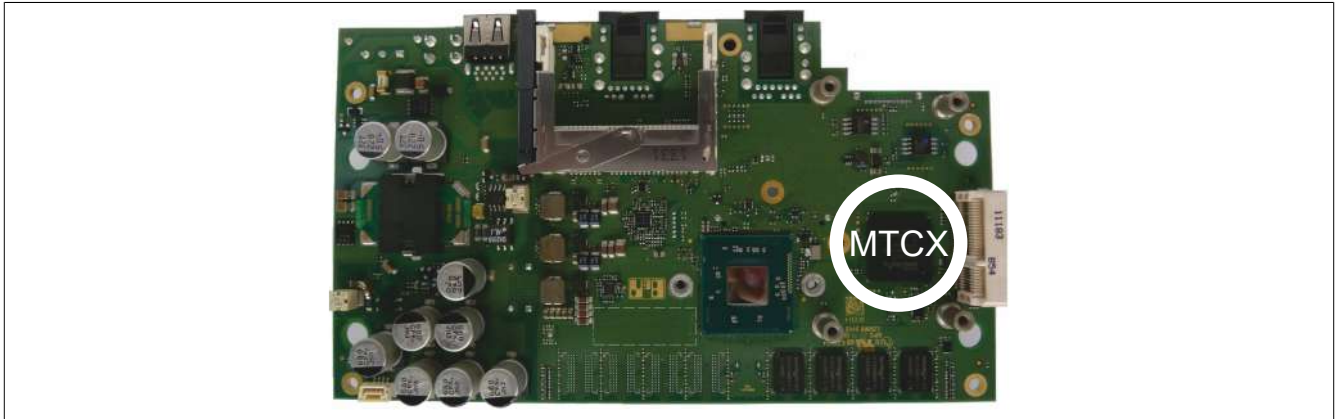
The unauthorized opening or repair of the device can result in injury and/or extensive damage to property. Therefore, do not attempt to perform repairs yourself. Repairs are only permitted to be performed by authorized qualified personnel at the place of manufacture.

To process a repair/complaint, please create a repair order or complaint using the B&R Material Return Portal on the B&R website at www.br-automation.com.

Appendix A

A.1 Maintenance Controller Extended (MTCX)

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



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

- Power on (power OK sequencing) and power failure logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring
- Fan control
- Key and LED handling/coordination (matrix keyboard of B&R panels)
- Advanced desktop operation (keys, USB redirection)
- Daisy chain display operation (touch screen, USB redirection)
- Panel locking mechanism (configurable using the B&R Control Center - ADI driver)
- Backlight control of a connected B&R display
- Calculation of statistical data (power cycles - every switch-on, power-on and fan hour is calculated, data is updated at 15-minute intervals)
- 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 based on the existing hardware.

The functions of the MTCX can be extended by upgrading its firmware⁵⁾. The version can be read in BIOS or with the B&R Control Center in approved Microsoft Windows operating systems.

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

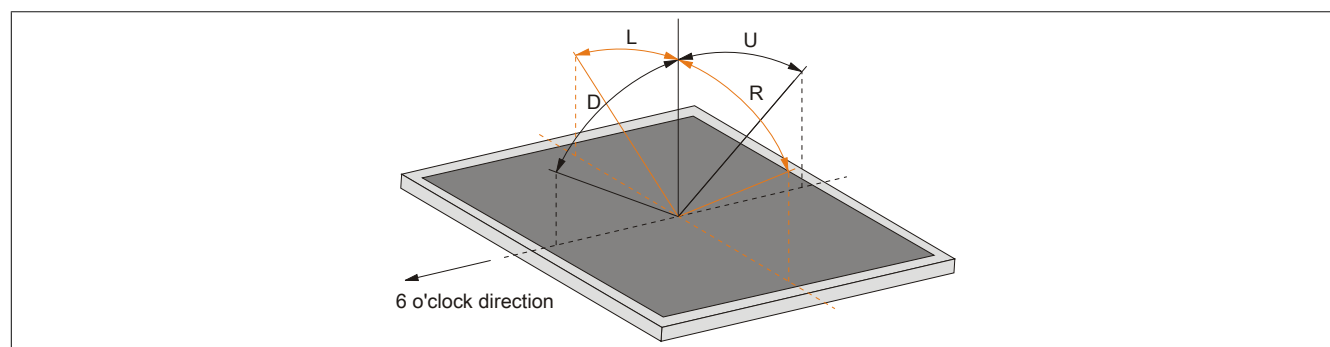
A.2 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	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	In technical data tables, this stands for a value that is not defined. This may be because a cable manufacturer does not provide a value for certain technical data, for example.
NO	Normally open	Normally open relay contact.
TBD	To be defined	Used in technical data tables when there is currently no value for specific technical data. The value will be provided at a later point in time.
B_{100}	-	Number of cycles before 10% of the components have experienced hazardous failure (per channel).
$MTTF_D$	Mean time to dangerous failure	Average time before hazardous failure occurs (per channel).
DC	Diagnostic coverage	Diagnostic coverage
PL	Performance level	Discrete level that specifies the ability of safety-related devices to perform a safety function under foreseeable conditions.
PFH	Probability of failure per hour	Probability of failure per hour.
SIL	Safety integrity level	Safety integrity level

Table 291: Abbreviations used in this user's manual

A.3 Viewing angles

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



A.4 Chemical resistance

AP1000 single-touch panels are manufactured with the Autotex panel overlay.

AP9x3 single-touch panels starting with the following revision are manufactured with the Autotex panel overlay:

- 5AP923.1215-00 ≥revision B8
- 5AP923.1505-00 ≥revision B8
- 5AP923.1906-00 ≥revision B8

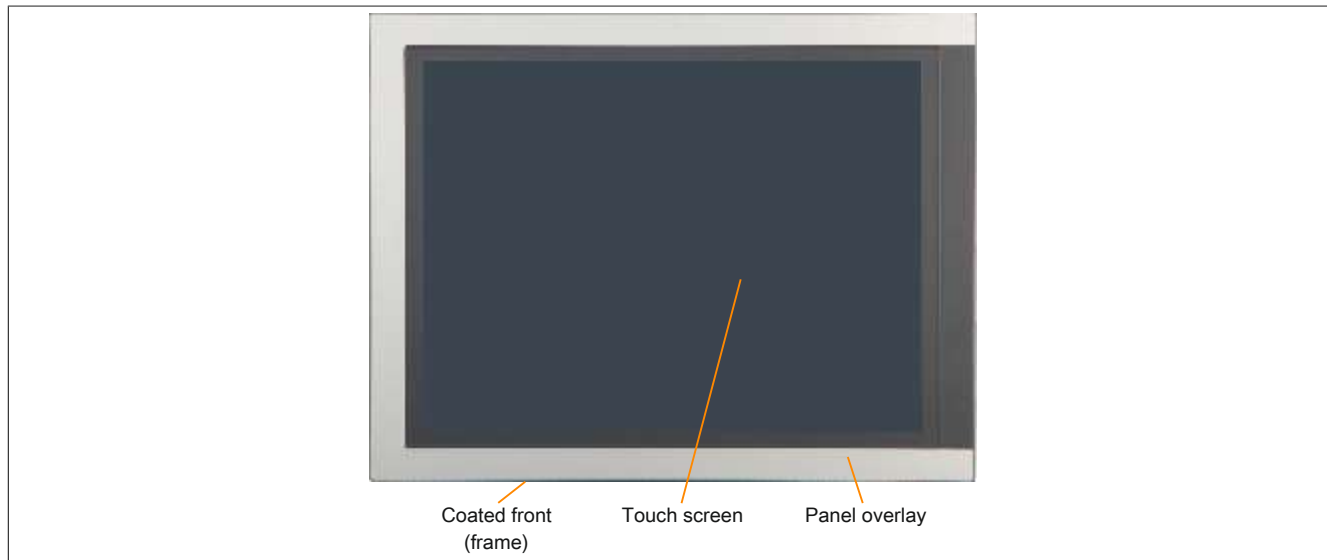


Figure 176: Single-touch display unit with Autotex panel overlay (sample screenshot)

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

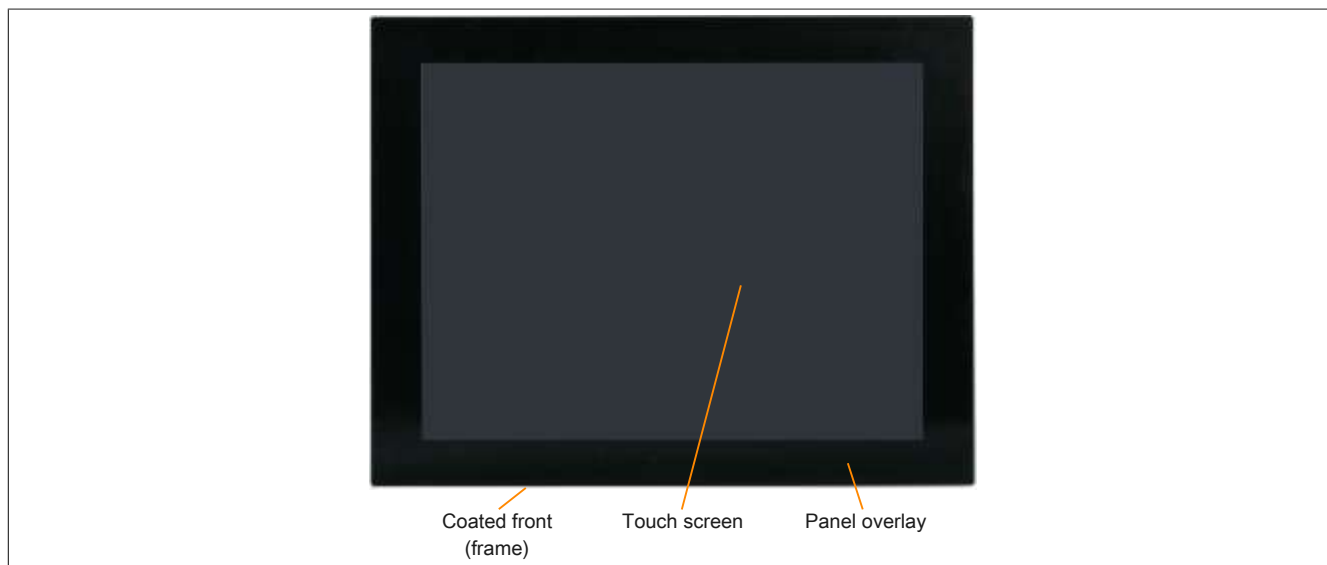


Figure 177: Single-touch display unit with aluminum panel overlay (sample screenshot)

AP9x3 and AP1000 multi-touch panels feature an edge-to-edge glass surface.

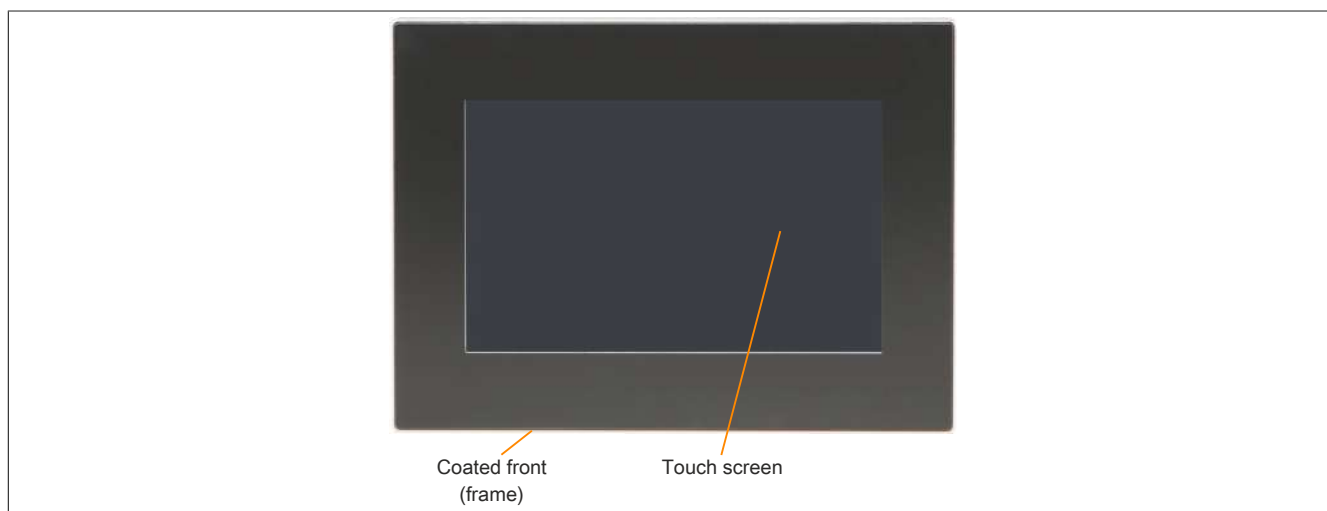


Figure 178: Multi-touch panel with glass surface (sample screenshot)

A.4.1 Autotex panel overlay (polyester)

Unless otherwise specified, the panel overlay is resistant to exposure to the following chemicals for up to 24 hours with no visible signs of damage per DIN 42115 Part 2:

- | | | |
|----------------------------|--------------------------------------|------------------------------|
| • Acetaldehyde | • Diethyl ether | • Caustic soda <40% |
| • Acetone | • Diethyl phthalate | • N-Butyl acetate |
| • Acetonitrile | • Dioxan | • Paraffin oil |
| • Aliphatic hydrocarbons | • Dowandol | • Phosphoric acid <30% |
| • Alkali carbonate | • DRM/PM | • Blown castor oil |
| • Formic acid <50% | • Iron chloride (FeCl ₂) | • Nitric acid <10% |
| • Ammonia <40% | • Iron chloride (FeCl ₃) | • Hydrochloric acid <36% |
| • Amyl acetate | • Acetic acid <50% | • Sea water |
| • Ethanol | • Ethyl acetate | • Sulphuric acid <10% |
| • Ether | • Linseed oil | • Silicon oil |
| • Gasoline | • Aviation fuel | • Tenside |
| • Bichromate | • Formaldehyde 37 to 42% | • Turpentine oil replacement |
| • Potassium | • Glycerine | • Toluene |
| • Cutting oil | • Glycol | • Triacetin |
| • Brake fluid | • Isophorone | • Trichloroacetic acid <50% |
| • Butylcellosolve | • Isopropanol | • Trichloroethane |
| • Sodium hypochlorite <20% | • Potassium hydroxide | • White spirits |
| • Cyclohexanol | • Potassium carbonate | • Washing agents |
| • Cyclohexanone | • Methanol | • Water |
| • Decon | • Methylisobutylketone | • Hydrogen peroxide <25% |
| • Diacetone alcohol | • MIBK | • Fabric conditioner |
| • Dibutyl phthalate | • Sodium bisulphate | • Xylene |
| • Diesel | • Sodium carbonate | |

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

A.4.2 Aluminum panel overlay

Unless otherwise specified, the panel overlay is resistant to exposure to the following chemicals for up to 24 hours with no visible signs of damage per DIN 42115 Part 2:

- | | | |
|--------------------------|--------------------------------------|------------------------------|
| • Acetaldehyde | • DRM/PM | • Methylbenzene |
| • Acetone | • Iron chloride | • Methyl ethyl ketone |
| • Acetonitrile | • Iron chloride (FeCl ₂) | • Methylisobutylketone |
| • Alkali carbonate | • Iron chloride (FeCl ₃) | • Sodium bisulphate |
| • Alkane | • Acetic acid <50% | • Sodium carbonate |
| • Formic acid <50% | • Butyl acetate | • Sodium hydroxide <40% |
| • Ammonia <40% | • Ethanol | • Sodium hypochlorite <20% |
| • Amyl acetate | • Ether | • Paraffin oil |
| • Gasoline | • Ethyl acetate | • Phosphoric acid <30% |
| • Bichromate | • 2-Butoxyethanol | • Phthalate |
| • Brake fluid | • Aviation fuel | • Nitric acid <10% |
| • Castor oil | • Formaldehyde 37 to 42% | • Sea water |
| • Hydrogen chloride <36% | • Transmission fluid | • Cutting oil |
| • Cyclohexanol | • Glycerine | • Sulphuric acid <10% |
| • Cyclohexanone | • Glycol | • Turpentine oil replacement |
| • Decon | • Isophorone | • Triacetin |
| • Diacetone alcohol | • Isopropanol | • Trichloroacetic acid <50% |
| • Diesel | • Potassium | • Trichloroethane |
| • Diethyl ether | • Potassium carbonate | • Washing agents |
| • Diethyl phthalate | • Potassium hydroxide | • Water |
| • Dimethylbenzene | • White spirit | • Hydrogen peroxide <25% |
| • Dioxan | • Linseed oil | • Fabric conditioner |
| • Dowandol | • Methanol | |

The panel overlay is not resistant to the following chemicals:

- | | | |
|-----------------------------|----------------------------------|-------------------|
| • Benzyl alcohol | • Concentrated caustic solution | • Tetrahydrofuran |
| • Dimethyl formamide | • High-pressure steam over 100°C | |
| • Concentrated mineral acid | • Methylene chloride | |

A.4.3 Coated aluminum front

Unless otherwise specified, the coated aluminum front is resistant to exposure to the following chemicals for up to 24 hours with no visible signs of damage per DIN 42115 Part 2:

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

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

- Acetone
- Ethyl acetate

A.4.4 Touch screen

AMT touch screen (single-touch)

Unless otherwise specified, the AMT touch screen is resistant to exposure to the following chemicals for up to 1 hour (at 25°C) with no visible changes:

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

3M touch screen (multi-touch)

Unless otherwise specified, the 3M touch screen is resistant to exposure to the following chemicals for up to 24 hours without visible changes per ASTM D 1308-02 and ASTM F 1598-95:

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

A.5 Touch screen

A.5.1 5-wire AMT touch screen (single-touch)

A.5.1.1 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Product ID	5-wire AMT touch screen
General information	
Certifications	
CE	Yes
c-UL-us	Yes
Manufacturer	AMT
Technology	Analog, resistive
Release pressure	<1 N
Light transmission	81% ±3%
Environmental 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
Operating conditions	
Service life	36 million touch operations at the same position (release pressure: 250 g, interval: 2x per second)
Activation	Finger, pointer, credit card, glove
Drivers	Touch screen drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

Table 292: 5-wire AMT touch screen - Technical data

A.5.1.2 Temperature/Humidity diagram

All values apply to non-condensing operation.

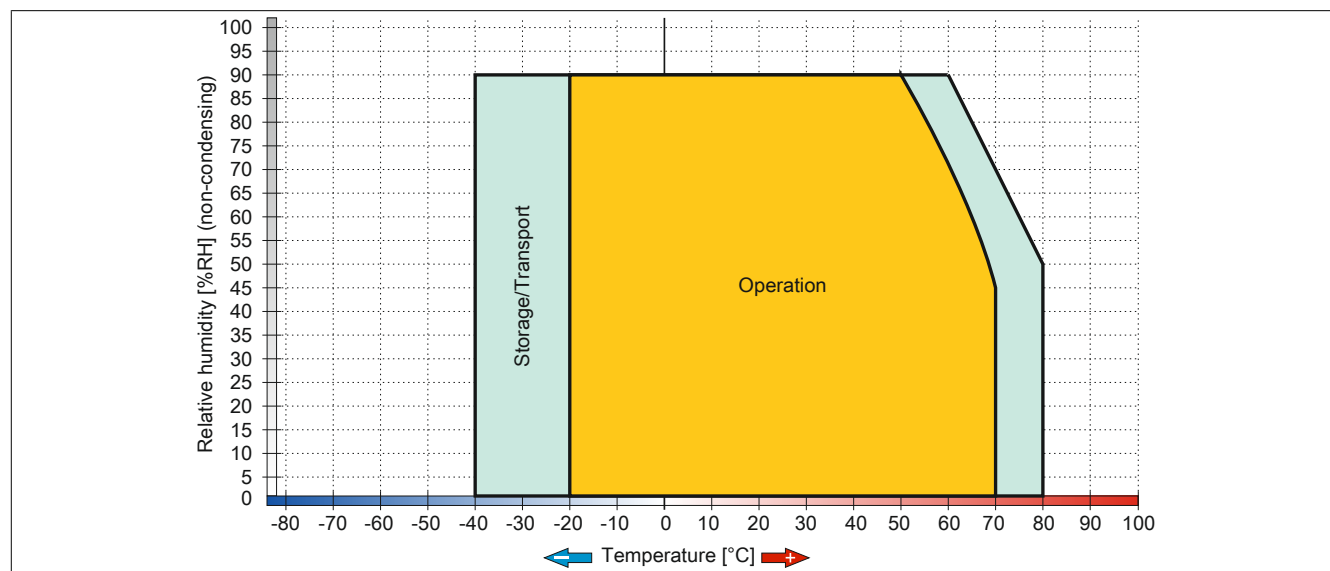


Figure 179: 5-wire AMT touch screen - Temperature/Humidity diagram

A.5.2 3M touch screen (multi-touch generation 2)

A.5.2.1 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.5.2.2 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Product ID	3M touch screen
General information	
Certifications CE	Yes
Manufacturer	3M
Technology	Projected capacitive touch (PCT)
Light transmission	88 ±2%
Anti-reflective coating	Chemical/Gloss = 70
Environmental 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
Operating conditions	
Activation	Finger, thin glove, 3M Smart Pen

Table 293: 3M touch screen - Technical data

A.5.2.3 Temperature/Humidity diagram

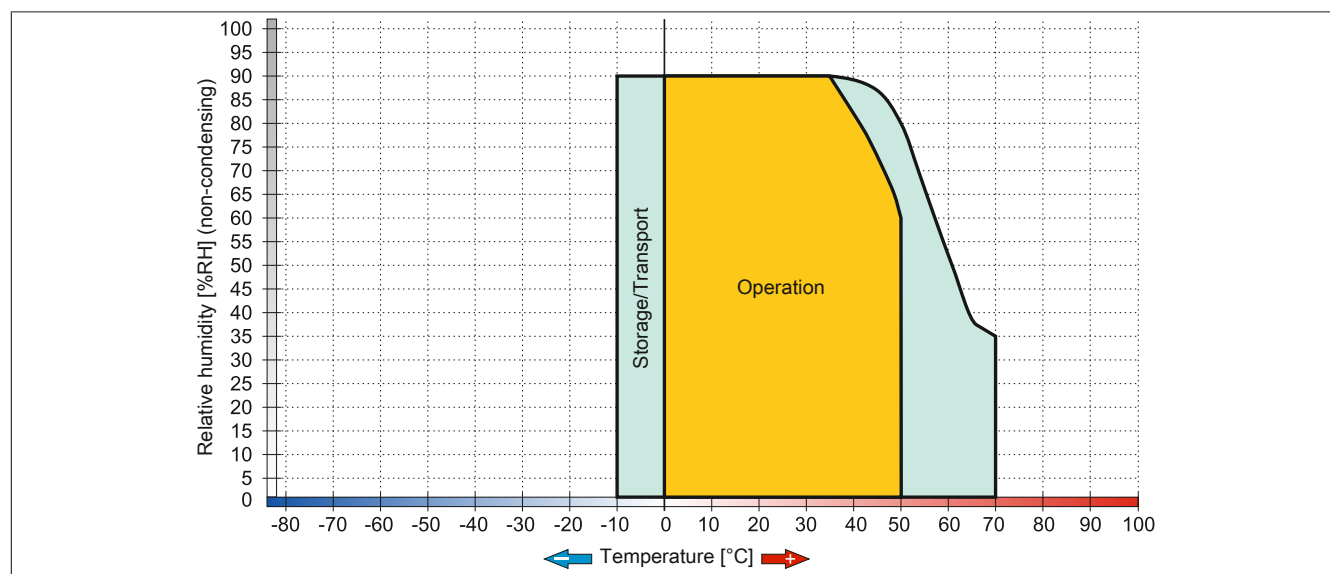


Figure 180: 3M touch screen - Temperature/Humidity diagram

A.5.3 3M touch screen (multi-touch generation 3)

A.5.3.1 General information

Valid for the following products:

- 5AP1130.0702-000
- 5AP1130.101E-000
- 5AP1130.121E-000
- 5AP1130.156C-000
- 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.5.3.2 Technical data

Information:

The following specifications, properties and limit values apply only to this individual component and may deviate from those that apply to the complete system. For the complete system in which this individual component is used, for example, the data specified for that complete system applies.

Product ID	3M touch screen
General information	
Certifications CE	Yes
Manufacturer	3M
Technology	Projected capacitive touch (PCT)
Light transmission	>90%
Anti-reflective coating	Optical/Gloss=80
Environmental 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, for >35°C see diagram
Storage	Up to 90% at max. 35°C, for >35°C see diagram
Transport	Up to 90% at max. 35°C, for >35°C see diagram
Operating conditions	
Activation	Finger, thin glove, 3M Smart Pen

Table 294: 3M touch screen - Technical data

A.5.3.3 Temperature/Humidity diagram

All values apply to non-condensing operation/storage/transport.

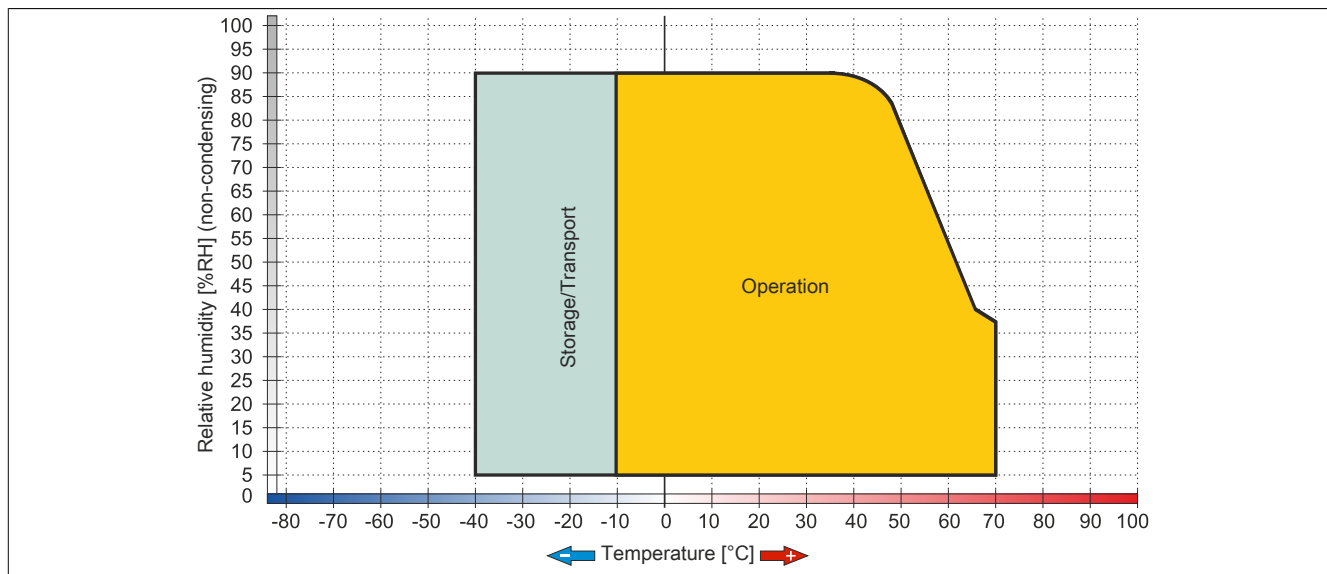


Figure 181: 3M touch screen - Temperature/Humidity diagram

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