

Panel PC 3100

panel mount device

User's manual

Version: **2.00 (November 2019)**
Model no.: **MAPPC3100-ENG**

Translation of the original documentation

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1 Introduction

Information:

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

1.1 Manual history

Version	Date	Change
1.0	September 2018	- First official version - Updated section "Product information" on page 26. - Updated interface options "5AC901.I232-00" on page 147, "5ACCIF02.CANE-000" on page 171 and "5ACCIF02.FPLK-000" on page 175. - Updated sections "BIOS options" on page 222 and "RAID configuration" on page 271. - Updated sections "Windows 10 IoT Enterprise 2016 LTSC" on page 282, "B&R Linux 9 (GNU/Linux)" on page 290, "Automation Runtime" on page 285, "B&R Hypervisor" on page 288 and "mapp Technology" on page 289. - Updated section "Installing the interface option and DDR4 SDRAM" on page 306.
2.00	November 2019	- Updated document. - Updated interface options "5ACCIF02.FPLS-000" on page 178, "5ACCIF02.FPSC-000" on page 182 and "5ACCIF02.ISS0-000" on page 187. - Updated section "BIOS options" on page 222. - Updated section "System units - Block diagram" on page 27.

1.2 Information about this document

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

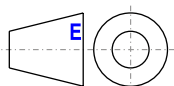
1.2.1 Organization of safety notices

Safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Failure to observe these safety guidelines and notices can result in death, severe injury or substantial damage to property.
Warning!	Failure to observe these safety guidelines and notices can result in severe injury or substantial damage to property.
Caution!	Failure to observe these safety guidelines and notices can result in injury or damage to property.
Information:	These instructions are important for avoiding malfunctions.

Table 1: Description of the safety notices used in this documentation

1.2.2 Guidelines



European dimension standards apply to all dimension diagrams.

All dimensions in mm.

Unless otherwise specified, the following general tolerances apply:

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

Table 2: Nominal dimension ranges

2 General safety guidelines

2.1 Intended use

Programmable logic controllers, operating and monitoring devices (such as industrial PCs, Power Panels, Mobile Panels, etc.) as well as uninterruptible power supplies from B&R have been designed, developed and manufactured for normal use in industry. They have not been designed, developed and manufactured for use that involves fatal risks or hazards that could result in death, injury, serious physical harm or other loss without the assurance of exceptionally stringent safety precautions. In particular, this includes the use of these systems to monitor nuclear reactions in nuclear power plants, flight control systems, air traffic control, the control of mass transport vehicles, medical life support systems and the control of weapon systems.

2.2 Protection against electrostatic discharge

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

2.2.1 Packaging

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

2.2.2 Regulations for proper ESD handling

Electrical assemblies with housing

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

Electrical assemblies without housing

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

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

Individual components

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

2.3 Regulations and measures

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

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

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

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

2.4 Transport and storage

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

2.5 Installation

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

2.6 Operation

2.6.1 Protection against contact with electrical parts

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

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

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

2.6.2 Ambient conditions - Dust, moisture, aggressive gases

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

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

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

2.6.3 Programs, viruses and malicious programs

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

2.7 Security concept

B&R products communicate via a network interface and were developed for integration into a secure network. The network and B&R products are affected by the following hazards (not a complete list):

- Unauthorized access
- Digital intrusion
- Data leakage
- Data theft
- A variety of other types of IT security breaches

It is the responsibility of the operator to provide and maintain a secure connection between B&R products and the internal network as well as other networks, such as the Internet, if necessary. The following measures and security solutions are suitable for this purpose:

- Segmentation of the network (e.g. separation of the IT and OT networks)
- Firewalls for the secure connection of network segments
- Implementation of a security-optimized user account and password concept
- Intrusion prevention and authentication systems
- Endpoint security solutions with modules for anti-malware, data leakage prevention, etc.
- Data encryption

It is the responsibility of the operator to take appropriate measures and to implement effective security solutions.

B&R Industrial Automation GmbH and its subsidiaries are not liable for damages and/or losses resulting from, for example, IT security breaches, unauthorized access, digital intrusion, data leakage and/or data theft.

Before B&R releases products or updates, they are subjected to appropriate functional testing. Independently of this, the development of customized test processes is recommended in order to be able to check the effects of changes in advance. Such changes include, for example:

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

These tests should ensure that implemented security measures remain effective and that systems behave as expected.

3 System overview

3.1 Information about this user's manual

This user's manual contains all the necessary information for a functioning Panel PC 3100 panel mount device.

Information:

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

3.2 Scalable Panel PCs

Whereas the Automation PC 3100 is designed to control remote panels, the Panel PC 3100 combines a CPU and panel into a single device. The CPU can be combined with any Automation Panel cabinet-mounted devices with a diagonal of 10.1" or larger.

3.3 Maximum flexibility through modularity

The Panel PC 3100 includes a wide range of modular interface options. Two slots are available to operate various interface cards for serial interfaces, Ethernet, CAN and POWERLINK; a UPS option and audio are also available. Two CFast data storage media with capacity up to 256 GB provide substantial disk space in a compact format.

3.4 Broad performance spectrum

Processors are based on Intel's Core-i technology. They can be scaled over a very wide range, from Celeron to Core i7. This allows the processing power to be adapted exactly to the respective application. All variants are fanless, which means that the Panel PC 3100 has no rotating parts at all. Maintenance tasks such as replacing air filters are therefore not necessary. The amount of memory is also scalable from 4 to 32 GB. This allows this PC generation to also handle extremely demanding applications.

3.5 Features

- Intel Core-i processor technology
- Powerful Intel HD graphics
- 2x Gigabit Ethernet
- 4x USB 3.0
- 2x CFast slot
- Fanless operation
- TPM 2.0 security
- +24 VDC supply voltage
- Up to 32 GB main memory
- Compact design
- Onboard SDL/DVI
- 1x USB 2.0 for Technology Guard
- Battery-backed RTC
- 3x interface option slots
- Additional graphics options (DP/DVI/SDL/SDL4)

3.6 Description of individual modules

3.6.1 AP9x3 panels

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

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

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



3.6.2 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. Different display diagonals and touch screen technologies as well as panels with touch screen and keys are available.

Panels are installed using retaining clips or clamping blocks.

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



3.6.3 System units

System units consist of a CPU board and an aluminum housing. All interfaces and the main memory for the PPC3100 are integrated on the system units; interface options and CFast cards can also be connected. The main memory is built into the system unit and can be replaced or expanded.

If a system unit is installed on a panel, this results in a functional Panel PC 3100.

A system unit without a panel is not functional.



3.7 PPC3100 configuration

The following individual components are mandatory for operation as a Panel PC 3100:

- Panel (observe the minimum revision, see ["Requirements for panel functionality" on page 17](#))
- System unit
- Main memory
- CFast card for the operating system
- Operating system

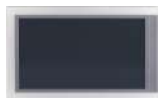
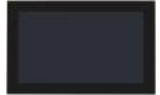
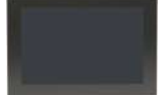
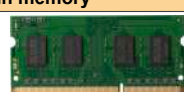
Base system - Configuration						
Panels	Select 1					
    	Diagonal	Resolution	Touch screen	Keys	Format	
	923 panels					
	5AP923.1215-00	12.1"	XGA	Single-touch	No	Landscape
	5AP923.1505-00	15.0"	XGA	Single-touch	No	Landscape
	5AP923.1906-00	19.0"	SXGA	Single-touch	No	Landscape
	933 panels					
	5AP933.156B-00	15.6"	HD	Multi-touch	No	Landscape
	5AP933.185B-00	18.5"	HD	Multi-touch	No	Landscape
	5AP933.215C-00	21.5"	FHD	Multi-touch	No	Landscape
	5AP933.240C-00	24.0"	FHD	Multi-touch	No	Landscape
	1120 panels					
	5AP1120.101E-000	10.1"	WXGA	Single-touch	No	Landscape
	5AP1120.1043-000	10.4"	VGA	Single-touch	No	Landscape
	5AP1120.1214-000	12.1"	SVGA	Single-touch	No	Landscape
	5AP1120.121E-000	12.1"	WXGA	Single-touch	No	Landscape
	5AP1120.1505-000	15.0"	XGA	Single-touch	No	Landscape
	5AP1120.156B-000	15.6"	HD	Single-touch	No	Landscape
	5AP1120.1906-000	19.0"	SXGA	Single-touch	No	Landscape
	1130 panels					
	5AP1130.101E-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
	1180 panels					
	5AP1180.1043-000	10.4"	VGA	Single-touch	Yes	Landscape
	5AP1180.1505-000	15.0"	XGA	Single-touch	Yes	Landscape
	1181 panels					
	5AP1181.1043-000	10.4"	VGA	Single-touch	Yes	Portrait
	5AP1181.1505-000	15.0"	XGA	Single-touch	Yes	Landscape
	1182 panels					
5AP1182.1043-000	10.4"	VGA	Single-touch	Yes	Landscape	
System units	Select 1					
	System unit	Processor	Processor - Clock frequency		Cores	
	5PPC3100.KBU0-000	Intel C-3965U	2200 MHz		2	
	5PPC3100.KBU1-000	Intel i3-7100U	2400 MHz		2	
	5PPC3100.KBU2-000	Intel i5-7300U	2600 MHz		2	
	5PPC3100.KBU3-000	Intel i7-7600U	2800 MHz		2	
Main memory	Select max. 2					
	5MMDDR.4096-04 5MMDDR.8192-04 5MMDDR.016G-04					
Mass storage devices	Select max. 2					
	CFast cards			Select max. 2		
	5CFAST.2048-00			5CFAST.032G-10		
	5CFAST.4096-00			5CFAST.064G-10		
	5CFAST.8192-00			5CFAST.128G-10		
	5CFAST.016G-00			5CFAST.256G-10		
	5CFAST.032G-00					

Table 3: PPC3100 configuration - Base system

Accessories and software - Configuration			
Covers		Select 1 each	
	Side covers¹⁾		
	5ACCF02.0000-001		
	Key cover²⁾		
	5ACCB02.0000-000 5ACCB02.0000-001		
Interfaces			
	Graphics option		Optional, select 1
	5ACCLI02.DPO0-000 5ACCLI02.SDL0-000 5ACCLI02.SD40-000		
	Interface options		Optional, select max. 2
	5AC901.I232-00	5AC901.IHDA-00	5ACCIF02.CANE-000
	5AC901.I485-00	5AC901.IPLK-00	5ACCIF02.FPLK-000
	5AC901.ICAN-00	5AC901.IRDY-00	5ACCIF02.FPLS-000
	5AC901.ICAN-01	5AC901.ISIO-00	5ACCIF02.FPSC-000
	5AC901.IETH-00	5AC901.ISRM-00	5ACCIF02.ISS0-000
	UPS³⁾		Optional, select 1 of each
	UPS module		Cables
	5AC901.IUPS-00	Battery unit	5CAUPS.0005-01
	5AC901.IUPS-01	5AC901.BUPS-00	5CAUPS.0010-01
		5AC901.BUPS-01	5CAUPS.0013-01 5CAUPS.0030-01
Accessories		Optional selection	
	5MMUSB.2048-01 5MMUSB.4096-01 5MMUSB.032G-02		
Terminal blocks		Select 1	
	Power supply connectors		
	0TB103.9		
	0TB103.91		
Operating systems		Select 1	
	Windows 10		Automation Runtime
	5SWW10.0654-MUL		1A4600.10-5
	5SWW10.0656-MUL		1A4601.06-5
	5SWW10.0754-MUL		1A4601.06-T
	5SWW10.0756-MUL		0TG1000.01
			0TG1000.02
		B&R Linux 9	
		5SWLIN.0754-MUL	
		5SWLIN.0756-MUL	

Table 4: PPC3100 configuration - Accessories and software

- 1) If no side cover is selected during device configuration, then side cover 5ACCF02.0000-001 (gray) is installed and delivered by default.
- 2) If no key cover is selected during device configuration, then key cover 5ACCB02.0000-000 (orange) is installed and delivered by default.
- 3) The UPS module can only be operated in the IF option 1 slot, and the battery unit compatible with the UPS module must be used.

3.7.1 Requirements for panel functionality

In order to ensure the functionality of panels with the Panel PC 3100, the following revision or later must be used:

AP1000 panels:

5AP1120.1043-000, Rev. E0 or later
5AP1120.101E-000, Rev. D0 or later
5AP1120.1214-000, Rev. E0 or later
5AP1120.121E-000, Rev. D0 or later
5AP1120.1505-000, Rev. E0 or later
5AP1120.156B-000, Rev. D0 or later
5AP1120.1906-000, Rev. E0 or later
5AP1130.101E-000, Rev. F0 or later
5AP1130.121E-000, Rev. F0 or later
5AP1130.156C-000, Rev. D0 or later
5AP1130.185C-000, Rev. D0 or later
5AP1180.1043-000, Rev. E0 or later
5AP1180.1505-000, Rev. E0 or later
5AP1181.1043-000, Rev. D0 or later
5AP1182.1043-000, Rev. D0 or later

AP9x3 panels:

5AP923.1215-00, Rev. E0 or later
5AP923.1505-00, Rev. F0 or later
5AP923.1906-00, Rev. F0 or later
5AP933.156B-00, Rev. G0 or later
5AP933.185B-00, Rev. G0 or later
5AP933.215C-00, Rev. G0 or later
5AP933.240C-00, Rev. G0 or later

3.8 Overview

Model number	Short description	Page
	Accessories	
0TB103.9	Connector 24 VDC - 3-pin female - Screw clamp terminal block 3.31 mm ²	315
0TB103.91	Connector 24 VDC - 3-pin female - Cage clamp terminal block 3.31 mm ²	315
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	301
	B&R Linux 9	
5SWLIN.0754-MUL	B&R Linux 9 - 64-bit - Multilingual - PPC3100 Kaby Lake (UEFI boot) - Installation (without Recovery DVD) - Only available with a new device	290
5SWLIN.0756-MUL	B&R Linux 9 - 64-bit - Multilingual - PPC3100 Kaby Lake (legacy boot) - Installation (without Recovery DVD) - Only available with a new device	290
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell	317
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	317
	CFast cards	
5CFAST.016G-00	CFast 16 GB SLC	133
5CFAST.032G-00	CFast 32 GB SLC	133
5CFAST.032G-10	CFast 32 GB MLC	137
5CFAST.064G-10	CFast 64 GB MLC	137
5CFAST.128G-10	CFast 128 GB MLC	137
5CFAST.2048-00	CFast 2 GB SLC	133
5CFAST.256G-10	CFast 256 GB MLC	137
5CFAST.4096-00	CFast 4 GB SLC	133
5CFAST.8192-00	CFast 8 GB SLC	133
	DVI cable	
5CADVI.0018-00	DVI-D cable - 1.8 m	341
5CADVI.0050-00	DVI-D cable - 5 m	341
5CADVI.0100-00	DVI-D cable - 10 m	341
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100	140
5ACCLI02.SD40-000	Graphics option - 1x SDL4 transmitter (max. 1920 x 1080) - For APC3100/PPC3100	145
5ACCLI02.SDL0-000	Graphics option - 1x SDL/DVI transmitter - For APC3100/PPC3100	142
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100	147
5AC901.I485-00	Interface card - 1x RS232/422/485 interface - For APC910/PPC900/APC3100/PPC3100	149
5AC901.ICAN-00	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100	152
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100	155
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100	168
5AC901.IHDA-00	Interface card - 1x audio interface (1x MIC / 1x Line In / 1x OUT) - For APC910/PPC900/APC3100/PPC3100	158
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100	162
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100	164
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100	166
5AC901.ISRM-00	Interface card - 2 MB RAM - For APC910/PPC900/APC3100/PPC3100	160
5ACCIF02.CANE-000	Interface card - 1x CAN interface (SJA1000) - 1x ETH 10/100/1000 - For APC3100/PPC3100	171
5ACCIF02.FPLK-000	Interface card - 1x POWERLINK interface - 2 MB SRAM - Integrated 2-port hub - Ring redundancy - POWERLINK managing or controlled node - PRC function - For APC3100/PPC3100	175
5ACCIF02.FPLS-000	Interface card - 2 MB SRAM - 1x RS232 interface - 1x POWERLINK interface - For APC3100/PPC3100	178
5ACCIF02.FPSC-000	Interface card - 2 MB SRAM - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 1x X2X - For APC3100/PPC3100	182
5ACCIF02.ISS0-000	Interface card - 2x RS232/RS422/RS485 interface - For APC3100/PPC3100	187
	Key covers	
5ACCB02.0000-000	PPC3100 key cover - Orange	207
5ACCB02.0000-001	PPC3100 key cover - Dark gray	207
	Main memory	
5MMDDR.016G-04	SO-DIMM DDR4, 16384 MB	130
5MMDDR.4096-04	SO-DIMM DDR4, 4096 MB	130
5MMDDR.8192-04	SO-DIMM DDR4, 8192 MB	130
	Panels	
5AP1120.101E-000	Automation Panel 10.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	88
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	85
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	90
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	93
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	95
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	98

Model number	Short description	Page
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	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	103
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	105
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	107
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	110
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	112
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	115
5AP1181.1043-000	Automation Panel 10.4" VGA TFT - 640 x 480 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Portrait format - Front USB - 38 function keys and 20 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules - Compatible with 5PP581.1043-00, 5AP981.1043-01, 5PC781.1043-00	118
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	121
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	124
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	65
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	67
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	70
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	73
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	76
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	79
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	82
RS232 cable		
9A0014.02	RS232 extension cable for operating a remote panel with touch screen, 1.8 m.	344
9A0014.05	RS232 extension cable for operating a remote panel with touch screen, 5 m.	344
9A0014.10	RS232 extension cable for operating a remote panel with touch screen, 10 m.	344
SDL cables		
5CASDL.0008-00	SDL cable - 0.8 m	326
5CASDL.0018-00	SDL cable - 1.8 m	326
5CASDL.0050-00	SDL cable - 5 m	326
5CASDL.0060-00	SDL cable - 6 m	326
5CASDL.0100-00	SDL cable - 10 m	326
5CASDL.0150-00	SDL cable - 15 m	326
5CASDL.0200-00	SDL cable - 20 m	326
5CASDL.0250-00	SDL cable - 25 m	326
5CASDL.0300-00	SDL cable - 30 m	326
SDL cables with 45° connector		
5CASDL.0018-01	SDL cable - 45-degree connector - 1.8 m	329
5CASDL.0050-01	SDL cable - 45-degree connector - 5 m	329
5CASDL.0100-01	SDL cable - 45-degree connector - 10 m	329
5CASDL.0150-01	SDL cable - 45-degree connector - 15 m	329
SDL flex cable		
5CASDL.0018-03	SDL flex cable - 1.8 m	332
5CASDL.0050-03	SDL flex cable - 5 m	332
5CASDL.0100-03	SDL flex cable - 10 m	332
5CASDL.0150-03	SDL flex cable - 15 m	332
5CASDL.0200-03	SDL flex cable - 20 m	332
5CASDL.0250-03	SDL flex cable - 25 m	332
5CASDL.0300-03	SDL flex cable - 30 m	332
SDL flex cables		
5CASDL.0300-13	SDL flex cable with extender - 30 m	336
5CASDL.0400-13	SDL flex cable with extender - 40 m	336
5CASDL.0430-13	SDL flex cable with extender - 43 m	336
SDL3/SDL4/PoE cables		
5CASD3.0030-00	SDL3/SDL4 cable - 3 m	323
5CASD3.0050-00	SDL3/SDL4 cable - 5 m	323
5CASD3.0100-00	SDL3/SDL4 cable - 10 m	323
5CASD3.0150-00	SDL3/SDL4 cable - 15 m	323
5CASD3.0200-00	SDL3/SDL4 cable - 20 m	323
5CASD3.0300-00	SDL3/SDL4 cable - 30 m	323

System overview

Model number	Short description	Page
5CASD3.0500-00	SDL3/SDL4 cable - 50 m	323
5CASD3.1000-00	SDL3/SDL4 cable - 100 m	323
Side covers		
5ACCF02.0000-001	PPC3100 side cover - Dark gray - Without logo	206
System units		
5PPC3100.KBU0-000	PPC3100 system unit - Intel Celeron 3965U 2.2 GHz - Dual core - For Automation Panel 923/933/1000	127
5PPC3100.KBU1-000	PPC3100 system unit - Intel Core i3 7100U 2.4 GHz - Dual core - For Automation Panel 923/933/1000	127
5PPC3100.KBU2-000	PPC3100 system unit - Intel Core i5 7300U 2.6 GHz - Dual core - For Automation Panel 923/933/1000	127
5PPC3100.KBU3-000	PPC3100 system unit - Intel Core i7 7600U 2.8 GHz - Dual core - For Automation Panel 923/933/1000	127
Technology Guard		
0TG1000.01	Technology Guard (MSD)	285
0TG1000.02	Technology Guard (HID)	285
1TG4600.10-5	Automation Runtime Windows TG license	285
1TG4601.06-5	Automation Runtime Embedded TG license	285
1TG4601.06-T	Automation Runtime Embedded Terminal TG license	285
Terminal blocks		
0TB2104.8000	Connector 24 VDC - 4-pin female - Screw clamp terminal block 2.5 mm ²	316
USB accessories		
5MMUSB.032G-02	USB 3.0 flash drive 32 GB MLC	321
5MMUSB.2048-01	USB 2.0 flash drive 2048 MB B&R	318
5MMUSB.4096-01	USB 2.0 flash drive 4096 MB B&R	318
USB cable		
5CAUSB.0018-00	USB 2.0 connection cable - Type A - type B connector - 1.8 m	346
5CAUSB.0050-00	USB 2.0 connection cable - Type A - type B connector - 5 m	346
Uninterruptible power supplies		
5AC901.BUPS-00	Battery unit 4.5 Ah - For UPS 5AC901.IUPS-00	196
5AC901.BUPS-01	Battery unit 2.2 Ah - For UPS 5AC901.IUPS-01	200
5AC901.IUPS-00	UPS - For 4.5 Ah battery	192
5AC901.IUPS-01	UPS - For 2.2 Ah battery	194
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	204
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	204
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	204
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	204
Windows 10 IoT Enterprise		
5SWW10.0654-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Value - Multilingual - PPC3100 Kaby Lake (UEFI boot) - License (without Recovery DVD) - Only available with a new device	282
5SWW10.0656-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - Value - Multilingual - PPC3100 Kaby Lake (legacy BIOS boot) - License (without Recovery DVD) - Only available with a new device	282
5SWW10.0754-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - High End - Multilingual - PPC3100 Kaby Lake (UEFI boot) - License (without Recovery DVD) - Only available with a new device	282
5SWW10.0756-MUL	Windows 10 IoT Enterprise 2016 LTSB - 64-bit - High End - Multilingual - PPC3100 Kaby Lake (legacy BIOS boot) - License (without Recovery DVD) - Only available with a new device	282

4 Technical data

4.1 Connection options

Additional Automation Panels can be connected directly to the Panel PC 3100 via the onboard DVI-D/SDL interface and an optional graphics option. The connection options described in the following provide an overview of the operating modes and possible limitations.

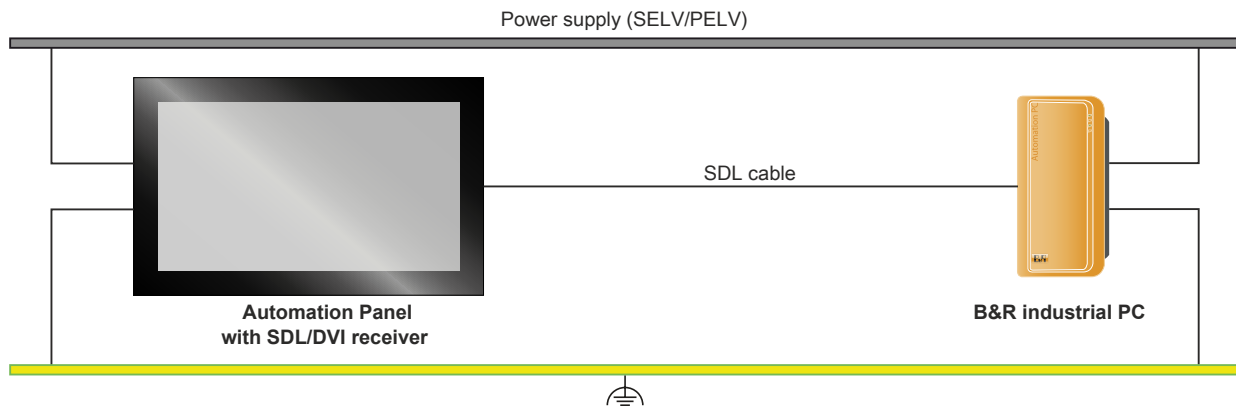
4.1.1 SDL operation

4.1.1.1 SDL operation without USB cable (mode 1)

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

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

The brightness of the display can be set via the B&R Control Center, for example.



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

Panel In	✓	USB In	✗	Power supply	✓	Brightness controls	✗
USB1, USB2	✓	USB 1.1	✓	COM interface for touch screen	✗	Grounding	✓

Requirements

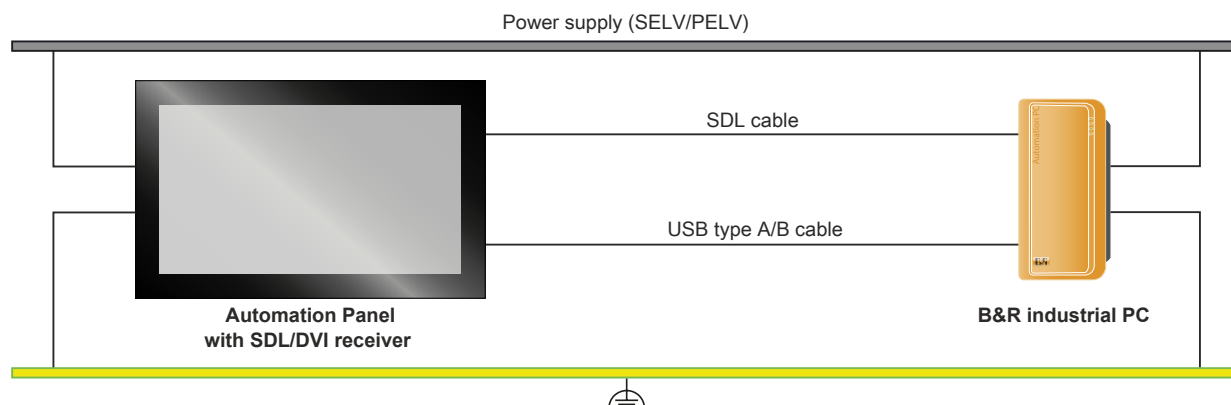
- Automation Panel with SDL/DVI receiver
- B&R industrial PC with SDL interface
- SDL cable

4.1.1.2 SDL operation with USB cable (mode 2)

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

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

The brightness of the display can be set via the B&R Control Center, for example.



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

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

Maximum cable length: 5 m

Requirements

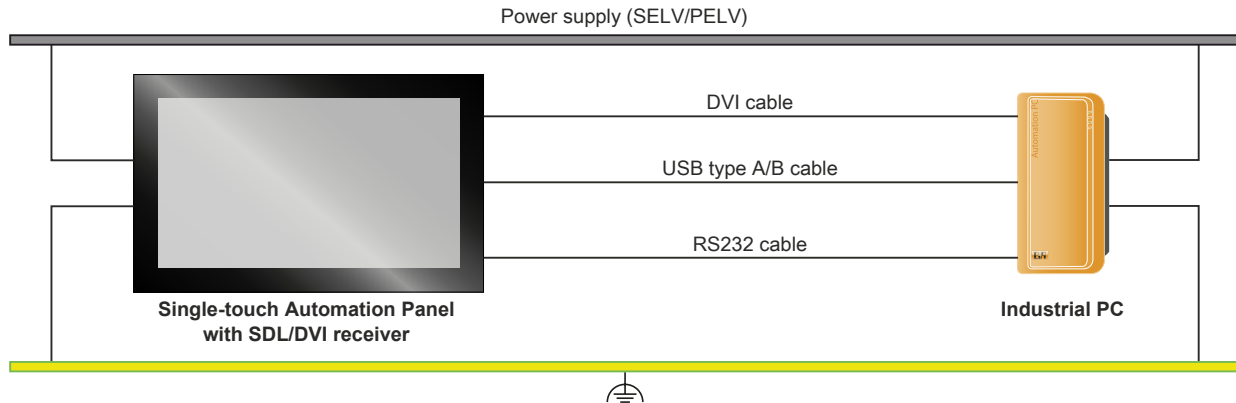
- Automation Panel with SDL/DVI receiver
- B&R industrial PC with SDL interface
- SDL cable, USB type A/B cable

4.1.2 DVI operation

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

4.1.2.1 DVI operation with single-touch Automation Panel

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



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

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

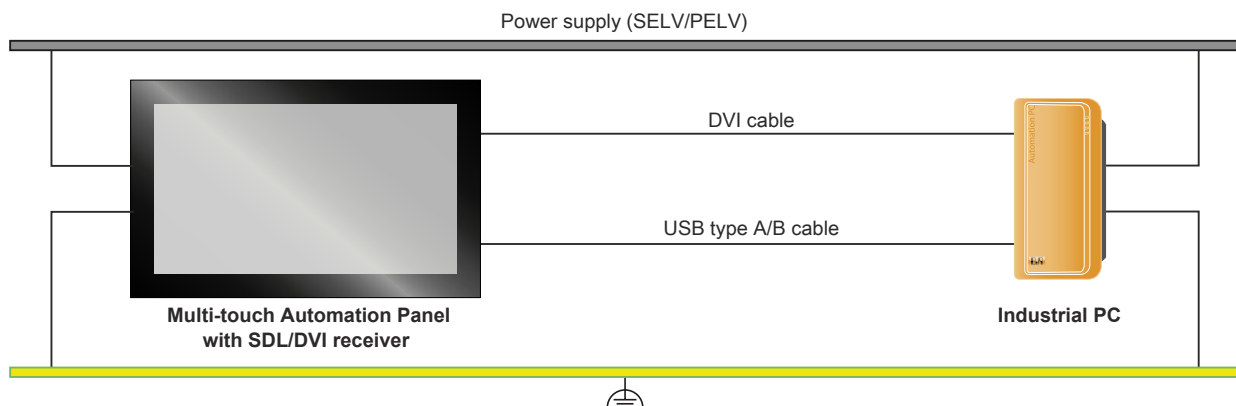
Maximum cable length: 5 m

Requirements

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

4.1.2.2 DVI operation with multi-touch Automation Panel

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



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

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

Maximum cable length: 5 m

Requirements

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

4.1.2.3 General limitations

- Key and LED data is not transferred.
- Service and diagnostic data is not transferred.
- Updating the firmware of Automation Panels is not possible.

4.1.3 SDL4 operation

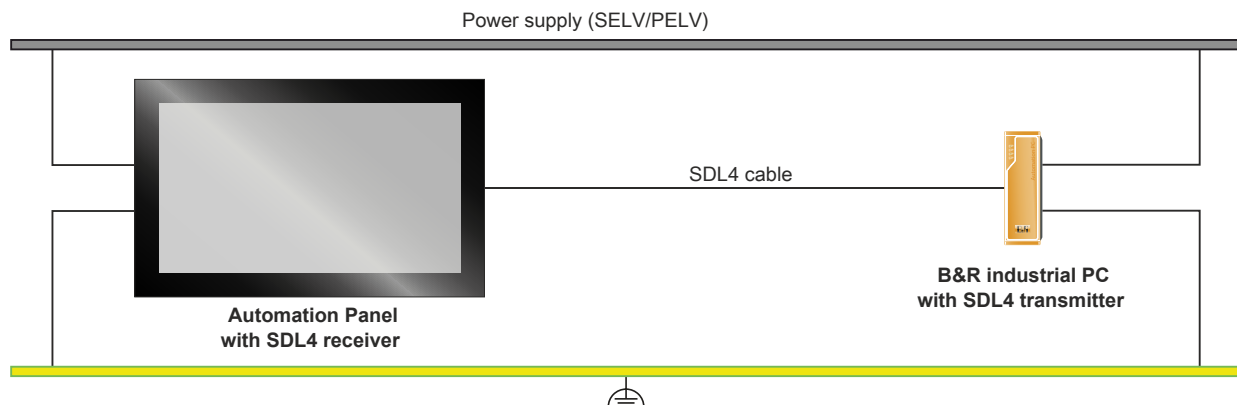
Smart Display Link 4 (SDL4) technology transfers all communication channels between a B&R industrial PC and panel up to 100 m over a standard Ethernet cable (min. Cat 6a). An RJ45 connector is used for the device connection, which is ideal for confined spaces in feed-throughs and swing arm systems.

4.1.3.1 SDL4 operation with SDL4 transmitter

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

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

The brightness of the display can be set via the B&R Control Center, for example.



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

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

Maximum cable length for SDL4: 100 m

Requirements

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

4.1.3.2 General limitations

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

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

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

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

4.2 Product information

Each B&R device is assigned a device number with a unique serial number and barcode (type 128) to enable unique identification of the device. The product information includes additional data such as product family, power data, certifications, safety notices, license adhesive labels and a field for customer information.

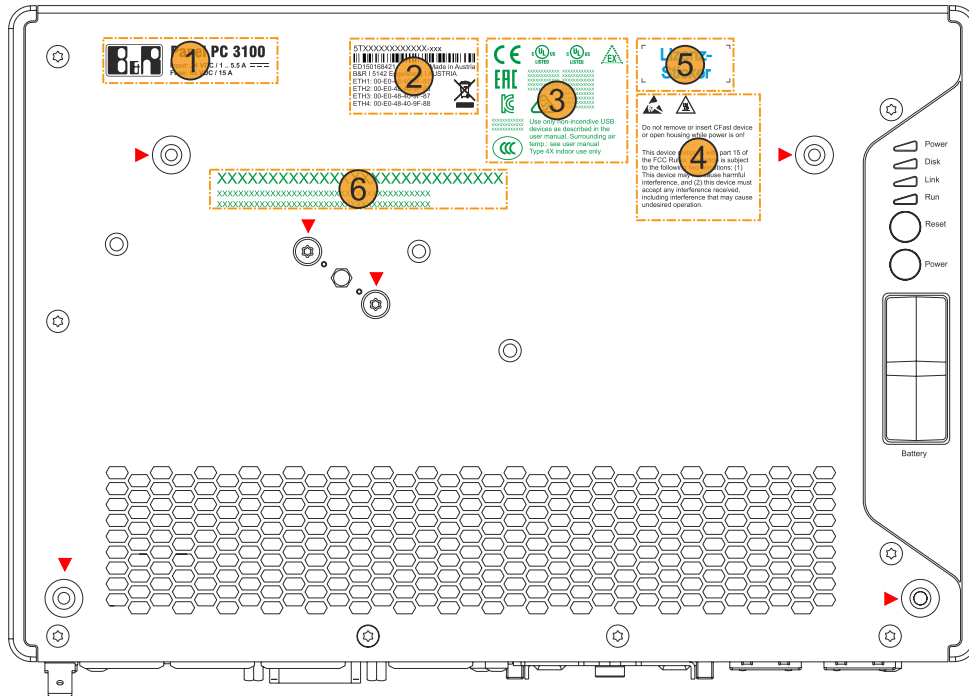


Figure 1: PPC3100 - Product information

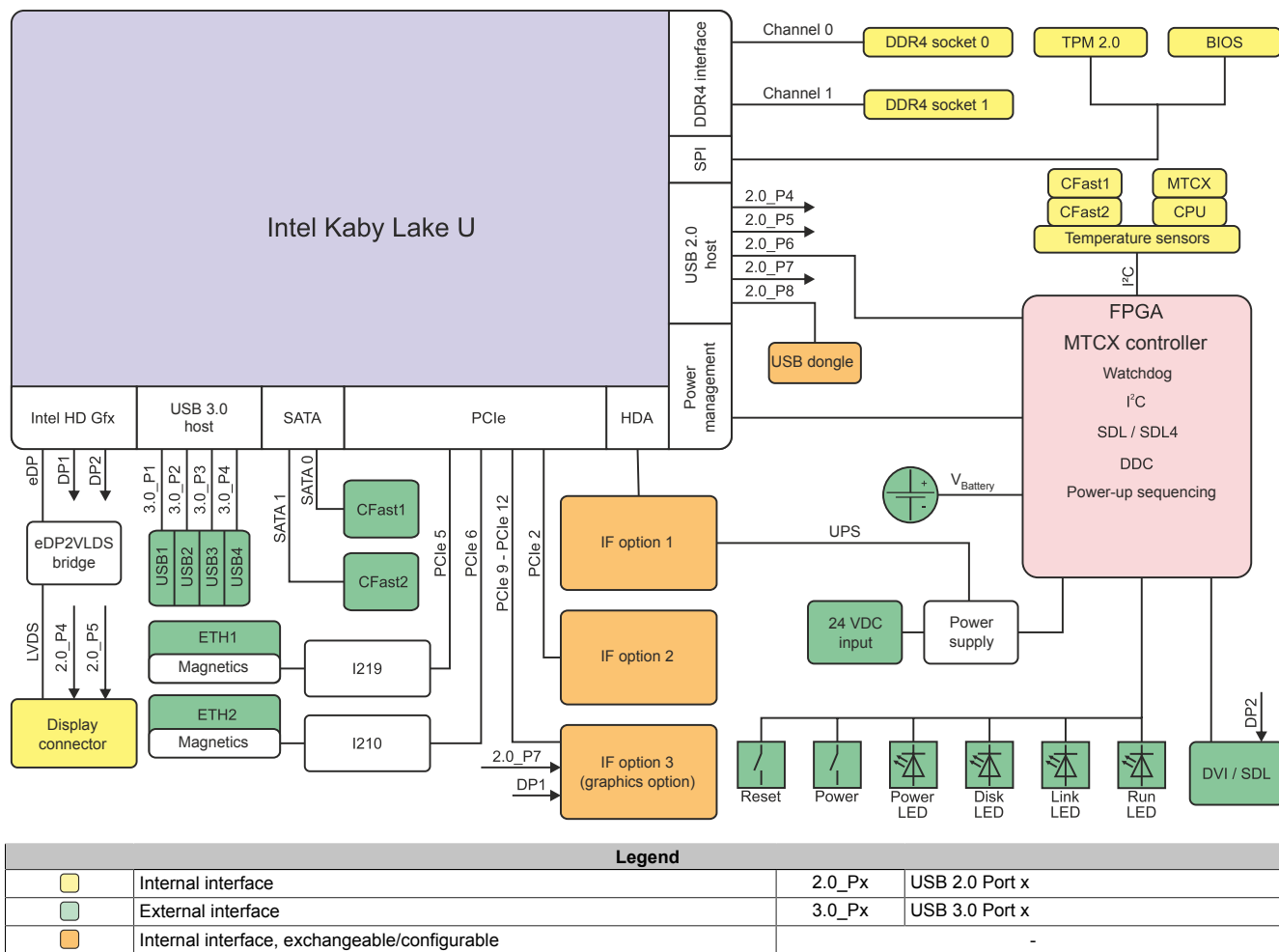
No.	Label	Explanation
1	Company logo, product family, power data	Contains the name of the product family, company logo and information about the power data of the device.
2	Identification	Contains the device number with unique serial number and barcode of the device, country of production, company address and MAC addresses of the installed Ethernet interfaces. The number of MAC addresses may vary depending on the configuration.
3	Certifications	Contains all standards and certifications valid for the complete system. These may vary depending on the device configuration.
4	Safety notices	Contains safety notices for the complete system. These may vary depending on the device configuration.
5	License adhesive label	The license adhesive label for operating systems depends on the selected operating system and is not available for all configurations.
6	Customer information	Space for possible customer information. This must be defined already during device configuration. Subsequently changing or adding this customer information is not possible.
▼	Installation markings	These holes are intended for installing/removing the panel PC on the panel.

All components installed in the system (serial number, material number, revision, delivery date and end of warranty) are indicated in the device number. This information can be retrieved from the B&R website (www.br-automation.com) with the device serial number. After the search, a detailed list of the installed components is displayed.

Identification	
1	The device number is shown here.
2	The serial number of the device is shown here.
(1) 5XXXXXXXXXXXX-xxx (2) ED150168421 Barcode Made in Austria B&R 5142 Eggelsberg AUSTRIA ETH1: 00-E0-48-40-9F-87 ETH2: 00-E0-48-40-9F-88 ETH3: 00-E0-48-40-9F-87 ETH4: 00-E0-48-40-9F-88 (symbolic image)	

4.3 Electrical properties

4.3.1 System units - Block diagram



4.3.2 Power calculation

In order to calculate the total power of the Panel PC 3100, the power rating of the system unit used must be added to the power rating of the graphics option; if an interface option or optional CFast card is connected, these power ratings must be added as well.

Information:

Unless otherwise stated, the following specified maximum values and additional consumers are not taken into account.

System units

Type	Model number	Total power consumption of the system unit
PPC3100 C-3965U 2C 2.1 GHz	5PPC3100.KBU0-000	19 W 39 W (with USB consumers)
PPC3100 i3-7100U 2C 2.4 GHz	5PPC3100.KBU1-000	20 W 40 W (with USB consumers)
PPC3100 i5-7300U 2C 2.6 GHz	5PPC3100.KBU2-000	23 W 43 W (with USB consumers)
PPC3100 i7-7600U 2C 2.8 GHz	5PPC3100.KBU3-000	23 W 43 W (with USB consumers)

AP9x3 panels

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
12.1" single-touch	5AP923.1215-00	-	4.2 W	7.2 W	11.4 W
15.0" single-touch	5AP923.1505-00	-	2.1 W	8.9 W	11 W
19.0" single-touch	5AP923.1906-00	5 W	-	22 W	27 W
15.6" multi-touch	5AP933.156B-00	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	4 W	-	15 W	19 W
24.0" multi-touch	5AP933.240C-00 ≥ C0	5 W	-	24.5 W	29.5 W

AP1000 panels

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
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

Graphics options

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
DisplayPort transmitter	5ACCLI02.DPO0-000	2.7 W	0.3 W	-	3 W
SDL/DVI transmitter	5ACCLI02.SDL0-000	0.25 W	0.75 W	-	1 W
SDL4 transmitter	5ACCLI02.SD40-000	2.5 W	2 W	-	4.5 W

Interface options

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
RS232 IF option	5AC901.I232-00	1 W	-	-	1 W
RS232/RS422/RS485 IF option	5AC901.I485-00	1 W	-	-	1 W
CAN IF option	5AC901.ICAN-00	1 W	-	-	1 W
CAN IF option	5AC901.ICAN-01	0.5 W	-	-	0.5 W
Audio IF option	5AC901.IHDA-00	0.2 W	0.2 W	-	0.4 W
Ready relay IF option	5AC901.IRDY-00	0.2 W	-	-	0.2 W
POWERLINK IF option	5AC901.IPLK-00	-	1.5 W	-	1.5 W
System I/O IF option	5AC901.ISIO-00	-	0.5 W	-	0.5 W
SRAM IF option	5AC901.ISRM-00	-	2 W	-	2 W
Gigabit Ethernet IF option	5AC901.IETH-00	-	1 W	-	1 W

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
Ethernet + CAN IF option	5ACCIF02.CANE-000	0.5 W	1 W	-	1.5 W
2x POWERLINK IF option	5ACCIF02.FPLK-000	-	2 W	-	2 W
SRAM POWERLINK RS232 IF option	5ACCIF02.FPLS-000	-	1.75 W	-	1.75 W
SRAM POWERLINK CAN X2X RS232 IF option	5ACCIF02.FPSC-000	0.6 W	1.4 W	-	2 W
2x RS232/RS422/RS485	5ACCIF02.ISS0-000	1.5 W	-	-	1.5 W

CFast cards

Type	Model number	+5 V	+3.3 V	+12 V	Total power consumption
SLC technology	5CFAST.xxxx-00	-	0.7 W read 0.7 W write 0.3 W idle	-	0.7 W read 0.7 W write 0.3 W idle
MLC technology	5CFAST.032G-10 5CFAST.064G-10	-	1.1 W read 1 W write 0.25 W idle	-	1.1 W read 1 W write 0.25 W idle
	5CFAST.128G-10	-	1.1 W read 1.4 W write 0.25 W idle	-	1.1 W read 1.4 W write 0.25 W idle
	5CFAST.256G-10	-	1.2 W read 1.9 W write 0.25 W idle	-	1.2 W read 1.9 W write 0.25 W idle

4.3.2.1 Calculation examples

12" panel 5AP1120.1214-000	1.9 W + 7.0 W	8.9 W
System unit 5PPC3100.KBU1-000	40 W (with USB consumers)	40 W
CFast card 5CFAST.128G-10	1.4 W (write)	1.4 W
Total max.:		50.3 W

Table 5: Power calculation with example configuration 1

10.1" panel 5AP1130.101E-000	1.0 W + 1.0 W + 5.8 W	7.8 W
System unit 5PPC3100.KBU3-000	43 W (with USB consumers)	43 W
Audio IF option 5AC901.IHDA-00	0.2 W + 0.2 W	0.4 W
Ethernet + CAN IF option 5ACCIF02.CANE-000	0.5 W + 1 W	1.5 W
Graphics option 5ACCLI01.SD40-000	2.5 W + 2 W	4.5 W
2x CFast card 5CFAST.256G-10	2x 1.9 W (write)	3.8 W
Total max.:		61.0 W

Table 6: Power calculation with example configuration 2

4.4 Mechanical properties

4.4.1 Dimensions

Information:

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

The following diagrams are symbolic and only meant to illustrate how the dimension tables should be read.

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

AP9x3 panels

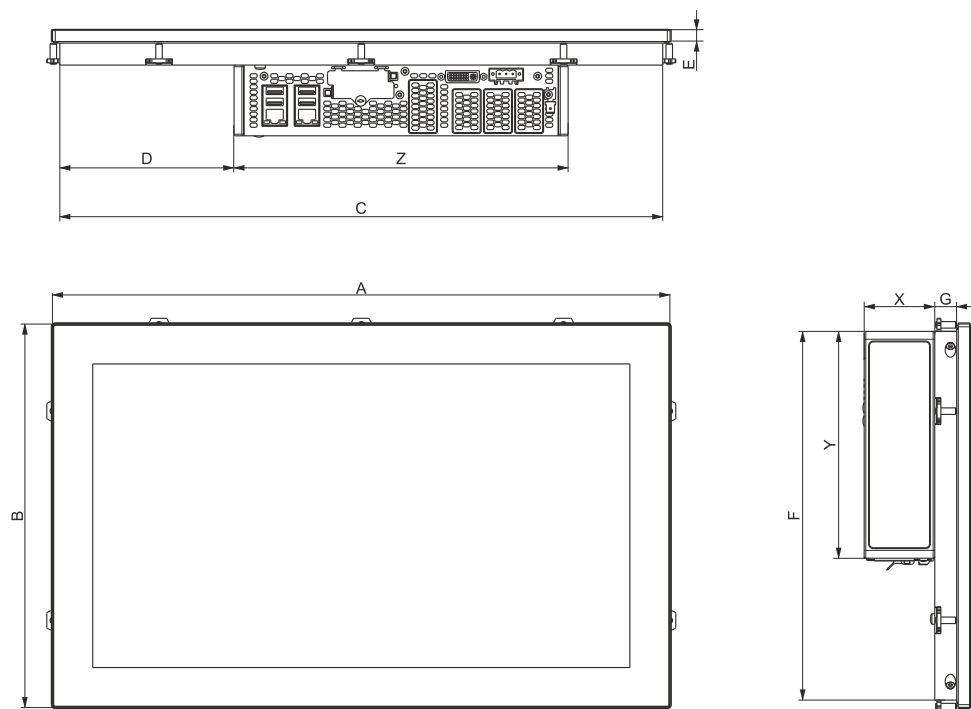


Figure 2: Panel PC 3100 with AP9x3 panels - Dimensions

Panels									
AP9x3	Model number	A	B	C	D	E	F	G	Revision
12.1" single-touch	5AP923.1215-00	315	239	302	15	9	226	13.5	-
15.0" single-touch	5AP923.1505-00	370	288	357	51.5	9	275	14.5	
19.0" single-touch	5AP923.1906-00	440	358	427	116	9	345	23	Up to Rev. E0
								14.5	Rev. F0 and later
15.6" multi-touch	5AP933.156B-00	414	258.5	401	72.5	9	245.5	20	Up to Rev. C0
								18	Rev. D0 and later
18.5" multi-touch	5AP933.185B-00	475	295	462	133.5	9	282	18	-
21.5" multi-touch	5AP933.215C-00	541.5	333	528.5	166.75	9	320	18	
24.0" multi-touch	5AP933.240C-00	598.5	364	585.5	195.25	9	351	18	
Components									
Type	Model number	X	Y	Z					
System units	5PPC3100.KBUx-000	54	173.5	256					

AP1000 panels with retaining clips

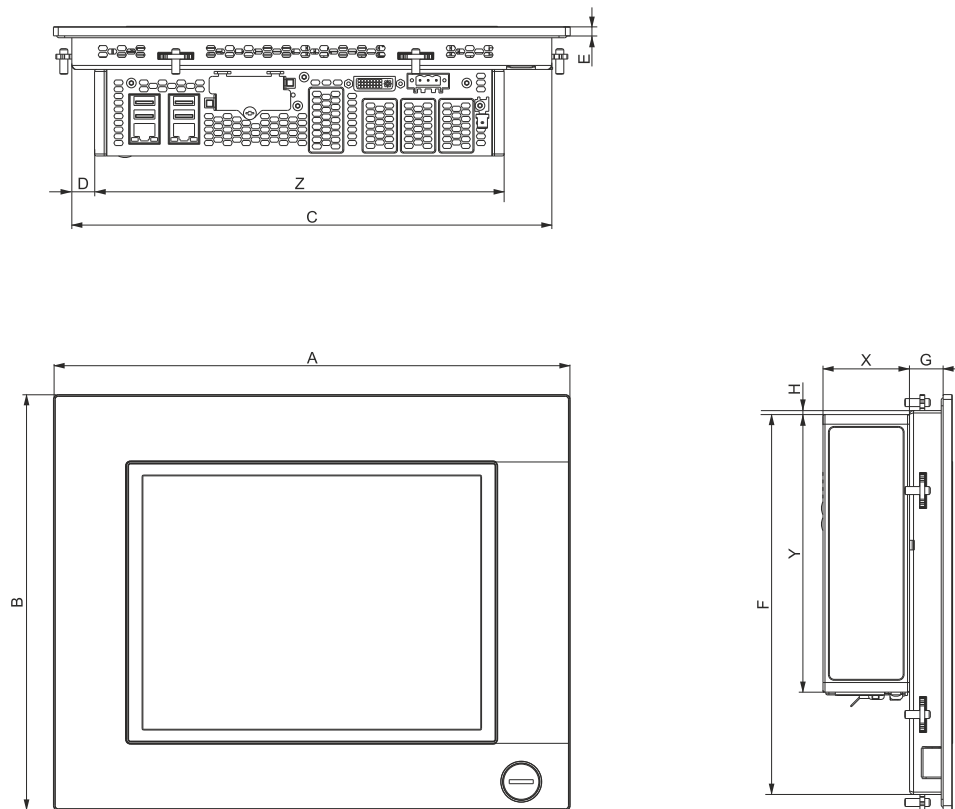


Figure 3: Panel PC 3100 with AP1000 panels with retaining clips - Dimensions

Panels										
AP1000	Model number	A	B	C	D	E	F	G	H	Revision
10.1" single-touch	5AP1120.101E-000	279	191	266	5	9	178	18	0	-
10.1" multi-touch	5AP1130.101E-000	279	191	266	5	9	178	18	0	
10.4" single-touch	5AP1120.1043-000	323	260	300	14.2	5.7	240	21	2.5	
10.4" single-touch with keys	5AP1180.1043-000	323	260	300	14.2	5.7	240	21	2.5	
12.1" single-touch	5AP1120.121E-000	324	221.5	311	27.5	9	208.5	18	0	
12.1" multi-touch	5AP1130.121E-000	324	221.5	311	27.5	9	208.5	18	0	
15.6" single-touch	5AP1120.156B-000	414	258.5	401	72.5	9	245.5	20 14.5	0	Up to Rev. C0
15.6" multi-touch	5AP1130.156C-000	414	258.5	401	72.5	9	245.5	18	0	Rev. D0 and later
18.5" multi-touch	5AP1130.185C-000	475	295	462	133.5	9	282	18	0	-
Components										
Type	Model number	X	Y	Z						
System units	5PPC3100.KBUx-000	54	173.5	256						

AP1000 panels with clamping blocks

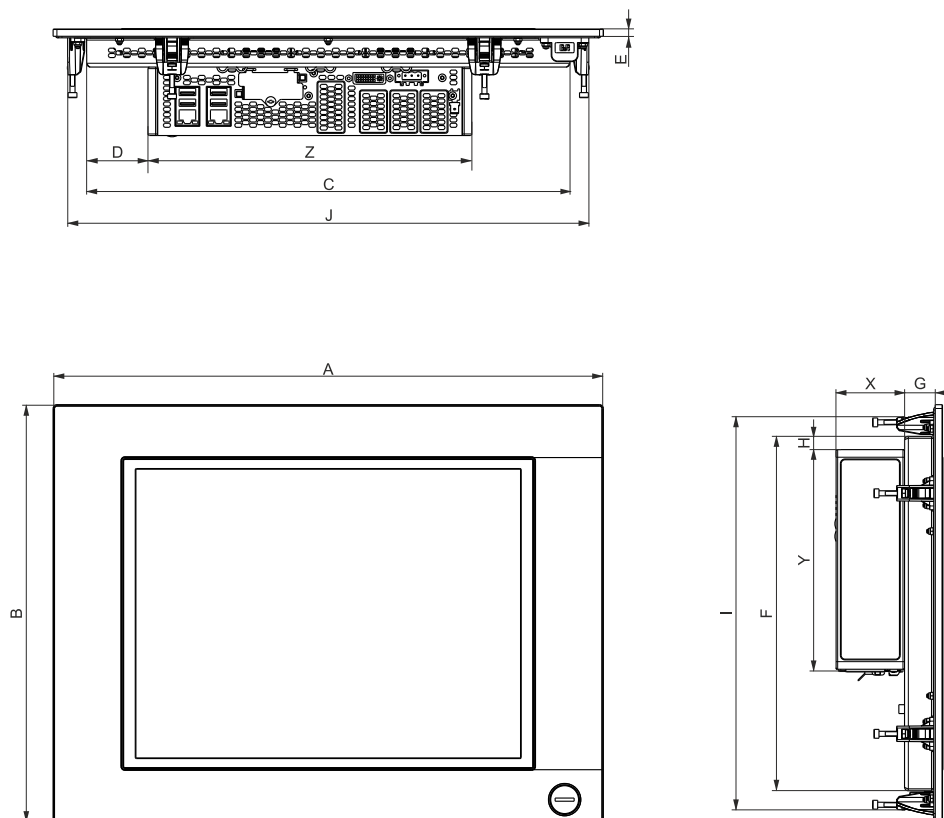


Figure 4: Panel PC 3100 with AP1000 panels with clamping blocks - Dimensions

Panels											
AP1000	Model number	A	B	C	D	E	F	G	H	I	J
10.4" single-touch with keys	5AP1181.1043-000	323	358	270	37.5	5.7	305	21.3	4	338	300
10.4" single-touch with keys	5AP1182.1043-000	423	288	355.5	37.5	5.7	234	21.3	4	268	400
12.1" single-touch	5AP1120.1214-000	362	284	309	19.5	5.7	234	20.3	4	264	339
15.0" single-touch	5AP1120.1505-000	435	330	382	48.5	5.7	280	24.3	10.5	310	412
15.0" single-touch with keys	5AP1180.1505-000	435	330	382	48.5	5.7	280	24.3	10.5	310	412
15.0" single-touch with keys	5AP1181.1505-000	435	430	382	48.5	5.7	280	24.3	24	410	412
19.0" single-touch	5AP1120.1906-000	527	421	445	153.5	5.7	351	23.3	5.8	401	507
Components											
Type	Model number	X	Y	Z							
System units	5PPC3100.KBUx-000	54	173.5	256							

4.4.2 Installation diagrams

Information:

When installing the Panel PC 3100, spacing for air circulation and additional free space for operating and servicing the device must be taken into account.

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

AP9x3 panels

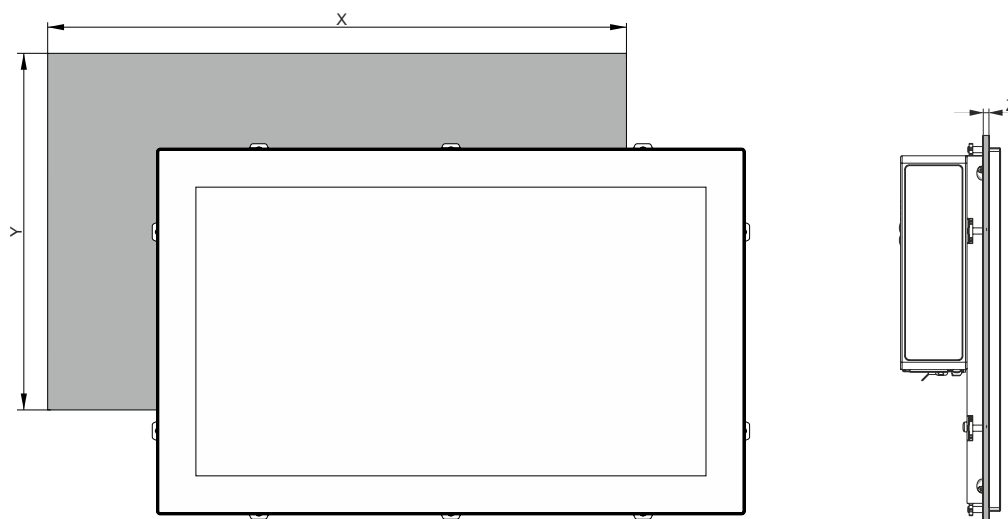


Figure 5: Panel PC 3100 with AP9x3 panels - Installation diagram

AP9x3	Model number	Panels		Z min.	Z max.	Number of retaining clips
		X	Y			
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.

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

A 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.

AP1000 panels with retaining clips

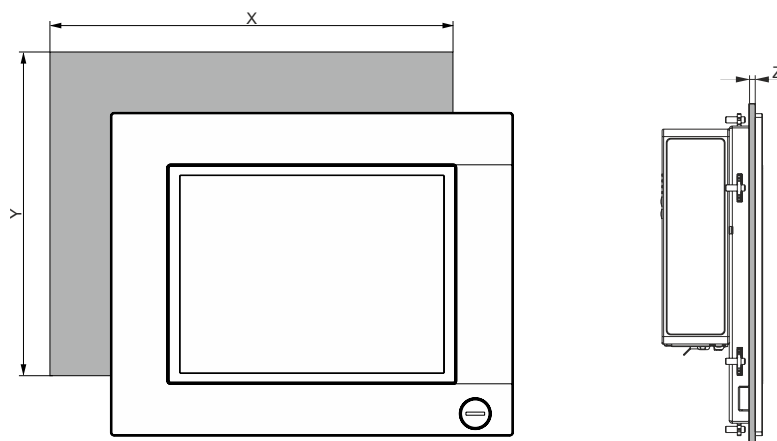


Figure 6: Panel PC 3100 with AP1000 panels with retaining clips - Installation diagram

AP1000	Model number	Panels				
		X	Y	Z min.	Z max.	Number of retaining clips
10.1" single-touch	5AP1120.101E-000	268	180	1	6	10
10.1" multi-touch	5AP1130.101E-000	268	180	1	6	10
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

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

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

Information:

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

AP1000 panels with clamping blocks

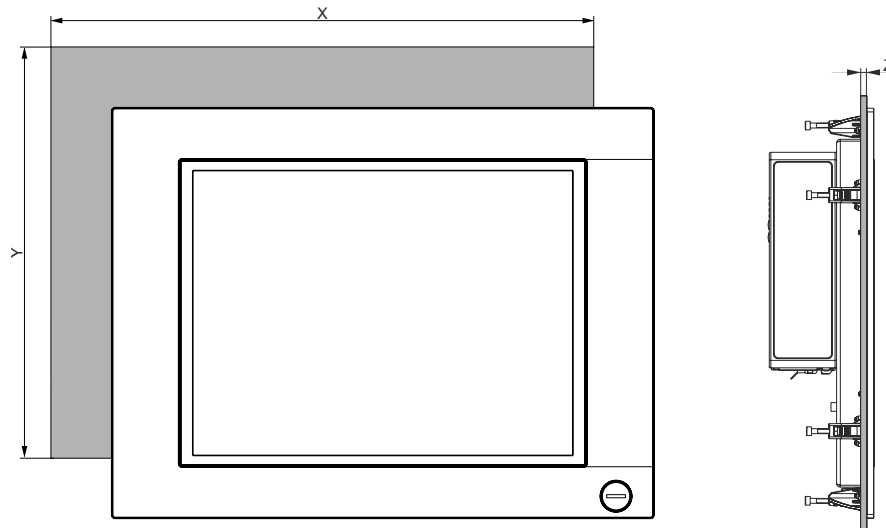


Figure 7: Panel PC 3100 with AP1000 panels with clamping blocks - Installation diagram

AP1000	Model number	Panels					Number of clamping blocks
		X	Y	Z min.	Z max.		
10.4" single-touch with keys	5AP1181.1043-000	303	341	2	10		10
10.4" single-touch with keys	5AP1182.1043-000	403	271	2	10		8
12.1" single-touch	5AP1120.1214-000	342	267	2	10		8
15.0" single-touch	5AP1120.1505-000	415	313	2	10		8
15.0" single-touch with keys	5AP1180.1505-000	415	313	2	10		8
15.0" single-touch with keys	5AP1181.1505-000	415	413	2	10		10
19.0" single-touch	5AP1120.1906-000	510	404	2	10		12

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

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

4.4.3 Spacing for air circulation

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

Information:

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

The air inlet and air outlet are shown in the following figure.

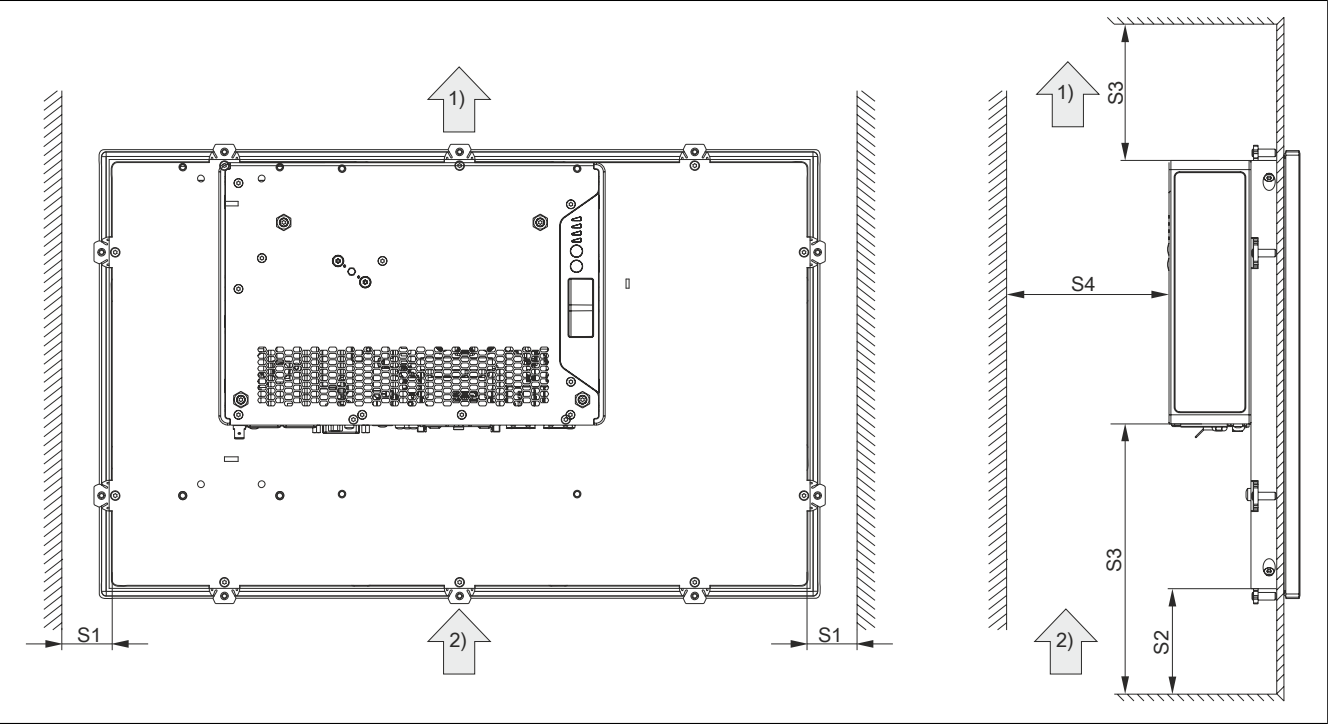


Figure 8: PPC3100 - Spacing for air circulation

Legend			
1)	Air outlet	2)	Air inlet
Description	Dimension	Description	Dimension
S1	≥ 20	S2	≥ 50
S3	≥ 100	S4	≥ 50

Caution!

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

If the specified spacing for air circulation cannot be maintained, the maximum specified temperatures of the temperature sensors (see ["Temperature sensor position" on page 45](#)) must be monitored by the user and appropriate measures taken if these values are exceeded.

4.4.4 Mounting orientations

The following diagrams show the specified mounting orientations of Panel PC 3100 devices. These are only permitted to be installed as specified below.

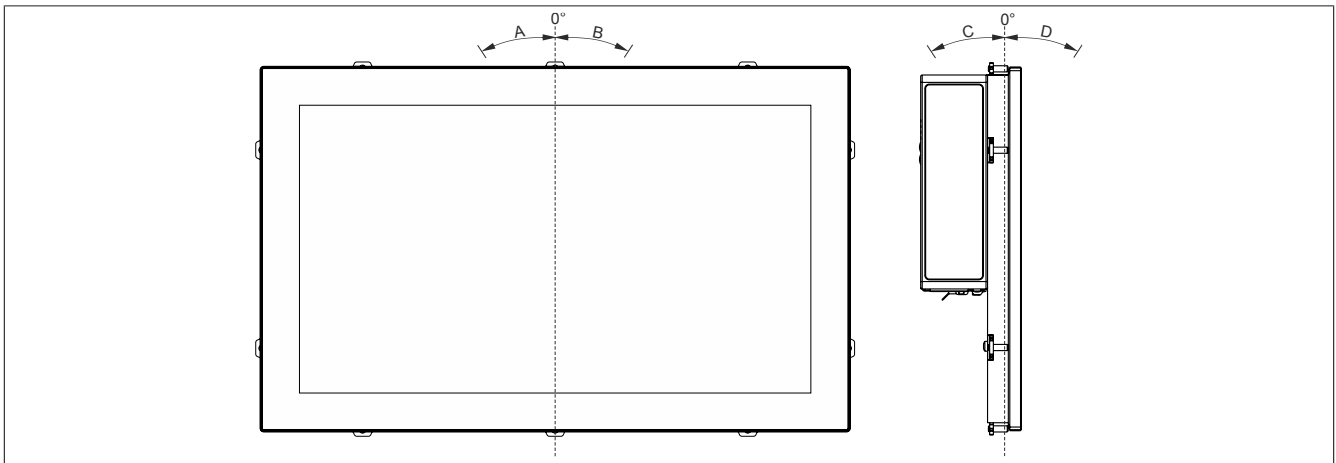


Figure 9: Panel PC 3100 - Mounting orientation

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 7: Mounting orientations during operation

1) The maximum ambient temperature must be reduced by the specified value.

During installation, it is important to make sure that the spacing as described in section ["Spacing for air circulation" on page 36](#) is observed in order to achieve natural air circulation.

4.4.5 Weight specifications

AP9x3 panels

Panels		
AP9x3	Model number	Weight [g]
12.1" single-touch	5AP923.1215-00	2200
15.0" single-touch	5AP923.1505-00	3700
19.0" single-touch	5AP923.1906-00	5800
15.6" multi-touch	5AP933.156B-00	3850
18.5" multi-touch	5AP933.185B-00	4850
21.5" multi-touch	5AP933.215C-00	5400
24.0" multi-touch	5AP933.240C-00	7800

AP1000 panels

Panels		
AP1000	Model number	Weight [g]
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

System units and components

Components		
Type	Model number	Weight [g]
System units	5PPC3100.KBUx-000	1150
CFast cards	5CFAST.xxxx-00	10
	5CFAST.xxxx-10	10
Graphics options	5ACCLI02.DPO0-000	27
	5ACCLI02.SDL0-000	27
	5ACCLI02.SD40-000	38
Interface options	5AC901.I232-00	30
	5AC901.I485-00	34
	5AC901.ICAN-00	33
	5AC901.ICAN-01	33
	5AC901.IHDA-00	21
	5AC901.IRDY-00	30
	5AC901.IPLK-00	35
	5AC901.ISIO-00	30
	5AC901.ISRM-00	20
	5AC901.IETH-00	35
	5ACCIF02.CANE-000	100
	5ACCIF02.FPLK-000	100
	5ACCIF02.FPLS-000	100
	5ACCIF02.FPSC-000	100

4.5 Environmental properties

4.5.1 Temperature specifications

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

Information:

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

Information about worst-case conditions

- Thermal Analysis Tool (TAT V5) from Intel for simulating processor load (100% CPU, 100% graphics, 100% memory)
- BurnInTest V7.1 Pro from PassMark Software for simulating 100% interface utilization using loopback adapters (100% network)
- 4x 1 A USB load
- Maximum expansion and power consumption of the system
- 100% display brightness

4.5.1.1 Maximum ambient temperature for worst-case operation

All temperatures in degrees Celsius (°C) at 500 m above sea level, non-condensing .		Maximum worst-case ambient temperature (system unit 5PPC3100.KBUx-000)			
The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.		5PPC3100.KBU0-000 (C-3965U 2.2 GHz)	5PPC3100.KBU1-000 (i3-7100U 2.4 GHz)	5PPC3100.KBU2-000 (i5-7300U 2.6 GHz)	5PPC3100.KBU3-000 (i7-7600U 2.8 GHz)
		55	50	50	50
Maximum ambient temperature (accessories)					
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓
	5AP923.1906-00	45	45	45	45
	5AP933.156B-00	50	✓	✓	✓
	5AP933.185B-00	50	✓	✓	✓
	5AP933.215C-00	45	45	45	45
AP1000 panels	5AP933.240C-00	45	45	45	45
	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	50	✓	✓	✓
	5AP1130.156C-000	45	45	45	45
	5AP1130.185C-000	45	45	45	45
CFast cards	5AP1120.1906-000	50	✓	✓	✓
	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
Graphics options	5CFAST.xxxx-10	✓	✓	✓	✓
	5ACCLI02.DPO0-000	✓	✓	✓	✓
	5ACCLI02.SDL0-000	✓	✓	✓	✓
Interface options	5ACCLI02.SD40-000	✓	✓	✓	✓
	5AC901.I232-00	✓	✓	✓	✓
	5AC901.I485-00	✓	✓	✓	✓
	5AC901.ICAN-00	✓	✓	✓	✓
	5AC901.ICAN-01	✓	✓	✓	✓
	5AC901.IHDA-00	✓	✓	✓	✓
	5AC901.IRDY-00	✓	✓	✓	✓
	5AC901.IPLK-00	✓	✓	✓	✓
	5AC901.ISIO-00	✓	✓	✓	✓
	5AC901.ISRM-00	✓	✓	✓	✓
	5AC901.IETH-00	✓	✓	✓	✓
	5ACCIF02.CANE-000	✓	✓	✓	✓
	5ACCIF02.FPLK-000	✓	✓	✓	✓
	5ACCIF02.FPSL-000	✓	✓	✓	✓
	5ACCIF02.FPSC-000	✓	✓	✓	✓
	5ACCIF02.ISS0-000	✓	✓	✓	✓

4.5.1.2 Minimum ambient temperature for worst-case operation

The minimum ambient temperature for non-condensing operation is 0°C.

4.5.1.3 Maximum ambient temperature for typical operation

Information about typical conditions

- BurnInTest V7.1 from PassMark Software for simulating moderate system and interface utilization using loopback adapters.
- No permanent 100% processor utilization and graphics utilization
- 2x Gigabit Ethernet
- The total power of all USB interfaces on the system unit is limited to 4 W.
- The power consumption of the complete system is limited to 55 W. For the power consumption of individual components, see 4.3.2 "Power calculation".
- 80% display brightness

All temperatures in degrees Celsius (°C) at 500 m above sea level, non-condensing .		Maximum worst-case ambient temperature (system unit 5PPC3100.KBUx-000)			
The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.		5PPC3100.KBU0-000 ¹⁾ (C-3965U 2.2 GHz)	5PPC3100.KBU1-000 ¹⁾ (i3-7100U 2.4 GHz)	5PPC3100.KBU2-000 ²⁾ (i5-7300U 2.6 GHz)	5PPC3100.KBU3-000 ²⁾ (i7-7600U 2.8 GHz)
		55	55	50	50
Maximum ambient temperature (accessories)					
AP9x3 panels	5AP923.1215-00	✓	✓	✓	✓
	5AP923.1505-00	✓	✓	✓	✓
	5AP923.1906-00	45	45	45	45
	5AP933.156B-00	50	50	✓	✓
	5AP933.185B-00	50	50	✓	✓
	5AP933.215C-00	45	45	45	45
	5AP933.240C-00	45	45	45	45
AP1000 panels	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	50	50	✓	✓
	5AP1130.156C-000	45	45	45	45
	5AP1130.185C-000	45	45	45	45
	5AP1120.1906-000	50	50	✓	✓
CFast cards	5CFAST.xxxx-00 ≥ E0	✓	✓	✓	✓
	5CFAST.xxxx-10	✓	✓	✓	✓
Graphics options	5ACCLI02.DPO0-000	✓	✓	✓	✓
	5ACCLI02.SDL0-000	✓	✓	✓	✓
	5ACCLI02.SD40-000	✓	✓	✓	✓
Interface options	5AC901.I232-00	✓	✓	✓	✓
	5AC901.I485-00	✓	✓	✓	✓
	5AC901.ICAN-00	✓	✓	✓	✓
	5AC901.ICAN-01	✓	✓	✓	✓
	5AC901.IHDA-00	✓	✓	✓	✓
	5AC901.IRDY-00	✓	✓	✓	✓
	5AC901.IPLK-00	✓	✓	✓	✓
	5AC901.ISIO-00	✓	✓	✓	✓
	5AC901.ISRM-00	✓	✓	✓	✓
	5AC901.IETH-00	✓	✓	✓	✓
	5ACCIF02.CANE-000	✓	✓	✓	✓
	5ACCIF02.FPLK-000	✓	✓	✓	✓
	5ACCIF02.FPSL-000	✓	✓	✓	✓
	5ACCIF02.FPSC-000	✓	✓	✓	✓
	5ACCIF02.ISS0-000	✓	✓	✓	✓

1) Max. 15 W without USB

2) Max. 17 W without USB

4.5.1.4 Determining the ambient temperature

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

Information:

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

3. If in the PPC3100 system additionally interface options and CFast cards are installed, they may result in a temperature limitation.
 - If a "✓" (check mark) is entered for the installed component, it can be operated without any problems.
 - If the installed component has a temperature specification (e.g. "45[°C]"), the ambient temperature of the complete system is not permitted to exceed this value.
4. Possible limitations may arise due to the mounting orientation of xPC3100. For more information, see section ["Mounting orientations" on page 37](#).
5. The relevant test and assessment must be carried out individually by the user on site (reading out the temperatures in BIOS or using the B&R Control Center). See section ["Information about typical conditions" on page 41](#).

4.5.1.5 Ambient temperature for storage and transport

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

AP9x3 panels

Type	Model number	Storage [°C]	Transport [°C]
12.1" single-touch	5AP923.1215-00	-25 to 80	-25 to 80
15.0" single-touch	5AP923.1505-00	-25 to 80	-25 to 80
19.0" single-touch	5AP923.1906-00	-25 to 70	-25 to 70
15.6" multi-touch	5AP933.156B-00	-25 to 70	-25 to 70
18.5" multi-touch	5AP933.185B-00	-20 to 60	-20 to 60
21.5" multi-touch	5AP933.215C-00	-20 to 60	-20 to 60
24.0" multi-touch	5AP933.240C-00	-30 to 70	-30 to 70

AP1000 panels

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

System units and components

Type	Model number	Storage [°C]	Transport [°C]
System units	5PPC3100.KBUx-000	-20 to 60	-20 to 60
CFast cards	5CFAST.xxxx-00	-50 to 100	-50 to 100
	5CFAST.xxxx-10	-40 to 85	-40 to 85
Graphics options	5ACCLI02.DPO0-000	-20 to 60	-20 to 60
	5ACCLI02.SDL0-000	-20 to 60	-20 to 60
	5ACCLI02.SD40-000	-20 to 60	-20 to 60
Interface options	5AC901.I232-00	-20 to 60	-20 to 60
	5AC901.I485-00	-20 to 60	-20 to 60
	5AC901.ICAN-00	-20 to 60	-20 to 60
	5AC901.ICAN-01	-20 to 60	-20 to 60
	5AC901.IHDA-00	-20 to 60	-20 to 60
	5AC901.IRDY-00	-20 to 60	-20 to 60
	5AC901.IPLK-00	-20 to 60	-20 to 60
	5AC901.ISIO-00	-20 to 60	-20 to 60
	5AC901.ISRM-00	-20 to 60	-20 to 60
	5AC901.IETH-00	-20 to 60	-20 to 60
	5ACCIF02.CANE-000	-20 to 60	-20 to 60
	5ACCIF02.FPLK-000	-20 to 60	-20 to 60
	5ACCIF02.FPLS-000	-20 to 60	-20 to 60
	5ACCIF02.FPSC-000	-20 to 60	-20 to 60
	5ACCIF02.ISS0-000	-20 to 60	-20 to 60

4.5.1.6 Temperature monitoring

Sensors monitor temperature values at various areas in the PPC3100. For the position of temperature sensors, see section "[Temperature sensor position](#)" on page 45. The values specified there represent the defined maximum temperature at this measuring point. If the temperature is exceeded, no alarm is triggered.

Temperatures¹⁾ can be read out in different ways in approved operating systems:

- BIOS (see "[Baseboard](#)" on page 235)
- 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 available from B&R for PPC3100 systems are equipped with Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T). This means that various parameters, such as temperature, can be read out using software (e.g. HDD Thermometer, freeware) in approved Microsoft Windows or B&R Linux operating systems.

For applications that do not run in approved operating systems, temperatures can be evaluated using the B&R MTCX Development Kit. The B&R MTCX Development Kit also contains executable EFI sample programs.

¹⁾ The measured temperature is a guide value for the immediate ambient temperature, but it may have been 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).

4.5.1.7 Temperature sensor position



ADI sensors	Position	Measuring point for	Measurement	Max. specified
Panel	A	Display	Temperature of the display (sensor integrated on the panel)	5AP923.1215-00: 90°C 5AP923.1505-00: 90°C 5AP923.1906-00: 80°C 5AP933.156B-00: 80°C 5AP933.185B-00: 75°C 5AP933.215C-00: 80°C 5AP933.240C-00: 80°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 5AP1181.1505-000: 90°C 5AP1120.156B-000: 80°C 5AP1130.156C-000: 80°C 5AP1130.185C-000: 80°C 5AP1120.1906-000: 80°C
System unit sensor 1	B	CFast 2	Temperature of the CFast 2 area	90°C
System unit sensor 2	C	CFast 1	Temperature of the CFast 1 area	90°C
System unit sensor 3	D	MTCX	Temperature of the MTCX processor	90°C
System unit sensor 4	E	CPU	Temperature of the processor	95°C
IF option 3 slot	F	Graphics option	Temperature of a graphics option (sensor integrated on the graphics option)	Depends on the graphics option

4.5.2 Relative humidity

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

Panels				
AP9x3	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	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

Panels				
AP1000	Model number	Operation [%]	Storage [%]	Transport [%]
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

Type	Model number	Operation [%]	Storage [%]	Transport [%]
System units	5PPC3100.KBUX-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.xxxx-10	Max. 85% at 85°C	Max. 85% at 85°C	Max. 85% at 85°C
Graphics options	5ACCLI02.DPO0-000	5 to 90	5 to 95	5 to 95
	5ACCLI02.SDL0-000	5 to 90	5 to 95	5 to 95
	5ACCLI02.SD40-000	5 to 90	5 to 95	5 to 95
Interface options	5AC901.I232-00	5 to 90	5 to 95	5 to 95
	5AC901.I485-00	5 to 90	5 to 95	5 to 95
	5AC901.ICAN-00	5 to 90	5 to 95	5 to 95
	5AC901.ICAN-01	5 to 90	5 to 95	5 to 95
	5AC901.IHDA-00	5 to 90	5 to 95	5 to 95
	5AC901.IRDY-00	5 to 90	5 to 95	5 to 95
	5AC901.IPLK-00	5 to 90	5 to 95	5 to 95
	5AC901.ISIO-00	5 to 90	5 to 95	5 to 95
	5AC901.ISRM-00	5 to 90	5 to 95	5 to 95
	5AC901.IETH-00	5 to 90	5 to 95	5 to 95
	5ACCIF02.CANE-000	5 to 90	5 to 95	5 to 95
	5ACCIF02.FPLK-000	5 to 90	5 to 95	5 to 95
	5ACCIF02.FPLS-000	5 to 90	5 to 95	5 to 95
	5ACCIF02.FPSC-000	5 to 90	5 to 95	5 to 95
	5ACCIF02.ISS0-000	5 to 90	5 to 95	5 to 95

Table 8: System units and components

4.5.3 Vibration and shock

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

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

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

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

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

4.5.4 Degree of protection

Under the following conditions, the Panel PC 3100 offers IP65 protection on the front and IP20 protection on the back per EN 60529:

- Correct installation of the Panel PC 3100 (see ["Installation and wiring" on page 208](#))
- Installation of all covers or components on interfaces and slots
- Compliance with all ambient conditions

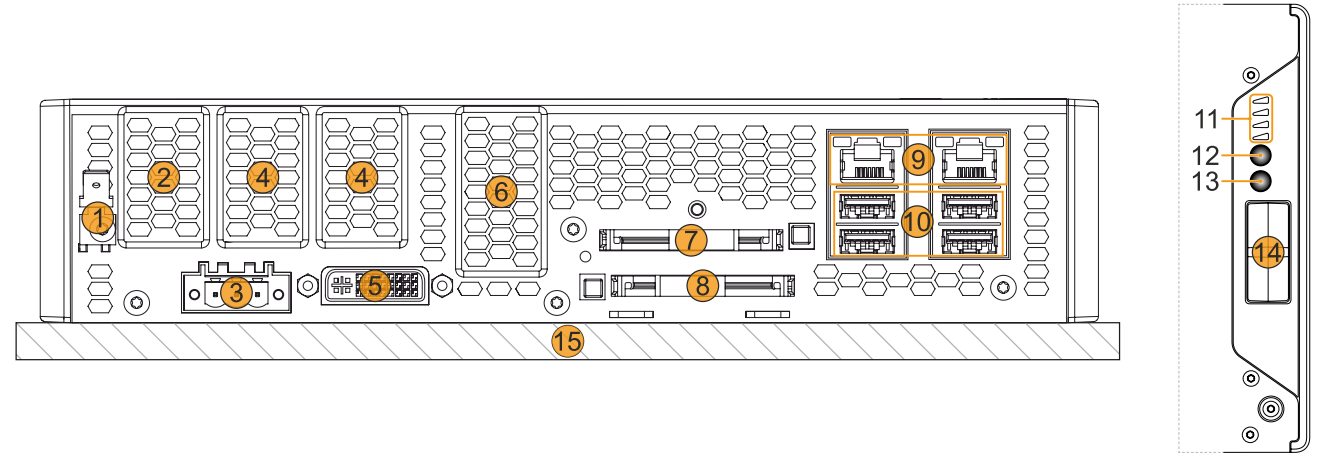
The Panel PC 3100 with AP9x3 and AP1000 panels additionally has "Type 4X indoor use only" on the front per UL 50 under the same conditions.

4.6 Device interfaces and slots

4.6.1 Device interfaces - Overview

Information:

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



Legend			
1	"Grounding" on page 49	9	Ethernet interfaces
2	"IF option 1 slot" on page 56	10	"USB interfaces" on page 51
3	" +24 VDC power supply" on page 49	11	"LED status indicators" on page 53
4	"IF option 2 slot" on page 57	12	"Power and reset buttons" on page 52
5	"SDL/DVI-D interface" on page 55	13	
6	IF option 3 slot	14	"Battery" on page 54
7	"CFast slots" on page 52	15	Panel (configuration-dependent)
8			

4.6.2 +24 VDC power supply

Danger!

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

The necessary 3-pin connector is not included in delivery; for suitable accessories, see "0TB103.9x" on page 315.

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

Pin	Description	Figure
1	+	
2	Functional ground	
3	-	
- Reverse polarity protection 3-pin - Male		
Electrical properties		
Nominal voltage	24 VDC $\pm 25\%$, SELV ¹⁾	
Nominal current	Max. 5.5 A	
Overvoltage category per EN 61131-2	II	
Inrush current	Max. 60 A for < 300 μ s	
Galvanic isolation	Yes	
Uninterruptible power supply	No	

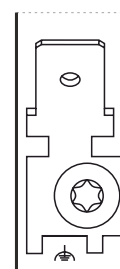
1) EN 60950 requirements must be observed.

4.6.3 Grounding

Caution!

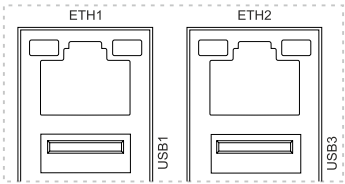
The functional ground (power supply pin 2 and ground connection) must be connected to the central grounding point (e.g. control cabinet or system) via the shortest possible path with the lowest possible resistance and with the largest possible wire cross section. This type of grounding is mandatory for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

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



4.6.4 Ethernet interfaces

The Ethernet controllers are routed externally via the system unit.



ETH1, ETH2		
Variant	RJ45, female	
Controller		
ETH1	Intel I219	
ETH2	Intel I210	
Wiring	S/STP (Cat 5e)	
Transfer rate	10/100/1000 Mbit/s ¹⁾	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Speed" (a)	On	Off
Green	100 Mbit/s	10 Mbit/s ²⁾
Orange (dark)	1000 Mbit/s	-
LED "Link" (b)	On	Active
Orange (light)	Link (a connection to an Ethernet network exists)	Blinking (data being transferred)

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

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

Information:

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

4.6.5 USB interfaces

PPC3100 devices are equipped with a USB 3.0 (Universal Serial Bus) host controller with several USB ports. There are 4 USB 3.0 interfaces routed externally and freely available for the user. An additional USB 2.0 interface located inside the device.

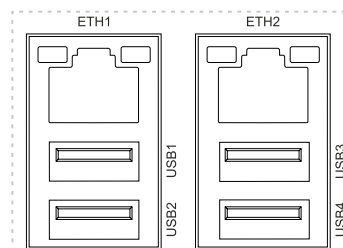
Warning!

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

Caution!

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

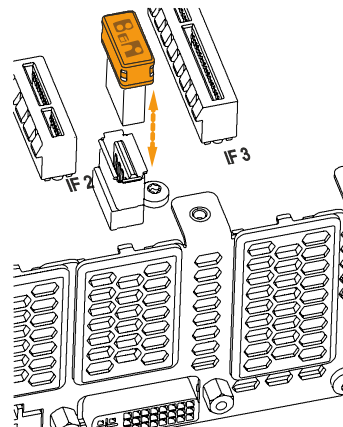
USB1-4		
Standard	USB 3.0	
Variant	Type A, female	
Quantity	4	
Transfer rate	Low speed (1.5 Mbit/s)	
	Full speed (12 Mbit/s)	
	High speed (480 Mbit/s)	
	SuperSpeed (5 Gbit/s)	
Current-carrying capacity ¹⁾	Max. 1 A	
Cable length		
	USB 2.0	Max. 5 m (without hub)
	USB 3.0	Max. 3 m (without hub)



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

A USB 2.0 interface is available internally for the Technology Guard. The system unit must be opened for replacement or retrofitting.

USB5		
Standard	USB 2.0	
Variant	Type A, female	
Transfer rate	Low speed (1.5 Mbit/s)	
	Full speed (12 Mbit/s)	
	High speed (480 Mbit/s)	
Current-carrying capacity ¹⁾		
USB5	Max. 0.5 A	
Cable length	Internal for Technology Guard	



1) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A).

4.6.6 CFast slots

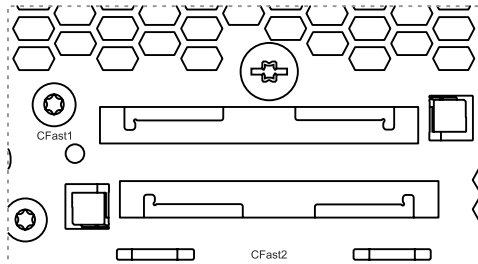
The Panel PC offers easily accessible CFast slots so that the CFast card can also be used as a removable storage medium for data transfer or upgrades.

The CFast slots are internally connected to the chipset and implemented in version SATA III (SATA 6.0 Gbit/s).

Warning!

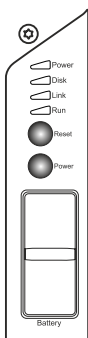
CFast cards are only permitted to be connected and disconnected when the power is switched off!

CFast slots 1-2	
Connection	
CFast slot 1	SATA 0
CFast slot 2	SATA 1
Model number	Short description
CFast cards	
5CFAST.2048-00	CFast 2 GB SLC
5CFAST.4096-00	CFast 4 GB SLC
5CFAST.8192-00	CFast 8 GB SLC
5CFAST.016G-00	CFast 16 GB SLC
5CFAST.032G-00	CFast 32 GB SLC
5CFAST.032G-10	CFast 32 GB MLC
5CFAST.064G-10	CFast 64 GB MLC
5CFAST.128G-10	CFast 128 GB MLC
5CFAST.256G-10	CFast 256 GB MLC



4.6.7 Power and reset buttons

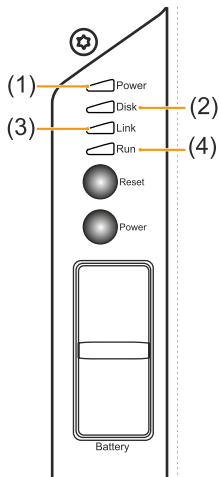
Both buttons can be pressed without any tools.

Description	
Power button The power button offers full ATX power supply support and has various configurable functions. • Short press: Switches the PC on or off or performs the action configured in the operating system when pressing the power button (shutdown, sleep, etc.). • Long press (approx. 4 s): The ATX power supply switches off the PC without shutting it down. Pressing the power button does not reset the MTCX processor.	
Reset button Pressing the reset button triggers a hardware/PCI reset. The PC is restarted. During a reset, the MTCX processor is not reset.	

Warning!

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

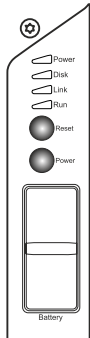
4.6.8 LED status indicators

Assignment	LED	Color	Status	Explanation	LED status indicator				
					500 ms per interval				
					1	2	1	2	
	(1): Power	Green	On	Power supply OK					
			Blinking	The device is started up; the battery state is "BAD".					
					Information: For additional information, see "Battery" on page 54.				
		Red	On	The system is in power saving mode (standby). ¹⁾					
			Blinking	The MTCX is running; the battery state is "BAD". The system is in power saving mode (standby). ¹⁾					
		Red-Green	Blinking	Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, power supply OK					
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state OK, standby mode ¹⁾					
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, power supply OK					
				Faulty or incomplete BIOS, MTCX or I/O FPGA update, battery state BAD, standby mode ¹⁾					
					Information: An update must be performed again.				
		Yellow	On	Power supply not OK. The system is running in UPS mode.					
	(2): Disk	Yellow	On	Indicates drive access (HDD, SSD, CFast)					
	(3): Link	Yellow	On	Indicates an active SDL connection on the panel connector.					
			Blinking	An active SDL connection was interrupted due to power loss of the panel.					
						Information: Check the power supply or power connection of the connected panel.			
	(4): Run	Green	Blinking	Automation Runtime is starting up. Controlled by Automation Runtime (ARemb and AR-win).					
		Green	On	Application running Controlled by Automation Runtime (ARemb and AR-win).					
		Red	On	Application in SERVICE mode Controlled by Automation Runtime (ARemb and AR-win).					
		Orange	Blinking	A license violation has occurred.					

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

4.6.9 Battery

The lithium battery (3 V, 950 mAh) ensures backup power to the internal real-time clock (RTC). It is located below the power and reset button behind the orange cover. The self-discharge time of the battery is at least 4 years.¹⁾ The battery is subject to wear and should be replaced regularly (at least after the specified service life) by changing the battery (see ["Changing the battery" on page 303](#)).

Battery		
Type	Renata 950 mAh	
Removable	Yes, accessible from the outside	
Service life	4 years ¹⁾	
Model number	Short description	
	Batteries	
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

1) At 50°C, 8.5 µA for the components being supplied and self-discharge of 40%. If an SRAM interface option is installed, the service life is 2½ years.

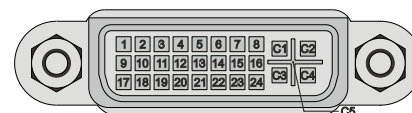
The battery state is determined by the system immediately after the device is switched on and subsequently every 24 hours. During the measurement, the battery is subjected to a brief load (approx. 1 second) and then assessed. The determined battery state is displayed on the BIOS Setup screens (Advanced - OEM features - ["Baseboard" on page 235](#)) and the B&R Control Center (ADI driver) but can also be read out in a customer application via the ADI library.

Battery state	Explanation
N/A	The hardware or firmware used is too old and does not support readout.
GOOD	Data retention is ensured.
BAD	As soon as the battery capacity is recognized as BAD (insufficient), retention of data is ensured for approximately another 500 hours. The battery must be replaced.

When replacing the battery, data is retained for approximately 10 minutes by a gold foil capacitor.

4.6.10 SDL/DVI-D interface

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



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

1) Protected internally by a multifuse.

Information:

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

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

Information:

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

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

4.6.10.1 Cable lengths and resolutions for SDL transfer

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

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

4.6.10.2 Cable lengths and resolutions for DVI transfer

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

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

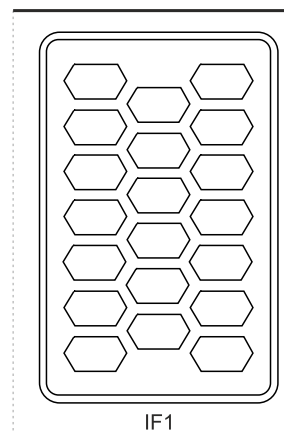
The maximum cable length for DVI transfer is limited to 5 m due to the USB specification.

4.6.11 IF option 1 slot

Panel PC 3100 system units have 3 slots for interface options.

The following table lists the interface options that can be used in the IF option 1 slot.

IF option 1 slot	
Model number	Interface option - Short description
5AC901.I232-00 ¹⁾	Interface card - 1x RS232 - For APC910/PPC900/APC3100/PPC3100
5AC901.I485-00 ¹⁾	Interface card - 1x RS232/RS422/RS458 interface - For APC910/PPC900/APC3100/PPC3100
5AC901.ICAN-00 ²⁾	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100
5AC901.ICAN-01 ²⁾	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100
5AC901.IHDA-00	Interface card - 1x audio interface (1x MIC / 1x Line In / 1x OUT) - For APC910/PPC900/APC3100/PPC3100
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100
5AC901.IUPS-00 ³⁾	UPS - For 4.5 Ah battery
5AC901.IUPS-01 ⁴⁾	UPS - For 2.2 Ah battery



- 1) Simultaneous operation with 5ACCIF02.ISS0-000 in the IF option 2 slot is not possible.
- 2) Simultaneous operation of 2 interface options with a legacy CAN interface in slots IF1 and IF2 is not possible.
- 3) UPS IF option 5AC901.IUPS-00 is only permitted to be operated with battery unit 5AC901.BUPS-00!
- 4) UPS IF option 5AC901.IUPS-01 is only permitted to be operated with battery unit 5AC901.BUPS-01!

Information:

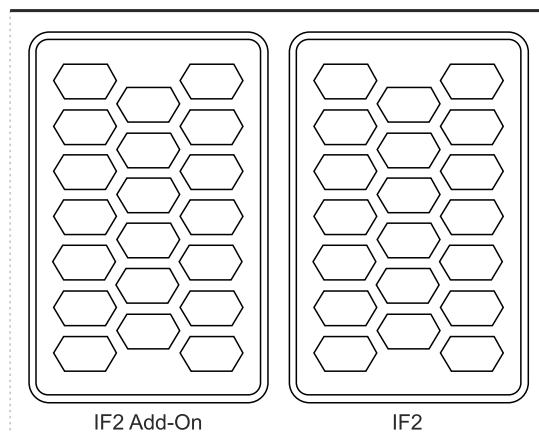
For information about replacing or installing an interface option, see section ["Installing the interface option and DDR4 SDRAM" on page 306](#).

4.6.12 IF option 2 slot

Panel PC 3100 system units have 3 slots for interface options.

The following table lists the interface options that can be used in the IF option 2 slot.

IF option 2 slot	
Model number	Interface option - Short description
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100
5AC901.ICAN-00 ¹⁾	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100
5AC901.ICAN-01 ¹⁾	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100
5AC901.IETH-00	Interface card - 1x Ethernet 10/100/1000 - For APC910/PPC900/APC3100/PPC3100
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100
5AC901.ISRM-00	Interface card - 2 MB RAM - For APC910/PPC900/APC3100/PPC3100
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100
5ACCIF02.CANE-000 ¹⁾²⁾	Interface card - 1x CAN interface (SJA1000) - 1x ETH 10/100/1000 - For APC3100/PPC3100
5ACCIF02.FPLK-000 ²⁾	Interface card - 1x POWERLINK interface - 2 MB SRAM - Integrated 2-port hub - Ring redundancy - POWERLINK managing or controlled node - PRC function - For APC3100/PPC3100
5ACCIF02.FPLS-000 ²⁾	Interface card - 2 MB SRAM - 1x RS232 interface - 1x POWERLINK interface - For APC3100/PPC3100
5ACCIF02.FPSC-000 ²⁾	Interface card - 2 MB SRAM - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 1x X2X - For APC3100/PPC3100
5ACCIF02.ISS0-000 ²⁾³⁾	Interface card - 2x RS232/RS422/RS485 interface - For APC3100/PPC3100



- 1) Simultaneous operation of 2 interface options with a legacy CAN interface in slots IF1 and IF2 is not possible.
- 2) These IF options use the IF option 2 and IF option 2 add-on slot.
- 3) Simultaneous operation with 5AC901.I232-00 or 5AC901.I485-00 in the IF option 1 slot is not possible.

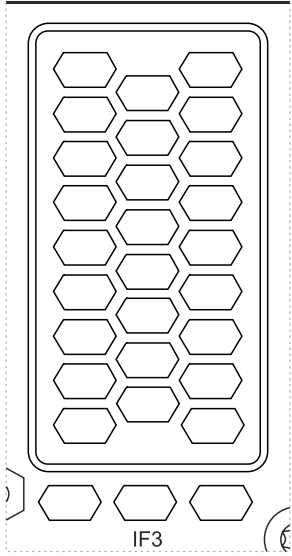
Information:

For information about replacing or installing an interface option, see section ["Installing the interface option and DDR4 SDRAM"](#) on page 306.

4.6.13 IF option 3 slot

Panel PC 3100 system units have 3 slots for interface options.

The following table lists the graphics options that can be used in the IF option 3 slot.

IF option 3 slot		
Model number	Graphics option - Short description	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100	
5ACCLI02.SDL0-000	Graphics option - 1x SDL/DVI transmitter - For APC3100/PPC3100	
5ACCLI02.SD40-000	Graphics option - 1x SDL4 transmitter (max. 1920 x 1080) - For APC3100/PPC3100	

Information:

For information about replacing or installing an interface option, see section ["Installing the interface option and DDR4 SDRAM"](#) on page 306.

4.6.14 Trusted Platform Module (TPM)

Depending on the configuration ordered, the system unit may contain a Trusted Platform Module (TPM 2.0). A TPM is a chip that adds important security features to your device, such as improved protection of the PC against unauthorized tampering by third parties. Current operating systems, e.g. Windows 10, support these safety functions.

Enabling the Trusted Platform Module

The TPM is disabled by default and can be enabled in BIOS menu "Setup utility" under "Security". In addition, parameter "Platform Trust Technology" must be disabled under "Advanced - Chipset configuration". Follow the instructions in BIOS Setup.

Information:

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

Using the Trusted Platform Module

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

Information:

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

4.7 Features of AP1000 panels

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

Display type	Model number	Resolution	Touch screen	Function keys	System keys	Front USB interface
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

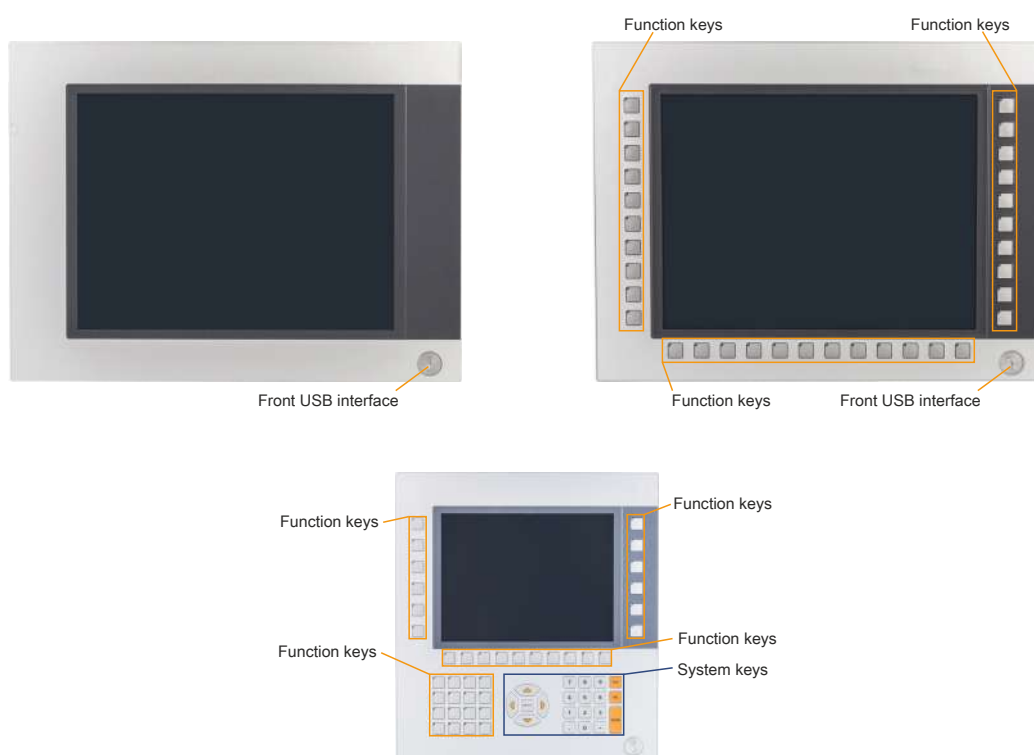


Figure 10: Features of AP1000 panels

4.7.1 Slide-in labels

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

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

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

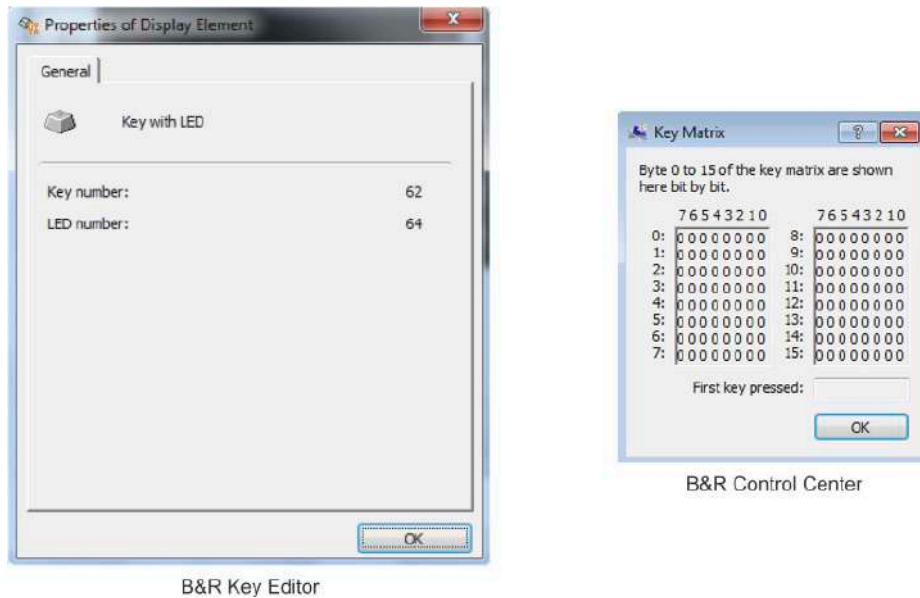
4.7.2 Key and LED configuration

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

- 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 the keys and LEDs in the matrix are represented as hardware numbers. The hardware numbers can be read directly from the target system using the B&R Key Editor and B&R Control Center, for example.



Keys and LEDs in the matrix

- Hardware numbers of keys are specified in the following with black numbers.
- Hardware numbers of LEDs are specified in the following with blue numbers.
- Presentation examples:

Key	Key with LED	LED
12	115 103	3

5AP1180.1043-000

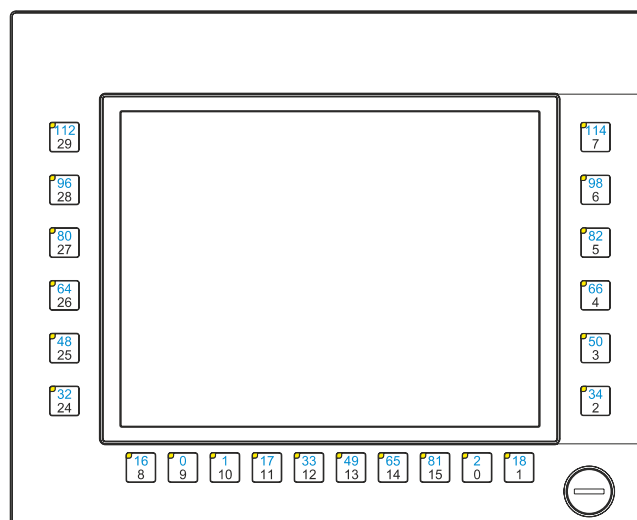


Figure 11: 5AP1180.1043-000 - Key and LED configuration

5AP1181.1043-000

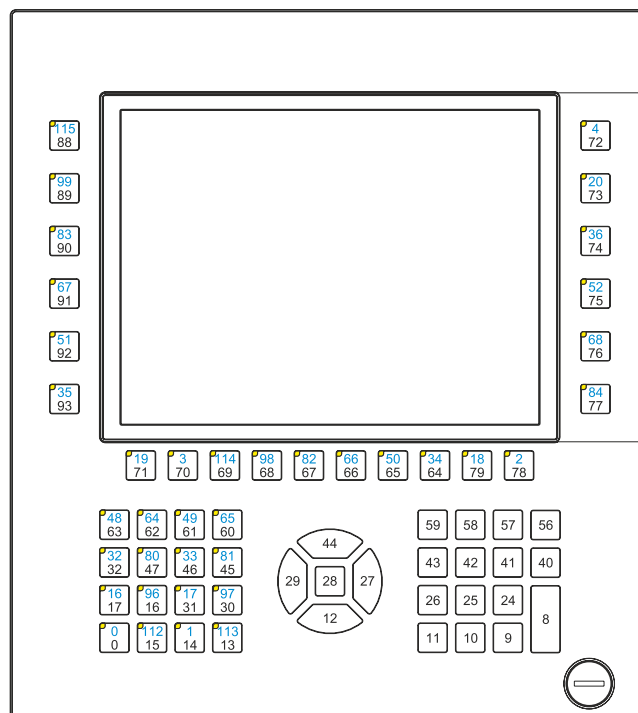


Figure 12: 5AP1181.1043-000 - Key and LED configuration

5AP1182.1043-000

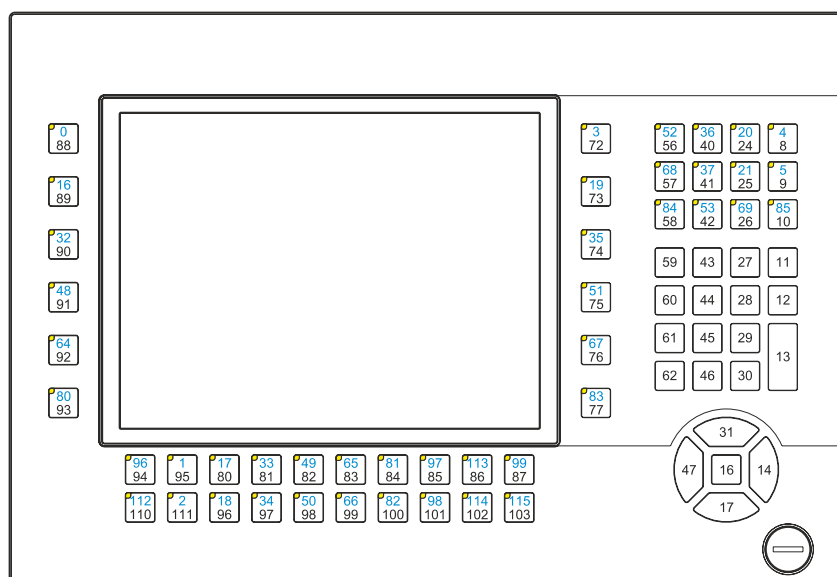


Figure 13: 5AP1182.1043-000 - Key and LED configuration

5AP1180.1505-000

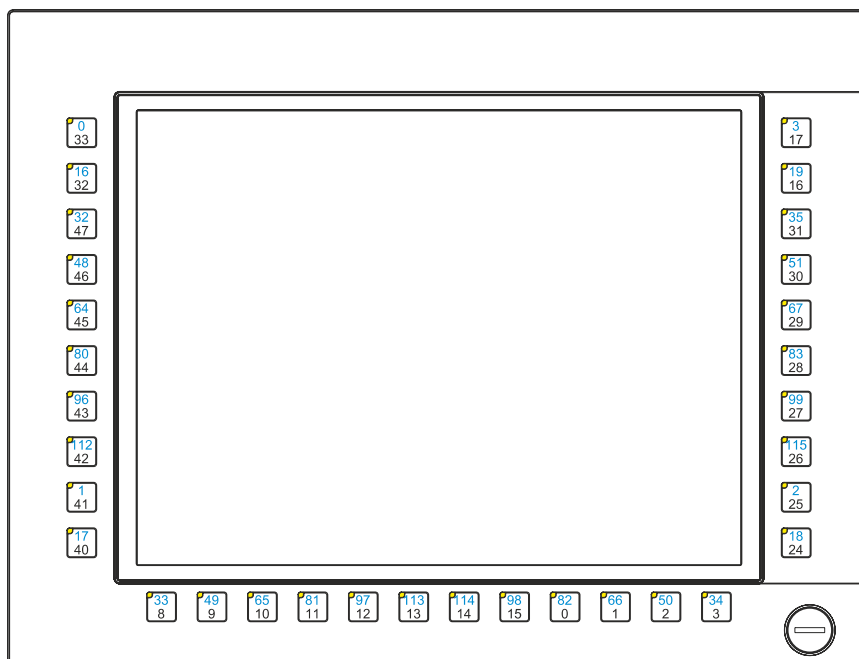


Figure 14: 5AP1180.1505-000 - Key and LED configuration

5AP1181.1505-000

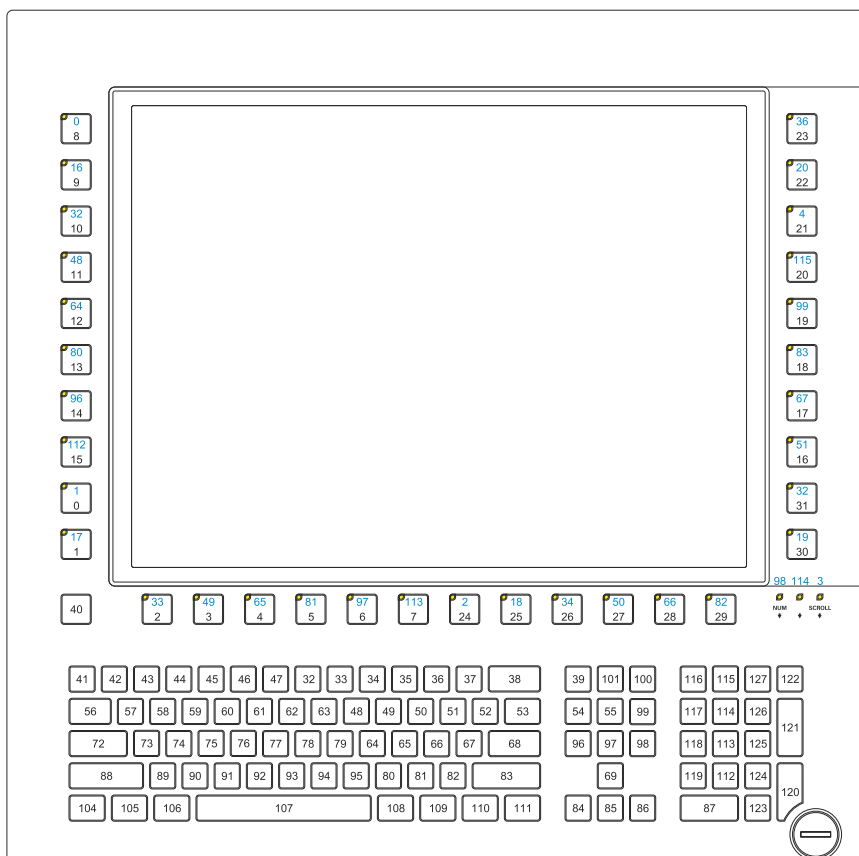


Figure 15: 5AP1181.1505-000 - Key and LED configuration

4.7.3 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 correctly installed.

Warning!

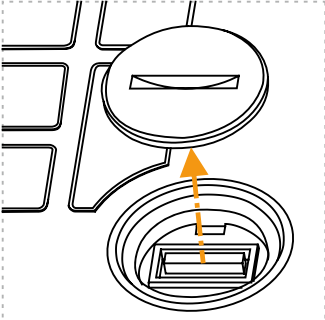
USB peripheral devices can be connected to the USB interfaces. Due to the variety of USB devices available on the market, B&R cannot guarantee their functionality. The functionality of USB devices available from B&R is guaranteed.

Caution!

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

Front USB

The front USB interface is available for service purposes.

Universal Serial Bus (front USB) ¹⁾		1x USB type A, female 
Type	USB 2.0	
Variant	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. 0.5 A	
Cable length		
USB 2.0	Max. 5 m (without hub)	

- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) The USB interface is protected by a maintenance-free "USB current-limiting switch" (max. 0.5 A).

4.8 Individual components

4.8.1 AP9x3 panels

4.8.1.1 5AP923.1215-00

4.8.1.1.1 General information

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

4.8.1.1.2 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 9: 5AP923.1215-00 - Order data

4.8.1.1.3 Technical data

Information:

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

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 10: 5AP923.1215-00 - Technical data

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)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	315 mm
Height	239 mm
Weight	2200 g

Table 10: 5AP923.1215-00 - Technical data

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

4.8.1.1.4 Dimensions

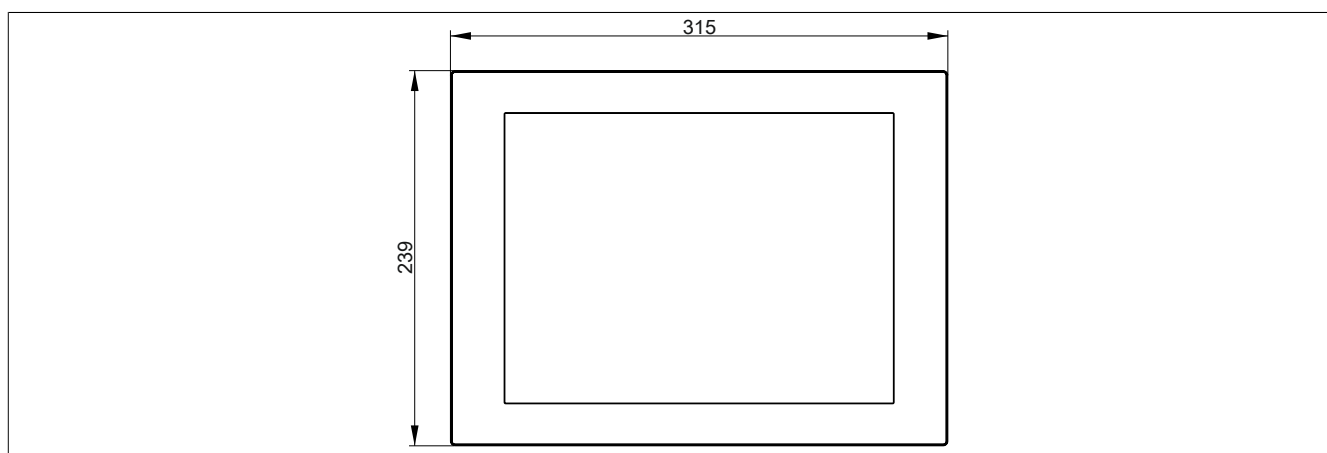


Figure 16: 5AP923.1215-00 - Dimensions

4.8.1.1.5 Temperature/Humidity diagram

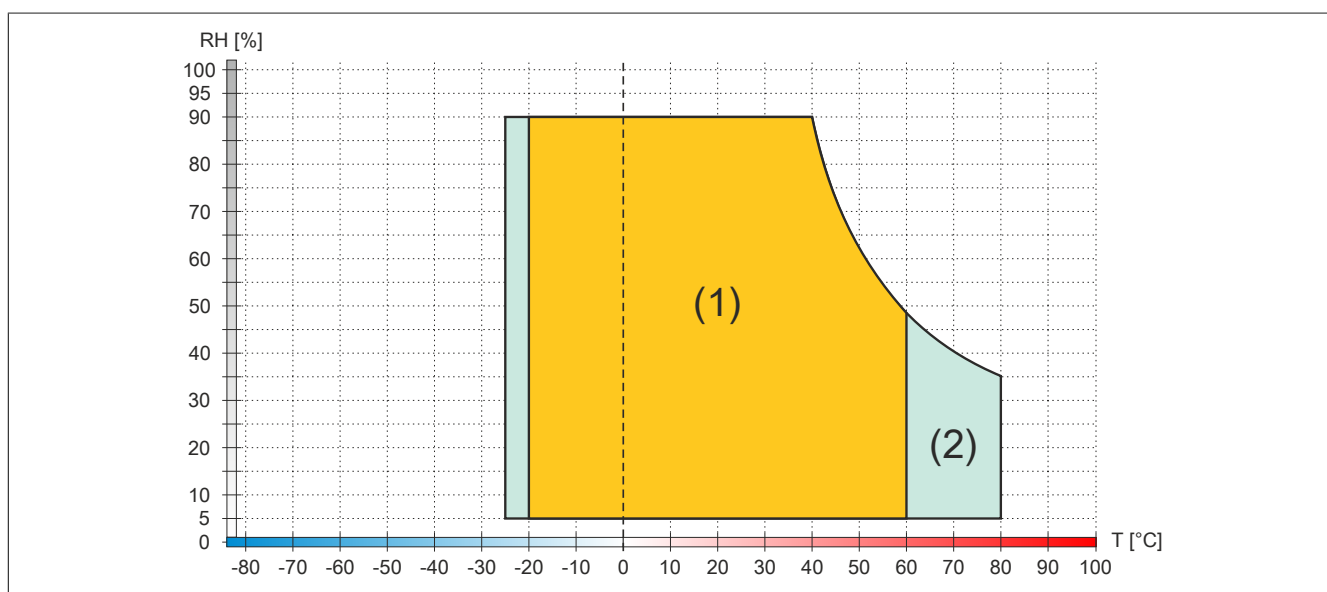


Figure 17: 5AP923.1215-00 - Temperature/Humidity diagram

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

4.8.1.2 5AP923.1505-00

4.8.1.2.1 General information

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

4.8.1.2.2 Order data

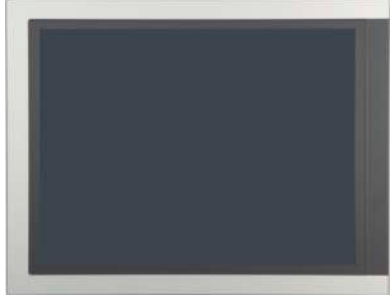
Model number	Short description	Figure
	Panels	
5AP923.1505-00	Automation Panel 15.0" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 11: 5AP923.1505-00 - Order data

4.8.1.2.3 Technical data

Information:

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

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⁾
Display	
Type	TFT color
Diagonal	15.0"
Colors	16.7 million
Resolution	XGA, 1024 x 768 pixels
Contrast	700:1
Viewing angles	
Horizontal	Direction R = 80° / Direction L = 80°
Vertical	Direction U = 70° / Direction D = 70°
Backlight	
Type	LED
Brightness (dimmable)	Typ. 20 to 400 cd/m²
Half-brightness time ³⁾	50,000 h
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 12: 5AP923.1505-00 - Technical data

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)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	370 mm
Height	288 mm
Weight	3700 g

Table 12: 5AP923.1505-00 - Technical data

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

4.8.1.2.4 Dimensions

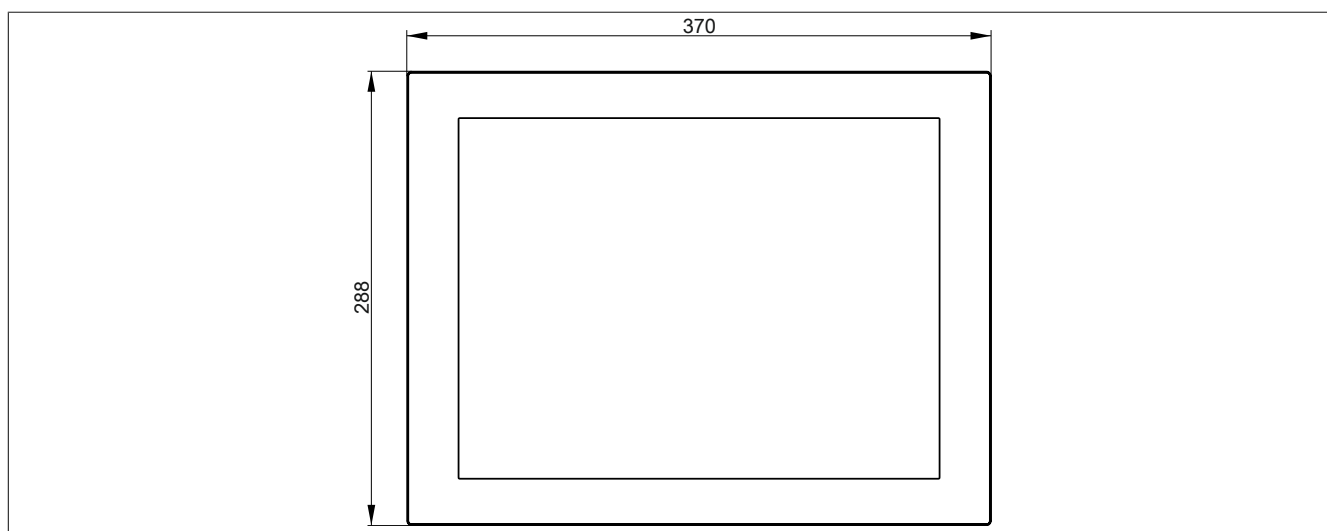


Figure 18: 5AP923.1505-00 - Dimensions

4.8.1.2.5 Temperature/Humidity diagram

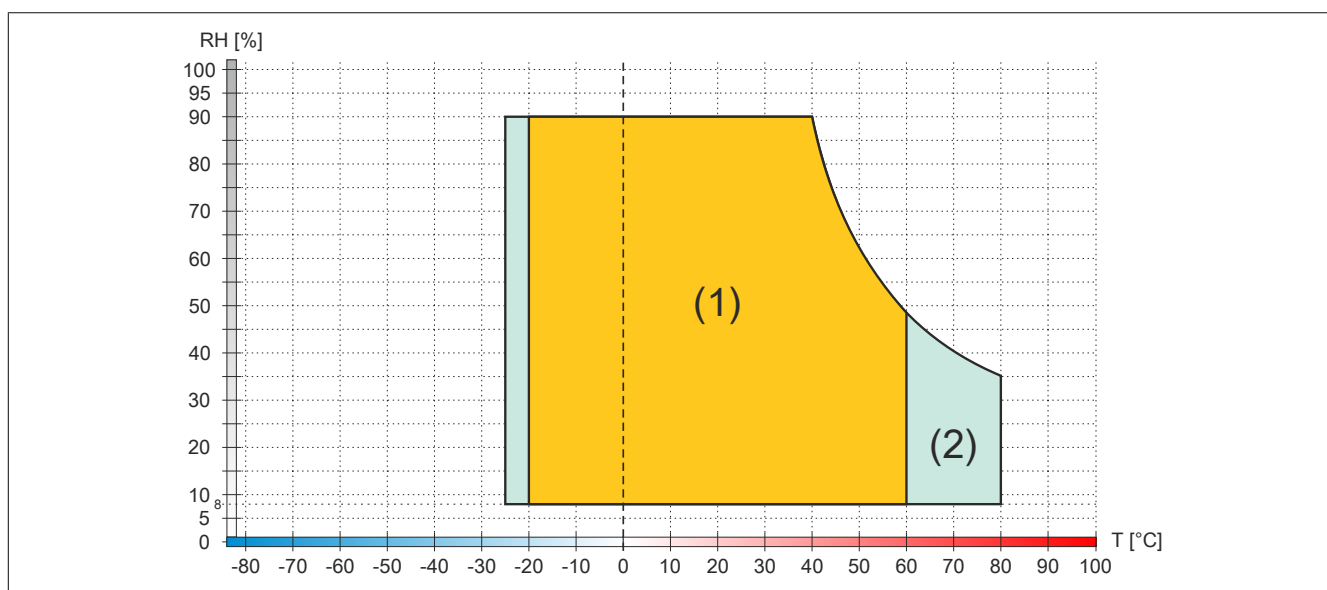


Figure 19: 5AP923.1505-00 - Temperature/Humidity diagram

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

4.8.1.3 5AP923.1906-00

4.8.1.3.1 General information

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

4.8.1.3.2 Order data

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

Table 13: 5AP923.1906-00 - Order data

4.8.1.3.3 Technical data

Information:

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

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)	
Degree of protection per UL 50	Front: Type 4X indoor use only	

Table 14: 5AP923.1906-00, 5AP923.1906-00 - Technical data

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

Table 14: 5AP923.1906-00, 5AP923.1906-00 - Technical data

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

4.8.1.3.4 Dimensions

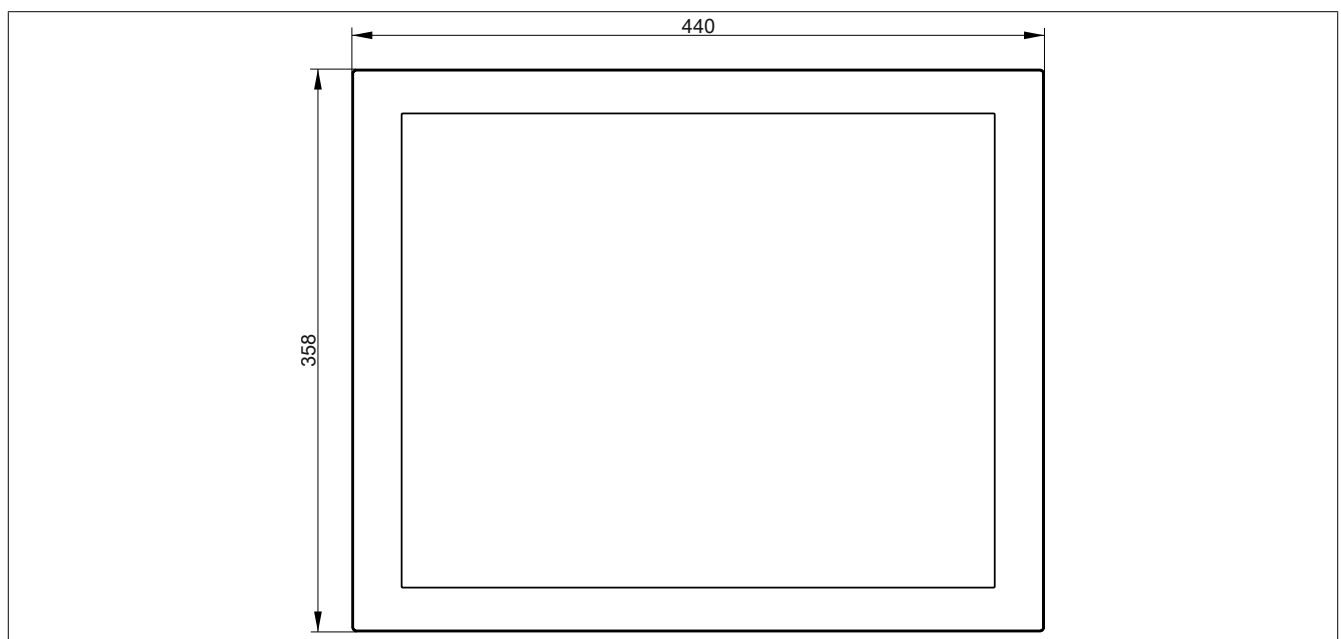


Figure 20: 5AP923.1906-00 - Dimensions

4.8.1.3.5 Temperature/Humidity diagram

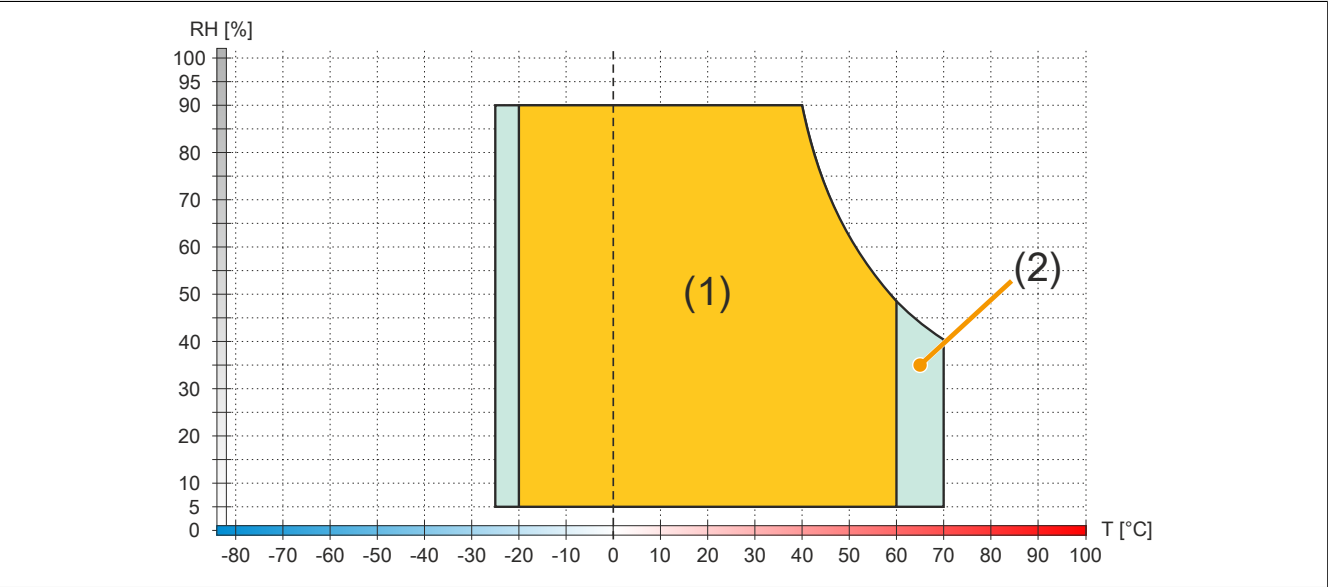


Figure 21: 5AP923.1906-00 ≥ Rev. E0 - Temperature/Humidity diagram

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

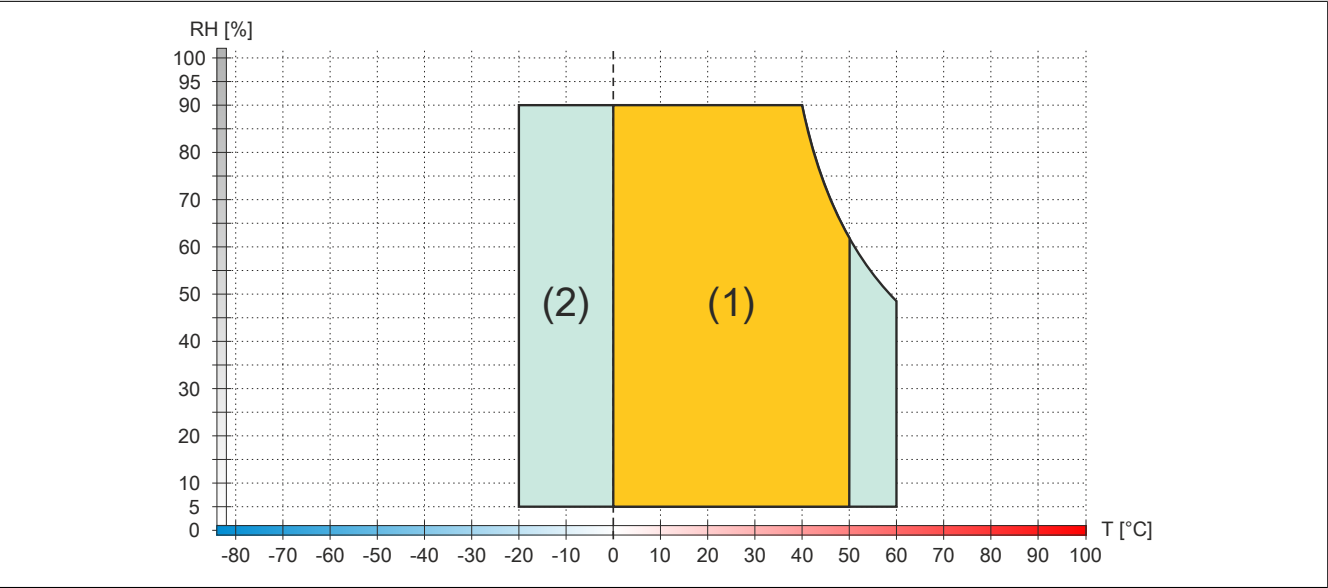


Figure 22: 5AP923.1906-00 ≤ Rev. D0 - Temperature/Humidity diagram

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

4.8.1.4 5AP933.156B-00

4.8.1.4.1 General information

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

4.8.1.4.2 Order data

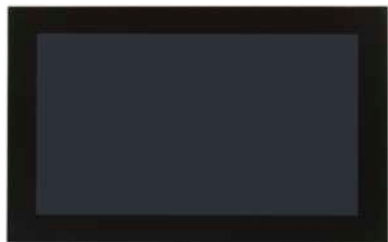
Model number	Short description	Figure
	Panels	
5AP933.156B-00	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 15: 5AP933.156B-00 - Order data

4.8.1.4.3 Technical data

Information:

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

Model number	5AP933.156B-00	
Revision	C0	D0
General information		
B&R ID code	0xE16A	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
Display		
Type	TFT color	
Diagonal	15.6"	
Colors	16.7 million	
Resolution	HD, 1366 × 768 pixels	
Contrast	500:1	1000:1
Viewing angles		
Horizontal	Direction R = 85° / Direction L = 85°	
Vertical	Direction U = 80° / Direction D = 80°	Direction U = 85° / Direction D = 85°
Backlight		
Type	LED	
Brightness (dimmbale)	Typ. 15 to 300 cd/m²	Typ. 40 to 400 cd/m²
Half-brightness time ¹⁾	50,000 h	70,000 h
Touch screen ²⁾		
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)	
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm fixed gasket	

Table 16: 5AP933.156B-00, 5AP933.156B-00 - Technical data

Technical data

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

Table 16: 5AP933.156B-00, 5AP933.156B-00 - Technical data

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

4.8.1.4.4 Dimensions

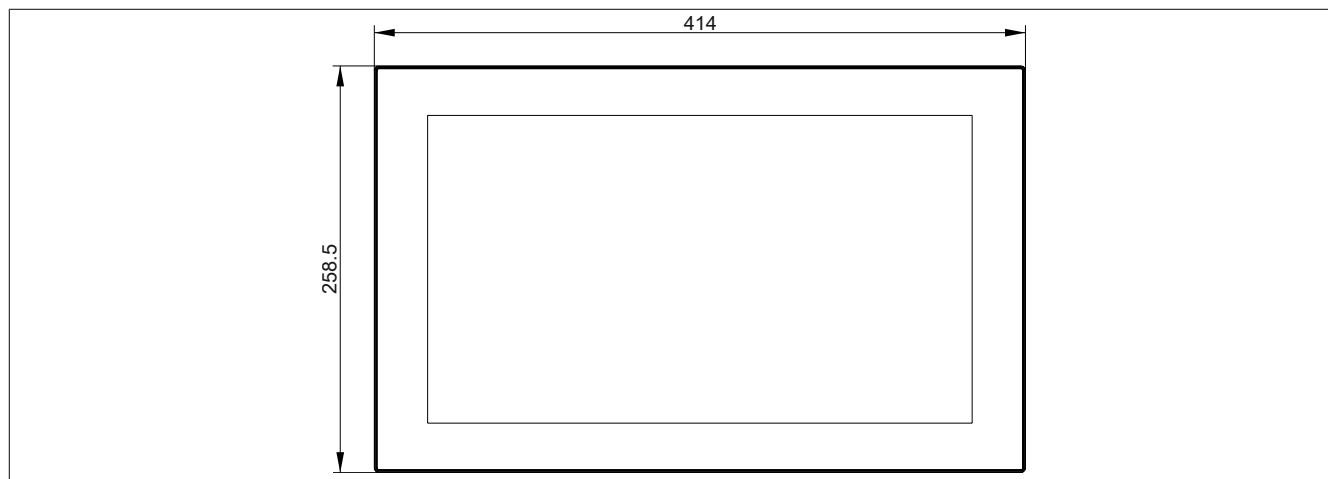


Figure 23: 5AP933.156B-00 - Dimensions

4.8.1.4.5 Temperature/Humidity diagram

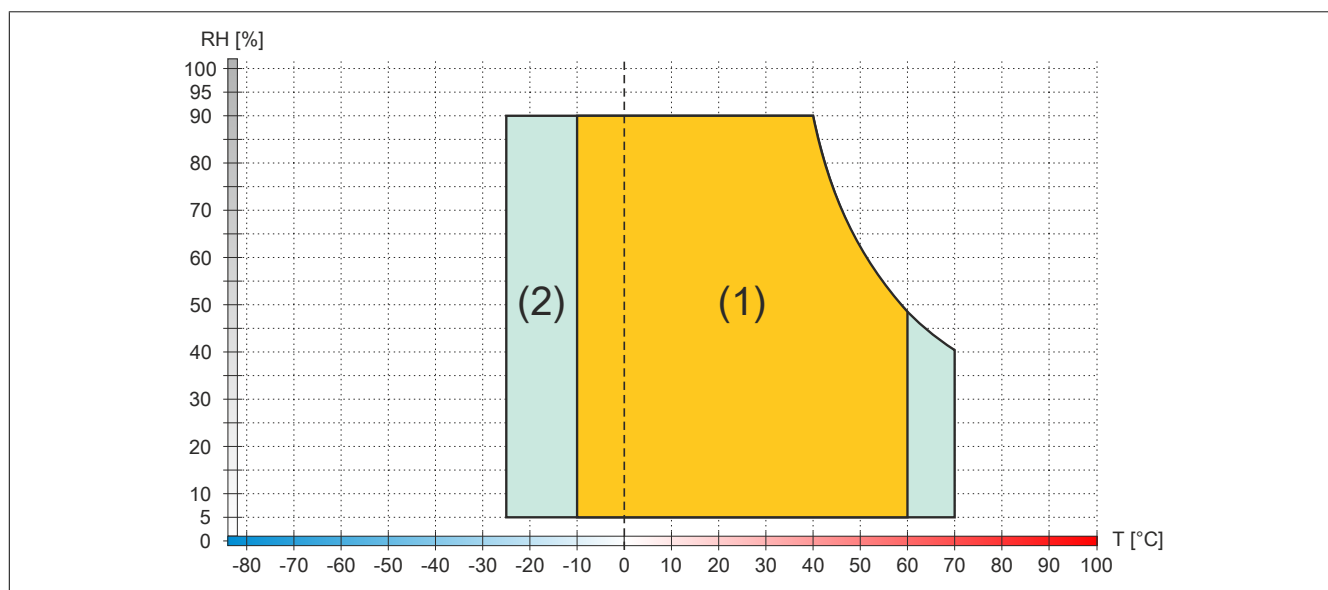


Figure 24: 5AP933.156B-00 ≥ Rev. D0 - Temperature/Humidity diagram

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

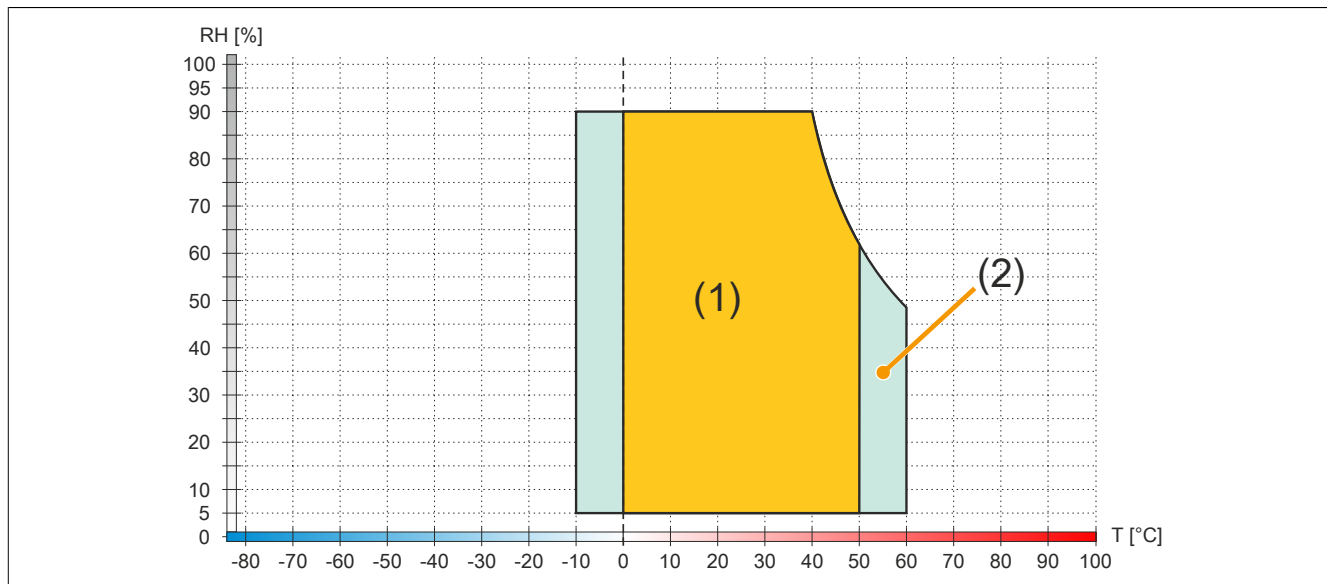


Figure 25: 5AP933.156B-00 ≤ Rev. C0 - Temperature/Humidity diagram

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

4.8.1.5 5AP933.185B-00

4.8.1.5.1 General information

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

4.8.1.5.2 Order data

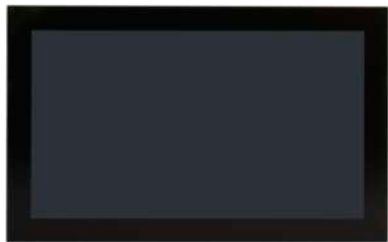
Model number	Short description	Figure
	Panels	
5AP933.185B-00	Automation Panel 18.5" HD TFT - 1366 x 768 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 17: 5AP933.185B-00 - Order data

4.8.1.5.3 Technical data

Information:

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

Model number	5AP933.185B-00	
Revision	C0	D0
General information		
B&R ID code	0xE16B	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
Display		
Type	TFT color	
Diagonal	18.5"	
Colors	16.7 million	
Resolution	HD, 1366 × 768 pixels	
Contrast	1000:1	
Viewing angles		
Horizontal	Direction R = 85° / Direction L = 85°	
Vertical	Direction U = 80° / Direction D = 80°	
Backlight		
Type	LED	
Brightness (dimable)	Typ. 15 to 300 cd/m²	
Half-brightness time ¹⁾	50,000 h	
Touch screen ²⁾		
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)	
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm fixed gasket	

Table 18: 5AP933.185B-00, 5AP933.185B-00 - Technical data

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

Table 18: 5AP933.185B-00, 5AP933.185B-00 - Technical data

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

4.8.1.5.4 Dimensions

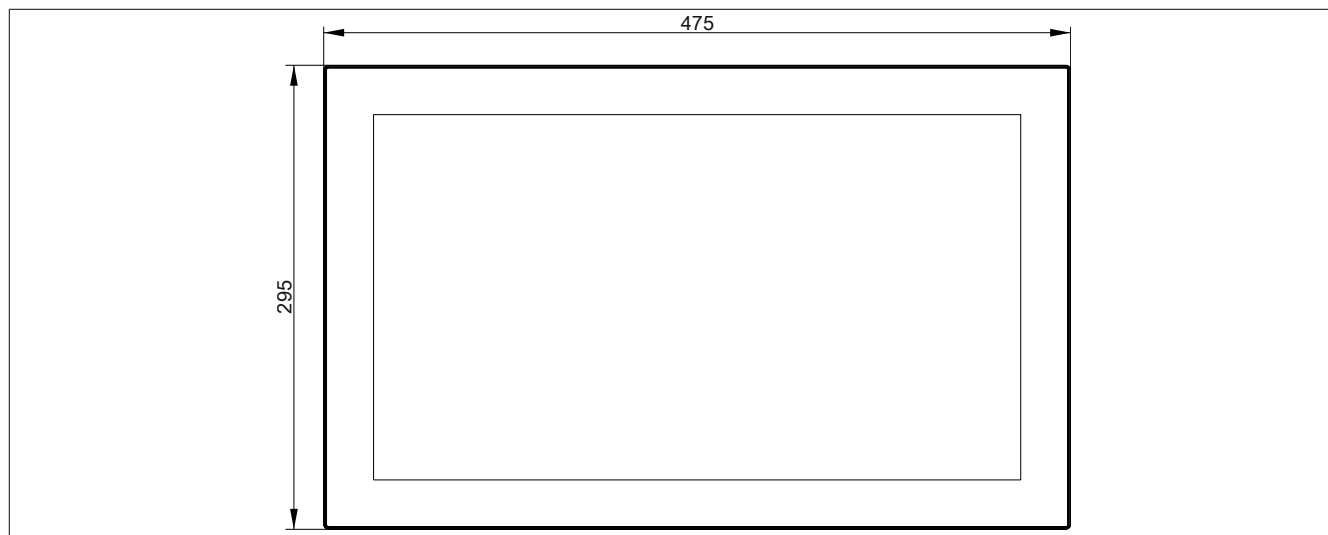


Figure 26: 5AP933.185B-00 - Dimensions

4.8.1.5.5 Temperature/Humidity diagram

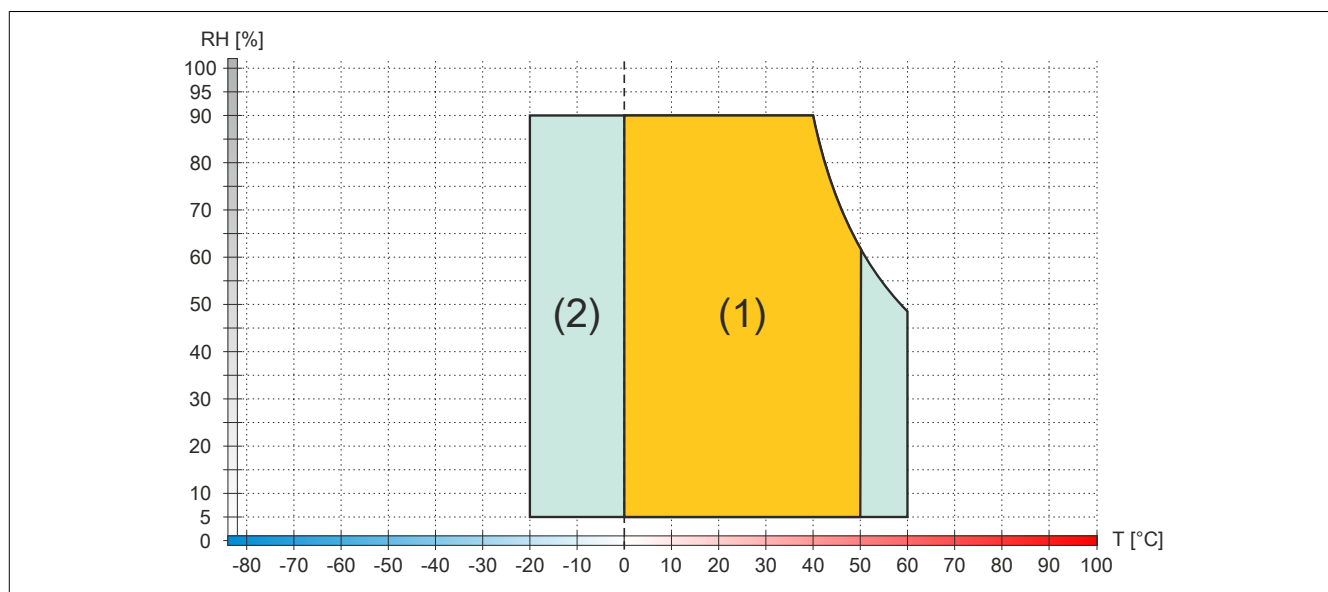


Figure 27: 5AP933.185B-00 ≥ Rev. D0 - Temperature/Humidity diagram

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

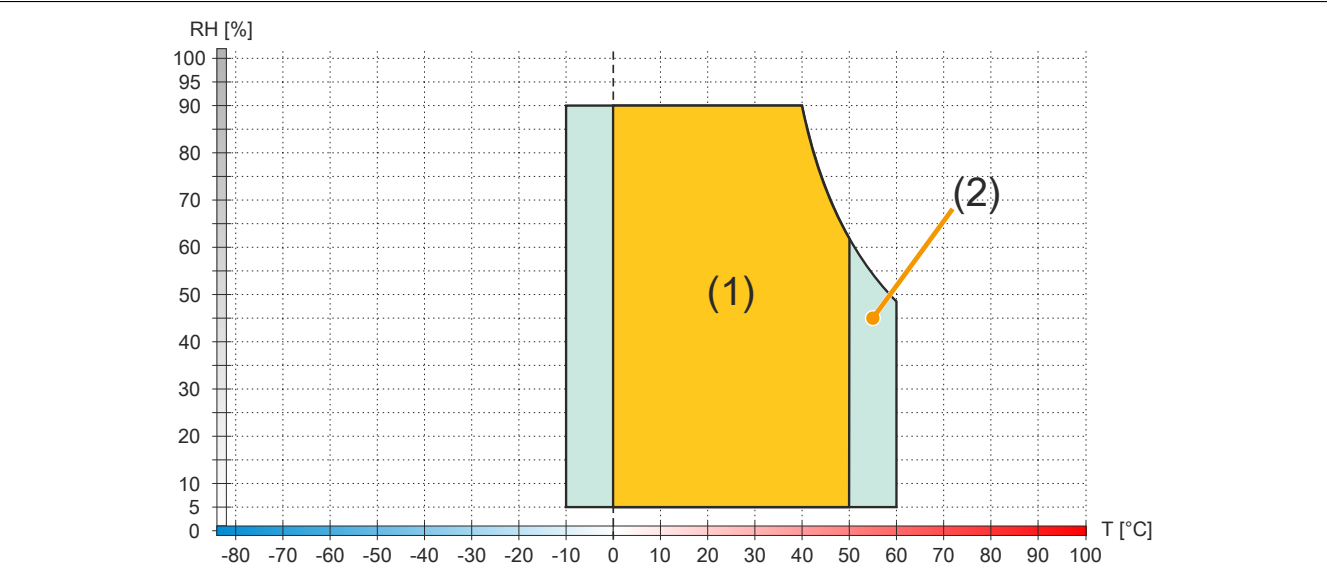


Figure 28: 5AP933.185B-00 ≤ Rev. C0 - Temperature/Humidity diagram

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

4.8.1.6 5AP933.215C-00

4.8.1.6.1 General information

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

4.8.1.6.2 Order data

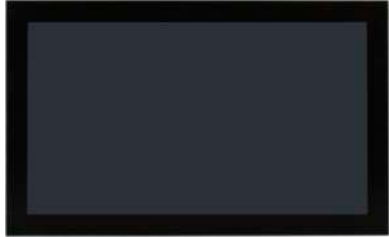
Model number	Short description	Figure
	Panels	
5AP933.215C-00	Automation Panel 21.5" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 19: 5AP933.215C-00 - Order data

4.8.1.6.3 Technical data

Information:

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

Model number	5AP933.215C-00	
Revision	C0	D0
General information		
B&R ID code	0xE16C	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
Display		
Type	TFT color	
Diagonal	21.5"	
Colors	16.7 million	
Resolution	FHD, 1920 × 1080 pixels	
Contrast	1000:1	5000:1
Viewing angles		
Horizontal	Direction R = 89° / Direction L = 89°	
Vertical	Direction U = 89° / Direction D = 89°	
Backlight		
Type	LED	
Brightness (dimnable)	Typ. 12.5 to 250 cd/m²	
Half-brightness time ¹⁾	30,000 h	
Touch screen ²⁾		
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)	
Degree of protection per UL 50	Front: Type 4X indoor use only	
Mechanical properties		
Front		
Frame	Aluminum, coated	
Design	Black	
Gasket	3 mm fixed gasket	

Table 20: 5AP933.215C-00, 5AP933.215C-00 - Technical data

Technical data

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

Table 20: 5AP933.215C-00, 5AP933.215C-00 - Technical data

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

4.8.1.6.4 Dimensions

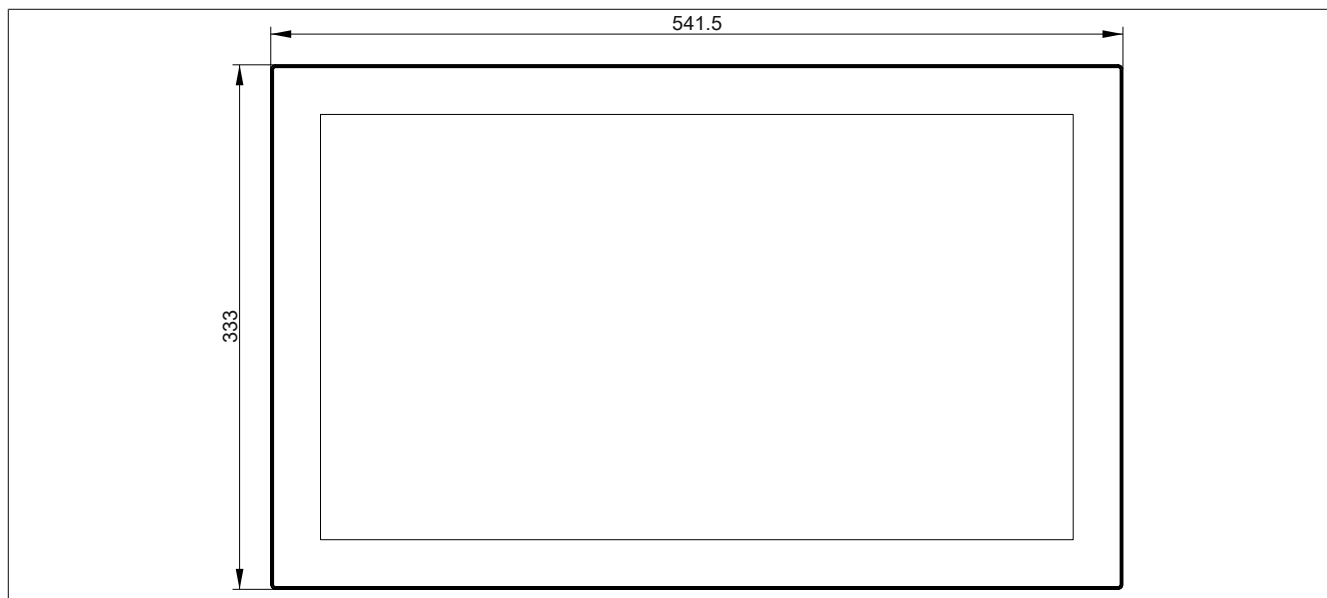


Figure 29: 5AP933.215C-00 - Dimensions

4.8.1.6.5 Temperature/Humidity diagram

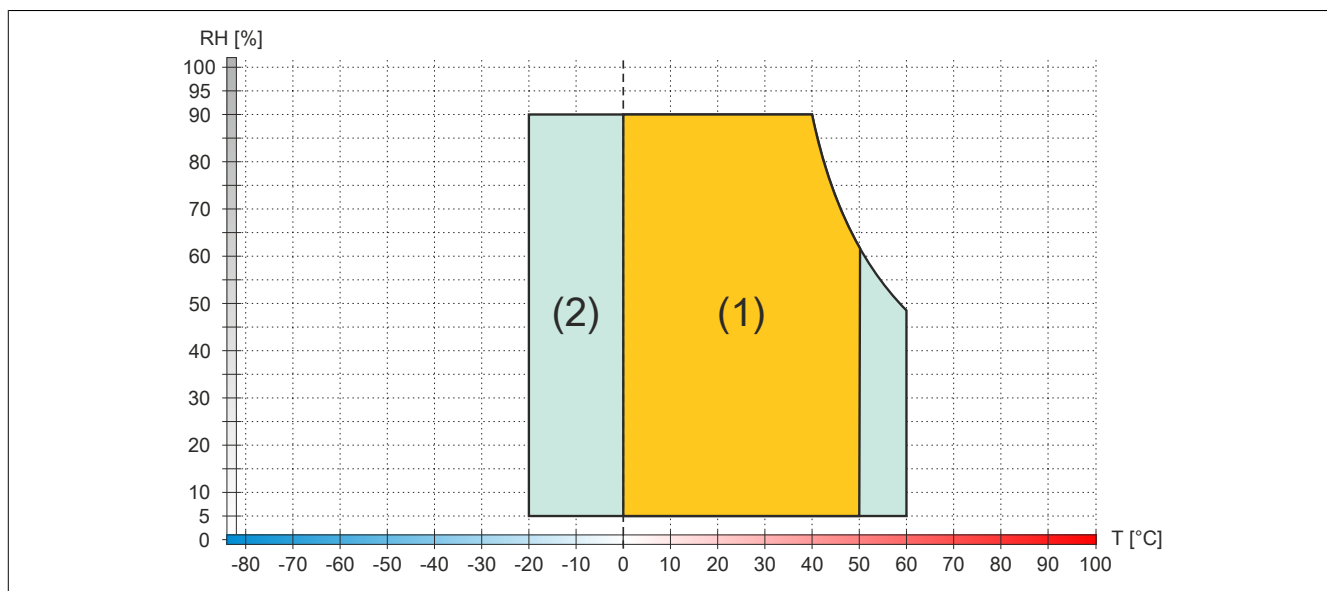


Figure 30: 5AP933.215C-00 ≥ Rev. D0 - Temperature/Humidity diagram

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

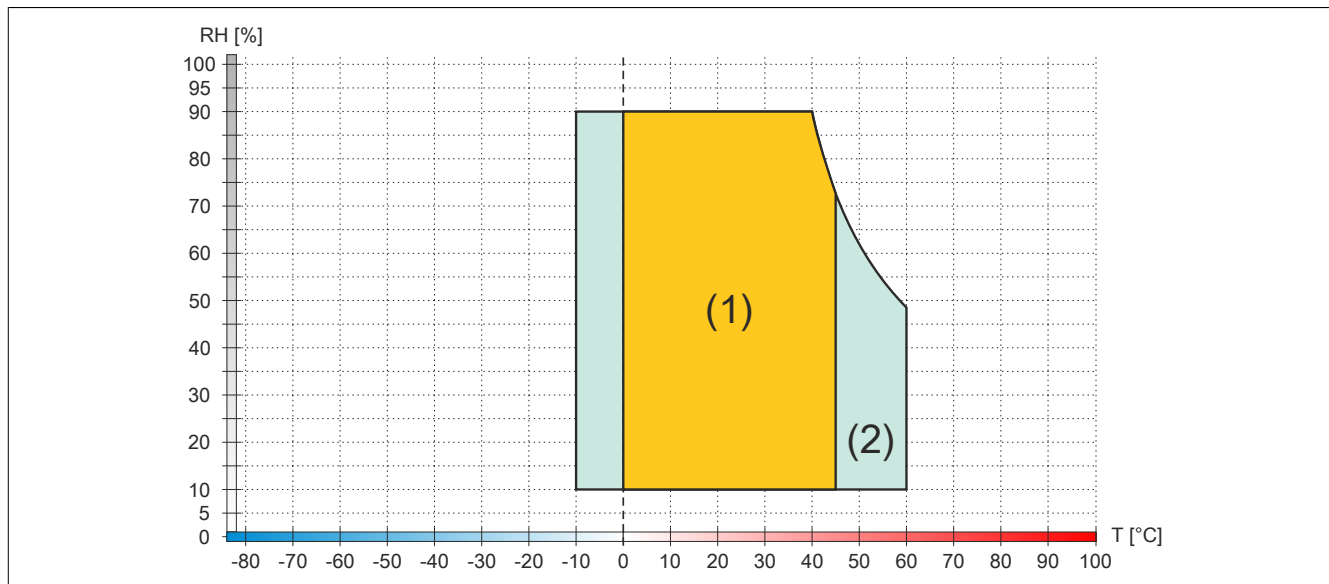


Figure 31: 5AP933.215C-00 ≤ Rev. C0 - Temperature/Humidity diagram

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

4.8.1.7 5AP933.240C-00

4.8.1.7.1 General information

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

4.8.1.7.2 Order data

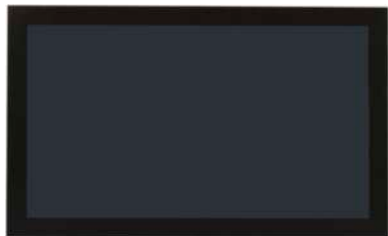
Model number	Short description	Figure
	Panels	
5AP933.240C-00	Automation Panel 24.0" Full HD TFT - 1920 x 1080 pixels (16:9) - Multi-touch (projected capacitive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 21: 5AP933.240C-00 - Order data

4.8.1.7.3 Technical data

Information:

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

Model number	5AP933.240C-00	
Revision	C0	D0
General information		
B&R ID code	0xE1B4	
Certifications		
CE	Yes	
UL	cULus E115267	
DNV GL	Industrial control equipment	
	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 ³⁾		
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)	
Degree of protection per UL 50	Front: Type 4X indoor use only	

Table 22: 5AP933.240C-00, 5AP933.240C-00 - Technical data

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

Table 22: 5AP933.240C-00, 5AP933.240C-00 - Technical data

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

4.8.1.7.4 Dimensions

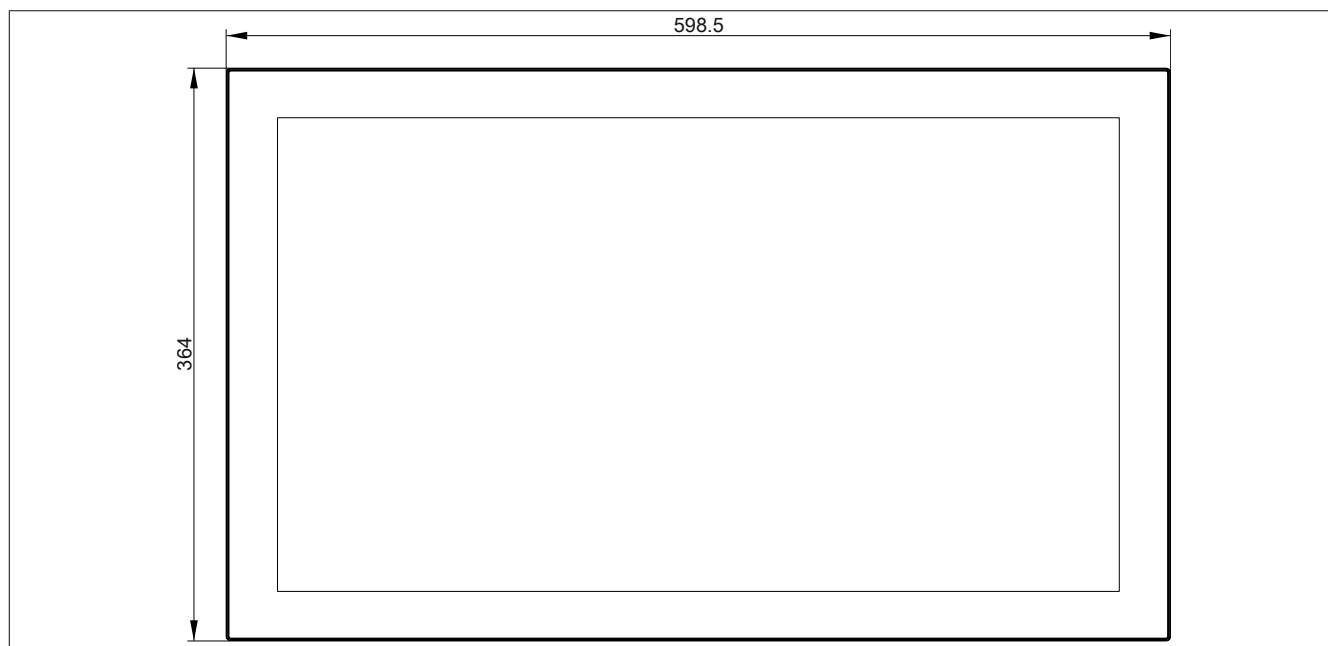


Figure 32: 5AP933.240C-00 - Dimensions

4.8.1.7.5 Temperature/Humidity diagram

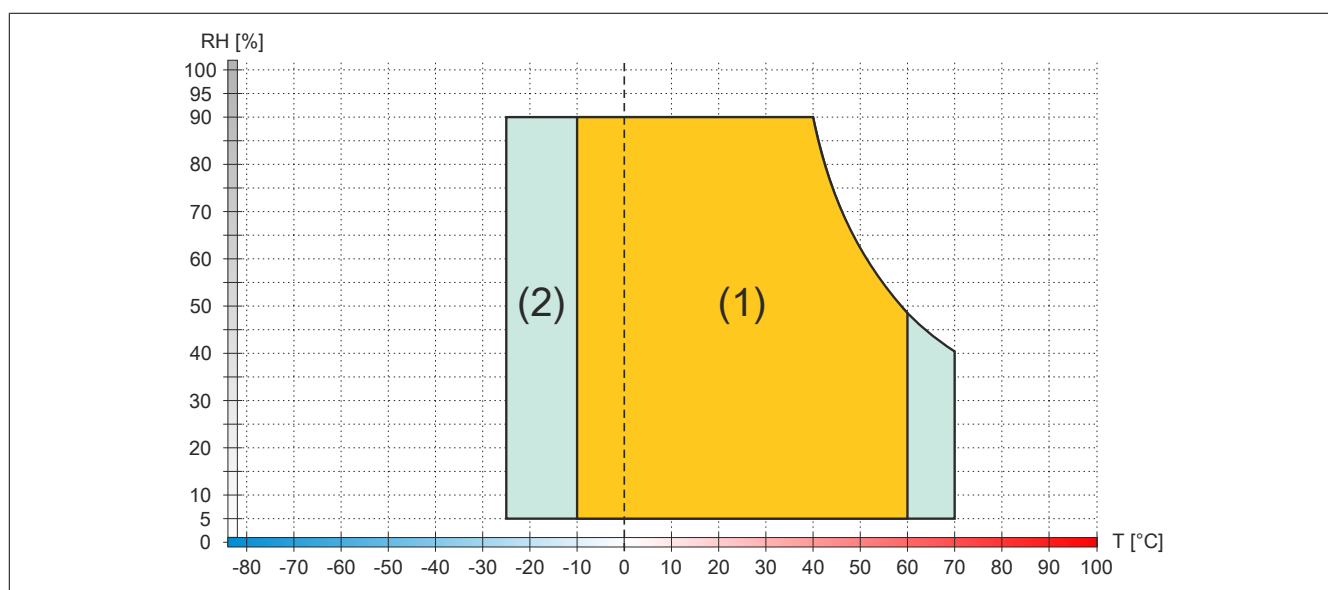


Figure 33: 5AP933.240C-00 ≥ Rev. D0 - Temperature/Humidity diagram

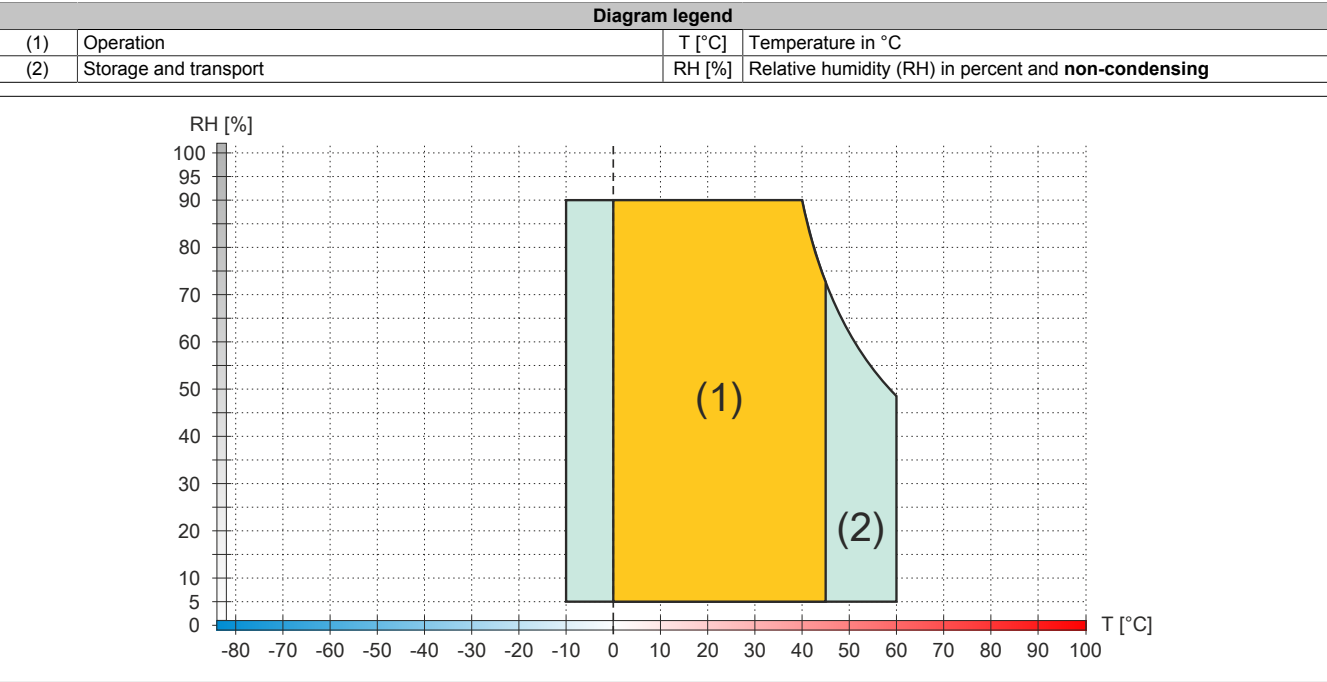


Figure 34: 5AP933.240C-00 ≤ Rev. C0 - Temperature/Humidity diagram

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

4.8.2 AP1000 panels

4.8.2.1 5AP1120.1043-000

4.8.2.1.1 General information

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

4.8.2.1.2 Order data

Model number	Short description	Figure
5AP1120.1043-000	Panels 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 23: 5AP1120.1043-000 - Order data

4.8.2.1.3 Technical data

Information:

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

Model number	5AP1120.1043-000
General information	
B&R ID code	0xE7AD
Certifications	
CE	Yes
EAC	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	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
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 24: 5AP1120.1043-000 - Technical data

Technical data

Model number	5AP1120.1043-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	323 mm
Height	260 mm
Weight	2800 g

Table 24: 5AP1120.1043-000 - Technical data

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

4.8.2.1.4 Dimensions

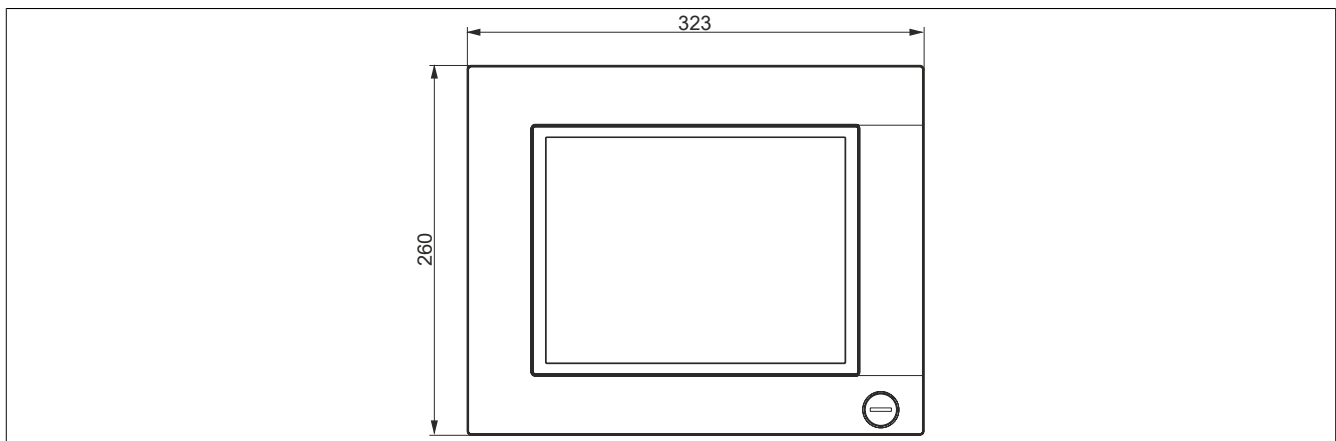


Figure 35: 5AP1120.1043-000 - Dimensions

4.8.2.1.5 Temperature/Humidity diagram

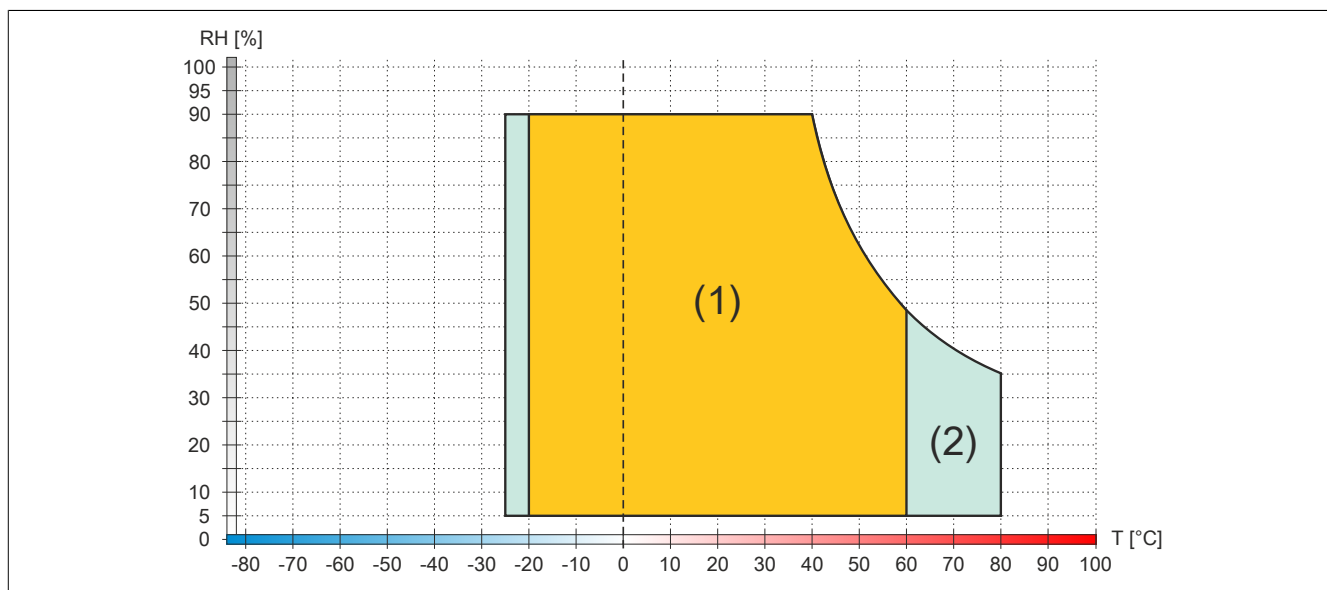


Figure 36: 5AP1120.1043-000 - Temperature/Humidity diagram

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

4.8.2.2 5AP1120.101E-000

4.8.2.2.1 General information

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

4.8.2.2.2 Order data

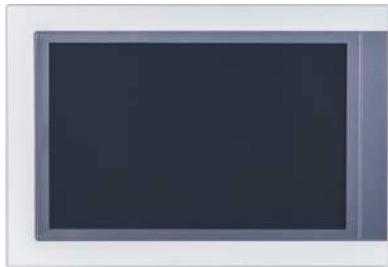
Model number	Short description	Figure
	Panels	
5AP1120.101E-000	Automation Panel 10.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

Table 25: 5AP1120.101E-000 - Order data

4.8.2.2.3 Technical data

Information:

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

Model number	5AP1120.101E-000
General information	
B&R ID code	0xE93D
Certifications	
CE	Yes
EAC	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	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/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)
Degree of protection per UL 50	Front: Type 4X indoor use only

Table 26: 5AP1120.101E-000 - Technical data

Model number	5AP1120.101E-000
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	1900 g

Table 26: 5AP1120.101E-000 - Technical data

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

4.8.2.2.4 Dimensions

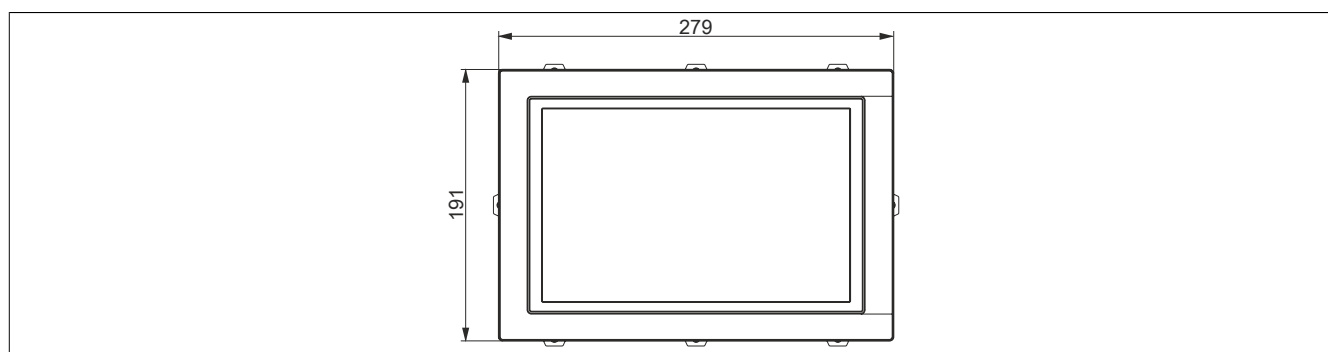


Figure 37: 5AP1120.101E-000 - Dimensions

4.8.2.2.5 Temperature/Humidity diagram

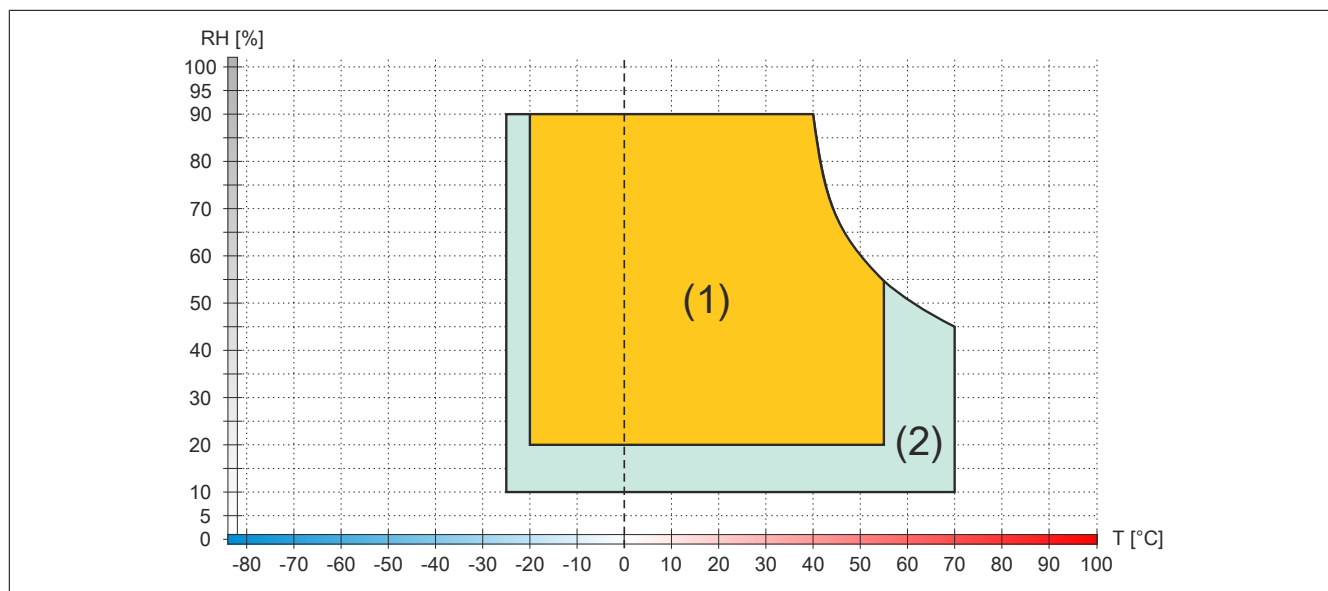


Figure 38: 5AP1120.101E-000 - Temperature/Humidity diagram

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

4.8.2.3 5AP1120.1214-000

4.8.2.3.1 General information

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

4.8.2.3.2 Order data

Model number	Short description	Figure
5AP1120.1214-000	Panels 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 27: 5AP1120.1214-000 - Order data

4.8.2.3.3 Technical data

Information:

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

Model number	5AP1120.1214-000
General information	
B&R ID code	0xE7BB
Certifications	
CE	Yes
EAC	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	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
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 28: 5AP1120.1214-000 - Technical data

Model number	5AP1120.1214-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	362 mm
Height	284 mm
Weight	3200 g

Table 28: 5AP1120.1214-000 - Technical data

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

4.8.2.3.4 Dimensions

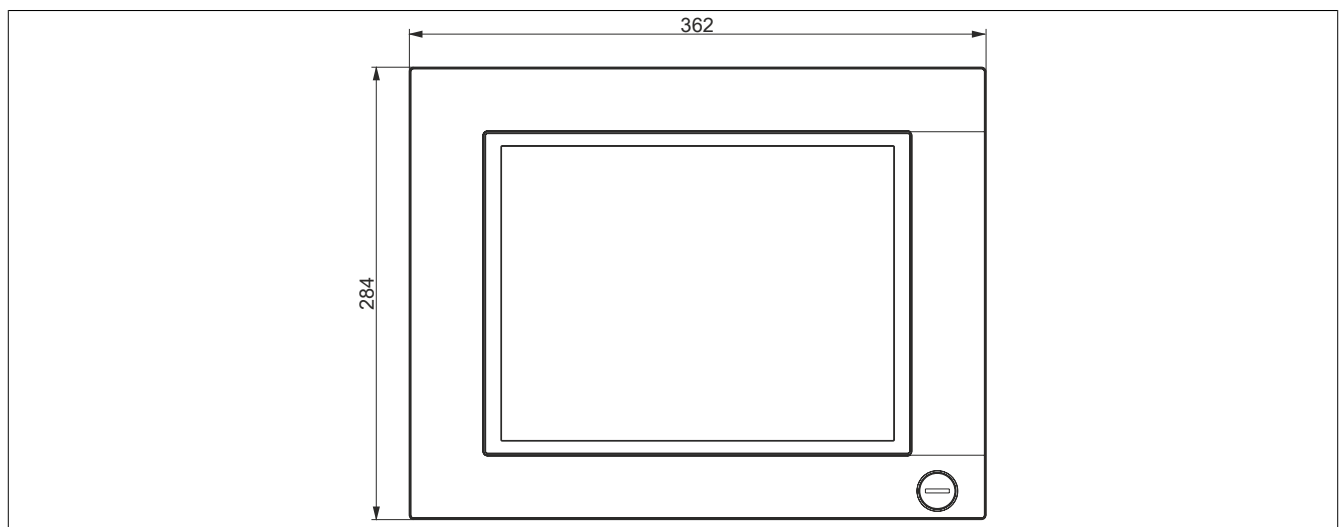


Figure 39: 5AP1120.1214-000 - Dimensions

4.8.2.3.5 Temperature/Humidity diagram

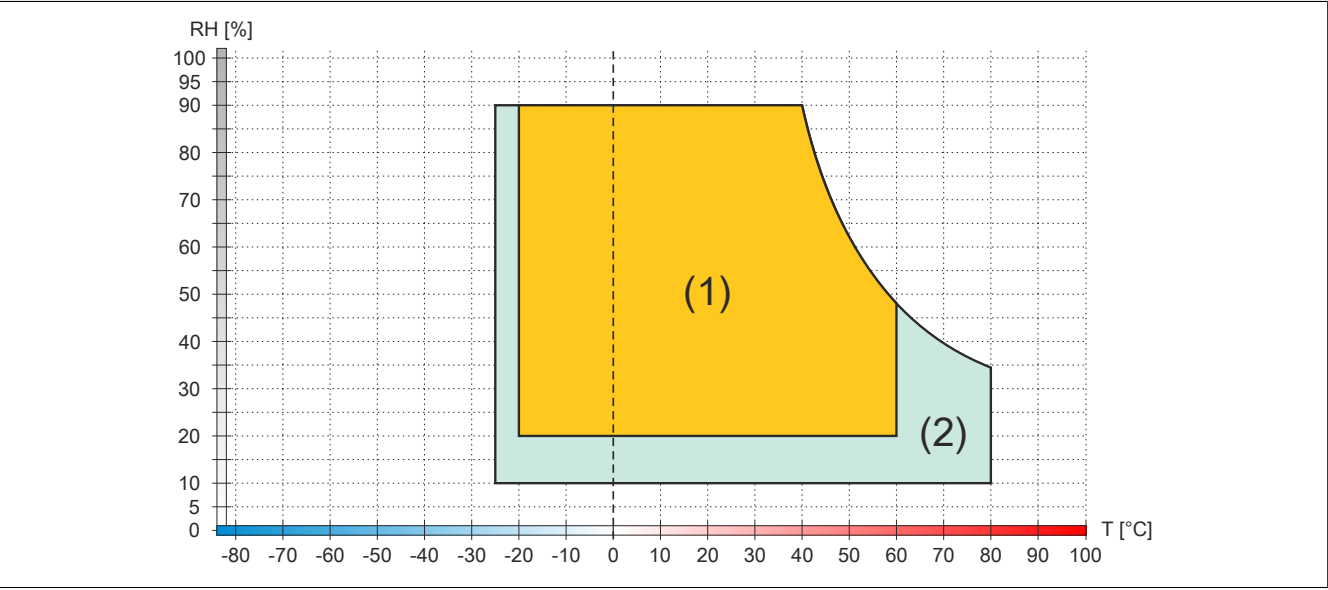


Figure 40: 5AP1120.1214-000 - Temperature/Humidity diagram

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

4.8.2.4 5AP1120.121E-000

4.8.2.4.1 General information

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

4.8.2.4.2 Order data

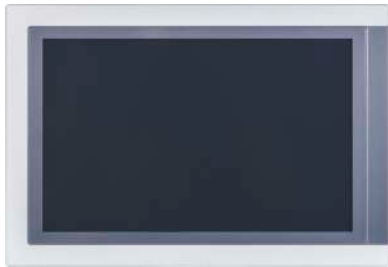
Model number	Short description	Figure
	Panels	
5AP1120.121E-000	Automation Panel 12.1" WXGA TFT - 1280 x 800 pixels (16:10) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC2100 / PPC3100 / PPC2200 / link modules	

Table 29: 5AP1120.121E-000 - Order data

4.8.2.4.3 Technical data

Information:

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

Model number	5AP1120.121E-000
General information	
B&R ID code	0xE8E4
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	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	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)
Degree of protection per UL 50	Front: Type 4X indoor use only

Table 30: 5AP1120.121E-000 - Technical data

Technical data

Model number	5AP1120.121E-000
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	2300 g

Table 30: 5AP1120.121E-000 - Technical data

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

4.8.2.4.4 Dimensions

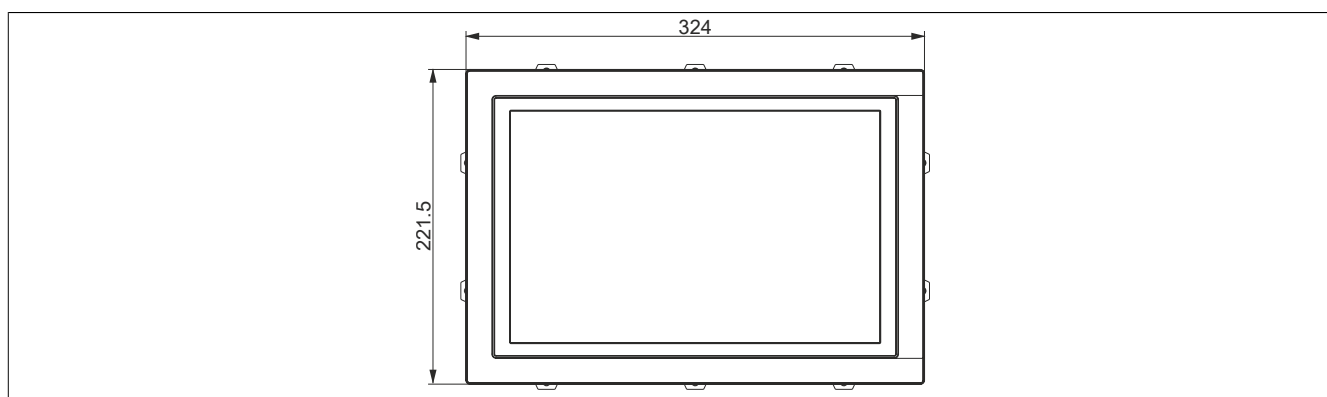


Figure 41: 5AP1120.121E-000 - Dimensions

4.8.2.4.5 Temperature/Humidity diagram

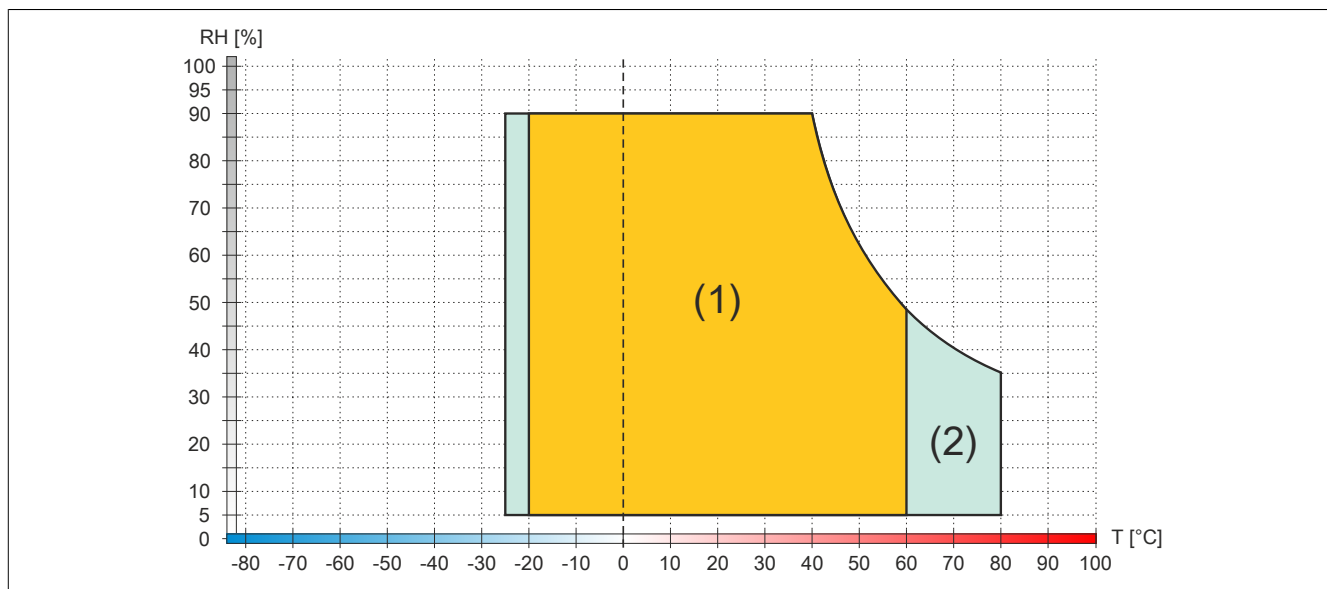


Figure 42: 5AP1120.121E-000 - Temperature/Humidity diagram

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

4.8.2.5 5AP1120.1505-000

4.8.2.5.1 General information

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

4.8.2.5.2 Order data

Model number	Short description	Figure
5AP1120.1505-000	Panels 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 31: 5AP1120.1505-000 - Order data

4.8.2.5.3 Technical data

Information:

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

Model number	5AP1120.1505-000
General information	
B&R ID code	0xE7BC
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	15.0"
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
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 32: 5AP1120.1505-000 - Technical data

Technical data

Model number	5AP1120.1505-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	435 mm
Height	330 mm
Weight	5000 g

Table 32: 5AP1120.1505-000 - Technical data

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

4.8.2.5.4 Dimensions

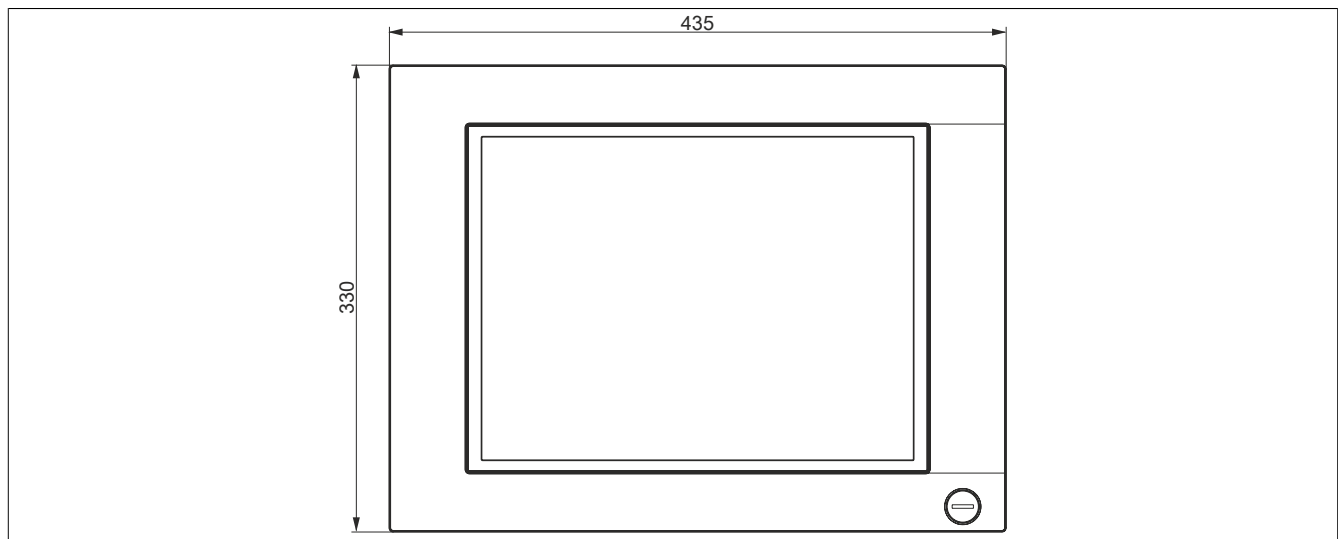


Figure 43: 5AP1120.1505-000 - Dimensions

4.8.2.5.5 Temperature/Humidity diagram

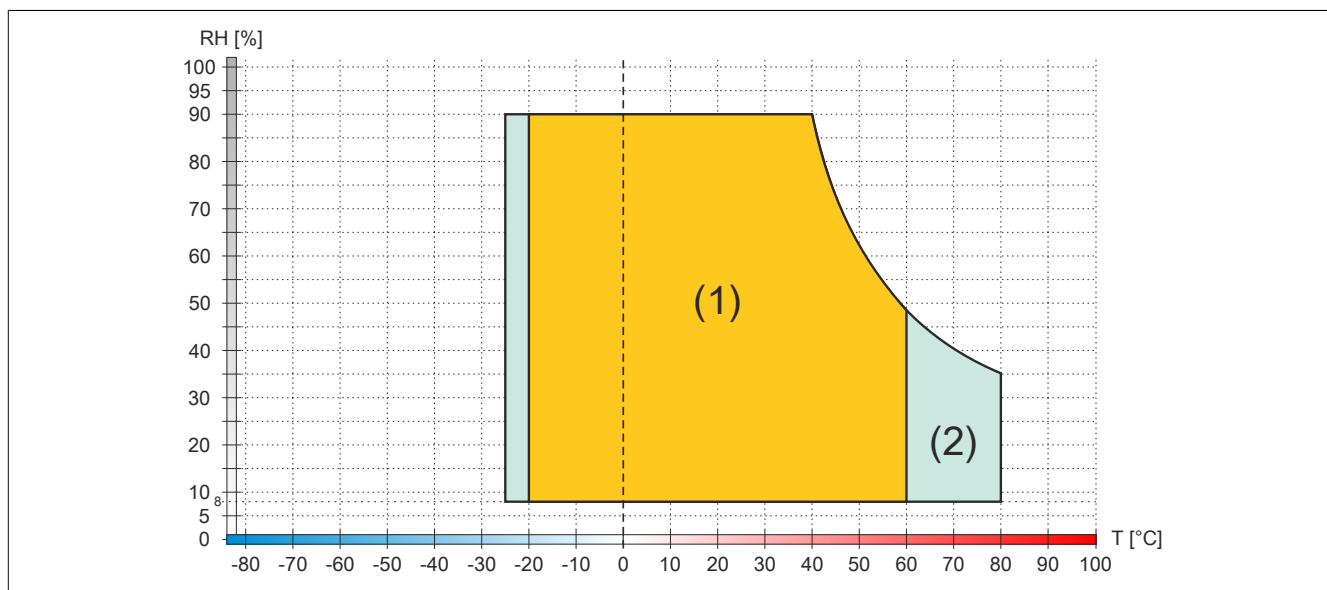


Figure 44: 5AP1120.1505-000 - Temperature/Humidity diagram

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

4.8.2.6 5AP1120.156B-000

4.8.2.6.1 General information

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

4.8.2.6.2 Order data

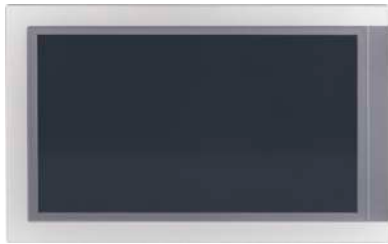
Model number	Short description	Figure
	Panels	
5AP1120.156B-000	Automation Panel 15.6" HD TFT - 1366 x 768 pixels (16:9) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules	

Table 33: 5AP1120.156B-000 - Order data

4.8.2.6.3 Technical data

Information:

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

Model number	5AP1120.156B-000
General information	
B&R ID code	0xE8E5
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	15.6"
Colors	16.7 million
Resolution	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/m²
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)
Degree of protection per UL 50	Front: Type 4X indoor use only

Table 34: 5AP1120.156B-000 - Technical data

Model number	5AP1120.156B-000
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, coated
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	4200 g

Table 34: 5AP1120.156B-000 - Technical data

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

4.8.2.6.4 Dimensions

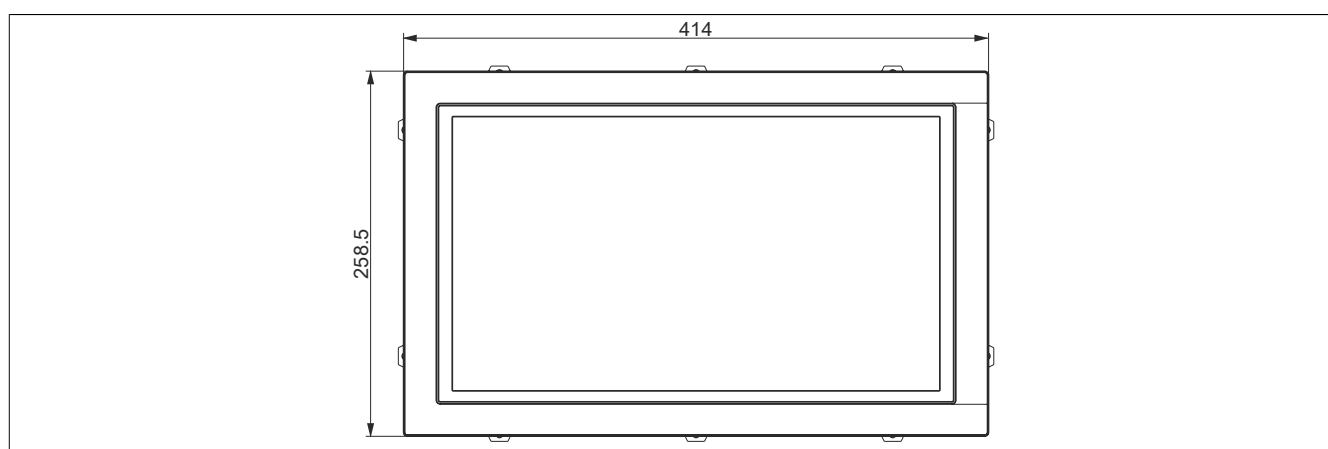


Figure 45: 5AP1120.156B-000 - Dimensions

4.8.2.6.5 Temperature/Humidity diagram

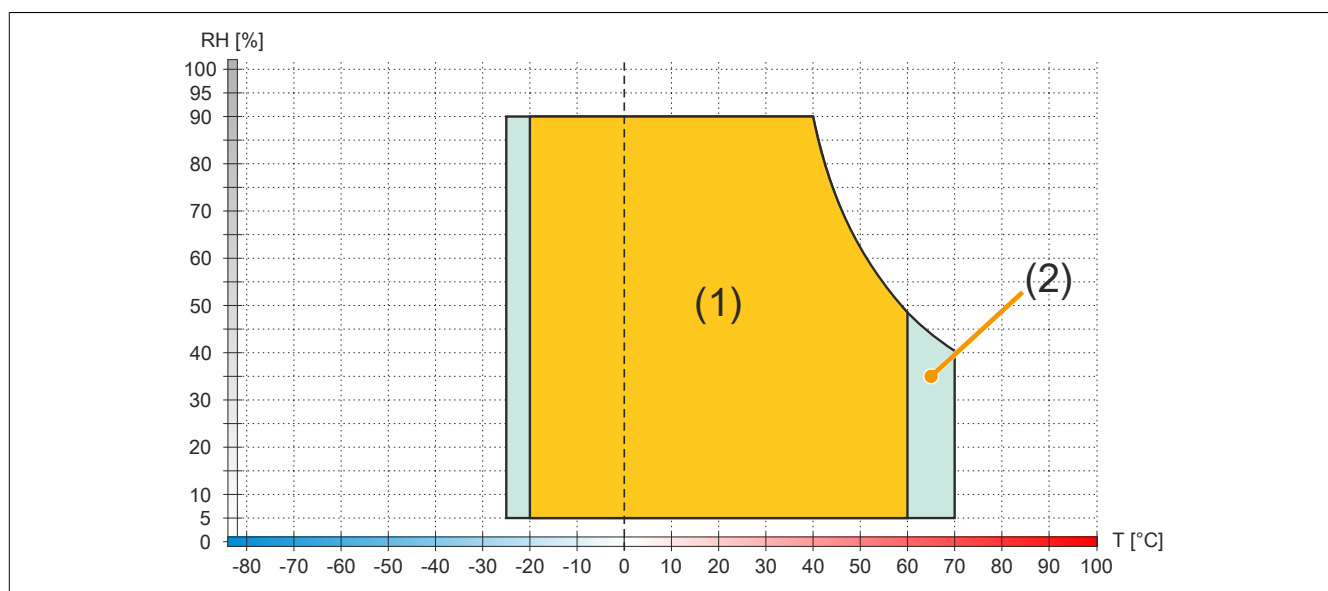


Figure 46: 5AP1120.156B-000 - Temperature/Humidity diagram

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

4.8.2.7 5AP1120.1906-000

4.8.2.7.1 General information

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

4.8.2.7.2 Order data

Model number	Short description	Figure
5AP1120.1906-000	Panels 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 35: 5AP1120.1906-000 - Order data

4.8.2.7.3 Technical data

Information:

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

Model number	5AP1120.1906-000
General information	
B&R ID code	0xE7BE
Certifications	
CE	Yes
EAC	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⁾
Display	
Type	TFT color
Diagonal	19.0"
Colors	16.2 million
Resolution	SXGA, 1280 x 1024 pixels
Contrast	1500:1
Viewing angles	
Horizontal	Direction R = 85° / Direction L = 85°
Vertical	Direction U = 85° / Direction D = 85°
Backlight	
Type	LED
Brightness (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%

Table 36: 5AP1120.1906-000 - Technical data

Model number	5AP1120.1906-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁵⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	527 mm
Height	421 mm
Weight	7300 g

Table 36: 5AP1120.1906-000 - Technical data

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

4.8.2.7.4 Dimensions

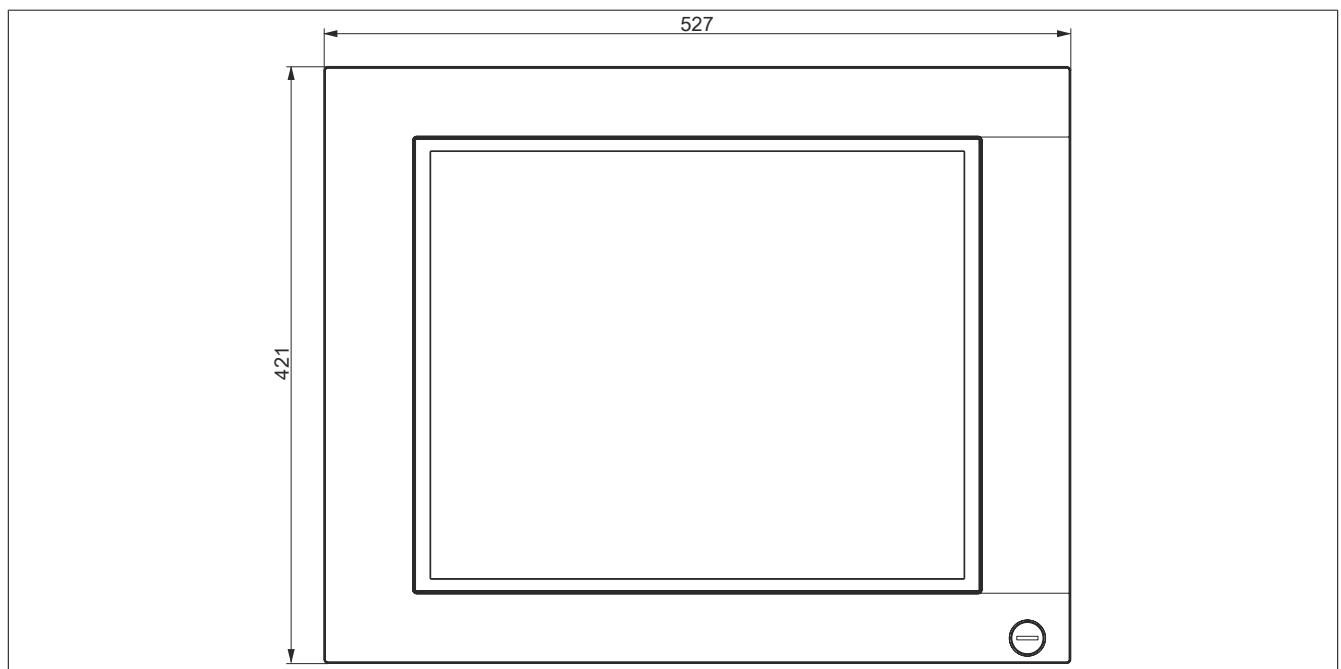


Figure 47: 5AP1120.1906-000 - Dimensions

4.8.2.7.5 Temperature/Humidity diagram

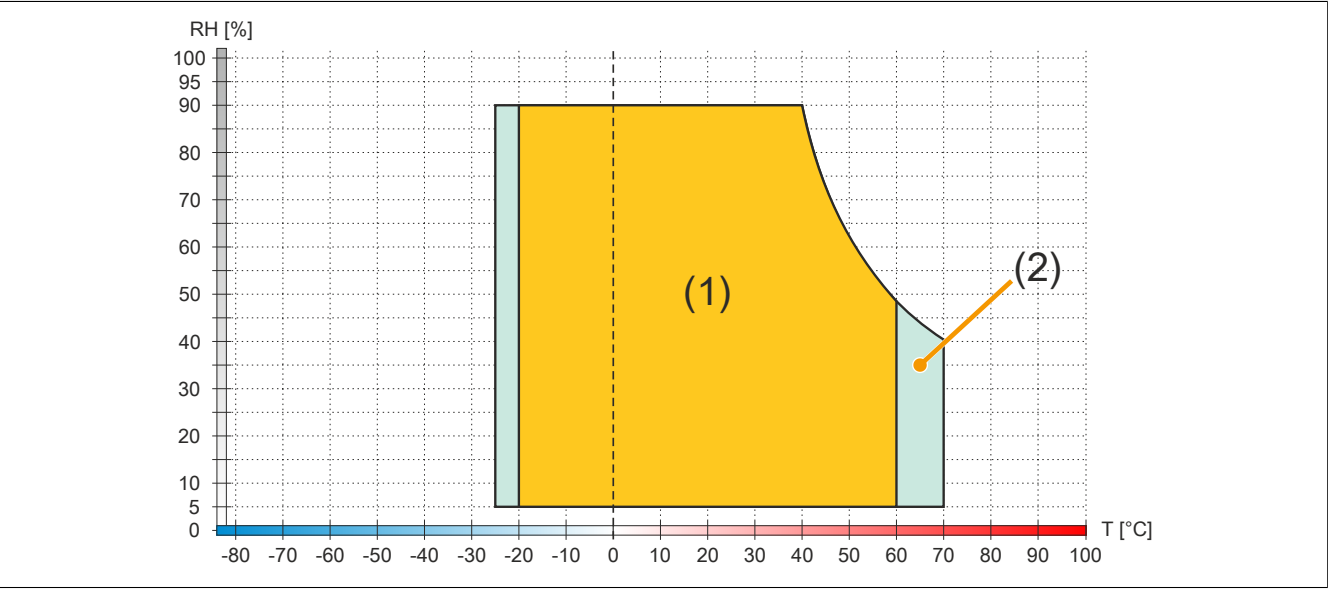


Figure 48: 5AP1120.1906-000 - Temperature/Humidity diagram

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

4.8.2.8 5AP1130.101E-000

4.8.2.8.1 General information

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

4.8.2.8.2 Order data

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

Table 37: 5AP1130.101E-000 - Order data

4.8.2.8.3 Technical data

Information:

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

Model number	5AP1130.101E-000
General information	
B&R ID code	0xEB62
Certifications	
CE	Yes
EAC	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	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/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, section "Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Table 38: 5AP1130.101E-000 - Technical data

Technical data

Model number	5AP1130.101E-000
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	279 mm
Height	191 mm
Weight	2000 g

Table 38: 5AP1130.101E-000 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) The specifications for the touch screen driver must be taken into account. See chapter 4 "Software", section "Multi-touch drivers".
- 4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.8.2.8.4 Dimensions

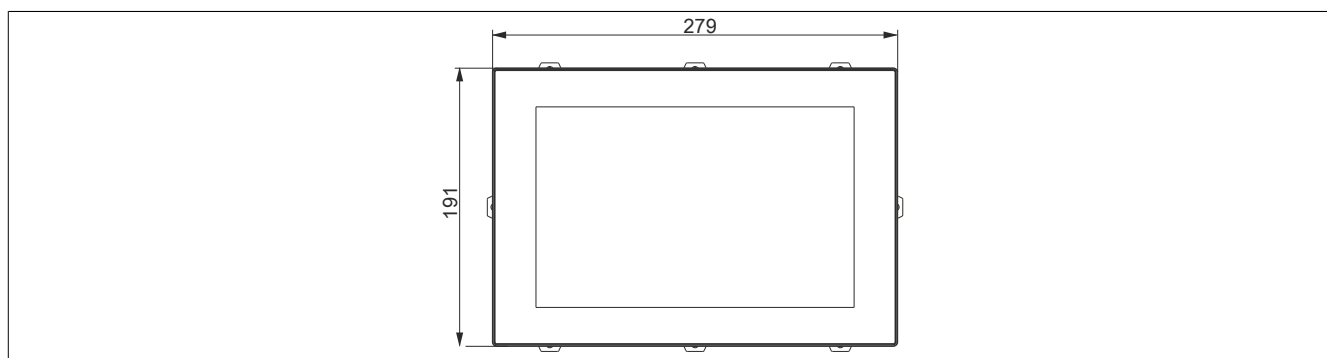


Figure 49: 5AP1130.101E-000 - Dimensions

4.8.2.8.5 Temperature/Humidity diagram

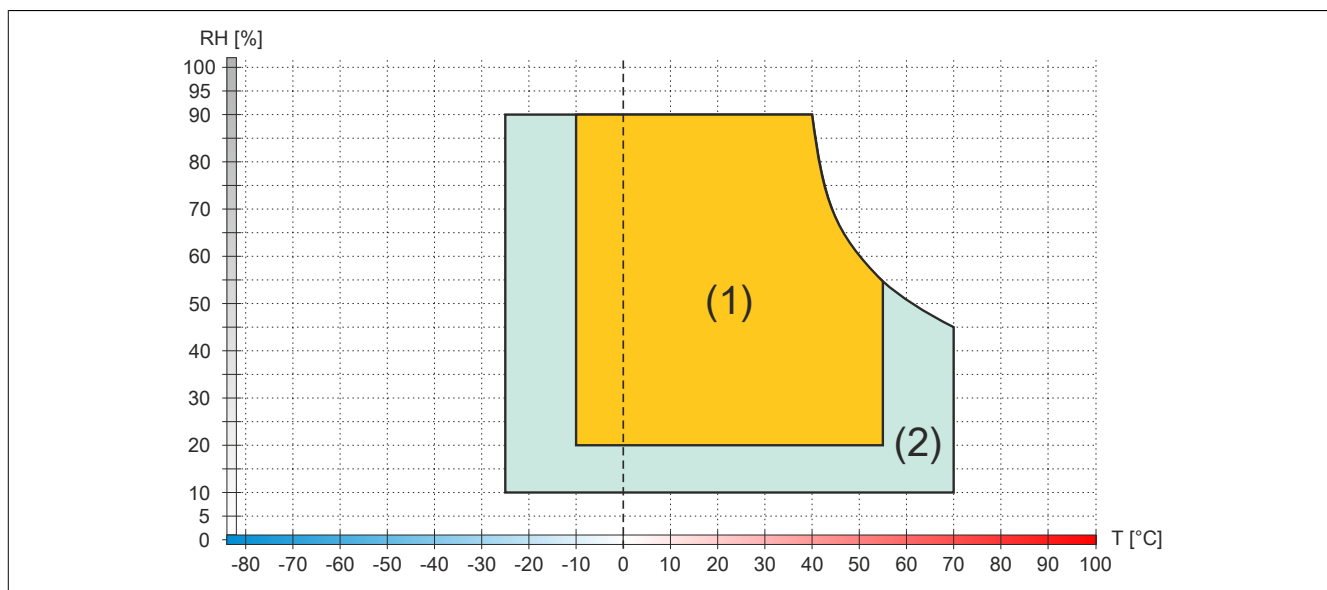


Figure 50: 5AP1130.101E-000 - Temperature/Humidity diagram

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

4.8.2.9 5AP1130.121E-000

4.8.2.9.1 General information

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

4.8.2.9.2 Order data

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

Table 39: 5AP1130.121E-000 - Order data

4.8.2.9.3 Technical data

Information:

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

Model number	5AP1130.121E-000
General information	
B&R ID code	0xEB63
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	12.1"
Colors	16.7 million
Resolution	WXGA, 1280 x 800 pixels
Contrast	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, section "Touch screen".
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only

Table 40: 5AP1130.121E-000 - Technical data

Technical data

Model number	5AP1130.121E-000
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	324 mm
Height	221.5 mm
Weight	2400 g

Table 40: 5AP1130.121E-000 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) The specifications for the touch screen driver must be taken into account. See chapter 4 "Software", section "Multi-touch drivers".
- 4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.8.2.9.4 Dimensions

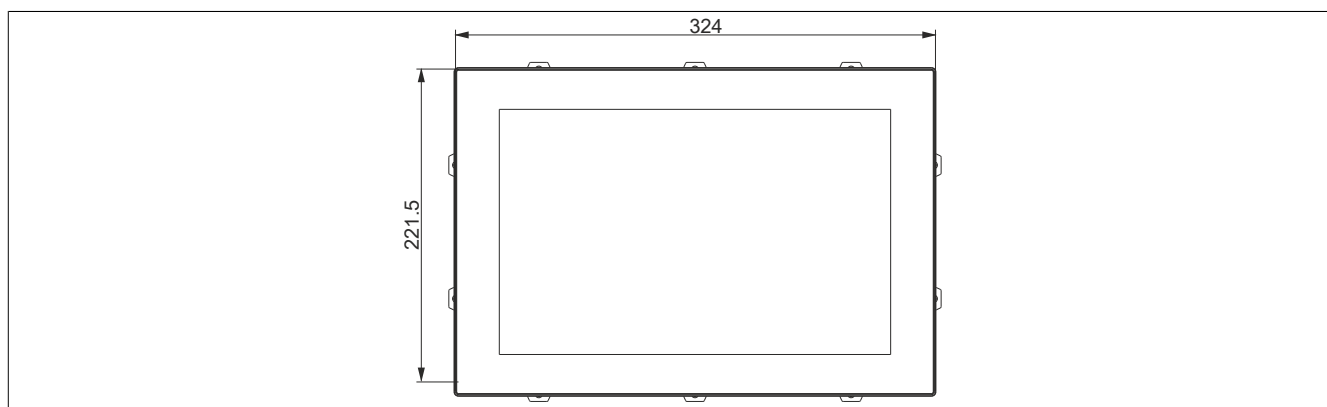


Figure 51: 5AP1130.121E-000 - Dimensions

4.8.2.9.5 Temperature/Humidity diagram

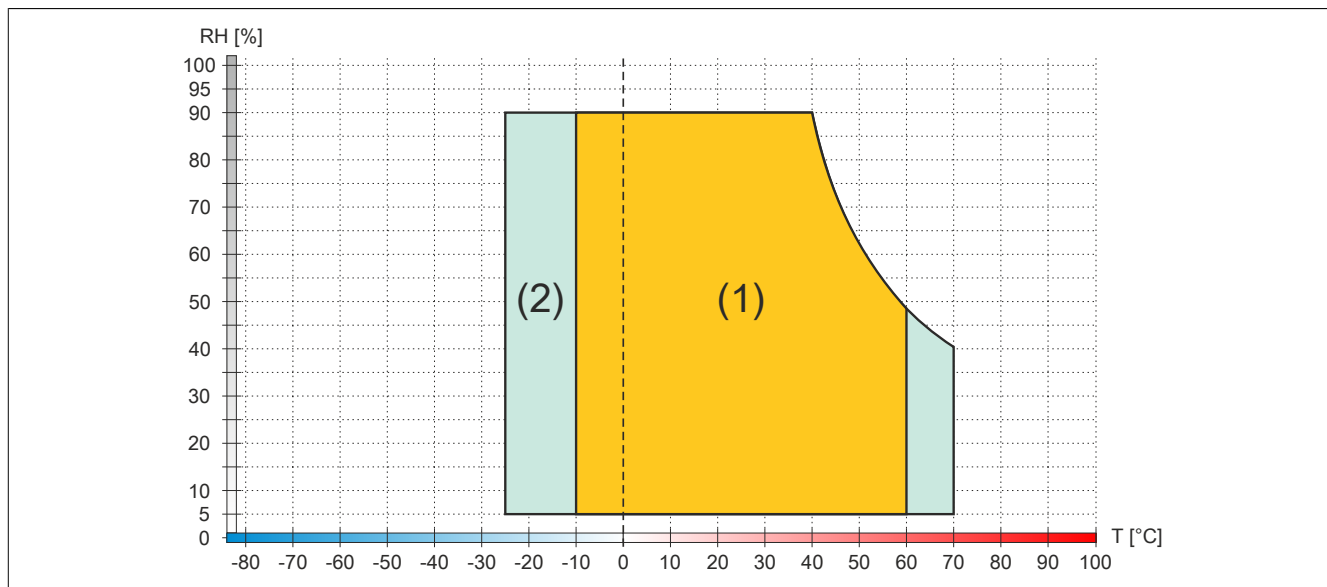


Figure 52: 5AP1130.121E-000 - Temperature/Humidity diagram

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

4.8.2.10 5AP1130.156C-000

4.8.2.10.1 General information

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

4.8.2.10.2 Order data

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

Table 41: 5AP1130.156C-000 - Order data

4.8.2.10.3 Technical data

Information:

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

Model number	5AP1130.156C-000
General information	
B&R ID code	0xEC5D
Certifications	
CE	Yes
EAC	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⁾
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 appendix A, section "Touch screen".

Table 42: 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)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁵⁾	
Frame	Aluminum, coated
Design	Black
Gasket	3 mm fixed gasket
Dimensions	
Width	414 mm
Height	258.5 mm
Weight	3700 g

Table 42: 5AP1130.156C-000 - Technical data

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

4.8.2.10.4 Dimensions

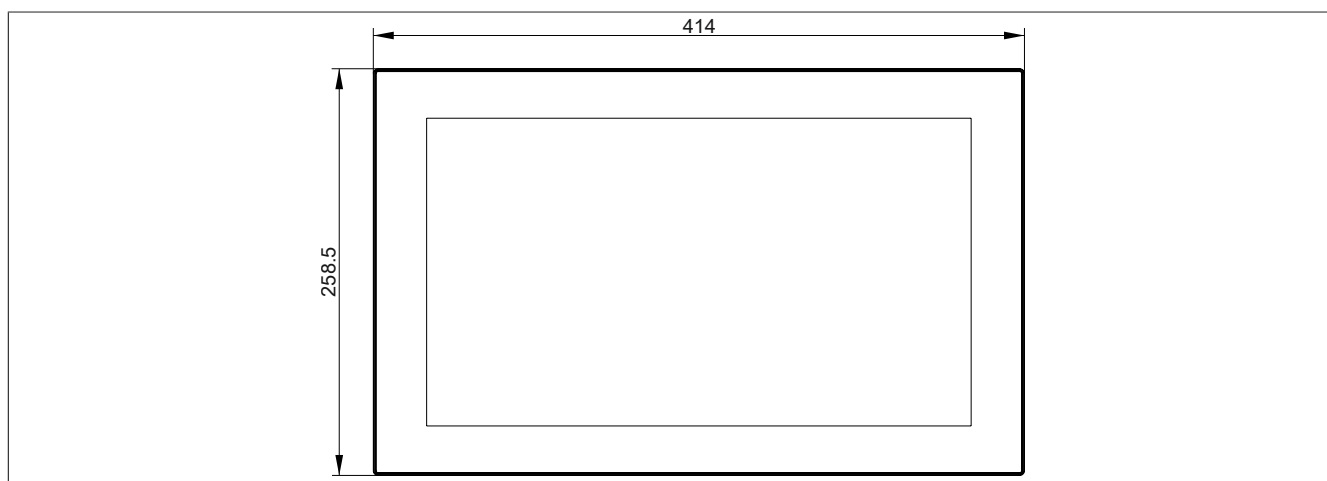


Figure 53: 5AP1130.156C-000 - Dimensions

4.8.2.10.5 Temperature/Humidity diagram

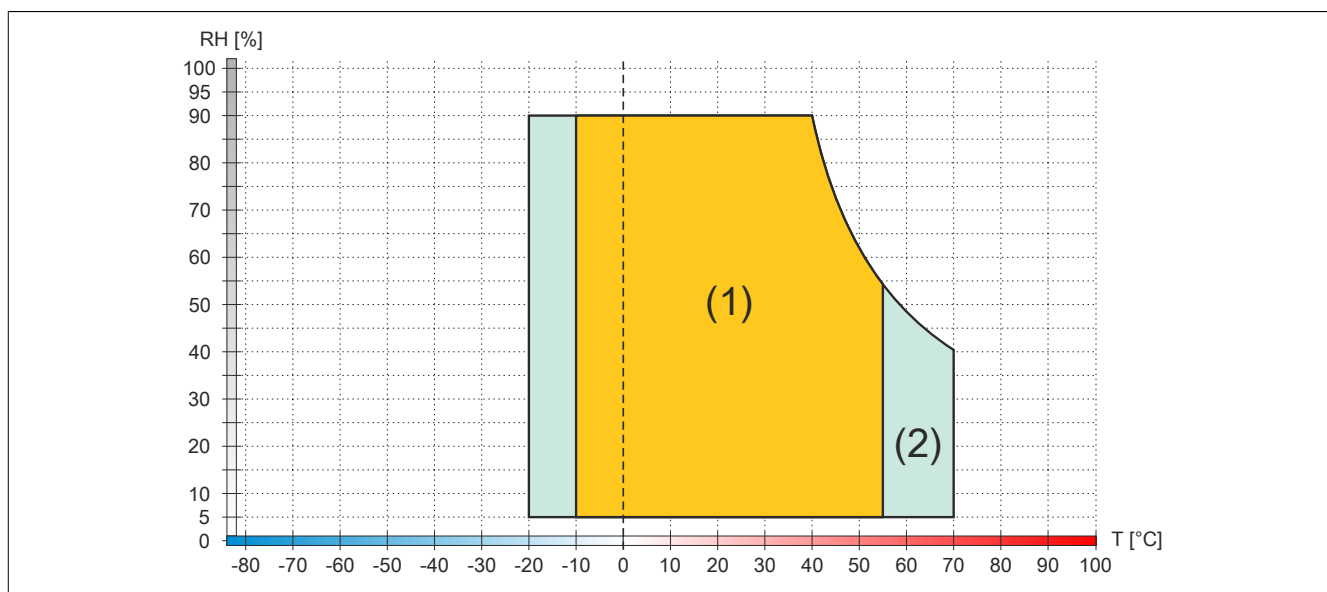


Figure 54: 5AP1130.156C-000 - Temperature/Humidity diagram

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

4.8.2.11 5AP1130.185C-000

4.8.2.11.1 General information

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

4.8.2.11.2 Order data

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

Table 43: 5AP1130.185C-000 - Order data

4.8.2.11.3 Technical data

Information:

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

Model number	5AP1130.185C-000
General information	
B&R ID code	0xEC5E
Certifications	
CE	Yes
EAC	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/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, section "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)

Table 44: 5AP1130.185C-000 - Technical data

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

Table 44: 5AP1130.185C-000 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At 25°C ambient temperature. Reducing the brightness by 50% can increase the half-brightness time by approximately 50%.
- 3) The specifications for the touch screen driver must be taken into account. See chapter 4 "Software", section "Multi-touch drivers".
- 4) Visual deviations in color and surface quality are possible due to process or batch conditions.

4.8.2.11.4 Dimensions

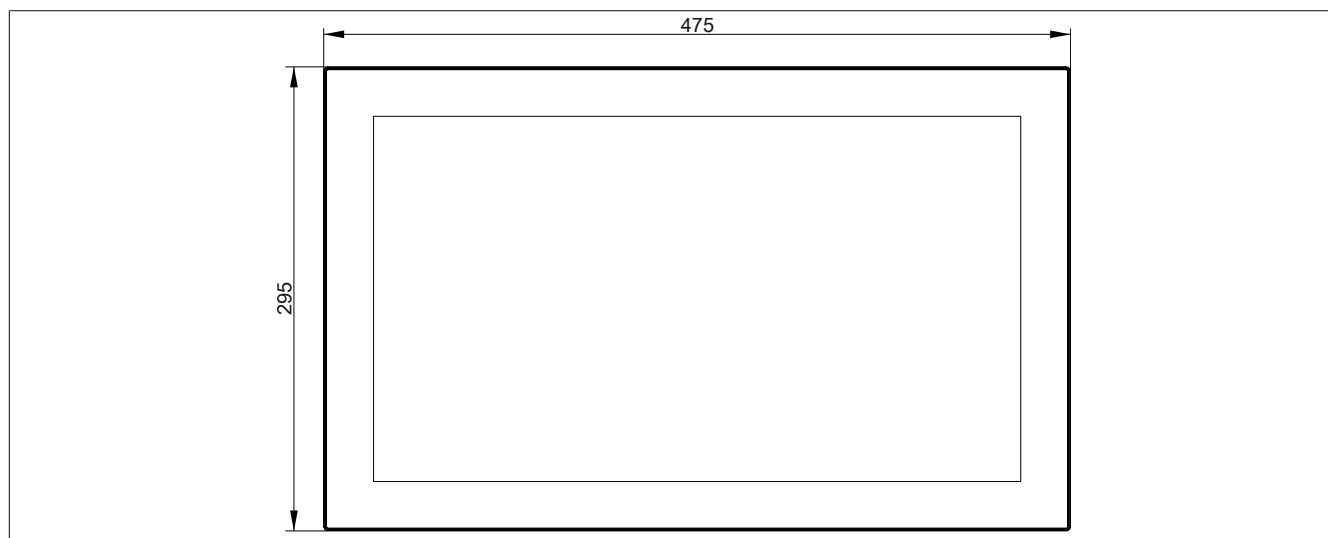


Figure 55: 5AP1130.185C-000 - Dimensions

4.8.2.11.5 Temperature/Humidity diagram

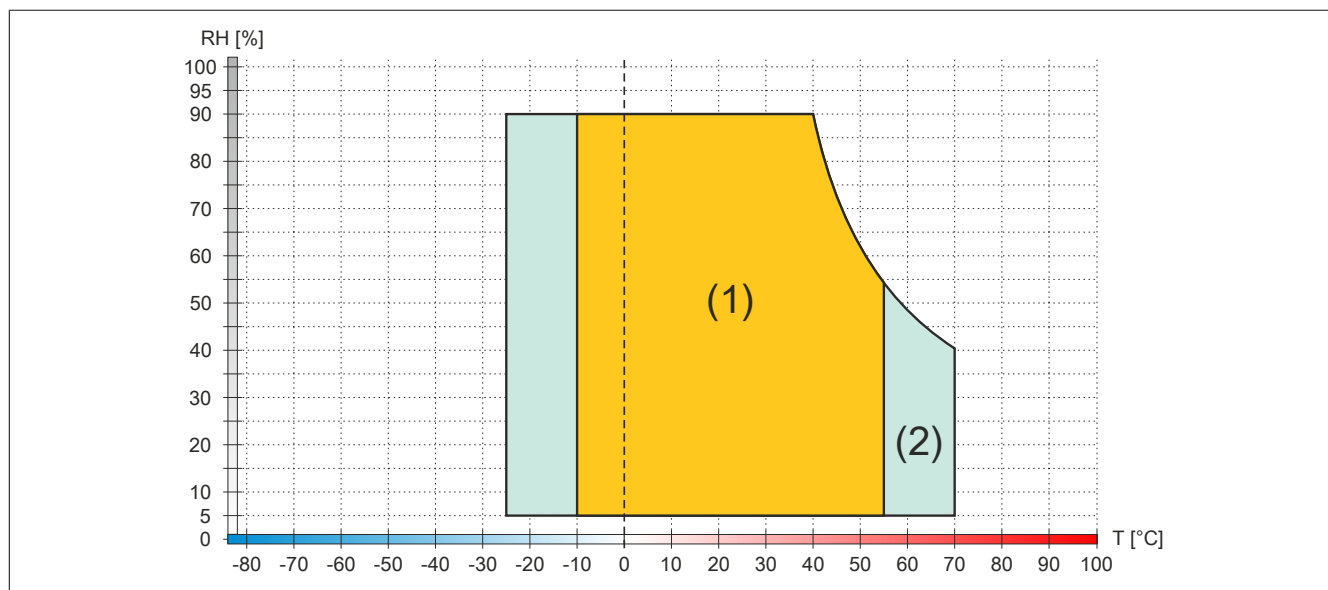


Figure 56: 5AP1130.185C-000 - Temperature/Humidity diagram

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

4.8.2.12 5AP1180.1043-000

4.8.2.12.1 General information

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

4.8.2.12.2 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 45: 5AP1180.1043-000 - Order data

4.8.2.12.3 Technical data

Information:

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

Model number	5AP1180.1043-000
General information	
B&R ID code	0xE7AE
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267
HazLoc	Industrial control equipment cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
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
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 46: 5AP1180.1043-000 - Technical data

Model number	5AP1180.1043-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Keys	
Function keys	22 with LED (yellow)
System keys	No
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	323 mm
Height	260 mm
Weight	2800 g

Table 46: 5AP1180.1043-000 - Technical data

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

4.8.2.12.4 Dimensions

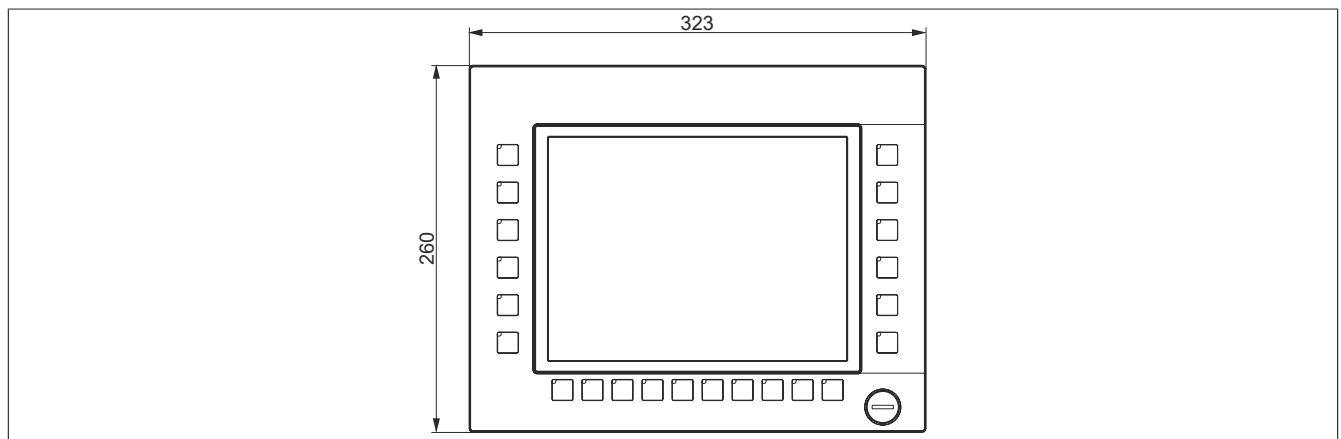


Figure 57: 5AP1180.1043-000 - Dimensions

4.8.2.12.5 Temperature/Humidity diagram

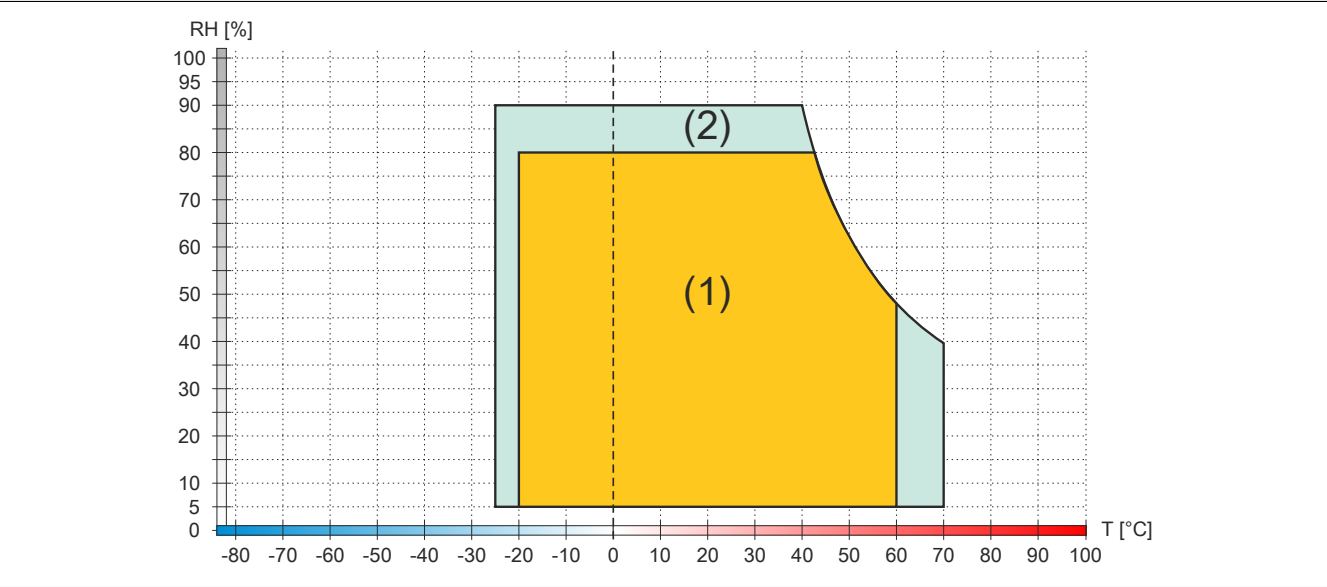


Figure 58: 5AP1180.1043-000 - Temperature/Humidity diagram

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

4.8.2.13 5AP1180.1505-000

4.8.2.13.1 General information

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

4.8.2.13.2 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 47: 5AP1180.1505-000 - Order data

4.8.2.13.3 Technical data

Information:

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

Model number	5AP1180.1505-000
General information	
B&R ID code	0xE7BD
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	15.0"
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
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 48: 5AP1180.1505-000 - Technical data

Technical data

Model number	5AP1180.1505-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Keys	
Function keys	32 with LED (yellow)
System keys	No
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	435 mm
Height	330 mm
Weight	4900 g

Table 48: 5AP1180.1505-000 - Technical data

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

4.8.2.13.4 Dimensions

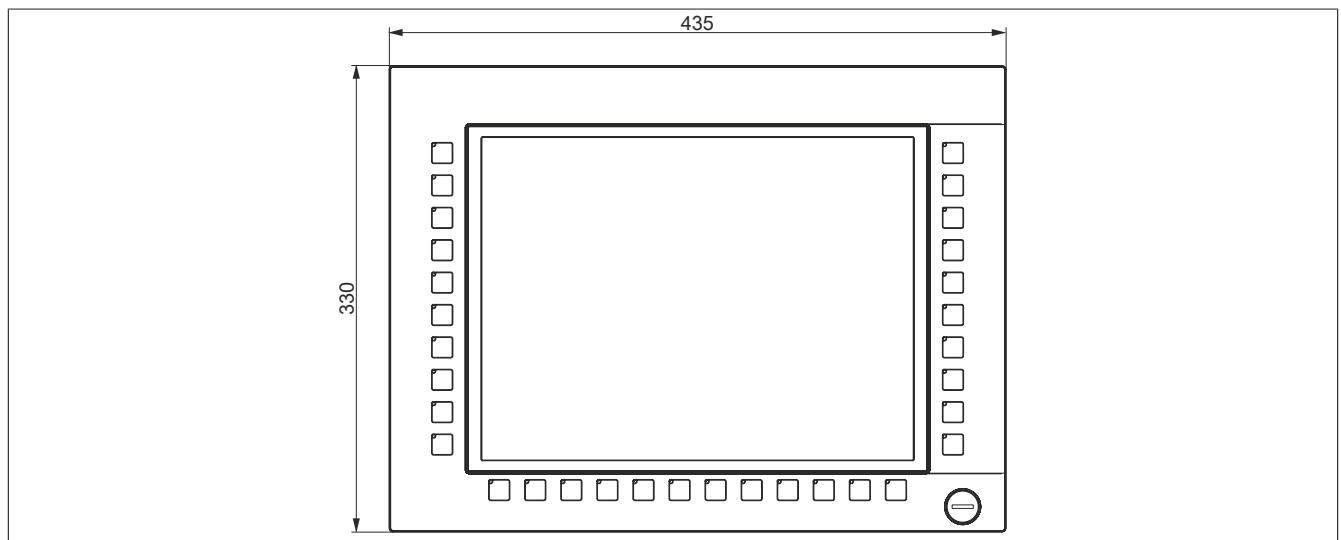


Figure 59: 5AP1180.1505-000 - Dimensions

4.8.2.13.5 Temperature/Humidity diagram

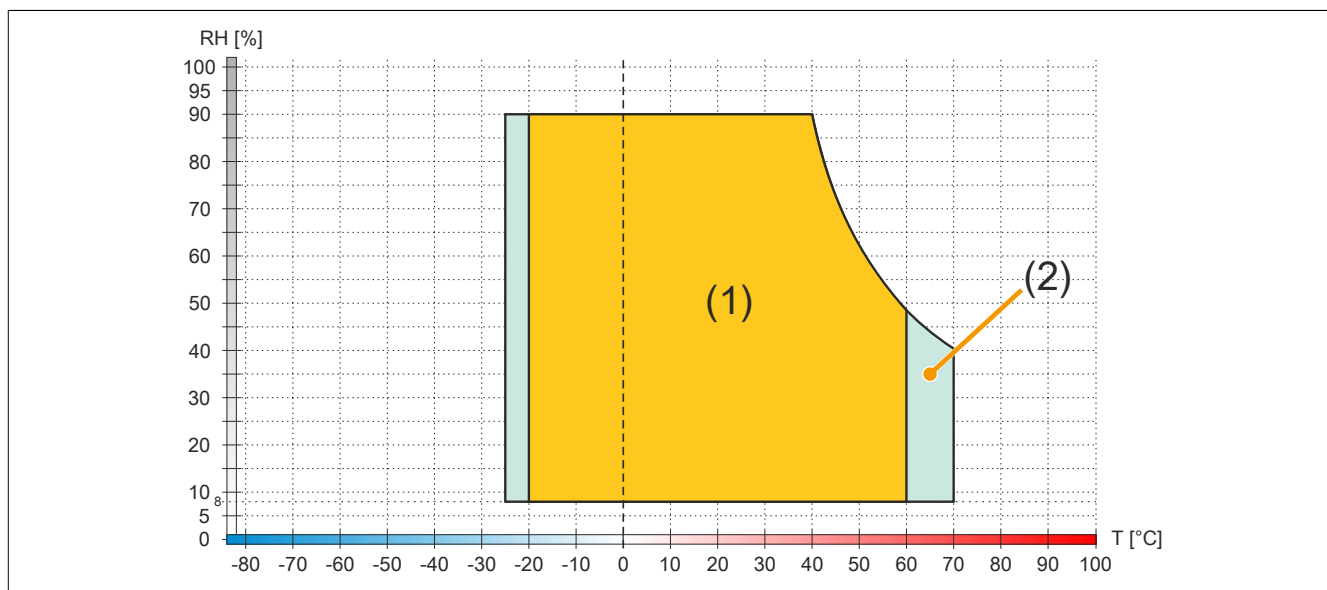


Figure 60: 5AP1180.1505-000 - Temperature/Humidity diagram

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

4.8.2.14 5AP1181.1043-000

4.8.2.14.1 General information

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

4.8.2.14.2 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 49: 5AP1181.1043-000 - Order data

4.8.2.14.3 Technical data

Information:

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

Model number	5AP1181.1043-000
General information	
B&R ID code	0xE7AF
Certifications	
CE	Yes
EAC	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	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 50: 5AP1181.1043-000 - Technical data

Model number	5AP1181.1043-000
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Keys	
Function keys	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 intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	323 mm
Height	358 mm
Weight	3400 g

Table 50: 5AP1181.1043-000 - Technical data

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

4.8.2.14.4 Dimensions

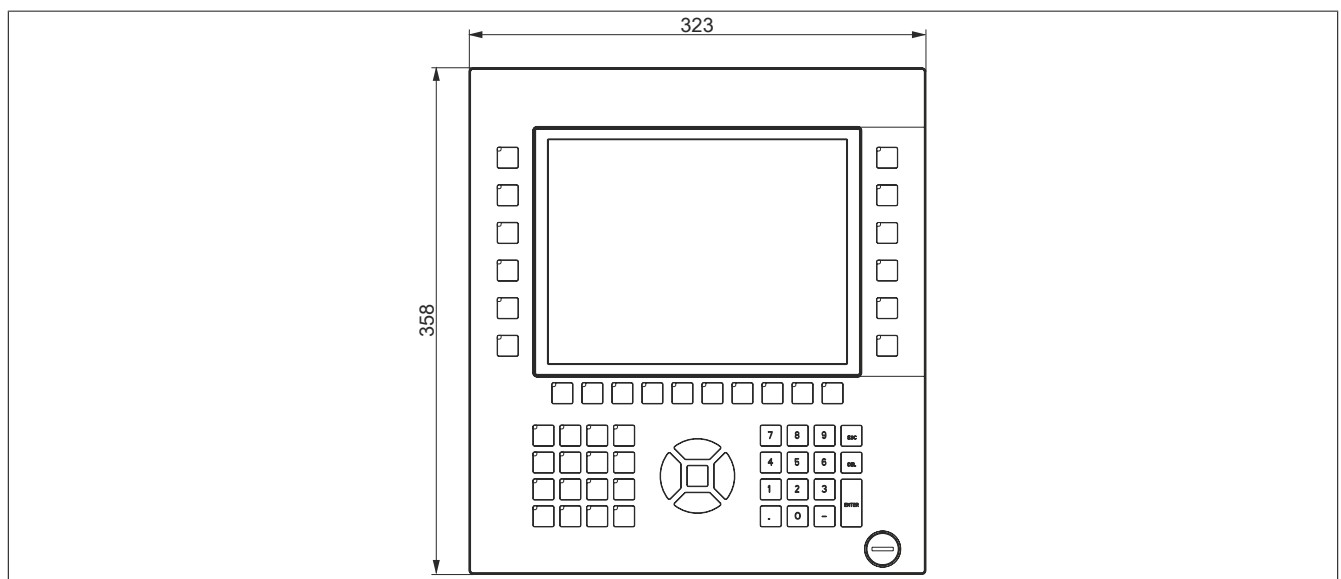


Figure 61: 5AP1181.1043-000 - Dimensions

4.8.2.14.5 Temperature/Humidity diagram

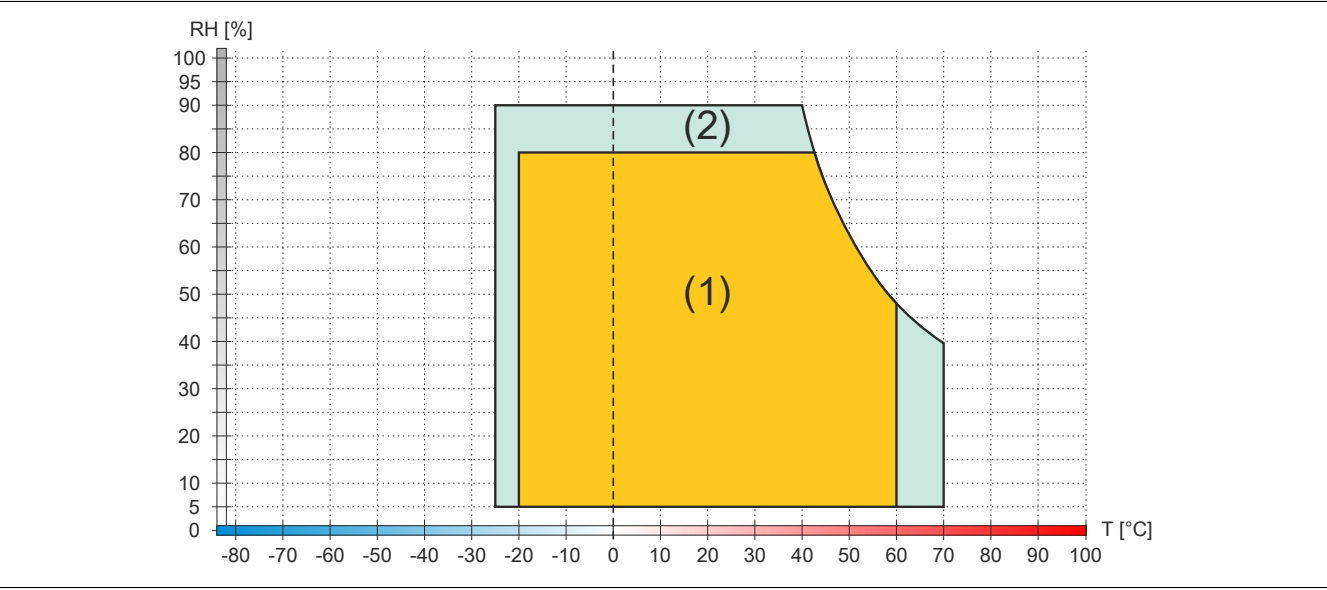


Figure 62: 5AP1181.1043-000 - Temperature/Humidity diagram

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

4.8.2.15 5AP1181.1505-000

4.8.2.15.1 General information

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

Information:

This Automation Panel is not approved for DVI operation.

4.8.2.15.2 Order data

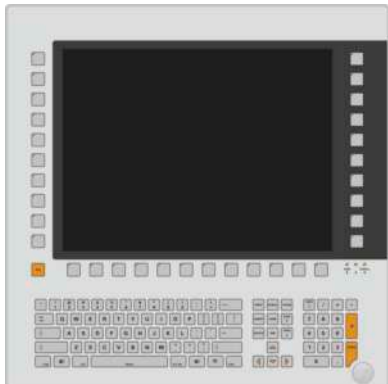
Model number	Short description	Figure
5AP1181.1505-000	Panels Automation Panel 15" XGA TFT - 1024 x 768 pixels (4:3) - Single-touch (analog resistive) - Control cabinet installation - Landscape format - Front USB - 32 function keys and 92 system keys - For PPC900/PPC2100/PPC3100/PPC2200 - For link modules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

Table 51: 5AP1181.1505-000 - Order data

4.8.2.15.3 Technical data

Information:

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

Model number	5AP1181.1505-000
General information	
B&R ID code	0xEF61
Certifications	
CE	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Display	
Type	TFT color
Diagonal	15.0"
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°

Table 52: 5AP1181.1505-000 - Technical data

Technical data

Model number	5AP1181.1505-000
Backlight	
Type	LED
Brightness (dimmbable)	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%
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Keys	
Function keys	32 with LED (yellow)
System keys	Alphanumeric keys, numeric keys, cursor block
Service life	>1,000,000 actuations at 1 ±0.3 N to 3 ±0.3 N actuating force
LED intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	435 mm
Height	430 mm
Weight	6000 g

Table 52: 5AP1181.1505-000 - Technical data

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

4.8.2.15.4 Dimensions

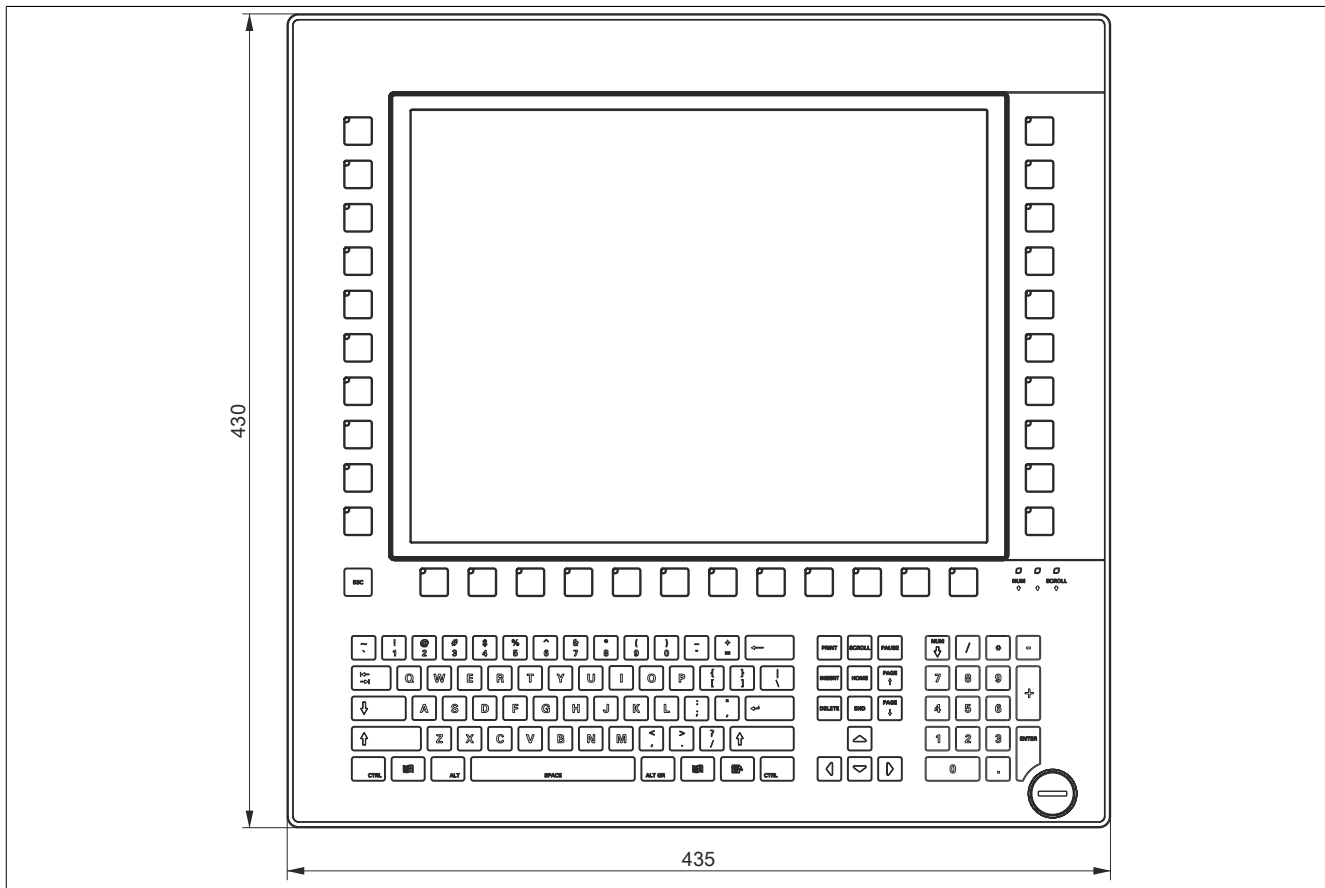


Figure 63: 5AP1181.1505-000 - Dimensions

4.8.2.15.5 Temperature/Humidity diagram

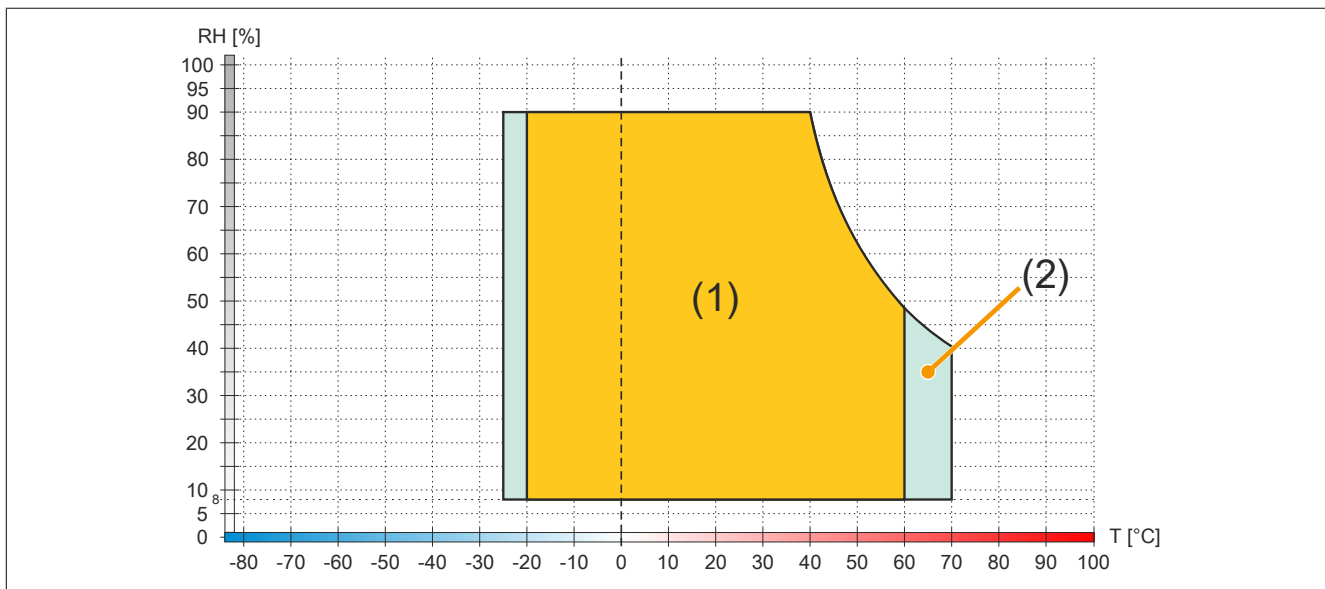


Figure 64: 5AP1181.1505-000 - Temperature/Humidity diagram

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

4.8.2.16 5AP1182.1043-000

4.8.2.16.1 General information

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

4.8.2.16.2 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 53: 5AP1182.1043-000 - Order data

4.8.2.16.3 Technical data

Information:

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

Model number	5AP1182.1043-000
General information	
B&R ID code	0xE7B0
Certifications	
CE	Yes
EAC	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	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
Touch screen ³⁾	
Type	AMT
Technology	Analog, resistive
Controller	B&R, serial, 12-bit
Transmittance	81% ±3%

Table 54: 5AP1182.1043-000 - Technical data

Model number	5AP1182.1043-000
Interfaces	
USB	
Quantity	1
Type	USB 2.0
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 500 mA
Keys	
Function keys	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 intensity	
Yellow	Typ. 38 mcd
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Degree of protection per EN 60529	Front: IP65 Back: IP20 (only with installed link module or installed system unit)
Degree of protection per UL 50	Front: Type 4X indoor use only
Mechanical properties	
Front ⁴⁾	
Frame	Aluminum, naturally anodized
Panel overlay	
Material	Polyester
Light background color	RAL 9006
Dark border color around display	RAL 7024
Gasket	3 mm fixed gasket
Dimensions	
Width	423 mm
Height	288 mm
Weight	3500 g

Table 54: 5AP1182.1043-000 - Technical data

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

4.8.2.16.4 Dimensions

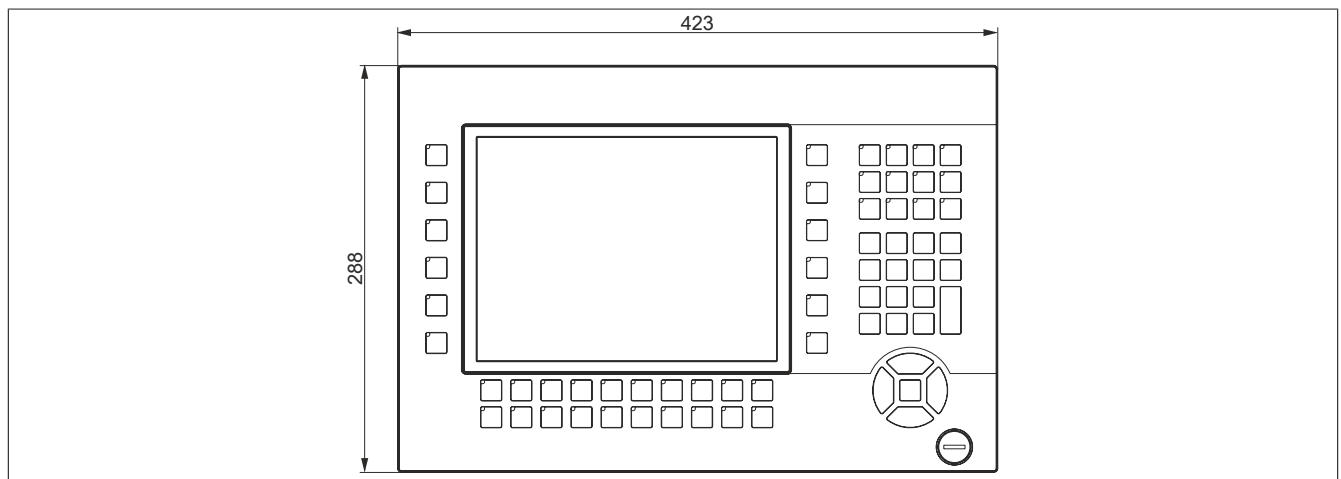


Figure 65: 5AP1182.1043-000 - Dimensions

4.8.2.16.5 Temperature/Humidity diagram

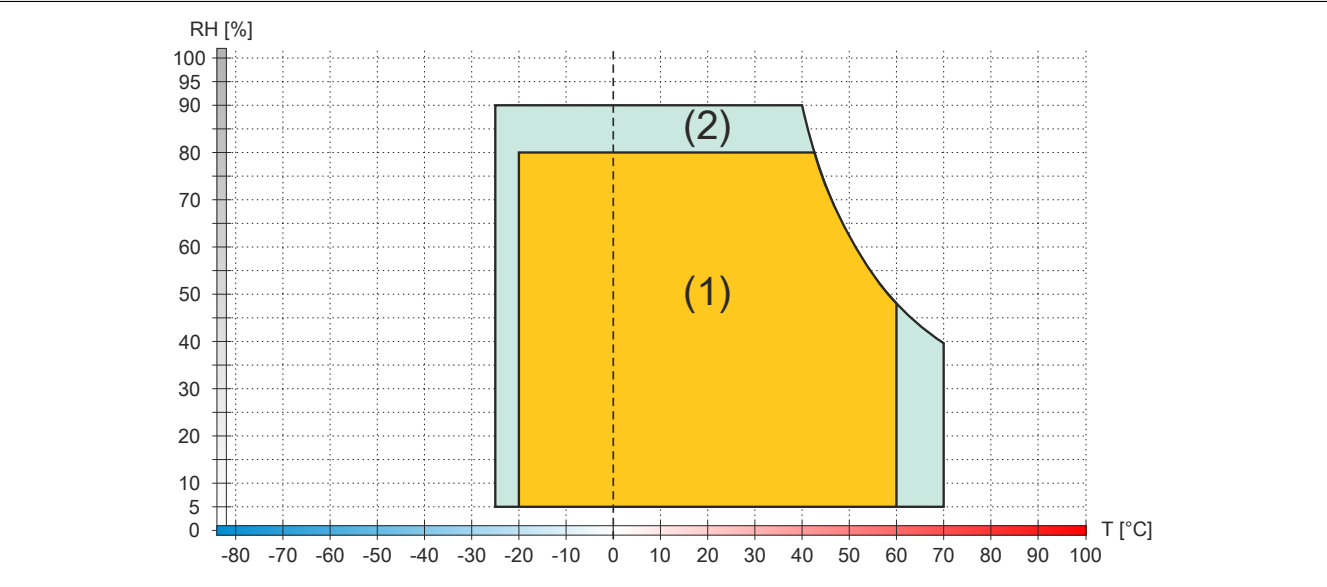


Figure 66: 5AP1182.1043-000 - Temperature/Humidity diagram

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

4.8.3 System units

4.8.3.1 5PPC3100.KBUx-000

4.8.3.1.1 General information

PPC3100 system units consist of a CPU board and housing. Several interfaces are already included, and 3 interface options can be additionally installed. The main memory can be replaced or expanded.

- Intel Core i-series processors
- DDR4 memory
- Intel HD Graphics
- 2 CFAST slots
- Slots for 3 interface options
- Replaceable and expandable main memory

4.8.3.1.2 Order data

Model number	Short description	Figure 
	System units	
5PPC3100.KBU0-000	PPC3100 system unit - Intel Celeron 3965U 2.2 GHz - Dual core - For Automation Panel 923/933/1000	
5PPC3100.KBU1-000	PPC3100 system unit - Intel Core i3 7100U 2.4 GHz - Dual core - For Automation Panel 923/933/1000	
5PPC3100.KBU2-000	PPC3100 system unit - Intel Core i5 7300U 2.6 GHz - Dual core - For Automation Panel 923/933/1000	
5PPC3100.KBU3-000	PPC3100 system unit - Intel Core i7 7600U 2.8 GHz - Dual core - For Automation Panel 923/933/1000	
	Required accessories	
	CFast cards	
5CFAST.016G-00	CFast 16 GB SLC	
5CFAST.032G-00	CFast 32 GB SLC	
5CFAST.032G-10	CFast 32 GB MLC	
5CFAST.064G-10	CFast 64 GB MLC	
5CFAST.128G-10	CFast 128 GB MLC	
5CFAST.2048-00	CFast card, 2 GB SLC	
5CFAST.256G-10	CFast 256 GB MLC	
5CFAST.4096-00	CFast 4 GB SLC	
5CFAST.8192-00	CFast 8 GB SLC	
	Optional accessories	
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100	
5ACCLI02.SD40-000	Graphics option - 1x SDL4 transmitter (max. 1920 x 1080) - For APC3100/PPC3100	
5ACCLI02.SDL0-000	Graphics option - 1x SDL/DVI transmitter - For APC3100/PPC3100	
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/APC3100/PPC3100	
5AC901.I485-00	Interface card - 1x RS232/RS422/RS485 interface - For APC910/PPC900/APC3100/PPC3100	
5AC901.ICAN-00	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100	
5AC901.IHDA-00	Interface card - 1x audio interface (1x MIC / 1x Line In / 1x OUT) - For APC910/PPC900/APC3100/PPC3100	
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100	
5AC901.ISRM-00	Interface card - 2 MB RAM - For APC910/PPC900/APC3100/PPC3100	
5ACCIF02.CANE-000	Interface card - 1x CAN interface (SJA1000) - 1x ETH 10/100/1000 - For APC3100/PPC3100	

Table 55: 5PPC3100.KBU0-000, 5PPC3100.KBU1-000, 5PPC3100.KBU2-000, 5PPC3100.KBU3-000 - Order data

Technical data

Model number	Short description	Figure
5ACCIF02.FPLK-000	Interface card - 1x POWERLINK interface - 2 MB SRAM - Integrated 2-port hub - Ring redundancy - POWERLINK managing or controlled node - PRC function - For APC3100/PPC3100	
5ACCIF02.FPLS-000	Interface card - 2 MB SRAM - 1x RS232 interface - 1x POWERLINK interface - For APC3100/PPC3100	
5ACCIF02.FPSC-000	Interface card - 2 MB SRAM - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 1x X2X - For APC3100/PPC3100	
5ACCIF02.ISS0-000	Interface card - 2x RS232/RS422/RS485 interface - For APC3100/PPC3100	

Table 55: 5PPC3100.KBU0-000, 5PPC3100.KBU1-000, 5PPC3100.KBU2-000, 5PPC3100.KBU3-000 - Order data

4.8.3.1.3 Technical data

Information:

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

Model number	5PPC3100.KBU0-000	5PPC3100.KBU1-000	5PPC3100.KBU2-000	5PPC3100.KBU3-000
General information				
Cooling	Passive via heat sink			
LED status indicators	Power, Disk, Link, Run			
B&R ID code	0xEF88	0xEF89	0xEF8A	0xEF95
Battery				
Type	Renata 950 mAh			
Service life	4 years ¹⁾			
Removable	Yes			
Design	Lithium ion			
Power button	Yes			
Reset button	Yes			
Buzzer	No			
Certifications				
CE	Yes			
EAC	Product family certification			
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⁾	-		Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ³⁾
Controller				
Boot loader	UEFI BIOS			
Processor				
Type	Intel C-3965U	Intel i3-7100U	Intel i5-7300U	Intel i7-7600U
Clock frequency	2200 MHz	2400 MHz	2600 MHz	2800 MHz
Number of cores	2			
Architecture	14 nm			
Thermal design power (TDP)	15 W			
L2 cache	2 MB	3 MB		4 MB
Intel 64 architecture	Yes			
Intel Turbo Boost Technology	No	Yes		
Intel Hyper-Threading Technology	No	Yes		
Intel vPro Technology	No	Yes		
Intel Virtualization Technology (VT-x)	Yes			
Intel Virtualization Technology for Directed I/O (VT-d)	Yes			
Enhanced Intel SpeedStep Technology	Yes			
Chipset	Intel Kabylake-U			
Trusted Platform Module	TPM 2.0			
Real-time clock				
Precision	At 25°C: Typ. 12 ppm (1 second) per day ⁴⁾			
Battery-backed	Yes			

Table 56: 5PPC3100.KBU0-000, 5PPC3100.KBU1-000, 5PPC3100.KBU2-000, 5PPC3100.KBU3-000 - Technical data

Model number	5PPC3100.KBU0-000	5PPC3100.KBU1-000	5PPC3100.KBU2-000	5PPC3100.KBU3-000
Power failure logic				
Controller	MTCX ⁵⁾			
Buffer time	10 ms			
Memory				
Removable	Yes			
Memory slot				
Number of memory channels	2			
Type	DDR4 SDRAM			
Memory size	Max. 32 GB			
Max. memory bandwidth	34.1 GB/s			
Graphics				
Controller	Intel HD Graphics 610	Intel HD Graphics 620		
Color depth	Max. 32-bit			
DirectX support	12			
OpenGL support	4.4			
Power management	ACPI 5.0			
Interfaces				
CFast slot				
Quantity	2			
Type	SATA III (SATA 60 Gbit/s)			
USB				
Quantity	5			
Type	4x USB 3.0 1x USB 2.0 (internal for Technology Guard)			
Design	Type A			
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), high speed (480 Mbit/s) to SuperSpeed (5 Gbit/s) ⁶⁾			
Current-carrying capacity	Max. 1 A per connection			
Ethernet				
Quantity	2			
Design	RJ45, shielded			
Transfer rate	10/100/1000 Mbit/s			
Max. baud rate	1 Gbit/s			
SDL/DVI-D interface				
Design	DVI-D			
Type	SDL/DVI			
Inserts				
Interface option ⁷⁾	3			
Electrical characteristics				
Nominal voltage	24 VDC ±25%, SELV ⁸⁾			
Nominal current	Max. 5.5 A			
Inrush current	Max. 60 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	IP20 ⁹⁾			
Environmental conditions				
Elevation				
Operation	Max. 3000 m (component-dependent) ¹⁰⁾			
Mechanical characteristics				
Dimensions ¹¹⁾				
Width	54 mm			
Height	173.5 mm			
Depth	256 mm			
Weight	1150 g			

Table 56: 5PPC3100.KBU0-000, 5PPC3100.KBU1-000, 5PPC3100.KBU2-000, 5PPC3100.KBU3-000 - Technical data

- 1) At 50°C, 8.5 μ A for the components being supplied and self-discharge of 40%. If an interface option with SRAM or POWERLINK is installed, the service life is 2 1/2 years.
- 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, but 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) At max. specified ambient temperature: Typ. 58 ppm (5 seconds) - worst case 220 ppm (19 seconds).
- 5) Maintenance Controller Extended
- 6) The SuperSpeed transfer rate (5 Gbit/s) is only possible with USB 3.0.
- 7) The interface option can be replaced.
- 8) EN 60950 requirements must be observed.
- 9) Only if all interface covers are installed.
- 10) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.
- 11) All dimensions without mounting plate.

4.8.4 Main memory

4.8.4.1 5MMDDR.xxxx-04

4.8.4.1.1 General information

These 260-pin DDR4 main memory modules operate with a data rate of 2133 MHz and are available in sizes ranging from 4 GB to 16 GB.

If two main memory modules of identical size (e.g. 4 GB) are connected to the CPU board, then dual-channel memory technology is supported. This technology is not supported if two main memory modules of different sizes (e.g. 4 GB and 8 GB) are connected.

4.8.4.1.2 Order data

Model number	Short description	Figure
	Main memory	
5MMDDR.4096-04	SO-DIMM DDR4, 4096 MB	
5MMDDR.8192-04	SO-DIMM DDR4, 8192 MB	
5MMDDR.016G-04	SO-DIMM DDR4, 16384 MB	

Table 57: 5MMDDR.4096-04, 5MMDDR.8192-04, 5MMDDR.016G-04 - Order data

4.8.4.1.3 Technical data

Information:

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

Model number	5MDDR.4096-04	5MDDR.8192-04	5MDDR.016G-04
General information			
Certifications			
CE	Yes		
EAC	Product family certification		
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⁾		
Controller			
Memory			
Type	SO-DIMM DDR4 SDRAM		
Memory size	4 GB	8 GB	16 GB
Construction	260-pin		
Organization	512M x 64-bit	1024M x 64-bit	2048M x 64-bit
Speed	DDR4-2133 (PC4-17000)		
Operating conditions			
Pollution deegree per EN 61131-2	Pollution degree 2		

Table 58: 5MMDDR.4096-04, 5MMDDR.8192-04, 5MMDDR.016G-04 - Technical data

1) Yes, but 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.

4.8.5 CFast cards

4.8.5.1 General information

CFast cards are easily replaceable storage media. Due to their robustness against and environmental influences (temperature, shock, vibration, etc.), CFast cards offer optimal values for use as storage media in industrial environments.

CFast cards are a further development of CompactFlash cards, but the SATA protocol is used here. CFast cards are not compatible with CompactFlash cards.

4.8.5.2 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 to maximize service life
- Good mechanisms for detecting and correcting flash memory errors

4.8.5.2.1 Flash technology

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

SLC flash blocks have a service life 10 times longer than MLC flash blocks and are characterized above all by 33 times the number of write/erase cycles, which makes CFast cards with SLC flash blocks the preferred choice for industrial applications. These factors are strongly dependent on the application, however, so that no general statement is possible.

Due to increasing cost pressure, improved wear level algorithms and improved monitoring features (S.M.A.R.T.), MLC flash technology is increasingly finding its way into this market.

4.8.5.2.2 Wear leveling

Wear leveling refers to an algorithm that can be used to maximize the service life of a CFast card. A distinction is made between the following algorithms:

- Dynamic wear leveling
- Static wear leveling

The basic idea of wear leveling is that data is distributed over a wide range of blocks or cells on the data storage medium so that the same areas do not always have to be erased and reprogrammed.

4.8.5.2.2.1 Dynamic wear leveling

Dynamic wear leveling offers the possibility to use unused flash blocks when writing to a file.

If the data storage medium is already 80% full of files, only 20% can be used for wear leveling.

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

4.8.5.2.2.2 Static wear leveling

Static wear leveling additionally monitors which data is rarely modified. From time to time, the controller moves this data to blocks that have already been programmed frequently to avoid further wear and tear of the cells.

4.8.5.2.3 ECC error correction

Inactivity or operation of a particular cell can cause bit errors. Error-correcting code (ECC) implemented by the hardware or software allows many such errors to be detected and corrected.

4.8.5.2.4 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 has been introduced to monitor key parameters and detect imminent failures at an early stage. Monitoring and storing critical performance and calibration data attempts to predict the probability of error states.

4.8.5.2.5 Calculating the expected service life for an existing application

To better verify whether an SLC or MLC CFast card should be used for an existing application, the following procedure is recommended:

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

Example of an MLC CFast card in a one-week period:

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

4.8.5.2.6 Dimensions

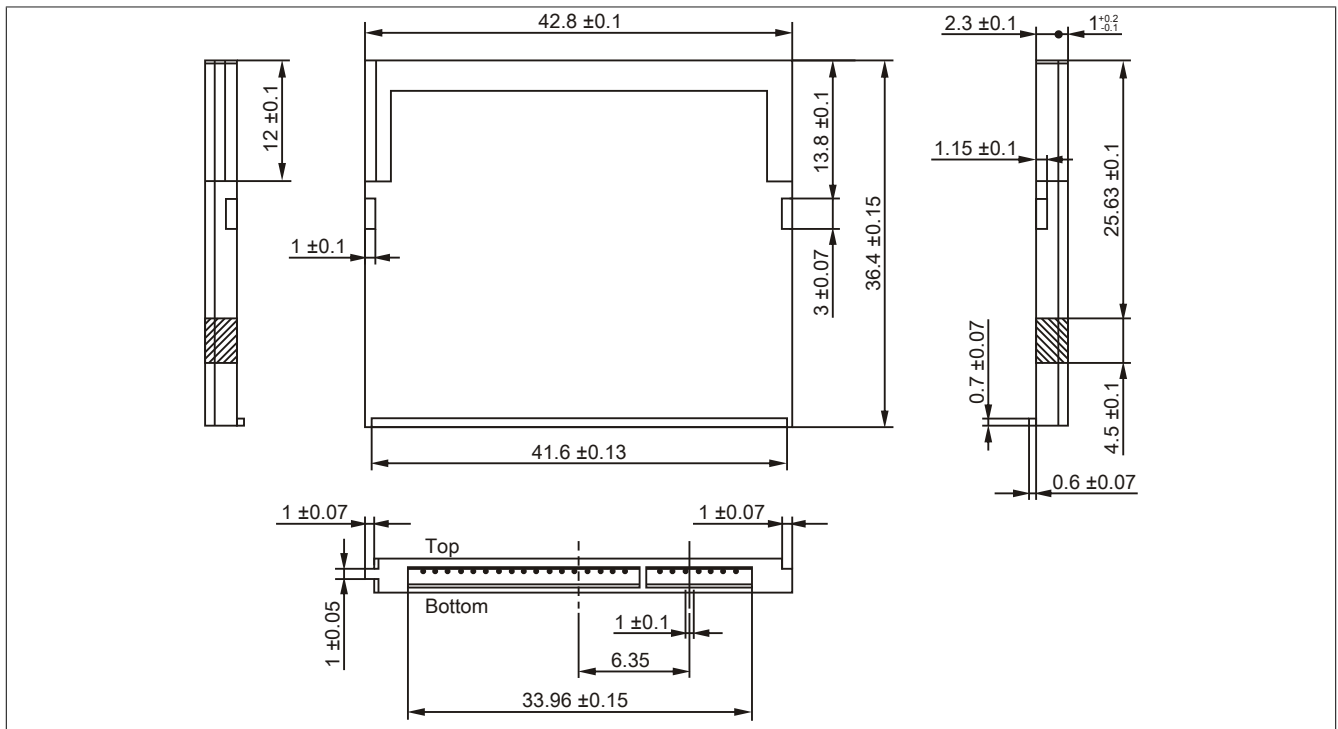


Figure 67: CFast card - Dimensions

4.8.5.3 5CFAST.xxxx-00

4.8.5.3.1 General information

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

4.8.5.3.2 Order data

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

Table 59: 5CFAST.2048-00, 5CFAST.4096-00, 5CFAST.8192-00, 5CFAST.016G-00, 5CFAST.032G-00 - Order data

4.8.5.3.3 Technical data

Caution!

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

The preventive use of a UPS is therefore recommended.

Information:

Due to the changeover to the new controller, revision E0 may not be image-compatible with previous revisions when using old cloning tools. With current cloning tools, this behavior usually does not occur.

Information:

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

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)				
Servicing	None				
Supported operating modes	SATA 2.6, max. PIO mode 4, Multiword DMA mode 2, Ultra DMA mode 6				
Continuous reading					
Typical					
With 128 kB block size	94 MB/s	108 MB/s			116 MB/s
With 4 kB block size	42 MB/s	46 MB/s			
Maximum					
With 128 kB block size	100 MB/s	115 MB/s			120 MB/s
With 4 kB block size		50 MB/s			

Table 60: 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
Continuous writing					
Typical					
With 128 kB block size	57 MB/s	86 MB/s			111 MB/s
With 4 kB block size	36 MB/s	40 MB/s			
Maximum					
With 128 kB block size	65 MB/s	95 MB/s			120 MB/s
With 4 kB block size	40 MB/s	45 MB/s			
Certifications					
CE	Yes				
EAC	Product family certification				
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⁾				
Endurance ¹⁾					
SLC flash memory	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				Yes
Windows Embedded 8.1 Industry Pro 32-bit	No			Yes	
Windows Embedded 8.1 Industry Pro 64-bit	No				Yes
Windows 7 32-bit	No			Yes	
Windows 7 64-bit	No				Yes
Windows Embedded Standard 7 32-bit	No			Yes	
Windows Embedded Standard 7 64-bit	No			Yes	
Windows XP Professional	No	Yes			
Windows Embedded Standard 2009	Yes				
B&R Linux 9	No	Yes			
B&R Linux 8	No	Yes			
Software					
PVI Transfer	≥V4.0.0.0.8 (part of the PVI Development installer ≥ V3.0.2.3014)				
B&R Embedded OS Installer	≥V3.10			≥V3.20	≥V3.21
Ambient 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 60: 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 60: 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 daily write workload reduces the expected service life and data retention of the data storage medium.
- 2) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 3) Yes, but 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 file system

4.8.5.3.4 Temperature/Humidity diagram

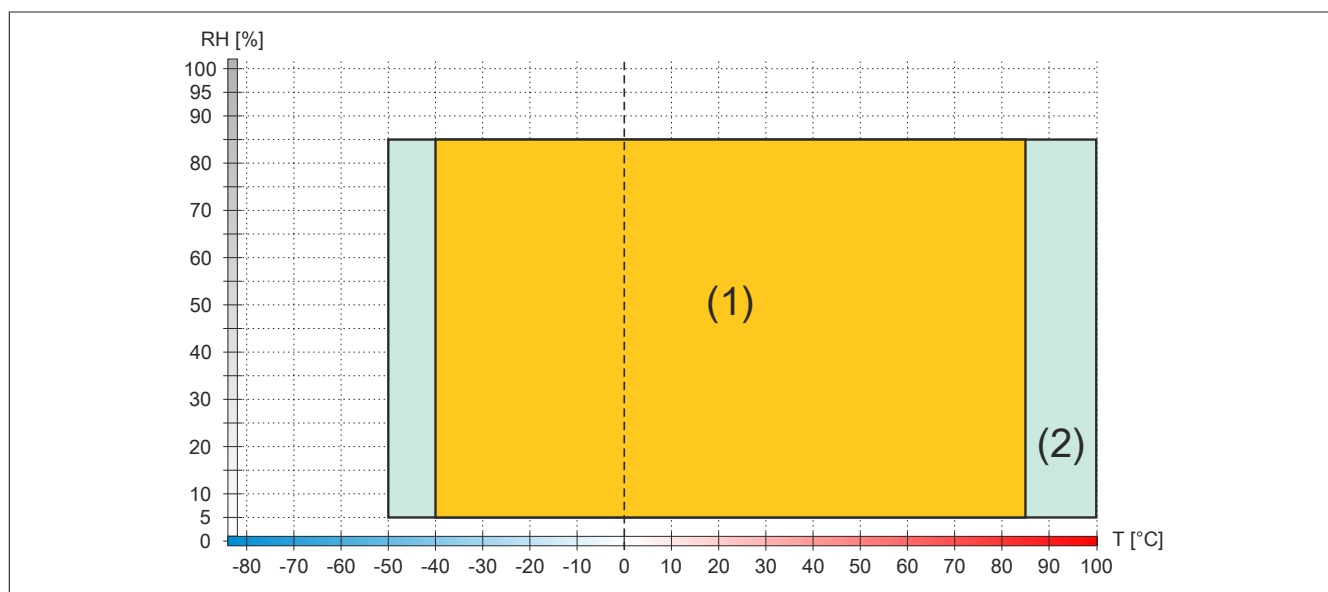


Figure 68: 5CFAST.xxxx-00 - Temperature/Humidity diagram

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

4.8.5.3.5 Dimensions

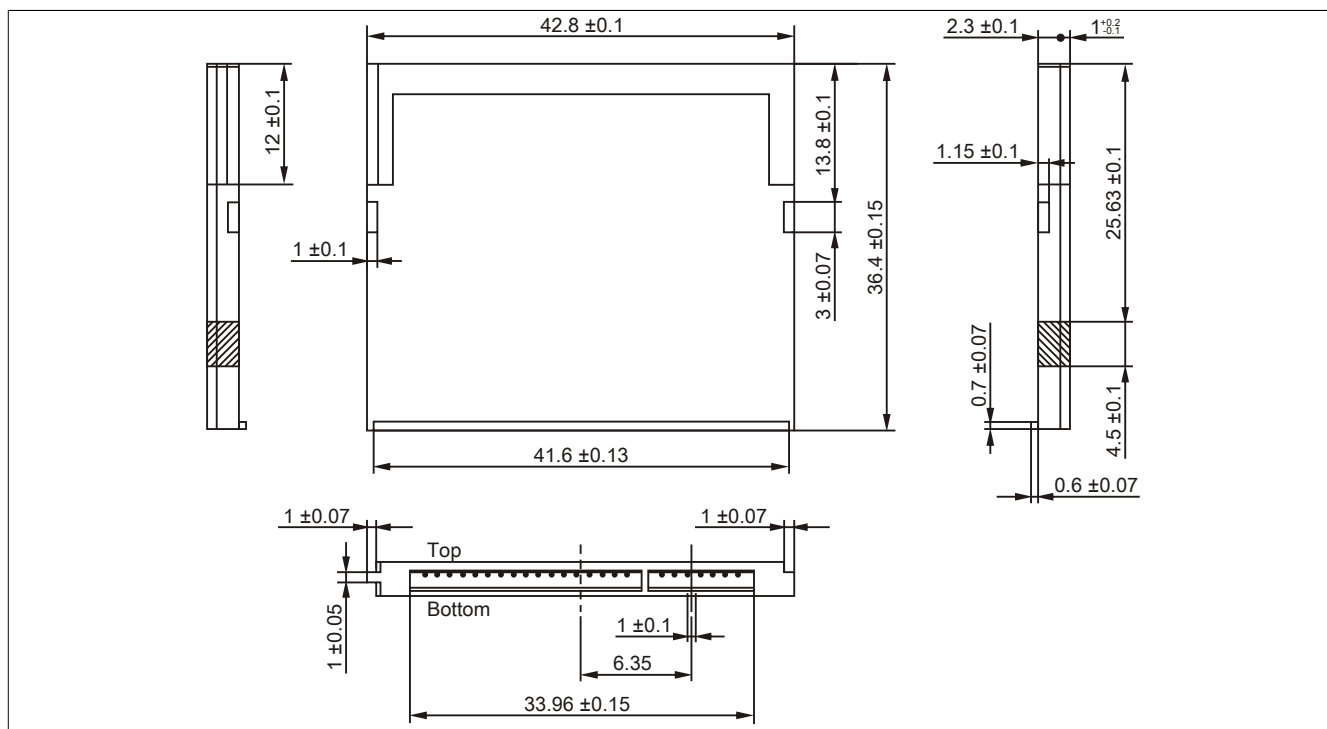


Figure 69: CFast card - Dimensions

4.8.5.4 5CFAST.xxxx-10

4.8.5.4.1 General information

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

4.8.5.4.2 Order data

Model number	Short description	Figure
	CFast cards	
5CFAST.032G-10	CFast 32 GB MLC	
5CFAST.064G-10	CFast 64 GB MLC	
5CFAST.128G-10	CFast 128 GB MLC	
5CFAST.256G-10	CFast 256 GB MLC	

Table 61: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Order data

4.8.5.4.3 Technical data

Caution!

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

The preventive use of a UPS is therefore recommended.

Information:

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

Model number	5CFAST.032G-10	5CFAST.064G-10	5CFAST.128G-10	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)			
Servicing	None			
Supported operating modes	SATA 3, SATA 2, SATA 1			
Continuous reading				
Maximum	495 MB/s	500 MB/s	500 MB/s	
Continuous writing				
Maximum	115 MB/s	100 MB/s	195 MB/s	330 MB/s
Certifications				
CE	Yes			
EAC	Product family certification			
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⁾			

Table 62: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Technical data

Technical data

Model number	5CFAST.032G-10	5CFAST.064G-10	5CFAST.128G-10	5CFAST.256G-10
Endurance ¹⁾				
MLC flash memory	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-correcting code (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 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 9	Yes			
B&R Linux 8	Yes			
Software				
PVI Transfer	≥V4.0.20 or V4.1.5		≥V4.0.22 or V4.1.6	
B&R Embedded OS Installer	≥V3.21			
Ambient 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			
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 62: 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 medium.
- 2) At 25°C ambient temperature at the start of service life.
- 3) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 4) Yes, but 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 file system
- 6) TBW = Terabytes written
Client workload per standard JEDEC JESD219

4.8.5.4.4 Temperature/Humidity diagram

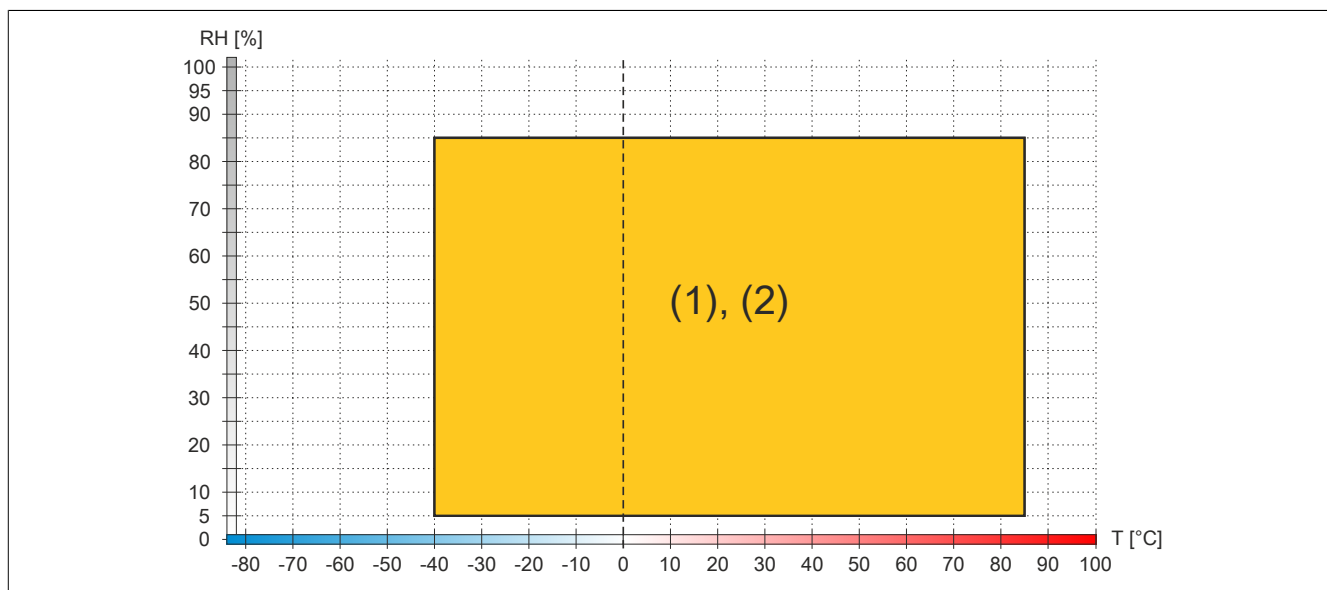


Figure 70: 5CFAST.032G-10, 5CFAST.064G-10, 5CFAST.128G-10, 5CFAST.256G-10 - Temperature/Humidity diagram

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

4.8.6 Graphics options

Information:

Graphics options can only be operated in the IF option 3 slot.

Information:

For information about replacing or installing a graphics option, see section ["Installing the interface option and DDR4 SDRAM"](#) on page 306.

After installation or replacement, it may be necessary to load the defaults settings in BIOS (see ["Exit"](#) on page 267).

4.8.6.1 5ACCLI02.DPO0-000

4.8.6.1.1 General information

Graphics option 5ACCLI02.DPO0-000 is equipped with a DisplayPort and USB 2.0 interface.

- DisplayPort interface
- USB 2.0 interface
- Compatible with APC3100/PPC3100

4.8.6.1.2 Order data

Model number	Short description	Figure
	Graphics options	
5ACCLI02.DPO0-000	Graphics option - 1x DisplayPort transmitter (version 1.2) - For APC3100/PPC3100	

Table 63: 5ACCLI02.DPO0-000 - Order data

4.8.6.1.3 Technical data

Information:

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

Model number	5ACCLI02.DPO0-000
General information	
B&R ID code	0xEEE6
Certifications	
CE	Yes
EAC	Product family certification
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
Variant	Type A
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s) to high speed (480 Mbit/s)
Current-carrying capacity	Max. 0.5 A
DisplayPort	
Quantity	1
Version	1.2

Table 64: 5ACCLI02.DPO0-000 - Technical data

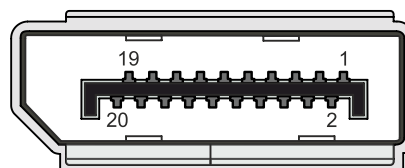
Model number	5ACCLI02.DPO0-000
Electrical properties	
Power consumption	3 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 27 g

Table 64: 5ACCLI02.DPO0-000 - Technical data

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

4.8.6.1.3.1 DisplayPort interface

The DisplayPort interface is 20-pin (female) and can be operated with DisplayPort, DVI or HDMI transmission technologies.



Pin	Pinout	Description	Pin	Pinout	Description
1	DP_LANE0+	DisplayPort lane 0 (positive)	11	GND	Ground
2	GND	Ground	12	DP_LANE3-	DisplayPort lane 3 (negative)
3	DP_LANE0-	DisplayPort lane 0 (negative)	13	CONFIG1	Configuration pin 1 (connected to ground)
4	DP_LANE1+	DisplayPort lane 1 (positive)	14	CONFIG2	Configuration pin 2 (connected to ground)
5	GND	Ground	15	DP_AUX+	Auxiliary channel (positive)
6	DP_LANE1-	DisplayPort lane 1 (negative)	16	GND	Ground
7	DP_LANE2+	DisplayPort lane 2 (positive)	17	DP_AUX-	Auxiliary channel (negative)
8	GND	Ground	18	DP_HPD#	Hot plug detection
9	DP_LANE2-	DisplayPort lane 2 (negative)	19	RETURN	Return for power
10	DP_LANE3+	DisplayPort lane 3 (positive)	20	DP_PWR	Power for connector

Information:

Hot plugging output devices on the interface for service purposes is supported by the hardware and graphic drivers of approved operating systems.

A maximum of 10,000 mating cycles are specified for this interface.

4.8.6.2 5ACCLI02.SDL0-000

4.8.6.2.1 General information

Graphics option 5ACCLI02.SDL0-000 is equipped with an SDL/DVI-D interface for connecting additional panels via SDL or DVI.

- SDL/DVI interface
- Compatible with APC3100/PPC3100

4.8.6.2.2 Order data

Model number	Short description	Figure
5ACCLI02.SDL0-000	Graphics options Graphics option - 1x SDL/DVI transmitter - For APC3100/PPC3100	

Table 65: 5ACCLI02.SDL0-000 - Order data

4.8.6.2.3 Technical data

Information:

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

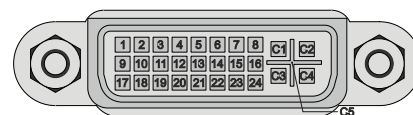
Model number	5ACCLI02.SDL0-000
General information	
B&R ID code	0xEEE7
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Interfaces	
SDL/DVI-D interface	
Design	DVI-D
Type	SDL/DVI
Electrical characteristics	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Environmental conditions	
Temperature	
Operation	0 to 60°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical characteristics	
Weight	Approx. 27 g

Table 66: 5ACCLI02.SDL0-000 - Technical data

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

4.8.6.2.3.1 SDL/DVI interface

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



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

1) Protected internally by a multifuse.

Information:

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

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

Information:

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

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

4.8.6.2.3.2 Cable lengths and resolutions for SDL transfer

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

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

4.8.6.2.3.3 Cable lengths and resolutions for DVI transfer

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

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

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

4.8.6.3 5ACCLI02.SD40-000

4.8.6.3.1 General information

Graphics option 5ACCLI02.SD40-000 is equipped with an SDL4 interface.

- SDL4 interface
- Compatible with APC3100/PPC3100

4.8.6.3.2 Order data

Model number	Short description	Figure
5ACCLI02.SD40-000	Graphics options Graphics option - 1x SDL4 transmitter (max. 1920 x 1080) - For APC3100/PPC3100	

Table 67: 5ACCLI02.SD40-000 - Order data

4.8.6.3.3 Technical data

Information:

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

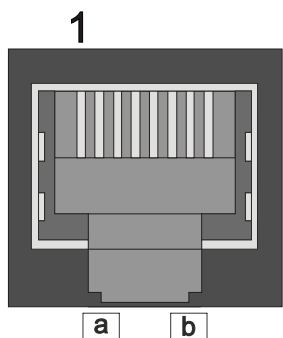
Model number	5ACCLI02.SD40-000
General information	
LEDs	Status, Link
B&R ID code	0xECCC
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267 Industrial control equipment
Interfaces	
SDL4 Out	
Variant	RJ45, shielded
Type	SDL4
Electrical properties	
Power consumption	4.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ¹⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 38 g

Table 68: 5ACCLI02.SD40-000 - Technical data

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

4.8.6.3.3.1 SDL4 interface

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

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

Information:

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

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

4.8.6.3.3.2 Cable lengths and resolutions for SDL4 transfer

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

4.8.7 Interface options

Information:

It is important to note that not every interface option can be connected in interface slots 1 and 2. For more information, see sections ["IF option 1 slot" on page 56](#) and ["IF option 2 slot" on page 57](#).

Information:

For information about replacing or installing an interface option, see section ["Installing the interface option and DDR4 SDRAM" on page 306](#).

Depending on the IF option used, it may be necessary to load the default settings in BIOS after replacement or installation (see ["Exit" on page 267](#)).

4.8.7.1 5AC901.I232-00

4.8.7.1.1 General information

Interface option 5AC901.I232-00 is equipped with an RS232 interface.

- 1x RS232 interface
- Compatible with APC910/PPC900 and APC3100/PPC3100

Simultaneous operation of this interface option in slot IF option 1 with interface option 5ACCIF02.ISS0-000 in slot IF option 2 is not possible.

4.8.7.1.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.I232-00	Interface card - 1x RS232 interface - For APC910/PPC900/ APC3100/PPC3100	

Table 69: 5AC901.I232-00 - Order data

4.8.7.1.3 Technical data

Information:

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

Model number	5AC901.I232-00
General information	
B&R ID code	0xF400
Certifications	
CE	Yes
UL	cULus E115267
EAC	Industrial control equipment Product family certification
Interfaces	
COM	
Type	RS232, modem supported, not galvanically isolated
Variant	DSUB, 9-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 70: 5AC901.I232-00 - Technical data

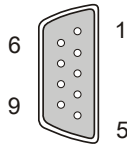
Technical data

Model number	5AC901.I232-00
Ambient conditions	
Temperature	
Operation	0 to 60°C ¹⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 30 g

Table 70: 5AC901.I232-00 - Technical data

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

4.8.7.1.3.1 Pinout

Serial interface COM ¹⁾		
	RS232	
Variant	DSUB, 9-pin, male	
Type	RS232, modem supported	
UART	16550-compatible, 16-byte FIFO buffer	
Galvanic isolation	No	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	
	Pin	
	Pinout	
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8	
	9	

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

4.8.7.1.3.2 I/O address and IRQ

When operated in the xPC3100:

Slot	I/O address ¹⁾	IRQ ¹⁾
IF option 1 (COM C)	2E8h - 2EFh	5
IF option 2 (COM D)	338h - 33Fh	7

1) The default I/O address and IRQ can be modified in BIOS.

4.8.7.1.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

4.8.7.2 5AC901.I485-00

4.8.7.2.1 General information

Interface option 5AC901.I485-00 is equipped with an RS232/RS422/RS485 interface. The operating mode (RS232/RS422/RS485) is selected automatically depending on the electrical connection.

- 1x RS232/RS422/RS485 interface
- Compatible with APC910/PPC900 and APC3100/PPC3100

Simultaneous operation of this interface option in slot IF option 1 with interface option 5ACCIF02.ISS0-000 in slot IF option 2 is not possible.

4.8.7.2.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.I485-00	Interface card - 1x RS232/422/485 interface - For APC910/PPC900/APC3100/PPC3100	

Table 71: 5AC901.I485-00 - Order data

4.8.7.2.3 Technical data

Information:

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

Model number	5AC901.I485-00
General information	
B&R ID code	0xD84A
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⁾
EAC	Product family certification
Interfaces	
COM	
Type	RS232/RS422/RS485, galvanically isolated
Variant	DSUB, 9-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 72: 5AC901.I485-00 - Technical data

Technical data

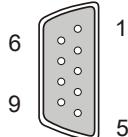
Model number	5AC901.I485-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 34 g

Table 72: 5AC901.I485-00 - Technical data

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

4.8.7.2.3.1 Pinout

Serial interface COM		
	RS232	RS422/485
Variant	DSUB, 9-pin, male	
Type	RS232, not modem supported	
UART	16550-compatible, 16-byte FIFO buffer	
Galvanic isolation	Yes	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	Max. 1200 m
Pin	RS232 - Pinout	RS422 - Pinout
1	NC ¹⁾	TXD\
2	RXD	NC
3	TXD	NC
4	NC	TXD
5	GND	GND
6	NC	RXD\
7	RTS	NC
8	CTS	NC
9	NC	RXD



- 1) Not connected

4.8.7.2.3.2 I/O address and IRQ

When operated in the xPC3100:

Slot	I/O address ¹⁾	IRQ ¹⁾
IF option 1 (COM C)	2E8h - 2EFh	5
IF option 2 (COM D)	338h - 33Fh	7

- 1) The default I/O address and IRQ can be modified in BIOS.

4.8.7.2.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

4.8.7.2.3.4 Operation as RS485 interface

The pins of the RS422 default interface (1, 4, 6 and 9) must be used for operation. To do this, connect the pins as shown.

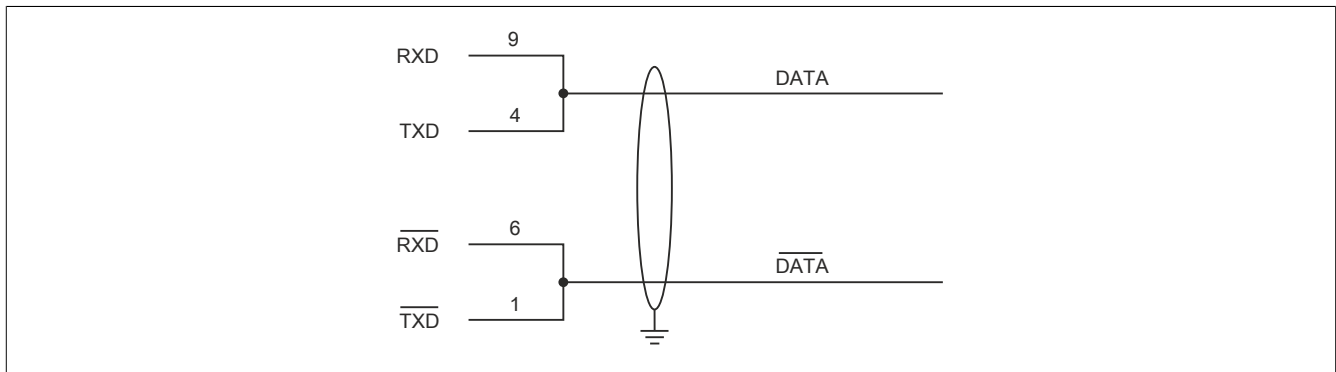


Figure 71: RS232/RS422/RS485 interface - Operation in RS485 mode

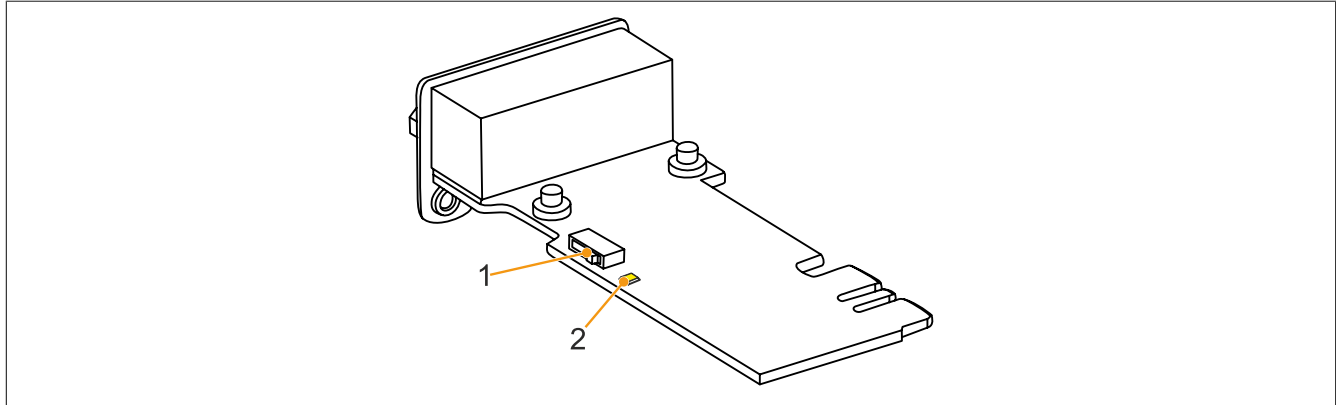
The RTS line must be switched by the driver for each transmission or reception; switching back does not take place automatically. This cannot be configured in Windows.

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

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

4.8.7.2.3.5 Terminating resistor

A terminating resistor for the serial interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2) (see ["Reading LED status indicators" on page 362](#)).



4.8.7.3 5AC901.ICAN-00

4.8.7.3.1 General information

Interface option 5AC901.ICAN-00 is equipped with a CAN bus master interface.

- 1x CAN bus master interface
- Compatible with APC910/PPC900 and APC3100/PPC3100

Simultaneous operation of 2 interface options with a legacy CAN interface in slots IF option 1 and IF option 2 is not possible.

4.8.7.3.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.ICAN-00	Interface card - 1x CAN interface - For APC910/PPC900/ APC3100/PPC3100	

Table 73: 5AC901.ICAN-00 - Order data

4.8.7.3.3 Technical data

Information:

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

Model number	5AC901.ICAN-00
General information	
B&R ID code	0xD84B
Certifications	
CE	Yes
EAC	Product family certification
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	
CAN	
Quantity	1
Controller	Bosch CC770 (compatible with Intel 82527 CAN controller)
Variant	DSUB, 9-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 74: 5AC901.ICAN-00 - Technical data

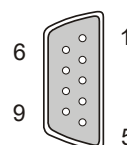
Model number	5AC901.ICAN-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 33 g

Table 74: 5AC901.ICAN-00 - Technical data

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

4.8.7.3.3.1 Pinout

CAN bus		
Variant	DSUB, 9-pin, male	
Galvanic isolation	Yes	
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 meters	
Pin	Pinout	
1	NC ¹⁾	
2	CAN LOW	
3	GND	
4	NC	
5	NC	
6	Reserved	
7	CAN HIGH	
8	NC	
9	NC	



- 1) Not connected

4.8.7.3.3.2 I/O address and IRQ

Resource	Default setting	Function
I/O address	384h (address register)	Defines the register number to be accessed.
	385h (data register)	Access to the register defined in the address register.
IRQ	IRQ10	Interrupt

- 1) Resource allocation is identical for the interface option 1 and 2 slots.

4.8.7.3.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

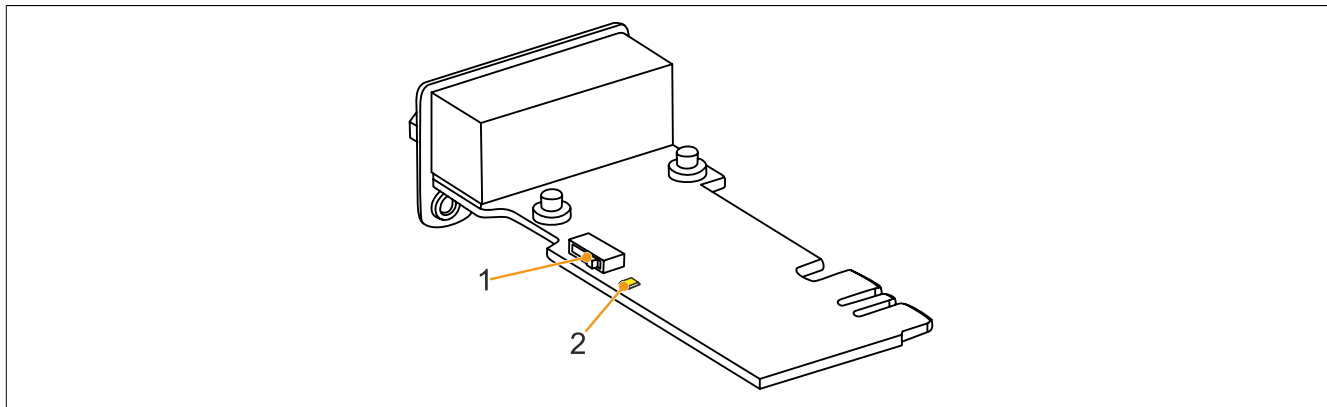
4.8.7.3.3.4 CAN driver setting

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

Bit timing register 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

4.8.7.3.3.5 Terminating resistor

A terminating resistor for the CAN interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2) (see ["Reading LED status indicators" on page 362](#)).



4.8.7.3.3.6 Drivers

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

Approved operating systems:

- Windows 10
- Automation Runtime

4.8.7.4 5AC901.ICAN-01

4.8.7.4.1 General information

Interface option 5AC901.ICAN-01 is equipped with a CAN bus master interface.

- 1x CAN bus master interface (SJA1000)
- Compatible with APC910/PPC900 and APC3100/PPC3100

Simultaneous operation of 2 interface options with a legacy CAN interface in slots IF option 1 and IF option 2 is not possible.

4.8.7.4.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.ICAN-01	Interface card - 1x CAN interface (SJA1000) - For APC910/PPC900/APC3100/PPC3100	

Table 75: 5AC901.ICAN-01 - Order data

4.8.7.4.3 Technical data

Information:

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

Model number	5AC901.ICAN-01
General information	
B&R ID code	0xD84C
Certifications	
CE	Yes
EAC	Product family certification
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	SJA1000
Variant	DSUB, 9-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
Electrical properties	
Power consumption	0.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 76: 5AC901.ICAN-01 - Technical data

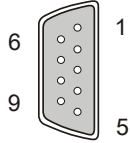
Technical data

Model number	5AC901.ICAN-01
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 33 g

Table 76: 5AC901.ICAN-01 - Technical data

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

4.8.7.4.3.1 Pinout

CAN bus		
Variant	DSUB, 9-pin, male	
Galvanic isolation	Yes	
Transfer rate	Max. 1 Mbit/s	
Bus length	Max. 1000 meters	
Pin	Pinout	
1	NC ¹⁾	
2	CAN LOW	
3	GND	
4	NC	
5	NC	
6	Reserved	
7	CAN HIGH	
8	NC	
9	NC	

- 1) Not connected

4.8.7.4.3.2 I/O address and IRQ

Resource	Default setting	Function
I/O address	384h (address register)	Defines the register number to be accessed.
	385h (data register)	Access to the register defined in the address register.
IRQ	IRQ10	Interrupt

- 1) Resource allocation is identical for the interface option 1 and 2 slots.

4.8.7.4.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

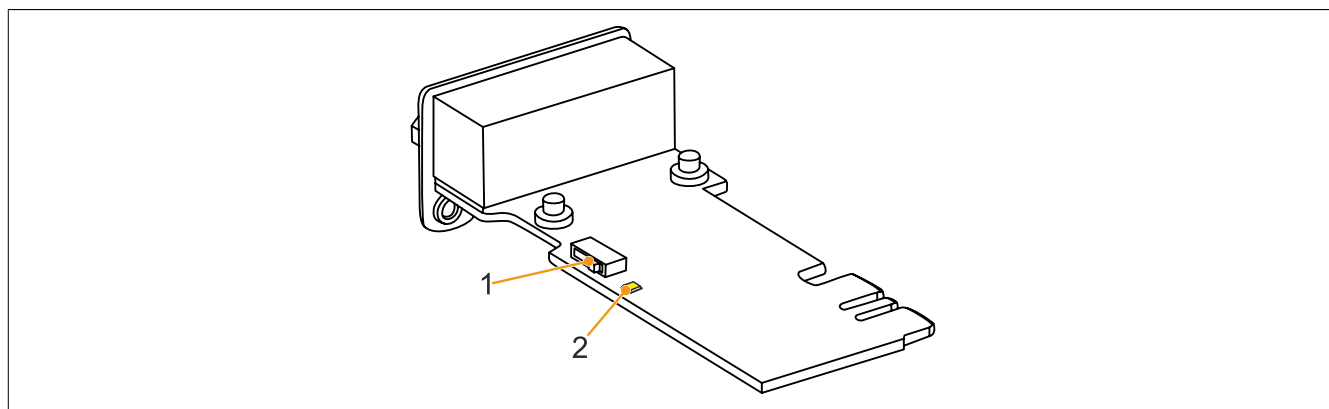
4.8.7.4.3.4 CAN driver settings

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

4.8.7.4.3.5 Terminating resistor

A terminating resistor for the CAN interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2) (see "Reading LED status indicators" on page 362).



4.8.7.4.3.6 Drivers

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

Approved operating systems:

- Windows 10
- B&R Linux

4.8.7.5 5AC901.IHDA-00

4.8.7.5.1 General information

Interface option 5AC901.IHDA-00 is equipped with an HDA sound chip with externally accessible MIC, Line IN and Line OUT channels.

- 1x MIC
- 1x Line IN
- 1x Line OUT
- Compatible with APC910/PPC900 and APC3100/PPC3100

This interface option can only be operated in slot IF option 1.

4.8.7.5.2 Order data

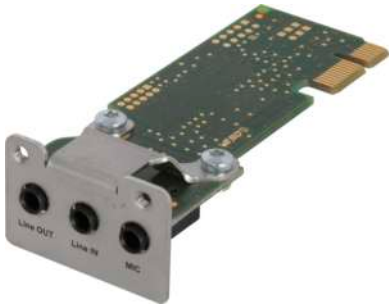
Model number	Short description	Figure
	Interface options	
5AC901.IHDA-00	Interface card - 1x audio interface (1x MIC / 1x Line In / 1x OUT) - For APC910/PPC900/APC3100/PPC3100	

Table 77: 5AC901.IHDA-00 - Order data

4.8.7.5.3 Technical data

Information:

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

Model number	5AC901.IHDA-00
General information	
B&R ID code	0xD84E
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267
HazLoc	Industrial control equipment cULus HazLoc E180196 Industrial control equipment for hazardous locations
DNV GL	Class I, Division 2, Groups ABCD, T3C ¹⁾ Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ²⁾
Interfaces	
Audio	
Type	HDA sound
Controller	Realtek ALC 662
Inputs	Microphone, Line In
Outputs	Line out
Electrical properties	
Power consumption	0.4 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 78: 5AC901.IHDA-00 - Technical data

Model number	5AC901.IHDA-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 21 g

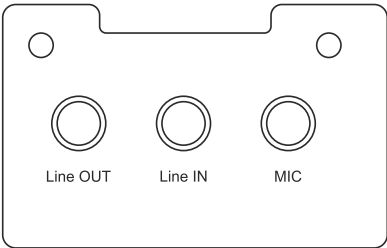
Table 78: 5AC901.IHDA-00 - Technical data

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

4.8.7.5.3.1 Pinout

All interfaces are designed as 3.5-mm jack connections (female).

MIC, Line IN, Line OUT	
Controller	Realtek ALC 662
MIC	Microphone input (mono)
Line IN	Input (stereo)
Line OUT	Output (stereo) for playback devices (e.g. amplifiers)
-	



4.8.7.5.3.2 Drivers

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

Information:

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

4.8.7.6 5AC901.ISRM-00

4.8.7.6.1 General information

Interface option 5AC901.ISRM-00 is equipped with 2 MB SRAM.

- 2 MB SRAM
- Compatible with APC910/PPC900 and APC3100/PPC3100

This interface option can only be operated in slot IF option 2.

4.8.7.6.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.ISRM-00	Interface card - 2 MB RAM - For APC910/PPC900/APC3100/PPC3100	

Table 79: 5AC901.ISRM-00 - Order data

4.8.7.6.3 Technical data

Information:

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

Model number	5AC901.ISRM-00
General information	
B&R ID code	0xD850
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267
HazLoc	Industrial control equipment cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Controller	
SRAM	
Size	2 MB
Battery-backed	Yes
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Electrical properties	
Power consumption	2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 20 g

Table 80: 5AC901.ISRM-00 - Technical data

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

4.8.7.6.3.1 Drivers

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

Approved operating systems:

- Windows 10
- Automation Runtime

4.8.7.7 5AC901.IPLK-00

4.8.7.7.1 General information

Interface option 5AC901.IPLK-00 is equipped with 1 POWERLINK interface and 2 MB SRAM.

- 1x POWERLINK interface managing or controlled node
- 2 MB SRAM
- Compatible with APC910/PPC900 and APC3100/PPC3100

This interface option can only be operated in slot IF option 2.

4.8.7.7.2 Order data

Model number	Short description	Figure
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100	

Table 81: 5AC901.IPLK-00 - Order data

4.8.7.7.3 Technical data

Information:

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

Model number	5AC901.IPLK-00
General information	
B&R ID code	0xE025
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
EAC	Product family certification
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	
SRAM	
Size	2 MB
Battery-backed	Yes
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Interfaces	
POWERLINK	
Quantity	1
Type	Type 4 ³⁾
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 82: 5AC901.IPLK-00 - Technical data

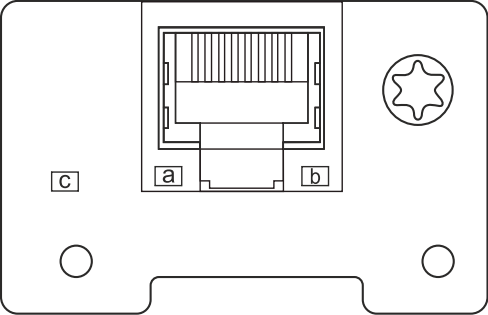
Model number	5AC901.IPLK-00
Ambient conditions	
Temperature	
Operation	0 to 55°C ⁴⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 35 g

Table 82: 5AC901.IPLK-00 - Technical data

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

4.8.7.7.3.1 Pinout

POWERLINK		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Link" (a)	On	Active
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)
(b)	-	
LED "Status/Error" (c)	On	Off
Green/Red	POWERLINK status see "LED "S/E" (LED "Status/Error")" on page 363	
	-	



POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 363.

4.8.7.7.3.2 Driver support and firmware update

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

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

4.8.7.8 5AC901.IRDY-00

4.8.7.8.1 General information

Ready relay 5AC901.IRDY-00 is switched as soon as the B&R industrial PC has started up and all internal supply voltages are applied. It is possible to connect additional devices to the ready relay; they will also be switched on when the B&R industrial PC starts up.

- 1 normally closed contact, 1 normally open contact
- Compatible with APC910/PPC900 and APC3100/PPC3100

Terminal block 0TB2104.8000 is not included in delivery and must be ordered separately.

4.8.7.8.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.IRDY-00	Interface card - Ready relay - For APC910/PPC900/APC3100/PPC3100	
	Required accessories	
	Terminal blocks	
0TB2104.8000	Connector 24 VDC - 4-pin female - Screw clamp terminal block 2.5 mm ²	

Table 83: 5AC901.IRDY-00 - Order data

4.8.7.8.3 Technical data

Information:

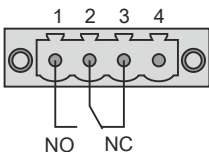
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Model number	5AC901.IRDY-00
General information	
B&R ID code	0xD84F
Ready relay	Normally open contact and normally closed contact, max. 30 VDC, max. 2 A
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267 Industrial control equipment
Electrical properties	
Power consumption	0.2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C ¹⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 30 g

Table 84: 5AC901.IRDY-00 - Technical data

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

4.8.7.8.3.1 Pinout

Ready relay			Connector, 4-pin, male 
Pin	Pinout	Description	
1	NO	Normally open contact	
2	COM	Changeover contact	
3	NC	Normally closed contact	
4	-	Not connected	

4.8.7.9 5AC901.ISIO-00

4.8.7.9.1 General information

The ready relay function of IF option 5AC901.ISIO-00 can be controlled using the MTCX. Corresponding commands must be issued by the MTCX in order to switch the ready relay.

In addition to the ready relay function, the reset and power button as well as the power LED of the APC910/PPC900 or APC3100/PPC3100 can be routed externally.

- Connections for the reset button and power buttons on the PC
- Connection for LED "Power" on the PC
- 1 normally closed contact, 1 normally open contact of the ready relay
- Control of the ready relay functions using MTCX commands
- Compatible with APC910/PPC900 and APC3100/PPC3100

Unlike IF option 5AC901.IRDY-00, ready relay 5AC901.ISIO-00 is not automatically switched on or off if the power supply to the PC is switched on or off.

The maximum cable length for connecting the reset button, power button and LED "Power" is 2 m.

4.8.7.9.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.ISIO-00	Interface card - System I/O - For APC910/PPC900/APC3100/PPC3100	

Table 85: 5AC901.ISIO-00 - Order data

4.8.7.9.3 Technical data

Information:

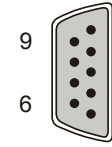
The following specified characteristic data, features and limit values are only valid for this accessory and may differ from those of the complete system. The data specified for the complete system applies to the complete system in which this accessory is installed, for example.

Model number	5AC901.ISIO-00
General information	
B&R ID code	0xE674
Ready relay	Normally open contact and normally closed contact, max. 30 VDC, max. 1 A
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267 Industrial control equipment
Electrical properties	
Power consumption	0.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C ¹⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 30 g

Table 86: 5AC901.ISIO-00 - Technical data

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

4.8.7.9.3.1 Pinout

Ready relay		DSUB, 9-pin, female 
Cable length	Max. 2 meters	
Pin	Pinout	
1	Output LED ("Power") - Green	
2	Output LED ("Power") - Red	
3	GND	
4	Input - Power button	
5	Input - Reset button	
6	Relay, normally open contact	
7	Relay, normally closed contact	
8	GND	
9	COM relay, changeover contact	

For information about LED "Power", see section ["LED status indicators" on page 53](#).

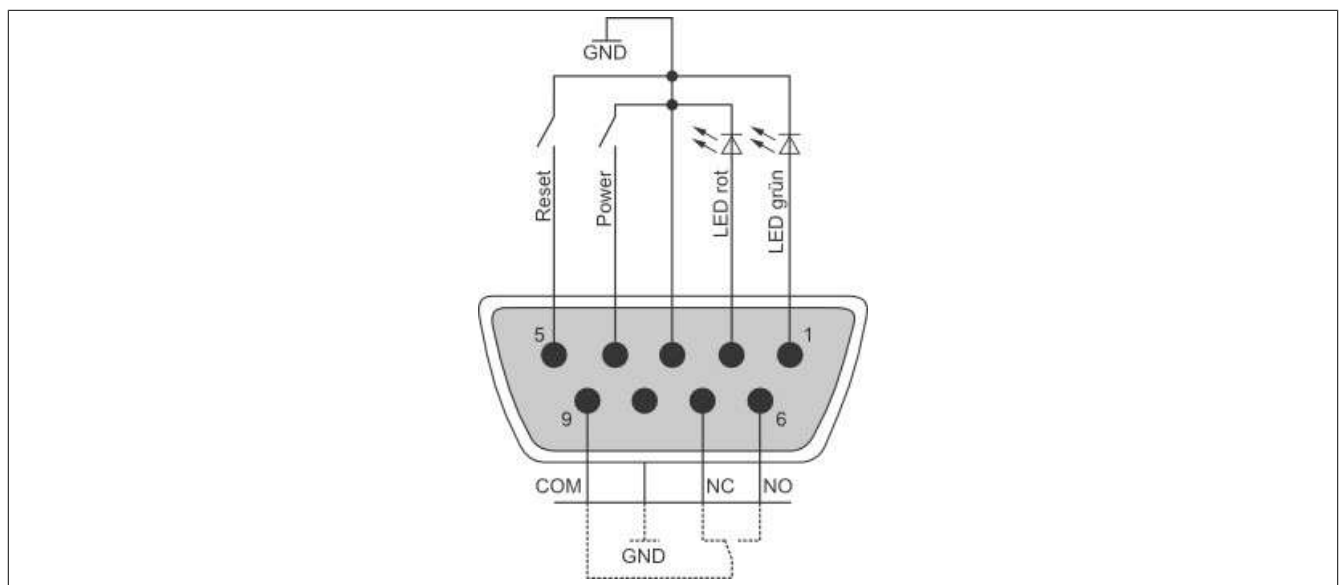
For information about the power and reset buttons, see section ["Power and reset buttons" on page 52](#).

4.8.7.9.3.2 Connection example

Information:

Series resistors for the LEDs are already installed on the interface option.

The LED outputs are dimensioned for a typical LED current of 3.5 mA.



4.8.7.10 5AC901.IETH-00

4.8.7.10.1 General information

Interface option 5AC901.IETH-00 is equipped with a 10/100/1000BASE-T Ethernet interface.

- 1x Ethernet interface 10/100/1000BASE-T
- Compatible with APC910/PPC900 and APC3100/PPC3100

This interface option can only be operated in slot IF option 2.

4.8.7.10.2 Order data

Model number	Short description	Figure
	Interface options	
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/ APC3100/PPC3100	

Table 87: 5AC901.IETH-00 - Order data

4.8.7.10.3 Technical data

Information:

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

Model number	5AC901.IETH-00
General information	
B&R ID code	EC3C
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267
DNV GL	Industrial control equipment
	Temperature: B (0 - 55°C)
	Humidity: B (up to 100%)
	Vibration: A (0.7 g)
	EMC: B (bridge and open deck) ¹⁾
Interfaces	
Ethernet	
Quantity	1
Controller	Intel I210
Variant	RJ45, shielded
Transfer rate	10/100/1000 Mbit/s ²⁾
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 88: 5AC901.IETH-00 - Technical data

Model number	5AC901.IETH-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 35 g

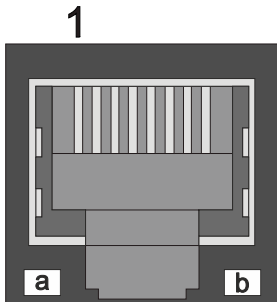
Table 88: 5AC901.IETH-00 - Technical data

- 1) Yes, but 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) Switching takes place automatically.
- 3) For detailed information, see the temperature tables in the user's manual.

4.8.7.10.3.1 Pinout

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

1



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

4.8.7.10.3.2 Driver support

A special driver is necessary to operate Intel Ethernet controller I210. Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

Approved operating systems:

- Windows 10
- B&R Linux

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

Information:

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

4.8.7.11 5ACCIF02.CANE-000

4.8.7.11.1 General information

Interface option 5ACCIF02.CANE-000 has a 10/100/1000BASE-T Ethernet interface and a CAN bus master interface.

- 1x Ethernet interface 10/100/1000BASE-T
- 1x CAN bus master interface (SJA1000)
- Compatible with APC3100/PPC3100

This interface option can only be operated in slot IF option 2 and additionally uses slot IF option 2 add-on.

Simultaneous operation of 2 interface options with a legacy CAN interface in slots IF option 1 and IF option 2 is not possible.

4.8.7.11.2 Order data

Model number	Short description	Figure
5ACCIF02.CANE-000	Interface card - 1x CAN interface (SJA1000) - 1x ETH 10/100/1000 - For APC3100/PPC3100	

Table 89: 5ACCIF02.CANE-000 - Order data

4.8.7.11.3 Technical data

Information:

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

Model number	5ACCIF02.CANE-000
General information	
B&R ID code	F171
Diagnostics	
Data transfer	Yes, using LED status indicator
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
Interfaces	
Ethernet	
Quantity	1
Controller	Intel I210
Variant	RJ45, shielded
Transfer rate	10/100/1000 Mbit/s ¹⁾
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Controller	SJA1000
Variant	DSUB, 9-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
Electrical properties	
Power consumption	1.5 W

Table 90: 5ACCIF02.CANE-000 - Technical data

Technical data

Model number	5ACCIF02.CANE-000
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 100 g

Table 90: 5ACCIF02.CANE-000 - Technical data

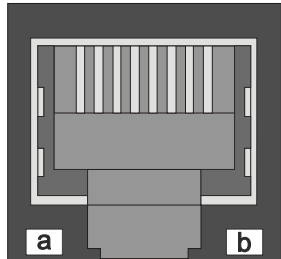
- 1) Switching takes place automatically.
- 2) For detailed information, see the temperature tables in the user's manual.

4.8.7.11.3.1 ETH - Pinout

The Ethernet interface is available in the IF option 2 slot.

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

1



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

Driver support

A special driver is necessary to operate Intel Ethernet controller I210. Drivers for approved operating systems are available for download in the Downloads section of the B&R website (www.br-automation.com).

Approved operating systems:

- Windows 10
- B&R Linux

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

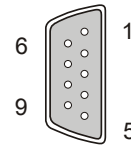
Information:

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

4.8.7.11.3.2 CAN - Pinout

The CAN interface is available in the IF option 2 add-on slot.

CAN bus ¹⁾	
Variant	DSUB, 9-pin, male
Galvanic isolation	Yes
Transfer rate	Max. 1 Mbit/s
Bus length	Max. 1000 meters
Pin	Pinout
1	NC ²⁾
2	CAN LOW
3	GND
4	NC
5	NC
6	Reserved
7	CAN HIGH
8	NC
9	NC



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
- 2) Not connected

I/O address and IRQ

Resource	Default setting	Function
I/O address	384h (address register)	Defines the register number to be accessed.
	385h (data register)	Access to the register defined in the address register.
IRQ	IRQ10	Interrupt

Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

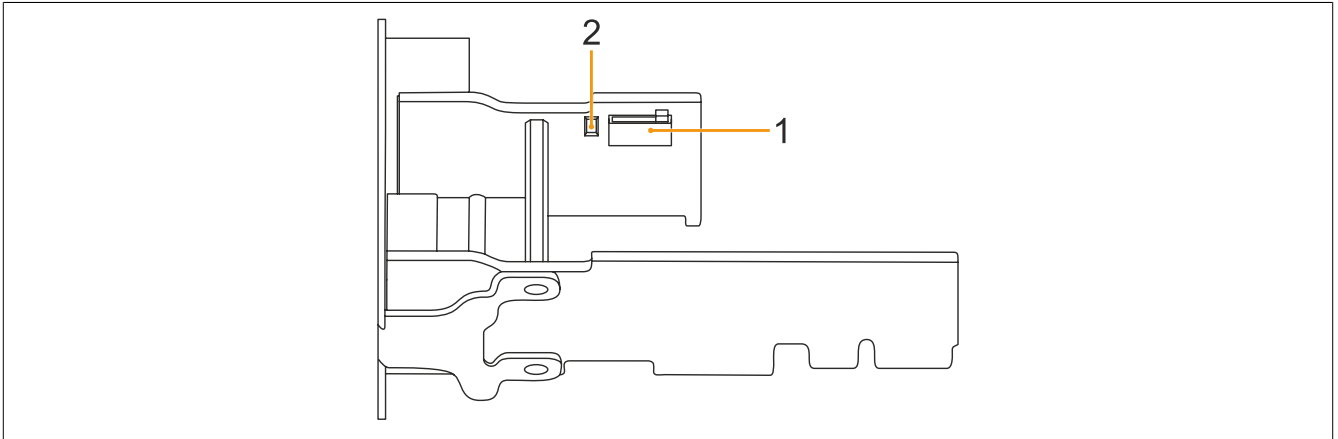
CAN driver settings

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

Terminating resistor

A terminating resistor for the CAN interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2) (see "Reading LED status indicators" on page 362).



Drivers

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

Approved operating systems:

- Windows 10
- B&R Linux

4.8.7.12 5ACCIF02.FPLK-000

4.8.7.12.1 General information

Interface option 5ACCIF02.FPLK-000 is equipped with 2 female RJ45 connectors connected to an integrated POWERLINK hub. 2 MB SRAM is also installed.

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

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

Information:

Ring redundancy and simultaneous poll-response chaining operation is not possible with this IF option.

- 1x POWERLINK interface for real-time communication
- 2 MB SRAM
- Integrated hub for economical wiring
- Configurable ring redundancy
- Poll-response chaining
- Compatible with APC3100/PPC3100

This interface option can only be operated in slot IF option 2, additionally uses slot IF option 2 add-on and is only supported by Automation Runtime.

4.8.7.12.2 Order data

Model number	Short description	Figure
	Interface options	
5ACCIF02.FPLK-000	Interface card - 1x POWERLINK interface - 2 MB SRAM - Integrated 2-port hub - Ring redundancy - POWERLINK managing or controlled node - PRC function - For APC3100/PPC3100	

Table 91: 5ACCIF02.FPLK-000 - Order data

4.8.7.12.3 Technical data

Information:

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

Model number	5ACCIF02.FPLK-000
General information	
B&R ID code	0xF10E
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267
	Industrial control equipment
Controller	
SRAM	
Size	2 MB
Battery-backed	Yes
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)

Table 92: 5ACCIF02.FPLK-000 - Technical data

Technical data

Model number	5ACCIF02.FPLK-000
Interfaces	
POWERLINK	
Quantity	1 (integrated 2-port hub)
Type	Type 4, redundant ¹⁾
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 100 g

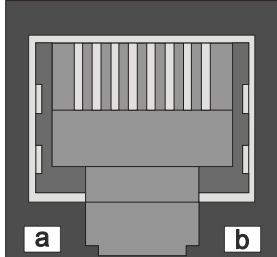
Table 92: 5ACCIF02.FPLK-000 - Technical data

- 1) For additional information, see Automation Help (Communication - POWERLINK - General - Hardware - IF / LS).
2) For detailed information, see the temperature tables in the user's manual.

4.8.7.12.3.1 POWERLINK 1 interface - Pinout

The POWERLINK 1 interface is available in the IF option 2 slot.

POWERLINK 1 - IF1 ¹⁾		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Link" (a)	On	Active
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)
LED status indicator (b)	On	Off
Green/Red	POWERLINK status see "LED "S/E" (LED "Status/Error")" on page 363	



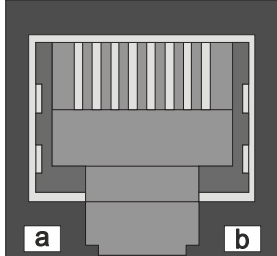
- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.

4.8.7.12.3.2 POWERLINK 2 interface - Pinout

The POWERLINK 2 interface is available in the IF option 2 add-on slot.

POWERLINK 2 - IF2 ¹⁾		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Link" (a)	On	Active
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)
LED "Status" (b)	On	Off
Green/Red	POWERLINK status see "LED "S/E" (LED "Status/Error")" on page 363	

1



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

4.8.7.12.3.3 POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 363.

4.8.7.12.4 Driver support and firmware update

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

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

4.8.7.13 5ACCIF02.FPLS-000

4.8.7.13.1 General information

Interface option 5ACCIF02.FPLS-000 is equipped with a POWERLINK and RS232 interface. In addition, 2 MB SRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x RS232 interface
- 2 MB SRAM
- Compatible with APC3100, PPC3100

This interface option can only be operated in slot IF option 2 and additionally uses slot IF option 2 add-on.

4.8.7.13.2 Order data

Model number	Short description	Figure
	Interface options	
5ACCIF02.FPLS-000	Interface card - 2 MB SRAM - 1x RS232 interface - 1x POWERLINK interface - For APC3100/PPC3100	

Table 93: 5ACCIF02.FPLS-000 - Order data

4.8.7.13.3 Technical data

Information:

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

Model number	5ACCIF02.FPLS-000
General information	
B&R ID code	0xF2E2
Diagnostics	
Data transfer	Yes, using LED "Status/Error"
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
Controller	
SRAM	
Size	2 MB
Battery-backed	Yes
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS232, modem supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
POWERLINK	
Quantity	1
Type	Type 4 ¹⁾
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
Electrical properties	
Power consumption	1.75 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 94: 5ACCIF02.FPLS-000 - Technical data

Model number	5ACCIF02.FPLS-000
Ambient conditions	
Temperature	
Operation	0 to 55°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 100 g

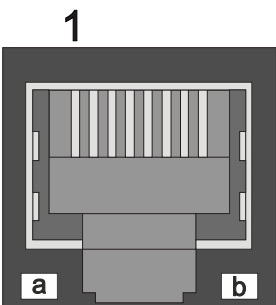
Table 94: 5ACCIF02.FPLS-000 - Technical data

- 1) For additional information, see Automation Help (Communication - POWERLINK - General - Hardware - IF / LS).
2) For detailed information, see the temperature tables in the user's manual.

4.8.7.13.3.1 POWERLINK interface - Pinout

The POWERLINK interface is available in the IF option 2 slot.

POWERLINK ¹⁾		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Link" (a)	On	Active
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)
LED "Status" (b)	On	Off
Green/Red	POWERLINK status "LED "S/E" (LED "Status/Error")" on page 363	



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

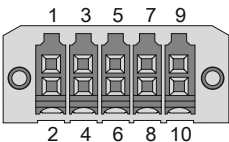
POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see ["LED "S/E" \(LED "Status/Error"\)" on page 363](#).

4.8.7.13.3.2 Serial interface COM D - Pinout

Serial interface COM D is available in the IF option 2 add-on slot.

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



- 1) The interfaces, etc. available on the device or module have been numbered for the purpose of clear differentiation. This numbering may deviate from the numbering used by the respective operating system, however.
2) This interface (if available) is automatically enabled in BIOS as COM D with default addresses I/O:338h and IRQ:7. The respective default values for the I/O address and IRQ can be modified in BIOS.

Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "[Cable data](#)" on page 366.

4.8.7.13.4 Shielding

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

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

4.8.7.13.5 Driver support and firmware update

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

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

4.8.7.14 5ACCIF02.FPSC-000

4.8.7.14.1 General information

Interface option 5ACCIF02.FPSC-000 is equipped with a POWERLINK, RS232 and CAN bus master as well as an X2X Link master interface. In addition, 2 MB SRAM is installed.

- 1x POWERLINK interface managing or controlled node
- 1x CAN bus master interface
- 1x X2X Link master interface
- 1x RS232 interface
- 2 MB SRAM
- Compatible with APC3100, PPC3100

This interface option can only be operated in slot IF option 2, additionally uses slot IF option 2 add-on and is only supported by Automation Runtime.

4.8.7.14.2 Order data

Model number	Short description	Figure
	Interface options	
5ACCIF02.FPSC-000	Interface card - 2 MB SRAM - 1x RS232 interface - 1x CAN interface - 1x POWERLINK interface - 1x X2X - For APC3100/PPC3100	

Table 95: 5ACCIF02.FPSC-000 - Order data

4.8.7.14.3 Technical data

Information:

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

Model number	5ACCIF02.FPSC-000
General information	
B&R ID code	0xF2E3
Diagnostics	
Data transfer	Yes, using LED "Status/Error"
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267 Industrial control equipment
Controller	
SRAM	
Size	2 MB
Battery-backed	Yes
Remanent variables in power failure mode	256 kB (for e.g. Automation Runtime, see Automation Help)
Interfaces	
COM	
Quantity	1
Type	RS232, modem not supported, not galvanically isolated
Variant	10-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s

Table 96: 5ACCIF02.FPSC-000 - Technical data

Model number	5ACCIF02.FPSC-000
POWERLINK	
Quantity	1
Type	Type 4 ¹⁾
Variant	RJ45, shielded
Transfer rate	100 Mbit/s
Transfer	100BASE-TX
Line length	Max. 100 m between two stations (segment length)
CAN	
Quantity	1
Variant	10-pin, male, galvanically isolated
Transfer rate	Max. 1 Mbit/s
Terminating resistor	
Type	Can be switched on and off with slide switch
Default setting	Off
X2X	
Type	X2X Link master
Quantity	1
Variant	10-pin, male, galvanically isolated
Electrical properties	
Power consumption	2 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ²⁾
Storage	-20 to 60°C
Transport	-20 to 60°C
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 100 g

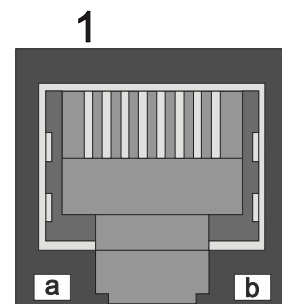
Table 96: 5ACCIF02.FPSC-000 - Technical data

- 1) For additional information, see Automation Help (Communication - POWERLINK - General - Hardware - IF / LS).
2) For detailed information, see the temperature tables in the user's manual.

4.8.7.14.3.1 POWERLINK interface - Pinout

The POWERLINK interface is available in the IF option 2 slot.

POWERLINK ¹⁾		
Variant	RJ45, female	
Wiring	S/STP (Cat 5e)	
Cable length	Max. 100 m (min. Cat 5e)	
LED "Link" (a)	On	Active
Orange (light)	Link (a connection to a POWERLINK network exists)	Blinking (data being transferred)
LED "Status" (b)	On	Off
Green/Red	POWERLINK status "LED "S/E" (LED "Status/Error")" on page 363	



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

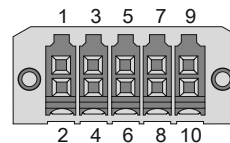
POWERLINK commissioning and operation

For a description of the operating modes, status and node numbers of the POWERLINK interface(s), see "LED "S/E" (LED "Status/Error")" on page 363.

4.8.7.14.3.2 Serial interface COM - Pinout

Serial interface COM is available in the IF option 2 add-on slot.

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



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

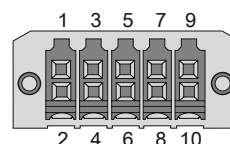
Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

4.8.7.14.3.3 CAN bus interface - Pinout

The CAN bus interface is available in the IF option 2 add-on slot.

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



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

CAN driver setting

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

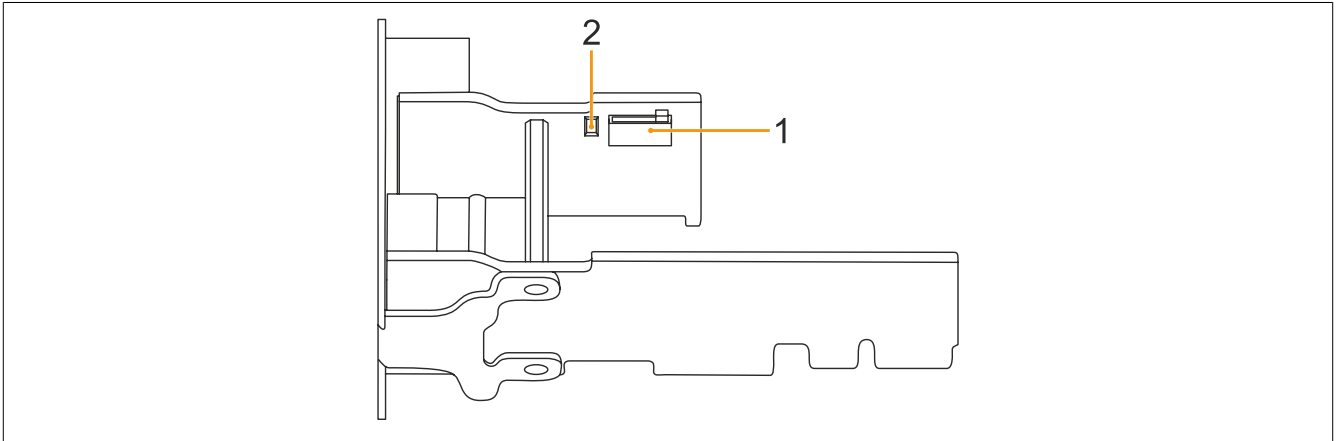
Bit timing register 1	Bit timing register 0	Baud rate
00h	14h	1000 kbit/s
80h or 00h	1Ch	500 kbit/s
81h or 01h	1Ch	250 kbit/s
83h or 03h	1Ch	125 kbit/s
84h or 04h	1Ch	100 kbit/s
89h or 09h	1Ch	50 kbit/s

Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see "[Cable data](#)" on page 366.

Terminating resistor

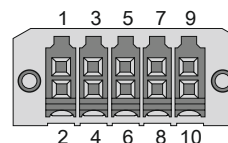
A terminating resistor for the CAN interface is already integrated in the IF option. This can be switched on or off with a switch (1); it is necessary to open the system unit for this. A switched-on terminating resistor is indicated by a yellow LED (2) (see "[Reading LED status indicators](#)" on page 362).



4.8.7.14.3.4 X2X Link master interface - Pinout

The X2X Link master interface is available in the IF option 2 add-on slot.

X2X Link master ¹⁾²⁾	
Variant	10-pin, male
Galvanic isolation	Yes
Pin	Pinout
1	X2X H
2	Shield
3	X2X L
4	X2X GND
5	-
6	-
7	-
8	-
9	-
10	-



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

4.8.7.14.4 Shielding

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

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

4.8.7.14.5 Driver support and firmware update

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

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

4.8.7.15 5ACCIF02.ISS0-000

4.8.7.15.1 General information

Interface option 5ACCIF02.ISS0-000 is equipped with two RS232/RS422/RS485 interfaces. The operating mode (RS232/RS422/RS485) is selected automatically depending on the electrical connection.

- 2x RS232/RS422/RS485 interfaces
- Compatible with APC3100/PPC3100

This interface option can only be operated in slot IF option 2 and additionally uses slot IF option 2 add-on.

Simultaneous operation of this interface option with interface option 5AC901.I232-00 or 5AC901.I485-00 in slot IF option 1 is not possible.

4.8.7.15.2 Order data

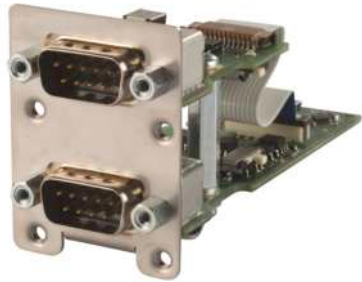
Model number	Short description	Figure
5ACCIF02.ISS0-000	Interface card - 2x RS232/RS422/RS485 interface - For APC3100/PPC3100	

Table 97: 5ACCIF02.ISS0-000 - Order data

4.8.7.15.3 Technical data

Information:

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

Model number	5ACCIF02.ISS0-000
General information	
B&R ID code	0xF725
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
Interfaces	
COM	
Quantity	2
Type	RS232/RS422/RS485, galvanically isolated
Variant	DSUB, 9-pin, male
UART	16550-compatible, 16-byte FIFO buffer
Max. baud rate	115 kbit/s
Terminating resistor	
Type	Possible to switch each on/off via slide switch
Default setting	Each off
Electrical properties	
Power consumption	1.5 W
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 60°C ¹⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 98: 5ACCIF02.ISS0-000 - Technical data

Technical data

Model number	5ACCIF02.ISS0-000
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 100 g

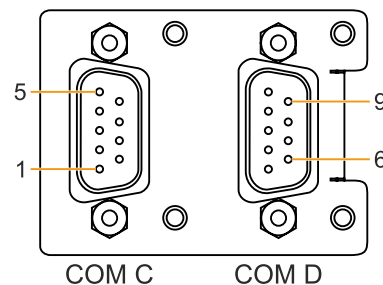
Table 98: 5ACCIF02.ISS0-000 - Technical data

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

4.8.7.15.3.1 Pinout

Serial interfaces COM C and COM D		
	RS232	RS422/485
Variant	DSUB, 9-pin, male	
Type	RS232, not modem supported	
UART	16550-compatible, 16-byte FIFO buffer	
Galvanic isolation	Yes	
Transfer rate	Max. 115 kbit/s	
Bus length	Max. 15 m	Max. 1200 m
Pin	RS232 - Pinout	RS422 - Pinout
1	n.c.	TXD\
2	RXD	n.c.
3	TXD	n.c.
4	n.c.	TXD
5	GND	GND
6	n.c.	RXD\
7	RTS	n.c.
8	CTS	n.c.
9	n.c.	RXD

The diagram shows two 9-pin D-sub connectors, COM C and COM D, mounted on a panel. COM C is on the left and COM D is on the right. Both connectors have a shielded outer casing. Pin 1 of COM C is labeled with an orange line. Pin 5 of COM C is labeled with an orange line. Pin 6 of COM D is labeled with an orange line. Pin 9 of COM D is labeled with an orange line. The connectors are labeled 'COM C' and 'COM D' below them.



4.8.7.15.3.2 I/O address and IRQ

Slot (interface)	I/O address ¹⁾	IRQ ¹⁾
IF option 2 add-on (COM C)	2E8h - 2EFh	5
IF option 2 (COM D)	338h - 33Fh	7

1) The default I/O address and IRQ can be modified in BIOS.

4.8.7.15.3.3 Cable data

For more detailed information about the transfer rate, bus length or cable requirements for the respective interfaces/buses, see ["Cable data" on page 366](#).

4.8.7.15.3.4 Operation as RS485 interface

The pins of the RS422 default interface (1, 4, 6 and 9) must be used for operation. To do this, connect the pins as shown.

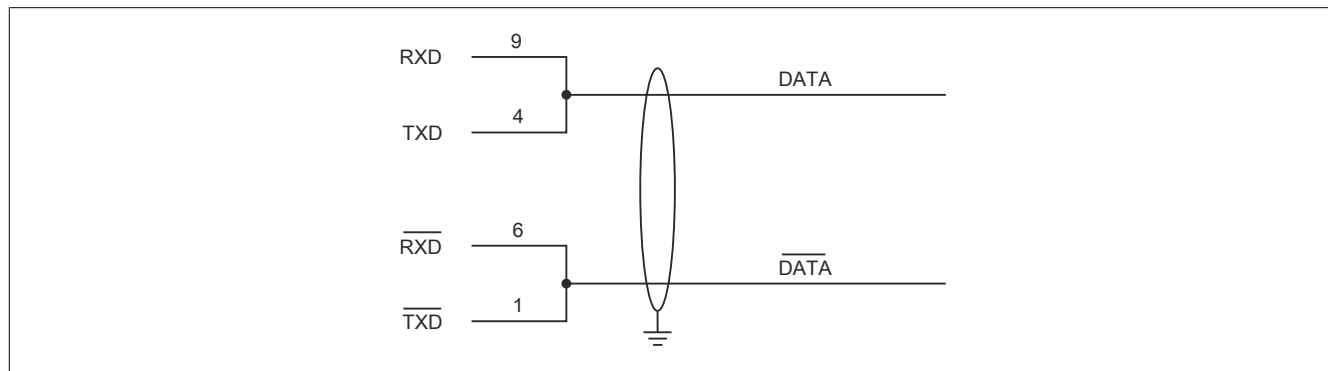


Figure 72: RS232/RS422/RS485 interface - Operation in RS485 mode

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

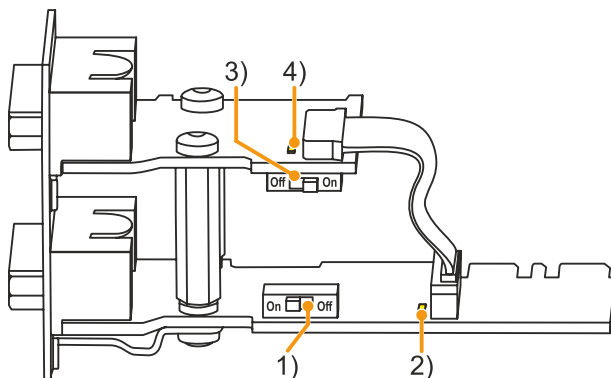
With long cable lengths, the voltage drop can result in greater potential differences between the bus devices, which can hinder communication. This can be improved by running the ground wire with the others.

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

4.8.7.15.3.5 Terminating resistor

A terminating resistor is already integrated on the IF option for each COM. This can be switched on or off with a switch; it is necessary to open the system unit for this.

The terminating resistors are switched off on delivery. The state of the respective terminating resistor is indicated by an LED (see "Reading LED status indicators" on page 362).



Assignment	State	Explanation
1) COM C terminating resistor	On	Enabled
	Off	Disabled
2) LED status indicator for COM C terminating resistor Color: Yellow	On	COM C terminating resistor on
	Off	COM C terminating resistor off
3) COM D terminating resistor	On	Enabled
	Off	Disabled
4) LED status indicator for COM D terminating resistor Color: Yellow	On	COM D terminating resistor on
	Off	COM D terminating resistor off

4.8.7.15.3.6 Firmware

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

- Automation PC 3100: V4.21
- Panel PC 3100: V4.21

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

For information about upgrading the firmware, see section "Firmware upgrade - Panel PC 3100" on page 269.

4.8.8 Uninterruptible power supply (UPS)

With the optionally integrated UPS, the B&R industrial PC ensures that the PC system can complete write operations even after a power failure occurs. If the UPS detects a power failure, it switches to battery operation immediately without interruption. All running programs are properly exited by the UPS software. The possibility of inconsistent data is eliminated (only works if the UPS has already been configured and the driver is enabled).

Information:

- **An external panel or monitor is not buffered by the UPS and will fail if a power failure occurs.**
- **For detailed information about uninterruptible power supplies, see the user's manual for the external UPS. This can be downloaded from the B&R website.**

Because the charging circuit is integrated in the housing of the B&R industrial PC, installation has been reduced to simply attaching the connection cable to the battery unit installed next to the PC.

Special emphasis was placed on simplified maintenance when designing the battery unit. Batteries are easily accessible from the front and can be replaced in just a few moments when servicing.

4.8.8.1 Requirements

- A suitable system unit
- UPS IF option 5AC901.IUPS-00 or 5AC901.IUPS-01
- Battery unit 5AC901.BUPS-00 or 5AC901.BUPS-01
- UPS connection cable 5CAUPS.00xx-01
- B&R UPS configured in the ADI Control Center

Warning!

Battery unit 5AC901.BUPS-00 is only permitted to be operated with UPS IF option 5AC901.IUPS-00!

Battery unit 5AC901.BUPS-01 is only permitted to be operated with UPS IF option 5AC901.IUPS-01!

Information:

For information about installation and connecting to the UPS IF option, see section ["Installing and connecting the UPS battery unit" on page 310](#).

4.8.8.2 5AC901.IUPS-00

4.8.8.2.1 General information

UPS IF option 5AC901.IUPS-00 used together with battery unit 5AC901.BUPS-00 allows the B&R industrial PC to be switched off properly without data loss during a power failure.

This interface option can only be operated in slot IF option 1.

Warning!

UPS IF option 5AC901.IUPS-00 is only permitted to be operated with battery unit 5AC901.BUPS-00!

Information:

If the system is in power saving mode (S5: soft-off or S4: hibernation/suspend-to-disk), then the internal UPS interface option charges the connected battery unit. The system's internal power supplies are active during this procedure. This allows various actions to be performed (e.g. opening the tray of the built-in slide-in DVD drive).

4.8.8.2.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC901.IUPS-00	UPS - For 4.5 Ah battery	
	Required accessories	
	Uninterruptible power supplies	
5AC901.BUPS-00	Battery unit 4.5 Ah - For UPS 5AC901.IUPS-00	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

Table 99: 5AC901.IUPS-00 - Order data

4.8.8.2.3 Technical data

Information:

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

Model number	5AC901.IUPS-00
General information	
B&R ID code	0xD851
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267
HazLoc	Industrial control equipment cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Electrical properties	
Power consumption	Max. 30 W at 1 A
Deep discharge protection	Yes
Short-circuit proof	Yes ²⁾
Battery charging data	
Charging current	Typ. 1 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 100: 5AC901.IUPS-00 - Technical data

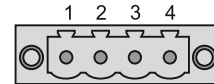
Model number	5AC901.IUPS-00
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 28 g

Table 100: 5AC901.IUPS-00 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) The interface option is short-circuit proof. This value does not apply to the connected battery unit.
- 3) For detailed information, see the temperature tables in the user's manual.

4.8.8.2.3.1 Pinout

UPS interface	
Variant	4-pin, male
Pin	Pinout
1	Temperature sensor
2	Temperature sensor
3	-
4	+



4.8.8.2.4 Installation

This module is installed using the materials included in delivery. For more information regarding installation, see section ["Installing the interface option and DDR4 SDRAM" on page 306](#).

4.8.8.3 5AC901.IUPS-01

4.8.8.3.1 General information

UPS IF option 5AC901.IUPS-01 used together with battery unit 5AC901.BUPS-01 allows the B&R industrial PC to be switched off properly without data loss during a power failure.

This interface option can only be operated in slot IF option 1.

Warning!

UPS IF option 5AC901.IUPS-01 is only permitted to be operated with battery unit 5AC901.BUPS-01!

Information:

If the system is in power saving mode (S5: soft-off or S4: hibernation/suspend-to-disk), then the internal UPS interface option charges the connected battery unit. The system's internal power supplies are active during this procedure. This allows various actions to be performed (e.g. opening the tray of the built-in slide-in DVD drive).

4.8.8.3.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC901.IUPS-01	UPS - For 2.2 Ah battery	
	Required accessories	
	Uninterruptible power supplies	
5AC901.BUPS-01	Battery unit 2.2 Ah - For UPS 5AC901.IUPS-01	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

Table 101: 5AC901.IUPS-01 - Order data

4.8.8.3.3 Technical data

Information:

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

Model number	5AC901.IUPS-01
General information	
B&R ID code	0xDF84
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267
HazLoc	Industrial control equipment cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ¹⁾
Electrical properties	
Power consumption	Max. 25 W at 0.9 A
Deep discharge protection	Yes
Short-circuit proof	Yes ²⁾
Battery charging data	
Charging current	Typ. 0.88 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 55°C ³⁾
Storage	-20 to 60°C
Transport	-20 to 60°C

Table 102: 5AC901.IUPS-01 - Technical data

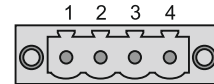
Model number	5AC901.IUPS-01
Relative humidity	
Operation	5 to 90%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Weight	Approx. 28 g

Table 102: 5AC901.IUPS-01 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) The interface option is short-circuit proof. This value does not apply to the connected battery unit.
- 3) For detailed information, see the temperature tables in the user's manual.

4.8.8.3.1 Pinout

UPS interface	
Variant	4-pin, male
Pin	Pinout
1	Temperature sensor
2	Temperature sensor
3	-
4	+



4.8.8.3.4 Installation

This module is installed using the materials included in delivery. For more information regarding installation, see section ["Installing the interface option and DDR4 SDRAM" on page 306](#).

4.8.8.4 5AC901.BUPS-00

4.8.8.4.1 General information

- Battery unit for UPS IF option 5AC901.IUPS-00
- Single-cell rechargeable battery
- 2 Hawker Cyclon 12 V, 4.5 Ah rechargeable batteries connected in series
- Rated voltage 24 V
- Capacity 4.5 Ah

The battery unit is subject to wear and should be replaced regularly (after the specified service life at the latest).

Warning!

Battery unit 5AC901.BUPS-00 is only permitted to be operated with UPS IF option 5AC901.IUPS-00!

Information:

If the max. specified temperature limits of the battery unit are overshoot or undershot, the temperature alarm of the battery unit is set. Battery backing is no longer provided if the temperature alarm for the battery unit is active. The battery is also no longer charged since this can result in damage to the battery. This temperature alarm is defined with a hysteresis of 5°C, i.e. the temperature alarm is only cleared again if the minimum temperature limit is again overshoot by this hysteresis or the maximum temperature limit is again undershot by this hysteresis. The temperature or temperature alarm of the battery unit can be read/evaluated using the B&R ADI Library or the B&R implementation guide.

4.8.8.4.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC901.BUPS-00	Battery unit 4.5 Ah - For UPS 5AC901.IUPS-00	
	Required accessories	
	Uninterruptible power supplies	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

Table 103: 5AC901.BUPS-00 - Order data

4.8.8.4.3 Technical data

Information:

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

Model number	5AC901.BUPS-00
General information	
Battery	
Type	Hawker Cyclon 12 V, 4.5 Ah, two rechargeable batteries connected in series
Service life	Up to 15 years at 20°C / 10 years at 25°C ¹⁾
Variant	Single cell
Temperature sensor	NTC resistance
Maintenance interval during storage	Charge 1 time every 6 months
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ²⁾
Charge duration when battery low	Typ. 7 hours

Table 104: 5AC901.BUPS-00 - Technical data

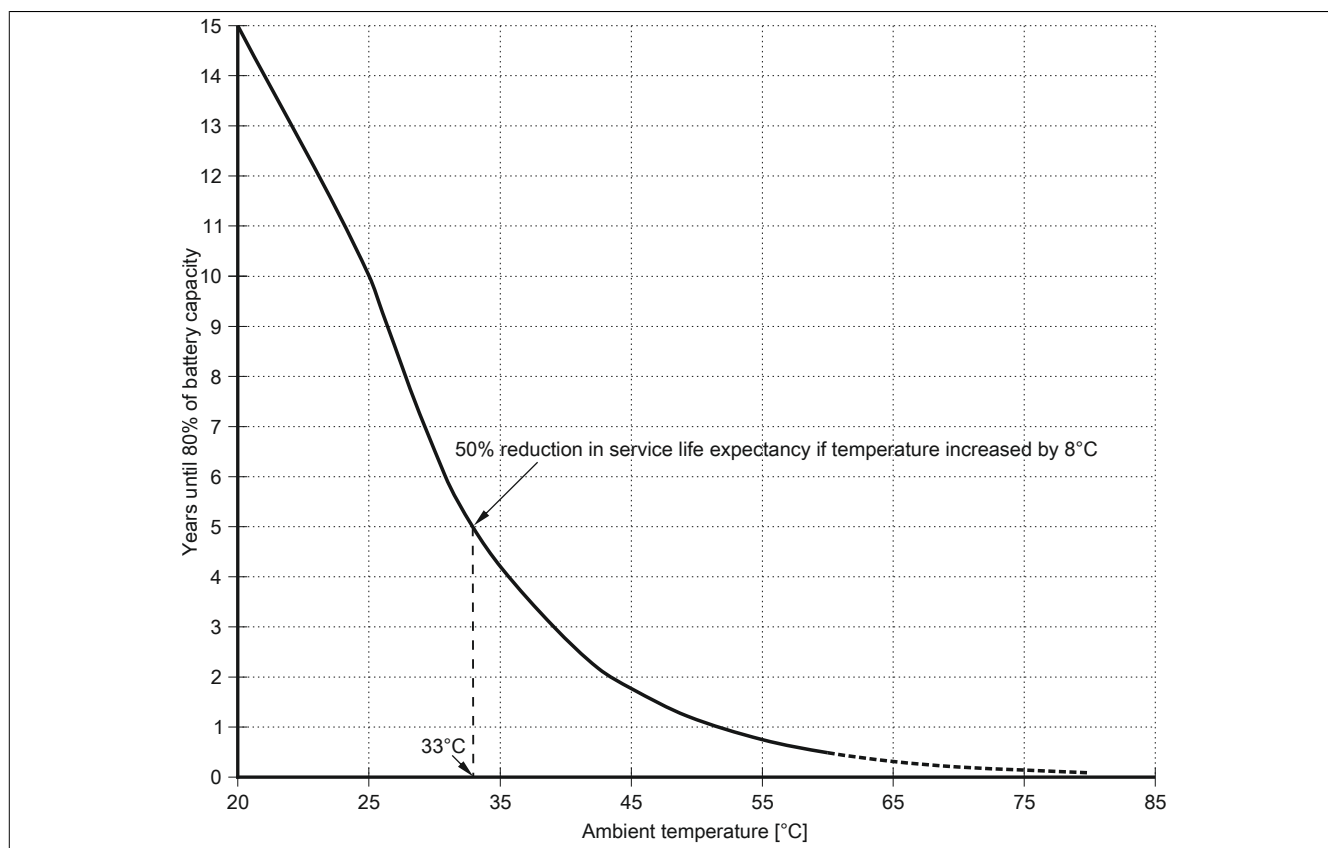
Model number	5AC901.BUPS-00
Electrical properties	
Nominal voltage	24 V
Capacity	4.5 Ah
Fuse	Yes
Battery charging data	
Charging current ³⁾	Typ. 1 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	-30 to 60°C ⁴⁾
Storage	-65 to 80°C
Transport	-65 to 80°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Elevation	
Operation	Max. 3000 m
Mechanical properties	
Dimensions	
Width	223.2 mm
Height	78.2 mm
Depth	145 mm
Weight	Approx. 4600 g

Table 104: 5AC901.BUPS-00 - Technical data

- 1) Depends on the charging and discharging cycles (up to 80% battery capacity).
- 2) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 3) Maximum charging current.
- 4) Battery backing is no longer provided if the temperature undershoots the minimum temperature or overshoots the maximum temperature. The battery is also no longer charged since this can result in damage to the battery.

4.8.8.4.4 Service life

The following diagram shows the relationship between ambient temperature and service life.



4.8.8.4.5 5AC901.BUPS-00 - Dimensions

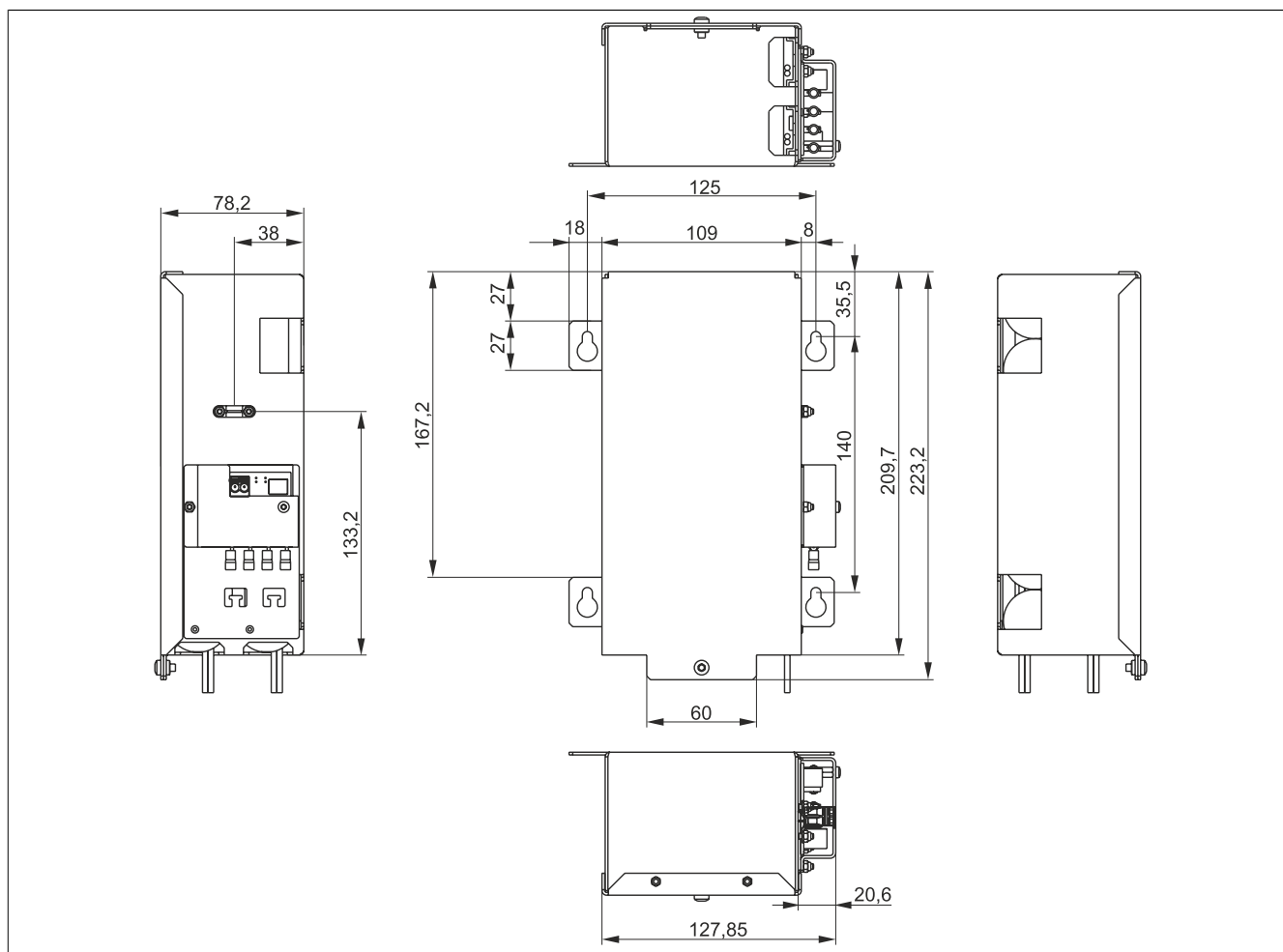


Figure 73: 5AC901.BUPS-00 - Dimensions

4.8.8.4.6 5AC901.BUPS-00 - Drilling template

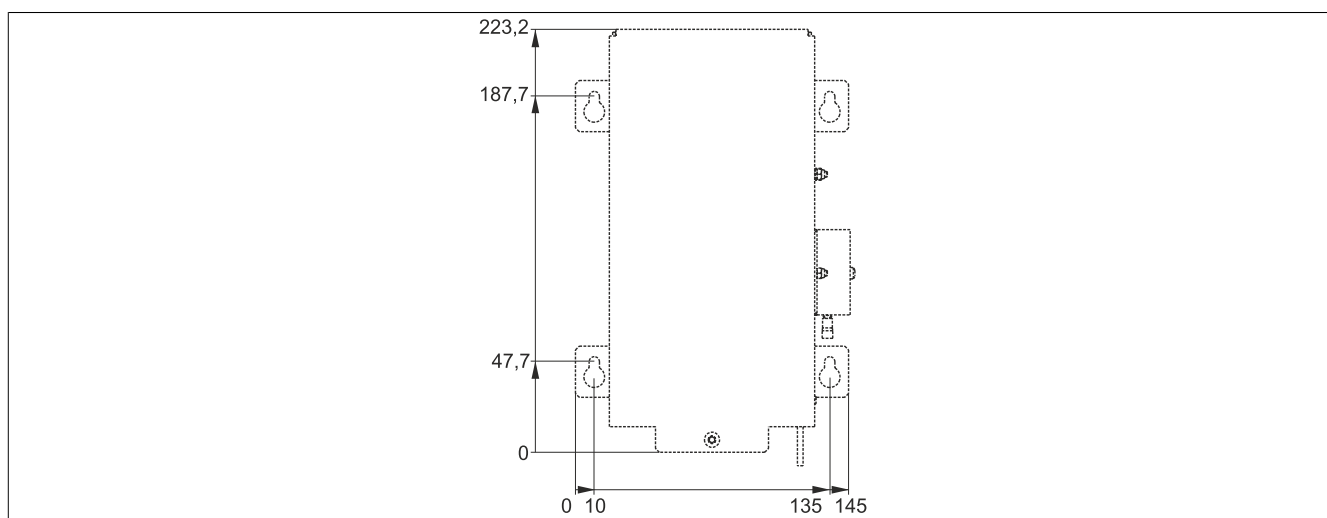


Figure 74: 5AC901.BUPS-00 - Drilling template

4.8.8.4.7 Installation

For information about installation and connecting to the UPS IF option, see section ["Installing and connecting the UPS battery unit"](#) on page 310.

4.8.8.4.8 Precautions for handling and use

Spills and leaks:

Further leakage must be prevented. Smaller spills must be bonded with dry sand, dirt and vermiculite. The use of flammable materials is not permitted. If possible, neutralize acids with sodium bicarbonate, chalk, etc. Acid-resistant clothing, shoes, gloves as well as acid-resistant face protection must be worn. The disposal of unneutralized acid in the sewage system is prohibited!

Waste disposal:

Used batteries and rechargeable batteries must be disposed of in an environmentally friendly recycling process.

Neutralized mud must be stored in closed containers and stored / disposed of in accordance with applicable regulations. After neutralization and inspection, larger spills diluted with water must be disposed of in accordance with applicable regulations.

Handling and storage:

- Store in cool, dry and well-ventilated rooms with impermeable surfaces and appropriate containment conditions in case of leakage.
- Protect from adverse weather conditions and separate from incompatible materials during storage and transport.
- A sufficient supply of water must be located nearby.
- Prevent damage to containers in which batteries and rechargeable batteries are stored and transported.
- Keep away from fire, sparks and heat.

4.8.8.5 5AC901.BUPS-01

4.8.8.5.1 General information

- Battery unit for UPS IF option 5AC901.IUPS-01
- Maintenance-free lead acid rechargeable battery
- 2 Panasonic 12 V, 2.2 Ah rechargeable batteries connected in series
- Rated voltage 24 V
- Capacity 2.2 Ah

The battery unit is subject to wear and should be replaced regularly (after the specified service life at the latest).

Warning!

Battery unit 5AC901.BUPS-01 is only permitted to be operated with UPS IF option 5AC901.IUPS-01!

Information:

If the max. specified temperature limits of the battery unit are overshoot or undershot, the temperature alarm of the battery unit is set. Battery backing is no longer provided if the temperature alarm for the battery unit is active. The battery is also no longer charged since this can result in damage to the battery. This temperature alarm is defined with a hysteresis of 5°C, i.e. the temperature alarm is only cleared again if the minimum temperature limit is again overshoot by this hysteresis or the maximum temperature limit is again undershot by this hysteresis. The temperature or temperature alarm of the battery unit can be read/evaluated using the B&R ADI Library or the B&R implementation guide.

4.8.8.5.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5AC901.BUPS-01	Battery unit 2.2 Ah - For UPS 5AC901.IUPS-01	
	Required accessories	
	Uninterruptible power supplies	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

Table 105: 5AC901.BUPS-01 - Order data

4.8.8.5.3 Technical data

Information:

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

Model number	5AC901.BUPS-01
General information	
Battery	
Type	Panasonic 12 V, 2.2 Ah, two rechargeable batteries connected in series
Service life	Up to 5 years at 20°C ¹⁾
Variant	Maintenance-free lead acid battery
Temperature sensor	NTC resistance
Maintenance interval during storage	Charge 1 time every 6 months
Certifications	
CE	Yes
EAC	Product family certification
UL	cULus E115267 Industrial control equipment
HazLoc	cULus HazLoc E180196 Industrial control equipment for hazardous locations Class I, Division 2, Groups ABCD, T4 ²⁾
Charge duration when battery low	Typ. 5 hours

Table 106: 5AC901.BUPS-01 - Technical data

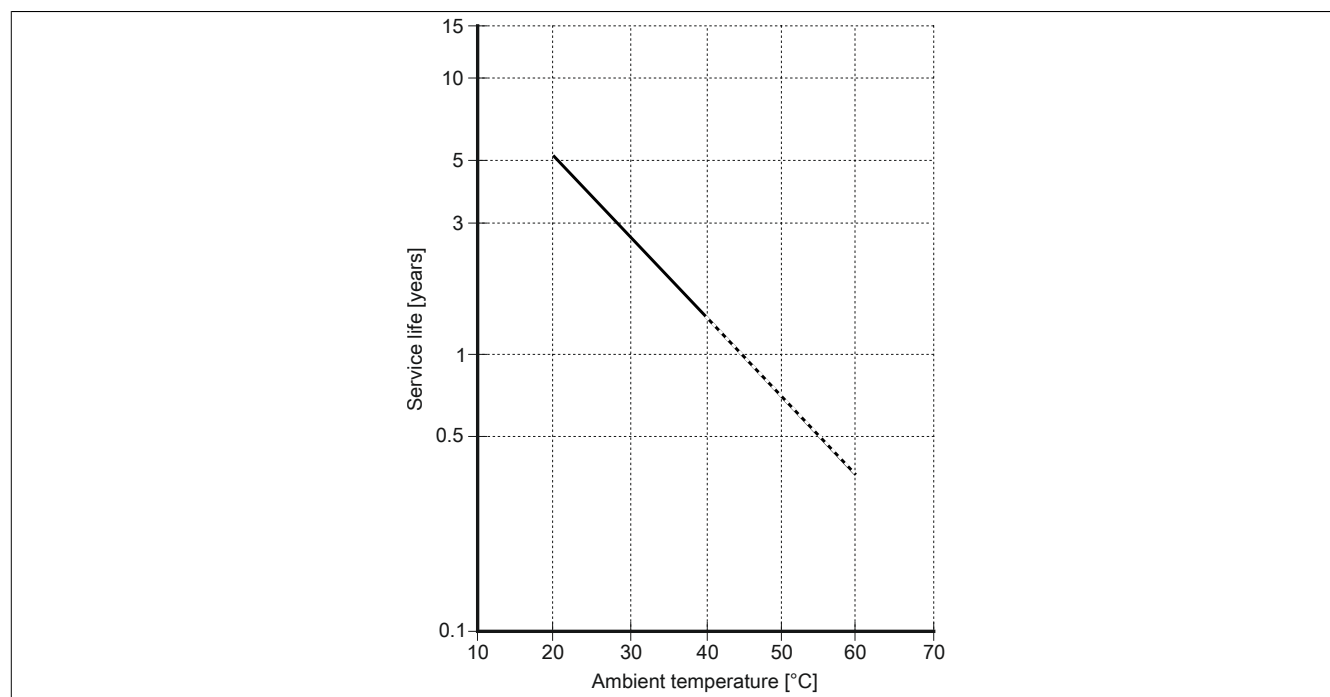
Model number	5AC901.BUPS-01
Electrical properties	
Nominal voltage	24 V
Capacity	2.2 Ah
Fuse	Yes
Battery charging data	
Charging current ³⁾	Typ. 0.88 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2
Ambient conditions	
Temperature	
Operation	0 to 40°C ⁴⁾
Storage	-15 to 40°C
Transport	-15 to 40°C
Relative humidity	
Operation	25 to 85%, non-condensing
Storage	25 to 85%, non-condensing
Transport	25 to 85%, non-condensing
Elevation	
Operation	Max. 3000 m
Mechanical properties	
Dimensions	
Width	188 mm
Height	78 mm
Depth	115 mm
Weight	Approx. 2550 g

Table 106: 5AC901.BUPS-01 - Technical data

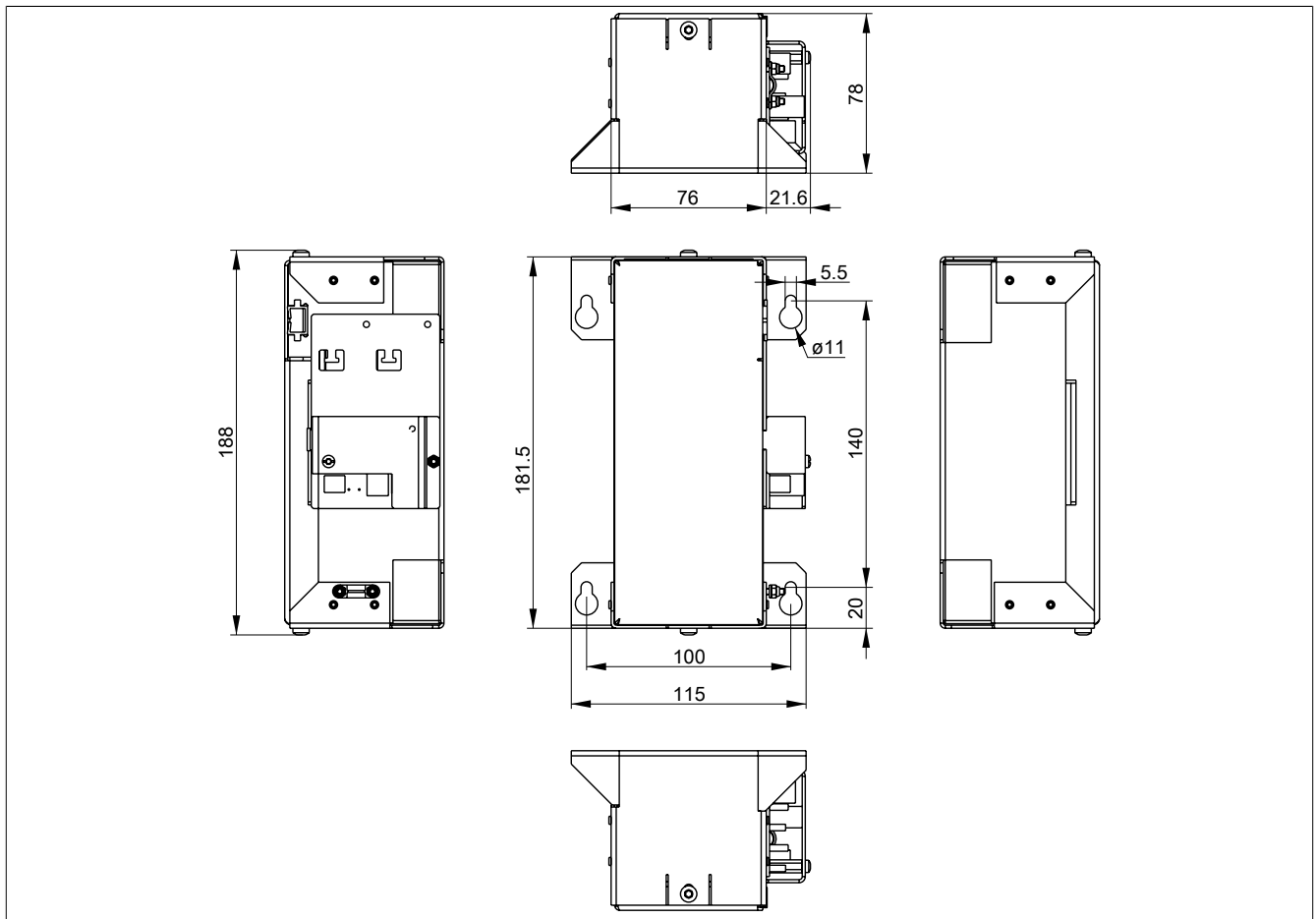
- 1) Depends on the charging and discharging cycles.
- 2) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 3) Maximum charging current.
- 4) Battery backing is no longer provided if the temperature undershoots the minimum temperature or overshoots the maximum temperature. The battery is also no longer charged since this can result in damage to the battery.

4.8.8.5.4 Service life

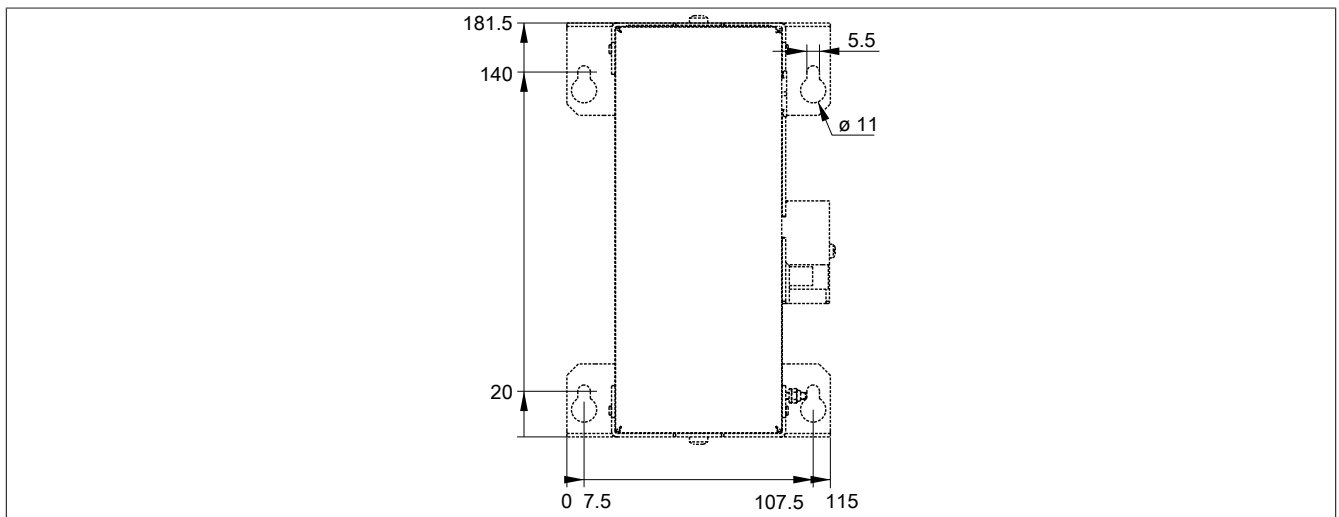
The following diagram shows the relationship between ambient temperature and service life.



4.8.8.5.5 5AC901.BUPS-01 - Dimensions



4.8.8.5.6 5AC901.BUPS-01 - Drilling template



4.8.8.5.7 Installation

For information about installation and connecting to the UPS IF option, see section ["Installing and connecting the UPS battery unit"](#) on page 310.

4.8.8.5.8 Precautions for handling and use

Spills and leaks:

Further leakage must be prevented. Smaller spills must be bonded with dry sand, dirt and vermiculite. The use of flammable materials is not permitted. If possible, neutralize acids with sodium bicarbonate, chalk, etc. Acid-resistant clothing, shoes, gloves as well as acid-resistant face protection must be worn. The disposal of unneutralized acid in the sewage system is prohibited!

Waste disposal:

Used batteries and rechargeable batteries must be disposed of in an environmentally friendly recycling process.

Neutralized mud must be stored in closed containers and stored / disposed of in accordance with applicable regulations. After neutralization and inspection, larger spills diluted with water must be disposed of in accordance with applicable regulations.

Handling and storage:

- Store in cool, dry and well-ventilated rooms with impermeable surfaces and appropriate containment conditions in case of leakage.
- Protect from adverse weather conditions and separate from incompatible materials during storage and transport.
- A sufficient supply of water must be located nearby.
- Prevent damage to containers in which batteries and rechargeable batteries are stored and transported.
- Keep away from fire, sparks and heat.

4.8.8.6 5CAUPS.xxxx-01

4.8.8.6.1 General information

The UPS connection cable establishes the connection between the UPS interface option and battery unit.

4.8.8.6.2 Order data

Model number	Short description	Figure
	Uninterruptible power supplies	
5CAUPS.0005-01	UPS cable - 0.5 m - For 5AC901.IUPS-xx	
5CAUPS.0010-01	UPS cable - 1 m - For 5AC901.IUPS-xx	
5CAUPS.0013-01	UPS cable - 1.3 m - For 5AC901.IUPS-xx	
5CAUPS.0030-01	UPS cable - 3 m - For 5AC901.IUPS-xx	

Table 107: 5CAUPS.0005-01, 5CAUPS.0010-01, 5CAUPS.0013-01, 5CAUPS.0030-01 - Order data

4.8.8.6.3 Technical data

Information:

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

Model number	5CAUPS.0005-01	5CAUPS.0010-01	5CAUPS.0013-01	5CAUPS.0030-01
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⁾			
Cable construction				
Wire cross section	2x 0.5 mm ² (20 AWG) 2x 2.5 mm ² (13 AWG)			
Conductor resistance	At 0.5 mm ² max. 39 Ω/km At 2.5 mm ² max. 7.98 Ω/km ²⁾			
Outer jacket				
Material	Thermoplastic PVC-based material			
Color	Window gray (similar to RAL 7040)			
Connector				
Type	4-pin screw clamp terminal block ³⁾			
Electrical properties				
Operating voltage	Max. 30 VDC			
Peak operating voltage	Typ. 30 VDC			
Test voltage				
Wire/Wire	1500 V			
Current-carrying capacity	10 A at 20°C			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Ambient conditions				
Temperature				
Moving	-5 to 70°C			
Static	-30 to 70°C			
Mechanical properties				
Dimensions				
Length	0.5 m	1 m	1.3 m	3 m
Diameter	7 mm			
Bend radius				
Moving	10x wire diameter			
Fixed installation	5x wire diameter			
Weight	Approx. 55 g	Approx. 100 g	Approx. 130 g	Approx. 250 g

Table 108: 5CAUPS.0005-01, 5CAUPS.0010-01, 5CAUPS.0013-01, 5CAUPS.0030-01 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At an ambient temperature of 20°C.
- 3) Tightening torque: Min. 0.4 Nm, max. 0.5 Nm

Information:

The maximum length of the UPS connection cable depends on the following:

- Power value
- Voltage drop
- Wire cross section
- Sensor line

4.8.8.6.4 Installation

For information about connecting the cable to the battery unit, see section ["Installing and connecting the UPS battery unit" on page 310](#).

4.8.9 Side covers

4.8.9.1 5ACCF02.000-00x

4.8.9.1.1 General information

One side cover variant is available for PPC3100 system units.

Information:

The side cover is part of the complete system and cannot be ordered as an individual component.

If a side cover is not selected during standard device configuration, then side cover 5ACCF02.0000-001 (gray PPC3100 side cover without B&R logo) is installed and delivered by default.

4.8.9.1.2 Order data

Model number	Short description	Figure
	Side covers	
5ACCF02.0000-001	PPC3100 side cover - Dark gray - Without logo	

Table 109: 5ACCF02.0000-001 - Order data

4.8.9.1.3 Technical data

Information:

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

Model number	5ACCF02.0000-001
General information	
Certifications	
CE	Yes
EAC	Product family certification
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⁾
Mechanical properties	
Housing	
Front cover	Colored dark gray plastic (similar to Pantone 432C)
Logo	-
Material	Plastic (PPE + PS)
Weight	Approx. 57 g

Table 110: 5ACCF02.0000-001 - 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) Yes, but 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.

4.8.10 Key covers

4.8.10.1 5ACCB02.0000-00x

4.8.10.1.1 General information

2 key cover variants are available for PPC3100 system units.

Information:

The key cover is part of the complete system and cannot be ordered as an individual component.

If a key cover is not selected during standard device configuration, then key cover 5ACCB02.0000-000 (orange PPC3100 key cover) is installed and delivered by default.

4.8.10.1.2 Order data

Model number	Short description	Figure
	Key covers	
5ACCB02.0000-000	PPC3100 key cover - Orange	
5ACCB02.0000-001	PPC3100 key cover - Dark gray	

Table 111: 5ACCB02.0000-000, 5ACCB02.0000-001 - Order data

4.8.10.1.3 Technical data

Information:

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

Model number	5ACCB02.0000-000	5ACCB02.0000-001
General information		
Certifications		
CE	Yes	
EAC	Product family certification	
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⁾	
Mechanical properties		
Housing		
Front cover	Colored orange plastic (similar to Pantone 144CV)	Colored dark gray plastic (similar to Pantone 432C)
Material	Plastic (PPE + PS)	
Weight	Approx. 12 g	

Table 112: 5ACCB02.0000-000, 5ACCB02.0000-001 - 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) Yes, but 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 Installation and wiring

5.1 Basic information

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

Unpacking

The following activities must be performed before unpacking the device:

- Check the packaging for visible transport damage.
- If transport damage is noticeable, document this immediately and submit a complaint. If possible, have the damage confirmed by the carrier/delivery service.
- Check the contents of the shipment for completeness and damage.
- If the contents of the packaging are incomplete, damaged or do not correspond to your order, you must immediately inform your responsible sales office or B&R Headquarters.
- Keep the original packaging for further transport.

Power supply

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

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

Installation

Information:

Optional sets are available that contain all necessary tools for installation. For more information about tool sets, see section ["General accessories" on page 314](#).

Before installation

Caution!

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

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

- Allow sufficient space for installation, operation and maintenance of the device.
- The device must be installed on a flat, clean and burr-free surface.
- The wall or control cabinet plate must be able to support four times the total weight of the device. If necessary, bracing must be attached to reinforce the mounting surface.
- To avoid overheating, the device is not permitted to be placed near other heat sources.

Information about the device's environment

- Observe the notes and regulations regarding the power supply and functional ground.
- Observe the specified bend radius when connecting cables.
- Any ventilation holes are not permitted to be covered.
- This device is only approved for use in closed rooms and not permitted to be exposed to direct sunlight.
- The climatic and ambient conditions must be taken into account, see ["Environmental properties" on page 39](#).

General installation instructions

- When installing the device, the permissible mounting orientations must be observed - see ["Mounting orientations" on page 37](#).
- When connecting installed or connected peripherals, follow the instructions in the peripheral device's documentation.

Transport and storage

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

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

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

5.1.1 Installing a Panel PC with an AP9x3 panel

The Panel PC 3100 with an AP9x3 panel is installed in the installation cutout using retaining clips. The number of retaining clips depends on the panel (see ["Installation diagrams"](#)).

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.

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

5.1.2 Installing an Automation Panel 1000 with retaining clips

The Panel PC 3100 with an AP1000 panel is installed in the installation cutout using retaining clips. The number of retaining clips depends on the panel (see ["Installation diagrams"](#)).

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.

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

5.1.3 Installing the Automation Panel 1000 with clamping blocks

The Panel PC 3100 with an AP1000 panel is installed in the installation cutout using clamping blocks. The number of clamping blocks depends on the panel (see ["Installation diagrams"](#)).

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

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

5.1.4 Replacing a system unit

1. Disconnect the power supply cable to the Panel PC (disconnect the power cable!). Disconnect from all sources and poles!
2. Carry out electrostatic discharge at the ground connection.
3. Remove the Panel PC from the control cabinet by following the installation steps in reverse order.
4. Place the Panel PC on a clean, flat surface.
5. The Torx screws (T10) marked in the following figure must be removed, see also "[Product information - Installation markings](#)" on page 26.

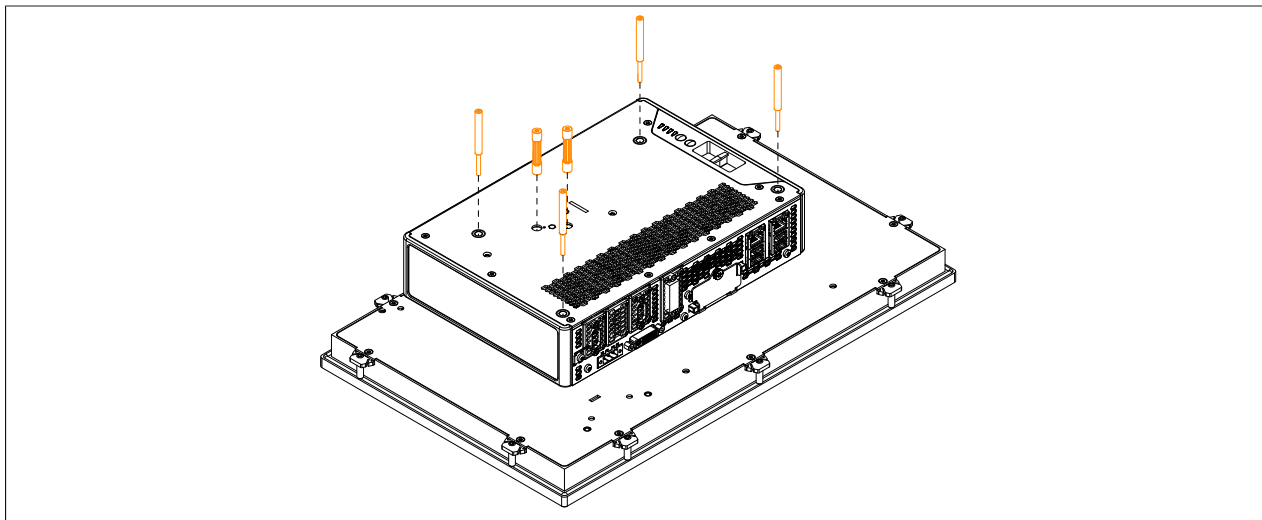


Figure 75: Removing the Torx screws

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

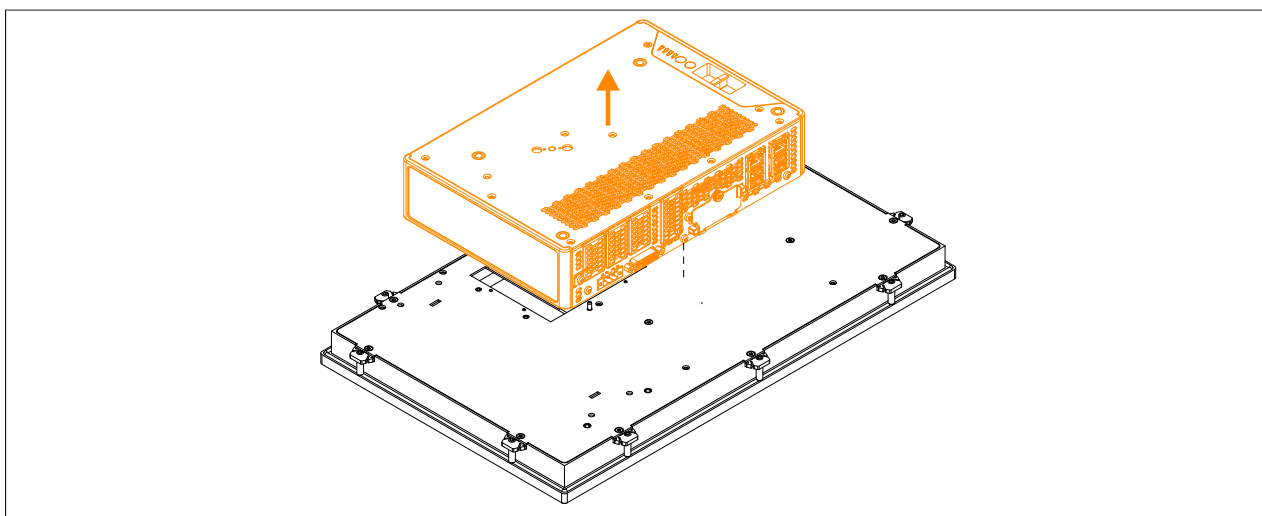


Figure 76: Removing the system unit

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

5.1.5 Installation information for individual deliveries / individual components

Information:

If the PPC3100 is not delivered as a complete system but as individual deliveries (or individual components are installed afterward), it may be necessary to enable these components in BIOS. To do this, open BIOS during system startup, load the BIOS default values, restore any customer-specific BIOS settings and save the settings. For more information, see section ["UEFI BIOS options" on page 222](#). This may be required for the following individual components:

- System unit
- Interface option
- Graphics option
- Main memory (DDR4 SDRAM)

5.2 Connecting to the power grid

Danger!

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

5.2.1 Installing the DC power cable

Danger!

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

5.2.1.1 Wiring

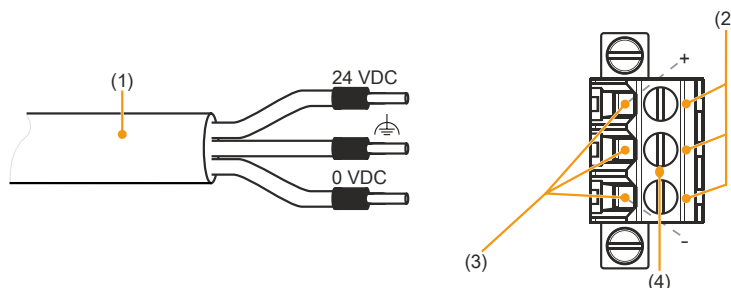
Install the DC power cable on the terminal block (power supply connector) as shown in the figure below. Conductors with a cross section of 0.75 mm² to 1.5 mm² and wire end sleeve must be used.

Caution!

The pinout of the power supply interface must be observed!

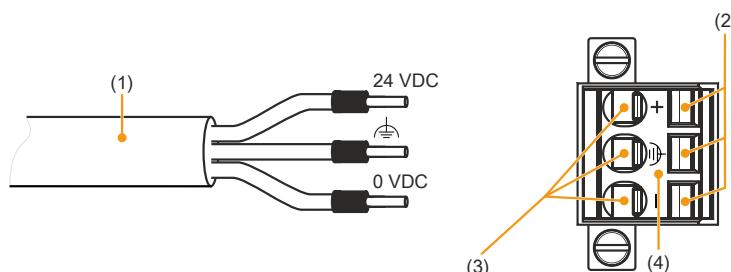
Installing screw clamp terminal block 0TB103.9

Secure the conductors with wire end sleeves in the terminal contacts ② as shown in the figure below and tighten the screw clamp terminals ① with a screwdriver (max. tightening torque 0.4 Nm).



Installing cage clamp terminal block 0TB103.91

Insert a screwdriver into the cage clamp terminals ① and secure the conductors with wire end sleeves in the terminal contacts ② as shown in the figure below. Close the terminal contact by removing the screwdriver.



5.2.2 Connecting the power supply to a B&R device

Danger!

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

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

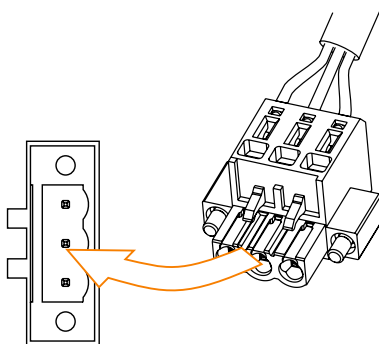


Figure 77: Connecting the power supply connector to a B&R device

5.2.3 Grounding concept - Functional ground

Functional ground is a current path of low impedance between circuits and ground. It is used to improve immunity to interference, for example, and not as a protective measure. It serves only to divert interference, not to protect against contact with persons.

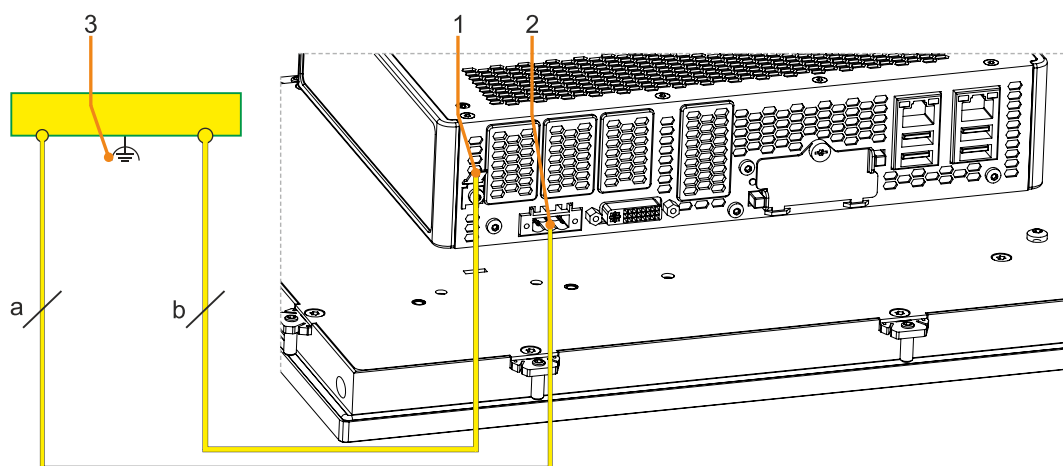
The device is equipped with 2 functional ground connections:

- Functional ground connection of the power supply
- Ground connection

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

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

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



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

6 Commissioning

6.1 Basic information

Before the device is started up, it must be gradually adapted to room temperature!

6.2 Connecting cables

When connecting or installing cables, the bend radius specification must be observed. For this specification, see the technical data of the respective cable.

The maximum tightening torque of the locating screws is 0.5 Nm.

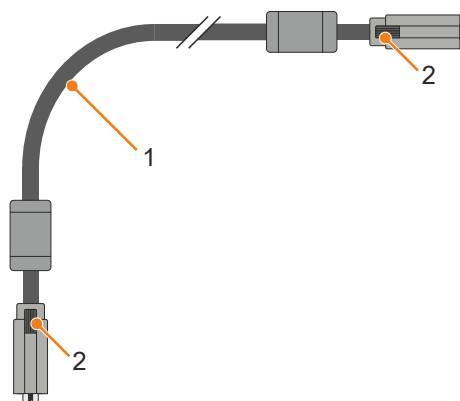


Figure 78: Connecting cables - Bend radius

- 1) Bend radius
- 2) Locating screws

6.3 Switching on the device for the first time

6.3.1 General information before switching on the device

Checklist

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

- Have the installation instructions been observed as described in "[Installation and wiring](#)" on page 208?
- Have the permissible ambient conditions and environmental conditions for the device been taken into account?
- Is the power supply connected correctly and have the values been checked?
- Is the ground cable correctly connected to the ground connection?
- Before installing additional hardware, the device must have been started up.

Caution!

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

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

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

Requirements

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

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

6.3.2 Switching on the device

Procedure

1. Connect the power supply and switch it on.
2. The device is operating and boots; LED "Power" lights up.

6.4 Touch screen calibration

B&R touch screen devices are equipped with a B&R touch controller that supports hardware calibration. This means that these devices are pre-calibrated at the factory. This feature offers great advantages especially for replacement parts since recalibration is usually no longer required when replacing a device (identical model/type). We still recommend calibration for best results and to adapt the touch screen to the needs of the user.

6.4.1 Single-touch (analog resistive)

6.4.1.1 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).

6.4.2 Multi-touch (projected capacitive - PCT)

6.4.2.1 Windows 10 IoT Enterprise 2016 LTSC

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

6.5 Display brightness control

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.

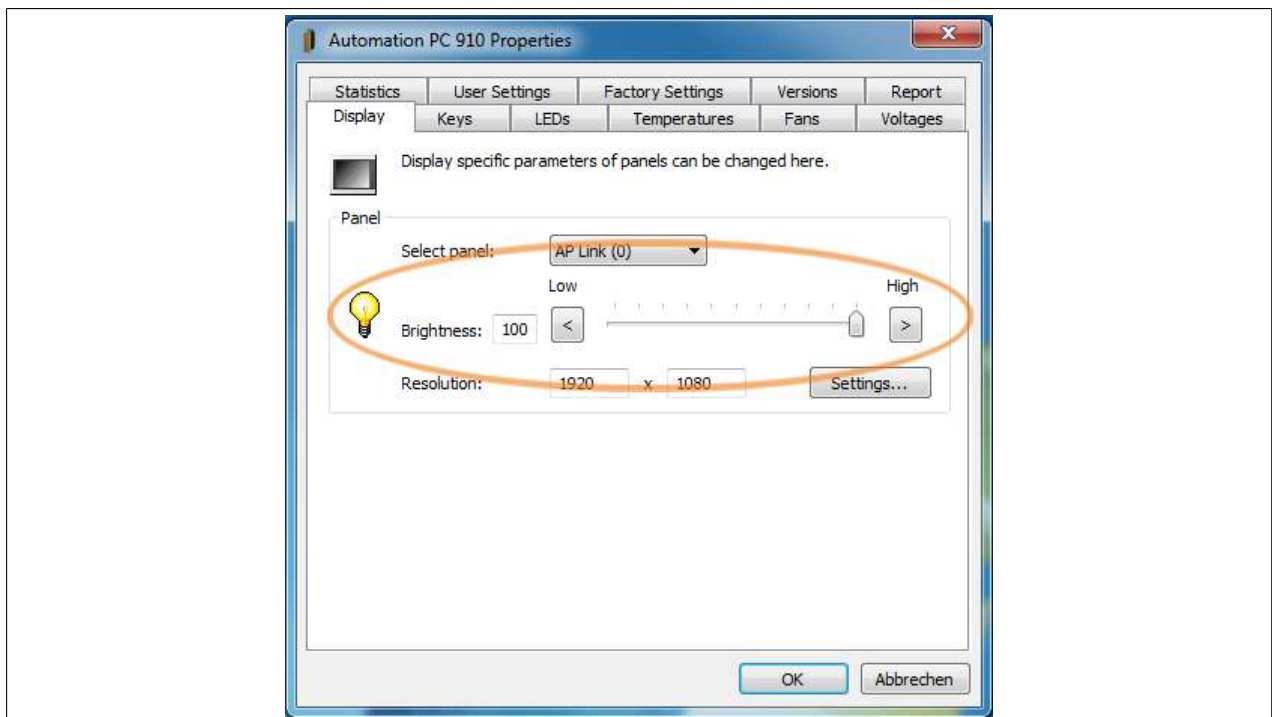


Figure 79: Adjusting the display brightness

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.

6.6 General instructions for the temperature test procedure

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

6.6.1 Procedure

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

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

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

For position specifications of the temperature sensors and their maximum specified temperatures, see section "[Temperature sensor position](#)" on page 45.

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

6.6.2 Evaluating temperatures in Windows operating systems

6.6.2.1 Evaluating with the B&R Control Center

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

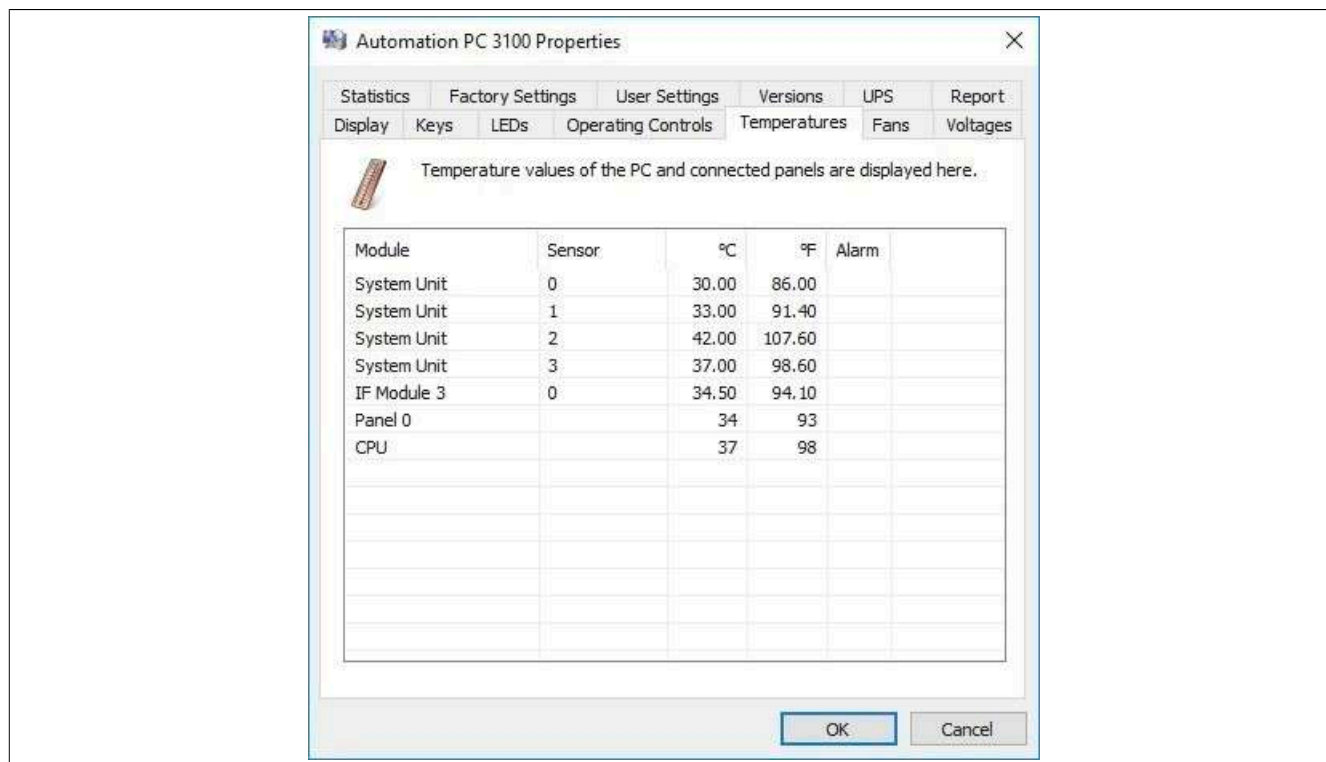


Figure 80: Displaying temperature values in the B&R Control Center

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

Information:

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

6.6.2.2 Evaluation with BurnInTest from PassMark

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

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

Information:

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

The following screenshots refer to PassMark BurnInTest Pro V7.1 using a PPC3100 without IF options.

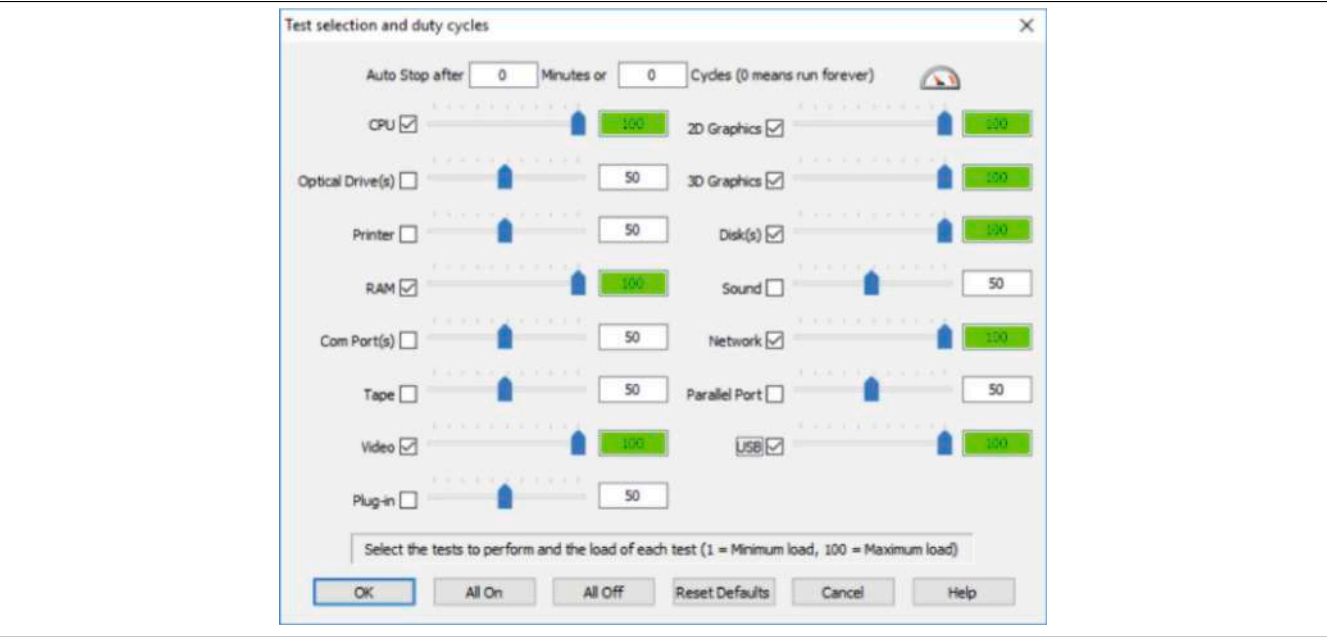


Figure 81: Settings for PassMark BurnInTest Pro V7.1 using an PPC3100 without IF options

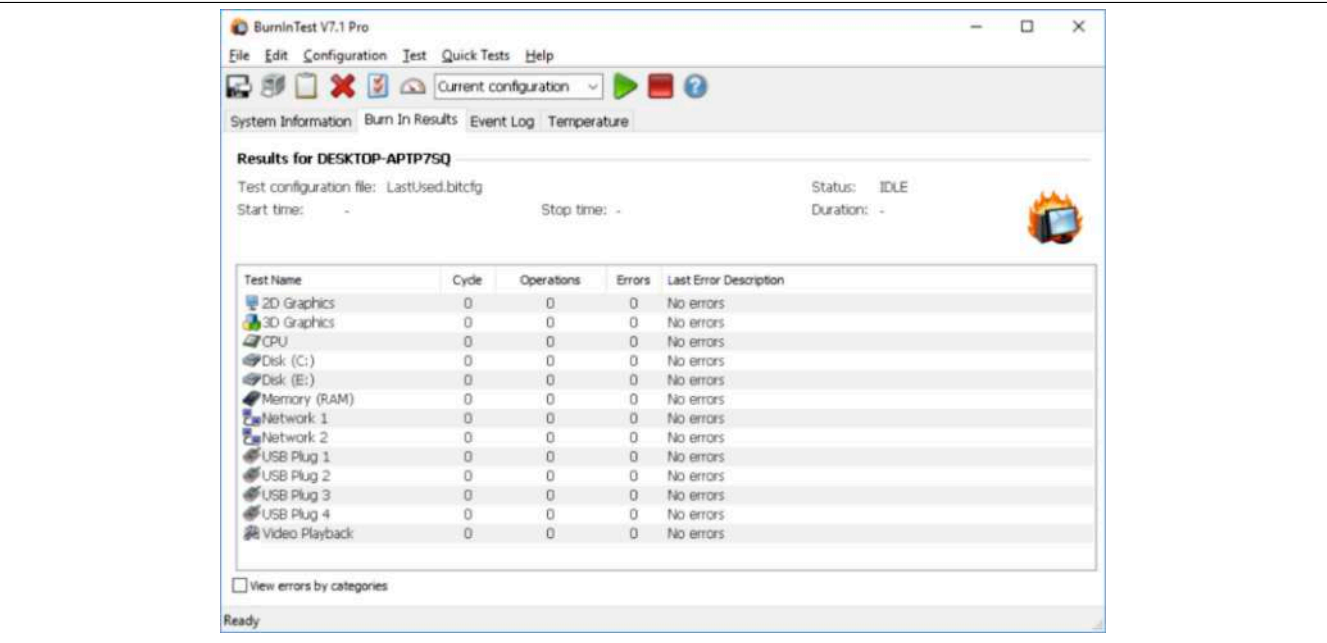


Figure 82: Test overview of a PPC3100 without IF options

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

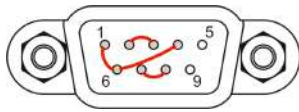
Information:

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



Information:

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



6.6.3 Evaluating temperatures in non-Windows operating systems

For applications that do not run in approved operating systems, temperatures can be evaluated using the B&R MTCX Development Kit. The MTCX Development Kit also contains executable EFI sample programs.

The implementation guide describes only device-specific functions and not the main functions of the sample programs.

If the code from the sample programs is applied, the notes in the implementation guide for the TODO instructions, I/O access functions, etc. must be taken into account!

Information:

For current B&R PC series (APC910 and later), 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 PC series can be downloaded at no cost from the B&R website (www.br-automation.com).

6.6.4 Evaluating the measurement results

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

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

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

6.7 Known problems / Characteristics

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

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

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

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

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

7 Software

7.1 UEFI BIOS options

7.1.1 General information

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

The UEFI BIOS Setup Utility allows you to modify basic system configuration settings. These settings are stored in a flash block.

Information:

The following BIOS settings are system-optimized. Changes to these settings should only be made by system experts who are aware of the effects of the modification.

7.1.2 Adaptation for touch operation

The BIOS used for the APC3100/PPC3100 was developed with touch screen systems in mind. Compared to other or older B&R systems, the user interface, especially buttons and selection fields, is therefore larger. In addition, the setting and configuration options are divided into separate submenu structures.

The APC3100/PPC3100 can still be used with standard displays and operator panels without sacrificing user friendliness, however.

7.1.2.1 Operation

During touch operation, the system does not display a mouse pointer.

If operation is carried out via an external operating device, the mouse pointer is displayed.

Both input methods can be used in parallel; the system automatically displays or hides the mouse pointer.

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

7.1.2.2 Overview of BIOS description

Note:

This description is for the full extent of version 1.15. Depending on the system configuration, BIOS version and BIOS settings, individual parameters or (sub)menus may not be displayed or deviate slightly.

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

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

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

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

Entries outside a specified range of values are not applied.

Note:

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

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

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

Table 113: Main menu - Menu - Submenu(s)

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

7.1.3 BIOS Setup and start procedure

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

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

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

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



Figure 83: Boot screen

7.1.3.1 BIOS Setup buttons

The following keys are enabled during POST:

Information:

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

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

Table 114: Relevant keys during POST

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

Table 115: Relevant keys in the boot menu

The following keys can be used after entering BIOS Setup:



Figure 84: Relevante Tasten im BIOS Menü

Key	Function
F1	Help
ESC	Exit
Cursor keys (←, ↑, ↓, →)	Menu navigation
F5	Change value (step back)
F6	Change value (step forward)
F9	Load default settings ¹⁾
F10	Save and close
Enter	Open selected submenu/parameter

Table 116: Relevant keys in BIOS

1) Save and close to restore the default values.

Information:

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

7.1.4 Boot menu



Figure 85: Boot menu

Boot menu option	Description
Continue	Continues the default boot process from the boot menu.
Boot manager	Lists all detected and bootable media. See "Boot manager" on page 227.
Device management	Lists all supported and enabled devices (e.g. RAID and Ethernet). See "Device manager" on page 228.
Boot from file	Selects a bootable file to boot from. Depending on the boot configuration, the files can also be stored on external storage media.
Administer Secure Boot	For a detailed description of this option, see the user documentation from the operating system manufacturer.
Setup utility	Carries out advanced boot configurations. See "Setup utility" on page 230.

Table 117: Boot menu

7.1.5 Boot manager



Figure 86: Boot manager

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

7.1.6 Device manager

Information:

For detailed instructions on how to create a RAID volume, see section ["RAID configuration"](#) on page 271.



Figure 87: Device manager

BIOS parameter	Setting options	Description
Intel® Rapid Storage Technology	Enter	Opens submenu "Intel® Rapid Storage Technology" on page 228
Primary video BIOS	PCI	Selects the primary video BIOS
	AGP	

Table 118: Device manager

7.1.6.1 Intel® Rapid Storage Technology

BIOS parameter	Setting options	Description
Intel® RST (...) RAID driver	-	Displays the version of the Intel RST RAID driver
Create RAID volume	Enter	Opens submenu "Create RAID volume" on page 229
Non-RAID physical disks:		
Disk <i>n</i> ¹⁾	Enter	Opens submenu "Disk <i>n</i>" on page 229
RAID volumes: ²⁾		
Volume1	Enter	Opens submenu "RAID volume info" on page 229

Table 119: Device manager - Intel® Rapid Storage Technology

- 1) "Disk *n*" is a placeholder. This BIOS parameter displays a subset of the values that are listed in more detail in the corresponding submenu.
- 2) Requires an existing RAID volume.

Its name can be defined during creation (see ["Create RAID volume"](#) on page 229). **Volume1** is used as the default value.

7.1.6.1.1 Create RAID volume

BIOS parameter	Setting options	Description
Name:	String Default: Volume1	Name for the RAID volume No special characters are permitted. Range: Max. 16 characters
RAID level:	RAID0 (stripe) RAID1 (mirror) Recovery	Selects the RAID level
Select disks:		
Disk n:	(Blank) X M R	Selects the storage medium for the RAID volume. Either X (RAID0 and RAID1) or M (master) /R (recovery) can be defined (recovery mode).
Stripe size:	4 kB 8 kB 16 kB 32 kB 64 kB 128 kB	Selects the data block size [kB]
Capacity:	INT	Defines the RAID memory size [MB] Range: Hardware-dependent If storage media of different sizes are used, this is limited to the smaller medium.
Synchronization:	Continuous On request	Selects the synchronization mode

Table 120: Device manager - Create RAID volume

7.1.6.1.2 Disk *n*

BIOS parameter	Setting options	Description
Volume actions ¹⁾		
Reset to non-RAID ¹⁾	Enter	Resets the disk to non-RAID
Port:	-	Displays the port number of device <i>n</i>
Model number:	-	Displays the product ID of device <i>n</i>
Serial number:	-	Displays the serial number of device <i>n</i>
Size:	-	Displays the memory size of device <i>n</i>
Status:	-	Displays the RAID status of device <i>n</i>
Controller type:	-	Displays the controller of device <i>n</i>
Controller interface:	-	Displays the controller interface of device <i>n</i>

Table 121: Device manager - Intel® Rapid Storage Technology

1) Available only if the storage medium is part of a RAID volume.

7.1.6.1.3 RAID volume info

BIOS parameter	Setting options	Description
Volume actions		
Delete	Enter	Deletes the RAID volume
Enable master disk only	Enter	Enables only the master disk
Enable recovery disk only	Enter	Enables only the recovery disk
Name:	-	Displays the name of the RAID volume
RAID level:	-	Displays the RAID level of the volume
Strip size:	-	Displays the data block size [kB] of the volume
Size:	-	Displays the memory size [GB or TB] of the volume
Status:	-	Displays the status of the volume
Bootable:	-	Displays the bootability of the volume
Disk <i>n</i> ¹⁾	Enter	Opens submenu "Disk <i>n</i> " on page 229

Table 122: Device manager - Intel® Rapid Storage Technology - RAID volume info

1) "Disk *n*" is a placeholder. This BIOS parameter displays a subset of the values that are listed in more detail in the corresponding submenu.

7.1.7 Setup utility

Settings can be made in boot menu option "Setup utility".

Submenu	Setting options	Description
Main	Enter	Opens submenu "Main" on page 230 Basic system information is displayed and the system time can be set here.
Advanced	Enter	Opens submenu "Advanced" on page 232 Changes to system settings can be made here.
Security	Enter	Opens submenu "Security" on page 261 Changes to the Trusted Platform Module can be made here. Passwords for storage media can be created and managed here.
Power	Enter	Opens submenu "Power" on page 263 Changes that affect the power consumption of the system can be made here.
Boot	Enter	Opens submenu "Boot" on page 264 Changes to the boot modes and boot sequence can be made here.
Exit	Enter	Opens submenu "Exit" on page 267 Changes can be discarded or saved here. User-specific default values can be saved and loaded here or system-optimized default values from B&R can be restored.

Table 123: Boot menu - Setup utility

7.1.7.1 Main



Figure 88: Main

BIOS setting	Setting options	Description
BIOS version	-	Displays the BIOS version
Processor type	-	Displays the processor type
System bus speed	-	Displays the bus speed
System memory speed	-	Displays the memory speed
Cache RAM	-	Displays the processor cache
Total memory	-	Displays the total RAM
Channel A	-	
SODIMM 0	-	Displays the amount of memory for channel A page 0

Table 124: Main

BIOS setting	Setting options	Description
SODIMM 1	-	Displays the amount of memory for channel B page 1
Channel B		
SODIMM 0	-	Displays the amount of memory for channel A page 0
SODIMM 1	-	Displays the amount of memory for channel B page 1
Platform configuration		
CPUID	-	Displays the processor ID
CPU speed	-	Displays the processor speed [MHz]
L1 data cache	-	Displays the L1 data cache [kB]
L1 instruction cache	-	Displays the L1 instruction cache [kB]
L2 cache	-	Displays the L2 cache [kB]
L3 cache	-	Displays the L3 cache [kB]
Number of processors	-	Displays the number of cores / number of threads
Microcode rev	-	Displays the microcode revision
GT info	-	Displays the name of the graphics processor (ID)
SMX / TXT	-	Displays SMX / TXT support
PCH rev / SKU	-	Displays the PCH revision / SKU
VBIOS ver	-	Displays the VBIOS version
GOP ver	-	Displays the GOP version
Intel ME version / SKU	-	Displays the Intel ME version
LAN PHY revision	-	Displays the LAN PHY revision
System time	INT	Adjusts the system time in the format hh:mm:ss
System date	INT	Adjusts the system date in the format yyyy:mm:dd
About this software	Enter	Displays the copyright disclaimer

Table 124: Main

7.1.7.2 Advanced



Figure 89: Advanced

BIOS parameter	Setting options	Description
OEM features	Enter	Opens submenu "OEM features" on page 233
USB configuration	Enter	Opens submenu "USB configuration" on page 238
Chipset configuration	Enter	Opens submenu "Chipset configuration" on page 240
ACPI settings	Enter	Opens submenu "ACPI table/features control" on page 241
CPU configuration	Enter	Opens submenu "CPU configuration" on page 243
Power & Performance	Enter	Opens submenu "CPU - Power management control" on page 245
Memory configuration	Enter	Opens submenu "Memory configuration" on page 249
System agent (SA) configuration	Enter	Opens submenu "System agent (SA) configuration" on page 251
PCH-IO configuration	Enter	Opens submenu "PCH-IO configuration" on page 254
PCH-FW configuration	Enter	Opens submenu "PCH-FW configuration" on page 259

Table 125: Advanced

7.1.7.2.1 OEM features



Figure 90: Advanced - OEM features

BIOS parameter	Setting options	Description
BIOS version	-	Displays the BIOS version
MTCX version	-	Displays the MTCX version
Realtime environment	Disabled Enabled	Disables/Enables the real-time environment This must be enabled for real-time operating systems such as Automation Runtime.
Hypervisor environment	Disabled Enabled	Disables/Enables the hypervisor environment Enabling is necessary for hypervisor operation. Parameters "VT-d" and "Intel (VMX) Virtualization Technology" are enabled and cannot be changed during hypervisor operation.
Automatic firmware update	Disabled Enabled	Disables/Enables automatic firmware updates for the mainboard, SDL and SDL4 cards
Super IO	Enter	Opens submenu "Super IO" on page 234
H2OUVE	Enter	Opens submenu "H2OUVE" on page 235
Baseboard	Enter	Opens submenu "Baseboard" on page 235
Interface slot n^{1) 2)}	Enter	Opens submenu "Interface slot n" on page 235
Panel settings	Enter	Opens submenu "Panel settings" on page 236
SSD monitoring service	Enter	Opens submenu "SSD monitoring service" on page 236
Custom boot logo	Enter	Opens submenu "Custom boot logo" on page 237

Table 126: Advanced - OEM features

- 1) A total of 3 interface option slots are available. Slot IF option 3 is reserved for graphic interfaces.
- 2) Unused interface option slots are not displayed.
If no IF option slot is used, this submenu is not available.

With BIOS V01.16 the behavior of parameters "Realtime environment" and "Hypervisor environment" was extended (see option "d)" in the following table).

This function is supported in Automation Studio 4.7 and later. Starting with this version, it is possible to configure hypervisor operation with or without hyperthreading for the GPOS (if the CPU used supports this).

Option	Realtime environment (RTE)	Hypervisor environment (HV)	Description
a)	Disabled	Disabled	The default settings are used.
b)	Enabled	Disabled	The system has full RTE support. Hyperthreading is disabled.
c)	Enabled	Enabled	The system has full RTE and HV support. Hyperthreading is disabled.
d)	Disabled	Enabled	The system has RTE and HV support. Hyperthreading is enabled.

If the complete system has been preconfigured for real-time and/or hypervisor operation, these parameters are system specifications and grayed out. Changes in BIOS Setup are then ineffective since they are overwritten by the system specifications during booting. In this case, configuration changes must be made with tool "mtcxsvc.efi", which is part of the firmware upgrades for xPC3100 systems ([see "Firmware upgrade - Panel PC 3100" on page 269](#)), in the EFI shell.

7.1.7.2.1.2 Super IO

BIOS parameter		Setting options	Description
CAN device		-	Indicates whether a CAN interface (IF option) is installed
COM A		Disable	Disables/Enables COM A (SDL onboard touch screen)
		Enable	
	Base I/O address	0x2E8	Selects the I/O address for COM A
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	IRQ 3	Selects the interrupt for COM A
		IRQ 4	
		IRQ 5	
		IRQ 7	
IRQ 11			
MTCX interrupt		Automatic	Disables the MTCX interrupt or assigns it automatically if permitted by the system configuration (at least 1 IRQ free).
		Disable	

Table 127: Advanced - OEM features - Super IO

Note:

COM B to COM E are only displayed if they are allocated.

BIOS parameter		Setting options	Description
COM B		Disable Enable	Disables/Enables COM B (LFP touch screen)
	Base I/O address	0x2E8	Selects the I/O address of port COM B
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	IRQ 3	Selects the interrupt for COM B
		IRQ 4	
		IRQ 5	
		IRQ 7	
IRQ 11			
COM C		Disable Enable	Disables/Enables COM C (IF option 1)
	Base I/O address	0x2E8	Selects the I/O address of port COM C
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
	Interrupt	IRQ 3	Selects the interrupt for COM C
		IRQ 4	
		IRQ 5	
		IRQ 7	
IRQ 11			
COM D		Disable Enable	Disables/Enables COM D (IF option 2)
	Base I/O address	0x2E8	Disables/Enables the I/O address of port COM D
		0x2F8	
		0x338	
		0x378	
		0x3E8	

Table 128: Advanced - OEM features - Super IO (supplement)

BIOS parameter		Setting options	Description
	Interrupt	0x3F8	Selects the interrupt for COM D
		IRQ 3	
		IRQ 4	
		IRQ 5	
		IRQ 7	
		IRQ 11	
COM E		Disable	Disables/Enables COM E (graphics option IF3)
		Enable	
	Base I/O address	0x2E8	Selects the I/O address of port COM E
		0x2F8	
		0x338	
		0x378	
		0x3E8	
		0x3F8	
		Interrupt	
	IRQ 4		
	IRQ 5		
	IRQ 7		
	IRQ 11		

Table 128: Advanced - OEM features - Super IO (supplement)

7.1.7.2.1.3 H2OUVE

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

Table 129: Advanced - OEM features - H2OUVE

7.1.7.2.1.4 Baseboard

BIOS parameter	Setting options	Description
Product name	-	Displays the B&R model number of the mainboard
Serial number	-	Displays the B&R serial number of the mainboard
Device ID	-	Displays the device ID of the mainboard
Vendor ID	-	Displays the vendor ID of the mainboard
Compatibility ID	-	Displays the compatibility ID of the mainboard
HW revision	-	Displays the hardware revision of the mainboard
Parent device ID	-	Displays the parent device ID of the mainboard
Parent comp. ID	-	Displays the parent compatibility of the mainboard
ETH1 MAC address	-	Displays the ETH1 MAC address
ETH2 MAC address	-	Displays the ETH2 MAC address
Power on cycles ¹⁾	-	Displays the power-on cycles of the mainboard
Power on hours	-	Displays the operating time [h] of the mainboard
Battery voltage	-	Displays the battery voltage [V]
Battery state	-	Displays the battery state
Temperature 1	-	Displays the current temperature at sensor 1 [°C and °F]
Temperature 2	-	Displays the current temperature at sensor 2 [°C and °F]
Temperature 3	-	Displays the current temperature at sensor 3 [°C and °F]
Temperature 4	-	Displays the current temperature at sensor 4 [°C and °F]

Table 130: Advanced - OEM features - Baseboard

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

7.1.7.2.1.5 Interface slot *n*

A total of 3 interface option slots are available. They are indexed from 1 to 3.

BIOS parameter	Setting options	Description
Product name	-	Displays the B&R model number of IF option <i>n</i>
Serial number	-	Displays the B&R serial number of IF option <i>n</i>
Device ID	-	Displays the device ID of IF option <i>n</i>
Vendor ID	-	Displays the vendor ID of IF option <i>n</i>
Compatibility ID	-	Displays the compatibility ID of IF option <i>n</i>
HW revision	-	Displays the hardware revision of IF option <i>n</i>
FW version ¹⁾	-	Displays the firmware version of IF option <i>n</i>
Parent device ID	-	Displays the parent device ID of IF option <i>n</i>

Table 131: Advanced - OEM features - Interface slot *n*

BIOS parameter	Setting options	Description
Parent comp. ID	-	Displays the parent compatibility ID of IF option <i>n</i>
Power on cycles ²⁾	-	Displays the power-on cycles of IF option <i>n</i>
Power on hours	-	Displays the operating time [h] of IF option <i>n</i>
Temperature <i>q</i> ³⁾	-	Displays the temperature at sensor <i>q</i> [°C and °F]

Table 131: Advanced - OEM features - Interface slot *n*

- 1) For graphics options only.
 2) Each start/restart increases the value by 1.
 3) Depending on the IF option card, the number of temperature sensors varies from 0 (parameter not displayed) to 4.

7.1.7.2.1.6 Panel settings

BIOS parameter	Setting options	Description
Panel <i>n</i> ¹⁾	Enter	Opens menu "Panel <i>n</i> " on page 236

Table 132: Advanced - OEM features - Panel settings

- 1) The number of panels varies by system and system configuration (see submenu "Panel *n*" for reserved indices).

Panel *n*

The panel on the SDL/DVI-D interface of the APC3100/PPC3100 is indexed as panel 0.

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

If the APC3100/PPC3100 is also equipped with a graphics option in the IF option 3 slot, the associated panel is assigned index 8.

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

Table 133: Advanced - OEM features - Panel settings - Panel *n*

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

7.1.7.2.1.7 SSD monitoring service

Information:

The following data is only displayed for CFast cards from B&R (see "CFast cards" on page 130).

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

Table 134: Advanced - OEM features - SSD monitoring service

- 1) Self-Monitoring, Analysis and Reporting Technology
 2) The write amplification factor (WAF) corresponds to the amount of data actually written to memory divided by the amount of data written by the host (WAF = Data written to flash memory ÷ Data written by host).

7.1.7.2.1.8 Custom boot logo

BIOS parameter	Setting options	Description
Add custom boot logo	Enter	Selects a customized boot logo The boot logo is not permitted to exceed 40 kB in size and must be stored as JPG.
Delete custom boot logo	Enter	Deletes customized boot logos ¹⁾

Table 135: Advanced - OEM Features - Custom boot logo

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

7.1.7.2.2 USB configuration



Figure 91: Advanced - OEM features - USB configuration

BIOS parameter		Setting options	Description
USB BIOS support		Disabled	Disables USB support in BIOS or enables USB support (UEFI only) or USB support (UEFI and Legacy Mode)
		Enabled	
		UEFI only	
USB legacy SMI bit clean		Disabled	Disables/Enables USB legacy SMI bit clean
		Enabled	
XHCI disable compliance mode		False	Selects XHCI disable compliance mode
		True	
USB port disable override		Disabled	Manually disables/enables USB ports (per port) or enables all ports
		Select per-port	
	USB1 3.0 connector	Disabled	Disables/Enables the interface USB1 3.0 connector
		Enabled	
	USB2 3.0 connector	Disabled	Disables/Enables the interface USB2 3.0 connector
		Enabled	
	USB3 3.0 connector	Disabled	Disables/Enables the interface USB3 3.0 connector
		Enabled	
	USB4 3.0 connector	Disabled	Disables/Enables the interface USB4 3.0 connector
		Enabled	
	USB1 2.0 connector	Disabled	Disables/Enables the interface USB1 2.0 connector
		Enabled	
	USB2 2.0 connector	Disabled	Disables/Enables the interface USB2 2.0 connector
		Enabled	
	USB3 2.0 connector	Disabled	Disables/Enables the interface USB3 2.0 connector
		Enabled	
	USB4 2.0 connector	Disabled	Disables/Enables the interface USB4 2.0 connector
		Enabled	
	USB1 2.0 onboard panel	Disabled	Disables/Enables the interface USB1 2.0 onboard panel
		Enabled	
	USB2 2.0 onboard panel	Disabled	Disables/Enables the interface USB2 2.0 onboard panel
		Enabled	
USB 2.0 SDL / DVI-D		Disabled	Disables/Enables the USB 2.0 interface on SDL / DVI-D

Table 136: Advanced - OEM features - USB configuration

BIOS parameter		Setting options	Description
	USB 2.0 IF option	Enabled	Disables/Enables the USB 2.0 interface on the IF option
		Disabled	
	USB 2.0 internal	Enabled	Disables/Enables the internal USB 2.0 interface
		Disabled	
		Enabled	

Table 136: Advanced - OEM features - USB configuration

7.1.7.2.3 Chipset configuration

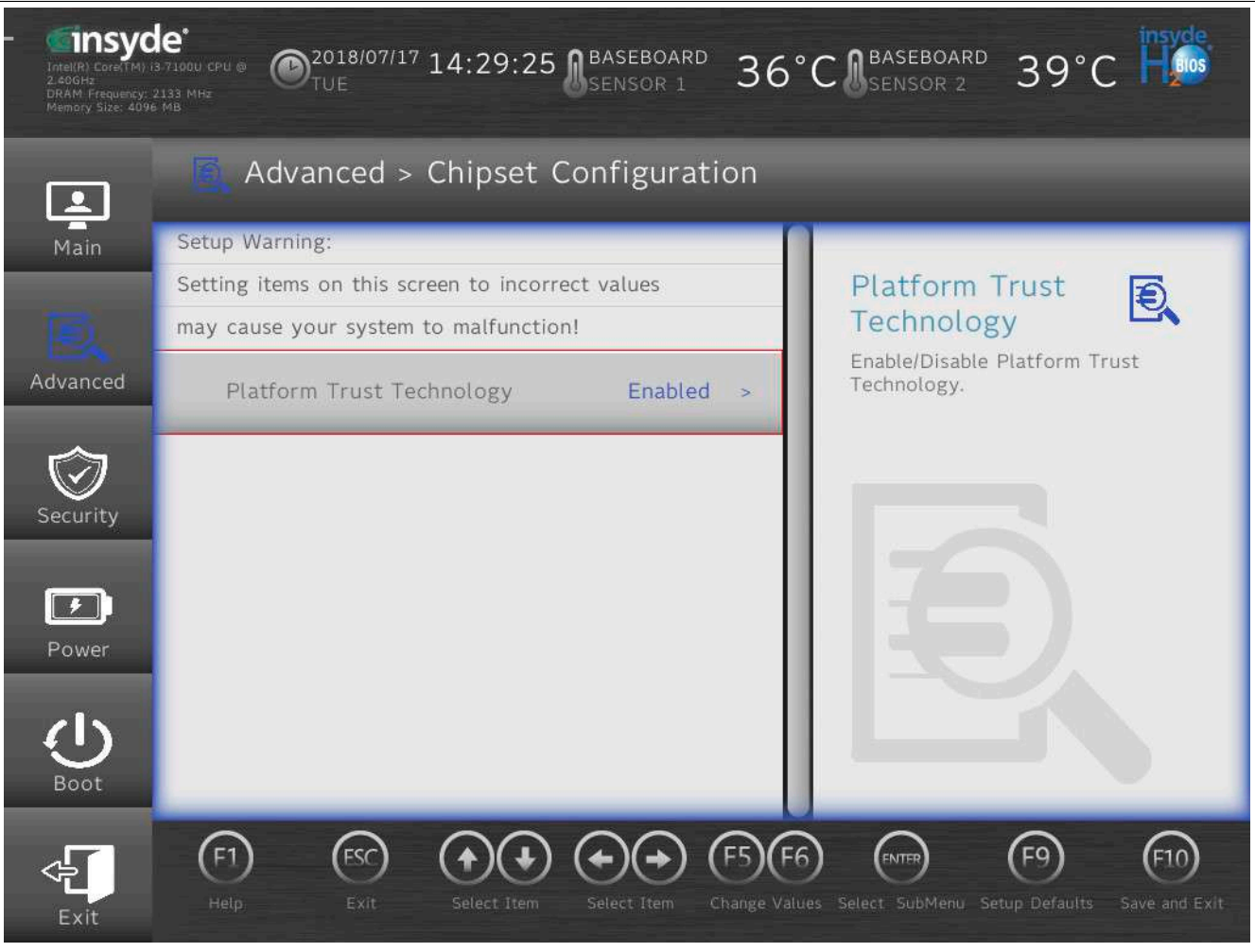


Figure 92: Advanced - Chipset configuration

Warning!

Settings made in this screen can cause malfunctions if changes are made to configured TPM systems (e.g. Secure Boot).

BIOS parameter	Setting options	Description
Platform Trust Technology	Disabled	Disables/Enables Platform Trust Technology (PTT)
	Enabled	By default, firmware TPM (FTPM of the combination of CPU and PCH) is used. If PTT is disabled, the discrete TPM (hardware DTPM) is used.

Table 137: Advanced - Chipset configuration

7.1.7.2.4 ACPI table/features control



Figure 93: Advanced - OEM features - ACPI table/features control

BIOS parameter	Setting options	Description
ACPI settings	Enter	Opens submenu "ACPI settings" on page 241
FACP - RTC S4 wakeup	Disabled Enabled	Disables/Enables S4 wakeup via RTC
APIC ¹⁾ - IO APIC mode	Disabled Enabled	Disables/Enables IO APIC mode

Table 138: Advanced - OEM features - ACPI table/features control

1) Advanced Programmable Interrupt Controller

7.1.7.2.4.1 ACPI settings

BIOS parameter	Setting options	Description
ACPI version	-	Displays the ACPI version
Enable ACPI auto configuration	Disabled Enabled	Disables/Enables ACPI BIOS auto-configuration
Enable hibernation	Disabled Enabled	Disables/Enables hibernation The effectiveness of this option may vary depending on the operating system.
PTID support	Disabled Enabled	Disables/Enable PTID support
PECI ¹⁾ access method	Direct I/O ACPI	Selects the PECI access mode
ACPI S3 support	Disabled Enabled	Disables/Enable ACPI S3 support
Native PCIe enable	Disabled	Native operating system PCI Express support

Table 139: Advanced - OEM features - ACPI table/features control - ACPI settings

BIOS parameter	Setting options	Description
Native ASPM ²⁾	Enabled	Disables native ASPM (BIOS controls ASPM), enables it (operating system controls ASPM) or sets it automatically (mode selected automatically)
	Auto	
	Disabled	
	Enabled	

Table 139: Advanced - OEM features - ACPI table/features control - ACPI settings

- 1) Platform environment control interface
- 2) Active State Power Management

7.1.7.2.5 CPU configuration

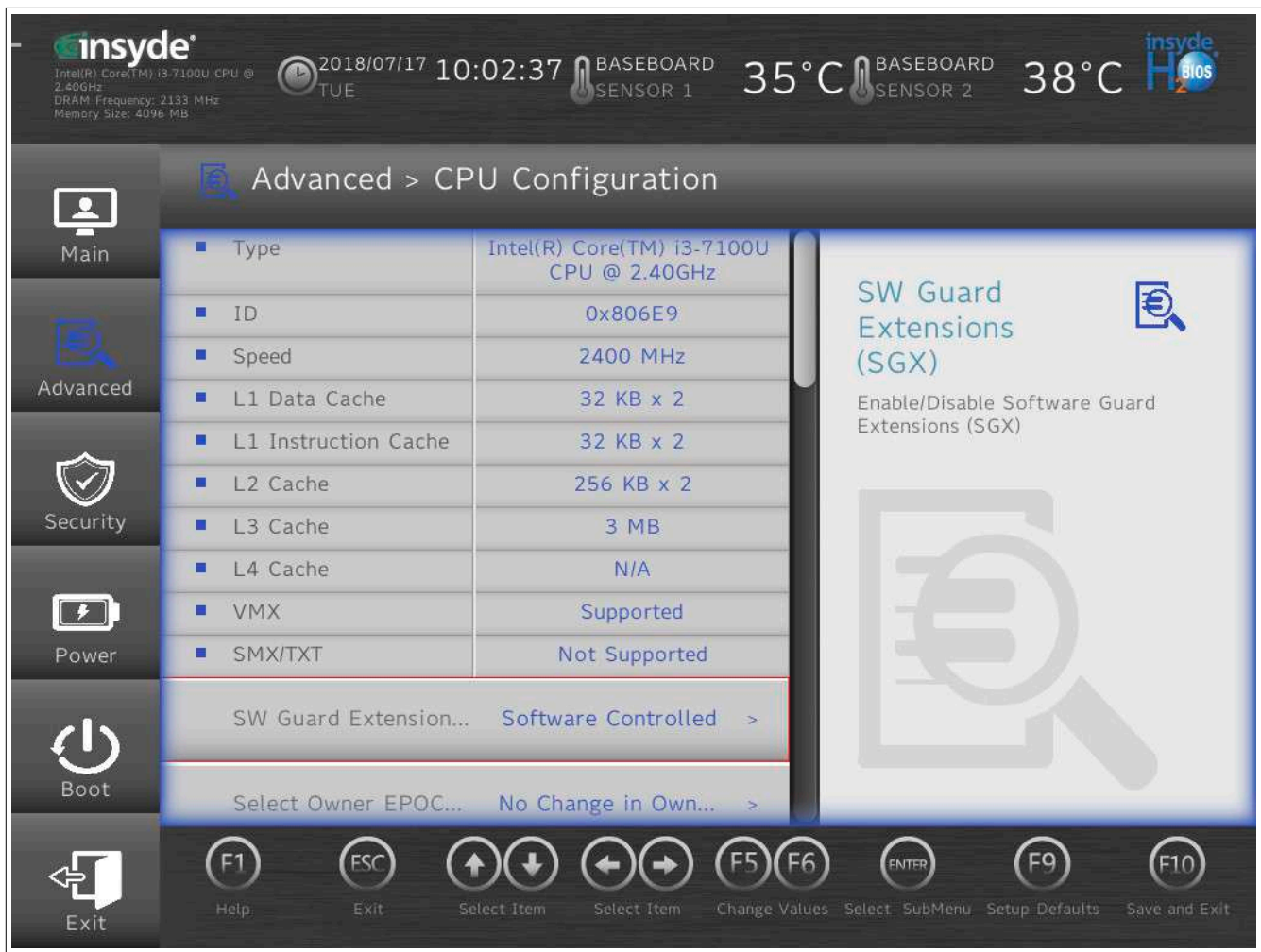


Figure 94: Advanced - CPU configuration

BIOS parameter	Setting options	Description
Type	-	Displays the CPU type
ID	-	Displays the CPU ID
Speed	-	Displays the CPU speed [MHz]
L1 data cache	-	Displays the L1 data cache [kB]
L1 instruction cache	-	Displays the L1 instruction cache [kB]
L2 cache	-	Displays the L2 cache [kB]
L3 cache	-	Displays the L3 cache [kB]
L4 cache	-	Displays the L4 cache [kB]
VMX	-	Displays VMX support
SMX/TXT	-	Displays SMX/TXT support
SW guard extension (SGX)	Disabled Enabled Software controlled	Disables/Enables software guard extension or lets it be determined by the system
Select owner EPOCH input type	No change in owner EPOCH Change to new random owner EPOCH Manual user defined owner EPOCH	Security key initial value ¹⁾ unchanged, random or manual
CPU flex ratio override	Disabled Enabled	Disables/Enables the CPU flex ratio override
CPU flex ratio settings ²⁾	INT Default: 24	Defines the CPU flex ratio override multiplier Range: Hardware-dependent
Hardware prefetcher	Disabled Enabled	Disables/Enables the hardware prefetcher
Adjacent cache line prefetch	Disabled Enabled	Disables/Enables adjacent cache line prefetch
Intel (VMX) Virtualization Technology	Disabled Enabled	Disables/Enables Intel (VMX) Virtualization Technology
Active processor cores	All	Disables/Enables individual or all processor cores

Table 140: Advanced - CPU configuration

BIOS parameter	Setting options	Description
	1	
Hyper threading	Disabled	Disables/Enables hyper-threading
	Enabled	
BIST	Disabled	Disables/Enables the built-in self-test on reset
	Enabled	
AES	Disabled	Disables/Enables the Advanced Encryption Standard
	Enabled	
Machine check	Disabled	Disables/Enables the machine check
	Enabled	

Table 140: Advanced - CPU configuration

- 1) For the "initial value", cf. "seed" (key)
- 2) This variable determines the multiplier for the CPU speed (variable * 100 MHz = CPU frequency).

The range of values is specified by the system and hardware.

7.1.7.2.6 Power & Performance



Figure 95: Advanced - Power & Performance

BIOS parameter	Setting options	Description
CPU - Power management control	Enter	Opens submenu "CPU - Power management control" on page 245
GT - Power management control	Enter	Opens submenu "GT - Power management control" on page 248

Table 141: Advanced - Power & Performance

7.1.7.2.6.1 CPU - Power management control

BIOS parameter	Setting options	Description
Boot performance mode	Max non-turbo performance	Selects the performance mode in which BIOS starts
	Max battery	
	Turbo performance	
Intel® SpeedStep™	Disabled Enabled	Disables/Enables Intel SpeedStep for more than 2 supported frequency ranges
Race-to-halt (RTH)	Disabled Enabled	Disables/Enables race-to-halt
Intel® Speed Shift Technology	Disabled Enabled	Disables/Enables Intel Speed Shift Technology ¹⁾
HDC ²⁾ control	Disabled Enabled	Disables/Enables HDC control The processor can force system components into idle mode.
Turbo mode	Disabled	Disables/Enables Intel Turbo Boost Technology Available only for processors with turbo mode support.
	Enabled	
View/Configure turbo options³⁾	Enter	Opens submenu "View/Configure turbo options" on page 247
Config TDP configurations	Enter	Opens submenu "Config TDP configurations" on page 248
Platform PL1 enable	Disabled	Disables/Enables platform power limit (PL1) programming Serves the processor as a performance limit in a specific time window.
	Enabled	
Platform PL1 power	INT Default: 0 ⁵⁾	Defines the platform PL1 power limit [mW] ⁴⁾ Range: 0 to 4,095,875 Resolution: 1/8

Table 142: Advanced - Power & Performance - CPU power management control

BIOS parameter	Setting options	Description
Platform PL1 time window	INT Default: 0	Defines the platform PL1 time window [s] Range: 0 to 128
Platform PL2 enable	Disabled Enabled	Disables/Enables platform power limit (PL2) programming
Platform PL2 power	INT Default: 0	Defines the platform PL1 power limit [mW] Range: 0 to 4,095,875 Resolution: 1/8
Power limit 4 override	Disabled Enabled	Disables/Enables the power limit 4 override Enable to set values for power limit 4 manually; otherwise, the system default values are used.
Power limit 4	INT Default: 0	Defines PL4 power limit 4 [mW] Range: 0 to 4,095,875 Resolution: 1/8
Power limit 4 lock	Disabled Enabled	Disables/Enables the power limit 4 lock function This can be used to lock the PL4 configuration when using an operating system.
C states ⁶⁾	Disabled Enabled	Disables/Enables CPU C-states management
Thermal monitor	Disabled Enabled	Disables/Enables temperature monitoring
Power limit 3 settings	Enter	Opens submenu "Power limit 3 settings" on page 248

Table 142: Advanced - Power & Performance - CPU power management control

- 1) Intel Speed Shift Technology enables hardware-controlled P-states via the CPPC (Collaborative Processor Performance Control) v2 interface.
- 2) Hardware duty cycling
- 3) This submenu appears only if the Intel® Speed Shift Technology option is enabled.
- 4) For all power limits (PL1 to PL4), the additional description on the display unit must be observed. All values must be entered in mW.
- 5) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.
- 6) The C-states options are described separately in the following table to maintain clarity.

BIOS setting	Configuration options	op-	Explanation
Enhanced C-states	Disabled Enabled		Disables/Enables enhanced C-states (C1E) The CPU switches to the lowest speed level if all cores are in a C-state.
C-state auto demotion	C1 C1 and C3 C3 Disabled		Selects or disables C-state auto-demotion Can be used to prevent unnecessary changing of C-states.
C-state un-demotion	C1 C1 and C3 C3 Disabled		Selects or disables C-state un-demotion
Package C-state demotion	Auto Disabled Enabled		Disables/Enables package C-state demotion or sets it automatically
Package C-state un-demotion	Auto Disabled Enabled		Disables/Enables package C-state un-demotion or sets it automatically
CState pre-wake	Disabled Enabled		Disables/Enables CState pre-wake
IO MWAIT redirection	Disabled Enabled		Disables/Enables I/O MWAIT redirection
Package C-state limit	Auto CPU default C10 C9 C8 C7S C7 C6 C3 C2 C0/C1		Selects package C-state limits, sets it automatically (lowest available state selected) or the CPU default (default C-state of the CPU) C9 optimized VR ¹⁾ off C8 + VR off C7 + PCH off Optimized deeper power down Deeper power down Deep power down Deep sleep Stop clock Operating mode/halt
C3 latency control (MSR 0x60A)			
Time unit	1 ns 32 ns 1024 ns 32768 ns 1048576 ns 33554432 ns		Select the IRTL ²⁾ time unit [ns]
Latency	INT Default: 78		Defines the IRTL value Range: 0 to 1023
C6/C7 short latency control (MSR 0x60B)			
Time unit	1 ns 32 ns		Selects the IRTL time unit [ns]

Table 143: Advanced - Power & Performance - CPU power management control - C-states

BIOS setting	Configuration options	op- tions	Explanation
	1024 ns		
	32768 ns		
	1048576 ns		
	33554432 ns		
Latency	INT Default: 118		Defines the IRTL value Range: 0 to 1023
C6/C7 long latency control (MSR 0x60C)			
Time unit	1 ns		Selects the IRTL time unit [ns]
	32 ns		
	1024 ns		
	32768 ns		
	1048576 ns		
	33554432 ns		
Latency	INT Default: 148		Defines the IRTL value Range: 0 to 1023
C8 latency control (MSR 0x633)			
Time unit	1 ns		Selects the IRTL time unit [ns]
	32 ns		
	1024 ns		
	32768 ns		
	1048576 ns		
	33554432 ns		
Latency	INT Default: 250		Defines the IRTL value Range: 0 to 1023
C9 latency control (MSR 0x634)			
Time unit	1 ns		Selects the IRTL time unit [ns]
	32 ns		
	1024 ns		
	32768 ns		
	1048576 ns		
	33554432 ns		
Latency	INT Default: 332		Defines the IRTL value Range: 0 to 1023
C10 latency control (MSR 0x635)			
Time unit	1 ns		Selects the IRTL time unit [ns]
	32 ns		
	1024 ns		
	32768 ns		
	1048576 ns		
	33554432 ns		
Latency	INT Default: 1010		Defines the IRTL value Range: 0 to 1023

Table 143: Advanced - Power & Performance - CPU power management control - C-states

- 1) Voltage regulator (module)
- 2) Interrupt response time limit

View/Configure turbo options

BIOS parameter	Setting options	Description
Max turbo power limit	-	Displays the max. turbo power limit
Min turbo power limit	-	Displays the min. turbo power limit
Package TDP limit	-	Displays the package TDP limit
Power limit 1	-	Displays power limit 1
Power limit 2	-	Displays power limit 2
1-core turbo ratio	-	Displays the 1-core turbo ratio
2-core turbo ratio	-	Displays the 2-core turbo ratio
Energy efficient P-state	Disabled	Disables/Enables energy-efficient P-states
	Enabled	
Package power limit MSR lock	Disabled	Disables/Enables the package power limit MSR lock function A reset is necessary to unlock the register.
	Enabled	
1-core ratio limit override	INT Default: 24	Defines the frequency of CPU turbo on an active core Range: 1 to 255
2-core ratio limit override	INT Default: 24	Defines the frequency of CPU turbo on two active cores Range: 1 to 255
Energy efficient turbo	Disabled	Disables/Enables energy-efficient turbo Reduces the turbo frequency to increase energy efficiency.
	Enabled	

Table 144: Advanced - Power & Performance - CPU power management control - View/Configure turbo options

Config TDP configurations

BIOS parameter	Setting options	Description
Configurable TDP ¹⁾ boot mode	Deactivate	Selects the configurable TDP boot mode
	Down	Nominal: TDP is not overshoot or undershot.
	Nominal	Down: TDP is undershot and the processor works with lower power.
Configurable TDP lock	Disabled	Disables/Enables TDP control register
	Enabled	
CTDP BIOS control	Disabled	Disables/Enables CTD BIOS control
	Enabled	
ConfigTDP levels	-	Displays the ConfigTDP levels supported by the MSR ²⁾
ConfigTDP turbo activation ratio	-	Displays the ConfigTDP turbo activation ratio values read by the MSR
Power limit 1	-	Displays the PL1 values from MMIO ³⁾
Power limit 2	-	Displays the PL2 values from MMIO
Custom settings nominal		
ConfigTDP nominal	-	Displays the ConfigTDP nominal ratio, turbo activation ratio and PL1 read from the MSR
Power limit 1 ⁴⁾	INT Default: 0 ⁵⁾	Defines the PL1 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power limit 2	INT Default: 0	Defines the PL2 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power limit 1 time window	INT Default: 0	Defines the PL1 time window [s] Range: 0 to 128
ConfigTDP turbo activation ratio	INT Default: 0	Defines the ConfigTDP turbo activation ratio Range: 0 to 255
Custom settings down		
ConfigTDP level1	-	Displays the ConfigTDP nominal ratio, turbo activation ratio and PL1 read from the MSR
Power limit 1	INT Default: 0	Defines the PL1 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power limit 2	INT Default: 0	Defines the PL2 power limit [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power limit 1 time window	INT Default: 0	Defines the PL1 time window [s] Range: 0 to 128
Config TDP turbo activation ratio	INT Default: 0	Defines the ConfigTDP turbo activation ratio Range: 0 to 255

Table 145: Advanced - Power & Performance - CPU power management control - Config TDP configurations

- 1) Thermal design power
- 2) Module-specific register
- 3) Memory-mapped I/O
- 4) For all power limits (PL1 to PL2), the additional description on the display unit must be observed. All values must be entered in mW.
- 5) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.

Power limit 3 settings

BIOS parameter	Setting options	Description
Power limit 3 override	Disabled Enabled	Disables/Enables power limit 3 If the power limit 3 override is disabled, default values are used.
Power limit 3 ¹⁾	INT Default: 0 ²⁾	Defines power limit 3 [mW] Range: 0 to 4,095,875 Resolution: 125 mW
Power limit 3 time window	INT Default: 0	Selects the power limit 3 time window [s] Range: 0 to 64
Power limit 3 duty cycle	INT Default: 0	Defines the power limit 3 duty cycle [%] Range: 0 to 100 Resolution: 1
Power limit 3 lock	Disabled	Disables/Enables the power limit 3 lock function
	Enabled	

Table 146: Advanced - Power & Performance - CPU power management control - Power limit 3 settings

- 1) The additional description on the display unit must be observed.
- 2) The default value 0 for this table means that pre-programmed default values are used. The system does not use the numeric value 0.

7.1.7.2.6.2 GT - Power management control

BIOS parameter	Setting options	Description
RC6 (render standby)	Disabled	Disable/Enables RC6 (render standby)
	Enabled	Permits the GPU to go into standby.
Maximum GT frequency	Default max frequency 100 to 1200 Mhz	Maximum graphics frequency (including graphic turbo) [MHz] The max. possible frequency is selected by default. Resolution: 50 MHz

Table 147: Advanced - Power & Performance - GT power management control

7.1.7.2.7 Memory configuration

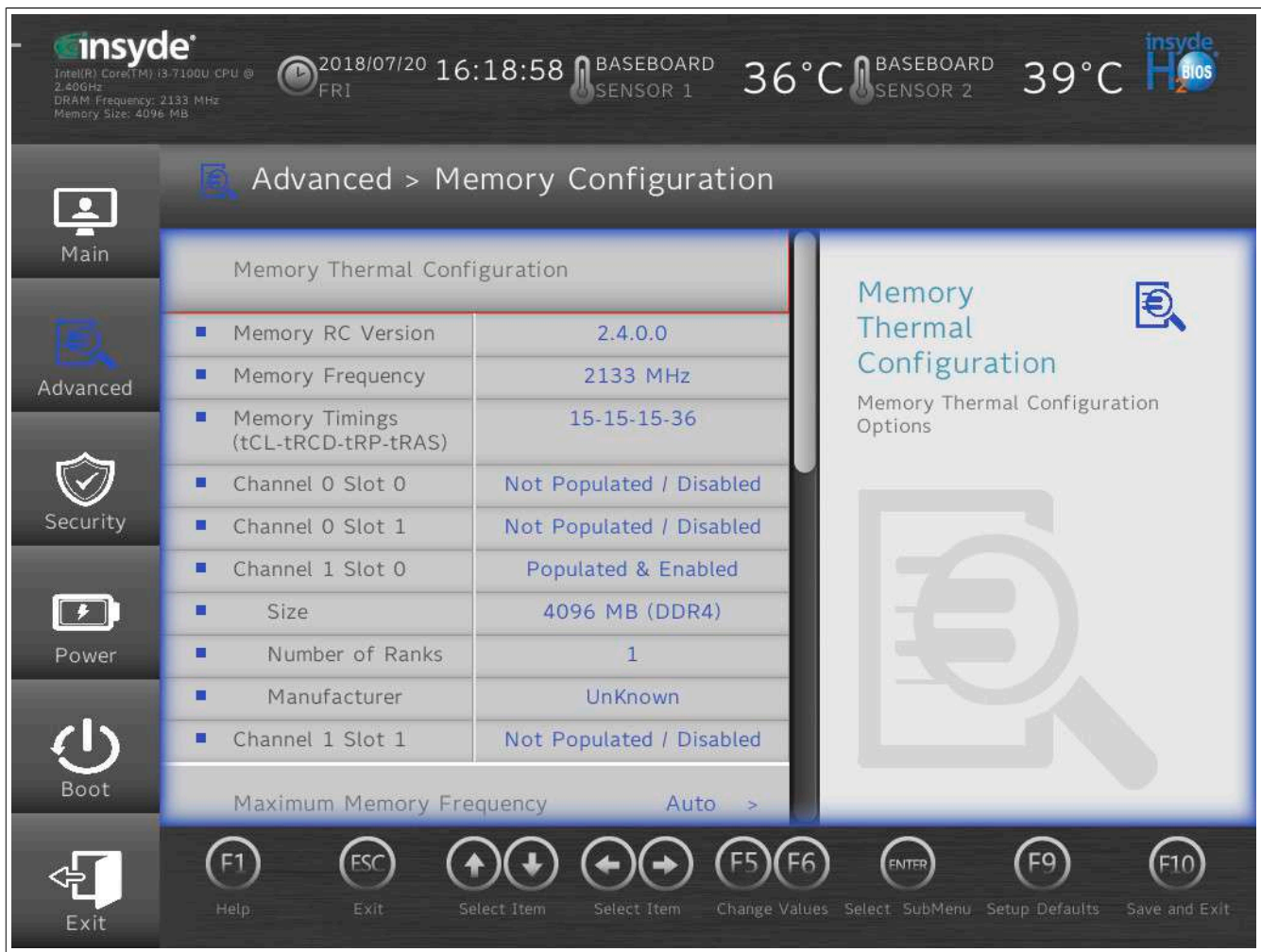


Figure 96: Advanced - Memory configuration

BIOS parameter	Setting options	Description
Memory thermal configuration	Enter	Opens submenu "Memory thermal configuration" on page 250
Memory RC version	-	Displays the memory RC version
Memory frequency	-	Displays the memory frequency [MHz]
Memory timings	-	Displays RAM timing
Channel 0 slot 0	-	Displays the memory status
Size	-	Displays the memory size [MB]
Number of ranks	-	Displays the number of ranks
Manufacturer	-	Displays the memory manufacturer
Channel 0 slot 1	-	Displays the memory status
Size	-	Displays the memory size [MB]
Number of ranks	-	Displays the number of ranks
Manufacturer	-	Displays the memory manufacturer
Channel 1 slot 0	-	Displays the memory status
Size	-	Displays the memory size [MB]
Number of ranks	-	Displays the number of ranks
Manufacturer	-	Displays the memory manufacturer
Channel 1 slot 1	-	Displays the memory status
Size	-	Displays the memory size [MB]
Number of ranks	-	Displays the number of ranks
Manufacturer	-	Displays the memory manufacturer
Memory maximum frequency	Auto 1067 1333 1600 1867 2133 2400	Selects the maximum frequency of RAM [MHz] automatically or manually
Max TOLUD ¹⁾	Dynamic 1.0 to 3.5 GB	Sets the max. TOLUD [GB] automatically (dynamic) or manually Resolution: 0.25 GB
Retain on fast fail	Disabled	Disables/Enables retain on fast fail

Table 148: Advanced - Memory configuration

BIOS parameter	Setting options	Description
	Enabled	If this parameter is enabled, a cold reboot is performed after a failed software memory test.
Exit on failure (MRC ²⁾)	Disabled	Disables/Enables exit on failure (MRC)
	Enabled	Enabling makes it possible to exit on failure for MRC training.
Channel A DIMM control	Disable both DIMMs	Selects the mode of main memory channel A control
	Disable DIMM0	Disables/Enables both or individual DIMMs
	Disable DIMM1	
	Enable both DIMMs	
Channel B DIMM control	Disable both DIMMs	Selects the mode of main memory channel B control
	Disable DIMM0	Disables/Enables both or individual DIMMs
	Disable DIMM1	
	Enable both DIMMs	
For single rank	Disabled	Disables/Enables force single rank
	Enabled	
Memory remap	Disabled	Disables/Enables memory remapping (available starting at 4 GB RAM)
	Enabled	
Mrc fast boot	Disabled	Disables/Enables MRC fast boot
	Enabled	

Table 148: Advanced - Memory configuration

- 1) Top of low usable DRAM
 2) Memory reference code

7.1.7.2.7.1 Memory thermal configuration

BIOS parameter	Setting options	Explanation
Memory power and thermal throttling	Enter	Opens submenu " Memory power and thermal throttling " on page 250
Memory thermal management	Disabled	Disables/Enables memory thermal management
	Enabled	
PECI inject temperature	Disabled	Disables Peci injected temperature or transfers the RAM temperature to the processor via Peci
	Enabled	
EXTTS# via TS ¹⁾ -on-board	Disabled	Disables/Enables routing of the TS-on-board pins to PCH (ALERT# via EXTTS#)
	Enabled	
EXTTS# via TS-on-DIMM	Disabled	Disables/Enables routing of the TS-on-DIMM pins to PCH (ALERT# via EXTTS#)
	Enabled	
Virtual temperature sensor (VTS)	Disabled	Disables/Enables the virtual temperature sensor
	Enabled	

Table 149: Advanced - Memory configuration - Memory thermal configuration

- 1) Thermal sensor

Memory power and thermal throttling

BIOS parameter	Setting options	Description
REFRESH_2X_MODE	Disabled	Disables REFRESH_2X_MODE or selects the mode
	1- Enabled for WARM or HOT	The IMC ¹⁾ enables refresh with 2x interval only at high temperature or at increased and high temperature.
	2- Enabled for HOT only	
SelfRefresh enable	Disabled	Disables/Enables SelfRefresh
	Enabled	
SelfRefresh IdleTimer	INT Default: 512	Defines the SelfRefresh IdleTimer in DLCK800s Range: 0 to 65535

Table 150: Advanced - Memory configuration - Memory thermal configuration - Memory power and thermal throttling

- 1) Integrated memory controller

7.1.7.2.8 System agent (SA) configuration



Figure 97: Advanced - System agent (SA) configuration

BIOS parameter	Setting options	Description
SA PCIe code version	-	Displays the SA PCIe code version
VT-d ¹⁾	-	Displays VT-d support
Graphics configuration	Enter	Opens submenu "Graphics configuration" on page 251
DMI^{2)/OPI³⁾ configuration}	Enter	Opens submenu "DMI/OPI configuration" on page 253
VT-d	Disabled Enabled	Disables/Enables VT-d
Above 4 GB MMIO BIOS assignment	Disabled Enabled	Disables/Enables above 4 GB MMIO BIOS assignment

Table 151: Advanced - System agent (SA) configuration

- 1) Intel Virtualization Technology for Directed I/O
- 2) Direct Media Interface
- 3) On package DMI interconnect Interface

7.1.7.2.8.1 Graphics configuration

BIOS parameter	Setting options	Description
Graphics turbo IMON current	INT Default: 31	Defines the graphics turbo IMON current Range: 14 to 31
GTT ¹⁾ size	8 MB 4 MB 2 MB	Selects the GTT size [MB]
Aperture size	128 MB 256 MB 512 MB 1024 MB	Selects reserved RAM [MB] If the graphics memory is full, the defined amount of memory is made available.
DVMT ²⁾ pre-allocated	4M to 64M Default: 32M	Defines the allocated graphics memory (DVMT) [MB] to be used by the IGD ³⁾ .
DVMT total Gfx mem	256M 128M	Selects the memory size [MB] that can be used by the IDG. MAX uses the entire available main memory.

Table 152: Advanced - System agent (SA) configuration - Graphics configuration

BIOS parameter		Setting options	Description
		MAX	The additional memory is dynamically allocated according to DVMT 5.0.
Gfx low power mode ⁴⁾		Disabled	Disables/Enables the graphic controller's sleep mode
		Enabled	
VDD enable		Disabled	Disables/Enables force VDD
		Enabled	
HDCP support		Disabled	Disables/Enable HDCP support
		Enabled	
	Algorithm	One-time	Selects HDCP re-encryption flow
		Periodic	
PM support		Disabled	Disables/Enables power management support
		Enabled	
PAVP enable		Disabled	Disables/Enables "Force protected audio video path"
		Enabled	
Cdynmax clamping enable		Disabled	Disables/Enables Cdynmax clamping
		Enabled	
Cd clock frequency		337.5 Mhz	Select highest supported Cd clock frequency [MHz]
		450 Mhz	
		540 Mhz	
		675 Mhz	
LCD control		Enter	Opens submenu "LCD control" on page 252

Table 152: Advanced - System agent (SA) configuration - Graphics configuration

- 1) Graphics translation table (cf. graphics aperture/address remapping table (GART))
- 2) Dynamic video memory technology
- 3) Internal graphic device
- 4) This function is only available for small form factor devices.

LCD control

BIOS parameter	Setting options	Description
Primary display	-	Displays the primary display
Secondary display	-	Displays the secondary display
Primary display priority	Enter	Opens submenu "Primary display priority" on page 252
Secondary display priority	Enter	Opens submenu "Secondary display priority" on page 252
Panel scaling	Auto	Disables, forces or selects panel scaling automatically
	Force scaling	
	Off	

Table 153: Advanced - System agent (SA) configuration - Graphics configuration - LCD control

Primary display priority

BIOS parameter	Setting options	Description
1st device	Onboard panel	Selects the device with the highest priority
	IF option	
	SDL / DVI-D	
2nd device	Onboard panel	Selects the device with the medium priority
	IF option	
	SDL / DVI-D	
3rd device	Onboard panel	Selects the device with the lowest priority
	IF option	
	SDL / DVI-D	

Table 154: Advanced - System agent (SA) configuration - Graphics configuration - LCD control - Primary display priority

Secondary display priority

BIOS parameter	Setting options	Description
1st device	Onboard panel	Selects the device with the highest priority or disables the priority list for the secondary display
	IF option	
	SDL / DVI-D	
	Disabled	
2nd device	Onboard panel	Selects the device with the medium priority
	IF option	
	SDL / DVI-D	
3rd device	Onboard panel	Selects the device with the lowest priority
	IF option	
	SDL / DVI-D	

Table 155: Advanced - System agent (SA) configuration - Graphics configuration - LCD control - Secondary display priority

7.1.7.2.8.2 DMI/OPI configuration

BIOS parameter	Setting options	Description
DMI Vc1 control	Disabled	Disables/Enables DMI Vc1
	Enabled	
DMI Vcm control	Disabled	Disables/Enables DMI Vcm
	Enabled	

Table 156: Advanced - System agent (SA) configuration - DMI/OPI configuration

7.1.7.2.9 PCH-IO configuration



Figure 98: Advanced - PCH-IO configuration

BIOS parameter	Setting options	Description
PCI Express configuration	Enter	Opens submenu "PCI Express configuration" on page 255
SATA and RST configuration	Enter	Opens submenu "SATA and RST configuration" on page 257
Security configuration	Enter	Opens submenu "Security configuration" on page 258
HD audio configuration	Enter	Opens submenu "HD audio configuration" on page 258
PCH LAN controller	Disabled Enabled	Disables/Enables PCH LAN controller
DeepSx power policies	Disabled Enabled in S4-S5	Disables/Enables DeepSx power policies
LAN wake from DeepSx	Disabled Enabled	Disables/Enables LAN wake from DeepSx
Wake on LAN enabled	Disabled Enabled	Disables/Enables wake on LAN enable
SLP_LAN# low on DC power	Disabled Enabled	Disables/Enables SLP_LAN# low on DC power
Port 61h bit-4 emulation	Disabled Enabled	Disables/Enables port 61h bit-4 emulation
State after G3	S0 state S5 state	Working Soft off Selects the state after G3 Defines how to proceed after "mechanical off" (G3). S0 or S5 after G3
Numlock	Off On	Disables/Enables the numeric keypad during booting Enables BIOS input via the numeric keypad of a keyboard.
Screenshot function	Disabled Enabled	Disables/Enables the screenshot function This function is only available in BIOS and cannot be used in operating systems. Screenshots are stored in BMP format and named using the capture time (yyyymmddhhmmss).
Shell startup script delay	INT Default: 3	Defines the shell startup script delay time [s] Range: 0 to 10

Table 157: Advanced - PCH-IO configuration

7.1.7.2.9.1 PCI Express configuration

BIOS parameter	Setting options	Description
PCI Express clock gating	Disabled	Disables/Enables PCI Express clock gating for root ports
	Enabled	
Legacy IO low latency	Disabled	Disables/Enables legacy IO low latency
	Enabled	
DMI link ASPM control	Disabled	Disables/Enables DMI link ASPM control
	Enabled	
PCIe port assigned to LAN	-	Displays the PCIe port assigned to the LAN
Port8xh decode	Disabled	Disables/Enables Port8xh decoding
	Enabled	
Peer memory write enable	Disabled	Disables/Enables peer memory write enable
	Enabled	
Compliance test mode	Disabled	Disables/Enables compliance test mode
	Enabled	
PCIe USB glitch W/A ¹⁾	Disabled	Disables/Enables PCIe USB glitch W/A For faulty USB devices after the PCIe/PEG ²⁾ port
	Enabled	
PCIe function swap	Disabled	Disables/Enables PCIe function swap
	Enabled	
PCI Express Gen3 eq lanes	Enter	Opens submenu "PCI Express Gen3 eq lanes" on page 255
PCI Express root port n³⁾	Enter	Opens submenu "PCI Express root port n" on page 255

Table 158: Advanced - PCH-IO configuration - PCI Express configuration

- 1) PCIe-USB glitch workaround
- 2) PCIe for graphics
- 3) Depending on the hardware, all available PCIe root ports are listed.

PCI Express Gen3 eq lanes

BIOS parameter	Setting options	Description
PCIEn ¹⁾ Cm	INT Default: 6	Defines PCIe <i>n</i> Cm Range: 0 to 63
PCIEn ¹⁾ Cp	INT Default: 2	Defines PCIe <i>n</i> Cp Range: 0 to 63
Override SW EQ setting	Disabled	Disables/Enables SW EQ setting override
	Enabled	
Coeffq ²⁾ Cp	INT Default: (Diverse)	Defines <i>q</i> Cp Range: 0 to 63
Coeffq ²⁾ Cm	INT Default: 2	Defines <i>q</i> Cm Range: 0 to 63

Table 159: Advanced - PCH-IO configuration - PCI Express configuration - PCI Express Gen3 Eq Lanes

- 1) *n* is the number of available PCIe root ports.
- 2) *q* ranges from 0 to 5.

PCI Express root port *n*

BIOS parameter	Setting options	Description
PCI Express root port <i>n</i> ¹⁾	Disabled	Disables/Enables PCI Express root port <i>n</i>
	Enabled	
Topology	x4	Selects the PCIe root port topology
	Unknown	
	x1	
	SATA Express	
	M2	
ASPM	Auto	Selects PCIe Active State Power Management manually/automatically or disables it
	Disabled	
	L0sL1	
	L0s	
	L1	
L1 substates	Disabled	Selects or disables L1 substates
	L1.1	
	L1.2	
	L1.1 & L1.2	
Gen3 Eq Phase3 Method	Hardware	PCIe Gen3 equalization Phase3 method
	Software search	
	Static coeff.	
UPTP ²⁾	INT Default: 5	Selects the UPT preset Range: 0 to 10
DPTP ³⁾	INT Default: 7	Selects the DPT preset Range: 0 to 10
ACS ⁴⁾	Disabled	Disables/Enables access control services extended capabilities
	Enabled	

Table 160: Advanced - PCH-IO configuration - PCI Express root port *n*

BIOS parameter		Setting options	Description
	URR	Disabled Enabled	Disables/Enables unsupported request reporting Notification of unsupported requests.
	FER	Disabled Enabled	Disables/Enables fatal error reporting Notification of fatal errors ⁵⁾
	NFER	Disabled Enabled	Disables/Enables non-fatal error reporting Notification of non-fatal errors ⁵⁾
	CER	Disabled Enabled	Disable/Enable correctable error reporting Notification of correctable errors ⁵⁾
	CTO	Disabled Enabled	Disables/Enables PCIe completion timer timeout
	SEFE	Disabled Enabled	Disables/Enables system error on fatal error ⁶⁾
	SENEFE	Disabled Enabled	Disables/Enables system error on non-fatal error ⁶⁾
	SECE	Disabled Enabled	Disables/Enables system error on correctable error ⁶⁾
	PME SCI	Disabled Enabled	Disables/Enables system control interrupt on a power management event
	Hot plug	Disabled Enabled	Disables/Enables hot plugging
	Advanced error reporting	Disabled Enabled	Disables/Enables advanced error reporting
PCIe speed		Auto Gen1 Gen2 Gen3	Selects the PCIe transfer rate [gigatransfers per second (GT/s)] automatically or manually Gen1: Max. 2.5 GT/s Gen2: Max. 5.0 GT/s Gen3: Max. 8.0 GT/s
	Transmitter half swing	Disabled Enabled	Disables/Enables transmitter half-swing Signals are transferred with a half-swing.
Detect timeout		INT Default: 0	Defines the detect timeout [ms] If no link is received from an enabled port after the detect timeout has expired, it is assumed that no device is present there. The system can disable the port if necessary. Range: 0 to 65535
Extra bus reserved		INT Default: 0	Defines the extra bus reserved for bridges after this root bridge Range: 0 to 7
Reserved memory		INT Default: 10	Defines reserved memory [MB] for this bridge Range: 0 to 20
Reserved I/O		INT Default: 4	Defines the reserved I/O range for this bridge Range: 4 to 20 kB Resolution: 4 kB
PCH PCIe LTR configuration			
PCH PCIE1 LTR		Disabled Enabled	Disables/Enables PCIe latency reporting
	Snoop latency override	Auto Disabled Manual	Disables the snoop latency override or selects manual or automatic mode
	Snoop latency value	INT Default: 60	Defines the snoop latency value Range: 0 to 1023
	Snoop latency multiplier	1 ns 32 ns 1024 ns 32768 ns 1048576 ns 33554432 ns	Defines the snoop latency multiplier value [ns]
	Non-snoop latency override	Auto Disabled Manual	Disables the non-snoop latency override or selects manual or automatic mode
	Non-snoop latency value	INT Default: 60	Defines the non-snoop latency value Range: 0 to 1023
	Non-snoop latency multiplier	1 ns 32 ns 1024 ns 32768 ns 1048576 ns 33554432 ns	Defines the non-snoop latency multiplier value [ns]
	Force LTR override	Disabled Enabled	Disables/Enables force LTR override
PCIE1 LTR lock		Disabled Enabled	Disables/Enables the PCIE1 LTR lock function
PCH PCIe CLKREQ#			

Table 160: Advanced - PCH-IO configuration - PCI Express root port *n*

BIOS parameter		Setting options	Description
PCH PCIe CLKREQ# mapping override		Custom number	Disables the clock request number for standard platform mapping or uses the default values or manual value
		Default	
		No CLKREQ	
	CLKREQ number	INT Default: 0	Defines the CLKREQ number Range: 0 to 15

Table 160: Advanced - PCH-IO configuration - PCI Express root port *n*

- 1) PCI Express root port *n* must be enabled in order to make further configurations.
- 2) Upstream port transmitter preset
The default value is system-optimized by B&R.
- 3) Downstream port transmitter preset
The default value is system-optimized by B&R.
- 4) Changes to the ACS have no effect on the display of the following indented parameters.
- 5) With a multifunction device, all functions within the device are monitored.
For the root port, the error occurs within the root complex.
- 6) Generates a system error if an error of this category is reported by a root port or device on a root port.

7.1.7.2.9.2 SATA and RST configuration

BIOS parameter		Setting options	Description
SATA controller(s) ¹⁾		Disabled Enabled	Disables/Enables the SATA controller
SATA mode selection		AHCI Intel RST premium with Intel Optane	Select SATA mode AHCI (not RAID) or Optane (or RAID) See "RAID configuration" on page 271 .
SATA test mode		Disabled Enabled	Disables/Enables the test function This is only used for control measurements.
RAID device ID		Alternate Client	Selects the RAID device ID mode
Software feature mask configuration²⁾		Enter	Opens submenu "Software feature mask configuration" on page 257
Aggressive LPM support		Disabled Enabled	Disables/Enables Aggressive Link Power Management The host controller can change to a low-power state in the idle phase of the SATA device.
Serial ATA port <i>n</i>		-	Displays the name and capacity of the SATA device
	Software preserve	-	Displays support for the software preserve
	Port <i>n</i>	Disabled Enabled	Disables/Enables SATA port <i>n</i>
	Hot plug	Disabled Enabled	Disables/Enables hot plugging
	Configured as eSATA	-	Displays hot plugging support of the device on the SATA port
	Spin up device	Disabled Enabled	Disables/Enables spin up for the connected device on the SATA port
	SATA device type	Hard disk drive Solid-state drive	Defines the SATA device type as HDD or SSD
	Topology	Unknown ISATA Direct connect Default for port 0 and 1 Flex M2 Default for port 2	Defines the SATA topology
	SATA port <i>n</i> DevSlp	Disabled Enabled	Disables/Enables for the device on port <i>n</i>
	DITO configuration	Disabled Enabled	Disables/Enables device sleep idle timeout
	DITO value	INT Default: 625	Defines the DITO value [ms] Range: 0 to 1023
	DM value	INT Default: 15	Defines the DITO multiplier Range: 0 to 15

Table 161: Advanced - PCH-IO configuration - SATA and RST configuration

- 1) SATA controller(s) must be enabled to be able to make additional configurations.
- 2) This submenu can only be configured if "SATA test mode" is enabled.
- 3) *n* corresponds to the available SATA ports that are indexed from 0 to *n*-1.

Software feature mask configuration

BIOS parameter		Setting options	Description
HDD unlock		Disabled Enabled	Disables/Enables HDD unlock The HDD can be locked in the operating system by a password.
LED locate		Disabled Enabled	Disables/Enables LED locate Indicates that LED/SGPIO hardware is connected and pingable.
Use RST legacy OROM		Disabled Enabled	Disables/Enables rapid storage technology legacy option ROM for active CSM ¹⁾

Table 162: Advanced - PCH-IO configuration - SATA and RST configuration - Software feature mask configuration

BIOS parameter	Setting options	Description
RAID0	Disabled	Disables/Enables RAID0
	Enabled	
RAID1	Disabled	Disables/Enables RAID1
	Enabled	
RAID10	Disabled	Disables/Enables RAID10
	Enabled	
RAID5	Disabled	Disables/Enables RAID5
	Enabled	
Intel Rapid Recovery technology	Disabled	Disables/Enables Intel Rapid Recovery Technology (IRRT)
	Enabled	
OROM UI and banner	Disabled	Disables/Enables OROM UI If OROM UI is disabled, no information is displayed as long as all storage media are in normal operation.
	Enabled	
IRRT only on eSATA	Disabled	Disables/Enables IRRT only on eSATA Enable to make internal and eSATA drives available for IRRT storage media.
	Enabled	
Smart Response Technology	Disabled	Disables/Enables Smart Response Technology
	Enabled	
OROM UI normal delay	2 to 8 [s] Default: 2 s	Defines the delay time of the OROM UI splash screen [s]
RST force form	Disabled	Disables/Enables force form for Intel RST
	Enabled	
System acceleration with Intel Optane memory	Disabled	Disables/Enables Intel Optane support
	Enabled	

Table 162: Advanced - PCH-IO configuration - SATA and RST configuration - Software feature mask configuration

1) Compatibility support module

7.1.7.2.9.3 Security configuration

BIOS parameter	Setting options	Description
RTC lock	Disabled	Disables/Enables lock bytes 0x38 to 0x3F of RTC RAM
	Enabled	
BIOS lock	Disabled	Disables/Enables the PCH BIOS lock function The BIOS lock function must be enabled for SMM ¹⁾ .
	Enabled	

Table 163: Advanced - PCH-IO configuration - Security configuration

1) System Management Mode

7.1.7.2.9.4 HD audio configuration

BIOS parameter	Setting options	Description
HD audio	Auto	Disables/Enables HD audio device detection or sets it to automatic Disables/Enables has a permanent effect. "Auto" is enabled if a device is present and disabled if a device is not present.
	Disabled	
	Enabled	
Audio DSP	Disabled	Disables/Enables audio digital signal processing
	Enabled	
PME enable	Disabled	Disables/Enables PME wake of HD audio controller during POST
	Enabled	

Table 164: Advanced - PCH-IO configuration - HD audio configuration

7.1.7.2.10 PCH-FW configuration



Figure 99: Advanced - PCH-FW configuration

BIOS parameter	Input options	Description
ME ¹⁾ firmware version	-	Displays the ME firmware version
ME firmware mode	-	Displays the ME firmware mode
ME firmware SKU	-	Displays the ME firmware SKU
ME file system integrity value	-	Displays the ME file system integrity value
ME firmware status 1	-	Displays ME firmware status 1
ME firmware status 2	-	Displays ME firmware status 2
NFC support	-	Displays NFC support
ME state	Disabled	Disables/Enables ME state
	Enabled	
Firmware update configuration	Enter	Opens submenu "Firmware update configuration" on page 259
PTT²⁾ configuration	Enter	Opens submenu "PTT configuration" on page 260

Table 165: Advanced - PCH-FW configuration

- 1) Intel Management Engine
2) Platform Trust Technology

7.1.7.2.10.1 Firmware update configuration

BIOS parameter	Setting options	Description
Me FW image re-flash	Disabled	Disables/Enables ME firmware image re-flash
	Enabled	
Local FW update	Disabled	Disables/Enables local firmware update
	Enabled	

Table 166: Advanced - PCH-FW configuration - Firmware update configuration

7.1.7.2.10.2 PTT configuration

BIOS parameter	Setting options	Description
PTT capability / state	-	Displays the PTT capability and status
PTP aware OS	<i>PTP aware</i>	Selects whether the operating system used is PTP-capable or not
	Not PTP aware	

Table 167: Advanced - PCH-FW configuration - PTT configuration

7.1.7.3 Security



Figure 100: Security

BIOS parameter	Setting options	Description
Current TPM ¹⁾ device	-	Displays the current TPM device
TPM state	-	Displays the TPM status
TPM active PCR hash algorithm	-	Displays the current PCR hash algorithm
TPM hardware support hash algorithm	-	Displays the hash algorithms supported by the hardware
TrEE protocol version	1.0 1.1	Selects the TrEE protocol version
TPM availability	Hidden Available	TPM invisible/visible for the operating system
TPM operation	No operation (Various)	Configuration of supported TPM functions The setting options of this parameter depend on whether FTPM or DTPM is used.
Clear TPM	Disabled Enabled	Starts clearing TPM by enabling it
Supervisor password	-	Displays whether a supervisor password has been created
Set supervisor password	String	Sets or changes the supervisor password
Set all Hdd password	String	Sets all HDD passwords
Set all Hdd master password	String	Sets all HDD master passwords
Storage password setup page	Enter	Opens submenu "Storage password setup page" on page 261

Table 168: Security

1) Trusted Platform Module

7.1.7.3.1 Storage password setup page

BIOS parameter	Setting options	Description
CFast name <i>n</i> ¹⁾	Enter	Opens submenu "CFast name <i>n</i> " on page 262

Table 169: Security - Storage password setup page

1) Displays the manufacturer ID of the CFast card in the corresponding CFast slot. 2 CFast card slots are available. They are indexed from 1 to 2.

7.1.7.3.1.1 CFast name *n*

A total of 2 CFast card slots are available. They are indexed from 1 to 2.

BIOS parameter	Setting options	Description
Device name	-	Displays the manufacturer ID of the CFast card
Security mode	-	Displays the security mode of the CFast card
Set storage password	String	Sets the HDD password
Set master Hdd password	String	Sets the master HDD password

Table 170: Security - Storage password setup page - CFast name *n*

7.1.7.4 Power

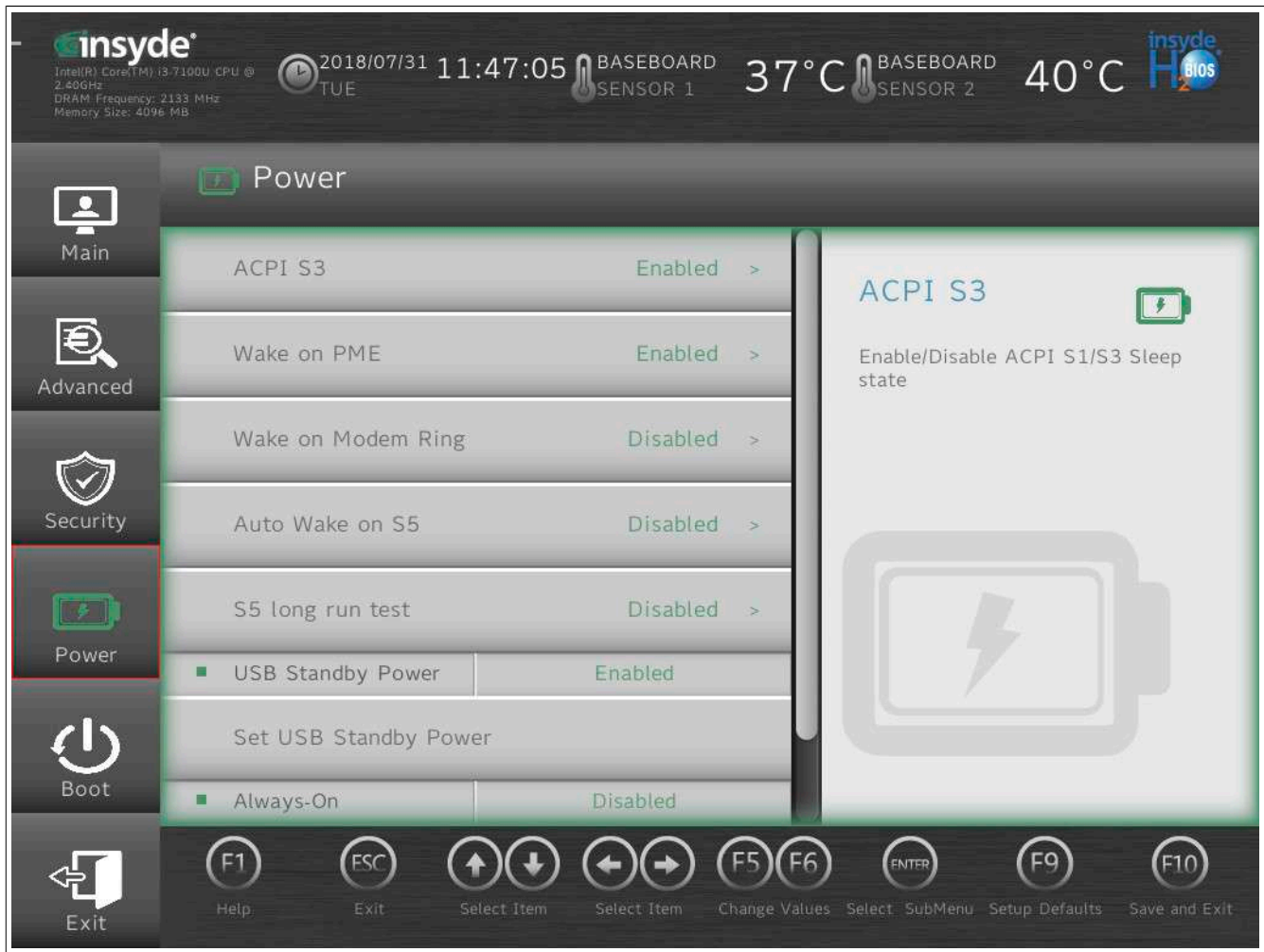


Figure 101: Power

BIOS parameter		Setting options	Description
ACPI S3		Disabled	Disables/Enables ACPI S1/S3 sleep state
		Enabled	
Wake on PME		Disabled	Disables/Enables wake on PME
		Enabled	
Wake on modem ring		Disabled	Disables/Enables wake on modem ring
		Enabled	
Auto wake on S5		Disabled	Disables auto wake on S5 or sets it to daily or on a specific day of the month
		By every day	
		By day of month	
	Wake on S5 hour	INT Default: 0	Defines the hour for auto wake on S5 daily Range: 0 to 23
	Wake on S5 minute	INT Default: 0	Defines the minute for auto wake on S5 daily Range: 0 to 59
	Wake on S5 second	INT Default: 0	Defines the second for auto wake on S5 daily Range: 0 to 59
	Day of month	INT Default: 1	Defines the monthly day for auto wake on S5 Range: 1 to 31
S5 long run test		Disabled	Disables/Enables S5 long run test
		Enabled	Enabling overrides some settings in the operating system.
USB standby power		-	Displays the USB standby power state
Set USB standby power		No operation	Disables/Enables or does not set USB standby power
		Disable	
		Enabled	
Always-on		-	Displays the always-on state
Set always-on		No operation	Disables/Enables or does not set always-on
		Disabled	
		Enabled	

Table 171: Power

7.1.7.5 Boot



Figure 102: Boot

BIOS parameter	Setting options	Description
Boot type	Dual boot type	Selects the boot type
	Legacy boot type	In dual boot mode, both UEFI and Legacy boot are possible and the CSM is enabled.
	UEFI boot type	In Legacy boot mode, the CSM is enabled. In UEFI boot mode, the CSM is disabled.
Quick boot	Disabled Enabled	Disables/Enables quick boot If quick boot is enabled, certain tests are not performed so the boot procedure is faster.
Quiet boot	Disabled Enabled	Disables/Enables booting in text mode
Network stack	Disabled Enabled	Disables/Enables the network stack Enabling makes ETH booting possible.
PXE boot capability	Disabled UEFI:IPV4 UEFI:IPV6 UEFI:IPV4/IVP6 Legacy	Disables PXE boot or selects the mode
PXE boot to LAN	Disabled Enabled	Disables/Enables PXE boot to LAN
Power up in standby support	Disabled Enabled	Disables/Enables power up in standby support
Add boot options	Auto First Manual Last	Selects or changes the mode of arrangement in the boot sequence for newly added devices. Manual mode is not fully UEFI compatible.
ACPI selection ¹⁾	Acpi1.0B Acpi3.0 Acpi4.0 Acpi5.0 Acpi6.0 Acpi6.1	Selects the ACPI mode
USB boot	Disabled	Disables/Enables USB boot

Table 172: Boot

BIOS parameter	Setting options	Description
EFI device first	Enabled	Disables/Enables EFI device first Enable to boot EFI devices before legacy devices. Disable to boot legacy devices before EFI devices.
	Disabled	
Timeout	Enabled	Delay time until the boot list is processed [s]. Range: 0 to 10
	Disabled	
Automatic failover	INT Default: 0	Disables/Enables automatic failover
	Default: 0	
EFI	Enter	Opens submenu "EFI" on page 265
Legacy	Enter	Opens submenu "Legacy" on page 266

Table 172: Boot

1) When changing the ACPI version, make sure that the operating system used is compatible.

7.1.7.5.1 EFI

BIOS parameter	Setting options	Description
EFI	Enter	Opens submenu "EFI" on page 265
1st device	CFast 1	Selects this device as first in the boot sequence
	CFast 2	
	ETH1 IPv4	
	ETH1 IPv6	
	USB storage	
	Internal EFI shell	
	Other	
	M.2	
	USB CD-ROM	
	USB other	
	RAID volume	
	Disabled	
2nd device ¹⁾	CFast 2	Selects this device as second in the boot sequence
3rd device	M.2	Selects this device as third in the boot sequence
4th Device	USB storage	Selects this device as fourth in the boot sequence
5th device	USB CD-ROM	Selects this device as fifth in the boot sequence
6th device	USB other	Selects this device as sixth in the boot sequence
7th device	Internal EFI shell	Selects this device as seventh in the boot sequence
8th device	ETH1 IPv4	Selects this device as eighth in the boot sequence

Table 173: Boot - EFI

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

7.1.7.5.1.1 EFI

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

Table 174: Boot - EFI - EFI

7.1.7.5.2 Legacy

BIOS parameter	Setting options	Description
boot menu	Normal	Selects the boot sequence type
	Advanced	
Boot type order	Enter	Opens submenu "Boot type order" on page 266
Other	Enter	Opens submenu ¹⁾
Floppy disk	Enter	
Hard disk drive	Enter	Opens submenu "Hard disk drive" on page 266
CD/DVD-ROM drive	Enter	Opens submenu ¹⁾
USB	Enter	
Legacy	Enter, then: ▶ Keyboard: F5/F6 ▶ Touch screen: Move items at the gray arrows	Defines the boot sequence

Table 175: Boot - Legacy

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

7.1.7.5.2.1 Boot type order

BIOS parameter	Setting options	Description
Boot type order	Enter	Opens submenu "Boot type order" on page 266

Table 176: Boot - Legacy - Boot type order

Boot type order

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

Table 177: Boot - Legacy - Boot type order - Boot type order

7.1.7.5.2.2 Hard disk drive

BIOS parameter	Setting options	Description
Hard disk drive	Enter	Opens submenu "Hard disk drive" on page 266

Table 178: Boot - Legacy - Hard disk drive

Hard disk drive

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

Table 179: Boot - Legacy - Hard disk drive - Hard disk drive

7.1.7.6 Exit



Figure 103: Exit

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

Table 180: Exit

7.2 Upgrade information

Warning!

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

7.2.1 UEFI BIOS upgrade

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

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

7.2.1.1 UEFI BIOS - What do I need to know?

Information:

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

Before starting an upgrade, it makes sense to determine the different software versions.

7.2.1.1.1 Which UEFI BIOS version and firmware are already installed?

This information is listed on the following UEFI BIOS Setup page:

- After switching on the PC, press "Esc", "Del" or "F2" to enter UEFI BIOS Setup.
- Under UEFI BIOS main menu "Setup utility" and "Advanced", select submenu "OEM features".

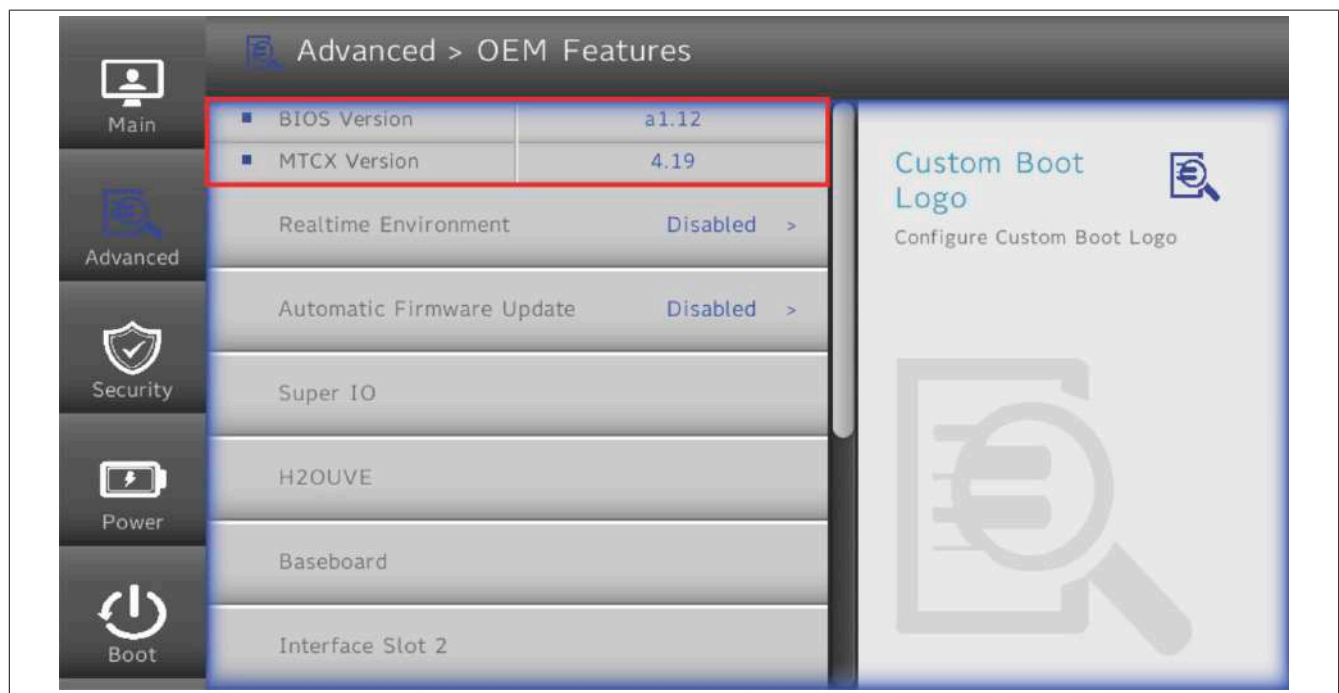


Figure 104: Software version

7.2.1.2 Procedure in the EFI shell

Caution!

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

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the files to a USB flash drive formatted in FAT16 or FAT32. Alternatively, a CFast card can also be used.
3. Reboot the PC and select "Internal EFI shell" as the boot device ("Esc", "Del" or "F2" key to open the boot menu).

- After booting the EFI shell, "startup.nsh" is executed and the UEFI BIOS upgrade is started.

Information:

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

- After a successful upgrade, the system must be rebooted.
- Reboot and press "Esc", "Del" or "F2" key to enter the UEFI BIOS Setup menu and load the setup defaults; then select "Save changes and exit".

7.2.2 Firmware upgrade - Panel PC 3100

With "Firmware upgrade (MTCX, SDLT, SDL4T)", it is possible to update the firmware of several controllers (MTCX, SDLT, SDL4T) depending on the variant of the APC3100/PPC3100 system.

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

Caution!

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

7.2.2.1 Procedure in Windows (B&R Control Center)

- Download the ZIP file from the B&R website (www.br-automation.com).
- Open **Control Center** in the Control Panel.
- Open tab **Versions**.
- Click on the desired **update** under **PC firmware** or **Panel firmware**. The dialog box opens.
- Under **Filename** enter the name of the firmware file or select a file.
- Click **Open**. Dialog box "Open" opens.

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

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

Information:

The power supply to the PC or Automation Panel must be switched off and on again for the new firmware to take effect and the updated version to be displayed. When exiting the Control Center, a corresponding prompt for this is displayed.

Information:

For more detailed information about saving and updating the firmware, see the ADI driver user's manual.

7.2.2.2 Procedure in the EFI shell

- Download the ZIP file from the B&R website (www.br-automation.com).
- Unzip the ZIP file and copy the files to a USB flash drive formatted in FAT16 or FAT32. Alternatively, a CFast card can also be used.
- Reboot the PC and select "Internal shell" as the boot device ("Esc", "Del" or "F2" key to open the boot menu).
- After booting the EFI shell, "startup.nsh" is executed and the MTCX, SDLT and SDL4T upgrades are started in sequence.
- After a successful upgrade, the system must be rebooted.
- Afterwards, the system-optimized or customized default values (if available) can be loaded again in boot menu "Setup utility" under "Exit".

Information:

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

7.2.3 Firmware upgrade - Automation Panels

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

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

Caution!

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

7.2.3.1 Procedure in Windows (B&R Control Center)

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

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

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

Information:

The power supply to the PC or Automation Panel must be switched off and on again for the new firmware to take effect and the updated version to be displayed. When exiting the Control Center, a corresponding prompt for this is displayed.

Information:

For more detailed information about saving and updating the firmware, see the ADI driver user's manual.

7.2.3.2 Procedure in the EFI shell

1. Download the ZIP file from the B&R website (www.br-automation.com).
2. Unzip the ZIP file and copy the files to a USB flash drive formatted in FAT16 or FAT32. Alternatively, a CFast card can also be used.
3. Reboot the PC and select "Internal shell" as the boot device ("Esc", "Del" or "F2" key to open the boot menu).
4. After booting the EFI shell, "startup.nsh" is executed and the SDLR and SDL4R upgrades are started in sequence.
5. After a successful upgrade, the system must be switched off and on again.

Information:

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

7.3 RAID configuration

Note:

When creating a RAID volume, existing data on the storage media is deleted.

Before creating a RAID volume, make sure that there is no important data on the storage media.

In order to create a SATA RAID volume and access the "Configuration utility", setting *SATA mode selection* in BIOS menu "SATA and RST configuration" (see "PCH-IO configuration" on page 254) must be set to *Intel RST premium with Intel Optane*.

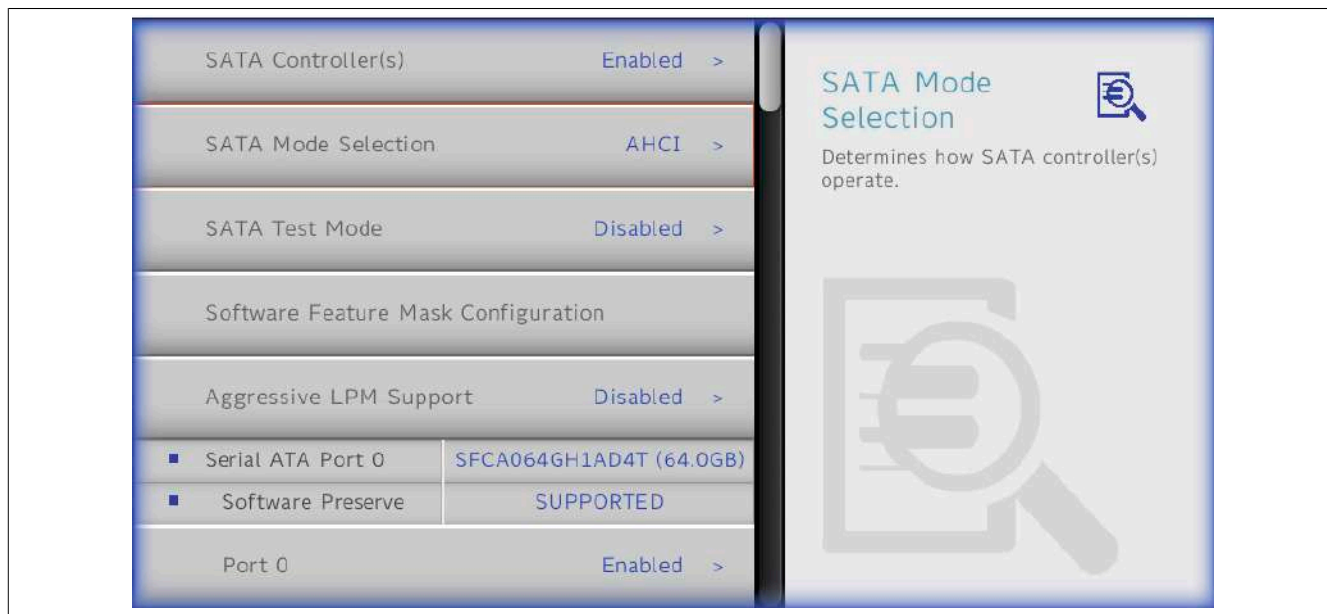


Figure 105: Advanced - PCH-IO configuration - SATA and RST configuration - SATA mode selection



Figure 106: Configured SATA mode selection for RAID volume

Information:

This setting is required for legacy and UEFI boot mode.

7.3.1 Legacy RAID

7.3.1.1 Configuring a SATA RAID volume with the internal RAID controller

The following software description applies to the internal RAID controller on *KabyLake-U* chipset.

Information:

B&R recommends using only the same drive type in the SATA RAID volume.

Caution!

The maximum number of possible write cycles must be taken into account when setting up a RAID volume with CFAST cards with MLC technology.

The "Configuration utility" in BIOS must be started after the reboot for the configuration. After POST, press <Ctrl+I> to open the RAID BIOS.

Information:

Since the associated driver is not yet loaded at this point, touch screen input is not possible in the "Configuration utility".

Input in the RAID menu are always processed according to the QWERTY schema. This is also the case if a QWERTZ USB input device is connected.

```
Intel(R) Rapid Storage Technology - Option ROM - 15.7.0.3054
Copyright(C) Intel Corporation. All Rights Reserved.

RAID Volumes:
ID   Name           Level           Strip           Size           Status           Bootable
0    Mirror         RAID1 (Mirror)  N/A            59.6GB         Normal          Yes

Physical Devices:
ID   Device Model      Serial #         Size           Type/Status (Vol ID)
0    SFCA064GH1AD4TO-  60143158A6000044 59.6GB         Member Disk(0)
1    SFCA064GH1AD4TO-  60143158A6000058 59.6GB         Member Disk(0)

Press <CTRL-I> to enter Configuration Utility..
```

Figure 107: RAID boot

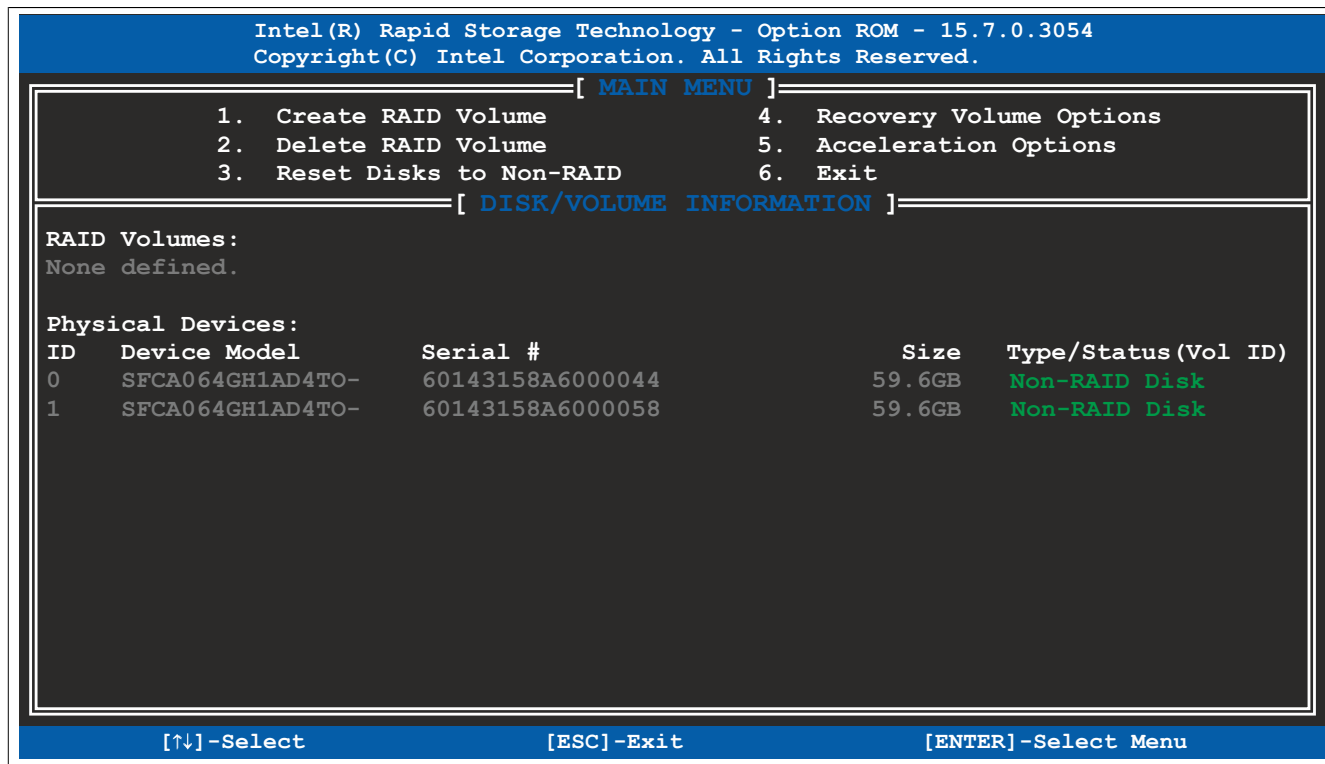


Figure 108: RAID - Configuration utility - Overview

The following keys can be used after entering BIOS Setup:

Key	Function
Cursor (↑, ↓)	Navigation in the menu and between objects.
Enter	Selects an item or opens a submenu.
ESC	Returns to the previous menu.
Ctrl+E	Saves any changed settings and exits setup.
Z/Y	Confirm ("Yes"). (QWERTZ/QWERTY)
N	Cancel ("No").
Pause	Bootling is paused, resume by pressing any key.

Table 181: BIOS-relevant keys in the RAID Configuration Utility

7.3.1.2 Create RAID volume

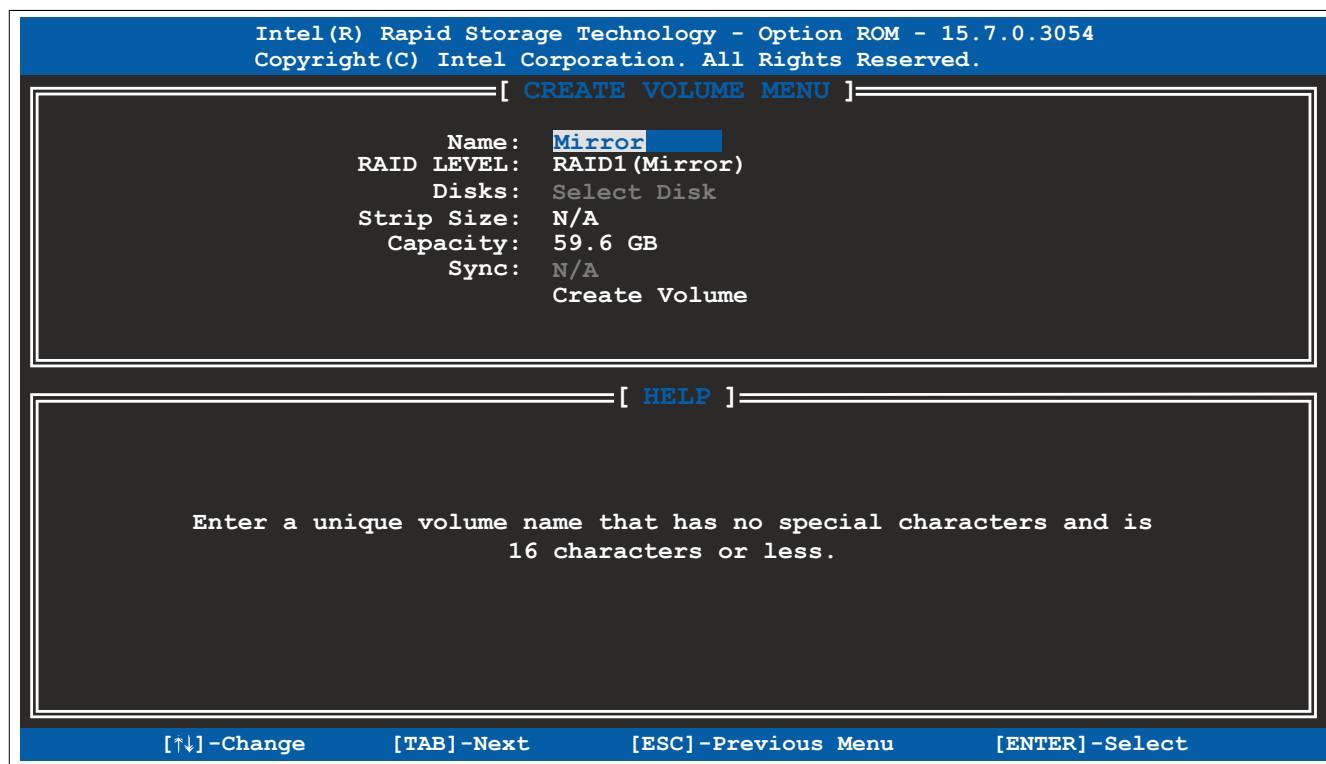


Figure 109: Creating a RAID volume

BIOS parameter	Setting options	Description
Name	String Default: Volume1	Name for the RAID volume No special characters are permitted. Range: Max. 16 characters
RAID level ¹⁾	RAID0 (Stripes) RAID1 (Mirror) Recovery	Selects the RAID level
Disks ²⁾	Master Recovery	Defines the storage media mode
Strip size ³⁾	4 kB 8 kB 16 kB 32 kB 64 kB 128 kB	Selects the data block size [kB]
Capacity	INT	Defines the RAID memory size Range: Hardware-dependent If storage media of different sizes are used, this is limited to the smaller medium.
Sync ⁴⁾	Continuous On request	Selects the synchronization mode
Create volume	Enter	Creates a RAID volume according to the configuration

Table 182: Configuration Utility - Create RAID volume

- 1) Grayed-out parameters cannot be modified in the currently selected RAID level.
- 2) This setting is only possible if *RAID level* is set to *Recovery*.
- 3) This setting is only possible if *RAID level* is set to *RAID0(Stripe)*.
- 4) This setting is only possible if *RAID level* is set to *Recovery*.

7.3.1.3 Delete RAID volume

The "Delete RAID volume" menu option can be used to format the RAID drive, making it non-RAID. The drive to be deleted is selected and then deleted by pressing <DEL>.

Information:

This option deletes all data on the drive, including the operating system.

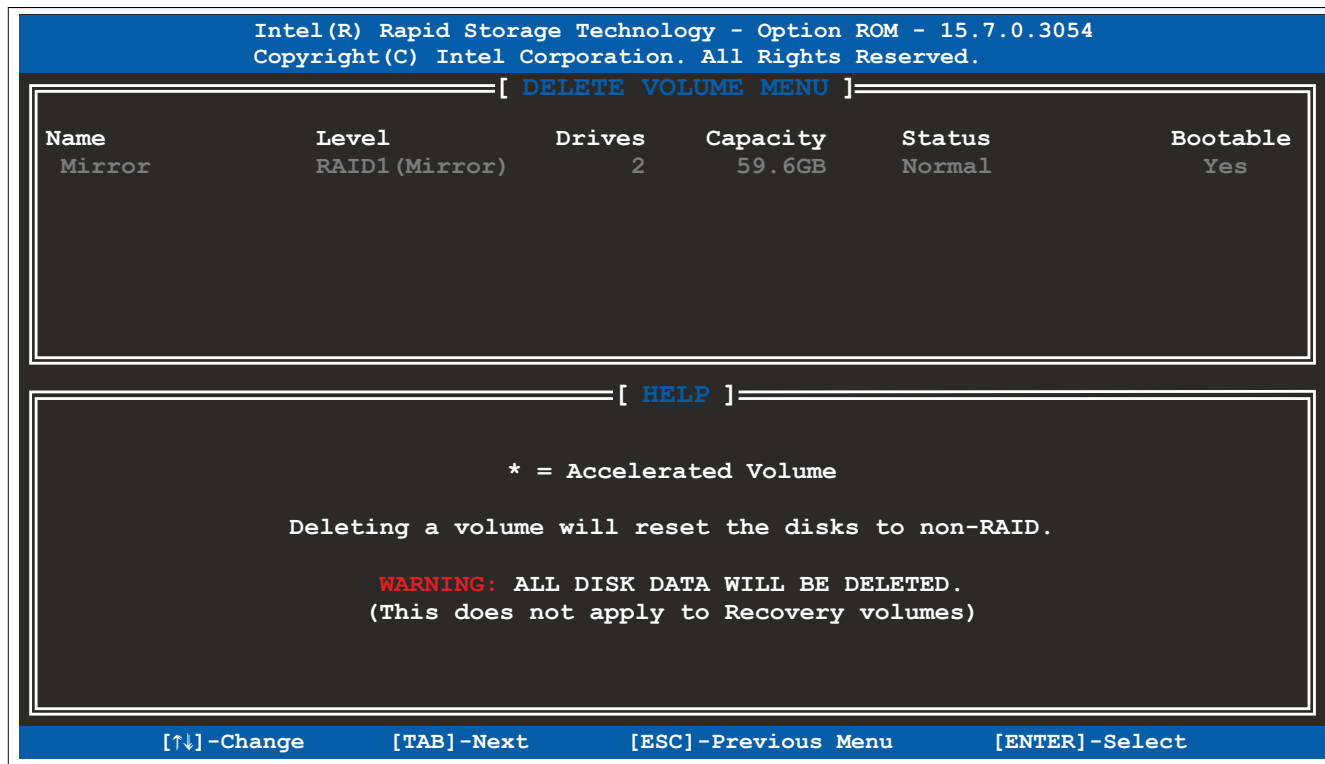


Figure 110: Deleting the RAID volume

7.3.1.4 Recovery volume options

The "Recovery volume options" menu option can be used to enable/disable recovery disk and master disk.

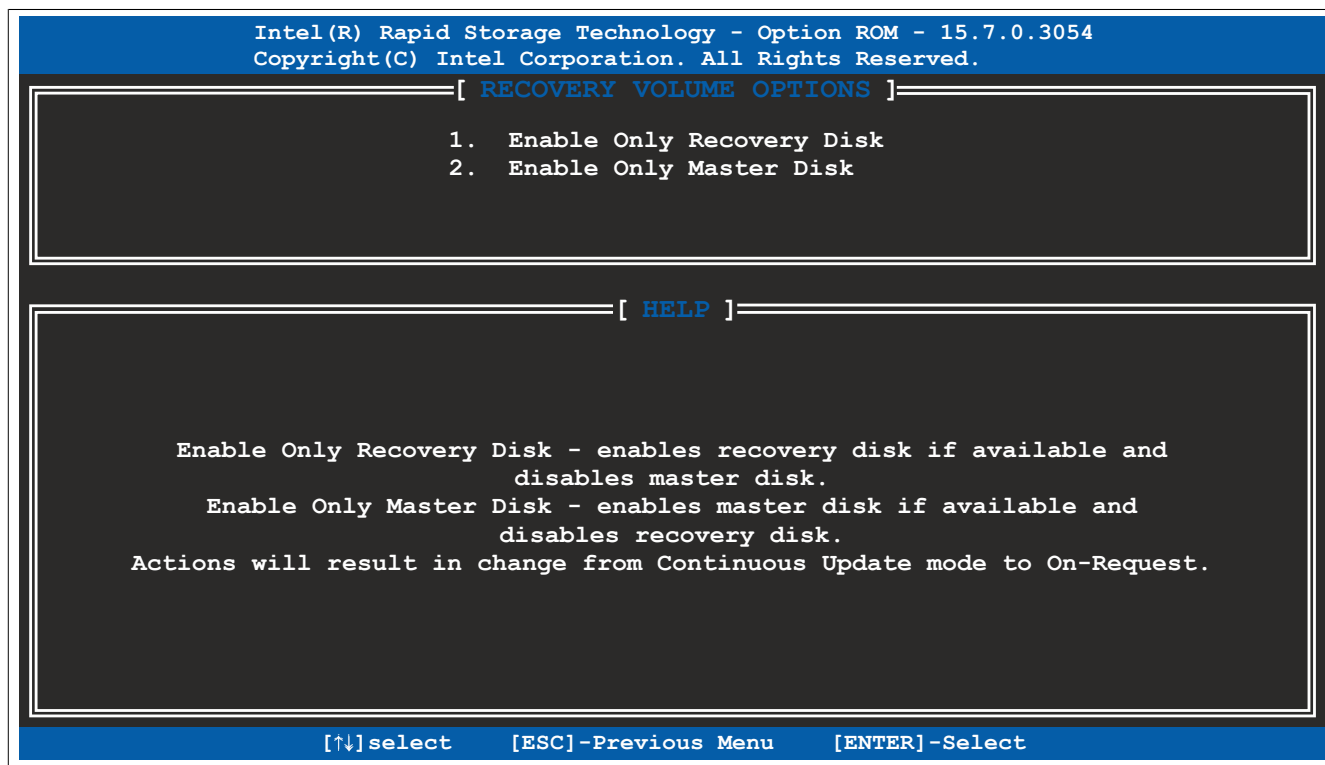


Figure 111: RAID recovery

Note:

Changes in this menu affect the synchronization mode.

7.3.1.5 Reset disks to non-RAID

An existing RAID volume can be deleted using option "Reset disks to non-RAID". The RAID to be deleted is selected and then deleted by pressing <SPACE> (<ENTER> to confirm).

Information:

Deleting a RAID volume also deletes all of the data on the drive.

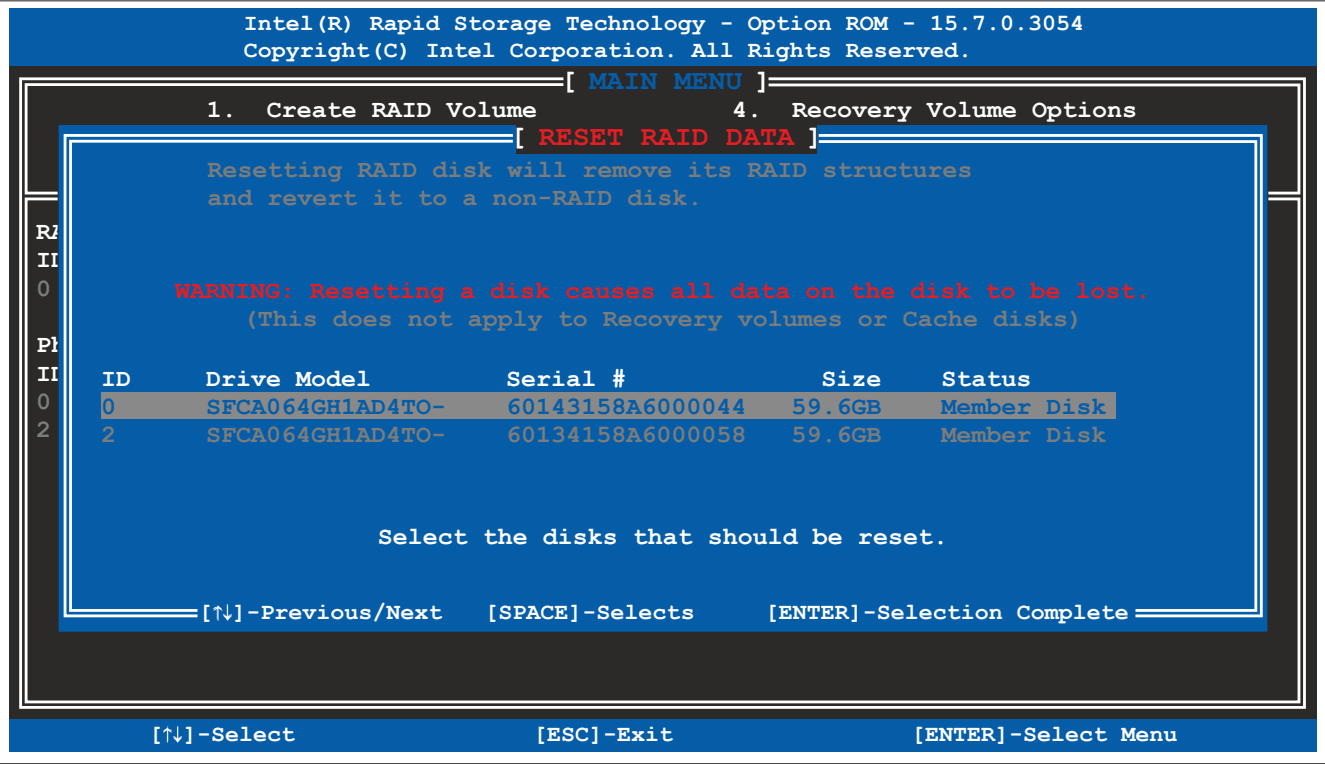


Figure 112: Resetting the RAID volume

7.3.2 UEFI RAID

7.3.2.1 Configuring a SATA RAID volume with the internal RAID controller

The following software description applies to the internal RAID controller on *KabyLake-U* chipset.

Information:

B&R recommends using only the same drive type in the SATA RAID volume.

Caution!

The maximum number of possible write cycles must be taken into account when setting up a RAID volume with CFast cards with MLC technology.

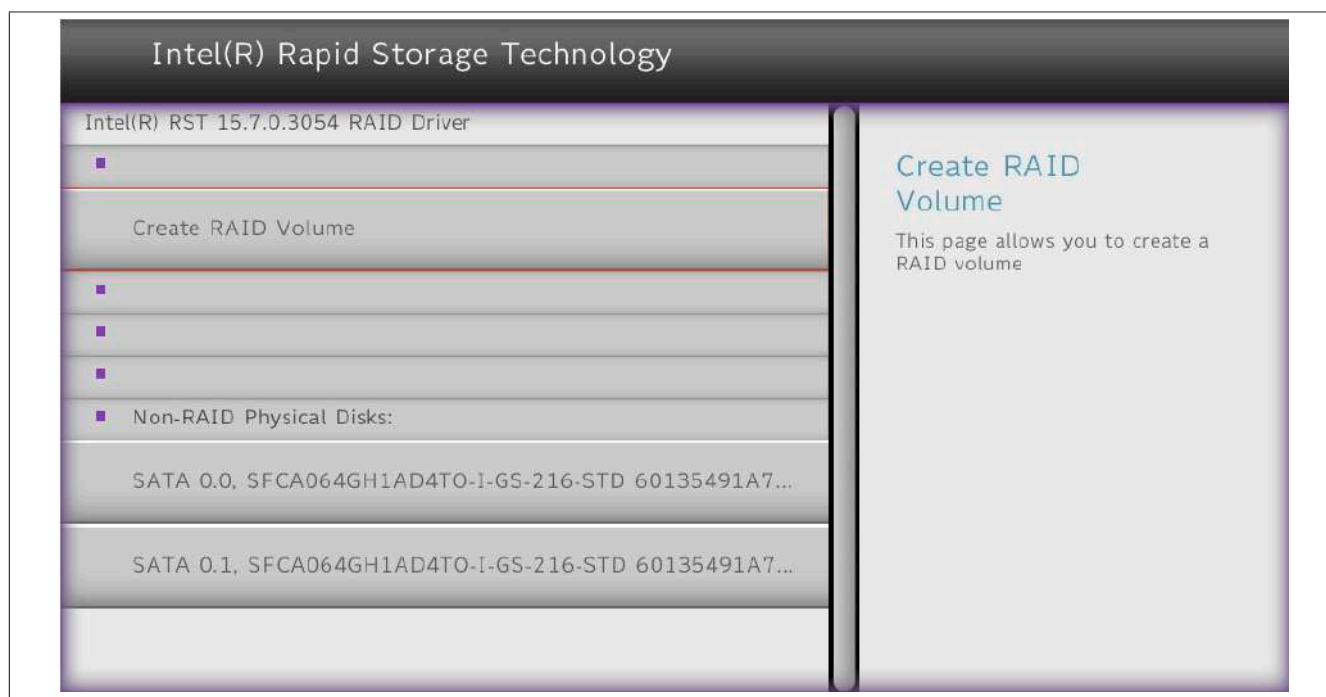


Figure 113: Device manager

Use submenu "Intel(R) Rapid Storage Technology" to navigate to the configuration of the RAID volume.

The following keys can be used in the device manager:

Key	Function
Cursor (↑, ↓)	Navigation in the menu and between objects.
Enter	Selects an item or opens a submenu.
ESC	Exits.

Table 183: Keys in the device manager

7.3.2.2 Create RAID volume

RAID volumes can be created via submenu "Create RAID volume" on page 229 in section "Intel® Rapid Storage Technology" on page 228.

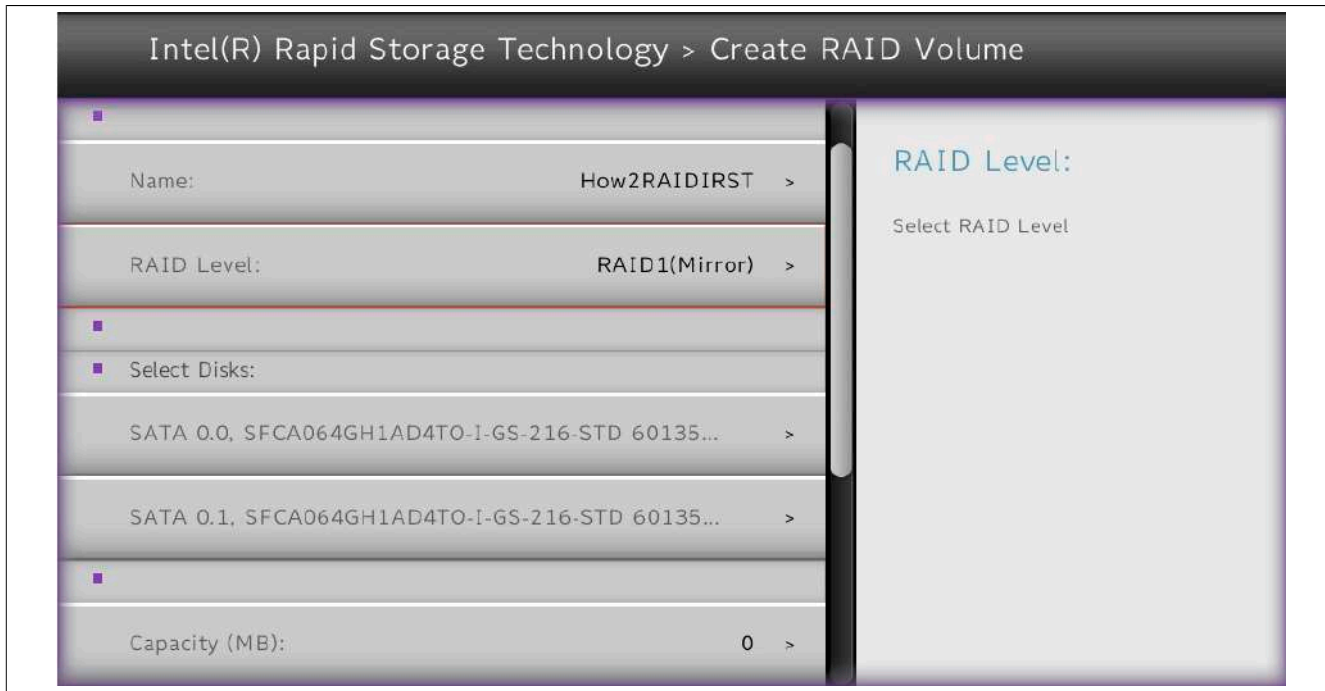


Figure 114: Creating a RAID volume

BIOS parameter	Setting options	Description
Name:	String Default: Volume1	Name for the RAID volume No special characters are permitted. Range: Max. 16 characters
RAID level:	RAID0 (stripe) RAID1 (mirror) Recovery	Selects the RAID level
Select disks:		
Disk n:	(Blank) X M R	Selects the storage medium for the RAID volume. Either X (RAID0 and RAID1) or M (master) /R (recovery) can be defined (recovery mode).
Stripe size:	4 kB 8 kB 16 kB 32 kB 64 kB 128 kB	Selects the data block size [kB]
Capacity:	INT	Defines the RAID memory size [MB] Range: Hardware-dependent If storage media of different sizes are used, this is limited to the smaller medium.
Synchronization:	Continuous On request	Selects the synchronization mode

Table 184: Device manager - Create RAID volume

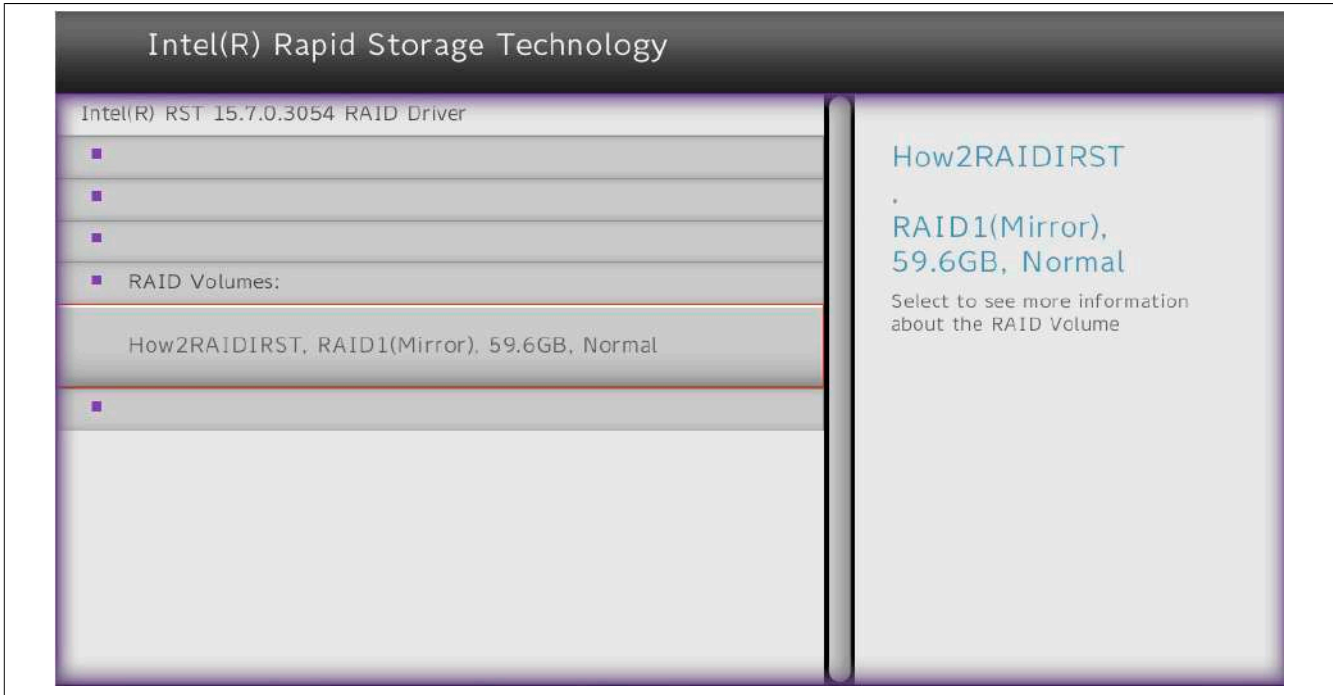


Figure 115: Intel® Rapid Storage Technology with created RAID volume (RAID1)

7.3.2.3 Delete RAID volume

Use function "Delete" (in section "RAID volume info" on page 229) to delete existing RAID volumes and reformat individual drives to non-RAID.

Information:

This option deletes all data on the drive, including the operating system.

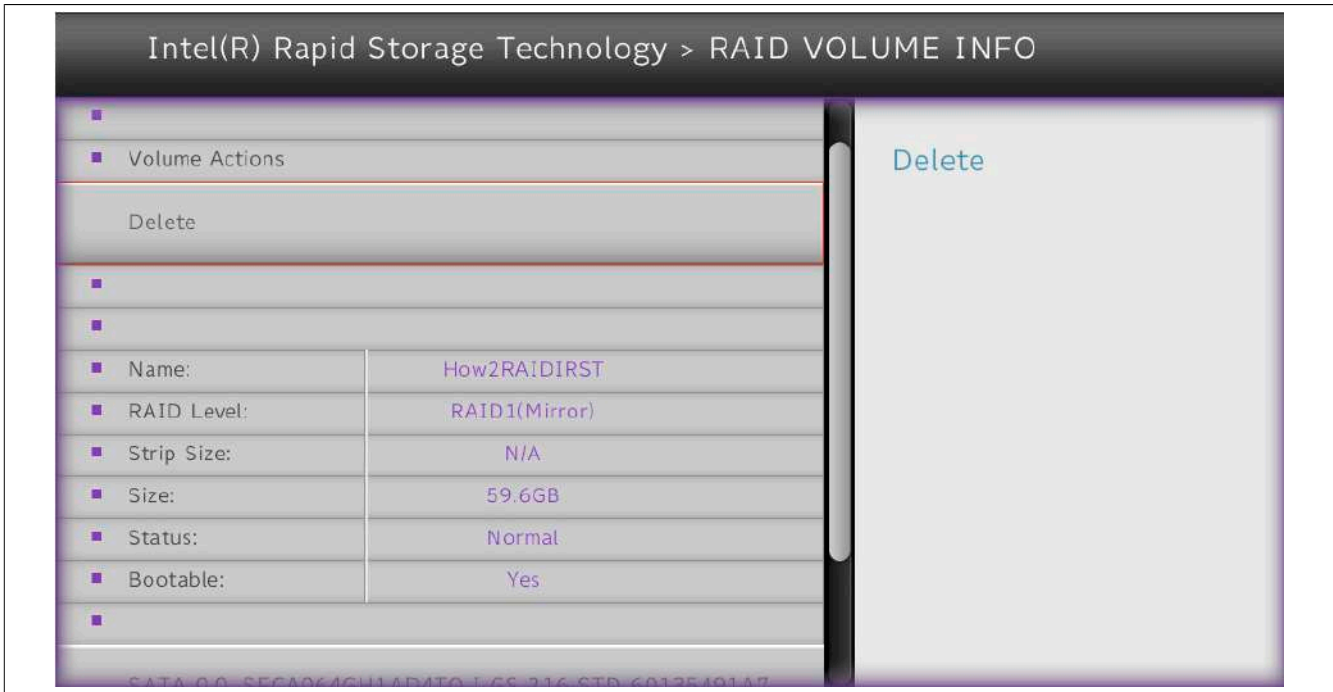


Figure 116: Deleting a RAID volume

7.3.2.4 Recovery volume options

For RAID volumes associations in recovery mode, there is the option to enable or disable only the recovery disk or master disk. This option is available in menu "RAID volume info" on page 229.

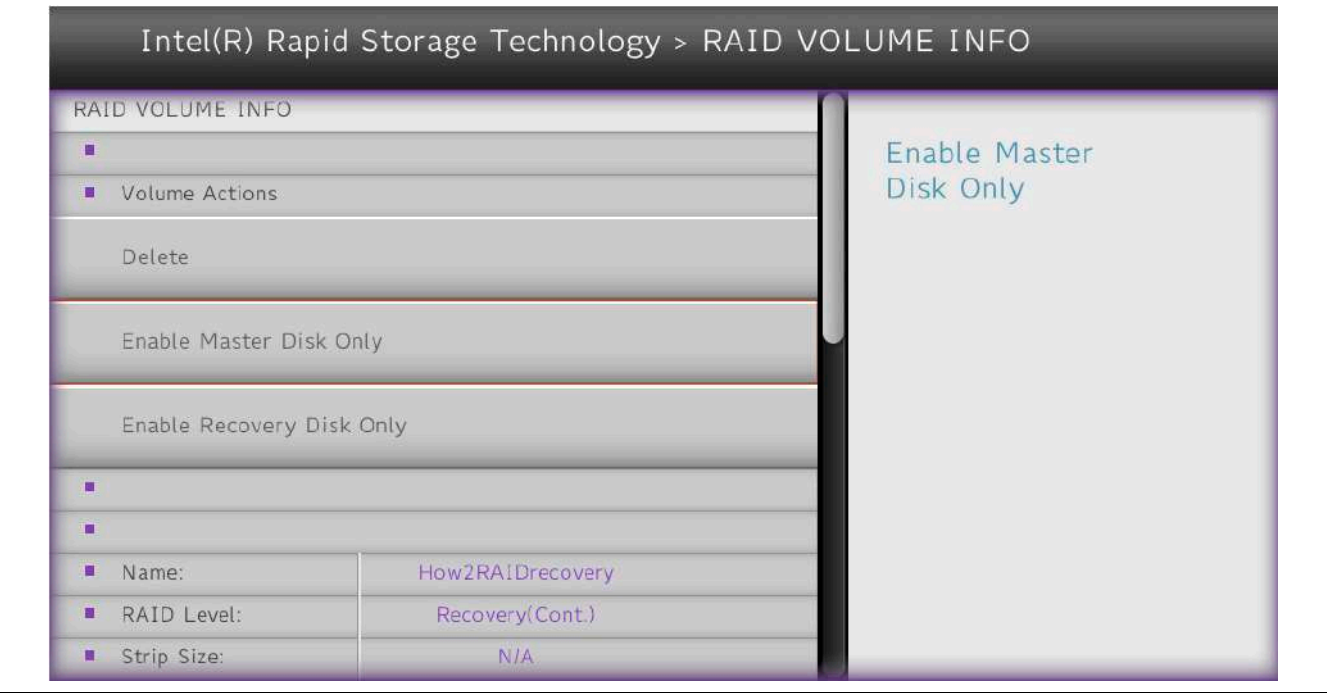


Figure 117: RAID recovery

Note:
Changes in this menu affect the synchronization mode.

7.3.2.5 Reset disks to non-RAID

Individual components of a RAID volume can be reset to non-RAID mode. This option is available in menu "Disk n" on page 229.

Information:
Deleting a RAID volume also deletes all of the data on the drive.

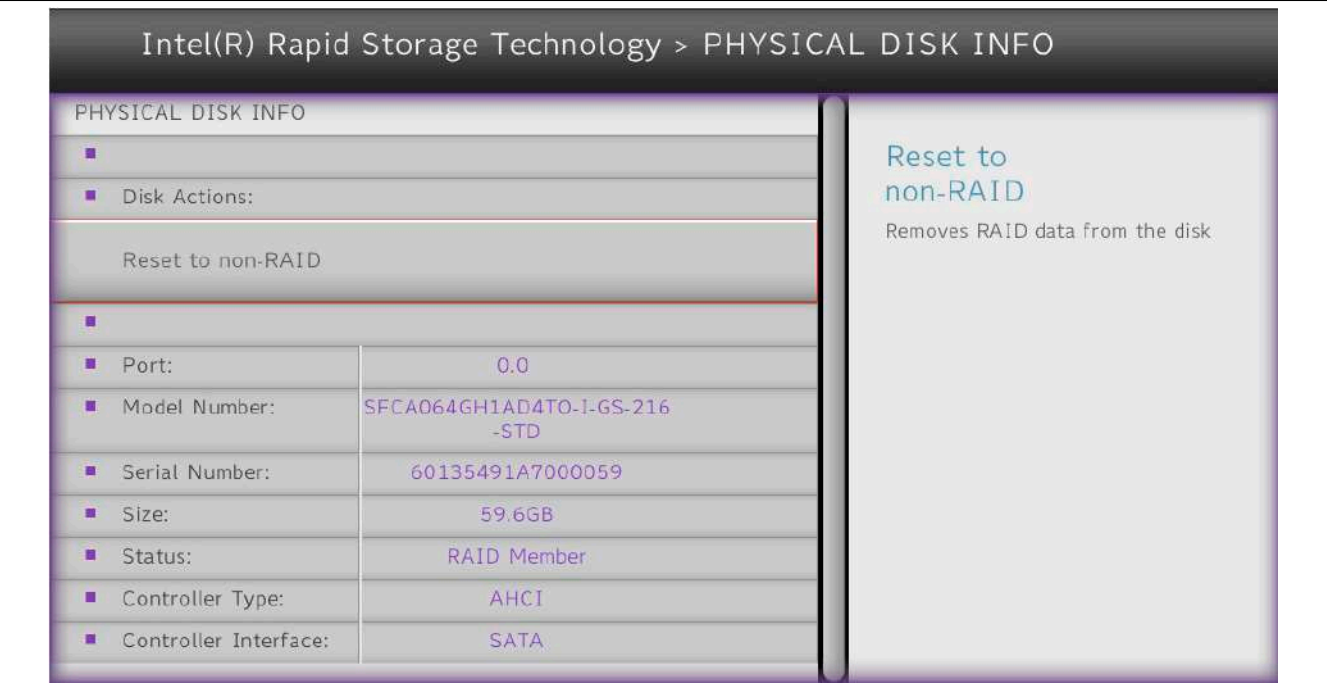


Figure 118: RAID volume reset

7.4 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 given for multi-touch or single-touch operation, compatibility and functionality for operation with other operating systems and/or individual touch screen drivers.

7.5 Operating systems

7.5.1 Windows 10 IoT Enterprise 2016 LTSC

7.5.1.1 General information

Windows 10 IoT Enterprise 2016 LTSC is the successor to Windows 10 IoT Enterprise 2015 LTSC and based on new Windows 10 technology. The operating system also offers a higher level of protection for industrial applications through additional lockdown functions. Windows 10 IoT Enterprise 2016 LTSC is a special version of Windows 10 Enterprise for industrial use (Long Term Servicing Branch).

7.5.1.2 Order data

Model number	Short description	Figure
	Windows 10 IoT Enterprise	
5SWW10.0654-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - Value - Multilingual - PPC3100 Kaby Lake (UEFI boot) - License (without Recovery DVD) - Only available with a new device	
5SWW10.0754-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - High End - Multilingual - PPC3100 Kaby Lake (UEFI boot) - License (without Recovery DVD) - Only available with a new device	
5SWW10.0656-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - Value - Multilingual - PPC3100 Kaby Lake (legacy BIOS boot) - License (without Recovery DVD) - Only available with a new device	
5SWW10.0756-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - High End - Multilingual - PPC3100 Kaby Lake (legacy BIOS boot) - License (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	Windows 10 IoT Enterprise	
5SWW10.0800-MUL	Windows 10 IoT Enterprise 2016 LTSC - 64-bit - Language Pack DVD	

Table 185: 5SWW10.0654-MUL, 5SWW10.0754-MUL, 5SWW10.0656-MUL, 5SWW10.0756-MUL - Order data

7.5.1.3 Overview

Model number	5SWW10.0654-MUL	5SWW10.0754-MUL	5SWW10.0656-MUL	5SWW10.0756-MUL
Operating system				
Target systems				
Industrial PC	PPC3100			
Processor	Celeron, Core i3 and i5	Core i7	Celeron, Core i3 and i5	Core i7
Chipset	Kaby Lake			
Edition	Enterprise LTSC - Value	Enterprise LTSC - High End	Enterprise LTSC - Value	Enterprise LTSC - High End
Architecture	64-bit (UEFI boot)		64-bit (legacy BIOS boot)	
Language	Multilingual			
Minimum RAM required	2 GB ¹⁾			
Minimum disk size	20 GB ²⁾			

Table 186: 5SWW10.0654-MUL, 5SWW10.0754-MUL, 5SWW10.0656-MUL, 5SWW10.0756-MUL - Technical data

- 1) The specified memory size is a minimum requirement according to Microsoft. B&R recommends using 4 GB RAM or more for 64-bit operating systems.
 2) The specified minimum size of the data storage medium does not take into account the memory requirements of additional language packages.

7.5.1.4 Features

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

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

Table 187: Device functions in Windows 10 IoT Enterprise 2016 LTSC

Function	Windows 10 IoT Enterprise 2016 LTSB
AppLocker	Configurable
Shell Launcher	Configurable
Unified Write Filter	✓
Keyboard Filter	Configurable

Table 187: Device functions in Windows 10 IoT Enterprise 2016 LTSB

7.5.1.5 Installation

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

Windows 10 IoT Enterprise 2016 LTSB can be installed on APC3100 and PPC3100 devices in UEFI or legacy BIOS mode. In UEFI mode, the data storage medium containing the Windows partition is formatted with a GUID Partition Table (GPT) file system. For other drives, it is possible to use either the GPT or Master Boot Record (MBR) file format. A GPT drive can have up to 128 partitions.

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

7.5.1.6 Drivers

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

Information:

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

7.5.1.7 Activation

Windows 10 IoT Enterprise 2016 LTSB must be activated like its predecessor Windows 10 IoT Enterprise 2015 LTSB. This takes place at B&R.

The activation status can be checked in the Control Panel:

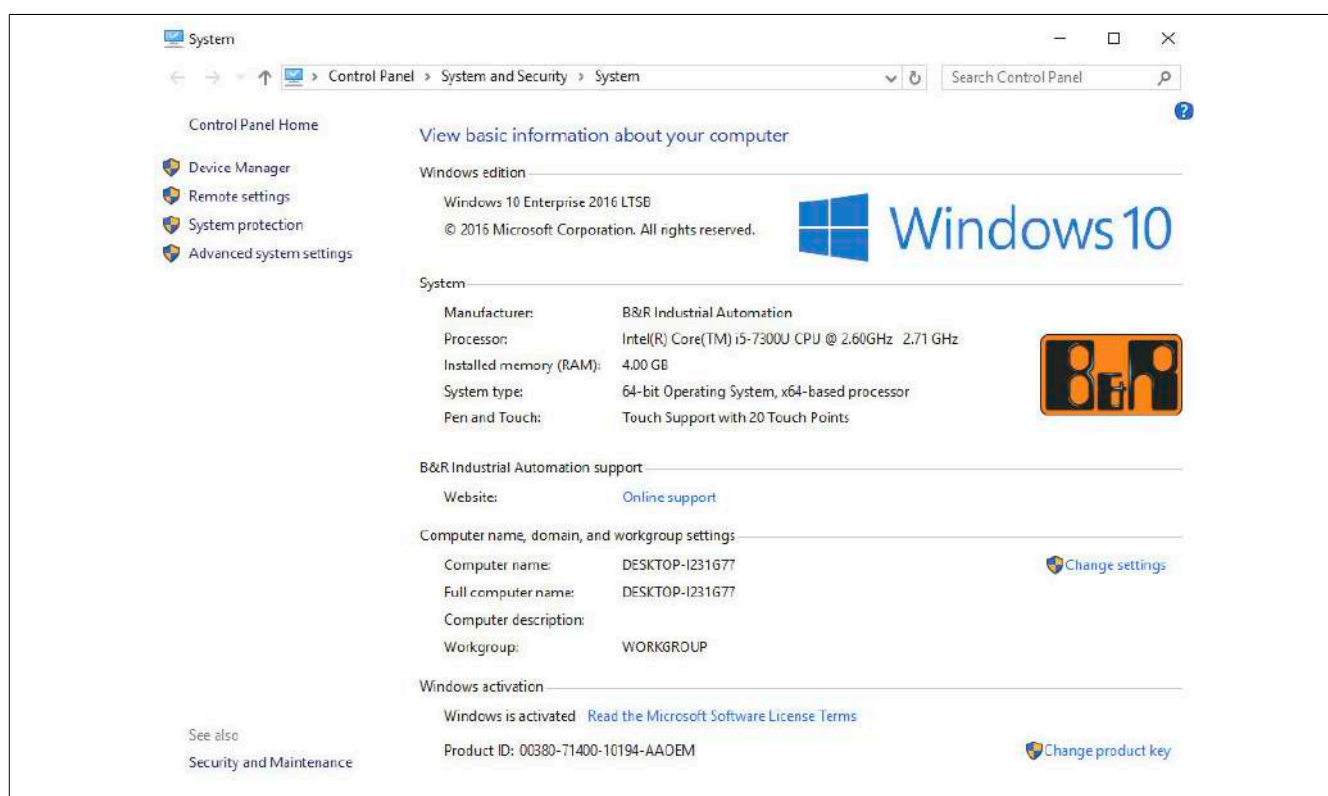


Figure 119: System properties

Activation carried out by B&R is supported by special B&R extensions in the operating system and theoretically not lost when the hardware is changed (e.g. replacement of components in the event of repair) or when the system is reinstalled, unlike Windows 10 IoT Enterprise 2015 LTSC (Microsoft reserves the right to make technical changes without notice).

Information:

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

7.5.1.8 Characteristics, limitations

- Unlike standard Windows 10 Enterprise, Windows 10 IoT Enterprise 2016 LTSC does not include Cortana, the Microsoft Edge browser or the Microsoft Store, for example.
- The LTSC version is based on build 14393 of Windows 10 and does not receive any feature updates.

The version installed by B&R contains optimized settings for operation in an industrial environment. These are described in detail in a manual for Windows 10 IoT Enterprise 2016 LTSC. This can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com) (login required).

Information:

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

7.5.1.9 Supported display resolutions

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

7.5.2 Automation Runtime

7.5.2.1 General information

The Automation Runtime real-time operating system is an integral part of Automation Studio. This real-time operating system makes up the software kernel that allows applications to run on a target system.

- Guarantees the highest possible performance for the hardware used
- Runs on all B&R target systems
- Makes the application hardware-independent
- Easy portability of applications between B&R target systems
- Guaranteed determinism through cyclic system
- Configurable jitter tolerance in all task classes
- Support for all relevant programming languages, such as IEC 61131-3 languages and C
- Rich function library per IEC 61131-3 and additionally the extended B&R Automation Library
- Integrated in Automation NET. Access to all networks and bus systems via function calls or by configuration in Automation Studio™

B&R Automation Runtime is fully embedded in the corresponding target system (hardware on which Automation Runtime is installed). It thus enables application programs to access I/O systems (also via the fieldbus) and other devices such as interfaces and networks.

7.5.2.2 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 188: 0TG1000.01, 0TG1000.02, 1TG4600.10-5, 1TG4601.06-5, 1TG4601.06-T - Order data

7.5.2.3 Automation Runtime Windows (ARwin)

System requirements

The following software versions (or higher) are required to operate Automation Runtime Windows on a Panel PC 3100:

- ARwin Upgrade uR E4.34
- Automation Studio V4.3.4
- Technology Guard

Information:

To operate Automation Runtime Windows (ARwin), parameter *Advanced - OEM features - Realtime environment* must be set to *Enabled* in BIOS and parameter *Boot - EFI device first* must be set to *Disabled*.

7.5.2.4 Automation Runtime Embedded (ARemb)

System requirements

The following software versions (or higher) are required to operate Automation Runtime Embedded on a Panel PC 3100:

- ARemb upgrade AR E4.34
- Automation Studio V4.3.4
- Visual Components Runtime (VC) V4.34
- Technology Guard

Information:

In order to use Automation Runtime Embedded (ARemb), BIOS setting *Advanced - OEM features - Realtime environment* must be set to *Enabled*.

7.5.2.5 Information regarding Automation Runtime operation

Information:

In situations where there is a heavy load on the CPU and GPU simultaneously, it is possible that the specified Thermal Design Power (TDP) of the CPU is exceeded. When this happens, the CPU's internal protective mechanisms will begin limiting the load to the TDP. This means that either the CPU frequency or the graphic frequency (GPU) will be reduced/controlled. In real-time applications, this can result in increased jitter and/or higher cycle times.

This behavior can be influenced by settings in BIOS. The maximum CPU frequency can be set in BIOS under *Advanced - CPU configuration* using option *CPU flex ratio override*. The number of cores used can be set using option *Active processor cores*.

In addition, the maximum frequency of the GPU (Gfx) can be limited in BIOS under *Advanced - Power & Performance - GT power management control* with option *Maximum GT frequency*.

Limiting the CPU and/or GPU frequency reduces power consumption and prevents the TDP from being exceeded.

The optimal settings for real-time operation depend on several factors:

1) The CPU variant being used:

- If CPU C-3965U is used, no further action (BIOS settings) are necessary. For pure ARemb operation, it is recommended to limit the *active processor cores* to 1 in BIOS.
- If the i3-7100U, i5-7300U or i7-7600U CPU is used, see item 2 "ARemb, ARwin or B&R Hypervisor operation".

2) ARemb, ARwin or B&R Hypervisor operation:

- For pure ARemb operation, the active processor cores must be limited to 1 and the GPU frequency must be limited to an average value (see item 3 "Typical applications for ARemb").
- For ARwin or B&R Hypervisor operation, see item 4 "Typical applications for ARwin or B&R Hypervisor".

3) Typical applications for ARemb:

The following operating modes are intended to represent typical applications.

- xPC3100 C-3965U: No limitation of CPU and/or GPU frequency necessary. Operation with max. CPU and Gfx frequency is possible, but B&R recommends single-core operation.
- xPC3100 i3-7100U: Operation as single-core system with 2400 MHz CPU and 600 MHz Gfx frequency
- xPC3100 i5-7300U: Operation as single-core system with 2600 MHz CPU and 600 MHz Gfx frequency
- xPC3100 i7-7600U: Operation as single-core system with 2800 MHz CPU and 600 MHz Gfx frequency

4) Typical applications for ARwin or B&R Hypervisor:

The following operating modes are intended to represent typical applications.

- xPC3100 C-3965U: No limitation of CPU and/or GPU frequency necessary. Operation with max. CPU and Gfx frequency is possible.
- xPC3100 i3-7100U: Operation with 1400 MHz CPU and 800 MHz Gfx frequency
- xPC3100 i3-7100U: Operation with 2000 MHz CPU and 450 MHz Gfx frequency
- xPC3100 i5-7300U: Operation with 1600 MHz CPU and 800 MHz Gfx frequency
- xPC3100 i5-7300U: Operation with 2100 MHz CPU and 450 MHz Gfx frequency
- xPC3100 i7-7600U: Operation with 1600 MHz CPU and 800 MHz Gfx frequency
- xPC3100 i7-7600U: Operation with 2100 MHz CPU and 450 MHz Gfx frequency

7.5.2.6 Technology Guarding

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

The B&R software components Automation Runtime Embedded (ARemb), Automation Runtime Windows (ARwin) and Automation Runtime Embedded Terminal require a license, and the use of the Technology Guard is mandatory.

Information:

Licensing using the Technology Guarding wizard is available starting with Automation Studio version 4.1 and Automation Runtime version 4.08. A Technology Guard is not necessary in earlier Automation Runtime versions.

For additional information about Technology Guarding, see Automation Help.

7.5.3 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 system configurations are determined individually. This makes the assignment of resources to the respective operating system flexible. 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 3100:

- ARemb upgrade AR B4.45
- Automation Studio V4.4.5
- PPC3100 BIOS V1.12
- PPC3100 MTCX V4.19

Information:

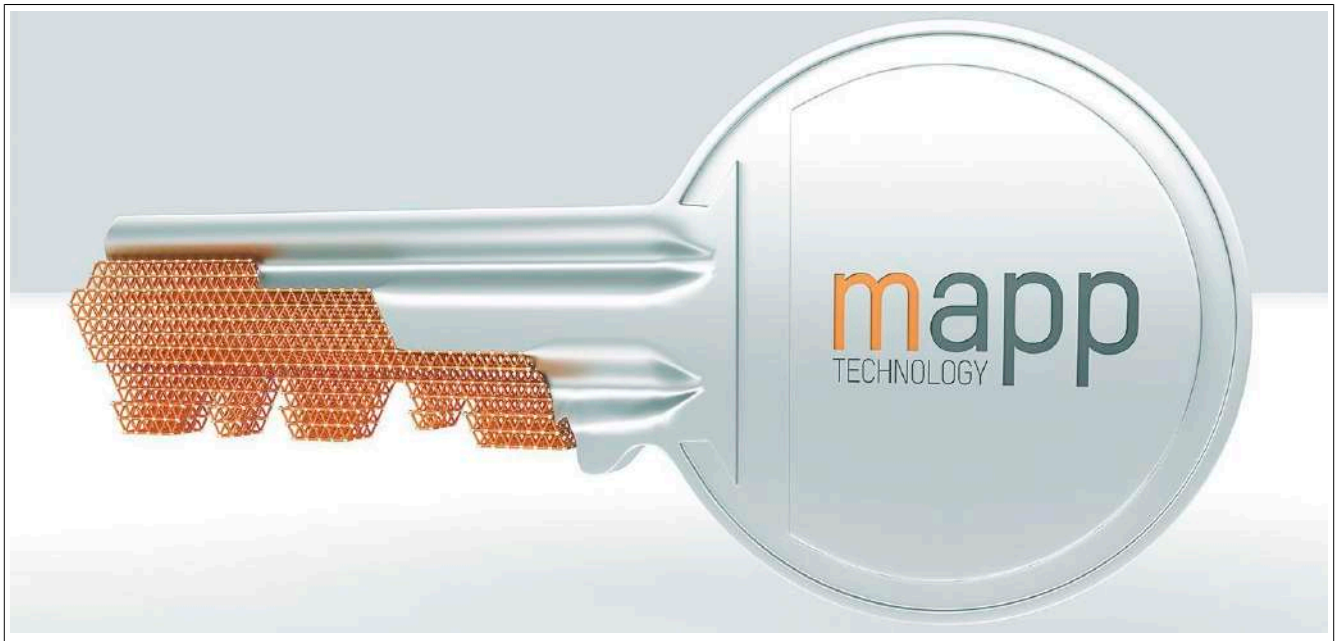
The following settings must be made to operate B&R Hypervisor:

- ***Advanced - OEM features - Realtime environment* must be enabled.**
- ***Advanced - OEM features - Hypervisor environment* must be enabled.**
- ***Boot - EFI device first* must be disabled.**

Information:

For details about B&R Hypervisor, see Automation Help.

7.5.4 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 in Automation Studio.

7.5.5 B&R Linux 9 (GNU/Linux)

7.5.5.1 General information

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

The Linux version created by B&R is based on Debian 9. It already contains all the drivers required for the respective device and can therefore be used immediately without any additional effort.

Advantages of Debian:

- High stability
- Large package selection

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

7.5.5.2 Order data

Model number	Short description	Figure
	B&R Linux 9	
5SWLIN.0754-MUL	B&R Linux 9 - 64-bit - Multilingual - PPC3100 Kaby Lake (UEFI boot) - Installation (without Recovery DVD) - Only available with a new device	
5SWLIN.0756-MUL	B&R Linux 9 - 64-bit - Multilingual - PPC3100 Kaby Lake (legacy boot) - Installation (without Recovery DVD) - Only available with a new device	
	Optional accessories	
	CFAST cards	
5CFAST.016G-00	CFAST 16 GB SLC	
5CFAST.032G-00	CFAST 32 GB SLC	
5CFAST.032G-10	CFAST 32 GB MLC	
5CFAST.064G-10	CFAST 64 GB MLC	
5CFAST.128G-10	CFAST 128 GB MLC	
5CFAST.256G-10	CFAST 256 GB MLC	
5CFAST.4096-00	CFAST 4 GB SLC	
5CFAST.8192-00	CFAST 8 GB SLC	

Table 189: 5SWLIN.0754-MUL, 5SWLIN.0756-MUL - Order data

7.5.5.3 Overview

Model number	5SWLIN.0754-MUL	5SWLIN.0756-MUL
Operating system		
Target systems		
Industrial PC	PPC3100	
Chipset	Kaby Lake	
Architecture	64-bit (UEFI boot)	64-bit (legacy boot)
Language	Multilingual	
Minimum RAM required	4 GB	
Minimum disk size	4 GB	

Table 190: 5SWLIN.0754-MUL, 5SWLIN.0756-MUL - Technical data

7.5.5.4 Features

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

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

7.5.5.5 Installation

B&R Linux 9 is preinstalled at B&R on the required data storage medium (e.g. CFAST card). All necessary drivers (graphics, network, etc.) for operation are also installed.

Debian 9 can also be downloaded and installed from the Debian website (<http://www.debian.org>). Instructions are also available on the Debian website.

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

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

7.5.5.6 Drivers

The operating system contains all drivers necessary for operation.

The latest versions of the B&R specific drivers can be downloaded and installed from the B&R website (www.br-automation.com).

7.6 B&R Automation Device Interface (ADI)

7.6.1 Control Center

The Automation Device Interface (ADI) allows access to specific functions of B&R devices. The settings of these devices can be read out and changed in Windows using the B&R Control Center in the Control Panel.

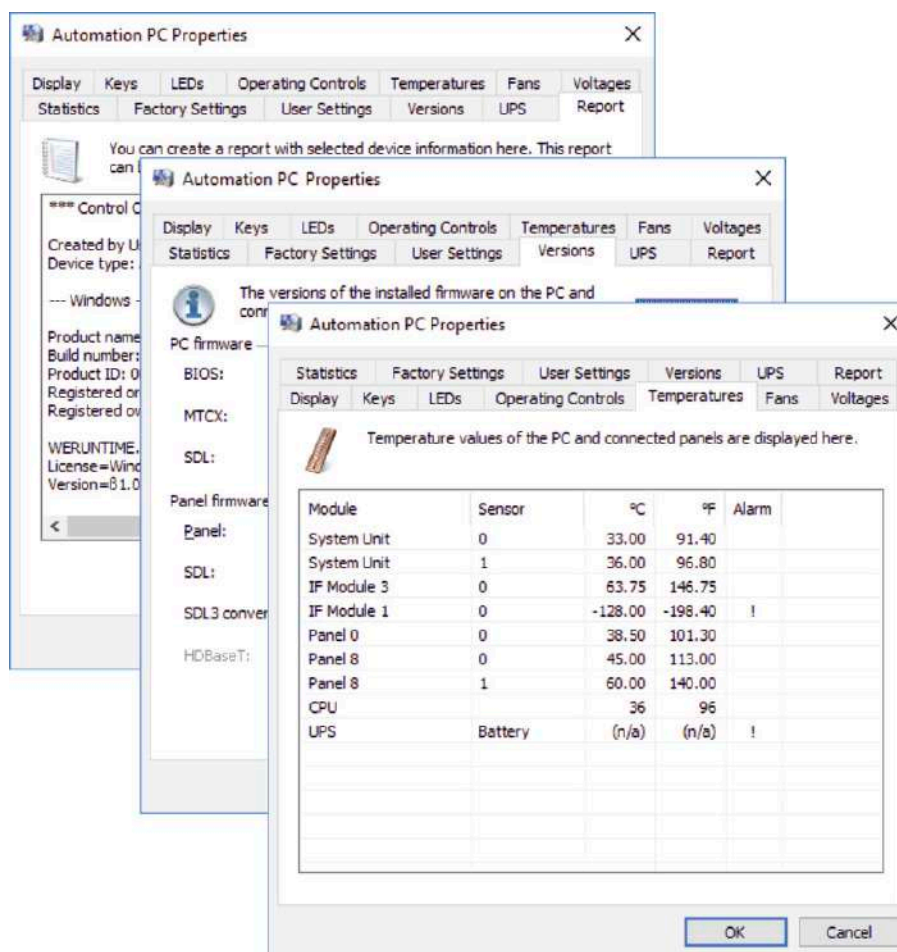


Figure 120: B&R Control Center screenshots - Examples

Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) represent uncalibrated information values. No conclusions about possible alarms or hardware malfunctions can be drawn from this. The hardware components used have automatic diagnostic functions in the event of error.

7.6.1.1 Functions

Information:

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

- Changing display-specific parameters
- Reading out device-specific keys
- Updating the key configuration
- Testing keys or device-specific LEDs of a membrane keypad
- Reading out or calibrating control devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading out temperatures, fan speeds, switch positions and statistical data
- Reading out operating hours (power-on hours)
- Reading user settings and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports for the current system (support)
- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the user serial ID

Depending on the version, a detailed description of the Control Center is available either in the integrated help documentation or in the user documentation.

7.6.1.2 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 or can be installed on request.

If a more recent ADI driver version exists (see the Downloads section of the B&R website), it can be installed later. The write filter must be disabled during installation.

7.6.1.3 Development kit

This software allows functions of the B&R Automation Device Interface (ADI) to be accessed from Windows applications created with Microsoft Visual Studio, for example:

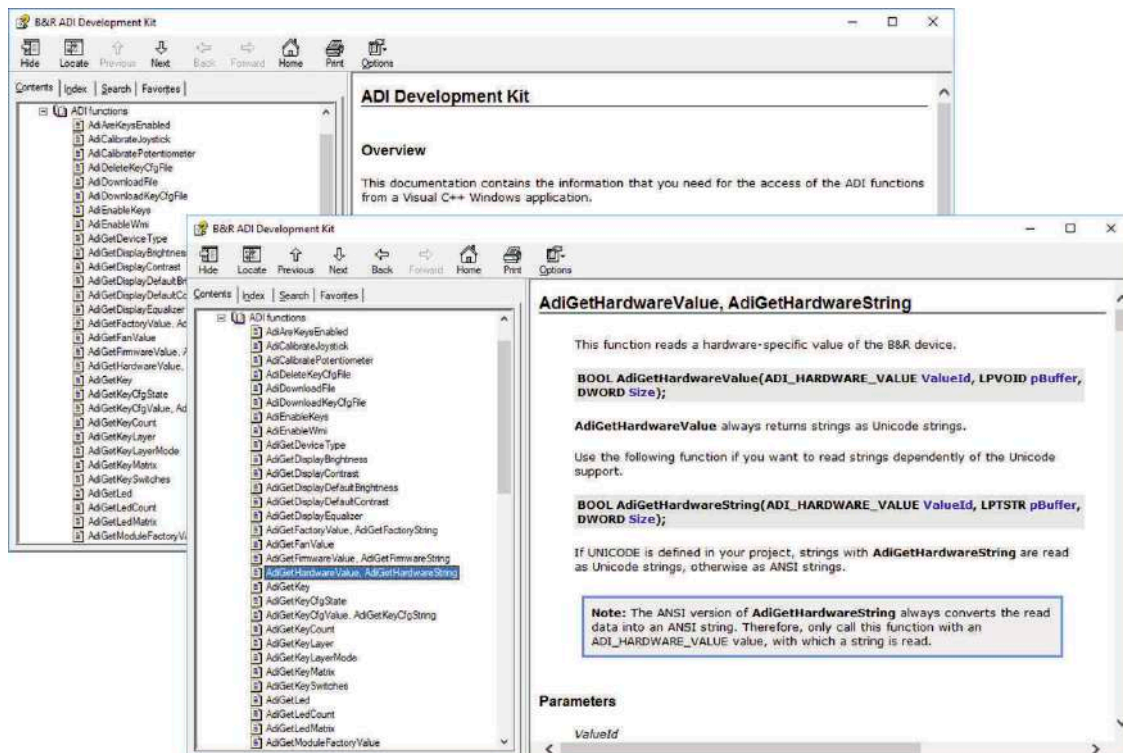


Figure 121: ADI Development Kit screenshots

Features:

- Header files and import libraries
- Help files
- Example projects
- ADI DLL (for testing applications if no ADI driver is installed)

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

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

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

7.6.1.4 .NET SDK

This software allows functions of the B&R Automation Device Interface (ADI) to be accessed from .NET applications created with Microsoft Visual Studio.

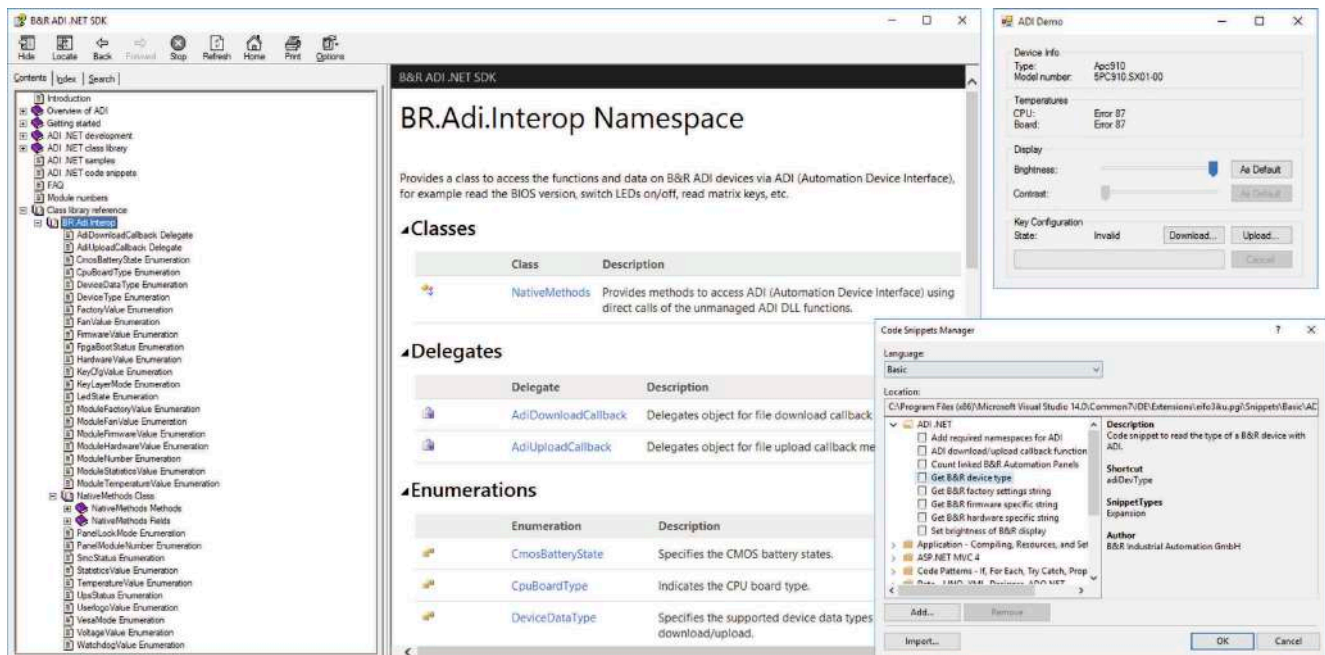


Figure 122: ADI .NET SDK screenshots

Features:

- ADI .NET class library
- Help files (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 for the device must be installed on the mentioned product family. The ADI driver is already included in B&R images of embedded operating systems.

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

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

7.7 Control Center

The Automation Device Interface (ADI) allows access to specific functions of B&R devices. The settings of these devices can be read out and changed in Windows using the B&R Control Center in the Control Panel.

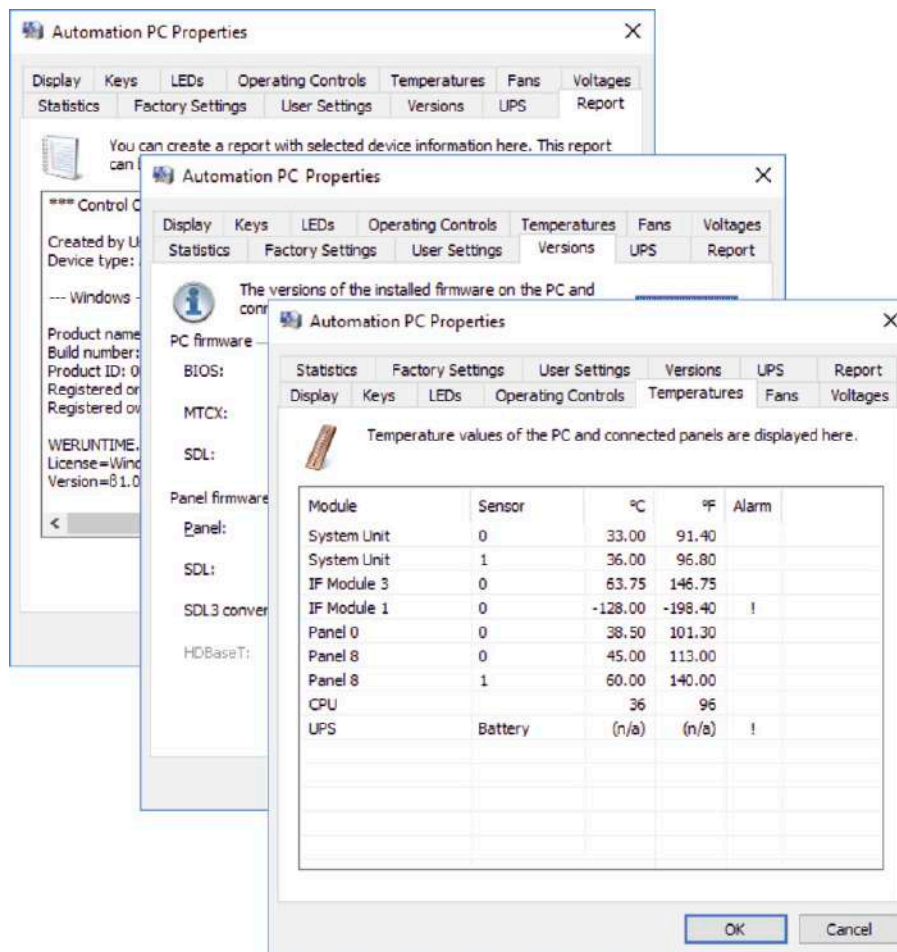


Figure 123: B&R Control Center screenshots - Examples

Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) represent uncalibrated information values. No conclusions about possible alarms or hardware malfunctions can be drawn from this. The hardware components used have automatic diagnostic functions in the event of error.

7.7.1 Functions

Information:

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

- Changing display-specific parameters
- Reading out device-specific keys
- Updating the key configuration
- Testing keys or device-specific LEDs of a membrane keypad
- Reading out or calibrating control devices (e.g. key switch, handwheel, joystick, potentiometer)
- Reading out temperatures, fan speeds, switch positions and statistical data
- Reading out operating hours (power-on hours)
- Reading user settings and factory settings
- Reading software versions
- Updating and backing up BIOS and firmware
- Creating reports for the current system (support)

- Setting the SDL equalizer value for the SDL cable adjustment
- Changing the user serial ID

Depending on the version, a detailed description of the Control Center is available either in the integrated help documentation or in the user documentation.

7.7.2 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 or can be installed on request.

If a more recent ADI driver version exists (see the Downloads section of the B&R website), it can be installed later. The write filter must be disabled during installation.

7.8 Development kit

This software allows functions of the B&R Automation Device Interface (ADI) to be accessed from Windows applications created with Microsoft Visual Studio, for example:

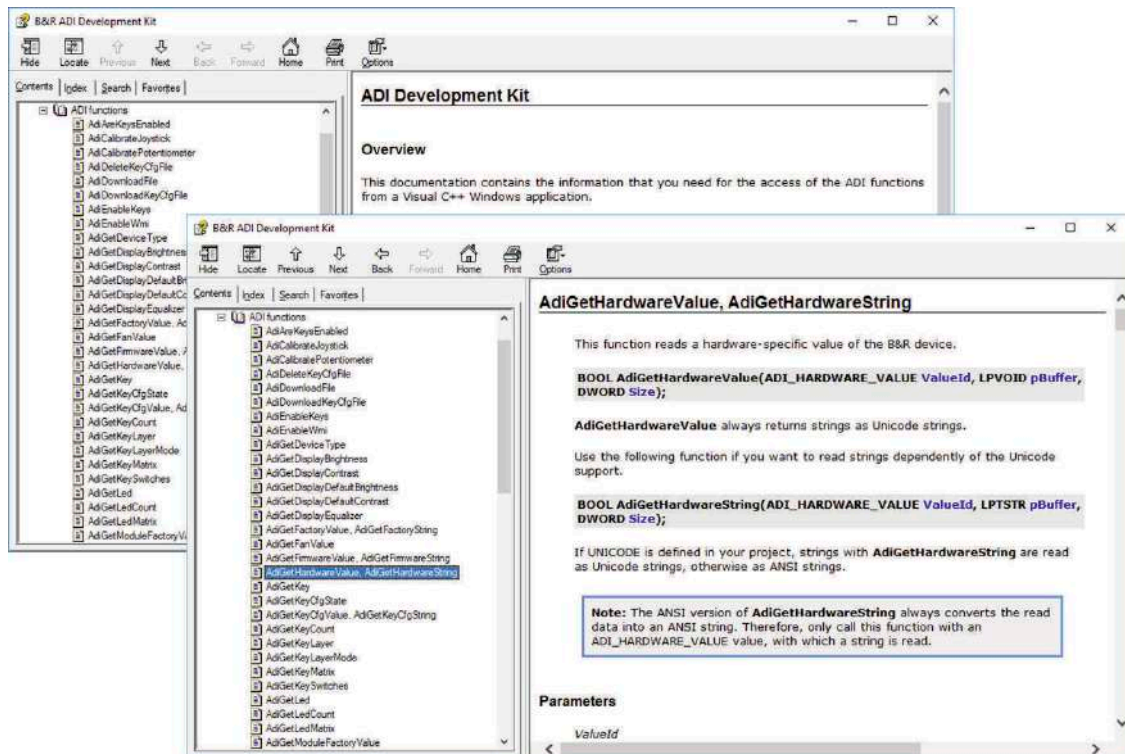


Figure 124: ADI Development Kit screenshots

Features:

- Header files and import libraries
- Help files
- Example projects
- ADI DLL (for testing applications if no ADI driver is installed)

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

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

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

7.9 .NET SDK

This software allows functions of the B&R Automation Device Interface (ADI) to be accessed from .NET applications created with Microsoft Visual Studio.

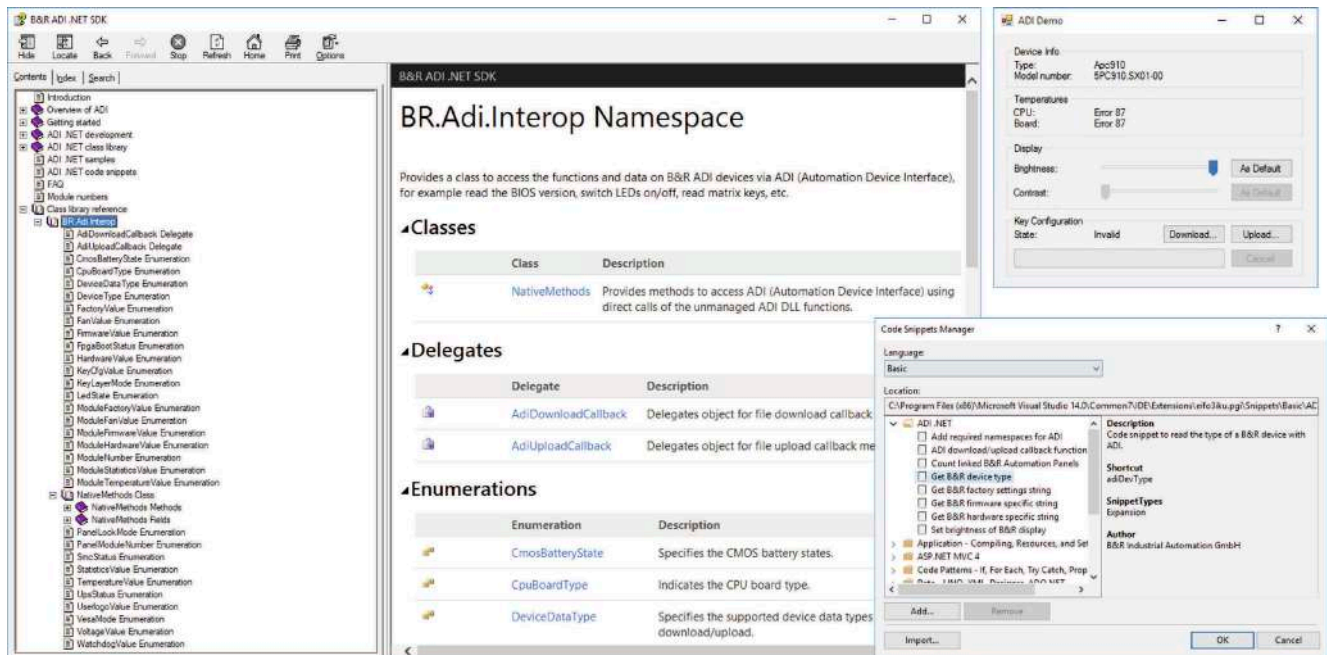


Figure 125: ADI .NET SDK screenshots

Features:

- ADI .NET class library
- Help files (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 for the device must be installed on the mentioned product family. The ADI driver is already included in B&R images of embedded operating systems.

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

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

7.10 B&R Key Editor

A frequently occurring requirement for panels is adapting function keys and LEDs to the application software. With the B&R Key Editor, individual adaptation to the application is possible quickly and easily.

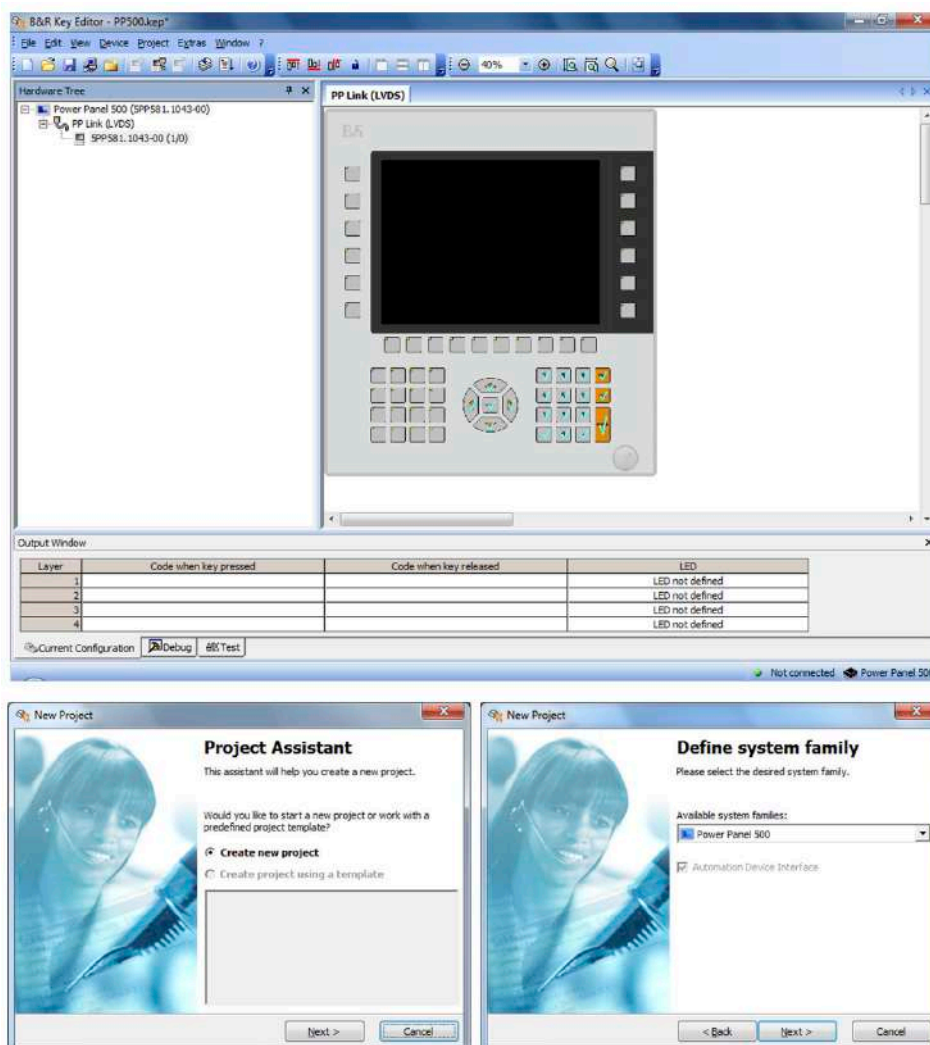


Figure 126: B&R Key Editor screenshots (symbolic image)

Features:

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Keyboard shortcuts (CTRL+C, SHIFT+DEL, etc.) on one key
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel lock time when connecting several Automation Panel devices to Automation PCs and Panel PCs

For detailed instructions about configuring keys and LEDs and installing the key configuration on the target system, see the help documentation for the B&R Key Editor. The B&R Key Editor and help documentation can be downloaded at no cost from the Downloads section of the B&R website (www.br-automation.com).

7.11 B&R KCF Editor

The B&R KCF Editor can be used as a simple alternative to the B&R Key Editor. It can also be used to adapt function keys and LEDs to the application software. In contrast to the B&R Key Editor, operation does not take place using a graphical representation of the device, but via a simple Windows dialog box. The B&R KCF Editor can therefore also be used for devices that are not yet supported in the B&R Key Editor. The B&R KCF Editor is a "portable" application and can be started directly from a USB flash drive without installation on the target device, for example. An installed ADI driver is required for the full range of functions.

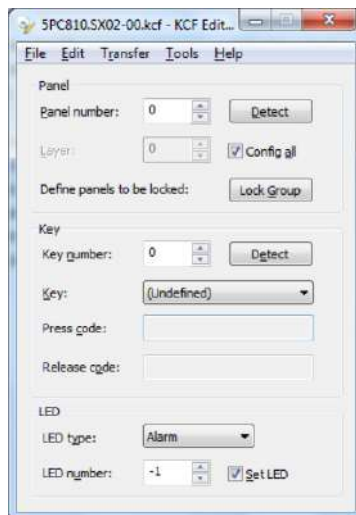


Figure 127: B&R KCF Editor version 1.0 screenshot

Features

- Configuration of normal keys like on a keyboard (A, B, C, etc.)
- Special key functions (change brightness, etc.)
- Assignment of LED functions (HDD access, power, etc.)
- 4 assignments possible per key (using layers)
- Configuration of the panel lock time when connecting several Automation Panel devices to B&R PCs.
- Export and import of the configuration (via INI files)
- Save configuration as report (text file)

Additional features if the KCF Editor is executed on the target device³⁾

- Panel and key detection
- LED test
- Download/Upload the configuration

7.12 HMI Service Center

7.12.1 5SWUTI.0001-000

7.12.1.1 General information

The HMI Service Center is software for testing B&R industrial PCs and Automation Panels. Testing covers different categories such as COM, network and SRAM.

The test system consists of a USB flash drive with the Windows PE operating system and HMI Service Center installed on it.

For details about the HMI Service Center, see the HMI Service Center user's manual. This can be downloaded at no cost from the B&R website (www.br-automation.com).

³⁾ The ADI driver must be installed on the B&R PC for these features.

7.12.1.2 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 191: 5SWUTI.0001-000 - Order data

Information:

The Automation PC 2200, Automation PC 3100, Panel PC 2200, Panel PC 3100, Automation Panel 1000 and Automation Panel 5000 are supported starting with revision D0 of the HMI Service Center flash drive.

8 Maintenance

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

Information:

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

8.1 Cleaning

Danger!

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

Use a cloth moistened with dishwashing detergent, screen cleaner or alcohol (ethanol) to clean the device. Do not apply the cleaner directly to the device!

It is never permitted to use aggressive solvents, chemicals, abrasive cleaners, compressed air or steam cleaners.

Information:

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

8.2 Changing the battery

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

Information:

- The product design allows the battery to be changed when the power is switched off to the B&R device or when it is switched on. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.
- When changing the battery when the power is switched off, the BIOS settings made are retained (stored in a voltage-safe EEPROM). The date and time must be reset later since this data is lost when the battery is changed.
- The battery is only permitted to be replaced by qualified personnel.

Warning!

The battery is only permitted to be replaced by a Renata CR2477N battery. The use of another battery may present a fire or explosion hazard.

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

The following lithium replacement batteries are available: 4A0006.00-000 (1 pc.) and 0AC201.91 (4 pcs.).

8.2.1 Changing the battery

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Remove the battery adapter of the device (protected against reverse polarity).

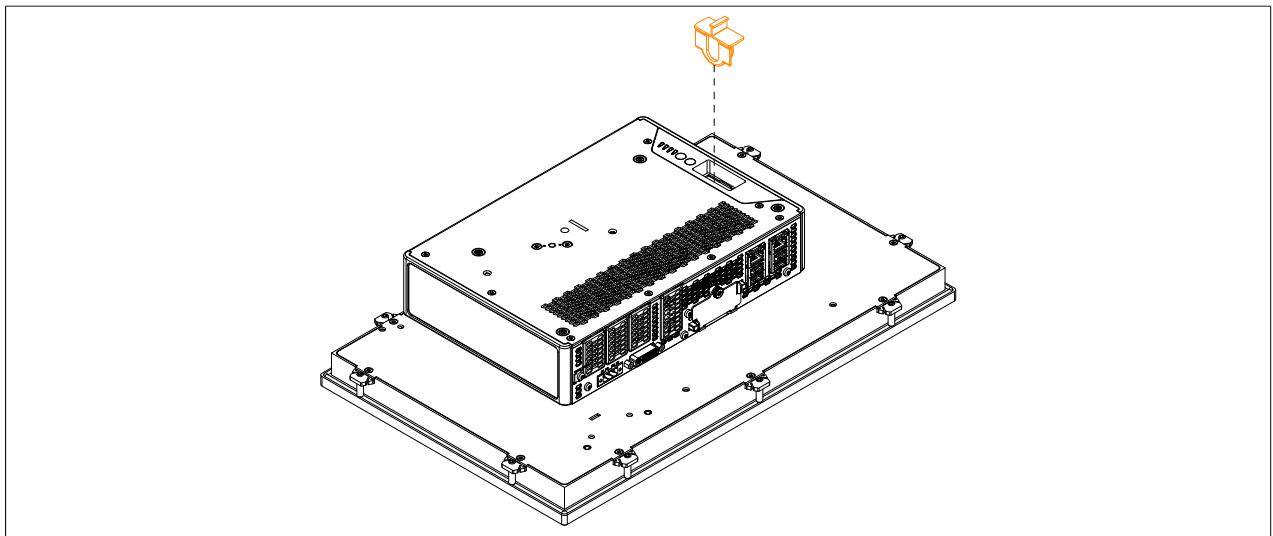


Figure 128: Removing the battery adapter

4. Remove the battery from the adapter and replace it.

Note:

The battery is not permitted to be held by its edges. Insulated tweezers may also be used to insert the battery.

When reinserting, pay attention to the polarity. The positive terminal is marked on the adapter; this must be congruent with the positive terminal of the battery.

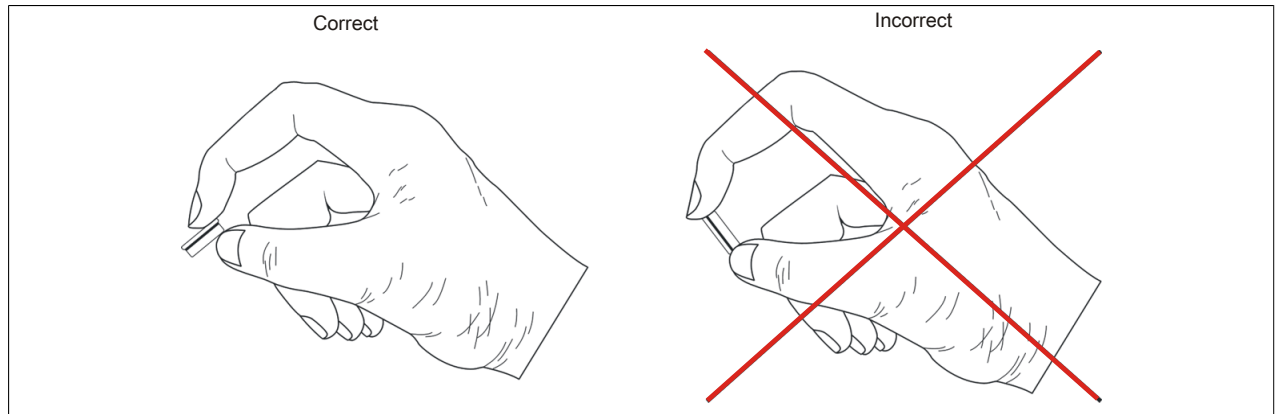
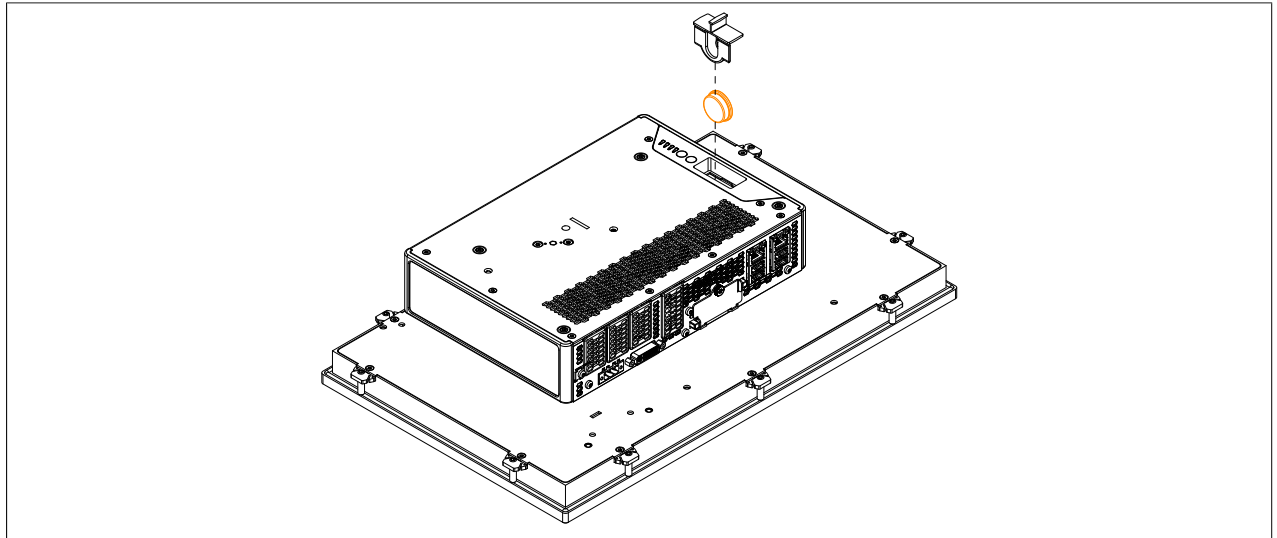


Figure 129: Battery handling



5. Insert the battery adapter back into the device.
6. Reconnect the power supply to the B&R industrial PC (plug in the power cable).
7. Reset the date and time in BIOS.

Warning!

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

8.3 Replacing CFast cards

Caution!

The CFast card is only permitted to be replaced when the power is switched off.

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

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

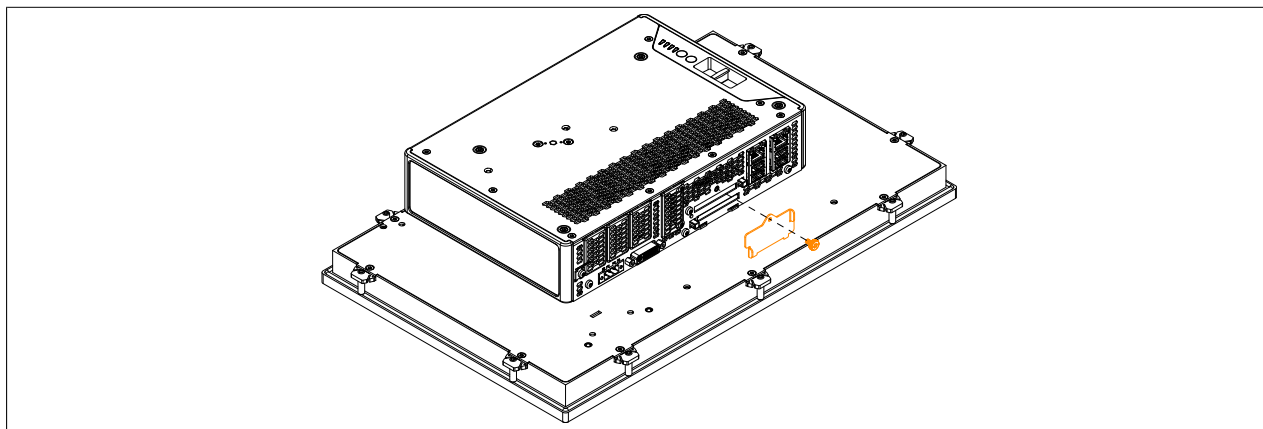


Figure 130: Removing the cover of the CFast slots

4. Press the ejector next to the card slot (see figure below).

The card is ejected and can be replaced.

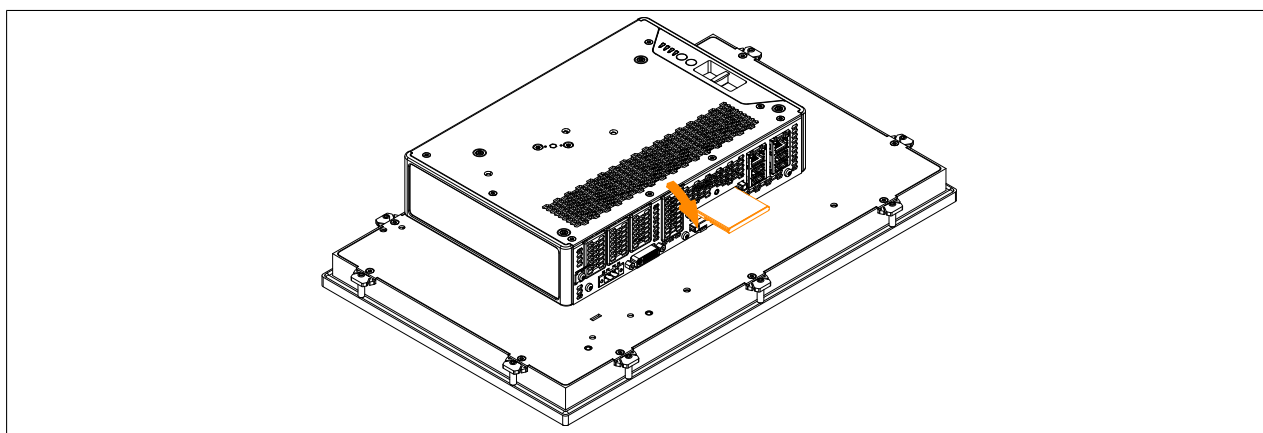


Figure 131: Pressing the ejector and removing the CFast card (the figure shows CFast slot 1)

5. After replacing, re-secure the cover of the CFast card slot.

8.4 Installing the interface option and DDR4 SDRAM

Caution!

Interface options or DDR4 main memory modules are only permitted to be installed when the power is switched off.

1. Disconnect the power supply cable to the B&R industrial PC (disconnect the power cable).
2. Carry out electrostatic discharge on the housing or at the ground connection.
3. Remove the Torx screws (T10) of the cover. Their number may vary depending on the system unit.

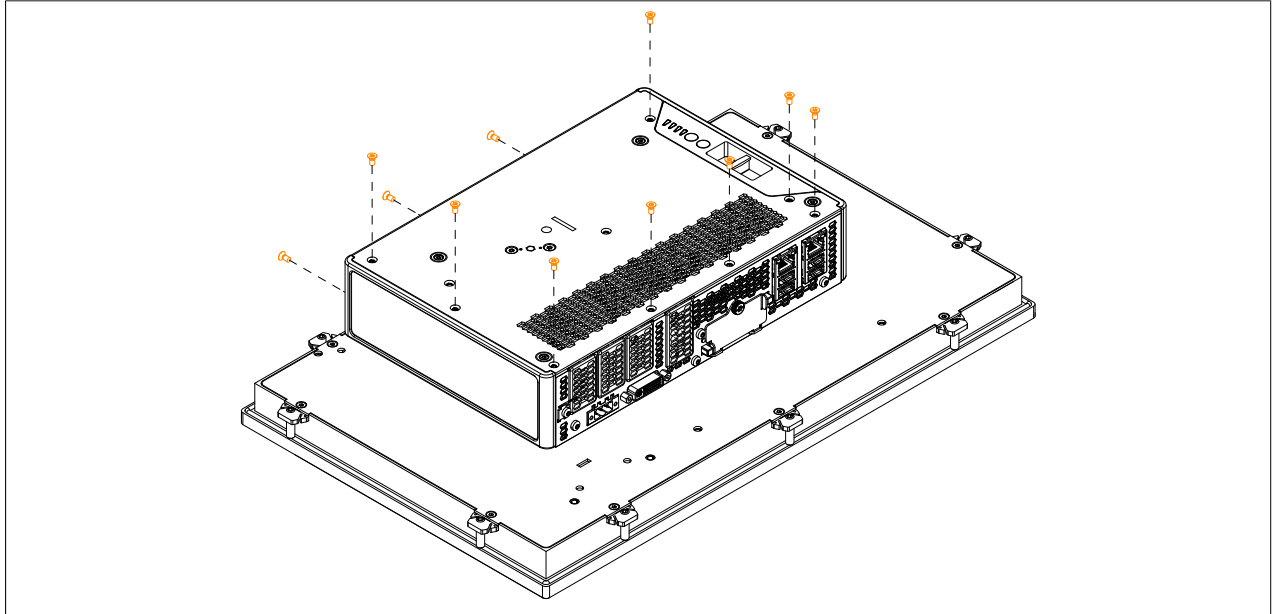


Figure 132: Removing the Torx screws on the cover

4. Remove the cover.

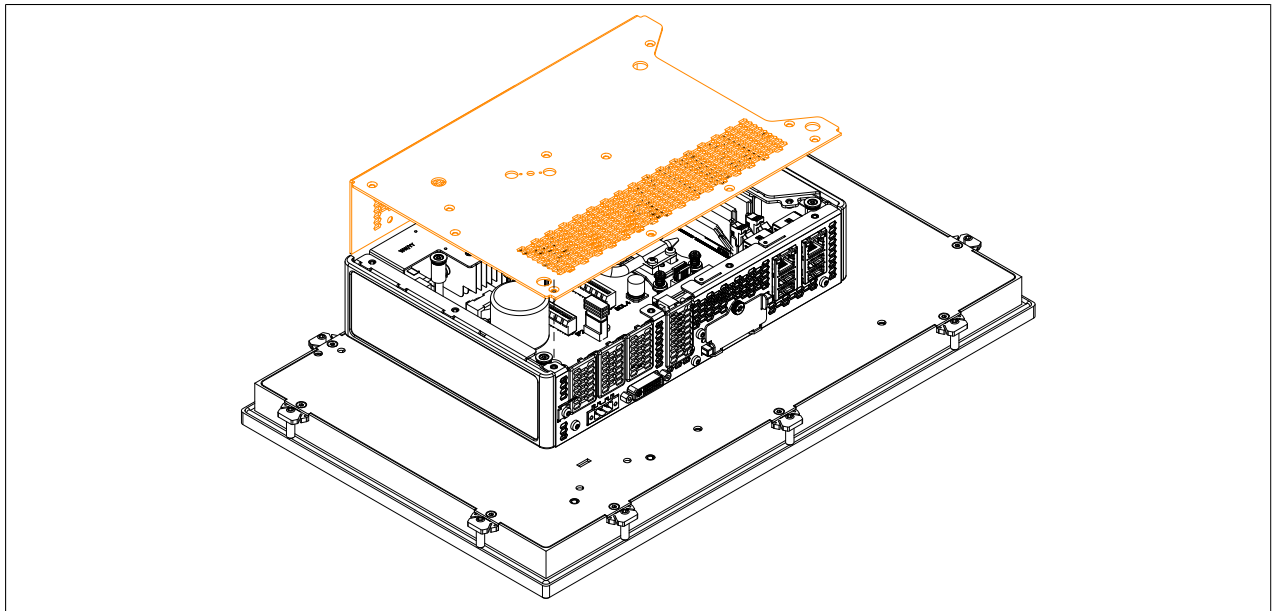


Figure 133: Removing the cover

5. Pull the slot cover out of the housing (only when replacing IF options).

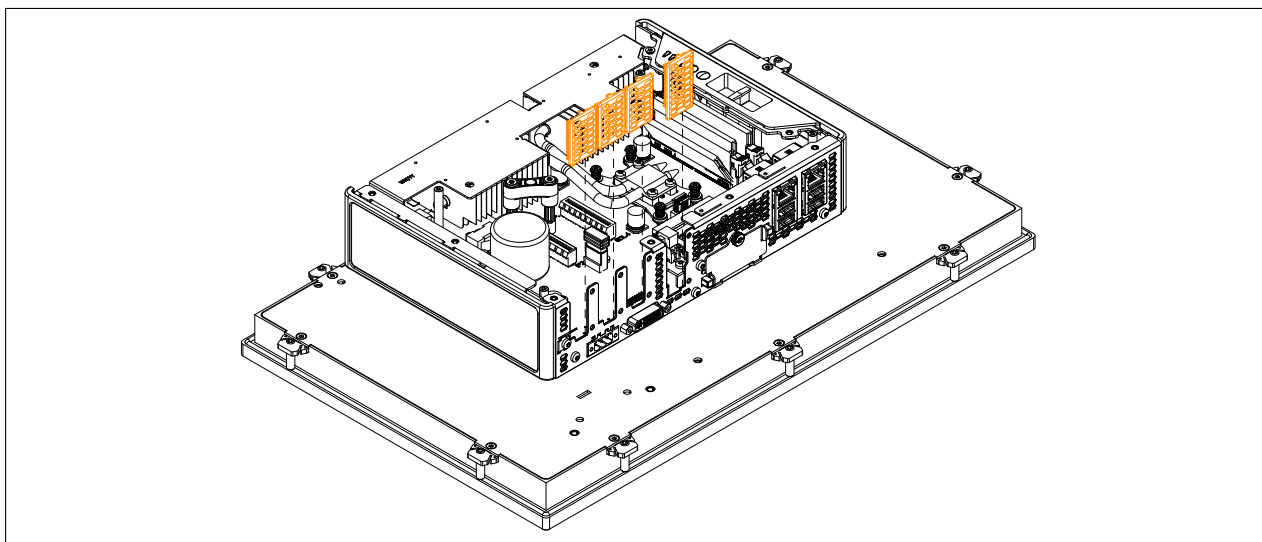


Figure 134: Removing the slot cover

6.

- a) Insert the interface option into the appropriate slot (see section ["Device interfaces and slots"](#) on [page 48](#) for the respective IF option or the associated data sheet of the module starting on [page 147](#)). The interface option must be mounted inside the housing in order to be installed properly.

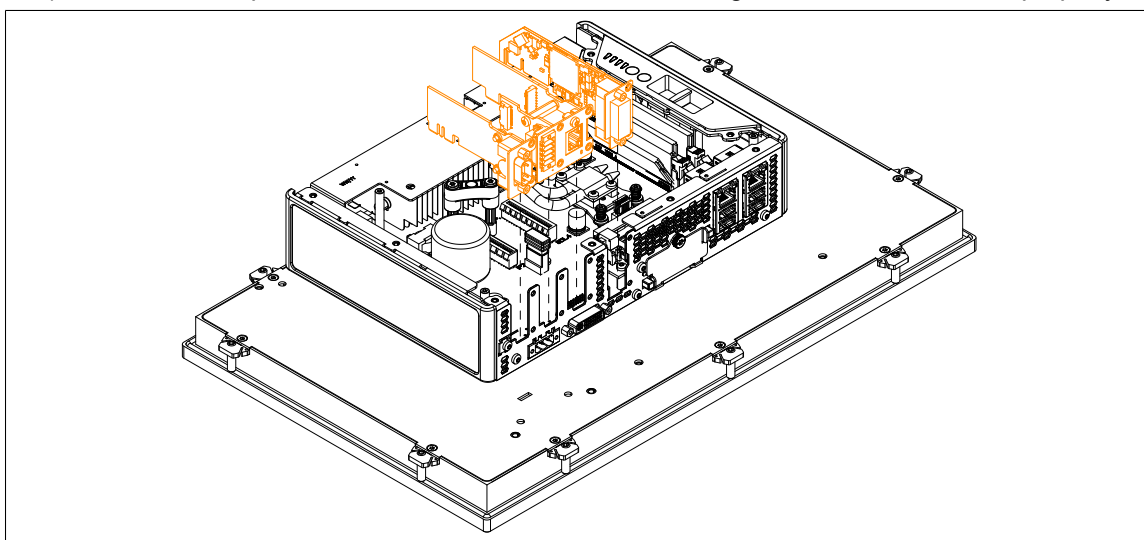
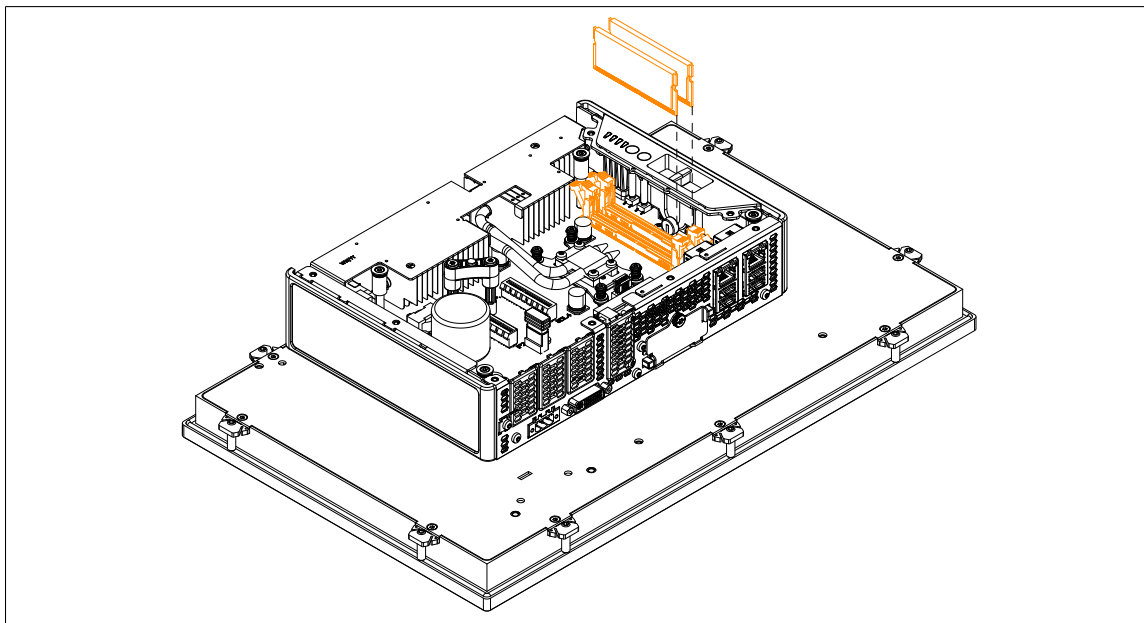


Figure 135: Installing an interface option

- b) When replacing the DDR4 SDRAM, the locking mechanism must first be released. The module can then be inserted or replaced. The locking mechanism engages and locks the SDRAM module when properly mounted.



7. Fasten the interface option to the housing using the Torx screws (T10).

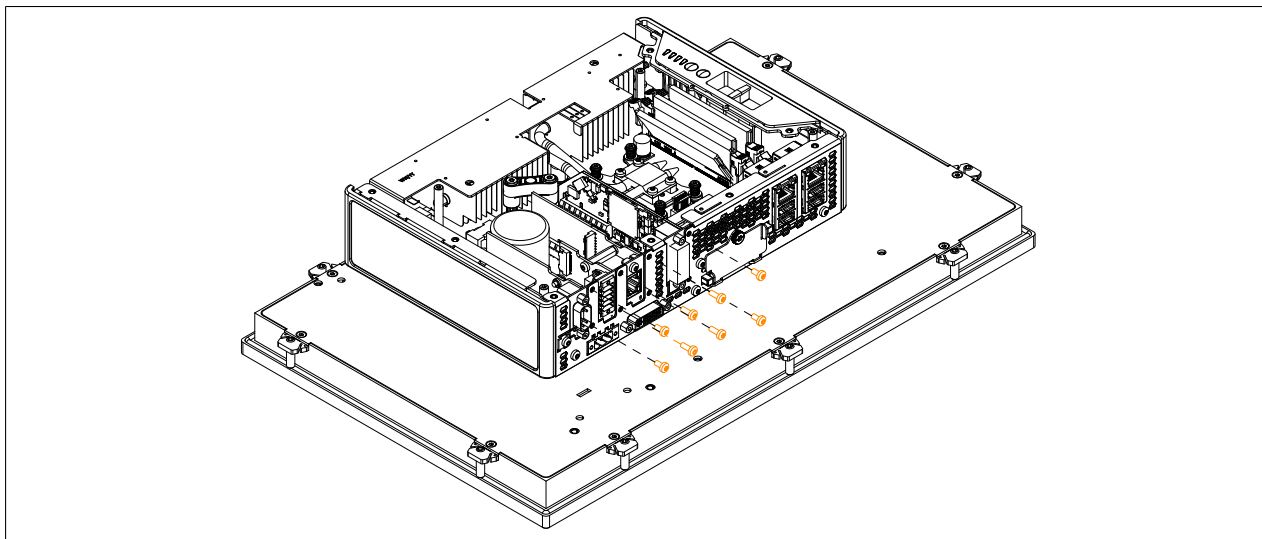


Figure 136: Securing the interface option

8. Install the cover.

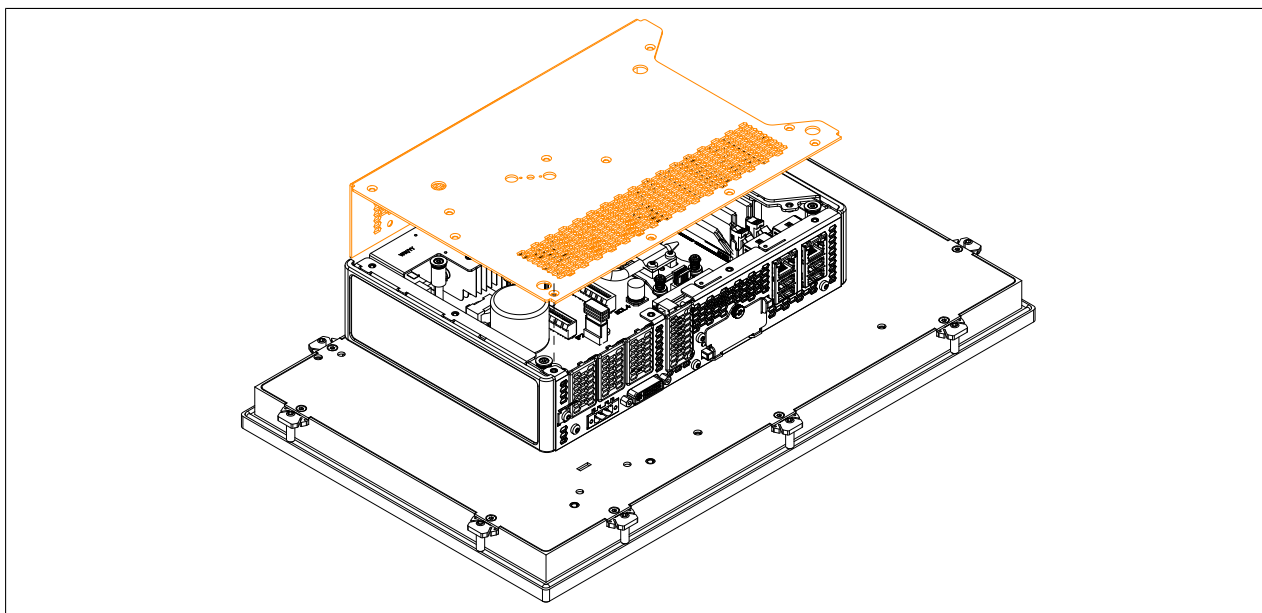


Figure 137: Installing the cover

9. Install the cover on the housing using the Torx screws (T10).

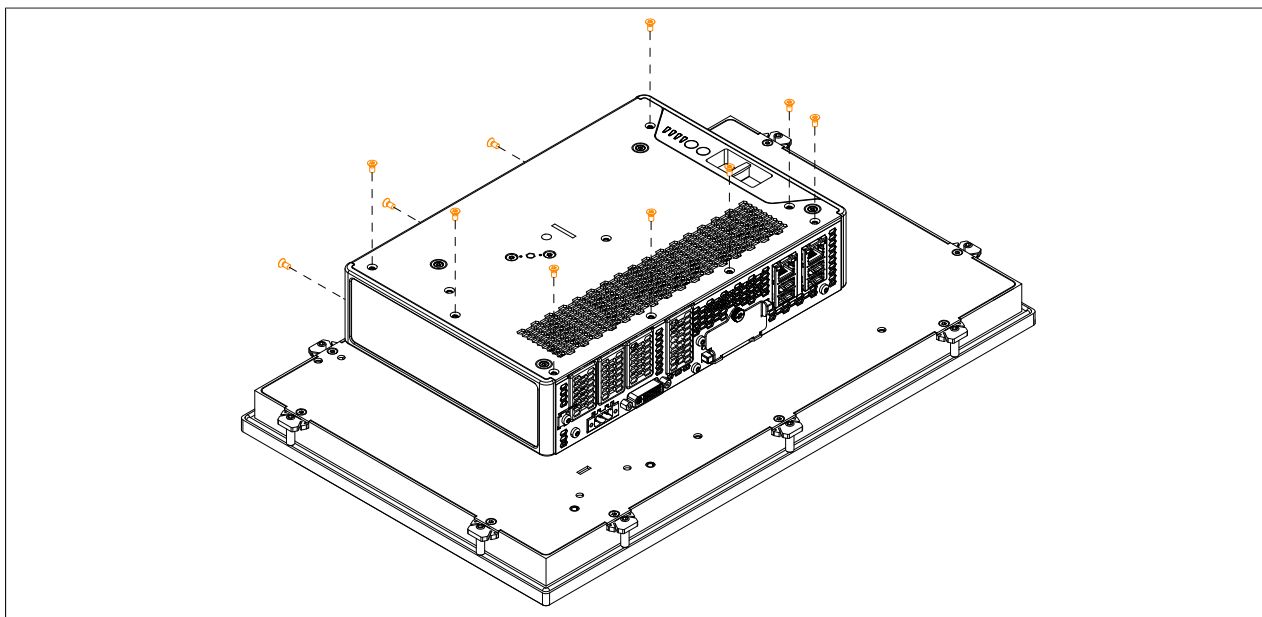


Figure 138: Securing the cover

8.5 Installing and connecting the UPS battery unit

Information:

For information about installing the UPS IF option, see section ["Installing the interface option and DDR4 SDRAM"](#) on page 306.

Warning!

Opening the UPS battery unit is not permitted!

1. Disconnect the power supply cable to the B&R industrial PC.
2. Install the battery unit. For the drilling template, see the technical data for the respective UPS battery unit. Ensure that the distance between the battery unit and the B&R industrial PC allows them to be connected with the UPS cable (0.5 m, 1 m or 3 m). 4 M5 screws, 4 flat washers and 1 screw locking washer are needed for installation (min. tightening torque 1.3 Nm, screw-in depth per applicable DIN regulations and the application). These are not included in delivery.
3. Connect the UPS cable to the battery. To do so, connect the red and black wires to the power supply (orange screw clamp terminal). Be sure to use the correct terminals (red wire to +, black wire to -)! Connect the white and brown wires to the temperature sensor (green screw clamp terminal) (brown wire to 1, white wire to 2).

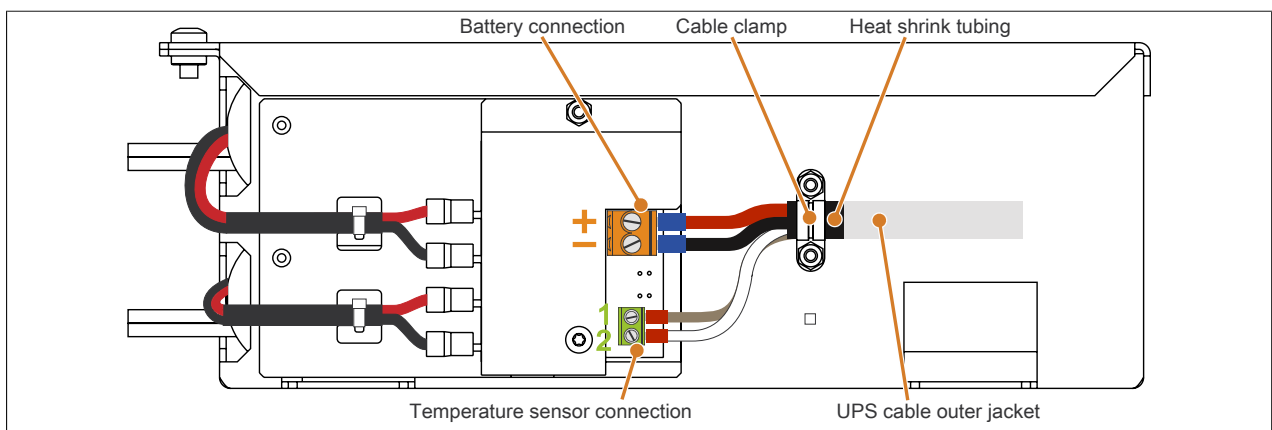


Figure 139: Connecting the UPS cable to the battery

4. Tighten the connected wires to the screw clamp terminals with a screwdriver (max. tightening torque 0.4 Nm).
5. Remove both nuts (M3) on the cable clamp and feed the UPS cable through.
6. Fasten the UPS cable using the cable clamp. Alternately tighten the previously removed nuts onto the cable clamp (max. tightening torque 0.35 Nm).
7. Connect the 4-pin screw clamp terminal block to the UPS IF option and tighten the two screws with a screwdriver (max. tightening torque 0.4 Nm).

8.5.1 Permissible mounting orientations

The UPS battery unit is only permitted to be installed as illustrated below.

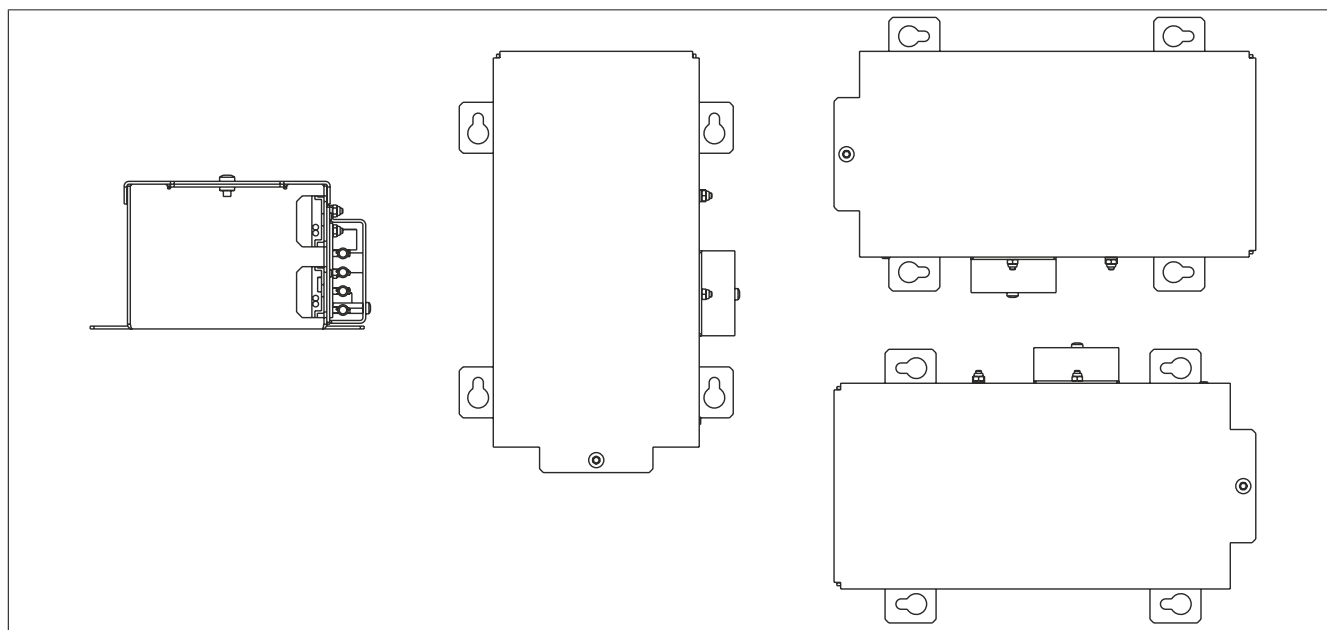


Figure 140: 5AC901.BUPS-0x - Mounting orientation

8.6 User tips for increasing the service life of the display

8.6.1 Backlight

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

8.6.1.1 How can the service life of backlights be extended?

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

8.6.2 Image persistence

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

There are 2 different types:

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

8.6.2.1 What causes image persistence?

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

8.6.2.2 How can image persistence be reduced?

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

8.7 Pixel errors

Information:

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

8.8 Repairs/Complaints and replacement parts

Danger!

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

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

9 Accessories

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

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

9.1 General accessories

The following accessories can be ordered for the Automation PC, Panel PC and Converter:

- Grounding clip

9.1.1 Accessories - Order data

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

9.2 0TB103.9x

9.2.1 General information

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

9.2.2 Order data

Model number	Short description	Figure
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 192: 0TB103.9, 0TB103.91 - Order data

9.2.3 Technical data

Information:

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

Model number	0TB103.9		0TB103.91	
General information				
Certifications				
CE		Yes		
EAC		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 data per UL		
Number of pins		3 (female)		
Type of terminal block		Screw clamp terminal block variant		Cage clamp terminal block variant ³⁾
Cable type		Only copper wires (no aluminum wires!)		
Spacing		5.08 mm		
Connection cross section				
AWG wire		26 to 14 AWG		26 to 12 AWG
Wire end sleeves with plastic covering		0.20 to 1.50 mm²		
Solid wires		0.20 to 2.50 mm²		
Fine-stranded wires		0.20 to 1.50 mm²		0.20 to 2.50 mm²
With wire end sleeves		0.20 to 1.50 mm²		
Tightening torque		0.4 Nm		-
Electrical properties				
Nominal voltage		300 V		
Nominal current ⁴⁾		10 A / contact		
Contact resistance		≤5 mΩ		
Operating conditions				
Pollution degreee per EN 61131-2		Pollution degree 2		

Table 193: 0TB103.9, 0TB103.91 - Technical data

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

9.3 Terminal block ready relay

9.3.1 0TB2104.8000

9.3.1.1 General information

This 1-row, 4-pin TB2104 terminal block is used for ready relay 5AC901.IRDY-00.

9.3.1.2 Order data

Model number	Short description	Figure
	Terminal blocks	
0TB2104.8000	Connector 24 VDC - 4-pin female - Screw clamp terminal block 2.5 mm ²	

Table 194: 0TB2104.8000 - Order data

9.3.1.3 Technical data

Information:

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

Model number	0TB2104.8000
General information	
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
Terminal block	
Note	Nominal data per UL
Number of pins	4 (female)
Type of terminal block	Screw clamp terminal block variant
Cable type	Only copper wires (no aluminum wires!)
Spacing	5.08 mm
Connection cross section	
AWG wire	26 to 14 AWG
Wire end sleeves with plastic covering	0.2 to 1.5 mm ²
Solid wires	0.2 to 2.5 mm ²
Fine strand wires	0.2 to 1.5 mm ²
With wire end sleeves	0.2 to 1.5 mm ²
Electrical characteristics	
Nominal voltage	300 V
Nominal current ¹⁾	10 A
Operating conditions	
Pollution degree per EN 61131-2	Pollution degree 2

Table 195: 0TB2104.8000 - Technical data

1) The respective limit data of the IF option must be taken into account!

9.4 Replacement CMOS batteries

9.4.1 0AC201.91 / 4A0006.00-000

9.4.1.1 General information

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

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

9.4.1.2 Order data

Model number	Short description	Figure
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell	
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	

Table 196: 0AC201.91, 4A0006.00-000 - Order data

9.4.1.3 Technical data

Warning!

The battery is only permitted to be replaced by a Renata CR2477N battery. The use of another battery may present a fire or explosion hazard.

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

Information:

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

Model number	0AC201.91	4A0006.00-000
General information		
Storage time	Max. 3 years at 30°C	
Certifications		
CE	Yes	
UL	cULus E115267 Industrial control equipment	
Electrical properties		
Capacity	950 mAh	
Self-discharge	<1% per year (at 23°C)	
Voltage range	3 V	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Ambient conditions		
Temperature		
Storage	-20 to 60°C	
Relative humidity		
Operation	0 to 95%	
Storage	0 to 95%	
Transport	0 to 95%	

Table 197: 0AC201.91, 4A0006.00-000 - Technical data

9.5 USB flash drives

9.5.1 5MMUSB.xxxx-01

9.5.1.1 General information

USB flash drives are easily replaceable storage media. Due to the fast data transfer (USB 2.0), USB flash drives offer optimal values for use as portable storage media. Without additional drivers, the USB flash drive immediately reports itself as another drive from which data can be read or to which data can be written (hot plugging).

Information:

Due to the large number of USB flash drives available on the market and their short lifecycles, we reserve the right to supply alternative products. It may therefore be necessary to take the following measures in order to also boot from these USB flash drives:

- The USB flash drive must be reformatted or, in some cases, repartitioned (set partition as active).
- The USB flash drive must be in the first position in the boot sequence; alternatively, the IDE controllers can be disabled in BIOS. In most cases, this can be avoided by running "fdisk / mbr" on the USB flash drive.

9.5.1.2 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 198: 5MMUSB.2048-01, 5MMUSB.4096-01 - Order data

9.5.1.3 Technical data

Information:

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

Model number	5MMUSB.2048-01	5MMUSB.4096-01
General information		
Capacity	2 GB	4 GB
LEDs	1 LED (green) ¹⁾	
MTBF	>3,000,000 hours	
Type	USB 1.1, USB 2.0	
Servicing	None	
Default file system	FAT32	
Certifications		
CE	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) to 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 memory	Yes	
Data retention	>10 years	
Data reliability	<1 unrecoverable error per 10 ¹⁴ bits read	
Mating cycles	>1500	

Table 199: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

Model number	5MMUSB.2048-01	5MMUSB.4096-01
Support		
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 XP Embedded	Yes	
Windows 2000	Yes	
Windows CE 5.0	Yes	
Windows CE 4.2	Yes	
B&R Linux 9	Yes	
B&R Linux 8	Yes	
Electrical properties		
Current consumption	Max. 500 µA in sleep mode, max. 120 mA read/write	
Ambient 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 199: 5MMUSB.2048-01, 5MMUSB.4096-01 - Technical data

- 1) Signals data transfer (reception and transmission).
2) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.

9.5.1.4 Temperature/Humidity diagram

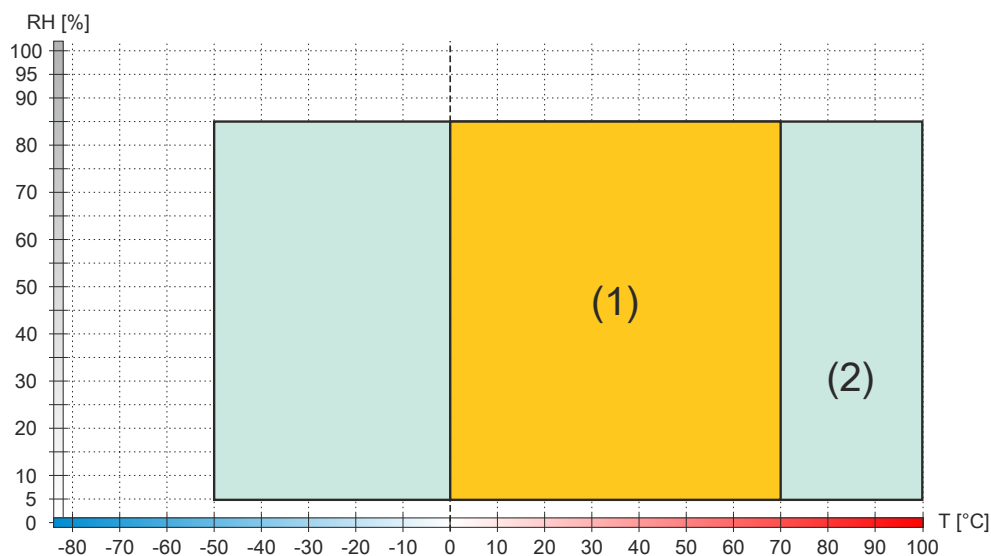


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and non-condensing

9.5.2 5MMUSB.032G-02

9.5.2.1 General information

USB flash drives are easily replaceable storage media. Due to the fast data transfer (USB 3.0), USB flash drives offer optimal values for use as portable storage media. Without additional drivers, the USB flash drive immediately reports itself as another drive from which data can be read or to which data can be written (hot plugging). USB 3.0 (XHCI) is supported in Windows 7 and later (USB 3.0 driver required).

Information:

Due to the large number of USB flash drives available on the market and their short lifecycles, we reserve the right to supply alternative products. It may therefore be necessary to take the following measures in order to also boot from these USB flash drives:

- The USB flash drive must be reformatted or, in some cases, repartitioned (set partition as active).
- The USB flash drive must be in the first position in the boot sequence; alternatively, the IDE controllers can be disabled in BIOS. In most cases, this can be avoided by running "fdisk / mbr" on the USB flash drive.

9.5.2.2 Order data

Model number	Short description	Figure
	USB accessories	
5MMUSB.032G-02	USB 3.0 flash drive 32 GB MLC	

Table 200: 5MMUSB.032G-02 - Order data

9.5.2.3 Technical data

Information:

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

Model number	5MMUSB.032G-02
General information	
Capacity	32 GB
LEDs	1 LED (green) ¹⁾
MTBF	>3,000,000 hours
Type	USB 2.0, USB 3.0
Servicing	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 memory	Yes
Data reliability	<1 unrecoverable error per 10 ¹⁴ bits read
Mating cycles	>1500
Electrical properties	
Current consumption	Max. 67 mA in sleep mode, max. 122 mA read, max. 141 mA write
Ambient conditions	
Temperature	
Operation	0 to 70°C ²⁾
Storage	-55 to 95°C
Transport	-55 to 95°C

Table 201: 5MMUSB.032G-02 - Technical data

Accessories

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	1500 g, 0.5 ms
Storage	1500 g, 0.5 ms
Transport	1500 g, 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
Vendor information	
Manufacturer	Innodisk
Manufacturer's product ID	DEUA1-32GI61BCH88 (USB Drive 3ME)

Table 201: 5MMUSB.032G-02 - Technical data

- 1) Signals data transfer (reception and transmission).
 2) The maximum ambient temperature is typically derated 1°C per 1000 meters starting at 500 m above sea level.

9.5.2.4 Temperature/Humidity diagram

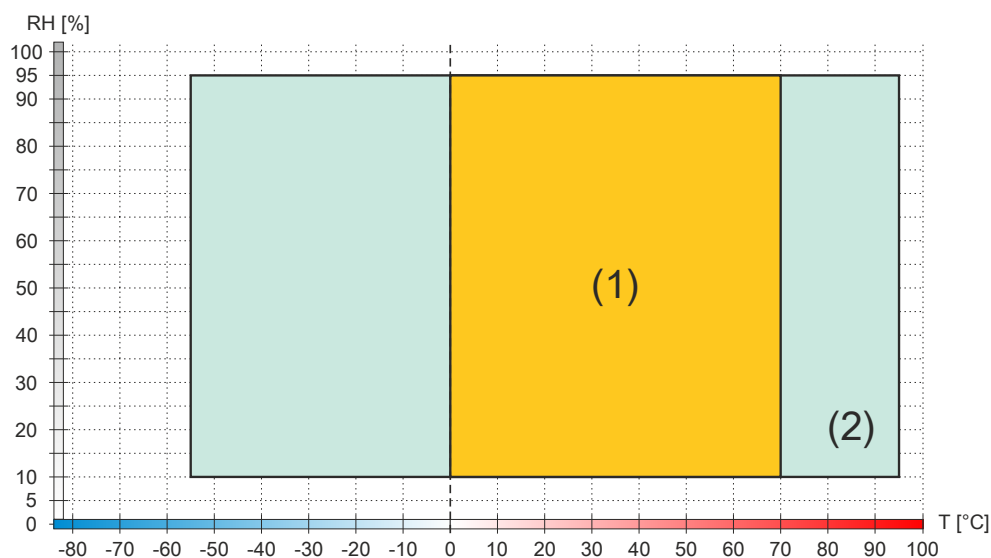


Diagram legend			
(1)	Operation	T [°C]	Temperature in °C
(2)	Storage and transport	RH [%]	Relative humidity (RH) in percent and non-condensing

9.6 Cables

9.6.1 SDL3/SDL4 cables

9.6.1.1 5CASD3.xxxx-00

9.6.1.1.1 General information

5CASD3.xxxx-00 SDL3/SDL4 cables are designed to transfer SDL3/SDL4 data and enable easy cable installation. Due to the RJ45 connector, the cable is also suitable for narrow feed-throughs, e.g. in swing arm shafts.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

9.6.1.1.2 Order data

Model number	Short description	Figure
	SDL3/SDL4/PoE cables	
5CASD3.0030-00	SDL3/SDL4 cable - 3 m	
5CASD3.0050-00	SDL3/SDL4 cable - 5 m	
5CASD3.0100-00	SDL3/SDL4 cable - 10 m	
5CASD3.0150-00	SDL3/SDL4 cable - 15 m	
5CASD3.0200-00	SDL3/SDL4 cable - 20 m	
5CASD3.0300-00	SDL3/SDL4 cable - 30 m	
5CASD3.0500-00	SDL3/SDL4 cable - 50 m	
5CASD3.1000-00	SDL3/SDL4 cable - 100 m	

Table 202: 5CASD3.0030-00, 5CASD3.0050-00, 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Order data

9.6.1.1.3 Technical data

Information:

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

Model number	5CASD3. 0030-00	5CASD3. 0050-00	5CASD3. 0100-00	5CASD3. 0150-00	5CASD3. 0200-00	5CASD3. 0300-00	5CASD3. 0500-00	5CASD3. 1000-00
General information								
Certifications								
CE	Yes							
EAC	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⁾							
Cable construction								
Wire cross section	4x 2x 26/7 AWG					4x 2x 23/1 AWG		
Properties	Flame-retardant, halogen-free, lead-free							
Outer jacket								
Material	Polyurethane (PUR)							
Color	Yellow, RAL 1021							
Labeling	HARTING INDUSTRIAL CABLE S/FTP CAT 6A PUR 4x2xAWG26/7					HARTING INDUSTRIAL INSTALLATION CABLE S/FTP CAT 7 PUR 4x2xAWG23/1		
Lines								
Wire insulation	Polyethylene (PE)							
Wire colors	Green/White-green, orange/white-orange, blue/white-blue, brown/white-brown							
Shield	Aluminum foil and braided wire shield composed of tinned copper wires							
Type	Bare copper strand, 4x 2x 26/7 AWG					Bare copper strand, 4x 2x 23/1 AWG		
Connector								
Type	2x RJ45, male							
Mating cycles	Min. 750							
Contacts	8							
Electrical properties ²⁾								
Operating voltage	≤100 V					≤125 V		

Table 203: 5CASD3.0030-00, 5CASD3.0050-00, 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Technical data

Accessories

Model number	5CASD3. 0030-00	5CASD3. 0050-00	5CASD3. 0100-00	5CASD3. 0150-00	5CASD3. 0200-00	5CASD3. 0300-00	5CASD3. 0500-00	5CASD3. 1000-00
Conductor resistance	≤290 Ω/km					≤75 Ω/km		
Wave impedance	100 ±5 Ω (at 100 MHz)							
Transfer properties	Category 6A / Class EA up to 500 MHz per ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)					Category 7 / Class F up to 600 MHz per ISO/IEC 11801 (EN 50173-1), ISO/IEC 24702 (EN 50173-3)		
Insulation resistance	≥500 MΩ/km					≥5 GΩ/km		
Operating conditions								
Pollution degree per EN 61131-2	Pollution degree 2							
Flame-retardant	IEC 60332-1-2							
Oil and hydrolysis resistance	EN 60811-2-1 (90°C / 7x24 h)							
Degree of protection per EN 60529	IP20							
Cables	IP20							
RJ45 connector	IP20, only when properly connected							
Ambient conditions								
Temperature								
Storage	-40 to 70°C							
Fixed installation	-40 to 70°C							
Flexible installation	-40 to 70°C					-10 to 50°C		
Mechanical properties								
Dimensions								
Length	3 m	5 m	10 m	15 m	20 m	30 m	50 m	100 m
Diameter	6.7 mm					8.3 mm		
Bend radius								
Fixed installation	≥5x diameter					≥4x diameter		
Flexible installation	≥10x diameter					≥8x diameter		
Weight	250 g	500 g	700 g	950 g	2150 g	3500 g	6950 g	
Tension								
In operation	≤70 N					≤110 N		
During installation	≤70 N					≤110 N		

Table 203: 5CASD3.0030-00, 5CASD3.0050-00, 5CASD3.0100-00, 5CASD3.0150-00, 5CASD3.0200-00, 5CASD3.0300-00, 5CASD3.0500-00, 5CASD3.1000-00 - Technical data

- 1) Yes, but applies only if all components installed in the complete system have this certification and the complete system bears the corresponding mark.
- 2) At 20°C ambient temperature.

9.6.1.1.4 Bend radius specification

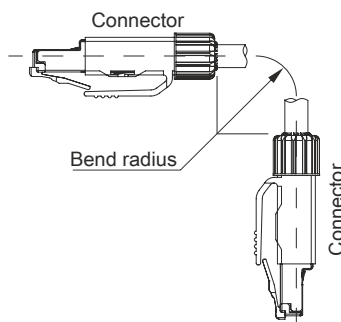


Figure 141: SDL3/SDL4 - Bend radius specification

9.6.1.1.5 Dimensions

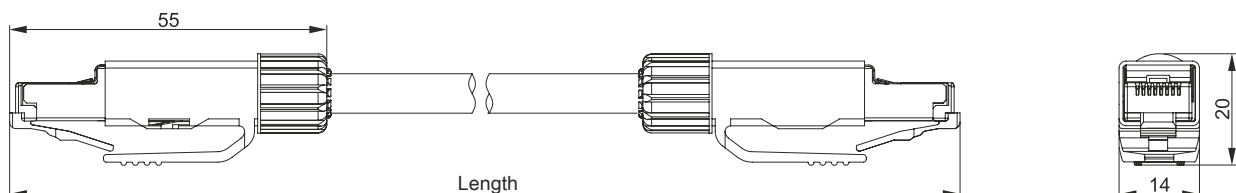


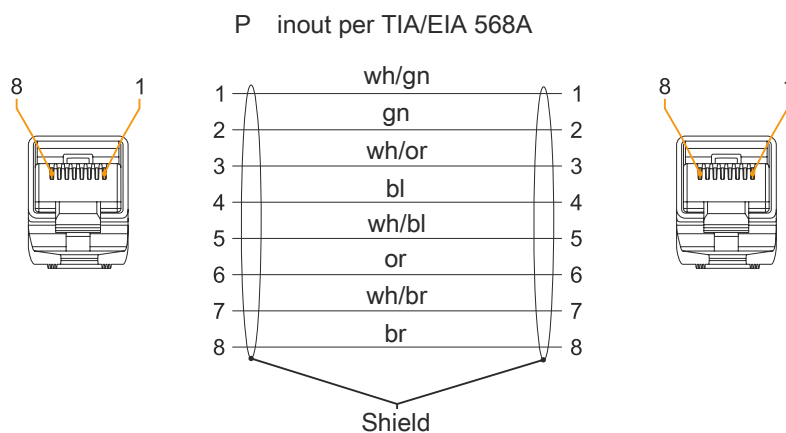
Figure 142: 5CASD3.xxxx-00 - Dimensions

9.6.1.1.6 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.



9.6.1.1.7 Wiring

The following information and figure apply if a field-assembled cable is used and connected to an RJ45 network connector (e.g. patch panel) instead of directly to a B&R device.

The wiring must comply with category 6A (Cat 6A) or 7 (Cat 7) requirements. The maximum total length of 100 m is not permitted to be exceeded.

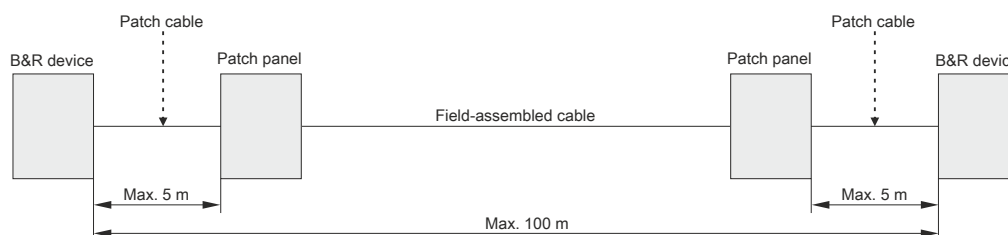


Figure 143: Wiring with a field-assembled cable

9.6.2 SDL cables

9.6.2.1 5CASDL.0xxx-00

9.6.2.1.1 General information

5CASDL.0xxx-00 SDL cables are designed for use in fixed installations. For flexible installations (e.g. swing arm systems), the use of 5CASDL.0xxx-03 SDL flex cables is required.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

9.6.2.1.2 Order data

Model number	Short description	Figure
	SDL cables	
5CASDL.0008-00	SDL cable - 0.8 m	
5CASDL.0018-00	SDL cable - 1.8 m	
5CASDL.0050-00	SDL cable - 5 m	
5CASDL.0060-00	SDL cable - 6 m	
5CASDL.0100-00	SDL cable - 10 m	
5CASDL.0150-00	SDL cable - 15 m	
5CASDL.0200-00	SDL cable - 20 m	
5CASDL.0250-00	SDL cable - 25 m	
5CASDL.0300-00	SDL cable - 30 m	

Table 204: 5CASDL.0008-00, 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0060-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Order data

9.6.2.1.3 Technical data

Information:

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

Model number	5CASDL. 0008-00	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0060-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
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⁾								
Cable construction									
Wire cross section	28 AWG				24 AWG				
Shield	Individual cable pairs, entire cable								
Cable shield	Tinned copper braiding, optical coverage > 85%								
Outer jacket									
Material	PVC								
Color	Black								
Labeling	E74020-C (UL) AWM STYLE 20176 80°C 30V VW-1 DVI DIGITAL LINK								
Connector									
Type	2x DVI-D (24+1), male								
Mating cycles	100								
Contacts	Gold-plated								
Mechanical protection	Metal cover with crimped strain relief								
Locating screw tightening torque	Max. 0.5 Nm								
Electrical properties									
Conductor resistance									
24 AWG	-				≤93 Ω/km				
28 AWG	≤237 Ω/km				-				

Table 205: 5CASDL.0008-00, 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0060-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

Model number	5CASDL. 0008-00	5CASDL. 0018-00	5CASDL. 0050-00	5CASDL. 0060-00	5CASDL. 0100-00	5CASDL. 0150-00	5CASDL. 0200-00	5CASDL. 0250-00	5CASDL. 0300-00
Insulation resistance	Min. 10 MΩ/km								
Operating conditions									
Pollution degree per EN 61131-2	Pollution degree 2								
Mechanical properties									
Dimensions									
Length	0.8 m ±25 mm	1.8 m ±30 mm	5 m ±30 mm	6 m ±30 mm	10 m ±50 mm	15 m ±100 mm	20 m ±100 mm	25 m ±100 mm	30 m ±100 mm
Diameter	Typ. 8.6 ±0.2 mm Max. 9 mm				Typ. 11 ±0.2 mm Max. 11.5 mm				
Bend radius	≥5x cable diameter (connector to ferrite bead and ferrite bead to ferrite bead)								
Flexibility	Conditionally flexible, applies from ferrite bead to ferrite bead (tested 100 cycles at 5x cable diameter, 20 cycles/minute)								
Weight	Approx. 206 g	Approx. 300 g	Approx. 580 g	Approx. 700 g	Approx. 1500 g	Approx. 2250 g	Approx. 2880 g	Approx. 4800 g	Approx. 5520 g

Table 205: 5CASDL.0008-00, 5CASDL.0018-00, 5CASDL.0050-00, 5CASDL.0060-00, 5CASDL.0100-00, 5CASDL.0150-00, 5CASDL.0200-00, 5CASDL.0250-00, 5CASDL.0300-00 - Technical data

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

9.6.2.1.4 Bend radius specification

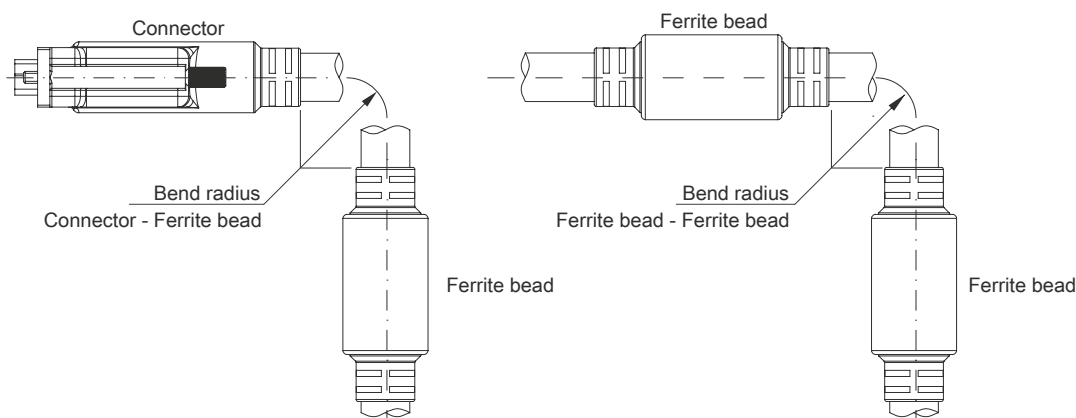


Figure 144: Bend radius specification

9.6.2.1.5 Dimensions

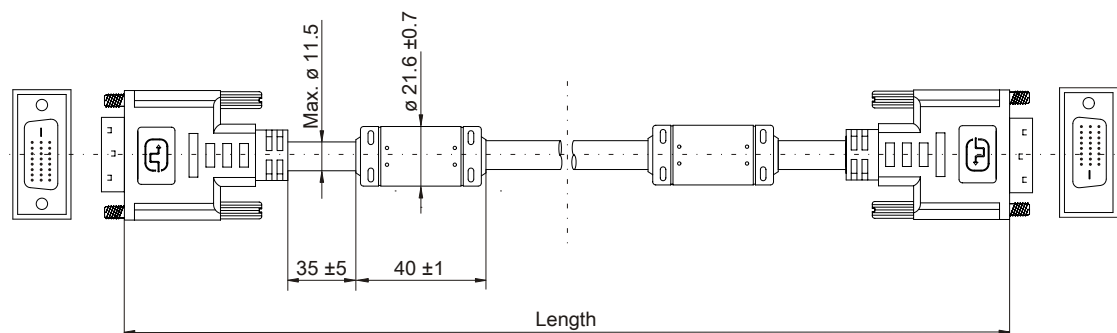


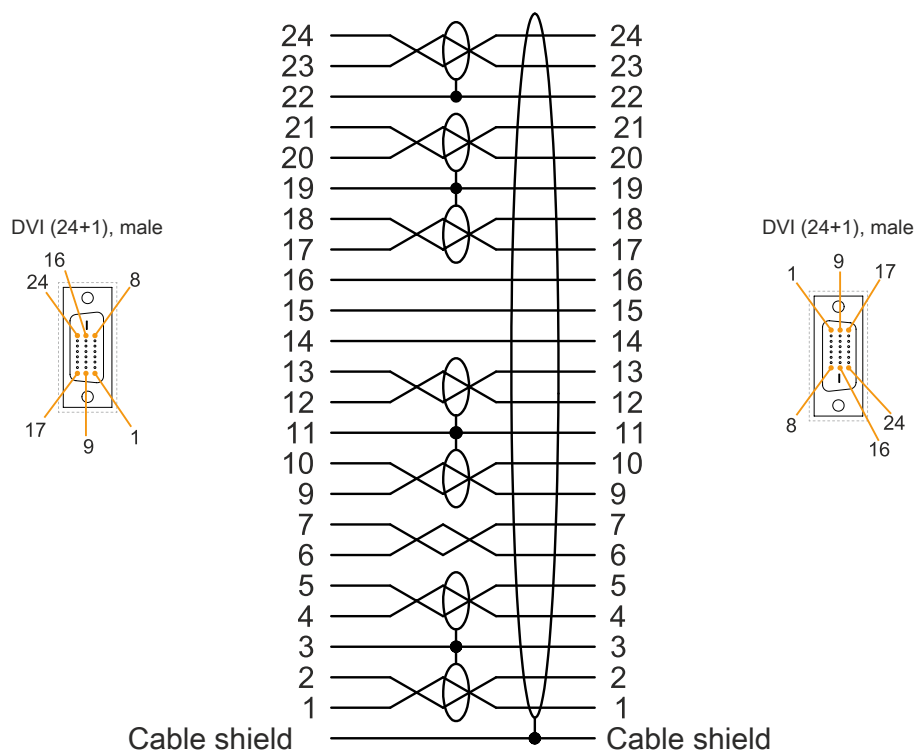
Figure 145: 5CASDL.0xxx-00- Dimensions

9.6.2.1.6 Cable pinout

Field-assembled cables must be created according to the following assignment.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMDS data 2 negative	13	XUSB0 positive
2	TMDS data 2 positive	14	+5 V
3	Shielding TMDS data 2 and SDL	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDS data 0 negative
6	DDC data	18	TMDS data 0 positive
7	DDC clock	19	Shielding TMDS data 0 and XUSB1
8	Not connected	20	XUSB1 negative
9	TMDS data 1 negative	21	XUSB1 positive
10	TMDS data 1 positive	22	TMDS data shield
11	TMDS data 1 and XUSB0 shield	23	TMDS clock positive
12	XUSB0 negative	24	TMDS clock negative

9.6.3 SDL cables with 45° connector

9.6.3.1 5CASDL.0xxx-01

9.6.3.1.1 General information

5CASDL.0xxx-01 SDL cables with 45° connector are designed for use in fixed installations.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

9.6.3.1.2 Order data

Model number	Short description	Figure
	SDL cables with 45° connector	
5CASDL.0018-01	SDL cable - 45-degree connector - 1.8 m	
5CASDL.0050-01	SDL cable - 45-degree connector - 5 m	
5CASDL.0100-01	SDL cable - 45-degree connector - 10 m	
5CASDL.0150-01	SDL cable - 45-degree connector - 15 m	

Table 206: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Order data

9.6.3.1.3 Technical data

Information:

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

Model number	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
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⁾			
Cable construction				
Wire cross section	28 AWG		24 AWG	
Shield	Individual cable pairs, entire cable			
Cable shield	Tinned copper braiding, optical coverage > 85%			
Outer jacket				
Material	PVC			
Color	Black			
Connector				
Type	2x DVI-D (24+1), male			
Mating cycles	100			
Contacts	Gold-plated			
Mechanical protection	Metal cover with crimped strain relief			
Locating screw tightening torque	Max. 0.5 Nm			
Electrical properties				
Conductor resistance				
24 AWG	-		≤93 Ω/km	
28 AWG	≤237 Ω/km		-	
Insulation resistance	Min. 10 MΩ/km			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Mechanical properties				
Dimensions				
Length	1.8 m ±30 mm	5 m ±50 mm	10 m ±100 mm	15 m ±100 mm
Diameter	Max. 9 mm		Max. 11.5 mm	

Table 207: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

Model number	5CASDL.0018-01	5CASDL.0050-01	5CASDL.0100-01	5CASDL.0150-01
Bend radius	$\geq 5 \times$ cable diameter (connector to ferrite bead and ferrite bead to ferrite bead)			
Fixed installation				
Flexibility	Conditionally flexible, applies from ferrite bead to ferrite bead (tested 100 cycles at $5 \times$ cable diameter, 20 cycles/minute)			
Weight	Approx. 300 g	Approx. 590 g	Approx. 2800 g	Approx. 2860 g

Table 207: 5CASDL.0018-01, 5CASDL.0050-01, 5CASDL.0100-01, 5CASDL.0150-01 - Technical data

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

9.6.3.1.4 Bend radius specification

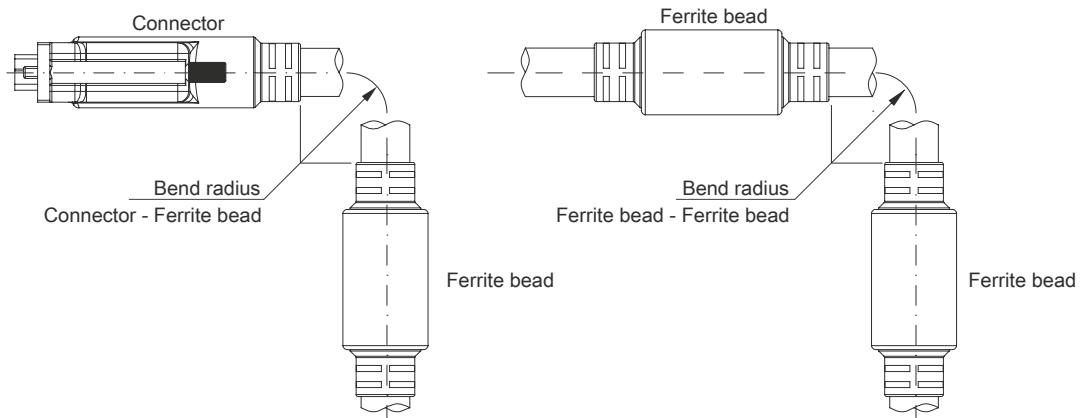


Figure 146: Bend radius specification

9.6.3.1.5 Dimensions

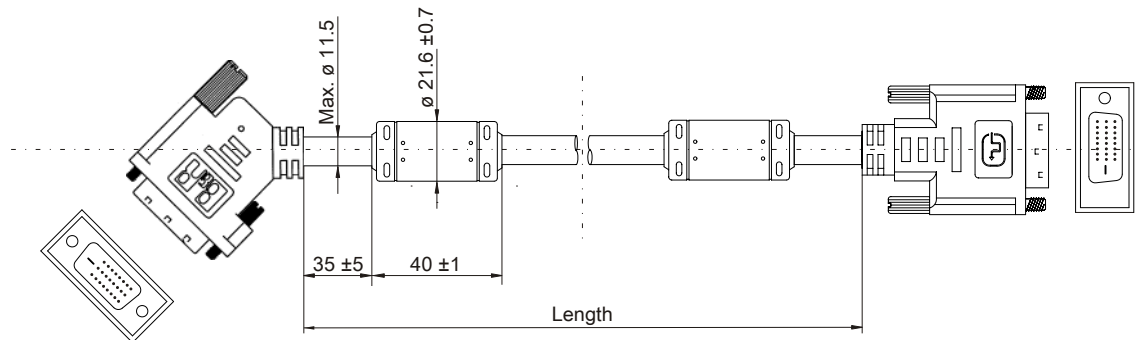


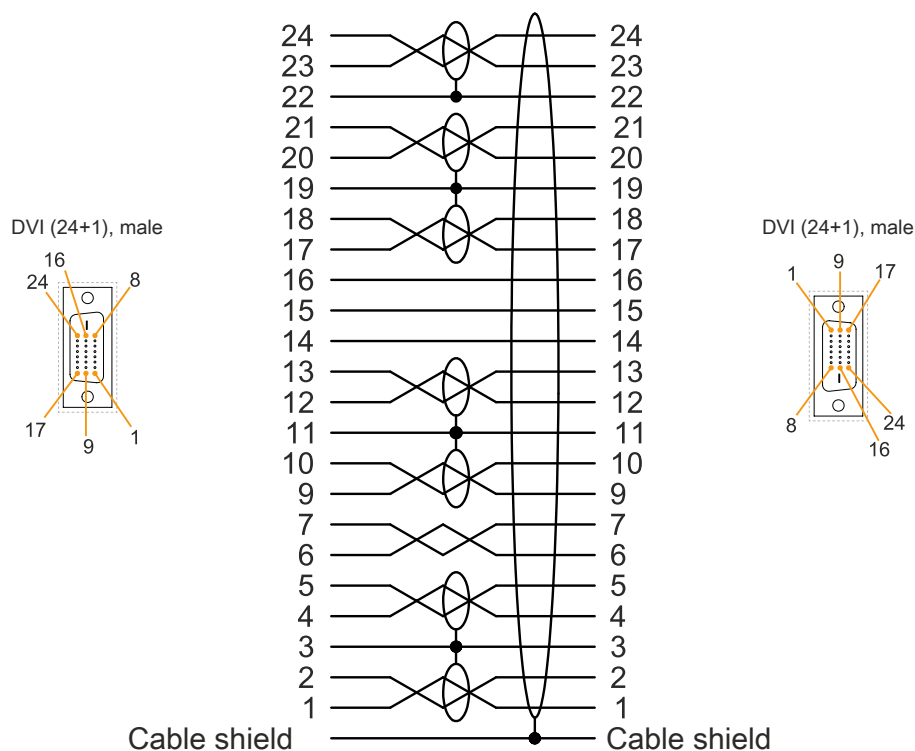
Figure 147: 5CASDL.0xxx-01 - Dimensions

9.6.3.1.6 Cable pinout

Field-assembled cables must be created according to the following assignment.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMDS data 2 negative	13	XUSB0 positive
2	TMDS data 2 positive	14	+5 V
3	Shielding TMDS data 2 and SDL	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDS data 0 negative
6	DDC data	18	TMDS data 0 positive
7	DDC clock	19	Shielding TMDS data 0 and XUSB1
8	Not connected	20	XUSB1 negative
9	TMDS data 1 negative	21	XUSB1 positive
10	TMDS data 1 positive	22	TMDS data shield
11	TMDS data 1 and XUSB0 shield	23	TMDS clock positive
12	XUSB0 negative	24	TMDS clock negative

9.6.4 SDL flex cables

9.6.4.1 5CASDL.0xxx-03

9.6.4.1.1 General information

5CASDL.0xxx-03 SDL flex cables are designed for use in fixed as well as flexible installations (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

9.6.4.1.2 Order data

Model number	Short description	Figure
	SDL flex cable	
5CASDL.0018-03	SDL flex cable - 1.8 m	
5CASDL.0050-03	SDL flex cable - 5 m	
5CASDL.0100-03	SDL flex cable - 10 m	
5CASDL.0150-03	SDL flex cable - 15 m	
5CASDL.0200-03	SDL flex cable - 20 m	
5CASDL.0250-03	SDL flex cable - 25 m	
5CASDL.0300-03	SDL flex cable - 30 m	

Table 208: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Order data

9.6.4.1.3 Technical data

Information:

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

Model number	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
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⁾						
Cable construction							
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)						
Properties	Halogen- and silicone-free						
Shield	Individual cable pairs, entire cable						
Cable shield	Aluminum-clad foil and tinned copper braiding						
Outer jacket							
Material	Special semi-matte TMPU						
Color	Black						
Labeling	(B&R) SDL Cable (UL) AWM 20236 80°C 30V E 63216						
Connector							
Type	2x DVI-D (24+1), male						
Mating cycles	Min. 200						
Contacts	Gold-plated						
Mechanical protection	Metal cover with crimped strain relief						
Locating screw tightening torque	Max. 0.5 Nm						
Electrical properties							
Operating voltage	≤30 V						

Table 209: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

Model number	5CASDL. 0018-03	5CASDL. 0050-03	5CASDL. 0100-03	5CASDL. 0150-03	5CASDL. 0200-03	5CASDL. 0250-03	5CASDL. 0300-03
Test voltage							
Wire/Wire	1 kV						
Wire/Shield	0.5 kV						
Wave impedance	100 ±10 Ω						
Conductor resistance							
24 AWG	≤95 Ω/km						
26 AWG	≤145 Ω/km						
Insulation resistance	>200 MΩ/km						
Operating conditions							
Pollution degree per EN 61131-2	Pollution degree 2						
Approbation	UL AWM 20236 80°C 30 V						
Flame-retardant	Per UL 758 (cable vertical flame test)						
Oil and hydrolysis resistance	Per VDE 0282-10						
Ambient conditions							
Temperature							
Storage	-20 to 80°C						
Fixed installation	-20 to 80°C						
Flexible installation	-5 to 60°C						
Mechanical properties							
Dimensions							
Length	1.8 m ±20 mm	5 m ±45 mm	10 m ±90 mm	15 m ±135 mm	20 m ±180 mm	25 m ±225 mm	30 m ±270 mm
Diameter	Max. 12 mm						
Bend radius							
Fixed installation	≥3.5x cable diameter						
Flexible installation	≥15x cable diameter (from ferrite bead to ferrite bead)						
Flexibility	Flexible, applies from ferrite bead to ferrite bead (tested 300000 cycles at 15x cable diameter, 4800 cycles/hour)						
Drag chain data							
Flex cycles	300,000						
Speed	4800 cycles/hour						
Bend radius	180 mm, 15x cable diameter						
Hub	460 mm						
Weight	Approx. 460 g	Approx. 1020 g	Approx. 1940 g	Approx. 2840 g	Approx. 3740 g	Approx. 4560 g	Approx. 5590 g
Tension							
In operation	≤50 N						
During installation	≤400 N						

Table 209: 5CASDL.0018-03, 5CASDL.0050-03, 5CASDL.0100-03, 5CASDL.0150-03, 5CASDL.0200-03, 5CASDL.0250-03, 5CASDL.0300-03 - Technical data

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

9.6.4.1.4 Bend radius specification

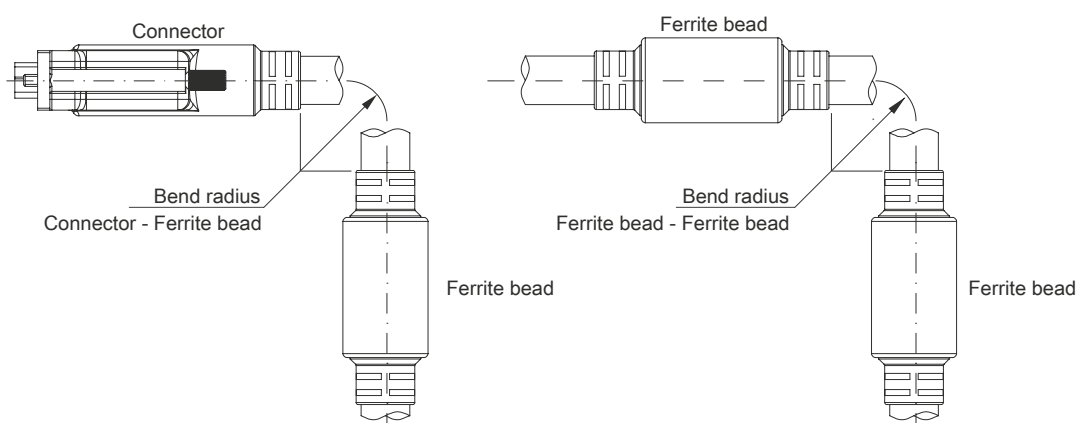


Figure 148: Bend radius specification

9.6.4.1.5 Dimensions

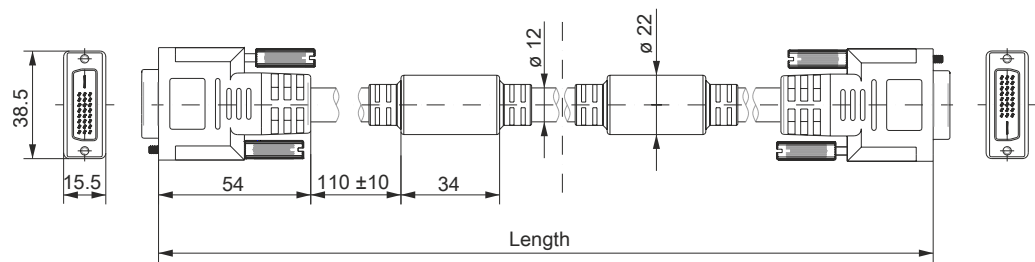


Figure 149: 5CASDL.0xxx-03 ≥ Rev. E0 - Dimensions

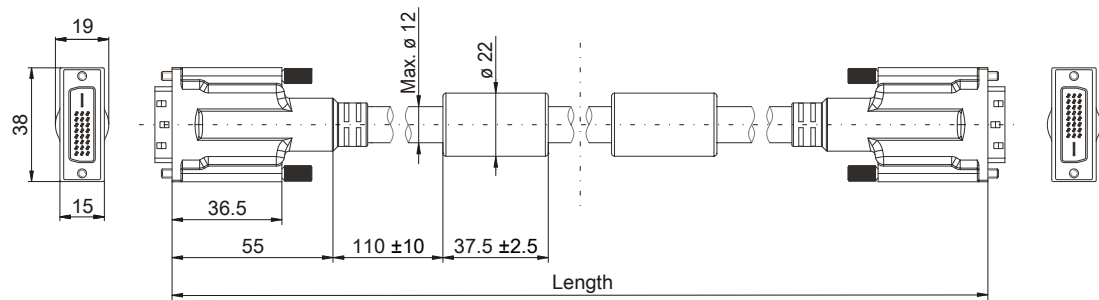


Figure 150: 5CASDL.0xxx-03 ≤ Rev. D0 - Dimensions

9.6.4.1.6 Structure 5CASDL.0xxx-03

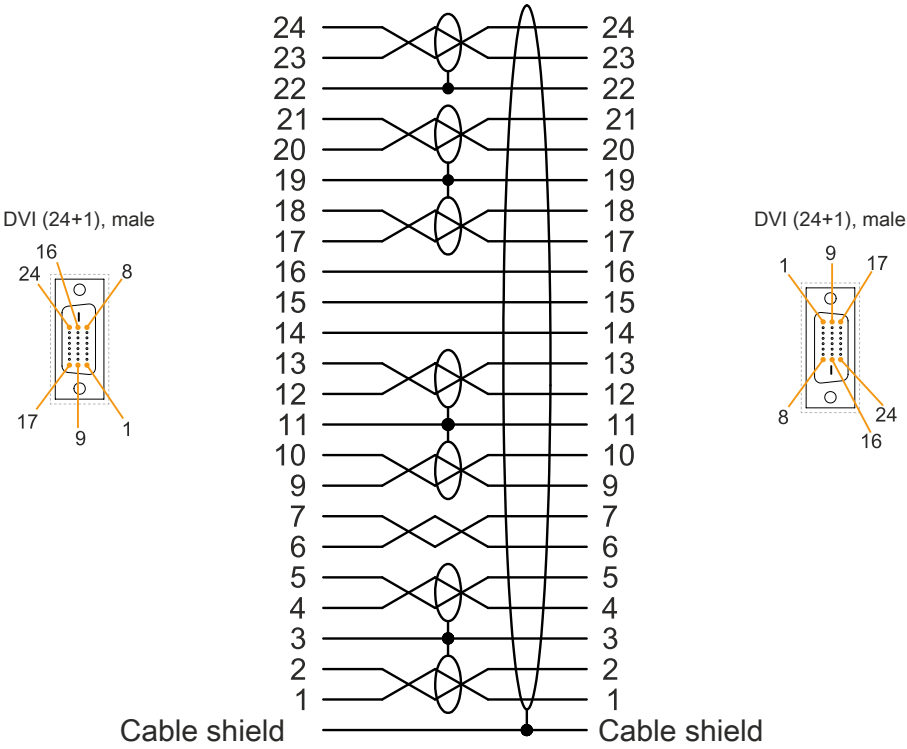
Element	Pinout	Cross section	
DVI	TMDS data 0	26 AWG	
	TMDS data 1	26 AWG	
	TMDS data 2	26 AWG	
	TMDS clock	26 AWG	
USB	XUSB0	26 AWG	
	XUSB1	26 AWG	
Data	SDL	26 AWG	
Control wires	DDC clock	24 AWG	
	DDC data	24 AWG	
	+5 V	24 AWG	
	Ground	24 AWG	
	Hot plug detection	24 AWG	

9.6.4.1.7 Cable pinout

Field-assembled cables must be created according to the following assignment.

Information:

Functionality is only guaranteed for the cables available from B&R.



Pin	Pinout	Pin	Pinout
1	TMDS data 2 negative	13	XUSB0 positive
2	TMDS data 2 positive	14	+5 V
3	Shielding TMDS data 2 and SDL	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDS data 0 negative
6	DDC data	18	TMDS data 0 positive
7	DDC clock	19	Shielding TMDS data 0 and XUSB1
8	Not connected	20	XUSB1 negative
9	TMDS data 1 negative	21	XUSB1 positive
10	TMDS data 1 positive	22	TMDS data shield
11	TMDS data 1 and XUSB0 shield	23	TMDS clock positive
12	XUSB0 negative	24	TMDS clock negative

9.6.5 SDL flex cables with extender

9.6.5.1 5CASDL.0xx0-13

9.6.5.1.1 General information

5CASDL.0xx0-13 SDL flex cables with extender are designed for use in fixed as well as flexible installations (e.g. swing arm systems).

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

9.6.5.1.2 Order data

Model number	Short description	Figure
	SDL flex cables	
5CASDL.0300-13	SDL flex cable with extender - 30 m	
5CASDL.0400-13	SDL flex cable with extender - 40 m	
5CASDL.0430-13	SDL flex cable with extender - 43 m	

Table 210: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Order data

9.6.5.1.3 Technical data

Information:

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

Model number	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
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⁾		
Cable construction			
Wire cross section	24 AWG (control wires) 26 AWG (DVI, USB, data)		
Properties	Halogen- and silicone-free		
Shield	Individual cable pairs, entire cable		
Cable shield	Aluminum-clad foil and tinned copper braiding		
Outer jacket			
Material	Special semi-matte TMPU		
Color	Black		
Labeling	(B&R) SDL Cable (UL) AWM 20236 80°C 30V E63216		
Connector			
Type	2x DVI-D (24+1), male		
Mating cycles	Min. 200		
Contacts	Gold-plated		
Mechanical protection	Metal cover with crimped strain relief		
Locating screw tightening torque	Max. 0.5 Nm		
Electrical properties			
Operating voltage	≤30 V		
Test voltage			
Wire/Wire	1 kV		
Wire/Shield	0.5 kV		
Wave impedance	100 ±10 Ω		
Conductor resistance			
24 AWG	≤95 Ω/km		
26 AWG	≤145 Ω/km		
Insulation resistance	>200 MΩ/km		

Table 211: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

Model number	5CASDL.0300-13	5CASDL.0400-13	5CASDL.0430-13
Operating conditions			
Pollution degree per EN 61131-2		Pollution degree 2	
Approbation		UL AWM 20236 80°C 30 V	
Flame-retardant		Per UL 758 (cable vertical flame test)	
Oil and hydrolysis resistance		Per VDE 0282-10	
Ambient conditions			
Temperature			
Storage		-20 to 60°C	
Fixed installation		-20 to 60°C	
Flexible installation		-5 to 60°C	
Mechanical properties			
Dimensions			
Length	30 m ±280 mm	40 m ±380 mm	43 m ±410 mm
Diameter		Max. 12 mm	
Extender box			
Width		35 mm	
Length		125 mm	
Height		18.5 mm	
Bend radius			
Fixed installation		≥6x cable diameter (from connector to ferrite bead) ≥10x cable diameter (from ferrite bead to ferrite bead)	
Flexible installation		≥15x cable diameter (from ferrite bead to ferrite bead)	
Flexibility		Flexible, applies from ferrite bead to ferrite bead (tested 300000 cycles at 15x cable diameter, 4800 cycles/hour)	
Drag chain data			
Flex cycles		300,000	
Speed		4800 cycles/hour	
Bend radius		180 mm, 15x cable diameter	
Hub		460 mm	
Weight	Approx. 5430 g	Approx. 7200 g	Approx. 7790 g
Tension			
In operation		≤50 N	
During installation		≤400 N	

Table 211: 5CASDL.0300-13, 5CASDL.0400-13, 5CASDL.0430-13 - Technical data

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

9.6.5.1.4 Bend radius specification

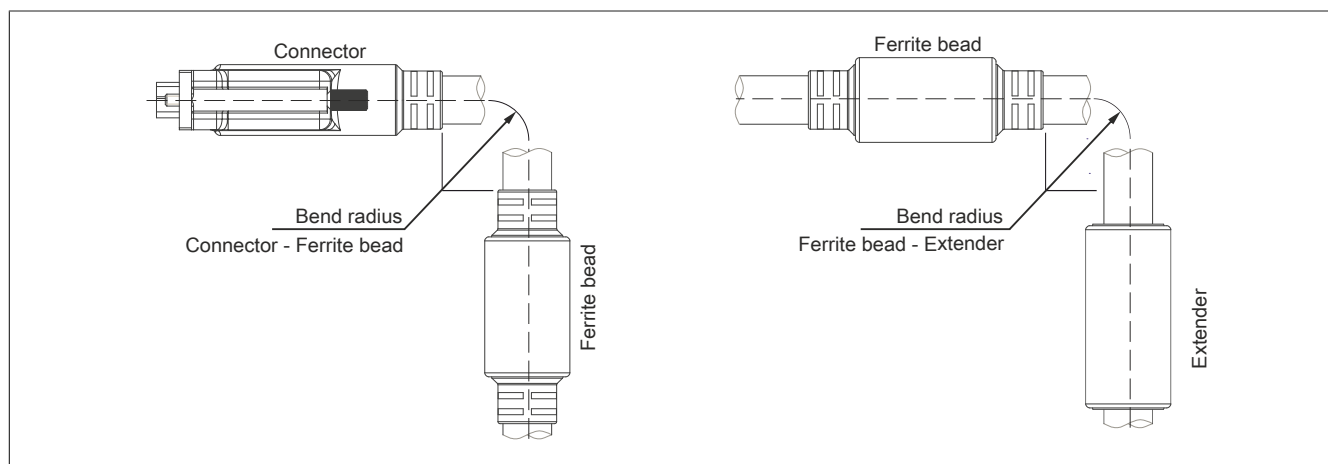


Figure 151: Bend radius specification with extender

9.6.5.1.5 Dimensions

All dimensions in mm.

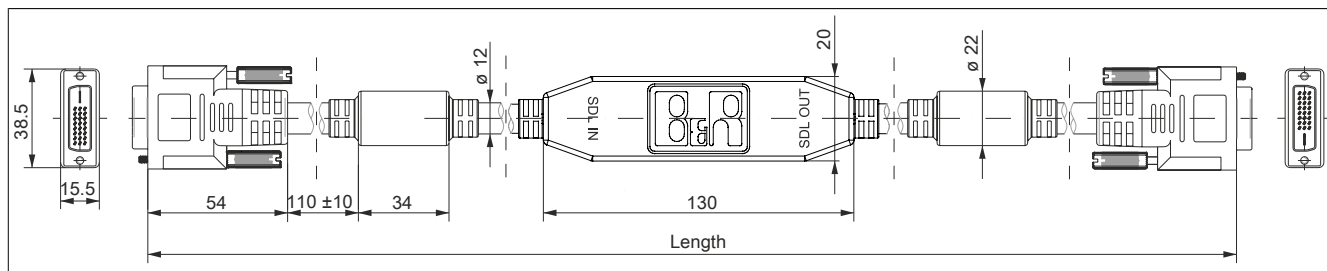


Figure 152: 5CASDL.xxxx-13 ≥ Rev. E0 - Dimensions

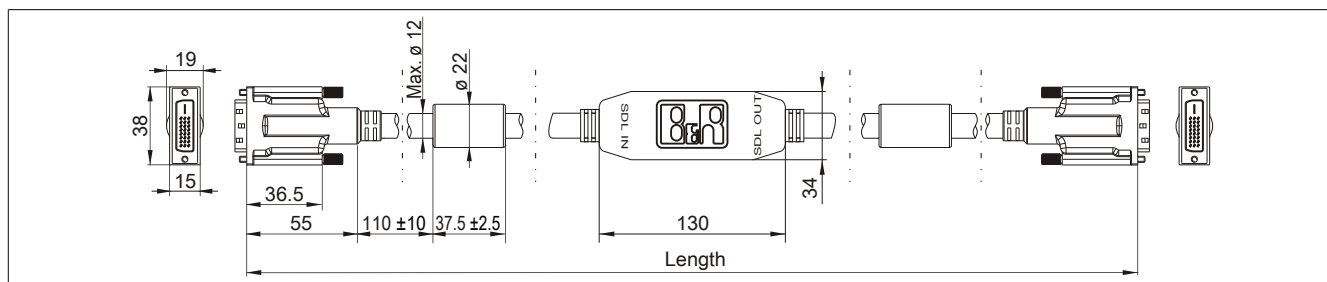


Figure 153: 5CASDL.0xx0-13 ≤ Rev. D0 - Dimensions

9.6.5.1.6 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.

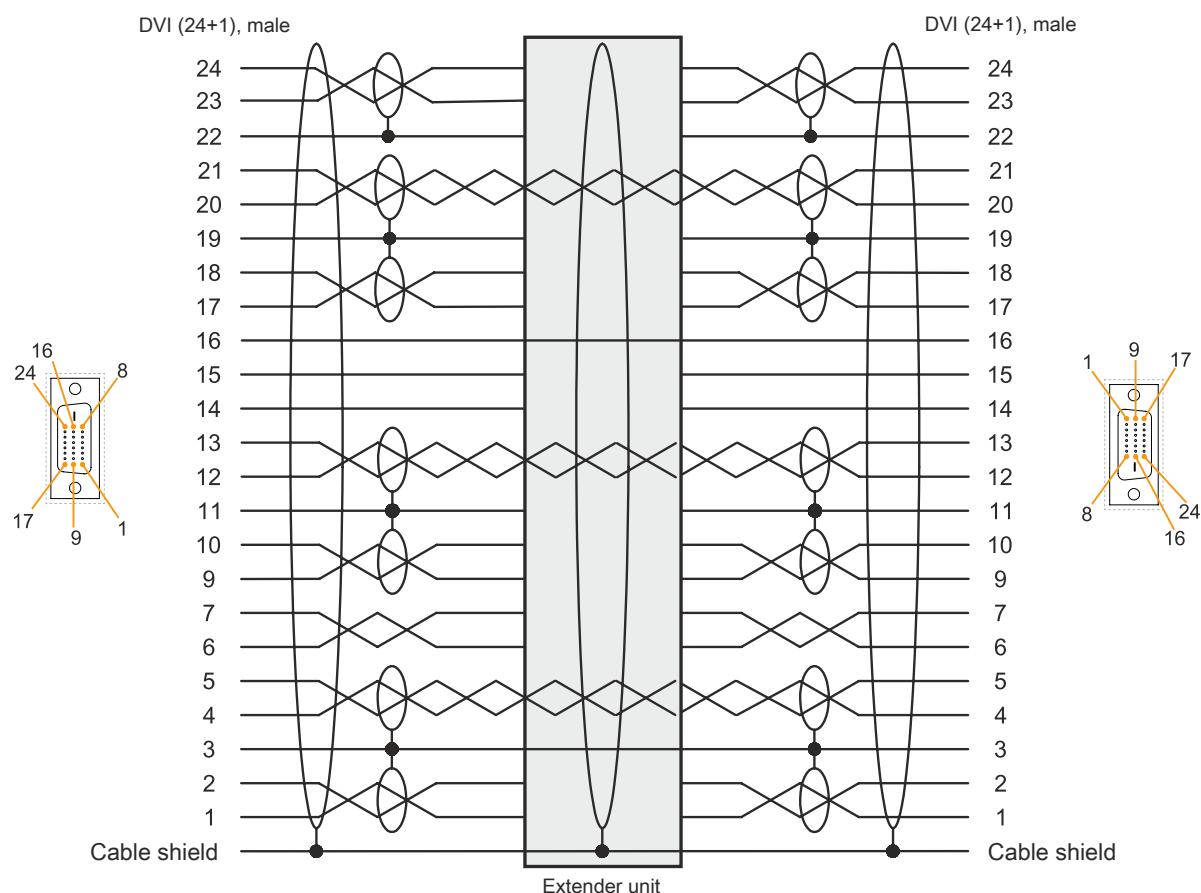


Figure 154: 5CASDL.0xx0-13 - Pinout

Pin	Pinout	Pin	Pinout
1	TMDs data 2 negative	13	XUSB0 positive
2	TMDs data 2 positive	14	+5 V
3	Shielding TMDs data 2 and SDL	15	GND
4	SDL negative	16	Hot plug detection
5	SDL positive	17	TMDs data 0 negative
6	DDC data	18	TMDs data 0 positive
7	DDC clock	19	Shielding TMDs data 0 and XUSB1
8	Not connected	20	XUSB1 negative
9	TMDs data 1 negative	21	XUSB1 positive
10	TMDs data 1 positive	22	TMDs data shield
11	TMDs data 1 and XUSB0 shield	23	TMDs clock positive
12	XUSB0 negative	24	TMDs clock negative

9.6.5.1.7 Cable connection

The SDL flex cable with extender must be connected in the correct direction between the B&R industrial PC and Automation Panel. For this purpose, the signal direction is indicated on the extender unit.

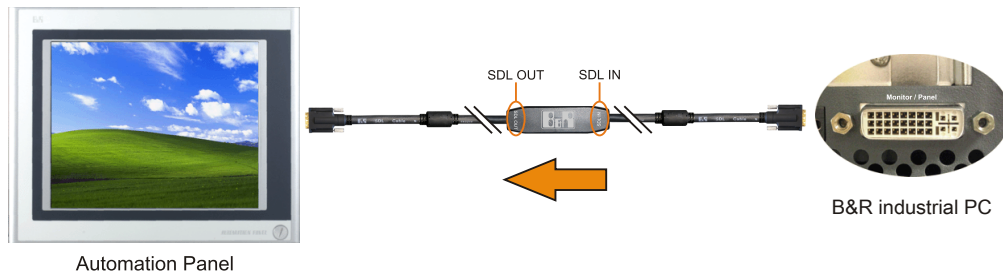


Figure 155: Example for the signal direction of the SDL flex cable with extender

9.6.6 DVI cables

9.6.6.1 5CADVI.0xxx-00

9.6.6.1.1 General information

5CADVI.0xxx-00 DVI cables are designed for use in fixed installations.

Caution!

The cable is only permitted to be connected/disconnected when the power is switched off.

9.6.6.1.2 Order data

Model number	Short description	Figure
	DVI cable	
5CADVI.0018-00	DVI-D cable - 1.8 m	
5CADVI.0050-00	DVI-D cable - 5 m	
5CADVI.0100-00	DVI-D cable - 10 m	

Table 212: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Order data

9.6.6.1.3 Technical data

Information:

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

Model number	5CADVI.0018-00		5CADVI.0050-00	5CADVI.0100-00
General information				
Certifications	Yes cULus E115267 Industrial control equipment Temperature: B (0 - 55°C) Humidity: B (up to 100%) Vibration: A (0.7 g) EMC: B (bridge and open deck) ¹⁾			
CE				
UL				
DNV GL				
Cable construction				
Wire cross section	28 AWG			
Shield	Individual cable pairs, entire cable			
Cable shield	Tinned copper braiding, optical coverage > 86%			
Outer jacket				
Material	PVC			
Color	Beige			
Labeling	AWM STYLE 20276 80°C 30V VW1 DVI DIGITAL SINGLE LINK DER AN			
Connector				
Type	2x DVI-D (18+1), male			
Mating cycles	100			
Locating screw tightening torque	Max. 0.5 Nm			
Electrical properties				
Conductor resistance	Max. 237 Ω/km			
Insulation resistance	Min. 100 MΩ/km			
Operating conditions				
Pollution degree per EN 61131-2	Pollution degree 2			
Mechanical properties				
Dimensions				
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm	
Diameter	Max. 8.5 mm			
Bend radius	≥5x cable diameter (connector to ferrite bead and ferrite bead to ferrite bead)			
Weight	Approx. 260 g	Approx. 460 g	Approx. 790 g	

Table 213: 5CADVI.0018-00, 5CADVI.0050-00, 5CADVI.0100-00 - Technical data

- 1) Yes, but 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.

9.6.6.1.4 Bend radius specification

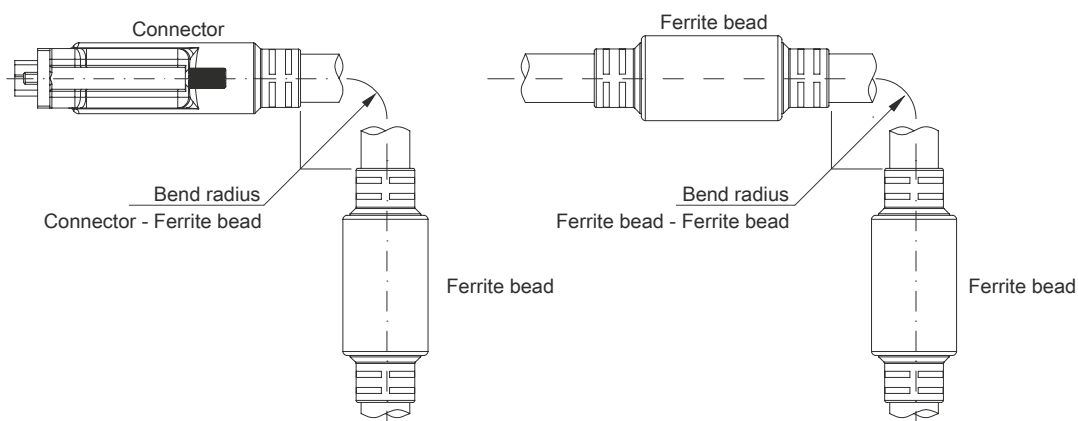


Figure 156: Bend radius specification

9.6.6.1.5 Dimensions

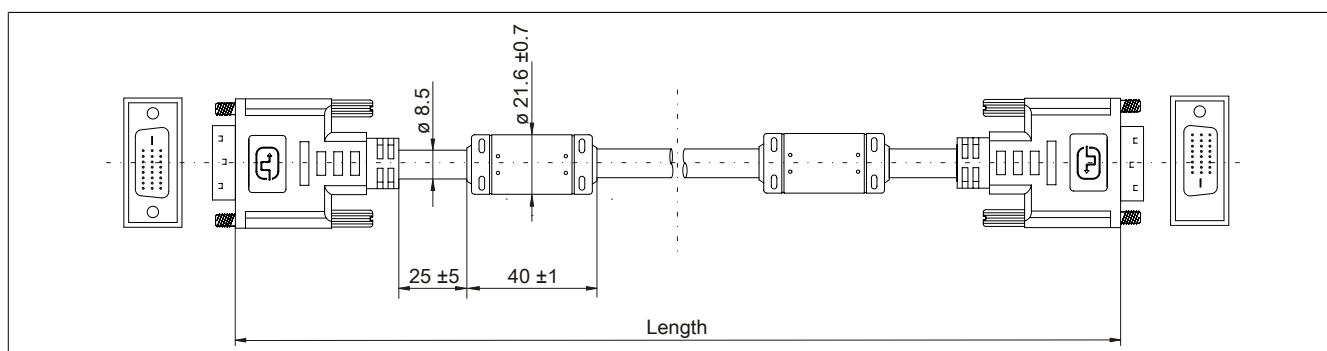


Figure 157: 5CADVI.0xxx-00 - Dimensions

9.6.6.1.6 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.

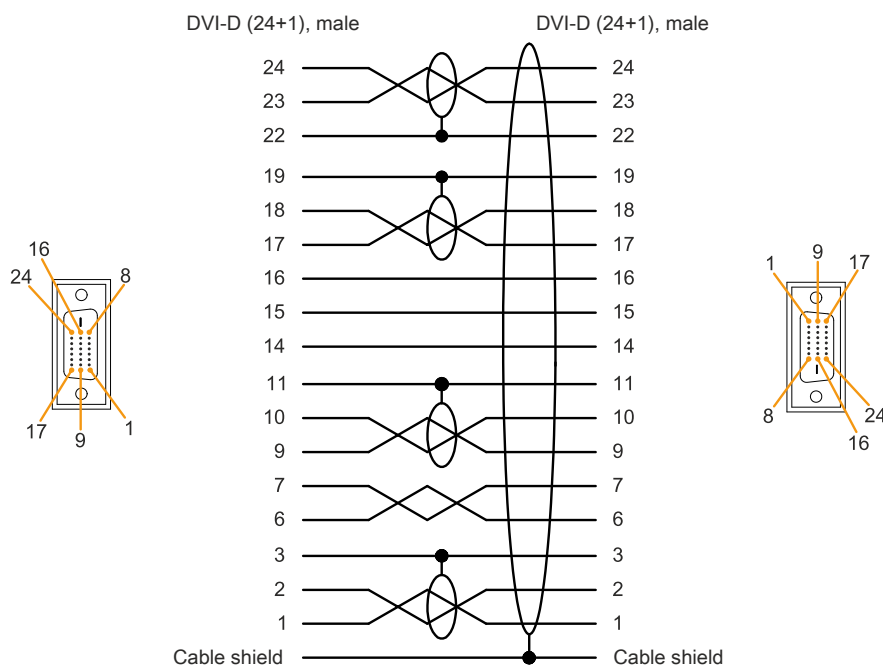


Figure 158: 5CADVI.0xxx-00 - Pinout

9.6.7 RS232 cables

9.6.7.1 9A0014.xx

9.6.7.1.1 General information

RS232 cables serve as extension cables between two RS232 interfaces.

9.6.7.1.2 Order data

Model number	Short description	Figure
	RS232 cable	
9A0014.02	RS232 extension cable for operating a remote panel with touch screen, 1.8 m.	
9A0014.05	RS232 extension cable for operating a remote panel with touch screen, 5 m.	
9A0014.10	RS232 extension cable for operating a remote panel with touch screen, 10 m.	

Table 214: 9A0014.02, 9A0014.05, 9A0014.10 - Order data

9.6.7.1.3 Technical data

Information:

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

Model number	9A0014.02	9A0014.05	9A0014.10
General information			
Certifications			
CE	Yes		
Cable construction			
Wire cross section	26 AWG		
Shield	Entire cable		
Outer jacket			
Color	Beige		
Connector			
Type	9-pin DSUB connector, male/female		
Locating screw tightening torque	Max. 0.5 Nm		
Operating conditions			
Pollution degree per EN 61131-2	Pollution degree 2		
Mechanical properties			
Dimensions			
Length	1.8 m ±50 mm	5 m ±80 mm	10 m ±100 mm
Diameter	Max. 5 mm		
Bend radius	Min. 70 mm		

Table 215: 9A0014.02, 9A0014.05, 9A0014.10 - Technical data

9.6.7.1.4 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.

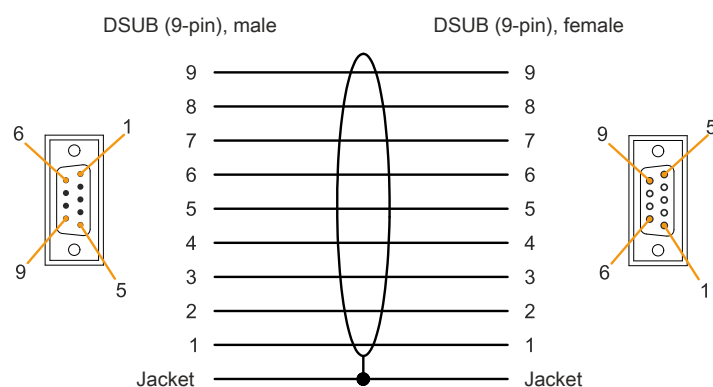


Figure 159: 9A0014.xx RS232 cables - Pinout

9.6.8 USB cables

9.6.8.1 5CAUSB.00xx-00

9.6.8.1.1 General information

USB cables are designed for USB 2.0 transfer rates.

9.6.8.1.2 Order data

Model number	Short description	Figure
	USB cable	
5CAUSB.0018-00	USB 2.0 connection cable - Type A - type B connector - 1.8 m	
5CAUSB.0050-00	USB 2.0 connection cable - Type A - type B connector - 5 m	

Table 216: 5CAUSB.0018-00, 5CAUSB.0050-00 - Order data

9.6.8.1.3 Technical data

Information:

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

Model number	5CAUSB.0018-00	5CAUSB.0050-00
General information		
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⁾	
Cable construction		
Wire cross section	24, 28 AWG	
Shield	Entire cable	
Outer jacket		
Color	Beige	
Connector		
Type	USB type A male and USB type B male	
Operating conditions		
Pollution degree per EN 61131-2	Pollution degree 2	
Mechanical properties		
Dimensions		
Length	1.8 m ±30 mm	5 m ±50 mm
Diameter	Max. 5 mm	
Bend radius	Min. 100 mm	

Table 217: 5CAUSB.0018-00, 5CAUSB.0050-00 - Technical data

- 1) Yes, but 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.

9.6.8.1.4 Cable pinout

If you wish to assemble a suitable cable yourself, the cable must be wired according to this pinout.

Information:

Functionality is only guaranteed for the cables available from B&R.

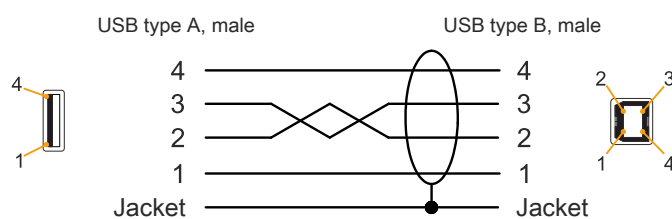


Figure 160: 5CAUSB.00xx-00 USB cables - Pinout

10 International and national certifications

10.1 Directives and declarations

10.1.1 CE marking



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

10.1.2 EMC Directive

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

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

Information:

The declarations of conformity are available on the B&R website under [Downloads - Certificates - Declarations of conformity](#).

10.2 Certifications

Danger!

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

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

Information:

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

10.2.1 UL certification



Ind. Cont. Eq.
E115267

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

Underwriters Laboratories (UL) per standards UL 61010-1 and UL 61010-2-201
Canadian (CSA) standard per C22.2 No. 61010-1-12 and CSA C22.2 No. 61010-2-201:14

The UL certificates are available on the B&R website under [Downloads - Certificates - UL](#).

When using industrial control equipment per UL 61010-1 / UL 61010-2-201, make sure that the device is classified as "open type". The prerequisite for certification or operation per UL 61010-1 / UL 61010-2-201 is therefore the installation of the device in an appropriate protective housing.

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

10.2.2 EAC



Products with this mark are tested by an accredited test laboratory and permitted to be imported into the Eurasian Customs Union (based on EU conformity).

10.2.3 KC



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

10.2.4 RCM



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

10.2.5 DNV GL certification



Products with this certification are certified by the classification society DNV GL and are suitable for the maritime sector. 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 ambient conditions (DNV GL classes):

Temperature	B
Moisture	B
Vibration	A
EMV	B
Housing	For onboard installation, the regulations for compliance with the required degree of protection 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.

The following table lists the revisions from which DNV GL certification applies to individual components.

Model number	Description	Revision
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	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/PPC2200 - For link modules	C0
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	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/PPC2200 - For link modules	F0
5PPC3100.KBU0-000	PPC3100 system unit - Intel Celeron 3965U 2.2 GHz - Dual core - For Automation Panel 923/933/1000	B8
5PPC3100.KBU3-000	PPC3100 system unit - Intel Core i7 7600U 2.8 GHz - Dual core - For Automation Panel 923/933/1000	B8
5MMDDR.4096-04	SO-DIMM DDR4, 4096 MB	C0
5MMDDR.8192-04	SO-DIMM DDR4, 8192 MB	C0
5MMDDR.016G-04	SO-DIMM DDR4, 16384 MB	C0
5CFAST.016G-00	CFast 16 GB SLC	D0
5CFAST.032G-00	CFast 32 GB SLC	D0
5CFAST.032G-10	CFast 32 GB MLC	D0
5CFAST.064G-10	CFast 64 GB MLC	D0
5CFAST.128G-10	CFast 128 GB MLC	D0
5CFAST.256G-10	CFast 256 GB MLC	C0
5CFAST.4096-00	CFast 4 GB SLC	D0
5CFAST.8192-00	CFast 8 GB SLC	D0
5AC901.I485-00	Interface card - 1x RS232/422/485 interface - For APC910/PPC900/APC3100/PPC3100	D0
5AC901.ICAN-00	Interface card - 1x CAN interface - For APC910/PPC900/APC3100/PPC3100	D0
5AC901.IETH-00	Interface card - 1x ETH 10/100/1000 - For APC910/PPC900/APC3100/PPC3100	BA
5AC901.IPLK-00	Interface card - 1x POWERLINK interface - 2 MB SRAM - For APC910/PPC900/APC3100/PPC3100	C0
5ACCF02.0000-002	PPC3100 side cover - Orange - Without logo	C0
5ACCB02.0000-000	PPC3100 key cover - Orange	C0
5ACCB02.0000-001	PPC3100 key cover - Dark gray	C0
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
0TG1000.01	Technology Guard (MSD)	C0
0TG1000.02	Technology Guard (HID)	C0

For the DNV GL certificates with information about the permissible ambient conditions, see the B&R website ([Downloads - Certificates - Maritime - DNV GL](#)).

Certificates for compass safe distance are available at [Downloads - Certificates - Maritime - Compass safe distance](#).

10.2.6 UL Haz. Loc. certification



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

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

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

The UL HazLoc certificates are available on the B&R website under [Downloads - Certificates - HazLoc](#).

10.2.6.1 General safety guidelines

PPC3100 systems with AP9x3 or AP1000 panels that are certified for use in potentially explosive atmospheres and bear the mark above are suitable for use in Class 1, Division 2, Groups A, B, C and D or in nonexplosive atmospheres and correspond to the following standards: UL Std. 61010-1, 3rd Edition, ANSI/ISA 12.12.01:2015, CSA Std. C22.2 No. 61010-1-12, 3rd Edition, CSA Std. C22.2 No. 213-16.

10.2.6.2 Assembly and installation

Explosion-protected devices must be used as intended and are only permitted to be operated by qualified and instructed specialists in accordance with these installation instructions and the additional information in the user's manual. Any other operation endangers the safety and function of the devices and connected systems. The operator is responsible for compliance with applicable safety and accident prevention regulations and standards.

Devices must be installed in a suitable protective housing that can only be opened using a tool. In order to ensure sufficient air circulation, the specified clearances must be observed. Use only in environments with pollution degree 2. The maximum ambient temperature varies depending on the individual components used, see section "Temperature specifications" on page 39.

Before any installation or use of a device in potentially explosive atmospheres, the certification mark on the device must be checked. Additional equipment must be suitable for the place of use. Final assembly must be approved by the responsible local authorities. Wiring must be carried out in accordance with national regulations and the requirements of the authorities.

Devices must be disconnected from the power supply until installation work has been completed. The tightening torque for power supply terminals is 0.5 Nm. Cables must be suitable for a surface temperature of 75°C. PPC3100 systems with AP9x3 or AP1000 panels are only permitted to be operated with 24 VDC.

Unshielded/ungrounded cables are never permitted to be used in potentially explosive atmospheres. Devices must be securely connected to equipotential bonding. Power supply, communication and accessory cables must be secured to the device or control cabinet. Power supply, communication and accessory cables are not permitted to exert excessive strain on connections. Possible vibrations in the environment must be taken into account.

10.2.6.3 Operation

To switch PPC3100 systems with AP9x3 or AP1000 panels on/off in a potentially explosive atmosphere, either a switch must be located outside the potentially explosive atmosphere or a switch certified for use in potentially explosive atmospheres must be used.

Danger!

Explosion hazard: Accessories are not permitted to be connected or disconnected when the power is switched on unless the area is considered nonhazardous and is free of ignitable concentrations!

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 accordance with the requirements listed in "[USB connection with the Panel PC 3100](#)", "[USB connection with the Automation Panel 1000](#)" and "[USB connection with optional DisplayPort graphics option](#)", USB interfaces are not certified for operation in potentially explosive atmospheres and are only permitted to be used for service purposes.

10.2.6.4 Servicing, disturbances and disassembly

Devices must be taken out of operation and protected against accidental startup. The actual disconnection of the power supply must be checked with a suitable voltmeter.

Before removing or installing accessories, components or cables, the power supply to PPC3100 systems with AP9x3 or AP1000 panels and power supplies must be interrupted. Defective devices are only permitted to be replaced by trained personnel. Before switching on or connecting to the power supply, all covers or components of the system must be reinstalled and secured.

Danger!

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

Danger !

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

10.2.6.5 USB connection with the Panel PC 3100

10.2.6.5.1 Introduction

The information below describes the use of USB peripheral devices on USB interfaces 1, 2, 3 and 4 of the B&R Panel PC 3100 in hazardous locations Class I, Division 2, Groups A, B, C and D.

Danger!

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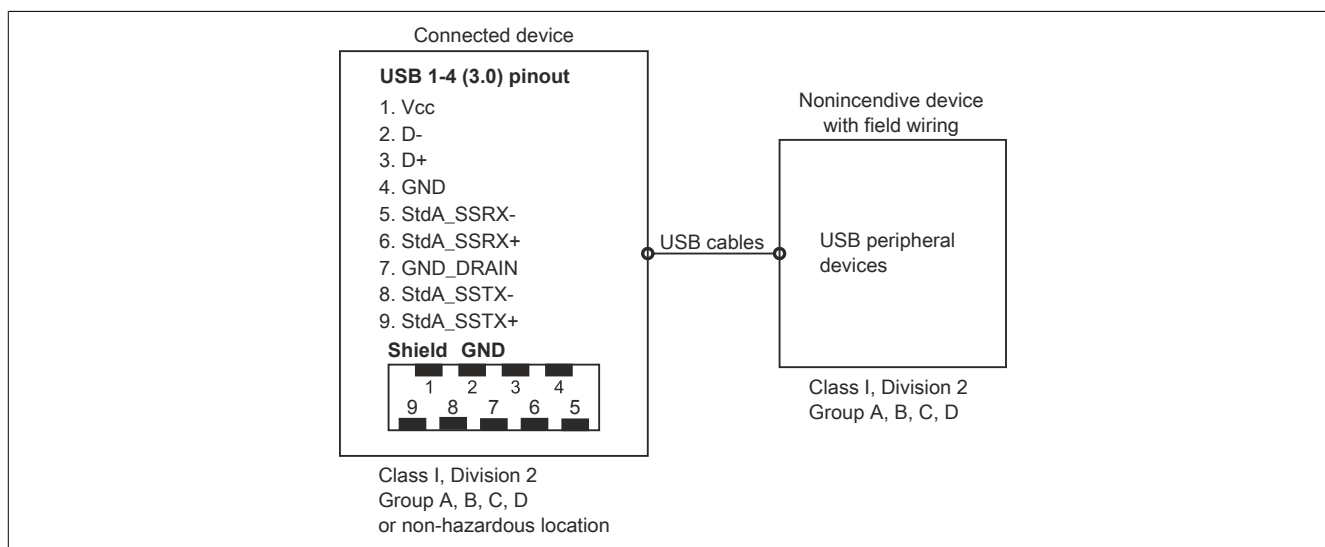
- Before installation or use in potentially explosive atmospheres, the explosion protection class of the device must be checked according to ANSI/ISA 12.12.01 and CSA C22.2 N°213.
- To switch on/off B&R devices installed in potentially explosive atmosphere, one of the following conditions must be met: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

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

10.2.6.5.2 Description

Nonincendive devices (keyboards, mouse) are certified for use on the rear USB interfaces of the B&R Panel PC 3100 (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 4 rear USB interfaces must meet the following criteria.

The figure shows a sketch of the wiring of the USB cable:



The following tables indicate the nonincendive electrical circuit parameters:

USB1, USB2, USB3 and USB4 interfaces (USB 3.0):	
Open-circuit voltage [V_{oc}]	5.0 V
Short-circuit current [I_{sc}]	8.06 A
Connected capacity [C_a]	20 μ F
Connected inductance [L_a]	4.8 μ H

Table 218: Nonincendive electrical circuit parameters for the USB1, USB2, USB3 and USB4 interfaces

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

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

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

Table 219: 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 carried out in accordance with national regulations and the requirements of the authorities.

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

Warning!

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

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

10.2.6.6 USB connection with the Automation Panel 1000

10.2.6.6.1 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!

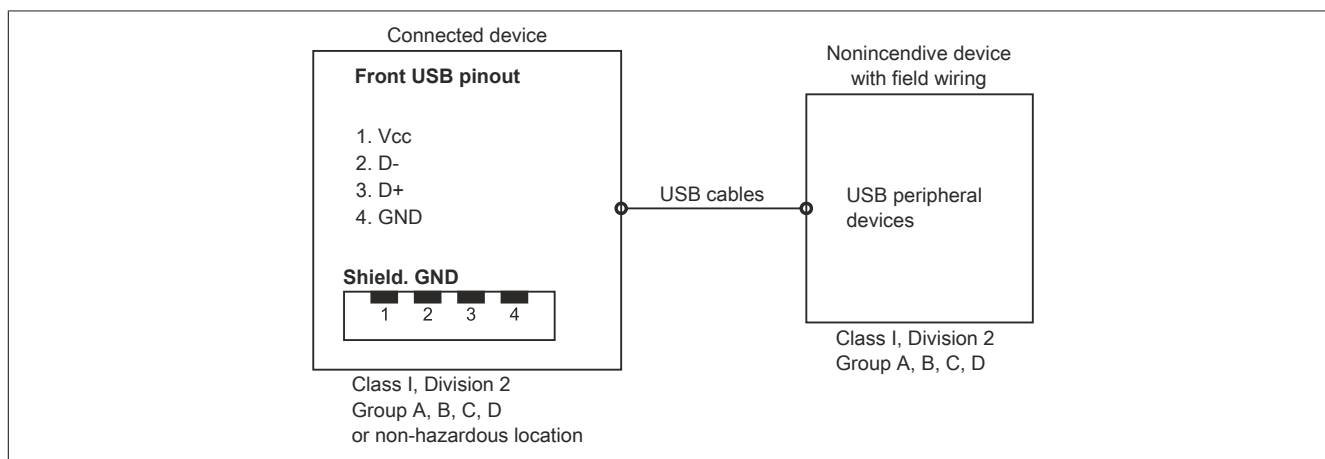
EXPLOSIONSGEFAHR

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

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

10.2.6.6.2 Description

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



Front USB interface (USB 2.0):	
Open-circuit voltage [V_{oc}]	5.04 V
Short-circuit current [I_{sc}]	1170 mA
Connected capacity [C_a]	20 μ F
Connected inductance [L_a]	16.8 μ H

Table 220: Nonincendive electrical circuit parameters for the front USB interface

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

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

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

Table 221: 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 carried out in accordance with national regulations and the requirements of the authorities.

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

Warning!

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

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

10.2.6.7 USB connection with optional DisplayPort graphics option

10.2.6.7.1 Introduction

The information below describes the use of USB peripheral devices on the USB interface of the DisplayPort graphics option in the B&R Panel PC 3100 in hazardous locations Class I, Division 2, Groups A, B, C and D.

Danger!

EXPLOSIONSGEFAHR

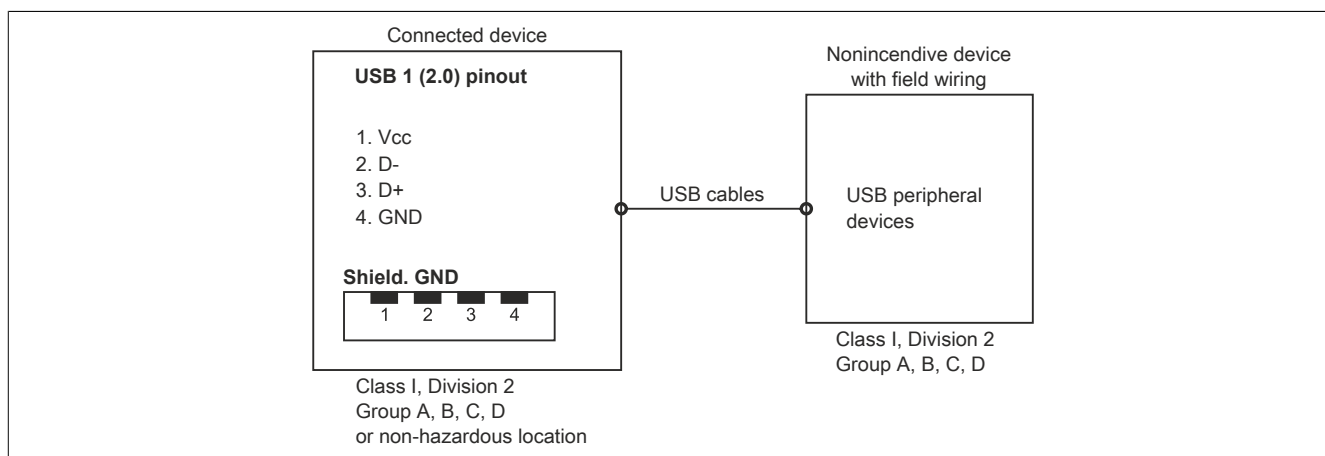
- Before installation or use in potentially explosive atmospheres, the explosion protection class of the device must be checked according to ANSI/ISA 12.12.01 and CSA C22.2 N°213.
- To switch on/off B&R devices installed in potentially explosive atmosphere, one of the following conditions must be met: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

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

10.2.6.7.2 Description

Nonincendive devices (keyboards, mouse) are certified for use on the USB interface of the DisplayPort graphics option in the B&R Panel PC 3100 (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 rear USB1 interface must meet the following criteria.

The figure shows a sketch of the wiring of the USB cable:



The following tables indicate the nonincendive electrical circuit parameters:

USB1 interface (USB 3.0):	
Open-circuit voltage [V_{oc}]	5.0 V
Short-circuit current [I_{sc}]	8.16 A
Connected capacity [C_a]	20 μ F
Connected inductance [L_a]	4.8 μ H

Table 222: Nonincendive circuit parameters for the USB1 interface

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

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

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

Table 223: 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 carried out in accordance with national regulations and the requirements of the authorities.

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

Warning!

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

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

11 Environmentally friendly disposal

All programmable logic controllers, operating and monitoring devices and uninterruptible power supplies from B&R are designed to have as little impact on the environment as possible.

11.1 Separation of materials

To ensure that devices can be recycled in an environmentally friendly manner, it is necessary to separate out the different materials.

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

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

Appendix A

A.1 Maintenance Controller Extended (MTCX)

The MTCX controller (FPGA processor) is located on the mainboard (component of every system unit) of the APC3100 and PPC3100 device.



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

- Switching on (power OK sequencing) and power failure logic
- Watchdog handling (NMI and reset handling)
- Temperature monitoring
- Fan control
- Key and LED handling/coordination (matrix keyboard of B&R panels)
- Advanced desktop operation (keys, USB redirection)
- Daisy chain display operation (touch screen, USB forwarding)
- Panel locking mechanism (configurable via the B&R Control Center - ADI driver)
- Backlight control of a connected B&R display
- Calculating statistical data: Power-on cycles, power-on hours and fan hours (resolution: 15 min)
- SDL data transfer (display, matrix keyboard, touch screen, service data, USB)
- LED status indicators (Power, Disk, Link, Run)
- Optimal default BIOS settings are reported to BIOS by the MTCX depending on the existing hardware.

The functions of the MTCX can be extended by upgrading the firmware⁴⁾. The version can be read in BIOS or in approved Microsoft Windows operating systems using the B&R Control Center.

⁴⁾ Available for download from the Downloads section of the B&R website (www.br-automation.com).

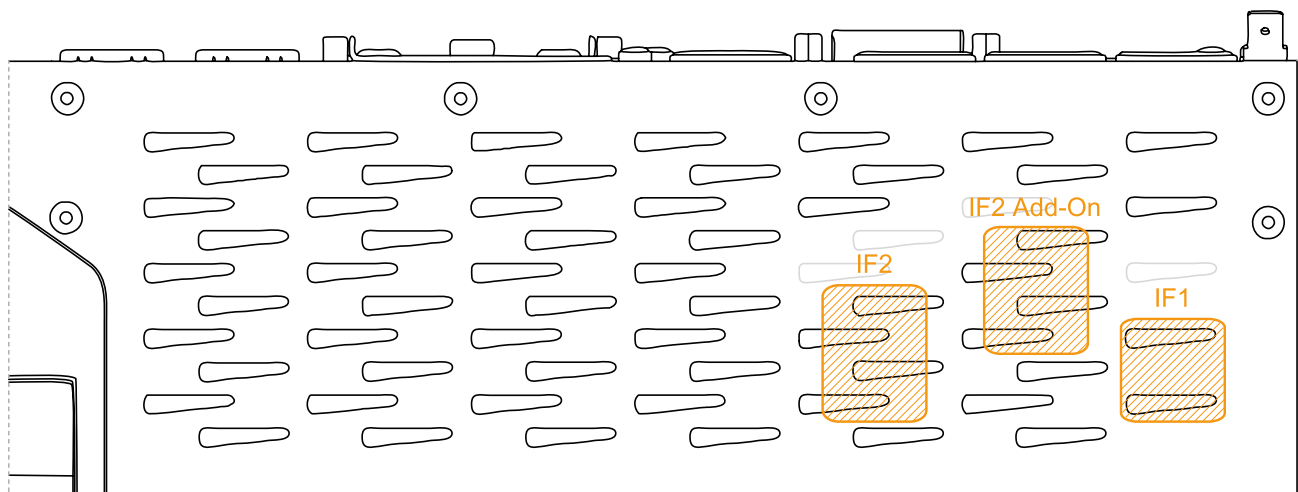
A.2 Reading LED status indicators

Danger!

The device is not permitted to be opened and covers are not permitted to be removed during operation.

Before opening/removing covers, the device must be disconnected from the power supply.

The LED status indicators of installed IF options on xPC3100 devices are visible during operation through ventilation slots in the following area.



A.3 LED "S/E" (LED "Status/Error")

This LED is a green/red dual LED and indicates the state of the POWERLINK interface. The LED states have a different meaning depending on the operating mode of the POWERLINK interface.

A.3.1 Ethernet mode

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

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

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

A.3.2 POWERLINK V2 mode

Error message

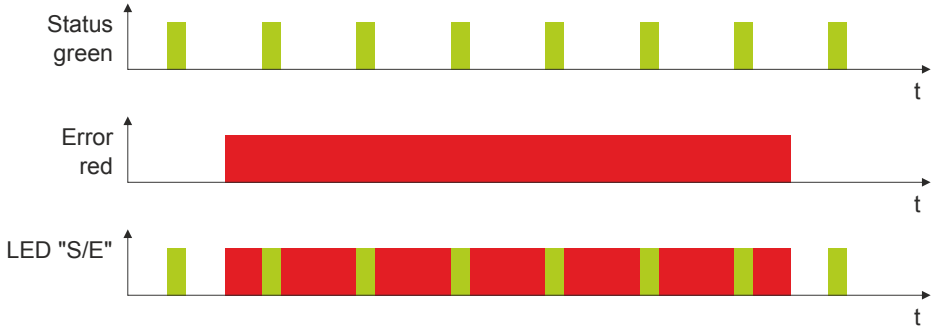
LED "S/E"		Description
Green	Red	
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	If an error occurs in the following modes, then the green LED blinks over the red LED: - PRE_OPERATIONAL_1 - PRE_OPERATIONAL_2 - READY_TO_OPERATE  The diagram illustrates the LED behavior during an error. The 'Status green' signal consists of a series of green pulses. The 'Error red' signal is a continuous red bar. The 'LED "S/E"' signal shows the combined state, where green pulses are superimposed on the red background.

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

Interface status

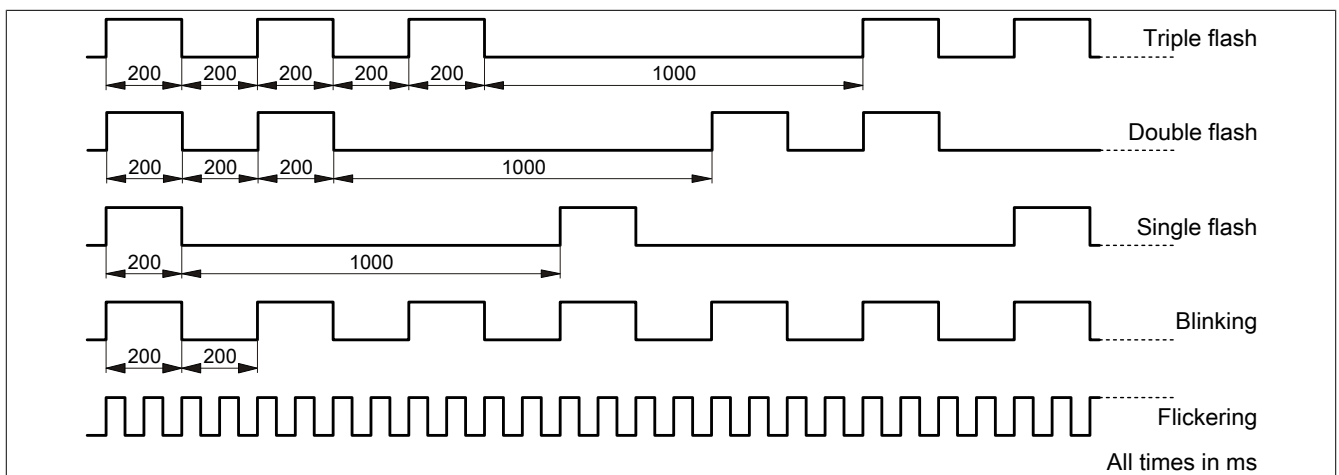
LED "S/E"		Description
Green	Red	
Off	Off	Mode: NOT_ACTIVE The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: - The device is switched off. - The device is in the startup phase. - The interface or device is not configured correctly in Automation Studio. - The interface or device is defective. Managing node (MN) The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode PRE_OPERATIONAL_1. If POWERLINK communication is detected before the time has elapsed, however, the MN is not started. Controlled node (CN) The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode BASIC_ETHERNET. If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1.
Flickering (approx. 10 Hz)	Off	Mode: BASIC_ETHERNET The interface is in mode BASIC_ETHERNET. The interface is operated in Ethernet mode. Managing node (MN) This mode can only be exited by resetting the controller. Controlled node (CN) If POWERLINK communication is detected during this mode, the interface enters mode PRE_OPERATIONAL_1.

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

LED "S/E"		Description
Green	Red	
Single flash (approx. 1 Hz)	Off	Mode: PRE_OPERATIONAL_1 The interface is in mode PRE_OPERATIONAL_1. Managing node (MN) The MN is in "reduced cycle" operation. The CNs are configured in this mode. Cyclic communication is not yet taking place. Controlled node (CN) The CN can be configured by the MN in this mode. The CN waits until it receives an SoC frame and then switches to mode PRE_OPERATIONAL_2.
	On	Controlled node (CN) If the red LED lights up in this mode, this means that the MN has failed.
Double flash (approx. 1 Hz)	Off	Mode: PRE_OPERATIONAL_2 The interface is in mode PRE_OPERATIONAL_2. Managing node (MN) The MN starts cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this mode. Controlled node (CN) The CN can be configured by the MN in this mode. A command then switches the mode to READY_TO_OPERATE.
	On	Controlled node (CN) If the red LED lights up in this mode, this means that the MN has failed.
Triple flash (approx. 1 Hz)	Off	Mode: READY_TO_OPERATE The interface is in mode READY_TO_OPERATE. Managing node (MN) Cyclic and asynchronous communication. Received PDO data is ignored. Controlled node (CN) The configuration of the CN is completed. Normal cyclic and asynchronous communication. The transmitted PDO data corresponds to the PDO mapping. However, cyclic data is not yet evaluated.
	On	Controlled node (CN) If the red LED lights up in this mode, this means that the MN has failed.
On	Off	Mode: OPERATIONAL The interface is in mode OPERATIONAL. PDO mapping is active and cyclic data is evaluated.
Blinking (approx. 2.5 Hz)	Off	Mode: STOPPED The interface is in mode STOPPED. Managing node (MN) This mode does not occur for the MN. Controlled node (CN) Output data is not being output, and no input data is being provided. This mode can only be reached and exited by a corresponding command from the MN.

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

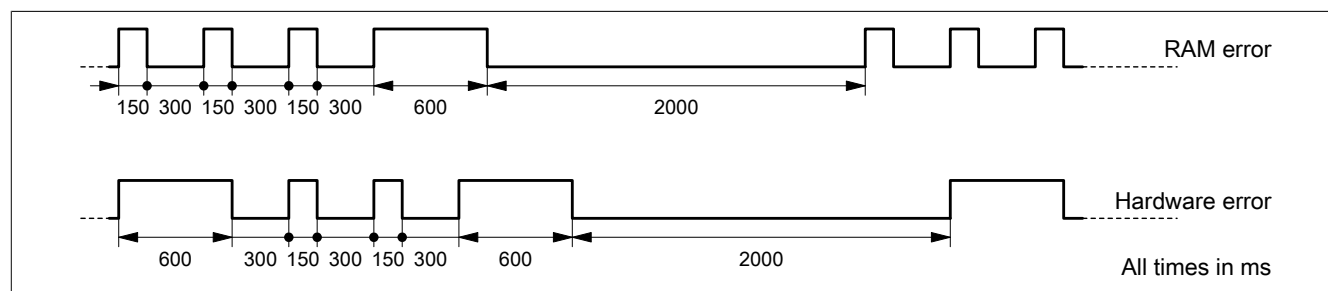
Blink times



A.3.3 System stop error codes

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

The error code is indicated by LED "S/E" blinking red. The blinking signal of the error code consists of 4 switch-on phases with short (150 ms) or long (600 ms) duration. The error code is repeated every 2 seconds.



Error	Error description
RAM error	The device is defective and must be replaced.
Hardware error	The device or a system component is defective and must be replaced.

A.3.4 POWERLINK V2

By default, the POWERLINK interface is operated as a managing node (MN). In the managing node, the node number is set to a fixed value of 240.

If the POWERLINK node is operated as a controlled node (CN), a node number from 1 to 239 can be set in the POWERLINK configuration in Automation Studio.

A.4 Cable data

Signal		Signal	
RS232	"RS232 - Bus length and cable type" on page 366	RS422	"RS422 - Bus length and cable type" on page 366
RS485	"RS485 - Bus length and cable type" on page 367	CAN	"CAN - Bus length and cable type" on page 367

A.4.1 RS232 - Bus length and cable type

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

Bus length	Transfer rate
≤15 m	Typ. 64 kbit/s
≤10 m	Typ. 115 kbit/s
≤5 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS232 cables	Property
Signal line	
Cable cross section	4x 0.16 mm ² (26 AWG), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Pair shielding with aluminum foil
GND	
Cable cross section	1x 0.34 mm ² (22AWG/19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Cable shield	Tinned copper wire

A.4.2 RS422 - Bus length and cable type

The RTS line must be switched on to activate the transmitter.

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

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

RS422 cables	Property
Signal line	
Cable cross section	4x 0.25 mm ² (24AWG/19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤82 Ω/km
Stranding	Wires stranded in pairs
Shield	Pair shielding with aluminum foil
GND	
Cable cross section	1x 0.34 mm ² (22AWG/19), tinned copper stranded wire
Wire insulation	PE
Conductor resistance	≤59 Ω/km
Outer jacket	
Material	PUR compound
Properties	Halogen-free
Cable shield	Tinned copper wire

A.4.3 RS485 - Bus length and cable type

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

Bus length	Transfer rate
1200 m	Typ. 115 kbit/s

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

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

A.4.4 CAN - Bus length and cable type

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

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

Bus length	Transfer rate
≤1000 m	Typ. 50 kbit/s
≤200 m	Typ. 250 kbit/s
≤60 m	Typ. 500 kbit/s
<20 m ¹⁾	Typ. 1 Mbit/s

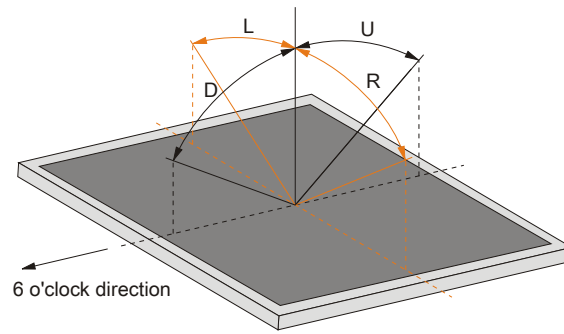
1) The specified cable length is only valid with the values specified in "CAN driver settings". Otherwise, the cable lengths depend on the values in the timing register.

Preferably, the cable material used should have the following properties or deviate only slightly from them in order to achieve an optimal transfer rate.

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

A.5 Viewing angles

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



A.6 Chemical resistance

All panels are made of a coated aluminum support frame.

Single-touch panels

- AP1000 single-touch panels are manufactured with an Autotex panel overlay.
- AP9x3 single-touch panels are manufactured with an Autotex panel overlay starting with the following revision:
 - 5AP923.1215-00 ≥ revision B8
 - 5AP923.1505-00 ≥ revision B8
 - 5AP923.1906-00 ≥ revision B8

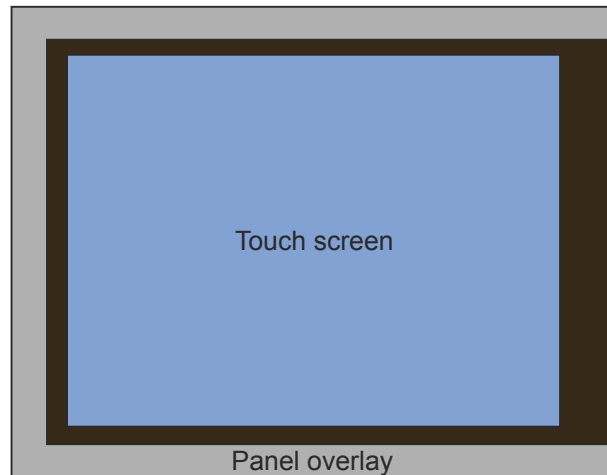
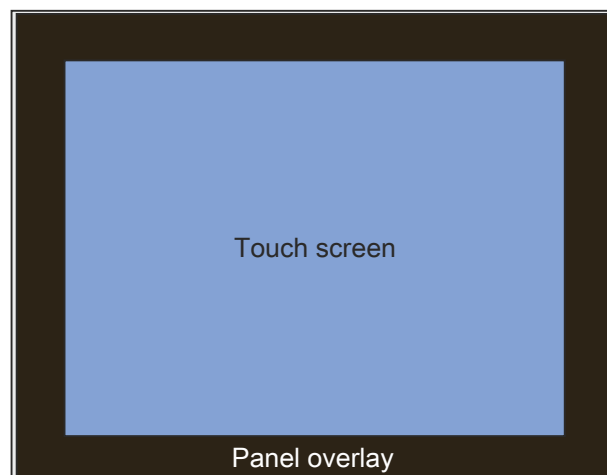


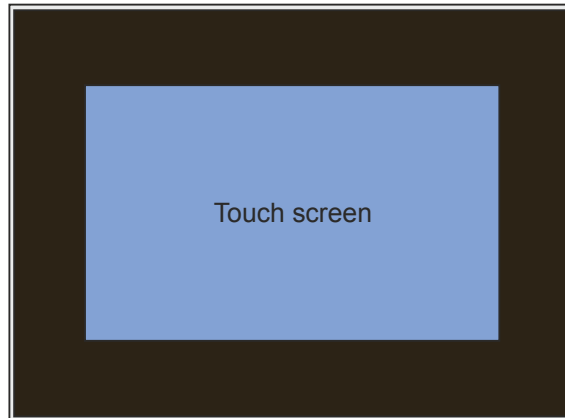
Figure 161: Single-touch panel with Autotex panel overlay

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



Multi-touch panels

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



A.6.1 Autotex panel overlay (polyester)

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

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

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

A.6.2 Aluminum panel overlay

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

• Acetaldehyde	• DRM/PM	• Methanol
• Acetone	• Iron chloride	• Methylbenzene
• Acetonitrile	• Iron II chloride (FeCl ₂)	• Methyl ethyl ketone
• Alkali carbonate	• Iron III chloride (FeCl ₃)	• Methylisobutylketone
• Alkane	• Acetic acid < 50%	• Sodium bisulphate
• Formic acid < 50%	• Butyl acetate	• Sodium carbonate
• Ammonia < 40%	• Ethanol	• Sodium hydroxide < 40%
• Amyl acetate	• Ether	• Sodium hypochlorite < 20%
• Gasoline	• Ethyl acetate	• Paraffin oil
• Bichromate	• 2-Butoxyethanol (Butyl CEL- LOSOVLE)	• Phosphoric acid < 30%
• Brake fluid	• Aviation fuel	• Phthalate
• Castor oil	• Formaldehyde 37 to 42%	• Nitric acid < 10%
• Hydrogen chloride < 36%	• Transmission fluid	• Sea water
• Cyclohexanol	• Glycerine	• Cutting oil
• Cyclohexanone	• Glycol	• Sulphuric acid < 10%
• Decon	• Isophorone	• Turpentine oil replacement
• Diacetone alcohol	• Isopropanol	• Triacetin
• Diesel	• Potassium	• Trichloroacetic acid < 50%
• Diethyl ether	• Potassium carbonate	• Trichloroethane
• Diethyl phthalate	• Potassium hydroxide	• Washing agents
• Dimethylbenzene	• White spirit	• Water
• Dioxan	• Linseed oil	• Hydrogen peroxide < 25%
• Dowandol		• Fabric conditioner

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.6.3 Coated aluminum front

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

• Formic acid < 50%	• 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.6.4 Touch screen

AMT touch screen (single-touch)

Unless otherwise specified, the AMT touch screen is resistant to the following chemicals when exposed for up to 1 hour (at 25°C) with no visible changes:

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

3M touch screen (multi-touch)

Unless otherwise specified, the 3M touch screen is resistant to the following chemicals per ASTM D 1308-02 and ASTM F 1598-95 when exposed for up to 24 hours without visible changes:

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

A.7 Touch screen

A.7.1 Touch screen AMT 5-wire (single-touch)

A.7.1.1 Technical data

Information:

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

Model number	Touchscreen AMT 5-Draht
General information	
Technology	Analog, resistive
Release pressure	<1 N
Light transmission	81% ±3%
Service life	36,000,000 touch operations at the same position (release pressure: 250 g, interval: 0.5 s)
Operating conditions	
Activation	Finger, stylus, credit card, glove
Ambient conditions	
Temperature	
Operation	-20 to 70°C
Storage	-40 to 80°C
Transport	-40 to 80°C
Relative humidity	
Operation	90% at max. 50°C
Storage	90% RH at max. 60°C for 504 hours
Transport	90% RH at max. 60°C for 504 hours
Vendor information	
Manufacturer	AMT

Table 224: Touchscreen AMT 5-Draht - Technical data

Note:

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

A.7.1.2 Temperature/Humidity diagram

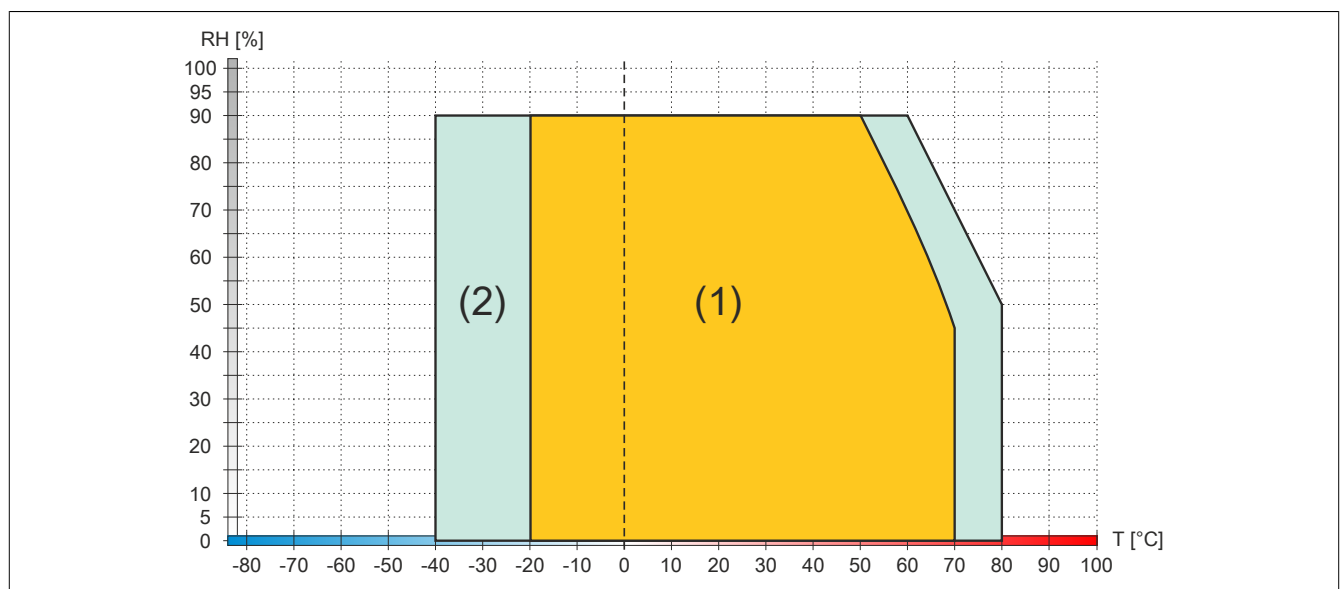


Figure 162: 5-wire AMT touch screen - Temperature/Humidity diagram

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

A.7.2 3M touch screen (multi-touch generation 2)

A.7.2.1 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.7.2.2 Technical data

Information:

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

Model number	Touchscreen 3M
General information	
Technology	Projected capacitive touch (PCT)
Light transmission	88 ±2%
Anti-glare coating	Optical/Gloss = 70
Operating conditions	
Activation	Finger, thin glove
Ambient conditions	
Temperature	
Operation	0 to 50°C
Storage	-10 to 70°C
Transport	-10 to 70°C
Relative humidity	
Operation	90% at max. 35°C
Storage	90% at max. 35°C
Transport	90% at max. 35°C
Vendor information	
Manufacturer	3M

Table 225: Touchscreen 3M - Technical data

A.7.2.3 Temperature/Humidity diagram

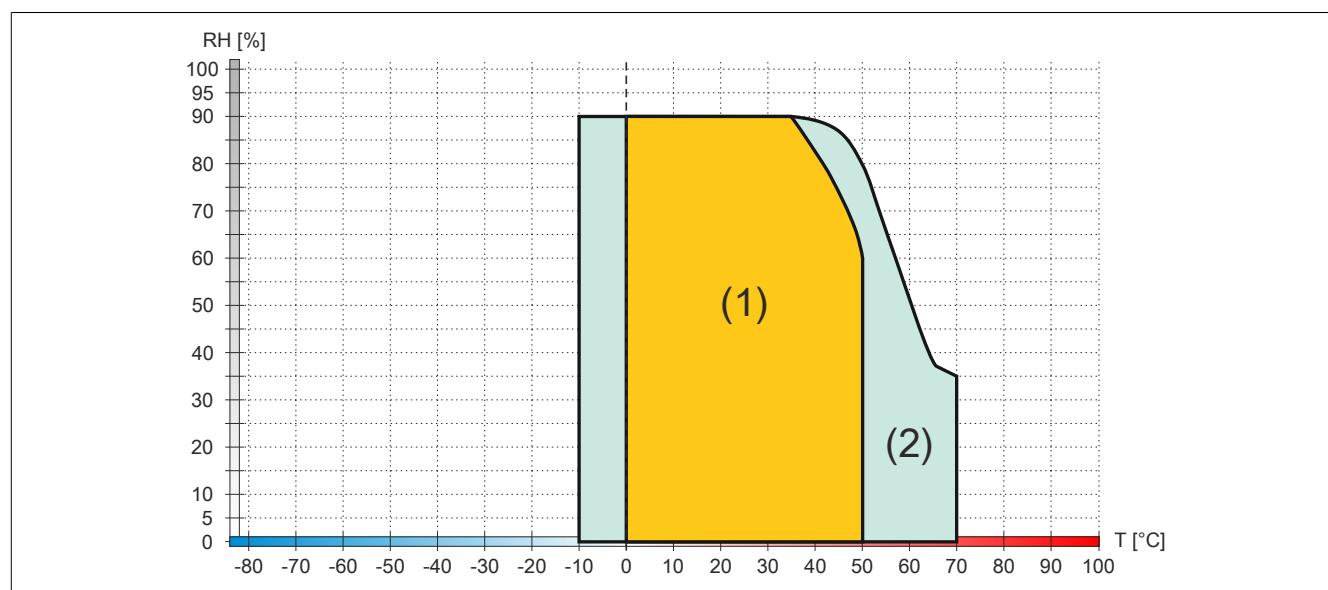


Figure 163: 3M touch screen generation 2 - Temperature/Humidity diagram

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

A.7.3 3M touch screen (multi-touch generation 3)

A.7.3.1 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. $\geq$ D0
- 5AP933.185B-00 with Rev. $\geq$ D0
- 5AP933.215C-00 with Rev. $\geq$ D0
- 5AP933.240C-00 with Rev. $\geq$ D0

A.7.3.2 Technical data

Information:

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

Model number	Touchscreen 3M
General information	
Technology	Projected capacitive touch (PCT)
Light transmission	>90%
Anti-glare coating	Optical/Gloss = 80
Operating conditions	
Activation	Finger, thin glove
Ambient conditions	
Temperature	
Operation	-10 to 70°C
Storage	-40 to 70°C
Transport	-40 to 70°C
Relative humidity	
Operation	Up to 90% at max. 35°C, see diagram for > 35°C.
Storage	Up to 90% at max. 35°C, see diagram for > 35°C.
Transport	Up to 90% at max. 35°C, see diagram for > 35°C.
Vendor information	
Manufacturer	3M

Table 226: Touchscreen 3M - Technical data

A.7.3.3 Temperature/Humidity diagram

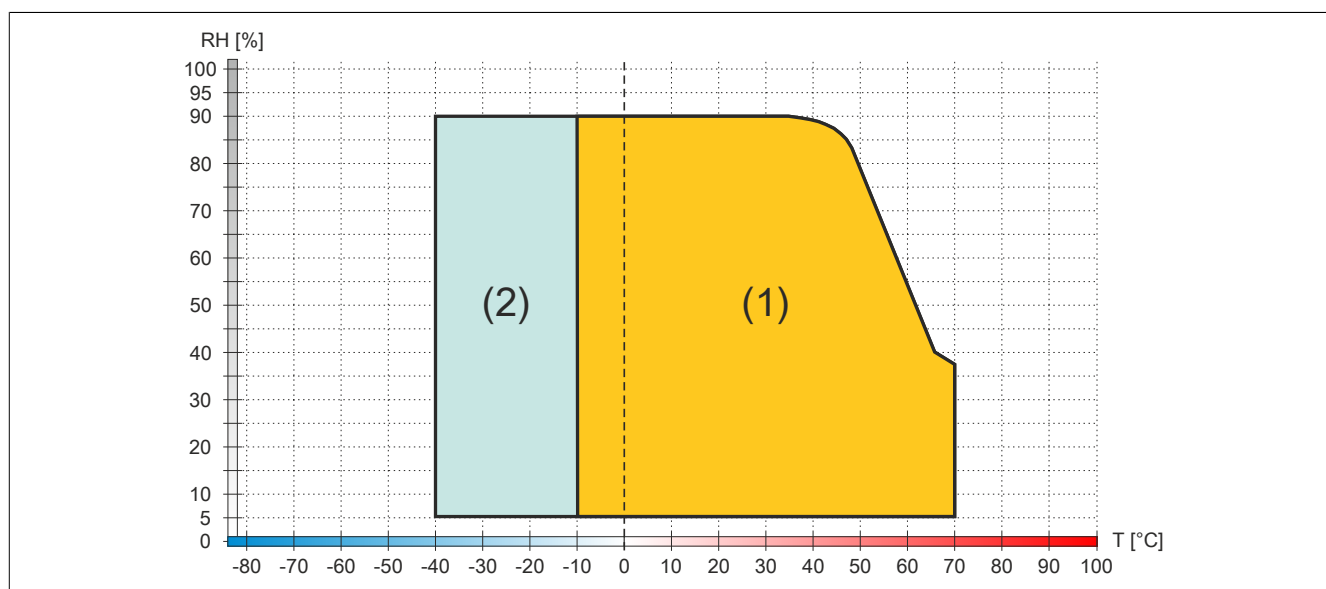


Figure 164: 3M touch screen generation 3 - Temperature/Humidity diagram

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

A.8 Abbreviations

Abbreviation	Stands for	Description
NC	Normally closed	Stands for a normally closed relay contact.
	Not connected	Used in pinout descriptions if a terminal or pin is not connected on the module side.
ND	Not defined	Stands for an undefined value in technical data tables. This may be because the cable manufacturer has not provided a value for certain technical data.
NO	Normally open	Stands for a normally open relay contact.
TBD	To be defined	Used in technical data tables if there is currently no value for specific technical data. The value will be supplied later.
MTBF	Mean time between failures	The expected value of the operating time between two consecutive failures.

Table 227: Abbreviations used in this user's manual

Publishing information

B&R Industrial Automation GmbH

B&R Strasse 1

5142 Eggelsberg

Austria

Telephone: +43 7748 6586-0

Fax: +43 7748 6586-26

office@br-automation.com