Panel PC 300

User's Manual

Version: **1.31 (June 2011**)
Model number: **MAPPC300-ENG**

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Chapter 1 • General information

Information:

B&R does its best to keep the printed versions of its user's manuals as current as possible. However, any newer versions of the User's Manual can always be downloaded in electronic form (pdf) from the B&R homepage www.br-automation.com.

1. Manual history

Version	Date	Changes
1.00	2007-10-18	- First version
1.10	2008-03-31	- Vibration / shock data revised. - Temperature specifications -45° / +45° and with Rittal housing added.
1.20	2008-10-20	- Compact Flash changed to CompactFlash. - Modification made to the standard range. - Updated to the 512 MB RAM Panel PC 300 model 5PC310.L800-01. - B&R Key Editor updated. - ADI Development Kit added. - User ID description.
1.30	2010-09-21	- 5SWWCE.0823-ENG added. - Section 2.7 "Environmentally-friendly disposal" in chapter 1 "General information" added. - Contents of delivery for USB flash drives removed. - B&R CompactFlash card added. - Technical data for Silicon Systems CFs revised. - The lithium batteries (5 pcs.) 0AC201.9 were replaced by 0AC201.91 (4 Stück). - BIOS dedault setting "USB Configuration - UDC" corrected. - Section 2.1 "BIOS upgrade" and 2.2 "Firmware upgrade" moved to the section 2 "Upgrade information", on page 150 and both sections revised. - Section 3 "Panel PC 300 with Windows CE", on page 160 updated. - Section 4 "Panel PC 300 with Windows XP Embedded", on page 163 updated. - CompactFlash card 5CFCRD.016G-04 added. - Section 1 "Temperature sensor locations", on page 237 added - Section "General device interfaces" renamed to "Device interfaces" and revised. - Figure 58 "Clamps", on page 107 changed. - Figure 59 "Space for air circulation", on page 108 added. - Section 6 "User tips for increasing the display lifespan", on page 118 added - Section 5 "Panel PC 300 with Windows Embedded Standard 2009", on page 165 added - Chapter 5 "Standards and certifications", on page 171 revised. - B&R flash drive 5MMUSB.2048-01 added to the section "USB flash drive", on page 199.

Table 1 : Manual history

Version	Date	Changes
		- The "B&R ID code" table entry was added to the technical data for the PPC300. - Technical data for PPC300 and AP900 devices revised: Touch screen type added, layout of information about button actuation changed, uniform wording for 16.7 million colors. - Derating information at bottom of temperature humidity diagram removed and added to altitude value as a footnote in technical data. - Section "B&R Automation Device Interface (ADI) - Control Center", on page 168 updated. - Section "B&R Automation Device Interface (ADI) development kit", on page 245 updated.
1.31	2011-06-08	- Sections "B&R Automation Device Interface (ADI) - Control Center", on page 168, "B&R Key Editor", on page 243 und "B&R Automation Device Interface (ADI) development kit", on page 245 updated. - Sections "HMI Drivers & Utilities DVD 5SWHMI.0000-00", on page 221, "B&R Automation Device Interface (ADI) .NET SDK", on page 247 and "Pixelerror", on page 119 added.

Table 1 : Manual history (Forts.)

2. Safety notices

2.1 Intended use

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

2.2 Protection against electrostatic discharges

Electrical components that are vulnerable to electrostatic discharge (ESD) must be handled accordingly.

2.2.1 Packaging

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

2.2.2 Guidelines for proper ESD handling

Electrical components with housing

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

Electrical components without housing

In addition to "Electrical components with housing", the following also applies:

- Any persons handling electrical components or devices that will be installed in the electrical components must be grounded.
- Components can only be touched on the small sides or on the front plate.
- Components should always be stored in a suitable medium (ESD packaging, conductive foam, etc.).
  Metallic surfaces are not suitable storage surfaces!

- Electrostatic discharges should be avoided on the components (e.g. through charged plastics).
- A minimum distance of 10 cm must be kept from monitors and TV sets.
- Measurement devices and equipment must be grounded.
- Measurement probes on potential-free measurement devices must be discharged on sufficiently grounded surfaces before taking measurements.

Individual components

- ESD protective measures for individual components are thoroughly integrated at B&R (conductive floors, footwear, arm bands, etc.).

The increased ESD protective measures for individual components are not necessary for our customers for handling B&R products.

2.3 Policy and procedures

Electronic devices are generally not failsafe. In the event of a failure on the programmable control system operating or monitoring device, or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, e.g. motors, are in a secure state.

Both when using programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a soft PLC (e.g. B&R Automation Runtime or comparable products) or a slot PLC (e.g. B&R LS251 or comparable products), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) must be observed in accordance with applicable national and international regulations. The same applies for all other devices connected to the system, such as drives.

All tasks such as installation, commissioning, and maintenance are only permitted to be carried out by qualified personnel. Qualified personnel are persons familiar with transport, ounting, installation, commissioning, and operation of the product who also have the respective qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed.
The safety guidelines, connection descriptions (type plate and documentation), and limit values listed in the technical data are to be read carefully before installation and commissioning and must be observed.

2.4 Transport and storage

During transport and storage, devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmospheres, etc.).

2.5 Installation

- Installation must take place according to the documentation, using suitable equipment and tools.
- Devices must be installed without voltage applied and by qualified personnel.
- General safety regulations and nationally applicable accident prevention guidelines must be observed.
- Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).

2.6 Operation

2.6.1 Protection against touching electrical parts

To operate programmable logic controllers, operating and monitoring devices or uninterruptible power supplies, certain components must carry dangerous voltage levels of over 42 VDC. A life-threatening electrical shock could occur if you come into contact with these parts. This could result in death, severe injury or material damage.

Before turning on the programmable logic controller, the operating and monitoring devices and the uninterruptible power supply, ensure that the housing is properly grounded (PE rail). The ground connection must be established when testing the operating and monitoring devices or the uninterruptible power supply, even when operating them for only a short time.

Before turning the device on, make sure that all parts with voltage applied are securely covered. During operation, all covers must remain closed.

2.6.2 Environmental conditions - dust, humidity, aggressive gases

Use of operating and monitoring devices (e.g. industrial PCs, power panels, mobile panels, etc.) and uninterruptible power supplies in very dusty environments should be avoided. Dust collection on the devices influences their function and, especially in systems with active cooling (fans), sufficient cooling cannot be guaranteed.

The presence of aggressive gases in the environment can also lead to malfunctions. When combined with high temperature and humidity, aggressive gases - e.g. with sulfur, nitrogen and chlorine components - start chemical processes that can damage electronic components very quickly. Signs of the presence of aggressive gases are blackened copper surfaces and cable ends on existing installations.

For operation in dusty or humid conditions, correctly installed (cutout installation) operating and monitoring devices like Automation Panel or Power Panel are protected on the front side. The rear side of all devices must be protected from dust and humidity and must be cleaned at suitable intervals.

2.6.3 Programs, viruses, and dangerous programs

The system is subject to potential danger each time data is exchanged or software is installed from a data medium (e.g. diskette, CD-ROM, USB flash drive, etc.), a network connection, or the Internet. The user is responsible for assessing these dangers, implementing preventative measures such as virus protection programs, firewalls, etc. and obtaining software from reliable sources.

2.7 Environmentally-friendly disposal

All B&R programmable controllers, operating and monitoring devices, and uninterruptible power supplies are designed to inflict as little harm on the environment as possible.

2.7.1 Separation of materials

It is necessary to separate different materials so the device can undergo an environmentally-friendly recycling process.

Component	Disposal
Programmable logic controllers Operating and monitoring devices Uninterruptible power supply Cables	Electronics recycling
Cardboard box / paper packaging	Paper / cardboard recycling
Plastic packaging	Plastic recycling

Table 2: Environmentally-friendly separation of materials

Disposal must comply with the respective legal regulations.

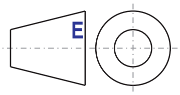
3. Organization of safety notices

The safety notices in this manual are organized as follows:

Safety notice	Description
Danger!	Disregarding the safety regulations and guidelines can be life-threatening.
Caution!	Disregarding the safety regulations and guidelines can result in severe injury or major damage to material.
Warning!	Disregarding the safety regulations and guidelines can result in injury or damage to material.
Information:	Important information for preventing errors.

Table 3: Organization of safety notices

4. Directives



All dimension diagrams (e.g. dimension diagrams, etc.) are drawn according to European dimension standards.

5. Model numbers

5.1 Panel PC 300

Model number	Description	Note
5PC310.L800-00	**AP slide-in PC LX800 256 MB RAM** 256 MB SDRAM; CompactFlash slot (type I); 2 x ETH 10/100; RS232; battery; 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately).	See page 39
5PC310.L800-01	**AP slide-in PC LX800 512 MB RAM** 512 MB SDRAM; CompactFlash slot (type I); 2 x ETH 10/100; RS232; battery; 24 VDC (order 0TB103.9 screw clamp or 0TB103.91 cage clamp terminals separately).	See page 42

Table 4: Model numbers - Panel PC 300 cards

5.2 Automation Panel 900

5.2.1 Automation Panel 10.4" VGA

Model number	Description	Note
5AP920.1043-01	**AP920 TFT C VGA 10.4in T** Automation Panel AP920; 10.4" VGA color TFT display with touch screen (resistive); 2 USB 2.0 interfaces; insert for Automation Panel link or PPC300; IP65 protection (front). 24 VDC supply.	See page 44
5AP980.1043-01	**AP980 TFT C VGA 10.4in F T** Automation Panel AP980, 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys and 28 function keys; 2 USB 2.0 interfaces; insert for Automation Panel Link or PPC300; IP65 protection (front side). 24 VDC supply.	See page 50
5AP981.1043-01	**AP981 TFT C VGA 10.4in F T** Automation Panel AP981, 10.4" VGA color TFT display with touch screen (resistive); 10 softkeys; 28 function keys and 20 system keys; 2 USB 2.0 interfaces; insert for Automation Panel Link or PPC300; IP65 protection (front side). 24 VDC supply.	See page 56
5AP982.1043-01	**AP982 TFT C VGA 10.4in F T** Automation Panel AP982, 10.4" VGA color TFT display with touch screen (resistive); 44 function keys and 20 system keys; 2 USB 2.0 interfaces; insert for Automation Panel Link or PPC300; IP65 protection (front side). 24 VDC supply.	See page 62

Table 5: Model numbers - Automation Panel 10.4" VGA

5.2.2 Automation Panel 12.1" SVGA

Model number	Description	Note
5AP920.1214-01	**AP920 TFT C SVGA 12.1in T** Automation Panel AP920; 12.1" SVGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel link or PPC300; IP65 protection (front). 24 VDC supply.	See page 68

Table 6: Model numbers - Automation Panel 12.1" SXGA

5.2.3 Automation Panel 15" XGA

Model number	Description	Note
5AP920.1505-01	**AP920 TFT C XGA 15in T** Automation Panel AP920; 15" XGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel link or PPC300; IP65 protection (front). 24 VDC supply.	See page 74
5AP980.1505-01	**AP980 TFT C XGA 15in F T** Automation Panel AP980, 15" XGA color TFT display with touch screen (resistive); 12 softkeys and 20 function keys; 3 USB 2.0 interfaces; insert for Automation Panel Link or PPC300; IP65 protection (front side). 24 VDC supply.	See page 80
5AP981.1505-01	**AP981 TFT C XGA 15in F T** Automation Panel AP981, 15" XGA color TFT display with touch screen (resistive); 12 softkeys; 20 function keys and 92 system keys; 3 USB 2.0 interfaces; insert for Automation Panel Link or PPC300; IP65 protection (front side). 24 VDC supply.	See page 86

Table 7: Model numbers for Automation Panel 15" XGA

5.2.4 Automation Panel 17" SXGA

Model number	Description	Note
5AP920.1706-01	**AP920 TFT C SXGA 17" T** Automation Panel AP920; 17" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel link or PPC300; IP65 protection (front). 24 VDC supply.	See page 92

Table 8: Model numbers - Automation Panel 17" SXGA

5.2.5 Automation Panel 19" SXGA

Model number	Description	Note
5AP920.1906-01	**AP920 TFT C SXGA 19" T** Automation Panel AP920; 19" SXGA color TFT display with touch screen (resistive); 3 USB 2.0 interfaces; insert for Automation Panel link or PPC300; IP65 protection (front). 24 VDC supply.	See page 98

Table 9: Model numbers - Automation Panel 19" SXGA

5.3 Accessories

Model number	Description	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamps** 24 VDC 3-pin connector, female. Screw clamps, 2.5 mm², protected against vibration by the screw flange	See page 193
0TB103.91	**Plug 24V 5.08 3-pin cage clamps** 24 VDC 3-pin connector, female. Cage clamps, 2.5 mm², protected against vibration by the screw flange	See page 193
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	See page 195
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	See page 195

Table 10: Model numbers - Accessories

Model number	Description	Note
5AC900.104X-03	**Legend strip template 10.4"** for Automation Panel 5AP951.1043-01 and 5A981.1043-01, for 1 device.	See page 196
5AC900.104X-04	**Legend strip template 10.4"** for Automation Panel 5AP952.1043-01 and 5A982.1043-01, for 1 device.	See page 196
5AC900.104X-05	**Legend strip template 10.4"** for Automation Panel 5AP980.1043-01, for 3 devices.	See page 196
5AC900.150X-01	**Legend strip template 15"** for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5A981.1505-01, for 4 devices.	See page 196
5AC900.1200-00	**USB port cap (attached)** Front side USB interface cover (attached) for Automation Panel 900 and Panel PC 700 devices.	See page 198
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	See page 199
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	See page 199
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24V DC; (Order 0TB103.9 screw clamp or 0TB103.91 cage clamps separately).	See page 204
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 212
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 212
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 212
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 212
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 212
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface.	See page 212
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	See page 217
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	See page 217

Table 10: Model numbers - Accessories (Forts.)

Model number	Description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	See page 221

Table 10: Model numbers - Accessories (Forts.)

5.4 Software

Model number	Description	Note
5SWWCE.0523-ENG	**WinCE5.0 Pro PPC300 LX800** Microsoft Windows CE 5.0 Professional, English, including license; for PPC300 units 5PC310.L800-00 and 5PC310.L800-01; order CompactFlash separately (at least 128 MB).	See page 160
5SWWCE.0623-ENG	**WinCE5.0 ProPlus PPC300 LX800** Microsoft Windows CE 5.0 Professional Plus, English, including license; for PPC300 units 5PC310.L800-00 and 5PC310.L800-01; order CompactFlash separately (at least 128 MB).	See page 160
5SWWCE.0823-ENG	**WinCE6.0 Pro PPC300 LX800** Microsoft OEM Windows CE 6.0 Professional, English; for Panel PC 300 BIOS; order CompactFlash separately (at least 128 MB).	See page 160
5SWWXP.0423-ENG	**WinXPe FP2007 PPC300 LX800** Microsoft Windows XP Embedded English, Feature Pack 2007; for PPC300 units 5PC310.L800-00 and 5PC310.L800-01, order CompactFlash separately (at least 512 MB). Only delivered with a new Panel PC.	See page 163
5SWWXP.0723-ENG	**Windows Embedded Standard 2009 PPC300 LX800** Microsoft OEM Windows Embedded, Standard 2009, English; for Panel PC 300; order CompactFlash separately (at least 1 GB).	See page 165

Table 11: Model numbers - Software

Chapter 2 • Technical data

1. Introduction

The Panel PC 300 (abbreviated as PPC300) insert card expands the Automation Panel 900 (abbreviated as AP900) display units to an embedded PC for applications in Windows CE and Windows XP Embedded. The PPC300 supports resolutions from VGA (10.4") to SXGA (19").

The PPC300 utilizes simple plug-in technology for plugging into the insert slot on the AP900 and is secured to the AP900 using two fastening screws (max. torque 0.5 Nm). For more information about installation, see chapter 3 "Commissioning", section "PPC300 installation in an Automation Panel 900", on page 105.

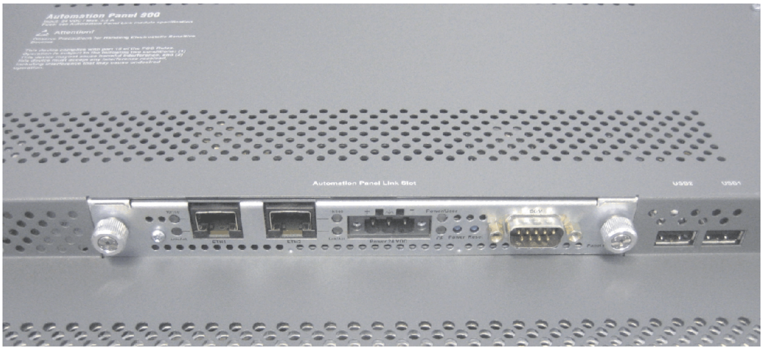


Figure 1: PPC300 mounted in the AP900

1.1 Features

- 500 MHz processor
- 256 or 512 MB SDRAM
- CompactFlash slot (type I)
- 24 VDC supply voltage
- 2 x Ethernet 10/100 MBit interfaces
- RS232 interface
- Real-time clock (battery-buffered)
- Status LEDs
- Power / reset button
- USB 2.0 support (together with Windows XP Embedded)
- Fan-free operation
- BIOS

1.2 System components / configuration

The Panel PC 300 insert can be operated with Automation Panel 900 display units. The following components are needed for operation:

- Panel PC 300 insert card
- Automation Panel 900 display unit (10.4" to 19")

2. Entire device

A PPC300 mounted in an AP900 is labeled as an entire device.

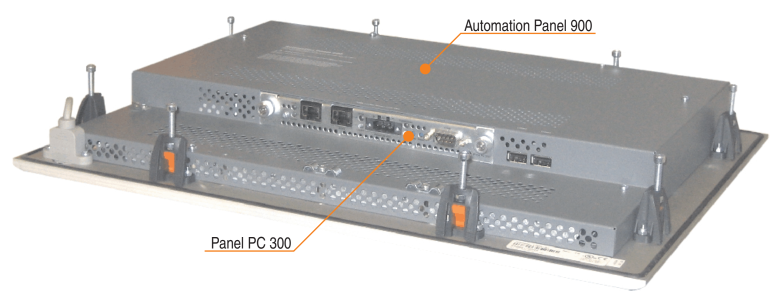


Figure 2: Entire device - PPC300 and AP900

2.1 Ambient temperatures

The following table shows the specifications for minimum and maximum ambient temperature for the combination of AP900 and PPC300 in operation, according to mounting orientation (for specifications, see chapter 3 "Commissioning", section 2.1 "Mounting orientation", on page 109).

	AP900 mounting orientation		
PPC300 + Automation Panel 900 without Rittal housing	**0°**	**to -45° display above**	**to +45° display below**
5AP920.1043-01	0 to +50°C	0 to +50°C	0 to +50°C
5AP980.1043-01	0 to +50°C	0 to +50°C	0 to +50°C
5AP981.1043-01	0 to +50°C	0 to +50°C	0 to +50°C
5AP982.1043-01	0 to +50°C	0 to +50°C	0 to +50°C
5AP920.1214-01	0 to +50°C	0 to +50°C	0 to +50°C
5AP920.1505-01	0 to +50°C	0 to +50°C	0 to +45°C
5AP980.1505-01	0 to +50°C	0 to +50°C	0 to +45°C
5AP981.1505-01	0 to +50°C	0 to +50°C	0 to +45°C
5AP920.1706-01	0 to +40°C	0 to +40°C	0 to +35°C
5AP920.1906-01	0 to +40°C	0 to +40°C	0 to +40°C
PPC300 + Automation Panel 900 with Rittal housing	**0°**	**to -45° display above**	**to +45° display below**
5AP920.1043-01	0 to +45°C	0 to +45°C	0 to +45°C
5AP980.1043-01	0 to +45°C	0 to +45°C	0 to +45°C
5AP981.1043-01	0 to +45°C	0 to +45°C	0 to +45°C
5AP982.1043-01	0 to +45°C	0 to +45°C	0 to +45°C

Table 12: Ambient temperature according to mounting orientation

More detailed information regarding the temperature according to the humidity can be found in the "Technical data" for the individual components.

2.2 Humidity specifications

The following specifications list the minimum and maximum humidity for an ambient temperature of +30°C for operation and transport.

Component	Operation	Storage / Transport
5PC310.L800-00	5 to 90%	5 to 90%
5PC310.L800-01	5 to 90%	5 to 90%
5AP920.1043-01	5 to 90%	5 to 90%
5AP980.1043-01	5 to 90%	5 to 90%
5AP981.1043-01	5 to 90%	5 to 90%
5AP982.1043-01	5 to 90%	5 to 90%
5AP920.1214-01	5 to 90%	5 to 90%
5AP920.1505-01	5 to 90%	5 to 90%
5AP980.1505-01	5 to 90%	5 to 90%
5AP981.1505-01	5 to 90%	5 to 90%
5AP920.1706-01	20 to 90%	5 to 90%
5AP920.1906-01	20 to 90%	5 to 90%

Table 13: Overview of humidity specifications for individual components

More detailed information regarding the specified humidity according to the temperature can be found in the "Technical data" for the individual components.

2.3 Power consumption

The total consumption includes the consumption of the PPC300 and the AP900 device variations together.

The following table shows the typical consumption for each component. The sum of the two is the total consumption. The values can be found in the "Technical data" for the individual components.

Component	Typical	Maximum	Maximum with USB
5PC310.L800-00 and 5PC310.L800-01	**5.5 W**	**8 W**	**8 W**
5AP920.1043-01	10 W	13 W	19 W
5AP980.1043-01	10 W	13 W	20 W
5AP981.1043-01	10 W	14 W	21 W
5AP982.1043-01	10 W	14 W	21 W
5AP920.1214-01	12 W	15 W	21 W
5AP920.1505-01	24 W	31 W	41 W
5AP980.1505-01	24 W	32 W	42 W
5AP981.1505-01	24 W	32 W	42 W
5AP920.1706-01	27 W	36 W	46 W
5AP920.1906-01	27 W	38 W	48 W
Sum			

Table 14: Power management according to mounting orientation

Specifications for the starting current can be found in the "Technical data" for each Automation Panel 900 variant.

2.4 Device interfaces

The following device interfaces are applicable to the Panel PC 300 insert 5PC310.L800-00 and 5PC310.L800-01.

2.4.1 +24 VDC supply voltage

The 3-pin socket required for the supply voltage connection is not included in delivery. This can be ordered from B&R using the model number 0TB103.9 (screw clamp) or 0TB103.91 (cage clamp).

The pin assignments can be found either in the following table or printed on the PPC300 insert. The supply voltage is internally protected (10A, fast-acting, soldered), so that the device cannot be damaged if there is an overload (fuse replacement necessary) or if the voltage supply is connected incorrectly (reverse polarity protection - fuse replacement not necessary). The device must be returned to B&R for repairs if the fuse is blown because of an error.

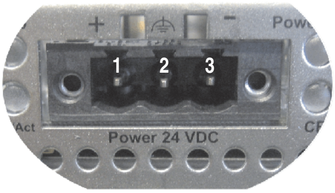
<table>
<tr><th colspan="3">Supply voltage</th></tr>
<tr><td colspan="2">Protected against reverse polarity</td><td rowspan="8">3-pin, male
 </td></tr>
<tr><th>Pin</th><th>Description</th></tr>
<tr><td>1</td><td>+</td></tr>
<tr><td>2</td><td>Functional ground</td></tr>
<tr><td>3</td><td>-</td></tr>
<tr><th colspan="2">Accessories</th></tr>
<tr><td>0TB103.9</td><td>Plug 24 V 5.08 3p screw clamps</td></tr>
<tr><td>0TB103.91</td><td>Plug 24 V 5.08 3p cage clamps</td></tr>
</table>

Figure 3: Supply voltage connection

Ground

> ## Warning!
>
> **The pin's connection to the functional ground (pin 2) should be as short as possible (e.g. in the switching cabinet). We recommend using the largest possible conductor cross section on the supply plug.**

2.4.2 Serial interface COM

The PPC300 is equipped with a PC-compatible serial interface with a 16 byte FIFO buffer. This can also be used as a general interface (e.g. third-party connection, bar code reader, etc.).

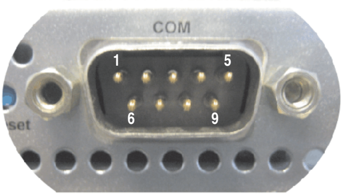
Serial interface (COM)		
Type	RS232, modem-capable, not electrically isolated	9-pin DSUB, male 
UART	16C550, 16 Byte FIFO	
Transfer rate	Up to 115 kBaud	
Pin	**Assignment**	
1	DCD	
2	RxD	
3	TxD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Table 15 : Pin assignments - COM

The interrupt and address range of the interface can be changed in the BIOS setup. For default settings, see the section "BIOS default values", on page 147.

2.4.3 Ethernet connection - ETH1

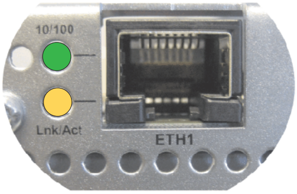
<table>
<tr><th colspan="4">Ethernet connection (ETH1)[1]</th></tr>
<tr><td>Controller</td><td colspan="2">Intel 82551ER</td><td rowspan="7">RJ45 twisted pair (10BaseT/100BaseT), female
 </td></tr>
<tr><td>Cabling</td><td colspan="2">S/STP (category 5)</td></tr>
<tr><td>Transfer rate</td><td colspan="2">10/100 Mbit/s [2]</td></tr>
<tr><td>PXE boot possible</td><td colspan="2">-</td></tr>
<tr><td><b>LED</b></td><td><b>On</b></td><td><b>Off</b></td></tr>
<tr><td>10/100 - green</td><td>100 Mbit/s</td><td>10 Mbit/s</td></tr>
<tr><td>Lnk/Act - orange</td><td>Link (Ethernet network connection available)</td><td>Activity (blinking) (Data transfer in progress)</td></tr>
</table>

Table 16: Ethernet connection (ETH1)

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) Both operating modes possible. Change-over takes place automatically.

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. The necessary software can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

> ## Information:
>
> **Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.**

2.4.4 Ethernet connection - ETH2

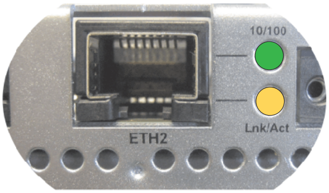
<table>
<tr><th colspan="4">Ethernet connection (ETH2)[1]</th></tr>
<tr><td>Controller</td><td colspan="2">Intel 82551ER</td><td rowspan="7">RJ45 twisted pair (10BaseT/100BaseT), female
 </td></tr>
<tr><td>Cabling</td><td colspan="2">S/STP (category 5)</td></tr>
<tr><td>Transfer rate</td><td colspan="2">10/100 Mbit/s [2]</td></tr>
<tr><td>PXE boot possible</td><td colspan="2">Yes</td></tr>
<tr><td><b>LED</b></td><td><b>On</b></td><td><b>Off</b></td></tr>
<tr><td>10/100 - green</td><td>100 Mbit/s</td><td>10 Mbit/s</td></tr>
<tr><td>Lnk/Act - orange</td><td>Link (Ethernet network connection available)</td><td>Activity (blinking) (Data transfer in progress)</td></tr>
</table>

Table 17: Ethernet connection (ETH2)

1) The interfaces, etc. available on the device or module were numbered accordingly for easy identification. This numbering can differ from the numbering used by the particular operating system.

2) Both operating modes possible. Change-over takes place automatically.

The Ethernet connection ETH2 is PXE boot compatible. Hold the key combination "Ctrl + S" during startup to access the PXE Setup menu.

Driver support

A special driver is necessary for operating the Intel Ethernet controller 82551ER. The necessary software can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

2.4.5 Status LEDs

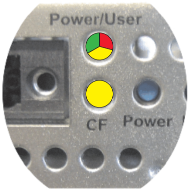
<table>
<tr><th colspan="5">Status LEDs</th></tr>
<tr><th>LED</th><th>Color</th><th></th><th>Meaning</th><td rowspan="6">1 x three-color, 1 x one-color
 </td></tr>
<tr><td rowspan="2">Power</td><td>Green</td><td>On</td><td>S0 state: PPC300 on.</td></tr>
<tr><td>Red</td><td>On</td><td>The system is in standby mode (S5: soft-off mode or S4: Hibernate mode -Suspend-to-Disk)</td></tr>
<tr><td rowspan="2">User</td><td>Yellow</td><td>On</td><td rowspan="2">Can be used as the user wants (for example, can be turned on/off directly using the ADI library - only possible in S0 state)</td></tr>
<tr><td>Green</td><td>Off</td></tr>
<tr><td>CF</td><td>Orange</td><td>On</td><td>IDE access (read, write) to the CompactFlash card.</td></tr>
</table>

Table 18: Technical data - Status LEDs

2.4.6 Power button

The power button has a variety of functions due to full ATX power supply support.

<table>
<tr><th colspan="2">Power button</th></tr>
<tr><td>The power button can be pressed with a pointed object (i.e. paper clip or tip of a pen).

The power button acts like the on/off switch on a normal desktop PC with ATX power supply:
press and release ... turn on or shutdown operating system (Windows XP Embedded) - can be configured in the operation system.
Press and hold ... ATX power supply switches off without shutting down the PPC300 (**data could be lost!**).

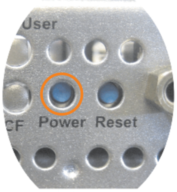
Pressing the power button does not reset the MTCX processor.
not reset.</td><td> </td></tr>
</table>

Table 19: Power button

2.4.7 Reset button

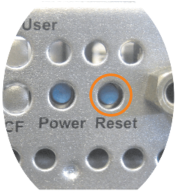
Reset button	
The reset button can be pressed with a pointed object (i.e. paper clip or tip of a pen). Pushing the reset button results in a hardware-reset. The PPC300 is restarted (cold restart). The MTCX processor is not reset when the reset button is pressed.	

Table 20: Reset button

Warning!

A system reset can cause data to be lost!

2.4.8 CompactFlash slot CF

This CompactFlash slot is a fixed part of an PPC300 system and is internally connected with the chipset via IDE PATA. Type I CompactFlash cards are supported.

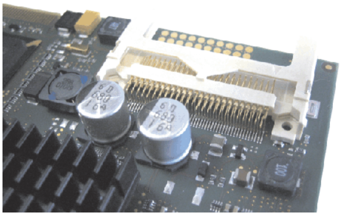
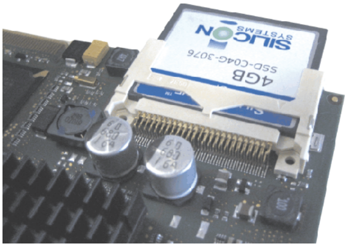
CompactFlash slot (CF)		
Connection	PATA Master	 
CompactFlash Type	Type I	
Accessories	**Short description**	
5CFCRD.0512-04	512 MB B&R CompactFlash card	
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB B&R CompactFlash card	
5CFCRD.0064-03	CompactFlash 64 MB SSI	
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 21: CompactFlash slot (CF1)

Warning!

Turn off power before inserting or removing the CompactFlash card!

The access method (PIO, MDMA or UDMA) is determined by the CompactFlash card being used. The speed can be changed in the BIOS setup. For default settings, see the section "BIOS default values", on page 147.

2.4.9 Battery

The lithium battery (3 V, 950 mAh) buffers the internal real-time clock (RTC) as well as the individually saved BIOS settings and is located on the baseboard. The buffer duration of the battery is at least 4 years (at 50°C, 6 µA of the supplied components and a self discharge of 40%). The battery is subject to wear and should be replaced regularly (at least following the specified buffer duration).

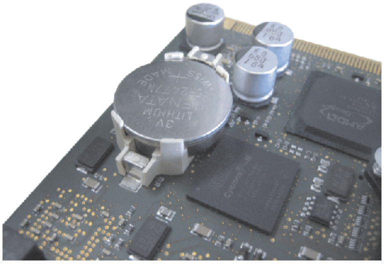
Battery		
Battery Type Removable Lifespan	 Renata 950 mAh Yes 4 years1)	
Accessories	**Short description**	
0AC201.91	**Lithium batteries, 4 pcs.** Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium batteries, 1 pcs.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	

Table 22: Technical data - battery

1) at 50°C, 6 µA of the supplied components and a self discharge of 40%.

For more on changing the lithium battery, see chapter 7 "Service and maintenance", section 1 "Changing the battery", on page 227.

Battery status evaluation

The battery status is evaluated immediately following start-up of the device and is subsequently checked by the system every 24 hours. The battery is subjected to a brief load (1 second) during the measurement and then evaluated. The evaluated battery status is displayed in the BIOS setup pages under "Motherboard Device Information - Thermal Configuration" (see page 134), but can also be read in a customer application via the ADI Library. Potential battery states include OK and Bad.

2.4.10 USB connection (via AP900)

The USB interfaces integrated in the AP900 displays (2 in 10.4" and 3 starting at 12.1") on the front and back are used.

USB peripherals can be connected directly or using an additional USB hub.

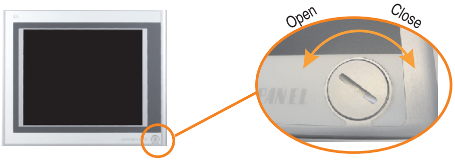
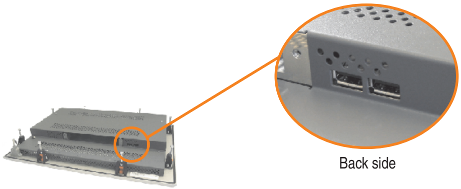
USB interfaces		
Type	USB 2.0	 Front side  Back side
Possible total number 10.4" display diagonal Starting at 12.1" display diagonal	 2 3	
Transfer rate	Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)	
Connection	Type A	
Current load	Max. 500 mA per connection	

Table 23 : USB interfaces

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

3. Individual components

The following pages contain descriptions of the individual components (Panel PC 300 and Automation Panel 900) in all available models.

3.1 Panel PC 300 insert

3.1.1 Model with 256 MB SDRAM 5PC310.L800-00

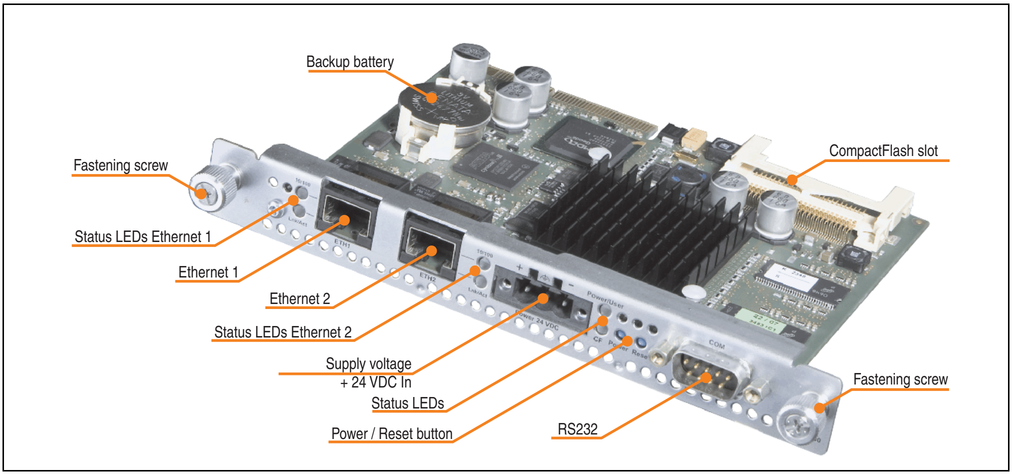


Figure 4: AP slide-in PC 5PC310.L800-00

Technical data

Features	5PC310.L800-00
B&R ID code	$25C7
Boot loader / Operating system	BIOS (see section "BIOS options", on page 121 for a description)
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	 Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)
Memory Type Quantity	 DDR SDRAM 256 MB
Real-time clock (RTC) Battery-buffered Accuracy	 Yes At +25°C typically 30 ppm (2.5 seconds) 1) per day

Table 24: Technical data - 5PC310.L800-00

Features	5PC310.L800-00
Battery Type Removable Lifespan Backup capacitor[2] (for changing battery) Buffer time	 Renata 950 mAh Yes 4 years[3] 10 minutes
Ethernet 1 (ETH1) Controller Transfer rate Connection Cables	 Intel 82551ER 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5)
Ethernet 2 (ETH2) Controller Transfer rate Connection Cables	 Intel 82551ER 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5)
Serial interface (COM) Type UART Transfer rate Connection	 RS232, modem-capable, not electrically isolated 16C550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB
Reset button	Yes, accessible from the outside
Power button	Yes, accessible from the outside
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow) 2x Ethernet 1 - 10/100 (green) and Link Act (yellow) 2x Ethernet 2 - 10/100 (green) and Link Act (yellow)
USB interface Type Amount Transfer rate Connection Current load	implemented via AP900 display unit (see section "USB connection (via AP900)", on page 38 USB 2.0 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Fastening screws Maximum fastening torque	2 0.5 Nm
Supply voltage Voltage range Rated current Starting current Power consumption Electrical isolation	via AP900 18 - 30 VDC see the technical data for the AP900 device see the technical data for the AP900 device 5.5 W typical, 8 W max. Yes
Bleeder resistance	1 MΩ
Mechanical characteristics	
Weight	Approx. 233 g

Table 24: Technical data - 5PC310.L800-00

Environmental characteristics	5PC310.L800-00
Ambient temperature	See 2.1 "Ambient temperatures", on page 27
Relative humidity	See 2.2 "Humidity specifications", on page 28

Table 24: Technical data - 5PC310.L800-00

1) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).

2) Included starting with revision C0.

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
Maximum lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 3 years at +25°C or 2 year at +50°C.

3.1.2 Model with 512 MB SDRAM 5PC310.L800-01

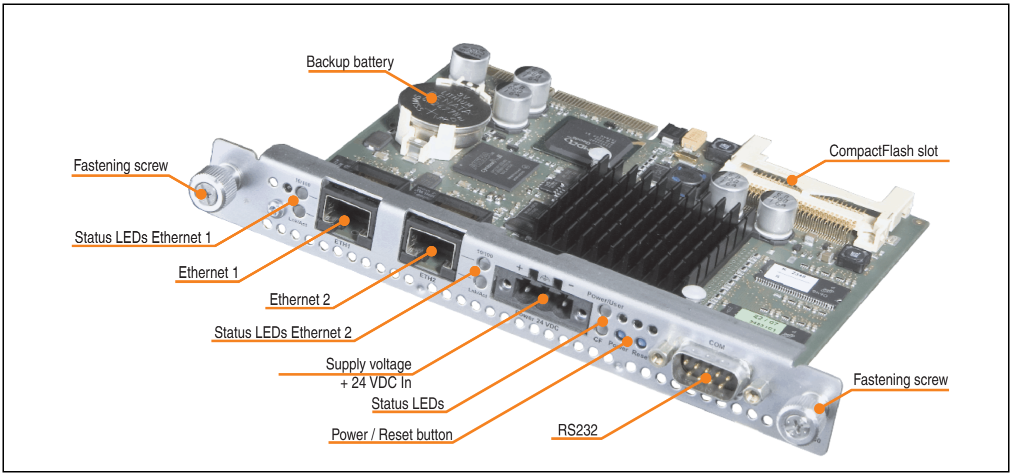


Figure 5: AP slide-in PC 5PC310.L800-01

Technical data

Features	5PC310.L800-01
B&R ID code	$A62E
Boot loader / Operating system	BIOS (see section "BIOS options", on page 121 for a description)
Processor Type Expanded command set L1 cache L2 cache Floating point unit (FPU) Cooling Method	 Geode LX800 500 MHz, 32-bit x86 MMX technology, 3D Now 128 kB (64 kB I-Cache / 64 kB D-Cache) 128 kB Yes Passive (heat sink)
Memory Type Quantity	 DDR SDRAM 512 MB
Real-time clock (RTC) Battery-buffered Accuracy	 Yes at 25°C typically 30 ppm (2.5 seconds)[1] per day
Battery Type Removable Lifespan Backup capacitor[2] (for changing battery) Buffer time	 Renata 950 mAh Yes 4 years[3] 10 minutes

Table 25: Technical data - 5PC310.L800-01

Features	5PC310.L800-01
Ethernet 1 (ETH1) Controller Transfer rate Connection Cables	 Intel 82551ER 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5)
Ethernet 2 (ETH2) Controller Transfer rate Connection Cables	 Intel 82551ER 10/100 Mbit/s RJ45 twisted pair (10 Base T / 100 Base T) S/STP (category 5)
Serial interface (COM) Type UART Transfer rate Connection	 RS232, modem-capable, not electrically isolated 16C550 compatible, 16 byte FIFO Max. 115 kBaud 9-pin DSUB
Reset button	Yes, accessible from the outside
Power button	Yes, accessible from the outside
LEDs	1x CF (yellow) 1x combined power (red/green) and user (yellow) 2x Ethernet 1 - 10/100 (green) and Link Act (yellow) 2x Ethernet 2 - 10/100 (green) and Link Act (yellow)
USB interface Type Amount Transfer rate Connection Current load	implemented via AP900 display unit (see section "USB connection (via AP900)", on page 38 USB 2.0 2 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Fastening screws Maximum fastening torque	2 0.5 Nm
Supply voltage Voltage range Rated current Starting current Power consumption Electrical isolation	via AP900 18 - 30 VDC see the technical data for the AP900 device see the technical data for the AP900 device 5.5 W typical, 8 W max. Yes
Bleeder resistance	1 MΩ
Mechanical characteristics	
Weight	Approx. 233 g
Environmental characteristics	
Ambient temperature	See 2.1 "Ambient temperatures", on page 27
Relative humidity	See 2.2 "Humidity specifications", on page 28

Table 25: Technical data - 5PC310.L800-01

1) At max. specified ambient temperature: typically 50 ppm (4 seconds) - worst-case 100 ppm (8 seconds).

2) Included starting with revision C0.

3) Typical lifespan (at 50% buffer operation, temperature 25°C when off, 50°C when on).
Maximum lifespan in 24-hour operation (no buffer) 6 years at +25°C or 5 years at +50°C.
Maximum lifespan when switched off: 3 years at +25°C or 2 year at +50°C.

3.2 Automation Panel 900

3.2.1 Automation Panel 5AP920.1043-01

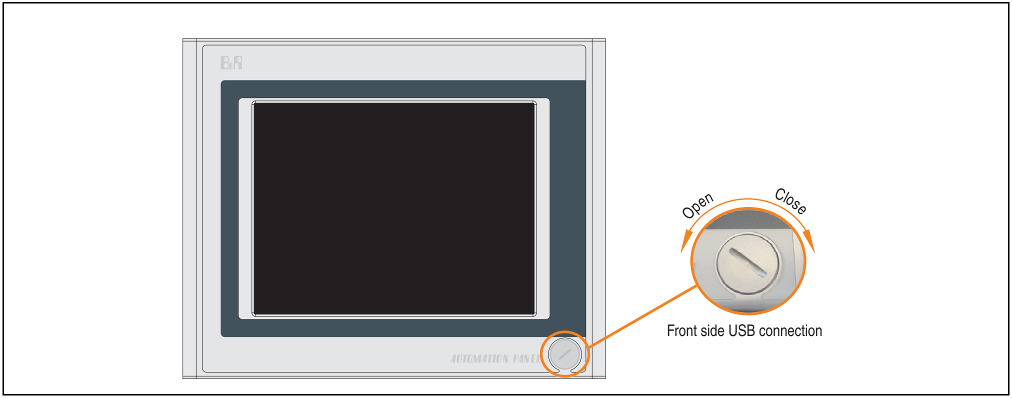


Figure 6: Front view - 5AP920.1043-01

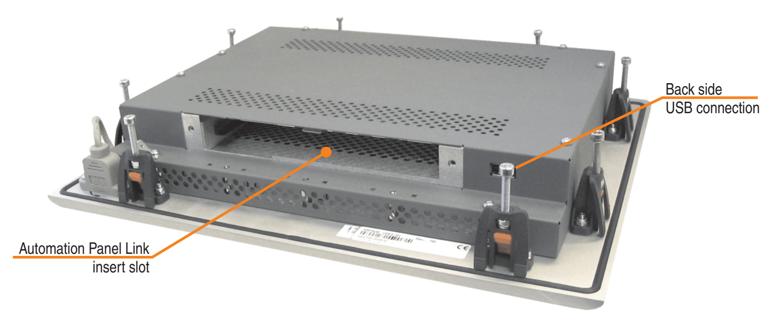


Figure 7: Rear view - 5AP920.1043-01

Technical data

Features	5AP920.1043-01
Mounting compatible for PPC300 insert	Revision D0 and higher
USB interface 1)	
Type	USB 2.0
Amount	2 (1x front side, 1x back side)
Transfer rate	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	10.4 in (264 mm)
Colors	262,144 colors
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 70°
Vertical	Direction U = 40°/ direction D = 70°
Background lighting	
Brightness	350 cd/m²
Half-brightness time2)	50,000 hours
Touch screen 3)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys	-
Function keys	
Soft keys	
Cursor keys	
Number block	
Other keys	
Key lifespan	
LED brightness	
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current4)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 10 W, maximum 13 W or 19 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Front	
Frame	Naturally anodized aluminum5)
Design	Gray5)
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV5)
Light background	Similar to Pantone 427CV5)
Gasket	Flat gasket around display front
Outer dimensions	
Width	323 mm
Height	260 mm
Depth	55 mm

Table 26: Technical data - 5AP920.1043-01

Mechanical characteristics	**5AP920.1043-01**
Housing Paint	Metal Similar to Pantone 432CV[5]
Weight	Approx. 2.9 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -30 to +70°C -30 to +70°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 47
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[6]

Table 26: Technical data - 5AP920.1043-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The specified value is based on the Automation Panel device with connected PPC300.

5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

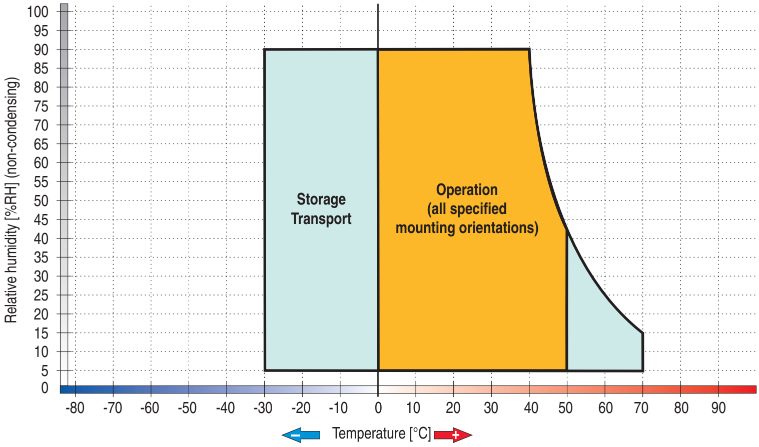
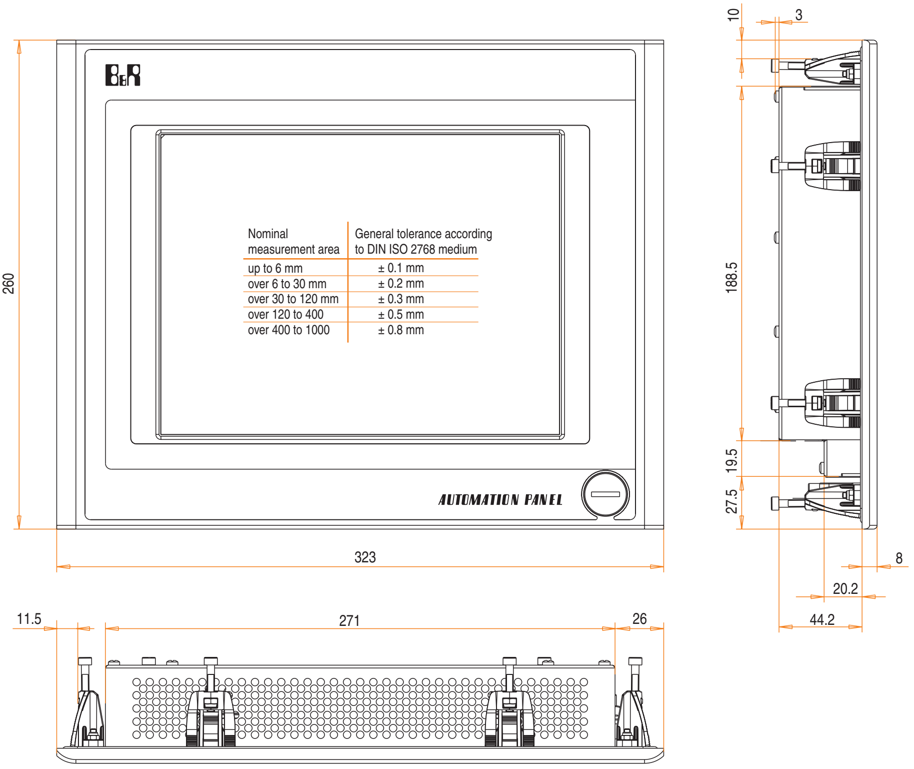


Figure 8: Temperature humidity diagram - 5AP920.1043-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 9: Dimensions - 5AP920.1043-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 920 TFT VGA 10.4in with touch screen

Table 27: Contents of delivery - 5AP920.1043-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

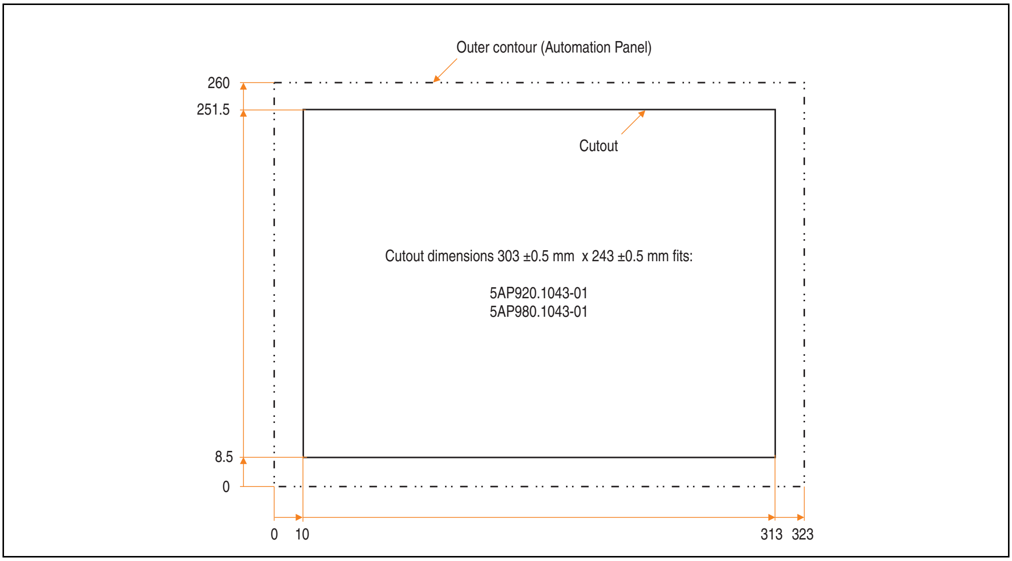

Outer contour (Automation Panel)
260
251.5
Cutout
Cutout dimensions 303 ±0.5 mm x 243 ±0.5 mm fits:
5AP920.1043-01
5AP980.1043-01
8.5
0
0
10
313
323

Figure 10: Cutout installation - 5AP920.1043-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.2 Automation Panel 5AP980.1043-01

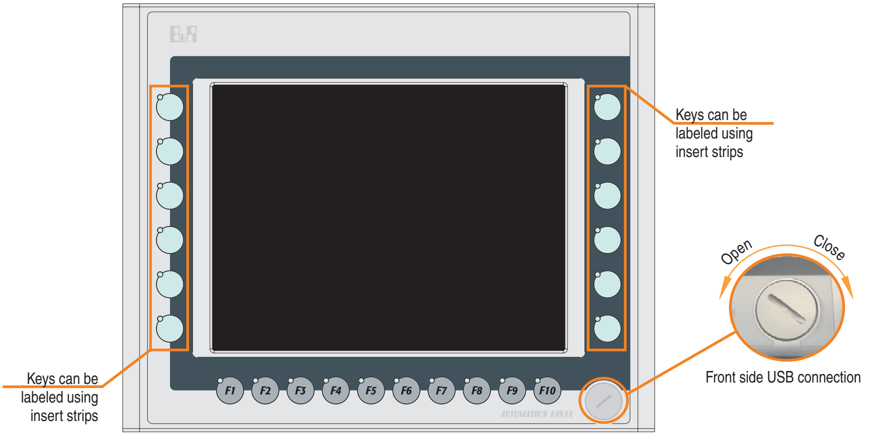

Keys can be labeled using insert strips
Open
Close
Front side USB connection
Keys can be labeled using insert strips
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
AUTOMATION PANEL

Figure 11: Front view - 5AP980.1043-01

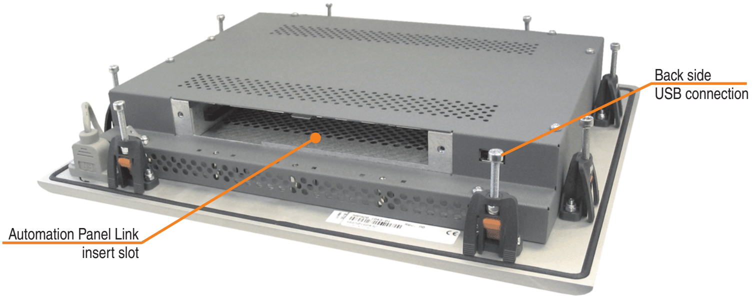


Figure 12: Rear view - 5AP980.1043-01

Technical data

Features	**5AP980.1043-01**
Mounting compatible for PPC300 insert	Revision D0 and higher
USB interface 1)	
Type	USB 2.0
Amount	2 (1x front side, 1x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	10.4 in (264 mm)
Colors	262,144 colors
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 70°
Vertical	Direction U = 40°/ direction D = 70°
Background lighting	
Brightness	350 cd/m^2
Half-brightness time2)	50,000 hours
Touch screen 3)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED 4)	
Function keys	12 with LED (yellow)
Soft keys	10 with LED (yellow)
Cursor keys	-
Number block	-
Other keys	-
Key lifespan	$> 10^6$ actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typically 12 mcd (yellow)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current5)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 10 W (without LED), maximum 13 W or 20 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Front	
Frame	Naturally anodized aluminum6)
Design	Gray6)
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV6)
Light background	Similar to Pantone 427CV6)
Legend strips (gray)	Similar to Pantone 429CV6)
Gasket	Flat gasket around display front

Table 28: Technical data - 5AP980.1043-01

Mechanical characteristics	**5AP980.1043-01**
Outer dimensions Width Height Depth	 323 mm 260 mm 55 mm
Housing Paint	Metal Similar to Pantone 432CV[6)]
Weight	Approx. 2.9 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -30 to +70°C -30 to +70°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 53
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[7)]

Table 28: Technical data - 5AP980.1043-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).

5) The value is based on the Automation Panel device with connected PPC300.

6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

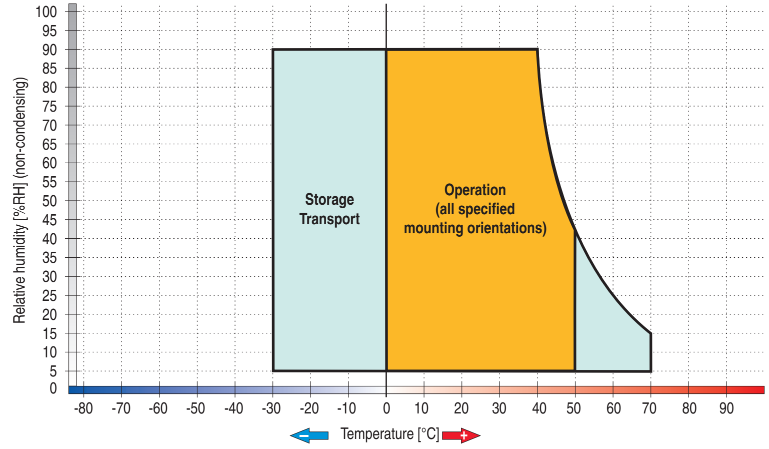
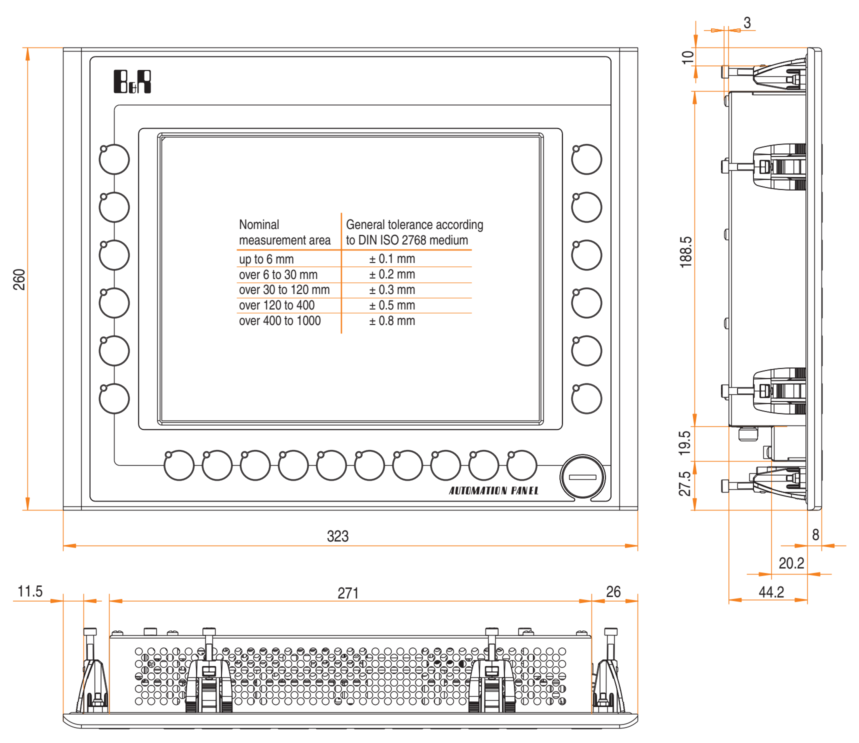


Figure 13: Temperature humidity diagram - 5AP980.1043-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 14: Dimensions - 5AP980.1043-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 980 TFT VGA 10.4in with touch screen and keys
2	Insert strips without labels (inserted in the front)

Table 29: Contents of delivery - 5AP980.1043-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

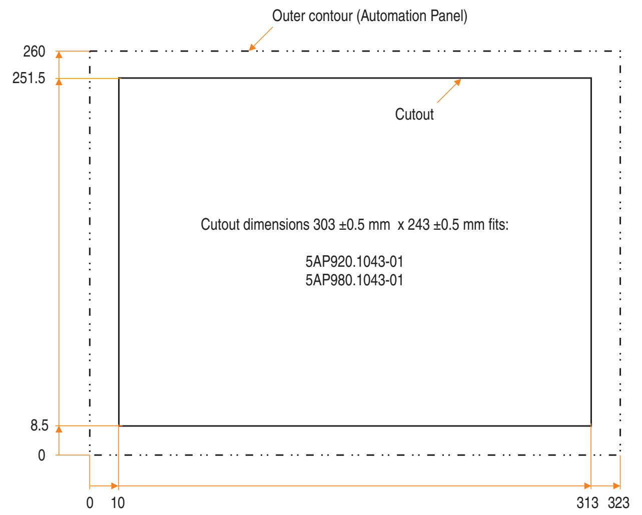

Outer contour (Automation Panel)
260
251.5
Cutout
Cutout dimensions 303 ±0.5 mm x 243 ±0.5 mm fits:
5AP920.1043-01
5AP980.1043-01
8.5
0
0
10
313
323

Figure 15: Cutout installation - 5AP980.1043-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.3 Automation Panel 5AP981.1043-01

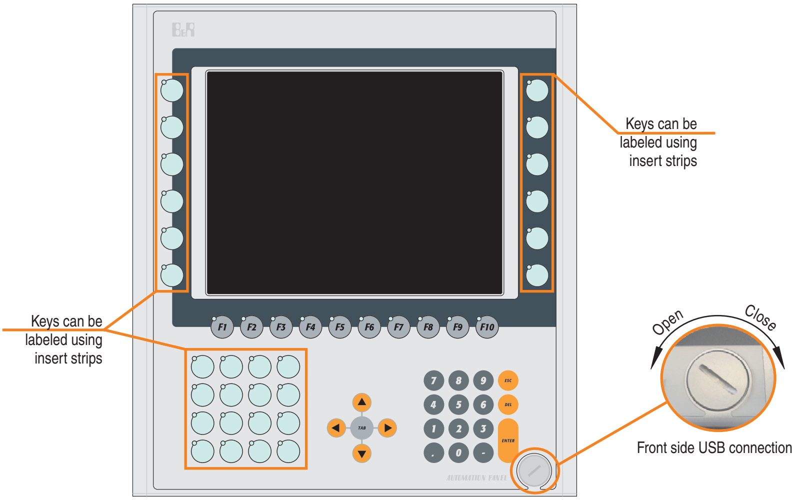

Keys can be labeled using insert strips
Keys can be labeled using insert strips
Open
Close
Front side USB connection
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
TAB
ESC
DEL
ENTER

Figure 16: Front view - 5AP981.1043-01

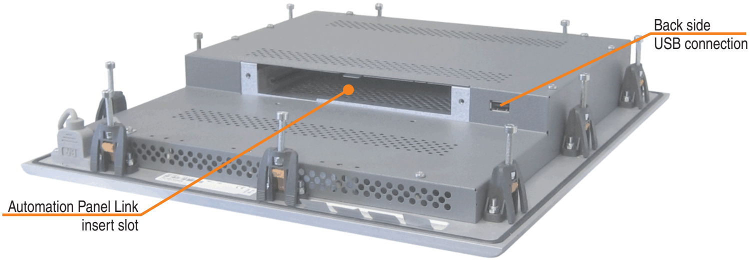


Figure 17: Rear view - 5AP981.1043-01

Technical data

Features	**5AP981.1043-01**
Mounting compatible for PPC300 insert	Revision D0 and higher
USB interface [1] Type Amount Transfer rate Connection Current load	 USB 2.0 2 (1x front side, 1x back side) Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 242) Horizontal Vertical Background lighting Brightness Half-brightness time[2]	 Color TFT 10.4 in (264 mm) 262,144 colors VGA, 640 x 480 pixels 300:1 Direction R / direction L = 70° Direction U = 40°/ direction D = 70° 350 cd/m² 50,000 hours
Touch screen [3] Touch screen type Technology Controller Degree of transmission	 Elo Analog, resistive Elo, serial, 12-bit Up to 78%
Keys/LED [4] Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	 28 with LED (yellow) 10 with LED (yellow) - 15 without LED 5 without LED > 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force Typically 12 mcd (yellow) **Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.**
Electrical characteristics	
Power supply Rated voltage Rated current[5] Starting current Power consumption (without insert) Electrical isolation	via PPC300 24 VDC ± 25% (printed on back of housing) Maximum 3.2 A (printed on back of housing) Typically 6 A, maximum 30 A for < 300 µs Typically 10 W (without LED), maximum 14 W or 21 W with USB Yes
Mechanical characteristics	
Outer dimensions Width Height Depth	 323 mm 358 mm 55 mm

Table 30: Technical data - 5AP981.1043-01

Mechanical characteristics	5AP981.1043-01
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	 Naturally anodized aluminum[6)] Gray[6)] Polyester Similar to Pantone 432CV[6)] Similar to Pantone 427CV[6)] Similar to Pantone 151CV[6)] Similar to Pantone 431CV[6)] Similar to Pantone 429CV[6)] Flat gasket around display front
Housing Paint	Metal Similar to Pantone 432CV[6)]
Weight	Approx. 3.6 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -30 to +70°C -30 to +70°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 59
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[7)]

Table 30: Technical data - 5AP981.1043-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).

5) The value is based on the Automation Panel device with connected PPC300.

6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

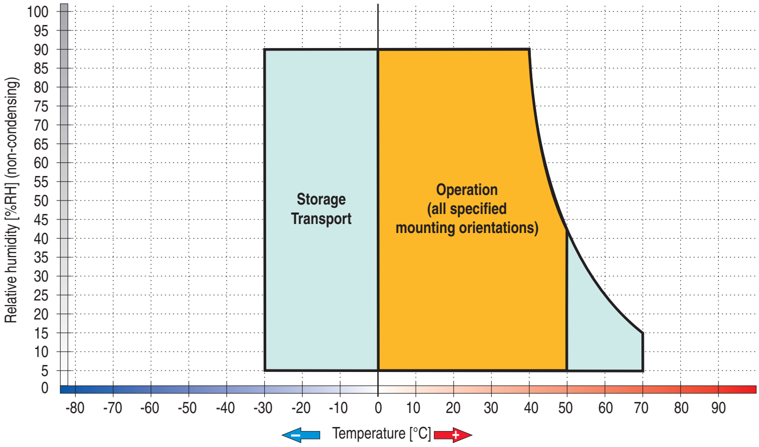
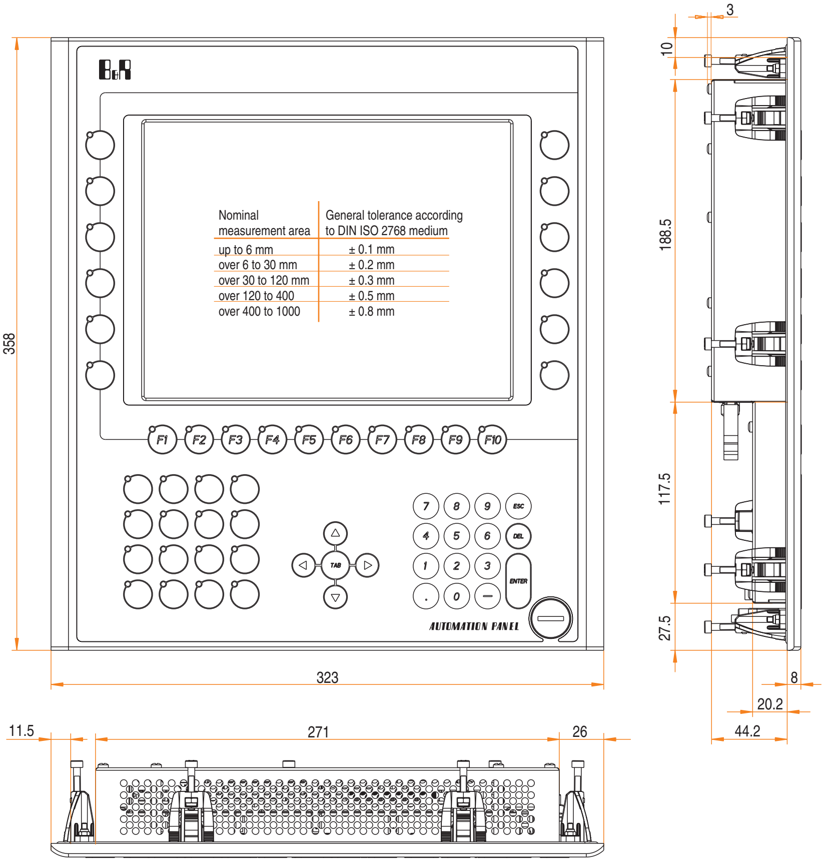


Figure 18: Temperature humidity diagram - 5AP981.1043-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 19: Dimensions - 5AP981.1043-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 981 TFT VGA 10.4in with keys and touch screen
6	Insert strips without labels (inserted in the front)

Table 31: Contents of delivery - 5AP981.1043-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

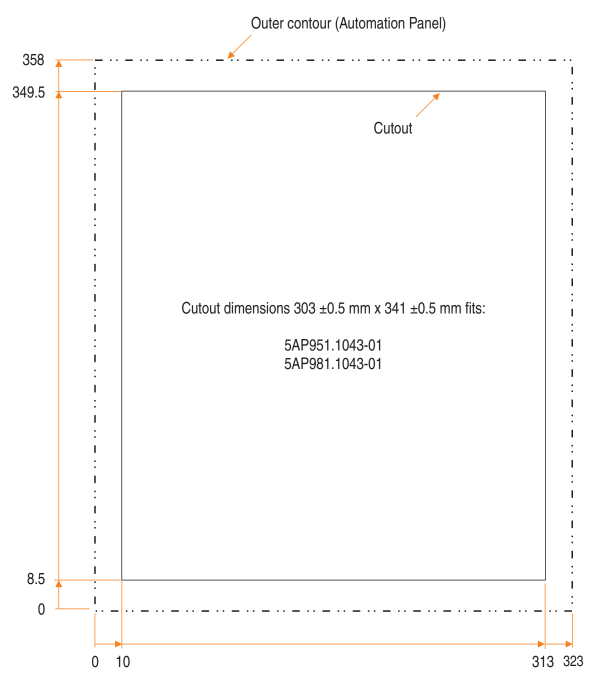

Outer contour (Automation Panel)
Cutout
Cutout dimensions 303 ±0.5 mm x 341 ±0.5 mm fits:
5AP951.1043-01
5AP981.1043-01
358
349.5
8.5
0
0
10
313
323

Figure 20: Cutout installation - 5AP981.1043-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.4 Automation Panel 5AP982.1043-01

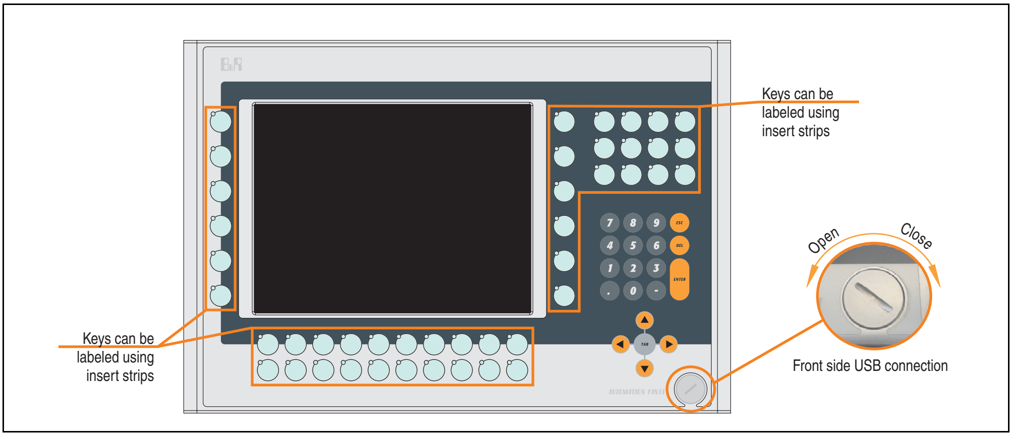

Keys can be labeled using insert strips
Open
Close
Front side USB connection
Keys can be labeled using insert strips

Figure 21: Front view - 5AP982.1043-01

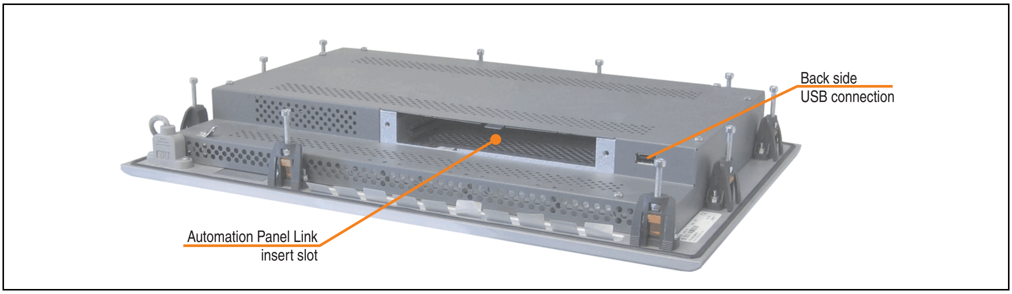


Figure 22: Rear view - 5AP982.1043-01

Technical data

Features	**5AP982.1043-01**
Mounting compatible for PPC300 insert	Revision D0 and higher
USB interface 1)	
Type	USB 2.0
Amount	2 (1x front side, 1x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	10.4 in (264 mm)
Colors	262,144 colors
Resolution	VGA, 640 x 480 pixels
Contrast	300:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 70°
Vertical	Direction U = 40°/ direction D = 70°
Background lighting	
Brightness	350 cd/m^2
Half-brightness time 2)	50,000 hours
Touch screen 3)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED 4)	
Function keys	44 with LED (yellow)
Soft keys	-
Cursor keys	-
Number block	15 without LED
Other keys	5 without LED
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typically 12 mcd (yellow)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current 5)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 10 W (without LED), maximum 14 W or 21 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Outer dimensions	
Width	423 mm
Height	288 mm
Depth	55 mm

Table 32: Technical data - 5AP982.1043-01

Mechanical characteristics	5AP982.1043-01
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	 Naturally anodized aluminum[6] Gray[6] Polyester Similar to Pantone 432CV[6] Similar to Pantone 427CV[6] Similar to Pantone 151CV[6] Similar to Pantone 431CV[6] Similar to Pantone 429CV[6] Flat gasket around display front
Housing Paint	Metal Similar to Pantone 432CV[6]
Weight	Approx. 3.9 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -30 to +70°C -30 to +70°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 65
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[7]

Table 32: Technical data - 5AP982.1043-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).

5) The specified value is based on the Automation Panel device with connected PPC300.

6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

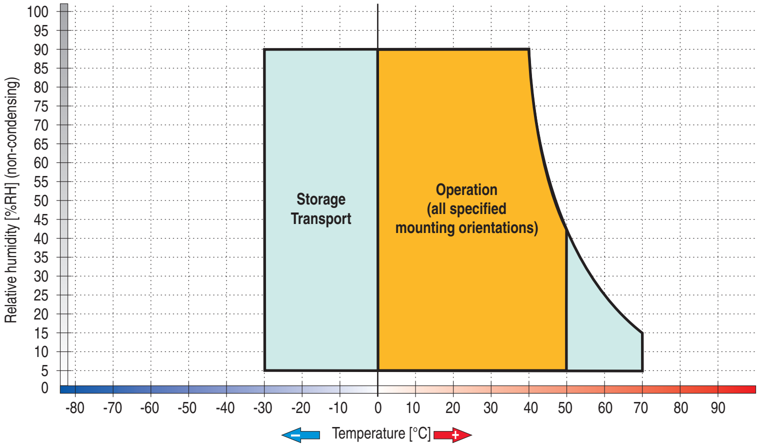
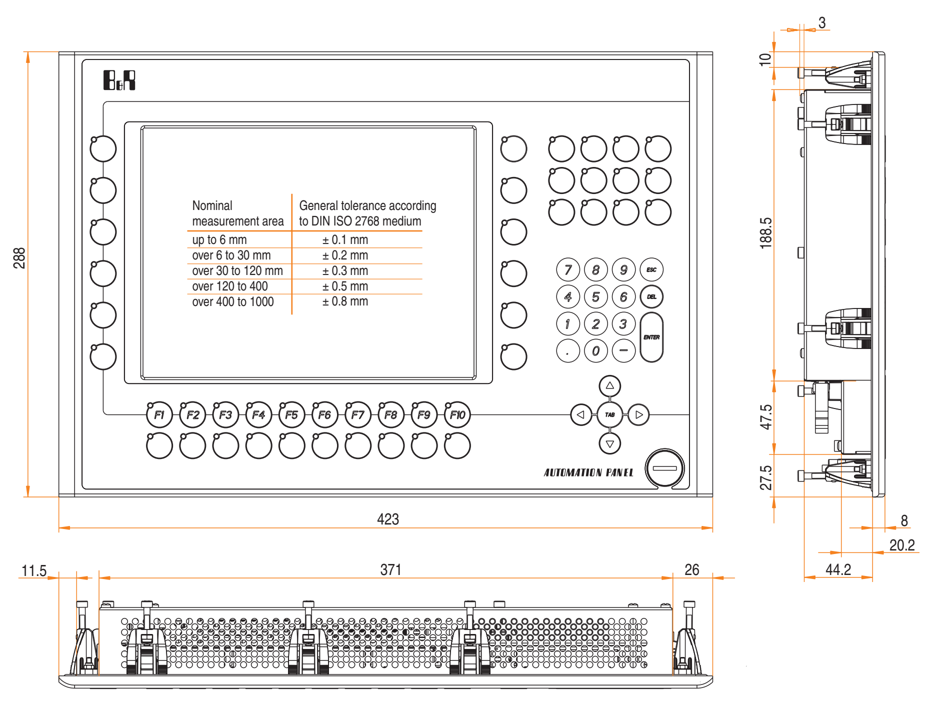


Figure 23: Temperature humidity diagram - 5AP982.1043-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 24: Dimensions - 5AP982.1043-01

Contents of delivery

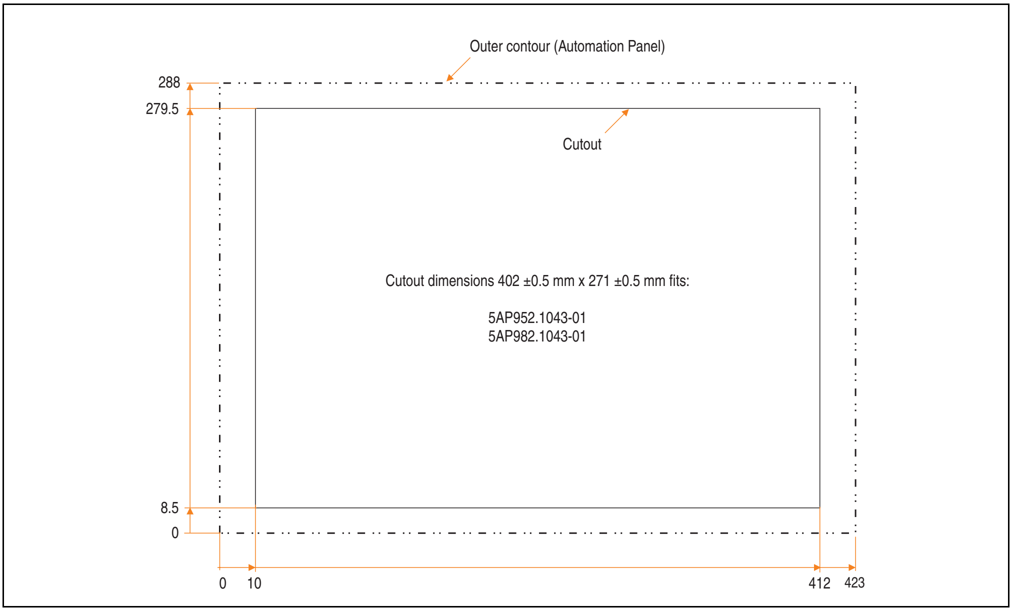
The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 982 TFT VGA 10.4in with touch screen and keys
16	6 insert strips without labels - 10 partially labeled "F1-F10" (inserted in the front)

Table 33: Contents of delivery - 5AP982.1043-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.



Cutout dimensions 402 ±0.5 mm x 271 ±0.5 mm fits:

5AP952.1043-01
5AP982.1043-01

Figure 25: Cutout installation - 5AP982.1043-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.5 Automation Panel 5AP920.1214-01

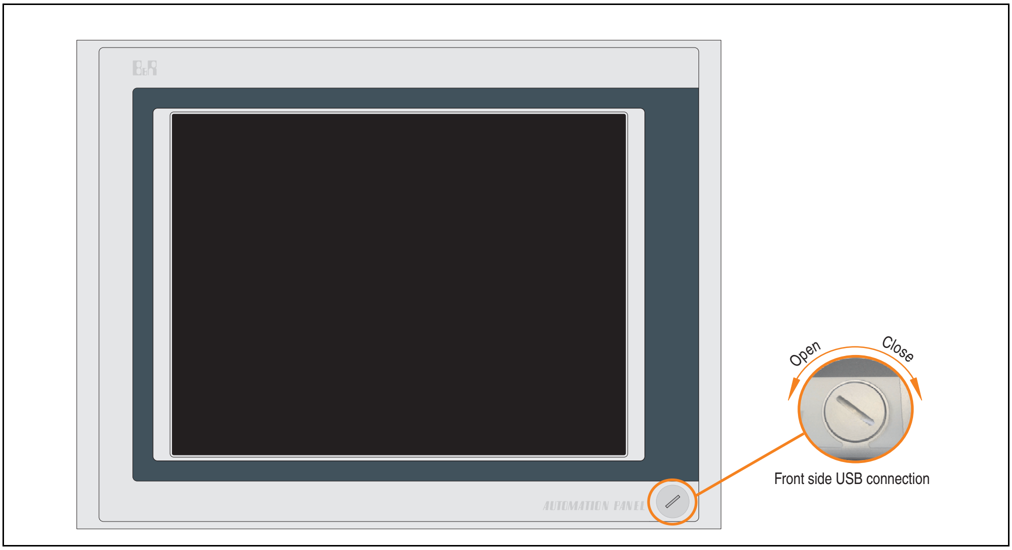


Figure 26: Front view - 5AP920.1214-01

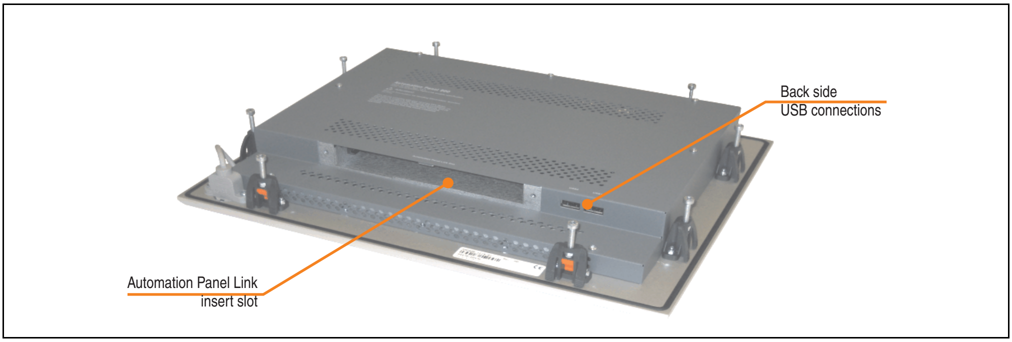


Figure 27: Rear view - 5AP920.1214-01

Technical data

Features	5AP920.1214-01
Mounting compatible for PPC300 insert	Starting with revision C0
USB interface [1] Type Amount Transfer rate Connection Current load	 USB 2.0 3 (1x front side, 2x back side) Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s) Type A Max. 500 mA per connection
Display Type Diagonal Colors Resolution Contrast Viewing angle (see page 242) Horizontal Vertical Background lighting Brightness Half-brightness time[2]	 Color TFT 12.1 in (307 mm) 262,144 colors SVGA, 800 x 600 pixels 300:1 Direction R / direction L = 70° Direction U = 50°/ direction D = 60° 350 cd/m² 50,000 hours
Touch screen [3] Touch screen type Technology Controller Degree of transmission	 Elo Analog, resistive Elo, serial, 12-bit Up to 78%
Keys/LED Function keys Soft keys Cursor keys Number block Other keys Key lifespan LED brightness	-
Electrical characteristics	
Power supply Rated voltage Rated current[4] Starting current Power consumption (without insert) Electrical isolation	via PPC300 24 VDC ± 25% (printed on back of housing) Maximum 3.2 A (printed on back of housing) Typically 6 A, maximum 30 A for < 300 µs Typically 12 W, maximum 15 W or 21 W with USB Yes
Mechanical characteristics	
Front Frame Design Membrane Dark gray border around display Light background Gasket	 Naturally anodized aluminum[5] Gray[5] Polyester Similar to Pantone 432CV[5] Similar to Pantone 427CV[5] Flat gasket around display front
Outer dimensions Width Height Depth	 362 mm 284 mm 54 mm

Table 34: Technical data - 5AP920.1214-01

Mechanical characteristics	5AP920.1214-01
Housing Paint	Metal Similar to Pantone 432CV[5]
Weight	Approx. 3.4 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -30 to +70°C -30 to +70°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 71
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[6]

Table 34: Technical data - 5AP920.1214-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The specified value is based on the Automation Panel device with connected PPC300.

5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

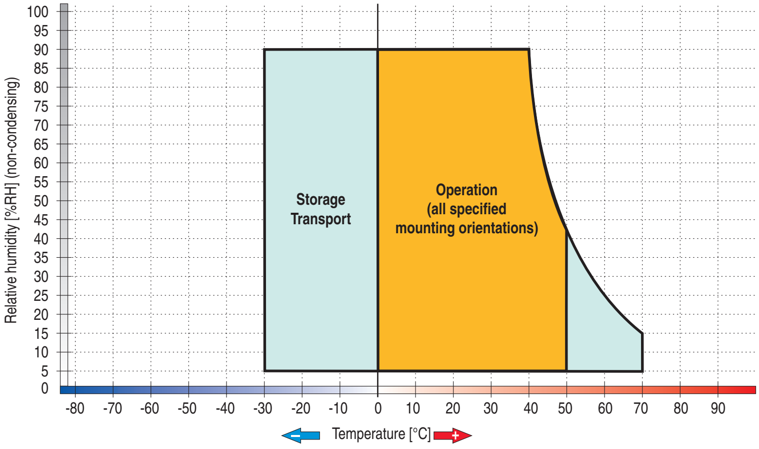
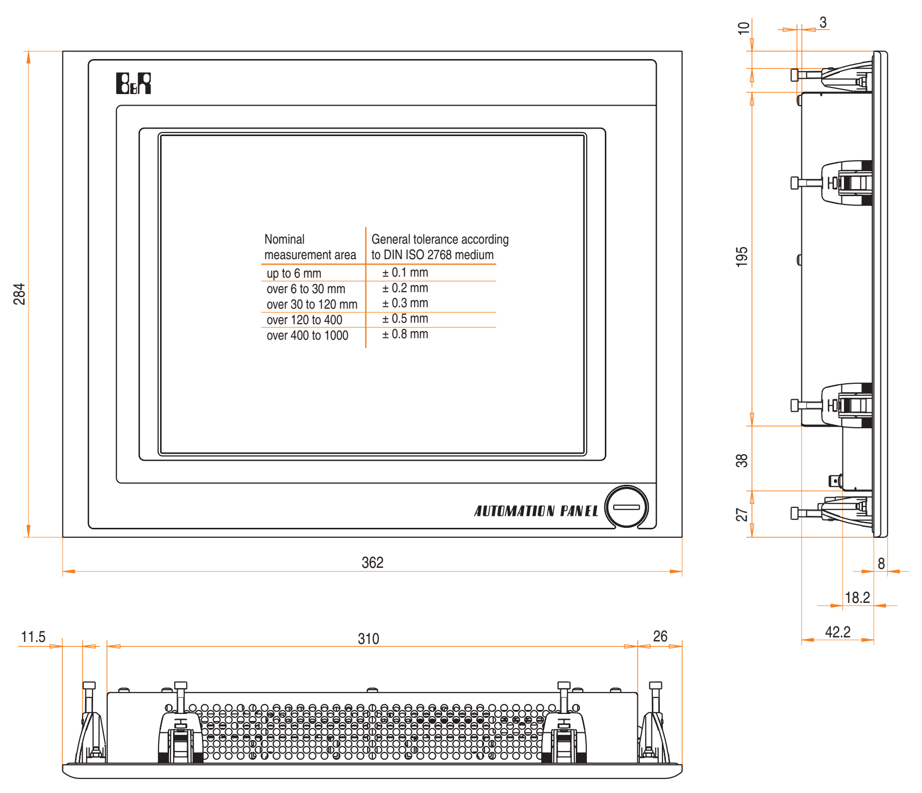


Figure 28: Temperature humidity diagram - 5AP920.1214-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 29: Dimensions - 5AP920.1214-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 920 TFT XGA 15in with touch screen

Table 35: Contents of delivery - 5AP920.1214-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

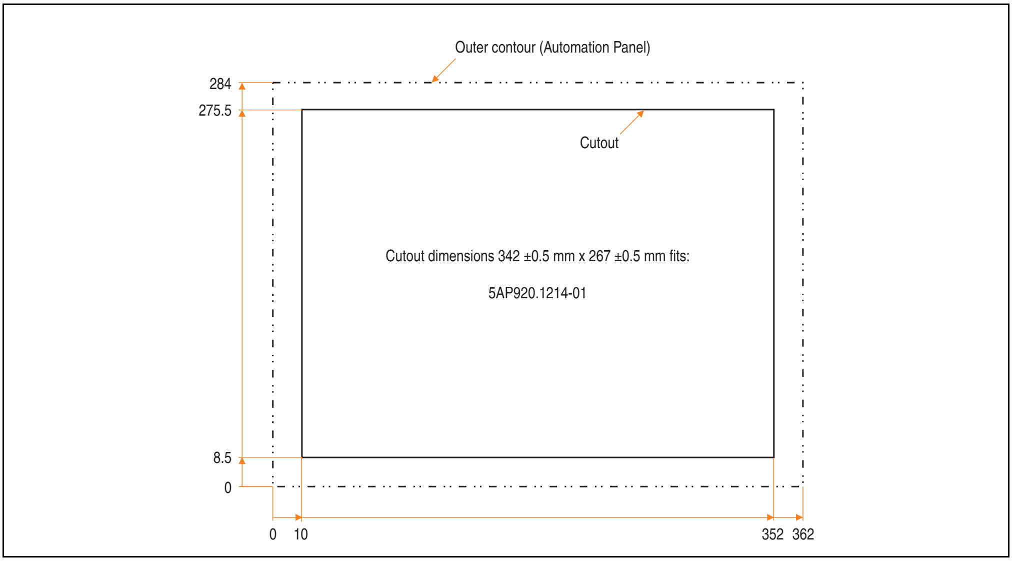

Outer contour (Automation Panel)
284
275.5
Cutout
Cutout dimensions 342 ±0.5 mm x 267 ±0.5 mm fits:
5AP920.1214-01
8.5
0
0
10
352
362

Figure 30: Cutout installation - 5AP920.1214-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.6 Automation Panel 5AP920.1505-01

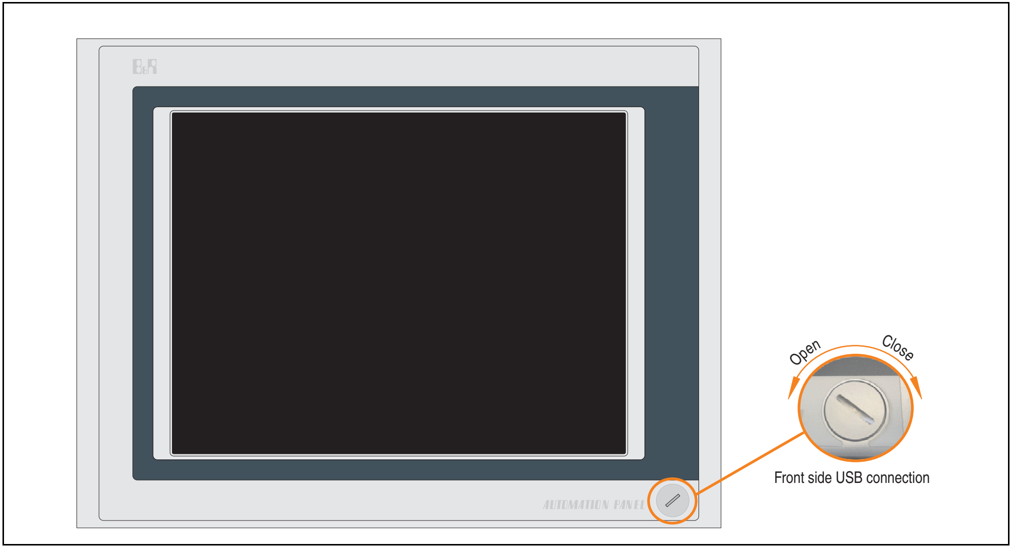


Figure 31: Front view - 5AP920.1505-01

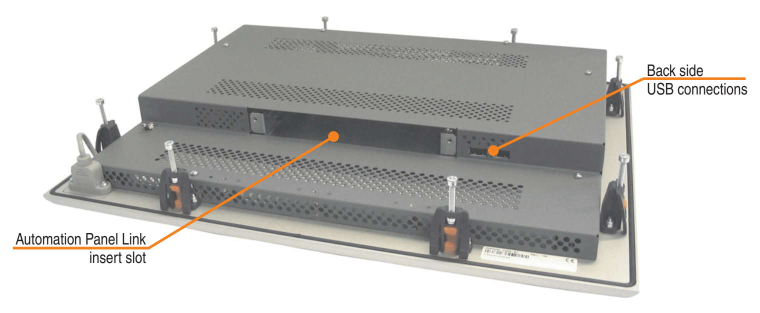


Figure 32: Rear view - 5AP920.1505-01

Technical data

Features	**5AP920.1505-01**
Mounting compatible for PPC300 insert	Starting with revision C0
USB interface 1)	
Type	USB 2.0
Amount	3 (1x front side, 2x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million colors
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time2)	50,000 hours
Touch screen 3)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED	-
Function keys	
Soft keys	
Cursor keys	
Number block	
Other keys	
Key lifespan	
LED brightness	
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current4)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 24 W, maximum 31 W or 41 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Front	
Frame	Naturally anodized aluminum5)
Design	Gray5)
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV5)
Light background	Similar to Pantone 427CV5)
Gasket	Flat gasket around display front
Outer dimensions	
Width	435 mm
Height	330 mm
Depth	54 mm

Table 36: Technical data - 5AP920.1505-01

Mechanical characteristics	**5AP920.1505-01**
Housing Paint	Metal Similar to Pantone 432CV[5)]
Weight	Approx. 5.1 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -25 to +60°C -25 to +60°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 77
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[6)]

Table 36: Technical data - 5AP920.1505-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The specified value is based on the Automation Panel device with connected PPC300.

5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

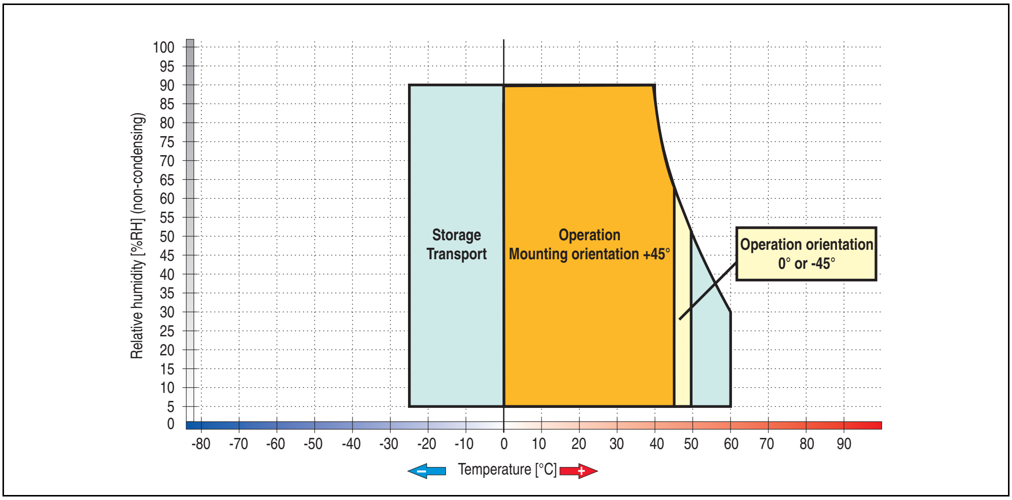
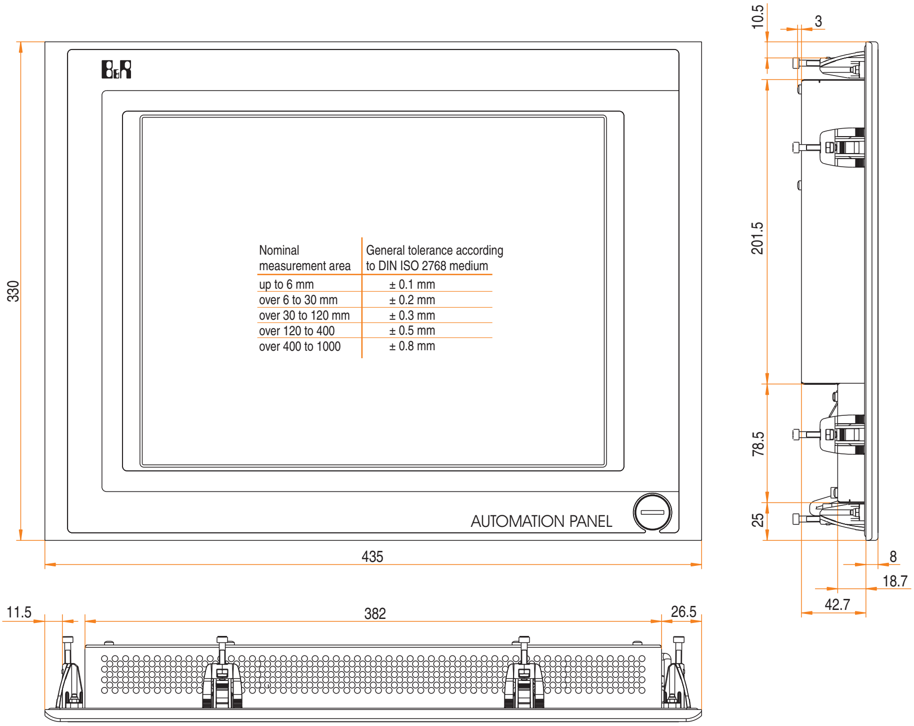


Figure 33: Temperature humidity diagram - 5AP920.1505-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 34: Dimensions - 5AP920.1505-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 920 TFT XGA 15in with touch screen

Table 37: Contents of delivery - 5AP920.1505-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

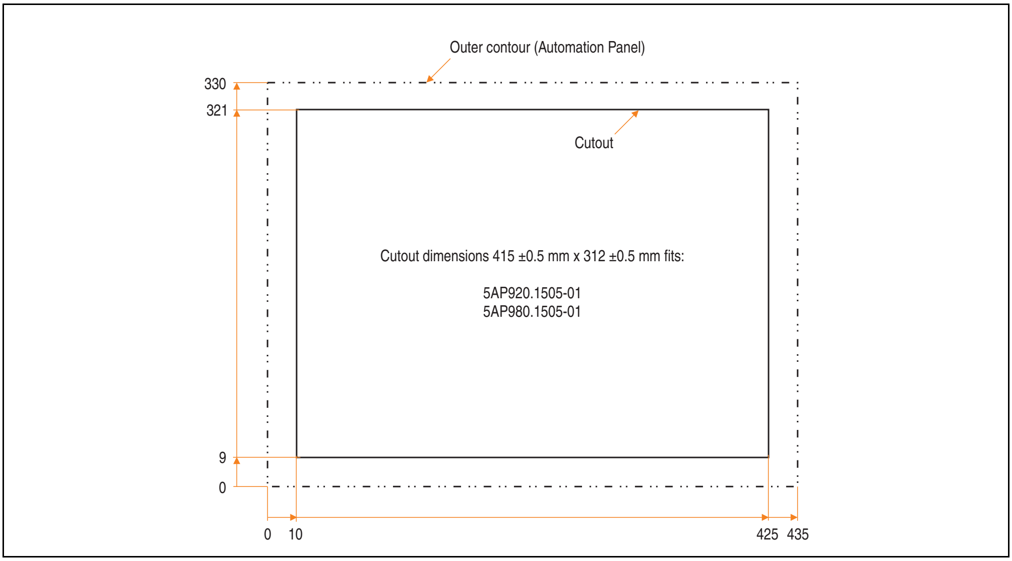

Outer contour (Automation Panel)
Cutout
Cutout dimensions 415 ±0.5 mm x 312 ±0.5 mm fits:
5AP920.1505-01
5AP980.1505-01
330
321
9
0
0
10
425
435

Figure 35: Cutout installation - 5AP920.1505-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.7 Automation Panel 5AP980.1505-01

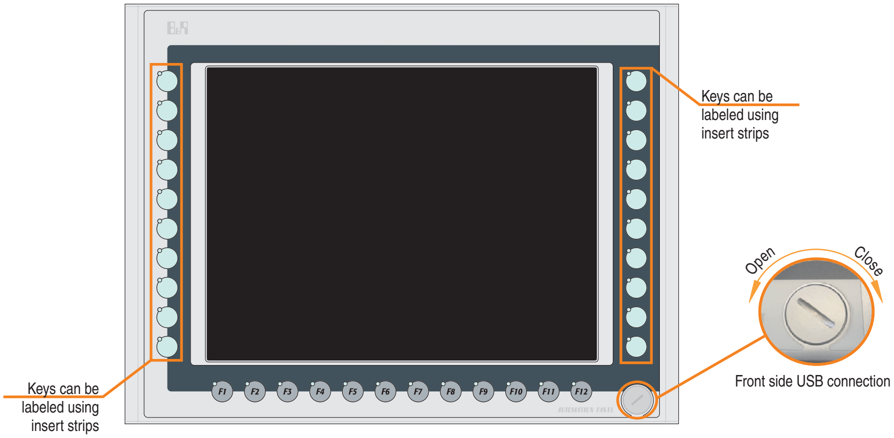

Keys can be labeled using insert strips
Open
Close
Front side USB connection
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
Keys can be labeled using insert strips

Figure 36: Front view - 5AP980.1505-01

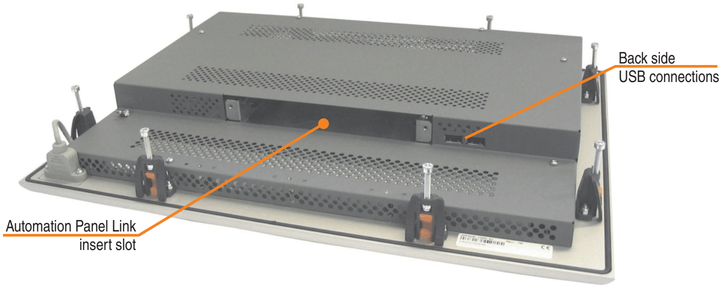


Figure 37: Rear view - 5AP980.1505-01

Technical data

Features	**5AP980.1505-01**
Mounting compatible for PPC300 insert	Starting with revision C0
USB interface 1)	
Type	USB 2.0
Amount	3 (1x front side, 2x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million colors
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m^2
Half-brightness time2)	50,000 hours
Touch screen 3)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED 4)	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
Cursor keys	-
Number block	-
Other keys	-
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typically 12 mcd (yellow)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current5)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 24 W (without LED), maximum 32 W or 42 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Front	
Frame	Naturally anodized aluminum6)
Design	Gray6)
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV6)
Light background	Similar to Pantone 427CV6)
Legend strips (gray)	Similar to Pantone 429CV6)
Gasket	Flat gasket around display front

Table 38: Technical data - 5AP980.1505-01

Mechanical characteristics	5AP980.1505-01
Outer dimensions Width Height Depth	 435 mm 330 mm 54 mm
Housing Paint	Metal Similar to Pantone 432CV[6)]
Weight	Approx. 5.1 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -25 to +60°C -25 to +60°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 83
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[7)]

Table 38: Technical data - 5AP980.1505-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).

5) The specified value is based on the Automation Panel device with connected PPC300.

6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

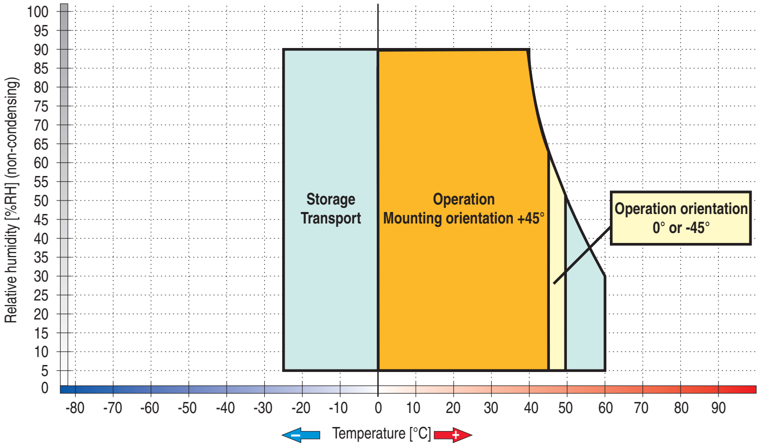
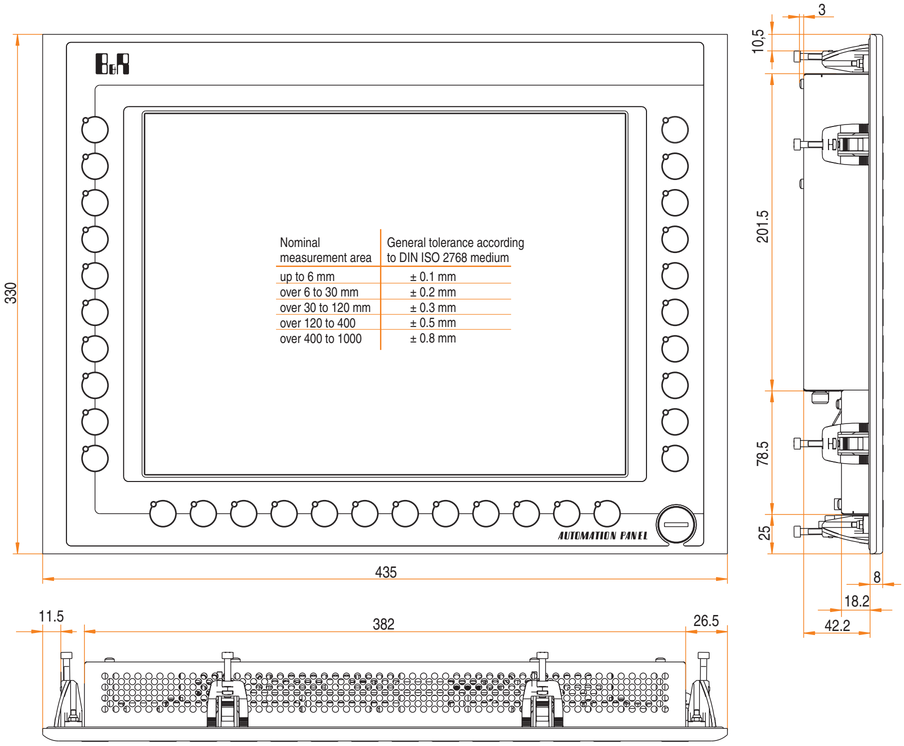


Figure 38: Temperature humidity diagram - 5AP980.1505-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 39: Dimensions - 5AP980.1505-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 980 TFT XGA 15in with touch screen
2	Insert strips without labels (inserted in the front)

Table 39: Contents of delivery - 5AP980.1505-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

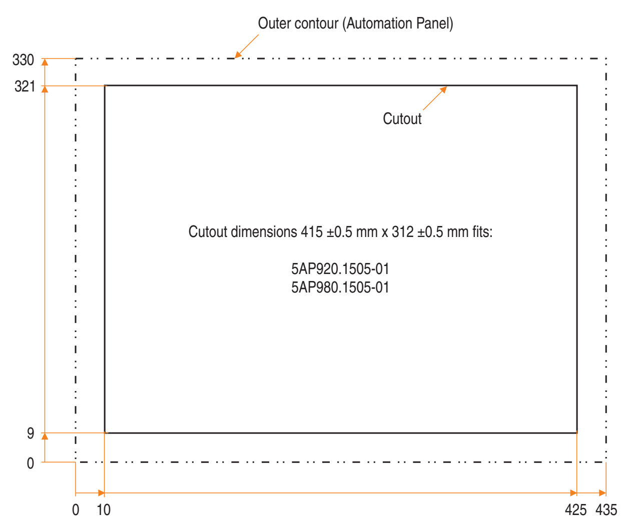

Outer contour (Automation Panel)
330
321
Cutout
Cutout dimensions 415 ±0.5 mm x 312 ±0.5 mm fits:
5AP920.1505-01
5AP980.1505-01
9
0
0
10
425
435

Figure 40: Cutout installation - 5AP980.1505-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.8 Automation Panel 5AP981.1505-01

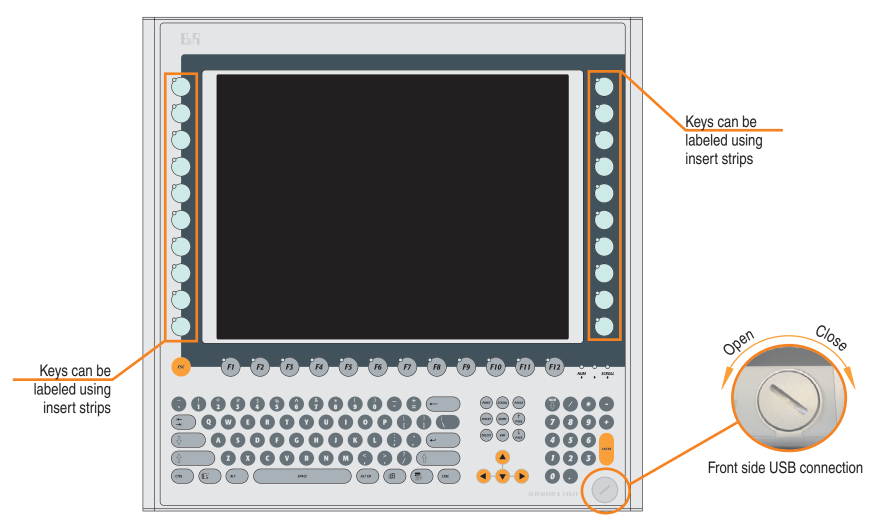

Keys can be labeled using insert strips
Keys can be labeled using insert strips
Open
Close
Front side USB connection

Figure 41: Front view - 5AP981.1505-01

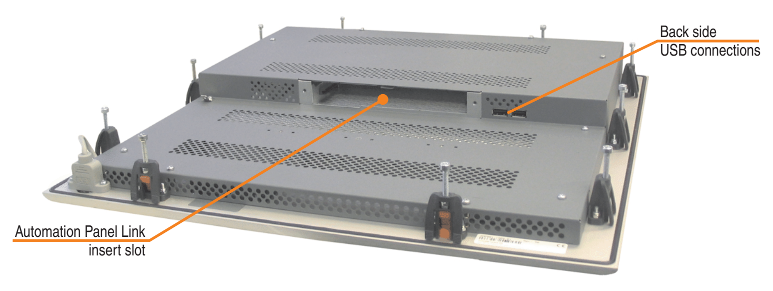


Figure 42: Rear view - 5AP981.1505-01

Technical data

Features	5AP981.1505-01
Mounting compatible for PPC300 insert	Starting with revision C0
USB interface [1)]	
Type	USB 2.0
Amount	3 (1x front side, 2x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	15 in (381 mm)
Colors	16.7 million Colors
Resolution	XGA, 1024 x 768 pixels
Contrast	400:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 85°
Vertical	Direction U / direction D = 85°
Background lighting	
Brightness	250 cd/m²
Half-brightness time[2)]	50,000 hours
Touch screen [3)]	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED [4)]	
Function keys	20 with LED (yellow)
Soft keys	12 with LED (yellow)
Cursor keys	-
Number block	15 without LED
Other keys	77 without LED
Key lifespan	> 10^6 actuations with 1 ±0.3 to 3 ±0.3 N operating force
LED brightness	Typically 12 mcd (yellow)
	Pressing more than one key at a time may result in so-called phantom keys, and may trigger unintended actions.
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current[5)]	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 24 W (without LED), maximum 32 W or 42 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Outer dimensions	
Width	435 mm
Height	430 mm
Depth	54 mm

Table 40: Technical data - 5AP981.1505-01

Mechanical characteristics	5AP981.1505-01
Front Frame Design Membrane Dark gray border around display Light background Orange keys Dark gray keys Legend strips (gray) Gasket	 Naturally anodized aluminum[6)] Gray[6)] Polyester Similar to Pantone 432CV[6)] Similar to Pantone 427CV[6)] Similar to Pantone 151CV[6)] Similar to Pantone 431CV[6)] Similar to Pantone 429CV[6)] Flat gasket around display front
Housing Paint	Metal Similar to Pantone 432CV[6)]
Weight	Approx. 5.9 kg
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -25 to +60°C -25 to +60°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 89
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)
Altitude	Max. 3000 m[7)]

Table 40: Technical data - 5AP981.1505-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The key and LED functions can be freely configured with the B&R Key Editor, which can be found in the download area of the B&R homepage (**www.br-automation.com**) or on the B&R HMI Driver & Utilities DVD (model number 5SWHMI.0000-00).

5) The specified value is based on the Automation Panel device with connected PPC300.

6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

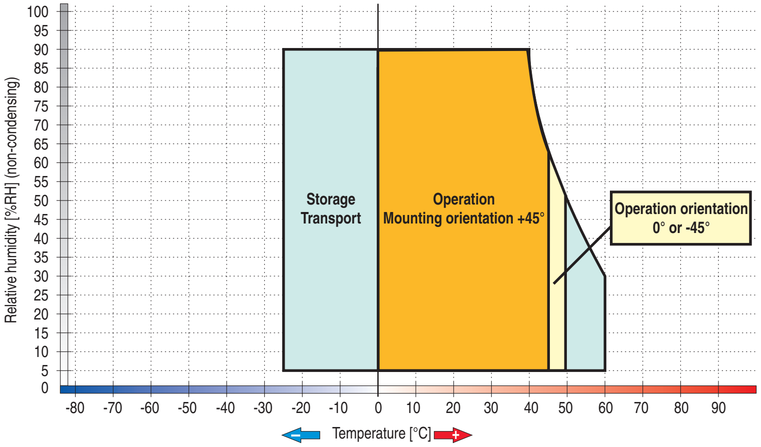
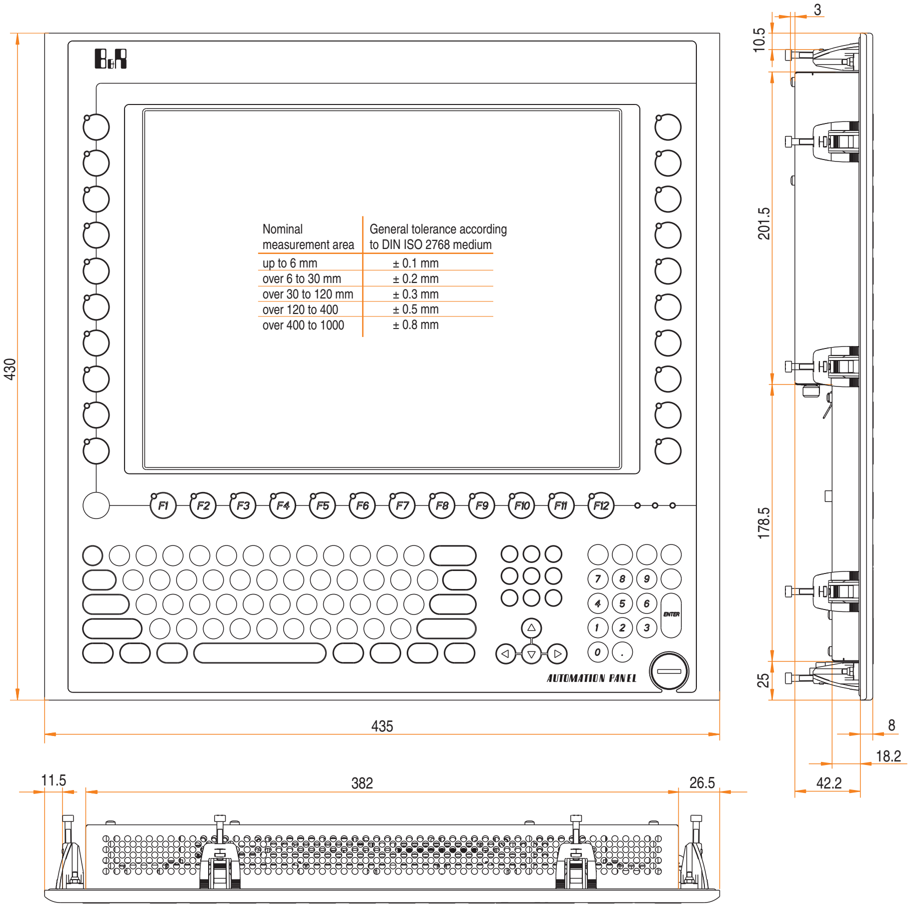


Figure 43: Temperature humidity diagram - 5AP981.1505-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 44: Dimensions - 5AP981.1505-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 981 TFT VGA 15in with touch screen and keys
2	2 insert strips without labels (inserted in the front)

Table 41: Contents of delivery - 5AP981.1505-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

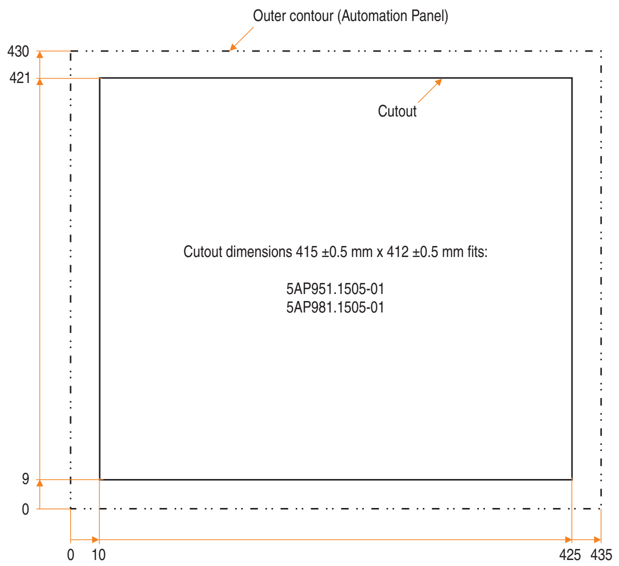

Outer contour (Automation Panel)
Cutout
Cutout dimensions 415 ±0.5 mm x 412 ±0.5 mm fits:
5AP951.1505-01
5AP981.1505-01
430
421
9
0
0
10
425
435

Figure 45: Cutout installation - 5AP981.1505-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.9 Automation Panel 5AP920.1706-01

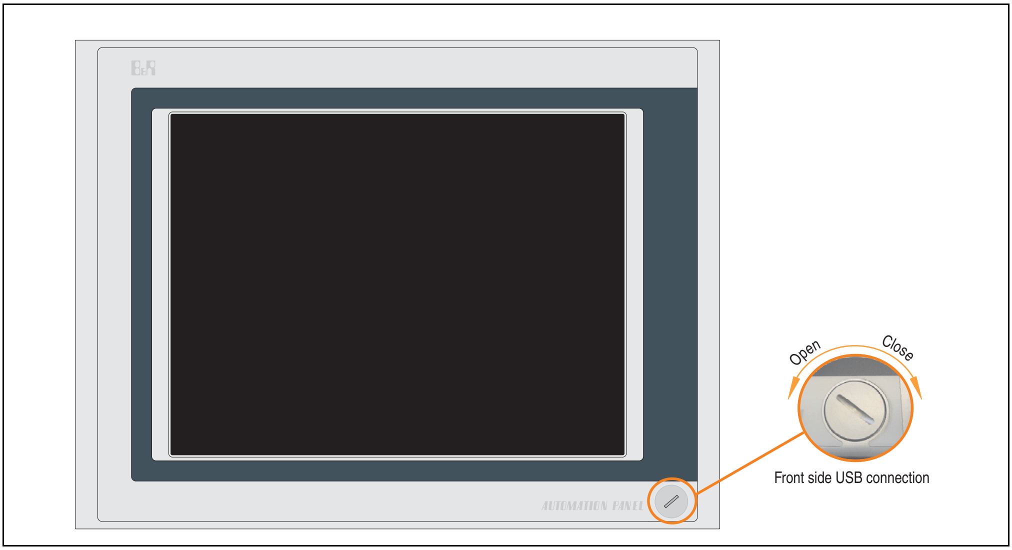


Figure 46: Front view - 5AP920.1706-01

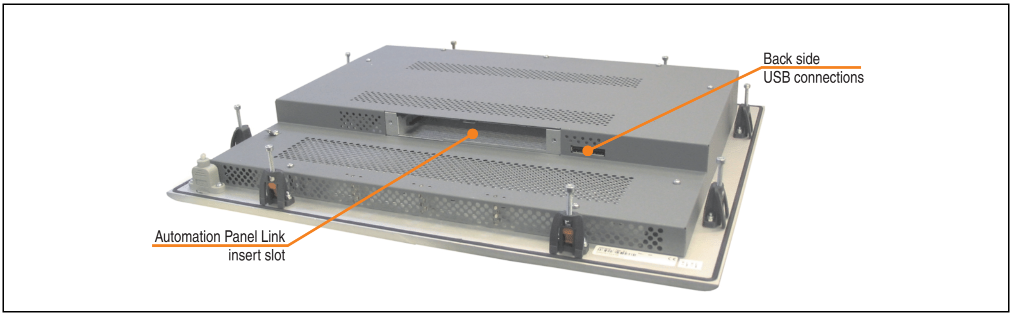


Figure 47: Rear view - 5AP920.1706-01

Technical data

Features	**5AP920.1706-01**
Mounting compatible for PPC300 insert	Starting with revision C0
USB interface 1)	
Type	USB 2.0
Amount	3 (1x front side, 2x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	17 in (431 mm)
Colors	16.7 million colors
Resolution	SXGA, 1280 x 1024 pixels
Contrast	600:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 75°
Vertical	Direction U = 75°/ direction D = 60°
Background lighting	
Brightness	250 cd/m²
Half-brightness time2)	50,000 hours3)
Touch screen 4)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED	-
Function keys	
Soft keys	
Cursor keys	
Number block	
Other keys	
Key lifespan	
LED brightness	
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current5)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 27 W, maximum 36 W or 46 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Front	
Frame	Naturally anodized aluminum6)
Design	Gray6)
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV6)
Light background	Similar to Pantone 427CV6)
Gasket	Flat gasket around display front
Outer dimensions	
Width	477 mm
Height	390 mm
Depth	59 mm

Table 42: Technical data - 5AP920.1706-01

Mechanical characteristics	5AP920.1706-01	
Housing Paint	Metal Similar to Pantone 432CV[6]	
Weight	Approx. 7 kg	
Environmental characteristics	**5AP920.1706-01 < Rev. D0**	**5AP920.1706-01, Rev. D0 and higher**
Ambient temperature Operation Bearings Transport	 See "Ambient temperatures", on page 27 -20 to +60°C -20 to +60°C	 See "Ambient temperatures", on page 27 -25 to +60°C -25 to +60°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 95	
Vibration Operation (continuous) Operation (occasional) Bearings Transport	 2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock Operation Bearings Transport	 15 g, 11 ms 30 g, 15 ms 30 g, 15 ms	
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude	Max. 3000 m[7]	

Table 42: Technical data - 5AP920.1706-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Revision < D0 - lifespan limited to 30,000 hours.

4) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

5) The specified value is based on the Automation Panel device with connected PPC300.

6) Depending on the process or batch, there may be visible deviations in the color and surface structure.

7) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

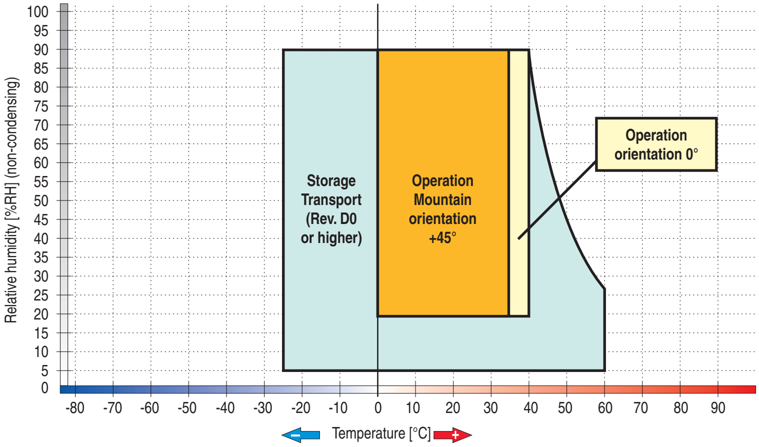
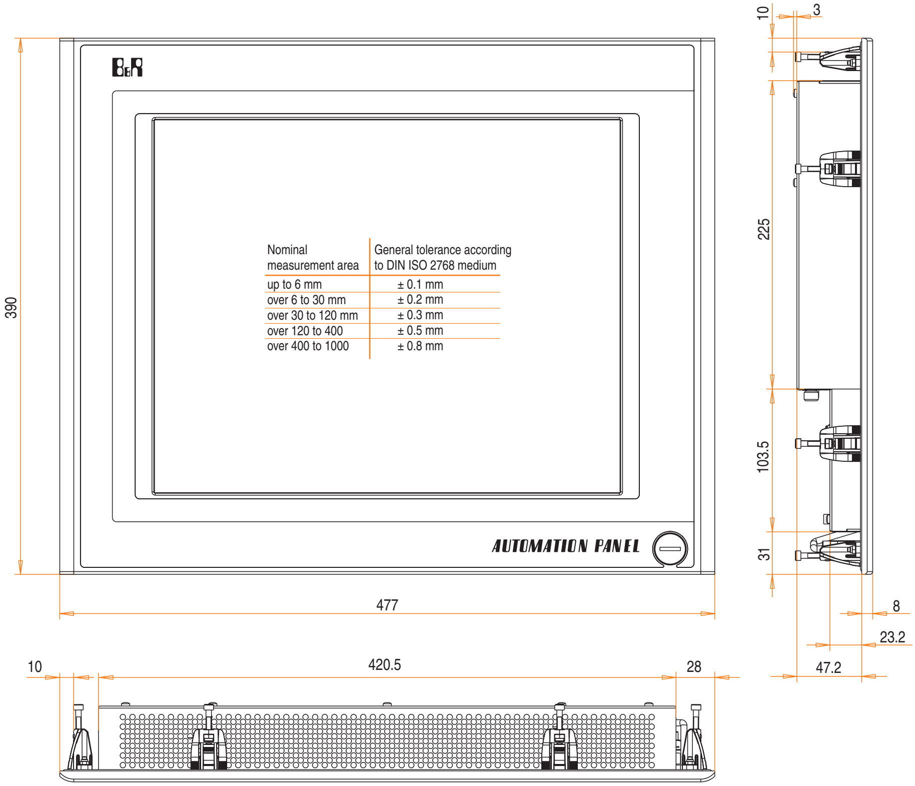


Figure 48: Temperature humidity diagram - 5AP920.1706-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 49: Dimensions - 5AP920.1706-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 920 TFT SXGA 17in with touch screen

Table 43: Contents of delivery - 5AP920.1706-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

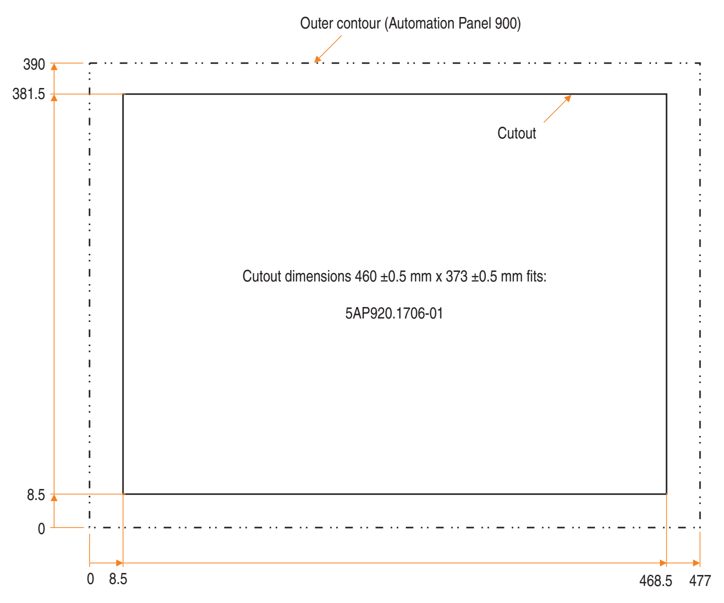

Outer contour (Automation Panel 900)
390
381.5
Cutout
Cutout dimensions 460 ±0.5 mm x 373 ±0.5 mm fits:
5AP920.1706-01
8.5
0
0
8.5
468.5
477

Figure 50: Cutout installation - 5AP920.1706-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

3.2.10 Automation Panel 5AP920.1906-01

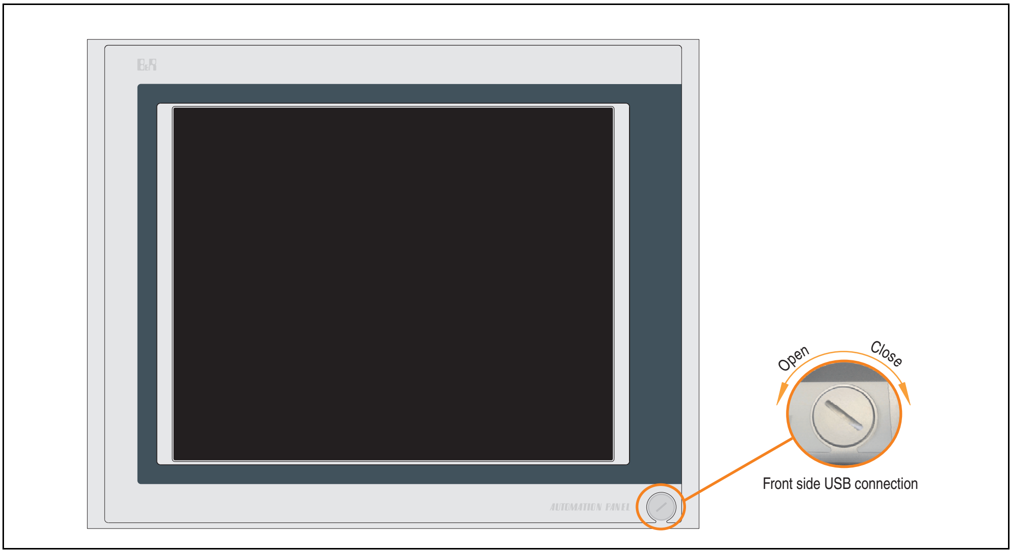


Figure 51: Front view - 5AP920.1906-01

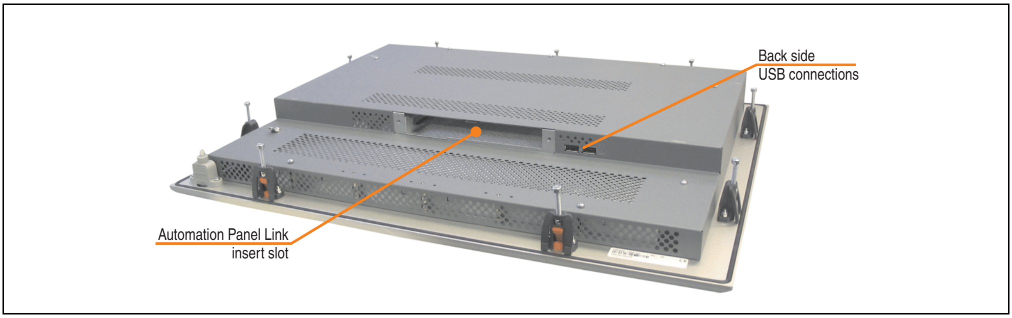


Figure 52: Rear view - 5AP920.1906-01

Technical data

Features	**5AP920.1906-01**
Mounting compatible for PPC300 insert	Starting with revision C0
USB interface 1)	
Type	USB 2.0
Amount	3 (1x front side, 2x back side)
Transfer rate	Low speed (1.5 MBit/s), full speed (12 MBit/s), to high speed (480 Mbit/s)
Connection	Type A
Current load	Max. 500 mA per connection
Display	
Type	Color TFT
Diagonal	19 in (482 mm)
Colors	16.7 million colors
Resolution	SXGA, 1280 x 1024 pixels
Contrast	600:1
Viewing angle (see page 242)	
Horizontal	Direction R / direction L = 75°
Vertical	Direction U = 75°/ direction D = 60°
Background lighting	
Brightness	250 cd/m^2
Half-brightness time 2)	35000 hours
Touch screen 3)	
Touch screen type	Elo
Technology	Analog, resistive
Controller	Elo, serial, 12-bit
Degree of transmission	Up to 78%
Keys/LED	-
Function keys	
Soft keys	
Cursor keys	
Number block	
Other keys	
Key lifespan	
LED brightness	
Electrical characteristics	
Power supply	via PPC300
Rated voltage	24 VDC ± 25% (printed on back of housing)
Rated current 4)	Maximum 3.2 A (printed on back of housing)
Starting current	Typically 6 A, maximum 30 A for < 300 µs
Power consumption (without insert)	Typically 27 W, maximum 38 W or 48 W with USB
Electrical isolation	Yes
Mechanical characteristics	
Front	
Frame	Naturally anodized aluminum 5)
Design	Gray 5)
Membrane	Polyester
Dark gray border around display	Similar to Pantone 432CV 5)
Light background	Similar to Pantone 427CV 5)
Gasket	Flat gasket around display front
Outer dimensions	
Width	527 mm
Height	421 mm
Depth	62 mm

Table 44: Technical data - 5AP920.1906-01

Mechanical characteristics	5AP920.1906-01	
Housing Paint	Metal Similar to Pantone 432CV[5)]	
Weight	Approx. 8.1 kg	
Environmental characteristics	**5AP920.1906-01 < Rev. D0**	**5AP920.1906-01, Rev. D0 and higher**
Ambient temperature Operation Bearings Transport	See "Ambient temperatures", on page 27 -20 to +60°C -20 to +60°C	See "Ambient temperatures", on page 27 -25 to +60°C -25 to +60°C
Relative humidity	See "Temperature humidity diagram - Operation and storage", on page 101	
Vibration Operation (continuous) Operation (occasional) Bearings Transport	2 - 9 Hz: 1.75 mm amplitude / 9 - 200 Hz: 0.5 g 2 - 9 Hz: 3.5 mm amplitude / 9 - 200 Hz: 1 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g 2 - 8 Hz: 7.5 mm amplitude / 8 - 200 Hz: 2 g / 200 - 500 Hz: 4 g	
Shock Operation Bearings Transport	15 g, 11 ms 30 g, 15 ms 30 g, 15 ms	
Protection type	IP20 back side (only with connected PPC300) IP65 / NEMA 250 type 4X, dust and sprayed water protection (front side)	
Altitude	Max. 3000 m[6)]	

Table 44: Technical data - 5AP920.1906-01 (Forts.)

1) USB devices, including a USB hub, can be connected right to the Automation Panel.

2) At 25°C ambient temperature. Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

3) Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

4) The specified value is based on the Automation Panel device with connected PPC300.

5) Depending on the process or batch, there may be visible deviations in the color and surface structure.

6) Derating the maximum ambient temperature - typically 1°C per 1000 meters (from 500 meters above sea level).

Temperature humidity diagram - Operation and storage

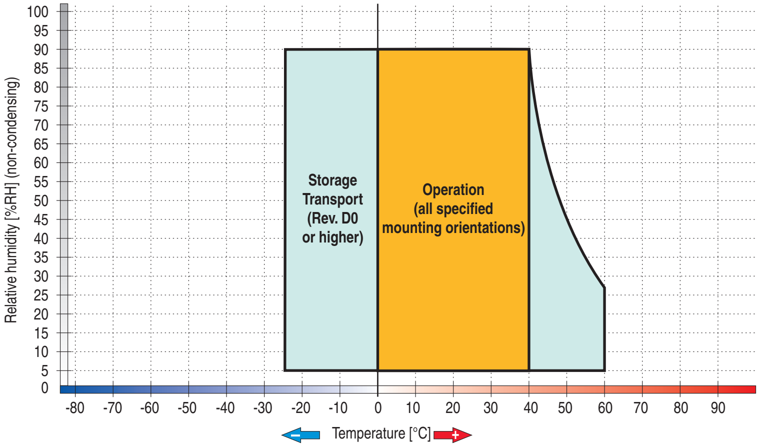
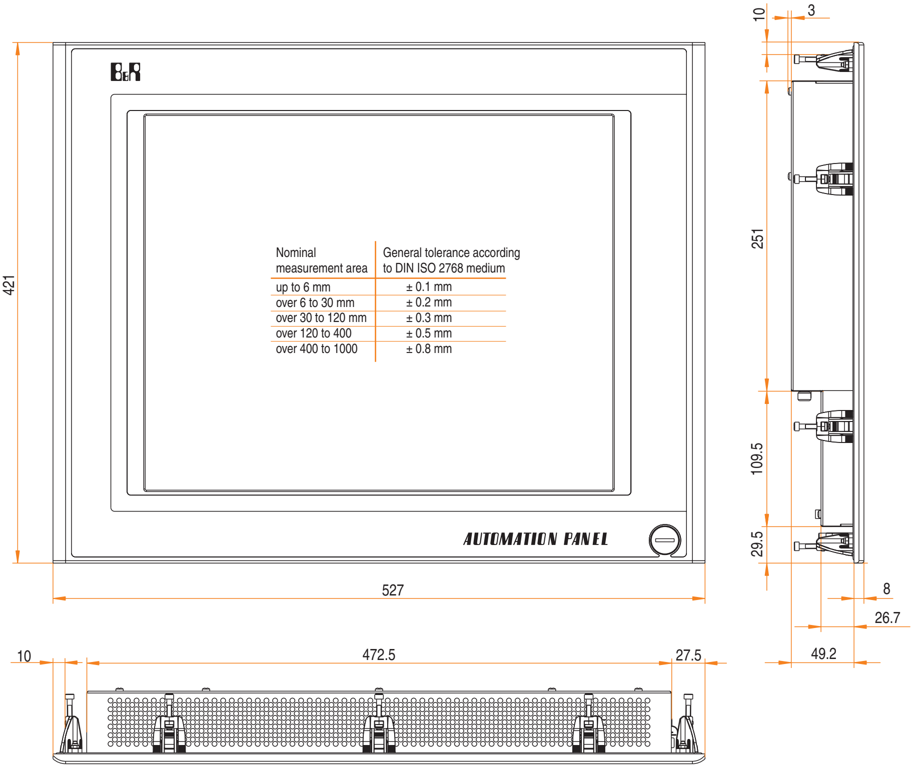


Figure 53: Temperature humidity diagram - 5AP920.1906-01

Dimensions



Nominal measurement area	General tolerance according to 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	± 0.5 mm
over 400 to 1000	± 0.8 mm

Figure 54: Dimensions - 5AP920.1906-01

Contents of delivery

The following components are included in the delivery of the Automation Panel:

Amount	Component
1	Automation Panel 920 TFT SXGA 19in with touch screen

Table 45: Contents of delivery - 5AP920.1906-01

Cutout installation

The Automation Panel can be installed in a housing cutout using the preassembled mounting clamps. A cutout that corresponds to the following drawing must be made.

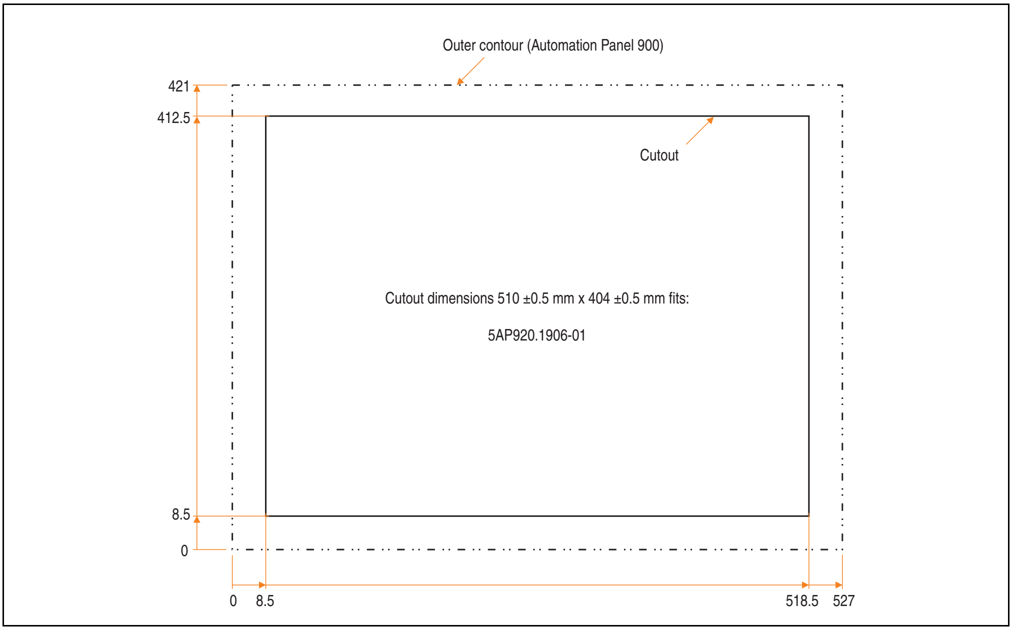

Outer contour (Automation Panel 900)
421
412.5
Cutout
Cutout dimensions 510 ±0.5 mm x 404 ±0.5 mm fits:
5AP920.1906-01
8.5
0
0
8.5
518.5
527

Figure 55: Cutout installation - 5AP920.1906-01

For further information regarding installation and mounting orientation, see Chapter 3 "Commissioning" starting on page 105.

Chapter 3 • Commissioning

1. PPC300 installation in an Automation Panel 900

Voltage must be disconnected before installation. The PPC300 insert is slid into the Automation Panel Link slot on the back side of the AP900. Make sure the PPC300 is correctly placed between the two guide rails (left and right) of the AP900.

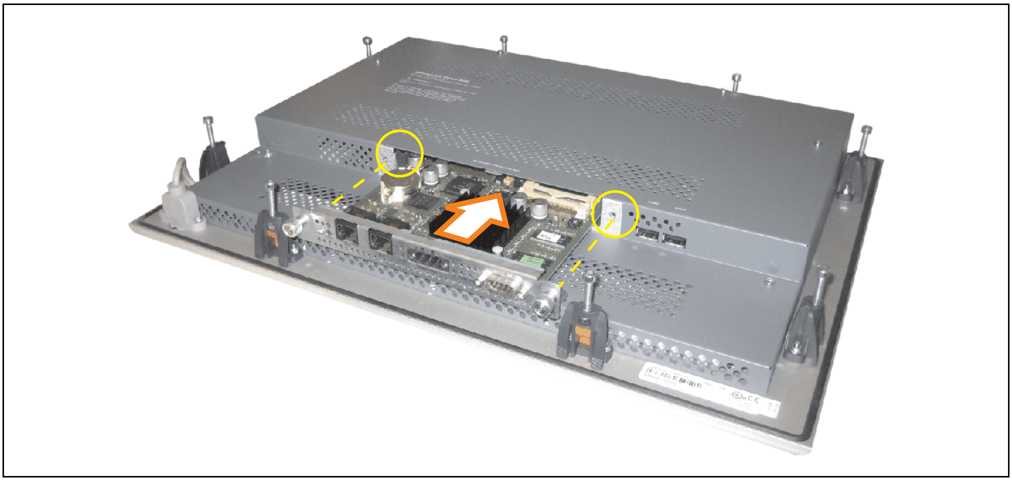


Figure 56: PPC300 mounted in the AP900

1.1 Hardware compatibilities with Automation Panel 900

The Panel PC 300 insert can be used in the following AP900 devices starting with the following revisions:

- 5AP920.1043-01 Rev. D0
- 5AP980.1043-01 Rev. D0
- 5AP981.1043-01 Rev. D0
- 5AP982.1043-01 Rev. D0
- 5AP920.1214-01 Rev. C0
- 5AP920.1505-01 Rev. C0
- 5AP980.1505-01 Rev. C0

- 5AP981.1505-01 Rev. C0
- 5AP920.1706-01 Rev. C0
- 5AP920.1906-01 Rev. C0

1.2 Fastening to Automation Panel 900

The two fastening screws are then used to securely fasten the PPC300 to the AP900 (max. torque 0.5 Nm).

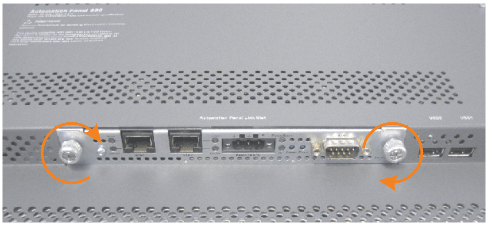


Figure 57: Fasten the PPC300 in the AP900

2. Installation guidelines for an Automation Panel 900

Automation Panel 900 devices are best installed in a housing cutout using the clamps found on the display units (various types possible).
The cutout dimensions for each of the Automation Panel 900 devices can be found in the technical data (see chapter 2 "Technical data" starting on page 44).

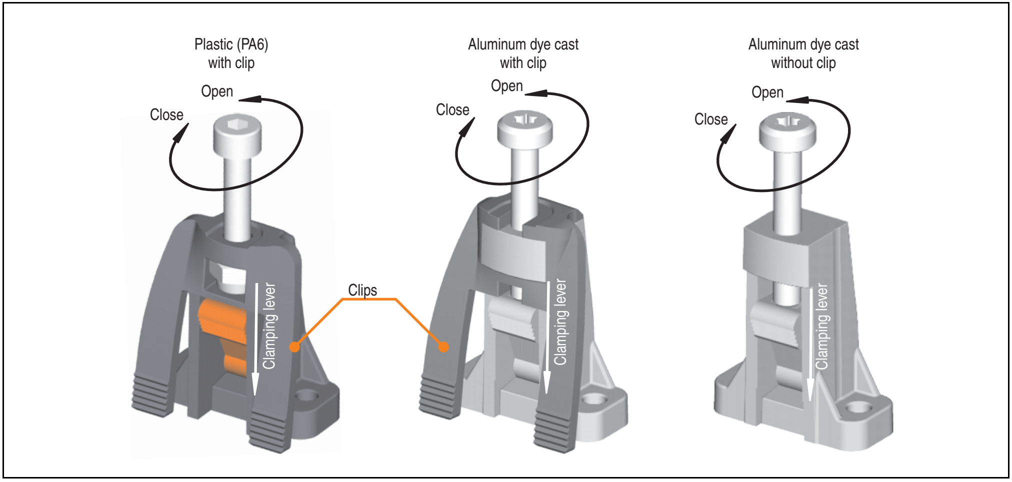


Figure 58: Clamps

The mounting clamps are designed for a max. thickness of 10 mm for the material where the device is being clamped. The minimum thickness is 2 mm.

In order to tighten or loosen the screws, a hex key (size 3) is required for the plastic clamps and a Torx screwdriver (size 20) or a large flat-head screwdriver for the aluminum die casting. The maximum torque when tightening the clamp is 0.5 Nm. An Automation Panel 900 unit must be mounted to a flat surface. Uneven areas can cause damage to the display when the screws are tightened.

In order to guarantee proper air circulation, allow the specified amount of space above, below, to the side and behind the Automation Panel. The minimum specified free space can be found in the diagram below.

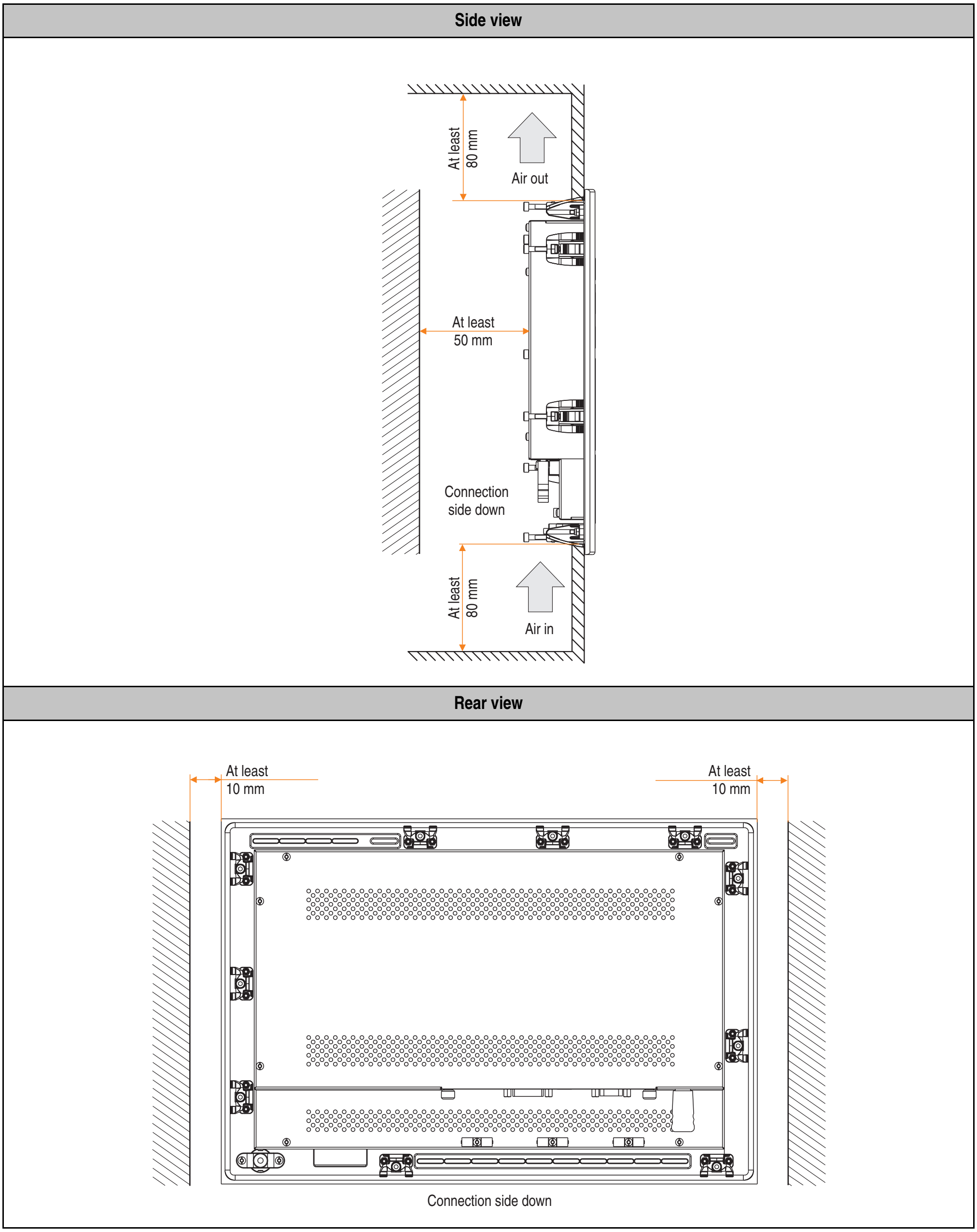


Figure 59: Space for air circulation

2.1 Mounting orientation

The following diagrams specify the orientations for mounting an Automation Panel device.

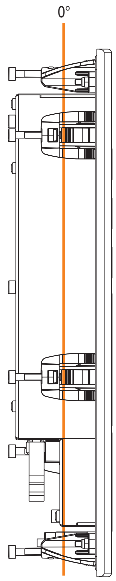
Mounting orientation 0°
 Connection side down

Table 46: Mounting orientation 0°

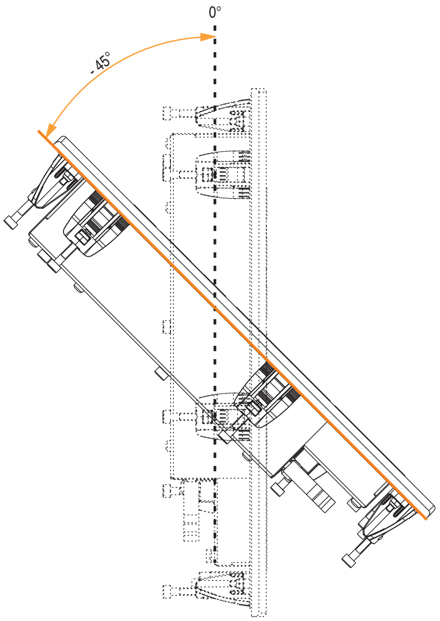
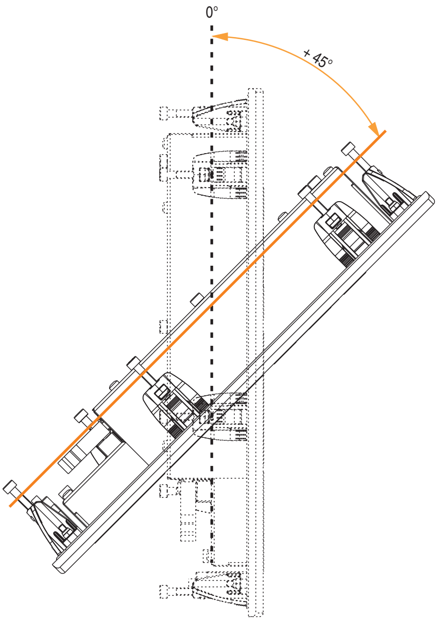
Mounting orientation up to -45°	Mounting orientation up to +45°
 Connection side down	 Connection side down

Table 47: Mounting orientation -45° and +45°.

Warning!

Because of the changed thermal properties with some mounting orientations, e.g. +/- 45°, the maximum ambient temperatures of the Automation Panel 900 specified for 0° mounting orientation cannot be achieved during operation. See the table 12 "Ambient temperature according to mounting orientation", on page 27 for the valid limit values.

3. Fastening the cable

Cable clamps are provided with the Automation Panel that can be used to fasten the connected cable to the bottom of the back side of the Automation Panel housing.

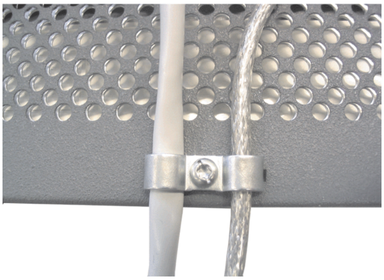


Figure 60: Mounting the cable clamps

4. Functional grounding clip

On the back side on the left next to the Automation Panel Link slot, there is a functional grounding clip. The grounding clip (functional ground) must be connected with a central grounding point on the switching cabinet using a 6.3 mm blade connector via the shortest distance and with as little resistance as possible (e.g. copper strip, but must be at least 2.5 mm²).

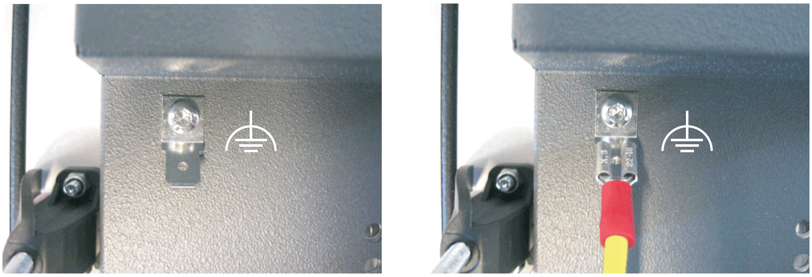


Figure 61: Functional grounding clip

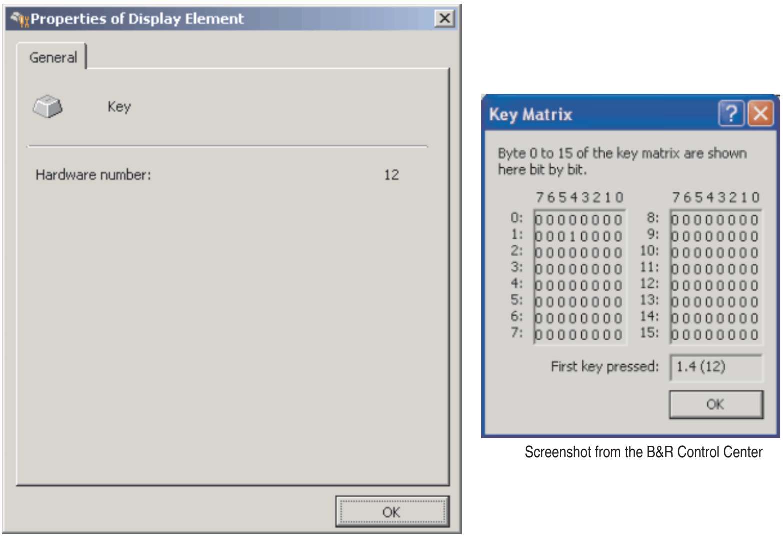
5. Key and LED configurations

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

- B&R Key Editor for Windows operating systems

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

The positions of the keys and LEDs in the matrix are shown as hardware numbers. The hardware numbers can be read directly on the target system, for example with the B&R Key Editor and the B&R Control Center.



Key

Hardware number: 12

Screenshot from the B&R Key Editor

Byte 0 to 15 of the key matrix are shown here bit by bit.

```
    76543210        76543210
 0: 00000000    8:  00000000
 1: 00010000    9:  00000000
 2: 00000000   10:  00000000
 3: 00000000   11:  00000000
 4: 00000000   12:  00000000
 5: 00000000   13:  00000000
 6: 00000000   14:  00000000
 7: 00000000   15:  00000000
```

First key pressed: 1.4 (12)

Screenshot from the B&R Control Center

Figure 62: Example - Hardware number in the B&R Key Editor or in the B&R Control Center

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

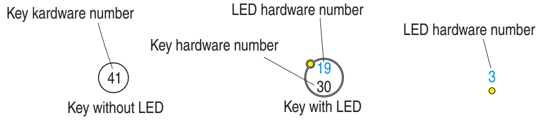


Figure 63: Display - Keys and LEDs in the matrix

5.1 Automation Panel 10.4" VGA

5.1.1 Automation Panel 5AP981.1043-01

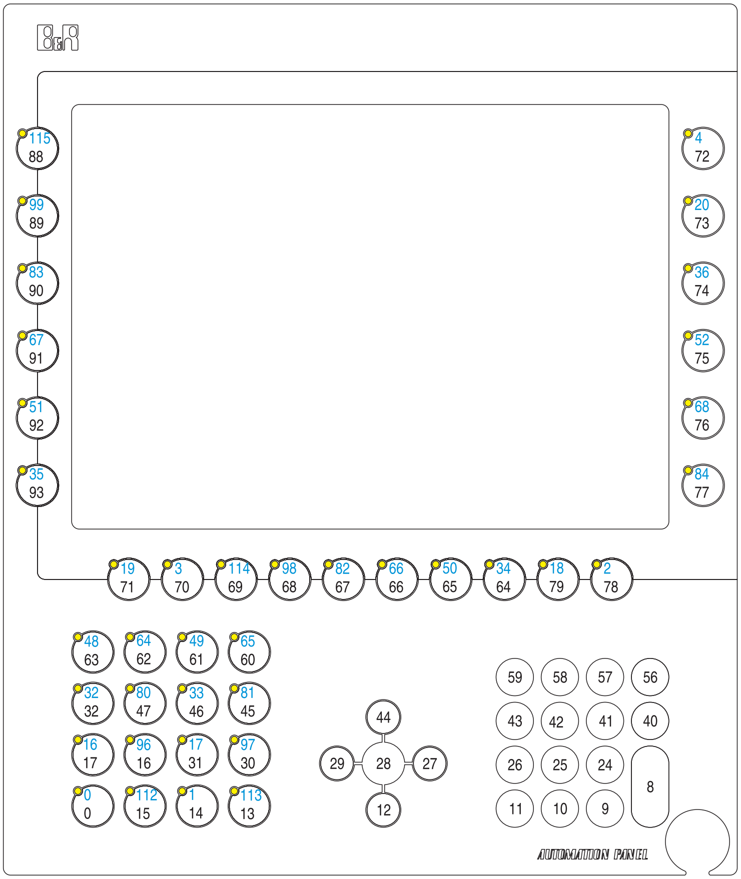


Figure 64: Hardware numbers - 5AP981.1043-01

5.1.2 Automation Panel 5AP982.1043-01

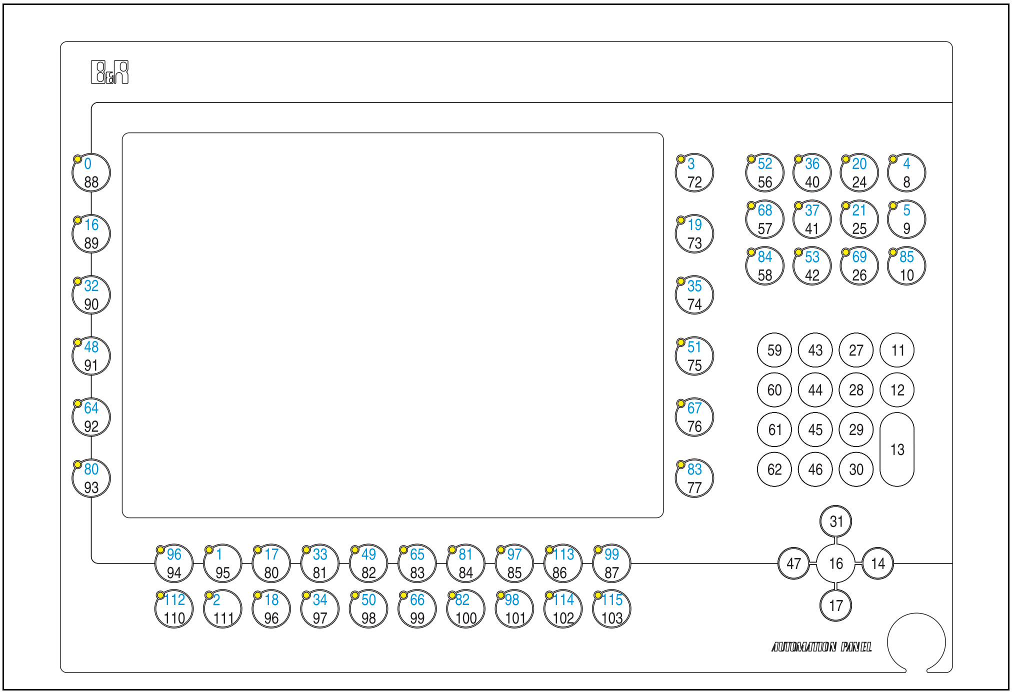


Figure 65: Hardware numbers - 5AP982.1043-01

5.1.3 Automation Panel 5AP980.1043-01

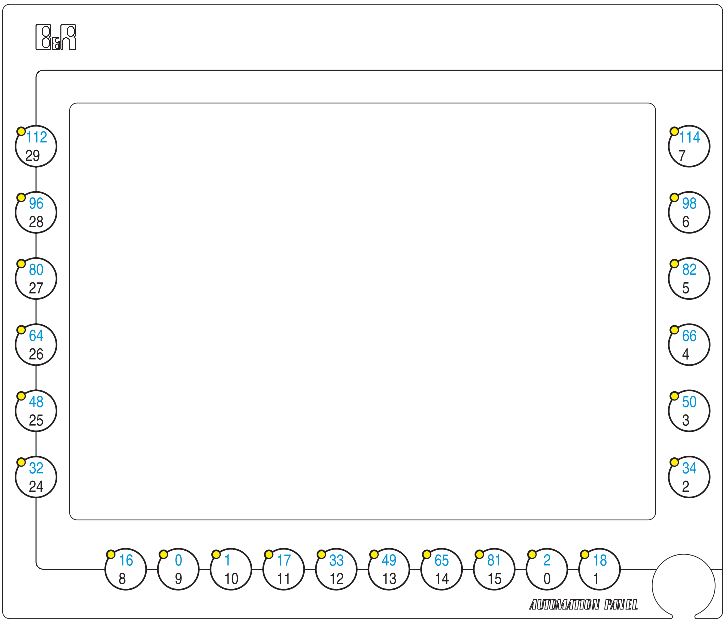


Figure 66: Hardware numbers - 5AP980.1043-01

5.2 Automation Panel 15" XGA

5.2.1 Automation Panel 5AP981.1505-01

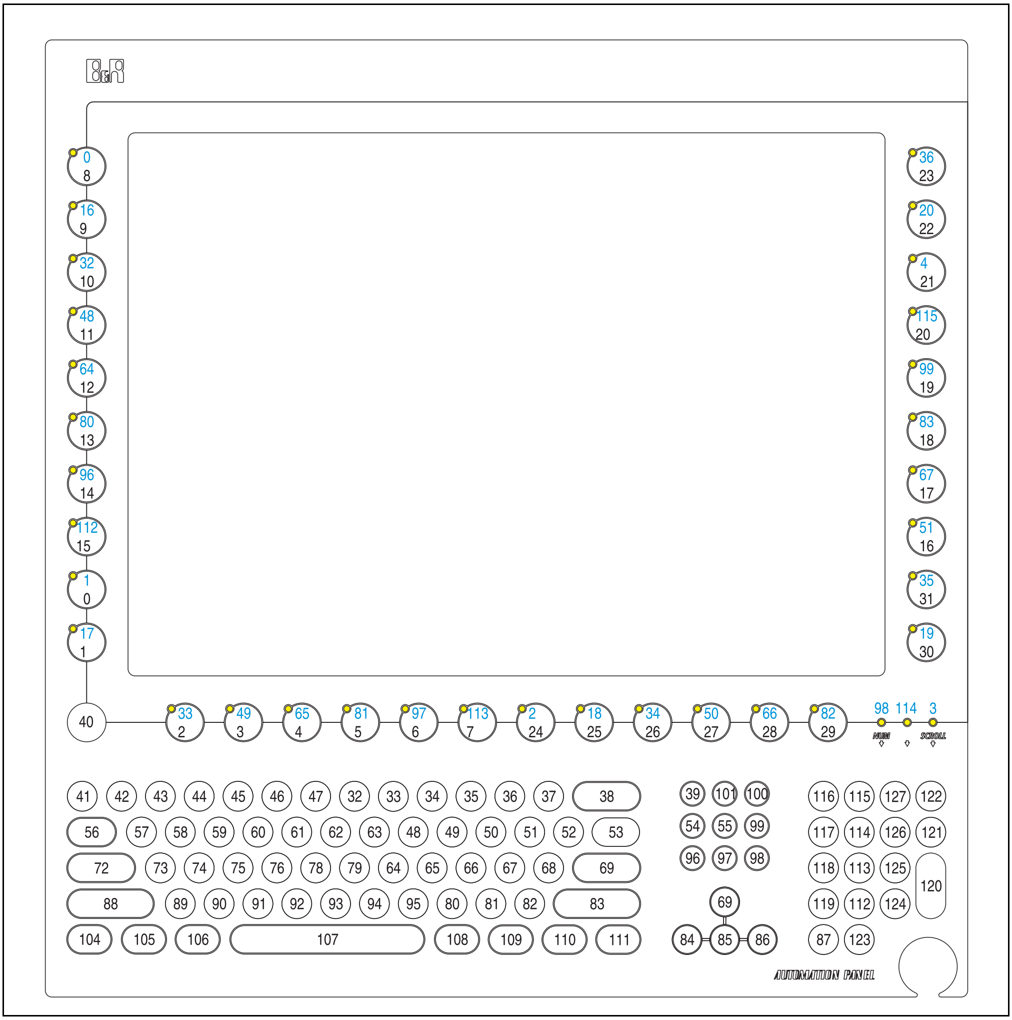


Figure 67: Hardware numbers - 5AP981.1505-01

5.2.2 Automation Panel 5AP980.1505-01

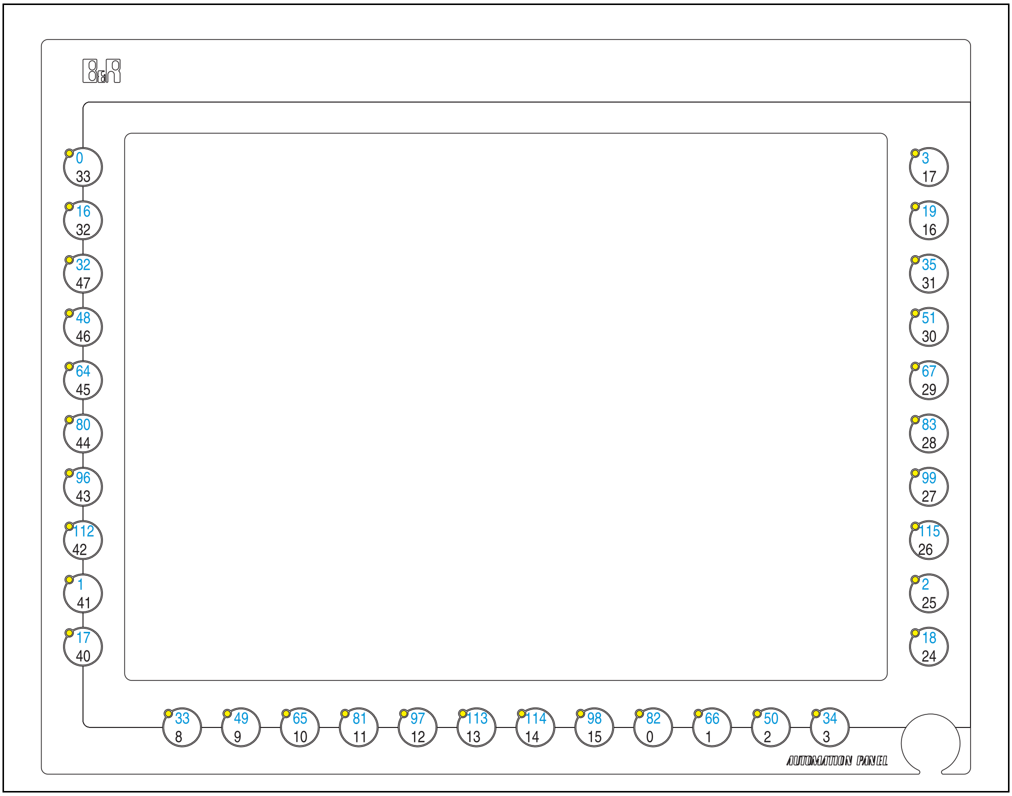


Figure 68: Hardware numbers - 5AP980.1505-01

6. User tips for increasing the display lifespan

6.1 Backlight

The lifespan of the backlight is specified in "Half Brightness Time". An operating time of 50,000 hours would mean that the display brightness would still be 50% after this time.

6.1.1 How can the lifespan of backlights be extended?

- Set the display brightness to the lowest value that is still comfortable for the eyes
- Use dark images
- Reducing the brightness by 50% results in an approximate 50% increase of the half-brightness time.

6.2 Image sticking

Image sticking is the "burning in" of a static image on a display after being displayed for a prolonged period of time. However, this does not only occur with static images. Image sticking is known in technical literature as the "burn-in effect", "image retention", "memory effect", "memory sticking" or "ghost image".

There are 2 types of this:

- Area type: This is seen with a dark gray image. The effect disappears if the display is switched off for a longer period of time.
- Line type: This can cause lasting damage.

6.2.1 What causes image sticking?

- Static images
- Screensaver not enabled
- Sharp contrast transitions (e.g. black / white)
- High ambient temperatures
- Operation outside of the specifications

6.2.2 How can image sticking be avoided?

- continual change between static and dynamic images
- avoiding excessive brightness contrast between foreground and background display
- use of colors with similar brightness
- use of complementary colors in subsequent images
- use of screensavers

7. Pixelerror

Information:

Displays can contain dead pixels that result from the manufacturing process. These flaws are not grounds claiming reclamation or warranty.

Chapter 4 • Software

1. BIOS options

Information:

The following diagrams and BIOS menu items including descriptions refer to BIOS version 1.03. It is therefore possible that these diagrams and BIOS descriptions do not correspond with the installed BIOS version.

1.1 General information

BIOS stands for "Basic Input Output System". It is the most basic standardized communication between the user and the system (hardware). A BIOS modified by B&R is used in the Panel PC 300 devices.

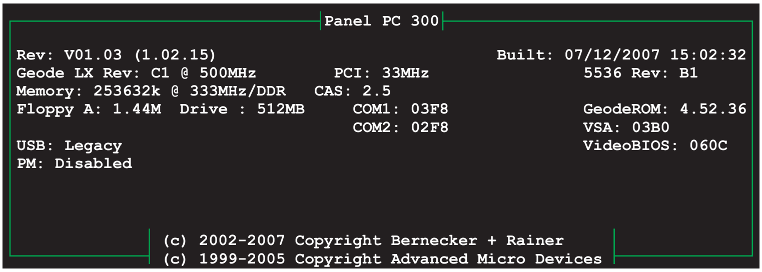
BIOS setup lets you modify basic system configuration settings. These settings are saved in CMOS RAM.

The CMOS RAM is a nonvolatile, battery-backed memory that retains information when power is not applied to the Panel PCs.

BIOS is immediately activated when the Panel PC 300 power supply is switched on.

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

1.2 Summary screen



```
                              Panel PC 300
Rev: V01.03 (1.02.15)                            Built: 07/12/2007 15:02:32
Geode LX Rev: C1 @ 500MHz        PCI: 33MHz               5536 Rev: B1
Memory: 253632k @ 333MHz/DDR   CAS: 2.5
Floppy A: 1.44M  Drive : 512MB     COM1: 03F8             GeodeROM: 4.52.36
                                   COM2: 02F8             VSA: 03B0
USB: Legacy                                               VideoBIOS: 060C
PM: Disabled



               (c) 2002-2007 Copyright Bernecker + Rainer
               (c) 1999-2005 Copyright Advanced Micro Devices
```

Figure 69: Summary screen

To deactivate this summary screen, see the section 1.3.9 "Miscellaneous configuration", on page 140.

To make changes in the BIOS setup, the DEL key must be pressed when starting the Panel PC 300 device, before the summary screen appears as soon as the message "`Press DEL for Setup`" appears (during the POST):

If the message disappears before DEL has been pressed[1)], then the PPC300 must be booted again in order to enter BIOS setup.

Warning!

The following general rule applies: Only modify those settings that you completely understand. On no account should settings be changed without a good reason. The BIOS settings have been carefully chosen by B&R to guarantee ideal performance and reliability. Even a seemingly minor change to the settings may cause the system to become unstable.

Information:

The settings recommended by B&R can be loaded with "Load defaults".

The following keys[1)] help you navigate in BIOS setup:

Key	Function
Cursor ↑	Moves to the previous item.
Cursor ↓	Go to the next item.
Cursor ←	Moves to the previous item.
Cursor →	Go to the next item.
ESC	Exits the submenu.
Enter or press highlighted character shortcut	Changes to the selected menu.
F1 and ALT+H	Opens up a help window that describes the possible values for the highlighted item. Press ESC to exit the help window. In a help window, the cursor ↑, Cursor ↓, Home, End, Page Up, and Page Down keys can be used to navigate when help texts are longer than the displayable area.
Home	Jumps to the first BIOS menu item or object.
End	Jumps to the last BIOS menu item or object.
ALT+Q and ALT+X	Enters the BIOS main menu.
- (Minus)	Decreases the numerical value or selects the previous parameter value.
+ (Plus)	Increases the numerical value or selects the next parameter value.

Table 48: BIOS-relevant keys

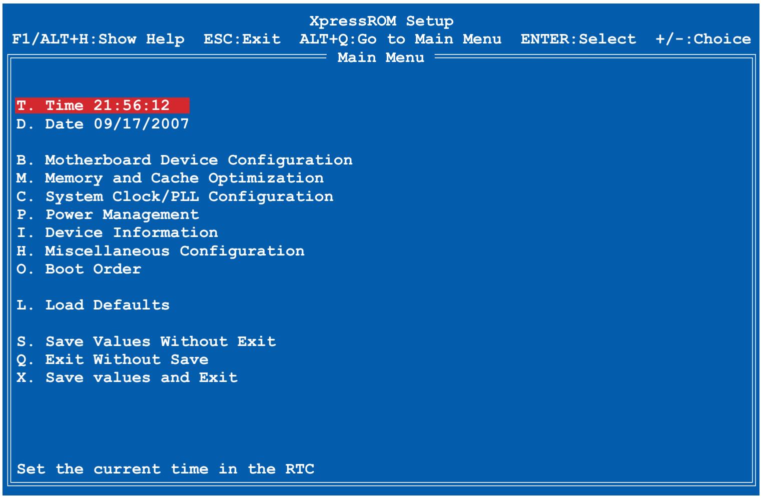
---

1) Characters can be entered and the BIOS Setup pages can be controlled by connecting a USB keyboard or (when using a key display) by using an accordingly configured touch keypad.

1.3 BIOS options

1.3.1 Main menu

Immediately after the DEL button is pressed during startup, the main BIOS setup menu appears.



```
                              XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                                 Main Menu


T. Time 21:56:12
D. Date 09/17/2007

B. Motherboard Device Configuration
M. Memory and Cache Optimization
C. System Clock/PLL Configuration
P. Power Management
I. Device Information
H. Miscellaneous Configuration
O. Boot Order

L. Load Defaults

S. Save Values Without Exit
Q. Exit Without Save
X. Save values and Exit




Set the current time in the RTC
```

Figure 70: Main menu

The individual menu items are explained in detail in the following sections.

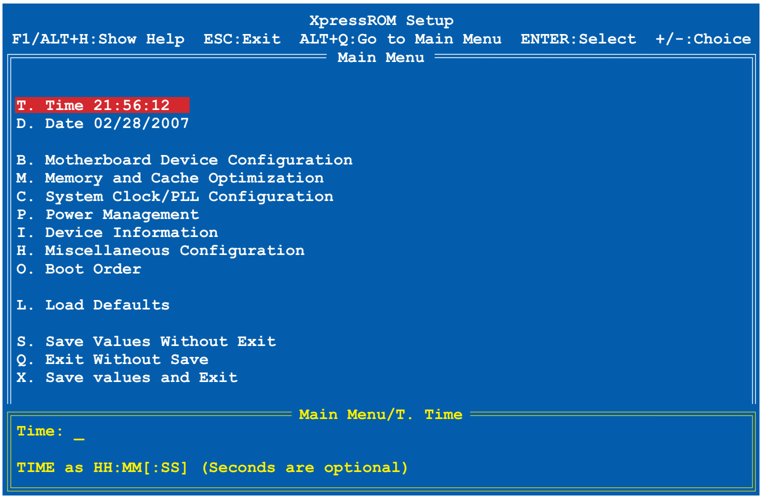
Shortcut	BIOS setup menu	Function
T	**Time 21:56:12**	The system time can be configured here.
D	**Date 09/17/2007**	The system date can be configured here.
B	**Motherboard device configuration**	Motherboard resources can be configured here.
M	**Memory and cache optimization**	The settings for memory management can be made here.
C	**System clock/PLL configuration**	The timing settings can be made here.
P	**Power management**	Setup of various APM (Advanced Power Management) options.
I	**Device information**	Important parameters (temp., mode/node position, etc.) for the Mobile Panel device.
H	**Miscellaneous configuration**	The various BIOS settings can be configured here (Summary screen, Halt on errors, etc.)
O	**Boot order**	The boot order can be set here.
L	**Load defaults**	Load the optimal BIOS settings for best performance.
S	**Save values without exit**	Saves BIOS values without exiting BIOS setup.
Q	**Exit without save**	Exits BIOS setup without saving any changes.

Table 49: Overview of BIOS Main Menu functions

Shortcut	BIOS setup menu	Function
X	**Save values and exit**	Saves settings and exits BIOS setup.

Table 49: Overview of BIOS Main Menu functions (Forts.)

1.3.2 Time



```
                           XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                             Main Menu

T. Time 21:56:12
D. Date 02/28/2007

B. Motherboard Device Configuration
M. Memory and Cache Optimization
C. System Clock/PLL Configuration
P. Power Management
I. Device Information
H. Miscellaneous Configuration
O. Boot Order

L. Load Defaults

S. Save Values Without Exit
Q. Exit Without Save
X. Save values and Exit
                          Main Menu/T. Time
Time: _

TIME as HH:MM[:SS] (Seconds are optional)
```

Figure 71: Time

The currently configured system time is displayed here. The time is buffered by a battery (CMOS battery, see section "Battery", on page 37) after the Panel PC 300 device has been switched off.

By selecting the item "Time" and the confirming by pressing Enter, or using the shortcut "T", you can enter a new system time. The format HH:MM[:SS] must be entered as follows:

Example: Set time to 13:00:00.

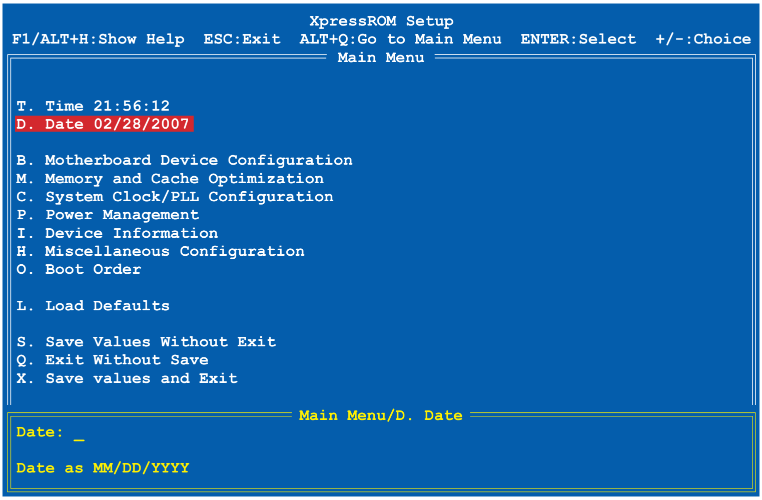
The entry can be made in three different ways using the keyboard:

- 13:00:00 - Confirm with Enter
- 13:00 - Confirm with Enter
- 13: - Confirm with Enter

Information:

If using a German keyboard, press the "Shift+ö" key to enter ":".

1.3.3 Date



```
                          XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                             Main Menu

T. Time 21:56:12
D. Date 02/28/2007

B. Motherboard Device Configuration
M. Memory and Cache Optimization
C. System Clock/PLL Configuration
P. Power Management
I. Device Information
H. Miscellaneous Configuration
O. Boot Order

L. Load Defaults

S. Save Values Without Exit
Q. Exit Without Save
X. Save values and Exit

                         Main Menu/D. Date
Date: _

Date as MM/DD/YYYY
```

Figure 72: Date

The current system date is displayed here. The date is buffered by a battery (CMOS battery) after the Panel PC 300 device has been switched off.

By selecting the item "Date" and the confirming by pressing Enter, or using the shortcut "D", you can enter a new system date. The format MM:DD:YYYY must be entered as shown in the following example:

Example: Set date to 12.02.2007.

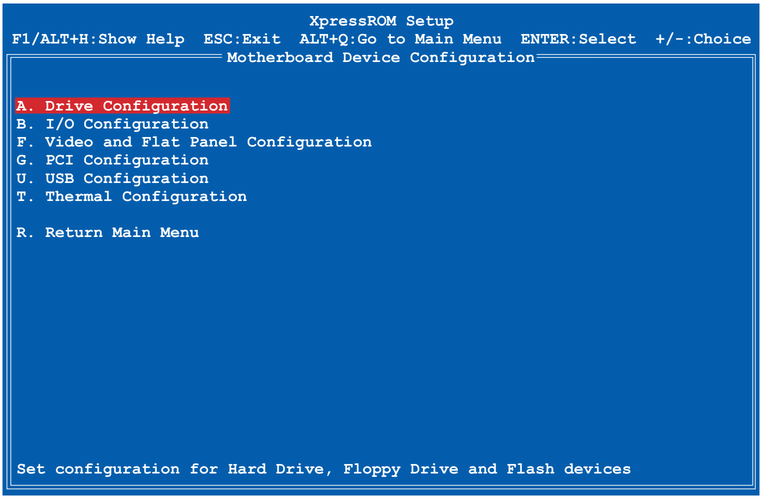
Entry using keyboard:

- 12/02/2007 - Confirm with Enter

Information:

If using a German keyboard, press the "-" key (next to the Shift key) to enter "/".

1.3.4 Motherboard device configuration



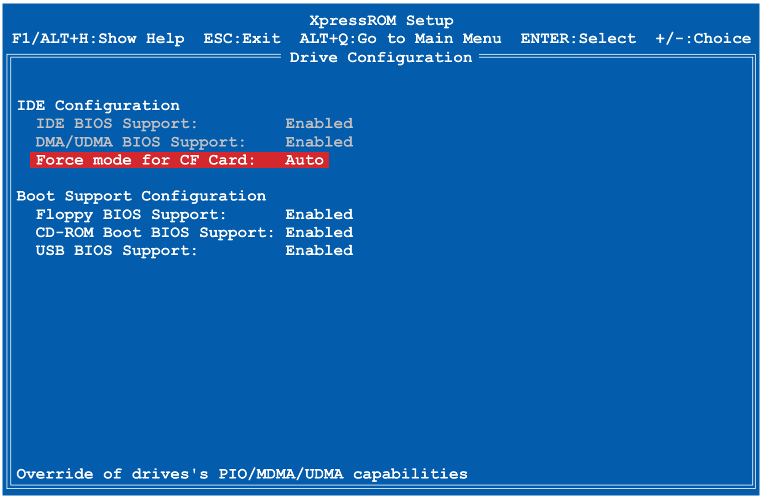
```
                              XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                      Motherboard Device Configuration

A. Drive Configuration
B. I/O Configuration
F. Video and Flat Panel Configuration
G. PCI Configuration
U. USB Configuration
T. Thermal Configuration

R. Return Main Menu










Set configuration for Hard Drive, Floppy Drive and Flash devices
```

Figure 73: Motherboard device configuration

Shortcut	BIOS setup menu	Function
A	**Drive configuration**	Settings for the floppy drive and CompactFlash card.
B	**I/O configuration**	Configuration of the I/O devices.
F	**Video and flat panel configuration**	Displays the video settings and configuration for resolution, brightness, and contrast display parameters.
G	**PCI Configuration**	Configures PCI bus settings.
U	**USB configuration**	Configures the USB settings.
T	**Thermal configuration**	Display of temperatures.
R	**Return to main menu**	Exits the current page and returns to the BIOS main menu.

Table 50: BIOS motherboard device configuration menu

Motherboard device configuration - drive configuration



```
                              XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                           Drive Configuration

IDE Configuration
  IDE BIOS Support:         Enabled
  DMA/UDMA BIOS Support:    Enabled
  Force mode for CF Card:   Auto

Boot Support Configuration
  Floppy BIOS Support:      Enabled
  CD-ROM Boot BIOS Support: Enabled
  USB BIOS Support:         Enabled

Override of drives's PIO/MDMA/UDMA capabilities
```

Figure 74: Motherboard device configuration - drive configuration

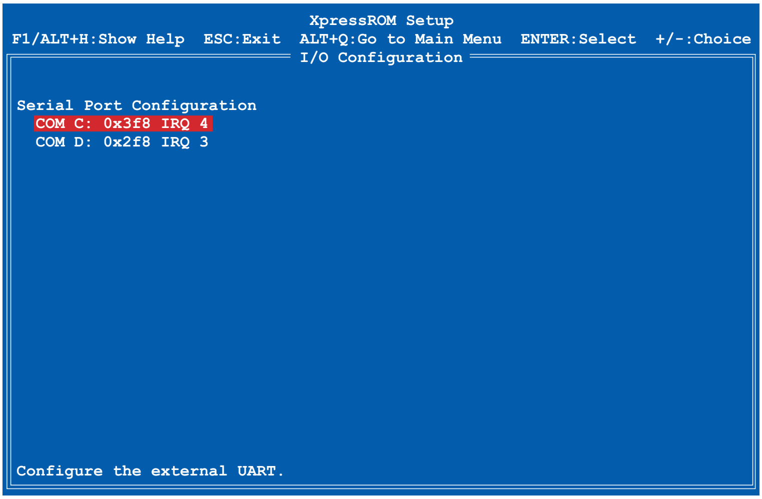
BIOS setting	Meaning	Setting options	Effect
IDE BIOS support	Display of the Panel PC 300 IDE configuration.	None	-
DMA/UDMA BIOS support	Display of the DMA/UDMA BIOS support for the inserted CompactFlash card.	None	-
Force mode for CF card	The maximum data transfer mode to and from a CompactFlash card can be configured here. **Information:** **If a mode is configured that is not supported by the CompactFlash card, then the fastest supported mode is configured.**	Auto	The fastest mode supported by the inserted CompactFlash card is automatically used.
		PIO 0 (3.3 MB/s) PIO 1 (5.2 MB/s) PIO 2 (8.3 MB/s) PIO 3 (11.1 MB/s) PIO 4 (16.6 MB/s)	Manual setting option for the PIO (Programmed Input/Output) mode.
		MDMA 0 (4.2 MB/s) MDMA 1 (13.3 MB/s) MDMA 2 (16.6 MB/s)	Manual setting option for the MDMA (Multiword DMA) mode.
		UDMA 0 (16.6 MB/s) UDMA 1 (25.0 MB/s) UDMA 2 (33.3 MB/s) UDMA 3 (44.4 MB/s) UDMA 4 (66.6 MB/s) UDMA 5 (100.0 MB/s)	Manual setting option for the UDMA (Ultra DMA) mode.

Table 51: BIOS drive configuration menu

BIOS setting	Meaning	Setting options	Effect
Floppy BIOS support	Floppy support (USB) can be activated/deactivated here.	Enabled	Floppy support activated.
		Disabled	Floppy support deactivated.
CD-ROM boot BIOS support	The CD-ROM boot BIOS support can be activated/deactivated here.	Enabled	CD-ROM boot support activated. It is possible to boot from a connected USB CD ROM drive.
		Disabled	CD-ROM boot support deactivated.
USB BIOS support	USB BIOS support can be activated/deactivated here.	Enabled	USB BIOS support activated.
		Disabled	USB BIOS support deactivated.

Table 51: BIOS drive configuration menu (Forts.)

Motherboard device configuration - I/O configuration



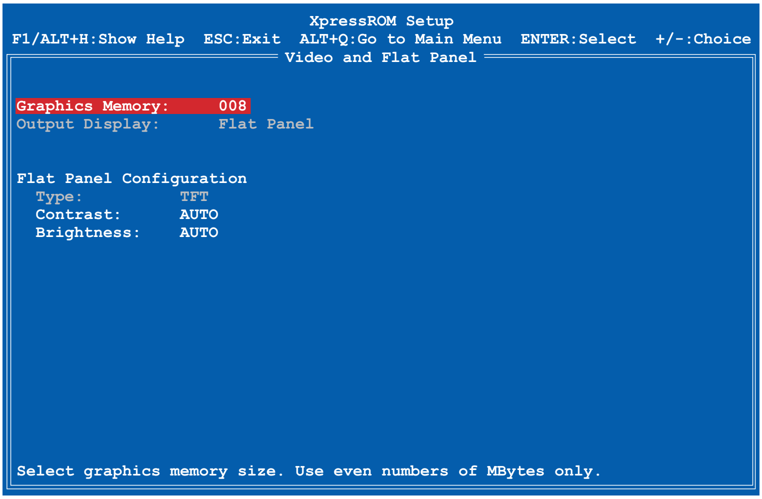
```
                           XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                          I/O Configuration

Serial Port Configuration
  COM C: 0x3f8 IRQ 4
  COM D: 0x2f8 IRQ 3

Configure the external UART.
```

Figure 75: Motherboard device configuration - I/O configuration

BIOS setting	Meaning	Setting options	Effect
COM C	Settings for the serial COM interface can be made on the PPC300. **Information:** **The port cannot use the same address range and interrupt as the COM D.**	Disabled	No assignment. The serial interface is disabled.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
		0x3f8 IRQ 12	
		0x2f8 IRQ 11	
		0x3e8 IRQ 12	
		0x2e8 IRO 11	
COM D	Settings can be made for the COM D, which is reserved for an AP900 touch screen. **Information:** **The port cannot use the same address range and interrupt as the COM C.**	Disabled	No assignment. The AP900 touch screen is disabled and does not function.
		0x3f8 IRQ 4	Use this address range and interrupt.
		0x2f8 IRQ 3	
		0x3e8 IRQ 4	
		0x2e8 IRQ 3	
		0x3f8 IRQ 12	
		0x2f8 IRQ 11	
		0x3e8 IRQ 12	
		0x2e8 IRQ 11	

Table 52: BIOS super I/O configuration menu

Motherboard device configuration - video and flat panel



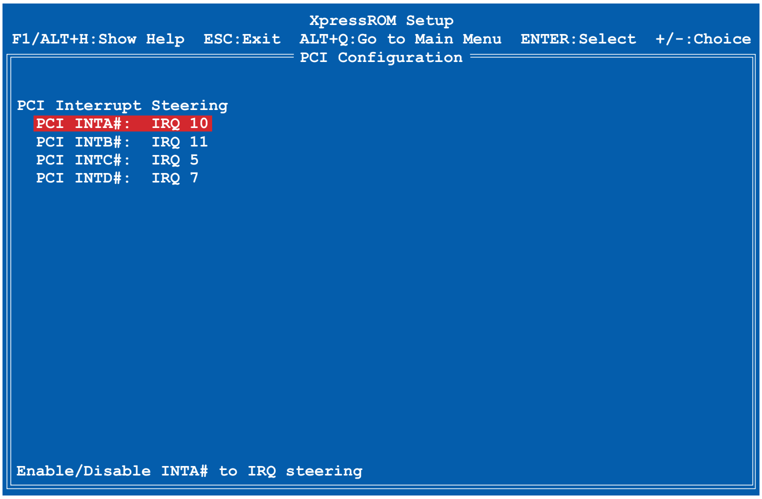
```
                          XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                         Video and Flat Panel

Graphics Memory:         008
Output Display:          Flat Panel


Flat Panel Configuration
  Type:            TFT
  Contrast:        AUTO
  Brightness:      AUTO









Select graphics memory size. Use even numbers of MBytes only.
```

Figure 76: Motherboard device configuration - video and flat panel configuration

BIOS setting	Meaning	Setting options	Effect
Graphics memory	Displays the current graphic memory reserved by the main memory.	2 - 254	The selected MB size is reserved from the main memory for video display.
Output display	Selection of display mode	None	Display from the display output device.
Type	Selection of the Automation Panel 900 type	None	Type display
Contrast	Contrast setting for the LCD display.	Auto	No effect because all AP900 units have a TFT display.
		0% to 100%	No effect because all AP900 units have a TFT display.
Brightness	Setting for the background lighting of the display.	Auto	The optimal brightness is automatically configured using the factory settings. A brightness value between 100% and 0% is set.
		0% to 100%	Manual setting of the desired brightness within factory settings limits.

Table 53: BIOS video configuration menu

Motherboard device configuration - PCI configuration



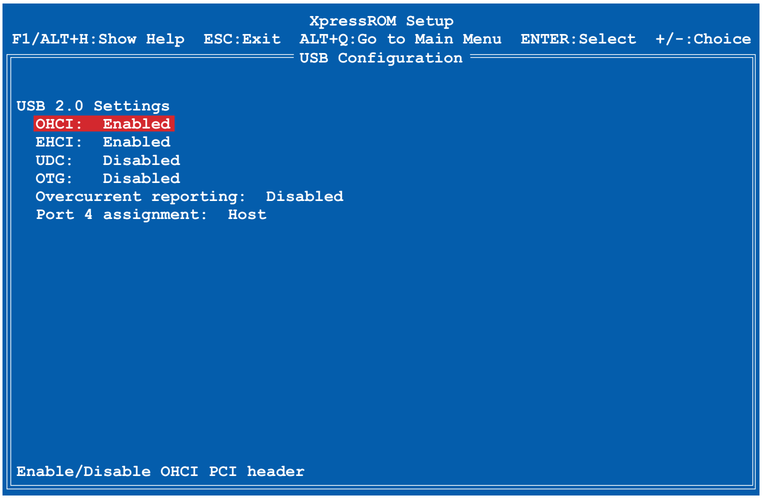
```
                           XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                          PCI Configuration


PCI Interrupt Steering
  PCI INTA#:  IRQ 10
  PCI INTB#:  IRQ 11
  PCI INTC#:  IRQ 5
  PCI INTD#:  IRQ 7

Enable/Disable INTA# to IRQ steering
```

Figure 77: Motherboard device configuration - PCI configuration

BIOS setting	Meaning	Setting options	Effect
PCI INTA#	IRQ setting for the VGA controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTB#	IRQ setting for the audio controller.	Disabled	No IRQ is reserved.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTC#	IRQ setting for the ETH1 interface.	Disabled	No IRQ is reserved. The ETH1 interface does not function.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.
PCI INTD#	IRQ setting for the ETH2 and USB interface.	Disabled	No IRQ is reserved. ETH2 and the USB interfaces on the AP900 do not function.
		3, 4, 5, 6, 7, 9, 10, 11, 12, 14 or 15	Assigns these IRQs.

Table 54: BIOS PCI configuration menu

Motherboard device configuration - USB configuration



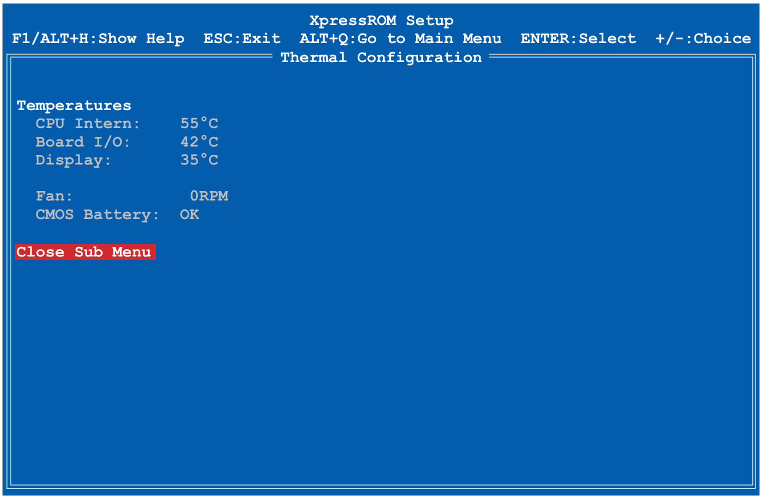
```
                              XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                              USB Configuration

USB 2.0 Settings
  OHCI:  Enabled
  EHCI:  Enabled
  UDC:   Disabled
  OTG:   Disabled
  Overcurrent reporting:  Disabled
  Port 4 assignment:  Host

Enable/Disable OHCI PCI header
```

Figure 78: Motherboard device configuration - USB configuration

BIOS setting	Meaning	Setting options	Effect
OHCI	Turns USB 1.0/ 1.1 support on/off (OHCI - Open Host Controller Interface).	Enabled	Activates the USB port.
		Disabled	Deactivates the USB port.
EHCI	Turns USB 2.0 support on/off (EHCI = Enhanced Host Controller Interface).	Enabled	Enables this function.
		Disabled	Disables this function.
UDC	Turns the USB device controller on/off. When on, only the PCI config space is activated in BIOS.	Enabled	Enables this function.
		Disabled	Disables this function.
OTG	Turns the On-to-Go device on/off. Only the PCI config space is activated in BIOS.	Enabled	Enables this function.
		Disabled	Disables this function.
Overcurrent reporting	This function enables an automatic error message to be sent to the system when the USB hub is overloaded (e.g. in Windows XP Embedded).	Enabled	Enables this function.
		Disabled	Disables this function.
Port 4 assignment	With this option, USB port 4 can be configured. USB Port 4 is not used with the PPC300, therefore this option has no function.	Host	Functions as host.
		Device	Runs as device.
		Not used	In BIOS, the default value (=Host) is assigned.

Table 55: BIOS USB configuration menu

Motherboard device configuration - thermal configuration



```
                         XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                     Thermal Configuration

Temperatures
  CPU Intern:     55°C
  Board I/O:      42°C
  Display:        35°C

  Fan:             0RPM
  CMOS Battery:   OK

Close Sub Menu
```

Figure 79: Motherboard device configuration - thermal configuration

BIOS setting	Meaning	Setting options	Effect
CPU internal	Displays the current internal processor temperature.	None	-
Display	Displays the current display temperature.	None	-
Board I/O	Indicates the current board I/O temperature.	None	-
Fan	Displays fan speed for the selected panel.	None	-
CMOS battery	The status of the built-in CMOS battery is displayed here. Possible displays: **OK** - Battery is ok, **Bad** - Battery must be replaced.	None	-

Table 56: BIOS thermal configuration menu

1.3.5 Memory and cache optimization

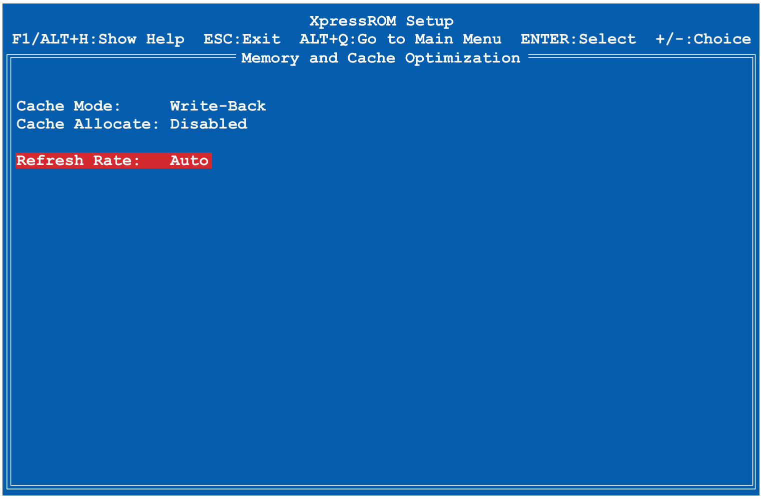
Warning!

The parameters in this screen are for system designers, service personnel, and technically competent users only. Only modify those settings that you completely understand.

Incorrectly setting "Memory optimization" values can cause instability and even cause the entire system not to boot. If the PPC300 can no longer be booted, then the default BIOS values can be restored by pushing the reset button three times (see section 1.4.8 "Restoring the default BIOS values", on page 149).

Information:

More detailed information about the meaning and effects of the settings can also be found in the corresponding user's manual for the processor.



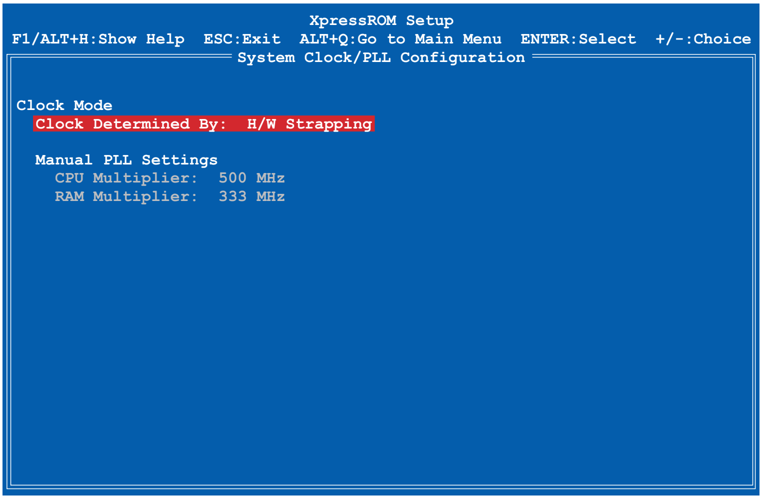
```
                              XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                     Memory and Cache Optimization

Cache Mode:     Write-Back
Cache Allocate: Disabled

Refresh Rate:   Auto
```

Figure 80: Memory and cache optimization

BIOS setting	Meaning	Setting options	Effect
Cache mode	Using cache mode, write accesses are determined on the cache.	Write back	The data is only written in the main memory if necessary (main memory and cache do not have the same information content).
		Write through	Data is written to the cache and to the main memory.
Cache allocate	The cache is divided into memory levels.	Disabled	Disables this function.
		Enabled	Enables this function.
Refresh rate	The refresh cycle can be set here. **Information:** **Enter the clock frequency, the chipset does the rest.**	Auto	Value selected automatically.
		15µs, 3µs, 7µs, 31µs, 62µs or 125µs	Value set manually.

Table 57: BIOS memory and cache optimization menu

1.3.6 System clock/PLL configuration



```
                       XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                 System Clock/PLL Configuration

Clock Mode
  Clock Determined By:  H/W Strapping

  Manual PLL Settings
    CPU Multiplier:  500 MHz
    RAM Multiplier:  333 MHz
```

Figure 81: System clock/PLL configuration

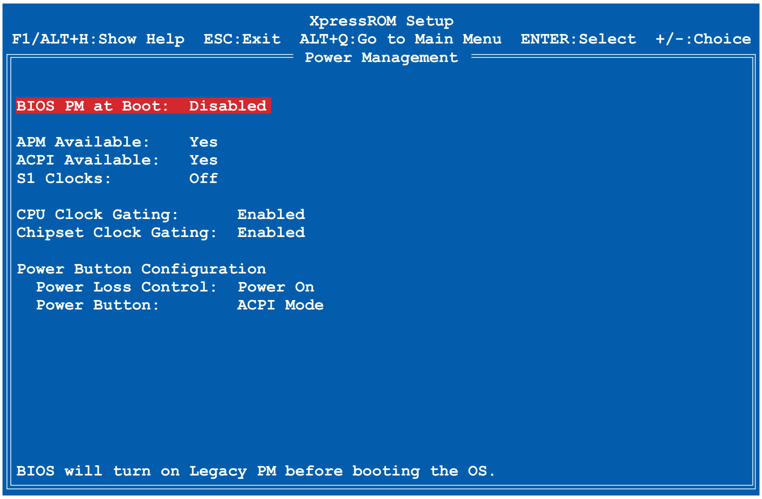
BIOS setting	Meaning	Setting options	Effect
Clock determined by	The processor clock can be set with this option.	H/W strapping	"CPU multiplier" and "RAM multiplier" values set automatically.
		Manual settings	Values must be set manually (CPU multiplier and RAM multiplier).

Table 58: System clock/PLL configuration

BIOS setting	Meaning	Setting options	Effect
CPU multiplier	The CPU multiplier can be selected with this option. Can only be selected if "Clock Determined By" is set to " Manual Setting".	233, 266, 300, 333, 366, 400, 433, 466 or 500 MHz	Value set manually.
RAM multiplier	The RAM multiplier can be selected with this option.	200, 233, 266, 300, 333, 366 or 400 MHz	Value set manually.

Table 58: System clock/PLL configuration

1.3.7 Power management



```
                           XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                          Power Management

BIOS PM at Boot:  Disabled

APM Available:    Yes
ACPI Available:   Yes
S1 Clocks:        Off

CPU Clock Gating:      Enabled
Chipset Clock Gating:  Enabled

Power Button Configuration
  Power Loss Control:  Power On
  Power Button:        ACPI Mode








BIOS will turn on Legacy PM before booting the OS.
```

Figure 82: Power management

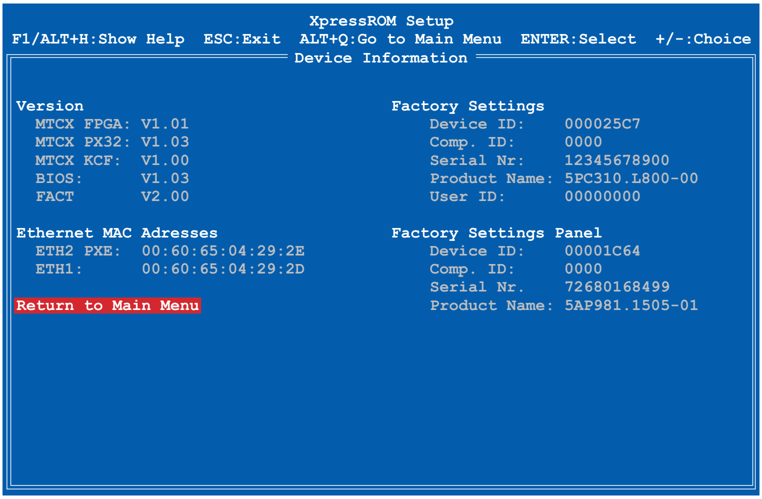
BIOS setting	Meaning	Setting options	Effect
BIOS PM at boot	Power Management is already enabled in the boot phase.	Enabled	Enables this function.
		Disabled	Disables this function.
APM available	Under this option you can set whether the operating system is allowed to change the BIOS power management settings.	Yes	Enables this function.
		No	Disables this function.
ACPI available	The ACPI (Advanced Configuration and Power Interface) option is an extended PnP and power management function.	Yes	Enables this function.
		No	Disables this function.
S1 clocks	The processor can be "stopped" with this option. Not enabled until the processor enters this state.	Off	Disables this function.
		On	Enables this function.

Table 59: BIOS power management menu

BIOS setting	Meaning	Setting options	Effect
CPU clock gating	During power management, the clock lines are turned off for devices connected to the chipset or CPU.	Enabled	Enables this function.
		Disabled	Disables this function.
Chipset clock gating	The clocks are never switched off.	Enabled	Enables this function.
		Disabled	Disables this function.
Power Loss Control	This option determines what should occur after a power failure.	Power-on	The device turns back on.
		Stay off	Device remains off.
Power button	This option determines how the Power button will function.	ACPI mode	When the power button is pressed and held for 4 seconds, the PPC300 is switched off without shutting down the operating system.
		Instant off	Turns off immediately.

Table 59: BIOS power management menu (Forts.)

1.3.8 Device information



```
                         XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                       Device Information

Version                                 Factory Settings
  MTCX FPGA: V1.01                          Device ID:     000025C7
  MTCX PX32: V1.03                          Comp. ID:      0000
  MTCX KCF:  V1.00                          Serial Nr:     12345678900
  BIOS:      V1.03                          Product Name: 5PC310.L800-00
  FACT       V2.00                          User ID:       00000000

Ethernet MAC Adresses                   Factory Settings Panel
  ETH2 PXE:  00:60:65:04:29:2E              Device ID:     00001C64
  ETH1:      00:60:65:04:29:2D              Comp. ID:      0000
                                            Serial Nr.     72680168499
Return to Main Menu                         Product Name: 5AP981.1505-01
```

Figure 83: Device information

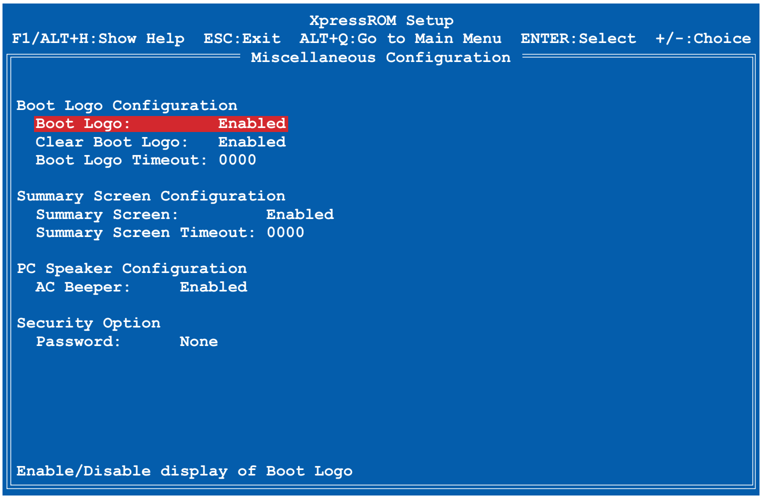
BIOS setting	Meaning	Setting options	Effect
MTCX FPGA	The FPGA firmware version is displayed here.	None	-
MTCX PX32	The MTCX firmware version is displayed here.	None	-
MTCX KCF	The KCF (Key Configuration File) version is displayed here.	None	-
BIOS	The BIOS version is displayed here.	None	-

Table 60: BIOS device information menu

BIOS setting	Meaning	Setting options	Effect
FACT	The version of the factory settings is displayed here.	None	-
ETH2 PXE	The MAC address of the ETH2 interface is displayed here.	None	-
ETH1	The MAC address of the ETH1 interface is displayed here.	None	-
Factory settings			
Device ID	Hex value display of the Panel PC 300 insert device ID.	None	-
Comp. ID	The compatibility code of the Panel PC 300 insert is displayed here.	None	-
Serial no.	The serial number of the Panel PC 300 insert is displayed here.	None	-
Product name	The product name of the Panel PC 300 insert is displayed here.	None	-
User ID	The user ID of the Panel PC 300 insert is displayed here. This 8 digit hex value can be freely assigned by the user (e.g. to give the device a unique ID) and can only be changed with using the "B&R Control Center" via the ADI driver.	None	-
Panel factory settings			
Device ID	Hex value display of the Automation Panel device ID.	None	-
Comp. ID	The compatibility code of the Automation Panel is displayed here.	None	-
Serial no.	The serial number of the Automation Panel is displayed here.	None	-
Product name	The product name of the Automation Panel is displayed here.	None	-

Table 60: BIOS device information menu (Forts.)

1.3.9 Miscellaneous configuration



```
                          XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                    Miscellaneous Configuration

Boot Logo Configuration
  Boot Logo:          Enabled
  Clear Boot Logo:    Enabled
  Boot Logo Timeout:  0000

Summary Screen Configuration
  Summary Screen:          Enabled
  Summary Screen Timeout:  0000

PC Speaker Configuration
  AC Beeper:     Enabled

Security Option
  Password:      None





Enable/Disable display of Boot Logo
```

Figure 84: Miscellaneous configuration

BIOS setting	Meaning	Setting options	Effect
Boot logo[1)]	Displays a boot logo while starting the Panel PC 300.	Disabled	A user boot logo is not displayed during booting.
		Enabled	A user boot logo is displayed during booting.
Clear boot logo	BIOS automatically clears the boot logo after starting in order to reduce the boot time.	Disabled	The boot logo is removed.
		Enabled	Disables this function.
Boot logo timeout	Defines the length of time the message "Press DEL for setup" is shown on the display, and how long the user has to switch to BIOS configuration . **Information** **Can be resumed before the timeout expires by pressing any button.**	0000	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass before the boot process continues. .
Summary screen	Displays information about the BIOS, VGA, VSA versions, devices found, etc.	Disabled	Shows the summary screen.
		Enabled	Hides the summary screen.
Summary screen timeout	Defines the length of time the summary screen is shown. **Information:** **Can be resumed before the timeout expires by pressing any button.**	0	No waiting.
		1-65535 [milliseconds]	The manually set value in milliseconds that must pass before the boot process continues. .

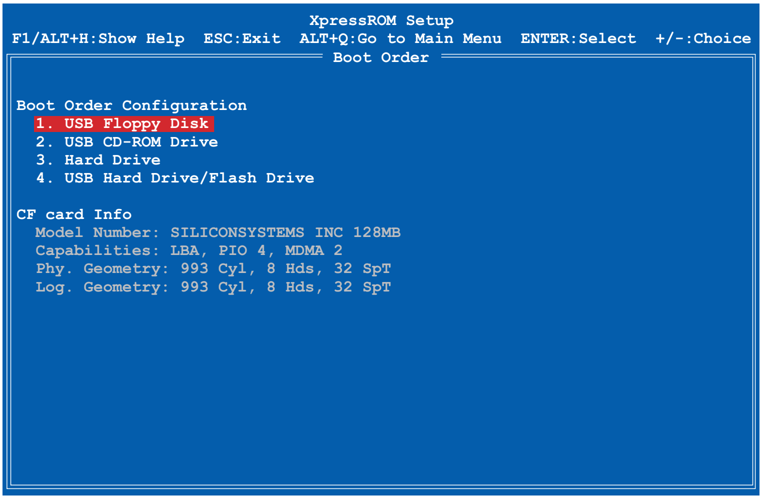
Table 61: BIOS miscellaneous configuration menu

BIOS setting	Meaning	Setting options	Effect
AC beeper	The tone that sounds after startup can be turned on/off here.	Disabled	Disables this function.
		Enabled	Enables this function.
Password	A password for BIOS setup can be specified here. No changes can be made without entering the password.	None	No password.
		Enter password	Enter a password manually (max. 8 characters).

Table 61: BIOS miscellaneous configuration menu (Forts.)

1) Boot logo not pre-configured upon delivery.

1.3.10 Boot order



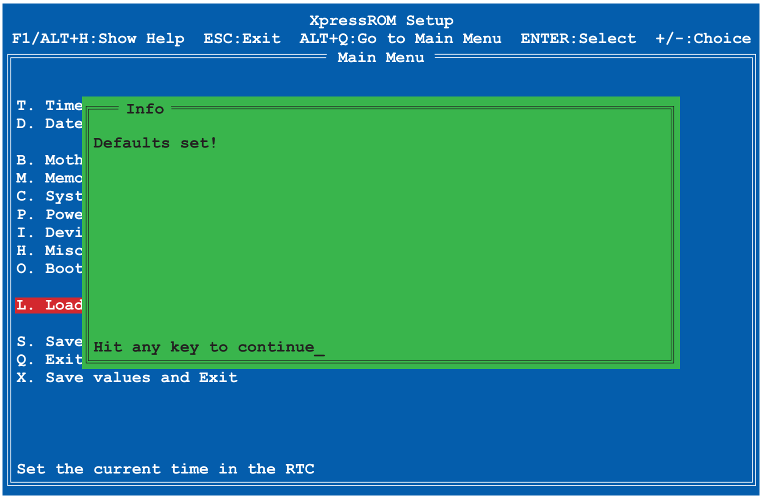
```
                        XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                          Boot Order

Boot Order Configuration
  1. USB Floppy Disk
  2. USB CD-ROM Drive
  3. Hard Drive
  4. USB Hard Drive/Flash Drive

CF card Info
  Model Number: SILICONSYSTEMS INC 128MB
  Capabilities: LBA, PIO 4, MDMA 2
  Phy. Geometry: 993 Cyl, 8 Hds, 32 SpT
  Log. Geometry: 993 Cyl, 8 Hds, 32 SpT
```

Figure 85: Boot order

BIOS setting	Meaning	Setting options		Effect
Boot order configuration	Configures the order in which memory media is booted. If two identical devices are selected a conflict warning is displayed. .	1	USB floppy disk	The device attempts to boot from this drive first.
			USB CD-ROM drive	
			Hard drive	
			USB hard drive / flash drive	
			None	
		2	USB floppy disk	The device attempts to boot from this drive second.
			USB CD-ROM drive	
			Hard drive	
			USB hard drive / flash drive	
			None	
		3	USB floppy disk	The device attempts to boot from this drive third.
			USB CD-ROM drive	
			Hard drive	
			USB hard drive / flash drive	
			None	
		4	USB floppy disk	The device attempts to boot from this drive fourth.
			USB CD-ROM drive	
			Hard drive	
			USB hard drive / flash drive	
			None	
Model number	Displays the CompactFlash model ID.	None		-
Capabilities	Displays the possible data transfer speeds to or from the inserted CompactFlash card.	None		-
Phy. geometry	Displays the physical geometry of the inserted CompactFlash card in cylinders, heads, and number of sectors.	None		-
Log. geometry	Displays the logical geometry of the inserted CompactFlash card in cylinders, heads, and number of sectors.	None		-

Table 62: BIOS drive configuration menu

1.3.11 Load defaults



```
                              XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                                 Main Menu

T. Time  Info
D. Date
         Defaults set!
B. Moth
M. Memo
C. Syst
P. Powe
I. Devi
H. Misc
O. Boot

L. Load

S. Save  Hit any key to continue_
Q. Exit
X. Save values and Exit



Set the current time in the RTC
```

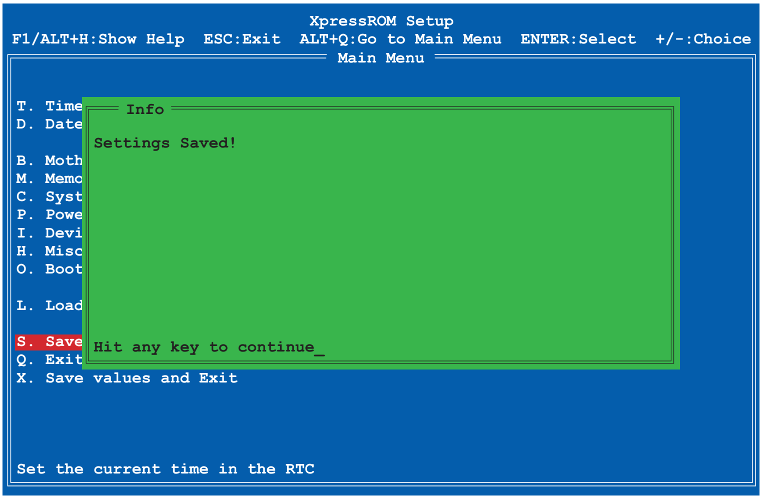
Figure 86: Load defaults

The BIOS default values are restored for all settings by selecting this BIOS menu item (Shortcut "L"). All changes are lost.

Restoring the default BIOS values

In the event that the BIOS settings become incorrectly defined (e.g. USB Keyboard Support disabled, crash during operating system startup) it is possible to automatically restore the default BIOS values by pressing the reset button three times (sequence: press - wait for beep - press - wait for beep - press - wait for beep).

1.3.12 Save values without exit



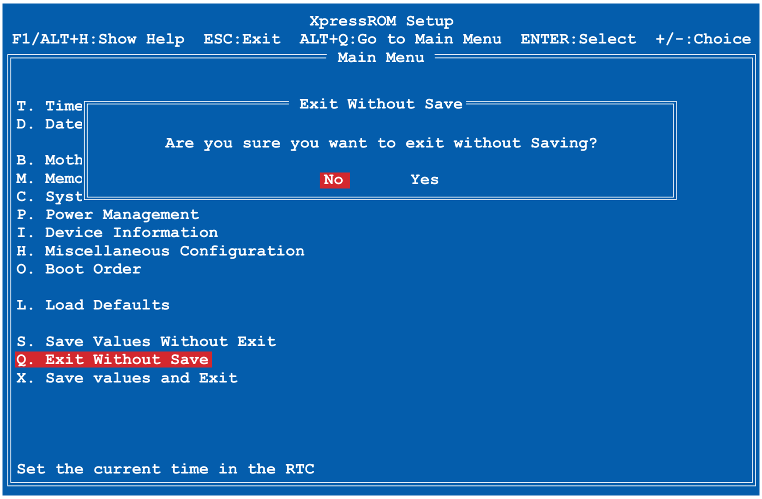
```
Settings Saved!

Hit any key to continue_
```

```
Set the current time in the RTC
```

Figure 87: Save values without exit

The BIOS values are saved using this menu item (S shortcut). The user can then make additional settings or exit BIOS setup.

1.3.13 Exit without save



```
                            XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                               Main Menu

T. Time              Exit Without Save
D. Date
            Are you sure you want to exit without Saving?
B. Moth
M. Memo                  No        Yes
C. Syst
P. Power Management
I. Device Information
H. Miscellaneous Configuration
O. Boot Order

L. Load Defaults

S. Save Values Without Exit
Q. Exit Without Save
X. Save values and Exit




Set the current time in the RTC
```

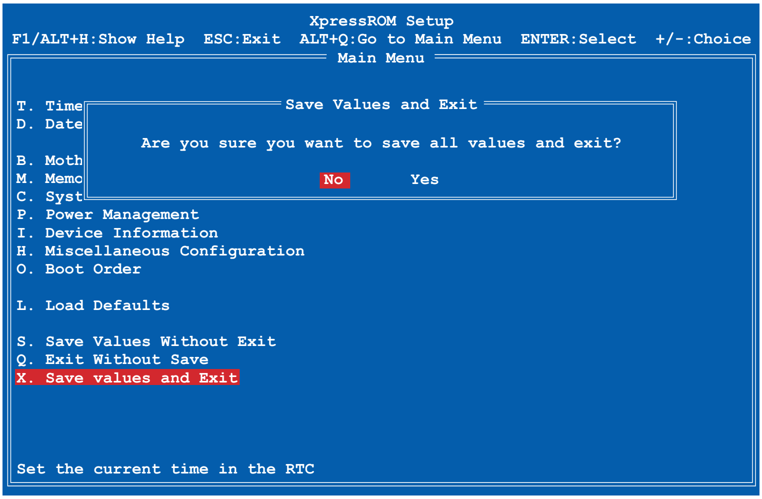
Figure 88: Exit without save

BIOS setup can be exited by selecting "Yes" under this menu item (shortcut "Q") without saving any changes that might have been made. The system is then automatically restarted.

Information:

If using a German keyboard layout, press the "z" key to enter the "y".

1.3.14 Save values and exit



```
                           XpressROM Setup
F1/ALT+H:Show Help  ESC:Exit  ALT+Q:Go to Main Menu  ENTER:Select  +/-:Choice
                              Main Menu

T. Time              Save Values and Exit
D. Date
          Are you sure you want to save all values and exit?
B. Moth
M. Memo                    No        Yes
C. Syst
P. Power Management
I. Device Information
H. Miscellaneous Configuration
O. Boot Order

L. Load Defaults

S. Save Values Without Exit
Q. Exit Without Save
X. Save values and Exit




Set the current time in the RTC
```

Figure 89: Save values and exit

If "Yes" is selected under this menu item (X shortcut), the system saves the settings, automatically exits BIOS setup, and reboots the system.

Information:

If using a German keyboard layout, press the "z" key to enter the "y".

1.4 BIOS default values

The BIOS default values are the BIOS settings that were already configured when the PPC300 was delivered.

1.4.1 Motherboard device configuration

Drive configuration	**Default value**
IDE BIOS support	Enabled
DMA/UDMA BIOS support	Enabled
Force mode for CF card	Auto
Floppy BIOS support	Enabled
CD-ROM boot BIOS support	Enabled
USB BIOS support	Enabled
I/O configuration	
COM C	0x3f8 IRQ 4
COM D	0x2f8 IRQ 3
Video and flat panel configuration	
Graphics memory	008
Output display	-
Type	-
Contrast	Auto
Brightness	Auto
PCI Configuration	
PCI INTA#	IRQ 10
PCI INTB#	IRQ 11
PCI INTC#	IRQ 5
PCI INTD#	IRQ 7
USB configuration	
OHCI	Enabled
EHCI	Enabled
UDC	Disabled
OTG	Disabled
Overcurrent reporting	Disabled
Port 4 assignment	Host
Thermal configuration	
CPU internal	-
Board I/O	-
Display	-

Table 63: Motherboard device configuration default values

Drive configuration	Default value
Fan	-
Battery	-

Table 63: Motherboard device configuration default values (Forts.)

1.4.2 Memory and cache optimization

Setting	Default value
Cache mode	Write back
Cache allocate	Disabled
Refresh rate	Auto

Table 64: Memory and cache optimization default values

1.4.3 System clock/PLL configuration

Setting	Default value
Clock determined by	H/W strapping
CPU multiplier	500 MHz
RAM multiplier	333 MHz

Table 65: System clock/PLL configuration default values

1.4.4 Power management

Setting	Default value
BIOS PM at boot	Disabled
APM available	Yes
ACPI available	Yes
S1 clocks	Off
CPU clock gating	Enabled
Chipset clock gating	Enabled
Power Loss Control	Power-on
Power button	ACPI mode

Table 66: Power management default values

1.4.5 Device information

This BIOS page is only provided for information purposes - therefore, no default BIOS values are available.

1.4.6 Miscellaneous configuration

Setting	Default value
Boot logo	Enabled
Clear boot logo	Enabled
Boot logo timeout	00000
Summary screen	Enabled
Summary screen timeout	00000
AC beeper	Enabled
Password	None

Table 67: Miscellaneous configuration default values

1.4.7 Boot order

Setting	Default value
1.	USB floppy disk
2.	USB CD-ROM drive
3.	Hard drive
4.	USB Hard Drive/Flash Drive

Table 68: Boot order default values

1.4.8 Restoring the default BIOS values

In the event that the BIOS settings become incorrectly defined (e.g. USB Keyboard Support disabled, crash during operating system startup) it is possible to automatically restore the default BIOS values by pressing the reset button three times (sequence: press - wait for beep - press - wait for beep - press - wait for beep).

2. Upgrade information

Warning!

The BIOS and firmware on PPC300 systems must be kept up to date. New versions can be downloaded from the B&R homepage (www.br-automation.com).

2.1 BIOS upgrade

An upgrade might be necessary for the following reason:

- To update implemented functions or to add newly implemented functions or components to the BIOS setup (information about changes can be found in the Readme files of the BIOS upgrade).

2.1.1 What information do I need?

Information:

Individually saved BIOS settings are deleted when upgrading the BIOS.

2.1.2 Upgrade procedure

- Download ZIP file from the B&R homepage (**www.br-automation.com**)
- Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".

Information concerning creating a bootable diskette in Windows XP cab be found on page 154.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 156.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 158.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the Automation Panel 900 and reboot the device.
- The following boot menu will be shown after startup:

```
1. Update BIOS => Default nach 5 sec

2. Save BIOS (into directory SAVED)

3. Exit
```

Concerning point 1:
BIOS automatically uses the default CMOS settings after a BIOS update. Any settings that were changed in the BIOS setup must be re-entered after the update!
A BIOS upgrade must not be interrupted.

Concerning point 2:
BIOS is automatically saved in the SAVED directory. It's necessary to have approximately 256 kB of free space on the disk.

Concerning point 3:
Returns to the shell (MS-DOS).

- The system must be rebooted after a successful upgrade.
- Reboot and press "Del" to enter the BIOS setup menu and load the setup defaults, then select "Save Changes and Exit".

Information:

A BIOS upgrade can also be made directly using the B&R Control Center (by directly selecting the BIOS ROM file) on the operating systems Windows XP Embedded and Windows CE.

For more information, please see the B&R Control Center help file.

2.2 Firmware upgrade

- Download ZIP file from the B&R homepage (www.br-automation.com)
- Create bootable media.

Information:

In MS-DOS, Win95 and Win98, a blank HD disk can be made bootable using the command line command "sys a:" or "format a: /s".

Information concerning creating a bootable diskette in Windows XP cab be found on page 154.

Information concerning creating a USB flash drive for a B&R upgrade can be found on page 156.

Information concerning creating a CompactFlash card for a B&R upgrade can be found on page 158.

- Copy the contents of the *.zip file to the bootable media. If the B&R upgrade was already added when the bootable media was created using the B&R Embedded OS Installer, then this step is not necessary.
- Connect the bootable media to the Automation Panel 900 and reboot the device.
- The following boot menu will be shown after startup:

```
1. Upgrade MTCX Firmware FPGA and PX32 (PC3F/PC3P)

2. Exit
```

Concerning point 1:
The MTCX Firmware FPGA and PX32 is automatically updated
(by default, after 5 seconds).
The update procedure must not be interrupted!

Concerning point 2:
Returns to the shell (MS-DOS).

- The system must be rebooted after a successful upgrade.
- Reboot and press "Del" to enter the BIOS setup menu and load the setup defaults, then select "Save Changes and Exit".

Information:

A MTCX upgrade can also be made directly using the B&R Control Center (by directly selecting the BIOS ROM file) on the operating systems Windows XP Embedded and Windows CE.

For more information, please see the B&R Control Center help file.

2.3 User boot logo

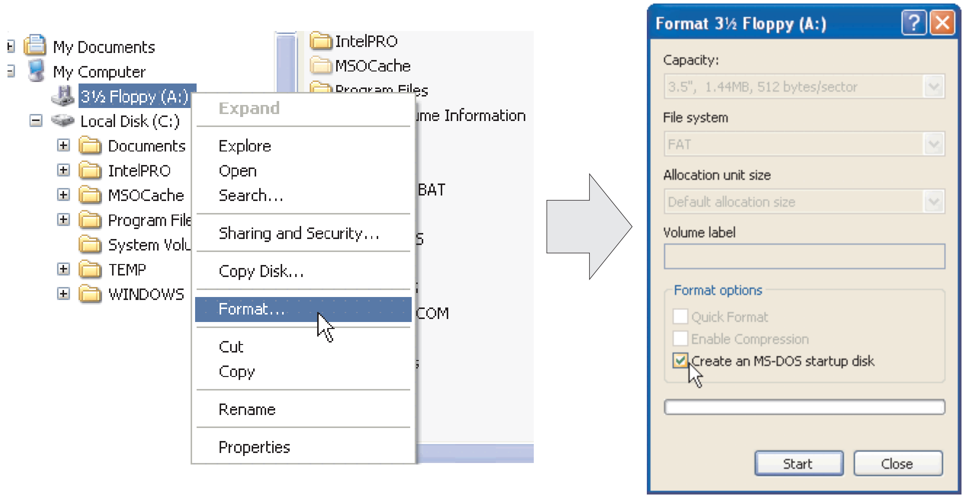
A custom user boot logo (bitmap file) can be transferred to the PPC300. The "B&R User Boot Logo conversion program" is required in order to create the file (available as free download in the service area of the B&R homepage **www.br-automation.com**), which generates a *.rom file from the bitmap file that is then transferred to the PPC300 (e.g. using the B&R Control Center).

2.4 CMOS backup

To protect CMOS data, a CMOS backup has been integrated into BIOS. If the BIOS setup was ended using "Save Values and Exit“ (see section 1.3.14 "Save values and exit", on page 146) and the PPC300 was successfully restarted, then the CMOS data is burned in the flash memory. If the CMOS checksum is incorrect during startup (battery empty) or the PPC300 cannot be booted correctly on three consecutive attempts, then the default BIOS values from flash memory are copied again to CMOS.

2.5 Creating an MS-DOS boot diskette in Windows XP

- Place an empty 1.44 MB HD diskette in the disk drive
- Open Windows Explorer
- Right-click on the 3½" Floppy icon and select "Format...".



Format 3½ Floppy (A:)

Capacity: 3.5", 1.44MB, 512 bytes/sector

File system: FAT

Allocation unit size: Default allocation size

Volume label

Format options

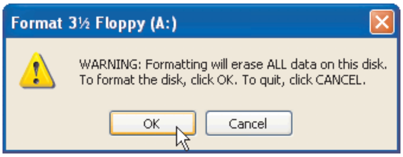
☐ Quick Format

☐ Enable Compression

☑ Create an MS-DOS startup disk

Figure 90: Creating a bootable diskette in Windows XP - step 1

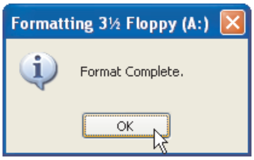
- Then select the checkbox **"Create an MS-DOS startup disk"**, press **"Start"** and acknowledge the warning message with "OK".



Format 3½ Floppy (A:)

WARNING: Formatting will erase ALL data on this disk.
To format the disk, click OK. To quit, click CANCEL.

Figure 91: Creating a bootable diskette in Windows XP - step 2



Formatting 3½ Floppy (A:)

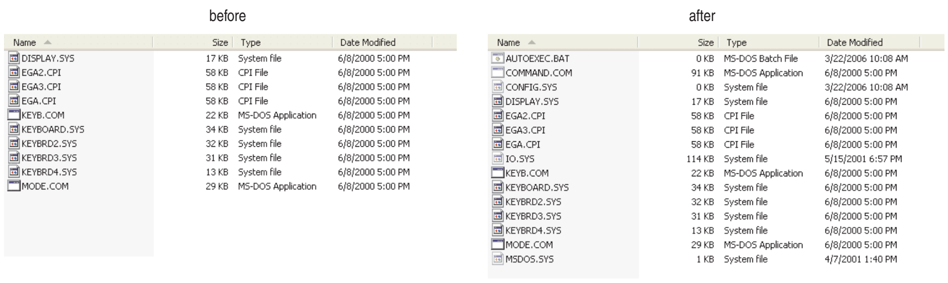
Format Complete.

Figure 92: Creating a bootable diskette in Windows XP - step 3

After creating the startup disk, some of the files must be deleted because of the size of the update.

When doing this, all files (hidden, system files, etc.) must be shown on the diskette.

In the Explorer, go to the "Tools" menu, select "Folder Options..." and open the "View" tab - now deactivate the option "Hide protected operating system files (Recommended)" (activated as default) and activate the option "Show hidden files and folders".



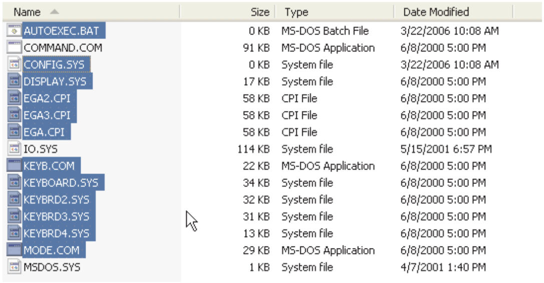
before

Name	Size	Type	Date Modified
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM

after

Name	Size	Type	Date Modified
AUTOEXEC.BAT	0 KB	MS-DOS Batch File	3/22/2006 10:08 AM
COMMAND.COM	91 KB	MS-DOS Application	6/8/2000 5:00 PM
CONFIG.SYS	0 KB	System file	3/22/2006 10:08 AM
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
IO.SYS	114 KB	System file	5/15/2001 6:57 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM
MSDOS.SYS	1 KB	System file	4/7/2001 1:40 PM

Figure 93: Creating a bootable diskette in Windows XP - step 4



Name	Size	Type	Date Modified
AUTOEXEC.BAT	0 KB	MS-DOS Batch File	3/22/2006 10:08 AM
COMMAND.COM	91 KB	MS-DOS Application	6/8/2000 5:00 PM
CONFIG.SYS	0 KB	System file	3/22/2006 10:08 AM
DISPLAY.SYS	17 KB	System file	6/8/2000 5:00 PM
EGA2.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA3.CPI	58 KB	CPI File	6/8/2000 5:00 PM
EGA.CPI	58 KB	CPI File	6/8/2000 5:00 PM
IO.SYS	114 KB	System file	5/15/2001 6:57 PM
KEYB.COM	22 KB	MS-DOS Application	6/8/2000 5:00 PM
KEYBOARD.SYS	34 KB	System file	6/8/2000 5:00 PM
KEYBRD2.SYS	32 KB	System file	6/8/2000 5:00 PM
KEYBRD3.SYS	31 KB	System file	6/8/2000 5:00 PM
KEYBRD4.SYS	13 KB	System file	6/8/2000 5:00 PM
MODE.COM	29 KB	MS-DOS Application	6/8/2000 5:00 PM
MSDOS.SYS	1 KB	System file	4/7/2001 1:40 PM

Figure 94: Creating a bootable diskette in Windows XP - step 5

Now all files (marked) except Command.com, IO.sys and MSDOS.sys can be deleted.

2.6 Creating a bootable USB flash drive for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade BIOS from one of the USB flash drives available from B&R. To do this, the USB flash drive must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (**www.br-automation.com**).

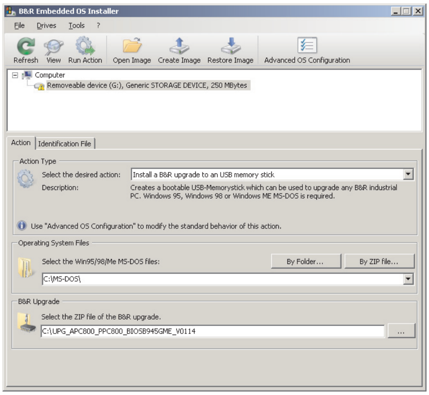
2.6.1 Requirements

The following peripherals are required for creating a bootable USB flash drive:

- B&R USB flash drive
- B&R Industrial PC
- USB Media Drive
- B&R Embedded OS Installer (V3.00 or higher)

2.6.2 Procedure

- Connect the USB flash drive to the PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Mark the desired USB flash drive in the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a USB flash drive** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file...**. If the files are stored in a directory on the hard drive, then click on the button **By folder...**.
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.



Computer
Removeable device (G:), Generic STORAGE DEVICE, 250 MBytes

Select the desired action: Install a B&R upgrade to an USB memory stick

Description: Creates a bootable USB-Memorystick which can be used to upgrade any B&R industrial PC. Windows 95, Windows 98 or Windows ME MS-DOS is required.

Use "Advanced OS Configuration" to modify the standard behavior of this action.

Select the Win95/98/Me MS-DOS files: C:\MS-DOS\

Select the ZIP file of the B&R upgrade. C:\UPG_APC800_PPC800_BIOSB945GME_V0114

Figure 95: Creating a USB flash drive for B&R upgrade files

2.6.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.5 "Creating an MS-DOS boot diskette in Windows XP", on page 154. Then the files from the diskette are to be copied to your hard drive.

2.7 Creating a bootable CompactFlash card for B&R upgrade files

When used in connection with a B&R industrial PC, it is possible to upgrade BIOS from one of the CompactFlash cards available from B&R. To do this, the CompactFlash card must be prepared accordingly. This is done with the B&R Embedded OS Installer, which can be downloaded for free from the B&R homepage (**www.br-automation.com**).

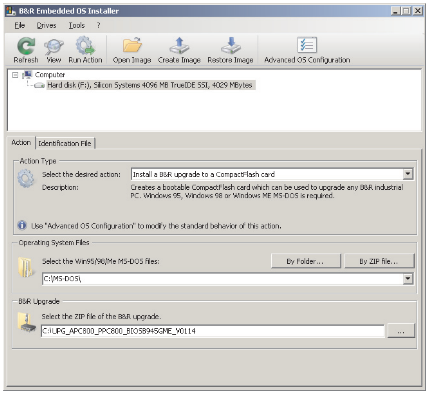
2.7.1 Requirements

The following peripherals are required for creating a bootable CompactFlash card:

- CompactFlash card
- B&R Industrial PC
- B&R Embedded OS Installer (V3.10 or higher)

2.7.2 Procedure

- Insert the CompactFlash card in the CF slot on the industrial PC.
- If the drive list is not refreshed automatically, the list must be updated using the command **Drives > Refresh**.
- Select the desired CompactFlash card from the drive list.
- Change to the **Action** tab and select **Install a B&R Update to a CompactFlash card** as type of action.
- Enter the path to the MS-DOS operating system files. If the files are part of a ZIP archive, then click on the button **By ZIP file...**. If the files are stored in a directory on the hard drive, then click on the button **By folder...**.
- In the **B&R Upgrade** text box, it's also possible to enter the path to the ZIP file for the B&R Upgrade Disk and select the file.
- Click on the **Start action** button in the toolbar.



Computer
Hard disk (F:), Silicon Systems 4096 MB TrueIDE SSI, 4029 MBytes

Select the desired action: Install a B&R upgrade to a CompactFlash card

Description: Creates a bootable CompactFlash card which can be used to upgrade any B&R industrial PC. Windows 95, Windows 98 or Windows ME MS-DOS is required.

Use "Advanced OS Configuration" to modify the standard behavior of this action.

Select the Win95/98/Me MS-DOS files: C:\MS-DOS\

Select the ZIP file of the B&R upgrade. C:\UPG_APC800_PPC800_BIOSB945GME_V0114

Figure 96: Creating a CompactFlash card for B&R upgrade files

2.7.3 Where do I get MS-DOS?

Information concerning creating an MS-DOS boot diskette can be found in section 2.5 "Creating an MS-DOS boot diskette in Windows XP", on page 154. Then the files from the diskette are to be copied to your hard drive.

2.8 Upgrade problems

Potential upgrade problems are listed in the Liesmich.txt or Readme.txt files on the upgrade disks.

3. Panel PC 300 with Windows CE

Figure 97: Windows CE logo

Model number	Short description	Note
5SWWCE.0523-ENG	**WinCE5.0 Pro PPC300 LX800** Microsoft Windows CE 5.0 Professional, English, including license; for PPC300 units 5PC310.L800-00 and 5PC310.L800-01; order CompactFlash separately (at least 128 MB).	
5SWWCE.0623-ENG	**WinCE5.0 ProPlus PPC300 LX800** Microsoft Windows CE 5.0 Professional Plus, English, including license; for PPC300 units 5PC310.L800-00 and 5PC310.L800-01; order CompactFlash separately (at least 128 MB).	
5SWWCE.0823-ENG	**WinCE6.0 Pro PPC300 LX800** Microsoft OEM Windows CE 6.0 Professional, English; for Panel PC 300 BIOS; order CompactFlash separately (at least 128 MB).	

Table 69: Model numbers - Windows CE

3.1 General information

B&R Windows CE is an operating system which is optimally tailored to B&R's devices. It includes only the functions and modules which are required by each device. This makes this operating system extremely robust and stable. A further advantage of B&R Windows CE compared to other operating systems are the low licensing costs.

3.2 Windows CE 5.0 features

Detailed information about Windows CE for B&R devices can be downloaded in the download area on the B&R homepage (www.br-automation.com).

Features	Windows CE 5.0
Supported screen resolutions	VGA (TFT), SVGA (TFT), XGA (TFT)
Color depth	16-bit / 65,536 colors 1)
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX

Table 70: Windows CE 5.0 features

Features	Windows CE 5.0
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 20 seconds
Screen rotation	Desktop can be rotated in 90° steps
Web browser	Internet Explorer 6.0 for Windows CE
.NET	Compact Framework 2.0 SP2
Image size	Pro: approximately 24 MB uncompressed, ProPlus: approximately 25MB uncompressed 2)
Custom keys	Supported
PVI	Supported
Automation Device Interface	Supported
Remote Desktop Protocol for thin clients	Yes
B&R VNC Viewer	Yes
B&R Task Manager	Yes
B&R Picture Viewer	Yes
Compatible with zenOn	Yes
Serial interfaces for any use	1

Table 70: Windows CE 5.0 features

1) The color depth depends on the display used.

2) Use the function *"Compress Windows CE Image"* in the B&R Embedded OS Installer to reduce the image size.

3.3 Windows CE 6.0 features

Detailed information about Windows CE for B&R devices can be downloaded in the download area on the B&R homepage (www.br-automation.com).

Features	Windows CE 6.0
Supported screen resolutions	VGA (TFT), SVGA (TFT), XGA (TFT), SXGA (TFT)
Color depth	Default: 16-bit / 65,536 colors *, can be changed to 32-bit using the B&R Control Center 1)
Graphics card driver	AMD Geode LX graphics card driver with screen rotation without DirectX
Main memory	Automatic detection and use of up to 512 MB RAM
Boot time / Startup time	Approx. 22 seconds
Screen rotation	Desktop can be rotated in 90° steps
Web browser	Internet Explorer 6.0 for Windows CE
.NET	Compact Framework 3.5
Image size	Approx. 29 MB (uncompressed) 2)
Custom keys	Supported
PVI	Supported
Automation Device Interface	Supported

Table 71: Windows CE 6.0 features

Features	Windows CE 6.0
Remote Desktop Protocol for thin clients	Yes
B&R VNC Viewer	Yes
B&R Task Manager	Yes
B&R Picture Viewer	Yes
Compatible with zenOn	Yes
Serial interfaces for any use	1

Table 71: Windows CE 6.0 features

1) The color depth depends on the display used.

2) Use the function *"Compress Windows CE Image"* in the B&R Embedded OS Installer to reduce the image size.

3.4 Differences between Windows CE 6.0 and Windows CE 5.0

- 2 GB of virtual RAM per process (Windows CE 5.0: 32 MB).
- Simultaneous operation of up to 32,000 processes (Windows CE 5.0: 32 processes).

3.5 Requirements

The device must fulfill the following criteria to be able run the Windows CE operating system.

- At least 128 MB main memory.
- At least one 128 MB CompactFlash card (size should be specified when ordered).

3.6 Installation

Windows CE is usually preinstalled at the B&R plant.

3.6.1 B&R Embedded OS Installer

The B&R Embedded OS Installer allows you to install existing B&R Windows CE images. The four files (NK.BIN, BLDR, LOGOXRES.BMP, and LOGOQVGA.BMP) must be provided from an already functioning B&R Windows CE installation.

The B&R Embedded OS Installer can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Further information is available in the online help for the B&R Embedded OS Installer.

4. Panel PC 300 with Windows XP Embedded

Figure 98: Windows XP Embedded Logo

Model number	Short description	Note
5SWWXP.0423-ENG	**WinXPe FP2007 PPC300 LX800** Microsoft Windows XP Embedded English, Feature Pack 2007; for PPC300 units 5PC310.L800-00 and 5PC310.L800-01, order CompactFlash separately (at least 512 MB). Only delivered with a new Panel PC.	

Table 72: Model numbers - Windows XP Embedded

4.1 General information

Windows XP Embedded is the modular version of the desktop operating system Windows XP Professional. Windows XP Embedded is based on the same binary files as Windows XP Professional and is optimally tailored to the hardware being used. In other words, only the functions and modules required by the respective device are included. Windows XP Embedded is also based on the same reliable code as Windows XP Professional. It provides industry with leading reliability, improvements in security and performance, and the latest technology for Web browsing and extensive device support.

4.2 Features with FP2007 (Feature Pack 2007)

The feature list shows the most important device functions in Windows XP Embedded with Feature Pack 2007 (FP2007).

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 6.0 + SP2	✓
Internet information service (IIS)	-

Table 73: Device functions in Windows XP Embedded with FP2007

Function	Present
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player	-
DirectX	-
Accessories	✓
Number of fonts	89

Table 73: Device functions in Windows XP Embedded with FP2007 (Forts.)

4.3 Installation

Upon request, Windows XP Embedded can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 512 MB). The PPC300 system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

Brief instructions for creating your own Windows XP Embedded images or a suitable Target Designer export file for Panel PC 300 can be downloaded from the download area on the B&R homepage (**www.br-automation.com**).

5. Panel PC 300 with Windows Embedded Standard 2009

Figure 99: Windows Embedded Standard 2009 Logo

Model number	Short description	Note
5SWWXP.0723-ENG	**Windows Embedded Standard 2009 PPC300 LX800** Microsoft OEM Windows Embedded, Standard 2009, English; for PPC 300; order CompactFlash separately (at least 1 GB).	

Table 74: Model numbers - Windows Embedded Standard 2009

5.1 General information

Windows XP Embedded Standard 2009 is the modular version of the desktop operating system Windows XP Professional with Service Pack 3. Windows XP Embedded Standard 2009 is based on the same binary files as Windows XP Professional with Service Pack 3 and is optimally tailored to the hardware being used. In other words, only the functions and modules required by the respective device are included. Windows XP Embedded Standard 2009 is also based on the same reliable code as Windows XP Professional with SP3. It provides industry with leading reliability, improvements in security and performance, and the latest technology for Web browsing and extensive device support.

5.2 Features with WES2009 (Windows Embedded Standard 2009)

The feature list shows the most important device functions in Windows Embedded Standard 2009.

Function	Present
Enhanced write filter (EWF)	✓
File Based Write Filter	✓
Page file	Configurable
Administrator account	✓
User account	Configurable
Explorer shell	✓
Registry filter	✓
Internet Explorer 7.0	✓
Internet information service (IIS)	-
Terminal service	✓
Windows Firewall	✓
MSN-Explorer	-
Outlook Express	-
Administrative Tools	✓
Remote Desktop	✓
Remote Assistance	-
.NET Framework	-
ASP.NET	-
Local Network Bridge	✓
Codepages/User Locale/Keyboard	✓
Disk Management Service	✓
Windows Installer Service	✓
Class Installer	✓
CoDevice Installer	✓
Media Player 6.4	✓
DirectX 9.0c	✓
Accessories	✓
Number of fonts	89

Table 75: Device functions in Windows Embedded Standard 2009

5.3 Installation

Upon request, Windows Embedded Standard 2009 can be preinstalled at B&R Austria on a suitable CompactFlash card (min. 1GB). The PPC300 system is then automatically configured after it has been switched on for the first time. This procedure takes approximately 30 minutes, and the device will be rebooted a number of times.

5.4 Drivers

All drivers required for operation are preinstalled on the operating system. If an older driver version is installed, the latest version can be downloaded from the B&R homepage (**www.br-automation.com**) and installed. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

5.4.1 Touch screen driver

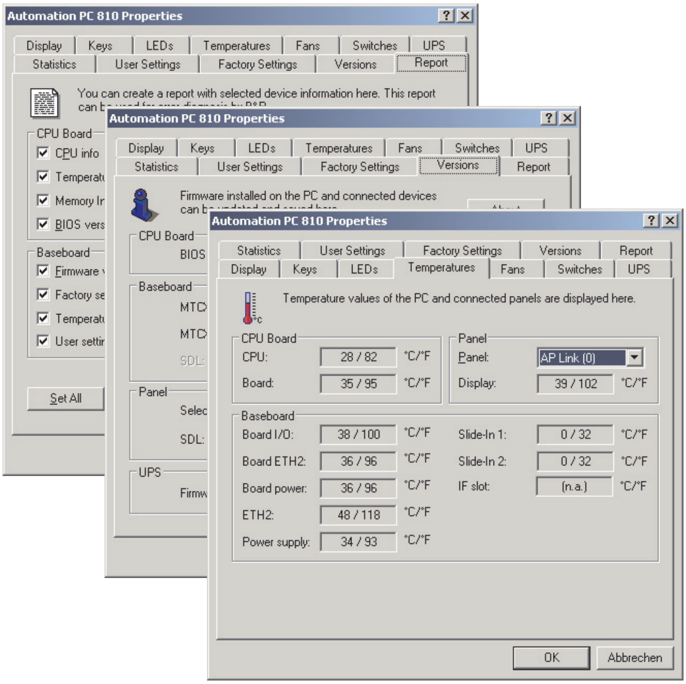
The touch screen driver must be manually installed in order to operate Automation Panel 800 or Automation Panel 900 touch screen devices. The driver can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration.

Information:

Required drivers can only be downloaded from the B&R homepage, not from manufacturers' pages.

6. B&R Automation Device Interface (ADI) - Control Center

The ADI (Automation Device Interface) enables access to specific functions of B&R devices. Settings for this device can be read and edited using the B&R Control Center applet in the control panel.



You can create a report with selected device information here. This report can b

Firmware installed on the PC and connected devices can b

Temperature values of the PC and connected panels are displayed here.

CPU Board

CPU: 28 / 82 °C/°F

Board: 35 / 95 °C/°F

Panel

Panel: AP Link (0)

Display: 39 / 102 °C/°F

Baseboard

Board I/O: 38 / 100 °C/°F

Board ETH2: 36 / 96 °C/°F

Board power: 36 / 96 °C/°F

ETH2: 48 / 118 °C/°F

Power supply: 34 / 93 °C/°F

Slide-In 1: 0 / 32 °C/°F

Slide-In 2: 0 / 32 °C/°F

IF slot: (n.a.) °C/°F

Figure 100: ADI Control Center screenshots - Examples (symbol photo)

Information:

The displayed temperature and voltage values (e.g. CPU temperature, core voltage, battery voltage) on the corresponding ADI page represent uncalibrated information values. These cannot be used to draw any conclusions about any hardware alarms or error conditions. The hardware components used have automatic diagnostics functions that can be applied in the event of error.

6.1 Functions

Information:

The functions provided by the Automation Device Interface (ADI) - Control Center vary according to device series.

- Adjusting the display-specific parameters of connected Panels
- Reading of device-specific keys
- Activation of device specific LEDs on a foil keypad
- Reading temperatures, fan speeds, statistical data, and switch settings
- Reading user settings and factory settings
- Reading software versions
- Updating and securing firmware
- Creating reports about the current system (support assistance)
- Setting the SDL equalizer value for the SDL cable adjustment
- Configuring an optional mounted UPS
- Change the user serial ID.

Supports following systems:

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Panel PC 300
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 300/400 BIOS Geräte
- Power Panel 500
- Mobile Panel BIOS Geräte
- Automation Panel 800 (in connection with Automation PCs and Panel PCs)
- Automation Panel 900 (in connection with Automation PCs and Panel PCs)

6.2 Installation

A detailed description of the Control Center can be found in the integrated online help. The B&R Automation Device Interface (ADI) driver (also contains Control Center) can be downloaded for free from the download area on the B&R homepage (www.br-automation.com).

1. Download and unzip the ZIP archive

2. Close all applications

3. Run BrSetup.exe (e.g. double-click on it in Explorer).

- or -

1. Right click on BrSetup.inf in explorer and select "Install".

Information:

The ADI driver is already included in the B&R images of embedded operating systems.

If a more current ADI driver version exists (see the B&R homepage download area), it can be installed later. A potentially activated "Enhanced Write Filter (EWF)" must be taken into consideration when installing.

Chapter 5 • Standards and certifications

1. Applicable European directives

- EMC directive 2004/108/EG
- Low-voltage directive 2006/95/EG
- Machine directives 98/37/EG beginning 12/29/2009: 2006/42/EG

2. Overview of standards

Standard	Description
EN 55022 Class A	Electromagnetic compatibility (EMC), radio disturbance characteristics, information technology equipment (ITE devices), limits and methods of measurement
EN 60060-1	High-voltage test techniques - part 2: Measuring systems
EN 60068-2-1	Environmental testing - part 2: Tests; test A: Cold
EN 60068-2-2	Environmental testing - part 2: Tests; test B: Dry heat
EN 60068-2-3	Environmental testing - part 2: Tests; test and guidance: Damp heat, constant
EN 60068-2-6	Environmental testing - part 2: Tests; test: Vibration (sinusoidal)
EN 60068-2-14	Environmental testing - part 2: Tests; test N: Change of temperature
EN 60068-2-27	Environmental testing - part 2: Tests; test and guidance: Shock
EN 60068-2-30	Environmental testing - part 2: Tests; test and guidance: Damp heat, cyclic
EN 60068-2-31	Environmental testing - part 2: Tests; test: Drop and topple, primarily for equipment-type specimens
EN 60068-2-32	Environmental testing - part 2: Tests; test: Free fall
EN 60664-1	Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
EN 60721-1	Classification of environmental conditions - part 1: Environmental parameters and their severities
EN 60721-3-2	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 2: Transport
EN 60721-3-3	Classification of environmental conditions - part 3: Classification of groups of environmental parameters and their severities, section 3: Stationary use at weather-protected locations
EN 61000-4-2	Electromagnetic compatibility (EMC) - part 4-2: Testing and measuring techniques; electrostatic discharge immunity test
EN 61000-4-3	Electromagnetic compatibility (EMC) - part 4-3: Testing and measuring techniques; radiated radio-frequency electromagnetic field immunity test

Table 76: Overview of standards

Standard	Description
EN 61000-4-4	Electromagnetic compatibility (EMC) - part 4-4: Testing and measuring techniques; electrical fast transient/burst immunity test
EN 61000-4-5	Electromagnetic compatibility (EMC) - part 4-5: Testing and measuring techniques; surge immunity test
EN 61000-4-6	Electromagnetic compatibility (EMC) - part 4-6: Testing and measuring techniques; immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Electromagnetic compatibility (EMC) - part 4-8: Testing and measuring techniques; power frequency magnetic field immunity test
EN 61000-4-11	Electromagnetic compatibility (EMC) - part 4-11: Testing and measuring techniques; voltage dips, short interruptions and voltage variations immunity tests
EN 61000-4-12	Electromagnetic compatibility (EMC) - part 4-12: Testing and measuring techniques; oscillatory waves immunity test
EN 61000-6-2	Electromagnetic compatibility (EMC), generic immunity standard - part 2: industrial environment
EN 61000-6-4	Electromagnetic compatibility (EMC), generic emission standard - part 2: industrial environment
EN 61131-2 IEC 61131-2	Product standard, programmable logic controllers - part 2: Equipment requirements and tests
EN 61508-2	Functional safety of electrical/electronic/programmable electronic safety-related systems - part 2: Requirements for electrical/electronic/programmable electronic safety-related systems
UL 508	Industrial control equipment (UL = Underwriters Laboratories)
47 CFR	Federal Communications Commission (FCC), 47 CFR Part 15 Subpart B Class A

Table 76: Overview of standards (Forts.)

3. Emission requirements

Emissions	Test carried out according to	Limits according to
Network-related emissions	EN 55022	EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61000-6-4: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		47 CFR Part 15 Subpart B Class A (FCC)
Emissions	EN 55022	EN 55022: Information technology equipment (ITE devices), class A (industrial areas)
		EN 61000-6-4: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
		47 CFR Part 15 Subpart B Class A (FCC)

Table 77: Overview of limits and testing guidelines for emissions

3.1 Network-related emissions

Test carried out according to EN 55022	Limits according to EN 55022 Class A	Limits according to EN 61000-6-4	Limits according to EN 61131-2	Limits according to 47 CFR Part 15 Subpart B class A
Power mains connections [1)] 150 kHz - 500 kHz	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-
Power mains connections 500 kHz - 30 MHz	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-
AC mains connections 150 kHz - 500 kHz	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average	-	79 dB (µV) Quasi-peak value 66 dB (µV) Average
AC mains connections 500 kHz - 30 MHz	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average	-	73 dB (µV) Quasi-peak value 60 dB (µV) Average
Other connections 150 kHz - 500 kHz	97 - 87 dB (µV) und 53 - 43 dB (µA) Quasi-peak value 84 - 74 dB (µV) und 40 - 30 dB (µA) Average	-	Only informative for cable lengths > 10 m 40 - 30 dB (µA) Quasi-peak value 30 - 20 dB (µA) Average	-

Table 78: Test requirements - Network-related emissions for industrial areas

Test carried out according to EN 55022	Limits according to EN 55022 Class A	Limits according to EN 61000-6-4	Limits according to EN 61131-2	Limits according to 47 CFR Part 15 Subpart B class A
Other connections 500 kHz - 30 MHz	87 dB (µV) and 43 dB (µA) Quasi-peak value 74 dB (µV) and 30 dB (µA) average	-	Only informative for cable lengths > 10 m 30 dB (µA) Quasi-peak value 20 dB (µA) Average	-

Table 78: Test requirements - Network-related emissions for industrial areas (Forts.)

1) AC network connections only with EN 61131-2

3.2 Emissions, electromagnetic emissions

Test carried out according to EN 55022	Limits according to EN 55022 Class A	Limits according to EN 61000-6-4	Limits according to EN 61131-2
30 MHz - 230 MHz measured at a distance of 10 m	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value	< 40 dB (µV/m) Quasi-peak value
230 MHz - 1 GHz measured at a distance of 10 m	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value	< 47 dB (µV/m) Quasi-peak value
Test carried out	**Limits according to 47 CFR Part 15 Subpart B class A**		
30 MHz - 88 MHz measured at a distance of 10 m	< 90 dB (µV/m) Quasi-peak value		
88 MHz - 216 MHz measured at a distance of 10 m	< 150 dB (µV/m) Quasi-peak value		
216 MHz - 960 MHz measured at a distance of 10 m	< 210 dB (µV/m) Quasi-peak value		
> 960 MHz measured at a distance of 10 m	< 300 dB (µV/m) Quasi-peak value		

Table 79: : Test requirements - Electromagnetic emissions for industrial areas

4. Requirements for immunity to disturbances

Immunity	Test carried out according to	Limits according to
Electrostatic discharge (ESD)	EN 61000-4-2	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity against high-frequency electromagnetic fields (HF field)	EN 61000-4-3	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to high-speed transient electrical disturbances (burst)	EN 61000-4-4	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to surge voltages	EN 61000-4-5	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to conducted disturbances	EN 61000-4-6	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity against magnetic fields with electrical frequencies	EN 61000-4-8	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to voltage dips, short-term interruptions and voltage fluctuations	EN 61000-4-11	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers
Immunity to damped vibration	EN 61000-4-12	EN 61000-6-2: Generic standard (industrial areas)
		EN 61131-2: Programmable logic controllers

Table 80: Overview of limits and testing guidelines for immunity

Evaluation criteria according to EN 61000-6-2

Criteria A:
The operating equipment must continue to work as intended **during** the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria B:
The operating equipment must continue to work as directed **after** the test. There should be no interference in the operating behavior and no system failures below a minimum operating quality as defined by the manufacturer.

Criteria C:
A temporary function failure is permitted if the function restores itself, or the function can be restored by activating configuration and control elements.

Criteria D:
Impairment or failure of the function, which can no longer be established (operating equipment destroyed).

4.1 Electrostatic discharge (ESD)

Test carried out according to EN 61000-4-2	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
Contact discharge to powder-coated and bare metal housing parts	±4 kV, 10 discharges, criteria B	±4 kV, 10 discharges, criteria B	
Discharge through the air to plastic housing parts	±8 kV, 10 discharges, criteria B	±8 kV, 10 discharges, criteria B	

Table 81: Test requirements - Electrostatic discharge (ESD)

4.2 High-frequency electromagnetic fields (HF field)

Test carried out according to EN 61000-4-3	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
Housing, completely wired	80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	2 GHz - 2.7 GHz, 1 V/m, 1.4 GHz - 2 GHz, 3 V/m, 80 MHz - 1 GHz, 10 V/m, 80% amplitude modulation at 1 kHz, duration 3 seconds, criteria A	

Table 82: Test requirements - High-frequency electromagnetic fields (HF field)

4.3 High-speed transient electrical disturbances (burst)

Test carried out according to EN 61000-4-4	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC power I/O	±2 kV, criteria B	-	
AC power inputs	-	±2 kV, criteria B	
AC power outputs	-	±1 kV, criteria B	
DC power I/O >10 m 1)	±2 kV, criteria B	-	
DC power inputs >10 m	-	±2 kV, criteria B	
DC power outputs >10 m	-	±1 kV, criteria B	
Functional ground connections, signal lines and I/Os >3 m	±1 kV, criteria B	±1 kV, criteria B	
Unshielded AC I/O >3 m	-	±2 kV, criteria B	
Analog I/O	±1 kV, criteria B	±1 kV, criteria B	

Table 83: Test requirements - High-speed transient electrical disturbances (burst)

1) For EN 55024 without length limitation.

4.4 Surges

Test carried out according to EN 61000-4-5	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC power I/O, L to L	±1 kV, criteria B	±1 kV, criteria B	
AC power I/O, L to PE	±2 kV, criteria B	±2 kV, criteria B	
DC power I/O, L+ to L-, >10 m	±0.5 kV, criteria B	-	
DC power I/O, L to PE, >10 m	±0.5 kV, criteria B	-	
DC power inputs, L+ to L-	-	±0.5 kV, criteria B	
DC power inputs, L to PE	-	±1 kV, criteria B	
DC power outputs, L+ to L-	-	±0.5 kV, criteria B	
DC power outputs, L to PE	-	±0.5 kV, criteria B	
Signal connections >30 m	±1 kV, criteria B	±1 kV, criteria B	
All shielded cables	-	±1 kV, criteria B	

Table 84: Test requirements - Surge voltages

4.5 Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	

Table 85: Test requirements - Conducted disturbances

Test carried out according to EN 61000-4-6	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
DC power I/O	150 kHz - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
Functional ground connections	0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	
Signal connections >3 m	0.15 - 80 MHz, 10 V, 80% amplitude modulation with 1 kHz, Length 3 seconds, criteria A	150 kHz - 80 MHz, 3 V, 80% amplitude modulation with 1 kHz, length 3 seconds, criteria A	

Table 85: Test requirements - Conducted disturbances (Forts.)

4.6 Magnetic fields with electrical frequencies

Test carried out according to EN 61000-4-8	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
Test direction x, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	
Test direction y, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	
Test direction z, test in the field of an induction coil 1 m x 1 m	30 A/m, criteria A	30 A/m, criteria A	

Table 86: Test requirements - Magnetic fields with electrical frequencies

4.7 Voltage dips, fluctuations, and short-term interruptions

Test carried out according to EN 61000-4-11	Limits according to EN 61000-6-2	Limits according to EN 61131-2	
AC power inputs	Voltage dip 70% (30% reduction), 0.5 periods, criteria B	-	
AC power inputs	Voltage dip 40% (60% reduction), 5 periods, criteria C	-	
AC power inputs	Voltage dip 40% (60% reduction), 50 periods, criteria C	-	
AC power inputs	Voltage interruptions < 5% (> 95% reduction), 250 periods, criteria C	-	
AC power inputs	-	20 interruptions, 0.5 periods, criteria A	
DC power inputs	-	20 interruptions for 10 ms < UN - 15%, criteria A	

Table 87: Test requirements - Voltage dips, fluctuations, and short-term interruptions

4.8 Damped vibration

Test carried out according to EN 61000-4-12	Limits according to EN 61131-2		
Power I/O, L to L	±1 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		
Power I/O, L to PE	±2.5 kV, 1 MHz, repeat rate 400/seconds, length 2 seconds, connection lengths 2 m, criteria B		

Table 88: Test requirements - Damped vibration

5. Mechanical conditions

Vibration	Test carried out according to	Limits according to
Vibration operation	EN 60068-2-6	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Vibration during transport (packaged)	EN 60068-2-6	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Shock during operation	EN 60068-2-27	EN 61131-2: Programmable logic controllers
		EN 60721-3-3 class 3M4
Shock during transport (packaged)	EN 60068-2-27	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Toppling (packaged)	EN 60068-2-31	EN 60721-3-2 class 2M1
		EN 60721-3-2 class 2M2
		EN 60721-3-2 class 2M3
Free fall (packaged)	EN 60068-2-32	EN 61131-2: Programmable logic controllers

Table 89: Overview of limits and testing guidelines for vibration

5.1 Vibration operation

Test carried out according to EN 60068-2-6	Limits according to EN 61131-2		Limits according to EN 60721-3-3 class 3M4		
Vibration during operation: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z), 1 octave per minute	10 sweeps for each axis		10 sweeps for each axis		
	Frequency	**Limit value**	**Frequency**	**Limit value**	
	5 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3 mm	
	9 - 150 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	

Table 90: Test requirements - Vibration during operation

5.2 Vibration during transport (packaged)

Test carried out according to EN 60068-2-6	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Vibration during transport: Uninterrupted duty with moveable frequency in all 3 axes (x, y, z)	10 sweeps for each axis, packaged		10 sweeps for each axis, packaged		10 sweeps for each axis, packaged	
	Frequency	**Limit value**	**Frequency**	**Limit value**	**Frequency**	**Limit value**
	2 - 9 Hz	Amplitude 3.5 mm	2 - 9 Hz	Amplitude 3.5 mm	2 - 8 Hz	Amplitude 7.5 mm
	9 - 200 Hz	Acceleration 1 g	9 - 200 Hz	Acceleration 1 g	8 - 200 Hz	Acceleration 2 g
	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 1.5 g	200 - 500 Hz	Acceleration 4 g

Table 91: Test requirements - Vibration during transport (packaged)

5.3 Shock during operation

Test carried out according to EN 60068-2-27	Limits according to EN 61131-2	Limits according to EN 60721-3-3 class 3M4	
Shock during operation: Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 15 g, length 11 ms, 18 shocks	Acceleration 15 g, length 11 ms	

Table 92: Test requirements - Shock during operation

5.4 Shock during transport (packaged)

Test carried out according to EN 60068-2-27	Limits according to EN 60721-3-2 class 2M1	Limits according to EN 60721-3-2 class 2M2	Limits according to EN 60721-3-2 class 2M3
Pulse (half-sine) stress in all 3 axes (x, y, z)	Acceleration 10 g, Length 11 ms, each 3 shocks, packaged	Acceleration 30 g, Length 6 ms, each 3 shocks, packaged	Acceleration 100 g, Length 6 ms, each 3 shocks, packaged

Table 93: Test requirements - Shock during transport

5.5 Toppling

Test carried out according to EN 60068-2-31	Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Drop and topple	Devices: Drop/topple on each edge		Devices: Drop/topple on each edge		Devices: Drop/topple on each edge	
	Weight	**Required**	**Weight**	**Required**	**Weight**	**Required**
	<20 kg	Yes	<20 kg	Yes	<20 kg	Yes
	20 - 100 kg	-	20 - 100 kg	Yes	20 - 100 kg	Yes
	>100 kg	-	>100 kg	-	>100 kg	Yes

Table 94: Test requirements - Toppling

5.6 Free fall (packaged)

Test carried out according to EN 60068-2-32	Limits according to EN 61131-2		Limits according to EN 60721-3-2 class 2M1		Limits according to EN 60721-3-2 class 2M2		Limits according to EN 60721-3-2 class 2M3	
Free fall	Devices with delivery packaging each with 5 fall tests		Devices packaged		Devices packaged		Devices packaged	
	Weight	**Height**	**Weight**	**Height**	**Weight**	**Height**	**Weight**	**Height**
	<10 kg	1.0 m	<20 kg	0.25 m	<20 kg	1.2 m	<20 kg	1.5 m
	10 - 40 kg	0.5 m	20 - 100 kg	0.25 m	20 - 100 kg	1.0 m	20 - 100 kg	1.2 m
	>40 kg	0.25 m	>100 kg	0.1 m	>100 kg	0.25 m	>100 kg	0.5 m
	Devices with product packaging each with 5 fall tests							
	Weight	**Height**						
	<10 kg	0.3 m						
	10 - 40 kg	0.3 m						
	>40 kg	0.25 m						

Table 95: Test requirements - Toppling

6. Climate conditions

Temperature / humidity	Test carried out according to	Limits according to
Worst case operation	UL 508	UL 508: Industrial control equipment EN 61131-2: Programmable logic controllers
Dry heat	EN 60068-2-2	EN 61131-2: Programmable logic controllers
Dry cold	EN 60068-2-1	EN 61131-2: Programmable logic controllers
Large temperature fluctuations	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Temperature fluctuations in operation	EN 60068-2-14	EN 61131-2: Programmable logic controllers
Humid heat, cyclic	EN 60068-2-30	EN 61131-2: Programmable logic controllers
Humid heat, constant (storage)	EN 60068-2-3	EN 61131-2: Programmable logic controllers

Table 96: Overview of limits and testing guidelines for temperature and humidity

6.1 Worst case operation

Test carried out according to UL 508	Limits according to UL 508	Limits according to EN 61131-2	
Worst case during operation. Operation of the device with the max. ambient temperature specified in the data sheet at the max. specified load	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	3 hours at max. ambient temperature (min. +40°C) duration approx. 5 hours	

Table 97: Test requirements - Worst case during operation

6.2 Dry heat

Test carried out according to EN 60068-2-2	Limits according to EN 61131-2		
Dry heat	16 hours at +70°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 98: Test requirements - Dry heat

6.3 Dry cold

Test carried out according to EN 60068-2-1	Limits according to EN 61131-2		
Dry cold	16 hours at -40°C for 1 cycle, then 1 hour acclimatization and function testing, duration approximately 17 hours		

Table 99: Test requirements - Dry cold

6.4 Large temperature fluctuations

Test carried out according to EN 60068-2-14	Limits according to EN 61131-2		
Large temperature fluctuations	3 hours at -40° C and 3 hours at +70°C, 5 cycles, then 2 hours acclimatization and function testing, duration approximately 14 hours		

Table 100: Test requirements - Large temperature fluctuations

6.5 Temperature fluctuations in operation

Test carried out according to EN 60068-2-14	Limits according to EN 61131-2		
Open devices: These can also have a housing and are installed in switching cabinets	3 hours at +5° C and 3 hours at 55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		
Closed devices: These are devices whose data sheet specifies a surrounding housing (enclosure) with the corresponding safety precautions	3 hours at +5°C and 3 hours at +55°C, 5 cycles, temperature gradient 3°C / min, the unit is occasionally supplied with voltage during testing, duration approximately 30 hours		

Table 101: Test requirements - Temperature fluctuations during operation

6.6 Humid heat, cyclic

Test carried out according to EN 60068-2-30	Limits according to EN 61131-2		
Alternating climate	24 hours at +25°C / +55°C and 97% / 83% RH, 2 cycles, then 2 hours acclimatization, function testing and insulation, duration approximately 50 hours		

Table 102: Test requirements - Humid heat, cyclic

6.7 Humid heat, constant (storage)

Test carried out according to EN 60068-2-3	Limits according to EN 61131-2		
Humid heat, constant (storage)	48 hours at +40°C and 92.5% RH, then insulation test within 3 hours, duration approximately 49 hours		

Table 103: Test requirements - Humid heat, constant (storage)

7. Safety

Safety	Test carried out according to	Limits according to
Ground resistance	EN 61131-2	EN 61131-2: Programmable logic controllers
High voltage	EN 60060-1	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Residual voltage	EN 61131-2	EN 61131-2: Programmable logic controllers
Leakage current		VDE 0701-1: Service, changes and testing of electrical devices
Overload	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Simulation component defect	UL 508	EN 61131-2: Programmable logic controllers
		UL 508: Industrial control equipment
Voltage range		EN 61131-2: Programmable logic controllers

Table 104: Overview of limits and testing guidelines for safety

7.1 Ground resistance

Test carried out according to EN 61131-2	Limits according to EN 61131-2		
Ground resistance: housing (from any metal part to the ground terminal)	Test current 30 A for 2 min, < 0.1 Ω		

Table 105: Test requirements - Ground resistance

7.2 High voltage

Test carried out according to EN 60060-1	Limits according to EN 61131-2[1]				Limits according to UL 508		
High voltage: Primary circuit to secondary circuit and to protective ground circuit (transformers, coils, varistors, capacitors and components used to protect against over-voltage can be removed before the test)	Input voltage	Test voltage			Input voltage	Test voltage	
		1.2/50 µs voltage surge peak	**AC, 1 min**	**DC, 1 min**		**AC, 1 min**	**DC, 1 min**
	0 - 50 VAC 0 - 60 VDC	850 V	510 V	720 V	≤ 50 V	500 V	707 V
	50 - 100 VAC 60 - 100 VDC	1360 V	740 V	1050 V	> 50 V	1000 V + 2 x U_N	(1000 V + 2 x U_N) x 1.414
	100 - 150 VAC 100 - 150 VDC	2550 V	1400 V	1950 V			
	150 - 300 VAC 150 - 300 VDC	4250 V	2300 V	3250 V			
	300 - 600 VAC 300 - 600 VDC	6800 V	3700 V	5250 V			
	600 - 1000 VAC 600 - 1000 VDC	10200 V	5550 V	7850 V			

Table 106: Test requirements - High voltage

[1] See EN 61131-2:2003 page 104, table 59.

7.3 Residual voltage

Test carried out according to EN 61131-2	Limits according to EN 61131-2		
Residual voltage after switching off	< 60 V after 5 sec (active parts) < 60 V after 1 sec (plug pins)		

Table 107: Test requirements - Residual voltage

7.4 Leakage current

Test carried out	Limits according to VDE 0701-1		
Leakage current: Phase to ground	< 3.5 mA		

Table 108: Test requirements - Leakage current

7.5 Overload

Test carried out according to UL 508	Limits according to EN 61131-2	Limits according to UL 508	
Overload of transistor outputs	50 switches, 1.5 I_N, 1 sec on / 9 sec off	50 switches, 1.5 I_N, 1 sec on / 9 sec off	

Table 109: Test requirements - Overload

7.6 Defective component

Test carried out according to UL 508	Limits according to EN 61131-2	Limits according to UL 508	
Simulation of how components in power supply became defective	Non-flammable surrounding cloth No contact with conductive parts	Non-flammable surrounding cloth No contact with conductive parts	

Table 110: Test requirements - Defective component

7.7 Voltage range

Test carried out according to	Limits according to EN 61131-2			
Supply voltage	Measurement value	Tolerance min/max		
	24 VDC 48 VDC 125 VDC	-15% +20%		
	24 VAC 48 VAC 100 VAC 110 VAC 120 VAC 200 VAC 230 VAC 240 VAC 400 VAC	-15% +10%		

Table 111: Test requirements - Voltage range

8. Other tests

Other tests	Test carried out according to	Limits according to
Protection type	-	EN 60529: Degrees of protection provided by enclosures (IP code)
Degree of pollution	-	EN 60664-1: Insulation coordination for equipment within low-voltage systems - part 1: Principles, requirements and tests
Mounting dimensions	-	B&R

Table 112: Overview of limits and testing guidelines for other tests

8.1 Protection type

Test carried out according to	Limits according to EN 60529		
Protection of the operating equipment	IP.6 Protection against large solid foreign bodies: Dust-proof		
Protection of personnel	IP.6 Protection against touching dangerous parts with conductor		
Protection against water permeation with damaging consequences	IP.5 Protected against sprayed water		

Table 113: Test requirements - Protection

8.2 Degree of pollution

Test carried out according to	Limits according to EN 60664-1		
Definition	Degree of pollution II		

Table 114: Test requirements - Degree of pollution

9. International certifications

B&R products and services comply with applicable standards. They 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 give special consideration to the reliability of our products in an industrial environment.

Certifications	
USA and Canada	All important B&R products are tested and listed by Underwriters Laboratories and checked quarterly by a UL inspector. This mark is valid for the USA and Canada and simplifies certification of your machines and systems in these areas.
Europe	All harmonized EN standards for the applicable directives are met.

Table 115: International Certifications

Chapter 6 • Accessories

1. Overview

Model number	Product ID	Note
0TB103.9	**Plug 24V 5.08 3-pin screw clamps** 24 VDC 3-pin connector, female. Screw clamps, 2.5 mm², protected against vibration by the screw flange	
0TB103.91	**Plug 24V 5.08 3-pin cage clamps** 24 VDC 3-pin connector, female. Cage clamps, 2.5 mm², protected against vibration by the screw flange	
0AC201.91	**Lithium batteries, 4 pcs**. Lithium batteries, 4 pcs., 3 V / 950 mAh, button cell	
4A0006.00-000	**Lithium battery, 1 pc.** Lithium battery, 1 pc., 3 V / 950 mAh, button cell	
5AC900.104X-03	**Legend strip template 10.4"** for Automation Panel 5AP951.1043-01 and 5A981.1043-01, for 1 device.	
5AC900.104X-04	**Legend strip template 10.4"** for Automation Panel 5AP952.1043-01 and 5A982.1043-01, for 1 device.	
5AC900.104X-05	**Legend strip template 10.4"** for Automation Panel 5AP980.1043-01, for 3 devices.	
5AC900.150X-01	**Legend strip template 15"** for Automation Panel 5AP951.1505-01, 5AP980.1505-01 and 5A981.1505-01, for 4 devices.	
5AC900.1200-00	**USB port cap (attached)** Front side USB interface cover (attached) for Automation Panel 900 and Panel PC 700 devices.	
5MMUSB.2048-00	**USB flash drive 2 GB SanDisk** USB 2.0 flash drive 2 GB	
5MMUSB.2048-01	**USB flash drive 2 GB B&R** USB 2.0 flash drive 2 GB	
5MD900.USB2-01	**USB 2.0 drive DVD-RW/CD-RW FDD CF USB** USB 2.0 drive combination, consists of DVD-R/RW DVD+R/RW, FDD, CompactFlash slot (type II), USB connection (type A front, type B back); 24V DC; (Order 0TB103.9 screw clamp or 0TB103.91 cage clamps separately).	
5CFCRD.0512-04	**CompactFlash 512 MB B&R** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-04	**CompactFlash 1024 MB B&R** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-04	**CompactFlash 2048 MB B&R** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-04	**CompactFlash 4096 MB B&R** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	

Table 116: Model numbers - Accessories

Model number	Product ID	Note
5CFCRD.8192-04	**CompactFlash 8192 MB B&R** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.016G-04	**CompactFlash 16 GB B&R** CompactFlash card with 16 GB SLC NAND flash and IDE/ATA interface.	
5CFCRD.0064-03	**CompactFlash 64 MB SSI** CompactFlash card with 64 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0128-03	**CompactFlash 128 MB SSI** CompactFlash card with 128 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0256-03	**CompactFlash 256 MB SSI** CompactFlash card with 256 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.0512-03	**CompactFlash 512 MB SSI** CompactFlash card with 512 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.1024-03	**CompactFlash 1024 MB SSI** CompactFlash card with 1024 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.2048-03	**CompactFlash 2048 MB SSI** CompactFlash card with 2048 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.4096-03	**CompactFlash 4096 MB SSI** CompactFlash card with 4096 MB SLC NAND flash and IDE/ATA interface	
5CFCRD.8192-03	**CompactFlash 8192 MB SSI** CompactFlash card with 8192 MB SLC NAND flash and IDE/ATA interface	
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 116: Model numbers - Accessories (Forts.)

2. TB103 3-pin supply voltage connector

2.1 General information

This single row 3-pin terminal block is mainly used to connect the supply voltage.

2.2 Order data

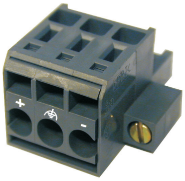
Model number	Description	Figure
0TB103.9	Plug for the 24 V supply voltage (screw clamps)	 0TB103.9  0TB103.91
0TB103.91	Plug for the 24 V supply voltage (cage clamps)	

Table 117: Order data - TB103

2.3 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Name	0TB103.9	0TB103.91
Number of pins	3	
Type of terminal	Screw clamps	Cage clamps
Distance between contacts	5.08 mm	
Resistance between contacts	≤ 5 mΩ	
Nominal voltage according to VDE / UL,CSA	250 V / 300 V	
Current load according to VDE / UL,CSA	14.5 A / 10 A per contact	
Terminal size	0.08 mm^2 - 3.31 mm^2	
Cable type	Copper wires only (no aluminum wires!)	

Table 118: Technical data - TB103 supply plug

3. Replacement CMOS batteries

The lithium battery is needed for buffering the BIOS CMOS data and real-time clock.

3.1 Order data

Model number	Description	Figure
0AC201.91	Lithium batteries, 4 pcs., 3 V / 950 mAh button cell	
4A0006.00-000	Lithium battery, 1 piece, 3 V / 950 mAh button cell	

Table 119: Order data - Lithium batteries

3.2 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	0AC201.91	4A0006.00-000
Capacity	950 mAh	
Voltage	3 V	
Self discharge at 23°C	< 1% per year	
Storage time	Max. 3 years at 30°C	
Environmental characteristics		
Storage temperature	-20 to +60°C	
Relative humidity	0 to 95%, non-condensing	

Table 120: Technical data - Lithium batteries

4. Legend strip templates

Automation Panel devices with keys are delivered with partially pre-labeled key legend strips (F1, F2, etc.). The key legend strip slots are accessible on the back of the Automation Panel device (above and below).

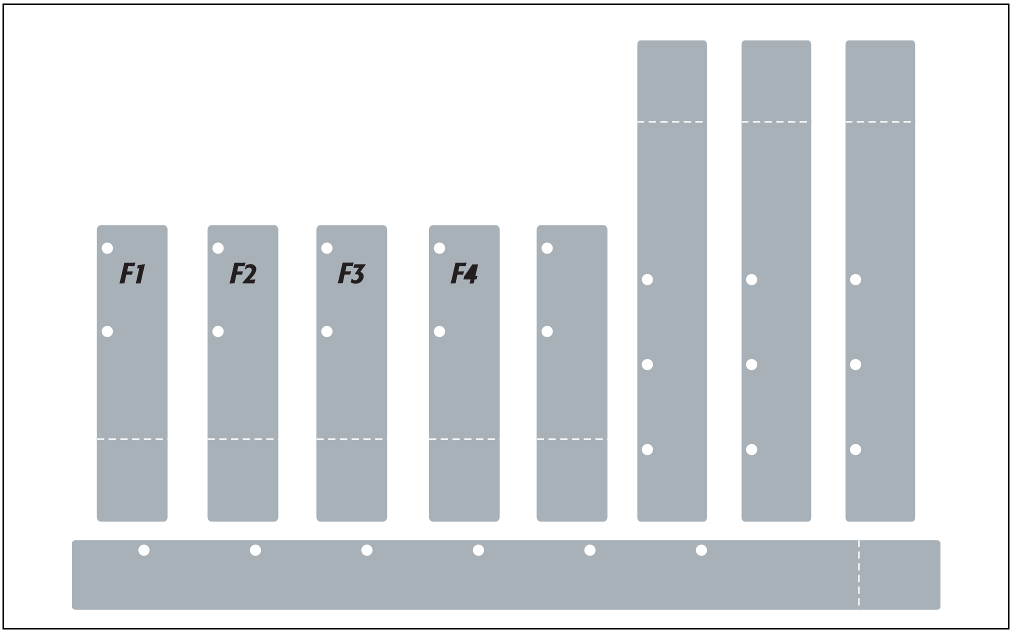


Figure 101: Legend strip templates

Printable legend strips (A4 format) can be ordered from B&R (see table 10 "Model numbers - Accessories", on page 21). They can be printed using a standard laser printer (b/w or color) in a temperature range from -40°C to +125°C. A print template (available for Corel Draw version 7, 9 and 10) for the respective legend strip template can be downloaded from the B&R homepage (**www.br-automation.com**). The print templates can also be found on the HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

4.1 Order data

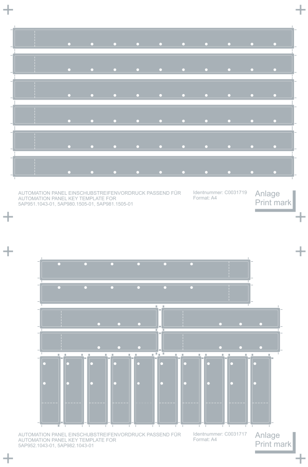
Model number	Description	Figure
5AC900.104X-03	**Legend strip template 10.4"** Legend strip templates for Automation Panels 5AP951.1043-01 and 5A981.1043-01. For 1 device.	Examples of legend strip templates  AUTOMATION PANEL EINSCHUBSTREIFENVORDRUCK PASSEND FÜR AUTOMATION PANEL KEY TEMPLATE FOR 5AP951.1043-01, 5AP980.1505-01, 5AP981.1505-01 Identnummer: C0031719 Format: A4 Anlage Print mark AUTOMATION PANEL EINSCHUBSTREIFENVORDRUCK PASSEND FÜR AUTOMATION PANEL KEY TEMPLATE FOR 5AP952.1043-01, 5AP982.1043-01 Identnummer: C0031717 Format: A4 Anlage Print mark
5AC900.104X-04	**Legend strip template 10.4"** Legend strip templates for Automation Panels 5AP952.1043-01 and 5A982.1043-01. For 1 device.	
5AC900.104X-05	**Legend strip template 10.4"** Legend strip templates for Automation Panel 5AP980.1043-01. For 3 devices.	
5AC900.150X-01	**Legend strip template 15"** Legend strip templates for Automation Panels 5AP951.1505-01, 5AP980.1505-01 and 5A981.1505-01. For 4 devices.	

Table 121: Order data - Legend strip templates

5. USB port cap (attached)

Front side USB interface cover (attached) for Automation Panel 900 and Panel PC 700 devices.

5.1 Order data

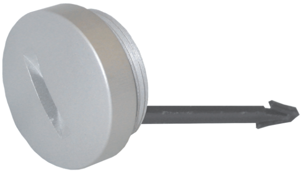
Model number	Description	Figure
5AC900.1200-00	**USB port cap (attached)** Front side USB interface cover (attached) for Automation Panel 900 and Panel PC 700 devices.	

Table 122: Order data - USB port cap (attached)

5.2 Installation

- Remove old cover.
- Feed the USB interface cover through the small opening (see red markings).

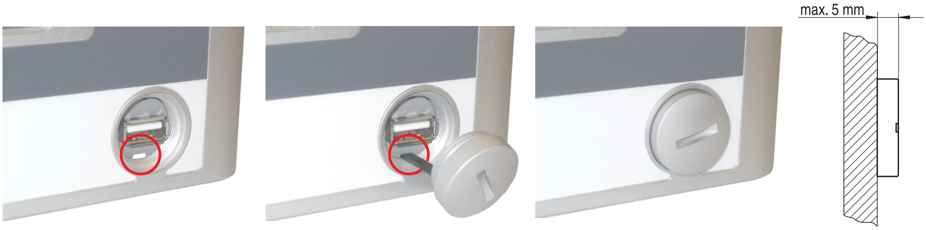


Figure 102: Front side USB interface cover - installation

- With the cover screwed on, the front side of the display is raised a maximum of 5 mm.

6. USB flash drive

Information:

We reserve the right to supply alternative products due to the vast quantity of flash drives available on the market and their corresponding short product lifecycle. Therefore, the following measures might be necessary in order to boot from these flash drives (e.g. the SanDisk Cruzer Micro flash drive with 2 GB):

- **The flash drive must be reformatted or in some cases even re-partitioned (set active partition).**
- **The flash drive must be at the top of the BIOS boot order, or alternatively the IDE controllers can also be deactivated in the BIOS. This can be avoided in most cases if a "`fdisk /mbr`" command is also executed on the USB flash drive.**

6.1 General information

USB flash drives are easy-to-exchange storage media. Because of the fast data transfer (USB 2.0), the USB flash drives are ideal for use as a portable memory medium. Without requiring additional drivers ("Hot Plug & Play" - except with Windows 98SE), the USB flash drive can be converted immediately into an additional drive where data can be read or written. Only USB flash drives from the memory specialists SanDisk are used.

6.2 Order data

Model number	Description	Figure
5MMUSB.2048-00	USB flash drive 2 GB SanDisk Cruzer Micro	
5MMUSB.2048-01	USB flash drive 2 GB B&R	

Table 123: Order data - USB flash drives

6.3 Technical data - 5MMUSB.2048-00

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	5MMUSB.2048-00
LED	1 LED (green), signals data transfer (send and receive)
Power supply Current requirements	Via the USB port 650 µA in sleep mode, 150 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 MBit (high speed) Max. 8.7 MB/second Max. 1.7 MB/second To each USB type A interface
MTBF (at 25°C)	100,000 hours
Data retention	10 years
Maintenance	None
Operating system support	Windows CE 5.0 and Windows XP Embedded
Mechanical characteristics	
Dimensions Length Width Thickness	 52.2 mm 19 mm 7.9 mm
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 0 to +45°C -20 to +60°C -20 to +60°C
Relative humidity Operation Bearings Transport	 10 to 90%, non-condensing 5 to 90%, non-condensing 5 to 90%, non-condensing
Vibration Operation Bearings Transport	 2 g (10 to 500 Hz), oscillation rate 1/minute 4 g (10 to 500 Hz), oscillation rate 1/minute 4 g (10 to 500 Hz), oscillation rate 1/minute
Shock Operation Bearings Transport	 40 g and 11 ms duration (all axes) 80 g and 11 ms duration (all axes) 80 g and 11 ms duration (all axes)

Table 124: Technical data - USB flash drive 5MMUSB.2048-00

Environmental characteristics	5MMUSB.2048-00
Altitude	
Operation	3,048 meters
Bearings	12,192 meters
Transport	12,192 meters

Table 124: Technical data - USB flash drive 5MMUSB.2048-00 (Forts.)

6.3.1 Temperature humidity diagram - Operation and storage

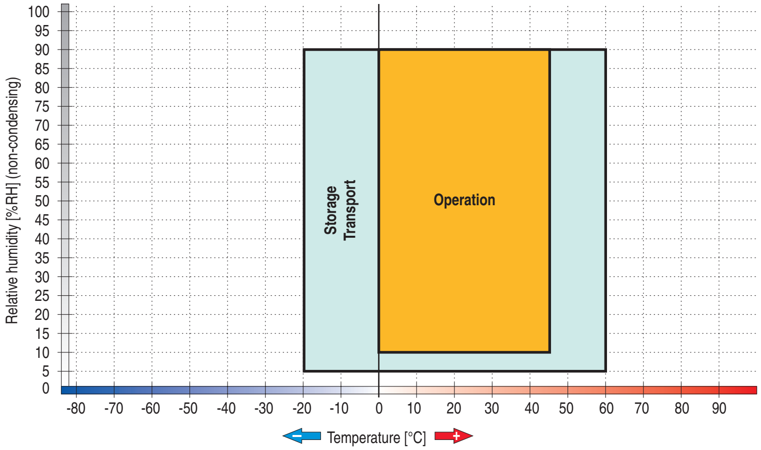


Figure 103: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-00

6.4 Technical data - 5MMUSB.2048-01

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	5MMUSB.2048-01
LED	1 LED (green), signals data transfer (send and receive)
Power supply Current requirements	Via the USB port max. 500 µA sleep mode, max. 120 mA read/write
Interface Type Transfer rate Sequential reading Sequential writing Connection	USB specification 2.0 high speed device, mass storage class, USB-IF and WHQL certified USB 1.1 and 2.0 compatible Up to 480 MBit (high speed) Max. 31 MB/second Max. 30 MB/second To each USB type A interface
MTBF	> 3,000,000 hours
Data retention	> 10 years
Maintenance	None
Operating system support	Windows CE, ME, 2000, XP, Vista und Mac OS 9 or newer, Linux 2.4 or newer
Mechanical characteristics	
Dimensions Length Width Thickness	 67.85 mm 17.97 mm 8.35 mm
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 0 to +70°C -50 to +100°C -50 to +100°C
Relative humidity Operation Bearings Transport	 85%, non-condensing 85%, non-condensing 85%, non-condensing
Vibration Operation Bearings Transport	 At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak) At 20 - 2000 Hz: 20 g (peak)
Shock Operation Bearings Transport	 max. 1500 g (peak) max. 1500 g (peak) max. 1500 g (peak)

Table 125: Technical data - USB flash drive 5MMUSB.2048-01

Environmental characteristics	5MMUSB.2048-01
Altitude Operation Bearings Transport	 3,048 meters 12,192 meters 12,192 meters

Table 125: Technical data - USB flash drive 5MMUSB.2048-01 (Forts.)

6.4.1 Temperature humidity diagram

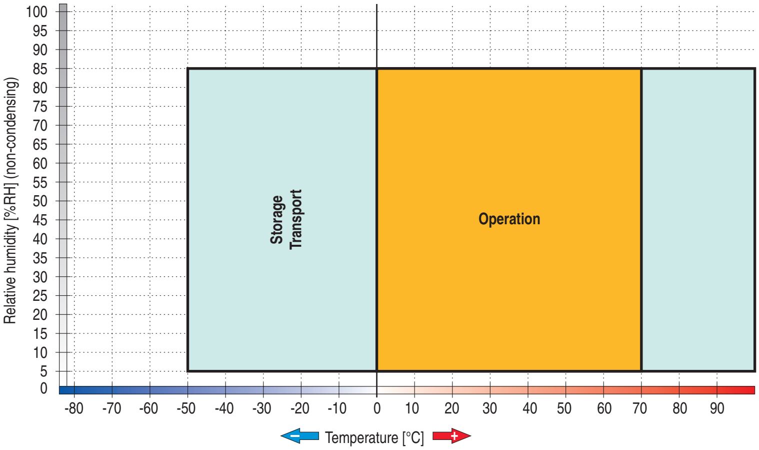


Figure 104: Temperature humidity diagram - USB flash drive - 5MMUSB.2048-01

7. USB Media Drive - 5MD900.USB2-01

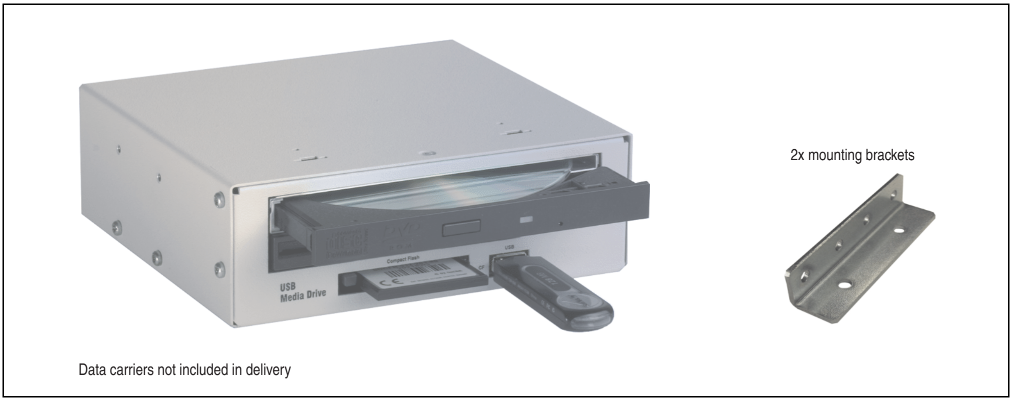


Figure 105: USB Media Drive - 5MD900.USB2-01

7.1 Features

- Desk-top or rack-mount operation (mounting rail brackets)
- Integrated USB diskette drive
- Integrated DVD-RW/CD-RW drive
- Integrated CompactFlash slot IDE/ATAPI (Hot Plug capable)
- Integrated USB 2.0 connection (up to 480 MBit high speed)
- +24 VDC supply (back side)
- USB/B 2.0 connection (back side)
- Optional front cover (see also section 7.8 "Front cover 5A5003.03 for the USB Media Drive", on page 210)

7.2 Technical data

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features - entire device	**5MD900.USB2-01**
Transfer rate	Low speed (1.5 Mbit/s), Full Speed (12 Mbit/s) to high speed (480 Mbit/s)
Maximum cable length	5 m (not including hub)
Power supply Rated voltage	 24 VDC ±25%
Features - diskette drive	
Data capacity	720 KB / 1.25 MB / 1.44 MB (formatted)
Data transfer rate	250 kbit/s (720 KB) or 500 kbit/s (1.25 MB and 1.44 MB)
Rotation speed	Up to 360 rpm
Diskette media	High density (2HD) or normal density (2DD) 3.5" diskettes
MTBF	30,000 POH (Power-On Hours)
Features - DVD-RW/CD-RW drive	
Write speed CD-R CD-RW DVD-R DVD-RW DVD-RAM[1)] DVD+R DVD+R (double layer) DVD+RW	 24x, 16x, 10x and 4x 10x and 4x 8x, 4x and 2x 4x and 2x 3x and 2x 8x, 4x and 2x 2x,4x 4x and 2x
Reading rate CD DVD	 24x 8x
Data transfer rate	Max. 33.3 MB/s
Access time (average) CD / DVD	 130 ms (24x) / 130 ms (8x)
Revolution speed	Max. 5090 rpm ±1%
Starting time (0 rpm to read access) CD DVD	 14 seconds (maximum) 15 seconds (maximum)
Host interface	IDE (ATAPI)
Readable media CD DVD	 CD/CD-ROM (12 cm, 8 cm), CD-R, CD-RW DVD-ROM, DVD-R, DVD-RW. DVD-RAM, DVD+R, DVD+R (double layer), DVD+RW

Table 126: Technical data - USB Media Drive 5MD900.USB2-01

Features - DVD-RW/CD-RW drive	**5MD900.USB2-01**
Non-write protected media CD DVD	 CD-R, CD-RW DVD-R/RW, DVD-RAM (4.7 GB), DVD+R/RW, DVD+R (double layer)
Compatible formats	CD-DA, CD-ROM mode 1/mode 2 CD-ROM XA mode 2 (form 1, form 2) Photo CD (single/multi-session), Enhanced CD, CD text DVD-ROM, DVD-R, DVD-RW, DVD-Video DVD-RAM (4.7 GB, 2.6 GB) DVD+R, DVD+R (double layer), DVD+RW
Write-methods CD DVD	 Disk at once, session at once, packet write, track at once Disk at once, incremental, over-write, sequential, multi-session
Laser class	Class 1 laser
Data buffer capacity	8 MB
Noise level (complete read access)	Approx. 48 dBA at 50 cm
Lifespan Opening/closing the drawer	60,000 POH (Power-On Hours) > 10,000 times
CompactFlash slot layout	
CompactFlash Type Amount Connection	 Type I 1 slot IDE/ATAPI
CompactFlash LED	Signals read or write access to an inserted CompactFlash card
Hot Plug capable	Yes
Features - USB connections	
USB A on the front side Power supply Type Transfer rate	Connection of further peripheral devices Max. 500 mA 2.0 Low speed (1.5 Mbit/s), full speed (12 Mbit/s), to high speed (480 Mbit/s)
USB B back side	Connection to the system
Mechanical characteristics	
Outer dimensions (without slide-in) Width Length Height	 70 mm 100 mm 9.5 mm
Weight	Approx. 1.1 kg (without front cover)
Environmental characteristics	
Ambient temperature Operation Bearings Transport	 +5 to +45°C -20 to +60°C -40 to +60°C
Relative humidity Operation Bearings Transport	 20 to 80%, non-condensing 5 to 90%, non-condensing 5 to 95%, non-condensing

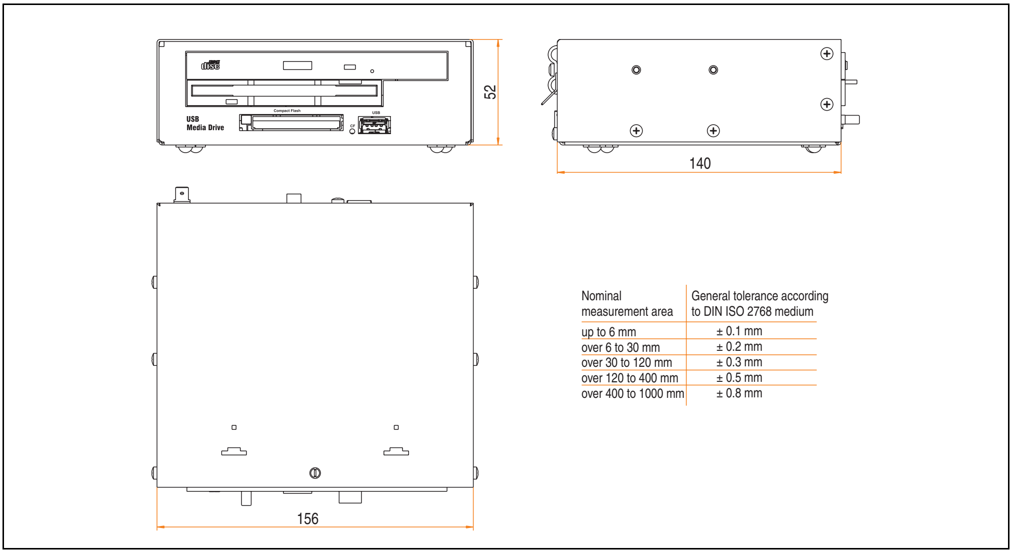
Table 126: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

Environmental characteristics	**5MD900.USB2-01**
Vibration Operation Bearings Transport	 5 - 500 Hz: 0.3 g (2.9 m/s^2 0-peak) 10 - 100 Hz: 2 g (19.6 m/s^2 0-peak) 10 - 100 Hz: 2 g (19.6 m/s^2 0-peak)
Shock Operation Bearings Transport	 Max. 5 g (49 m/s^2 0-peak) and 11 ms duration Max. 60 g (588 m/s^2 0-peak) and 11 ms duration Max. 60 g (588 m/s^2 0-peak) and 11 ms duration
Altitude	Max. 3000 meters

Table 126: Technical data - USB Media Drive 5MD900.USB2-01 (Forts.)

[1] DVD RAM drivers are not provided by the manufacturer. Support of DVD RAM function by the burning software "Nero" (model number 5SWUTI.0000-00) or other burning software packages and drivers from third party providers.

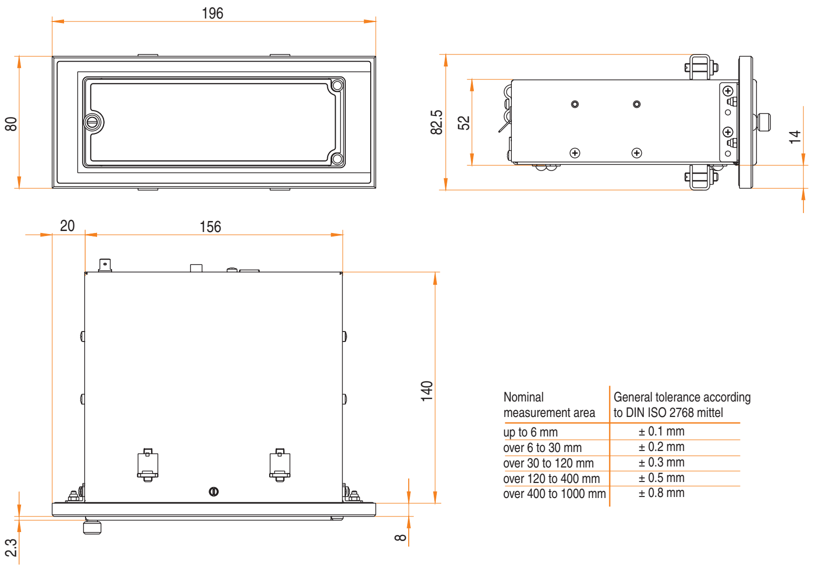
7.3 Dimensions



Nominal measurement area	General tolerance according to 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

Figure 106: Dimensions - 5MD900.USB2-01

7.4 Dimensions with front cover



Nominal measurement area	General tolerance according to DIN ISO 2768 mittel
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

Figure 107: Dimensions - USB Media Drive with front cover

7.4.1 Cutout installation

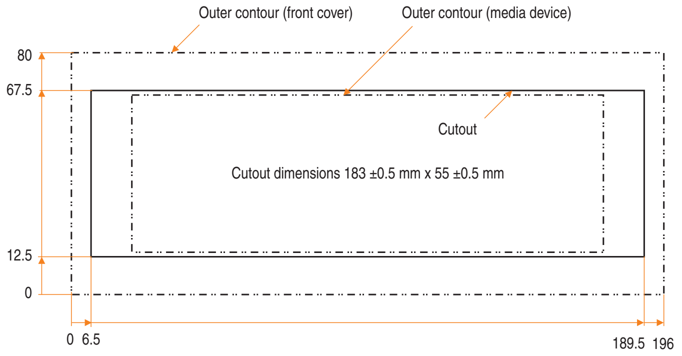

Outer contour (front cover)
Outer contour (media device)
Cutout
Cutout dimensions 183 ±0.5 mm x 55 ±0.5 mm
80
67.5
12.5
0
0
6.5
189.5
196

Figure 108: Installation cutout - USB Media Drive with front cover

7.5 Contents of delivery

Amount	Component
1	USB Media Drive complete unit
2	Mounting rail brackets

Table 127: Contents of delivery - USB Media Drive - 5MD900.USB2-01

7.6 Interfaces

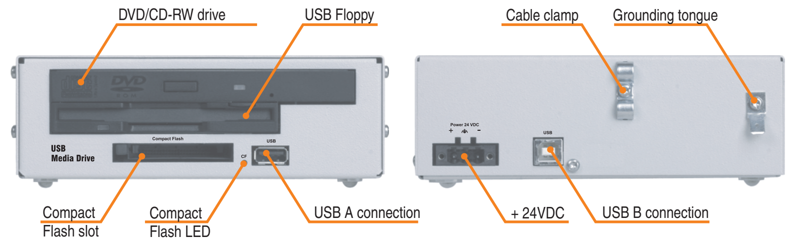


Figure 109: Interfaces - 5MD900.USB2-01

7.7 Installation

The USB Media Drive can be operated as a desk-top device (rubber feet) or as a rack-mount device (2 mounting rail brackets included).

7.7.1 Mounting orientation

Because of limits to the mounting orientation with the components used (floppy, DVD-CDRW drive), the USB media drive is only permitted to be mounted and operated as shown in the following figure.

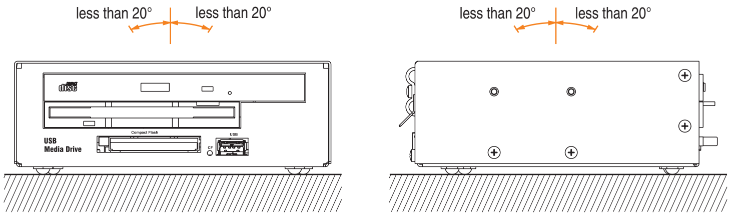


Figure 110: Mounting orientation - 5MD900.USB2-01

7.8 Front cover 5A5003.03 for the USB Media Drive

This front cover can also be mounted on the front of the USB media drive (model number 5MD900.USB2-00 or 5MD900.USB2-01) to protect the interface.

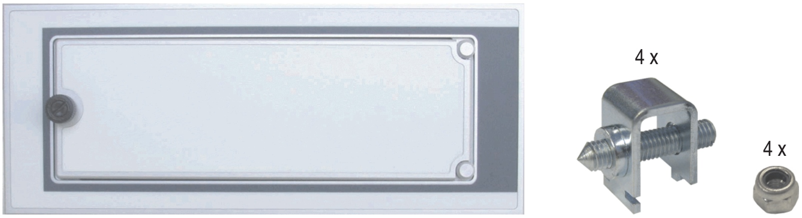


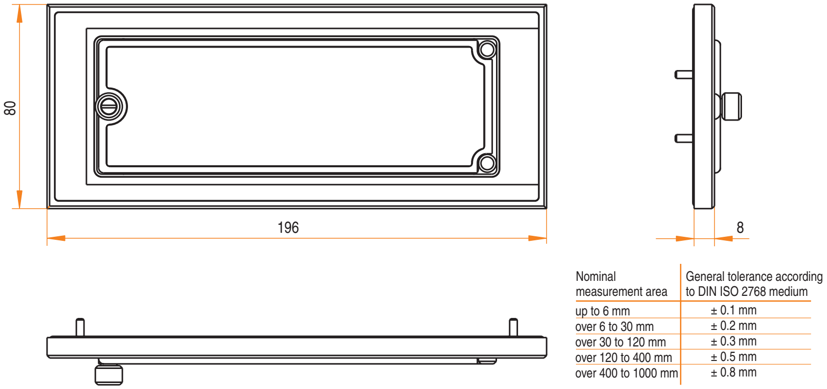
Figure 111: Front cover 5A5003.03

7.8.1 Technical data

Features	5A5003.03
Front cover design / colors Dark gray border around the cover Light gray background	 Pantone 432CV Pantone 427CV

Table 128: Technical data - 5A5003.03

7.8.2 Dimensions

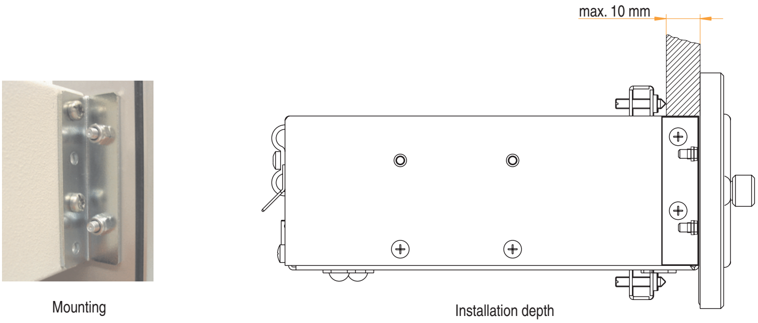


Nominal measurement area	General tolerance according to DIN ISO 2768 medium
up to 6 mm	± 0.1 mm
over 6 to 30 mm	± 0.2 mm
over 30 to 120 mm	± 0.3 mm
over 120 to 400 mm	± 0.5 mm
over 400 to 1000 mm	± 0.8 mm

Figure 112: Dimensions - 5A5003.03

7.8.3 Installation

The front cover is attached with 2 mounting rail brackets (included with USB Media Drive) and 4 M3 locknuts. The USB media drive and front cover can be mounted as a whole in (for example) a switching cabinet door.



Mounting

Installation depth

Figure 113: Front cover mounting and installation depth

7.8.4 Cutout installation

See the figure 108 "Installation cutout - USB Media Drive with front cover", on page 208.

8. CompactFlash cards 5CFCRD.xxxx-04

8.1 General information

Information:

The 5CFCRD.xxxx-04 CompactFlash cards are supported on B&R devices with WinCE Version 6.0 or higher.

8.2 Order data

Model number	Description	Figure
5CFCRD.0512-04	512 MB B&R CompactFlash card	 CompactFlash card
5CFCRD.1024-04	1024 MB B&R CompactFlash card	
5CFCRD.2048-04	2048 MB B&R CompactFlash card	
5CFCRD.4096-04	4096 MB B&R CompactFlash card	
5CFCRD.8192-04	8192 MB B&R CompactFlash card	
5CFCRD.016G-04	16 GB B&R CompactFlash card	

Table 129: Order data - CompactFlash cards

8.3 Technical data

Caution!

A sudden loss of power can cause data to be lost! In very rare cases, the mass memory may also become damaged.

To prevent damage and loss of data, it is recommended to use a UPS device.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	5CFCRD.0512-04	5CFCRD.1024-04	5CFCRD.2048-04	5CFCRD.4096-04	5CFCRD.8192-04	5CFCRD.016G-04
MTBF (at 25°C)	> 3,000,000 hours					
Maintenance	None					
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses					
Data retention	10 years					
Lifetime monitoring	Yes					
Supported operating modes	PIO Mode 0-6, Multiword DMA Mode 0-4, Ultra DMA Mode 0-4					
Continuous reading	Typically 35 MB/s(240X)1)2) Max. 37 MB/s (260X)1) 2)	Typically 35 MB/s (240X)1) 2) Max. 37 MB/s (260X)1) 2)	Typically 35 MB/s (240X)1) 2) Max. 37 MB/s (260X)1) 2)	Typically 33 MB/s (220X)1) 2) Max. 34 MB/s (226X)1) 2)	Typically 27 MB/s (180X)1) 2) Max. 28 MB/s (186X)1) 2)	Typically 36 MB/s (240X)1) 2) Max. 37 MB/s (247X)1) 2)
Continuous writing	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 17 MB/s (110X) Max. 20 MB/s (133X)	Typically 16 MB/s (106X) Max. 18 MB/s (120X)	Typically 15 MB/s (100X) Max. 17 MB/s (110X)	Typically 18 MB/s (120X) Max. 19 MB/s (126X)
Endurance						
Guaranteed amount of data 3) Results in 5 years 3)	50 TB 27.40 GB/day	100 TB 54.79 GB/day	200 TB 109.59 GB/day	400 TB 219.18 GB/day	800 TB 438.36 GB/day	1600 TB 876.72 GB/day
Clear/write cycles Guaranteed Typical4)	100,000 2,000,000					
SLC flash	Yes					
Wear leveling	Static					
Error Correction Coding (ECC)	Yes					

Table 130: Technical data - CompactFlash cards 5CFCRD.xxxx-04

Support	**5CFCRD.0512-04**	**5CFCRD.1024-04**	**5CFCRD.2048-04**	**5CFCRD.4096-04**	**5CFCRD.8192-04**	**5CFCRD.016G-04**
Hardware	PP300/400, PPC300, PPC700, PPC725, PPC800, APC620, APC810, APC820					
Windows XP Professional	-	-	-	Yes	Yes	Yes
Windows XP Embedded	Yes	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	-	Yes	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes [5]
Windows CE 5.0	-	-	-	-	-	-
PVI Transfer Tool	V3.2.3.8 (part of PVI Development Setup V2.06.00.3011)					-
B&R Embedded OS Installer	V3.10					-
Mechanical characteristics						
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm					
Weight	10 g					
Environmental characteristics						
Ambient temperature Operation Bearings Transport	 0 to +70°C -65 to +150°C -65 to +150°C					
Relative humidity Operation/Storage/Transport	Max. 85% at 85°C					
Vibration Operation/Storage/Transport	20 G peak, 20- 2000 Hz, 4 in each direction (JEDEC JESD22, method B103) 5.35 G RMS, 15 min per level (IEC 68-2-6)					
Shock Operation/Storage/Transport	1.5k G peak, 0.5 ms 5 times (JEDEC JESD22, method B110) 30 G, 11 ms 1 time (IEC 68-2-27)					
Altitude	Max. 15,000 feet (4,572 m)					

Table 130: Technical data - CompactFlash cards 5CFCRD.xxxx-04 (Forts.)

1) Speed specification with 1X = 150 KB/s. All specifications refer to the Samsung Flash chips, CompactFlash cards in UDMA mode 4, 30 ns cycle time in True-IDE mode with sequential write/read test.

2) The file is written/read sequentially in True IDE mode with the DOS program Thruput.exe.

3) Endurance of B&R CF cards (linear written block size with 128 KB)

4) Depending on the average file size.

5) Not supported by B&R Embedded OS installer.

8.3.1 Temperature humidity diagram - Operation and storage

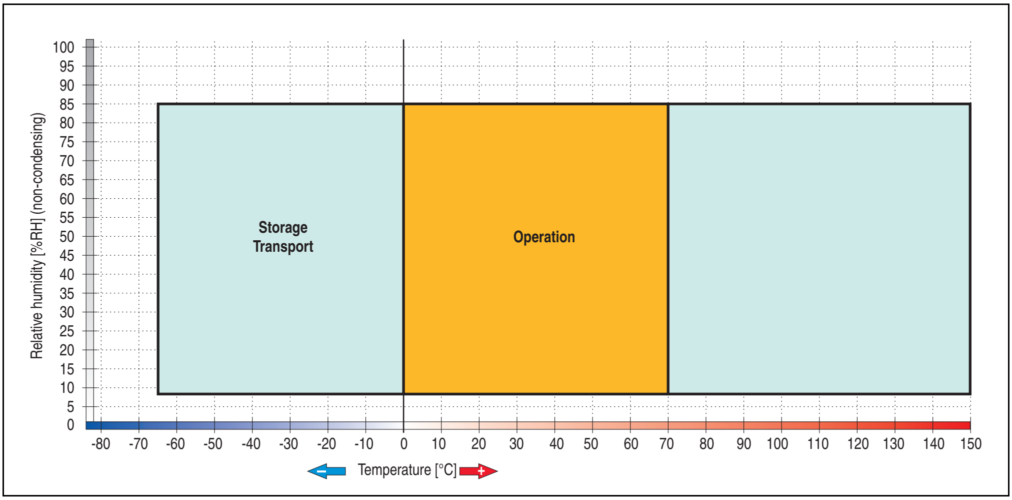


Figure 114: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-04

8.4 Dimensions

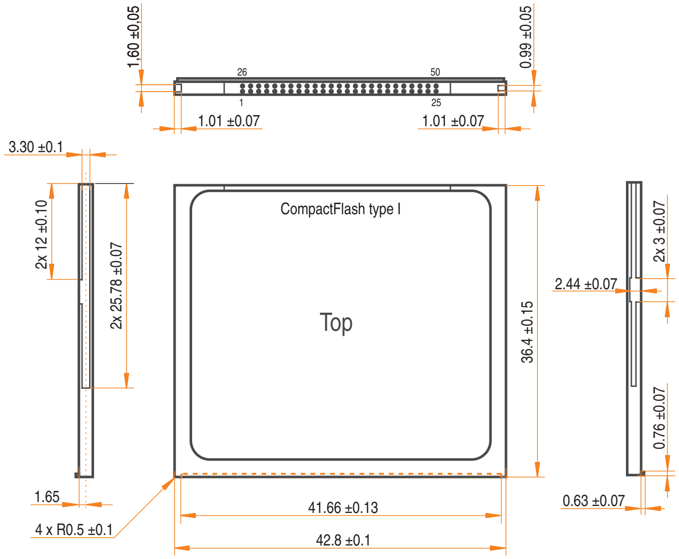


Figure 115: Dimensions - CompactFlash card Type I

8.5 Benchmark

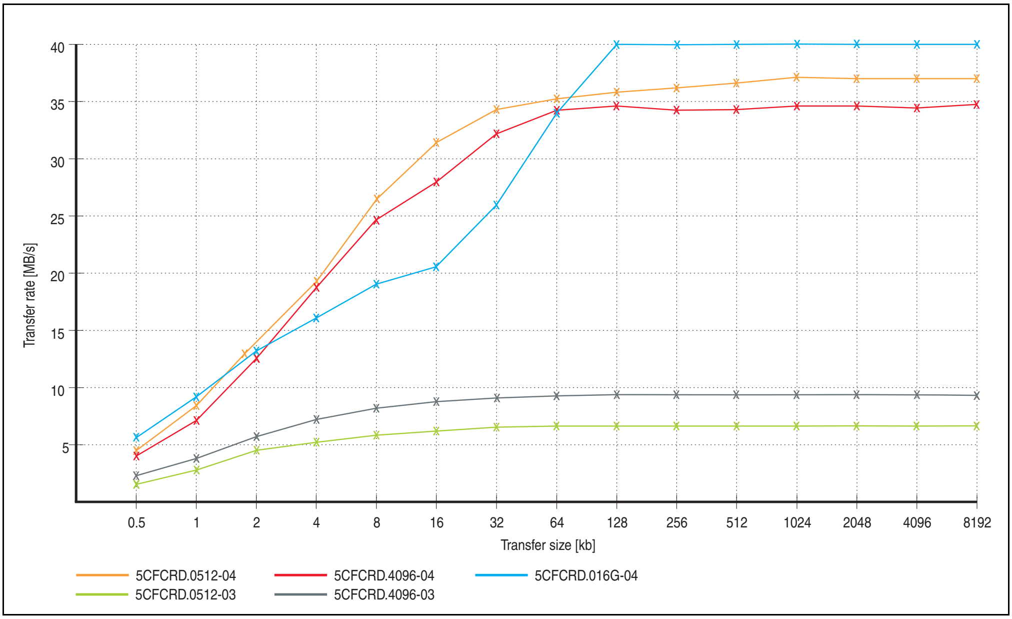


Figure 116: ATTO disk benchmark v2.34 comparison (reading)

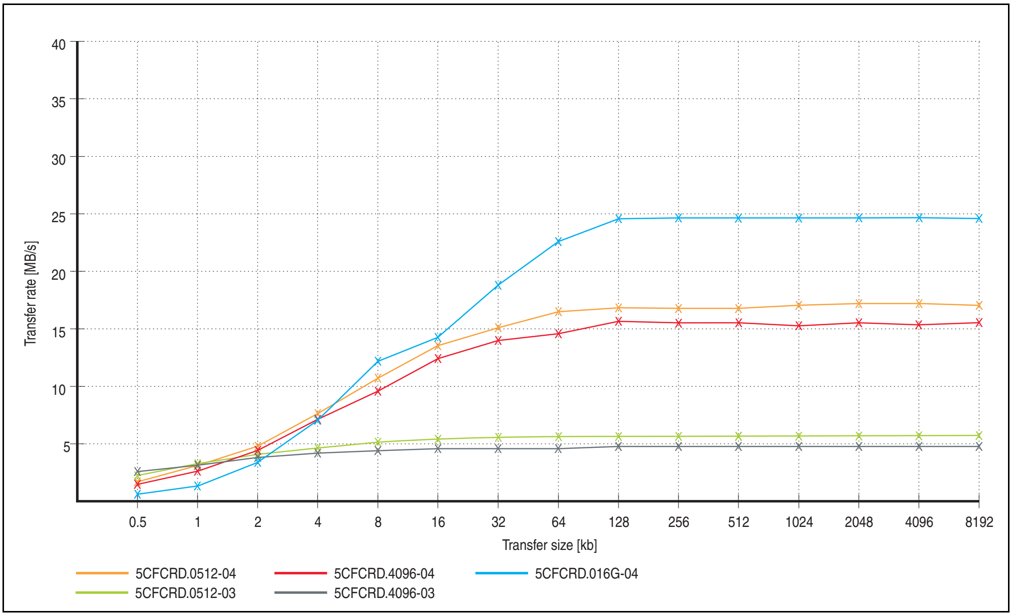


Figure 117: ATTO disk benchmark v2.34 comparison (writing)

9. CompactFlash cards - 5CFCRD.xxxx-03

9.1 General information

Information:

On Windows CE 5.0 devices, 5CFCRD.xxxx-03 CompactFlash cards up to 1GB are supported.

9.2 Order data

Model number	Description	Figure
5CFCRD.0064-03	CompactFlash 64 MB SSI	SILICONDRIVE™ CF SSD-CXXX-3576 19968/3576 Mfg. Date 08/09 SILICON SYSTEMS CompactFlash card
5CFCRD.0128-03	CompactFlash 128 MB SSI	
5CFCRD.0256-03	CompactFlash 256 MB SSI	
5CFCRD.0512-03	CompactFlash 512 MB SSI	
5CFCRD.1024-03	CompactFlash 1024 MB SSI	
5CFCRD.2048-03	CompactFlash 2048 MB SSI	
5CFCRD.4096-03	CompactFlash 4096 MB SSI	
5CFCRD.8192-03	CompactFlash 8192 MB SSI	

Table 131: Order data - CompactFlash cards

9.3 Technical data

Caution!

A sudden loss of power can cause data to be lost! In very rare cases, the mass memory may also become damaged.

To prevent damage and loss of data, B&R recommends that you use a UPS device.

Information:

The following characteristics, features and limit values only apply to this accessory and can deviate those specified for the entire device. For the entire device where this accessory is installed, refer to the data provided specifically for the entire device.

Features	**5CFCRD. 0064-03**	**5CFCRD. 0128-03**	**5CFCRD. 0256-03**	**5CFCRD. 0512-03**	**5CFCRD. 1024-03**	**5CFCRD. 2048-03**	**5CFCRD. 4096-03**	**5CFCRD. 8192-03**
MTBF (at 25°C)	> 4,000,000 hours							
Maintenance	None							
Data reliability	< 1 unrecoverable error in 10^{14} bit read accesses							
Data retention	10 years							
Lifetime monitoring	Yes							
Supported operating modes	PIO Mode 0-4, Multiword DMA Mode 0-2							
Continuous reading	Typically 8 MB/s							
Continuous writing	Typically 6 MB/s							
Endurance								
Clear/write cycles Typical	> 2,000,000							
SLC flash	Yes							
Wear leveling	Static							
Error Correction Coding (ECC)	Yes							
Support								
Hardware	MP100/200, PP100/200, PP300/400, PPC700, PPC300, Provit 2000, Provit 5000, APC620, APC680, APC810, APC820							
Windows XP Professional	-	-	-	-	-	-	Yes	Yes
Windows XP Embedded	-	-	-	Yes	Yes	Yes	Yes	Yes
Windows Embedded Standard 2009	-	-	-	-	Yes	Yes	Yes	Yes
Windows CE 6.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes1)

Table 132: Technical data - CompactFlash cards 5CFCRD.xxxx-03

Support	**5CFCRD. 0064-03**	**5CFCRD. 0128-03**	**5CFCRD. 0256-03**	**5CFCRD. 0512-03**	**5CFCRD. 1024-03**	**5CFCRD. 2048-03**	**5CFCRD. 4096-03**	**5CFCRD. 8192-03**
Windows CE 5.0	Yes	Yes	Yes	Yes	Yes	-	-	-
PVI Transfer Tool	V2.57 (part of PVI Development Setup V2.5.3.3005)							
B&R Embedded OS Installer	V2.21							
Mechanical characteristics								
Dimensions Length Width Thickness	 36.4 ±0.15 mm 42.8 ±0.10 mm 3.3 ±0.10 mm							
Weight	11.4 g							
Environmental characteristics								
Ambient temperature Operation Bearings Transport	 0 to +70°C -50 to +100°C -50 to +100°C							
Relative humidity Operation/Storage/Transport	 8 to 95%, non-condensing							
Vibration Operation Storage/Transport	 max. 16,3 g (159 m/s^2 0-peak) max. 30 g (294 m/s^2 0-peak)							
Shock Operation Storage/Transport	 Max. 1000 g (9810 m/s^2 0-peak) Max. 3000 g (29430 m/s^2 0-peak)							
Altitude	Maximum 80,000 feet (24,383 meters)							

Table 132: Technical data - CompactFlash cards 5CFCRD.xxxx-03 (Forts.)

1) Not supported by B&R Embedded OS installer.

9.3.1 Temperature humidity diagram - Operation and storage

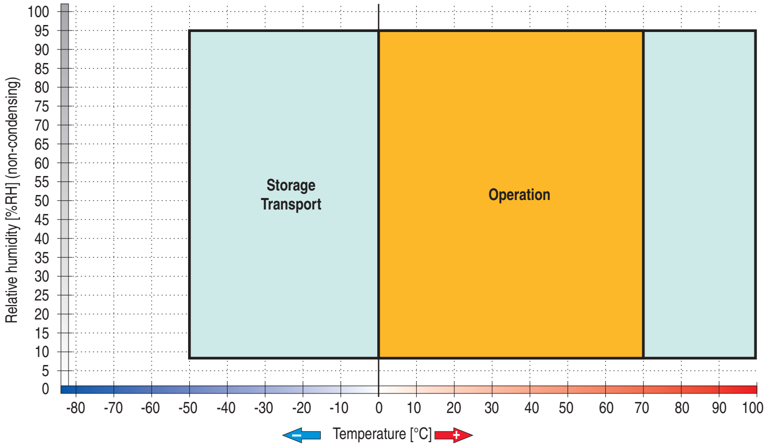


Figure 118: Temperature humidity diagram - CompactFlash cards 5CFCRD.xxxx-03

9.4 Dimensions

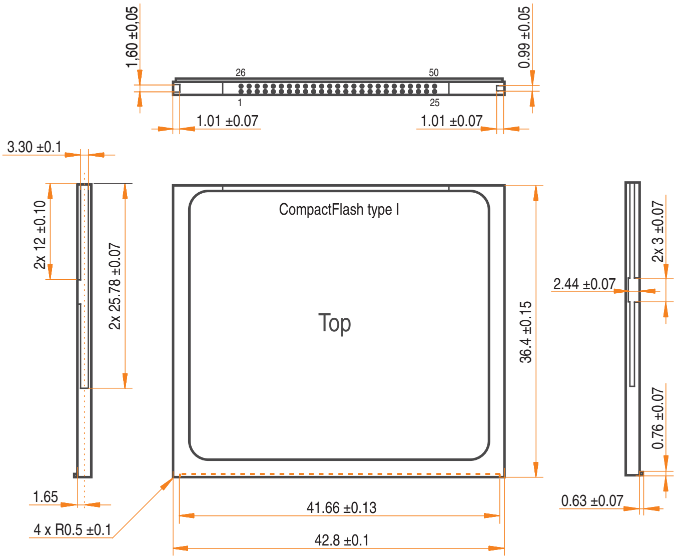


Figure 119: Dimensions - CompactFlash card Type I

10. HMI Drivers & Utilities DVD 5SWHMI.0000-00

Figure 120: HMI Drivers & Utilities DVD 5SWHMI.0000-00

Model number	Short description	Note
5SWHMI.0000-00	**HMI Drivers & Utilities DVD**	

Table 133: Order data - HMI Drivers & Utilities DVD

This DVD contains drivers, utilities, software upgrades and user's manuals for B&R Panel system products (see B&R homepage www.br-automation.com – Industrial PCs, Visualization and Operation).

At the time of its creation, the content on the DVD is identical to the files found in the download area of the B&R homepage (under Service – “Material Related Downloads”).

BIOS upgrades for the products

- Automation PC 620 / Panel PC 700 CPU Board 815E und 855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board X855GME BIOS
- Automation PC 620 / Panel PC 700 CPU Board 945GME N270 BIOS
- Automation PC 680
- Automation PC 810 / Automation PC 820 / Panel PC 800 B945GME BIOS
- Automation PC 810 / Panel PC 800 945GME N270 CPU Board BIOS
- Automation PC 810 / Panel PC 800 GM45 CPU Board BIOS
- Provit 2000 products - IPC2000/2001/2002
- Provit 5000 products - IPC5000/5600/5000C/5600C
- Power Panel 100 BIOS devices

- Mobile Panel 100 BIOS devices
- Power Panel 100 / Mobile Panel 100 User Boot Logo
- Power Panel 100 / Mobile Panel 100 REMHOST Utility
- Power Panel 300/400 BIOS devices
- Power Panel 300/400 BIOS User Boot Logo
- Panel PC 310

Drivers for the devices

- Automation Device Interface (ADI)
- Audio
- Chipset
- CD-ROM
- LS120
- Graphics
- Network
- PCI / SATA RAID controller
- Touch screen
- Touchpad
- Interfacecard

Firmware Upgrades

- Automation PC 620 / Panel PC 700 (MTCX, SDLR, SDLT)
- Automation PC 810 (MTCX, SDLR, SDLT)
- Automation PC 820 (MTCX, SDLR, SDLT)
- Mobile Panel 100 (SMCX)
- Panel PC 300 (MTCX)
- Power Panel 100 (aPCI)
- Power Panel 300/400 (aPCI)
- Power Panel 300/400 (MTCX)
- Panel PC 800 (MTCX, SDLR, SDLT)
- UPS firmware

Utilities / Tools

- B&R Embedded OS Installer
- Windows CE Tools
- User Boot Logo Conversion Utility
- SATA RAID Installations Utility
- Automation Device Interface (ADI)
- CompactFlash endurance calculator (Silicon Systems)
- Miscellaneous
- MTC Utilities
- Key Editor
- MTC & Mkey Utilities
- Mkey Utilities
- UPS configuration software
- ICU ISA configuration
- Intel PCI NIC Boot ROM
- Diagnostic Utilities

Windows

- Windows CE 6.0
- Windows CE 5.0
- Windows CE 4.2
- Windows CE 4.1
- Windows CE Tools
- Windows Embedded Standard 2009
- Thin Client
- Windows NT Embedded
- Windows XP Embedded
- VNC Viewer

MCAD templates for

- Industrial PCs
- Operator Interface devices
- Legend Strips templates
- Customized designs

ECAD templates for

- Industrial PCs
- Automation PCs
- Automation Panel 900
- Panel (Power Panel)

Documentation for

- Automation PC 620
- Automation PC 680
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- Panel PC 310
- Panel PC 700
- Panel PC 725
- Panel PC 800
- Power Panel 15/21/35/41
- Power Panel 100/200
- Power Panel 300/400
- Mobile Panel 40/50
- Mobile Panel 100/200
- Mobile Panel connection box
- Provit 2000
- Provit 3030
- Provit 4000
- Provit 5000
- Provit Benchmark
- Provit Mkey
- Windows CE 5.0 help
- Windows CE 6.0 help
- Windows NT Embedded application guide
- Windows XP Embedded application guide
- UPS - uninterruptible power supply

- Implementation instructions
- B&R Hilscher feldbus cards (CANopen, DeviceNet, PROFIBUS, PROFINET)

Service tools

- Acrobat Reader 5.0.5 (freeware in German, English and French)
- Power Archiver 6.0 (freeware in German, English and French)
- Internet Explorer 5.0 (German and English)
- Internet Explorer 6.0 (German and English)

Chapter 7 • Service and maintenance

1. Changing the battery

- Disconnect the PPC300 power supply.
- Touch the housing or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Loosen the fastening screws and carefully remove the Panel PC 300 insert card.

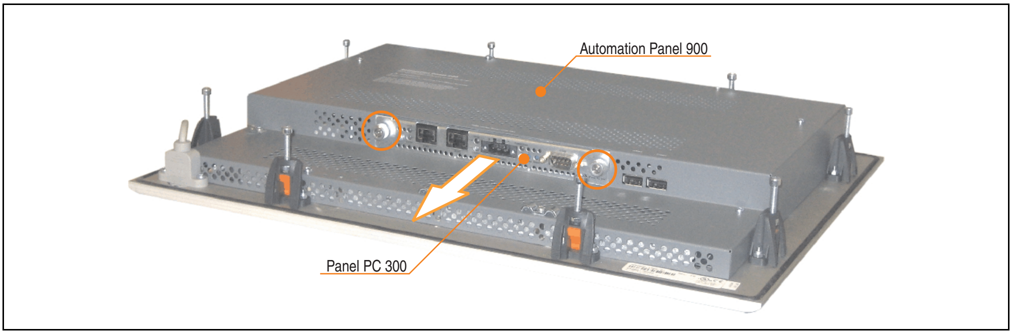


Figure 121: Remove Panel PC 300 insert

- Remove the old battery and insert the new battery with correct polarity. The battery should not be held by its edges. Insulated tweezers may also be used for inserting the battery.

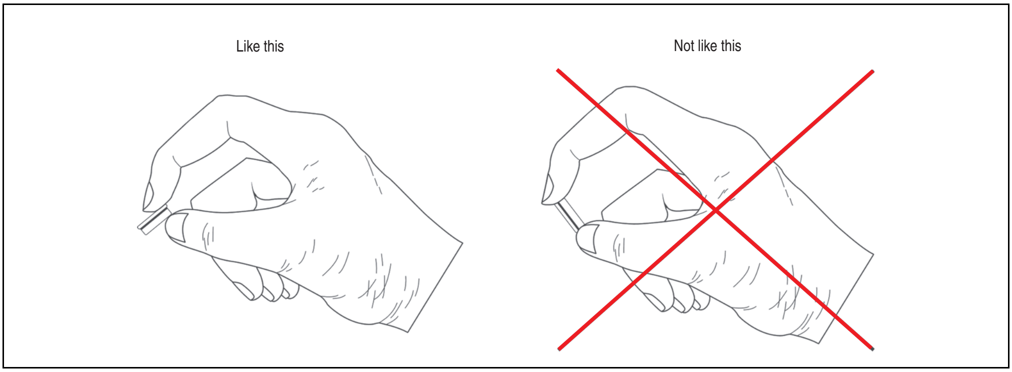


Figure 122: Battery handling

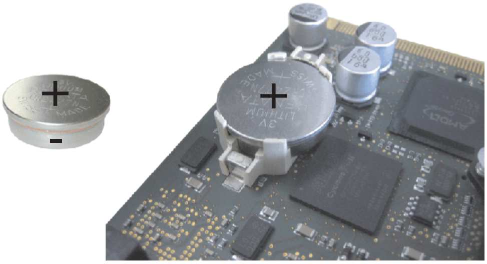


Figure 123: Battery polarity

- Re-assemble the Panel PC 300 in reverse order.
- The time might have to be set again if the battery change took more than 10 minutes (maximum buffer time for battery change).

Warning!

Lithium batteries are considered hazardous waste. Used batteries should be disposed of according to local requirements.

2. Cleaning

Danger!

PPC300 devices may only be cleaned when switched off. This is to prevent unintended functions from being triggered when touching the touch screen or pressing the buttons or entry devices.

A moist towel should be used to clean the PPC300 device. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the Automation Panel 900 device! Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

Information:

Displays with touch screens should be cleaned at regular intervals.

3. Preventing after-image effect in LCD/TFT monitors

Burn-in effect (after images, display memory effect, image retention or also image sticking) occurs in LCD/TFT monitors when a static image is displayed for a long period of time. This static screen content causes the build-up of parasitic capacities within the LCD components that prevent the liquid crystal molecules from returning to their original states. This condition may arise, is not predictable and depends on the following factors:

- Type of image displayed
- Color composition of the image
- Length of image output
- Ambient temperature

3.1 What measures can be taken against this?

There is no total solution, however, measures can be taken to significantly reduce this effect:

- Avoid static pictures or screen content
- Use screen savers (moving) when the display is not in use
- Frequent picture change
- Shut off the display when not in use

Turning off the background lighting (backlight) does not influence the prevention of the after-image effect.

4. Replacing the fluorescent lights

Danger!

The fluorescent lights may only be exchanged by trained personnel when the Automation Panel 900 device and the entire system are turned off.

4.1 General information

The fluorescent lights in the TFT display are subject to wear. Depending on the number of operating hours (see technical data for the Automation Panel) they must be exchanged after several years.

The fluorescent lights can be exchanged in the 10.4", 12.1", and 15" Automation Panel 900 devices.
They cannot be exchanged in the 17" and 19" Automation Panel 900 devices.

Warning!

To avoid damaging the fluorescent lights during the exchange, they should be pulled out by grasping them on the plastic frame (10.4" unit) or on the white plate (12.1" and 15" units) using small flat-nose pliers. Don't pull on the cables, as this can break the tubes.

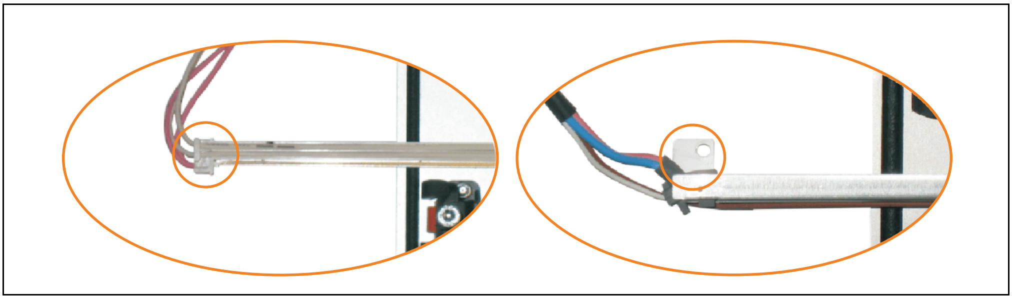


Figure 124: Warning - Exchanging the fluorescent lights

4.2 Procedure

4.2.1 First step for all units (10.4", 12.1'", 15").

Remove the cover. Remove the fastening screws (1) and insert card (2). Loosen the screws on the cover (using Torx screw driver size 10) and remove the cover (3).

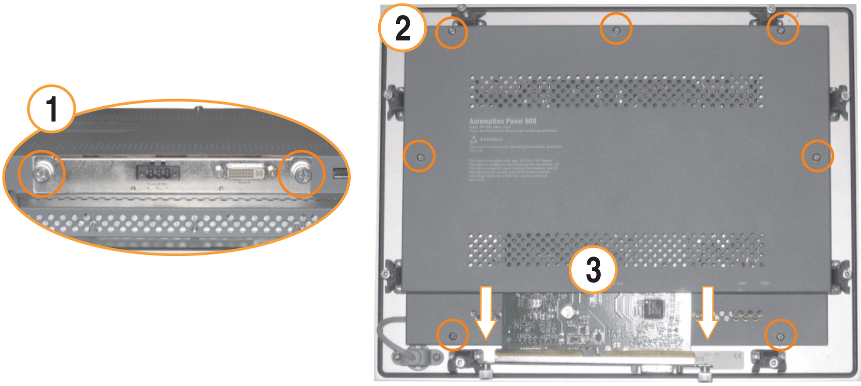


Figure 125: Remove the cover

4.2.2 Procedure for 10.4" Automation Panel

1) Using a size 10 Torx screwdriver, remove the screws from the circuit board (1) and tilt it to the side to access the plug for the fluorescent tube. Unplug the fluorescent tube (2).

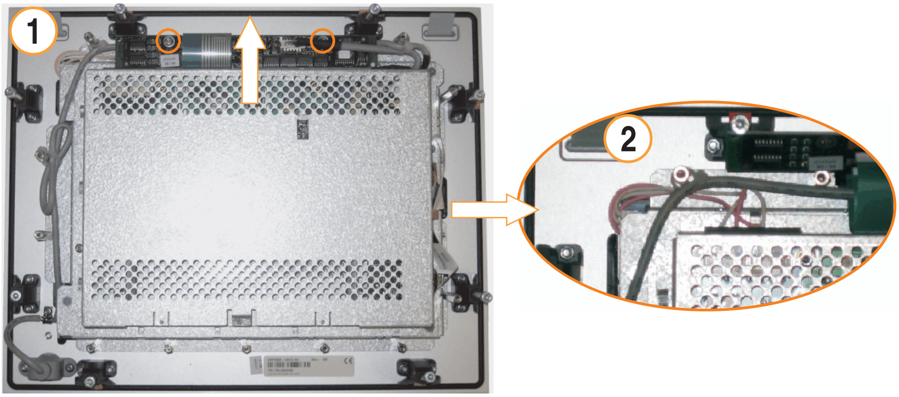


Figure 126: 10.4" Automation Panel - unscrew and unplug

2) Exchange fluorescent tube. To do this, carefully pull the tube out of its holder and replace with a new one.

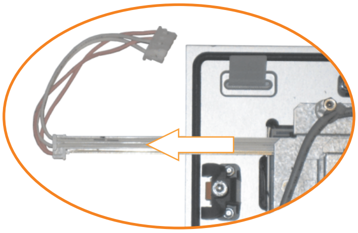


Figure 127: 10.4" Automation Panel - exchange fluorescent tube

4.2.3 Procedure for 12.1" Automation Panel

1) Using a small Phillips screwdriver, remove the screws and unplug the fluorescent tube.

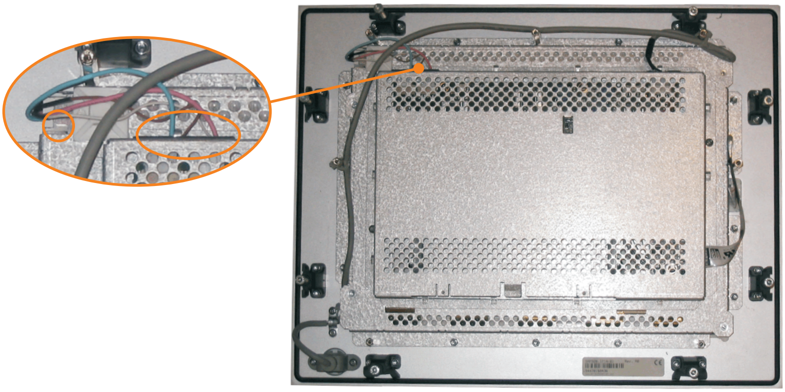


Figure 128: 12.1" Automation Panel - unscrew and unplug

2) Exchange fluorescent tube. To do this, carefully pull the tube out of its holder and replace with a new one.

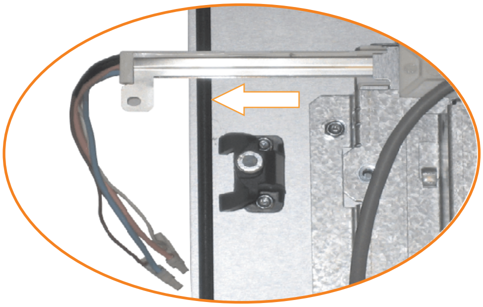


Figure 129: 12.1" Automation Panel - exchange fluorescent tube

4.2.4 Procedure for 15" Automation Panel

1) Unplug the fluorescent tube (1). Using a small Phillips screwdriver, remove the screws (2) from the fluorescent lights, and using a size 10 Torx screwdriver, remove the ground (3) from the housing.

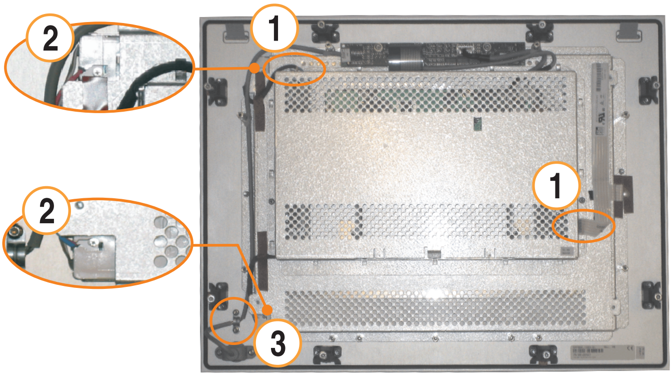


Figure 130: 15" Automation Panel - unscrew and unplug

2) Unplug the second fluorescent tube. Loosen the screws (using a size 10 Torx screw driver) and push the cover up (1), tilt it up and unplug the tube (2).

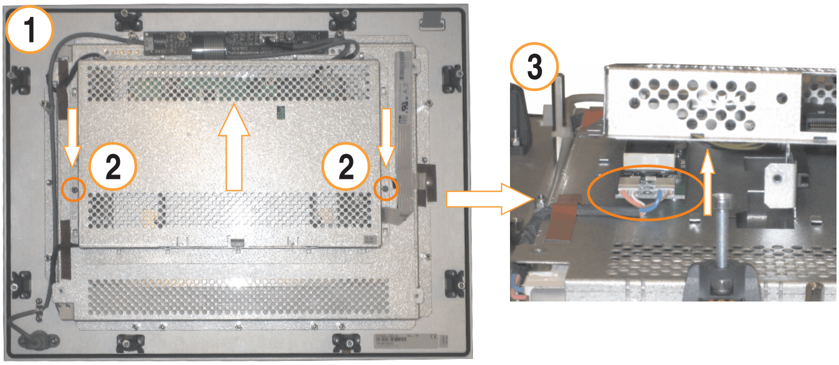


Figure 131: 15" Automation Panel - remove cover and unplug

3) Replacing fluorescent lights. To do this, carefully pull the fluorescent lights out of their holders and replace with new ones.

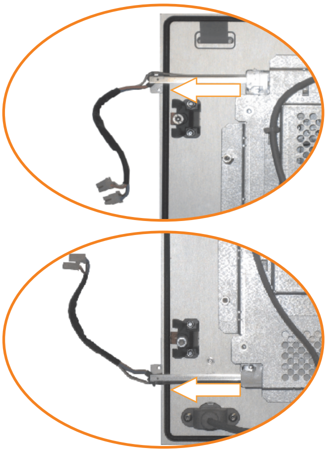


Figure 132: 15" Automation Panel - Replacing fluorescent lights

Appendix A

1. Temperature sensor locations

Sensors display temperature values in various places (CPU, board I/O) on the PPC300. The temperatures[1] can be read in BIOS (menu item "advanced" - CPU monitor) or in Microsoft Windows XP/embedded, using B&R Control Center[2] .

Position	Measurement point for	Measurement	Max. specified
1	CPU	Processor temperature (the sensor is located near the CPU on the solder side).	95°C
	Board I/O	Board I/O area temperature (the sensor is located near the CPU on the solder side).	80°C
2	Display	Display temperature.	Display-dependent

Table 134: Temperature sensor locations

---

[1] The measured temperature is a guideline for the immediate ambient temperature, but can be influenced by neighboring components.

[2] The B&R Control Center - ADI driver - can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

2. Touch screen - Elo Accu Touch

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device. For the entire device in which this individual component is used, refer to the data given specifically for the entire device.

Elo Accu touch screen	Specifications
Manufacturer	Elo
Accuracy For < 18" diagonals For > 18" diagonals	Typically < than 0.080 inches (2.032 mm) Maximum error in all directions 0.180 inches (4.752 mm) Maximum 1% of the diagonal for the active area of the touch screens
Response time	< 10 ms
Release pressure	< 113 g
Resolution	4096 x 4096 touch points
Light permeability	Up to 80% ±5%
Temperature Operation Bearings Transport	- 10 to + 50°C - 40 to + 71°C - 40 to + 71°C
Relative humidity Operation Bearings Transport	Max. 90% at max. 35°C Max. 90% at max. 35°C for 240 hours, non-condensing Max. 90% at max. 35°C for 240 hours, non-condensing
Waterproofing	IP65
Lifespan	35 million touch operations on the same point
Chemical resistance 1)	Acetone, ammonia-based glass cleaner, normal food and drinks, hexane, methylene chloride, methyl ethyl ketone, mineral spirits, turpentine, isopropyl alcohol
Activation	Finger, pointer, credit card, glove
Drivers	Touch screen drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). Additionally, they can also be found on the B&R HMI Drivers and Utilities DVD (Mod. No. 5SWHMI.0000-00).

Table 135: Technical data - Elo Accu touch screen 5-wire

1) The active area of the touch screen is resistant to these chemicals for a timeframe of one hour at 21°C.

2.1 Temperature humidity diagram - Operation and storage

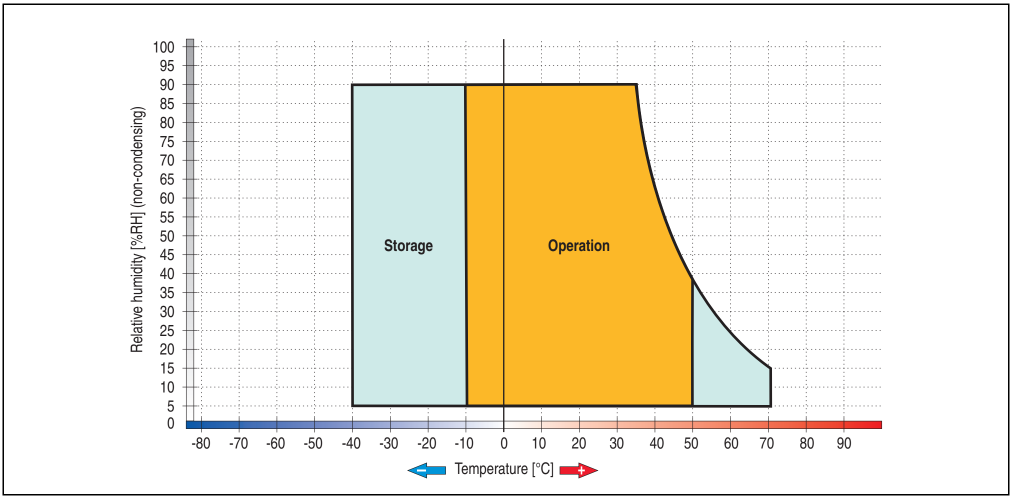


Figure 133: Temperature humidity diagram - Elo Accu touch screen

2.2 Calibration

B&R touch screen devices are equipped with a touch controller, which supports hardware calibration. This means that the devices are pre-calibrated from stock (pre-calibration). This feature proves advantageous in the case of a replacement part because a new calibration is no longer required when exchanging devices (identical model / type). Nevertheless, we recommend calibrating the device in order to achieve the best results and to better readjust the touch screen to the user's preferences.

Regardless of this, the touch screen driver requires calibration following installation.

2.2.1 Windows CE

Windows CE starts the touch screen calibration sequence during its first boot in the default configuration / delivered state.

2.2.2 Windows XP Embedded

After first starting Windows XP Embedded (First Boot Agent), the touch screen driver must be installed in the device in order to operate the touch screen. The corresponding drivers can be downloaded from the download area on the B&R homepage (**www.br-automation.com**). The touch screen should be calibrated while installing the driver.

2.3 Cleaning

The touch screen should be cleaned with a moist lint-free cloth. When moistening the cloth, use only water with detergent, screen cleaning agent, or alcohol (ethanol). The cleaning agent should be applied to the cloth beforehand and not sprayed directly onto the touch screen itself. Never use aggressive solvents, chemicals, scouring agents, pressurized air or steam jet.

> **Information:**
>
> **Displays with touch screens should be cleaned at regular intervals.**

In order to clean the touch screen during operation with Windows CE, the touch screen can be deactivated for 20 seconds. This function can be activated under **Start** > **Settings** > **Control Panel** > **Touch Screen**, **Screen Cleaning** tab.

3. Membrane

The décor foil conforms to DIN 42115 (section 2). This means it is resistant to exposure to the following chemicals for a 24-hour period with no visible signs of damage:

Information:

The following characteristics, features, and limit values only apply to this individual component and can deviate from those specified for the entire device.

Ethanol Cyclohexanol Diacetone alcohol Glycol Isopropanol Glycerine Methanol Triacetin Dowandol DRM/PM	Formaldehyde 37% - 42% Acetaldehyde Aliphatic hydrocarbons Toluene Xylene White spirits	1.1.1.Trichloroethane Ethyl acetate Diethyl ether N-Butyl acetate Amyl acetate Butylcellosolve Ether
Acetone Methyl ethyl ketone Dioxan Cyclohexanone MIBK Isophorone	Formic acid <50% Acetic acid <50% Phosphoric acid <30% Hydrochloric acid <36% Nitric acid <10% Trichloracetic acid <50% Sulphuric acid <10%	Sodium hypochlorite <20% Hydrogen peroxide <25% Potassium carbonate Washing agents Fabric conditioner Ferric chloride Ferrous chloride (FeCl2) Ferrous chloride (FeCl3) Dibutyl phthalate Dioctyl phthalate Sodium carbonate
Ammonia <40% Caustic soda <40% Potassium hydroxide Alkali carbonate Bichromate Potassium Acetonitrile Sodium bisulphate	Cutting oil Diesel oil Linseed oil Paraffin oil Blown castor oil Silicon oil Turpentine oil substitute Universal brake fluid Aviation fuel Gasoline Water Sea water Decon	

Table 136: Chemical resistance of the décor foil

The décor foil conforms to DIN 42115 section 2 for exposure to glacial acetic acid for less than one hour without visible damage.

4. Viewing angles

The viewing angle information (R, L, U, D) can be seen in the technical data for the individual components.

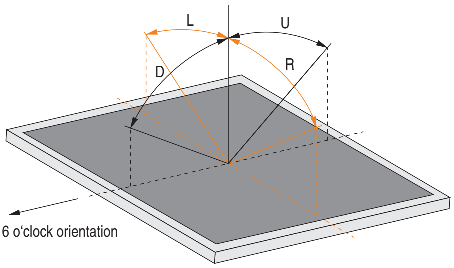
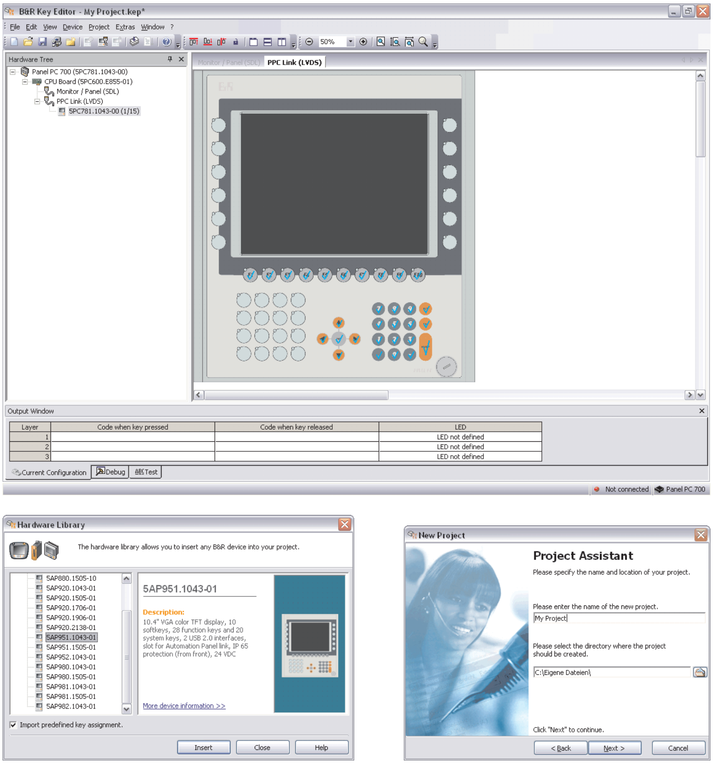


Figure 134: Viewing angles

5. B&R Key Editor

On display units, it is often necessary to adjust the function keys and LEDs for the application software being used. The B&R Key Editor makes it quick and easy to adapt the application to a unique configuration. The PPC300 is only supported in Version 2.60 and higher.



Layer	Code when key pressed	Code when key released	LED
1			LED not defined
2			LED not defined
3			LED not defined

The hardware library allows you to insert any B&R device into your project.

5AP951.1043-01

Description:
10.4" VGA color TFT display, 10 softkeys, 28 function keys and 20 system keys, 2 USB 2.0 interfaces, slot for Automation Panel link, IP 65 protection (from front), 24 VDC

☑ Import predefined key assignment.

Please specify the name and location of your project.

Please enter the name of the new project.
My Project

Please select the directory where the project should be created.
C:\Eigene Dateien\

Click "Next" to continue.

Figure 135: B&R Key Editor screenshots Version 3.10 (representation picture)

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.)
- Assign functions to LEDs (HDD access, power, etc.)
- 4 assignments per key possible (using layer function)
- Configuration of panel locking time when multiple Automation Panel 900 devices are connected to Automation PCs and Panel PCs devices.

Supports following systems (Version 3.10):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Automation Panel 800
- Automation Panel 900
- IPC2000, IPC2001, IPC2002
- IPC5000, IPC5600
- IPC5000C, IPC5600C
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500 (the Key Editor device file must be downloaded separately from the B&R homepage)

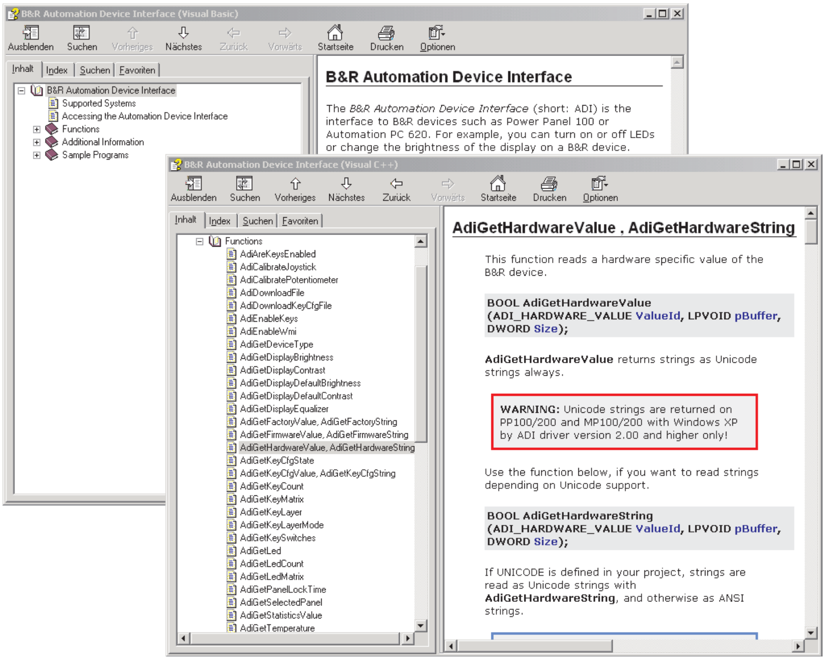
A detailed guide for configuring keys and LEDs can be found in the B&R Key Editor's online help.

The B&R Key Editor can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**). Additionally, it can also be found on the B&R HMI Drivers & Utilities DVD (model number 5SWHMI.0000-00).

6. B&R Automation Device Interface (ADI) development kit

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from Windows applications, which, for example, were created using the following development tools:

- Microsoft Visual C++ 6.0
- Microsoft Visual Basic 6.0
- Microsoft eMbedded Visual C++ 4.0
- Microsoft Visual Studio 2005 (or newer)



B&R Automation Device Interface

The *B&R Automation Device Interface* (short: ADI) is the interface to B&R devices such as Power Panel 100 or Automation PC 620. For example, you can turn on or off LEDs or change the brightness of the display on a B&R device.

AdiGetHardwareValue , AdiGetHardwareString

This function reads a hardware specific value of the B&R device.

```
BOOL AdiGetHardwareValue
(ADI_HARDWARE_VALUE ValueId, LPVOID pBuffer,
DWORD Size);
```

AdiGetHardwareValue returns strings as Unicode strings always.

WARNING: Unicode strings are returned on PP100/200 and MP100/200 with Windows XP by ADI driver version 2.00 and higher only!

Use the function below, if you want to read strings depending on Unicode support.

```
BOOL AdiGetHardwareString
(ADI_HARDWARE_VALUE ValueId, LPVOID pBuffer,
DWORD Size);
```

If UNICODE is defined in your project, strings are read as Unicode strings with **AdiGetHardwareString**, and otherwise as ANSI strings.

Figure 136: ADI development kit screenshots (Version 3.10)

Features:

- One Microsoft Visual Basic module with declarations for the ADI functions.
- Header files and import libraries for Microsoft Visual C++ 6.0 and Microsoft eMbedded Visual C++ 4.0.
- Help files for Visual Basic and Visual C++.
- Sample projects for Visual Basic and Visual C++.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 3.10 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400
- Power Panel 500

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The B&R Automation Device Interface (ADI) development kit can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

7. B&R Automation Device Interface (ADI) .NET SDK

This software can be used to activate functions of the B&R Automation Device Interface (ADI) from .NET applications, which were created using Microsoft Visual Studio 2005 (or newer).

Supported programming languages:

- Visual Basic
- Visual C++
- Visual C#
- Visual J#

System requirements:

- Developingsystem: PC with Windows XP/7 with
  - Microsoft Visual Studio 2005 or newer
  - Microsoft .NET Framework 2.0 and / or Microsoft .NET Compact Framework 2.0 or newer
  - Optional for Windows CE Systems: B&R Windows CE SDK

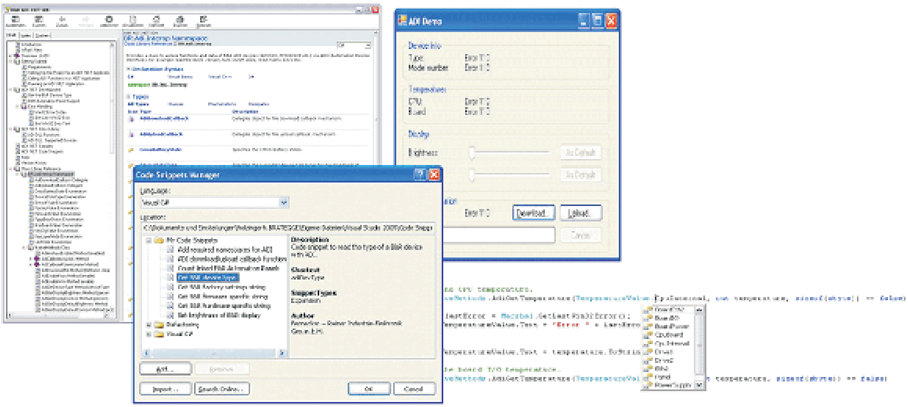


Figure 137: ADI .NET SDK Screenshots (Version 1.30)

Features:

- ADI .NET Class Library.
- Help files in HTML Help 1.0 format (.chm file) and MS Help 2.0 format (.HxS file).
- Sample projects and code snippets for Visual Basic, Visual C++, Visual C# and Visual J#.
- ADI DLL (for testing the applications, if no ADI driver is installed).

Supports following systems (Version 1.30 and higher):

- Automation PC 620
- Automation PC 810
- Automation PC 820
- Mobile Panel 40/50
- Mobile Panel 100/200
- Panel PC 300
- Panel PC 700
- Panel PC 800
- Power Panel 100/200
- Power Panel 300/400

The ADI driver suitable for the device must be installed on the stated product series. The ADI driver is already included in the B&R images of embedded operating systems.

A detailed description of using the ADI functions can be found in the integrated online help.

The ADI .NET SDK can be downloaded for free from the download area on the B&R homepage (**www.br-automation.com**).

8. Glossary

A

ACPI

Abbreviation for "**A**dvanced **C**onfiguration and **P**ower **I**nterface". Configuration interface that enables the operating system to control the power supply for each device connected to the PC. With ACPI, the computer's BIOS is only responsible for the details of communication with the hardware.

API

Abbreviation for "**A**pplication **P**rogram **I**nterface" The interface, which allows applications to communicate with other applications or with the operating system.

B

Baud rate

Measurement unit for data transfer speed. It indicates the number of states for a transferred signal per second and is measured using the baud unit of measurement. 1 baud = 1 bit/sec or 1 bps.

BIOS

An abbreviation for "**B**asic **I**nput/**O**utput **S**ystem". Core software for computer systems with essential routines for controlling input and output processes on hardware components, for performing tests after system start and for loading the operating system. Although BIOS is used to configure a system's performance, the user does not usually come into contact with it.

Bit

Binary digit > binary position, binary character, smallest discrete unit of information. A bit can have the value 0 or 1.

Bit rate

The number of bits that can be transferred within a specified time unit. 1 bit/sec = 1 baud.

Byte

Data format [1 byte = 8 bits] and a unit for characterizing information amounts and memory capacity. The following units are the commonly used units of progression: kB, MB, GB.

C

Cache

Background memory, also known as non-addressable memory or fast buffer memory. It is used to relieve the fast main memory of a computer. For example, data that should be output to slower components by the working memory (e.g. disk storage, printers) is stored temporarily in cache memory and output from there at an appropriate speed for the target devices.

CE mark

A CE mark for a product. It consists of the letters "CE" and indicates conformity to all EU guidelines for the labeled product. It indicates that the individual or corporate body who has performed or attached the label assures that the product conforms to all EU guidelines for complete harmonization. It also indicates that all mandatory conformity evaluation procedures have taken place.

CMOS

"CMOS" is a battery powered memory area where fundamental parameters of an IBM (or compatible) personal computer are stored. Information such as the type of hard drive, size of the working memory and the current date and time are required when booting the computer. As the name suggests, the memory is based on CMOS technology standards.

COM

A device name used to access serial ports in MS-DOS. The first serial port can be accessed under COM1, the second under COM2, etc. A modem, mouse, or serial printer is typically connected to a serial port.

CompactFlash®

CompactFlash memory cards [CF cards] are exchangeable nonvolatile mass memory systems with very small dimensions [43 x 36 x 3.3 mm, approximately half the size of a credit card]. In addition to the flash memory chips, the controller is also present on the cards. CF cards provide complete PC card / ATA functionality and compatibility. A 50-pin CF card can be simply inserted in a passive 68-pin type II adapter card. It conforms to all electrical and mechanical PC card interface specifications. CF cards were launched by SanDisk back in 1994. Currently, memory capacities reach up to 8 GB per unit. Since 1995, CompactFlash Association [CFA] has been looking after standardization and the worldwide distribution of CF technology

CPU

An abbreviation for "**C**entral **P**rocessing **U**nit". Interprets and executes commands. It is also known as a "microprocessor" or "processor" for short. A processor is able to receive, decode and execute commands, as well as transfer information to and from other resources via the computer bus.

CTS

An abbreviation for "**C**lear **T**o **S**end". A signal used when transferring serial data from modem to computer, indicating its readiness to send the data. CTS is a hardware signal which is transferred via line number 5 in compliance with the RS-232-C standard.

D

DCD

An abbreviation for "**D**ata **C**arrier **D**etected". A signal used in serial communication that is sent by the modem to the computer it is connected to, indicating that it is ready for transfer.

DMA

Direct **M**emory **A**ccess > Accelerated direct access to a computer's RAM by bypassing the CPU.

DRAM

An abbreviation for "**D**ynamic **R**andom **A**ccess **M**emory". Dynamic RAM consists of an integrated semiconductor circuit that stores information based on the capacitor principle. Capacitors lose their charge in a relatively short time. Therefore, dynamic RAM circuit boards must contain a logic that allows continual recharging of RAM chips. Since the processor cannot access dynamic RAM while it is being recharged, one or more waiting states can occur when reading or writing data. Although it is slower, dynamic RAM is used more often than static RAM since the simple design of the circuits means that it can store four times more data than static RAM.

DSR

An abbreviation for "**D**ata **S**et **R**eady". A signal used in serial data transfer, which is sent by the modem to the computer it is connected to, indicating its readiness for processing. DSR is a hardware signal which is sent via line number 6 in compliance with the RS-232-C standard.

DTR

An abbreviation for "**D**ata **T**erminal **R**eady". A signal used in serial data transfer that is sent by the computer to the modem it is connected to, indicating the computer's readiness to accept incoming signals.

E

EDID data

Abbreviation for "**E**xtended **D**isplay **I**dentification **D**ata". EDID data contains the characteristics of monitors / TFT displays transferred as 128 kB data blocks to the graphics card via the Display Data Channel (DDC). This EDID data can be used to set the graphics card to the monitor properties.

EMC

"**E**lectro**m**agnetic **C**ompatibility" The ability of a device or a system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment [IEV 161-01-07].

EPROM

Erasable **PROM** > (completely with ultraviolet light).

Ethernet

An IEEE 802.3 standard for networks. Ethernet uses bus or star topology and controls the traffic on communication lines using the access procedure CSMA/CD (Carrier Sense Multiple Access with Collision Detection). Network nodes are connected using coaxial cables, fiber optic cables or twisted pair cabling. Data transfer on an Ethernet network takes place in frames of variable lengths that consist of supply and controller information as well as 1500 bytes of data. The Ethernet standard provides base band transfers at 10 megabit and 100 megabit per second.

F

FIFO

An abbreviation for "**F**irst **I**n **F**irst **O**ut". A queuing organization method whereby elements are removed in the same order as they were inserted. The first element inserted is the first one removed. Such an organization method is typical for a list of documents that are waiting to be printed.

Firmware

Programs stored permanently in read-only memory. Firmware is software used to operate computer-controlled devices that generally stays in the device throughout its lifespan or over a long period of time. Such software includes operating systems for CPUs and application programs for industrial PCs as well as programmable logic controllers (e.g. the software in a washing machine controller). This software is written in read-only memory (ROM, PROM, EPROM) and cannot be easily replaced.

Floppy

Also known as a diskette. A round plastic disk with an iron oxide coating that can store a magnetic field. When the floppy disk is inserted in a disk drive, it rotates so that the different areas (or sectors) of the disk's surface are moved under the read/write head. This allows the magnetic orientation of the particle to be modified and recorded. Orientation in one direction represents binary 1, while the reverse orientation represents binary 0.

G

GB

Gigabyte (1 GB = 230 or 1,073,741,824 bytes)

H

Handshake

Method of synchronization for data transfer when data is sent at irregular intervals. The sender signals that data can be sent, and the receiver signals when new data can be received.

I

IDE

An abbreviation for "**I**ntegrated **D**rive **E**lectronics". A drive interface where the controller electronics are integrated in the drive.

Interface

From the hardware point of view, an interface is the connection point between two modules/devices/systems. The units on both sides of the interface are connected by the interface lines so that data, addresses, and control signals can be exchanged. The term interface includes all functional, electrical and constructive conditions [encoding, signal level, pin assignments] that characterize the connection point between the modules, devices, or systems. Depending on the type of data transfer, a differentiation is made between parallel [e.g. Centronics, IEEE 488] and serial interfaces [e.g. V.24, TTY, RS232, RS422, RS485], which are set up for different transfer speeds and transfer distances. From the point of view of software, the term "interface" describes the transfer point between program modules using specified rules for transferring the program data.

L

LCD

An abbreviation for "**L**iquid **C**rystal **D**isplay". A display type, based on liquid crystals that have a polarized molecular structure and are enclosed between two transparent electrodes as a thin layer. If an electrical field is applied to the electrodes, the molecules align themselves with the field and form crystalline arrangements that polarize the light passing through. A polarization filter, which is arranged using lamellar electrodes, blocks the polarized light. In this way, a cell (pixel) containing liquid crystals can be switched on using electrode gates, thus coloring this pixel black. Some LCD displays have an electroluminescent plate behind the LCD screen for lighting. Other types of LCD displays can use color.

LED

An abbreviation for "**L**ight **E**mitting **D**iode". A semiconductor diode which converts electrical energy into light. LEDs work on the principle of electroluminescence. They are highly efficient because they do not produce much heat in spite of the amount of light they emit. For example, "operational status indicators" on floppy disk drives are LEDs.

M

MB

Megabyte (1 MB = 220 or 1,048,576 bytes).

Microprocessor

Highly integrated circuit with the functionality of a CPU, normally housed on a single chip. It comprises a control unit, arithmetic and logic unit, several registers and a link system for connecting memory and peripheral components. The main performance features are the internal and external data bus and address bus widths, the command set and the clock frequency. Additionally, a choice can be made between CISC and RISC processors. The first commercially available worldwide microprocessor was the Intel 4004. It came on the market in 1971.

MIPS

Million instructions per second > Measurement for the computing speed of computers.

MTBF

An abbreviation for "**M**ean **t**ime **b**etween **f**ailure". The average time which passes before a hardware component fails and repair is needed. This time is usually expressed in thousands or ten thousands of hours, sometimes known as power-on hours (POH).

MTC

An abbreviation for "**M**ain**t**enance **C**ontroller". The MTC is an independent processor system that provides additional functions for a B&R industrial PC that are not available with a normal PC. The MTC communicates with the B&R industrial PC via the ISA bus (using a couple register).

MTCX

Abbreviation for "**M**ain**T**enance **C**ontroller E**X**tended".

O

OEM

"Original **E**quipment **M**anufacturer"; A company that integrates third-party and in-house manufactured components into their own product range and then distributes these products under its own name.

P

Panel

A common term for B&R display units (with or without keys).

POH

An abbreviation for "**P**ower **O**n **H**ours". See MTBF.

POST

An abbreviation for "**P**ower-**O**n **S**elf **T**est". A set of routines that are stored in ROM on the computer and that test different system components, e.g. RAM, disk drive and the keyboard in order to determine that the connection is operating correctly and ready for operation. POST routines notify the user of problems that occur. This is done using several signal tones or by displaying a message that frequently accompanies a diagnosis value on the standard output or standard error devices (generally the monitor). If the POST runs successfully, control is transferred over to the system's bootstrap loader.

R

RAM

An abbreviation for "**R**andom **A**ccess **M**emory". Semiconductor memory which can be read or written to by the microprocessor or other hardware components. Memory locations can be accessed in any order. The various ROM memory types do allow random access, but they cannot be written to. The term RAM refers to a more temporary memory that can be written to as well as read.

Real time

A system is operating in real-time or has real-time capability, if the input sizes (e.g. signals, data) are received and processed in a defined time period, and the results are made available in real-time for a partner system or the system environment. See also "real-time demands" and "real-time system".

ROM

An abbreviation for "**R**ead-**O**nly **M**emory". Semiconductor memory where programs or data were permanently stored during the production process.

RS232

Recommended **S**tandard **N**umber **232**. Oldest and most widespread interface standard, also called a V.24 interface. All signals are referenced to ground making this an unbalanced interface. High level: -3 ... -30 V, low level: +3 ... +30 V. Cable lengths up to 15 m, transfer rates up to 20 kBit/s. For point-to-point connections between 2 participants.

RXD

An abbreviation for "Receive (**RX**) **D**ata". A line for transferring serial data received from one device to another, e.g. from a modem to a computer. For connections complying with the RS-232-C standard, the RXD is connected to pin 3 of the plug.

S

SDRAM

An abbreviation for "**S**ynchronous **D**ynamic **R**andom **A**ccess **M**emory". A construction of dynamic semiconductor components (DRAM) that can operate with higher clock rates than conventional DRAM switching circuits. This is made possible using block access. For each access, the DRAM determines the next memory addresses to be accessed.

SVGA

Abbreviation for "**S**uper **V**ideo **G**raphics **A**rray"; Graphics standard with a resolution of at least 800×600 pixels and at least 256 colors.

SXGA

Abbreviation for Super Extended Graphics Array. Graphics standard with a screen resolution of 1280 × 1024 pixels (aspect ratio 5:4).

T

TCP/IP

Transmission Control Protocol/Internet Suit of Protocols. Network protocol that has become the generally accepted standard for data exchange in heterogeneous networks. TCP/IP is used both in local networks for communication between various computer and also for LAN to WAN access.

TFT display

LCD (Liquid Crystal Display) technology where the display consists of a large grid of LCD cells. Each pixel is represented by a cell, whereby electrical fields produced in the cells are supported by thin film transistors (TFT) that result in an active matrix. In its simplest form, there is exactly one thin film transistor per cell. Displays with an active matrix are generally used in laptops and notebooks because they are thin, offer high-quality color displays and can be viewed from all angles.

Touch screen

Screen with touch sensors for selecting options in a displayed menu using the tip of the finger.

TXD

An abbreviation for "Transmit (**TX**) **D**ata". A line for the transfer of serial data sent from one device to another, e.g. from a computer to a modem. For connections complying with the RS-232-C standard, the TXD is connected to pin 2 of the plug.

U

UART

An abbreviation for "**U**niversal **A**synchronous **R**eceiver-**T**ransmitter". A module generally consisting of a single integrated circuit that combines the circuits required for asynchronous serial communication for both sending and receiving. UART represents the most common type of circuit in modems for connecting to a personal computer.

USB

An abbreviation for "**U**niversal **S**erial **B**us" A serial bus with a bandwidth of up to 12 megabits per second (Mbit/s) for connecting a peripheral device to a microcomputer. Up to 127 devices can be connected to the system using a single multipurpose connection, the USB bus (e.g. external CD drives, printers, modems as well as the mouse and keyboard). This is done by connecting the devices in a row. USB allows devices to be changed when the power supply is switched on (hot plugging) and multi-layered data flow.

UXGA

Abbreviation for "**U**ltra **E**xtended **G**raphics **A**rray" Generally a screen resolution of 1600 × 1200 pixels (aspect ratio 4:3, 12:9).

V

VGA

An abbreviation for "**V**ideo **G**raphics **A**dapter". A video adapter which can handle all EGA (Enhanced Graphics Adapter) video modes and adds several new modes.

W

Windows CE

Compact 32-bit operating system with multitasking and multithreading that Microsoft developed especially for the OEM market. It can be ported for various processor types and has a high degree of real-time capability. The development environment uses proven, well-established development tools. It is an open and scalable Windows operating system platform for many different devices. Examples of such devices are handheld PCs, digital wireless receivers, intelligent mobile phones, multimedia consoles, etc. In embedded systems, Windows CE is also an excellent choice for automation technology.

X

XGA

An abbreviation for "E**X**tended **G**raphics **A**rray". An expanded standard for graphics controllers and monitors that was introduced by IBM in 1990. This standard supports 640x480 resolution with 65,536 colors or 1024x768 resolution with 256 colors. This standard is generally used in workstation systems.